PSSG

PHILIPS SERVICE SOLUTIONS GROUP

FTV1.9 DISPLAY PANEL AND E-BOX TRAINING MANUAL

PLASMA DISPLAY

E BOX

PHILIPS TECH TRAINING
VIDEOTAPES MANUALS

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INTRODUCTION

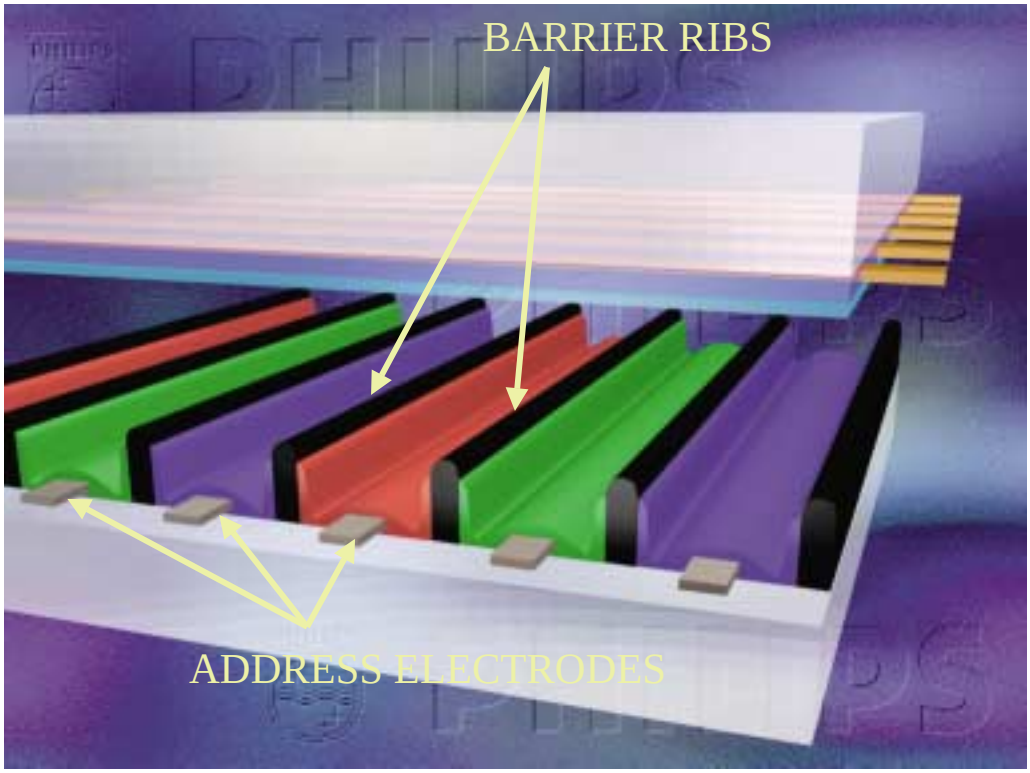
The FTV1.9 Chassis has a 42 inch diagonal display which uses Plasma Display technology. The Receiver or E-Box contains the Tuning System and AV inputs. The E-Box and Display are designed to work together. Both can be operated alone.

Both the Display and E-Box have IR inputs to allow operation of the units by Remote. The Display can only be operated by a Remote Control. When the E-Box is connected to the Display, the IR Receiver in the E-Box is disabled unless the unit is placed in the Service Mode. When the E-Box is connected to the Display, the AV inputs on the Display are disabled. The Display cannot be placed in the Service Mode while the E-Box is connected.

The Display has a VGA in, a VGA out which is a loop though from the VGA in, two composite inputs, and one Y Cr Cb component inputs. The AV inputs, which are the two composite inputs and the Component input, become active when the Display is operated alone.

PLASMA DISPLAY

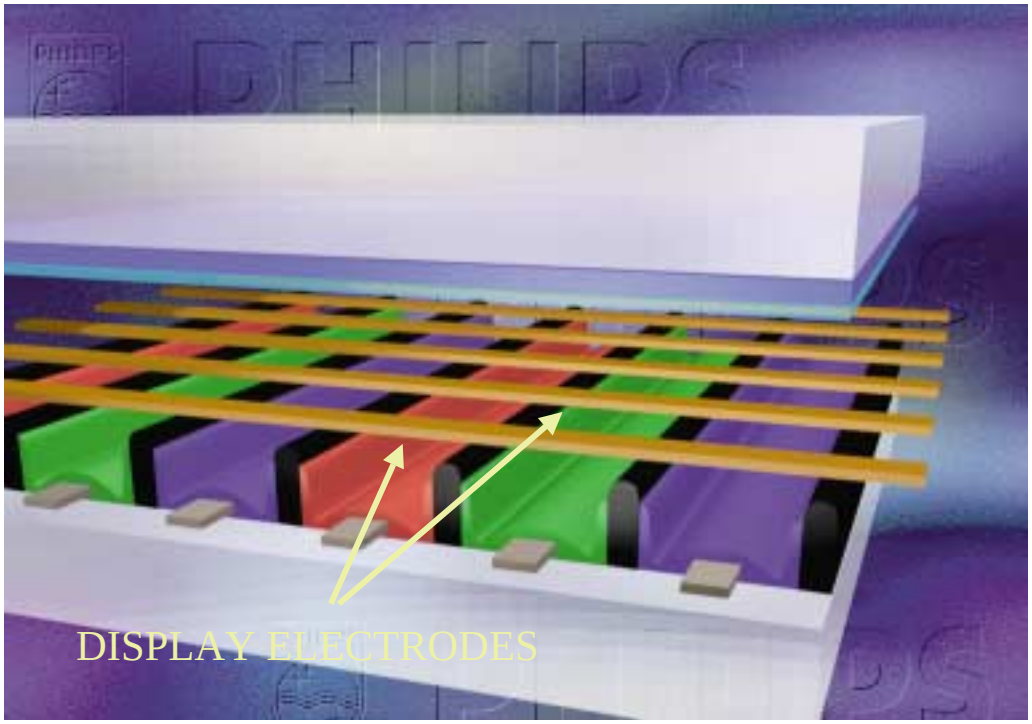
The Display has a resolution of 852 x 480 pixels. The Display consists of a series vertical repeating Red, Green, and Blue phosphor strips. These strips are separated by Barrier Ribs that are activated by Address Electrodes.



Display Electrodes are placed over the channels in the Horizontal direction.

The Display is then covered by a glass plate.

A voltage is applied to the Red, Green, and Blue Address Electrodes corresponding to the desired brightness and color of the displayed pixel. A Voltage is then applied to the Display Electrode for the line that the pixel is to be displayed.



NOTES:

POWER SUPPLY

Power Supply Block (Figure 1)

AC power for the Display is applied to the Line Conditioner panel. The Line Conditioner panel has the 5 volt Standby supply, On/Off Relays, and a Boost Regulator. The 5 volt Standby supply is present whenever power is applied to the unit. The Standby voltage is routed through the VS-VA panel, AV Control panel, to the Switch panel. When the Power Switch on the Switch panel is turned On, the 5 volts Standby supply is applied to the Microprocessor on the AV Control panel, Switching circuits on the VS-VA supply panel, and the Control circuits on the Line Conditioner panel.

When the set is turned On, the Standby line from the Microprocessor goes Low. The Error Detect circuit on the VS-VA Supply panel switches the Standby line to the Line Conditioner panel High. The Control circuit on the Line Conditioner panel switches the Relays On, applying power to the Boost Regulator circuit. This circuit outputs 380 volts dc to the VS and VA supplies on the VS-VA Supply panel. The VS supply output 180 volts to the Sequencer panel and then to the Plasma Display. The VA supply outputs a 65 volt supply for the Plasma Display, a 17 volt supply for the Fan circuits and the secondary regulators. It also outputs a plus and minus 19 volt supplies to the Audio Amplifier circuits. The 17 volt supply feeds a 5.2 and 8.6 volt regulators.

NOTES:

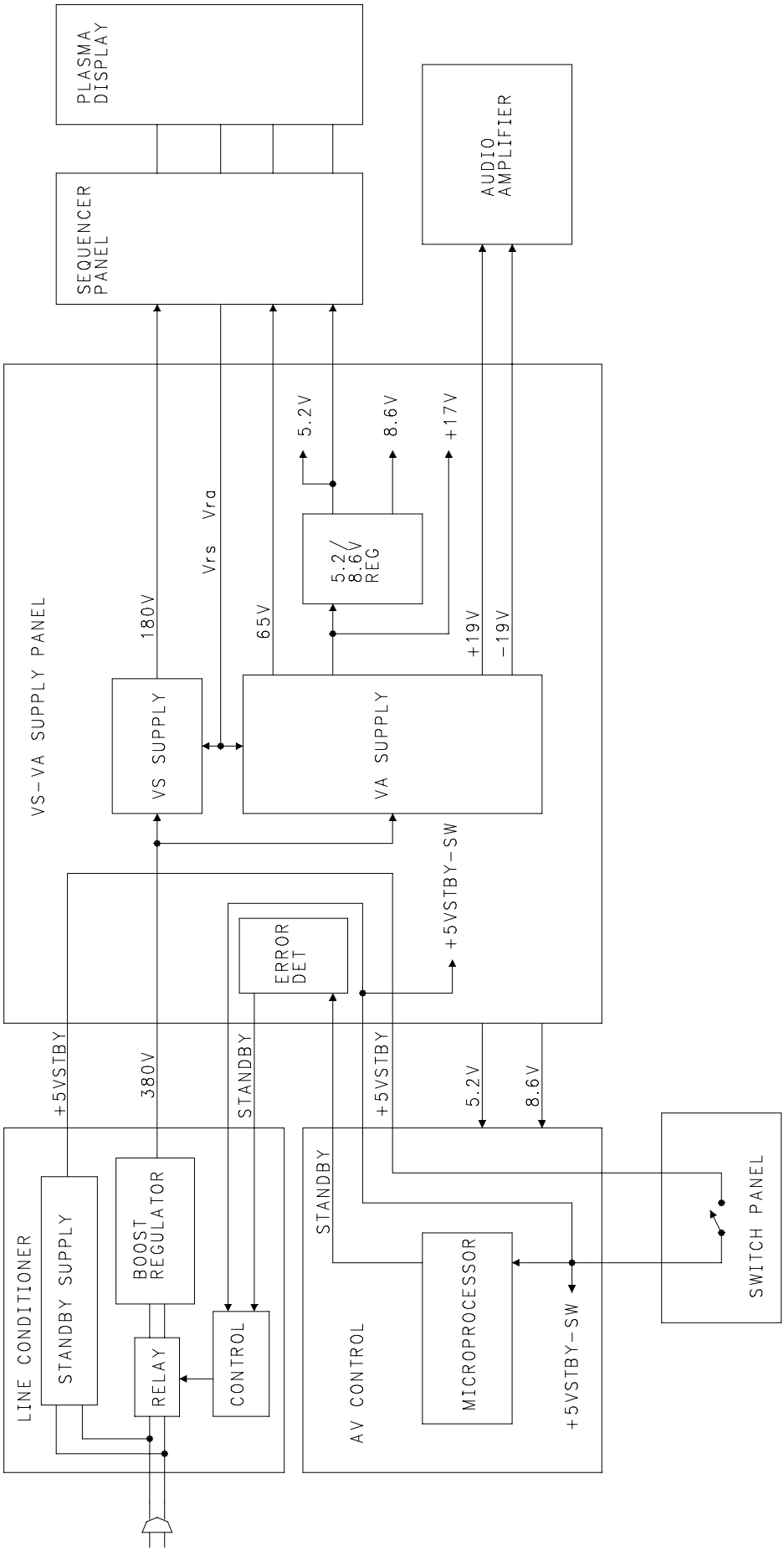


FIGURE 1 - POWER SUPPLY BLOCK

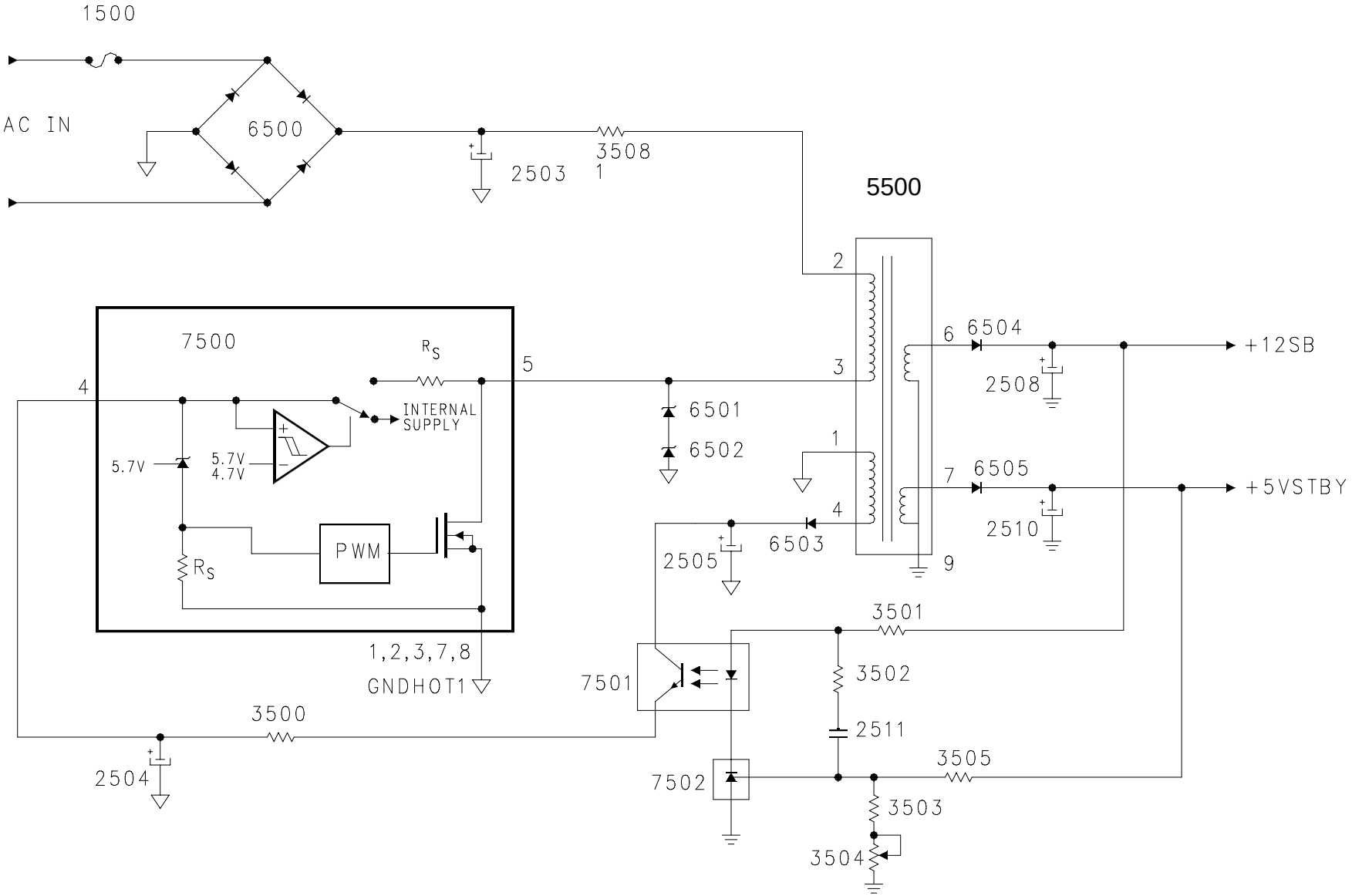


FIGURE 2 - STANDBY POWER SUPPLY

Standby Power Supply (Figure 2)

The Standby Power Supply produces a +5 Volt Standby and a +12 volt Standby supplies. This is a Pulse Width type switching power supply. Power is applied to this circuit when power is applied to the unit. This Supply is located on the Pre-Conditioner panel. When Power is first applied to the circuit, the internal switch in 7500 applies a charging voltage to 2504, which is connected to Pin 4. When 2504 charges to 5.7 volts, the internal switch switches to internal. Capacitor 2504 is now supplying power to the PWM. The internal switch then drives the internal FET to drive transformer 5500. 7500 continues to drive the transformer until 2504 discharges to 4.7 volts. Capacitor 2504 is again charged and the cycle is then repeated. When the secondary 5 volt supply reaches the correct voltage, 7502 is turned on, driving the opto-isolator 7501. Voltage from the Hot secondary is rectified by 6503 and applied to 7501. Voltage from 7501 then keeps 2504 charged to 5.7 volts. An internal Zener Diode, inside 7500, keeps the voltage at 5.7 volts. Regulation is accomplished via the shut regulator 7502, opto-isolator 7501, and the internal current sensing resistor in 7500. If the 5 volt supply increases, the shunt regulator drives 7501 harder causing an increased voltage drop across the internal sensing resistor Rs inside 7500. The PWM will then reduce the On time in the internal FET, reducing the output voltage.

POWER ON CIRCUIT

When the mechanical On/Off switch is turned On, the 5 volts Standby voltage is switched to the +5VSTBYSW-REL and +5VSTBYSW lines. (Figure 3) When the Power is turned On via the Remote Control, Pin 1 of the Microprocessor, 7001, goes Low. This switches 7370 Off. The Supply On line then goes High via the +5VSTBYSW line. If one of the Shutdown circuits is activated, 7371 is turned On which turns 7370 On, turning the set Off.

The +5VSTBYSW and Supply On lines are fed to the Line Conditioner panel. (Figure 4) There is a two stage turn On to supply power to the Line Conditioner circuit. When the Supply On line goes High, 7681 turns On, switching relay 5680 On. Capacitor 2683 provides a short delay for the turn On of 7684 and 7690 which turns relay 5690 On. The Line Conditioner circuit provides 380 volts dc to the VS-VA Power Supplies.

The VS and VA supplies are Frequency controlled supplies. (Figure 5) The output transformer, 5002, and related components form a Resonant circuit. As the Frequency of the supply approaches the resonant frequency of the output circuit, the output voltage increases. When the unit is turned On, 380 volts dc form the Line Conditioner circuit is applied to the switching FET, 7005. A Startup voltage is applied to Pin 15 of 7001. The Variable Frequency Oscillator drives transformer 5001 which drives the output switches, 7005 and 7006. A Feedback Error voltage from the secondary controls the Variable Frequency Oscillator to control the Output voltage. The Fault Detect latch is activated if a problem is detected on the secondary. The VA Supply is identical to the VS supply.

The VS supply outputs a 180 volts supply for the Plasma Panel. (Figure 6) Secondary voltage on Pins 13 and 12 of 5002 is rectified by 6020 to produce the 180 volt supply. Feedback for the Error Amplifier to regulate the supply is accomplished by sampling the 180 volt supply and by a feedback Vrs signal from the Plasma Panel. The 180 volt supply is sampled by 3024, 3025, and 3026. The sampled voltage feeds shunt regulator 7010 which drives the opto-isolator 7002. Feedback voltage from the Plasma Display feeds shunt regulator 7011, which also drives 7010. The Feedback circuit is powered by voltage from Pin 14 of 5002.

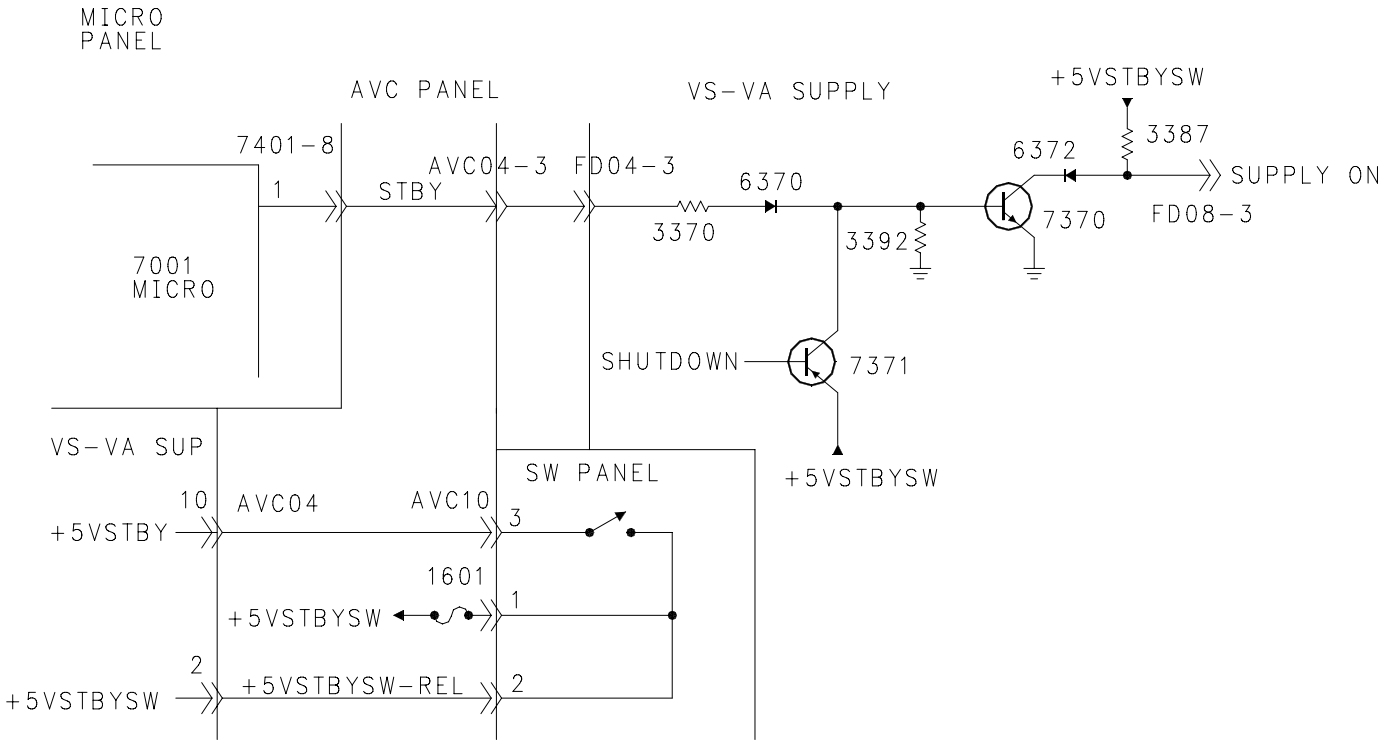


FIGURE 3 - POWER ON CIRCUIT

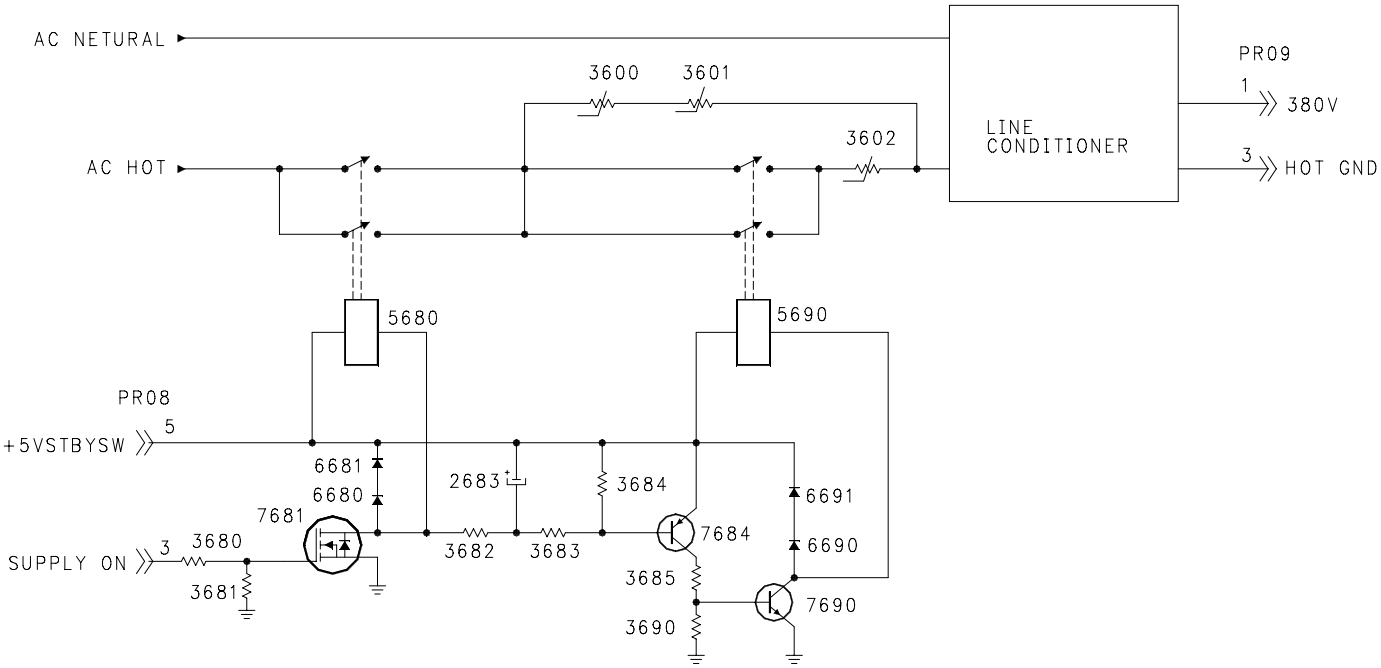


FIGURE 4 - LINE CONDITIONER POWER ON

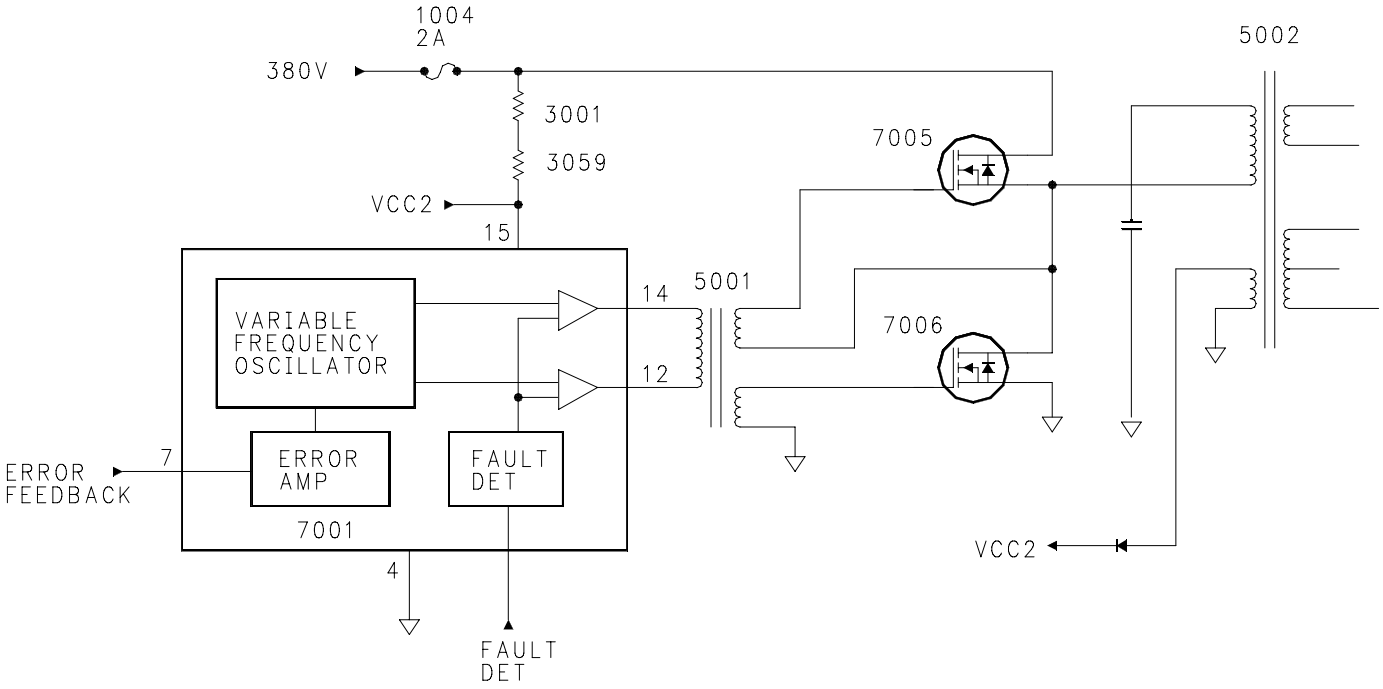


FIGURE 5 - VS SUPPLY BLOCK

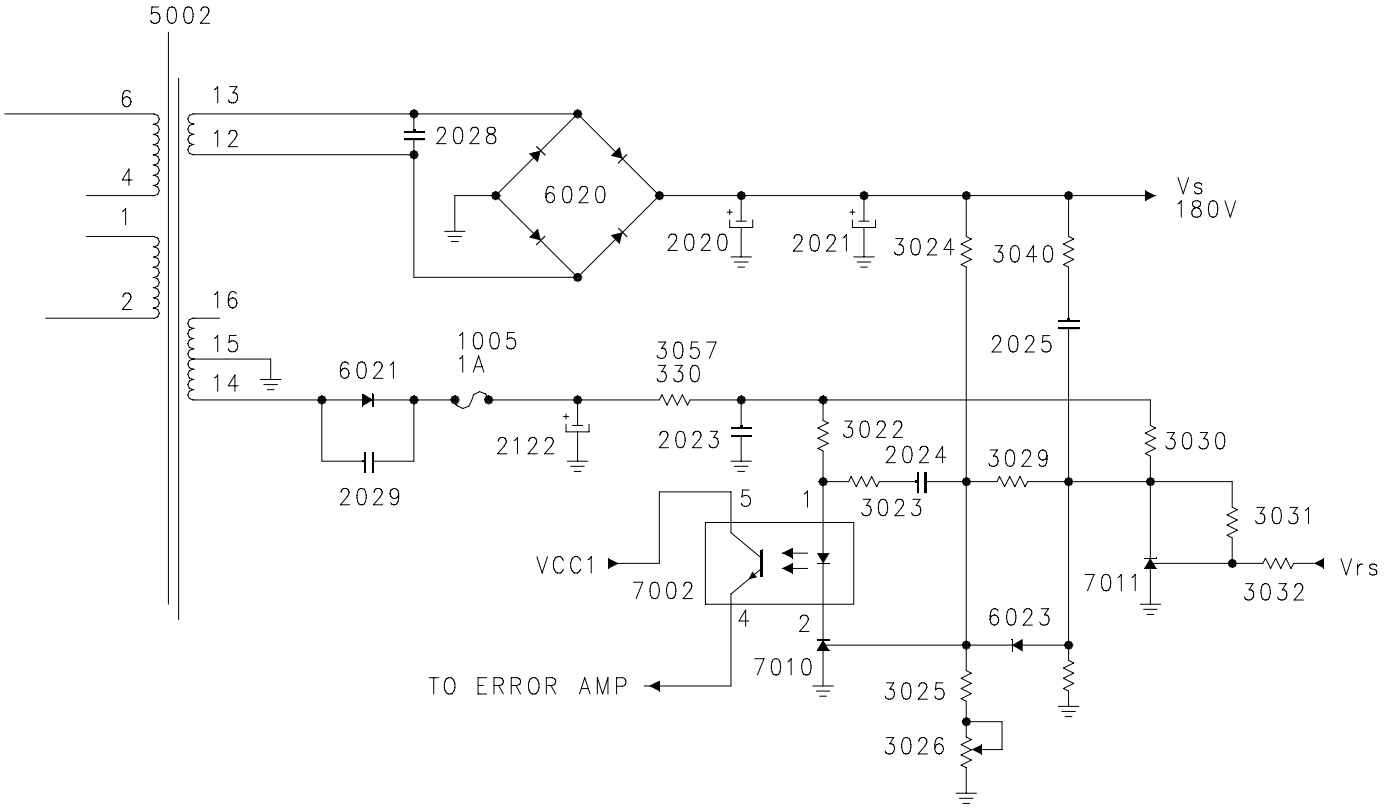


FIGURE 6 - VS SUPPLY OUTPUT

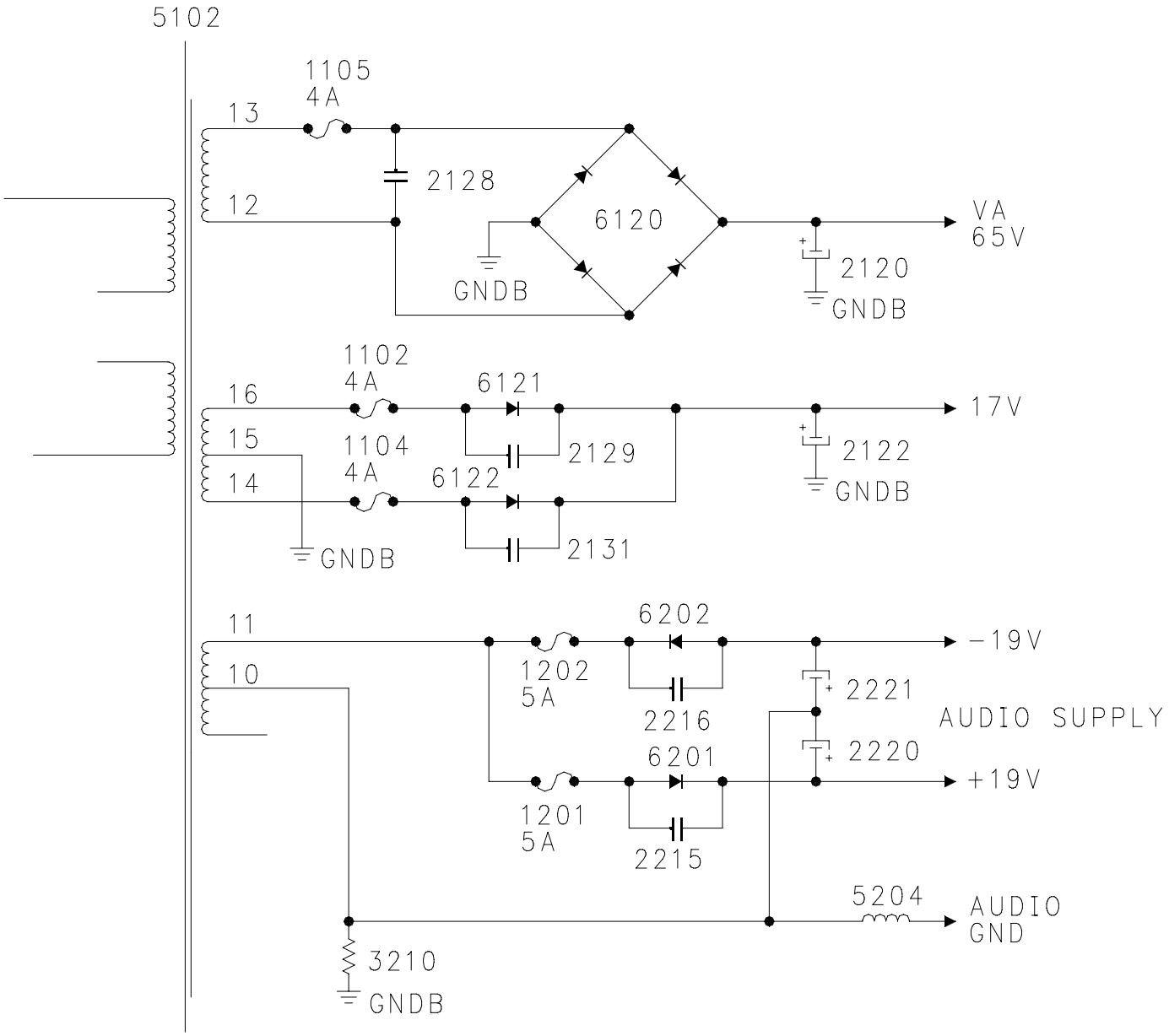


FIGURE 7 - VA SUPPLY OUTPUT

Voltage from Pins 13 and 12 of 5102 are rectified by Bridge 6120 to produce the 65 volt VA supply. (Figure 7) Voltage from Pins 16 and 14 are rectified by Diodes 6121 and 6122 to produce the 17 volt supply. Voltage from Pin 11 is rectified by 6202 to produce the minus 19 volt supply. Diode 6201 rectifies voltage from Pin 11 to produce the plus 19 volt supply. These voltages are used to power the Audio Amplifier. When checking voltages in the Audio circuit, use the Audio Ground. If either of the plus or minus 19 volt supplies are lost, the Audio Protection circuits will shut the set down. These circuits are discussed later in this manual.

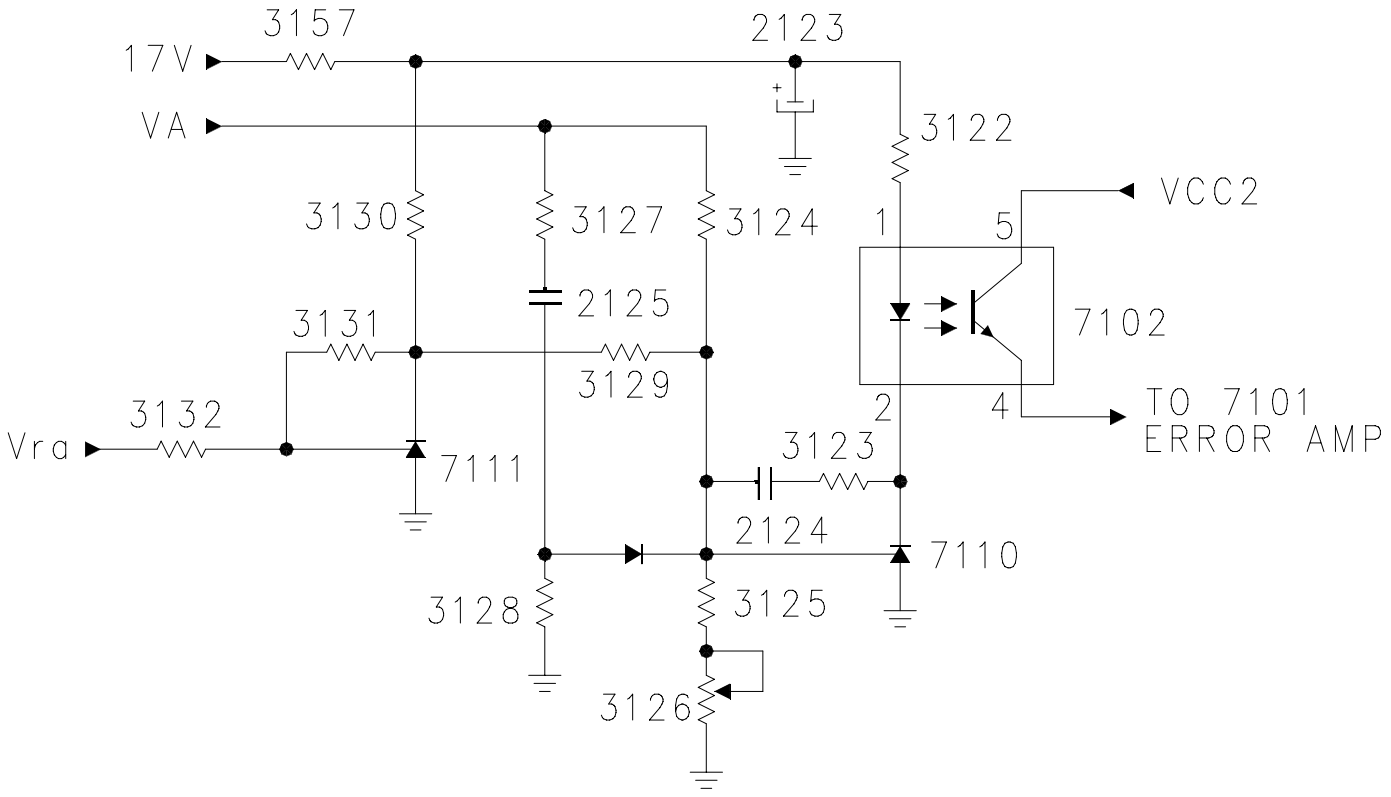


FIGURE 8 - VA REGULATION FEEDBACK

The 65 volt supply is used as a reference voltage for the VA supply. (Figure 8) The VA supply is sampled by resistors 3124, 3125, and 3126 to produce a reference voltage to drive Shunt Regulator 7110. Variable Resistor 3126 is used to set the VA supply to the correct voltage. Additional control for the supply from the Plasma Display is fed to Shunt Regulator 7111 via the Vra voltage. Regulator 7111 drives 7110. If the Vra voltage is missing, the set will go into shutdown. The 17 volt supply powers the Feedback circuit. Regulator 7110 drives the opto-isolator 7102 which provides a correction voltage to the Error Amp in 7101.

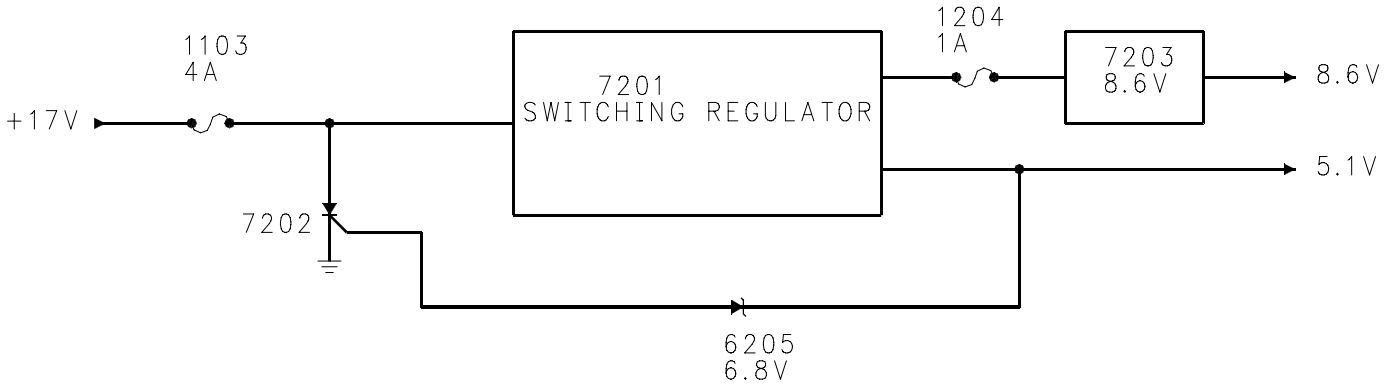


FIGURE 9 - 5.1 AND 8.6 VOLT SUPPLY BLOCK

The 17 volt supply feeds the Switching Regulator 7201 which produces the 5.1 volt source. (Figure 9) The output of the Regulator also feeds the 8.6 volt regulator 7203. If the 5.1 volt source reaches 7.4 volts, Zener diode 6205 will conduct, switching SCR 7202 On. This will cause fuse 1103 to open. The failure of these supplies will cause the set to shut down.

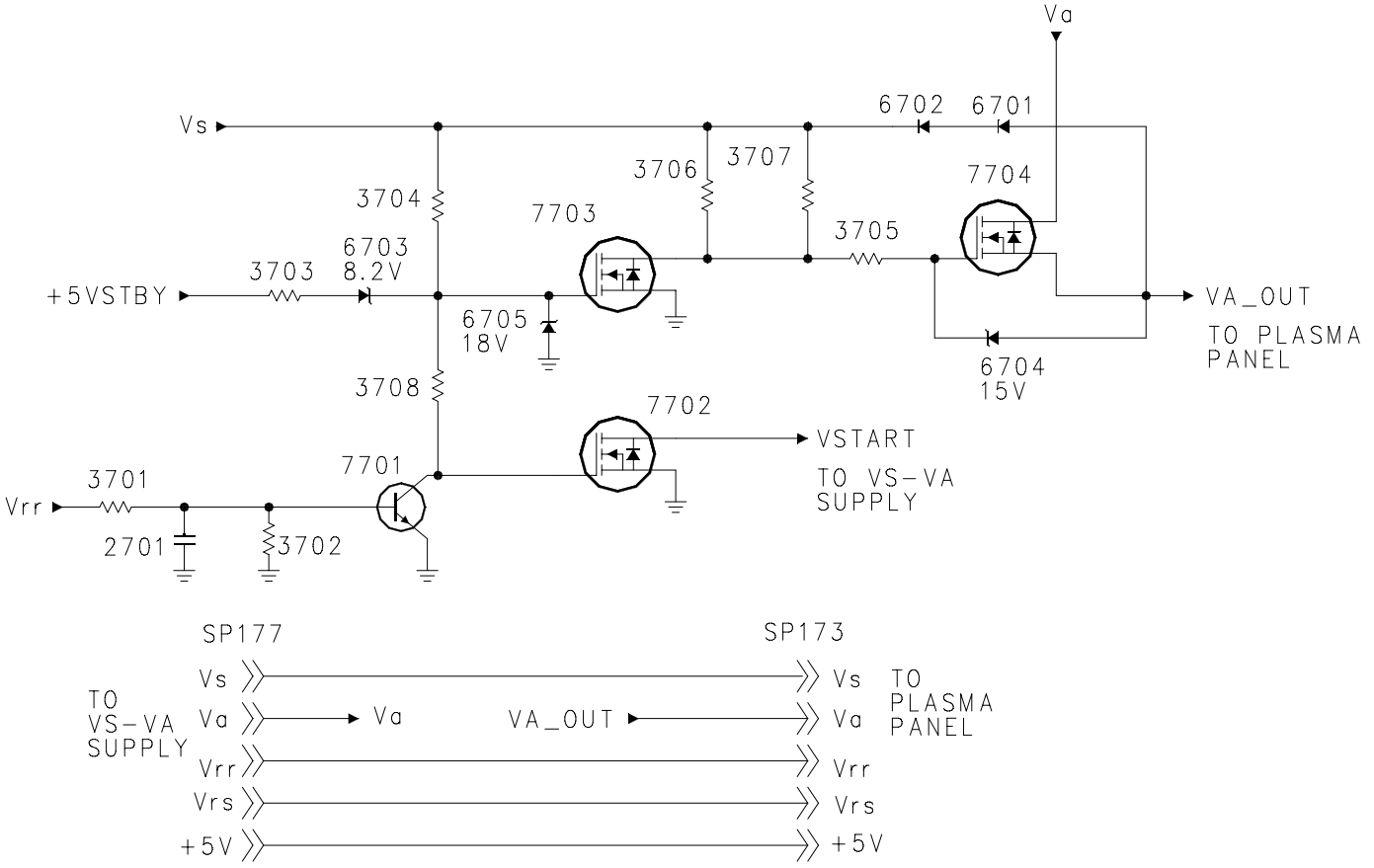


FIGURE 10 - SEQUENCER PANEL

The VS and VA supplies are fed to the Sequencer panel. The Vrr signal from the Plasma Display is monitored by the Sequencer Panel. (Figure 10) If there is a problem on the Plasma Display, the Vrr line will go Low. Transistor 7701 will turn Off. This will cause transistors 7702 and 7703 to turn On. The VSTART line will go Low which will shut the VA Supply down. This will cause the set to shut down and generate an error code. Transistor 7704 will also turn Off, shutting Off the VA supply to the Plasma Display.

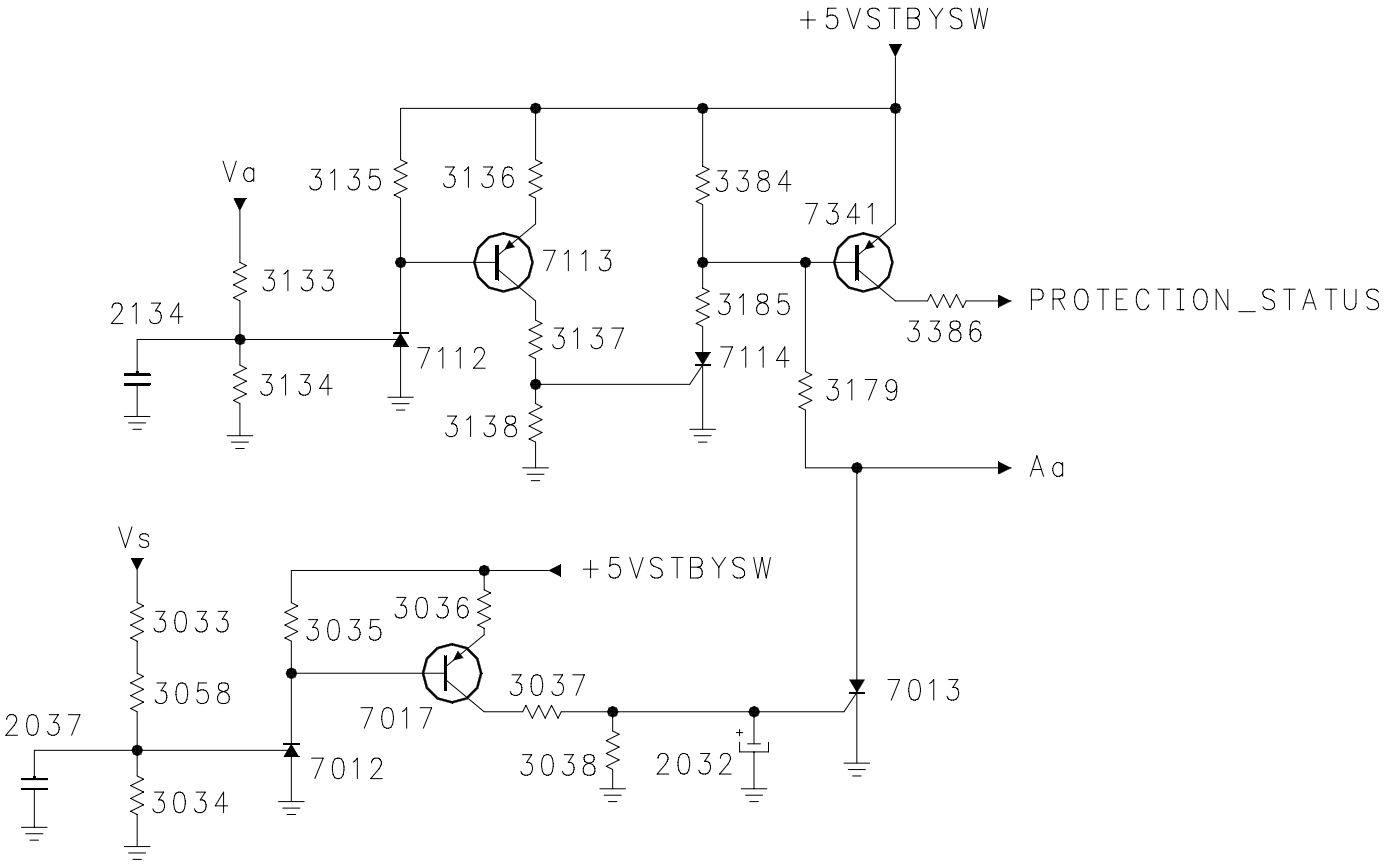


FIGURE 11 - OVERVOLTAGE PROTECTION

The VS and VA supplies are monitored for overvoltage. If the 65 volt VA supply goes High, the input to Shunt Regulator 7112 will go to 2.5 volts, causing 7112 to conduct. This turn on 7113 which will turn On SCR 7114 which will cause the Aa line go Low. In addition, Transistor 7341 will turn On, switching the Protection Status line High. If the VA supply reaches 67.75 volts, the set will go into shutdown. The VS supply is sampled by resistors 3033, 3058, and 3034. If the VS supply reaches 198 volts, the input to Shut Regulator 7012 will go to 2.5 volts, turning 7012 On. This will turn On 7017 and SCR 7013. The Aa line will go Low, turning the set Off.

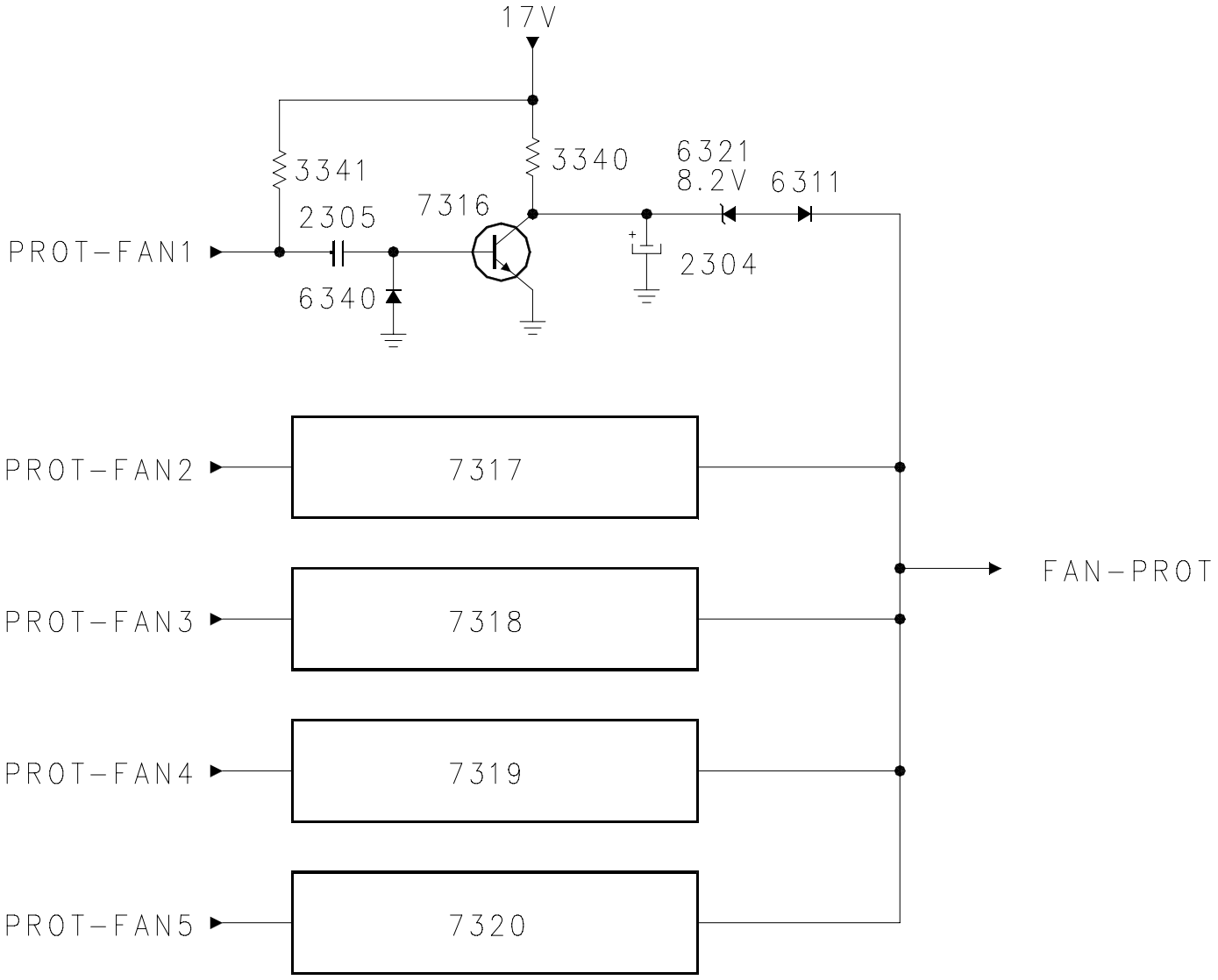


FIGURE 12 - FAN PROTECTION CIRCUIT

To prevent damage to the Plasma Display, the Fans are monitored to ensure that they are all working. (Figure 12) If any of the Fans should fail, the set will go into shutdown and error code will be generated by the Microprocessor. When the Fans are operating, Transistors 7316, 7317, 7318, 7319, and 7320 are turned On. This keeps the FAN-PROT line Low. If any of the Fans fail, the Transistor monitoring that fan will turn Off. When the collector reaches 9.4 volts, the FAN-PROT line will go to 0.6 volts activating the Shutdown circuits.

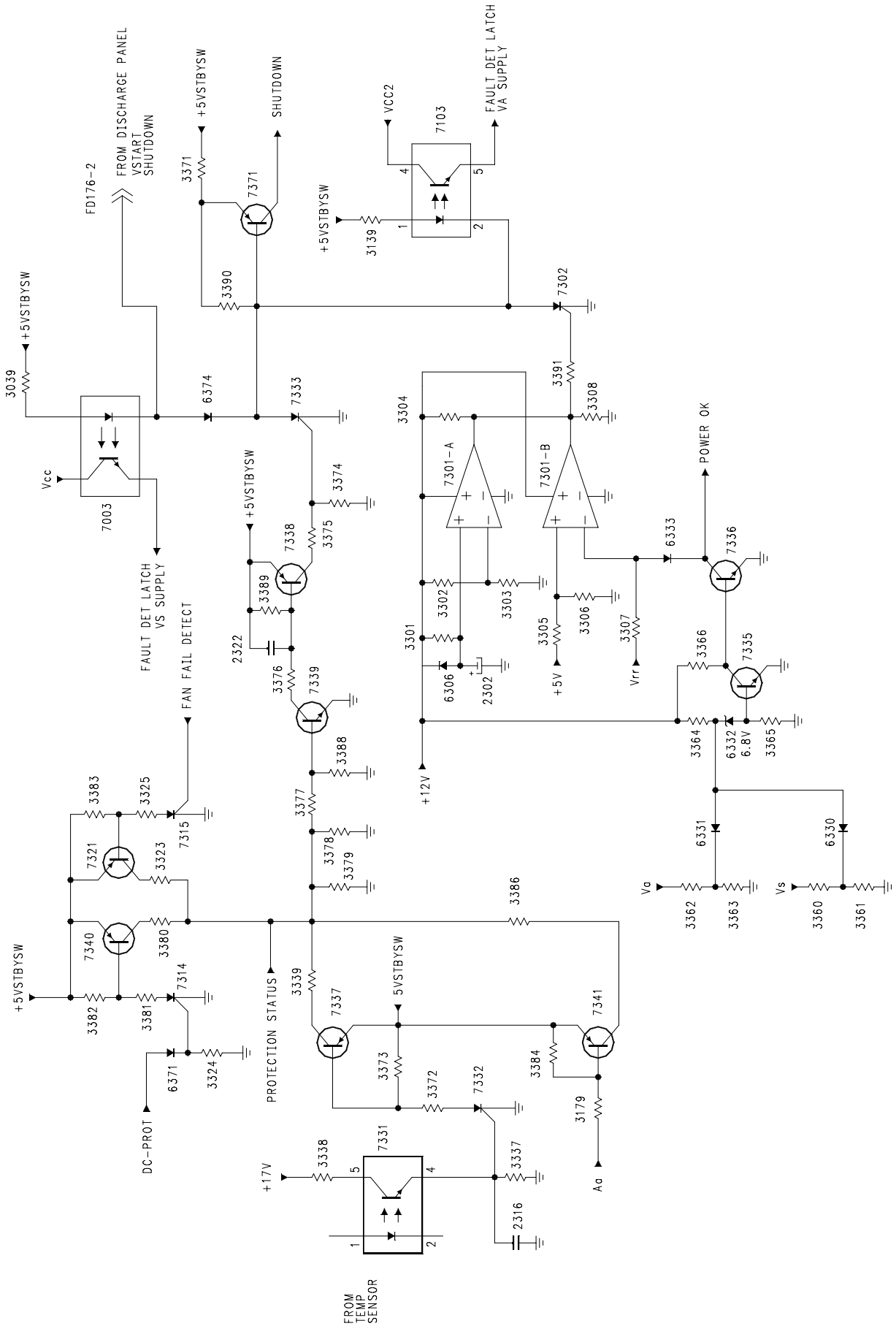


FIGURE 13 - SHUTDOWN CIRCUITS

SHUTDOWN

As shown in Figure 3, the Shutdown circuit turns the set Off in the event of a failure which could damage the set. (Figure 13) If one of the Fans should fail, the Fan Fail Detect circuit will go High turning SCR 7315 On. This will turn 7321 On, turning 7339 On, turning 7338 On, turning SCR 7333 On, which will turn 7371 On. This will turn the set Off. If a problem develops in the Audio circuit, the DC-PROT line will go High, causing the same switching action, which will cause the set to shut down. A thermistor on the Line Conditioner panel monitors for an excessive temperature problem. If this circuit senses a problem, the opto-isolator 7331 will conduct, turning SCR 7332 On. This will turn 7337 On, causing the set to shut down. If the Aa line, shown in Figure 6, goes Low, 7341 will turn On, which will turn 7339 On, causing the set to shut down. If the PROTECTION STATUS line goes High, the set will shut down.

The VS and VA supplies are monitored for any negative spikes by 3362, 3363, 3360, and 3361. If any negative spikes occur, 7335 will turn Off, 7336 will turn On. The output of 7301-B will then go High turning SCR 7302 On, causing the set to shut down. The Vrr voltage from the Plasma display is also monitored by 7301-B. If this voltage drops, 7301-B goes High, shutting the set Off.

Connector FD176, Pin2 is connected to the Sequencer Panel (This panel may also be labeled Discharge Panel). On the Sequencer panel, this line is labeled V-Start. If this line goes Low, opto-isolator 7003 turns On. This causes the Fault Detect Latch line to the VS supply to go High, shutting the supply Off.

PLASMA PANEL VIDEO SIGNAL FLOW

When the Display panel is used without the E-Box, Composite and Component inputs to the panel are via the INPUT panel. (Figure 14) If the input is a NTSC Component input signal, the Y Cr Cb signals are buffered by 7020, 7014, and 7025. These signals are fed to the YUV to RGB matrix. This signal is then fed to 7013, Signal Processor. There are two Composite inputs to the panel. The Comb Filter IC 7080 selects the desired Composite input. YC from the Comb Filter is fed to switch IC 7095 which selects between the Comb Filter and the SVHS input. The selected YC signal is then fed to the Signal Processor. This signal is then converted to a YUV and then to an RGB signal inside the Signal Processor. The Signal Processor then selects RGB from the Component input or from 7095. RGB is then output to the Audio Video Control panel. The Signal Processor also separates Horizontal and Vertical Sync which is also fed to the Audio Video Control panel.

The E-Box provides signal and communication to the Display via the VGA in connector, AVC32. (Figure 15) The RGB signal is also routed to the VGA-OUT connector, allowing more than one Plasma Panels to be connected. For troubleshooting purposes, a computer monitor can also be connected to this port.

The RGB signal is fed to 7360 which switches between the VGA-IN and RGB from the YC panel. The RGB signal is then fed to 7300 which provides clamping, brightness, and contrast control. This signal is then buffered and sent to the PDP Limesco panel. Black Level Feedback signals, FB-R, FB-G, and FB-B are provided by the Gamma Amplifier on the PDP Limesco panel. This is to insure proper dc coupling between the two panels.

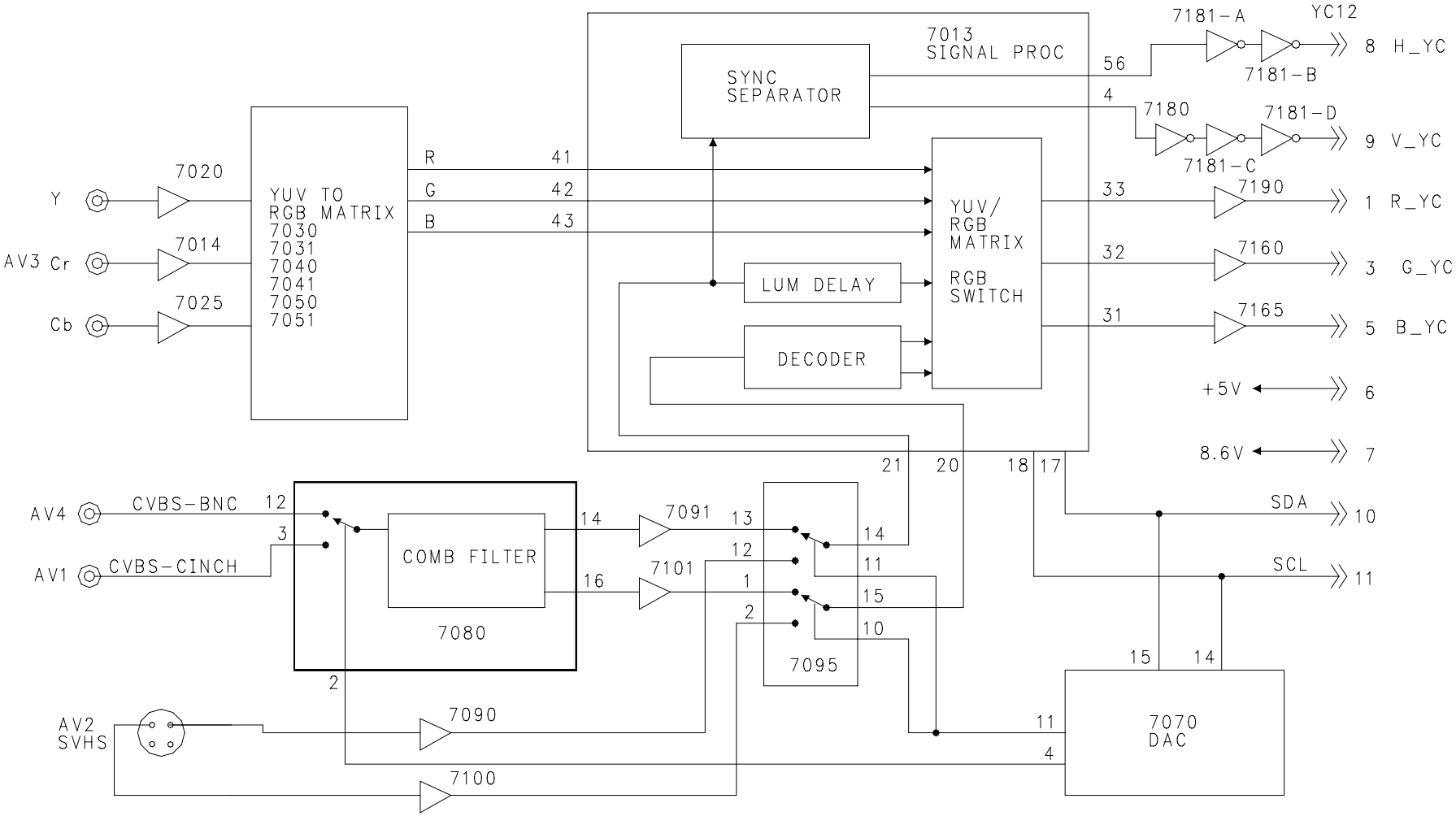


FIGURE 14 - INPUT PANEL

NOTES:

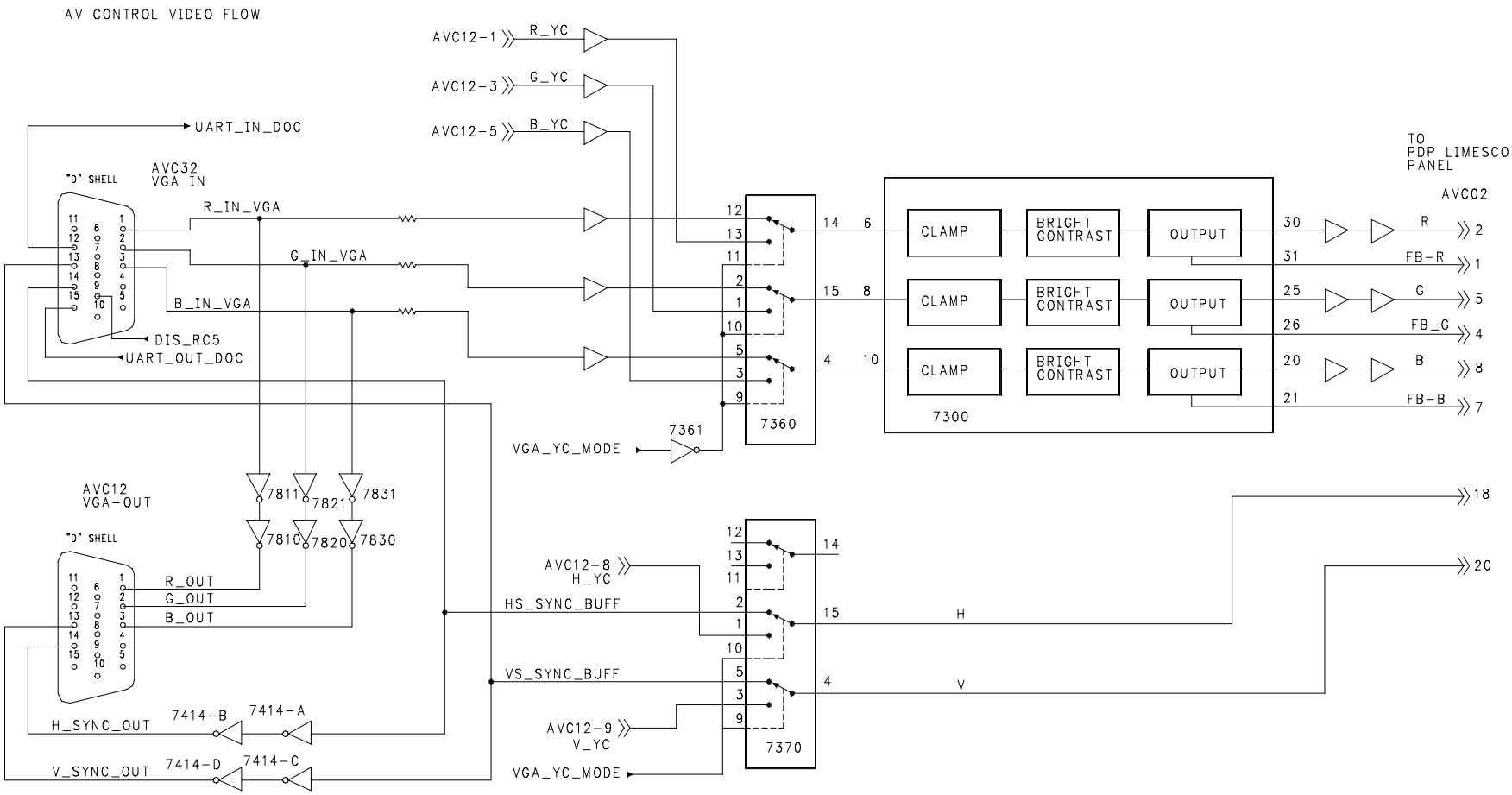


FIGURE 15 - AVC PANEL VIDEO PROCESSING

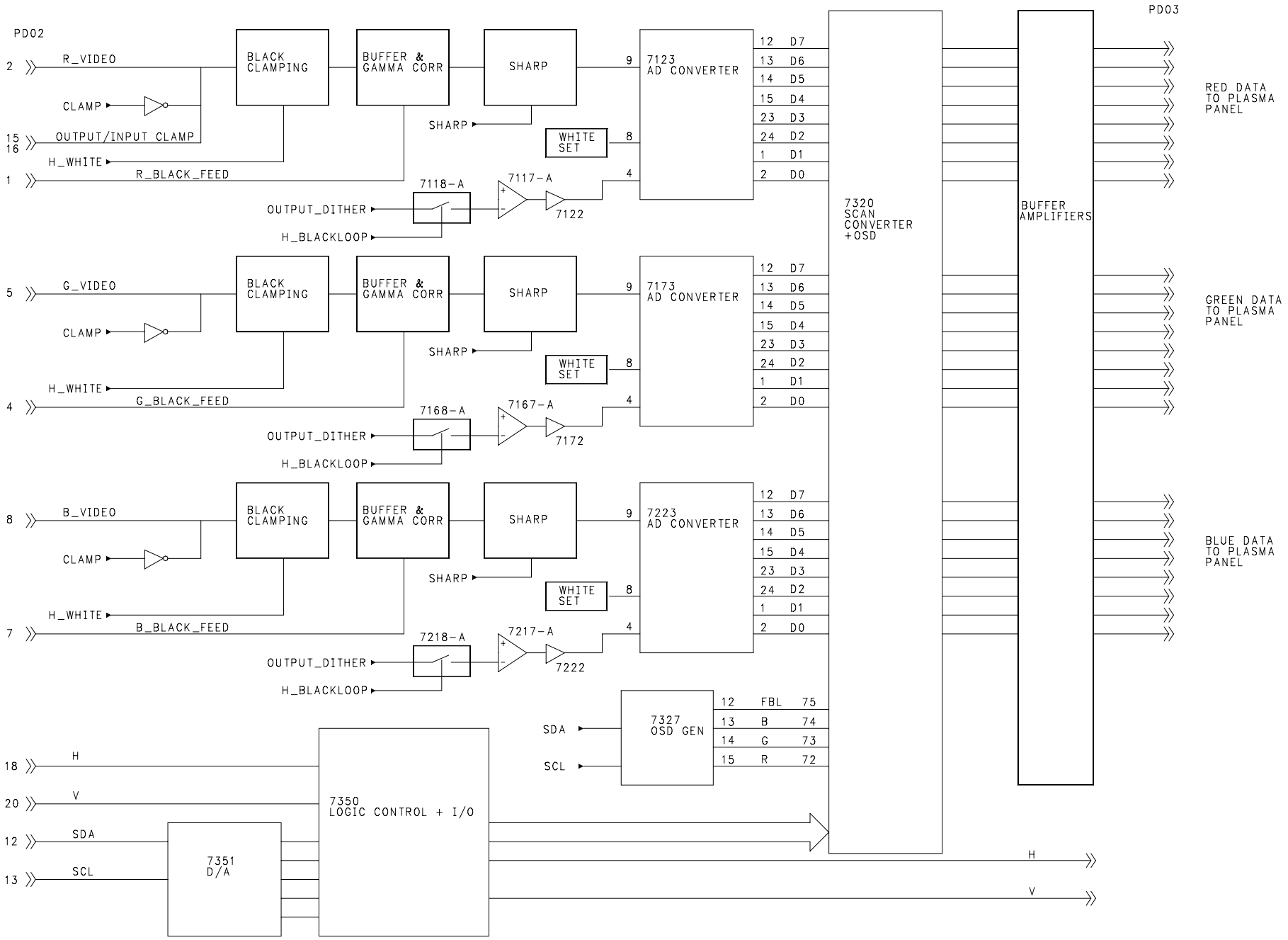


FIGURE 16 - PDP LIMESCO VIDEO

The RGB signals are fed to the PDP Limesco panel. (Figure 16) The signals are fed to a Black Clamping circuit and then to a Gamma Correction circuit. The H_White input controls the gain and Black Clamping level by switching an AGC circuit On or Off. Since the Plasma Display is a Linear display, Gamma must be corrected to Linear to obtain the correct brightness levels across the screen. The Gamma in normal broadcast signals are made non-linear so as to display correctly on a CRT. The Sharpness circuit serves as an anti-aliasing filter to obtain optimal picture sharpness. If a lower sample rate is required, the Low Pass filter is switched in to reduce the High Frequency component of the signal.

The Signals are then fed to their respective A/D (Analog to Digital) converters. The RGB Signals are converted an 8 bit 256 sample level digital signal. The White Set on Pin 8 determines what voltage level will be the value for FF. The input on Pin 4 determines what voltage level will be the value for 00. This level is determines by the OUTPUT_DITHER signal. The H_BLACKLOOP signals can switch off the OUTPUT_DITHER signal to fix the value on Pin 4.

The 8 bit output from the RGB circuits are fed to the Scan Converter. 7327 develops the On Screen Display, which is also fed to the Scan Converter. The Scan Converter adds the OSD and digital Video. It also converts the signal to the desired aspect ratio. VGA, VGA Wide, and 4x3 aspect ratios are possible in this circuit.

The outputs of the Scan Converter are fed to their respective Buffer Amplifiers and then sent to the Plasma Display Panel.

The Logic Control circuit provides control signals for the Scan Converter and processes Horizontal and Vertical Sync which are sent to the PDP.

When connecting a Computer to the Display, it should be noted that the PDP does not accept Horizontal frequencies above 33.7 kHz (SVGA) or vertical refresh rates above 72 Hz. The PDP Limesco panel converts the higher frequency inputs to the lower rates which the Display can handle.

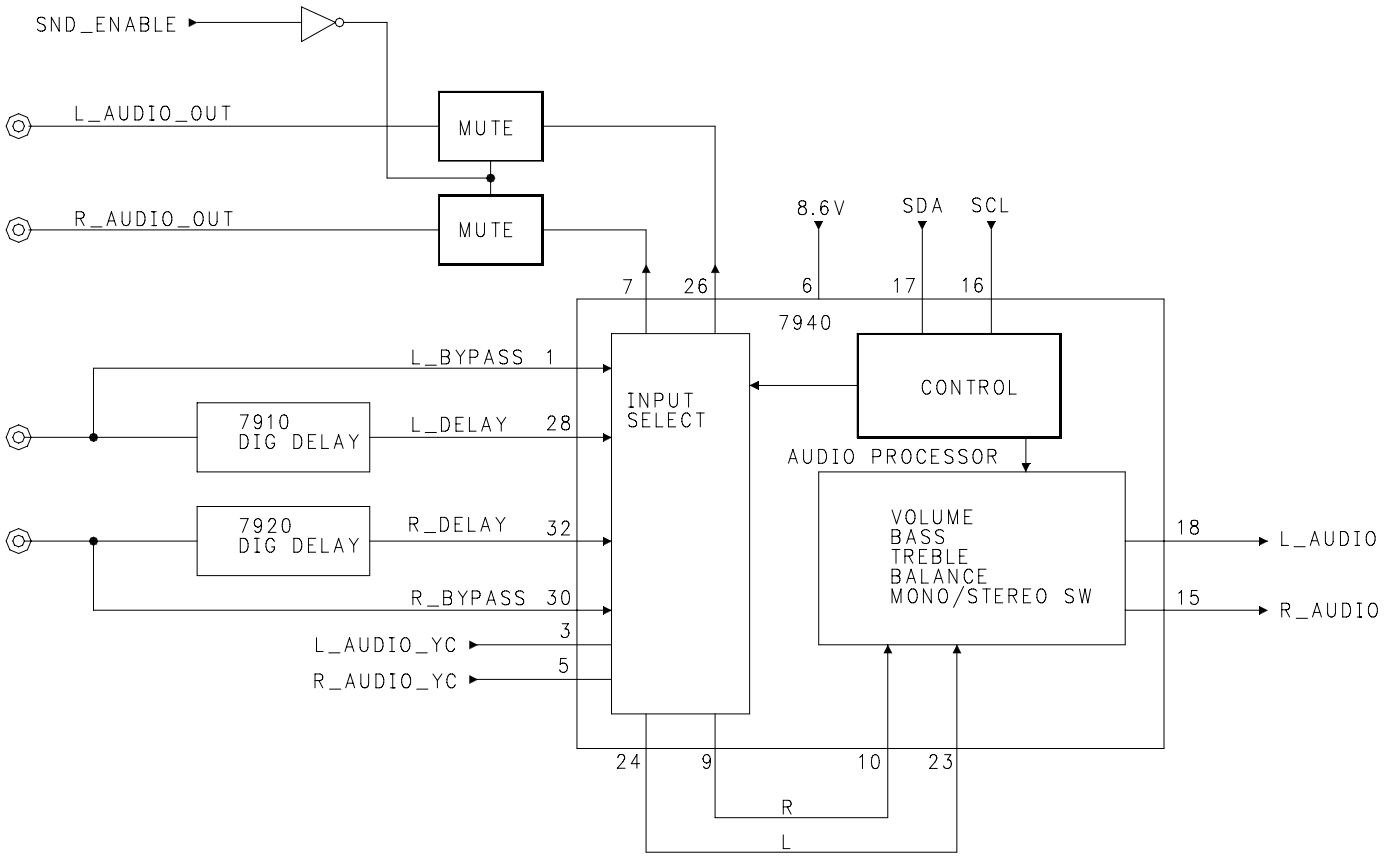


FIGURE 17 - DISPLAY AUDIO SWITCHING

DISPLAY AUDIO CIRCUITS

Audio switching for the Display is performed on the AVC panel. (Figure 17) VGA Audio is fed to Pins 1 and 30 of 7940 for audio from the E-Box or when using a Computer input. The Digital delays 7910 and 7920 are used when a European Pal Plus signal is used to ensure the correct lip sync. Audio from the YC panel is input on Pins 3 and 5. Audio to the internal amplifier is output on Pins 18 and 15. Outputs on Pins 7 and 26 are fed to a mute circuit and then to the Audio output connectors on the display. Volume, Bass, Treble, Balance, and Mono/Stereo switching are performed in 7940 for the internal speakers.

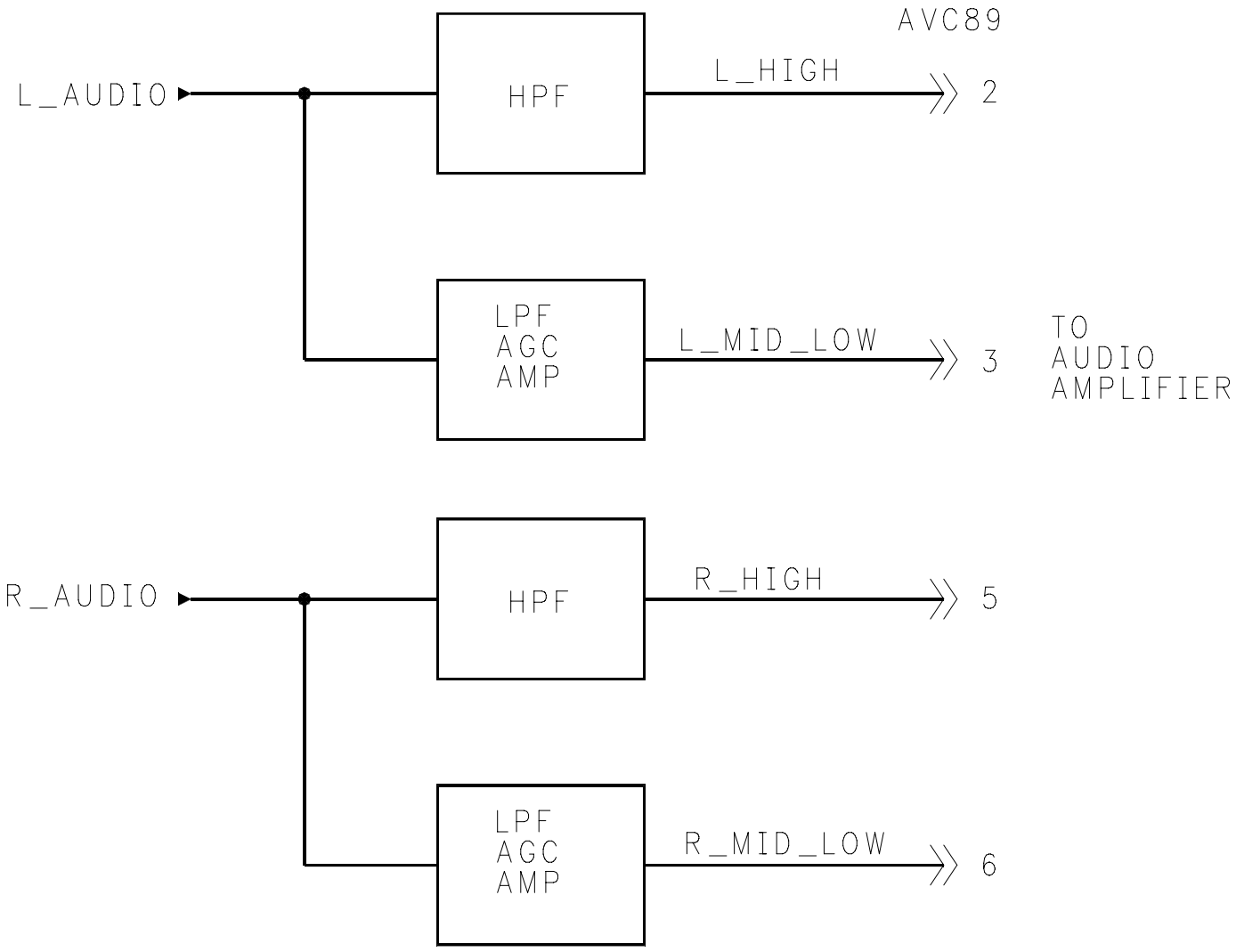


FIGURE 18 - AUDIO HIGH/LOW PASS FILTERS

The Left and Right internal audio signals are then fed to High and Low pass filters located on the AVC panel. (Figure 18) The Left and Right audio signals are then fed to the Audio Amplifier panel via AVC89.

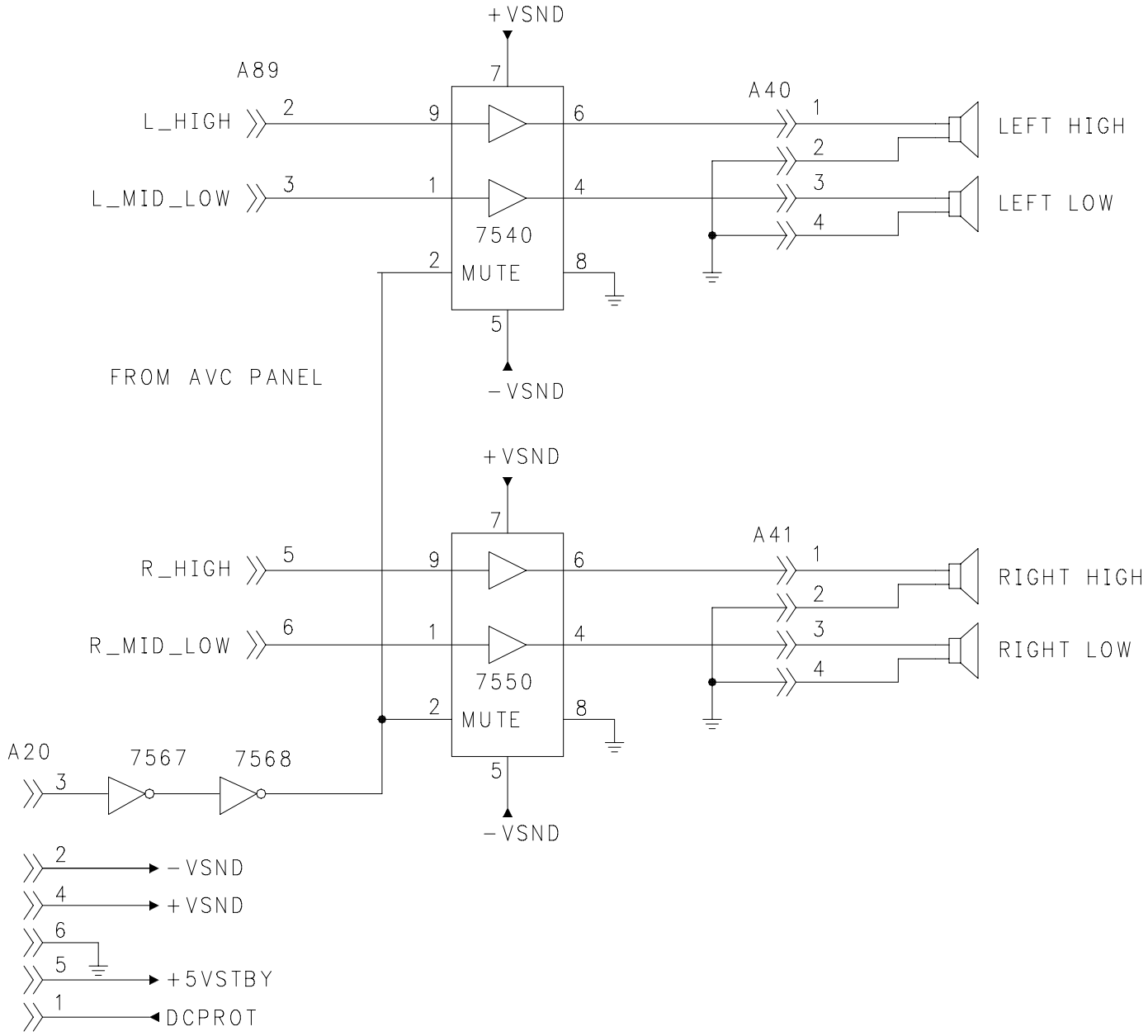


FIGURE 19 - AUDIO AMPLIFIER

Audio Amplifier (Figure 19)

The Audio Amplifier is powered by a plus and minus 19 volts from the VS supply. These supplies are labeled +VSND and -VSND. There are four audio channels, Left High, Left Low, Right High, and Right Low. Muting of the Audio amplifiers is accomplished by applying a Low on connector A20 Pin 3. The total output for the Audio Amplifier is 13 watts RMS.

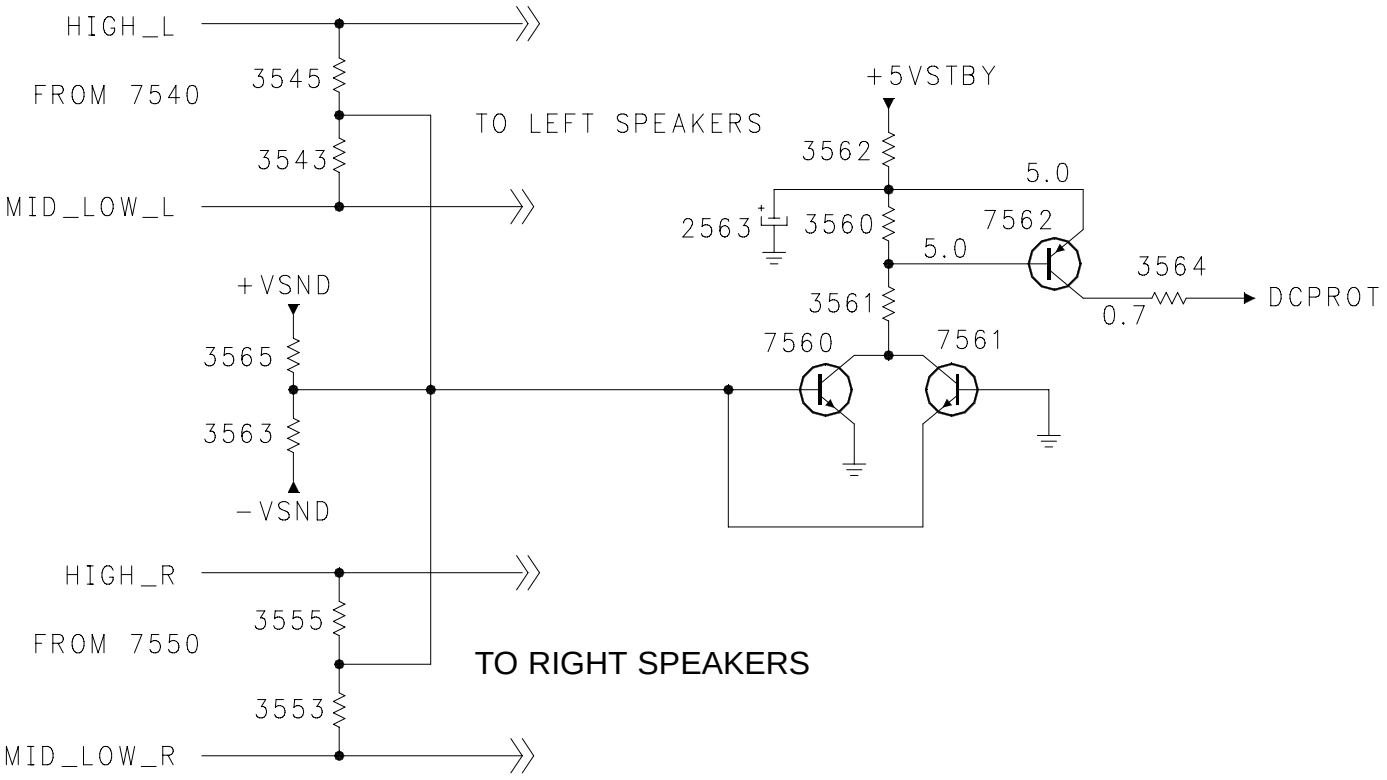


FIGURE 20 - AUDIO PROTECTION CIRCUITS

To prevent damage to the speakers in the event of an Audio Amplifier or Power Supply failure, a protection circuit has been added. (Figure 20) This circuit guards against a voltage imbalance in the supplies or a dc voltage on the audio output lines. The plus +VSND and the minus -VSND supply voltages are applied to the base of 7560 and the emitter of 7561 through resistors 3565 and 3563. In the same manner, the outputs of the four audio amplifiers are connected to 7560 and 7561. As long as the supplies are equal in level, the voltage on the base of 7560 and the emitter of 7561 will be zero volts. If the negative supply should fail or become overloaded, the base of 7560 will become positive causing 7560 to conduct. This will turn 7562 On which will switch the DCPROT line High, causing the set to shut down. If the positive supply should fail, the emitter of 7561 will become more negative than the base causing the transistor to conduct. This will also cause 7562 to turn On, causing the set to shut down.

BOARD LEVEL TROUBLESHOOTING

If the Audio Amplifier is suspected of causing the set o shut down, unplug connector A20 to disable the DC_PROT. (Figure 17) If the set then stays On, measure the +19 and -19 supplies on the connector. If the supplies are present, check the line level audio input signals on connector A89. Then check the SND_ENABLE line on Pin 3 of A20. This should be approximately 5 volts. This line goes Low to mute the audio.

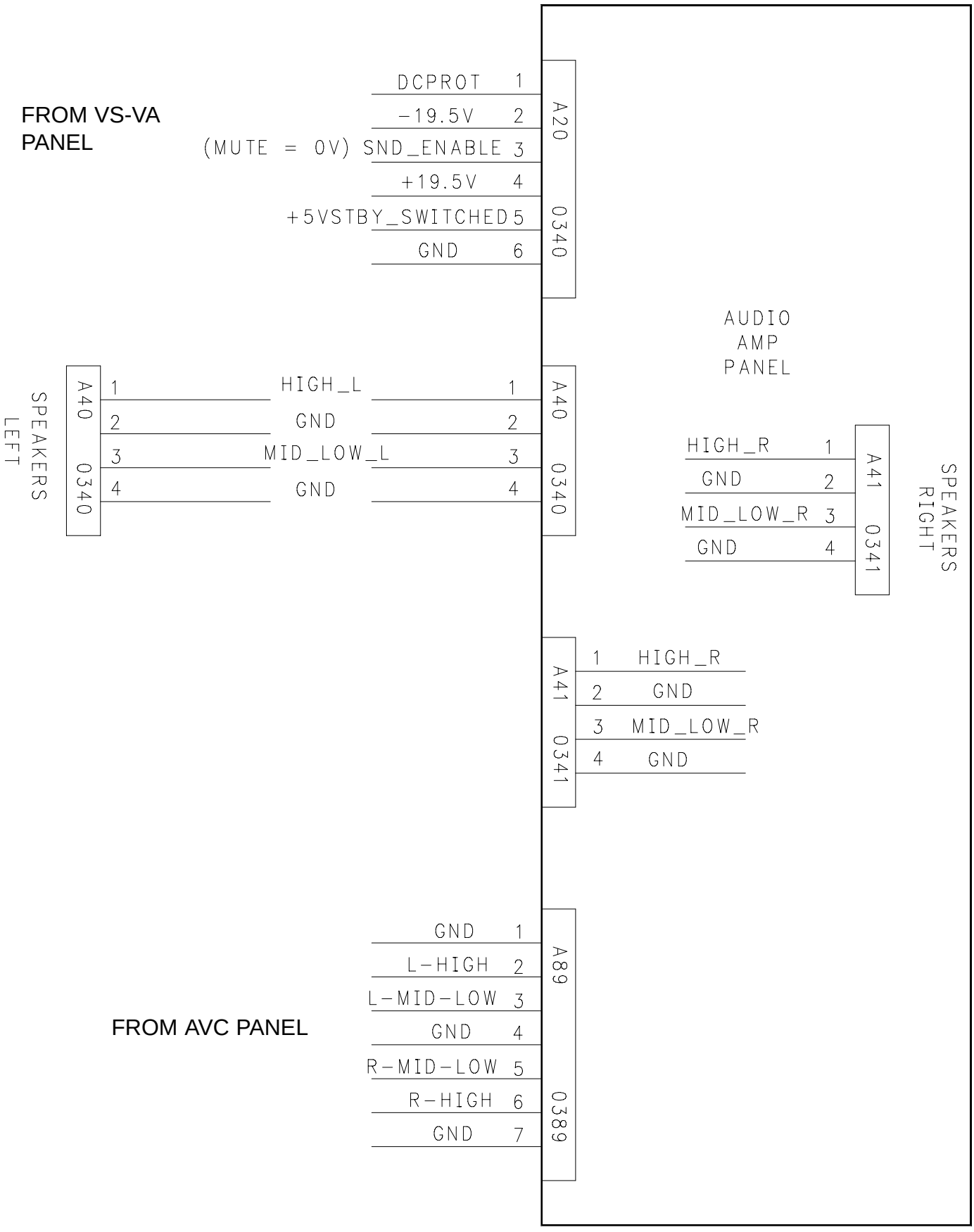
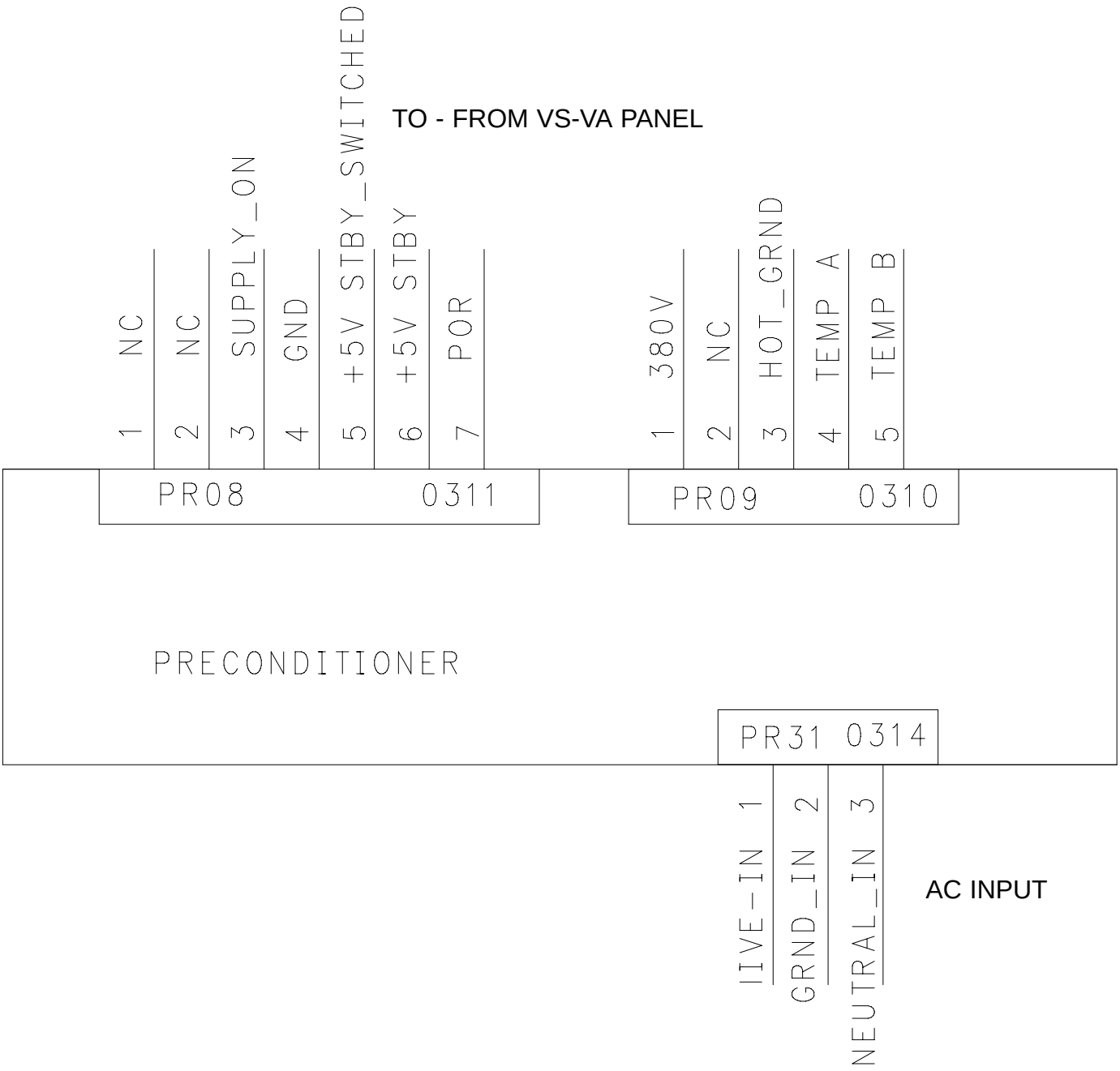


FIGURE 21 - AUDIO AMPLIFIER WIRING INTERCONNECT



PRECONDITIONER PANEL (Figure 22)

The Preconditioner panel provides Standby voltage and 380 volts dc to the VS-VA supplies. If there is no standby light on the unit, check the 5 volt standby voltage on PR08 Pin 6. When the On/Off button is pressed, the +5VSTBY voltage on PR08 Pin 5 should appear. When the set is turned On, the SUPPLY_ON line should go to approximately 5 volts. The 380 volts dc on PR09 Pin 1 is referenced to Hot Ground on Pin 3.

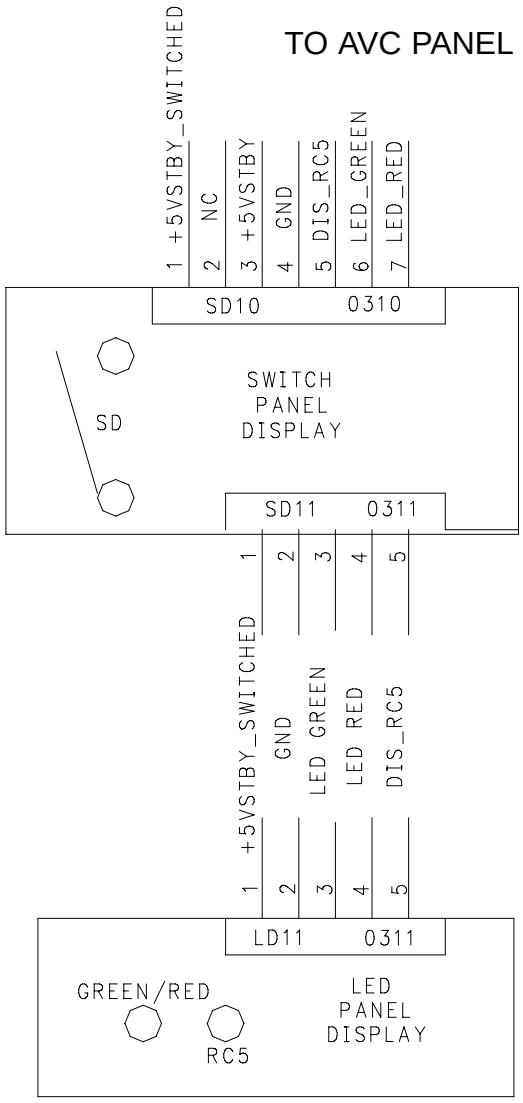


FIGURE 23 - SWITCH AND LED PANEL

SWITCH AND LED PANEL (Figure 23)

The Switch panel switches the panel from an Off mode to a Standby mode. Once the set is in the Standby Mode, it can be operated with the Remote Control. The +5VSTBY is switched to the operating circuits of the set via the +5VSTBY-SW line. The LED panel is connected to the Switch Panel. The LED panel has the indicator LED's and the Remote receiver.

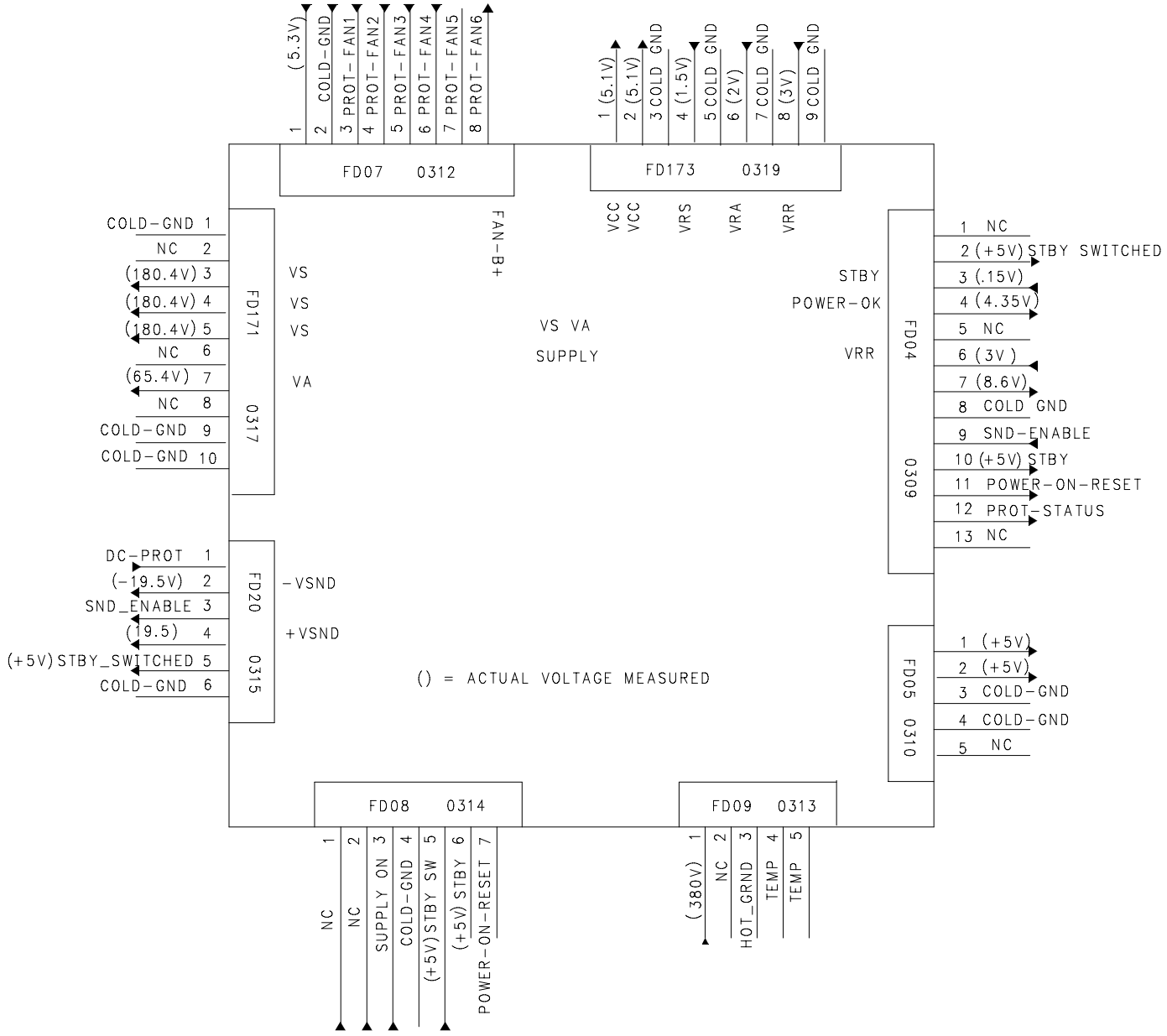


FIGURE 24 - VS-VA SUPPLY WIRING INTERCONNECT

VS-VA SUPPLY (Figure 24)

If the Standby LED is On, check the Standby line on Pin 10 of FD04. This line should go Low when the set is turned On. If it does not go Low, the problem is on the AVC or Microprocessor panel. If this line goes Low, the 180 and 65 volt supplies should come On. The Audio supplies on FD20 should also come On. If they do not appear, the VS-VA panel should be replaced.

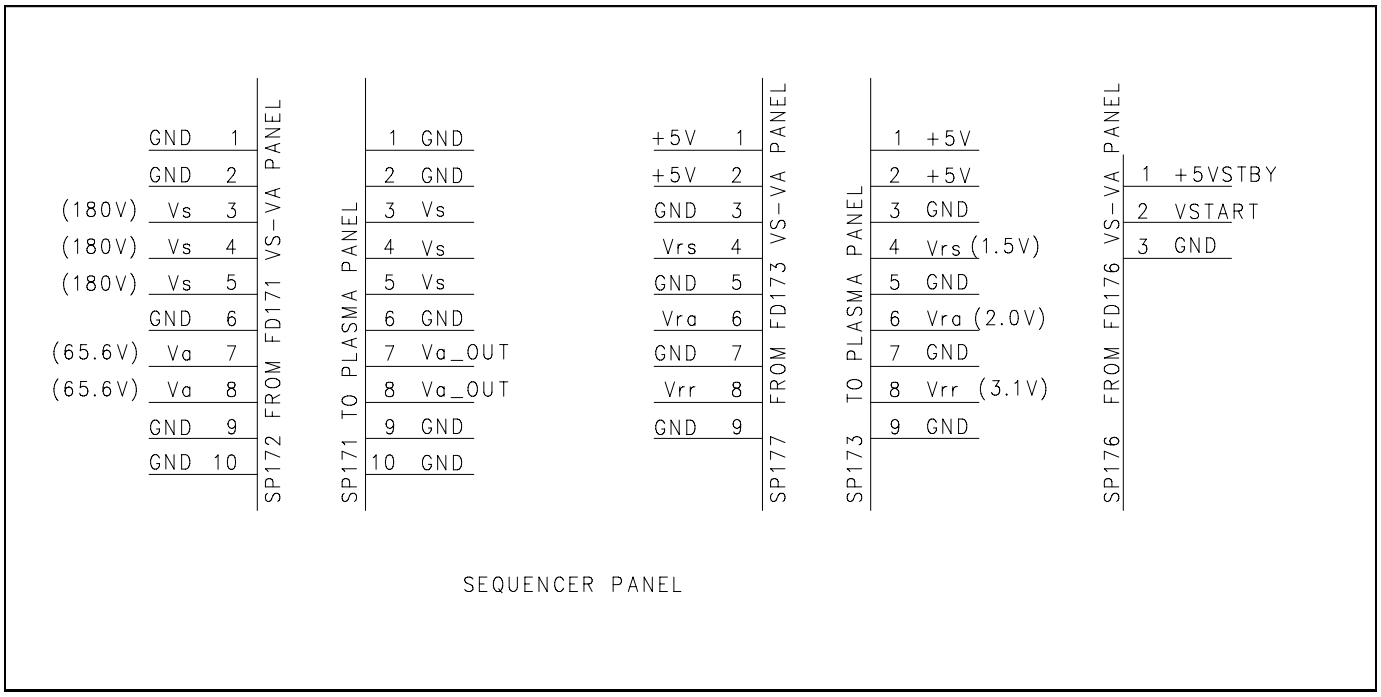


FIGURE 25 - SEQUENCER PANEL

SEQUENCER PANEL (Figure 25)

The Sequencer panel connects the VS-VA supply panel to the Plasma Display Panel. It also switches the VA to the Display Off if there is a problem on the Vrr line. When the set is turned On the Vrr line should go to approximately 3 volts. If a problems is suspected with the PDP, SP171 and SP173 can be disconnected. If the PDP is the problems, the operating voltages to the Sequencer panel should appear.

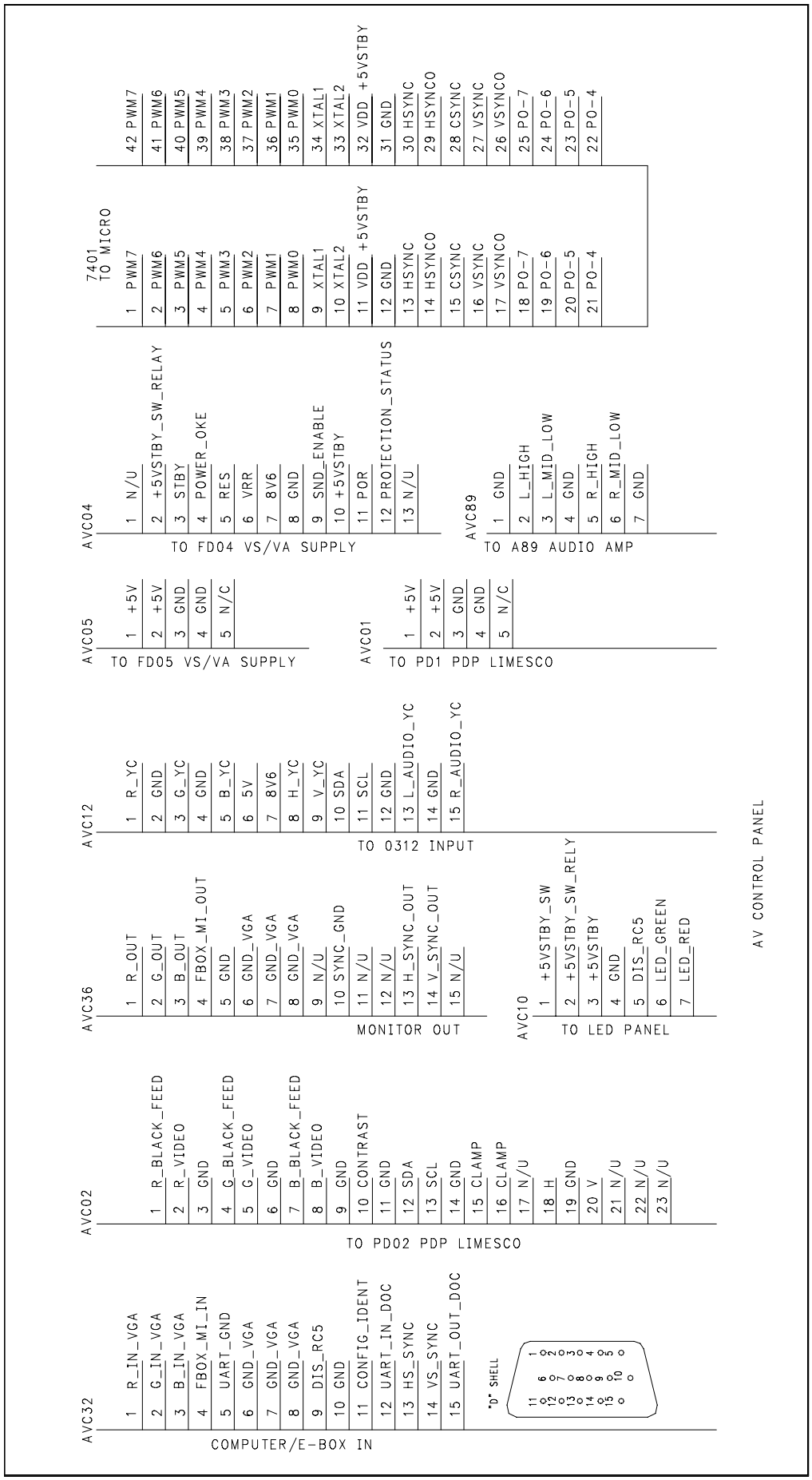


FIGURE 26 - AV CONTROL PANEL

AV CONTROL PANEL (Figure 26)

The AV Control Panel provides Video processing and switching, Audio processing and switching and interface for the Microprocessor. RGB from the E-Box or computer is input on AVC32 and is output on AVC36. The Microprocessor is connected to the AV Control panel on 7401. Output to the PDP Limesco panel is on connector AVC02.

PDP LIMESCO PANEL (Figure 27)

Input to the PDP Limesco panel from the AV Control panel is on connector AVC02. Output Data Lines and Sync to the PDP is on PD03. If operating voltages to the PDP are present along with Data signals and Sync, a no picture condition problem would most likely be the PDP.

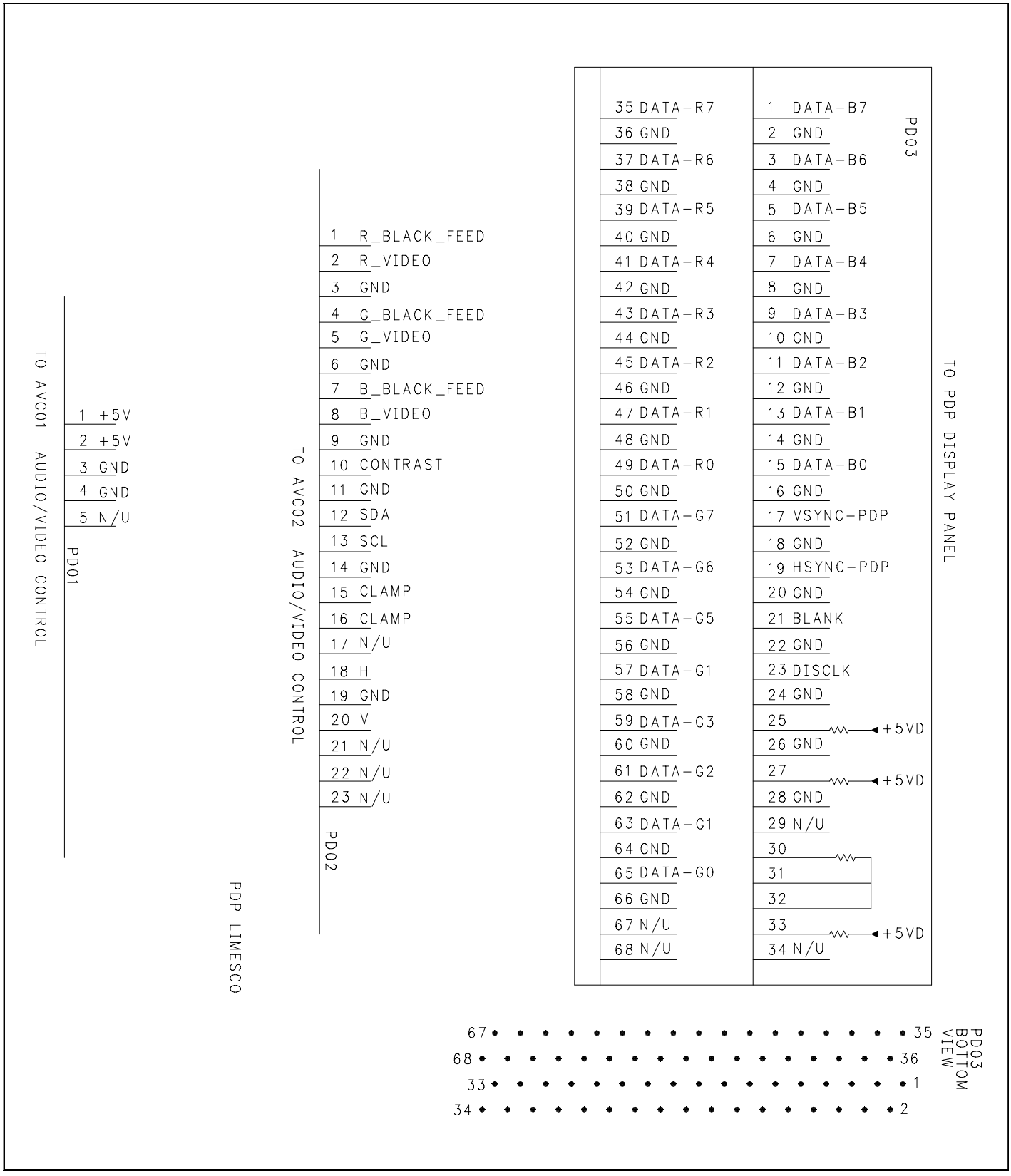


FIGURE 23 - PDP LIMESCO WIRING INTERCONNECT

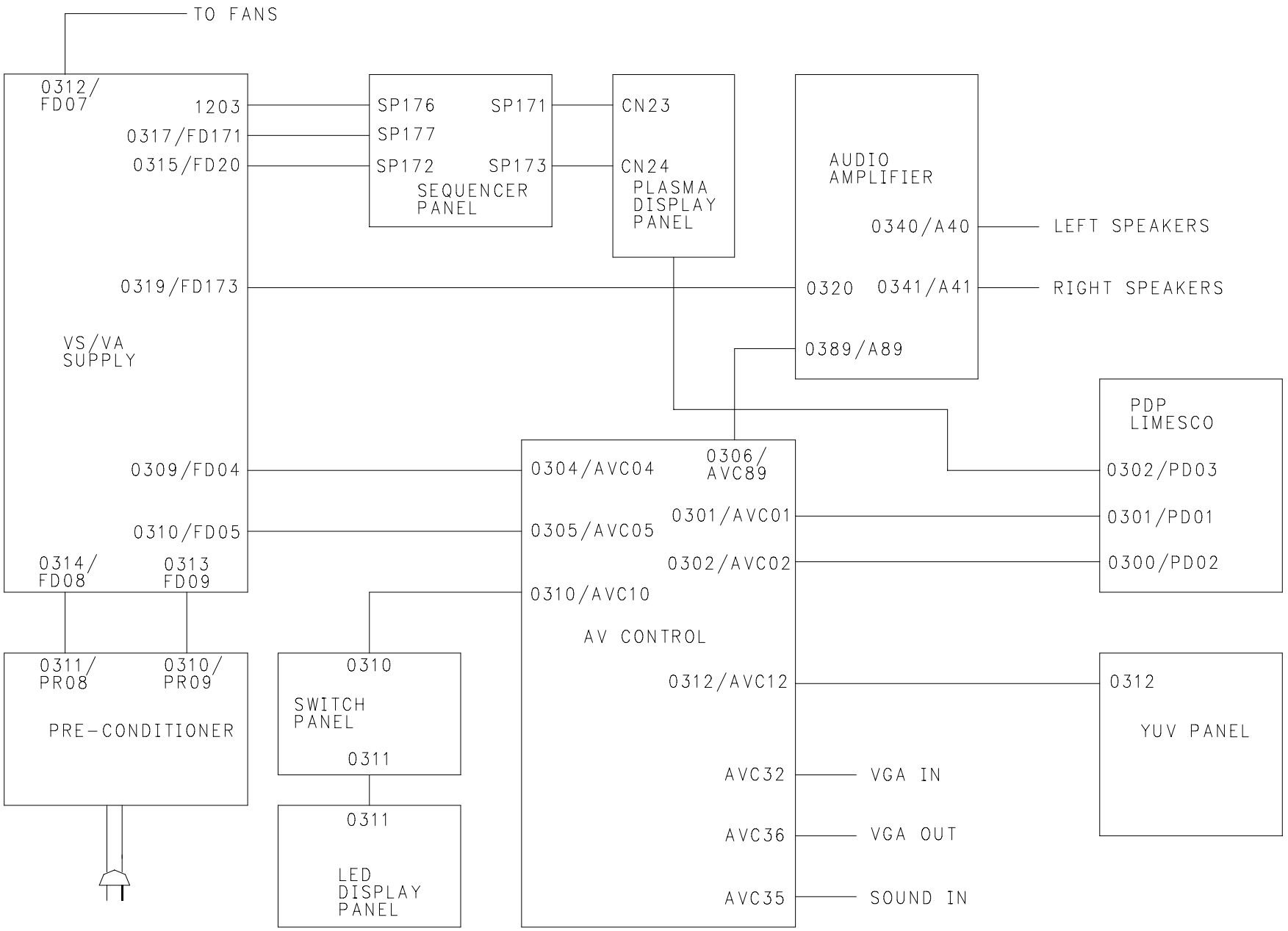


FIGURE 28 - PLASMA DISPLAY WIRING INTERCONNECT

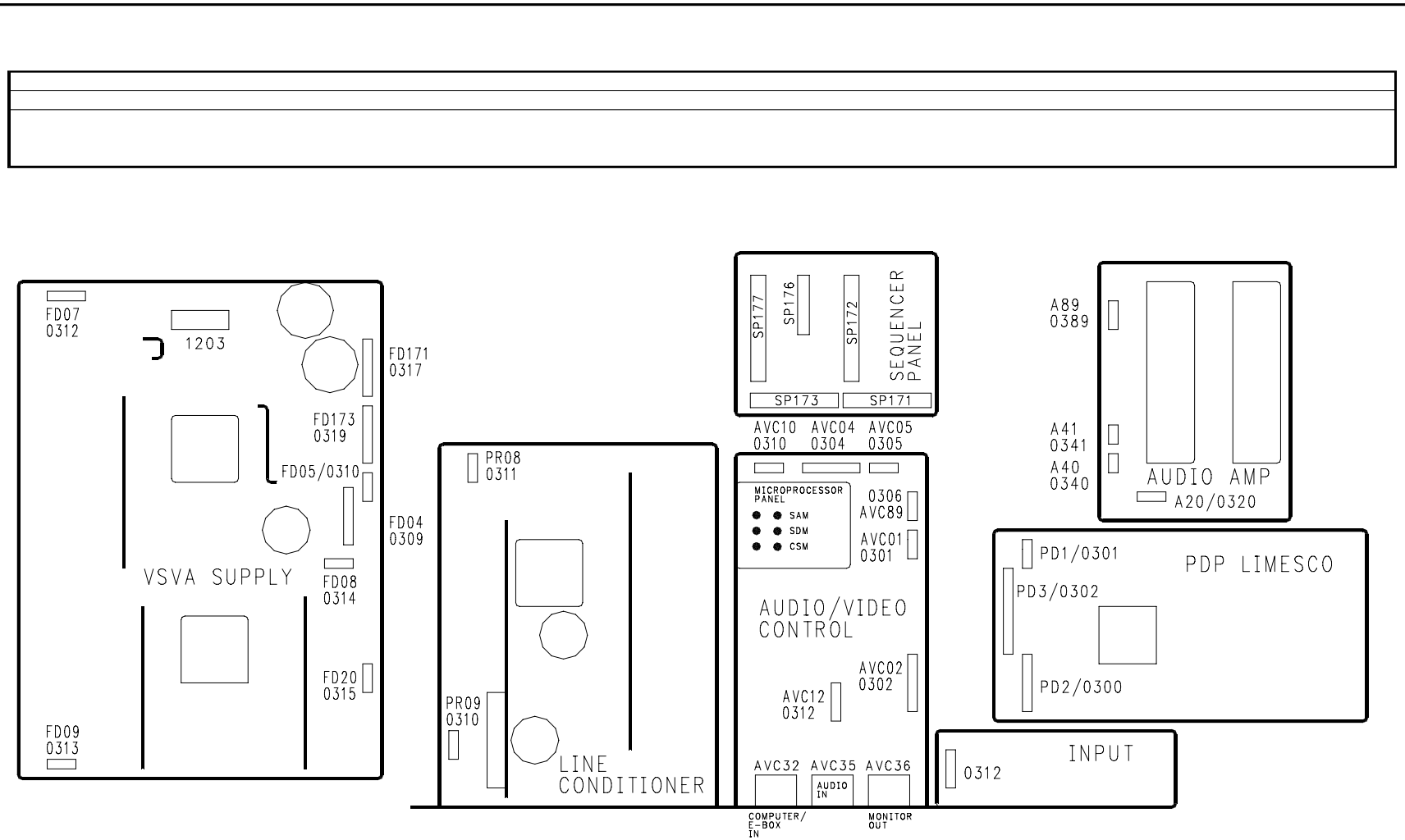


FIGURE 29 - PLASMA DISPLAY BOARD LOCATION

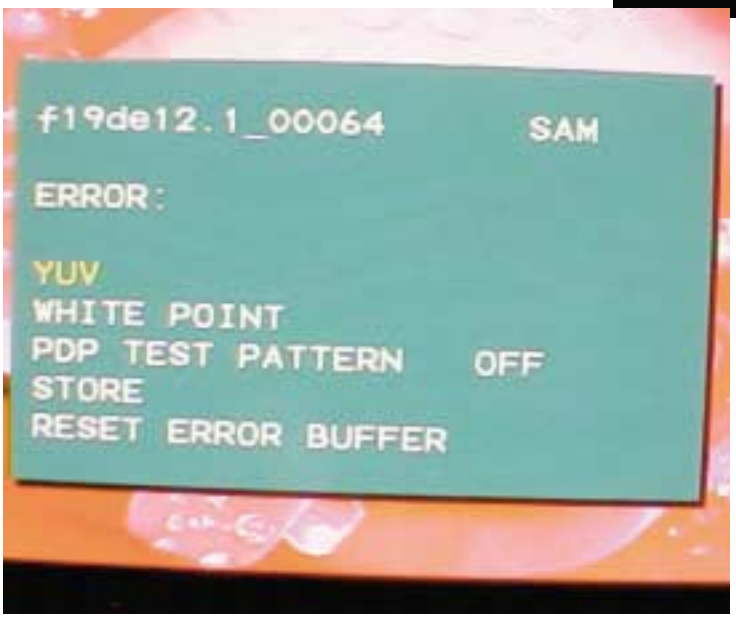
SERVICE MODES

CUSTOMER SERVICE MODE

The Customer Service mode (CSM) allows the Customer to read error codes with the instruction of the Technician. This mode also disables any Customer settings such as Channel blocking.

To enter the CSM, press the following keys on the Display remote, Picture, sound, cursor up, cursor down, cursor left, cursor right, followed by the mute button.

To Exit the CSM, press the Menu button on the remote.



SERVICE DEFAULT MODE (SDM)

The SDM allows Error Codes to be read.

The SDM can be entered by pressing the following buttons on the E-Box remote, 062596 followed by the Menu button.

The Mode can also be entered by shorting the SDM pins on the Microprocessor panel.

SERVICE ALIGNMENT MODE (SAM)

The SAM allows Error Codes to be read, Clearing of the Error buffer, and Alignments to be made.

To enter the SAM, press the following buttons on the E-Box remote, 062596 followed by the Index button.

The Mode can also be entered by shorting the SAM Pins on the Microprocessor panel.

Note: The Display SAM mode cannot be entered while the E-Box is connected.

DISASSEMBLY

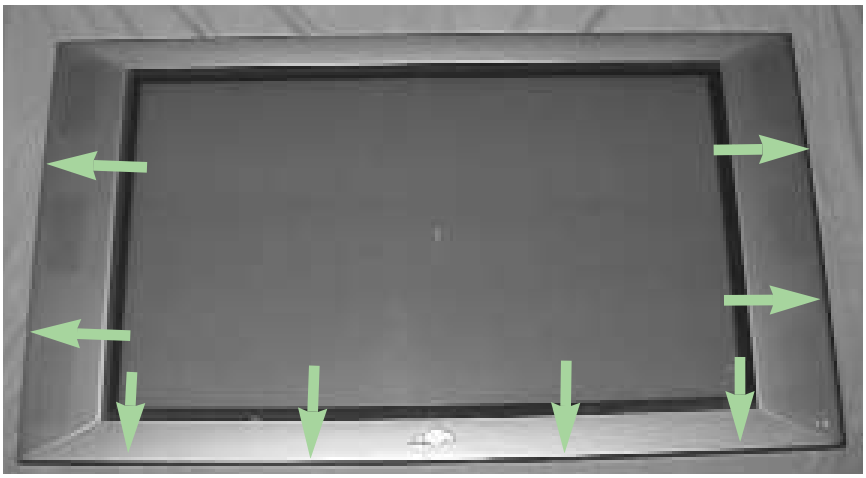
Remove the unit from the wall and place on a soft cloth facing up

Using a #15 Torx, remove the the eight screws holding the Front Cover in place.

The Front Cover is hinged on top. Lift the bottom up first, then lift up.

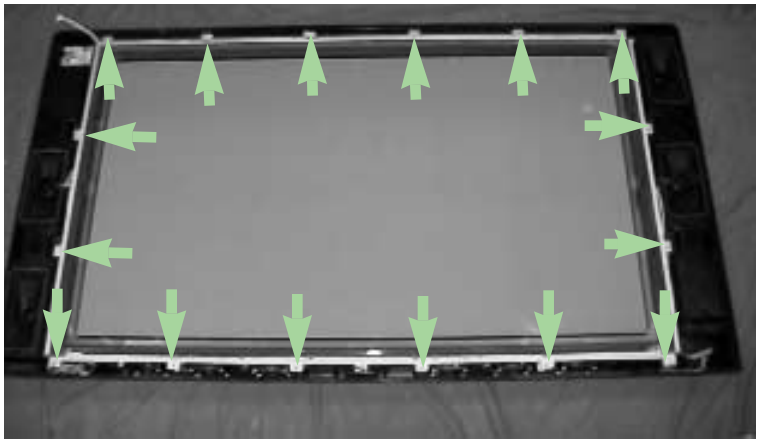
Unplug the LED display and set the front cover aside.

Note: If only the Front cover needs changing, the unit does not have to be remove from the wall.

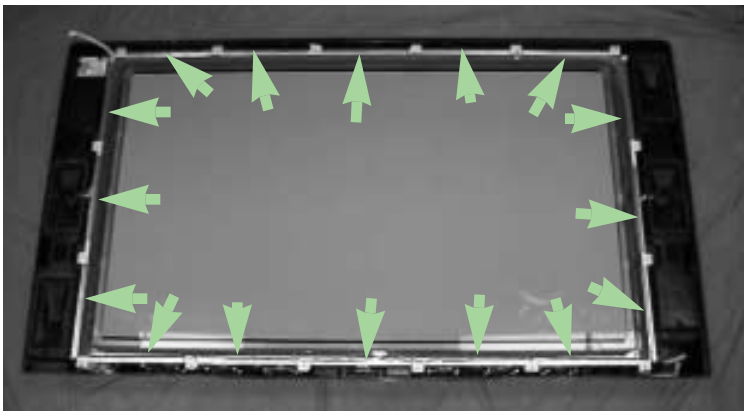


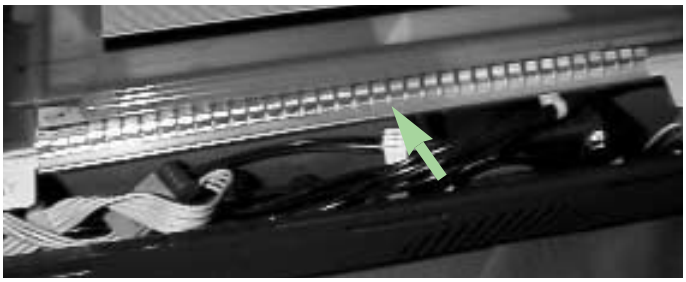
Using a #10 Torx, remove the 16 clamps securing the Glass Plate to the Plasma Display.

Set the Glass Plate aside.

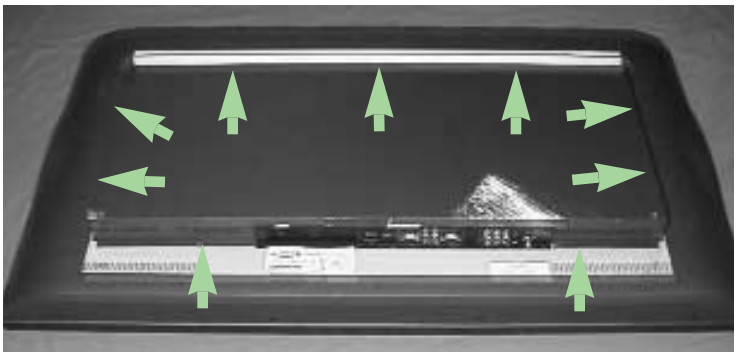


Remove the 16 EMC shielding springs mounted around the Display.



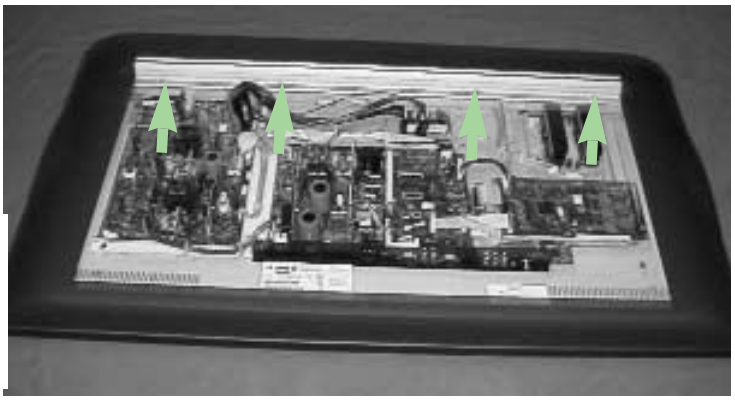


Unplug the Switch Panel and Speakers.

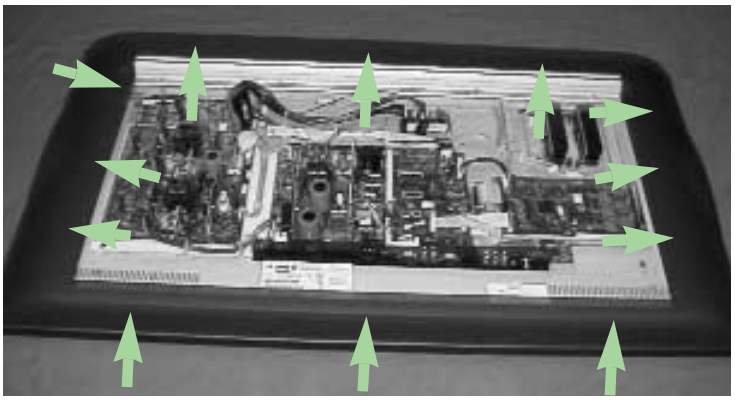


Place the Display face down on a foam cushion.
Using a #10 Torx, remove the 9 screws securing the Rear Cover.

Using a #10 Torx,

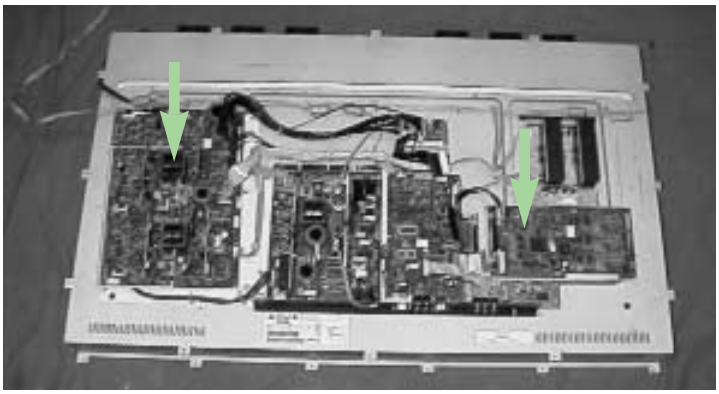


Using a #20 Torx, remove the four screws securing the wall mount to the chassis and Plasma Display.



Using a #10 Torx, remove the 12 screws securing the Speaker Box to the chassis.

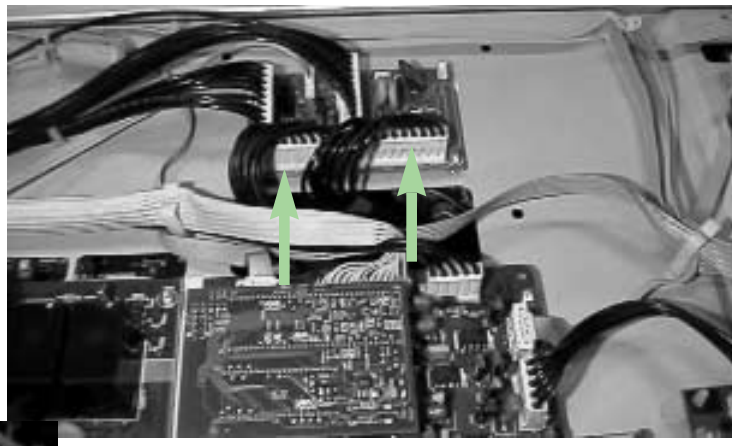
Remove the Speaker Box and set it aside.

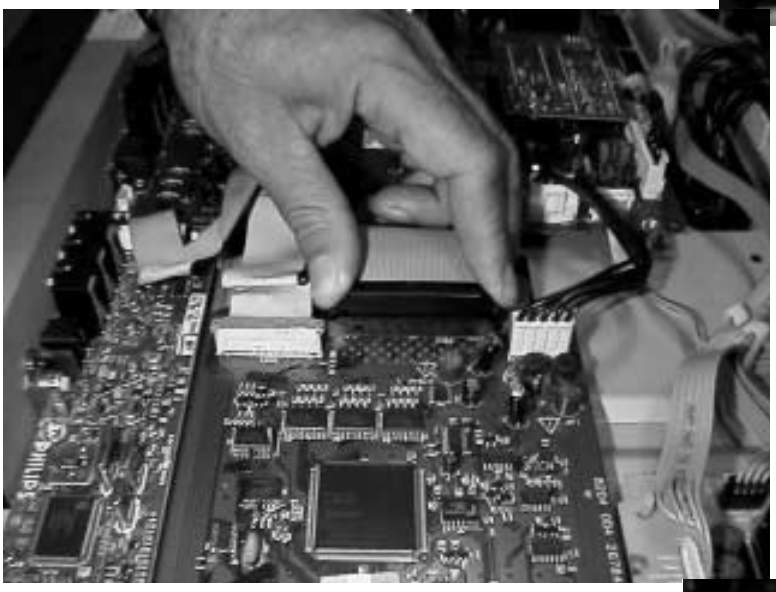


Remove the screws from the VS/VA supply and the PDP Limesco panels.

Two of the screws securing the Plasma Panel to the chassis are under these panels.

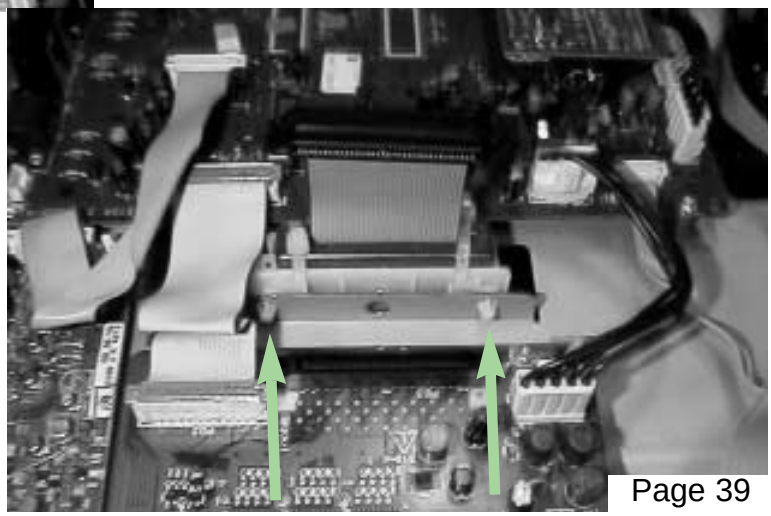
Unplug FD173 and FD171 from the Sequencer Panel.

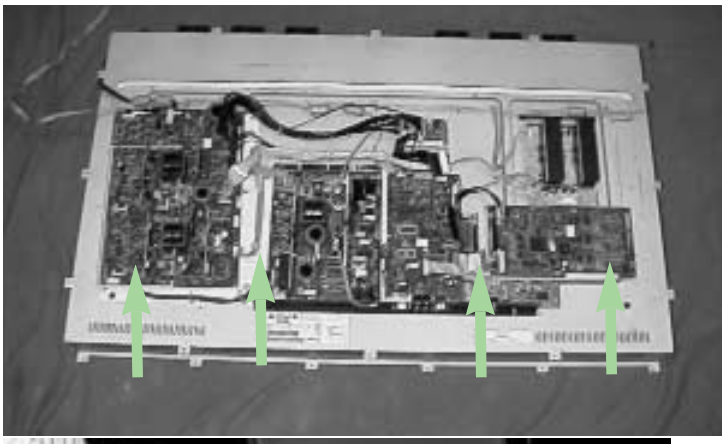




Unplug PD3 from the PDP Limesco panel.

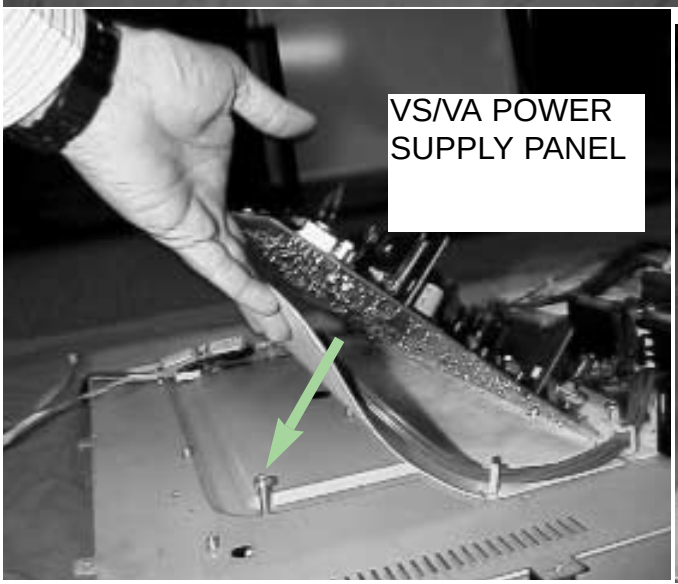
Remove the strain relief from the main chassis.

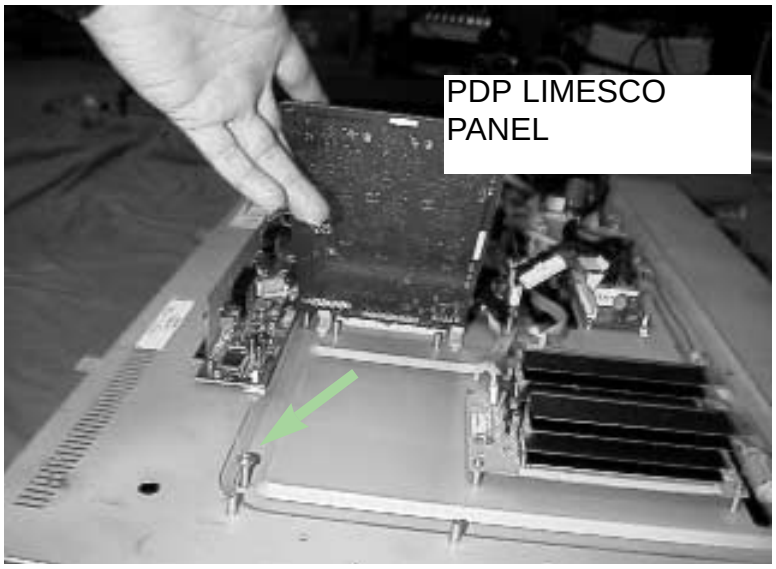




Using a #20 Torx, remove the four remaining screws securing the chassis to the Plasma Panel.

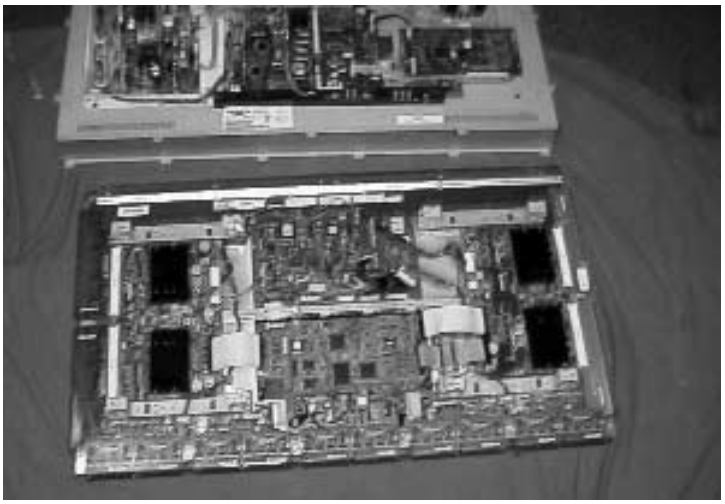
See the following picture for the hidden screws.





Lift the chassis off the Plasma Panel.

To reassemble, follow the reverse order.



FTV1.9 E-BOX

The E-Box is designed to work with the Display panel. However, for troubleshooting, the E-Box can be connected to a Computer monitor.

The E-box has three composite video inputs and one antenna input. (Figure 26) On AV3, it also has a European Scart input. AV5 is the HD input. This is a Y Pr Pb 1080i Component input. AV6 is a DVD NTSC Y Cr Cb Component input. It also has a VGA monitor input connector. For the E-Box to communicate correctly with the Display, the correct cable must be used. This cable has extra connections for Remote input from the Display, UART IN and UART OUT for communication with the Display.

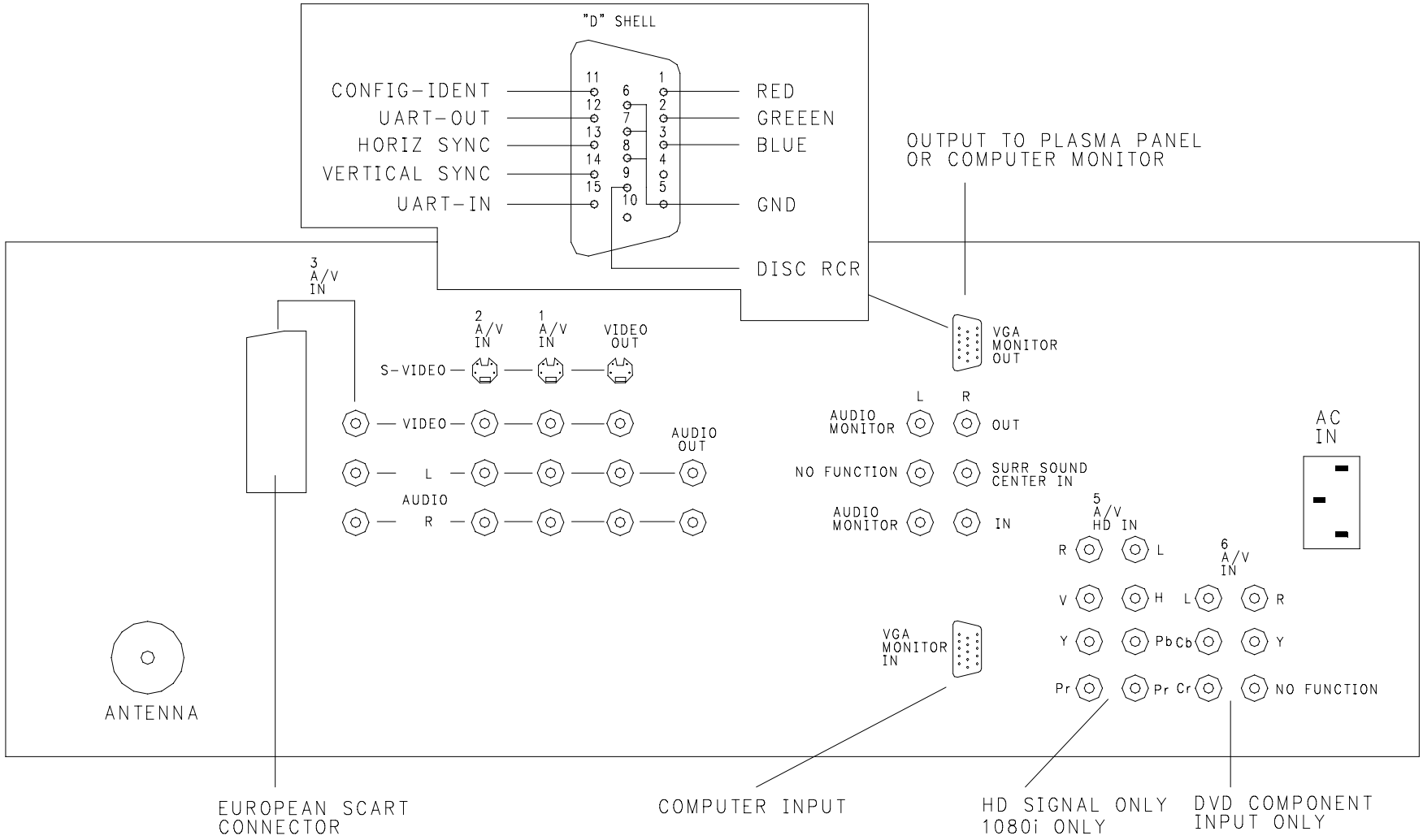


FIGURE 30 - E-BOX REAR VIEW

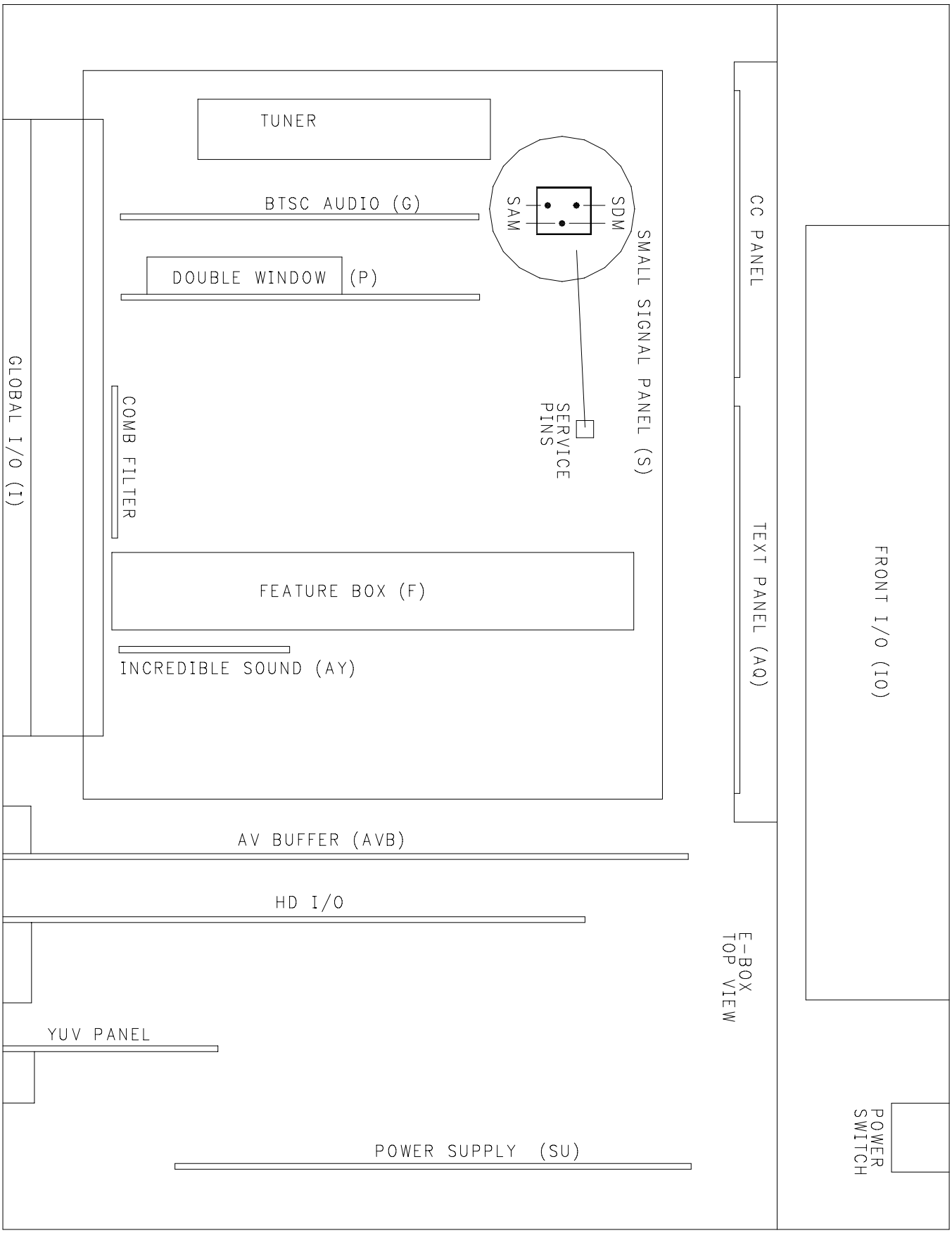


FIGURE 31 - E-BOX BOARD LOCATION

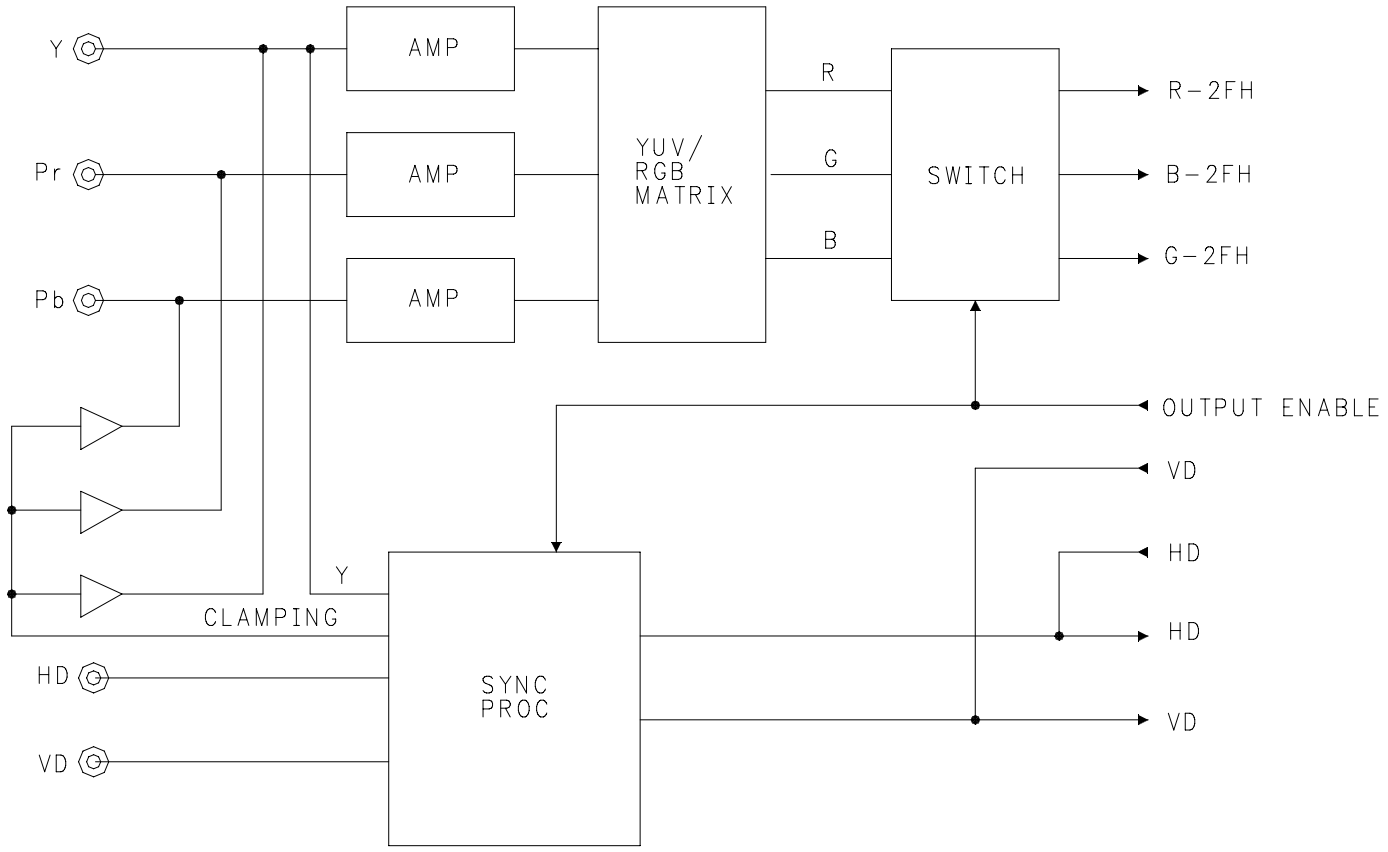


FIGURE 32 - HD INTERFACE BLOCK

The E-Box is capable of accepting a 1080i HD Component input signal. (Figure 32) The Y Pr Pb HD Component input signal is amplified and sent to a YUV to RGB matrix. The RGB signal is then fed to a switch which is enabled by the OUTPUT ENABLE line. The Sync processing circuit can accept either Sync on Y, Composite Sync, or separate Horizontal and Vertical Sync. The Sync Processor outputs TTL Sync to the Small Signal board. Sync from the Small Signal board is looped through the HD interface board and fed to the AVB panel. If the HD input is selected in the menu, the OUTPUT ENABLE line switches the Sync Processor circuit On.

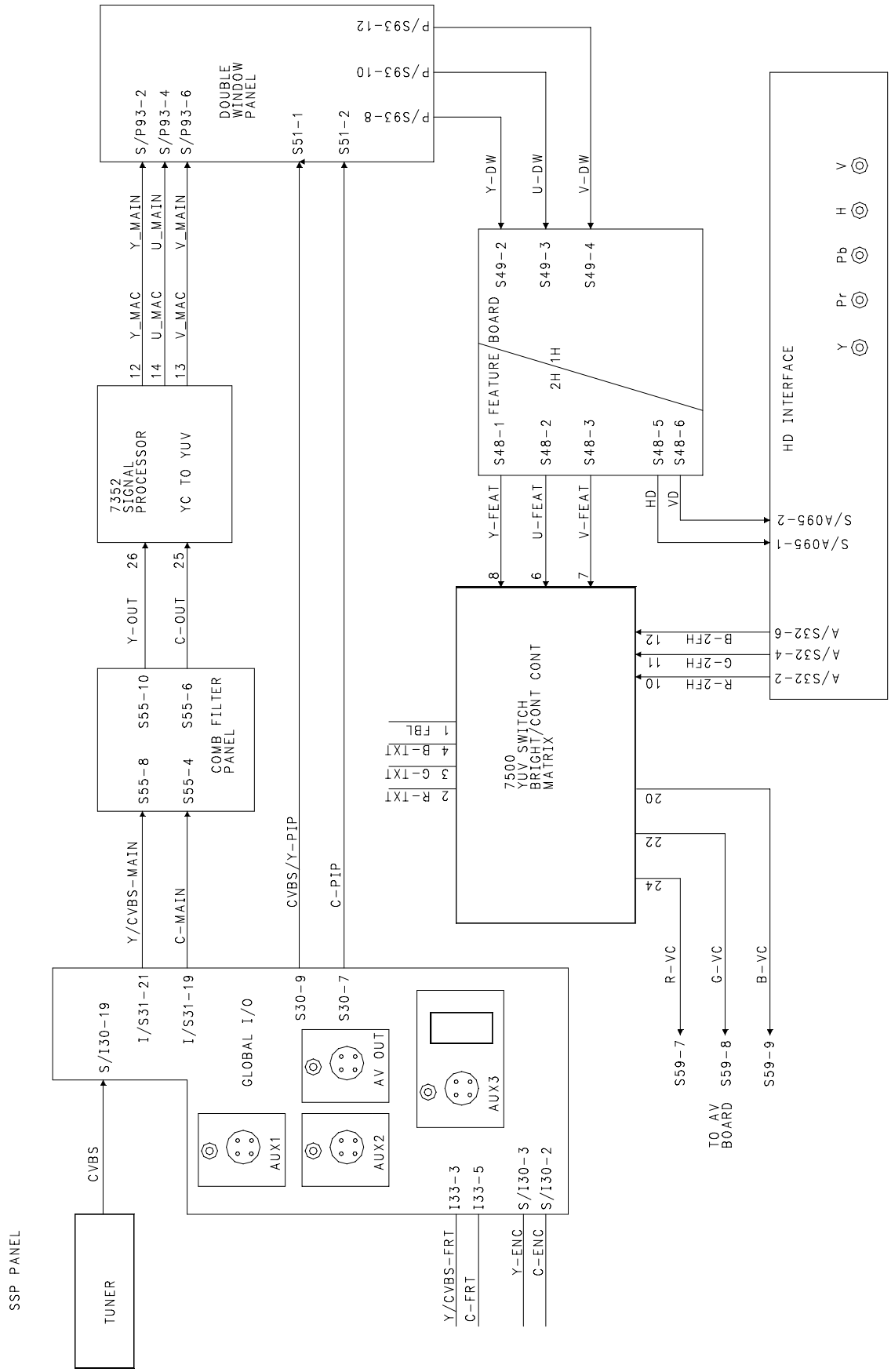


FIGURE 33 - SSP PANEL SIGNAL FLOW

E-BOX VIDEO SIGNAL FLOW (Figure 33)

Video from the Tuner, Front Jack panel, and YUV panel is fed to the Global I/O Panel (Jack panel). The Global I/O panel selects between the Tuner, Front Jack panel, YUV panel, or AV inputs on the I/O panel. Composite Video or YC for the main picture is fed to the Comb Filter panel. YC from the Comb Filter panel is fed to the Signal Processor panel. The Decoder in 7352 converts the YC to a YUV signal which is fed to the Double Window circuit. Selected PIP video is also fed to the DW panel from the Global I/O panel. The Double Window panel the outputs YUV to the Feature board. The Feature Board has a line doubler. The signal is also digitally processed to change the picture to the Aspect Ratio selected by the user. YUV at two time Horizontal is then fed to the Signal Processor IC 7500. If the User selects the HD signal from the HD Interface panel, this signal is fed to 7500. 7500 selects between the output of the Feature board or the HD Interface panel. The Matrix circuit in 7500 converts the YUV signal to the RGB outputs, R-VC, G-VC, and B-VC. 7500 also changes the Brightness and Contrast of the RGB outputs.

RGB from the SSB is fed to the AVB panel. (Figure 34) RGB from the SSB is fed to the switch 7800 which selects between RGB from the SSB or RGB from a Computer connected to VGA in. If the VGA In is selected the OSD from the Plasma Display is active. If RGB from the SSB is selected the OSD comes from the E-Box. 7700 switches Horizontal and Vertical sync to the RGB output. If the Microprocessor detects the Plasma Panel, the Monitor Present line switches the RC5 from the E-Box to the Plasma Display.

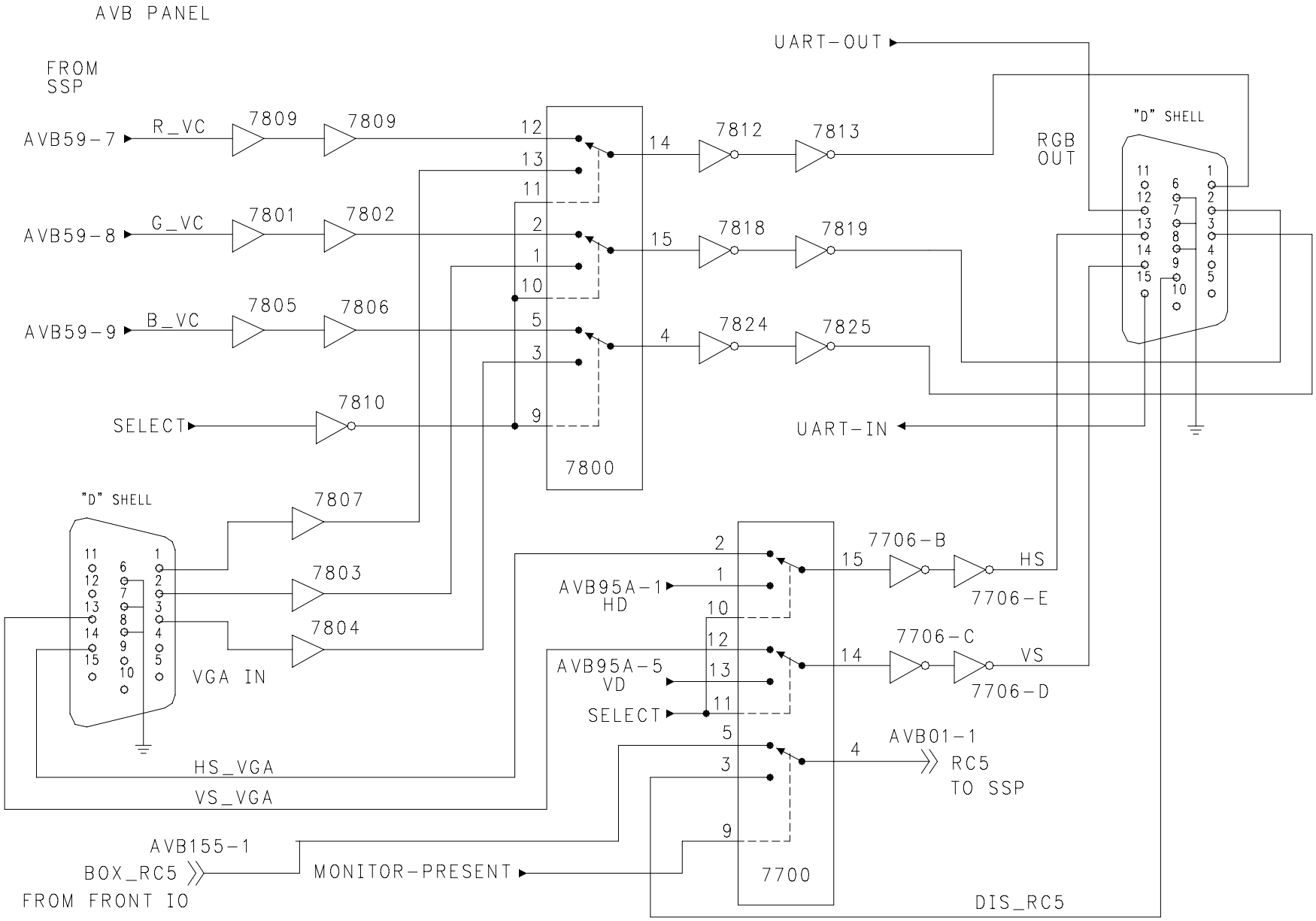


FIGURE 34 - AVB PANEL VIDEO SIGNAL FLOW

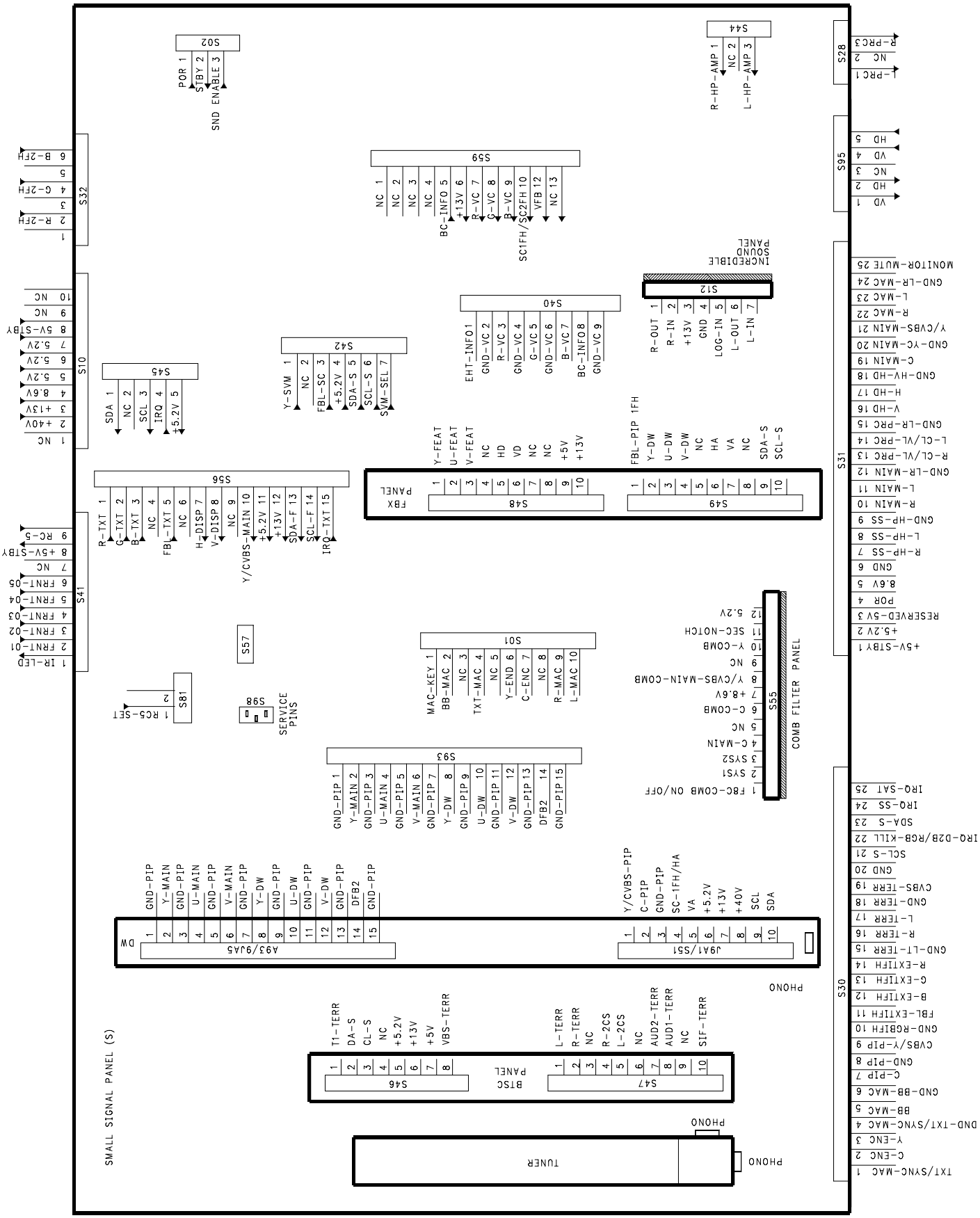


FIGURE 35 - SSP WIRING INTERCONNECT

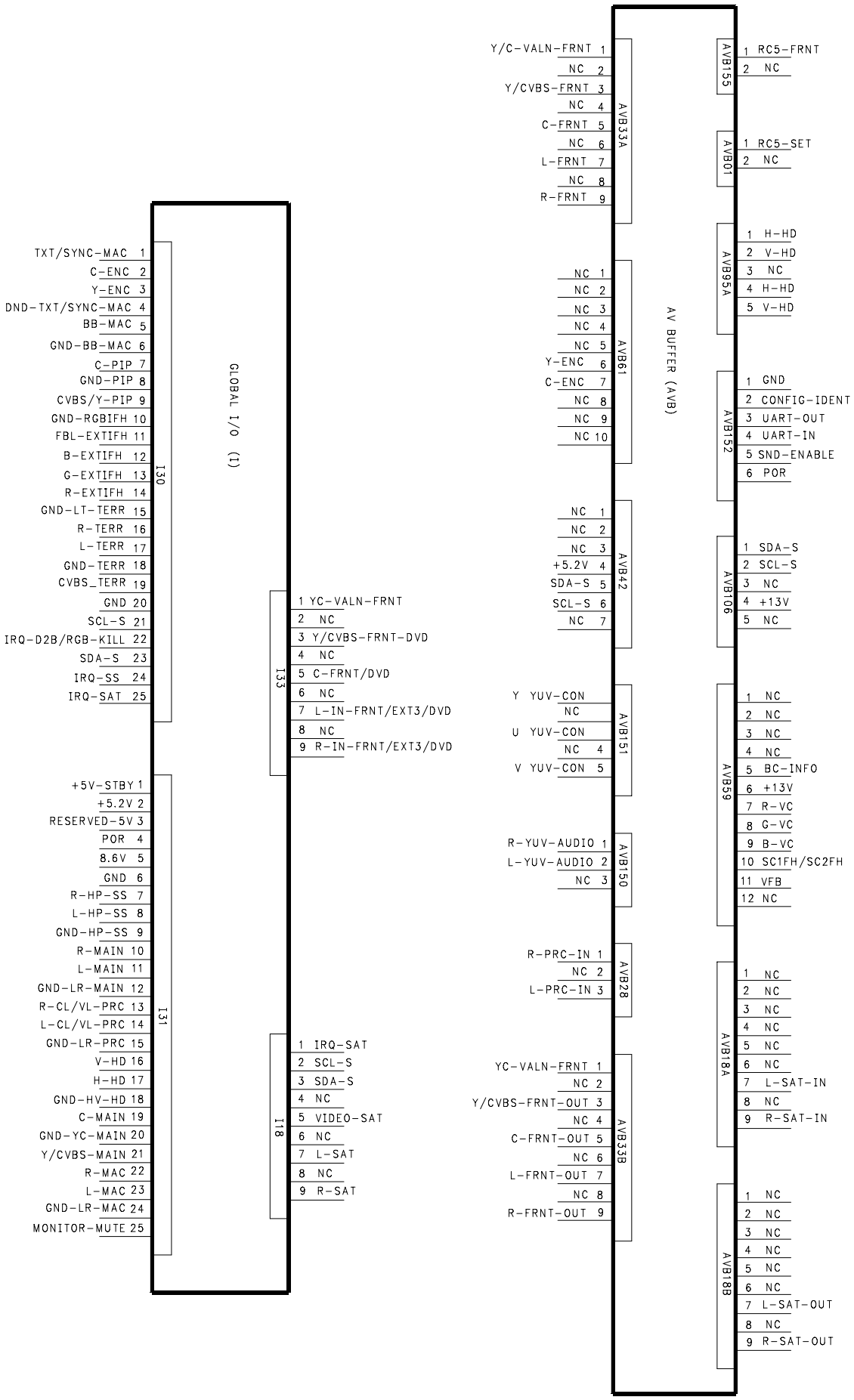


FIGURE 36 - GLOBAL I/O AND AV BUFFER

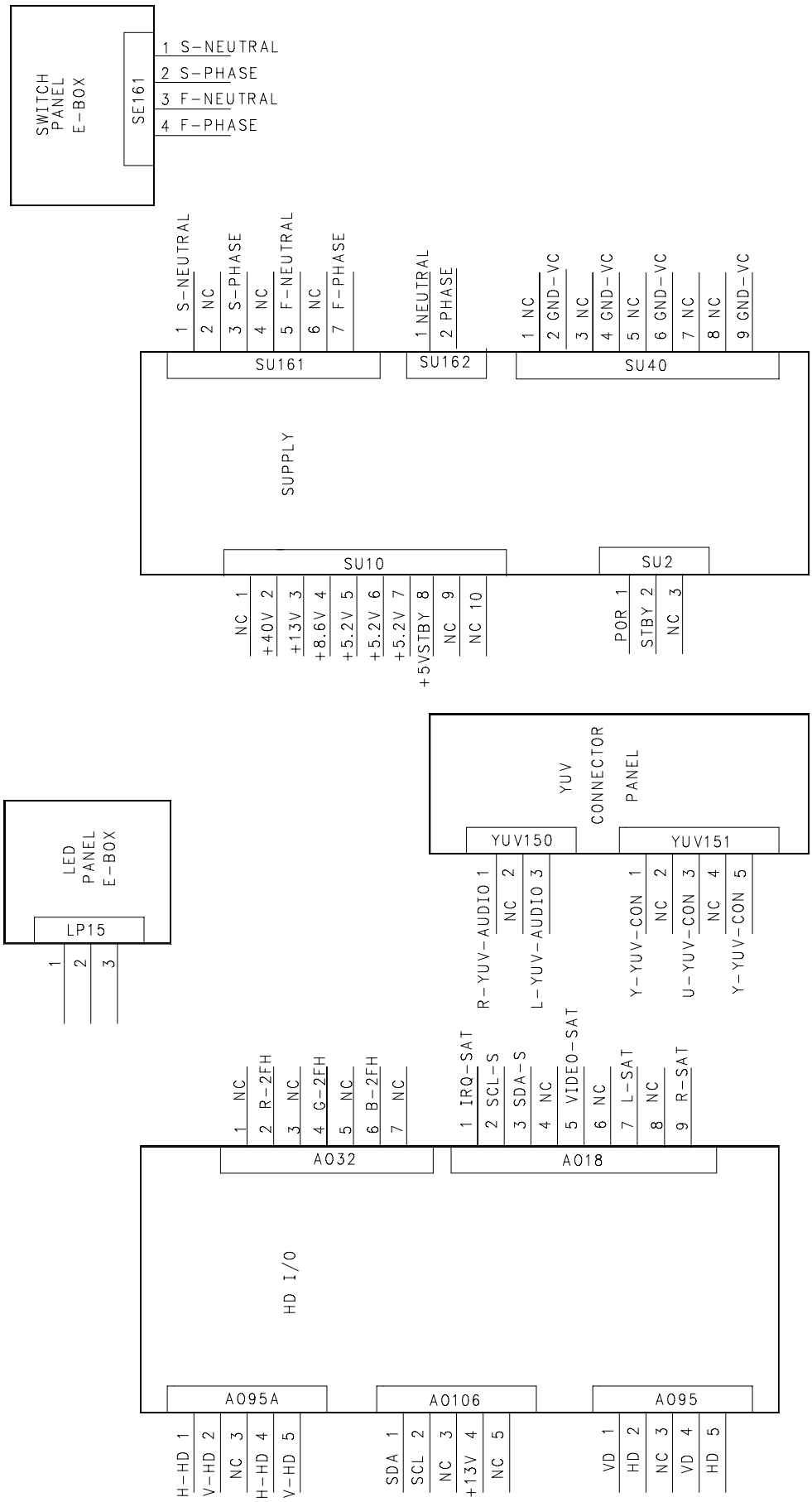


FIGURE 37 - HD - YUV - SUPPLY - SW - LED

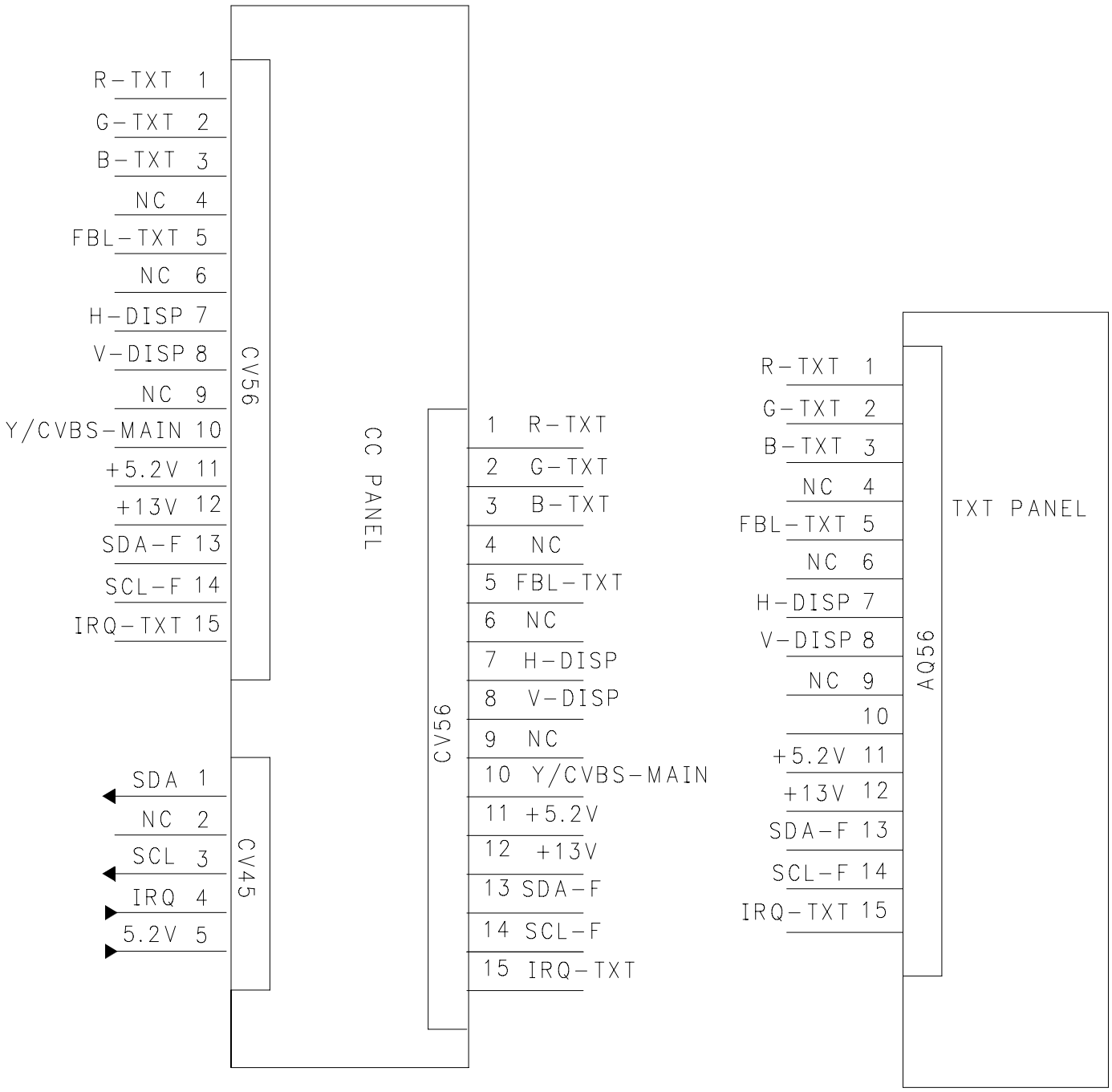


FIGURE 38 - CLOSED CAPTION AND TEXT PANEL

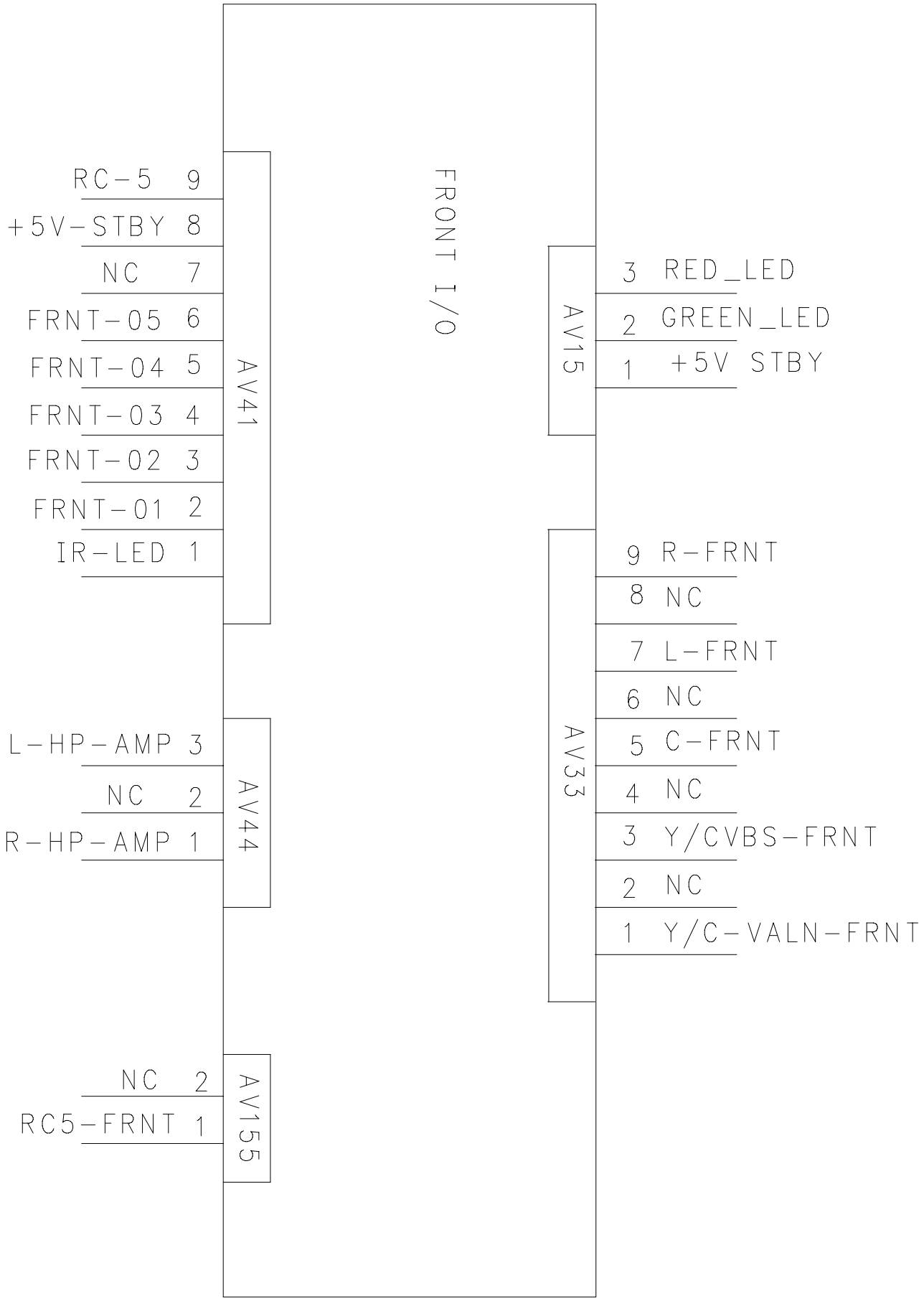


FIGURE 39 - FRONT I/O PANEL

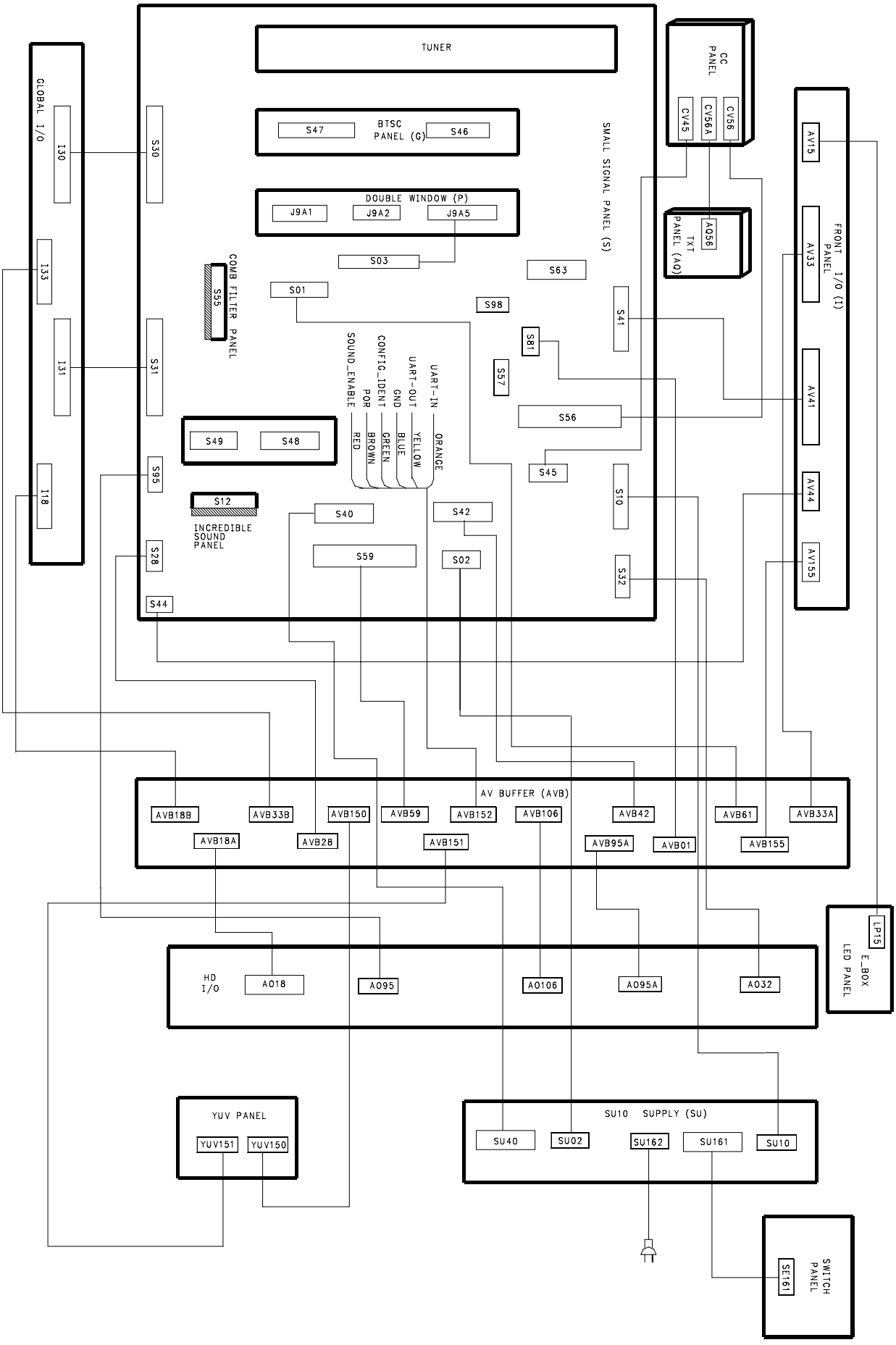


FIGURE 40 - E-BOX WIRING INTERCONNECT

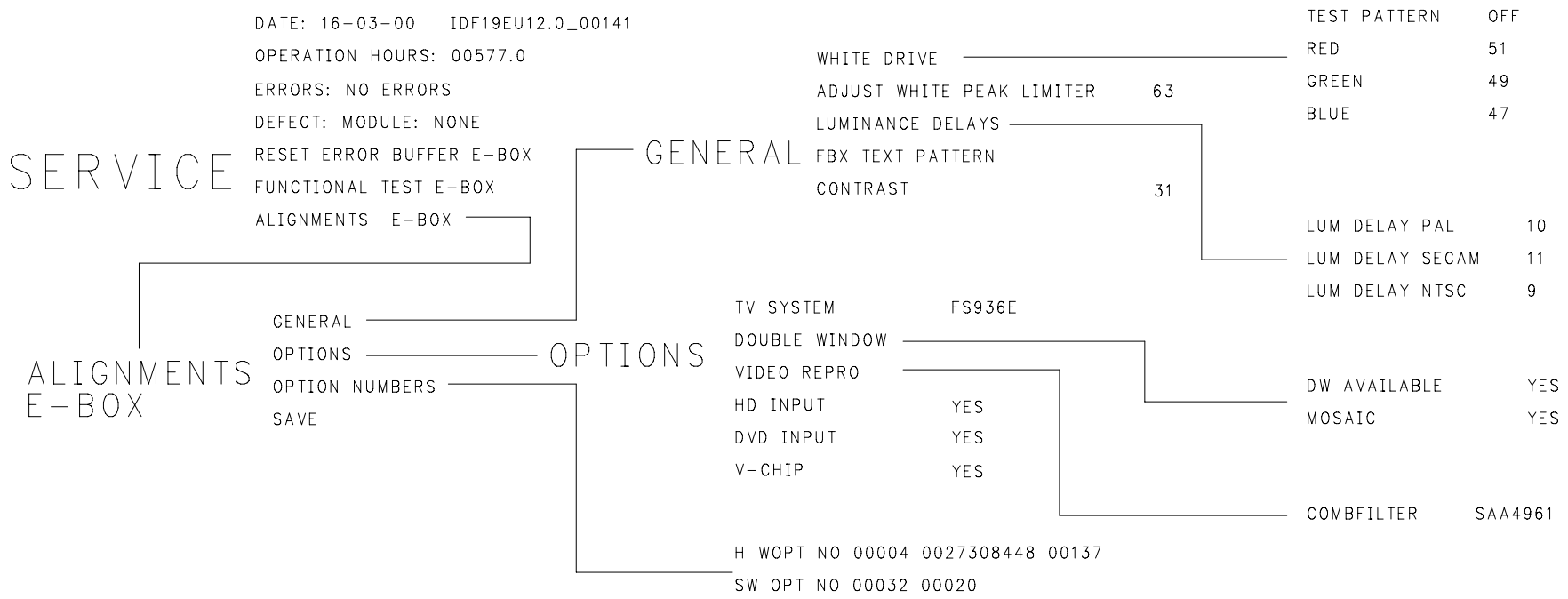


FIGURE 41 - SERVICE ALIGNMENT MODE

SERVICE ALIGNMENT MODE (SAM)

The Purpose of the SAM is make Service alignments. The SAM mode can be entered by pressing 062596 Index on the Remote Control or by shorting the SAM pins on the SSP. The Error Buffer can also be cleared in the SAM. If the Plasma Display is connected, the Remote must be pointed at the Display to enter SAM. After the SAM has been entered, the Remote Receiver on the E-Box becomes active.

The first line of the SAM gives the date and identification number for the software that is loaded in the set. The Error Buffer displays up to 10 errors in two lines. The most recent error is stored in the most left position. When the Error list is empty, “no errors” is displayed.

To exit the SAM, turn the Set Off.

CUSTOMER SERVICE MODE (CSM)

The Customer Service Mode allows the Customer to read Error codes and other information with the instruction of the technician. To enter the CSM, press the Menu button on the E-Box and at the same time press the Mute button on the Remote. Use the P+ and P- buttons on the Remote to change from page one to page two.

To exit the CSM, press any key other than P+ or P- on the Remote Control.

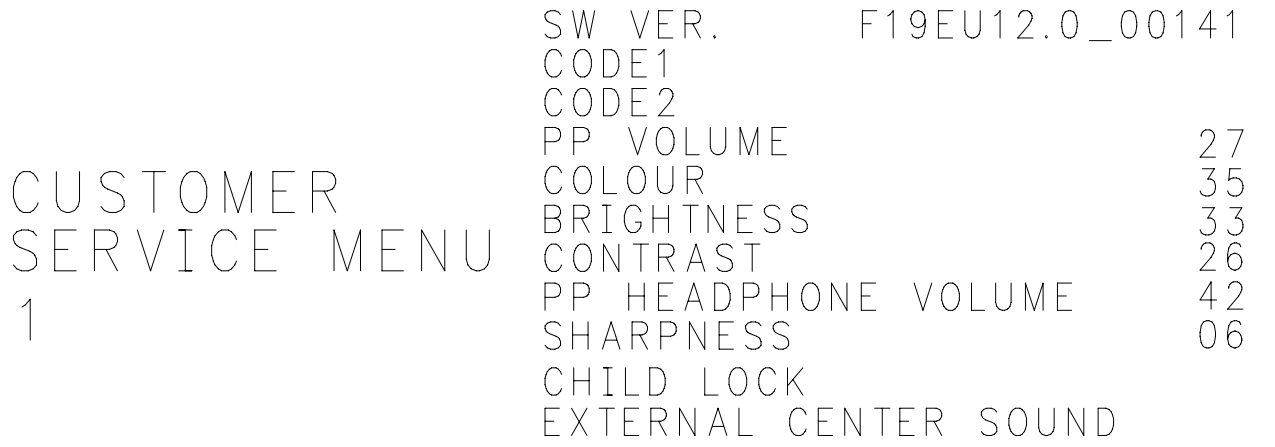


FIGURE 42 - CUSTOMER MODE PAGE 1

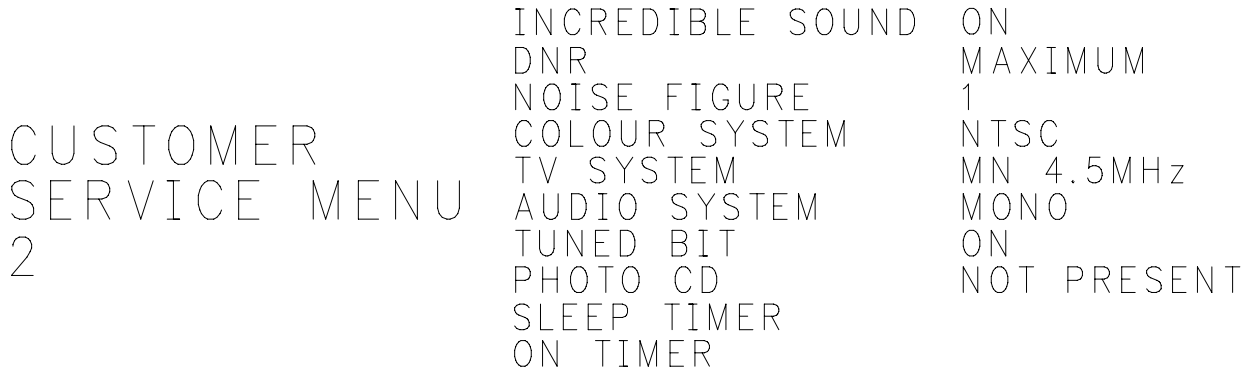


FIGURE 43 - CUSTOMER MODE PAGE 2

E-BOX SYSTEM CONTROL

The System Control Microprocessor 7200 controls the E-Box via the Remote Control and Front Keyboard. The System Software is located in the ROM 7202. The RAM 7206 stores changes to the parameters of the set while in operation. This memory is cleared when the set is switched Off. The Non Volatile Memory NVM 7212 stores Option Codes, Sound, and Picture adjustments. The I/O expanders, 7204 and 7213, are D/A converters to output SOUND_ENABLE, STBY, etc. The System Control is located on the SSB (Small Signal Board).

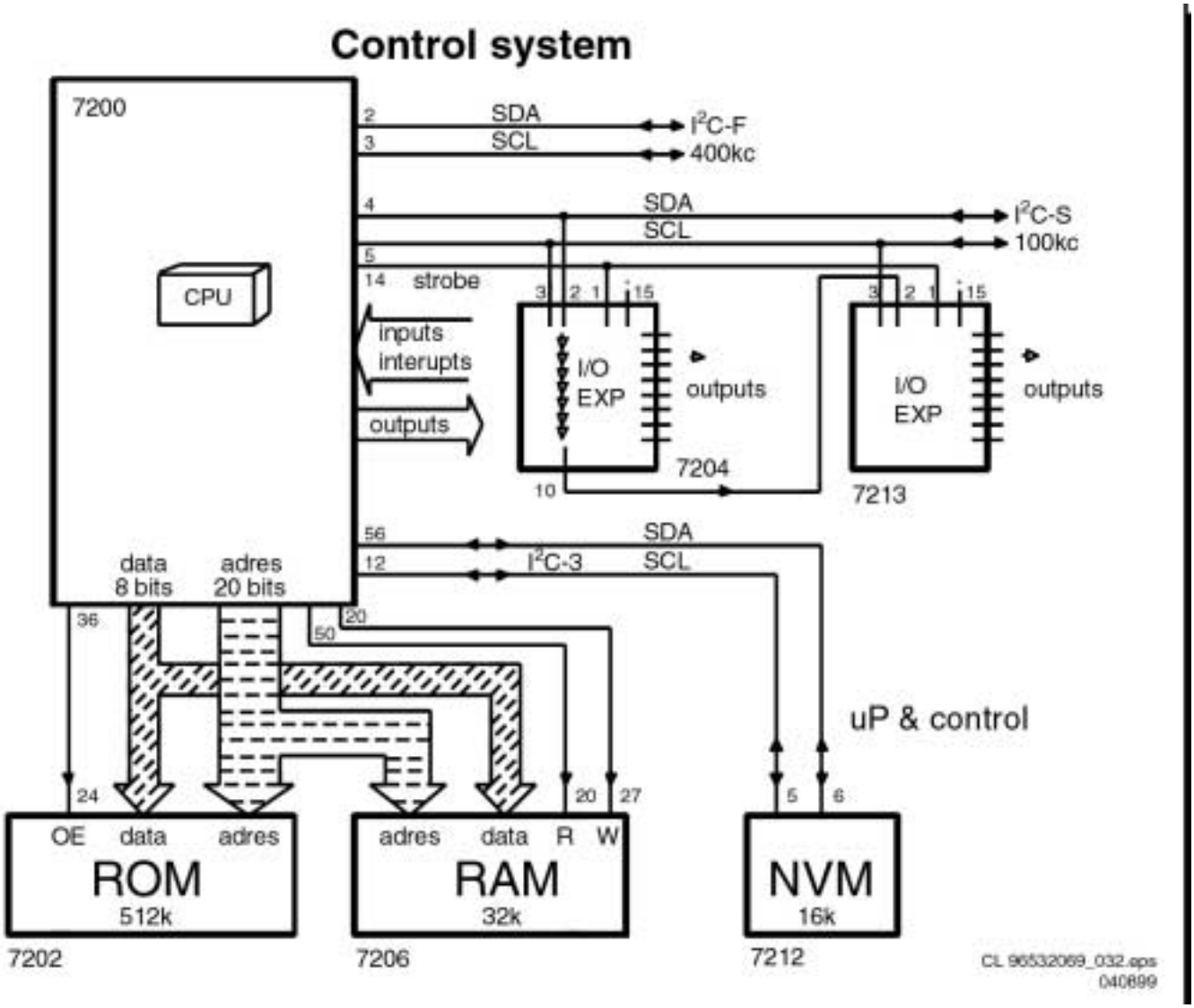


FIGURE 44 - E-BOX MICROPROCESSOR