



SERVICE MANUAL

MODEL : RC278

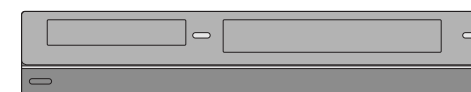
VCR+DVD RECORDER

SERVICE MANUAL

MODEL : RC278

CAUTION

BEFORE SERVICING THE UNIT, READ THE "SAFETY PRECAUTIONS" IN THIS MANUAL.



P/NO : AFN32896724

MAY,2007

LG

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SECTION 1

SUMMARY

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PRODUCT SAFETY SERVICING GUIDELINES FOR VCR+DVD RECORDER PRODUCTS

IMPORTANT SAFETY NOTICE

This manual was prepared for use only by properly trained audio-video service technicians.

When servicing this product, under no circumstances should the original design be modified or altered without permission from LG Corporation. All components should be replaced only with types identical to those in the original circuit and their physical location, wiring and lead dress must conform to original layout upon completion of repairs.

Special components are also used to prevent x-radiation, shock and fire hazard. These components are indicated by the letter "x" included in their component designators and are required to maintain safe performance. No deviations are allowed without prior approval by LG Corporation. Circuit diagrams may occasionally differ from the actual circuit used. This way, implementation of the latest safety and performance improvement changes into the set is not delayed until the new service literature is printed.

CAUTION : Do not attempt to modify this product in any way. Never perform customized installations without manufacturer's approval. Unauthorized modifications will not only void the warranty, but may lead to property damage or user injury.

Service work should be performed only after you are thoroughly familiar with these safety checks and servicing guidelines.

GRAPHIC SYMBOLS



The exclamation point within an equilateral triangle is intended to alert the service personnel to important safety information in the service literature.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the service personnel to the presence of noninsulated "dangerous voltage" that may be of sufficient magnitude to constitute a risk of electric shock.



The pictorial representation of a fuse and its rating within an equilateral triangle is intended to convey to the service personnel the following fuse replacement caution notice:

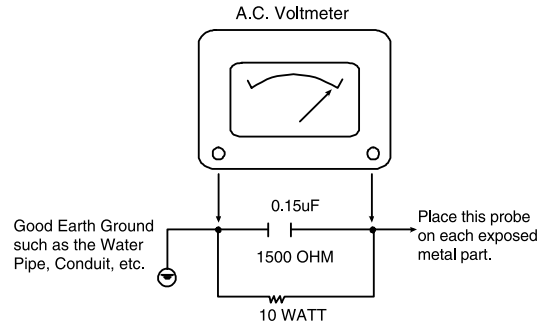
CAUTION : FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ALL FUSES WITH THE SAME TYPE AND RATING AS MARKED NEAR EACH FUSE.

SERVICE INFORMATION

While servicing, use an isolation transformer for protection from AC line shock. After the original service problem has been corrected, make a check of the following:

FIRE AND SHOCK HAZARD

1. Be sure that all components are positioned to avoid a possibility of adjacent component shorts. This is especially important on items transported to and from the repair shop.
2. Verify that all protective devices such as insulators, barriers, covers, shields, strain reliefs, power supply cords, and other hardware have been reinstalled per the original design. Be sure that the safety purpose of the polarized line plug has not been defeated.
3. Soldering must be inspected to discover possible cold solder joints, solder splashes, or sharp solder points. Be certain to remove all loose foreign particles.
4. Check for physical evidence of damage or deterioration to parts and components, for frayed leads or damaged insulation (including the AC cord), and replace if necessary.
5. No lead or component should touch a high current device or a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces must be avoided.
6. After reassembly of the set, always perform an AC leakage test on all exposed metallic parts of the cabinet (the channel selector knobs, antenna terminals, handle and screws) to be sure that set is safe to operate without danger of electrical shock. **DO NOT USE A LINE ISOLATION TRANSFORMER DURING THIS TEST.** Use an AC voltmeter having 5000 ohms per volt or more sensitivity in the following manner: Connect a 1500 ohm, 10 watt resistor, paralleled by a .15 mfd 150V AC type capacitor between a known good earth ground water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of 1500 ohm resistor and .15 mfd capacitor. Reverse the AC plug by using a non-polarized adaptor and repeat AC voltage measurements for each exposed metallic part. Voltage measured must not exceed 0.75 volts RMS. This corresponds to 0.5 milliamp AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.



TIPS ON PROPER INSTALLATION

1. Never install any receiver in a closed-in recess, cubbyhole, or closely fitting shelf space over, or close to, a heat duct, or in the path of heated air flow.
2. Avoid conditions of high humidity such as: outdoor patio installations where dew is a factor, near steam radiators where steam leakage is a factor, etc.
3. Avoid placement where draperies may obstruct venting. The customer should also avoid the use of decorative scarves or other coverings that might obstruct ventilation.
4. Wall- and shelf-mounted installations using a commercial mounting kit must follow the factory-approved mounting instructions. A product mounted to a shelf or platform must retain its original feet (or the equivalent thickness in spacers) to provide adequate air flow across the bottom. Bolts or screws used for fasteners must not touch any parts or wiring. Perform leakage tests on customized installations.
5. Caution customers against mounting a product on a sloping shelf or in a tilted position, unless the receiver is properly secured.
6. A product on a roll-about cart should be stable in its mounting to the cart. Caution the customer on the hazards of trying to roll a cart with small casters across thresholds or deep pile carpets.
7. Caution customers against using extension cords. Explain that a forest of extensions, sprouting from a single outlet, can lead to disastrous consequences to home and family.

SERVICING PRECAUTIONS

CAUTION: Before servicing the VCR+DVD RECORDER covered by this service data and its supplements and addends, read and follow the *SAFETY PRECAUTIONS*. *NOTE:* if unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions in this publications, always follow the safety precautions.

Remember Safety First :

General Servicing Precautions

1. Always unplug the VCR+DVD RECORDER AC power cord from the AC power source before:
 - (1) Removing or reinstalling any component, circuit board, module, or any other assembly.
 - (2) Disconnecting or reconnecting any internal electrical plug or other electrical connection.
 - (3) Connecting a test substitute in parallel with an electrolytic capacitor.
Caution : A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Do not spray chemicals on or near this VCR+DVD RECORDER or any of its assemblies.
3. Unless specified otherwise in this service data, clean electrical contacts by applying an appropriate contact cleaning solution to the contacts with a pipe cleaner, cotton-tipped swab, or comparable soft applicator.
Unless specified otherwise in this service data, lubrication of contacts is not required.
4. Do not defeat any plug/socket B+ voltage interlocks with which instruments covered by this service manual might be equipped.
5. Do not apply AC power to this VCR+DVD RECORDER and / or any of its electrical assemblies unless all solidstate device heat sinks are correctly installed.
6. Always connect the test instrument ground lead to an appropriate ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.

Insulation Checking Procedure

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

Note 1 : Accessible Conductive Parts include Metal panels, Input terminals, Earphone jacks, etc.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field effect transistors and semiconductor chip components.

The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

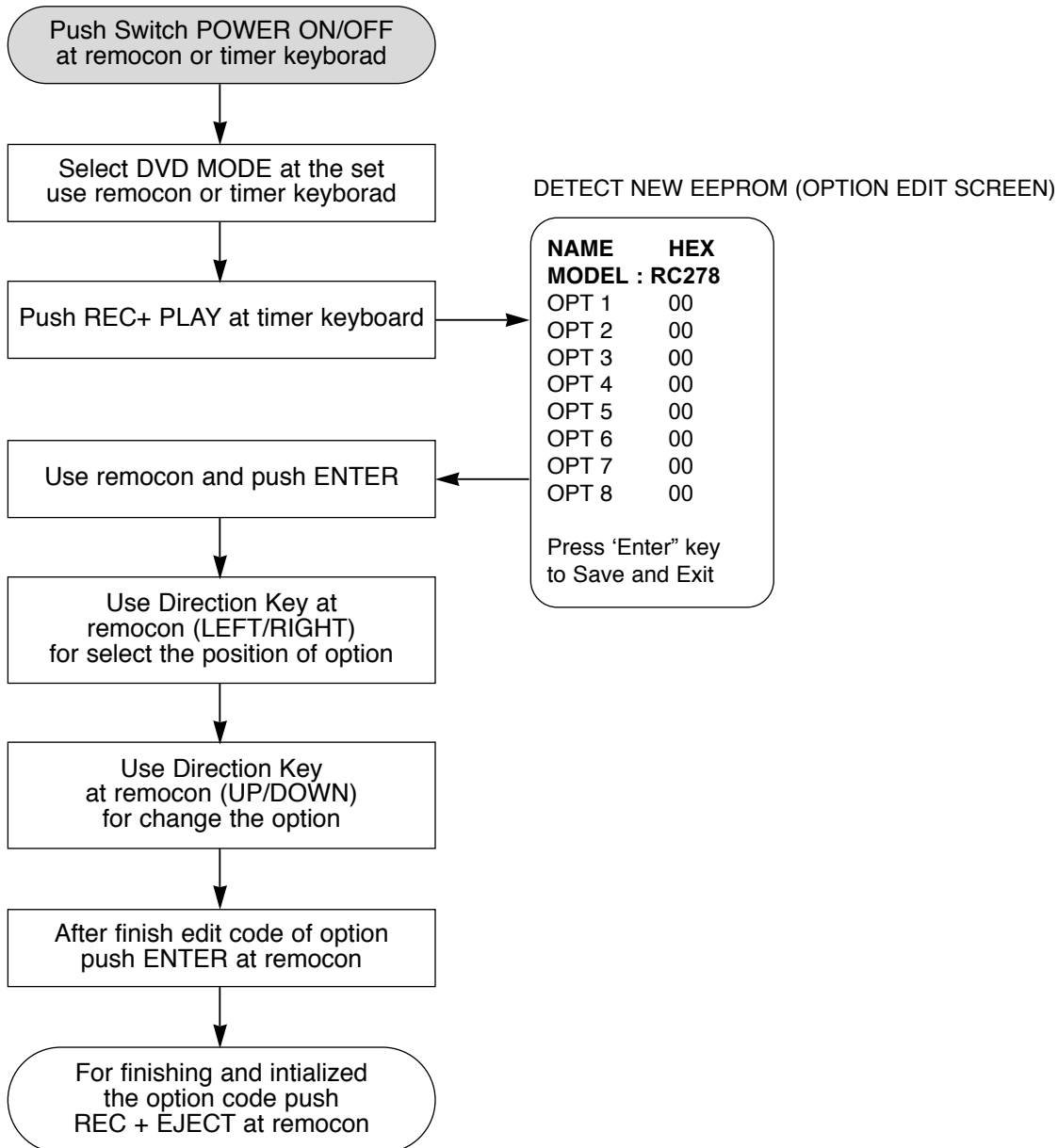
1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential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

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

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

THE STEPS FOR CHANGE THE OPTION CODE

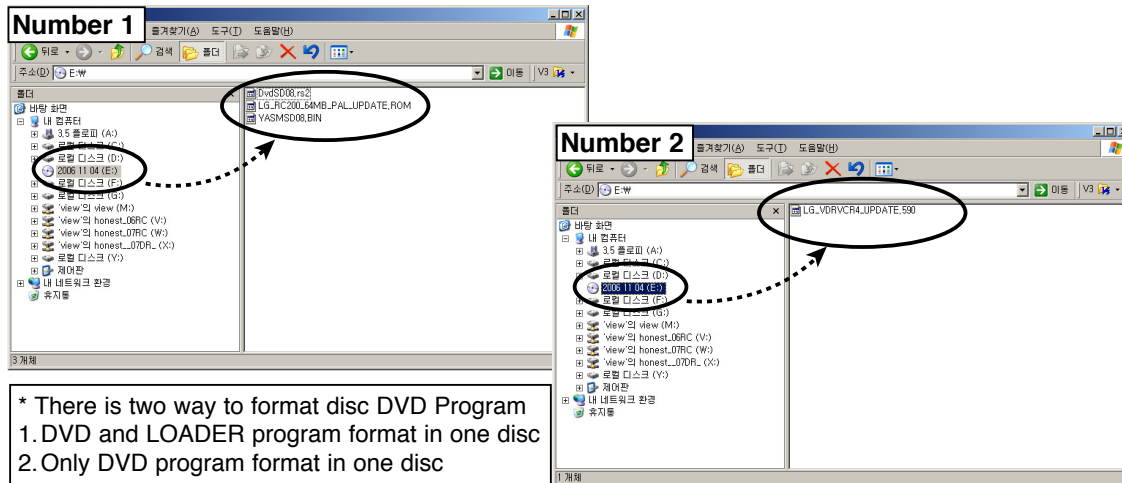
* **Note** : This procedure must be done when IC1300(On digital Board) or Digital Boardassy



UP-DATING PROGRAM

BURNING DISC

- For up-dating the DVD program using the disc, it must burning the disc which include the DVD software.
- For recorder combi set which using the disc downloader program are DVD Program and Loader Program.
- In 2nd generation for recorder combi can download the DVD program and Loader program one by one, or all together.



- If you format like number 1 you'll see capture like (figure 1)
- And you have three choice:
 1. Main. It's mean if you chose this it'll up-dating only DVD program.
 2. Loader. It's mean if you chose this it'll up-dating only Loader program.
 3. ALL. It's mean if you chose this it'll up-dating DVD and Loader program.



[FIGURE 1]

- If you format like number 2 you'll not see capture like figure 1 that give you choices, you have no choice only update DVD program

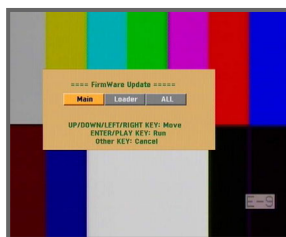
DVD UPGRADE INSTRUCTION

FORMAT NO 1

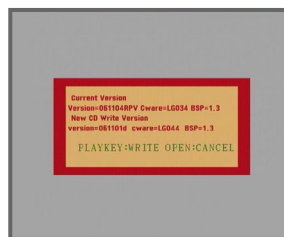
1. Press POWER KEY to turn on.
2. After booting, insert the upgrade disc, and you will see message like [FIGURE 1]
3. Press "PLAY" key (front or remote) 3 times and you will see as [FIGURE 2] with remote Chose one of them then Press enter
4. For update both of them [MAIN & LOADER] we chose "ALL" and first you will see [FIGURE 3] DVD update
→ Check the "Current Version" and "New CD Write Version" and press "PLAY" key.
5. The DVD update will be on progress. And when finish update MAIN Version it's automatically continue to Update Loader Version and You will see [FIGURE 4]
- Check the "Current Version" and "New CD Write Version " and Press "PLAY" key once more
6. The LOADER update will be on progress. And tray will open.
7. Remove the disc and wait until finish
8. The tray will be close and open automatically after completing "UNDER UPDATE" 100%
9. Turn off the unit
10. Turn on again the unit is operation with new software



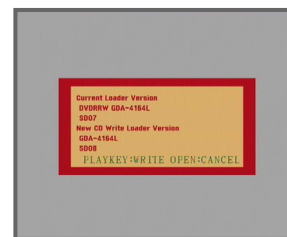
[FIGURE 1]



[FIGURE 2]



[FIGURE 3]



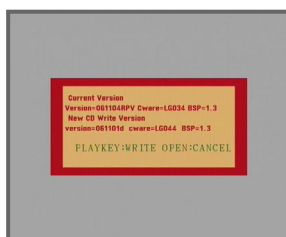
[FIGURE 4]

FORMAT NO 2

1. Press POWER KEY to turn on.
2. After booting, insert the upgrade disc, and you will see message like [FIGURE 1]
3. Press "PLAY" key (front or remote) 3 times
4. The DVD update will be on progress.
→ Check the "Current Version" and "New CD Write Version" and Press "PALY" key once more
5. The tray will be open automatically after completing "UNDER UPDATE" 100%
6. Remove the disc and Turn off the unit
7. Turn on again the unit is operation with new software



[FIGURE 1]



[FIGURE 2]

SPECIFICATIONS

• GENERAL

Power requirements	AC 200-240V, 50/60Hz
Power consumption	24W
Dimensions (approx.)	430 X 78.5 X 260mm (w x h x d)
Net weight (approx.)	4.6 kg
Operating temperature	5°C to 35°C
Operating humidity	5% to 90%
Television system	PAL SECAM colour system
Recording format	PAL

• SYSTEM

Laser	Semiconductor laser, wavelength 650nm
Video head system	Double azimuth 4 heads, helical scanning
Signal system	PAL

• RECORDING

Recording format	DVD VideoRecording, DVD-VIDEO
Recordable discs	DVD-ReWritable, DVD-Recordable, DVD+ReWritable, DVD+Recordable, DVD+Recordable (Double Layer), 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), 11 hours (MLP mode) DVD+R DL (8.5GB) : Approx. 2 hours (XP mode), 3 hours 40 minutes (SP mode), 7 hours 10 minutes (LP mode), 9 hours (EP mode), 11 hours (MLP 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 100dB (AUDIO OUT connector)
Harmonic distortion	Less than 0.008% (AUDIO OUT connector)
Dynamic range	More than 95dB (AUDIO OUT connector)

• INPUTS

ANTENNA IN	Aerial input, 75 ohms
VIDEO IN	1.0Vp-p 75ohms, sync negative, RCA jack x 1 / SCART x 2
AUDIO IN	-6.0dBm more than 47kohms, RCA jack (L, R) x 1 / SCART x 2
DV IN	4 pin (IEEE 1394 standard)
USB IN	4 pin (USB 1.1 standard)

• OUTPUTS

VIDEO OUT	1.0Vp-p 75ohms, sync negative, SCART x 2
S-VIDEO OUT	(Y) 1.0V (p-p), 75Ω, negative sync, Mini DIN 4-pin x 1 (C) 0.3V (p-p) 75Ω
COMPONENT VIDEO OUT	(Y) 1.0V (p-p), 75Ω, negative sync, RCA jack x 1 (Pb)/(Pr) 0.7V (p-p), 75Ω, RCA jack x 2
HDMI video/audio output	19 pin (HDMI standard, Type A)
Audio output (digital audio)	0.5V (p-p), 75Ω, RCA jack x 1
Audio output (optical audio)	3V (p-p), 75Ω, Optical connector x 1
Audio output (analog audio)	2.0Vrms (1KHz, 0dB), 600Ω, RCA jack (L, R) x 1 / SCART

SECTION 2

CABINET & MAIN CHASSIS

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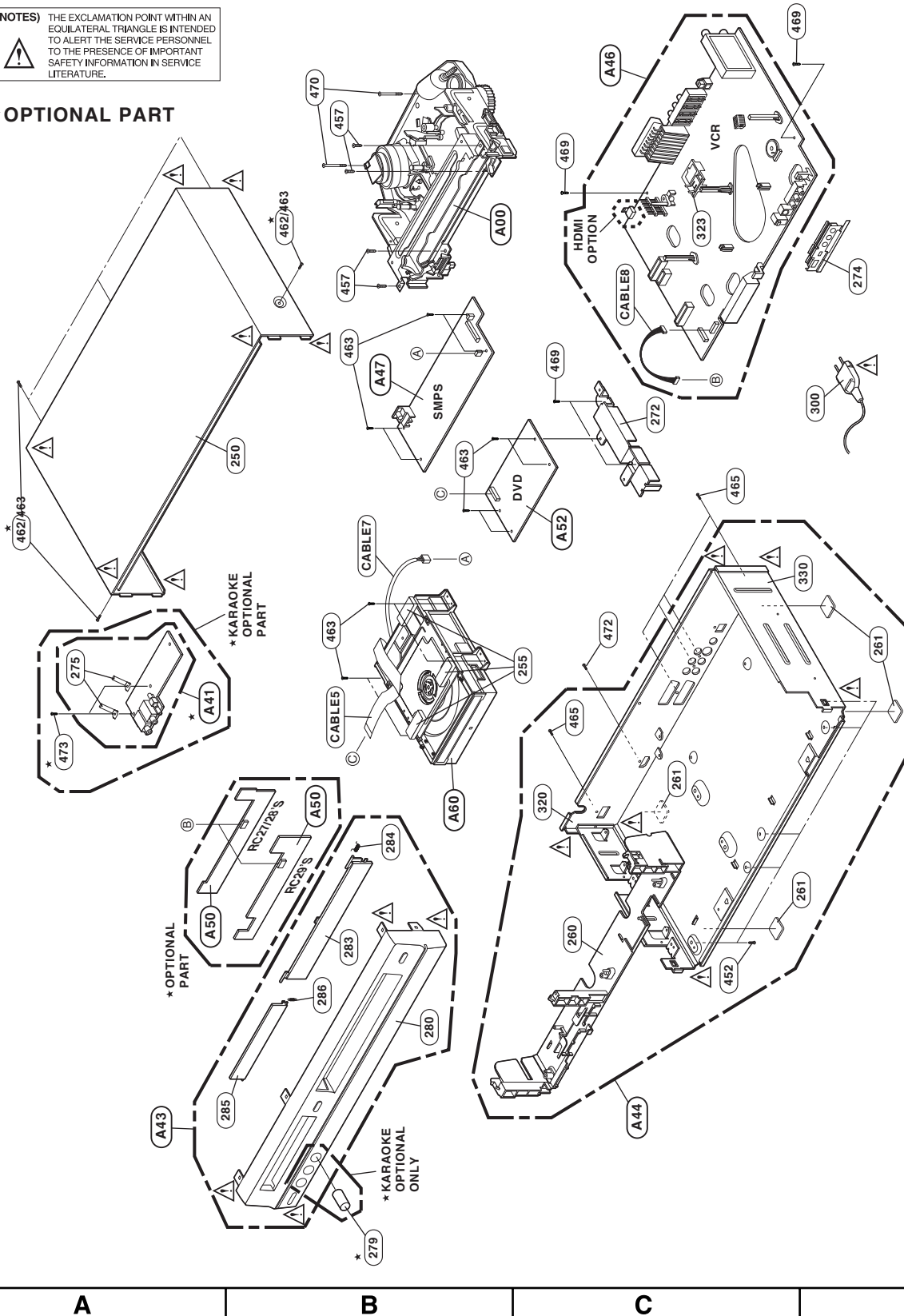
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EXPLODED VIEWS

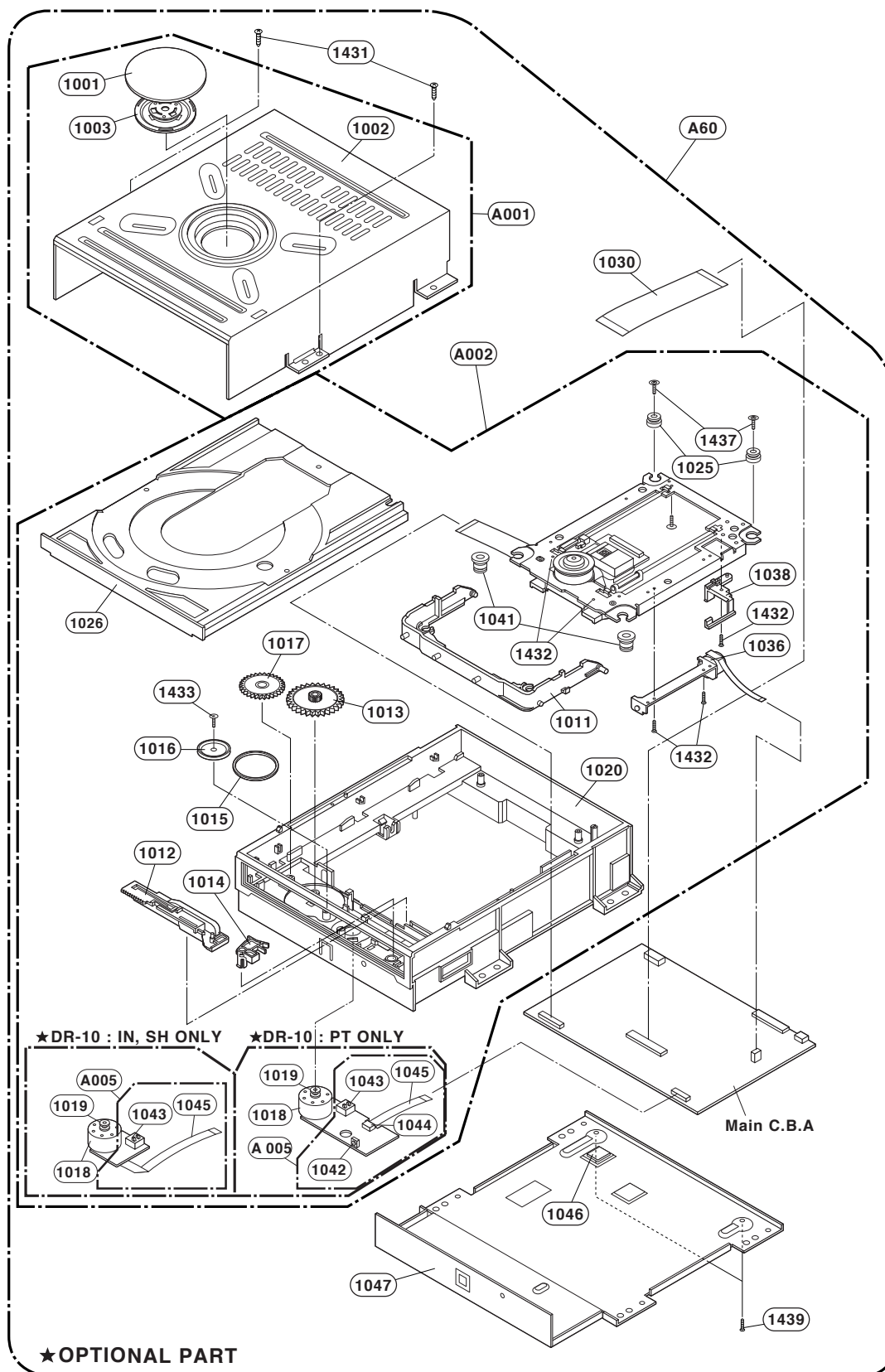
1. CABINET AND MAIN FRAME SECTION

NOTES THE EXCLAMATION POINT WITHIN AN EQUILATERAL TRIANGLE IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF IMPORTANT SAFETY INFORMATION IN SERVICE LITERATURE.

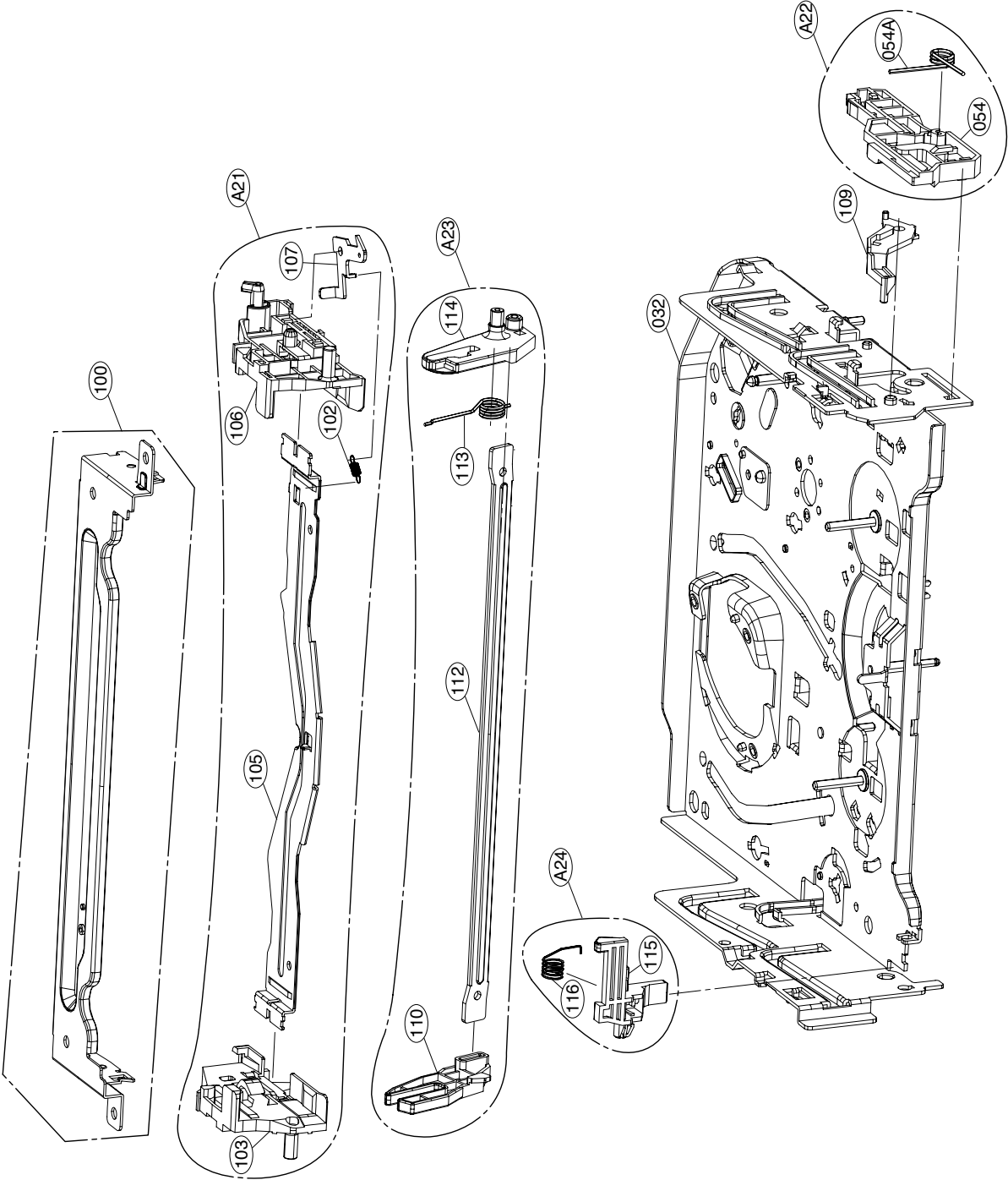
* OPTIONAL PART



2. DECK MECHANISM SECTION (RS-02A(DR-10A))

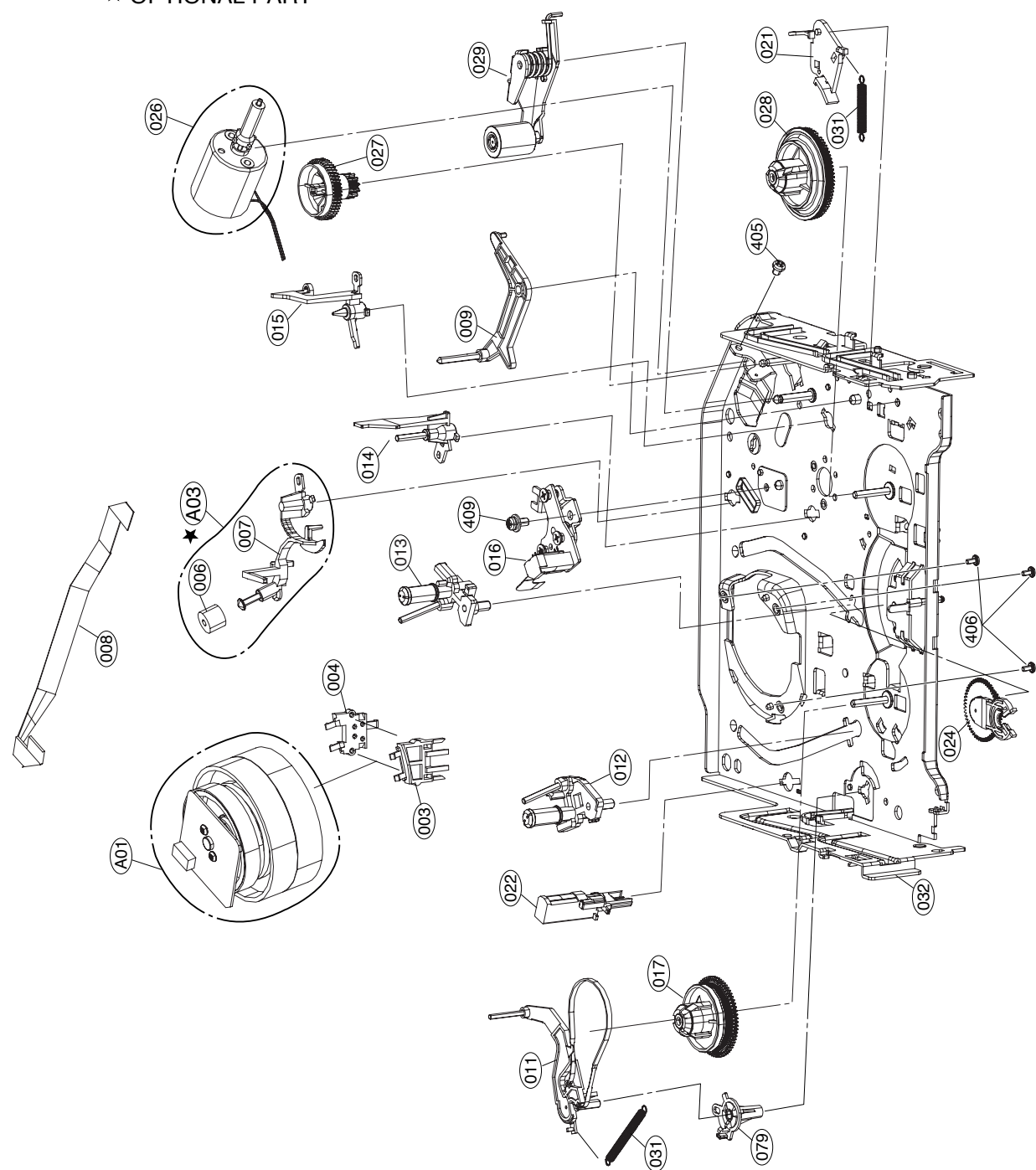


3. DECK MECHANISM SECTION (D37(N))
3-1. Front loading mechanism section

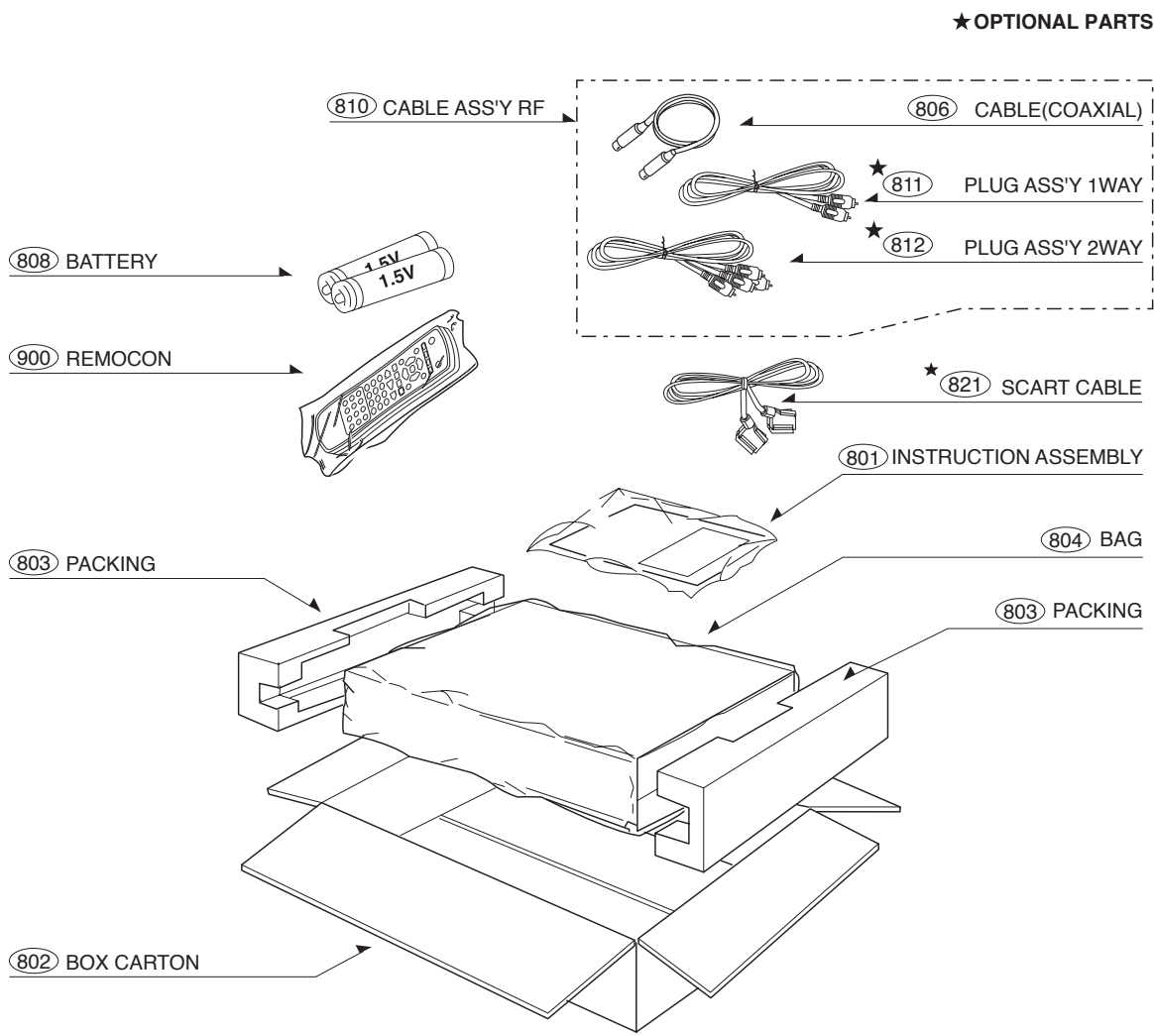


3-2. Moving mechanism section (1)

★ OPTIONAL PART



4. PACKING ACCESSORY SECTION



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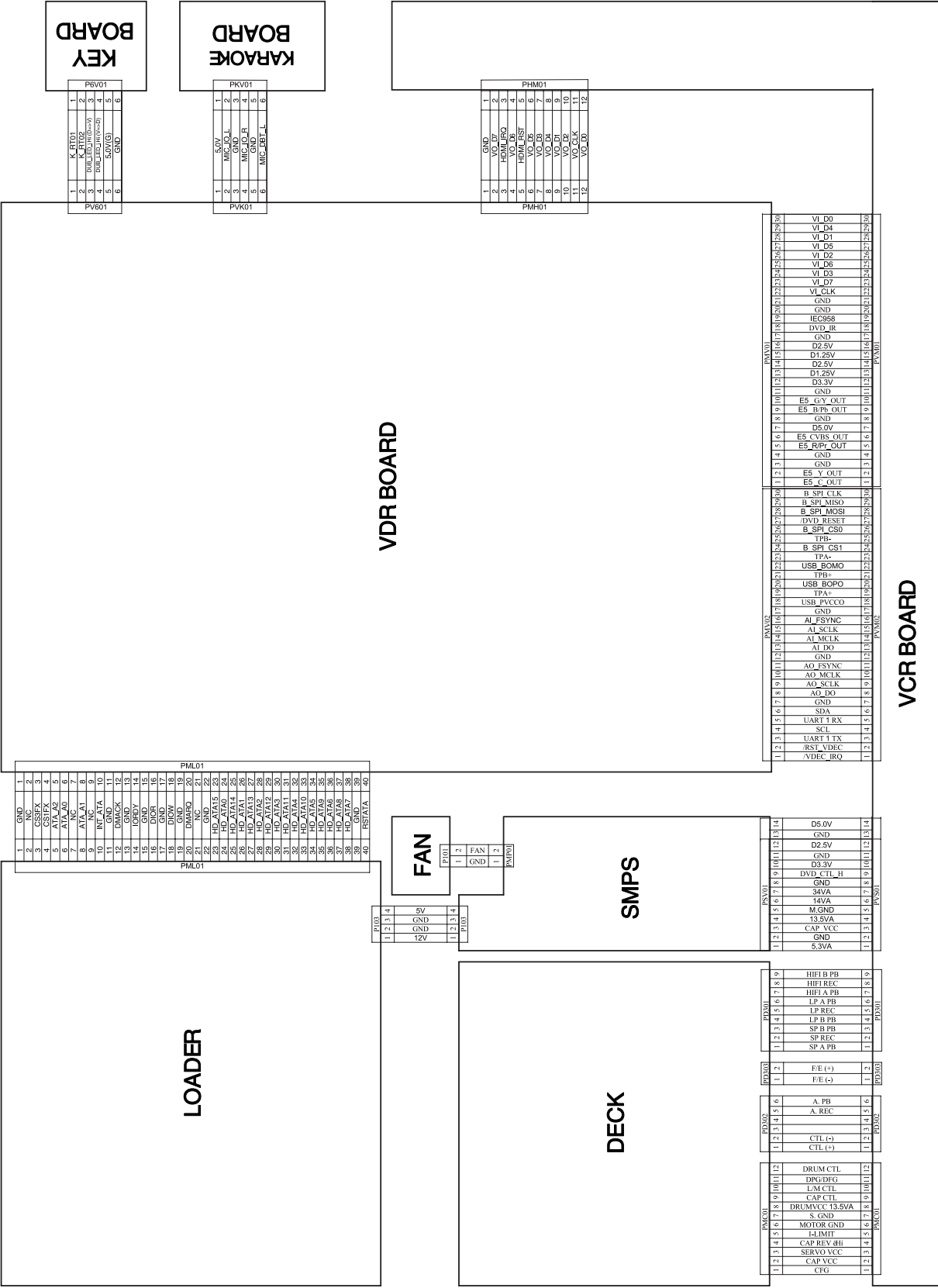
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OVERALL WIRING DIAGRAM



VCR PART

ELECTRICAL ADJUSTMENT PROCEDURES

1. SERVO ADJUSTMENT

1) PG Adjustment

- Test Equipment
- a) OSCILLOSCOPE

b) NTSC MODEL : NTSC SP TEST TAPE

- Adjustment And Specification

MODE	MEASUREMENT POINT	ADJUSTMENT POINT	SPECIFICATION
PLAY	V.Out H/SW(TP)	R/C TRK JIG KEY	$6.5 \pm 0.5H$

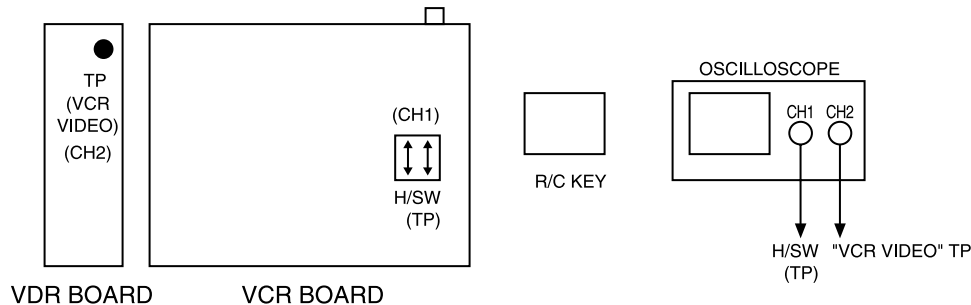
• Adjustment Procedure

- a) Insert the SP Test Tape and play.
- b) Connect the CH1 of the oscilloscope to the H/SW and CH2 to the "VCR VIDEO" TP for the VCR.
- c) Trigger the mixed Combo Video Signal of CH2 to the CH1 H/SW, and then check the distance (time difference), which is from the selected A(B) Head point of the H/SW signal to the starting point of the vertical synchronized signal, to $6.5H \pm 0.5H$ ($416\mu s$, $1H=64\mu s$).

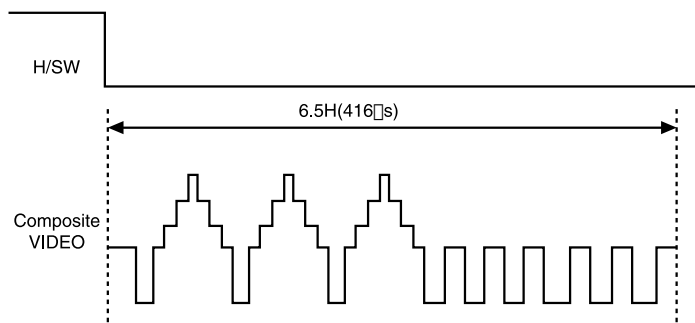
• PG Adjustment Method

- a-1) Playback the SP standard tape
- b-2) Wait for 3seconds with F/P "REC" key and "PLAY" key pressed at the same time. < Digitron[- -] >
- c-3) Repeat the above step(No.b-2), then it finishes the PG adjusting automatically. < Digitron[PG] >
- d-4) Stop the playback, then it goes out of PG adjusting mode after many the PG data.

• CONNECTION

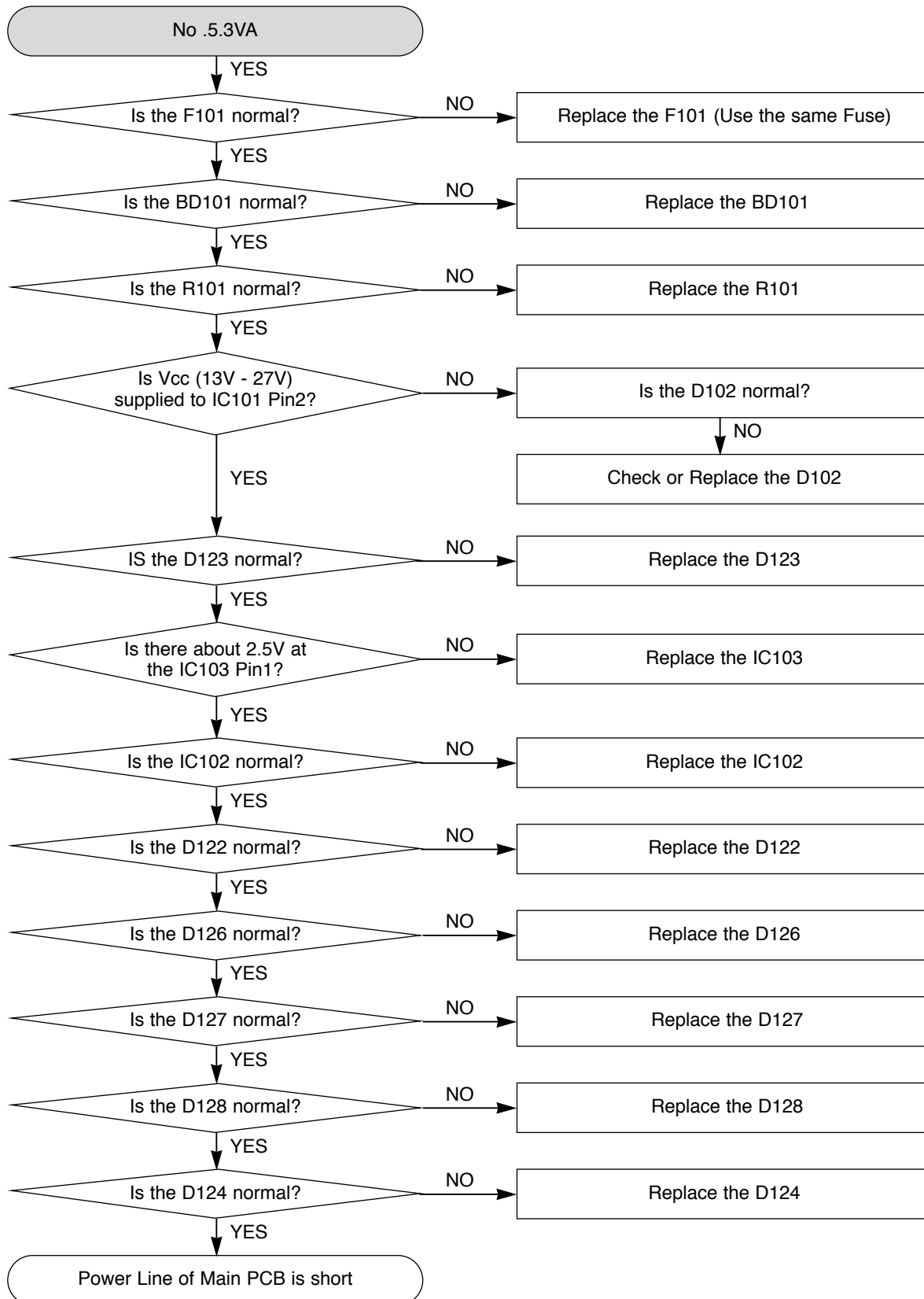


• WAVEFORM



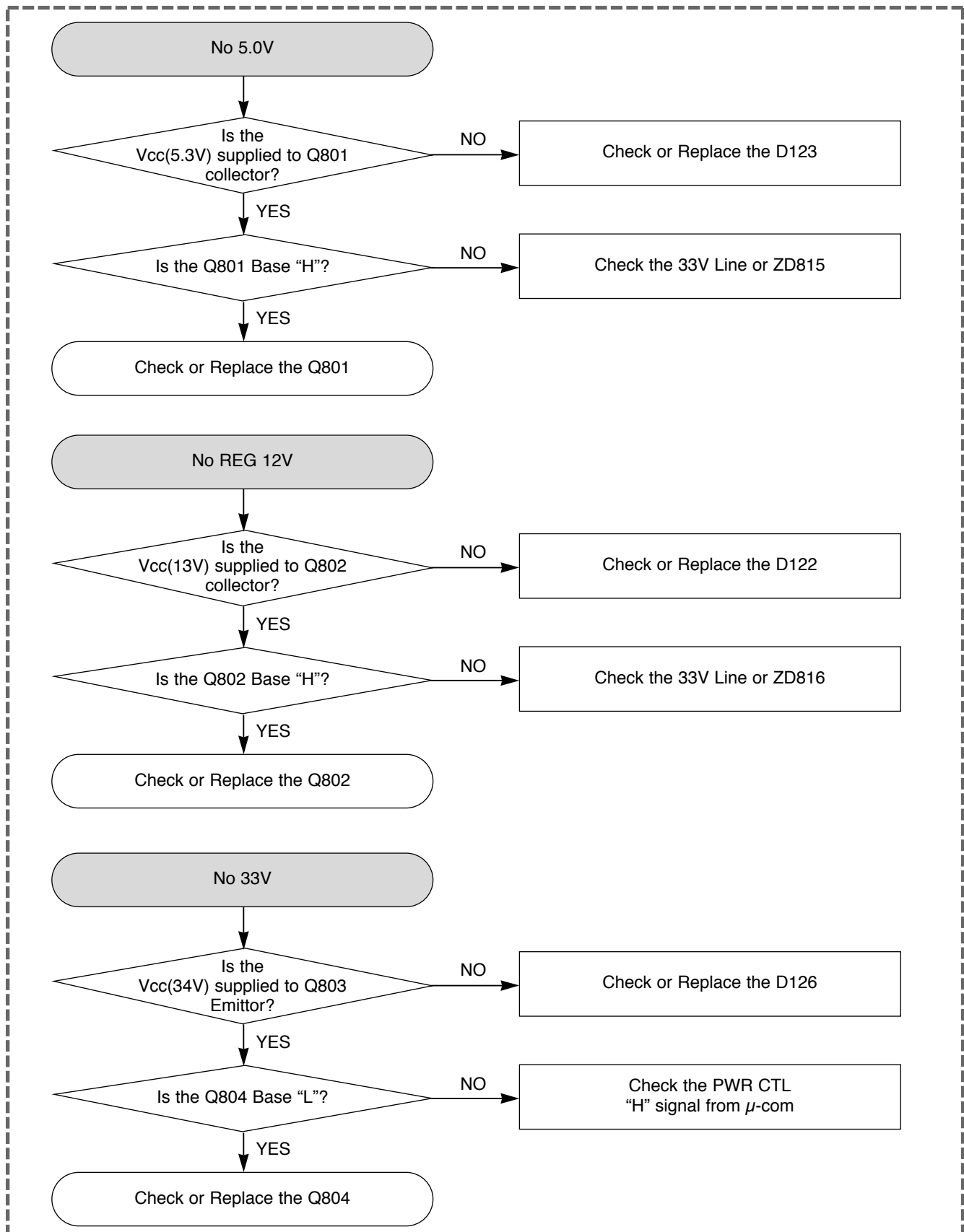
VCR ELECTRICAL TROUBLESHOOTING GUIDE

1. POWER (SMPS) CIRCUIT

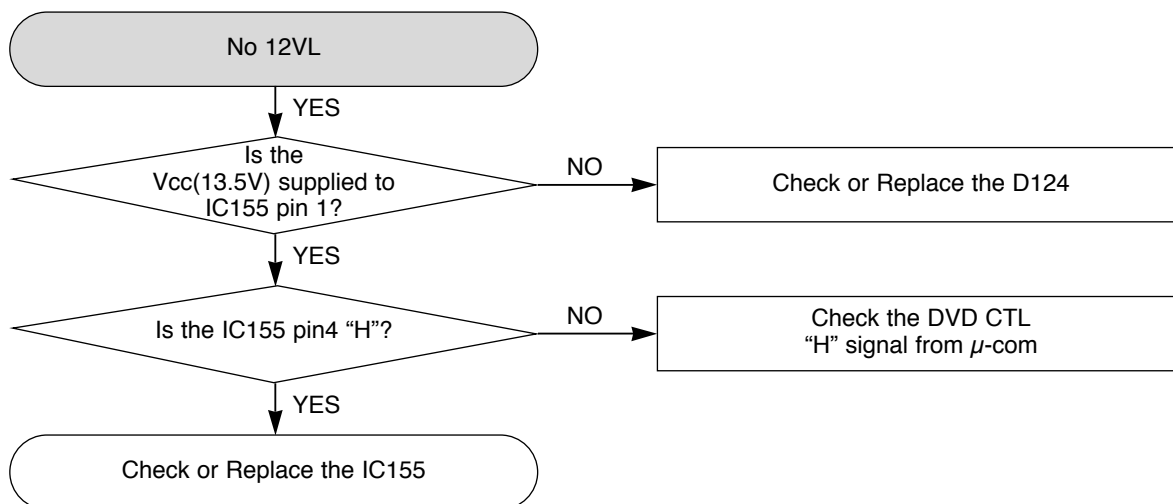
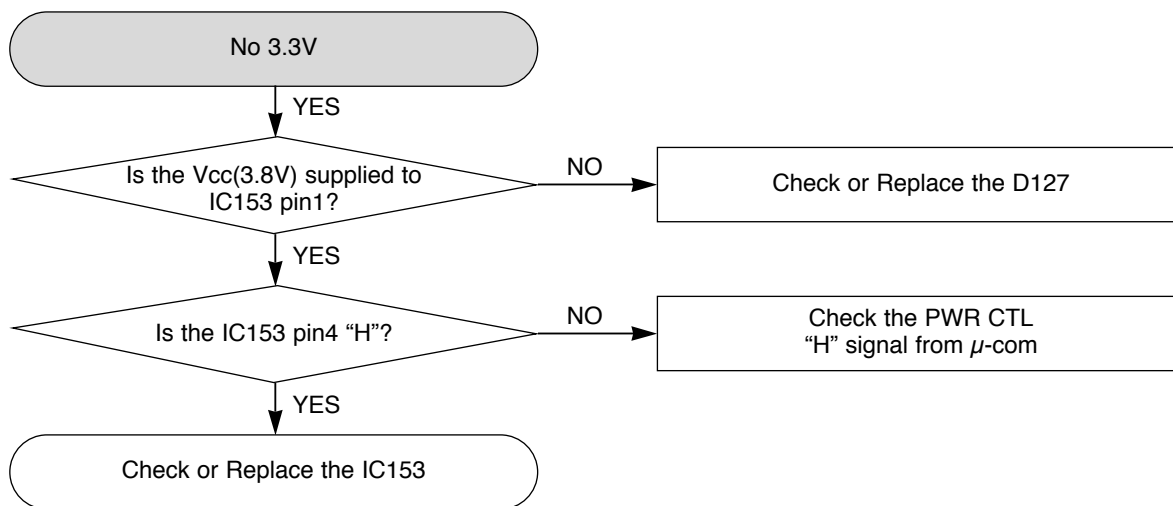
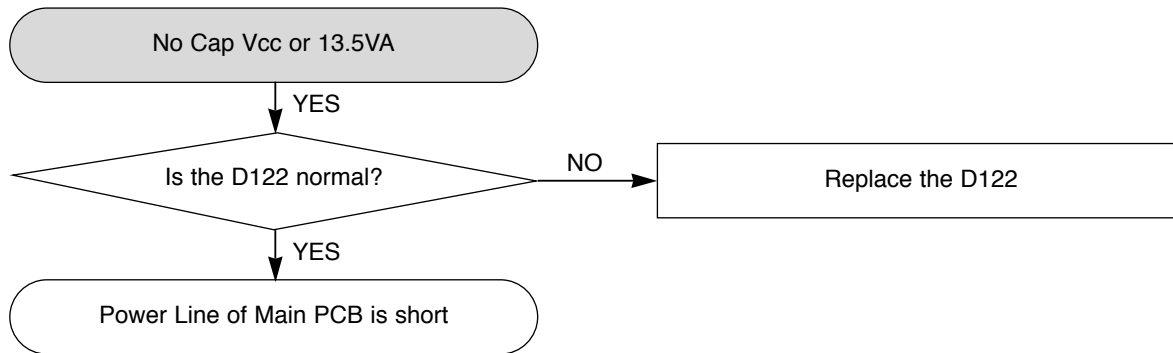


VCR ELECTRICAL TROUBLESHOOTING GUIDE

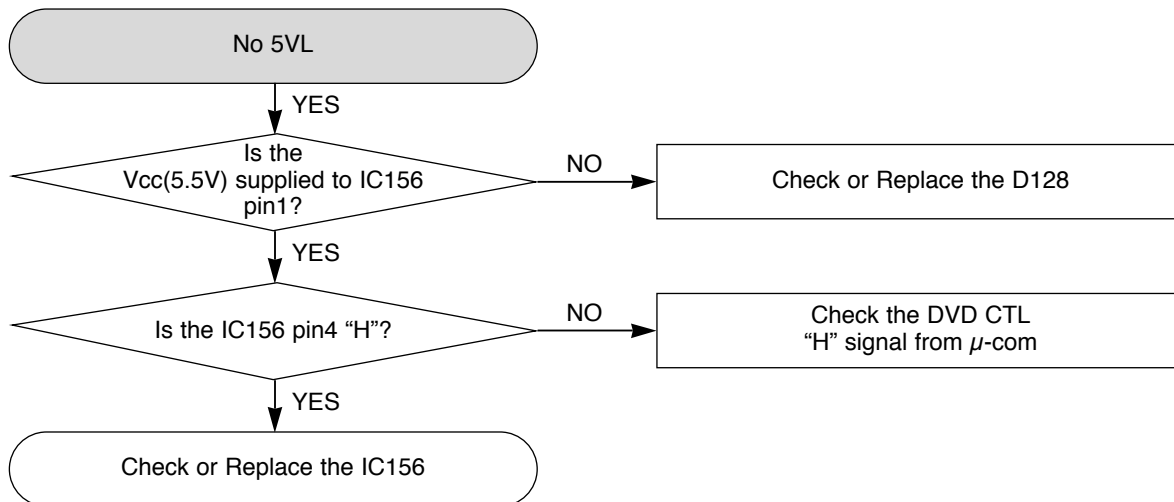
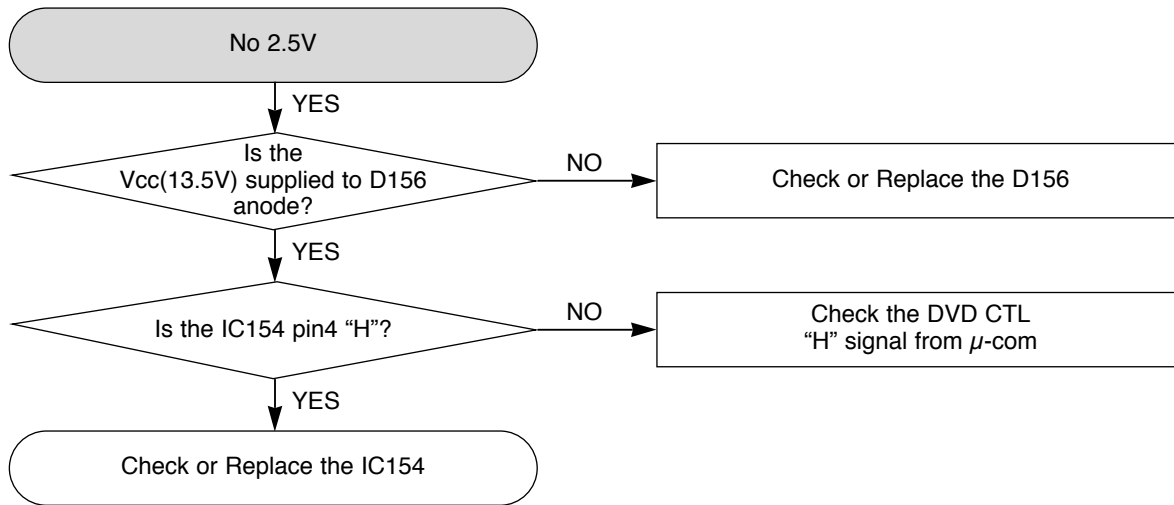
VCR MAIN



VCR ELECTRICAL TROUBLESHOOTING GUIDE



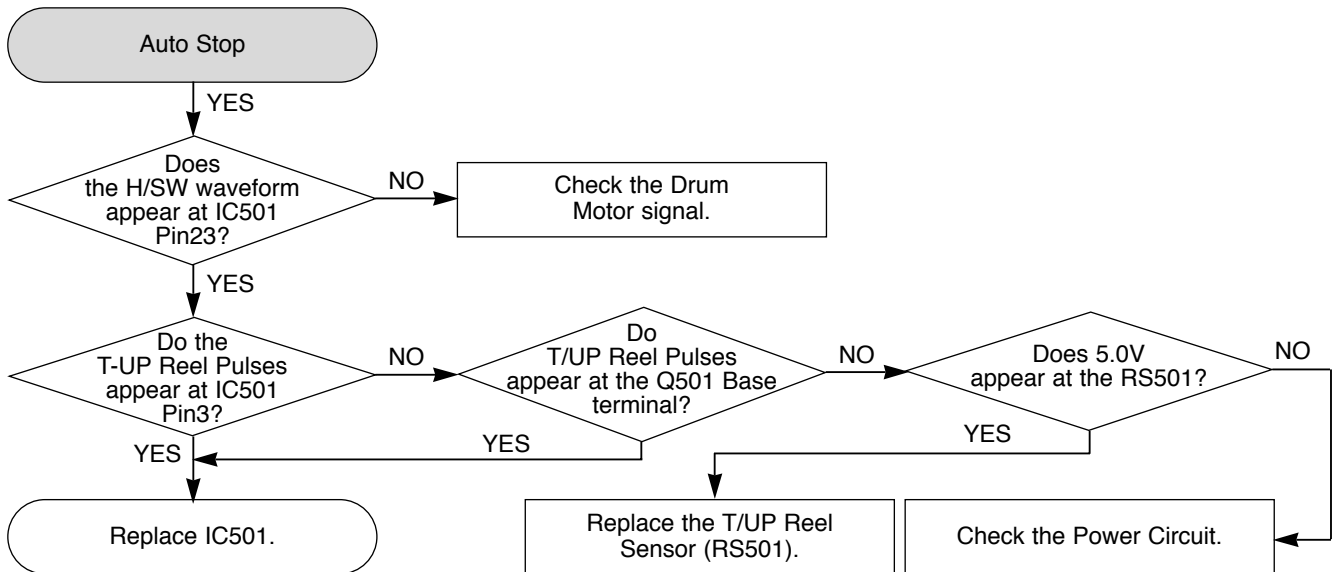
VCR ELECTRICAL TROUBLESHOOTING GUIDE



VCR ELECTRICAL TROUBLESHOOTING GUIDE

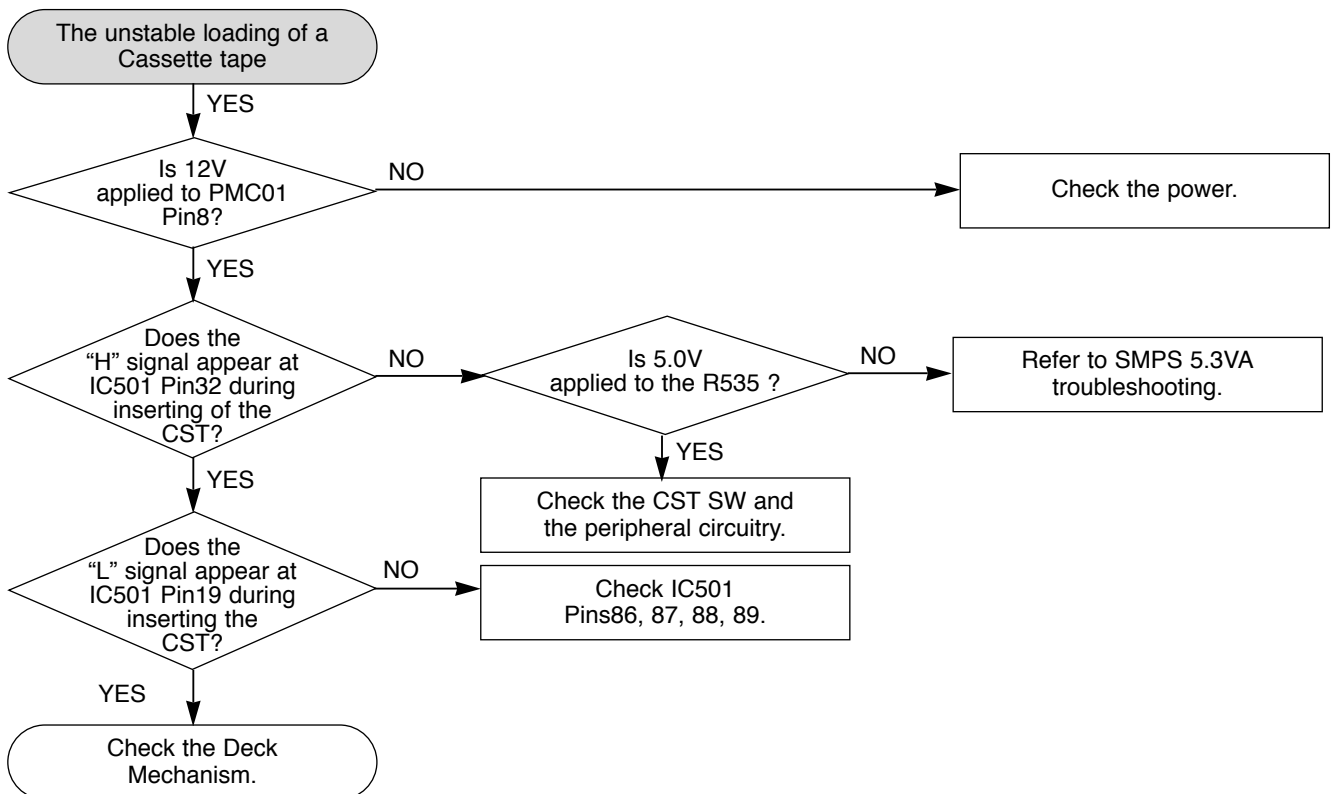
2. SYSTEM/KEY CIRCUIT

2-1. AUTO STOP



Note : Auto stop can occur because Grease or Oil has dried up

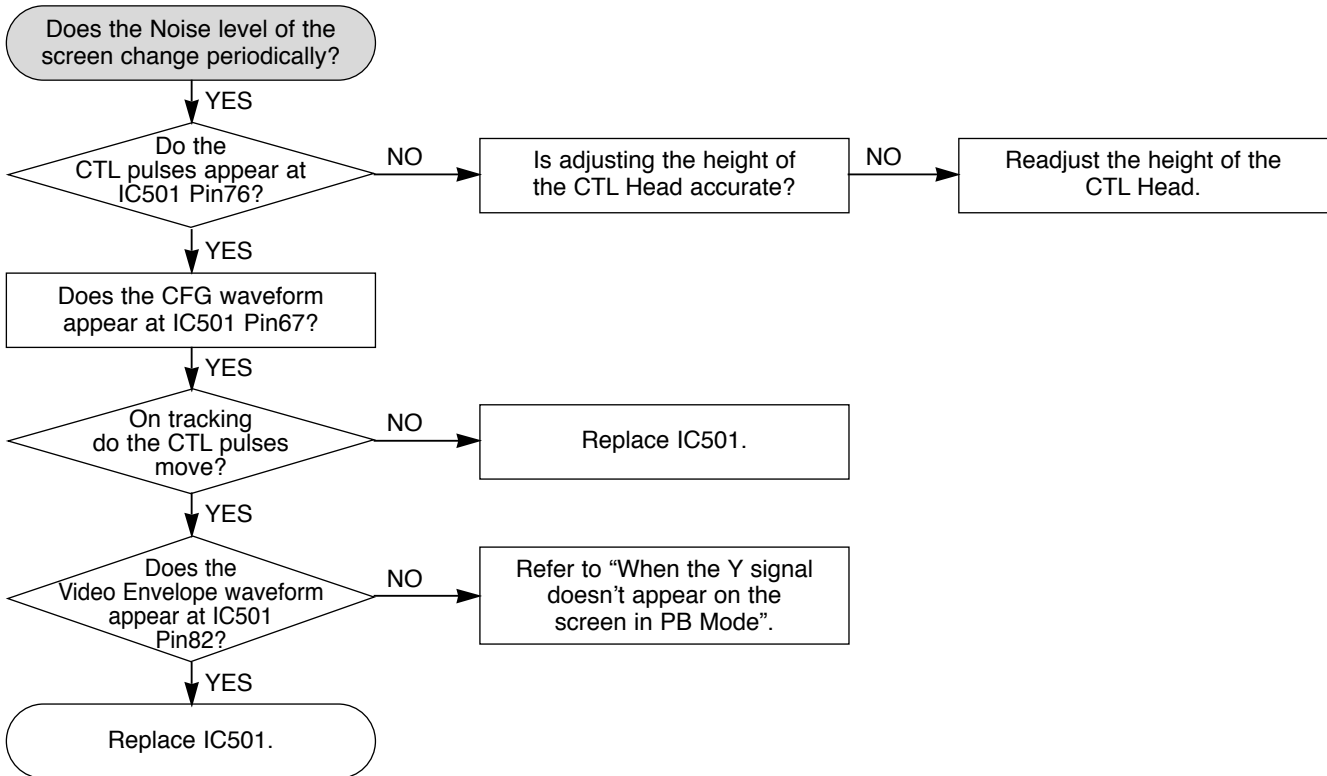
2-2. The unstable loading of a Cassette tape



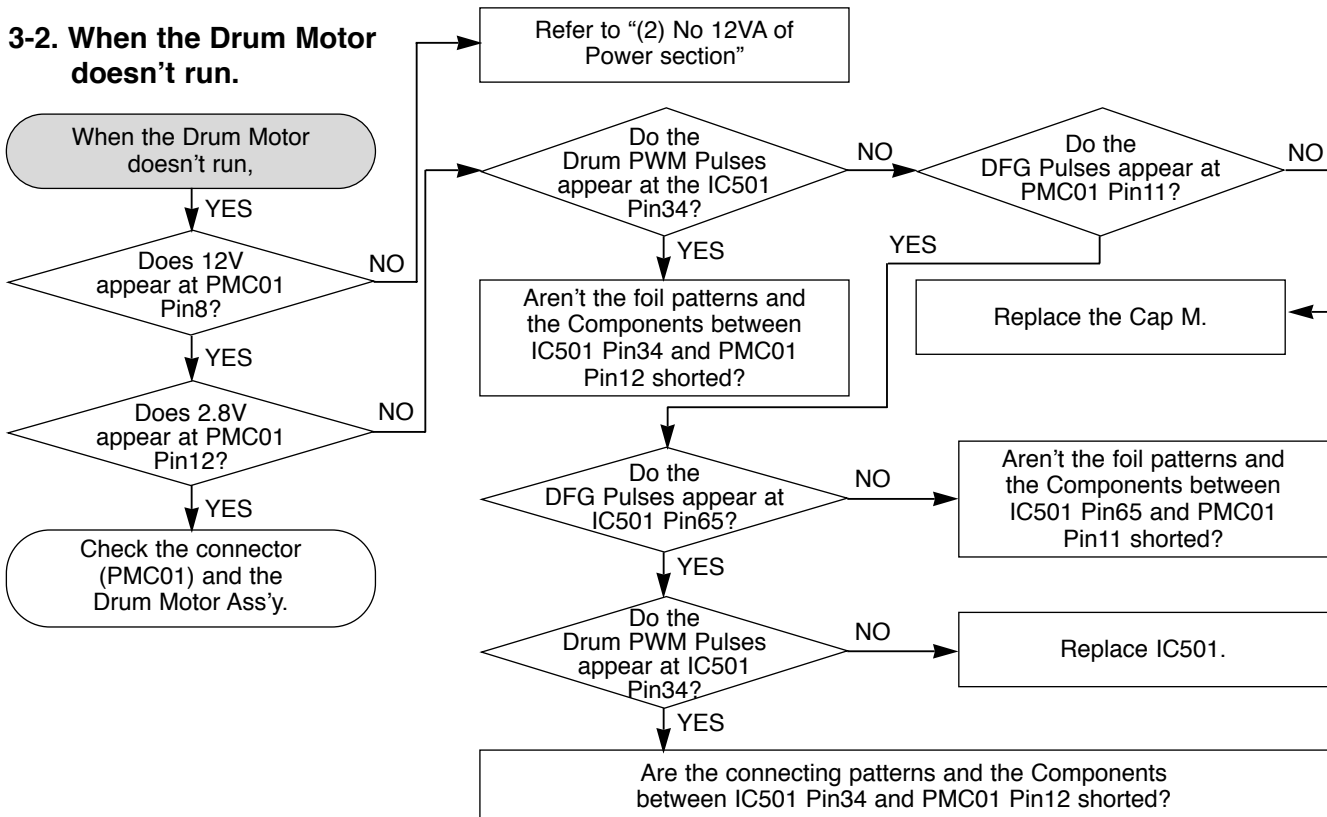
VCR ELECTRICAL TROUBLESHOOTING GUIDE

3. SERVO CIRCUIT

3-1. Unstable Video in PB MODE

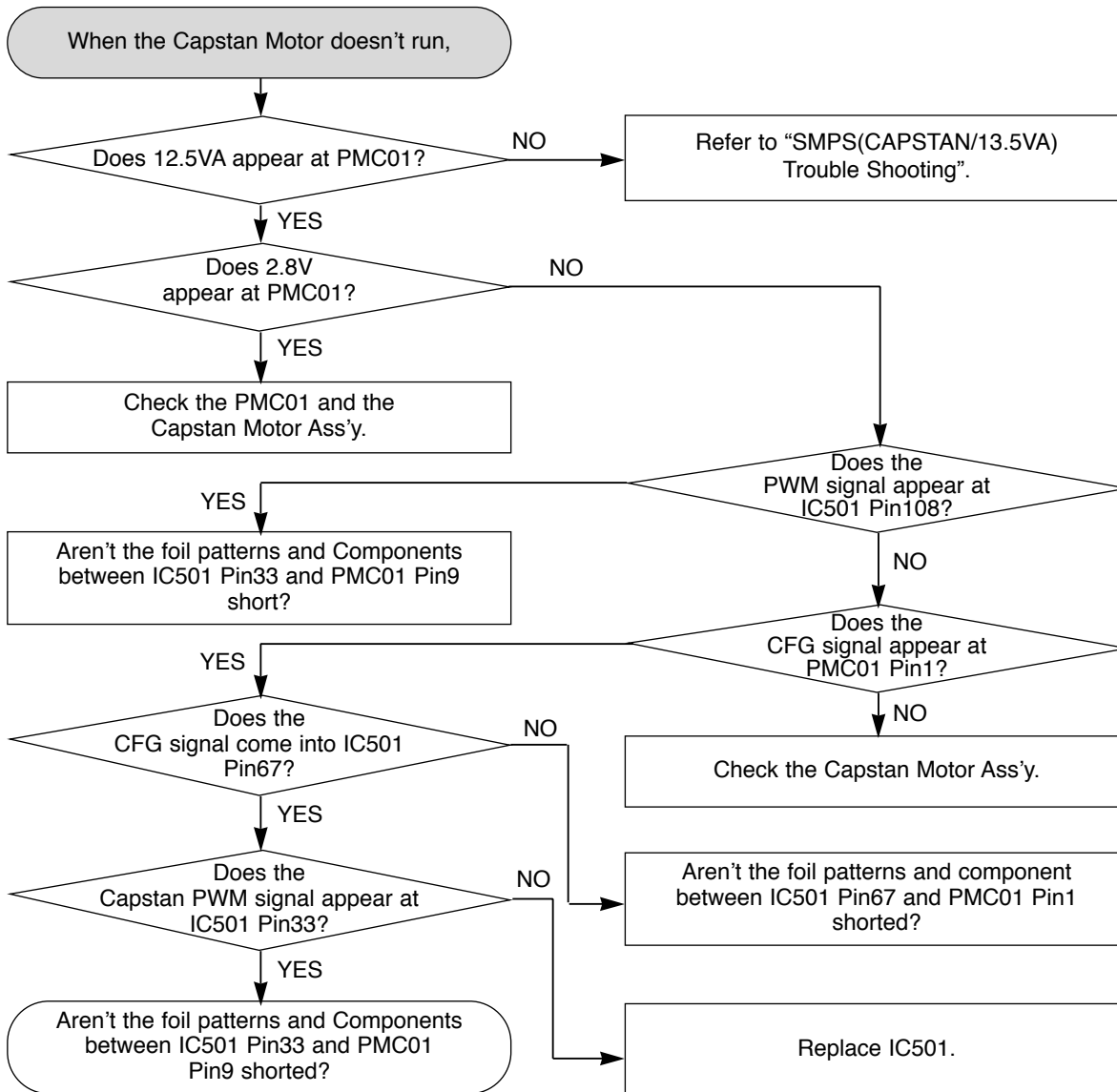


3-2. When the Drum Motor doesn't run.

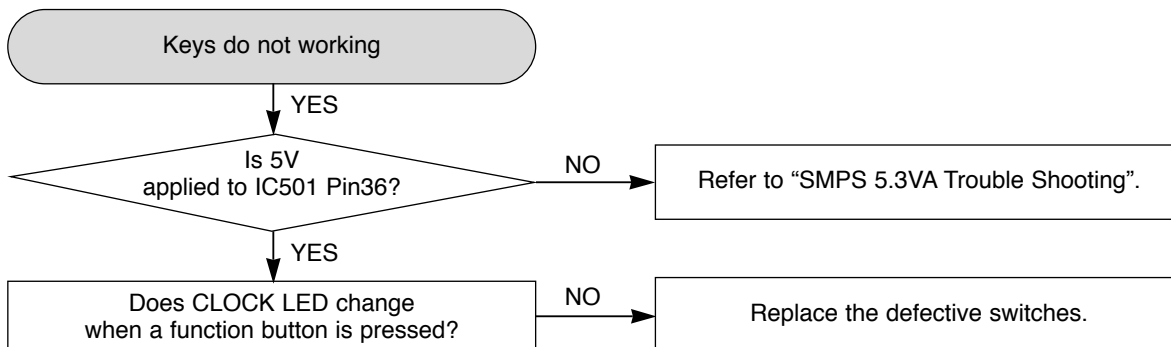


VCR ELECTRICAL TROUBLESHOOTING GUIDE

3-3. When the Capstan Motor doesn't run,



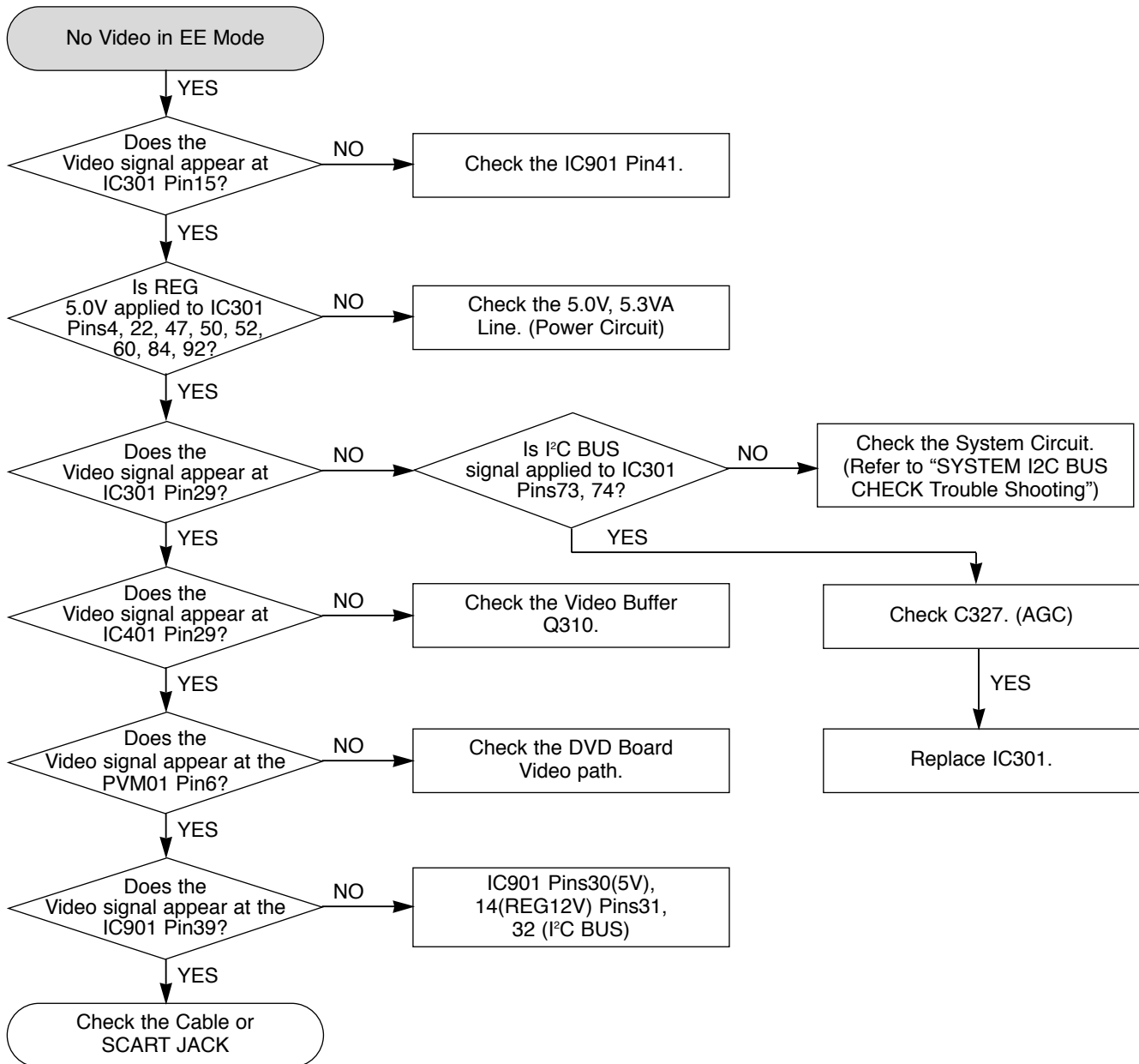
3-4. Keys do not working



VCR ELECTRICAL TROUBLESHOOTING GUIDE

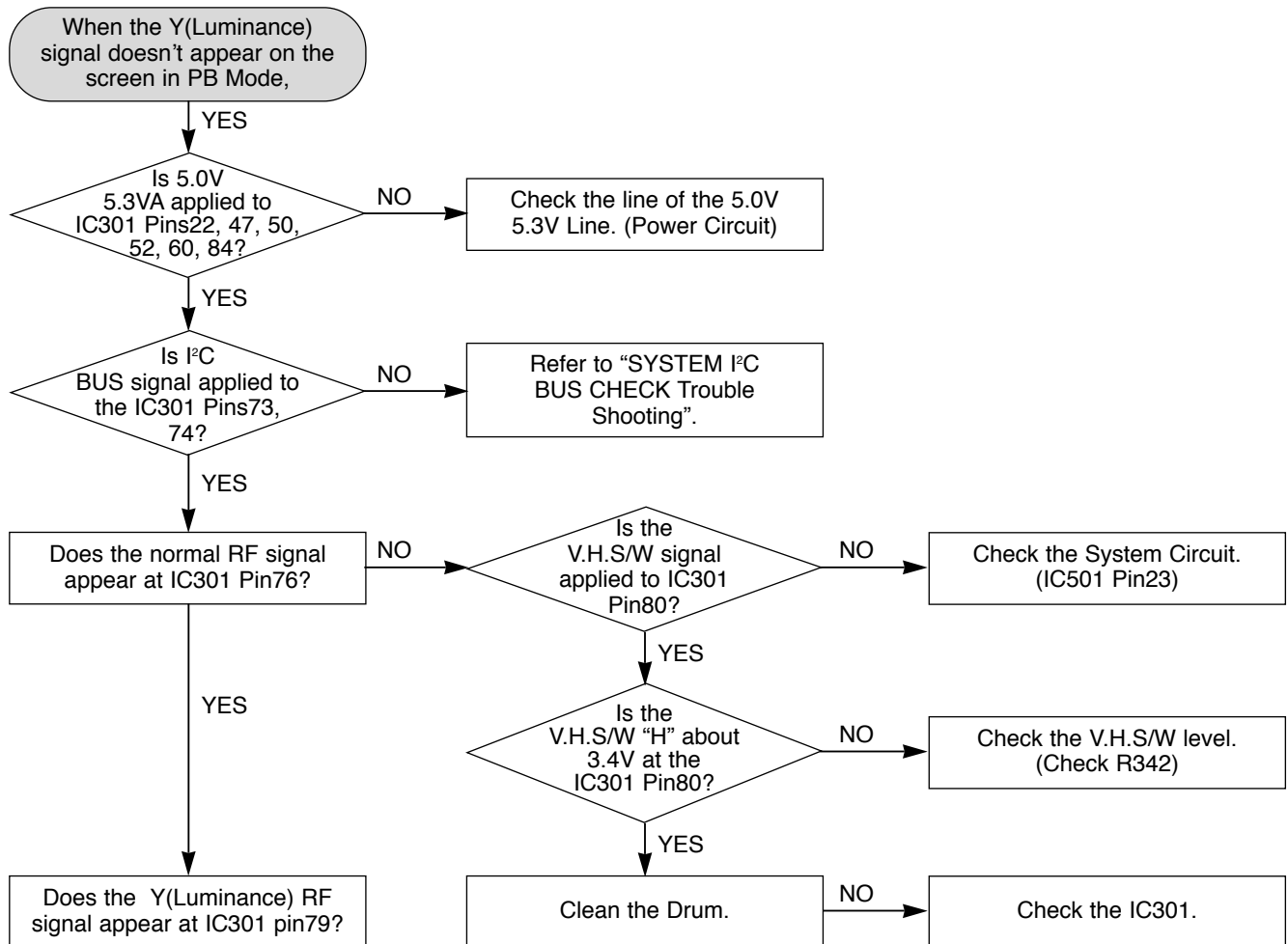
4. Y/C CIRCUIT

4-1. No Video in EE Mode,



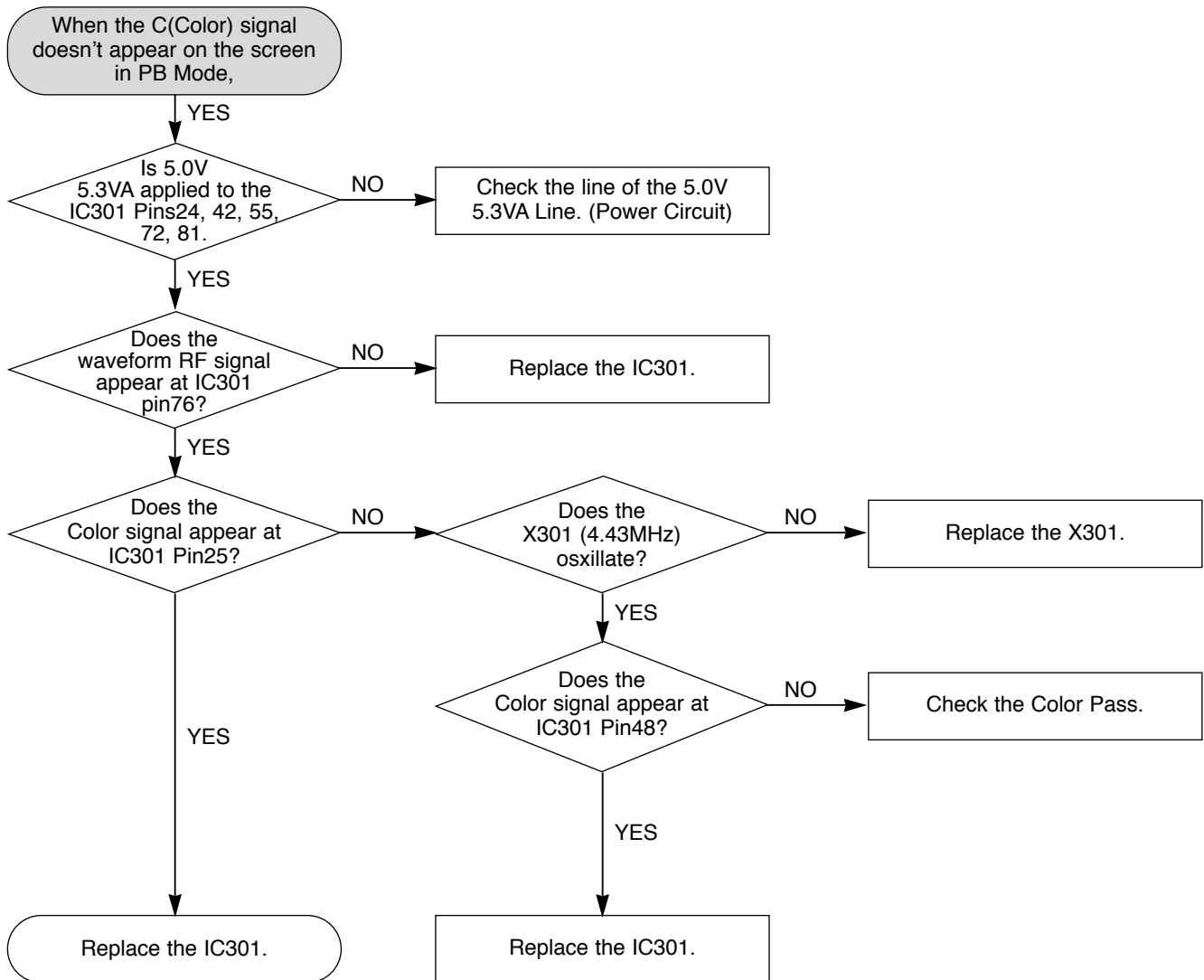
VCR ELECTRICAL TROUBLESHOOTING GUIDE

4-2. When the Y(Luminance) signal doesn't appear on the screen in PB Mode,



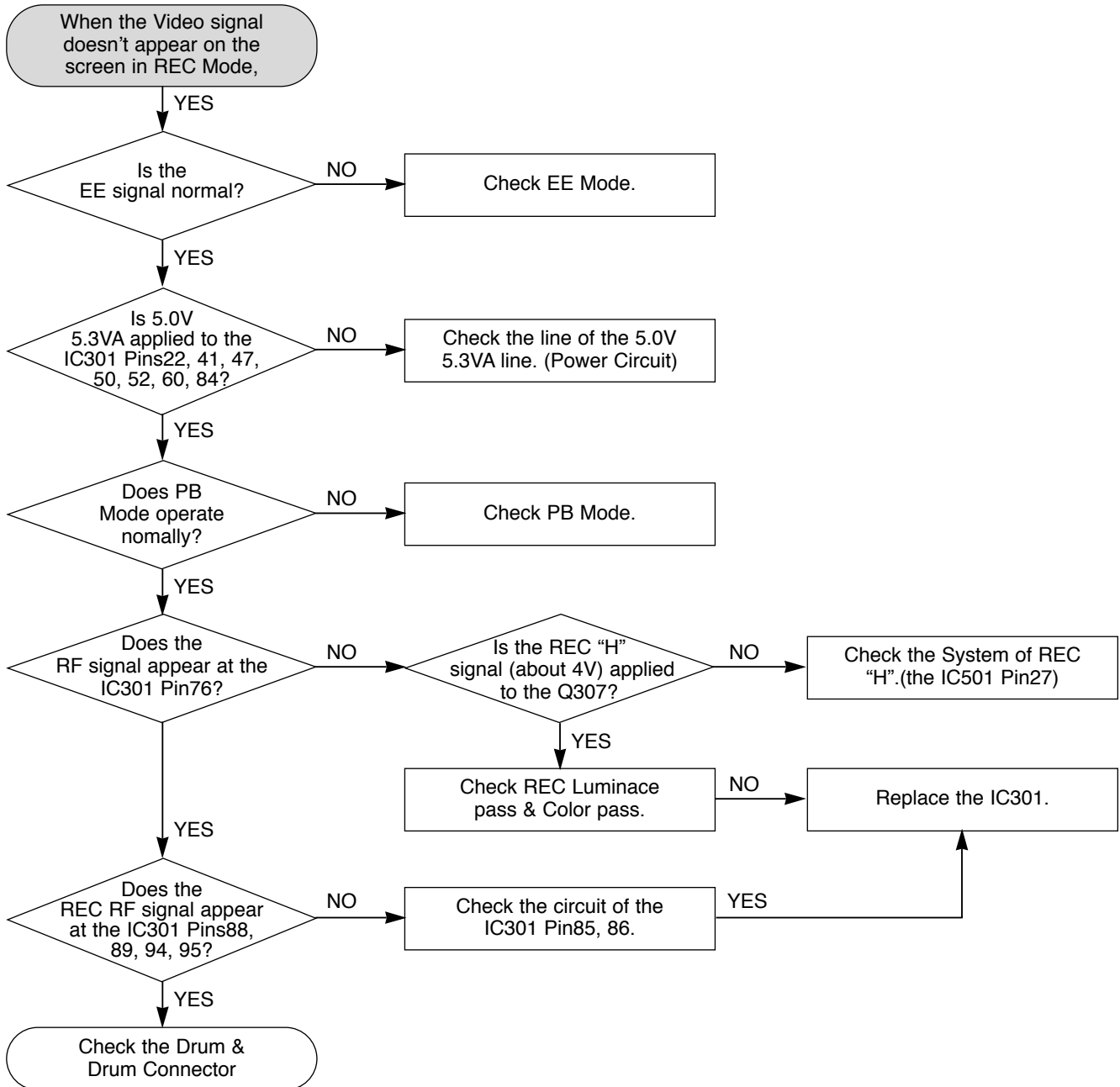
VCR ELECTRICAL TROUBLESHOOTING GUIDE

4-3. When the C(Color) signal doesn't appear on the screen in PB Mode,



VCR ELECTRICAL TROUBLESHOOTING GUIDE

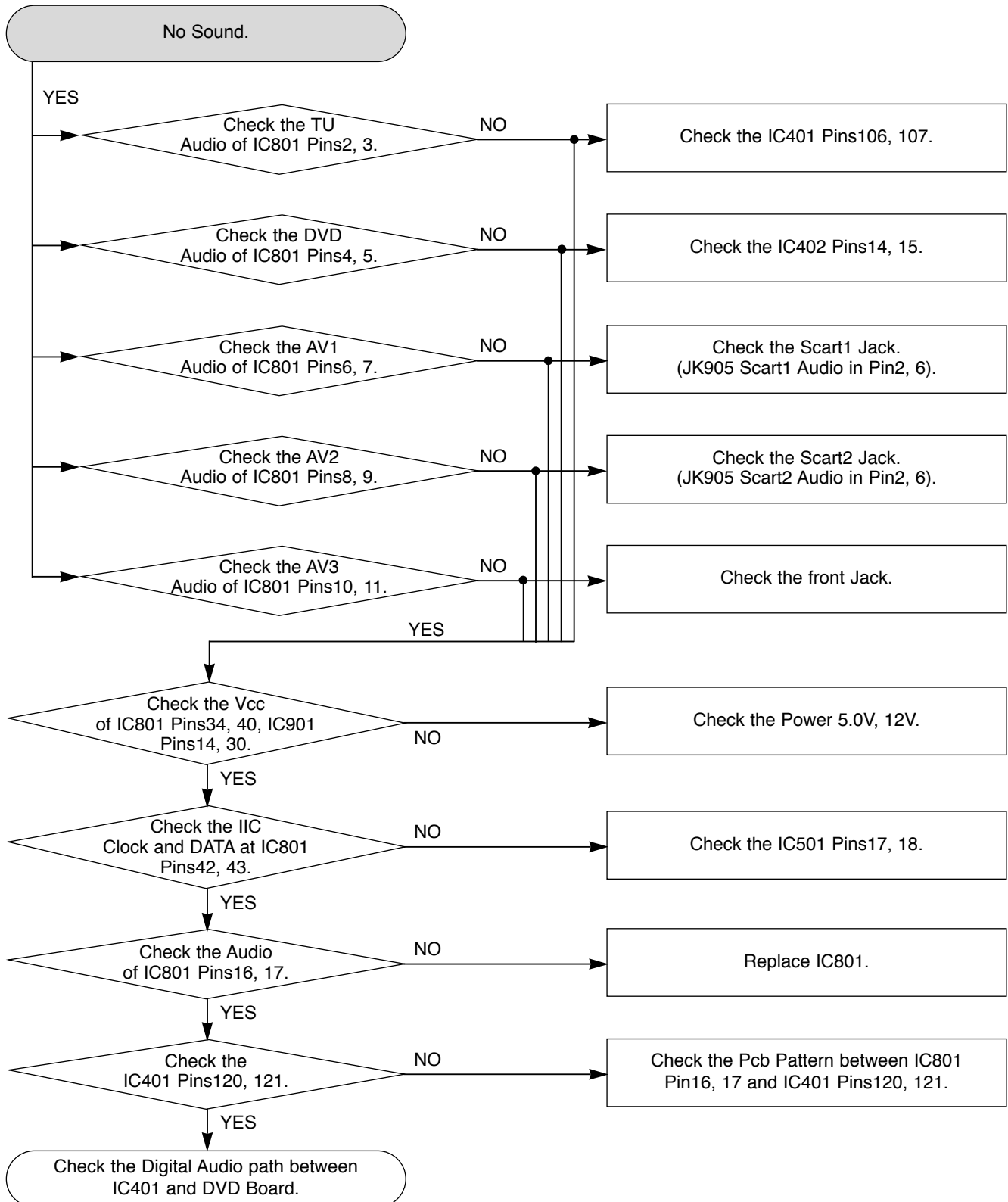
4-4. When the Video signal doesn't appear on the screen in REC Mode,



VCR ELECTRICAL TROUBLESHOOTING GUIDE

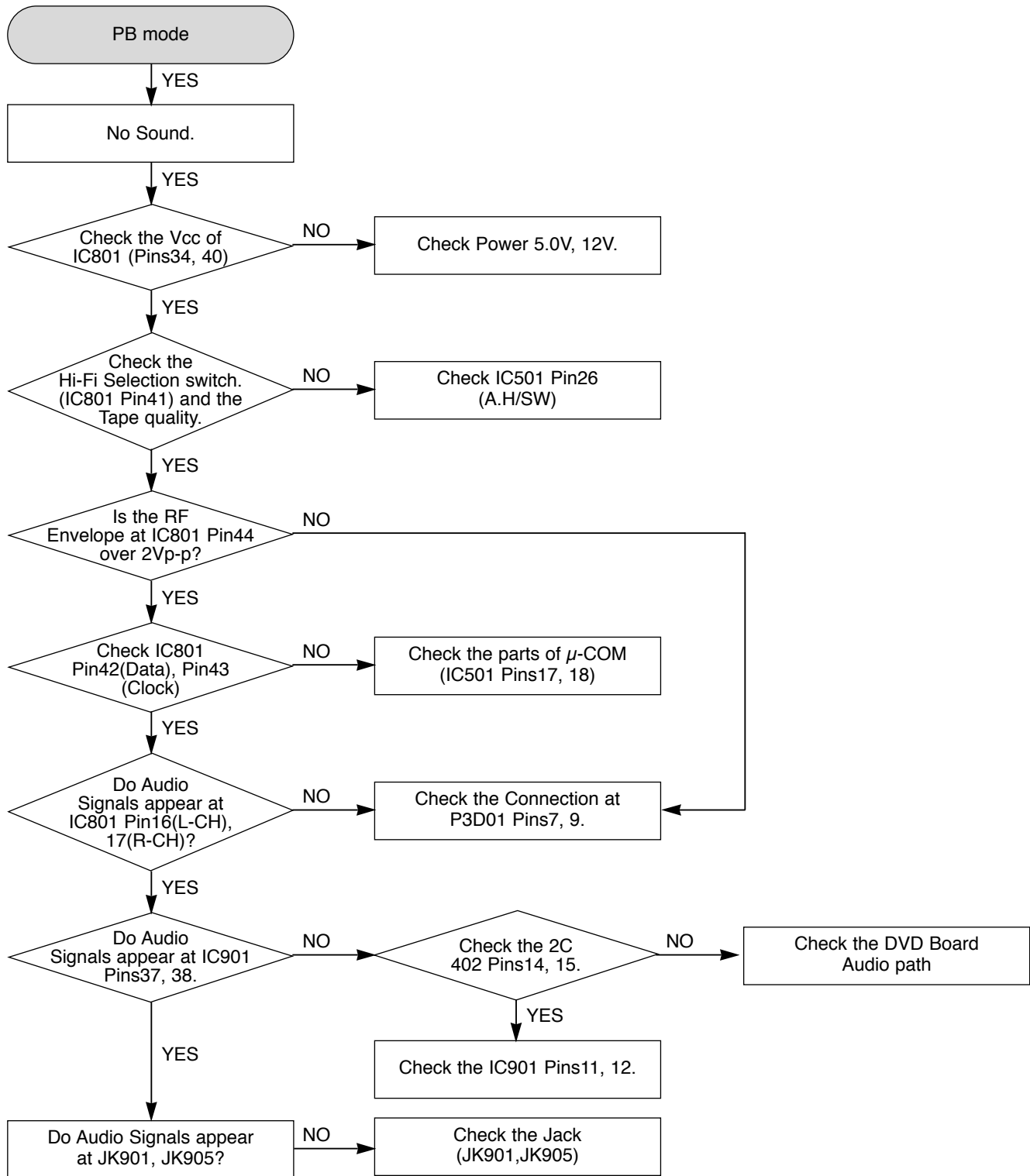
5. Hi-Fi CIRCUIT

5-1. No Sound(EE Mode)



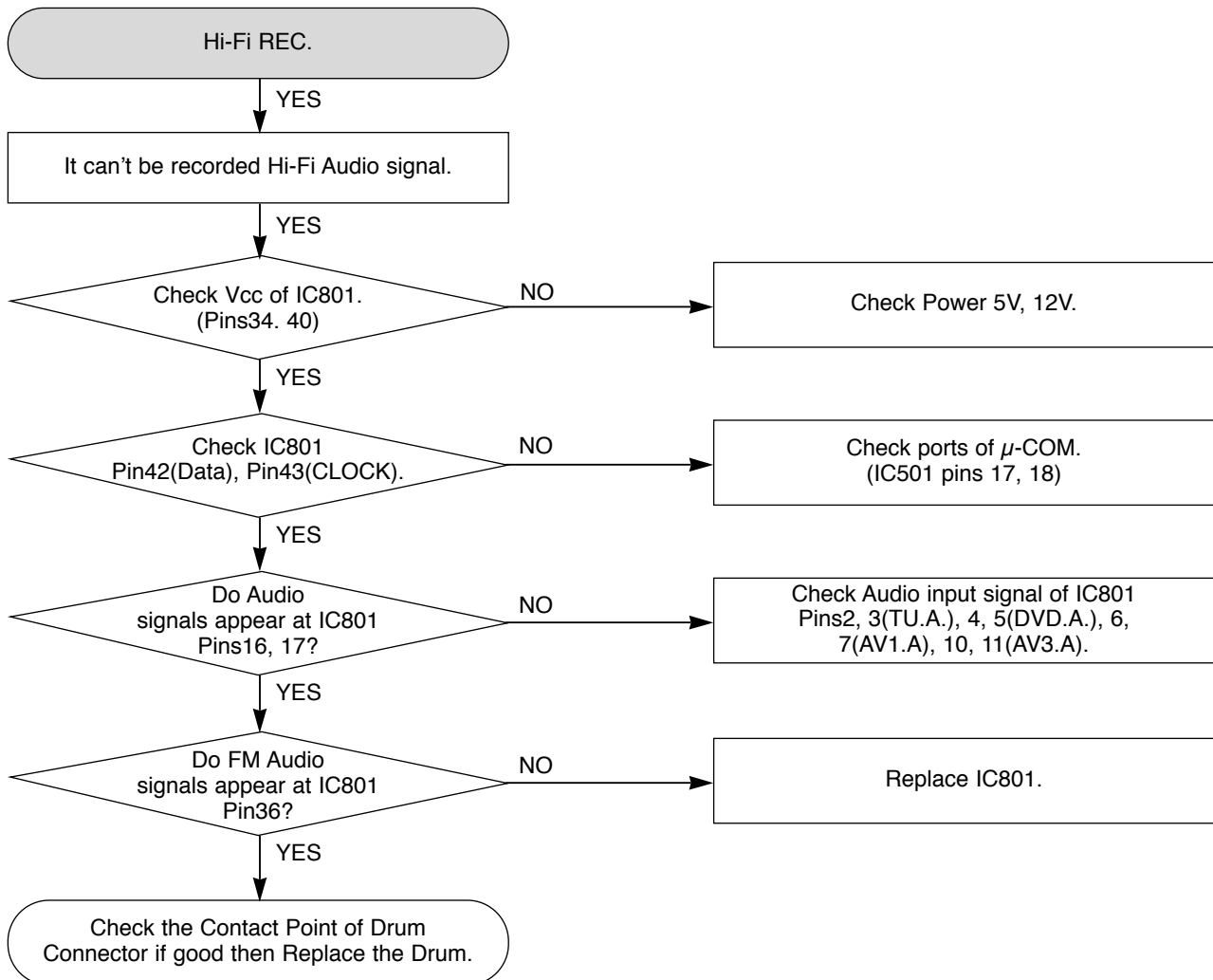
VCR ELECTRICAL TROUBLESHOOTING GUIDE

5-2. Hi-Fi Playback



VCR ELECTRICAL TROUBLESHOOTING GUIDE

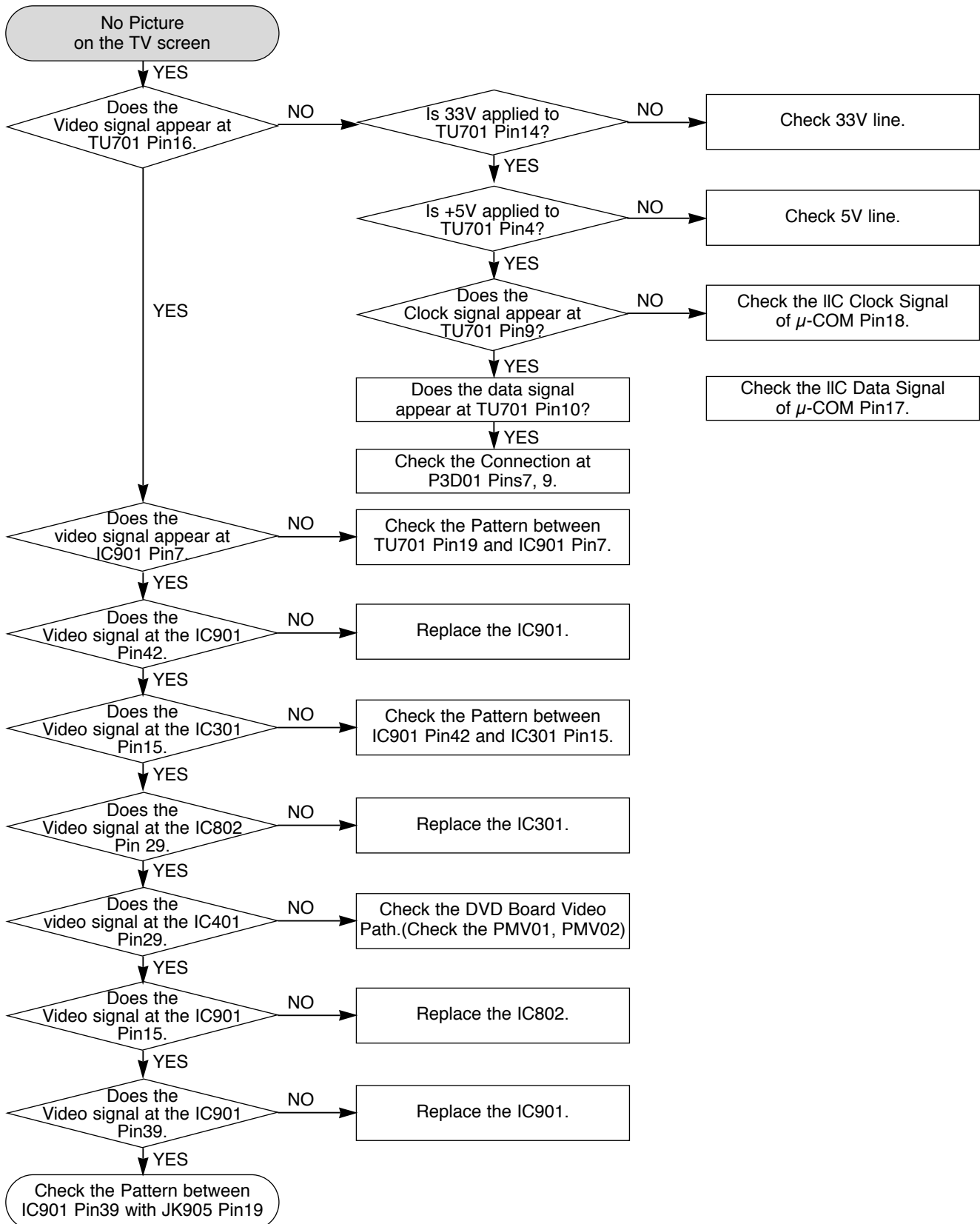
5-3. HI-FI REC.



VCR ELECTRICAL TROUBLESHOOTING GUIDE

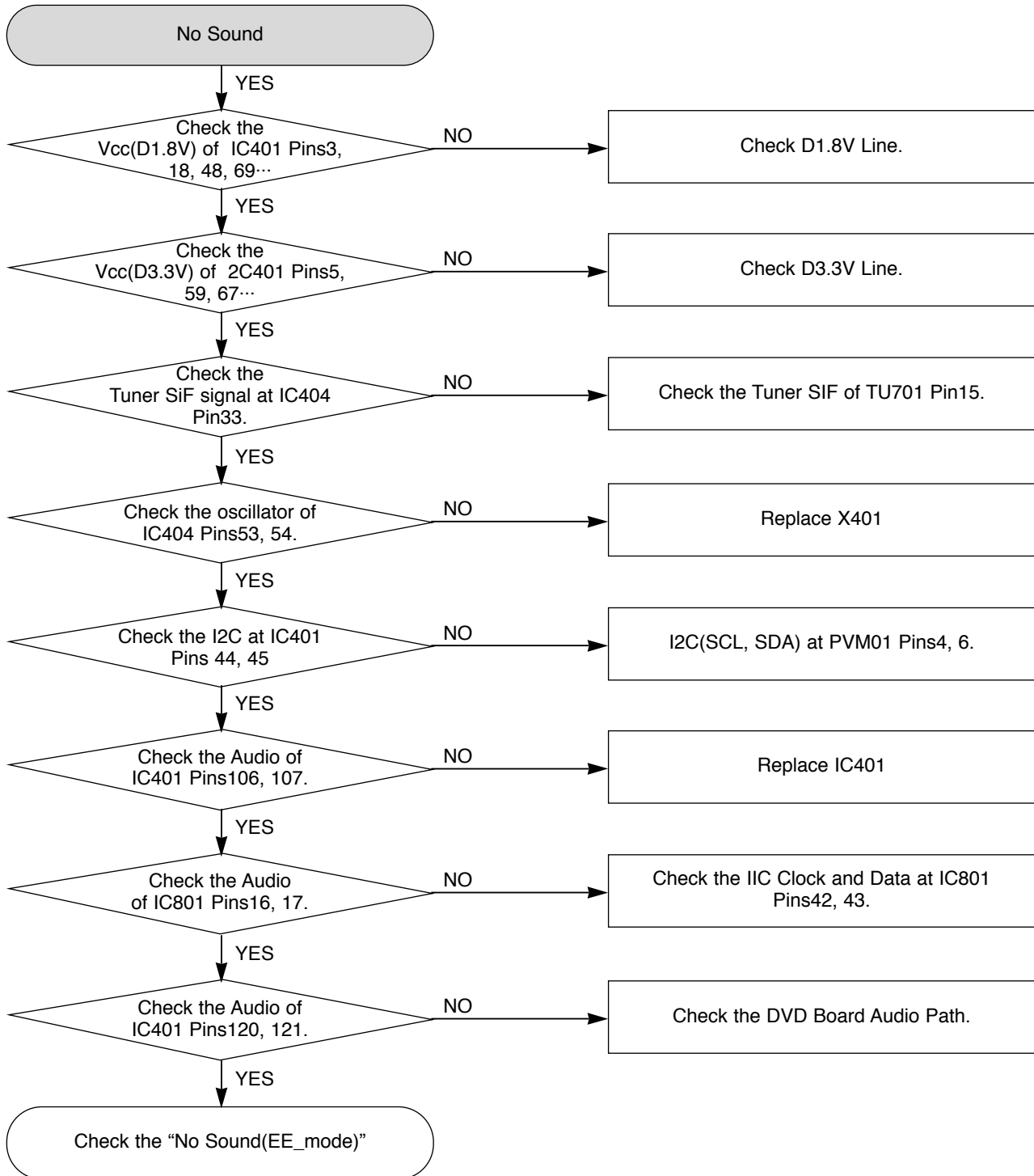
6. TUNER/IF CIRCUIT

6-1. No Picture on the TV screen



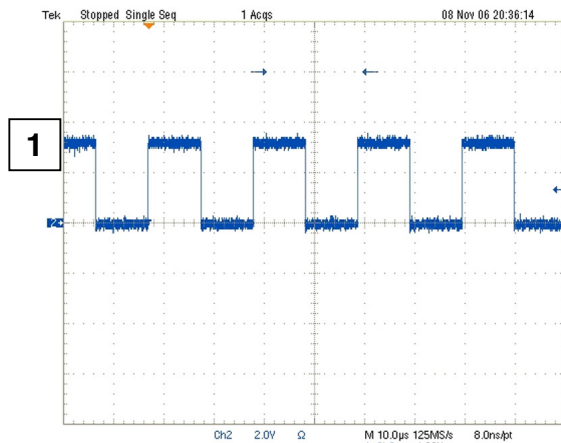
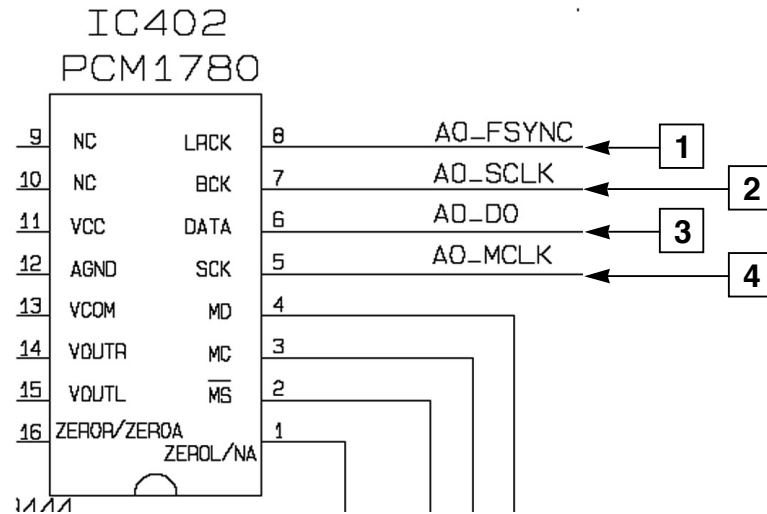
VCR ELECTRICAL TROUBLESHOOTING GUIDE

6-2. No Sound

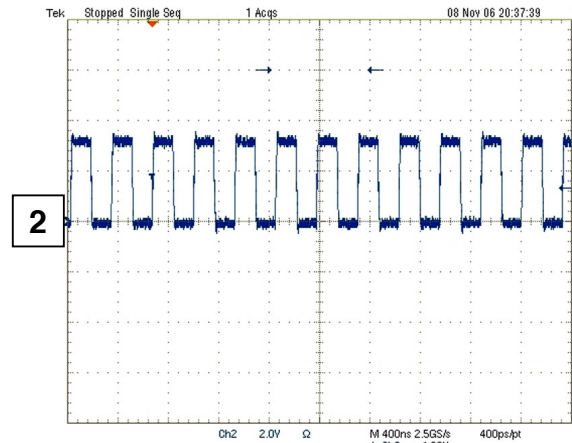


WAVEFORMS

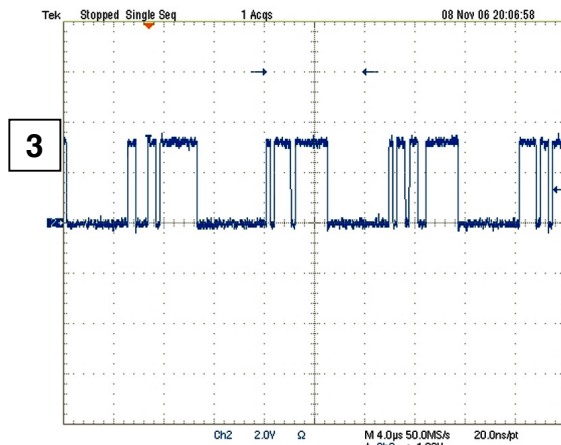
1. AUDIO BLOCK (WHEN 1KHz SIGNWAVE IS OUTPUT)



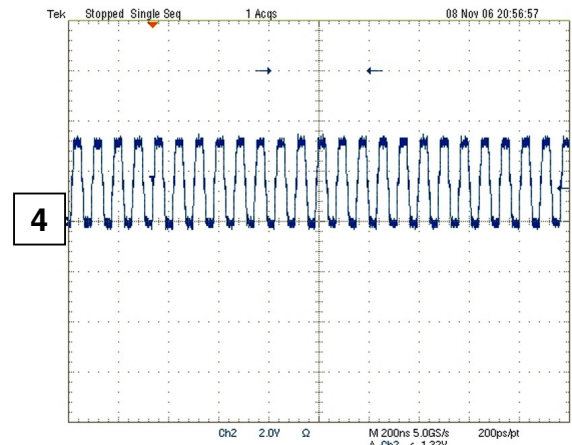
AO_FSYNC



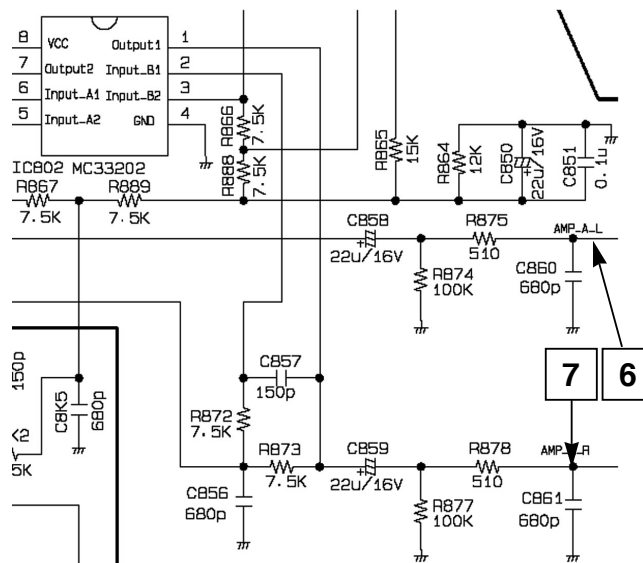
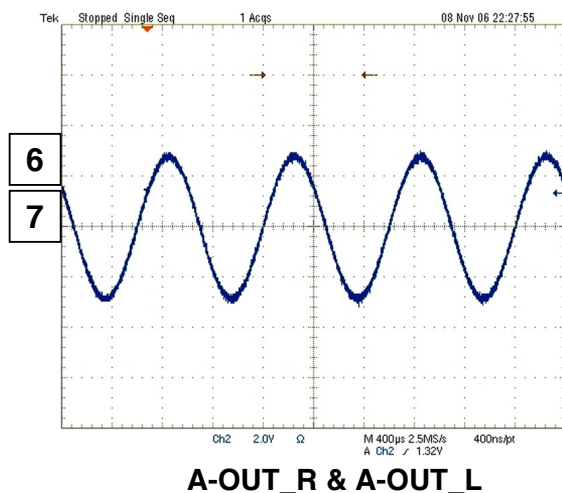
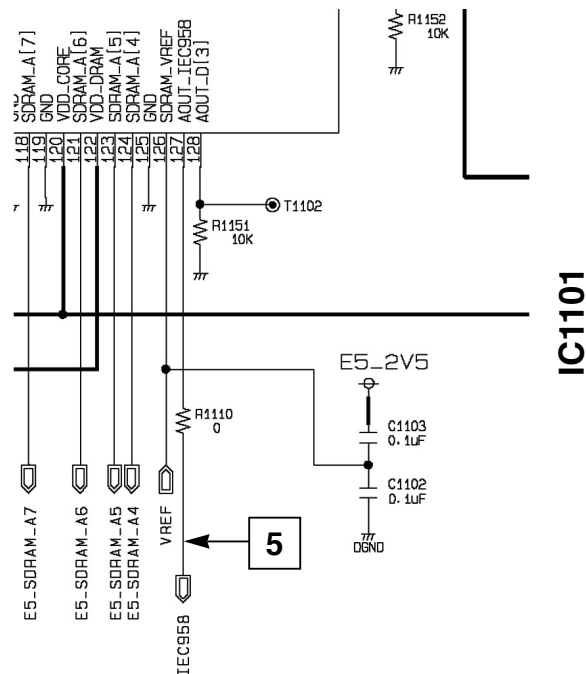
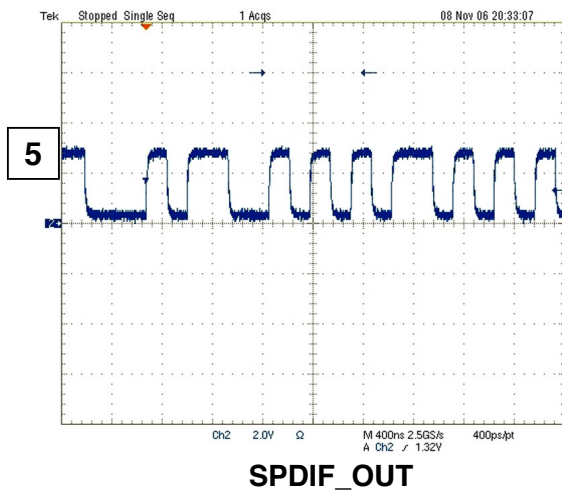
AO_SCLK



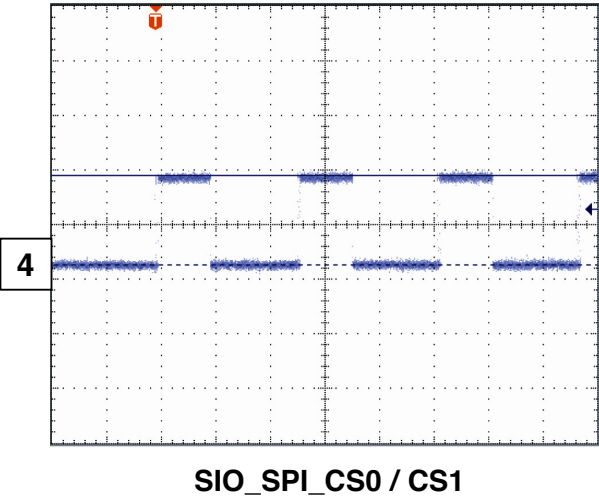
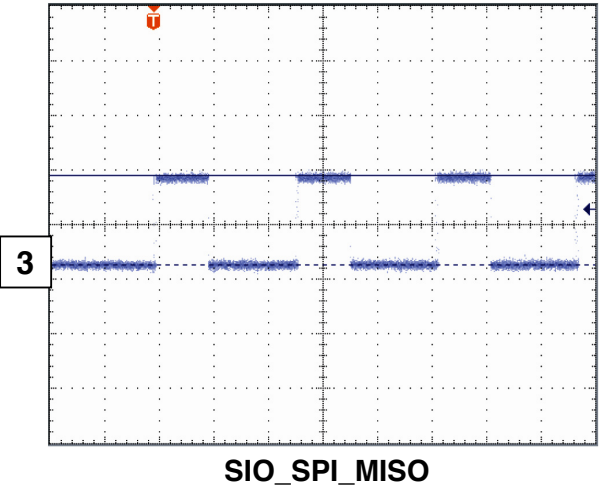
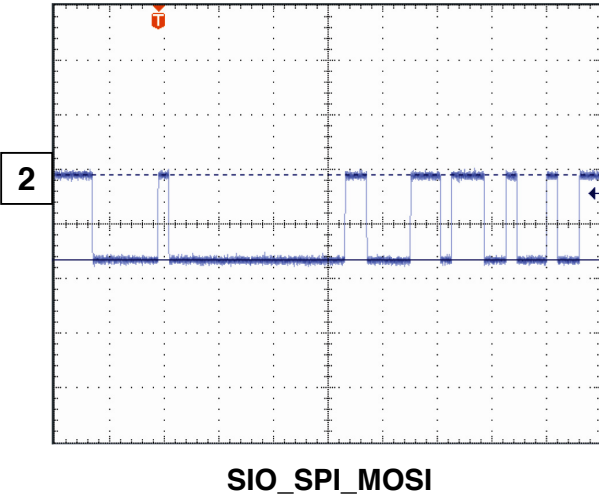
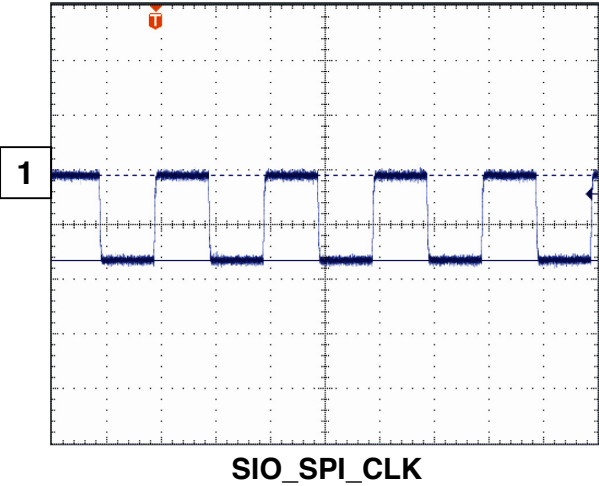
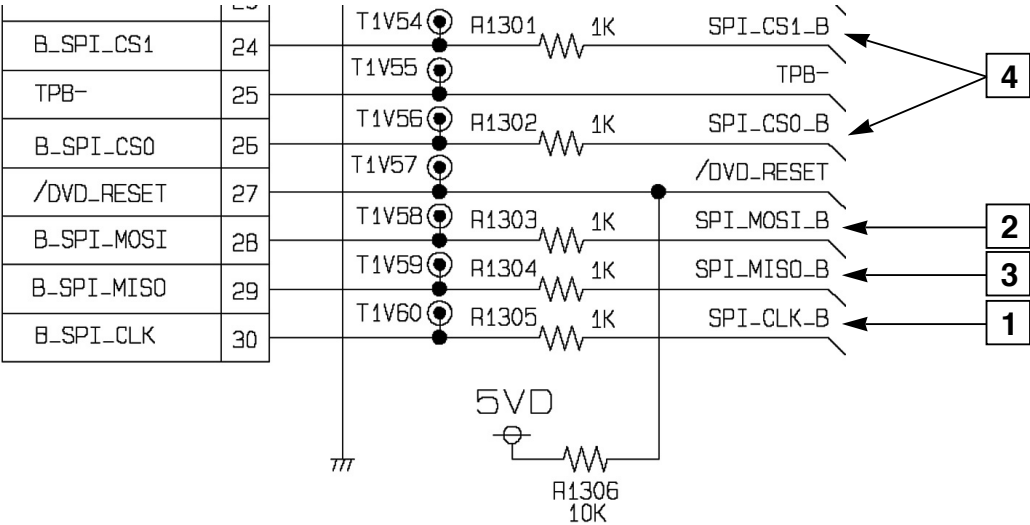
AO_D0



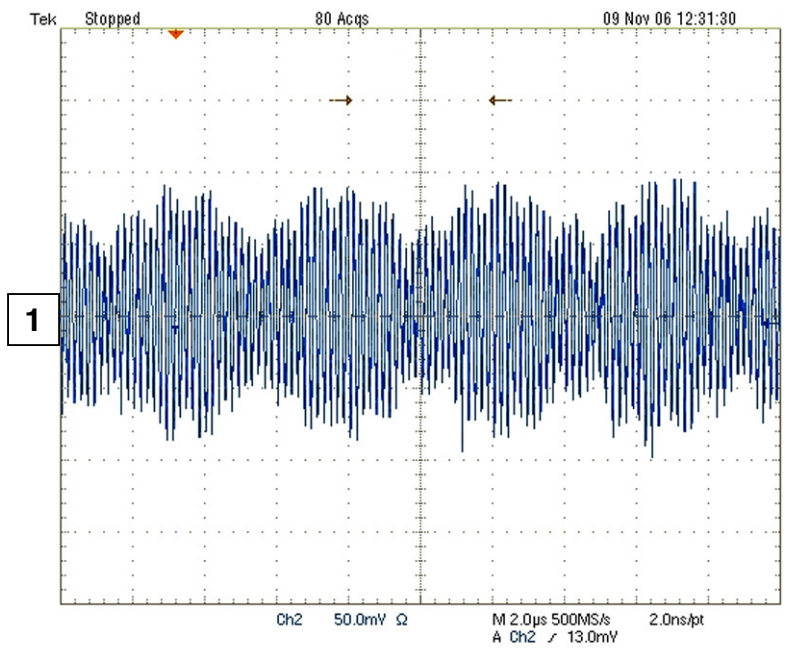
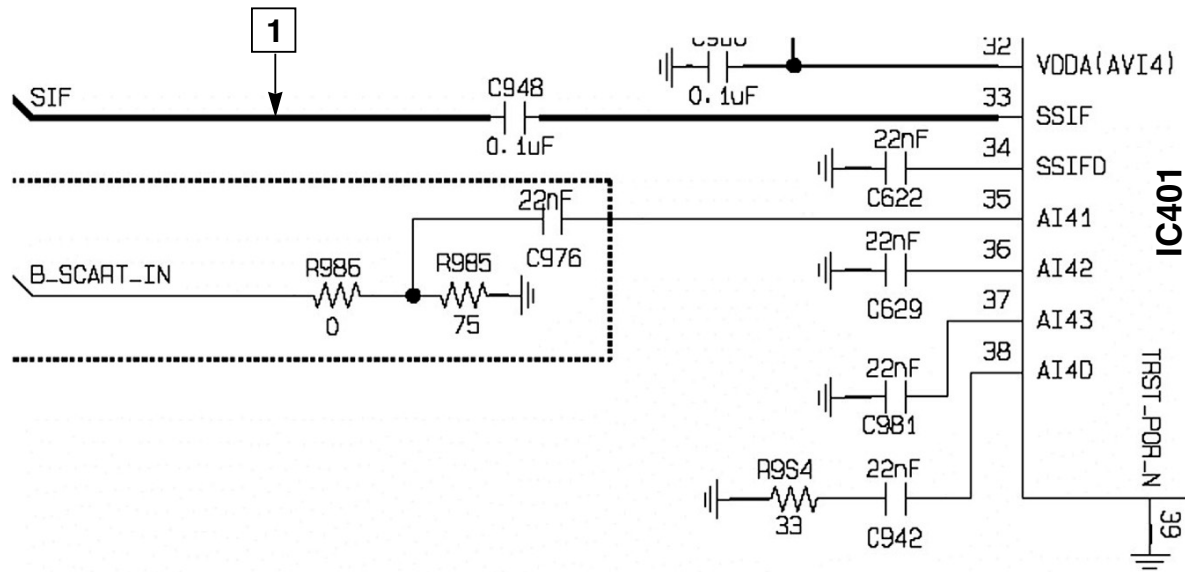
AO_MCLK



2. SERIAL INTERFACE BLOCK (BETWEEN MAIN & I/O)

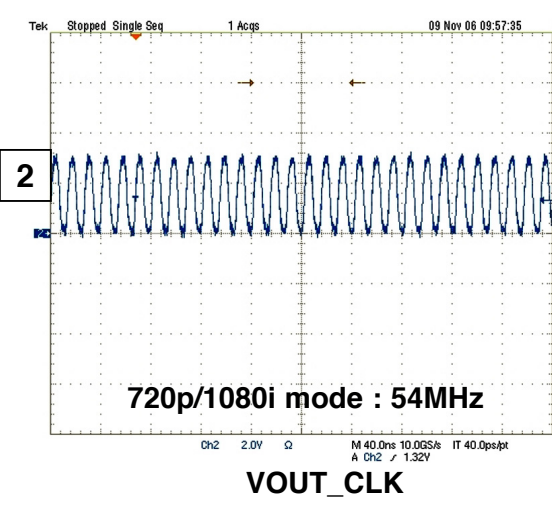
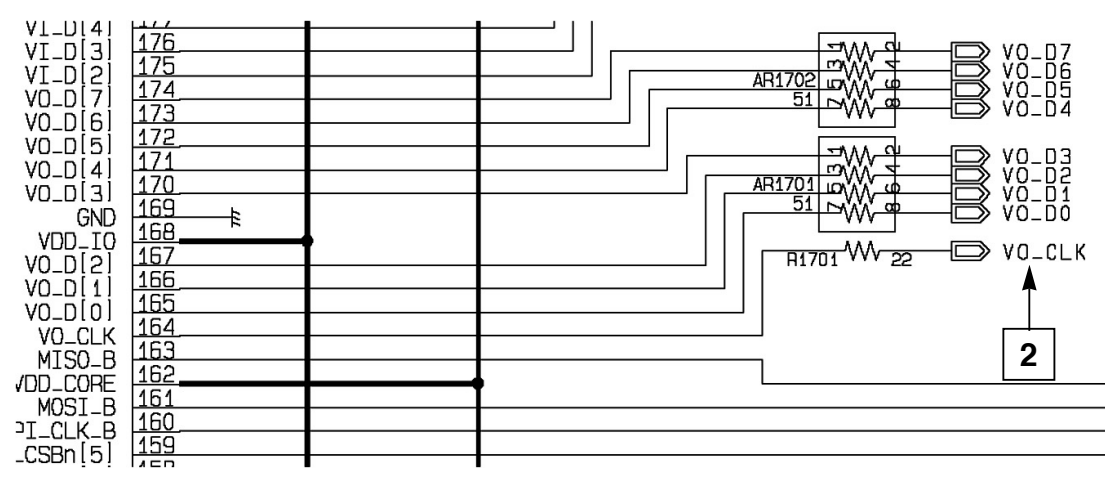
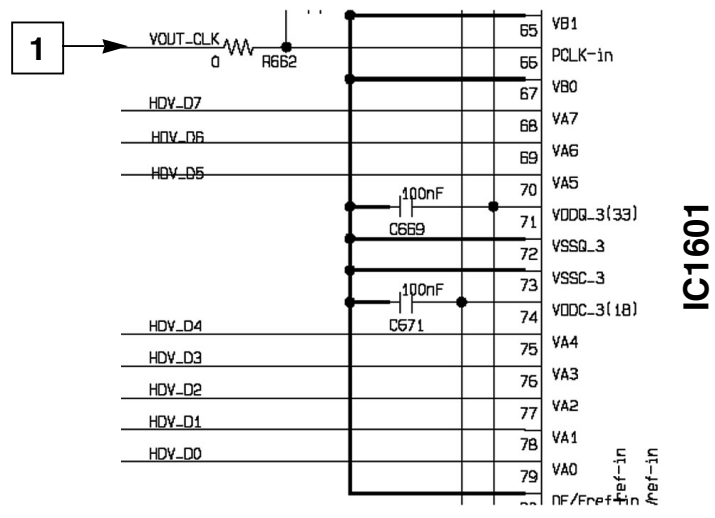
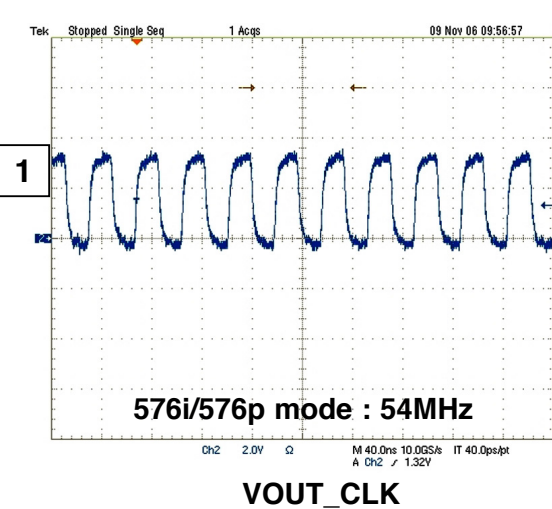


3. TUNER BLOCK



SIF

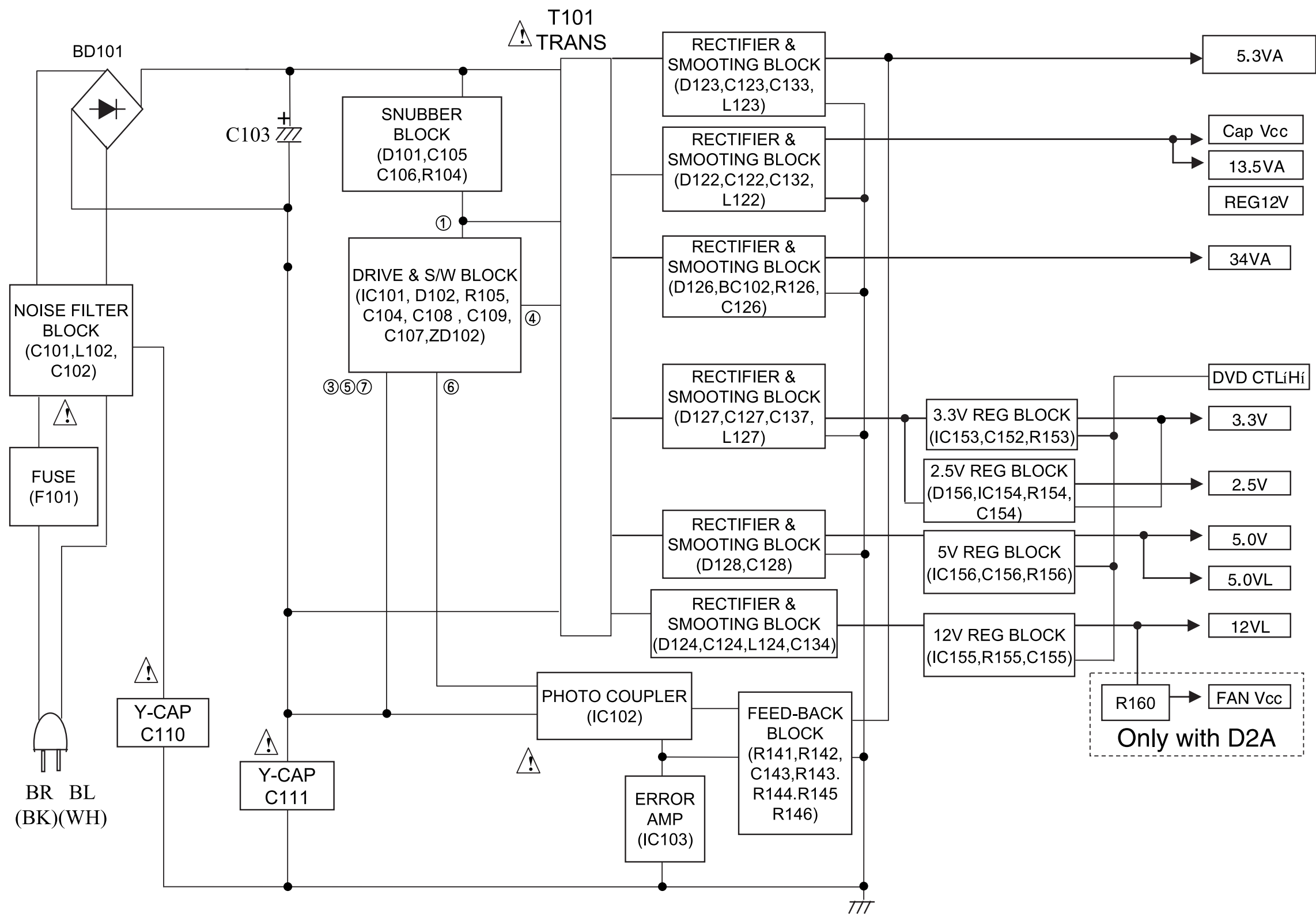
4. HDMI BLOCK



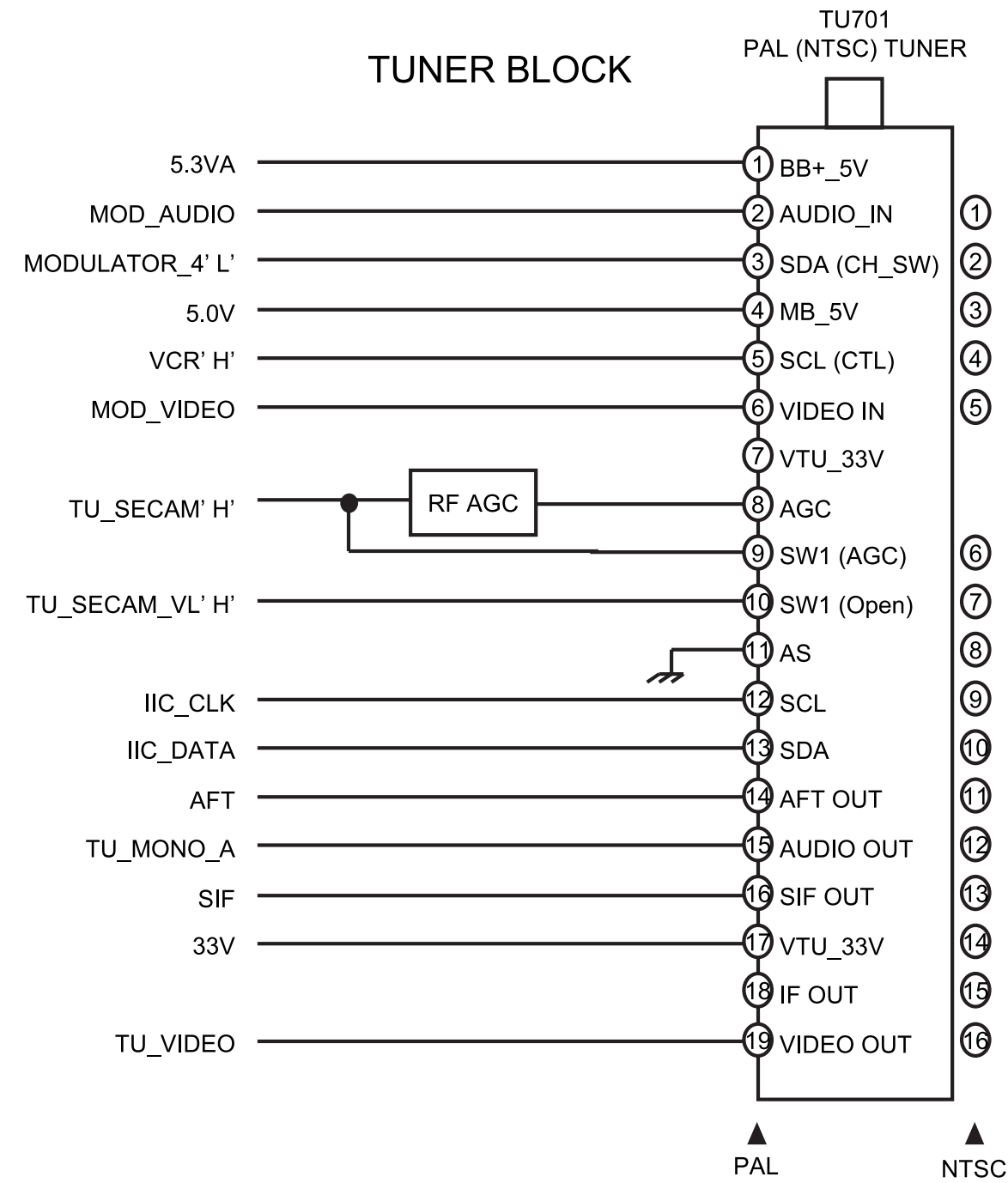
MEMO

BLOCK DIAGRAMS

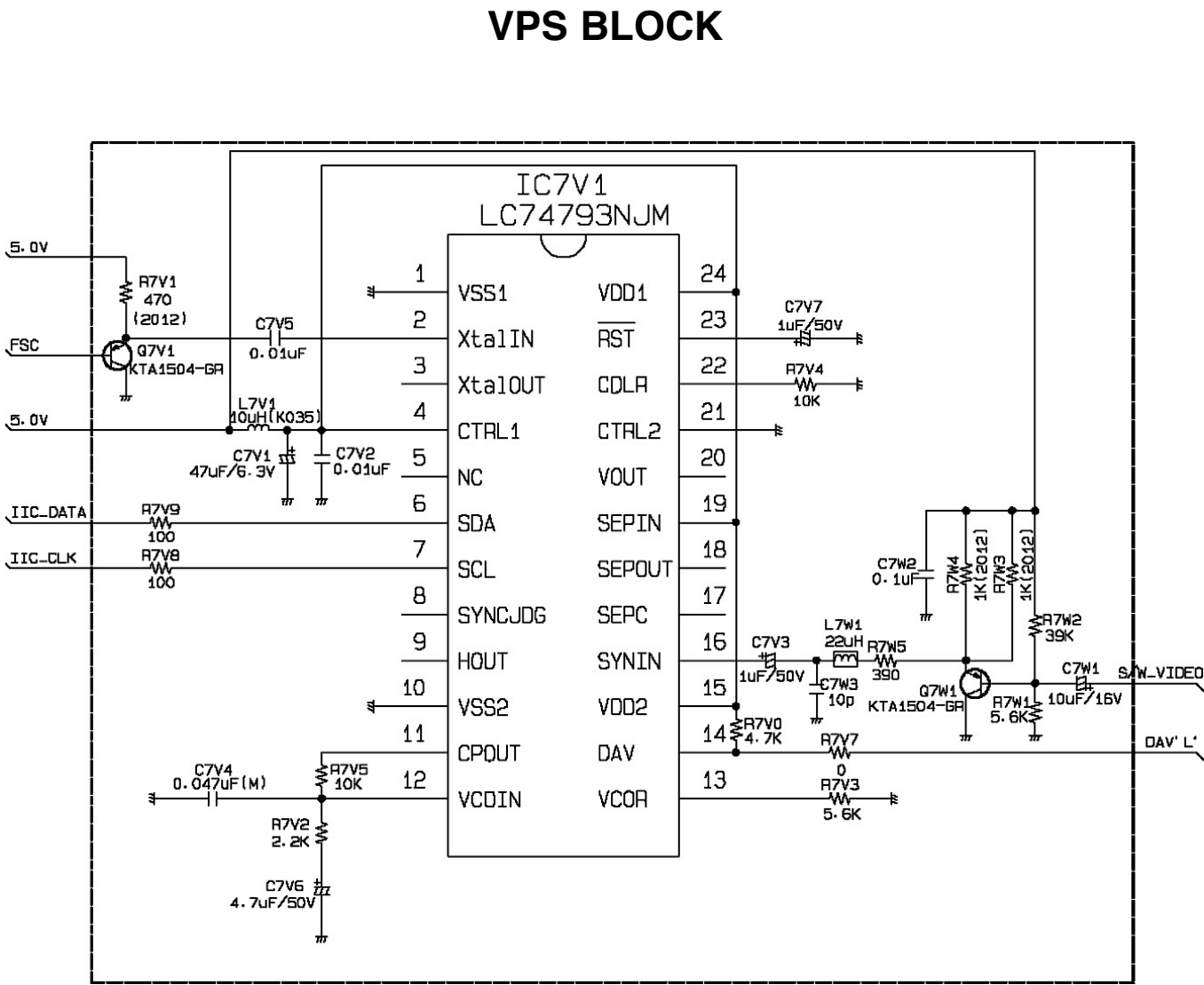
1. POWER (SMPS) BLOCK DIAGRAM



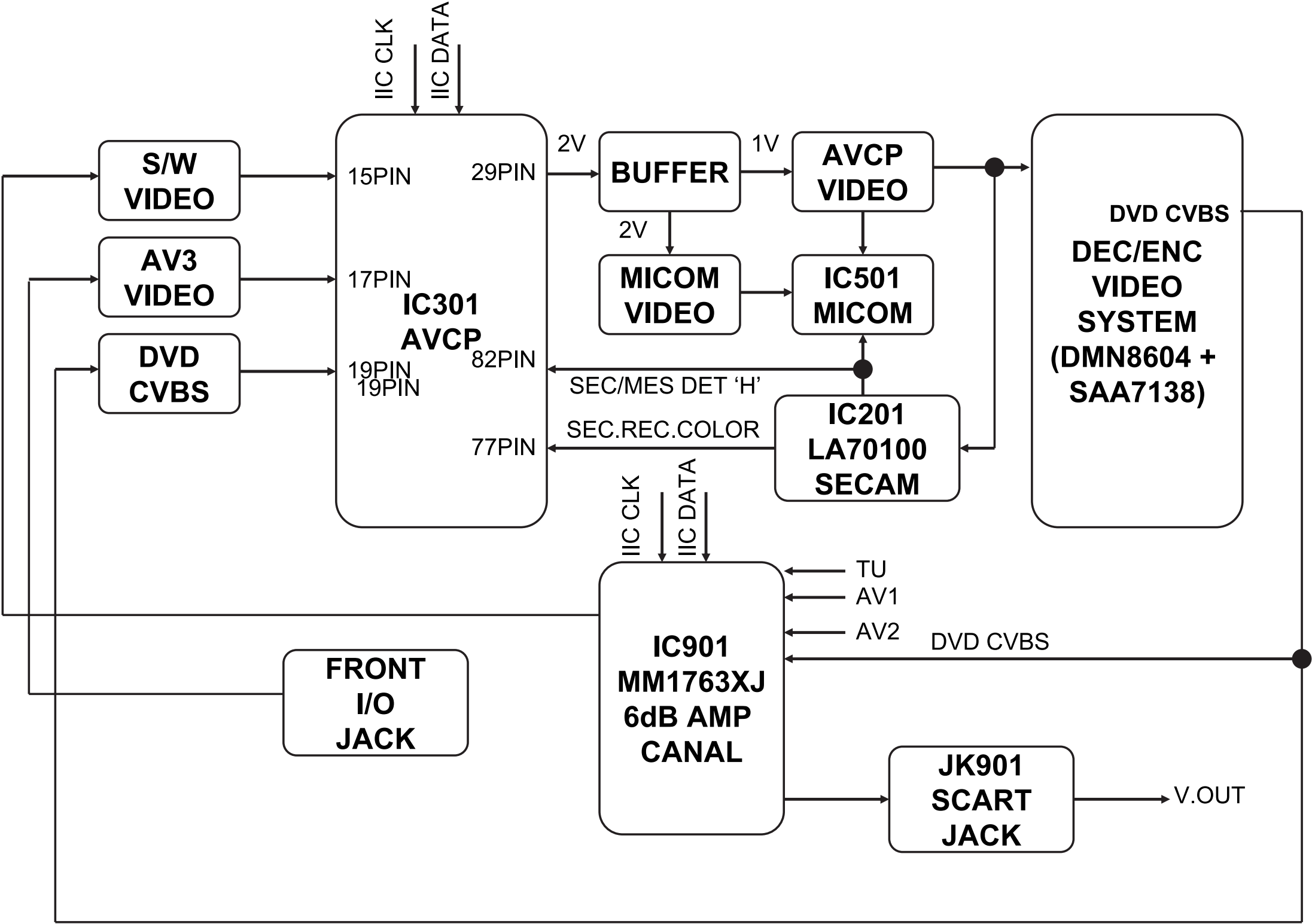
2. TUNER BLOCK DIAGRAM



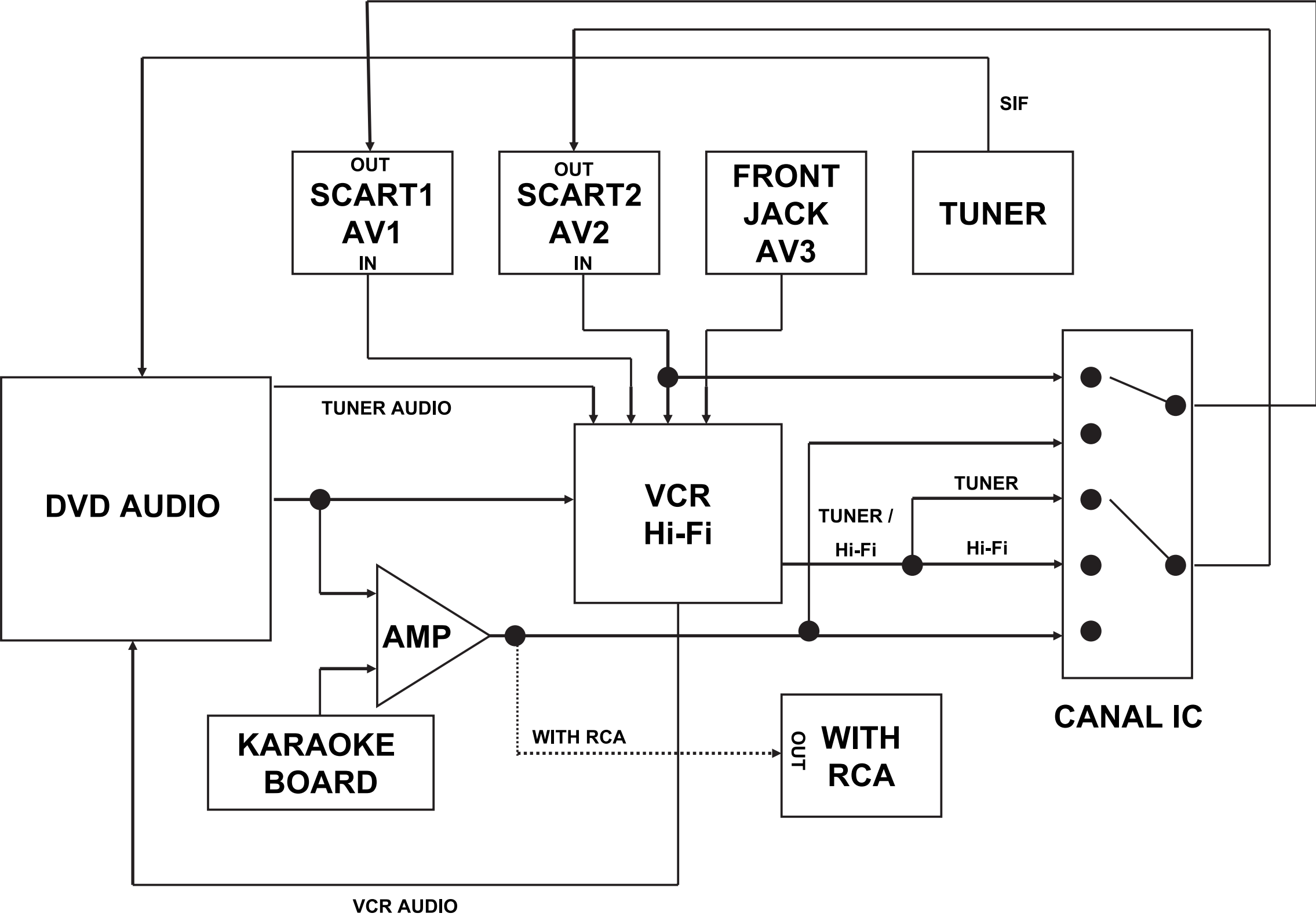
3. VPS BLOCK DIAGRAM



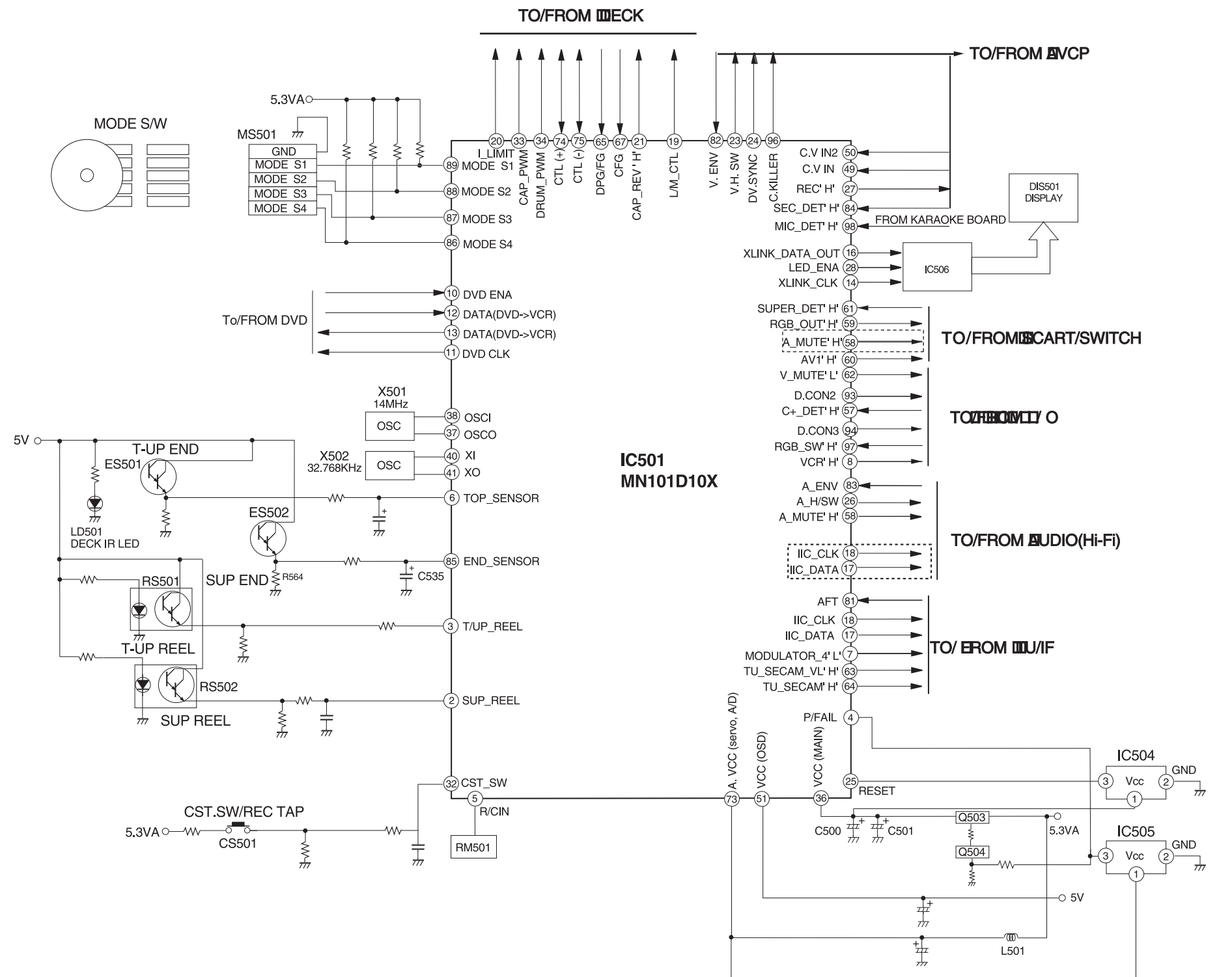
4. Y/C BLOCK DIAGRAM



5. HI-FI BLOCK DIAGRAM

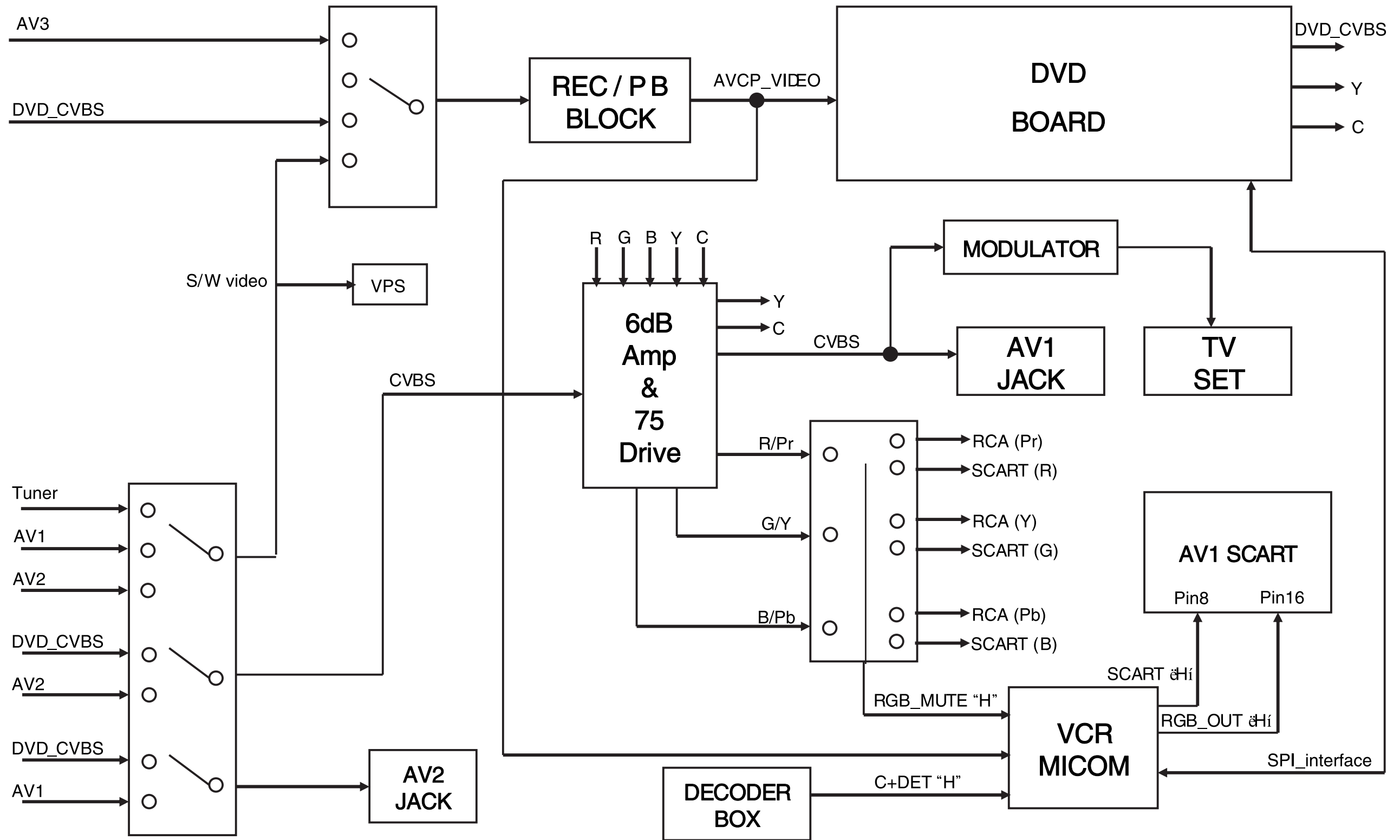


6. SYSTEM BLOCK DIAGRAM



VCR+DVD REC SCART+RCA

7. SCART & SWITCH BLOCK DIAGRAM



CIRCUIT DIAGRAMS

1. POWER (SMPS) CIRCUIT DIAGRAM

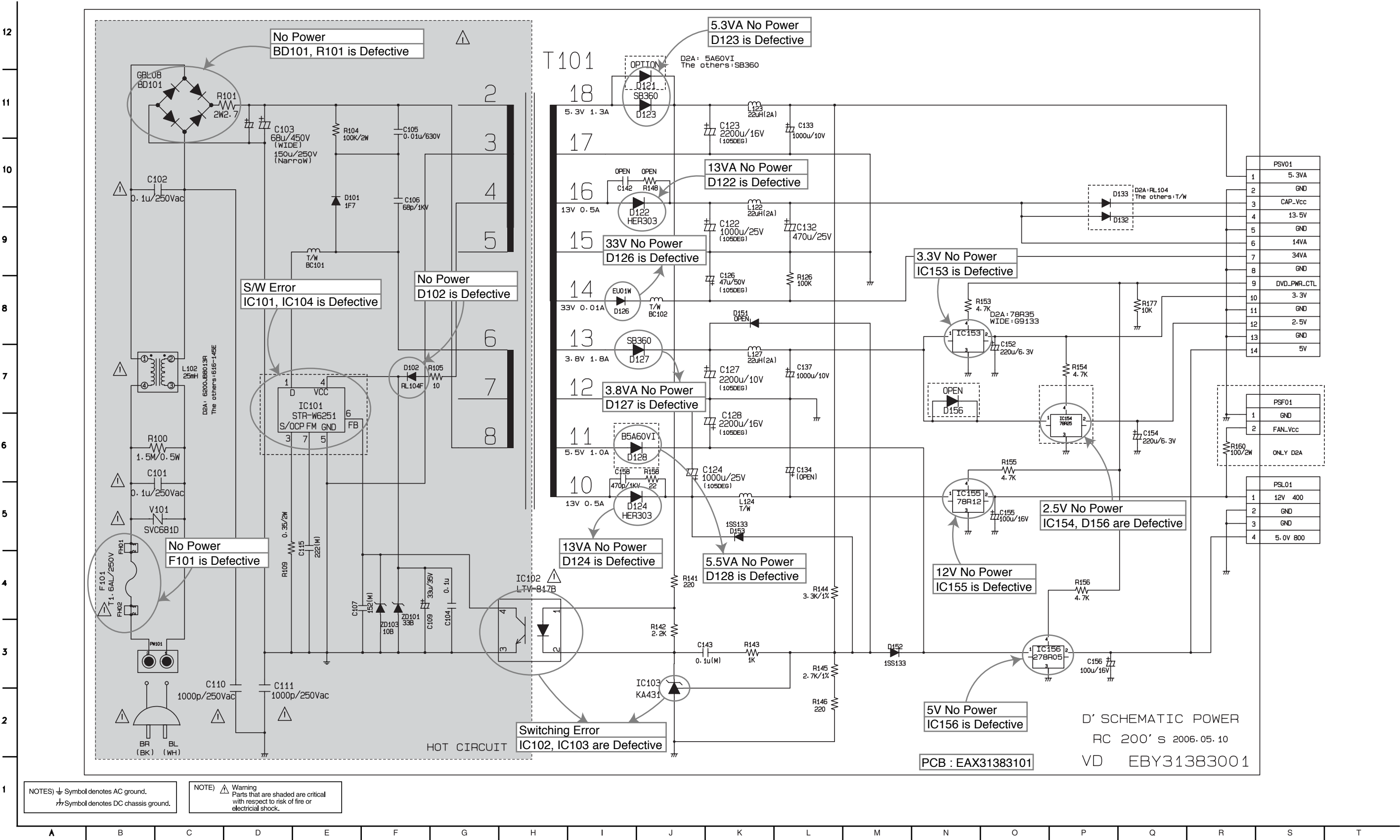
IMPORTANT SAFETY

WHEN SERVICING THIS CHASSIS, UNDER NO CIRCUMSTANCES SHOULD THE ORIGINAL DESIGN BE MODIFIED OR ALTERED WITHOUT PERMISSION FROM THE LG CORPORATION. ALL COMPONENTS SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL CIRCUIT. SPECIAL COMPONENTS ARE SHADED ON THE

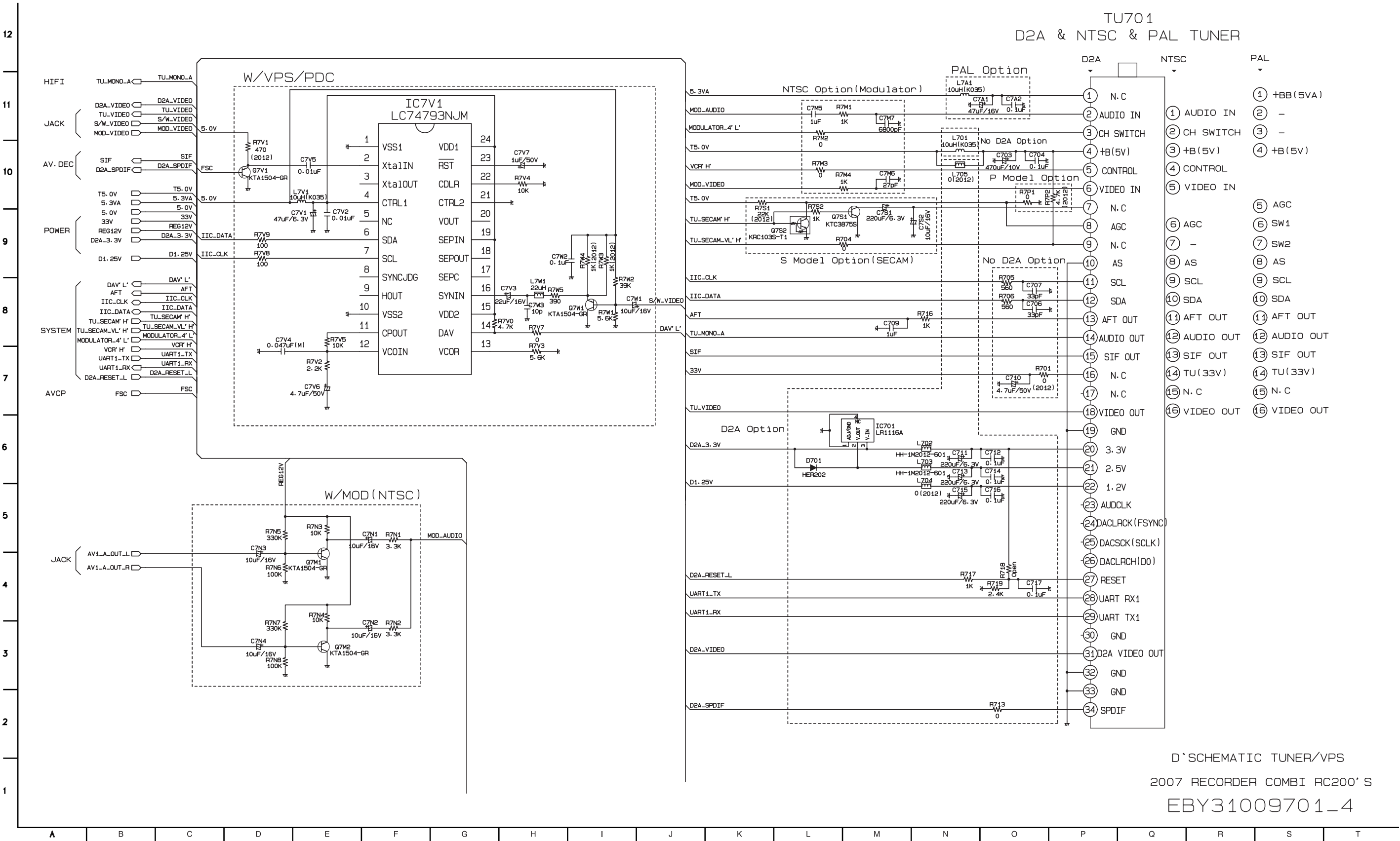
SCHEMATIC FOR EASY IDENTIFICATION. THIS CIRCUIT DIAGRAM MAY OCCASIONALLY DIFFER FROM THE ACTUAL CIRCUIT USED. THIS WAY, IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET IS NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.

NOTE :

- 1. Shaded(■) parts are critical for safety. Replace only with specified part number.
- 2. Voltages are DC-measured with a digital voltmeter during Play mode.



2. TUNER CIRCUIT DIAGRAM



12
11
10
9
8
7
6
5
4
3
2
1

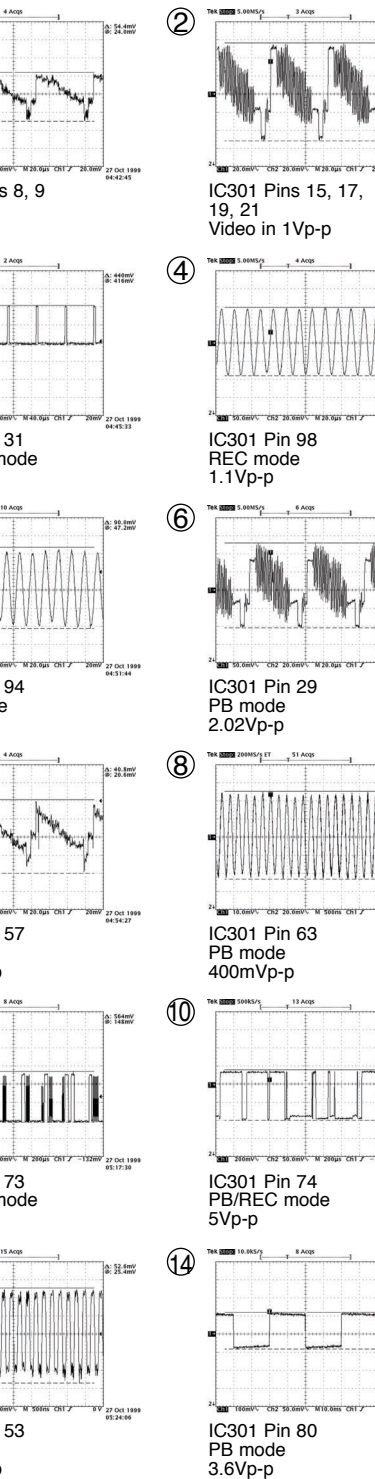


12
11
10
9
8
7
6
5
4
3
2
1

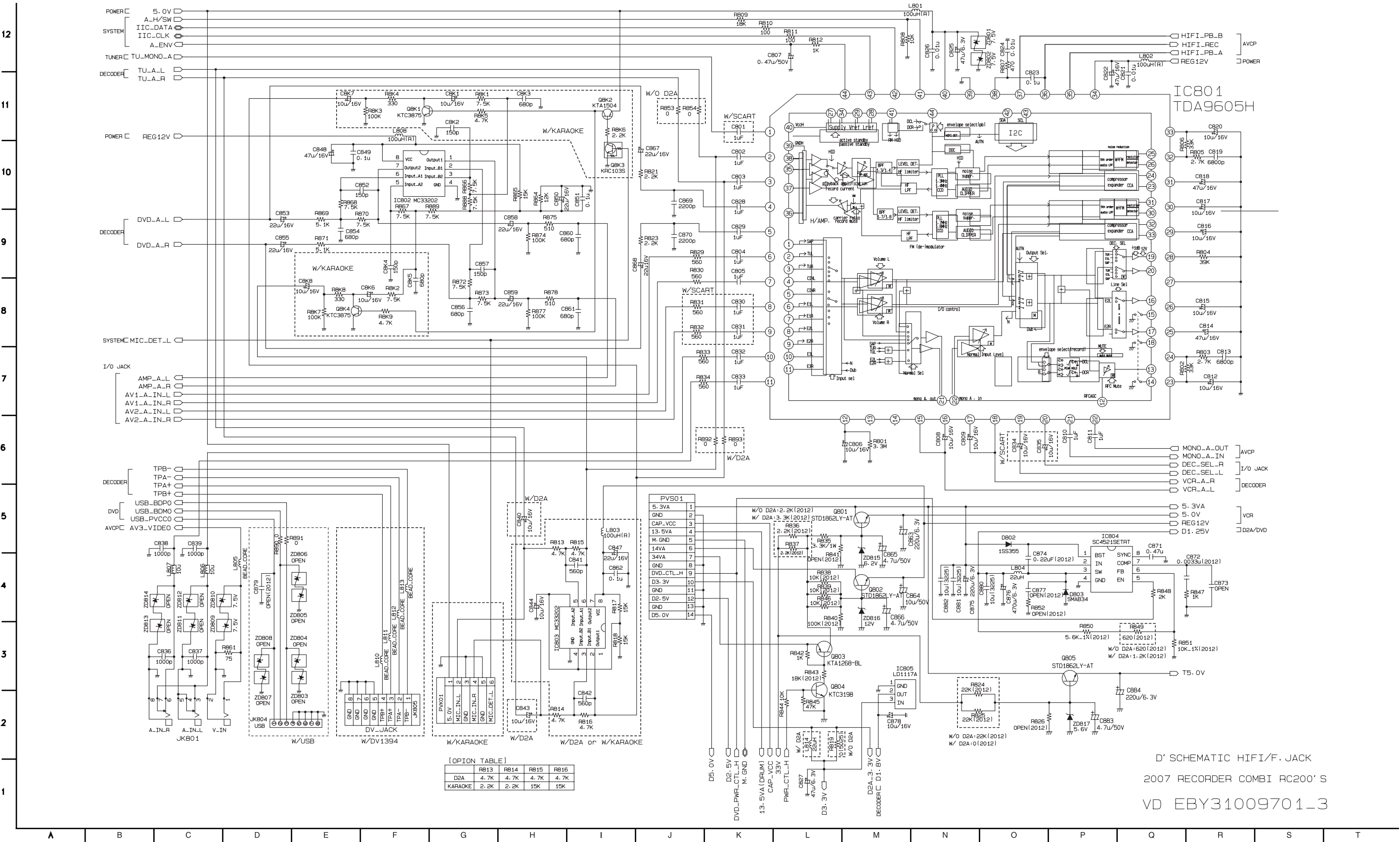
12
11
10
9
8
7
6
5
4
3
2
1

WAVEFORMS

C301 Oscilloscope Waveform



4. HI-FI CIRCUIT DIAGRAM

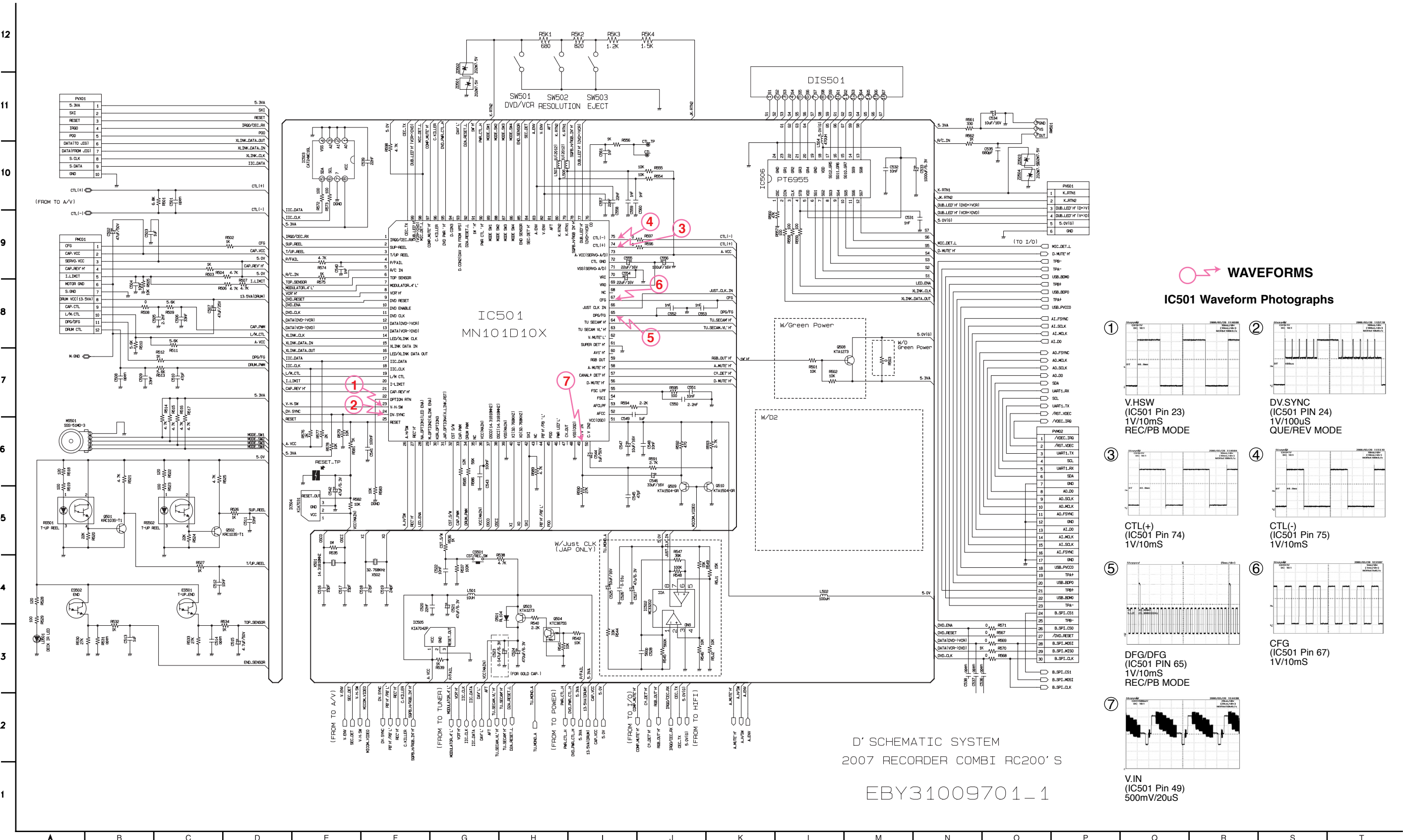


D' SCHEMATIC HIFI/F. JACK

2007 RECORDER COMBI RC200'S

VD EBY31009701-3

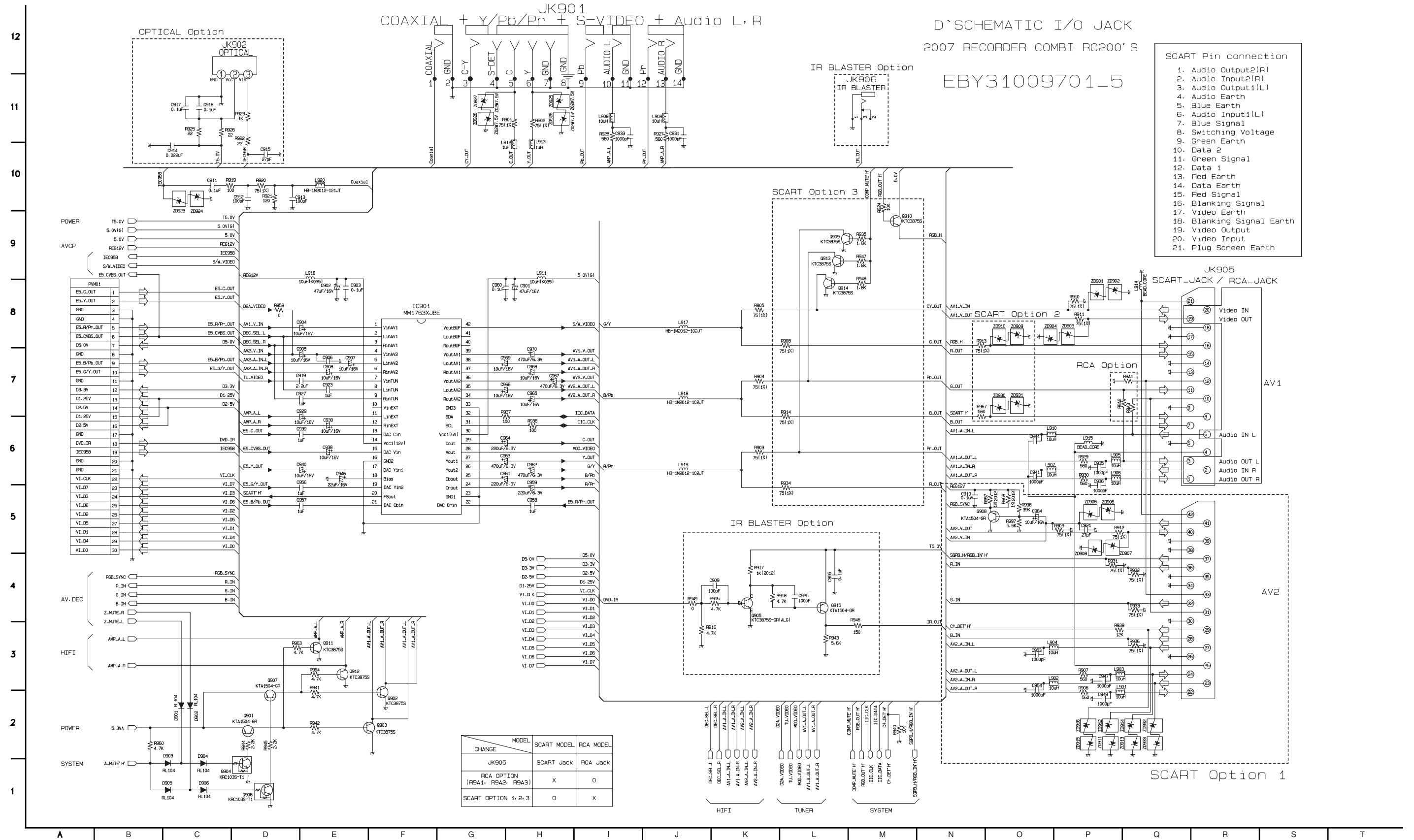
5. SYSTEM CIRCUIT DIAGRAM



D' SCHEMATIC SYSTEM
2007 RECORDER COMBI RC200' S

EBY31009701-1

6. SCART CIRCUIT DIAGRAM (SCART MODEL ONLY)



The schematic diagram illustrates the HDMI interface for the 2007 RECORDER COMBI RC200'S. It features two main integrated circuits: IC1601 (TDA9983) and IC1603 (UPA672T). The diagram includes various components such as resistors (R651-R675), capacitors (C671-C678), and connectors (CN651, CN652). It also shows power supply sections for 3.3V and 5V, and a detailed pinout for the HDMI connector (CN651).

IC1601 (TDA9983) Pinout:

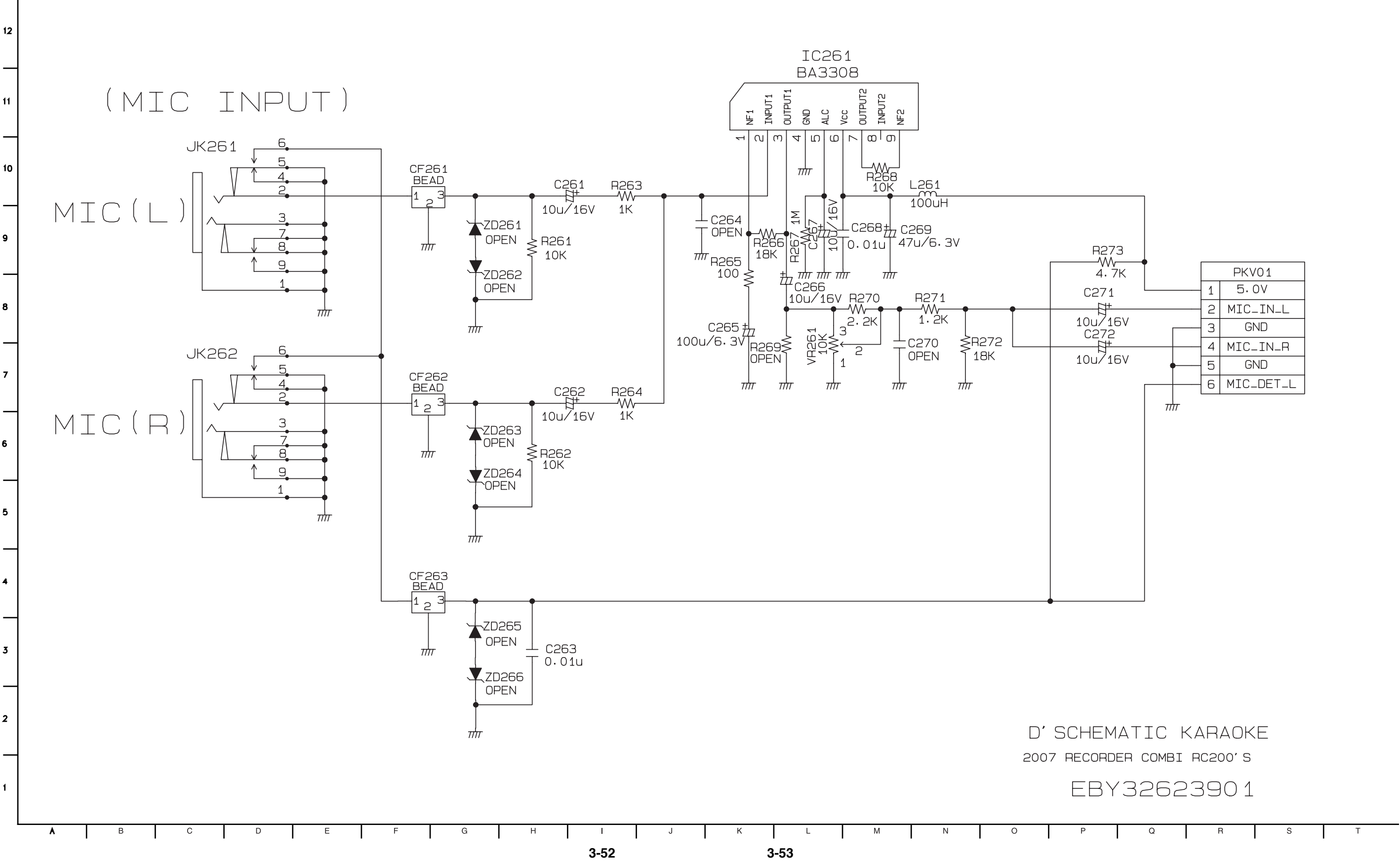
Pin	Signal
1	TX2+
2	TX2-
3	TX2+
4	TX2-
5	TX2+
6	TX2-
7	TX2+
8	TX2-
9	TX2+
10	TX2-
11	TX2+
12	TX2-
13	TX2+
14	TX2-
15	TX2+
16	TX2-
17	TX2+
18	TX2-
19	TX2+
20	TX2-
21	TX2+
22	TX2-
23	TX2+
24	TX2-
25	TX2+
26	TX2-
27	TX2+
28	TX2-
29	TX2+
30	TX2-
31	TX2+
32	TX2-
33	TX2+
34	TX2-
35	TX2+
36	TX2-
37	TX2+
38	TX2-
39	TX2+
40	TX2-
41	TX2+
42	TX2-
43	TX2+
44	TX2-
45	TX2+
46	TX2-
47	TX2+
48	TX2-
49	TX2+
50	TX2-
51	TX2+
52	TX2-
53	TX2+
54	TX2-
55	TX2+
56	TX2-
57	TX2+
58	TX2-
59	TX2+
60	TX2-
61	TX2+
62	TX2-
63	TX2+
64	TX2-
65	TX2+
66	TX2-
67	TX2+
68	TX2-
69	TX2+
70	TX2-
71	TX2+
72	TX2-
73	TX2+
74	TX2-
75	TX2+
76	TX2-
77	TX2+
78	TX2-
79	TX2+
80	TX2-

IC1603 (UPA672T) Pinout:

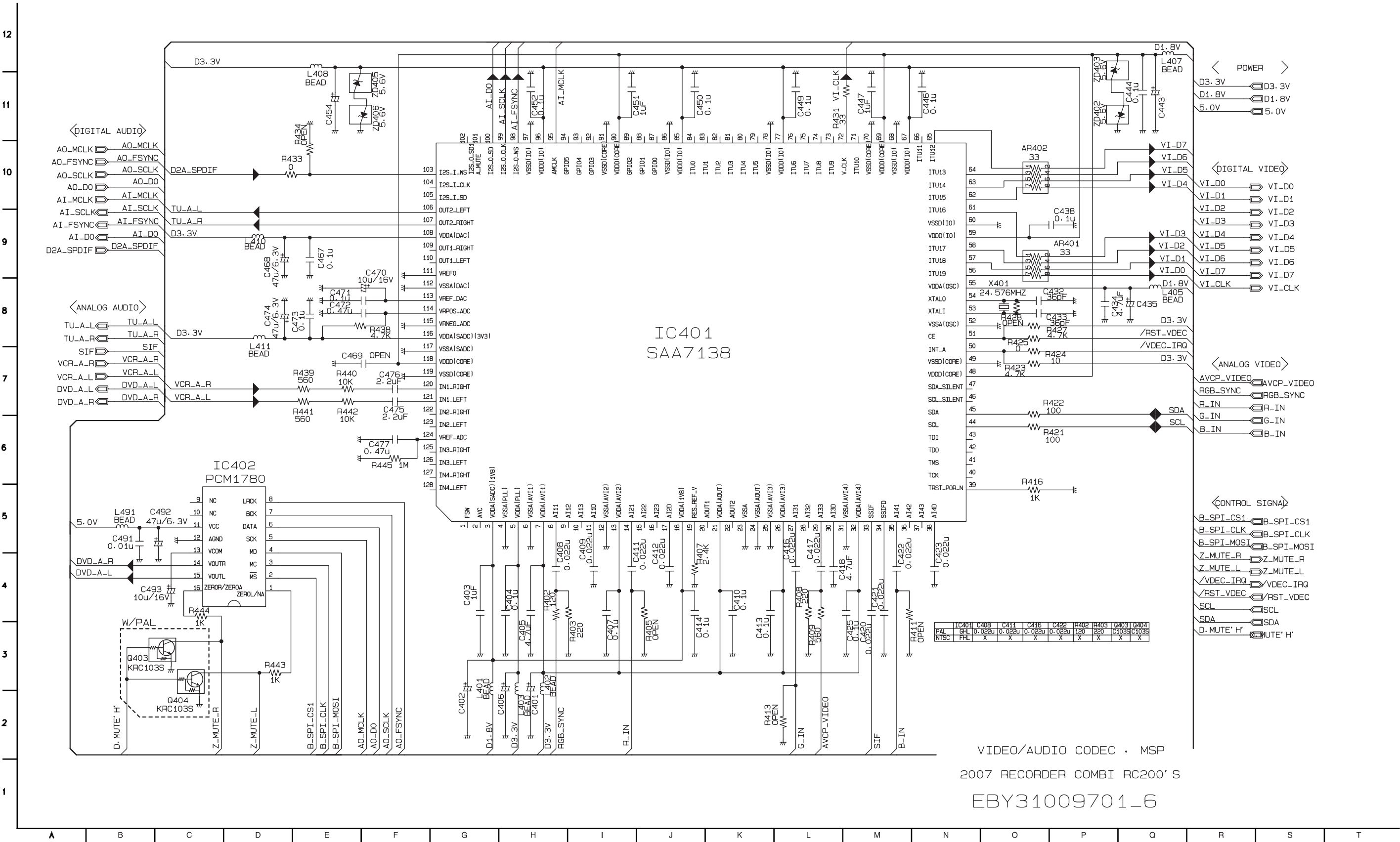
Pin	Signal
1	TX2+
2	TX2-
3	TX2+
4	TX2-
5	TX2+
6	TX2-
7	TX2+
8	TX2-
9	TX2+
10	TX2-
11	TX2+
12	TX2-
13	TX2+
14	TX2-
15	TX2+
16	TX2-
17	TX2+
18	TX2-
19	TX2+
20	TX2-
21	TX2+
22	TX2-
23	TX2+
24	TX2-
25	TX2+
26	TX2-
27	TX2+
28	TX2-
29	TX2+
30	TX2-
31	TX2+
32	TX2-
33	TX2+
34	TX2-
35	TX2+
36	TX2-
37	TX2+
38	TX2-
39	TX2+
40	TX2-
41	TX2+
42	TX2-
43	TX2+
44	TX2-
45	TX2+
46	TX2-
47	TX2+
48	TX2-
49	TX2+
50	TX2-
51	TX2+
52	TX2-
53	TX2+
54	TX2-
55	TX2+
56	TX2-
57	TX2+
58	TX2-
59	TX2+
60	TX2-
61	TX2+
62	TX2-
63	TX2+
64	TX2-
65	TX2+
66	TX2-
67	TX2+
68	TX2-
69	TX2+
70	TX2-
71	TX2+
72	TX2-
73	TX2+
74	TX2-
75	TX2+
76	TX2-
77	TX2+
78	TX2-
79	TX2+
80	TX2-

SCHEMATIC DIAGRAM(HDMI)
2007 RECORDER COMBI RC200'S
EBY31009701_7

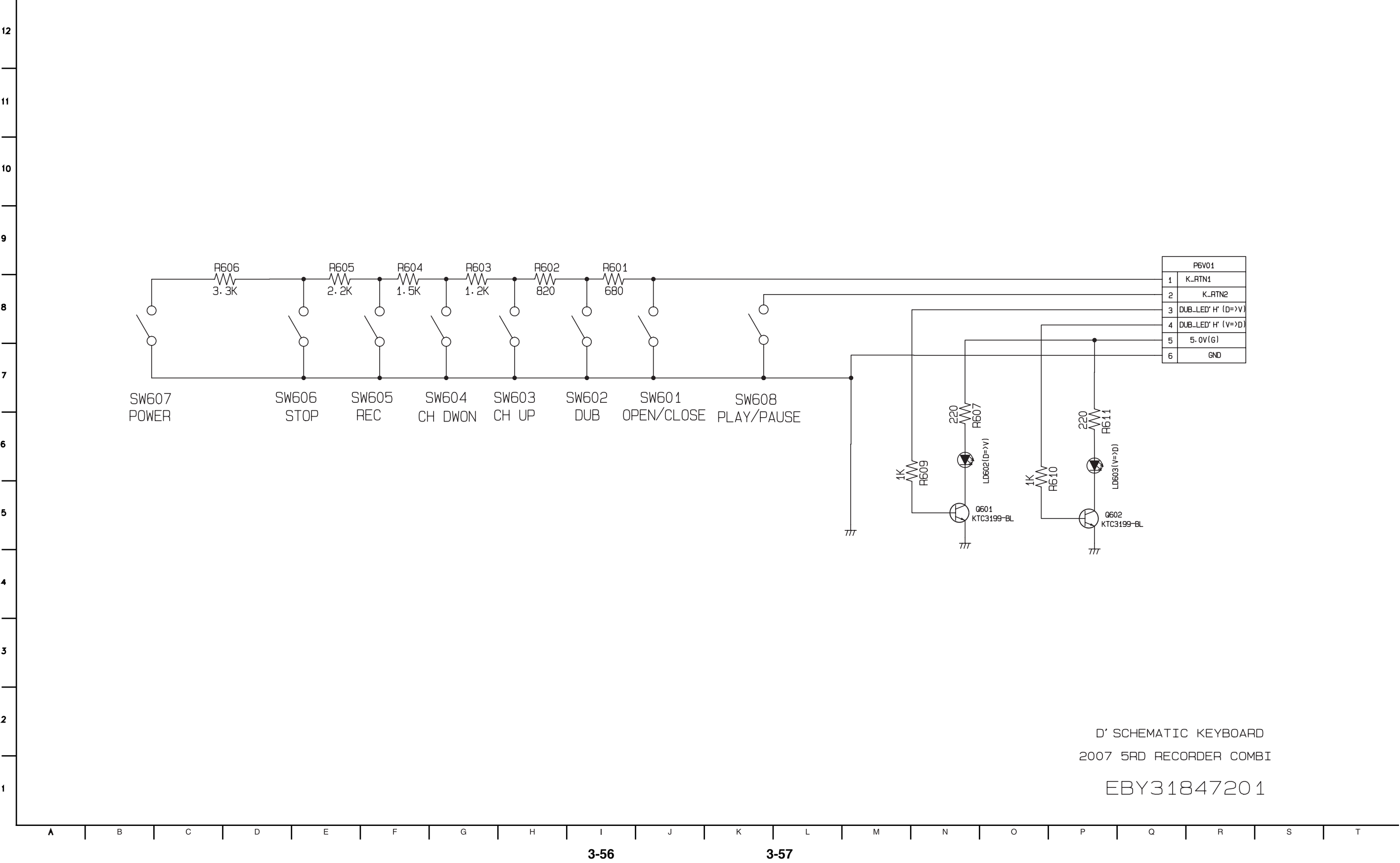
8. KARAOKE CIRCUIT DIAGRAM (KARAOKE MODEL ONLY)



9. VIDEO/AUDIO CODEC, MSP CIRCUIT DIAGRAM



10. KEY CIRCUIT DIAGRAM (7, 8 & 9 TOOL)



• CIRCUIT VOLTAGE CHART

MODE PIN NO.	EE	PLAY
IC301 (HA118725)		
1	20m	100m
2	20m	100m
3	20m	100m
4	1.95V	4.88V
5	1.94V	1.88V
6	2.6V	3.12V
7	2.8V	2.74V
8	2.5V	1.7V
9	2.04V	1.3V
10	1.8V	1.88V
11	2V	1.8V
12	1.6V	0.72V
13	0V	0V
14	1.26V	1.3V
15	3.04V	3.36V
16	0V	4.78V
17	2.38V	2.32V
18	1.88V	2.84V
19	3.02V	2.94V
20	0V	0V
21	2.38V	2.34V
22	4.88V	4.82V
23	2.64V	2.24V
24	0V	0V
25	2.08V	2.14V
26	3.08V	2.66V
27	0V	0V
28	150m	140m
29	3.88V	3.18V
30	2.08V	2.74V
31	4.74V	4.72m
32	2.08V	2.12V
33	2.42V	2.26V
34	1.58V	1.54V
35	3.3V	3.36V
36	2.5V	2.32V
37	3.1V	3.18V
38	2.6V	2.28V
39	1.4V	1.42V
40	2.3V	2.16V
41	1.08V	1.58V
42	1.82V	1.84V
43	2.04V	2.28V
44	0V	0V
45	2.88V	3.04V
46	2V	2.98V
47	4.82V	4.78V
48	120mV	2.4V
49	3.48V	1.94V
50	4.78V	4.74V
51	2.08V	1.98V

MODE PIN NO.	EE	PLAY
52	4.8V	4.7V
53	2.6V	2.8V
54	0V	0V
55	1.3V	1.48V
56	0V	0V
57	2.08V	2.18V
58	1.78V	2.14V
59	4.6V	4.62V
60	4.62V	4.62V
61	3.82V	0V
62	2.2V	2.08V
63	2.32V	2.32V
64	1.62V	1.64V
65	1.62V	2.28V
66	2.3V	1.68V
67	0V	0V
68	1.12V	1.14V
69	2.3V	2.38V
70	0.82V	0.82V
71	2.2V	2.18V
72	100m	2.42V
73	4.96V	4.98V
74	4.96V	4.98V
75	2.56V	2.54V
76	2.34V	2.18V
77	2.68V	2.64V
78	0V	4.72
79	0V	0V
80	2.16V	2.68V
81	4.06V	20m
82	0V	0V
83	120m	2.72V
84	2.76V	4.74V
85	2.114V	2.42V
86	2.04V	2.08V
87	2.04V	2.08V
88	0V	0V
89	2.14V	2.08V
90	2.14V	2.08V
91	2.14V	2.08V
92	4.88V	4.89V
93	300m	260m
94	2.48V	2.4V
95	2.48V	1.86V
96	2.06V	1.86V
97	0V	0V
98	2.30V	2.46V
99	0V	20m
100	2.48V	2.42V
IC501 (MM01D10F)		
1	0V	0V
2	4.52V	4.82V

MODE PIN NO.	EE	PLAY
3	4.84V	4.84V
4	4.64V	4.58V
5	4.56V	4.56V
6	80m	60m
7	0V	0V
8	4.98V	4.98V
9	4.98V	5.3V
10	4.8V	4.8V
11	4.82V	4.82V
12	4.72V	4.82V
13	4.92V	4.92V
14	5.02V	5.02V
15	0V	0V
16	4.98V	4.98V
17	5.04V	5.04V
18	4.98V	9.98V
19	2.46V	2.46V
20	3.36V	3.36V
21	0V	0V
22	0V	0V
23	4.96V	4.96V
24	120m	140m
25	4.94V	4.94V
26	4.92V	4.92V
27	20m	20m
28	5.02V	5.02
29	4.98V	4.98V
30	4.84V	4.84V
31	5V	5V
32	0V	0V
33	4.98V	4.94V
34	0V	5V
35	5.02V	0V
36	3.16V	4.94V
37	5.7V	Da/CIk(5.5)
38	0V	5.7V
39	520m	0V
40	4.84V	520m
41	4.83V	Da/CIk(5.62)
42	4.86V	4.86V
43	0V	0V
44	5.02V	5V
45	0V	0V
46	3.94V	3.94V
47	2.88V	2.88V
48	0V	0V
49	0.98V	2.94V
50	1.84V	1.94V
51	0.98V	4.78V
52	3.28V	3.28V
53	2.38V	2.38V
54	2.52V	2.54V

MODE PIN NO.	EE	PLAY
55	1.88V	1.88V
56	0V	0V
57	0V	0V
58	120m	120m
59	4.92V	4.92V
60	4.92V	4.92V
61	0V	0V
62	4.82V	4.82V
63	3.98V	3.98V
64	0V	0V
65	2.36V	2.63V
66	0V	0V
67	4.68V	9.68V
68	0V	0V
69	2.48V	2.48V
70	2.48V	2.48V
71	0V	0V
72	2.48V	4.98V
73	4.92V	4.92V
74	0V	0V
75	2.52V	2.42V
76	2.42V	2.48V
77	80m	80m
78	0V	0V
79	4.02V	4.96V
80	4.96V	4.96V
81	2.8V	280m
82	1V	2.62V
83	120m	3.24V
84	0V	1.96V
85	0V	0V
86	4.98V	4.9V
87	4.98V	4.98V
88	5V	5V
89	0V	0V
90	4.88V	4.88V
91	0V	0V
92	0V	0V
93	5.04V	5.04V
94	4.88V	0V
95	4.98V	4.98V
96	0V	0V
97	0V	0V
98	4.98V	4.98V
99	20m	4.98V
100	0V	0V
IC801 (TDA9505H)		
1	3.28V	3.24V
2	3.28V	3.28V
3	3.32V	3.26V
4	3.28V	3.92V
5	3.28V	3.92V

MODE PIN NO.	EE	PLAY
6	3.28V	3.26
7	3.28V	3.74V
8	3.28V	3.24V
9	3.28V	3.24V
10	3.28V	3.24V
11	3.28V	3.26V
12	0V	0V
13	3.78V	4.52V
14	0V	0V
15	0V	640m
16	5.82V	6.64V
17	5.82V	6.68V
18	0V	620m
19	6.28V	6.66V
20	6.28V	6.72V
21	4.46V	4.42V
22	3.28V	4.02V
23	3.62V	3.68V
24	3.74V	4.12V
25	3.74V	3.76V
26	0.1V	640m
27	0V	0V
28	3.7V	3.68V
29	3.66V	3.64V
30	0.7V	680m
31	3.72V	3.72V
32	3.74V	4.08V
33	3.62V	3.68V
34	13.4V	13.32V
35	3.62V	520m
36	13.4V	520V
37	580m.	520V
38	0V	0V
39	0V	20m
40	4.7V	4.76V
41	0V	1.68V
42	5V	5.04V
43	5V	4.96
44	20m	3.38

TR

LOCA. NO.	SPEC	POWER ON			PB			REMARKS
		E	C	B	E	C	B	
PART : SYSTEM								
Q501	KRC103M	.000V	.030V	4.880V	.010V	5.030V	4.830V	
Q502	KRC103M	.010V	.030V	4.870V	.010V	5.030V	4.830V	
Q503	KTA1273	4.490V	5.160V	5.170V	4.460V	5.130V	5.140V	
Q504	KTC3875S	.000V	.020V	.680V	0.010V	0.020V	0.680V	
Q509	A1504	2.150V	.000V	1.490V	3.040	0.010V	2.380	
Q510	A1504	2.100V	.000V	1.500V	3.030	0.010V	2.380	
Q508	KTA1273	5.170V	5.120V	4.450V	5.140V	5.050V	4.400V	
PART : AVCP								
Q301	2SC5344	0.19	0.19	0.01	0.18	0.18	0.01	
Q302	STB1277	5.03	0.18	5.03	5.03	0.08	5.03	
Q305	KTC3875S	0.01	0.01	0.70	0.01	0.01	0.71	
Q306	KTC3875S	0.01	0.00	0.71	0.00	0.00	0.72	
Q307	KRA103S	5.05	5.00	0.05	5.05	5.01	0.04	
Q303	DTC124EK	0.00	5.05	0.05	0.00	5.05	0.04	
Q310	KTA1504	2.14	0.01	1.49	3.05	0.01	2.38	
Q201	KTA1504	2.12	0.00	1.50	3.05	0.00	2.38	
PART : AV DECODER								
Q403	KRC103S	.000V	.010V	.010V	.000V	.010V	.010V	
Q404	KRC103S	.000V	.010V	.010V	.000V	.010V	.010V	
PART : HI-FI/F.JACK/AMP								
Q801	STD1862LY	5.120	5.230	5.900	5.110	5.230	5.880	
Q802	STD1862LY	11.61	13.60	12.26	11.62	13.58	12.28	
Q803	KTA1268	34.00	33.90	33.30	34.10	33.90	33.40	
Q804	KTC3198	0.01	0.01	0.66	0.01	0.01	0.66	
PART : JACK								
Q904	KRC103S	.000V	.040V	4.240V	.000V	4.750V	.010V	
Q906	KRC103S	.000V	.040V	4.250V	.000V	4.750V	.000V	
Q901	KTA1504	5.250V	5.230V	4.520V	5.240V	-.370V	4.740V	
Q907	KTA1504	5.250V	5.230V	4.520V	5.240V	-.340V	4.730V	
Q908	KTA1504	2.450V	.000V	1.780V	2.450V	1.780V	1.620V	
Q902	KTC3875S	.000V	.010V	.700V	.000V	-.050V	-.660V	
Q903	KTC3875S	.000V	.010V	.700V	.000V	-.020V	-.470V	
Q909	KTC3875S	.000V	.010V	.070V	.000V	.010V	.070V	
Q910	KTC3875S	.230V	5.040V	.020V	1.000V	5.050V	.020V	
Q911	KTC3875S	.000V	.010V	.690V	.000V	.000V	-.270V	
Q912	KTC3875S	.000V	.010V	.690V	.000V	.000V	-.360V	
Q913	KTC3875S	.000V	.010V	.070V	.000V	.010V	.070V	
Q914	KTC3875S	.000V	.010V	.070V	.000V	.010V	.070V	
PART : TUNER & VPS								
Q7S1	KTC3875S	.000V	4.480V	.000V	.000V	4.480V	.000V	
Q7S2	KRC103S	.000V	4.940V	.000V	.000V	4.940V	.000V	
Q7V1	KTA1504	2.880V	.000V	2.220V	2.880V	.000V	2.220V	
Q7W1	KTA1504	1.460V	.000V	.780V	1.450V	.000V	.780V	

CAPACITOR

LOCA. NO.	SPEC	POWER ON		PB		REMARKS
		VOLTAGE(+)	VOLTAGE(-)	VOLTAGE(+)	VOLTAGE(-)	
PART : SYSTEM						
C502	47uF/50V	13.990V	-.010V	13.600V	.010V	
C507	47uF/25V	13.990V	-.010V	13.600V	.000V	
C515	4.7uF/50V	4.280V	.000V	.110V	.000V	
C521	47uF/6.3V	5.180V	.000V	5.140V	.000V	
C524	470uF/6.3V	5.170V	.000V	5.120V	.000V	
C533	1000uF/6.3V	5.060V	.010V	4.750V	.010V	
C542	47uF/6.3V	5.160V	.000V	5.120V	.000V	
C544	1uF/16V	2.120V	2.050V	2.990V	2.560V	<-1u/50V
C546	33uF/16V	2.140V	1.200V	3.040V	1.950V	
C547	10uF/16V	5.050V	.000V	5.030V	.000V	
C554	22uF/16V	2.590V	.000V	2.560V	.000V	
C555	22uF/16V	2.620V	2.620V	2.560V	2.550V	
C556	100uF/16V	2.620V	.010V	2.560V	.000V	
PART : AVCP						
C301	47u/6.3V	5.04	0.00	5.03	0.00	
C303	0.33u/50V	0.38	0.00	0.37	0.00	
C305	4.7u/50V	2.51	0.00	2.49	0.00	
C308	4.7u/50V	2.32	0.01	2.57	0.00	
C309	22u/16V	2.53	0.00	2.53	0.00	
C310	22u/16V	2.59	0.00	2.59	0.00	
C314	47u/16V	0.35	0.00	0.30	0.00	
C317	10u/16V	2.05	0.00	2.04	0.00	
C319	10u/16V	2.84	0.00	2.84	0.00	
C327	2.2u/50V	2.03	0.00	1.91	0.00	
C328	47u/6.3V	5.04	0.00	5.03	0.00	
C329	1.0u/50V	2.81	0.00	2.81	0.00	
C331	1.0u/50V	2.81	2.40	2.81	2.38	
C337	0.1u/50V	2.51	2.24	2.33	1.90	
C339	3.3u/50V	1.52	0.00	1.46	0.00	
C340	10u/16V	3.53	2.13	3.17	2.13	
C343	47u/6.3V	4.99	0.00	4.98	0.00	
C350	47u/6.3V	5.00	0.00	5.00	0.00	
C353	3.3u/50V	2.99	0.00	3.10	0.00	
C355	2.2u/50V	2.97	0.00	3.10	0.00	
C358	1.0u/50V	1.03	0.00	0.95	0.00	
C359	4.7u/50V	2.74	0.00	2.74	0.00	
C361	1.0u/50V	2.81	0.43	2.81	0.52	
C364	0.33u/50V	4.71	0.00	4.77	0.00	
C366	47u/6.3V	4.94	0.00	4.93	0.00	
C203	1.0u/50V	3.55	0.00	3.55	0.00	
C204	1.0u/50V	0.41	0.00	3.74	0.00	
C207	0.47u/50V	1.84	0.00	1.82	0.00	->4.7u
C210	0.47u/50V	1.89	0.00	2.48	0.00	->4.7u
C213	2.2u/50V	1.99	0.00	1.96	0.00	
C215	47u/16V	4.82	0.00	4.78	0.00	
PART : AV DECODER						
C401	47u/6.3V	3.22	0.00	3.22	0.00	
C402	47u/6.3V	1.80	0.00	1.80	0.00	
C406	47u/6.3V	3.24	0.00	3.24	0.00	
C435	47u/6.3V	1.80	0.00	1.80	0.00	
C443	47u/6.3V	1.78	0.00	1.78	0.00	

LOCA. NO.	SPEC	POWER ON		PB		REMARKS
		VOLTAGE(+)	VOLTAGE(-)	VOLTAGE(+)	VOLTAGE(-)	
C454	47u/6.3V	3.25	0.00	3.25	0.00	
C468	47u/6.3V	3.25	0.00	3.24	0.00	
C470	10u/16V	1.62	0.00	1.62	0.00	
C474	47u/6.3V	3.24	0.00	3.24	0.00	
C492	47u/6.3V	5.06	0.00	5.06	0.00	
C493	10u/16V	2.53	0.00	2.52	0.00	
PART : HI-F/F.JACK/AMP						
C806	10uF/16V	.030V	.000V	.030V	.000V	
C807	0.47uF/50V	.090V	.000V	.680V	.010V	
C808	10uF/16V	6.070V	.010V	6.070V	.010V	
C809	10uF/16V	6.070V	.010V	6.070V	.000V	
C812	10uF/16V	3.860V	.000V	3.820V	.000V	
C814	47uF/16V	3.880V	.000V	3.870V	.000V	
C815	10uF/16V	.770V	.000V	.770V	.000V	
C816	10uF/16V	3.870V	.000V	3.870V	.000V	
C817	10uF/16V	.770V	.000V	.760V	.000V	
C818	47uF/16V	3.880V	.000V	3.880V	.000V	
C820	10uF/16V	3.870V	.000V	3.900V	.000V	
C822	47uF/16V	11.680V	.000V	11.630V	.000V	
C825	47uF/16V	5.000V	.000V	4.970V	.000V	
C834	10uF/16V	6.900V	6.070V	6.800V	6.060V	
C835	10uF/16V	6.900V	6.080V	6.800V	6.070V	
C848	47uF/16V	11.780V	.000V	11.720V	.000V	
C850	22uF/16V	5.250V	.000V	5.220V	.000V	
C853	22uF/16V	5.250V	2.560V	5.220V	2.550V	
C855	22uF/16V	5.250V	2.560V	5.220V	2.550V	
C858	22uF/16V	5.250V	.000V	5.230V	.000V	
C859	22uF/16V	5.250V	.000V	5.220V	.000V	
C863	220uF/6.3V	5.110V	.000V	5.100V	.000V	
C864	10uF/50V	11.790V	.000V	11.730V	.000V	
C865	4.7uF/50V	5.850V	.000V	5.850V	.000V	
C866	4.7uF/50V	12.400V	.000V	12.360V	.000V	
C867	22uF/16V	2.560V	2.270V	2.550V	2.610V	
C868	22uF/16V	2.560V	2.400V	2.550V	2.370V	
C875	220uF/6.3V	5.220V	.000V	5.220V	.000V	
C876	470uF/6.3V	1.310V	.000V	1.310V	.000V	<- 220u
C878	10uF/16V	1.800V	.000V	1.800V	.000V	
PART : JACK						
C901	47u/16V	5.030V	.010V	4.950V	.010V	
C902	47u/16V	11.770V	.000V	11.720V	.000V	
C904	10u/16V	1.390V	.000V	1.300V	.000V	
C905	10u/16V	1.060V	.000V	1.040V	.000V	
C907	10u/16V	6.890V	1.340V	6.810V	1.010V	
C908	10u/16V	6.890V	.780V	6.810V	1.010V	
C919	1u/50V	2.280V	2.360V	2.280V	2.090V	(-)>(+)
C928	10u/16V	1.450V	.430V	1.520V	.520V	
C929	10u/16V	6.890V	.010V	6.810V	.010V	
C930	10u/16V	6.890V	.010V	6.810V	.010V	
C938	10u/16V	1.360V	.350V	1.520V	.520V	C958
C940	10u/16V	1.450V	.430V	1.520V	.520V	
C946	22u/16V	2.410V	.000V	2.380V	.000V	
C959	470u/6.3V	2.460V	1.800V	2.420V	.010V	

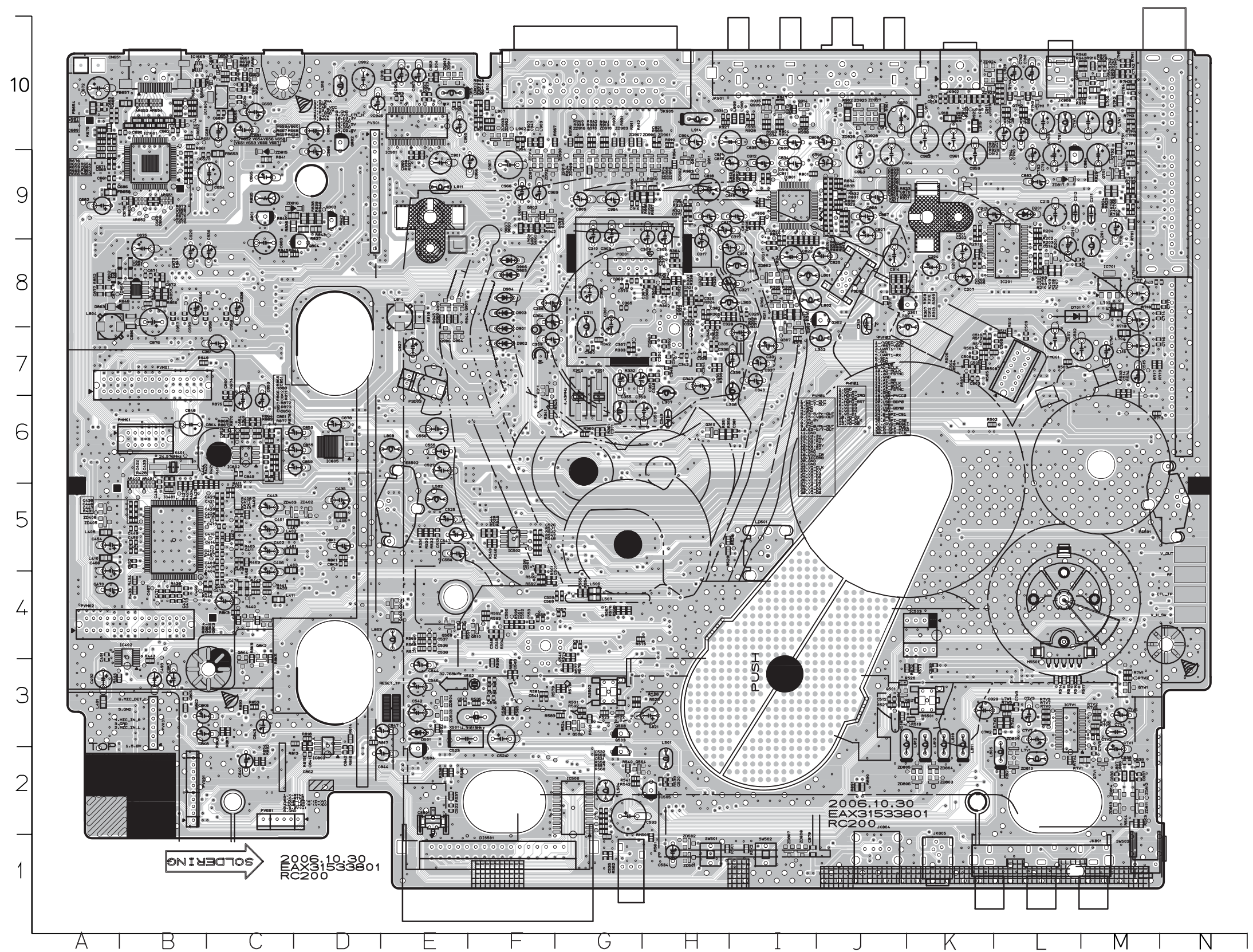
LOCA. NO.	SPEC	POWER ON		PB		REMARKS
		VOLTAGE(+)	VOLTAGE(-)	VOLTAGE(+)	VOLTAGE(-)	
C961	470u/6.3V	2.470V	1.830V	2.430V	.010V	
C962	470u/6.3V	1.640V	.010V	1.970V	.010V	
C963	470u/6.3V	1.900V	.980V	1.730V	.880V	
C964	470u/6.3V	2.440V	1.650V	2.430V	1.620V	
C965	10u/16V	6.300V	1.300V	6.230V	.220V	
C966	10u/16V	6.330V	1.280V	6.250V	.790V	
C967	470u/6.3V	3.520V	1.910V	2.060V	.440V	
C968	10u/16V	6.330V	.000V	.624V	.370V	
C969	10u/16V	6.330V	.000V	6.240V	.380V	
C970	470u/6.3V	1.900V	.050V	2.060V	.010V	
C984	10u/16V	1.760V	.010V	1.770V	.000V	
PART : TUNER & VPS						
C703	470u/10V	4.900V	.000V	4.890V	.000V	
C710	4.7u/50V	32.800V	.100V	32.400V	.010V	
C7A1	47u/16V	5.130V	.000V	5.090V	.000V	
C7S1	220u/6.3V	4.880V	.010V	4.870V	1.330V	
C7S2	10u/16V	4.880V	.000V	4.870V	.000V	
C7V1	47u/6.3V	5.010V	.000V	5.010V	.000V	
C7V3	1u/50V	3.280V	1.460V	3.270V	1.450V	
C7V6	4.7u/50V	2.640V	.000V	2.630V	.000V	
C7V7	1u/50V	5.010V	.000V	4.990V	.000V	
C7W1	10u/16V	2.400V	.780V	2.390V	.780V	
PART : HDMI						
C654	220uF/6.3V	3.25	0.01V	3.25	0.01V	
C672	220uF/6.3V	3.25	0.01V	3.25	0.01V	
C681	47uF/6.3V	5.01	0.01V	5.01	0.01V	
C682	47uF/6.3V	1.79	0.01V	1.79	0.01V	
C691	47uF/6.3V	3.31	0.01V	3.31	0.01V	
C693	47uF/6.3V	5.22	0.01V	5.22	0.01V	

CE

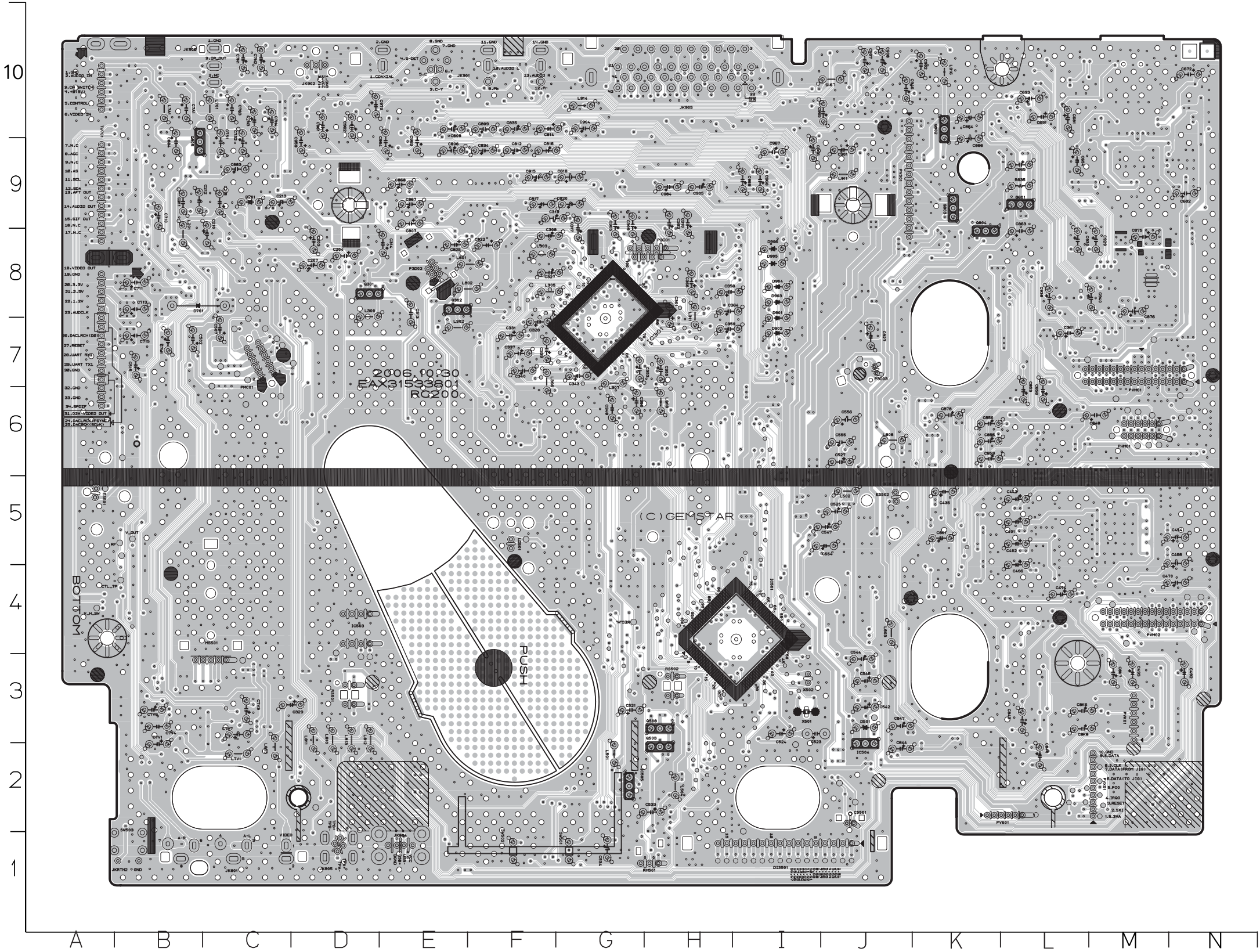
LOCA. NO.	SPEC	REC		P/OFF		REMARKS
		VOLTAGE(+)	VOLTAGE(-)	VOLTAGE(+)	VOLTAGE(-)	
PART : POWER						
C103	100u/450	320.00	0.00	324.00	0.00	
C109	33u/35	17.70	0.00	15.60	0.00	
C123	2200u/16	5.30	0.00	5.31	0.00	
C133	1000u/10	5.27	0.00	5.31	0.00	
C122	1000u/25	14.10	0.00	16.50	0.00	
C124	1000u/25	13.10	0.00	14.10	0.00	
C126	47u/50	32.70	0.00	36.60	0.00	
C127	2200u/16	3.83	0.00	5.38	0.00	
C128	2200u/16	5.38	0.00	6.78	0.00	
C132	470u/25	14.10	0.00	16.50	0.00	
C134	470u/25	13.10	0.00	14.10	0.00	
C137	1000u/10	3.81	0.00	5.39	0.00	
C152	100u/16	3.29	0.00	0.00	0.00	
C154	100u/16	2.52	0.00	0.00	0.00	
C155	100u/16	11.90	0.00	0.00	0.00	
C156	100u/16	5.02	0.00	0.00	0.00	

PRINTED CIRCUIT DIAGRAMS

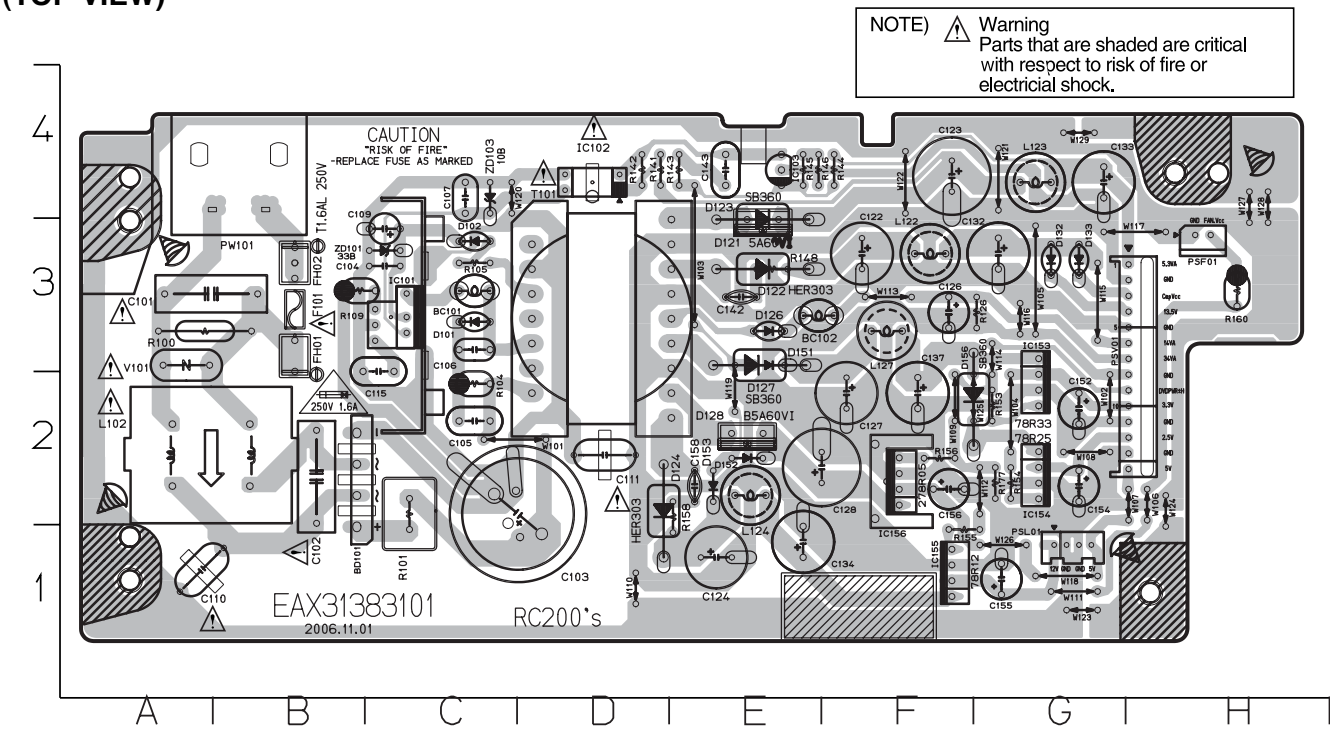
1. VCR P.C.BOARD (TOP VIEW)



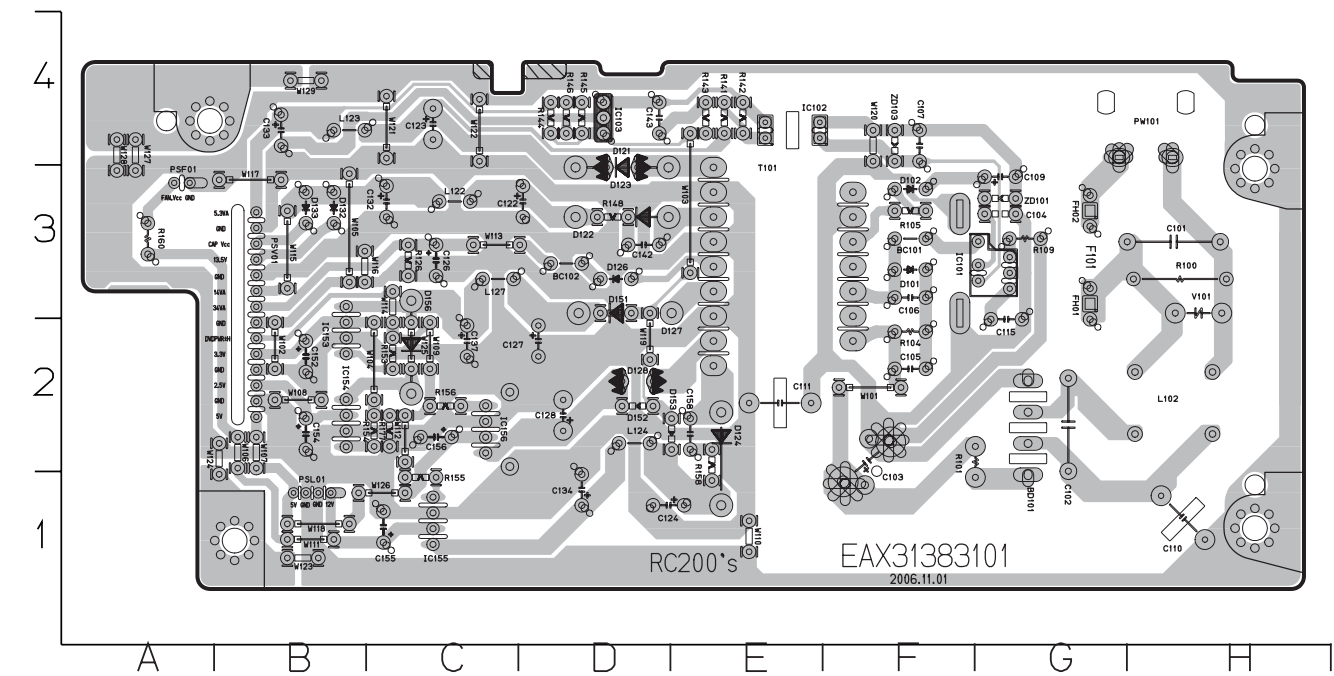
VCR P.C.BOARD
(BOTTOM VIEW)



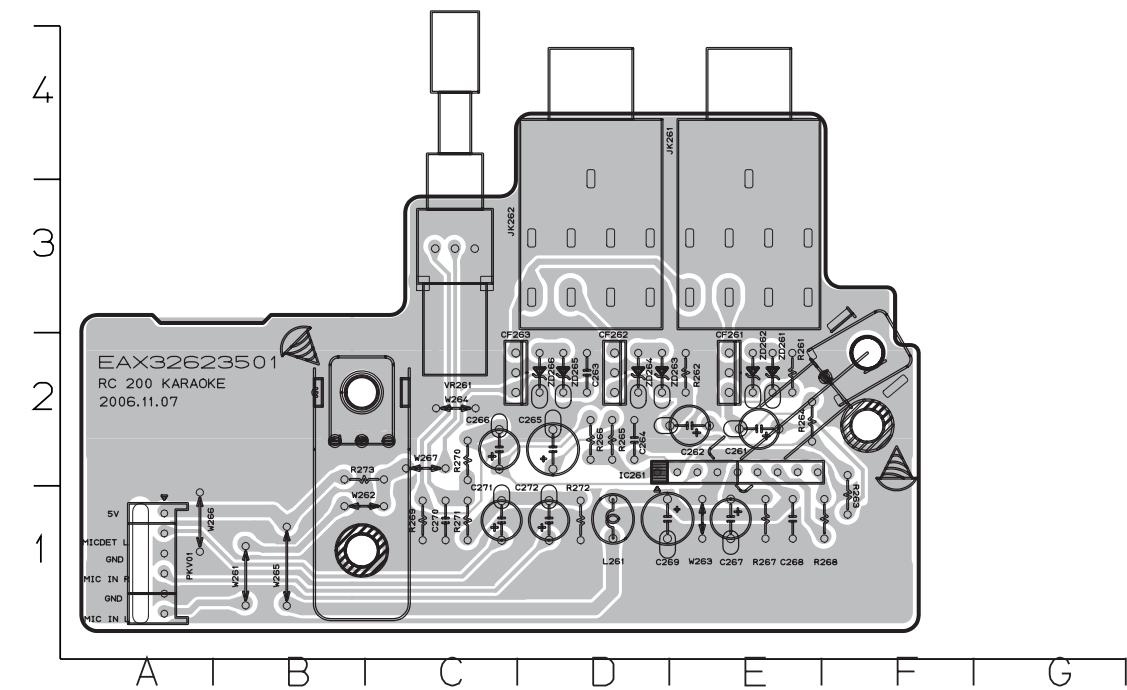
2. SMPS P.C.BOARD (TOP VIEW)



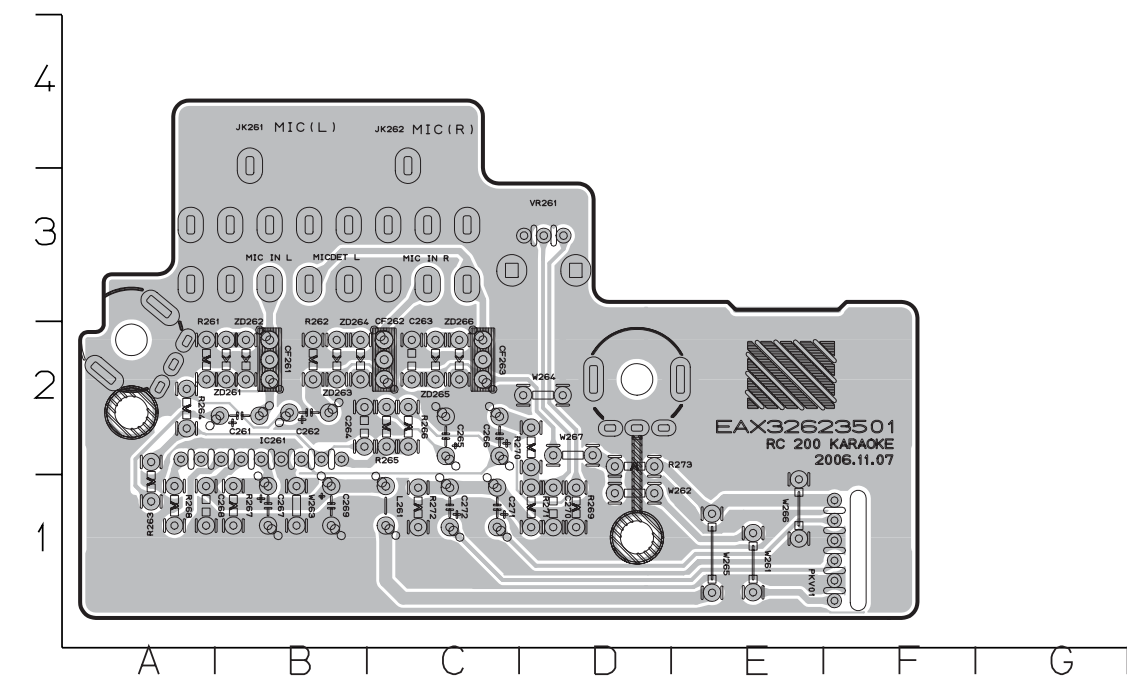
(BOTTOM VIEW)



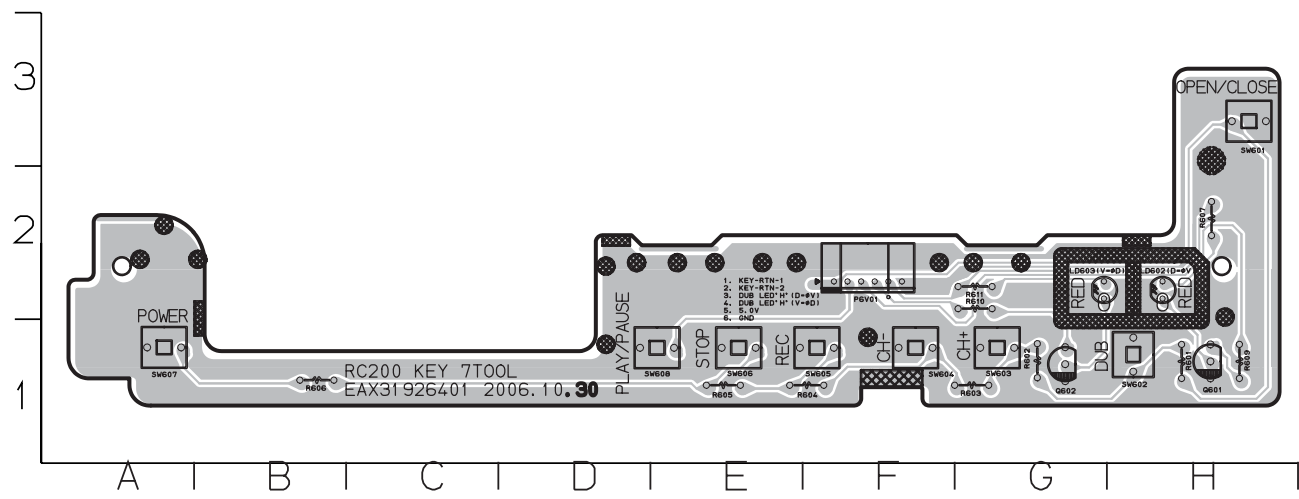
3. KARAOKE P.C.BOARD (KARAOKE MODEL ONLY) (TOP VIEW)



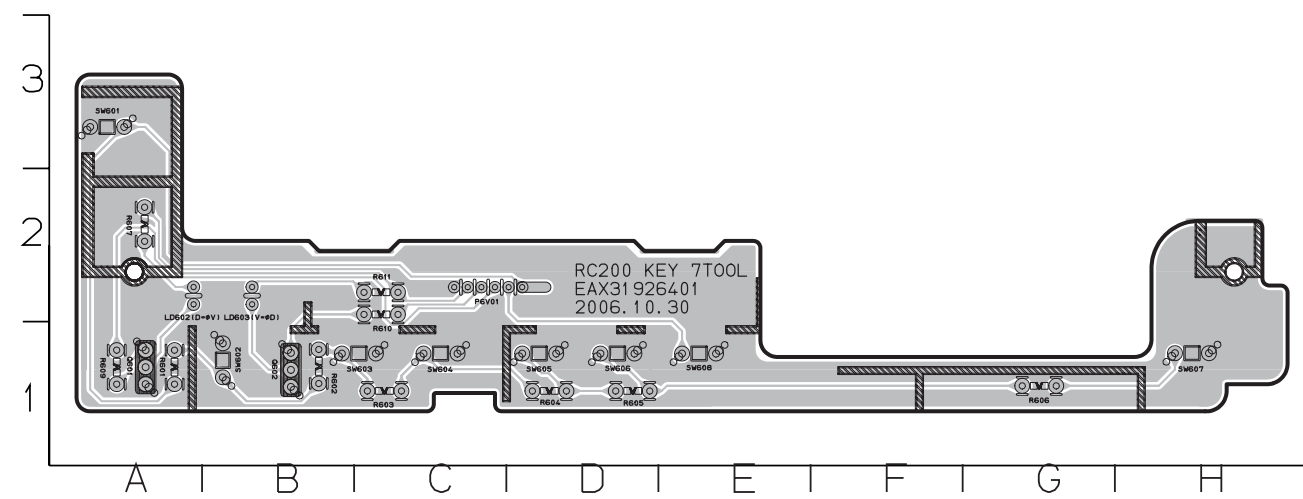
(BOTTOM VIEW)



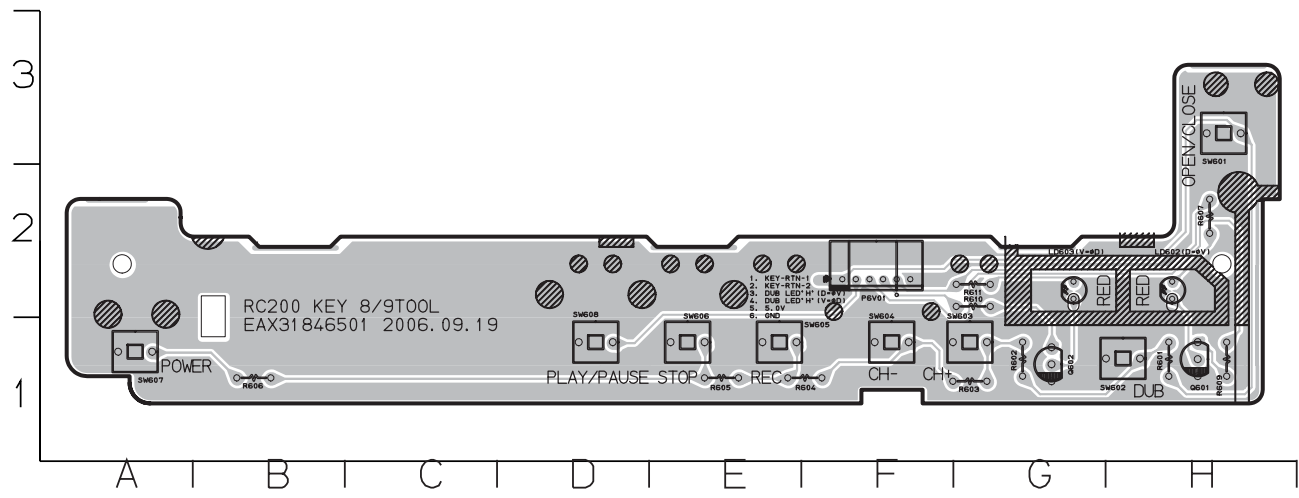
4. KEY P.C.BOARD
(7 TOOL)
(TOP VIEW)



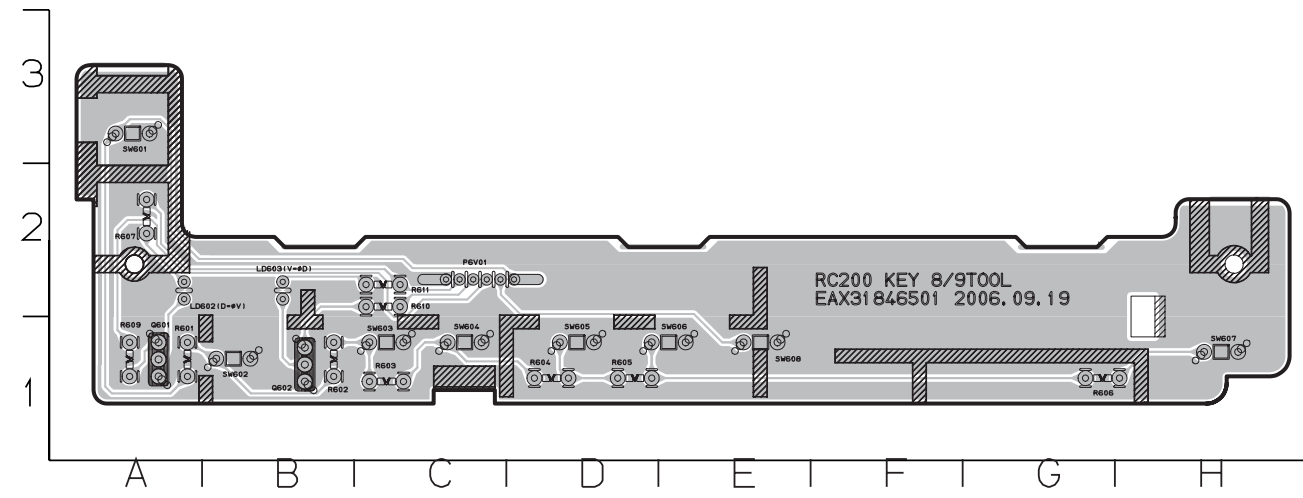
(BOTTOM VIEW)



(8, 9 TOOL)
(TOP VIEW)



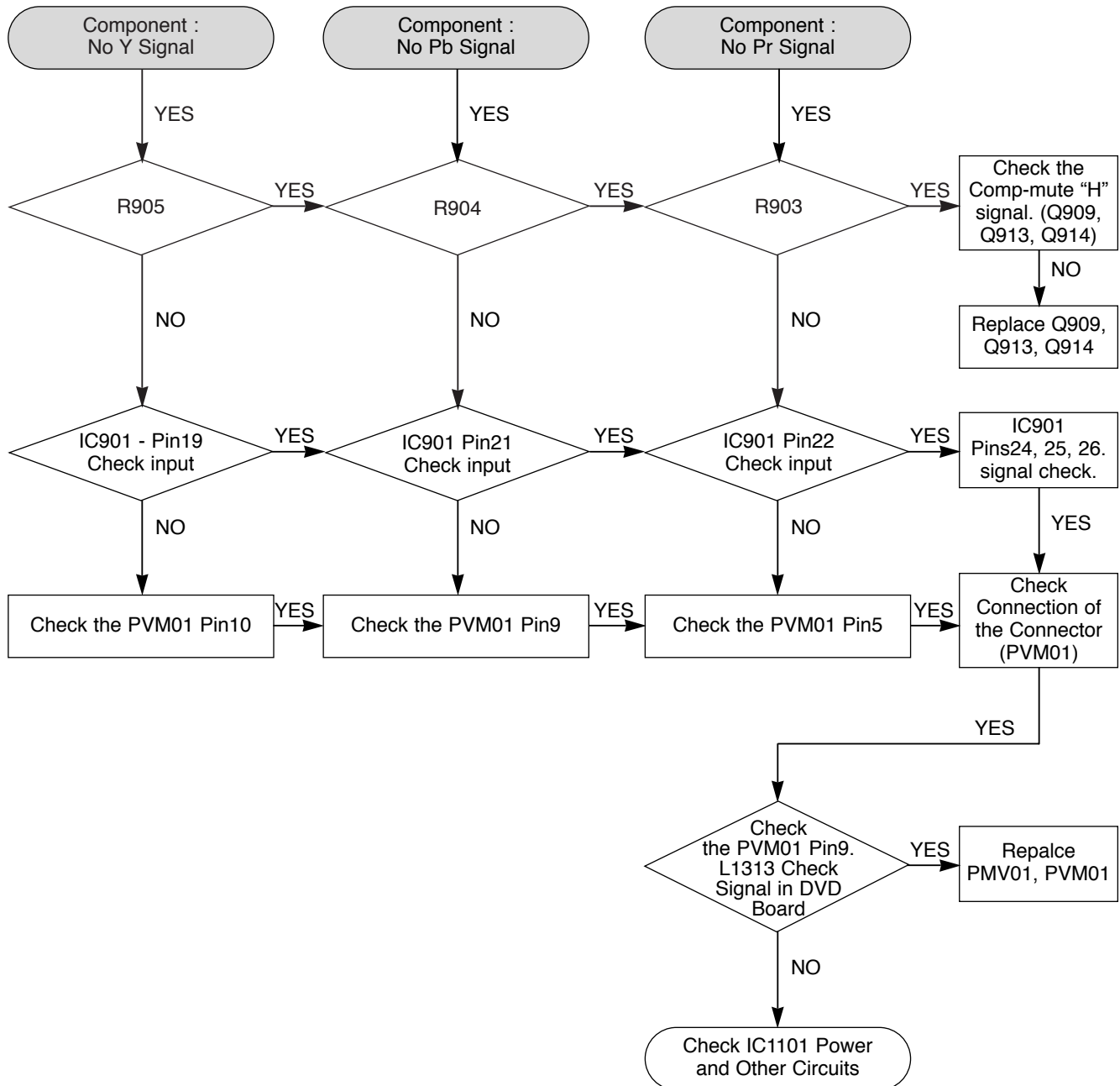
(BOTTOM VIEW)



VDR PART

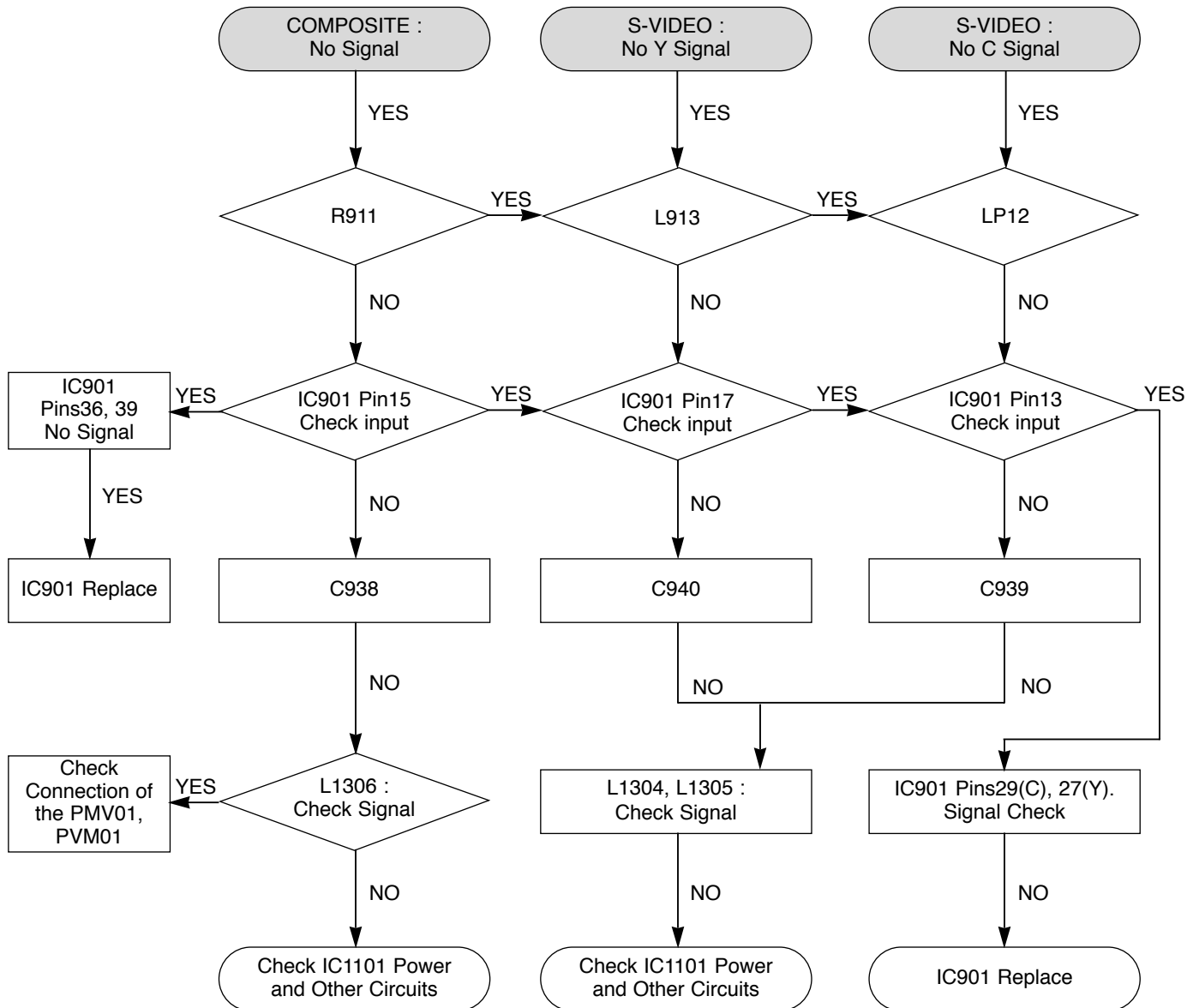
VDR ELECTRICAL TROUBLESHOOTING GUIDE

1. NO COMPONENT VIDEO SIGNAL WHEN PLAYING DISC



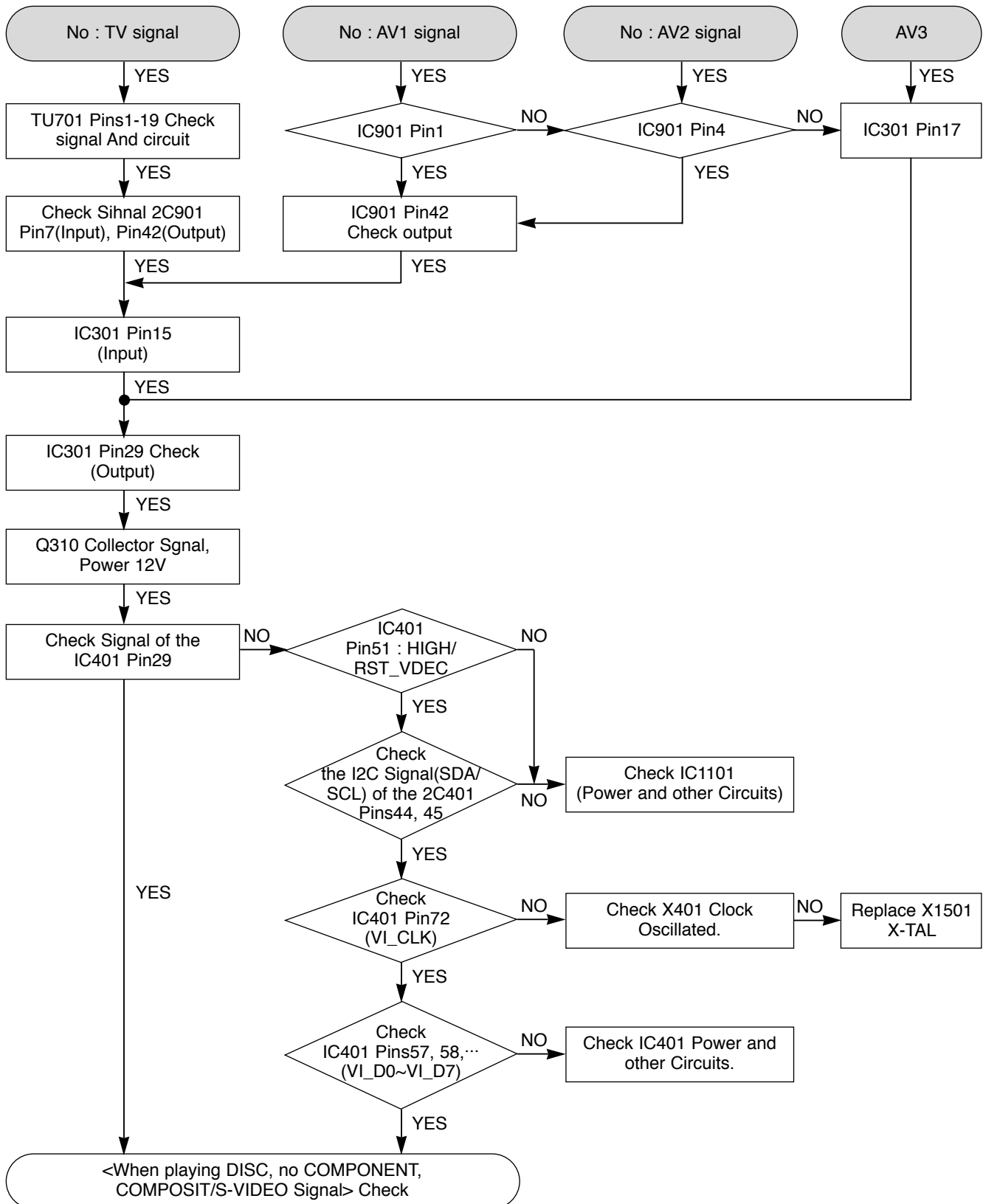
VDR ELECTRICAL TROUBLESHOOTING GUIDE

2. NO COMPOSITE/S-VIDEO SIGNAL WHEN PLAYING DISC



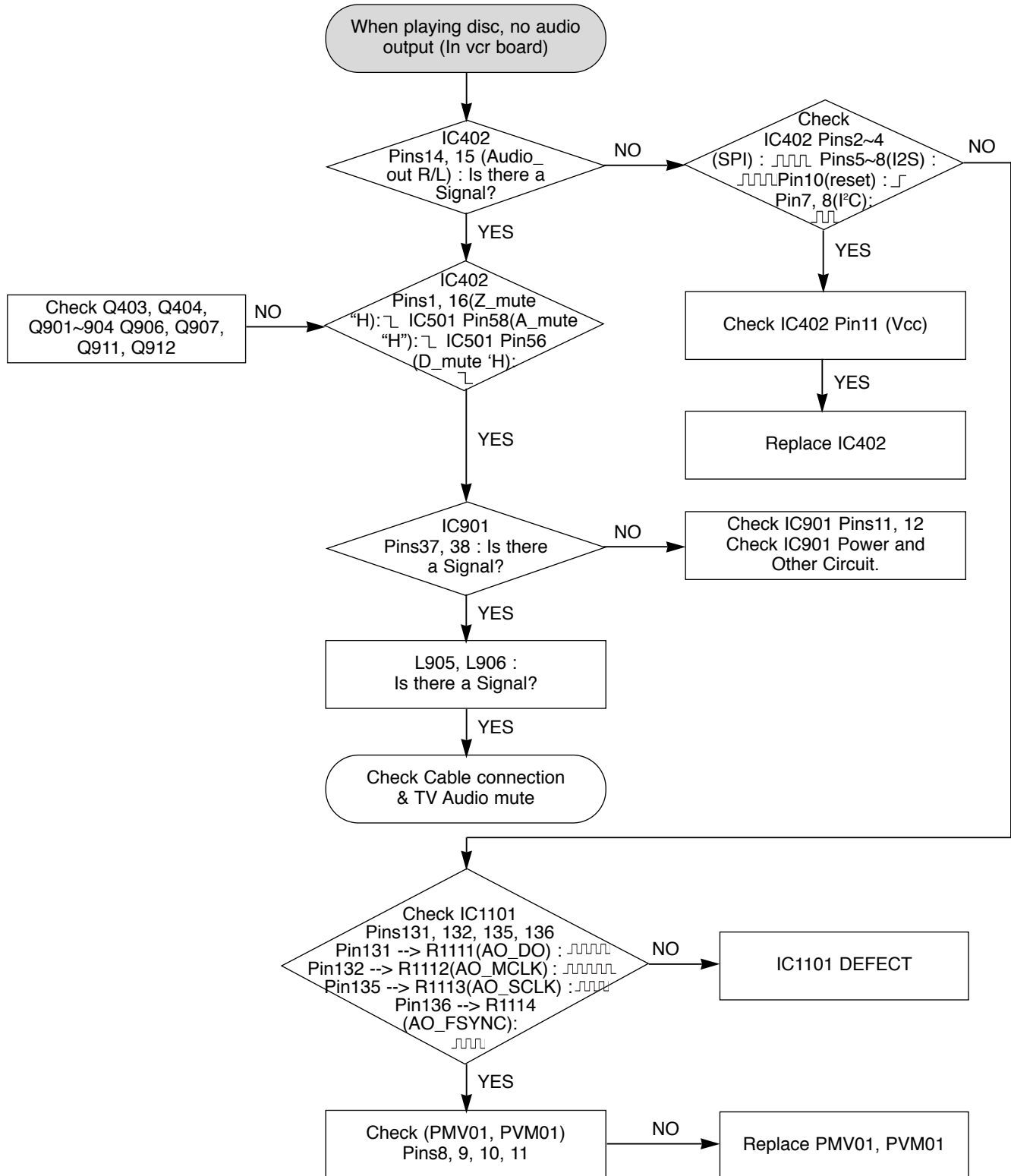
VDR ELECTRICAL TROUBLESHOOTING GUIDE

3. NO TV, EXTERNAL INPUT VIDEO SIGNAL



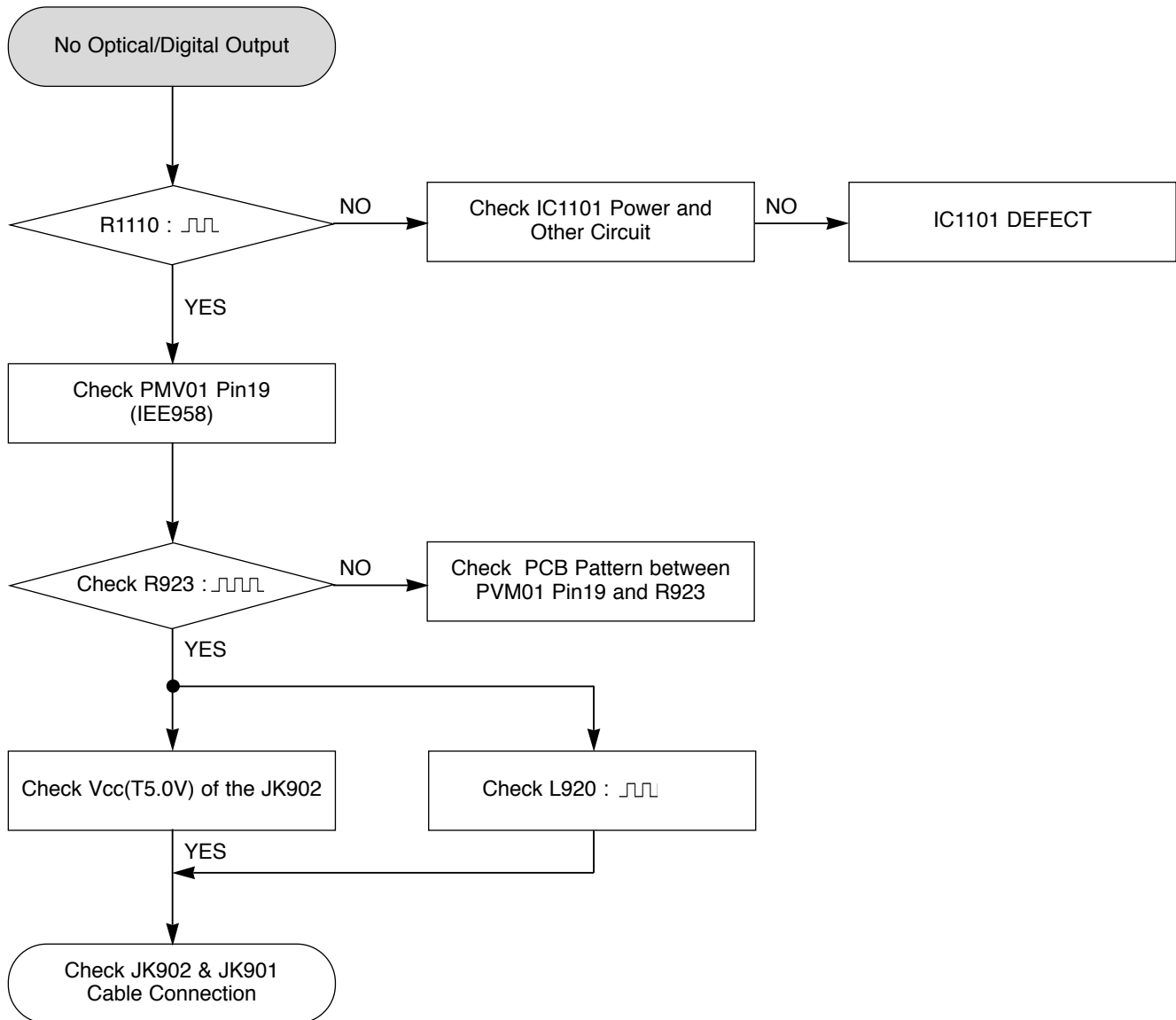
VDR ELECTRICAL TROUBLESHOOTING GUIDE

4. WHEN PLAYING DISC, NO AUDIO OUTPUT (IN VCR BOARD)



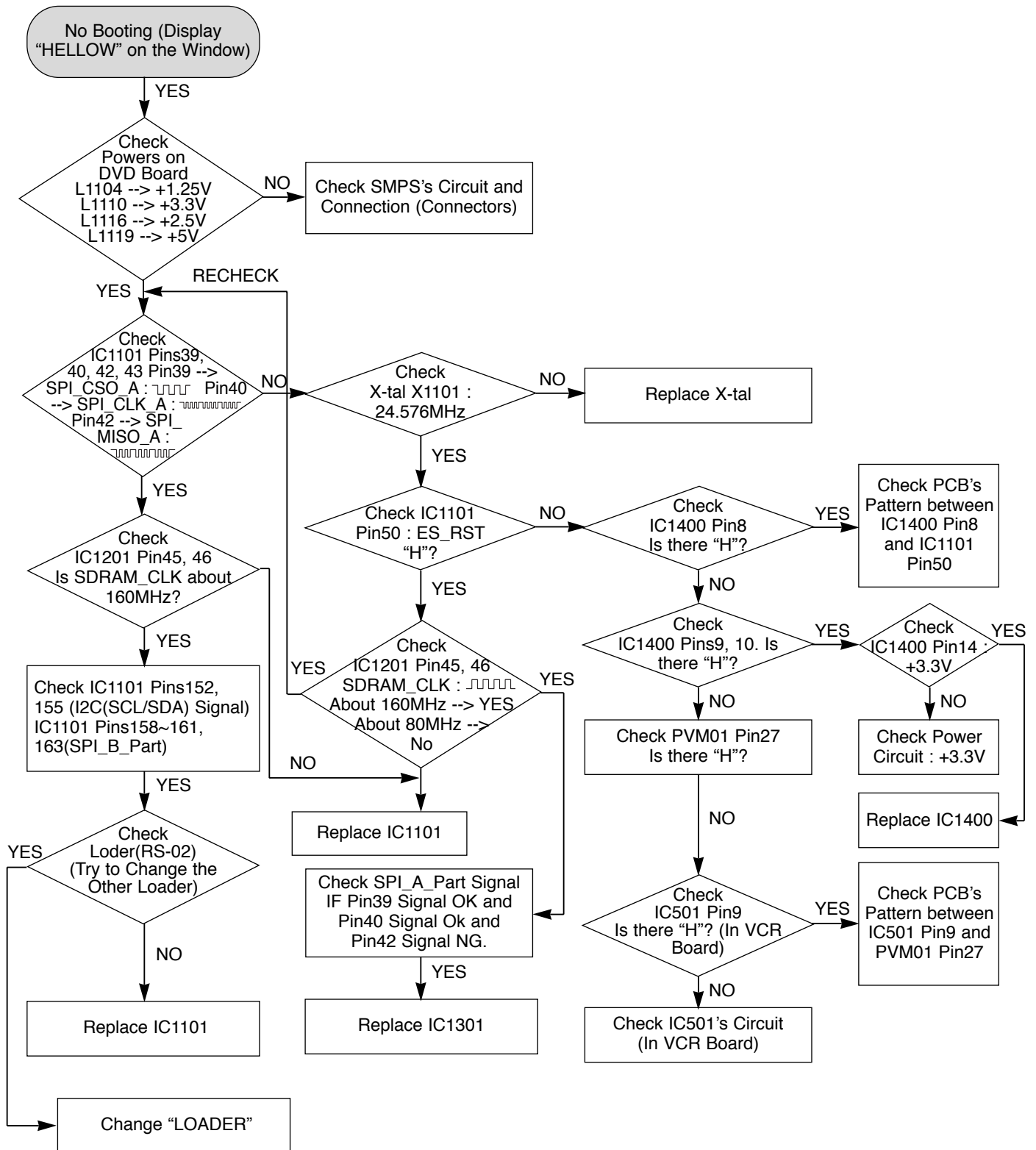
VDR ELECTRICAL TROUBLESHOOTING GUIDE

5. NO OPTICAL/DIGITAL OUTPUT



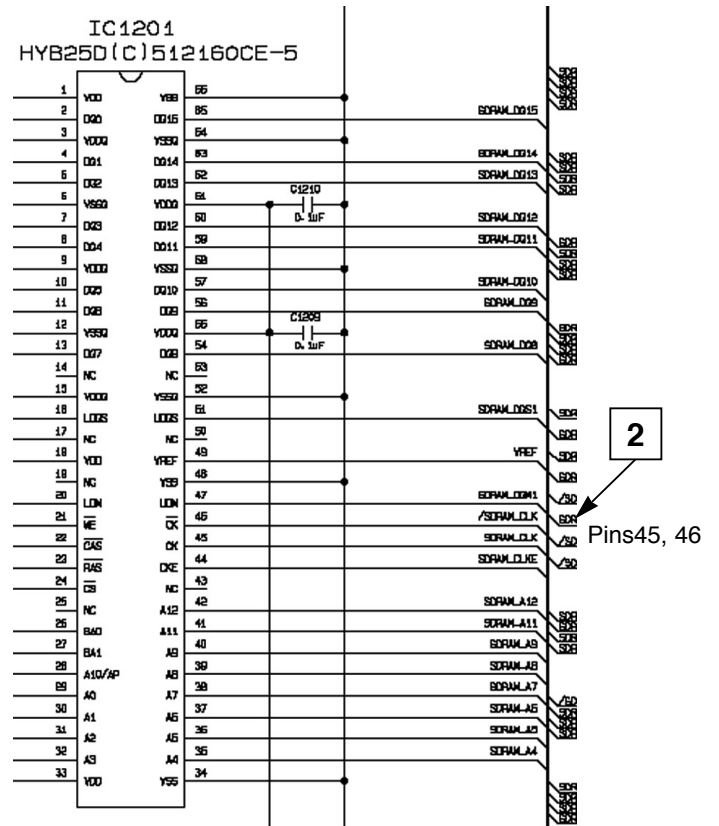
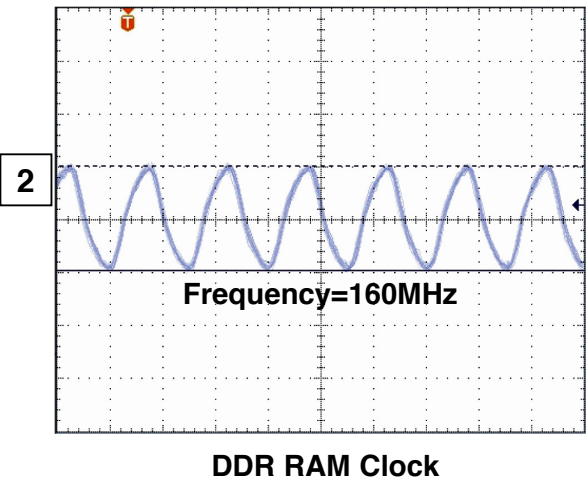
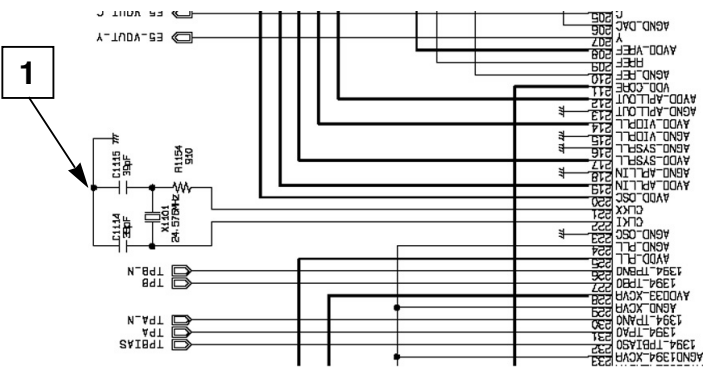
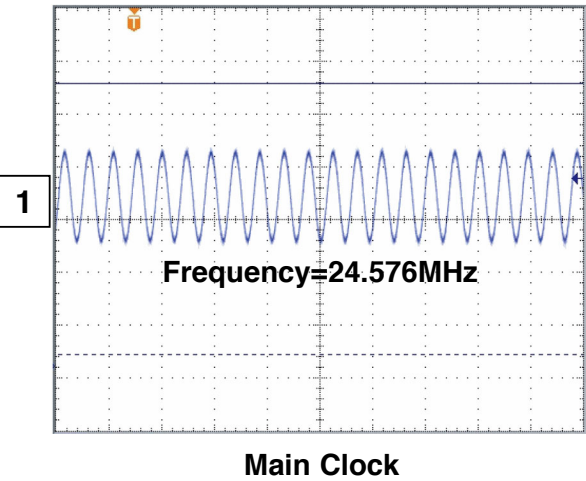
VDR ELECTRICAL TROUBLESHOOTING GUIDE

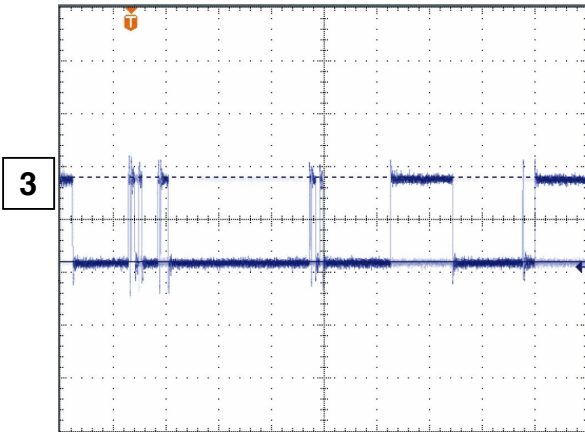
6. NO BOOTING (DISPLAY “HELLO” ON THE WINDOW)



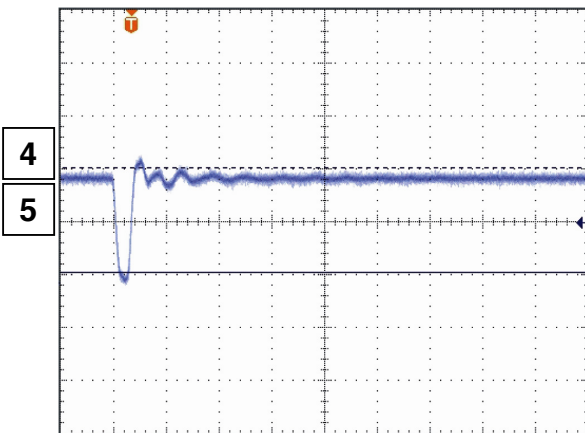
WAVEFORMS

1. SYSTEM BLOCK

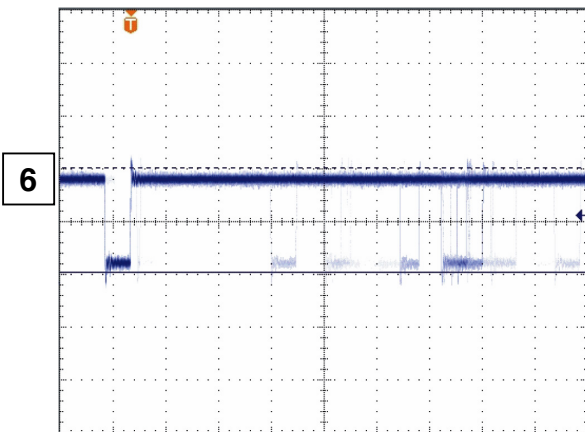




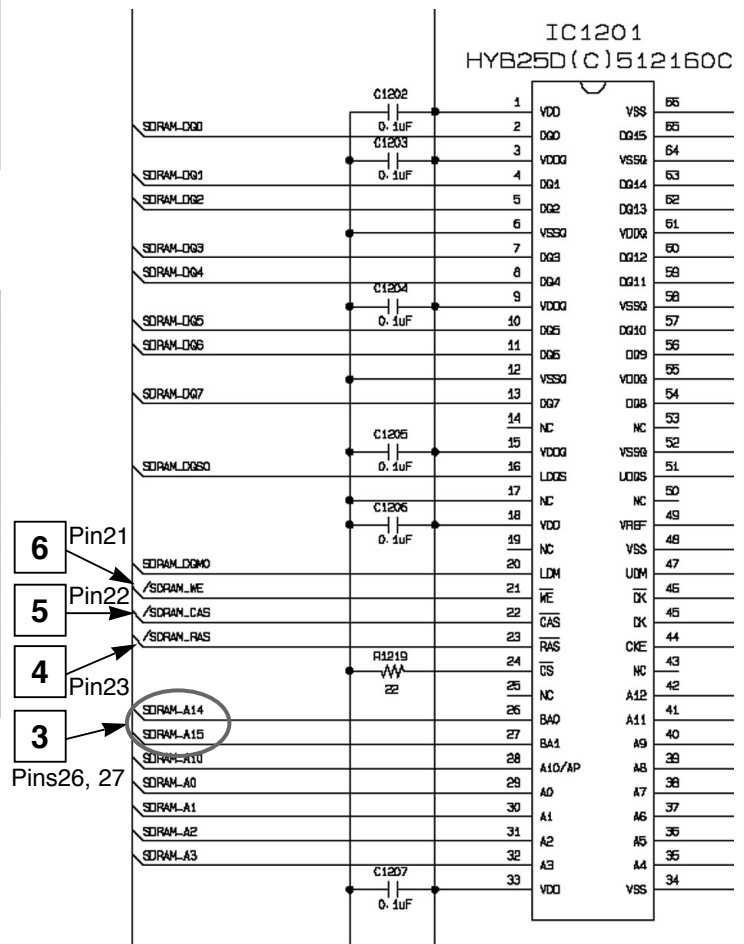
DDR Bank Address



DDR RAS & CAS

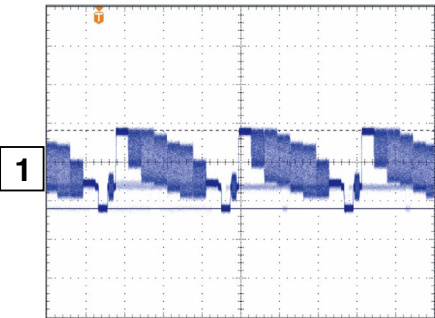


DDR Write Enable

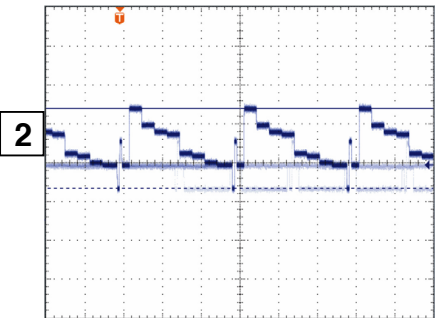




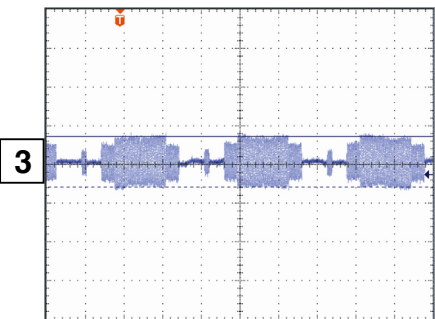
2. VIDEO BLOCK (COLOR BAR INPUT)



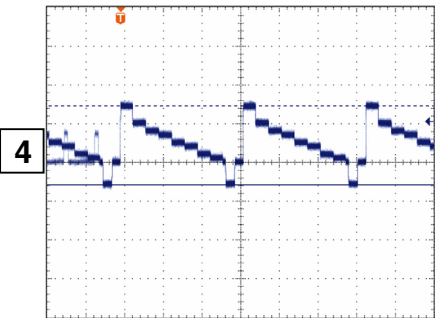
CVBS_OUT



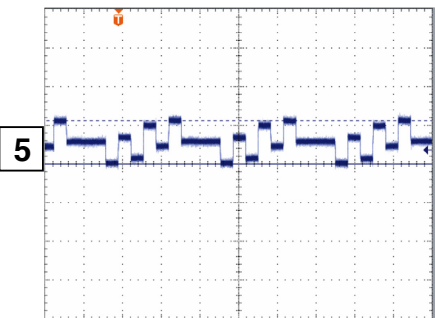
Y_OUT



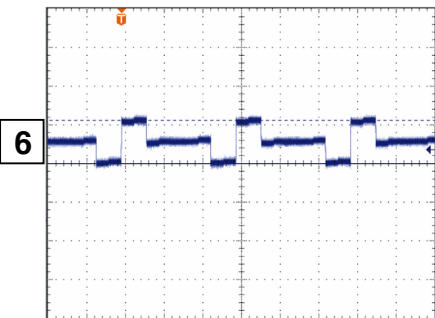
C_OUT



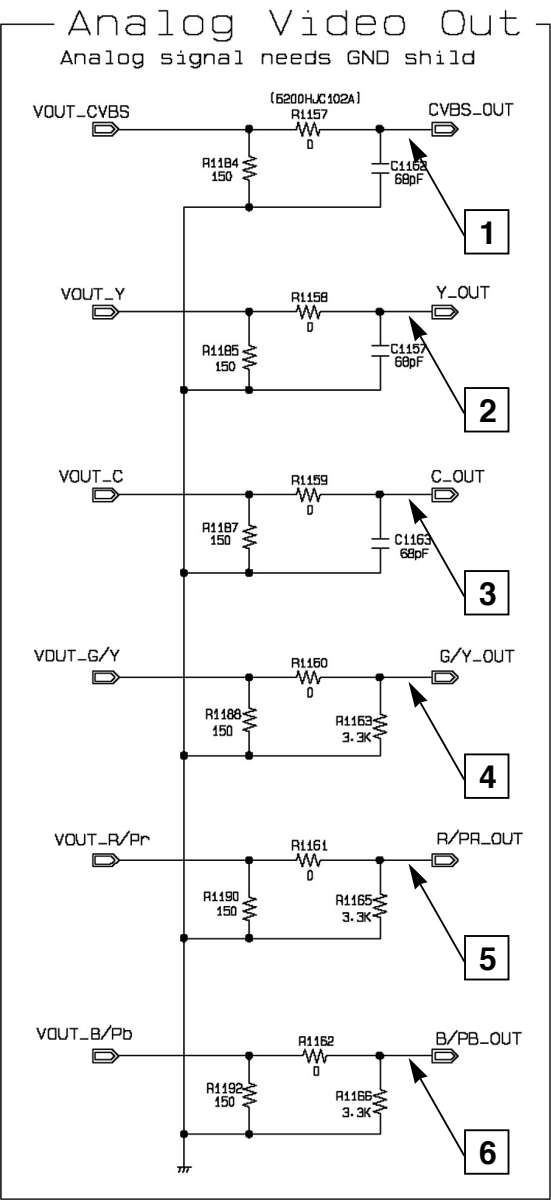
G/Y_OUT



R/PR_OUT

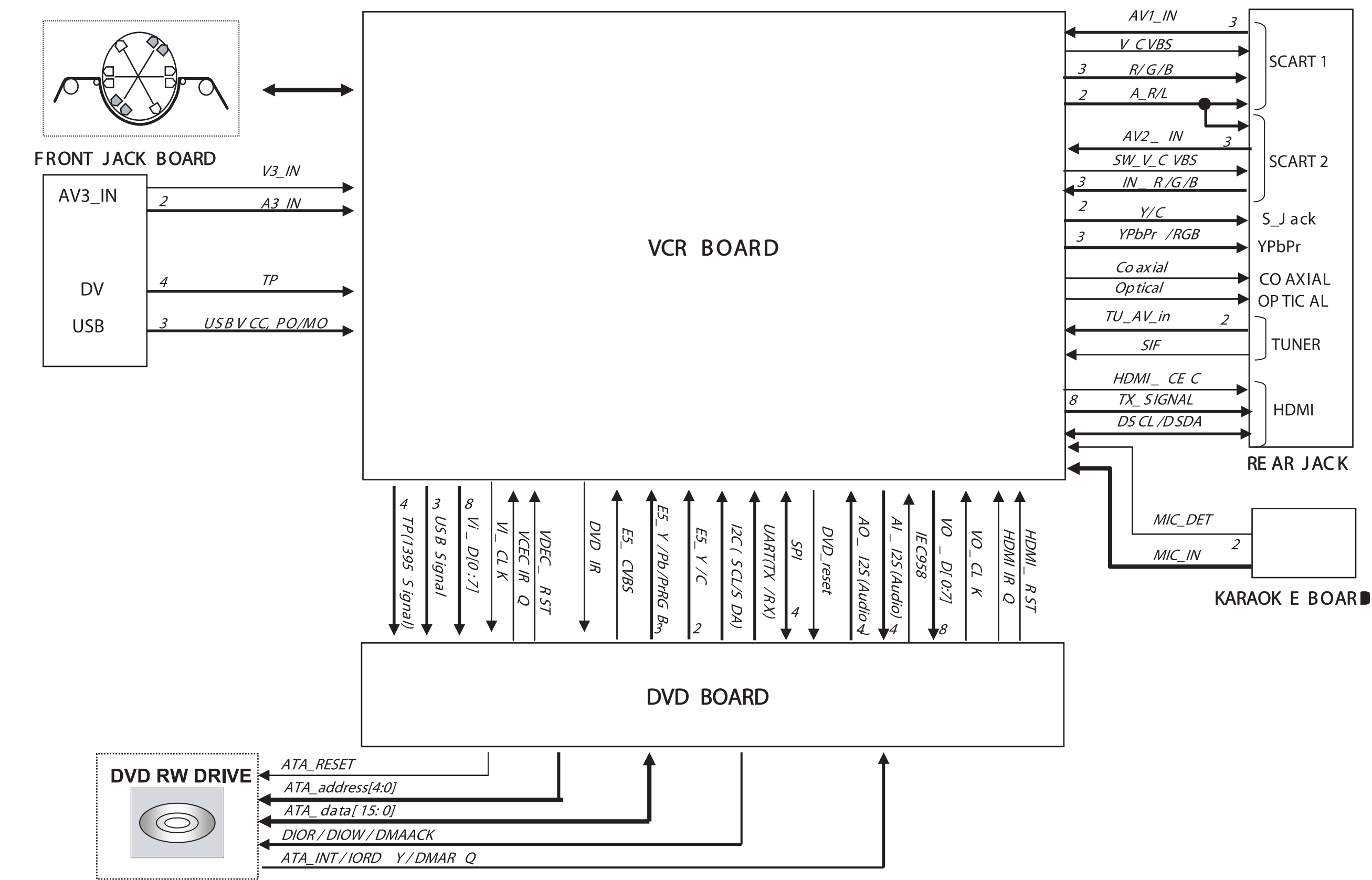


B/PB_OUT

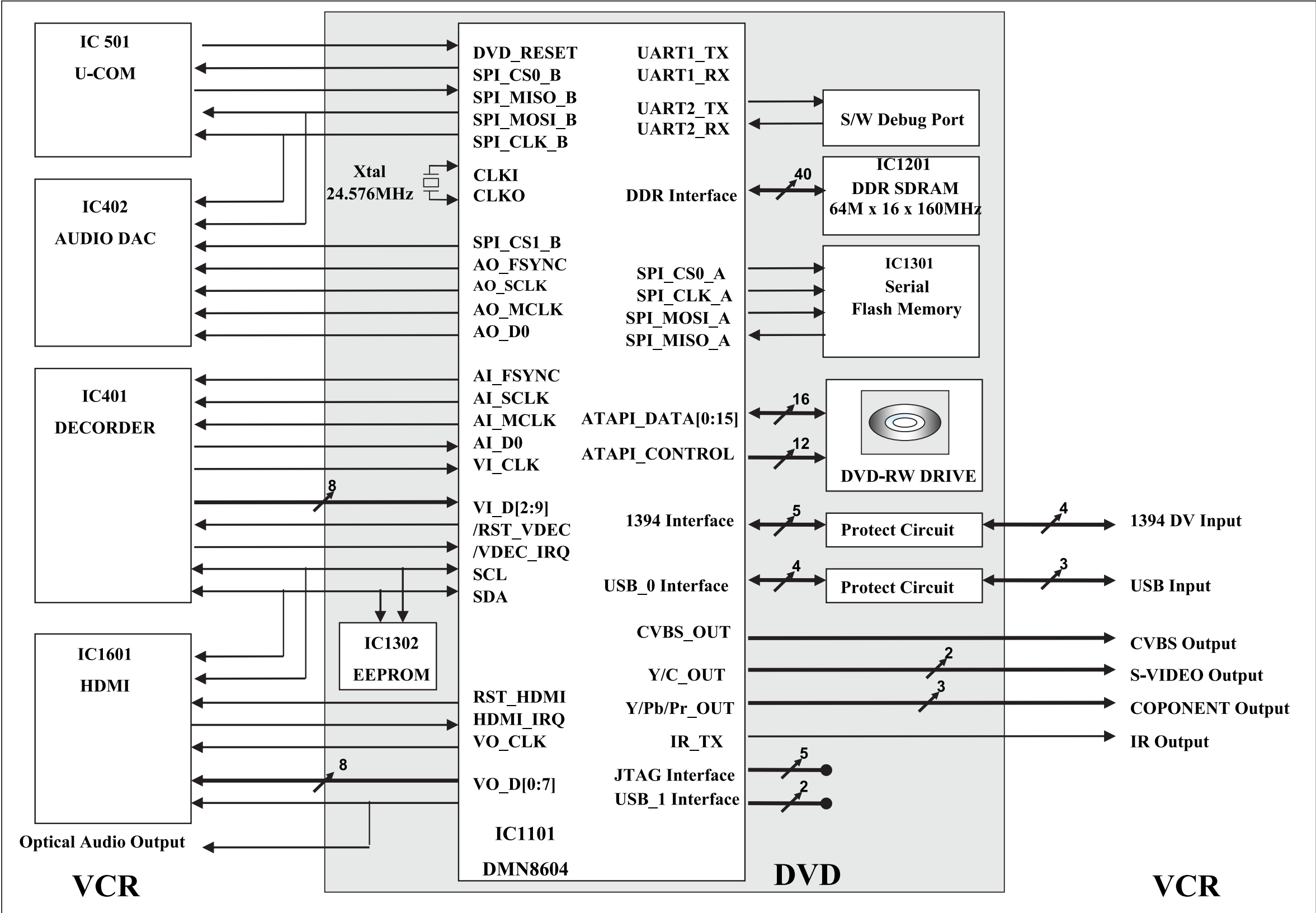


BLOCK DIAGRAMS

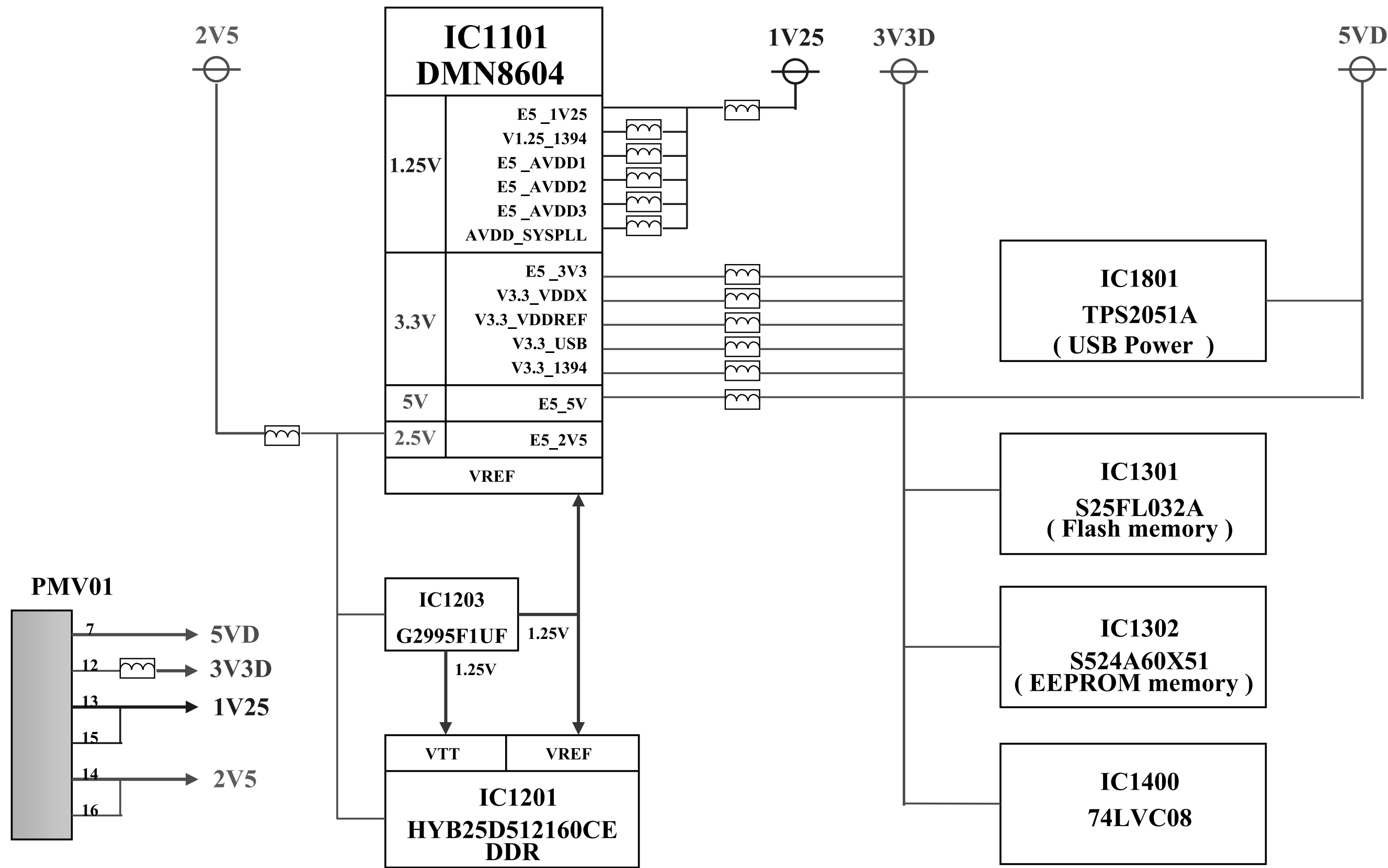
1. VDR SET TOTAL BLOCK DIAGRAM



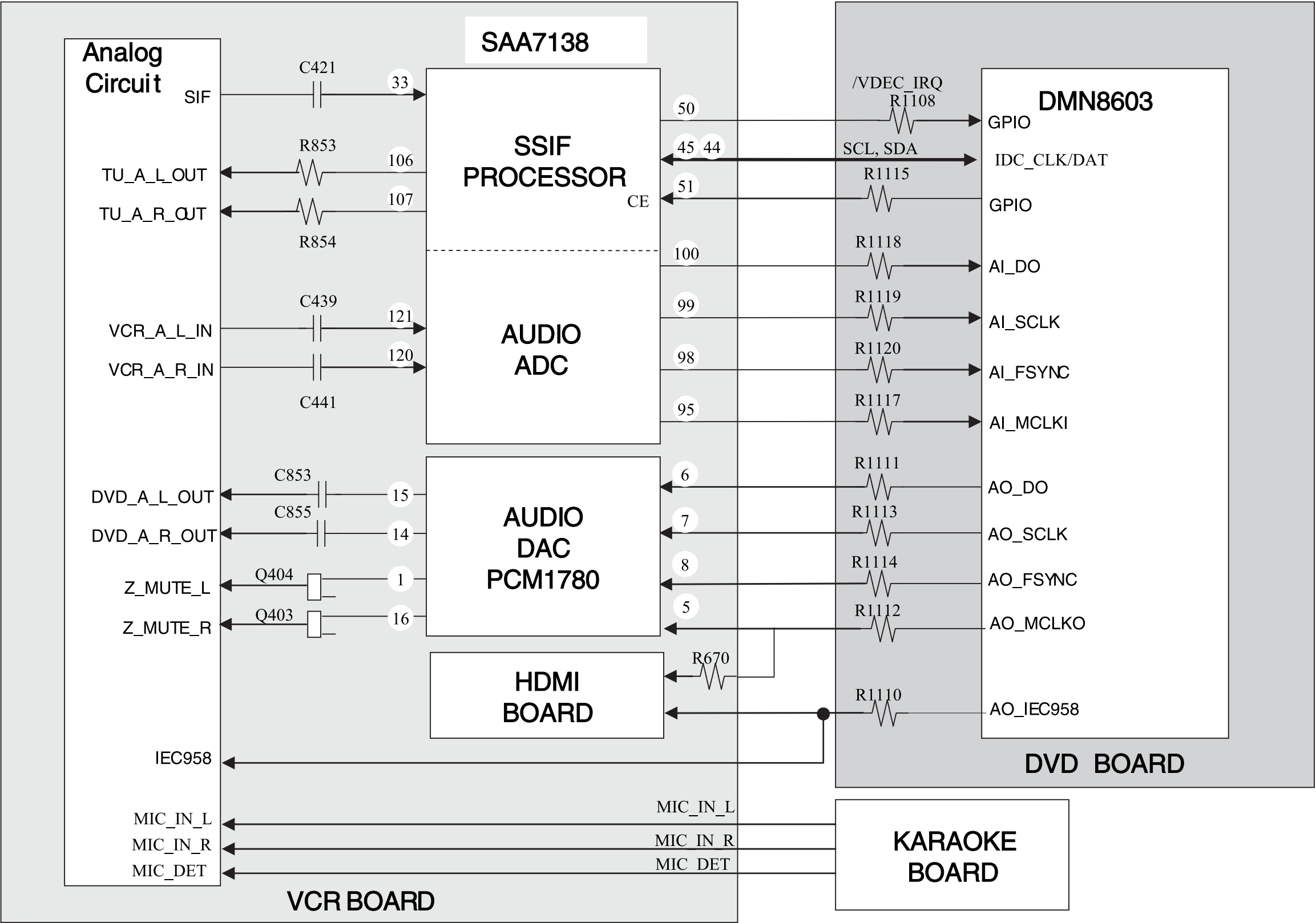
2. VDR MAIN H/W BLOCK DIAGRAM



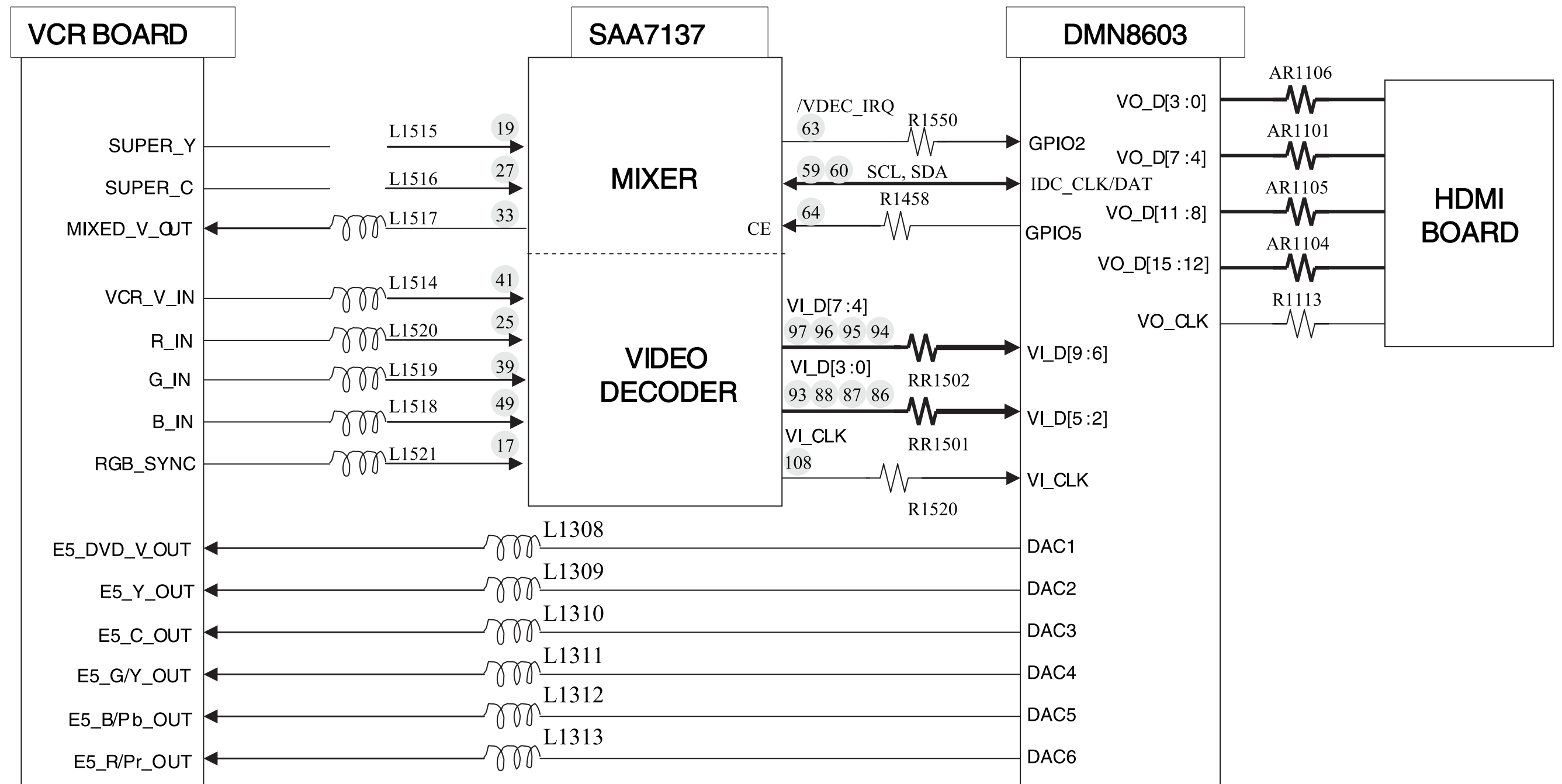
3. POWER BLOCK DIAGRAM



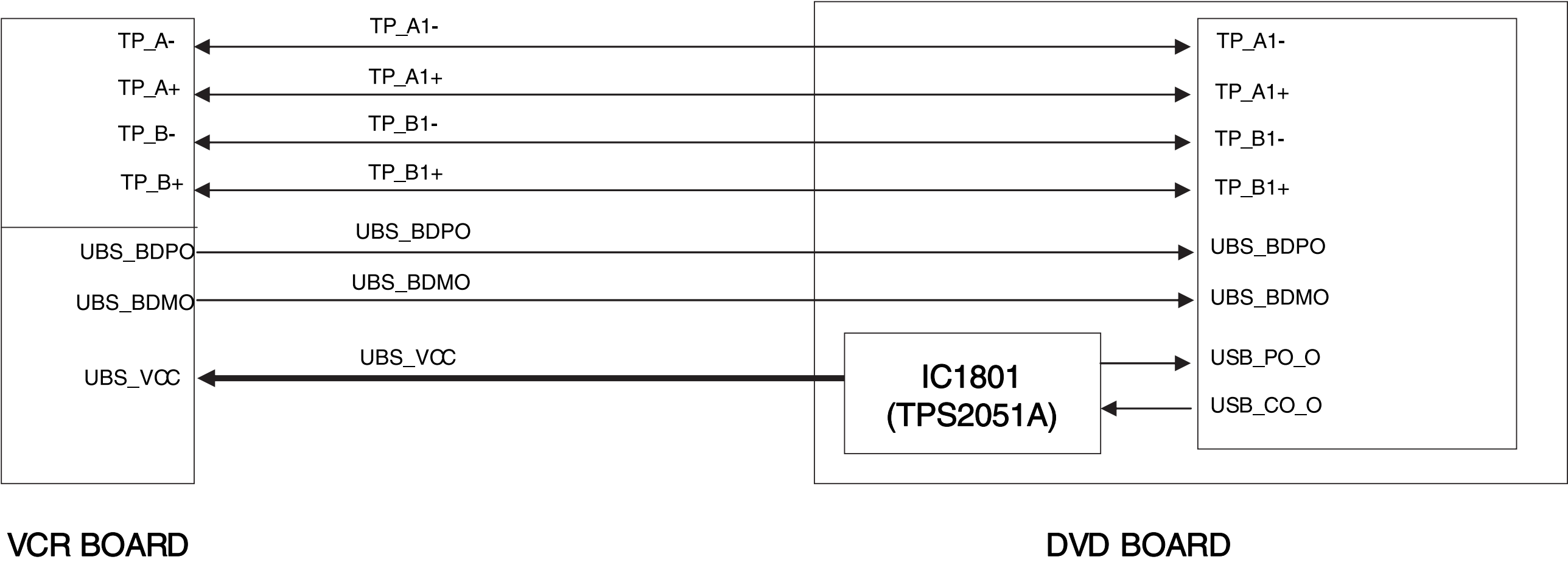
4. AUDIO IN/OUT BLOCK DIAGRAM



5. VIDEO IN/OUT BLOCK DIAGRAM



6. DV1394, USB BLOCK DIAGRAM



1. MPEG (DMN8604) CIRCUIT DIAGRAM



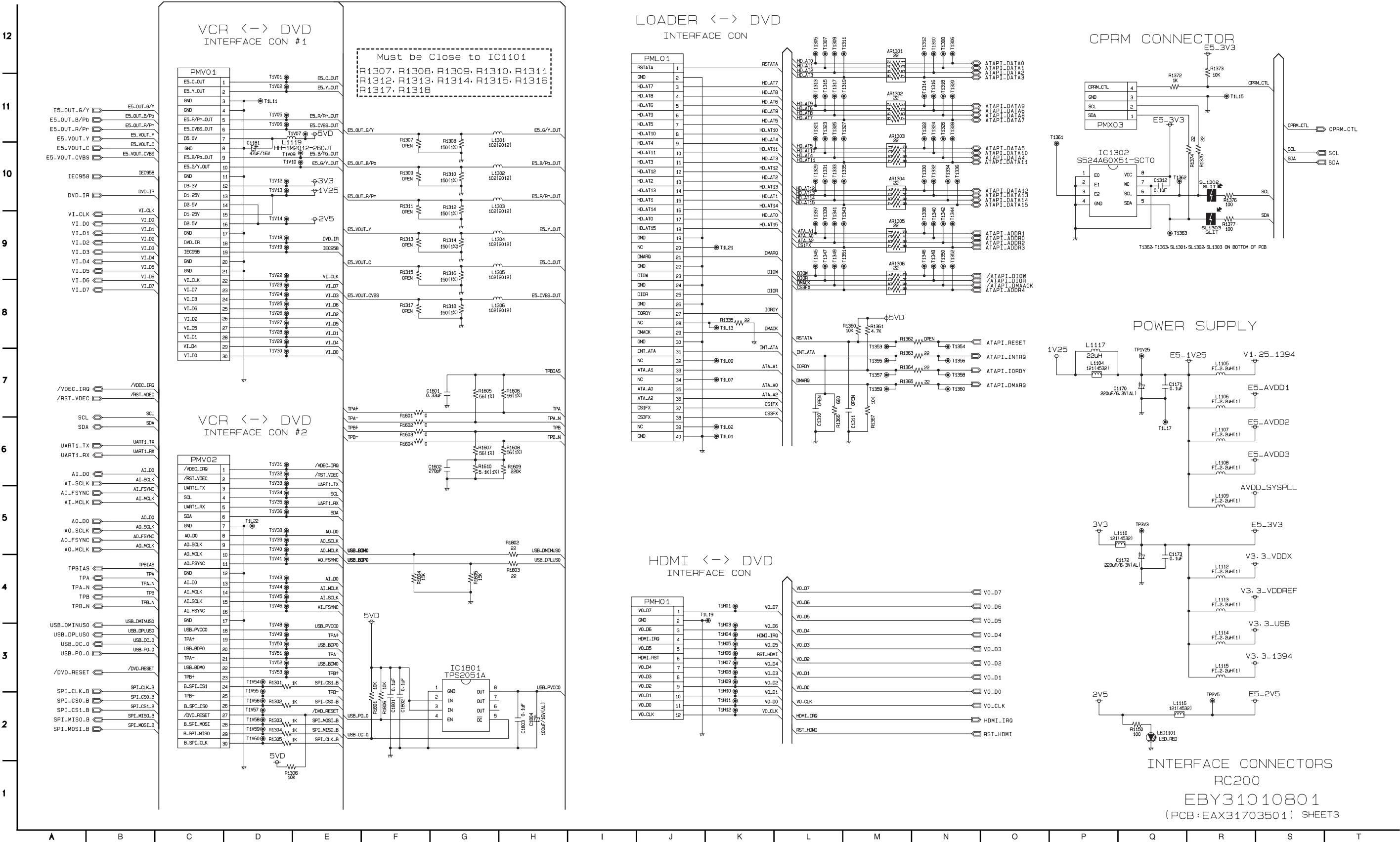
```
Must be Close to IC1101 Pins
-C1102,C1103:Pin126(SDRAM_VREF)
-C1107,C1108:Pin208(AVDD_VREF)
-R1148:Pin209(AREF)
-C1603:Pin232(1394_TPBIAS0)
```

MPEG
RC200
EBY31010801
(PCB:EAX31703501) SHEET1

PCB: EAX31703501

SHEET2

3. POWER, LOADER, B TO B CIRCUIT DIAGRAM



• CIRCUIT VOLTAGE CHART

Pin	Description	Type	Voltage (play)	Voltage (rec)
PIN IC1101				
1	ATAPI_DATA[5]	I/O	3.3Vpp	3.3Vpp
2	ATAPI_DATA[10]	I/O	3.3Vpp	3.3Vpp
3	ATAPI_DATA[4]	I/O	3.3Vpp	3.3Vpp
4	VDD_IO	VDD	3.3Vdc	3.3Vdc
5	GND	GND	0Vdc	-
6	ATAPI_DATA[11]	I/O	3.3Vpp	3.3Vpp
7	ATAPI_DATA[3]	I/O	3.3Vpp	3.3Vpp
8	VDD_CORE	VDD	1.25Vdc	1.25Vdc
9	ATAPI_DATA[12]	I/O	3.3Vpp	3.3Vpp
10	ATAPI_DATA[2]	I/O	3.3Vpp	3.3Vpp
11	VDD_IO	VDD	3.3Vdc	3.3Vdc
12	GND	GND	0Vdc	-
13	ATAPI_DATA[13]	I/O	3.3Vpp	3.3Vpp
14	ATAPI_DATA[1]	I/O	3.3Vpp	3.3Vpp
15	GND	GND	0Vdc	-
16	ATAPI_DATA[14]	I/O	3.3Vpp	3.3Vpp
17	ATAPI_DATA[0]	I/O	3.3Vpp	3.3Vpp
18	ATAPI_DATA[15]	I/O	3.3Vpp	3.3Vpp
19	VDD_IO	VDD	3.3Vdc	3.3Vdc
20	GND	GND	0Vdc	-
21	ATAPI_DIORn	Out	3.3Vpp	3.3Vpp
22	VDD_CORE	VDD	1.25Vdc	1.25Vdc
23	ATAPI_DIOWn	Out	3.3Vdc	3.3Vpp
24	ATAPI_DMAACKn	I/O	3.3Vpp	3.3Vpp
25	ATAPI_INTRQ	In	0Vdc	0Vdc
26	ATAPI_IORDY	In	4.8Vdc	4.8Vdc
27	ATAPI_DMARQ	In	3.3Vpp	3.3Vpp
28	ATAPI_DA[1]	I/O	0Vdc	0Vdc
29	VDD_IO	VDD	3.3Vdc	3.3Vdc
30	GND	GND	0Vdc	0Vdc
31	ATAPI_DA[0]	I/O	0Vdc	0Vdc
32	ATAPI_DA[2]	I/O	0Vdc	0Vdc
33	ATAPI_CS[0]	I/O	3.3Vdc	3.3Vdc
34	VDD_CORE	VDD	1.25Vdc	1.25Vdc
35	ATAPI_CS[1]	I/O	3.3Vdc	3.3Vdc
36	SPI_CSAn[1]	I/O	3.3Vdc	3.3Vdc
37	VDD_IO	VDD	3.3Vdc	3.3Vdc
38	GND	GND	0Vdc	0Vdc
39	SPI_CSAn[0]	I/O	3.3Vdc	3.3Vdc
40	SPI_CLK_A	I/O	0Vdc	0Vdc
41	GND	GND	0Vdc	0Vdc
42	MISO_A	In	0Vdc	0Vdc
43	MOSI_A	Out	0Vdc	0Vdc
44	IRRX	I/O	1.25Vdc	1.25Vdc
45	GPIO_0	I/O	68mVdc	68mVdc
46	VDD_CORE	VDD	1.25Vdc	1.25Vdc
47	VDD_IO	VDD	3.3Vdc	3.3Vdc
48	GND	GND	0Vdc	0Vdc
49	GPIO_1	I/O	0Vdc	0Vdc
50	RSTn	In	3.3Vdc	3.3Vdc
51	SDRAM_A[3]	Out	2.4Vpp	2.4Vpp
52	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
53	SDRAM_A[2]	Out	2.4Vpp	2.4Vpp
54	SDRAM_A[1]	Out	2.4Vpp	2.4Vpp
55	GND	GND	0Vdc	0Vdc
56	SDRAM_A[0]	Out	2.4Vpp	2.4Vpp
57	GND	GND	0Vdc	0Vdc
58	VDD_CORE	VDD	1.25Vdc	1.25Vdc
59	SDRAM_A[10]	Out	2.4Vpp	2.4Vpp
60	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
61	SDRAM_BA[1]	Out	2.4Vpp	2.4Vpp
62	SDRAM_BA[0]	Out	2.4Vpp	2.4Vpp
63	GND	GND	0Vdc	0Vdc
64	SDRAM_RASn	Out	2.4Vpp	2.4pp
65	SDRAM_CASn	Out	2.4Vpp	2.4Vpp
66	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
67	SDRAM_WEN	Out	2.4Vpp	2.4Vpp
68	GND	GND	0Vdc	0Vdc
69	VDD_CORE	VDD	1.25Vdc	1.25Vdc
70	SDRAM_DQ[0]	I/O	2.4Vpp	2.4Vpp
71	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
72	SDRAM_DQ[1]	I/O	2.4Vpp	2.4Vpp
73	GND	GND	0Vdc	0Vdc
74	SDRAM_DQ[2]	I/O	2.4Vpp	2.4Vpp
75	SDRAM_DQ[3]	I/O	2.4Vpp	2.4Vpp
76	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
77	SDRAM_DQS[0]	I/O	2.4Vpp	2.4Vpp
78	GND	GND	0Vdc	0Vdc
79	SDRAM_DQM[0]	Out	2.4Vpp	2.4Vpp
80	SDRAM_DQ[4]	I/O	2.4Vpp	2.4Vpp
81	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
82	SDRAM_DQ[5]	I/O	2.4Vpp	2.4Vpp
83	GND	GND	0Vdc	0Vdc
84	SDRAM_DQ[6]	I/O	2.4Vpp	2.4Vpp

Pin	Description	Type	Voltage (play)	Voltage (rec)
85	SDRAM_DQ[7]	I/O	2.4Vpp	2.4Vpp
86	VDD_CORE	VDD	1.25Vdc	1.25Vdc
87	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
88	SDRAM_CLK	Out	2.4Vpp	2.4Vpp
89	SDRAM_CLKn	Out	2.4Vpp	2.4Vpp
90	GND	GND	0Vdc	0Vdc
91	SDRAM_DQ[8]	I/O	2.4Vpp	2.4Vpp
92	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
93	SDRAM_DQ[9]	I/O	2.4Vpp	2.4Vpp
94	GND	GND	0Vdc	0Vdc
95	SDRAM_DQ[10]	I/O	2.4Vpp	2.4Vpp
96	SDRAM_DQ[11]	I/O	2.4Vpp	2.4Vpp
97	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
98	SDRAM_DQS[1]	I/O	2.4Vpp	2.4Vpp
99	GND	GND	0Vdc	0Vdc
100	SDRAM_DQM[1]	Out	2.4Vpp	2.4Vpp
101	SDRAM_DQ[12]	I/O	2.4Vpp	2.4Vpp
102	VDD_CORE	VDD	1.25Vdc	1.25Vdc
103	SDRAM_DQ[13]	I/O	2.4Vpp	2.4Vpp
104	GND	GND	0Vdc	0Vdc
105	SDRAM_DQ[14]	I/O	2.4Vpp	2.4Vpp
106	SDRAM_DQ[15]	I/O	2.4Vpp	2.4Vpp
107	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
108	GND	GND	0Vdc	0Vdc
109	VDD_CORE	VDD	1.25Vdc	1.25Vdc
110	SDRAM_CKE	Out	2.4Vdc	2.4Vdc
111	SDRAM_A[12]	Out	2.4Vpp	2.4Vpp
112	GND	GND	0Vdc	0Vdc
113	SDRAM_A[11]	Out	2.4Vpp	2.4Vpp
114	SDRAM_A[9]	Out	2.4Vpp	2.4Vpp
115	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
116	SDRAM_A[8]	Out	2.4Vpp	2.4Vpp
117	GND	GND	0Vdc	0Vdc
118	SDRAM_A[7]	Out	2.4Vpp	2.4Vpp
119	GND	GND	0Vdc	0Vdc
120	VDD_CORE	VDD	1.25Vdc	1.25Vdc
121	SDRAM_A[6]	Out	2.4Vpp	2.4Vpp
122	VDD_DRAM	VDD	2.5Vdc	2.5Vdc
123	SDRAM_A[5]	Out	2.4Vpp	2.4Vpp
124	SDRAM_A[4]	Out	2.4Vpp	2.4Vpp
125	GND	GND	0Vdc	0Vdc
126	SDRAM_VREF	In	1.25Vdc	1.25Vdc
127	AOUT_IEC958	Out	3Vpp	3Vpp
128	AOUT_D[3]	I/O	0Vdc	0Vdc
129	AOUT_D[2]	I/O	0Vdc	0Vdc
130	AOUT_D[1]	I/O	0Vdc	0Vdc
131	AOUT_D[0]	I/O	3.3Vpp	3.3Vpp
132	AOUT_MCLKI	In	3.1Vpp	3.1Vpp
133	VDD_IO	VDD	3.3Vdc	3.3Vdc
134	GND	GND	0Vdc	0Vdc
135	AOUT_SCLK	Out	3.6Vpp	3.6Vpp
136	AOUT_FSYNC	Out	3.3Vpp	3.3Vpp
137	A2_FSYNC	I/O	3.3Vdc	3.3Vdc
138	A2_SCLK	I/O	0Vdc	0Vdc
139	VDD_CORE	VDD	1.25Vdc	1.25Vdc
140	A2IN_D	In	0Vdc	0Vdc
141	AIN_MCLKI	I/O	3.1Vpp	3.1Vpp
142	VDD_IO	VDD	3.3Vdc	3.3Vdc
143	GND	GND	0Vdc	0Vdc
144	AIN_D[0]	In	3.3Vpp	3.3Vpp
145	AIN_SCLK	I/O	3.6Vpp	3.6Vpp
146	AIN_FSYNC	I/O	3.3Vpp	3.3Vpp
147	IRTX1	I/O	3.3Vdc	3.3Vdc
148	UART1_RX	I/O	3.3Vdc	3.3Vdc
149	UART1_TX	I/O	3.3Vdc	3.3Vdc
150	UART2_RX	I/O	3.3Vdc	3.3Vdc
151	UART2_TX	I/O	3.3Vdc	3.3Vdc
152	SDA	I/O	3.3Vpp	3.3Vpp
153	GND	GND	0Vdc	0Vdc
154	VDD_CORE	VDD	1.25Vdc	1.25Vdc
155	SCL	I/O	3.3Vpp	3.3Vpp
156	VDD_IO	VDD	3.3Vdc	3.3Vdc
157	GND	GND	0Vdc	0Vdc
158	SPI_CSBn[4]	I/O	3.3Vpp	3.3Vpp
159	SPI_CSBn[5]	I/O	3.3Vdc	3.3Vdc
160	SPI_CLK_B	I/O	3.3Vpp	3.3Vpp
161	MOSI_B	Out	3.3Vpp	3.3Vpp
162	VDD_CORE	VDD	1.25Vdc	1.25Vdc
163	MISO_B	In	5Vpp	5Vpp
164	VO_CLK	I/O	3.3Vpp	3.3Vpp
165	VO_D[0]	I/O	3.3Vpp	3.3Vpp
166	VO_D[1]	I/O	3.3Vpp	3.3Vpp
167	VO_D[2]	I/O	3.3Vpp	3.3Vpp
168	VDD_IO	VDD	3.3Vdc	3.3Vdc
169	GND	GND	0Vdc	0Vdc
170	VO_D[3]	I/O	3.3Vpp	3.3Vpp

Pin	Description	Type	Voltage (play)	Voltage (rec)
171	VO_D[4]	I/O	3.3Vpp	3.3Vpp
172	VO_D[5]	I/O	3.3Vpp	3.3Vpp
173	VO_D[6]	I/O	3.3Vpp	3.3Vpp
174	VO_D[7]	I/O	3.3Vpp	3.3Vpp
175	VI_D[2]	In	3.3Vpp	3.3Vpp
176	VI_D[3]	In	3.3Vpp	3.3Vpp
177	VI_D[4]	In	3.3Vpp	3.3Vpp
178	VI_D[5]	In	3.3Vpp	3.3Vpp
179	VI_D[6]	In	3.3Vpp	3.3Vpp
180	GND	GND	0Vdc	0Vdc
181	VDD_CORE	VDD	1.25Vdc	1.25Vdc
182	VDD_IO	VDD	3.3Vdc	3.3Vdc
183	GND	GND	0Vdc	0Vdc
184	VI_D[7]	In	3.3Vpp	3.3Vpp
185	VI_D[8]	In	3.3Vpp	3.3Vpp
186	VI_D[9]	In	3.3Vpp	3.3Vpp
187	VI_CLK[0]	In	3.3Vpp	3.3Vpp
188	TCK	In	3.3Vdc	3.3Vdc
189	TMS	In	3.3Vdc	3.3Vdc
190	TDI	In	3.3Vdc	3.3Vdc
191	TDO	Out	0Vdc	0Vdc
192	TRSTn	In	0Vdc	0Vdc
193	AGND_BATT	GND	0Vdc	0Vdc
194	RTCCLKI	I/O	0Vdc	0Vdc
195	RTCCLKX	I/O	0Vdc	0Vdc
196	AVDD_BATT	VDD	0Vdc	0Vdc
197	Y/GREEN	Out	1Vpp	1Vpp
198	AVDD_DACD	VDD	3.3Vdc	3.3Vdc
199	Pb/BLUE	Out	0.5Vpp	0.5Vpp
200	AVDD_DAC	VDD	3.3Vdc	3.3Vdc
201	Pr/RED	Out	0.5Vpp	0.5Vpp
202	AVDD_DAC	VDD	3.3Vdc	3.3Vdc
203	CVBS	Out	1Vpp	1Vpp
204	AGND_DAC	GND	0Vdc	0Vdc
205	C	Out	0.7Vpp	0.7Vpp
206	AGND_DAC	GND	0Vdc	0Vdc
207	Y	Out	1Vpp	1Vpp
208	AVDD_VREF	VDD	3.3Vdc	3.3Vdc
209	RREF	Out	1.2Vdc	1.2Vdc
210	AGND_VREF	GND	0Vdc	0Vdc
211	VDD_CORE	VDD	1.25Vdc	1.25Vdc
212	AVDD_APLL0UT	VDD	1.25Vdc	1.25Vdc
213	AGND_APLL0UT	GND	0Vdc	0Vdc
214	AVDD_VIDPLL	VDD	1.25Vdc	1.25Vdc
215	AGND_VIDPLL	GND	0Vdc	0Vdc
216	AGND_SYSPLL	GND	0Vdc	0Vdc
217	AVDD_SYSPLL	VDD	1.25Vdc	1.25Vdc
218	AGND_APLLIN	GND	0Vdc	0Vdc
219	AVDD_APLLIN	VDD	1.25Vdc	1.25Vdc
220	AVDD_OSC	VDD	3.3Vpp	3.3Vpp
221	CLKX	In	3.8Vpp	3.8Vpp
222	CLKI	In	1.3Vpp	1.3Vpp
223	AGND_OSC	GND	0Vdc	0Vdc
224	AGND_PLL	GND	0Vdc	0Vdc
225	AVDD_PLL	VDD	1.25Vdc	1.25Vdc
226	1394_TPBNO	I/O	0Vdc	0Vdc
227	1394_TPB0	I/O	0Vdc	0Vdc
228	AVDD33_XCVR	VDD	3.3Vdc	3.3Vdc
229	AGND_XCVR	GND	0Vdc	0Vdc
230	1394_TPAN0	I/O	3Vdc	3Vdc
231	1394_TPA0	I/O	3Vdc	3Vdc
232	1394_TPBIA0	I/O	3Vdc	3Vdc
233	AGND1394_XCVR	GND	0Vdc	0Vdc
234	AVDD1394_XCVR	VDD	1.25Vdc	1.25Vdc
235	VDD_CORE	VDD	1.25Vdc	1.25Vdc
236	AVDD_USB0	VDD	3.3Vdc	3.3Vdc
237	USB_DPLUS0	I/O	0Vdc	0Vdc
238	USB_DMINUS0	I/O	0Vdc	0Vdc
239	AGND_USB0	GND	0Vdc	0Vdc
240	AGND_USB1	GND	0Vdc	0Vdc
241	USB_DMINUS1	I/O	0Vdc	0Vdc
242	USB_DPLUS1	I/O	0Vdc	0Vdc
243	AVDD_USB1	VDD	3.3Vdc	3.3Vdc
244	USB_OC_0	In	0Vdc	0Vdc
245	USB_PO_0	Out	0Vdc	0Vdc
246	BIAS_5V	VDD	5Vdc	5Vdc
247	ATAPI_RESET	Out	3.3Vdc	3.3Vdc
248	GND	GND	0Vdc	0Vdc
249	VDD_CORE	VDD	1.25Vdc	1.25Vdc
250	VDD_IO	VDD	3.3Vdc	3.3Vdc
251	GND	GND	0Vdc	0Vdc
252	ATAPI_DATA[7]	I/O	3.3Vpp	3.3Vpp
253	ATAPI_DATA[8]	I/O	3.3Vpp	3.3Vpp
254	ATAPI_DATA[6]	I/O	3.3Vpp	3.3Vpp
255	ATAPI_DATA[9]	I/O	3.3Vpp	3.3Vpp
256	N/C		0Vdc	0Vdc

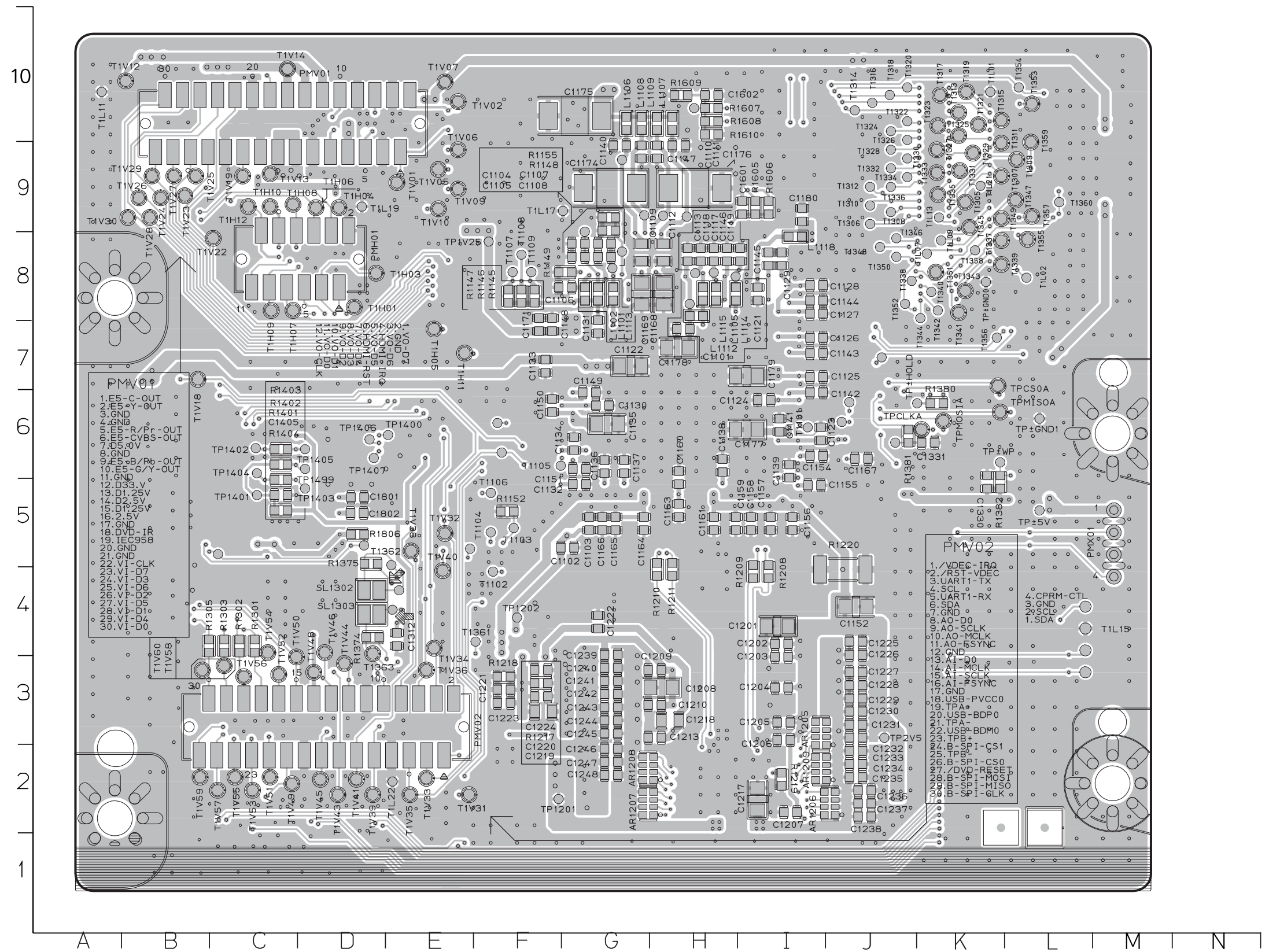
PART : DVD

LOCA. NO.	SPEC	POWER ON		PB		REMARKS
		VOLTAGE(+)	VOLTAGE(-)	VOLTAGE(+)	VOLTAGE(-)	
Tantal Cap						
C1122	10uF/16V 20% 3216	3.240V	.000V	3.240V	.000V	
C1135	22uF/10V 20% 3216	1.270V	.000V	1.270V	.000V	
C1152	22uF/10V 20% 3216	2.470V	.000V	2.460V	.000V	
C1201	10uF/16V 20% 3216	2.470V	.000V	2.460V	.000V	
C1208	10uF/16V 20% 3216	2.470V	.000V	2.460V	.000V	
C1217	220uF/6.3V 20%	1.230V	.000V	1.220V	.000V	
C1168	220uF/6.3V 20%	1.270V	.000V	1.260V	.000V	
C1169	220uF/6.3V 20%	1.260V	.000V	1.260V	.000V	
C1174	330uF/6.3V 20%	1.260V	.000V	1.260V	.000V	
AL Cap						
C1170	220uF/6.3V 20%	1.260V	.000V	1.260V	.000V	
C1172	220uF/6.3V 20%	3.240V	.000V	3.240V	.000V	
C1211	220uF/6.3V 20%	2.470V	.000V	2.460V	.000V	
C1216	220uF/6.3V 20%	1.230V	.000V	1.220V	.000V	
C1804	100uF/16V 20%	5.010V	.000V	5.000V	.000V	

1. VDR P.C.BOARD (TOP VIEW)



VDR P.C.BOARD (BOTTOM VIEW)



SECTION 4 MECHANISM OF VCR PART(D-37)

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DECK

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TROUBLESHOOTING GUIDE

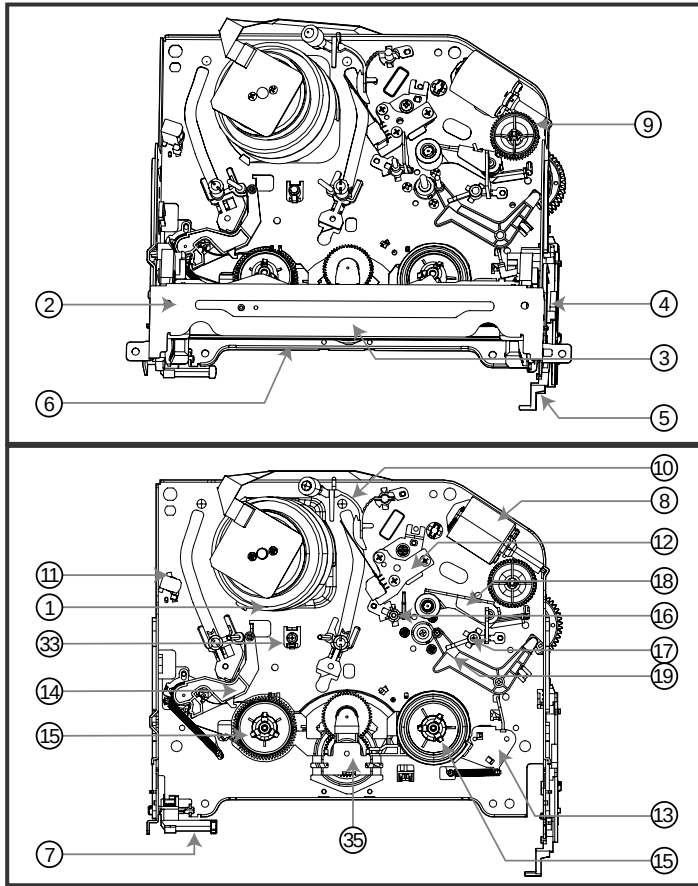
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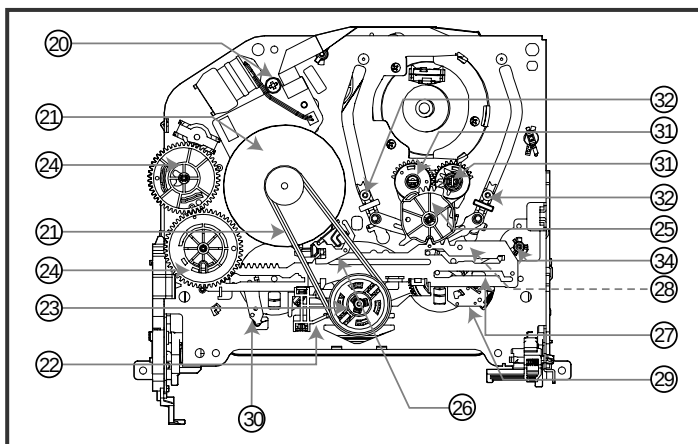
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DECK MECHANISM PARTS LOCATIONS

• Top View



• Bottom View



Starting No.	Procedure	Part	Fixing Type	Ref. Drawings	Position
	1	Drum Assembly	3 screws	A-1	T
	2	Plate Top	2 hooks	A-2	T
2	3	Holder Assembly CST	6 chasses	A-2	T
2,3	4	Gear Assembly Rack F/L	1 hook	A-2	T
2,3,4	5	Opener Door	Chassis Hole	A-2	T
2,3,4,5	6	Arm Assembly F/L	Chassis Hole	A-2	T
	7	Lever Assembly S/W	Chassis Hole, 1 hook	A-2	T
	8	Motor Assembly L/D	1 screw	A-3	T
	9	Gear Wheel	2 hooks	A-3	T
	10	Arm Assembly Cleaner	Chassis Embossing	A-3	T
	11	Head F/E	Chassis Embossing	A-3	T
	12	Base Assembly A/C Head	1 screw	A-3	T
2,3	13	Brake Assembly T	1 hook	A-4	T
2,3	14	Arm Assembly Tension	1 hook	A-4	T
2,3,13,14	15	Reel S / Reel T	Shaft	A-4	T
	16	Base Assembly P4	Chassis Embossing	A-5	T
	17	Opener Lid	Chassis Embossing	A-5	T
17	18	Arm Assembly Pinch	Shaft	A-5	T
17	19	Arm T/up	1 hook	A-5	T
	20	Supporter, capstan	Chassis Hole	A-6	B
17,18	21	Belt Capstan/Motor Capstan	3 screws	A-6	B
	22	Lever F/R	Locking Tab	A-6	B
21, 22	23	Clutch Assembly D37	Washer	A-6	B
	24	Gear Drive/Gear Cam	Washer/Hook	A-7	B
	25	Gear Sector	Hook	A-7	B
21	26	Brake Assembly Capstan	Chassis Hole	A-7	B
21,22,23, 24,25,26	27	Plate Slider	Chassis Guide	A-7	B
21,22,23, 24,25,26,27	28	Lever Tension	1 Hook	A7	B
21,22,23, 24,25,26,27	29	Lever Spring	1 Hook	A-7	B
21,22,23, 24,25,26,27	30	Lever Brake	1 Hook	A-7	B
25	31	Gear Assembly P2/ Gear Assembly P3	Bass	A-8	B
2, 3, 14, 25, 31	32	Base Assembly P2 /Base Assembly P3	6 Chasses	A-8	B
25, 31	33	Base Loading	3 Hooks	A-8	B
2,3,14	34	Base Tension	Chassis Embossing	A-9	T
	35	Arm Assembly Idler Jog	Locking Tab	A-9	T

T:Top, B:Bottom

NOTE : When reassembling, perform the procedure in the reverse order.

- (1) When reassembling, confirm Mechanism and Mode Switch Alignment Position
- (2) When disassembling, the Parts in the "Starting No." column should be removed first."

DISASSEMBLY AND ASSEMBLY OF DECK MECHANISM

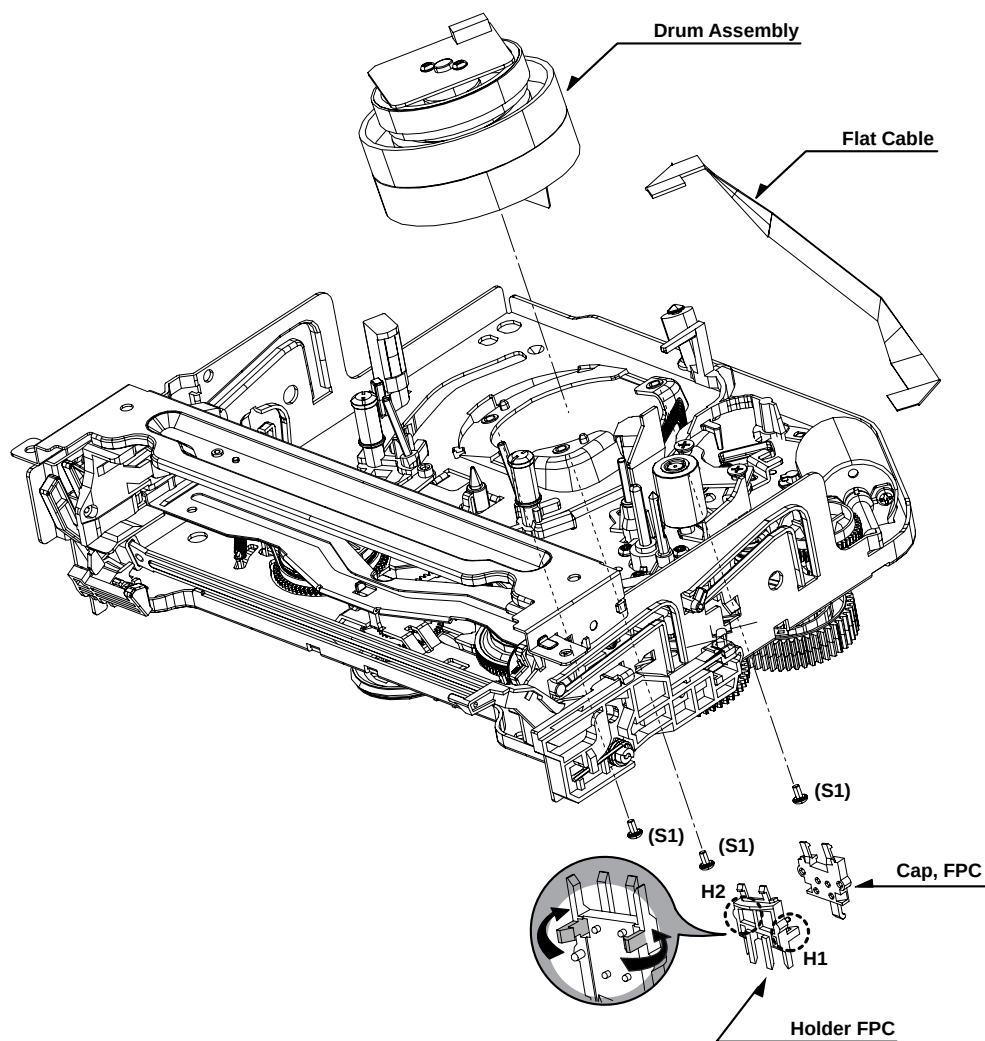
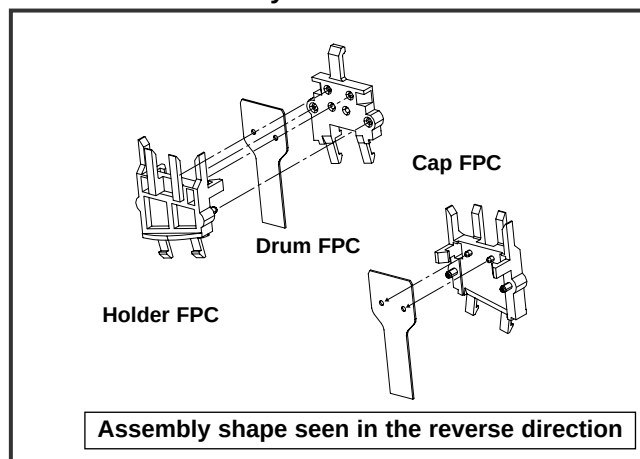


Fig. A-1

1. Disassembly of Drum Assembly (Figure A-1)

- 1) Separate the flat cable from the Drum FPC and the Capstan Motor.
- 2) Release 3 screws (S1) on the bottom side of the chassis, and separate the drum assembly.
- 3) Release the hooks (H1, H2) and separate both the holder FPC and the Cap FPC (disassemble if necessary).

Cautions in assembly of FPC



DISASSEMBLY AND ASSEMBLY OF DECK MECHANISM

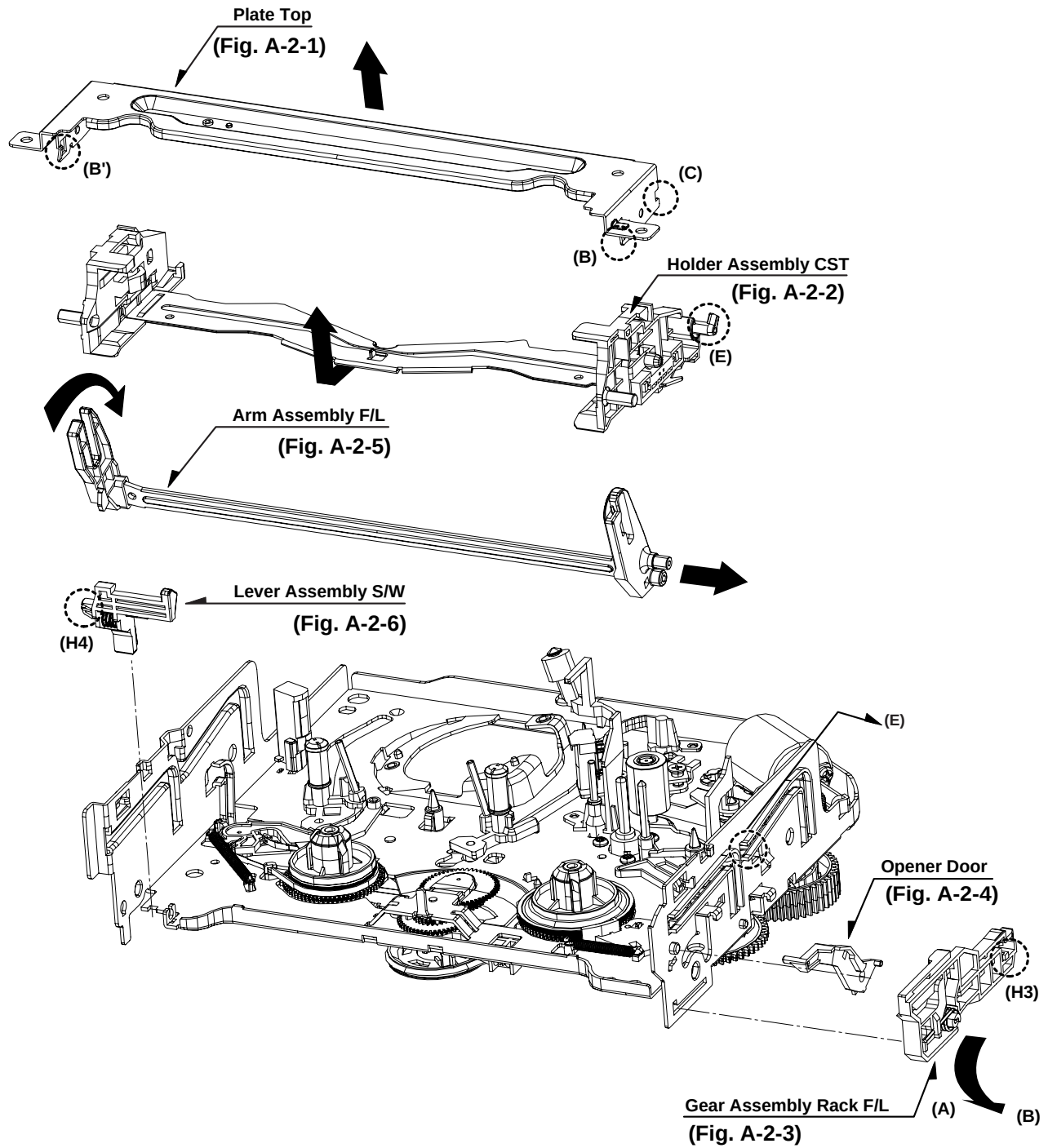


Fig. A-2

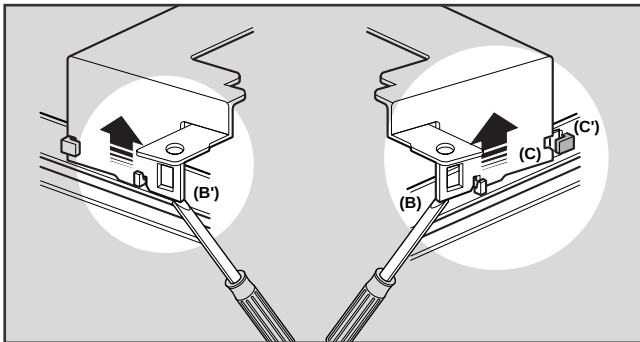
DISASSEMBLY AND ASSEMBLY OF DECK MECHANISM

2. Disassembly of Plate Top (Fig. A-2-1)

- 1) Separate the right part while leaning back the (B) part of the plate top toward the arrow direction.
- 2) Separate the left part while leaning back the (B') part of the plate top toward the arrow direction.
(Tool used: Tool such as (-) driver, auger, etc with pointed or flat end)

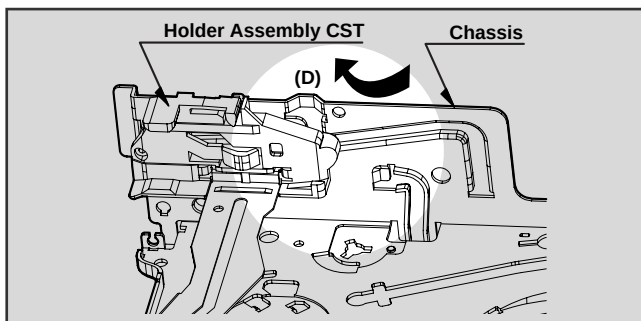
CAUTIONS

Assemble while pressing the (C), (C') part after corresponding them as in drawing.



3. Holder Assembly CST (Fig. A-2-2)

- 1) Firstly separate the left part from the groove on the (D) part of chassis while moving the holder assembly CST toward the arrow direction.



- 2) Separate the right part from each groove of chassis

CAUTIONS

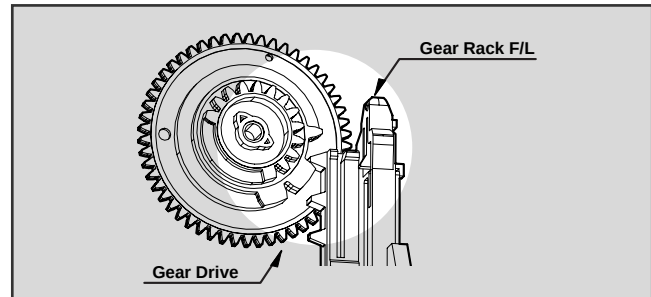
Assemble by inserting the left part after firstly inserting the (E) part of the holder assembly CST into the groove on the (E') part of chassis.

4. Disassembly of Gear Assembly Rack F/L (Fig. A-2-3)

- 1) Separate the hook (H3) while leaning ahead the hook (3) after moving the gear assembly rack F/L toward the arrow (A) direction.
- 2) Separate the gear assembly rack F/L toward the arrow (B) direction.

CAUTIONS

For the assembly, correspond the gear part of gear assembly rack F/L to the gear drive.



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

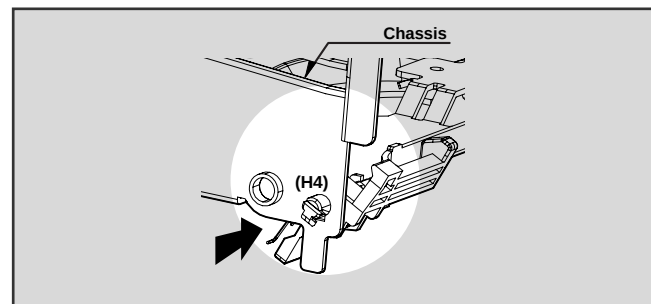
- 1) Separate the opener door ahead from the guide hole of chassis while turning it clockwise.

6. Arm Assembly F/L (Fig. A-2-5)

- 1) Firstly separate the left part of the arm assembly F/L from the groove of chassis while pushing the arm assembly F/L toward the arrow direction.
- 2) Separate the right part from the groove of chassis.

7. Lever Assembly S/W (Fig. A-2-6)

- 1) Separate the lever assembly S/W while pushing it toward the arrow direction after removing the hook (4) on the left side of chassis.



DISASSEMBLY AND ASSEMBLY OF DECK MECHANISM

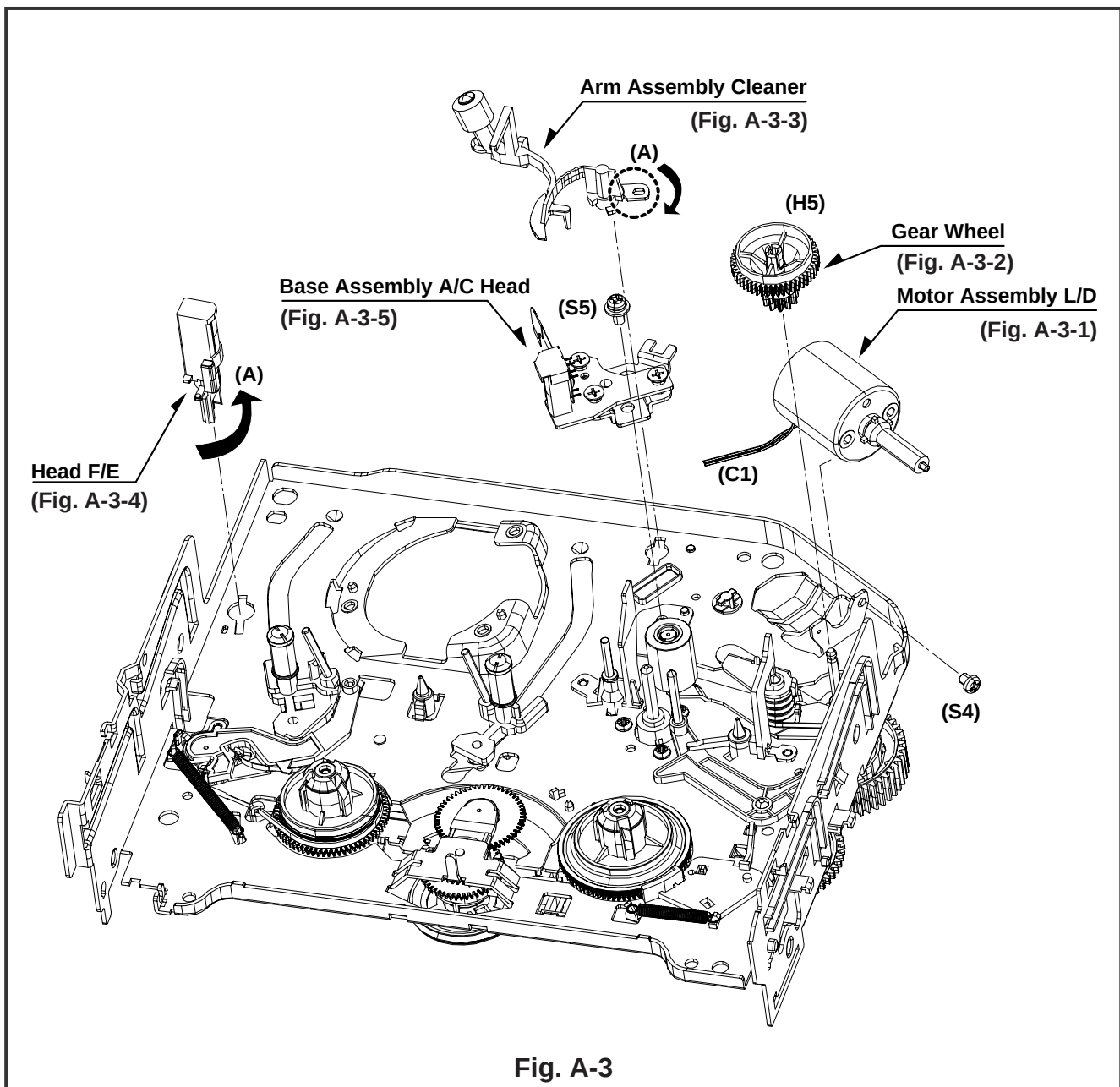


Fig. A-3

8. Motor Assembly L/D (Fig. A-3-1)

- 1) Take the connector (C1) connected to the Capstan motor PCB out.
- 2) Remove a screw (S4) of the chassis (S4) and step backward, and disassemble it while holding it up.

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

- 1) Release the hook (H5) of the gear wheel and disassemble it upward.

10. Arm Assembly Cleaner (Fig. A-3-3)

- 1) Separate the (A) part of Fig. A-3-1 from the embossing of chassis, and hold it up while turning it anti-clockwise.

11. Head F/E (Fig. A-3-4)

- 1) Separate the (A) part of the head F/E from the embossing of chassis, and hold it up while turning it anti-clockwise.

12. Base Assembly A/C Head (Fig. A-3-5)

- 1) Release a screw (S5) and disassemble while holding it up.

DISASSEMBLY AND ASSEMBLY OF DECK MECHANISM

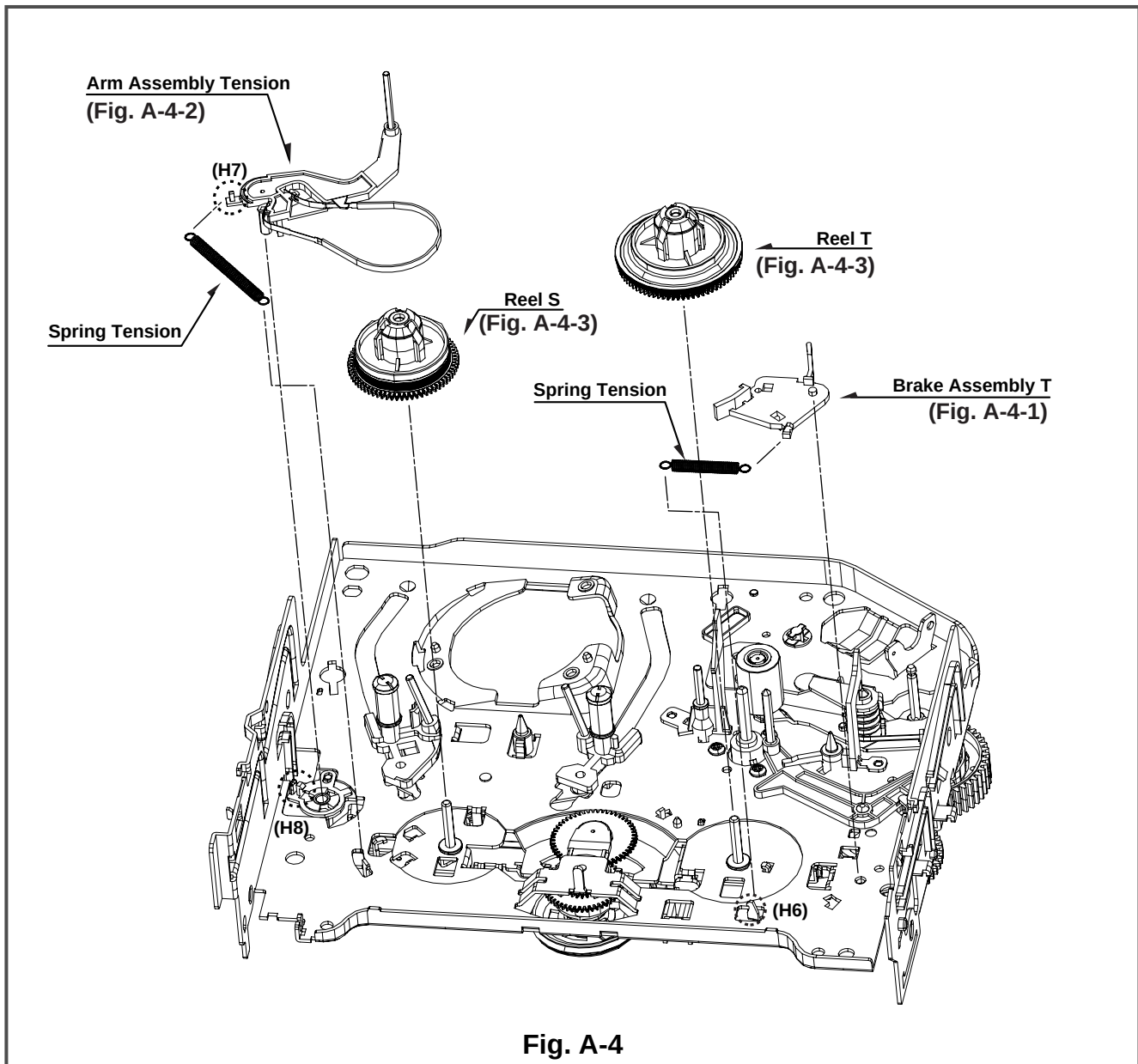


Fig. A-4

13. Brake Assembly T (Fig. A-4-1)

- 1) Release the spring tension from the lever spring hook (H6).
- 2) Disassemble the brake assembly T while holding it upward.

14. Arm Assembly Tension (Fig. A-4-2)

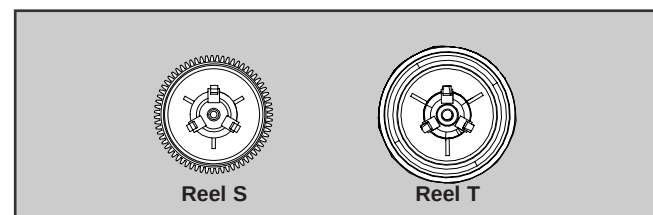
- 1) Release the spring tension the hook (H7) from the arm assembly tension.
- 2) After releasing the hook (H8) of the base tension, separate it while holding it up.

CAUTIONS

Spring used for both brake assembly T and arm assembly tension is used (2EA used).

15. Reel S/Reel T (Fig. A-4-3)

- 1) Disassemble the reel S/ reel T while holding it up (comparison between Reel S and Reel T)



DISASSEMBLY AND ASSEMBLY OF DECK MECHANISM

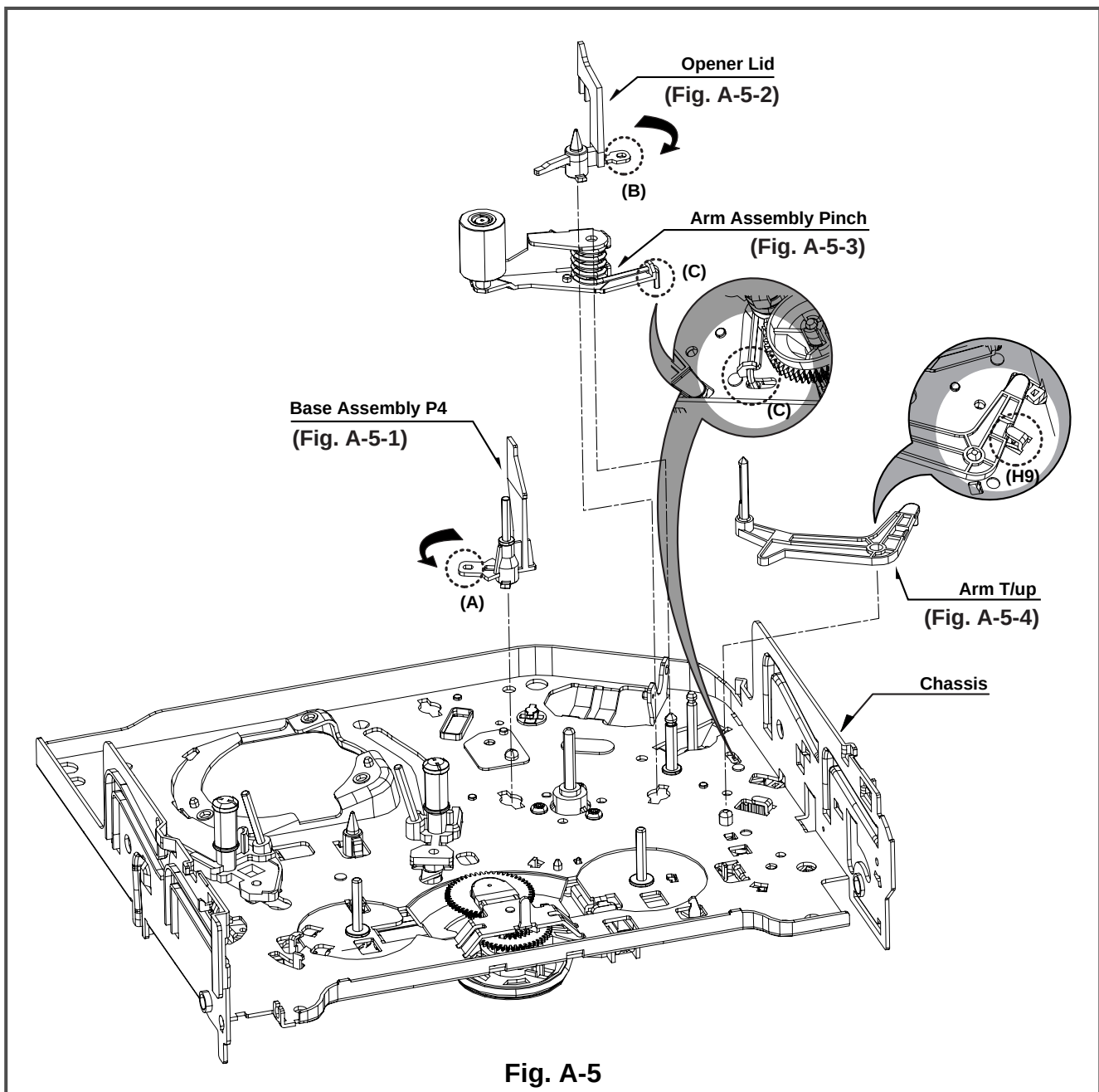


Fig. A-5

16. Base Assembly P4 (Fig. A-5-1)

- 1) Release the (A) part of the base assembly P4 from the embossing of chassis.
- 2) Hold the base assembly P4 up while turning it anti-clockwise.

17. Opener Lid (Fig. A-5-2)

- 1) Release the (B) part of the opener lid from the embossing of chassis.
- 2) Disassemble the opener lid upward while turning it anti-clockwise.

18. Arm Assembly Pinch (Fig. A-5-3)

- 1) Hold the arm assembly pinch up.

19. Arm T/up (Fig. A-5-4)

- 1) Turn the arm T/up to release the anchor jaw (H9) part of chassis and then hold it upward.

CAUTIONS

For the assembly, check the (C) part of the arm assembly pinch is assembled as in drawing.

- REVERSE THE MECHANISM.

DISASSEMBLY AND ASSEMBLY OF DECK MECHANISM

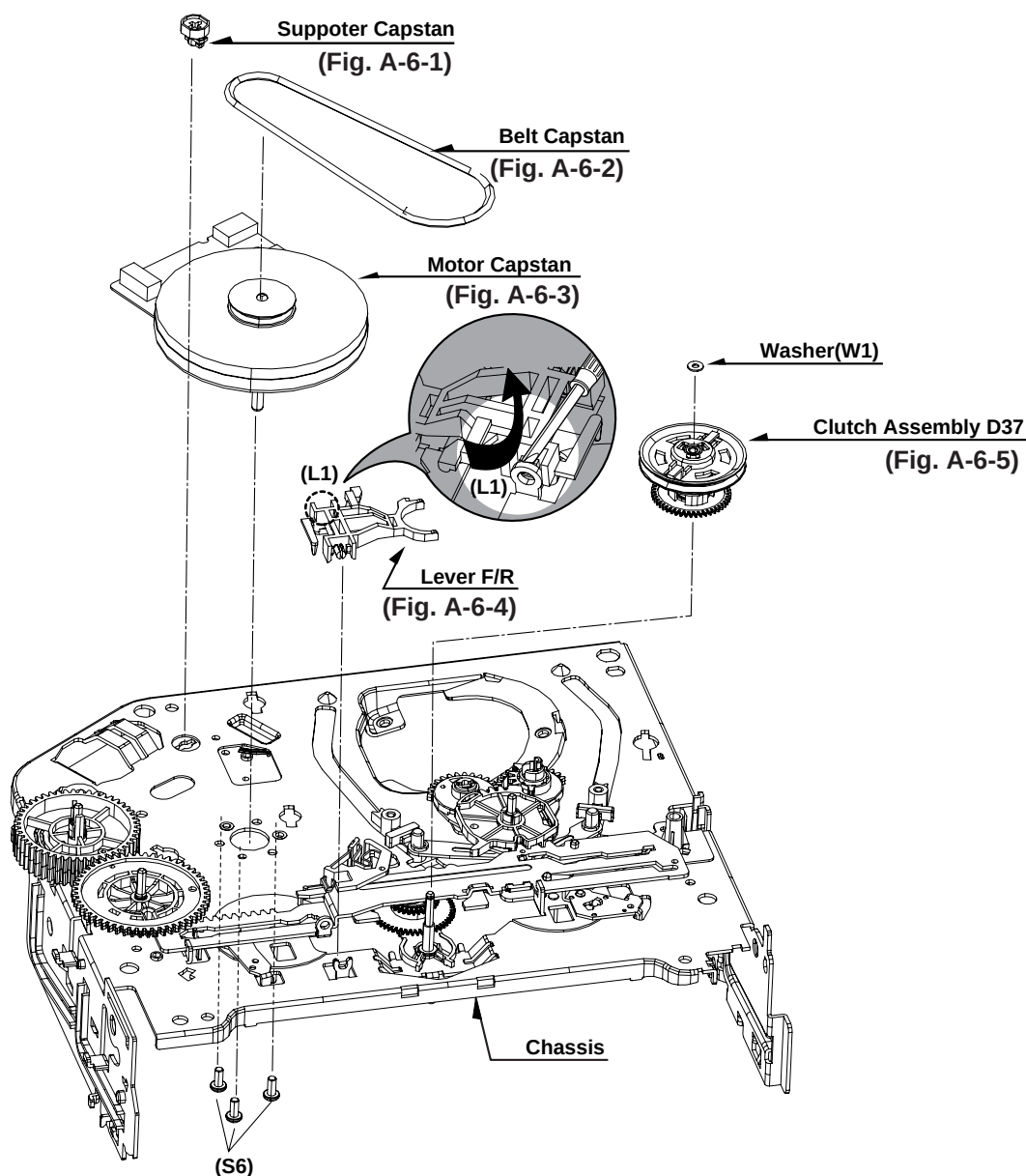


Fig. A-6

20. Supporter, Capstan (Fig. A-6-1)

- 1) Turn the supporter and Capstan by 90 deg. clockwise with a driver for disassembly.

21. Belt Capstan (Fig. A-6-2) / Motor Capstan (Fig. A-6-3)

- 1) Separate the belt Capstan.
- 2) Undo 3 screws (S6) on the bottom side of chassis and disassemble it upward.

22. Lever F/R (Fig. A-6-4)

- 1) Release the locking tab (L1) and then disassemble it upward.

23. Clutch Assembly D37 (Fig. A-6-5)

- 1) Remove the washer (W1) and then disassemble it upward.

DISASSEMBLY AND ASSEMBLY OF DECK MECHANISM

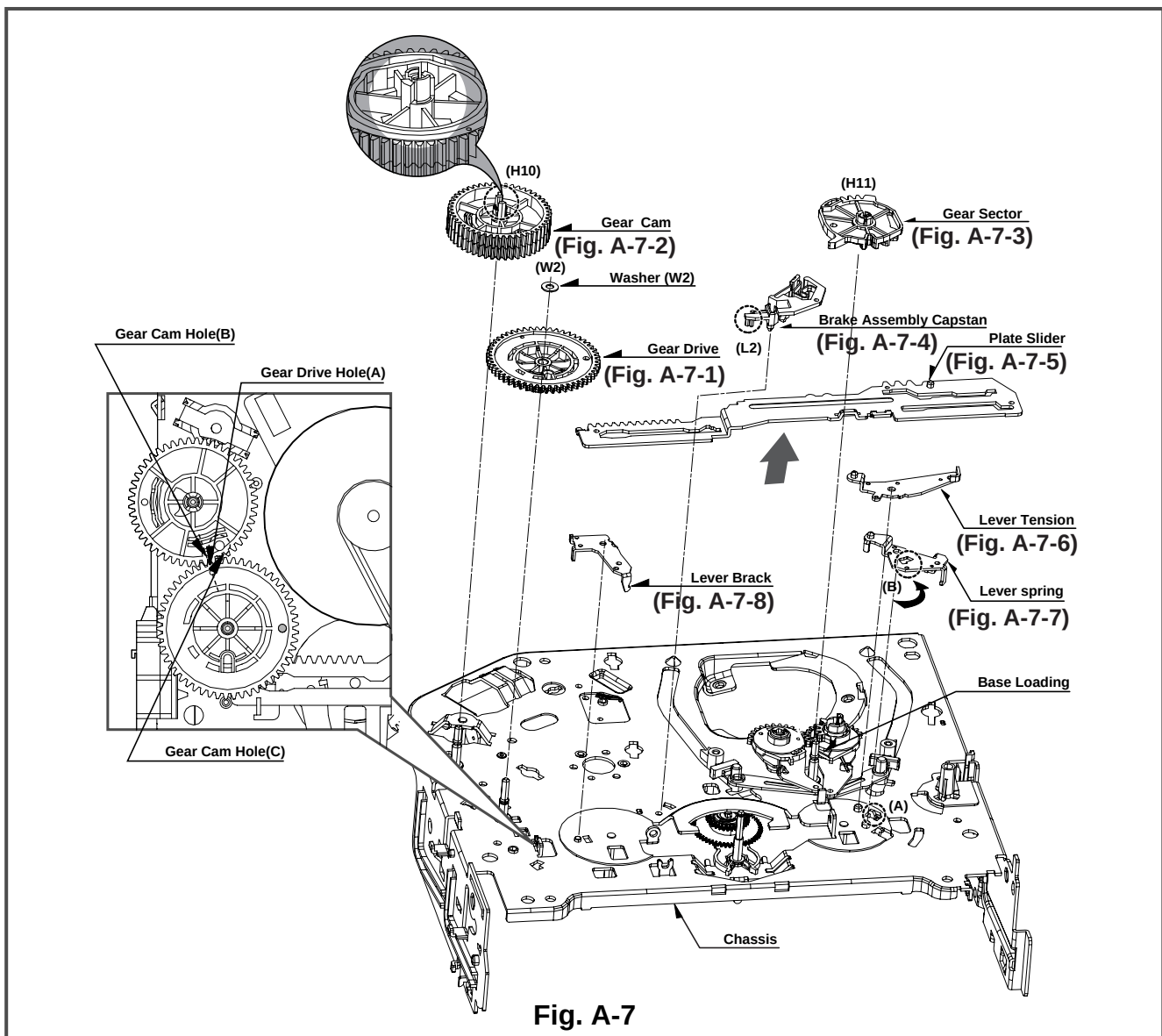


Fig. A-7

24. Gear Drive (Fig. A-7-1)/ Gear Cam (Fig. A-7-2)

- 1) Remove the washer (W2) and then disassemble the gear drive.
- 2) Release the hook (H10) of the gear cam and then disassemble it upward.

CAUTIONS

For the assembly, adjust both the gear driver hole (A) and the gear cam hole (B) straightly and then correspond the gear cam hole (C) to the chassis hole.

25. Gear Sector (Fig. A-7-3)

- 1) Release the hook (H11) of the gear sector and then hold the gear sector upward.

26. Brake Assembly Capstan (Fig. A-7-4)

- 1) Release the locking tab (L2) on the bottom side of the plate slider and then disassemble it upward.

27. Plate Slider (Fig. A-7-5)

- 1) Disassemble the plate slider while holding it up.

28. Lever Tension (Fig. A-7-6)

- 1) Release the lever tension from the guide (A) of chassis while turning it anti-clockwise.
- 2) Disassemble the lever tension while holding it up.

29. Lever Spring (Fig. A-7-7)

- 1) Release the (B) part of the lever spring from the guide (A) of chassis while turning it anti-clockwise.
- 2) Disassemble the lever tension while holding it up.

30. Lever Brake (Fig. A-7-8)

- 1) Disassemble the lever brake while holding it up.

DECK MECHANISM DISASSEMBLY

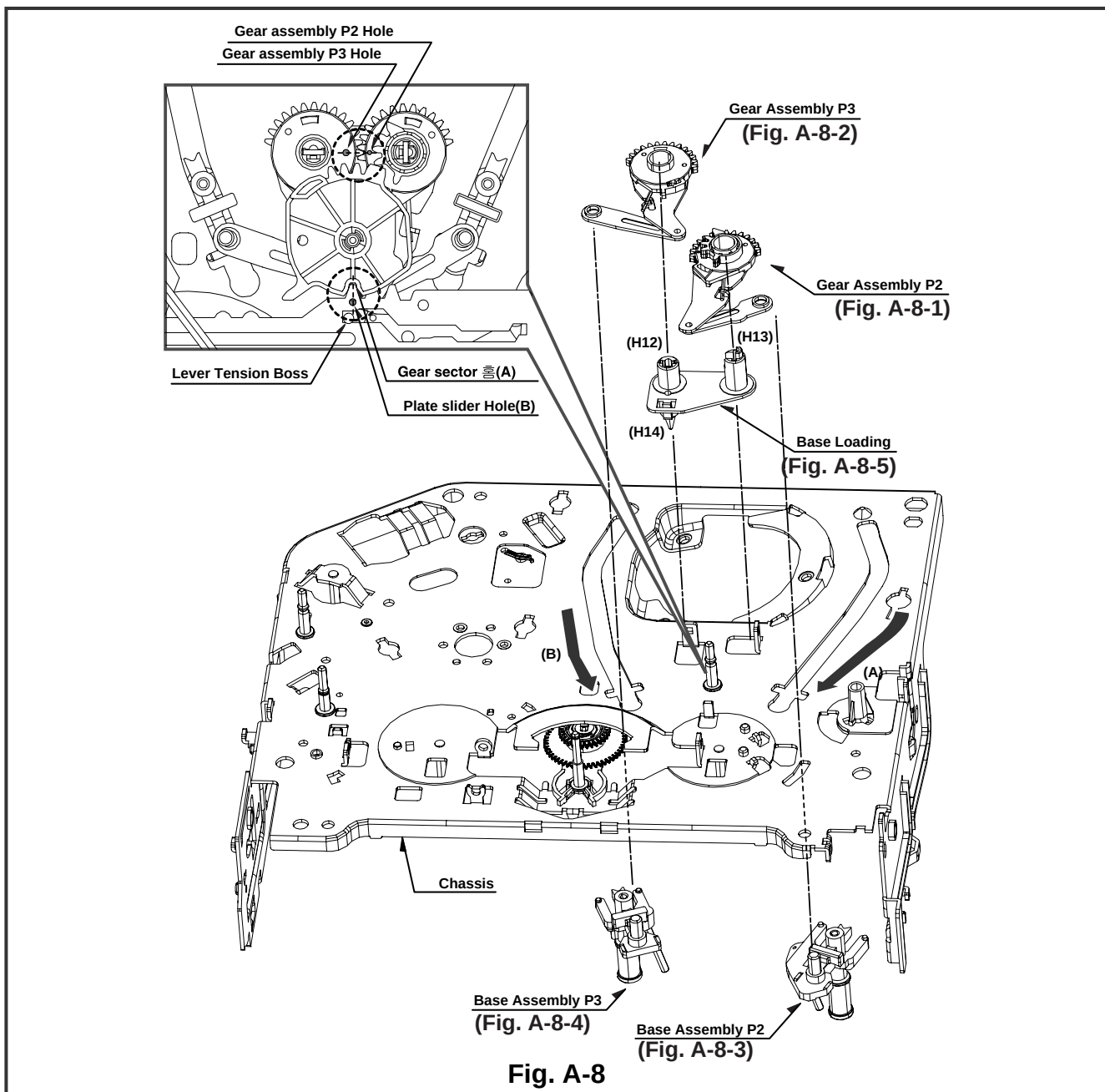


Fig. A-8

31. Gear Assembly P2 (Fig. A-8-1)/ Gear Assembly P3 (Fig. A-8-2)

- 1) Hold the gear assembly P2 upward.
- 2) Hold the gear assembly P3 upward.

CAUTIONS

For the assembly, check the holes of both the gear assembly P2 and the P3 are adjusted straightly, and then correspond the gear section groove (A) to the plate slider hole (B).

32. Base Assembly P2 (Fig. A-8-3)/ Base Assembly P3 (Fig. A-8-4)

- 1) Disassemble the base assembly P2 downward while moving it toward the arrow (A) direction along with the guide hole of chassis.
- 2) Disassemble the base assembly P2 downward while moving it toward the arrow (B) direction along with the guide hole of chassis.

33. Base Loading (Fig. A-8-5)

- 1) Release 3 hooks (H12, 13, 14) of the base loading, and then disassemble them upward.
- Reverse the mechanism.

DISASSEMBLY AND ASSEMBLY OF DECK MECHANISM

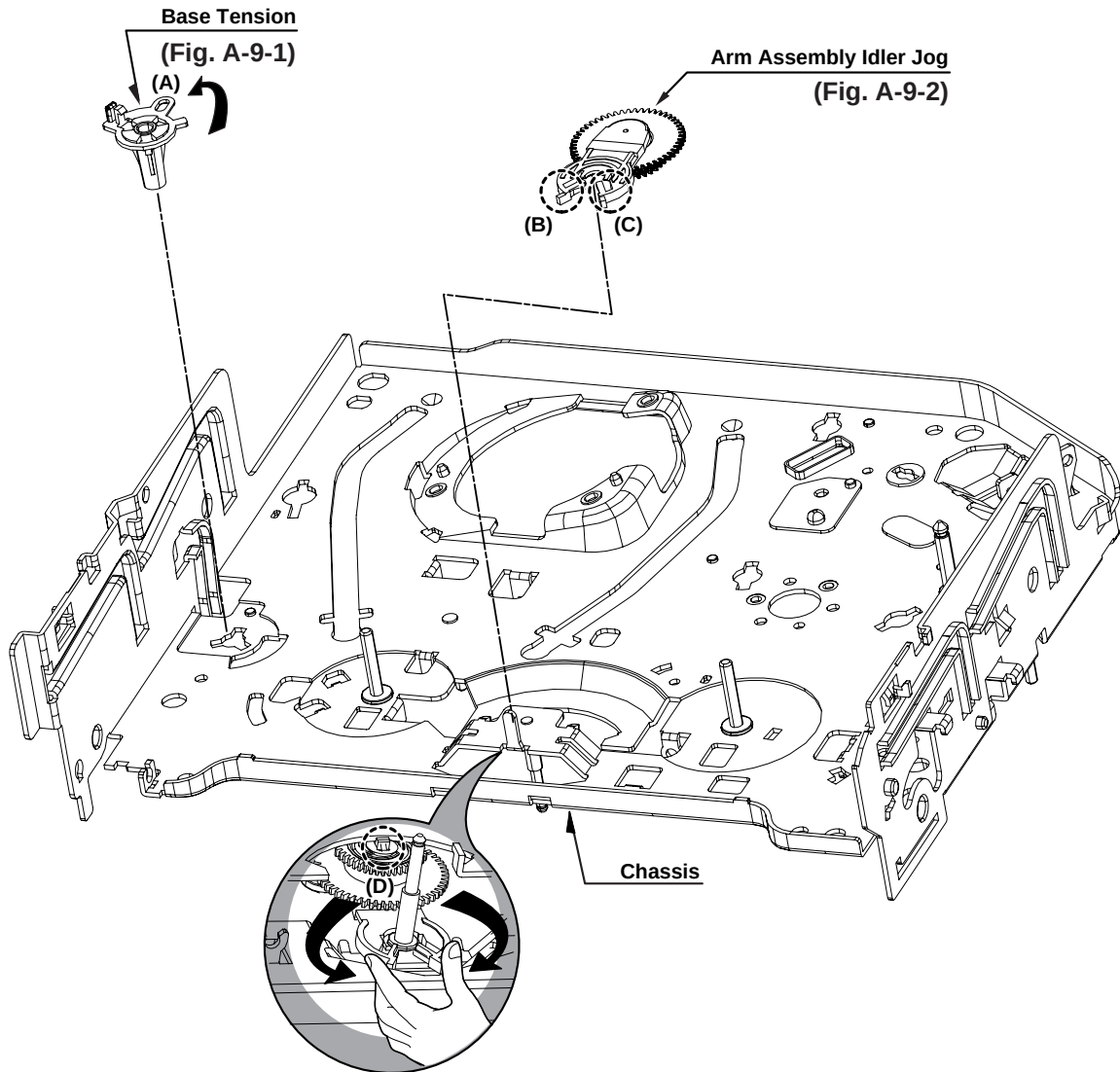


Fig. A-9

34. Base Tension (Fig. A-9-1)

- 1) Release the (A) part of the base tension from the embossing of chassis.
- 2) Hold the base tension upward while turning it anti-clockwise.

35. Arm assembly Idler Jog (Fig. A-9-2)

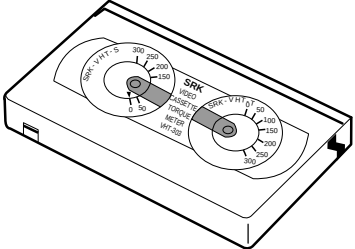
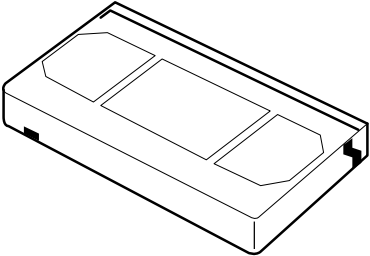
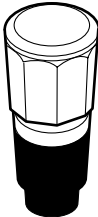
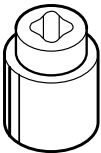
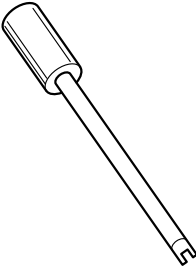
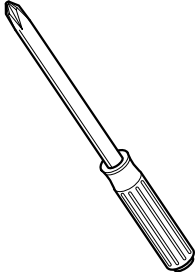
- 1) Push both (B), (C) parts in Fig. A-9-2 toward the arrow direction.
- 2) Disassemble the arm assembly idler upward.

CAUTIONS

Take care to ensure that the (D) part in the drawing is not hung to chassis in disassembly.

DECK MECHANISM ADJUSTMENT

• Fixtures and Tools for Service

1. Cassette Torque Meter SRK-VHT-303(Not SVC part) Part No:D00-D006 	2. Alignment tape Part No NTSC:DTN-0001 PAL:DTN-0002 	3. Torque gauge 600g.Cm ATG Part No:D00-D002 
4. Torque gauge adaptor Part No:D09-R001 	5. Post height adjusting driver Part No:DTL-0005 	6. + Type driver (ø5) 

DECK MECHANISM ADJUSTMENT

1. Mechanism Assembly Mode Check

Purpose of adjustment : To make tools normally operate by positioning tools accurately.		
Fixtures and tools used	VCR (VCP) status	Checking Position
• Blank Tape (empty tape)	• Eject Mode (with cassette withdrawn)	• Mechanism and Mode Switch
1) Turn the VCR on and take the tape out by pressing the eject button. 2) Separate both top cover and plate top, and check both the hole (A) of gear cam and the hole (A') of chassis correspond (Fig. C-2). 3) If it is done as in the paragraph 2): Turn the gear cam as in No.2) after mantling the motor assembly L/D. 4) Undo the screw fixing the deck and the main frame, and separate the deck assembly. Check both the hole (A) of gear cam and the hole (A') of chassis correspond (Fig. C-1). 5) Check the mode S/W on the main P.C. board locates at a proper position as in (B) of the Fig. (C-1). 6) Connect the deck to the main P.C. board and perform all types of test.		

CHECK DIAGRAM

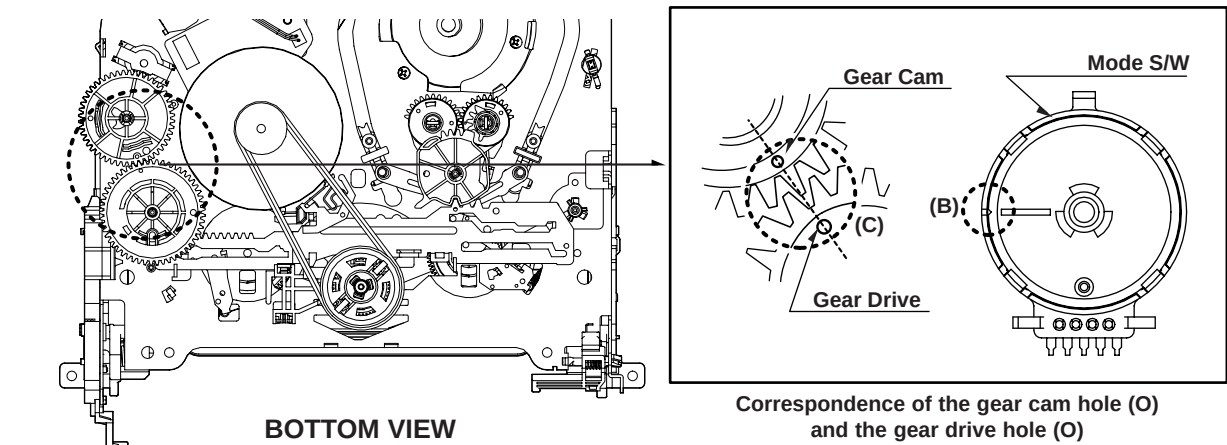


Fig. C-1

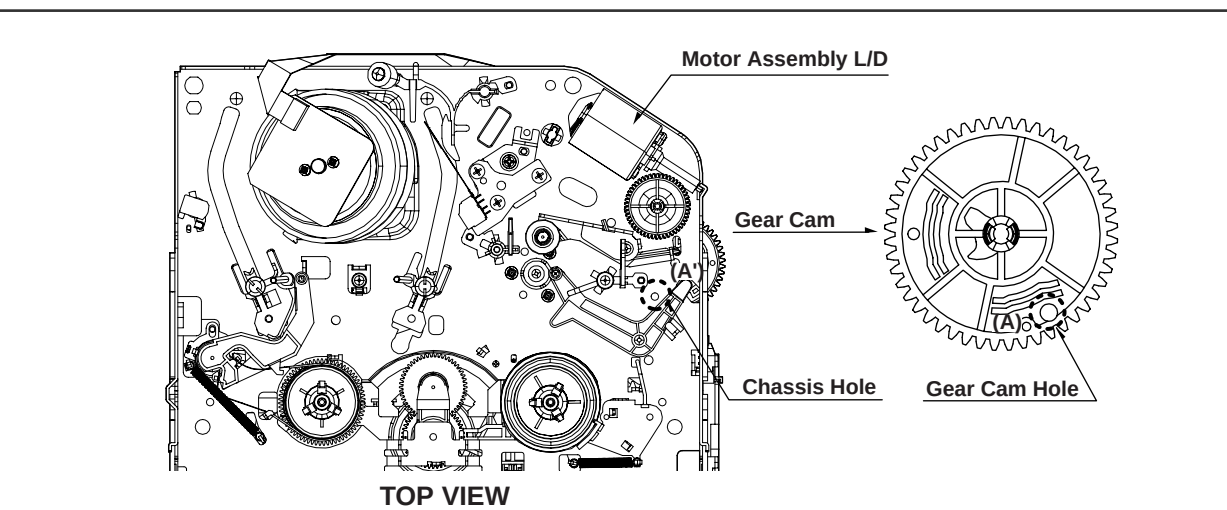


Fig. C-2

DECK MECHANISM ADJUSTMENT

2. Previous Preparation for Deck Adjustment

(Preparation to load the VCR (VCP) with cassette tape not inserted)

- 1) Take the power cord from the consent.
- 2) Separate the top cover and the plate assembly top.
- 3) Insert the power cord into again.
- 4) Turn the VCR (VCP) on and load the cassette while pushing the lever stopper of the holder assembly CST backward. In this case, clog both holes on the housing rail part of chassis to prevent detection of the end sensor.

If doing so, proceeding to the stop mode is done. In this status, input signals of all modes can be received. However, operation of the Rewind and the Review is impossible since the take-up reel remains at stop status and so cannot detect the reel pulse (however, possible for several seconds).

3. Torque Measuring

Purpose of Measuring : To measure and check the reel torque on the take-up part and the supply part that performs basic operation of the VCR (VCP) for smoothly forwarding the tape.
Measure and check followings when the tape is not smoothly wound or the tape velocity is abnormally proceeded:

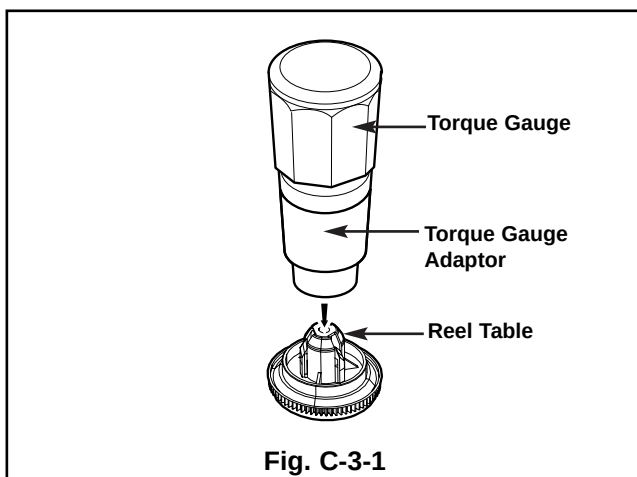
Fixtures and tools used	VCR (VCP) status	Measuring method
• Torque Gauge (600 g.cm ATG) • Torque Gauge Adaptor • Cassette Torque Meter SRK-VHT-303	• Play (FF) or Review (REW) Mode	• Try to operate the VCR (VCP) per mode with the tape not inserted (See '2. Prior Preparation for Deck Adjustment). • Measure after adhering and fixing the torque gauge adaptor to the torque gauge (Fig. C-3-1) • Read scale of the supply or take-up part of the cassette torque meter (Fig. C-3-2).

Item	Mode	Instruments	Reel Measured	Measuring Value
Fast forward Torque	Fast Forward	Torque Gauge	Take-Up Reel	More than 400g°cm
Rewind Torque	Rewind	Torque Gauge	Supply Reel	More than 400g°cm
Play Take-Up Torque	Play	VHT-303	Take-Up Reel	40~100g°cm
Review Torque	Review	VHT-303	Supply Reel	120~210g°cm

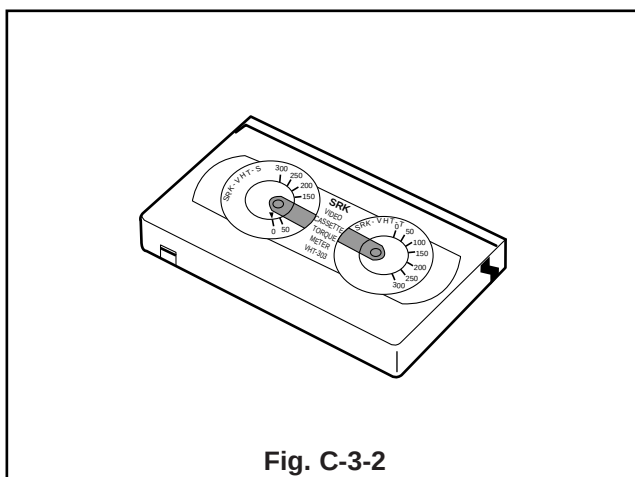
NOTE

Adhere the torque gauge adaptor to the torque gauge for measuring the value.

• Torque Gauge (600g.cm ATG)



• Cassette Torque Meter (SRK-VHT-303)

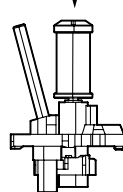


DECK MECHANISM ADJUSTMENT

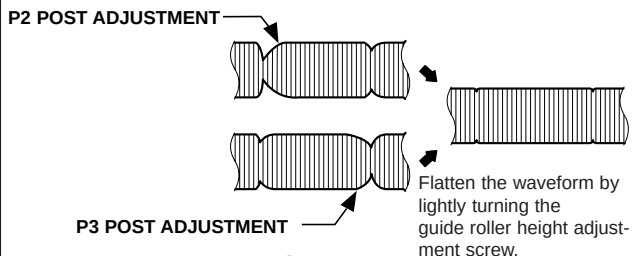
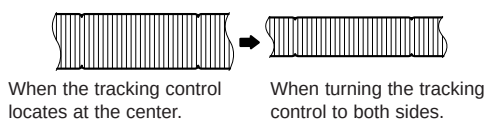
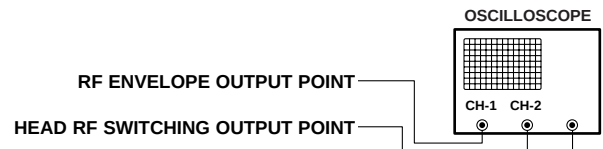
4. Guide Roller Height Adjustment

Purpose of adjustment : To ensure that the bottom surface of the tape can travel along with the tape lead line of the lower drum by constantly and adjusting and maintaining the height of the tape.

4-1. Prior Adjustment

Fixtures and tools used	VCR (VCP) status	Adjustment position
• Post Height Adjusting Driver	• Play or Review Mode	• The guide roller height adjusting screw on the supply guide roller and the take-up guide roller
Adjustment Procedure 1) Travel the tape and check the bottom surface of the tape travels along with the guide line of the lower drum. 2) If the tape travels toward the lower part of guide line on the lower drum, turn the guide roller height adjusting screw to the left 3) If it travels to the upper part, turn it to the right. 4) Adjust the height of the guide roller to ensure that the tape is guided on the guide line of the lower drum at the inlet/outlet of the drum. (Fig. C-4-1)		ADJUSTMENT DIAGRAM  Fig. C-4-1

4-2. Fine Adjustment

Fixtures and tools used	Measuring tools and connection position	VCR (VCP) status	Adjustment position
• Oscilloscope • Standard test tape • Post height adjusting driver	• CH-1: PB RF Envelope • CH-2: NTSC : SW 30Hz PAL : SW 25Hz • Head switching output point • RF Envelope output point	• Play the standard test tape.	• Guide roller height adjusting screw
1) Play the standard test tape after connecting the probe of oscilloscope to the RF envelope output point and the head switching output point. 2) Tracking control (playback) : Locate it at the center (Set the RF output to the maximum value via the tracking control when such adjustment is completed after the drum assembly is replaced.) 3) Height adjusting screw: Flatten the RF waveform. (Fig. C-4-2) 4) Move the tracking control (playback) to the right/left. (Fig. C-4-3) 5) Check the start and the end of the RF output reduction width are constant.		Waveform  Fig. C-4-2  Fig. C-4-2	
CAUTIONS There must exist no crumpling and folding of the tape due to excess adjustment or insufficient adjustment.		Connection Diagram 	

DECK MECHANISM ADJUSTMENT

5. Audio/Control (A/C) Head Adjustment

Purpose of adjustment : To ensure that audio and control signals can be recorded and played according to the contract tract by constantly maintaining distance between tape and head, and tape tension between the P3 post and the P4 post.

5-1. Prior Adjustment (performed only when no audio output appears in play of the standard test tape)

Fixtures and tools used	VCR (VCP) status	Adjustment position
- Blank Tape (Empty Tape) - Driver (+) Type $\varnothing 5$	Play the blank tape (empty tape).	- Tilt adjusting screw (C) - Height adjusting screw (B) - Azimuth adjusting screw (A)

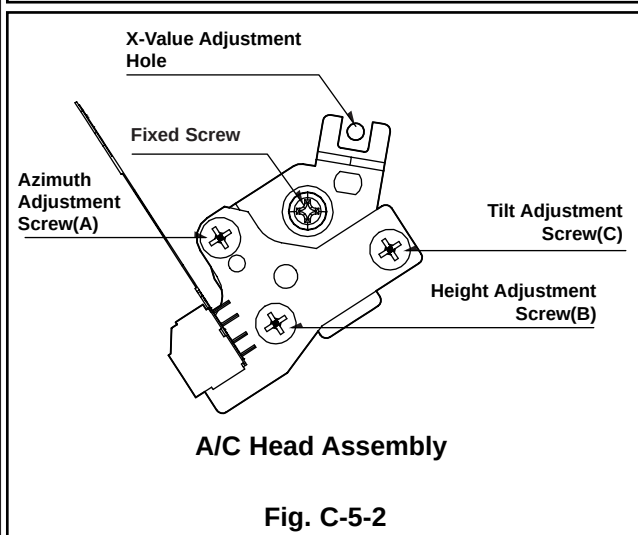
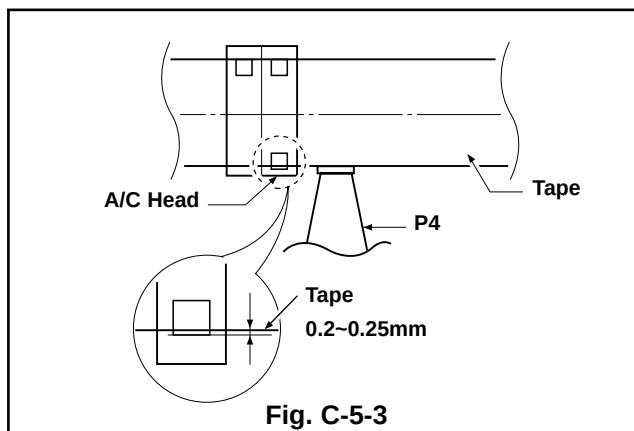
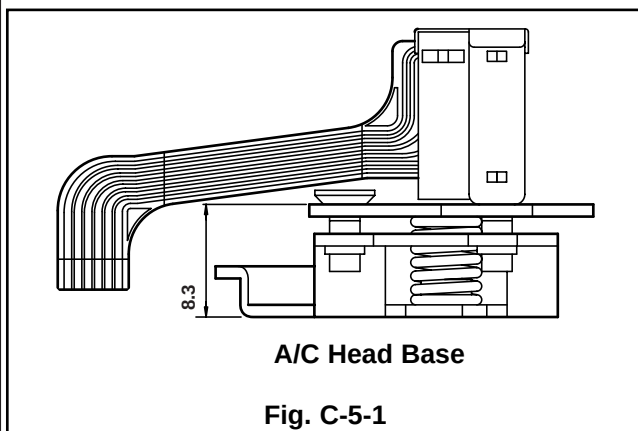
Adjustment Procedure/Adjustment Diagrams

- 1) Basically use the A/C head assembly adjusted as in SPEC.
- 2) Check there is crumpling and folding of the tape around the A/C head. If it is, Turn and adjust the tilt adjusting screw to ensure that the tape corresponds to the bottom guide of the P4, and recheck the tape path after proceeding play for 4-5 seconds.

- 3) Where the tape bottom is not equal to Fig. C-5-3, Adjust the height by using the height adjusting screw (B) and then readjust it by using the tilt adjusting screw (C).

CAUTIONS

Always check the height of the A/C head since most ideal height of A/C head can be obtained when the bottom part of the tape is away 0.2 ~ 0.25mm from the bottom part of the A/C head.



DECK MECHANISM ADJUSTMENT

5-2. Tape Path Check between Pinch Roller and Take up Guide (Check in the Rev Mode)

- 1) Check the tape pass status between the pinch roller and the take-up guide.(Check there is crumpling of the tape pass and folding of the take-up guide.)
 - (1) When holding of the take-up guide bottom occurs
Turn the tilt adjusting screw (C) clockwise and travel it stably to ensure there is no crumbling or folding of the tape.
 - (2) When holding of the take-up guide top occurs
Turn the tilt adjusting screw (C) anti-clockwise and

travel it stably to ensure there is no crumbling or folding of the tape.

- 2) Check there is folding of the tape at the bottom or top of the take-up guide in cutting-off the REV mode

CAUTIONS

If the RF waveform is changed after adjusting the A/C head, perform fine adjustment to ensure the RF waveform is flattened.

5-3. Fine Adjustment (Azimuth Adjustment)

Fixtures and tools used	Connection position	VCR (VCP) status	Adjustment position
- Oscilloscope - Standard test tape (only for SP) - Driver (+) Type Ø 4	Audio Output Jack	- Play the standard test - Tape, 1KHz, 7KHz.	- Azimuth Adjusting Screw (A) - Height Adjusting Screw (B)
Adjustment Procedure 1) Connect the probe of Oscilloscope to the audio output jack. 2) Ensure that Audio 1KHz, 7KHz output is flattened at the maximization point by adjusting the Azimuth adjusting screw (A).			



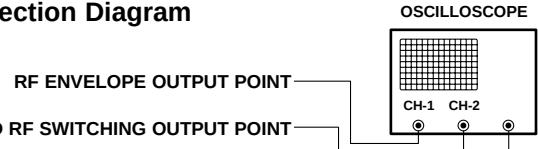
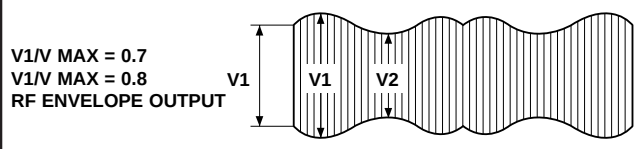
Fig. C-5-4

6. X-distance Adjustment

Purpose of adjustment : To maintain compatibility with other VCR (VCP).			
Fixtures and tools used	Connection position	VCR (VCP) status	Adjustment position
- Oscilloscope - Standard test tape (only for SP) - Driver (+) Type Ø 4	- CH-1: PB RF Envelope - CH-2: NTSC ; SW 30Hz PAL:SW 25Hz - Head switching output point - RF Envelope output point	Play the standard test tape.	
Adjustment Procedure 1) After releasing the auto tracking, lightly turn the fixing screw. Turn the (+) type driver (Ø 3 ~ Ø 4) on the X-distance adjusting hole to the right or left. Adjust the RF envelope level to the maximum point and then fix the fixing screws. 2) For the 31mm head, adjust it with the SP tape recorded in the width of 31mm since the head travels on the tape track only for SP with the width of 58mm.		Connection Diagram Fig. C-6	

DECK MECHANISM ADJUSTMENT

7. Adjustment after Drum Assembly (Video Heads)

Purpose of adjustment : To adjust and stabilize the height change, X-distance change, etc depending on the guide roller after assembling the drum.			
Fixtures and tools used	Connection position	VCR (VCP) status	Adjustment position
- Oscilloscope - Standard test tape (only for SP) - Post Height Adjusting Driver - Driver (+) Type Ø 5	- CH-1: PB RF Envelope - CH-2: NTSC : SW 30Hz PAL:SW 25Hz - Head switching output point - RF Envelope output point	- Play the blank tape. - Play the standard test tape.	- Fine adjustment of guide roller - Switching Point - Tracking Preset - X-distance
Checking/Adjustment Procedure 1) Play the blank tape (empty tape) and check whether the guide roller crumbles or wrinkles the tape and adjust it if necessary. 2) Check that the RF envelope output waveform is flat, and adjust the height of the guide roller while playing the standard test tape. 3) Adjust the switching point. 4) Check the RF envelope output is the maximum when the tracking control locates at the center. If not maximum, set up to ensure that RF envelope output becomes the maximum by turning the (+) type driver (Ø 3 ~ Ø 4) on the base A/C groove.		Connection Diagram  Waveform 	

8. Check of Traveling Device after Deck Assembly

8-1. Audio, RF Normalization Time (Locking Time) Check in Play after CUE or REV

Fixtures and tools used	Measuring standard	Connection position	VCR (VCP) status
- Oscilloscope 6H 3KHz Color Bar Standard Test tape - Stop Watch	- RF Locking Time: Within 5 seconds - Audio Locking Time : Within 10 seconds	- CH-1: PB RF Envelope - CH-2: Audio output - RF Envelope output point - Audio output jack	Play the 6H 3KHz Color Bar Standard Test tape.
Checking Procedure 1) Check that locking time of the RF and Audio waveform is fallen within the measuring standard in conversion of the play mode from the CUE or the REV mode. 2) Readjust the paragraph 5 and 6 if it deviates from the standard.			

8-2. Check of Tape Curl and Jam Status

Fixtures and tools used	Fixtures and tools used	Fixtures and tools used
- T-160 Tape - T-120 Tape	There must be no jam or curl at the first, middle and end position of tape.	Travel the tape at the position of its first and end.
Checking Procedure 1) Check there is no abnormality of every traveling post status. 2) There must be no abnormal operation of the counter in occurrence of folding of the bottom tape. There must be not abnormality of audio signal in damage of the top tape. 3) If there is abnormality, readjust the adjustment paragraph 4 and 5.		

PROTECTION, MAINTENANCE AND CHECK OF VIDEO FUNCTION

1. Checking Points prior to Repair

Following abnormal phenomena may be repaired by removal of foreign materials and oil supply. Check oiling is required at the checking set or cleaning status is complete. Determine that necessity of checking and repair the set exists after checking the using period of the set together with the user. In this case, followings must be checked:

Phenomena	Checking Points and Cause	Replacement
Color beat	Pollution of Full-Erase Head	○
S/N, Color Faded	Pollution of Video Head	○
Horizontal, Vertical Jitte	Pollution of Video Head or Tape Transport System	○
Poor Sound, Low Sound	Pollution of Audio/Control Head	○
No tape wound or tape wound loosely, FF or REW impossible, or slow turning	Pollution of Pinch Roller or Belt Capstan Belt	○
Tape loosely wound in REV or Unloading	Deterioration of Clutch Assembly D37 Torque	○
	Pollution of Drum and Traveling Device	Fig. C-9-3

CAUTIONS

If operation of the position with (O) mark is abnormal even after removing cause, replace it with substitute product since it shows damage or wearing.

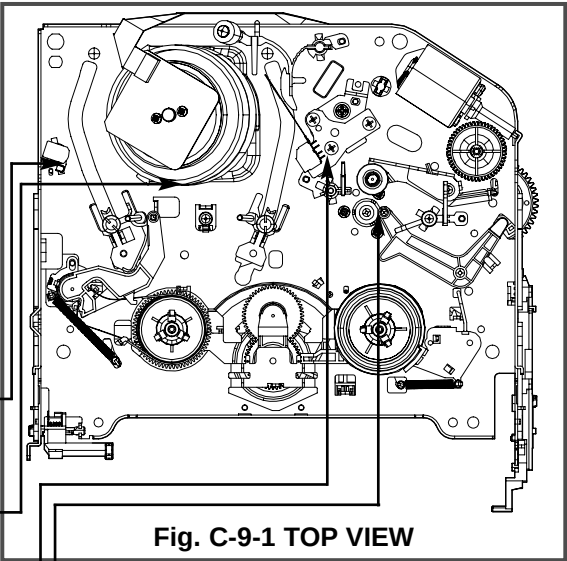


Fig. C-9-1 TOP VIEW

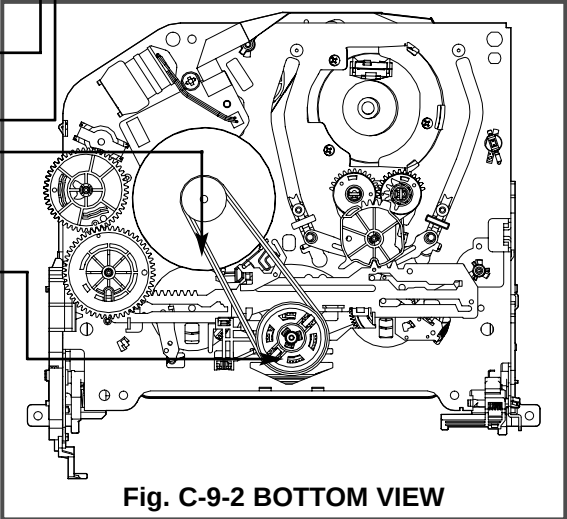


Fig. C-9-2 BOTTOM VIEW

* No. (1) ~ (12) shows sequence that the tape moves from the supply reel to the take-up reel.)

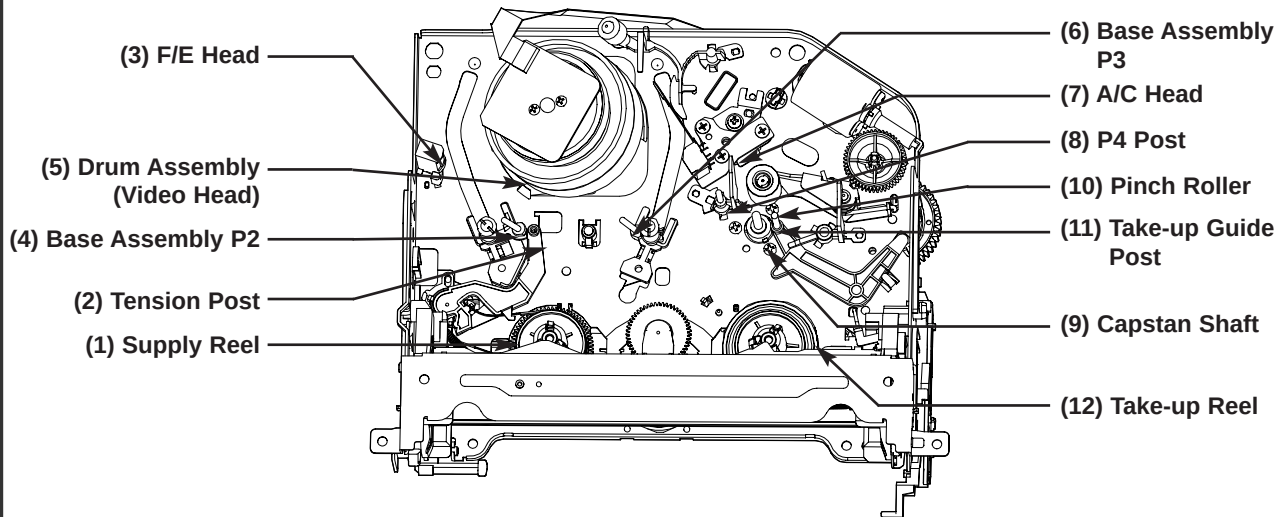


Fig. C-9-3 Tape Transport System

PROTECTION, MAINTENANCE AND CHECK OF VIDEO FUNCTION

2. Essential Check and Repair

Recording density of the video is far higher than the audio. Therefore video parts are very precise so as to allow only error of 1/1000mm or so in order to maintain compatibility with other videos.

If one of these parts is polluted or old, same phenomena will appear as they are damaged.

To maintain clear screen, regular check, replacement of old and damaged parts and oil supply, etc are essential.

3. Regular Check and Repair

Check and repair schedule is not constant since they vary depending on method that the consumer uses video and environment where the video is installed at.

However, for the video used by common household, good screen will be maintained if regular check and repair per 1,000 hour is performed. The following chart shows relationship between using time and checking time:

Table 1

Time Requiring Checking Average hours used per day	About 1 year	About 18 months	About 3 years
One hour			
Two hours			
Three hours			

4. Tools for Check and Repair

- (1) Grease: Floil G-3114 (KANTO) or equivalent grease (Green)
- (2) Grease: Kanto G-754, PL-433 (Yellow)
- (3) Alcohol (Isopropyl Alcohol)
- (4) Cleaning Patch (cloth)

5. Maintenance Process

5-1) Removal of Foreign Material

- (1) Removal of foreign material from video head (Fig. C-9-4)
Firstly try to use a cleaning tape.

Use a cleaning patch if foreign materials are not removed with the cleaning tape due to severe dirty of the head. Soak the cleaning patch in alcohol and put it to the head tip. Smoothly turn the drum (turning cylinder) to the right or left (In this case, the cleaning patch must not be moved vertically).

After completely drying the head, test the traveling status of the tape.

If alcohol (Isopropyl Alcohol) remains at the video head, the tape may be damaged when this solution touches with the head surface.

Never use a cloth bar (commercial sale)

- (2) Wipe the tape transport system and the drive system with the cleaning patch soaked in alcohol (Isopropyl Alcohol) when removing foreign materials from them.
 - 1) The part touched with the traveling tape is called as tape transport system. The drive system consists of parts to travel the tape.
 - 2) Care must be exercised so that unreasonable force to change the pattern will be applied to the tape transport system during removal of foreign materials.

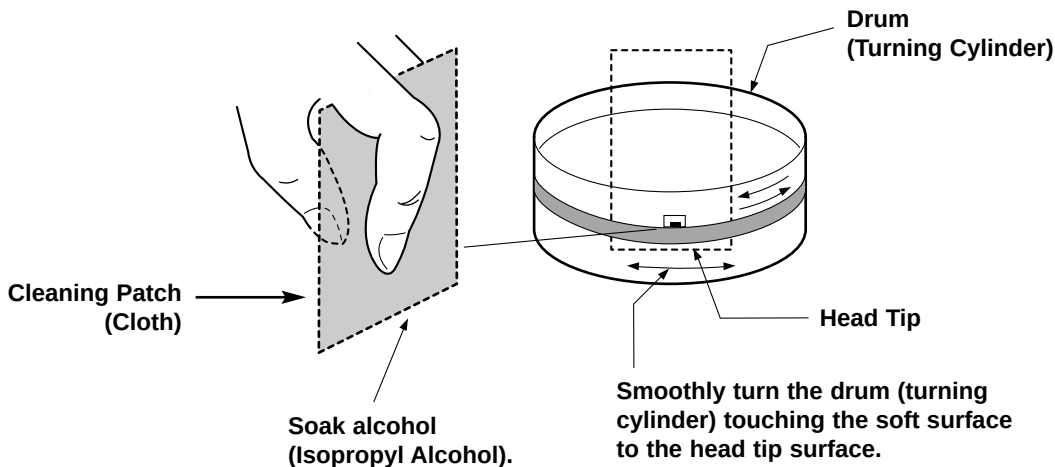


Fig. C-9-4

PROTECTION, MAINTENANCE AND CHECK OF VIDEO FUNCTION

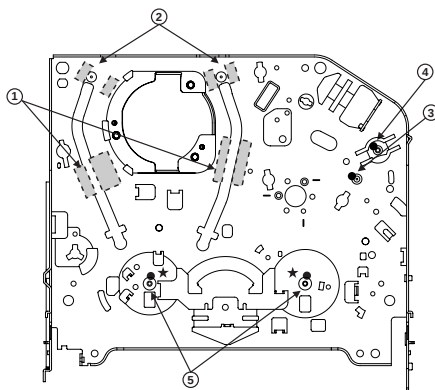
5-2) Grease Applications

(1) Grease Application Method

Apply grease by using a cloth swab or brush. Care must be exercised so that excess quantity should not be used. If the excessive quantity is applied, wipe it with the gauze soaked in alcohol (Isopropyl Alcohol).

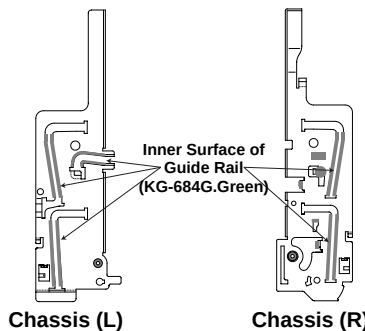
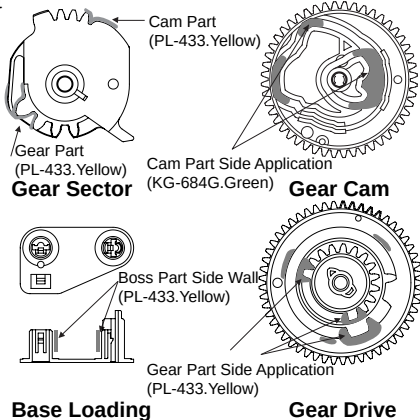
NOTE: POSITION OF GREASE APPLICATION

- | | |
|--|----------------------------------|
| (1) Inner Side Surface and Top Surface of Loading Path | (4) Gear Wheel Shaft |
| (2) Stable Adhesion Part of Base P2, P3 | (5) Reel S. T. Shaft |
| (3) Arm Pinch Shaft | (1) (2) (3) (4): KG-684G (Green) |
| | (5): PL-433 (Yellow) |



Chassis (TOP)

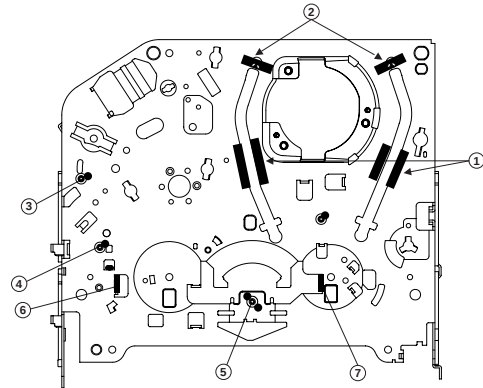
Gear Part



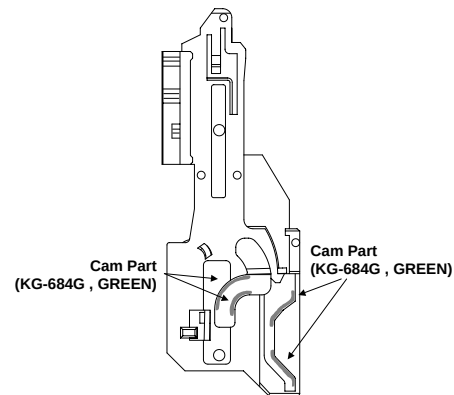
(2) Regular Grease Application

Apply grease to the designated application position every 500 hour.

- | | |
|--|--|
| (1) Inner Side Surface and Top Surface of Loading Path | (6) Guide Part on the Plate Slider Side Wall (Left) |
| (2) Stable Adhesion Part of Base P2, P3 Coil | (7) Guide Part on the Plate Slider Side Wall (Right) |
| (3) Gear Cam Shaft | (1) (2) (3) (4) (5) (6) (7): KG-684G (Green) |
| (4) Gear Drive Shaft | |
| (5) Clutch Shaft Groove | |



Chassis (Bottom)



Gear Rack F/L

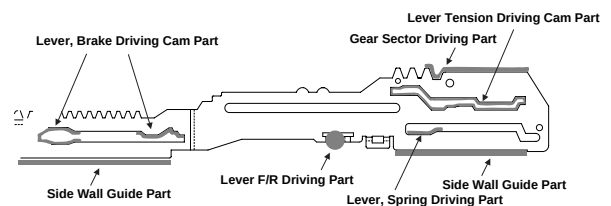
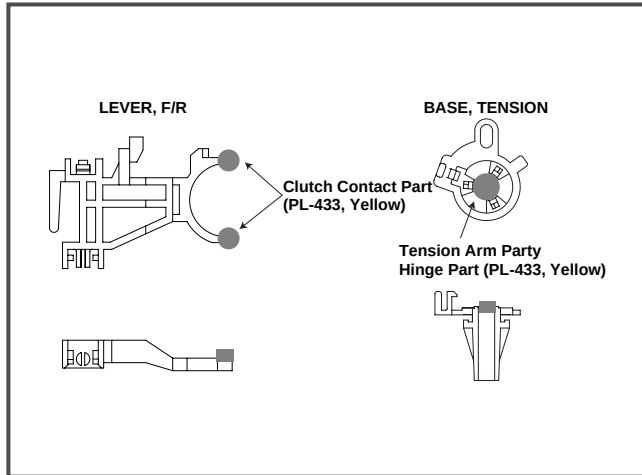


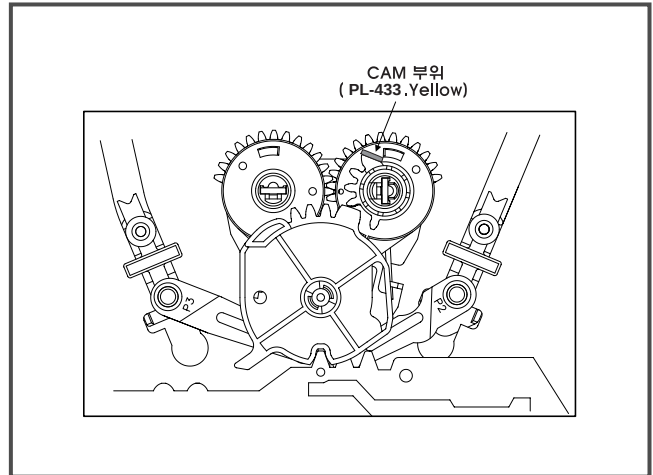
Plate Slider

PROTECTION, MAINTENANCE AND CHECK OF VIDEO FUNCTION

Lever, F/R, Base, Tension



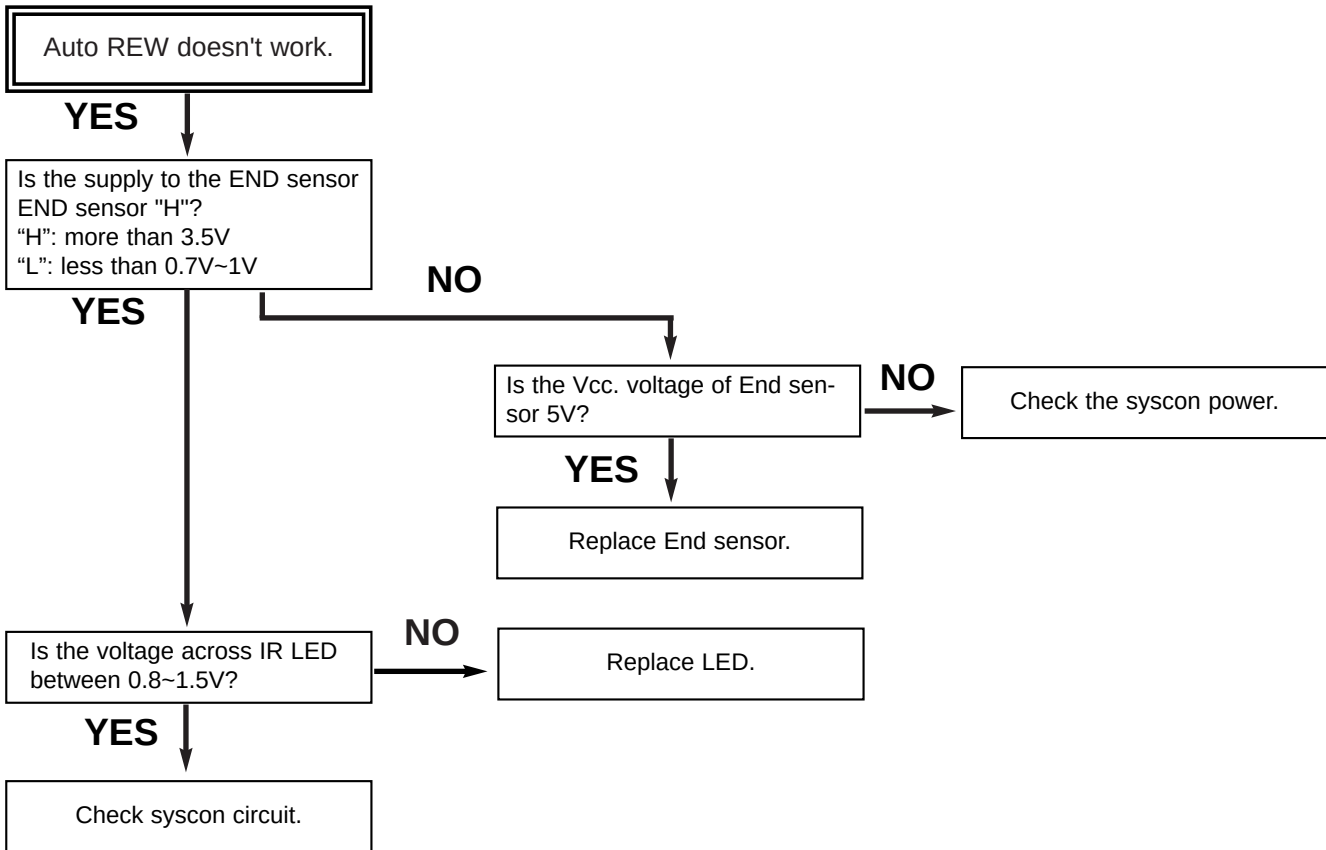
GEAR AY, P2 & P3



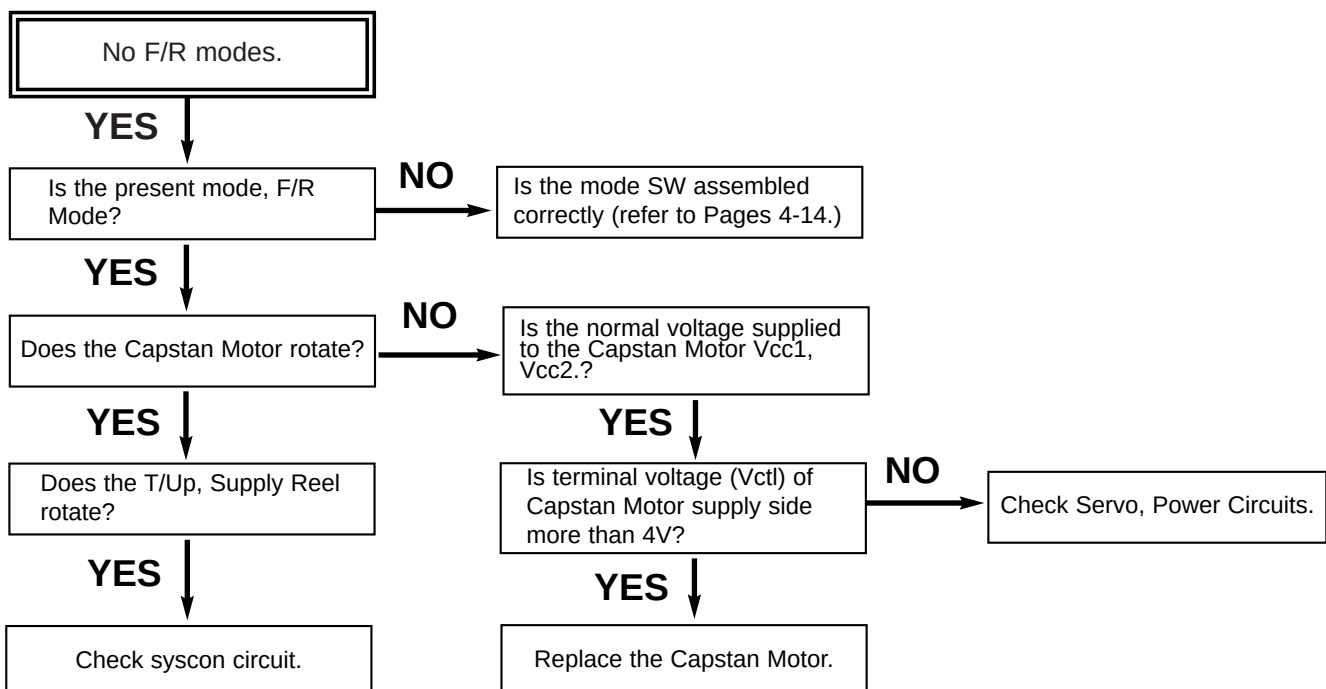
MECHANISM TROUBLESHOOTING GUIDE

1. Deck Mechanism

A.

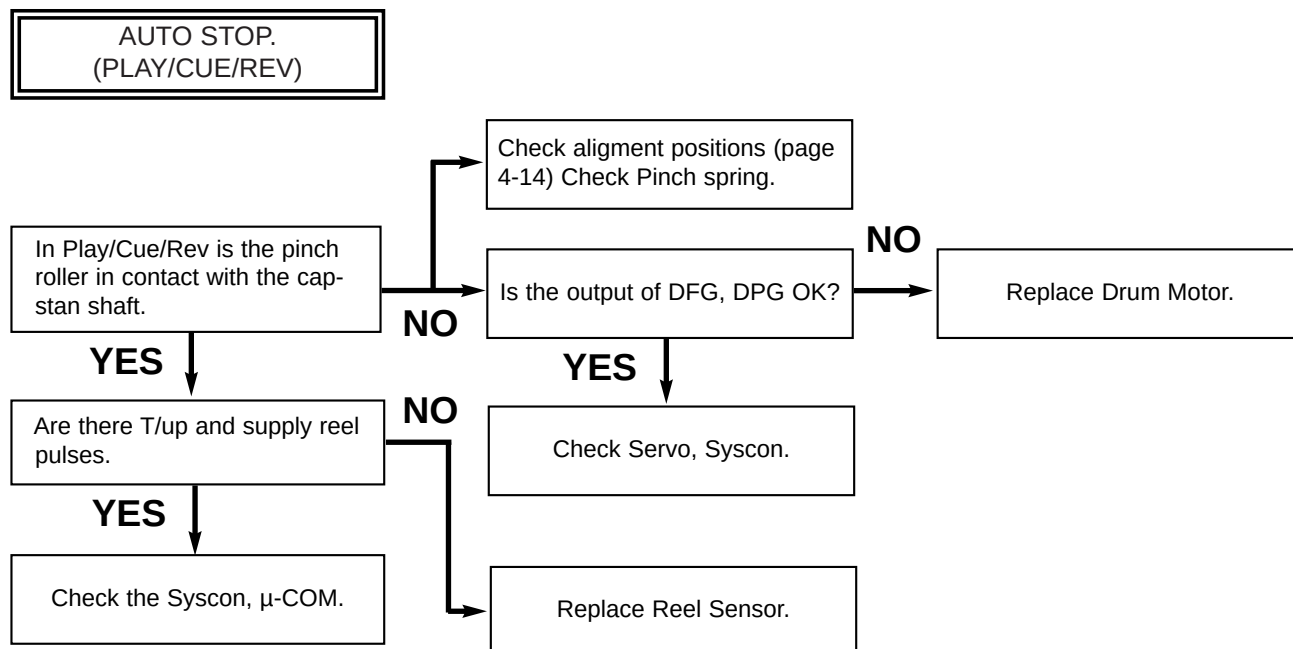


B.

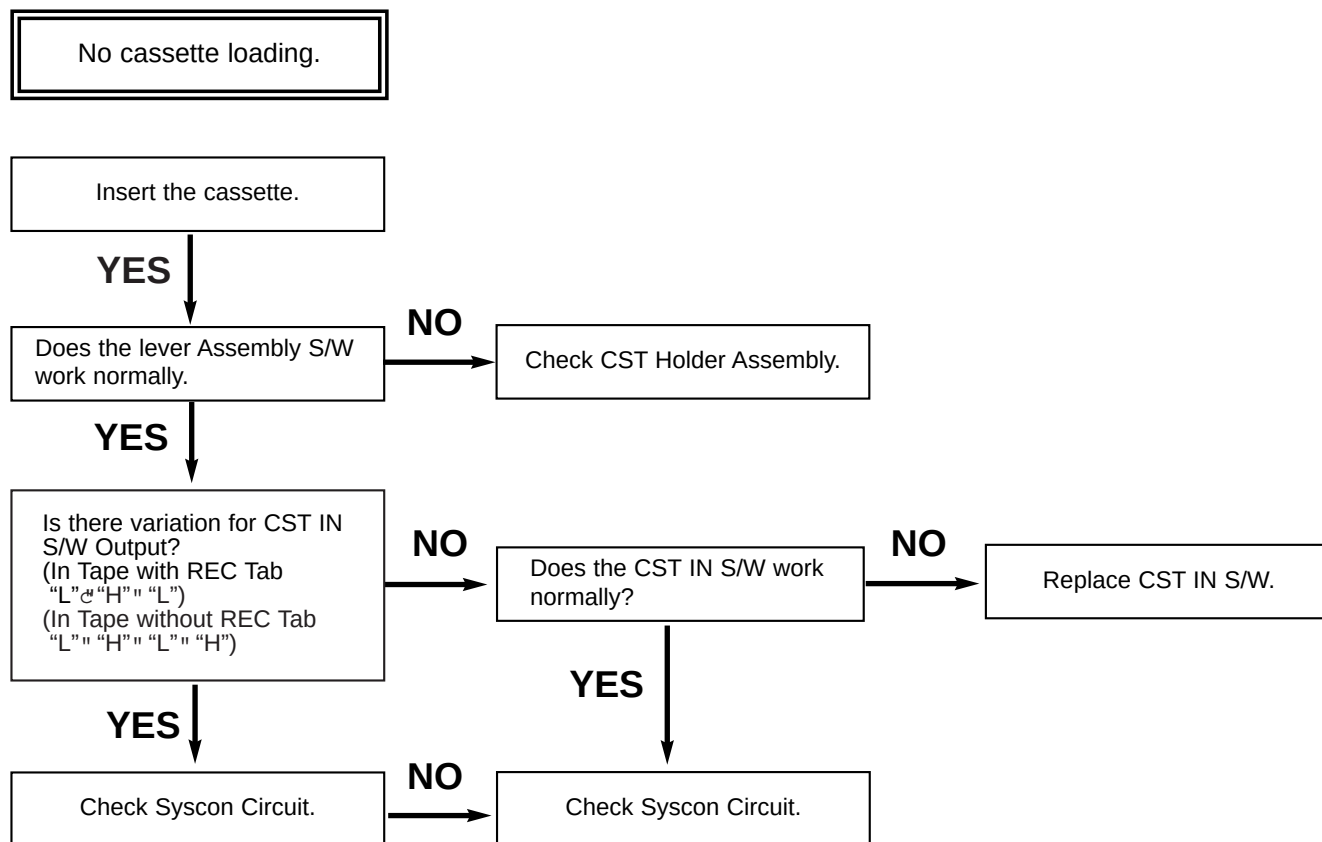


MECHANISM TROUBLESHOOTING GUIDE

C.

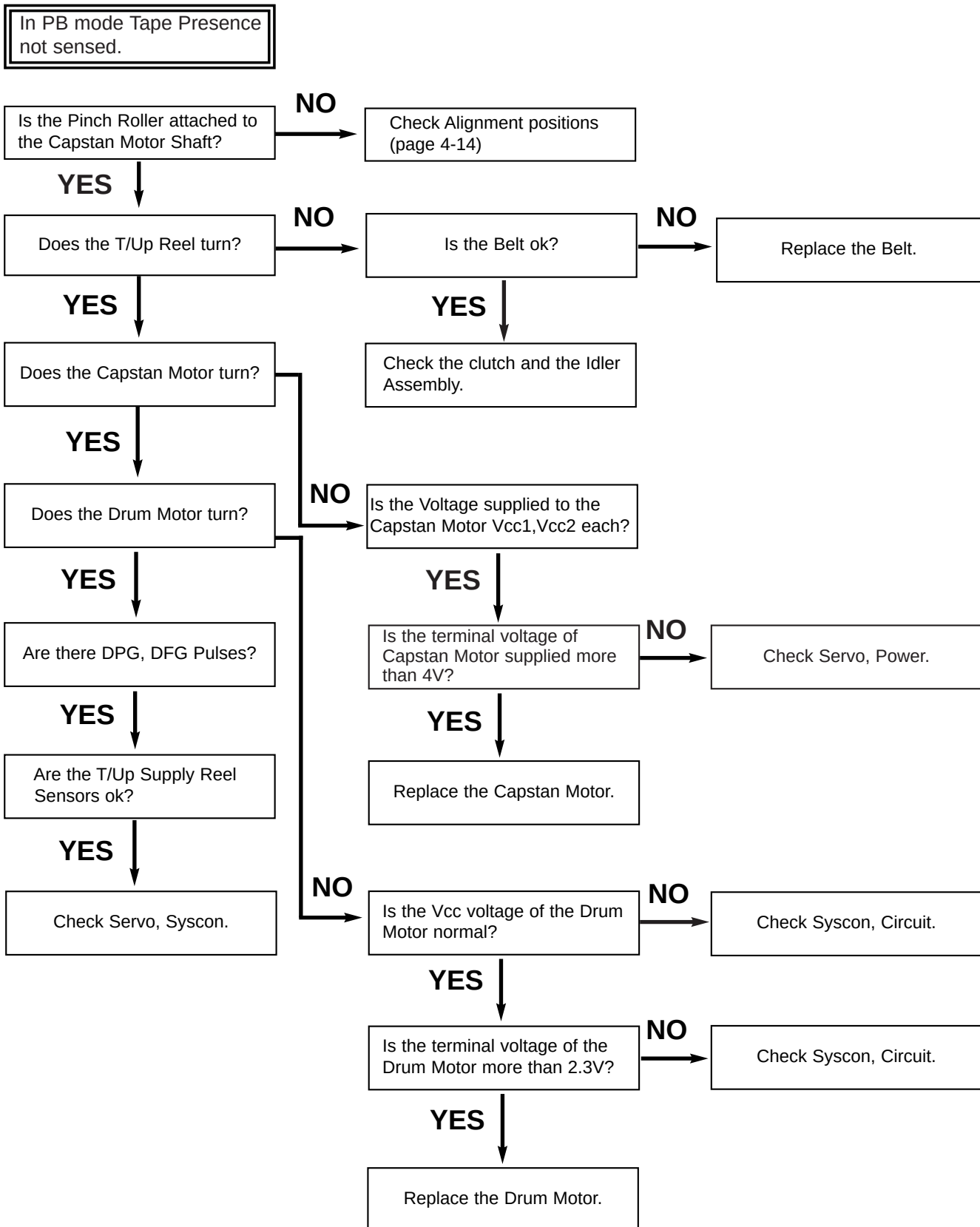


D.



MECHANISM TROUBLESHOOTING GUIDE

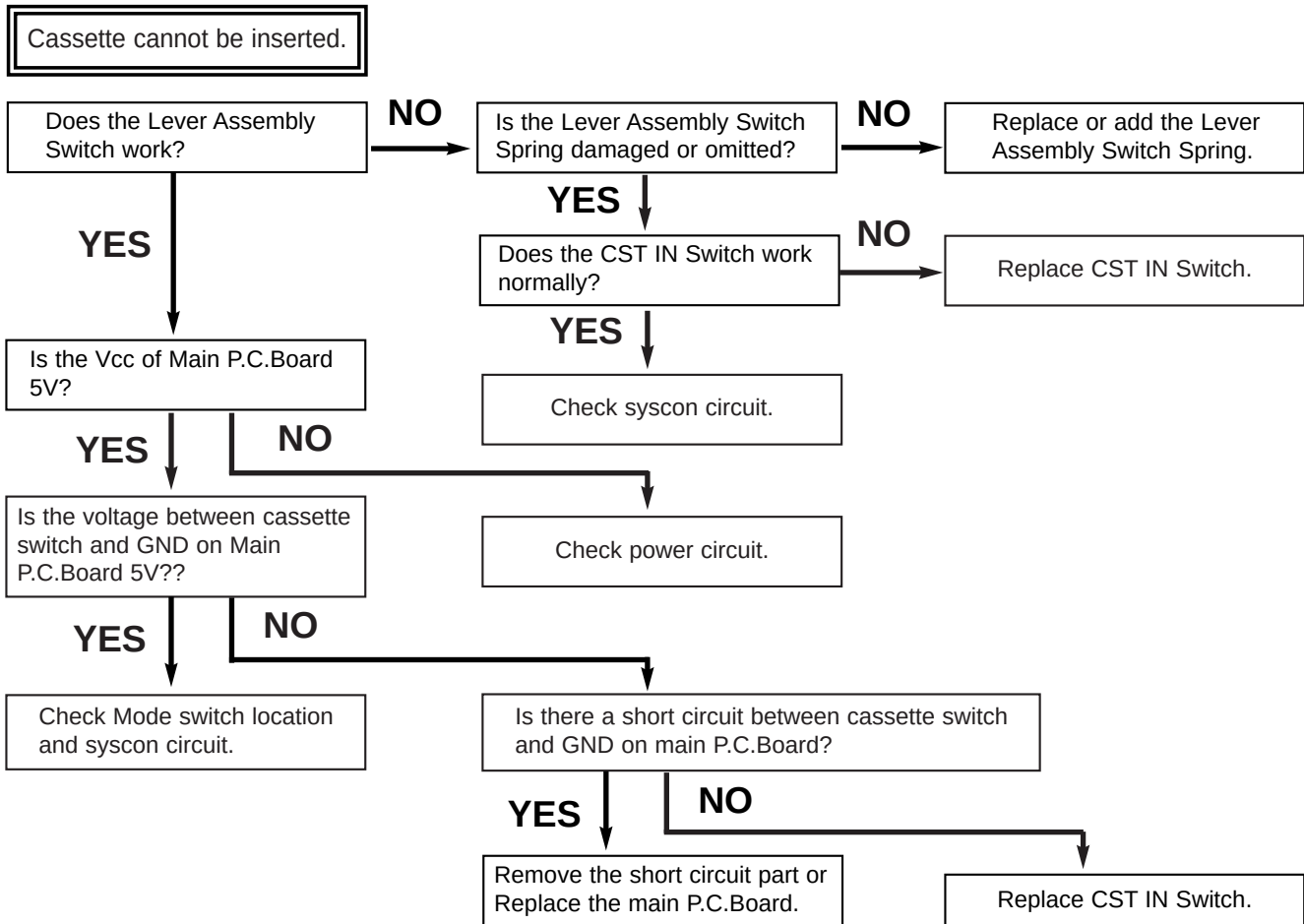
E.



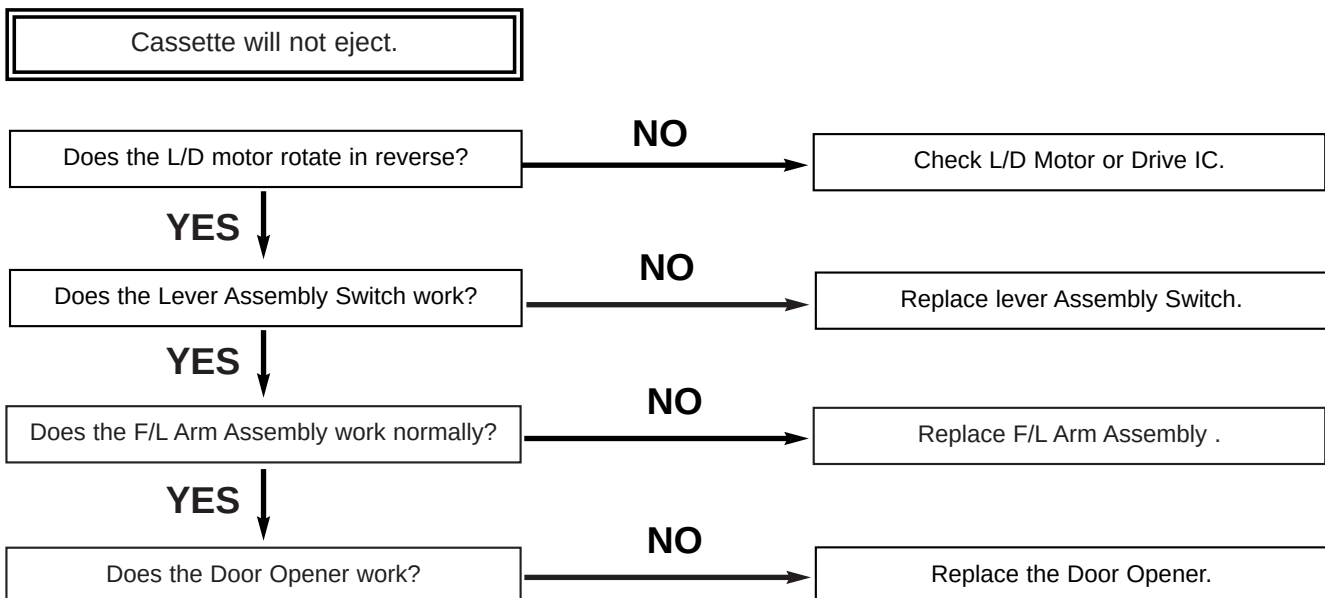
MECHANISM TROUBLESHOOTING GUIDE

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A.

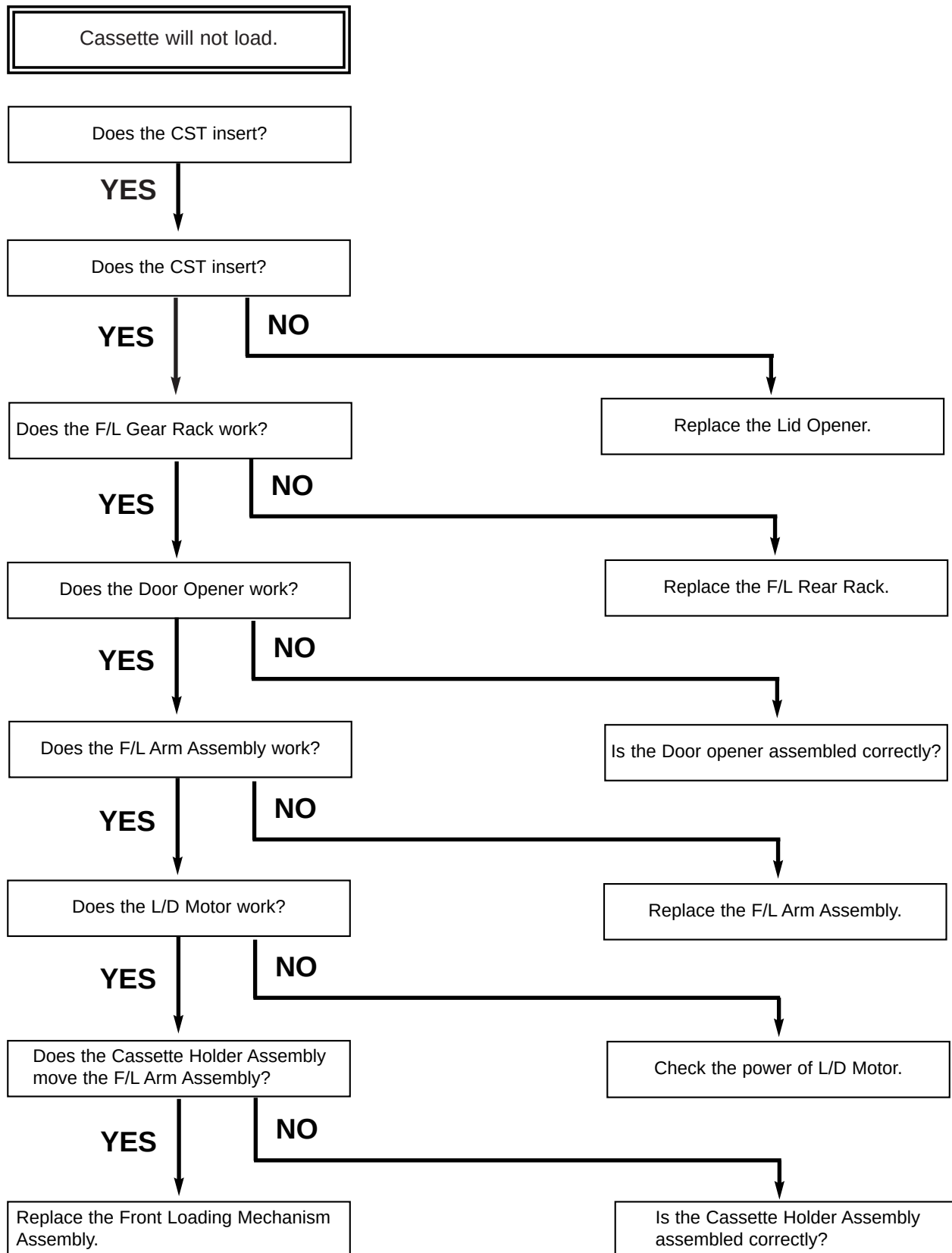


B.



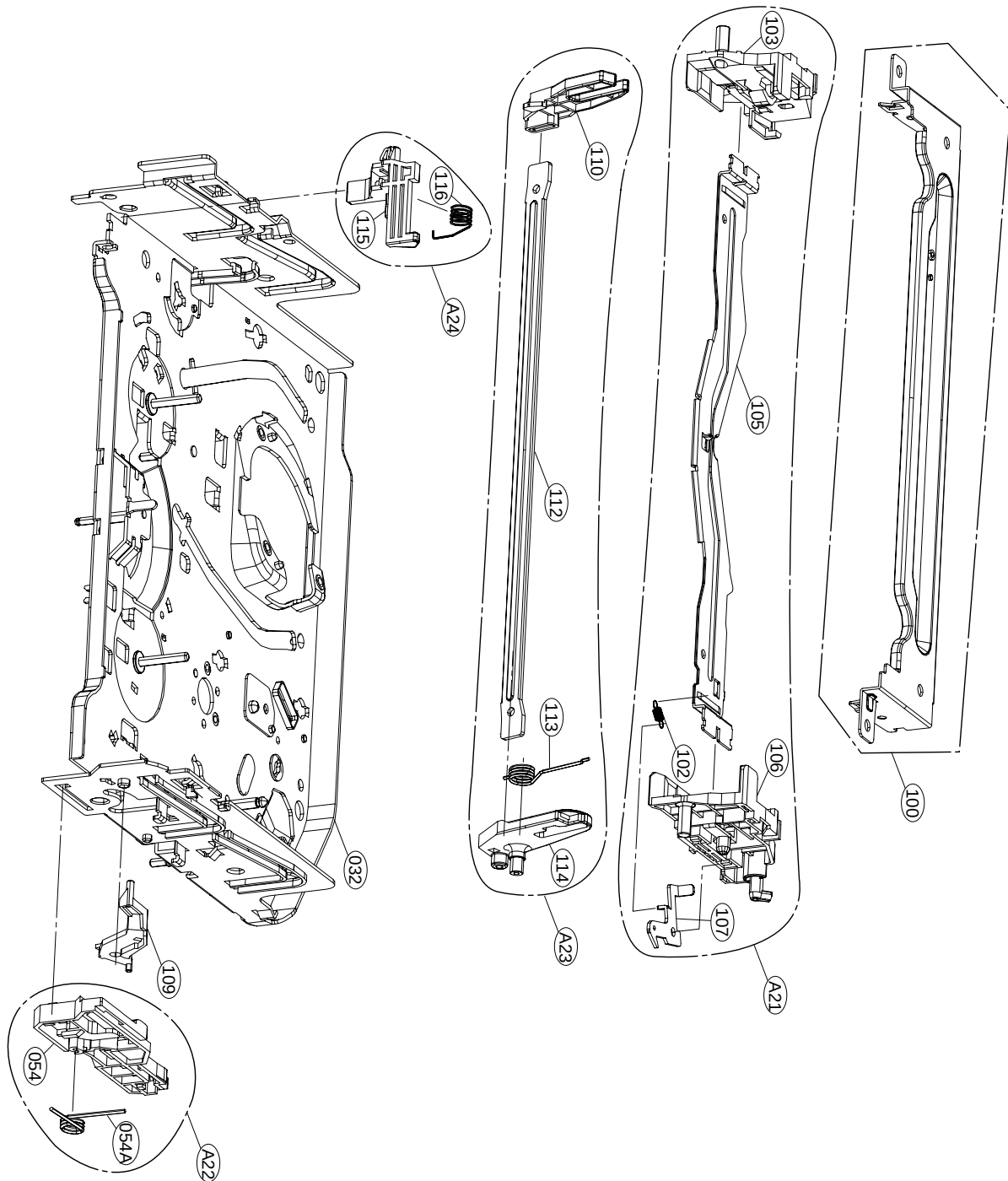
MECHANISM TROUBLESHOOTING GUIDE

C.



EXPLODED VIEWS

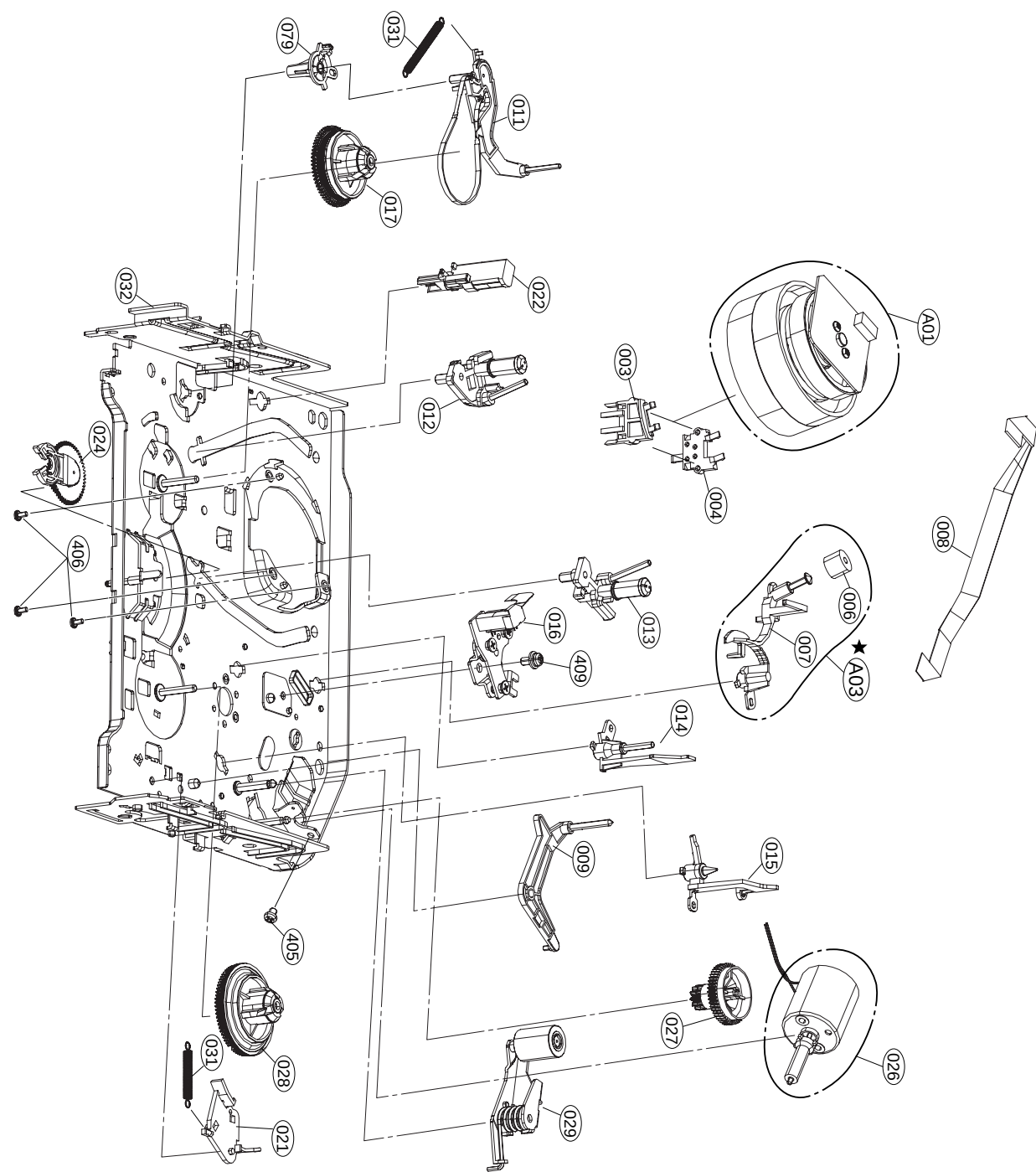
1. Front Loading Mechanism Section



EXPLODED VIEWS

2. Moving Mechanism Section (1)

★ OPTIONAL PART



3. Moving Mechanism Section (2)



MEMO

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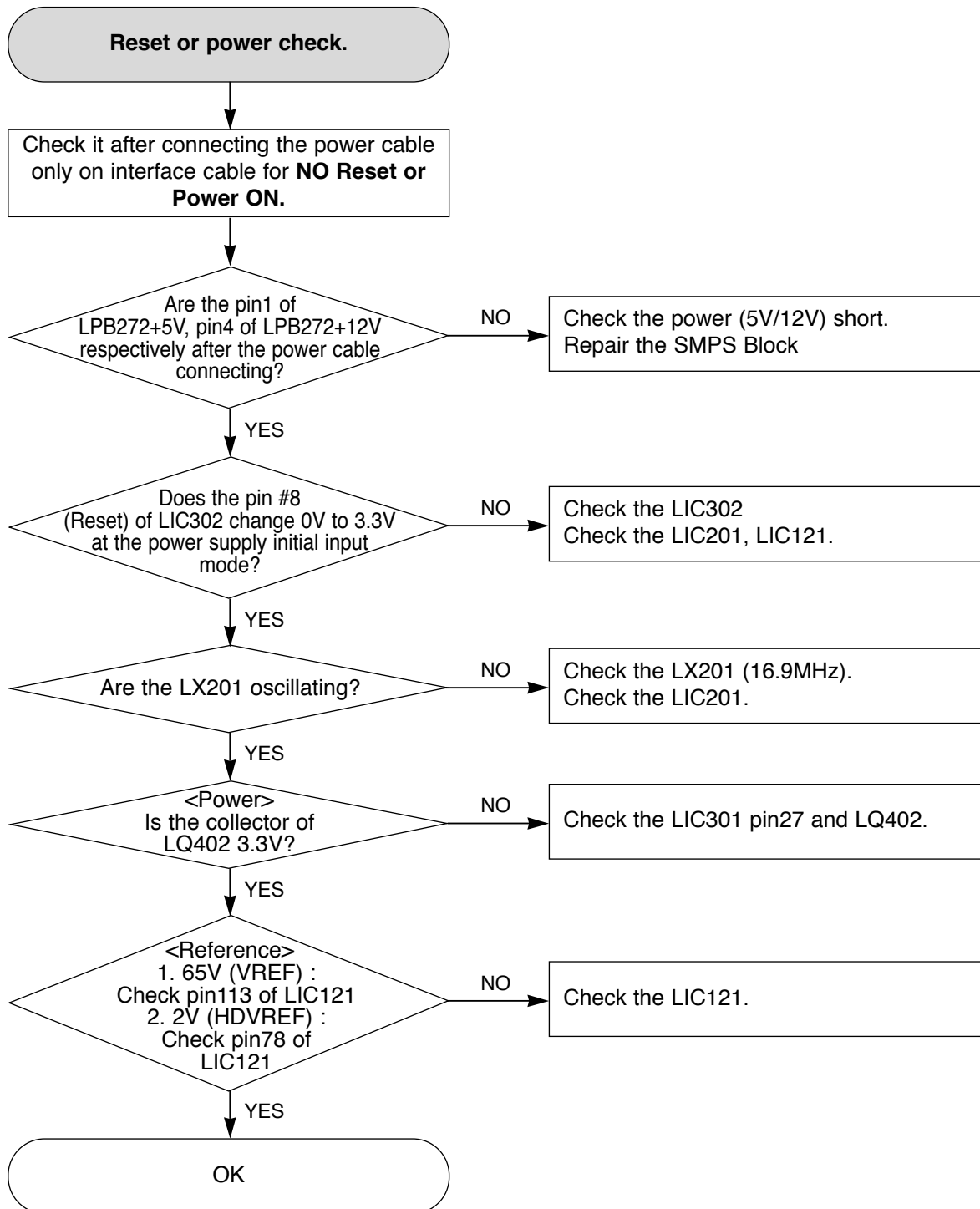
SECTION 5

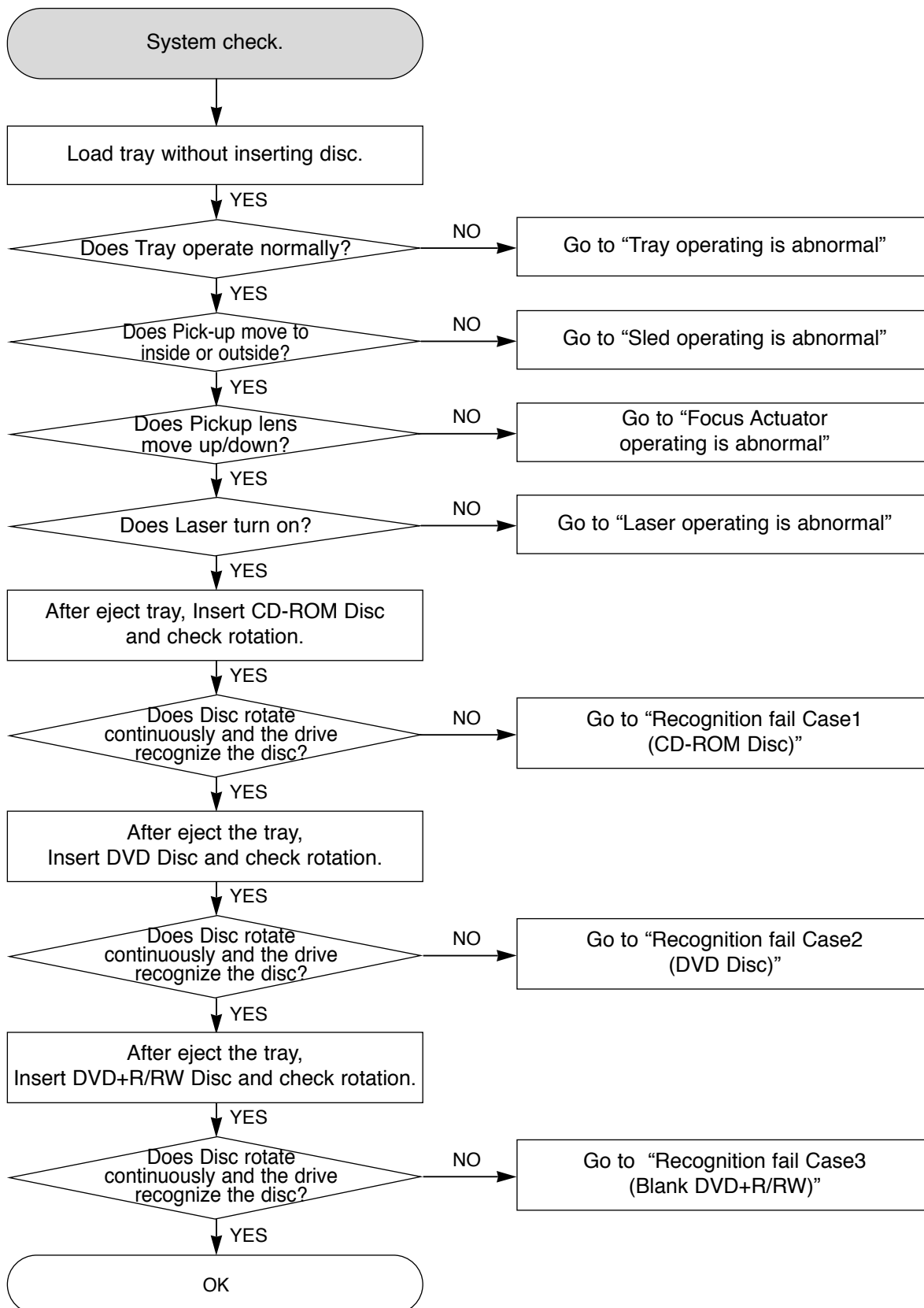
RS-02A LOADER PART

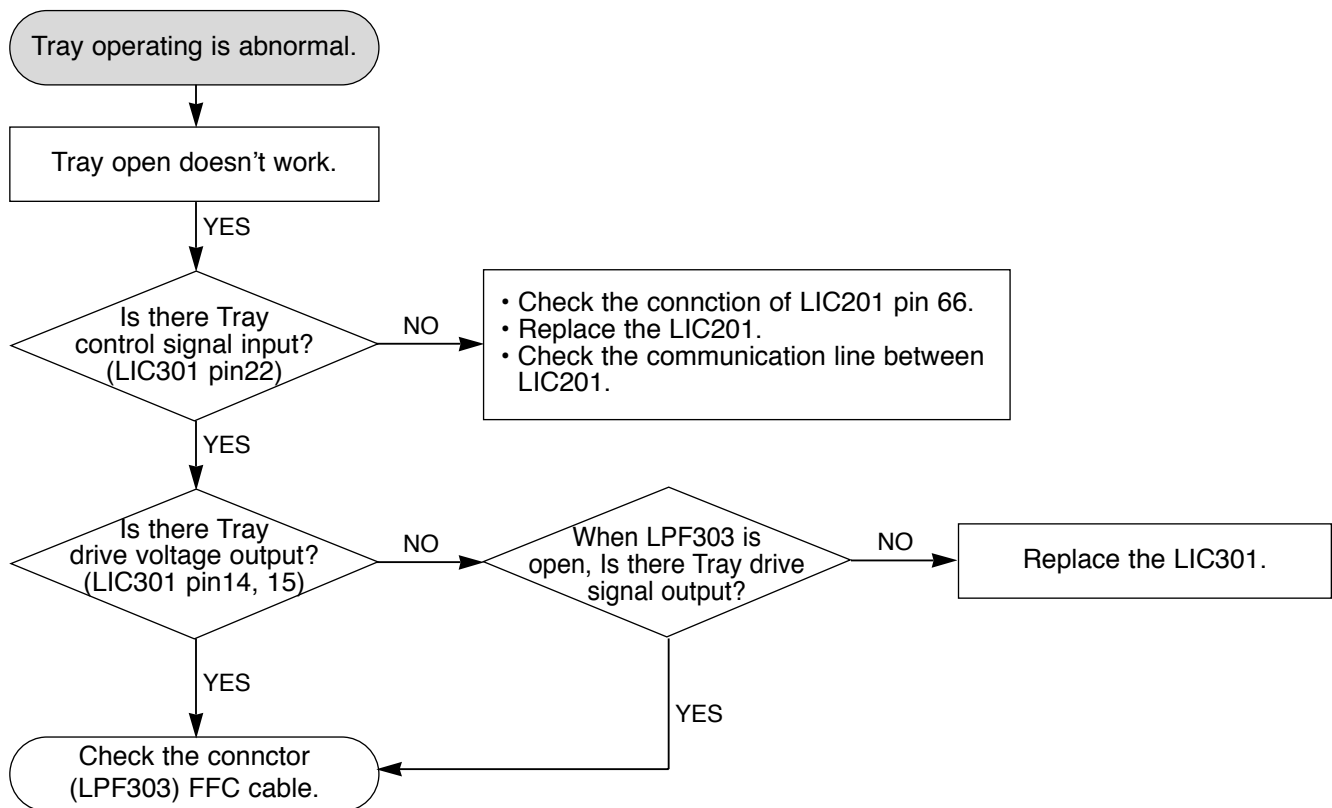
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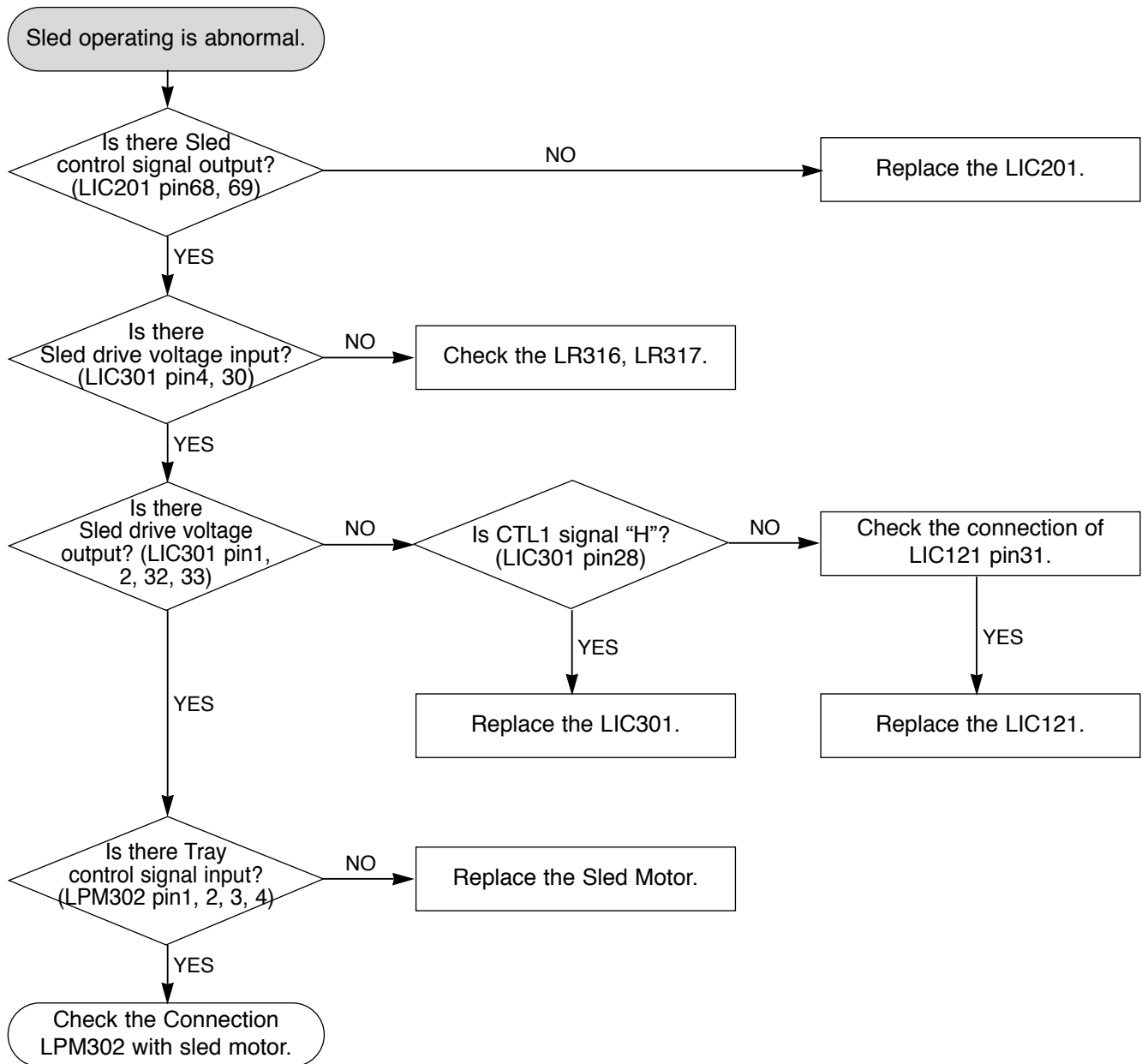
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1. MAIN P.C.BOARD (TOP VIEW).....	5-45
2. MAIN P.C.BOARD (BOTTOM VIEW)	5-47

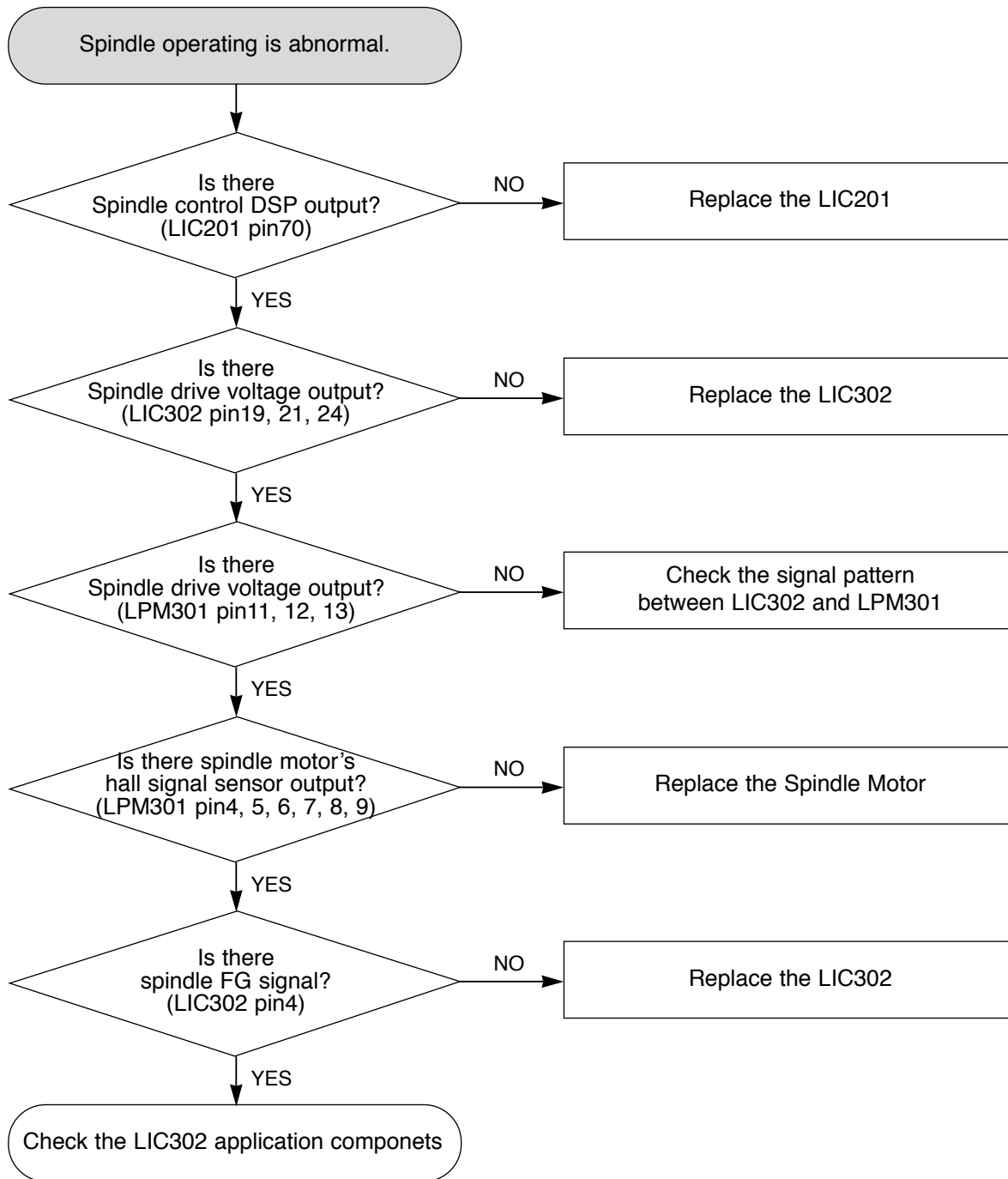
ELECTRICAL TROUBLESHOOTING GUIDE

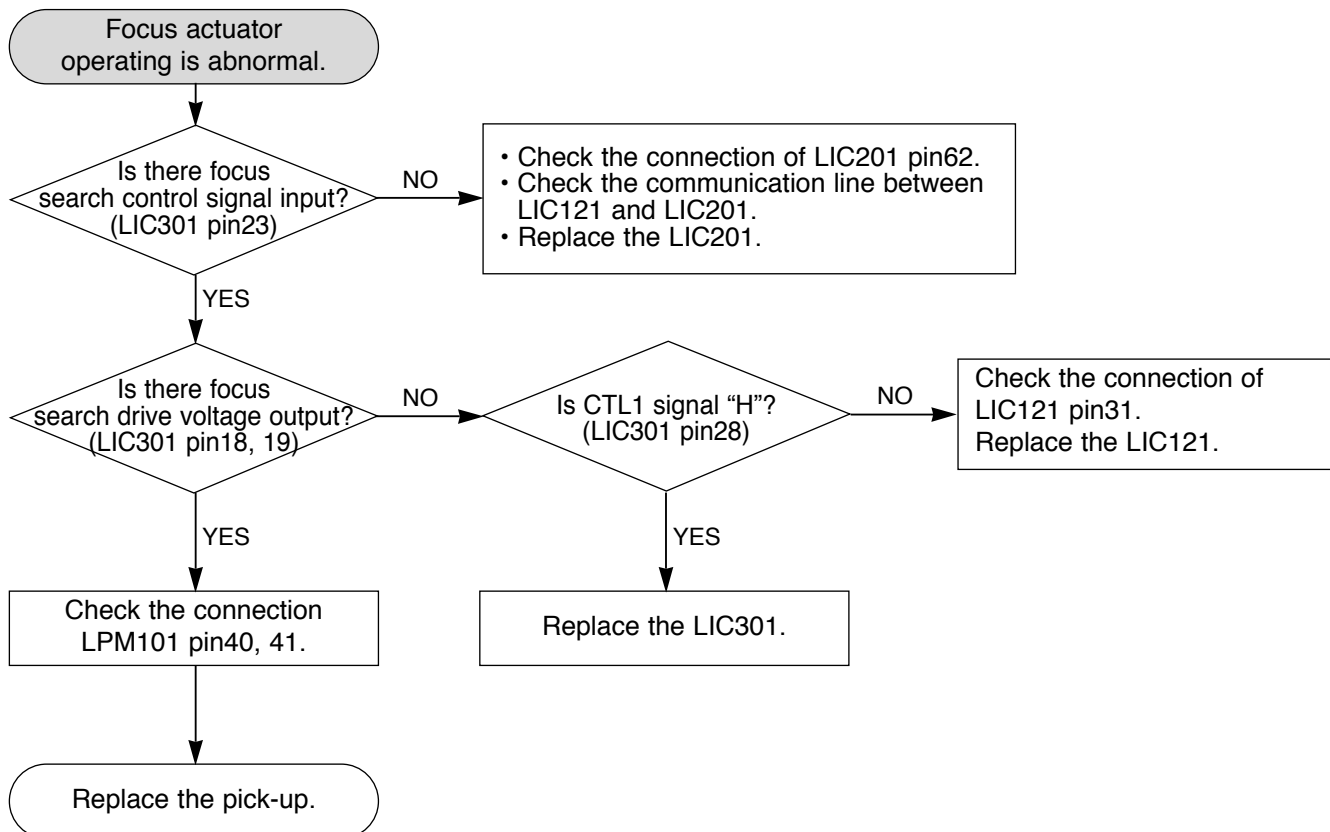
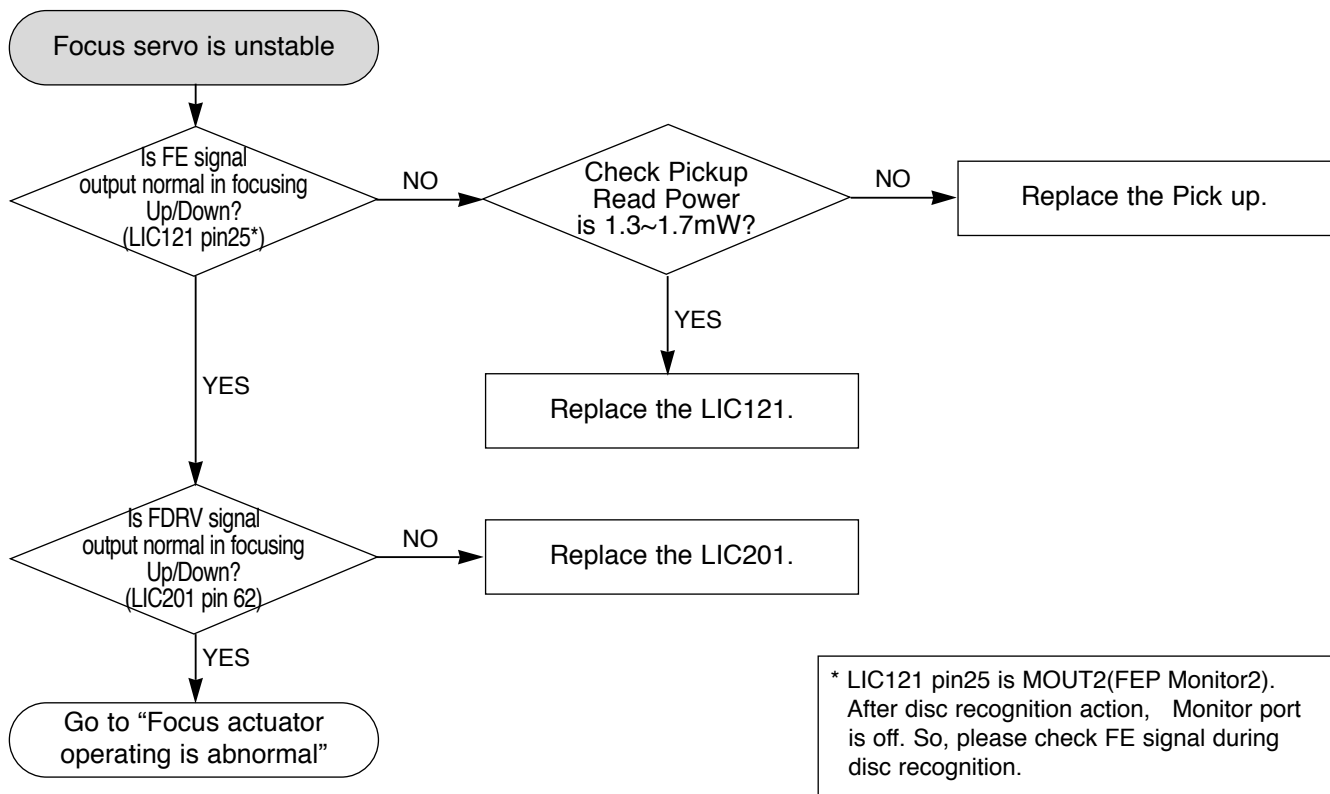


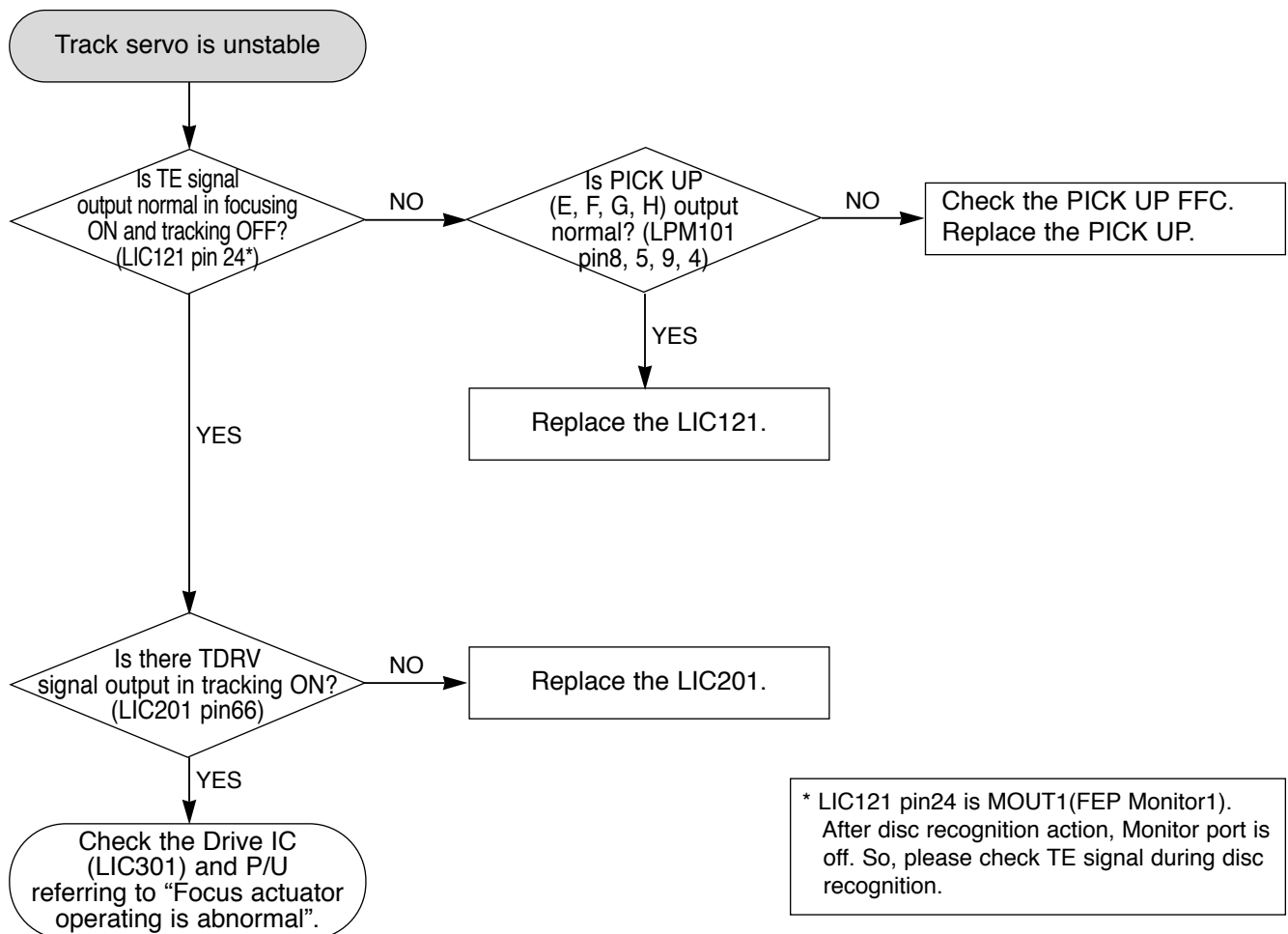


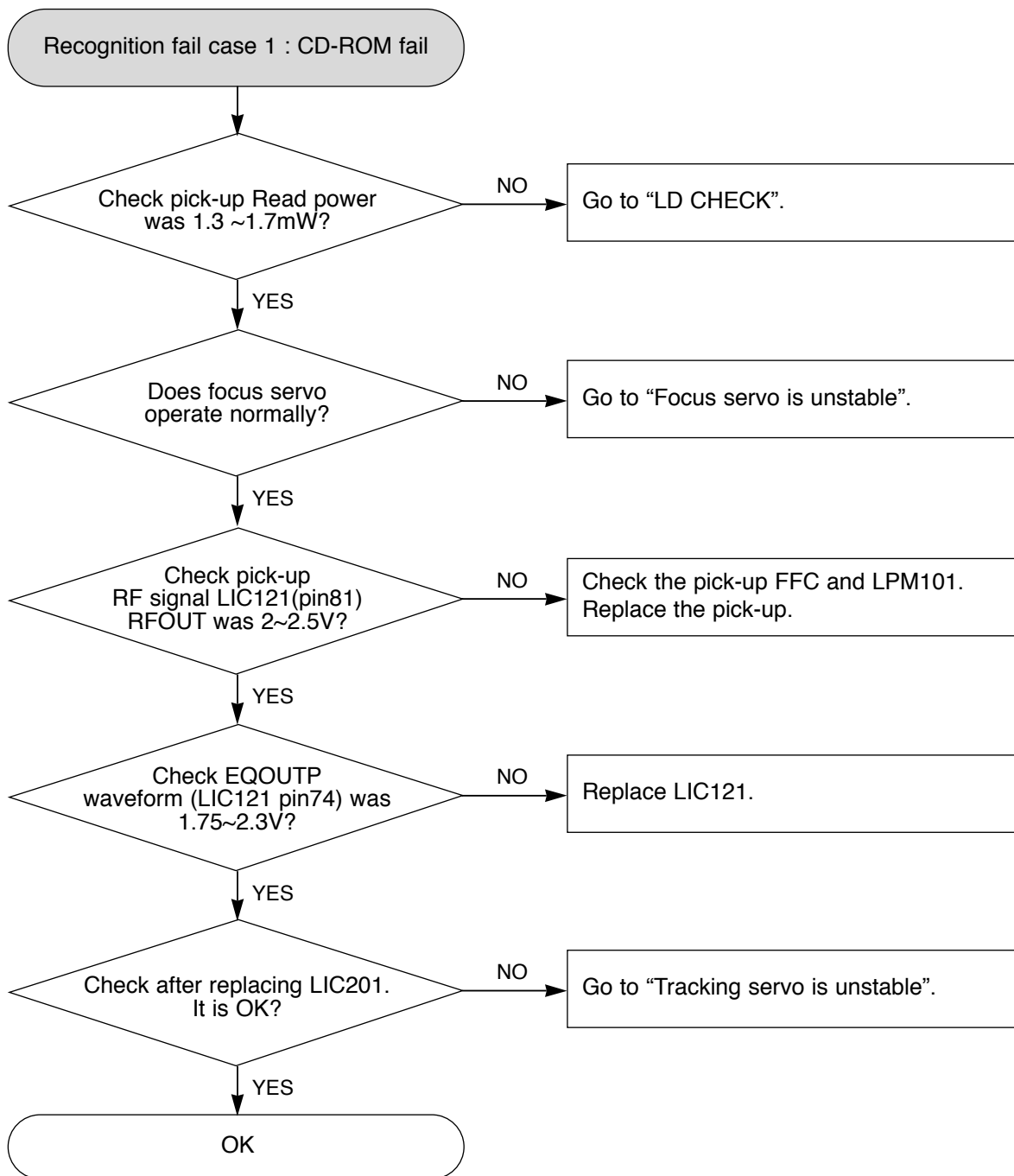


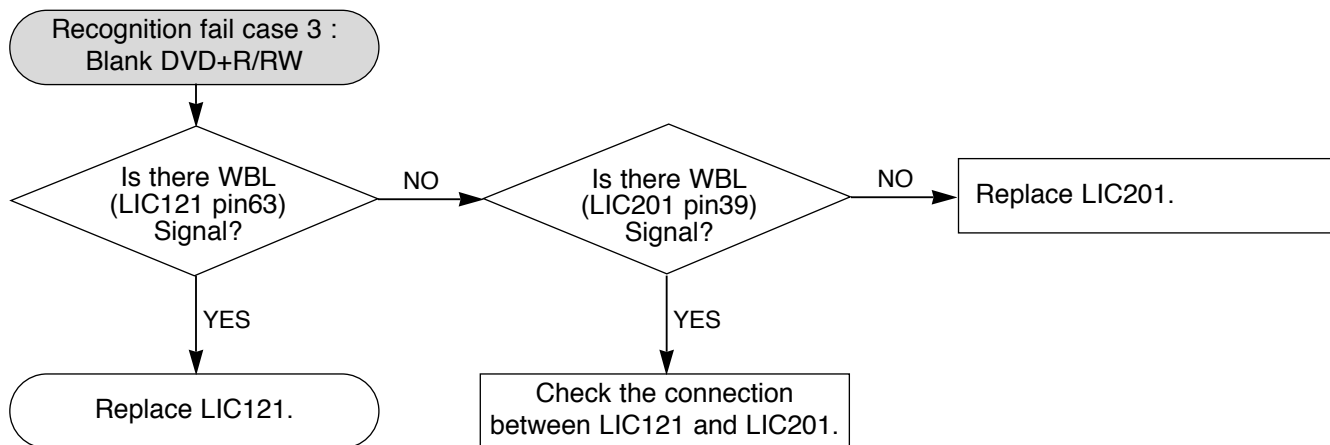
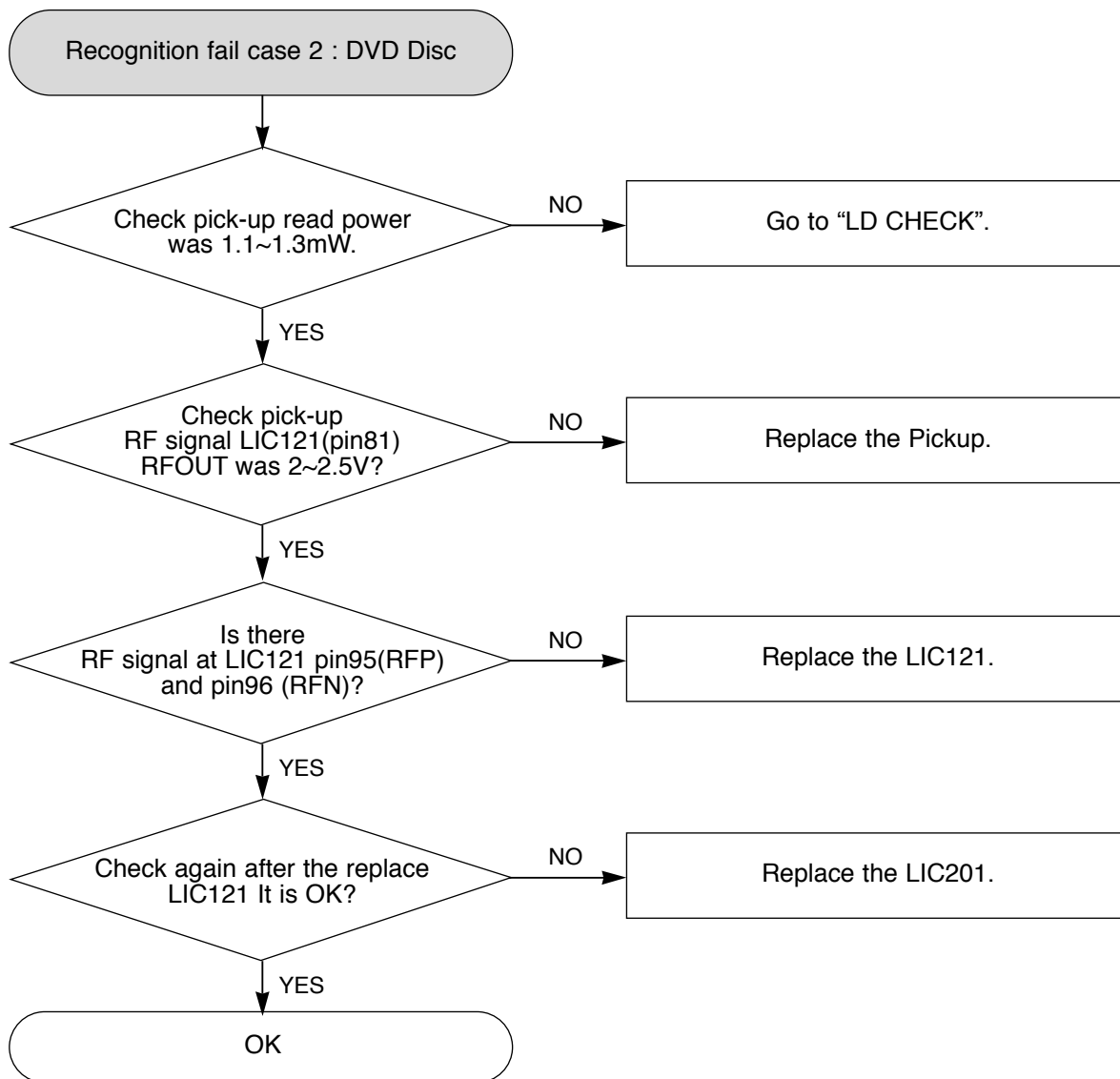


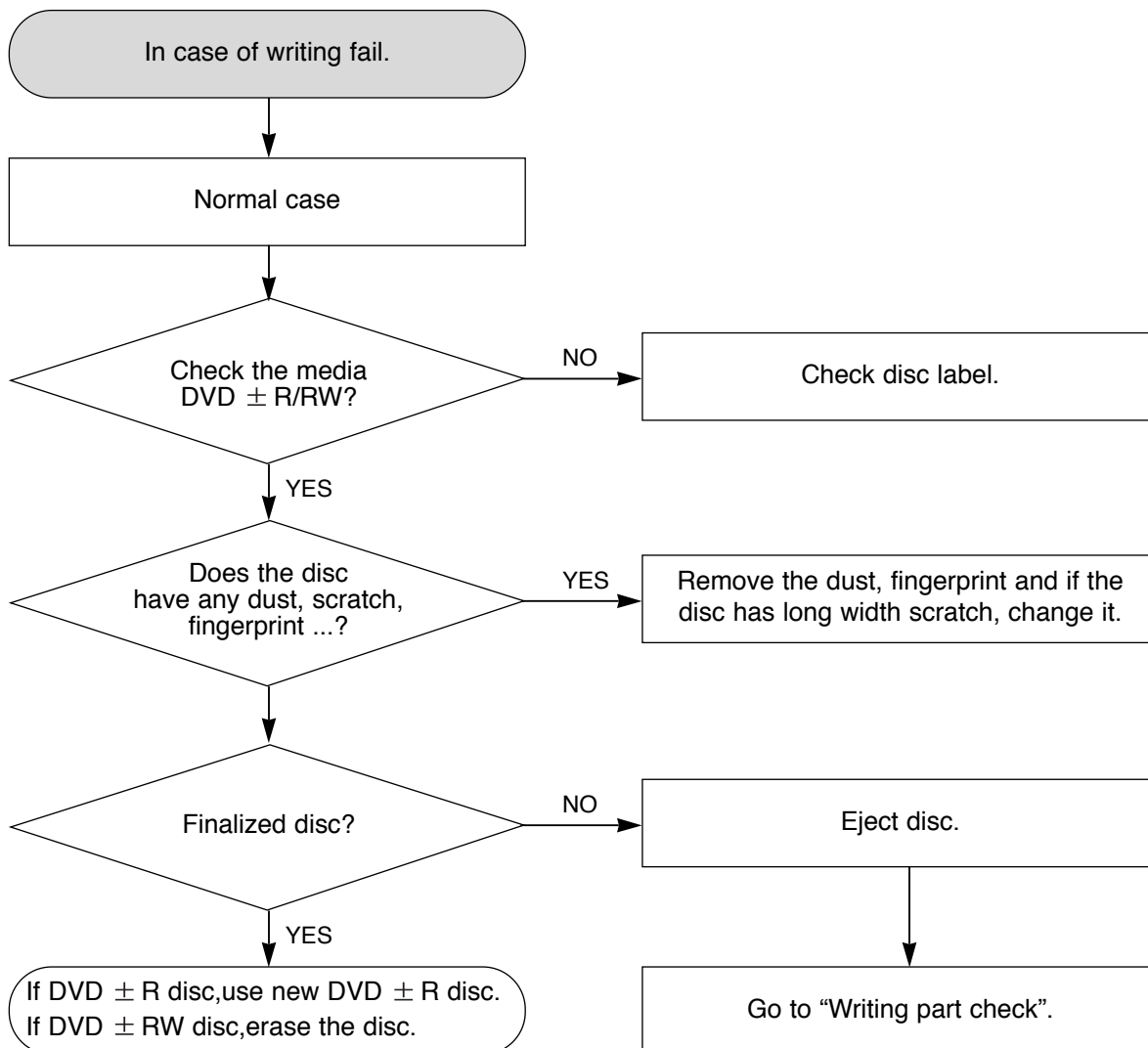


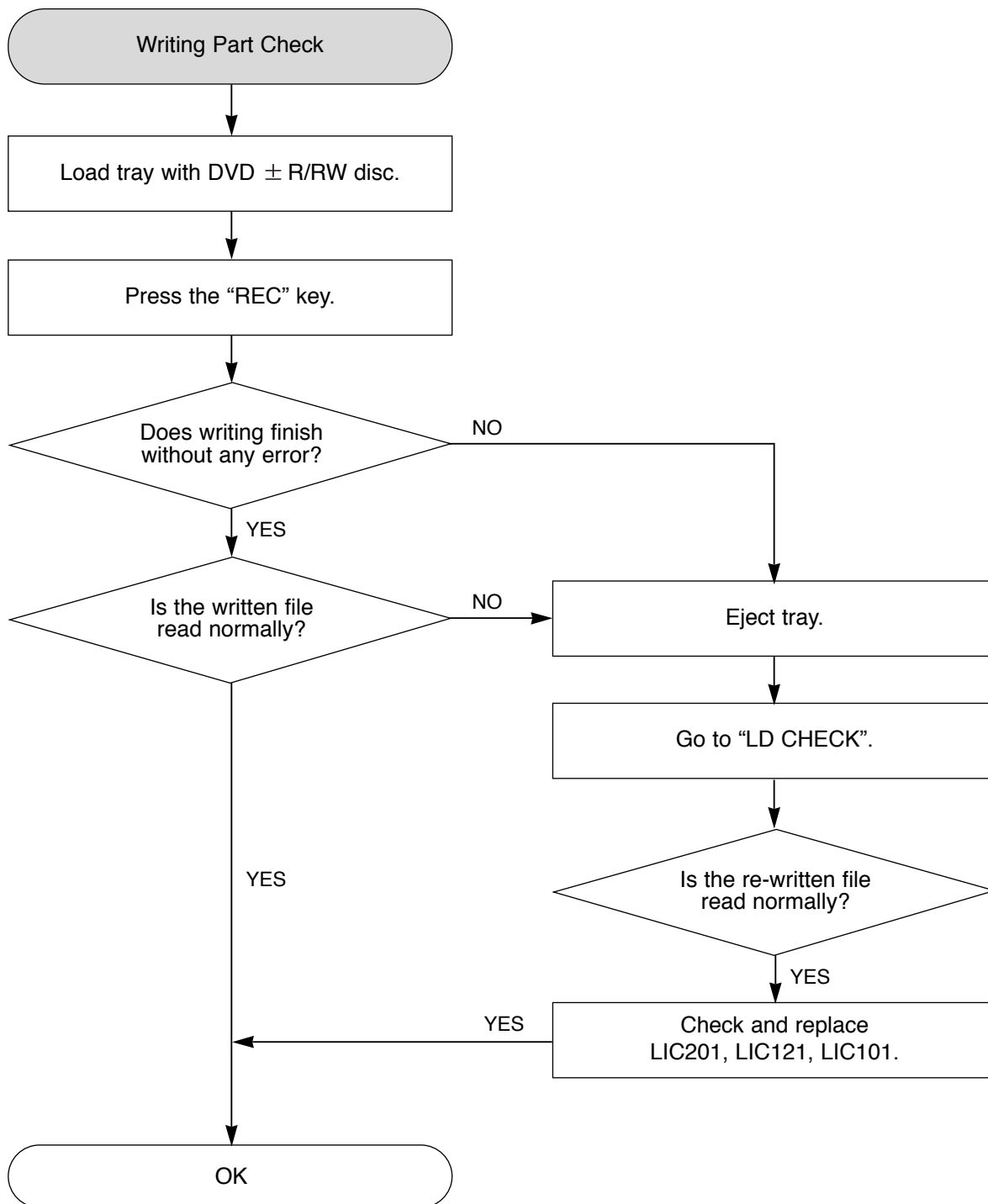


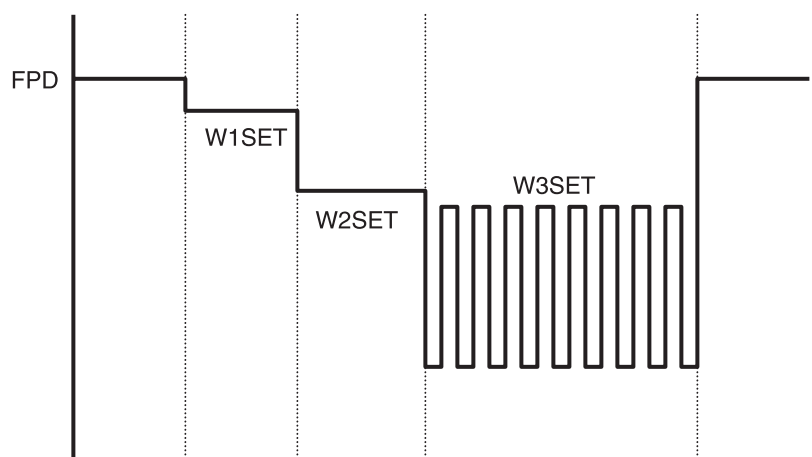
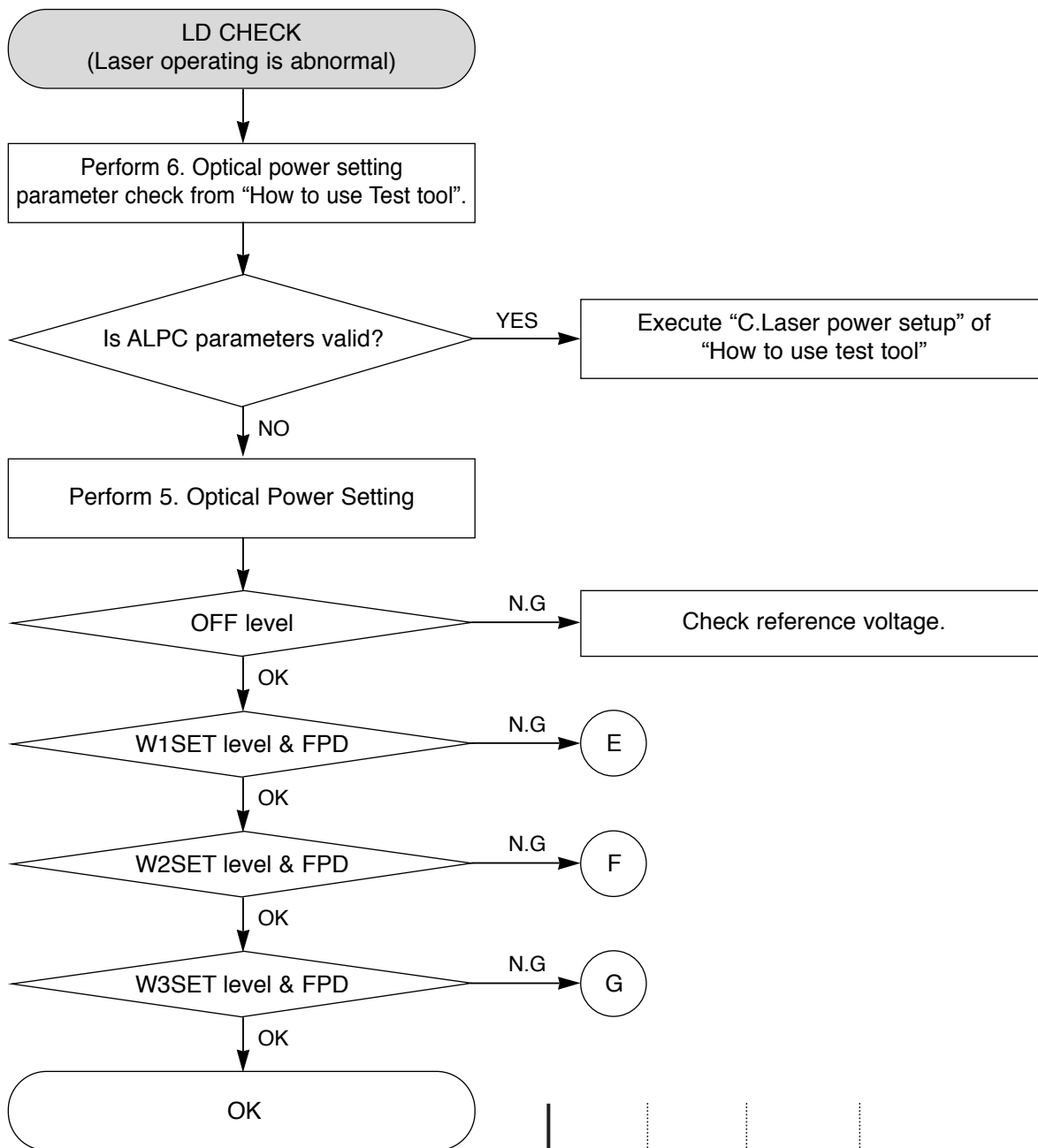


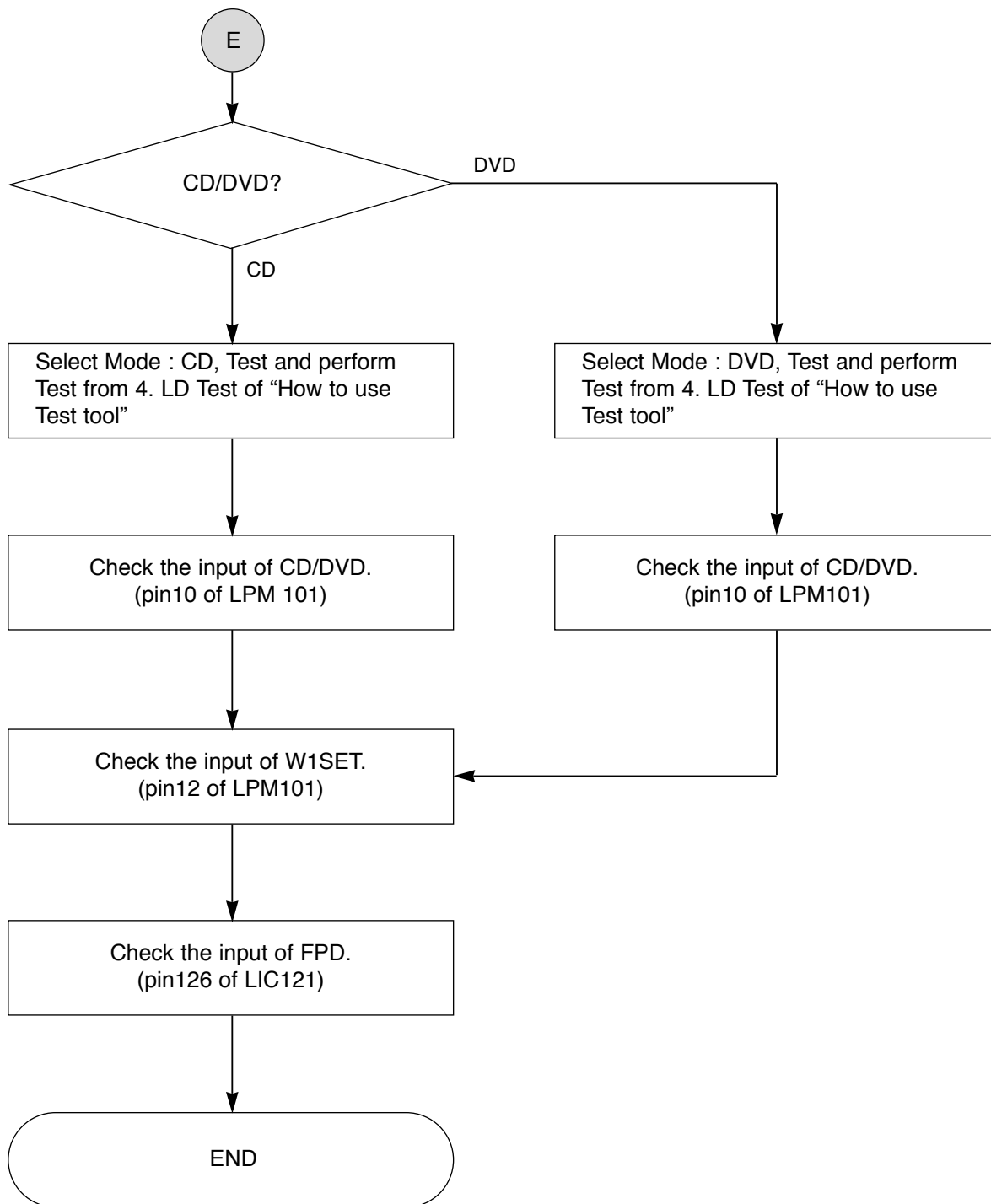


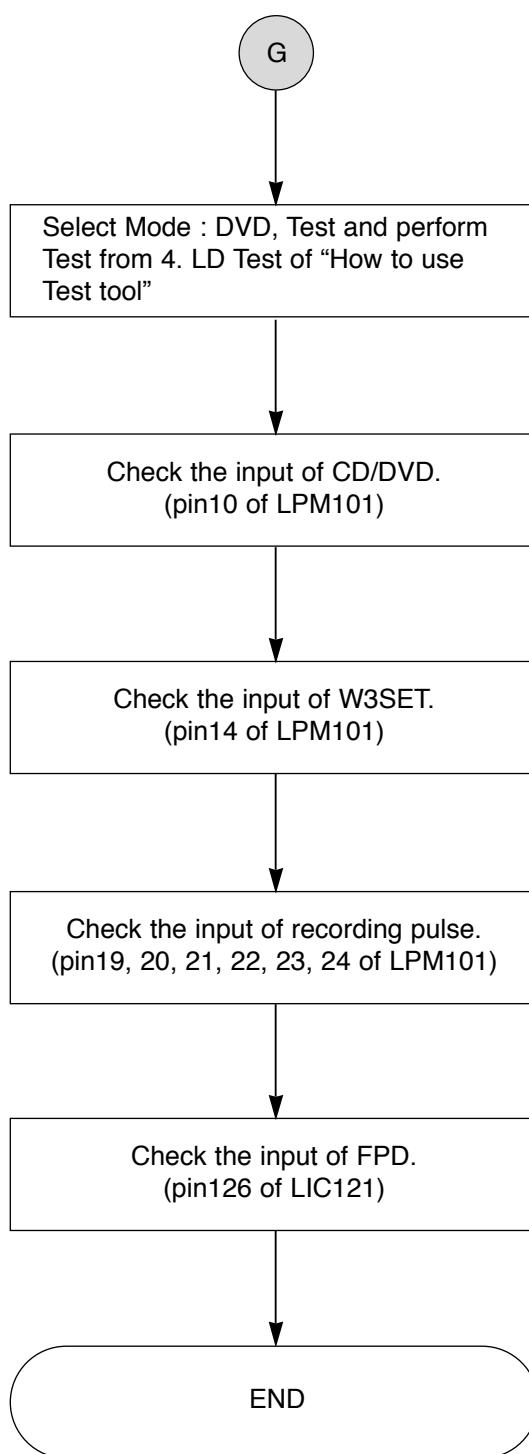
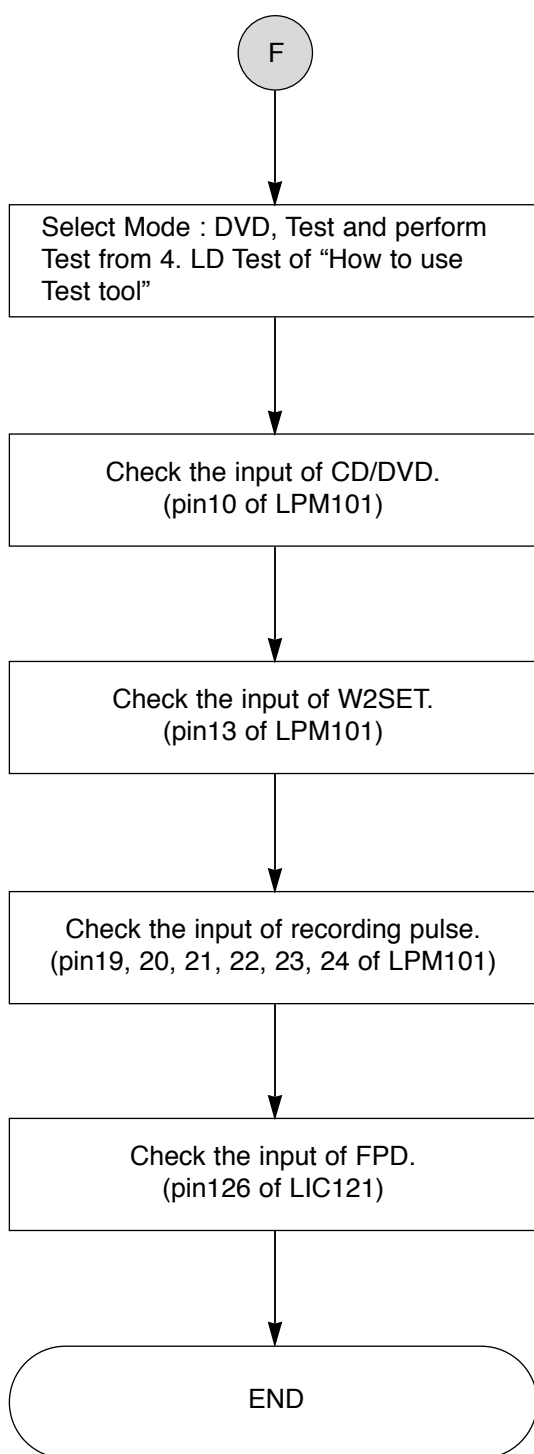








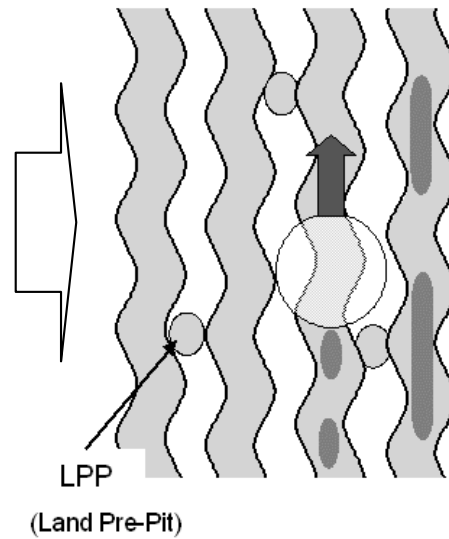
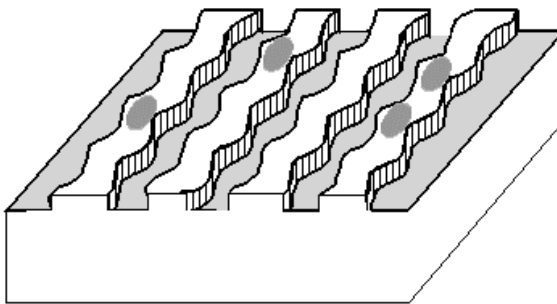
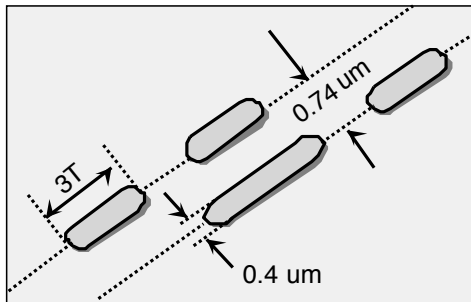




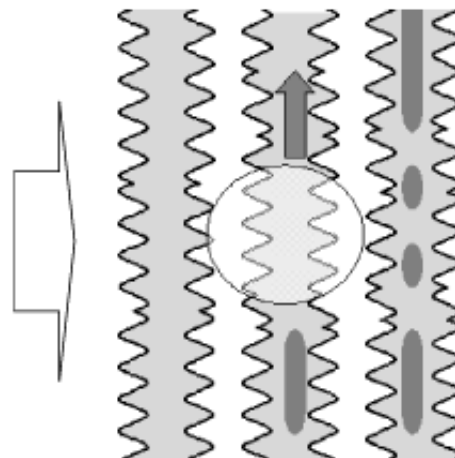
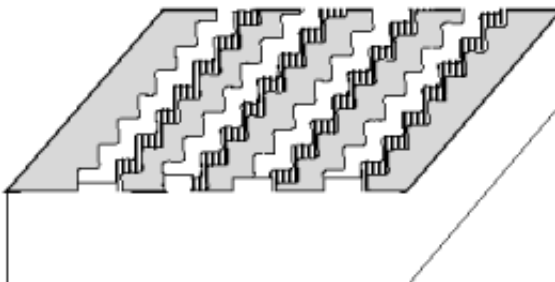
THE DIFFERENCE OF DVD-R/RW, DVD+R/RW DISCS AND DVD-ROM

1. RECORDING LAYER

- DVD-ROM (Read Only Disc)



- DVD+R/RW Disc

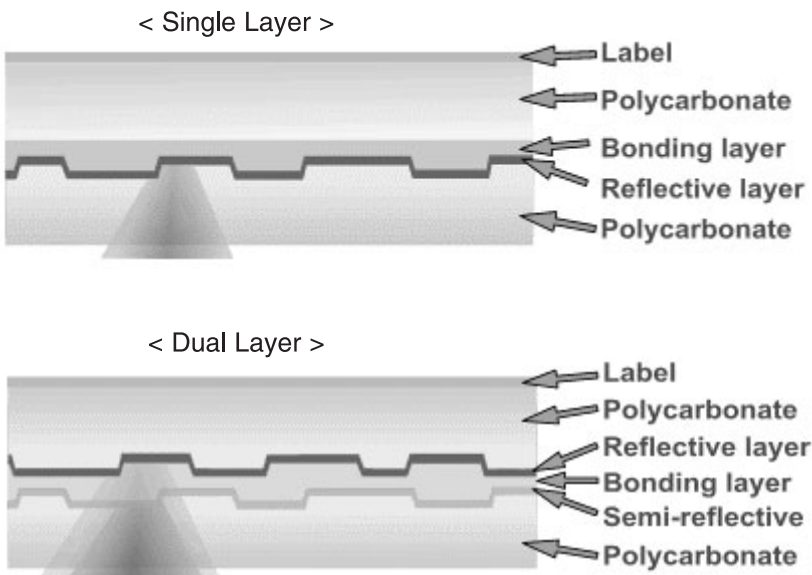


2. DISC SPECIFICATION

	DVD-ROM		DVD-R	DVD-RW	DVD+R	DVD+RW
	Single-Layer	Dual-Layer				
Media Type	Read Only	Read Only	Dye	Phase change	Dye	Phase change
User data capacity	4.7GB	8.54GB	4.7GB	4.7GB	4.7GB	4.7GB
Wavelength	650nm	650nm	650nm	650nm	650nm	650nm
Reflectivity	45~85%	18~30nm	45~85%	18~30 %	45~85 %	18~30nm
Track pitch	0.74μm	0.74μm	0.74μm	0.74μm	0.74μm	0.74μm
Minimum pit length	0.4μm	0.4μm	0.4μm	0.4μm	0.4μm	0.4μm
Modulation	>0.6	>0.6	>0.6	>0.6	>0.6	>0.6
Channel bit-rate	26.16MHz	26.16MHz	26.16MHz	26.16MHz	26.16MHz	26.16MHz
Wobble Frequency	—	—	140KHz	140KHz	817.4KHz	817.4KHz
Addressing	26.16MHz	26.16MHz	Wobble & LPP	Wobble & LPP	Wobble(ADIP)	Wobble(ADIP)
Read Power (mW)					0.7 ± 0.1	0.7 ± 0.1
Write Power (mW)	—					
Jitter	<8%	<8%	<8%	<8%	<9%	<9%

3. DISC MATERIALS

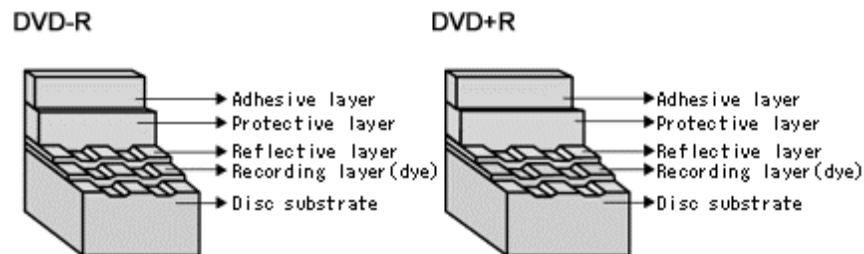
1) DVD-ROM



2) Recording format using organic dye material (DVD-R / DVD+R)

The format that records data through the creation of recorded marks by changing the organic dye material with a laser beam.

• Disc structure



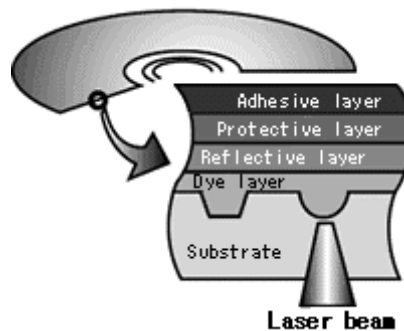
• Recording principles

[Recording]

Recording is done by changing the organic dye layer and the substrate with a laser. When a strong laser is applied to a disc, the temperature of the organic dye material goes up, the dye is decomposed and the substrate changes at the same time. At this time, a durable bit is created as is the case with a CD-ROM.

[Playback]

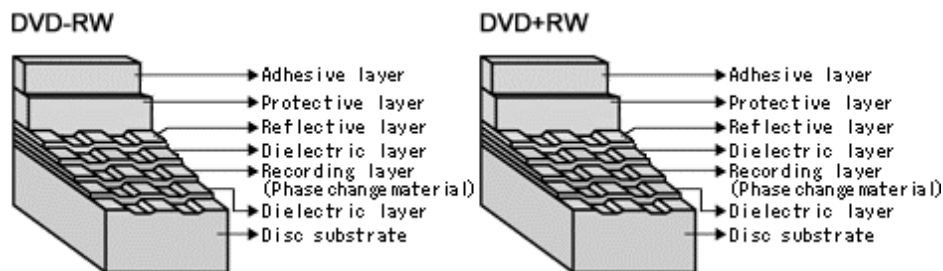
Signals are read with the differences of the reflection of a laser from pits.



3) Recording format using phase-change recording material (DVD-RW / DVD+RW)

Data is recorded by changing the recording layer from the amorphous status to the crystalline status, and played back by reading the difference of the reflection coefficient.
Amorphous : Non-crystalline.

• Disc structure



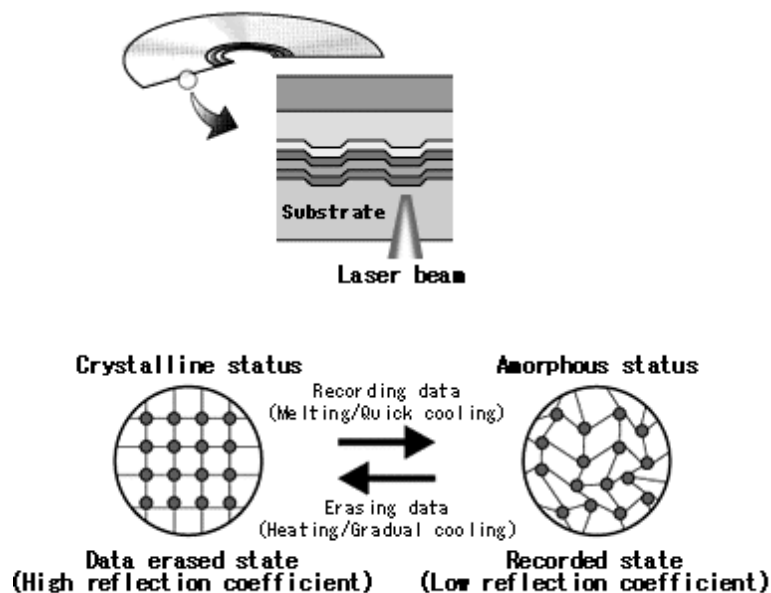
• Recording principles

[Recording]

When a high-power laser is applied to the recording material, it melts and then becomes amorphous with a low reflection coefficient when it quickly cools off. When a mid-power laser is applied to heat gradually the recording material and then gradually cools it off, it becomes crystal with a high reflection coefficient.

[Playback]

A low-power laser is used for playback. The amount of reflected light depends on the status (amorphous or crystalline) of the recording material. This is detected by an optical sensor.

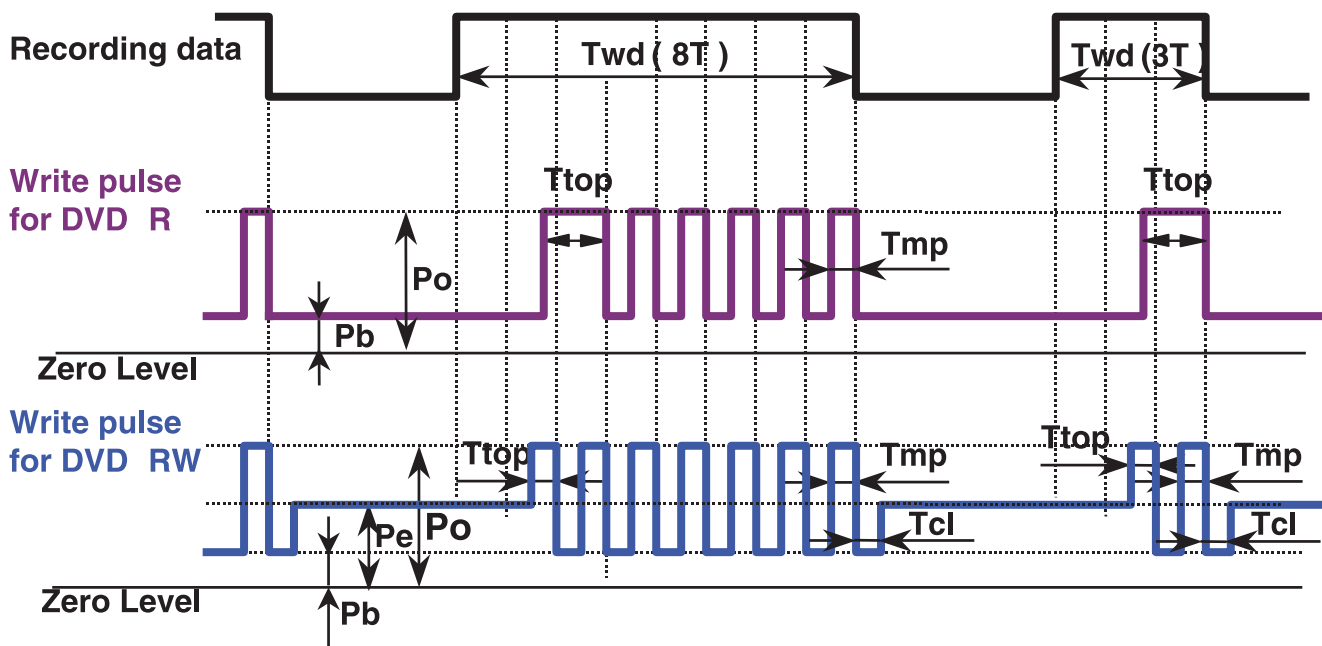


To make recordings, it is necessary to modulate the write pulse, which is called “Write Strategy”.

There can be many types in Write Strategy. Typically Write Strategy for DVD $\pm$ R has NMP(Non Multi-Pulse) type and MP(Multi-Pulse) type. In NMP type each single mark is created by subsequent separated short pulses. In MP type each single mark is created by one continuous pulse.

Write Strategy for DVD $\pm$ RW has Type 1 and Type2. In Type 1 the mark with nT width is created by one top pulse and $(n-2)$ multi-pulses. Thus mark $3T$ is made by one top pulse and one multi-pulse. In Type 2 the mark with nT width is created by one top pulse and $(n-3)$ multi-pulses. Thus mark $3T$ is made by one top pulse only.

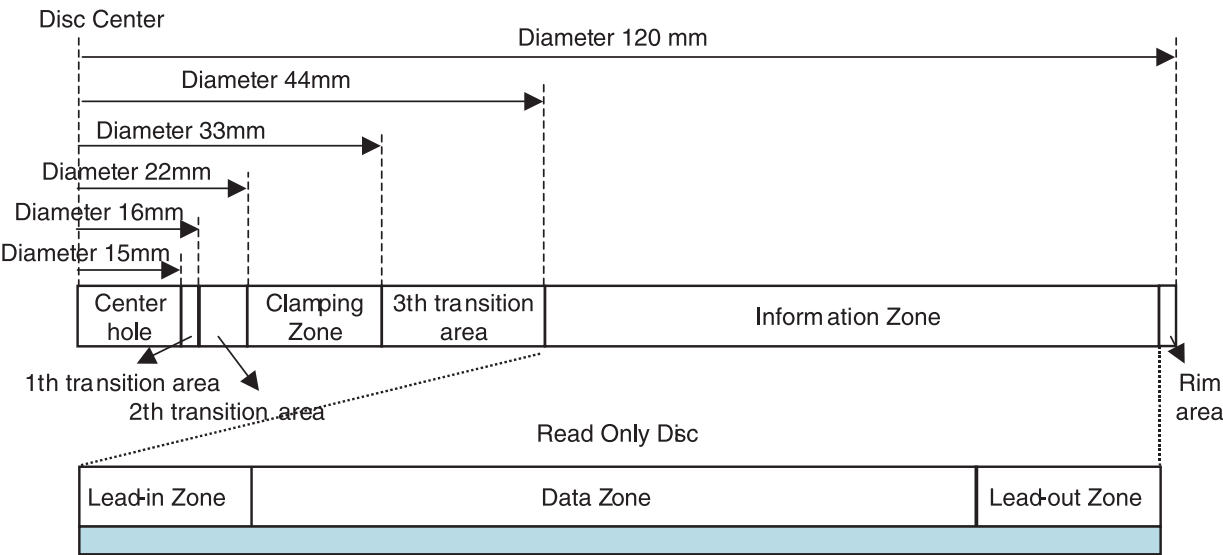
RL-02A uses MP type Write Strategy for DVD $\pm$ R and Type 1 for DVD $\pm$ RW as shown below.



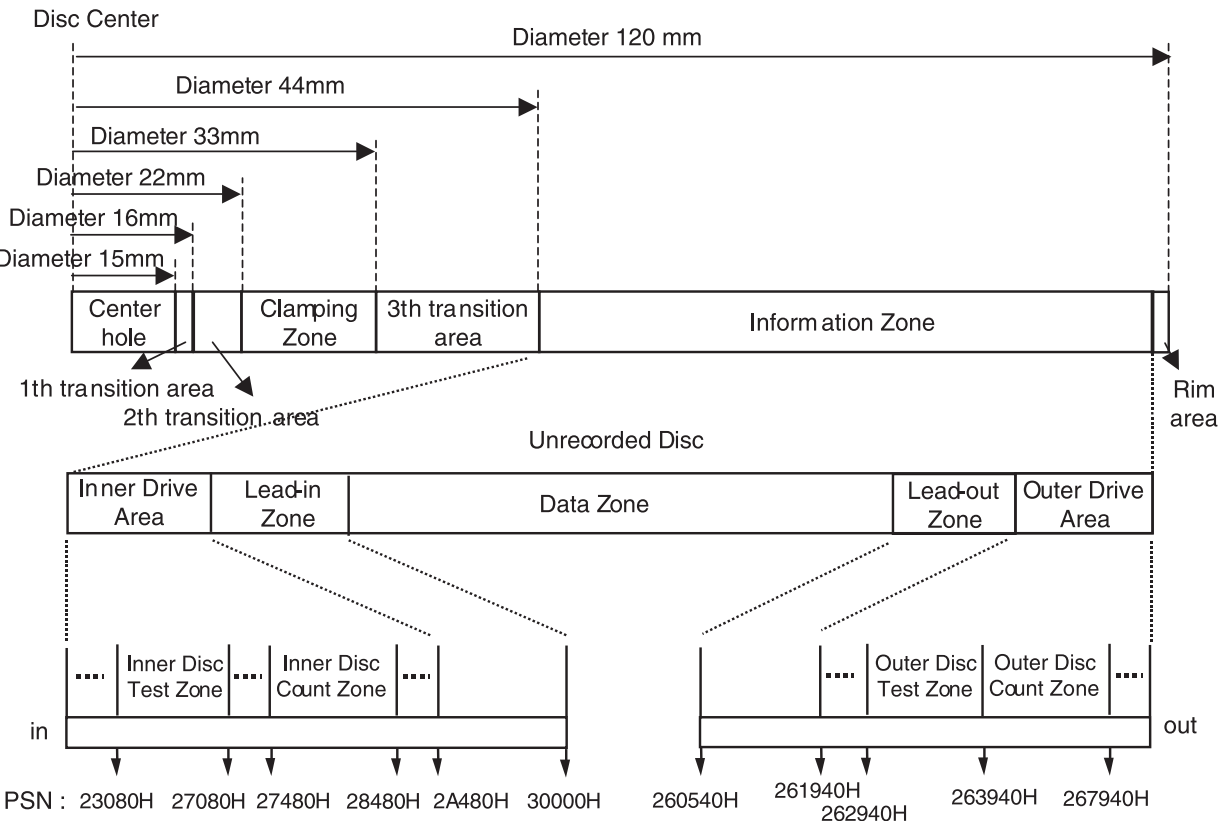
P_o :Write Power (Peak Power)
 P_e :Erase Power
 P_b :Bias Power

4. ORGANIZATION OF THE INNER DRIVE AREA, OUTER DRIVE AREA, LEAD-IN ZONE AND LEAD-OUT ZONE

1) Layout of DVD-ROM disc

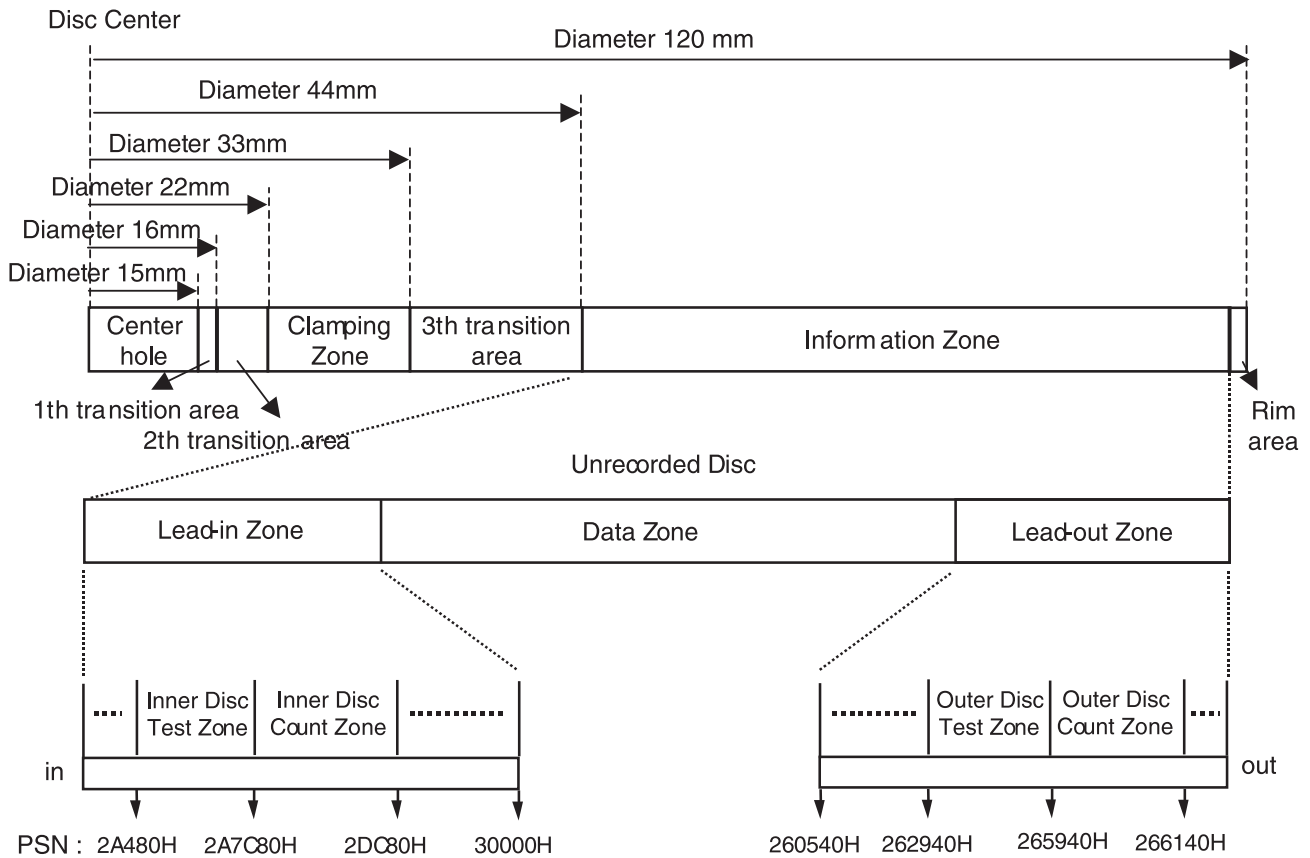


2) Layout of DVD+R disc



Inner Disc Test Zone : for performing OPCprocedures.
 Inner Disc Count Zone : For counting the number of OPCalgorithm performed in IDT Zone.
 Outer Disc Test Zone : for performing OPC proœdures.
 Outer Disc Cant Zone : For counting the number of OPC algorithm performed in IDT Zone.

3) Layout of DVD+RW disc



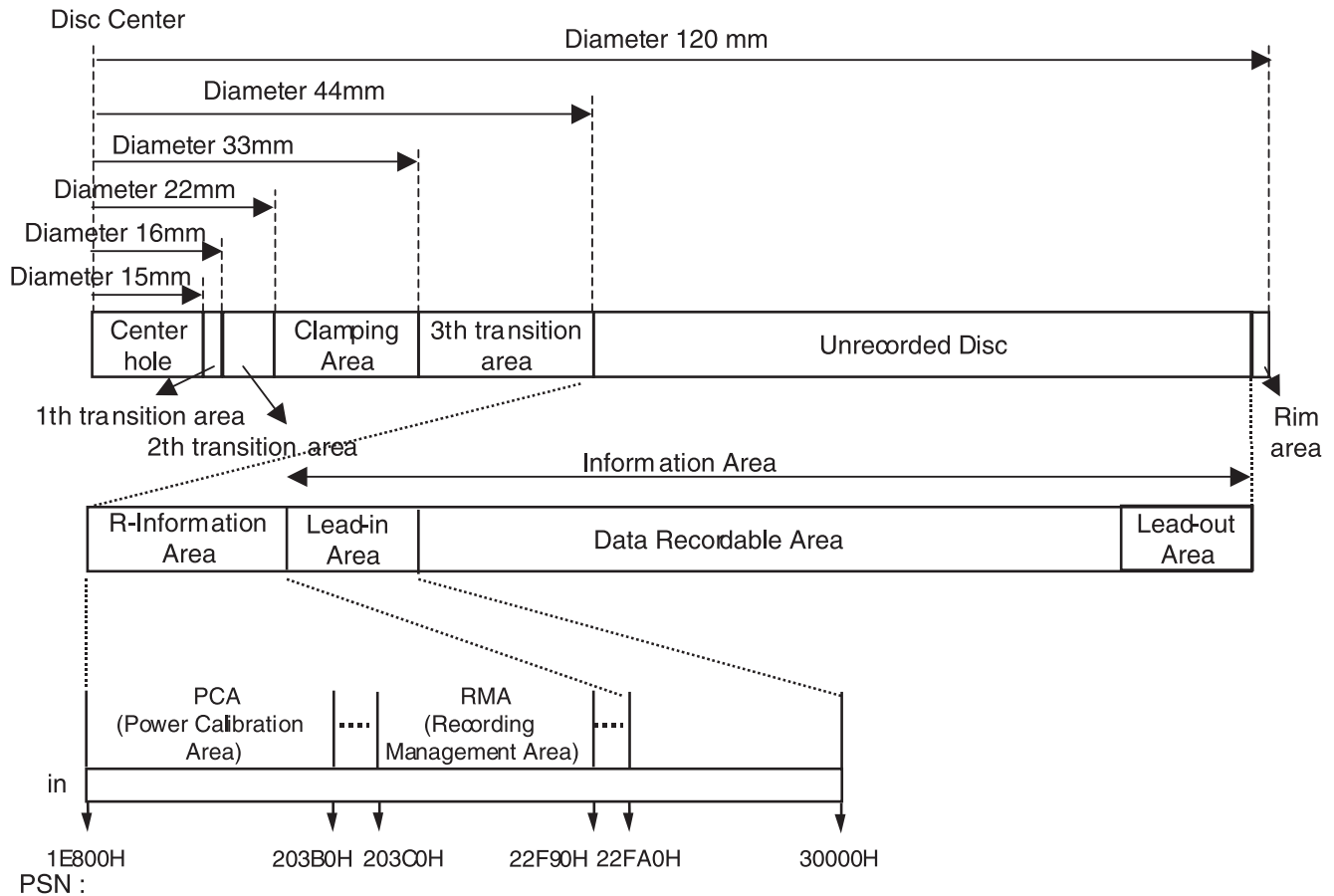
Inner Disc Test Zone : for performing OPCprocedures.

Inner Disc Count Zone : For counting the number of OPCalgorithm performed in IDT Zone.

Outer Disc Test Zone : for performing OPC proœdures.

Outer Disc Count Zone : For counting the number of OPC algorithm performed in IDT Zone.

4) Layout of DVD-R/RW disc



HOW TO USE TEST TOOL

1. ALPC MEASUREMENT SYSTEM

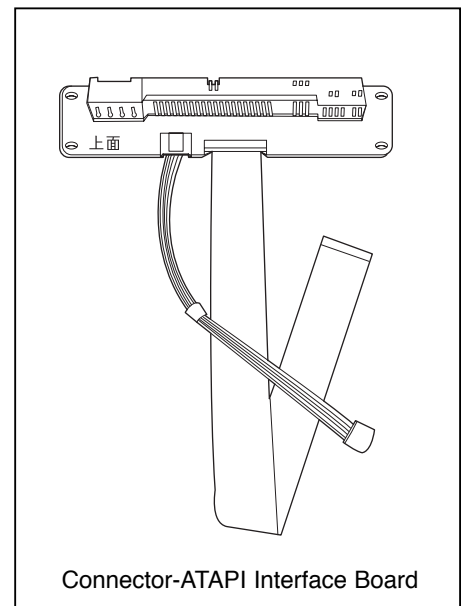
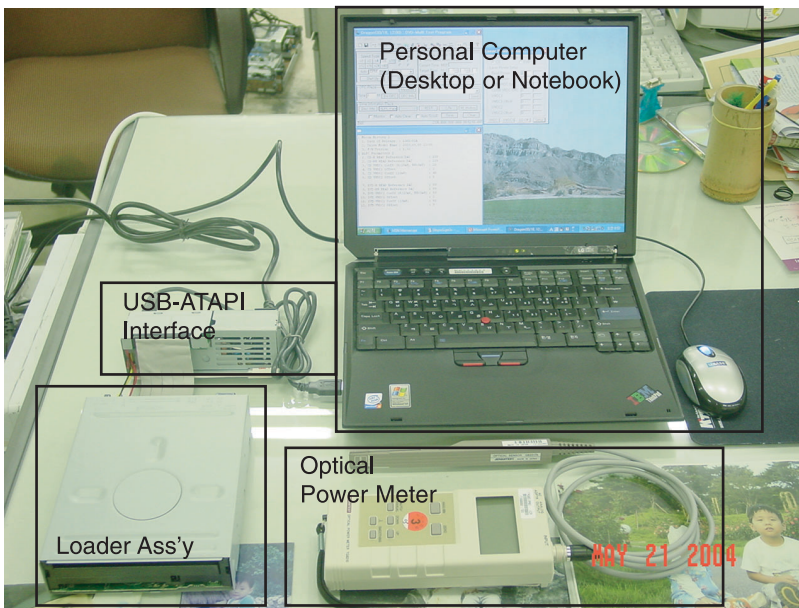
We need basically several measurement instrument to adjust Optical Power of CD and DVD Disc

- **ESSENTIAL INSTRUMENT**

- 1) Optical Power meter & Sensor (ADVANTEST, TQ8230/Q82014A)
- 2) Personal Computer
- 3) Adjustment Program (Dragon or ALPC) --> being recommended ALPC Program in case of SVC

- **OPTIONAL INSTRUMENT**

- 1) USB-ATAPI Interface (if you don't have Notebook which has ATAPI Interface or use PC USB Port)
- 2) Connector-ATAPI Interface Board



2. ALPC PROGRAM

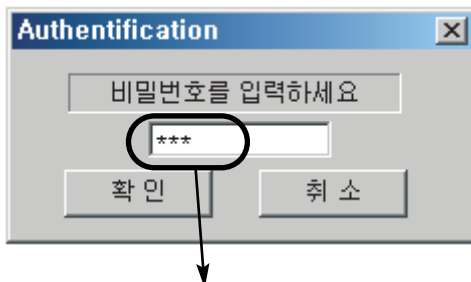
Use the ALPC program in Dragon tool for Optical power setting. It is consist of total 4 files.

Dragon_JW3P.exe
dragon.cfg
blue.dat
WNASPI32.DLL

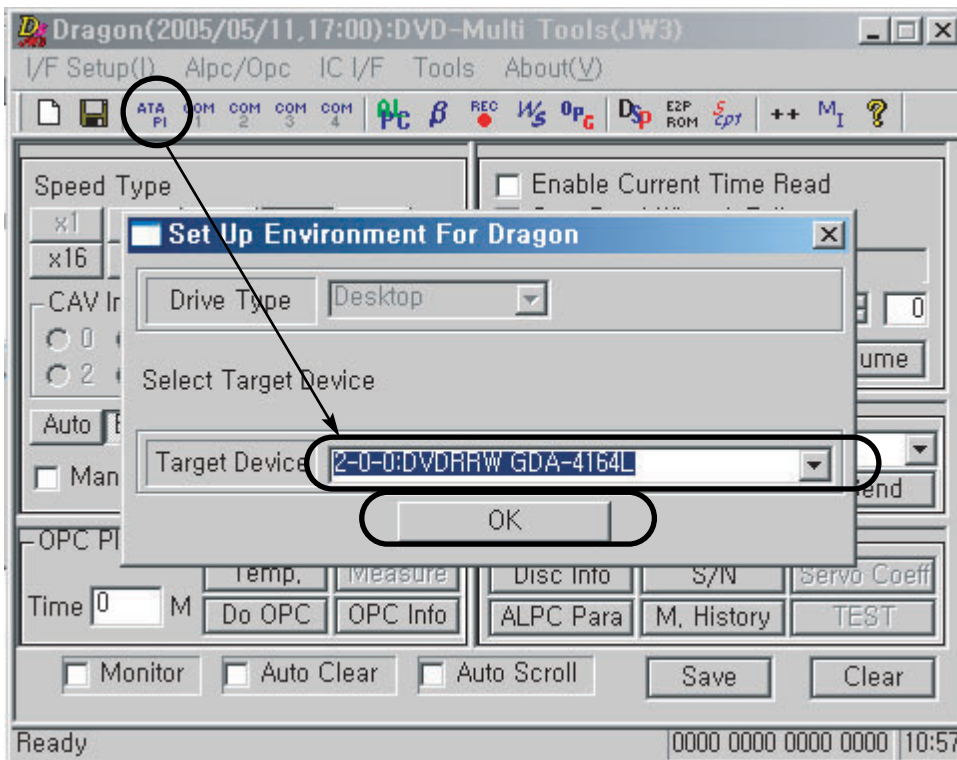
Four files must exist in same Directory.

3. EXECUTE ALPC PROGRAM

- 1) Execute Dragon_JW3P.exe file.

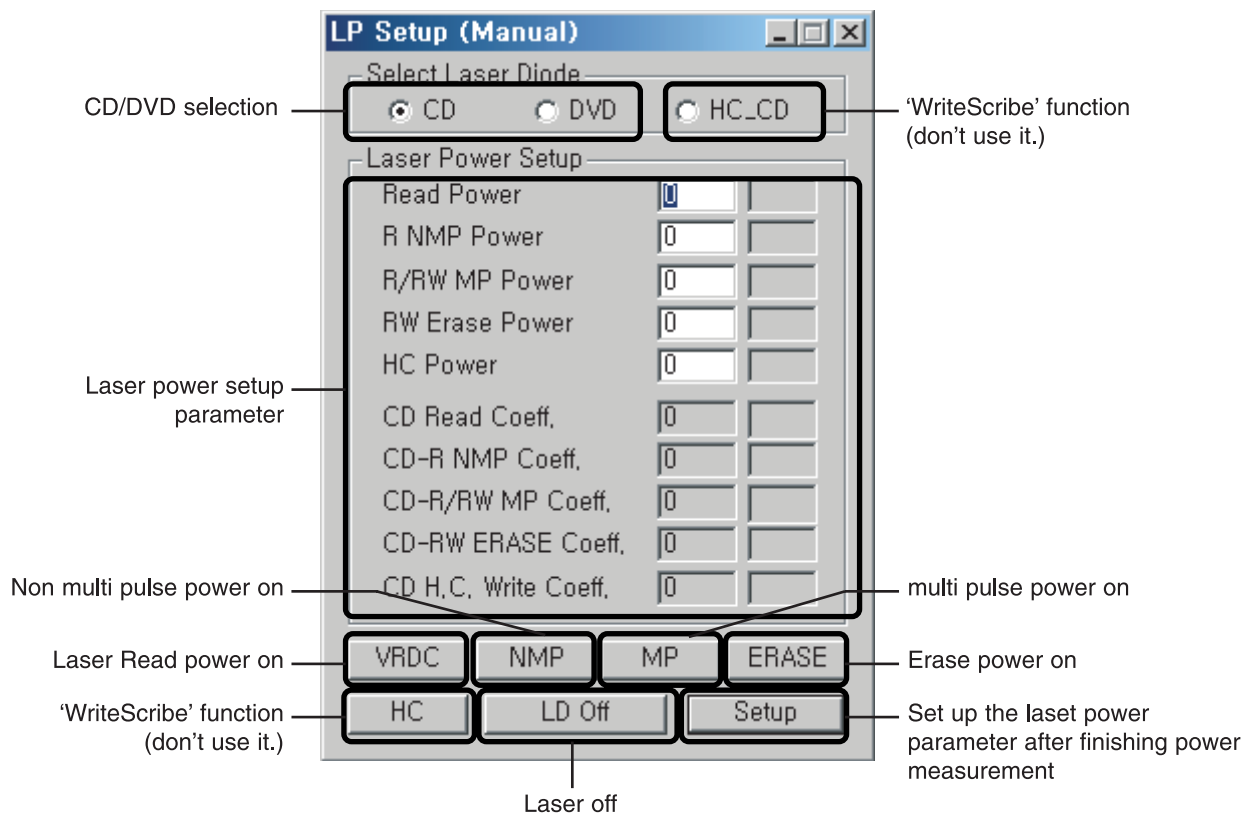
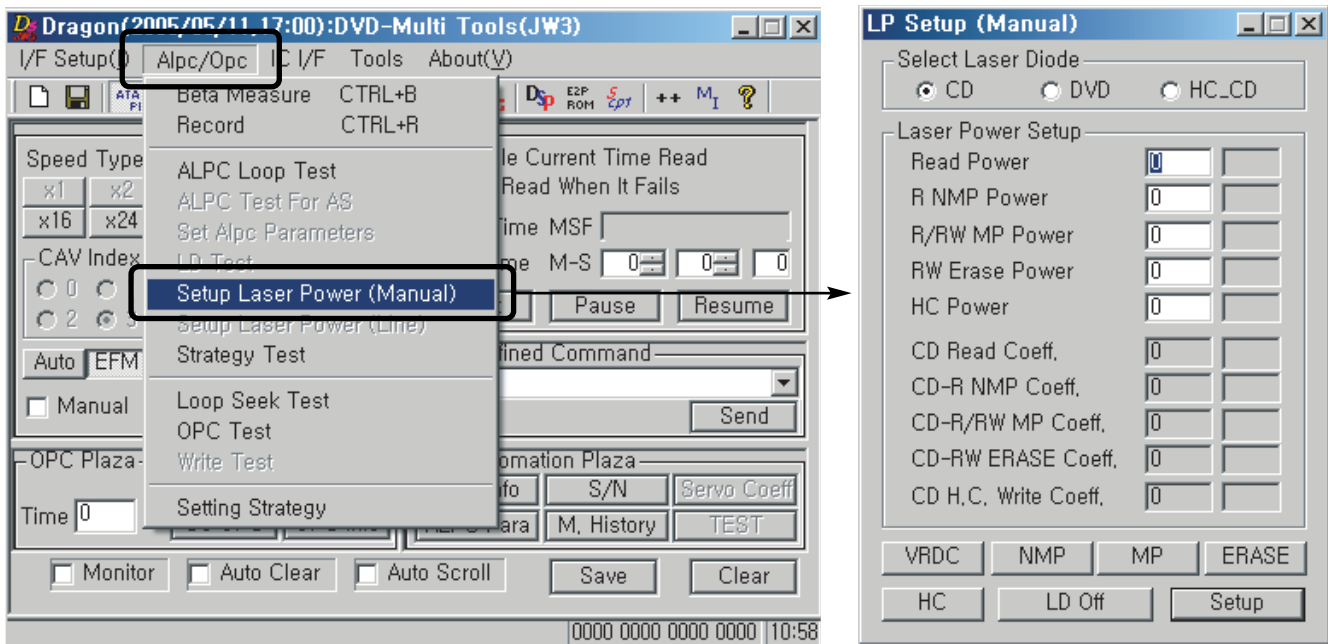


- 2) Enter the password. It is "qaz".
When you enter the password, turn off the "Caps lock" in your keyboard.



- 3) Set up the target device.
Press "ATAPI" button on the main dialog of Dragon tool. And find the target device which is GDA-4164L.

4) If the target device setting is completed, execute the “Setup Laser Power(Manual)” in the “Alpc/Opc” menu.



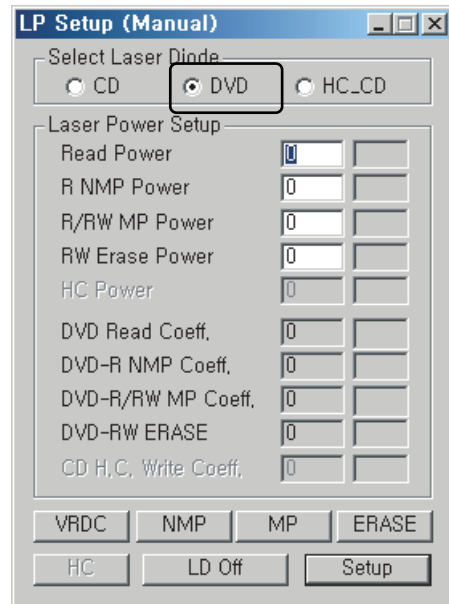
4. OPTICAL POWER SETTING

<Test for checking DVD LD and CD LD>

When you change the Travers ass'y(including pick-up) or loader PCB, you must do the laser power setting to match pick-up and loader PCB.

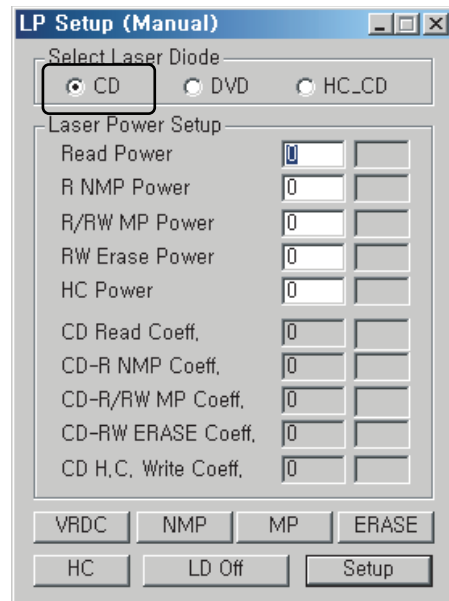
1) DVD LD power setting

- Select the DVD in the “Select Laser Diode”
- Press **VRDC** (Read power on, Strong read light)
- Measure optical read Power.
- Write read power value.
- In case of **NMP** **MP** **ERASE** ,
you are able to measure the power through same procedure.
(caution) Don't watch light directly.
- When you finish optical power measurement,
press **LD Off** button(LD Off).
- Press **Setup** button.(save to ERPROM)



2) CD LD Power Setting

- Select the CD in the “Select Laser Diode”
 - Press **VRDC** .
 - Measure optical read Power.
 - Write Read Power value.
 - Press **Setup** button(save to ERPROM)
- *** In case of CD power setting of RS-02A, loader don't need to set up write power.
Although NMP, MP,Erase and HC power is N.G when you press setup, please ignore the N.G message.
Because of RS-02A only support reading function about CD-R/RW.
- * Look at reference sheet to test Optical Power.
** Power value is β — unit. Value is read power X 100.



5. CONFIRM OPTICAL POWER SETTING PARAMETER

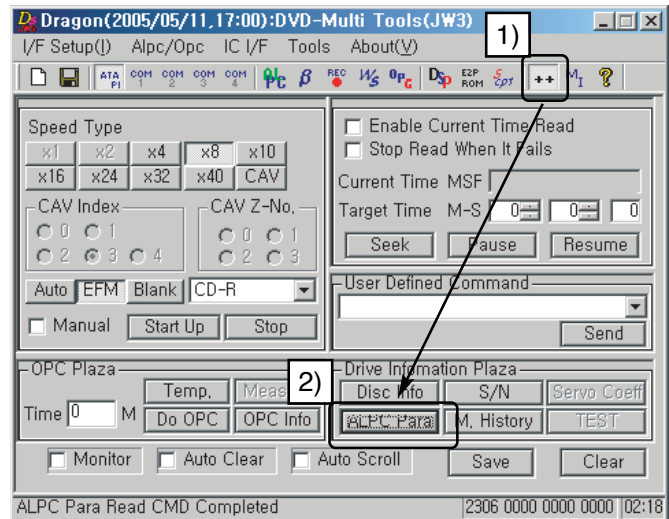
LD Test result is ok, but Loader performance is bad.

1. Check ALPC parameter value

1) Press  button to open "Results Display" dialog.

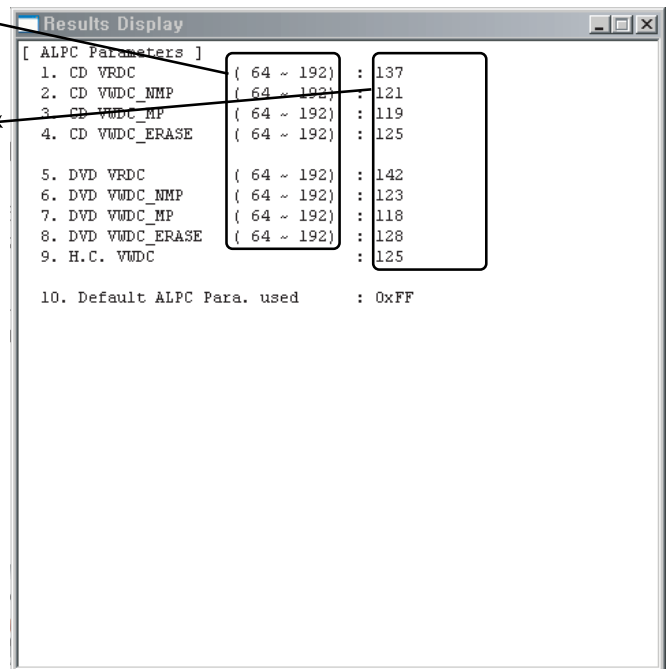
2) Press  button.

- We can see optical power setting value.
- Write optical Power Setting value to paper.
- Adjust power setting again.
- Compare original parameter to new parameter.
- if parameter value is different highly, original value is wrong or optical power may change.
- But pick-up LD test is all ok, just adjust optical power setting again.



Normal range of ALPC parameter

Optical power value which has been saved in the EEPROM



6. ATTACHMENT. OPTICAL POWER MEASUREMENT

Optical Power measurement is to adjust LD power from Pick-up

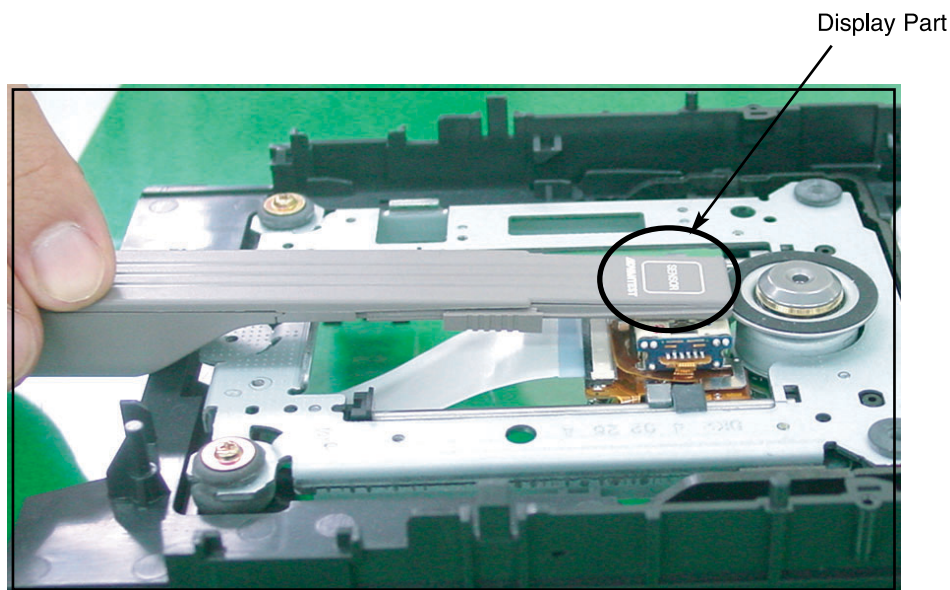
To measure optical power, LD status is on. Other light affects to optical power.

Avoid other light to measure exact power

Generally headlight power is about $50\mu\text{W}$, Sun power is about 100mW .

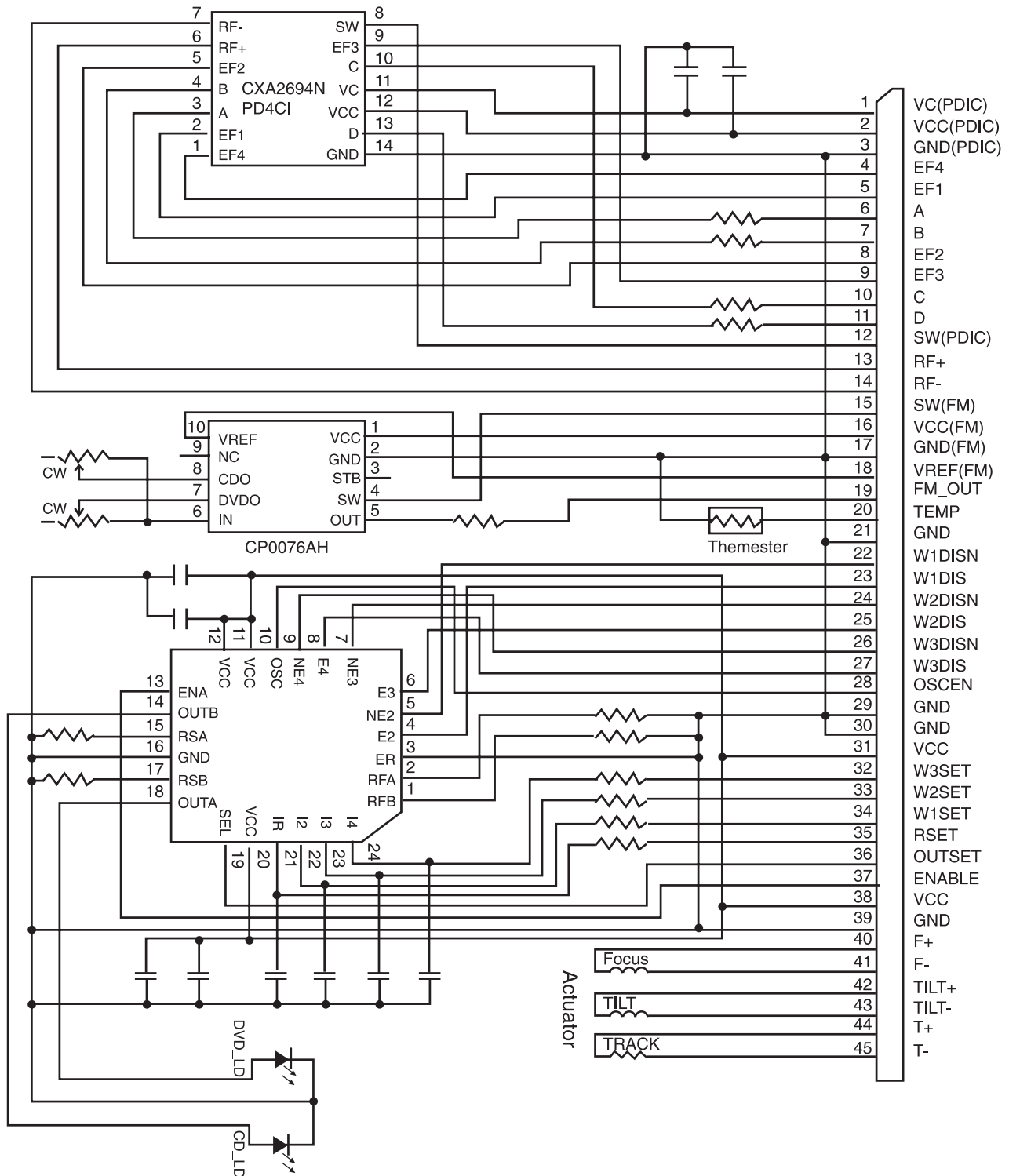
Optical Power measurement method

1. Fit optical Power Meter λ (wavelength) value to DVD.(generally 660nm)
2. DVD LD On.
3. Approach power sensor to Pick-up Lens about 3mm vertically. Fix Lens and Sensor mark position.
4. Read Monitor value. (move sensor read just a little and read max value.)
(caution) unit is mW.
5. Write monitoring value x 100. Only an integer.
6. Fit opticcac Power Meter λ (wavelength) value to CD.(generally 780nm)
7. CD LD On.
8. 3 ~ 5 recheck.



INTERNAL STRUCTURE OF THE PICK-UP

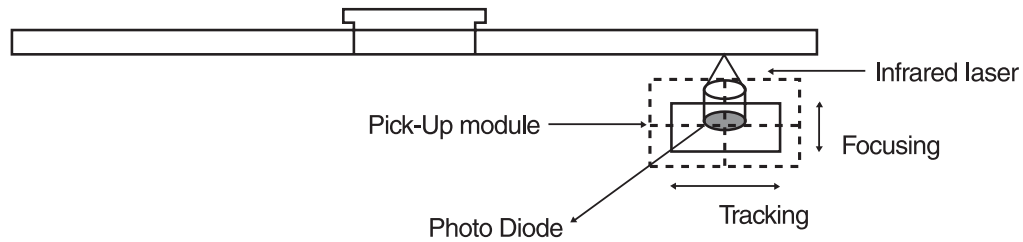
1. BLOCK DIAGRAM OF THE PICK-UP (LPC-812R)



2. PICK UP PIN ASSIGNMENT

No.	Pin Name	Signal Description
1	VC(PDIC)	Reference voltage input for PDIC)
2	VCC(PDIC)	Power supply for PDIC (+5V)
3	GND(PDIC)	Ground connection for PDIC, FPD, TEMP, LDD
4	EF4	Signal PDIC output EF4
5	EF1	Signal PDIC output EF1
6	A	Signal PDIC output A
7	B	Signal PDIC output B
8	EF2	Signal PDIC output EF2
9	EF3	Signal PDIC output EF3
10	C	Signal PDIC output C
11	D	Signal PDIC output D
12	SW1(PDIC)	PDIC output gain Select (L/M/H)
13	RF+	Signal PDIC RF positive differential output
14	RF-	Signal PDIC RF negative differential output
15	SW2(FPD)	FPD output gain Select (High : CD, Low:DVD)
16	VCC(FPD)	Power supply for FPD
17	GND(TEMP)	Ground connection for PDIC, FPD, TEMP
18	VREF(FPD)	APC amplifier reference voltage output
19	FPD-OUT	APC amplifier output
20	TEMP	Output voltage for controlling temperature
21	GND(FPD)	Ground connection for PDIC, FPD, TEMP
22	W1DISN	LVDS control for output current (Low Enable)
23	W1DIS	LVDS control for output current (High Enable)
24	W2DISN	LVDS control for output current (Low Enable)
25	W2DIS	LVDS control for output current (High Enable)
26	W3DISN	LVDS control for output current (Low Enable)
27	W3DIS	LVDS control for output current (High Enable)
28	OSCEN	TTL control for Oscillator Enable (High Enable)
29	GND(LDD)	Ground connection for LDD
30	GND(LDD)	Ground connection for LDD
31	VCC(LDD)	Power supply for LDD
32	W3SET	Input voltage for current amplifier
33	W2SET	Input voltage for current amplifier
34	W1SET	Input voltage for current amplifier
35	RSET	Input voltage for current amplifier
36	OUTSEL	High:selects DVD LD, Low:CD LD
37	ENABLE	Disables output current regardless of OUTEN (ENABLE Low : No lout)
38	VCC(LDD)	Power supply for LDD
39	GND(LDD)	Ground connection for LDD
40	F+	Focusing Actuator drive signal+
41	F-	Focusing Actuator drive signal-
42	Tilt+	Tilting Actuator drive signal+
43	Tilt-	Tilting Actuator drive signal-
44	T+	Tracking Actuator drive signal+
45	T-	Tracking Actuator drive signal-

3. SIGNAL DETECTION OF THE P/U



1) Focus Error Signal $\Rightarrow (A+C)-(B+D)$

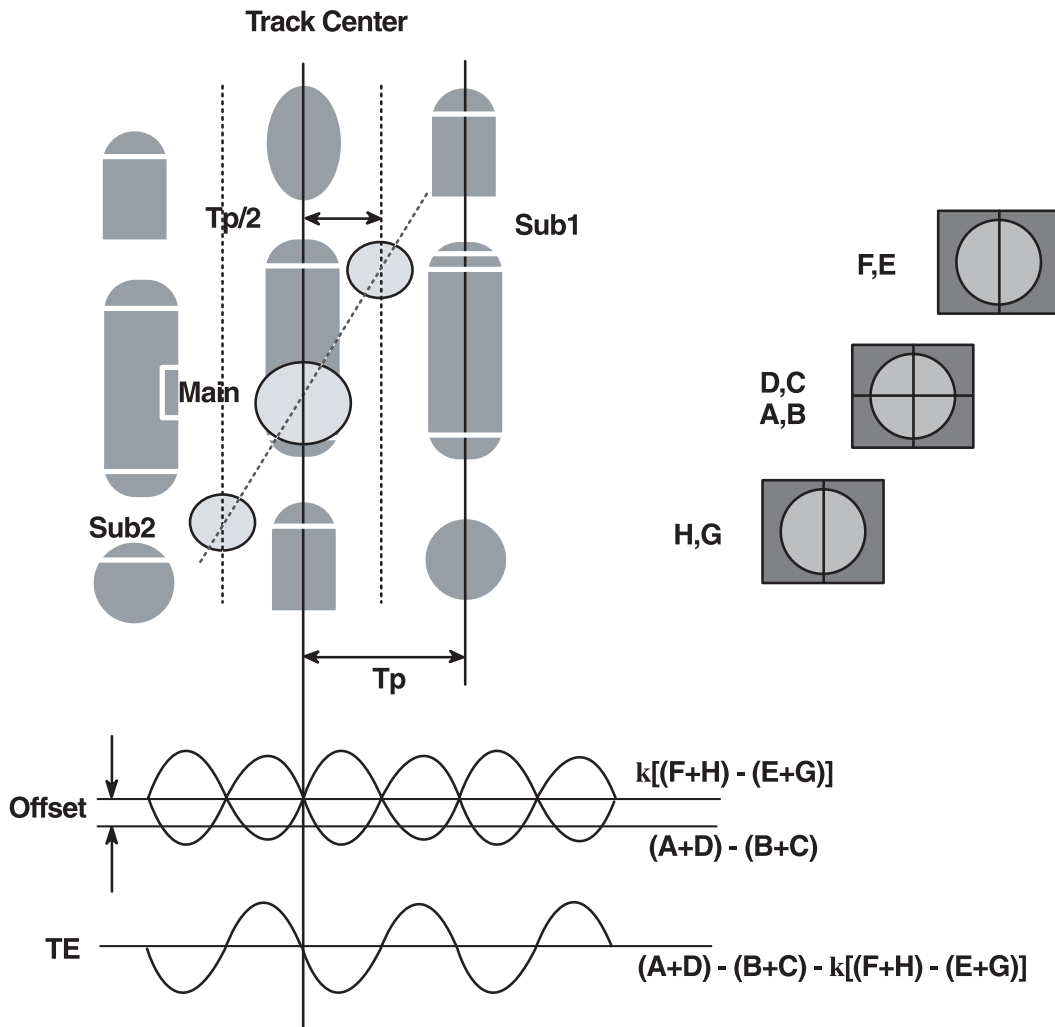
This signal is generated in RF IC (LIC121 : AN22113A) and controls the pick-up's up and down to focus on Disc.

2) Tracking Error Signal (DPP Method) $\Rightarrow \{(A+D)-(B+C)\} - k \times \{(EF1+EF4)-(EF2+EF3)\}$

This signal is generated in RF IC (LIC121 : AN22113A) and controls the pick-up's left and right shift to find to track on Disc.

3) RF Signal $\Rightarrow (A+B+C+D)$

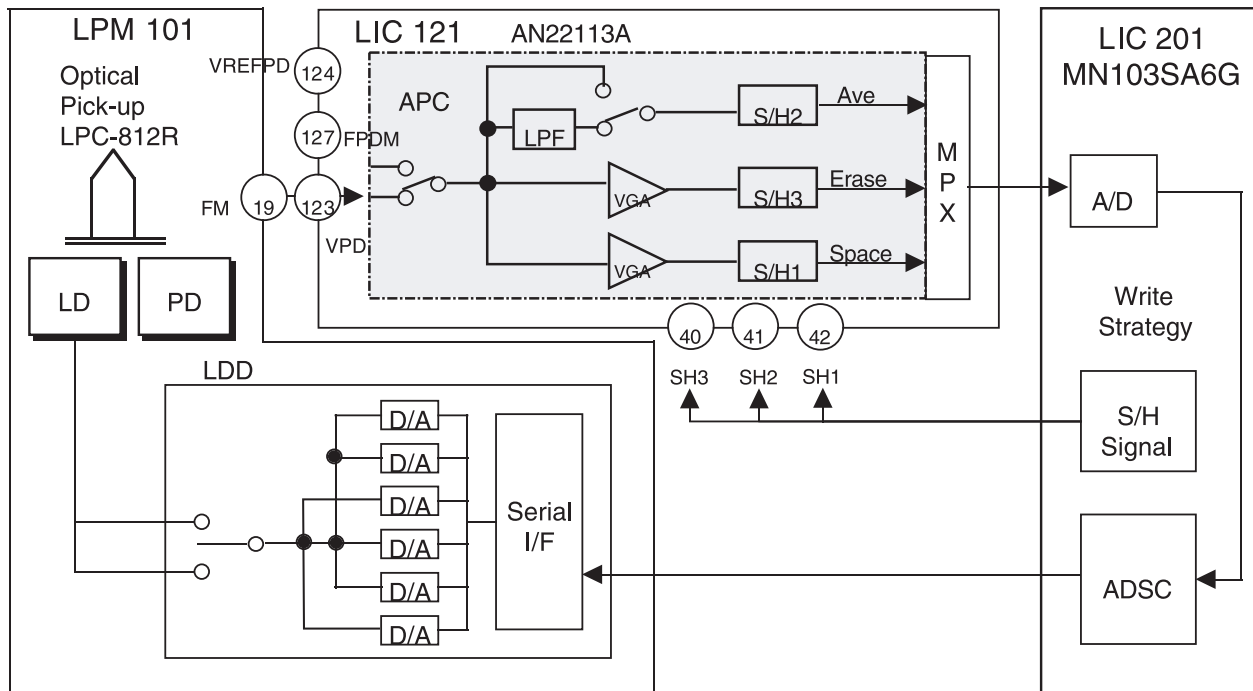
This signal is converted to DATA signal in DSP IC (LIC201 : MN103SA6G).



DESCRIPTION OF CIRCUIT

1. ALPC (AUTOMATIC LASER POWER CONTROL) CIRCUIT

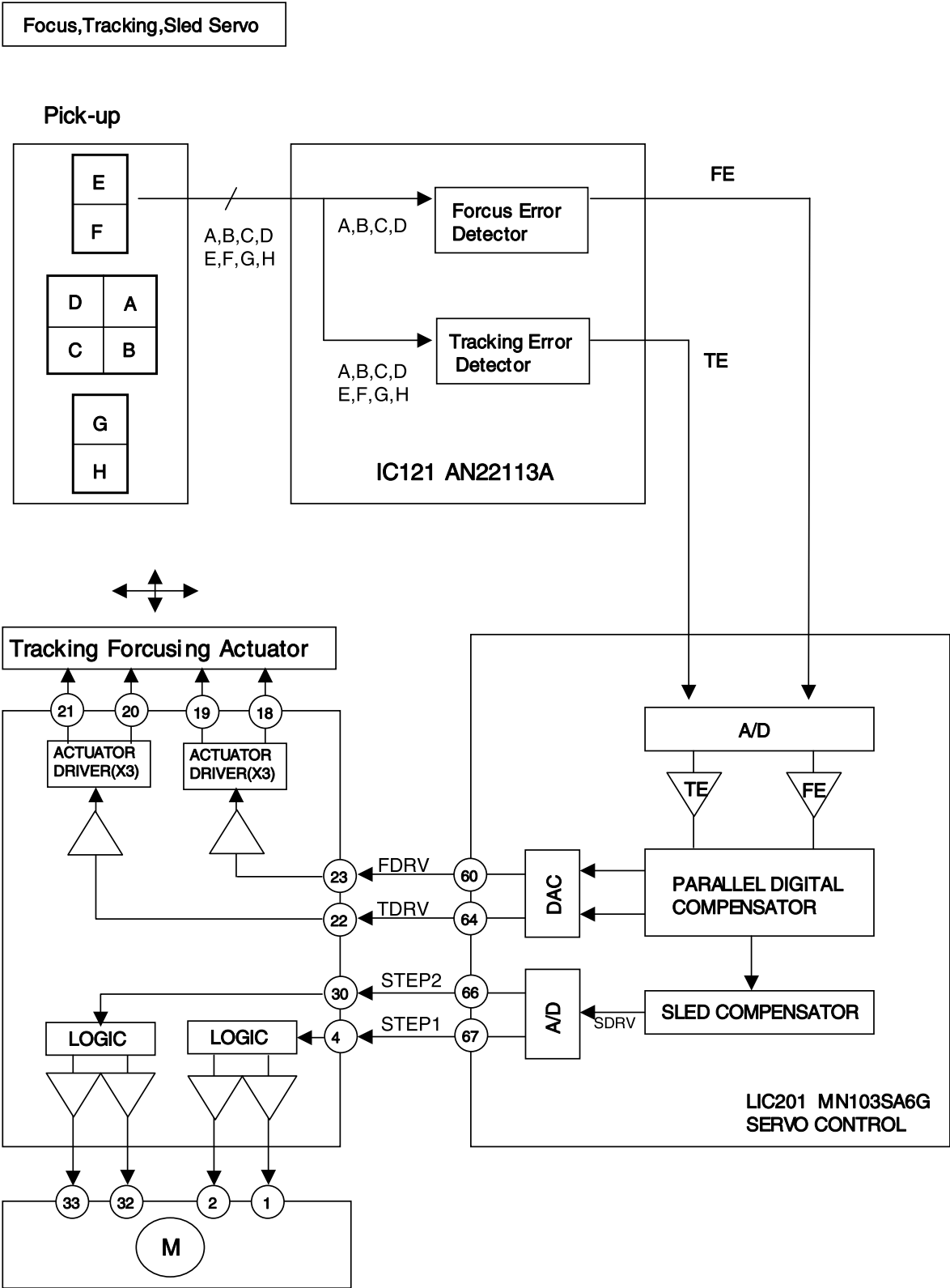
1-1. BLOCK DIAGRAM



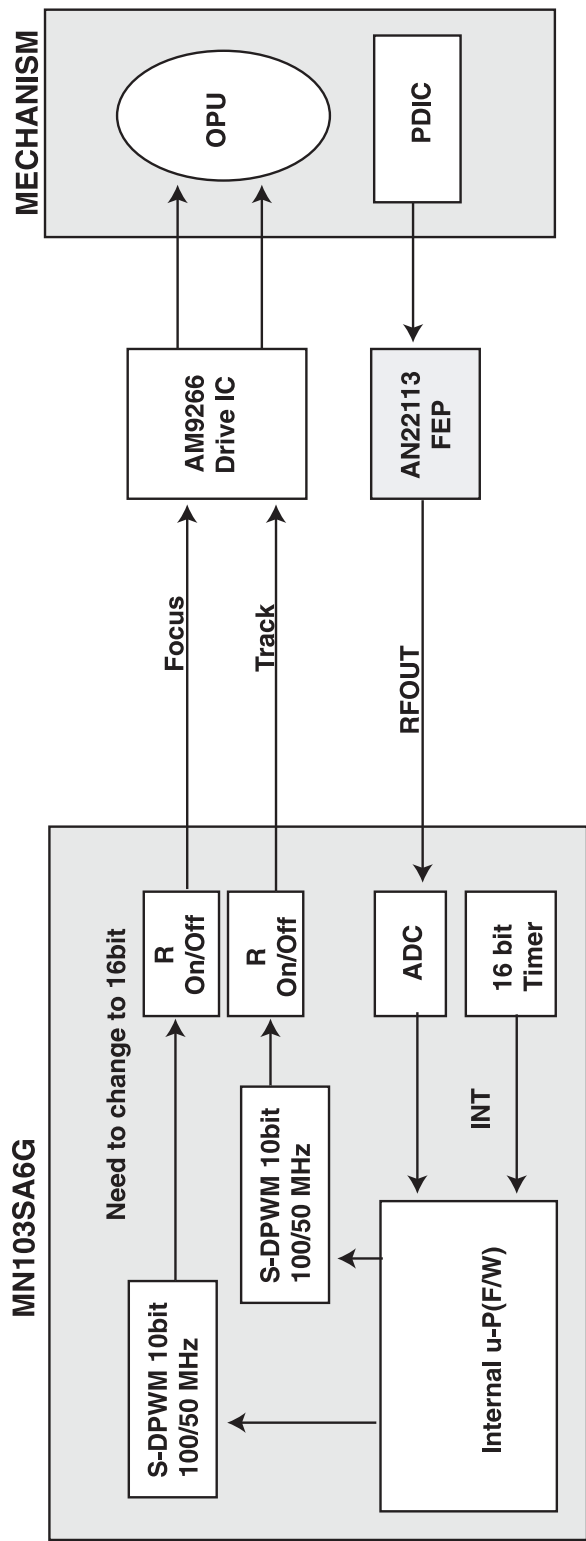
1-2. ALPC (AUTOMATIC LASER POWER CONTROL) CIRCUIT OPERATION

THE ALPC BLOCK DETECTS THE LASER OUTPUT POWER OF THE FRONT MONITOR. THE POWER SIGNAL DETECTED WITH THE PD FOR FRONT MONITOR DETECTION IS INPUT THE VOLTAGE FROM THE VPD PIN (123PIN) OR THE FPDM PIN (127PIN), THE REFERENCE SIGNAL OF THE INPUT SIGNAL IS INPUT FROM THE VREFPD PIN (124PIN). THE ALPC BLOCK GENERATES THE SIGNALS FROM THE INPUT LASER POWER SIGNALS IN THE FOLLOWING DETECTION SYSTEMS. THIS BLOCK HAS FOUR DETECTION PATHS : ALL AVERAGE VALUE PATH, MULTI PULSE AVERAGE/PEAK VALUE DETECTION PATH, ERASE/BOTTOM VALUE DETECTION PATH, SPACE/PLAYBACK POWER VALUE DETECTION PATH.

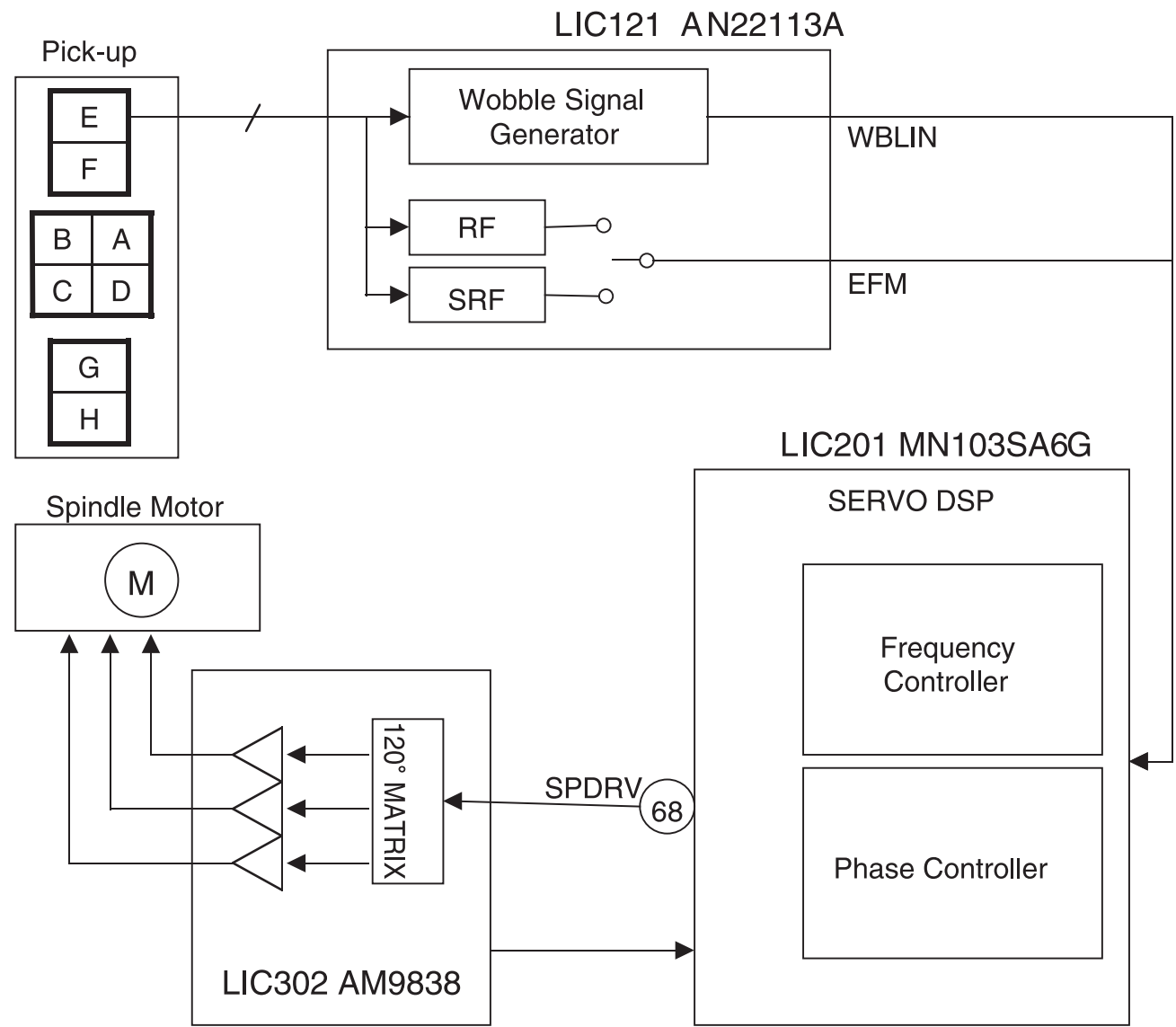
2. FOCUS/TRACKING/SLED SERVO CIRCUIT
2-1. FOCUS, TRACKING & SLED SERVO PROCESS



2-1. FOCUS, TRACKING & SLED SERVO PROCESS



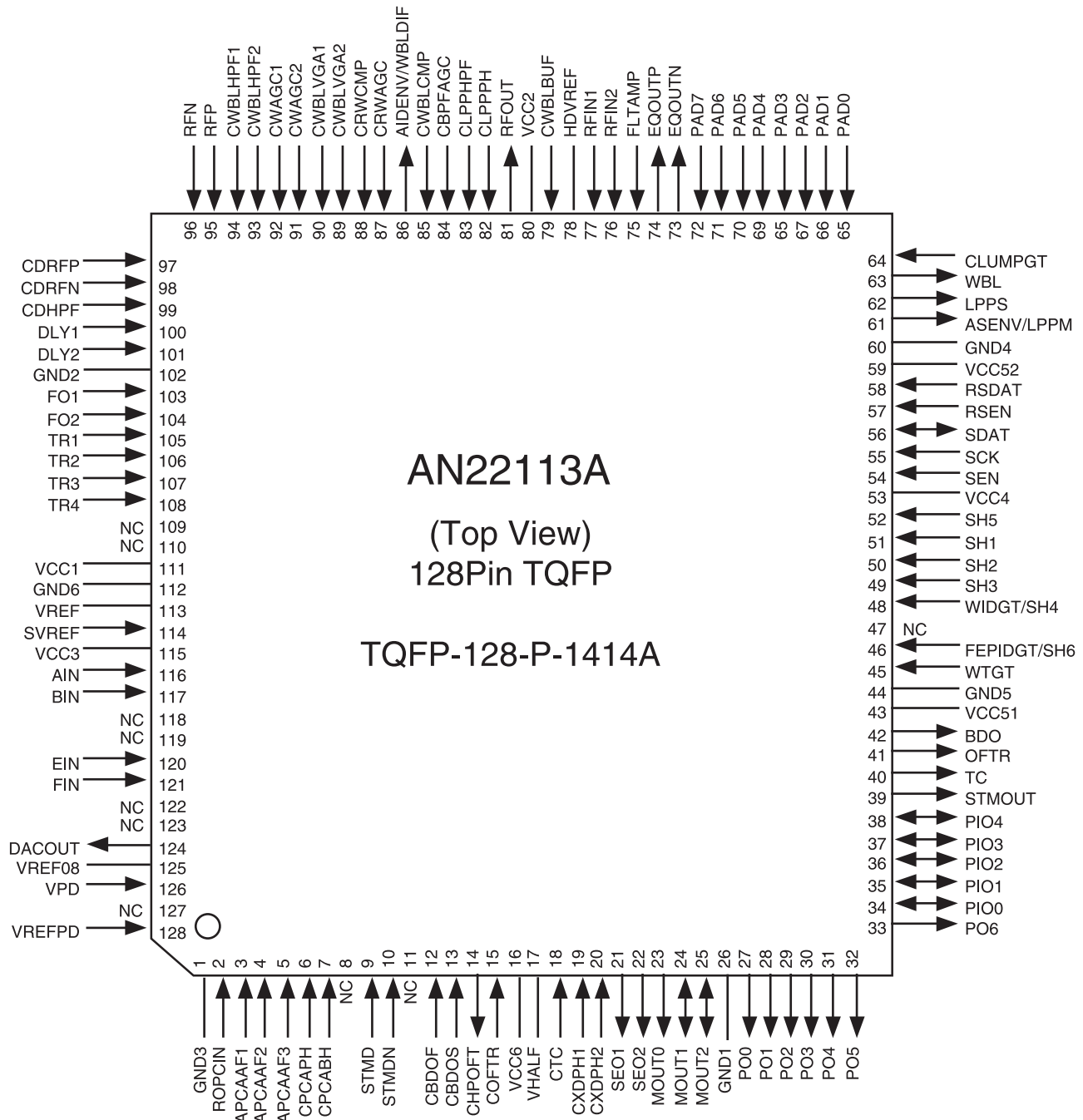
3. SPINDLE SERVO CIRCUIT
3-1. SPINDLE SERVO PROCESS



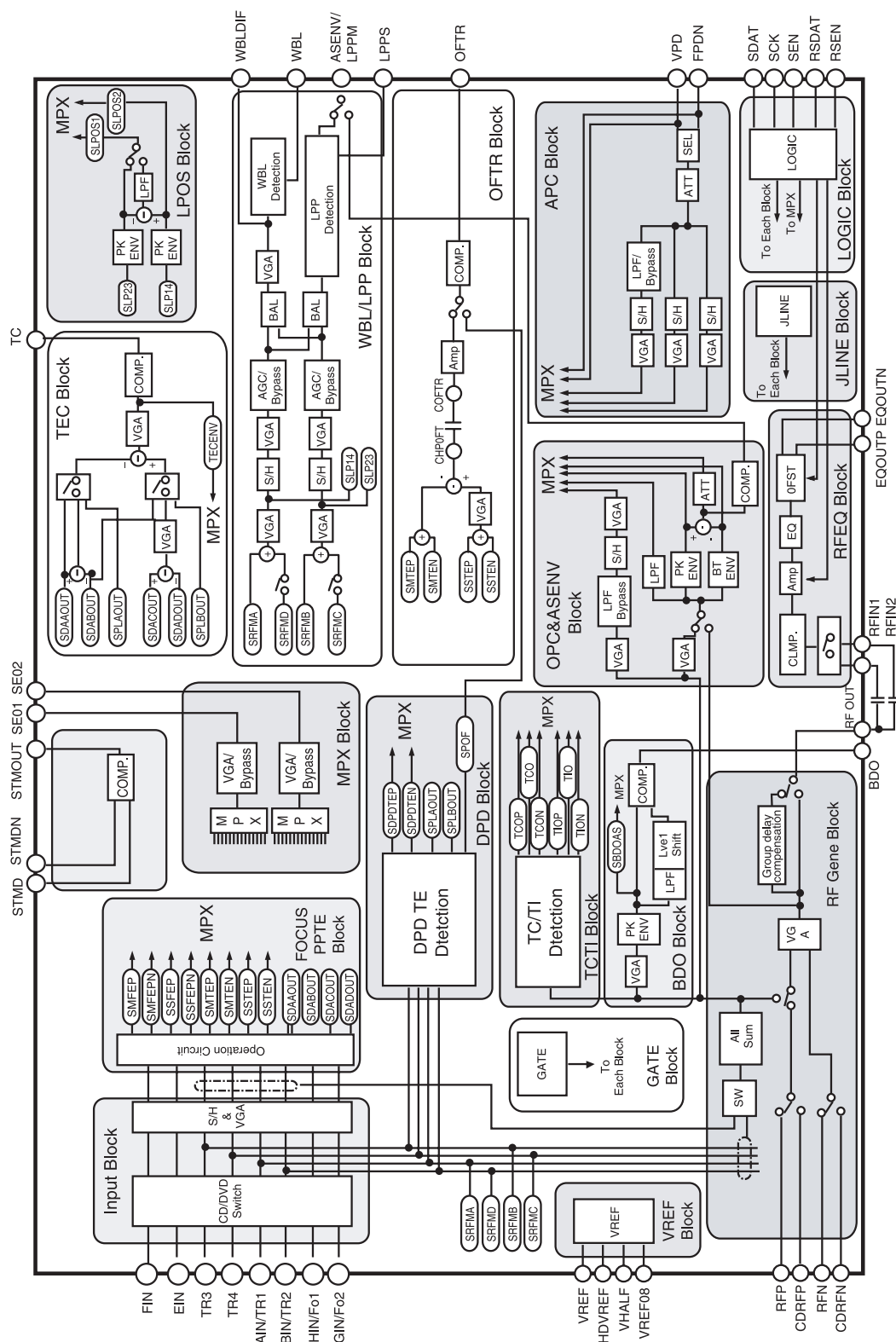
MAJOR IC INTERNAL BLOCK DIAGRAM

LIC121 (AN22113A) : FEP(RF) ANALOG SIGNAL PROCESSOR

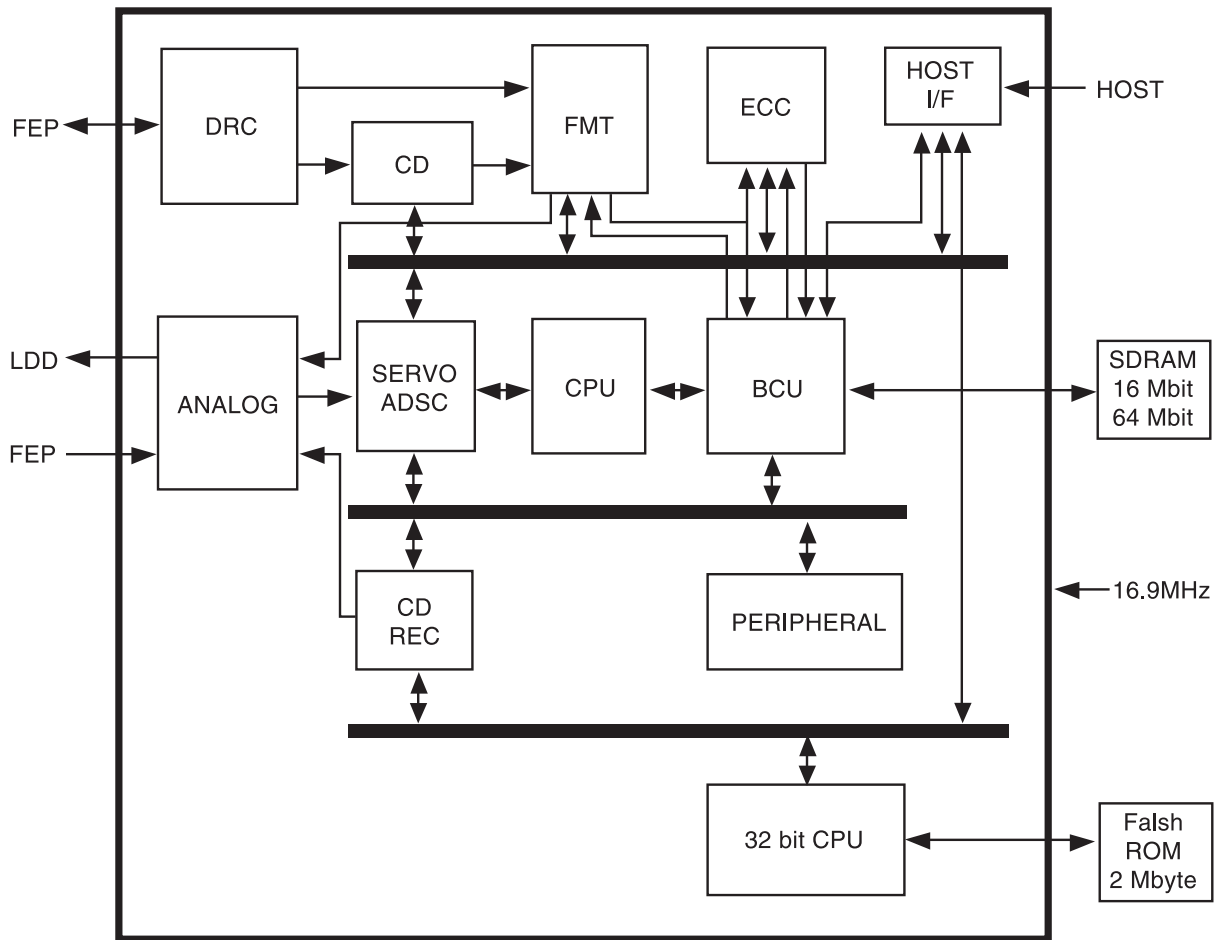
• PIN ASSIGNMENT



- **BLOCK DIAGRAM**

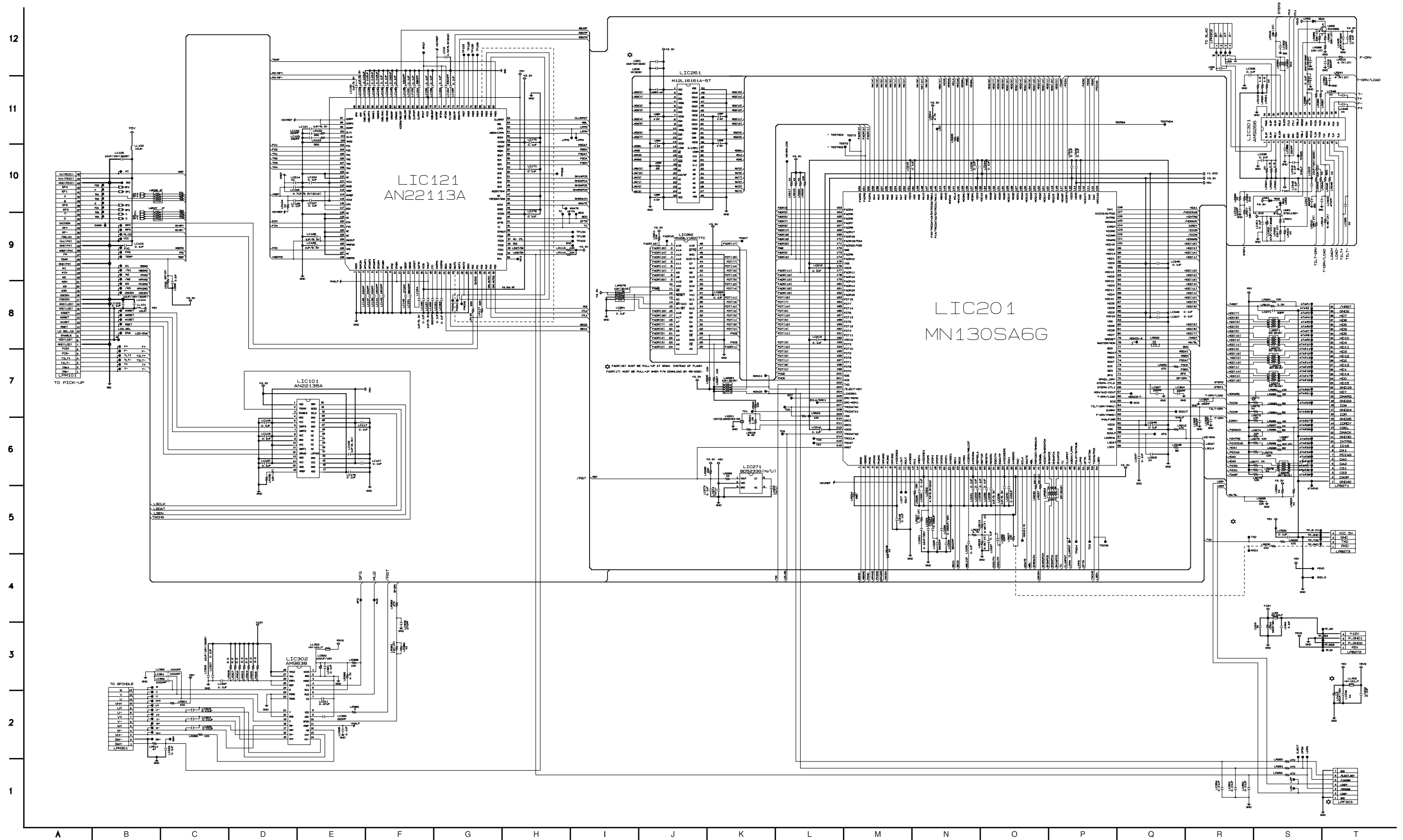


• **BLOCK DIAGRAM**



MEMO

CIRCUIT DIAGRAM

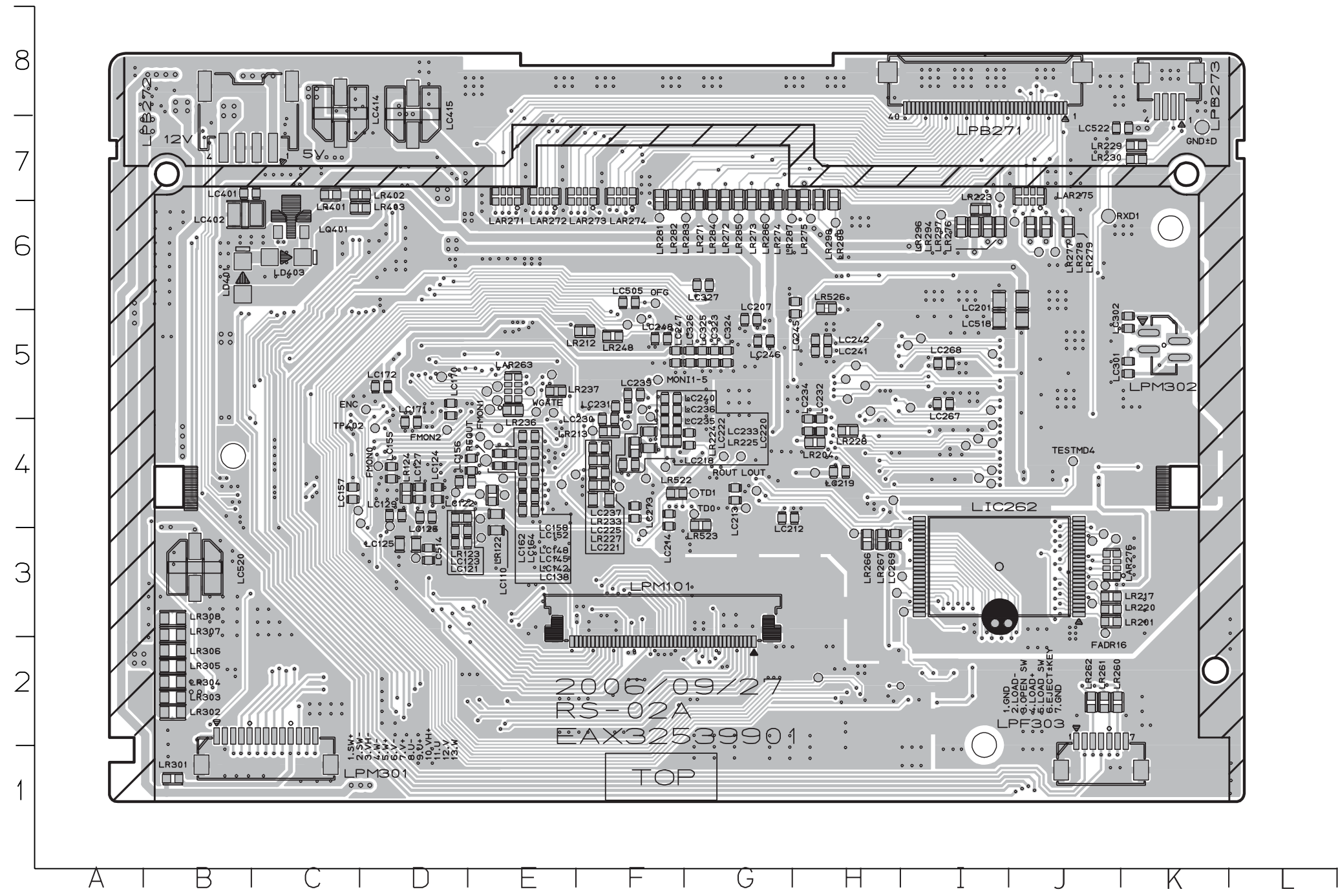


CIRCUIT VOLTAGE CHART

MODE PIN NO.	STATE	MODE PIN NO.	STATE	MODE PIN NO.	STATE	MODE PIN NO.	STATE	MODE PIN NO.	STATE	MODE PIN NO.	STATE	MODE PIN NO.	STATE	MODE PIN NO.	STATE	MODE PIN NO.	STATE
LIC101		22	1.57	77	2.19	3	1.64	58	1.17	113	0.00	168	PULSE	6	PULSE	10	
1	3.29	23	1.33	78	2.19	4	1.18	59	0.00	114	4.96	169	PULSE	7	3.29	11	
2	0.00	24	1.10	79	2.16	5	1.65	60	3.27	115	3.28	170	PULSE	8	PULSE	12	
3	3.28	25	1.33	80	4.98	6	1.19	61	1.65	116	3.25	171	PULSE	9	PULSE	13	
4	0.00	26	0.00	81	2.18	7	0.14	62	1.65	117	0.00	172	PULSE	10	0.00	14	
5	4.99	27	0.00	82	2.96	8	0.00	63	1.06	118	PULSE	173	PULSE	11	PULSE	15	
6	0.00	28	3.30	83	2.14	9	3.30	64	0.00	119	PULSE	174	PULSE	12	PULSE	16	PULSE
7	0.00	29	0.00	84	2.79	10	1.65	65	0.20	120	PULSE	175	0.00	13	3.29	17	PULSE
8	4.98	30	0.00	85	2.21	11	1.65	66	1.65	121	PULSE	176	3.29	14	PULSE	18	PULSE
9	0.00	31	0.00	86	2.49	12	0.00	67	0.00	122	PULSE	177	PULSE	15	PULSE	19	PULSE
10	4.99	32	0.00	87	2.85	13	1.50	68	1.69	123	PULSE	178	PULSE	16	PULSE	20	PULSE
11	0.00	33	0.00	88	2.20	14	2.19	69	1.52	124	PULSE	179	PULSE	17	PULSE	21	PULSE
12	0.00	34	0.00	89	2.16	15	3.30	70	1.65	125	PULSE	180	PULSE	18	0.00	22	PULSE
13	0.00	35	3.20	90	2.19	16	0.27	71	5.00	126	PULSE	181	PULSE	19	PULSE	23	PULSE
14	4.99	36	3.29	91	2.19	17	0.27	72	1.23	127	PULSE	182	PULSE	20	PULSE	24	PULSE
15	0.00	37	0.00	92	2.19	18	0.23	73	1.63	128	PULSE	183	PULSE	21	PULSE	25	PULSE
16	1.09	38	0.00	93	1.68	19	0.00	74	1.60	129	PULSE	184	PULSE	22	PULSE	26	PULSE
17	3.28	39	0.00	94	1.67	20	0.25	75	1.50	130	PULSE	185	PULSE	23	PULSE	27	0.00
18	0.00	40	0.00	95	2.37	21	0.00	76	0.61	131	PULSE	186	PULSE	24	PULSE	28	PULSE
19	4.99	41	1.61	96	2.37	22	1.43	77	3.28	132	PULSE	187	PULSE	25	3.28	29	PULSE
20	0.00	42	3.29	97	2.19	23	1.57	78	0.00	133	PULSE	188	PULSE	26	0.00	30	PULSE
21	0.00	43	3.30	98	2.19	24	0.00	79	3.26	134	0.00	189	PULSE	27	PULSE	31	PULSE
22	0.00	44	0.00	99	1.62	25	2.01	80	2.80	135	1.17	190	PULSE	28	PULSE	32	PULSE
23	0.00	45	0.00	100	1.49	26	3.29	81	2.14	136	3.29	191	PULSE	29	PULSE	33	PULSE
24	0.00	46	0.00	101	1.44	27	3.28	82	2.67	137	3.29	192	1.17	30	PULSE	34	PULSE
25	0.00	47	0.00	102	0.00	28	2.24	83	0.00	138	3.29	193	PULSE	31	PULSE	35	PULSE
26	0.00	48	0.00	103	1.65	29	1.73	84	1.17	139	3.29	194	PULSE	32	PULSE	36	PULSE
27	0.00	49	0.00	104	1.65	30	1.29	85	3.27	140	3.29	195	PULSE	33	PULSE	37	
28	4.97	50	0.00	105	1.65	31	2.02	86	2.82	141	2.68	196	PULSE	34	PULSE	38	PULSE
29	0.00	51	0.00	106	1.65	32	2.03	87	2.20	142	3.28	197	PULSE	35	PULSE	39	PULSE
30	3.29	52	0.00	107	1.65	33	3.28	88	2.40	143	0.00	198	PULSE	36	PULSE	40	PULSE
31	0.36	53	4.96	108	1.65	34	0.85	89	2.70	144	0.00	199	PULSE	37	PULSE	41	PULSE
32	0.00	54	1.23	109	0.00	35	0.00	90	2.20	145	0.00	200	PULSE	38	3.29	42	PULSE
LIC121		55	1.65	110	0.00	36	3.28	91	2.70	146	PULSE	201	PULSE	39	PULSE	43	PULSE
1	0.00	56	1.62	111	4.96	37	0.00	92	2.20	147	PULSE	202	PULSE	40	PULSE	44	PULSE
2	0.00	57	1.65	112	0.00	38	0.00	93	2.20	148	PULSE	203	3.28	41	0.00	45	PULSE
3	1.69	58	0.61	113	1.65	39	2.95	94	2.20	149	PULSE	204	0.00	42	PULSE	46	0.00
4	1.64	59	3.29	114	1.65	40	0.00	95	0.00	150	0.00	205	3.26	43	PULSE	47	
5	1.66	60	0.00	115	4.96	41	0.00	96	3.28	151	3.29	206	3.26	44	3.29	48	PULSE
6	2.67	61	0.00	116	1.65	42	0.00	97	2.20	152	PULSE	207	0.00	45	PULSE	LIC301	
7	2.60	62	0.00	117	1.65	43	0.00	98	2.18	153	PULSE	208	0.00	46	PULSE	1	-0.22
8	0.00	63	2.95	118	0.00	44	0.00	99	2.18	154	PULSE	209	0.00	47	0.00	2	-0.22
9	0.00	64	3.29	119	0.00	45	0.00	100	2.17	155	PULSE	210	OSC	48	PULSE	3	12.40
10	1.65	65	1.21	120	1.65	46	3.29	101	0.00	156	PULSE	211	OSC	49	PULSE	4	1.61
11	0.00	66	1.34	121	1.66	47	3.29	102	3.27	157	PULSE	212	3.28	50	0.00	5	1.00
12	0.25	67	1.16	122	0.00	48	0.00	103	2.15	158	PULSE	213	0.00	LIC262		6	0.00
13	1.58	68	1.34	123	0.00	49	0.00	104	0.00	159	PULSE	214	0.00	1	PULSE	7	0.00
14	1.82	69	1.35	124	2.51	50	0.00	105	3.27	160	PULSE	215	0.00	2	PULSE	8	1.64
15	2.20	70	0.50	125	0.81	51	0.00	106	0.00	161	PULSE	216	3.28	3	PULSE	9	1.30
16	3.29	71	0.70	126	2.50	52	0.70	107	4.96	162	PULSE	LIC261		4	PULSE	10	1.24
17	1.65	72	0.00	127	0.00	53	0.00	108	0.00	163	PULSE	1	3.29	5	PULSE	11	12.40
18	1.56	73	2.03	128	2.50	54	0.00	109	4.96	164	PULSE	2	PULSE	6	PULSE	12	1.64
19	0.00	74	2.03	LIC201		55	3.29	110	0.00	165	PULSE	3	PULSE	7	PULSE	13	1.63
20	2.50	75	2.14	1	1.65	56	0.56	111	1.66	166	PULSE	4	0.00	8	PULSE	14	6.38
21	1.42	76	0.30	2	1.19	57	0.00	112	0.00	167	PULSE	5	PULSE	9	PULSE	15	6.38

PRINTED CIRCUIT DIAGRAMS

1. MAIN P.C.BOARD (TOP VIEW)



2. MAIN P.C.BOARD (BOTTOM VIEW)

