



# Service Manual

2003



SET TOP BOX  
V21S CHASSIS

## V21S MODELS

**HD-5000  
HD-5000A**

### **CAUTION:**

Before servicing this chassis, it is important that the service person read the "SAFETY PRECAUTIONS" and "PRODUCT SAFETY NOTICE" contained in this manual.

## SPECIFICATIONS

• Power Input	: AC 120V, 60Hz	• Input Level	: VIDEO IN JACK (RCA Type) 1.0Vp-p 75Ω unbalanced
• Power Usage	: 79W	• Frequency Range	: AUDIO IN JACK (RCA Type) -4.7dBm 43kΩ unbalanced
• Frequency Range	: VHF 54 ~ 470MHz UHF 470 ~ 806MHz	• Antenna Input	: S-VIDEO IN JACK (Y/C separate type) Y:1.0 Vp-p C:0.286Vp-p(BURST) 75Ω unbalanced
• Antenna Input	: VHF/UHF 75Ω unbalanced 2 - NTSC 1 - ATV/QAM	• Output Level	: COMP / Y, Cr, Cb (RCA Type) Y: 1.0 Vp-p Cr, Cb: 700mVp-p ATV / Y(G), Pr(R), Pb(B), H, V Y: 1.0Vp-p with sync 75Ω (BNC) Pr, Pb: 700mV 75Ω H, V: 3.0Vp-p 75Ω
• Cabinet Weight and Demensions		• Digital Interface	: VGA / R,G,B,V,H (15 pin D) VIDEO OUT JACK (RCA Type) 1.0Vp-p 75Ω unbalanced
			: AUDIO OUT JACK (RCA Type) -4.7dBm 4.7kΩ unbalanced
			: IEEE-1394 I/O Jacks AC-3 Digital Audio Output MonitorLink™/DVI
			: MonitorLink™ Control/RS-232C NetCommand®

**MITSUBISHI DIGITAL ELECTRONICS AMERICA, INC.**

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## CONTENTS

INTRODUCTION .....	5
PRODUCT SAFETY NOTICE .....	5
SAFETY PRECAUTIONS .....	6
 <b>DISASSEMBLY</b>	
Top Cover Assembly / Disassembly .....	7
PCB Disassembly FlowChart .....	7
PCB Assembly / Disassembly .....	8
Cabinet Assembly / Disassembly .....	10
 <b>ELECTRICAL ADJUSTMENTS</b>	
Test Equipment .....	11
Initial Setup .....	12
LED Indicator Diagnostics .....	13
Error Codes .....	13
Remote Control Operational Mode .....	13
Circuit Adjustment Mode .....	14
On Screen Display Position Adjustment Mode .....	15
Data Transfer Mode .....	15
E2PROM Replacement .....	15
Adjustment Items List .....	15
Adjustment Test Points .....	17
Adjustment Procedures .....	18
Audio Circuit .....	18
Character Position .....	19
Main/Sub Y Level .....	19
Color Alignment .....	20
CHIP PARTS REPLACEMENT .....	21
 <b>REPLACEMENT PARTS</b>	
Parts Ordering .....	22
Critical and Warranty Parts Designation .....	22
Parts Tolerance Codes .....	22
Service Parts List .....	23
 <b>CIRCUITRY BLOCK DIAGRAMS</b>	
Standby Supplies Regulator .....	32
DM Power Supply .....	33
Video / Color A/V Switch Circuit .....	34
Video / Color Signal Path .....	35
Control Circuitry .....	36
Sound Circuitry .....	37
Sync Circuitry .....	38

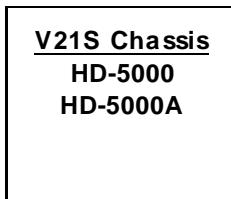
## Section 2 .... Schematic Diagrams

### **SCHEMATIC DIAGRAMS**

Overall Block Diagram .....	1
PCB-POWER / CONTROL / E2P .....	2
PCB-TERMINAL-1 [JACK] .....	3
PCB-TERMINAL-2-1 [SWITCH] .....	4
PCB-TERMINAL-2-2 [3DYC] .....	5
PCB-SIGNAL-1 [MICRO] .....	6
PCB-SIGNAL-2 [AV / IO] .....	7
PCB-SIGNAL-3 [VIDEO / CHROMA] .....	8
PCB-SIGNAL-4 [IR / MV / DMP] .....	9
PCB-2HDW-1 [IN] .....	10
PCB-2HDW-2 [MAIN] .....	11
PCB-2HDW-3 [OUT] .....	12
PCB-2HDW-4 [C720] HD-5000A ONLY .....	13
PCB-DEMOD .....	14
<b>PCB LAYOUT DIAGRAMS .....</b>	<b>15</b>

## INTRODUCTION

This service manual provides service instructions for the V21S STB chassis type. The specific models for each chassis type are listed below. Service personnel should read this manual thoroughly before servicing these chassis.



This service manual includes:

1. Safety Precautions
2. Assembly and disassembly instructions.
3. Servicing printed circuit boards (PCBs).
4. Electrical adjustments.
5. Chip parts replacement procedures.
6. Circuit path diagrams.

The parts list section of this service manual includes:

1. Mechanical and Cosmetic parts.
2. Electrical parts.

Schematic and block diagrams of the above listed models are included in this service manual for better understanding of the circuitry. PCB drawings are also included for easy location of parts and test points.

## PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in television receivers have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc.

Replacement parts which have special safety characteristics are identified in this service manual.

Electrical components having such features are identified by shading  on the schematic diagram and by **bold type** in the parts list of this service manual. **The replacement for any safety part should be identical in value and characteristics.**

## SAFETY PRECAUTIONS

**NOTICE:** Observe all cautions and safety related notes located inside the receiver cabinet and on the receiver chassis.

**WARNING:**

1. Operation of this receiver outside the cabinet or with the cover removed presents a shock hazard from the receiver's power supplies. Work on the receiver should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment.
2. When service is required, observe the original lead dress. Extra precaution should be taken to assure correct lead dress in the high voltage area. Where a short-circuit has occurred, replace those components that indicate evidence of overheating.

**Leakage current check**

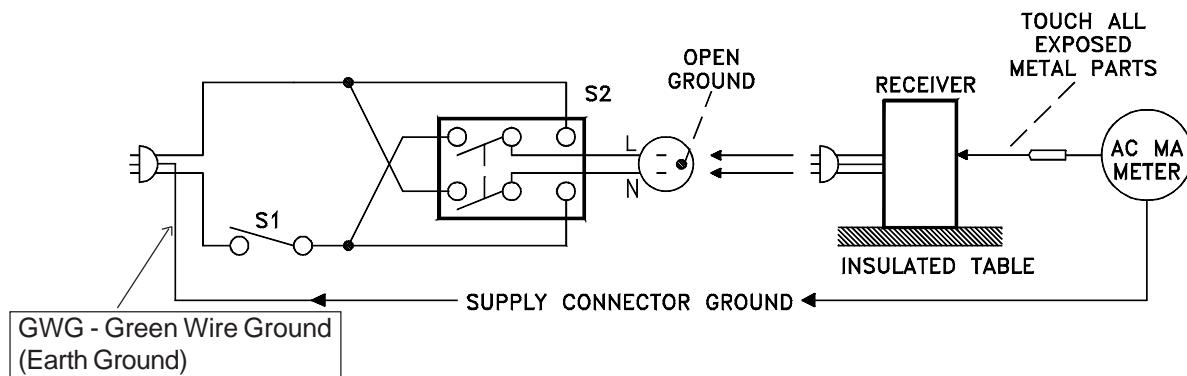
Before returning the receiver to the customer, it is recommended that leakage current be measured according to the following methods.

**1. Cold Check**

With the alternating current (AC) plug removed from the AC source, place a jumper across the two AC plug prongs. Connect one lead of an ohm meter to the AC plug and touch the other lead to each exposed metal part (i.e. antennas, handle bracket, metal cabinet, screw heads, metal overlay, control shafts, etc.), particularly any exposed metal part that has a return path to the chassis. The resistance of the exposed metal parts having a return path to the chassis **should be a minimum of 1Mega Ohm**. Any resistance below this value indicates an abnormal condition and requires corrective action.

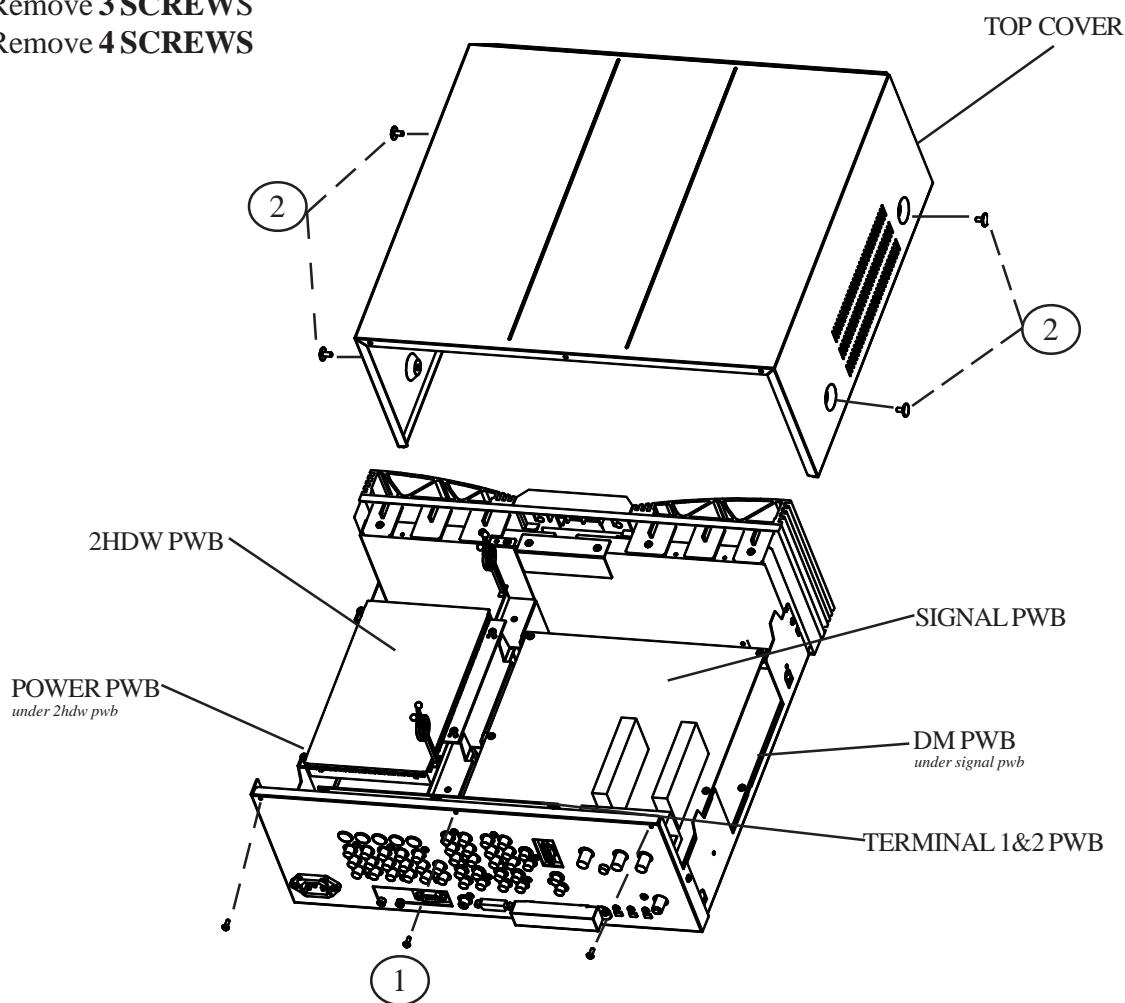
**2. Hot Check ... Use the circuit shown below to perform the hot check test.**

1. Keep switch S1 open and connect the receiver to the measuring circuit. Immediately after connection, and with the switching devices of the receiver in their operating positions, measure the leakage current for both positions of switch S2.
2. Close switch S1, energizing the receiver. Immediately after closing switch S1, and with the switching devices of the receiver in their operating positions, measure the leakage current for both positions of switch S2. Repeat the current measurements of items 1 and 2 after the receiver has reached thermal stabilization. **The leakage current must not exceed 0.5 milliampere (mA).**

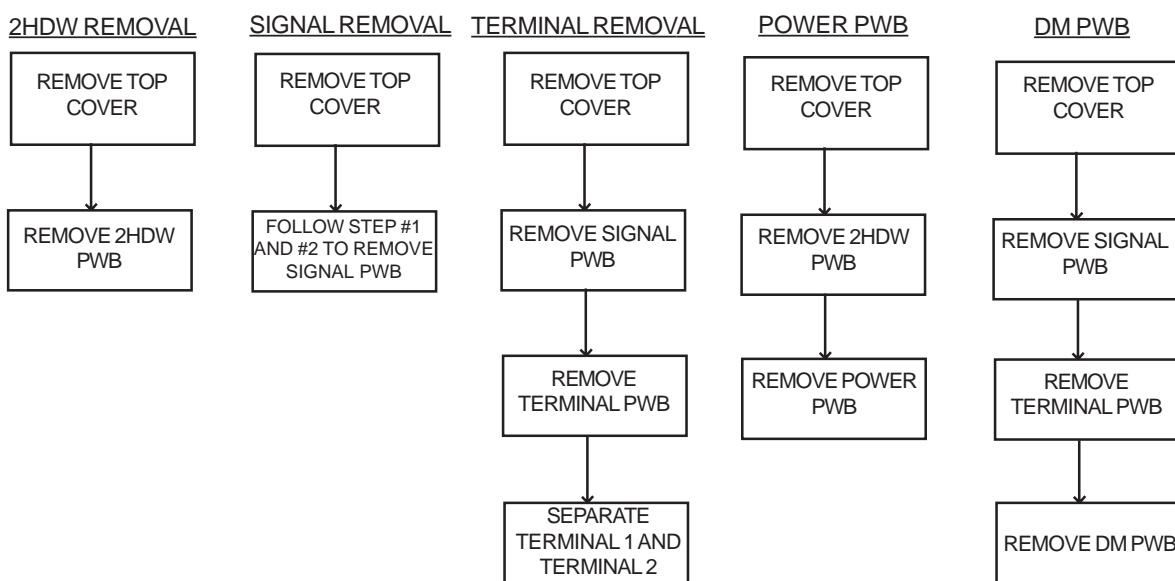


**TOP COVER ASSEMBLY/DISASSEMBLY**

- 1) Remove 3 SCREWS
- 2) Remove 4 SCREWS

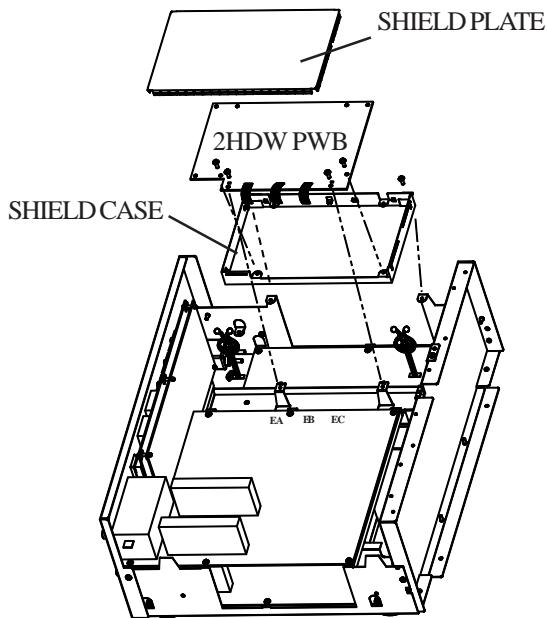
**PWB ASSEMBLY/DISASSEMBLY**

(See detailed drawings on next 3 pages)



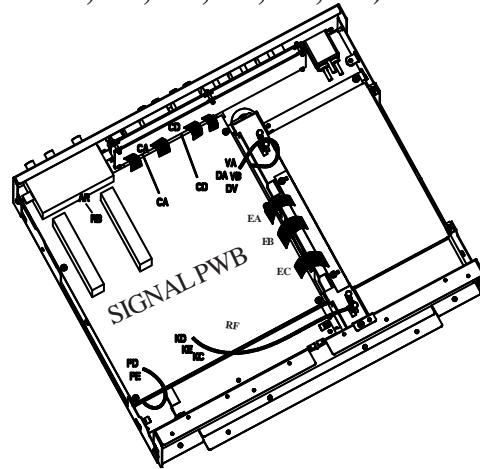
### 2HDW ASSEMBLY

- 1) Remove **3 connectors (EA, EB, EC)** from Signal PWB
- 2) Remove **4 SCREWS** from 2HDW PCB



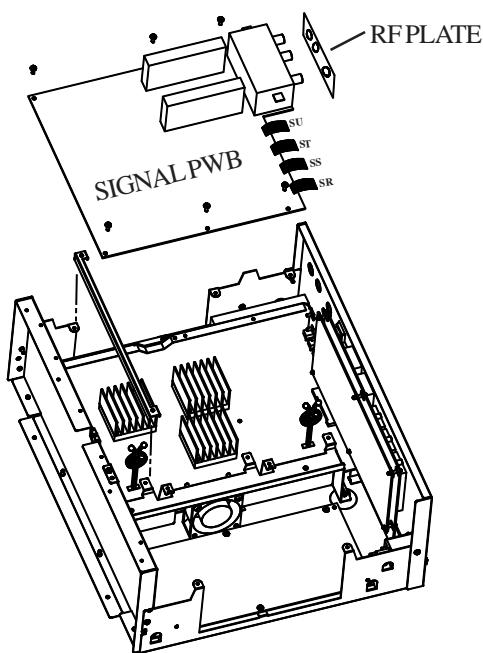
### SIGNAL PWB ASSEMBLY STEP 1

- 1) Remove **15 connectors (EA, EB, EC, KE, KC, KB, CD, CA, VA, DA, DV, VB, PE, PD, RF)**



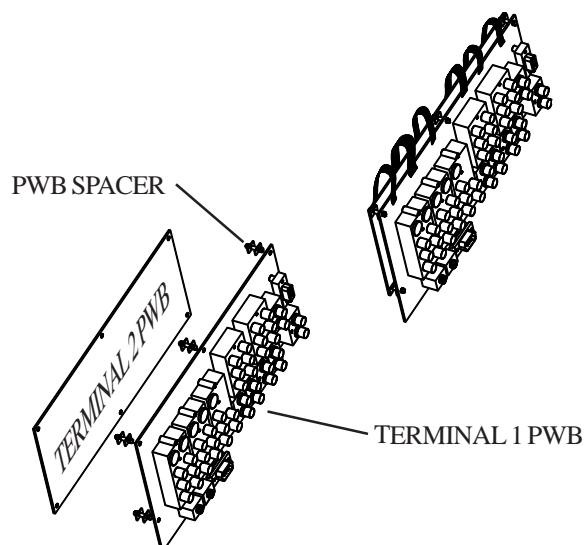
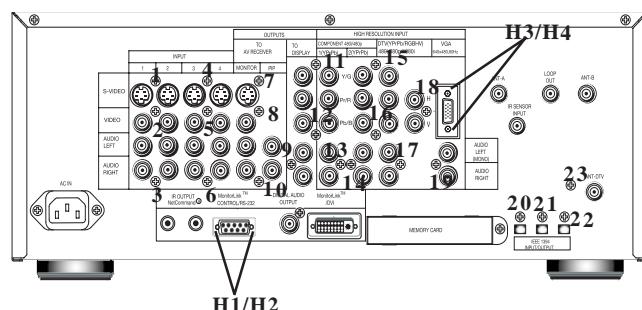
### SIGNAL PWB ASSEMBLY STEP 2

- 1) Remove **4 connectors (SU, ST, SS, SR)**
- 2) Remove **6 SCREWS**
- 3) Remove **RF PLATE**



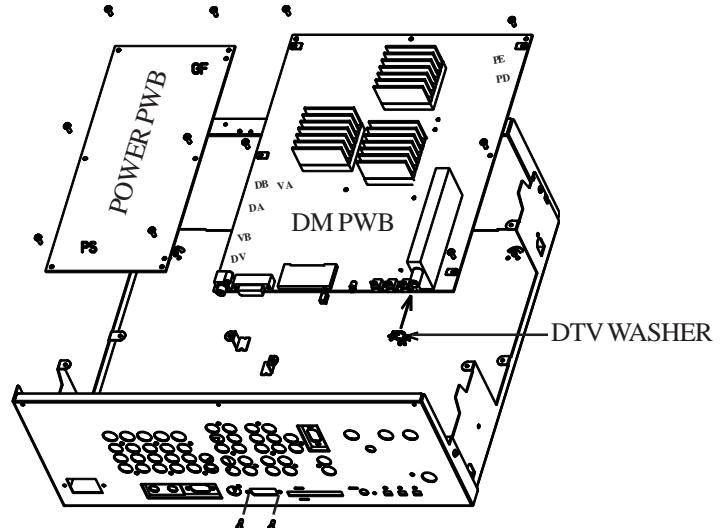
### TERMINAL 1&2 PWB ASSEMBLY

- 1) Remove **23 SCREWS (not shown)**
- 2) Remove **4 HEX LOCK (H1~H4) screws**



POWER PWB ASSEMBLY

- 1) Remove **6 SCREWS** from Power PCB
- 1) Remove **2 connectors (GS, PS)**

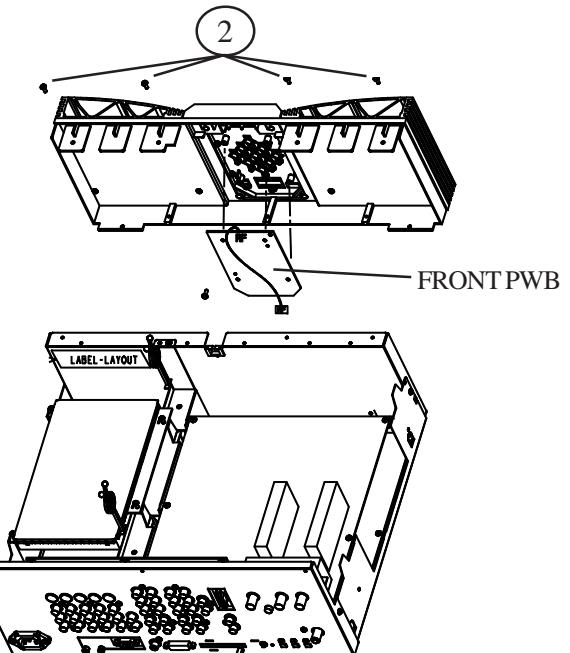
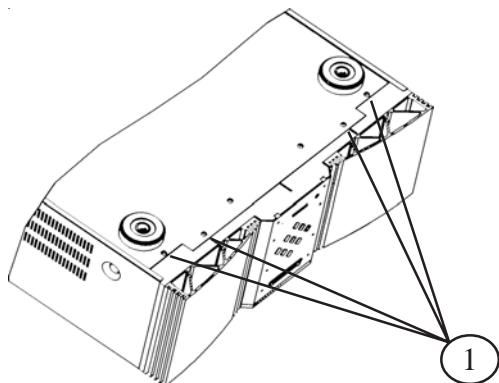


DM PWB ASSEMBLY

- 1) Remove **5 SCREWS** from DM PCB
- 2) Remove **2 HEX LOCK SCREWS**
- 3) Remove **DTV WASHER**
- 3) Remove **7 connectors (DV, DA, DB, VA, VB, PD, PE)**

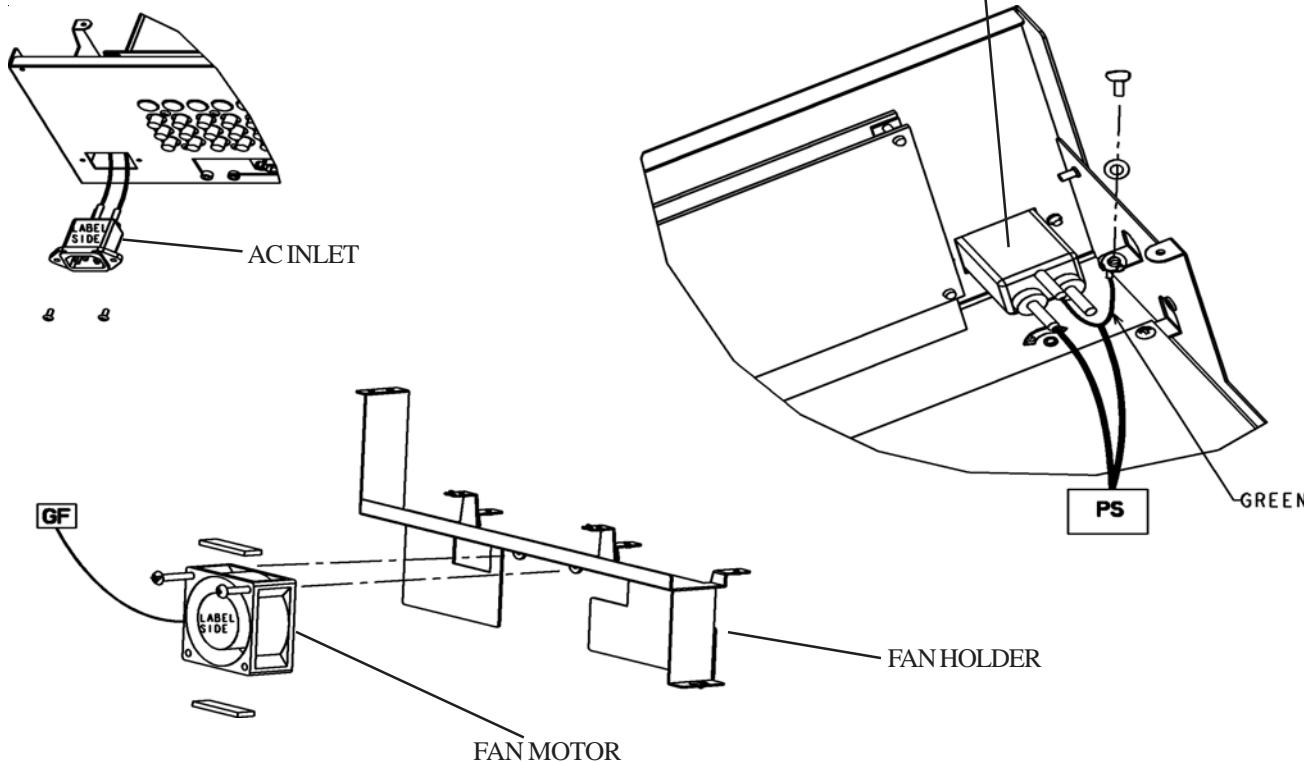
FRONT PWB ASSEMBLY

- 1) Remove **4 SCREWS** from bottom
- 2) Remove **4 SCREWS** from top
- 3) Remove **1 connectors (RF)**
- 4) Remove **4 SCREWS** from FRONT PWB

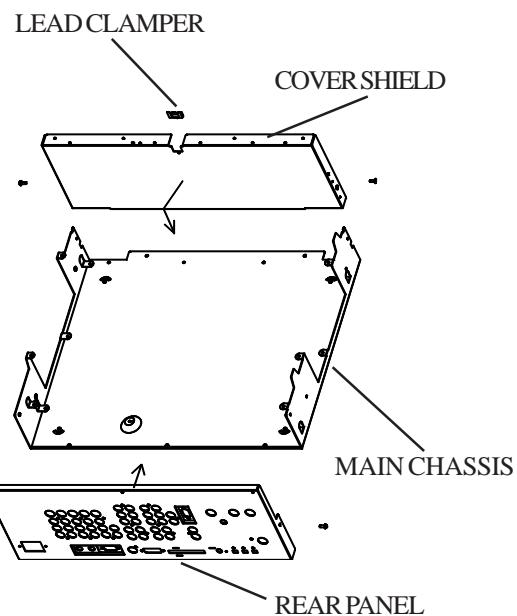
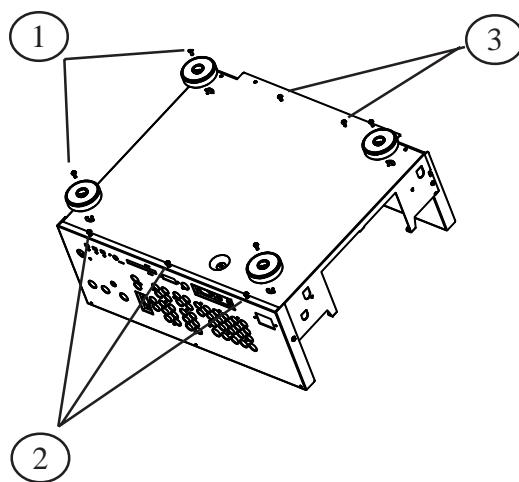


**CABINET ASSEMBLY****AC INLET / FAN ASSEMBLY**

- 1) Remove **AC INLET** from rear panel
- 2) Remove **FAN MOTOR** from fan holder

**MAIN CHASSIS ASSEMBLY**

- 1) Remove **4 SCREWS** from bottom feet
- 2) Remove **3 SCREWS** from rear panel bottom
- 3) Remove **2 SCREWS** from cover shield bottom



## ELECTRICAL ADJUSTMENTS

**Note:** Perform only the adjustments required.  
Do not attempt an alignment if proper equipment is not available.

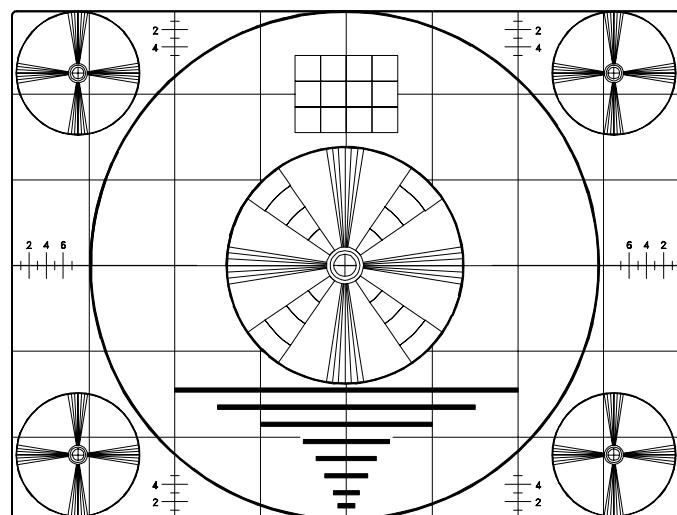
### Test Equipment

- Oscilloscope (Unless otherwise specified, use 10:1 probes)
- Signal Generator (both SD and HD capable)
- Frequency Counter
- Direct Current Voltmeter
- Direct Current Power Supply
- Multiplex Audio Signal Generator
- Direct Current Ampere Meter

### Test Signal

#### A. Monoscope Signal

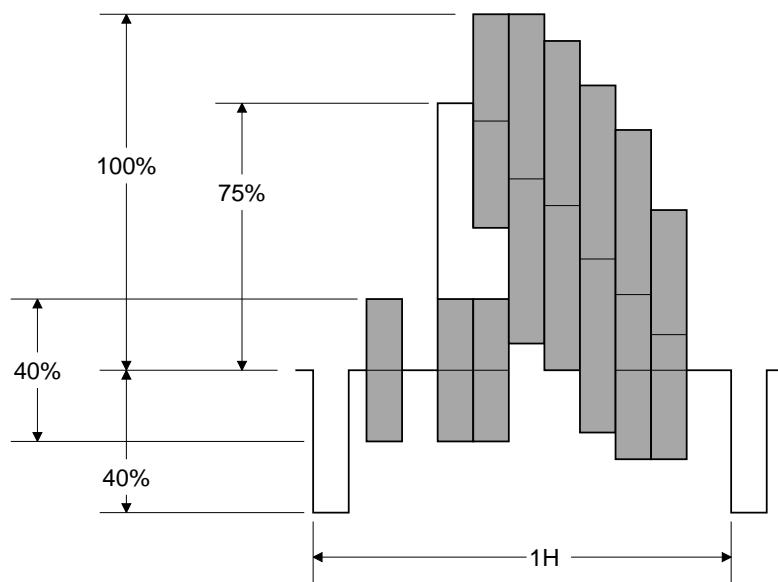
**Note:** If you do not have a monoscope signal source, connect the unit to a VCR and play a \*Monoscope alignment tape.  
(\* Part Number: 859C568060)



Monoscope Signal

#### B. Color Bar Signal

Use the color bar signal shown below, unless otherwise specified in this manual.



Split-Field Color Bars (100% window)

**Initial Setup****A. Option Menu Setup**

Follow the steps below for the initial set-up:

1. Move switch to 'Cable/DBS/DTV' layer
2. Select the "MENU" display by pressing the "MENU" button once.
3. Press the number buttons "0", "3", "7", "0" in sequence to select the "OPTION MENU" display.
4. Press the "ADJUST" button to select "INITIAL."
5. Press "ENTER."

(MENU-0-3-7-0)	
<b>OPTION MENU</b>	
Initial	
Power restore	:OFF
DTV Port	:Auto

**NOTE:** At this time channel 3 is automatically selected.

**B. Default Settings****MAIN MENU DEFAULT SETTINGS**

SETUP		CAPTIONS		AUDIO SETTINGS			
<b>Edit Setup</b>		Closed Captions	With Mute	Volume	30%		
Review		CC Background	Gray	Bass	50%		
Antenna A	( <input checked="" type="checkbox"/> ) Enabled	Digital Channel Guide	Off	Treble	50%		
Antenna B	( <input checked="" type="checkbox"/> ) Enabled	<b>V-CHIP PARENT LOCK</b>		Balance	Center		
Antenna DTV	( <input checked="" type="checkbox"/> ) Enabled	V-CHIP	Off	Surround	Off		
Input 1	( <input checked="" type="checkbox"/> ) Enabled	TV Rating	TV-PG	Listen to	Stereo		
Input 2	( <input checked="" type="checkbox"/> ) Enabled	FV-Fantasy Violence	( <input checked="" type="checkbox"/> ) Enabled	Level Sound	On		
Input 3	( <input checked="" type="checkbox"/> ) Enabled	D-Sexual Dialog	( <input checked="" type="checkbox"/> ) Enabled	<b>VIDEO SETTINGS</b>			
Input 4	( <input checked="" type="checkbox"/> ) Enabled	L-Adult Language	( <input checked="" type="checkbox"/> ) Enabled	Contrast	50%		
Component 1	( <input checked="" type="checkbox"/> ) Enabled	S-Sexual Situation	( <input checked="" type="checkbox"/> ) Enabled	Brightness	50%		
Component 2	( <input checked="" type="checkbox"/> ) Enabled	V-Violence	( <input checked="" type="checkbox"/> ) Enabled	Sharpness	50%		
Input DTV	( <input checked="" type="checkbox"/> ) Enabled	Program not Rated	( <input checked="" type="checkbox"/> ) Enabled	Color	50%		
VGA	( <input checked="" type="checkbox"/> ) Enabled	Movie Rating	PG	Tint	Center		
<b>Icon Position</b>		<b>V-CHIP LOCK BY TIME</b>		Video Noise	Standard		
Transport Menu	As above	V-Chip Start Time	12:00 PM	Film Mode (Auto)	On		
Language	English	V-Chip Stop Time	12:00 PM	VCR Compensation	Standard		
<b>ANTENNA</b>		<b>Lock By Time</b>		Video Mute	On		
Antenna	ANT A	Lock by Time	Off	Black Enhancement	On		
Memorize Channels	Air	Unlock Time	N/A	Audio Out to Display	On		
Channel	Ch-3	Lock Time	N/A	<b>PIP/POP</b>			
Memory	Deleted	<b>TIMER</b>		Source	Ant A Ch 3		
<b>CLOCK</b>		Timer	Off	PIP Position	Lower Right		
Clock Setting	Manual	Set Day	Everyday	POP Position	Right Half		
Set Time	12:00 AM	Set Time	12:00PM	Format	Stretched		
Set Day	Sunday	Device	Ant-A	PIP/POP Format	Dble. Window		
<b>A/V RESET DEFAULT SETTINGS (By Input)</b>							
A/V Memory	Ant A/B	Ant DTV	Inp-DTV	INPUTS 1/2/3/4	Component 1/2	VGA	1394
Contrast	Center	Center	Center	Center	Center	Center	Center
Brightness	Center	Center	Center	Center	Center	Center	Center
Sharpness	Center	Center	Center	Center	Center	N/A	Center
Color	Center	Center	Center	Center	Center	Center	Center
Tint	Center	Center	Center	Center	Center	Center	Center
Video Noise	Standard	N/A	Standard	Standard	Standard	N/A	N/A
Film Mode(auto)	On	N/A	On	On	On	N/A	N/A
VCR Compensation	Standard	N/A	Standard	Standard	Standard	N/A	N/A
Image Type	Video	N/A	Video	Video	Video	N/A	N/A
Bass	Center	Center	Center	Center	Center	Center	Center
Treble	Center	Center	Center	Center	Center	Center	Center
Balance	Center	Center	Center	Center	Center	Center	Center
Surround	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Listen To	Stereo	English	N/A	N/A	N/A	N/A	N/A

### C. A/V Memory

Each of the external inputs has its' own Audio/Video Memory. A change in an A/V setting at a specific input is stored in memory for that specific input.

#### A/V Reset

1. The front panel AV Reset button initializes all A/V Memories.
2. The AV Reset in the user's menu initializes only the selected input's A/V Memory.

## LED Indicator Diagnostics

The "Power ON LED" provides an indication of the sets operation, and the possible cause of a malfunction.

### 1. Initial Control Circuitry Check

Immediately after the TV is connected to an AC power source:

LED Indications	Conditions	Probable Cause
Off	After AC is applied	Standy Power Supply or TV µPC not running
Fast Blink for 70 sec.	After AC is applied	Normal - DM µPC is booting up
Fast Blink (doesn't stop)	After AC is applied	TV µPC is running, but DM failed to boot up
Slow Blink	Set is Off	Normal - Timer is set for Automatic Turn ON

### 2. Error Code Operational Check

Pressing the front panel "INPUT" and "MENU" buttons at the same time, and holding for 5 seconds, activates the Error Code Mode. The LEDs flashes denoting a two digit Error Code, or indicating no problem has occurred since the last Initialization.

**Note:** The front panel buttons must be used, NOT those on the Remote Control.

- The number of flashes indicates the value of the MSD (tens digit) of the Error Code.
- The flashing then pauses for approximately 1/2 second.
- The LEDs then flash indicating the value of the LSD (ones digit) of the Error Code.
- The Error Code is repeated a total of 5 times.

Example: If the Error Code is "24", the LEDs will flash two times, pause, and then flash four times.

### 3. Error Codes

The Error Code designations indicating a malfunction, or no malfunction, are listed below:

Error Code	Probable Cause
12	Normal Operation - No Error Detected
35	Fan Stop

## Remote Control Operational Modes

There are two Remote Hand Unit Operational Modes, "Standard" and "NetCommand™". The Remote is initially in the "Standard" mode. The "NetCommand™" mode is used when controlling Home Theater devices using NetCommand™. To change the Remote Operational Mode:

- Set the Remote to the CABLE/DBS/DTV Layer
- Point the Remote away from the Set Top Box.
- To change to "Netcommand™" ... Hold the "Power" button and press "1-9-7" in sequence.
- To change to "Standard" ... Hold the "Power" button and press "0-0-0" in sequence.

## Circuit Adjustment Mode

Most of the adjustments can only be performed using the remote hand unit. Many of the adjustments must be performed in both the 480i and 1080i modes. Video/Color adjustments must be performed in the 480i and 1080i modes, and data must be preset in the 480P (DVD) and VGA modes.

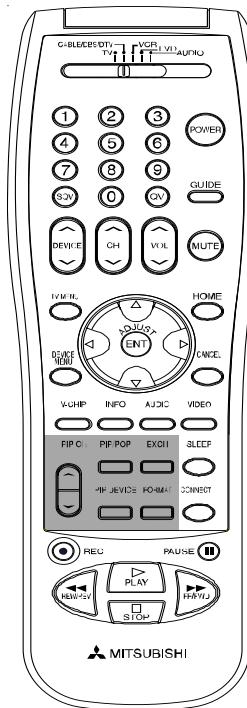
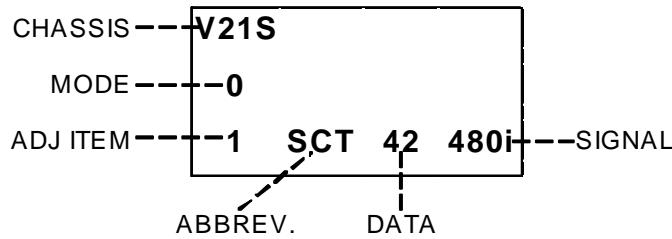
**Note:** Set the Remote Operational Mode to "NetCommandTM". (Hold the "Power" button and press "1-9-7" in sequence.) This slows the remote's response and makes adjustments easier. When adjustments are complete, **set the Remote to its' original Operational Mode.**

### A. Activating the Circuit Adjustment Mode

The current signal source determines if the activated Adjustment Mode is 480i or 1080i.

1. Select the signal source (480i or 1080i).
2. Select 'Cable/DBS/DTV' remote layer.
3. Press the "MENU" button on a remote hand unit.
4. Press the number buttons "0", "3", "5", "7" in sequence. The screen will change to the Adjustment Mode.

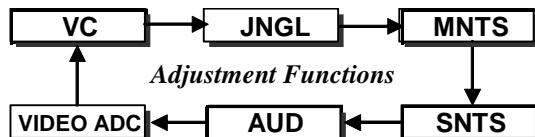
**Note:** Repeat steps 1 and 2 if the circuit adjustment mode does not appear on screen.



### B. Selection of adjustment Functions and Adjustment Items

To select an adjustment item in the circuit adjustment mode, first select the adjustment function that includes the specific adjustment item to be selected. Then select the adjustment item. Refer to the following pages for the listing of adjustment functions and adjustment items.

1. Press the "AUDIO" button on a remote hand unit to select an adjustment function. Each time the button is pressed, the Function changes in the following sequence:



2. Press the "VIDEO" button to select a specific Adjustment Item. The Item number increases each time the "VIDEO" button is pressed.

### C. Changing Data

After selecting an adjustment item, use the "ADJUST UP/DOWN" buttons to change data.

- Press "ADJUST DOWN" to decrease the data value.
- Press "ADJUST UP" to increase the data value.

### D. Saving Adjustment Data

Press "ENTER" to save adjustment data in memory. The character display turns red for approximately one second in this step.

**Note:** If the circuit adjustment mode is terminated without pressing "ENTER", changes in adjustment data are not saved.

### **E. Terminating the Circuit Adjustment Mode**

Press the "MENU" button on the remote hand unit twice to terminate the adjustment mode.

**Note:** The circuit adjustment mode can also be terminated by turning power OFF.

### **F. Toggle Between Reception Modes**

Pressing "3" when in the Adjustment Mode VC Function toggles between 480i, 480p, 1080i and VGA. However data changes are not automatically saved. **Press "ENTER" to save data before pressing "3".**

## **On Screen Display Position Adjustment Mode**

### **Activation**

1. Select 480i or 1080i (DTV INPUT) source.
2. Press MENU-0-3-9-9

## **Data Transfer Mode**

### **Activation**

1. Pressing the "0" key when in the open alignment mode will access a special function table. The table will be displayed at the top of the screen and below is description of the special functions available.

Key Sequence	Name	Description
1 2	XFER Console Data	Transfers console alignment data (MNTS;SNTS;AUD) stored on the Signal EEPROM to the DM EEPROM. Used when replacing a bad DM.
1 3	XFER White Balance Data	Transfers white balance alignment data (VC) stored on the Signal EEPROM to the DM EEPROM. Used when replacing a bad DM.
1 4	Net check	Runs a check to confirm if a valid HAVI certificate has been loaded. Status message will appear after pressing the key sequence.
1 6	Copy DM data to signal EEPROM	Transfers the alignment data stored in the DM EEPROM to the signal EEPROM.
1 7	Copy signal data to DM	Transfers the alignment data stored in the signal EEPROM to the DM EEPROM.

**Note 1:** After pressing the key sequence shown above, the special function table will disappear. The "0" key must be pressed again to bring up the special function table.

## **E2PROM Replacement**

IC7A01 stores some adjustment data. After replacing the IC, set the data to the values given in the following tables. If good performance is not obtained, perform the Adjustments Procedures given in the Notes column.

## **List of Adjustment Items.**

### **VC Function (Video Color)**

IC2V00

Function Display NO.	Abbrev.	Adjustment Description	Data Range	Initial Data				Notes
				1080i	480i	480p	VGA	
1	SBRT	SUB-BRIGHT	0~63	53	53	53	53	Sub Contrast
2	SCOL	SUB-COL	0~15	9	9	9	9	Sub Color
3	STIN	SUB-HUE	0~15	8	8	8	8	Sub Tint
4	SCON	SUB-CON	0~15	7	7	7	7	Sub Contrast
26	D-PIC	DYNAMIC PICTURE	0~3	1	1	1	1	

**JNGL Function (Jungle)**

IC2V01

Display		Adjustment Description	Data Range	720P	1080i	480i	Notes
No.	Abbrev.			HD	HD	HD	
15	HPOS	Horizontal Position	0~63	30	25	28	
16	BLKL	Blanking on Left Side	0~63	15	5	26	
17	BLKR	Blanking on Right Side	0~63	35	46	42	
18	BLKT	Number of blanking lines after Vsync (top blank)	0~63	32	32	37	
19	BLKB	Number of blanking lines before Vsync (bottom blank)	0~63	26	26	27	
38	HFRQ	Horizontal Frequency Control	0~255	125	26	3	

**MNTS Function (Main Decoder)**

IC2E00

Function Display		Adjustment Description	Data Range	Initial Data		Notes
Item #	Abbrev.			RF	Non RF	
1	TNTM	Main Tint	0~63	24	24	Preset
2	COLM	Main Color	0~63	17	17	"
3	YDRM	Main Gain Control	0~31	5	5	Main Y Level
4	VPDM	Pr Pedestal Adjustment	0~15	7	7	
5	UPDM	Pb Pedestal Adjustment	0~15	7	7	

**SNTS Function (Sub Decoder)**

IC2H00

Function Display		Adjustment Description	Data Range	Initial Data	Notes
Item #	Abbrev.				
1	TNTS	Sub Tint	0~63	26	Preset
2	COLS	Sub Color	0~63	18	"
3	YDRS	Sub Gain Control	0~31	5	Sub Y Level
4	VPDS	Pr Pedestal Adjustment	0~15	7	"
5	UPDS	Pb Pedestal Adjustment	0~15	7	"

**AUDIO Function**

IC3A01

Function Display		Adjustment Description	Data Range	Initial Data	Notes
Item #	Abbrev.				
1	INP	Input Level Alignment	0~15	8	Input Level
2	WDE	Wideband Separator Align.	0~31	3	Separation
3	SPC	Spectral Separator Align.	0~31	3	"

**VIDEO ADC**

IC53J6

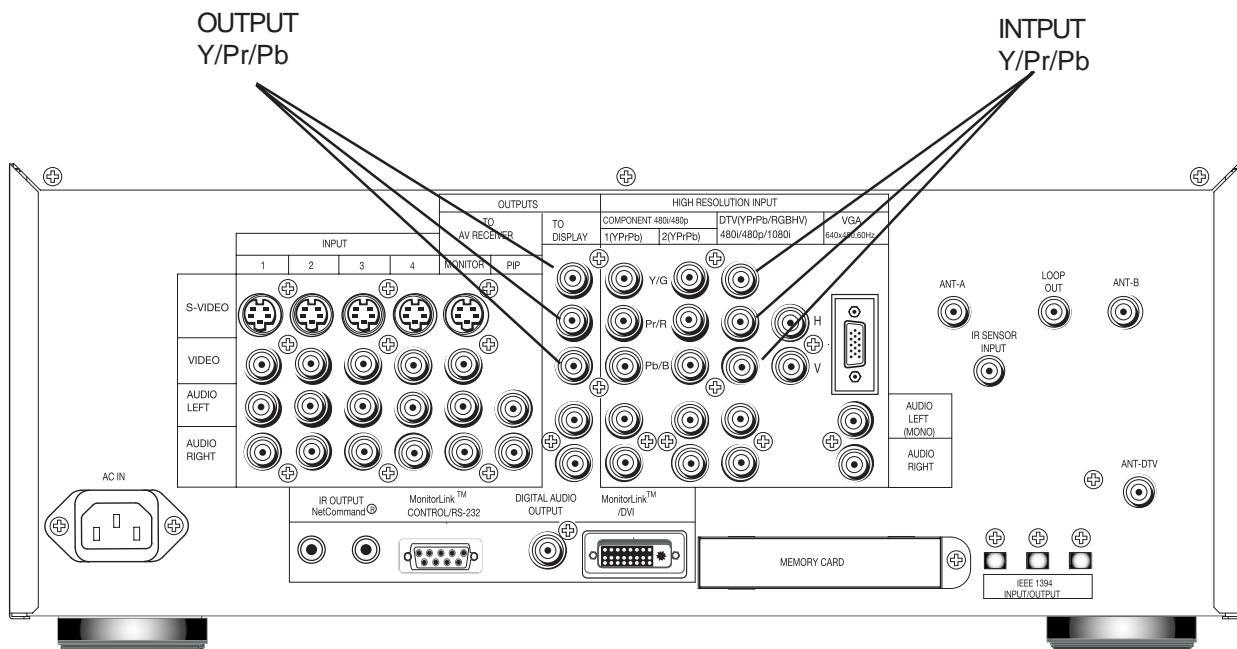
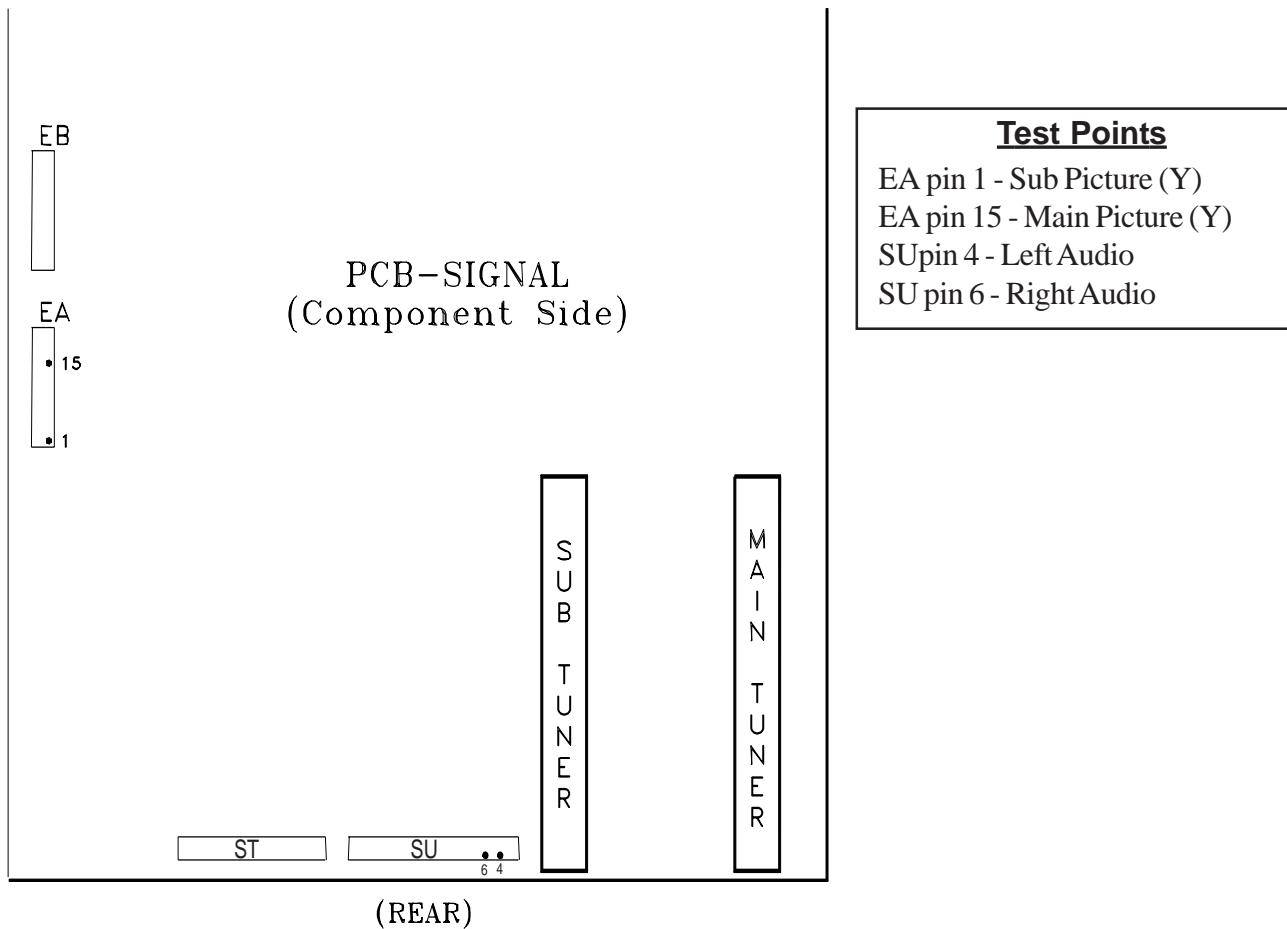
Function Display		Adjustment Description	Data Range	Analog		DVI		Notes
Item #	Abbrev.			1080i	480P	1080i	720P	
6	CPLC	CLMPLACE	8	139	60	139	192	60
7	CDUR	CLMPDUR	8	48	48	48	48	
8	HWID	HWIDTH	8	34	16	34	83	16
9	RGAI	RED GAIN	8	160	160	160	160	Color Alignment
10	GGAI	GRN GAIN	8	160	160	160	160	"
11	BGAI	BLUE GAIN	8	160	160	160	160	"
12	ROFS	RED OFFSET	7	60	60	60	60	"
13	GOFS	GREEN OFFSET	7	42	42	60	60	"
14	BOFS	BLUE OFFSET	7	60	60	60	60	"

**OSD Horizontal Centering**

(MENU-0-3-9-9)

Abbrev.	Description	Data Range	Initial Data
OSDHD	OSD POSITION FOR HD	-	114249
OSDSD	OSD POSITION FOR SD	-	62754

## Adjustment Test Point Location

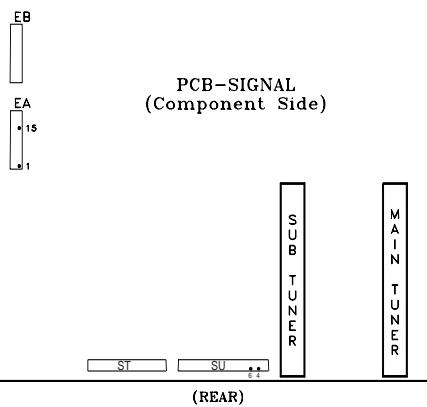


## MODELS: HD-5000 / HD-5000A

### [Audio Circuit]

#### 1. MCS Input Level

Measuring Instrument	Oscilloscope
Test Point	Connector SU pins 6&4
Ext. Trigger	-----
Measuring Range	50mV/Div
Input Signal	RF Stereo 300 Hz modulation
Input Terminal	RF Input



**Purpose:** Check the input signal level to the MCS circuit

**Symptom:** Distorted sound during a stereo broadcast.

- Supply an RF MCS signal to the Ant A input, 300 Hz at 100% modulation (25 kHz deviation) for right and left channels.
- Connect the oscilloscope to connector **SU pin 6** (Right Audio).
- Enter the Adjustment Mode and select the Audio Function.
- Verify that the Audio Function items are set to the data values given the table below.
- Set the data for Item “**1 INP**” for **1.28 Vp-p ±0.06V**. (450mv ±10mv rms)
- Connect the oscilloscope to connector **ST pin 4** (Left Audio).
- Confirm that the left audio level at pin 4 of the ST connector is **1.28 Vp-p ±0.06V** (450mv ±20mv rms).

**Note:** Adjustment 2 (Stereo Separation) must be performed after this adjustment)

#### CIRCUIT ADJUST MODE

Layer ..... Cable/DBS/DTV  
 Activate ..... MENU-0-3-5-7  
 Function .....AUDIO  
 Item No. .....VIDEO  
 Adjust Data .....ADJUST  
 Save Data .....ENTER  
 Exit .....MENU (twice)

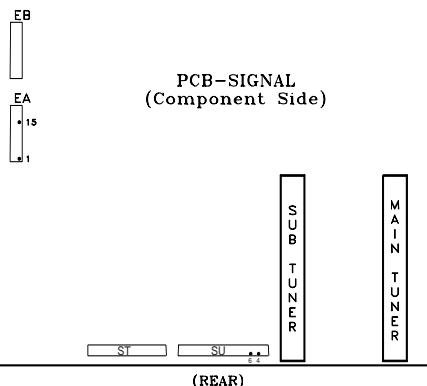
#### AUDIO Function

Item #	Abbrev.	Data
1	INP	8
3	WDE	3
4	SPC	3

### [Audio Circuit]

#### 2. Separation

Measuring Instrument	Oscilloscope
Test Point	Connector SU pin 6
Ext. Trigger	-----
Measuring Range	10mV/Div
Input Signal	RF Stereo
Input Terminal	RF Input



**Purpose:** Check stereo separation

**Symptom:** Poor stereo separation

**Note:** This adjustment must follow Adjustment 1 (Input Level)

- Supply a RF Stereo Signal (dual tone stereo) to the Ant. A input.
  - Left Channel = 300 Hz modulation**
  - Right Channel = no modulation**
- Connect the oscilloscope to connector **SU pin 6** (Right Audio).
- Enter the Adjustment Mode and select the Audio Function.
- Set the data for Item “**3 WDE**” for minimum 300 Hz signal.
- Change the modulation frequency to 3kHz.
- Adjust the data for Item “**4 SPC**” for minimum 3kHz signal.

#### CIRCUIT ADJUST MODE

Layer ..... Cable/DBS/DTV  
 Activate ..... MENU-0-3-5-7  
 Function .....AUDIO  
 Item No. .....VIDEO  
 Adjust Data .....ADJUST  
 Save Data .....ENTER  
 Exit .....MENU (twice)

## MODELS: HD-5000 / HD5000A

<b>[On Screen Display]</b>		<b>Purpose:</b> To position the character display horizontally.
<b>3. Character Position</b>		<b>Symptom:</b> Incorrect display position
Measuring Instrument		1. Supply a <b>480i</b> signal to <b>Ant-A</b> and select Ant-A as the source.
Test Point		2. Enter the 'ADJUST GFX PLANE' mode, press " <b>MENU-0-3-9-9</b> ".
Ext. Trigger		3. Adjust "OSDSD" to center the OSD horizontally/vertically.
Measuring Range		4. Press "MENU" to save data and exit the mode.
Input Signal	Video Signal (NTSC/HD)	5. Supply an <b>1080i</b> signal to <b>DTV INPUT</b> and select DTV INPUT as the source.
Input Terminal	ANT-A / DTV INPUT	6. Adjust "OSDHD" to center the OSD horizontally/vertically.
		7. Press "MENU" to save data and exit the mode.

**CIRCUIT ADJUST MODE**

Layer .....	Cable/DBS/DTV
Activate .....	<b>MENU-0-3-9-9</b>
Adjust Data .....	<b>ADJUST</b>
Save Data .....	<b>ENTER</b>
Exit .....	<b>MENU</b> (twice)

<b>[Video Circuit]</b>		<b>Purpose</b> To set picture luminance														
<b>4. Main/Sub Y Level</b>		<b>Symptom:</b> Excess or insufficient brightness.														
Measuring Instrument	Oscilloscope	1. Supply a color bar signal to a Video Input (not an RF input).														
Test Point	EA connector pins 15 & 1	2. Select the color bar signal for both the main and sub pictures.														
Ext. Trigger	-----	3. Connect the oscilloscope to connector <b>EA pin 15</b> .														
Measuring Range	-----	4. Activate the Adjustment Mode														
Input Signal	Color Bars	5. Select Item " <b>3 YDRM</b> " in the <b>MNTS</b> function.														
Input Terminal	Video Input	6. Adjust the data for <b>0.7 Vp-p max. - 0.67 Vp-p min.</b> at EA pin 15. (If it cannot be adjusted within this range, set to the lower value)														
		7. Move the oscilloscope to EA pin 1.														
		8. Select Item " <b>3 YDRS</b> " in the <b>SNTS</b> function.														
		9. Adjust the data to equal the <b>MAIN-Y Gain (+0.01V -0.04V)</b> .														
		<b>CIRCUIT ADJUST MODE</b> <table> <tr><td>Layer .....</td><td>Cable/DBS/DTV</td></tr> <tr><td>Activate .....</td><td><b>MENU-0-3-5-7</b></td></tr> <tr><td>Function .....</td><td><b>AUDIO</b></td></tr> <tr><td>Item No. ....</td><td><b>VIDEO</b></td></tr> <tr><td>Adjust Data .....</td><td><b>ADJUST</b></td></tr> <tr><td>Save Data .....</td><td><b>ENTER</b></td></tr> <tr><td>Exit .....</td><td><b>MENU</b> (twice)</td></tr> </table>	Layer .....	Cable/DBS/DTV	Activate .....	<b>MENU-0-3-5-7</b>	Function .....	<b>AUDIO</b>	Item No. ....	<b>VIDEO</b>	Adjust Data .....	<b>ADJUST</b>	Save Data .....	<b>ENTER</b>	Exit .....	<b>MENU</b> (twice)
Layer .....	Cable/DBS/DTV															
Activate .....	<b>MENU-0-3-5-7</b>															
Function .....	<b>AUDIO</b>															
Item No. ....	<b>VIDEO</b>															
Adjust Data .....	<b>ADJUST</b>															
Save Data .....	<b>ENTER</b>															
Exit .....	<b>MENU</b> (twice)															

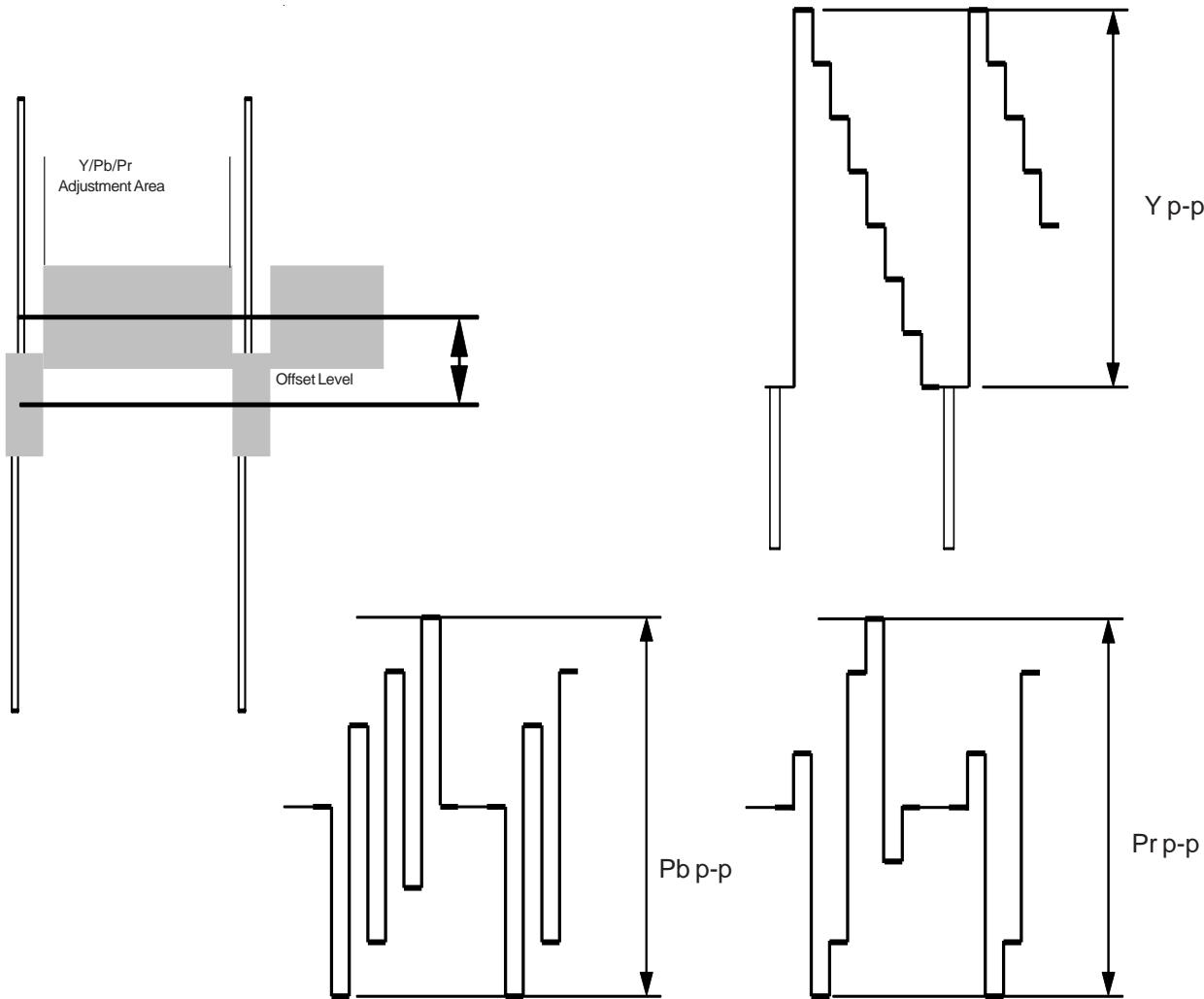
**MODELS: HD-5000 / HD-5000A**

**[Gain & Offset Alignment]**

**5. 480P / 1080i Color Alignment**

Measuring Instrument	Oscilloscope
Test Point	Y/Pb/Pr OUTPUTS
Ext. Trigger	-----
Measuring Range	10 (usec/div) 200 (mV/div) / 10 (mV/div)
Input Signal	Color Bar / Black Raster 480P & 1080i
Input Terminal	

- (1) Connect an oscilloscope to Y/Pb/Pr of OUTPUTS TO DISPLAY on the back panel. (terminated at  $75\Omega$ ).
- (2) Input a full **color bar signal** (with 100% white level) of **480p (Y/Pb/Pr)** to DTV-INPUT.
- (3) Go to the alignment mode (**MENU+ 0 3 5 7**).
- (4) Select Video ADC by using 'Audio' button on remote.
- (5) Adjust VideoADC item 10 **GGAI** so that the Y p-p is equal to the source Y p-p level ( $\pm 0.03V$ ).
- (6) Adjust VideoADC item 11 **BGAI** so that the Pb p-p is equal to the source Pb p-p level ( $\pm 0.03V$ ).
- (7) Adjust VideoADC item 9 **RGAI** so that the Pr p-p is equal to the source Pr p-p level ( $\pm 0.03V$ ).
- (8) Input a **black raster signal** of 480p (Y/Pb/Pr) to DTV-INPUT.
- (9) Adjust VideoADC item 13 **GOFS** so that the Y offset level is **0.00Vp-p/-0.01V**.
- (10) Adjust VideoADC item 14 **BOFS** so that the Pb offset level is **0.00Vp-p/-0.01V**.
- (11) Adjust VideoADC item 12 **ROFS** so that the Pr offset level is **0.00Vp-p/-0.01V**.
- (12) Switch input signal to **1080i** and restart at #2.



## CHIP PARTS REPLACEMENT

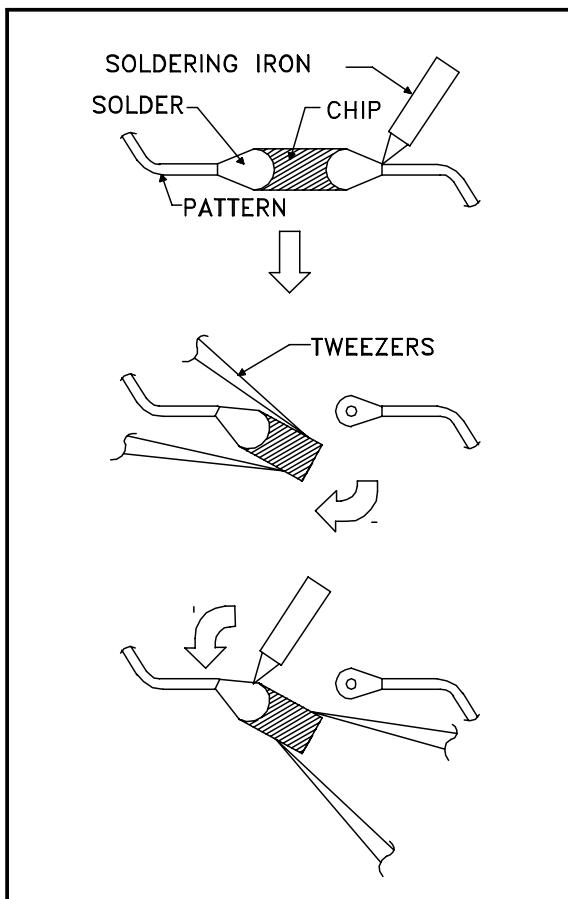
Some resistors, shorting jumpers (0 Ohm resistors), ceramic capacitors, transistors and diodes are chip parts. The following precautions should be taken when replacing these parts.

**Cautions:**

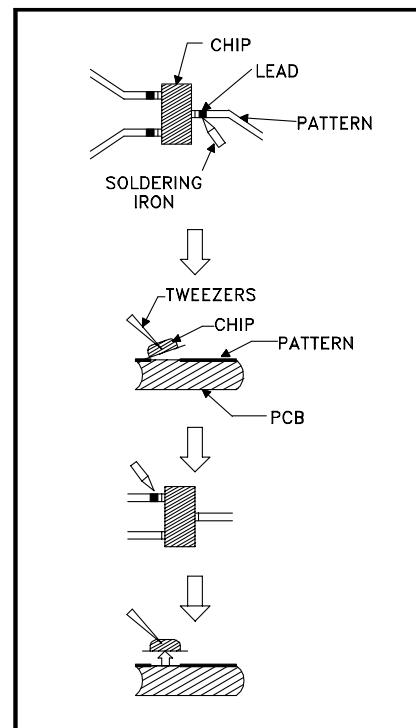
1. Use a fine tipped, well insulated soldering iron (approximately 30 watts), and tweezers.
2. Melt the solder and remove the chip parts carefully so as not to tear the copper foil from the printed circuit board.
3. Discard removed chips; do not reuse them.
4. Do not apply heat for more than 3 (three) seconds to new chip parts.
5. Avoid using a rubbing stroke when soldering.
6. Take care not to scratch, or damage the chip parts when soldering.
7. Supplementary cementing is not required.

**Chip Parts Removal (Resistors, Capacitors, etc.)**

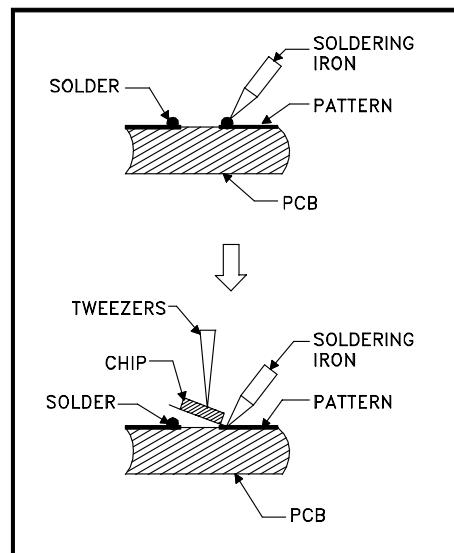
1. Grasp the part with tweezers. Melt the solder at both sides alternately, and remove one side of the part with a twisting motion.
2. Melt the solder at the other side and remove the part.


**Chip Parts Removal (Transistors)**

1. Melt the solder of one lead and lift the side of that lead upward.
2. Simultaneously melt the solder of the other two leads and lift the part from the PCB.


**Replacement**

1. Presolder the contact points on the circuit pattern.
2. Press the part downward with tweezers and apply the soldering iron as shown.



## REPLACEMENT PARTS

### **Parts Ordering**

To expedite delivery of replacement parts orders, specify the following:

1. Model Number/Serial Number
2. Part Number and description
3. Quantity

**Note:** Unless complete information is supplied, delay in processing of orders will result.

### **Critical and Warranty Parts Designation**

**Critical Electrical Components** are indicated by **Bold Type** in the Parts List, and in the schematic diagrams by shading. 

**Warranty Return Parts** are indicated in the Parts List with an (\*).

### **Parts Tolerance Codes**

Refer to the following chart for tolerance characteristics of electrical components.

<b>MARK</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>F</b>	<b>G</b>	<b>J</b>	<b>K</b>
Tolerance %	$\pm 0.1$	$\pm 0.25$	$\pm 0.5$	$\pm 1$	$\pm 2$	$\pm 5$	$\pm 10$

<b>MARK</b>	<b>M</b>	<b>N</b>	<b>V</b>	<b>X</b>	<b>Z</b>	<b>P</b>	<b>Q</b>
Tolerance %	$\pm 20$	$\pm 30$	$\pm 10$	$+ 40$ $-20$	$+ 80$ $-20$	$+ 100$ $-0$	$+ 30$ $-10$

<b>MARK</b>	<b>M</b>	<b>N</b>	<b>V</b>	<b>X</b>	<b>Z</b>
Tolerance (pF)	$\pm 0.1$	$\pm 0.25$	$\pm 0.5$	$\pm 1$	$\pm 2$

## MODELS: HD-5000 / HD-5000A

[#] Model Legend:  
 (a) HD-5000, (b) HD-5000A

Ref #	Part #	Part Name & Description	[#]	Ref #	Part #	Part Name & Description	[#]
<b>INTEGRATED CIRCUITS</b>							
IC201	263P384010	IC-C-MOS - TC74HC221AF-EL	a	IC5412	275P664010	IC-C-MOS - IDTQS34XVH245Q3	
IC202	263P384010	IC-C-MOS - TC74HC221AF-EL		IC54A0	275P726010	IC-C-MOS - PIC17C43T-25/L	
IC2A00	270P870010	IC - CXA2151Q		IC54K1	275P673010	IC-C-MOS - RTC-8563SA	
IC2A60	272P938010	IC - M52055FP		IC54K5	275P270010	IC-C-MOS - M66010GP	
IC2B00	270P870010	IC - CXA2151Q		IC54Z1	275P657050	IC-C-MOS - 24LC256T-I/SN	
IC2C00	275P496010	IC-C-MOS - UPD64082GF-3BA		IC54Z3	275P657050	IC-C-MOS - 24LC256T-I/SN	
IC2C01	275P531010	IC-C-MOS - MSM54V16258B		IC54Z4	270P880010	IC - 24LC64I/SN	
IC2D01	272P379020	IC - LM1881MX (NSC)		IC55A0	275P685040	IC-C-MOS - TL850D	
IC2E00	270P658030	IC - CXA2019AQ/T4		IC55A2	275P669010	IC-C-MOS - MK2771-15	
IC2F50	272P379020	IC - LM1881MX (NSC)		IC55A3	275P689010	IC-C-MOS - ICS551MT	
IC2F60	272P379020	IC - LM1881MX (NSC)		IC55A4	275P689010	IC-C-MOS - ICS551MT	
IC2F70	275P718010	IC-C-MOS - TC74HC4053FT		IC55A6	275P741020	IC-C-MOS - MT48LC8M16A2TG	
IC2F80	275P718010	IC-C-MOS - TC74HC4053FT		IC55A7	275P741020	IC-C-MOS - MT48LC8M16A2TG	
IC2H00	270P658030	IC - CXA2019AQ/T4		IC55A8	275P741020	IC-C-MOS - MT48LC8M16A2TG	
IC2K00	270P623010	IC - CXA2069Q		IC55A9	275P741020	IC-C-MOS - MT48LC8M16A2TG	
IC2L00	270P623010	IC - CXA2069Q		IC55C2	275P668010	IC-C-MOS - MK2716STR	
IC2R00	275P269010	IC-C-MOS - ADM331EARS		IC55C3	275P680010	IC-C-MOS - TC74VCX257FT	
IC2V00	270P663020	IC - CXA2101AQ		IC55C4	275P680010	IC-C-MOS - TC74VCX257FT	
IC2V01	270P664010	IC - CXA2102Q		IC55E0	279P069030	IC - SN74LVTH244APW	
IC2V02	263P384010	IC-C-MOS - TC74HC221AF-EL		IC55E1	275P464010	IC-C-MOS - TC7WH14FK	
IC2V03	270P870010	IC - CXA2151Q		IC55E2	275P388010	IC-C-MOS - ICS1523M	
IC2V90	275P419010	IC-C-MOS - SN74AHCT1G126DBV		IC55E3	275P679010	IC-C-MOS - TC74LCX74FT	
IC2Y01	270P526020	IC - MM1111XF		IC55F0	267P158010	HIC - AF-9317B	
IC301	270P938010	IC - MC33202D		IC5600	275P379020	IC-C-MOS - SN74LVC00APW	
IC3A01	270P467010	IC - TDA9855		IC5601	275P659010	IC-C-MOS - CS8414-CSR	
IC5100	275P686010	IC-C-MOS - TSB41AB3PFP		IC5602	279P069030	IC - SN74LVTH244APW	
IC5101	275P624010	IC-C-MOS - TSB42AA4		IC5603	275P661040	IC-C-MOS - CS493002-CLR	
IC5102	274P670010	IC - 24LC04BT*SN		IC5604	275P678010	IC-C-MOS - SN74LVTH16374DGG	
IC5103	275P679010	IC-C-MOS - TC74LCX74FT		IC5605	274D104020	IC-C-MOS - AT_49LV001_12TC	
IC5251	270P988010	IC-OP AMP - LM358M		IC5606	275P464010	IC-C-MOS - TC7WH14FK	
IC5252	270P877010	IC - UPC3217GV		IC5607	275P660020	IC-C-MOS - CS4341-KSR	
IC5253	270P877010	IC - UPC3217GV		IC5670	270P938010	IC - MC33202D	
IC5290	270P677030	IC - BAO9FP		IC56A0	275P169030	IC-C-MOS - M65677FP	
IC52A0	275P715020	IC-C-MOS - BCM3510KPF P22		IC56C0	276P019090	IC-C-MOS - M4A3-128/64-55VC	
IC52A1	275P662020	IC-C-MOS - CY7C1019CV33-15		IC5900	270P953010	IC - MIC39300-2.5BU	
IC52A2	270P806030	IC - SI-3018LSA		IC59P0	270P879010	IC - SC1566IM-2.5	
IC5300	275P957010	IC-C-MOS - TL811A3		<b>IC7A00</b>	<b>276P017010</b>	<b>IC-C-MOS - M306V7FGFP</b>	
<b>IC5301</b>	<b>275P672010</b>	<b>IC-C-MOS - RM5231-200Q</b>		IC7A01	275P533010	IC-C-MOS - M24C64WM6T	
IC5302	275P675010	IC-C-MOS - SN74LV125APWR		IC7A02	270P706020	IC - MAX823REUK	
IC5303	275P666010	IC-C-MOS - MAX6358SYUT-T		IC7A03	271P023010	IC - SN74CBTD1G125DBVR	
IC53A0	275P888010	IC-C-MOS - MT48LC16M16A2TG		IC7A04	271P023010	IC - SN74CBTD1G125DBVR	
IC53A1	275P888010	IC-C-MOS - MT48LC16M16A2TG		IC7A05	271P023010	IC - SN74CBTD1G125DBVR	
IC53A2	275P888010	IC-C-MOS - MT48LC16M16A2TG		IC7A06	271P023010	IC - SN74CBTD1G125DBVR	
IC53A3	275P888010	IC-C-MOS - MT48LC16M16A2TG		IC7A08	271P023010	IC - SN74CBTD1G125DBVR	
IC53J3	275P970010	IC-C-MOS - SIL170BCL64		IC7A09	271P023010	IC - SN74CBTD1G125DBVR	
IC53J4	270P998010	IC-C-MOS - LM317EMP		IC7A10	271P023010	IC - SN74CBTD1G125DBVR	
IC53J6	275P894010	IC-C-MOS - AD9883AKST-110		IC7A11	271P023010	IC - SN74CBTD1G125DBVR	
IC53J7	275P778010	IC-C-MOS - AD7196AKS		IC7D00	275P451010	IC-C-MOS - TC74HC4066AFN	
IC53J8	270P997010	IC-C-MOS - SM5301AS		IC7D01	275P560010	IC-C-MOS - ADS931E	
IC53J9	275P464010	IC-C-MOS - TC7WH14FK		IC7D02	275P560010	IC-C-MOS - ADS931E	
IC53K0	271P004010	IC - CM1208-08MS		IC7D03	275P560010	IC-C-MOS - ADS931E	
IC5400	275P677010	IC-C-MOS - SN74LVC573APWR		IC7D10	275P535010	IC-C-MOS - TC74AC157FN-ELP	
IC5403	275P864010	IC-C-MOS - MD2211-D16-V3		IC7D11	275P535010	IC-C-MOS - TC74AC157FN-ELP	
IC5407	275P124040	IC-C-MOS - SN74LVC245APWR		IC7E00	275P451010	IC-C-MOS - TC74HC4066AFN	
IC5408	275P665010	IC-C-MOS - M66230FP		IC7E01	275P560010	IC-C-MOS - ADS931E	
IC5409	275P379020	IC-C-MOS - SN74LVC00APW		IC7E02	275P560010	IC-C-MOS - ADS931E	
IC5410	275P122020	IC-C-MOS - SN74LV32APWR		IC7E03	275P560010	IC-C-MOS - ADS931E	
IC5411	275P674010	IC-C-MOS - SN74LV123APWR		IC7E10	275P535010	IC-C-MOS - TC74AC157FN-ELP	
				IC7E11	275P535010	IC-C-MOS - TC74AC157FN-ELP	







# MODELS: HD-5000 / HD-5000A

[#] Model Legend:

(a) HD-5000, (b) HD-5000A

Ref #	Part #	Part Name & Description	[#]	Ref #	Part #	Part Name & Description	[#]
LC7G07	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470Sa		103P502030	1/16W 680-J	103P503040	1/16W 5.6K-J
LC7G08	409P875090	EMI-F-CHIP - ELKE103FA		103P492020	1/16W 750-F	103P814040	1/16W 6.2K-D
LC7G09	409P875090	EMI-F-CHIP - ELKE103FA		103P492030	1/16W 820-F	103P494040	1/16W 6.2K-F
LC7G10	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470S		103P502040	1/16W 820-JP	103P494050	1/16W 6.8K-F
LC7G11	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470S		103P492050	1/16W 1K-F	103P503050	1/16W 6.8K-J
LC7G12	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470S		103P502050	1/16W 1K-J	103P494070	1/16W 8.2K-F
LC7G13	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470Sa		103P492070	1/16W 1.2K-F	103P503060	1/16W 8.2K-J
LC7G14	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470S		103P502060	1/16W 1.2K-J	103P494090	1/16W 10K-F
LC7G15	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470S		103P492080	1/16W 1.3K-F	103P503070	1/16W 10K-J
LC7J03	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470Sa		103P492090	1/16W 1.5K-F	103P495010	1/16W 12K-F
LC7J04	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470S		103P502070	1/16W 1.5K-J	103P503080	1/16W 12K-J
LC7J05	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470S		103P493000	1/16W 1.6K-F	103P495020	1/16W 13K-F
LC7J10	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470S		103P493010	1/16W 1.8K-F	103P503090	1/16W 15K-J
LC7J13	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470Sa		103P502080	1/16W 1.8K-J	103P495040	1/16W 16K-F
LC7J14	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470Sa		103P493030	1/16W 2.2K-F	103P496000	1/16W 30K-F
LC7J15	409P876020	EMI-F-CHIP - CNF20C470S/CKD510JB1H470Sa		103P502090	1/16W 2.2K-J	103P496010	1/16W 33K-F
LF56A1	409P900010	FILTER-LP - 7MHZ SMD		103P493040	1/16W 2.4K-F	103P504030	1/16W 33K-J
LF7D00	409P901010	LP-FILTER - 14MHZ SMD		103P493050	1/16W 2.7K-F	103P496050	1/16W 47K-F
LF7D01	409P901010	LP-FILTER - 14MHZ SMD		103P503000	1/16W 2.7K-J	103P504050	1/16W 47K-J
LF7D02	409P901010	LP-FILTER - 14MHZ SMD		103P495070	1/16W 22K-F	103P496070	1/16W 56K-F
LF7E00	409P901010	LP-FILTER - 14MHZ SMD		103P504010	1/16W 22K-J	103P504060	1/16W 56K-J
LF7E01	409P901010	LP-FILTER - 14MHZ SMD		103P495080	1/16W 24K-F	103P504070	1/16W 68K-J
LF7E02	409P901010	LP-FILTER - 14MHZ SMD		103P495090	1/16W 27K-F	103P504080	1/16W 82K-J
LF7G00	409P901010	LP-FILTER - 14MHZ SMD		103P493020	1/16W 2K-F	103P497030	1/16W 100K-F
LF7G01	409P901010	LP-FILTER - 14MHZ SMD		103P493060	1/16W 3K-F	103P504090	1/16W 100K-J
LF7G02	409P901010	LP-FILTER - 14MHZ SMD		103P493070	1/16W 3.3K-F	103P497050	1/16W 120K-F
<b>TRANSFORMERS</b>							
T9A20	350P766020	TRANS-PWR - ETS35AASJ3ND		103P503010	1/16W 3.3K-J	103P505000	1/16W 120K-J
T9B00	350P788010	TRANS-PWR - TCGSB 60262R7M1		103P506070	1/16W 3.3M-J	103P505010	1/16W 150K-J
<b>RESISTORS</b>							
CHIP Type Resistors (Listed by Value)							
Part No.	Value	Part No.	Value	<b>RESISTORS</b>			
103P489050	1/4W 00HM	103P810050	1/16W 150-D	Conventional Resistors (By Ref #)			
103P490950	1/8W 00HM	103P490050	1/16W 150-F	R5290	103C188040	R-METAL - 2W 2.2-J	
103P509050	1/16W 00HM	103P501050	1/16W 150-J	R54E4	103C180020	R-METAL - 2W 12-J	
103P509000	1/16W 6.8-J	103P490060	1/16W 160-F	R54E5	103C180020	R-METAL - 2W 12-J	
103P400010	1/10W 10-J	103P490070	1/16W 180-F	R902	103C181000	R-METAL - 2W 56-J	
103P500010	1/16W 10-J	103P501060	1/16W 180-J	R903	103P713010	R-CARBON - 1/4W 3.3K-J	
103P500030	1/16W 15-J	103P490090	1/16W 220-F	R904	103P142020	R-CARBON - 1/2W 560-J	
103P500050	1/16W 22-J	103P501070	1/16W 220-J	R905	103P713000	R-CARBON - 1/4W 2.7K-J	
103P910050	1/16W 22-J	103P491000	1/16W 240-F	R906	103P714070	R-CARBON - 1/4W 68K-J	
103P500070	1/16W 33-J	103P491010	1/16W 270-F	<b>R9A02</b>	<b>102P338040</b>	<b>R-CEMENT-WIRE - 15W 2.2-K</b>	
103P500090	1/16W 47-J	103P501080	1/16W 270-J	<b>R9A03</b>	<b>109C010010</b>	<b>R-COMP - 1/2W 1M-K</b>	
103P844030	1/16W 56-D	103P491020	1/16W 300-F	R9A04	103P145020	R-CARBON - 1/2W 180K-J	
103P501000	1/16W 56-J	103P491030	1/16W 330-F	<b>R9A05</b>	<b>109C010010</b>	<b>R-COMP - 1/2W 1M-K</b>	
103P911000	1/16W 56-J	103P501090	1/16W 330-J	<b>R9A06</b>	<b>109C010010</b>	<b>R-COMP - 1/2W 1M-K</b>	
103P501000	1/16W 56-J	103P401090	1/10W 330-J	R9A09	103P144090	R-CARBON - 1/2W 100K-J	
103P501010	1/16W 68-J	103P491050	1/16W 390-F	R9A10	103P713040	R-CARBON - 1/4W 5.6K-J	
103P509090	1/16W 75-J	103P502000	1/16W 390-J	R9A11	103P144090	R-CARBON - 1/2W 100K-J	
103P401030	1/10W 100-J	103P502010	1/16W 470-J	R9A12	103P713030	R-CARBON - 1/4W 4.7K-J	
103P501030	1/16W 100-J	103P491080	1/16W 510-F	R9A20	103P713010	R-CARBON - 1/4W 3.3K-J	
103P911030	1/16W 100-J	103P491090	1/16W 560-F				
103P501030	1/16W 100-J	103P502020	1/16W 560-J				
103P490030	1/16W 120-F	103P492000	1/16W 620-F				
103P501040	1/16W 120-J	103P492010	1/16W 680-F				



**MODELS: HD-5000 / HD-5000A**

[#] Model Legend:

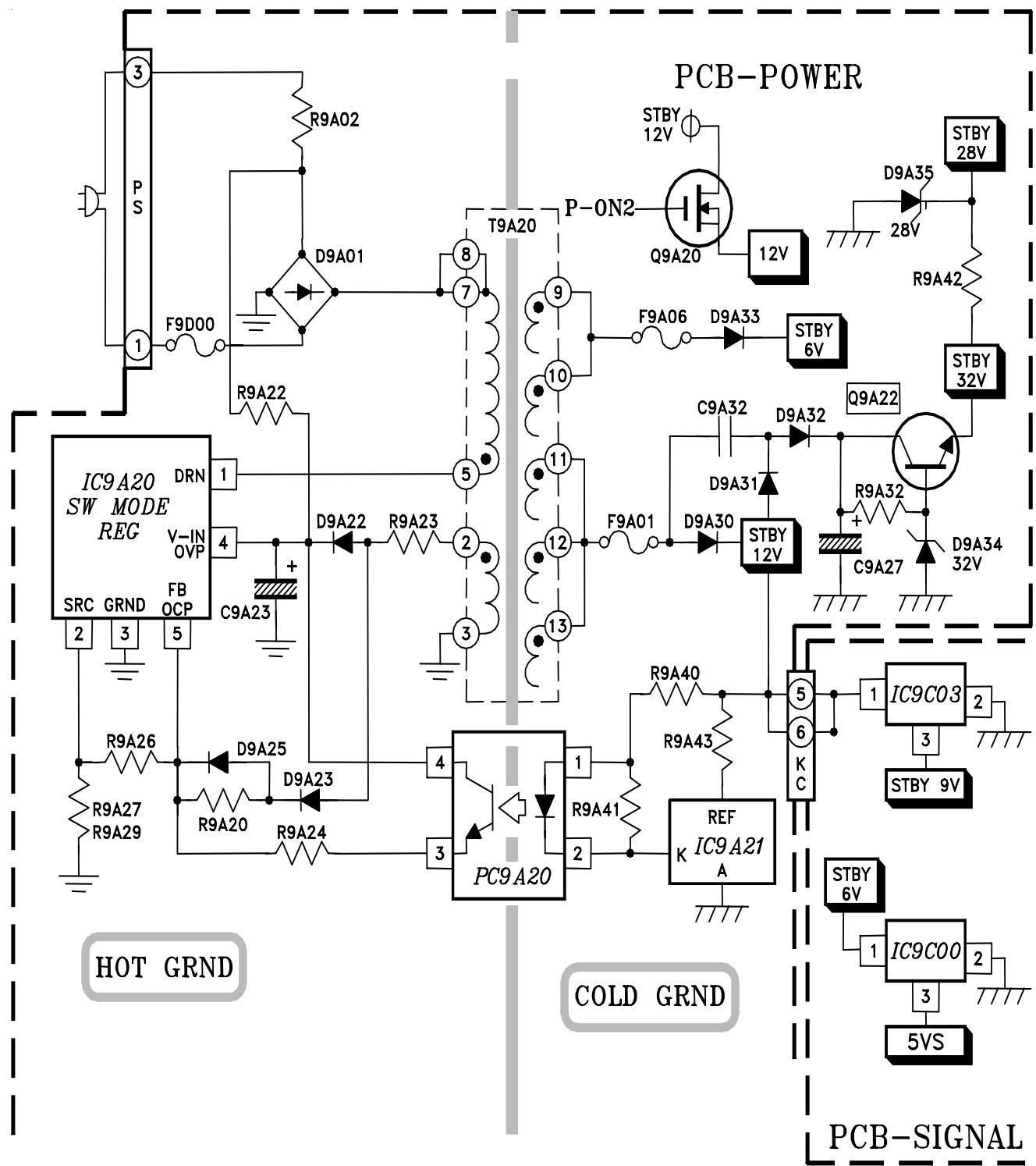
(a) HD-5000, (b) HD-5000A

Ref #	Part #	Part Name & Description	[#]	Ref #	Part #	Part Name & Description	[#]
C2E03	181P351080	C-ELEC - 10V 1000M-M		C2X03	181P352030	C-ELEC - 16V 47M-M	
C2E24	181P211010	C-ELEC - 10V 220M-M		C2X62	181P352040	C-ELEC - 16V 100M-M	
C2E33	181P355040	C-ELEC - 50V 4.7M-M		C2Y03	181P219010	C-ELEC - 16V 10M-M	
C2F30	181P352040	C-ELEC - 16V 100M-M		C2Y05	181P219010	C-ELEC - 16V 10M-M	
C2F54	181P210040	C-ELEC - 6.3V 100M-M		C2Y07	181P219010	C-ELEC - 16V 10M-M	
C2F64	181P210040	C-ELEC - 6.3V 100M-M		C2Y11	181P352030	C-ELEC - 16V 47M-M	
C2F70	181P352030	C-ELEC - 16V 47M-M		C2Y30	181P352030	C-ELEC - 16V 47M-M	
C2F80	181P352030	C-ELEC - 16V 47M-M		C302	181P352040	C-ELEC - 16V 100M-M	
C2H33	181P355040	C-ELEC - 50V 4.7M-M		C303	181P124040	C-ELEC-NP - 50V 10M-M	
C2H60	181P352030	C-ELEC - 16V 47M-M		C304	181P124040	C-ELEC-NP - 50V 10M-M	
C2H63	181P352030	C-ELEC - 16V 47M-M		C321	181P352030	C-ELEC - 16V 47M-M	
C2J02	181P211010	C-ELEC - 10V 220M-M		C322	181P352030	C-ELEC - 16V 47M-M	
C2K01	181P216050	C-ELEC - 50V 10M-M		C3A10	181P355020	C-ELEC - 50V 2.2M-M	
C2K03	181P216050	C-ELEC - 50V 10M-M		C3A11	181P352040	C-ELEC - 16V 100M-M	
C2K08	181P216050	C-ELEC - 50V 10M-M		C3A15	181P124020	C-ELEC-NP - 50V 4.7M-M	
C2K10	181P216050	C-ELEC - 50V 10M-M		C3A16	181P355050	C-ELEC - 50V 10M-M	
C2K15	181P216050	C-ELEC - 50V 10M-M		C3A17	181P355050	C-ELEC - 50V 10M-M	
C2K17	181P216050	C-ELEC - 50V 10M-M		C3A22	181P355050	C-ELEC - 50V 10M-M	
C2K24	181P124040	C-ELEC-NP - 50V 10M-M		C3A24	181P355040	C-ELEC - 50V 4.7M-M	
C2K30	181P124040	C-ELEC-NP - 50V 10M-M		C3A27	181P352060	C-ELEC - 16V 330M-M	
C2K50	181P216050	C-ELEC - 50V 10M-M		C3A29	181P355050	C-ELEC - 50V 10M-M	
C2K52	181P216050	C-ELEC - 50V 10M-M		C3A30	181P352040	C-ELEC - 16V 100M-M	
C2K54	181P216050	C-ELEC - 50V 10M-M		C3A34	181P355050	C-ELEC - 50V 10M-M	
C2K60	181P216050	C-ELEC - 50V 10M-M		C3A35	181P355040	C-ELEC - 50V 4.7M-M	
C2K63	181P216050	C-ELEC - 50V 10M-M		C3A36	181P355040	C-ELEC - 50V 4.7M-M	
C2K65	181P212070	C-ELEC - 16V 100M-M		C3A37	181P355040	C-ELEC - 50V 4.7M-M	
C2L08	181P216050	C-ELEC - 50V 10M-M		C3A38	181P124020	C-ELEC-NP - 50V 4.7M-M	
C2L10	181P216050	C-ELEC - 50V 10M-M		C5102	181P355010	C-ELEC - 50V 1M-M	
C2L15	181P216050	C-ELEC - 50V 10M-M		C5112	181P355010	C-ELEC - 50V 1M-M	
C2L17	181P216050	C-ELEC - 50V 10M-M		C5122	181P355010	C-ELEC - 50V 1M-M	
C2L22	181P216050	C-ELEC - 50V 10M-M		C51K7	181P351050	C-ELEC - 10V 220M-M	
C2L24	181P216050	C-ELEC - 50V 10M-M		C51P0	181P181010	C-ELEC - 10V 470M-M 105C	
C2L30	181P216050	C-ELEC - 50V 10M-M		C51P1	181P350050	C-ELEC - 6.3V 470M-M	
C2L49	181P582070	C-ELEC-BP - 25V 10M-M 105C		C5221	181P353060	C-ELEC - 25V 330M-M	
C2L50	181P216050	C-ELEC - 50V 10M-M		C5234	181P355090	C-ELEC - 50V 100M-M	
C2L60	181P216050	C-ELEC - 50V 10M-M		C5235	181P355090	C-ELEC - 50V 100M-M	
C2L65	181P212070	C-ELEC - 16V 100M-M		C5251	181P351070	C-ELEC - 10V 470M-M	
C2M00	181P351070	C-ELEC - 10V 470M-M		C5253	181P351060	C-ELEC - 10V 330M-M	
C2M01	181P211010	C-ELEC - 10V 220M-M		C5255	181P351060	C-ELEC - 10V 330M-M	
C2M02	181P351070	C-ELEC - 10V 470M-M		C5257	181P350060	C-ELEC - 3V 1000M-M	
C2M03	181P212070	C-ELEC - 16V 100M-M		C5258	181P350050	C-ELEC - 6.3V 470M-M	
C2M20	181P352080	C-ELEC - 16V 1000M-M		C5291	181P353060	C-ELEC - 25V 330M-M	
C2M22	181P212060	C-ELEC - 16V 47M-M		C5292	181P353060	C-ELEC - 25V 330M-M	
C2M23	181P212060	C-ELEC - 16V 47M-M		C5295	181P353060	C-ELEC - 25V 330M-M	
C2M30	181P350060	C-ELEC - 3V 1000M-M		C5297	181P353060	C-ELEC - 25V 330M-M	
C2M31	181P350060	C-ELEC - 3V 1000M-M		<b>C5301</b>	<b>141P144020</b>	<b>C-CER-CHIP - F25V 0.1M-Z</b>	
C2M32	181P350060	C-ELEC - 3V 1000M-M		C5303	181P185060	C-ELEC - 50V 10M-M 105C	
C2R05	181P212060	C-ELEC - 16V 47M-M		C5305	181P350040	C-ELEC - 6.3V 330M-M	
C2V07	181P352070	C-ELEC - 16V 470M-M		C5307	181P181000	C-ELEC - 10V 330M-M 105C	
C2V11	181P352030	C-ELEC - 16V 47M-M		C53J7	181P351030	C-ELEC - 10V 47M-M	
C2V27	181P352030	C-ELEC - 16V 47M-M		C53K0	181P351030	C-ELEC - 10V 47M-M	
C2V30	172P262090	C-M-POLY - 50V 0.22M-J		C53K5	181P351030	C-ELEC - 10V 47M-M	
C2V43	181P355060	C-ELEC - 50V 22M-M		C53K8	181P351030	C-ELEC - 10V 47M-M	
C2V44	181P351070	C-ELEC - 10V 470M-M		C53L0	181P351030	C-ELEC - 10V 47M-M	
C2V54	181P355050	C-ELEC - 50V 10M-M		C53L8	181P351030	C-ELEC - 10V 47M-M	
C2V72	181P352070	C-ELEC - 16V 470M-M		C53M0	181P351030	C-ELEC - 10V 47M-M	
C2V98	181P351070	C-ELEC - 10V 470M-M		C53M2	181P351030	C-ELEC - 10V 47M-M	
C2W04	181P352070	C-ELEC - 16V 470M-M		C53P3	181P351030	C-ELEC - 10V 47M-M	
C2X01	181P352040	C-ELEC - 16V 100M-M		C53P4	181P351030	C-ELEC - 10V 47M-M	
				C53P7	181P351030	C-ELEC - 10V 47M-M	

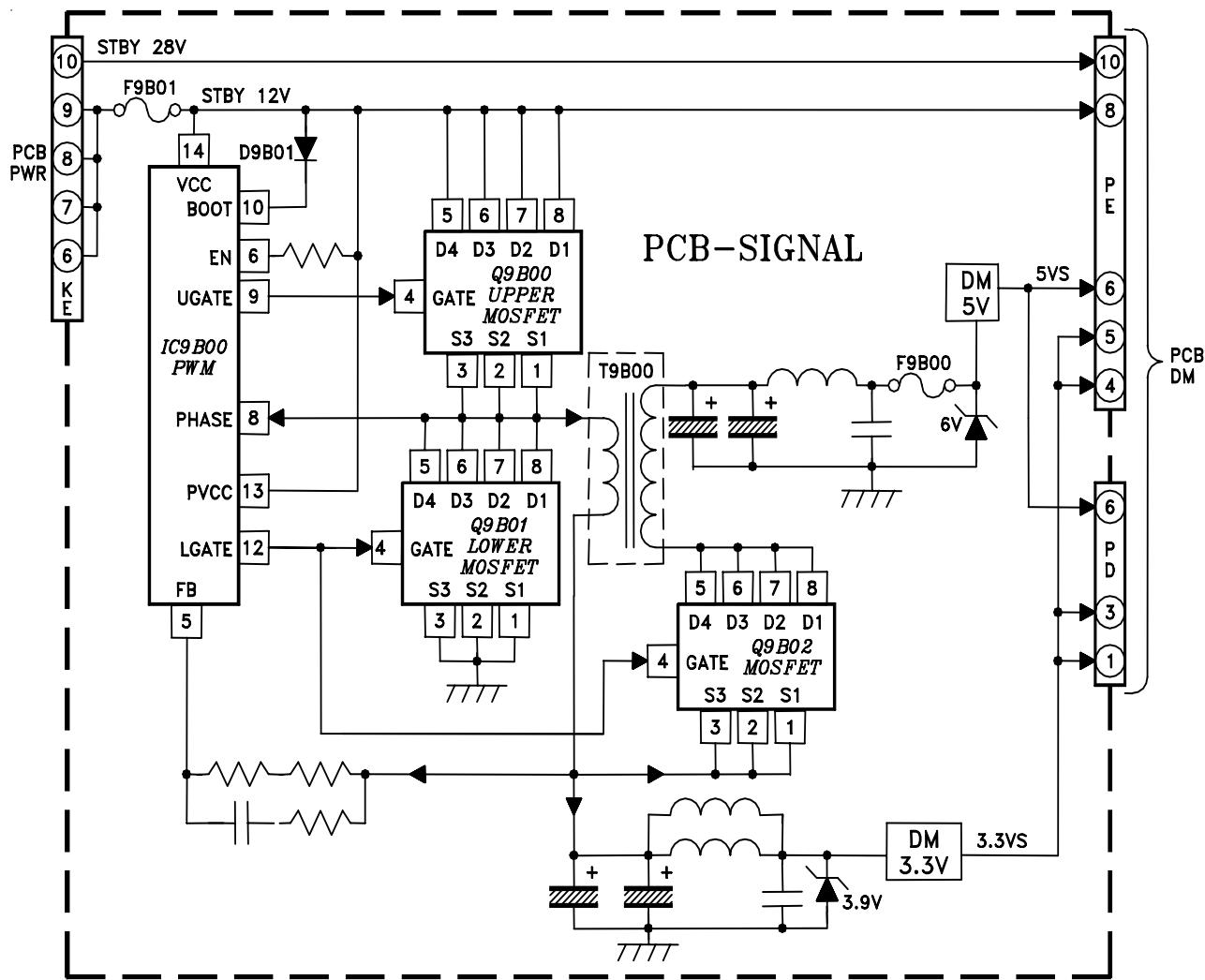




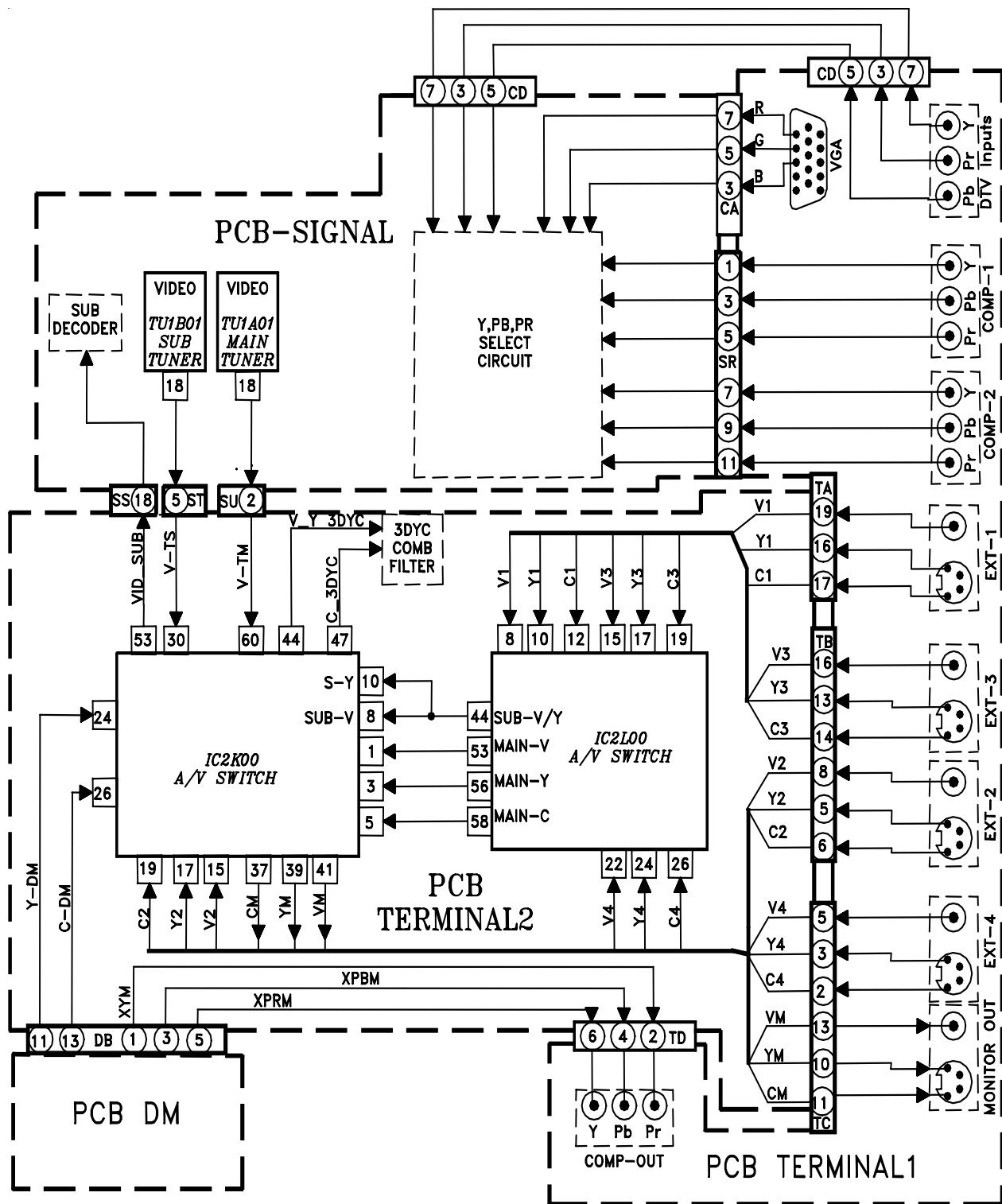
## STANDBY POWER SUPPLY



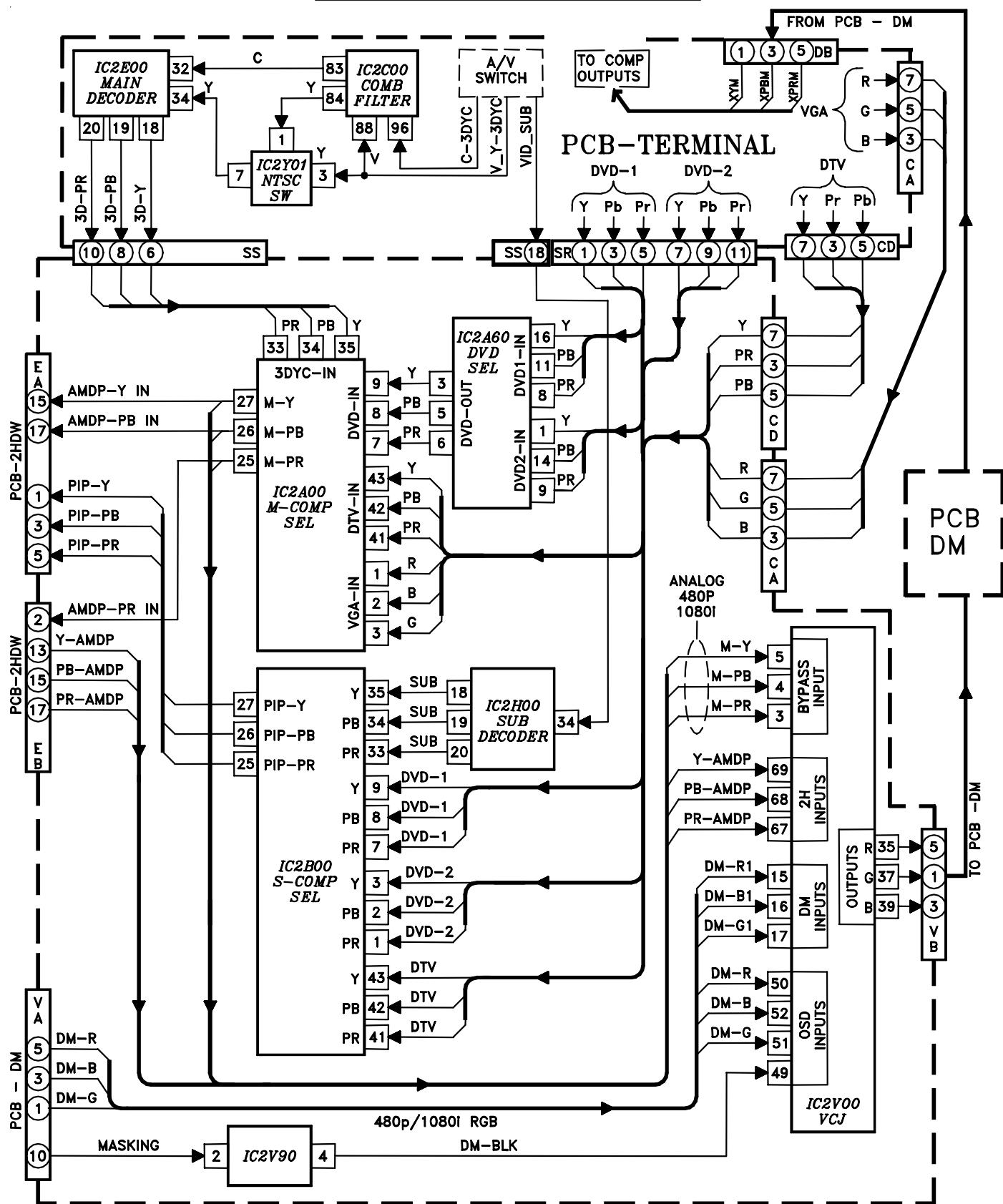
**DM  
POWER  
SUPPLY**



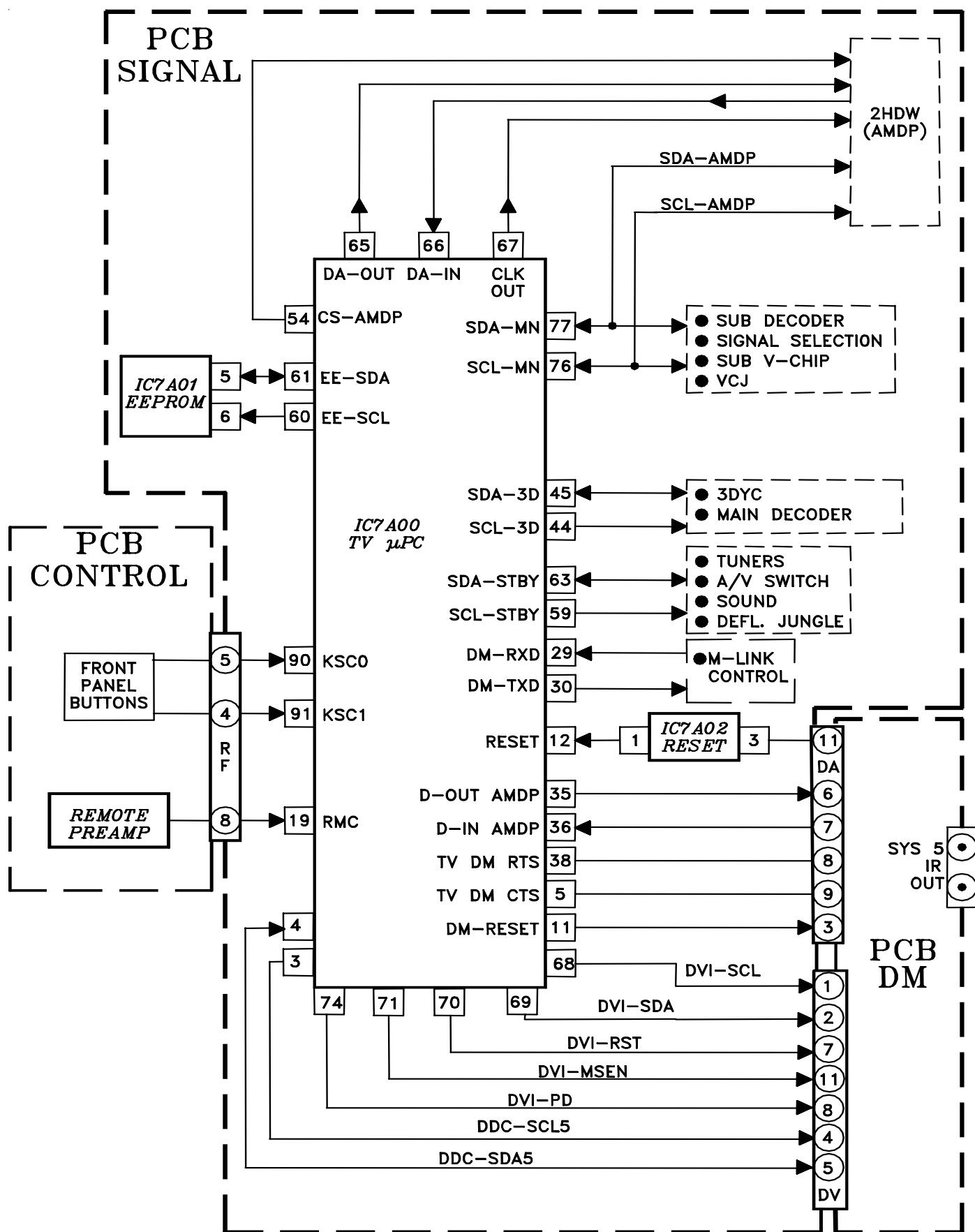
**VIDEO/COLOR  
AV SWITCH  
CIRCUIT**



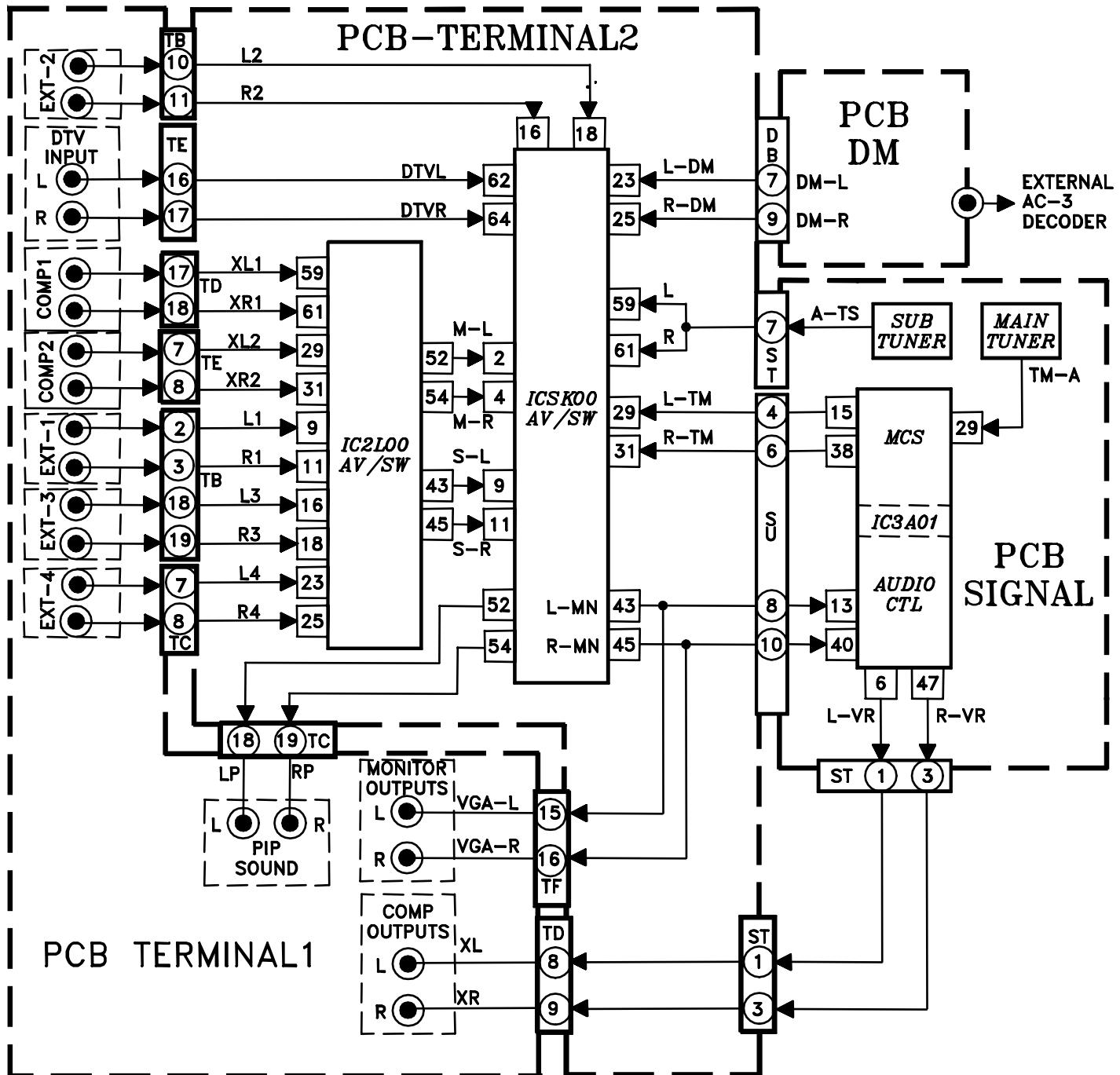
**PCB SIGNAL  
Y/C PATH**

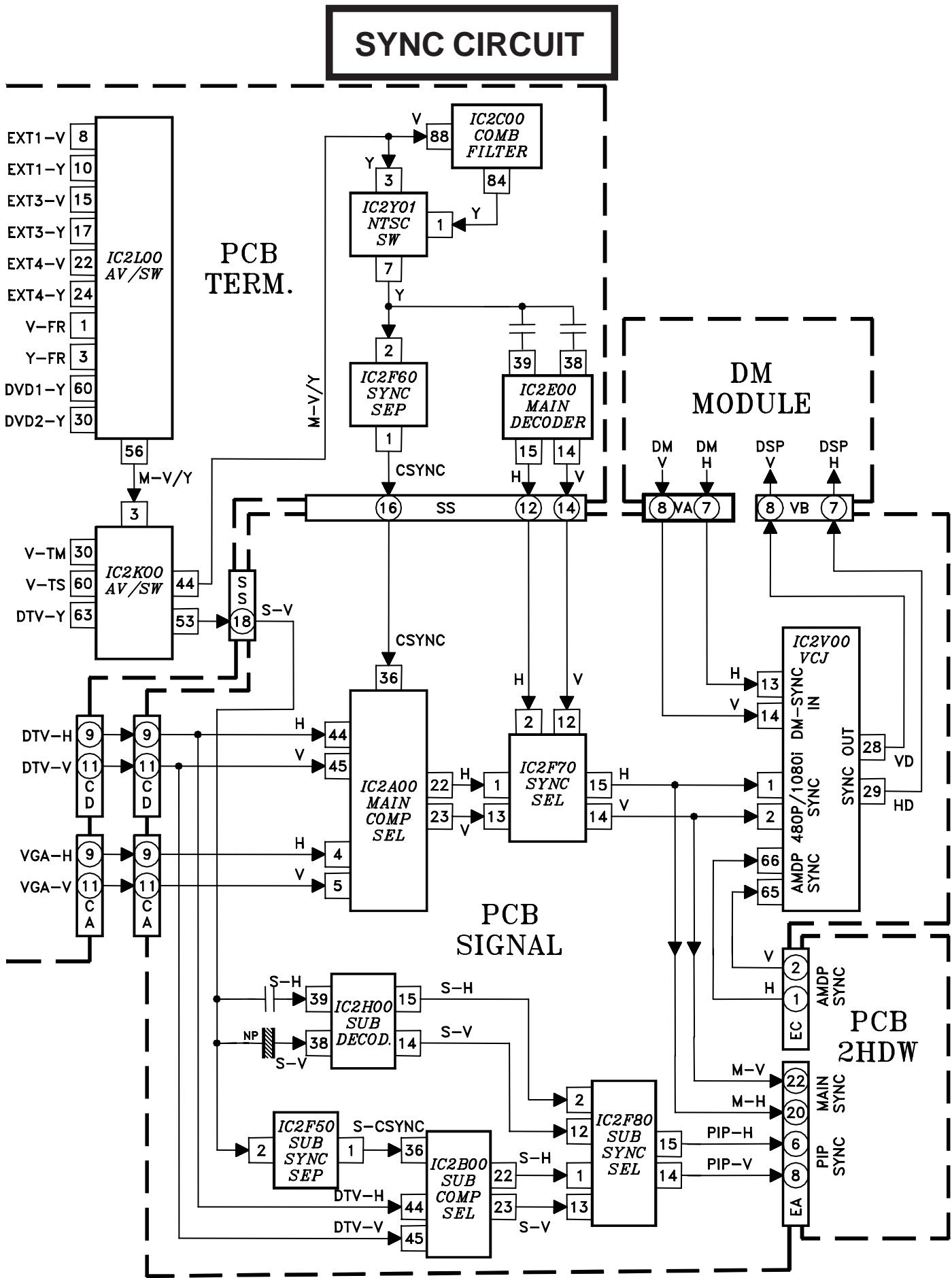


## CONTROL CIRCUITRY



## SOUND PATH







# Service Manual

2003

SET TOP BOX  
V21S CHASSIS



## V21S MODELS

HD-5000  
HD-5000A

### **CAUTION:**

Before servicing this chassis, it is important that the service person read the "SAFETY PRECAUTIONS" and "PRODUCT SAFETY NOTICE" contained in this manual.

## PART 2 SCHEMATIC DIAGRAMS

### **CONTENTS**

	Page
Overall PCB Block Diagram .....	1
PCB-POWER / CONTROL / E2P .....	2
PCB-TERMINAL 1 (JACK) .....	3
PCB-TERMINAL 2-1 (SW) .....	4
PCB-TERMINAL 2-2 (3DYC) .....	5
PCB-SIGNAL-1 (MICRO) .....	6
PCB-SIGNAL-2 (AV I/O) .....	7
PCB-SIGNAL-3 (VIDEO CHROMA) .....	8
PCB-SIGNAL-4 (IR / MP / DMP) .....	9
PCB-2HDW-1 (IN) .....	10
PCB-2HDW-2 (MAIN) .....	11
PCB-2HDW-3 (OUT) .....	12
PCB-2HDW-4(C720) HD5000A ONLY.....	13
PCB-DEMOD .....	14

### **Refer to PART 1 for:**

- Specifications
- Safety Precautions
- Disassembly
- Electrical Adjustments
- Parts List
- Block Diagrams

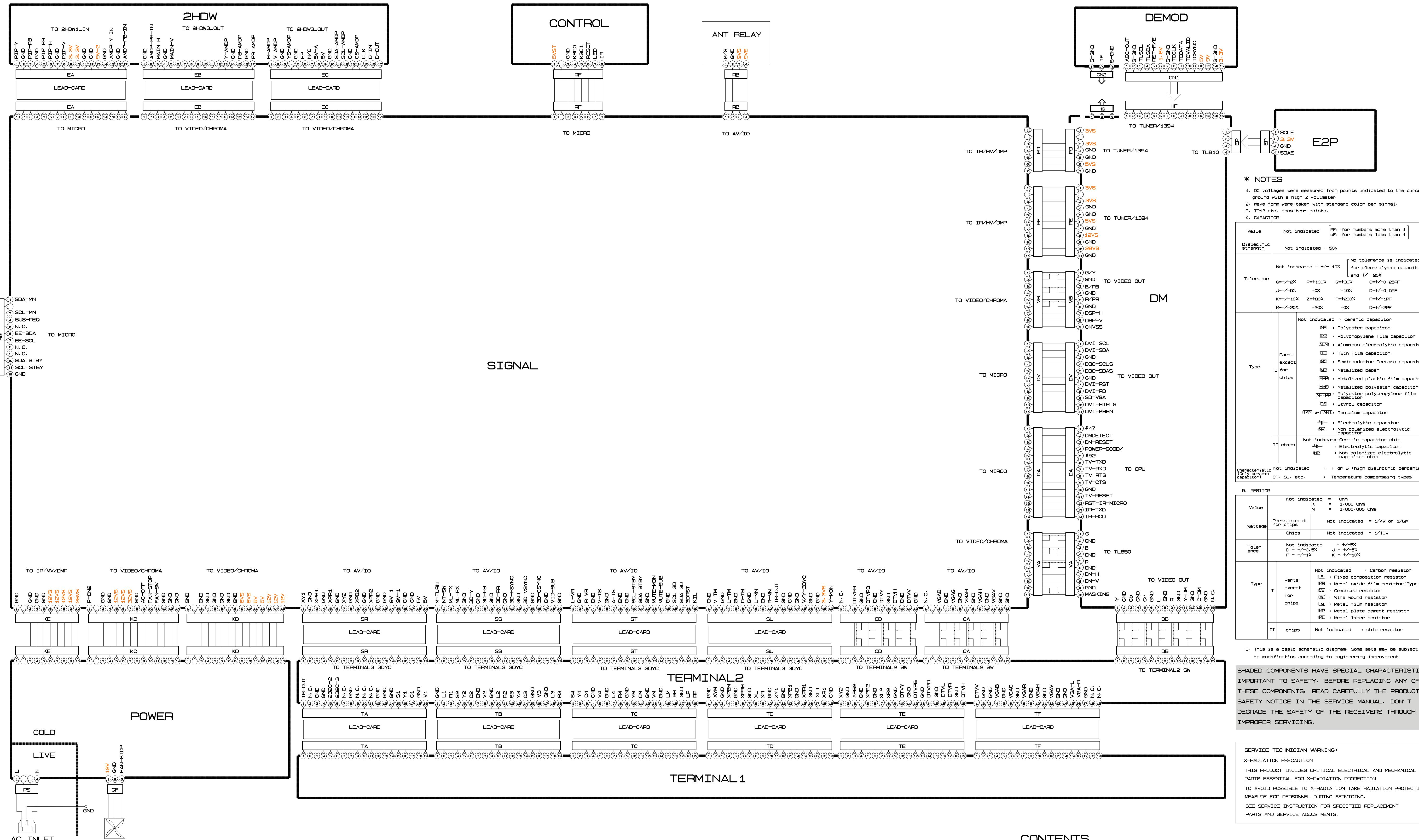
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1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16



\* NOTES

- DC voltages were measured from points indicated to the circuit ground with a high-Z voltmeter.
- Wave form were taken with standard color bar signal.
- TP13 etc. show test points.
- CAPACITOR

Value	Not indicated	[PF for numbers more than 1] [UF for numbers less than 1]
Dielectric strength	Not indicated	= 50V
Tolerance	Not indicated	= +/- 10% [for electrolytic capacitor] G=+/-100% Q=+30K C=+/-0.25PF J=+/-5% -10% D=+/-0.5PF K=+/-10% Z=+30K T=+200% F=+/-10% M=+/-20% -20% -10% D=+/-0.5PF
Type		Not indicated : Ceramic capacitor MD : Polyester capacitor PF : Polypropylene film capacitor ALM : Aluminum electrolytic capacitor TF : Twin film capacitor SD : Semiconductor Ceramic capacitor MP : Metallized paper MFP : Metallized plastic film capacitor MPP : Polyester polypropylene film capacitor MCP : Tantalum capacitor SC : Styrol capacitor TAN or TAND : Tantalum capacitor EP : Electrolytic capacitor NP : Non polarized electrolytic capacitor
Characteristic	Not indicated	F or B (high dielectric percentage) CH, SL, etc. : Temperature compensating types

Value	Not indicated	= Ohm
Wattage	K	= 1.000 Ohm
Parts except for chips	M	= 1.000-0.000 Ohm
Chips	Not indicated	= 1/10W
Tolerance	Not indicated	= +/- 5%
D	= +/- 0.5%	J = +/- 5%
F	= +/- 1%	K = +/- 10%
Type	I	Not indicated : Carbon resistor S : Fixed composition resistor MO : Metal oxide film resistor (Type B) CD : Cemented resistor W : Wire wound resistor MF : Metal film resistor MPC : Metal plate cement resistor ML : Metal liner resistor
II chips	Not indicated	: chip resistor

6. This is a basic schematic diagram. Some sets may be subject to modification according to engineering improvement.

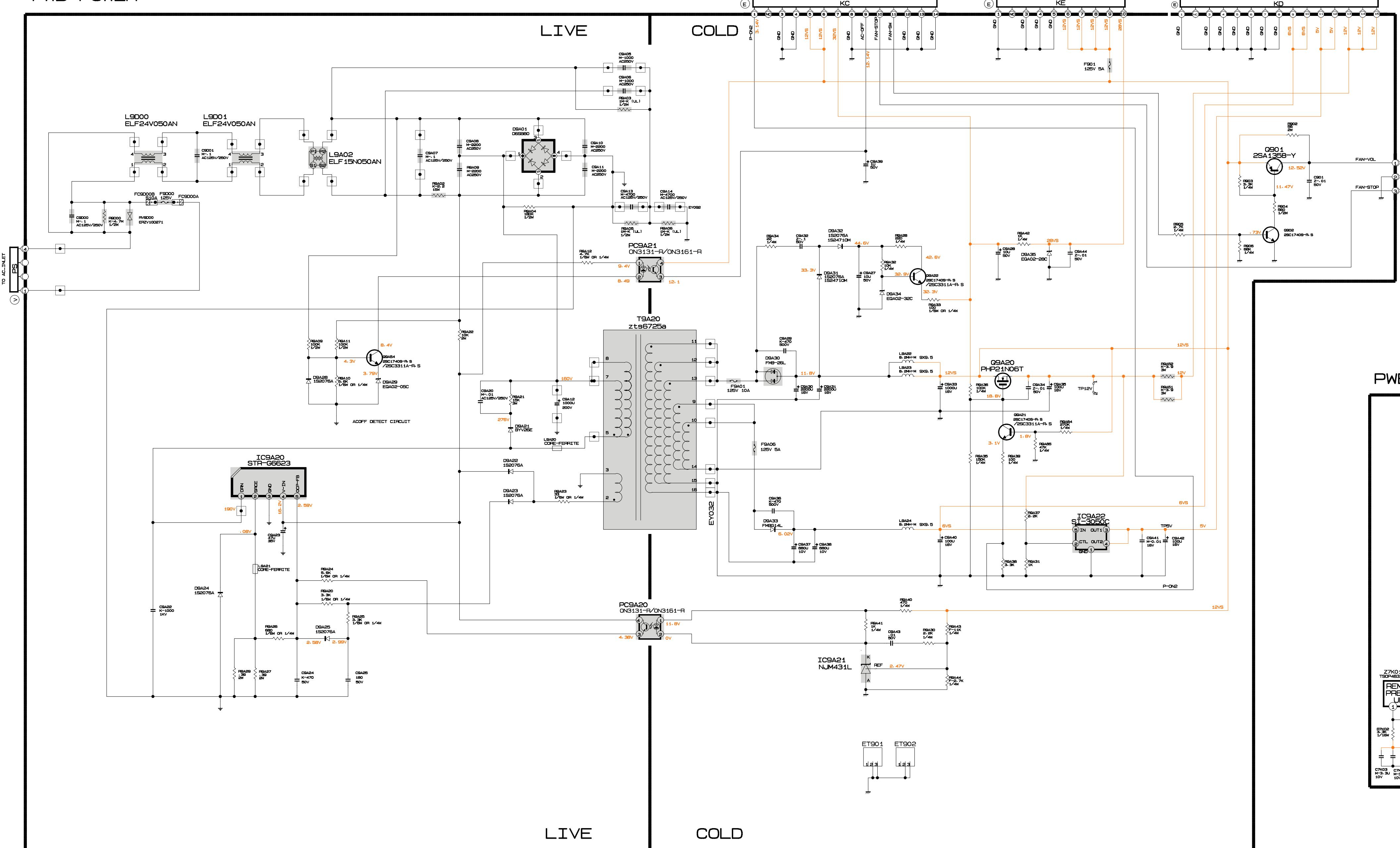
**SHADED COMPONENTS HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THE SERVICE MANUAL. DON'T DEGRADE THE SAFETY OF THE RECEIVERS THROUGH IMPROPER SERVICING.**

**SERVICE TECHNICIAN WARNING:**  
X-RADIATION PRECAUTION  
THIS PRODUCT INCLUDES CRITICAL ELECTRICAL AND MECHANICAL PARTS ESSENTIAL FOR X-RADIATION PROTECTION  
TO AVOID POSSIBLE TO X-RADIATION TAKE RADIATION PROTECTIVE MEASURE FOR PERSONNEL DURING SERVICING.  
SEE SERVICE INSTRUCTION FOR SPECIFIED REPLACEMENT PARTS AND SERVICE ADJUSTMENTS.

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16

A

PWB-POWER



CONTENTS

PG. 1... BLOCK DIAGRAM	PG. 10... 2HDW_1_IN	HD-5000
PG. 2... POWER/CONTROL/E2P	PG. 11... 2HDW_2_MAIN	HD-5000A
PG. 3... TERMINAL_1_JACK	PG. 12... 2HDW_3_OUT	
PG. 4... TERMINAL_2_1_SW	PG. 13... 2HDW_4_C720 (HD5000A)	
PG. 5... TERMINAL_2_2_3DYC_DEC.	PG. 14... DEMOD	
PG. 6... SIGNAL_1_MICRO		
PG. 7... SIGNAL_2_AV_IO		
PG. 8... SIGNAL_3_VIDEO/CHROMA		
PG. 9... SIGNAL_4_IR/MV/DMP		

A

B

C

D

E

F

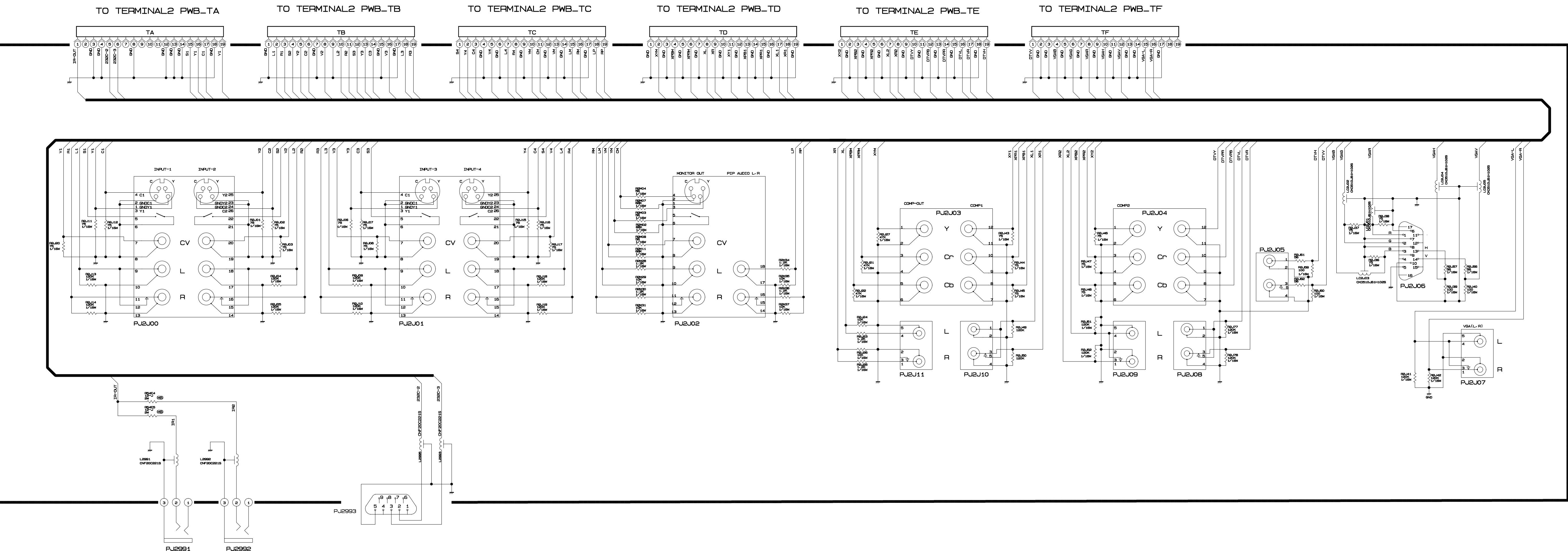
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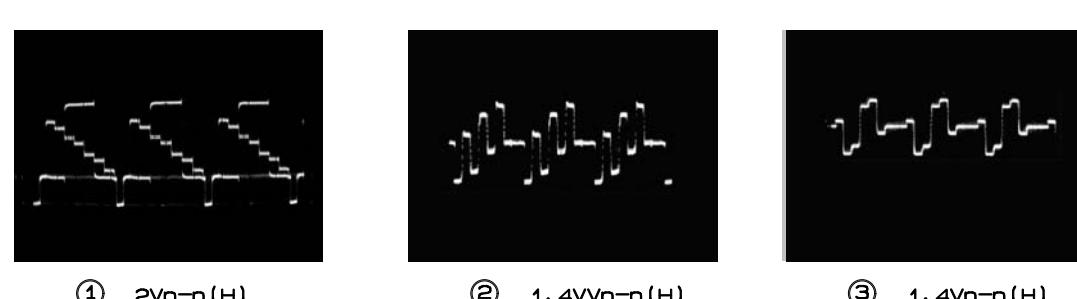
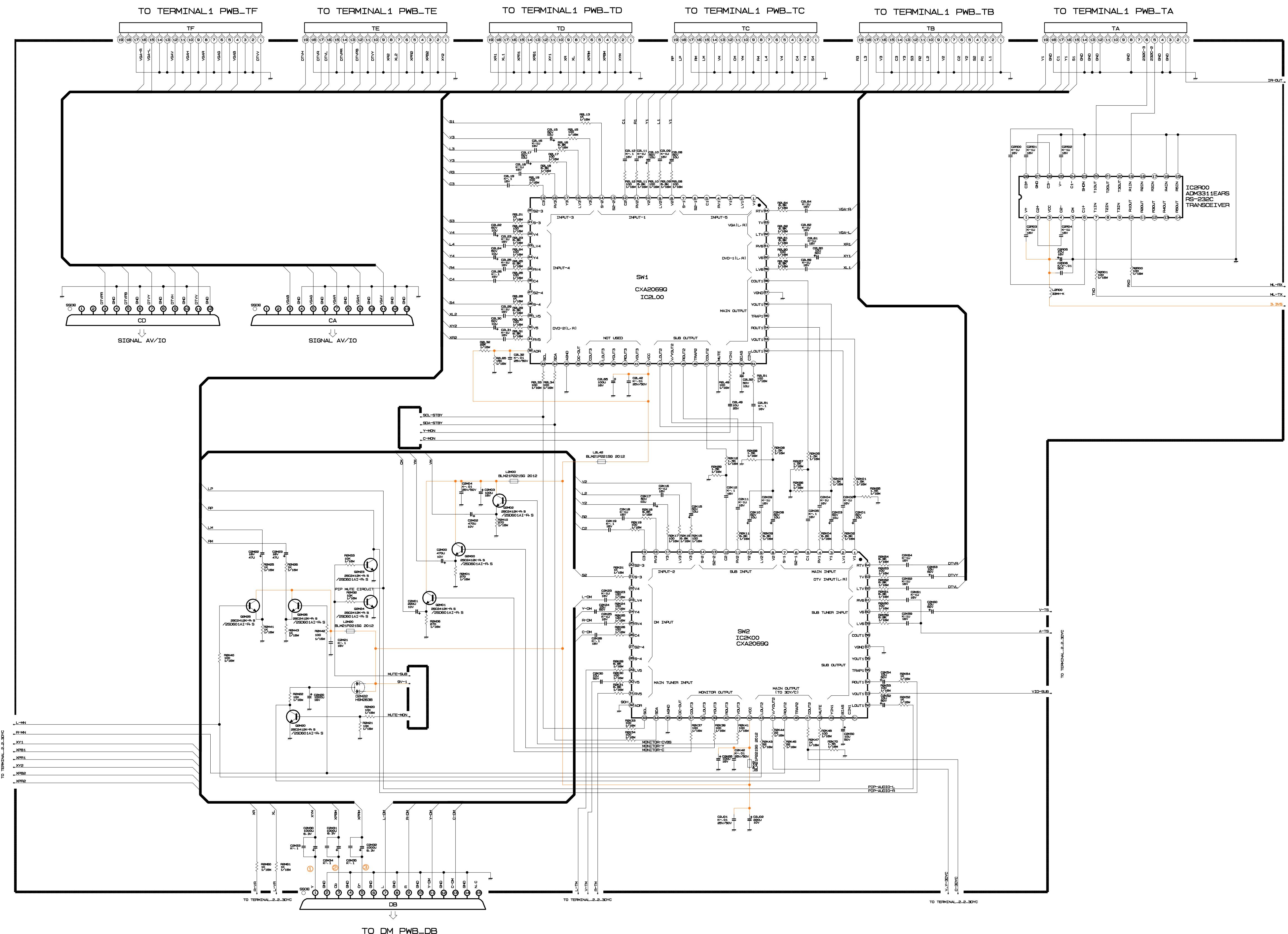
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**CONTENTS**

PG. 1... BLOCK DIAGRAM	PG. 10... 2HDW_1_IN	HD-5000
PG. 2... POWER/CONTROL/E2P	PG. 11... 2HDW_2_MAIN	HD-5000A
PG. 3... TERMINAL_1_JACK	PG. 12... 2HDW_3_OUT	
PG. 4... TERMINAL_2_1_SW	PG. 13... 2HDW_4_C720 (HD5000A)	
PG. 5... TERMINAL_2_2_3DYC_DEC.	PG. 14... DEMOD	
PG. 6... SIGNAL_1_MICRO		
PG. 7... SIGNAL_2_AV/IO		
PG. 8... SIGNAL_3_VIDEO/CHROMA		
PG. 9... SIGNAL_4_IR/MV/DMP		



#### CONTENTS

PG. 1... BLOCK DIAGRAM	PG. 10... 2HDW_1_IN	HD-5000
PG. 2... POWER/CONTROL/E2P	PG. 11... 2HDW_2_MAIN	HD-5000A
PG. 3... TERMINAL_1_JACK	PG. 12... 2HDW_3_OUT	
PG. 4... TERMINAL_2-1_SW	PG. 13... 2HDW_4_C720 (HD5000A)	
PG. 5... TERMINAL_2-2-3DYC, DEC.	PG. 14... DEMOD	
PG. 6... SIGNAL_1-MICRO		
PG. 7... SIGNAL_2-AV/IO		
PG. 8... SIGNAL_3-VIDEO/CHROMA		
PG. 9... SIGNAL_4-IP/MV/DMP		

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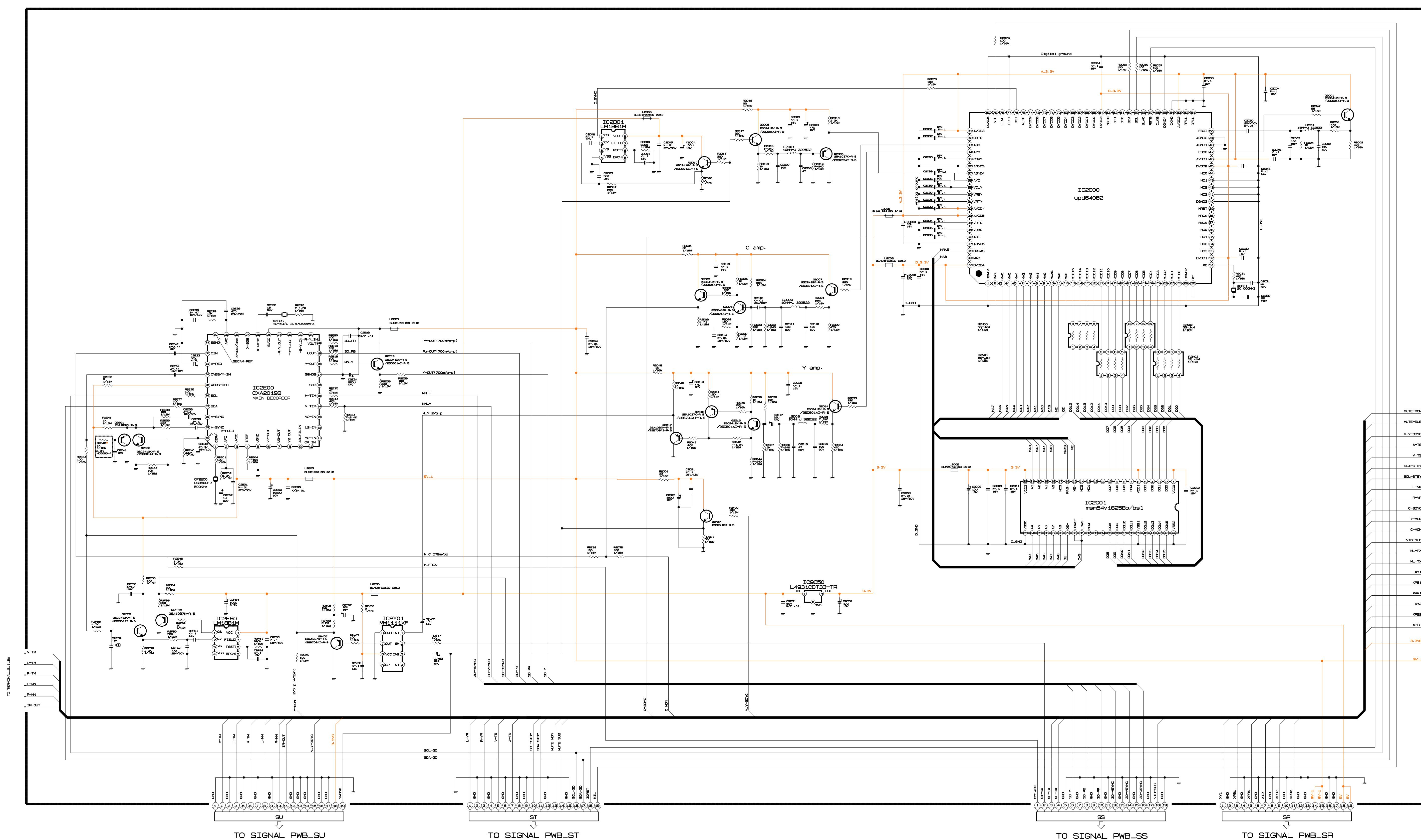
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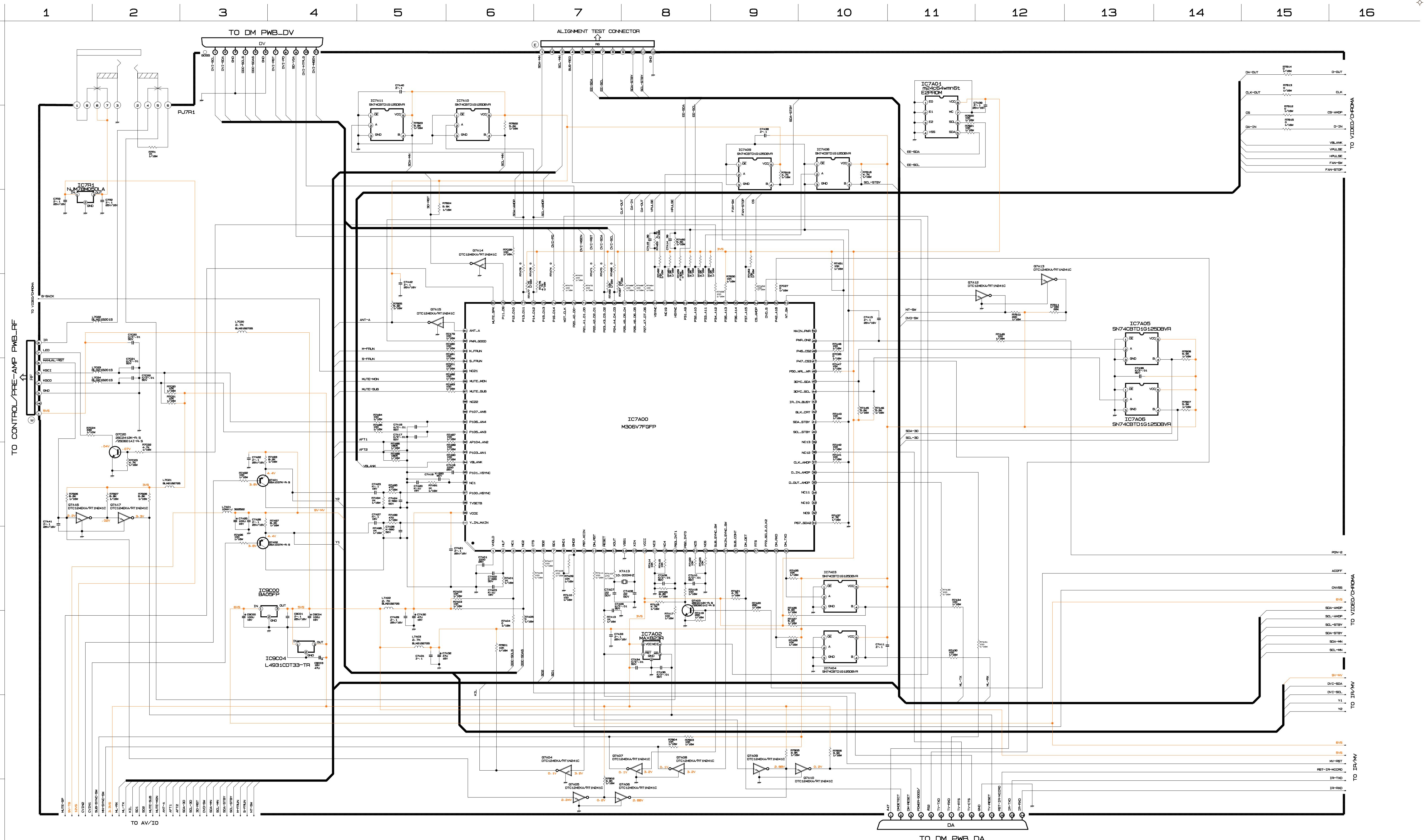
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## CONTENTS

PG. 1... BLOCK DIAGRAM	PG. 10... 2HDW_1_IN	HD-5000
PG. 2... POWER/CONTROL/E2P	PG. 11... 2HDW_2_MAIN	HD-5000A
PG. 3... TERMINAL_1_JACK	PG. 12... 2HDW_3_OUT	
PG. 4... TERMINAL_2_1_SW	PG. 13... 2HDW_4_C720 (HD5000A)	
PG. 5... TERMINAL_2_2_3DYC_DEC.	PG. 14... DEMOD	
PG. 6... SIGNAL_1_MICRO		
PG. 7... SIGNAL_2_AV_IO		
PG. 8... SIGNAL_3_VIDEO/CHROMA		
PG. 9... SIGNAL_4_IR/MV/DMP		



## CONTENTS

PG. 1... BLOCK DIAGRAM	PG. 10... 2HDW-1-IN	HD-5000
PG. 2... POWER/CONTROL/E2P	PG. 11... 2HDW-2-MAIN	HD-5000A
PG. 3... TERMINAL_1-JACK	PG. 12... 2HDW-3-OUT	
PG. 4... TERMINAL_2-1-SW	PG. 13... 2HDW-4-C720 (HD5000A)	
PG. 5... TERMINAL_2-2-3DYC_DEC.	PG. 14... DEMOD	
PG. 6... SIGNAL_1-MICRO		
PG. 7... SIGNAL_2-AV/I/O		
PG. 8... SIGNAL_3-VIDEO/CHROMA		
PG. 9... SIGNAL_4-IR/MV/DMP		

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

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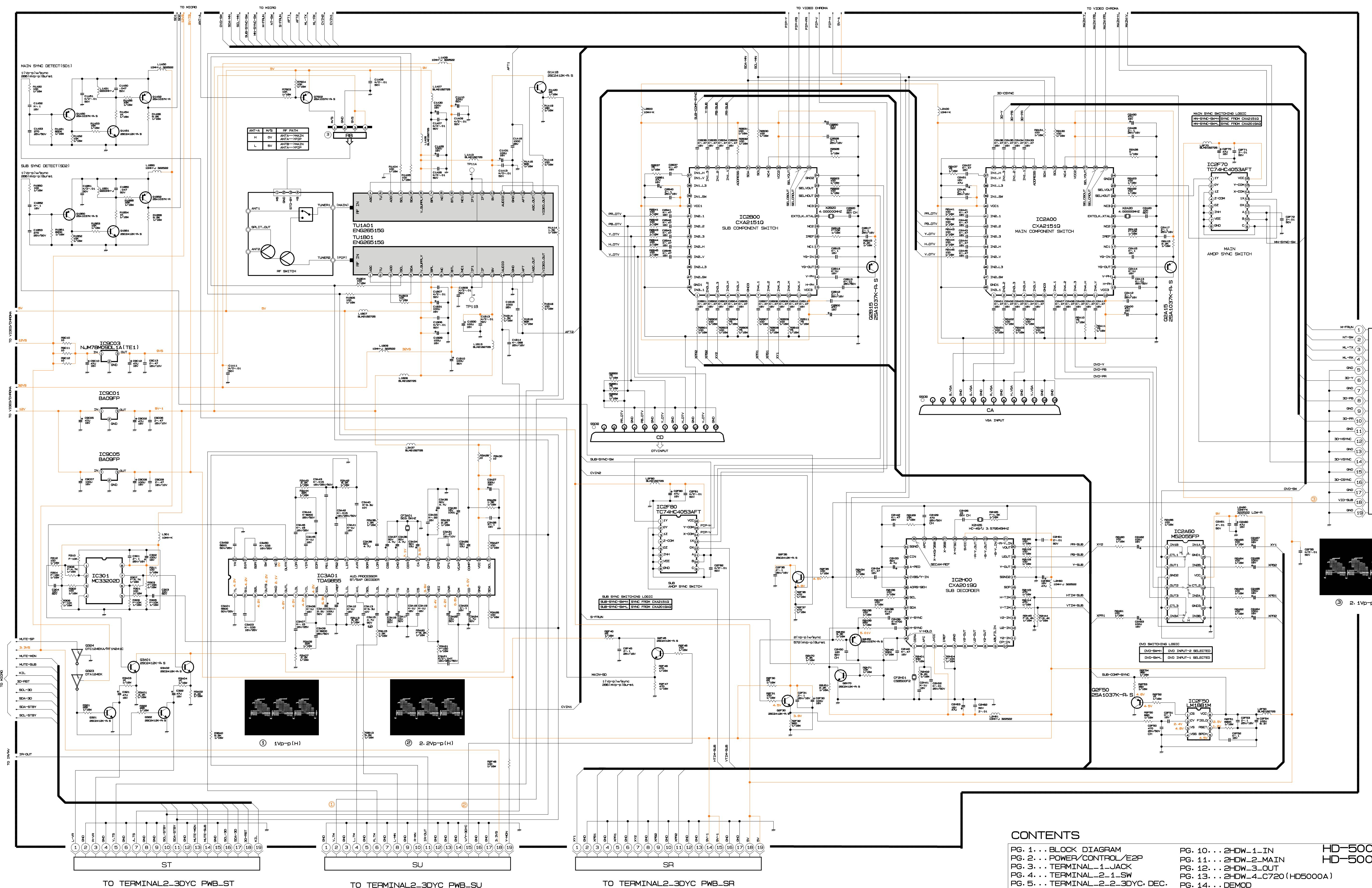
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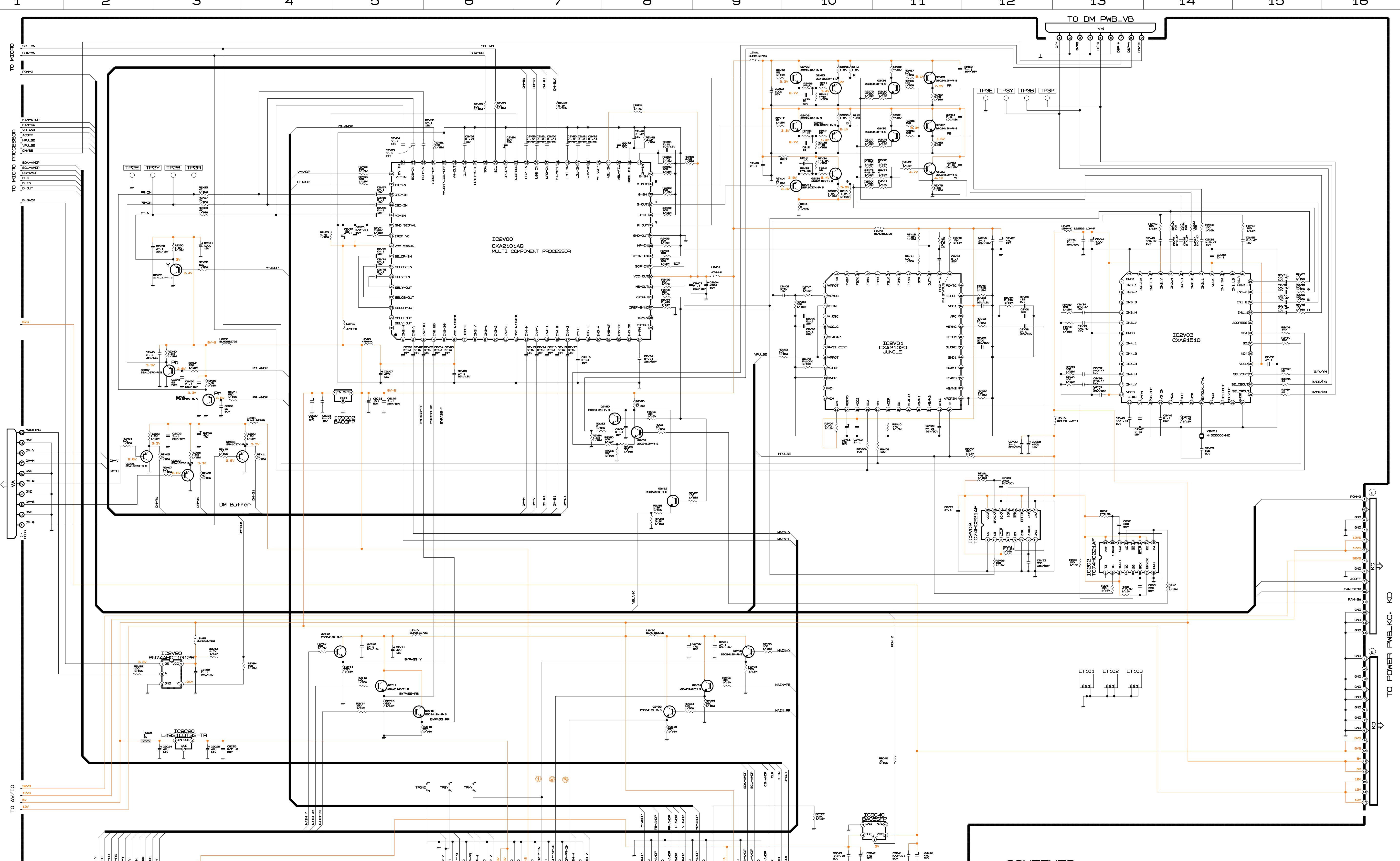
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#### CONTENTS

- PG. 1... BLOCK DIAGRAM
- PG. 2... POWER/CONTROL/E2P
- PG. 3... TERMINAL1-JACK
- PG. 4... TERMINAL2-1-SW
- PG. 5... TERMINAL2-2-3DYC.DEC.
- PG. 6... SIGNAL\_1-MICRO
- PG. 7... SIGNAL\_2-AV/IO
- PG. 8... SIGNAL\_3-VIDEO/CHROMA
- PG. 9... SIGNAL\_4-IR/MV/DMP
- PG. 10... 2HDW\_1-IN
- PG. 11... 2HDW\_2-MAIN
- PG. 12... 2HDW\_3-OUT
- PG. 13... 2HDW\_4\_C720 (HD5000A)
- PG. 14... DEMOD
- HD-5000
- HD-5000A



#### CONTENTS

- PG. 1... BLOCK DIAGRAM  
 PG. 2... POWER/CONTROL/E2P  
 PG. 3... TERMINAL\_1\_JACK  
 PG. 4... TERMINAL\_2\_1\_SW  
 PG. 5... TERMINAL\_2\_2\_3DYC\_DEC.  
 PG. 6... SIGNAL\_1\_MICRO  
 PG. 7... SIGNAL\_2\_AV\_IO  
 PG. 8... SIGNAL\_3\_VIDEO/CHROMA  
 PG. 9... SIGNAL\_4\_IR/MV/DMP  
 PG. 10... 2HDW\_1\_IN  
 PG. 11... 2HDW\_2\_MAIN  
 PG. 12... 2HDW\_3\_OUT  
 PG. 13... 2HDW\_4\_C720 (HD5000A)  
 PG. 14... DEMOD
- HD-5000 HD-5000A

(1) 0.71Vp-p(H) (2) 0.66Vp-p(H) (3) 6.8Vp-p(H)

A

B

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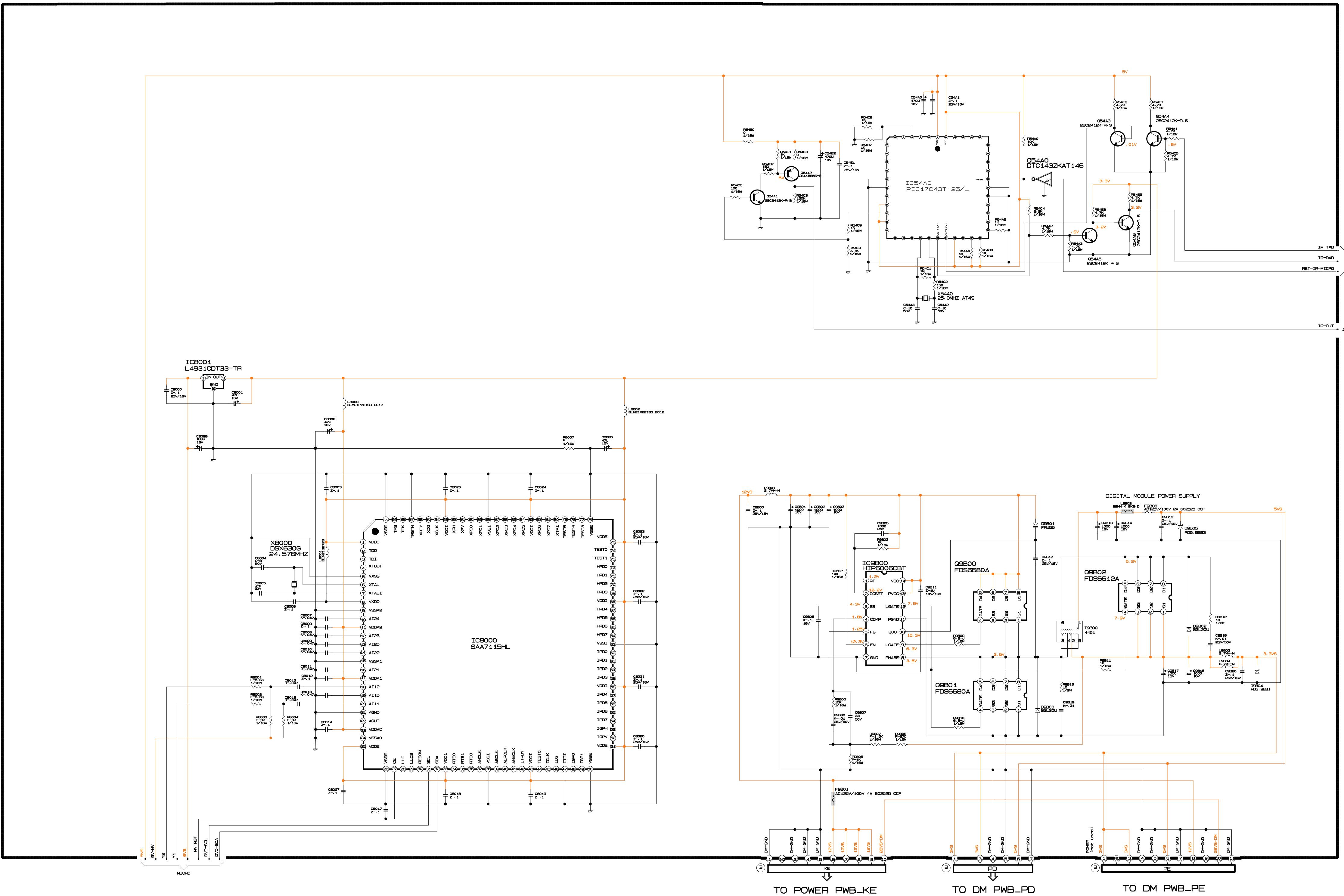
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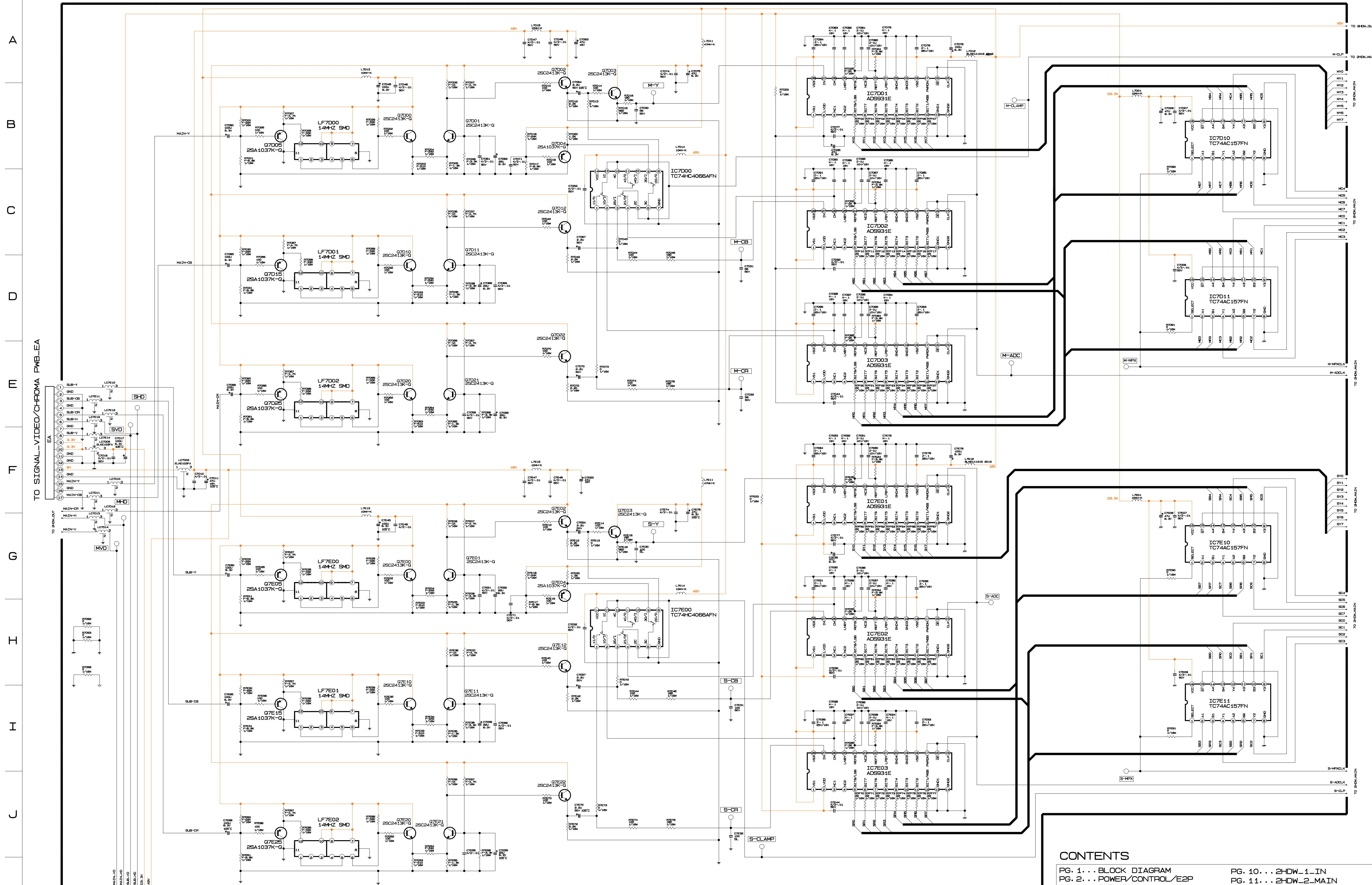
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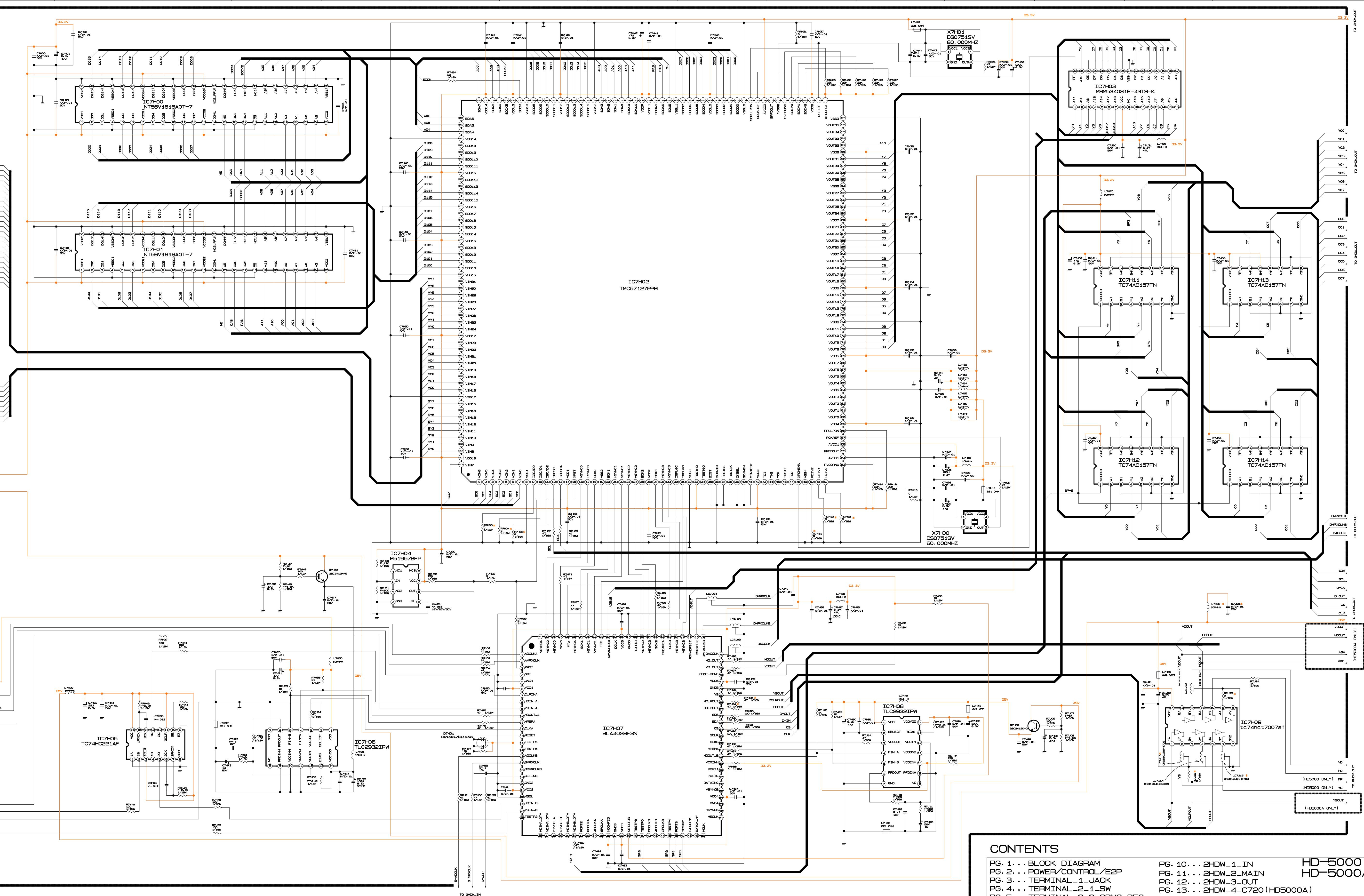
**CONTENTS**

PG. 1... BLOCK DIAGRAM	PG. 10... 2HDW-1-IN	HD-5000
PG. 2... POWER/CONTROL/E2P	PG. 11... 2HDW-2-MAIN	HD-5000A
PG. 3... TERMINAL_1-JACK	PG. 12... 2HDW-3-OUT	
PG. 4... TERMINAL_2_1-SW	PG. 13... 2HDW_4_C720 (HD5000A)	
PG. 5... TERMINAL_2_2-3DYC_DEC.	PG. 14... DEMOD	
PG. 6... SIGNAL_1-MICRO		
PG. 7... SIGNAL_2-AV/10		
PG. 8... SIGNAL_3-VIDEO/CHROMA		
PG. 9... SIGNAL_4-IR/MV/DMP		

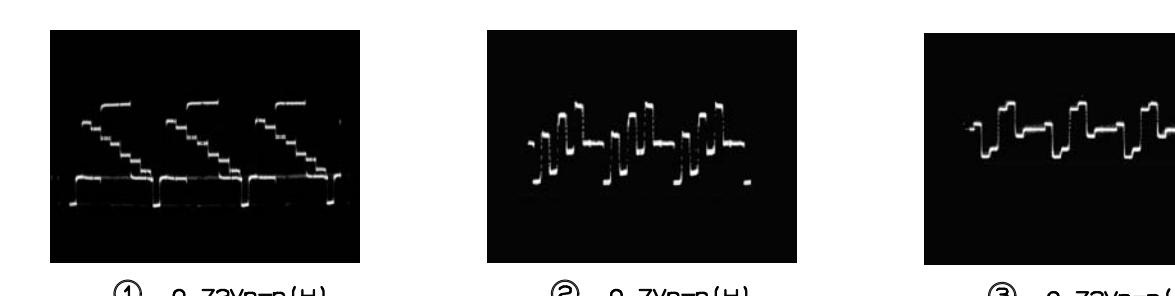
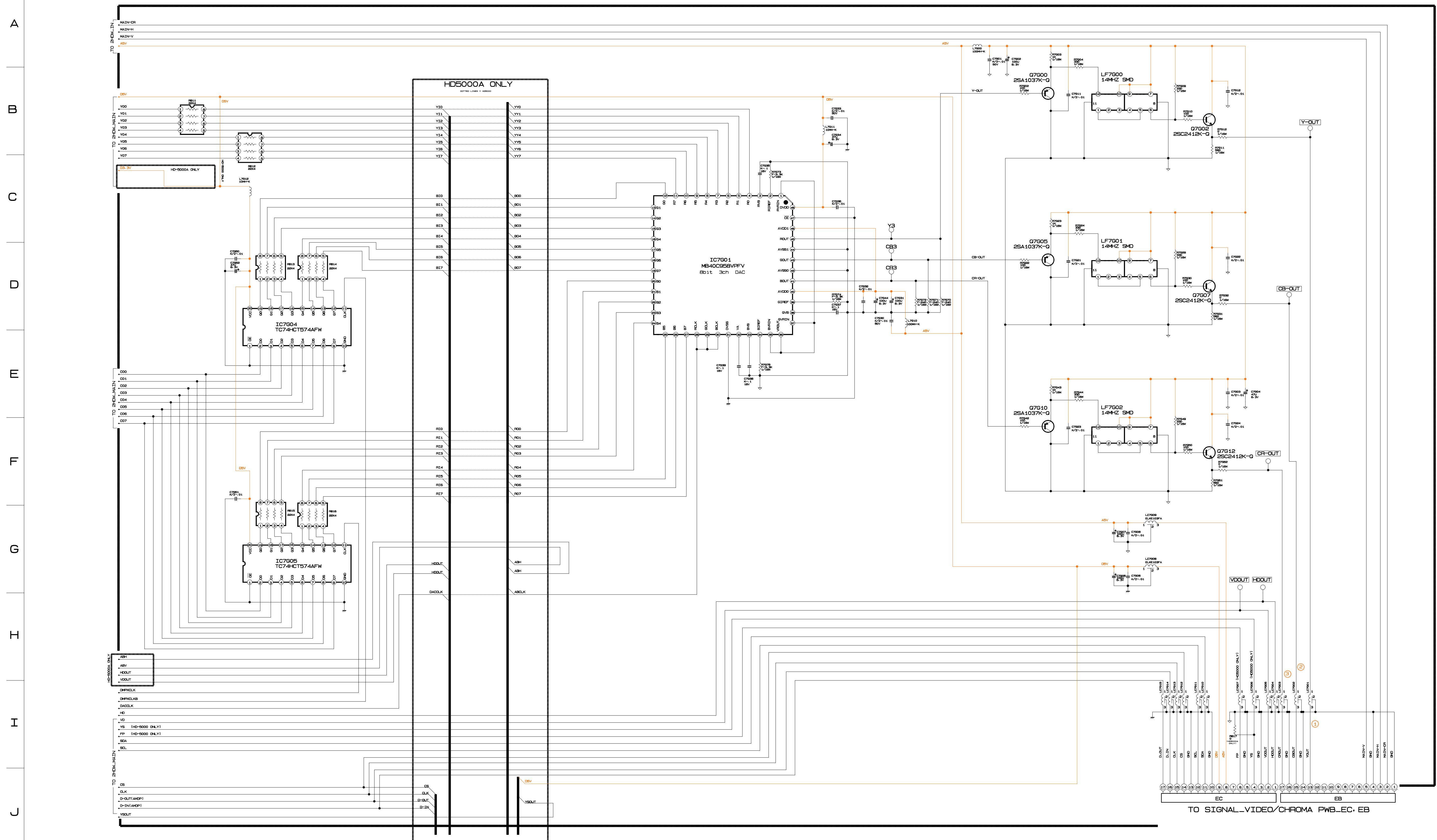


## CONTENTS

- |                                 |                                |
|---------------------------------|--------------------------------|
| PG. 1... BLOCK DIAGRAM          | PG. 10... 2HDW-1-IN            |
| PG. 2... POWER/CONTROL/E2P      | PG. 11... 2HDW-2-MAIN          |
| PG. 3... TERMINAL_1-JACK        | PG. 12... 2HDW-3-OUT           |
| PG. 4... TERMINAL_2-1-SW        | PG. 13... 2HDW-4-C720(HD5000A) |
| PG. 5... TERMINAL_2-2-3DYC_DEC. | PG. 14... DEMOD                |
| PG. 6... SIGNAL_1-MICRO         |                                |
| PG. 7... SIGNAL_2-LV/IO         |                                |
| PG. 8... SIGNAL_3-VIDEO/CHROMA  |                                |
| PG. 9... SIGNAL_4-IR/MV/DMP     |                                |
- HD-5000  
HD-5000A



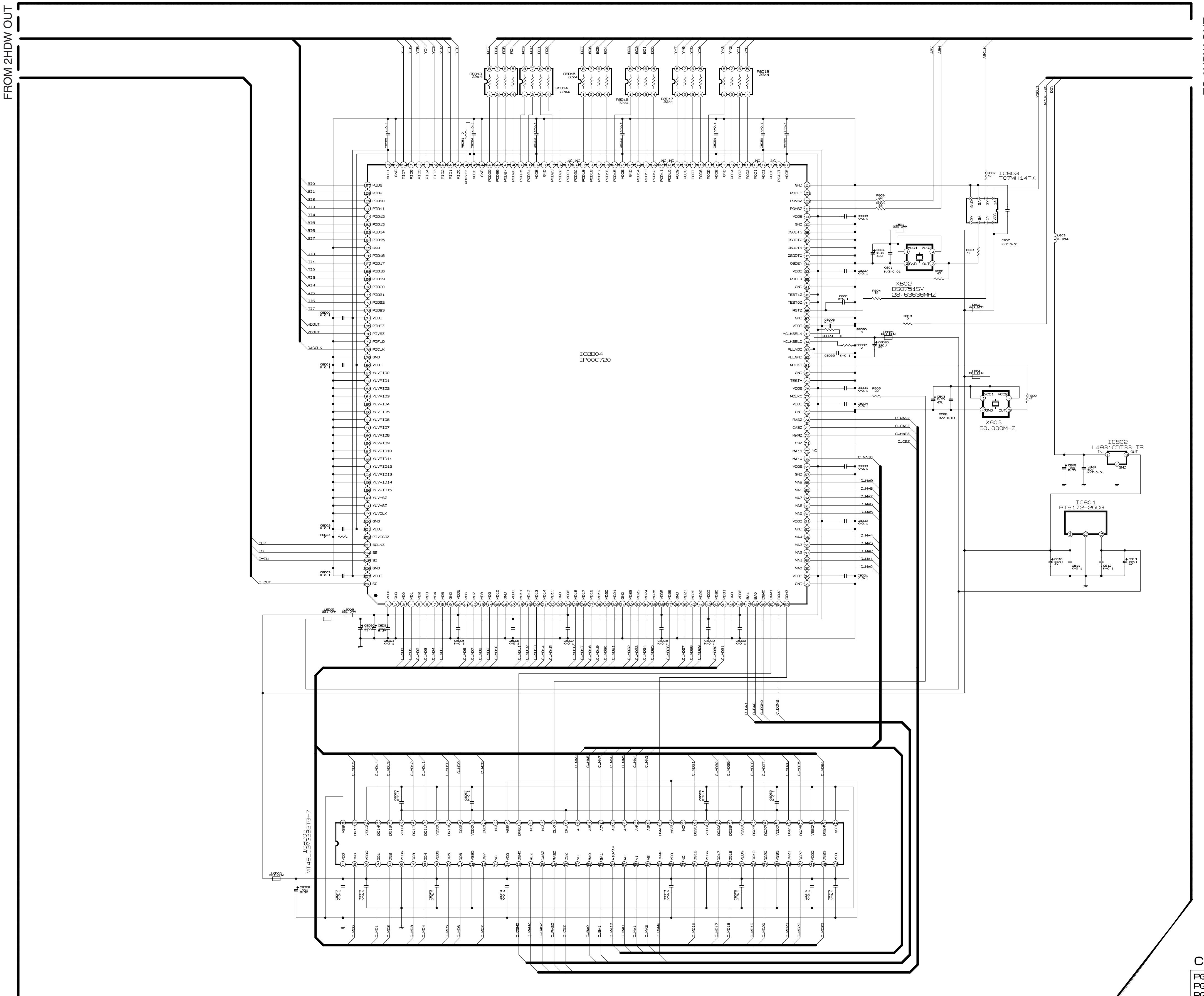
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#### CONTENTS

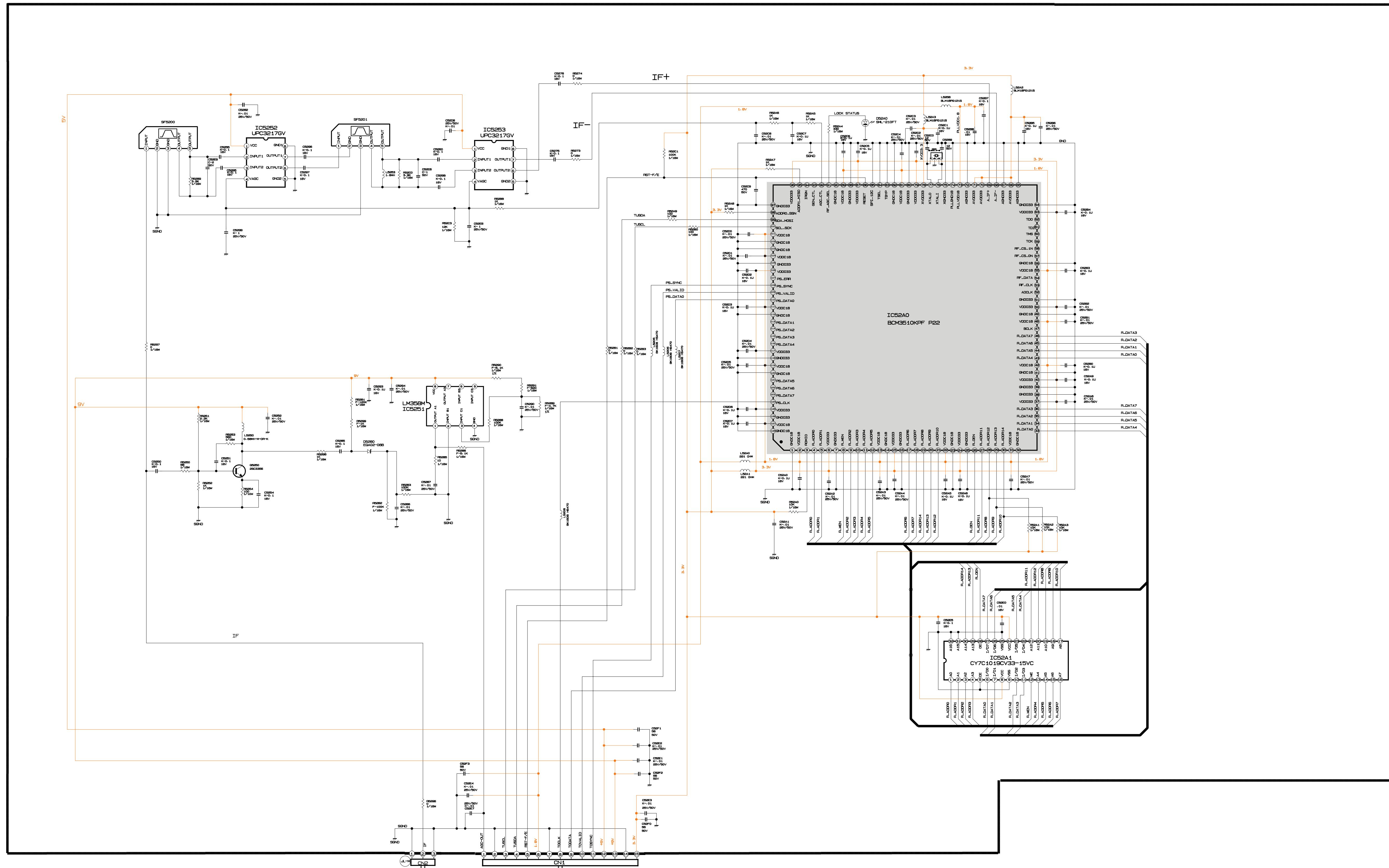
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  - PG. 2... POWER/CONTROL/E2P
  - PG. 3... TERMINAL\_1-JACK
  - PG. 4... TERMINAL\_2-1-SW
  - PG. 5... TERMINAL\_2-2\_3DYC, DEC.
  - PG. 6... SIGNAL\_1-MICRO
  - PG. 7... SIGNAL\_2-AV/IO
  - PG. 8... SIGNAL\_3-VIDEO/CHROMA
  - PG. 9... SIGNAL\_4-IR/MV/DMP
  - PG. 10... 2HDW\_1-IN
  - PG. 11... 2HDW\_2-MAIN
  - PG. 12... 2HDW\_3-OUT
  - PG. 13... 2HDW\_4\_C720 (HD5000A)
  - PG. 14... DEMOD
- HD-5000  
HD-5000A

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16



#### CONTENTS

PG. 1... BLOCK DIAGRAM	PG. 10... 2HDW_1_IN	HD-5000
PG. 2... POWER/CONTROL/E2P	PG. 11... 2HDW_2_MAIN	HD-5000A
PG. 3... TERMINAL_1_JACK	PG. 12... 2HDW_3_OUT	
PG. 4... TERMINAL_2_1_SW	PG. 13... 2HDW_4_C720(HD5000A)	
PG. 5... TERMINAL_2_2_3DYC_DEC.	PG. 14... DEMOD	
PG. 6... SIGNAL_1-MICRO		
PG. 7... SIGNAL_2-AV/10		
PG. 8... SIGNAL_3-VIDEO/CHROMA		
PG. 9... SIGNAL_4-IR/MV/DMP		

**CONTENTS**

- |                                 |                                 |          |
|---------------------------------|---------------------------------|----------|
| PG. 1... BLOCK DIAGRAM          | PG. 10... 2HDW_1_IN             | HD-5000  |
| PG. 2... POWER/CONTROL/E2P      | PG. 11... 2HDW_2_MAIN           | HD-5000A |
| PG. 3... TERMINAL_1_JACK        | PG. 12... 2HDW_3_OUT            |          |
| PG. 4... TERMINAL_2_1_SW        | PG. 13... 2HDW_4_C720 (HD5000A) |          |
| PG. 5... TERMINAL_2_2_3DYC_DEC. | PG. 14... DEMOD                 |          |
| PG. 6... SIGNAL_1_MICRO         |                                 |          |
| PG. 7... SIGNAL_2_AV/IO         |                                 |          |
| PG. 8... SIGNAL_3_VIDEO/CHROMA  |                                 |          |
| PG. 9... SIGNAL_4_IR/MV/DMP     |                                 |          |