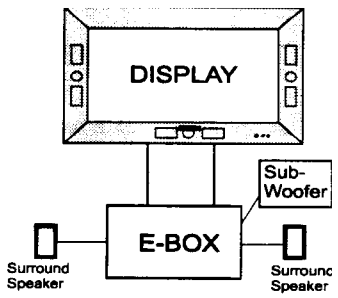
Colour Television **First Line**

FTV1.5E

AA

Service
Service
Service



Service Manual

Content

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PHILIPS

1 Introduction/Technical data

1.1 Introduction

1.1.1 General

The Flat-TV is compared with the current range of products a complete new product.

A service policy has been defined for the dealer to serve the Customer's needs. In this First Line Manual the dealer is explained how to repair the Flat-TV.

Explanation functioning 42" Plasma Display Panel (pdp)

The plasma display panel consists of 2 glass-plates with in between a matrix configured electrode structure, a gas and 3 phosphors-coatings (red, green, blue).

At the back of the display the row- and column-drivers and additional electronics are positioned.

The input to the panel are three digital 8 bit signals for each colour and synchronisation signals.

The 42" wide screen display consists of 852x3 columns and 480 rows. One cell (1.08x1.08 mm) consists of a red, a green and a blue phosphor (0.36x1.08 mm.

The pdp is an emissive panel, so not a light-modulator as an LCD. The pdp dissipates on average about 300 Watts; the viewing angle is 160°.

The light making process happens as follows:

A cell is 'on' or 'off'.

Light-modulation is done by means of cycles having different sustain periods, sub frames.

If a cell is addressed to make light, electrical signals activate a plasma between the electrodes which generates UV light. This UV light activates the phosphor to enlighten.

To give the cells different luminance during a frame (one complete picture), this frame is subdivided in 8 sequential sub-frames. The duration of the sub-frames could be seen as digitising the analogue video. (So more video amplitude means more luminance, more light). The cell will be addressed 'on' for a longer time. The integration of this 'on'-times is perceived as amount of light. The weight factors of the different sub frames are chosen as a compromise between movement artifacts and flicker.

1.2 Technical data

Display

- Visible diagonal: 42"
- Display type: AC-Plasma
- Number of pixels: 852 (*3)*480
- Aspect ratio: 16:9

1.2.2 Sound

- Sound system: 15 speaker HIFI-stereo
- Dolby Prologic L.R.C.S.
- Graphics equalizer
- Loudspeakers: 6*65x135 mm squeeter, 3*14 mm tweeters surround 4*4"
- Subwoofer (external): 2*5"
- Output (total): 120 W continuous RMS

Frequency response: 20 Hz - 20 kHz +/-3 dB

1.2.3 Reception

- Tuning system: 100 fold PLL
- Colour transmission system:
  -/12 PAL BG, SECAM BGL, NTSC 4.43
  -/19 PAL BGLI, SECAM BGLL'
- Channel selections: VHF, UHF, S-Channels, Hyperband
- Frequency range: 47.25 - 855.25 MHz
- VCR pre-selection: All inputs
- Aerial input: 75 Ohm (Coax)

1.2.4 Miscellaneous

- Ambient temperature: +0/+45 degrees C
- Maximum operating altitude: 2000 m
- Mains: AC 110 - 240 V
- Power consumption: around 450 W
- Stand by consumption: 2 W
- Weight display: 45 kg
- Weight e-box: 18 kg
- Dimensions display (w*h*d): 118.5x75x11.5 cm
- Dimensions e-box (w*h*d): 43.5x25x41 cm

2 Connections

2.1 Front connections e-box

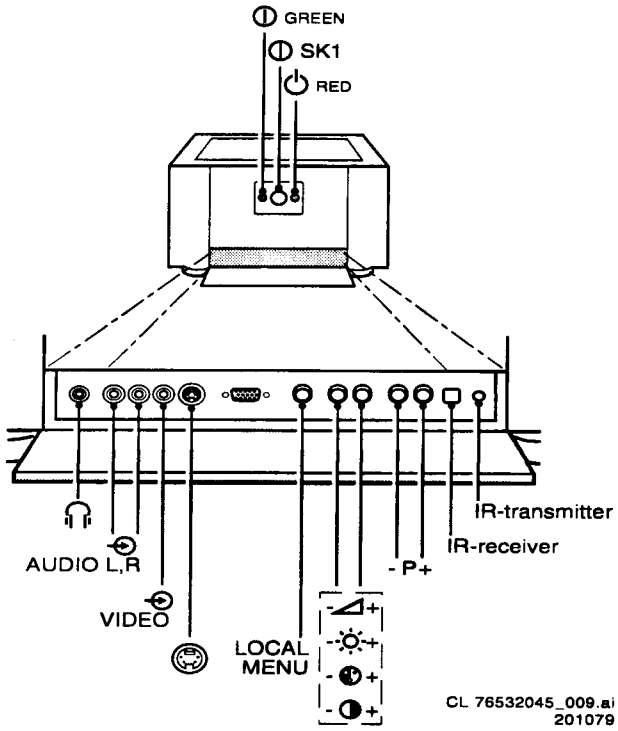


Figure 2-1

2.1.1 *Audio/Video*

-	Video	1Vpp/75Ω	◎
-	Audio	L(0.5Vrms ≥10kΩ)	◎
-	Audio	R(0.5Vrms ≥10kΩ)	◎
-	Headphone	(32-600Ω ≥10mW)	🎧

2.1.2 *SVHS*

2-			⊥
3-	Y	(1Vpp; 75Ω)	⊙
4-	C	(0.3 Vpp;75Ω)	⊙

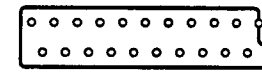
2.1.3 *VGA-in*

1-	Red	(0.7Vpp/75Ω)	
2-	Green	(0.7Vpp/75Ω)	
3-	Blue	(0.7Vpp/75Ω)	
4-			
5-			
6-	R		⊥
7-	G		⊥
8-	B		⊥
9-			
10-			⊥
11-			
12-			
13	-Hsync		
14-	Vsync		
15-			

2.2 Rear connections e-box/Connections set level

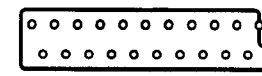
See figure 2.2

2.2.1 *EXT1(in/out): RGB+CVBS*



1-	Audio	R (0.5Vrms ≤1kΩ)	⊙
2-	Audio	R (0.5Vrms ≥10kΩ)	⊙
3-	Audio	L (0.5Vrms ≤1kΩ)	⊙
4-	Audio		⊥
5-	Blue		⊥
6-	Audio	L (0.5Vrms ≥10kΩ)	⊙
7-	Blue	(0.7Vpp/75Ω)	
8-	CVBS-status	0-1.3V:INT	
		4.5-7V:EXT 16:9	
		9.5-12V:EXT 4:3	⊙
9-	Green		⊥
10-			
11-	Green	(0.7Vpp/75Ω)	
12-			
13-	Red		⊥
14-	RGB-status		⊥
15-	Red	(0.7Vpp/75Ω)	
16-	RGB-status	(0-0.4V:INT	
		1-3V:EXT/75Ω)	
17-	CVBS		⊥
18-	CVBS		⊥
19-	CVBS	(1Vpp/75Ω)	⊙
20-	CVBS	(1Vpp/75Ω)	⊙
21-	Earth socket		

2.2.2 *EXT2(in/out): SVHS+RGB+CVBS (intended for VCR.)*

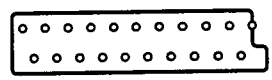


1-	Audio	R (0.5Vrms ≤1kΩ)	⊙
2-	Audio	R (0.5Vrms ≥10kΩ)	⊙
3-	Audio	L (0.5Vrms ≤1kΩ)	⊙
4-	Audio		⊥
5-	Blue		⊥
6-	Audio	L (0.5Vrms ≥10kΩ)	⊙
7-	Blue	(0.7Vpp/75Ω)	
8-	CVBS-status	0-1.3V:INT	
		4.5-7V:EXT 16:9	
		9.5-12V:EXT 4:3	⊙
9-	Green		⊥
10-		Easy link	
11-	Green	(0.7Vpp/75Ω)	
12-			
13-	Red		⊥
14-	RGB-status		⊥
15-	Red	(0.7Vpp/75Ω)	

16- RGB-status (0-0.4V:INT
1-3V:EXT/75Ω)
17- CVBS
18- CVBS
19- CVBS (1Vpp/75Ω)
20- CVBS (1Vpp/75Ω)
21- Earth socket

8- B
9-
10-
11-
12-
13 -Hsync
14- Vsync
15-

2.2.3 *EXT3(in): CVBS+Audio*



1-
2- Audio R (0.5Vrms >10kΩ)
3-
4- Audio
5-
6- Audio L (0.5Vrms>10kΩ)
7-
8-
9-
10-
11-
12-
13-
14-
15-
16-
17- CVBS
18- CVBS
19-
20- CVBS (1Vpp/75Ω)
21- Earth socket

2.2.4 *Audio out:*

- Audio L(constant level 0.5Vrms; ≤ 1KΩ/ variable level)
Audio R(constant level 0.5Vrms; ≤ 1KΩ/ variable level)

2.2.5 *Audio VGA-in:*

- Cinch Audio L(0.5Vrms ≥ 10KΩ,)
- Cinch Audio R(0.5Vrms ≥ 10KΩ)

2.2.6 *Audio VGA-out:*

Cinch Audio L(0.5Vrms ≤ 1kΩ)
Cinch Audio L(0.5Vrms ≤ 1kΩ)

2.2.7 *VGA-in/VGA-out*

1- Red (0.7Vpp/75Ω)
2- Green (0.7Vpp/75Ω)
3- Blue (0.7Vpp/75Ω)
4-
5-
6- R
7- G

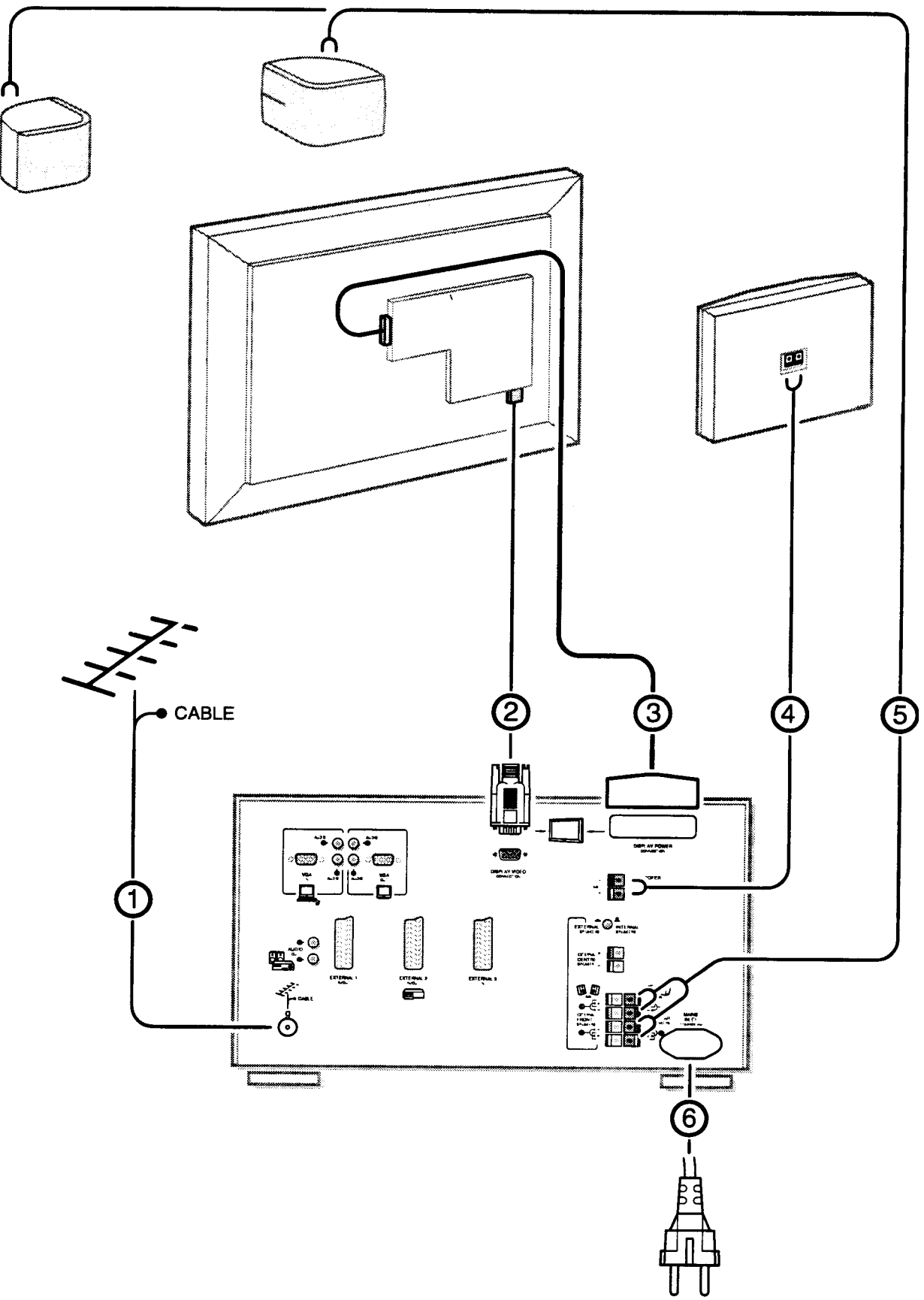


Fig 2-2

3 Safety Instructions, Warnings and Notes

3.1 Safety Instructions

If the mains switch is switched off, the set still has live voltages on the mains input filter, as this is positioned before the mains switch. When the mains switch is switched off , parts of the following panels: Pre-conditioner, Audio & Standby Supply and the Set & Display Supply are live. (all these panels are inside the e-box). This is due to the fact that the relays on the Pre-conditioner circuitry to de-activate all circuits behind it, is single-pole switched. The service-technician will be warned with a Safety warning sticker on the inner e-box.
It is not allowed to operate the FTV-set without glass plate. One function of this glass plate is to absorb Infrared Radiation. Without this glass plate the level of Infrared Radiation produced by the plasma display could damage your eyes.

1. Safety regulations require that during a repair:
   - The set should be connected to the mains via an isolating transformer (in this particular case a transformer of ≥ 800 VA);
   - Safety components, indicated by the symbol, see figure above, should be replaced by components identical to the original ones;

2. Safety regulations require that after a repair the set must be returned in its original condition.
   - Note:
     The wire trees should be routed correctly and fixed with the mounted cable clamps.
   - The insulation of the mains lead should be checked for external damage
   - The electrical DC resistance between the mains plug and the secondary side should be checked (only for sets which have a mains isolated power supply). This check can be done as follows:
     - unplug the mains cord and connect a wire between the two pins of the mains plug;
     - set the mains switch to the on position (keep the mains cord unplugged!);
     - measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ;
     - switch off the FTV and remove the wire between the two pins of the mains plug

   The cabinet should be checked for defects to avoid touching of any inner parts by the customer.

3.2 Warnings

ESD
All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.

2. Available ESD protection equipment:
   a. anti-static table mat, large 1200x650x1.25mm: 4822 466 10953
   b. anti-static table mat, small 600x650x1.25mm: 4822 466 10958
   c. anti-static wristband: 4822 395 10223
   d. connection box (3 press stud connections, 1 MΩ): 4822 320 11307
   e. extension cable (2 m, 2 MΩ; to connect wristband to connection box): 4822 320 11305
   f. connecting cable (3 m, 2 M Ω; to connect table mat to connection box): 4822 320 11306
   g. earth cable (1 M Ω; to connect any product to mat or connection box): 4822 320 11308
   h. complete kit ESD3 (combining all 6 prior products - small table mat): 4822 310 10671
   i. wristband tester: 4822 344 13999

3. Never replace modules or other components while the unit is switched on.
4. When making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable

3.3 Notes

A glass plate is positioned before the plasma display. This glass plate can be cleaned with a slightly humid cloth. If due to circumstances there is some dirt between the glass plate and the plasma display panel it is recommended to do some maintenance by a qualified service employee only. Never disconnect the power display cable when the set is operating.
With DST no failures (error-codes) can be read, when set is in Service-mode.
If DST reacts with 'error 2', there is no communication between set and DST. Notice that IR-transmitter LED is positioned at right side of IR-receiver eye of the e-box. Take into account that receive-LED on DST is positioned not in the middle but at the left side. Point corresponding LEDs to each other. In case the amount of Infrared produced by the screen pollutes the communication, the set can be set in Standby-mode. Then still the error-messages can be retrieved.

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4 Repair instructions

4.1 General repair approach

As the product is rather complex for servicing, it has been decided to repair the set from the dealers' perception in an easy way. The dealer is expected to diagnose in high level functions, where the set-problem is located. This can be:

electronic box (e-box) and some mechanical parts (see figure 12-2)
electrical parts of display box (see figure 12-1):
- plasma display [FU]
- pdp-interface panel [FI]
- pdp-discharge panel [FD]
- led-display panel [FW]

connections, being (see figure 12-2):
- display video cable
- display power cable
- mains cord
- aerial cable

styling parts of display box (see figure 2-2)

The repair procedure will be explained step by step.

1. First the dealer does some nuisance check ups with the customer, either together with the customer by phone or by visiting the customer.
2. When the complaint is valid, the repair technicians of the dealer (2 persons) take as well the display-box as e-box to dealer's site. Use will be made of foam cushion and set will be transported to the dealer's site. Cabling will be left at Customer's home, if necessary. Dealer can order these cables separately. If the complaint has to do with a mechanical or styling part, this can be ordered and replaced at the Customer's home.
3. At the dealer's site the set is being diagnosed. The problem could be caused by one of the next parts/components:
   - internal e-box
   - pdp-interface-panel of display-box [FI]
   - pdp-discharge-panel of display-box [FD]
   - led-display panel of display-box [FW]
   - loudspeaker-assemblies
   - plasma display panel [FU]
   - one of the fans in the e-box
   - one of the cables (mains cord [6], aerial cable [1], display video cable [2], display power cable [3]
4. After diagnosis the dealer orders a spare part directly at the local service organization. See also paragraph 4.2.
5. The dealer repairs, and aligns black and white settings of the set if necessary, checks and returns the set to the customer.
6. Set will be re-installed at the Customer's home.

If the e-box is defective the dealer can order an inner e-box (so without styling); see paragraph 4.2.

Pack the defective e-box in the packaging of the new received e-box and sent it to your local service organization. This defective e-box should be accompanied with a copy of a repair form on which the failure description is stated. This information will be used as input for the Central Repair Workshop.

4.2 Central Repair Procedure:

This set contains one or more printed wiring boards or assemblies, which will be repaired centrally via a 'central repair procedure'. These parts/assemblies are marked with a 'R' in the spare parts list (chapter 13). Contact your local service organization for a resent request. After confirmation a replacement assembly will be sent to you. Send the defective assembly including a filled-in 'repair form' to your local service organization. The defective parts should be correctly packed inclusive ESD protection material. The original packing of the replacement part can be used for this purpose. The accompanying 'repair form should contain all basic information such as:

- full name and address of the sender
- service code of part
- model and/or type number part/assembly
- full model number of the set
- serial number/production code of the set
- description of the failure including timing indication (immediate, after. minutes warm-up up, sometimes)

For this purpose you can make use of a standard repair form: ordering code 4822 727 20133 (packing quantity 10 pieces)

For the plasma display a different procedure is valid. A special form accompanies the packaging of the new received panel. It has been agreed with the display supplier to provide them with this information.

4.3 Repair instructions

Available service accessories : (for code numbers see the spare parts list)

- VGA interface block
- Dealer Service Tool (RC7150)
- Test pattern-software (floppy)
- Dealer stand
- Connecting cables (in case the connecting cables are left in the Customer's home)
  - Mains power cable
  - Display power cable
  - Display video cable

Workshop equipment to support the diagnosis:

PC (486 with Windows and with a true colour video card)
PC-monitor that can handle 50 and 60 Hz frame frequencies.
Foam-cushion for protection, transportation
Service-generator (e.g. PM5518), multi meter, oscilloscope
Torque screwdrivers 10, 15 and 20

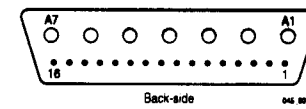


Figure 4-1

Connections	descriptions	Voltage
A1	GND Vs-Va	0 V
A2	Vs	< 185 Vdc
A3	GND Vs-Va	0 V
A4	Va	< 65 Vdc
A5	GND Vs-Va	0 V
A6	Vcc	< 5.25 Vdc

A7	GND Vcc	0 V
1	Vrs	< 2Vdc
2	Vra	< 2Vdc
3	Vrr	< 5Vdc
4	Vcc, sense	< 5.25 Vdc
5	Va, sense	< 65 Vdc
6	Vs, sense	< 185 Vdc
7	GND Sense	0V
8	V12	< 14 Vdc
9	GND V12	0 V
10	+5 Vstby	< 5.25 Vdc
11	C	< 30 Vp
12	GNDC	0 V
13	L	<30 Vp
14	GND L	0 V
15	R	< 30 Vp
16	GND R	0 V
17	reserve	< 30 Vdc

Check e-box:
The e-box can be checked in an easy way.

- Supply-part: See figure 4.1 of connector-socket of e-box, located at the back of the e-box. Remove display power cable and display video cable from e-box. (Note: without disconnecting the display video cable, the set will go in protection). Make with a wire a robust connection between connection-hole A6 (Vcc, 5 V) and connection-hole 3 (Vrr). Now you can measure:
  pin A2: 165 V (Vs) versus A1
  pin A4: 55 V (Va) versus A1
  pin A6: 5 V (Vcc) versus A7
  pin 8: 12 V (V12) versus shielding e-box
  pin 10: 5 V (5Vstby) versus shielding e-box
  Should this voltages be not available then exchange e-box by a new one

  Processing-part: connect display video cable from e-box to VGA-monitor (ordering code 4822 263 21189). Use special VGA-interface block in series with this cable. (this block interrupts the signals 4 and 11 of the cable). If monitor does not give correct picture, exchange e-box. Take care the monitor can handle 50 and 60 Hz frame-frequencies
  Additional repair instructions are given in the fault finding tree of figure 4-6.

2. Check display-box: (place the display in a stand; ordering code 4822 462 11011).
   - Check with working e-box (in order to supply the display) and with VGA-signal of a PC whether the FTV-display functions. (The start-up behaviour of DOS of a PC, gives a VGA 640x480 picture on the screen). If this functionality is not in order, do the following:
     Remove encasing board (this board covers some PWBs at the back of the display-box). (10 torque 10 screws)

3. Check Pdp-discharge panel [FD]:
   See layout FD-board (figure 4-2).
   Measure at:
   - FD1: Vs should be 175 V, versus GND FD172.10
   - FD2: Va should be 60 V, versus GND FD172.10

   - FD3: Vcc should be 5 V, versus GND FD177.3
   - FD4: V12 should be 12 V, versus GND FD175.2
   - FD5: V-fan should be between 5 and 12 V, versus GND FD175.2
   - FD6: 5Vstby should be 5 V, versus GND FD175.2

4. If voltage is missing check before and after display power cable connections itself. Also check whether the voltages Vs, Va and Vcc are still correct at the output connectors FD171 and FD173. See DC-supply diagram in chapter 5. If this is defective the pdp-discharge panel is defective and should be exchanged.

   If Vrr is high however for a short while (measure with oscilloscope) or constant low, then the display is most likely defective. (check as above whether e-box itself is functioning well). In case of doubt please double check this, to avoid unnecessary transport costs
   When the test voltages however are correct and also the fans operate (at top side of display box there are 4 fans), the adjacent panel must be checked. This is the pdp-interface panel.

5. Check Pdp-interface panel [FI]:
   The pdp-interface-panel is fixed via the D-sub socket (two 5 mm bolts to be unscrewed with a socket spanner) and some plastic holders. Remove the panel from the holders. Turn it 180 degrees and place it in the holders again. The solder side can be accessed now. In figure 4-3 the test points overview is showed together with wave forms. Check first the supply-voltages. The GND connected to the shielding of the video display cable connection can be used as GND.
   Before measuring, the set must be set in a default condition. The set will be placed in Service default Mode via the dealer remote. (See chapter 6.). A PAL-colour pattern signal is generated with a service generator on a frequency of 475.25 MHz.
   The test points can be measured with a oscilloscope (see wave forms adjacent figure 4.4) and with a DC-voltmeter
   Results should be:
   PD1: 5V
   PD2..PD4: Red, green, Blue
   PD5: Contrast Voltage. Will be typical 4.3 V
   PD6: VsyncN
   PD7: HsyncN
   PD8 : RC5
   PD9 : I2C SDA
   PD10..PD12: Red, Green, Blue
   PD13: I2C SCL

   For the test points PD15 until PD38 following signal condition is required. The set must be set via the dealer remote in Service Alignment Mode (see chapter 6). Via menu-structure an internal test pattern can be activated. The picture content changes from black to white and vice versa in about 4 seconds. It can be checked now whether one or more of the 24 digital outputs (of Red, Green and Blue) function adequately dependent of colour loss or discontinuous pictures:
   PD15..PD22: (digital outputs of Red ADC from most significant bit to the least significant bit)
   PD23..PD30: (digital outputs of Green ADC from most significant bit to the least significant bit)
   PD31..PD38: (digital outputs of Blue ADC from most significant bit to the least significant bit)

PD39: (DCLK)
PD40: BlankN
PD41: HsyncN
PD42: VsyncN

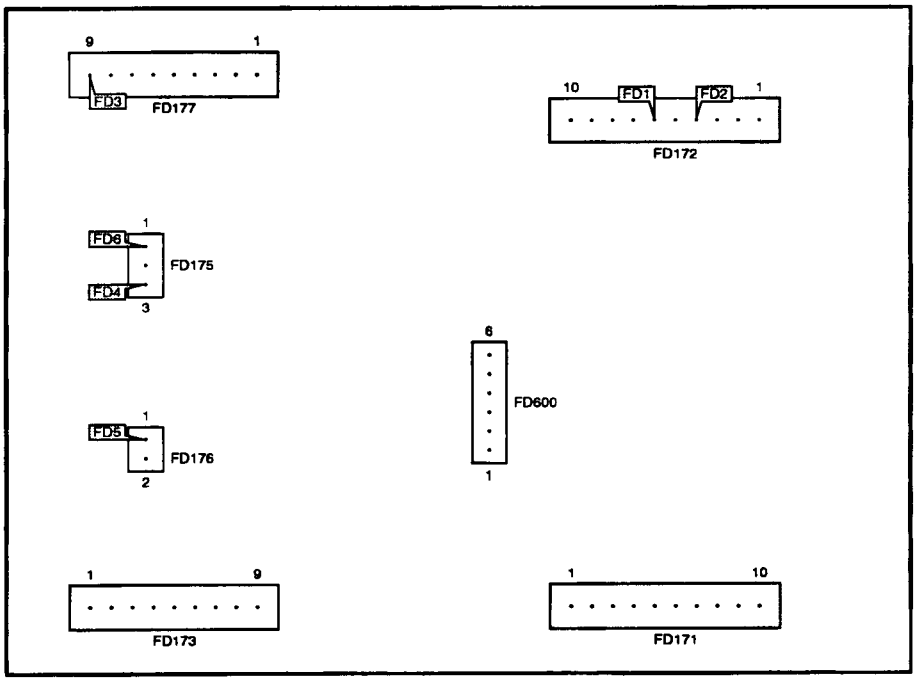
If test points do not match with the referring wave forms, the panel is defective and must be exchanged by a new one.

6. Check Led panel display [FW]: (see figure 4-4)
   Check availability of power supplies 5Vstby, Vcc. Check whether components 3301, 5300 or 5320 are interrupted. If one of the components is defective, exchange FW-panel. If absence 5VStby is caused by pdp-discharge-panel or pdp-interface-panel check both panels. If otherwise the e-box must be exchanged. See Vdc-supply diagram (chapter 5)

7. Exchange the glass plate: (see figure 12-1)
   Remove front profile [1] by two torque-15 screws at bottom of display-box. Disassemble glass plate fixation at the top side of glass plate. Remove glass plate and exchange with a new one [2].

8. If the plasma display is defective exchange the plasma display. (see figure 12-1)
   - Remove front profile [1], glass plate fixation and glass plate [2]
   - At the top middle of the display-box (front-side) 2 connectors should be pulled towards you. Disconnect those in order to make wiring loose from back profile [7]
   - Remove back profile fixation from back cover by 8 torque-20 screws.
     Remove the emc-springs [9]
   - Place back cover with plasma display with glass side on a foam-cushion.
   - Remove back cover from plasma display by 8 torque-20 screws, also the 2 Z-shape copper springs at right top side (rear view)
   - Write down serial number of plasma display and complaint-code on mentioned special form; see paragraph 4.2
   - Assemble wooden plate (delivered with new display panel) with accompanied screws
   - Pack defective panel in original packaging and return it.
   - Assemble new plasma panel in reverse sequence (inclusive 2 two Z-shape springs) and check functioning display.

9. Exchange defective fan, loudspeaker assembly (see exploded view mechanics display-box, chapter 12)
   Indicated in the exploded views



(Component-side)

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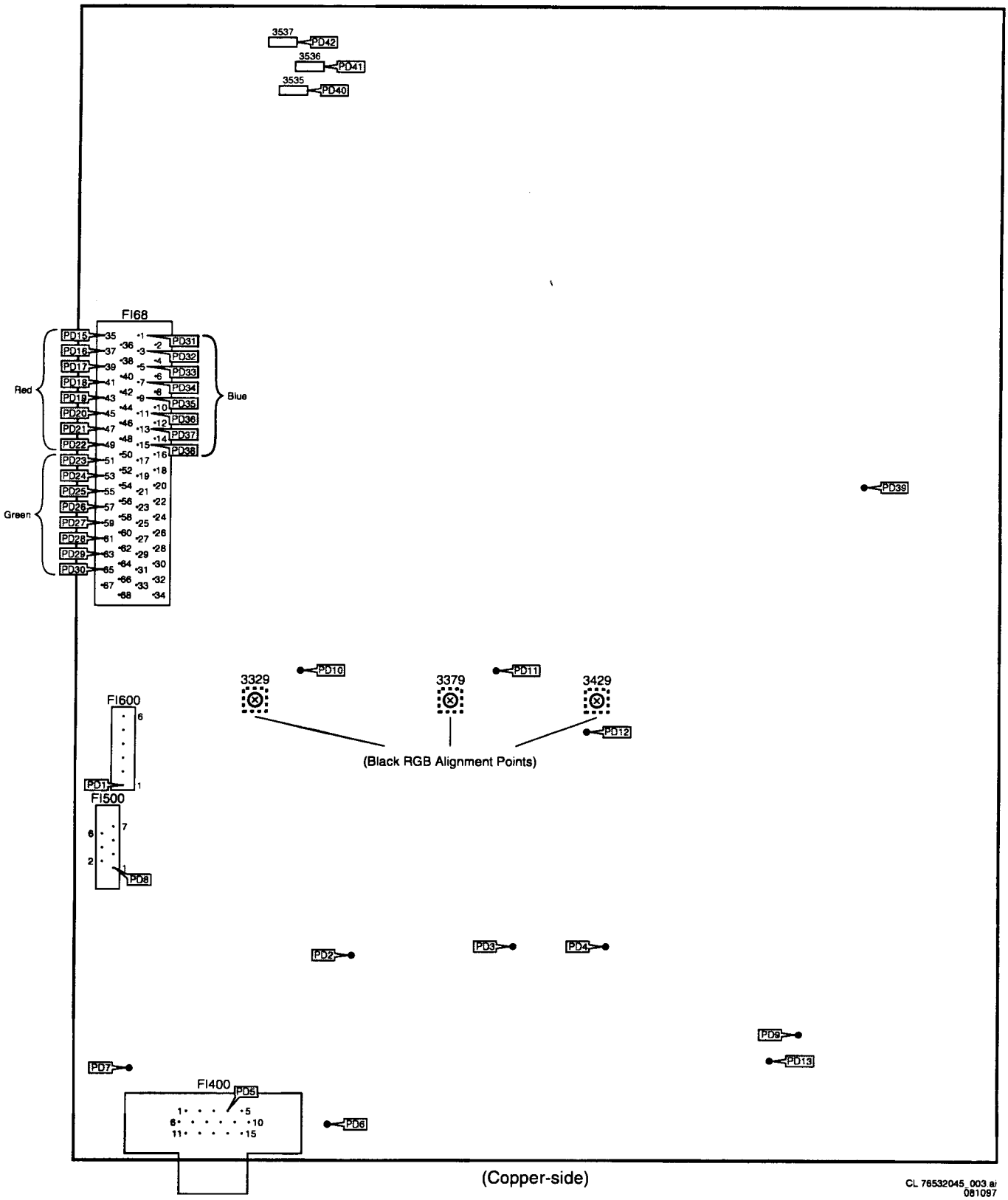
Figure 4-2


3537
PD42
3536
PD41
3535
PD40
FI68
Red
Blue
Green
PD15
PD16
PD17
PD18
PD19
PD20
PD21
PD22
PD23
PD24
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PD28
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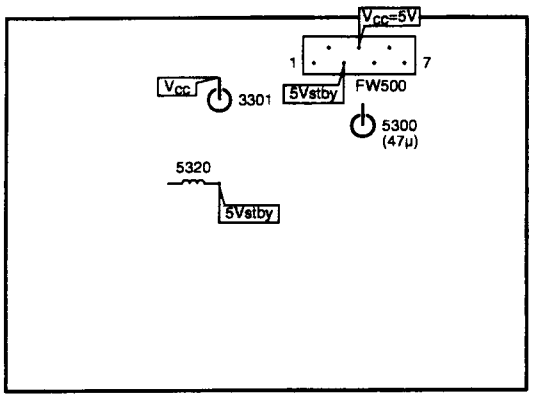
PD36
PD37
PD38
PD39
3329
3379
3429
PD10
PD11
PD12
(Black RGB Alignment Points)
FI600
PD1
FI500
PD8
PD2
PD3
PD4
PD9
PD13
PD7
FI400
PD5
PD6
(Copper-side)
CL 76532045_003.ai
081097

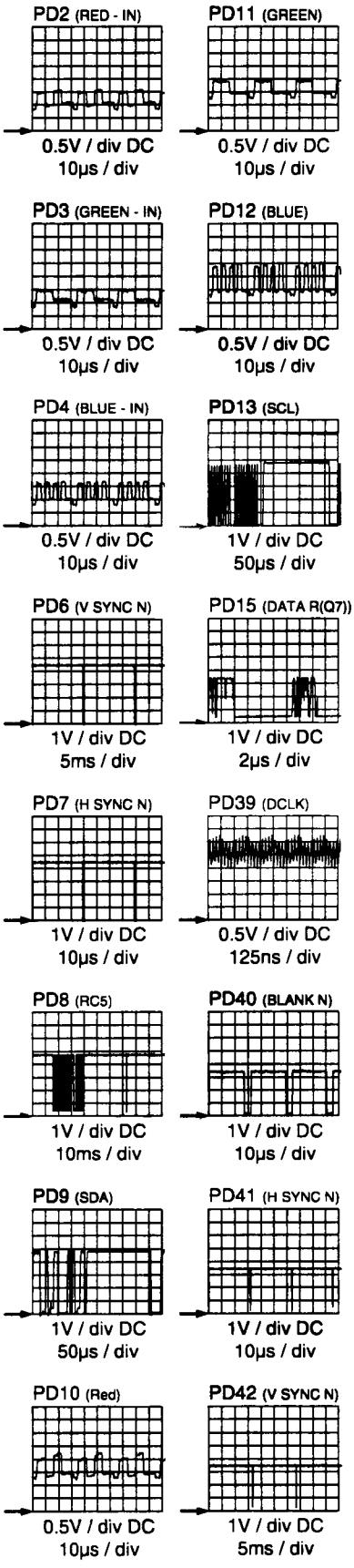
Figure 4-3



(Component-side)

CL 76532045_001.ai
081097

Figure 4-4



76532045_011.AI
201097

Figure 4-5

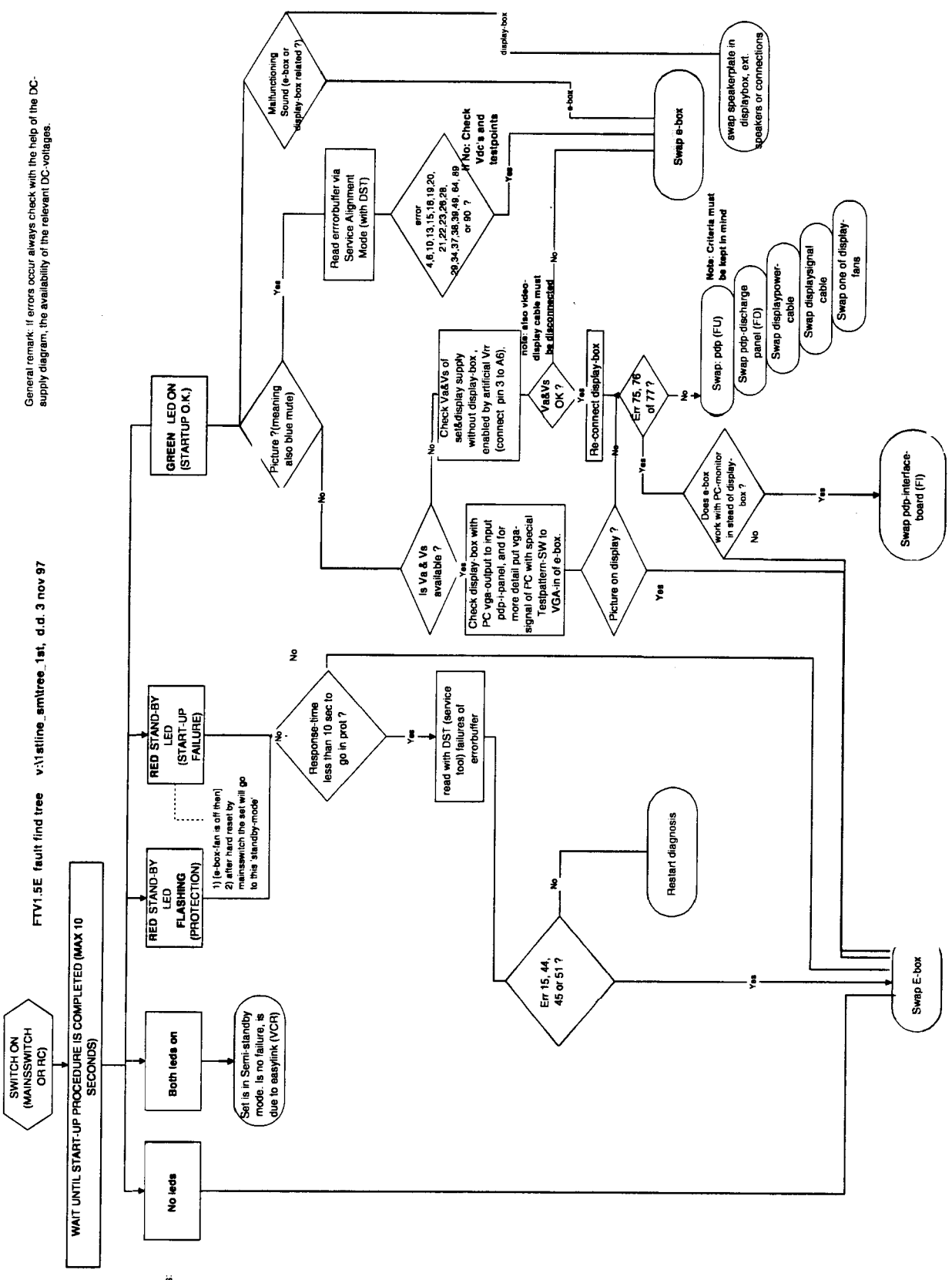
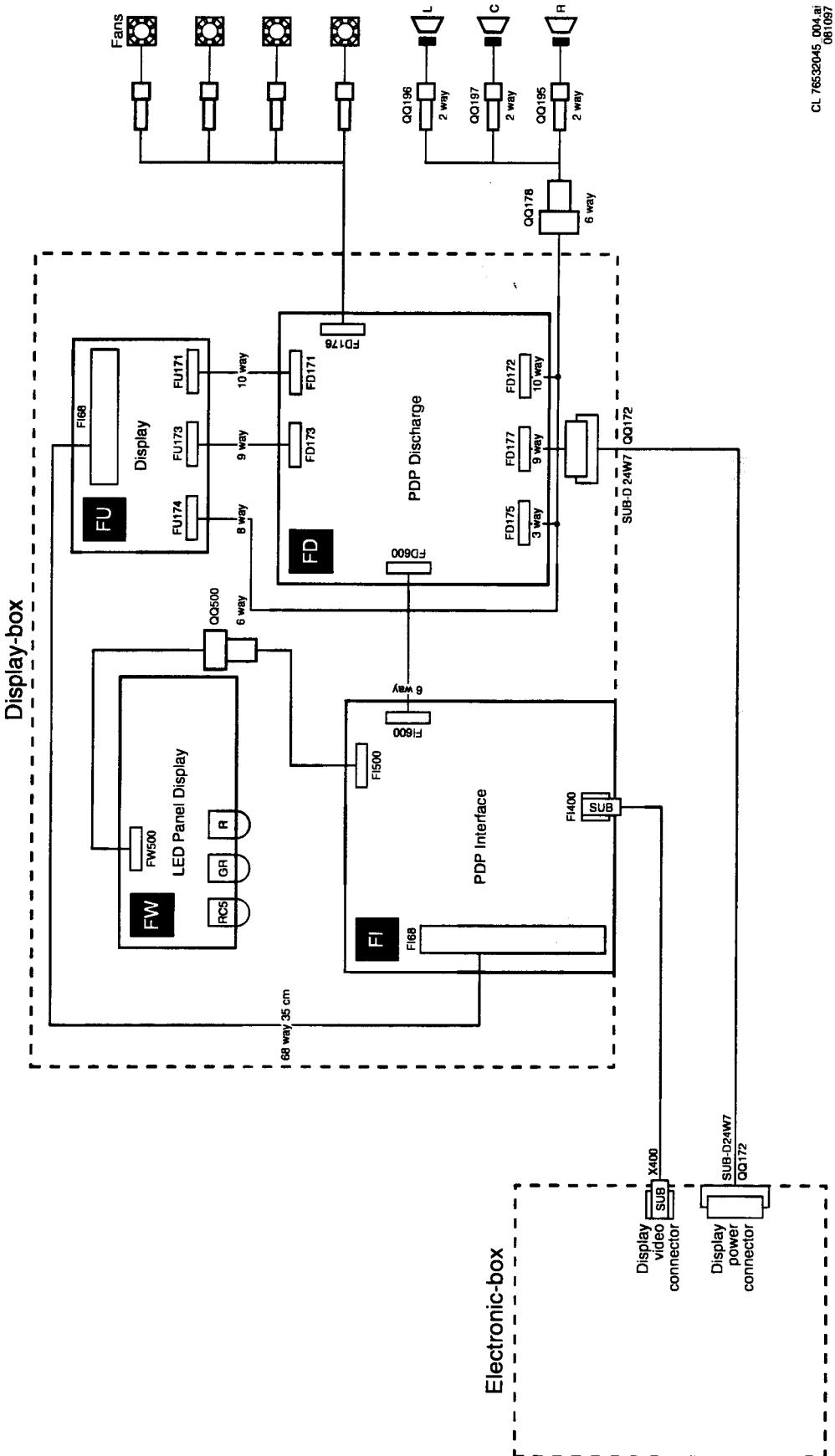

General remark: if errors occur always check with the help of the DC-supply diagram, the availability of the relevant DC-voltages.
FTV1.5E fault find tree v:\1stline_sm\tree_1st, d.d. 3 nov 97
SWITCH ON (MAINSSWITCH OR RC)
WAIT UNTIL START-UP PROCEDURE IS COMPLETED (MAX 10 SECONDS)
E-box leds:
No leds
Both leds on
Set is in Semi-standby mode. Is no failure, is due to easylink (VCR)
RED STAND-BY LED FLASHING (PROTECTION)
1) (e-box-fan is off then)
2) after hard reset by mainsswitch the set will go to the 'standby-mode'
RED STAND-BY LED (START-UP FAILURE)
Response-time less than 10 sec to go in prot ?
No
Yes
read with DST (service tool) failures of errorbuffer
Err 15, 44, 45 or 51 ?
No
Restart diagnosis
Yes
Swap E-box
GREEN LED ON (STARTUP O.K.)
Picture ?(meaning also blue mute)
Yes
Read errorbuffer via Service Alignment Mode (with DST)
error 4,8,10,13,15,18,19,20, 21,22,23,26,28, 29,34,37,38,39,49, 64, 89 or 90 ?
No: Check Vdc's and testpoints
Yes
Swap e-box
Malfunctioning Sound (e-box or display-box related ?)
display-box
e-box
swap speakerplate in displaybox, ext. speakers or connections
No
Is Va & Vs available ?
Yes
Check display-box with PC vga-output to input pdp-i-panel, and for more detail put vga-signal of PC with special Testpattern-SW to VGA-in of e-box.
No
Check Va&Vs of set&display supply without display-box , enabled by artificial Vrr (connect pin 3 to A6).
note: also video-display cable must be disconnected
Va&Vs OK ?
Yes
No
Re-connect display-box
Picture on display ?
No
Yes
Err 75, 76 of 77 ?
No
Yes
Swap: pdp (FU)
Swap pdp-discharge panel (FD)
Swap displaypower-cable
Swap displaysignal cable
Swap one of display-fans
Note: Criteria must be kept in mind
Does e-box work with PC-monitor in stead of display-box ?
No
Yes
Swap pdp-interface-board (FI)

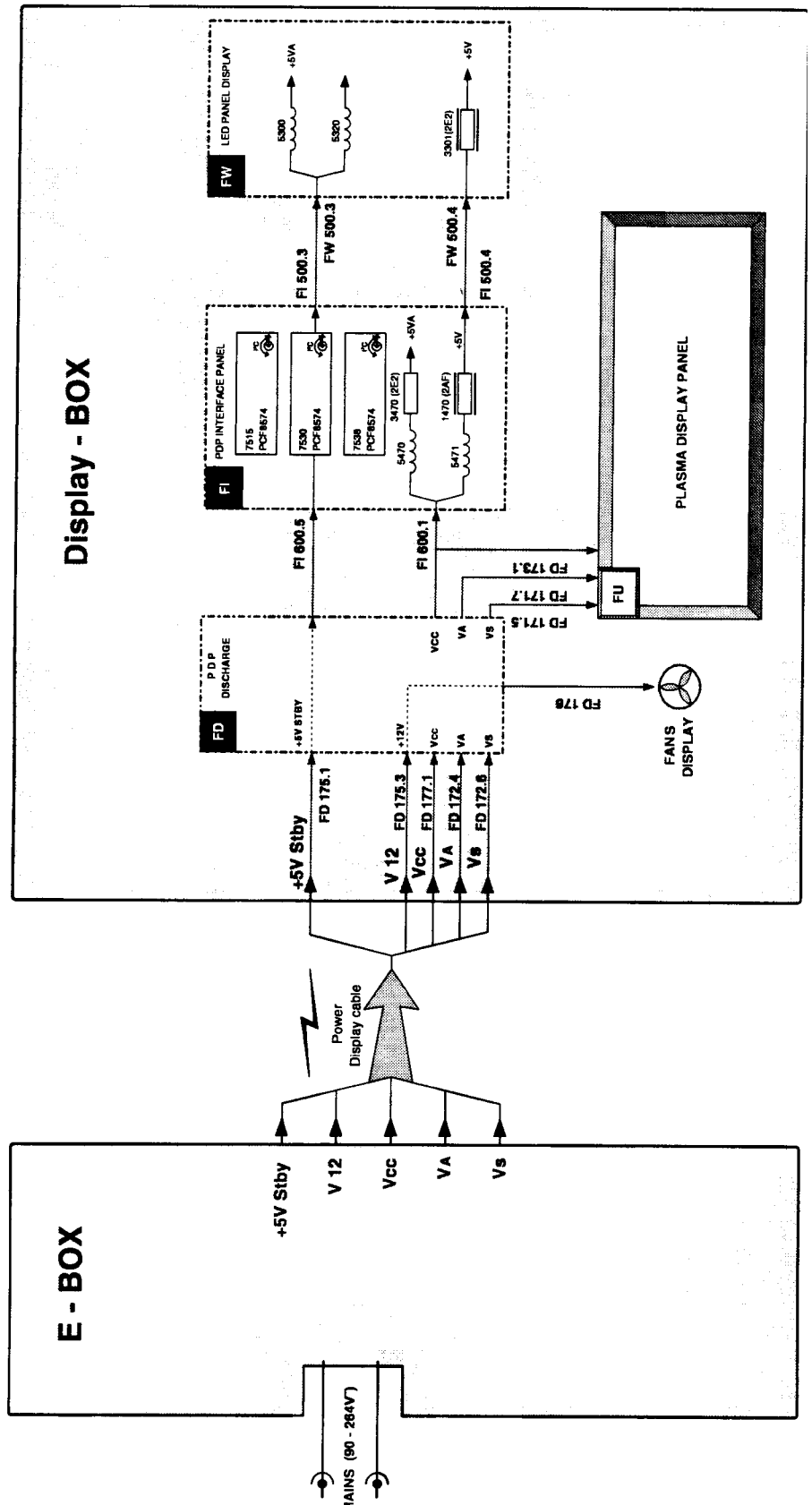
Figure 4-6

Connection diagram

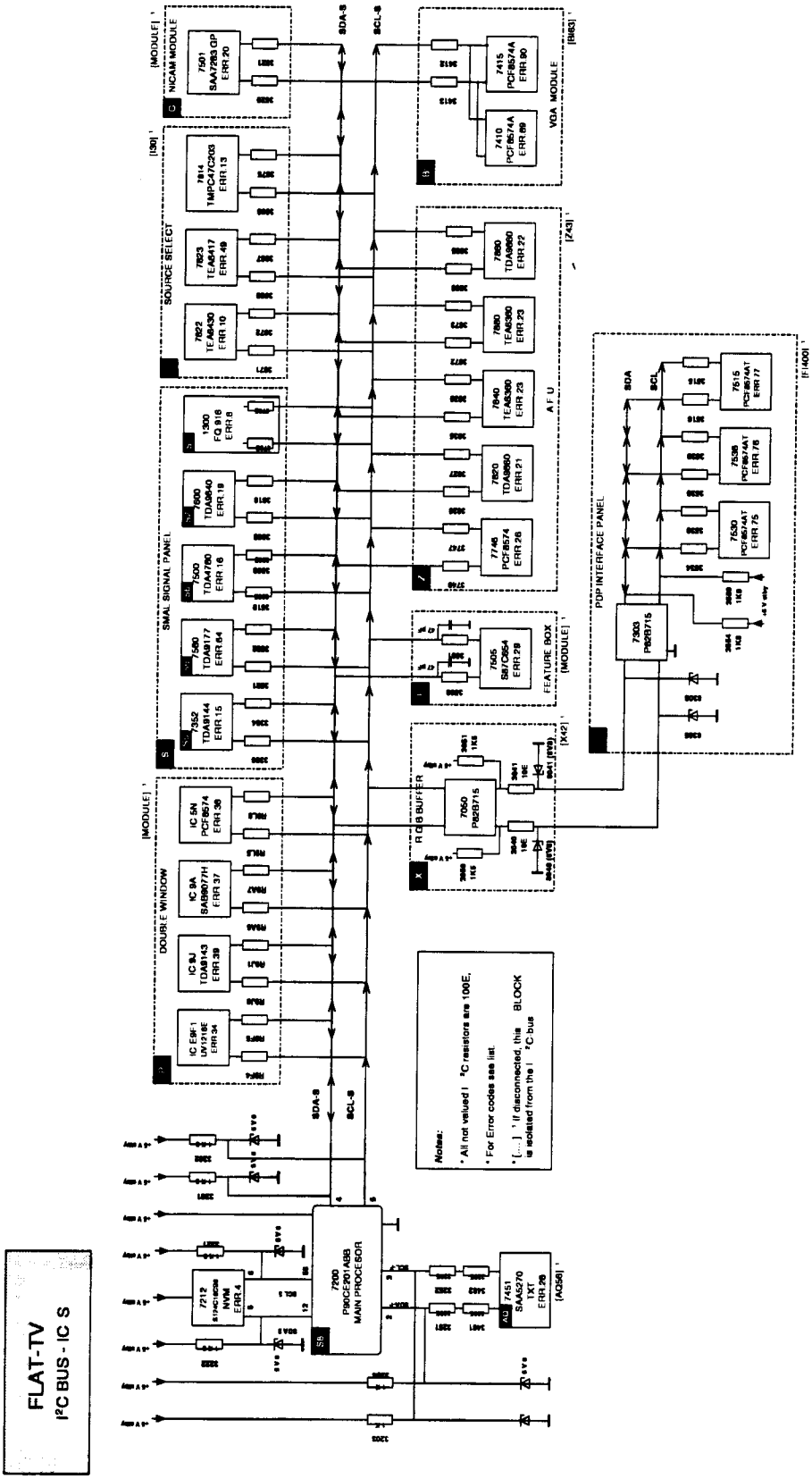


FLAT-TV

DC SUPPLY VOLTAGE DIAGRAM (limited)



5 Block diagrams



VIONDLINE SMUIC_BUS.VSD
Last modified date: Monday 3 November

6 Service tools/Service tips

6.1 Service Hardware-tools

DST (Dealer Service Tool RC7150) For detailed explanation see paragraph 6.6.
In the main-software of the set a service-protocol is implemented.
By putting the set in a special mode, the software can detect whether ICs that are connected to the so-called I2C-bus operate adequately.
Via an infrared-transmitting led, located behind the cover of the e-box, at the right from the IR-receiver eye, information can be sent to the DST. The DST has a display on which the error codes can be displayed (see error table 6.4). If one of the codes 4, 6, 10, 13, 15, 16, 19, 20, 21, 22, 23, 26, 28, 29, 34, 37, 38, 39, 44, 45, 49, 51, 64, 89, 90 are displayed, the defect is e-box related. If code 75, 76 or 77 than the failure is display-box or e-box related.
PC-monitor.
This PC-monitor gives the possibility to test the e-box signal processing without display box. This monitor must be foreseen with a special VGA-interface block (ordering code 4822 263 21189) that interrupts pin 4 and 11 of VGA-cable. (4 = contrast down, 11=RC5). Take care that the connected monitor can handle 50 Hz and 60 Hz frame frequencies.

6.2 Service Software-tools

Service related Software-modes:

- SAM (Service Alignment Mode)
  Push <align >-button of DST and input password "3140" and push <OK>-button.
  The next data will be displayed:
  Line (1) Date and version number SW
  Line (2) Operating hours
  Line (3) The error buffer-content {note: maximal 10 error}
  xx1 xx2 xx3 xx4 xx5
  xx6 xx7 xx8 xx9 x10
  {First mentioned error (top left) is the last occurred error}
  Line (4) Description defective module.
  With 'Reset error buffer' the buffer can be erased.
  With 'Functional test' the error check will be executed again.
  With ' Alignments' a lot of settings can be made. (more details in chapter 'alignments' (see chapter 8)
  The SAM can be de-activated by pushing the <menu>-button
- SDM (Service Default Mode) Push on <default >-button on dealer remote . Set is tuned in this mode on a frequency of 475.25 MHz, with pre-programmed brightness-, contrast-, colour saturation- and sound volume-level. Should the set be in blue mute due to the absence of signal, the blue-mute will be de-activated. The SDM can be de-activated by switching the set to Standby. No other way.

Customer/Service related software-mode CSM (Customer Service Mode).
Push simultaneous for at least 4 seconds on a random button of the local keyboard and on the <mute>-button of the Remote Control hand set of the FTV set.
The next data will be displayed:
Line (1): Version: ..... (= implemented software version)
Line (2): Errors: ..... (= detected error codes)
Line (3): HW opt nr 01280 14353 14873 27468
Line (4): SW opt nr 00006 07955
Lines (5,6,7): Hidden Modes, in case active, it will be shown here, as Childlock, Timer on, Sleeptimer on, Phantom.

This 'Customer Service Mode' (CSM) is a special service mode which can be activated and de-activated by the customer.
This CSM is a 'read only' mode, therefore the customer is unable to store other settings via this mode.
The customer de-activates the CSM by:

- selecting any button on the remote control handset
- switching the set to Standby and then switching on again
- switching the set off (mains switch) and then switching back on again

Pdp-test pattern. (internal in set)
Under SAM-menu, via Alignments-menu and General-menu the Pdp-test pattern can be activated. (slowly changing picture from full-black to full-white and vice versa). With this pattern the display and pdp-interface panel can be checked in an easy way. However the e-box must be functioning

- Test pattern-software. (external).
  Via VGA-input of the e-box , the VGA-signal output of a PC could be connected. With the test pattern-software [ordering code 4822 901 10027], the functioning of the screen can be checked in more detail.
  Additional information:
  The test patterns are pictures that should be made visual with a viewer-program. The test patterns can be displayed with the program ACDSee.
  This program needs a Windows-environment.
  The video card driver of the PC must be positioned in VGA-mode, with true colour option (3x8 bits 640x480).
  The dealer needs the ACDSee program in order to generate the patterns.
  TV must be switched in <16:9>-mode.
  After starting the ACDSee program, you see the following files on the screen:

  - black (black.gif)
  - red (red.gif)
  - green (green.gif)
  - blue (blue.gif)
  - white (white-gif)
  - white bar on black background in order to check 'contrast down'-signal functioning. [output of pdp-i-panel]. (white_bar.gif))
  - red, green, blue sawtooth (rgbsaw.jpg)

- Controlling ACDSee program
  With left-button of mouse and <CNTL>-button of PC-keyboard you can select the files you want to activate. To show the patterns activate 'View'-line .
  When showing pictures place cursor marker in the picture and push right hand mouse-button.
  Via 'options', full-screen, page flip delay and 'Start Slideshow' must be chosen and saved. Under Control Panel of Windows the video card can be selected to 'true colour' and to the '640x480'-format. Only with these settings all grey levels of the pixels of display can be tested.
  The ACDSee-program can run different pictures sequentially or apart.

6.3 Service Tips

- Tip how to check whether display-box functions, with partly functioning e-box . (meaning the power supply part)
  The display-box is powered via e-box . The video signal input of the display-box is now coming from a PC.

6 Service tools/Service tips

When booting PC, it will start in DOS, with a certain VGA-output format (640h,400v/60 Hz). The rough functioning of display is proven then.

6.4 Error code table

Error	Device	Description	Item	Panel	Defective module indication in SAM	Exchange
0	no error		-	-	No errors	e-box
4	ST24C16B6	NVM EAROM 2048 bytes	7212	S8	Control	e-box
6	FQ916	Frontend	1300	S1	Frontend	e-box
10	TEA6430	Audiosignal switch	7822	I	Source Select	e-box
13	TMPC47C203	I/O processor	7814	I	Source Select	e-box
15	TDA9144	Video + sync processor	7352	S5	Video processing	e-box
16	TDA4780	Video controller	7500	S6	Video control	e-box
19	TDA9840	2SC Sound Decoder	7600	S2	Stereodecoder	e-box
20	SAA7283GP	Nicam Decoder	7501	G	Nicam Decoder	e-box
21	TDA9860	Audio processor	7820	Z	Audio feature Unit	e-box
22	TDA9860	Audio processor	7860	Z	Audio feature Unit	e-box
23	TEA6360	Equalizer-IC	7840 7880	Z	Audio feature Unit	e-box e-box
26	PCF8574P	I/O-expander for Source Select	7746	P	Audio Feature Unit	e-box
28	SAA5270	TXT processor	7451	AQ	Teletext	e-box
29	PCF83CE652 featurebox	FBX microprocessor	7505	F	Feature box	e-box
34	UV1216E	DW tuner	E9F1	P	Double Window	e-box
37	SAB9077H_dwi	PIPO (Picture In Picture Out)	IC9A	P	Double Window	e-box
38	PCF8574_dwi	I/O-expander for DW	IC9N	P	Double Window	e-box
39	TDA9143_dwi	Video + Sync processor for DW	IC9J	P	Double Window	e-box
44	Supply 5 V	Check TSA5512 (Frontend) SAA5270 UV1216E PCF83CE652	1300 7451 E9F1 7505	S1 AQ P F	+ 5V Supply error	e-box
45	Supply_8V	Check TEA6430 (I)	7822	I	+8V Supply error	e-box
49	TEA6417	Videosignal switch IC	7823	I	Source Select	e-box
51	I2C_slow_bus	Blocked I2c slow-bus (shorted SDA, SCL or SDA to SCL)	-	-	I2C bus blocked	e-box
64	TDA9177	LTP	7580	S6	SSP	e-box
75	PCF8574AT	I/O-expander for Pdp-interface	7530	FI	Pdp-interface	pdp-interface panel or e-box
76	PCF8574AT	I /O-expander for Pdp-interface	7538	FI	Pdp-interface	pdp-interface panel or e-box
77	PCF8574AT	I/O-expander for Pdp-interface	7515	FI	Pdp-interface	pdp-interface panel or e-box

89	PCF8574A	I/O-expander for VGA-module	7410	BI	VGA-module	e-box
90	PCF8574A	I/O-expander for VGA-module	7410	BI	VGA-module	e-box

Remark: When "ERROR 2" displayed on DST, this means that there is no communication from FTV to DST.

6.5 Possible occurring defects:

Flickering picture (no picture content, but just flickering grey field):

VGA-cable not proper connected

No picture (If more causes are mentioned the lines must be read as or's)

- set in black-mute and aerial connector not connected (press the OSD button on the remote control handset; is OSD present now, then the display panel is OK or switch on the SDM, is there noise on the screen now, then the display is OK)
- supply e-box defective (check Va, Vs, V12, V5, 5Vstby with Vrr connected to 5 V, pin A6 to pin 3)) (no OSD)
- display panel defective (no OSD)
- pdp-interface panel defective (no OSD)
- pdp-discharge panel defective (no OSD)
- e-box defective (e.g. VGA-module)

Noisy picture:

display is not sharp due to aerial signal (investigate your aerial signal, it could also help to mount a ferrite core (4822 526 10694) around aerial cable or VCR/TV coaxial cable.

Distorted picture:

- display shows row- and/or column failures, or an increasing amount of cell-defects (cause display)
- display shows colour defects (cause pdp-interface panel or e-box or display)
- display shows synchronisation-failures (cause pdp-interface panel, e-box, or display)
- display shows spots, affected area's (cause display)
- display shows burning effects. (cause misuse, excessive operating hours)
- display shows spots with colour differences. (when set is positioned on an altitude higher then 2000 meters, it could occur due to the technology of this display that the performance decreases. This effect can not damage the display.)

No Sound:

Ext. Loudspeaker-switch is placed in wrong setting
Set is in 'external amplifier'- mode, surround mode set in 'prologic' and center mode in 'phantom'. In case the external amplifier is not switched on , then the set will not produce any sound in case the set receives just a stereo signal.
Or external amplifier must be switched on or center mode should be placed in normal

Set not controllable with local keyboard buttons e-box:

set is in Childlock-mode. De-active with RC, in features-menu.

Set does not respond on remote control:

- Batteries of remote control could be empty. Check whether set responds with IR-receiving eye on e-box. Door must be opened. . If this works replace batteries.

Other electronic equipment can not be controlled or does not function adequately due to operating Flat-TV:

- Check whether other infrared-controlled equipment is disturbed by this FTV-set. In case of doubt check functionality other equipment , with FTV-set in reduced contrast-level setting or even in Standby. In case this helps, the cause is known. The Flat-TV produces a small amount of Infrared-radiation which can interfere with infrared-equipment. Vary the position of the other equipment to see if situation can be improved. (Only increasing distance or changing view-angle can help)

6.6 Software protection

The software protection is totally managed by the main microprocessor on the small signal panel and consists out of a continuous checking on the presence of the +5V2 and the +8V supply voltage and the continuous checking on the activity on the I2C bus. This checking is done by testing the communication between the microprocessor and a number of ICs which are connected to this supply voltage. In case one of these ICs do not respond, the protection-processing becomes active and the power supply will be switched to Standby.

Replace e-box.

6.7 +5V protection via main-processor

The main-processor controls via a number of ICs the presence of the +5V supply voltage on the SSP. This controls is realized via I2C. The following ICs are used for the check of the +5V supply voltage:

- TSA5512 (front-end), (error 6)
- SAA5270 (IVT), (error 28)
- Feature box, (error 29)
- UV1216E (DW), (error 34)

In case the above mentioned IC does not respond, the error code of that specific IC is stored in the error buffer together with error 44 (+5V error) and the main-processor switches the set to Standby.

Replace e-box.

6.8 +8V protection via the main-processor

The main-processor controls via a number of ICs the presence of the +8V supply voltage on the SSP. This controls is realized via I^2C. The following ICs are used for the check of the +8V supply voltage:

- Source select, TEA6430, (error 10) In case the above mentioned IC does not respond, the error code of that specific IC is stored in the error buffer together with error 45 (+8V error) and the main-processor switches the set to Standby.
  Replace e-box.

6.9 I²C protection (error 51)

The (slow) I²C bus is controlled at each I²C-command. To do this at every I²C command a defined start/stop condition is generated. In case this defined start/stop condition fails for a few times after each other, by then error 51 (I²C error) is placed in the error buffer and the power supply is switched to Standby. I²C-protection is generated in case the SDA is shorted to earth, in case the SCL is shorted to earth or in case the SDA and the SCL is shorted.

Remark: The (fast) I²C bus for teletext and the I²C bus to the NVM are not checked for protection matters

Replace e-box.

6.10 Detailed information about DST

6.10.1 Introduction

This paragraph will give more detailed information about the service modes and the Dealer Service Tool (DST) RC7150.

6.10.2 Installation features for the dealer

One of the innovative features of the Dealer Service Tool is the way in which it is programmed. A complete list of presets can simply be downloaded from the FTV1.5E into the Dealer Service Tool. To make this download possible, a two way communication link, the so called "dealer link", is set up between the RC7150 and the FTV1.5E. To establish this link, the FTV1.5E sets are equipped with an additional Infra Red transmitter LED and the RC7150 has an Infra Red receiver on board. The Dealer Link however only works on short distance, up to 10 cm or 4 inches. For explanation of the installation features of the DST, the directions for use of the DST are recommended (use code 4 for correct downloading).

6.10.3 Dealer Mode

Press the "DEALER" key on the DST to enter the Dealer Mode. In the dealer mode some settings can be changed in order to customize the set.

6.10.4 Diagnose features for the service

The FTV1.5E set can be put in the various service modes via the DST RC7150. (see paragraph 6.2)

6.10.5 Service Default Mode (SDM)

Specification of the SDM:
- Tuning frequency 475.25 MHz
- TV-system for BGLM set to BG, for BGLL'I sets to LL'
- All picture settings at 50% (brightness, colour, contrast, HUE)
- All sound settings at 50% except volume at 25% (so bass, treble, balance at 50%, volume at 25%)
- All service-unfriendly modes are disabled (like sleep timer, child lock, automatic switch off, blue mute)

Entering the SDM:
- By the "DEFAULT" key on the DST while the set is in the normal operation mode.
- Exiting the SDM can only be done via the STANDBY command. By switching off-on the set with the mains switch the FTV1.5E will come up again in the SDM.

6.10.6 Service Alignment Mode (SAM)

Specification of the SAM:
- Software alignments (see chapter 8)
- Option settings (see chapter 8)
- Error buffer reading and erasing. The most recent error code is displayed on the top left side.
- Operating hours counter
- Software version

Entering the SAM:
- By the "ALIGN" key on the DST while the set is in the normal operation mode (or SDM). Enter the password "3140" and push <ok>-button

Exiting the SAM can be done via the MENU command or via switching off-on the set with the mains switch.

6.10.7 Diagnose Mode (only active during transmission of error codes and diagnose 99)

This mode is activated by the DIAGNOSE command on the DST for reading the error codes and erasing the error buffer by the DST even when the set is in protection and so there is no picture (assuming that the power supply and the control part are working). The diagnose Mode is only a temporarily mode (the set will go back to the previous mode), and can not be switched on permanently.

Note The diagnose mode can not be entered if the SAM is activated.

6.10.8 Error codes

Reading error codes from the error buffer
The error buffer can be read in 2 ways:

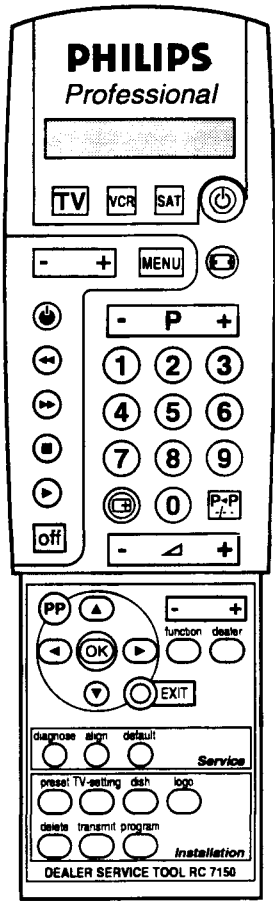
- On the screen via the Service Alignment Mode (SAM)
  In case picture is OK, the error buffer can be read the easiest via the SAM. In the main menu of the SAM the last 10 different error codes occurred are displayed. The most recent detected error code is displayed on the left side, so e.g.:
  0 0 0 0 0 means no error codes present in the buffer
  3 0 0 0 0 means one error code present in the buffer; error code 3
  2 3 0 0 0 means two error codes present in the buffer; error code 2 is the most recent, error code 3 is detected before 2
- On the display of the DST
  If an error has been detected by the FTV1.5E chassis, the set might go into protection. Without the presence of a picture the errors can be read by the DST, as long as the main-processor is still active (green LED continuous and red LED blinking fast (5 Hz); in case of red LED is blinking slow (1.25 Hz) there is a main-processor problem).
  To transmit the errors from the FTV to the DST:
  1. Press the "DIAGNOSE" key (in all modes except the SAM)
  2. Press "1" to view the last error detected.
  3. Hold the DST 5 to 10 cm from the IR-transmitter led of the set (in the FTV1.5E this led is located at the right side of the IR-receiver eye).
  4. Press the "OK" key.
     The error is represented by a 2 digit number. The 2 digits on the DST are displayed sequentially, with a pause before it is repeated. The digit after the pause is the 1st digit.
     If the display reads 4 - 7, the error code is 47. To read other error codes, press "DIAGNOSE" and one of the other digit keys.

Note:
- If the DST cannot communicate to the FTV1.5E in a proper way, ERROR 2 is shown in the display of the DST. Trying again by changing the DST position a little bit might often help.
- If the error buffer of FTV1.5E is empty, no errors are displayed by the DST. The display remains blank.

Clearing the error buffer
The error buffer can be cleared in 2 ways:

1. In the SAM by selecting the item RESET ERROR BUFFER in the main menu.
2. By the "DIAGNOSE 99" command of the DST (in all modes except the SAM). Press the DIAGNOSE key on the DST, followed by 9 and 9 and then <OK >.

Error code table
See paragraph 6.4



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130794

8 Electrical adjustments

8.1 Matching adjustments (e-box/display-box)

When should something be aligned?

If the display panel (8; figure 12-1) is exchanged, nothing.
If pdp-interface panel or an e-box is exchanged [small signal panel, to be precise the TDA4780 must be matched to the pdp-interface panel], both white-drive as black reference must be re-aligned.
Black alignment is done by 3 potentiometers (R:3329, G:3379, B:3429) on the pdp-interface panel.
Conditions:
The black picture can be generated by a service generator.
Set must warm-up for 10 minutes
Contrast-level to maximum & brightness-level to level 30 (in the middle)
Tint on 'cool'
Dynamic contrast 'off'
DNR 'off'.
The potentiometers first will be rotated to the left, then they will be adjusted accurately in such a way that no colour becomes visible. (So turn potentiometer from just colour, to no colour)
White-drive alignment will be settled via Service Alignment Mode. After selecting "white drive"l the following values have to be entered:

	Cool	Normal	Warm
R	10	23	47
G	09	22	36
B	63	63	63

8.2 Set settings via Service Alignment Mode

Alignments in the Service Alignment Menu; General

1. Enter this mode:

   Push <align>-button on the DST (RC7150), followed by password "3140" and <OK>-button.

2. Now the Service Menu is displayed on the screen. The next data becomes visible:
   - Software date ('Date') and version ('Id') of the Eprom e.g. 08-10-97 and Id: 3104 317 00900
   - Number of operating hours ('Operation Hours').
   - Content of the error buffer ('Errors') (the most recent failure is represented at top left side, directly behind 'ERRORS' indication.
   - The module that generated the defect. ('Defect. Module'). (In case more failures are in buffer, then 'Unknown' will be displayed. In case no failures 'None'.
   - Menu item 'Reset Error Buffer'. Via the< → >-button the error buffer can be erased.
   - Menu item 'Functional Test'. With the < → >-button all devices will be tested. Eventual defects will not be erased. The content re-appears when leaving 'Functional Test' again.
   - Menu item 'Alignments'. With this the Alignments sub-menu will be activated.
     The next settings can be selected:
     'General'
     - 'Adjustment of 'White Drive'
     - 'Adjustment Soft Clipper'
     - 'Adjust 'Peak White Limiter'
     - 'Input Level Stereo Decoder'
     - 'Stereo Channel Separation'
     - 'Luminance Delays'
     - 'PDP Test Pattern'.

     'Options'
     Set initialisation-codes of set via text
     'Option number':
     All options together, expressed in two long numbers. The original factory setting can be found at the back of the display box as well at the back of the e-box.
     'Store':
     Store of all alignments.

8.2.1 Detailed explanation sub-menus:

General

- When all alignments have been performed, 'STORE' must be activated to freeze value in permanent non volatile memory
- When option codes have been changed and stored, the mains switch of the set must be switched off and on to activate new configuration. (when switched off/on by Standby-command, the new option codes will not be read by main processor and the set will not operate as wished)
- When an empty NVM (non volatile memory) is detected, all settings will get pre-programmed factory default settings.
- In 'white-drive'-submenus a built in white field test pattern is available. Via 'TEST PATTERN ON/OFF' the pattern can be activated. The pattern only appears after selection specific white-D alignment.
- 'Adjust Soft Clipper': For the 'Soft Clipper' the default-value 63 can be set.
- 'Adjust Peak White Limiter': For the 'Peak White Limiter' the default-value 35 can be set.
- 'Input Level Stereo Decoder: Value between -4 and 5. Default: 0
- 'Stereo Channel Separation': Value between -24 and 25. Default: -4
- 'Luminance delay': With the "Luminance delay" alignments the luminance-information and the chrominance-information can be matched in time.
- The PAL-alignment is only active with PAL-signals and should be aligned with PAL-signals. (default: 10)
- The SECAM alignment is only active with SECAM signals and should be aligned with SECAM signals. (default: 11)
- The BYPASS alignment is only active with NTSC signals, when COMB-filter is on or with PALplus signals. This alignment can only be executed with this signals. (if the alignment for PALplus is correct, it is automatically also correct for NTSC with combfilter on and vice versa). (default: 9).
- As with other alignments, the changed settings should be followed by a 'STORE'-command.

Option menu
The options are divided in groups. Dependent of the hardware in the set, a certain configuration can be made. As this set only has limited configurations it is better to enter the HW-option number and SW-number. In this codes all information is covered. The chosen option code will lead to functions indicated with =>.

Menu name	Subjects	Options	Physically in the set
TV Systems	Frontend Type	=>FQ916(D)ME	Select frontend type (type number is on the frontend)
		FQ916MR	
		FV916MG	
		FQ936D	
		FS988	
		Chinese Tuner	
		FQ944D	
Stereo Decoder	Nicam Type	Not Available	No Nicam
		BG or I	Nicam with 2 IC's and 1 input filter
		BG and I	Nicam with 2 IC's and 2 input filters
		=>Eco Nicam	Nicam with 1 IC
	2 CS	=>Yes	TDA9840 present on SSP
		No	TDA9840 not present on SSP
	Global	Yes	Global sound decoder present
		=>No	Global sound decoder not present
Double Window	DW Available	=>Yes	DW module present
		No	DW module not present
	DW Version	=>Euro	European DW module
		USA	USA DW-module)
	PIP	Yes	
		=>No	
	Mosaic	=>Yes	
		No	
Teletext	TXT	Not available	-
		128 Kb	128 kB teletext memory
		=>512 Kb(400p)	512 kB teletext memory (1x514256)
		1 Mb (800p)	1 MB teletext memory (2x514256)
Communication	ESI	Yes	
		=>No	
	EACEM	=>Yes	
		No	
	Easylink	=>Yes	
		No	
Video Repro	Frame	Digital Scan	Full Feature - box present
		=>Natural Motion	Full Feature - box present + extra HW
		100/120 Hz	Eco feature box present
		50/60 Hz	No feature box present
	Combfilter	Not Present	No Comb filter present

8 Electrical adjustments

Menu name	Subjects	Options	Physically in the set
		=>SAA4961	Comb filter with SAA4961
		MC 141625	Comb filter with MC 141625
	Dynamic Contrast	=>Yes	Smartic present
		No	Smartic not present
	Digital Panorama	=>Yes	Panic present
		No	Panic not present
	Auto Format FBX	=>Yes	algoritm activated
		No	algoritm not activated
Source Selection	SS Type	=>Euro AV3	Single-sided EURO I/O panel
	Euro AV3	None	No 3rd EURO connector (only with EURO I/O)
		=>Normal	3rd EURO connector present
Audio Repro	Basic		TDA9860 present on SSP
	Equalizer		AFU panel without Dolby
	=>Eq. + Dolby		AFU panel with Dolby
Digital Output	=>No		no digital output present
	Yes		digital output present (NICAM also present)

'Option number menu'
For FTV1.5E there are only 2 sets of settings valid:

Setting /12 models:
HW opt. 01280 14353 14783 27468
SW opt. 00006 07955

Setting /19 models:
HW opt. 01281 14353 14783 27468
SW opt. 00006 07955

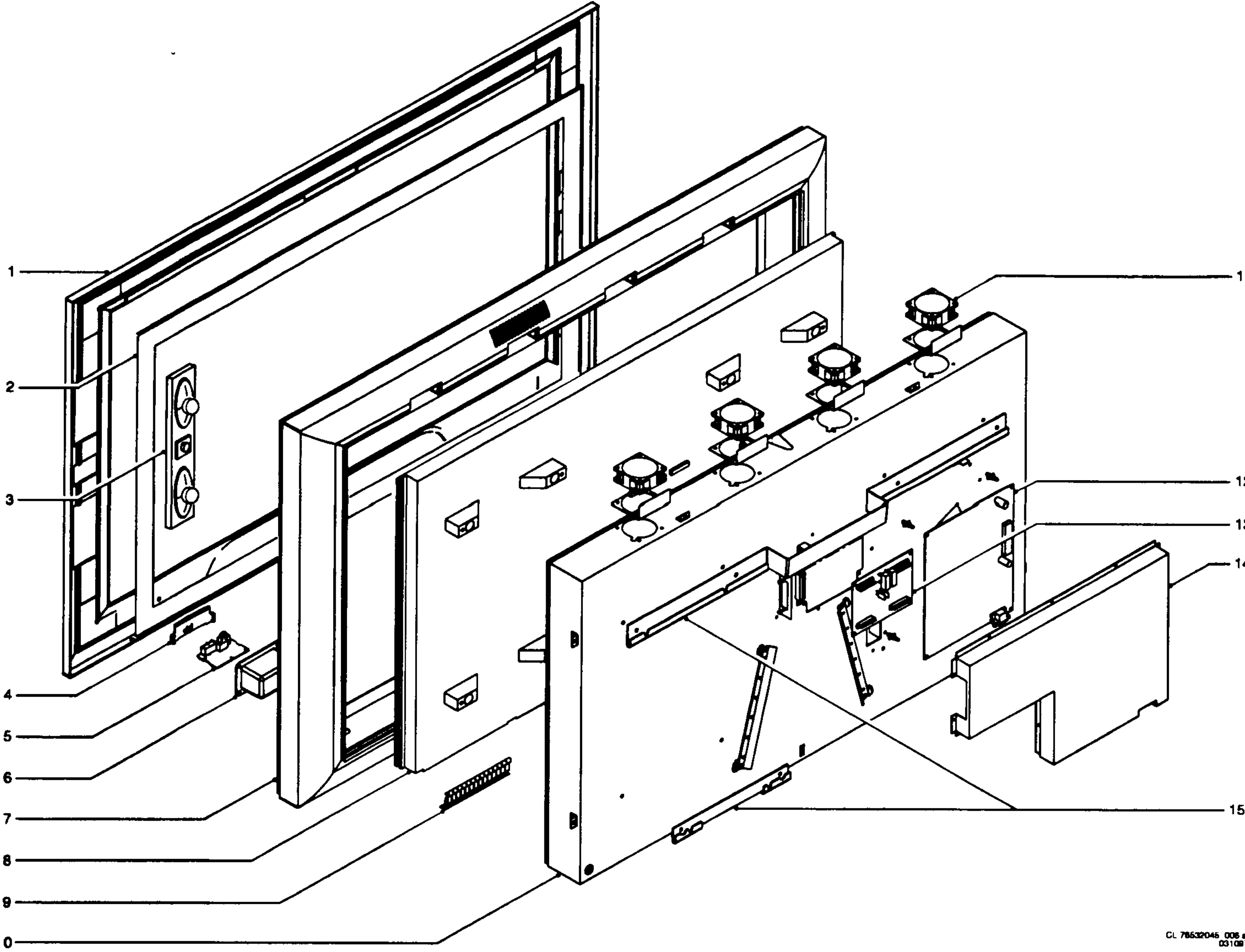


Figure 12-1 Display box

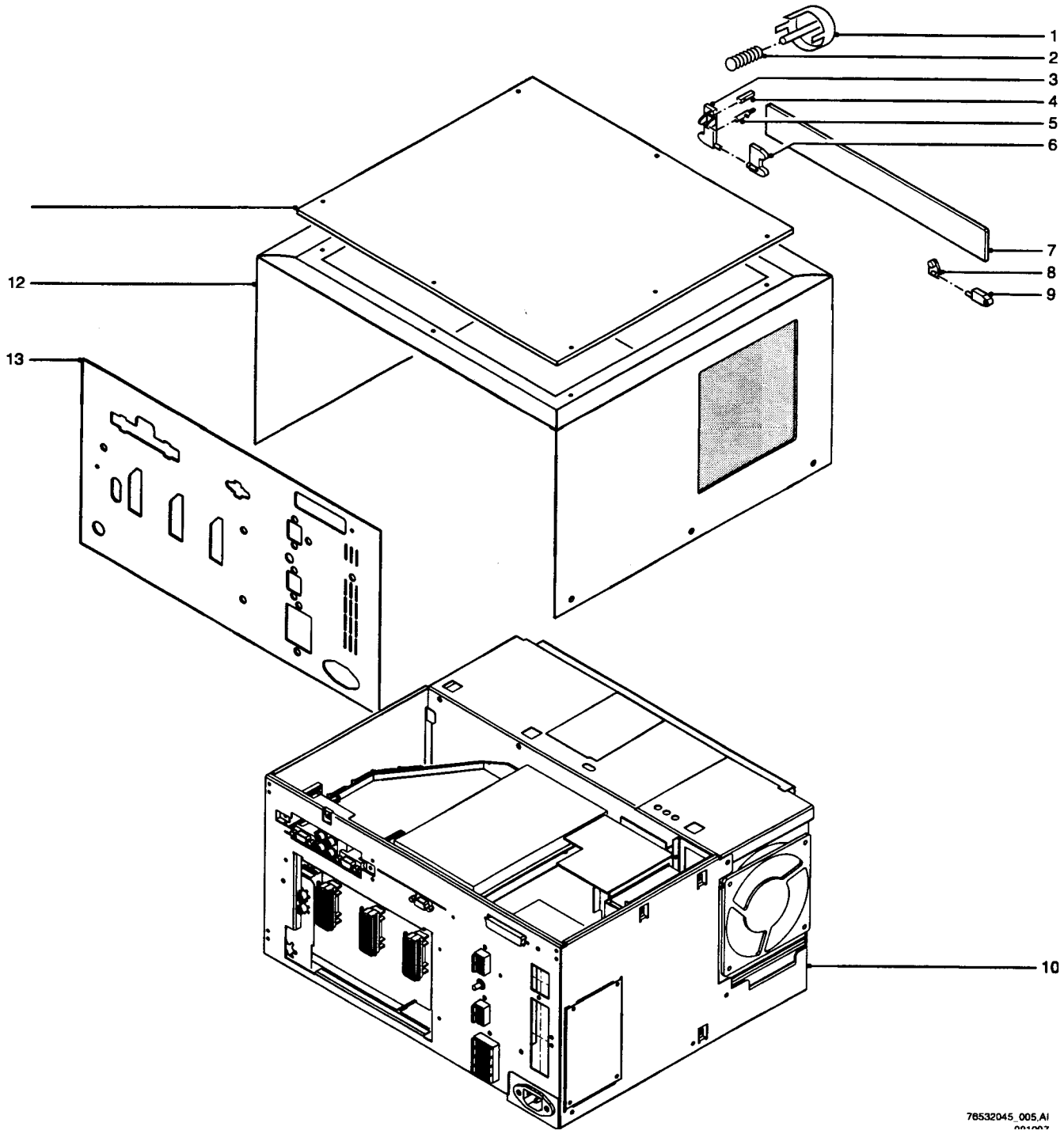


Figure 12-2; E-box

Exploded view display-box

1	4822 460 11103	Front Profile assy painted
2	4822 450 10397	Glass plate
3	4822 240 10253	Speaker plate FTV
4	4822 381 11912	Led lens
5	4822 212 11454	Led Panel Display
6	4822 441 12052	Led panel housing
7	4822 460 11104	Back profile assy painted
8(R)	4822 135 00146	Colour Plasma Display FPF42C10660UC-01
9	4822 492 11493	EMC Spring short
	4822 492 11492	EMC Spring long
	4822 402 10854	EMC Spring Z-shape
10	4822 442 01092	Back cover assy
11	4822 361 10689	Fan assy display
12(R)	4822 212 11459	Pdp Interface panel
13(R)	4822 212 11456	Pdp Discharge Panel
	4822 402 10853	Bracket fix glass plate

Exploded View E-box

1	4822 410 11401	Mains Knob
2	4822 492 52423	Spring Mains knob
3	4822 535 10507	Pivot push side
4	4822 417 50289	Locking Mechanism
5	4822 529 10305	Shock absorber air
6	4822 535 10506	Hinge push side
7	4822 443 10816	Door assy painted
8	4822 535 10508	Hinge
9	4822 535 10509	Pivot
10(R)	4822 310 11105	Inner E-box-/12
	4822 310 11106	Inner E-box-/19
11	4822 442 01093	Top Cover
12	4822 441 12051	Housing E-box
13	4822 442 01094	I/O cover E-box

Connecting material

1	4822 320 11091	Coaxial cable (absorption)
2	4822 320 12135	Display video cable (VGA-cable 3 meter)
3	4822 321 11355	Display power cable
6	4822 321 11356	Mains cord euro

Other parts

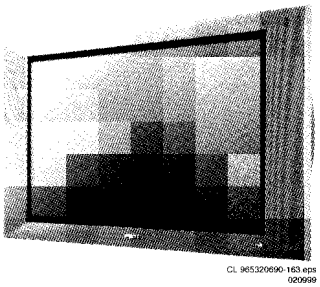
	4822 410 63802	Knob loudspeaker On/Off
	4822 526 10694	Ferrite core
	4822 526 10695	Ferrite Core split
	4822 219 10363	Remote Control RC8106/01
	4822 462 10981	Spacer for display box (wall)
	4822 445 10693	Loudspeaker box FB505 30W/6 ohm
	4822 445 10692	Subwoofer box assy

Service accessories

	4822 462 11011	Dealer Stand
	4822 218 21232	DST RC7150
	4822 263 50216	VGA/MAC plug adapter
	4822 462 10982	Foot E-box
	4822 263 21189	VGA interface block
	4822 901 10027	Test Software
	4822 900 11192	Set software

FTV1.9DE
AA

Service
Service
Service



Service Manual

Published by JR9970 Service PaCE Printed in The Netherlands Subject to modification GB 3122 785 10170

PHILIPS

1. Technical specifications

1.1 Technical data D-box

Mains voltage	:	85 - 264Vac
	:	50Hz - 60Hz
Power dissipation	:	400W
Stand-by dissipation	:	< 1W

1.2 Connection facilities

1.2.1 Specification of the terminal sockets

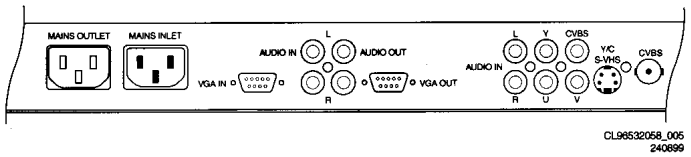


Figure 1-1

VGA-in

1	- R	(0.7Vpp 75Ω)
2	- G	(0.7Vpp 75Ω)
3	- B	(0.7Vpp 75Ω)
4	- Reserved	
5	- Bus-gnd	⏚
6	- R-gnd	⏚
7	- G-gnd	⏚
8	- B-gnd	⏚
9	- RC5	
10	- GND	⏚
11	- Config_Ident	
12	- Bus1 (TxD/ Rxd or SDA)	
13	- Hsync	
14	- Vsync	
15	- Bus2 (TxD/ RxD or SDA)	

VGA-out

1	- R	(0.7Vpp 75Ω)
2	- G	(0.7Vpp 75Ω)
3	- B	(0.7Vpp 75Ω)
4	- Reserved	
5	- gnd	
6	- R-gnd	
7	- G-gnd	
8	- B-gnd	
9	- Reserved	
10	- GND	
11	- Reserved	
12	- Reserved	
13	- Hsync	
14	- Vsync	
15	- Reserved	

Audio VGA-in

	- Cinch Audio	L(0.5Vrms >= 10kΩ)
	- Cinch Audio	R(0.5Vrms >= 10kΩ)

Audio VGA-out

	- Cinch Audio	L(0.5Vrms >= 1kΩ)
	- Cinch Audio	R(0.5Vrms >= 1kΩ)

SVHS

1	- GND	
2	- GND	
3	- Y	(1Vpp / 75Ω)
4	- C	(0.3Vpp / 75Ω)

Audio_in:

	- Cinch Audio	L (0.5Vrms >= 10kΩ)
	- Cinch Audio	R (0.5Vrms >= 10kΩ)

CVBS

	- BNC - CVBS	(1Vpp / 75Ω)

YUV

	- Y	(1Vpp / 75Ω)
3	- U	(1Vpp / 75Ω)
4	- V	(1Vpp / 75Ω)

1.3 Chassis overview

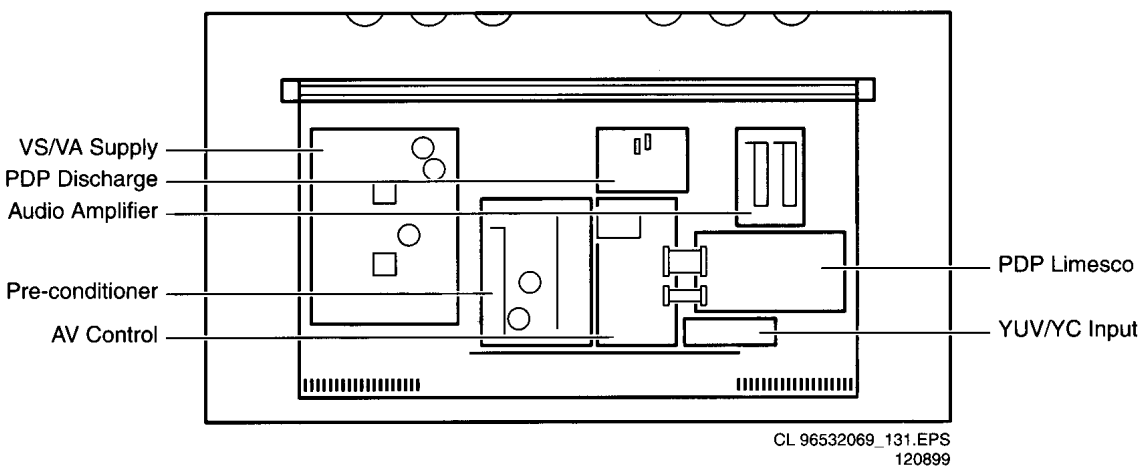


Figure 1-2

2. Safety instructions, warnings and notes

2.1 Safety instructions ⚠

It is not allowed to operate the FTV-set without glass plate. One function of this glass plate is to absorb Infrared Radiation. Without this glass plate the level of Infrared Radiation produced by the plasma display could damage your eyes.

1. Safety regulations require that during a repair:
   - the set should be connected to the mains via an isolating transformer (in this particular case a transformer of ≥ 800 VA);
   - safety components, indicated by the symbol ⚠ , should be replaced by components identical to the original ones;
2. Safety regulations require that after a repair the set must be returned in its original condition. In particular attention should be paid to the following points.
   - Note: The wire trees should be routed correctly and fixed with the mounted cable clamps.
   - The insulation of the mains lead should be checked for external damage.
   - The electrical DC resistance between the mains plug and the secondary side should be checked (only for sets that have a mains isolated power supply). This check can be done as follows:
     - unplug the mains cord and connect a wire between the two pins of the mains plug;
     - set the mains switch to the on position (keep the mains cord unplugged!);
     - measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ;
     - switch off the TV and remove the wire between the two pins of the mains plug.
   - The cabinet should be checked for defects to avoid touching of any inner parts by the customer.

2.2 Warnings

1. ESD

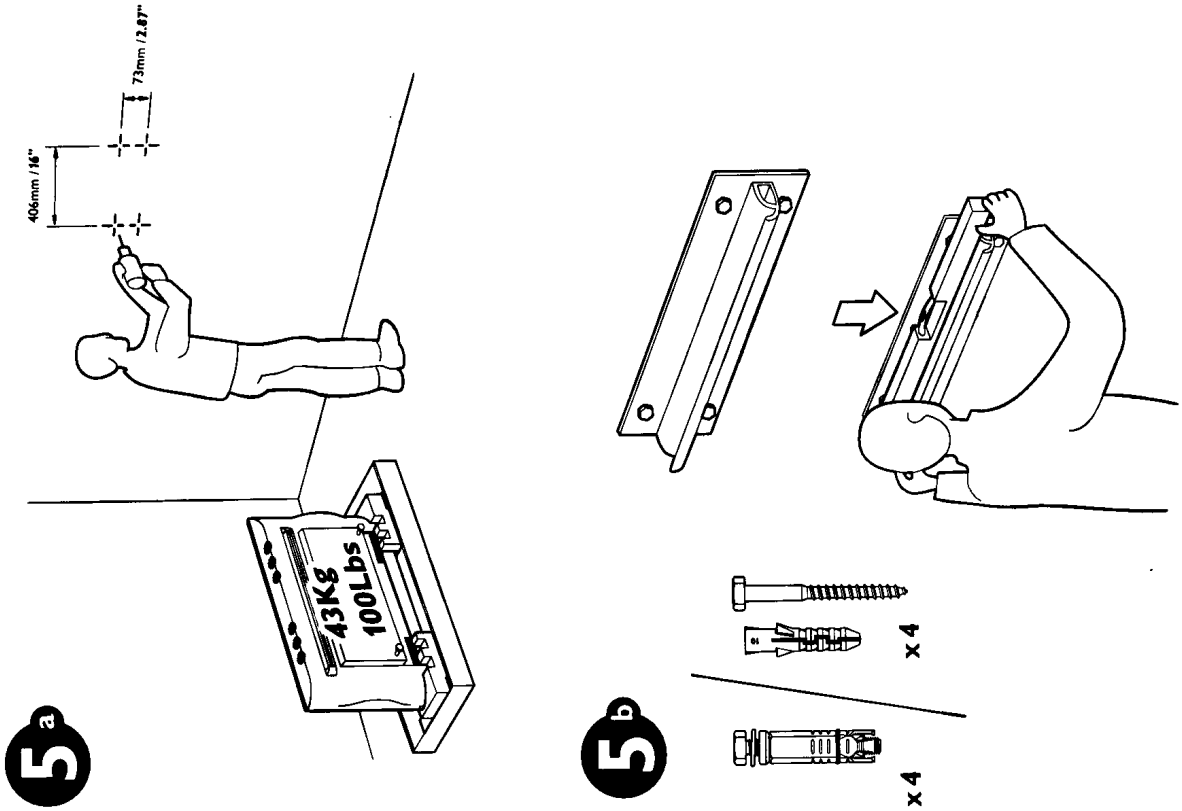
All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.

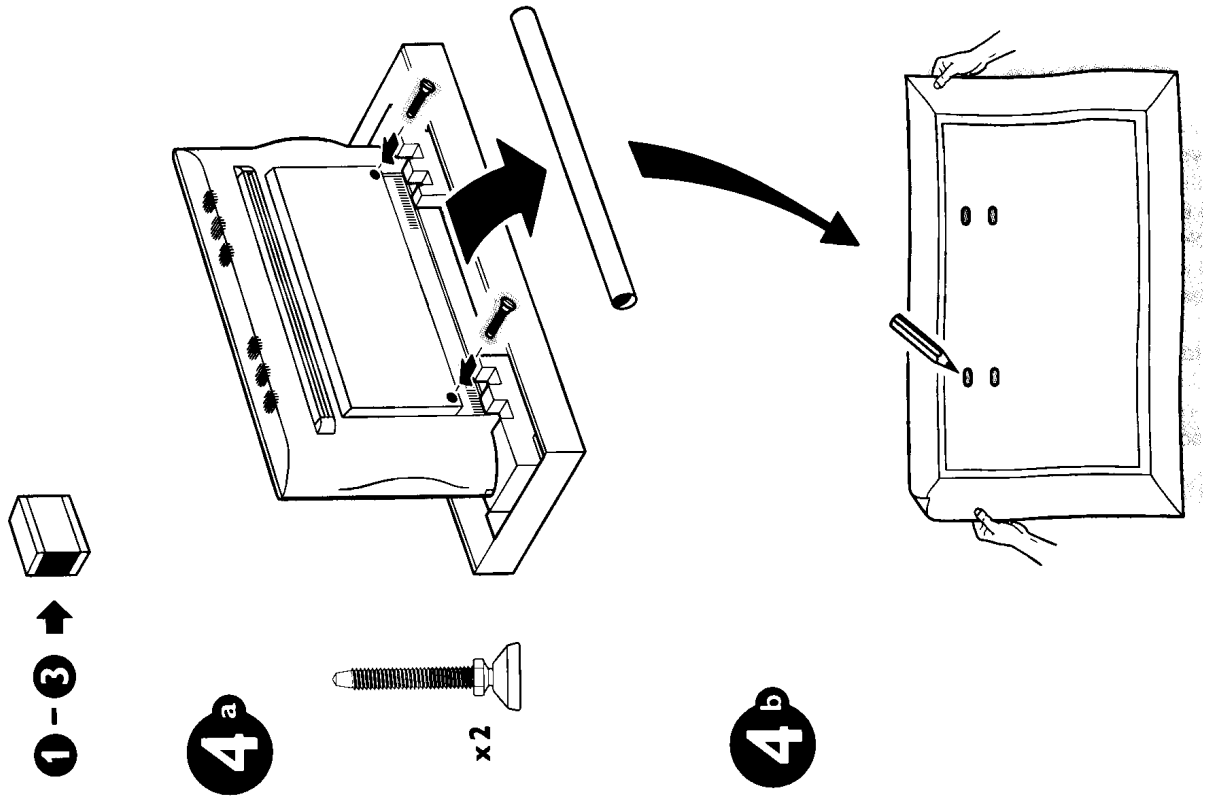
1. Available ESD protection equipment:
   - complete kit ESD3 (combining all 6 prior products - small table mat) 4822 310 10671
   - wristband tester 4822 344 13999
2. Never replace modules or other components while the unit is switched on.
3. When making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

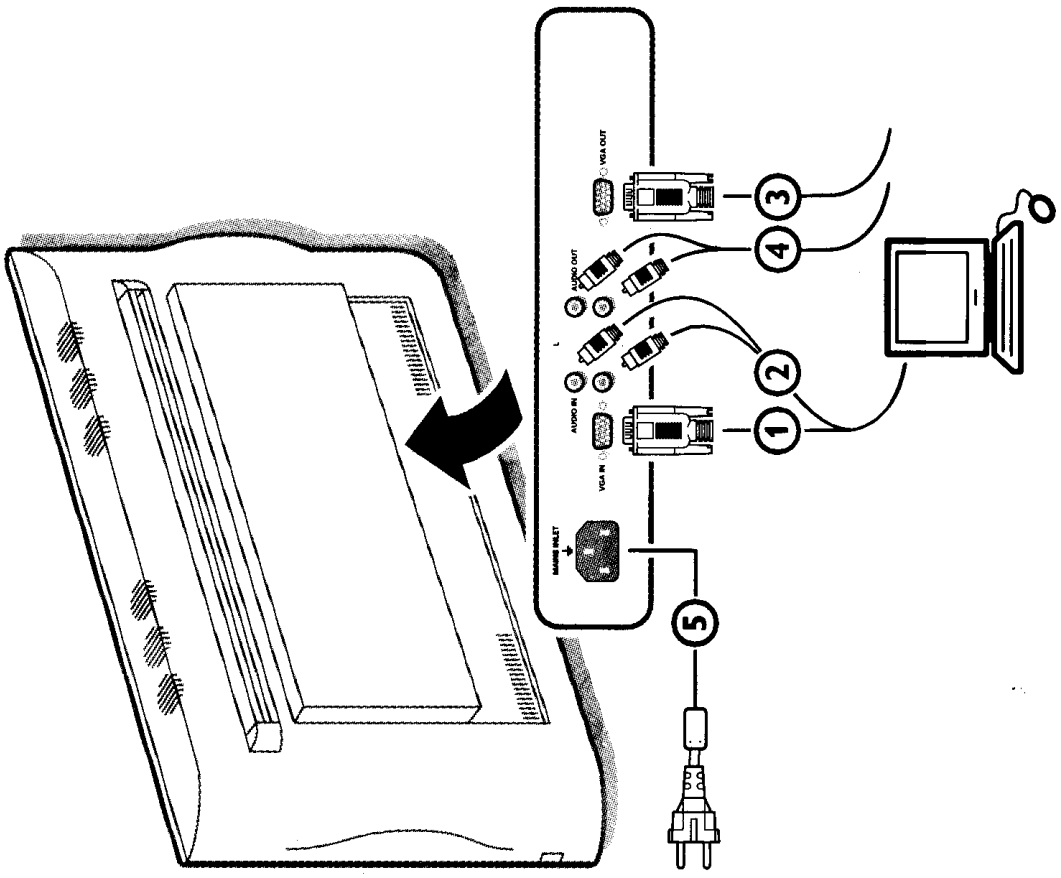
2.3 Notes

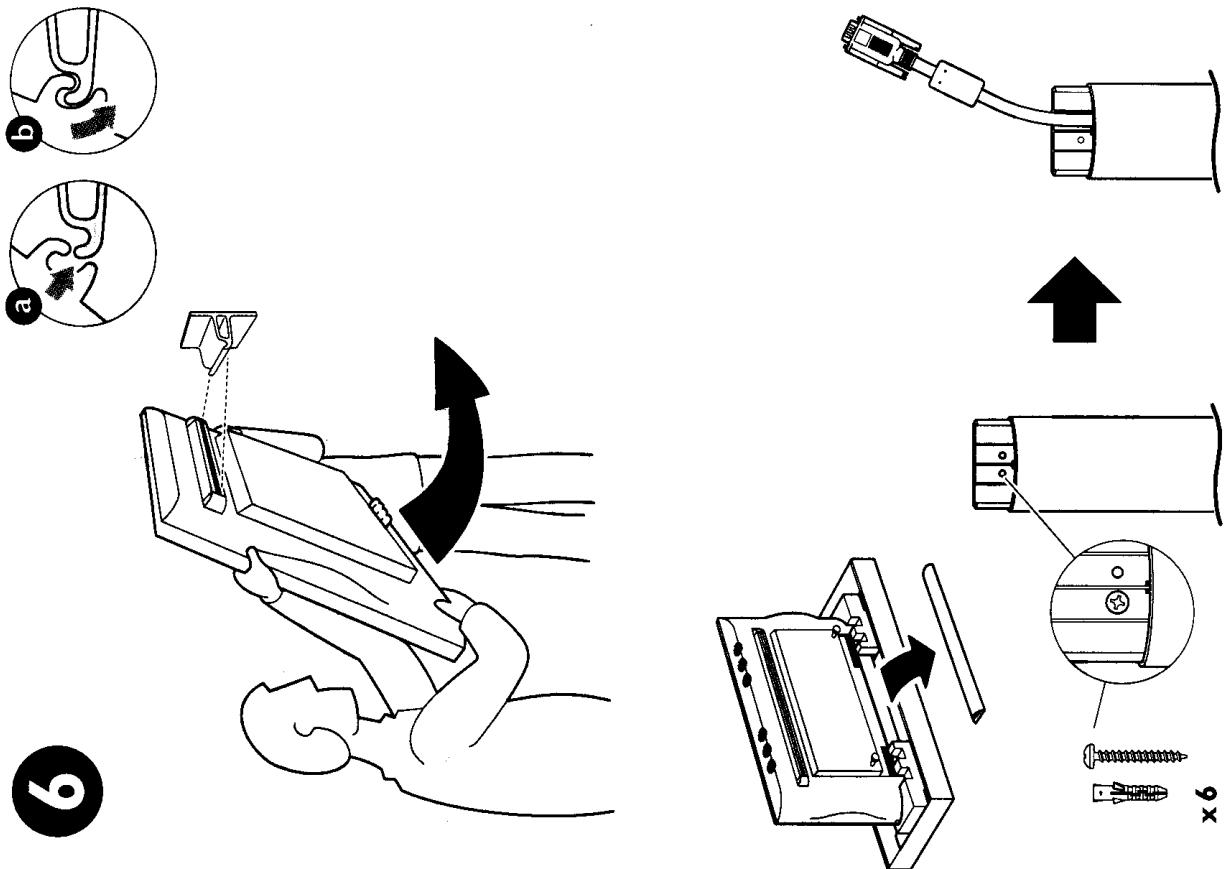
1. A glass plate is positioned before the plasma display. This glass plate can be cleaned with a slightly humid cloth. If due to circumstances there is some dirt between the glass plate and the plasma display panel it is recommended to do some maintenance by a qualified service employee only.
2. Never disconnect the power display cable when the set is operating
3. With DST no failures (error-codes) can be red, when the set is in Service-mode.
4. If DST reacts with 'error 2', there is no communication between set and DST. Note that IR-transmitter LED is positioned at right side of IR-receiver eye of the E-box. Take into account that receiver-LED on DST is positioned not in the middle but at the left side. Point corresponding LED's to each other. In case the amount of Infrared produced by the screen pollutes the communication, the set can be set in Standby-mode. Then still the error-messages can be retrieved.

3. Directions for use






VGA OUT
AUDIO OUT
AUDIO IN
VGA IN
MAINS INLET
1
2
3
4
5


6
a
b
x6

Unpacking and wall mounting instructions

For the unpacking instructions follow the illustrated steps printed on the packaging (outside and inside).
For the wall mounting instructions follow the illustrated steps ❹ to ❻ printed on the first pages of this instruction booklet.

Make sure that the wall mount is being fixed securely enough so that it meets safety standards. The weight of the monitor (excl. packaging) is about 43 kg.

Connect your computer

❶ Connect one end of the VGA cable ① supplied to the video card of the computer and the other end to the **VGA IN** connector at the rear side of the monitor. Fix the connectors firmly with the screws on the plug.

❷ In case of a Multimedia computer, connect the audio cable ② to the audio outputs of your Multimedia computer and to the **AUDIO IN R** (right) and **L** (left) inputs of the monitor.

Daisy chaining

The Active Loop Through facility makes it possible to make a daisy chain with a second VGA monitor.

❸ Connect one end of another VGA cable ③ to the **VGA OUT** connector at the rear side of the monitor and the other end to the **VGA IN** connector of a second VGA monitor.

❹ In case of a Multimedia computer, also connect the audio cables ④ to the **AUDIO L** and **R** outputs of the monitor and to the **AUDIO IN L** and **R** inputs of the second VGA monitor.

Note: only use the VGA cables supplied or use cables that are specially delivered with the monitor.

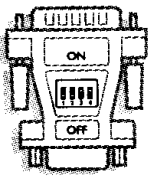
Connect your Apple Macintosh* computer

Attention: Macintosh computers with separate H and V synchronisation signals can be used together with the supplied adaptor. Macintosh computers with Composite Sync and Sync on Green signals may need a special (not supplied) adaptor or cable. Contact your dealer.

Connect the supplied switchable adaptor for Apple video connectors to one end of a VGA cable.

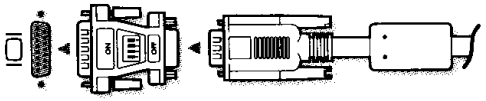
Put the DIP switches on the adaptor in the following positions :

1	2	3	4
off	off	on	on



Connect the end of the VGA cable with the adaptor to the video card of the computer and the other end to the **VGA IN** connector on the back of the monitor.

Screw the connectors down firmly.



15-pin D sub (2-row) — 15-pin mini D sub (3-row)

* Apple Macintosh is a registered trademark of Apple Computer, Inc.

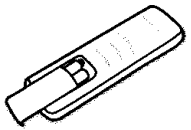
Computer Display modes

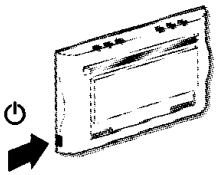
VGA	640x480	31.468 kHz	60 Hz
VGA	640x400	31.468 kHz	70 Hz
VGA	640x350	31.468 kHz	70 Hz
MAC II	640x480	35.000 kHz	67 Hz
SVGA	800x600	35.156 kHz	56 Hz
XGA	1024x768	45.000 kHz	56 Hz

When a VGA computer is connected, the selection is made automatically.

A message is displayed when the monitor does not support one of the above mentioned VGA modes.
Switch your computer to a correct display mode.

Operation



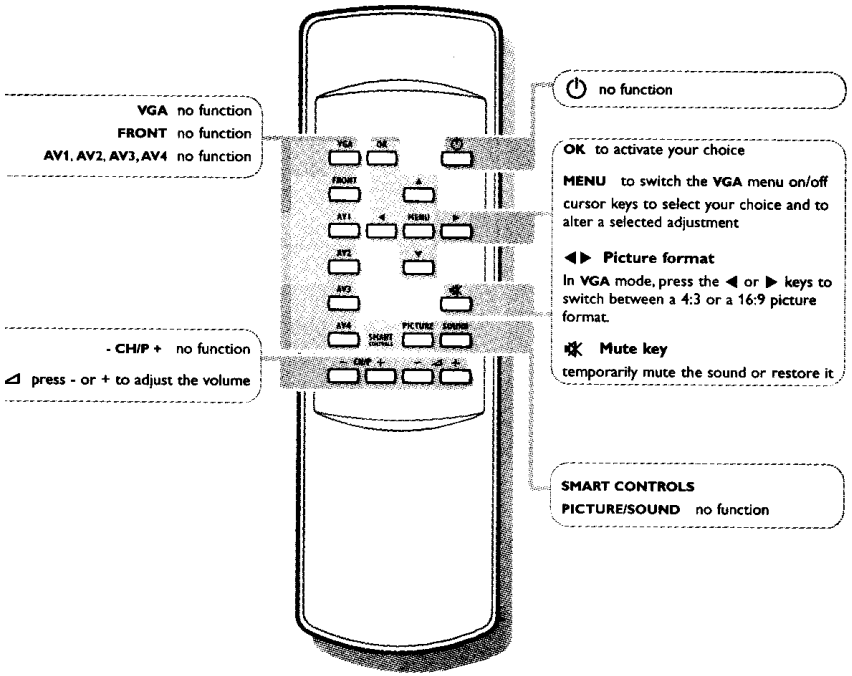


❶ **Insert the mains plug** ⑤ (see previous page for the illustration) supplied into the mains inlet at the back of the monitor and in the wall socket.
Please, only use the supplied rim-earthed mains cord with its built-in filter.

❷ **Remote control:** remove the cover of the battery compartment.
Insert the 2 batteries supplied (Type LR6AA-1.5V).
The batteries supplied do not contain the heavy metals mercury and cadmium. Nevertheless in many countries batteries may not be disposed of with your household waste. Please check on how to dispose of batteries according to local regulations.

❸ **Switch the monitor on :** Press the power button ⏻ at the right side of the monitor.
A green indicator lights up and the screen comes on.
When the monitor does not receive a certain VGA signal the screen remains black.
Make sure that your PC is switched on and is in the correct display mode.

Use of the remote control



VGA menu

1. Press the **MENU** key to switch on the **VGA** menu.
2. Select one of the symbols with the ▲ and ▼ keys:
   - for contrast
   - for brightness,
   - for colour temperature
   - for horizontal picture position
   - for vertical picture position
   - for volume
3. Press the ◀ and ▶ keys to alter the selected adjustment.
4. Press the **MENU** key again to switch off the **VGA** menu.

Tips

Ambient temperature
Do not hang up the monitor above a central heating or other heating sources.

Active Loop Through
The Active Loop Through facility makes it possible to make a daisy chain for VGA. Maximum 2 sets.

Care of the screen
Clean the anti-reflex coated flat glass screen with a slightly damp soft cloth. Do not use abrasives solvents as it can damage the glass surface of the screen.

Plasma Display characteristics
When switching over to another picture after having displayed the same still picture for a long time (many hours), it may happen that some parts from the previous picture will remain on screen due to a kind of memory effect. This ghost picture will disappear after some time. To avoid this effect change the pictures regularly or for PC use you can turn on a screen saver in your computer.
Philips has built in an automatic shift of the picture every 5 minutes to avoid this effect and to prolong the life of the screen.
Very incidentally and after a longer period of unuse (approx. 1 year) the screen may display some strange colour deficiencies. This is quite normal for plasma displays and these effects will disappear after the set has been turned on for some time.
A plasma display consists of more than 1,2 Million colour pixels. It is within industry standards that very few pixels (< 0.001%) may be defective, even for a new set. There is however no reason to doubt about the quality of the set.
The plasma display technology operates with rare gases which are being influenced by air pressure. Up to an altitude of 2000 m above sea-level, the display is functioning fine. Operating the set at a higher altitude, the picture becomes unstable and the picture performance is deteriorating. Bringing the set below 2000 m it works fine again. Transportation has no influence.

Control of peripheral equipment
The infrared signals of the screen may influence the reception sensitivity of other peripherals. Solution: replace the batteries of the remote control or change position of other equipment. E.g. keep away a wireless headphone from within a radius of 1.5 m.

No stable or not synchronised VGA picture
Check if you have selected the correct VGA mode in your PC (640x480, 640x400, 640x350, MAC II, SVGA, XGA).

No picture or no sound
Are the supplied cables connected properly? (The power cable to the display, the VGA cables, the audio cables,...)
Is your PC switched on?
Do you see a black screen and the indicator in front of the monitor lights up green, this means that the display mode is not supported.
Switch your VGA source to a correct mode.

Remote control
If your monitor no longer responds to the remote control, the batteries may be exhausted.

If your problem is not solved:
Switch your monitor off and then on again.
Never attempt to repair a defective monitor yourself.
Check with your dealer or call a TV technician.

Transport
Keep the original packaging to transport the monitor if needed.

End of life directives
Philips is paying a lot of attention to produce environmentally-friendly in green focal areas. Your new monitor contains materials which can be recycled and reused.
At the end of its life specialised companies can dismantle the discarded monitor to concentrate the reusable materials and to minimise the amount of materials to be disposed of.
Please ensure you dispose of your old monitor according to local regulations.

How to dispose of batteries ?
The batteries supplied do not contain the heavy metals mercury and cadmium. Nevertheless in many countries batteries may not be disposed of with your household waste. Please ensure you dispose of batteries according to local regulations.

Miscellaneous
- Ambient temperature: + 5~ + 45°C
- Maximum operating altitude: 2000 m
- Mains: AC 100-240V
- Power consumption: around 350W
- Standby consumption: 1 W
- Weight (excl. packaging)
  Display: 42.5 kg
- Dimensions (wxhxd):
  Display: 122.2 x 68.1 x 14.6 cm
- Wall mounting bracket included

4. Mechanical instructions

4.1 Introduction:

There are pre-defined service positions for the following panels:

1. VS/VA SUPPLY panel.
2. PDP DISCHARGE panel.
3. AUDIO AMPLIFIER panel.
4. PRE-CONDITIONER panel.
5. AV CONTROL panel.
6. PDP LIMESCO panel.
7. YUV/YC INPUT panel.
8. LED DISPLAY panel.
9. SWITCH DISPLAY panel.

Before these panels can be accessed, the rear cover has to be removed:

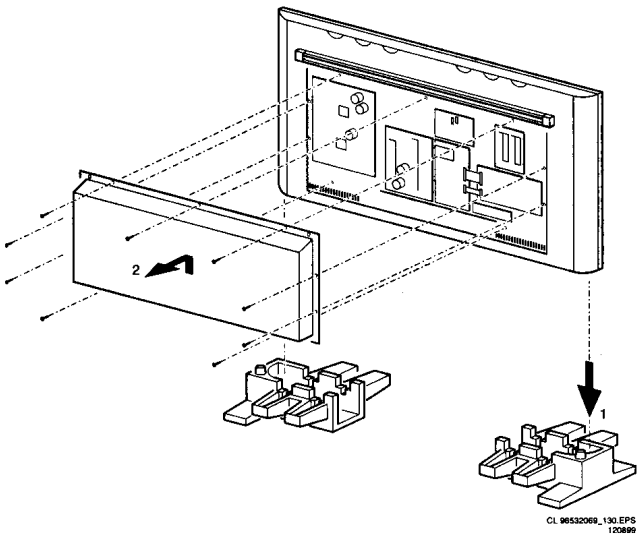


Figure 4-1

1. Place the Display Box in the service stand via 2 reinforced cushions (order code: 3122 126 30181).
2. Remove the 9 fixation screws of the rear cover.
3. Remove the rear cover (during removal push it slightly upwards).

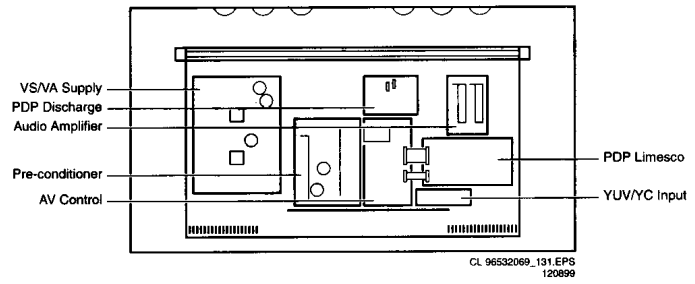


Figure 4-2

1. All panels are now accessible.

4.1.1 VS/VA SUPPLY panel.

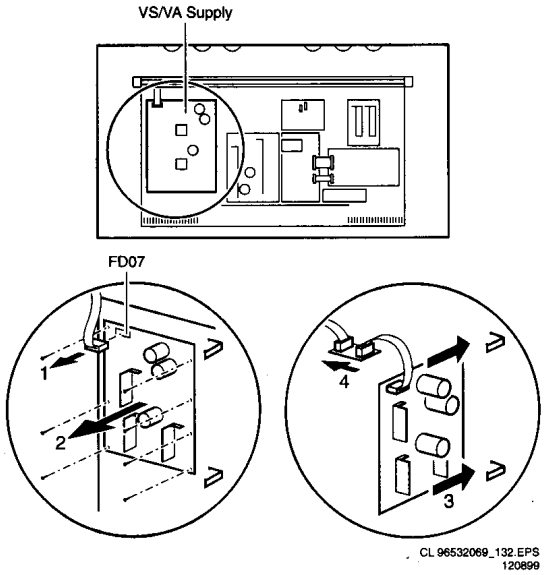


Figure 4-3

1. Disconnect Fan Supply cable from connector FD07 in the upper left corner [1].
2. Remove the 7 fixation screws of the panel [2].
3. Place panel on the 2 hinges, which are located near the right corners of the panel [3].
4. Use the mechanical service part (extension cable assembly, 12NC: 3122 785 90006) to extend the Fan Supply cable [4].
5. The copper side is now accessible from the left.

4.1.2 PDP DISCHARGE panel.

As in the FTV 1.5, this panel must be exchanged completely if defective.

4.1.3 AUDIO AMPLIFIER panel.

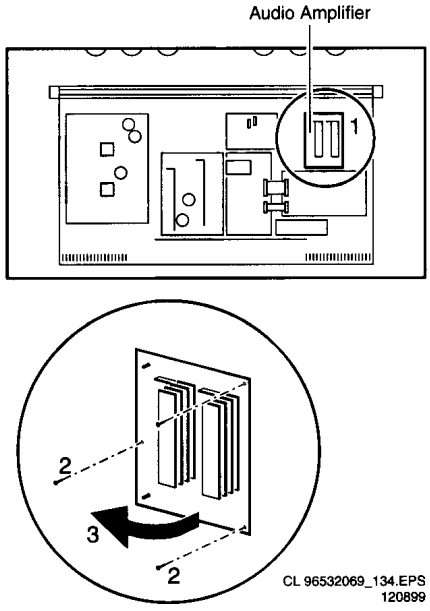


Figure 4-4

1. Some testpoints are accessible at the B-side [1].
2. If this is not sufficient, remove the 3 fixation screws of the panel [2].
3. Panel now can be hinged on the left side to access the A-side (soldering side) [3].

4.1.4 PRECONDITIONER panel.

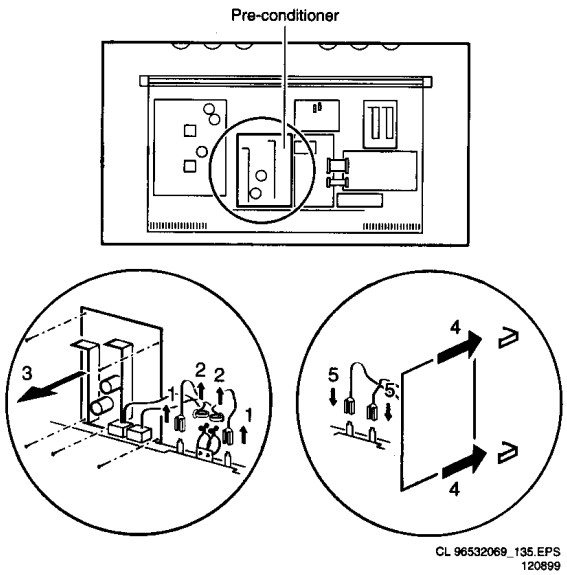


Figure 4-5

1. Disconnect the 2 grounding wires from the shielding plate by pressing the small lever on the connector while pulling [1].
2. Remove the 2 ferrite ring cores from their fixations [2].
3. Remove the 5 fixation screws of the panel [3].
4. Place panel on the 2 hinges, which are located, near the left corners of the panel [4].
5. Reconnect grounding wires to the extra connectors on the shielding plate at the left side [5].
6. The copperside becomes accessible now from the right side.

4.1.5 AUDIO VIDEO CONTROL panel.

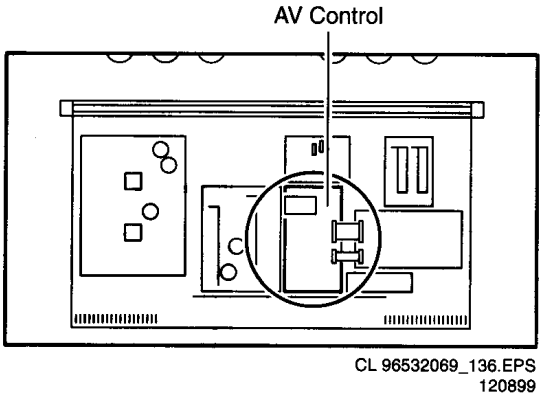


Figure 4-6

This panel has no service position for accessing the A-side, however all service test points are accessible at the B-side (see Service Manual).
In case some components must be (de)soldered, all fixation screws (6 for the panel, 5 at the metal connector plate) and all cables must be removed to access the A-side.

4.1.6 PDP LIMESCO panel.

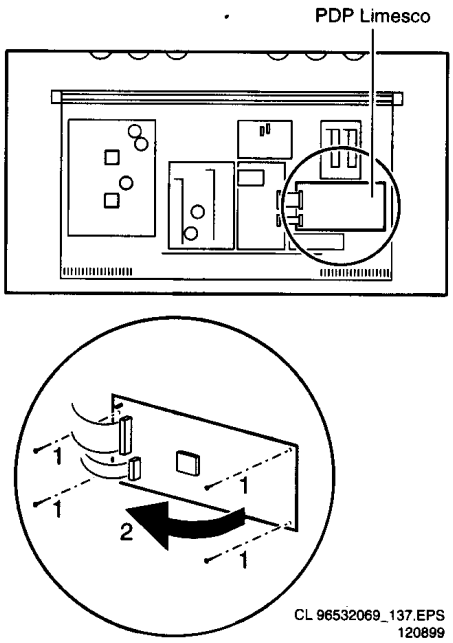


Figure 4-7

All SMC's are located on the B-side, so all testpoints are accessible. In case some components must be (de)soldered, the hinge construction can be used to access the A-side.
1. Remove the 4 fixation screws of the panel [1].
2. Panel can now be hinged to access soldering side [2].

4.1.7 YUV/YC INPUT panel.

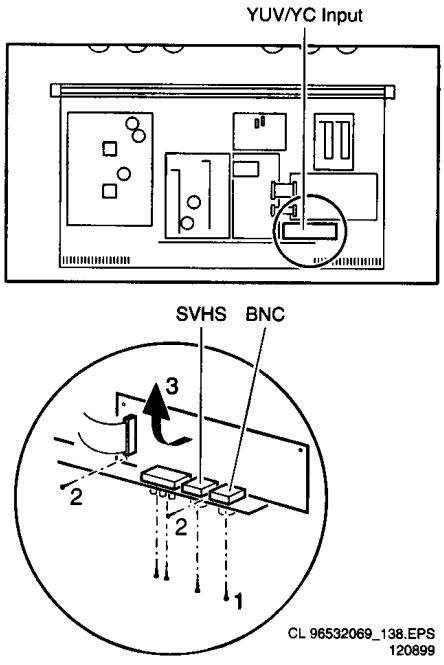


Figure 4-8

This panel has no pre-defined service position. For access of the A-side, the panel has to be removed:
1. Remove the 4 screws at the metal connector plate [1].
2. Remove the 2 fixation screws of the panel [2].
3. Panel can be removed now to access the A-side [3].

4.1.8 LED DISPLAY panel.

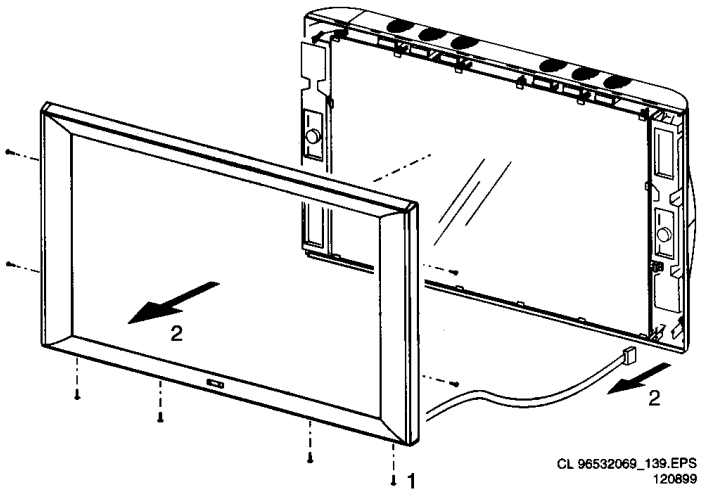


Figure 4-9

1. Remove 2 x 2 screws at the sides and 4 screws at the bottom of the front cover [1].
2. Remove the front cover (it hinges at the top). During removal unplug the cable of the LED DISPLAY panel at the SWITCH DISPLAY panel (connector SD11) [2].

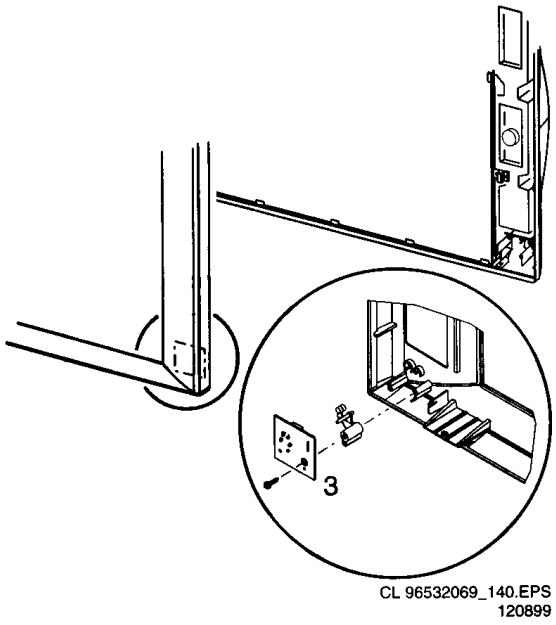


Figure 4-10

1. The LED DISPLAY panel can be removed now by unscrewing 1 fixation screw [3].

4.1.9 SWITCH DISPLAY panel.

1. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

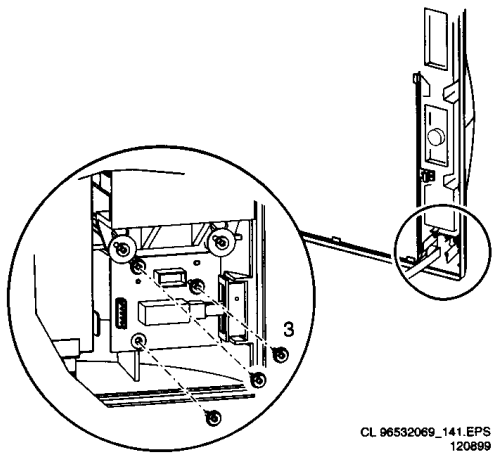


Figure 4-11

1. The SWITCH DISPLAY panel can be removed now by unscrewing 3 fixation screws [3].

4.2 Exchanging parts

Some parts of the FTV1.9 Display Box must be exchanged if defective:

1. GLASS PLATE.
2. LOUDSPEAKER.
3. PLASMA DISPLAY PANEL [PDP].

4.2.1 Exchanging of the GLASS PLATE.

1. First unplug (remove Mains and VGA cable) the Display Box .
2. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

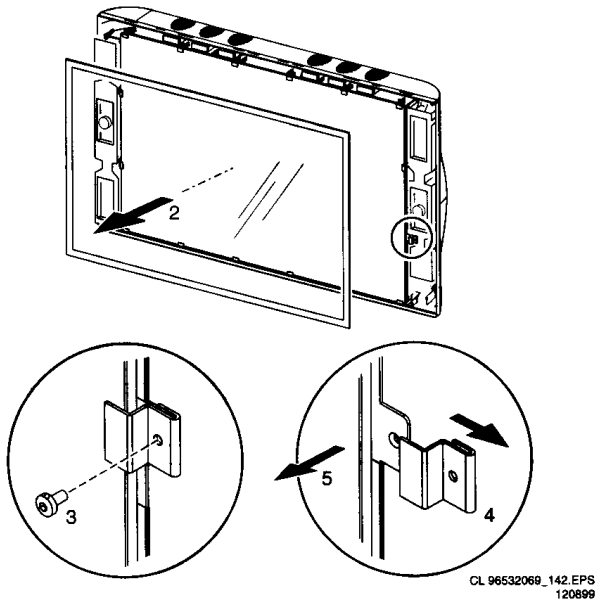


Figure 4-12

1. Now the GLASS PLATE can be removed by unscrewing all screws [3] and removing all glass clips [4].

4.2.2 Exchanging of a LOUDSPEAKER.

1. First unplug (remove Mains and VGA cable) the Display Box.
2. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

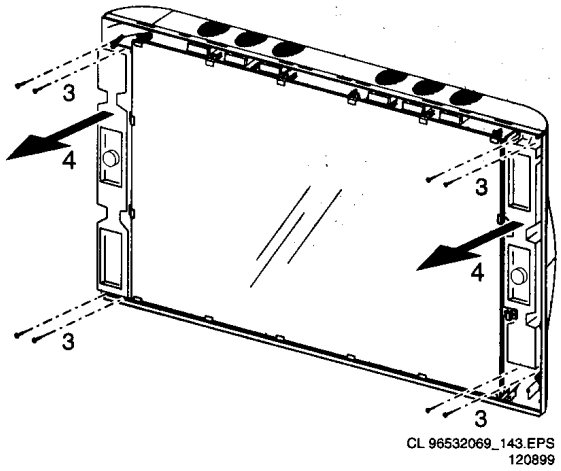


Figure 4-13

1. The LOUDSPEAKER can now be removed by disconnecting its cable and removing the 4 fixation screws at the top and bottom of the speakerbox. Be sure to remove the correct screws, otherwise the speaker system will be damaged (it is an airtight system).

4.2.3 Exchanging of the PDP.

1. First unplug (remove Mains and VGA cable) the Display Box.
2. Place the rear side of the Display Box on a foam cushion (be sure the metal rear cover is mounted in order to prevent damaging of the electronic panels).
3. Remove front cover (for a description see Chapter 1.1.8 LED DISPLAY panel).
4. Now the GLASS PLATE can be removed by unscrewing all screws and removing all glass clips (for a description see Chapter 1.2.1. 'Exchanging of the GLASS PLATE').

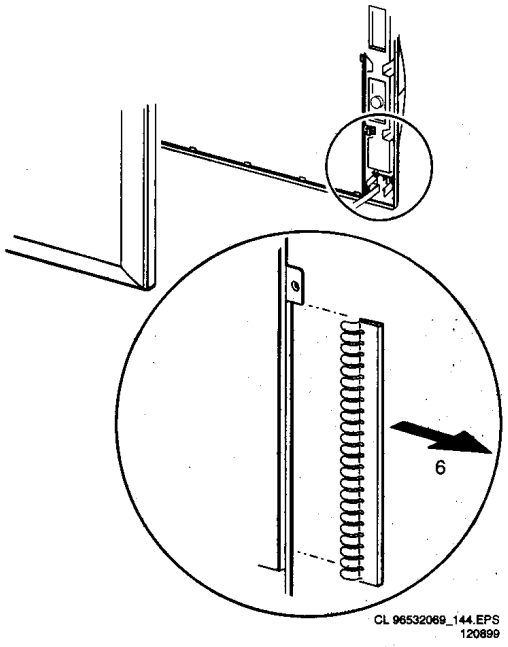


Figure 4-14

1. Remove all copper EMC SHIELDING springs mounted around the display [6].
2. Now flip the complete Display Box and place it with the Plasma Display down on a foam cushion. Be 100 % sure a large foam cushion is placed underneath the PDP, as it will drop about 10 mm after removing its fixation screws ! !
3. Disassemble metal rear cover (for a description see Chapter 1.1 'Introduction').

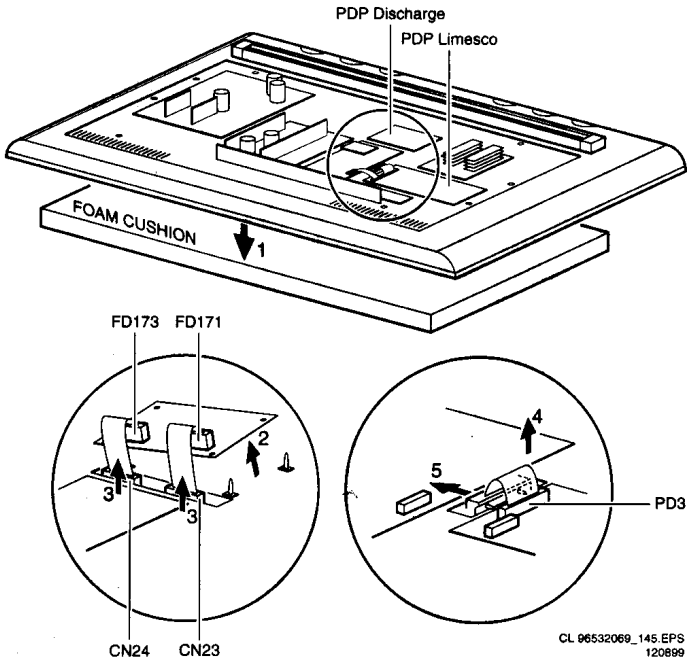


Figure 4-15

1. Disconnect the following cables:
   - Cables coming from connectors CN23 and CN24 of the PDP DISPLAY panel [3] (for easiest access lift the PDP DISCHARGE panel from its fixations [2]).
   - Flat cable on connector PD3 of the PDP LIMESCO panel [4]. Also remove the ferrite 'flat cable shield' completely by unlocking its fixations [5].

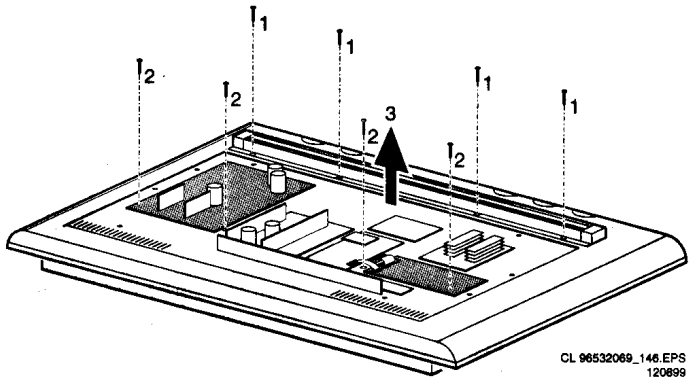


Figure 4-16

1. Now remove the 8 large screws which hold the PDP:
   - 4 screws are located at the top: they also hold the aluminium wall mount [1].
   - The other 4 are located at the bottom: the 2 outer screws are hidden behind panels. Therefor unscrew the VS/VA SUPPLY and the PDP-LIMESCO panel (grey panels) [2].
2. Lift encasing from PDP and replace PDP [3].

5. Service modes, fault finding and repair tips

For the FTV1.9, the Monitor can be used in two applications.
- A stand-alone configuration, a separate device which can also be sold and serviced separately.
- TV configuration, where the monitor is combined with the E-box.

The monitor, as a stand-alone unit, can be serviced by using a test pattern coming from the PDP-LIMESCO panel on the rear of the monitor itself or via a PC/laptop by using ComPair via the ComPair connector.
In this chapter the following paragraphs are included:
1. Test points
2. Dealer Service Tool (DST)
3. Service Modes
4. Error code buffer and error codes
5. The "blinking LED" procedure
6. Fault-finding tips
7. ComPair

5.1 Test points

The FTV1.9 chassis is equipped with test points in the service printing. These test points are referring to the functional blocks:
- A1-A2-A3, etc.: Test points for the Audio amplifier (A)
- C1-C2-C3, etc.: Test points for the AV control circuit (AVC)
- FD1-FD2-FD3, etc.: Test points for the VsVa supply (FD1-FD2) and the PDP discharge panel
- L1-L2-L3, etc.: Test points for the PDP LIMESCO (PD1-PD9)
- PR1-PR2-PR3, etc.: Test points for the Pre-conditioner (PR1-PR3)
- Y1-Y2-Y3, etc: Test points for the Y/C YUV monitor panel (UY1-YC4)

Measurements are performed under the following conditions:
Video: colour bar signal; Audio: 3 kHz left, 1 kHz right

5.2 Dealer Service Tool (DST)

For easy installation and diagnosis the dealer service tool (DST) RC7150 can be used. When there is no picture (to access the error code buffer via the OSD), DST can enable the functionality of displaying the contents of the entire error code buffer via the blinking LED procedure, see also paragraph 5.5. The ordering number of the DST (RC7150) is 4822 218 21232.

5.2.1 Installation features for the dealer

The dealer can use the RC7150 for programming the TV-set with pre-sets. 10 Different program tables can be programmed into the DST via a GFL TV-set (downloading from the GFL to the DST; see GFL service manuals) or by the DST-I (DST interface; ordering code 4822 218 21277). For explanation of the installation features of the DST, the directions for use of the DST are recommended (For the FTV1.9 chassis, download code 4 should be used).

5.2.2 Diagnose features for service

FTV1.9 sets can be put in two service modes via the RC7150. These are the Service Default Mode (SDM) and the Service Alignment Mode (SAM).

5.3 Service Modes

Below described sequence is only valid for the "Monitor Only Configuration". When a Receiver box is connected to the Display Box (TV Configuration), please check chapter 5 in the Training Manual of the Receiver Box.

5.3.1 Service Default Mode (SDM)

The purpose of the SDM is:
- Provide a situation with predefined settings to get the same measurements as in this manual.
- Access to the error buffer via the blinking LED procedure.
- Inspection of the error buffer.
- Possibility to overrule software protections via the service pins (caution: override of software protections!).

Entering the SDM:
- By transmitting the "DEFAULT" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM).
- By pressing on a standard RC the following sequence 0, 6, 2, 5, 9, 6 followed by the "MENU" key.
- By short-circuiting the SDM pin on the µP panel.

In the SDM the following information is displayed on the screen:

```
------------------------------------------------------------
F19DBC X.Y_12345 (1)   LLLL (2)   SDM (3)
ERR 02 01 14 ## ## ## ## ## ## ##
------------------------------------------------------------
```

Explanation notes/references:
(1) Software identification of the main micro controller (F19DBC X.Y_12345)
- F19D is the chassis name for FTV1.9 display
- B is the region identification
- C is the language cluster
- X = (main version number)
- Y = (subversion number)
- ##### are 5 digits of the serial number

(2) "LLLL" Normal display operation in hours
(3) "SDM" To indicate that the TV set is in the service default mode
(4) "ERR 02 01 14 ## ## ## ## ## ## ## ##" This line shows the contents of the error buffer (max. 10 errors). The last error that occurred is displayed at the most left position. When less then 10 errors have occurred the rest of the line is empty. When the errorlist is empty " No errors" is displayed. No duplicate errors.
Exit the SDM:
Push the "STANDBY" button on the Remote Control.
The SDM sets the following pre-defined conditions:
- Volume level is set to 25% (of the maximum volume level).
- Linear Audio and Video settings are set to 50%.
- Colour temperature is set to normal.

The following functions are "overruled" in SDM since they interfere with diagnosing/repairing a set
- Video blanking.
- Slow demute.
- Anti-ageing.
- Automatic switch to "Standby" when H- and/or V-sync signals are lost.

All other controls operate normally.

5.3.2 Service Alignment Mode (SAM)

The purpose of the SAM is to align and or adjust settings.
For recognition of the SAM, "SAM" is displayed at the top of the right side of the screen
Entering the SAM-menu:
- By pressing the "ALIGN" button on the RC7150 Dealer Service
- Standard RC sequence 062596 followed by the "OSD" button.

- By short-circuiting the SAM pin on the µP panel (Caution: override of software protections ! !)

In the SAM the following information is displayed on the screen:

F19DBC X.Y_12345 SAM
ERROR## ## ## ## ##
WHITE POINT
PDP TEST PATTERN [ON/OFF]
STORE
RESET ERROR BUFFER

The menus and submenus

White point
The white point sub menu contains the following items:

- RED
- GREEN
- BLUE
- COLOUR TEMPERATURE

PDP Test pattern
By selecting this item, all OSD disappears from the screen. The screen now changes from light grey to dark grey in a slow regular rhythm. One can so easily check if all pixels of the monitor are correct.

Store
The change values are stored in the NVM.

Reset Error Buffer
This option will reset the error buffer.

Exit the SAM:
Push the "STANDBY" button on the Remote Control.
SAM menu control:
Menu items can be selected with the "UP" or "DOWN" key. Entry into the selected items (sub menus) is done by the "LEFT" or "RIGHT" key. The selected item will be highlighted. With the same "LEFT/RIGHT" keys, it is possible to increase/ decrease the value of the selected item.
Return to the former screen by pushing the "MENU" button.
The item values are stored in NVM if the sub menu is left.

5.3.3 Customer Service Mode (CSM) Display

FTV1.9 monitors are equipped with the "Customer Service Mode" (CSM). CSM is a special service mode that can be activated and de-activated by the customer, upon request of the service technician/dealer during a telephone conversation in order to identify the status of the set. This CSM is a 'read only' mode, therefore modifications in this mode are not possible.
Entering the Customer Service Mode.

- By pressing on RC03333/01 the following sequence : Picture, sound, cursor up, cursor down, cursor left, cursor right followed by the "MUTE" button.

Exit the Customer Service Mode.

- pressing the "MENU" or any key on the Remote Control handset (except "P+" or "P-")
- switching off the TV set with the mains switch.

All settings that were changed at activation of CSM are set back to the initial values

The Customer Service Mode information screen
The following information is displayed on screen:

CUSTOMER SERVICE MENU

- Software version F19DBC X.Y_#####)
- Code 1: contains the last 5 error codes
- Code 2: contains the first 5 error codes with the last received error at the most left-hand side.
- Service unfriendly modes

5.4 Error code buffer and error-codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right.
In case of non-intermittent faults, clear the error buffer before starting the repair to prevent that "old" error codes are present. If possible check the entire content of the error buffers. In some situations an error code is only the RESULT of another error code (and not the actual cause).
Note: a fault in the protection detection circuitry can also lead to a protection
The error code buffer will be cleared in the following cases:

- exiting SDM or SAM with the "Standby" command on the remote control
- transmitting the commands "DIAGNOSE-9-9-OK" with the DST.

Leaving SDM or SAM with the mains switch does not reset the error buffer.
Examples:
ERROR: 0 0 0 0 0 : No errors detected
ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
ERROR: 5 6 0 0 0 : Error code 6 was first detected and error code 5 is the last detected (newest) error

Error -nr	Type of Error	Possible defect/cause
1	+5V	+5V pin at µP is low.
2	8V6	8V6 pin at µP is low.
3	Fan_prot	Gives an indication that 1 or more FAN(s) does not function, or that 1 or more fan control circuits is defect
4	Over-temp_prot	Temperature at the heatsink of the VsVa supply or the Preconditioner is too high
5	DC_prot	Audio-amplifier IC, its supply or the Audio amplifier is defect
6	Over_voltage_prot	Vs or Va supply voltage is too high
7	Vrr	Powersupply of the display is not correct. Ignorance of the signal during startup by the software.
8	Power_OKE	Power supply or modules that uses this voltage. If this signal is NOT activated means that all supply voltages are available (exception Audio supply)
9	Blocked NVM IIC bus	NVM IIC bus is not correct
10	Blocked slow IIC bus	Slow IIC bus is not correct
11	TDA9860	No acknowledge of Audio controller
12	TDA4885	No acknowledge of Video controller
13	MC141585	No acknowledge of OSD Generator
14	uPD93687 GD-LBD	No acknowledge of Limesco

Error -nr	Type of Error	Possible defect/cause
15	PCF8574 AT	No acknowledge of I/O Expander
16	NVM	No acknowledge of NVM
17	Communic ation	Fault in the communication

5.5 The "blinking LED" procedure

The contents of the error buffer can also be made visible through the "blinking LED" procedure. This is especially useful when there is no picture. There are two methods:

- When the SDM is entered, the LED will blink the contents of the error-buffer. Error-codes = 10 are shown as followed. A long blink of 1second which is an indication of the decimal digit, followed by a pause, followed by n short blinks. When all the error-codes are displayed, the sequence is finished with a led display of about 3 seconds. The sequence starts again.
- With the DST all error codes in the error buffer can be made visible. Transmit the command: "DIAGNOSE x OK" where x is the position in the error buffer to be made visible x ranges from 1, (the last (actual) error) to 10 (the first error). The LED will operate in the same way as in the previous point, but now for the error code on position x.

Example:
Error code position 1 2 3 4 5
Error buffer: 12 9 5 0 0

- after entering SDM: 1 long blink of 1 sec. + 2 short blinks - pause - 9 short blinks - pause - 5 short blinks - pause - long blink of 3 sec. --etc.
- after transmitting "DIAGNOSE- 1- OK" with the DST: 1 long blink 2 short blinks - pause - 1 long blink + 2 short blinks - etc.
- after transmitting "DIAGNOSE- 2- OK" with the DST: blink (9x) - pause - blink (9x) - etc.
- after transmitting "DIAGNOSE- 3- OK" with the DST: blink (5x) - pause - blink (5x) - etc.
- after transmitting "DIAGNOSE- 4- OK" with the DST: nothing happens

5.6 Protection structure

5.6.1 General

The protection structure of the FTV1.9 D-box is shown at figure 5.5.
The FTV1.9 monitor has one microprocessor, which is situated on the AV-control panel and is supplied by the 5V standby supply. The microprocessor is even active when the set is switched to standby. The microprocessor controls the "supply-on" line which switches first relay 5680 and then relay 5690. In de standby-mode or the protection-mode the "supply-on" line is "low" and both relays are switched off. The preconditioner is disconnected from the mains.
The protections of the FTV1.9 monitor can be divided into 5 subgroups:

- Fan_prot
- Over_temp_prot
- DC_prot
- Over_voltage_prot
- Vrr

For the Fan-, Over_temp, DC and the Over_voltage protections the signals for the µP are latching, using the 5Vstby_switched for powering the circuits permanently. The µP has sufficient time for diagnosis and for storing the error-codes in the NVM. Vrr, which is an indication of the powersupply of the display is correct, is directly fed to the µP.

5.6.2 Signal line "PROTECTION STATUS" and errorcodes

When one of the protection mechanism is triggered, the 5Vstby-switched is connected via a saturated transistor and a pre-defined resistor to signal line "protection status", which is connected to the µP.
Signal line "protection status" is connected to ground via resistor R3378 and 3379. For each separate fault condition mechanism we get a pre-defined voltage at the µП.
This results in the following table

Protection-mode	Series resistor	Voltage at "protection-status" line	Error-code
None	-----	< 0.3V	none
Fan_prot	1KΩ	0.30V < Vprot < 1.90V	3
Vs or Va_prot	470Ω	1.90V < Vprot < 2.80V	4
Temp_prot	220Ω	2.80V < Vprot < 3.75V	5
DC-prot	68Ω	3.75V < Vprot < 4.7V	6
Vrr	------	------	7

Protection signal Vrr coming from the PDP, to indicate that the powersupply is ok or not ok ("1" or "0") is directly connected to the µP. Error-code 7 is stored in the NVM and the set is switched to standby.
When one of the protections is activated, the power supplies of the Vs and Va are shut down and the set is switched to standby.

5.6.3 Fan protection

When this protection is activated, the Va- and Vs power supply are shut down. The set is switched to the standby mode and error-code 3 is stored in the NVM.
The fan voltage is powered by 17V, but clamped to 12V to prevent damage. In order to be able to verify whether the fans are running, a fault detection circuit is implemented for each of the 6 fans. A running fan gives pulses in the same speed as the rotation of the blades. The circuit uses these pulses to trigger the discharge of an elcap. The elcap is continuously charged through a resistor.
Example : Capacitor C2319 is charged through R3356 and at every pulse discharged by T7322. When fan 6 is blocked, C2314 is charged via D6326 en triggers thyristor 7315, because C2319 is no longer discharged via T7322. The current now flows from the 5Vstby-switched via resistor 3383 and 3325 driving transistor T7321 into saturation. The voltage dividing of R3323 and resistor R3378 and 3379 now determine the voltage "protection status". (neglect the Vce of 0.2V of T7321.).

Reset of the VsVa-supply.
Transistor T7339 is shorted now by the presence of the "protection status" signal. T7339 connects resistor R3376 and R3389 to ground, switching on T7338. Thyristor 7333 is now triggered, shorting signal PROTS to ground. To follow the signal flow, go to the right upper corner of schematic FD1. Connecting PROTS to ground, will start a current flow through opto-coupler diode 7103 and the opto-coupler transistor connects supply voltage Vcc2 to the fault input (pin 10) of IC 7101. When the voltage at pin 10 exceeds 1.0V, IC7101 stops oscillating. The Va-supply stops functioning.
To continue the signal flow, go to the right upper corner of schematic FD2. Connecting PROTS to ground also results in a current flow through the opto-coupler diode of 7003. The opto-coupler transistor connects supply voltage Vcc1 to the fault input (pin 10) of IC 7001. When the voltage at pin 10 exceeds 1.0V, IC7001 stops oscillating. The Vs-supply stops functioning.

5.6.4 Vs and Va protection

Va protection
When this protection is activated, the Va- and Vs power supply are shut down. The set is switched to the standby mode and error-code 4 is stored in the NVM.
When the Va-supply exceeds the 68V, regulator 7112 is triggered and will switch on T7113. Capacitor 2132 is charged via the 5Vstby-switched and will trigger thyristor 7114, which will switch on T7341. The voltage dividing of R3386 and resistor R3378 and 3379 now determine the voltage "protection status". (neglect the Vce of 0.2V of T7341). See schematic FD2.
The presence of the voltage at "protection status" line will eventually reset the VsVa-supply. For more info see subparagraph - Reset of the VsVa-supply.

Vs protection
When this protection is activated, the Vs power supply is shut down. The set is switched to the standby mode and error-code 4 is stored in the NVM.
When the Vs supply exceeds the 198V, regulator 7012 is triggered and will switch on T7016. Capacitor 2032 is charged via the 5Vstby-switched and will trigger thyristor 7013. Thyristor 7013 is fired and connects signal Aa to ground. To follow the signal flow, go to the right upper corner of schematic FD1.
When signal Aa is shorted to ground, T7341 is switched on. The voltage dividing of R3386 and resistor R3378 and 3379 now determine the voltage "protection status". (neglect the Vce of 0.2V of T7341). See schematic FD2.
The presence of the voltage at "protection status" line will eventually reset the VsVa-supply. For more info see subparagraph - Reset of the VsVa-supply.

5.6.5 Temperature Protection

When this protection is activated, the Va- and Vs power supply are shut down. The set is switched to the standby mode and error-code 5 is stored in the NVM.
When the temperature of the heatsink on the Preconditioner panel or on one of the 2 heatsink on the VsVa panel exceeds the 110°C, the PTC resistance increases drastically. The voltage at pin 3 of IC7330 will drop and the output of 7330 will do the same. The current flow through opto-coupler diode 7331 results also in a current flow through the opto-coupler transistor and will trigger thyristor 7332. The fired thyristor switches transistor 7337 on. The voltage dividing of R3339 and resistor R3378 and 3379 now determine the voltage "protection status". (neglect the Vce of 0.2V of T7337).
The presence of the voltage at "protection status" line will eventually reset the VsVa-supply. For more info see subparagraph - Reset of the VsVa-supply.

5.6.6 DC Protection - Audio Amplifier

When this protection is activated, the Va- and Vs power supply are shut down. The set is switched to the standby mode and error-code 6 is stored in the NVM.
In case of a fault in the Audio amplifier or when a DC voltage appears on the speaker output, a signal called DCPROT is generated. See schematic FD2 - F7. In case of a fault, thyristor 7314 is triggered and switches on T7340. The voltage dividing of R3380 and resistor R3378 and 3379 now determine the voltage "protection status". (neglect the Vce of 0.2V of T7340).
The presence of the voltage at "protection status" line will eventually reset the VsVa-supply. For more info see subparagraph - Reset of the VsVa-supply.

5.6.7 Vrr - PDP supplies

Vrr is a logical signal ("high" in normal circumstances) that comes from the PDP. It's purpose is to trigger the switch-off of the Pre-conditioner supply in case Vrr becomes "low" , to trigger the shutdown of the VsVa supply and to initialise that error-code 7 is stored in the NVM.
When signal Vrr becomes "low", see FD1 - section F13, the output of IC7301-B becomes "high". This results in two actions. It will trigger thyristor 7302 and short signal PROTS to ground. This results eventually in a reset of the VsVa supply.
Switching on T7371, which again switches on T7370 via the 5Vstby-switched supply. Signal-line "supply-on" is now grounded. This results in switching off relay 5680 and 5690, disconnecting the mains from the pre-conditioner. The standby supply (5Vstby-switched) is still functional. (See Fig. 5-5)

5.7 Fault finding tips

5.7.1 Pre-conditioner

The Pre-conditioner delivers the following output voltages:
- 5 VSTBY
- 5 VSTBY_switched
- 380 VDC
- Internal 12 VSTBY to supply the relay, which switches the mains input

To trouble shoot the pre-conditioner, first check the LED of the display-box.
- No red, green or orange LED indicates the absence of the +5Vstby_switched at the VsVa panel.

Check the +5Vstby_switched on pin 5 of connector PR08. If this voltage is present check the presence of this voltage at the VsVa-panel on pin 2 of connector FD04. See the wiring diagram of the monitor for more details.
If the voltage is not present, check R3508 and fuse 1500. In case of a defective R3508, check/replace item 7500, opto-coupler 7501, regulator 7502, and diode 6501 + 6502.
In case of an open circuit of fuse 1500, check/replace bridge 6500 and capacitor C2501.
If both component are alive, measure the voltage at pin 5 of IC7500 - Topswitch. If the waveforms resemble a burst-signal, the output is too heavy loaded. Check the output diode D6504 and capacitor C2508 of the 12VSB and diode 6505 and capacitor C2510 of the 5VSTBY.
- The red LED is blinking (+5Vstby is OK!), which is an indication of a protection.

Disconnect the VGA-cable between the E-box and the Monitor. Now the Monitor is operating as a stand-alone unit.
Switch the monitor via the DST, (command "Default") or via the RC (special sequence) to the SDM.
Automatically the orange coloured LED of the monitor will blink the content of the error-buffer. If the sequence contains error-code 8, the cause could be a defective pre-conditioner. Error-code 8 is an indication that the +5V and/or the Vs/Va of the VsVa supply are not correct.
In case of error-code 4, switch OFF the set and check the temperature of the heatsink. In case of a high temperature of the heatsink, check MOSFET T7610 and the drive-circuit around T7640, T7641 and T7608.
In case of error-code 8, remove connector PR09 from the board. Short-circuit pin 2 of T7681 to ground, simulation of "SUPPLY_ON". (Caution - Protections overruled!!!)
Measure voltage at C2616. Is voltage 380Vdc?
Yes, the cause was a too heavy load/short-circuit at the VsVa-panel.
No, measure the voltage at C2606/C2607. Is this voltage a DC-voltage of approx. 300V with a strong ripple at a mains-input of 230Vac? If NO, check if relay 5690 is activated via the transistors T7684 + T7690. Check also PTC's 3600, 3601 and 3602 at their resistor-value.

Voltage is present at C2606. Check/replace NFR 3663 and 3668, if one of them is an open-circuit. In case R3663 is an open circuit, check/replace diode 6660, 6661 and capacitor C2664 plus IC 7660. If IC7660 is defect, check/replace IC 7650 and C2262. In case of an open circuit of NFR 3668, replace IC 7650.
NFR 3663 and NFR 3668 are not defect. Measure waveform at base of T7608. Is a square waveform present at gate of T7610? Check/replace MOSFET T7610 and the drive-circuit around T7640, T7641 and T7608.

5.7.2 VsVa-supply

The red LED is blinking (+5Vstby is OK!), which is an indication of a protection.
Disconnect the VGA-cable between the E-box and the Monitor. The Monitor is now operating as a stand-alone unit.
Switch the monitor via the DST, (command "Default") or via the RC (special sequence) to the SDM.

- Error-code 1, check the +5V supply

Check fuse 1103. If the fuse is an open circuit, check/replace IC 7201. If fuse 1103 is OK, check the presence of the 17V. I this voltage is not present check fuse 1102 + 1104 and D6121 + D6122. If the 17V is present, then remove connector FD05. The reason could be a too heavy load or a short-circuit of the +5V supply. If after disconnection of connector FD05 the set still goes into protection, check D6203, NFR 3205 and the circuit around IC 7201.

- Error-code 2, check the 8V6 supply

Check regulator IC 7203, NFR 3099 and D6204.

- Error-code 8 there is something wrong with the POWER_OKE signal. When the POWER_OKE signal is low, the Vs and Va and the +5V are available.

Measure the voltage Va at C2120. Is the voltage between 55V and 65V? If not check fuse 1105 and D6120. If both components are OK, the cause could be a too heavy load.
Measure the voltage Vs at C2020. Is the voltage between 165V and 185V? If not check D6020. If D6020 is OK, the cause could be a too heavy load.
If both voltage are not present, check fuse 1004 at the input. If fuse 1004 is an open circuit, check the MOSFET's 7005 and 7006 for a short-circuit. In case of short-circuit use the repair-kit.
If fuse 1004 is OK, check the voltage at pin 15 of IC 7001. Is the voltage at pin 15 approx. 16-17V? If NO, check NFR 3002 and D6002 + D6030. If YES, check the waveforms FD49 and FD50 at pin 14 and 12. If they are present, check pulse transformer 5001 and the driver-circuits around MOSFET 7005 and 7006. If the waveforms FD49 and FD50 are not present, replace IC7001.

- Error-code 5, check the audio-supply or the Audio amplifier IC.

Check/replace fuse 1201 + 1202 and diode 6201 + 6202. If the components are OK, check the audio-amplifier IC.

- Error-code 6, check the Vs and/or the Va supply voltage.

The regulation-circuit of one of these voltages is not working correctly.
For the Va supply check opto-coupler 7102 and IC 7110.
For the Vs supply check opto-coupler 7002 and IC 7010

5.8 ComPair

5.8.1 ComPair mode

The monitor, as a stand-alone unit, can be diagnosed via a PC/ laptop by using ComPair via the ComPair connector. Before connecting the ComPair-cable at the AV Control panel on connector AVC34, the monitor must be put in the "ComPair - Mode ". This can be done by changing the jumpers at connector AVC39. Connector AVC39 is situated under the uP panel.
The figure below shows how to do it.

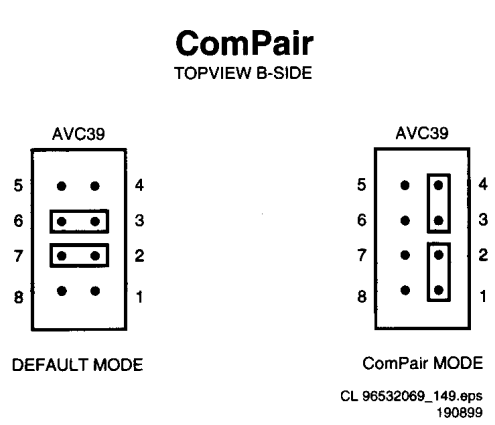


Figure 5-1

After switching ON the set, the red LED will blink as an indication that the monitor is in the ComPair mode.

5.8.2 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the DST service remote control allowing faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding how to repair the FTV1.9 in short time by guiding you step by step through the repair procedures.
- ComPair allows very detailed diagnostics (on I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C commands yourself; ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the FTV1.9 (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan FTV1.9 electronic manual, schematics and PCBs are only a mouse-click away.

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable. In case of the FTV1.9 chassis, the ComPair interface box and the FTV1.9 communicate via an I2C cable (bi-directional) The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in 2 ways:

1. Communication to the television (automatic)
2. Asking questions to you (manually)

ComPair combines this information with the repair information in its database to find out how to repair the FTV1.9.

Automatic information gathering
Reading out the error buffer, ComPair can automatically read out the contents of the entire error buffer.
Diagnosis on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the FTV1.9.

Manual information gathering
Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions and showing you examples. You can answer by clicking on a link (e.g. text or an

waveform pictures) that will bring you to the next step in the faultfinding process.
A question could be: Do you see snow? (Click on the correct answer)
YES / NO
An example can be: Measure testpoint I7 and click on the correct oscillogram you see on the oscilloscope

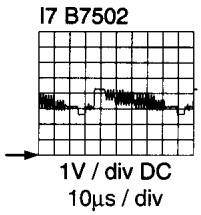


Figure 5-2

By a combination of automatic diagnostics and an interactive question/answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Additional features
Beside fault finding, ComPair provides some additional features like:
- Uploading/downloading of pre-sets
- Managing of pre-set lists
- Emulation of the Dealer Service Tool

5.8.3 Searchman (Electronic Service Manual)

If both ComPair and SearchMan are installed, all the schematics and PCB's of the faulty set are available when clicking on the hyper-link of a schematic or a PCB in ComPair.
Example : Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Monocarrier.
Clicking on the PCB hyper-link, automatically shows the PCB with a highlighted capacitor C2568. clicking on the schematic hyper-link, automatically shows the position of a highlighted capacitor C2568 at the schematic.

5.8.4 Connecting the ComPair interface

The ComPair Browser software should be installed and setup before connecting ComPair to the FTV1.9. (See the ComPair Browser Quick Reference Card for installation instructions):
1. Connect the RS232 interface cable to a free serial (COMM) port on the PC and the ComPair interface PC connector (connector marked with "PC").
2. Place the ComPair interface box straight in front of the television with the infrared window (marked "IR") directed to the television LED. The distance between ComPair interface and television should be between 0.3 and 0.6 meter. (Note: make sure that (also) in the service position, the ComPair interface infra red window is pointed to the standby LED of the television set (no objects should block the infra red beam)
3. Connect the mains adapter to the connector marked "POWER 9V DC" on the ComPair interface
4. Switch the ComPair interface OFF
5. Switch the television set OFF with the mains switch
6. Remove the rear cover of the television set
7. Connect the interface cable (4822 727 21641) to the connector on the rear side of the ComPair interface that is marked "I2C" (See Figure 5-4)
8. Connect the other end of the interface cable to the ComPair connector AVC34 (0334) at the right/bottom side of the AV-Control panel.
9. Plug the mains adapter in the mains outlet and switch ON the interface. The green and red LED's light up together. The red LED extinguishes after approx. 1 second (the green LED remains lit).
10. Start-up Compair and select "File" menu, "Open...:; select "FTV1.9 Fault finding" and click "OK"
11. Click on the icon (Fig. 5-3) to switch ON the communication mode (the red LED on the Compair interface wil light up)
12. Switch on the television set with the mains switch
13. When the set is in standby. Click on "Start-up in ComPair mode from standby" in the ComPair FTV1.9 fault finding tree, otherwise continue.

Figure 5-3

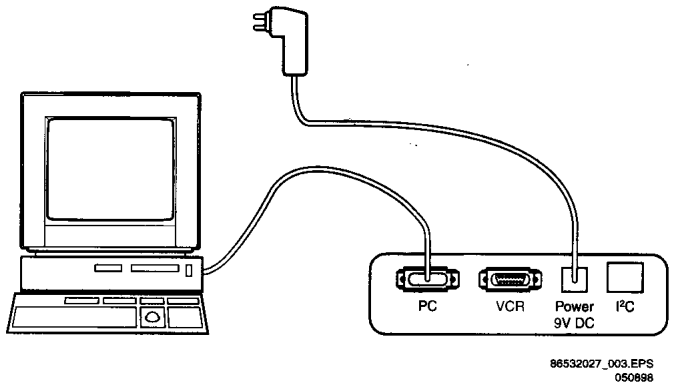


Figure 5-4

The set has now started up in ComPair mode. Follow the instruction in the FTV1.9 fault finding tree to diagnose the set. Note that the OSD works but that the actual user control is disabled

5.8.5 Preset installation

Presets can be installed in 2 ways with the FTV1.9.
- Via infra red
  - only sending TO the television
  - the rearcover does NOT have to be removed

Click on "File" "Open" and select "TV - use ComPair as DST" to use infra red
- Via cable
  - sending TO the television and reading FROM the television
  - the rearcover has to be removed

Click on "File" "Open" and select "FTV1.9 fault finding" to use the cable
Presets can be installed via menu "Tools", "Installation", "Presets".

5.8.6 Ordering ComPair

ComPair order codes:
- Starterkit ComPair + SearchMan software + ComPair interface (excluding transformer): 4822 727 21629
- ComPair interface (excluding transformer): 4822 727 21631
- ComPair transformer (continental) Europe: 4822 727 21632
- ComPair transformer United Kingdom: 4822 727 21633
- Starterkit ComPair software: 4822 727 21634

- Starterkit SearchMan software: 4822 727 21635
- Starterkit ComPair + SearchMan software: 4822 727 21636
- ComPair CD (update): 4822 727 21637
- SearchMan CD (update): 4822 727 21638
- ComPair interface cable (for FTV1.9): 4822 727 21641

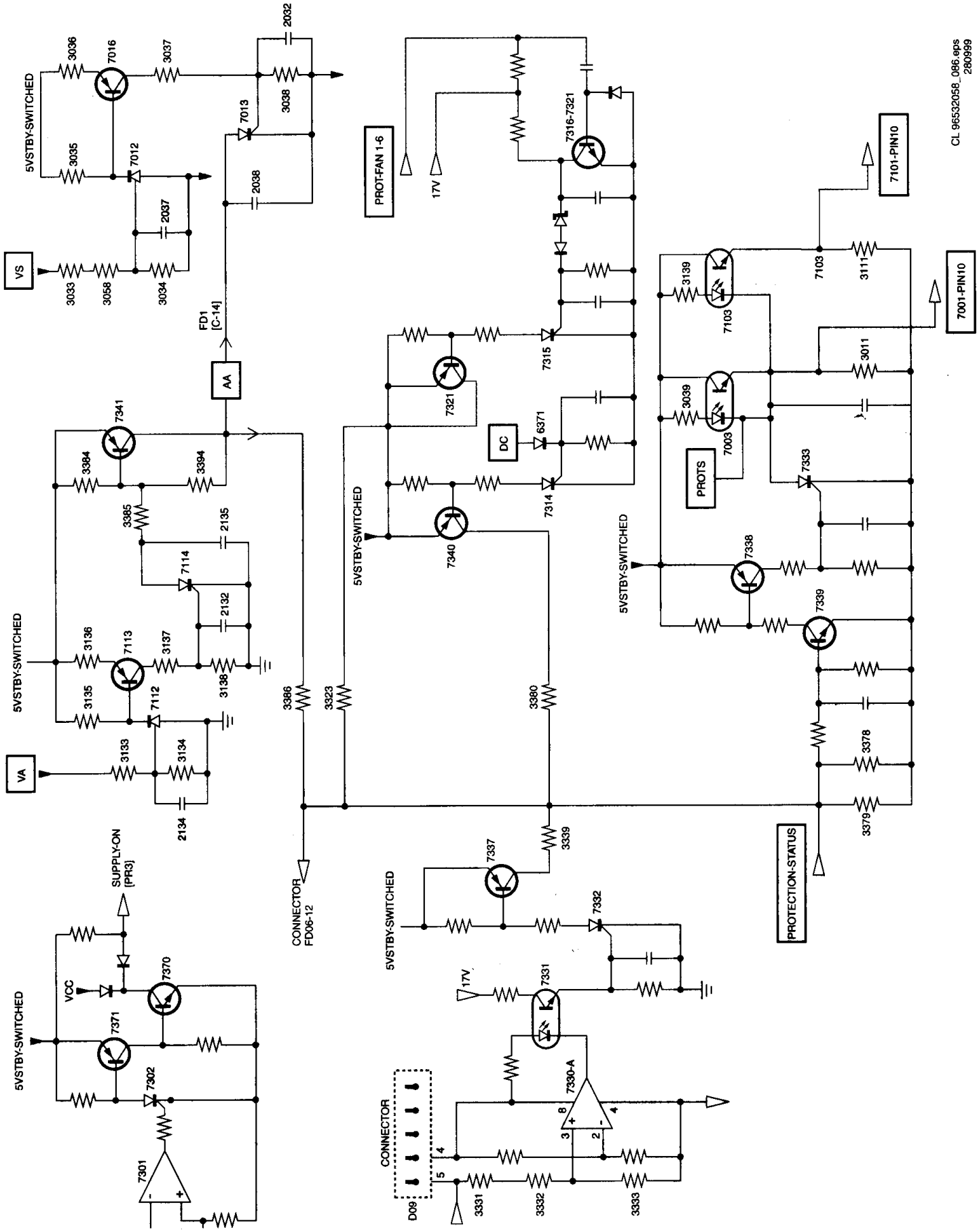
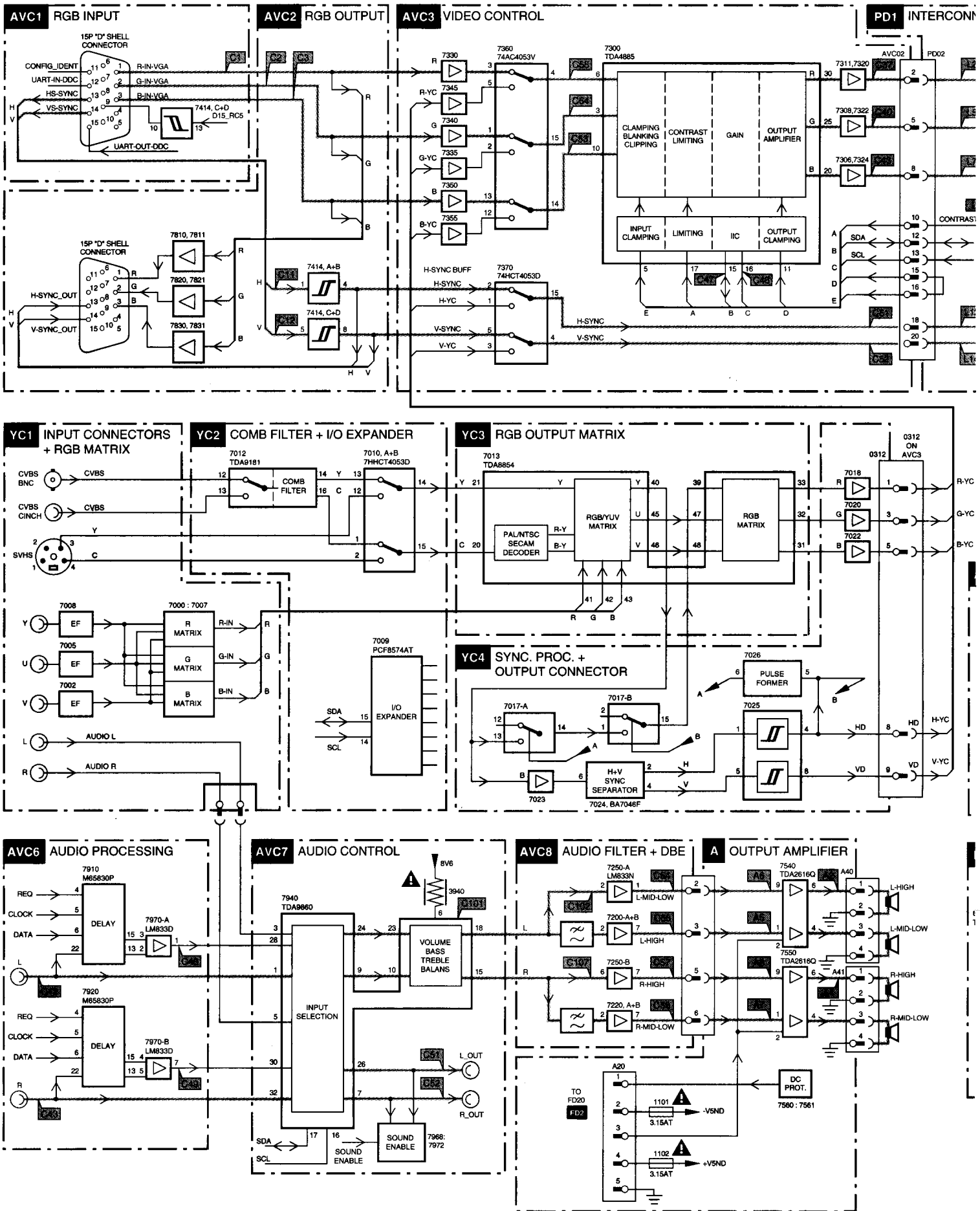
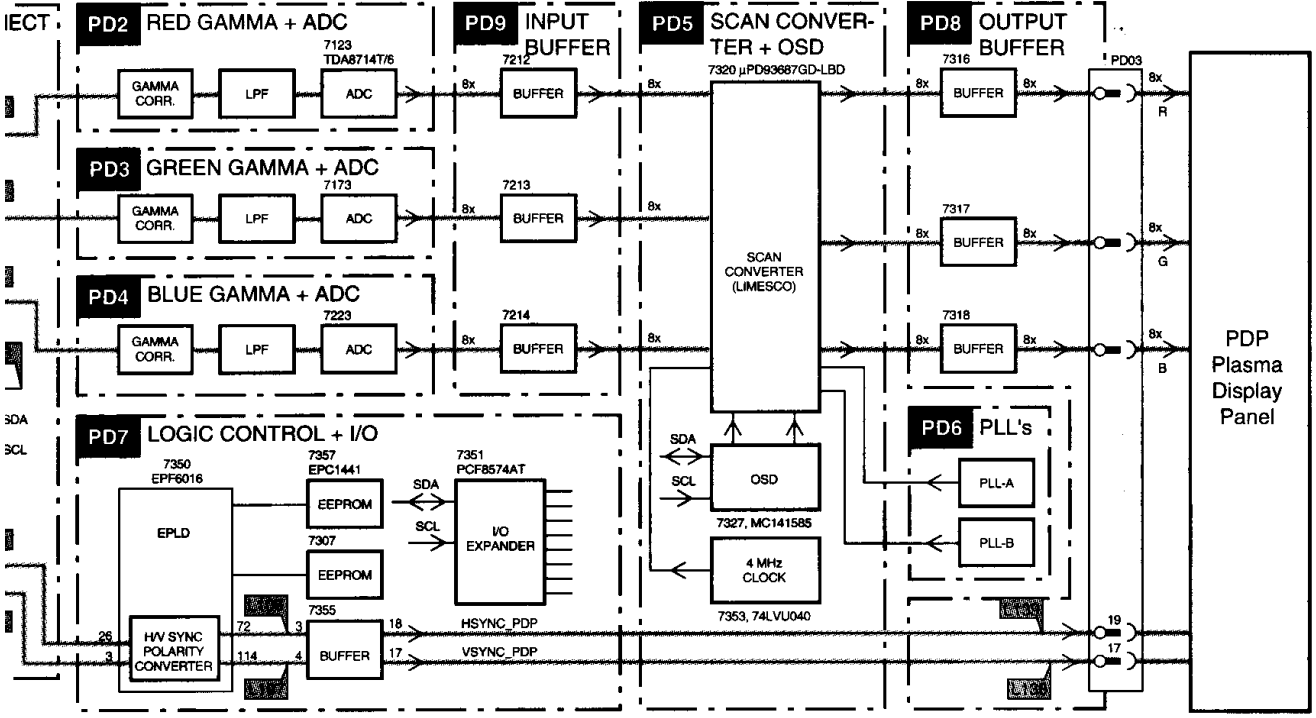


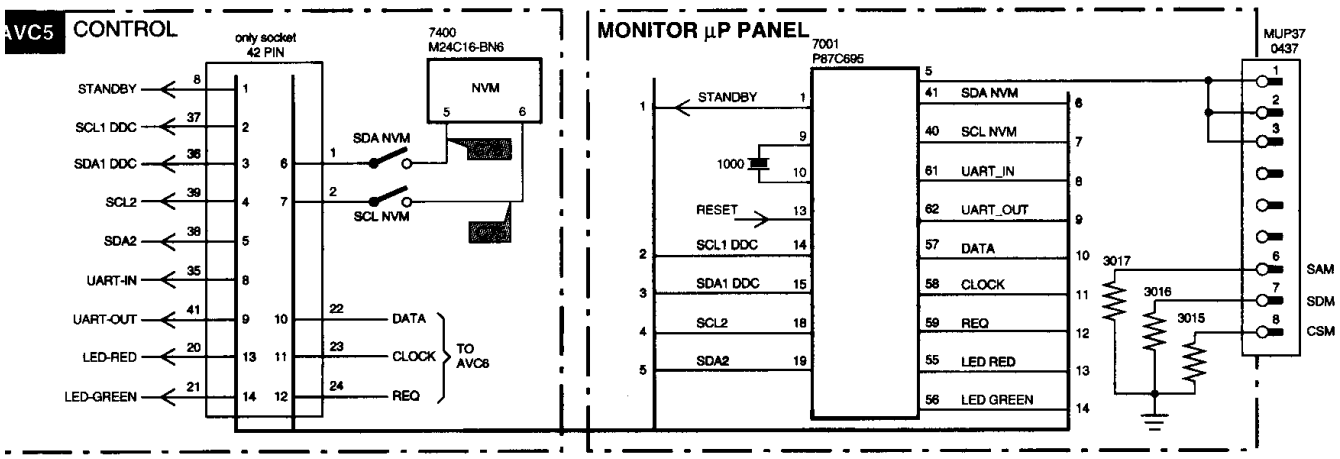
Figure 5-5

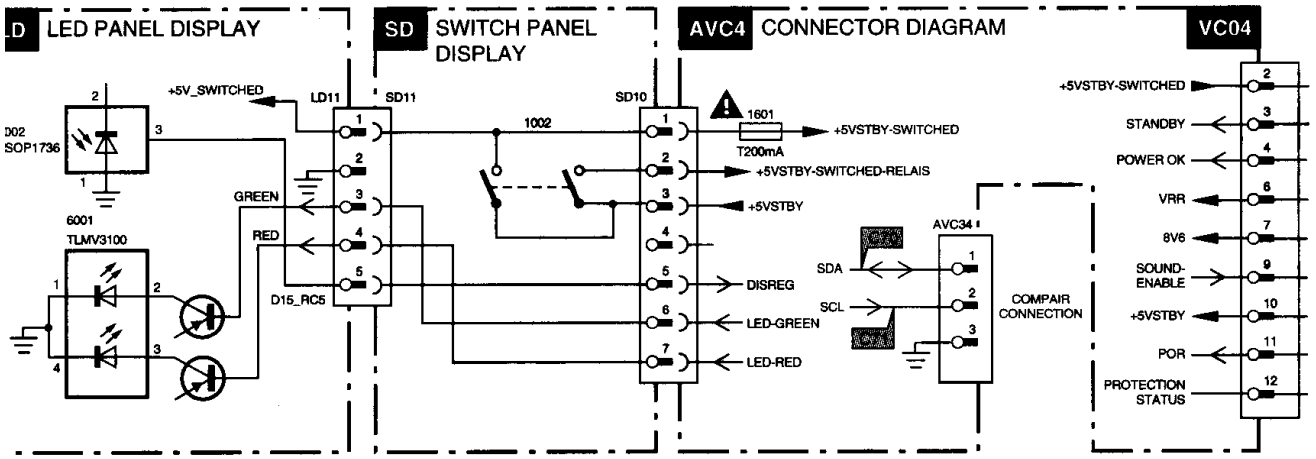
6. Block diagrams

Block diagram (Part 1)



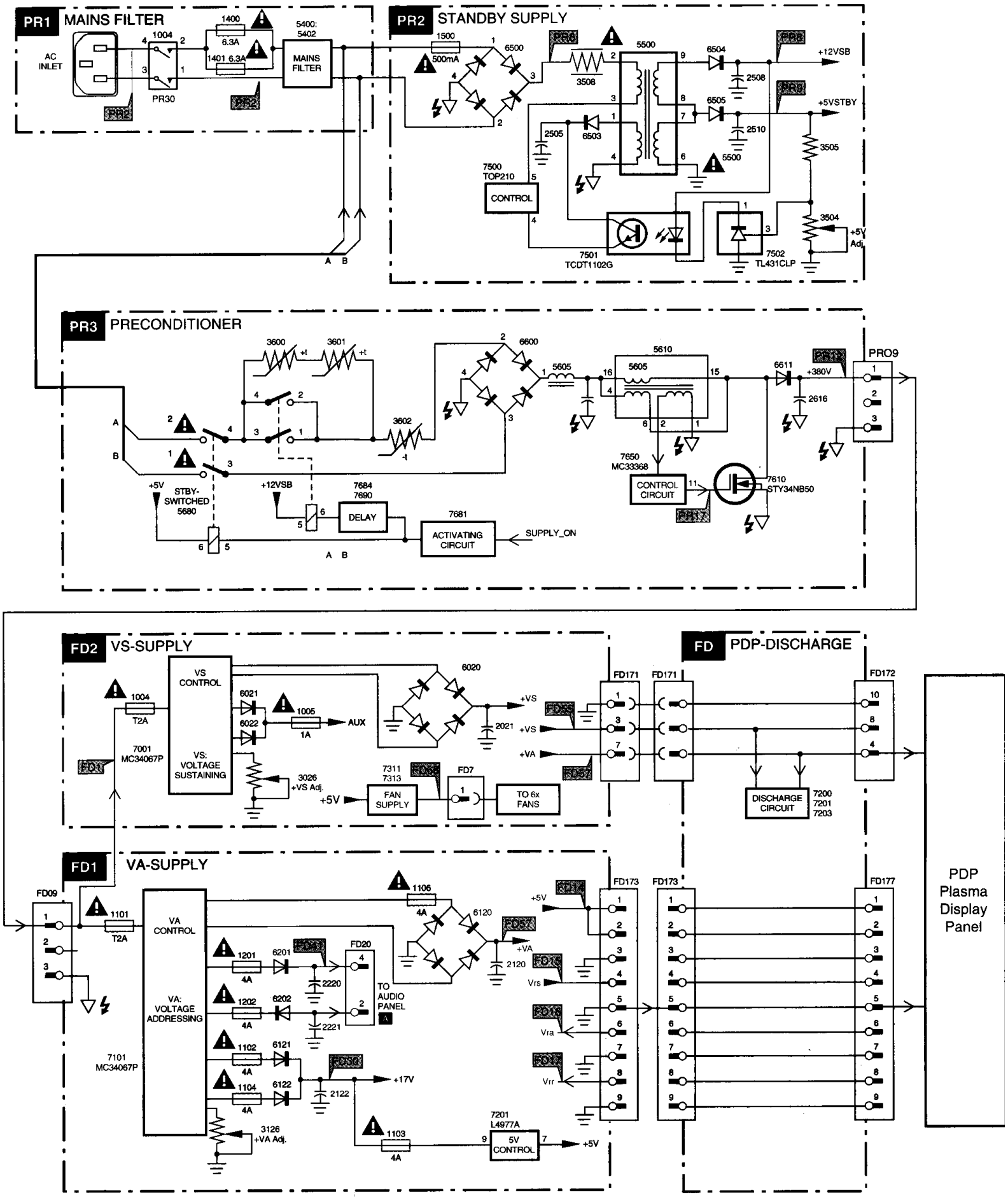






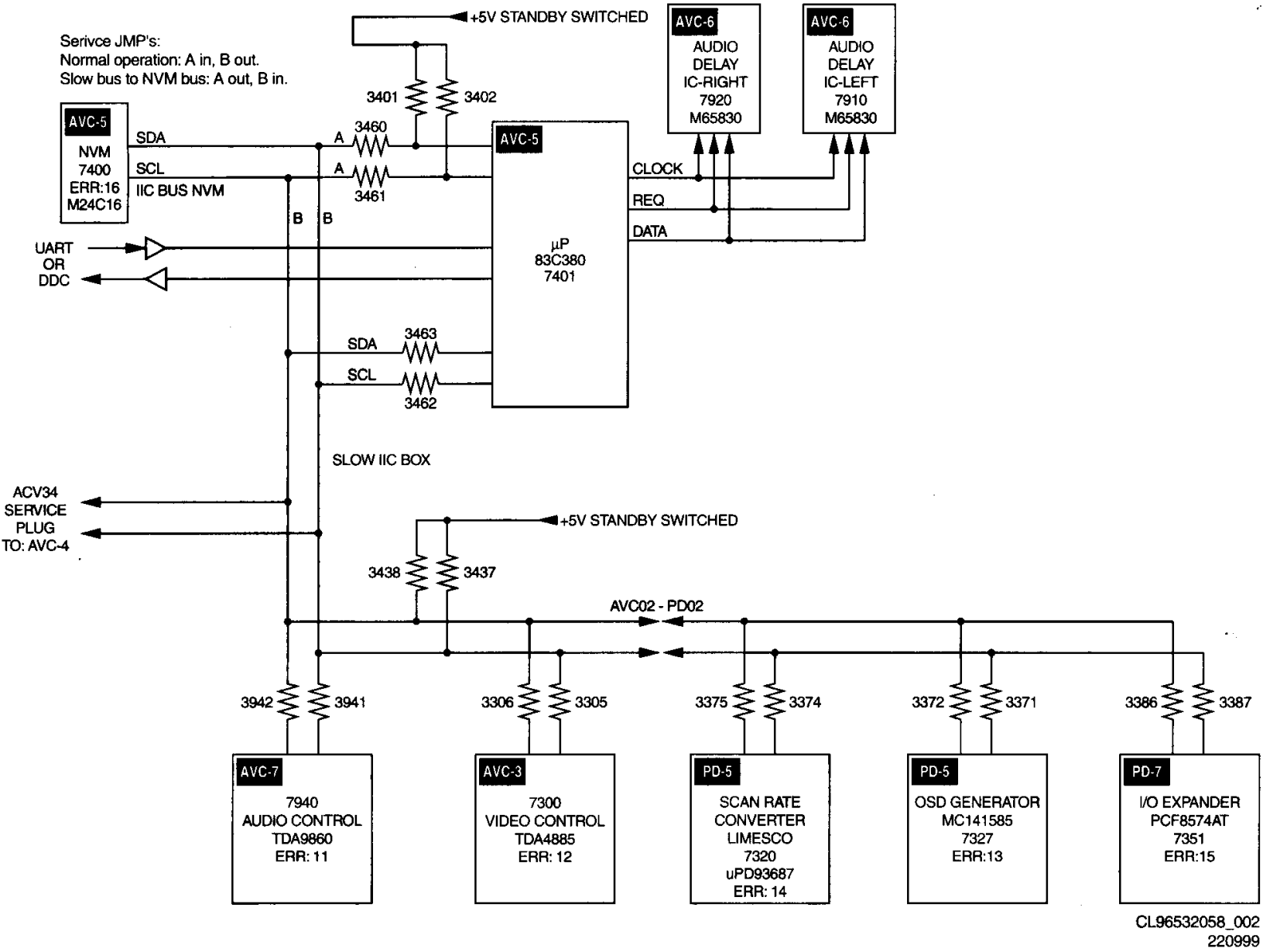
CL 96532058_17A.eps
260899

Block diagram (Part 2)



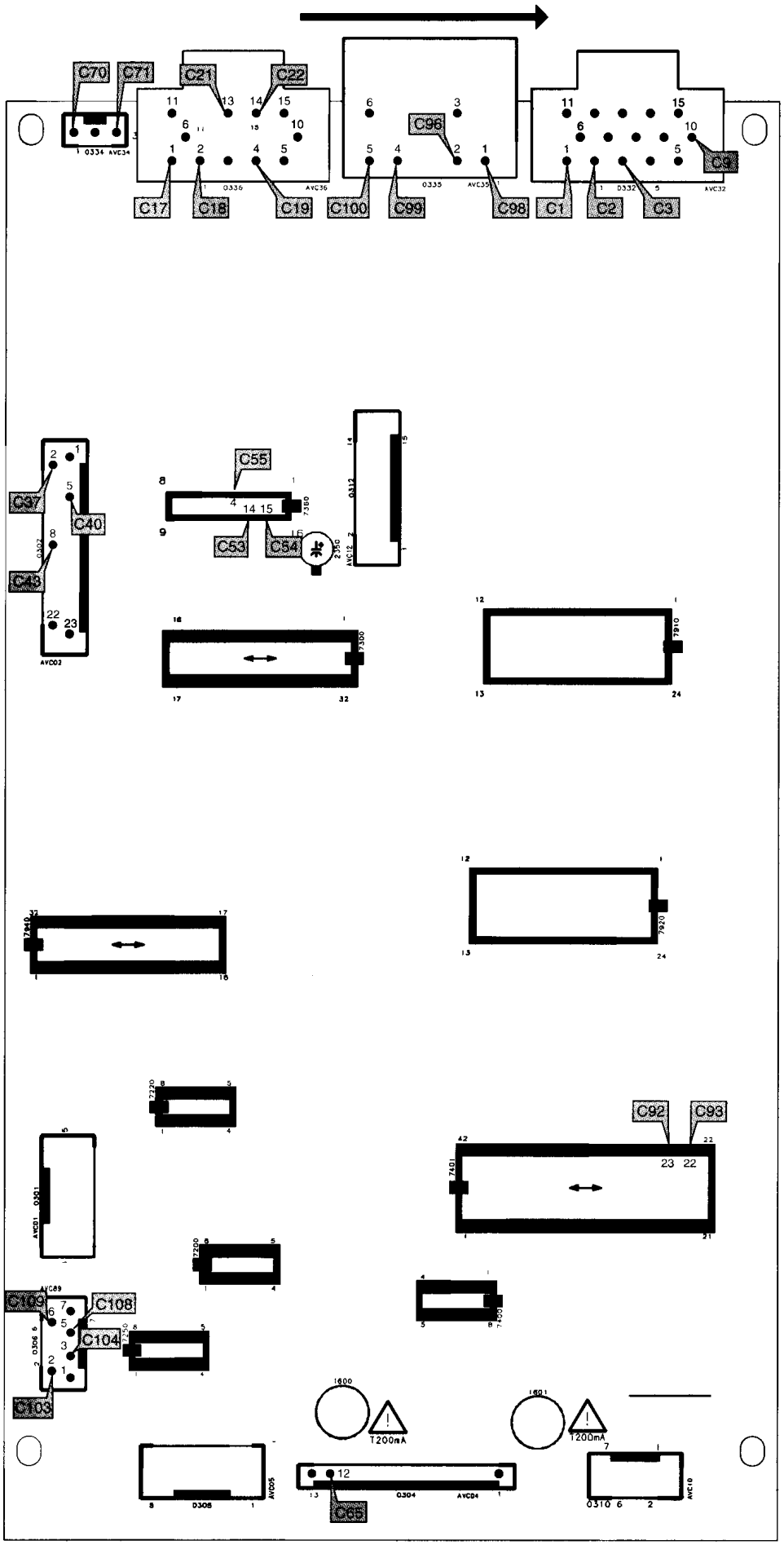
CL 96532058_17B.eps
280999

I2C bus interconnection diagram



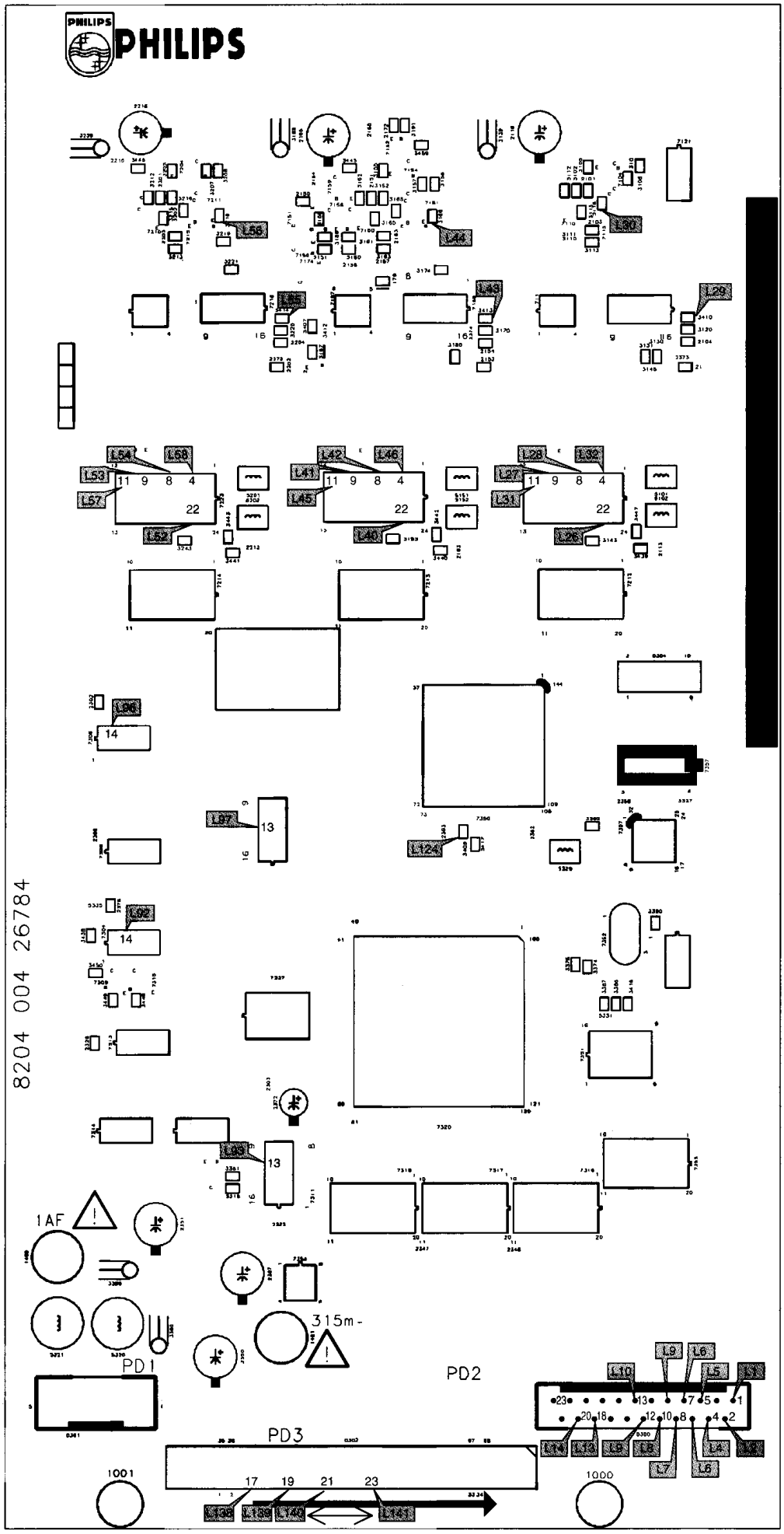
CL96532058_002
220999

Testpoint overview AV Control



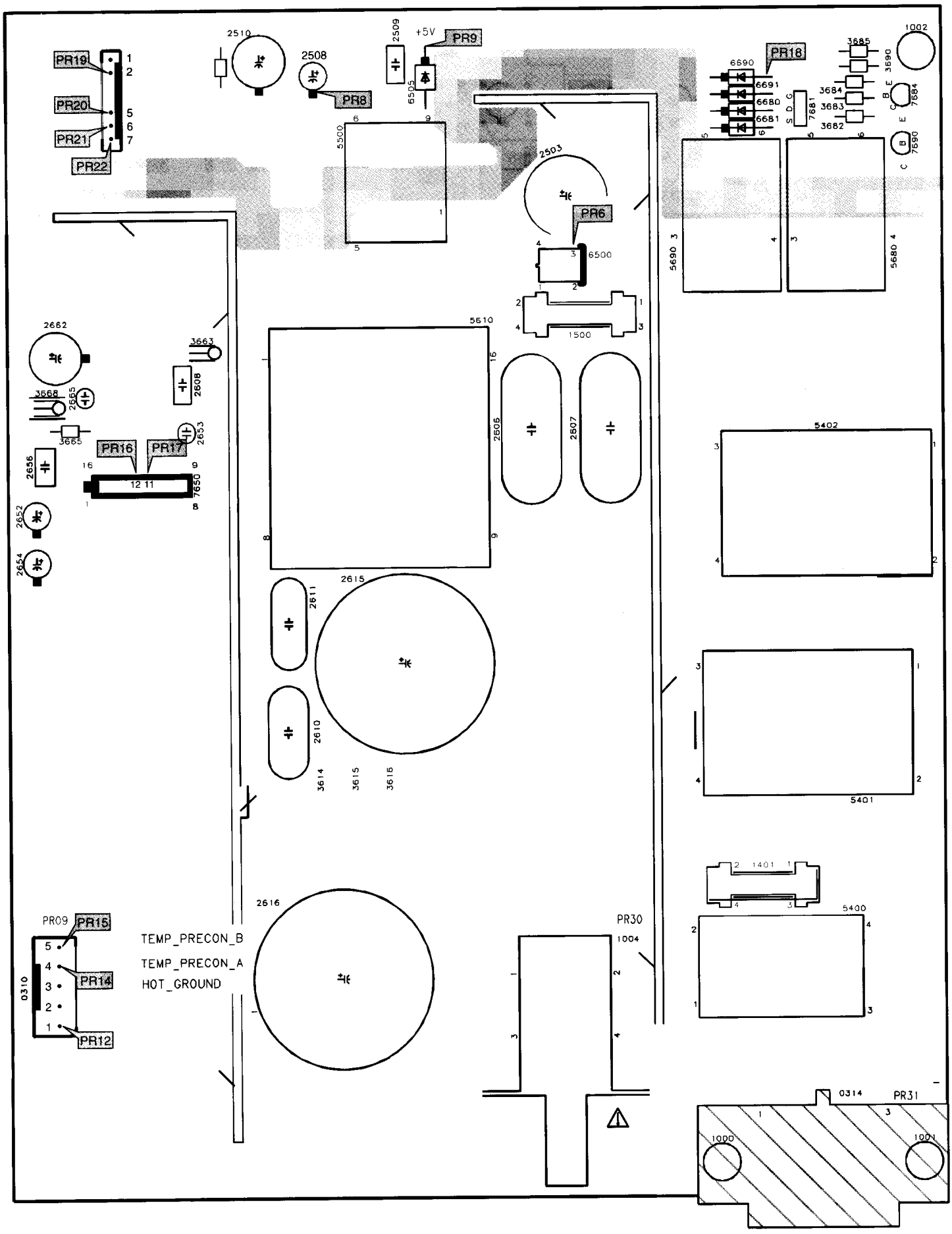
CL 96532058_019.EPS
240899

Testpoint overview Limesco



CL 96532058_020.EPS
270899

Testpoint overview Preconditioner



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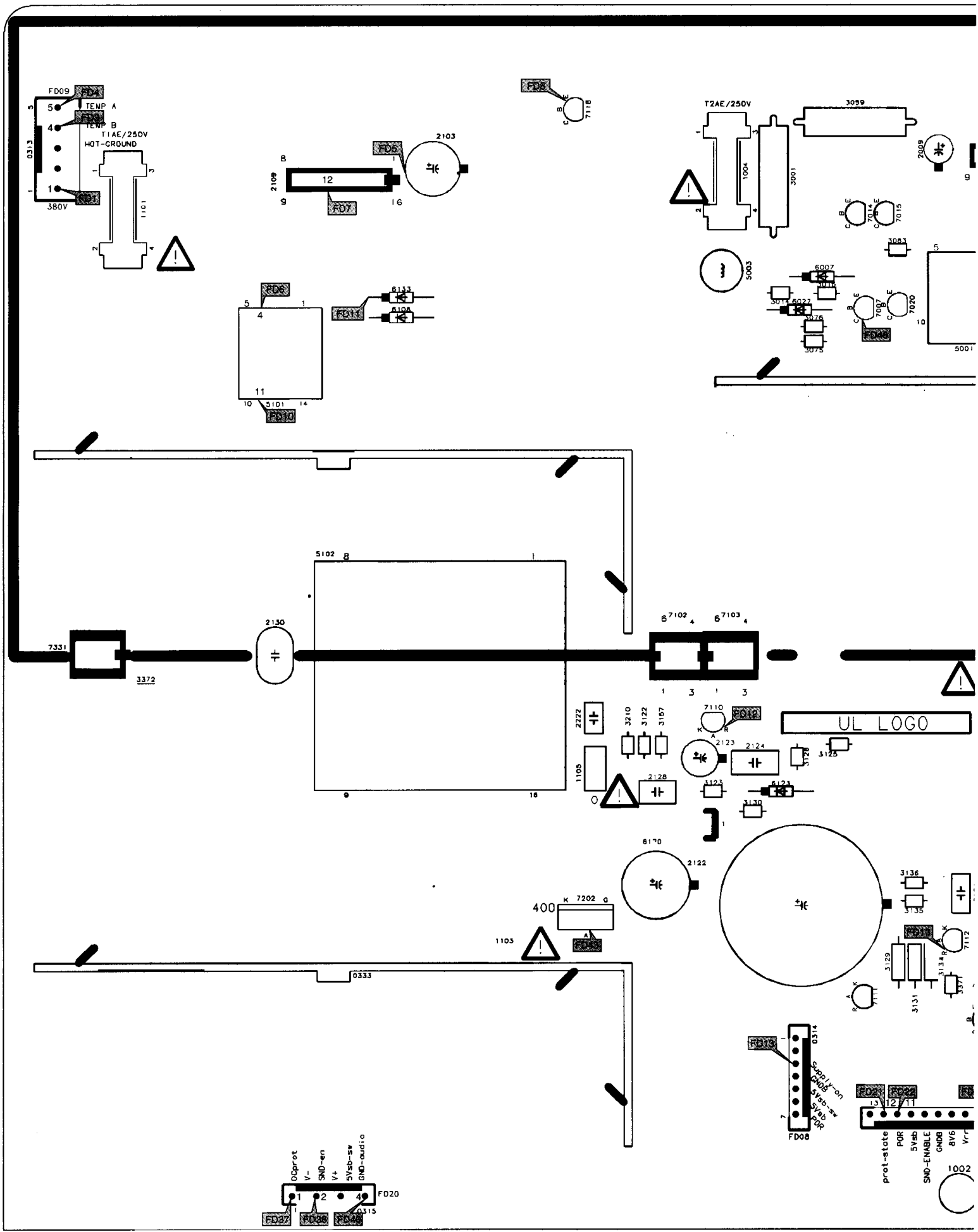
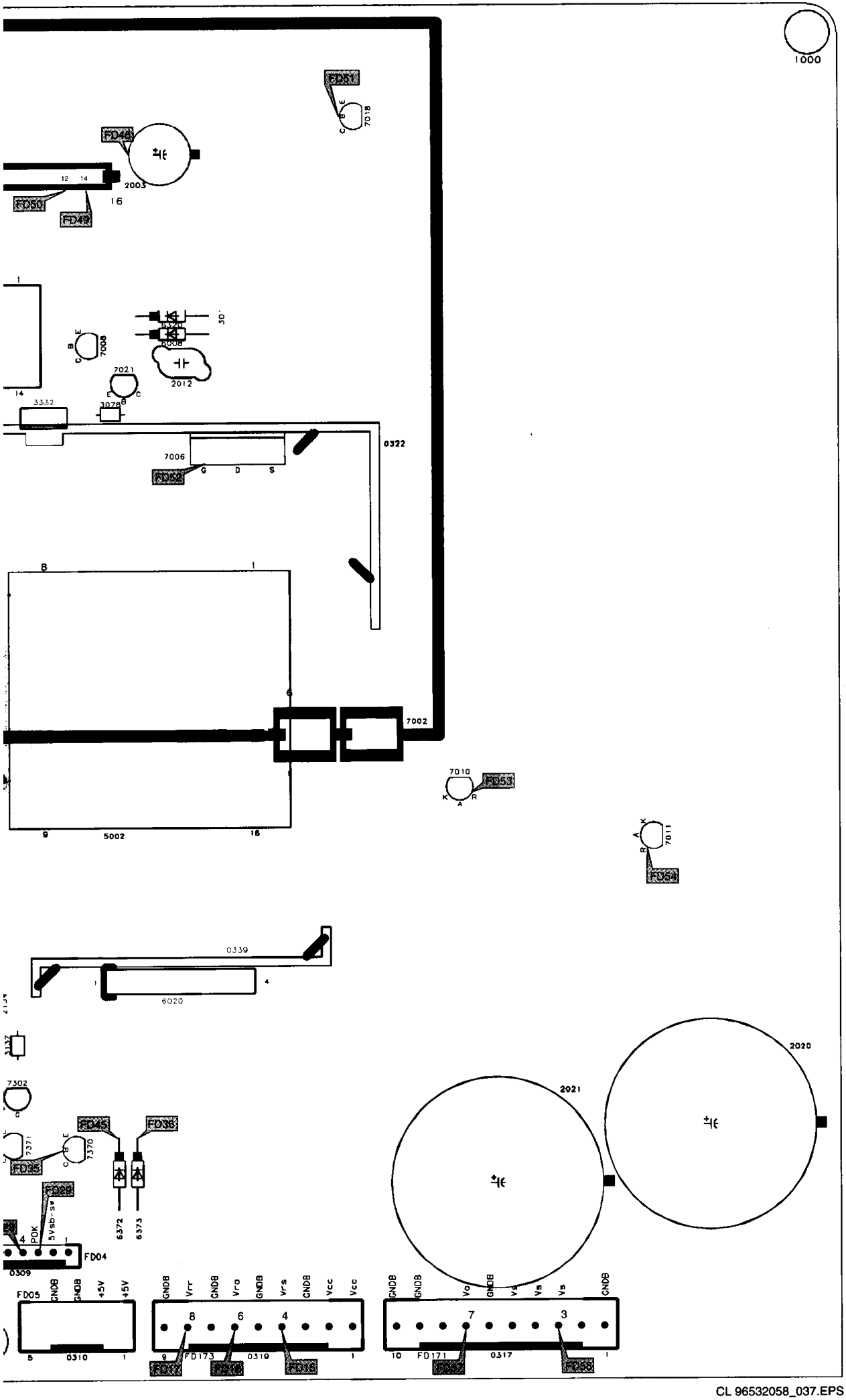
Testpoint overview VsVa Supply





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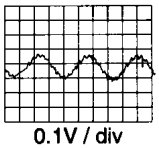
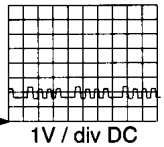
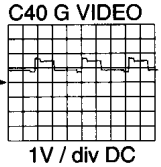
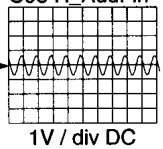
240899

Oscillograms

A1 PIN4-7540

0.1V / div
0.2ms / div

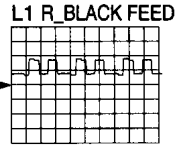
C3 Bin VGA

1V / div DC
10µs / div

C40 G VIDEO

1V / div DC
10µs / div

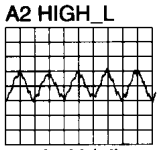
C98 R_Aud.-in

1V / div DC
1ms / div

FD12 +2V5 DC
FD13 +2V5 DC
FD18 +5V DC
FD22 0V2 DC
FD23 +5V DC
FD24 0V
FD25 +8V6 DC
FD28 +5V DC
FD31 +4V6 DC
FD32 +5V DC
FD34 +13V DC
FD36 +7V DC

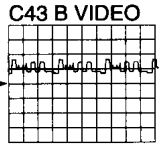
FD53 +2V5 DC
FD54 +2V5 DC
FD55 +180V DC
FD57 +65V DC
FD58 +5V5 DC

L1 R_BLACK FEED

1V / div DC
10µs / div

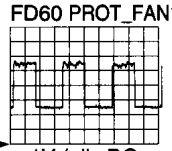
L26 +
L27 +

A2 HIGH_L

50mV / div
0.2ms / div

C7 +5V DC

C43 B VIDEO

1V / div DC
10µs / div

C103 +4V DC
C104 +4V DC
C108 +4V DC
C109 +4V DC

FD60 PROT_FAN1

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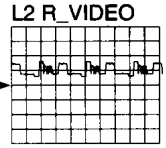
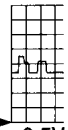
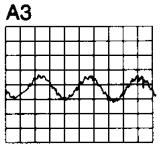
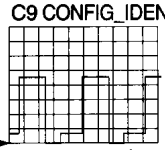
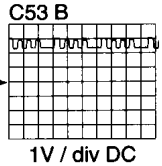
5ms / div

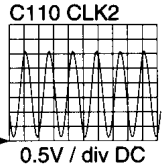
L2 R_VIDEO

1V / div DC
10µs / div

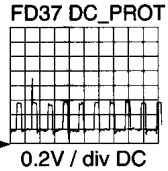
L28 V

0.5V
10

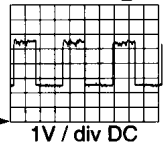
A3

0.1V / div
0.2ms / div

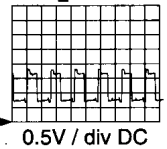
C9 CONFIG_IDENT

1V / div DC
0.1s / div

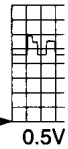
C53 B

1V / div DC
10µs / div

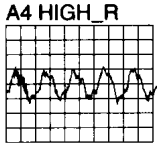
C110 CLK2

0.5V / div DC
2ms / div

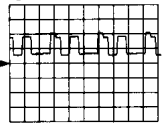
FD37 DC_PROT

0.2V / div DC
10µs / div

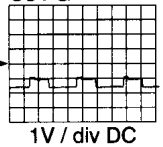
FD61 PROT_FAN2

1V / div DC
5ms / div

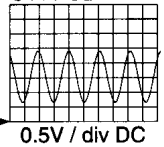
L4 G_BLACK FEED

0.5V / div DC
20µs / div

L29 7

0.5V
10

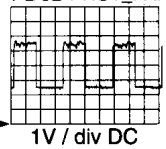
A4 HIGH_R

50mV / div
0.5ms / div

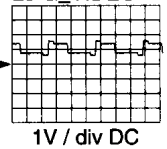
C17 R-out

1V / div DC
10µs / div

C54 G

1V / div DC
10µs / div

C111 CLK1

0.5V / div DC
2ms / div

FD38 -18V DC
FD39 +4V8 DC
FD40 +18V DC
FD41 +5V DC
FD46 +17V DC

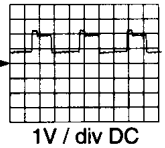
FD62 PROT_FAN3

1V / div DC
5ms / div

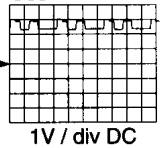
L5 G_VIDEO

1V / div DC
10µs / div

L30 7

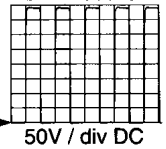
0.5V
10

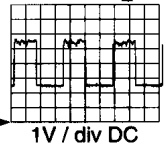
A11 +4V DC
A12 +4V DC
A14 +4V DC
A15 +4V DC

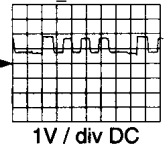
C18 G-out

1V / div DC
10µs / div

C55 R

1V / div DC
10µs / div

FD1 +380V DC
FD3 +10V DC
FD4 +19V DC
FD5 +18V DC

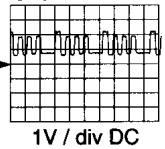
FD47 7005-G

50V / div DC
5µs / div

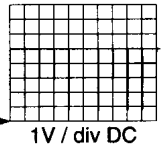
FD63 PROT_FAN4

1V / div DC
5ms / div

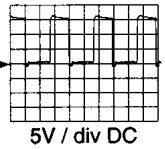
L6 B_BLACK FEED

1V / div DC
10µs / div

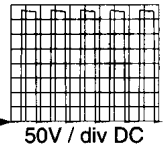
L31 0

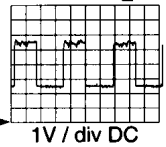
0.5V
50

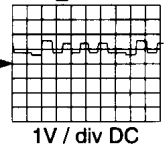
C19 B-out

1V / div DC
10µs / div

C70 SDA

1V / div DC
0.5s / div

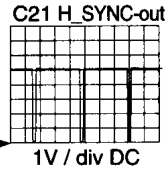
FD6 PIN14-7101

5V / div DC
5µs / div

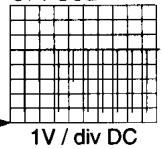
FD48 PIN11-5001

50V / div DC
5µs / div

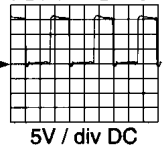
FD64 PROT_FAN5

1V / div DC
5ms / div

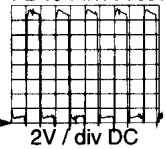
L7 B_VIDEO

1V / div DC
10µs / div

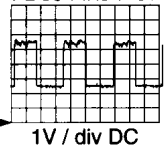
L32 +
L40 +
L41 +

C21 H_SYNC-out

1V / div DC
10µs / div

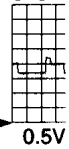
C71 SCL

1V / div DC
0.5s / div

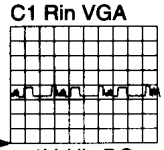
FD7 PIN12-7101

5V / div DC
5µs / div

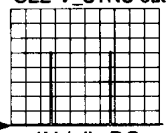
FD49 PIN14-7001

2V / div DC
2µs / div

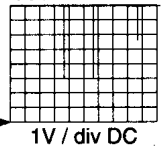
FD65 PIN8-7101

1V / div DC
5ms / div

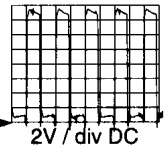
L8 +4V5 DC
L9 +5V DC
L10 +5V DC

L42 V

0.5V
10

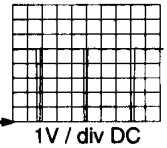
C1 Rin VGA

1V /div DC
10µs / div

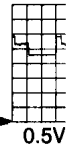
C22 V_SYNC-out

1V / div DC
5ms / div

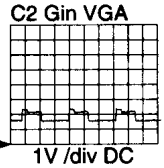
C93 DATA

1V / div DC
0.5s / div

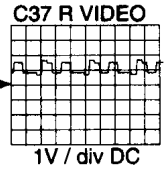
FD50 PIN12-7001

2V / div DC
2µs / div

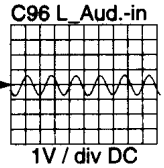
FD66 +5V DC
FD67 +2V5 DC

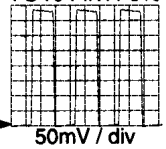
L13 H

1V / div DC
10µs / div

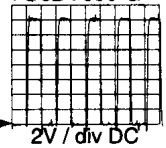
L43 7

0.5V
10

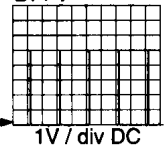
C2 Gin VGA

1V /div DC
10µs / div

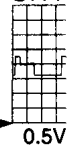
C37 R VIDEO

1V / div DC
10µs / div

C96 L_Aud.-in

1V / div DC
0.2ms / div

FD10 PIN11-5101

50mV / div
5µs / div

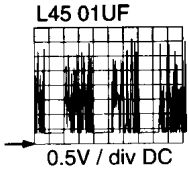
FD52 7006-G

2V / div DC
5µs / div

L14 V

1V / div DC
10µs / div

L44 7

0.5V
10

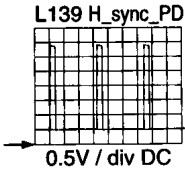
L26 +0V1 DC
L27 +3V6 DC

L45 01UF



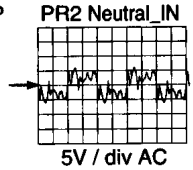
0.5V / div DC
10µs / div

L139 H_sync_PDP



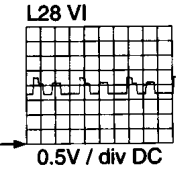
0.5V / div DC
10µs / div

PR2 Neutral_IN



5V / div AC
5ms / div

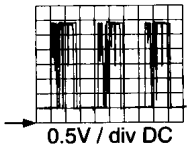
L28 VI



0.5V / div DC
10µs / div

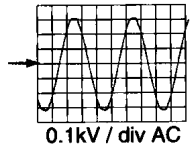
L46 +1V5 DC
L52 +0V1 DC
L53 +3V6 DC

L140 BLANK



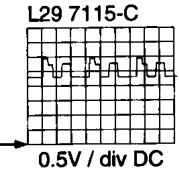
0.5V / div DC
10µs / div

PR3 PIN3-5400



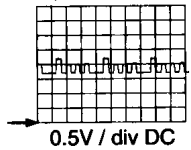
0.1kV / div AC
5ms / div

L29 7115-C



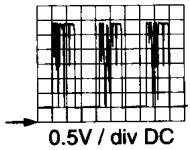
0.5V / div DC
10µs / div

L54 VI



0.5V / div DC
10µs / div

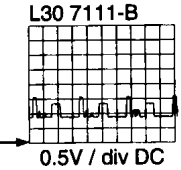
L141 DIS CLK



0.5V / div DC
10µs / div

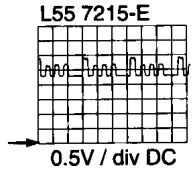
PR6 +300V DC
PR8 +11V DC
PR9 +5V2 DC
PR12 +380V DC
PR14 +15V DC
PR15 +15V DC
PR16 +15V DC

L30 7111-B



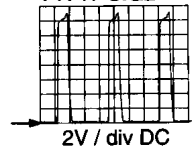
0.5V / div DC
10µs / div

L55 7215-E



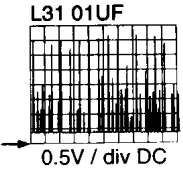
0.5V / div DC
10µs / div

PR 17 SIG2



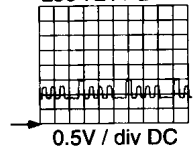
2V / div DC
1µs / div

L31 01UF



0.5V / div DC
50µs / div

L56 7211-B

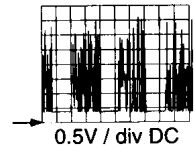


0.5V / div DC
10µs / div

PR18 +0V2 DC
PR19 +4V7 DC
PR20 +5V DC
PR21 +5V DC

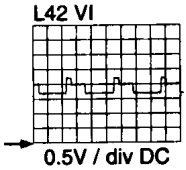
L32 +1V5 DC
L40 +0V1 DC
L41 +3V6 DC

L57 01UF



0.5V / div DC
10µs / div

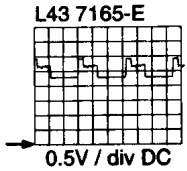
L42 VI



0.5V / div DC
10µs / div

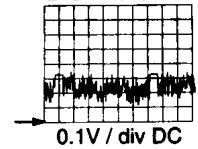
L58 +1V5 DC
L92 +1V1 DC
L93 +1V8 DC
L96 +1V8 DC
L97 +1V9 DC

L43 7165-E



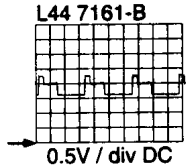
0.5V / div DC
10µs / div

L124 NOISE



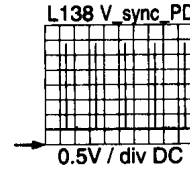
0.1V / div DC
5µs / div

L44 7161-B



0.5V / div DC
10µs / div

L138 V_sync_PDP

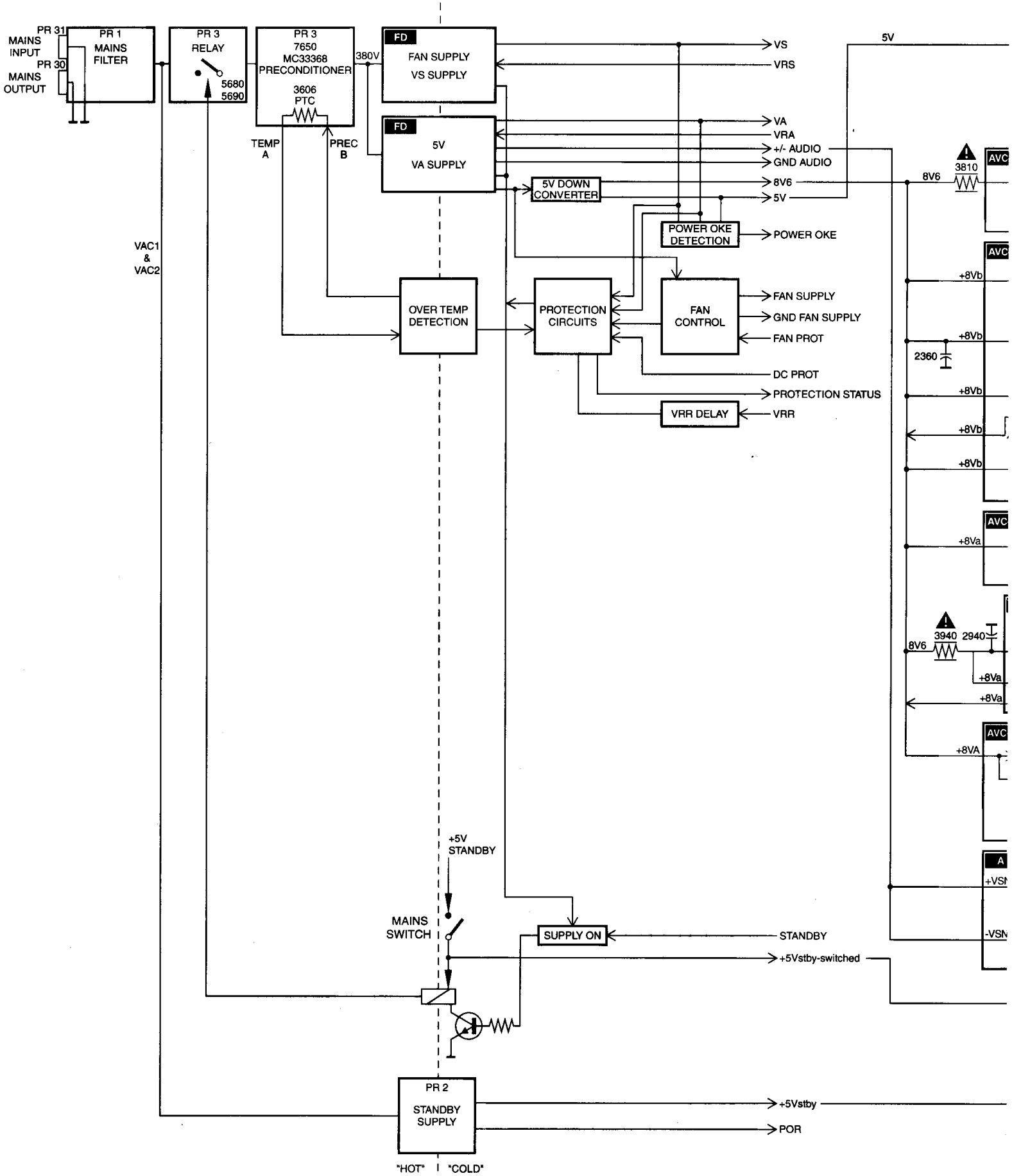


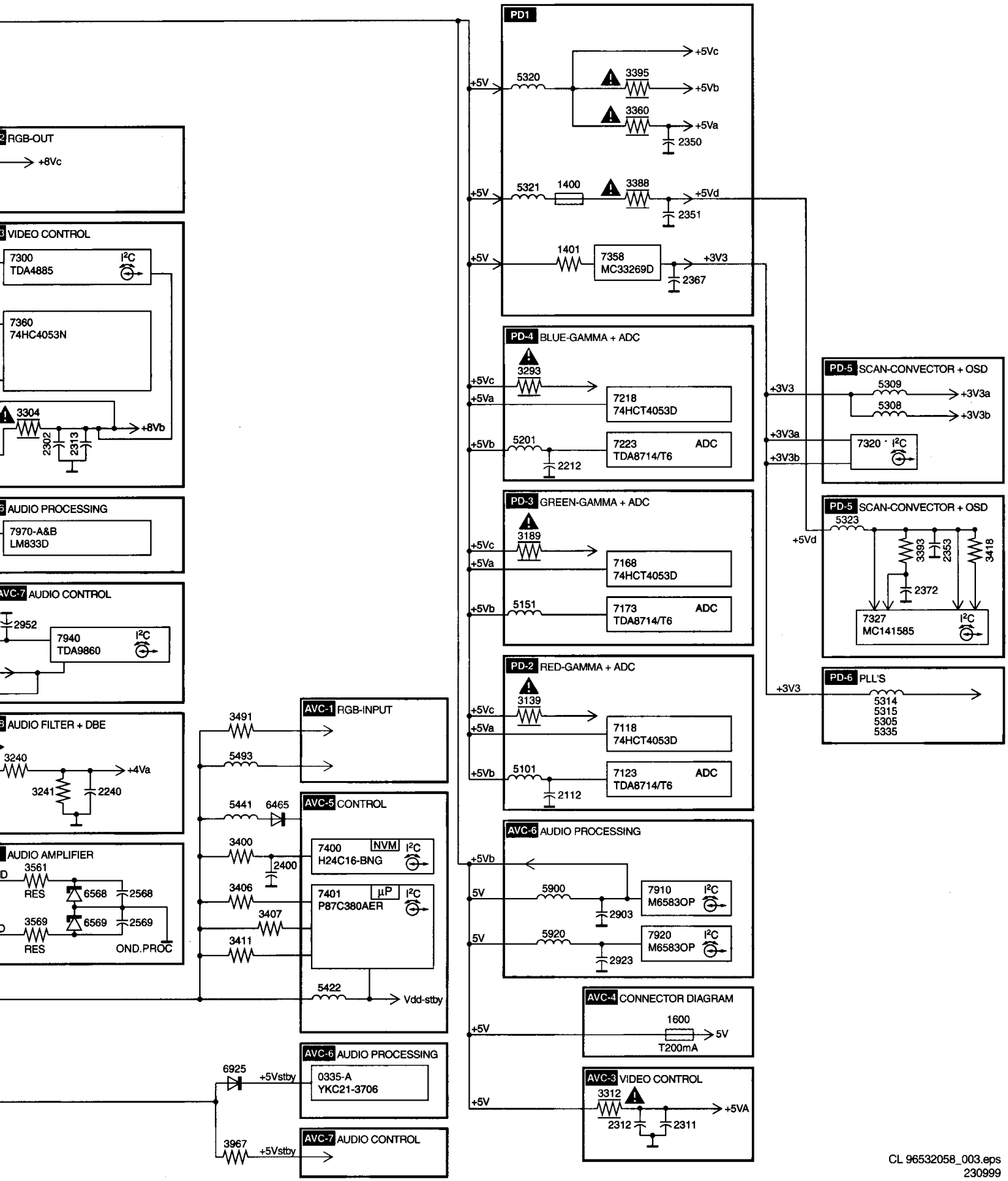
0.5V / div DC
10ms / div

→ = 0V

CL 96532058_016.eps
300999

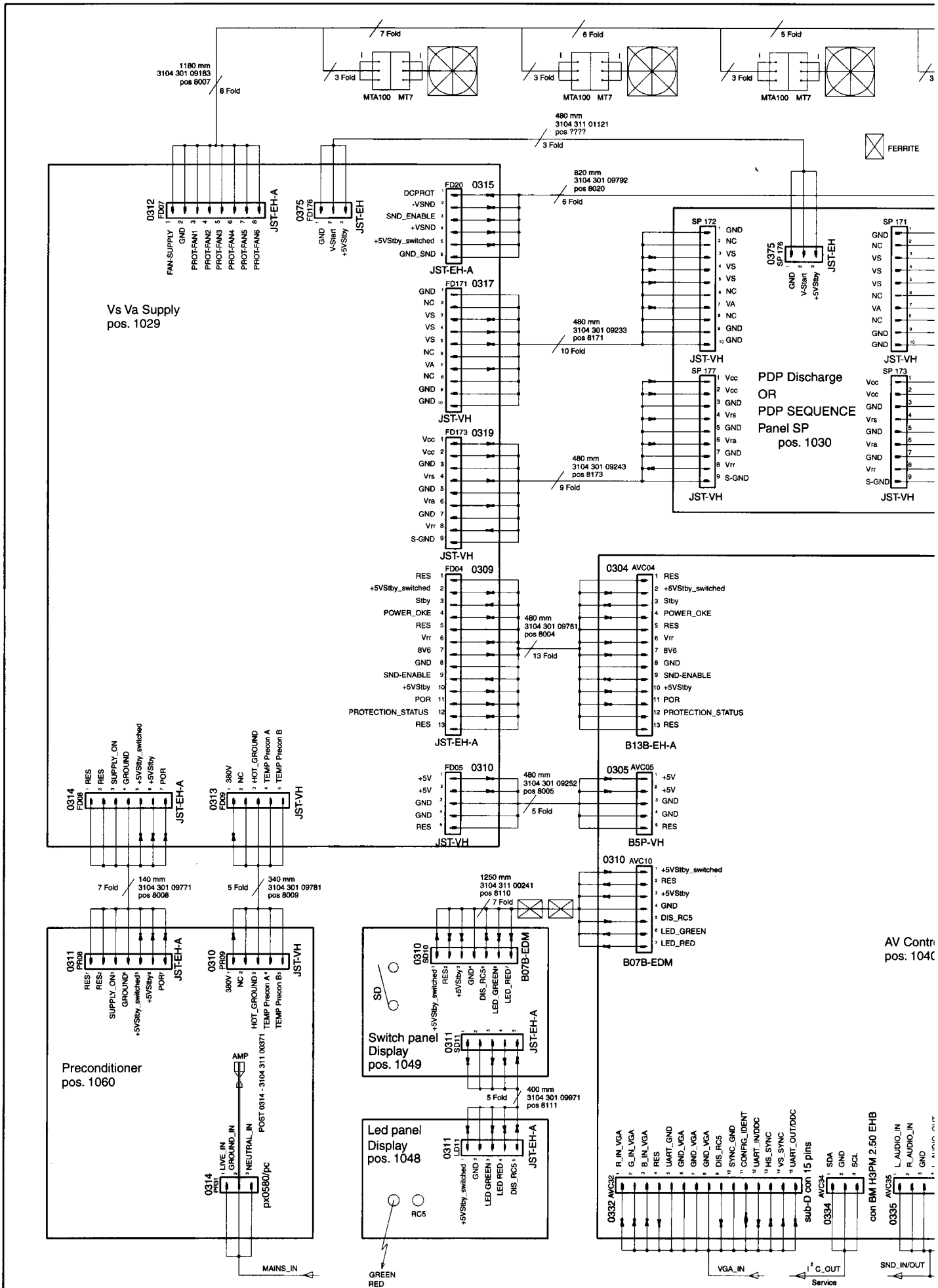
Supply voltage diagram

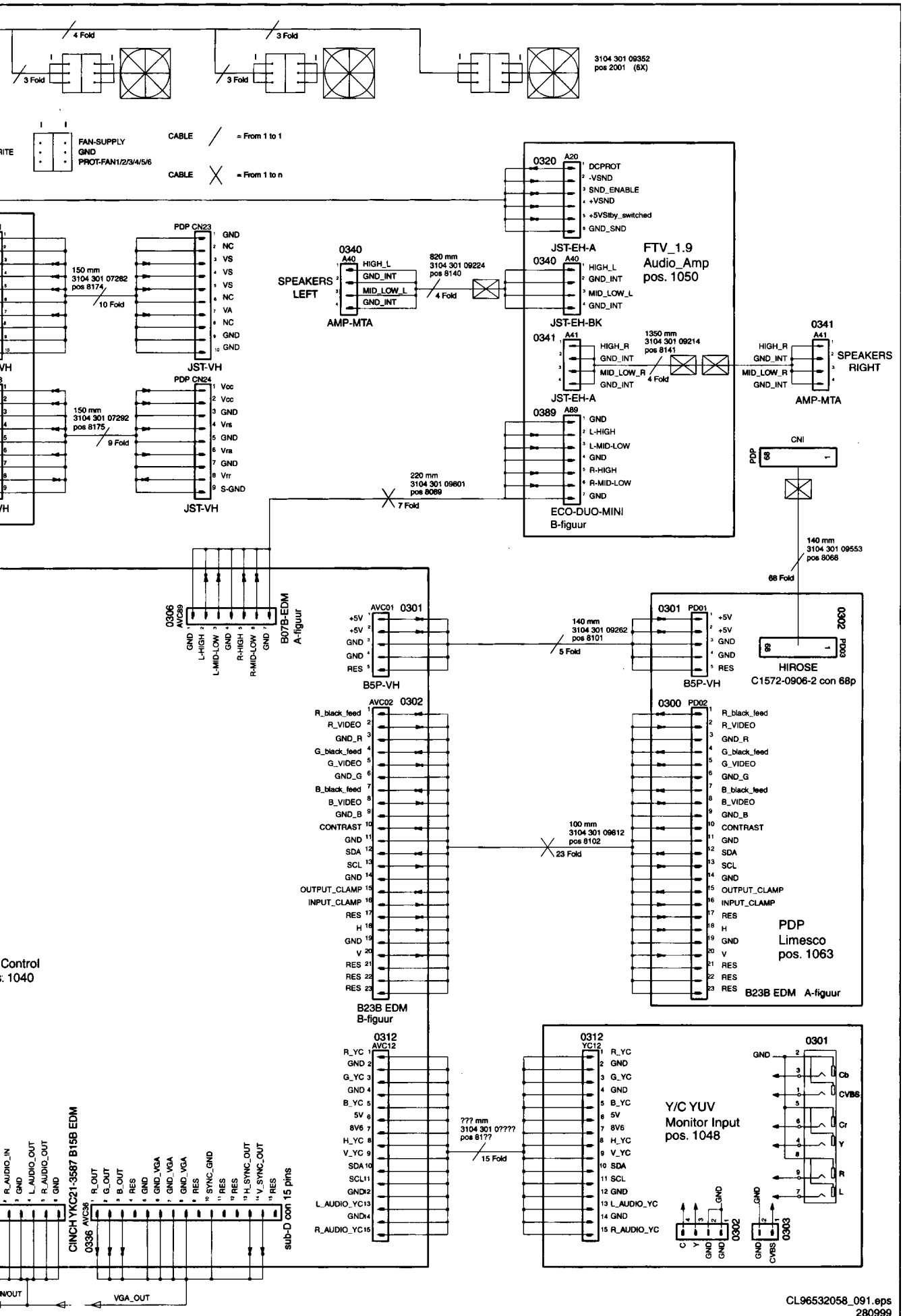




CL 96532058_003.eps
230999

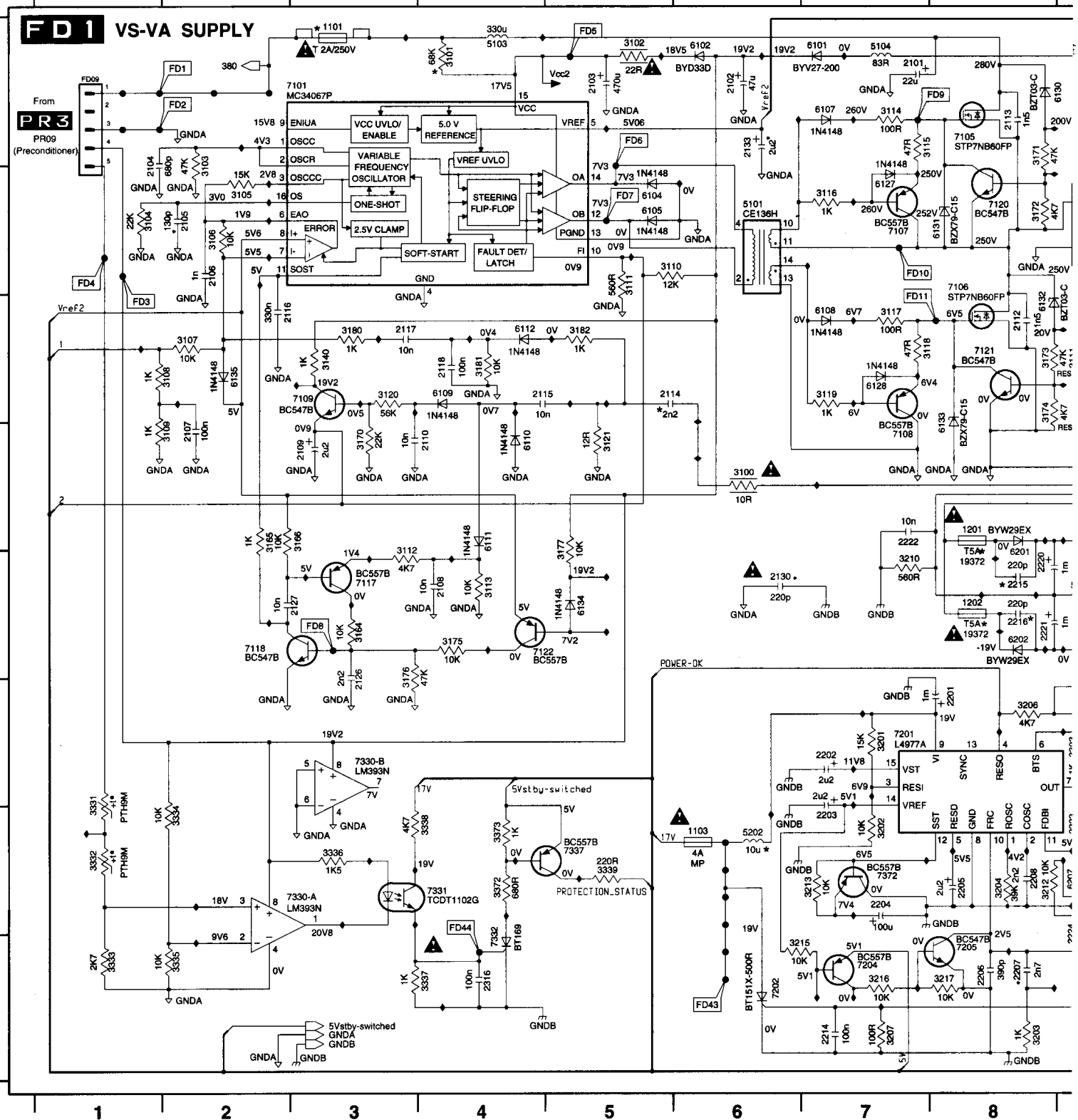
Wiring diagram

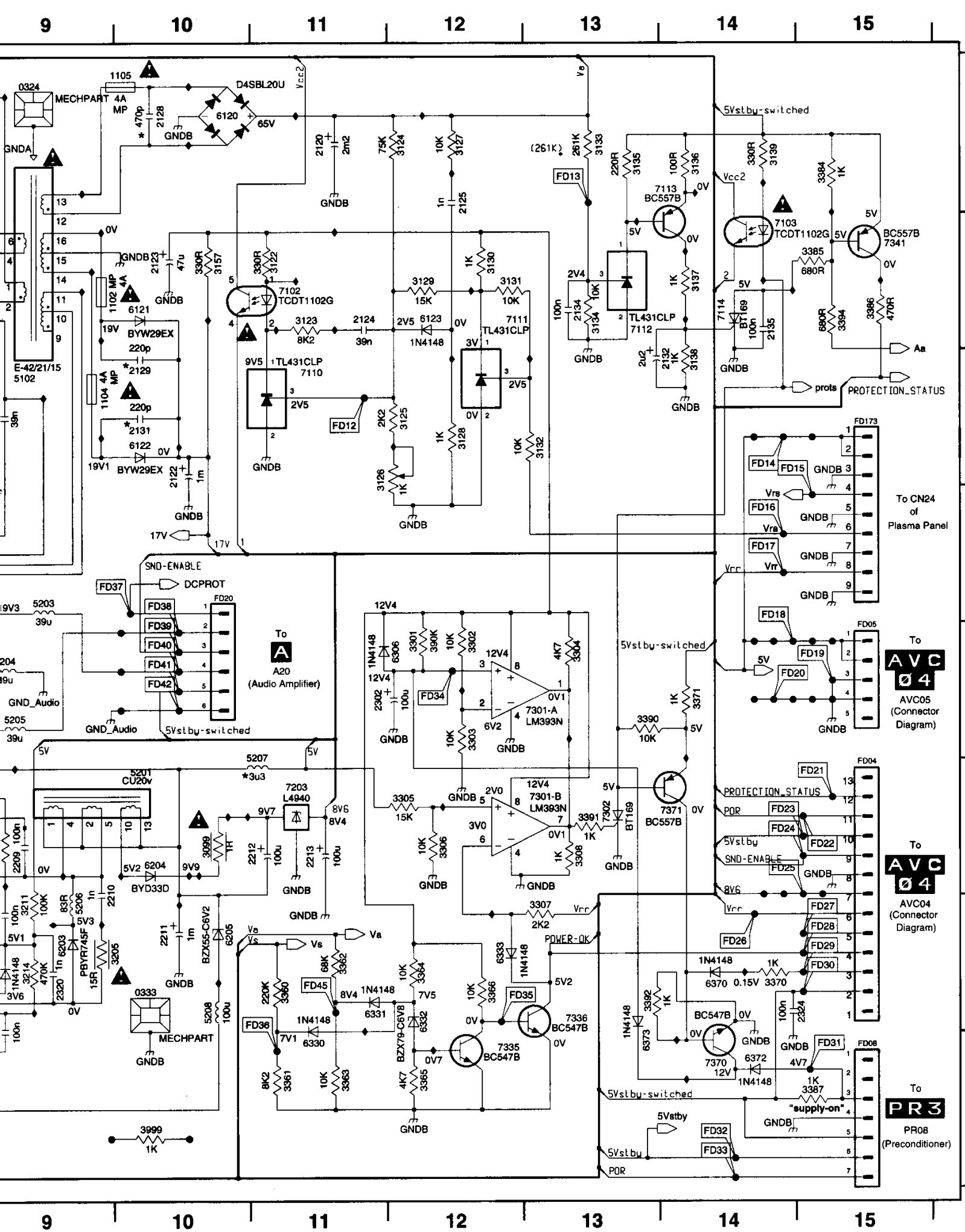



4 Fold
3 Fold
3 Fold
3 Fold
3104 301 09352
pos 2001 (5X)
FAN-SUPPLY
GND
PROT-FAN1/2/3/4/5/6
CABLE = From 1 to 1
CABLE = From 1 to n
0320 A20
DCPROT
-VSND
SND_ENABLE
+VSND
+5VStby_switched
GND_SND
JST-EH-A
FTV_1.9
Audio_Amp
pos. 1050
PDP CN23
150 mm
3104 301 07282
pos 8174
10 Fold
JST-VH
0340 A40
HIGH_L
GND_INT
MID_LOW_L
GND_INT
SPEAKERS LEFT
820 mm
3104 301 09224
pos 8140
4 Fold
AMP-MTA
JST-EH-BK
0341 A41
HIGH_R
GND_INT
MID_LOW_R
GND_INT
1350 mm
3104 301 09214
pos 8141
4 Fold
SPEAKERS RIGHT
PDP CN24
150 mm
3104 301 07292
pos 8175
9 Fold
JST-VH
0389 A89
GND
L-HIGH
L-MID-LOW
GND
R-HIGH
R-MID-LOW
GND
220 mm
3104 301 09601
pos 8089
7 Fold
ECO-DUO-MINI
B-figuur
CNI
PDP
140 mm
3104 301 09553
pos 8068
68 Fold
0306 AVC39
B07B-EDM
A-figuur
0301 AVC01
+5V
+5V
GND
GND
RES
B5P-VH
140 mm
3104 301 09262
pos 8101
5 Fold
0301 PD01
B5P-VH
0302 PD03
HIROSE
C1572-0906-2 con 68p
0302 AVC02
R_black_feed
R_VIDEO
GND_R
G_black_feed
G_VIDEO
GND_G
B_black_feed
B_VIDEO
GND_B
CONTRAST
GND
SDA
SCL
GND
OUTPUT_CLAMP
INPUT_CLAMP
RES
H
GND
V
RES
RES
RES
B23B EDM
B-figuur
100 mm
3104 301 09612
pos 8102
23 Fold
0300 PD02
CONTRAST
INPUT_CLAMP
PDP
Limesco
pos. 1063
B23B EDM A-figuur
Control
: 1040
0312 AVC12
R_YC
GND
G_YC
GND
B_YC
5V
8V6
H_YC
V_YC
SDA
SCL
GND
L_AUDIO_YC
GND
R_AUDIO_YC
??? mm
3104 301 0????
pos 81??
15 Fold
0312 YC12
Y/C YUV
Monitor Input
pos. 1048
0301
Cb
CVBS
Cr
Y
R
L
0302
0303
CINCH YKC21-3587 B15B EDM
0336 AVC36
sub-D con 15 pins
R_AUDIO_IN
L_AUDIO_OUT
R_AUDIO_OUT
R_OUT
G_OUT
B_OUT
GND_VGA
H_SYNC_OUT
V_SYNC_OUT
VGA_OUT
CL96532058_091.eps
280999

7. Electrical diagrams and print layouts

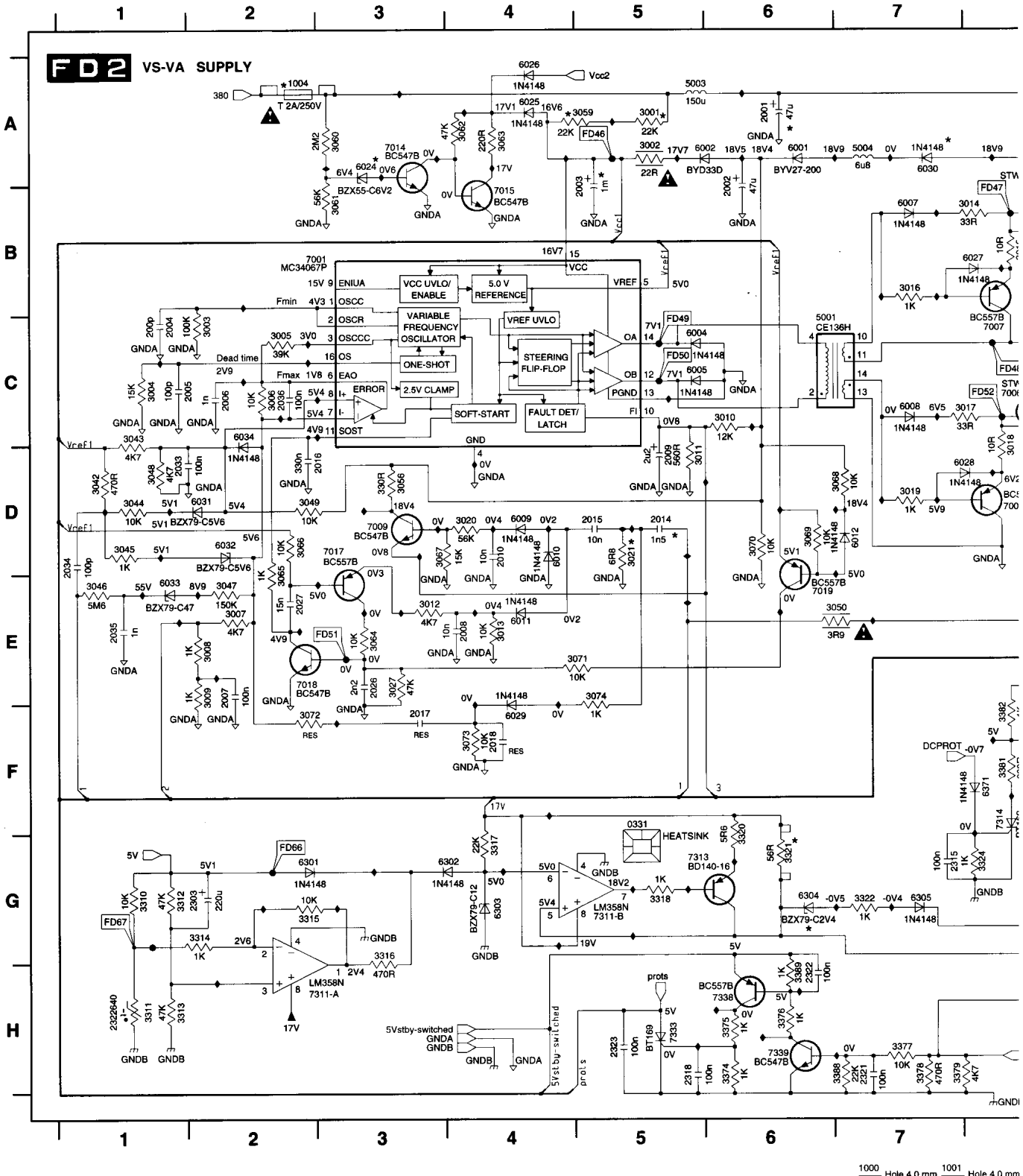
VsVa supply (FD)



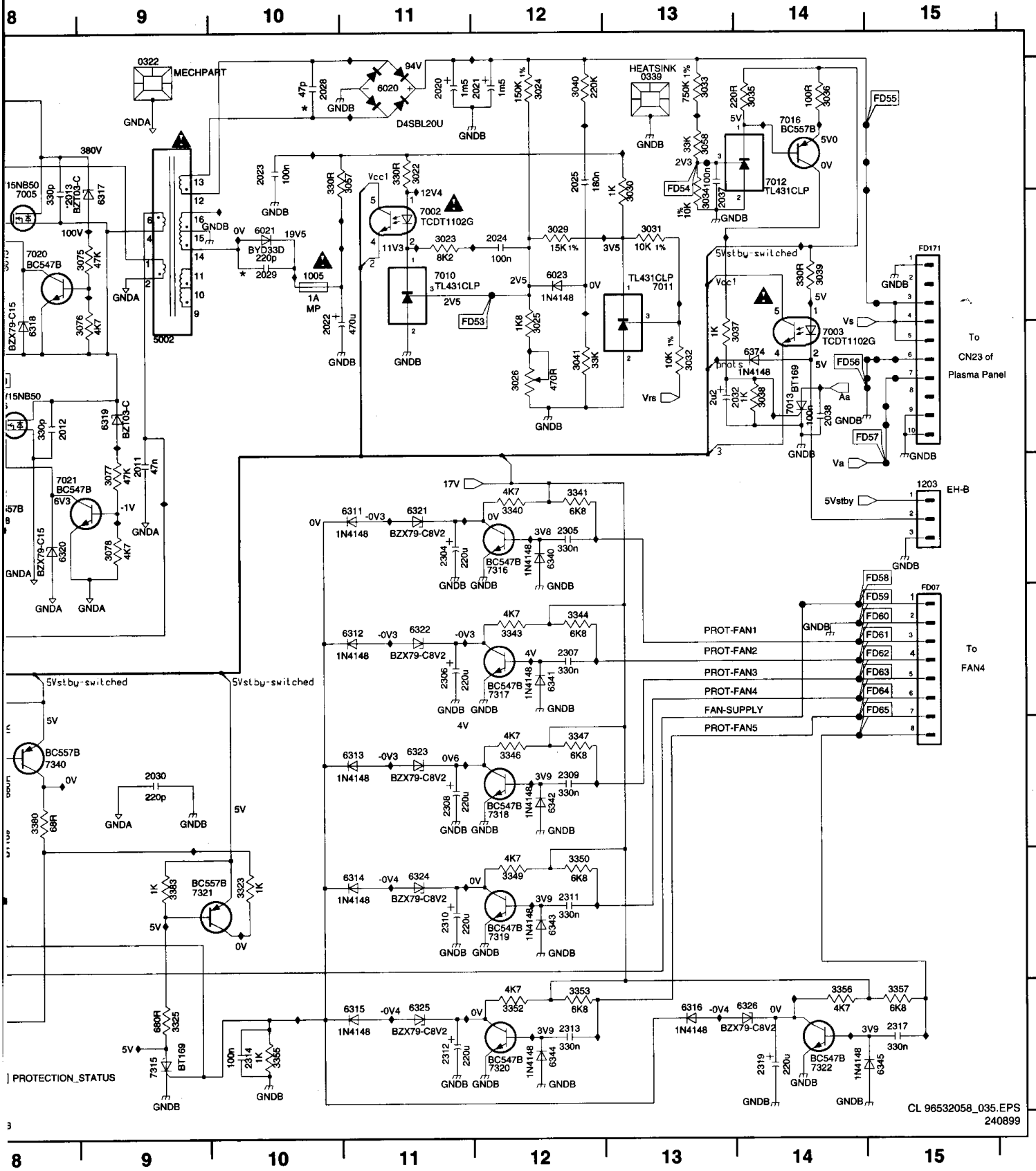

9
10
11
12
13
14
15
A
B
C
D
E
F
G
H
0324
MECHPART
1105
4A MP
D4SBL20U
6120
65V
GNDA
GNDB
Vcc2
Va
5Vstby-switched
FD13
(261K)
261K 3133
220R 3135
100R 3136
330R 3139
7113 BC557B
7103 TCDT1102G
BC557B 7341
5V
0V
3385 680R
3384 1K
2120 2m2
75K 3124
10K 3127
1n 2125
330R 3157
330R 3122
7102 TCDT1102G
1K 3130
3129 15K
3131 10K
3123 8K2
2124 39n
2V5 6123
1N4148
7111 TL431CLP
3V
9V5 TL431CLP 7110
FD12
2K2 3125
1K 3128
10K 3132
3126 1K
2V4
100n 2134
10K 3134
TL431CLP 7112
1K 3137
2u2 2132
1K 3138
7114 BT169
100n 2135
680R 3394
3386 470R
Aa
prots
PROTECTION_STATUS
1102 4A MP
6121 BYW29EX
220p *2129
1104 4A MP
220p *2131
6122 BYW29EX
19V
19V1
2122 1m
17V
E-42/21/15 5102
39n
FD173
FD14
FD15
FD16
FD17
Vrs
Vrr
To CN24 of Plasma Panel
FD18
FD19
FD20
FD05
To AVC 04 AVC05 (Connector Diagram)
SND-ENABLE
FD37
DCPROT
FD38
FD39
FD40
FD41
FD42
FD20
To A A20 (Audio Amplifier)
19V3 5203 39u
204 39u
GND_Audio
5205 39u
5V
5207 *3u3
5201 CU20v
12V4
1N4148 6306
3301 390K
10K 3302
4K7 3304
2302 100u
FD34
7301-A LM393N
6V2
10K 3303
3390 10K
1K 3371
7371 BC557B
7203 L4940
9V7
8V6
8V4
3099 1R
2212 100u
2213 100u
5V2 6204 BYD33D
9V9
3305 15K
2V0
3V0
7301-B LM393N
0V1
3391 1K
7302 BT169
10K 3306
1K 3308
3307 2K2
Vrr
POWER-OK
FD21
PROTECTION_STATUS
POR
FD23
FD24
FD22
5Vstby
SND-ENABLE
FD25
8V6
FD27
FD28
FD26
FD29
FD30
FD04
To AVC 04 AVC04 (Connector Diagram)
2209 100n
3211 100K
83R 5206
1n 2210
5V3
5V1
1N4148 3214
470K
3V6
2320
6203 1n
PBYR745F
15R
3205
BZX55-C6V2
6205
2211 1m
0333
MECHPART
5208 100u
Va
Vs
68K 3362
220K 3360
FD45
8V4
1N4148 6331
FD36
7V1
1N4148 6330
10K 3364
7V5
FD35
10K 3366
6333 1N4148
5V2
7336 BC547B
0V
7335 BC547B
0V7
BZX79-C6V8 6332
8K2 3361
10K 3363
4K7 3365
1N4148 6370
0.15V
1K 3370
3392 1K
1N4148 6373
BC547B
7370 12V
6372 1N4148
100n 2324
FD31
FD08
4V7
1K 3387
"supply-on"
To PR3 PR08 (Preconditioner)
5Vstby
FD32
FD33
POR
3999 1K
CL 96532058_034.EPS
240899

VsVa supply (FD)

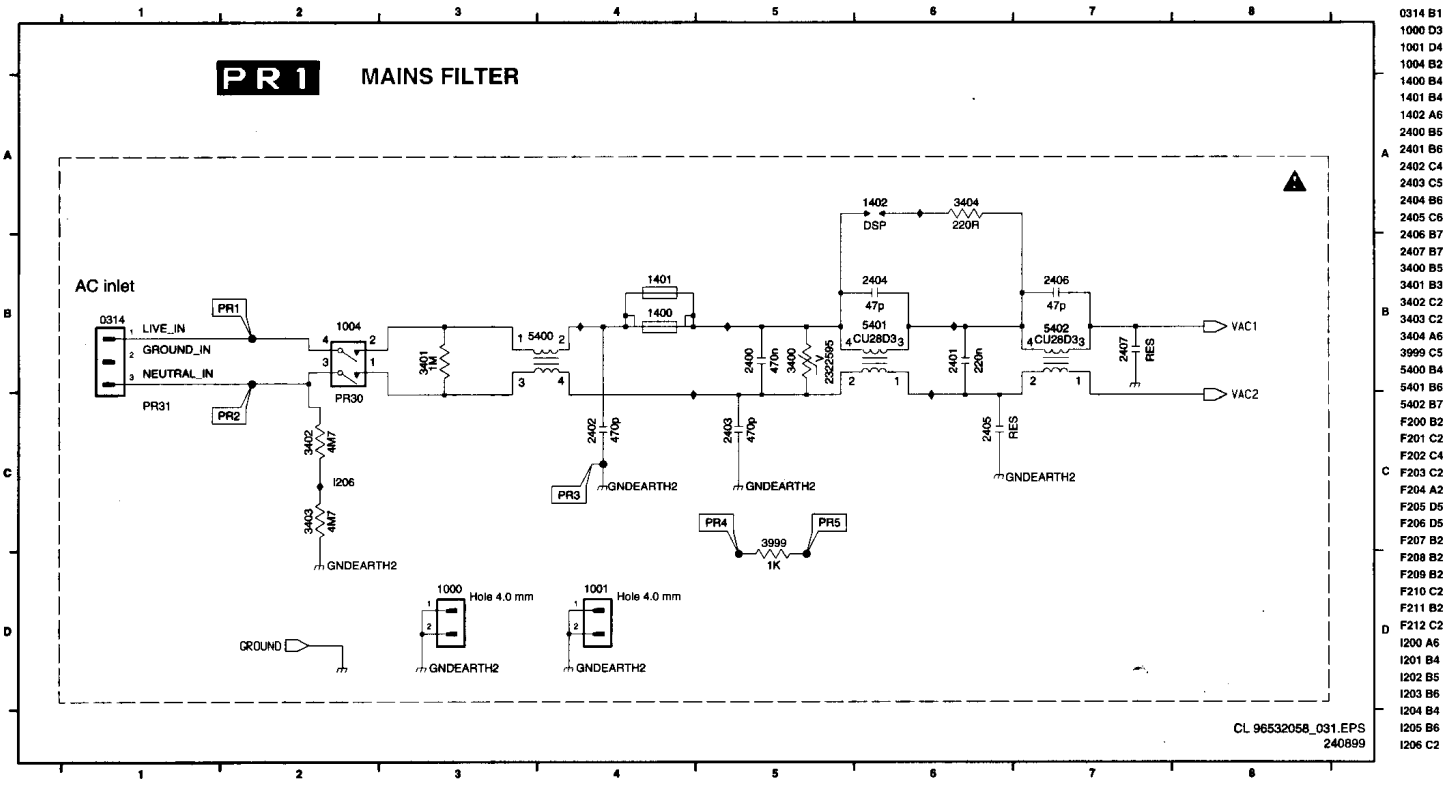
0312 E15	2009 D5	2026 E3	2307 E12	3002 A5	3018 D8	3035 A14	3056 D3	3072 F2	3320 G6	3355 H10	5002 C9	6024 A3	6311 D11
0317 B15	2010 D4	2027 E2	2308 F11	3003 C2	3019 D7	3036 A14	3057 A11	3073 F4	3321 G6	3356 H14	5003 A5	6025 A4	6312 E11
0318 D15	2011 D9	2028 A10	2309 F12	3004 C1	3020 D4	3037 C13	3058 A13	3074 E5	3322 G7	3357 H15	5004 A7	6026 A4	6313 F11
0322 A9	2012 C8	2029 B10	2310 G11	3005 C2	3021 D5	3038 C14	3059 A5	3075 B9	3323 G10	3374 H6	6001 A6	6027 B8	6314 G11
0331 F5	2013 B8	2030 F9	2311 G12	3006 C2	3022 A11	3039 B14	3060 A3	3076 C9	3324 G8	3375 H6	6002 A6	6028 D8	6315 H11
0339 A13	2014 D5	2032 C14	2312 H11	3007 E2	3023 B11	3040 A12	3061 B3	3077 D9	3325 H9	3376 H6	6004 C5	6029 F4	6316 H13
1004 A2	2015 D5	2033 D1	2313 H12	3008 E2	3024 A12	3041 C12	3062 A4	3078 D9	3340 D12	3377 H7	6005 C5	6030 A7	6317 B9
1005 B10	2016 D2	2034 D1	2314 H10	3009 E2	3025 C12	3042 D1	3063 A4	3310 G1	3341 D12	3378 H7	6007 B7	6031 D2	6318 C8
2001 A6	2017 F3	2035 E1	2315 G7	3010 C6	3026 C12	3043 C1	3064 E3	3311 H1	3343 E12	3379 H7	6008 C7	6032 D2	6319 C9
2002 B6	2018 F4	2036 C2	2317 H15	3011 D5	3027 E3	3044 D1	3065 E2	3312 G1	3344 E12	3380 F8	6009 D4	6033 E1	6320 D8
2003 B5	2020 A11	2037 B13	2318 H5	3012 E3	3029 B12	3045 D1	3066 D2	3313 H1	3346 F12	3381 F8	6010 D4	6034 C2	6321 D11
2004 C1	2021 A12	2038 C14	2319 H14	3013 E4	3030 B13	3046 E1	3067 D3	3314 G2	3347 F12	3382 F8	6011 E4	6301 G2	6322 E11
2005 C1	2022 C10	2303 G2	2321 H7	3014 B8	3031 B13	3047 E2	3068 D7	3315 G2	3349 G12	3383 G9	6012 D7	6302 G4	6323 F11
2006 C2	2023 A10	2304 D11	2322 H6	3015 B8	3032 C13	3048 D1	3069 D6	3316 G3	3350 G12	3388 H7	6020 A11	6303 G4	6324 G11
2007 E2	2024 B12	2305 D12	2323 H5	3016 B7	3033 A13	3049 D2	3070 D6	3317 G4	3352 H12	3389 H6	6021 B10	6304 G6	6325 H11
2008 E4	2025 A12	2306 E11	3001 A5	3017 C8	3034 B13	3050 E7	3071 E5	3318 G5	3353 H12	5001 C6	6023 B12	6305 G7	6326 H14



0 D12	7010 B11	7315 H9
1 E12	7011 B13	7316 D12
2 F12	7012 A14	7317 E12
3 G12	7013 C14	7318 F12
4 H12	7014 A3	7319 G12
5 H15	7015 B4	7320 H12
1 F8	7016 A14	7321 G9
4 C14	7017 D3	7322 H14
1 B2	7018 E3	7333 H5
2 B11	7019 E6	7338 H6
3 C14	7020 B8	7339 H6
5 B8	7021 D8	7340 F8
6 C8	7311-A H2	
7 C8	7311-B G5	
8 D8	7313 G5	
9 D3	7314 F8	

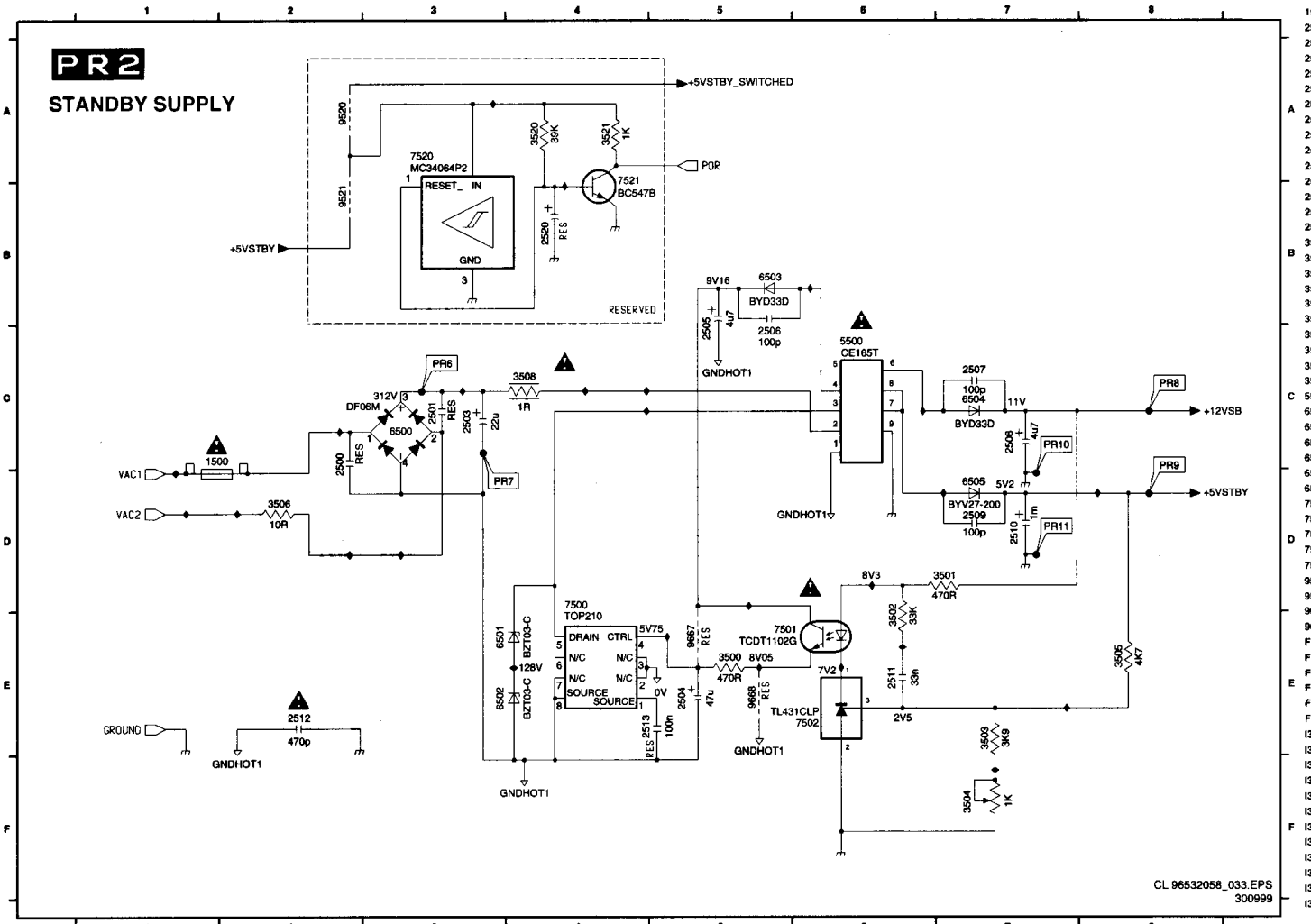


Pre conditioner (PR)



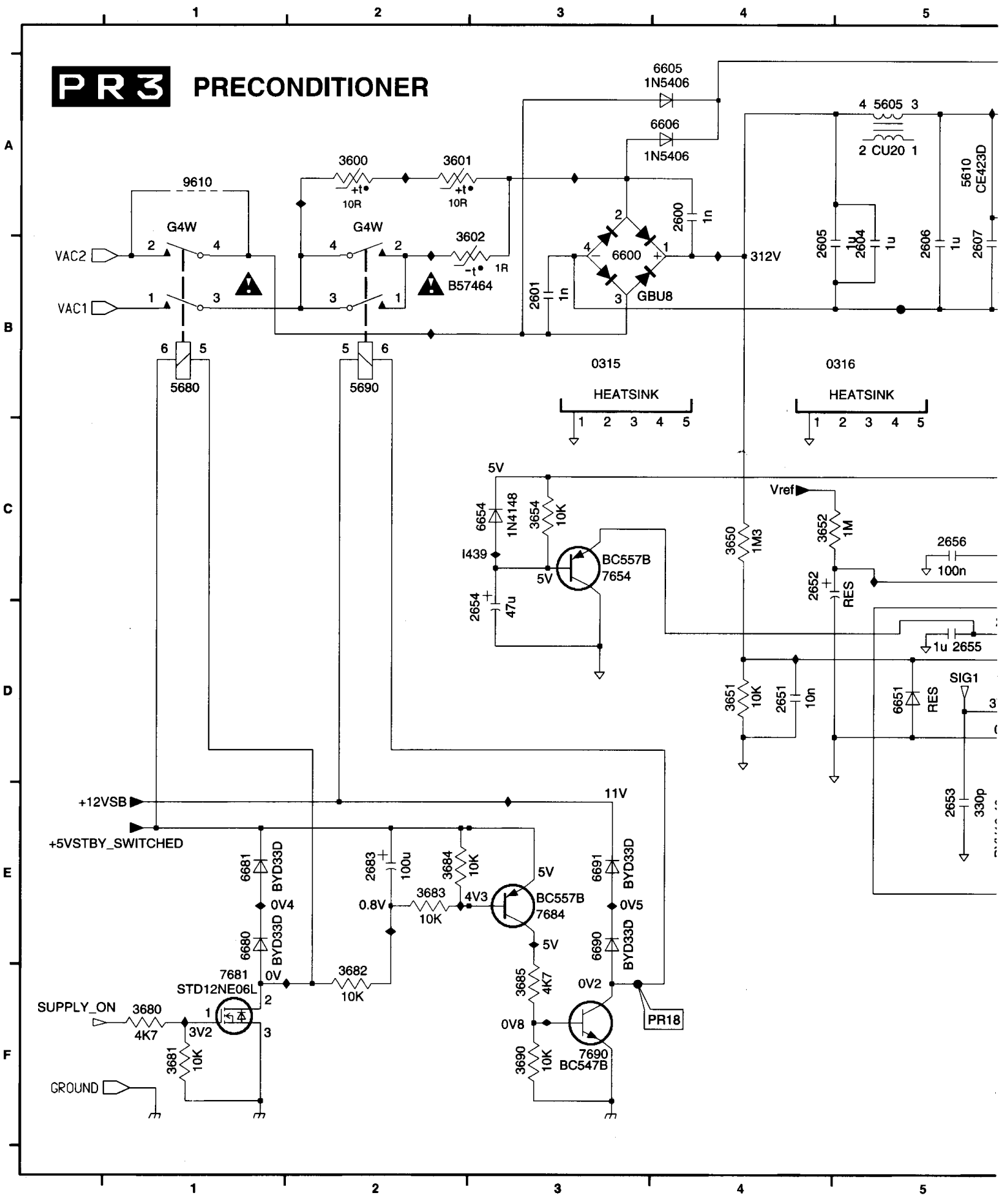
0314 B1
1000 D3
1001 D4
1004 B2
1400 B4
1401 B4
1402 A6
2400 B5
2401 B6
2402 C4
2403 C5
2404 B6
2405 C6
2406 B7
2407 B7
3400 B5
3401 B3
3402 C2
3403 C2
3404 A6
3999 C5
5400 B4
5401 B6
5402 B7
F200 B2
F201 C2
F202 C4
F203 C2
F204 A2
F205 D5
F206 D5
F207 B2
F208 B2
F209 B2
F210 C2
F211 B2
F212 C2
I200 A6
I201 B4
I202 B5
I203 B6
I204 B4
I205 B6
I206 C2

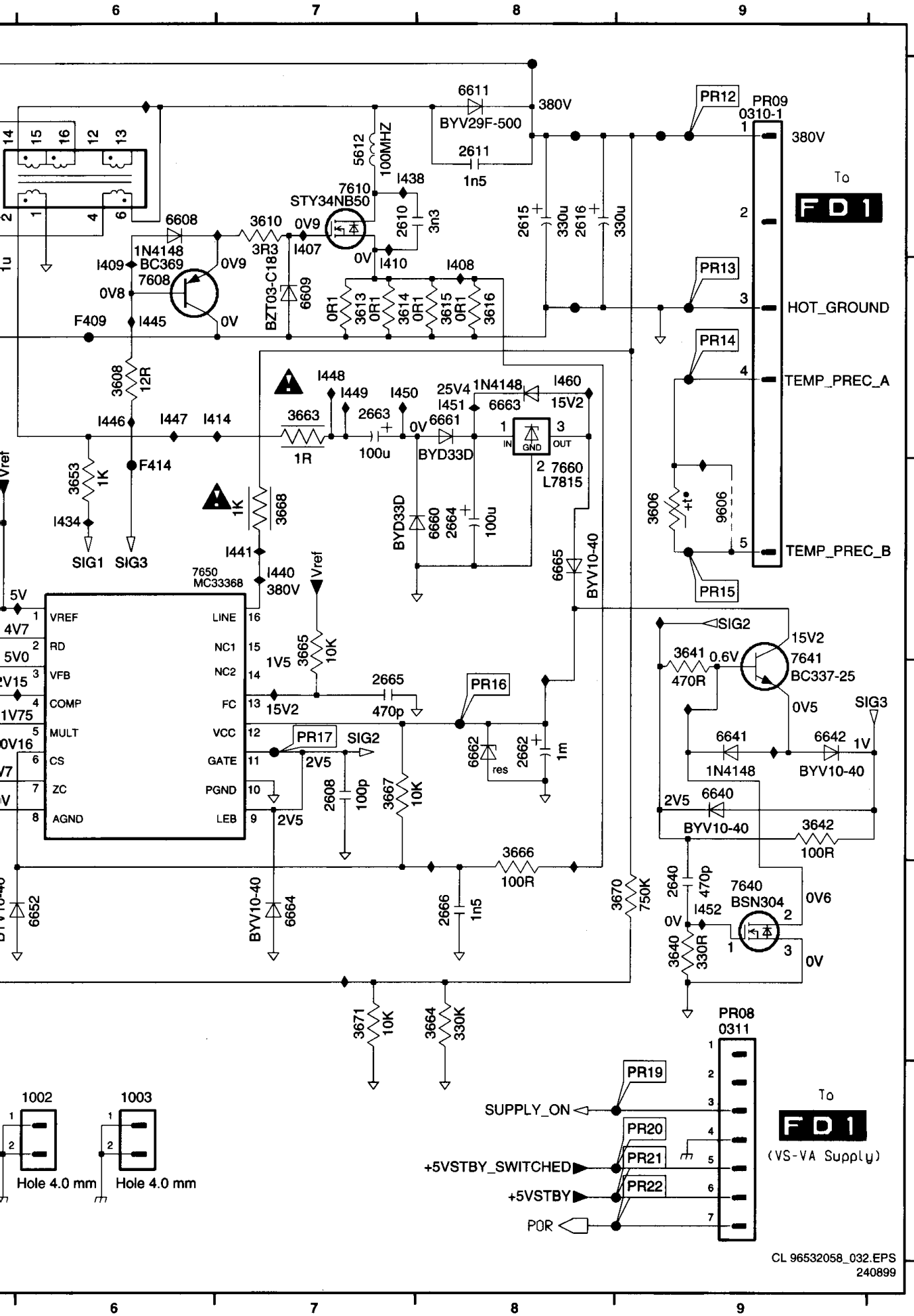
Pre conditioner (PR)



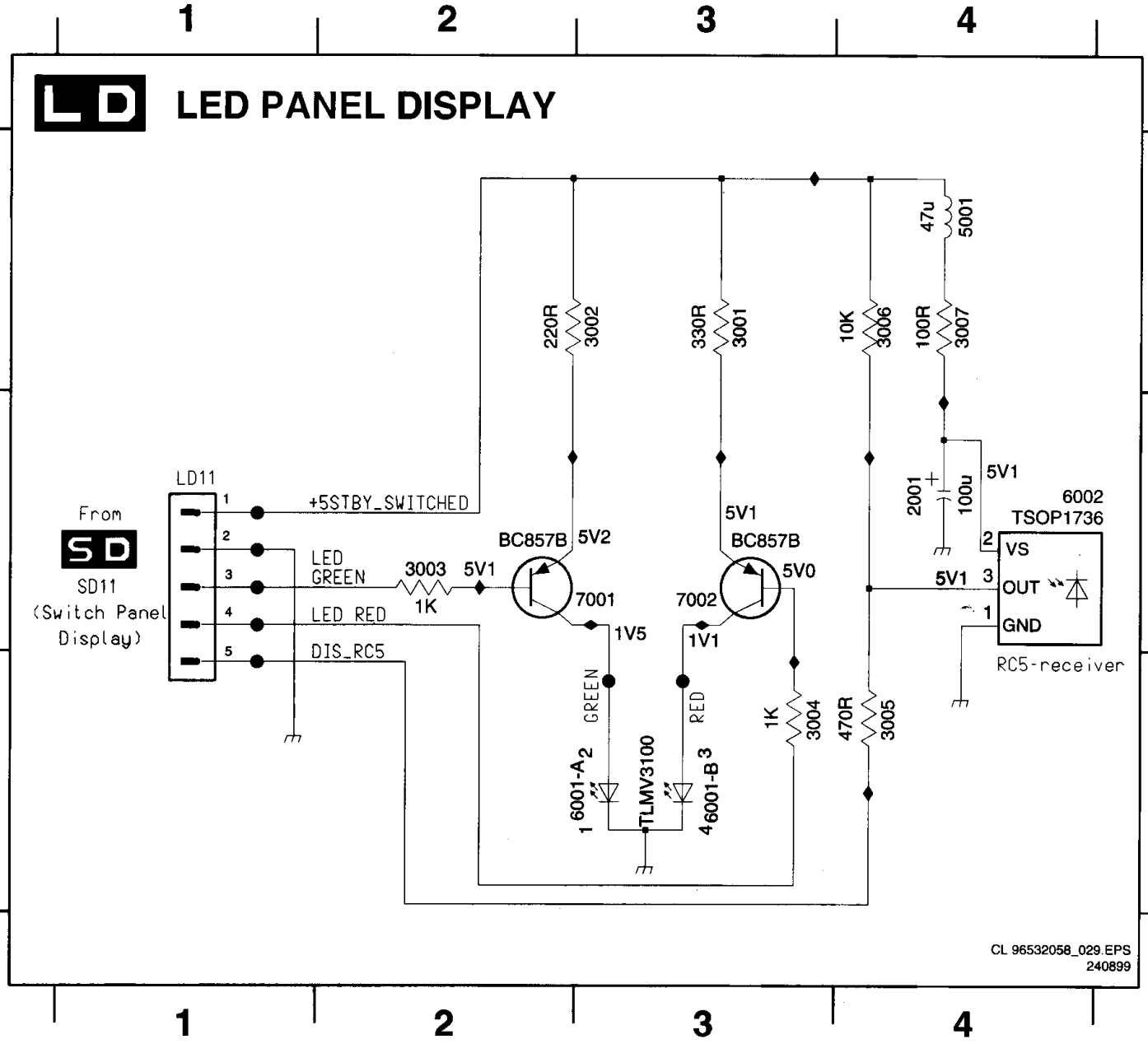
1500 C1
2500 C2
2501 C3
2503 C3
2504 E5
2505 C5
2506 C5
2507 C7
2508 C7
2509 D7
2510 D7
2511 E6
2512 E2
2513 E5
2520 B4
3500 E5
3501 D7
3502 E6
3503 E7
3504 F7
3505 E8
3506 D2
3508 C4
3520 A4
3521 A4
5500 C6
6500 C3
6501 E3
6502 E3
6503 B5
6504 C7
6505 D7
7500 D4
7501 E6
7502 E5
7520 A4
7521 B4
9520 A2
9521 B2
9667 E5
9668 E5
F300 C3
F301 C8
F302 D8
F303 C7
F304 D7
F305 C3
I300 A3
I301 A4
I303 C4
I304 C6
I306 C2
I307 C4
I308 C1
I309 B6
I310 D7
I311 E3
I312 D6
I314 D5
I316 E5
I317 E5
I318 E6
I319 E7
I320 F7
I321 D1
I322 D3
I323 D2
I324 C4
I325 C3
I326 D2
I327 D8

Pre conditioner (PR)

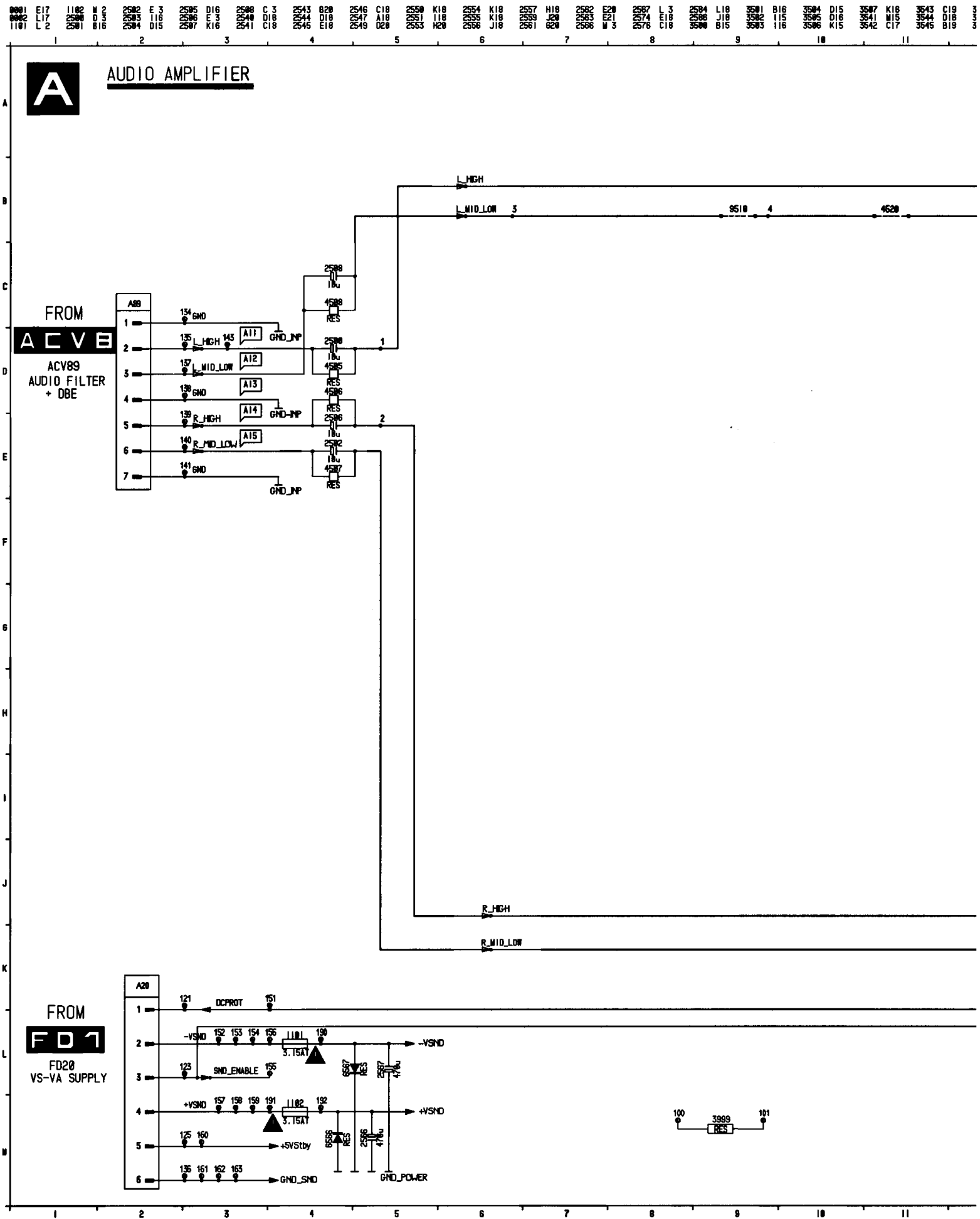




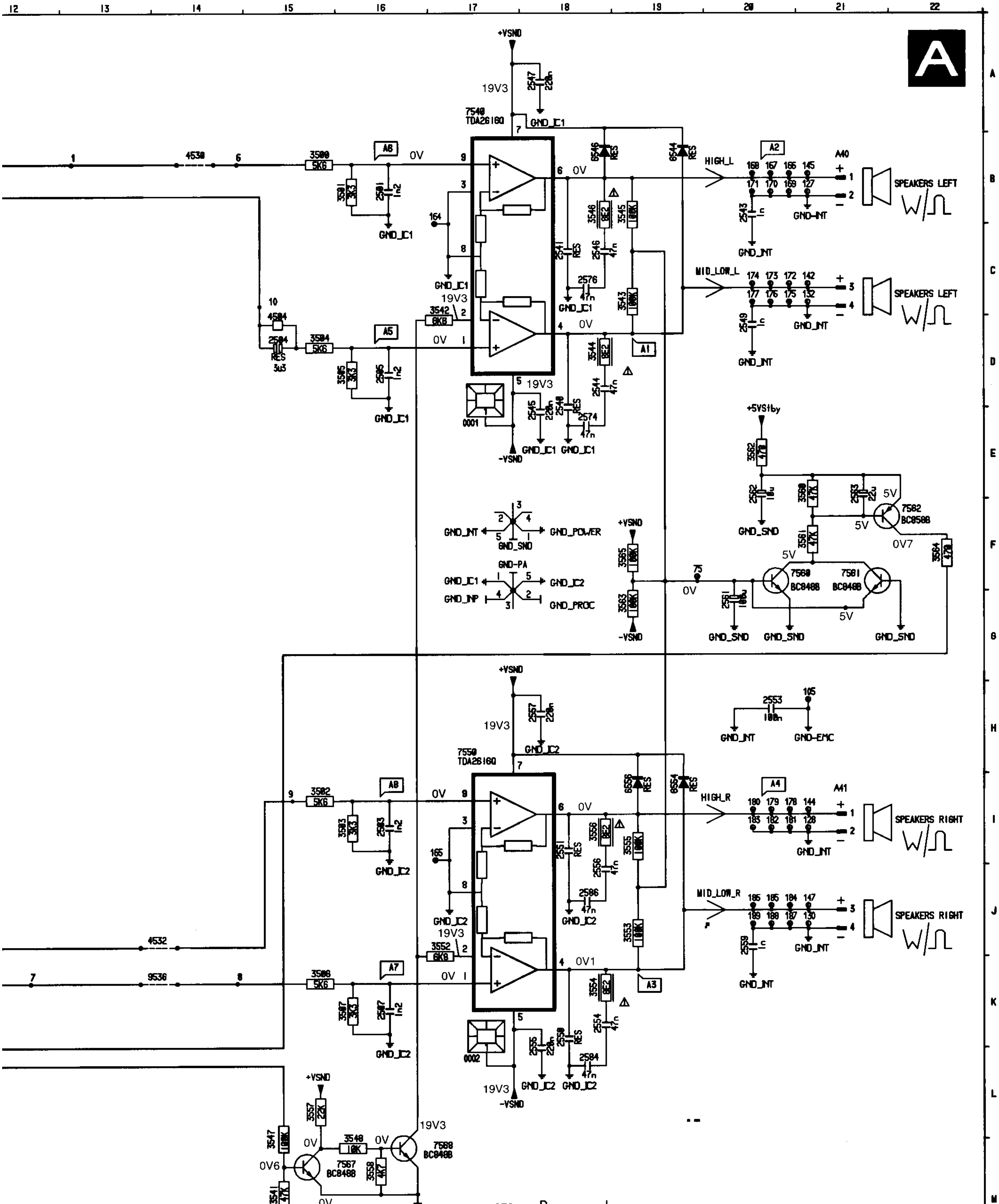
LED panel


LD
LED PANEL DISPLAY
0311 B1
2001 B4
3002 A3
3004 C3
3005 C3
3006 A3
3007 A4
3008 B2
3009 A2
5001 A4
6001 C2
6001 C3
6002 B4
7001 B2
7002 B3
LD11
From
SD
SD11
(Switch Panel
Display)
+5STBY_SWITCHED
LED
GREEN
LED RED
DIS_RC5
3003
1K
5V1
BC857B
5V2
7001
1V5
BC857B
5V1
5V0
7002
1V1
220R
3002
330R
3001
10K
3006
100R
3007
47u
5001
2001
100u
5V1
6002
TSOP1736
VS
OUT
GND
RC5-receiver
GREEN
RED
6001-A
6001-B
TLMV3100
1K
3004
470R
3005
CL 96532058_029.EPS
240899

Audio amplifier A1

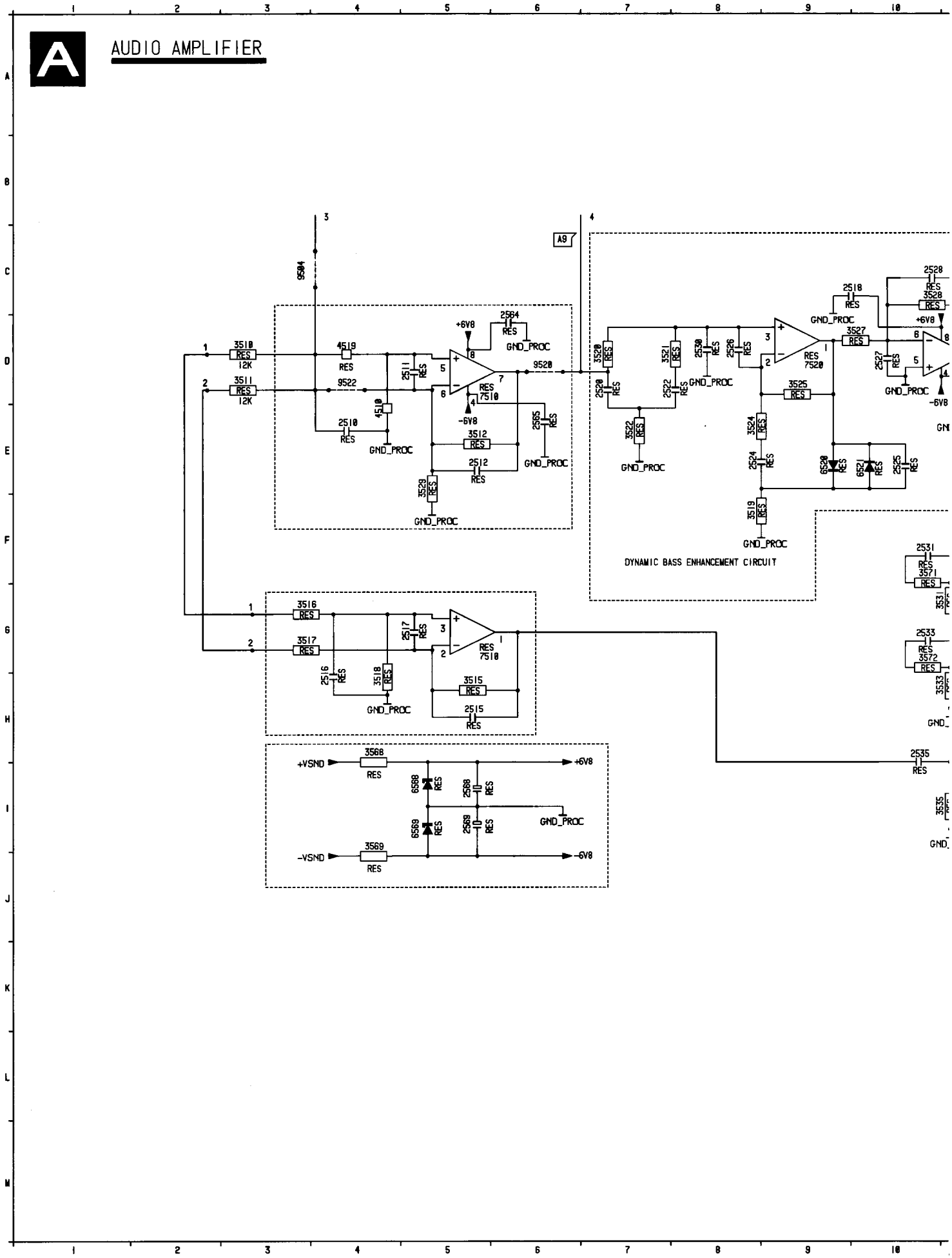


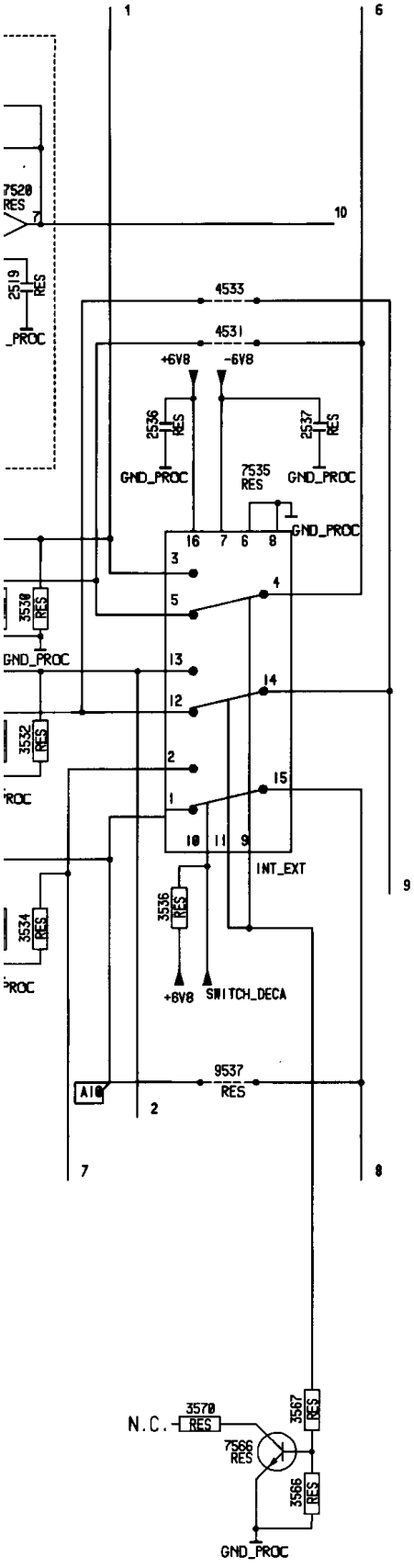
46	B18	3552	J17	3555	I19	3558	M16	3582	E20	3565	F19	4505	D 3	4508	C 3	4532	J14	6554	I19	6567	L 3	7560	F20	7567	M16	9536	K14	A41	I21
47	L15	3553	J19	3556	I18	3560	E21	3583	G19	3999	M 7	4506	D 3	4520	B 9	6544	B19	6556	I19	7540	A17	7561	F21	7568	M17	A20	K 1	A89	C 1
48	M16	3554	K18	3557	L15	3561	F21	3564	F22	4504	D15	4507	E 3	4530	B14	6546	B18	6566	M 3	7550	H17	7562	F22	9510	B 7	A40	B21		



CL 96532058_036.EPS
240899

Audio amplifier A2

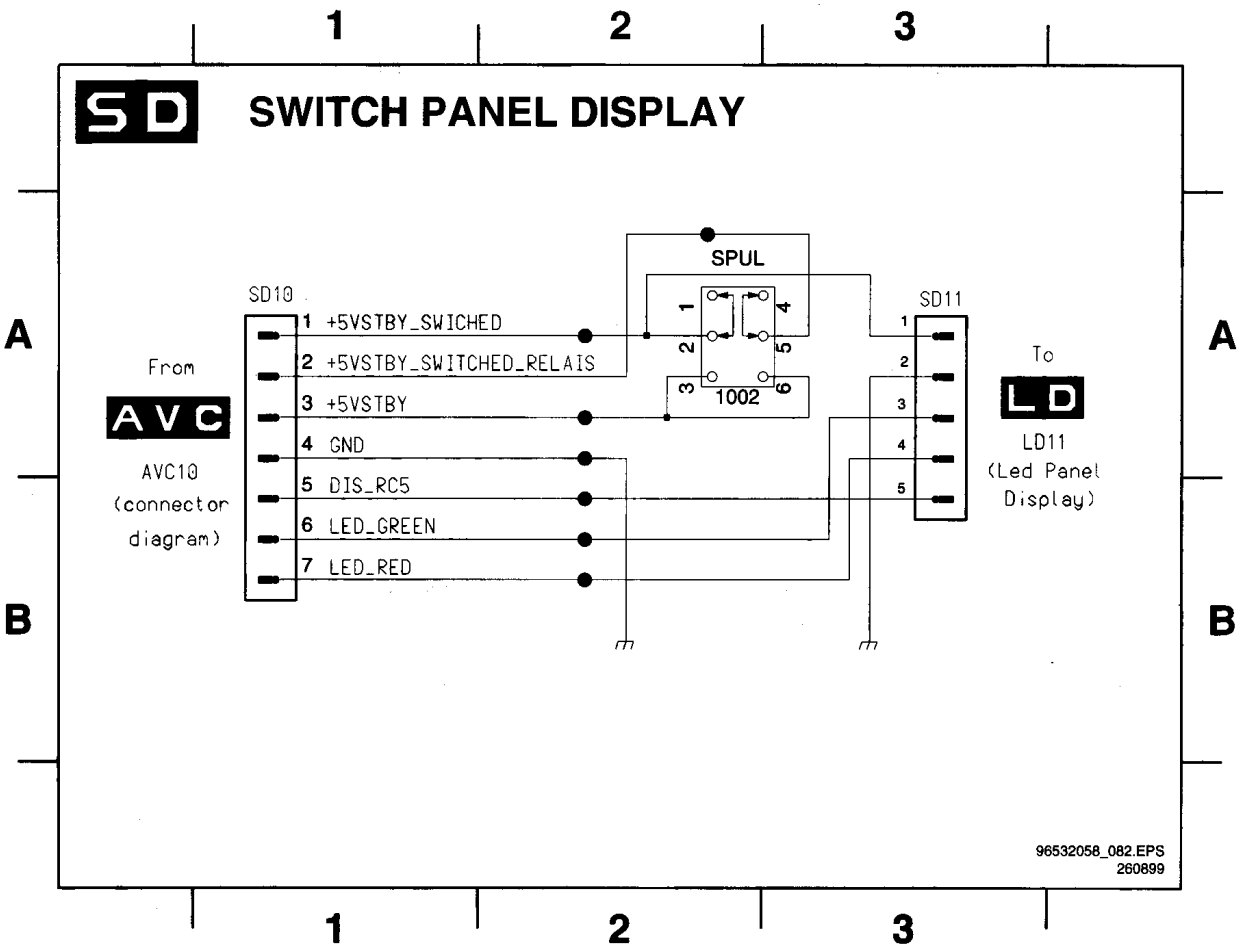




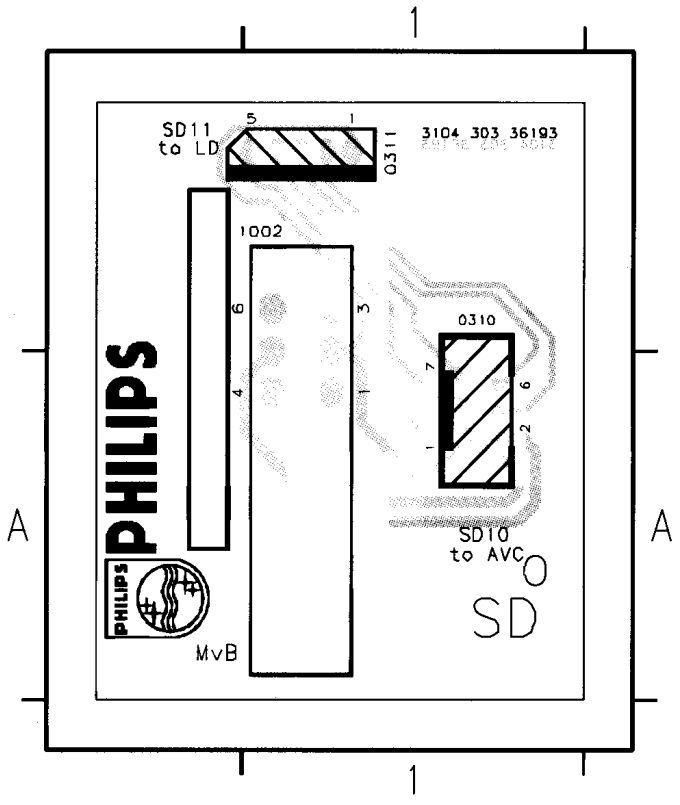
RES : Reserved

96532058_062.EPS
260899

Switch panel

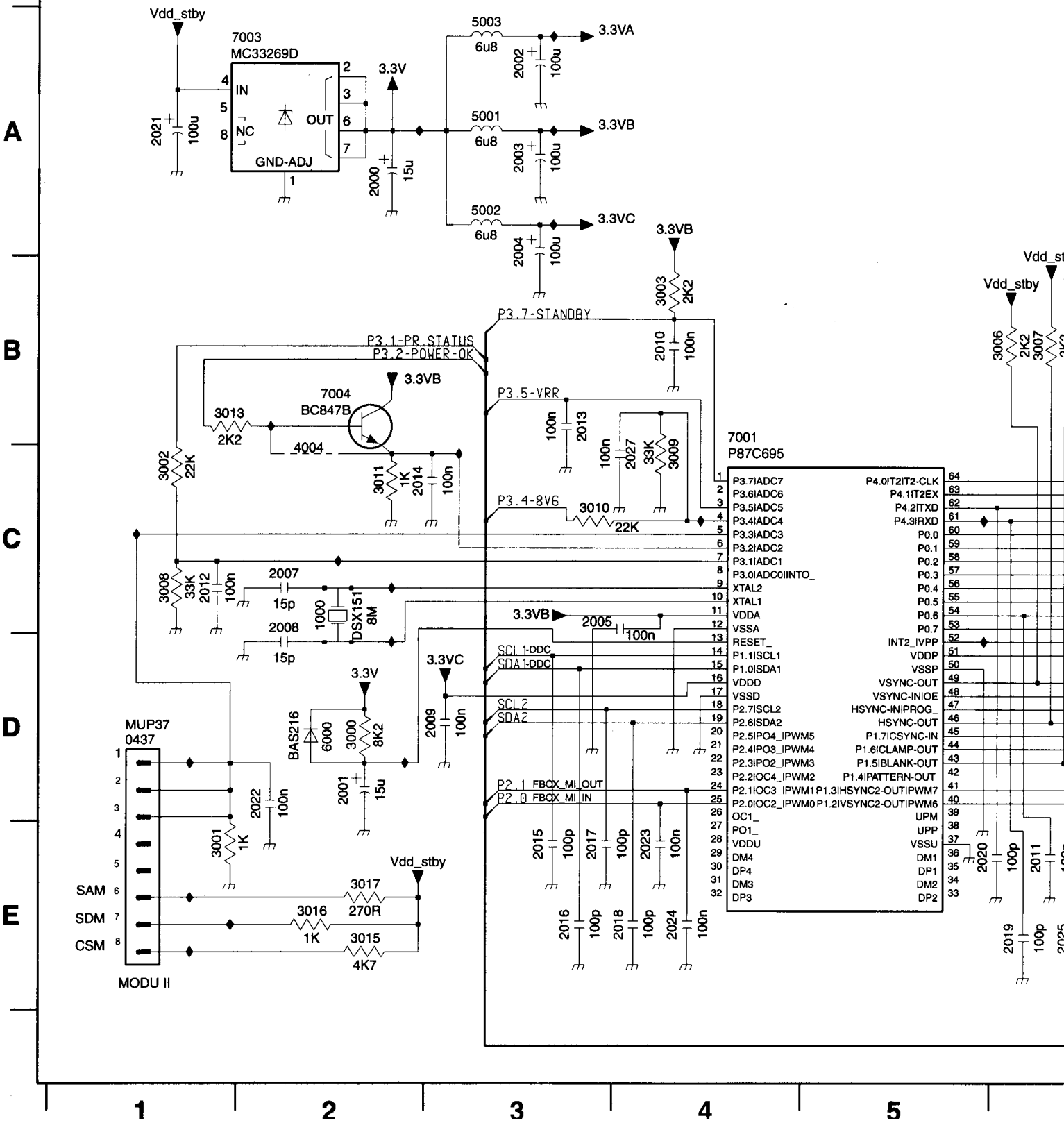


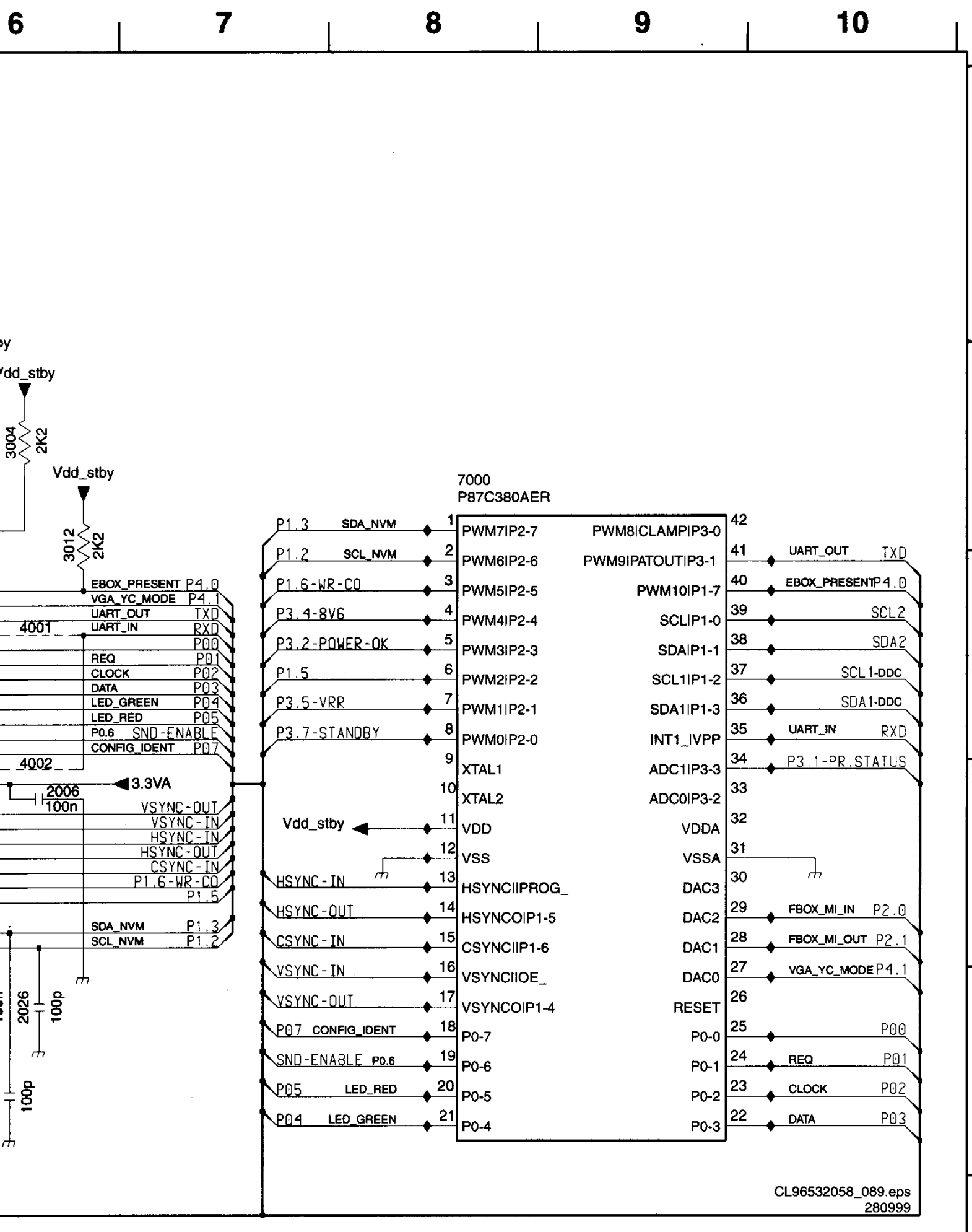
Switch panel (component side)



Monitor microprocessor panel

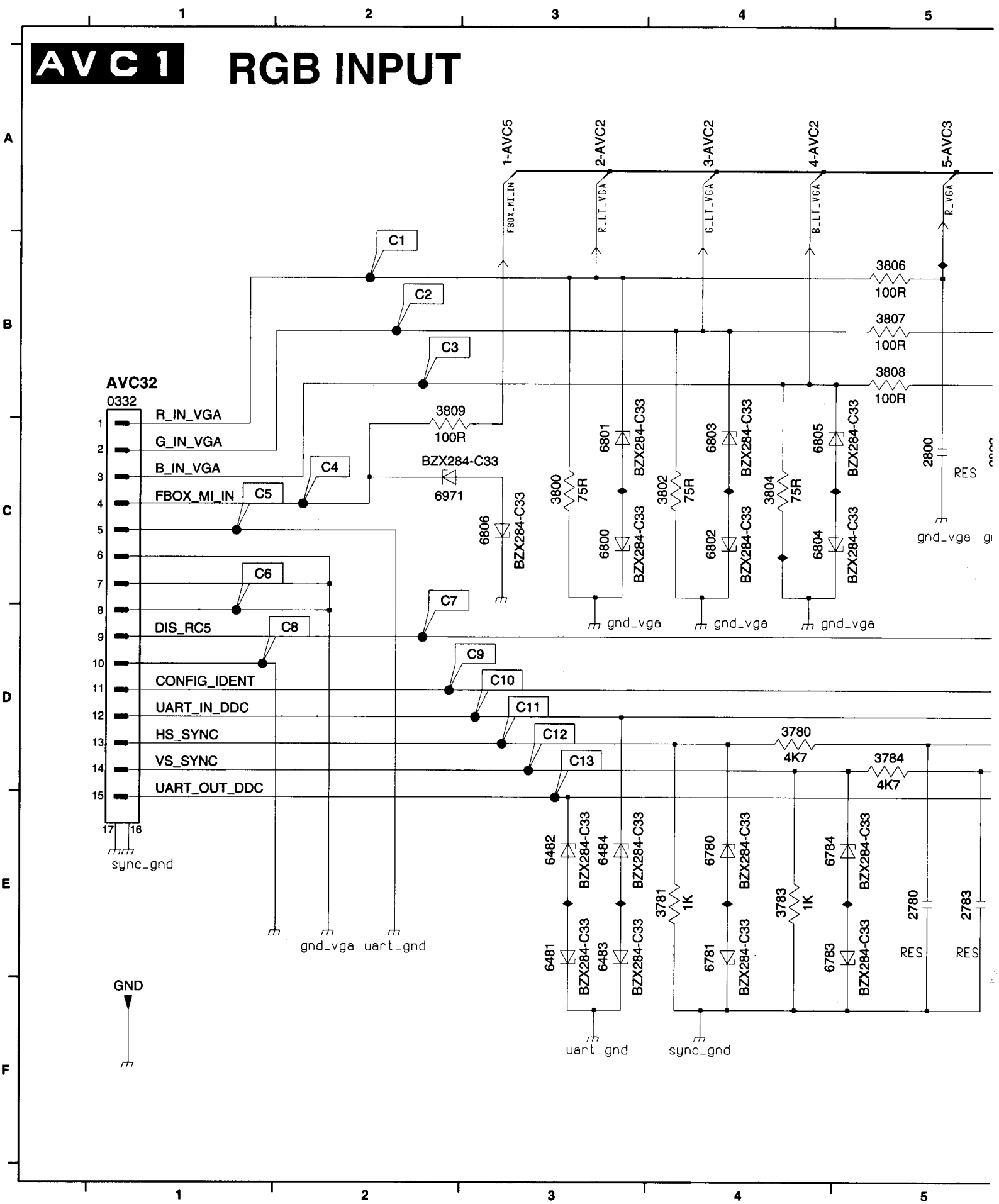
0437 D1	2003 A3	2008 C2	2013 B3	2018 E4	2023 E4	3000 D2	3006 B6	3011 C2	3017 E2	5002 A3	7003 A1
1000 C2	2004 A3	2009 D3	2014 C2	2019 E6	2024 E4	3001 D1	3007 B6	3012 B6	4001 C6	5003 A3	7004 B2
2000 A2	2005 C3	2010 B4	2015 E3	2020 E5	2025 E6	3002 C1	3008 C1	3013 B1	4002 D6	6000 D2	
2001 D2	2006 D6	2011 E6	2016 E3	2021 A1	2026 E6	3003 B4	3009 C4	3015 E2	4004 C2	7000 B8	
2002 A3	2007 C2	2012 C1	2017 E3	2022 D2	2027 C4	3004 B6	3010 C3	3016 E2	5001 A3	7001 B4	

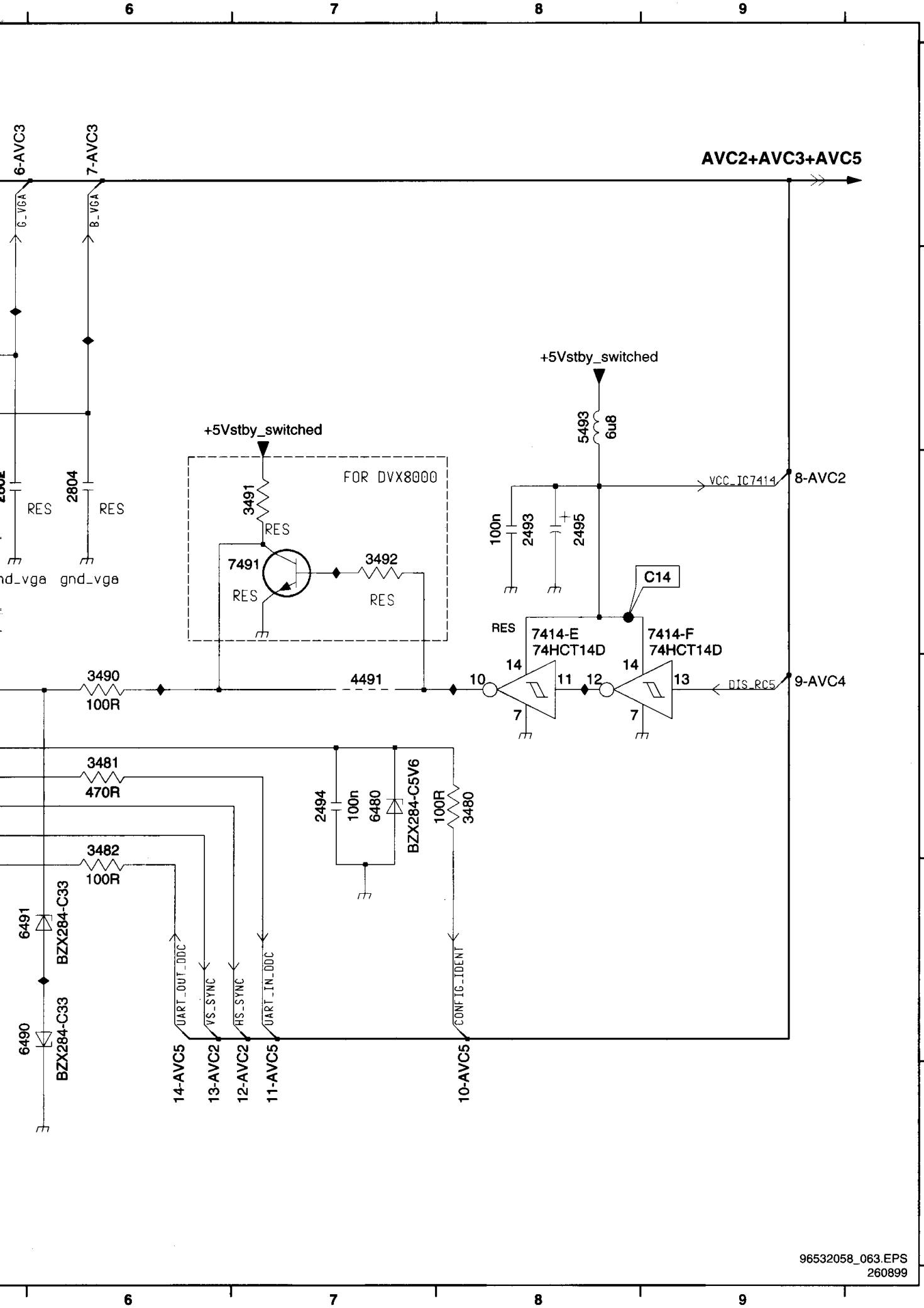



6
7
8
9
10
A
B
C
D
E
Vdd_stby
3004
2K2
Vdd_stby
3012
2K2
7000
P87C380AER
EBOX_PRESENT P4.0
VGA_YC_MODE P4.1
UART_OUT TXD
4001
UART_IN RXD
P00
REQ P01
CLOCK P02
DATA P03
LED_GREEN P04
LED_RED P05
P0.6 SND-ENABLE
CONFIG_IDENT P07
4002
3.3VA
2006
100n
VSYNC-OUT
VSYNC-IN
HSYNC-IN
HSYNC-OUT
CSYNC-IN
P1.6-WR-CO
P1.5
SDA_NVM P1.3
SCL_NVM P1.2
2026
100p
100p
P1.3 SDA_NVM
P1.2 SCL_NVM
P1.6-WR-CO
P3.4-8V6
P3.2-POWER-OK
P1.5
P3.5-VRR
P3.7-STANDBY
Vdd_stby
HSYNC-IN
HSYNC-OUT
CSYNC-IN
VSYNC-IN
VSYNC-OUT
P07 CONFIG_IDENT
SND-ENABLE P0.6
P05 LED_RED
P04 LED_GREEN
1 PWM7IP2-7
2 PWM6IP2-6
3 PWM5IP2-5
4 PWM4IP2-4
5 PWM3IP2-3
6 PWM2IP2-2
7 PWM1IP2-1
8 PWM0IP2-0
9 XTAL1
10 XTAL2
11 VDD
12 VSS
13 HSYNCIIPROG_
14 HSYNCOIP1-5
15 CSYNCIIP1-6
16 VSYNCIIOE_
17 VSYNCOIP1-4
18 P0-7
19 P0-6
20 P0-5
21 P0-4
42 PWM8ICLAMPIP3-0
41 PWM9IPATOUTIP3-1
40 PWM10IP1-7
39 SCLIP1-0
38 SDAIP1-1
37 SCL1IP1-2
36 SDA1IP1-3
35 INT1_IVPP
34 ADC1IP3-3
33 ADC0IP3-2
32 VDDA
31 VSSA
30 DAC3
29 DAC2
28 DAC1
27 DAC0
26 RESET
25 P0-0
24 P0-1
23 P0-2
22 P0-3
41 UART_OUT TXD
40 EBOX_PRESENT P4.0
39 SCL2
38 SDA2
37 SCL1-DDC
36 SDA1-DDC
35 UART_IN RXD
34 P3.1-PR.STATUS
29 FBOX_MI_IN P2.0
28 FBOX_MI_OUT P2.1
27 VGA_YC_MODE P4.1
25 P00
24 REQ P01
23 CLOCK P02
22 DATA P03
CL96532058_089.eps
280999

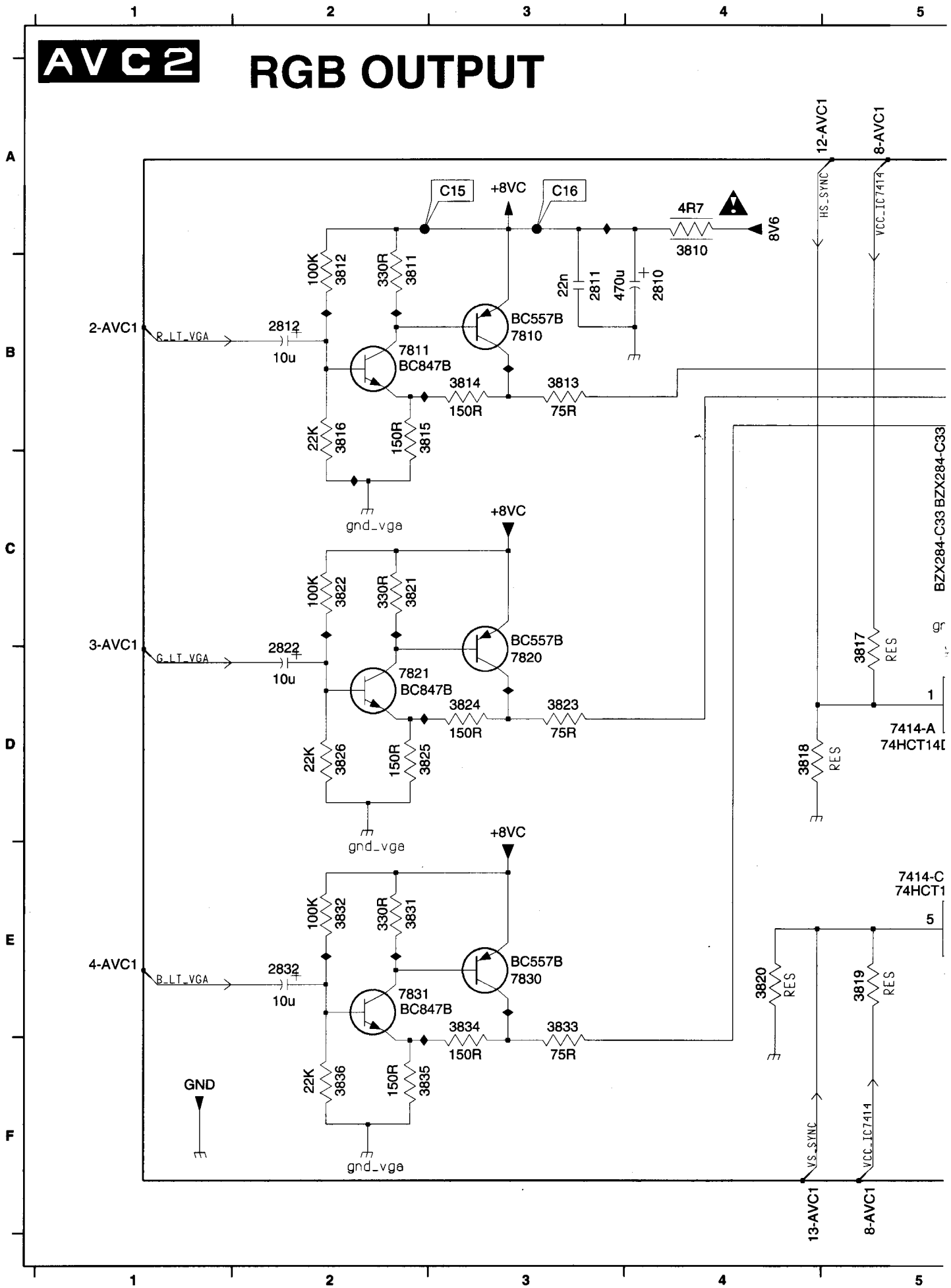
AV control

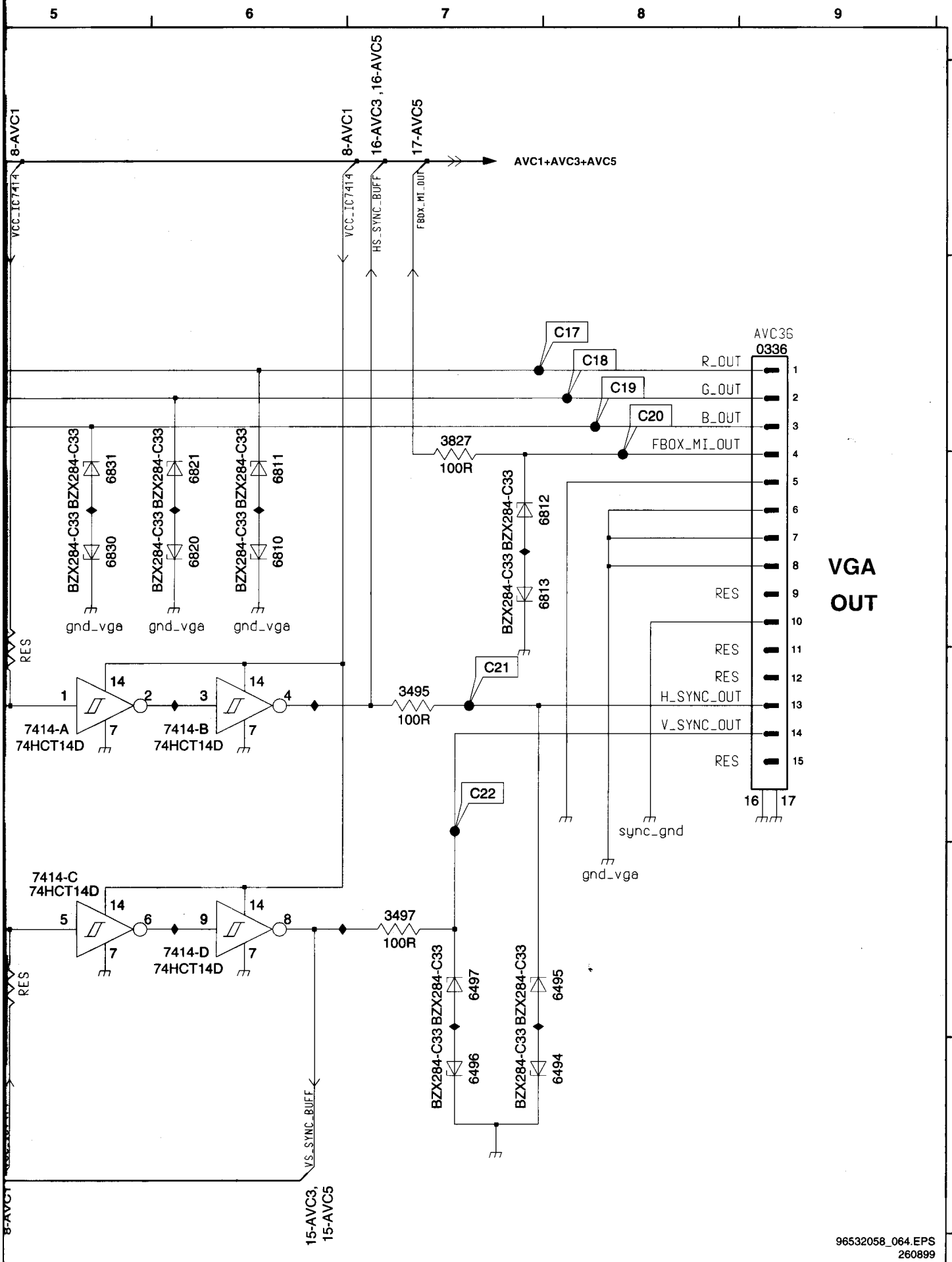
AVC 1 RGB INPUT





AV control

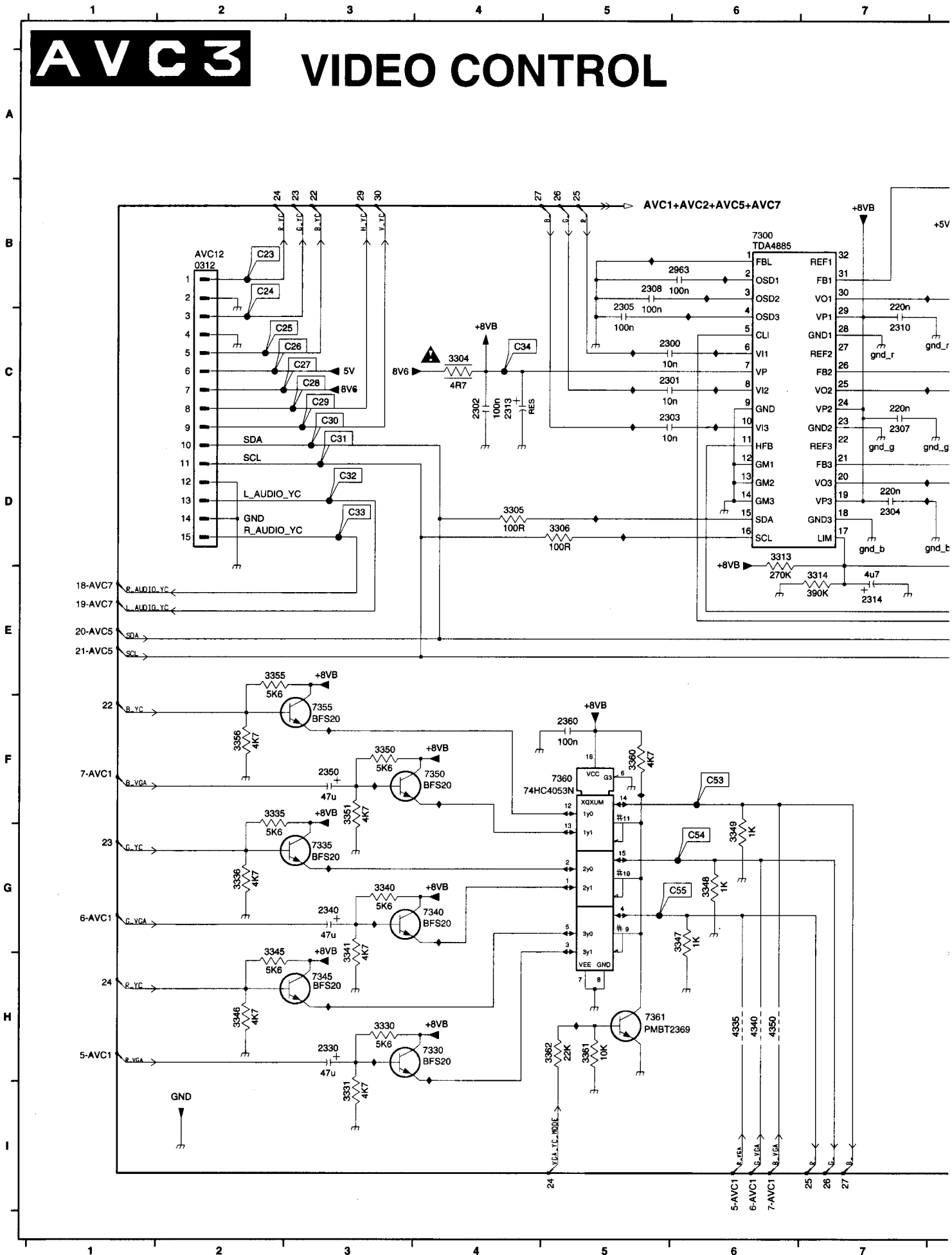

AVC2
RGB OUTPUT
12-AVC1
8-AVC1
HS_SYNC
VCC_IC7414
C15
+8VC
C16
4R7
3810
8V6
100K
3812
330R
3811
22n
2811
470u
2810
2-AVC1
R_LT_VGA
2812
10u
BC557B
7810
7811
BC847B
3814
150R
3813
75R
22K
3816
150R
3815
gnd_vga
+8VC
100K
3822
330R
3821
3-AVC1
G_LT_VGA
2822
10u
BC557B
7820
7821
BC847B
3824
150R
3823
75R
22K
3826
150R
3825
gnd_vga
BZX284-C33 BZX284-C33
3817
RES
1
7414-A
74HCT14
3818
RES
+8VC
100K
3832
330R
3831
4-AVC1
B_LT_VGA
2832
10u
BC557B
7830
7831
BC847B
3834
150R
3833
75R
22K
3836
150R
3835
GND
gnd_vga
7414-C
74HCT1
5
3820
RES
3819
RES
VS_SYNC
VCC_IC7414
13-AVC1
8-AVC1

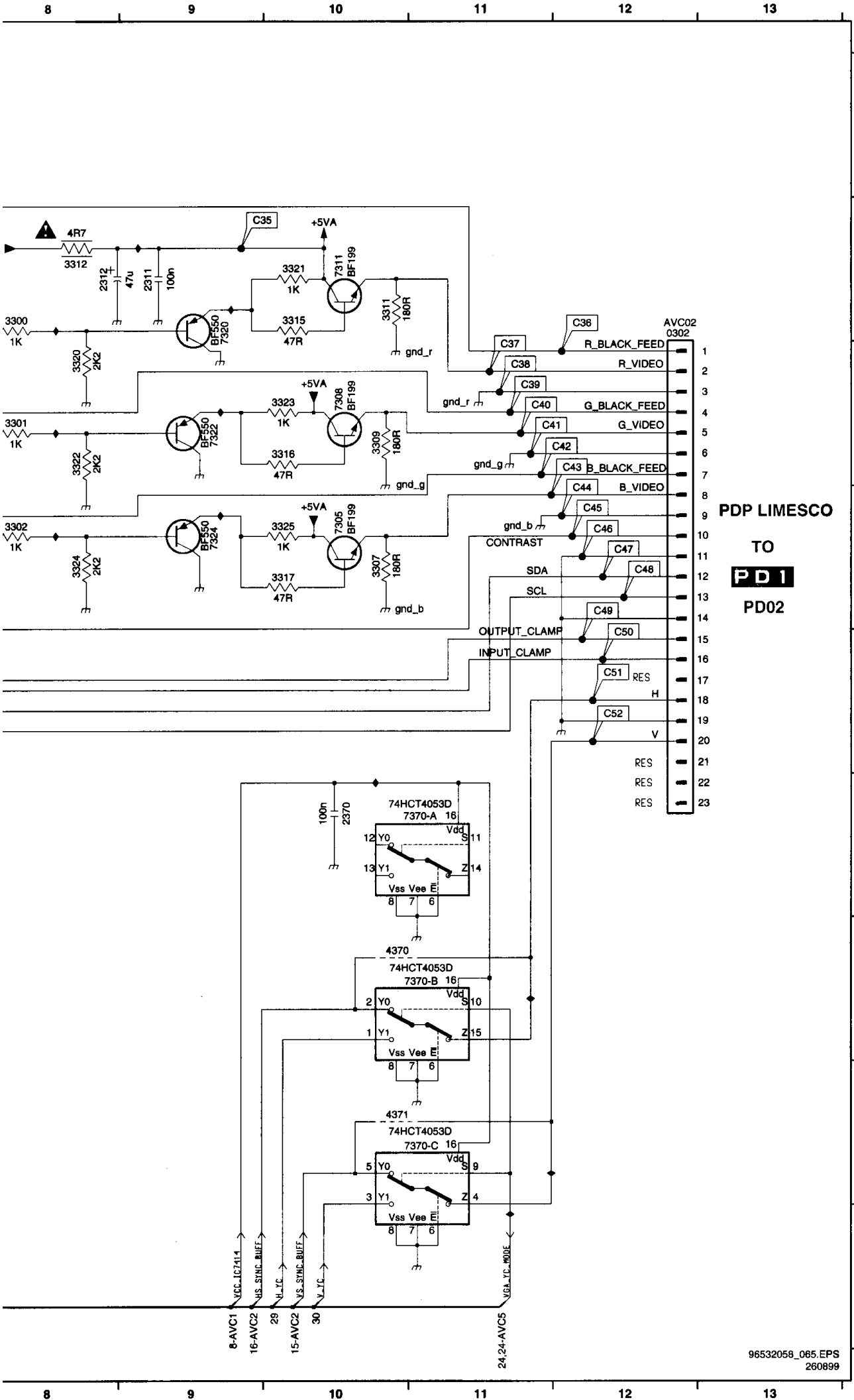


0336 B8
2810 A6
2811 A6
2812 B4
2822 C2
2832 E2
3495 D7
A 3497 E7
3810 A5
3811 A5
3812 A4
3813 B6
3814 B5
3815 B5
3816 B4
3817 D5
B 3818 D5
3819 E5
3820 E5
3821 B3
3822 B3
3823 C4
3824 C3
3825 C3
3826 C3
C 3827 B7
3831 D2
3832 D2
3833 E3
3834 E3
3835 E3
3836 E2
6494 F7
6495 E7
6496 F7
D 6497 E7
6810 C6
6811 C6
6812 C7
6813 C7
6820 C6
6821 C6
6830 C6
6831 C6
E 7414-A D5
7414-B D6
7414-C E5
7414-D E6
7810 B5
7811 B5
7820 C4
7821 C3
7830 E3
F 7831 E2

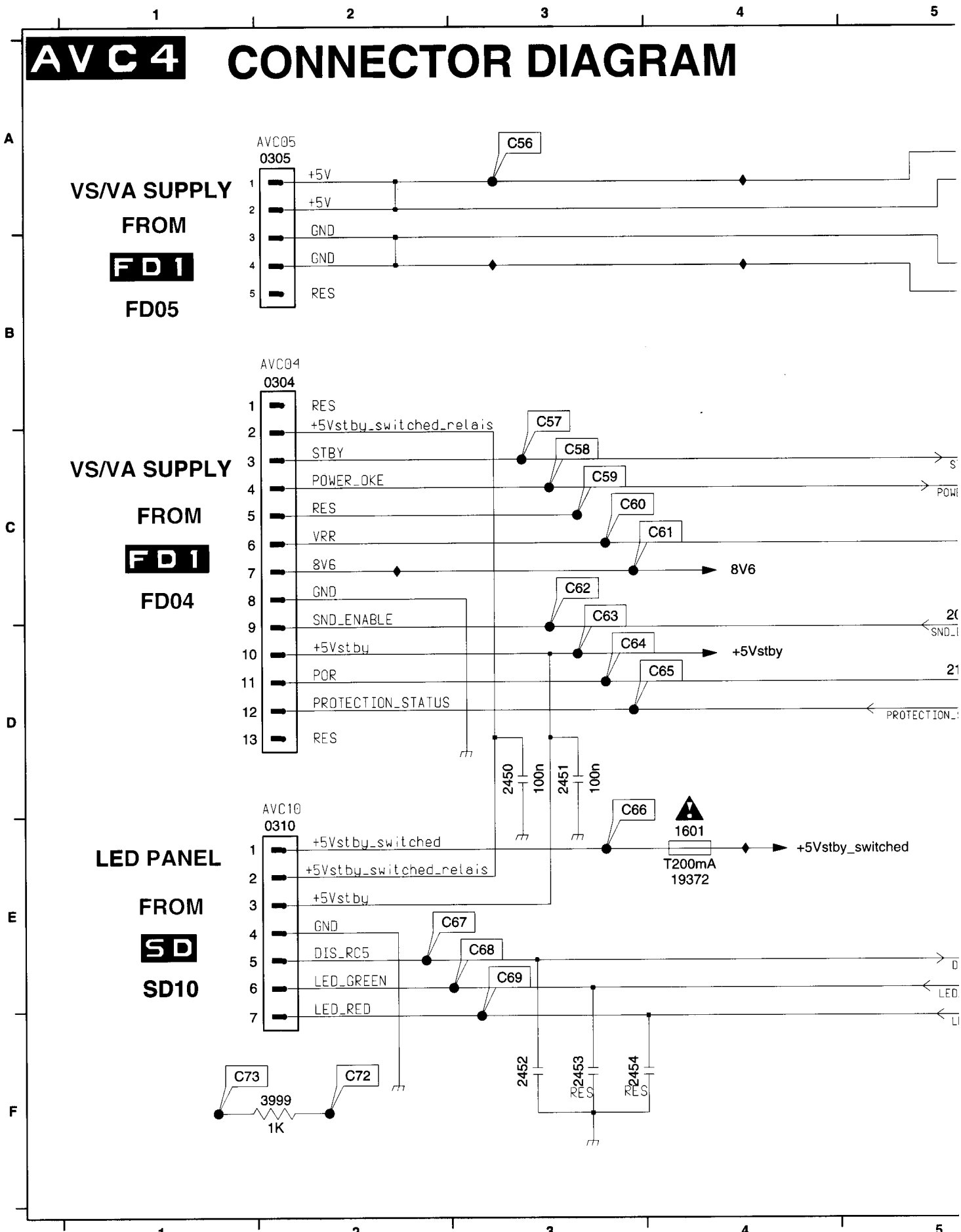
AV control

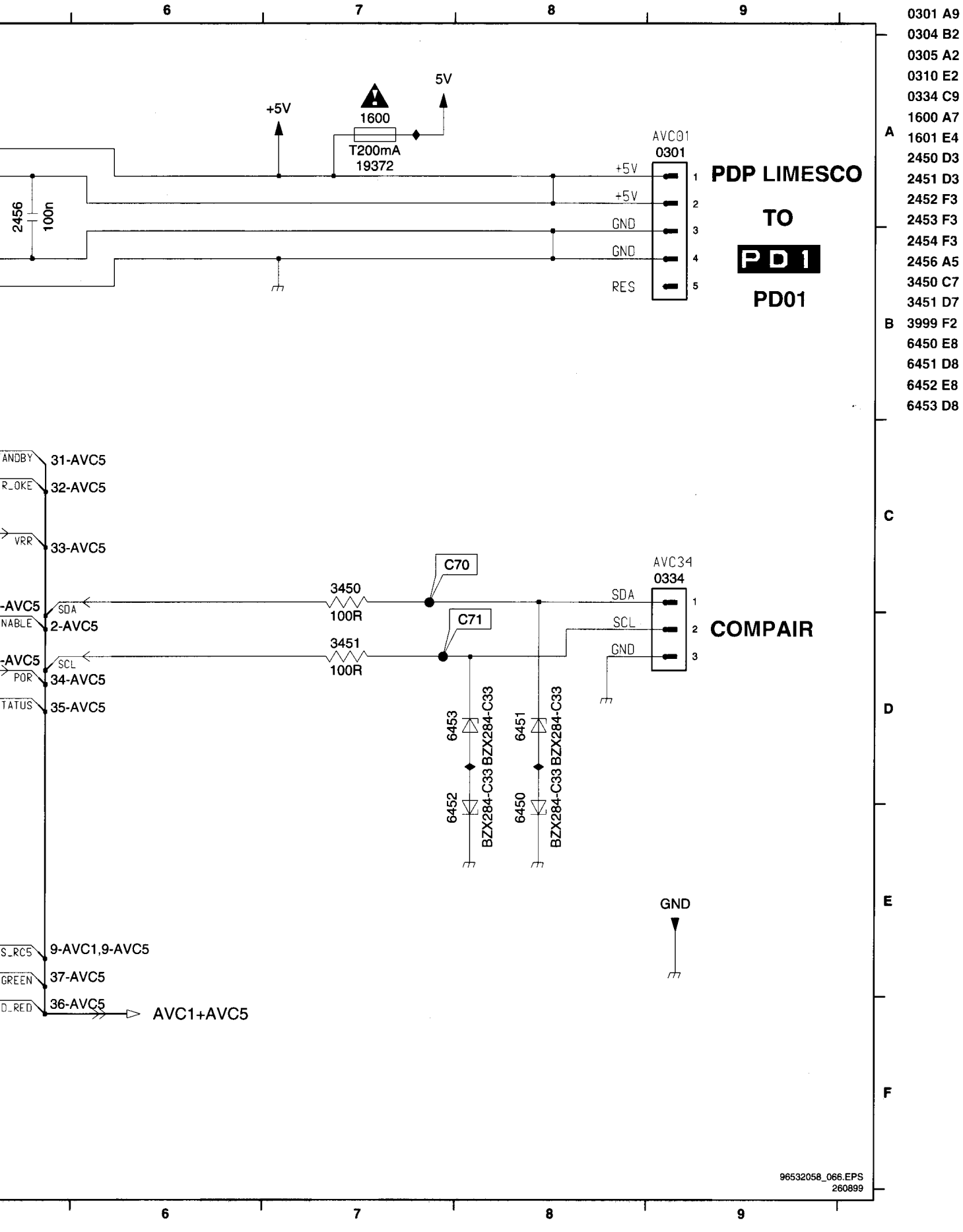
AVC3 VIDEO CONTROL



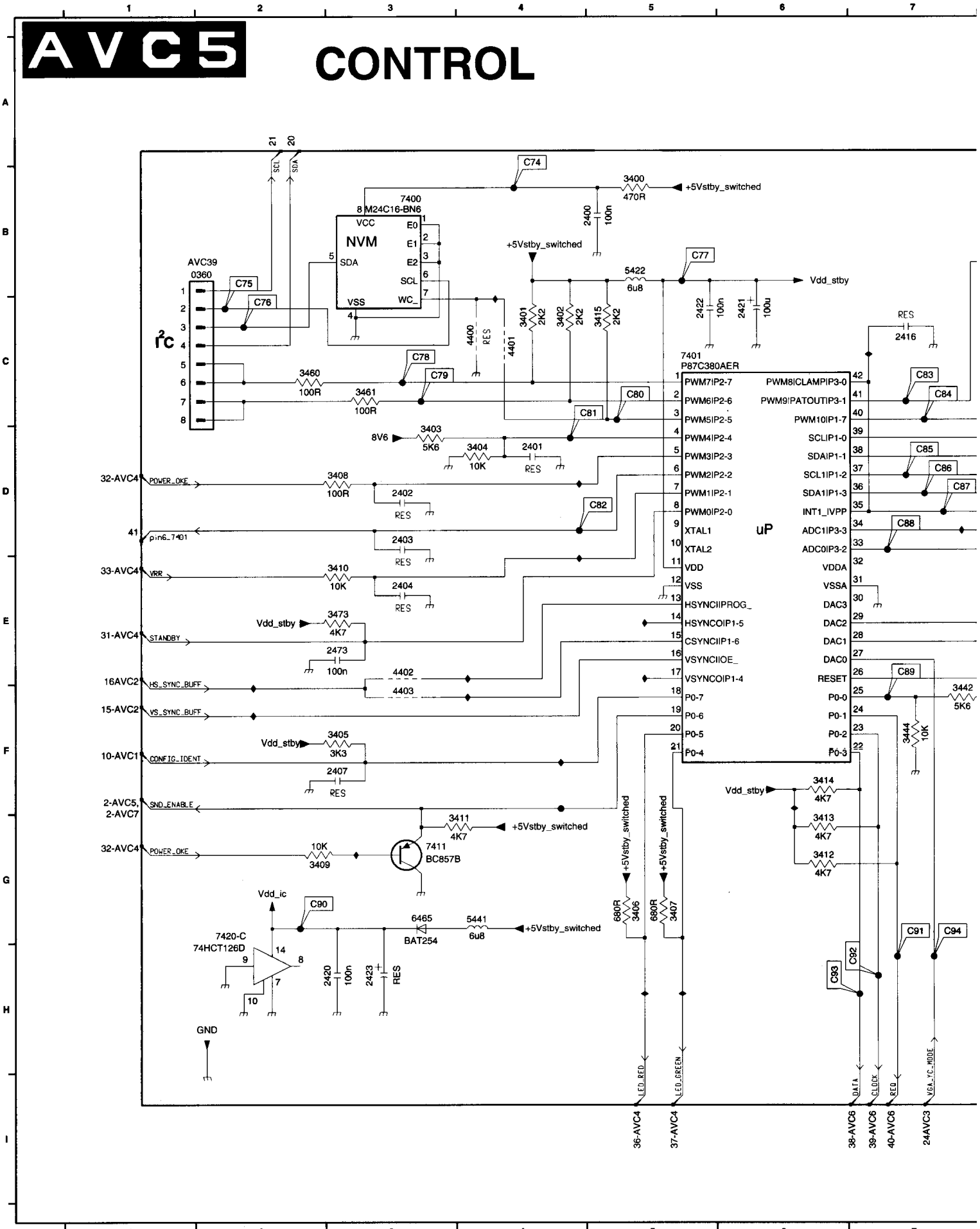


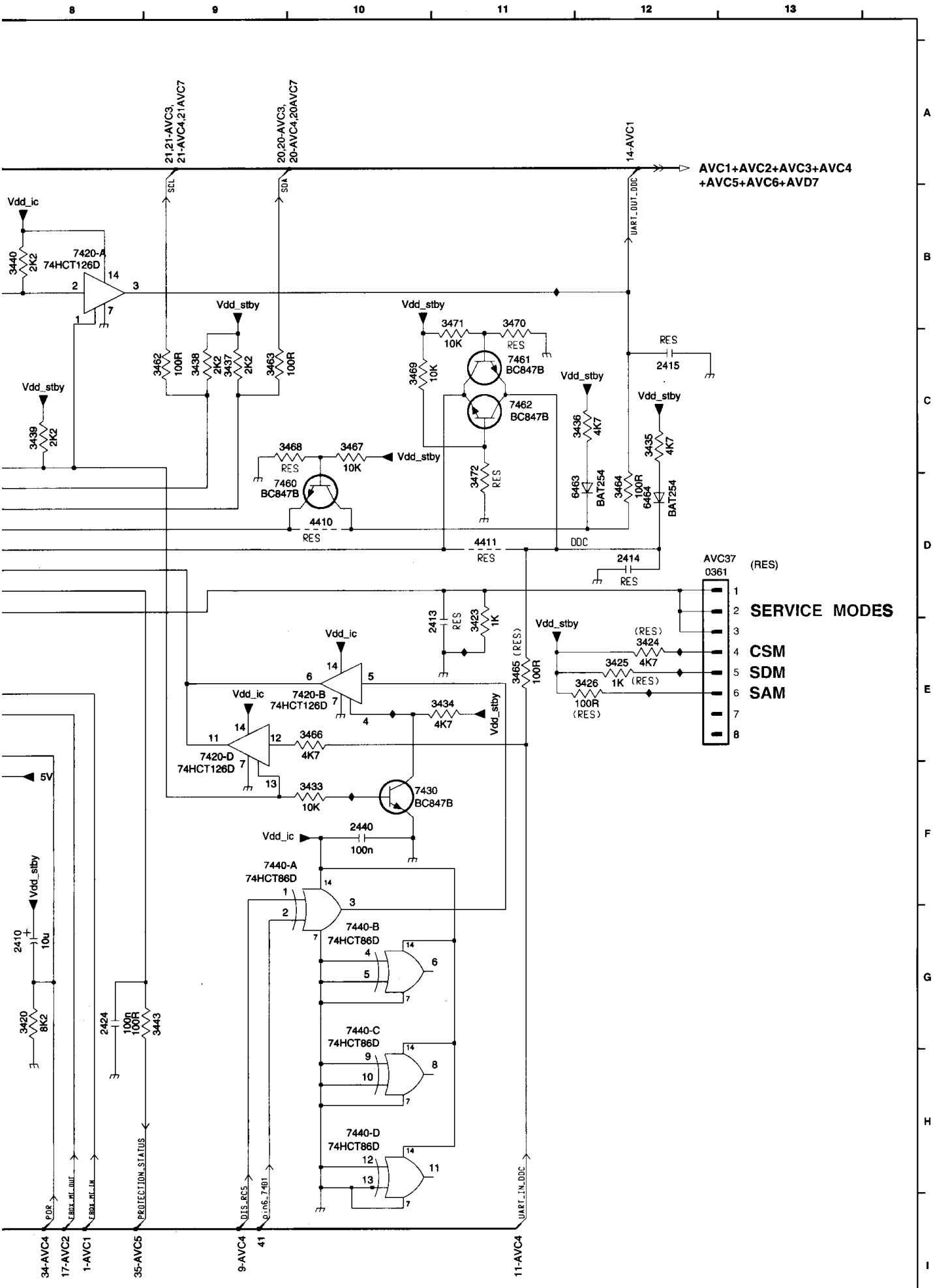
AV control


AVC4 CONNECTOR DIAGRAM
VS/VA SUPPLY FROM FD1 FD05
AVC05
0305
+5V
+5V
GND
GND
RES
C56
VS/VA SUPPLY FROM FD1 FD04
AVC04
0304
RES
+5Vstby_switched_relais
STBY
POWER_OKE
RES
VRR
8V6
GND
SND_ENABLE
+5Vstby
POR
PROTECTION_STATUS
RES
C57
C58
C59
C60
C61
C62
C63
C64
C65
8V6
+5Vstby
LED PANEL FROM SD SD10
AVC10
0310
+5Vstby_switched
+5Vstby_switched_relais
+5Vstby
GND
DIS_RC5
LED_GREEN
LED_RED
C66
C67
C68
C69
1601
T200mA
19372
+5Vstby_switched
2450
100n
2451
100n
2452
2453
2454
C73
3999
1K
C72


6
7
8
9
5V
+5V
1600
T200mA
19372
2456
100n
AVC01
0301
+5V
+5V
GND
GND
RES
1
2
3
4
5
PDP LIMESCO
TO
PD 1
PD01
0301 A9
0304 B2
0305 A2
0310 E2
0334 C9
1600 A7
1601 E4
2450 D3
2451 D3
2452 F3
2453 F3
2454 F3
2456 A5
3450 C7
3451 D7
3999 F2
6450 E8
6451 D8
6452 E8
6453 D8
A
B
C
D
E
F
ANDBY
31-AVC5
R_OKE
32-AVC5
VRR
33-AVC5
-AVC5
SDA
NABLE
2-AVC5
-AVC5
SCL
POR
34-AVC5
TATUS
35-AVC5
C70
C71
3450
100R
3451
100R
AVC34
0334
SDA
SCL
GND
1
2
3
COMPAIR
6453
6452
6451
6450
BZX284-C33
BZX284-C33
BZX284-C33
BZX284-C33
GND
S_RCS
9-AVC1,9-AVC5
GREEN
37-AVC5
D_RED
36-AVC5
AVC1+AVC5
96532058_066.EPS
260899

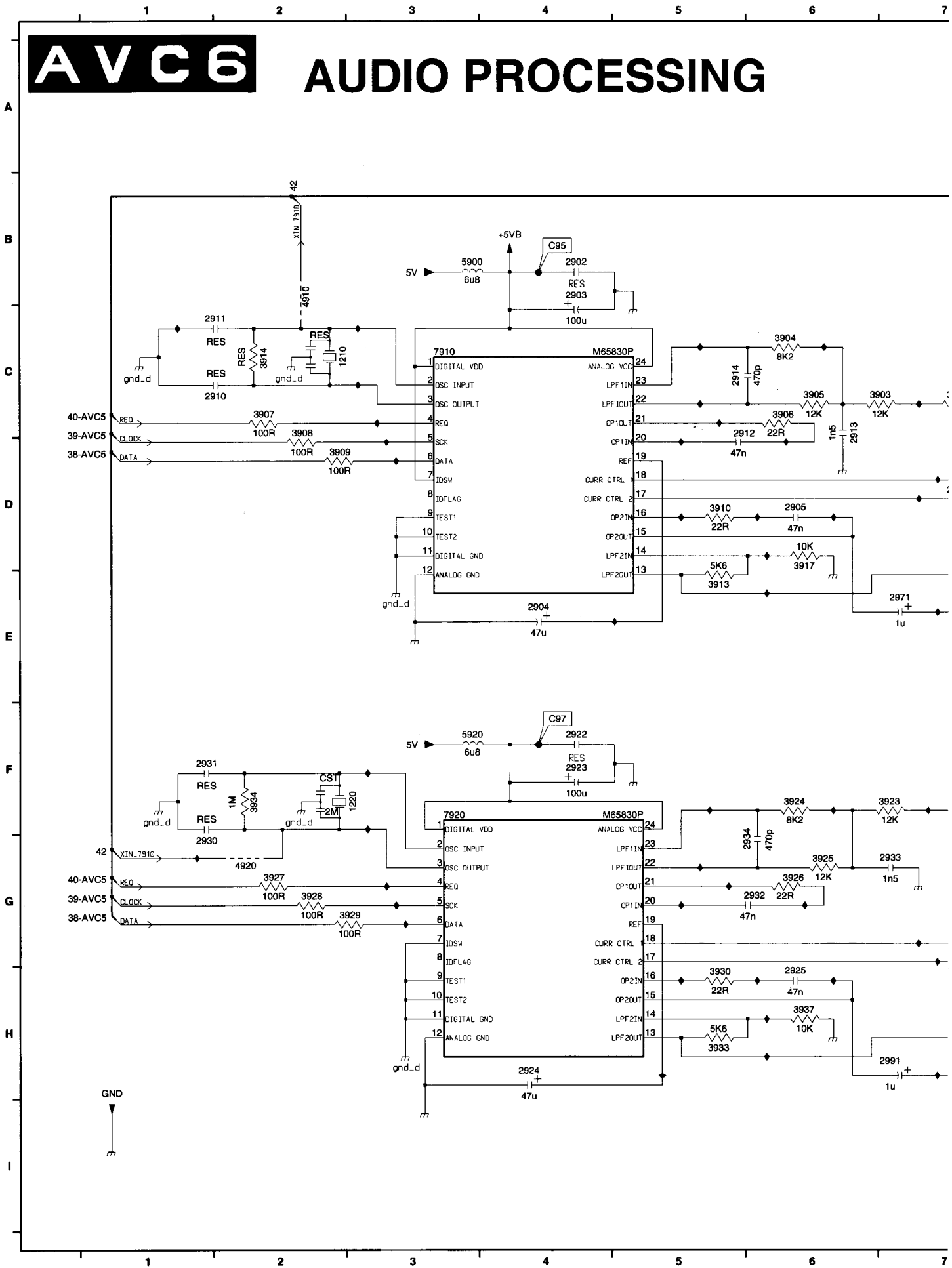
AV control

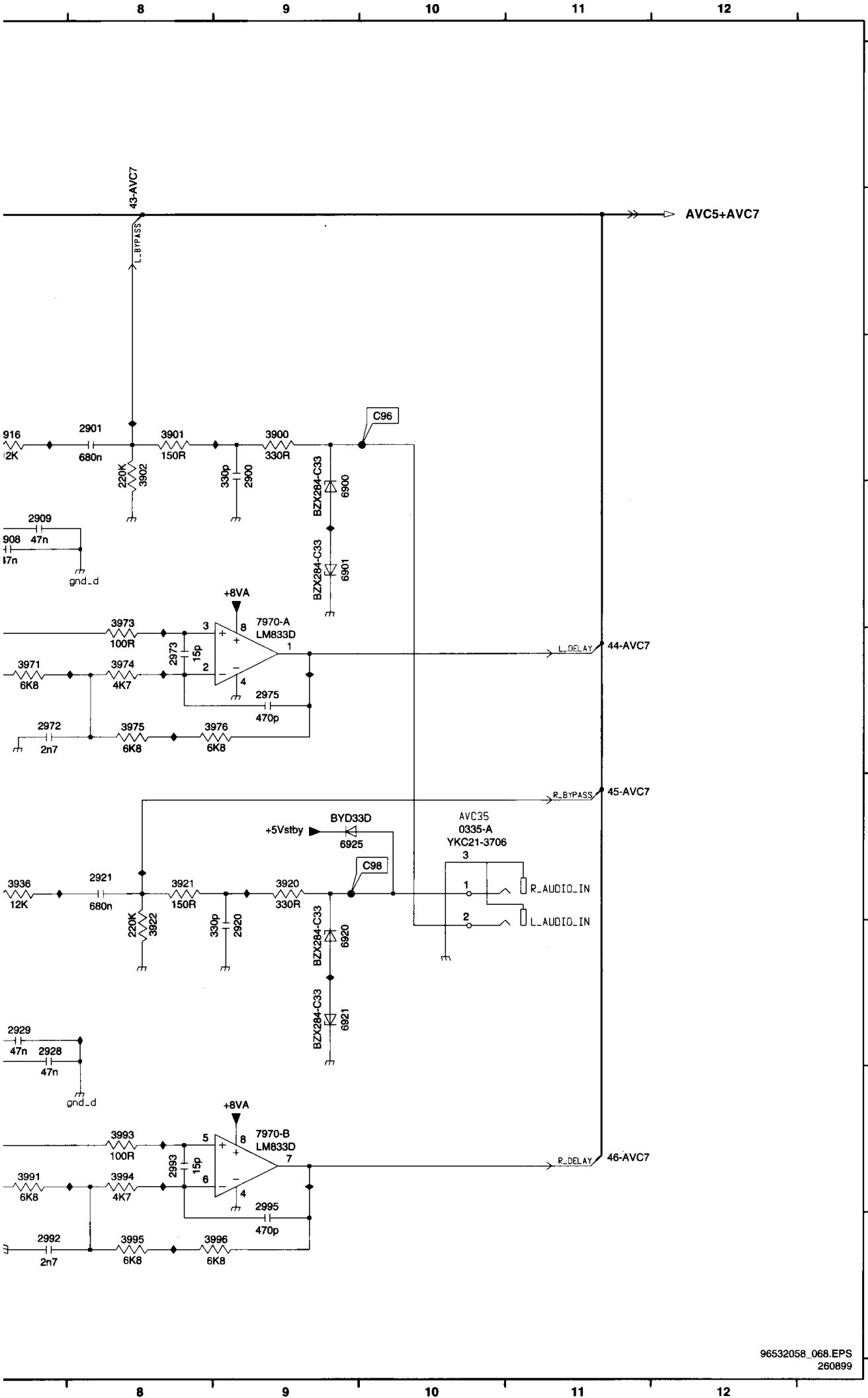

AVC5
CONTROL
7400
M24C16-BN6
NVM
VCC
VSS
SDA
SCL
E0
E1
E2
WC_
AVC39
0360
I²C
7401
P87C380AER
uP
PWM7IP2-7
PWM6IP2-6
PWM5IP2-5
PWM4IP2-4
PWM3IP2-3
PWM2IP2-2
PWM1IP2-1
PWM0IP2-0
XTAL1
XTAL2
VDD
VSS
HSYNCIIPROG_
HSYNCOIP1-5
CSYNCIIP1-6
VSYNCIIOE_
VSYNCOIP1-4
P0-7
P0-6
P0-5
P0-4
PWM8ICLAMPIP3-0
PWM9IPATOUTIP3-1
PWM10IP1-7
SCLIP1-0
SDAIP1-1
SCL1IP1-2
SDA1IP1-3
INT1_IVPP
ADC1IP3-3
ADC0IP3-2
VDDA
VSSA
DAC3
DAC2
DAC1
DAC0
RESET
P0-0
P0-1
P0-2
P0-3
+5Vstby_switched
Vdd_stby
8V6
Vdd_ic
GND
POWER_OKE
pin6_7401
VRR
STANDBY
HS_SYNC_BUFF
VS_SYNC_BUFF
CONFIG_IDENT
SND_ENABLE
7411
BC857B
BAT254
7420-C
74HCT126D
LED_RED
LED_GREEN
DATA
CLOCK
RED
VGA_YC_MODE
36-AVC4
37-AVC4
38-AVC6
39-AVC6
40-AVC6
24AVC3



0360 B2 7440-C G10
0361 D12 7440-D H10
2400 B5 7460 D9
2401 D4 7461 C11
2402 D3 7462 C11
2403 D3
2404 E3
A 2407 F3
2410 G8
2413 E11
2414 D12
2415 C12
2416 C7
2420 H3
2421 C6
2422 C5
B 2423 H3
2424 G8
2440 F10
2473 E3
3400 B5
3401 C4
3402 C4
3403 D3
3404 D4
C 3405 F3
3406 G5
3407 G5
3408 D3
3409 G2
3410 E3
3411 G4
3412 F6
3413 G6
D 3414 G6
3415 C5
3420 G8
3423 E11
3424 E12
3425 E12
3426 E12
3433 F10
3434 E11
3435 C12
E 3436 C12
3437 C9
3438 C9
3439 C8
3440 B8
3442 F7
3443 G9
3444 F7
3460 C2
F 3461 C3
3462 C9
3463 C9
3464 D12
3465 E11
3466 E10
3467 C10
3468 C10
3469 C10
G 3470 B11
3471 B11
3472 D11
3473 E3
4400 C4
4401 C4
4402 E3
4403 F3
4410 D10
4411 D11
H 5422 B5
5441 G4
6463 D12
6464 D12
6465 G3
7400 B3
7401 C5
7411 G3
7420-A B8
I 7420-B E10
7420-C G2
7420-D E9
7430 F10
7440-A F9
7440-B G10

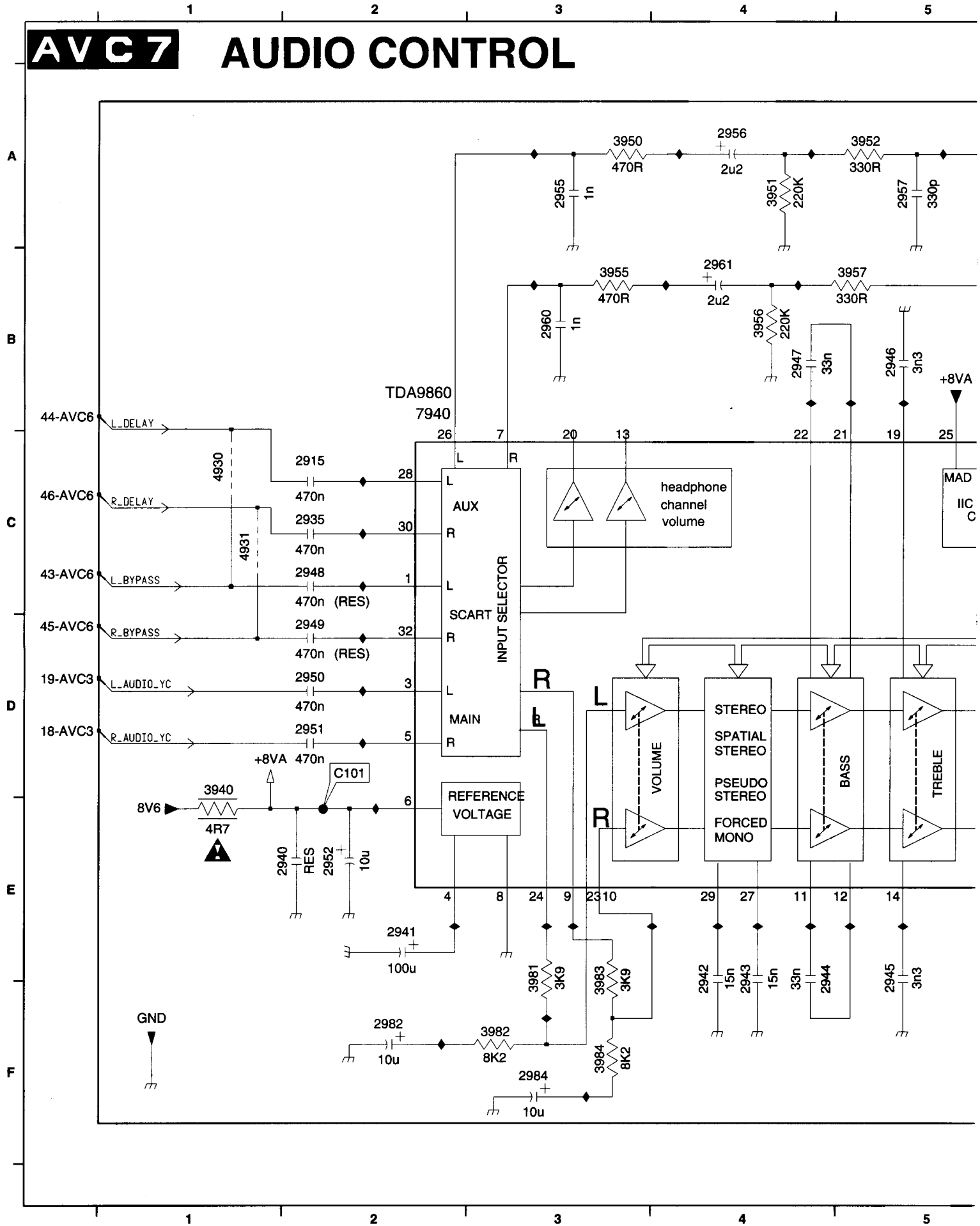
AV control

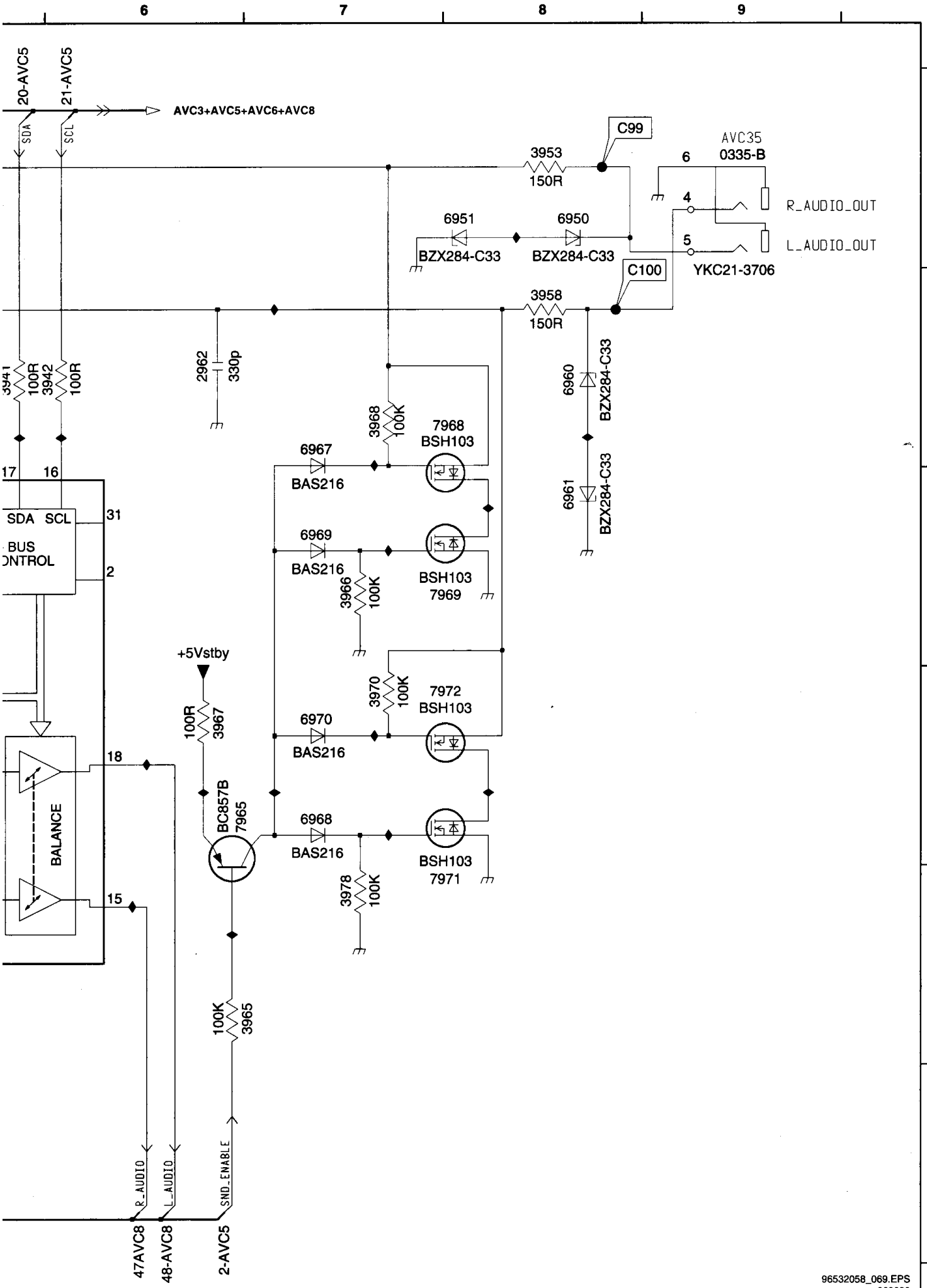

AVC6
AUDIO PROCESSING
+5VB
5V
C95
5900
6u8
2902
RES
2903
100u
7910
M65830P
DIGITAL VDD
OSC INPUT
OSC OUTPUT
REQ
SCK
DATA
IDSW
IDFLAG
TEST1
TEST2
DIGITAL GND
ANALOG GND
ANALOG VCC
LPF1IN
LPF1OUT
OP1OUT
OP1IN
REF
CURR CTRL
CURR CTRL 2
OP2IN
OP2OUT
LPF2IN
LPF2OUT
2911
2910
3914
1210
4910
XIN_7910
3904
8K2
3905
12K
3903
12K
3906
22R
2912
47n
2914
470p
1n5
2913
3907
100R
3908
100R
3909
100R
40-AVC5
39-AVC5
38-AVC5
REQ
CLOCK
DATA
3910
22R
2905
47n
10K
3917
5K6
3913
2904
47u
2971
1u
C97
5920
6u8
2922
2923
100u
7920
2931
2930
3934
1M
1220
2M
4920
3924
8K2
3923
12K
3925
12K
2933
1n5
3926
22R
2932
47n
2934
470p
3927
100R
3928
100R
3929
100R
3930
22R
2925
47n
3937
10K
5K6
3933
2924
47u
2991
1u
GND
gnd_d
RES
CS1
42



AV control

AVC 7 AUDIO CONTROL





AV control

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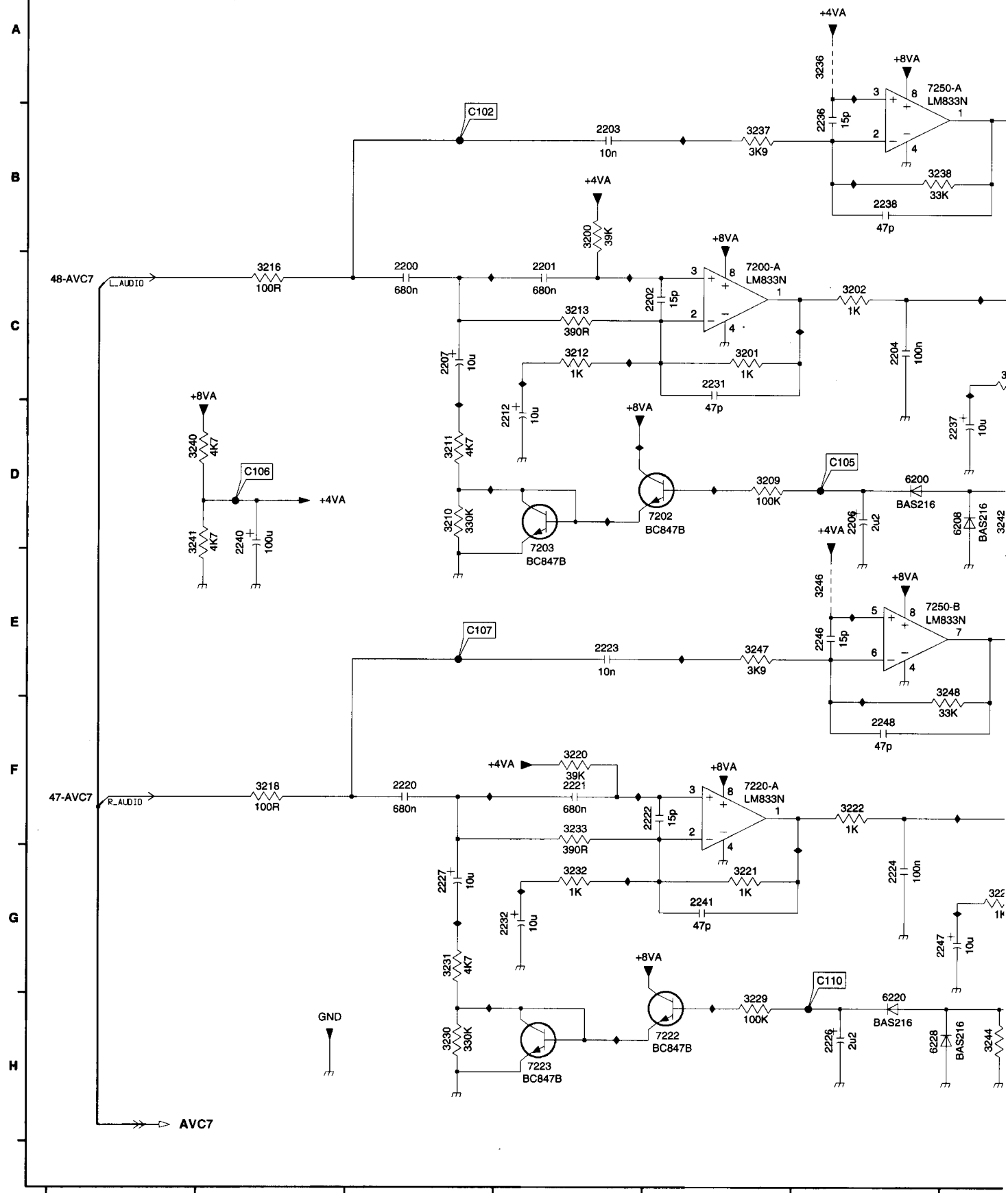

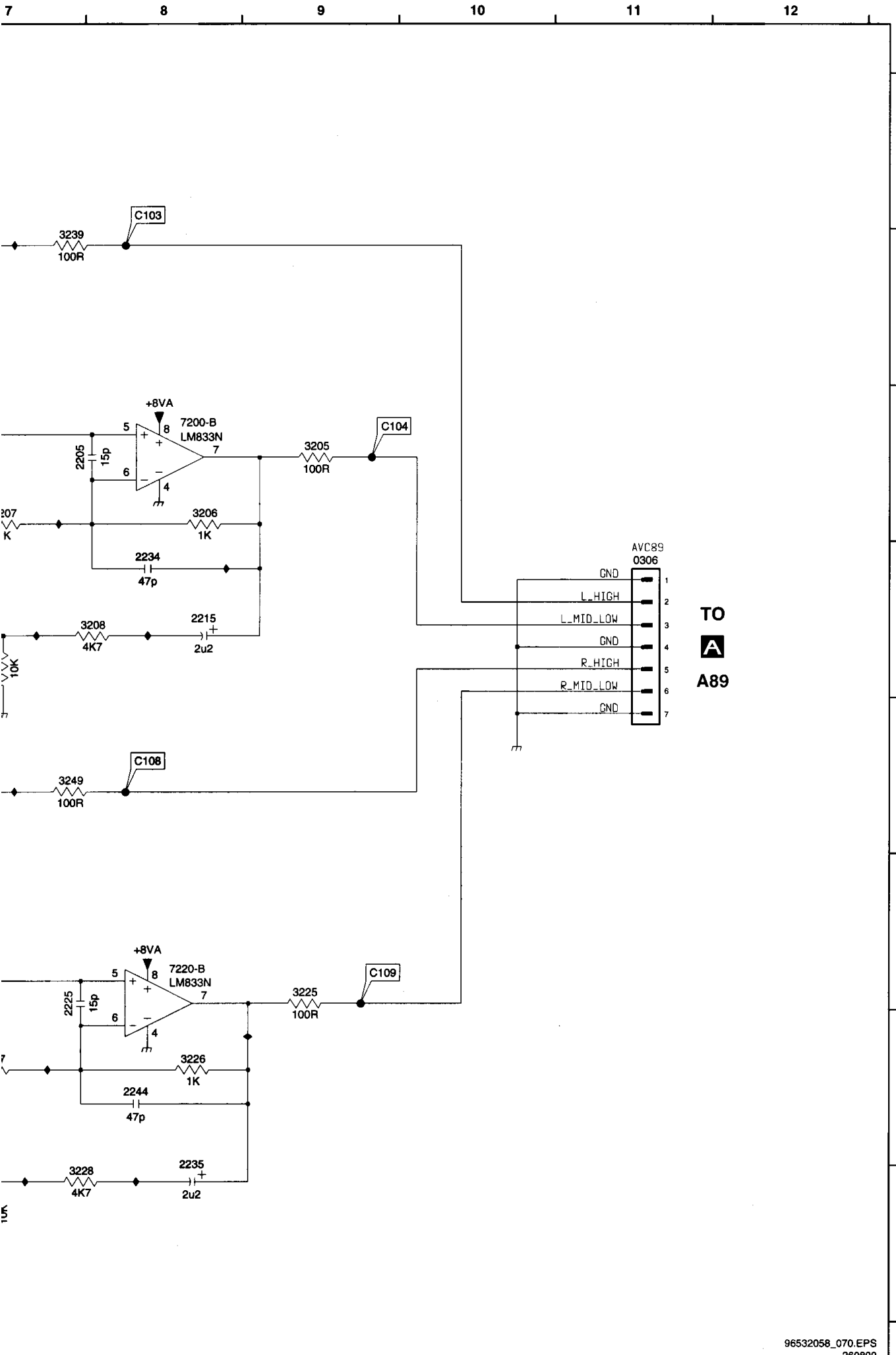

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2201 C4
2202 C5
2203 B4
2204 C6
2205 C7
2206 D6
2207 C3
2212 D4
2215 D8
2220 F3
2221 F4
2222 F5
2223 E4
2224 G6
2225 F7
2226 H6
2227 G3
2231 C5
2232 G4
2234 D8
2235 H8
2236 B6
2237 D7
2238 B6
2240 D2
2241 G5
2244 G8
2246 E6
2247 G7
2248 F6
3200 B4
3201 C5
3202 C6
3205 C9
3206 C8
3207 C7
3208 D8
3209 D5
3210 D3
3211 D3
3212 C4
3213 C4
3216 C2
3218 F2
3220 F4
3221 G5
3222 F6
3225 F9
3226 G8
3227 G7
3228 H7
3229 H5
3230 H3
3231 G3
3232 G4
3233 F4
3236 A6
3237 B5
3238 B6
3239 B7
3240 D1
3241 D1
3242 D7
3244 H7
3246 E6
3247 E5
3248 E7
3249 E7
6200 D6
6208 D7
6220 H6
6228 H6
7200-A C5
7200-B C8
7202 D5
7203 E4
7220-A F5
7220-B F8
7222 H5
7223 H4
7250-A A6
7250-B E6

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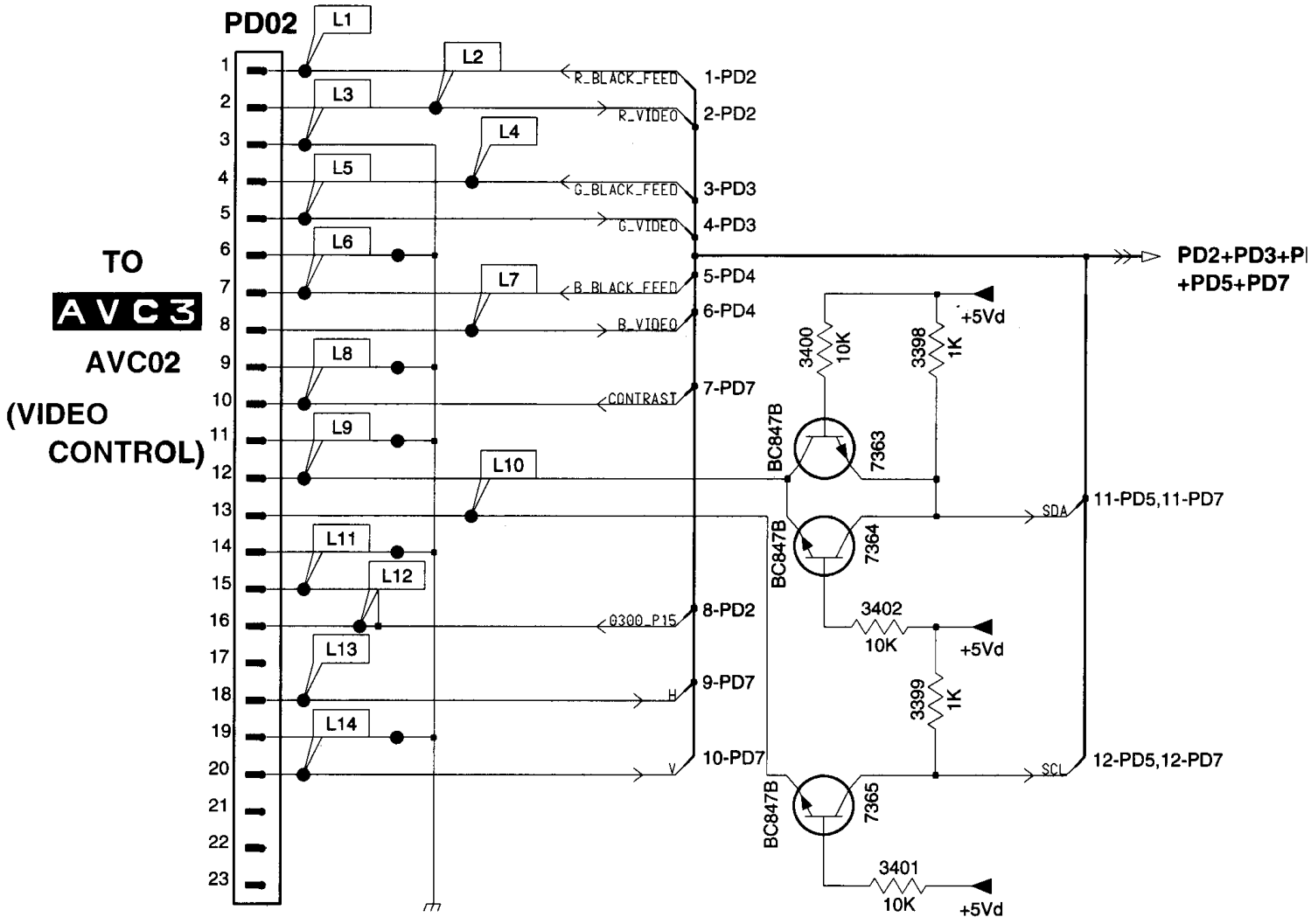
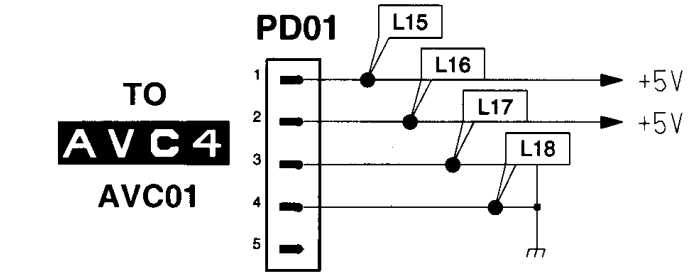
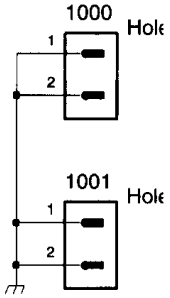
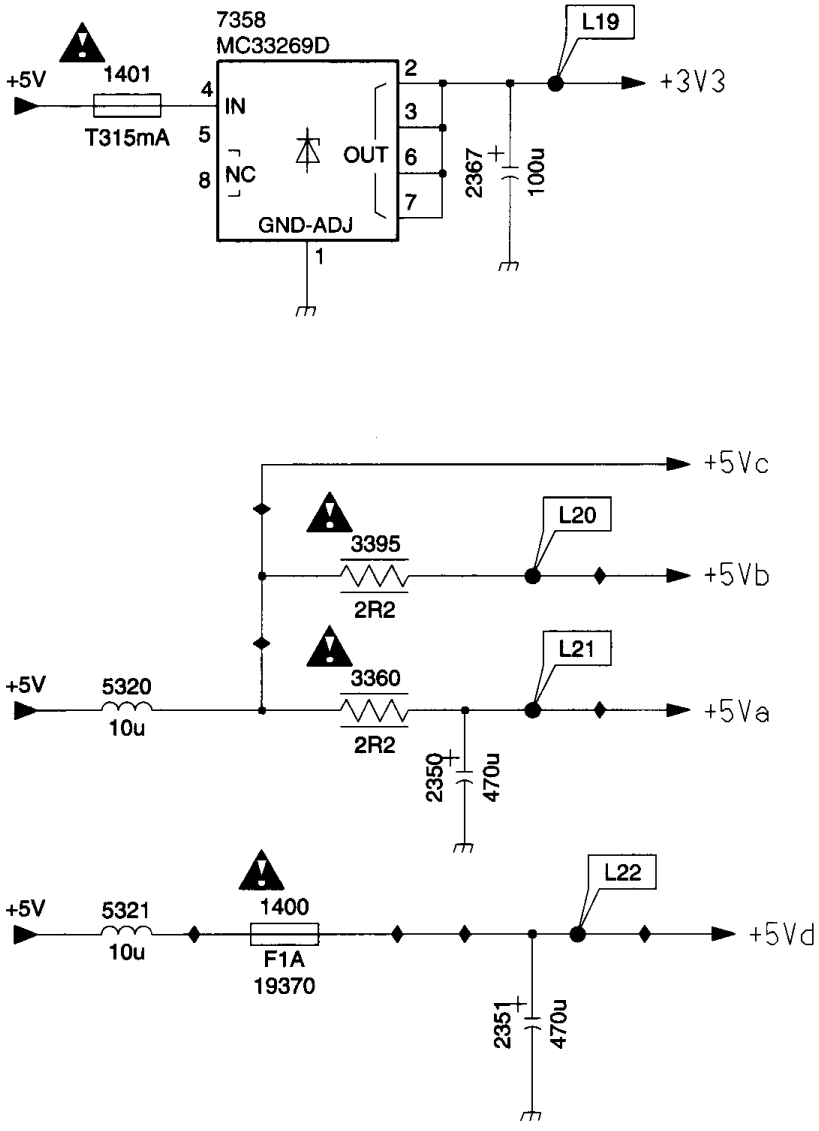
PDP limesco

PD1 INTERCONNECT









4.0 mm

4.0 mm

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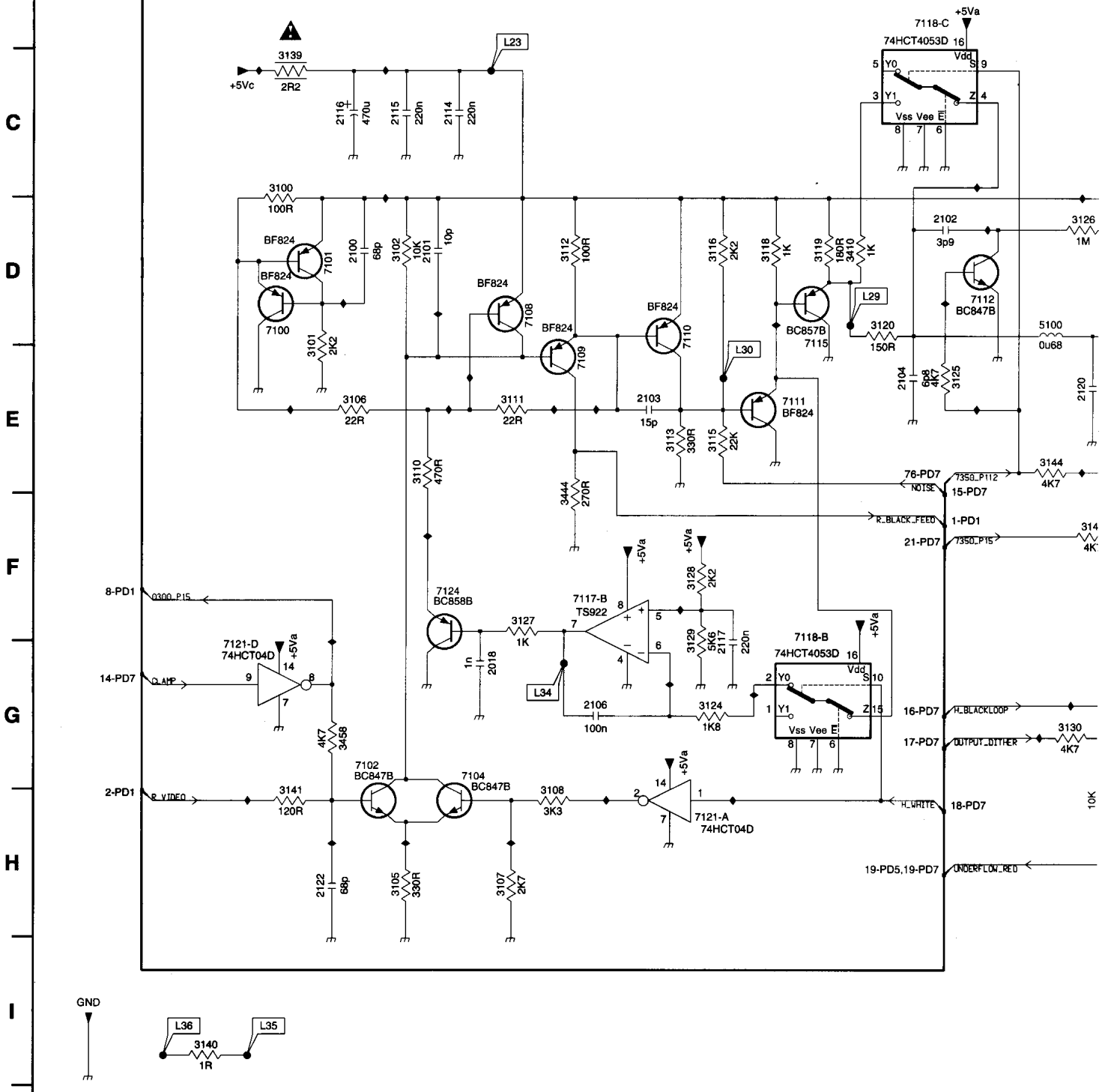
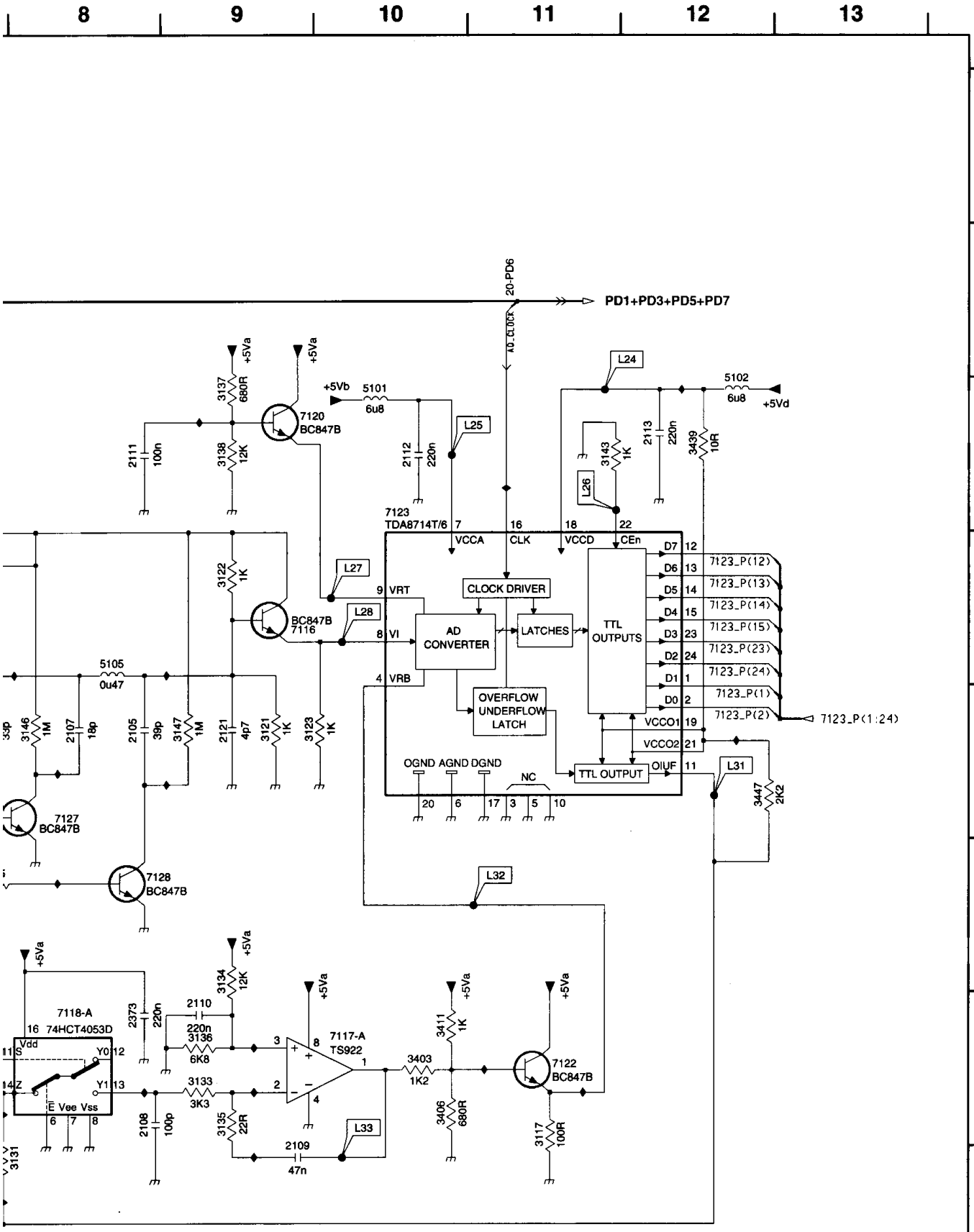
PDP limesco

PD2 RED GAMMA + ADC



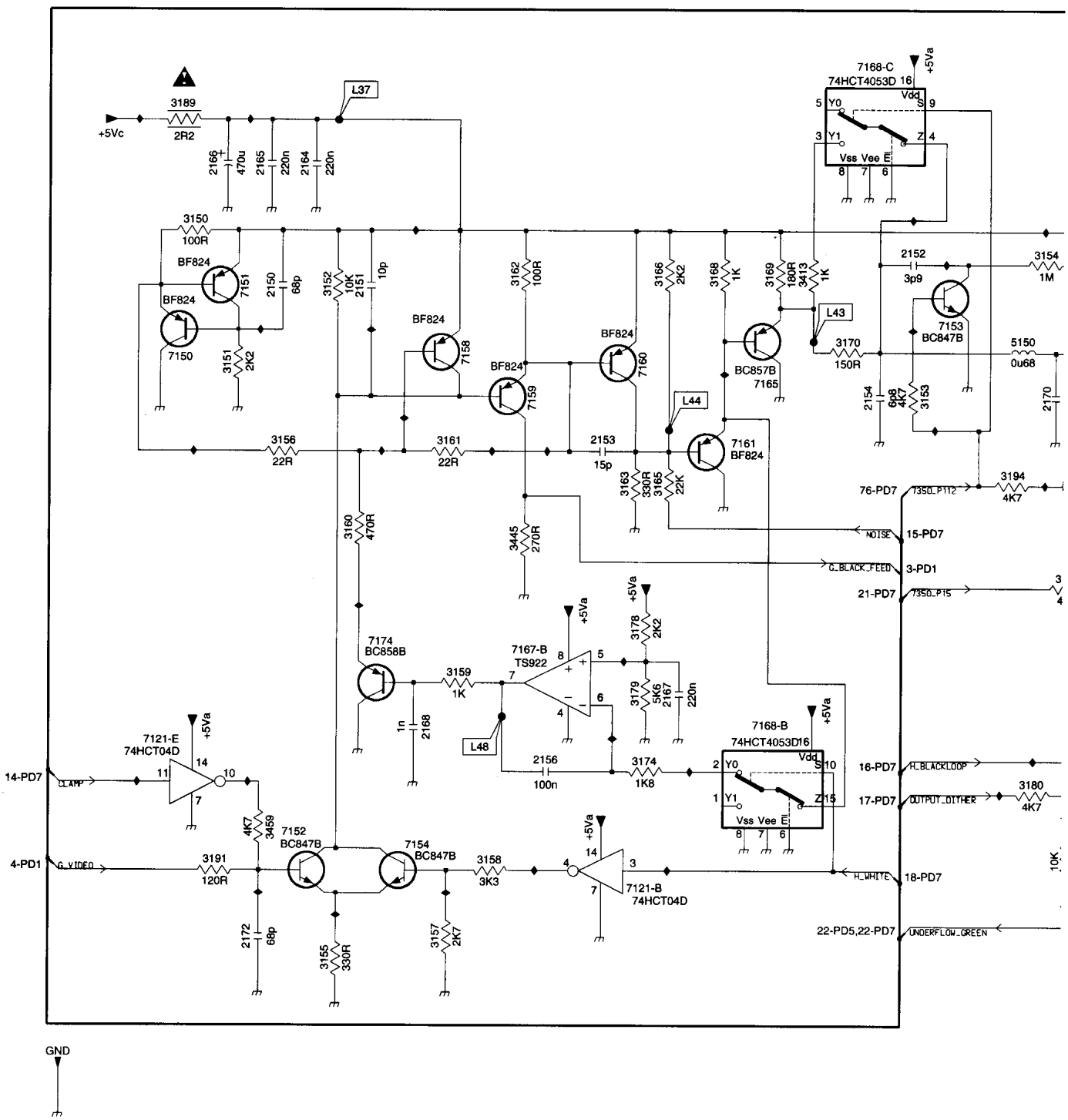


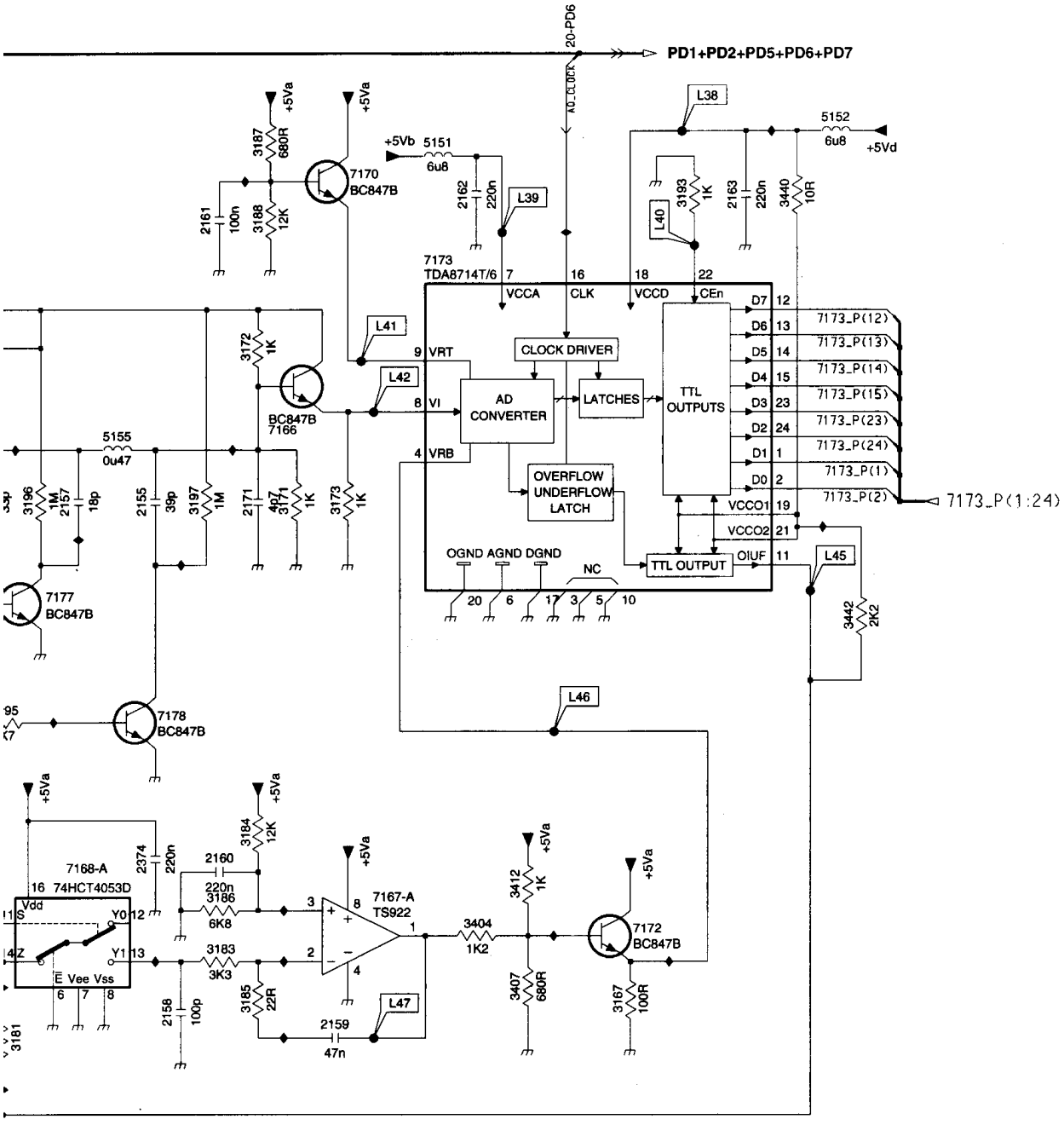
96532058_074.EPS
270899

2018 G3
2100 D2
2101 D3
2102 D6
2103 E4
2104 E6
2105 E8
2106 G4
2107 E8
2108 G8
2109 H9
2110 G9
2111 C8
2112 C10
2113 C12
2114 C3
2115 C3
2116 C2
2117 G5
2120 E7
2121 E9
2122 H2
2373 G8
3100 C2
3101 E2
3102 D3
3105 H3
3106 E2
3107 H3
3108 H4
3110 E3
3111 E3
3112 D4
3113 E5
3115 E5
3116 D5
3117 G11
3118 D5
3119 D6
3120 D6
3121 E9
3122 D9
3123 E9
3124 G5
3125 E6
3126 D7
3127 F4
3128 F5
3129 G5
3130 G7
3131 H8
3133 G9
3134 F9
3135 G9
3136 G9
3137 C9
3138 C9
3139 C2
3140 I1
3141 H2
3143 C11
3144 E7
3145 F7
3146 E8
3147 E9
3403 G10
3406 G10
3410 D6
3411 G10
3439 C12
3444 F4
3447 E12
3458 G2
5100 D7
5101 C10
5102 C12
5105 D8
7100 D2
7101 D2
7102 G2
7104 G3
7108 D4
7109 E4
7110 E5
7111 E5
7112 D7
7115 D5
7116 D10
7117-A G10
7117-B F4
7118-A G8
7118-B F5
7118-C B6
7120 C9
7121-A H5
7121-D G2
7122 G11
7123 C10
7124 F3
7127 E8
7128 F8

PDP limesco

PD3 GREEN GAMMA + ADC





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2150 D2
2151 D3
2152 D7
2153 E5
2154 D6
2155 D8
2156 G4
2157 D8
2158 G8
2159 G9
2160 F9
2161 C9
2162 C10
2163 C12
2164 C3
2165 C2
2166 C2
2167 F5
2168 G3
2170 D7
2171 D9
2172 H2
2374 F8
3150 C2
3151 D2
3152 D3
3153 D7
3154 D7
3155 H3
3156 E2
3157 H3
3158 G4
3159 F4
3160 E3
3161 E4
3162 D4
3163 E5
3165 E5
3166 D5
3167 G11
3168 D5
3169 D6
3170 D6
3171 D9
3172 D9
3173 D9
3174 G5
3178 F5
3179 F5
3180 G7
3181 G8
3183 G9
3184 F9
3185 G9
3186 G9
3187 B9
3188 C9
3189 C2
3191 G2
3193 C11
3194 E7
3195 E8
3196 D8
3197 D9
3404 G10
3407 G10
3412 G10
3413 D6
3440 C12
3442 E12
3445 E4
3459 G2
5150 D7
5151 B10
5152 B12
5155 D8
7121-B H5
7121-E G2
7150 D2
7151 D2
7152 G2
7153 D7
7154 G3
7158 D4
7159 E4
7160 D5
7161 E5
7165 D5
7166 D9
7167-A G10
7167-B F4
7168-A F8
7168-B G6
7168-C B6
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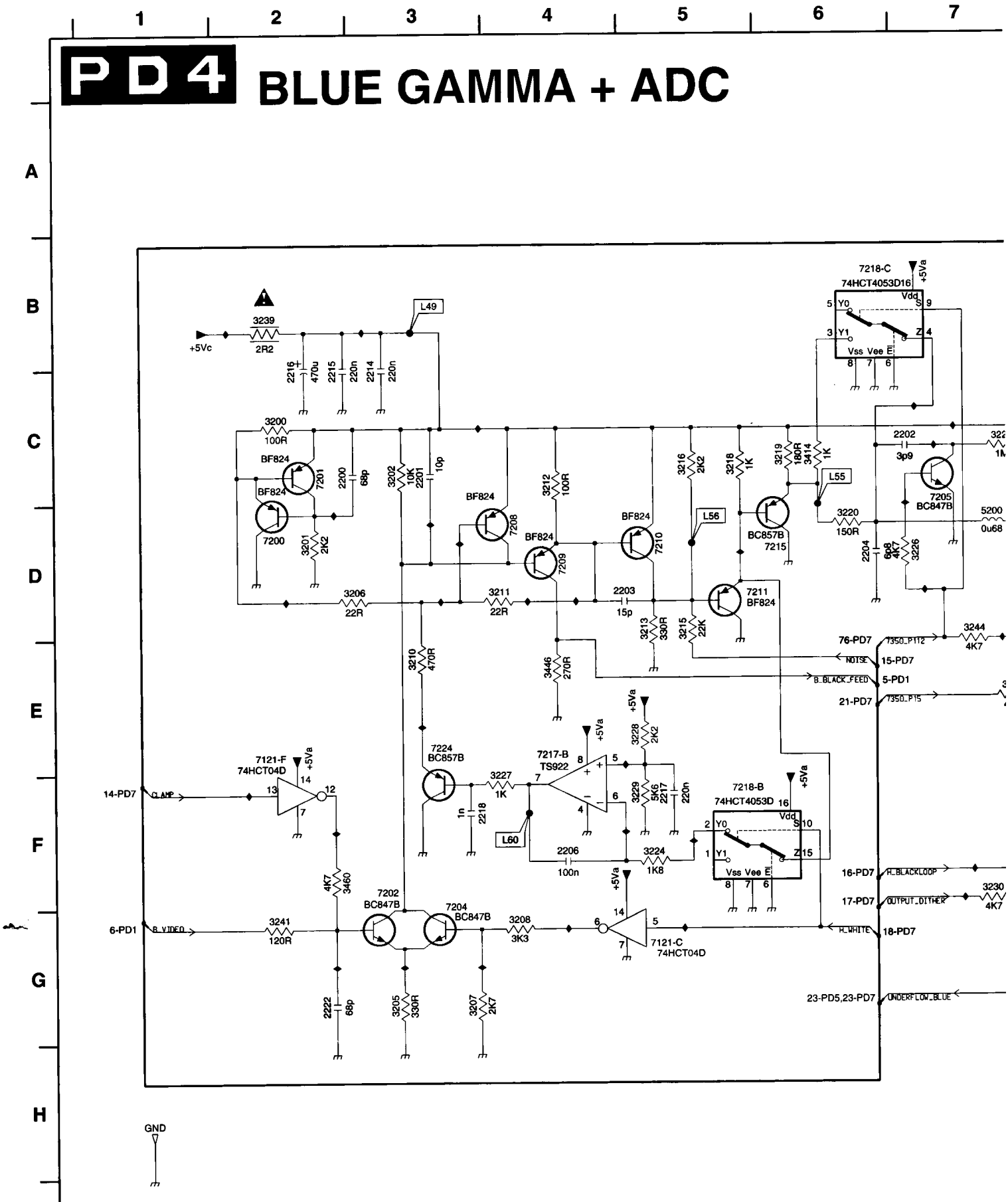
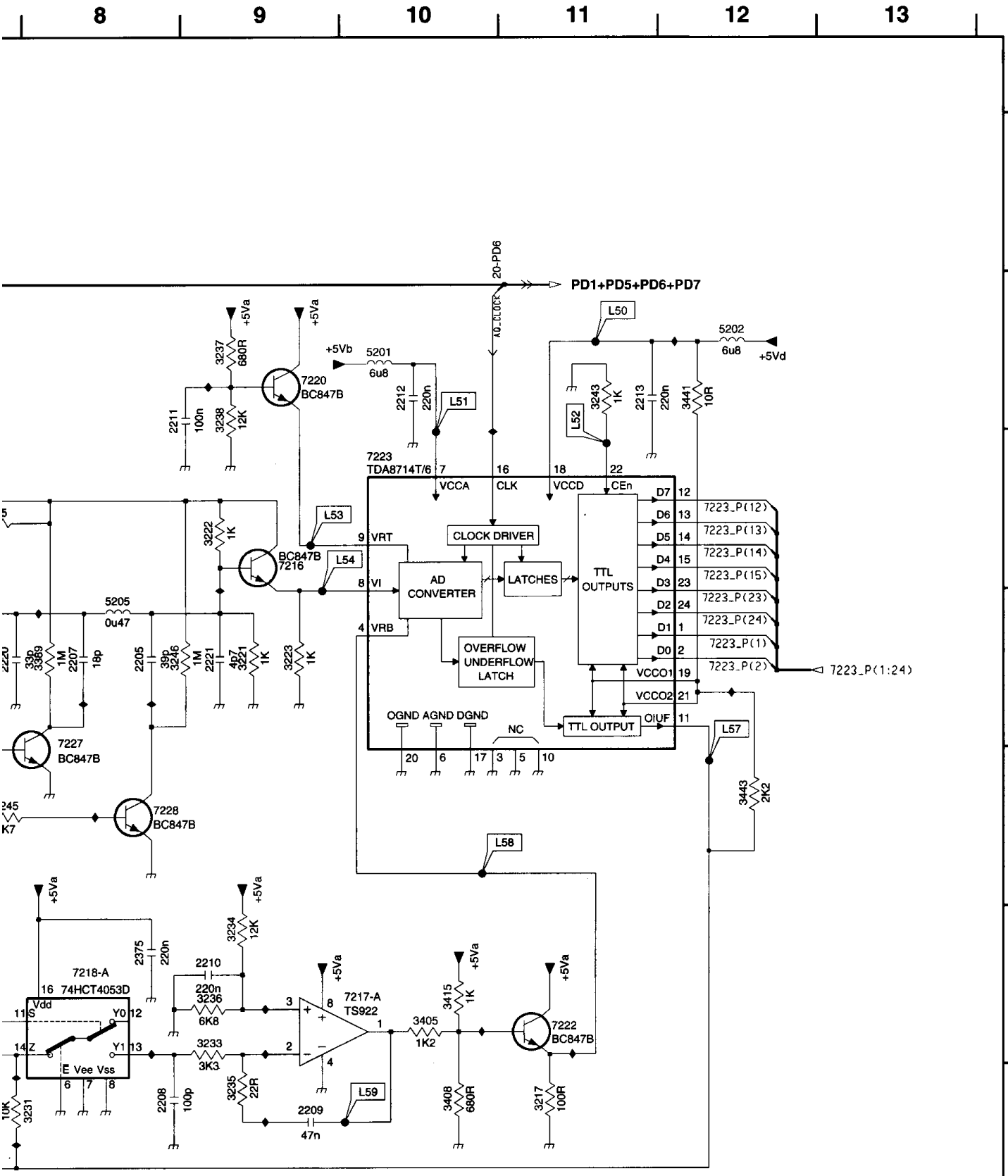
7172 G11
7173 C10
7174 F3
7177 E8
7178 E8

PDP limesco

PD4 BLUE GAMMA + ADC





96532058_076.EPS
270899

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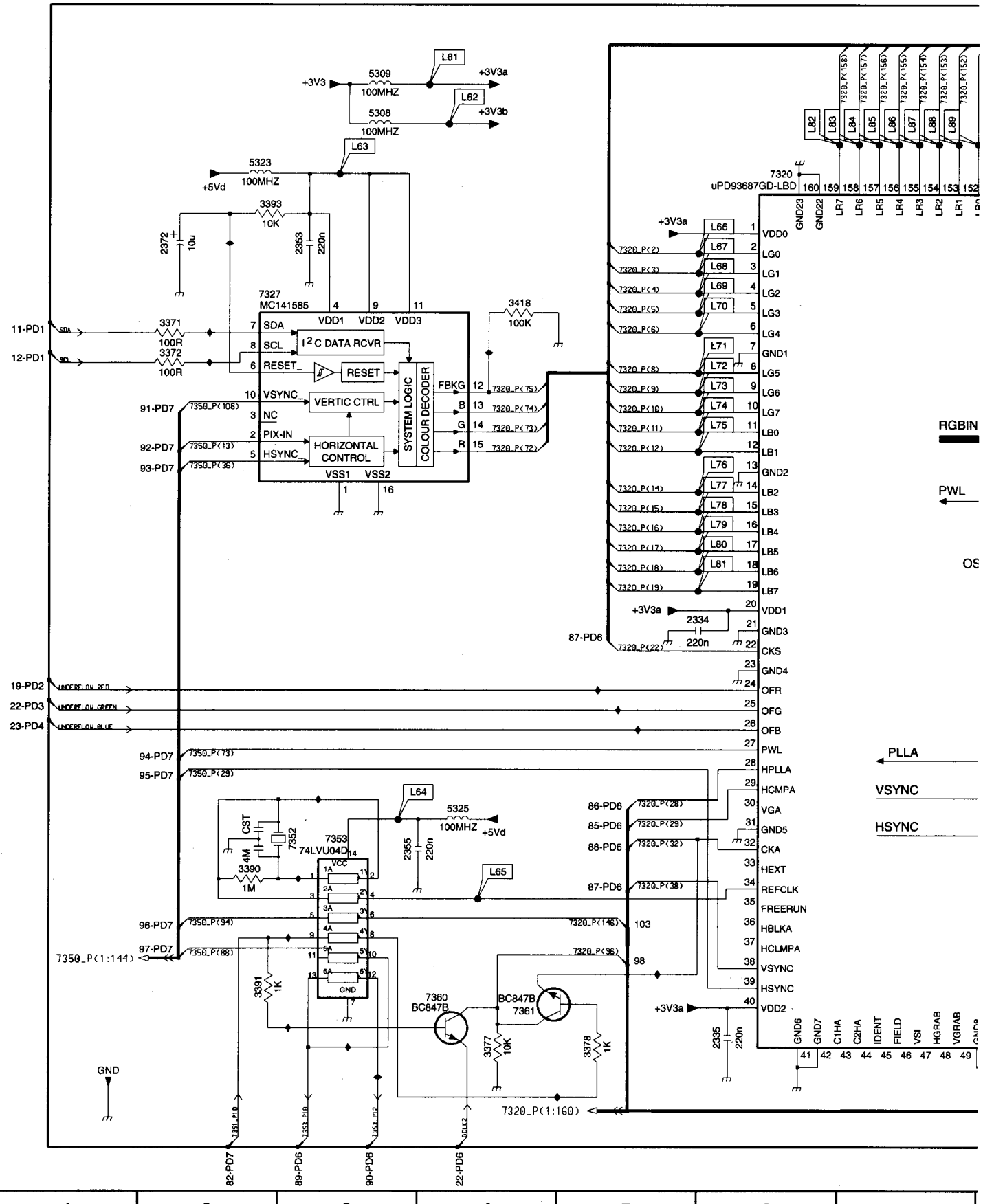
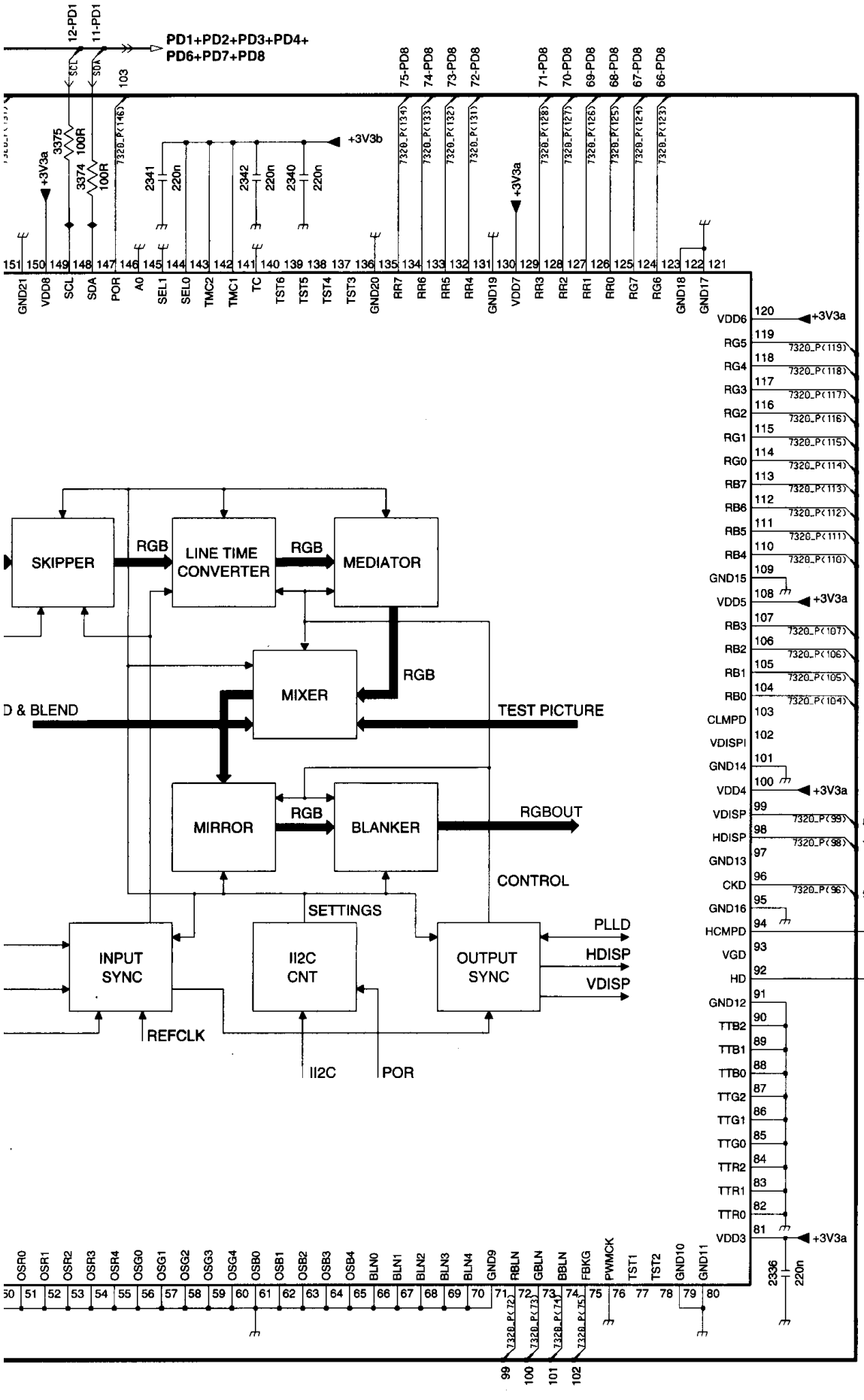
2203 D5
2204 D6
2205 D8
2206 F4
2207 D8
2208 G8
2209 G9
2210 F9
2211 B8
2212 B10
2213 B11
2214 C3
2215 C2
2216 C2
2217 F5
2218 F3
2220 D7
2221 D9
2222 G2
2375 F8
3200 C2
3201 D2
3202 C3
3205 G3
3206 D3
3207 G3
3208 G4
3210 E3
3211 D4
3212 C4
3213 D5
3215 D5
3216 C5
3217 G11
3218 C5
3219 C6
3220 D6
3221 D9
3222 C9
3223 D9
3224 F5
3225 C7
3226 D7
3227 F4
3228 E5
3229 F5
3230 F7
3231 G8
3233 F9
3234 F9
3235 G9
3236 F9
3237 B9
3238 B9
3239 B2
3241 G2
3243 B11
3244 D7
3245 E8
3246 D8
3389 D8
3405 F10
3408 G10
3414 C6
3415 F10
3441 B12
3443 E12
3446 E4
3460 F2
5200 D7
5201 B10
5202 B12
5205 D8
7121-C G5
7121-F E2
7200 D2
7201 C2
7202 F3
7204 G3
7205 C7
7208 D4
7209 D4
7210 D5
7211 D5
7215 D6
7216 C9
7217-A F10
7217-B E4
7218-A F8
7218-B F5
7218-C B6
7220 B9
7222 F11
7223 C10
7224 E3
7227 D8
7228 E8

PDP limesco

PD5 SCAN CONVERTER + OSD





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2334 F6
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2336 I12
2340 B9
2341 B8
2342 B9
2353 C3
2355 G3
2372 C2
3371 C2
3372 D2
3374 B8
3375 B8
3377 I4
3378 I5
3390 G2
3391 H2
3393 C2
3418 C4
5308 B3
5309 B3
5323 B2
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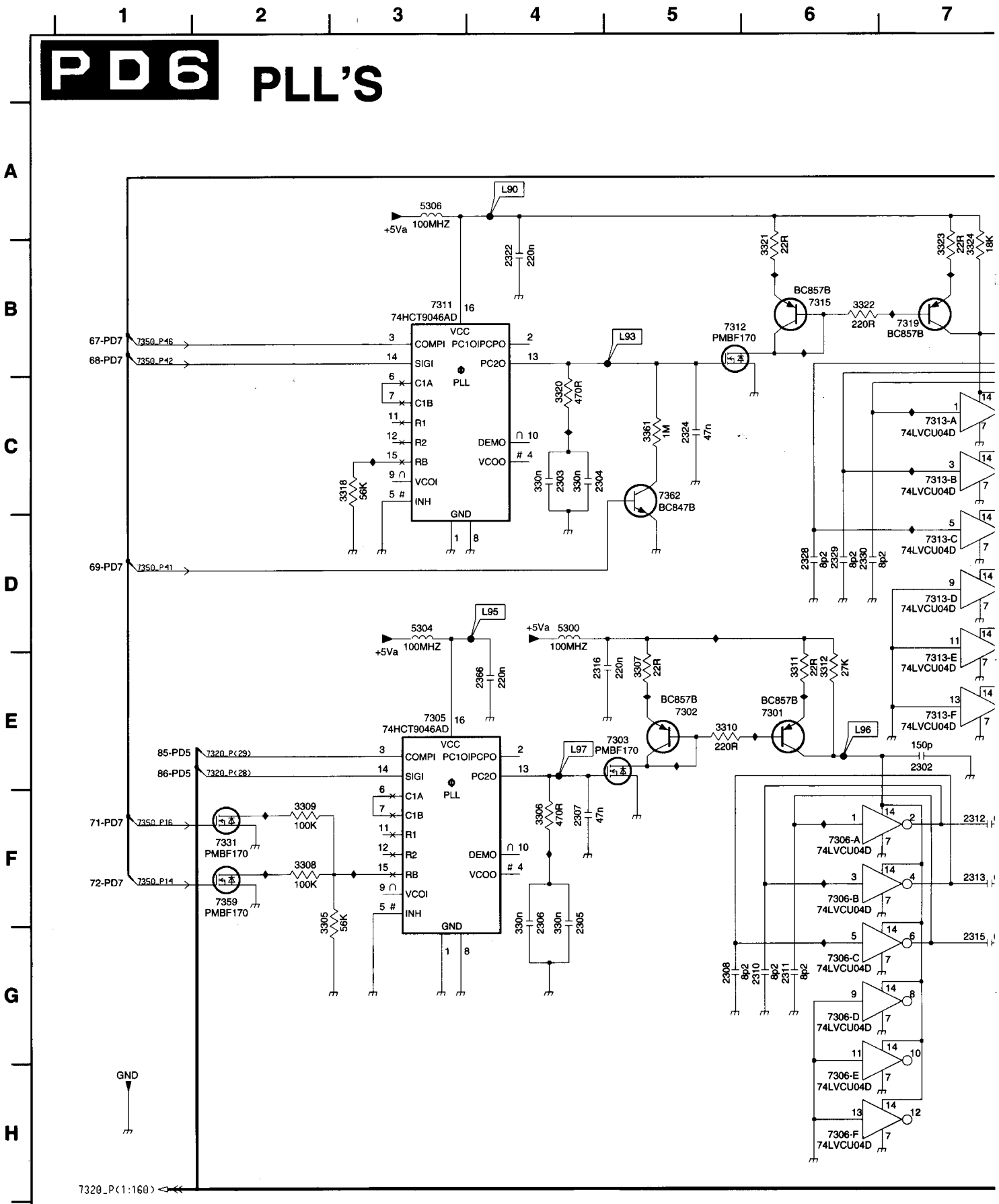
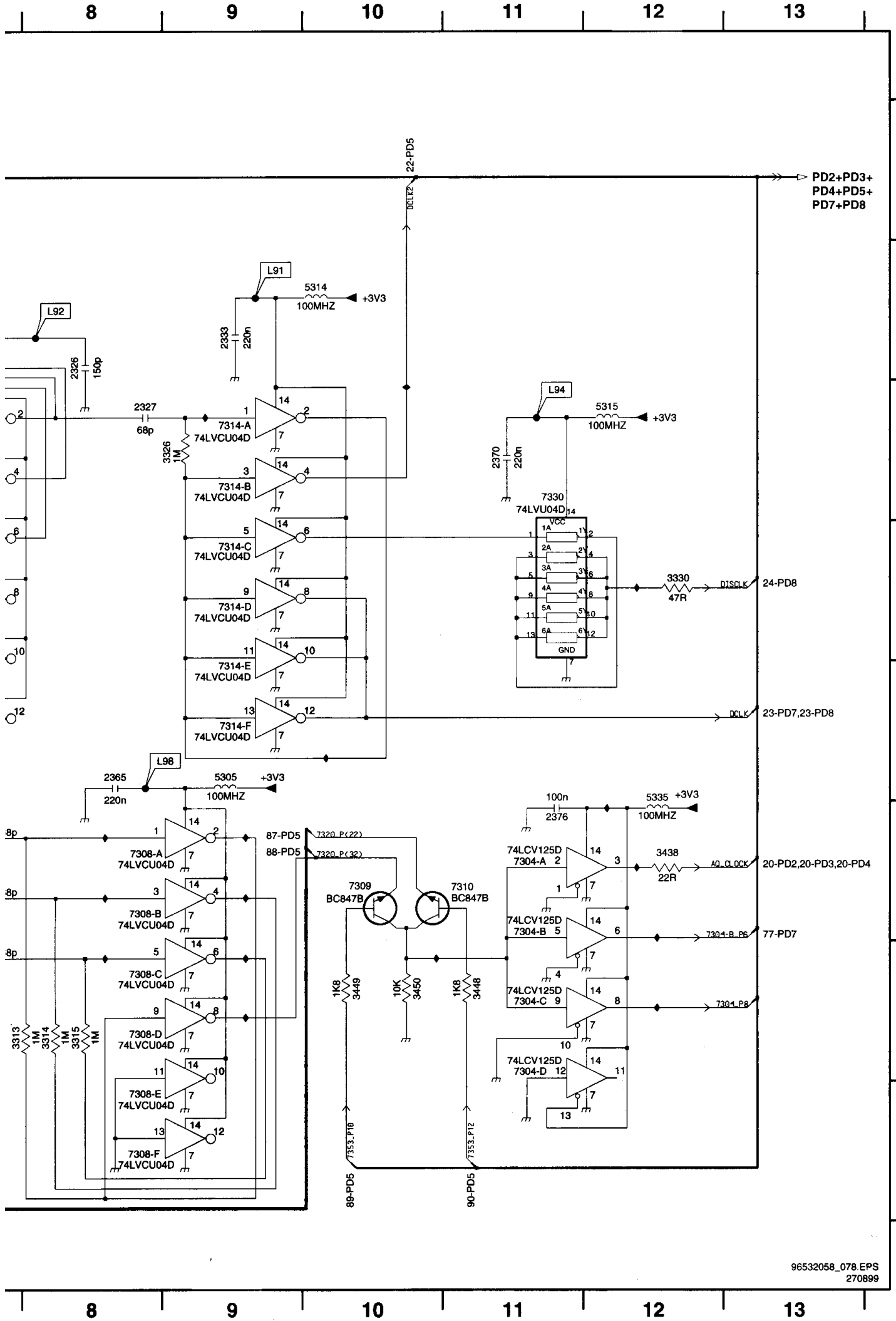
7320 B6
7327 C2
7352 G3
7353 G3
7360 H4
7361 H4

PDP limesco

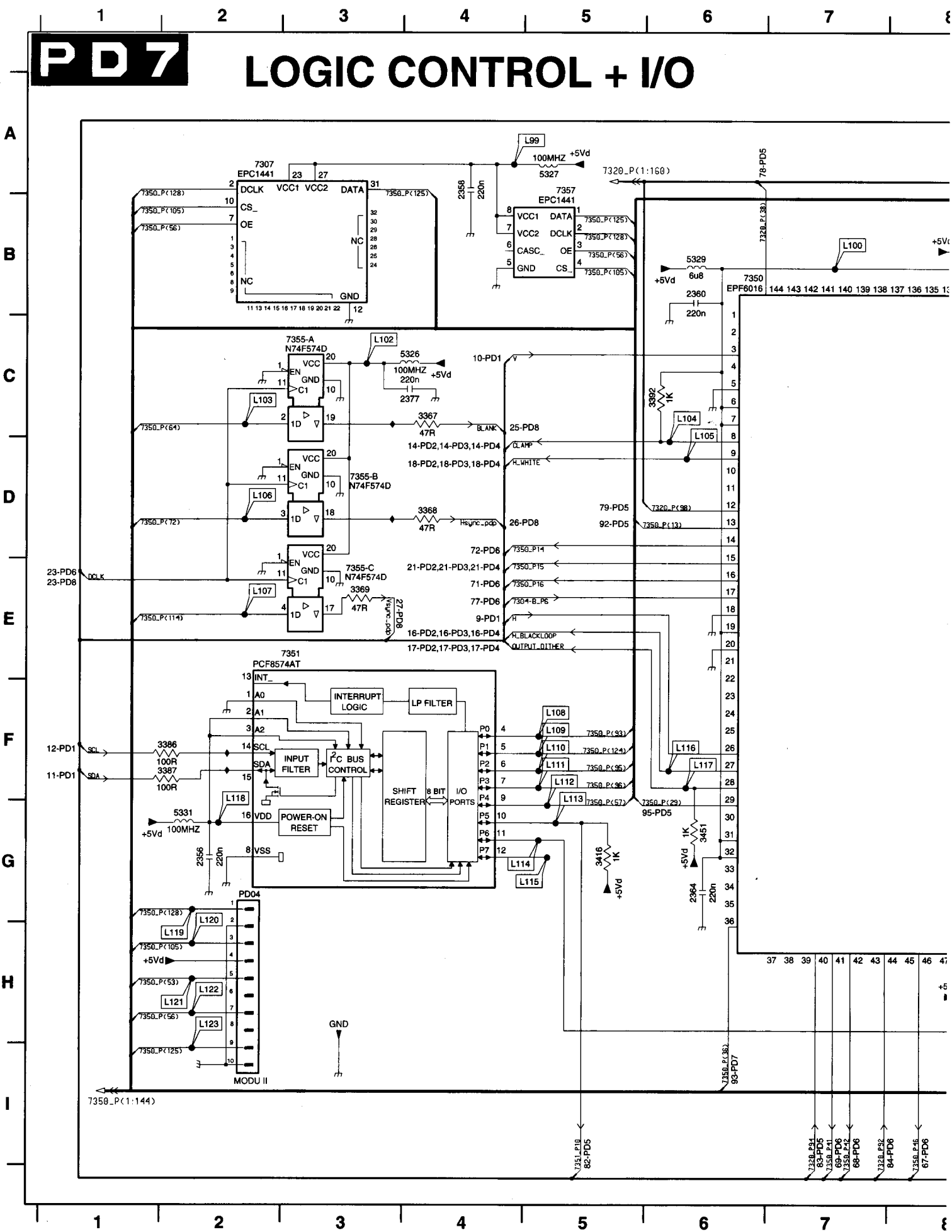
PD6 PLL'S

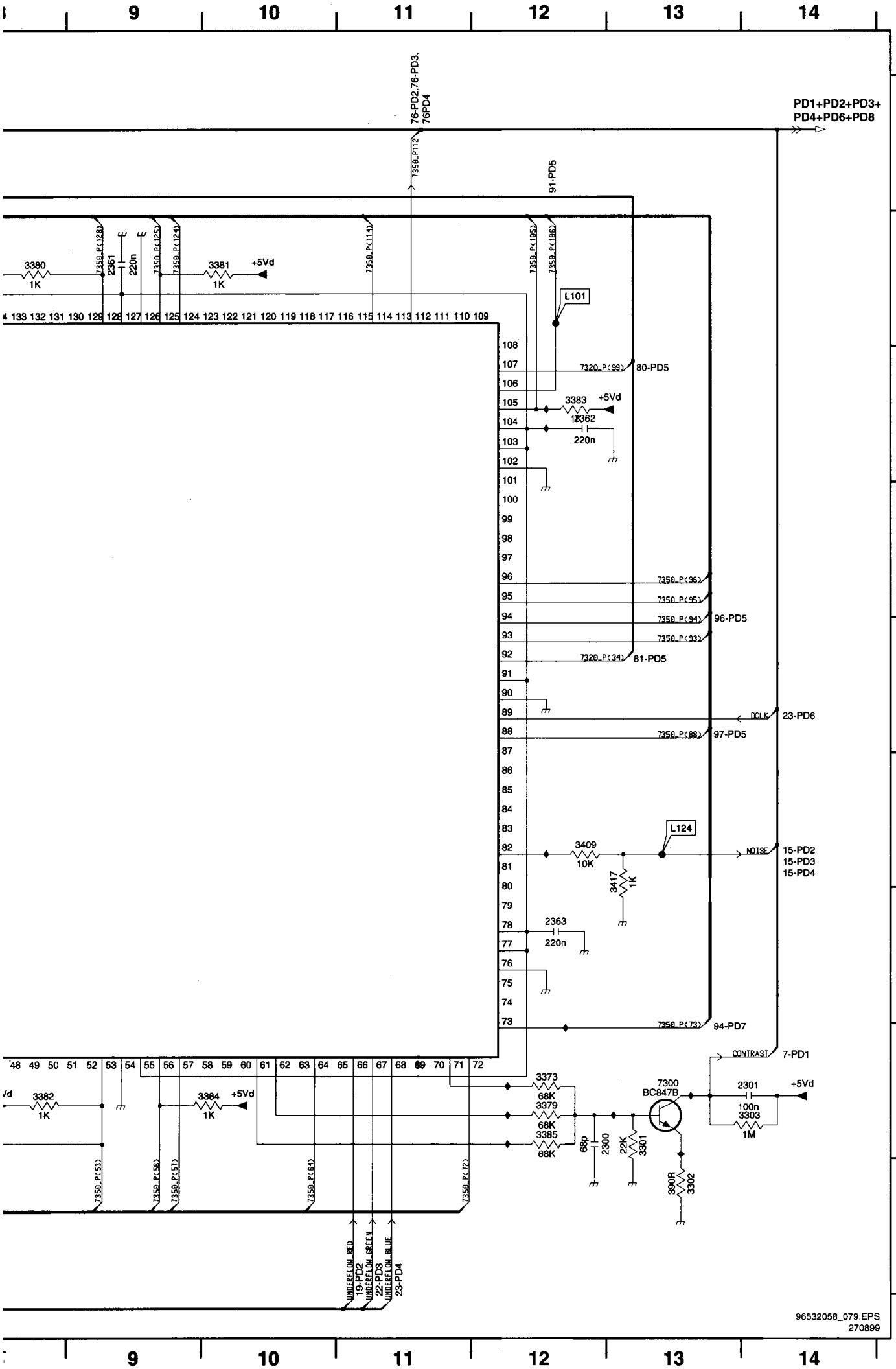




PDP limesco

PD7 LOGIC CONTROL + I/O





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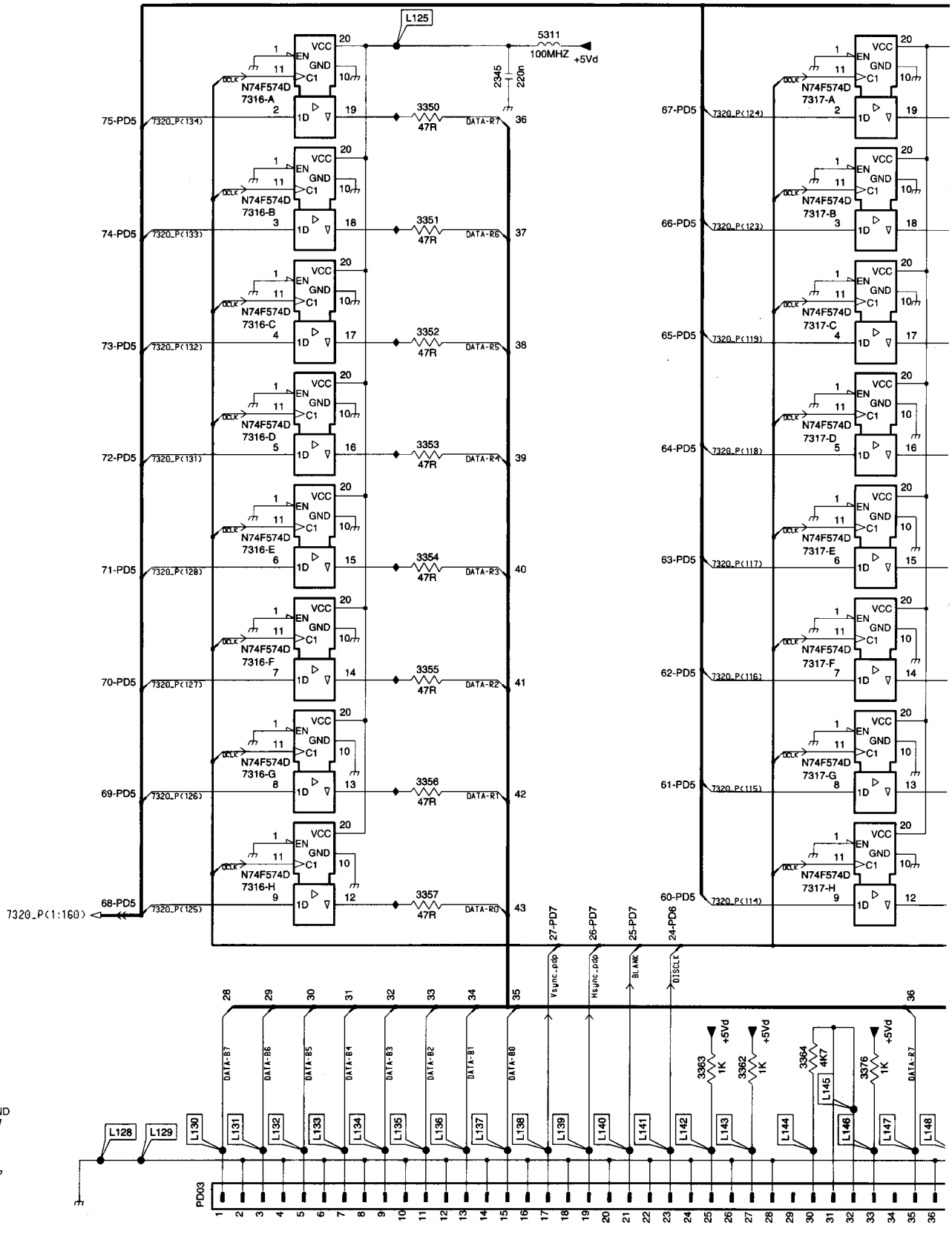
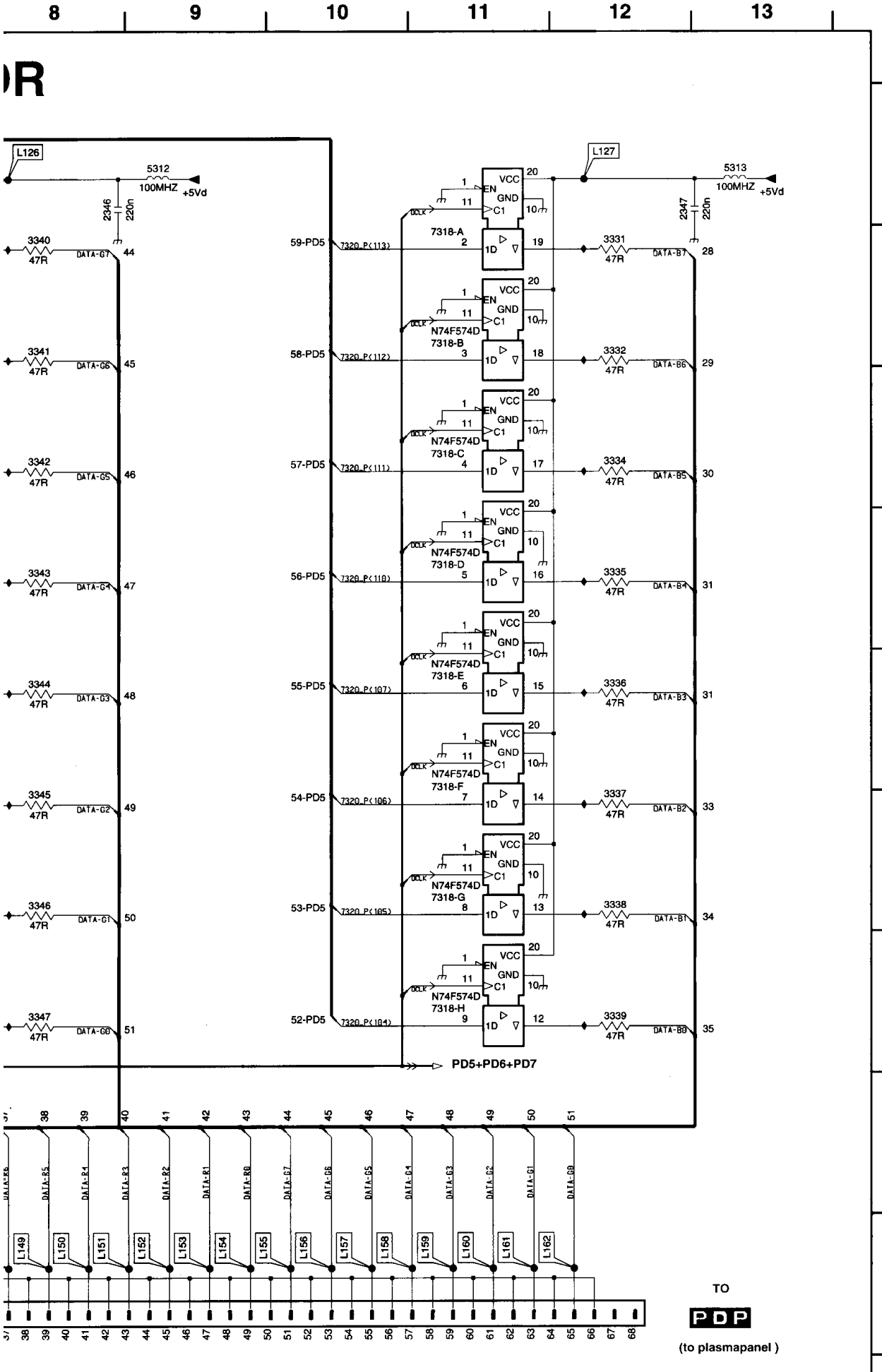
2301 H14
2356 G2
2358 A4
2360 B6
2361 B9
2362 C12
2363 G12
2364 G6
2377 C4
3301 H13
3302 I13
3303 H14
3367 C4
3368 D4
3369 E4
3373 H12
3379 H12
3380 B8
3381 B10
3382 H8
3383 C12
3384 H10
3385 H12
3386 F2
3387 F2
3392 C6
3409 F12
3416 G5
3417 F13
3451 G6
5326 C4
5327 A5
5329 B6
5331 G2
7300 H13
7307 A2
7350 B6
7351 E2
7355-A C3
7355-B D3
7355-C E3
7357 A5

PDP limesco

PD8 OUTPUT BUFFER PDP-CONNECTO





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2347 B13
3331 B12
3332 C12
3334 C12
3335 D12
3336 E12
3337 F12
3338 G12
3339 G12
3340 B8
3341 C8
3342 C8
3343 D8
3344 E8
3345 F8
3346 G8
3347 G8
3350 B4
3351 C4
3352 C4
3353 D4
3354 E4
3355 F4
3356 G4
3357 G4
3362 I6
3363 I6
3364 I7
3376 I7
5311 A5
5312 A9
5313 A13
7316-A B3
7316-B C3
7316-C C3
7316-D D3
7316-E E3
7316-F F3
7316-G G3
7316-H G3
7317-A B7
7317-B C7
7317-C C7
7317-D D7
7317-E E7
7317-F F7
7317-G G7
7317-H G7
7318-A B11
7318-B C11
7318-C C11
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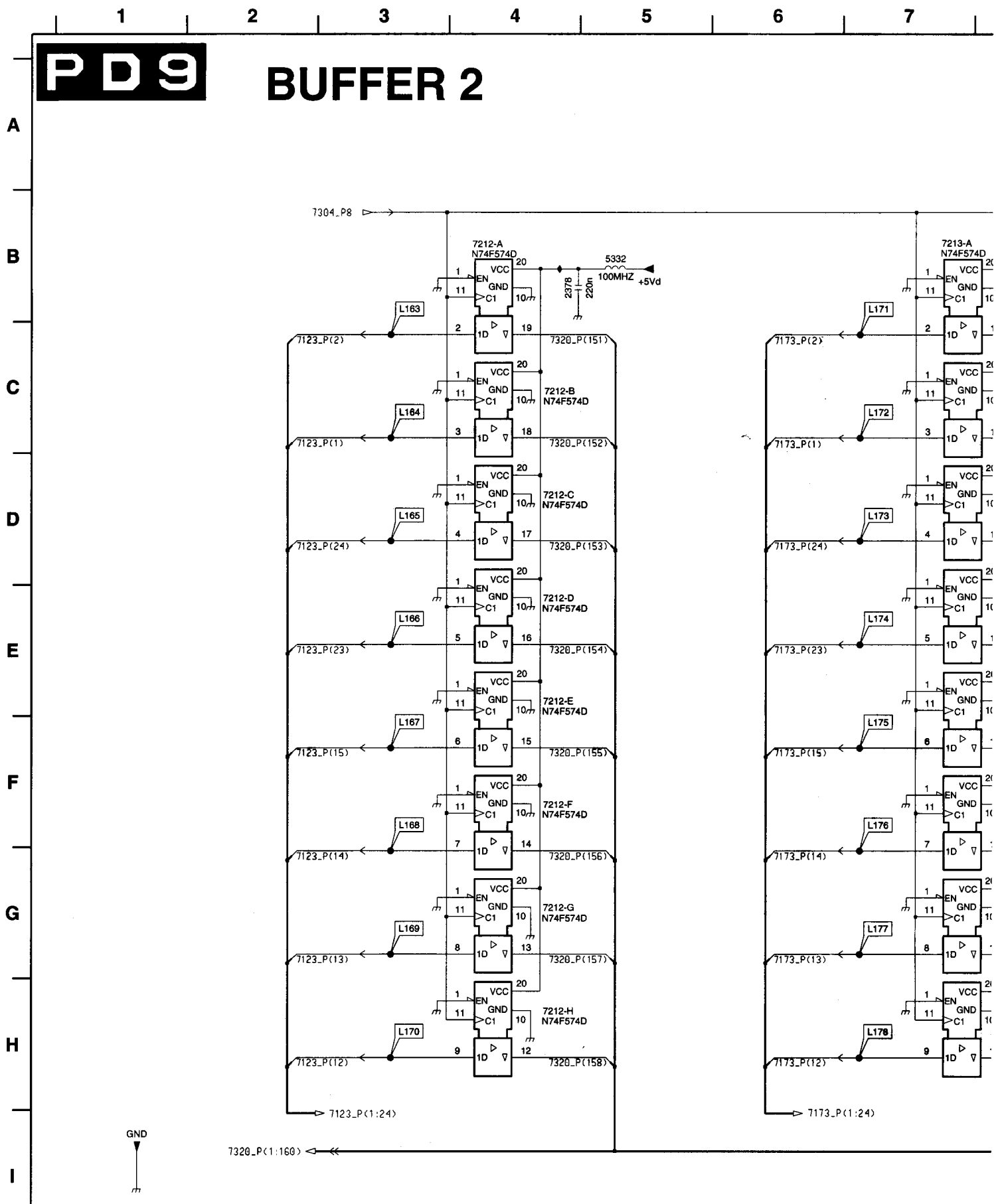
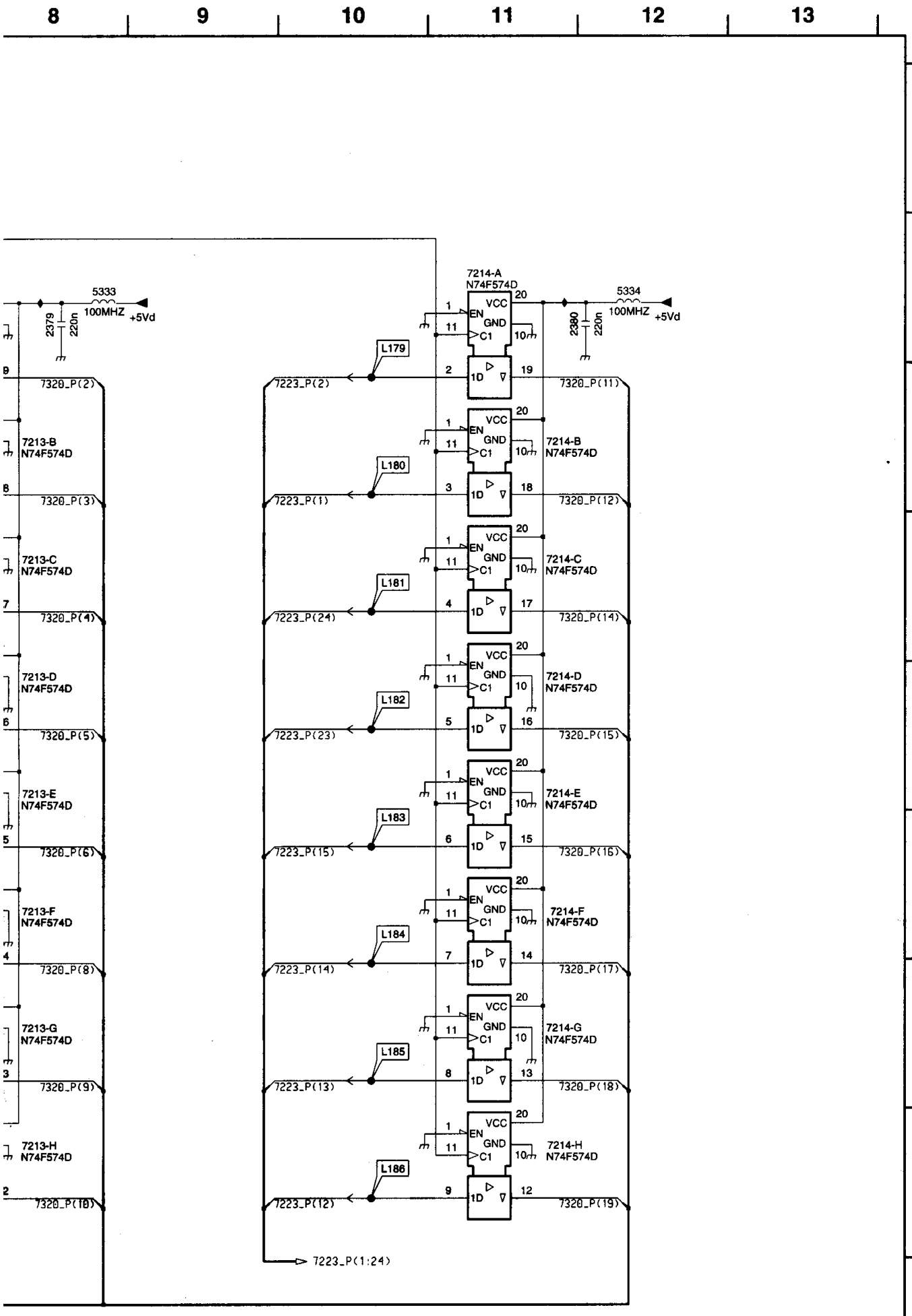
7318-E E11
7318-F F11
7318-G G11
7318-H G11

PDP limesco

PD9 BUFFER 2





2378 B4
2379 B8
2380 B11
5332 B5
5333 B8
5334 B12
7212-A B4
7212-B C4
7212-C D4
7212-D E4
7212-E E4
7212-F F4
7212-G G4
7212-H H4
7213-A B7
7213-B C8
7213-C D8
7213-D E8
7213-E E8
7213-F F8
7213-G G8
7213-H H8
7214-A B11
7214-B C11
7214-C D11
7214-D E11
7214-E E11
7214-F F11
7214-G G11
7214-H H11

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8. Alignments

General: the Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5 'Service modes, faultfinding and repair tips'.

8.1 Alignment conditions

All electrical adjustments should be performed under the following conditions:

- Supply voltage : 220 - 240 VAC (+/- 10 %)
- Warm-up time: 10 minutes
- The voltages and oscillograms are measured in relation to the tuner earth.
- Test probe: Ri > 10MΩ Ci < 2,5 pF.

8.1.1 Selection of the SAM-menu

- By transmitting the "ALIGN" command with the RC7150 Dealer Service Tool, followed by password "3140" and < OK > button.
- Standard RC sequence 062596 (within OSD time-out) OSD
- By shorting test-point M28 and M29 on the AV Control panel on the monitor while switching on the set.

8.2 Adjustments on the D-box

8.2.1 Electrical Alignments

Pre-conditioner +5Vstby (PR3)
Connect a voltmeter to capacitor C2510 (PR2). With the aid of R3504 adjust the voltage to 5.2 V +/- 50 mV.

VsVa supply (FD)

Va-supply (Addressing of the PDP - FD1)
De-activated the PDP.
Connect a voltmeter to capacitor C2120 (FD1). With the aid of R3126 adjust the voltage to 55 V +/- 0.5 V.

Vs-supply (Sustain pulses - FD2)
De-activated the PDP.
Connect a voltmeter to capacitor C2020 (FD2). With the aid of R3026 adjust the voltage to 165 V +/- 0.5 V.

8.2.2 Software Alignments

White point

- Select the item "PDP test pattern" of the Service Alignment menu and set it to "ON.
- Select item " White point" of the Service Alignment menu.
- Enter the "white point" menu and adjust the value of one of the 4 submenu if necessary. Only the selected menu-item including its value remain on the screen when selected. The value has to changed within 5 seconds otherwise the main menu reappears again.

The 4 sub menu-items of the White point menu:

- "RED"
- "GREEN"
- "BLUE"
- "COLOUR TEMPERATURE"

- Leave the sub-menu by pressing "cursor up", "cursor down", "OK" or the "MenuOnOff" button and return to the main menu.
- Select the item "PDP test pattern" of the Service Alignment menu and set it to "OFF.

9. Circuit description and list of abbreviations

9.1 Circuit description

For a detailed description of the circuits see Training Manual FTV1.9 Display Box (3122 785 10036).

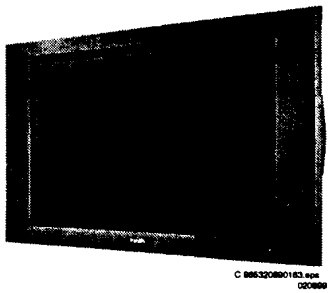
9.2 List of abbreviations

µP	Micro Processor
1FH	One time the line frequency for normal picture quality
2FH	Twice the line frequency for a better picture with less field flicker
2CS	2 Carrier Sound (sound system using two separate FM carriers at 5.5 MHz)
AARA	Automatic Aspect Ratio Adaptation
ADC	Analogue Digital Converter
ADJ	Adjust -
AFC	(S1) Automatic Frequency Control. Automatic fine-tuning circuit for signal reception.
AGC	Automatic Gain Control
AM	Amplitude Modulation
AMV	Automatic Multi Voltage
ANT	Antenna
AP	Asian Pacific region (Covering Hong Kong, Australia, Singapore etc.)
APC	Automatic Power Control
ASP	Aspect Ratio 4:3 or 14:9 or 16:9
AUD	Audio - GFL
AVB	Audio Video Buffer or Audio Video Blanking
BC	Beam current - GFL
BNC	Professional connector for higher frequencies
C	Centre
CINCH	Common connector for several kinds of signals
COMP	COMB-filter
CRT	Cathode Ray Tube
CVBS	Composite Video Blanking Synchronisation, video signal
DAC	Digital Analogue Converter
DEC	Decoder
DFB	Double Window Fast Blanking
DU	Double Window - U_signal
DV	Double Window - V_signal
DW	Double Window
DY	Double Window - Y_signal
E-Box	Electronic Box
EHT	Extra High Tension - GFL
ELPS	Eco Low Power Supply - GFL
EWD	East West Drive - GFL
EXT	External
FBL	Fast Blinking
FBX	Feature Box
FE	FrontEnd
FM	Frequency Modulation
FMS	Functional Module Specification
FRNT	Front
FRS	Functional Requirement Specification
FTV	Flat TeleVision
GFL	Global Feature Line (high end TV chassis)
GFL-FL	GFL Feature (up)Lift
GND	Ground
HFB	Horizontal FlyBack (display system sync. pulse)
HP	Headphone
HSI	Hardware Software Interface
HW	HardWare
I/O	Input / Output
I2C	IC bus, Inter Integrated circuit, on-board communication line
IF	Intermediate Frequency
IRQ	Interrupt ReQuest.
L	Left
L_CL VL	Left_Constant_Level Variable_Level
L_REC SEL	Left_Record_Select
LED	Light Emitting Diode
LP	Low Pass
LTP	Luminance Transient Processor
MAC	(Apple) MACintosh
MAC13	or MACII (Apple) MACintosh format for 13" monitors
MACP	Motion Adaptive Colour Plus
ML-2	Media Line 2
Monitor	PDP Display with all the electronic boards (incl. self developed boards).
MU	Main U_signal
MV	Main V_signal
MY	Main Y_signal
NICAM	Near Instantaneous Companding Audio Multiplex (digital terrestrial sound
NTSC	National TV Standard Committee
OE	(AQ) Output Enable
PAL	Phase Alternating Lines (Colour video standard)
PDP	Plasma Display Panel
PIP	Picture In Picture
PLL	Phase Locked Loop
POR	Power On Reset / Power Off Reset (depending on context)
QPSK	Quadruple Phase Shift Keying
R	Right
RAM	Random Access Memory
RC5	Remote Control 5 (infrared signal transmission protocol)
RECEI-RC5	Received RC5-code
REF	Reference
RES	Resistor
RGB	Red Green Blue, video signals
SC-1FH	Sandcastle 1FH
SCL	Serial Clock Line of the IC bus
SDA	Serial Data Line of the IC bus
SECAM	SEquential Couleur A Memoire (Colour video standard)
SIF	Second Intermediate frequency
SND	Sound
SOG	Sync On Green
SP_GAIN	Splitter GAIN
SPHsync	Splitter Horizontal Sync
SPVsync	Splitter Vertical Sync
SSP	Small Signal Panel (of the GFL chassis)
STBY	Standby
SW	SoftWare / SubWoofer (depending on context)
SYNC	Synchronisation
SYS	System
Terr	Terrestrial
TP	Testpoint
TRASN	(AQ)
TSD	Terrestrial Sound Decoder (combination of 2CS and NICAM decoder)
TUN	Tuner

TXT	TeleteXT
TXT-KILL	Teletext killer (Signal to disable Teletext)
U-VIDCONTR	U-VideoContrast
VCO	Voltage Controlled Oscillator
VD	Vertical Drive
VGA	Video Graphics Array. In this document, the term VGA is used for all VGA
WE	Write Enable
Xtal	Crystal (Oscillator)
Y/C	Luminance (Y) signal / Chrominance signal (C)
YUV	Combination of colour difference signals

FTV1.9DE
AA

Service
Service
Service



Service Manual

Contents **Page**

PROVISIONAL

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PHILIPS

1. Technical specifications

1.1 Technical data D-box

Mains voltage	:	110 - 240 Vac; (- 15 %, + 10 %)
	:	50 Hz - 60 Hz
Power dissipation	:	400W
Stand-by dissipation	:	< 1W

1.2 Connection facilities

1.2.1 Specification of the terminal sockets

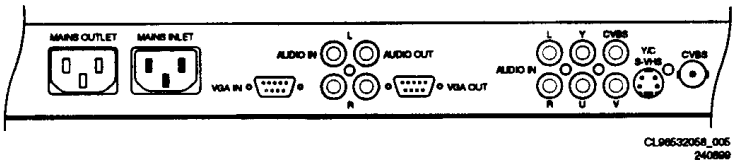

Figure 1-1

VGA-in

1 - R	(0.7 Vpp 75 Ω)
2 - G	(0.7 Vpp 75 Ω)
3 - B	(0.7 Vpp 75 Ω)
4 - Reserved	
5 - Bus-gnd	
6 - R-gnd	
7 - G-gnd	
8 - B-gnd	
9 - RC5	
10- GND	
11- CONFIG_IDENT	
12- Bus1 (TxD/ Rxd or SDA)	
13- Hsync	
14- Vsync	
15- Bus2 (TxD/ RxD or SDA)	

VGA-out

1 - R	(0.7 Vpp 75 Ω)
2 - G	(0.7 Vpp 75 Ω)
3 - B	(0.7 Vpp 75 Ω)
4 - Reserved	
5 - gnd	
6 - R-gnd	
7 - G-gnd	
8 - B-gnd	
9 - Reserved	
10- GND	
11- Reserved	
12- Reserved	
13- Hsync	
14- Vsync	
15- Reserved	

Audio VGA-in

- Cinch Audio	L(0.5 Vrms >= 10 k)
- Cinch Audio	R(0.5 Vrms >= 10 kΩ)

Audio VGA-out

- Cinch Audio	L(0.5 Vrms >= 1 k)
- Cinch Audio	R(0.5 Vrms >= 1 kΩ)

SVHS

1 - GND	
2 - GND	
3 - Y	(1 Vpp / 75)
4 - C	(0.3 Vpp / 75)

Audio_in:

- Cinch Audio	L (0.5 Vrms >= 10 k)
- Cinch Audio	R (0.5 Vrms >= 10 kΩ)

CVBS

- BNC - CVBS	(1 Vpp / 75 Ω)

YUV

- Y	(1 Vpp / 75)
3 - U	(1 Vpp / 75)
4 - V	(1 Vpp / 75)

1.3 Chassis overview

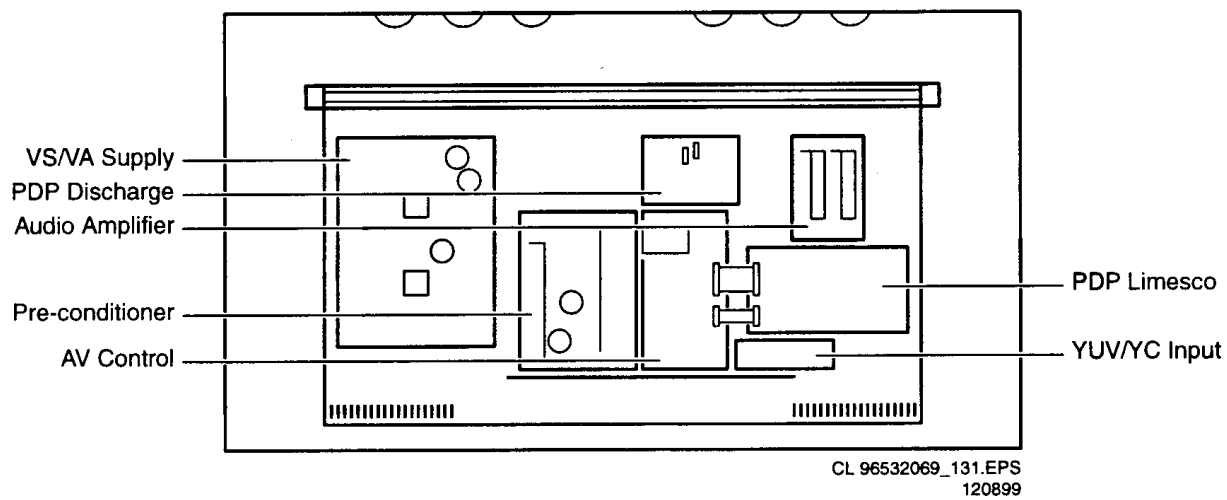

Figure 1-2

2. Safety instructions, warnings and notes

2.1 Safety instructions ⚠

It is not allowed to operate the FTV-set without glass plate. One function of this glass plate is to absorb Infrared Radiation. Without this glass plate the level of Infrared Radiation produced by the plasma display could damage your eyes.

1. Safety regulations require that during a repair:
   - the set should be connected to the mains via an isolating transformer (in this particular case a transformer of ≥ 800 VA);
   - safety components, indicated by the symbol ⚠ , should be replaced by components identical to the original ones;
2. Safety regulations require that after a repair the set must be returned in its original condition. In particular attention should be paid to the following points.
   - Note: The wire trees should be routed correctly and fixed with the mounted cable clamps.
   - The insulation of the mains lead should be checked for external damage.
   - The electrical DC resistance between the mains plug and the secondary side should be checked (only for sets that have a mains isolated power supply). This check can be done as follows:
     - unplug the mains cord and connect a wire between the two pins of the mains plug;
     - set the mains switch to the on position (keep the mains cord unplugged!);
     - measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ;
     - switch off the TV and remove the wire between the two pins of the mains plug.
   - The cabinet should be checked for defects to avoid touching of any inner parts by the customer.

2.2 Warnings

1. ESD

All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.

1. Available ESD protection equipment:
   - complete kit ESD3 (combining all 6 prior products - small table mat) 4822 310 10671
   - wristband tester 4822 344 13999
2. Never replace modules or other components while the unit is switched on.
3. When making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.3 Notes

1. A glass plate is positioned before the plasma display. This glass plate can be cleaned with a slightly humid cloth. If due to circumstances there is some dirt between the glass plate and the plasma display panel it is recommended to do some maintenance by a qualified service employee only.
2. Never disconnect the power display cable when the set is operating
3. With DST no failures (error-codes) can be red, when the set is in Service-mode.
4. If DST reacts with 'error 2', there is no communication between set and DST. Note that IR-transmitter LED is positioned at right side of IR-receiver eye of the E-box. Take into account that receiver-LED on DST is positioned not in the middle but at the left side. Point corresponding LED's to each other. In case the amount of Infrared produced by the screen pollutes the communication, the set can be set in Standby-mode. Then still the error-messages can be retrieved.

4. Mechanical instructions

4.1 Introduction:

There are pre-defined service positions for the following panels:

1. VS/VA SUPPLY panel.
2. PDP DISCHARGE panel.
3. AUDIO AMPLIFIER panel.
4. PRE-CONDITIONER panel.
5. AV CONTROL panel.
6. PDP LIMESCO panel.
7. YUV/YC INPUT panel.
8. LED DISPLAY panel.
9. SWITCH DISPLAY panel.

Before these panels can be accessed, the rear cover has to be removed:

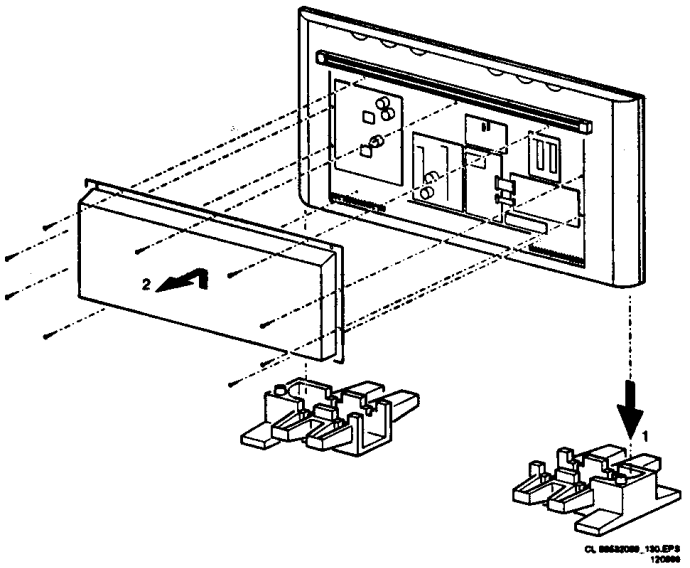

Figure 4-1

1. Place the Display Box in the service stand via 2 reinforced cushions (order code: 3122 126 ?????).
2. Remove the 9 fixation screws of the rear cover.
3. Remove the rear cover (during removal push it slightly upwards).

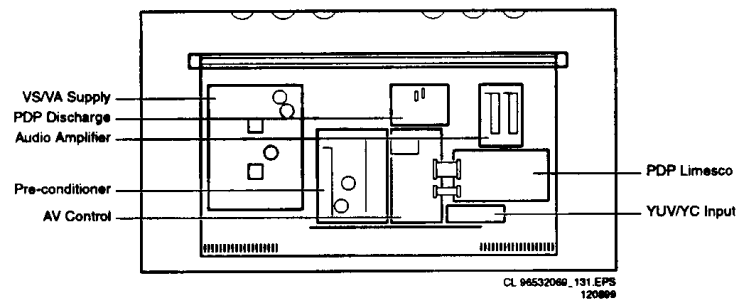

Figure 4-2

1. All panels are now accessible.

4.1.1 VS/VA SUPPLY panel.

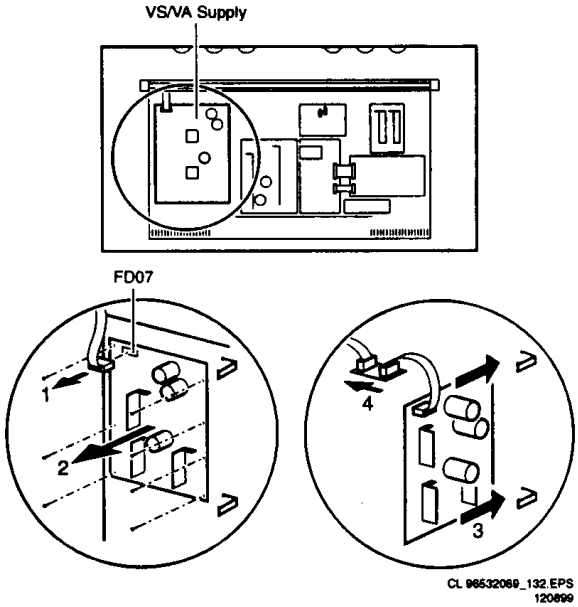

Figure 4-3

1. Disconnect Fan Supply cable from connector FD07 in the upper left corner [1].
2. Remove the 7 fixation screws of the panel [2].
3. Place panel on the 2 hinges, which are located near the right corners of the panel [3].
4. Use the mechanical service part (extension cable assembly, 12NC: 3122 785 90006) to extend the Fan Supply cable [4].
5. The copper side is now accessible from the left.

4.1.2 PDP DISCHARGE panel.

As in the FTV 1.5, this panel must be exchanged completely i defective.

4.1.3 AUDIO AMPLIFIER panel.

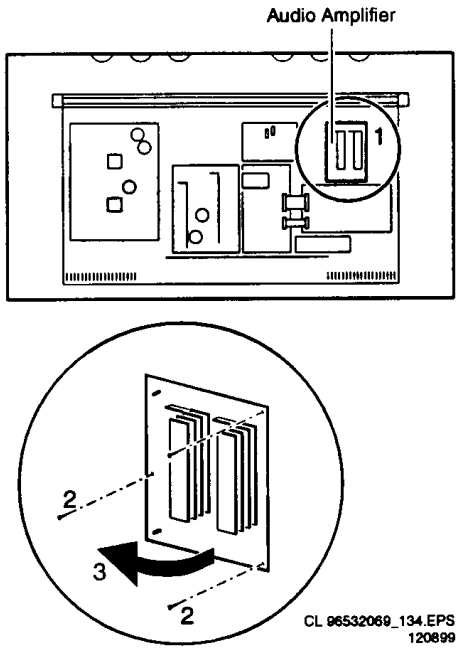

Figure 4-4

1. Some testpoints are accessible at the B-side [1].
2. If this is not sufficient, remove the 3 fixation screws of the panel [2].
3. Panel now can be hinged on the left side to access the A-side (soldering side) [3].

4.1.4 PRECONDITIONER panel.

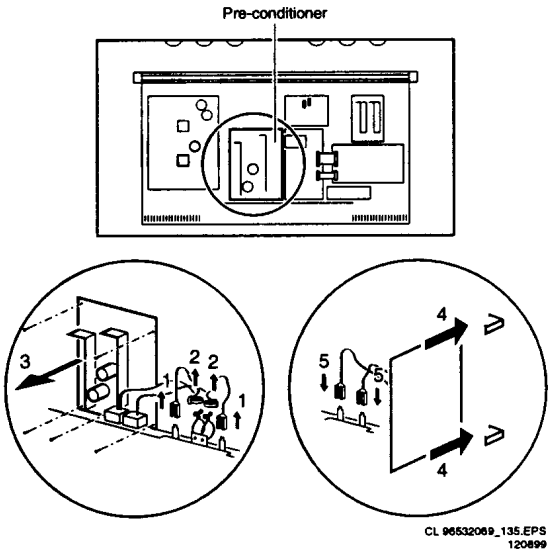

Figure 4-5

1. Disconnect the 2 grounding wires from the shielding plate by pressing the small lever on the connector while pulling [1].
2. Remove the 2 ferrite ring cores from their fixations [2].
3. Remove the 5 fixation screws of the panel [3].
4. Place panel on the 2 hinges, which are located, near the left corners of the panel [4].
5. Reconnect grounding wires to the extra connectors on the shielding plate at the left side [5].
6. The copperside becomes accessible now from the right side.

4.1.5 AUDIO VIDEO CONTROL panel.

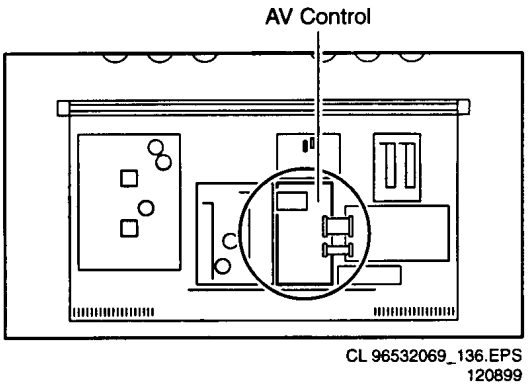

Figure 4-6

This panel has no service position for accessing the A-side, however all service test points are accessible at the B-side (see Service Manual).
In case some components must be (de)soldered, all fixation screws (6 for the panel, 5 at the metal connector plate) and all cables must be removed to access the A-side.

4.1.6 PDP LIMESCO panel.

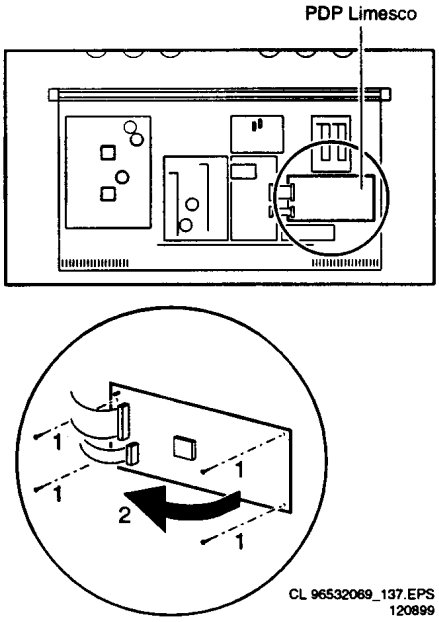

Figure 4-7

All SMC's are located on the B-side, so all testpoints are accessible. In case some components must be (de)soldered, the hinge construction can be used to access the A-side.
1. Remove the 4 fixation screws of the panel [1].
2. Panel can now be hinged to access soldering side [2].

4.1.7 YUV/YC INPUT panel.

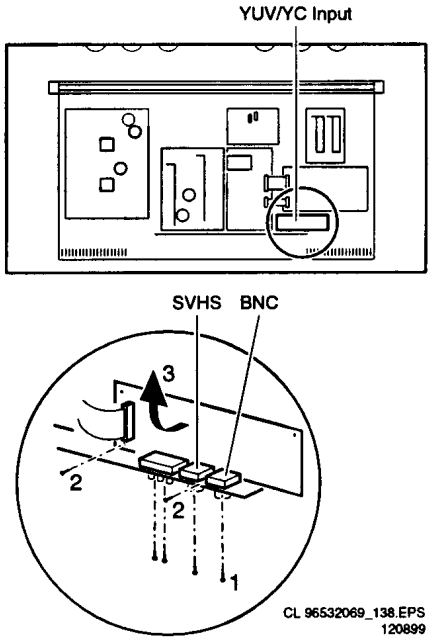

Figure 4-8

This panel has no pre-defined service position. For access of the A-side, the panel has to be removed:
1. Remove the 4 screws at the metal connector plate [1].
2. Remove the 2 fixation screws of the panel [2].
3. Panel can be removed now to access the A-side [3].

4.1.8 LED DISPLAY panel.

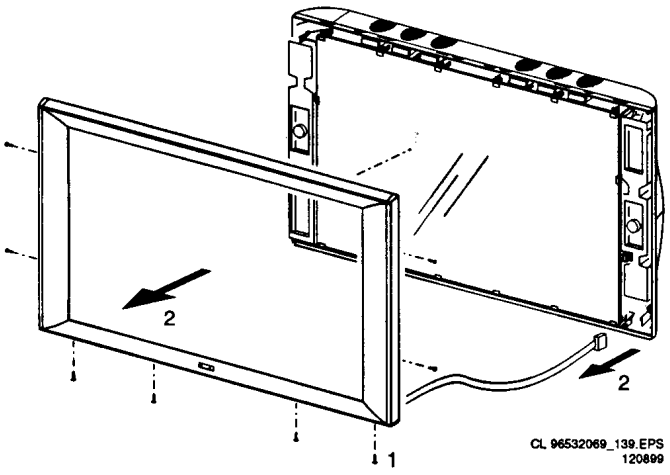

Figure 4-9

1. Remove 2 x 2 screws at the sides and 4 screws at the bottom of the front cover [1].
2. Remove the front cover (it hinges at the top). During removal unplug the cable of the LED DISPLAY panel at the SWITCH DISPLAY panel (connector SD11) [2].

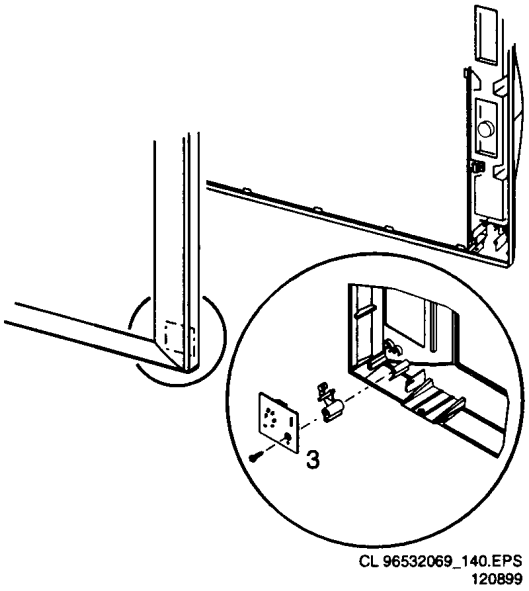

Figure 4-10

1. The LED DISPLAY panel can be removed now by unscrewing 1 fixation screw [3].

4.1.9 SWITCH DISPLAY panel.

1. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

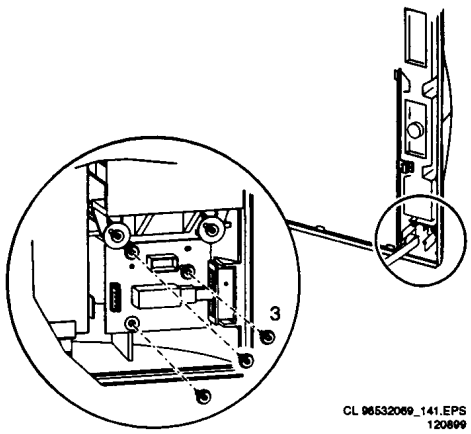

Figure 4-11

1. The SWITCH DISPLAY panel can be removed now by unscrewing 3 fixation screws [3].

4.2 Exchanging parts

Some parts of the FTV1.9 Display Box must be exchanged if defective:

1. GLASS PLATE.
2. LOUDSPEAKER.
3. PLASMA DISPLAY PANEL [PDP].

4.2.1 Exchanging of the GLASS PLATE.

1. First unplug (remove Mains and VGA cable) the Display Box .
2. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

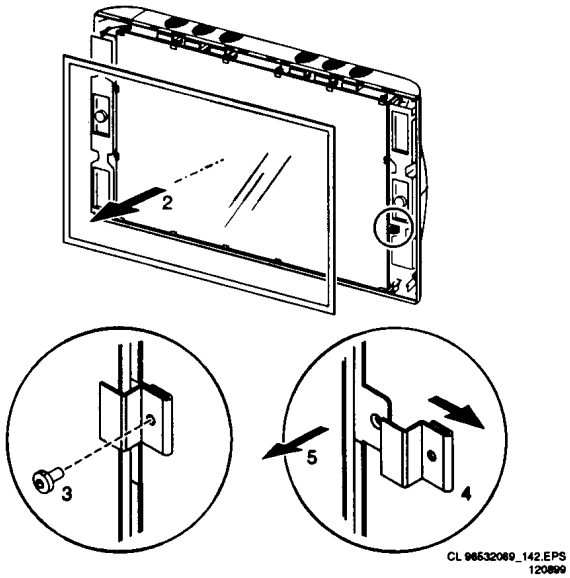

Figure 4-12

1. Now the GLASS PLATE can be removed by unscrewing a screws [3] and removing all glass clips [4].

4.2.2 Exchanging of a LOUDSPEAKER.

1. First unplug (remove Mains and VGA cable) the Display Box.
2. Remove front cover (for a description see Chapter 1.1.8 'LED DISPLAY panel').

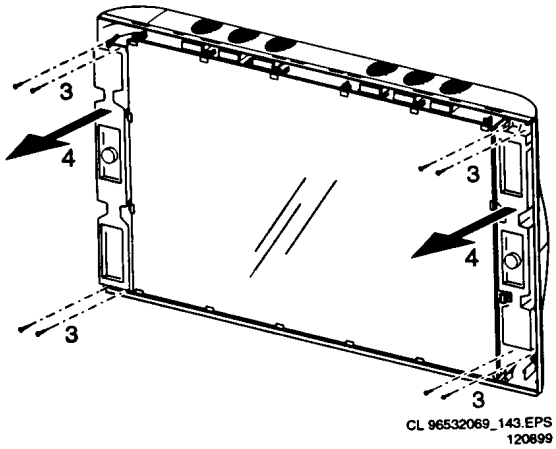

Figure 4-13

1. The LOUDSPEAKER can now be removed by disconnecting its cable and removing the 4 fixation screws at the top and bottom of the speakerbox. Be sure to remove the correct screws, otherwise the speaker system will be damaged (it is an airtight system).

4.2.3 Exchanging of the PDP.

1. First unplug (remove Mains and VGA cable) the Display Box.
2. Place the rear side of the Display Box on a foam cushion (be sure the metal rear cover is mounted in order to prevent damaging of the electronic panels).
3. Remove front cover (for a description see Chapter 1.1.8 LED DISPLAY panel).
4. Now the GLASS PLATE can be removed by unscrewing all screws and removing all glass clips (for a description see Chapter 1.2.1. 'Exchanging of the GLASS PLATE').

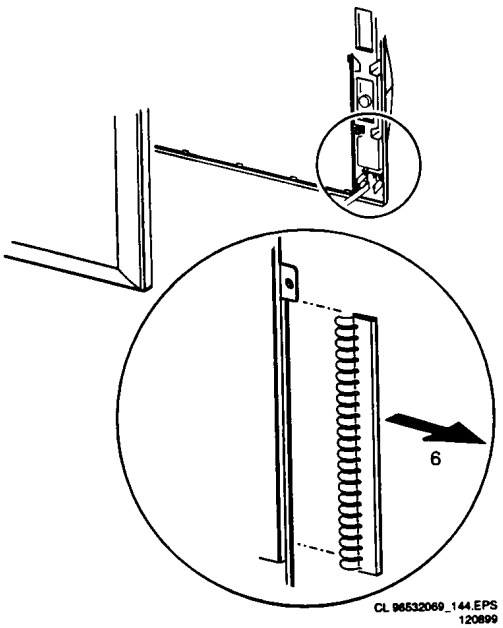

Figure 4-14

1. Remove all copper EMC SHIELDING springs mounted around the display [6].
2. Now flip the complete Display Box and place it with the Plasma Display down on a foam cushion. Be 100 % sure a large foam cushion is placed underneath the PDP, as it will drop about 10 mm after removing its fixation screws ! !
3. Disassemble metal rear cover (for a description see Chapter 1.1 'Introduction').

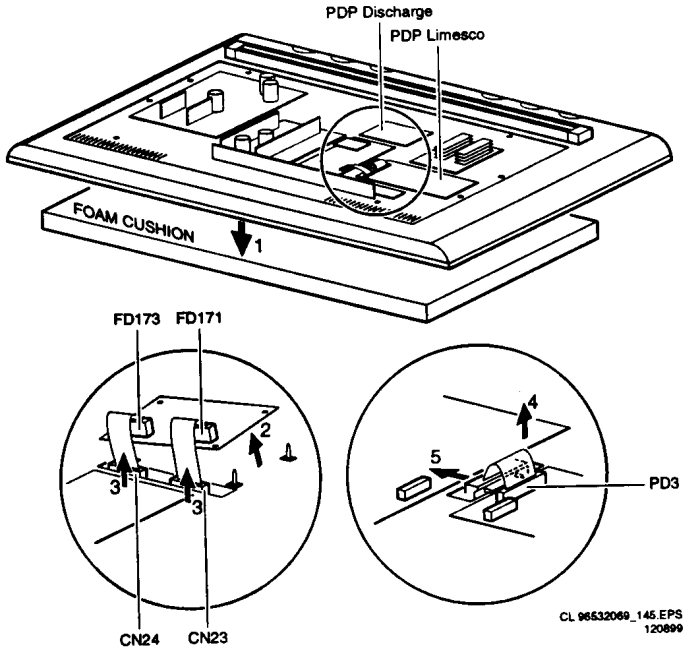

Figure 4-15

1. Disconnect the following cables:
   - Cables coming from connectors CN23 and CN24 of the PDP DISPLAY panel [3] (for easiest access lift the PDP DISCHARGE panel from its fixations [2]).
   - Flat cable on connector PD3 of the PDP LIMESCO panel [4]. Also remove the ferrite 'flat cable shield' completely by unlocking its fixations [5].

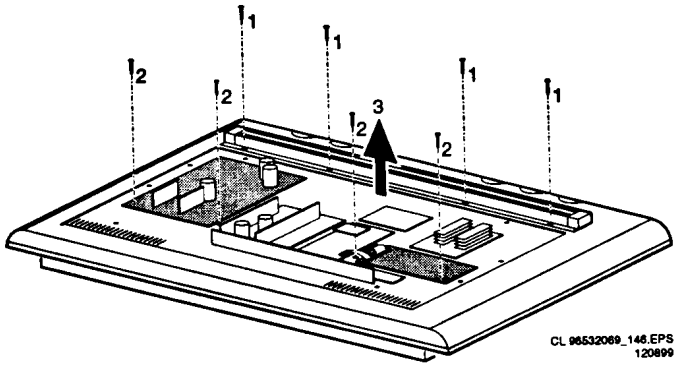

Figure 4-16

1. Now remove the 8 large screws which hold the PDP:
   - 4 screws are located at the top: they also hold the aluminium wall mount [1].
   - The other 4 are located at the bottom: the 2 outer screws are hidden behind panels. Therefor unscrew the VS/VA SUPPLY and the PDP-LIMESCO panel (grey panels) [2].
2. Lift encasing from PDP and replace PDP [3].

5. Service modes, fault finding and repair tips

For the FTV1.9, the Monitor can be used in two applications.
- A stand-alone configuration, a separate device which can also be sold and serviced separately.
- TV configuration, where the monitor is combined with the E-box.

The monitor, as a stand-alone unit, can be serviced by using a test pattern coming from the PDP-LIMESCO panel on the rear of the monitor itself or via a PC/laptop by using ComPair via the ComPair connector.
In this chapter the following paragraphs are included:
1. Test points
2. Dealer Service Tool (DST)
3. Service Modes
4. Error code buffer and error codes
5. The "blinking LED" procedure
6. Fault-finding tips
7. ComPair

5.1 Test points

The FTV1.9 chassis is equipped with test points in the service printing. These test points are referring to the functional blocks:
- A1-A2-A3, etc.: Test points for the Audio amplifier (A)
- C1-C2-C3, etc.: Test points for the AV control circuit (AVC)
- FD1-FD2-FD3, etc.: Test points for the VsVa supply (FD1-FD2) and the PDP discharge panel
- L1-L2-L3, etc.: Test points for the PDP LIMESCO (PD1-PD9)
- PR1-PR2-PR3, etc.: Test points for the Pre-conditioner (PR1-PR3)
- Y1-Y2-Y3, etc: Test points for the Y/C YUV monitor panel (UY1-YC4)

Measurements are performed under the following conditions:
Video: colour bar signal; Audio: 3 kHz left, 1 kHz right

5.2 Dealer Service Tool (DST)

For easy installation and diagnosis the dealer service tool (DST) RC7150 can be used. When there is no picture (to access the error code buffer via the OSD), DST can enable the functionality of displaying the contents of the entire error code buffer via the blinking LED procedure, see also paragraph 5.5. The ordering number of the DST (RC7150) is 4822 218 21232.

5.2.1 Installation features for the dealer

The dealer can use the RC7150 for programming the TV-set with pre-sets. 10 Different program tables can be programmed into the DST via a GFL TV-set (downloading from the GFL to the DST; see GFL service manuals) or by the DST-I (DST interface; ordering code 4822 218 21277). For explanation of the installation features of the DST, the directions for use of the DST are recommended (For the FTV1.9 chassis, download code X should be used).

5.2.2 Diagnose features for service

FTV1.9 sets can be put in two service modes via the RC7150. These are the Service Default Mode (SDM) and the Service Alignment Mode (SAM).

5.3 Service Modes

Below described sequence is only valid for the "Monitor Only Configuration". When a Receiver box is connected to the Display Box (TV Configuration), please check chapter 5 in the Training Manual of the Receiver Box.

5.3.1 Service Default Mode (SDM)

The purpose of the SDM is:
- Provide a situation with predefined settings to get the same measurements as in this manual.
- Access to the error buffer via the blinking LED procedure
- Inspect the error buffer.
- Possibility to overrule software protections via the service pins (caution: override of software protections!).

Entering the SDM:
- By transmitting the "DEFAULT" command with the RC715(Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM).
- By pressing on a standard RC the following sequence 0, 6 2, 5, 9, 6 followed by the "MENU" key.
- By short-circuiting the SDM pin on the AVC panel (see TM Display Box chapter 7).

In the SDM the following information is displayed on the screen:

F19DBC X.Y_12345 (1) LLLL (2) SDM (3)
ERR 02 01 44 ## ## ## ## ## ## ##

Explanation notes/references:
(1) Software identification of the main micro controller (F19DBC X.Y_12345)
- F19D is the chassis name for FTV1.9 display
- B is the region identification
- C is the language cluster
- X = (main version number)
- Y = (subversion number)
- ##### are the last 5 digits of the 12nc number

(2) "LLLL" Normal display operation in hours
(3) "SDM" To indicate that the TV set is in the service defaul mode
(4) "ERR 02 01 44 ## ## ## ## ## ## ## ##" This line show the contents of the error buffer (max. 10 errors). The last erro that occurred is displayed at the most left position. When les then 10 errors have occurred the rest of the line is empty. Whe the errorlist is empty " No errors" is displayed. No duplicate errors.
Exit the SDM:
Push the "MENU" button on the Remote Control.
The SDM sets the following pre-defined conditions:
- Volume level is set to 25% (of the maximum volume leve
- Linear Audio and Video settings are set to 50%.
- Colour temperature is set to normal.

The following functions are "overruled" in SDM since they interfere with diagnosing/repairing a set
- Video blanking.
- Slow demute.
- Anti-ageing.
- Automatic switch to "Standby" when H- and/or V-sync signals are lost.

All other controls operate normally.

5.3.2 Service Alignment Mode (SAM)

The purpose of the SAM is to align and or adjust settings.
For recognition of the SAM, "SAM" is displayed at the top of th right side of the screen
Entering the SAM-menu:
- By pressing the "ALIGN" button on the RC7150 Dealer Service Tool followed by code 3140 and the "OK" buttor
- Standard RC sequence 062596 followed by the "OSD" button.

- By short-circuiting the SAM pin on the AVC panel (Caution: override of software protections ! !)

In the SAM the following information is displayed on the screen:

F19DBC X.Y_12345 SAM
ERROR## ## ## ## ##
WHITE POINT
PDP TEST PATTERN [ON/OFF]
STORE
RESET ERROR BUFFER

The menus and submenus

White point
The white point sub menu contains the following items:
- RED
- GREEN
- BLUE
- COLOUR TEMPERATURE

PDP Test pattern
By selecting this item, all OSD disappears from the screen. The screen now changes from light grey to dark grey in a slow regular rhythm. One can so easily check if all pixels of the monitor are correct.

Store
The change values are stored in the NVM.

Reset Error Buffer
This option will reset the error buffer.

Exit the SAM:
Push the "MENU" button on the Remote Control.
SAM menu control:
Menu items can be selected with the "UP" or "DOWN" key. Entry into the selected items (sub menus) is done by the "LEFT" or "RIGHT" key. The selected item will be highlighted. With the same "LEFT/RIGHT" keys, it is possible to increase/ decrease the value of the selected item.
Return to the former screen by pushing the "MENU" button.
The item values are stored in NVM if the sub menu is left.

5.3.3 Customer Service Mode (CSM) Display

FTV1.9 monitors are equipped with the "Customer Service Mode" (CSM). CSM is a special service mode that can be activated and de-activated by the customer, upon request of the service technician/dealer during a telephone conversation in order to identify the status of the set. This CSM is a 'read only' mode, therefore modifications in this mode are not possible.
Entering the Customer Service Mode.
- By pressing on RC03333/01 the following sequence : Picture, sound, cursor up, cursor down, cursor left, cursor right followed by the button (MUTE)
- RC7150 (DST) or a standard RC by pressing the sequence 062596 followed by the button (MUTE)

Exit the Customer Service Mode.
- pressing the "MENU" or any key on the Remote Control handset (except "P+" or "P-")
- switching off the TV set with the mains switch.

All settings that were changed at activation of CSM are set back to the initial values

The Customer Service Mode information screen
The following information is displayed on screen:

CUSTOMER SERVICE MENU
- Software version F19DBC X.Y_#####)
- Code 1: contains the last 5 error codes
- Code 2: contains the first 5 error codes with the last received error at the most left-hand side.
- Service unfriendly modes

5.4 Error code buffer and error-codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right.
In case of non-intermittent faults, clear the error buffer before starting the repair to prevent that "old" error codes are present.
If possible check the entire content of the error buffers. In some situations an error code is only the RESULT of another error code (and not the actual cause).
Note: a fault in the protection detection circuitry can also lead to a protection
The error code buffer will be cleared in the following cases:
- exiting SDM or SAM with the "Standby" command on the remote control
- transmitting the commands "EXIT" with the DST (RC7150)
- transmitting the commands "DIAGNOSE-9-9-OK" with the DST.

The error buffer is not reset by leaving SDM or SAM with the mains switch.
Examples:
ERROR: 0 0 0 0 0 : No errors detected
ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
ERROR: 5 6 0 0 0 : Error code 6 was first detected and error code 5 is the last detected (newest) error

Error-nr	Type of Error	Possible defect/cause
1	+5V	+5V pin at mP is low.
2	8V6	8V6 pin at mP is low
3	Fan_prot	Gives an indication that 1 or more FAN(s) does not function, or that 1 or more fan control circuits is defect
4	Over-temp_prot	Temperature at the heatsink of the VsVa supply or the Preconditioner is too high
5	DC_prot	Audio-amplifier IC, its supply or the Audio amplifier is defect
6	Over_voltage_prot	Vs or Va supply voltage is too high
7	Vrr	Powersupply of the display is not correct. Ignorance of the signal during startup by the software.
8	Power_OKE	Power supply or modules that uses this voltage. If this signal is NOT activated means that all supply voltages are available (exception Audio supply)
9	Blocked NVM IIC bus	NVM IIC bus is correct
10	Blocked slow IIC bus	Slow IIC bus is correct
11	TDA9860	No acknowledge of Audio controller
12	TDA4885	No acknowledge of Video controller
13	MC141585	No acknowledge of OSD Generator
14	uPD93687GD-LBD	No acknowledge of Limesco
15	PCF8574AT	No acknowledge of I/O Expander

Error-nr	Type of Error	Possible defect/cause
16	NVM	No acknowledge of NVM
17	Communication	Fault in the communication

5.5 The "blinking LED" procedure

The contents of the error buffer can also be made visible through the "blinking LED" procedure. This is especially useful when there is no picture. There are two methods:

- When the SDM is entered, the LED will blink the number of times, equal to the value of the last (newest) error code (repeatedly).
- With the DST all error codes in the error buffer can be made visible. Transmit the command: "DIAGNOSE x OK" where x is the position in the error buffer to be made visible x ranges from 1, (the last (actual) error) to 5 (the first error). The LED will operate in the same way as in the previous point, but now for the error code on position x.

Example:
Error code position1 2 3 4 5
Error buffer:8 9 5 0 0

- after entering SDM: blink (8x) - pause - blink (9x) - etc.
- after transmitting "DIAGNOSE- 2- OK" with the DST: blink (9x) - pause - blink (9x) - etc.
- after transmitting "DIAGNOSE- 3- OK" with the DST: blink (5x) - pause - blink (5x) - etc.
- after transmitting "DIAGNOSE- 4- OK" with the DST: nothing happens

5.6 Fault finding tips

5.6.1 Pre-conditioner

The Pre-conditioner delivers the following output voltages:

- 5 VSTBY
- 5 VSTBY_switched
- 380 VDC
- Internal 12 VSTBY to supply the relay, which switches the mains input

To trouble shoot the pre-conditioner, first check the LED of the display-box.

- No red, green or orange LED indicates the absence of the +5Vstby_switched at the VsVa panel.

Check the +5Vstby_switched on pin 5 of connector PR08. If this voltage is present check the presence of this voltage at the VsVa-panel on pin 2 of connector FD04. See the wiring diagram of the monitor for more details.
If the voltage is not present, check R3508 and fuse 1500. In case of a defective R3508, check/replace item 7500, opto-coupler 7501, regulator 7502, and diode 6501 + 6502.
In case of an open circuit of fuse 1500, check/replace bridge 6500 and capacitor C2501.
If both component are alive, measure the voltage at pin 5 of IC7500 - Topswitch. If the waveforms resembles a burst-signal, the output is too heavy loaded. Check the output diode D6504 and capacitor C2508 of the 12VSB and diode 6505 and capacitor C2510 of the 5VSTBY.

- The red LED is blinking (+5Vstby is OK!), which is an indication of a protection.

Disconnect the VGA-cable between the E-box and the Monitor. Now the Monitor is operating as a stand-alone unit.
Switch the monitor via the DST, (command "Default") or via the RC (special sequence) to the SDM.
Automatically the orange coloured LED of the monitor will blink the content of the error-buffer. If the sequence contains error-code 8, the cause could be a defective pre-conditioner. Error-code 8 is an indication that the +5V and/or the Vs/Va of the VsVa supply are not correct.
In case of error-code 4, switch OFF the set and check the temperature of the heatsink. In case of a high temperature of the heatsink, check MOSFET T7610 and the drive-circuit around T7640, T7641 and T7608.
In case of error-code 8, remove connector PR09 from the board. Short-circuit pin 2 of T7681 to ground, simulation of "SUPPLY_ON". (Caution - Protections overruled!!!)
Measure voltage at C2616. Is voltage 380Vdc?
Yes, the cause was a too heavy load/short-circuit at the VsVa panel.
No, measure the voltage at C2606/C2607. Is this voltage a DC voltage of approx. 300V with a strong ripple at a mains-input of 230Vac? If NO, check if relay 5690 is activated via the transistors T7684 + T7690. Check also PTC's 3600, 3601 and 3602 at their resistor-value.
Voltage is present at C2606. Check/replace NFR 3663 and 3668, if one of them is an open-circuit. In case R3663 is an open circuit, check/replace diode 6660, 6661 and capacitor C2664 plus IC 7660. If IC7660 is defect, check/replace IC 765(and C2262. In case of an open circuit of NFR 3668, replace IC 7650.
NFR 3663 and NFR 3668 are not defect. Measure waveform a base of T7608. Is a square waveform present at gate of T7610?
Check/replace MOSFET T7610 and the drive-circuit around T7640, T7641 and T7608.

5.6.2 VsVa-supply

The red LED is blinking (+5Vstby is OK!), which is an indicatior of a protection.
Disconnect the VGA-cable between the E-box and the Monitor The Monitor is now operating as a stand-alone unit.
Switch the monitor via the DST, (command "Default") or via the RC (special sequence) to the SDM.

- Error-code 1, check the +5V supply

Check fuse 1103. If the fuse is an open circuit, check/replace IC 7201. If fuse 1103 is OK, check the presence of the 17V. I this voltage is not present check fuse 1102 + 1104 and D6121 + D6122. If the 17V is present, then remove connector FD05. The reason could be a too heavy load or a short-circuit of the +5V supply. If after disconnection of connector FD05 the set still goes into protection, check D6203, NFR 3205 and the circuit around IC 7201.

- Error-code 2, check the 8V6 supply

Check regulator IC 7203, NFR 3099 and D6204.

- Error-code 8 there is something wrong with the POWER_OKE signal. When the POWER_OKE signal is low, the Vs and Va and the +5V are available.

Measure the voltage Va at C2120. Is the voltage between 55\ and 65V? If not check fuse 1105 and D6120. If both components are OK, the cause could be a too heavy load.
Measure the voltage Vs at C2020. Is the voltage between 165\ and 185V? If not check D6020. If D6020 is OK, the cause coul be a too heavy load.
If both voltage are not present, check fuse 1004 at the input.
If fuse 1004 is an open circuit, check the MOSFET's 7005 an 7006 for a short-circuit. In case of short-circuit use the repair-kit.
If fuse 1004 is OK, check the voltage at pin 15 of IC 7001. Is th voltage at pin 15 approx. 16-17V? If NO, check NFR 3002 an D6002 + D6030. If YES, check the waveforms FD49 and FD5(at pin 14 and 12. If they are present, check pulse transforme 5001 and the driver-circuits around MOSFET 7005 and 7006
If the waveforms FD49 and FD50 are not present, replace IC7001.

- Error-code 5, check the audio-supply or the Audio amplifie IC.

Check/replace fuse 1201 + 1202 and diode 6201 + 6202. If th components are OK, check the audio-amplifier IC.

- Error-code 6, check the Vs and/or the Va supply voltage.

The regulation-circuit of one of these voltages is not working correctly.
For the Va supply check opto-coupler 7102 and IC 7110.
For the Vs supply check opto-coupler 7002 and IC 7010

5.7 ComPair

5.7.1 ComPair mode

The monitor, as a stand-alone unit, can be diagnosed via a PC/ laptop by using ComPair via the ComPair connector. Before connecting the ComPair-cable at the AV Control panel on connector AVC34, the monitor must be put in the "ComPair - Mode ". This can be done by changing the jumpers at connector AVC39. Connector AVC39 is situated close to the up panel.
The figure below shows how to do it.

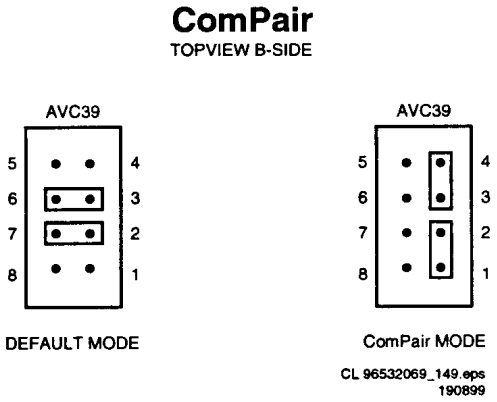

Figure 5-1

After switching ON the set, the red LED will blink as an indication that the monitor is in the ComPair mode.

5.7.2 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the DST service remote control allowing faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding how to repair the FTV1.9 in short time by guiding you step by step through the repair procedures.
- ComPair allows very detailed diagnostics (on I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C commands yourself; ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the FTV1.9 (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan FTV1.9 electronic manual, schematics and PCBs are only a mouse-click away.

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable. In case of the FTV1.9 chassis, the ComPair interface box and the FTV1.9 communicate via an I2C cable (bi-directional) The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in 2 ways:

1. Communication to the television (automatic)
2. Asking questions to you (manually)

ComPair combines this information with the repair information in its database to find out how to repair the FTV1.9.

Automatic information gathering
Reading out the error buffer, ComPair can automatically read out the contents of the entire error buffer.
Diagnosis on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the FTV1.9.

Manual information gathering
Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions and showing you examples. You can answer by clicking on a link (e.g. text or an waveform pictures) that will bring you to the next step in the faultfinding process.
A question could be: Do you see snow? (Click on the correct answer)
YES / NO
An example can be: Measure testpoint I7 and click on the correct oscillogram you see on the oscilloscope

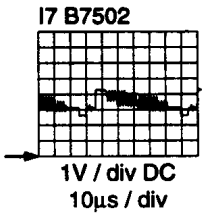

Figure 5-2

By a combination of automatic diagnostics and an interactive question/answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Additional features
Beside fault finding, ComPair provides some additional features like:

- Uploading/downloading of pre-sets
- Managing of pre-set lists
- Emulation of the Dealer Service Tool

5.7.3 Searchman (Electronic Service Manual)

If both ComPair and SearchMan are installed, all the schematics and PCB's of the faulty set are available when clicking on the hyper-link of a schematic or a PCB in ComPair.
Example : Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Monocarrier.
Clicking on the PCB hyper-link, automatically shows the PCB with a highlighted capacitor C2568. clicking on the schematic hyper-link, automatically shows the position of a highlighted capacitor C2568 at the schematic.

5.7.4 Connecting the ComPair interface

The ComPair Browser software should be installed and setup before connecting ComPair to the FTV1.9. (See the ComPair Browser Quick Reference Card for installation instructions):

1. Connect the RS232 interface cable to a free serial (COMM) port on the PC and the ComPair interface PC connector (connector marked with "PC").
2. Place the ComPair interface box straight in front of the television with the infrared window (marked "IR") directed to the television LED. The distance between ComPair interface and television should be between 0.3 and 0.6

meter. (Note: make sure that (also) in the service position, the ComPair interface infra red window is pointed to the standby LED of the television set (no objects should block the infra red beam)
3. Connect the mains adapter to the connector marked "POWER 9V DC" on the ComPair interface
4. Switch the ComPair interface OFF
5. Switch the television set OFF with the mains switch
6. Remove the rear cover of the television set
7. Connect the interface cable (4822 727 21641) to the connector on the rear side of the ComPair interface that is marked "I2C" (See Figure)
8. Connect the other end of the interface cable to the ComPair connector on the monocarrier (see figure 5.xx)
9. Plug the mains adapter in the mains outlet and switch ON the interface. The green and red LED's light up together. The red LED extinguishes after approx. 1 second (the green LED remains lit).
10. Start-up Compair and select "File" menu, "Open...:; select "FTV1.9 Fault finding" and click "OK"
11. Click on the < xxxxx > icon to switch ON the communication mode (the red LED on the Compair interface wil light up)
12. Switch on the television set with the mains switch
13. When the set is in standby. Click on "Start-up in ComPair mode from standby" in the ComPair FTV1.9 fault finding tree, otherwise continue.

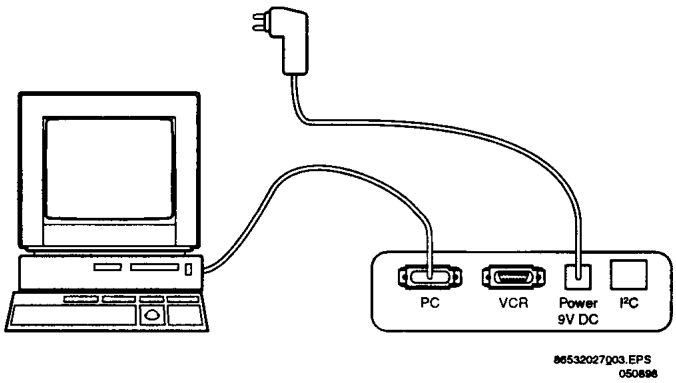

Figure 5-3

The set has now started up in ComPair mode. Follow the instruction in the FTV1.9 fault finding tree to diagnose the set. Note that the OSD works but that the actual user control is disabled

5.7.5 Preset installation

Presets can be installed in 2 ways with the FTV1.9.
- Via infra red
  - only sending TO the television
  - the rearcover does NOT have to be removed

Click on "File" "Open" and select "TV - use ComPair as DST" to use infra red
- Via cable
  - sending TO the television and reading FROM the television
  - the rearcover has to be removed

Click on "File" "Open" and select "FTV1.9 fault finding" to use the cable
Presets can be installed via menu "Tools", "Installation", "Presets".

5.7.6 Ordering ComPair

ComPair order codes:
- Starterkit ComPair + SearchMan software + ComPair interface (excluding transformer): 4822 727 21629
- ComPair interface (excluding transformer): 4822 727 21631
- ComPair transformer (continental) Europe: 4822 727 21632
- ComPair transformer United Kingdom: 4822 727 21633
- Starterkit ComPair software: 4822 727 21634
- Starterkit SearchMan software: 4822 727 21635
- Starterkit ComPair + SearchMan software: 4822 727 21636
- ComPair CD (update): 4822 727 21637
- SearchMan CD (update): 4822 727 21638
- ComPair interface cable (for FTV1.9): 4822 727 21641

1. Alignments

General: the Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5 'Service modes, faultfinding and repair tips'.

1.1 Alignment conditions

All electrical adjustments should be performed under the following conditions:

- Supply voltage : 220 - 240 VAC (+/- 10 %)
- Warm-up time: 10 minutes
- The voltages and oscillograms are measured in relation to the tuner earth.
- Test probe: Ri > 10MΩ Ci < 2,5 pF.

1.1.1 Selection of the SAM-menu

- By transmitting the "ALIGN" command with the RC7150 Dealer Service Tool, followed by password "3140" and < OK > button.
- Standard RC sequence 062596 (within OSD time-out) OSD
- By shorting test-point M28 and M29 on the AV Control panel on the monitor while switching on the set.

1.2 Adjustments on the D-box

1.2.1 Electrical Alignments

Pre-conditioner +5Vstby (PR3)
Connect a voltmeter to capacitor C2510 (PR2). With the aid of R3504 adjust the voltage to 5.2 V +/- 50 mV.

VsVa supply (FD)

Va-supply (Addressing of the PDP - FD1)
De-activated the PDP.
Connect a voltmeter to capacitor C2120 (FD1). With the aid of R3126 adjust the voltage to 55 V +/- 0.5 V.

Vs-supply (Sustain pulses - FD2)
De-activated the PDP.
Connect a voltmeter to capacitor C2020 (FD2). With the aid of R3026 adjust the voltage to 165 V +/- 0.5 V.

1.2.2 Software Alignments

White point

- Select the item "PDP test pattern" of the Service Alignment menu and set it to "ON.
- Select item " White point" of the Service Alignment menu.
- Enter the "white point" menu and adjust the value of one of the 4 submenu if necessary. Only the selected menu-item including its value remain on the screen when selected. The value has to changed within 5 seconds otherwise the main menu reappears again.

The 4 sub menu-items of the White point menu:

- "RED"
- "GREEN"
- "BLUE"
- "COLOUR TEMPERATURE"

- Leave the sub-menu by pressing "cursor up", "cursor down", "OK" or the "MenuOnOff" button and return to the main menu.
- Select the item "PDP test pattern" of the Service Alignment menu and set it to "OFF.

2. Circuit description and list of abbreviations

2.1 Circuit description

For a detailed description of the circuits see Training Manual FTV1.9 Display Box (3122 785 10036).

2.2 List of abbreviations

µP	Micro Processor
1FH	One time the line frequency for normal picture quality
2FH	Twice the line frequency for a better picture with less field flicker
2CS	2 Carrier Sound (sound system using two separate FM carriers at 5.5 MHz)
AARA	Automatic Aspect Ratio Adaptation
ADC	Analogue Digital Converter
ADJ	Adjust -
AFC	(S1) Automatic Frequency Control. Automatic fine-tuning circuit for signal reception.
AGC	Automatic Gain Control
AM	Amplitude Modulation
AMV	Automatic Multi Voltage
ANT	Antenna
AP	Asian Pacific region (Covering Hong Kong, Australia, Singapore etc.)
APC	Automatic Power Control
ASP	Aspect Ratio 4:3 or 14:9 or 16:9
AUD	Audio - GFL
AVB	Audio Video Buffer or Audio Video Blanking
BC	Beam current - GFL
BNC	Professional connector for higher frequencies
C	Centre
CINCH	Common connector for several kinds of signals
COMP	COMB-filter
CRT	Cathode Ray Tube
CVBS	Composite Video Blanking Synchronisation, video signal
DAC	Digital Analogue Converter
DEC	Decoder
DFB	Double Window Fast Blanking
DU	Double Window - U_signal
DV	Double Window - V_signal
DW	Double Window
DY	Double Window - Y_signal
E-Box	Electronic Box
EHT	Extra High Tension - GFL
ELPS	Eco Low Power Supply - GFL
EWD	East West Drive - GFL
EXT	External
FBL	Fast Blinking
FBX	Feature Box
FE	FrontEnd
FM	Frequency Modulation
FMS	Functional Module Specification
FRNT	Front
FRS	Functional Requirement Specification
FTV	Flat TeleVision
GFL	Global Feature Line (high end TV chassis)
GFL-FL	GFL Feature (up)Lift
GND	Ground
HFB	Horizontal FlyBack (display system sync. pulse)
HP	Headphone
HSI	Hardware Software Interface
HW	HardWare
I/O	Input / Output
I2C	IC bus, Inter Integrated circuit, on-board communication line
IF	Intermediate Frequency
IRQ	Interrupt ReQuest.
L	Left
L_CL VL	Left_Constant_Level Variable_Level
L_REC SEL	Left_Record_Select
LED	Light Emitting Diode
LP	Low Pass
LTP	Luminance Transient Processor
MAC	(Apple) MACintosh
MAC13	or MACII (Apple) MACintosh format for 13" monitors
MACP	Motion Adaptive Colour Plus
ML-2	Media Line 2
Monitor	PDP Display with all the electronic boards (incl. self developed boards).
MU	Main U_signal
MV	Main V_signal
MY	Main Y_signal
NICAM	Near Instantaneous Companding Audio Multiplex (digital terrestrial sound
NTSC	National TV Standard Committee
OE	(AQ) Output Enable
PAL	Phase Alternating Lines (Colour video standard)
PDP	Plasma Display Panel
PIP	Picture In Picture
PLL	Phase Locked Loop
POR	Power On Reset / Power Off Reset (depending on context)
QPSK	Quadruple Phase Shift Keying
R	Right
RAM	Random Access Memory
RC5	Remote Control 5 (infrared signal transmission protocol)
RECEI-RC5	Received RC5-code
REF	Reference
RES	Resistor
RGB	Red Green Blue, video signals
SC-1FH	Sandcastle 1FH
SCL	Serial Clock Line of the IC bus
SDA	Serial Data Line of the IC bus
SECAM	SEquential Couleur A Memoire (Colour video standard)
SIF	Second Intermediate frequency
SND	Sound
SOG	Sync On Green
SP_GAIN	Splitter GAIN
SPHsync	Splitter Horizontal Sync
SPVsync	Splitter Vertical Sync
SSP	Small Signal Panel (of the GFL chassis)
STBY	Standby
SW	SoftWare / SubWoofer (depending on context)
SYNC	Synchronisation
SYS	System
Terr	Terrestrial
TP	Testpoint
TRASN	(AQ)
TSD	Terrestrial Sound Decoder (combination of 2CS and NICAM decoder)
TUN	Tuner

TXT	TeleteXT
TXT-KILL	Teletext killer (Signal to disable Teletext)
U-VIDCONTR	U-VideoContrast
VCO	Voltage Controlled Oscillator
VD	Vertical Drive
VGA	Video Graphics Array. In this document, the term VGA is used for all VGA
WE	Write Enable
Xtal	Crystal (Oscillator)
Y/C	Luminance (Y) signal / Chrominance signal (C)
YUV	Combination of colour difference signals