



SERVICE MANUAL

MODEL : DR165/DR175/DR676X



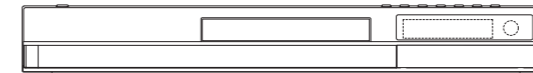
# DVD RECORDER

## SERVICE MANUAL

**MODEL : DR165/DR175/DR676X**

### CAUTION

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



LG Electronics Inc.

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# SECTION 1

## SUMMARY

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# PRODUCT SAFETY SERVICING GUIDELINES FOR VIDEO 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 Electronics 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 Electronics 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:

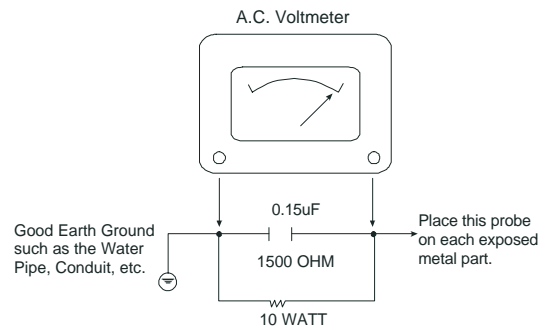
**CAUTION:** FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ALL FUSES WITH THE SAME TYPE AND RATING AS MARKED NEAR EACH FUSE.

## 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 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.

*Remembers Safety First:*

## General Servicing Precautions

1. Always unplug the 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) Disconnection 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 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 DVD Recorder and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
6. Always connect test instrument ground lead to the appropriate ground before connection 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 1M-ohm.

**Note 1** : Accessible Conductive Parts including 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.

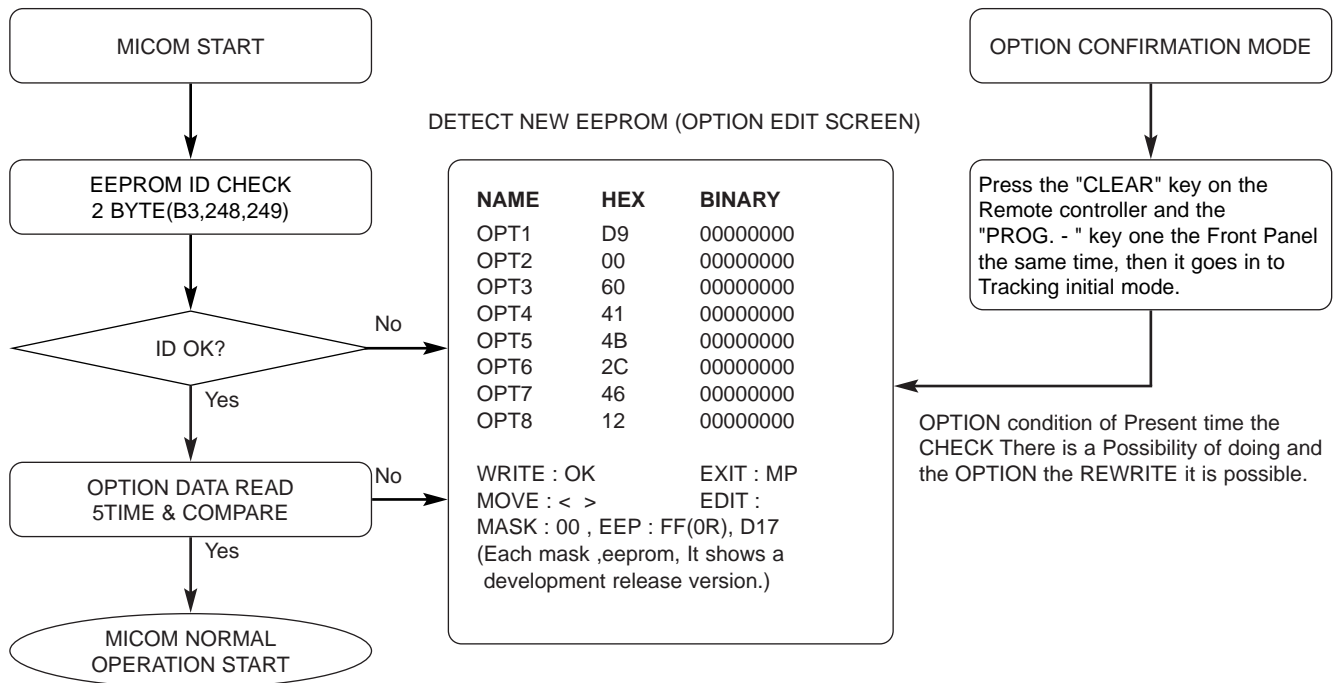
The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

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 a "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate 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.)

# SERVICE INFORMATION FOR EEPROM IC SETTING



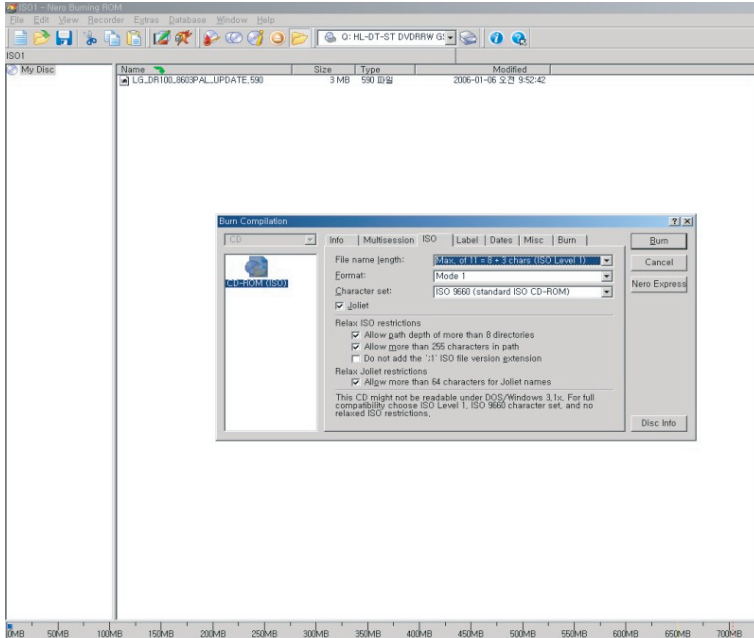
### \*\*\* EEPROM INITIAL \*\*\*

- SETUP is displayed in the field if pressing the Front PROG. - & + Key with the Remocon number "clear" key pressed in the status of powering on.
- AUTO SEARCH is done since the initial screen of ACMS is serviced if powering on.

# FLASH UPGRADE

## 1. MAKING UPGRADE DISC

- 1) Do Physical format as ISO9660 or JOLIET file system.
- 2) Don't care about the CD Volume label.
- 3) Write DR100 BE Upgrade File on Root.



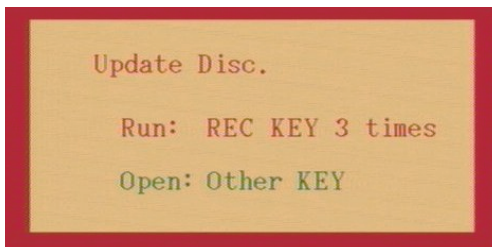
< example- Nero Burning Rom >

### \* OPTIONAL PARTS

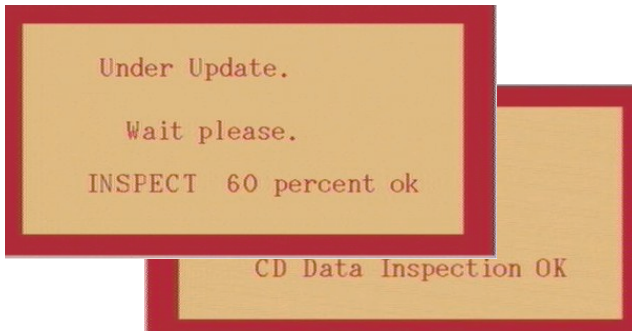
- DR100 8601 64M NTSC ) :  
LG\_DR100\_8601NT64\_UPDATE.590
- DR100 860164M (PAL ) :  
LG\_DR100\_8601PAL64\_UPDATE.590
- DR100 860132M (NTSC) :  
LG\_DR100\_8601NT\_UPDATE.590
- DR100 860132M (PAL ) :  
LG\_DR100\_8601PAL\_UPDATE.590
- DR100 8603 64M (NTSC) :  
LG\_DR100\_8603NT\_UPDATE.590
- DR100 8603 64M (PAL ) :  
LG\_DR100\_8603PAL\_UPDATE.590

## 2. UPGRADE FLASH

- 1) Put Flash Upgrade Disc on the Set.
- 2) After Disc Reading, you can see below screen.



- 3) Press REC KEY 3 times. It will start Inspection.



- 4) You can see both current and upgrade version.  
Press REC KEY.



- 5) Upgrading.



- 6) After Upgrading, you can see the below screen. And automatically open tray.  
Eject the Disc. Reboot the set.

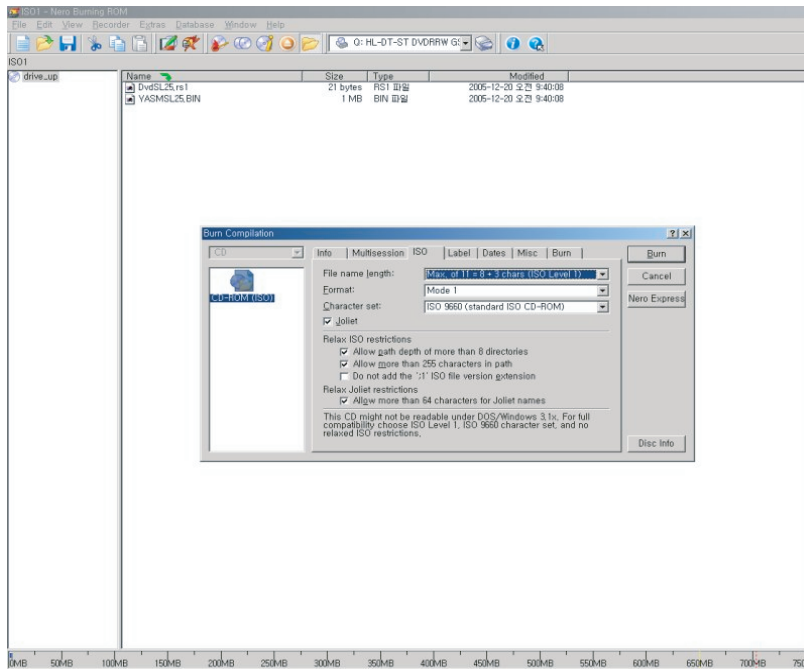




# LOADER UPGRADE

## 1.MAKING UPGRADE DISC

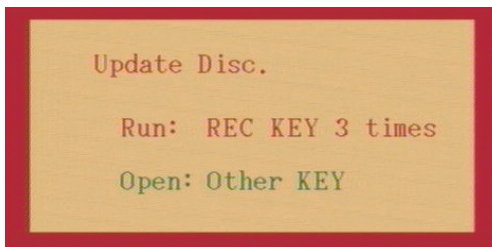
- 1) Do Physical format as ISO9660 or JOLIET file system
- 2) Make a Volume label as "DRIVE\_UP".
- 3) Write DvdSLXX.rs1, YASMSLXX.BIN on Root like below.(XX is Version)



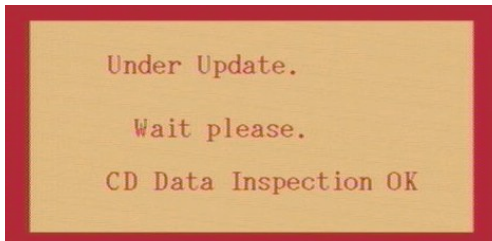
< example- Nero Burning Rom >

## 2. LOADER UPGRADE

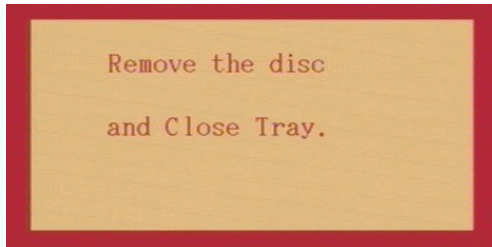
- 1) Put Loader Upgrade Disc on Set.
- 2) After Disc Reading, you can see the below screen.



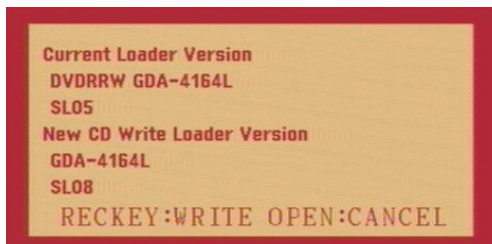
- 3) Press REC KEY 3 times.



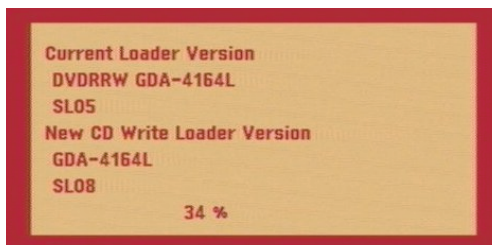
4) After Tray open, pick the disc up and close the tray.



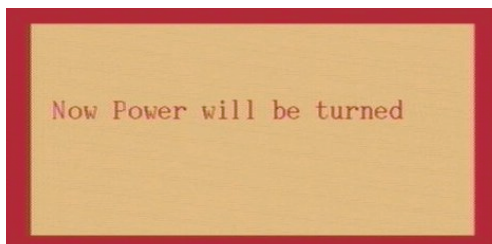
5) It shows both the current version and upgrade version.  
Press REC KEY.



6) Upgrading.



7) After finishing Upgrade, it shows the below screen and is tuned off



# SPECIFICATIONS

## • GENERAL

Power requirements	AC 200-240V, 50/60 Hz
Power consumption	25W
Dimensions (approx.)	430 X 54 X 275 mm (w x h x d) without foot
Mass (approx.)	4.1 kg
Operating temperature	5°C to 35°C
Operating humidity	5 % to 90 %
Television system	PAL I, B/G, I/I, SECAM D/K, K1, SECAM L color system
Recording format	PAL

## • RECORDING

Recording format	DVD Video Recording, DVD-VIDEO
Recordable media	DVD-ReWritable, DVD-Recordable, DVD+ReWritable, DVD+Recordable
Recordable time	DVD (4.7GB): Approx. 1 hour 20 minutes (XP mode), 2 hours (SP mode), 4 hours (LP mode), 6 hours (EP mode)

### Video recording format

Sampling frequency	27MHz
Compression format	MPEG 2 (VBR support)

### Audio recording format

Sampling frequency	48kHz
Compression format	Dolby Digital

## • PLAYBACK

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

## • INPUTS

AERIAL IN	Aerial input, 75 ohms
VIDEO IN	1.0 Vp-p 75 ohms, sync negative, RCA jack x 2 / SCART x 2
AUDIO IN	2.0 Vrms more than 47 kohms, RCA jack (L, R) x 2 / SCART x 2
S-VIDEO IN	(Y) 1.0 V (p-p), 75 Ω, sync negative, Mini DIN 4-pin x 1 (C) 0.3 V (p-p) 75 Ω
DV IN	4 pin (IEEE 1394 standard)

## • OUTPUTS

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

**SECTION 2**  
**CABINET & MAIN CHASSIS**

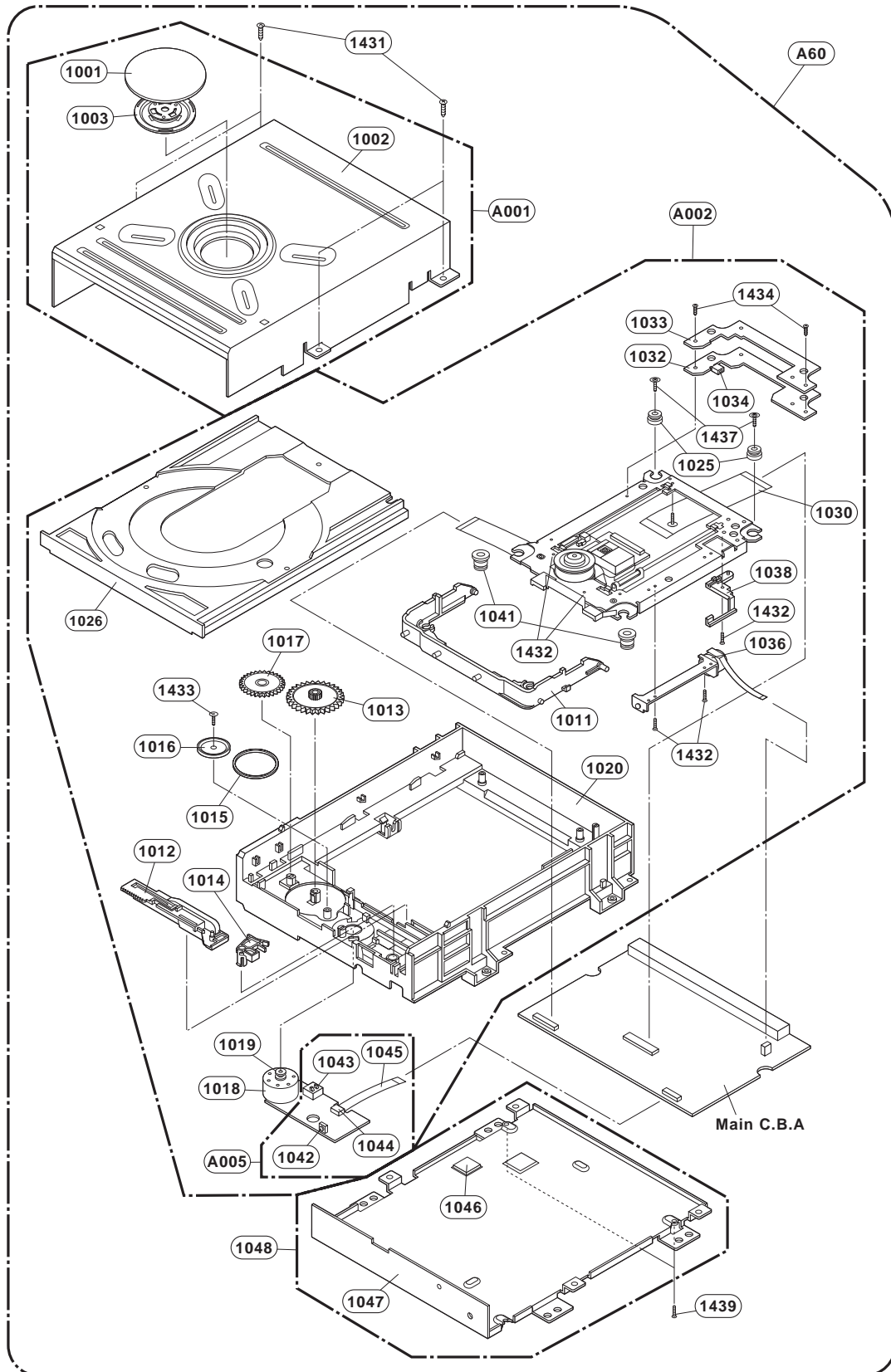
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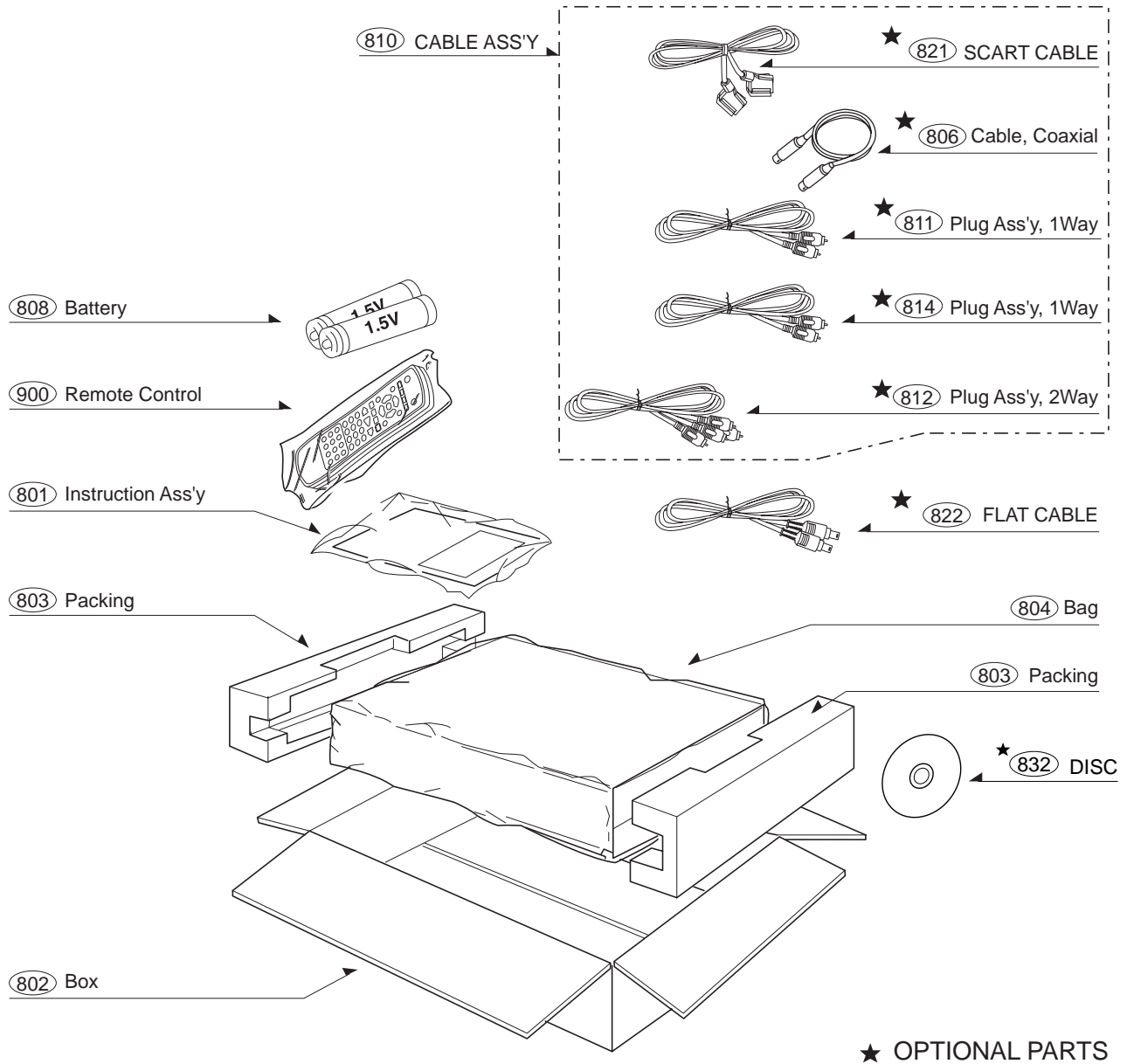
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## 2. DECK MECHANISM SECTION(RS-01A)



### 3. Packing Accessory Section



# SECTION 3 ELECTRICAL CONTENTS

## VDR PART

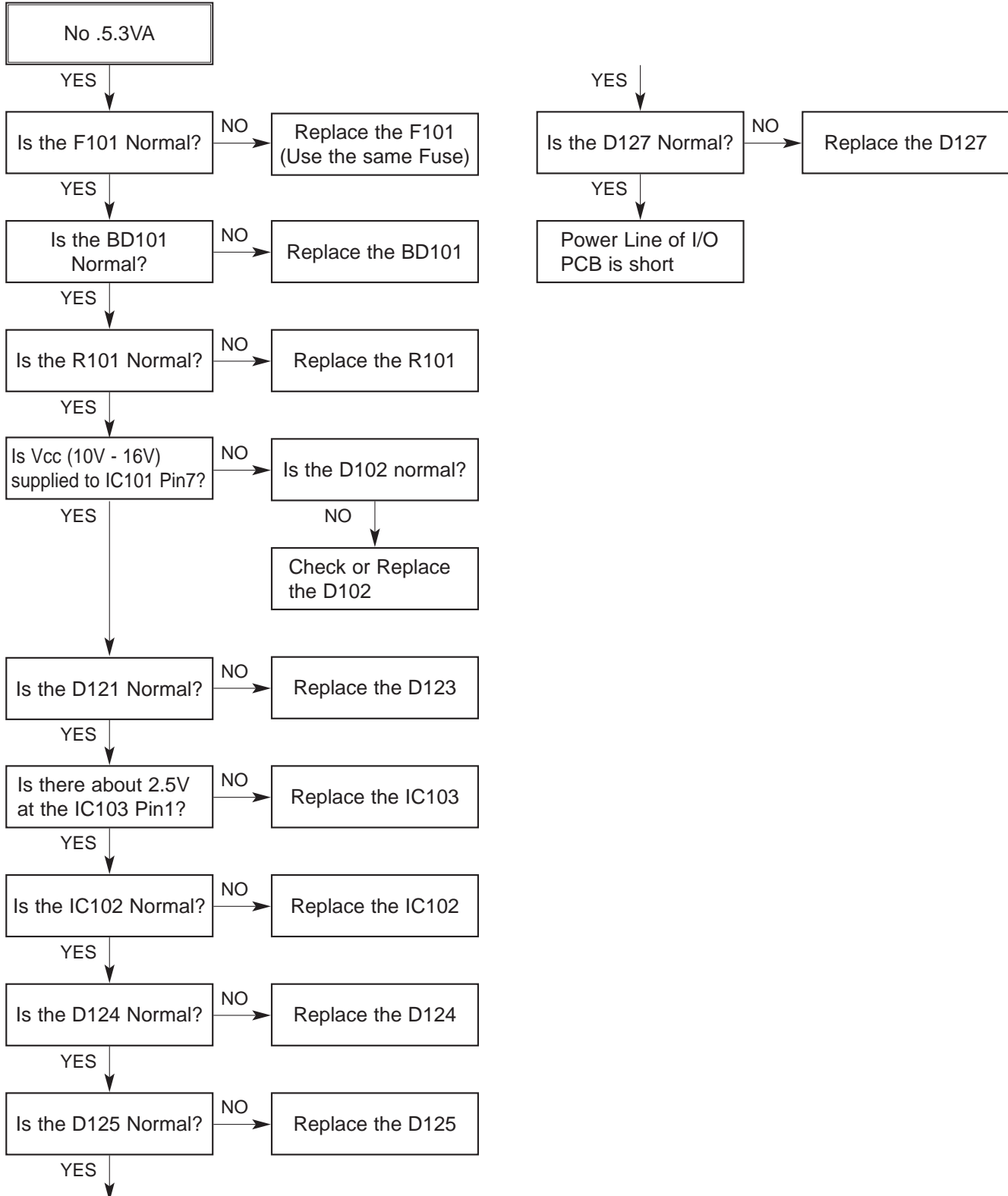
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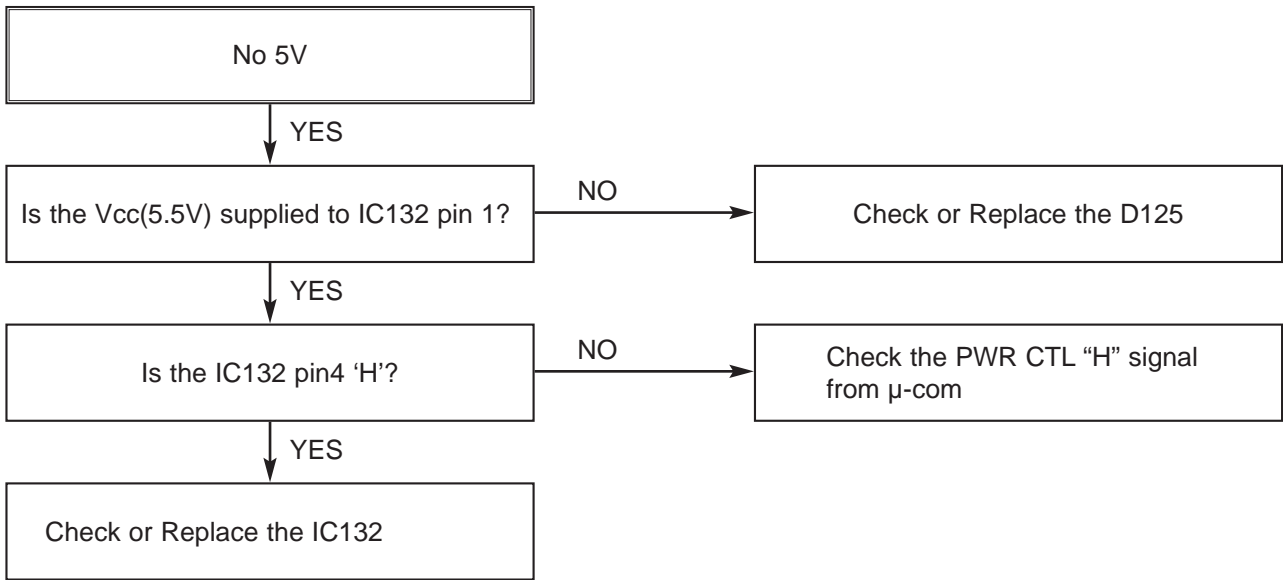
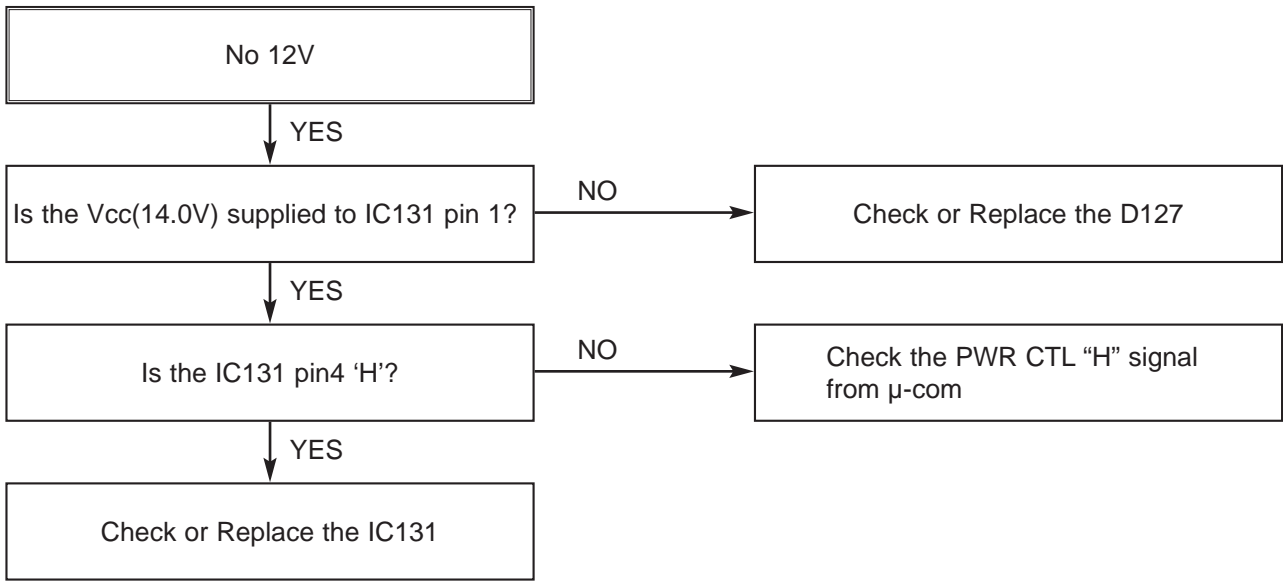


# VDR PART

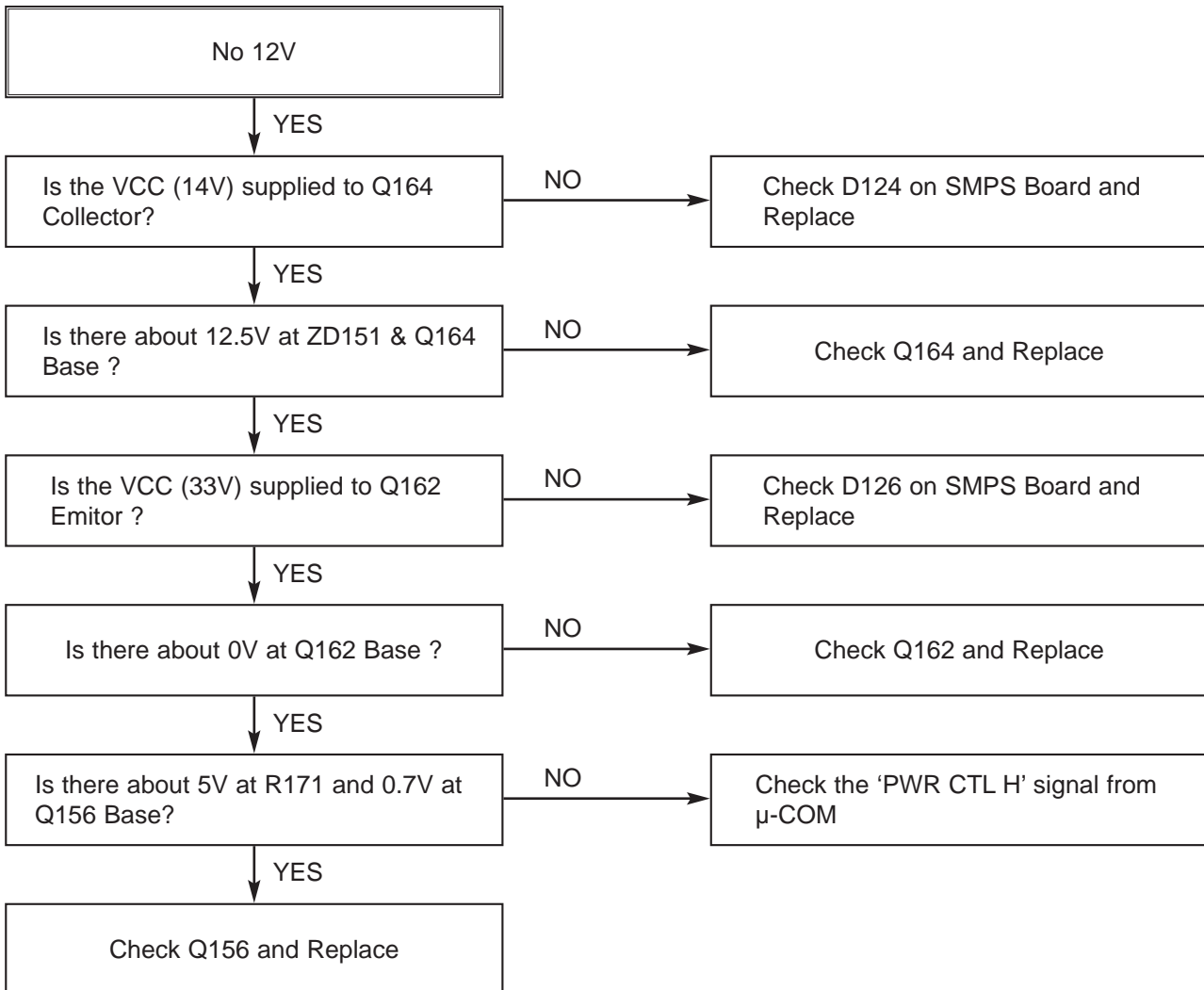
## ELECTRICAL TROUBLESHOOTING GUIDE

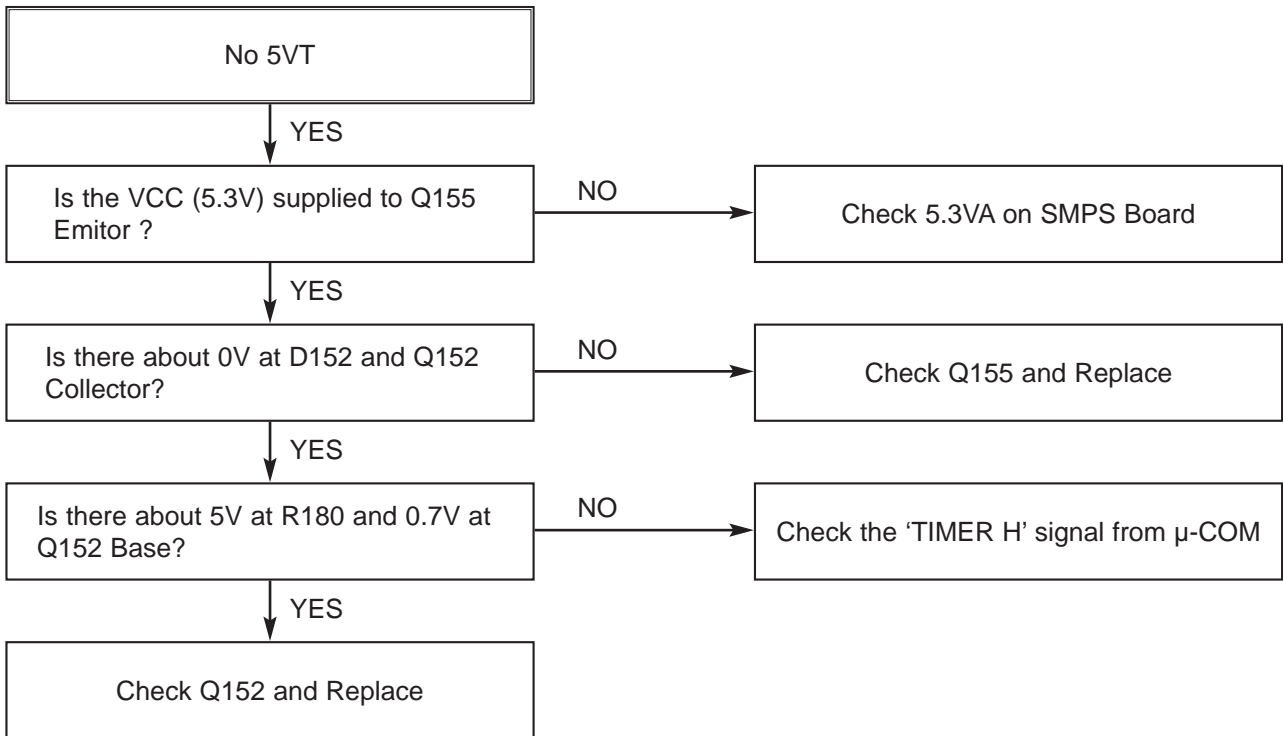
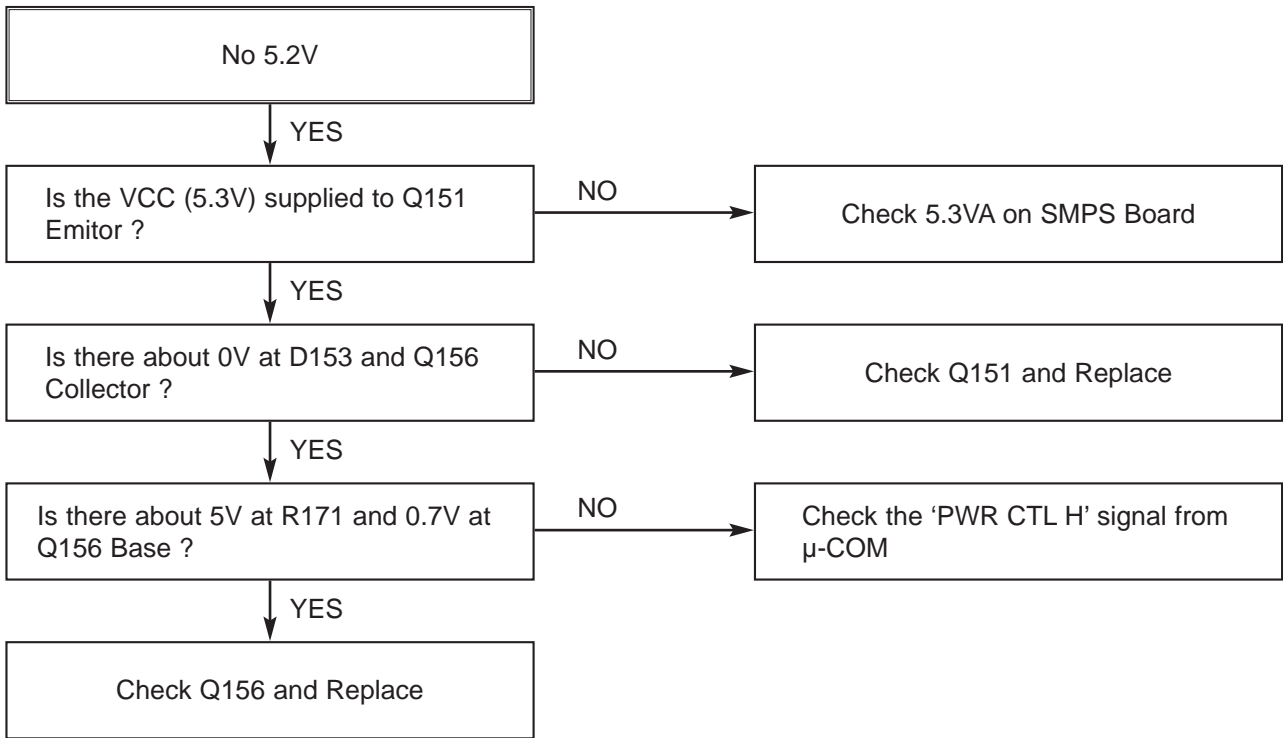
### 1. POWER SUPPLY ON SMPS BOARD

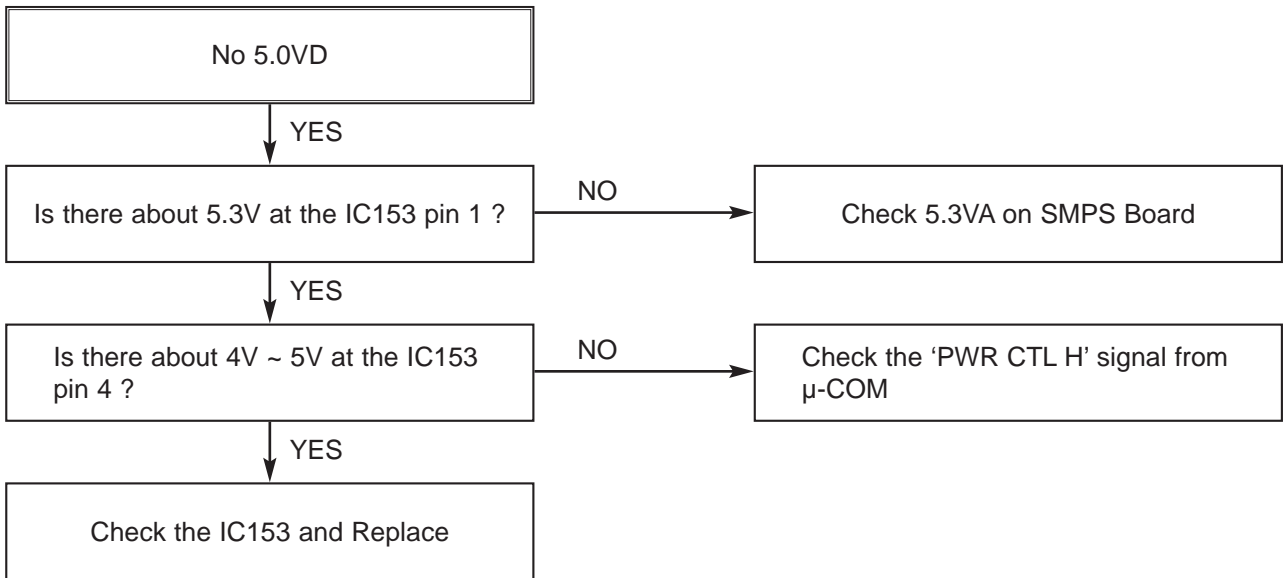
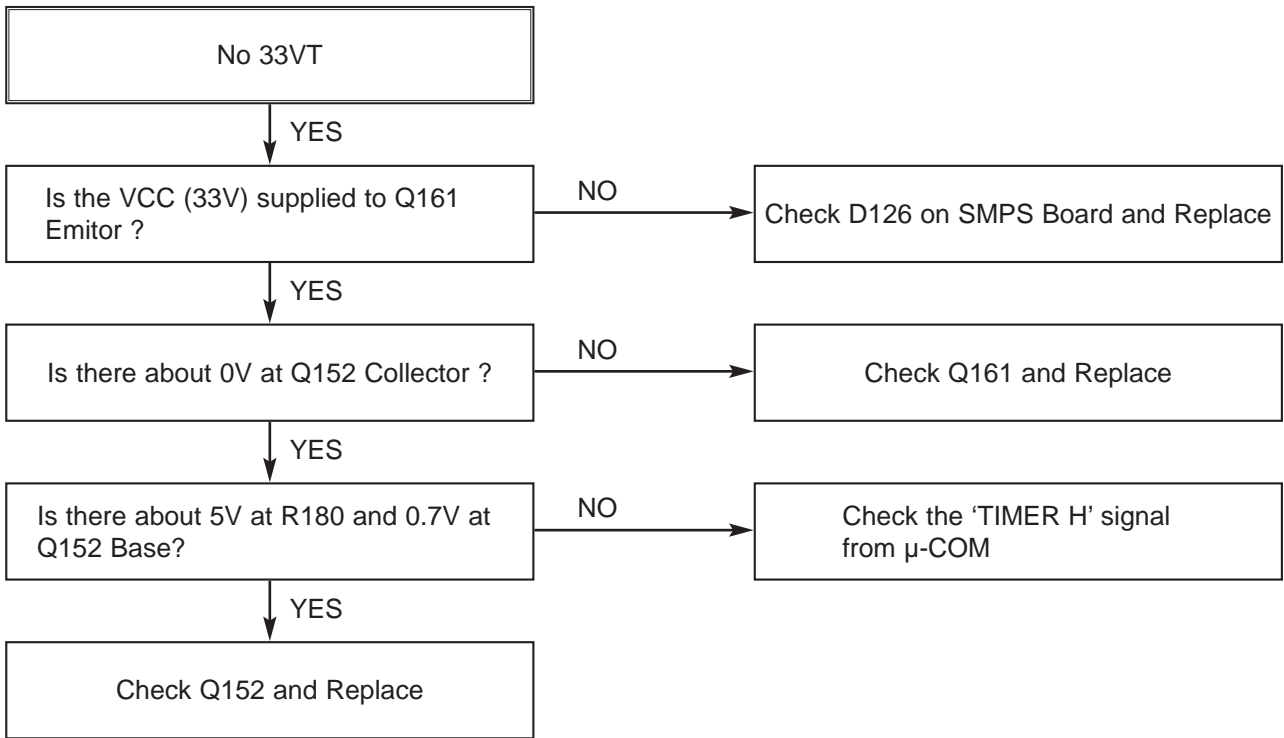


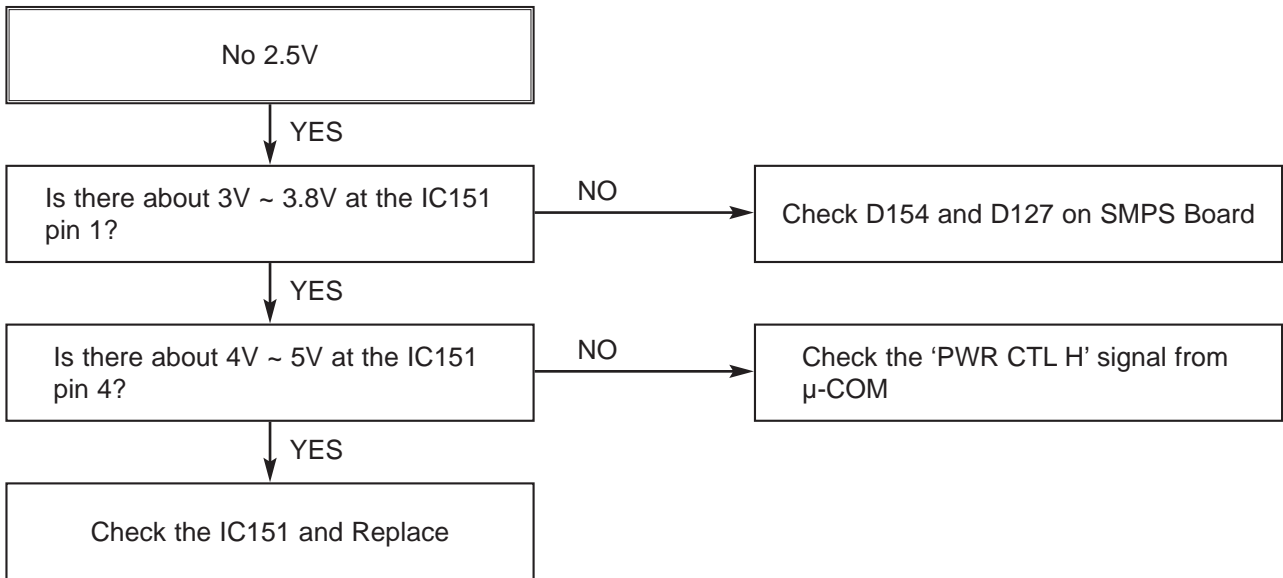
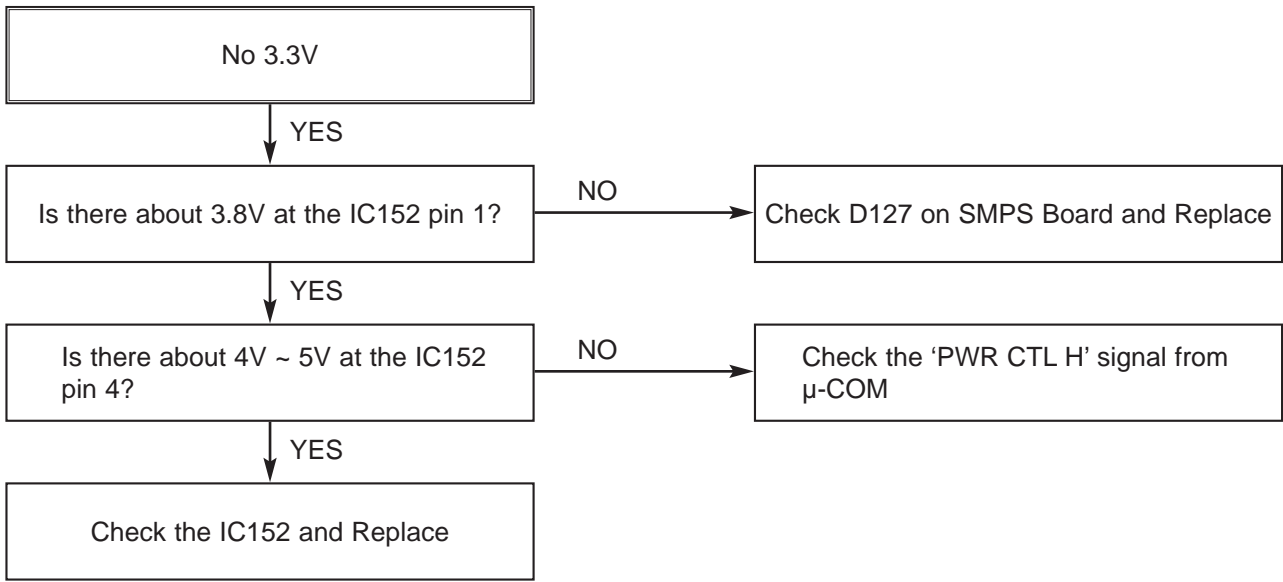


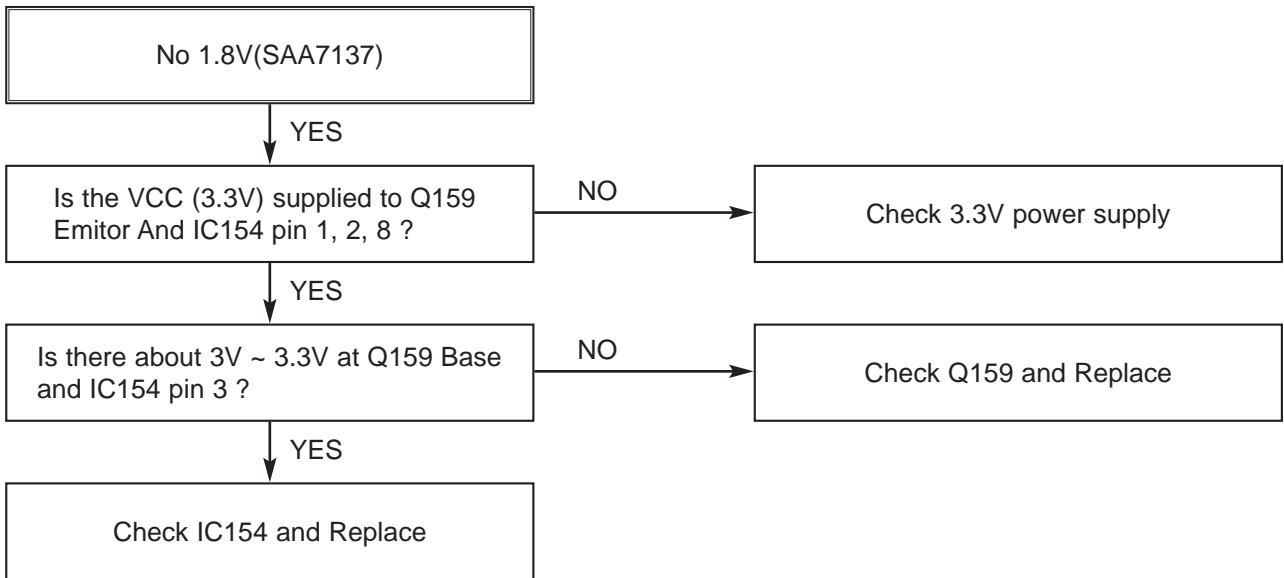
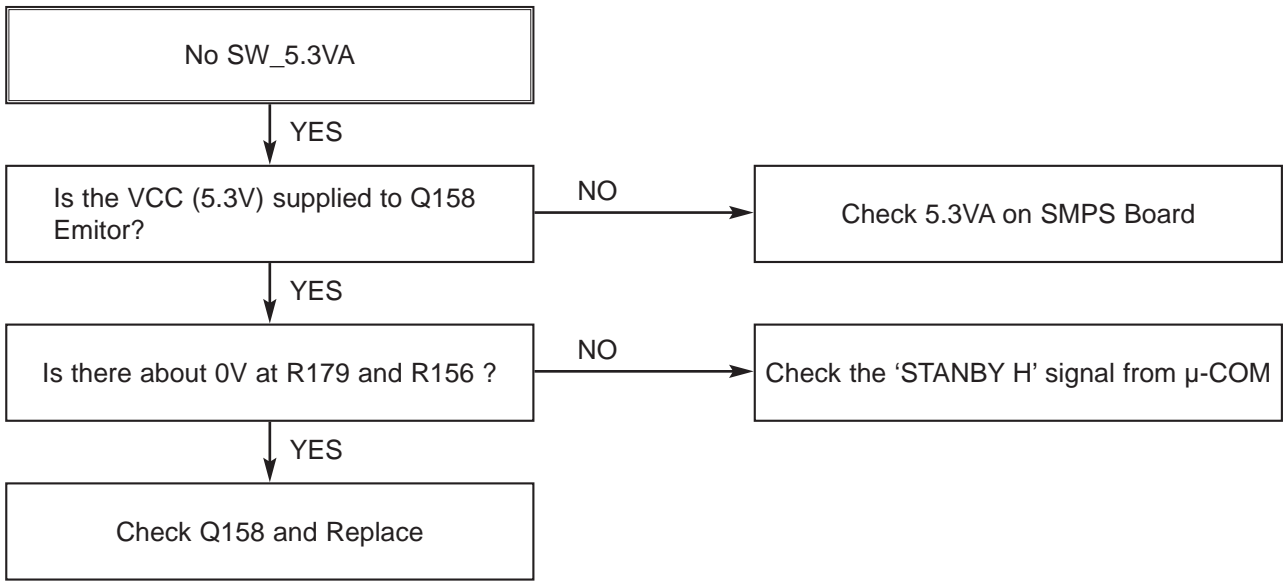
## 2. POWER SUPPLY ON I/O BOARD

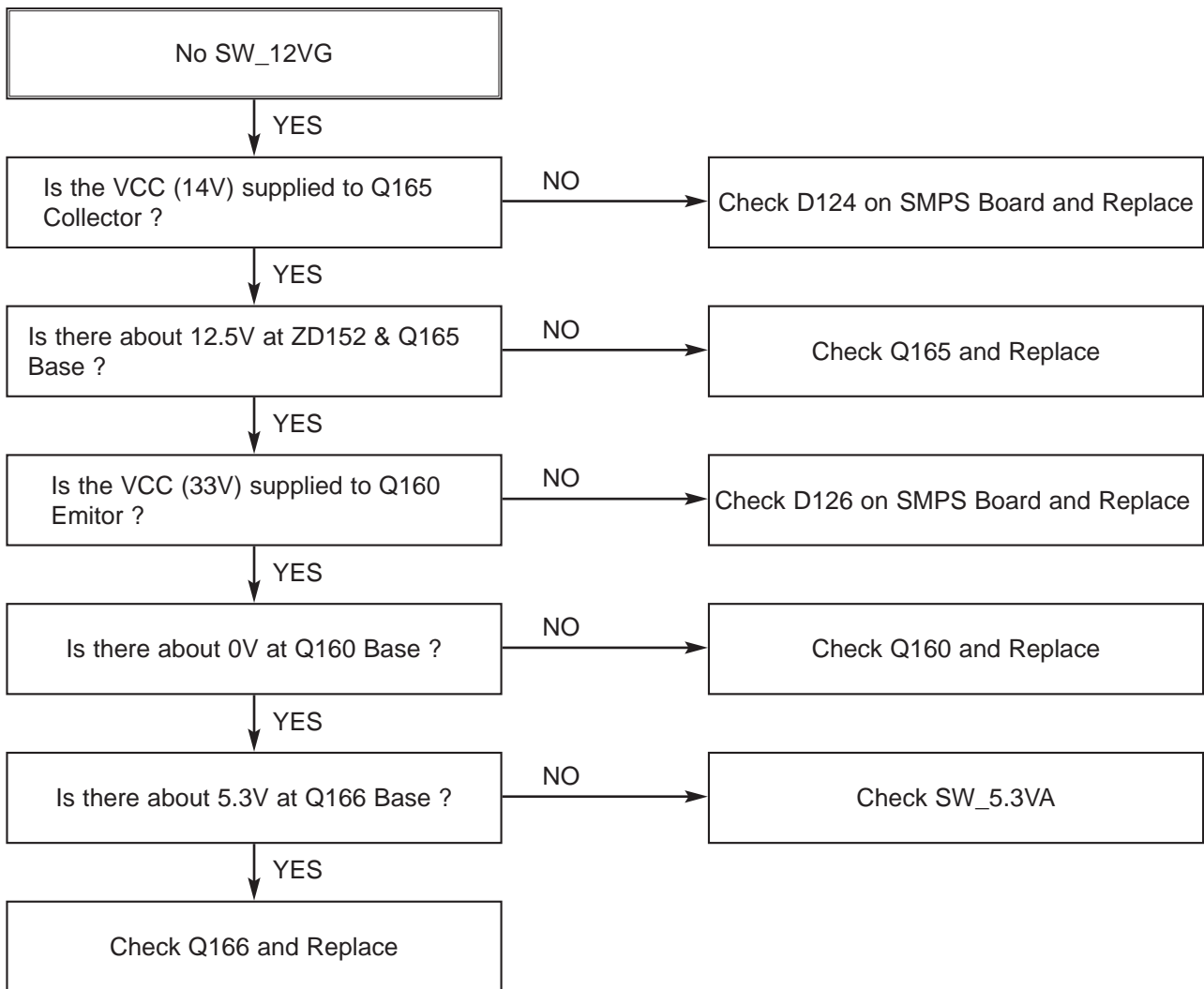




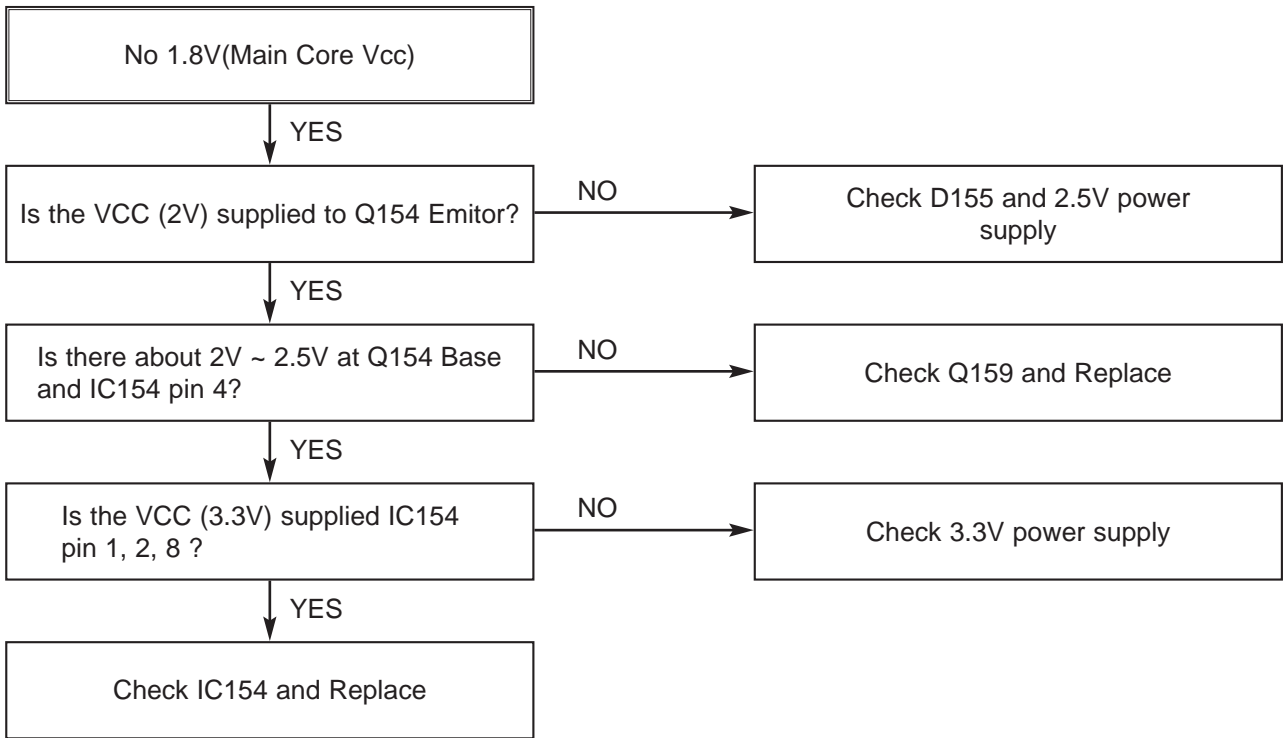




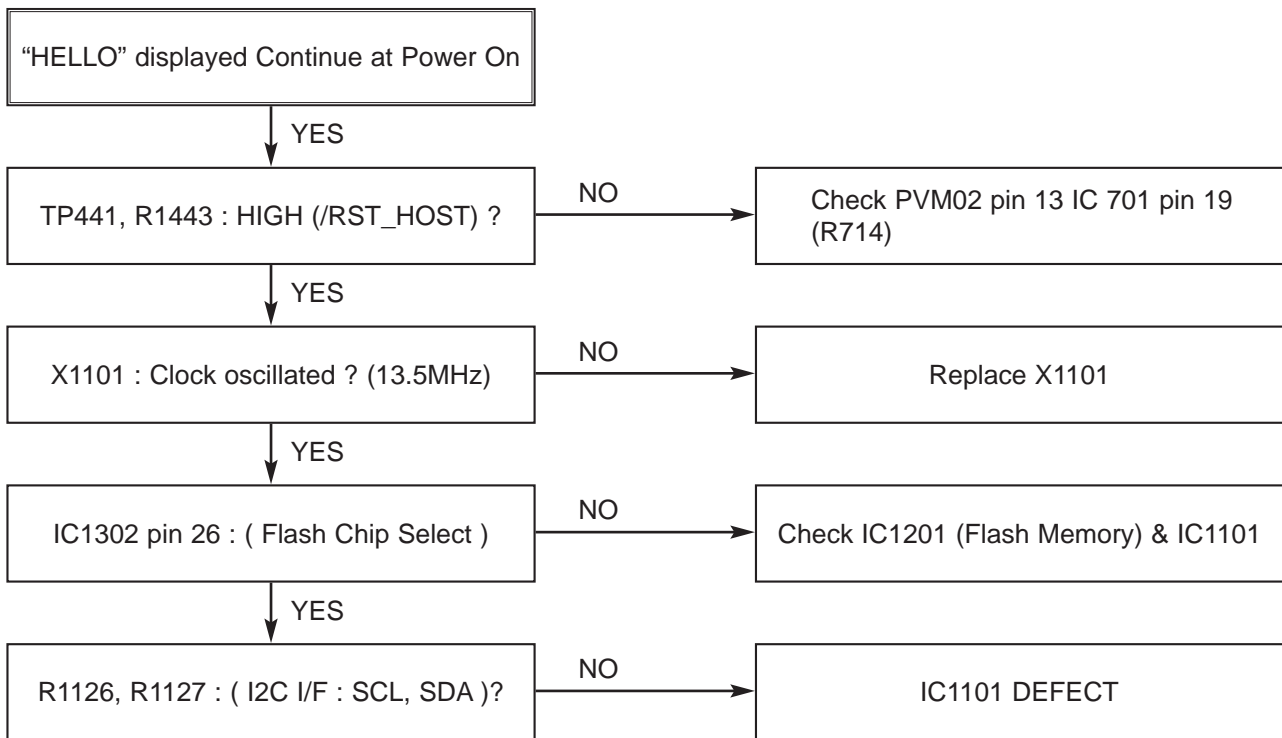




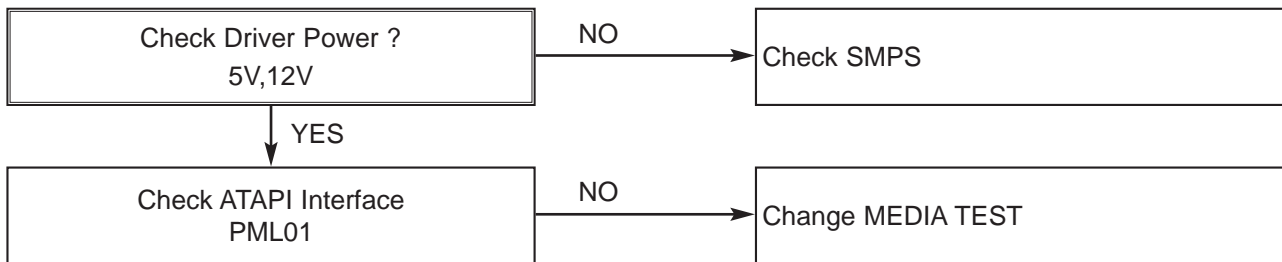




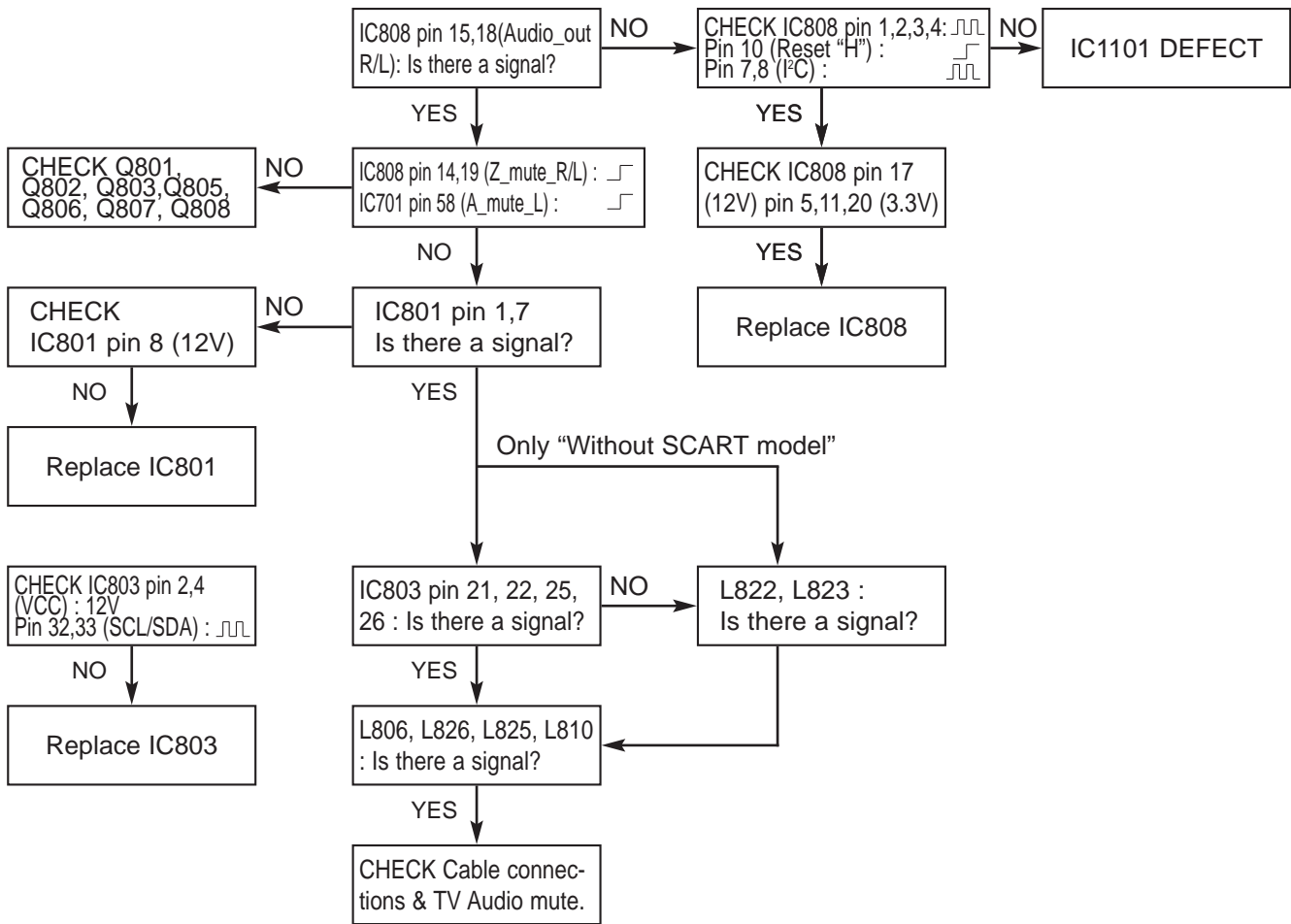
### 3. SYSTEM CIRCUIT PART



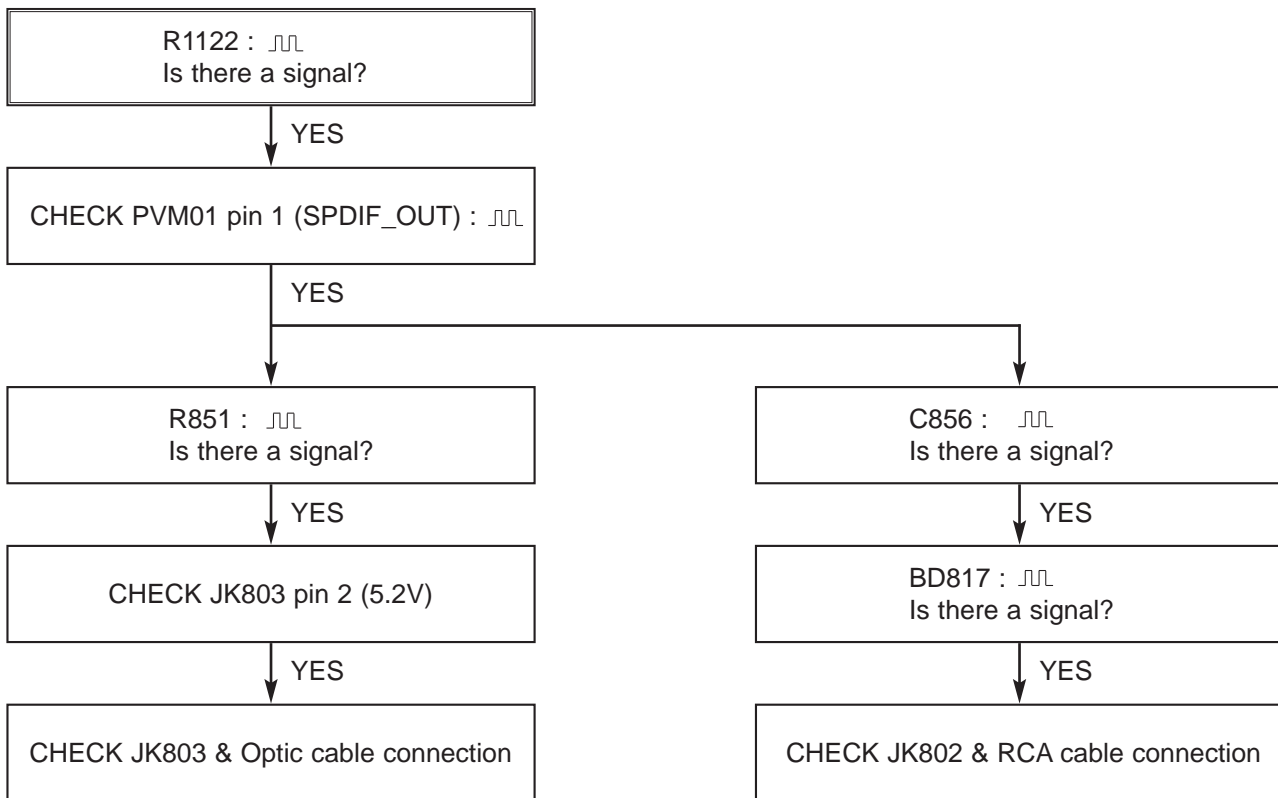
### 4. DISC NOT RECOGNIZED



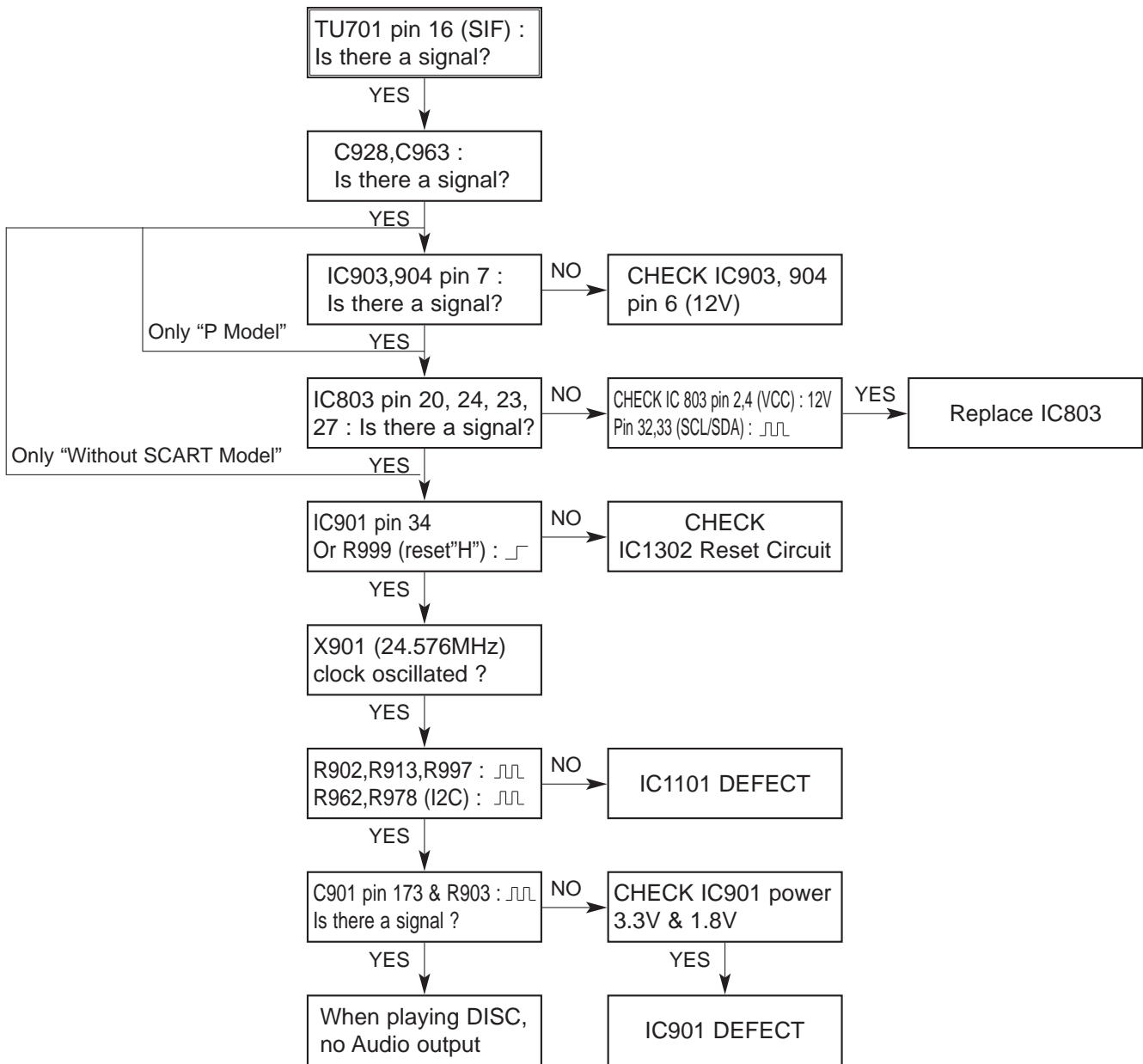
## 5. WHEN PLAYING DISC, NO AUDIO OUTPUT



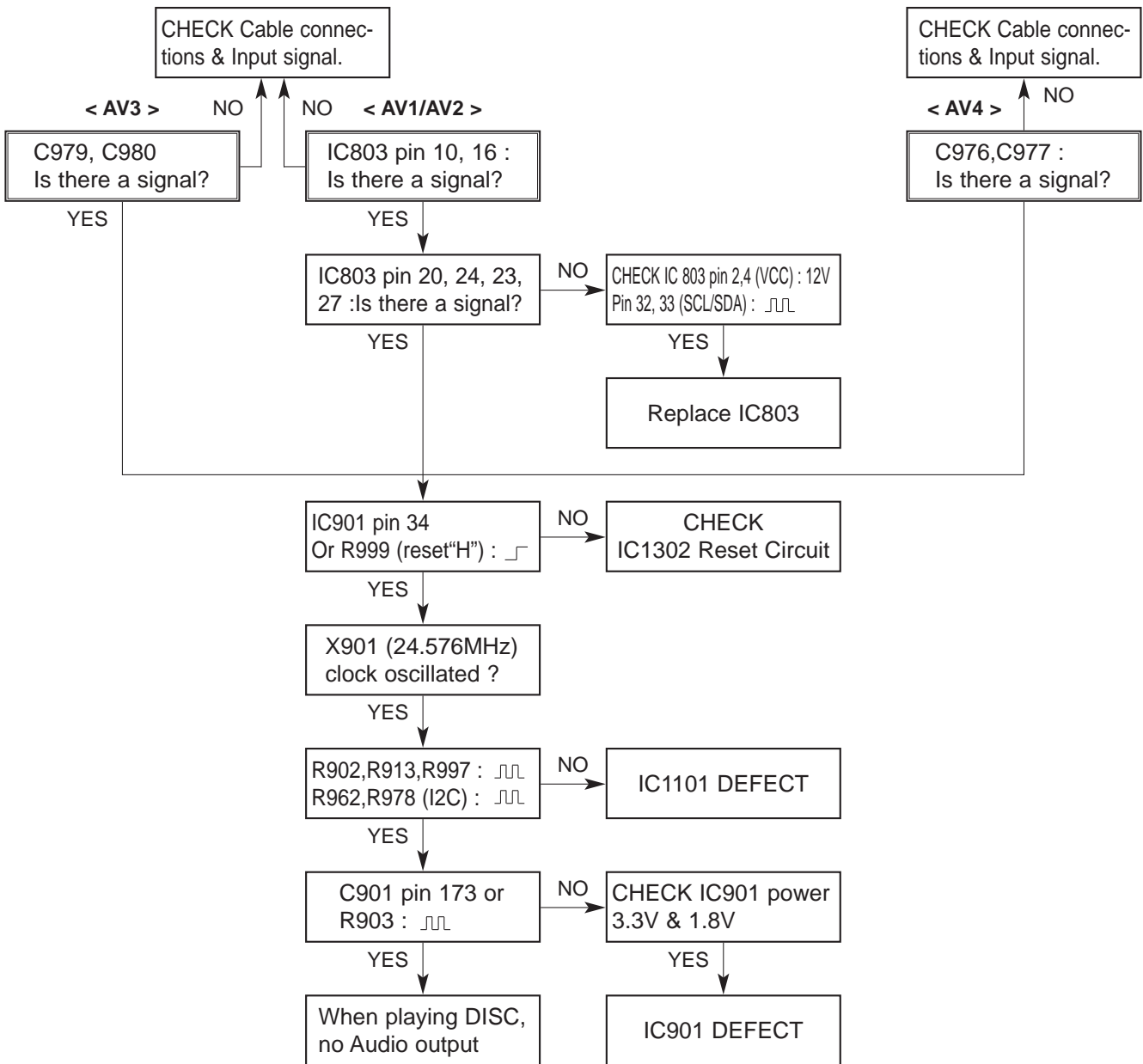
## 6. NO OPTICAL / DIGITAL OUTPUT



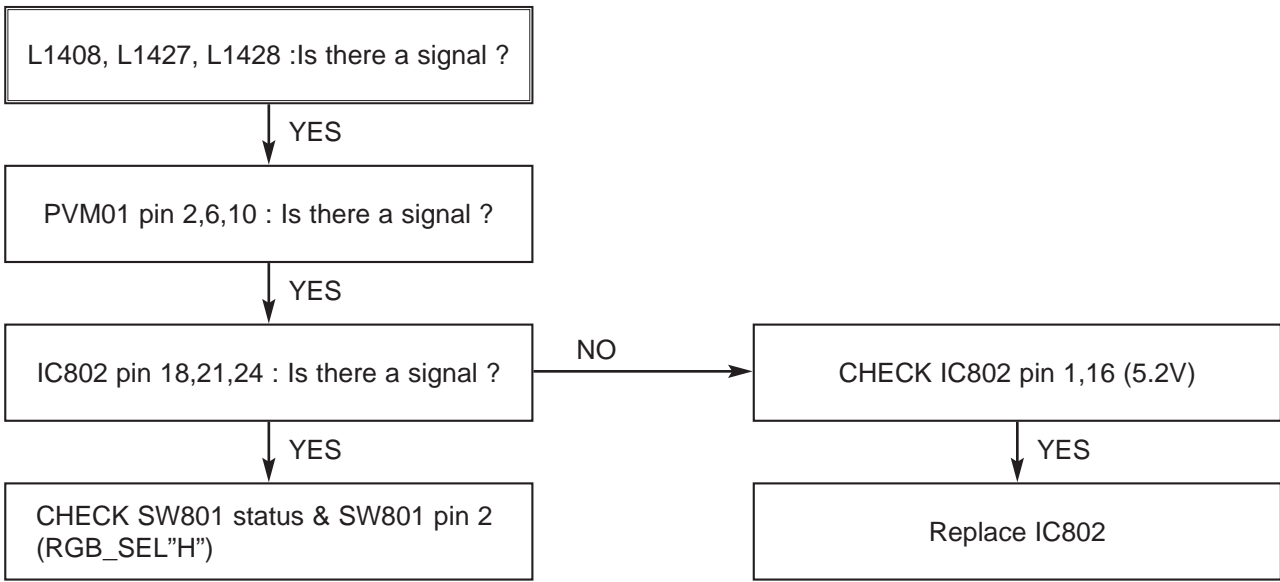
## 7. NO TUNER AUDIO OUTPUT



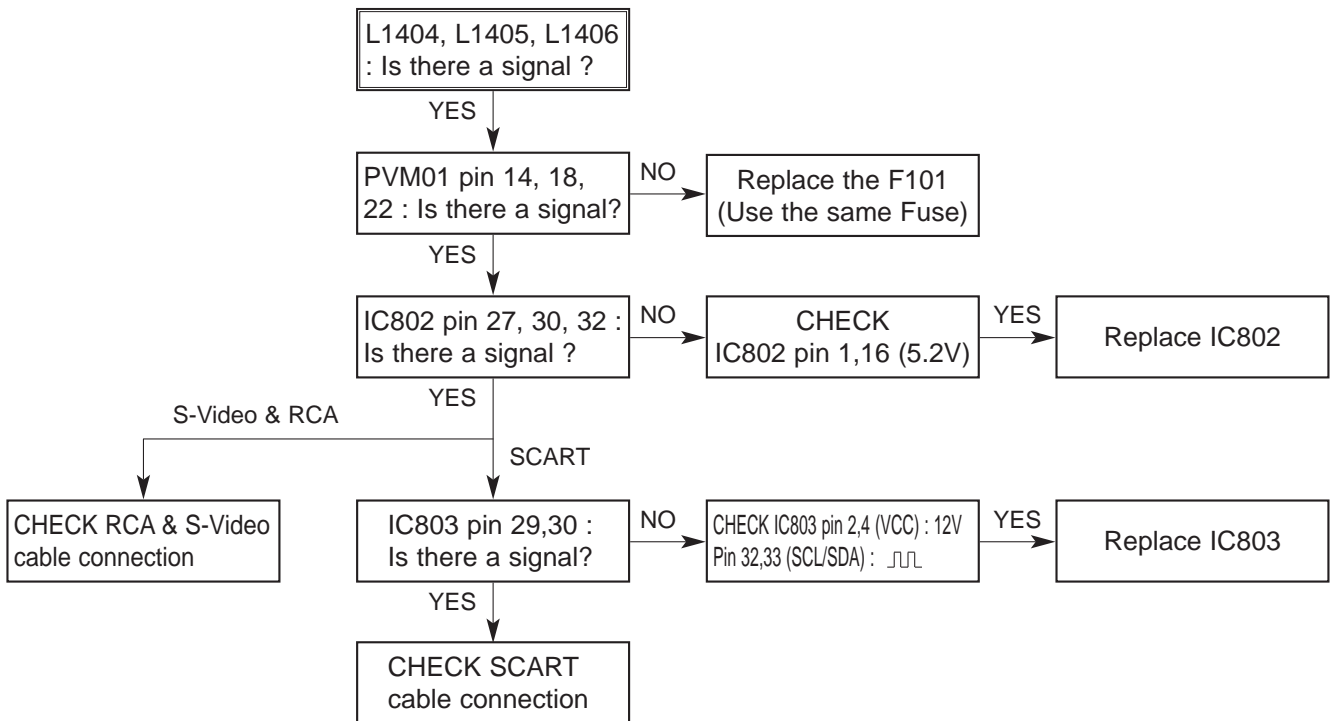
## 8. NO EXTERNAL AUDIO INPUT



### 9. NO RGB / COMPONENT VIDEO SIGNAL WHEN PLAY DISC

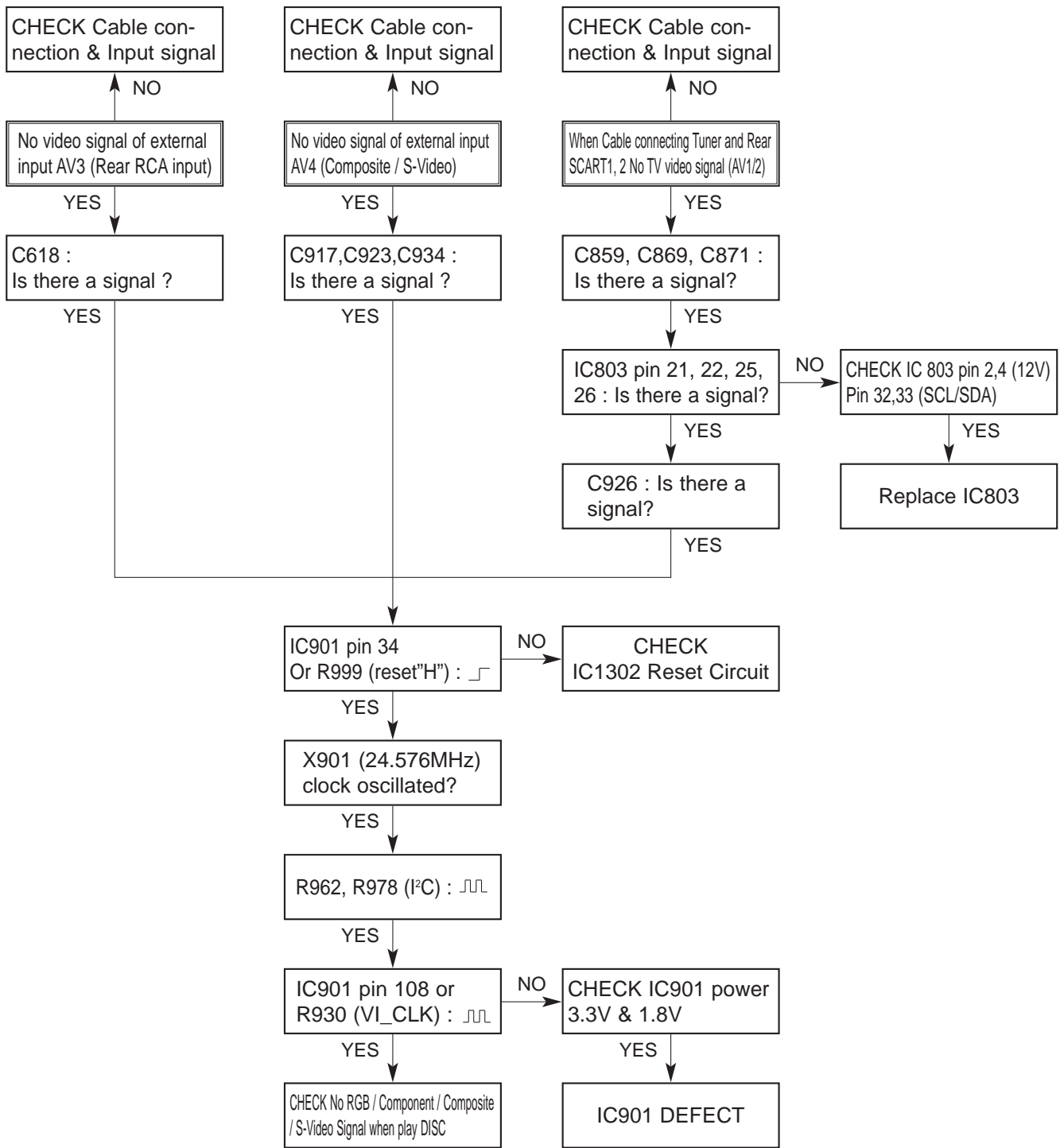


## 10. NO COMPOSITE / S-VIDEO SIGNAL WHEN PLAY DISC

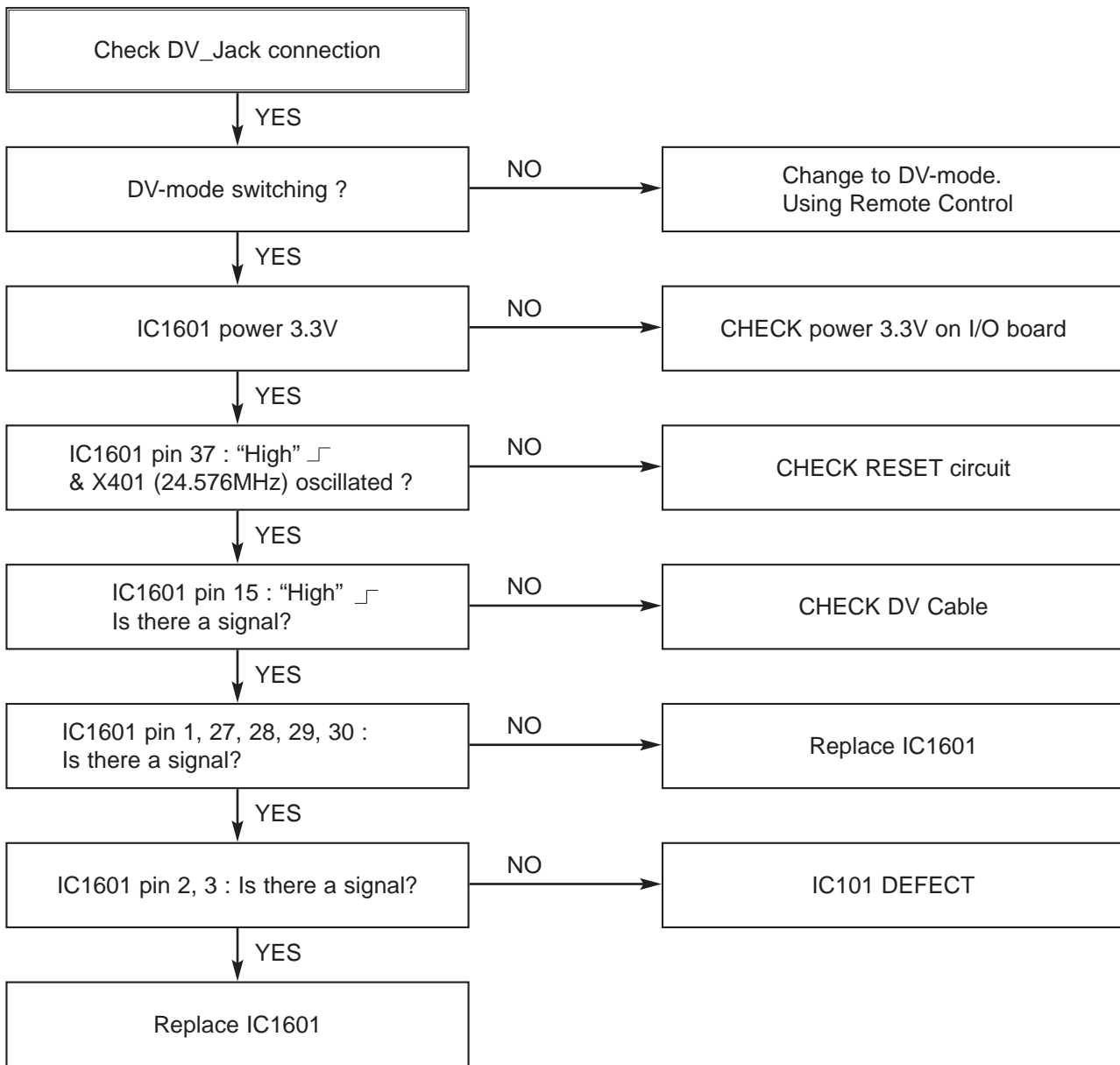




# 11. NO TV, EXTERNAL INPUT VIDEO SIGNAL

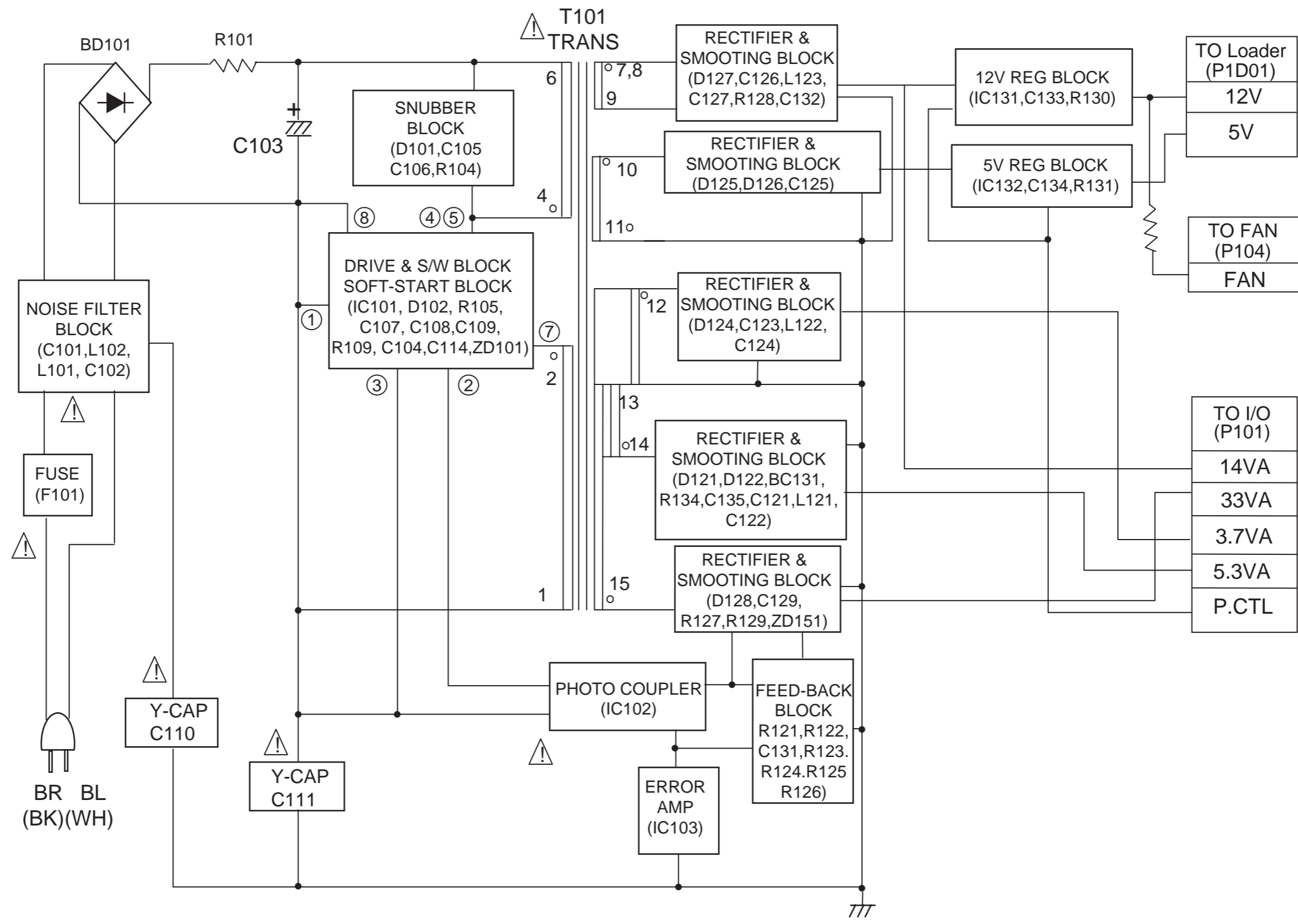


## 12. NO DV(IEEE 1394) INPUT (VIDEO/AUDIO) SIGNAL

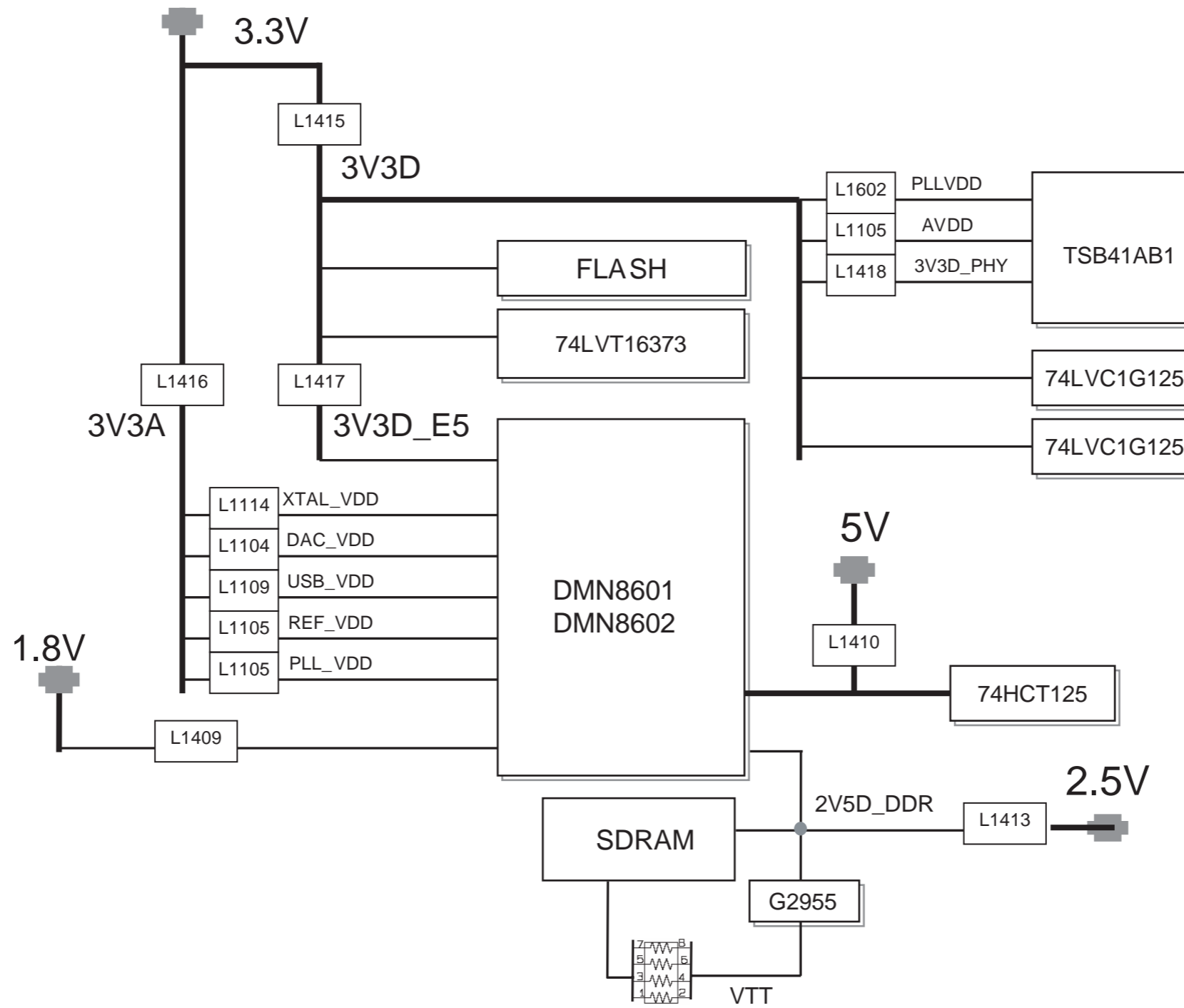


# BLOCK DIAGRAMS

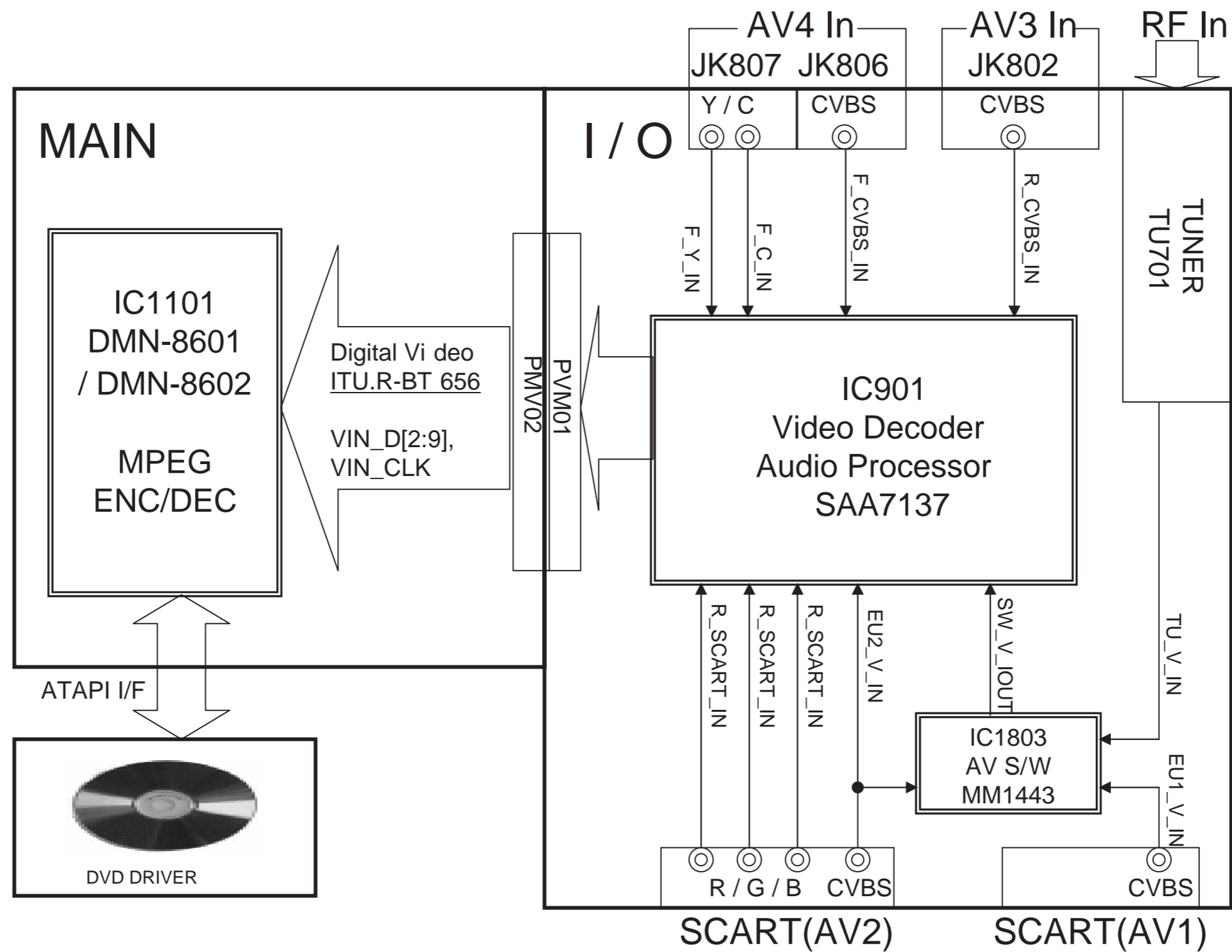
## 1. SMPS BLOCK DIAGRAM



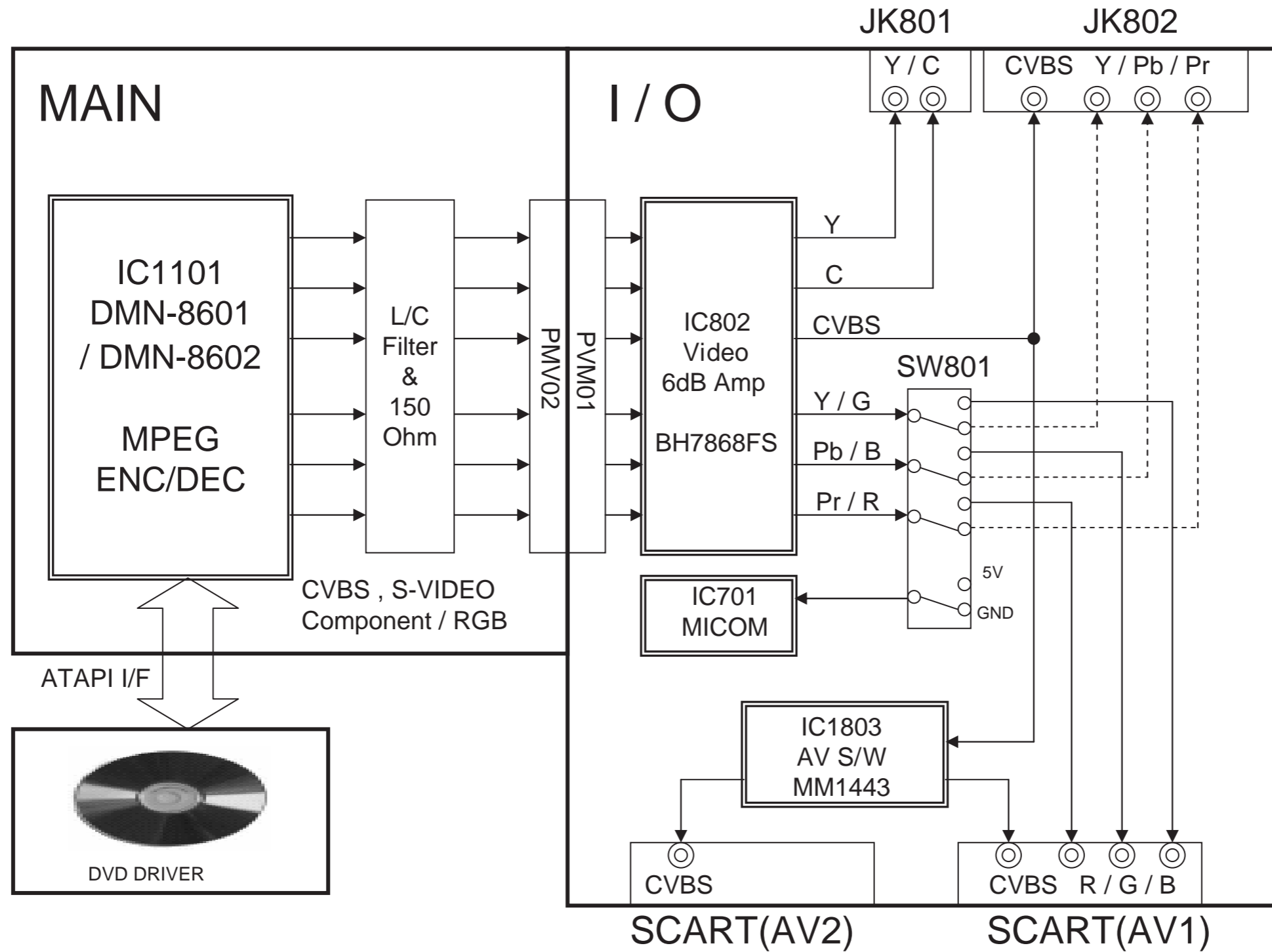
## 2. MAIN POWER BLOCK DIAGRAM



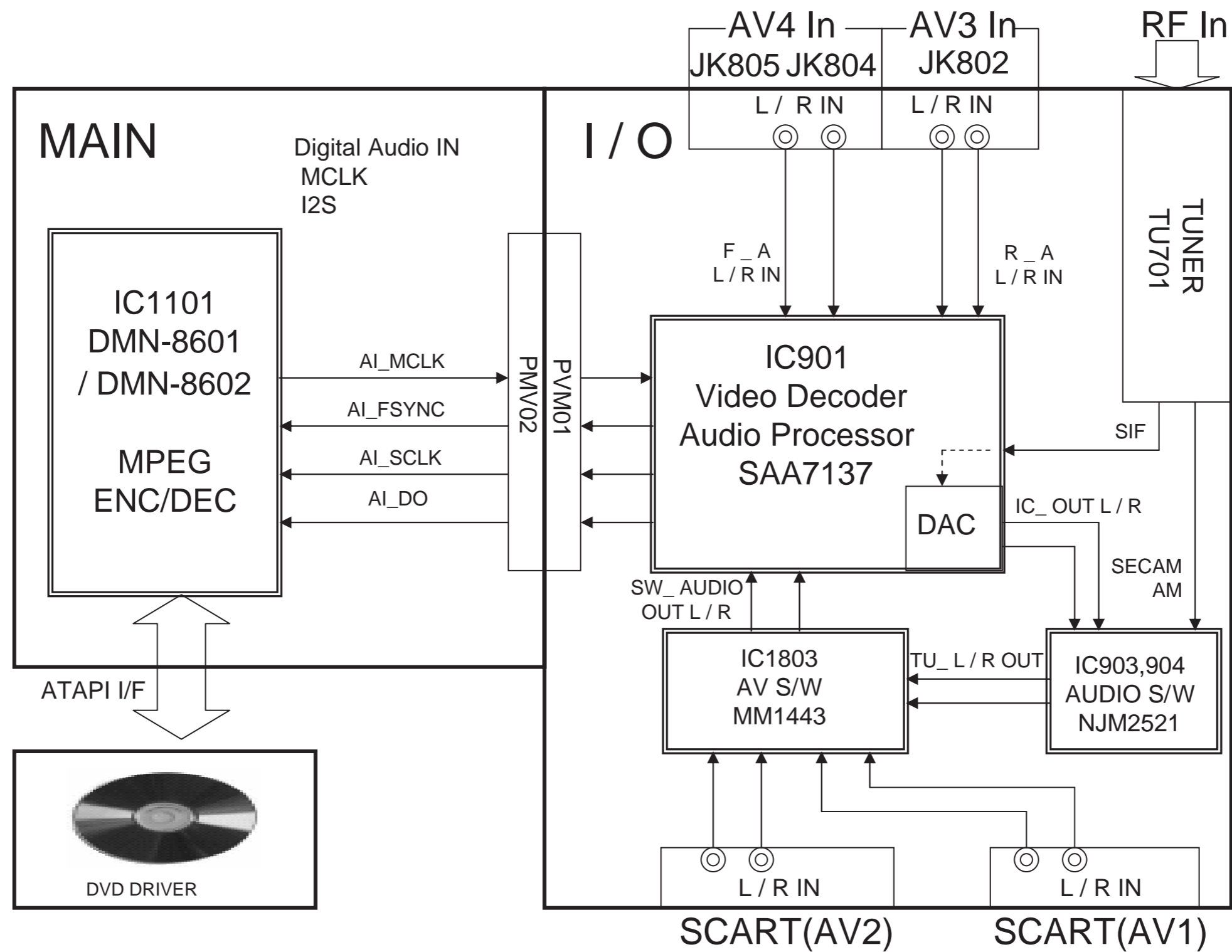
### 3. VIDEO IN BLOCK DIAGRAM



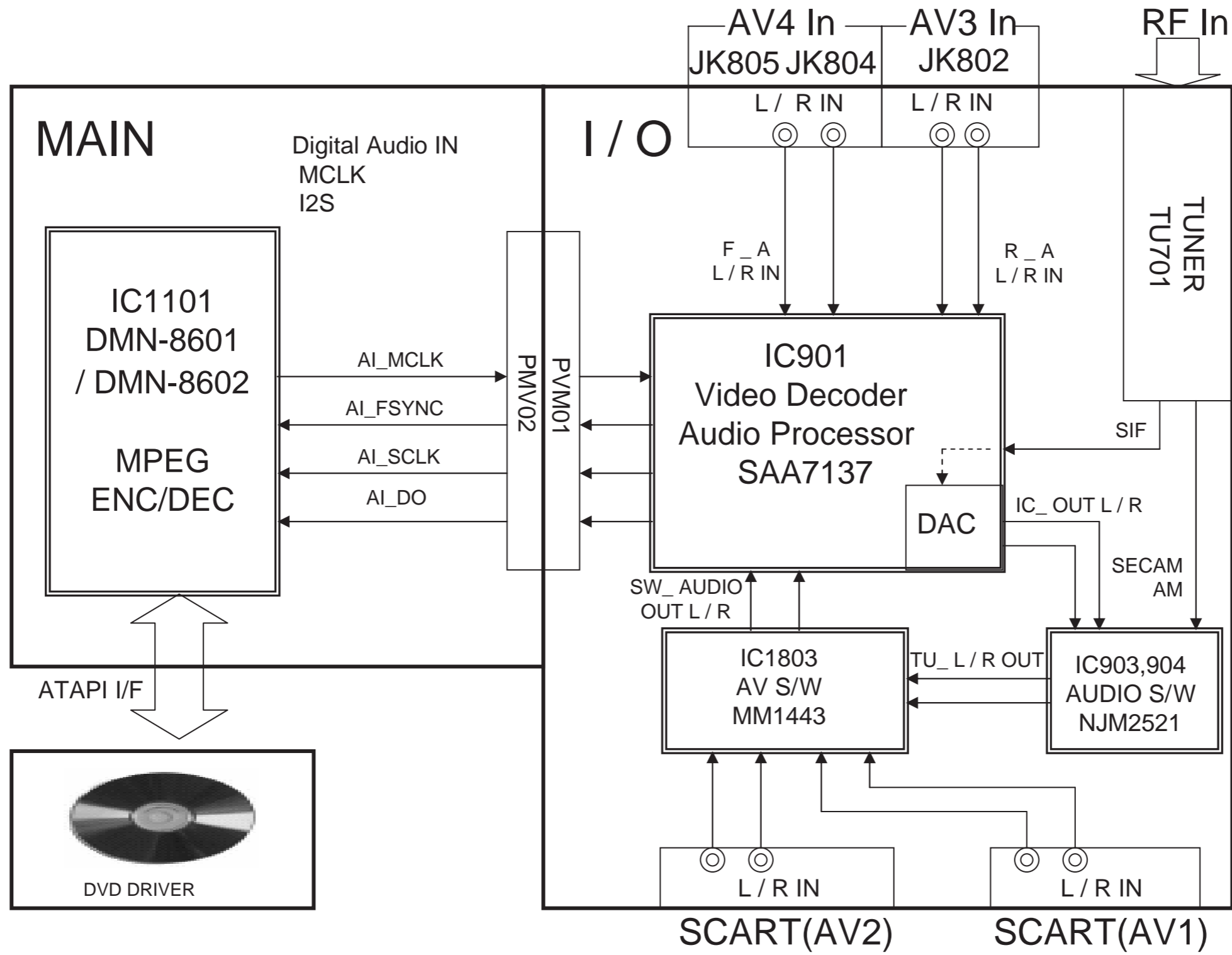
#### 4. VIDEO OUT BLOCK DIAGRAM



## 5. AUDIO IN BLOCK DIAGRAM

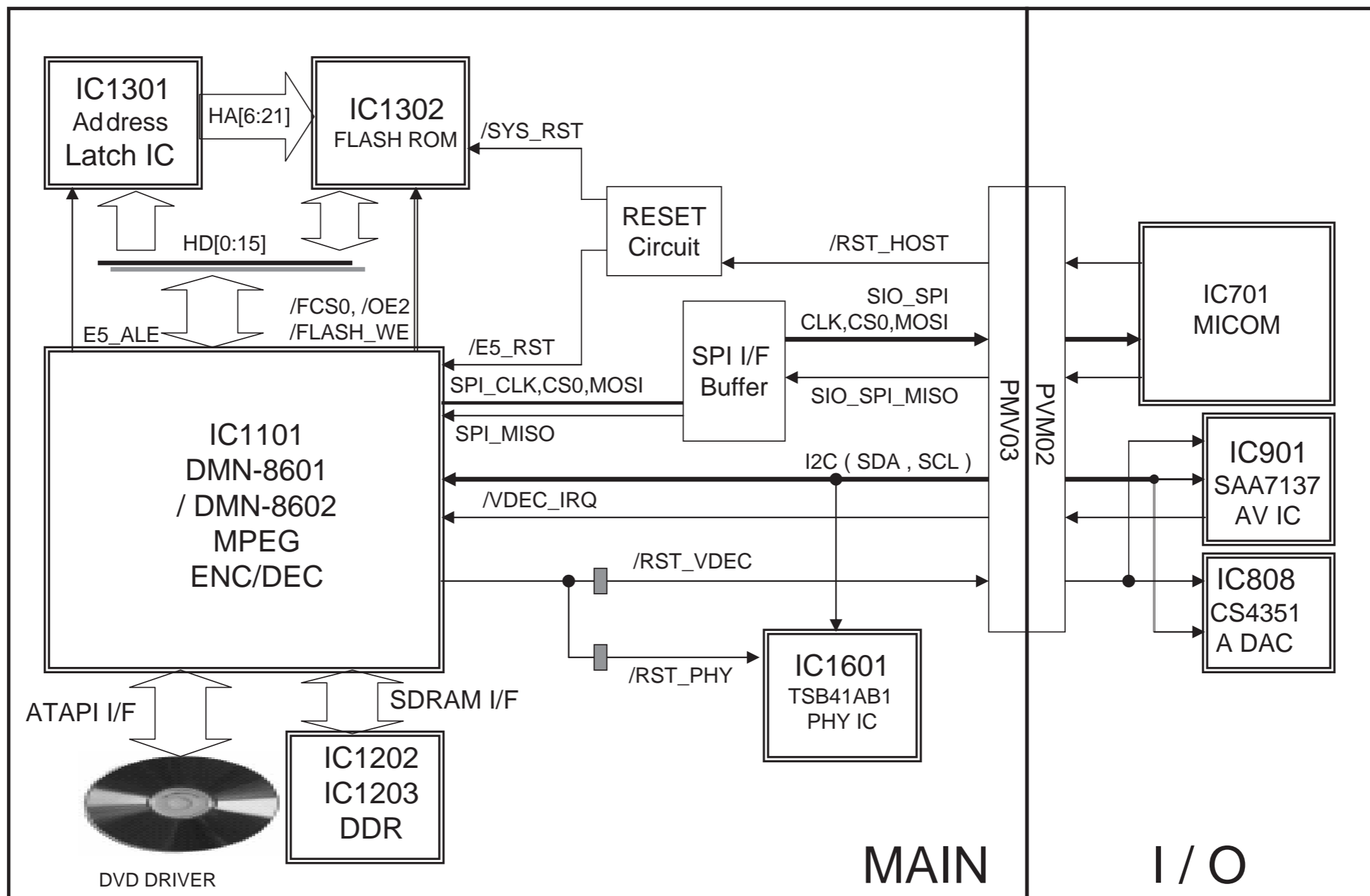


## 6. AUDIO OUT BLOCK DIAGRAM

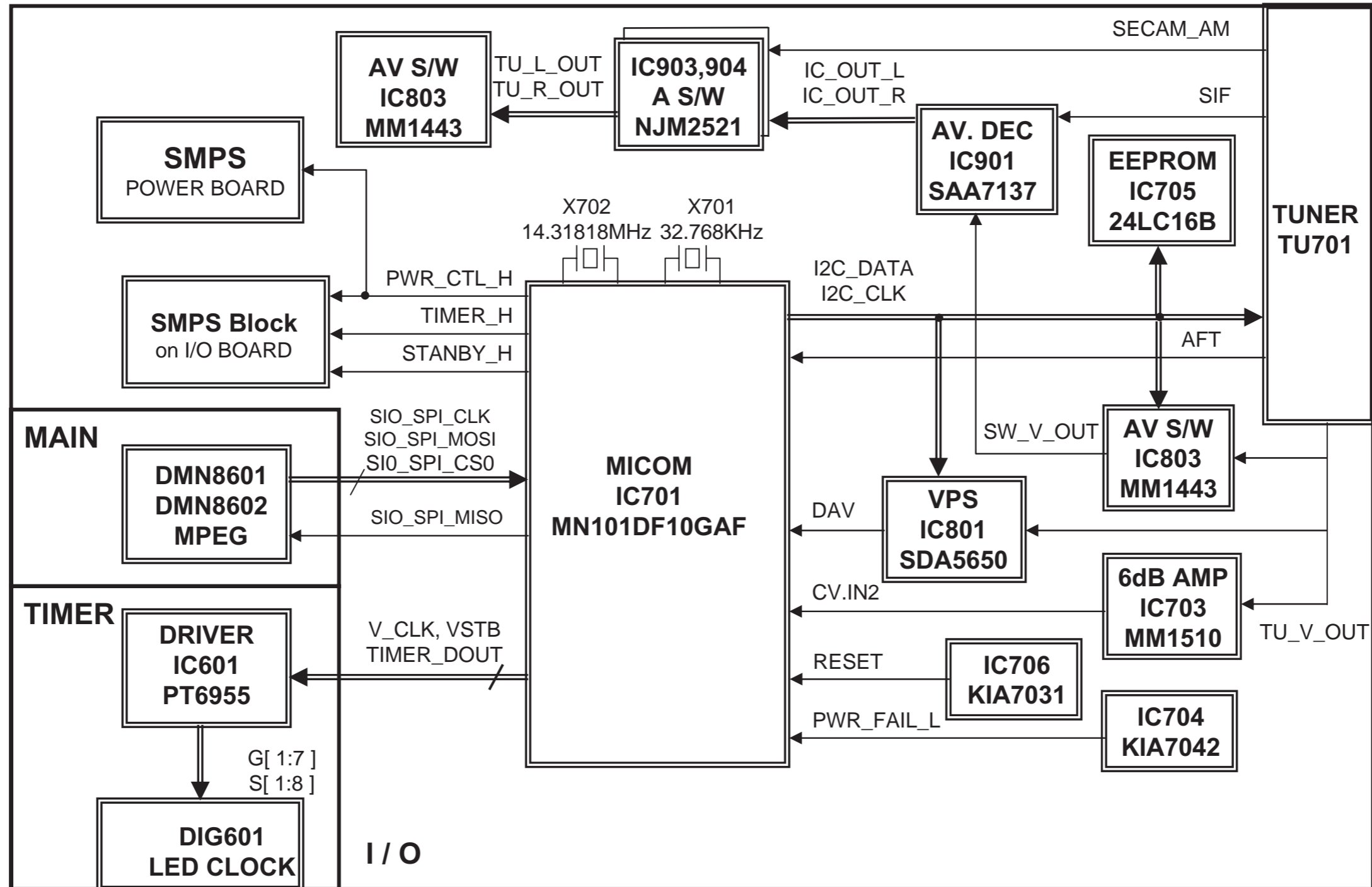




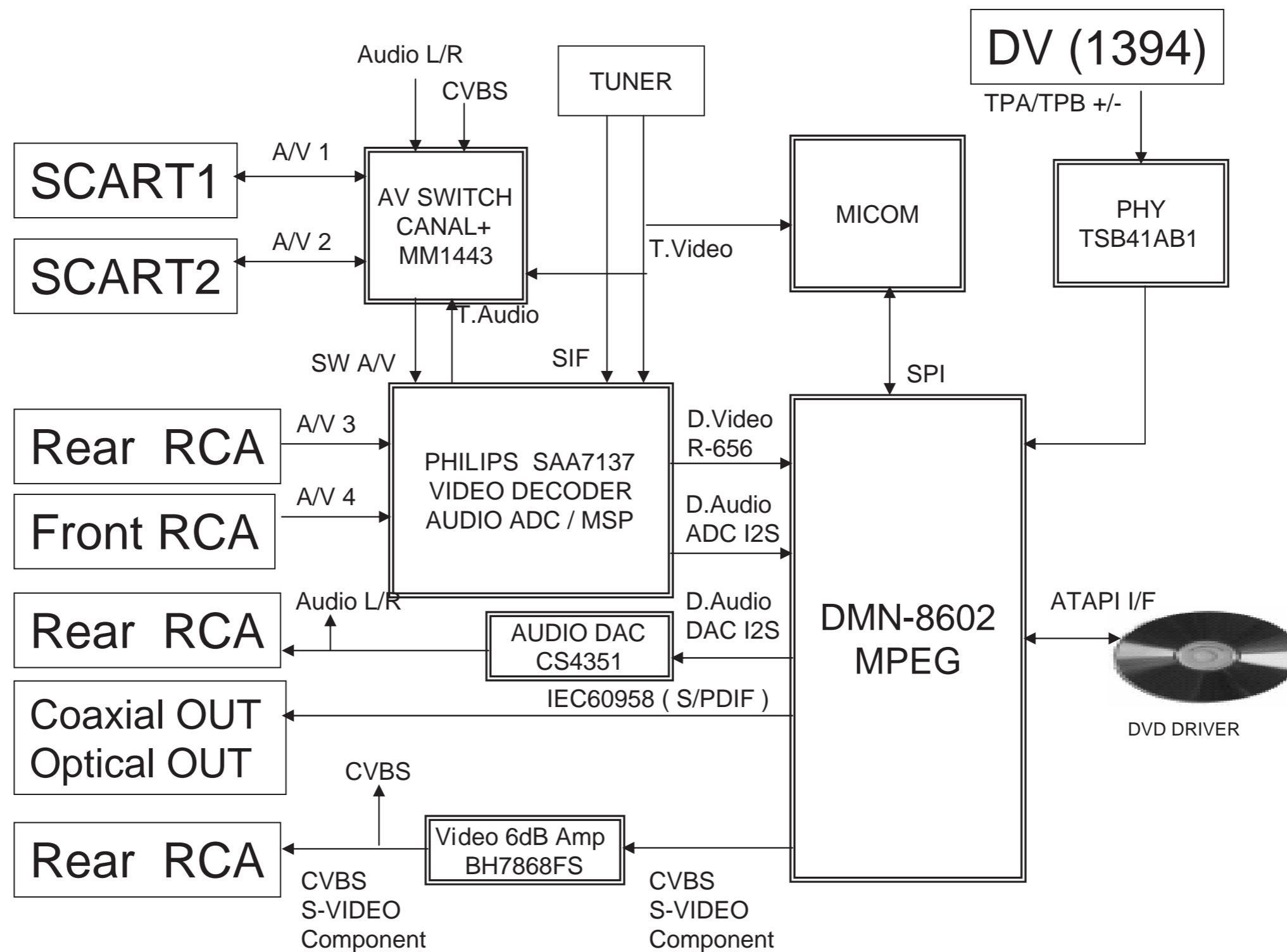
## 7. SYSTEM MAIN BLOCK DIAGRAM



## 8. I/O $\mu$ -COM BLOCK DIAGRAM



9. SCART BLOCK DIAGRAM(SCART MODEL ONLY)



# CIRCUIT DIAGRAMS

## 1. POWER CIRCUIT DIAGRAM

### IMPORTANT SAFETY NOTICE

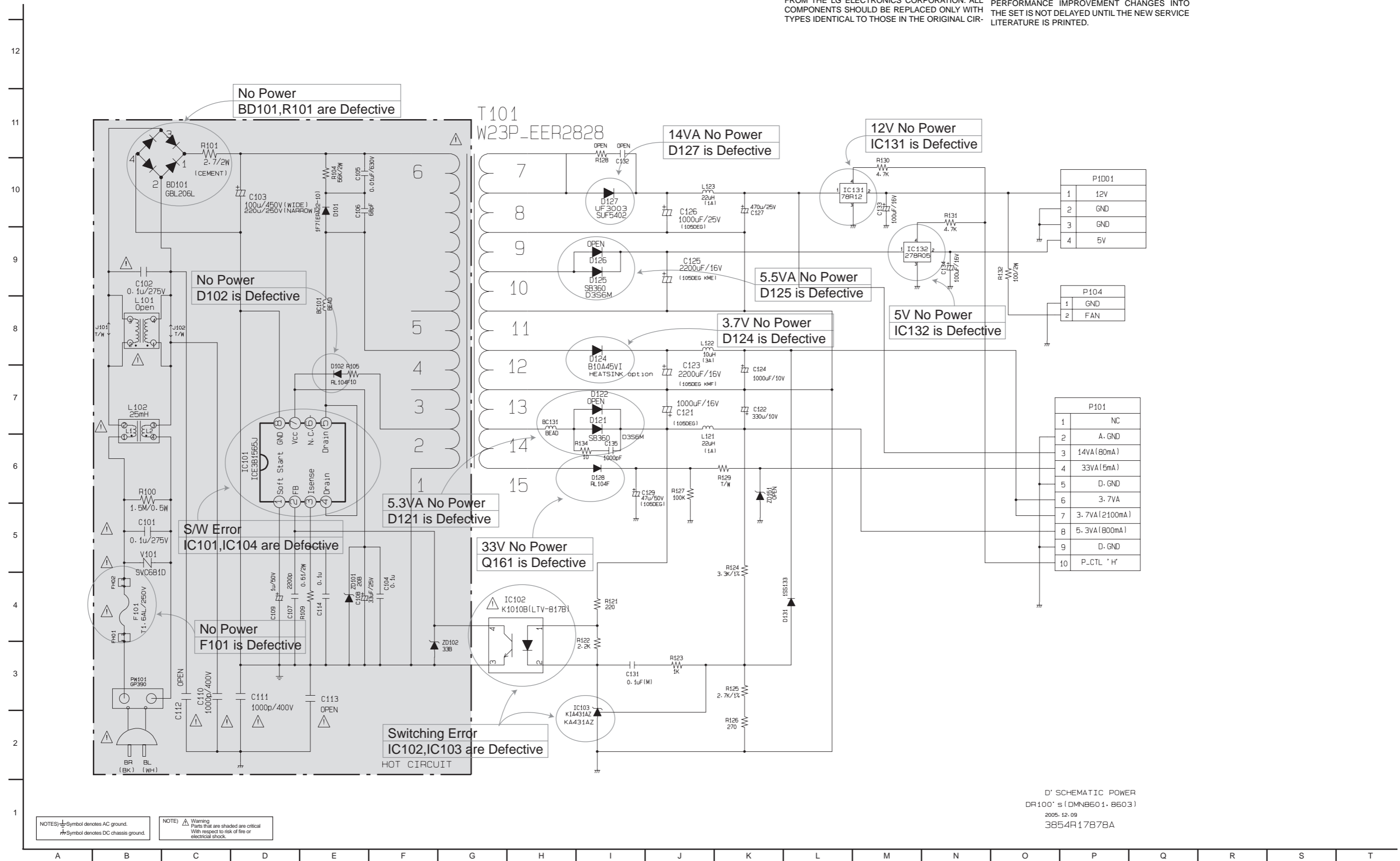
WHEN SERVICING THIS CHASSIS, UNDER NO CIRCUMSTANCES SHOULD THE ORIGINAL DESIGN BE MODIFIED OR ALTERED WITHOUT PERMISSION FROM THE LG ELECTRONICS CORPORATION. ALL COMPONENTS SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL CIR-

CUIT. 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 :

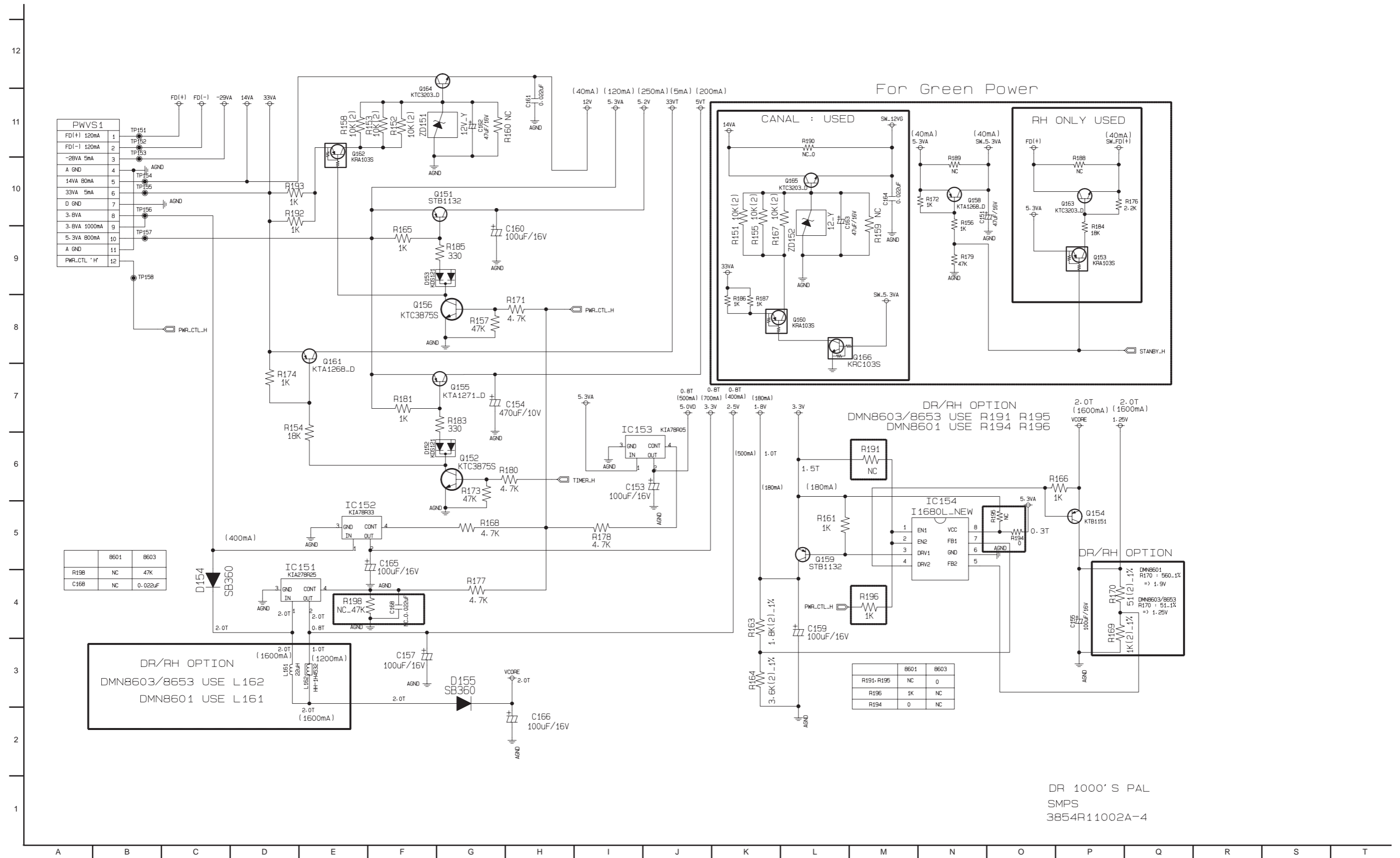
1. Shaded(■) parts are critical for safety. Replace only with specified part number.
2. Voltages are DC-measured with a digital voltmeter during Play mode.



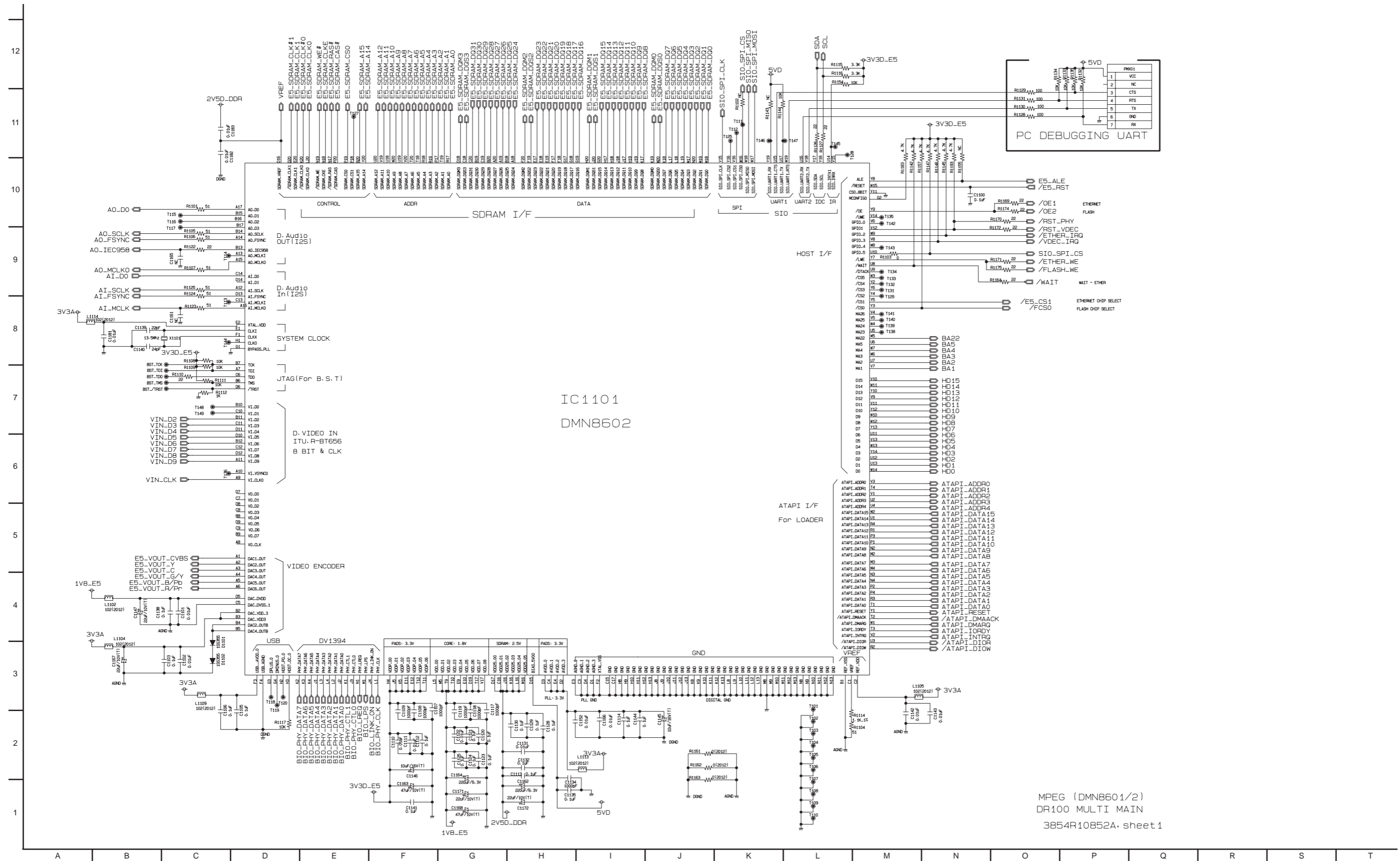
NOTES)  $\perp$  Symbol denotes AC ground.  
 $\perp$  Symbol denotes DC chassis ground.

NOTE)  $\triangle$  Warning Parts that are shaded are critical With respect to risk of fire or electrical shock.

## 2. MAIN POWER CIRCUIT DIAGRAM

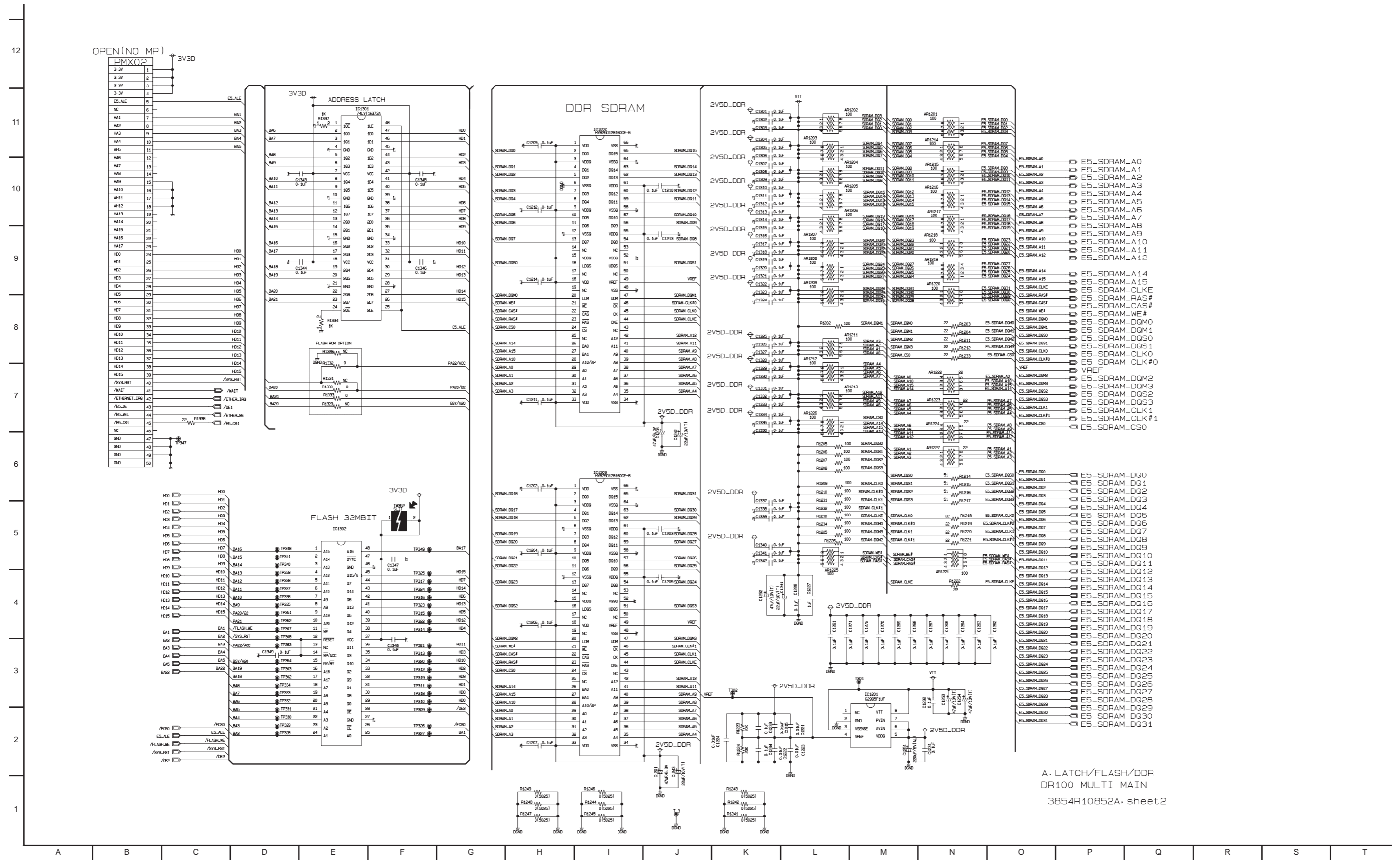


### 3. MPEG CIRCUIT DIAGRAM



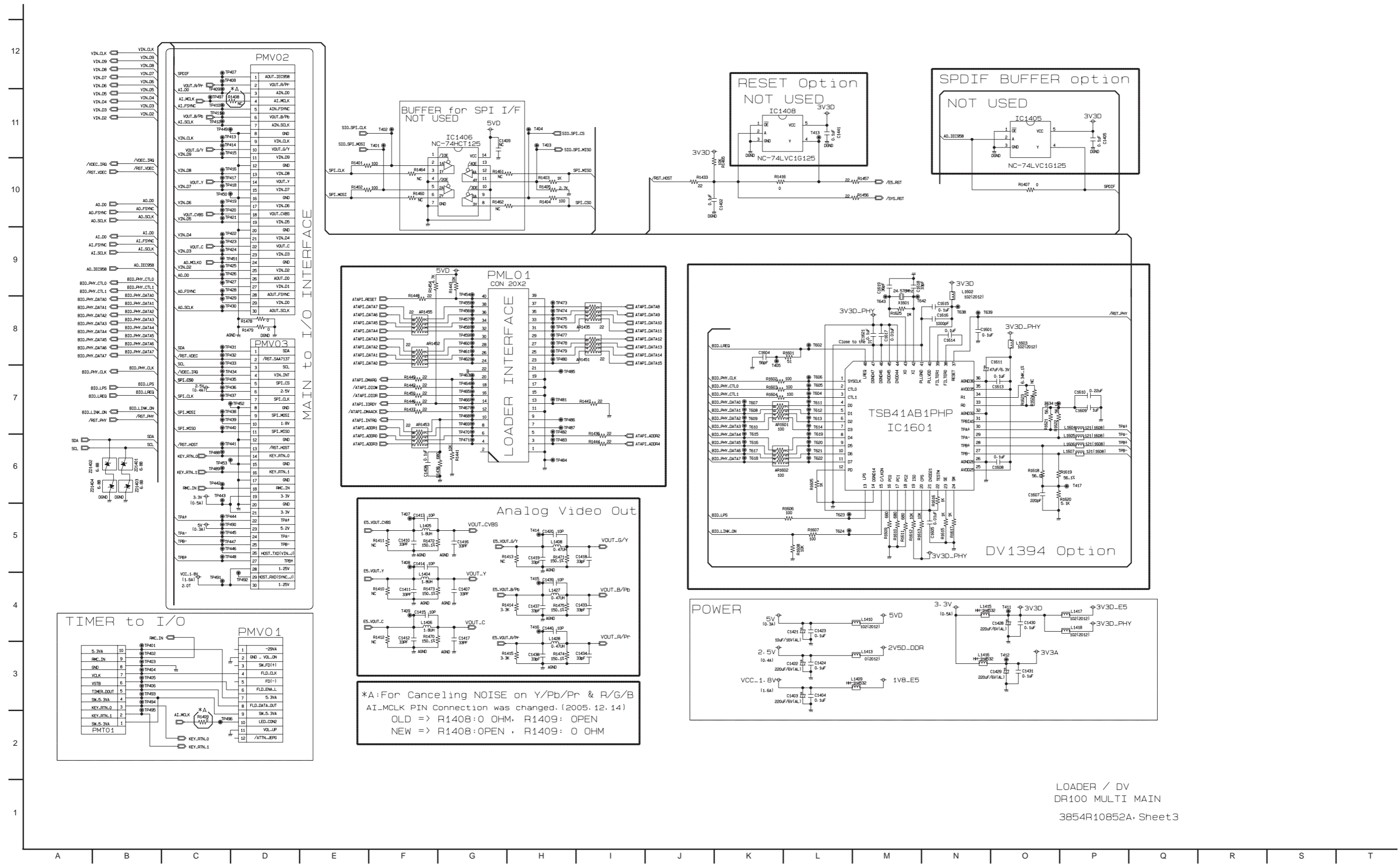
MPEG (DMN8601/2)  
DR100 MULTI MAIN  
3854R10852A. sheet 1

# 4. A.LATCH/FLASH/DDR CIRCUIT DIAGRAM



A. LATCH/FLASH/DDR  
 DR100 MULTI MAIN  
 3854R10852A, sheet 2

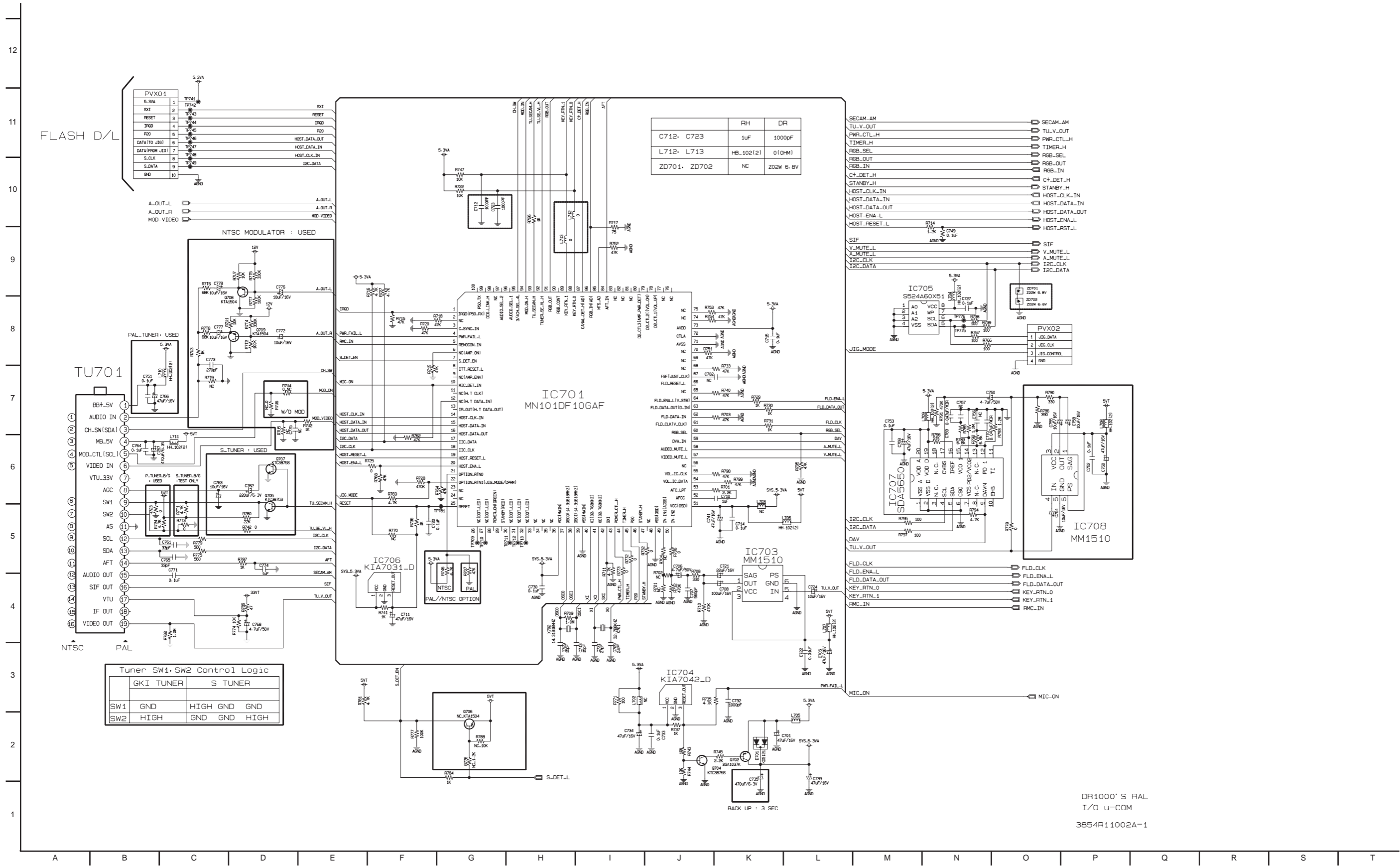
# 5. LOADER/DV CIRCUIT DIAGRAM



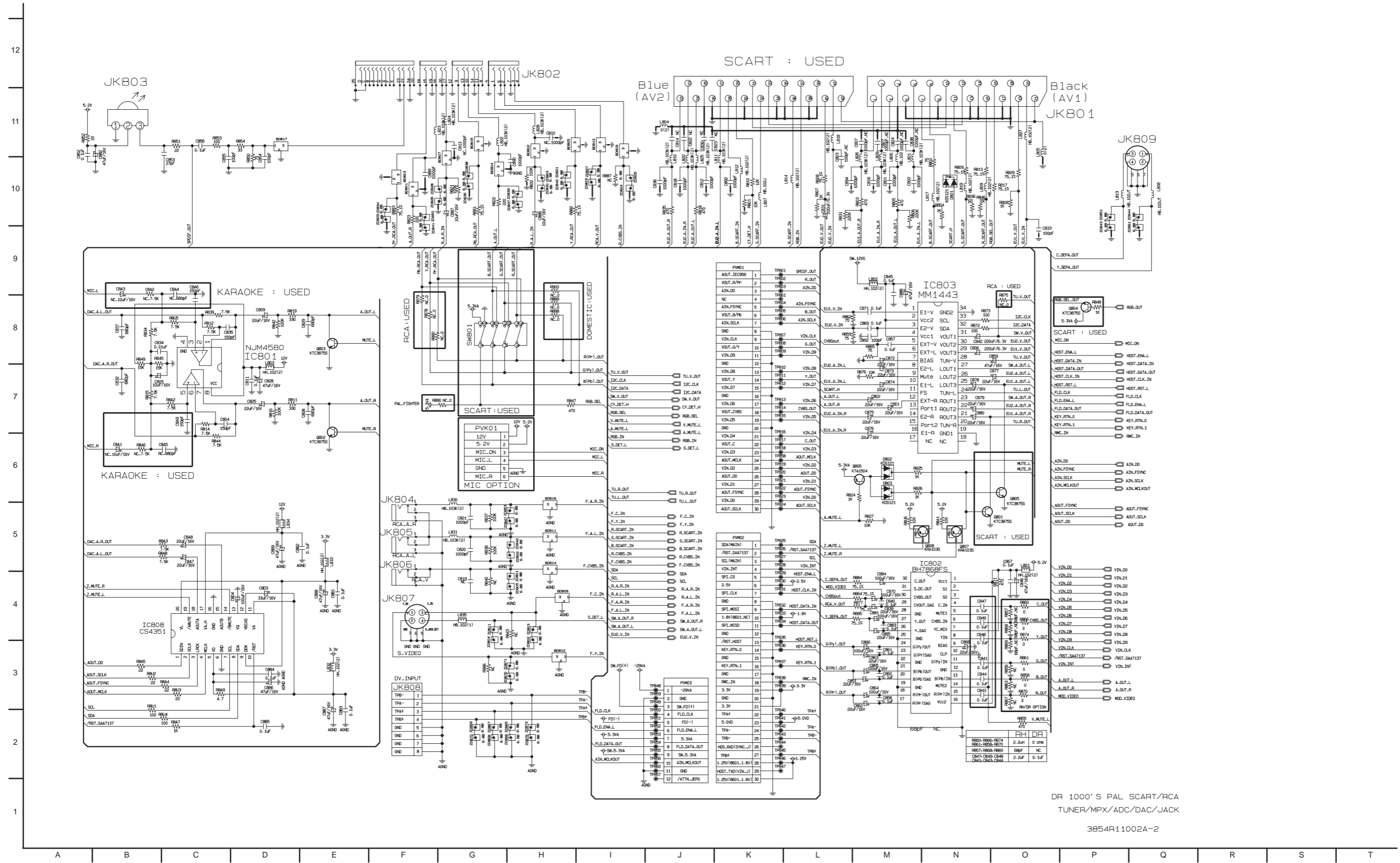
LOADER / DV  
DR100 MULTI MAIN  
3854R10852A·Sheet3



# 6. I/O μ-COM CIRCUIT DIAGRAM



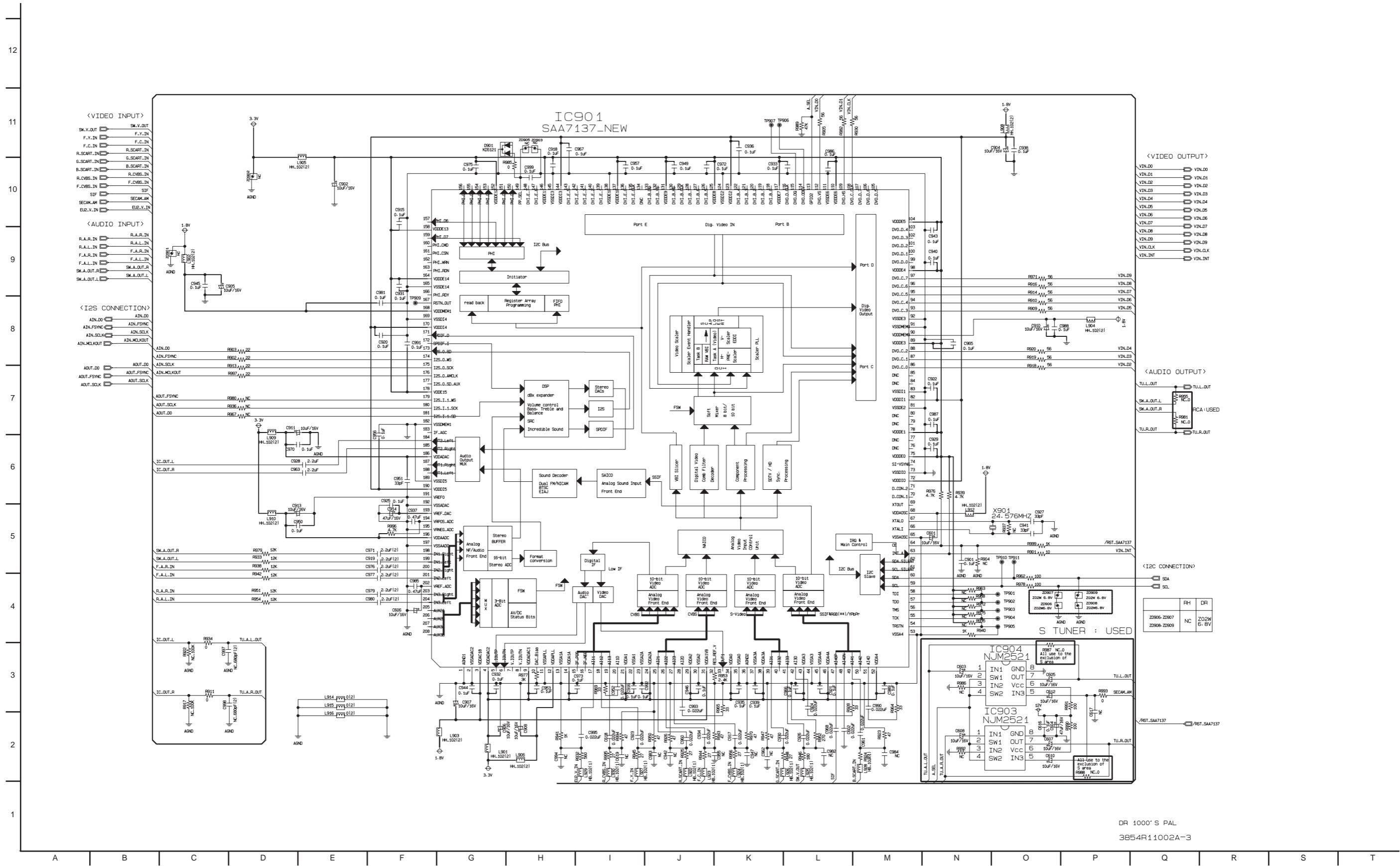
# 7. TUNER/MPX/ADC/DAC/JACK CIRCUIT DIAGRAM



DR 1000' S PAL SCART/RCA  
TUNER/MPX/ADC/DAC/JACK

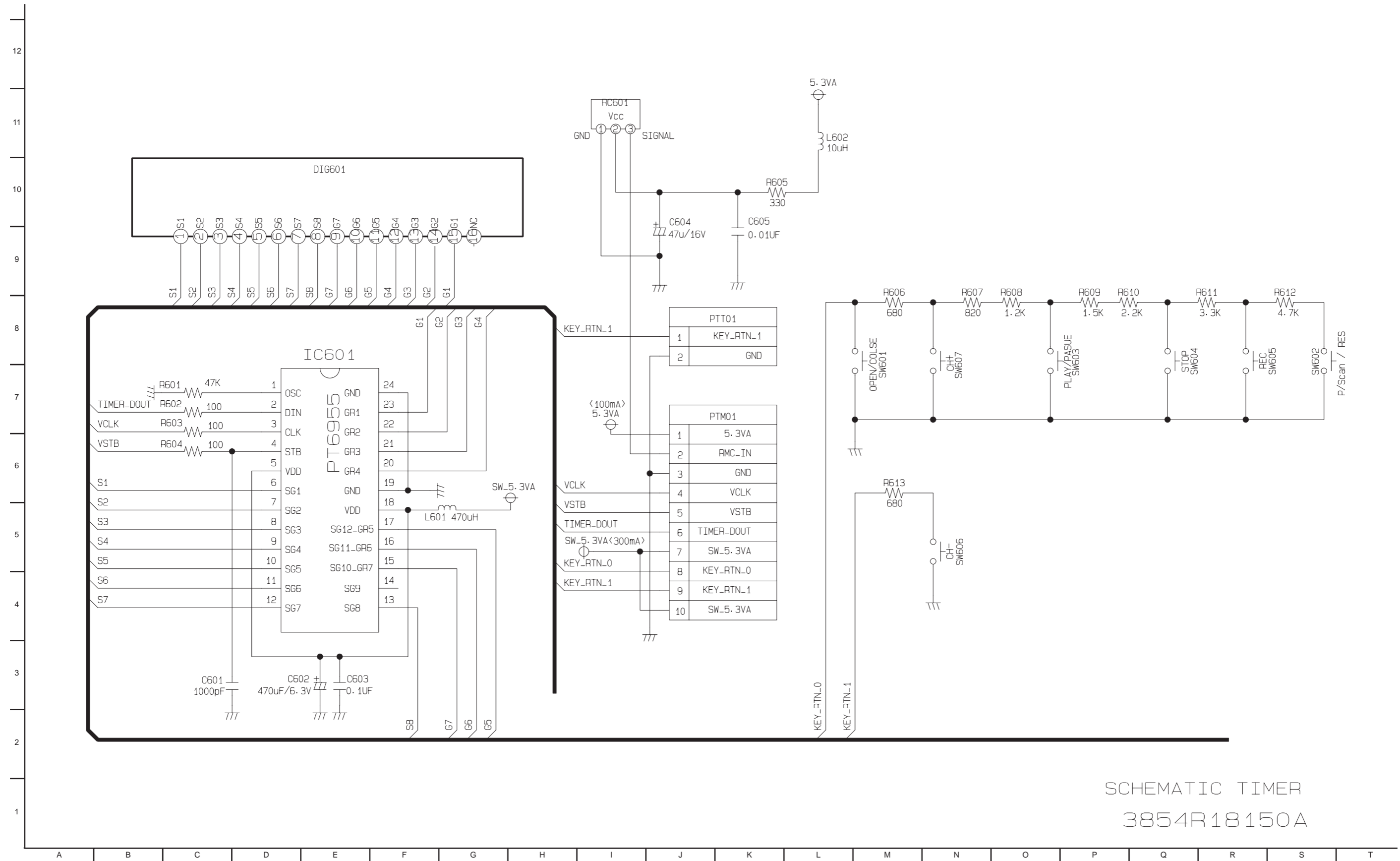
3854R11002A-2

# 8. DECODER CIRCUIT DIAGRAM



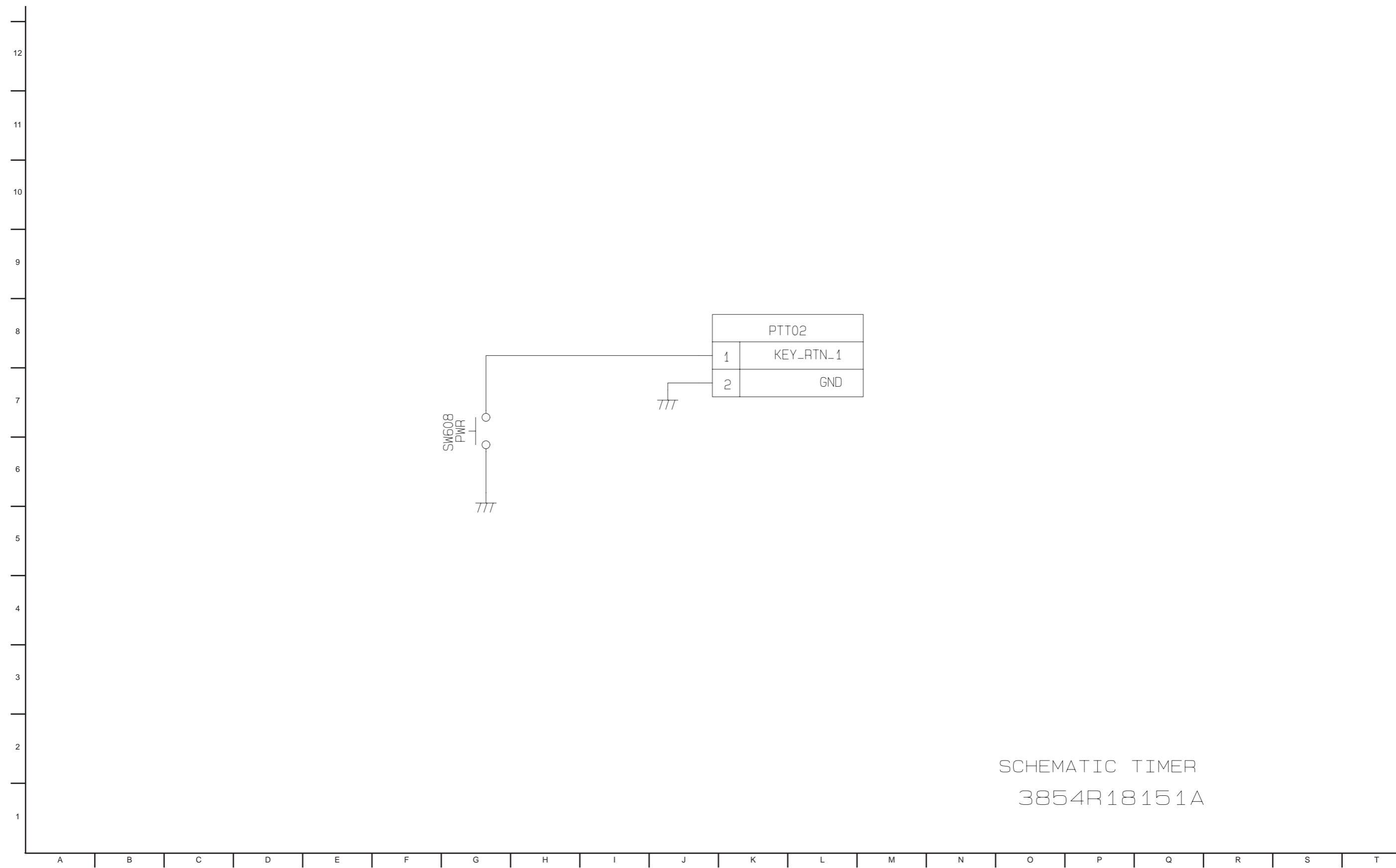
DR 1000'S PAL  
3B54R11002A-3

# 9. TIMER CIRCUIT DIAGRAM ( 6, 7 TOOL ONLY )



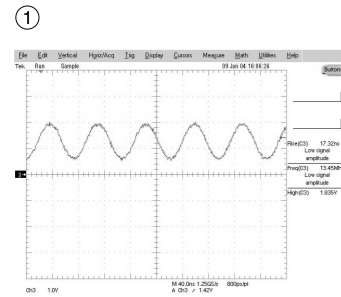
SCHMATIC TIMER  
3854R18150A

10. KEY CIRCUIT DIAGRAM ( 6, 7 TOOL ONLY )

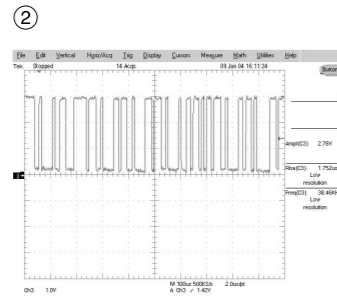


SCHEMATIC TIMER  
3854R18151A

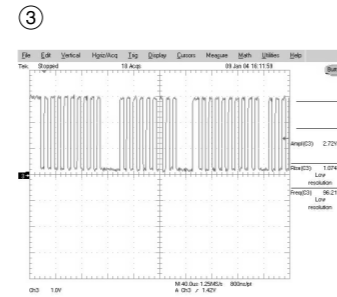
# • WAVEFORMS



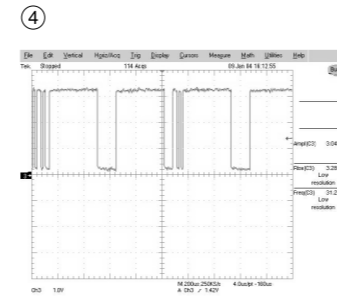
X1101  
13.5 MHz



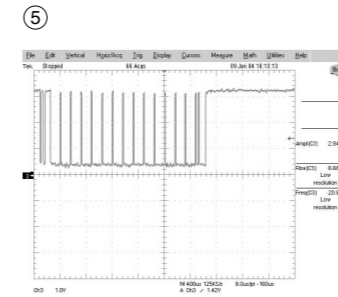
PMV03  
PIN1  
SDA



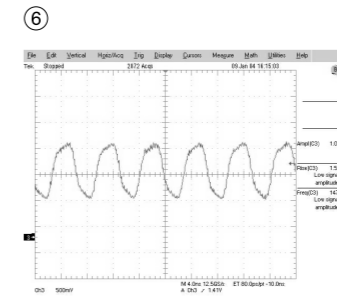
PMV03  
PIN3  
SCL



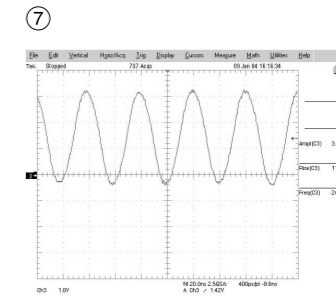
PMV03  
PIN29  
HOST\_RXD



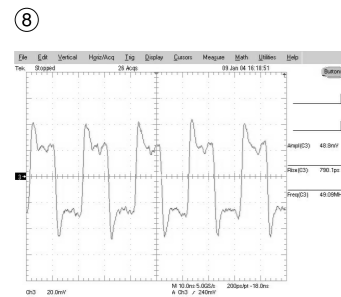
PMV03  
PIN26  
HOST\_TXD



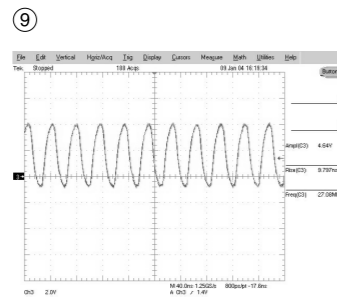
IC1202  
PIN45  
SDRAM\_CLK1



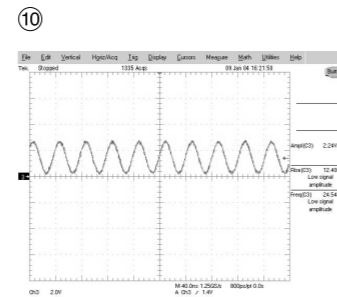
IC1601  
24.576MHz



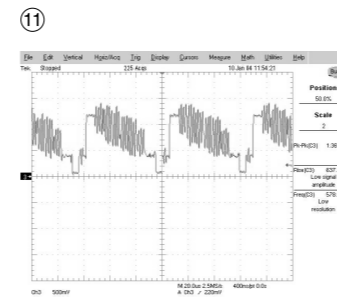
IC1601  
PIN1  
PHY\_CLK



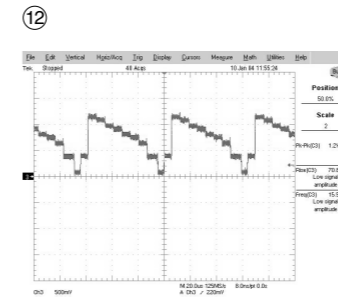
PMV02  
PIN9  
VIN\_CLK



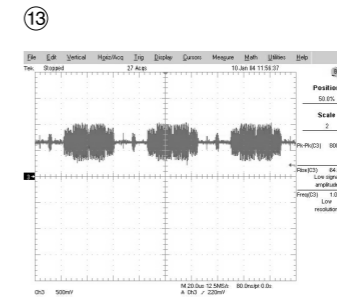
X901  
14.31818MHz



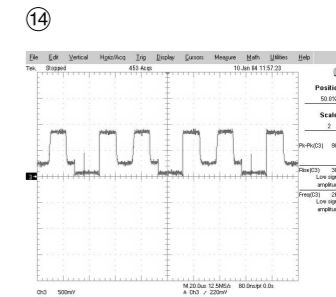
PMV02  
PIN18  
VOUT\_CVBS



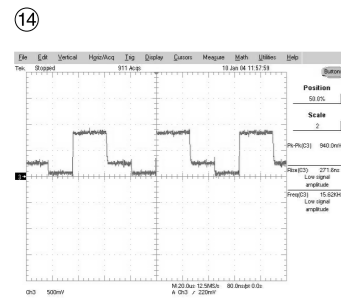
PMV02  
PIN10  
VOUT\_G/Y



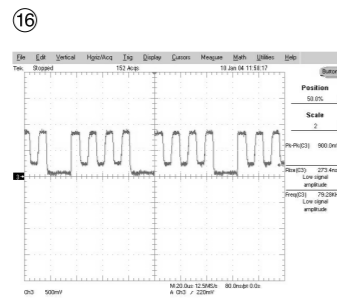
PMV02  
PIN22  
VOUT\_C



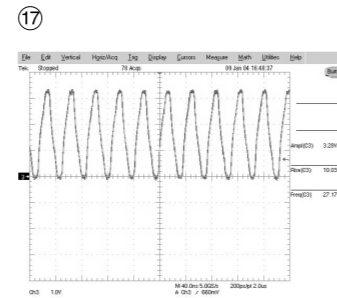
PMV02  
PIN2  
VOUT\_R/Pr



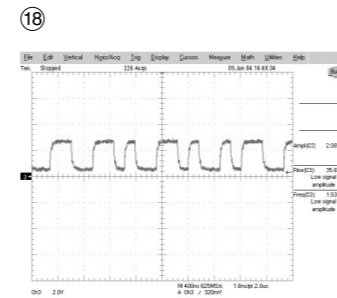
PMV02  
PIN10  
VOUT\_G/Y



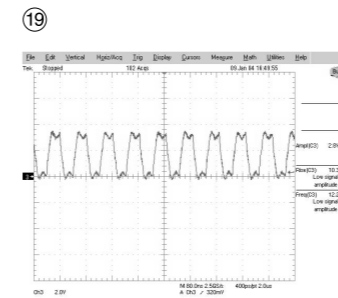
PMV02  
PIN06  
VOUT\_B/Pb



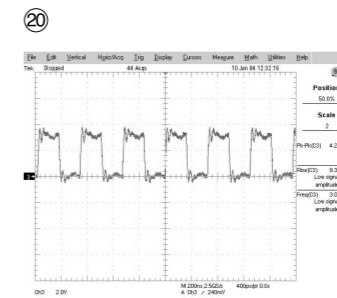
IC901  
PIN108  
27MHz



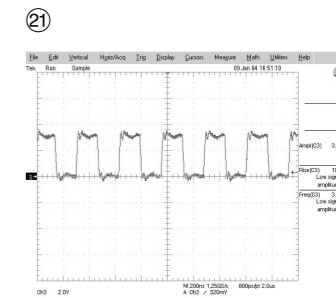
PMV02  
PIN01  
AOUT\_IEC958



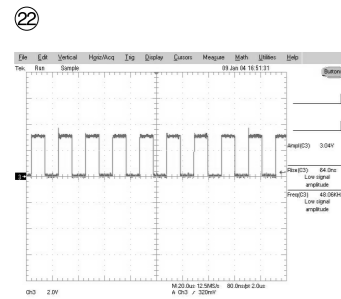
PMV02  
PIN10  
AIN\_MCLKOUT



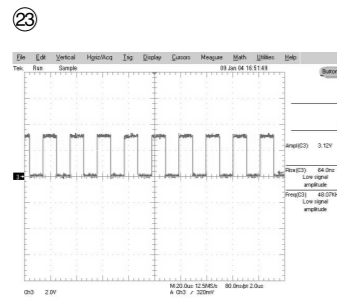
PMV02  
PIN07  
AIN\_SCLK



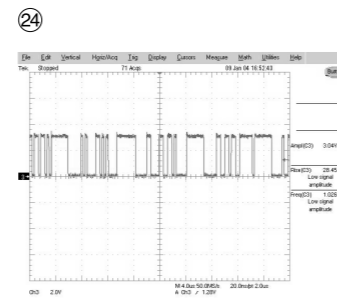
PMV02  
PIN24  
AOUT\_MCLK



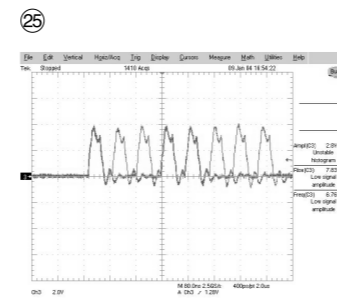
PMV02  
PIN05  
AIN\_FSYNC



PMV02  
PIN\_FSYNC  
AOUT\_FSYNC



PMV02  
PIN26  
AOUT\_D0



PMV02  
PIN29  
VIN\_D0

## • CIRCUIT VOLTAGE CHART

MODE PIN NO.	EE	PB	REC
<b>IC151_KIA78R25</b>			
1	3.25	3.24	3.23
2	2.52	2.52	2.52
3	0.00	0.00	0.00
4	4.88	4.88	4.88
<b>IC152_KIA78R33</b>			
1	3.64	3.63	3.62
2	3.28	3.28	3.28
3	0.00	0.00	0.00
4	4.43	4.42	4.41
<b>IC153_KIA78R05</b>			
1	5.28	5.28	5.28
2	4.97	4.97	4.97
3	0.00	0.00	0.00
4	4.88	4.88	4.88
<b>IC154_IP1680</b>			
1	3.25	3.25	3.25
2	3.25	3.25	3.25
3	2.55	2.56	2.55
4	1.12	1.12	1.12
5	1.71	1.72	1.71
6	0.00	0.00	0.00
7	1.25	1.25	1.25
8	3.25	3.25	3.25
<b>IC701_MN101DF10GAF</b>			
1	0.00	0.00	0.00
2	5.12	5.12	5.12
3	0.00	0.00	0.00
4	4.80	4.80	4.80
5	4.86	4.86	4.87
6	0.01	0.01	0.01
7	5.13	5.13	5.13
8	5.15	5.15	5.16
9	0.01	0.01	0.01
10	0.00	0.00	0.00
11	5.16	5.16	5.16
12	0.00	0.00	0.00
13	5.15	5.15	5.16
14	4.82	4.83	4.89
15	0.04	0.04	0.04
16	0.12	0.11	0.08
17	5.05	5.05	5.05
18	5.06	5.06	5.06
19	5.10	5.10	5.11
20	4.91	4.90	4.90
21	0.00	0.00	0.00
22	0.01	0.01	0.01
23	0.01	0.01	0.01
24	0.33	0.31	0.14
25	5.16	5.16	5.16
26	0.05	0.05	0.05
27	0.00	0.00	0.22
28	5.16	5.16	5.16
29	0.01	0.01	0.01
30	0.01	0.01	0.01

MODE PIN NO.	EE	PB	REC
31	0.01	0.01	0.01
32	0.01	0.01	0.01
33	0.31	0.32	0.15
34	0.33	0.32	0.16
35	0.01	0.01	0.01
36	5.16	5.16	5.16
37	2.53	2.52	2.54
38	2.43	2.42	2.42
39	0.00	0.00	0.00
40	1.99	1.95	1.95
41	2.55	2.55	2.55
42	0.00	0.00	0.00
43	4.88	4.89	4.89
44	4.89	4.90	4.90
45	0.01	0.01	0.01
46	0.64	0.63	0.63
47	0.01	0.01	0.01
48	0.00	0.00	0.00
49	1.04	1.04	1.04
50	2.78	2.90	2.89
51	5.13	5.13	5.13
52	3.01	3.04	3.05
53	2.54	2.54	2.54
54	5.10	5.10	5.10
55	5.10	5.10	5.10
56	0.01	0.01	0.01
57	5.09	5.09	5.09
58	5.00	5.00	5.01
59	5.25	5.02	5.00
60	0.00	0.00	0.00
61	4.94	4.94	4.93
62	0.00	0.00	0.00
63	0.82	0.81	0.81
64	4.83	4.82	4.82
65	0.00	0.00	0.00
66	0.00	0.00	0.00
67	0.00	0.00	0.00
68	0.00	0.00	0.00
69	0.00	0.00	0.00
70	0.00	0.00	0.00
71	0.00	0.00	0.00
72	0.00	0.00	0.00
73	5.25	5.25	5.25
74	0.00	0.00	0.00
75	0.00	0.00	0.00
76	0.01	0.01	0.00
77	0.01	0.01	0.01
78	0.01	0.01	0.01
79	0.01	0.01	0.01
80	0.01	0.01	0.01
81	0.01	0.01	0.01
82	0.24	0.19	0.14
83	0.24	0.19	0.15
84	1.94	1.92	1.93
85	0.00	0.00	0.00

MODE PIN NO.	EE	PB	REC
86	0.00	0.00	0.00
87	0.00	0.00	0.00
88	5.25	5.25	5.25
89	5.25	5.25	5.25
90	0.01	0.01	0.01
91	0.01	0.01	0.01
92	0.02	0.02	0.02
93	0.01	0.01	0.01
94	0.01	0.01	0.01
95	0.01	0.01	0.01
96	5.16	5.16	5.16
97	0.01	0.01	0.01
98	0.01	0.01	0.01
99	0.01	0.01	0.01
100	5.16	5.16	5.16
<b>IC703_MM1510</b>			
1	2.24	2.24	2.24
2	2.37	2.37	2.38
3	5.13	5.13	5.13
4	1.87	1.87	1.87
5	0.00	0.00	0.00
6	5.13	5.13	5.13
<b>IC704_KIA7042</b>			
1	5.21	5.21	5.21
2	0.00	0.00	0.00
3	4.80	4.80	4.80
<b>IC705_24LC16B</b>			
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.00	0.00	0.00
4	0.00	0.00	0.00
5	5.05	5.05	5.06
6	5.06	5.06	5.06
7	0.00	0.00	0.00
8	5.25	5.25	5.25
<b>IC706_KIA7031</b>			
1	5.17	5.17	5.17
2	0.00	0.00	0.00
3	5.17	5.16	5.16
<b>IC707_SDA5650</b>			
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.00	0.00	0.00
4	5.06	5.06	5.06
5	5.05	5.05	5.06
6	0.00	0.00	0.00
7	0.42	0.42	0.42
8	0.00	0.00	0.00
9	5.25	5.01	5.00
10	2.80	2.79	2.81
11	0.00	0.00	0.00
12	2.47	2.48	2.48
13	0.00	0.00	0.00
14	2.49	2.48	2.49
15	2.47	2.48	2.49

MODE PIN NO.	EE	PB	REC
16	1.57	1.56	1.57
17	1.48	1.54	1.54
18	0.00	0.00	0.00
19	5.25	5.25	5.25
20	5.25	5.25	5.25
<b>IC801_NJM4580</b>			
1	6.06	6.06	6.07
2	6.06	6.06	6.07
3	6.05	6.05	6.05
4	0.00	0.00	0.00
5	6.05	6.05	6.05
6	6.06	6.06	6.06
7	6.06	6.06	6.06
8	12.12	12.12	12.12
<b>IC802_BH7868FS</b>			
1	5.19	5.19	5.19
2	0.05	0.06	0.06
3	0.05	0.06	0.06
4	2.28	2.27	2.27
5	5.00	5.00	5.00
6	1.78	1.60	1.60
7	5.14	5.14	5.15
8	1.78	1.58	1.54
9	2.27	2.27	2.27
10	0.00	0.00	0.00
11	1.77	1.57	1.56
12	0.00	0.00	0.00
13	2.25	2.25	2.25
14	5.00	5.00	5.00
15	2.24	2.27	2.27
16	5.19	5.19	5.20
17	2.31	2.35	2.34
18	2.32	2.37	2.35
19	0.00	0.00	0.00
20	2.32	2.30	2.32
21	2.33	2.32	2.32
22	0.00	0.00	0.00
23	1.90	1.51	1.46
24	2.29	1.79	1.71
25	0.00	0.00	0.00
26	1.91	1.52	1.45
27	2.31	1.81	1.75
28	0.00	0.00	0.00
29	1.98	1.57	1.49
30	2.39	1.85	1.79
31	0.06	0.06	0.06
32	2.39	2.37	2.37
<b>IC803_MM1443</b>			
1	2.74	2.74	2.74
2	12.15	12.15	12.15
3	2.74	2.74	2.74
4	12.15	12.15	12.15
5	3.06	3.22	3.18
6	5.75	5.75	5.75
7	5.76	5.76	5.76

MODE PIN NO.	EE	PB	REC
8	5.70	5.70	5.70
9	0.01	0.01	0.01
10	5.70	5.70	5.70
11	11.55	11.55	11.55
12	5.75	5.75	5.75
13	0.01	0.01	0.01
14	5.70	5.70	5.70
15	0.01	0.01	0.01
16	5.70	5.70	5.70
17	0.00	0.00	0.00
18	0.00	0.00	0.00
19	0.00	0.00	0.00
20	5.70	5.70	5.70
21	5.81	5.81	5.81
22	5.81	5.80	5.80
23	5.74	5.74	5.73
24	5.70	5.70	5.70
25	5.80	5.80	5.80
26	5.80	5.80	5.80
27	5.73	5.73	5.73
28	3.31	3.26	3.33
29	2.47	2.62	2.35
30	2.47	2.62	2.35
31	1.88	1.88	1.80
32	5.05	5.05	5.05
33	5.07	5.07	5.07
34	0.00	0.00	0.00
<b>IC808_CS4351</b>			
1	1.61	1.61	1.62
2	1.62	1.62	1.61
3	1.62	1.62	1.62
4	1.63	1.63	1.63
5	3.17	3.17	3.17
6	0.00	0.00	0.00
7	3.08	3.08	3.08
8	3.03	3.03	3.03
9	3.23	3.23	3.23
10	3.21	3.20	3.20
11	3.22	3.22	3.22
12	1.25	1.25	1.25
13	4.12	4.12	4.12
14	12.12	12.12	12.12
15	4.11	4.11	4.11
16	0.00	0.00	0.00
17	12.13	12.13	12.13
18	4.12	4.12	4.12
19	12.12	12.12	12.12
20	3.23	3.22	3.22
<b>IC901_SAA7317</b>			
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	1.88	1.87	1.87
4	2.94	2.96	2.95
5	2.94	2.96	2.94
6	2.94	2.96	2.94

MODE PIN NO.	EE	PB	REC
7	2.94	2.96	2.94
8	2.94	2.96	2.94
9	2.94	2.95	2.94
10	1.13	1.13	1.16
11	0.00	0.00	0.00
12	2.95	2.97	2.95
13	0.00	0.00	0.00
14	2.94	2.96	2.93
15	0.17	0.89	0.37
16	0.17	0.75	0.37
17	0.57	1.90	0.59
18	0.57	0.40	0.63
19	0.58	0.78	0.71
20	0.00	0.99	2.36
21	2.94	2.96	2.94
22	0.00	0.00	0.00
23	0.00	0.00	0.00
24	2.94	2.96	2.93
25	0.58	0.60	0.57
26	0.58	0.57	0.57
27	0.57	0.47	0.47
28	1.00	1.00	1.00
29	2.94	2.96	2.93
30	0.00	0.00	0.00
31	1.88	1.87	1.87
32	0.00	0.01	0.01
33	0.00	0.01	0.01
34	2.94	2.96	2.93
35	0.00	0.00	0.00
36	0.00	0.00	0.00
37	0.00	0.00	0.00
38	2.94	2.96	2.93
39	0.57	0.58	0.58
40	0.56	0.58	0.

MODE PIN NO.	EE	PB	REC
117	3.19	2.96	2.93
118	0.21	0.33	1.37
119	0.22	0.32	1.35
120	0.27	0.33	1.37
121	0.22	0.34	1.38
122	0.27	0.37	1.37
123	1.88	1.85	1.85
124	0.02	0.02	0.02
125	2.98	2.96	2.93
126	0.43	0.45	1.35
127	0.42	0.44	1.36
128	0.43	0.44	1.38
129	0.43	0.43	1.36
130	0.43	0.44	1.36
131	2.96	2.96	2.93
132	0.51	0.44	1.33
133	0.52	0.35	1.31
134	0.52	0.50	1.33
135	0.41	0.53	1.42
136	1.44	1.44	1.43
137	2.96	2.96	2.93
138	0.02	0.02	0.02
139	1.31	1.31	1.30
140	1.33	1.32	1.36
141	1.48	1.48	1.49
142	1.49	1.52	1.43
143	1.10	1.11	1.10
144	1.85	1.85	1.88
145	0.02	0.02	0.02
146	2.96	2.96	3.20
147	1.13	1.12	0.37
148	1.51	1.53	0.37
149	0.22	0.20	0.23
150	0.49	0.50	0.37
151	0.49	0.45	0.37
152	3.13	2.96	3.20
153	0.52	0.54	0.37
154	0.53	0.38	0.37
155	0.53	0.41	0.35
156	0.53	0.40	1.44
157	0.59	0.52	1.42
158	3.13	2.97	2.93
159	0.51	0.52	1.53
160	0.51	0.52	1.43
161	0.55	0.52	1.40
162	0.59	0.52	1.45
163	0.62	0.52	1.34
164	3.13	2.97	2.93
165	0.02	0.02	0.02
166	0.60	0.54	1.34
167	0.02	0.02	0.02
168	1.88	1.87	1.05
169	0.02	0.02	0.02
170	1.85	1.85	1.87
171	1.50	1.56	1.88

MODE PIN NO.	EE	PB	REC
172	1.35	1.37	1.68
173	1.27	1.32	1.10
174	1.49	1.49	1.49
175	1.51	1.51	1.49
176	2.98	2.99	2.95
177	2.95	2.95	2.92
178	2.96	2.97	2.93
179	1.50	1.50	1.48
180	1.50	1.51	1.49
181	1.52	1.50	1.48
182	0.02	0.02	0.02
183	0.01	0.01	0.01
184	1.45	1.46	1.46
185	1.45	1.46	1.45
186	2.96	2.97	2.93
187	1.46	1.46	1.45
188	1.46	1.46	1.46
189	0.02	0.02	0.02
190	1.85	1.82	1.85
191	0.00	0.00	0.00
192	0.00	0.00	0.00
193	1.45	1.47	1.44
194	2.96	2.97	2.93
195	0.00	0.00	0.00
196	2.96	2.97	2.93
197	0.00	0.00	0.00
198	1.44	1.44	1.43
199	1.44	1.45	1.43
200	1.44	1.44	1.42
201	1.44	1.45	1.43
202	1.48	1.48	1.46
203	1.44	1.44	1.43
204	1.44	1.44	1.43
205	0.56	1.46	1.16
206	0.57	1.45	1.25
207	0.57	1.46	1.24
208	0.57	1.64	1.12
<b>IC903_NJM2521</b>			
1	7.10	7.09	7.08
2	0.01	0.01	0.01
3	7.22	7.20	7.18
4	0.01	0.01	0.01
5	7.22	7.21	7.19
6	10.70	10.69	10.69
7	7.46	7.45	7.43
8	0.00	0.00	0.00
<b>IC904_NJM2521</b>			
1	7.10	7.09	7.07
2	0.01	0.01	0.01
3	7.22	7.21	7.19
4	0.01	0.01	0.01
5	7.22	7.21	7.19
6	10.70	10.69	10.67
7	7.46	7.45	7.43
8	0.00	0.00	0.00

MODE PIN NO.	EE	PB	REC
<b>Q151_STB1132_5.2V</b>			
E	5.27	5.27	5.27
C	5.21	5.21	5.21
B	4.52	4.52	4.52
<b>Q155_KTA1271_5VT</b>			
E	5.26	5.27	5.27
C	5.18	5.18	5.18
B	4.48	4.49	4.48
<b>Q158_KTA1268_SW_5.3VA</b>			
E	5.26	5.26	5.26
C	5.20	5.20	5.20
B	4.56	4.56	4.55
<b>Q161_KTA1268_33VT</b>			
E	33.90	33.90	34.00
C	33.80	33.80	33.90
B	33.40	33.30	33.30
<b>Q164_KTC3202_12V</b>			
E	12.12	12.12	12.12
C	12.99	12.99	12.99
B	12.74	12.74	12.74
<b>Q165_KTC3203_SW_12VG</b>			
E	12.16	16.16	12.15
C	12.99	12.98	12.99
B	112.79	12.79	12.80
<b>IC301</b>			
1	0 (GND)	0 (GND)	0 (GND)
2	0.09	0.09	0.09
3	0.09	0.09	0.09
4	0 (GND)	0 (GND)	0 (GND)
5	0.09	0.09	0.09
6	0.09	0.09	0.09
7	3.24	2.65	3.22
8	0.09	0.09	0.09
9	0.09	0.09	0.09
10	0 (GND)	0 (GND)	0 (GND)
11	0.09	0.09	0.09
12	0.09	0.09	0.09
13	0.09	0.09	0.09
14	0.09	0.09	0.09
15	0 (GND)	0 (GND)	0 (GND)
16	0.09	0.09	0.09
17	0.09	0.09	0.09
18	3.24	3.24	3.22
19	0.09	0.09	0.09
20	0.09	0.09	0.09
21	0 (GND)	0 (GND)	0 (GND)
22	0.09	0.09	0.09
23	0.09	0.09	0.09
24	0 (GND)	0 (GND)	0 (GND)
25	0.00	0.00	0.00
26	0.00	0.00	0.00
27	0.00	0.00	0.00
28	0 (GND)	0 (GND)	0 (GND)
29	0.00	0.00	0.00
30	0.00	0.00	0.00

MODE PIN NO.	EE	PB	REC
31	3.24	3.24	3.22
32	0.00	0.00	0.00
33	0.00	0.00	0.00
34	0 (GND)	0 (GND)	0 (GND)
35	0.00	0.00	0.00
36	0.00	0.00	0.00
37	0.00	0.00	0.00
38	0.00	0.00	0.00
39	0 (GND)	0 (GND)	0 (GND)
40	0.00	0.00	0.00
41	0.00	0.00	0.00
42	3.24	3.24	3.22
43	0.00	0.00	0.00
44	0.00	0.00	0.00
45	0 (GND)	0 (GND)	0 (GND)
46	0.00	0.00	0.00
47	0.00	0.00	0.00
48	0.00	0.00	0.00
<b>IC202/203</b>			
1	2.39	2.36	2.36
2	1.13	1.05	1.13
3	2.39	2.36	2.36
4	1.13	1.06	1.11
5	1.15	1.06	1.15
6	0.00	0.00	0.00
7	1.14	1.09	1.14
8	1.14	1.12	1.12
9	2.39	2.35	2.34
10	1.14	1.09	1.10
11	1.14	1.09	1.10
12	0.00	0.00	0.00
13	1.14	1.13	1.13
14	0.00	0.00	0.00
15	2.39	2.35	2.35
16	1.18	1.16	1.16
17	1.14	1.11	1.14
18	2.39	2.37	2.36
19	0.00	0.00	0.00
20	0.60	0.60	0.60
21	1.78	1.76	1.75
22	1.78	1.71	1.71
23	1.78	1.75	1.75
24	0.00	0.00	0.00
25	0.00	0.00	0.00
26	1.19	1.19	1.19
27	1.19	1.19	1.19
28	1.15	1.11	1.12
29	1.16	1.12	1.12
30	1.16	1.13	1.13
31	1.16	1.13	1.13
32	1.18	1.17	1.17
33	2.39	2.36	2.36
34	0.00	0.00	0.00
35	1.18	1.17	1.17
36	1.18	1.17	1.17

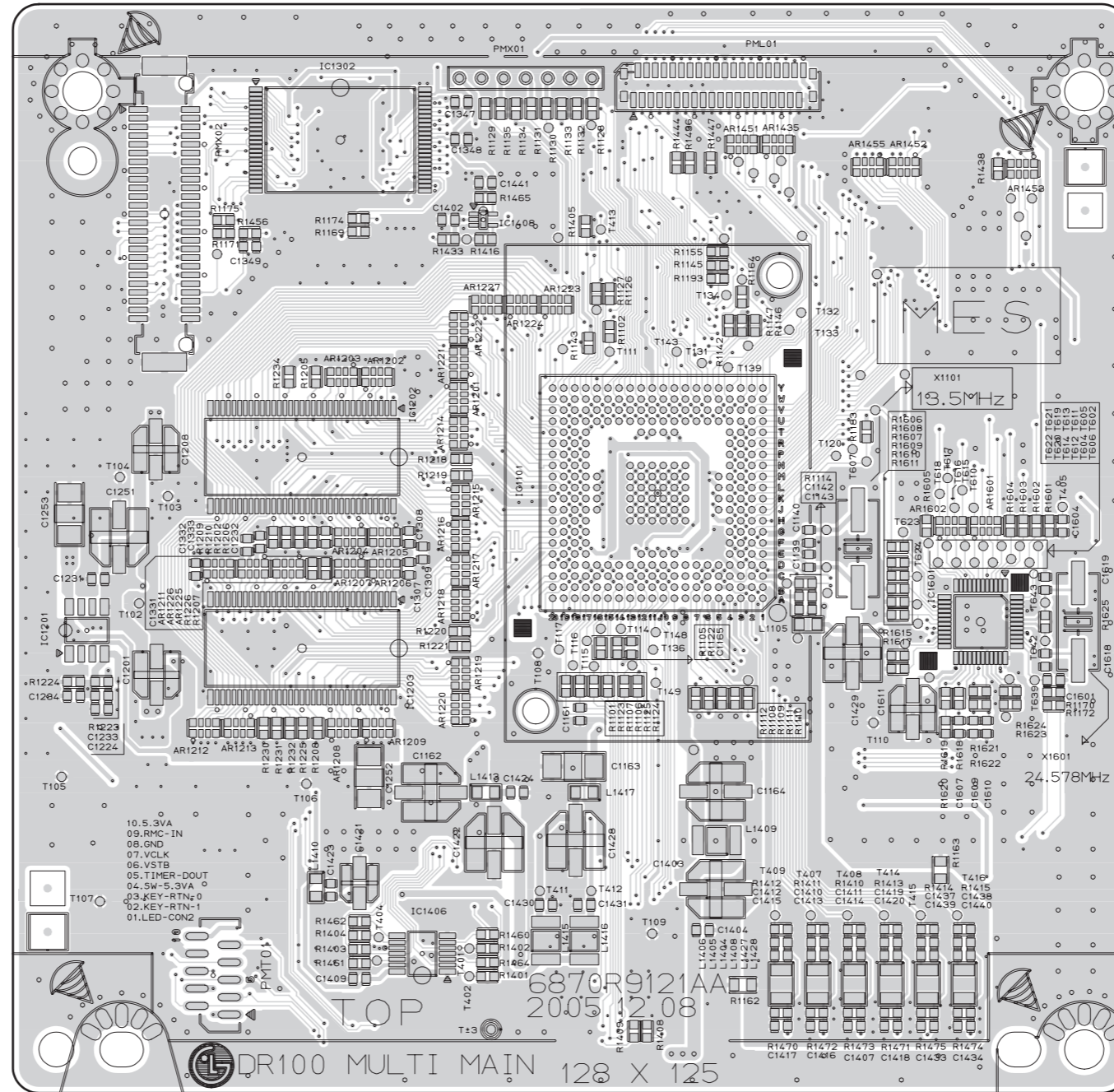
MODE PIN NO.	EE	PB	REC
37	1.17	1.17	1.17
38	1.18	1.17	1.17
39	1.19	1.17	1.17
40	1.18	1.16	1.16
41	1.15	1.11	1.11
42	1.16	1.12	1.14
43	0.00	0.00	0.00
44	1.82	1.80	1.80
45	1.21	1.20	1.20
46	1.18	1.17	1.17
47	0.60	0.59	0.60
48	0.00	0.00	0.00
49	1.19	1.18	1.18
50	0.00	0.00	0.00
51	1.18	1.16	1.16
52	0.00	0.00	0.00
53	0.00	0.00	0.00
54	1.14	1.06	1.14
55	2.39	2.36	2.36
56	1.15	1.06	1.06
57	1.15	1.05	1.05
58	0.00	0.00	0.00
59	1.14	1.06	1.06
60	1.14	1.06	1.06
61	2.39	2.37	2.36
62	1.16	1.12	1.12
63	1.14	1.04	1.04
64	0.00	0.00	0.00
65	1.15	1.05	1.05
66	0.00	0.00	0.00
<b>IC201</b>			
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	1.18	1.17	1.17
4	1.18	1.17	1.17
5	2.37	2.34	2.34
6	2.37	2.34	2.34
7	2.37	2.34	2.34
8	1.18	1.17	1.17
<b>IC301</b>			
1	0 (GND)	0 (GND)	0 (GND)
2	0.09	0.09	0.09
3	0.09	0.09	0.09
4	0 (GND)	0 (GND)	0 (GND)
5	0.09	0.09	0.09
6	0.09	0.09	0.09
7	3.24	2.65	3.22
8	0.09	0.09	0.09
9	0.09	0.09	0.09
10	0 (GND)	0 (GND)	0 (GND)
11	0.09	0.09	0.09
12	0.09	0.09	0.09
13	0.09	0.09	0.09
14	0.09	0.09	0.09
15	0 (GND)	0 (GND)	0 (GND)

MODE PIN NO.	EE	PB	REC
16	0.09	0.09	0.09
17	0.09	0.09	0.09
18	3.24	3.24	3.22
19	0.09	0.09	0.09
20	0.09	0.09	0.09
21	0 (GND)	0 (GND)	0 (GND)
22	0.09	0.09	0.09
23	0.09	0.09	0.09
24	0 (GND)	0 (GND)	0 (GND)
25	0.00	0.00	0.00
26	0.00	0.00	0.00
27	0.00	0.00	0.00
28	0 (GND)	0 (GND)	0 (GND)
29	0.00	0.00	0.00
30	0.00	0.00	0.00
31	3.24	3.24	3.22
32	0.00	0.00	0.00
33	0.00	0.00	0.00
34	0 (GND)	0 (GND)	0 (GND)
35	0.00	0.00	0.00
36	0.00	0.00	0.00
37	0.00	0.00	0.00
38	0.00	0.00	0.00
39	0 (GND)	0 (GND)	0 (GND)
40	0.00	0.00	0.00
41	0.00	0.00	0.00
42	3.24	3.24	3.22
43	0.00	0.00	0.00
44	0.00	0.00	0.00
45	0 (GND)	0 (GND)	0 (GND)
46	0.00	0.00	0.00
47			

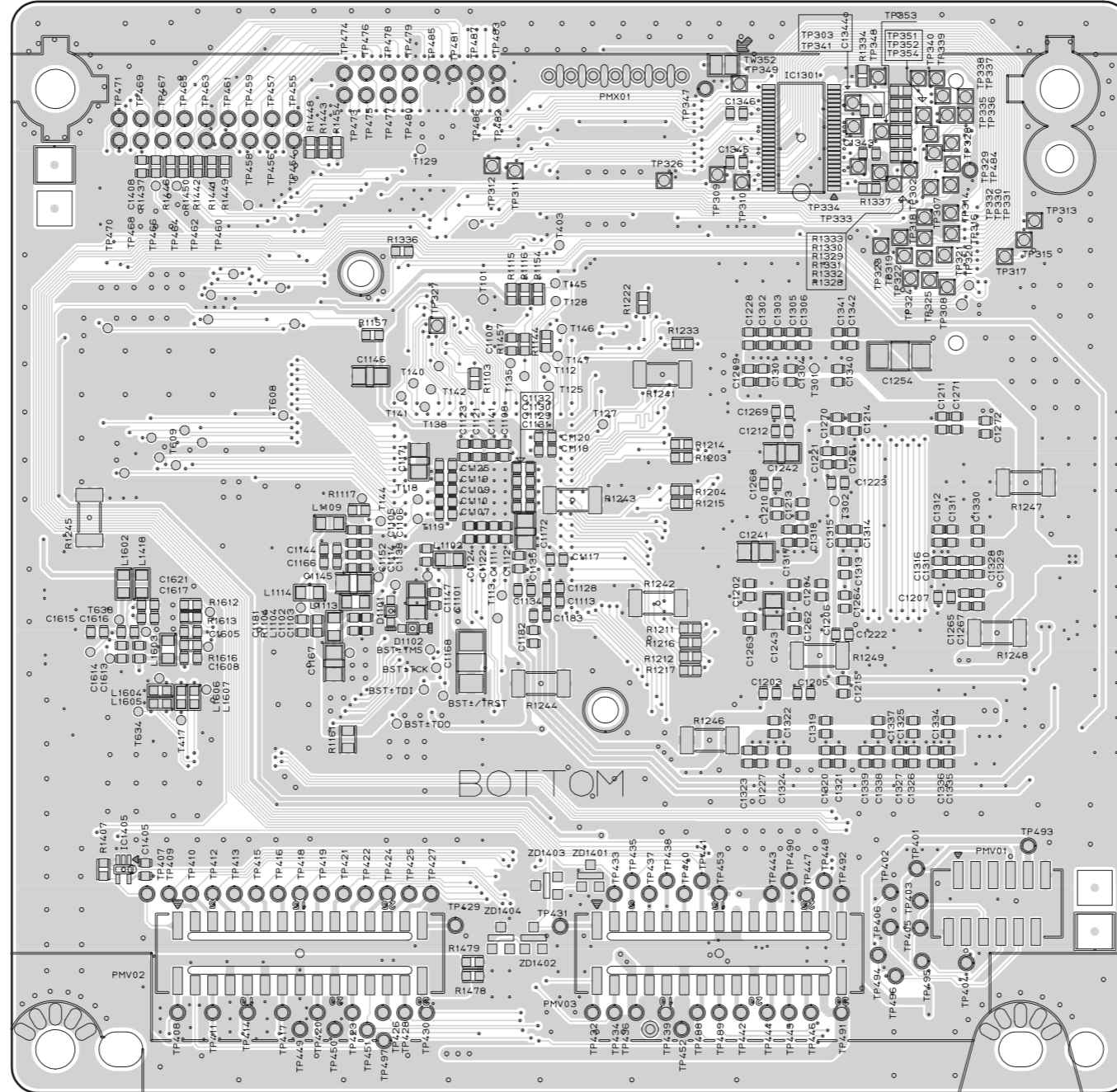


# PRINTED CIRCUIT DIAGRAMS

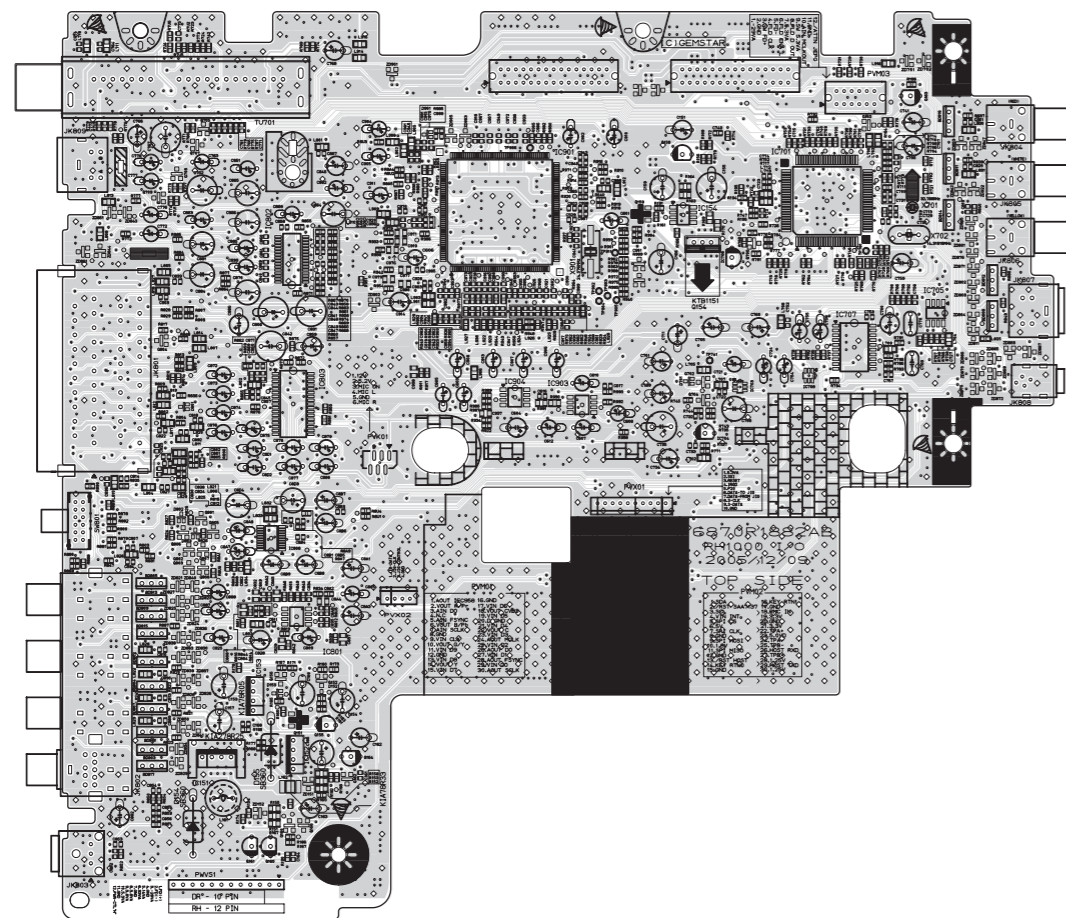
## 1. MAIN P.C.BOARD(TOP SIDE)



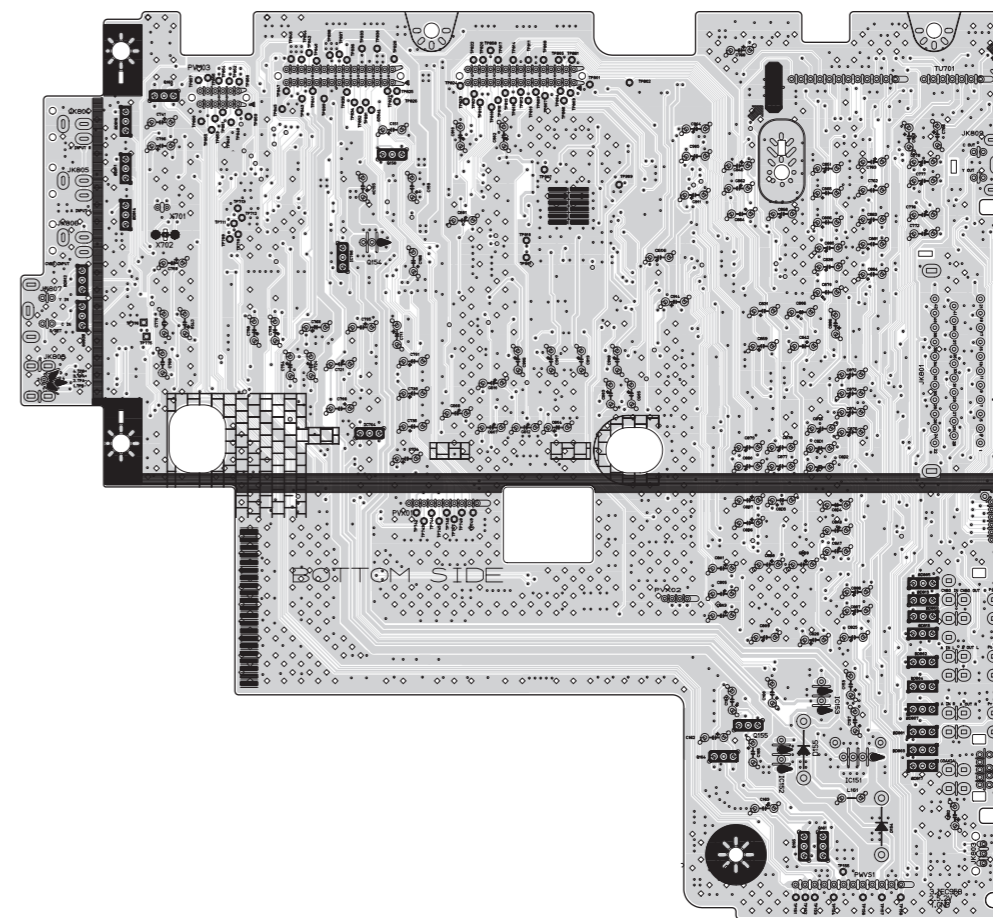
## 2. MAIN P.C.BOARD(BOTTOM SIDE)



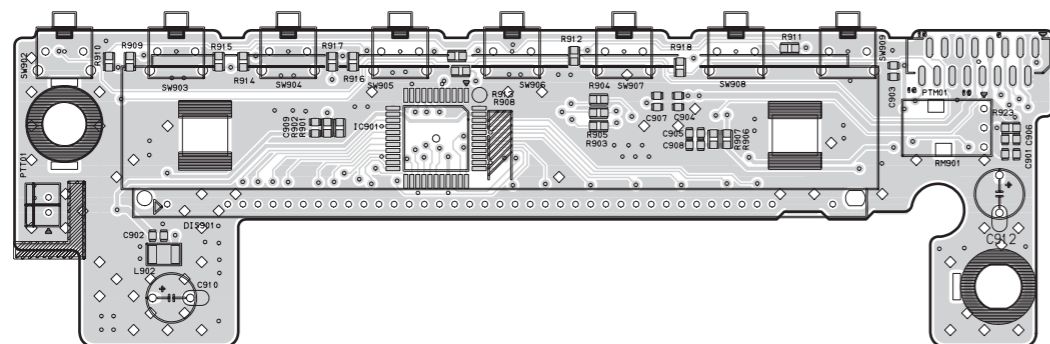
**3. I/O P.C.BOARD  
( TOP VIEW )**



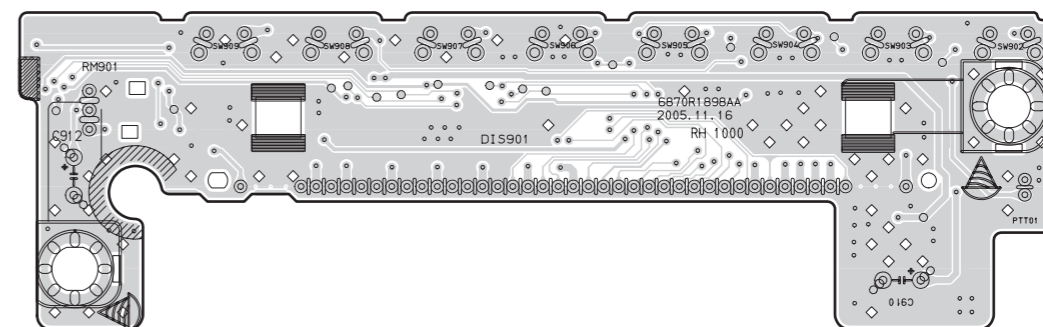
**( BOTTOM VIEW )**



**4. JUNCTION P.C.BOARD  
( TOP VIEW )**

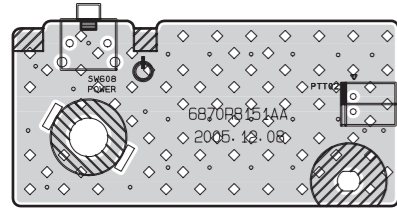


**( BOTTOM VIEW )**

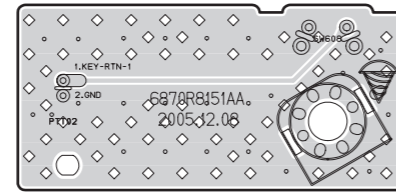


### 5. KEY P.C.BOARD

( 6, 7 TOOL )  
( TOP VIEW )

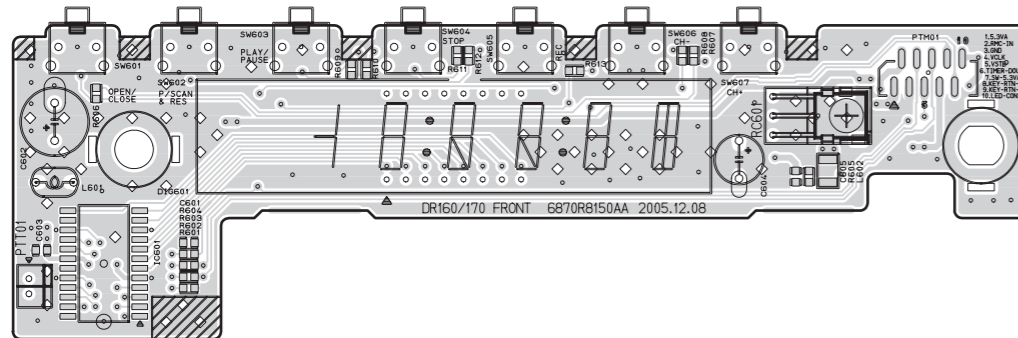


( BOTTOM VIEW )

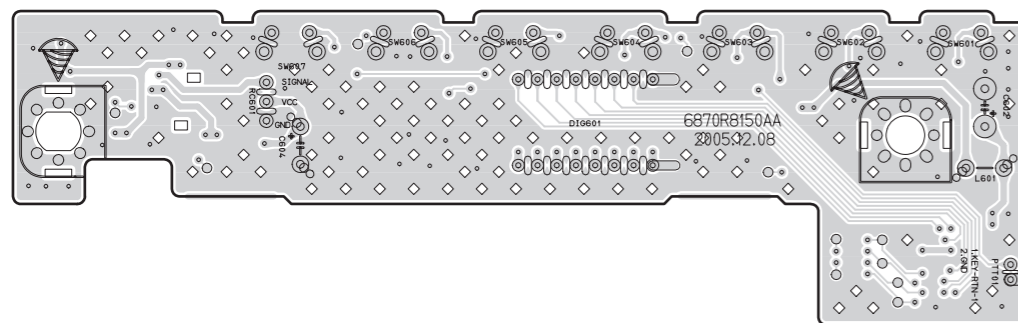


### 6. TIMER P.C.BOARD

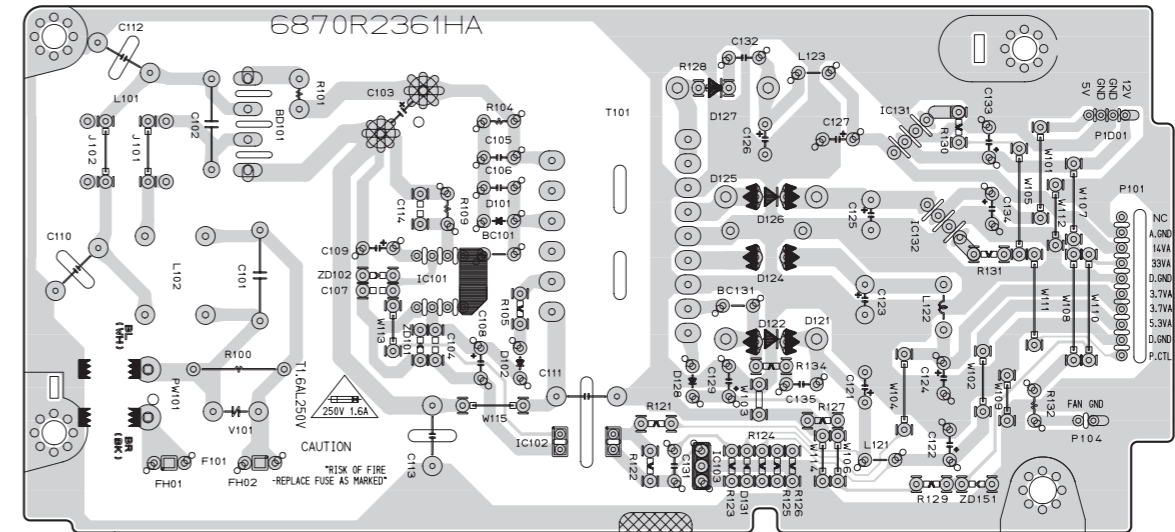
( 6, 7 TOOL )  
( TOP VIEW )



( BOTTOM VIEW )



### 7. POWER P.C.BOARD



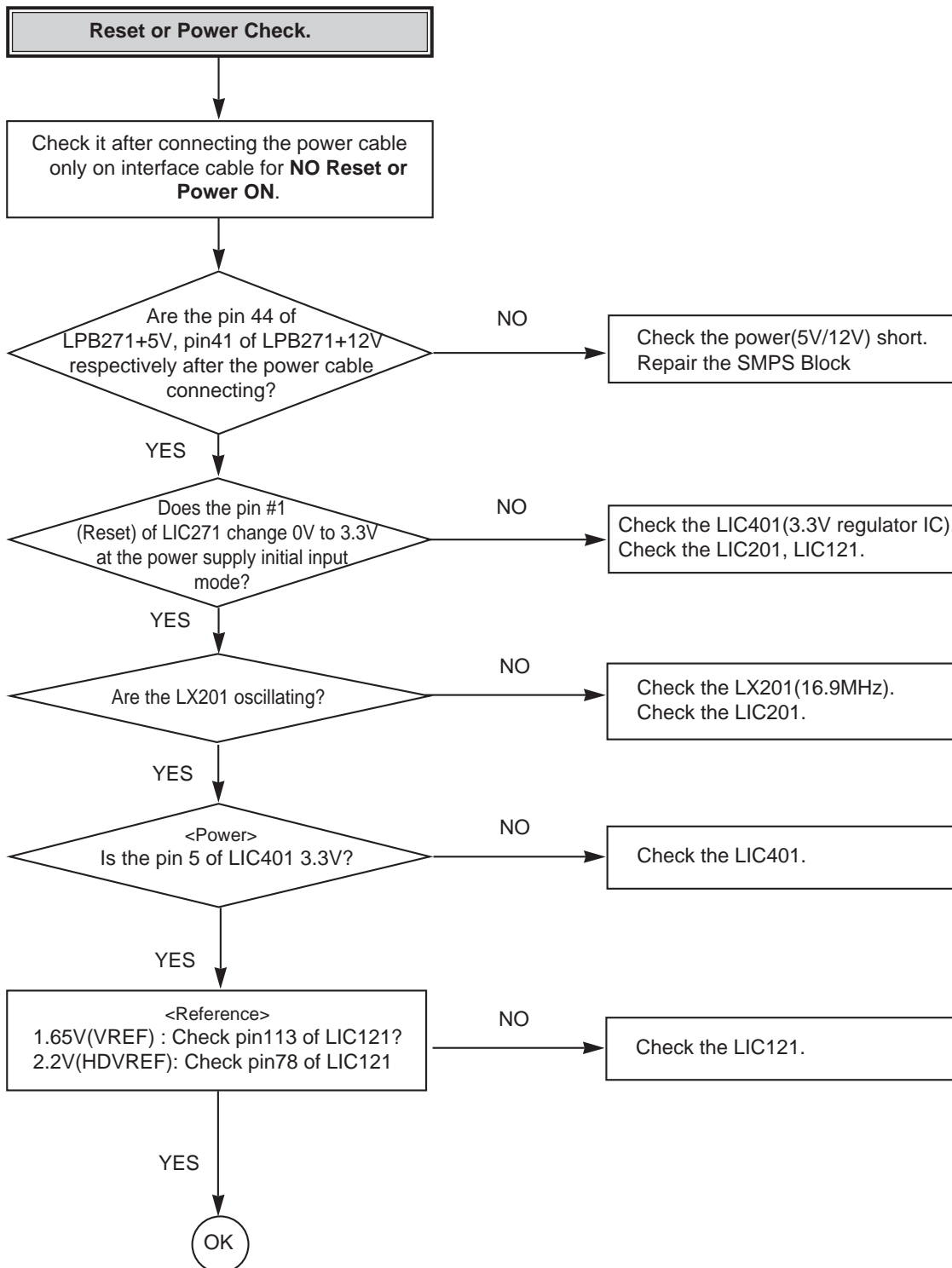
# SECTION 4

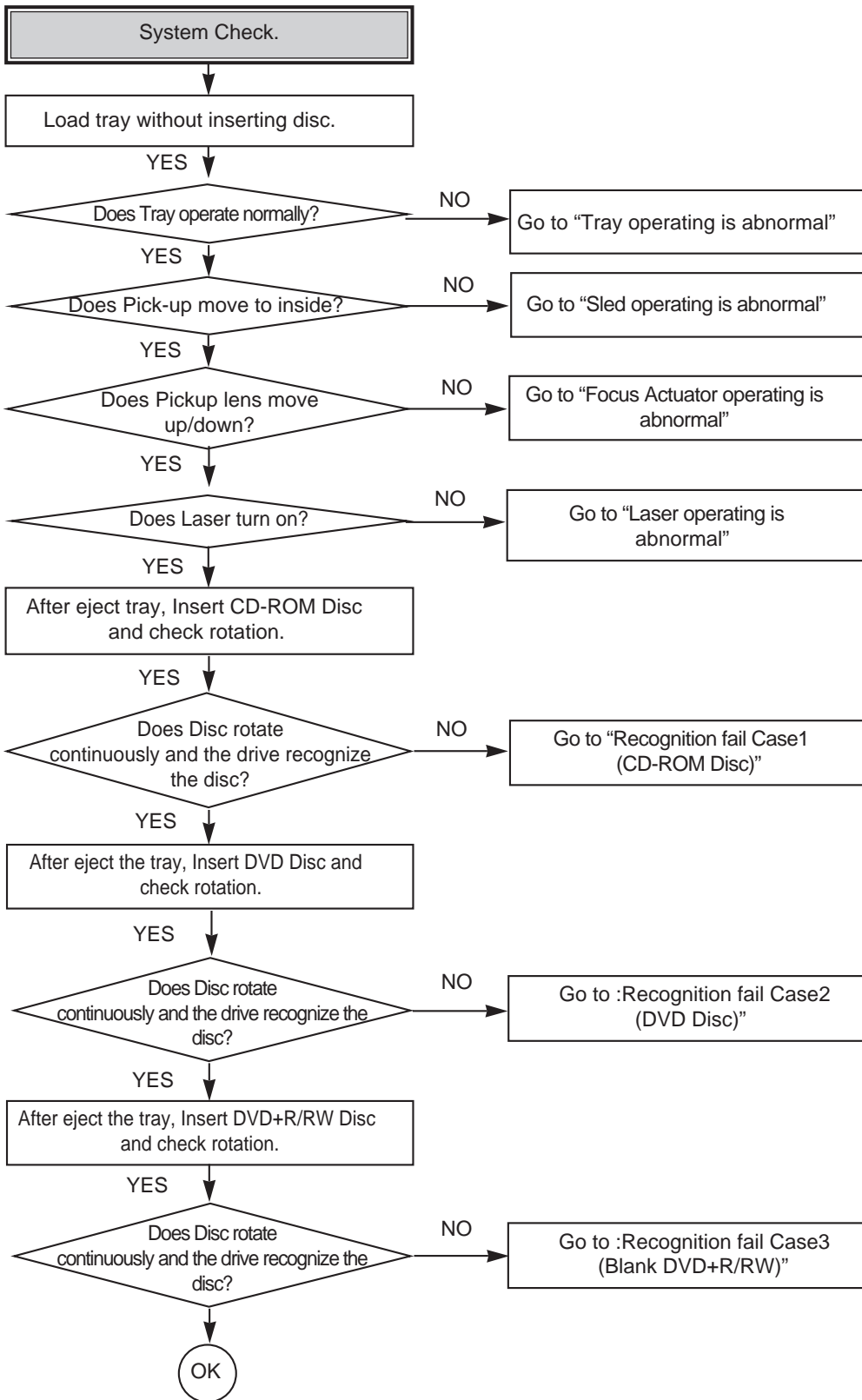
## RS-01A LOADER PART

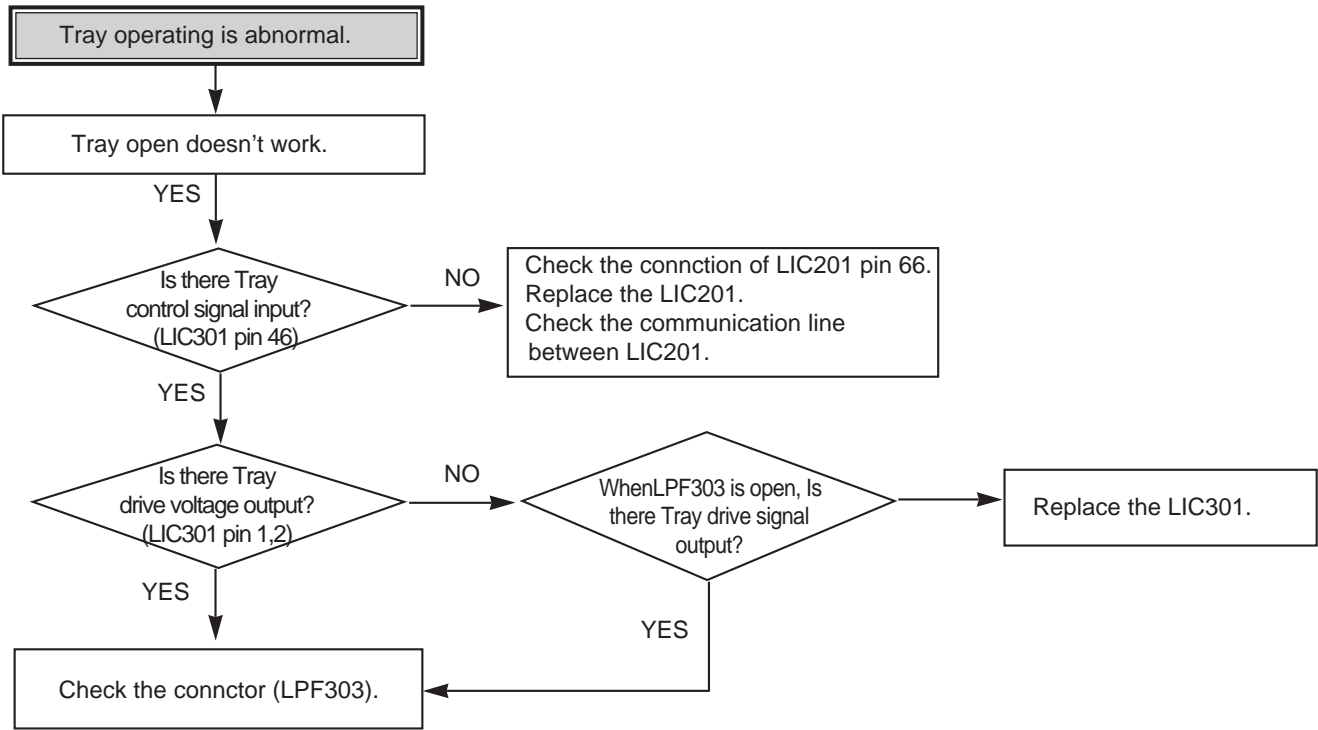
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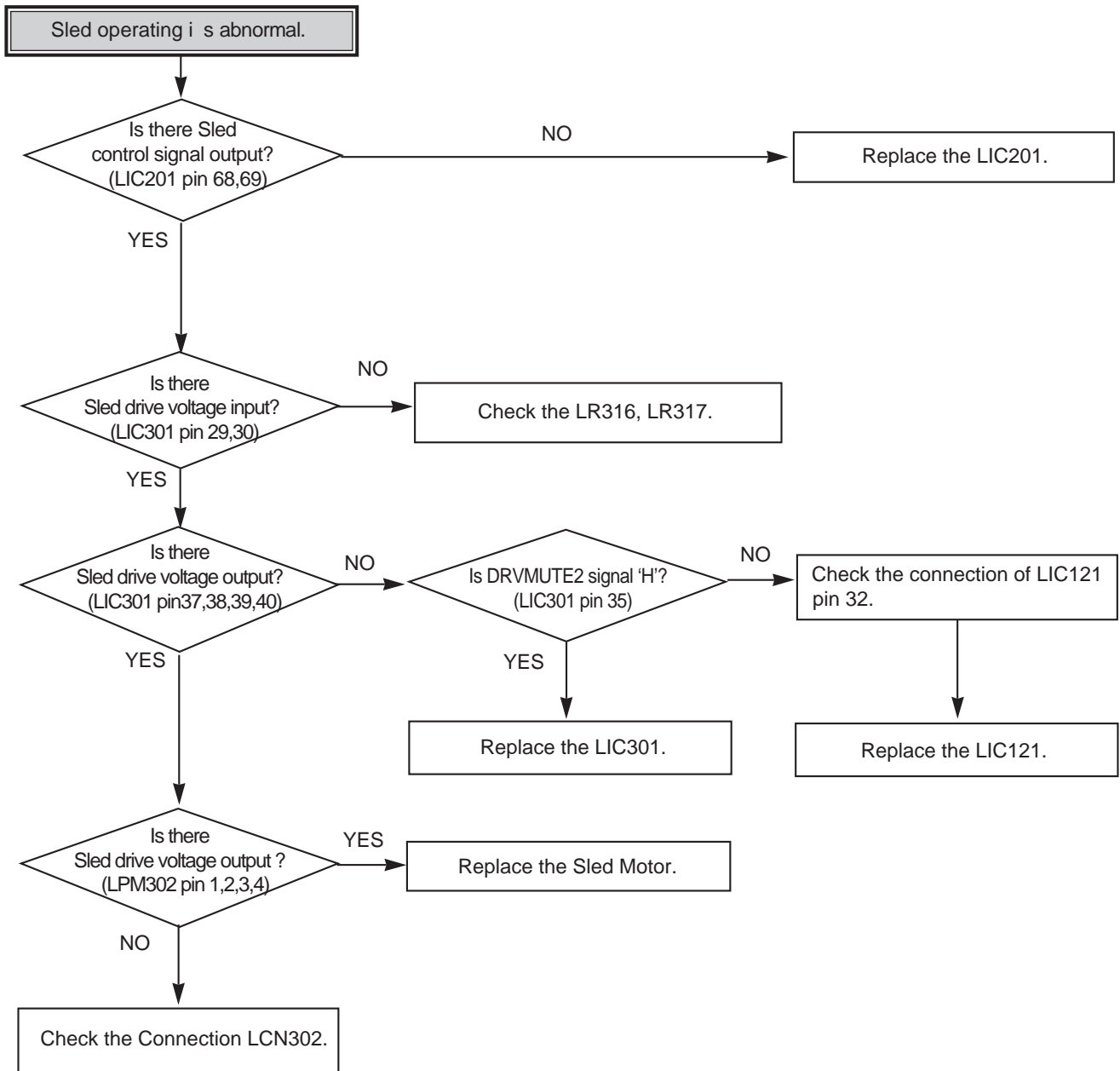
# ELECTRICAL TROUBLESHOOTING GUIDE

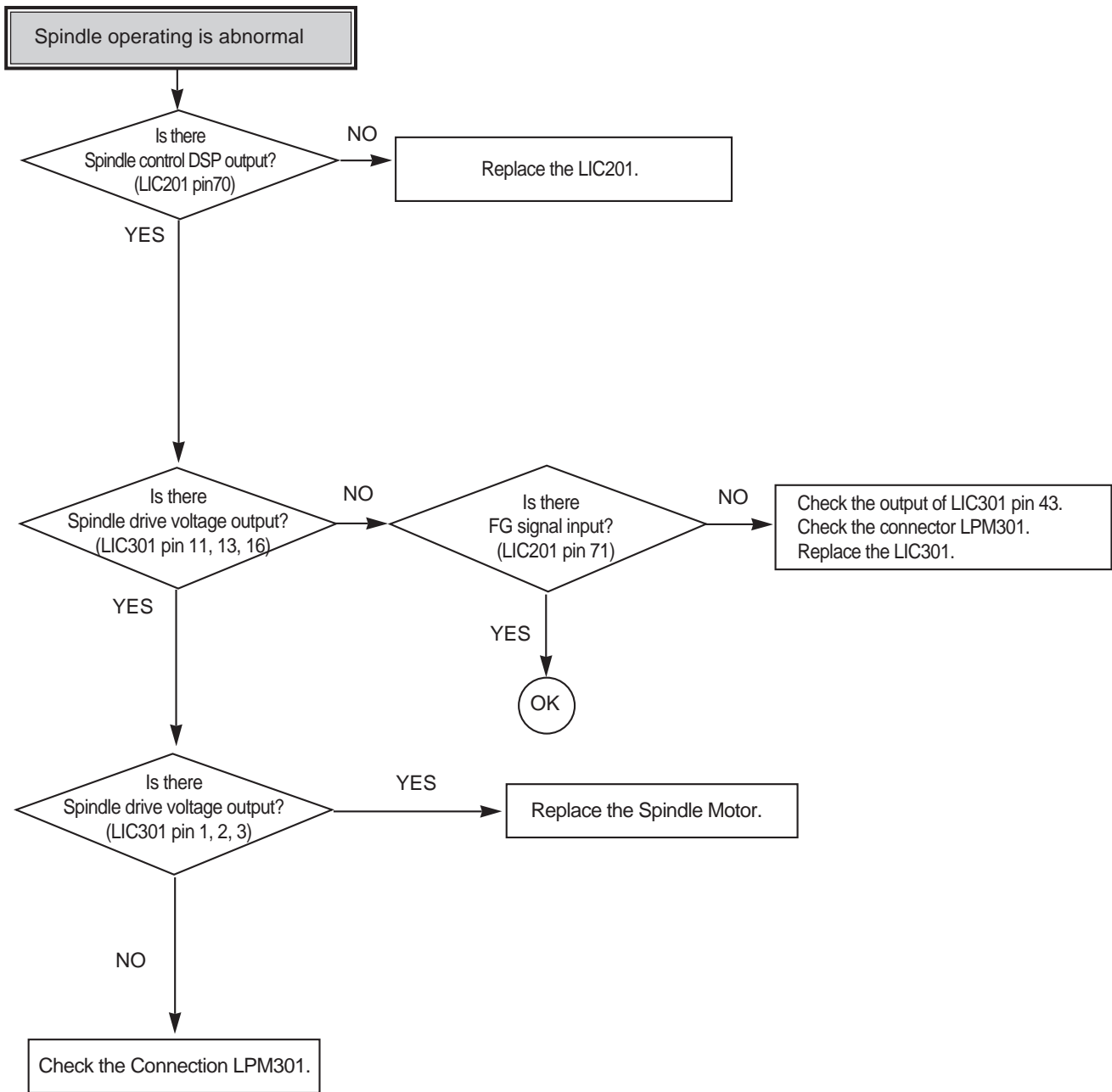


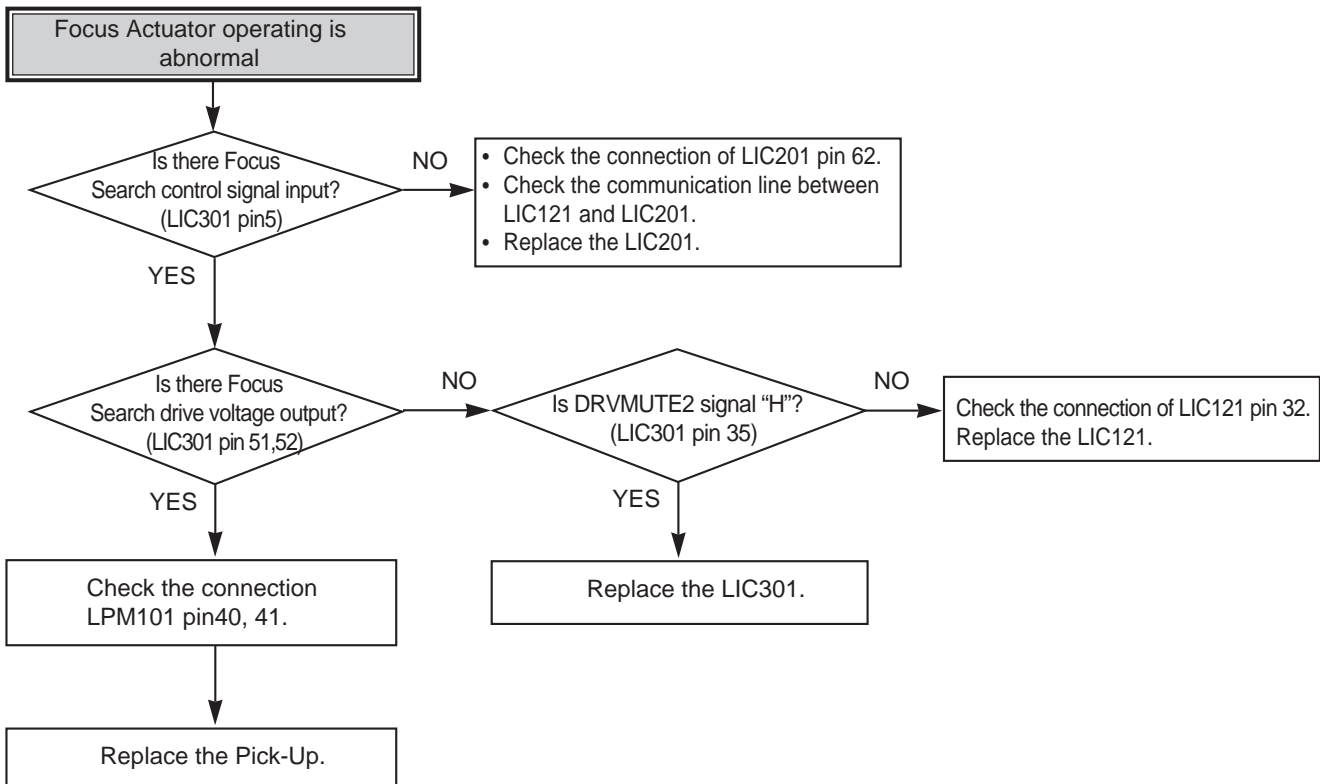
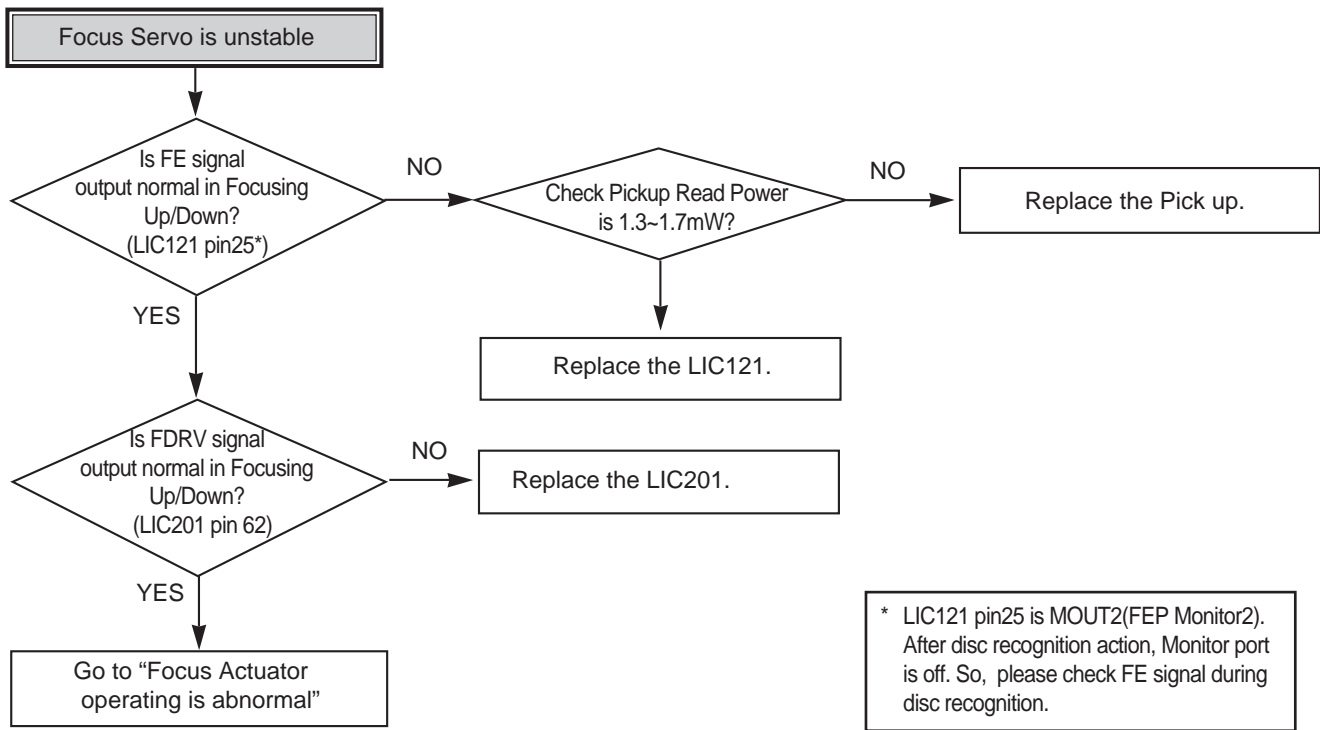


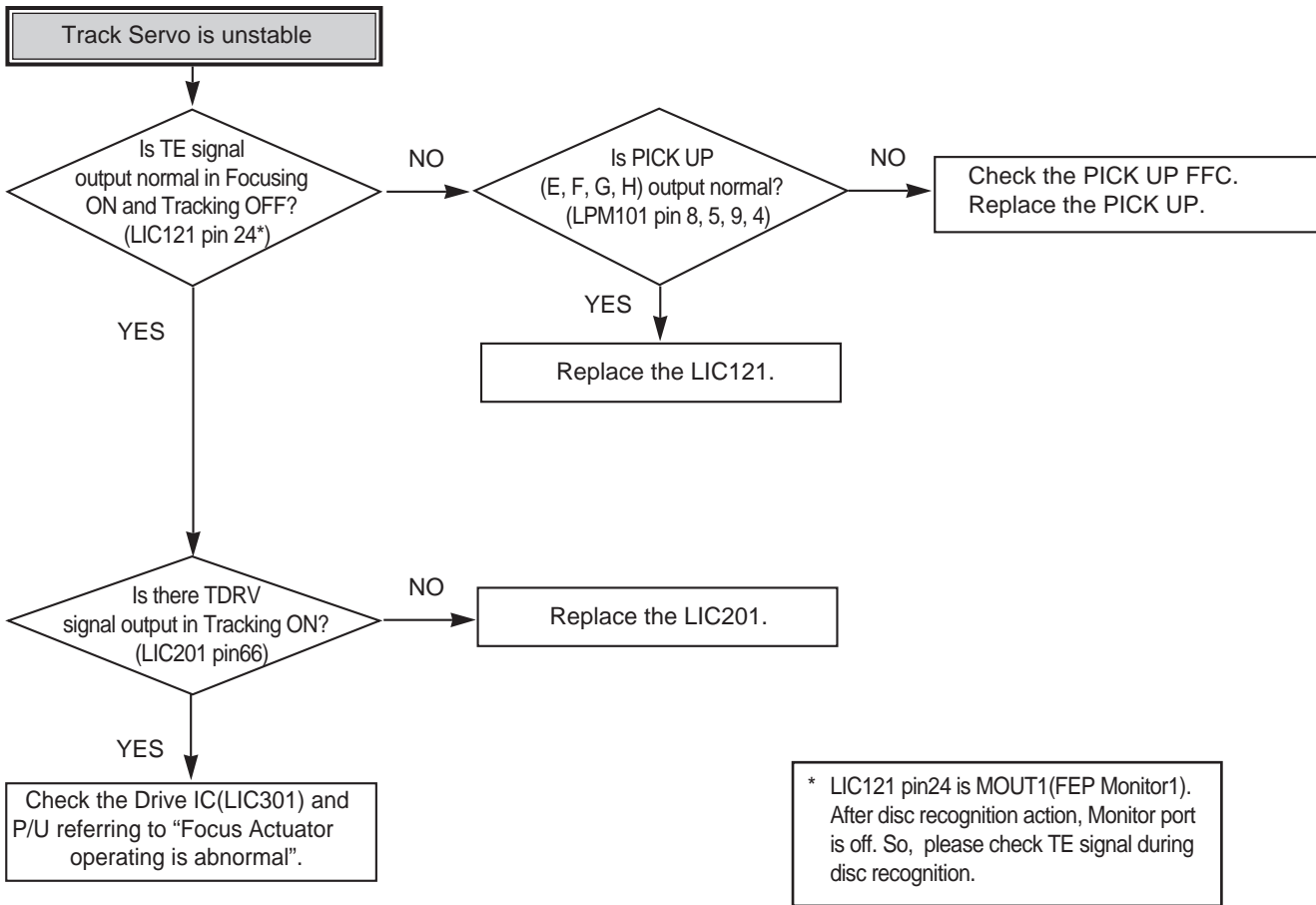


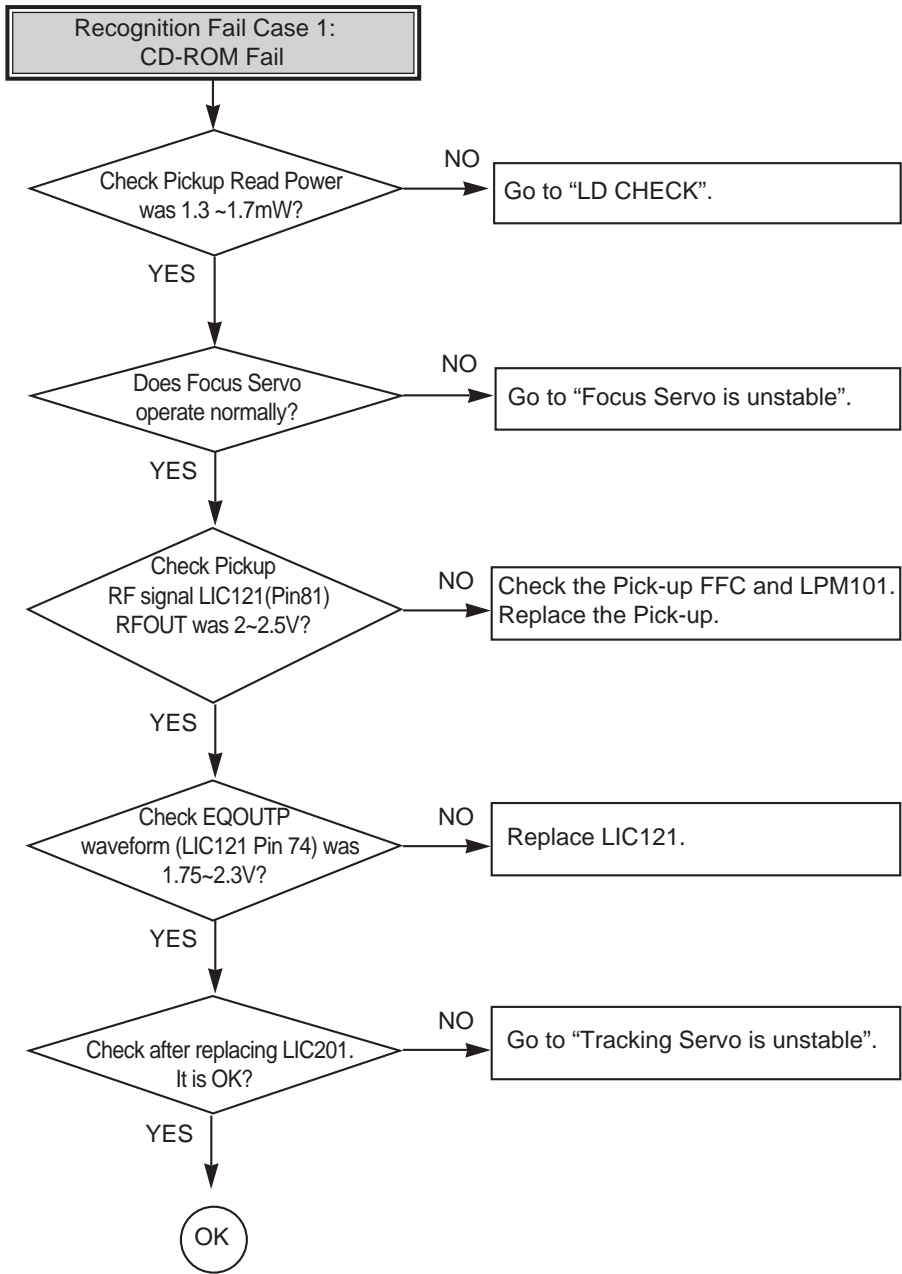


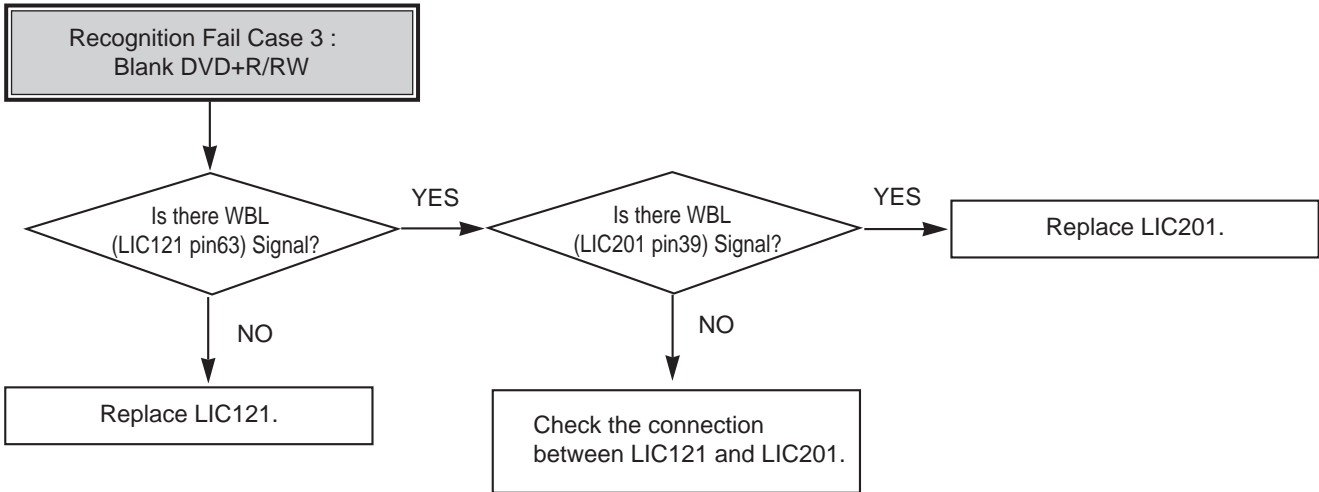
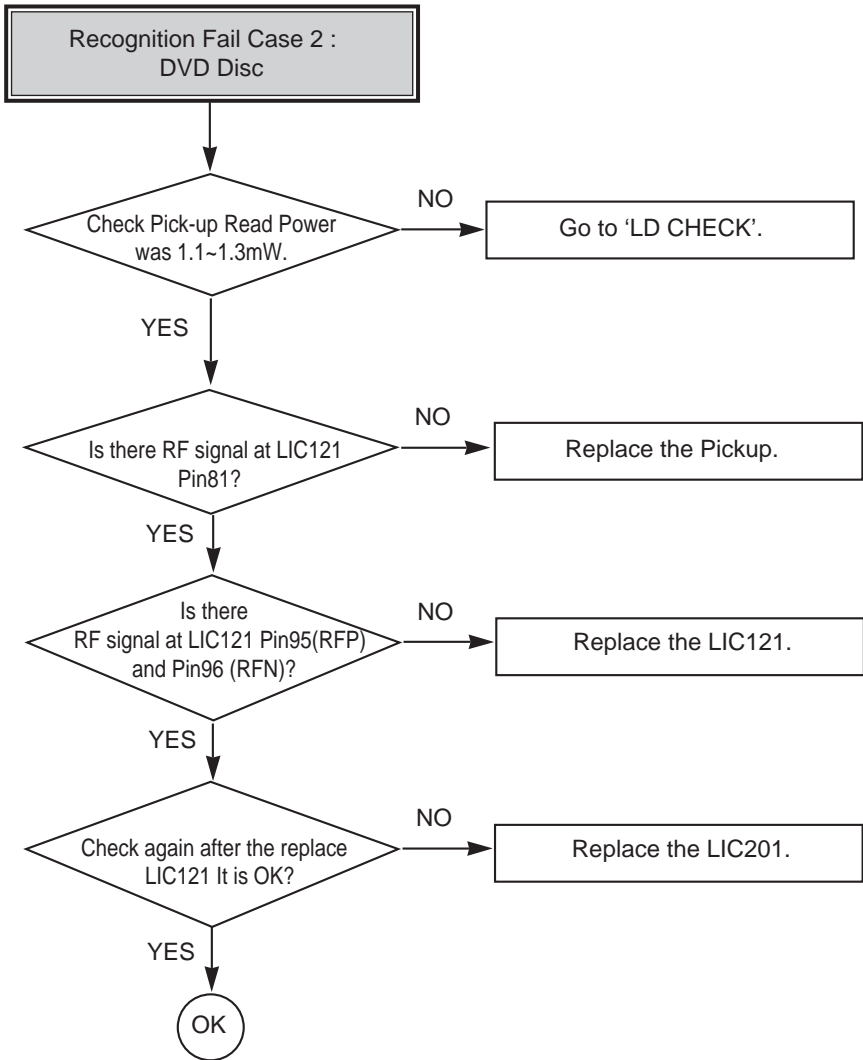




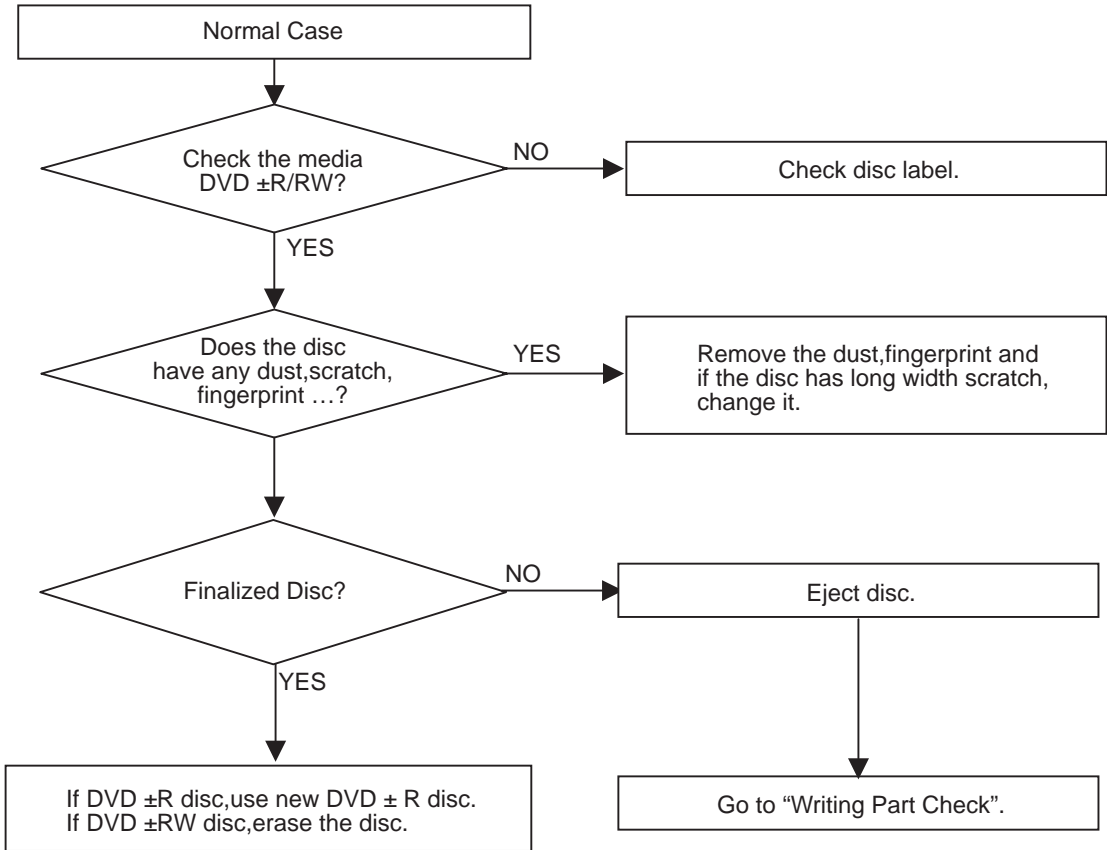


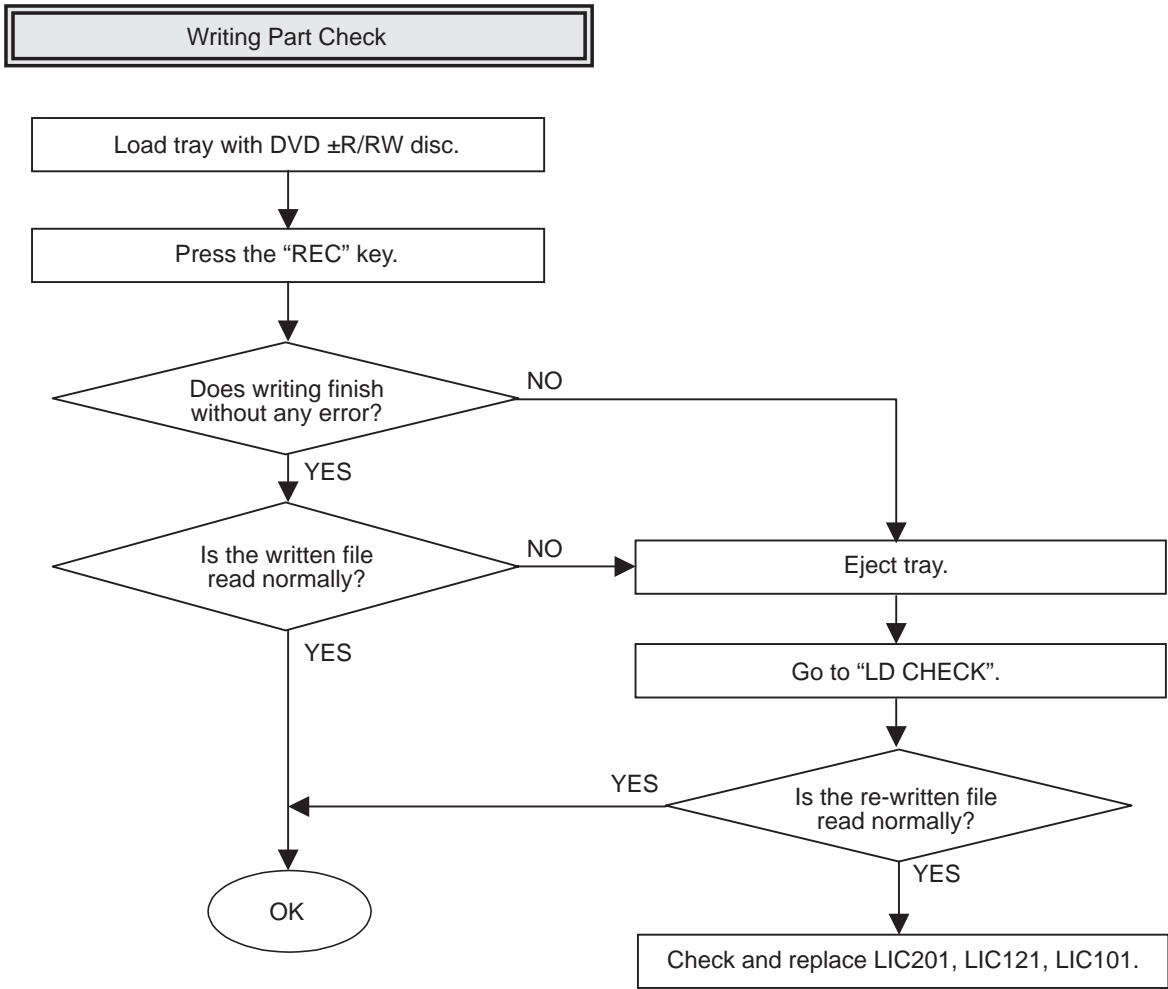




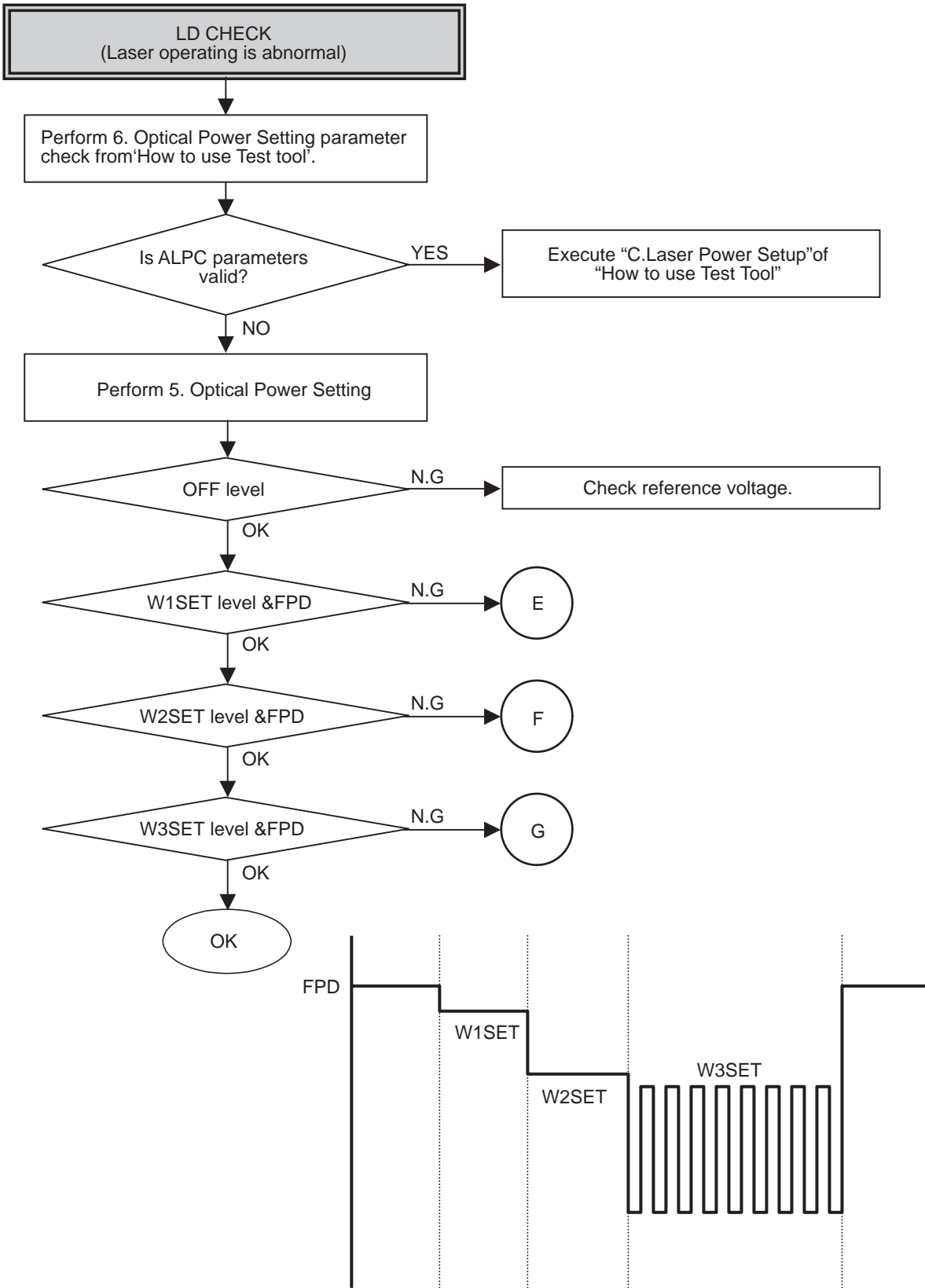


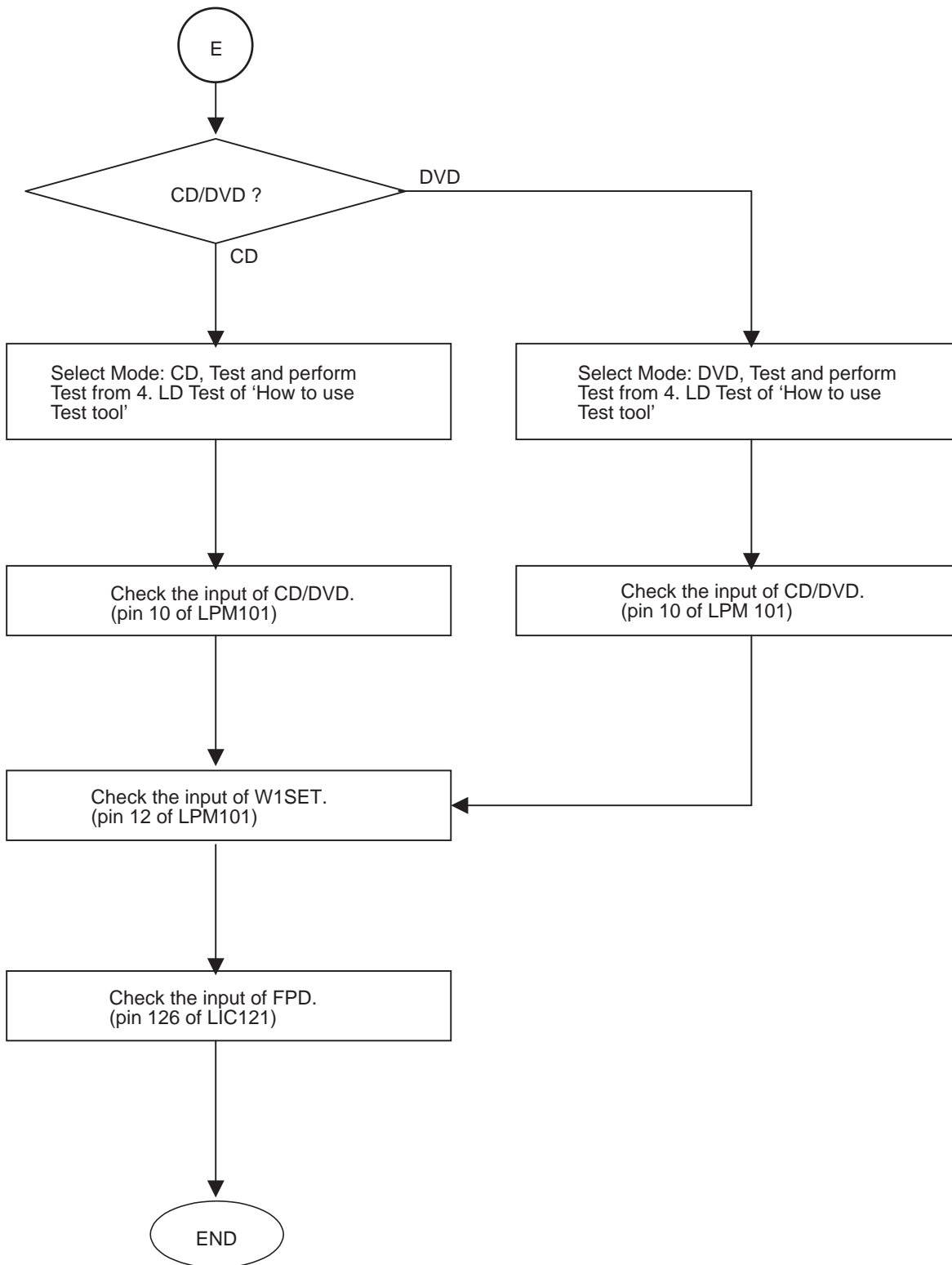
In case of writing fail.













Select Mode: DVD, Test and perform Test from 4. LD Test of 'How to use Test tool'

Check the input of CD/DVD.  
(pin 10 of LPM101)

Check the input of W2SET.  
(pin 13 of LPM101)

Check the input of recording pulse.  
(pin 19, 20, 21, 22,23,24 of LPM101)

Check the input of FPD.  
(pin 126 of LIC121)



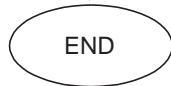
Select Mode: DVD, Test and perform Test from 4. LD Test of 'How to use Test tool'

Check the input of CD/DVD.  
(pin 10 of LPM101)

Check the input of W3SET.  
(pin 14 of LPM101)

Check the input of recording pulse.  
(pin 19, 20, 21, 22, 23, 24 of LPM101)

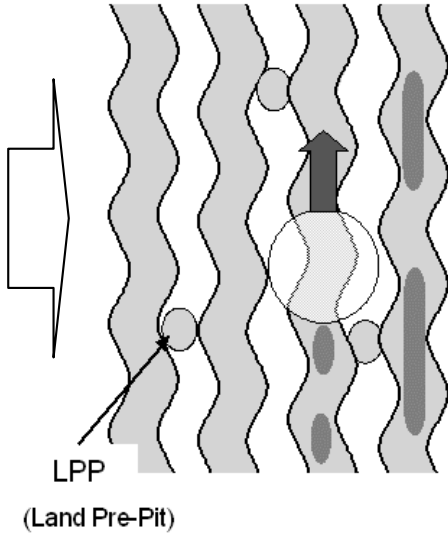
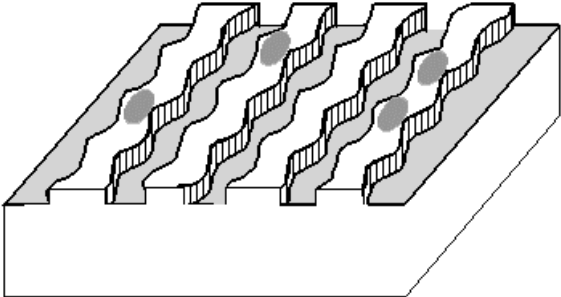
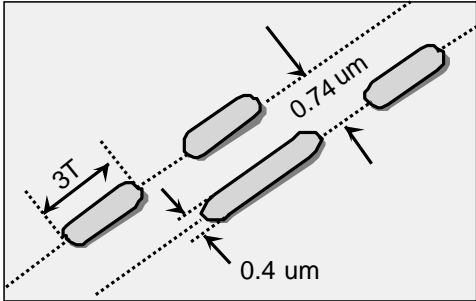
Check the input of FPD.  
(pin 126 of LIC121)



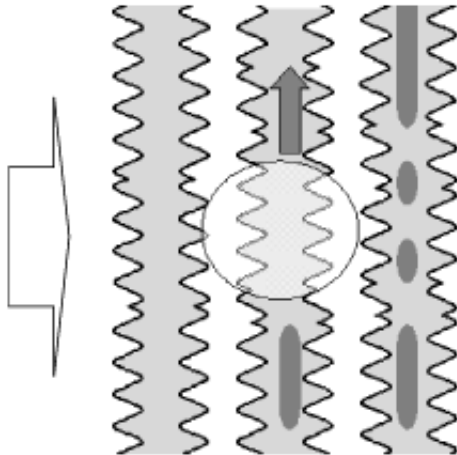
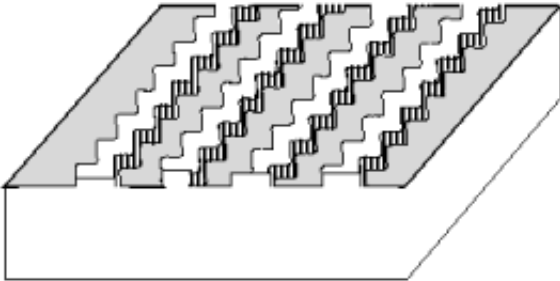
# THE DIFFERENCE OF DVD-R/RW, DVD+R/RW DISCS AND DVD-ROM

## 1. RECORDING LAYER

- DVD-ROM (Read Only Disc)



- DVD+R/RW Disc

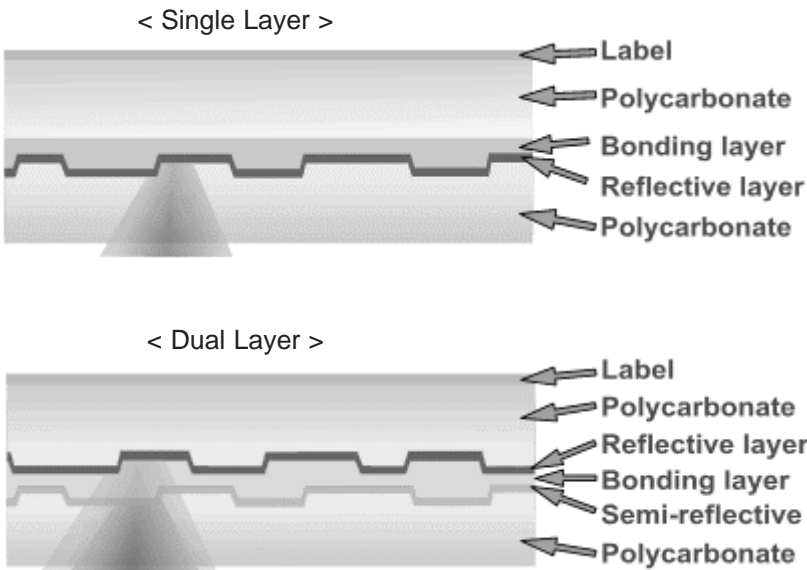


## 2. DISC SPECIFICATION

	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%	18~30%	45~85%	18~30%	45~85%	18~30%
Track pitch	0.74 $\mu$ m	0.74 $\mu$ m	0.74 $\mu$ m	0.74 $\mu$ m	0.74 $\mu$ m	0.74 $\mu$ m
Minimum pit length	0.4 $\mu$ m	0.4 $\mu$ m	0.4 $\mu$ m	0.4 $\mu$ m	0.4 $\mu$ m	0.4 $\mu$ m
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 $\pm$ 0.1	0.7 $\pm$ 0.1
Write Power (mW)	–					
Jitter	<8%	<8%	<8%	<8%	<9%	<9%

## 3. DISC MATERIALS

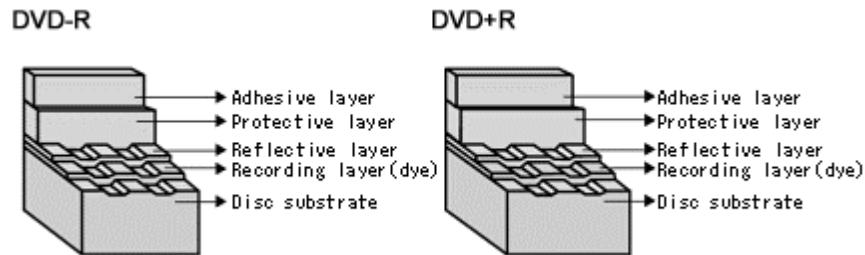
### 1) DVD-ROM



## 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



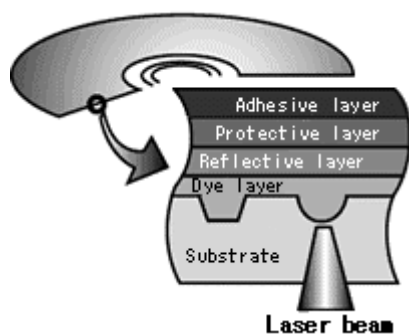
### ► Recording principles

#### [ 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.

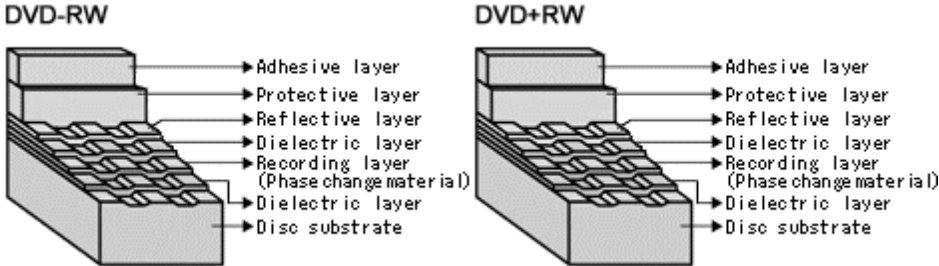
#### [ Playback ]

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



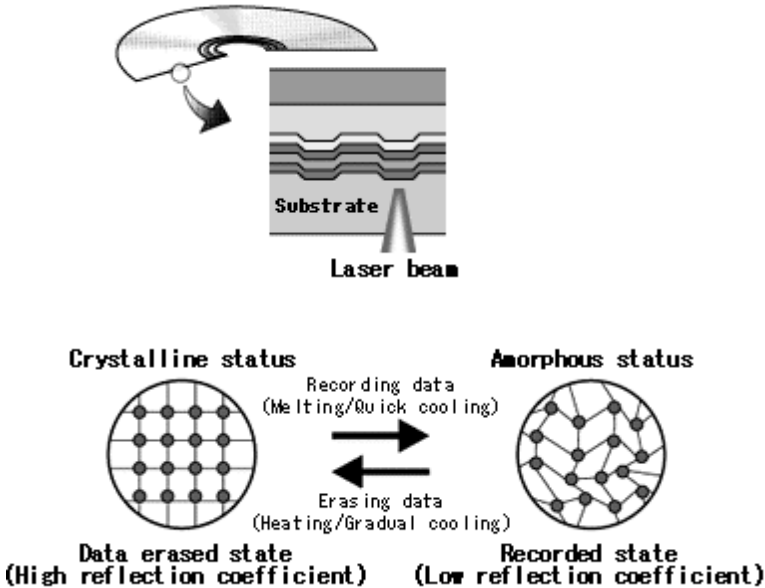
- ▶ Recording principles

**[ Recording ]**

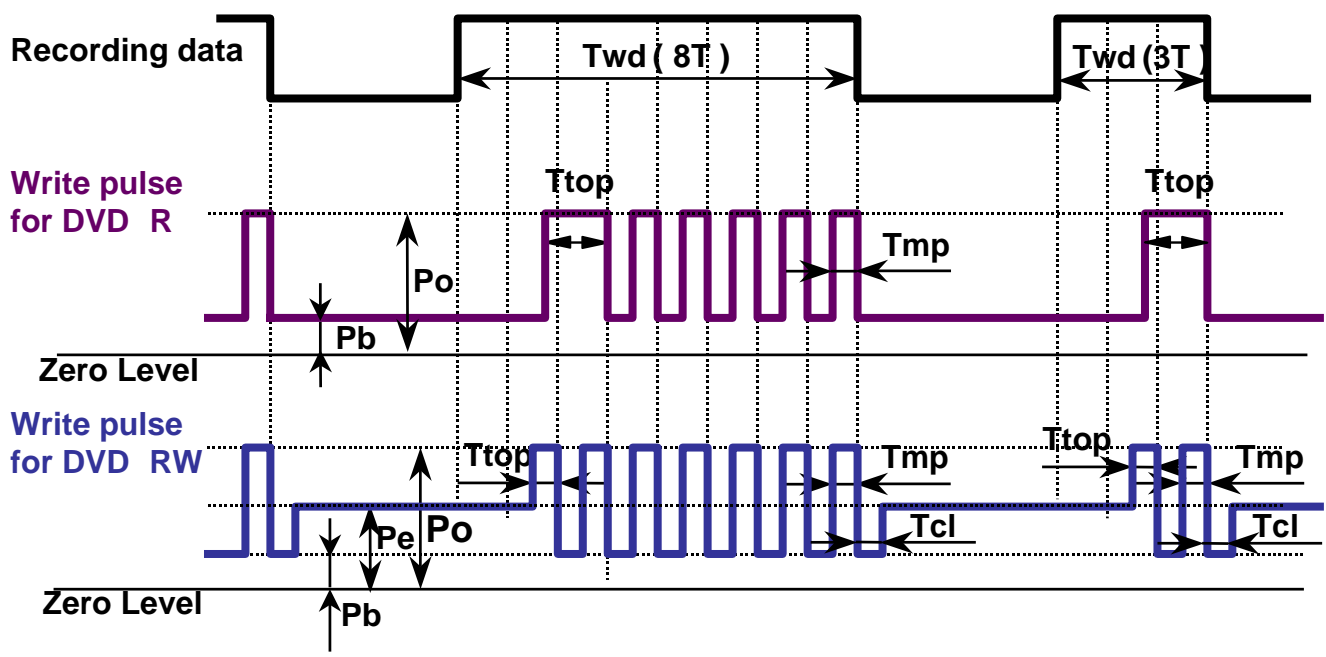
When a high-power laser is applied to the recording material, it melts and then becomes amorphous with a low reflection coefficient when it quickly cools off. When a mid-power laser is applied to heat gradually the recording material and then gradually cools it off, it becomes crystal with a high reflection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

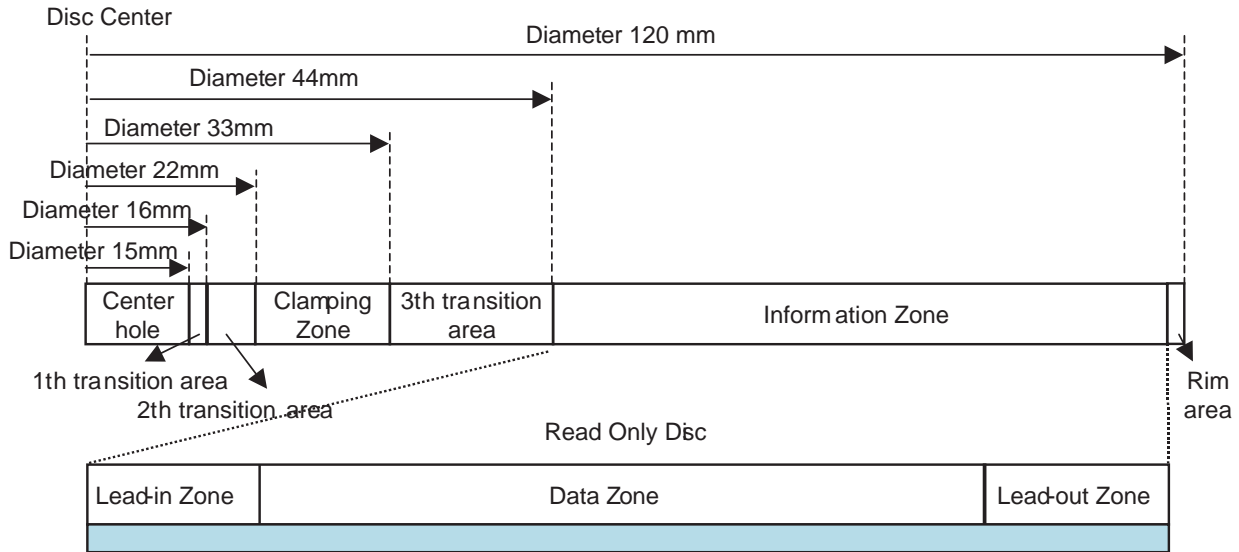


$P_o$  :Write Power (Peak Power)  
 $P_e$  :Erase Power  
 $P_b$  :Bias Power

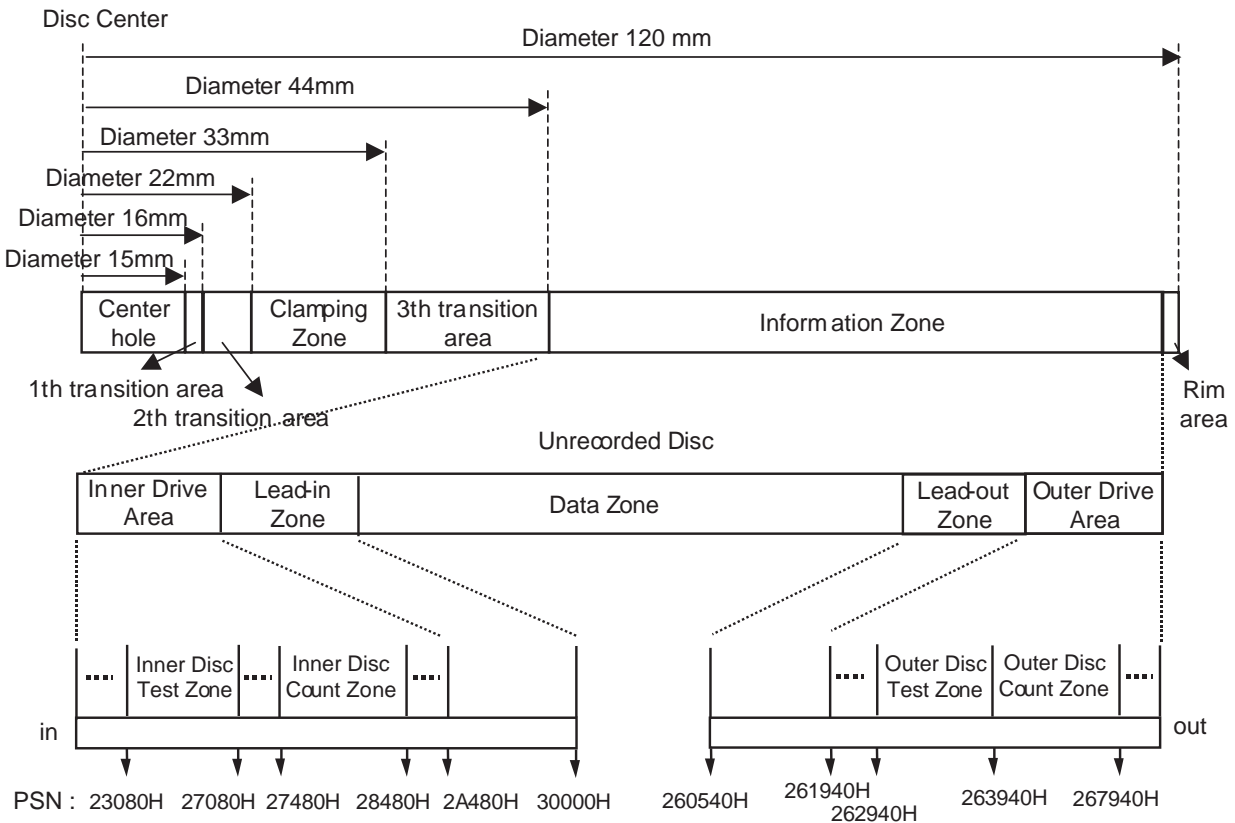


## 4. ORGANIZATION OF THE INNER DRIVE AREA, OUTER DRIVE AREA, LEAD-IN ZONE AND LEAD-OUT ZONE

### 1) Layout of DVD-R/DL disc



### 2) Layout of DVD+R disc



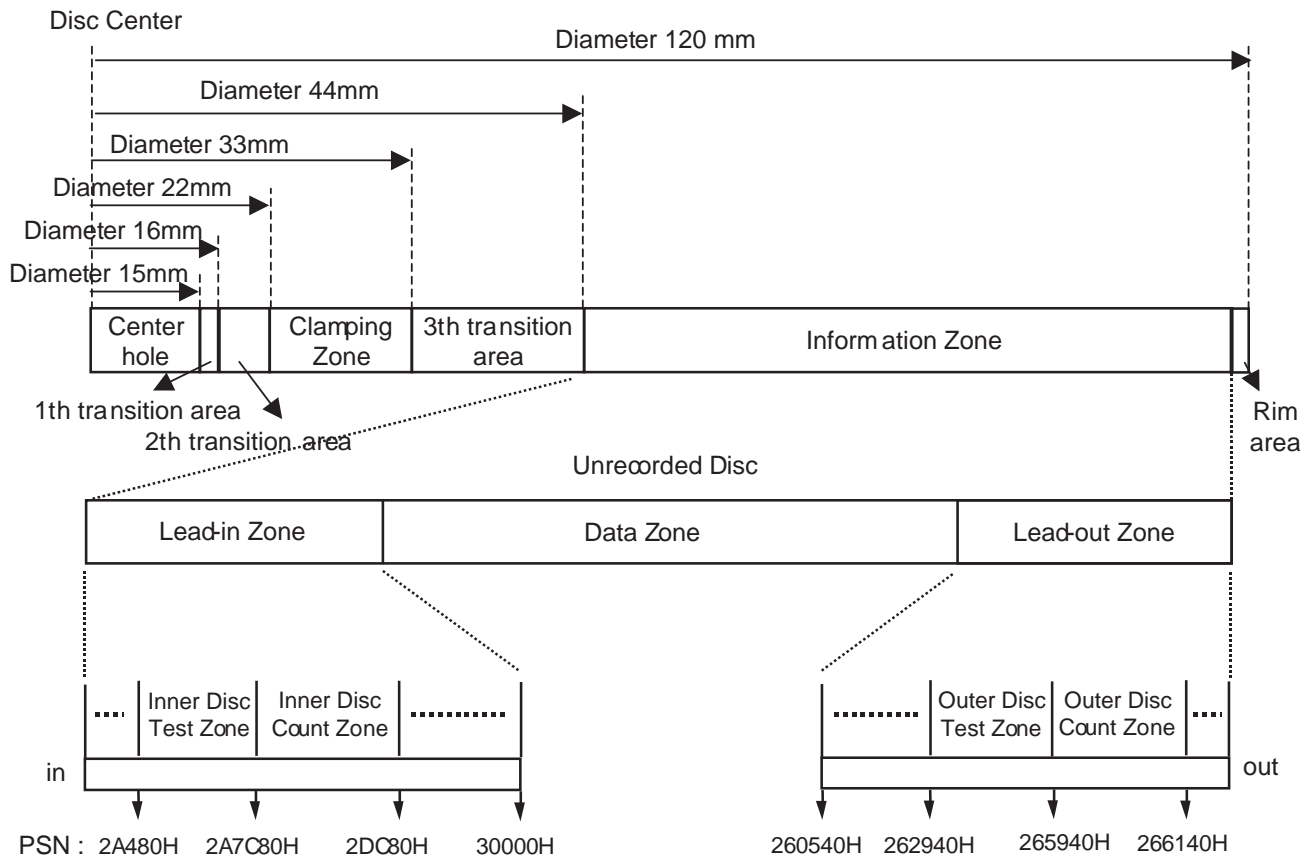
Inner Disc Test Zone : for performing OPC procedures.

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

Outer Disc Test Zone : for performing OPC procedures.

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

### 3) Layout of DVD+RW disc



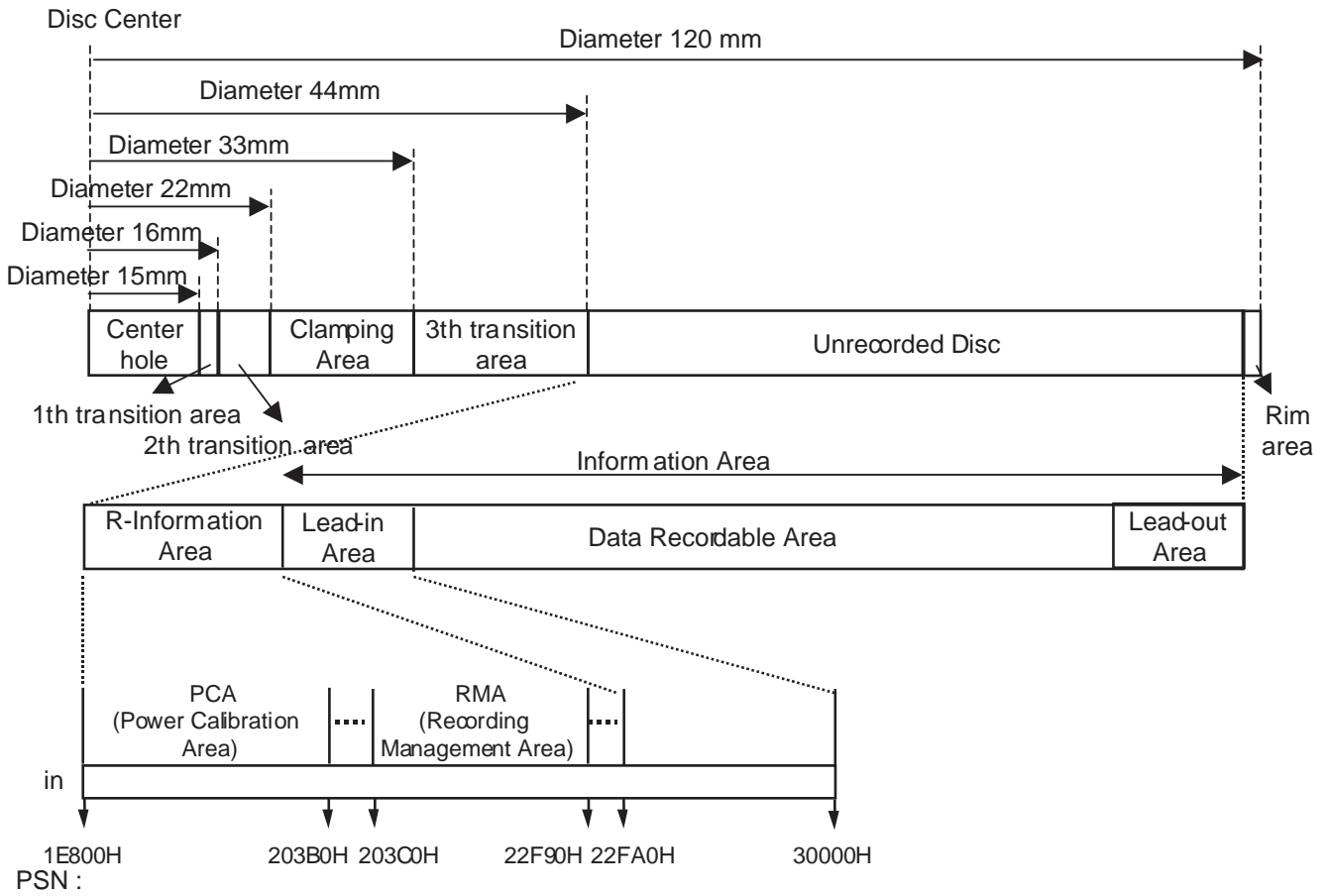
Inner Disc Test Zone : for performing OPC procedures.

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

Outer Disc Test Zone : for performing OPC procedures.

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

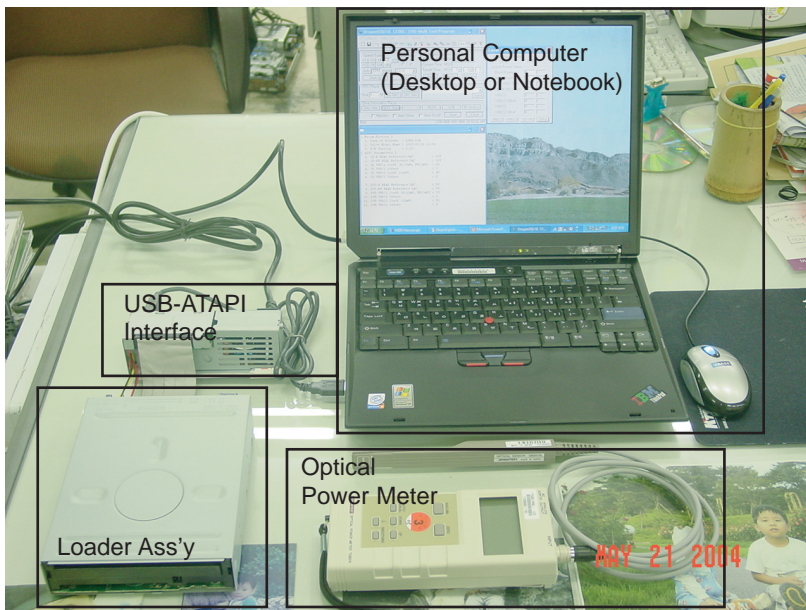
We need basically several measurement instrument to adjust Optical Power of CD and DVD Disc

- **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

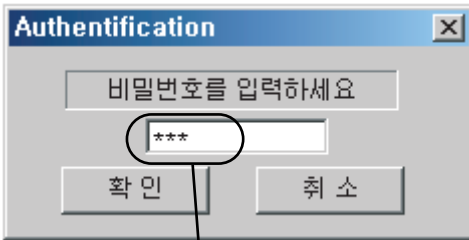
Use the ALPC program in Dragon tool for Optical power setting. It is consist of total 4 files.

Dragon\_JW3P.exe  
dragon.cfg  
blue.dat  
WNASPI32.DLL

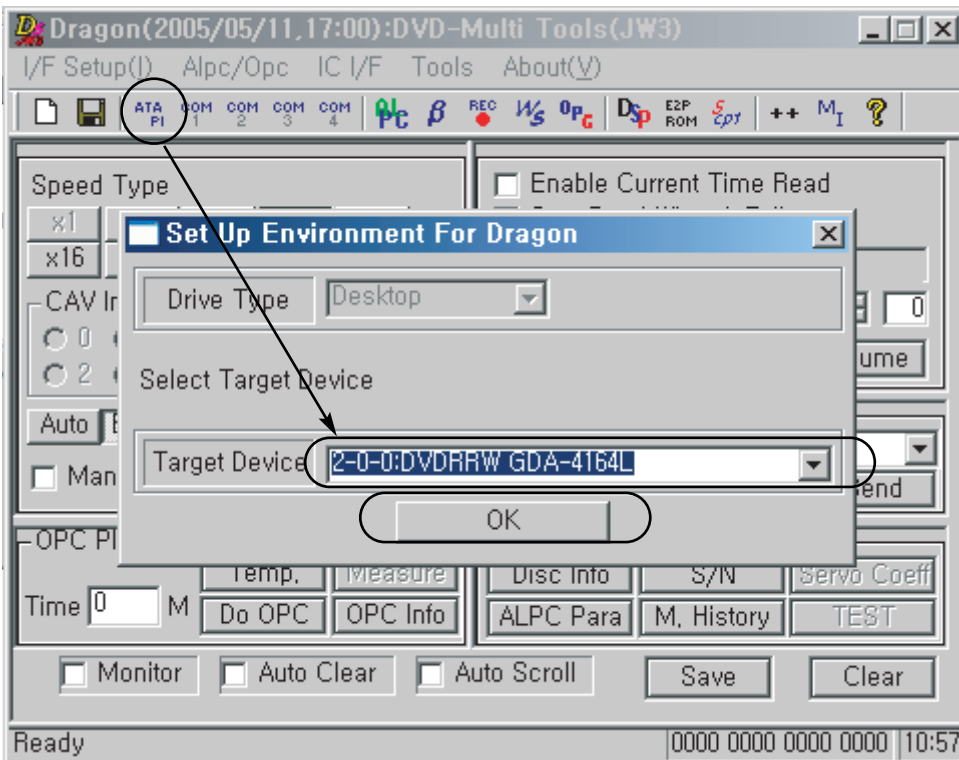
Four files must exist in same Directory.

### 3. EXECUTE ALPC PROGRAM

1) Execute Dragon\_JW3P.exe file.

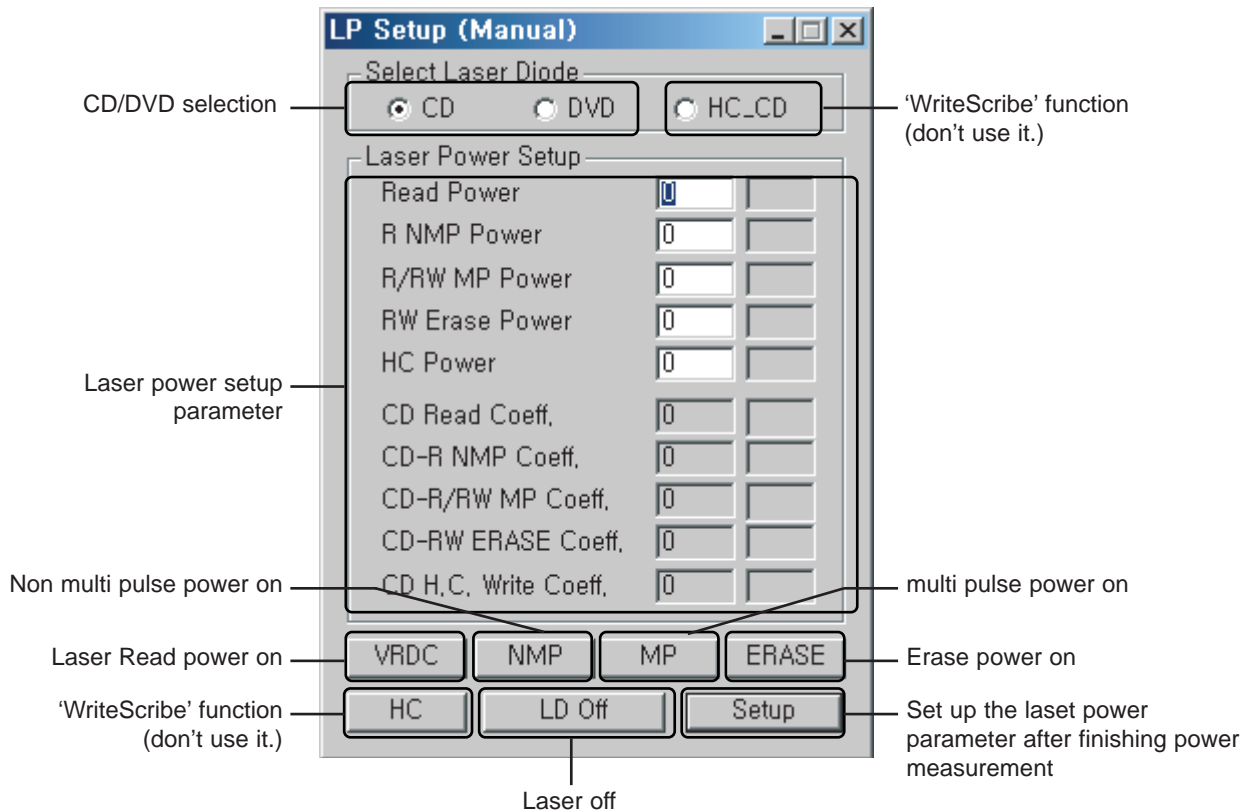
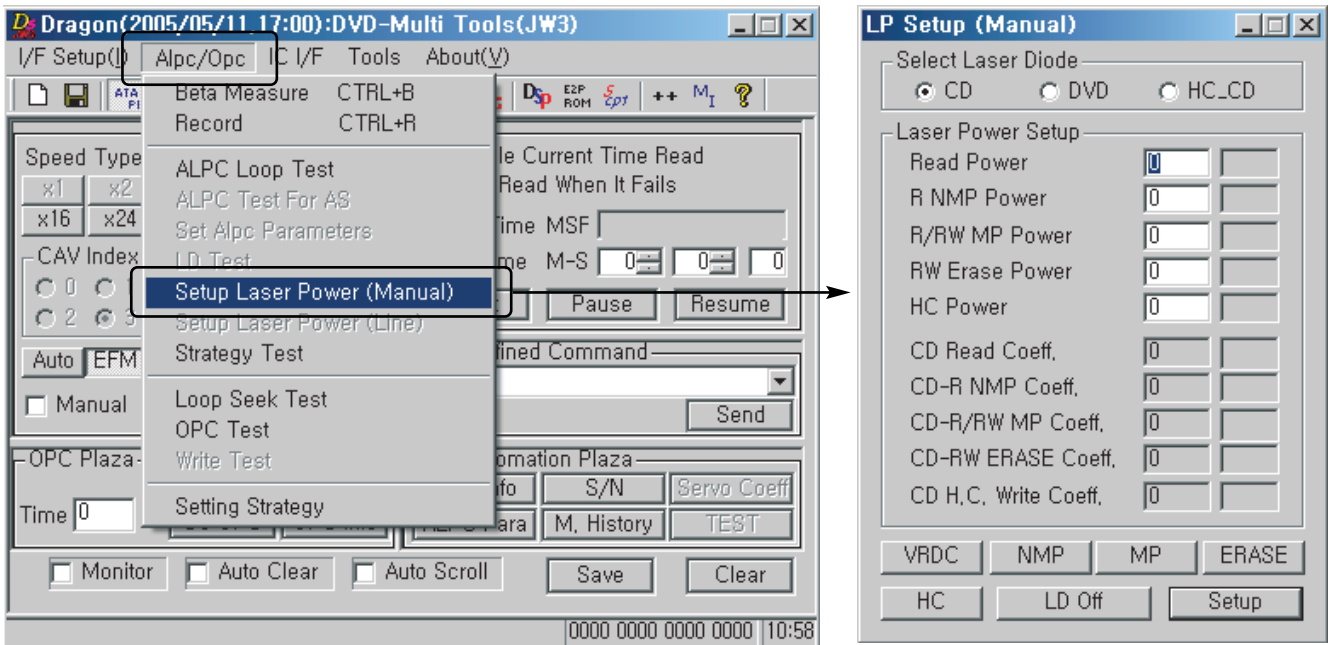


2) Enter the password. It is 'qaz'.  
When you enter the password, turn off the 'Caps lock' in your keyboard.



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.



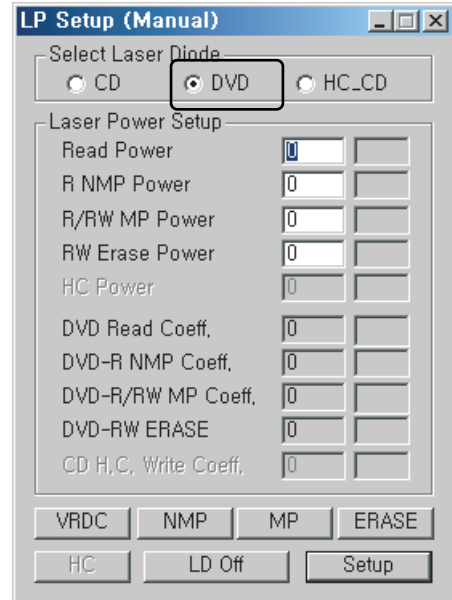
## 4. OPTICAL POWER SETTING

<Test for checking DVD LD and CD LD>

When you change the Travers ass<sup>o</sup>Øy(including pick-up) or loader PCB, you must do the laser power setting to match pick-up and loader PCB.

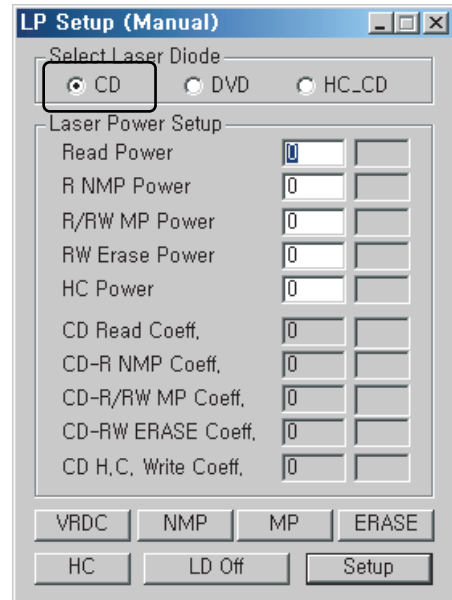
### 1) DVD LD power setting

- 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-01A, 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-01A only support reading function about CD-R/RW.



\* Look at reference sheet to test Optical Power.

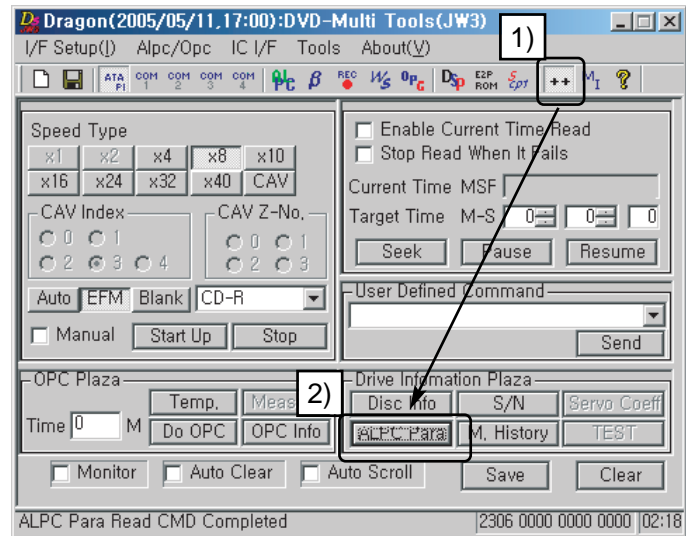
\*\*Power value is  $\beta$ — unit. Value is read power X 100.

## 5. CONFIRM OPTICAL POWER SETTING PARAMETER

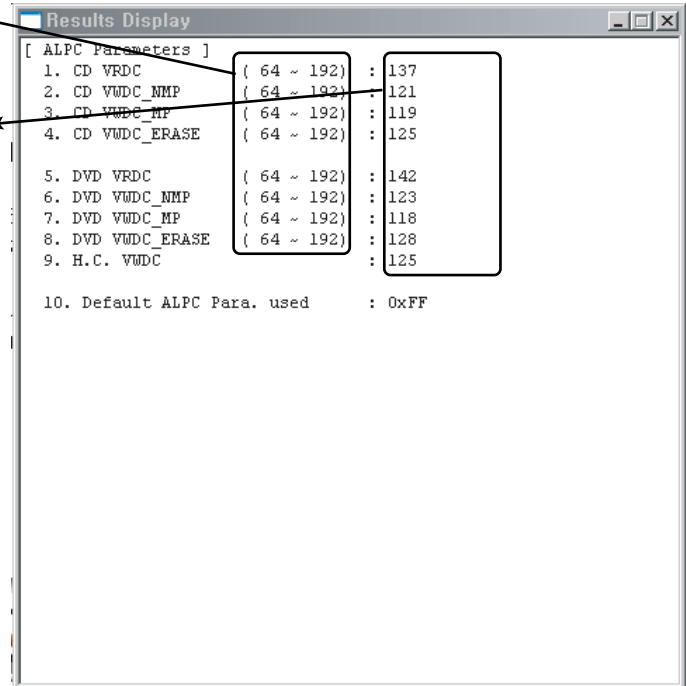
LD Test result is ok, but Loader performance is bad.

### 1. Check ALPC parameter value

- 1) Press **++** button to open 'Results Display' dialog.
- 2) Press **ALPC Para** 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.



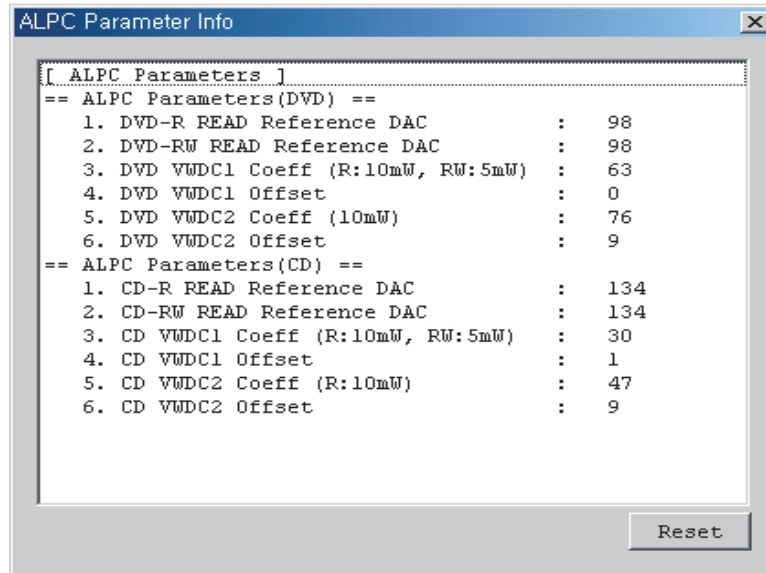
Normal range of ALPC parameter



Optical power value which has been saved in the EEPROM



## 6. OPTICAL POWER SETTING PARAMETER RANGE



[VALID ALPC Parameters]

< CD >

<DVD>

1) CD-R READ Reference DAC	: 30 ~150
2) CD-RW READ Reference DAC	: 80 ~ 250
3) VWDC1	: 10 ~ 39
4) VWDC1 Offset	: 0 ~ 20
5) VWDC2	: 20 ~ 57
6) VWDC2 Offset	: 0 ~ 20

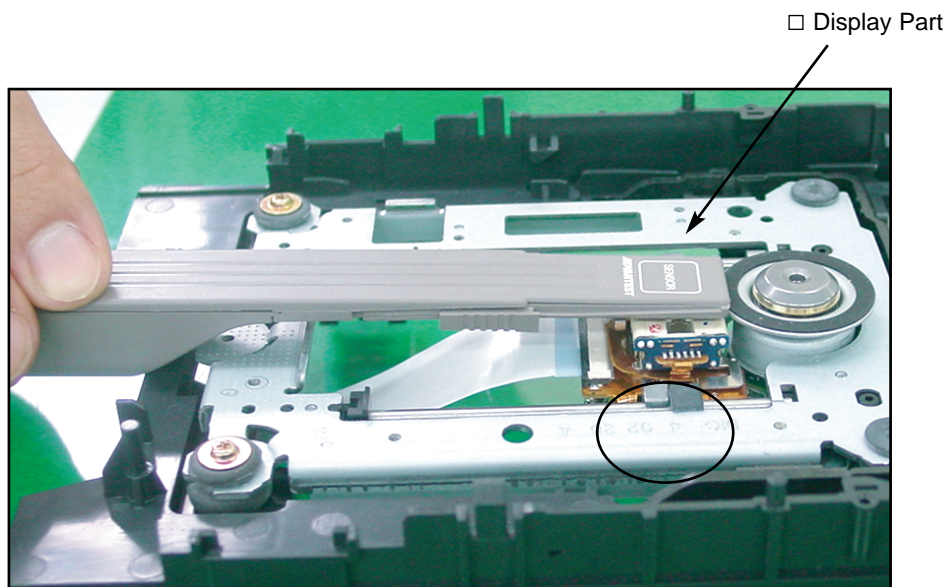
1) DVD-R READ Reference DAC	: 40 ~145
2) DVD-RW READ Reference DAC	: 40 ~145
3) VWDC1	: 30 ~ 100
4) VWDC1 Offset	: 0 ~ 20
5) VWDC2	: 40 ~ 140
6) VWDC2 Offset	: 0 ~ 20

## 7. 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  $100\text{mW}$ .

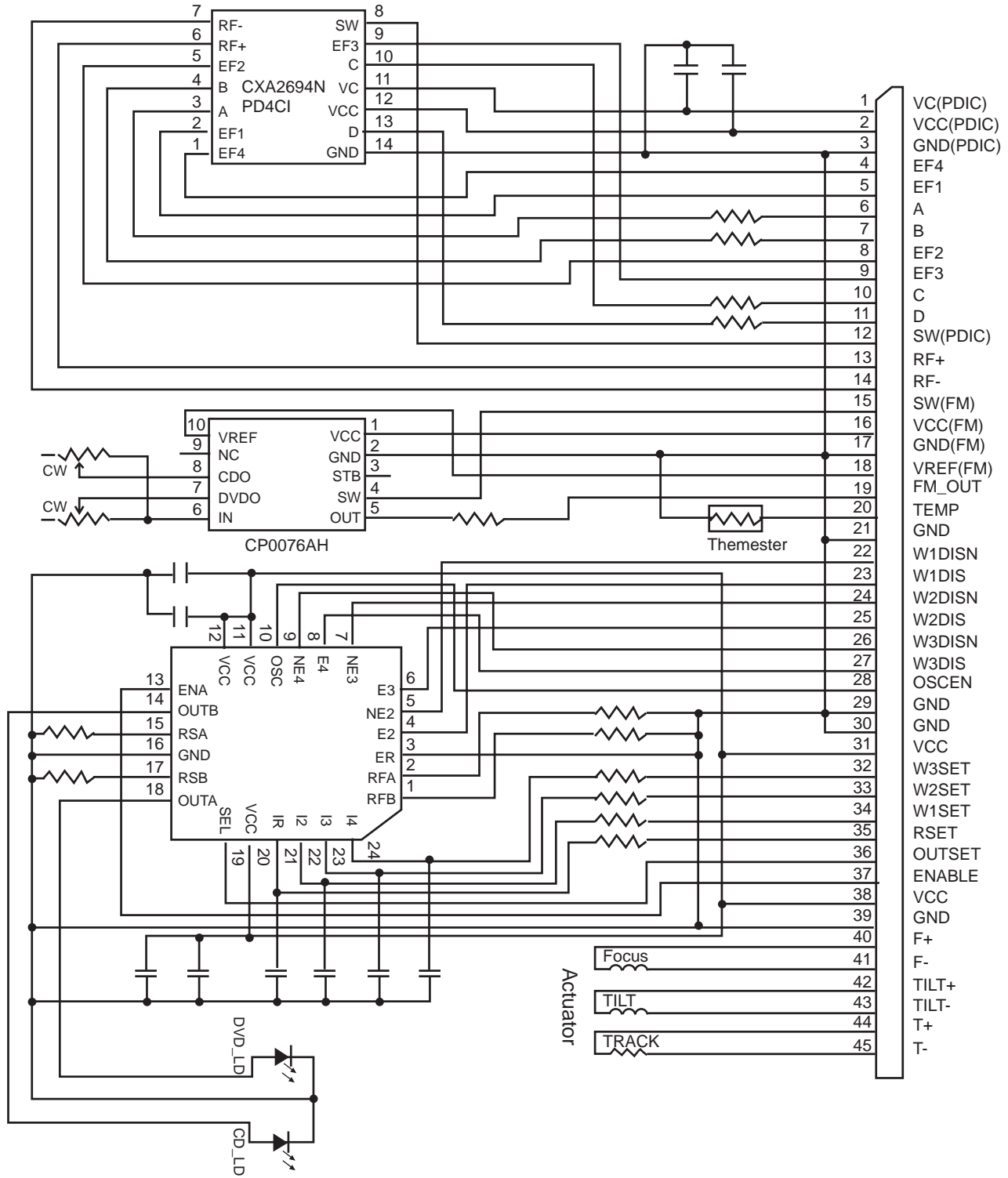
Optical Power measurement method

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



# INTERNAL STRUCTURE OF THE PICK-UP

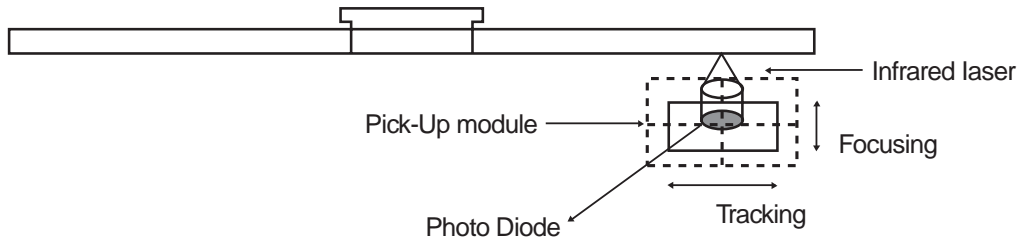
## 1. BLOCK DIAGRAM OF THE PICK-UP(LPC-812R)



## 2. PICK UP PIN ASSIGNMENT

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

### 3. SIGNAL DETECTION OF THE P/U



#### 1) Focus Error Signal ==> (A+C)-(B+D)

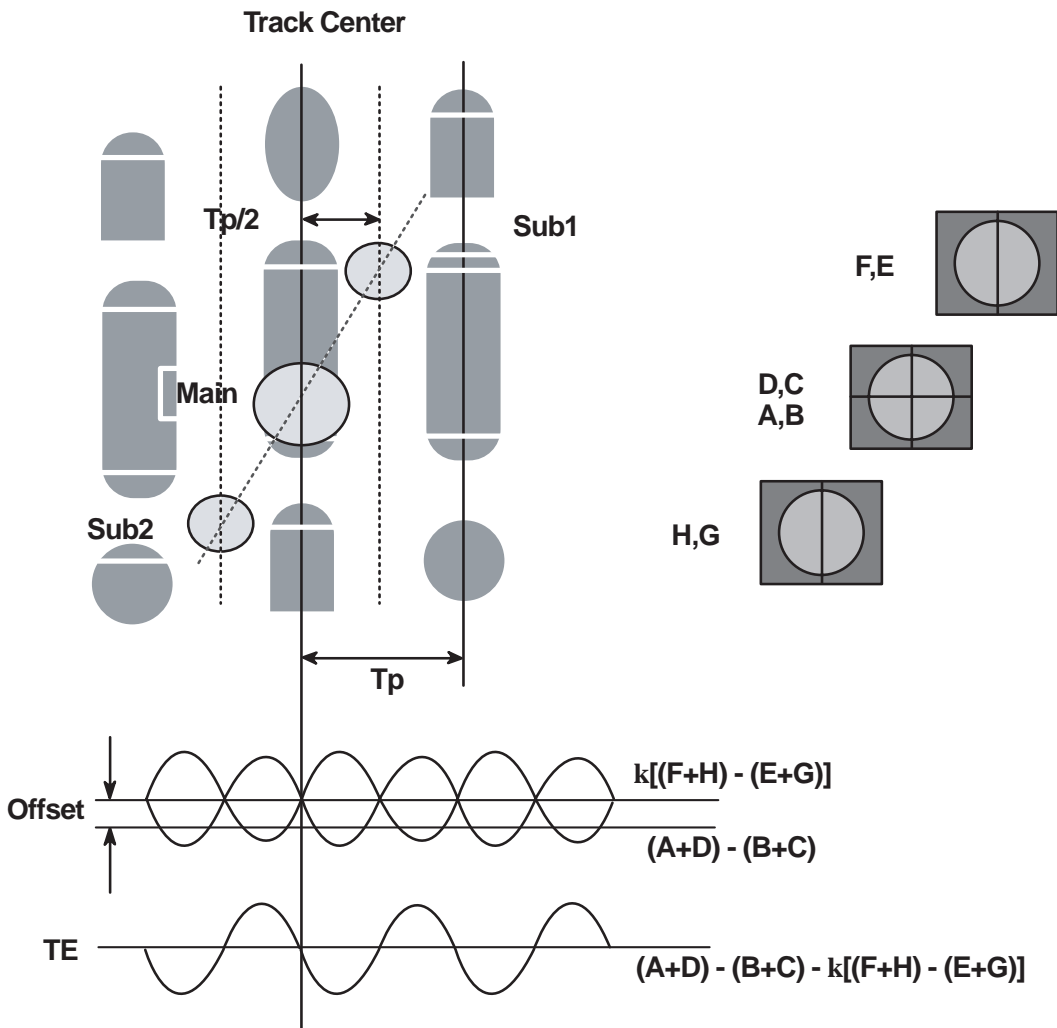
This signal is generated in RF IC (LIC121 : AN22113A) and controls the pick-up's up and down to focus on Disc.

#### 2) Tracking Error Signal (DPP Method) ==> $\{(A+D)-(B+C)\} - k \times \{(EF_1+EF_4)-(EF_2+EF_3)\}$

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 ==> (A+B+C+D)

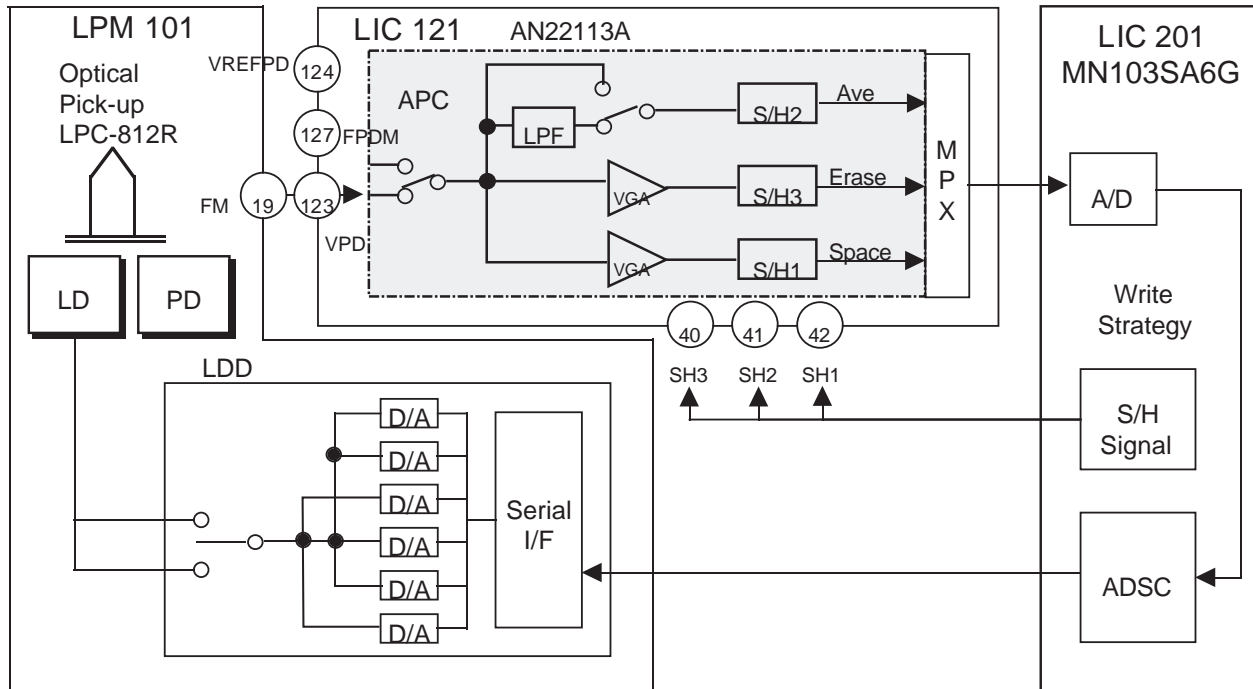
This signal is converted to DATA signal in DSP IC (LIC201 : MN103SA6G).



# DESCRIPTION OF CIRCUIT

## 1. ALPC (AUTOMATIC LASER POWER CONTROL) CIRCUIT

### 1-1. BLOCK DIAGRAM

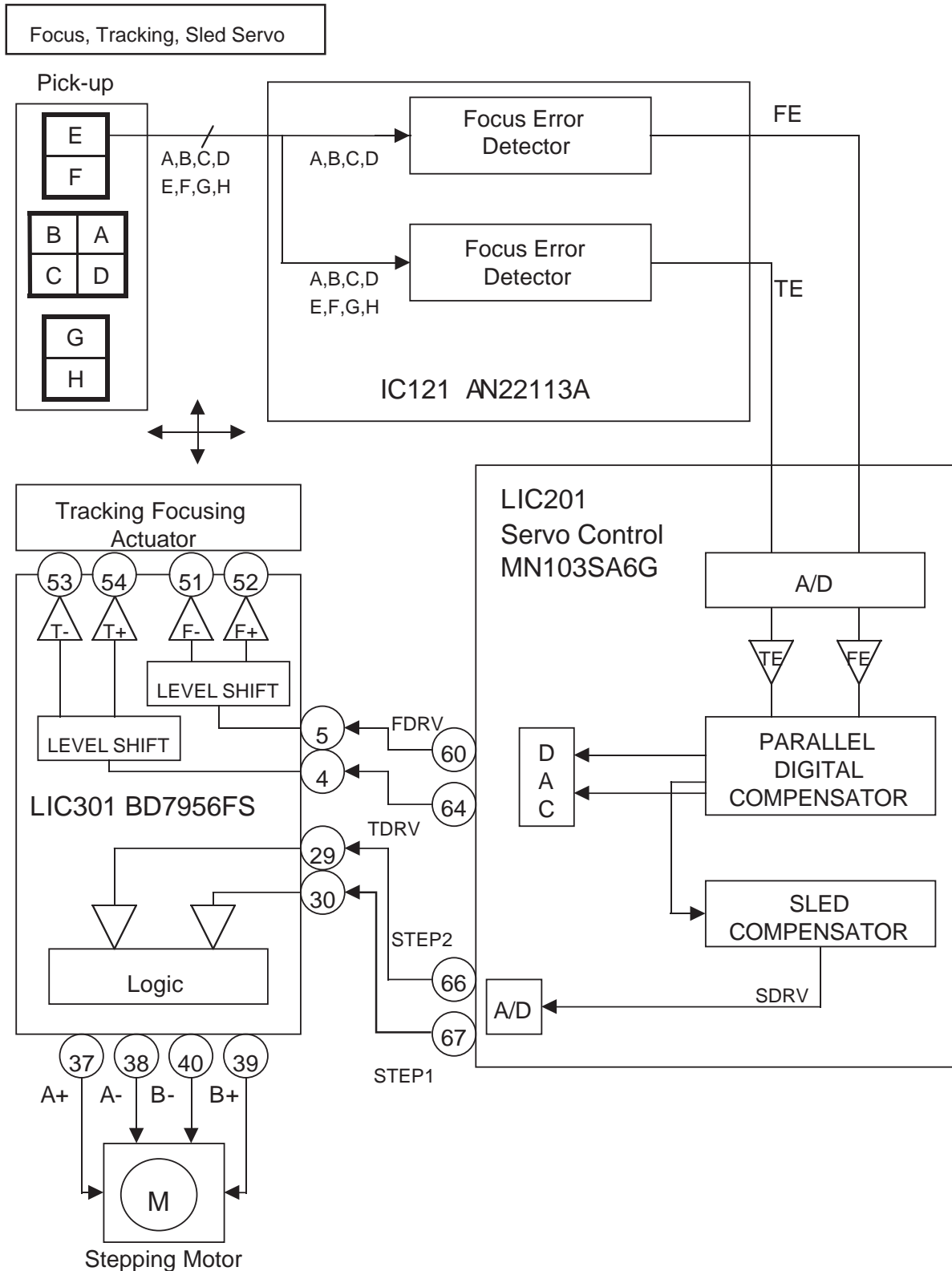


### 1-2. ALPC (AUTOMATIC LASER POWER CONTROL) CIRCUIT OPERATION

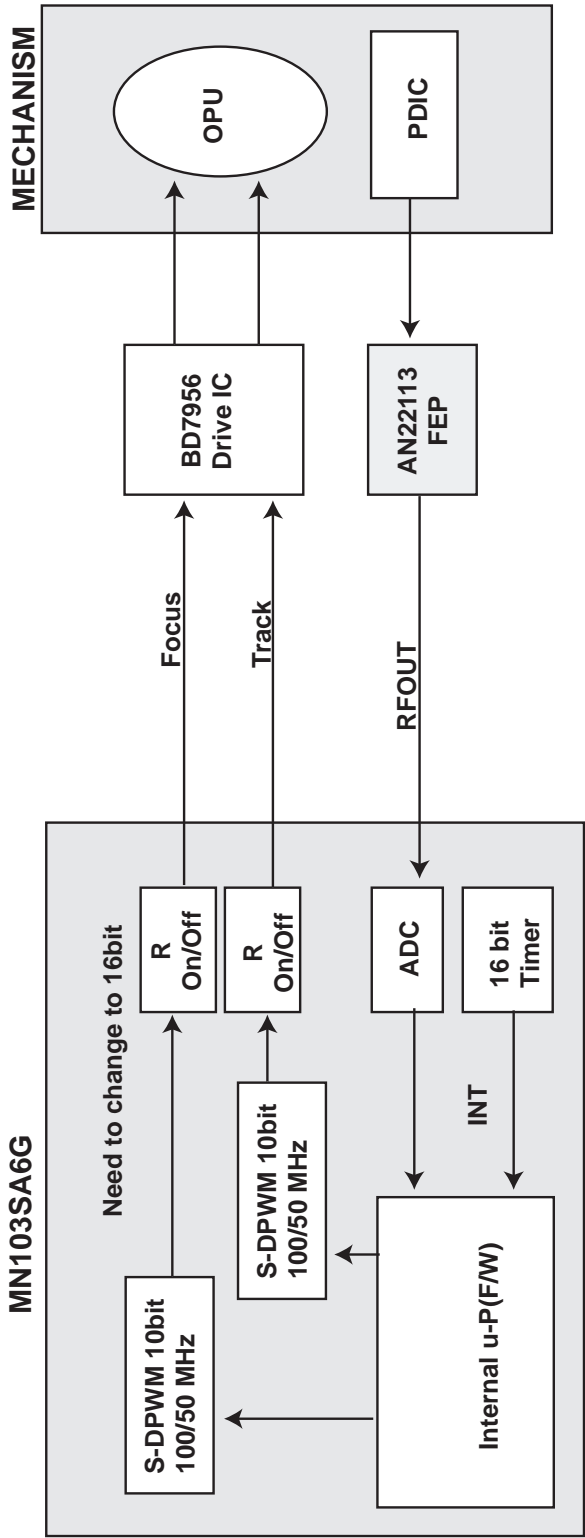
THE ALPC BLOCK DETECTS THE LASER OUTPUT POWER OF THE FRONT MONITOR. THE POWER SIGNAL DETECTED WITH THE PD FOR FRONT MONITOR  
DETECTION IS INPUT THE VOLTAGE FROM THE VPD PIN(123PIN) OR THE FPDM PIN(127PIN), THE REFERENCE SIGNAL OF THE INPUT SIGNAL IS  
INPUT FROM THE VREFPD PIN(124PIN). THE ALPC BLOCK 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



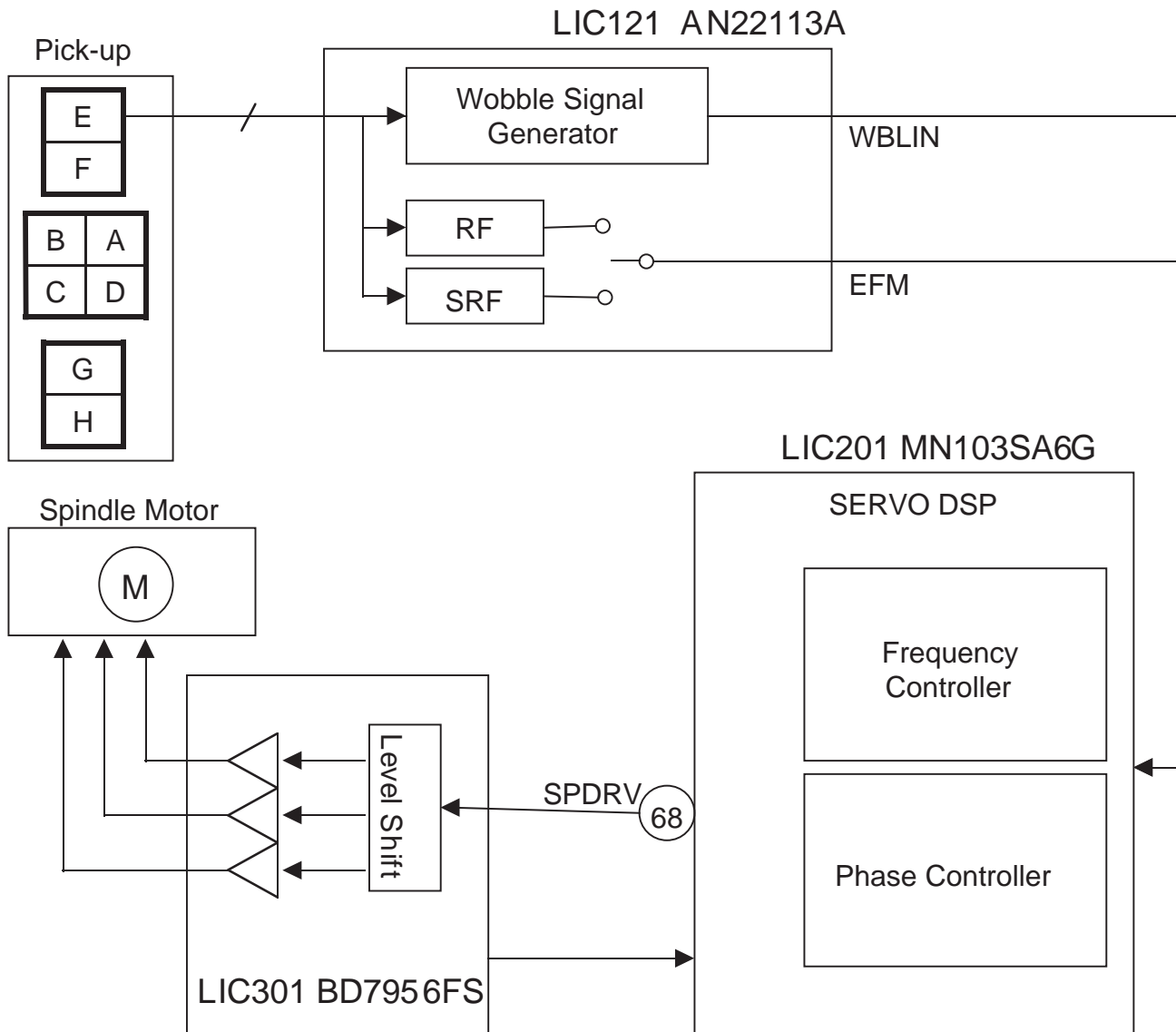
2-1. FOCUS, TRACKING & SLED SERVO PROCESS





### 3. SPINDLE SERVO CIRCUIT

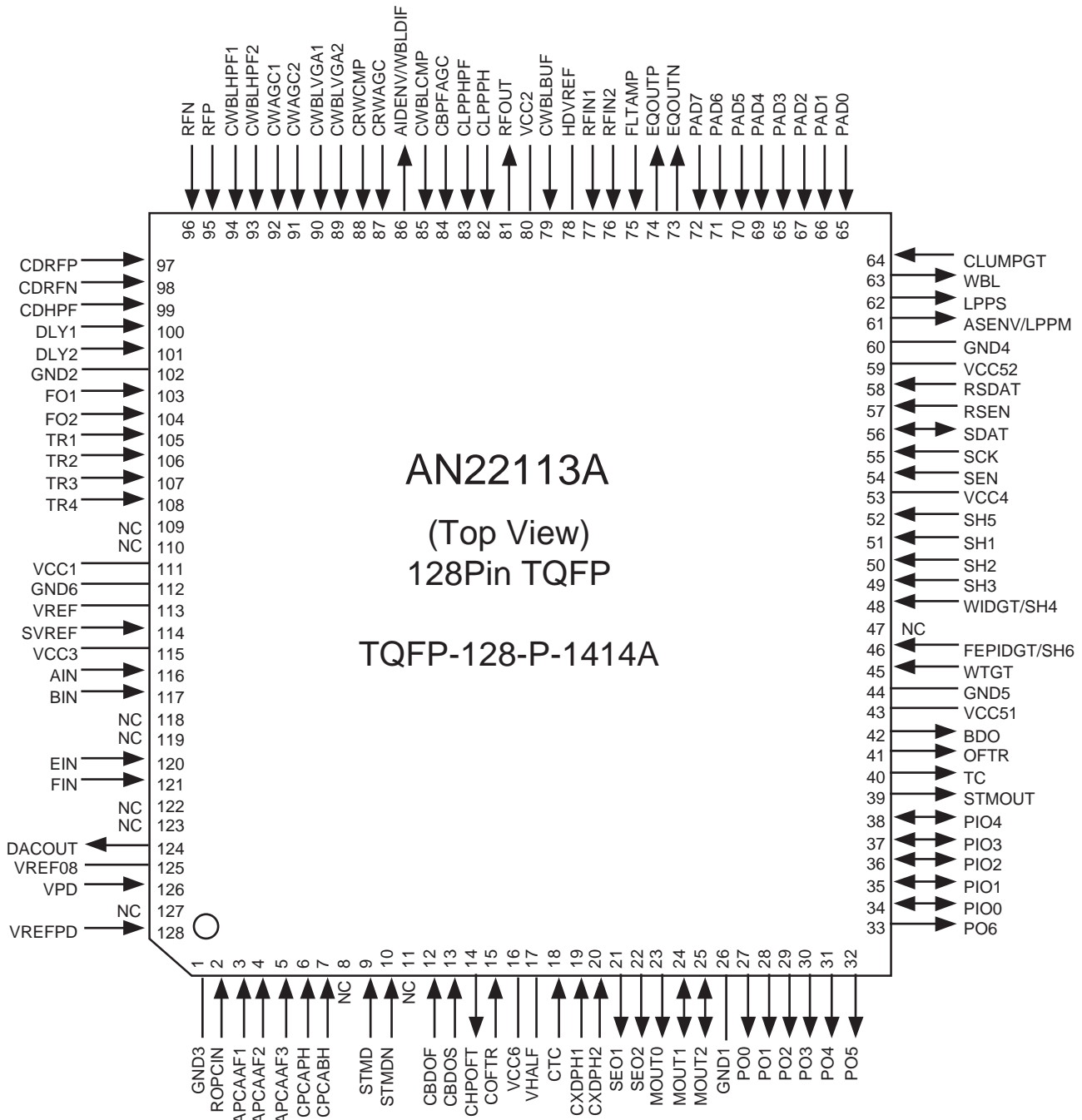
#### 3-1. SPINDLE SERVO PROCESS



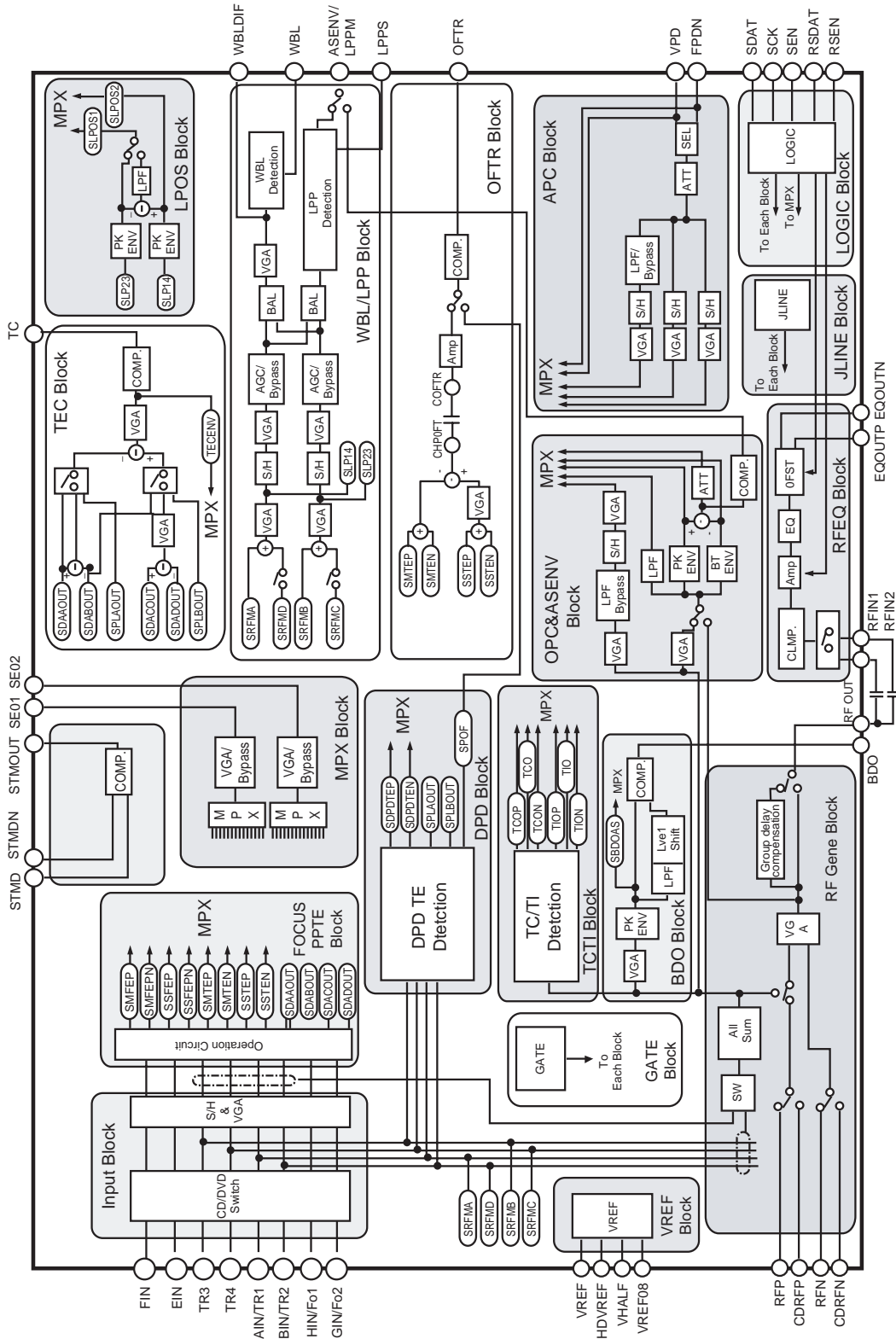
# MAJOR IC INTERNAL BLOCK DIAGRAM

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

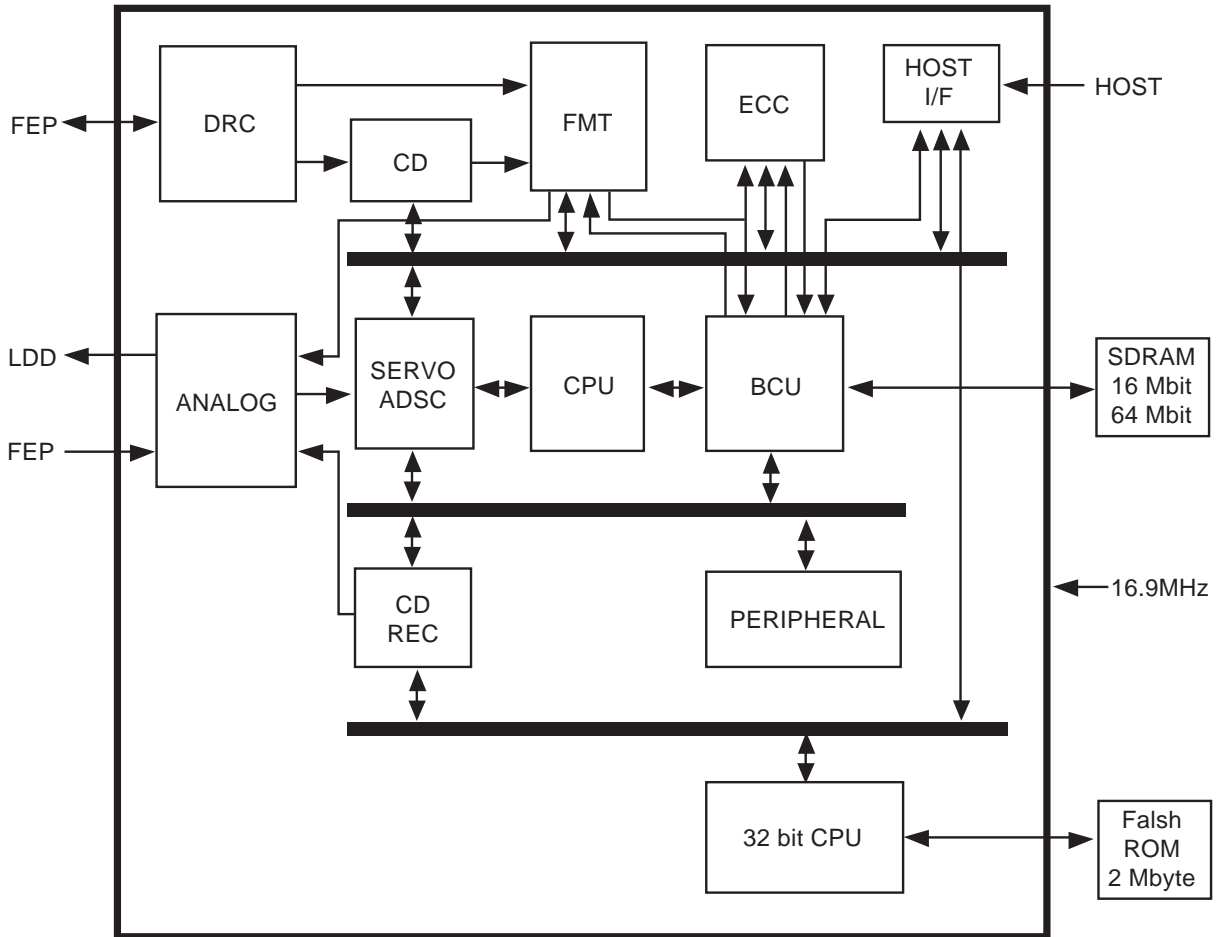
### • PIN ASSIGNMENT



• BLOCK DIAGRAM

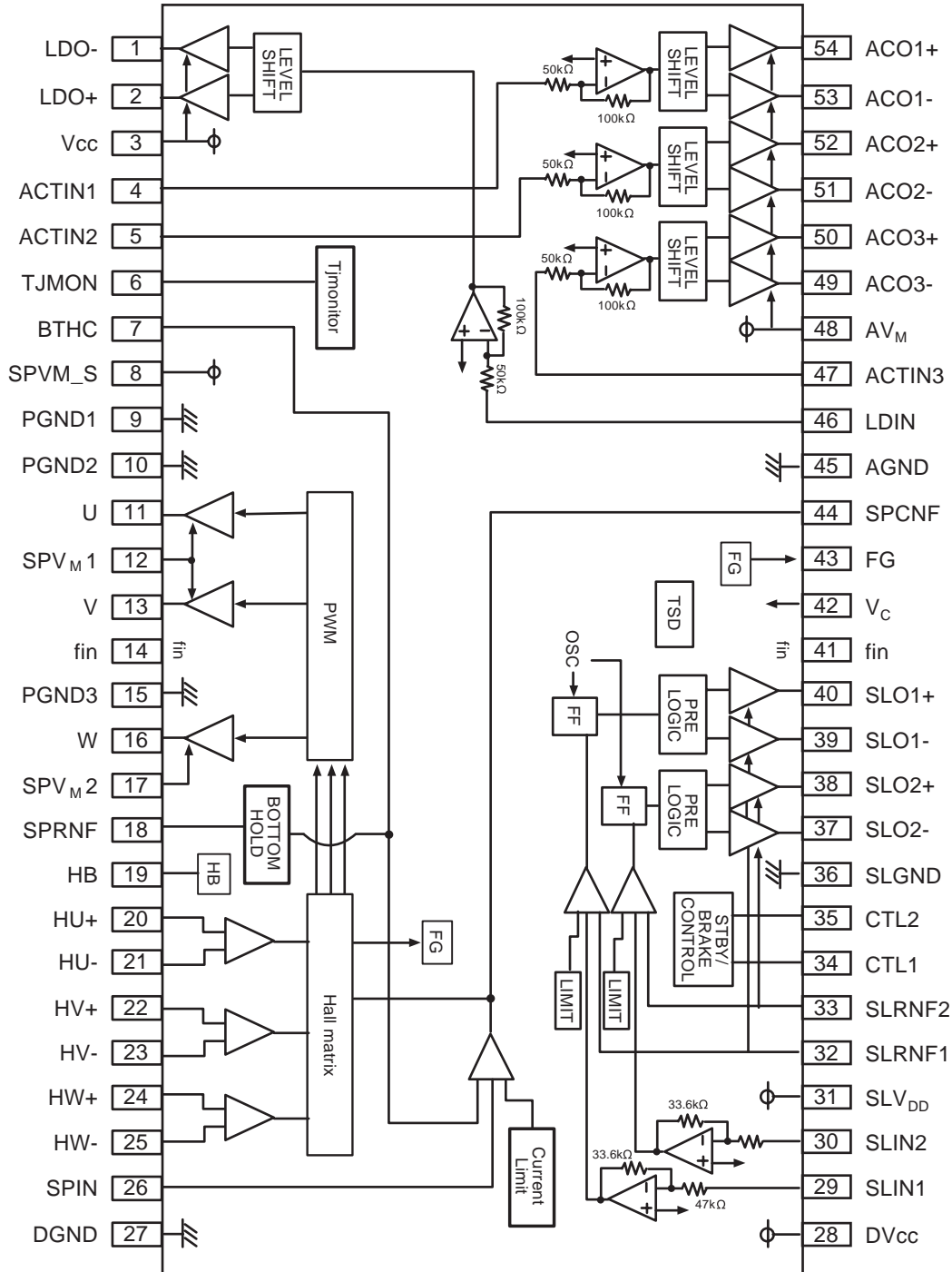


• BLOCK DIAGRAM



# IC301 (BD7956FS) : CD-ROM/DVD-ROM 7CH POWER DRIVER

## • BLOCK DIAGRAM

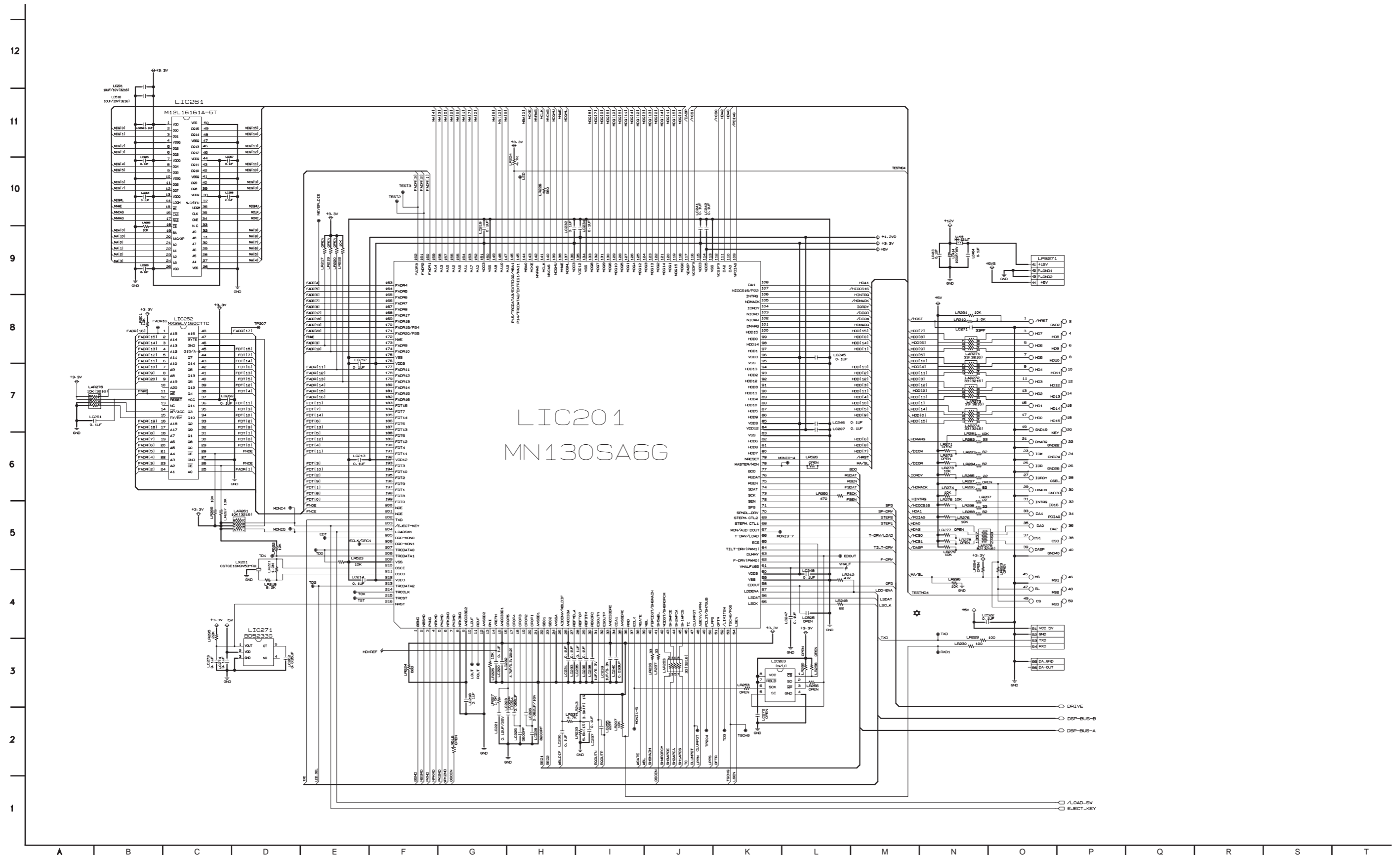


# MEMO

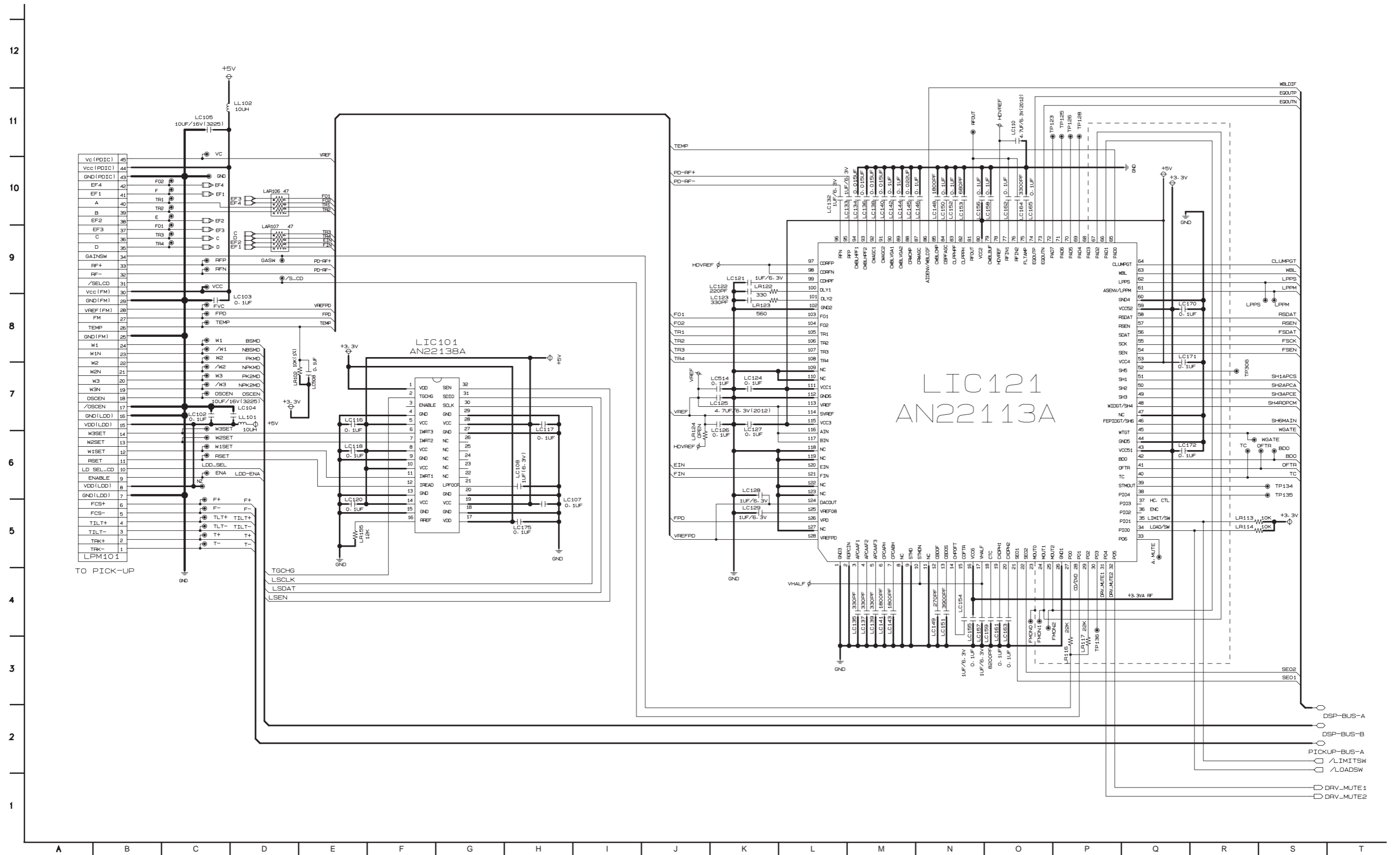
A series of horizontal dotted lines for writing.

# CIRCUIT DIAGRAMS

## 1. DSP CIRCUIT DIAGRAM

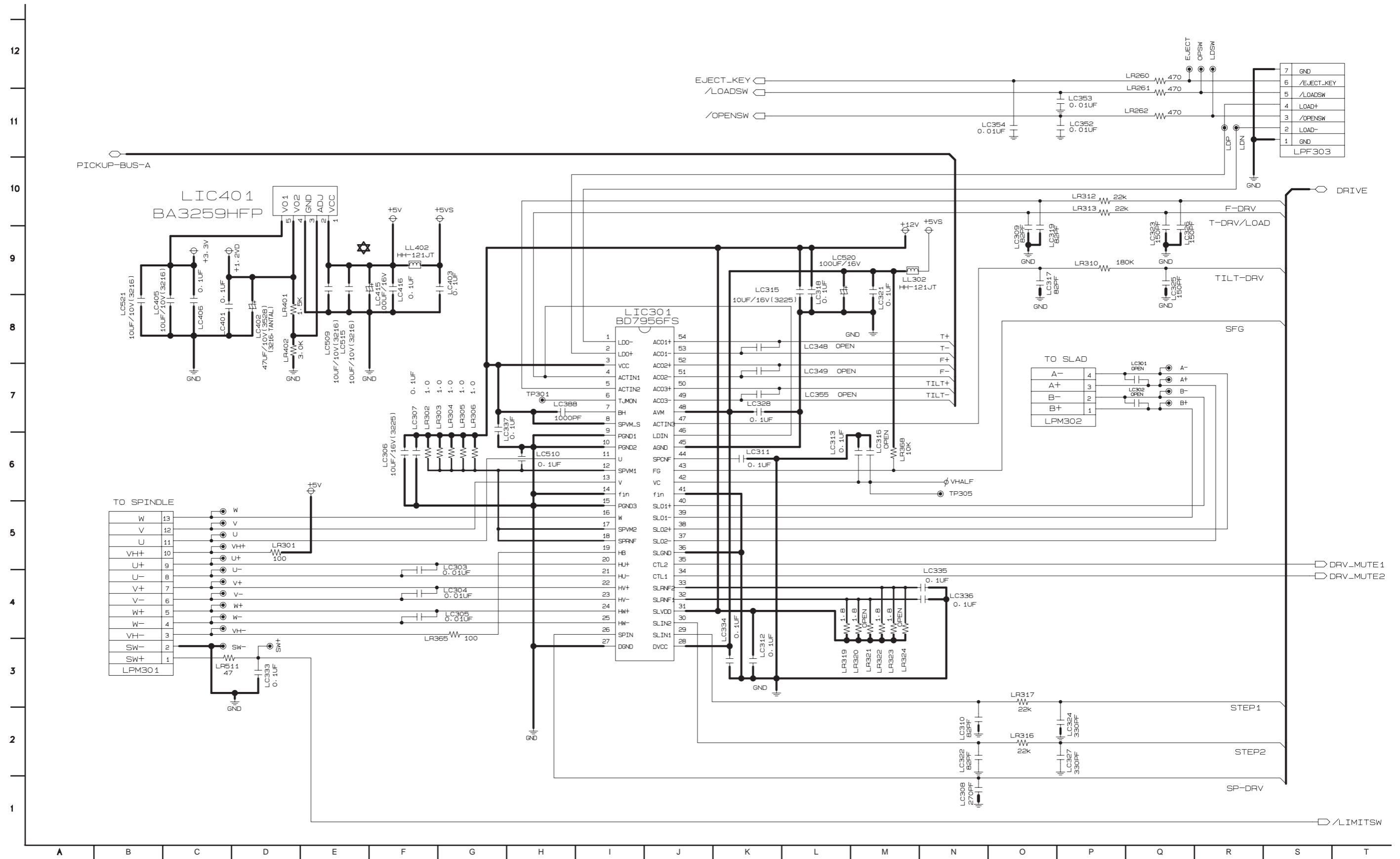


## 2. RF CIRCUIT DIAGRAM





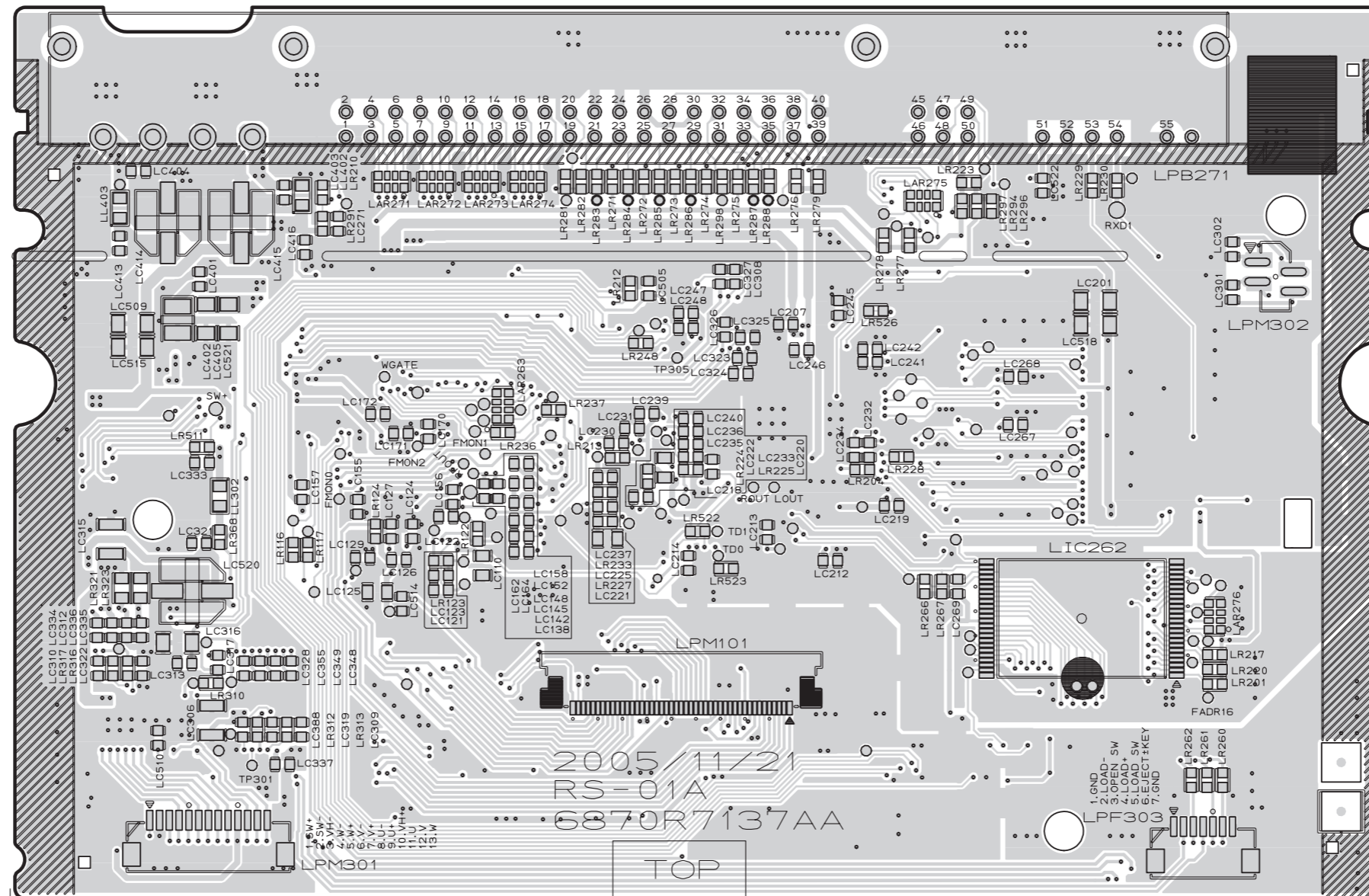
### 3. DRIVE CIRCUIT DIAGRAM





# PRINTED CIRCUIT DIAGRAMS

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



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

