



# SERVICE MANUAL

SERVICE MANUAL

MODEL : M56

# SERVICE MANUAL

**M56**

**Blu-ray Disc™ PLAYER**

**M56**  
Blu-ray Disc™ PLAYER

**M56**



**M56**  
Blu-ray Disc™ PLAYER

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**NAD ELECTRONICS INTERNATIONAL  
TORONTO**

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# SECTION 1

## SUMMARY

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# PRODUCT SAFETY SERVICING GUIDELINES FOR BLU-RAY DISC PLAYER 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 NAD 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 NAD 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 non-insulated "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:

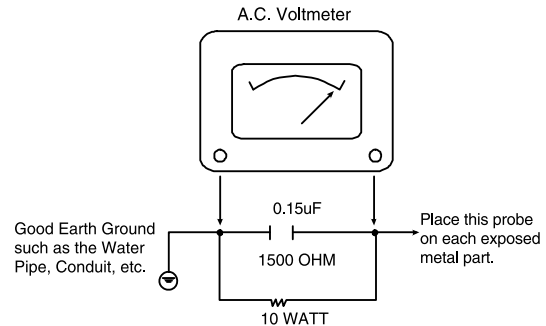
**CAUTION** : FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ALL FUSES WITH THE SAME TYPE AND RATING AS MARKED NEAR EACH FUSE.

## 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 BLU-RAY DISC PLAYER 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 BLU-RAY DISC PLAYER 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 BLU-RAY DISC PLAYER 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 BLU-RAY DISC PLAYER 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.)

# SOFTWARE UPGRADE

- Burn a DVD recordable disc or USB with a file that is named to “NAD\_BD\_330BB.ROM” or “NAD\_BD\_310BB.ROM”.
- Insert a upgrading disc or USB.
- Show help message for disc upgrade as follows.

< in the case of Back End program & Front End program >

Press play key to upgrade and it will show progress information

After completing upgrade then power is off.

# SPECIFICATIONS

## • GENERAL

Power requirements:	AC 120V, 60Hz
Power consumption:	21W
Dimensions (W x H x D):	Approx. 17.1 x 2.4 x 11.0 inches (435 x 60 x 280mm) without feet
Weight (Approx.):	3.5kg (7.7lbs)
Operating temperature:	41°F to 95°F (5°C to 35°C)
Operating humidity:	5% to 90%

## • OUTPUTS

VIDEO OUT:	1.0V (p-p), 75Ω, sync negative, RCA jack x 1
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 OUT (video/audio):	19pin (HDMI standard, Type A)
ANALOG AUDIO OUT:	2.0Vrms (1kHz, 0dB), 600Ω, RCA jack (L, R) x 1
DIGITAL OUT (OPTICAL):	3V (p-p), Optical jack x 1
DIGITAL OUT (COAXIAL):	0.5V (p-p), 75Ω, RCA jack x 1
MULTI CHANNEL OUT:	2.0Vrms (1kHz, 0dB), 600Ω, RCA jack x 8

## • SYSTEM

Laser:	Semiconductor laser, wavelength: 405nm / 650nm
Signal system:	Auto (NTSC / PAL), NTSC system
Frequency response:	20Hz to 20kHz
Signal-to-noise ratio:	More than 100dB (ANALOG OUT connectors only)
Harmonic distortion:	Less than 0.008%
Dynamic range:	More than 95dB
LAN port:	Ethernet jack x 1, 10BASE-T/100BASE-TX

**Note** : Design and specifications are subject to change prior notice.

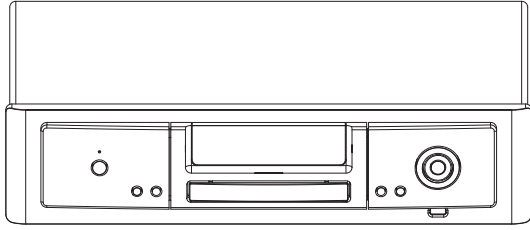
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**CABINET & MAIN CHASSIS**  
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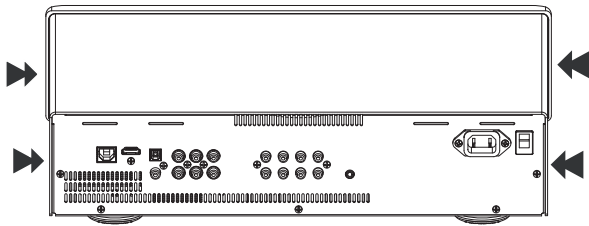


# DISASSEMBLY INSTRUCTIONS

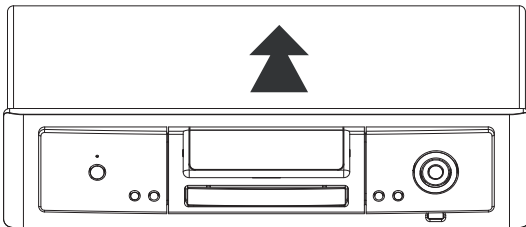
1. It is the product appearance.



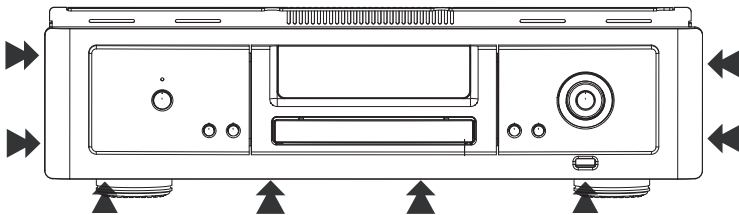
2. Remove the four screws on the top cover to separate the top cover.



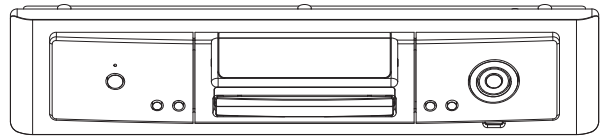
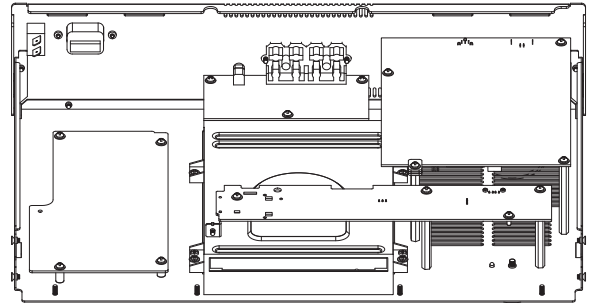
3. Push the top cover backward to separate the top cover completely.



4. Remove the eight screws in front panel (four screws on the bottom, other four screws on the both side) to separate the front panel.



5. It is the feature that the top and front panel are separated.



# 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.



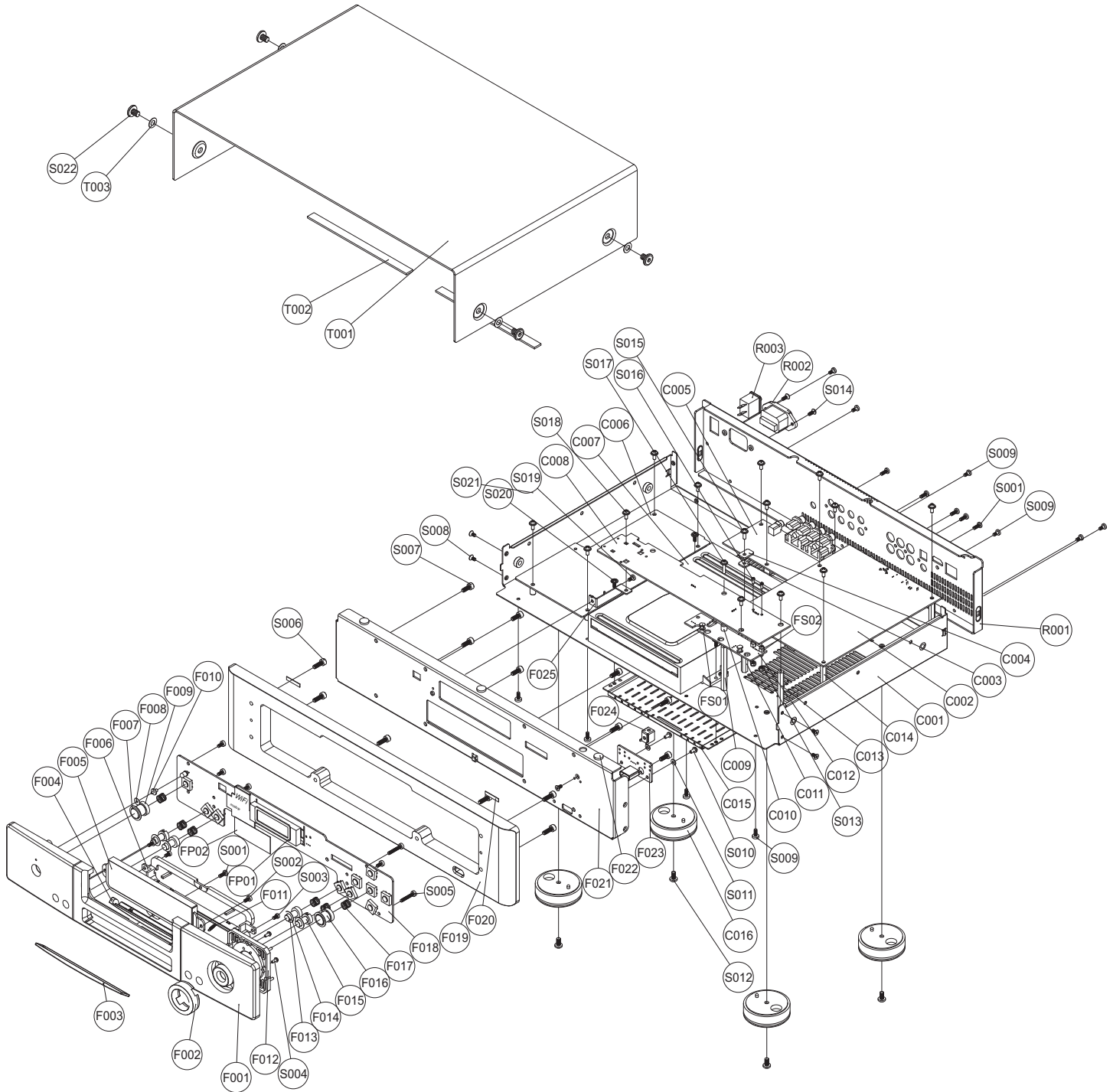
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4

3

2

1



A

B

C

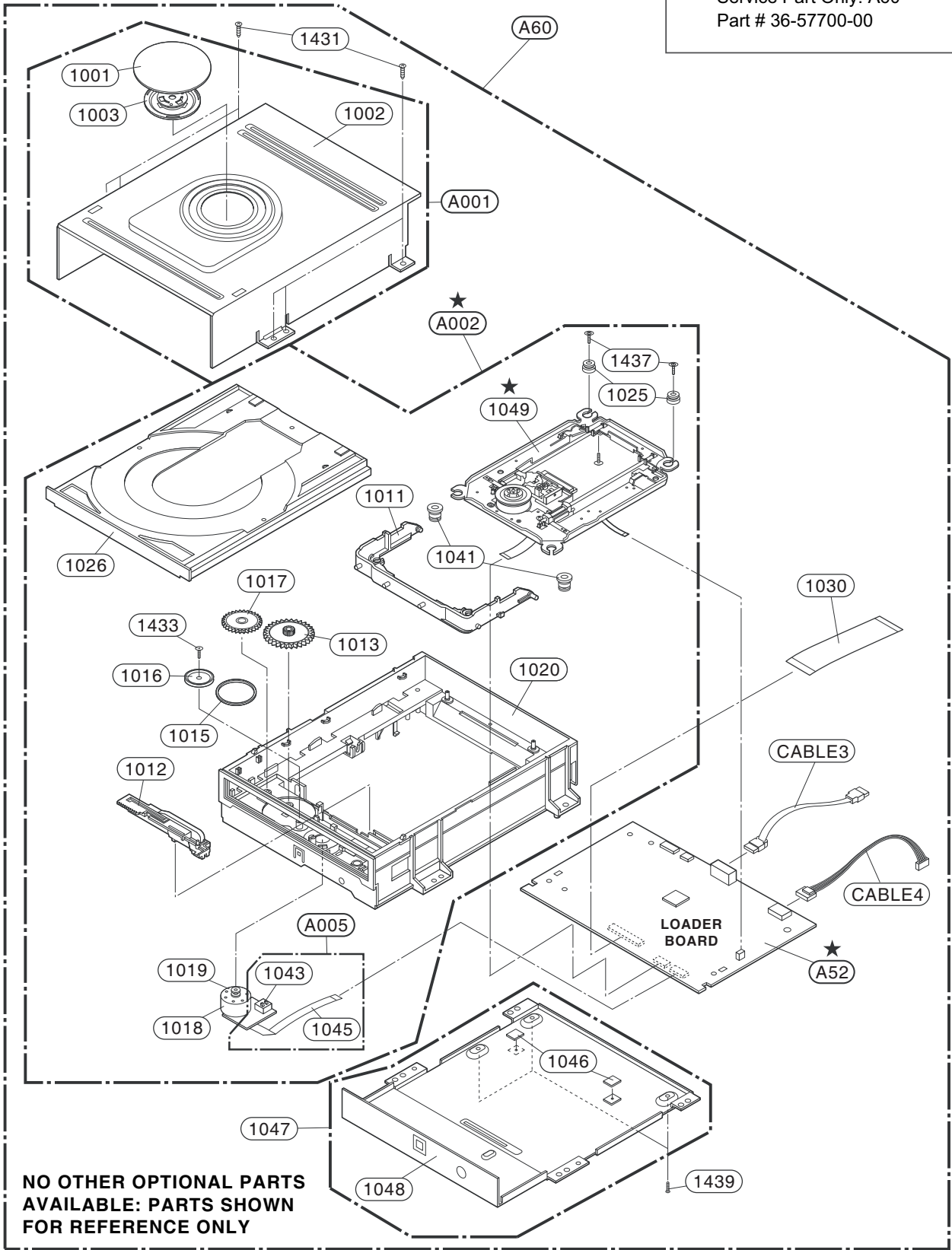
D

## 2. EXPLODED VIEW PARTS LIST

REF.NO.	PART NO.	DESCRIPTION	Qty.	REF.NO.	PART NO.	DESCRIPTION	Qty.
C001	67-154003-3	Chassis	1	F024	66-011011-0	Connectible Bracket	1
C002	01-55605-00	Decode Board(Region A)	1	F025	66-154001-1	PCB Bracket	1
	01-55605-01	Decode Board(Region B)	1				
	01-55605-02	Decode Board(Region C)	1	R001	67-154001-2B	Rear Panel (Region A)	1
C003	A16-55604-21	PCB Clamp	2		67-154011-2B	Rear Panel (Region B)	1
C004	A16-55605-21	PCB Washer	1		67-154021-2B	Rear Panel (Region C)	1
C005	01-57702-00	Audio Board	1	R002	JA17-07002-02	AC Inlet	1
C006	01-55606-00	Power Board	1	R003	A11-01101-03	Rocker Switch	1
C007	36-57700-00	BD Drive (Region A)	1				
	36-57700-00	BD Drive (Region B)	1	T001	67-051002-0	Top Cover	1
	36-57700-00	BD Drive (Region C)	1	T002	89-019015-0	CR Pad	1/2x2
C008	01-57704-00	FPP assembly	1	T003	76-046001-0	Screw Washer	4
C009	69-154006-1	FPP Spacer2	1				
C010	85-054001-0	Round Spacer	1				
C011	69-154002-1	Decode Board Spacer	1	FP01	79-154003-0	Foam for Filter double sided 3M	1
C012	01-55603-00	M56 FPP SUB-Board	1	FP02	78-154005-0	Lee Filter #209 Sheet 54x22mm	1
C013	69-154004-1	FPP Spacer1	1				
C014	69-154001-1	Decode Board Spacer	3	FS01	85-154001-0	PCB Spacer	2
C015	67-154004-0	Chassis Cover	1	FS02	69-154007-1	Copper Spacer	2
C016	83-043001-0	Foot Assembly	4				
F001	70-154001-0A	Fascia2	1	S001	61-023208-0	Self Taping Screw (BTB3X8)	6
F002	70-051002-0	Ring Cursor	1	S002	61-023206-0	Self Taping Screw (BTB3X6)	6
F003	70-154002-1	Flip Door Skin	1	S003	61-023204-0	Self Taping Screw (BTB3X4)	2
F004	75-154002-2	Flip Door Bracket	1	S004	61-022506-6	Machine Screw (MB2.5X6-Ni)	2
F005	76-154001-0	VFD Window	1	S005	61-023616-0	Self Taping Screw (TBBT3x16)	2
F006	75-154001-3	Flip Door Frame	1	S006	61-224512-1	Hex Head Screw (M4X12)	6
F007	87-048003-0	Power Button Pad	2	S007	61-224508-1	Hex Head Screw (M4X8)	8
F008	86-046001-0	Led Lens Gum	1	S008	61-063106-0	Self Taping Screw (STF3X6)	5
F009	70-048013-0	Power Button	1	S009	61-023106-2	Self Taping Screw (STB3X6)	10
F010	76-008001-0	Led Lens	1	S010	61-023506-1	Machine Screw (MB3X6-Ni)	2
F011	92-154001-0	Flip Door Spring	1	S011	63-010303-0	Copper Washer	2
F012	77-051001-1	Cursor Holder	1	S012	61-024108-1	Self Taping Screw (STB4X8)	4
F013	70-048012-1	Input Button	2	S013	62-010302-0	Nut(M3)	2
F014	87-048002-0	Input Button Pad	4	S014	61-073108-0	Self Taping Screw (STO3X8)	2
F015	70-051006-1	Stop-Menu Button	2	S015	61-083510-1	Machine Screw (MPW3x10-Ni)	1
F016	70-051007-0	Enter Button	1	S016	61-022506-0	Machine Screw (MB2x6)	2
F017	92-048001-0	Spring for Button	6	S017	61-083514-1	Machine Screw (MPW3x14-Ni)	1
F018	01-55601-00	FPP	1	S018	61-083106-1	Self Taping Screw (STPW3X6-Ni)	2
F019	J70-154003-1B	Fascia1	1	S019	61-023104-0	Self Taping Screw (STB3x4)	1
F020	86-046002-0	Fascia Padding	2	S020	61-083108-0	Self Taping Screw (STPW3X8)	4
F021	67-154002-1	Subfascia	1	S021	61-083506-1	Machine Screw (MPW3x6-Ni)	11
F022	86-001004-0	2mm Rubber Pad	3	S022	61-246508-0	Machine Screw (MB6X8-Cr)	4
F023	01-55602-00	USB Board	1				

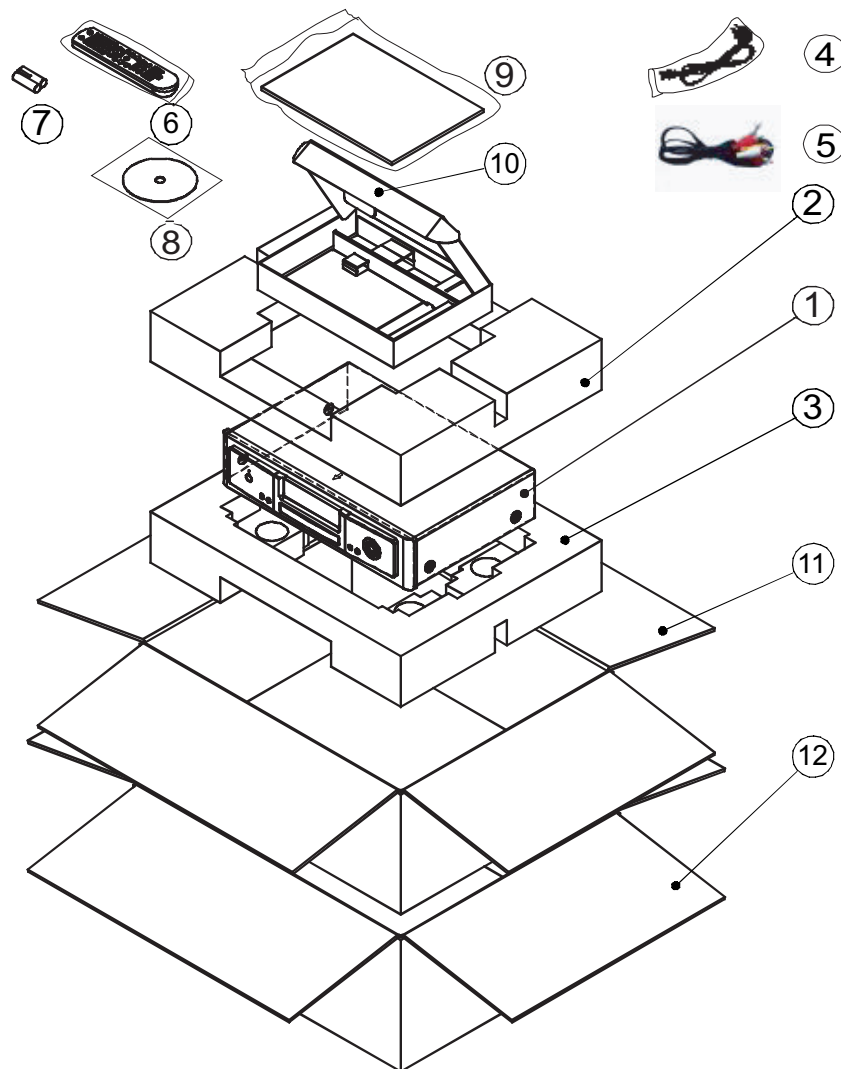
### 3. DECK MECHANISM SECTION (HL-05P)

■ SVC purchase order caution ■  
 Service Part Only: A60  
 Part # 36-57700-00



**NO OTHER OPTIONAL PARTS  
 AVAILABLE: PARTS SHOWN  
 FOR REFERENCE ONLY**

## 4. PACKING ACCESSORY SECTION



REF.N0	Part No.	Description	Qty.
1	00-55600-10	M56 RegionA	1
	00-55600-20	M56 RegionB	1
	00-55600-30	M56 RegionC	1
2	89-051001-0	EPE Polyfoam	1
3	89-051002-0	EPE Polyfoam	1
4	JA15-10125-01 or A15-10125-00	AC Cord	AH:1
	JA15-10250-20 or A15-10250-00	AC Cord	C:1
5	29-57702-00 & 29-57701-00	Audio and Video Cord	1
6	J30-15560-00	Remote Control	1
7	30-25770-00	Batteries	2
8	30-95770-00	DISC	1
9	30-45560-02 & 30-45561-02	Instruction Manual	1
10	88-043003-0	Accessories Box	1
11	88-154001-0A	Gift Box	1
12	88-154002-0A	Shipping Box	1

# MEMO

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# SECTION 3

## ELECTRICAL

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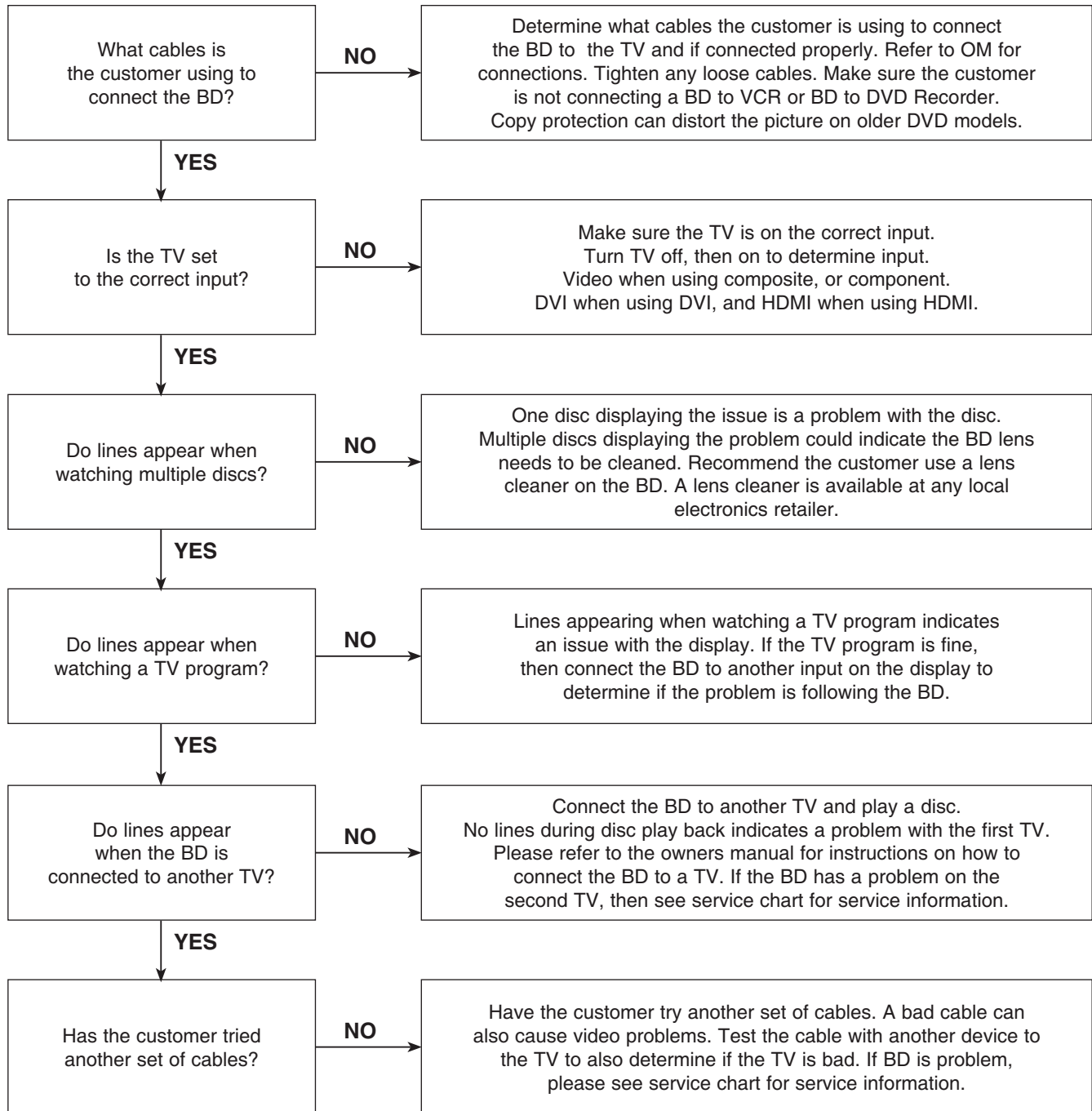
# TRAINING MASTER FOR BLU-RAY (BD)

**Objective:** To provide clear and concise guidelines for customer service agents to handle calls on box goods calls.

## 1. DISTORTED PICTURE

### 1-1. Lines on Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.

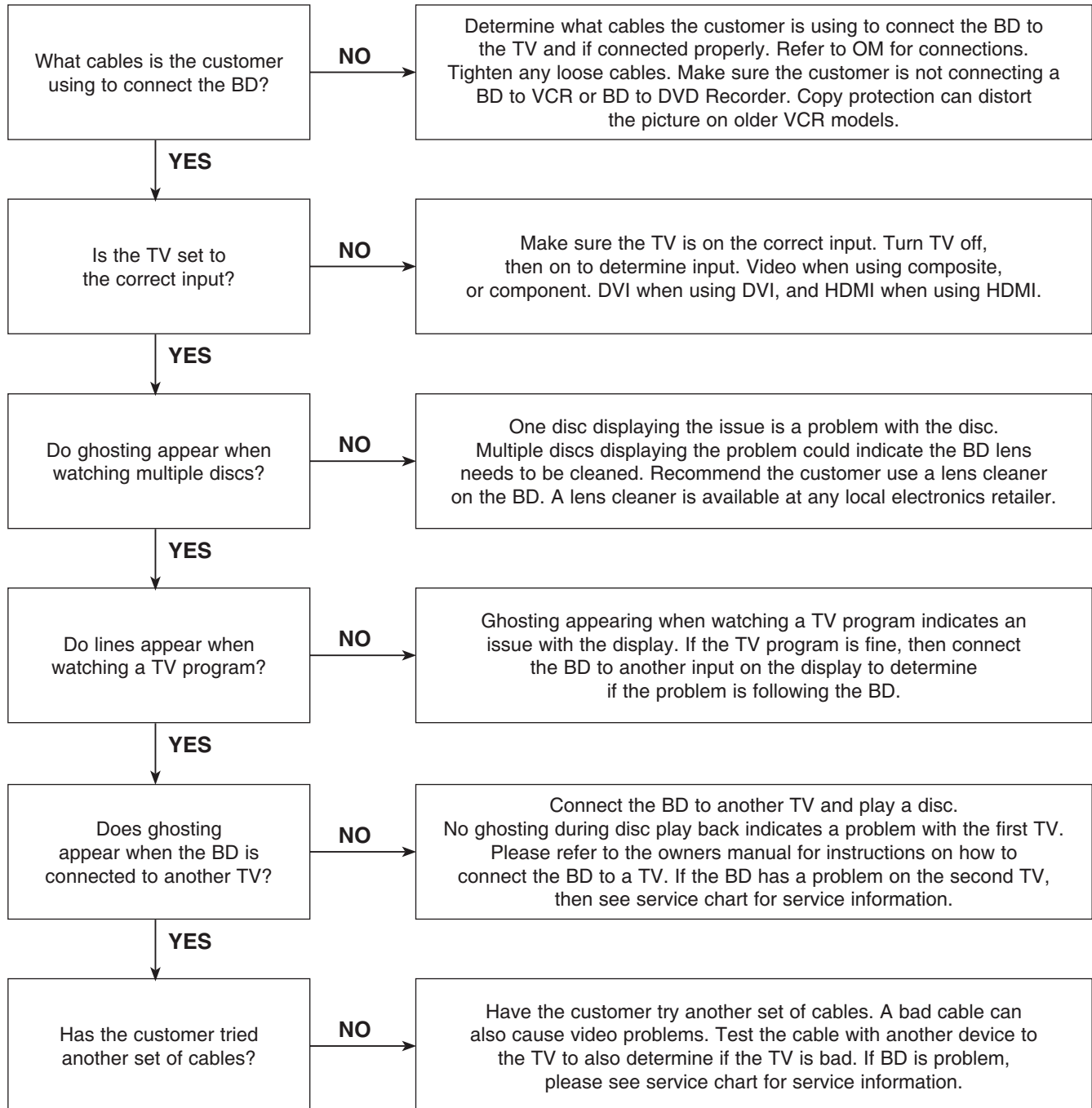




# TRAINING MASTER FOR BLU-RAY (BD)

## 1-2. Ghost Picture

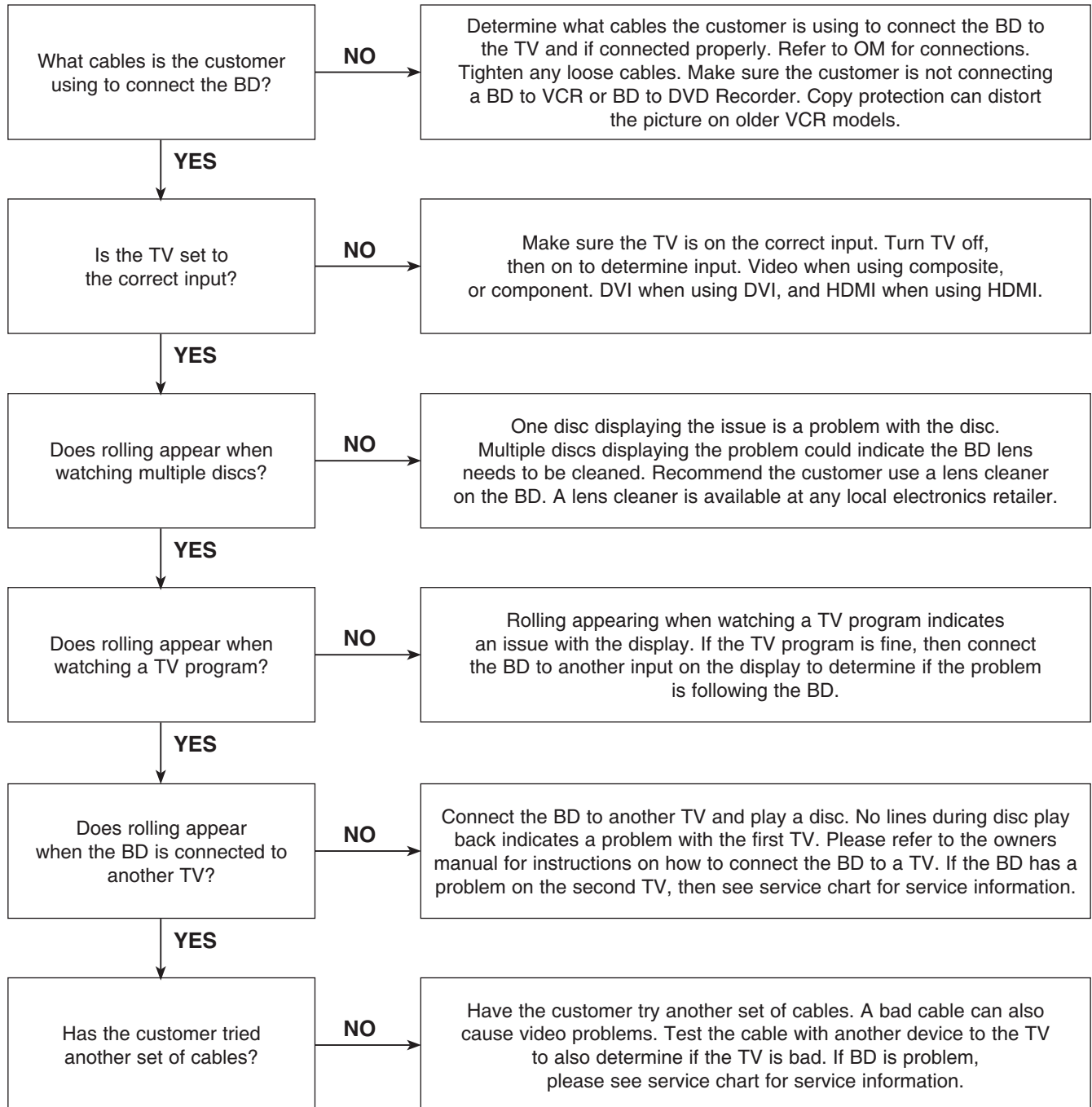
Distorted picture refers to the customer getting video, but there is a problem with the video.



# TRAINING MASTER FOR BLU-RAY (BD)

## 1-3. Rolling Picture

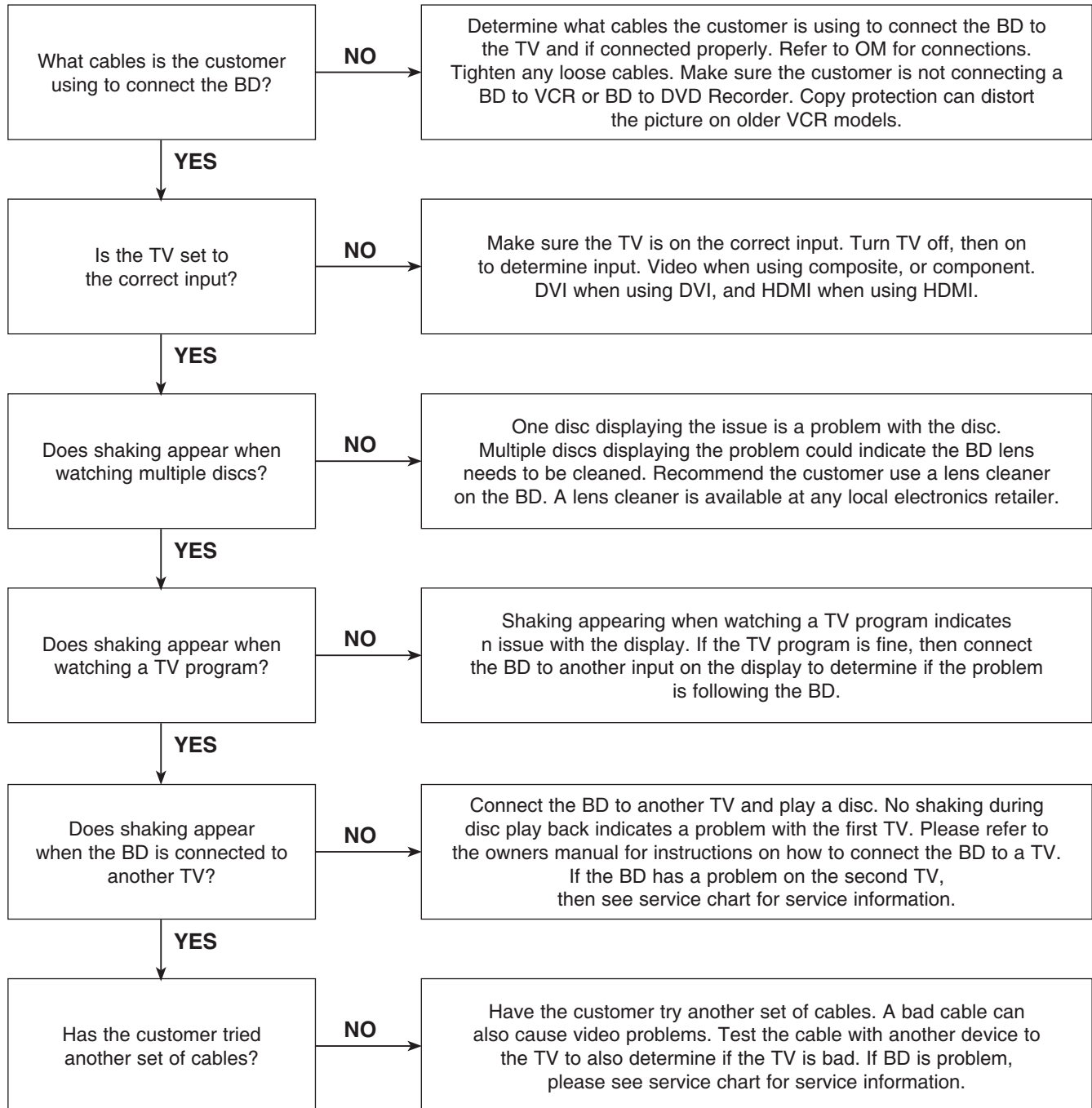
Distorted picture refers to the customer getting video, but there is a problem with the video.



# TRAINING MASTER FOR BLU-RAY (BD)

## 1-4. Shaky Picture

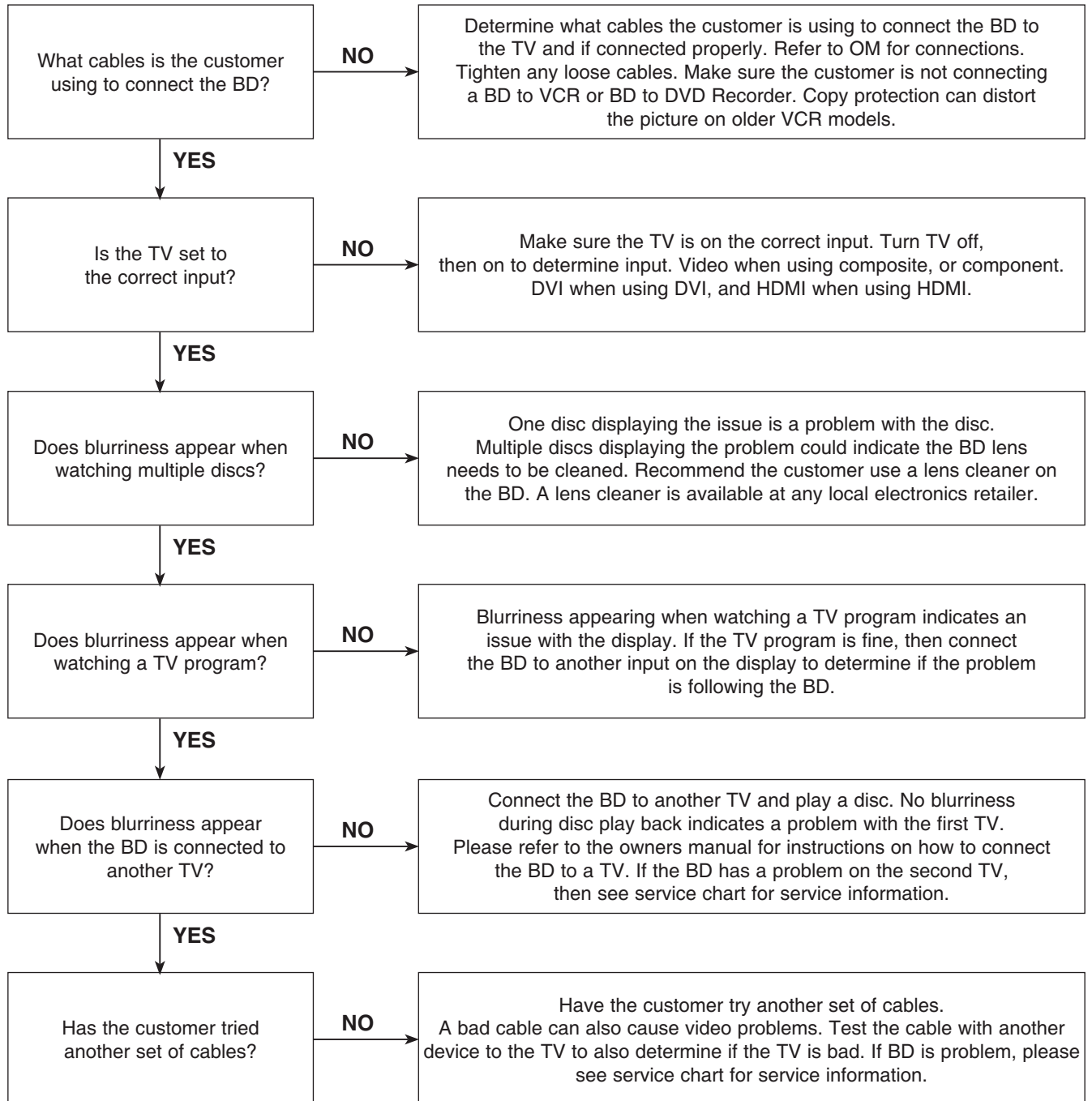
Distorted picture refers to the customer getting video, but there is a problem with the video.



# TRAINING MASTER FOR BLU-RAY (BD)

## 1-5. Blurry Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.

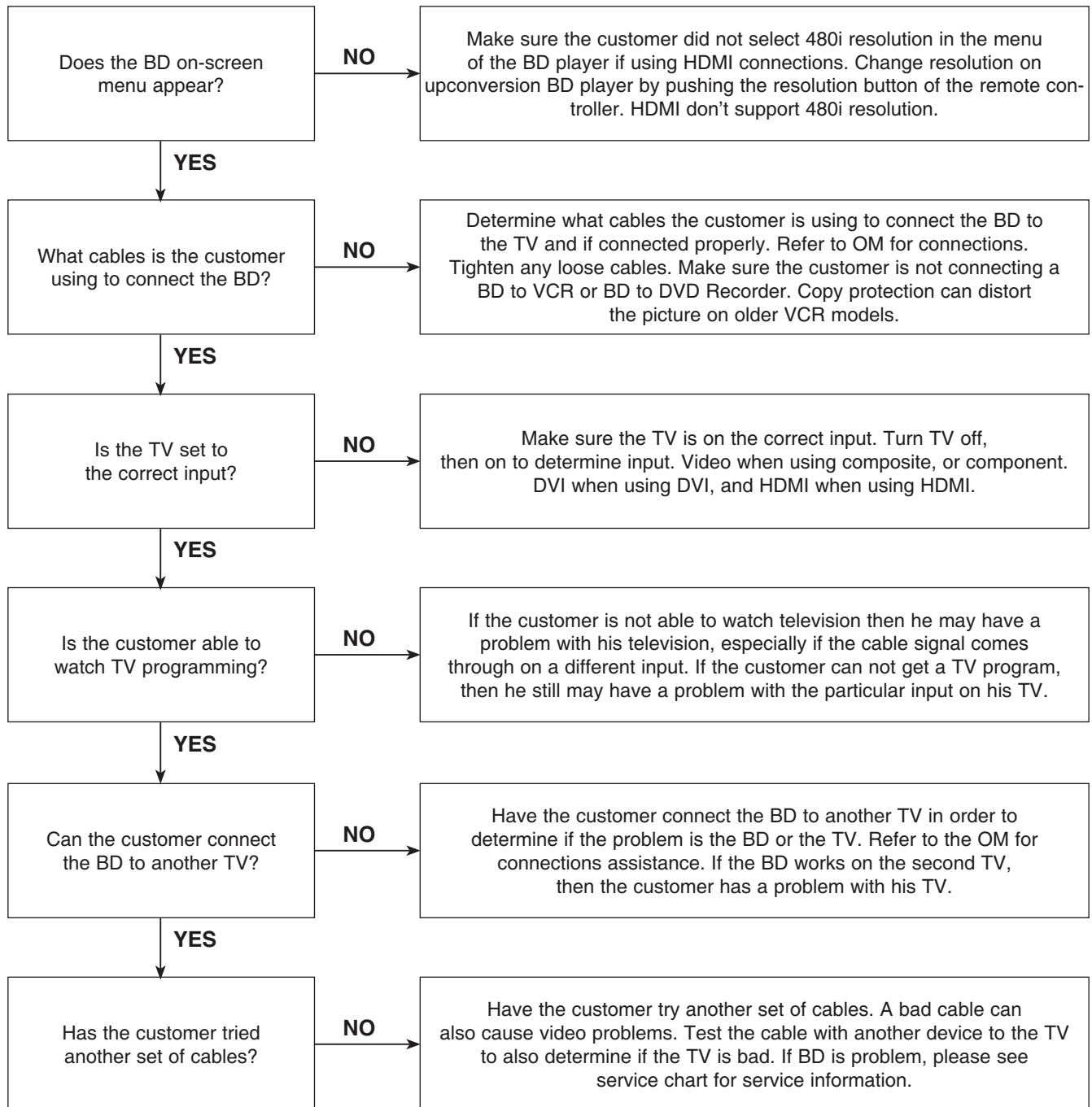


# TRAINING MASTER FOR BLU-RAY (BD)

## 2. NO PICTURE

### 2-1. Black Screen

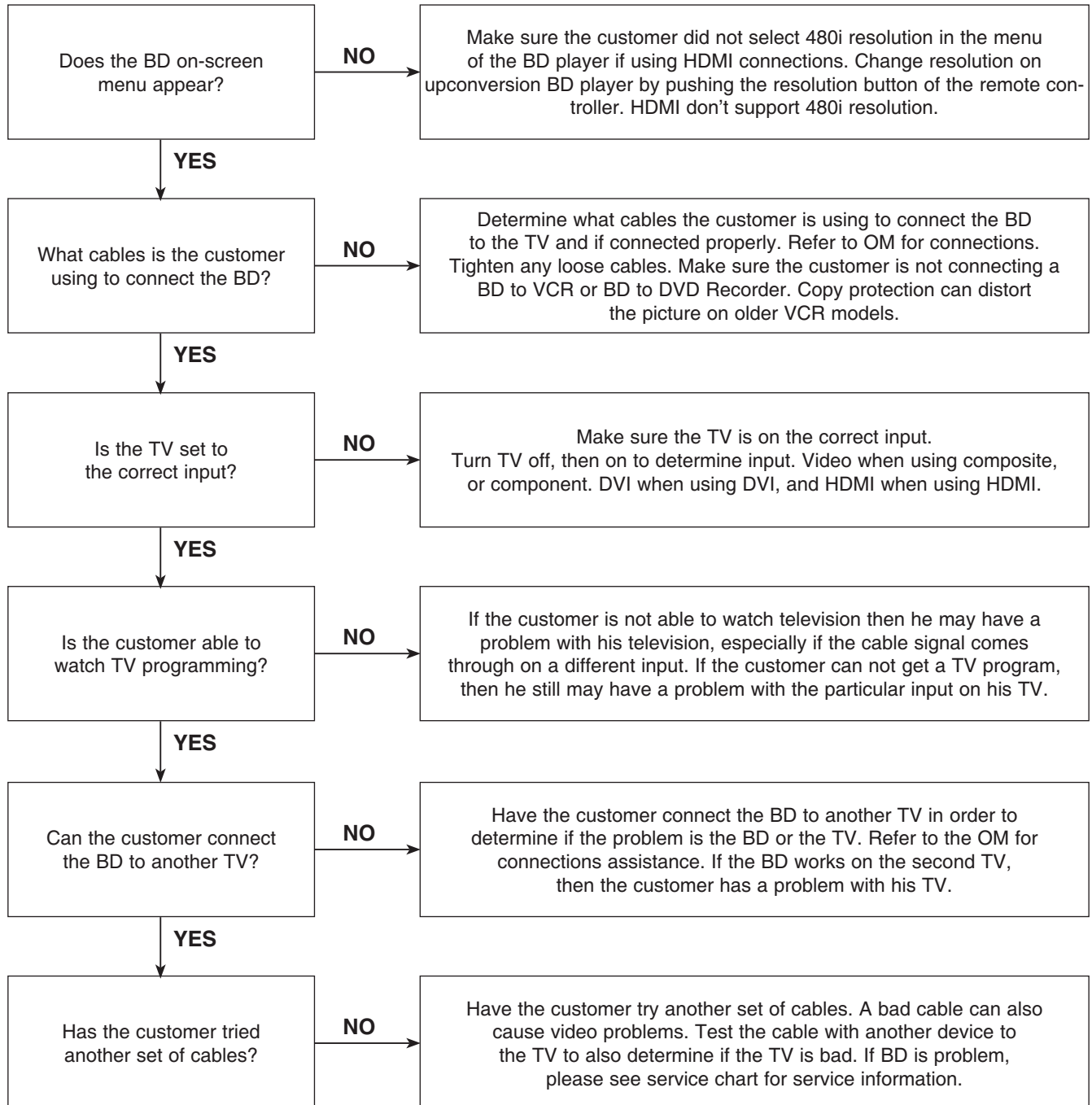
The entire screen is black.



# TRAINING MASTER FOR BLU-RAY (BD)

## 2-2. Blue Screen

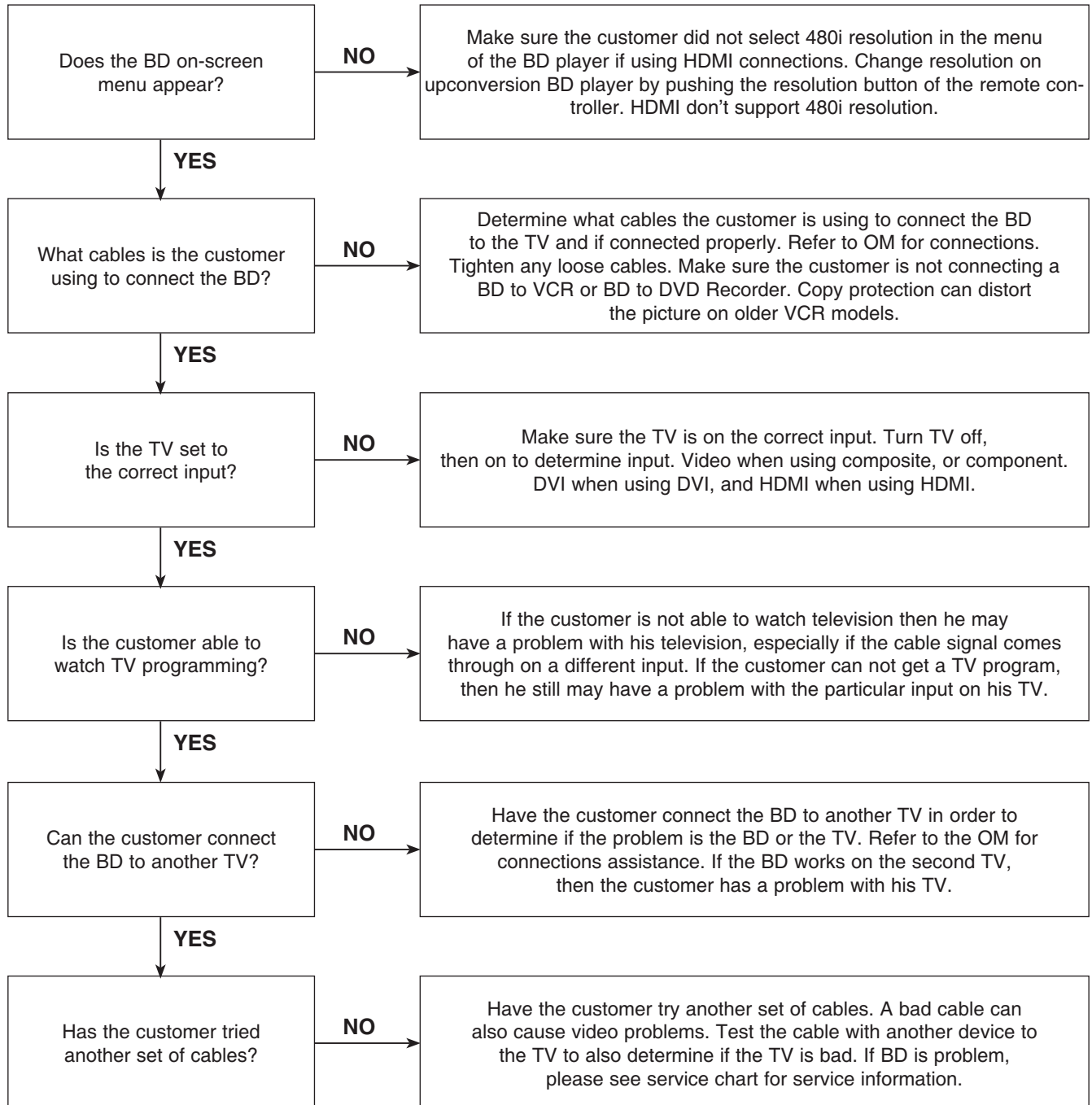
The entire screen is a solid blue color.



# TRAINING MASTER FOR BLU-RAY (BD)

## 2-3. Snowy Screen

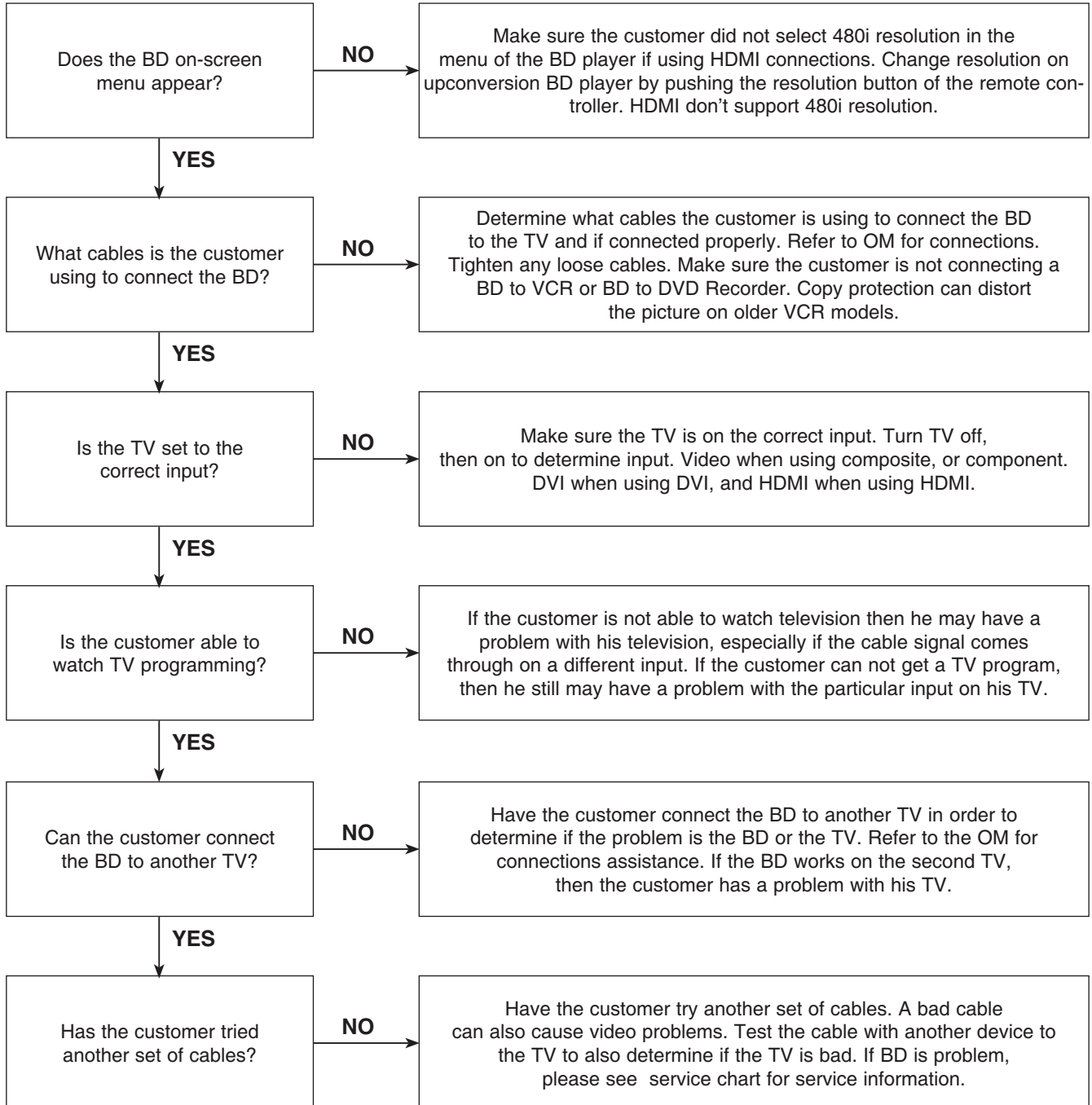
A snowy picture is when black and white dots are all over the screen.



# TRAINING MASTER FOR BLU-RAY (BD)

## 2-4. No Signal

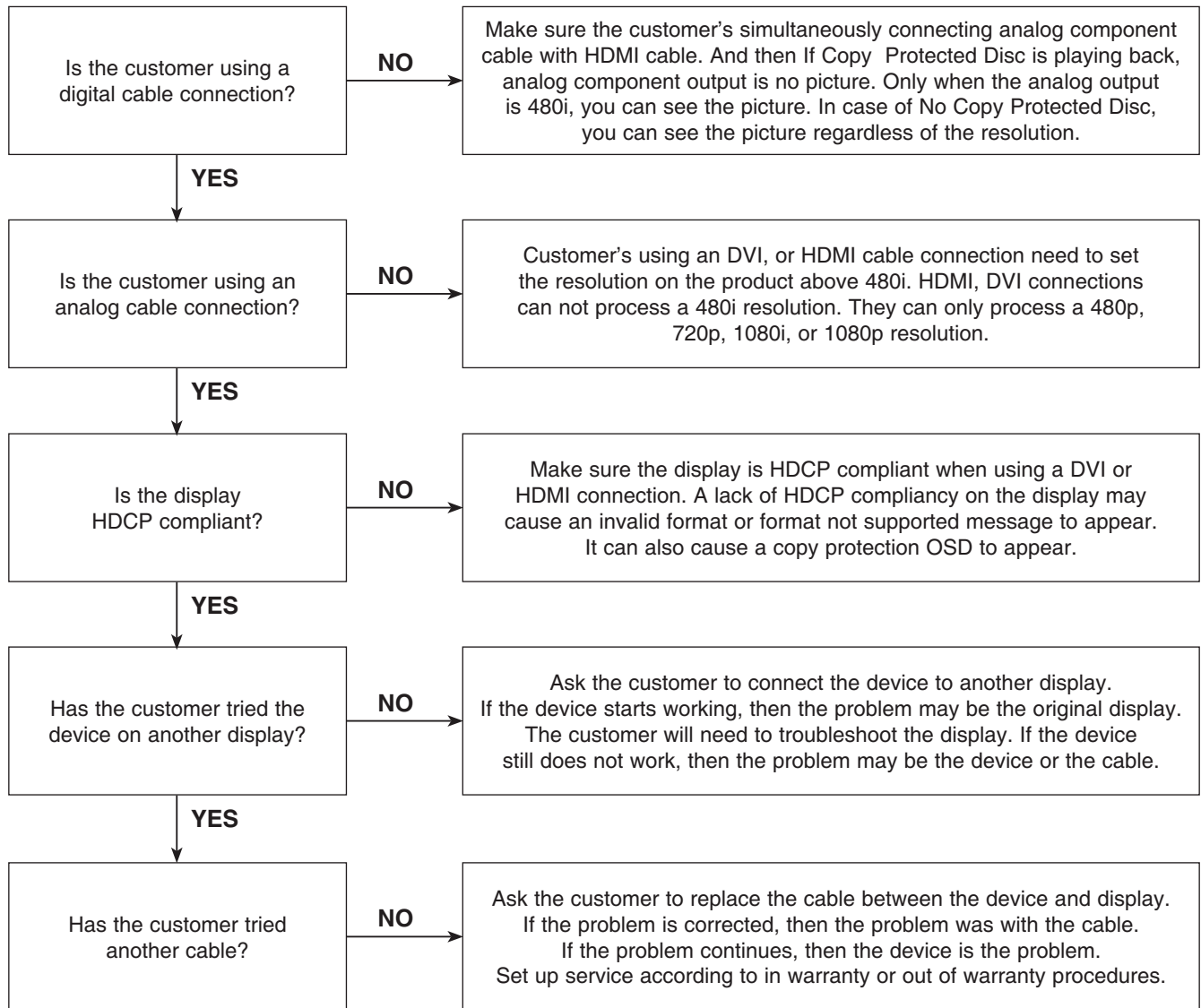
A “no signal” message appears on the screen of the display.





# TRAINING MASTER FOR BLU-RAY (BD)

## 2-5. Invalid Format or Format Not Supported

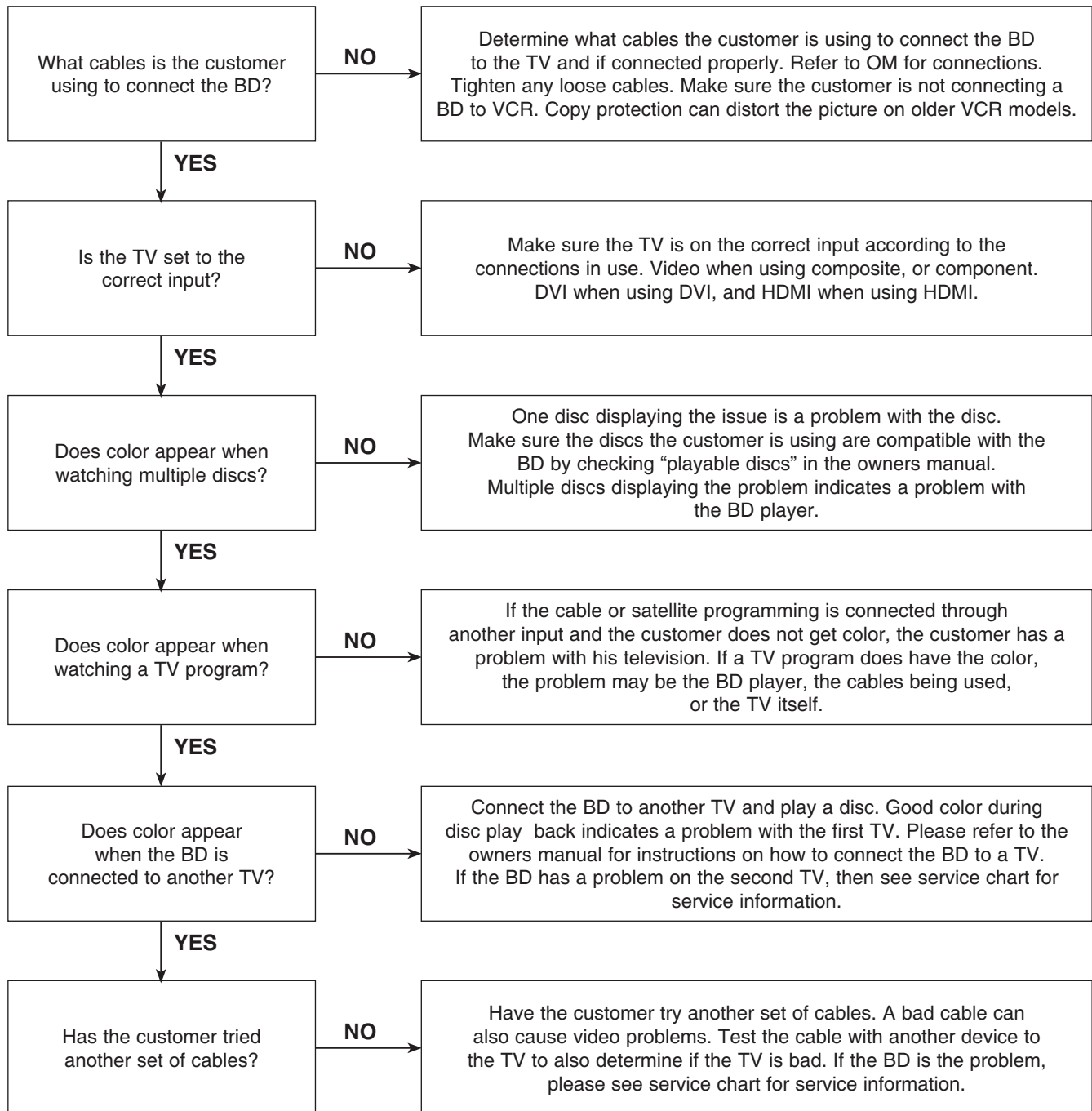


# TRAINING MASTER FOR BLU-RAY (BD)

## 3. PICTURE COLOR

### 3-1. No Color

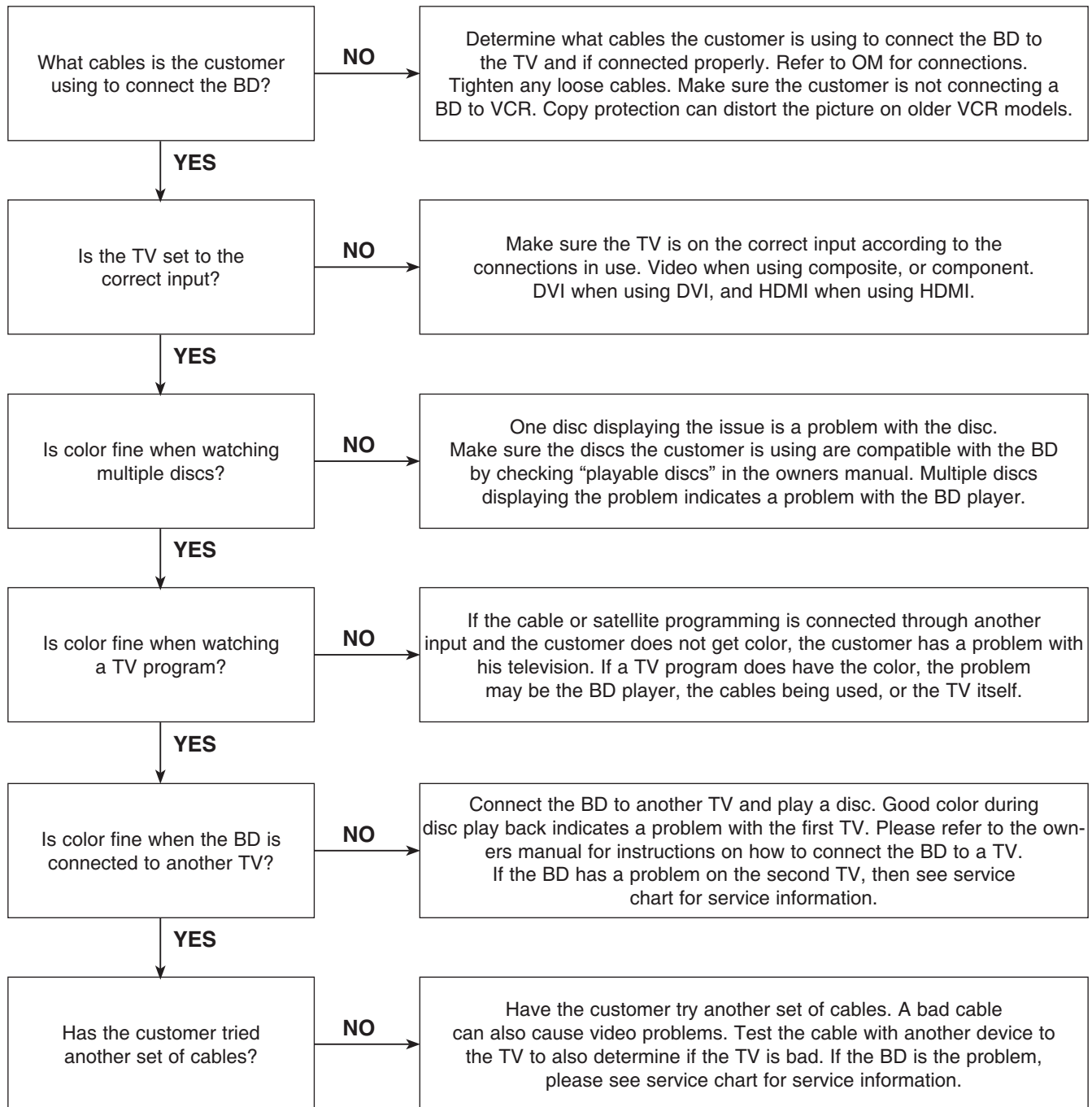
The video displays no color and only shows in black and white.



# TRAINING MASTER FOR BLU-RAY (BD)

## 3-2. Poor Color

The color is poor. Examples would be washed out colors, colors bleeding into one another, or a solid tint to a screen.

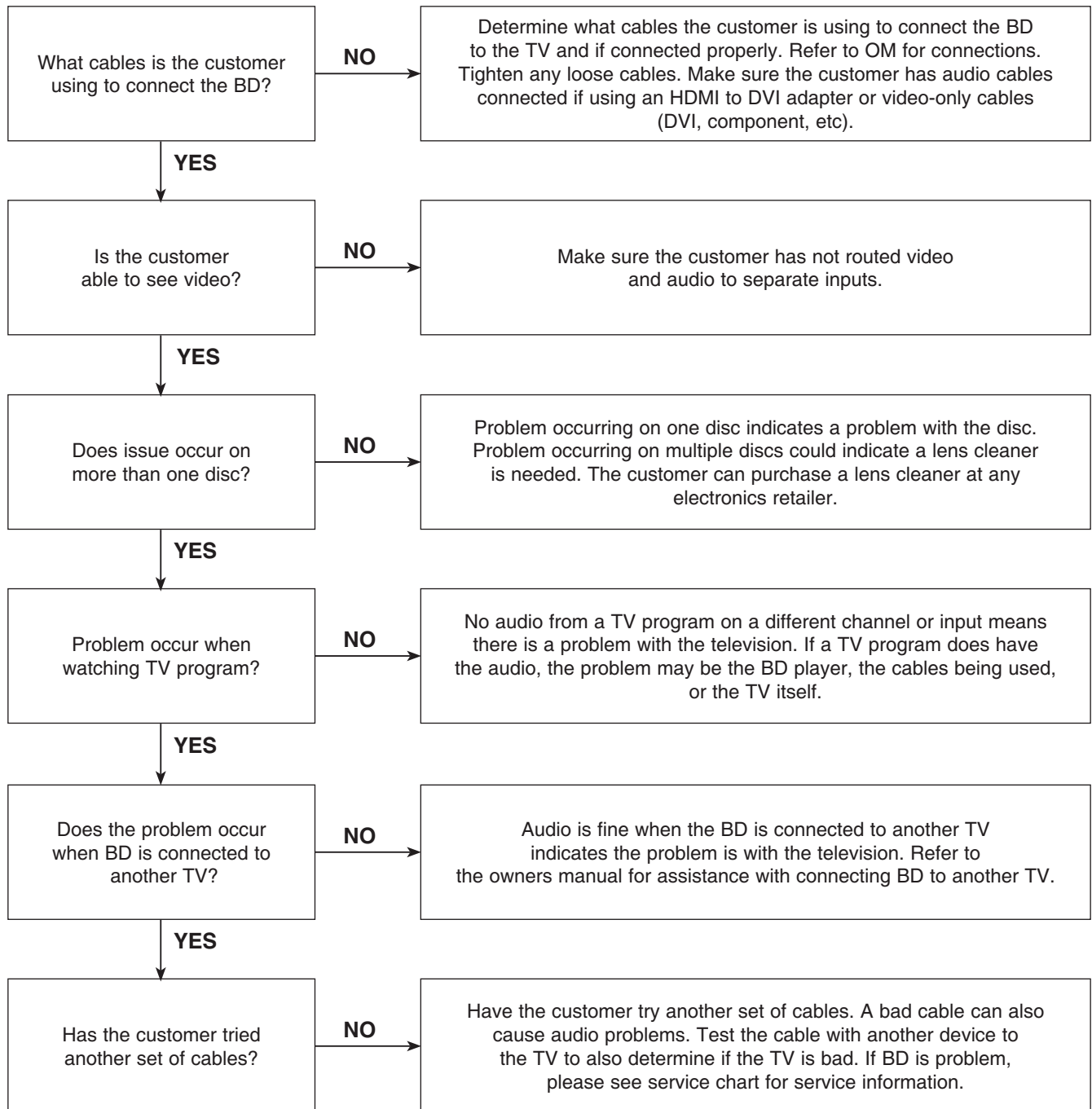


# TRAINING MASTER FOR BLU-RAY (BD)

## 4. NOISE/AUDIO PROBLEMS

### 4-1. No Audio

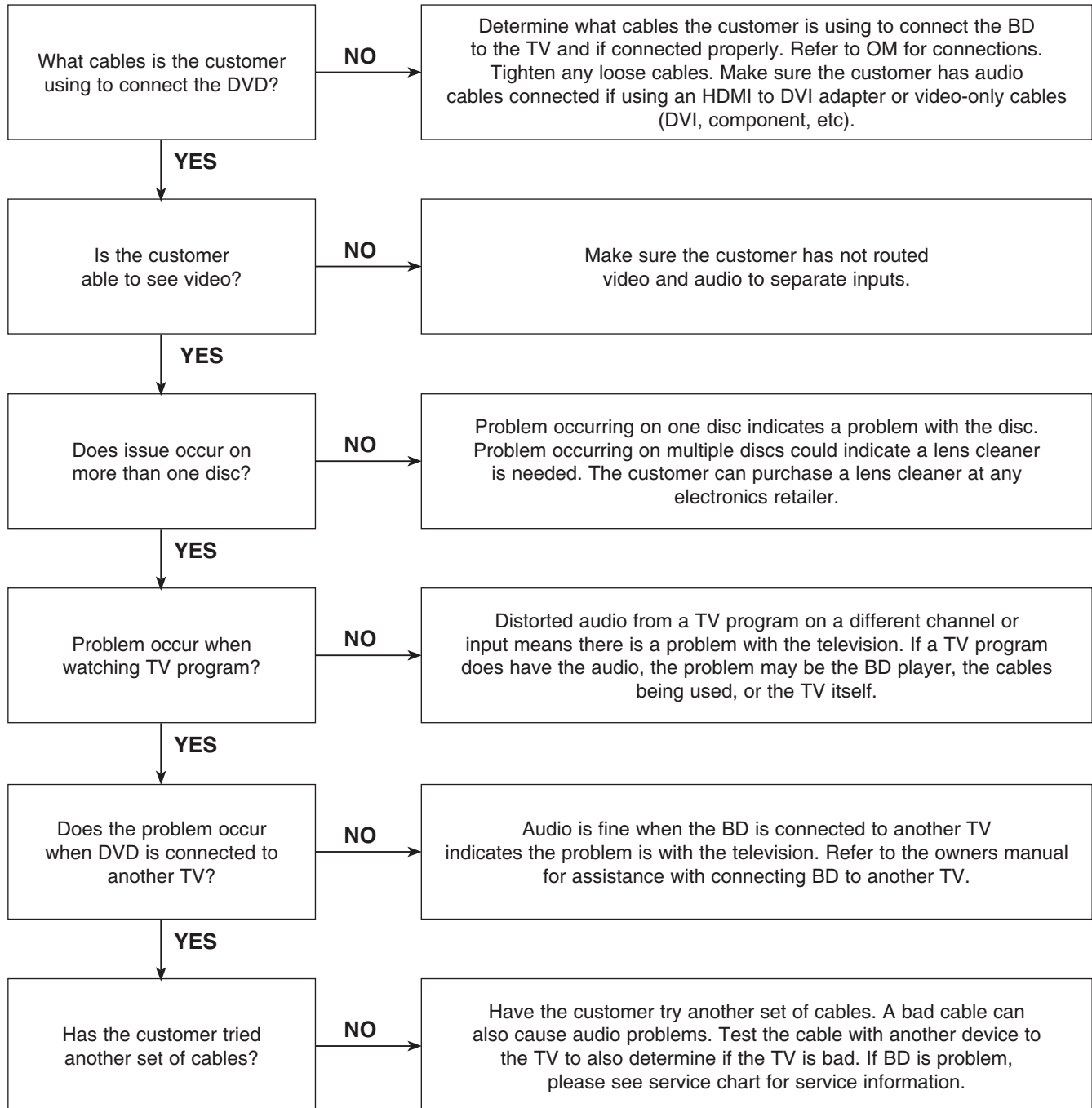
The customer is not able to get audio.



# TRAINING MASTER FOR BLU-RAY (BD)

## 4-2. Distorted Audio

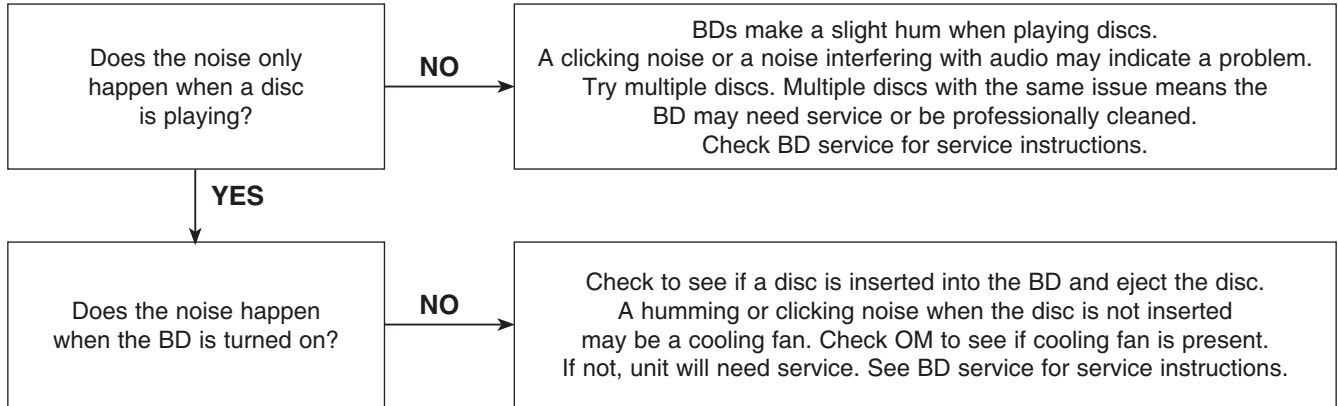
The audio sounds muffled, scratchy, or the audio skips.



# TRAINING MASTER FOR BLU-RAY (BD)

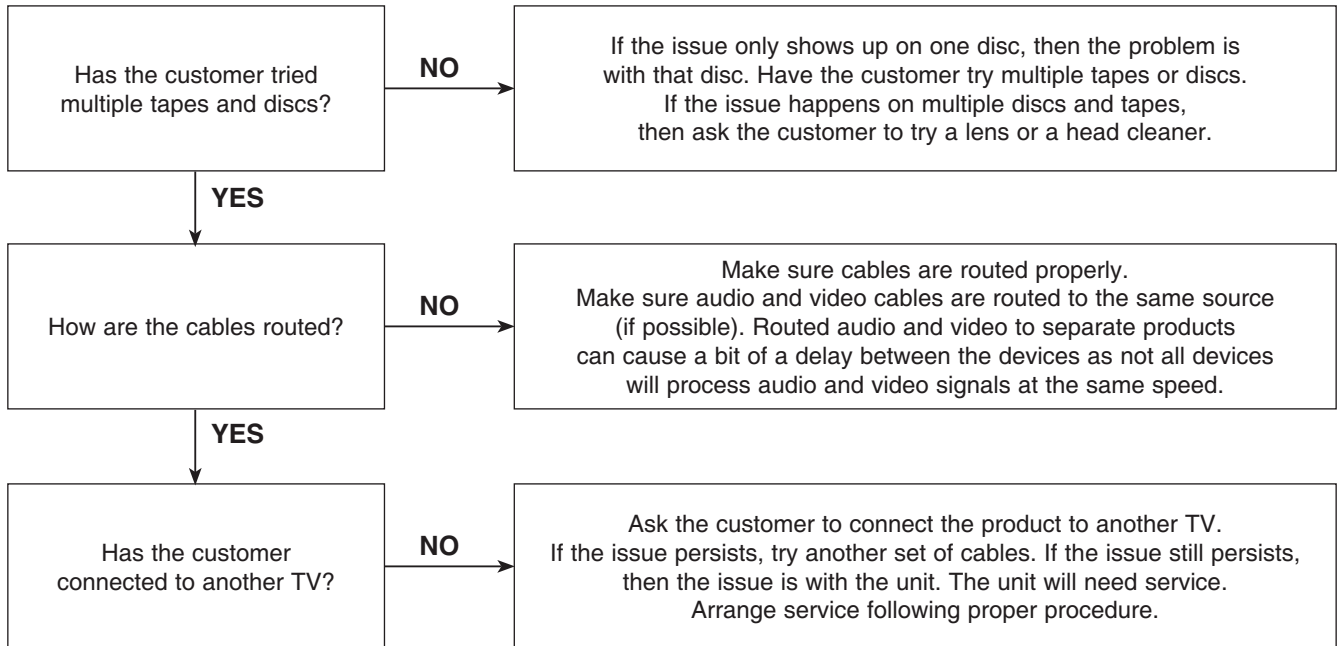
## 4-3. Humming/Clicking Noise

The unit is making a humming noise or a clicking noise.



## 4-4. Audio/Video Out of Synch

The audio and video do not match up. People look to be talking, but their voices are delayed by a few seconds.

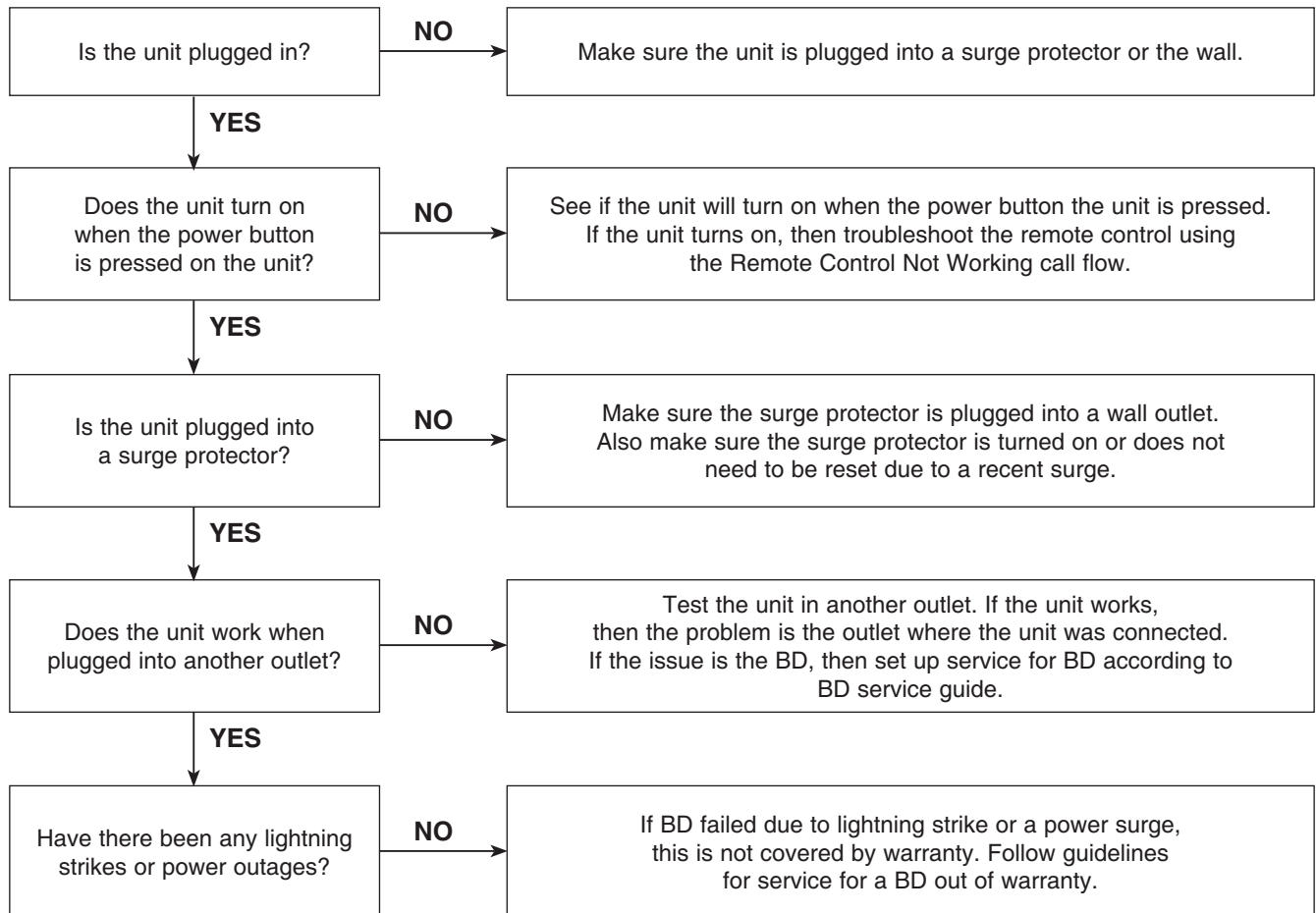


# TRAINING MASTER FOR BLU-RAY (BD)

## 5. MISCELLANEOUS

### 5-1. No Power

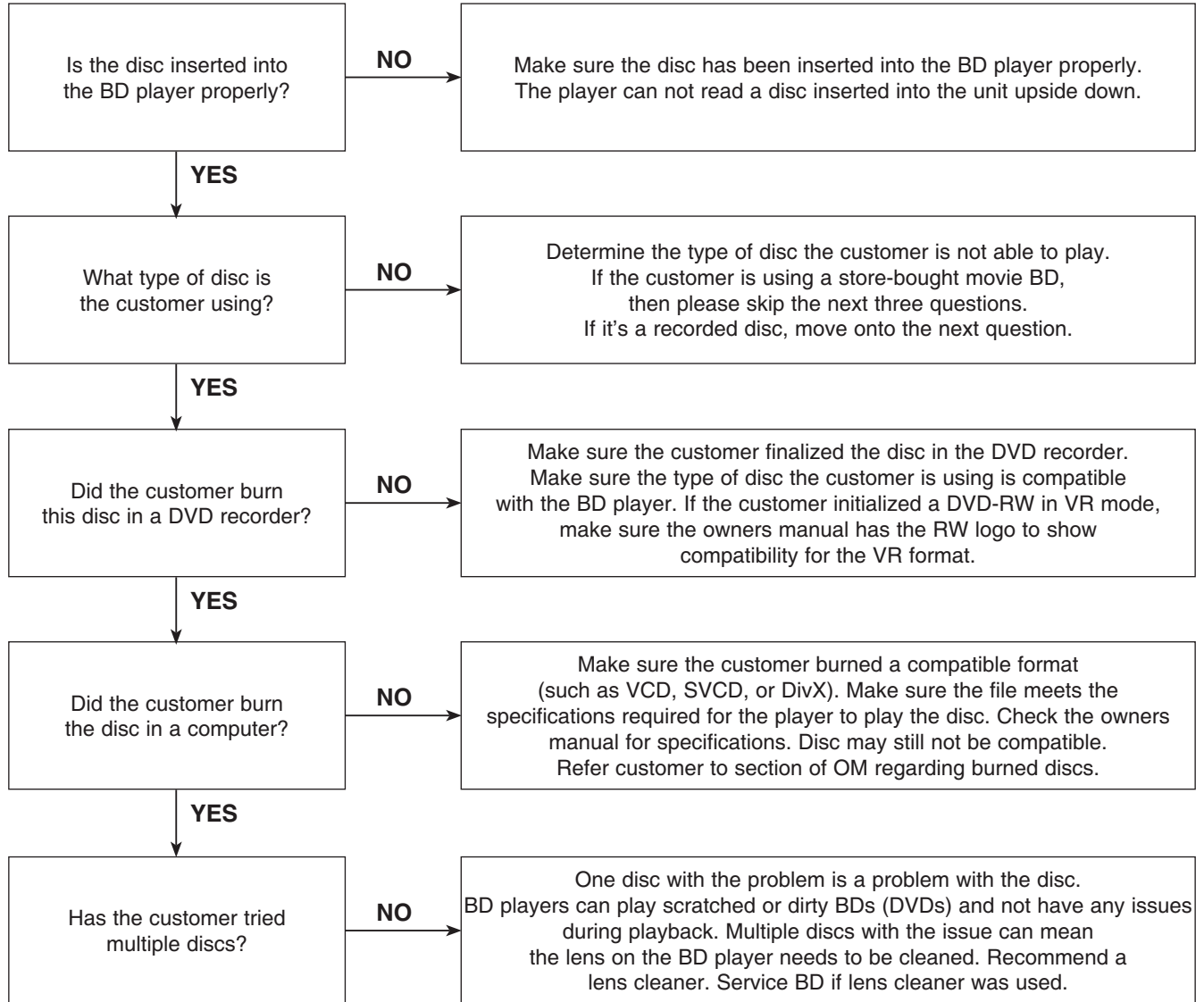
The unit will not turn on.



# TRAINING MASTER FOR BLU-RAY (BD)

## 5-2. Disc Error

The unit displays “disc error” when a disc is inserted into the BD player.

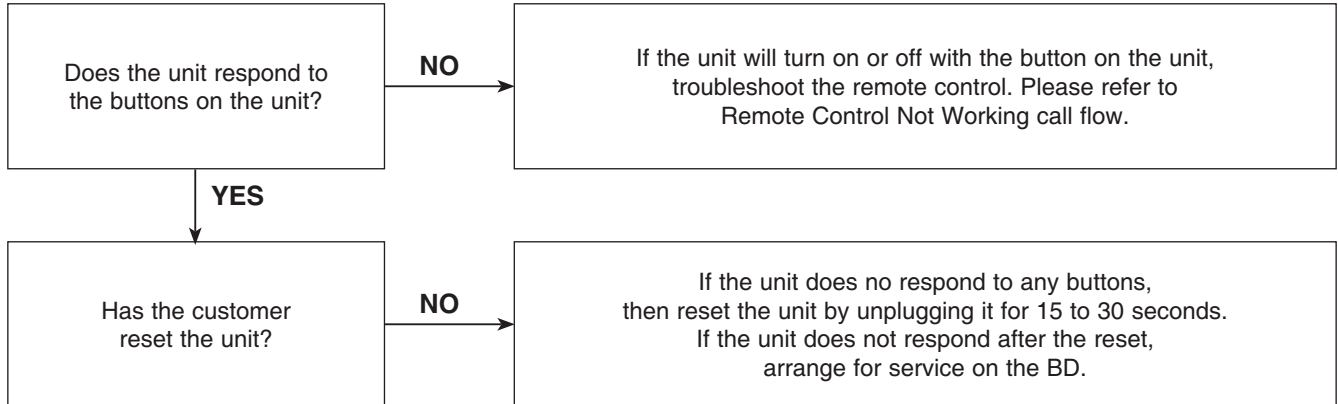




# TRAINING MASTER FOR BLU-RAY (BD)

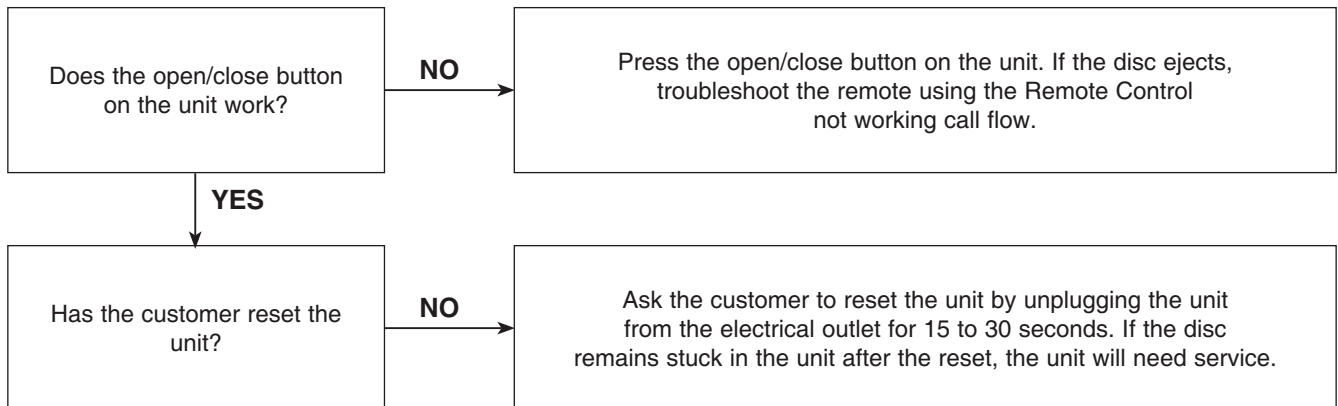
## 5-3. Unit Locks Up

Unit does not respond to any commands.



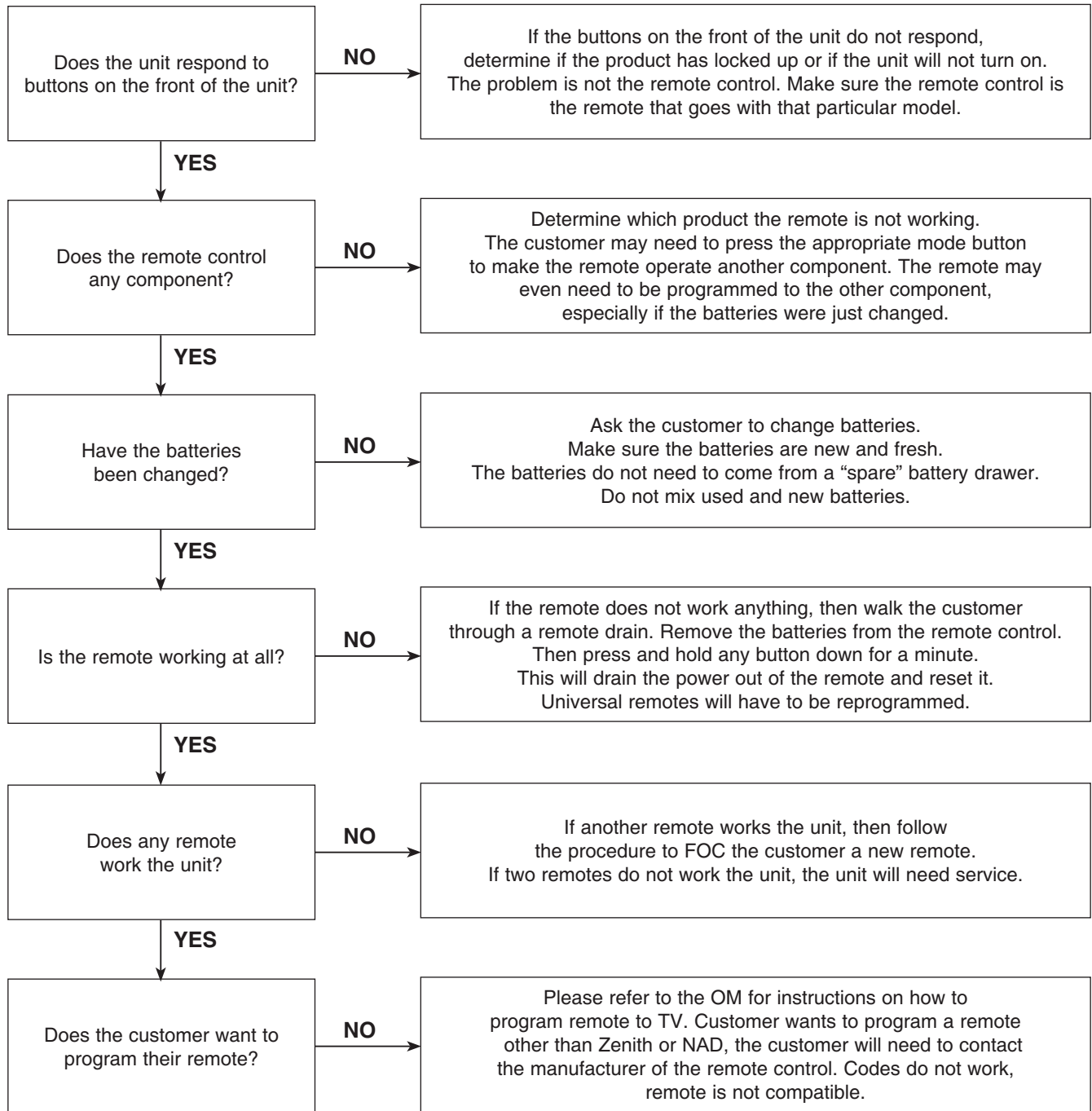
## 5-4. Disc Stuck

A BD disc is stuck in the unit.



# TRAINING MASTER FOR BLU-RAY (BD)

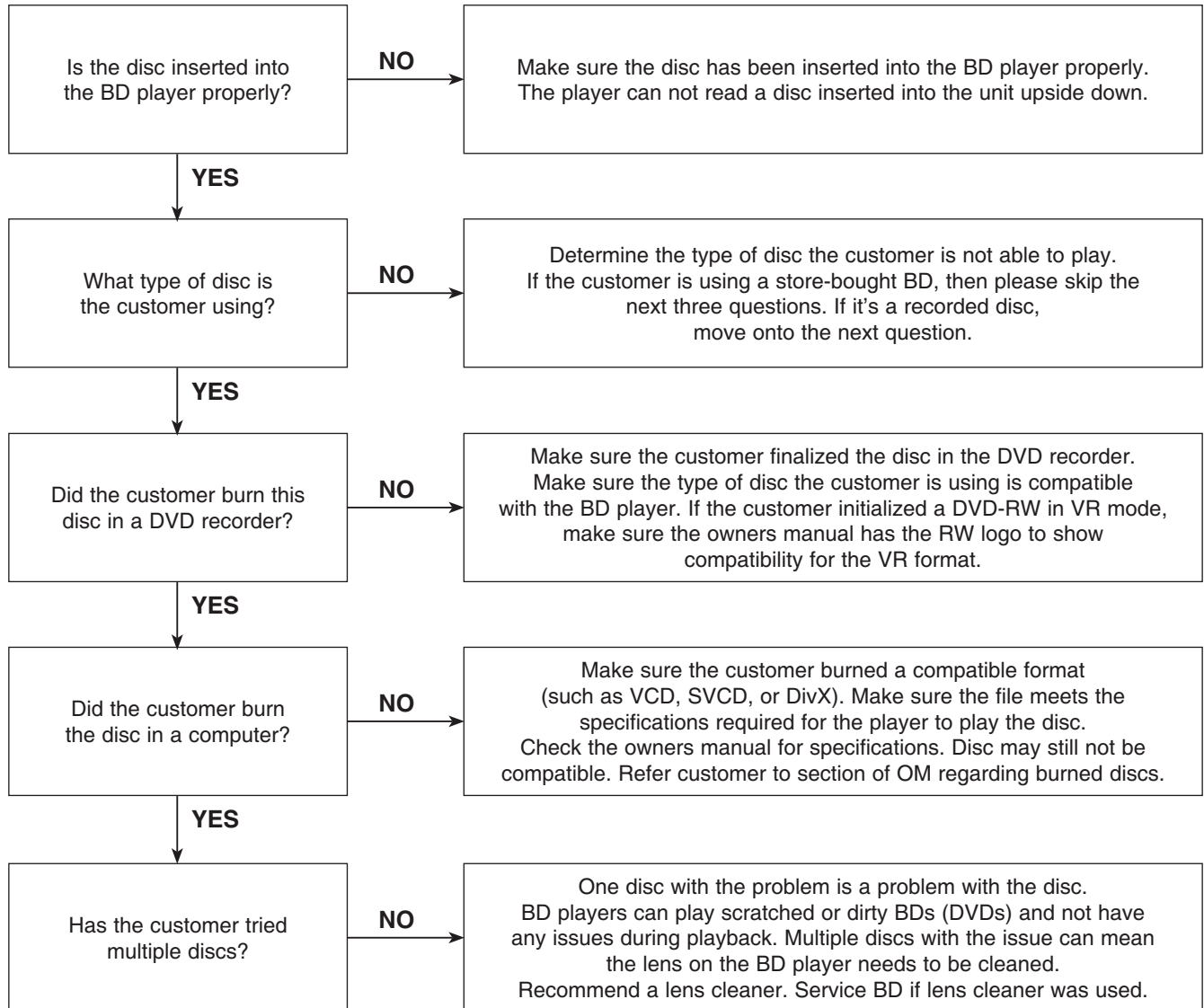
## 5-5. Remote Control Not Working



# TRAINING MASTER FOR BLU-RAY (BD)

## 5-6. Will Not Play Disc

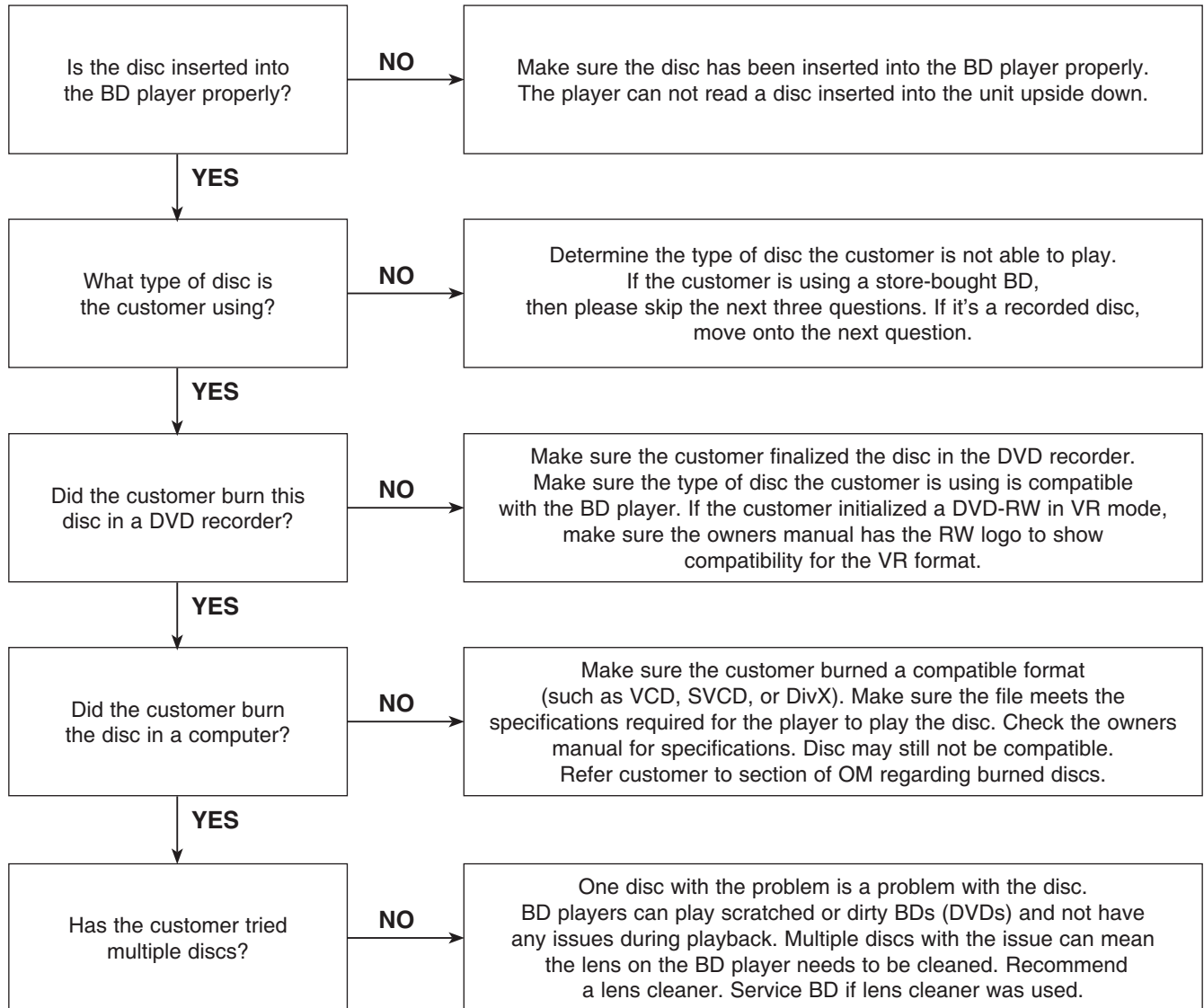
The unit will not play a disc when a disc is inserted into the player.



# TRAINING MASTER FOR BLU-RAY (BD)

## 5-7. Disc Freezes or Skips

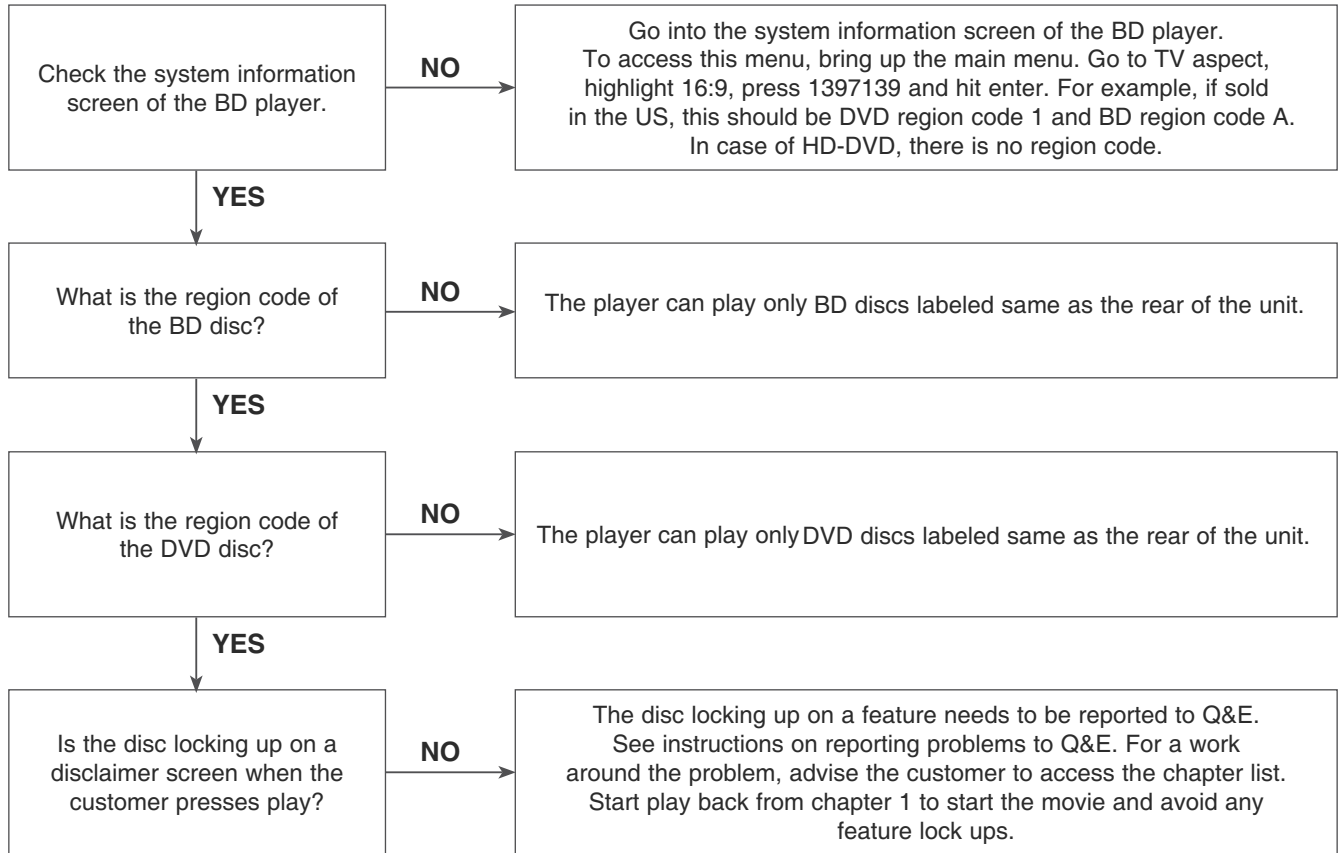
The audio and video freeze and skip during play back of a BD or DVD disc.



# TRAINING MASTER FOR BLU-RAY (BD)

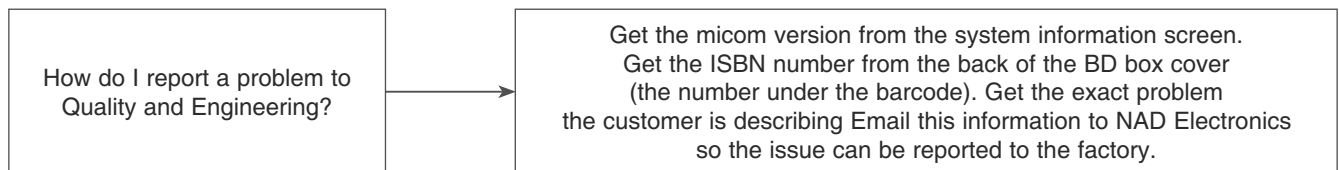
## 5-8. Can Access Menu, but Not Play a Movie

The disc menu is displayed but the disc will not play.



## 5-9. Reporting a problem to Quality & Engineering

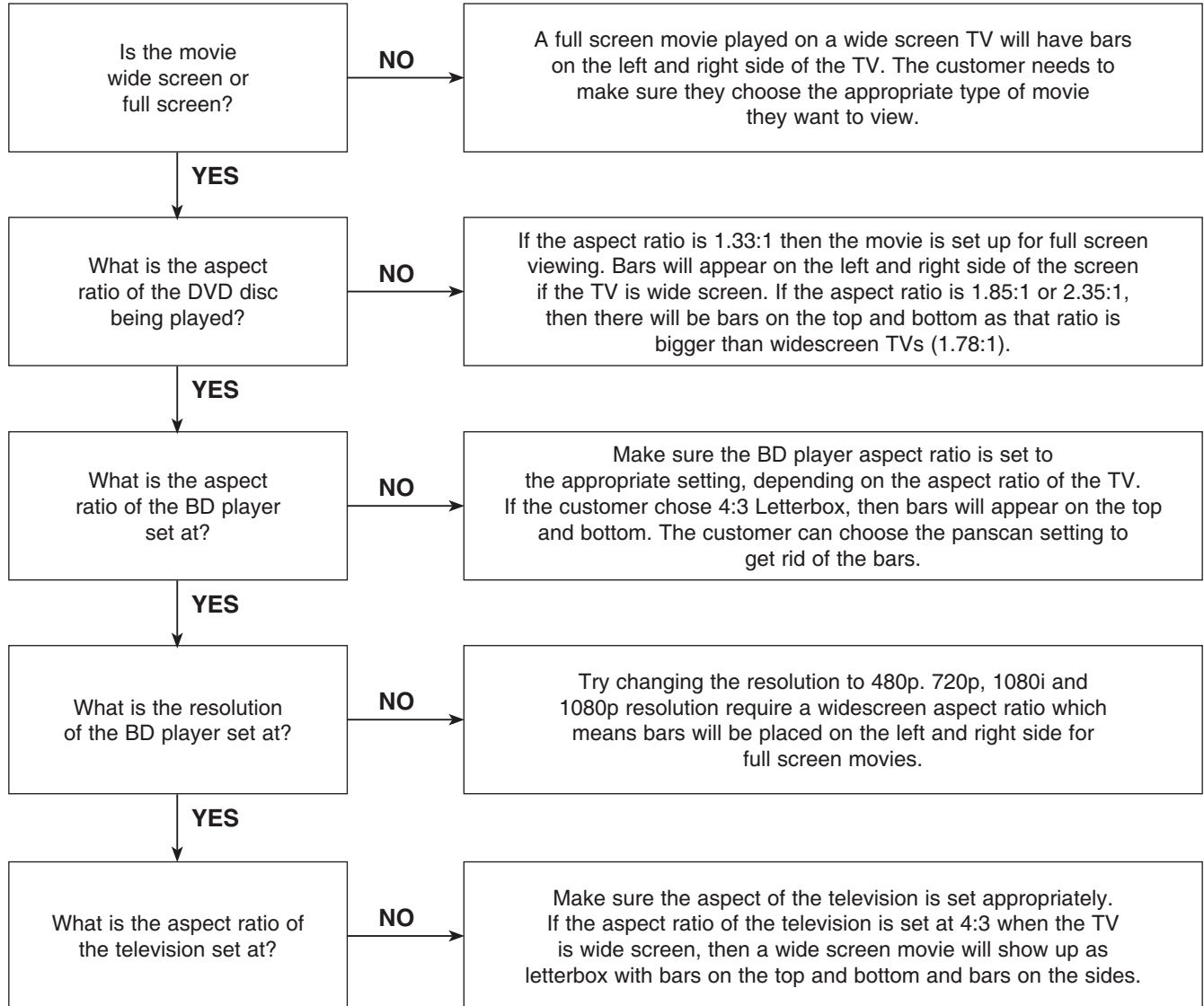
Reporting a problem that may require a firmware update to fix.



# TRAINING MASTER FOR BLU-RAY (BD)

## 5-10. Aspect Ratio

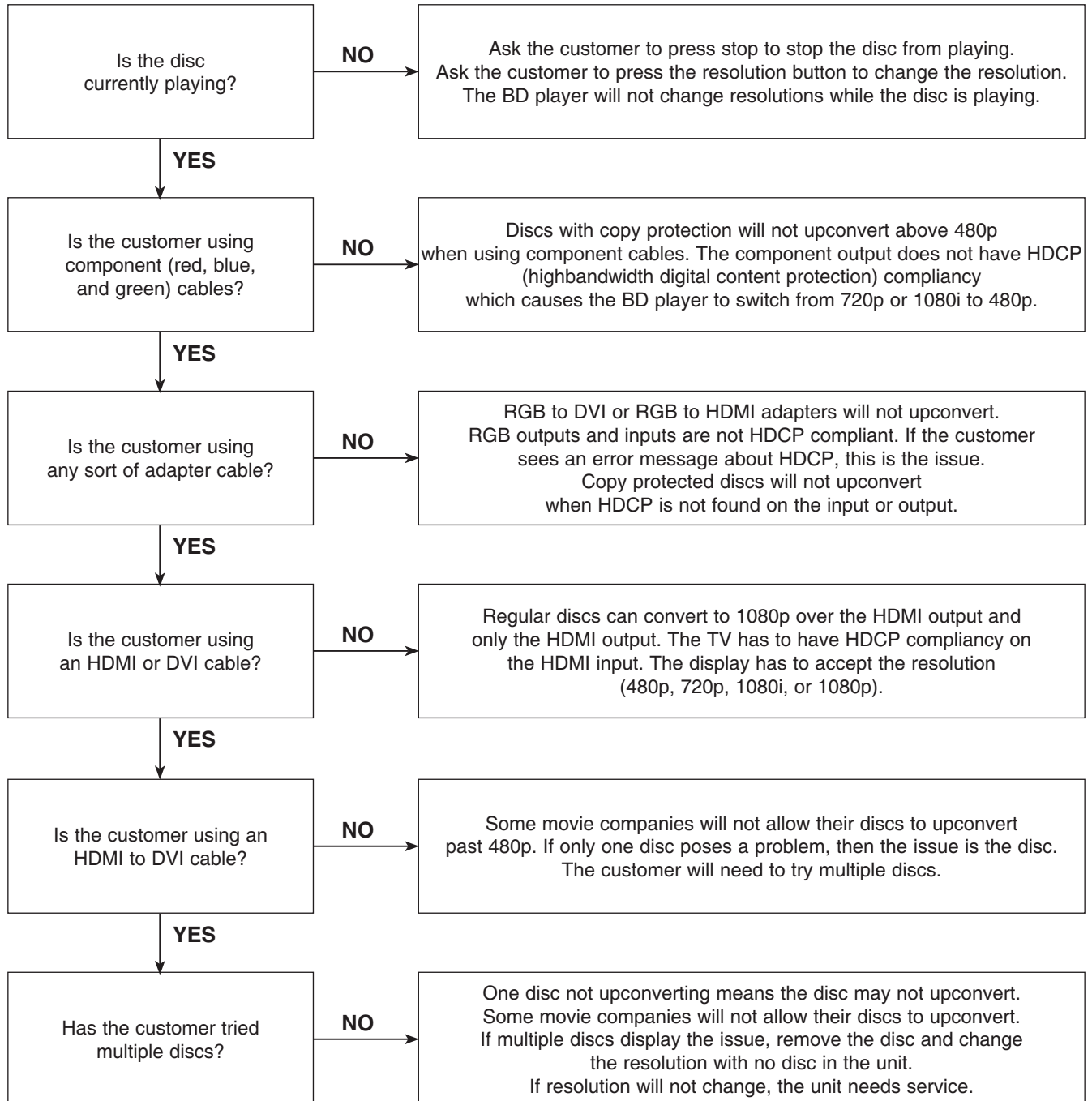
The customer has bars on the top and bottom of the screen, the left and right of the screen, or both.



# TRAINING MASTER FOR BLU-RAY (BD)

## 5-11. My Unit Won't Upconvert

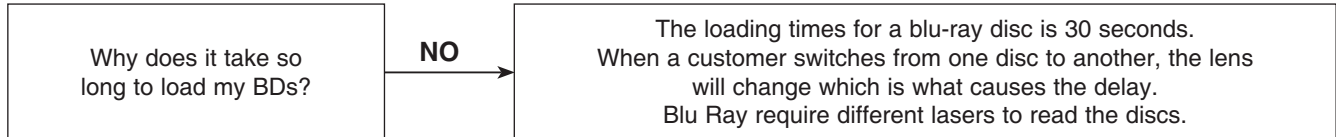
The customer has a problem with getting the unit to change resolutions to 480p, 720p, 1080i, or 1080p.



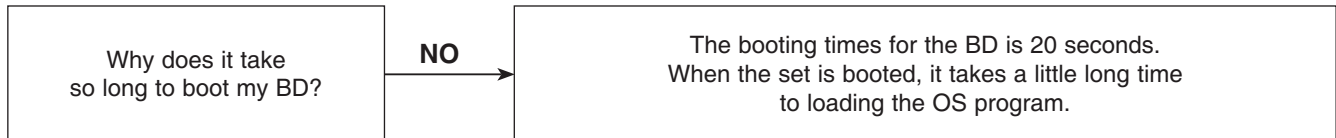
# TRAINING MASTER FOR BLU-RAY (BD)

## 6. BLU-RAY PLAYER

### 6-1. Slow Loading Times for BDs

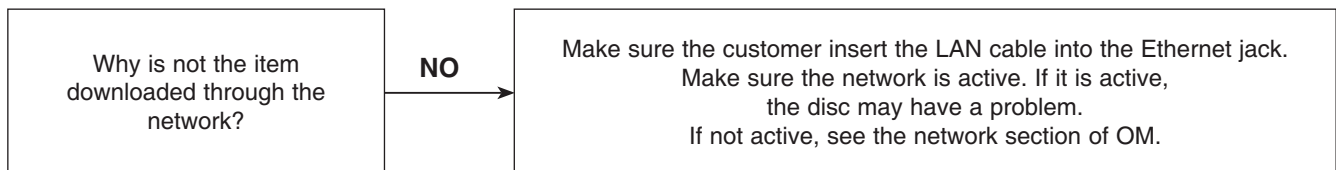
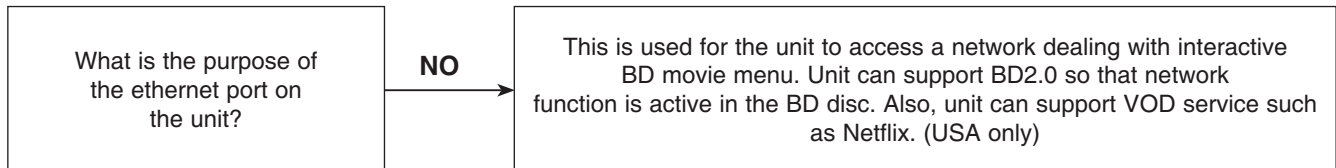


### 6-2. Booting Times



### 6-3. Ethernet Port

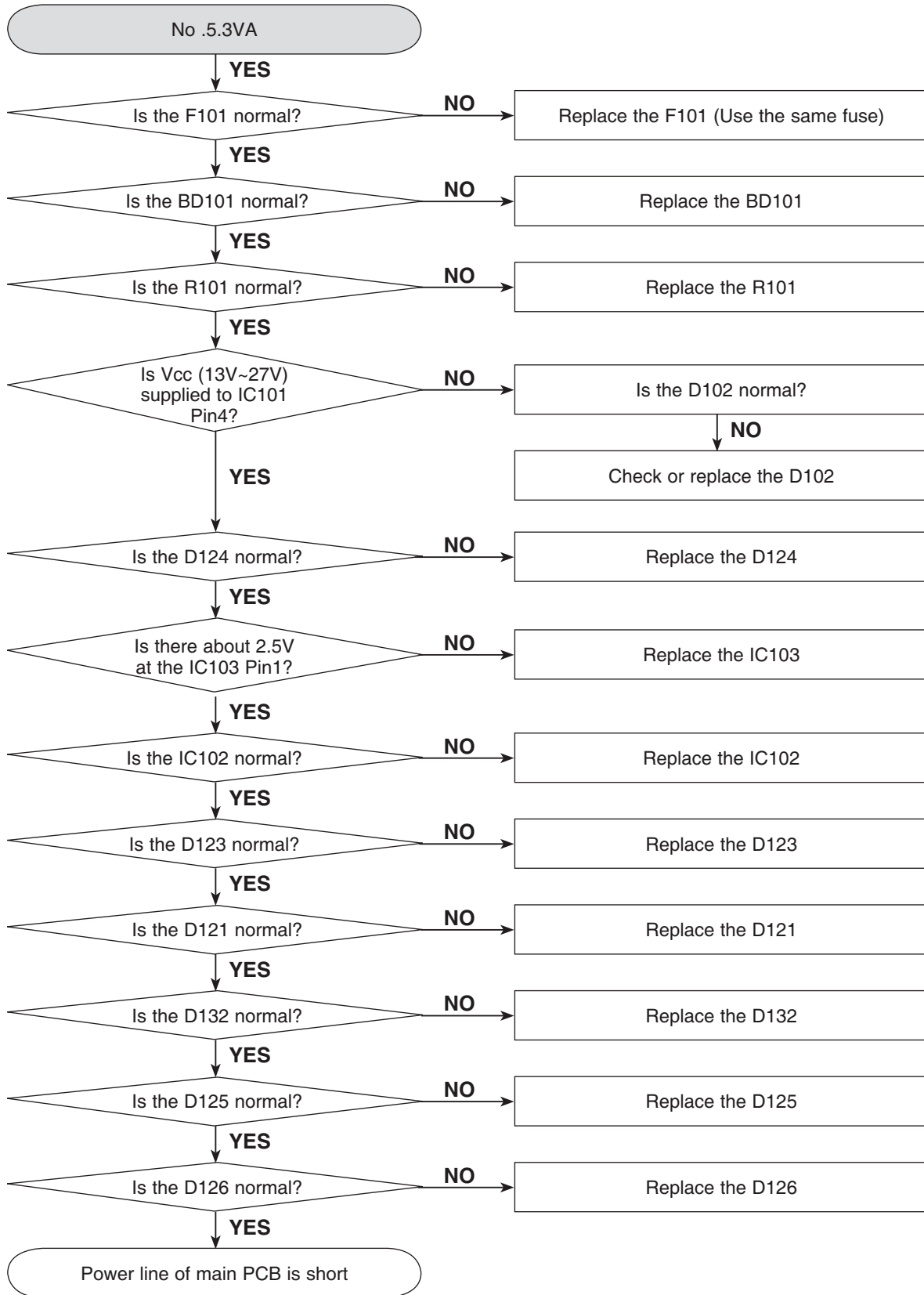
The purpose of the ethernet port on the unit.



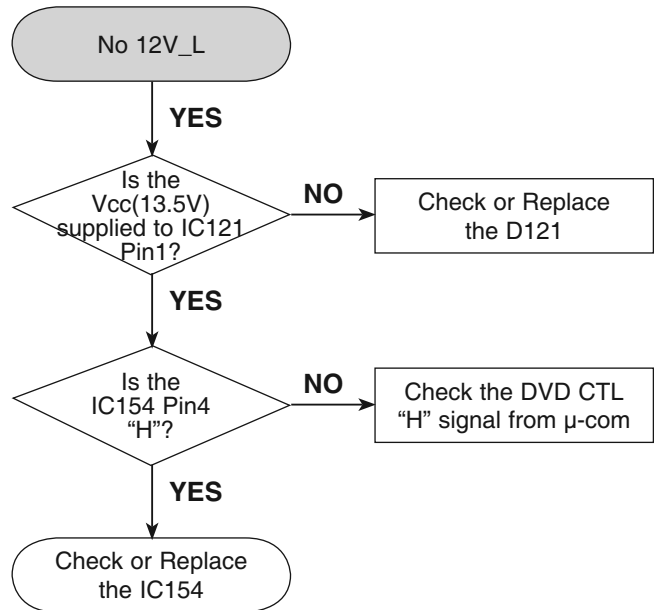
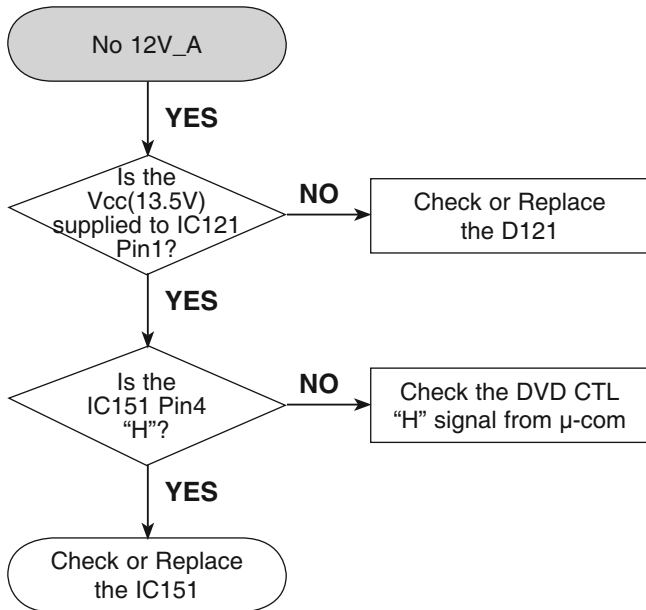
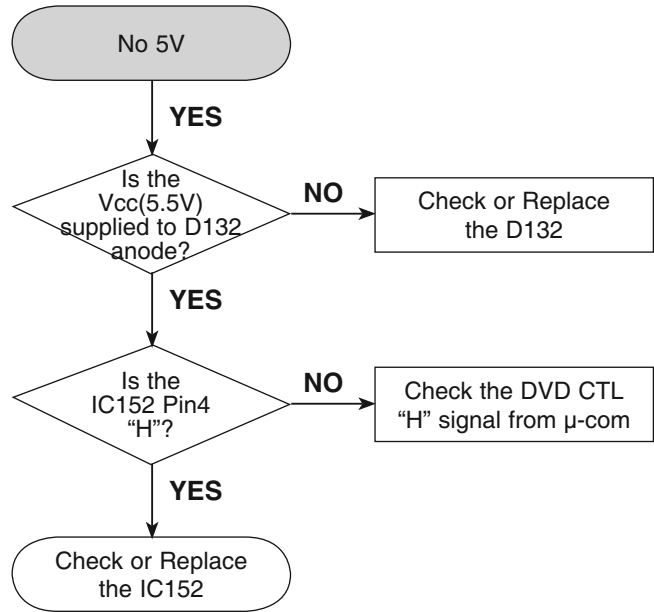
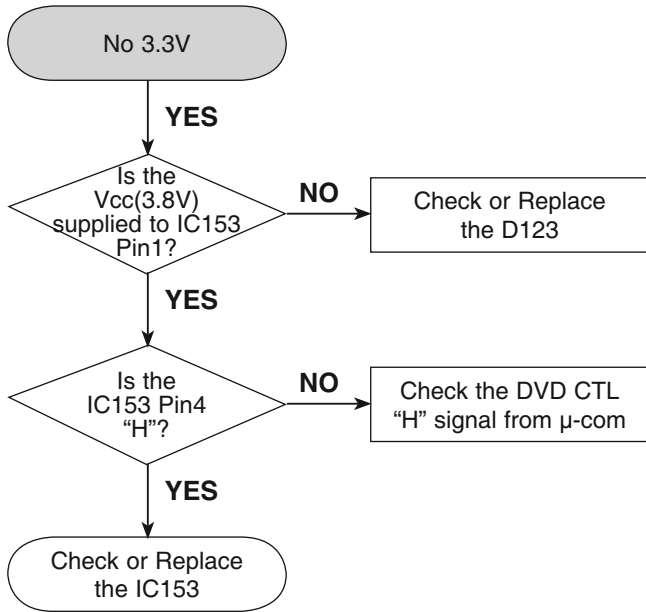


# ELECTRICAL TROUBLESHOOTING GUIDE

## 1. POWER SUPPLY (SMPS)

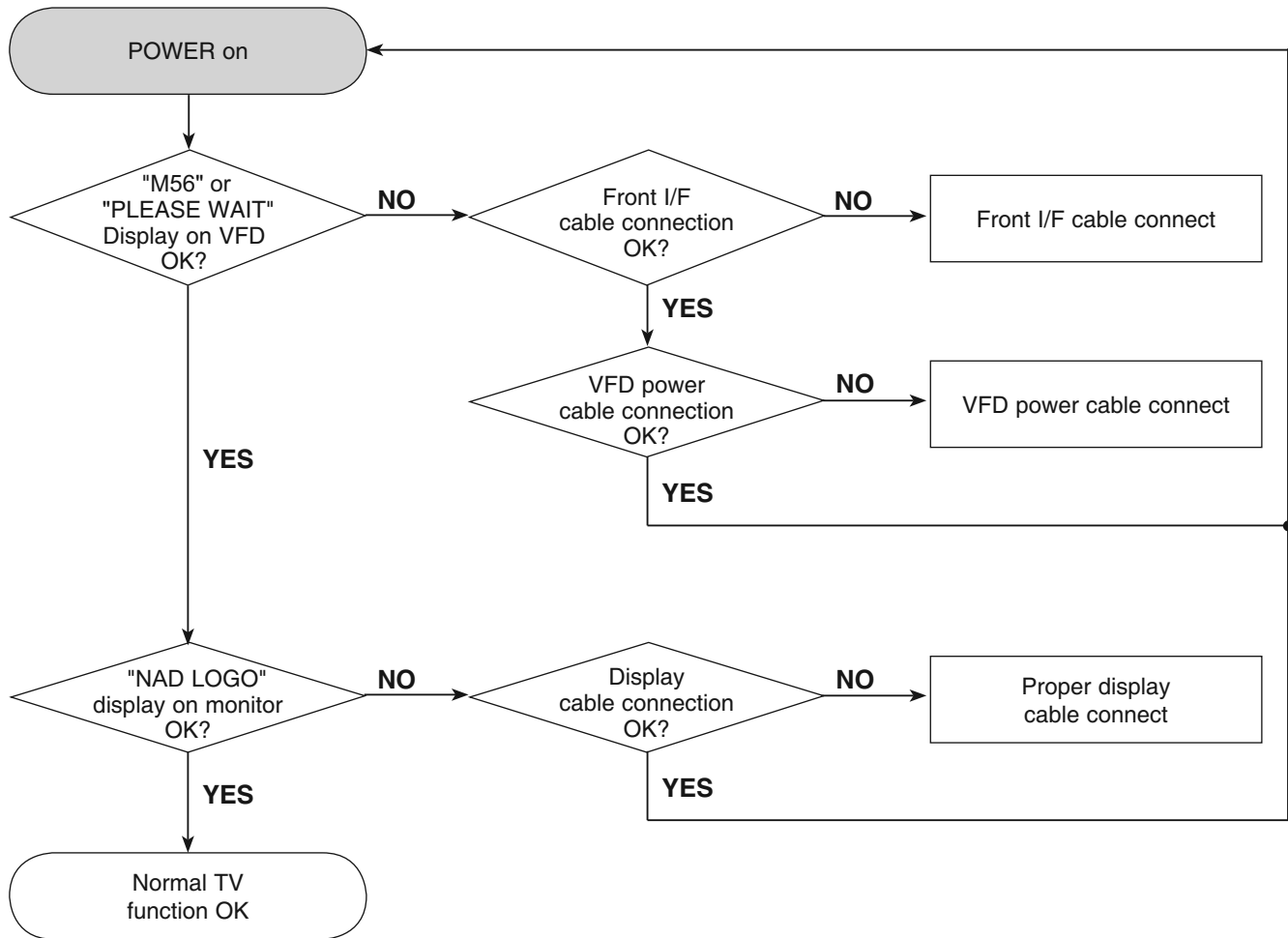


# ELECTRICAL TROUBLESHOOTING GUIDE



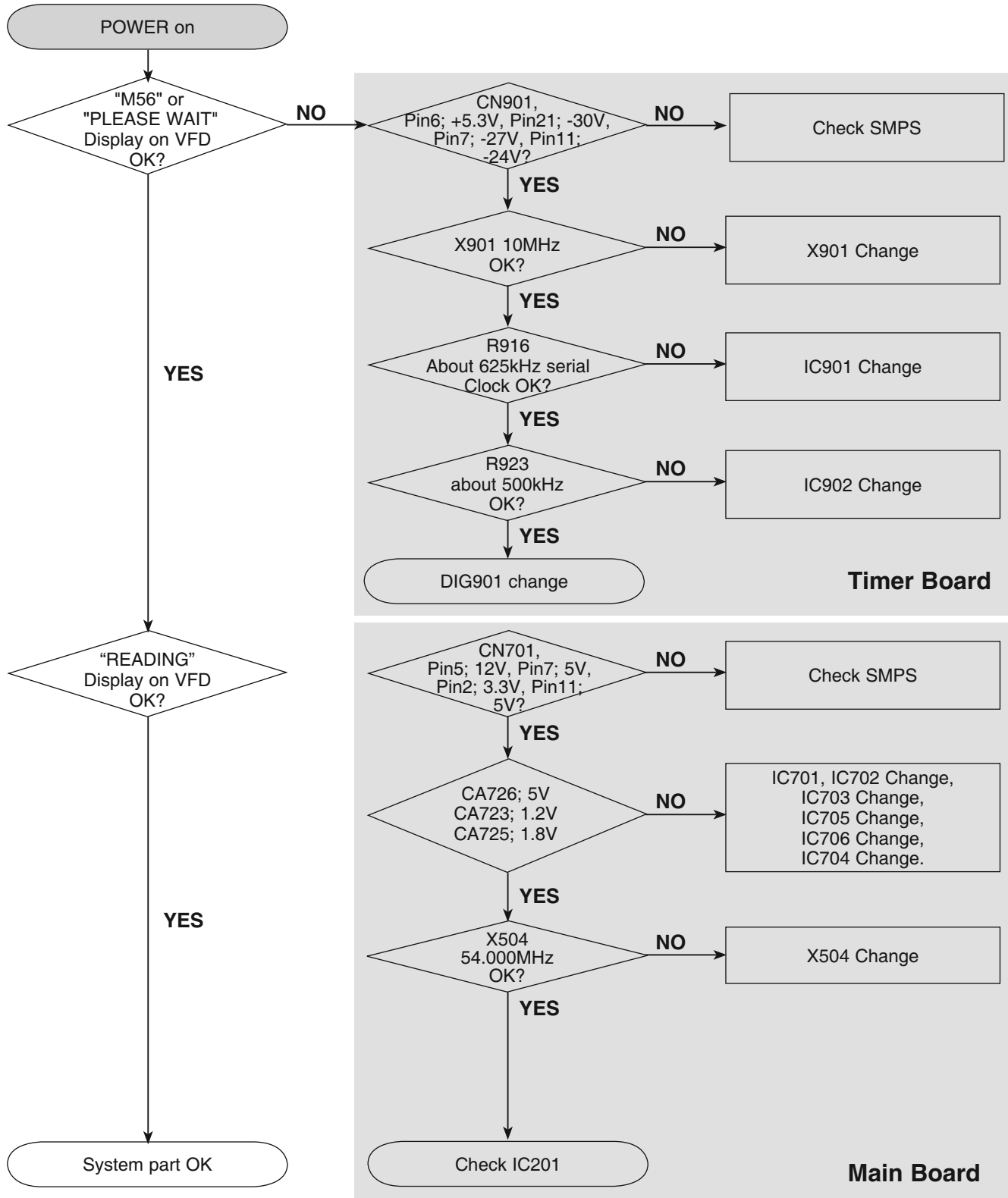
# ELECTRICAL TROUBLESHOOTING GUIDE

## 2. POWER ON



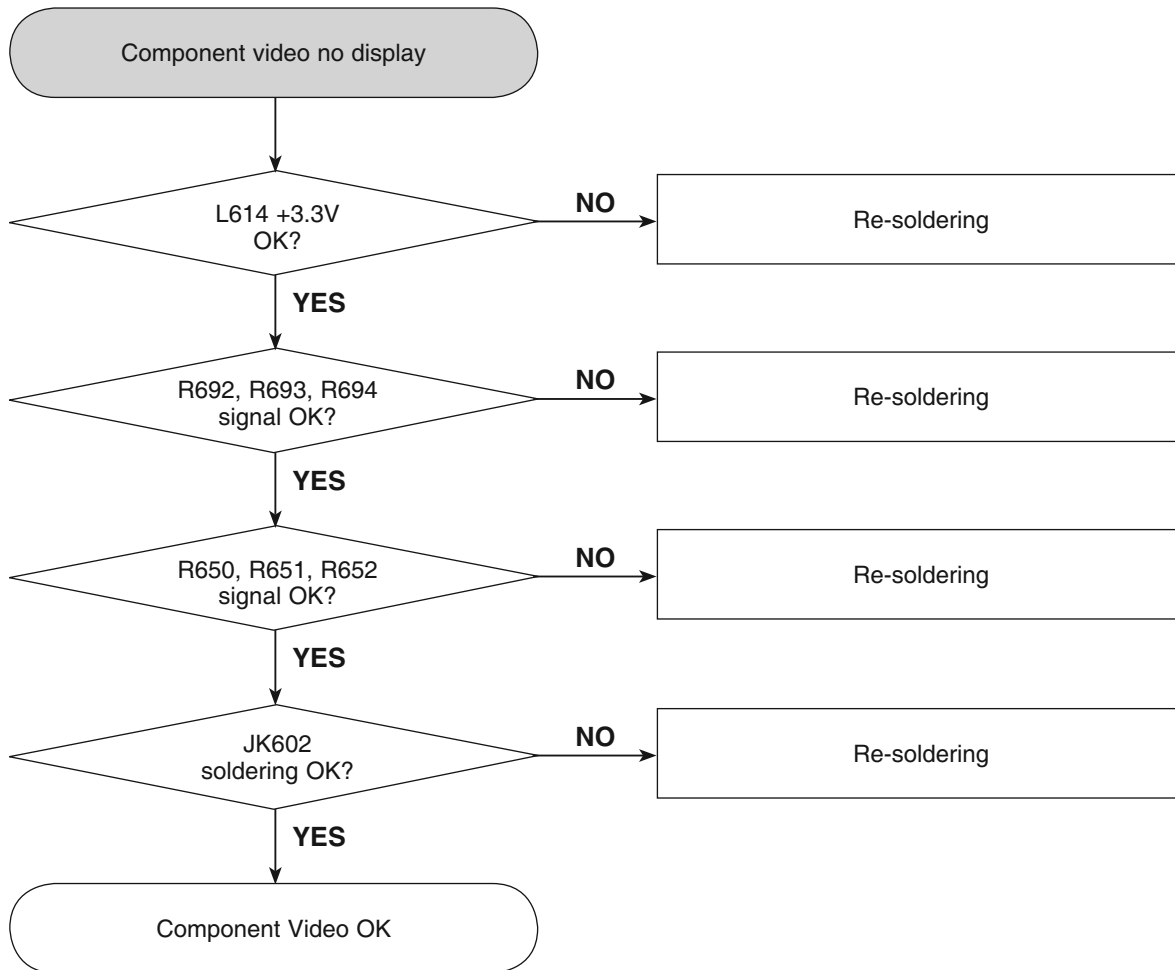
# ELECTRICAL TROUBLESHOOTING GUIDE

## 3. SYSTEM PART



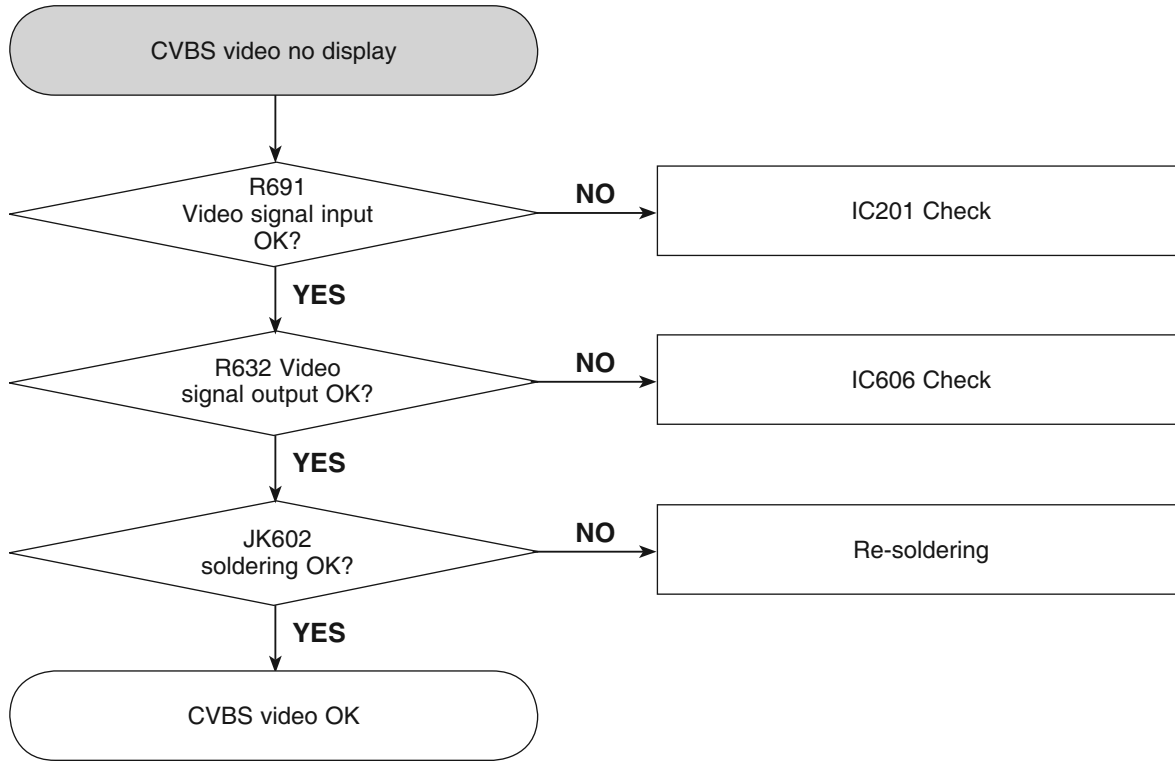
# ELECTRICAL TROUBLESHOOTING GUIDE

## 4. COMPONENT (YPbPr) VIDEO OUT



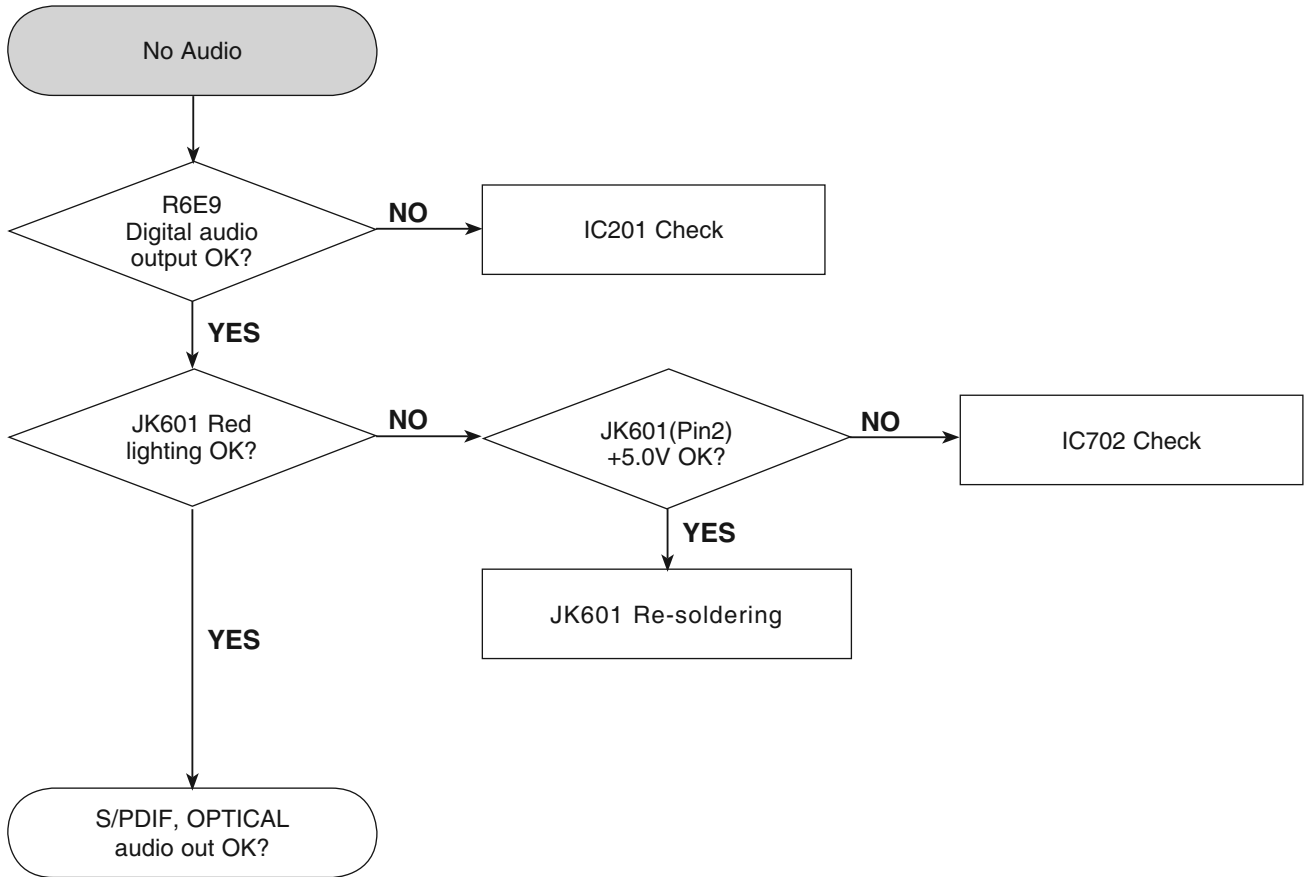
# ELECTRICAL TROUBLESHOOTING GUIDE

## 5. CVBS VIDEO OUT



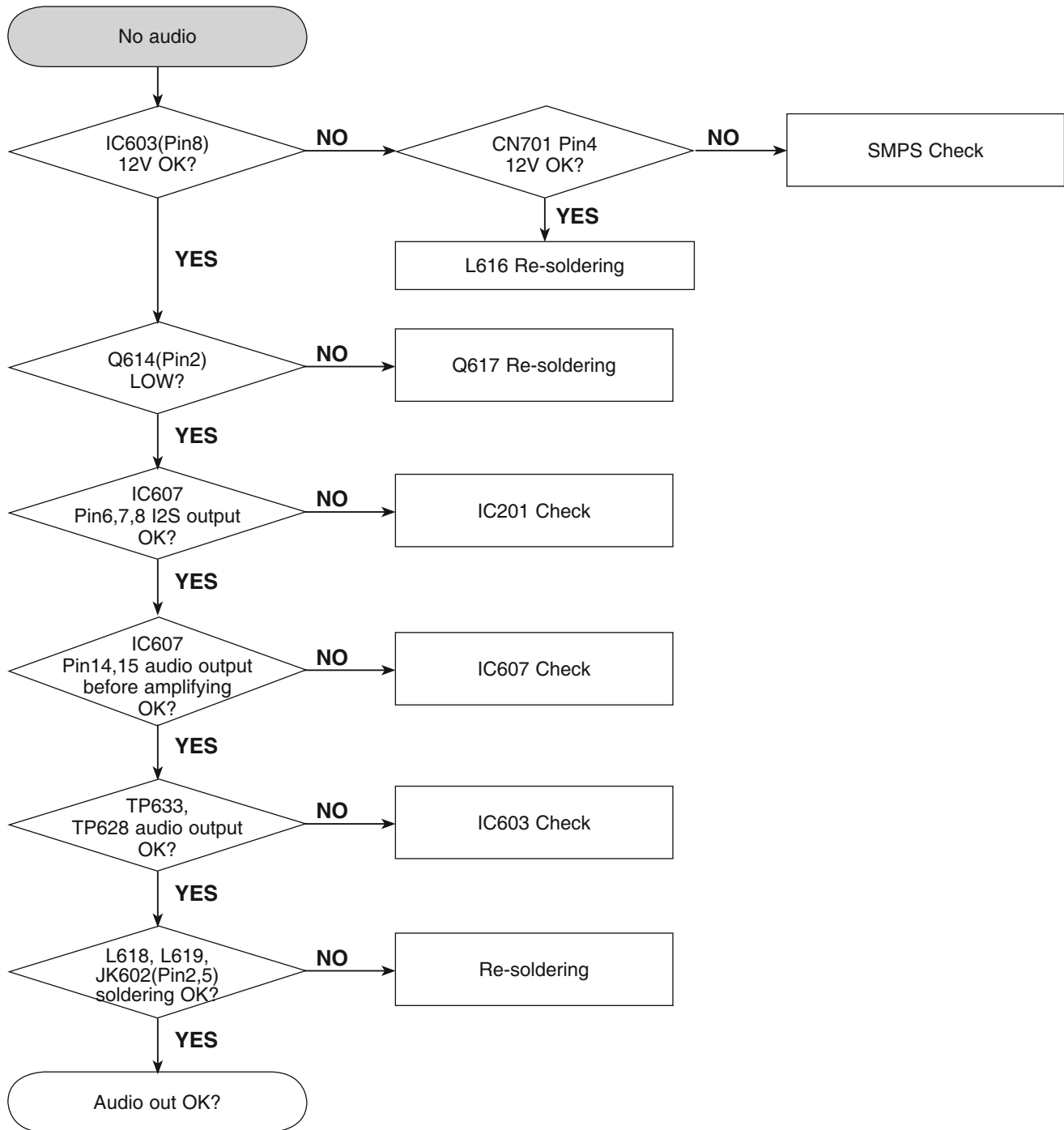
# ELECTRICAL TROUBLESHOOTING GUIDE

## 6. AUDIO (S/PDIF, OPTICAL)



# ELECTRICAL TROUBLESHOOTING GUIDE

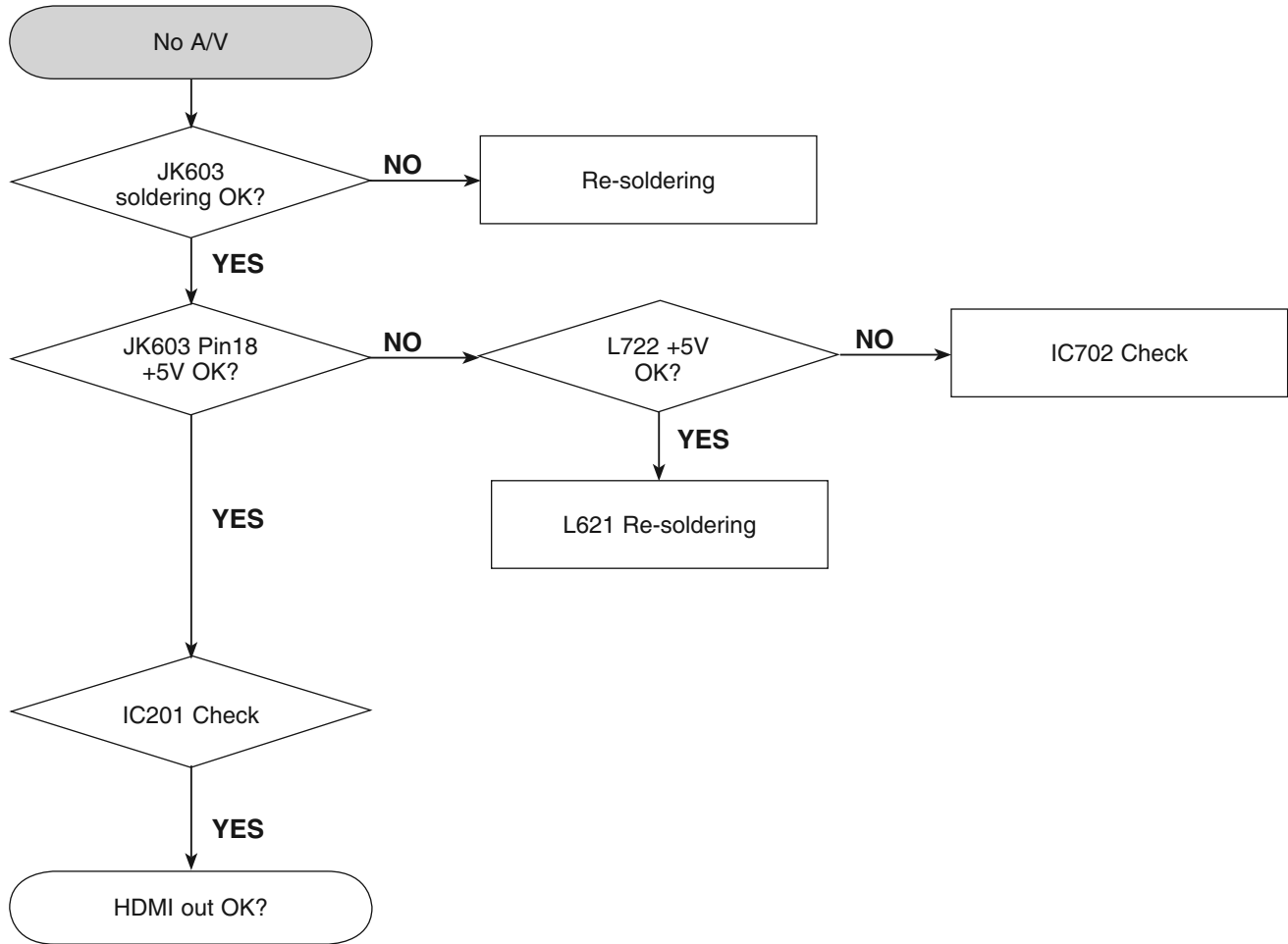
## 7. AUDIO (ANALOG)





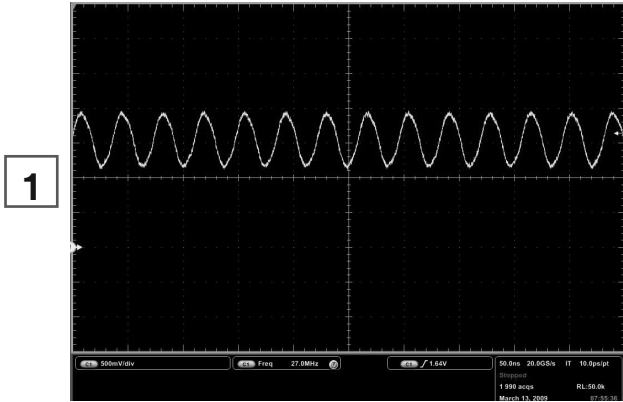
# ELECTRICAL TROUBLESHOOTING GUIDE

## 8. HDMI

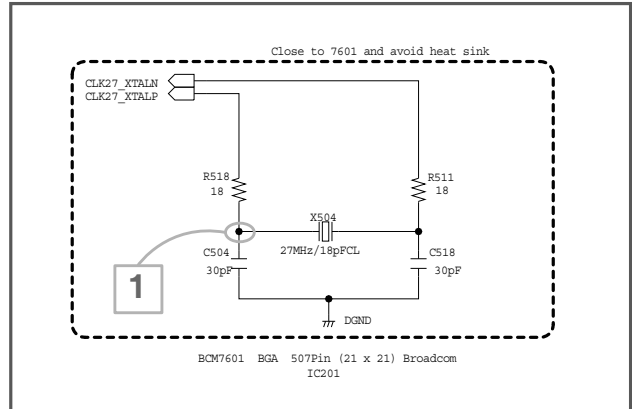


# WAVEFORMS

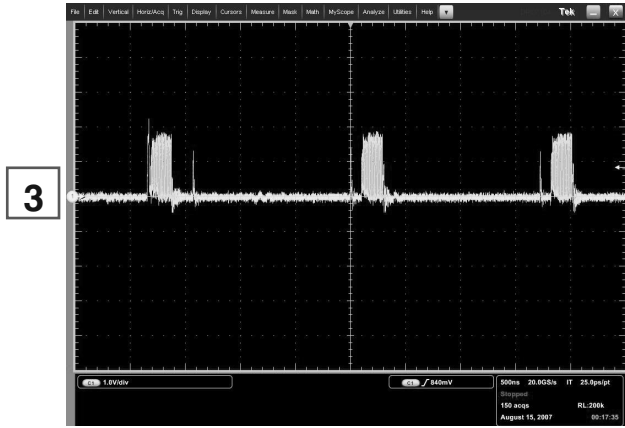
## 1. SYSTEM PART-1



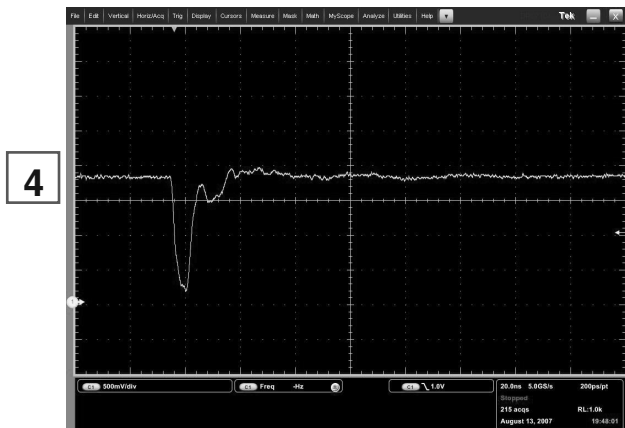
7601 XTAL (27MHz)



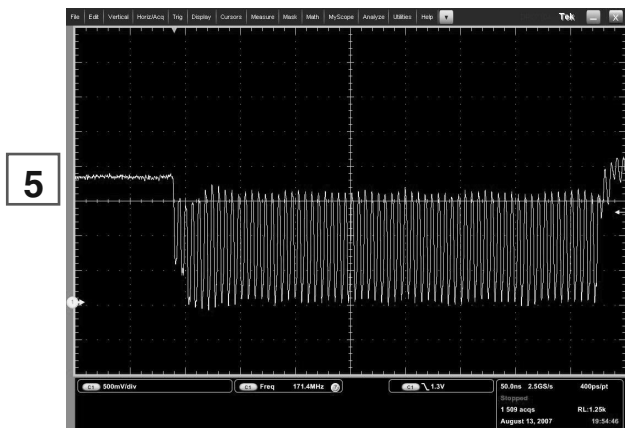
## 2. SYSTEM PART-2 (SYSTEM MEMORY)



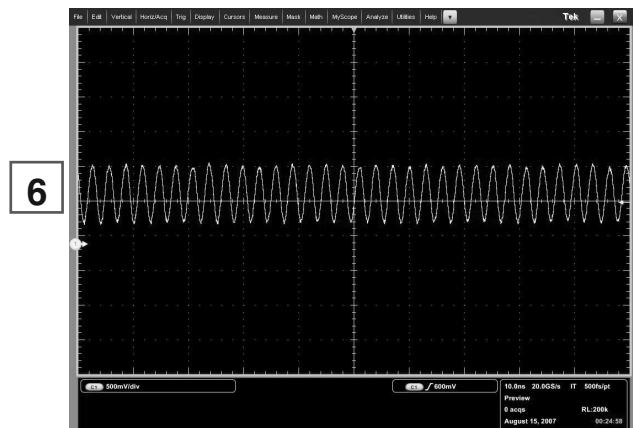
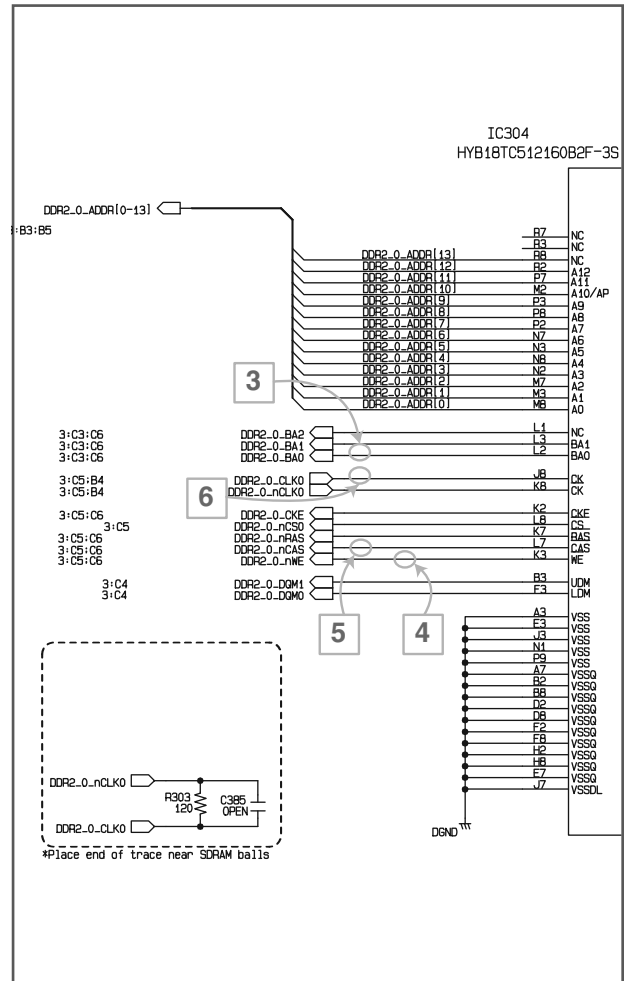
7601 DDR2\_0\_BA0



7601 DDR2\_0\_nWE

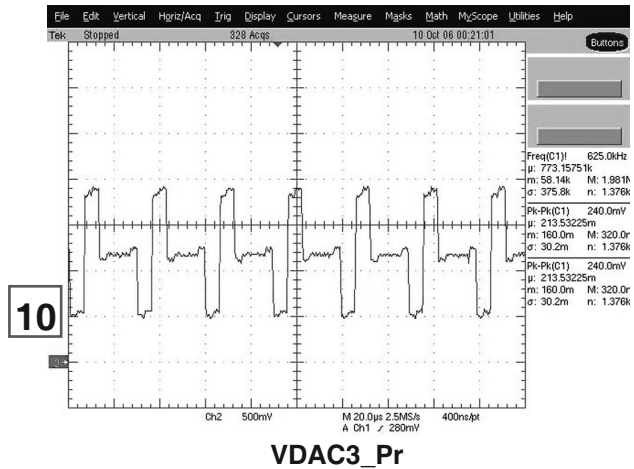
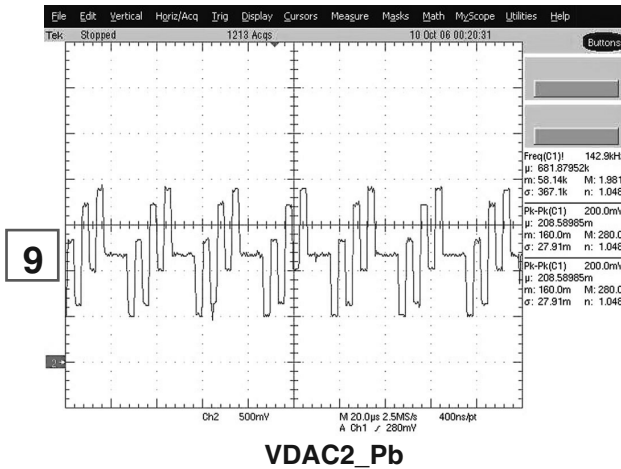
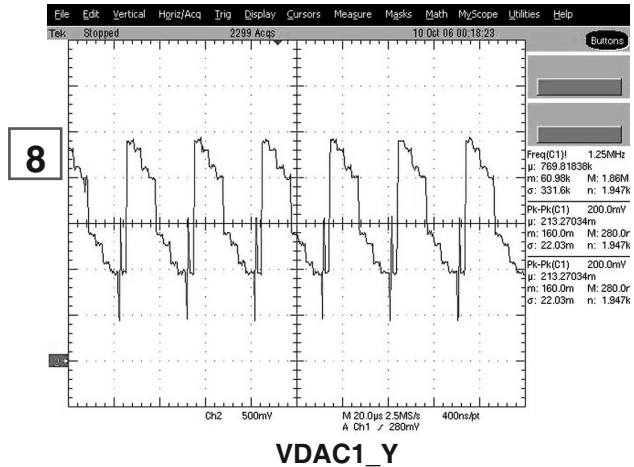
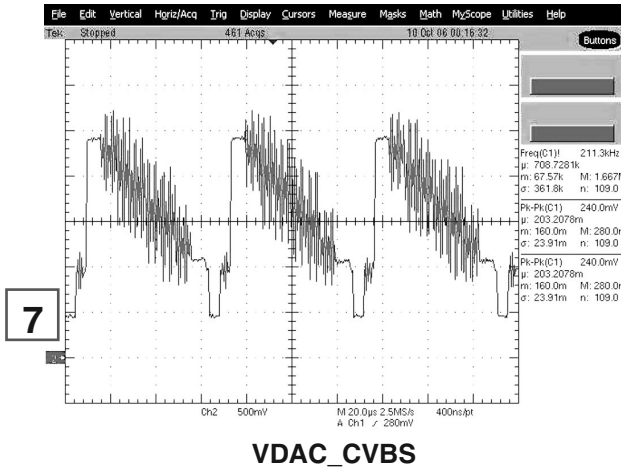
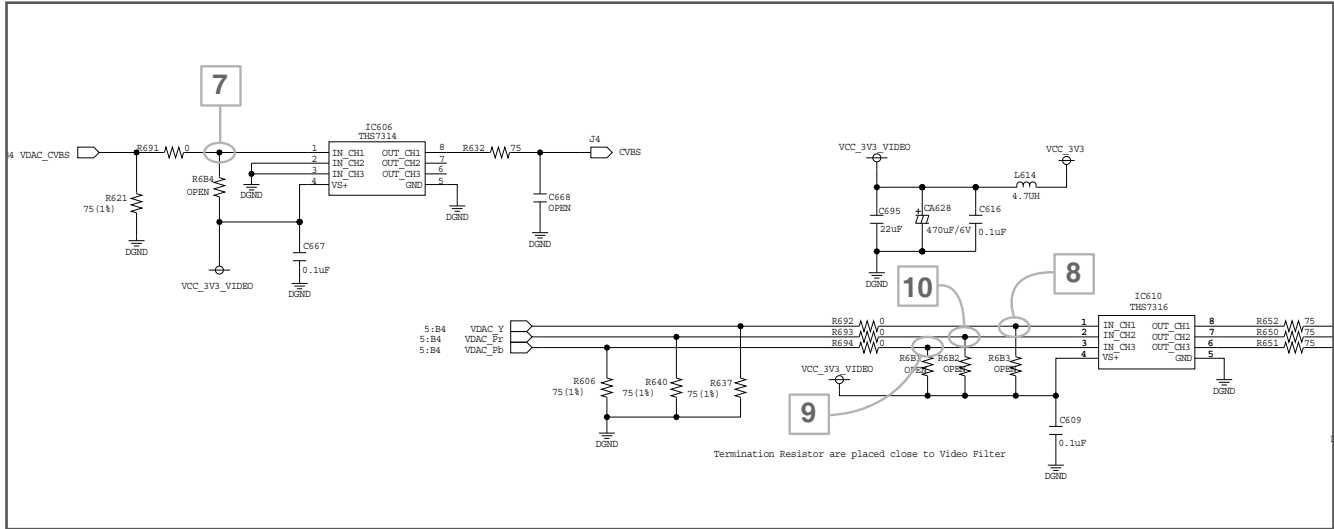


7601 DDR2\_0\_nCAS

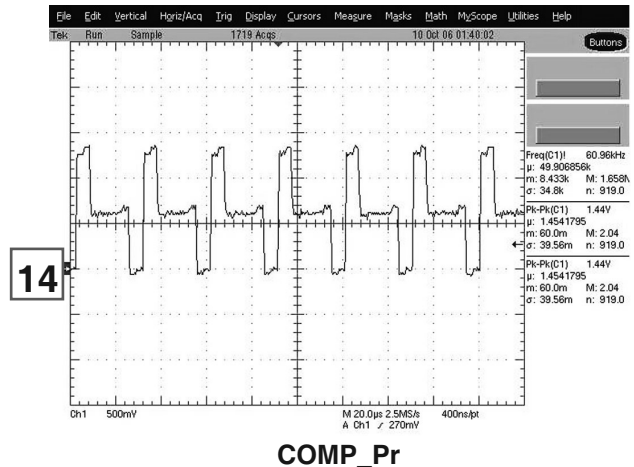
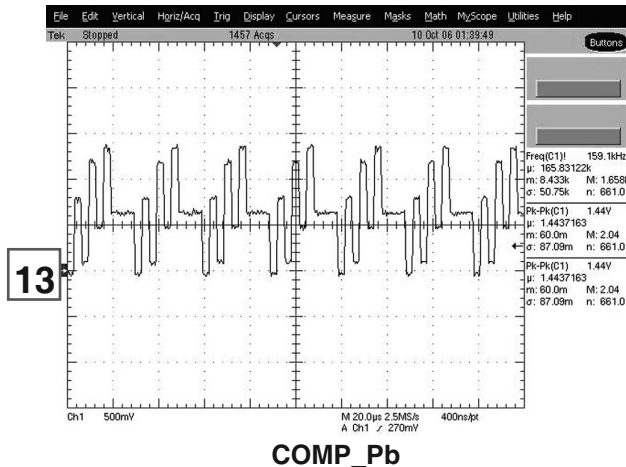
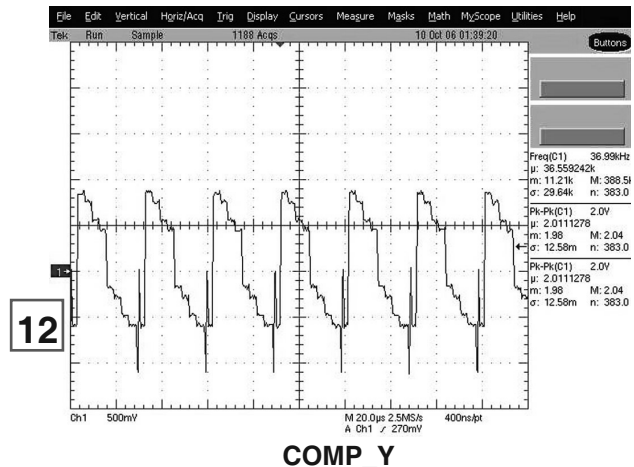
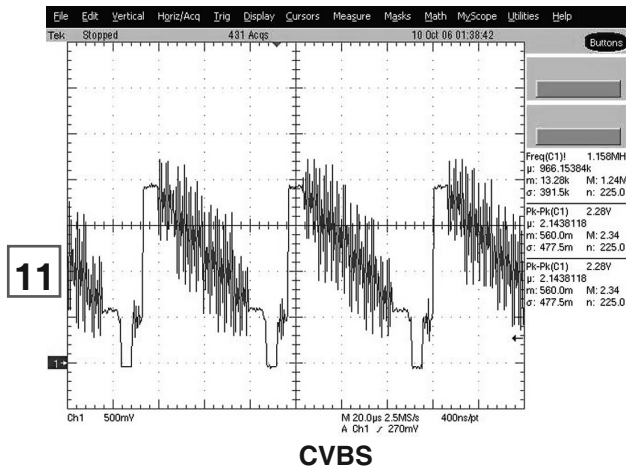
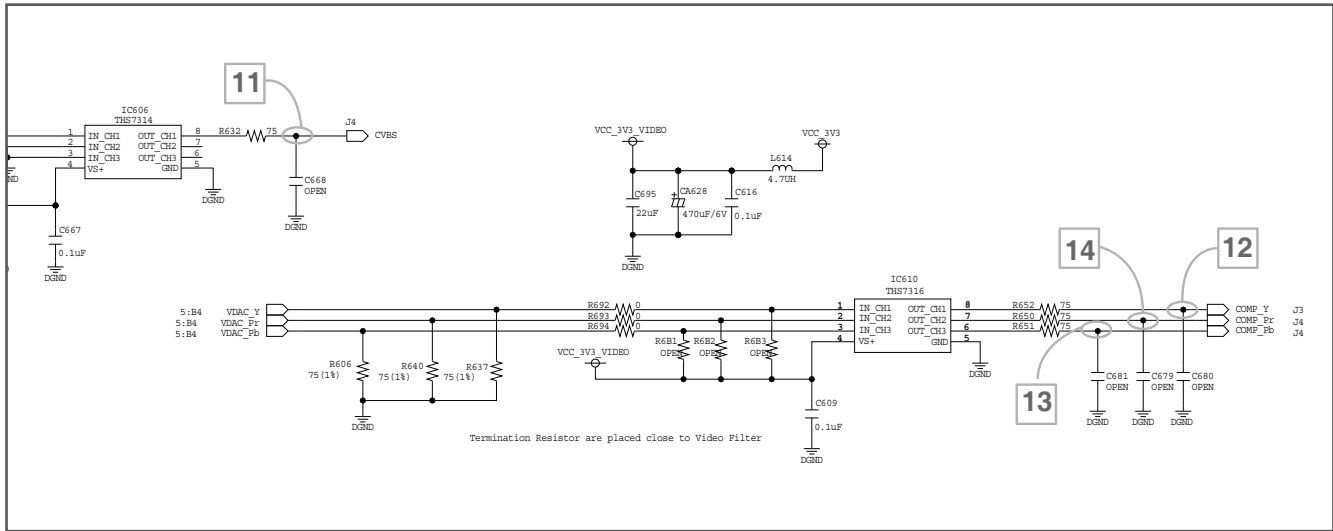


7601 DDR2\_0\_CLK0

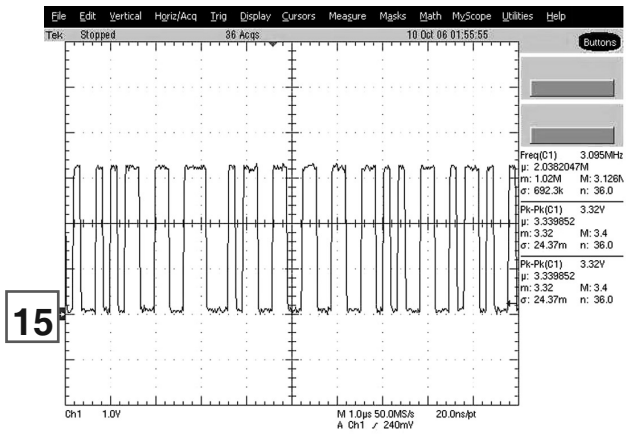
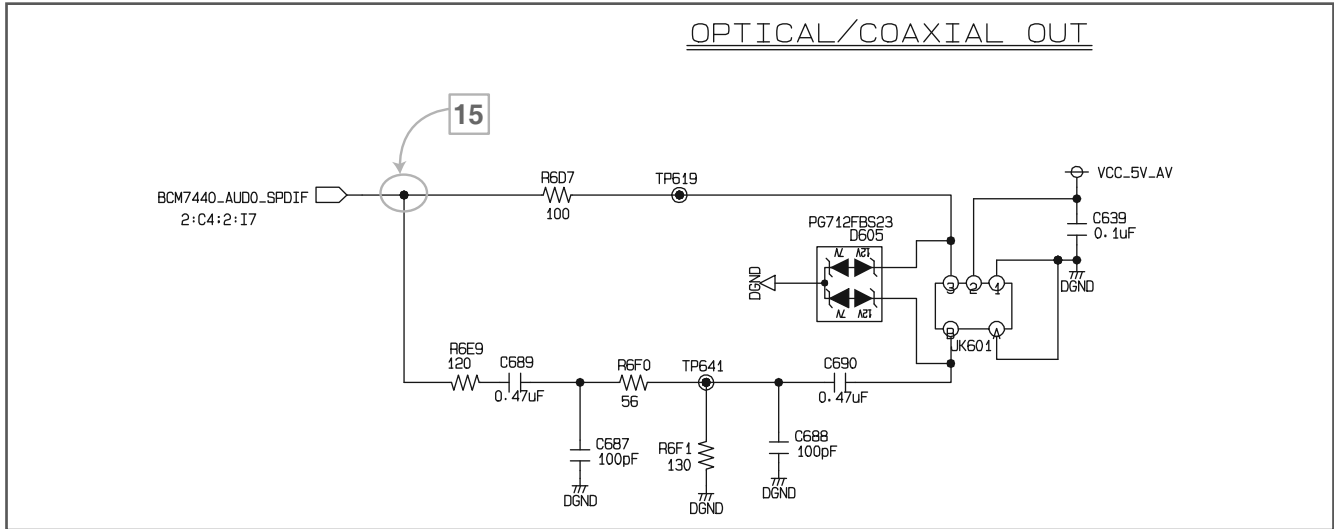
### 3. VIDEO PART-1 (100% FULL COLOR-BAR)



# 4. VIDEO PART-2 (100% FULL COLOR-BAR)

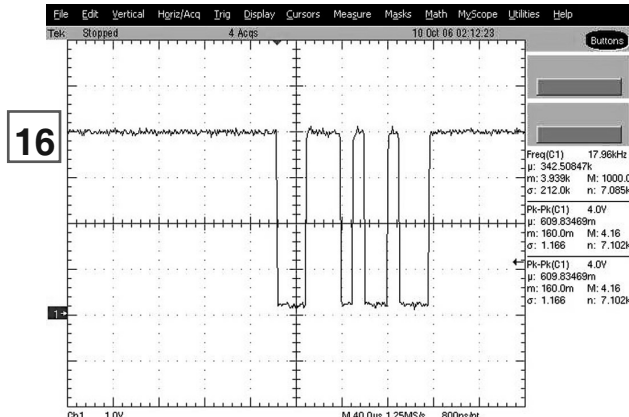
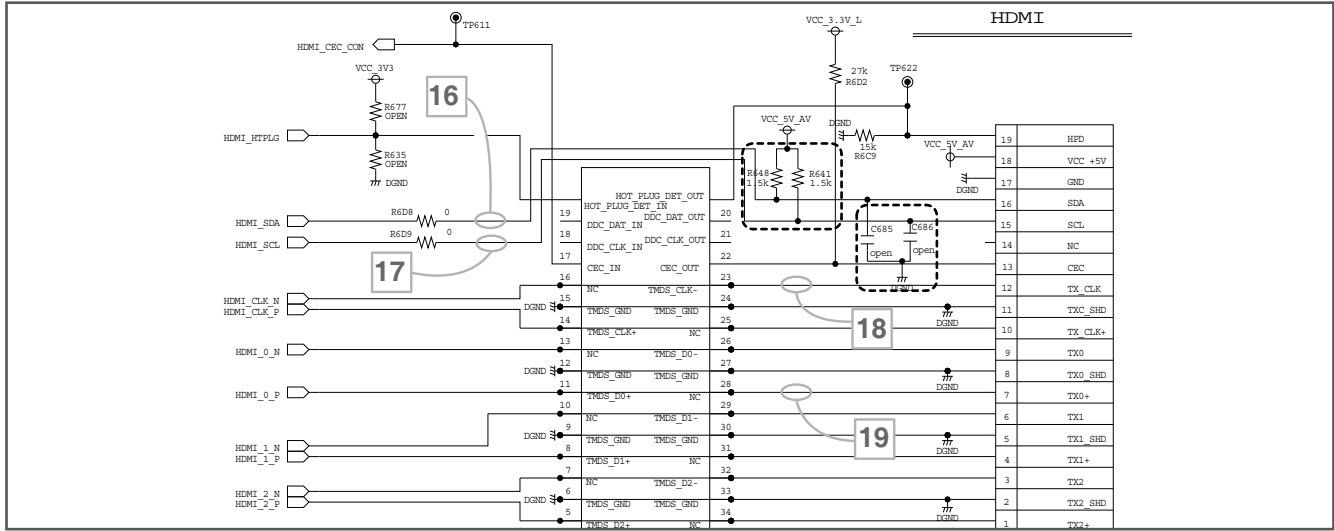


## 5. AUDIO PART (S/PDIF)

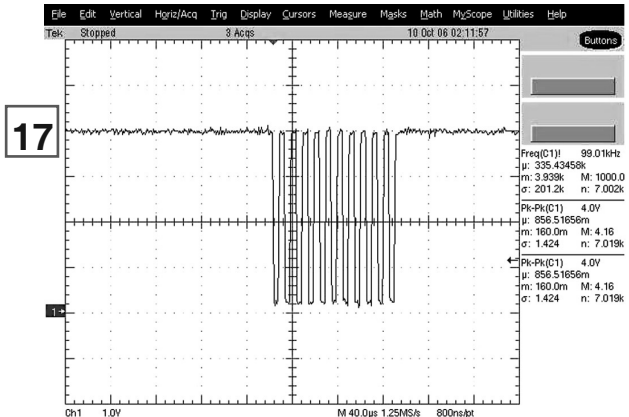


7601\_AUD0\_SPDIF

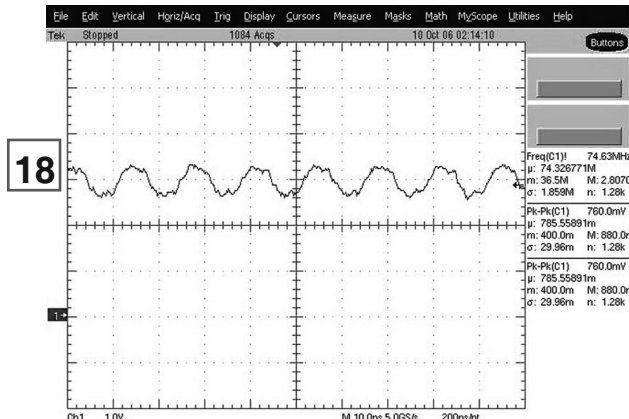
# 6. HDMI PART



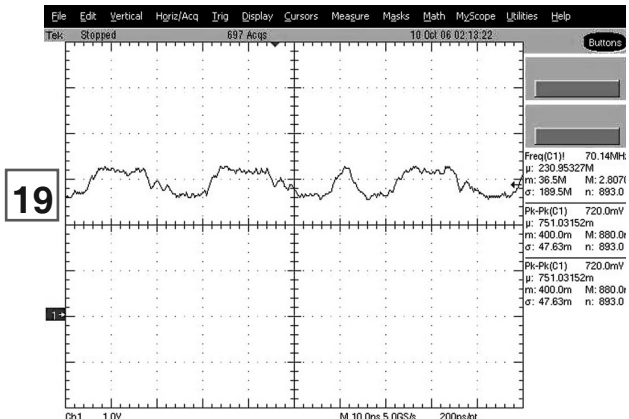
9134\_12C\_SDA



9134\_12C\_SCL

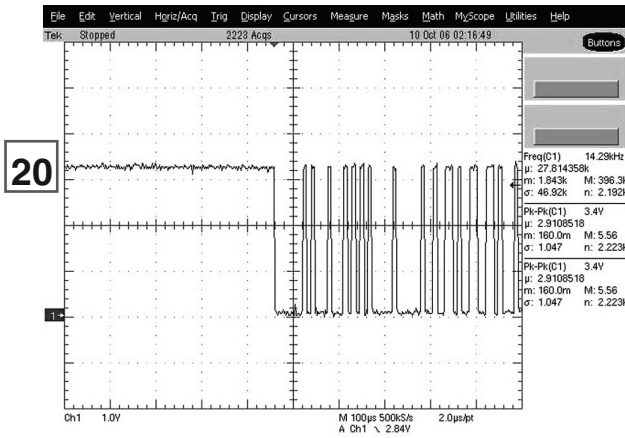
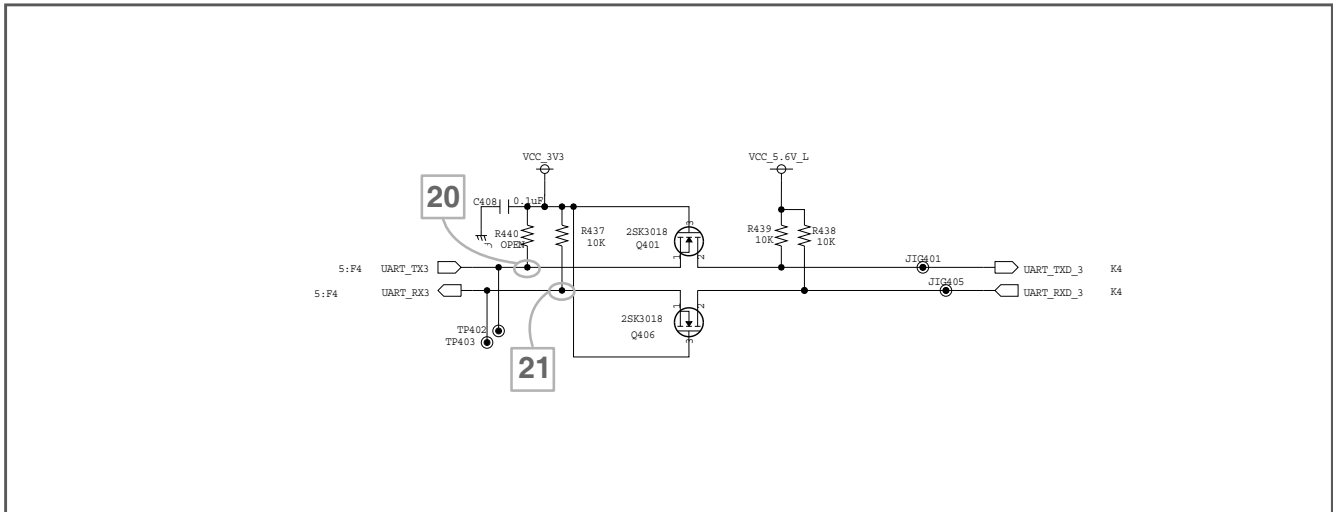


HDMI\_CLK

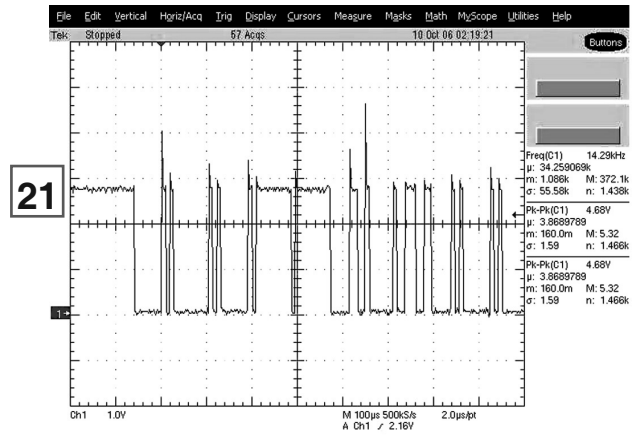


HDMI\_DATA

# 7. FRONT I/F PART



UART\_TXD\_0

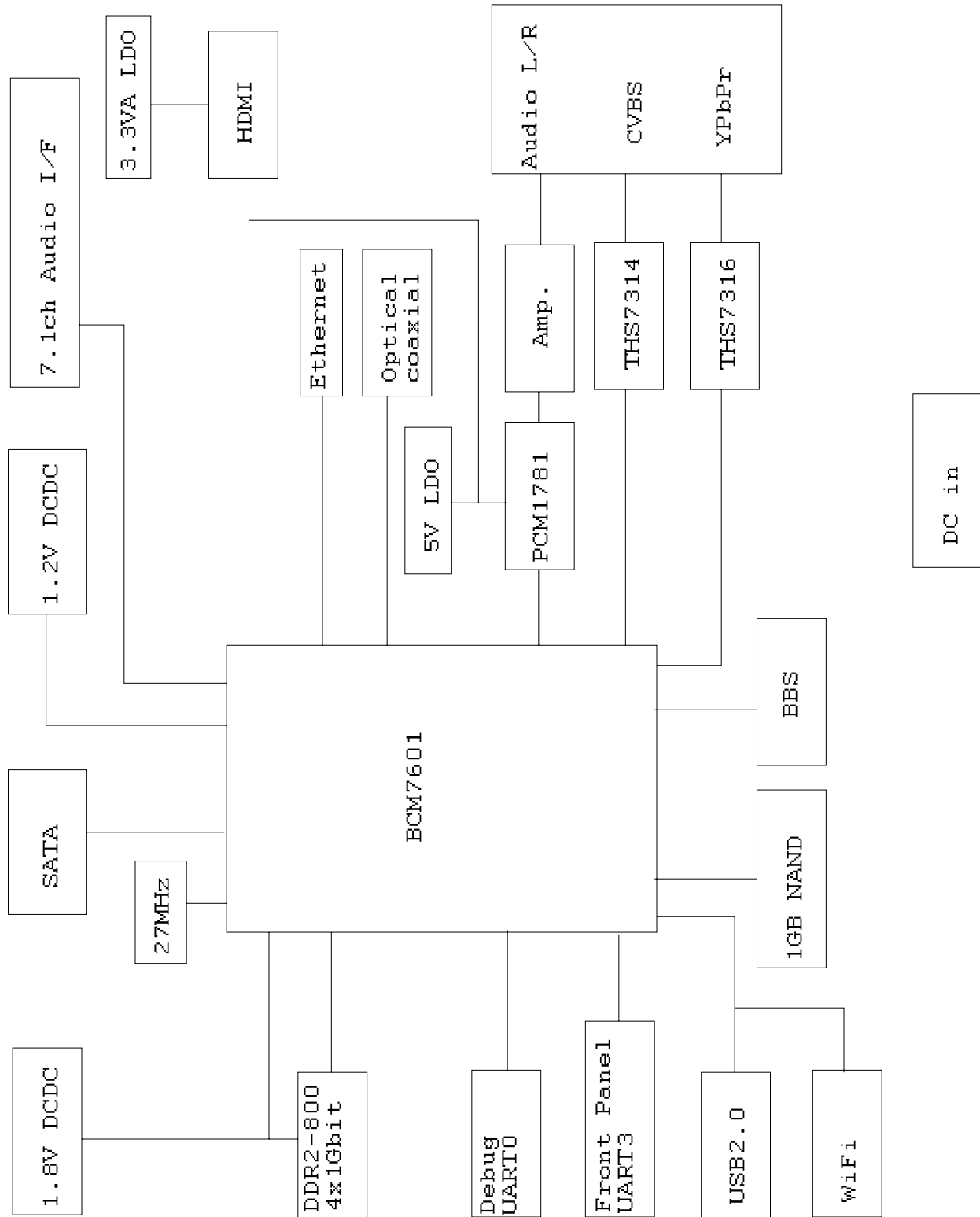


UART\_RXD\_0

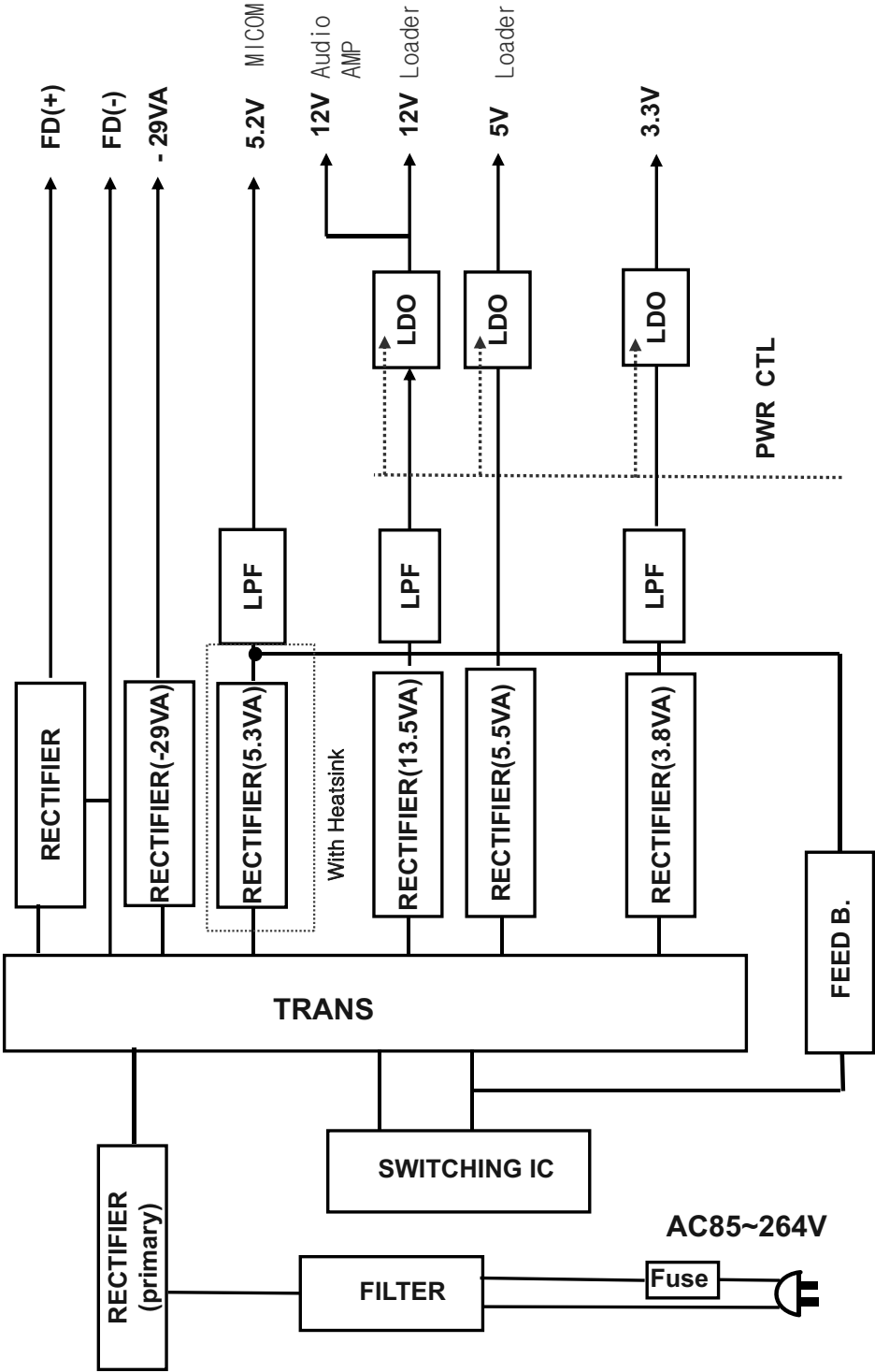


# BLOCK DIAGRAMS

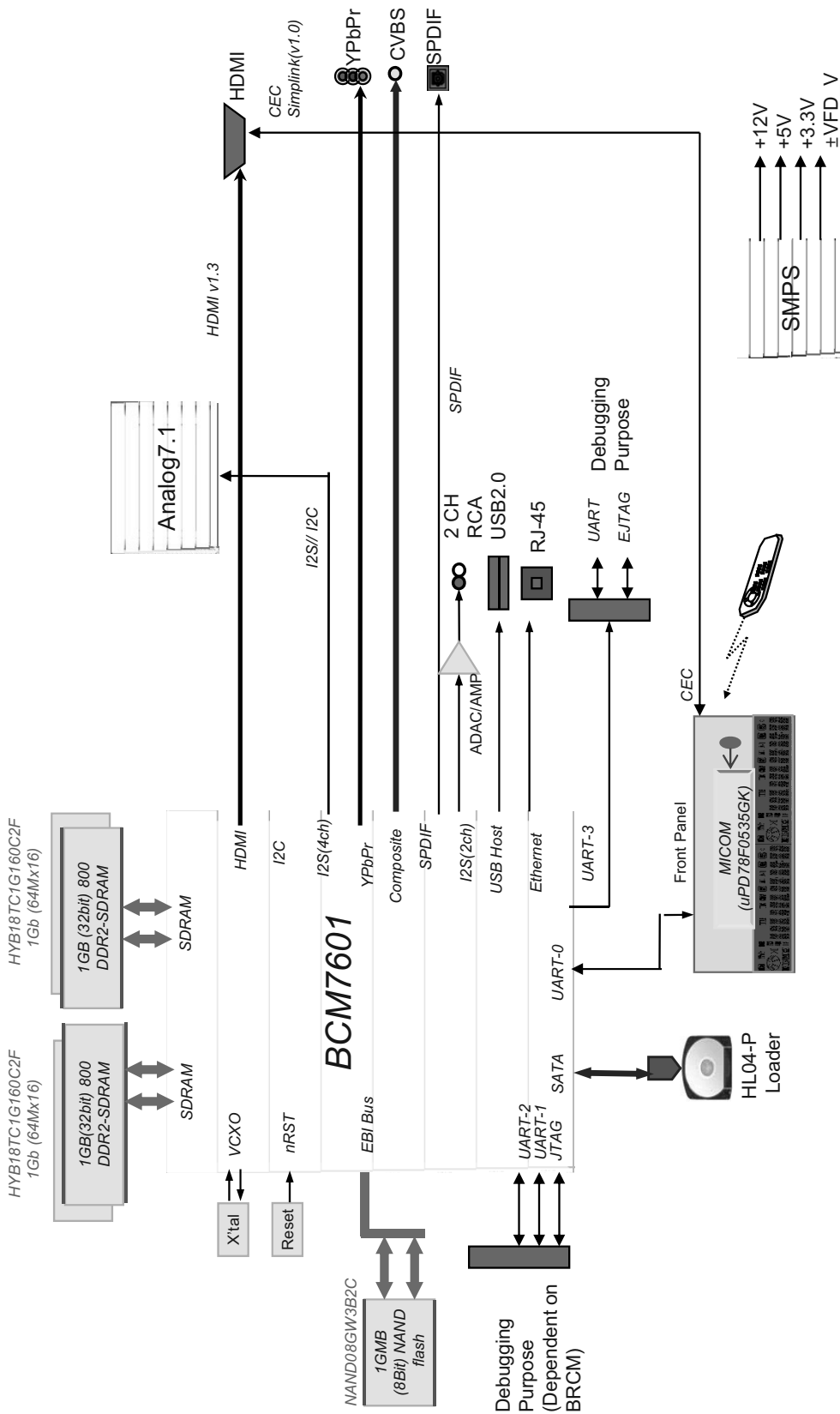
## 1. OVERALL BLOCK DIAGRAM



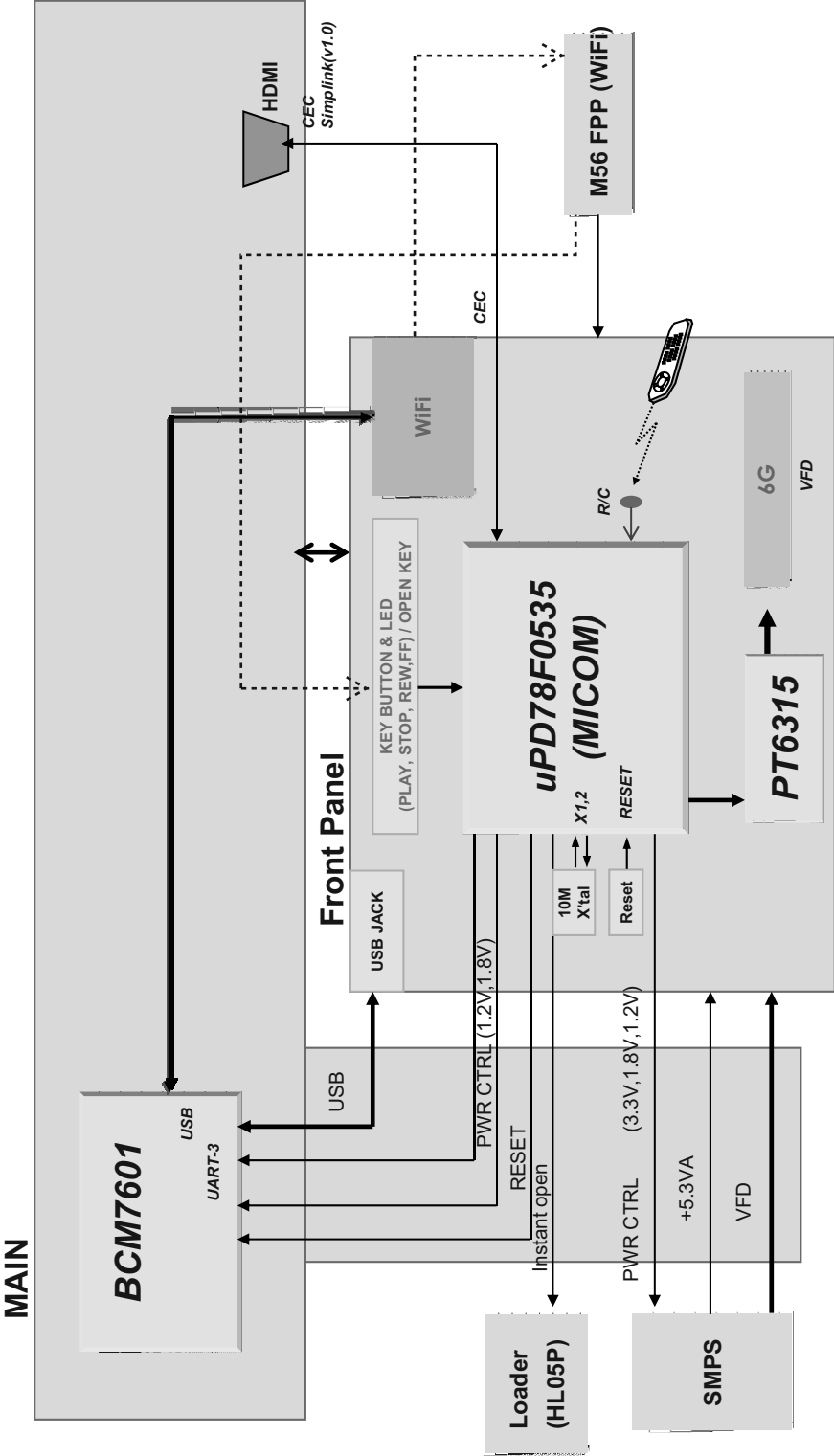
## 2. SMPS BLOCK DIAGRAM



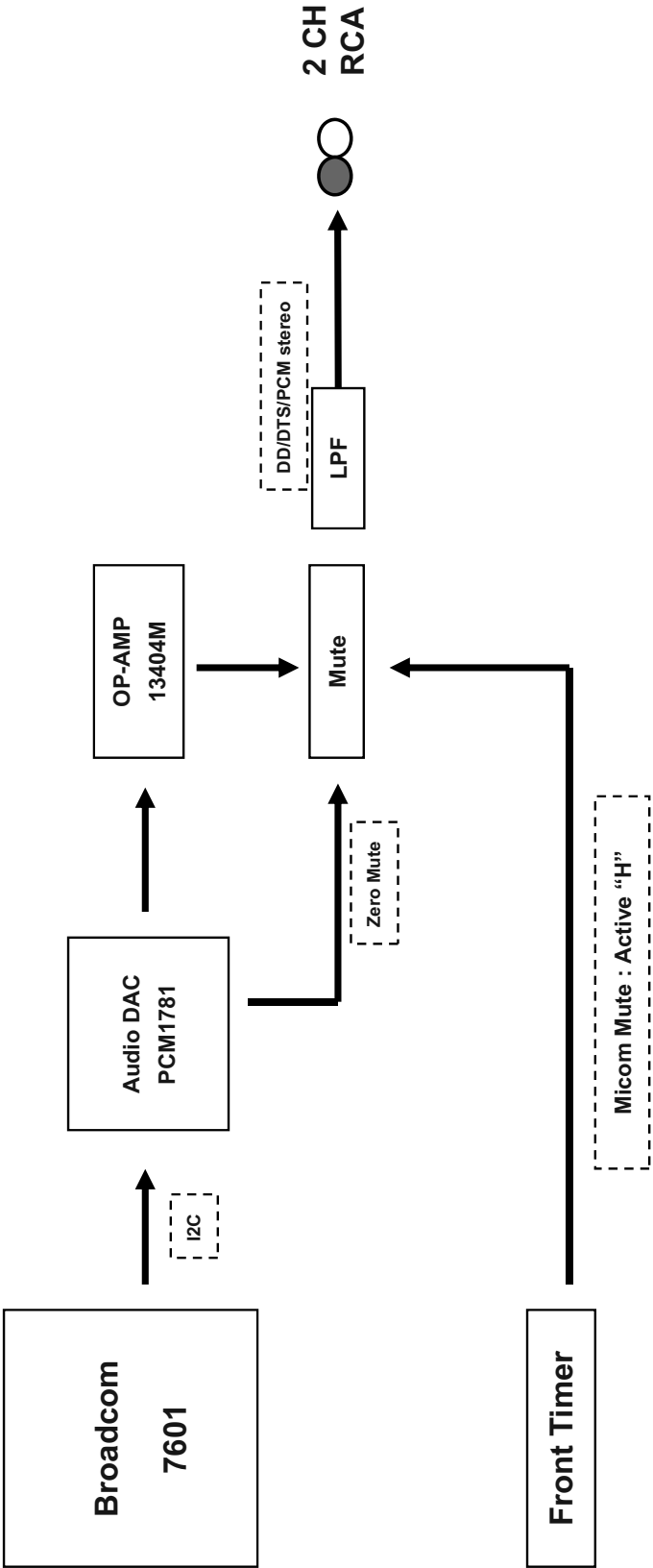
### 3. SYSTEM STRUCTURE BLOCK DIAGRAM



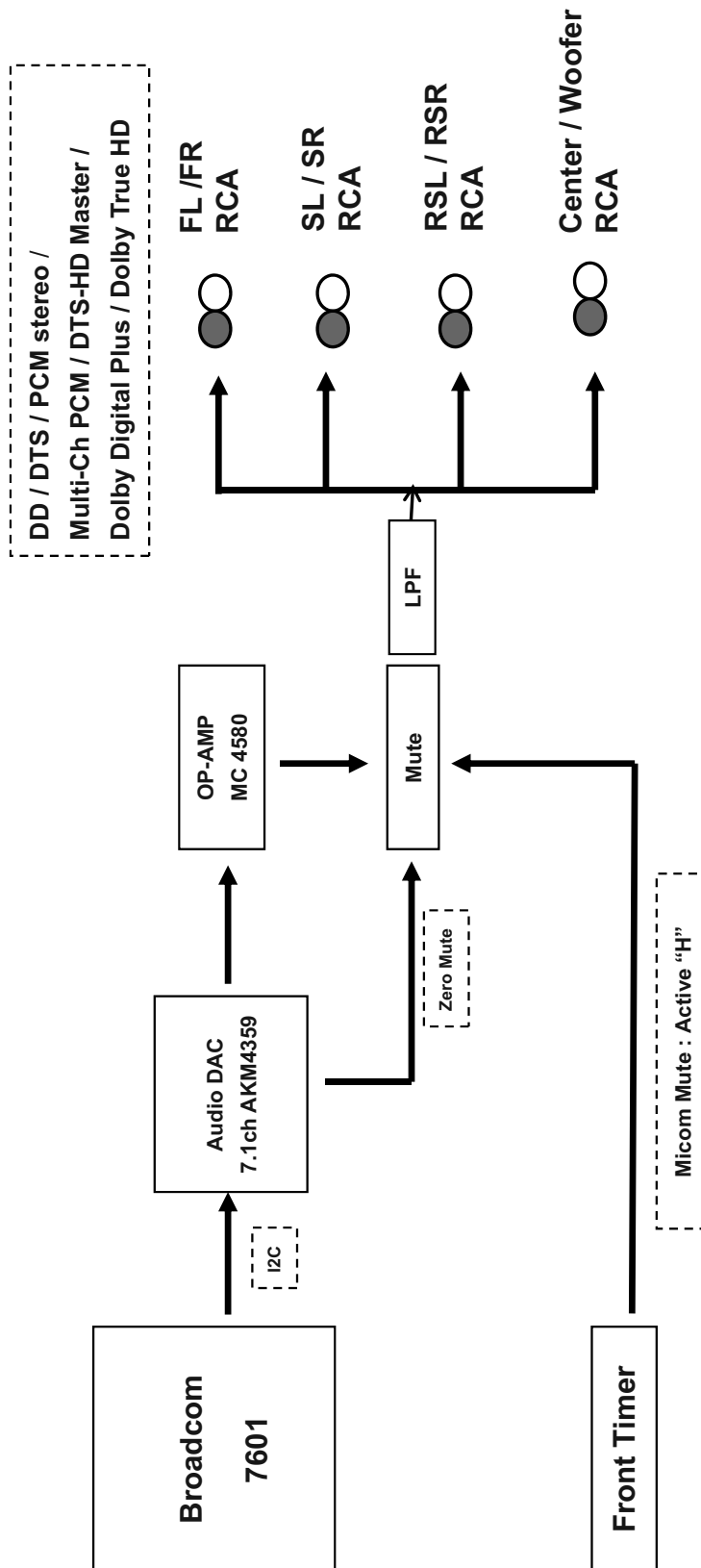
# 4. FRONT PART BLOCK DIAGRAM



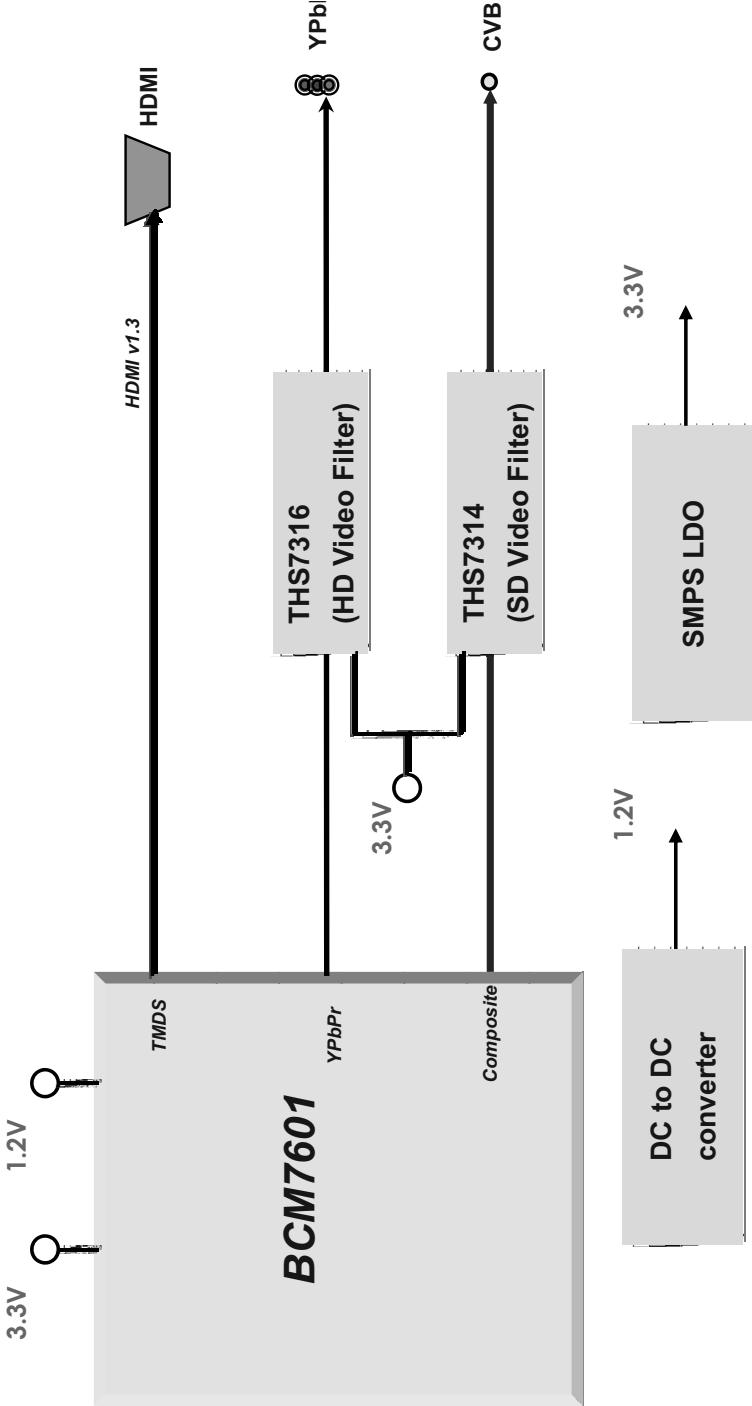
# 5. 2CH AUDIO INTERFACE BLOCK DIAGRAM



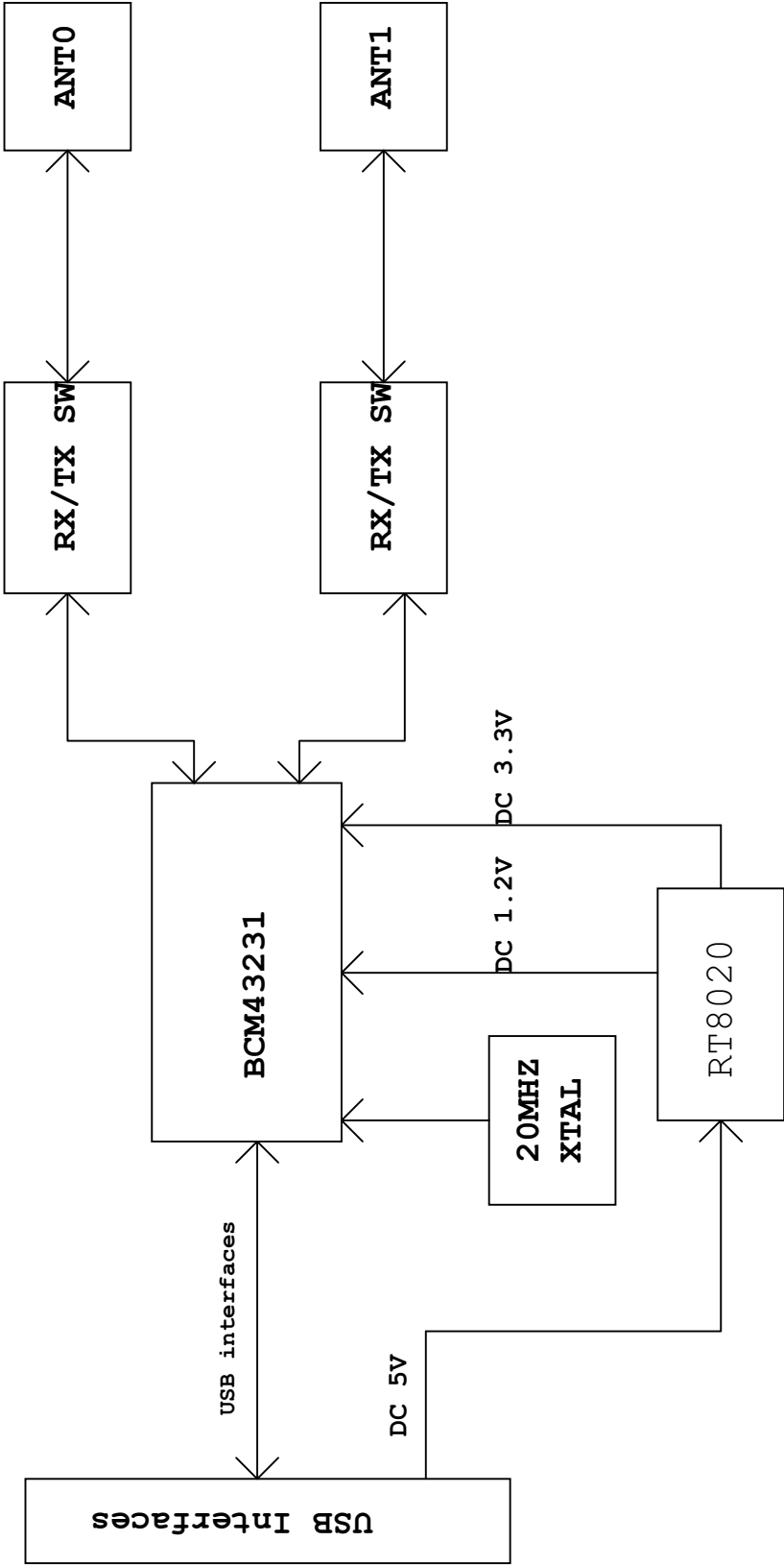
## 6. 7.1CH AUDIO INTERFACE BLOCK DIAGRAM



# 7. VIDEO BLOCK DIAGRAM



# 8. Wi-Fi BLOCK DIAGRAM





# MEMO

A series of horizontal dotted lines for writing.

# CIRCUIT DIAGRAMS

## 1. SMPS CIRCUIT DIAGRAM

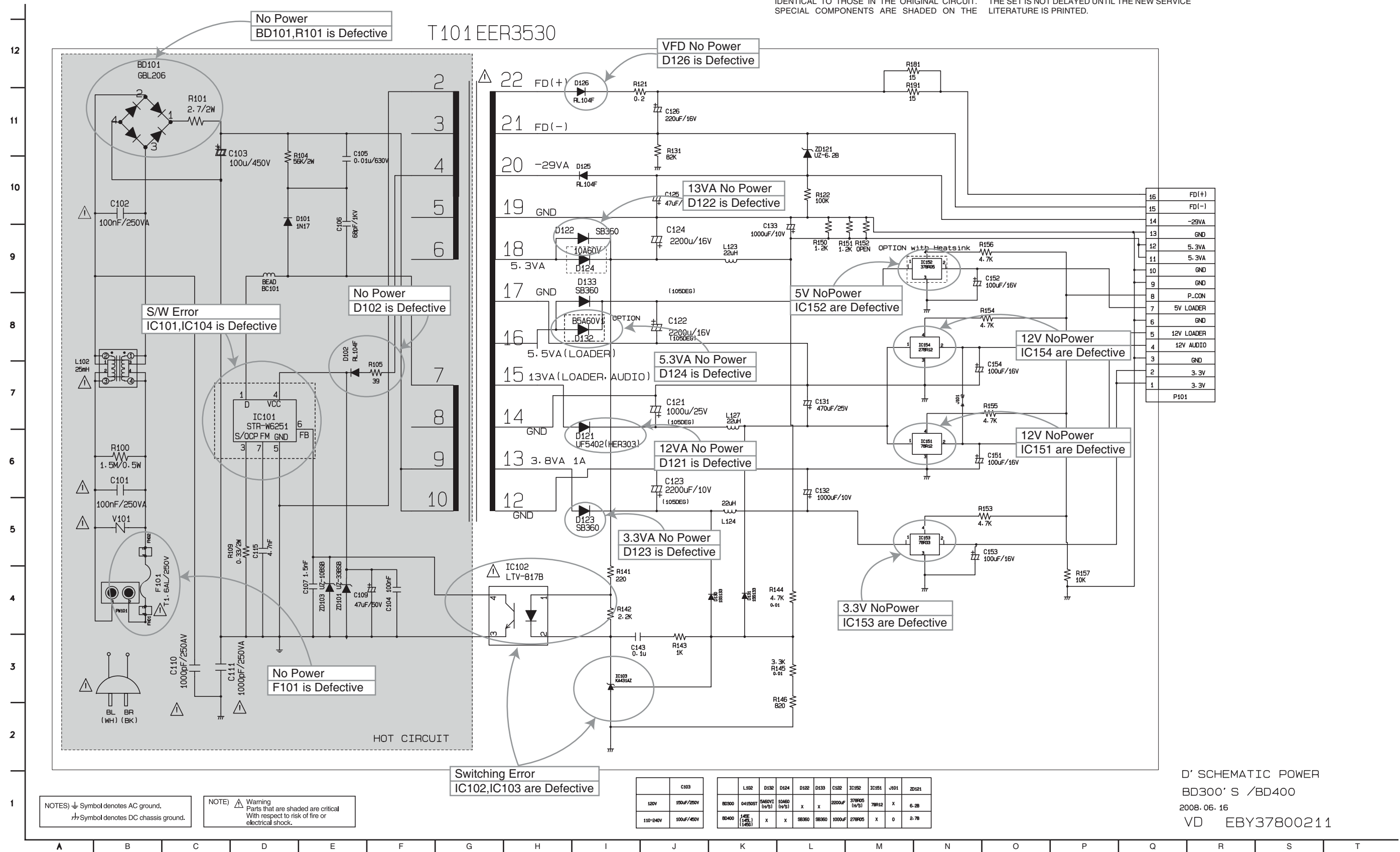
### IMPORTANT SAFETY

WHEN SERVICING THIS CHASSIS, UNDER NO CIRCUMSTANCES SHOULD THE ORIGINAL DESIGN BE MODIFIED OR ALTERED WITHOUT PERMISSION FROM THE NAD 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 :

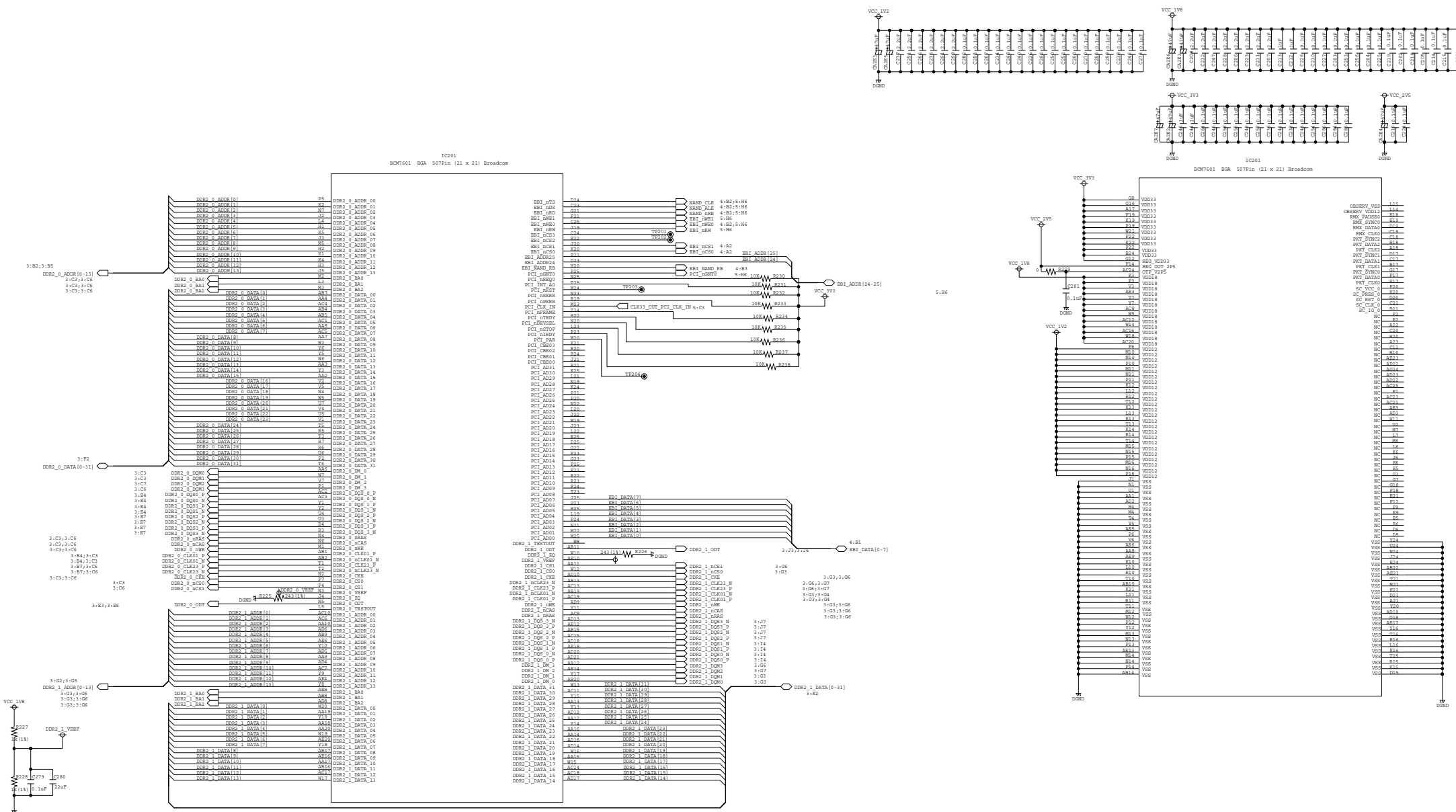
1. Shaded(■) parts are critical for safety. Replace only with specified part number.
2. Voltages are DC-measured with a digital voltmeter during Play mode.



D' SCHEMATIC POWER  
BD300' S /BD400  
2008.06.16  
VD EBY37800211

## 2. BCM7601-2 CIRCUIT DIAGRAM

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



place C279 to N3 ball of 7601  
place C217 to AE10 ball of 7601

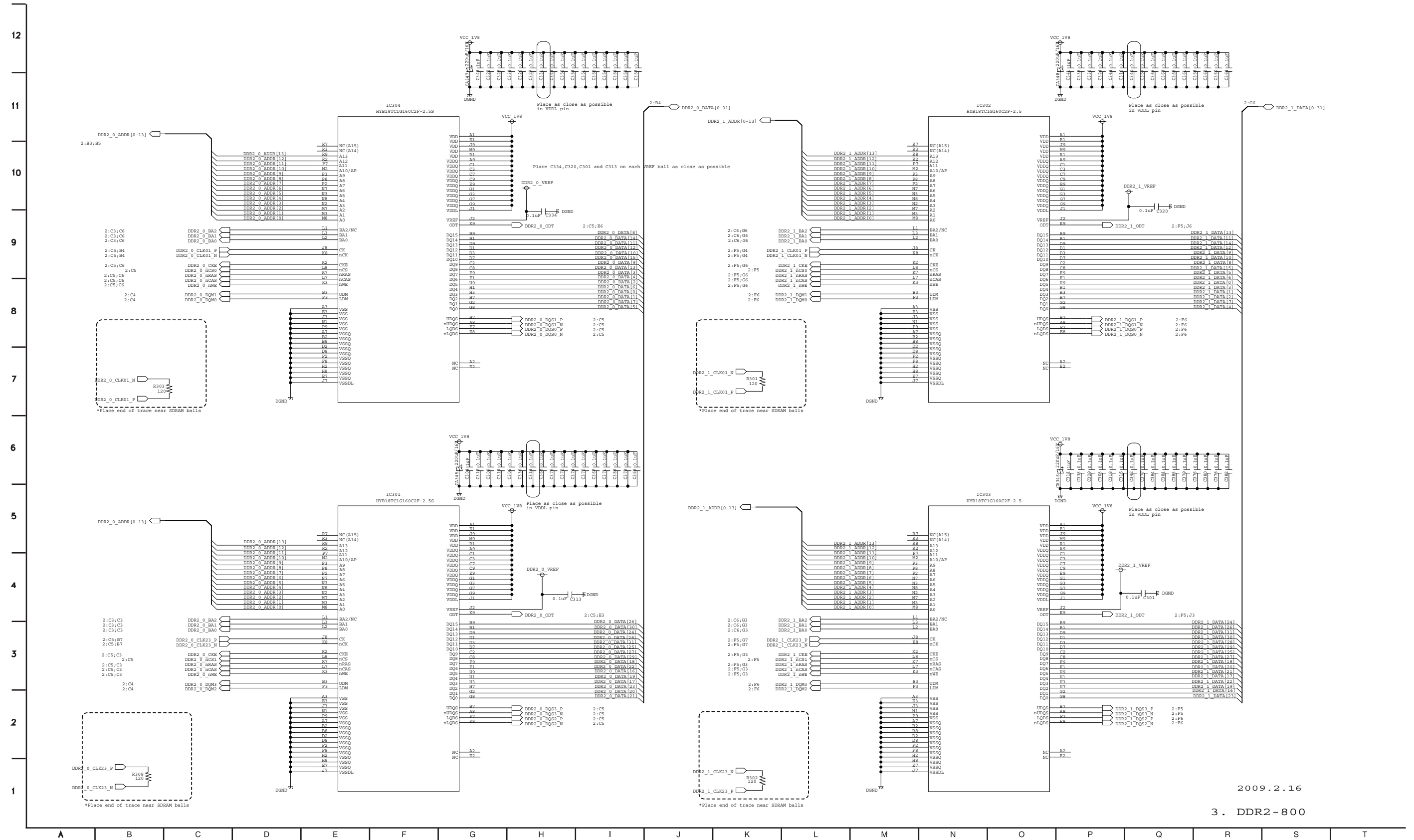
### DDR2 SDRAM LAYOUT GUIDE

- 1) a. DQS pairs will eventually have length matching rule to their respective byte lane data  
b. DQ pairs will eventually have length matching rule to the address lines
- 2) The Decoupe and VREF resistors and caps should be laid out near the associated balls. For 7600 they should be backside in the depopulated ring. VREF is the most sensitive net (in terms of isolation) to route.
- 3) use top and bottom layers only
- 4) Lay out escape plan per attached sketch
- 5) Complete the layout of the wires in the following order, keeping signals on their layer as much as possible:  
DQ pairs  
DQ and DM  
remaining signals
- 6) Signals can be freely substituted within the following groups: [RS] if this is done, the schematic should be updated to match  
DQ[1:0] DQ[15:8] DQ[11:4]
- 7) DQ pairs should be routed together 4 mil each 4 mil spacing
- 8) Signals should be routed 4 mil each 4 mil spacing rule, 8 mil spacing nearby.
- 9) Keep data lines separate from address lines, to avoid x-talk between the two
- 10) Prepare wire length report and schedule a review
- 11) LENGTH RULE: Data bits DDR2\_n\_DATA[11:0] <= 1.5"
- 12) Keep decoupling caps on back side out from beneath backing plate.
- 13) Route clocks as differential pairs - Match differential impedance  
40 Ohm to plane  
120 Ohm on pair

2009.2.16  
2. BCM7601-2

A B C D E F G H I J K L M N O P Q R S T

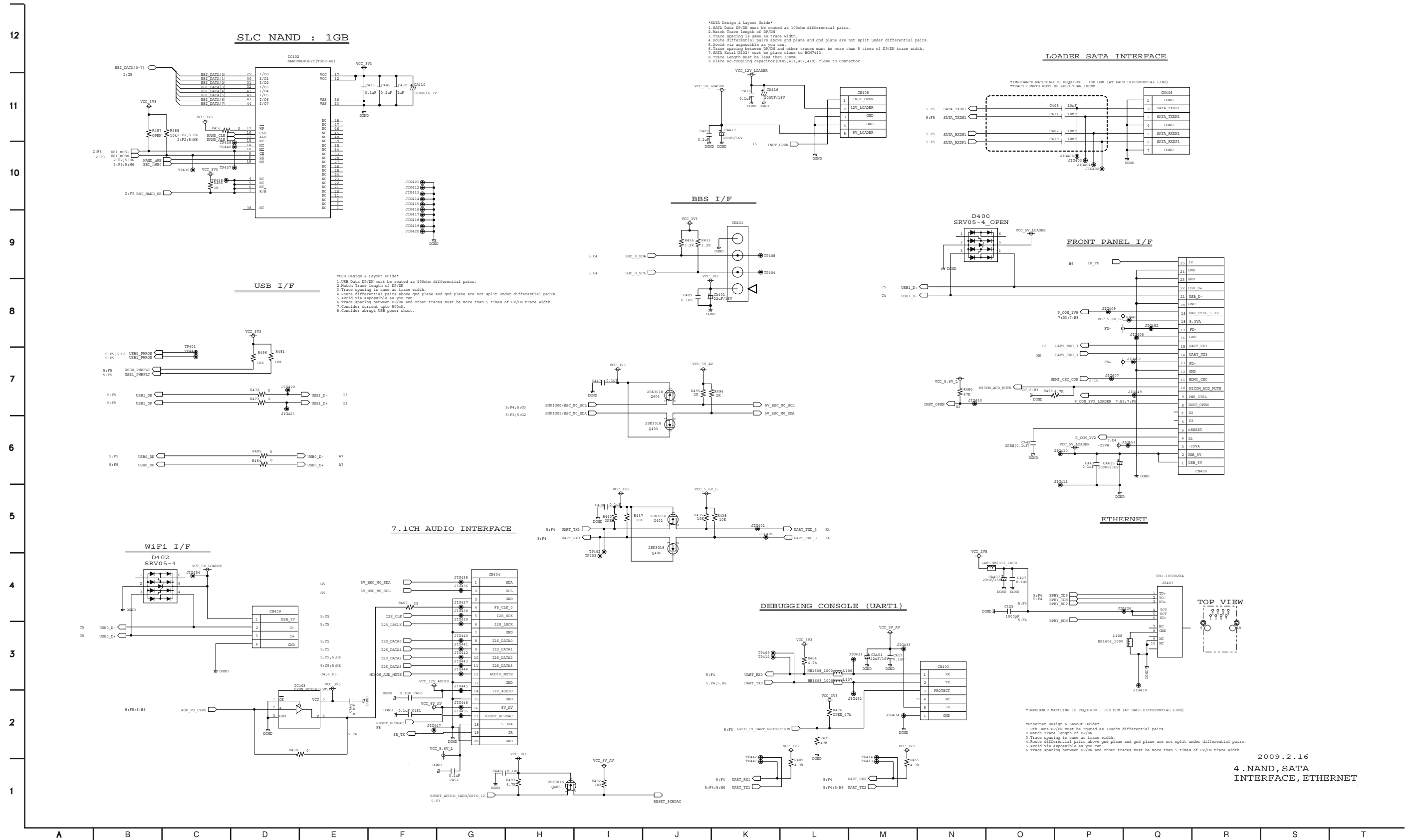
### 3. DDR2-800 CIRCUIT DIAGRAM



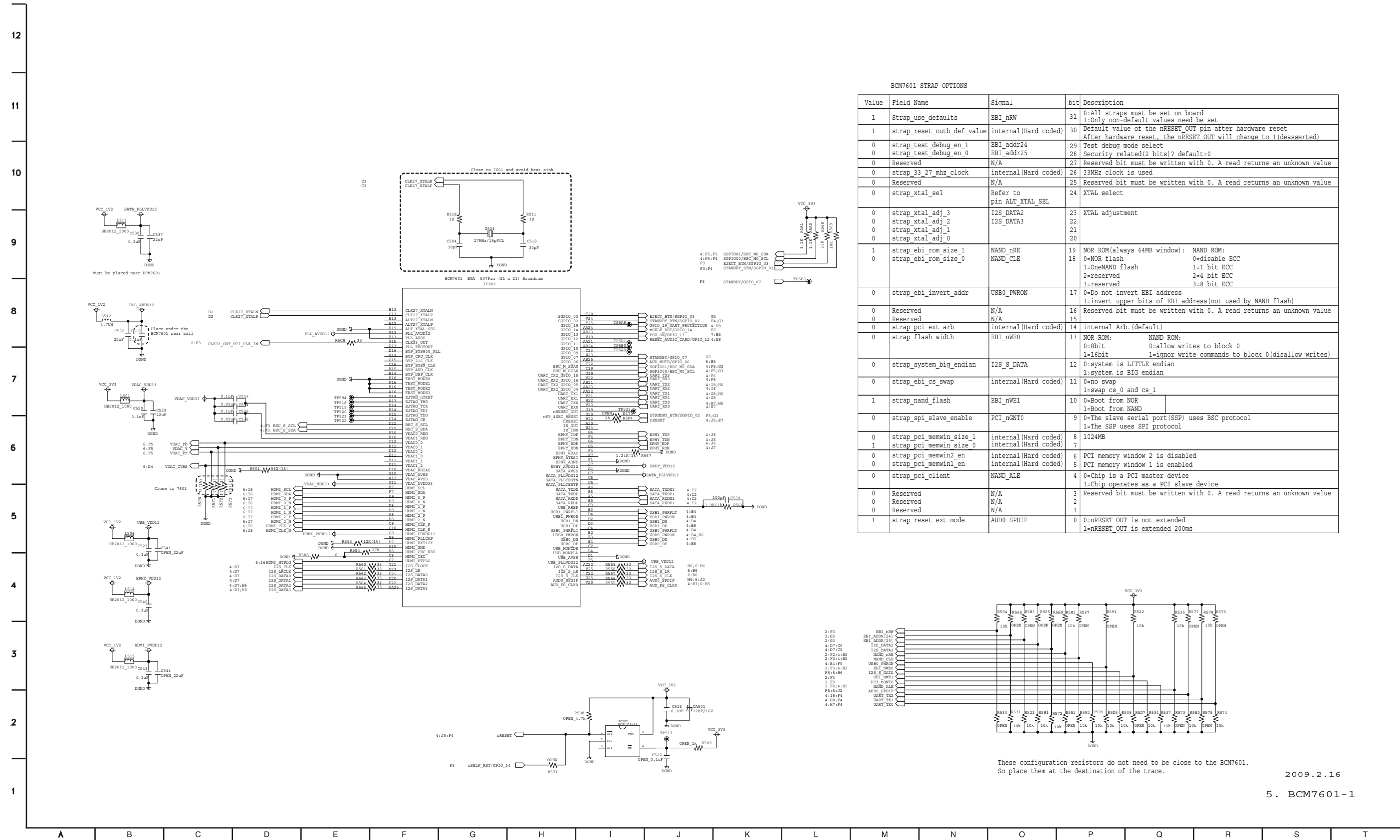
2009.2.16

3. DDR2-800

# 4. NAND, SATA INTERFACE, ETHERNET CIRCUIT DIAGRAM

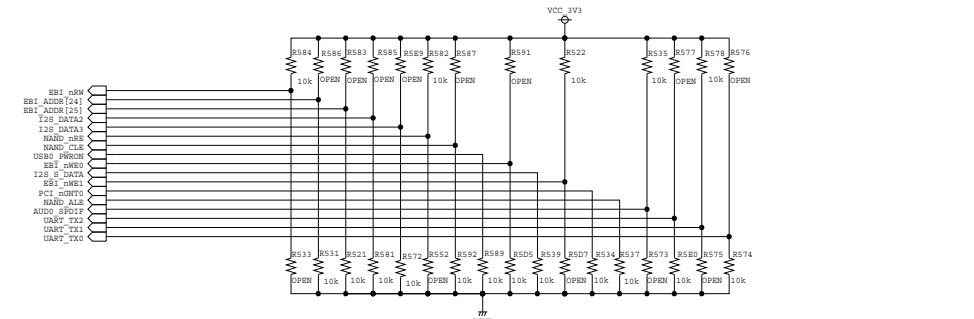


# 5. BCM7601-1 CIRCUIT DIAGRAM



BCM7601 STRAP OPTIONS

Value	Field Name	Signal	bit	Description
1	Strap_use_defaults	EBI_nRW	31	0:All straps must be set on board 1:Only non-default values need be set
1	strap_reset_outb_def_value	internal(Hard coded)	30	Default value of the nRESET_OUT pin after hardware reset After hardware reset, the nRESET_OUT will change to 1(deasserted)
0	strap_test_debug_en_1	EBI_addr24	29	Test debug mode select
0	strap_test_debug_en_0	EBI_addr25	28	Security related(2 bits)? default=0
0	Reserved	N/A	27	Reserved bit must be written with 0. A read returns an unknown value
0	strap_33_27_mhz_clock	internal(Hard coded)	26	33MHz clock is used
0	Reserved	N/A	25	Reserved bit must be written with 0. A read returns an unknown value
0	strap_xtal_sel	Refer to pin ALT_XTAL_SEL	24	XTAL select
0	strap_xtal_adj_3	I2S_DATA2	23	XTAL adjustment
0	strap_xtal_adj_2	I2S_DATA3	22	
0	strap_xtal_adj_1		21	
0	strap_xtal_adj_0		20	
1	strap_ebi_rom_size_1	NAND_nRE	19	NOR ROM(always 64MB window): NAND ROM: 0=NOR flash 0=disable ECC 1=OneNAND flash 1=1 bit ECC
0	strap_ebi_rom_size_0	NAND_CLE	18	2=reserved 2=4 bit ECC 3=reserved 3=8 bit ECC
0	strap_ebi_invert_addr	USB0_PWRON	17	0=Do not invert EBI address 1=invert upper bits of EBI address(not used by NAND flash)
0	Reserved	N/A	16	Reserved bit must be written with 0. A read returns an unknown value
0	Reserved	N/A	15	
0	strap_pci_ext_arb	internal(Hard coded)	14	Internal Arb. (default)
0	strap_flash_width	EBI_nWE0	13	NOR ROM: NAND ROM: 0=8bit 0=allow writes to block 0 1=16bit 1=ignor write commands to block 0(disallow writes)
0	strap_system_big_endian	I2S_S_DATA	12	0:system is LITTLE endian 1:system is BIG endian
0	strap_ebi_cs_swap	internal(Hard coded)	11	0=no swap 1=swap cs_0 and cs_1
1	strap_nand_flash	EBI_nWE1	10	0=Boot from NOR 1=Boot from NAND
0	strap_spi_slave_enable	PCI_nGNT0	9	0=The slave serial port(SSP) uses BSC protocol 1=The SSP uses SPI protocol
0	strap_pci_memwin_size_1	internal(Hard coded)	8	1024MB
1	strap_pci_memwin_size_0	internal(Hard coded)	7	
0	strap_pci_memwin2_en	internal(Hard coded)	6	PCI memory window 2 is disabled
0	strap_pci_memwin1_en	internal(Hard coded)	5	PCI memory window 1 is enabled
0	strap_pci_client	NAND_ALE	4	0=Chip is a PCI master device 1=Chip operates as a PCI slave device
0	Reserved	N/A	3	Reserved bit must be written with 0. A read returns an unknown value
0	Reserved	N/A	2	
0	Reserved	N/A	1	
1	strap_reset_ext_mode	AUD0_SPDIF	0	0=nRESET_OUT is not extended 1=nRESET_OUT is extended 200ms



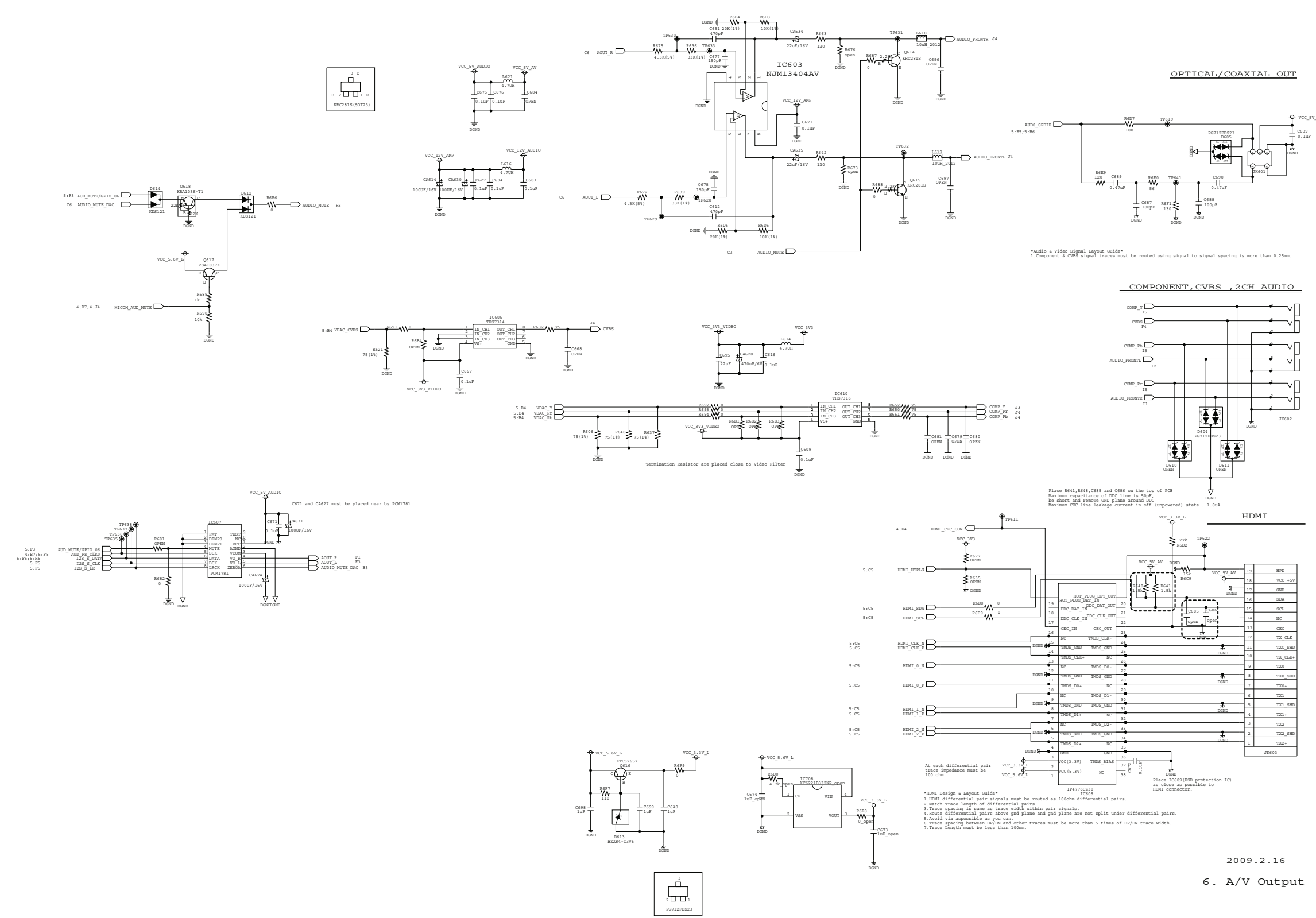
These configuration resistors do not need to be close to the BCM7601. So place them at the destination of the trace.

2009.2.16

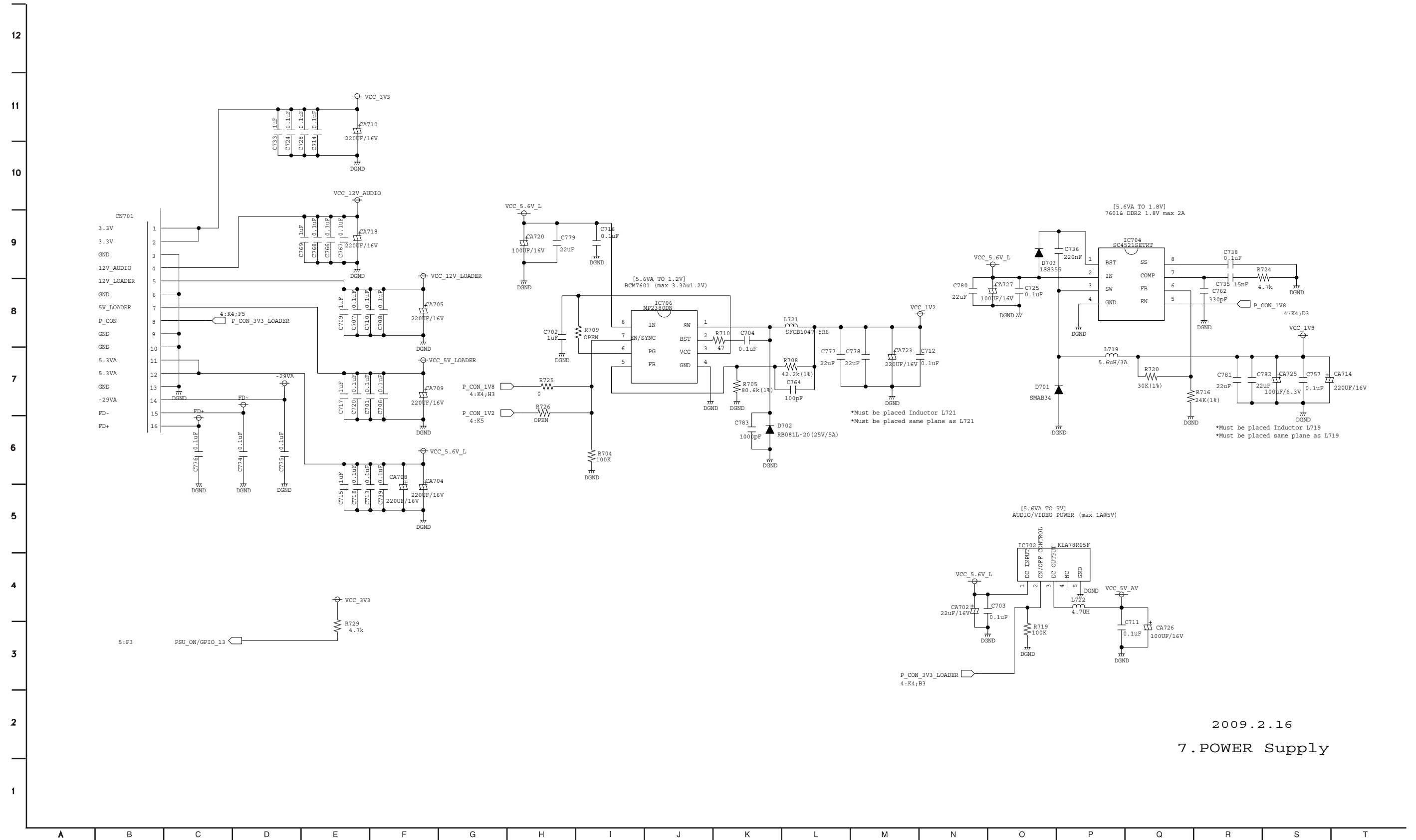
5. BCM7601-1

# 6. A/V OUTPUT CIRCUIT DIAGRAM

12  
11  
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6  
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4  
3  
2  
1



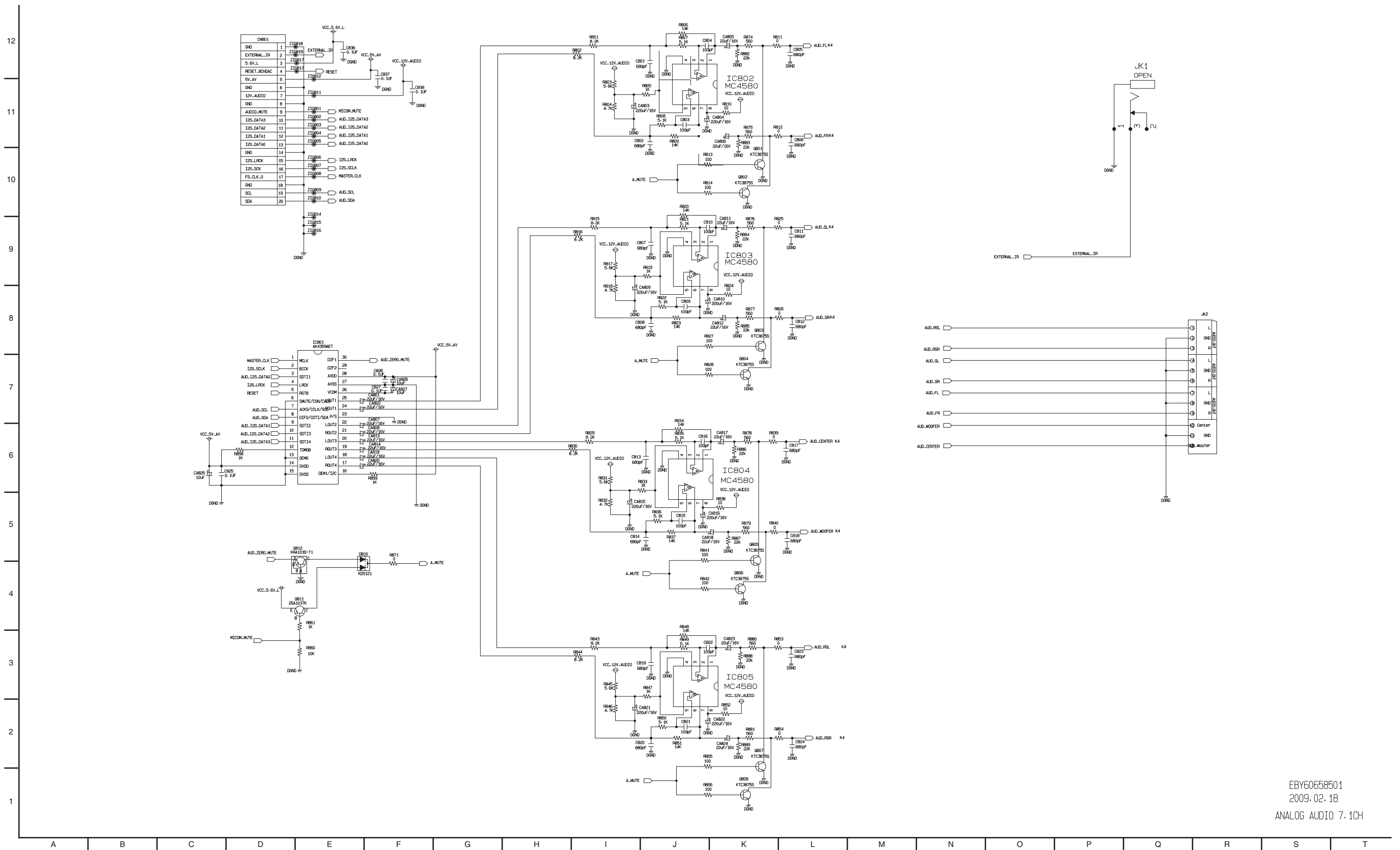
# 7. POWER SUPPLY CIRCUIT DIAGRAM



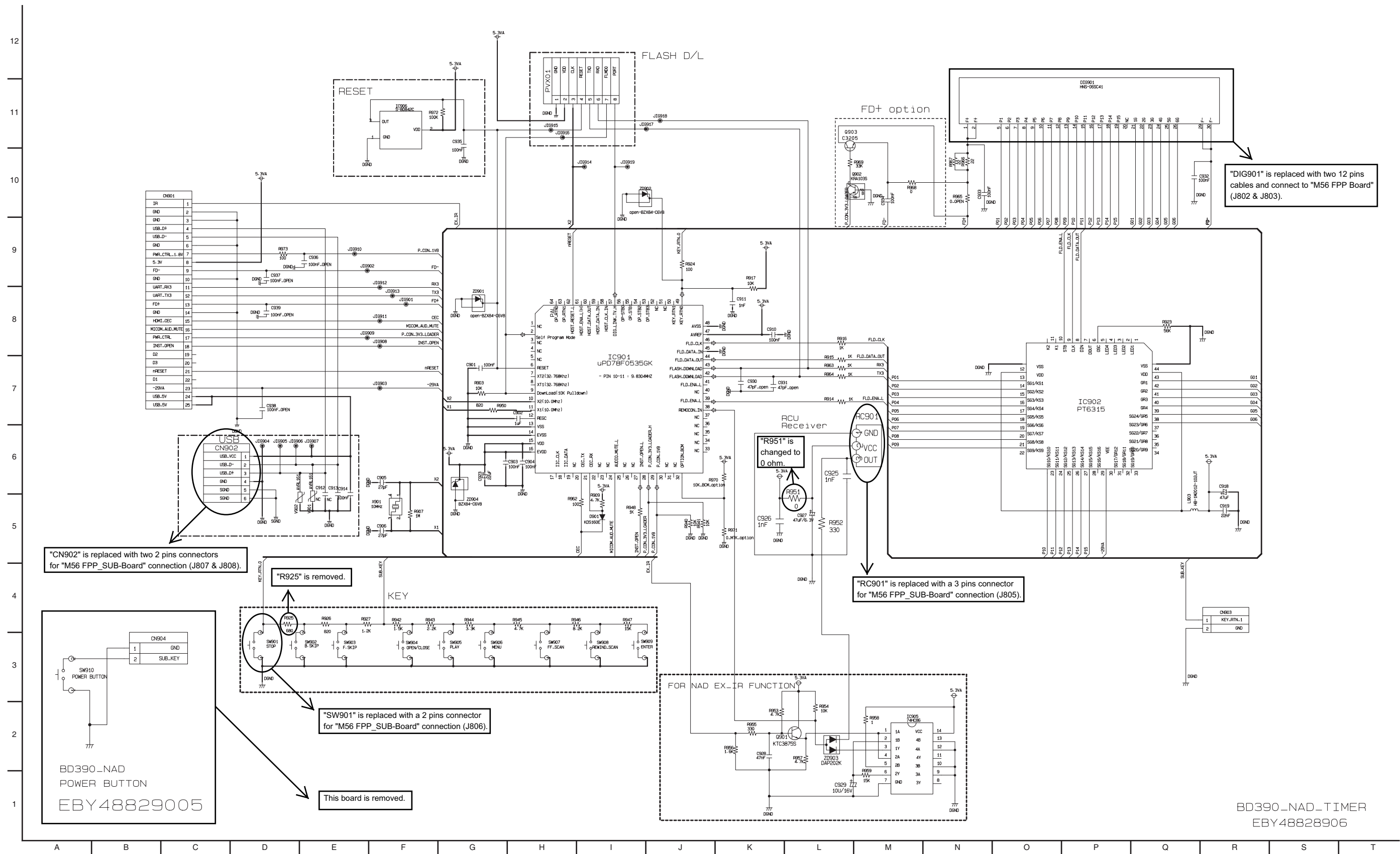
2009.2.16  
7. POWER Supply



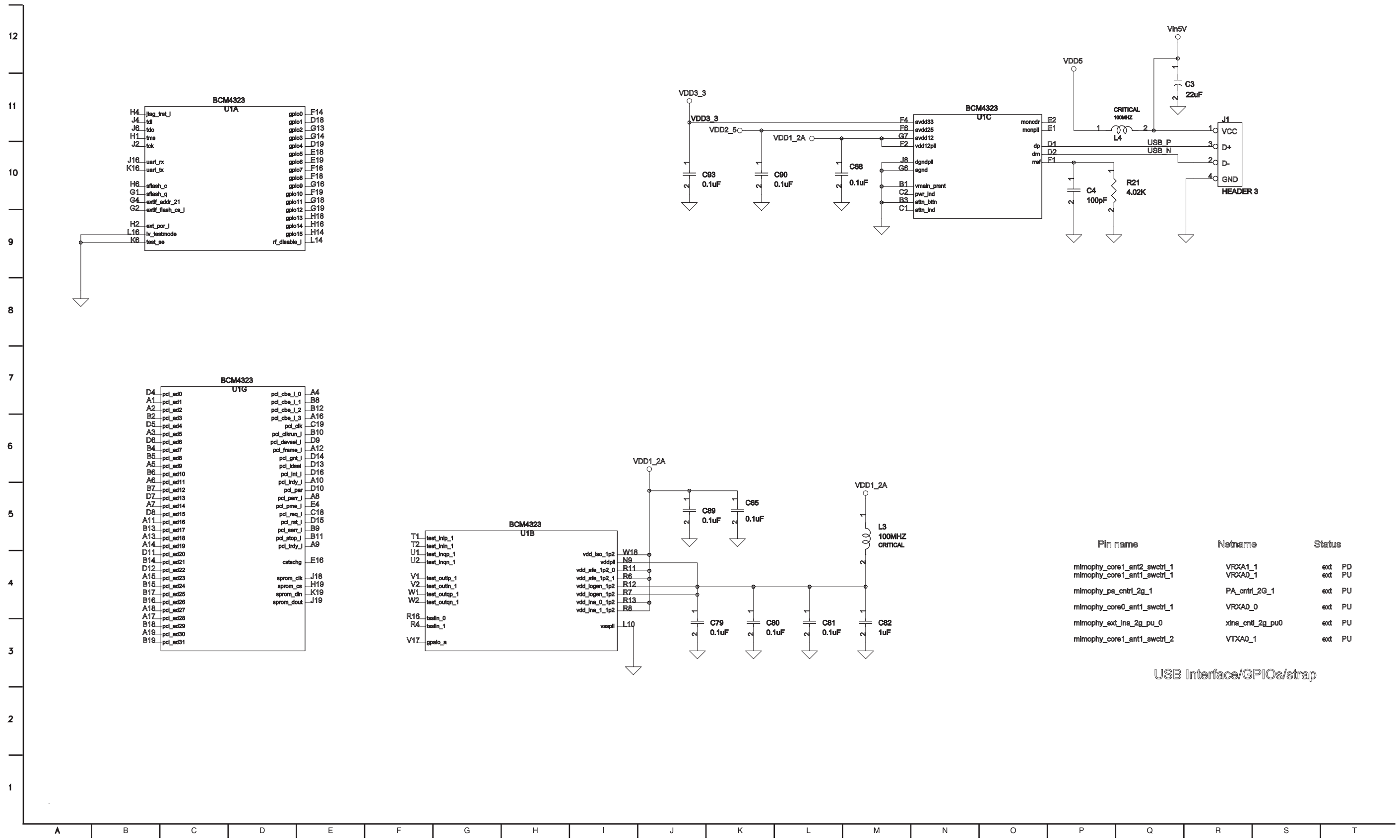
# 8. ANALOG AUDIO 7.1CH. CIRCUIT DIAGRAM



# 9. FRONT TIMER / KEY CIRCUIT DIAGRAM

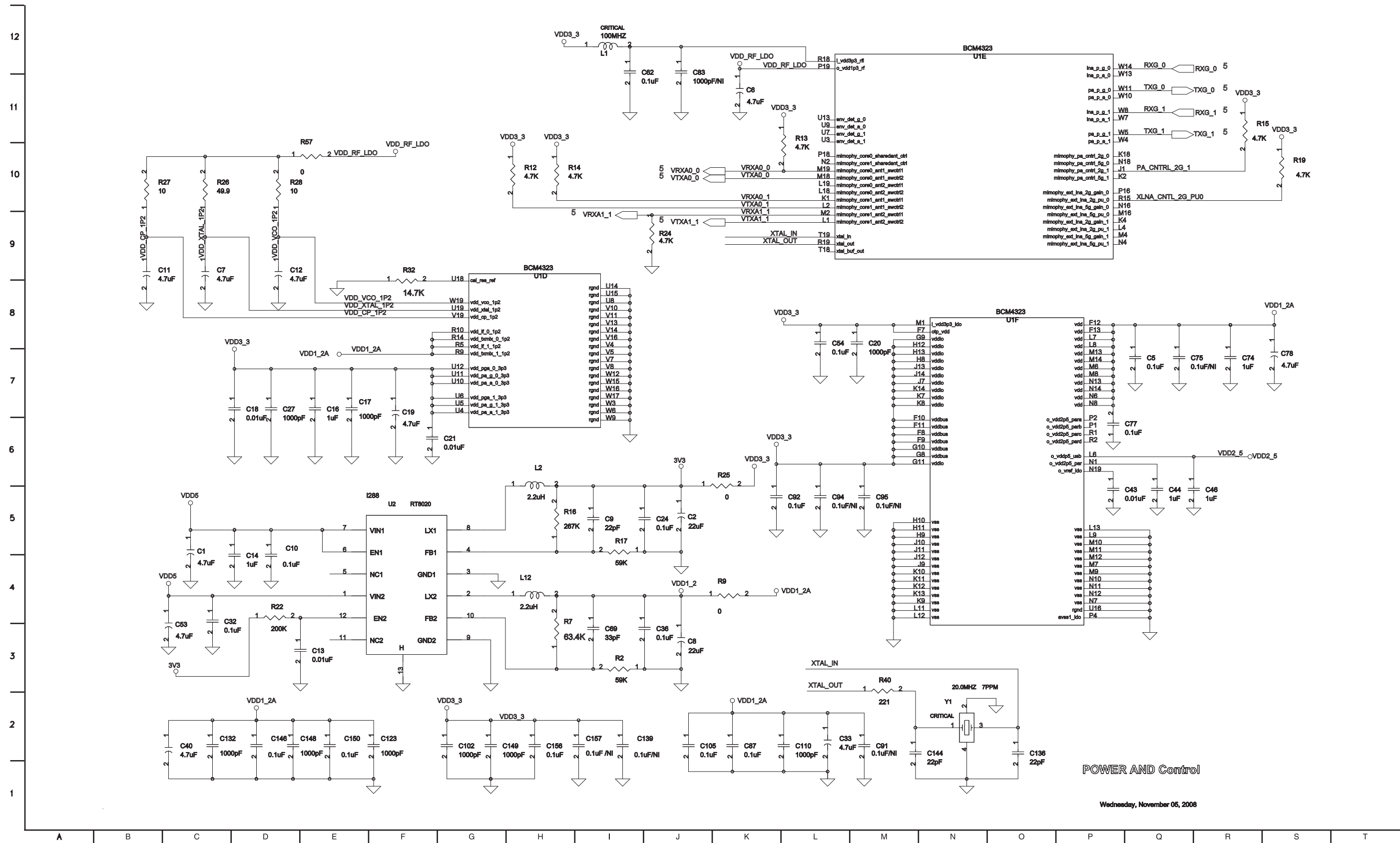


# 10. USB, GPIO, STRAP CIRCUIT DIAGRAM (OPTIONAL)



USB Interface/GPIOs/strap

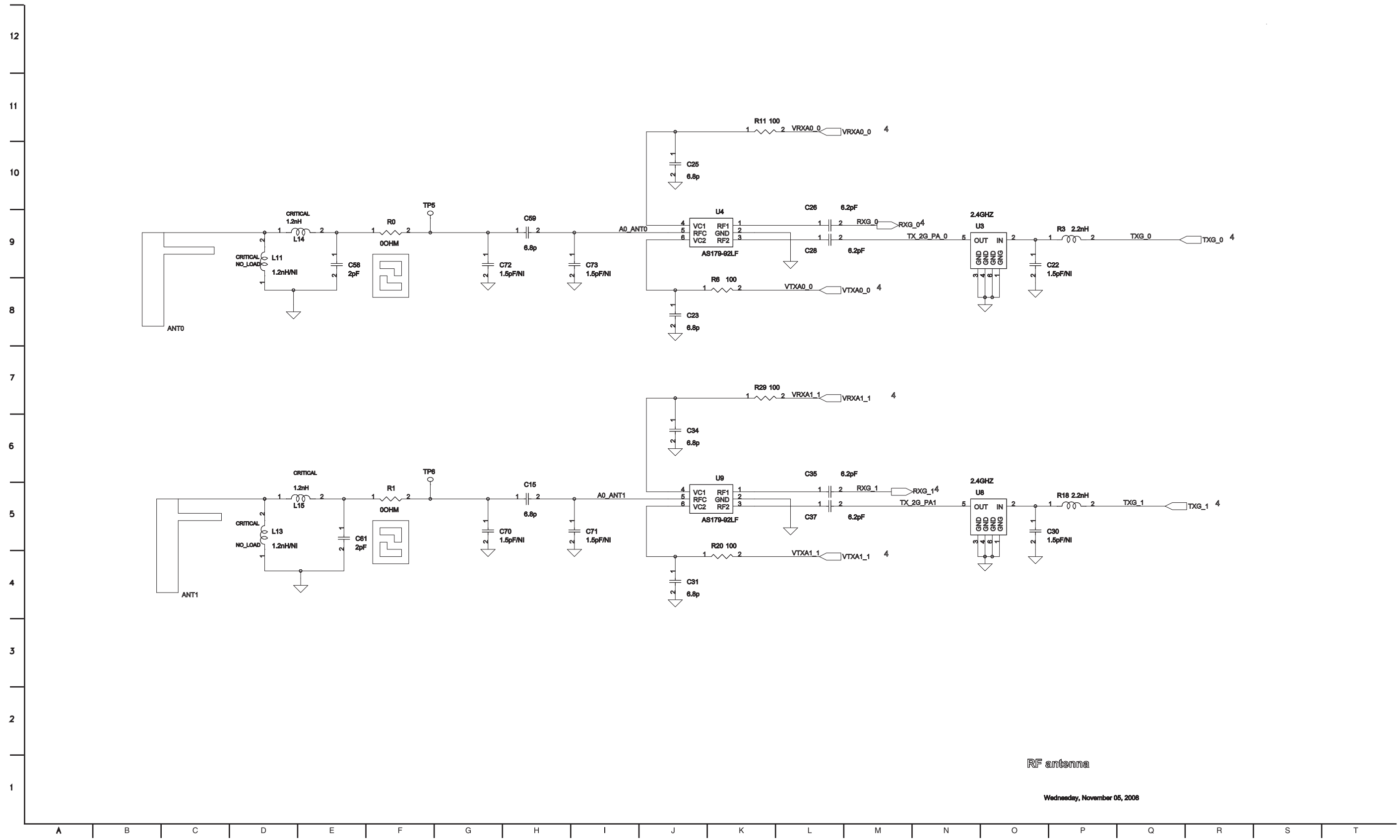
# 11. POWER AND CONTROL CIRCUIT DIAGRAM (OPTIONAL)



POWER AND Control

Wednesday, November 06, 2008

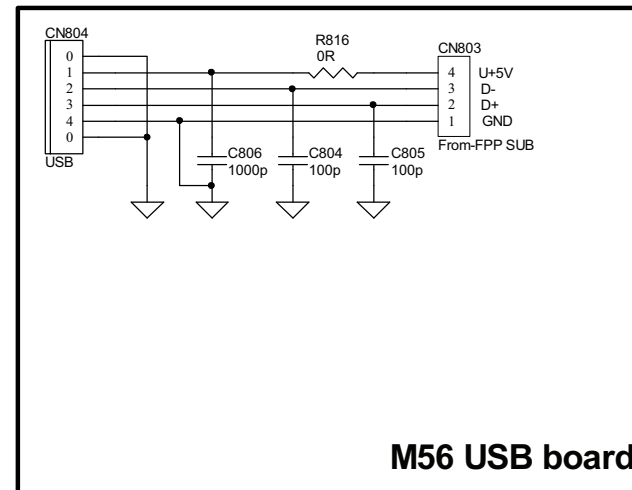
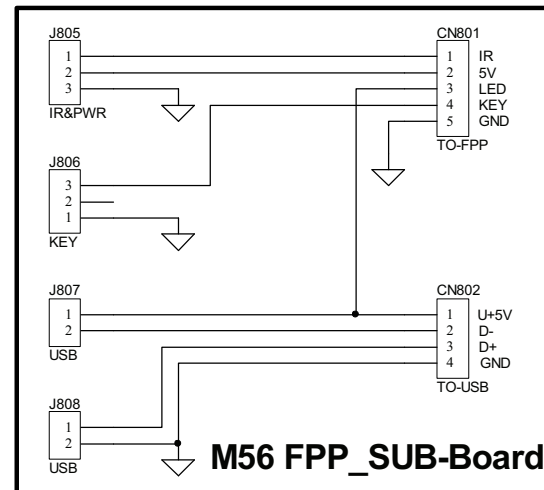
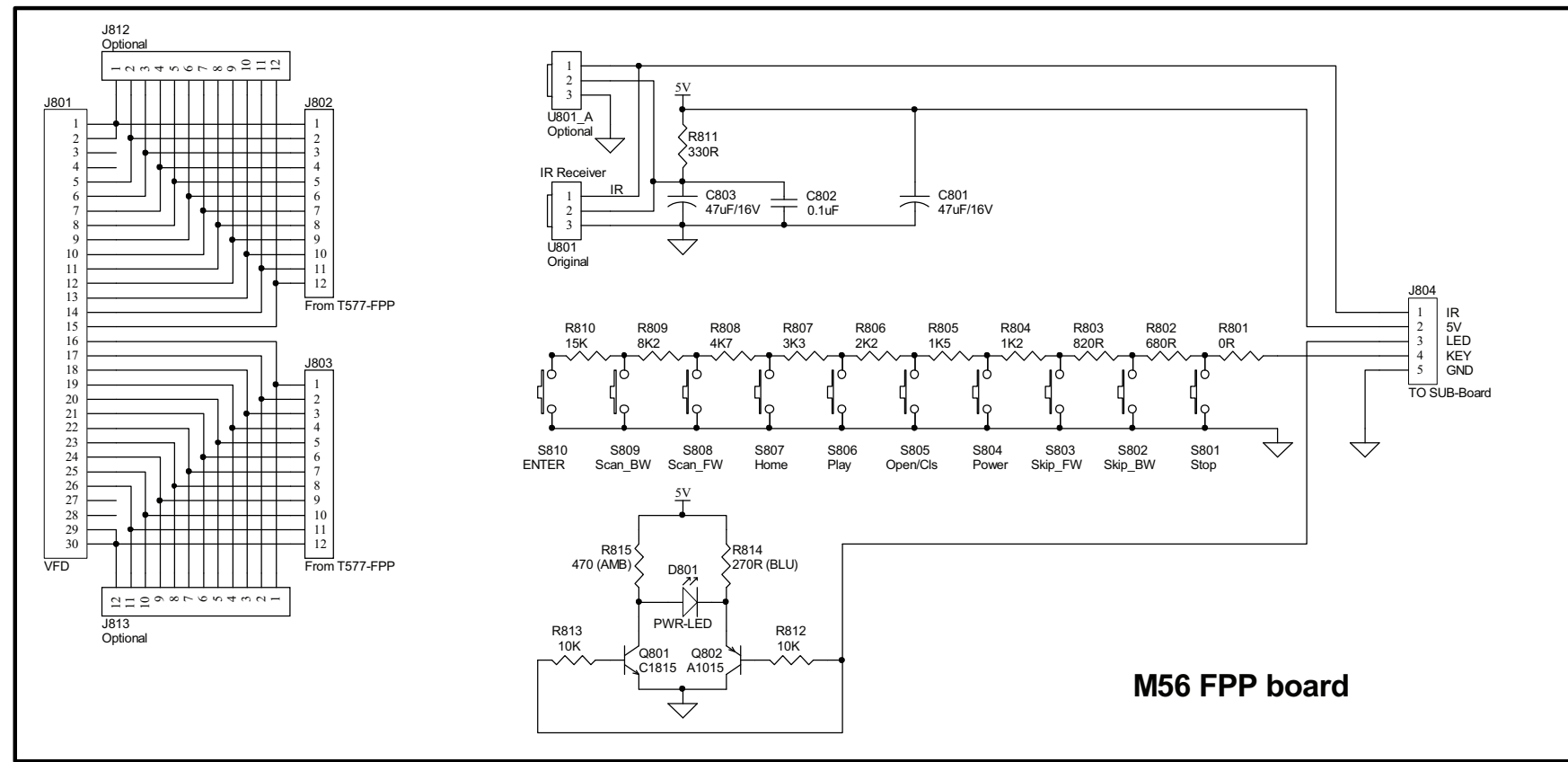
# 12. RF ANTENNA CIRCUIT DIAGRAM (OPTIONAL)



RF antenna

Wednesday, November 05, 2008

### 13. M56 FPP+SUB+USB CIRCUIT DIAGRAM



# CIRCUIT VOLTAGE CHART

## 1. MAIN BOARD ICs (VOLT)

PIN	IC402		IC609		IC603		IC610		IC606		IC702		IC704		IC706	
	STOP	PLAY	STOP	PLAY	STOP	PLAY	STOP	PLAY	STOP	PLAY	STOP	PLAY	STOP	PLAY	STOP	PLAY
1	0.00	0.00	5.30	5.30	3.60	3.60	0.00	0.00	0.00	0.00	5.30	5.30	6.78	6.78	1.27	1.27
2	0.00	0.00	3.30	3.30	2.40	2.40	0.00	0.00	0.00	0.00	5.20	5.20	5.30	5.30	5.90	5.90
3	0.00	0.00	0.00	0.00	2.40	2.40	0.00	0.00	0.00	0.00	5.00	5.00	1.86	1.86	5.00	5.00
4	3.30	3.30	3.00	3.00	0.00	0.00	3.30	3.30	3.30	3.30	0.00	0.00	0.00	0.00	0.00	0.00
5	3.30	3.30	0.00	0.00	2.40	2.40	0.00	0.00	0.00	0.00	0.00	0.00	5.30	5.30	0.78	0.78
6	3.30	3.30	3.00	3.00	2.40	2.40	1.00	1.00	0.00	0.00			0.80	0.80	0.00	0.00
7	3.30	3.30	3.00	3.00	3.60	3.60	1.00	1.00	0.00	0.00			1.30	1.30	5.25	5.25
8	3.30	3.30	0.00	0.00	12.00	12.00	1.30	1.30	1.20	1.20			1.70	1.70	5.30	5.30
9	3.30	3.30	3.00	3.00												
10	3.30	3.30	3.00	3.00												
11	0.00	0.00	0.00	0.00												
12	3.30	3.30	3.00	3.00												
13	0.00	0.00	3.00	3.00												
14	0.00	0.00	0.00	0.00												
15	0.00	0.00	3.00	3.00												
16	3.30	3.30	5.00	5.00												
17	3.30	3.30	0.00	0.00												
18	3.30	3.30	0.00	0.00												
19	3.30	3.30	3.23	3.23												
20	0.00	0.00	3.13	3.13												
21	0.00	0.00	0.00	0.00												
22	0.00	0.00	0.00	0.00												
23	0.00	0.00	0.00	0.00												
24	0.00	0.00	3.00	3.00												
25	0.00	0.00	0.00	0.00												
26	0.00	0.00	3.00	3.00												
27	0.00	0.00	3.00	3.00												
28	0.00	0.00	0.00	0.00												
29	3.30	3.30	3.00	3.00												
30	3.30	3.30	3.00	3.00												
31	3.30	3.30	0.00	0.00												
32	3.30	3.30	3.00	3.00												
33	0.00	0.00	3.00	3.00												
34	0.00	0.00	0.00	0.00												
35	0.00	0.00	3.00	3.00												
36	0.00	0.00	0.00	0.00												
37	3.30	3.30	4.70	4.70												
38	0.00	0.00	0.00	0.00												
39	0.00	0.00														
40	0.00	0.00														
41	3.30	3.30														
42	3.30	3.30														
43	3.30	3.30														
44	3.30	3.30														
45	0.00	0.00														
46	0.00	0.00														
47	0.00	0.00														
48	0.00	0.00														

## 2. MAIN BOARD Capacitors

NO	LOC	SPEC	PLAYBACK	
			(+)	(-)
1	CA401	22uF/16V	3.29	0.00
2	CA404	22uF/16V	5.09	0.00
3	CA407	22uF/16V	2.54	0.00
4	CA702	22uF/16V	5.29	0.00
5	CA2E1	47uF/16V	1.81	0.00
6	CA2E2	47uF/16V	3.29	0.00
7	CA2E3	47uF/16V	1.23	0.00
8	CA2E4	47uF/16V	2.54	0.00
9	CA2E5	47uF/16V	1.23	0.00
10	CA2E6	47uF/16V	1.81	0.00
11	CA2E7	47uF/16V	3.29	0.00
12	CA410	100uF/6.3V	3.29	0.00
13	CA725	100uF/6.3V	1.81	0.00
14	CA415	100uF/16V	5.00	0.00
15	CA416	100uF/16V	12.00	0.00
16	CA417	100uF/16V	5.00	0.00
17	CA614	100uF/16V	12.05	0.00
18	CA624	100uF/16V	2.54	0.00
19	CA630	100uF/16V	12.05	0.00
20	CA631	100uF/16V	5.09	0.00
21	CA634	22uF/16V	3.60	0.00
22	CA635	22uF/16V	3.60	0.00
23	CA720	100uF/16V	5.28	0.00
24	CA726	100uF/16V	5.09	0.00
25	CA727	100uF/16V	5.27	0.00
26	CA628	470uF/6.3V	3.28	0.00
27	CA345	220uF/16V	1.81	0.00
28	CA346	220uF/16V	1.81	0.00
29	CA347	220uF/16V	1.81	0.00
30	CA348	220uF/16V	1.81	0.00
31	CA704	220uF/16V	5.32	0.00
32	CA705	220uF/16V	12.20	0.00
33	CA708	220uF/16V	5.32	0.00
34	CA709	220uF/16V	4.98	0.00
35	CA710	220uF/16V	3.30	0.00
36	CA714	220uF/16V	1.81	0.00
37	CA718	220uF/16V	12.20	0.00
38	CA723	220uF/16V	1.23	0.00
39	CA501	22uF/16V	3.30	0.00

## 3. 7.1CH BOARD Capacitors

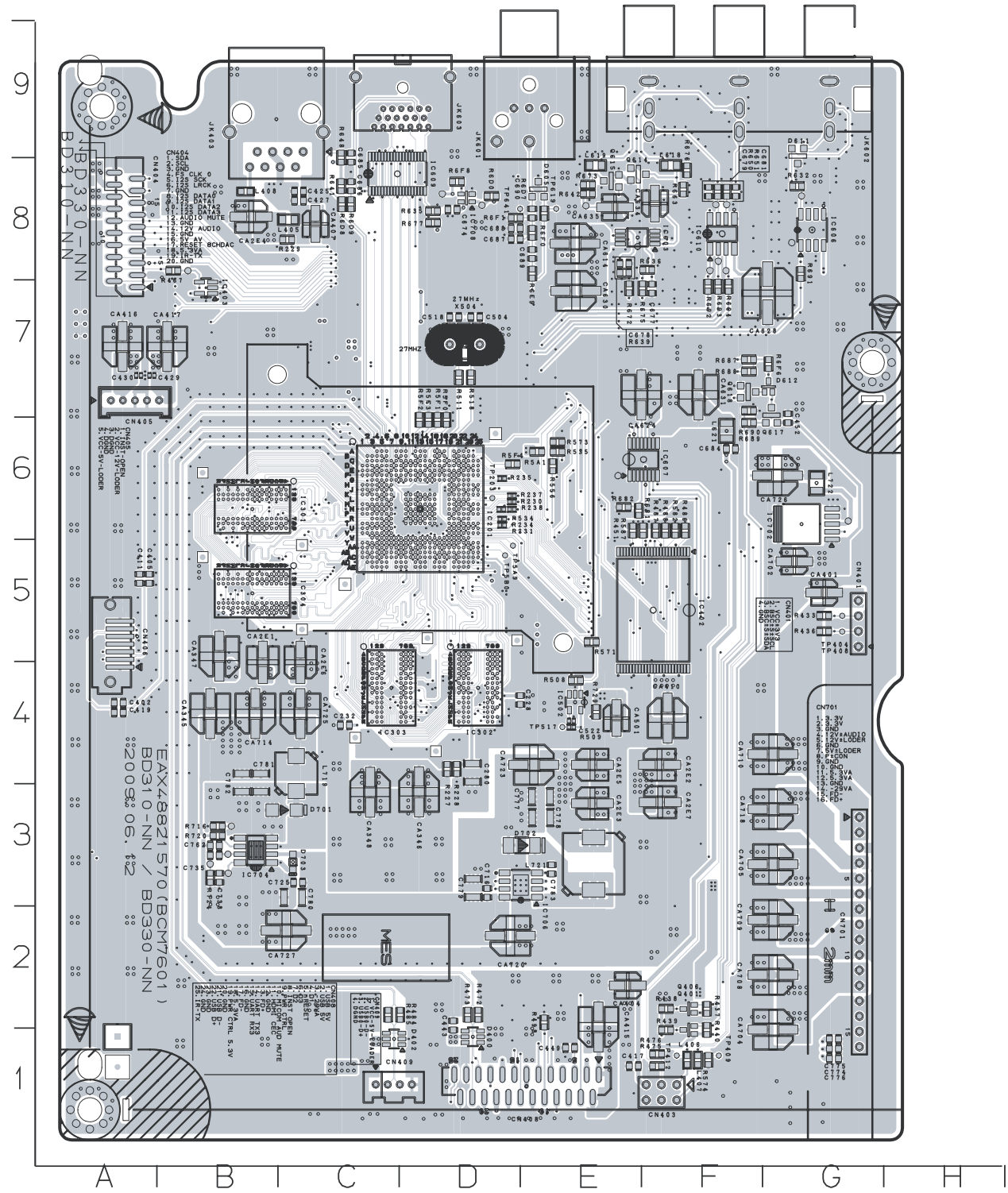
NO	LOC	SPEC	PLAYBACK	
			(+)	(-)
1	CA825	10uF/16V	5.08	0.00
2	CA826	10uF/16V	5.08	0.00
3	CA827	10uF/16V	2.52	0.00
4	CA803	220uF/16V	5.49	0.00
5	CA804	220uF/16V	12.00	0.00
6	CA805	22uF/16V	5.53	0.00
7	CA806	22uF/16V	5.53	0.00
8	CA809	220uF/16V	5.5	0.00
9	CA810	220uF/16V	12.00	0.00
10	CA811	22uF/16V	5.53	0.00
11	CA812	22uF/16V	5.53	0.00
12	CA815	220uF/16V	5.53	0.00
13	CA816	220uF/16V	12.00	0.00
14	CA817	22uF/16V	5.53	0.00
15	CA818	22uF/16V	5.53	0.00
16	CA821	220uF/16V	5.47	0.00
17	CA822	220uF/16V	12.00	0.00
18	CA823	22uF/16V	5.53	0.00
19	CA824	22uF/16V	5.53	0.00
20	CA801	22UF/16V	5.50	2.50
21	CA802	22UF/16V	5.50	2.50
22	CA807	22UF/16V	5.50	2.50
23	CA808	22UF/16V	5.50	2.50
24	CA813	22UF/16V	5.50	2.50
25	CA814	22UF/16V	5.50	2.50
26	CA819	22UF/16V	5.50	2.50
27	CA820	22UF/16V	5.50	2.50

## 4. FRONT TIMER BOARD

Timer Board	Reference	Capacitors	Play Mode		EE Mode	
			+	-	+	-
	C923	22uF/16V	5.27	0	5.27	0
	C916	47uF/16V	4.88	0	4.88	0
	C918	47uF/16V	5.27	0	5.27	0
IC901 - uPD7BF0535GK Micom			IC902 - PT6315 VFD Driver IC			
Pin No.	Desc.	Voltage	Pin No.	Desc.	Voltage	
15	VDD	5.27	13, 43	VDD	5.26	
47	AVREF	5.27	30	-29VA	-28.68	
IC904 S-80842C 4.2V RESET IC			RC901 RCU Receiver			
	Desc.	Voltage	Pin	Desc.	Voltage	
	1	VDD	2	VCC	4.87	
	2	OUT				
	3	VSS				
DIG901 HNS-06SC41						
	Desc.	Voltage				
	FD+	-22.4				

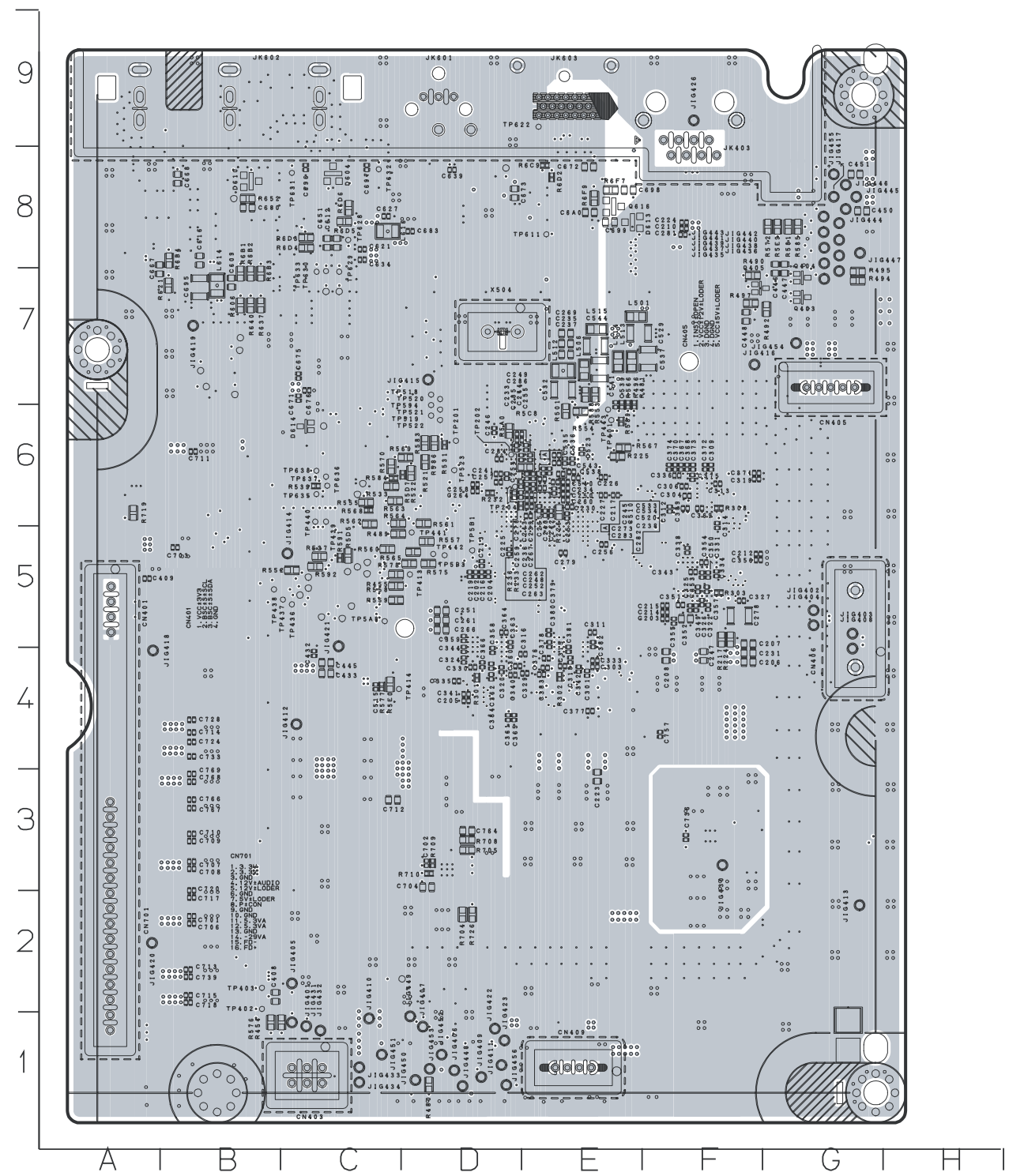
# PRINTED CIRCUIT BOARD DIAGRAMS

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



3-79

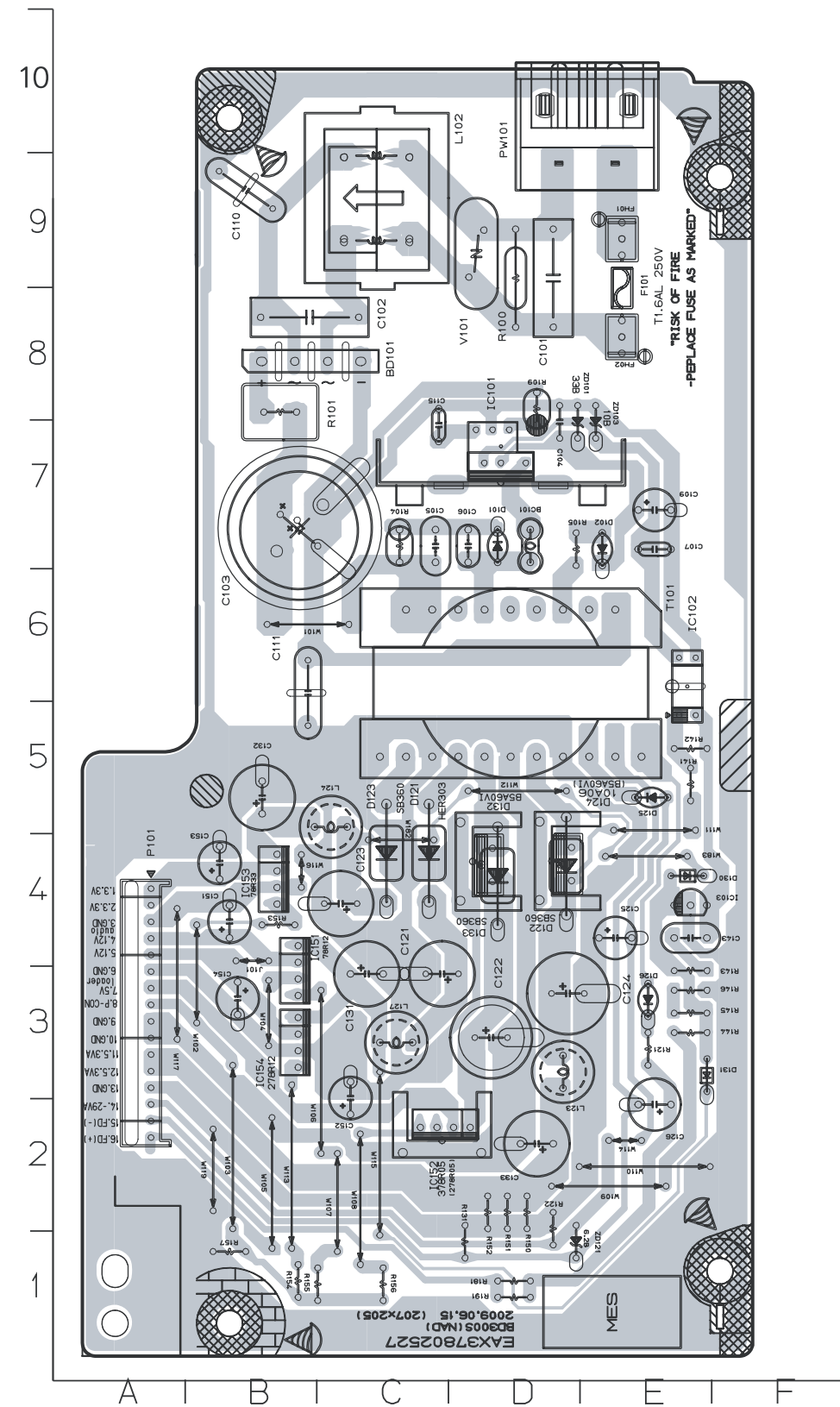
## (BOTTOM VIEW)



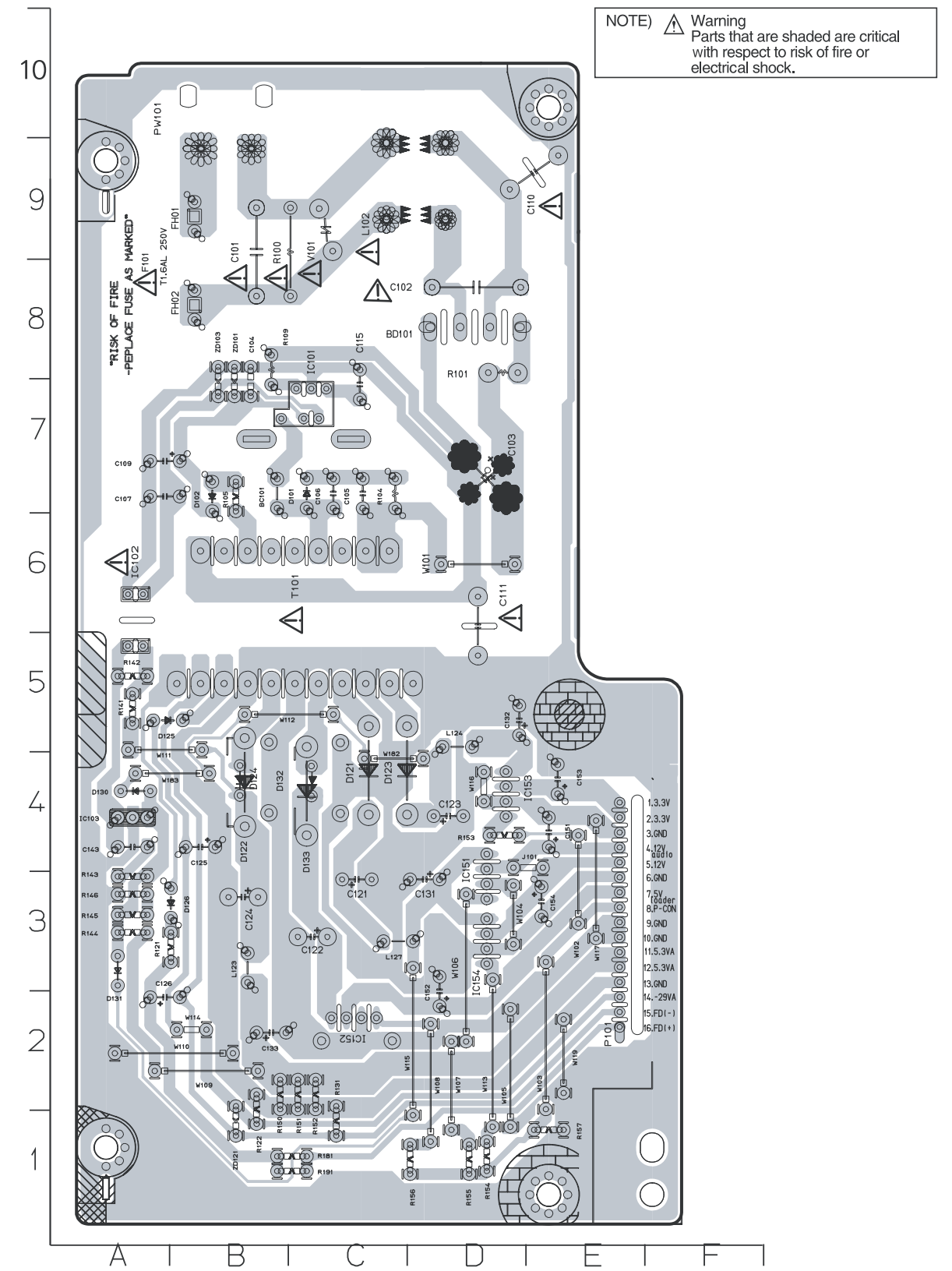
38-80



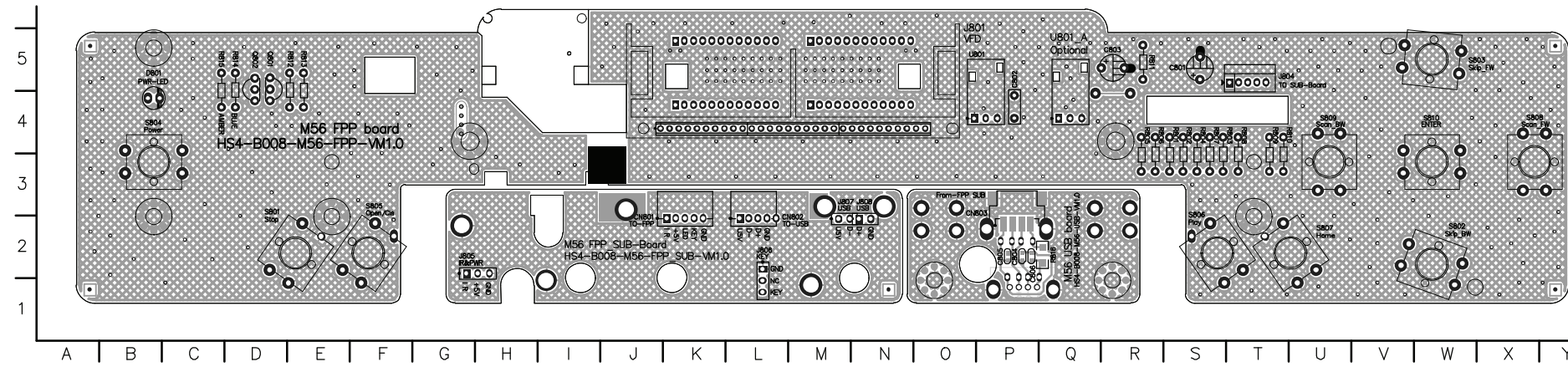
## 2. SMPS P.C.BOARD (TOP VIEW)



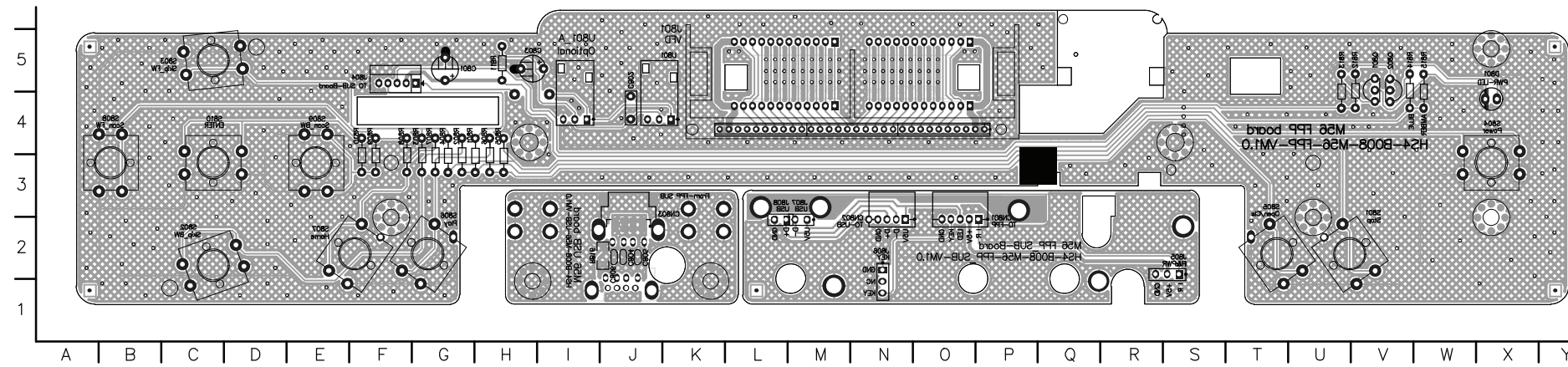
## (BOTTOM VIEW)



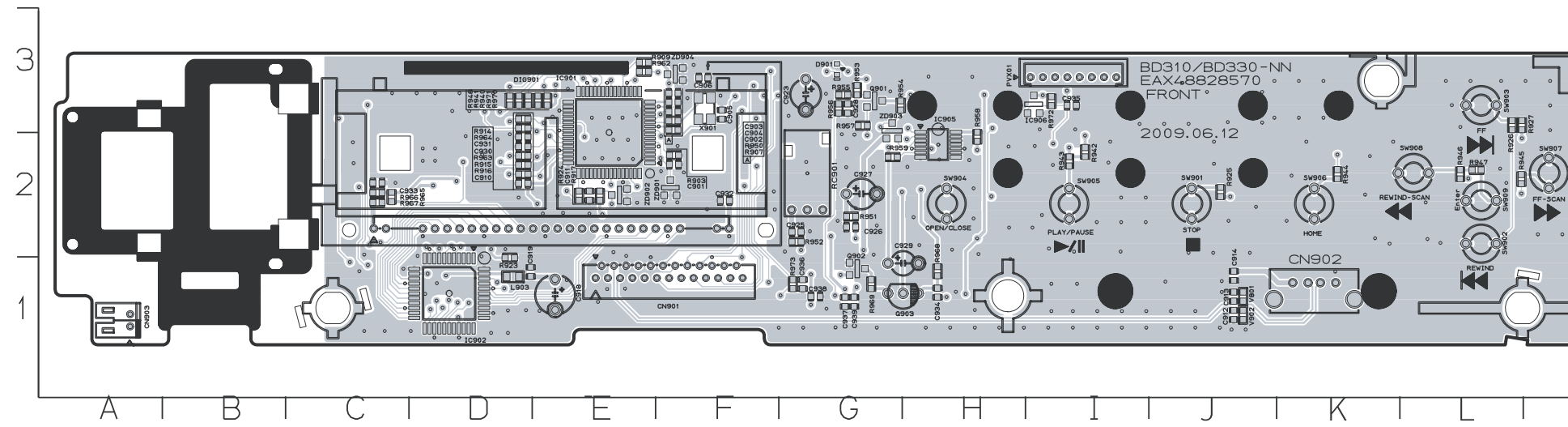
### 3. M56 FPP+SUB+USB P.C.Boards (TOP VIEW)



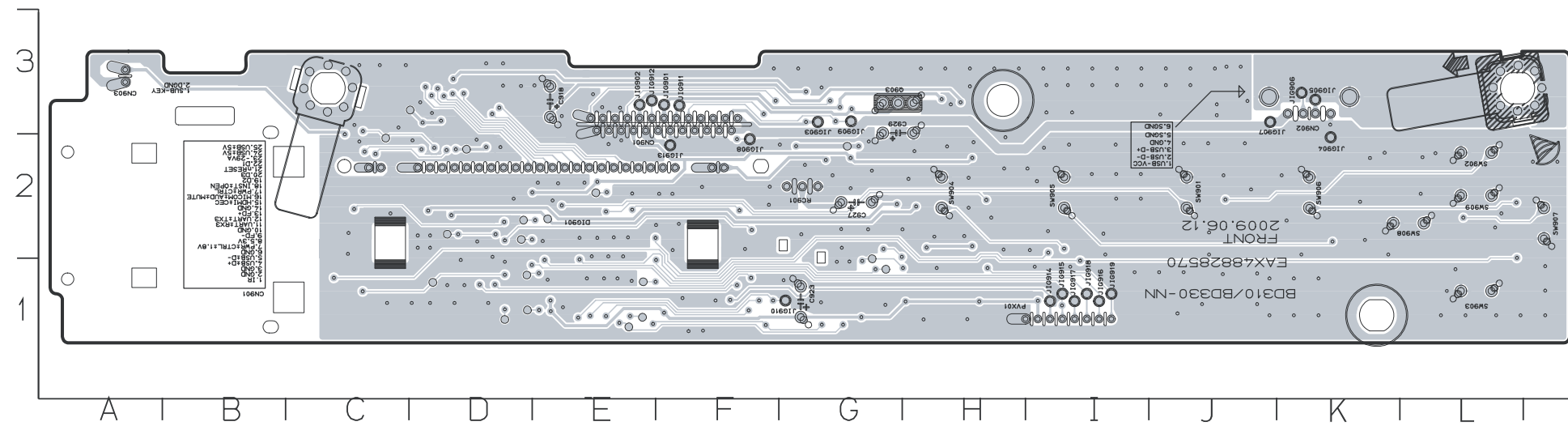
### (BOTTOM VIEW)



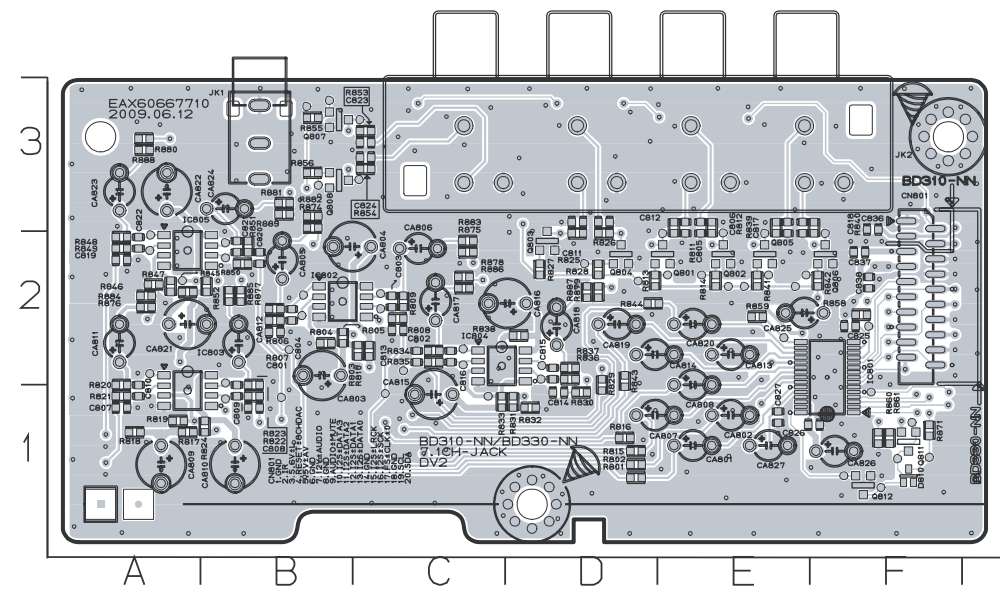
**4. FRONT TIMER P.C.BOARD  
(TOP VIEW)**



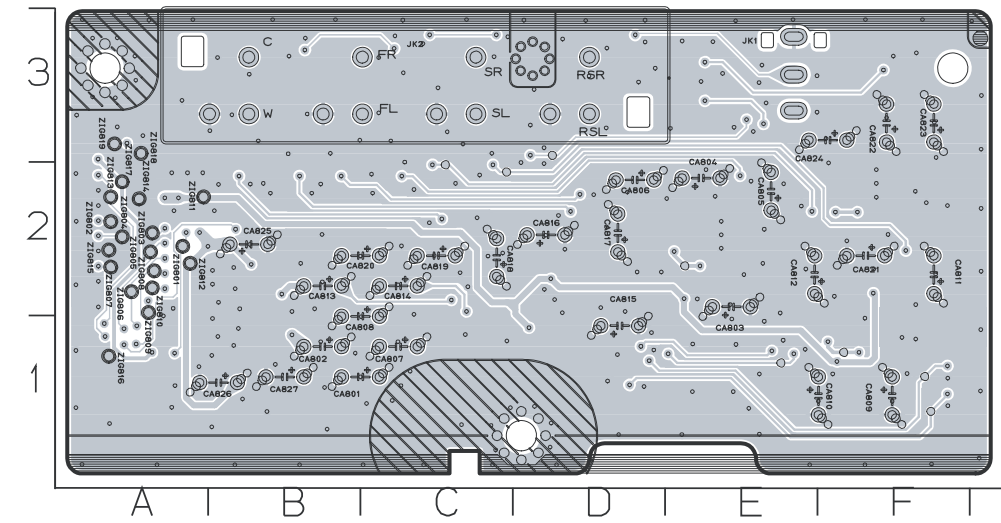
**(BOTTOM VIEW)**



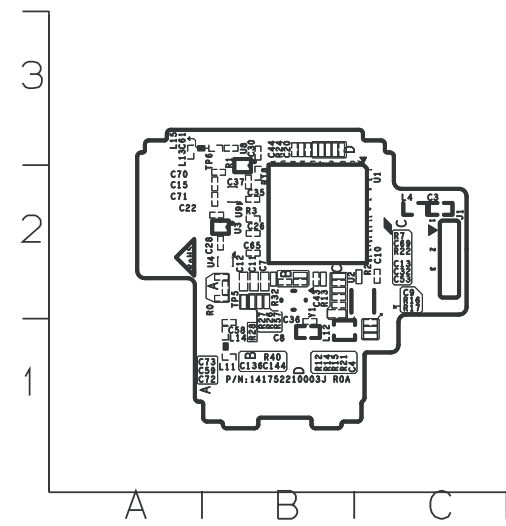
**5. ANALOG 7.1CH P.C.BOARD  
(TOP VIEW)**



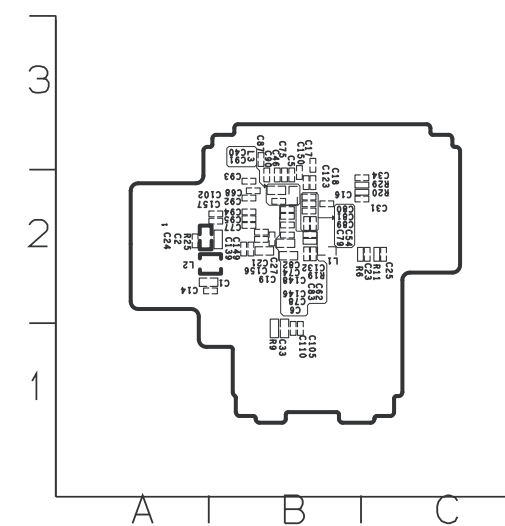
**(BOTTOM VIEW)**



**6. WI-FI P.C.BOARD  
(TOP VIEW)**



**(BOTTOM VIEW)**



# MEMO

Lined area for writing notes on page 3-89.

# MEMO

Lined area for writing notes on page 3-90.

# SECTION 4

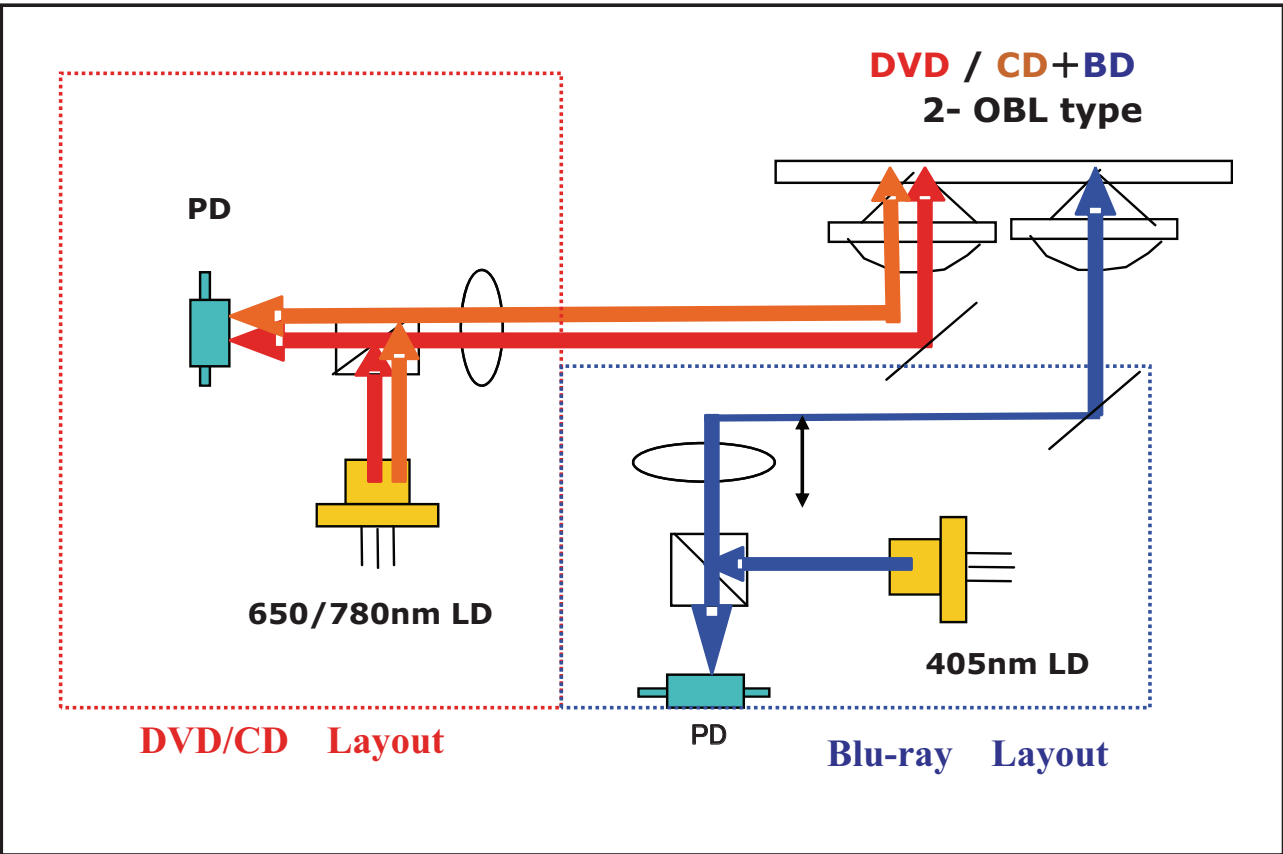
## HL-05P LOADER PART

### CONTENTS

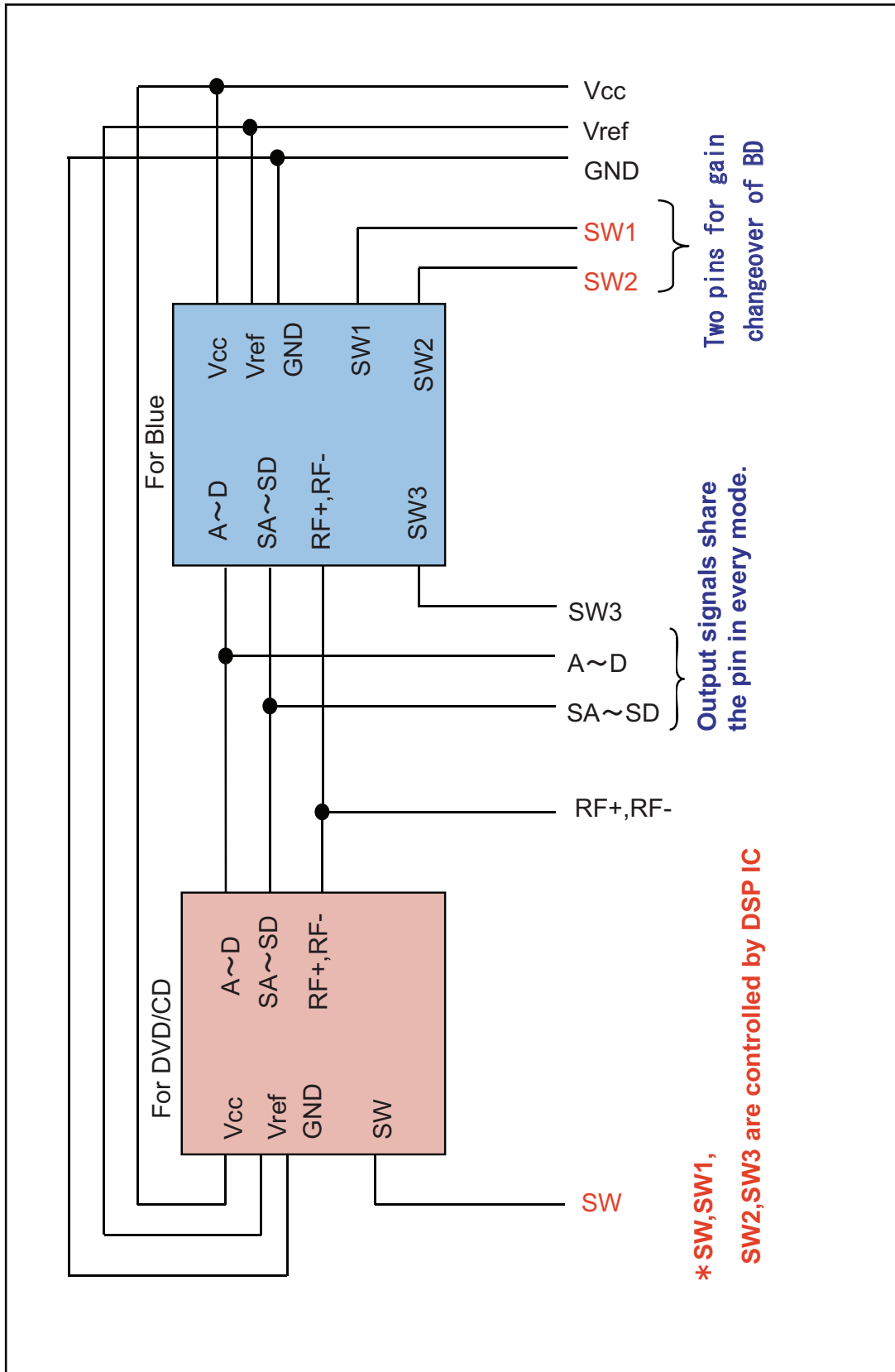
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# INTERNAL STRUCTURE OF THE PICK-UP

## 1. OPTICAL LAYOUT



## 2. SF-BD412 PDIC COMPOSITION





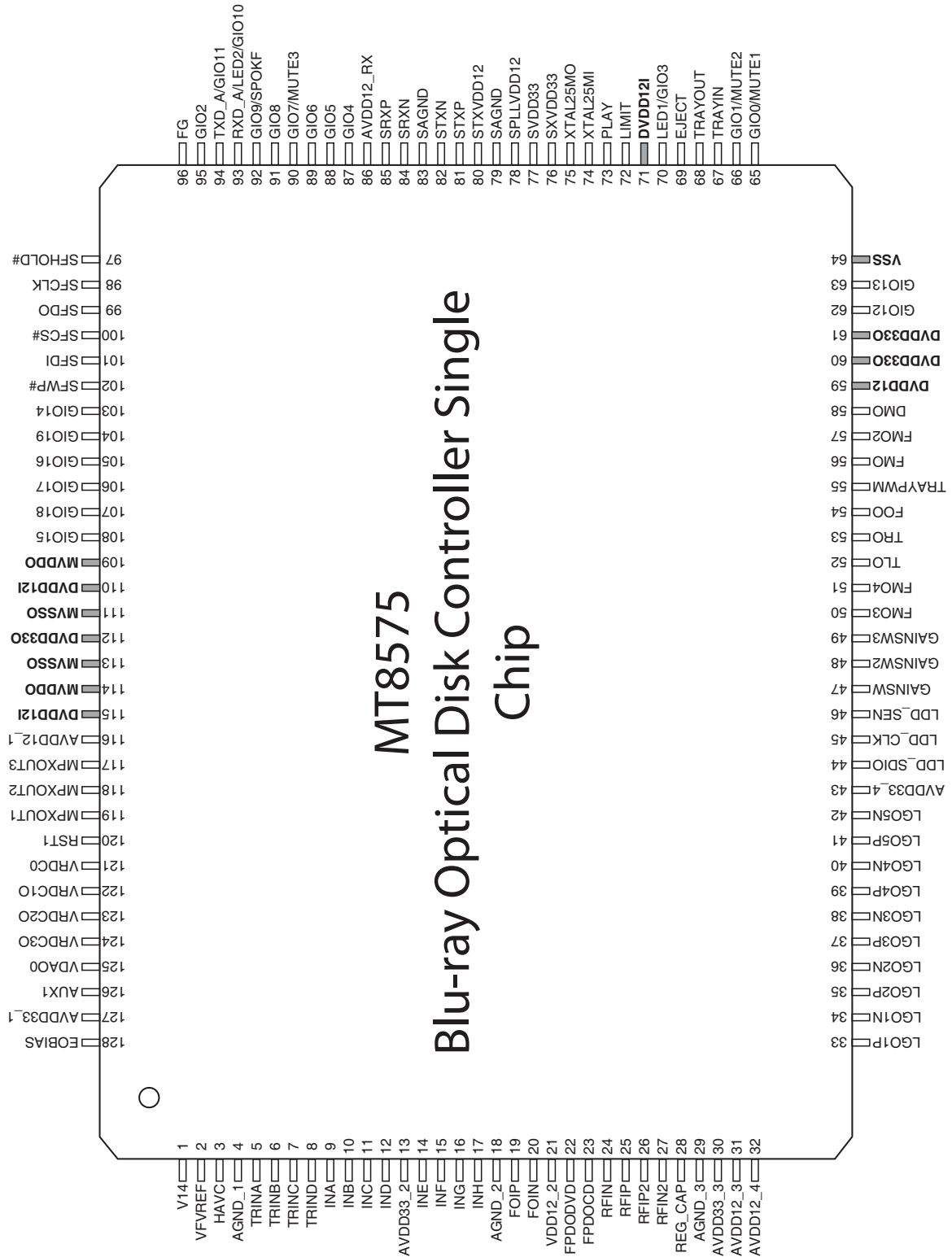
### 3. PICK-UP CONNECTOR TERMINAL PIN ASSIGNMENTS

PIN NO.	PIN NAME		DESCRIPTION
1	FCS2+	ACT	FOCUSING2+
2	FCS2-		FOCUSING2-
3	TRK+		TRACKING+
4	FCS1+		FOCUSING1+
5	TRK-		TRACKING-
6	FCS1-		FOCUSING1-
7	A-	CL SHIFTER	Stepping Motor A- Terminal
8	B-		Stepping Motor B- Terminal
9	A+		Stepping Motor A+ Terminal
10	B+		Stepping Motor B+ Terminal
11	NC		NC
12	NC		NC
13	NC	NC	NC
14	A	PDIC	A output
15	B		B output
16	C		C output
17	D		D output
18	SA		SA output
19	SB		SB output
20	SC		SC output
21	SD		SD output
22	SW3		PDIC BD Sub Output Switch Port
23	RF+		RF(+)output for BD/DVD/CD
24	RF-		RF(-)output for BD/DVD/CD
25	SWB2		SW for PDIC,BD Gain and sleep
26	SWB1		SW for PDIC,BD Gain and sleep
27	VREF_PD		PDIC Reference Supply Terminal 2.1V
28	VCC_+5PD		PDIC Power Terminal 5V
29	GND_PD		GND for PDIC
30	SW		2-Wavelength PDIC DVD/CD/Sleep Changeover SW
31	GND1		LDD HFM IC Monitor
32	LDI_BD	LD control for BD_LD	
33	LDI_CD	LD control for CD_LD	
34	LDI_DVD	LD control for DVD_LD	
35	GND1	GND for LD & HFM IC	
36	TEMP	Thermister	
37	VCC	VCC for HFM IC	
38	MON_CD/DVD	Monitor output for DVD & CD	
39	MON_BD	Monitor output for BD	
40	SEL_DVD	Select input for DVD Monitor(L:enable)	
41	SEL_CD	Select input for CD Monitor(L:enable)	
42	NC	NC	
43	NC	NC	
44	GND1	GND for LD & HFM IC	
45	GND_BDBM	GND for Back monitor PD,BD	

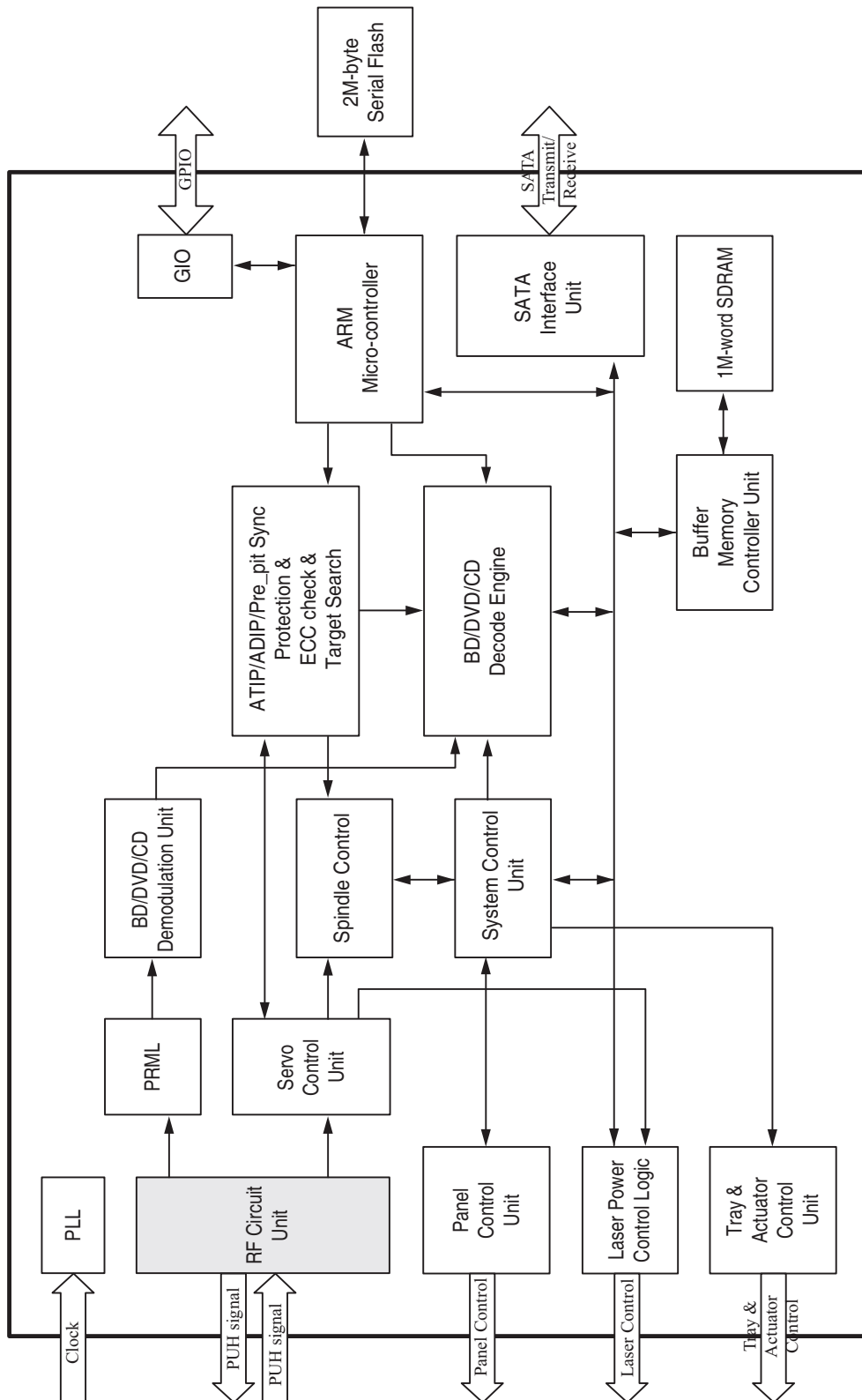
# MAJOR IC INTERNAL BLOCK DIAGRAM AND PIN DESCRIPTION

## 1. LIC501 (MT8575) : Blu-ray SIGNAL PROCESSOR SINGLE CHIP

### 1-1. Pin Assignment



## 1-2. Block Diagram



### 1-3. Pin Function

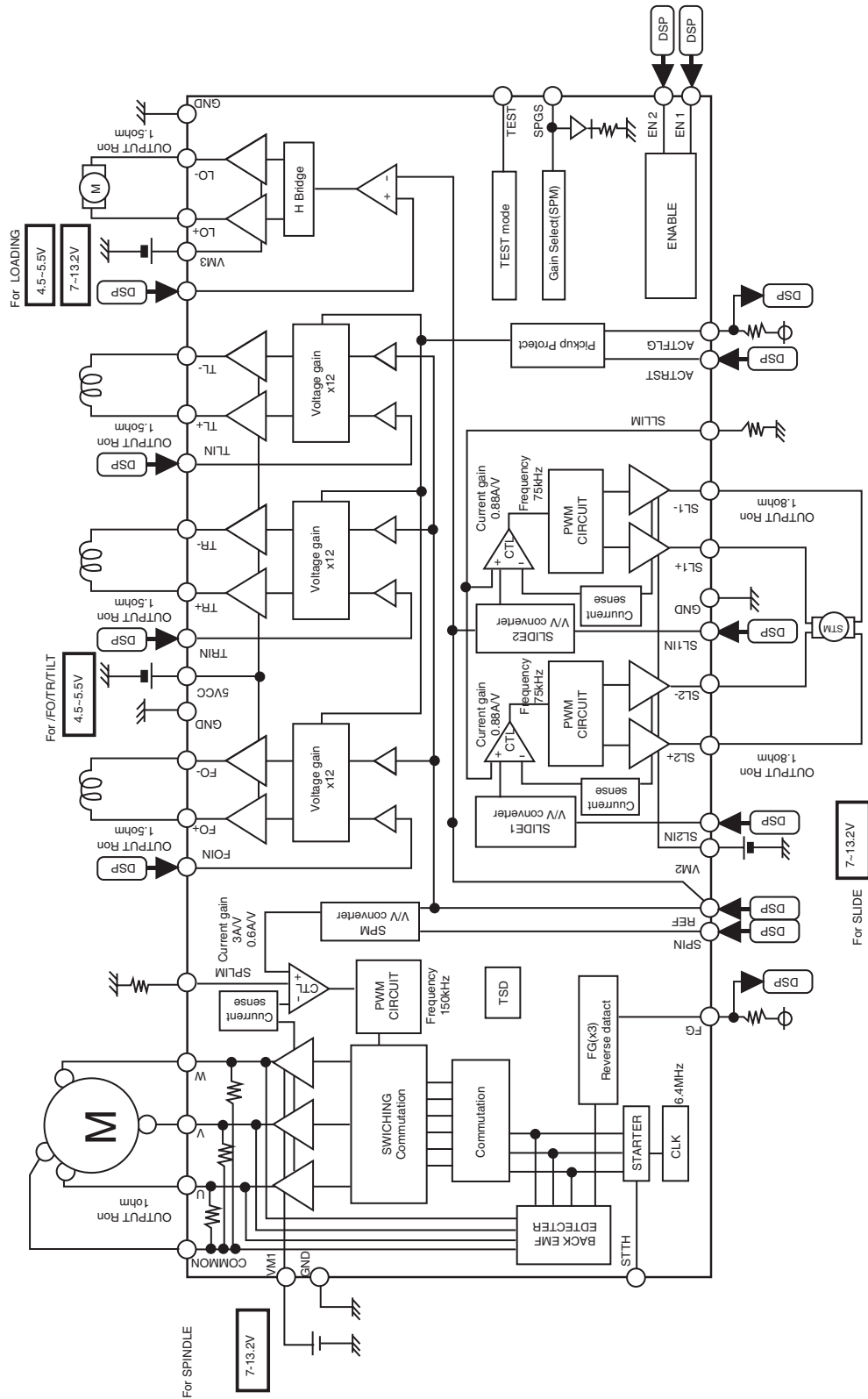
PIN NO	PIN NAME	TYPE	DESCRIPTION
<b>RF Signals &amp; S/H Control Pulses (21)</b>			
5	TRINA	Analog Input	Input of Tracking Signal (A)
6	TRINB	Analog Input	Input of Tracking Signal (B)
7	TRINC	Analog Input	Input of Tracking Signal (C)
8	TRIND	Analog Input	Input of Tracking Signal (D)
9	INA	Analog Input	Input of Main Beam Signal (A)
10	INB	Analog Input	Input of Main Beam Signal (B)
11	INC	Analog Input	Input of Main Beam Signal (C)
12	IND	Analog Input	Input of Main Beam Signal (D)
14	INE	Analog Input	Input of Sub-Beam Signal (E)
15	INF	Analog Input	Input of Sub-Beam Signal (F)
16	ING	Analog Input	Input of Sub-Beam Signal (G)
17	INH	Analog Input	Input of Sub-Beam Signal (H)
19	FOIP/RRFSUM	Analog Input	Input of Focusing Signal (Positive) Alternative Function : Read RF sum
20	FOIN	Analog Input	Input of Focusing Signal (Negative)
24	RFIN	Analog Input	Differential Input of AC Coupling RF SUM Signal (Negative)
25	RFIP	Analog Input	Differential Input of AC Coupling RF SUM Signal (Positive)
26	RFIP2	Analog Input	Differential Input of AC Coupling RF SUM Signal (Positive)
27	RFIN2	Analog Input	Differential Input of AC Coupling RF SUM Signal (Negative)
47	GAINSW	Analog Output	Read gain switch. 1
48	GAINSW2	Analog Output	Read gain switch 2.
49	GAINSW3	Analog Output	Read gain switch 3.
<b>EQRF Circuits (1)</b>			
128	EQBIAS	Analog Output	External Bias Connection for Circuits in EQRF Block & SATA Block. The external resistor need meet the precision for SATA requirement. (23.1K, 1%)
<b>APC (Auto Power Control for Laser) (6)</b>			
22	FPDODVD	Analog Input	Laser Power Monitor Input for DVD APC / Differential positive input
23	FPDOCD	Analog Input	Laser Power Monitor Input for CD APC / Differential negative input
121	VRDCO	Analog Output	Output Voltage of Laser Diode Control in Read APC
122	VRDC1O	Analog Output	Output Voltage 1 of Laser Diode Control in Read APC
123	VRDC2O	Analog Output	Output Voltage 2 of Laser Diode Control in Read APC
124	VRDC3O	Analog Output	Output Voltage 3 of Laser Diode Control in Read APC
<b>Reference Voltages &amp; DACs (5)</b>			
1	V14	Analog Output	Output of Voltage Reference (1.4V)
2	VFVREF	Analog Output	Output of Voltage Reference
3	HAVC	Analog Output	Decoupling Pin for Reference Voltage of Main and Sub Beams
28	REG_CAP	Analog Output	Output of Voltage Reference
125	VDAC0	Analog Output	Output of General DAC
<b>MPXOUT (Multiplexer Circuit for Various Signals) and Testing Interface (4)</b>			
117	MPXOUT3/MON/GO	Analog Output	Multiplexer Output 3 for Signal Monitoring. Alternate function : Internal monitored signal output / General output.
118	MPXOUT2/MON/GO	Analog Output	Multiplexer Output 2 for Signal Monitoring. Alternate function : Internal monitored signal output / General output.
119	MPXOUT1/MON/GO	Analog Output	Multiplexer Output 1 for Signal Monitoring. Alternate function : Internal monitored signal output / General output
126	AUX1	Analog I/O	Auxiliary Input. Alternative Function : Signal Monitoring
<b>RF Power Supplies (11)</b>			
4	AGND_1	Analog Ground	Ground Pin
13	AVDD33_2	Analog Power(3.3V)	Power Pin
18	AGND_2	Analog Ground	Ground Pin
21	AVDD12_2	Analog Power(1.2V)	Power Pin
29	AGND_3	Analog Ground	Ground Pin
30	AVDD33_3	Analog Power(3.3V)	Power Pin

PIN NO	PIN NAME	TYPE	DESCRIPTION
31	AVDD12_3	Analog Power(1.2V)	Power Pin
32	AVDD12_4	Analog Power(1.2V)	Power Pin
43	AVDD33_4	Analog Power(3.3V)	Power Pin
116	AVDD12_1	Analog Power(1.2V)	Power Pin
127	AVDD33_1	Analog Power(3.3V)	Power Pin
<b>Low-Speed General Output (10)</b>			
33	LGO1P	Analog Output	Lowspeed General Output 1P
34	LGO1N	Analog Output	Lowspeed General Output 1N
35	LGO2P	Analog Output	Lowspeed General Output 2P
36	LGO2N	Analog Output	Lowspeed General Output 2N
37	LGO3P	Analog Output	Lowspeed General Output 3P
38	LGO3N	Analog Output	Lowspeed General Output 3N
39	LGO4P	Analog Output	Lowspeed General Output 4P
40	LGO4N	Analog Output	Lowspeed General Output 4N
41	LGO5P	Analog Output	Lowspeed General Output 5P Alternative Function : Read gain switch 4
42	LGO5N	Analog Output	Lowspeed General Output 5N Alternative Function : Read gain switch 5
<b>MOTOR (10)</b>			
50	FMO3	Analog I/O	Feed motor 3 control. PWM output. Alternative Function : Auxiliary servo input
51	FMO4	Analog I/O	Feed motor 4 control. PWM output. Alternative Function : Auxiliary servo input
52	TLO	Analog Output	Tilt servo output
53	TRO	Analog Output	Tracking servo output. PDM output of tracking servo compensator.
54	FOO	Analog Output	Focus servo output. PDM output of focus servo compensator.
55	TRAYPWM	Analog Output	Tray PWM control output. Controlled by $\mu$ P.
56	FMO	Analog Output	Feed motor control. PWM output.
57	FMO2	Analog Output	Feed motor 2 control. PWM output.
58	DMO	Analog Output	Disk motor control output. PWM output.
96	FG	3.3V LVTTTL I/O, 5V-tolerance, 1 2mA PDR, 75K pull-up.	Motor Hall sensor input. The pin is spike-free at power-on stage.
<b>SATA Interface (10)</b>			
77	SVDD33	Analog Power(3.3V)	Power supply for SATA 3.3V circuitry
78	SPLLVD12	Analog Power(1.2V)	Power supply for SATA circuitry
79	SAGND	Analog Ground	Ground Pin for SATA circuitry
80	STXVDD12	Analog Power(1.2V)	Power supply for SATA transmit circuitry
81	STXP	Analog Output	Differential serial output transmit signal of SATA
82	STXN	Analog Output	Differential serial output transmit signal of SATA
83	SAGND	Analog Ground	Ground Pin for SATA circuitry
84	SRXN	Analog Input	Differential input receive signal of SATA
85	SRXP	Analog Input	Differential input receive signal of SATA
86	AVDD12_RX	Analog Power(1.2V)	Power supply for SATA circuitry
<b>Crystal Interface (3)</b>			
74	XTAL25MI	Input	X'tal input. The working frequency is 25MHz.
75	XTAL25MO	Output	X'tal output.
76	SXVDD33	Analog Power(3.3V)	Power supply for X'ftal circuitry
<b>Serial Flash (6)</b>			
97	SFHOLD#	3.3V LVTTTL I/O, 5V-tolerance, 4,8,12,16mA PDR, 75K pull-up	Hold in normal serial flash mode but in quad I/O, as serial data input/data output
98	SFCLK		serial flash's clock output
99	SFDO		serial data output
100	SFCS#		chip select output
101	SFDI		serial data input
102	SFWP#		Write protection in normal serial flash mode but in quad I/O, as serial data input/data output

PIN NO	PIN NAME	TYPE	DESCRIPTION
<b>LDD serial interface (3)</b>			
44	LDD_SDIO	3.3V LVTTTL I/O, 5V-tolerance, 2,4,6,8mA PDR, 75K pull-up	LDD serial interface data. The pin is spike-free at power-on stage.
45	LDD_CLK		LDD serial interface CLK. The pin is spike-free at power-on stage.
46	LDD_SEN		LDD serial interface command enable. The pin is spike-free at power-on stage.
<b>Panel &amp; sense key (5)</b>			
67	TRAYIN	3.3V LVTTTL I/O, 5V-tolerance, 12mA,75K pull-up	Tray_is_in Input, A Logical Low Indicates the Tray is IN. Feedback Flag is from Tray Connector. The pin is spike-free at power-on stage.
68	TRAYOUT		Tray_is_out Input. A Logical Low Indicates the Tray is OUT. Feedback Flag is from Tray Connector. The pin is spike-free at power-on stage.
69	EJECT		Eject/stop key input, active low. The pin is spike-free at power-on stage.
72	LIMIT		Sledge Inner Limit Input, Active Low. The pin is spike-free at power-on stage. Alternate function : 1. Internal monitored signal output
73	PLAY		Play/pause key input, active low. The pin is spike-free at power-on stage.
<b>MISC &amp; GIO function (21)</b>			
120	RSTI	Analog Input	Internal power on reset detection input.
62	GIO12	3.3V LVTTTL I/O, 5V-tolerance, 4,8,12,16mA PDR, 75K pull-up	General IO
63	GIO13		General IO.
65	GIO0/MUTE1		General IO
66	GIO1/MUTE2		General IO
70	LED1/GIO3		LED Control Output. Initial 0 Output. The pin is spike-free at power-on stage. Alternate function : General I/O
87	GIO4		General IO.
88	GIO5		General IO.
89	GIO6		General IO.
90	GIO7/MUTE3		General IO. The pin is spike-free at power-on stage.
91	GIO8		General IO.
92	GIO9/SPOKE		General IO. The pin is spike-free at power-on stage. The pin is not allowed to pull-up in circuit layout. Alternate function : Spoke input.
93	RXD_A/ LED2/GIO10		PC RS232 serial receive data. The pin is spike-free at power-on stage. Alternate function : 1. LED Control Output. Initial "0" Output 2. General IO.
94	TXD_A/GIO11		PC RS232 serial transmit data. The pin is spike-free at power-on stage. Alternate function : 1. LED Control Output. Initial "0" Output 2. General IO.
95	GIO2		General IO
103	GIO14		General IO
104	GIO19		General IO
105	GIO16		General IO
106	GIO17		General IO
107	GIO18		General IO
108	GIO15		General IO The pin is not allowed to pull-up in circuit layout.
<b>Digital Power Pins (11)</b>			
60,61,112	DVDD330	Digital Power (3.3V)	VDD for digital pad.
109,114	MVDDQ	DRAM Power (3.3V)	VDD for pad output buffer of DRAM die.
111,113	MVSSQ	DRAM Ground	VSS for pad output buffer of DRAM die.
59,71, 110,115	DVDD12I	Digital Power (1.2V)	VDD for internal circuit.
64	VSS	Digital Ground	VSS for digital pad

## 2. LIC201 (R2A30232SP) : SPINDLE MOTOR AND 6CH ACTUATOR DRIVER

### 2-1. Block Diagram



## 2-2. Pin Function

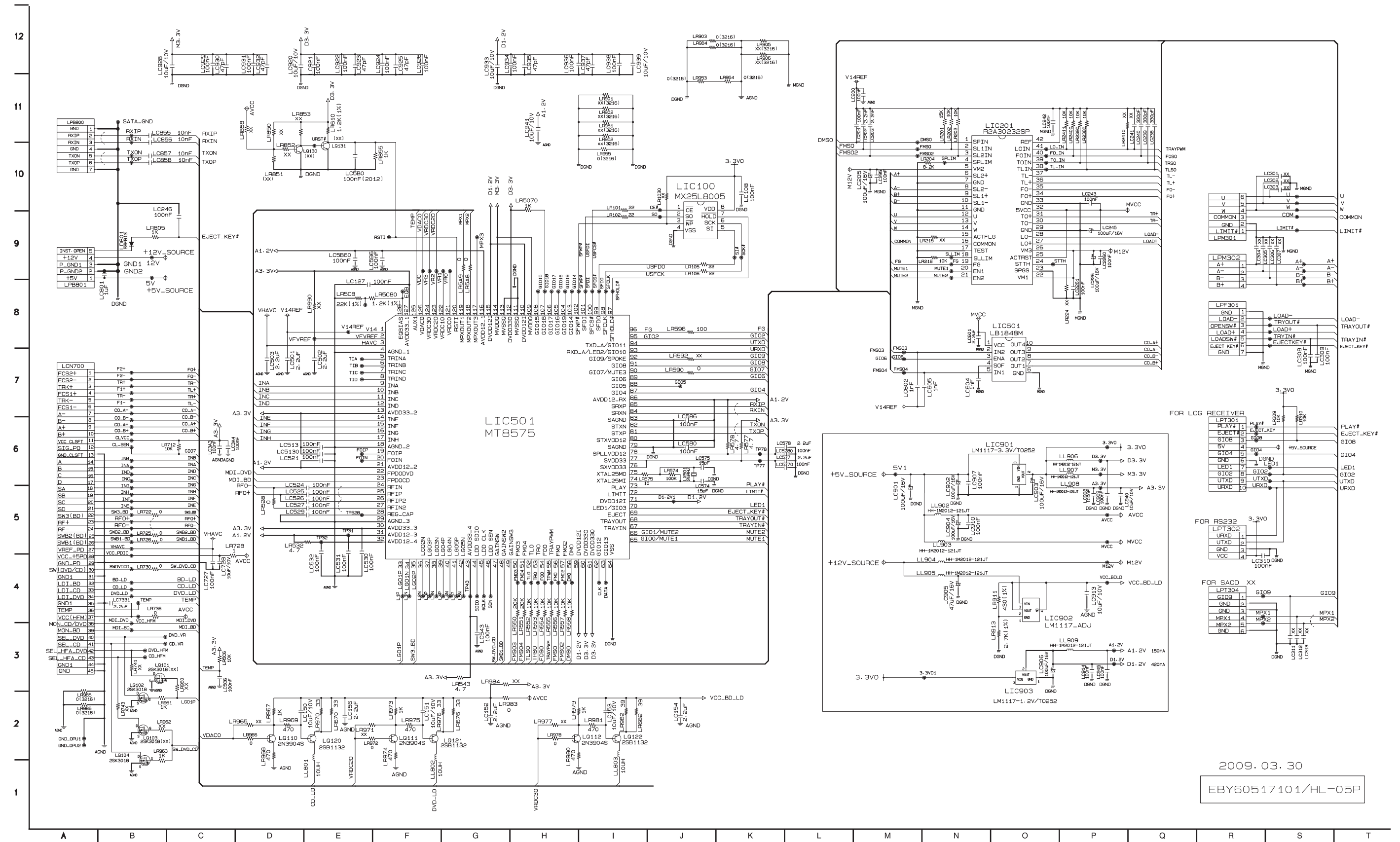
PIN NO	SYMBOL	FUNCTION
1	SPIN	Spindle control voltage input
2	SL1IN	Slide control voltage input 1
3	SL2IN	Slide control voltage input ÇQ
4	SPLIM	Input terminal for spindle current limit
5	VM2	Motor Power Supply ÇQ(for Slide)
6	SL2+	Slide non-inverted output 2
7	GND	GND
8	SL2-	Slide inverted output 2
9	SL1+	Slide non-inverted output 1
10	SL1-	Slide inverted output 1
11	GND	GND
12	U	Motor drive output U
13	V	Motor drive output V
14	W	Motor drive output W
15	ACTFLG	Pickup protect flag output
16	COMMON	Motor common
17	TEST	Test
18	SLLIM	Input terminal for slide current limit
19	FG	Frequency generator output
20	EN1	Input terminal for enable 1
21	EN2	Input terminal for enable 2
22	VM1	Motor Power Supply 1(for Spindle)
23	SPGS	Input terminal for gain select SPM
24	STTH	Reference voltage for spindle start up
25	ACTRST	Pickup protect Reset
26	VM3	Power Supply3(for Loading)
27	LO+	Loading non-inverted output
28	LO-	Loading inverted output
29	GND	GND
30	TO-	Tracking inverted output
31	TO+	Tracking non-inverted output
32	5VCC	5V Power Supply (for FS,TS,TL)
33	GND	GND
34	FO+	Focus non-inverted output
35	FO-	Focus inverted output
36	TL+	Tilt non-inverted output
37	TL-	Tilt inverted output
38	TLIN	Tilt control voltage input
39	TOIN	Tracking control voltage input
40	FOIN	Focus control voltage input
41	LOIN	Loading control input
42	REF	Reference voltage input



# MEMO

A series of horizontal dotted lines for writing.

# CIRCUIT DIAGRAM



2009.03.30  
EBY60517101/HL-05P

# CIRCUIT VOLTAGE CHART

MODE: BD-ROM PLAYBACK

LIC100	
PIN NO.	VOLTAGE
1	0.00
2	PULSE
3	3.30
4	0.00
5	0.00
6	PULSE
7	3.30
8	3.30

LIC201	
PIN NO.	VOLTAGE
1	1.53
2	1.42
3	1.38
4	1.23
5	12.19
6	0.00
7	0.00
8	PULSE
9	PULSE
10	PULSE
11	0.00
12	4.50
13	4.50
14	4.50
15	0.01
16	4.50
17	0.00
18	1.24
19	1.64
20	3.30
21	3.30
22	12.19
23	0.00
24	2.13
25	4.94
26	12.19
27	0.68
28	0.62
29	0.00

30	2.39
31	2.49
32	4.94
33	0.00
34	2.60
35	0.00
36	2.49
37	2.40
38	1.41
39	1.41
40	1.43
41	1.41
42	1.41

LIC501	
PIN NO.	VOLTAGE
1	1.41
2	1.01
3	2.10
4	0.00
5	1.16
6	1.12
7	1.06
8	1.67
9	2.33
10	2.45
11	2.47
12	2.31
13	3.29
14	2.37
15	2.22
16	2.29
17	2.30
18	0.00
19	1.19
20	0.00
21	1.19
22	0.00
23	0.00
24	1.41
25	1.41
26	0.00
27	0.00
28	1.50

29	0.00
30	3.28
31	1.19
32	1.16
33	0.00
34	0.00
35	0.00
36	0.00
37	0.00
38	0.00
39	0.00
40	0.00
41	0.00
42	0.00
43	3.29
44	0.00
45	0.00
46	0.00
47	1.67
48	3.23
49	0.00
50	0.00
51	0.00
52	1.41
53	1.41
54	1.44
55	1.40
56	1.48
57	1.42
58	1.52
59	1.19
60	3.28
61	3.28
62	0.00
63	0.00
64	0.00
65	3.30
66	3.30
67	0.00
68	0.00
69	3.30
70	0.00
71	1.19

72	3.27
73	3.27
74	OSC
75	OSC
76	3.24
77	3.24
78	1.16
79	0.00
80	1.19
81	1.19
82	1.19
83	0.00
84	1.19
85	1.19
86	1.19
87	PULSE
88	0.00
89	0.00
90	2.87
91	0.00
92	0.00
93	PULSE
94	PULSE
95	0.00
96	PULSE
97	3.30
98	0.00
99	0.00
100	0.00
101	PULSE
102	3.30
103	3.30
104	3.30
105	3.30
106	3.30
107	3.30
108	3.30
109	3.30
110	1.19
111	0.00
112	3.30
113	0.00
114	3.30

115	1.19
116	1.19
117	1.12
118	1.40
119	3.29
120	1.50
121	0.00
122	1.50
123	0.00
124	1.32
125	0.00
126	1.44
127	3.24
128	1.35
120	1.50
121	0.00
122	1.50
123	0.00
124	1.32
125	0.00
126	1.44
127	3.24
128	1.35

LIC601	
PIN NO.	VOLTAGE
1	4.94
2	2.20
3	0.00
4	4.40
5	2.27
6	0.00
7	0.3
8	0.3
9	0.3
10	0.3

LIC901	
PIN NO.	VOLTAGE
1	0.00
2	3.30
3	5.05

LIC902	
PIN NO.	VOLTAGE
1	6.93

2	8.18
3	12.19

LIC903	
PIN NO.	VOLTAGE
1	0.00
2	1.20
3	3.30

LQ110	
PIN	VOLTAGE
Emitter	0.00
Collector	4.93
Base	0.00

LQ111	
PIN	VOLTAGE
Emitter	0.00
Collector	4.93
Base	0.00

LQ112	
PIN	VOLTAGE
Emitter	0.67
Collector	7.97
Base	1.33

LQ120	
PIN	VOLTAGE
Emitter	4.93
Collector	0.00
Base	4.93

LQ121	
PIN	VOLTAGE
Emitter	4.93
Collector	0.00
Base	4.93

LQ122	
PIN	VOLTAGE
Emitter	8.68
Collector	4.86
Base	8.00

# PRINTED CIRCUIT BOARD DIAGRAMS

(TOP VIEW)

