PSSG

PHILIPS SERVICE SOLUTIONS GROUP

H8 CHASSIS TECHNICAL TRAINING MANUAL

2001 RTM TRAINING

PHILIPS TECH TRAINING VIDEOTAPES MANUALS

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PHILIPS

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INTRODUCTION

The H8 TV Chassis is designed for the 2000-2001 model years. It comes in three screen sizes which are 27, 32, and 36 inch. All Chassis versions have a Side Jack Panel, a Component Input, and Surround Speaker Jacks. The Rear Jack and Side Jack Panels are equipped with both Composite, Component, and SVHS inputs. The sets are equipped with either a Standard Dark Glass picture tube or a Very Flat Square Invar picture tube.

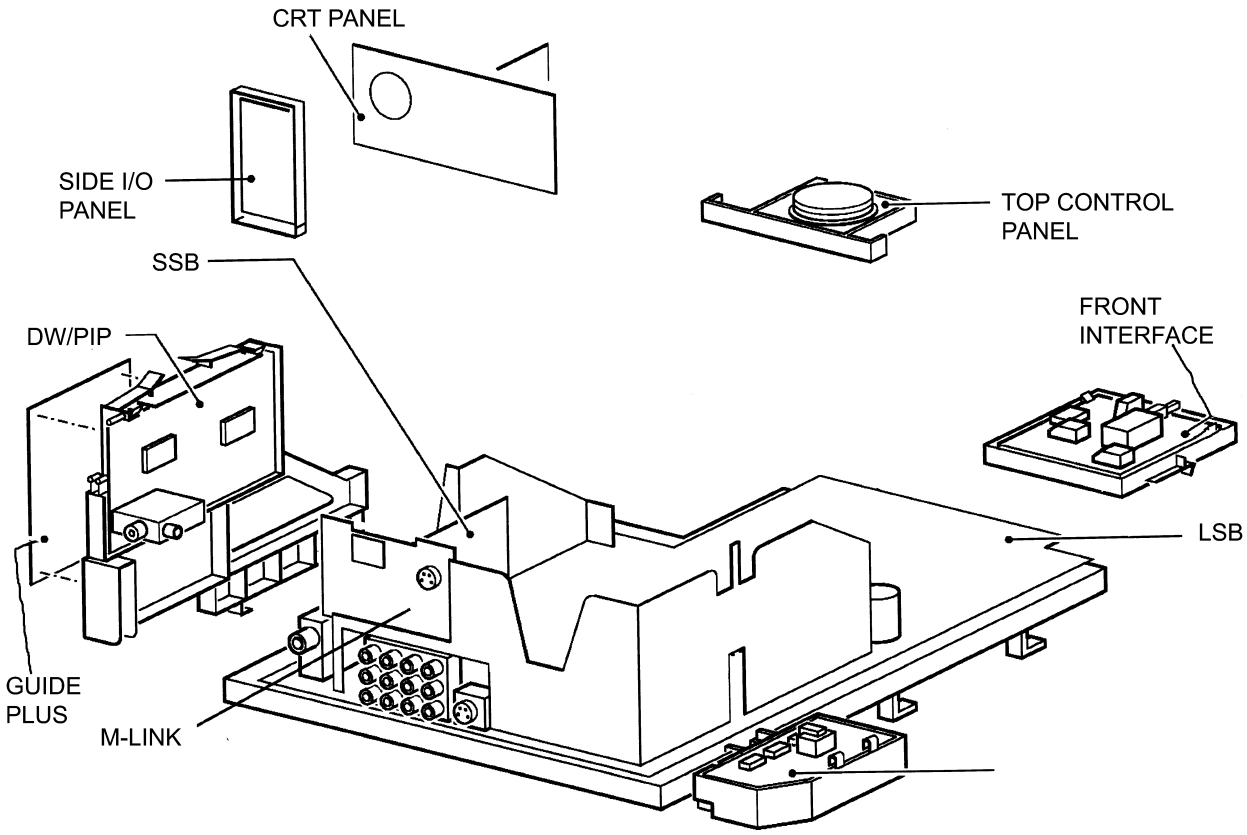
The H8 Chassis comes in Non-PIP (Picture in Picture), Single Tuner PIP, two Tuner PIP, or Double Window versions. Each time the User selects the PIP window, the PIP window appears, changes size, then disappears. In the Double Window version when the PIP On/Off button on the Remote is pressed, a PIP window appears. When the button is pressed again, the window changes size. Press it again and the picture goes to a double window (split screen). Pressing the button again, the picture returns to normal. The XXPT41 and larger models are equipped with the M-Link feature. The M-Link feature allows VCRs, DVD, etc to be controlled through the TV. Up to five devices can be controlled. Refer to the Model to Module listing in the Service Manual to determine which modules are in a given model.

Other features include an Audio Volume Leveler (AVL) to compensate for changes in volume level. AutoLock which allows certain channels, or programs with certain ratings to be blocked. Each time the set is turned Off and back On, the Access Code must be reentered to view the blocked channels. If the Customer forgets the Access Code, entry into the Menu to change the code can by obtained by entering Access Code 0711. To gain entry, the code must be entered twice.

A Format selection in the menu allows the user to select between 4x3, Zoom, or 16x9 aspect ratio for the picture. This is accomplished by changing the Height and Width settings in the set.

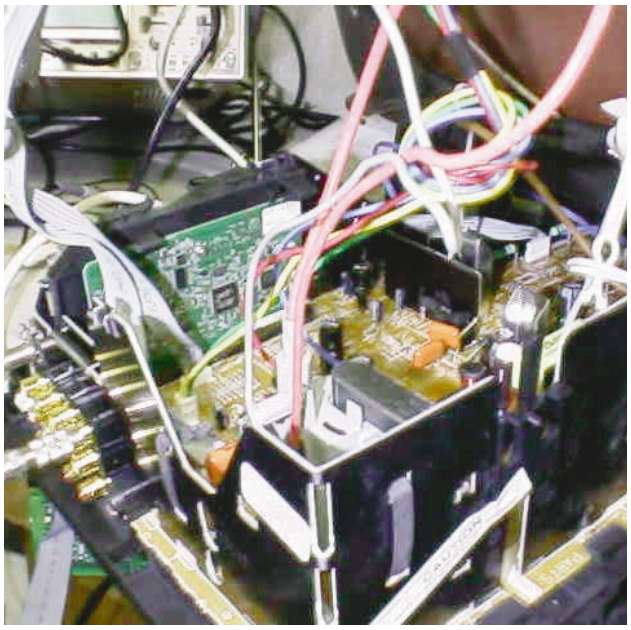
The following table refers to the models and features:

27PT31	NON PIP
27/32/36PT41	Single Tuner PIP
27/32/36PT71	Two Tuner PIP
27/32PT81	Real Flat Invar CRT - Two Tuner PIP - SCAVEM
27/32PT91	Real Flat Invar CRT - Double Window - Guide Plus Virtual Dolby - SCAVEM - Histogram



H8 CHASSIS BOARD LOCATIONS

TV BLOCKING OPTIONS



NON PIP CHASSIS VIEW

POWER SUPPLY

Switch Mode Supply **(Figure 1)**

The Power Supply is a Switching type supply. The Power Supply begins operating as soon as AC power is applied to the set. AC power is applied to the Large Signal Board through Fuse 1900 and applied to the Bridge Rectifier 6915. The rectified B+ voltage is applied to the regulator switching IC, 7921, through Pins 6 and 3 of transformer 5912. Startup voltage for the supply is applied to Pin 4 through resistors 3914 and 3913. The Zener Diode 6921 prevents the voltage on Pin 4 from exceeding 33 volts in case the Regulator IC is not working. When the voltage on Pin 4 reaches 16 volts, the Oscillator inside the IC begins operating. Once the Supply is in full operation, the operating voltage for the supply is supplied by Pin 8 of 5912 and is rectified by 6929. The Oscillator drives the internal switching FET. When the FET is On, energy is stored in 5912. When the FET is Off, energy is transferred to the secondary of 5912. The Frequency and On time of the internal switching FET is determined by the Internal Comparator, the internal RC network, and the Magnetizing Inductance of the Transformer. The Internal RC network also determines the Off time of the FET switch. The On Time is determined by the ramping voltage across 3924, 3923, the feedback voltage from Pin 8 of the transformer, and the voltage from the feedback opto-isolator. The Reference Voltage for the supply is the VBAT (135 volt source). This source is sampled by 7971 which drives the feedback opto-isolator 7929 to set the switch time of comparator B. This controls the On time of the internal switching FET to maintain the VBAT voltage at the correct level. There are four output voltages from the transformer which are the VBAT voltage, 8 volts to the 5 and 3.3 volt regulators, 8 volts unregulated, and 27 volts for the Audio Output circuit.

To troubleshoot the Power Supply, first check the VBAT (135 volt source). If this voltage is missing, check for a short on the VBAT line. The most likely cause would be a shorted Horizontal Output Transistor. If the voltage is pulsing or is Low, check the feedback circuit, 7971 and 7929. Also check Fuse 1941 on the 8 volt unregulated supply. This line supplies the operating voltage for the feedback circuit. Next, check the B+ voltage for 7921 on Pin 3. If the drive signal is pulsing On and Off on Pin 3, there may be a problem with the feedback circuit. If there is no drive signal on Pin 3, check for the operating voltage on Pin 4. This voltage must ramp to 16 volts to start the supply. If it is missing or is not ramping to 16 volts, check 3913, 3914, and 2919. Regulation problems could be caused by resistors 3923 or 3924 changing value. If 7921 should fail, these resistors should be changed by using original parts only.

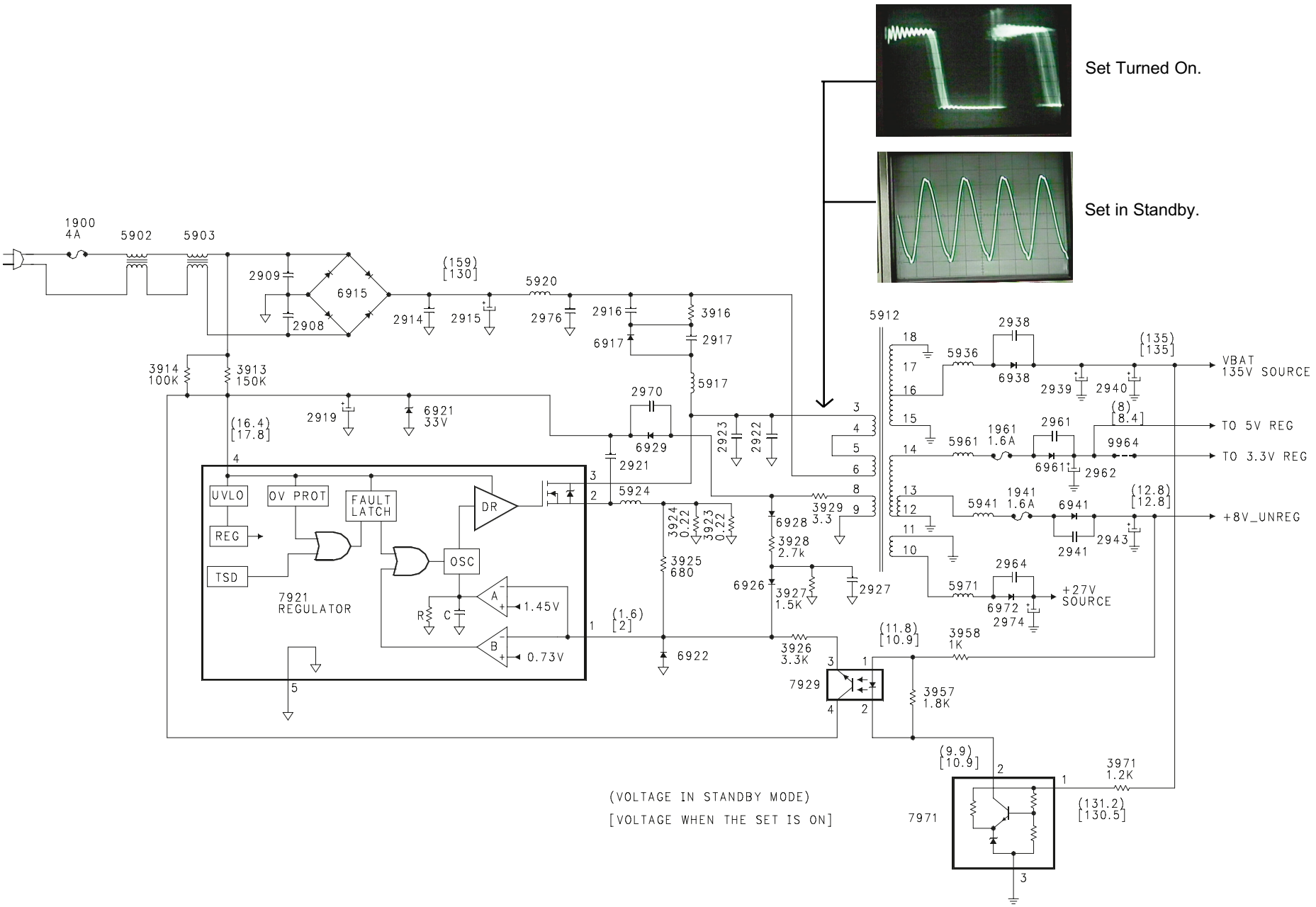


Figure 1 - Switch Mode Power Supply

Standby Regulators and On/Off **(Figure 2)**

The voltage from jumper 9964 (approximately 8 volts) is used to produce the 3.3 volt standby, 5 volt standby, 5 volt remote control, and switched 8 volt supplies. The voltage is applied to transistor 7965 to produce the 3.3 volt Standby supply. When the set is in the Standby mode, transistor 7944 is turned On, turning 7922 On, providing a extra current drive for the 3.3 volt regulator. The 8 volt unregulated supply is applied to 7942, which is a switched 8 volt regulator. The Standby line goes Low when the set is turned On, turning transistor 7944 Off, switching 7942 On. The switched 8 volt supplies the Horizontal Oscillator in the Signal Processor IC located on the SSB.

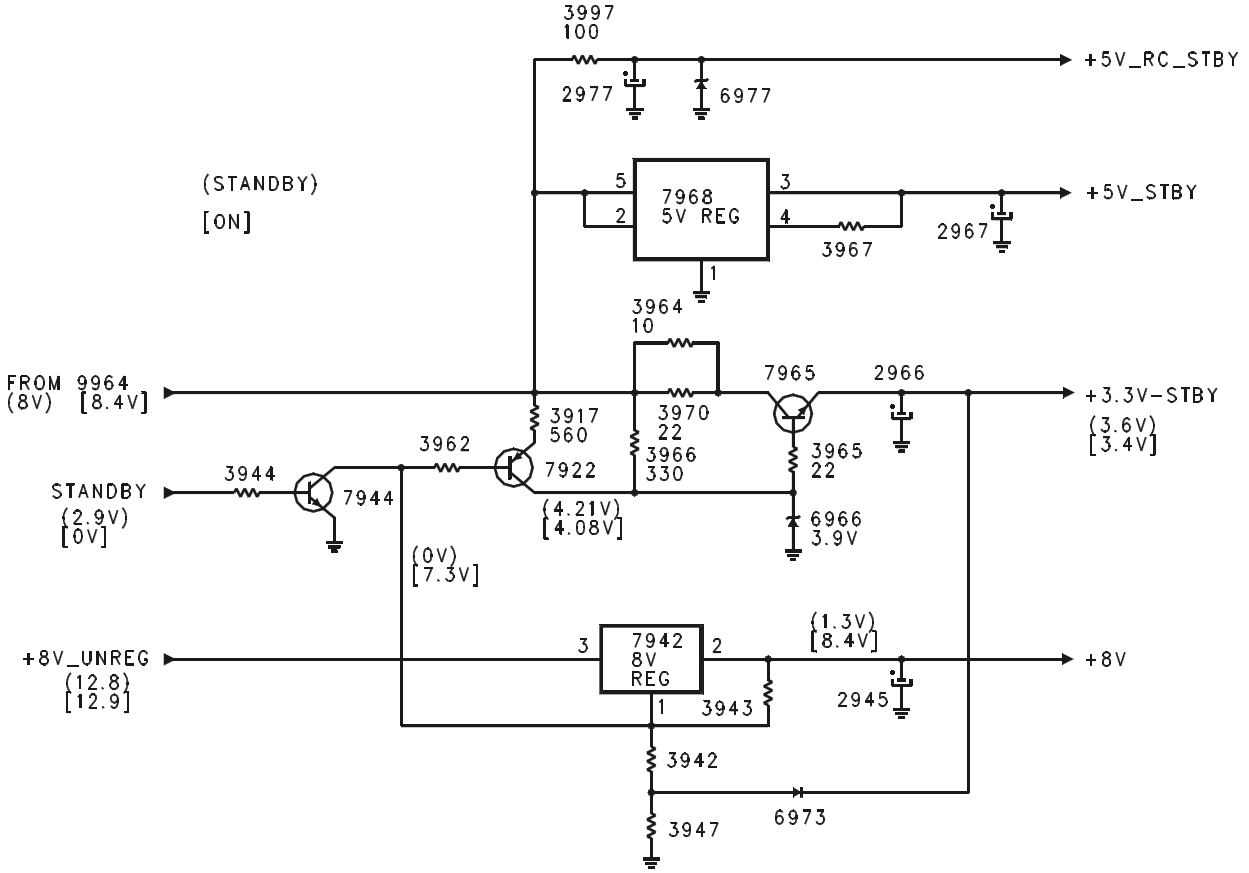


Figure 2 - Standby Regulators and On/Off

Five Volt Switch **(Figure 3)**

The Switched 8 volt supply also turns On the 5 volt regulator, 7967, to produce a switched 5 volt supply. The Switched 5 volt supply turns transistor 7950 On. This provides a load on the 27 volt Audio Supply line to discharge any remaining voltage on the line in the event that power is removed from the set while it is being turned On. This is necessary to prevent a POP in the speaker while the set is powering down.

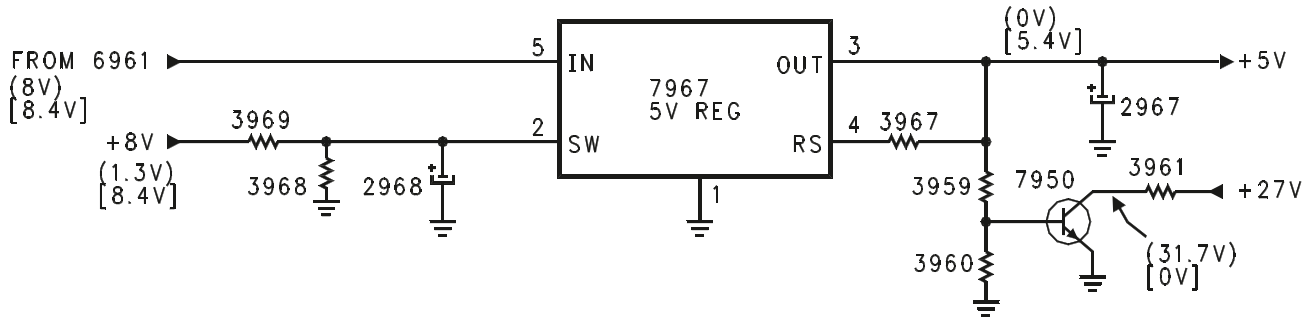


Figure 3 - 5 Volt Switch

Power Down and Front Detect **(Figure 4)**

The Power-Down and Front Detect circuits signal the Microprocessor in case power is removed from the set. The Microprocessor will store the customer settings before shutting the set down. Diode 6942 produces a negative voltage to turn transistor 7987 On, keeping the Power-Down line High. This keeps transistor 7277 turned Off. If power is removed from the set, the negative voltage will discharge before the operating voltage for the set falls. Transistor 7987 will turn Off. 7277 will then turn On, placing a High on the RGB CRT drive lines, blanking the CRT. Transistor 7277 will continue to conduct until Capacitor 2284 has discharged. In the same manner, 7990 will be turned Off, turning 7991 Off, which will turn 7992 On, causing the Front-Detect line to go Low. This will prevent the Microprocessor from receiving any commands while the set is being shut down. If there is a problem in this circuit which causes the Front Detect line to go Low, the Microprocessor will not respond to any commands from the Keyboard or Remote.

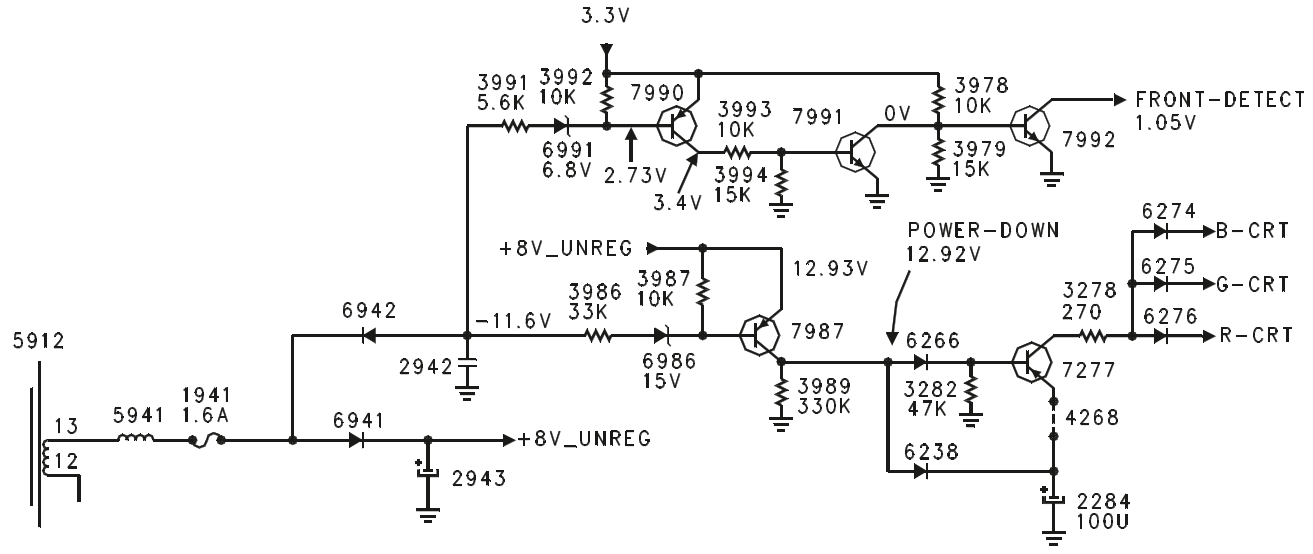


Figure 4 - Power Down and Front Detect

SWEEP AND SHUTDOWN CIRCUITS

Horizontal and Vertical Drive **(Figure 5)**

The 3.3 volts Standby supply provides power to 7301 on Pin 14 for a Horizontal Soft Start. The Standby line from the Microprocessor turns the +8 volt supply On to provide power for the Sync circuits when the set is turned On. The Horizontal Output on Pin 56 is switched On by the Microprocessor via the I2C buss, after the Soft Start is complete. Vertical Drive, labeled Frame-Drive, is output on Pins 63 and 64. In the event the Vertical Output should fail, the Signal Processor 7301 will blank the RGB output. East-West Drive on Pin 62 provides linearity correction for the Very Flat and Larger CRTs. Sandcastle is output on Pin 57. The Dynamic Phase Correction input on Pin 58 has two functions. One function is to provide Horizontal Phase correction for the Horizontal Drive. The other is to provide Flash protection in case of an overvoltage on the I-Beam line. If the pulse on Pin 58 exceeds 6 volts, Horizontal Drive will be shut Off. It will be necessary to recycle power to the set to restore operation. This failure will generate an error code 1 indicating a problem with the Horizontal Output Transformer or with the CRT drive circuit. The PROTN line is connected to the IBEAM (Dag) line. This voltage is used to make minor adjustments in the Vertical Drive to compensate for minor changes in Beam Current. This line is also connected to the Overvoltage Detection circuit. If this voltage exceeds 3.9 volts, the Horizontal Drive will be shut Off. The Microprocessor will show an error code 3.

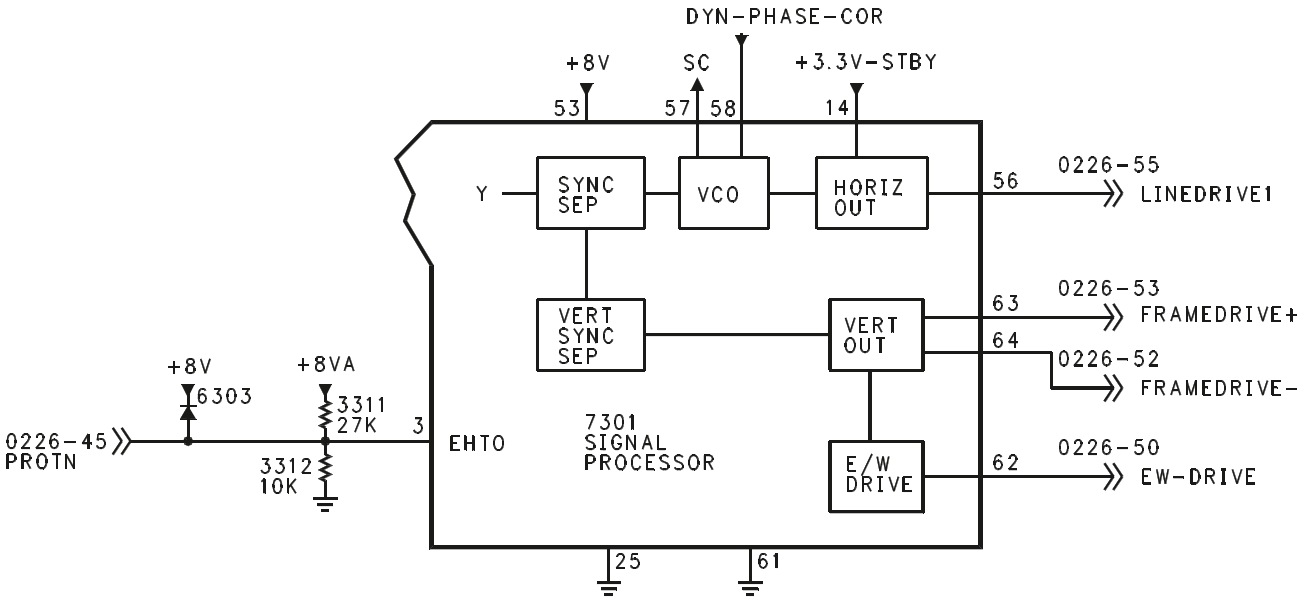


Figure 5 - Horizontal and Vertical Drive

Horizontal Output and Shutdown **(Figure 6)**

Horizontal Drive (LINEDRIVE1) is fed to transistor 7481 and coupled through transformer 5406 to the Horizontal Output transistor 7410. In sets with the Very Flat CRT and larger screen sizes, an East West Drive circuit is present. The East West Drive circuit also has a protection circuit to detect the loss of Horizontal drive. In normal operation, 7470 is switched by the EW-Drive. The pulse width is too narrow to develop the necessary voltage to turn 7478 On. Current flow through 3479 keeps transistor 7480 turned On, keeping

the PROT-UP line Low. If Horizontal drive or EW Drive is lost, 7470 is turned On, applying a positive voltage to the base of 7478, turning it On. Transistor 7480 turns Off, causing the PROT-UP line to go High through resistor 3480, which will cause the Microprocessor to turn the set Off.

When the Driver Transistor 7481 is conducting, the voltage drop across resistors 3404, 3405, and 3406 turns transistor 7408 On. This circuit supplies the 33 volt tuning voltage and bias voltage to the IBEAM (Dag) circuit. Transistor 7440 also detects the failure of Horizontal Drive or Overcurrent. If there is no Horizontal drive to 7481, 7408 will turn Off, removing the 33 volt tuning voltage. Transistor 7440 will turn On, causing the PROT-UP to go High, which will cause the set to shut Off. Voltage from Pin 5 of the IFT is rectified by 6461 and applied to 7464. If this voltage exceeds 5.4 volts, 7464 will turn On, turning 7467 On, applying the +8 volt supply to the PROTN line, shutting the set Off. The IFT produces a plus and minus 13 volt supply for the Vertical Output circuit. The voltage on Pin 9 of the IFT is rectified by 6445 to produce a +200 volt supply for the CRT output circuit. The Horizontal Drive signal is sampled by 3411, 3412, and 3413 to produce the HFB (Horizontal Feedback signal) which is used to provide Sync for the Small Signal Board.

Vertical Output **(Figure 7)**

Positive and Negative Vertical drive from the Small Signal Board is fed to the Vertical Output IC7501 which drives the Vertical Yoke. The Vertical Pulse on Pin3 drives 7513 to produce the VFB (Vertical Feedback signal) for the Small Signal Board. A failure in the Vertical Output circuit will be detected by the Signal Processor on the SSB by sensing the Frame Drive line and by the Microprocessor sensing the loss of the VFB pulse. While turning the set On, check the plus and minus 13 volt sources. Then check for Vertical Drive on Pin 7 with an oscilloscope while turning the set On.

VIDEO SIGNAL FLOW

There are four variations in the signal flow path for the H8 chassis. They are the Non-PIP, the Single Tuner PIP, the Dual Tuner PIP, and the Double Window version.

NON PIP Video Signal Flow **(Figure 8)**

The first version to be discussed is the Non PIP chassis video path. The Main Tuner, AV1, AV2, and Component Inputs are located on the Large Signal panel. The AV3 input is located on the Side Jack Panel. All of these inputs are fed to the Small Signal Board, SSB, which plugs into the Large Signal panel. The Tuner IF is fed to the SAW filter, 1451, and then to the Signal Processor, 7301, on Pins 1 and 2.

Composite Video is output on Pin 16 and is buffered by 7305 and 7331. Baseband Audio is output on Pin 27 and is buffered by 7307. This signal is fed to the Sound Decoder IC for processing. The Video Signal is then fed to 7301 on Pin 24 which selects between the composite signal and

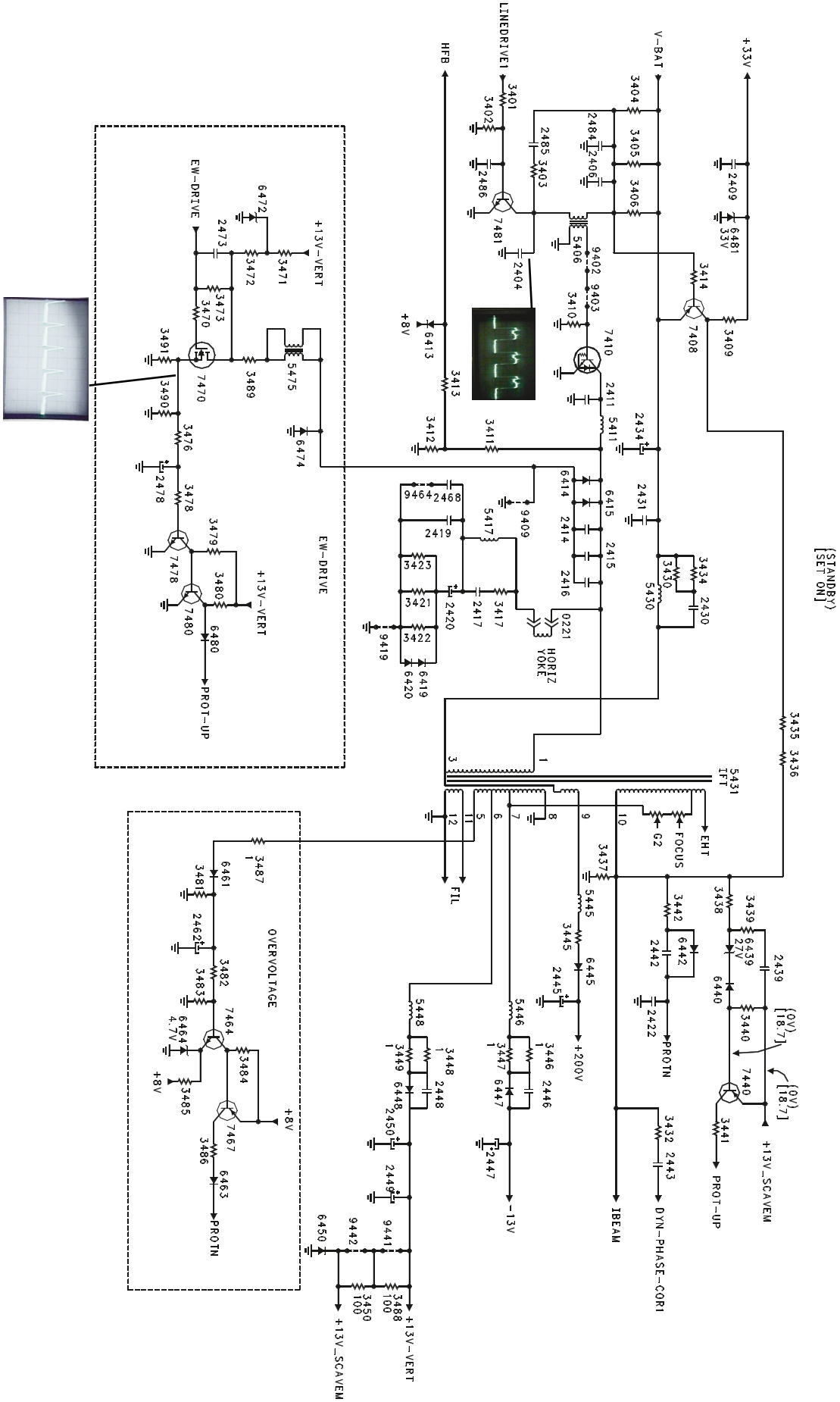


Figure 6 - Horizontal Output and Shutdown

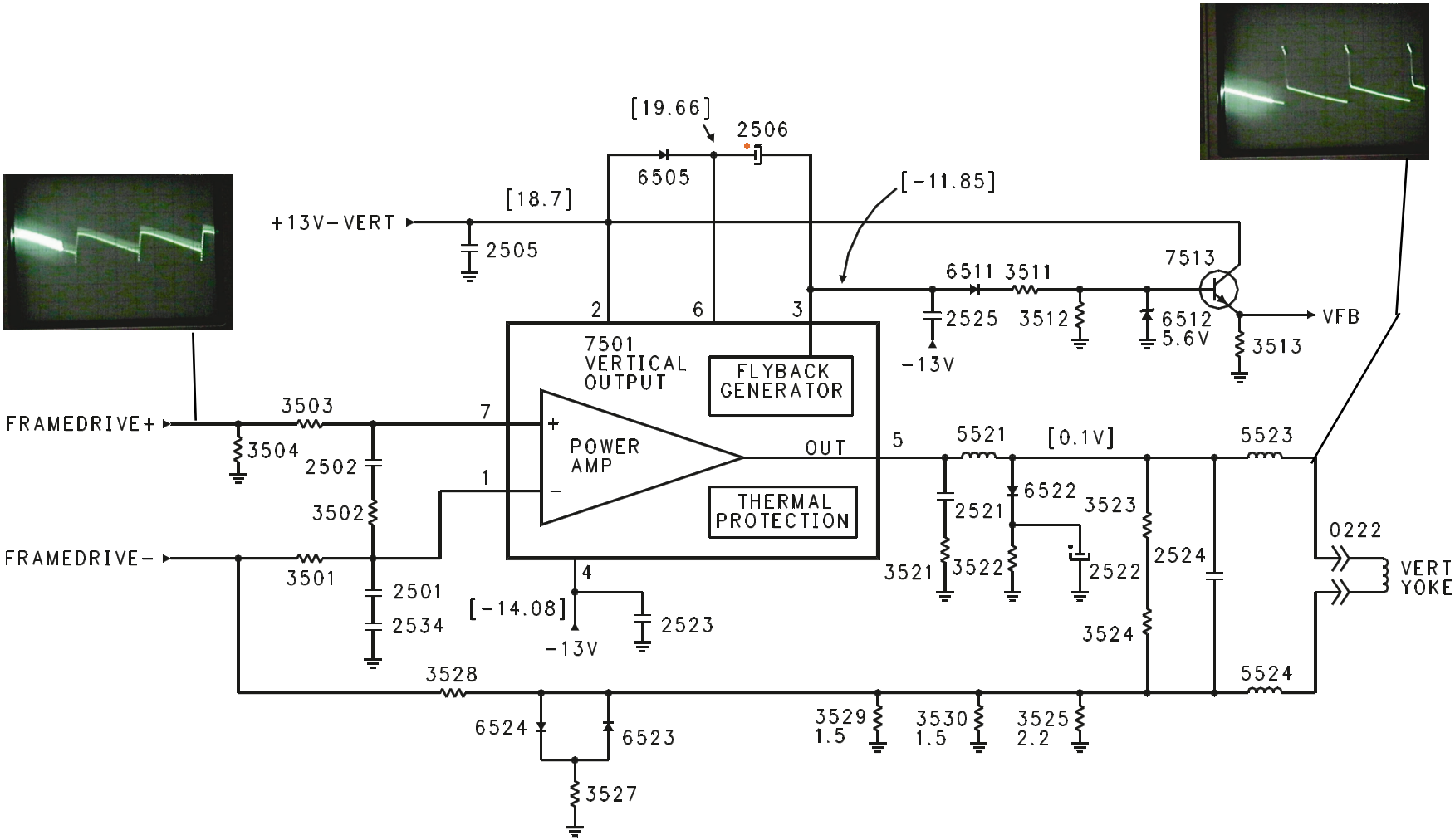


Figure 7 - Vertical Output

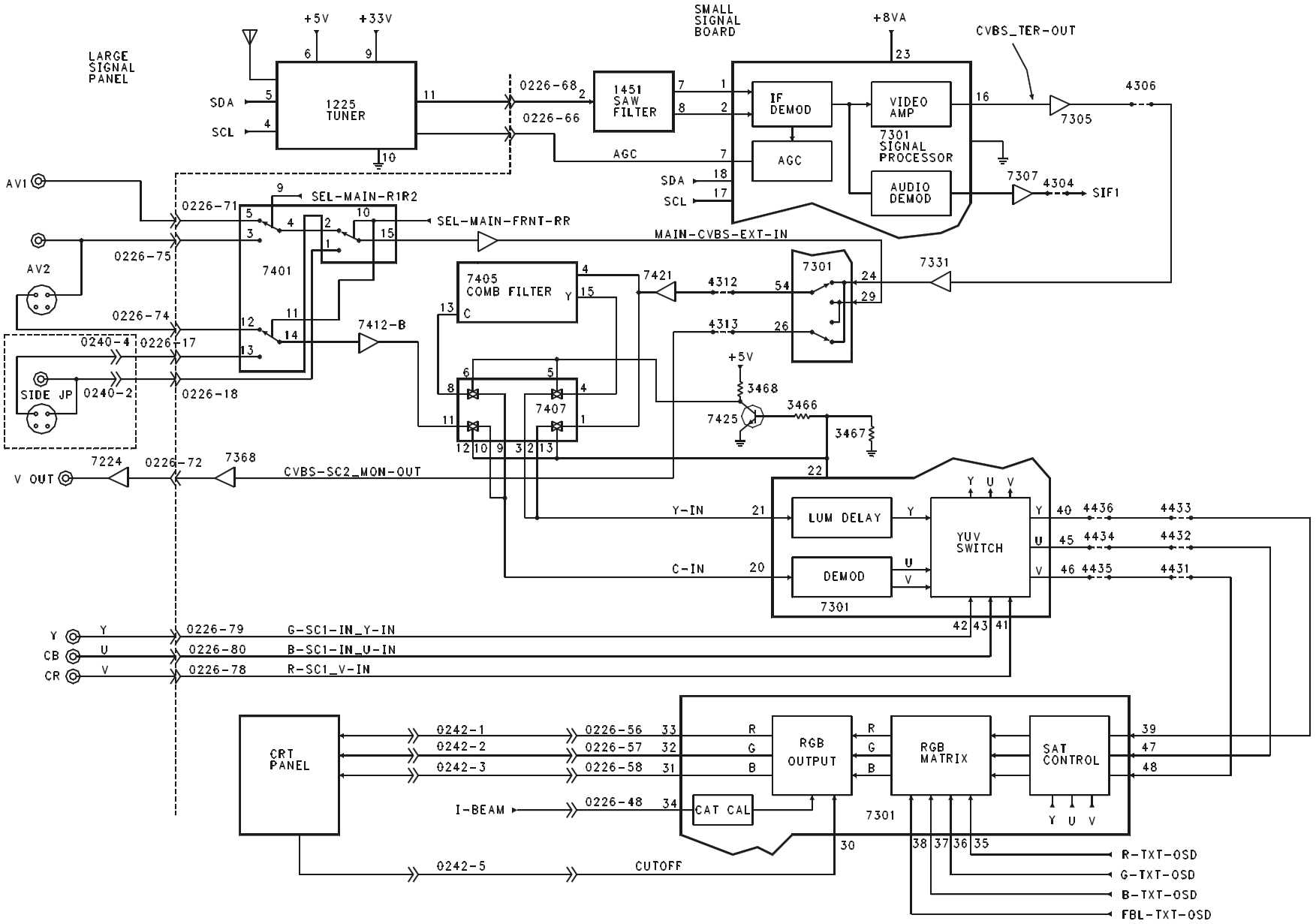


Figure 8 - Non PIP H8 Video Signal Flow

the MAIN-CVBS-EXT-IN. The MAIN-CVBS-EXT-IN is selected composite Video or Luminance from either AV1, AV2, or AV3. These signals are selected by the Switch IC 7401 which is controlled by two lines from the Microprocessor, which are SEL-MAIN-R1R2 and SEL-MAIN-FRNT-RR. If SVHS is the selected input, the Y (Luminance signal) is fed to Pin 29 by 7401. Selected Video or Y from 7301 is output on Pin 54 and is buffered by 7421. If the output of 7301 is Composite Video, the Comb Filter IC 7405 will output Y and C on Pins 15 and 13. Switching IC 7407 selects YC from either the Comb Filter or Y from 7421. If one of the SVHS inputs is selected, 7401 outputs C (Chrominance) on Pin 14 and is buffered by 7412-B before being fed to 7407. IC 7407 is switched by Pin 22 of 7301. A High on Pin 22 causes Pins 12 and 13 to switch the inputs on Pins 1 and 11. When Pin 22 is Low, 7425 is turned Off switching Pins 5 and 6 High, selecting the inputs on Pins 4 and 8. Selected YC is then fed to Pins 21 and 20 of 7301 where they are fed to a Delay Line and Demodulator. The output of the Demodulator and Delay Line is fed to a YUV switch, which selects between this signal and external YUV (Component Input) from the Jacks on the Large Signal panel. The selected YUV signal is then fed back into 7301 on Pins 39, 47, and 48. The signal is then fed to a YUV processing circuit and to an RGB Matrix where OSD (On Screen Display) is added. The signal is then fed to the RGB output circuit and to the CRT. A Test Waveform is first sent to the CRT on the RGB lines. When this Test Signal is detected by the CRT drive circuits, the signal is fed back to 7301 on Pin 3 on the CUTOFF LINE. When these are detected, the Video signal is then output on the RGB lines.

Standard CRT Drive **(Figure 9)**

The CRT drive signal is fed to 7830 which drives the CRT. As mentioned previously, a Test Signal is sent to 7830 and to the CRT. The Waveform on the left shows this Test Signal. When 7830 senses the correct current flow in the CRT, the Test Signal is sent to the SSB via the CUTOFF line. The Picture RGB signal is then fed to the CRT Board. This waveform is shown on the right. If the CRT is defective or unplugged, no pulse will be ouput on Pin 4. Therefore, the Signal Processor IC on the SSB will not output the Video Signal on the RGB lines.

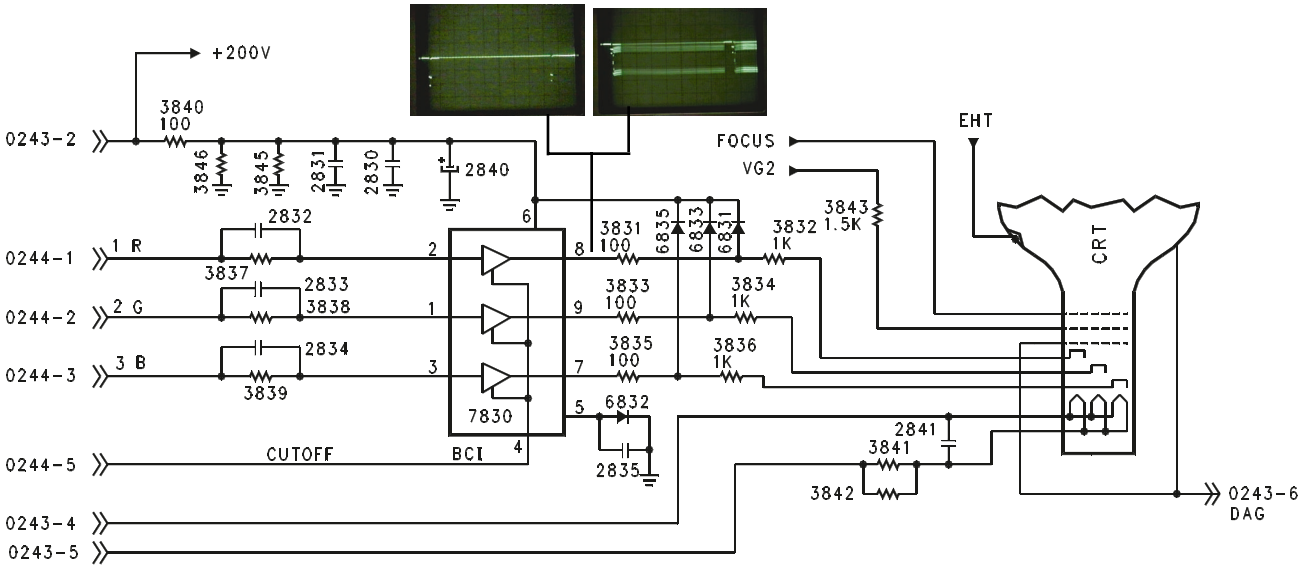


Figure 9 - Standard CRT Drive Circuit

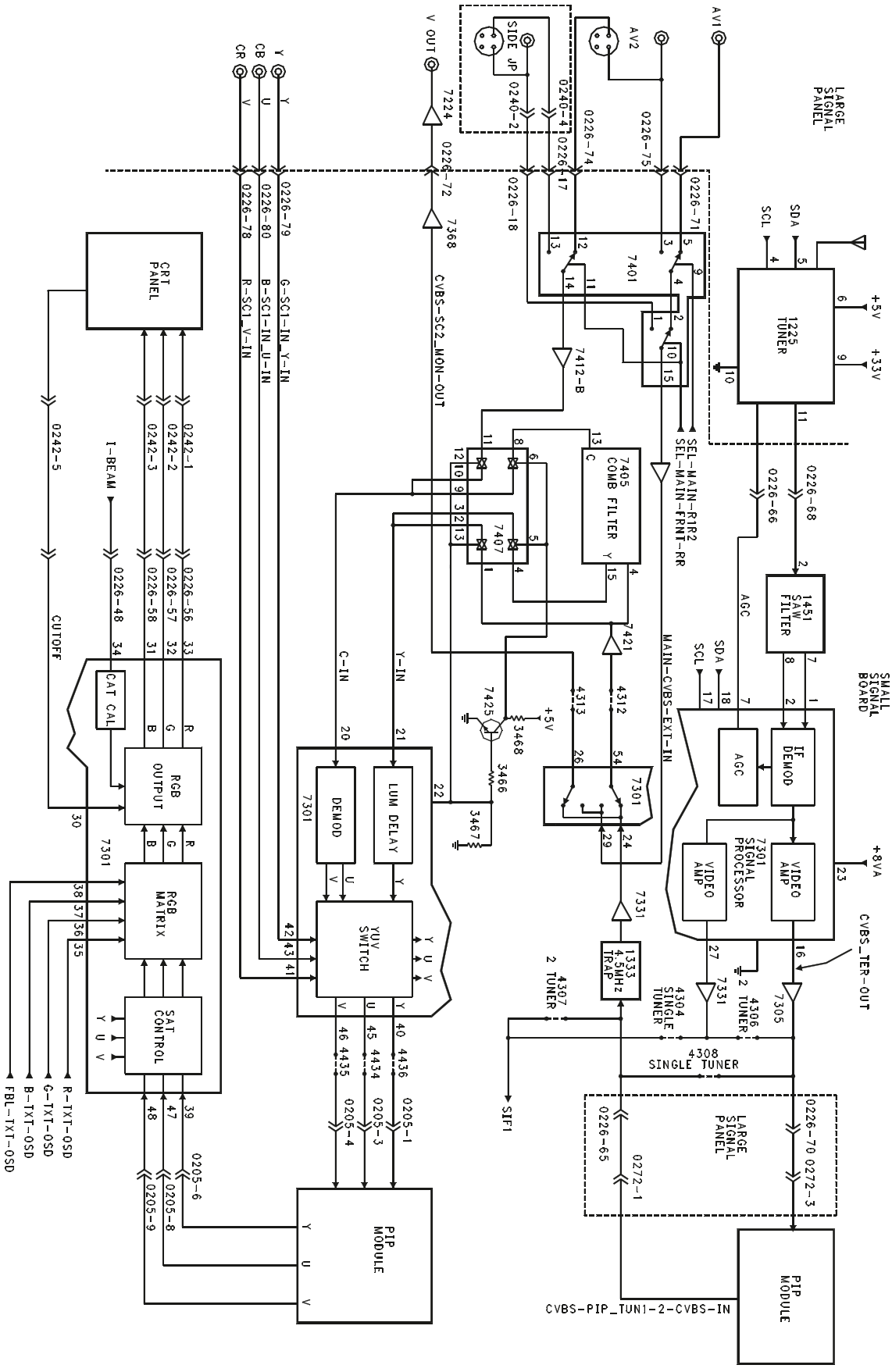


Figure 10 - Video Signal Flow with Standard PIP

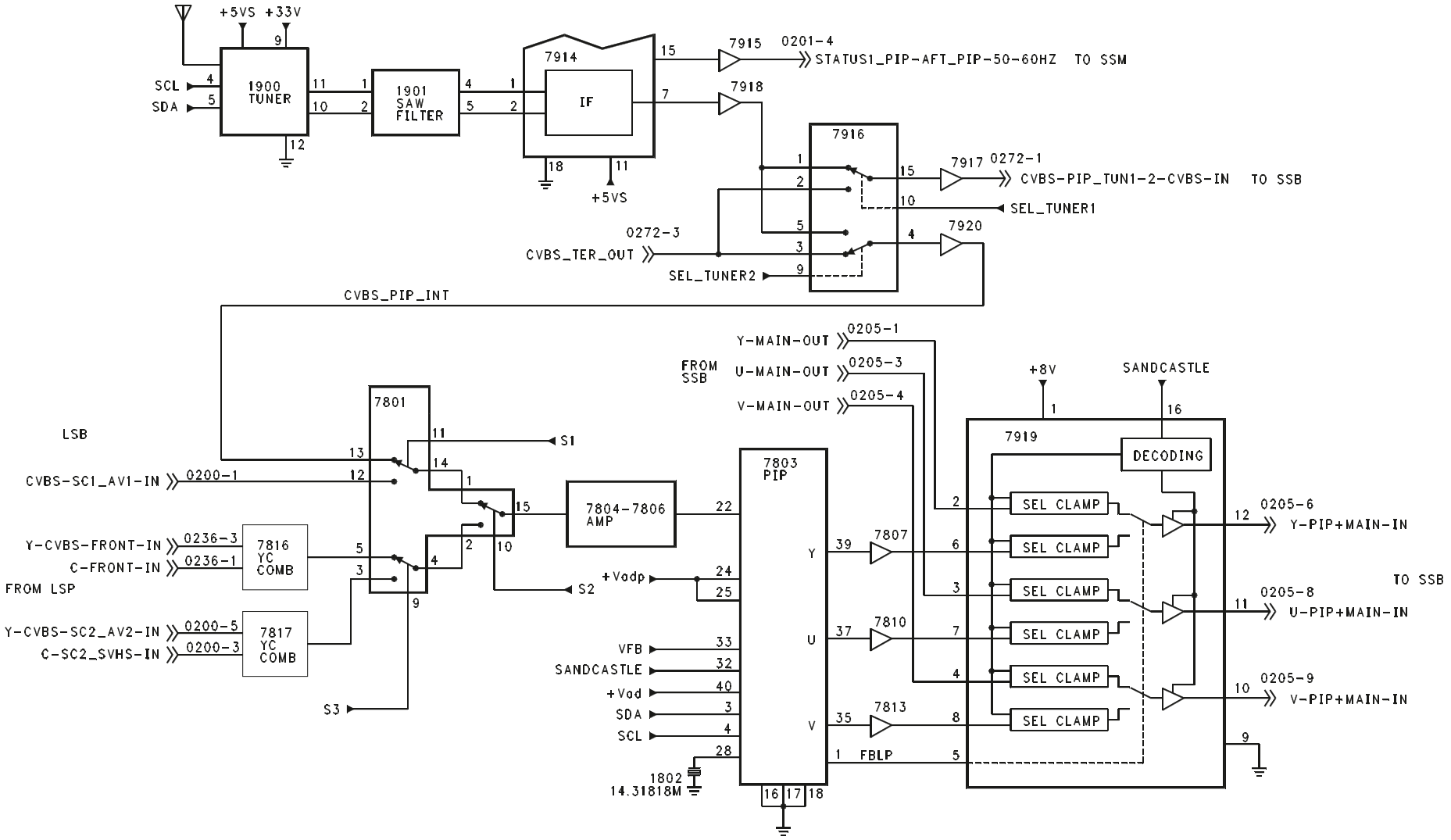


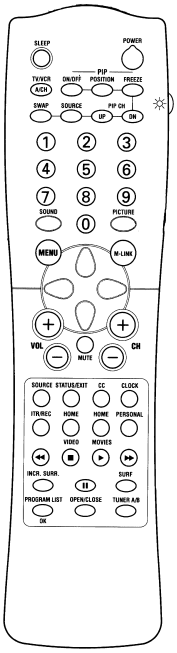
Figure 11 - Single Window PIP

PIP (Picture in Picture) Video Flow **(Figure 10)**

There are two PIP chassis versions which are the Single Tuner and Two Tuner sets. Video Signal flow for the Single Tuner PIP version is the same as the Two Tuner version, except the Composite Video from Pin 16 of 7301 is routed through the Large Signal Board (LSB) to the PIP module and back to the 1333 Sound Trap in the Two Tuner version. In the Single Tuner version, Video from Pin 16 is routed through jumper 4308. The second Tuner is located on the PIP panel. Baseband audio is output on Pin 27 and is buffered by 7331. In the Two Tuner version, the Audio is combined with the composite video before being fed to the PIP panel. Selected Video with the Baseband Audio from the PIP panel is fed through jumper 4307 to the Audio Processor. In the Single Tuner version, Baseband Audio from 7331 is fed through jumper 4304 to the Audio Processor. YUV signal from Pins 40, 45, and 46 are routed through the PIP module where the PIP window Video is inserted. Other Video signal flows are the same as for the Non-PIP version. The Single and Two Tuner PIP circuits are the same except for the addition of the second Tuner and Signal processing circuits on the PIP panel.

PIP Circuit **(Figure 11)**

The PIP comes in two versions, Single Tuner with no tuner on the PIP panel and two tuner versions with the second tuner located on the PIP module. Output of the second tuner is fed to the SAW FILTER 1901, and to the Signal Processor 7914. Composite Video is fed to the Switch 7916 which selects between the PIP tuner or selected Composite Video from the SSB. There are two sets of switches: one to select Video for the main picture, CVBS-PIP_TUN1-2-CVBS-IN, and one to select Video for the PIP window. Selected Video for the PIP window is fed to 7801, which selects between the output of 7916 or from AV1, AV2, or the Side Jack panel (labeled Front In). The output of 7801 is buffered by a four transistor amplifier and then fed to Pin 22 of 7803, PIP processor. The PIP processor is controlled by the I2C buss (SDA and SCL). It is kept in sync by the Vertical sync pulse (VFB) and the Horizontal sync pulse (SANDCASTLE). The PIP window video is output as YUV to the YUV switch, 7919. The signal is combined with the main picture YUV from



Model 27PT81 - Very Flat CRT - Two Tuner PIP

the SSB panel on connector 0205. The combined YUV signal is output on Pins 12, 11, and 10 to the SSB.

PIP Switching **(Figure 12)**

Control for the PIP panel is performed by 7910 via the I2C buss. SEL_TUNER1 and SEL_TUNER2 control the composite switching to the SSB panel. S1, S2, and S3 control the tuner aux switching IC 7801.

PIP Power Supply **(Figure 13)**

The PIP panel is powered by +5 volt, +8 volt, and +33 volt supplies from the Large Signal Board (LSB). A 3.3 volt regulator supplies power to the PIP processor, 7803.

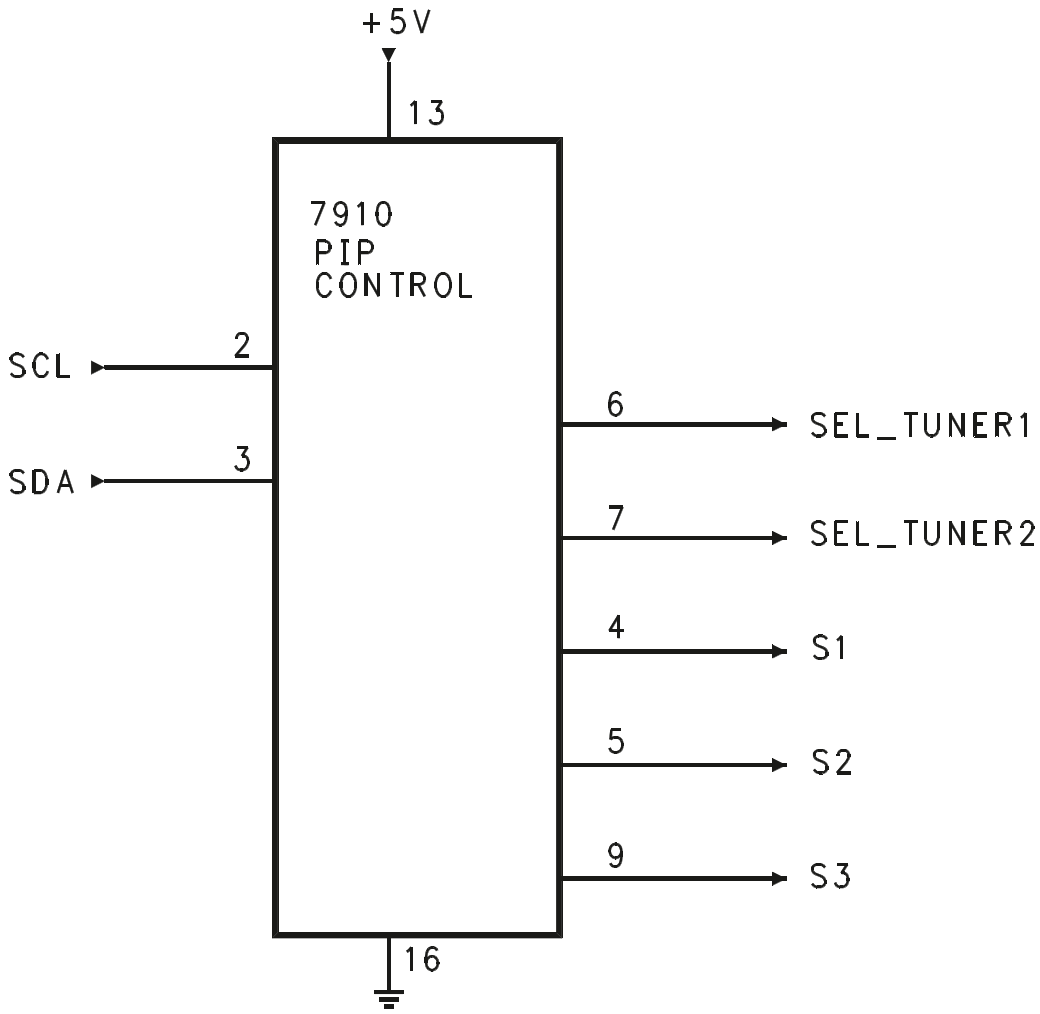


Figure 12 - Single Window PIP Control

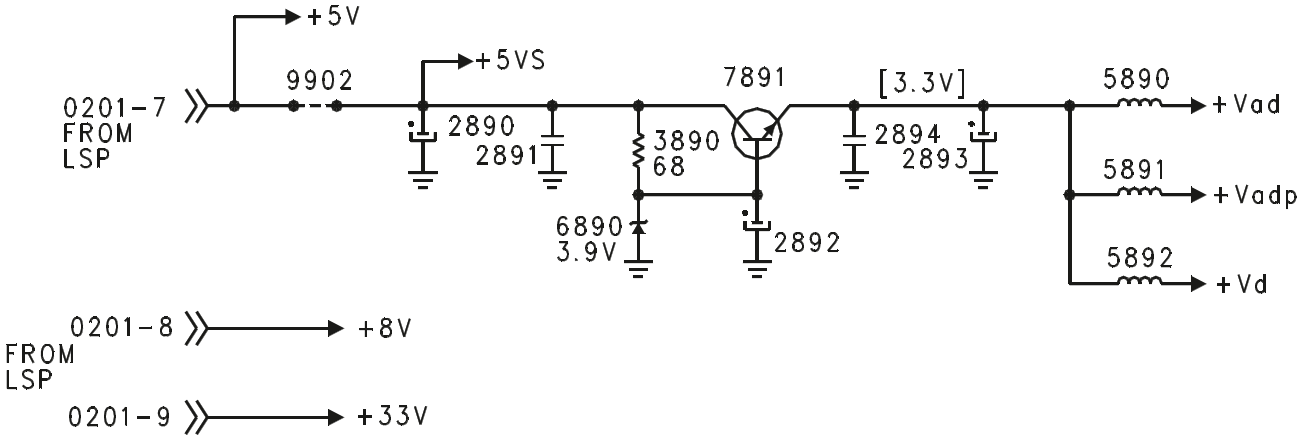


Figure 13 - PIP Power Supply

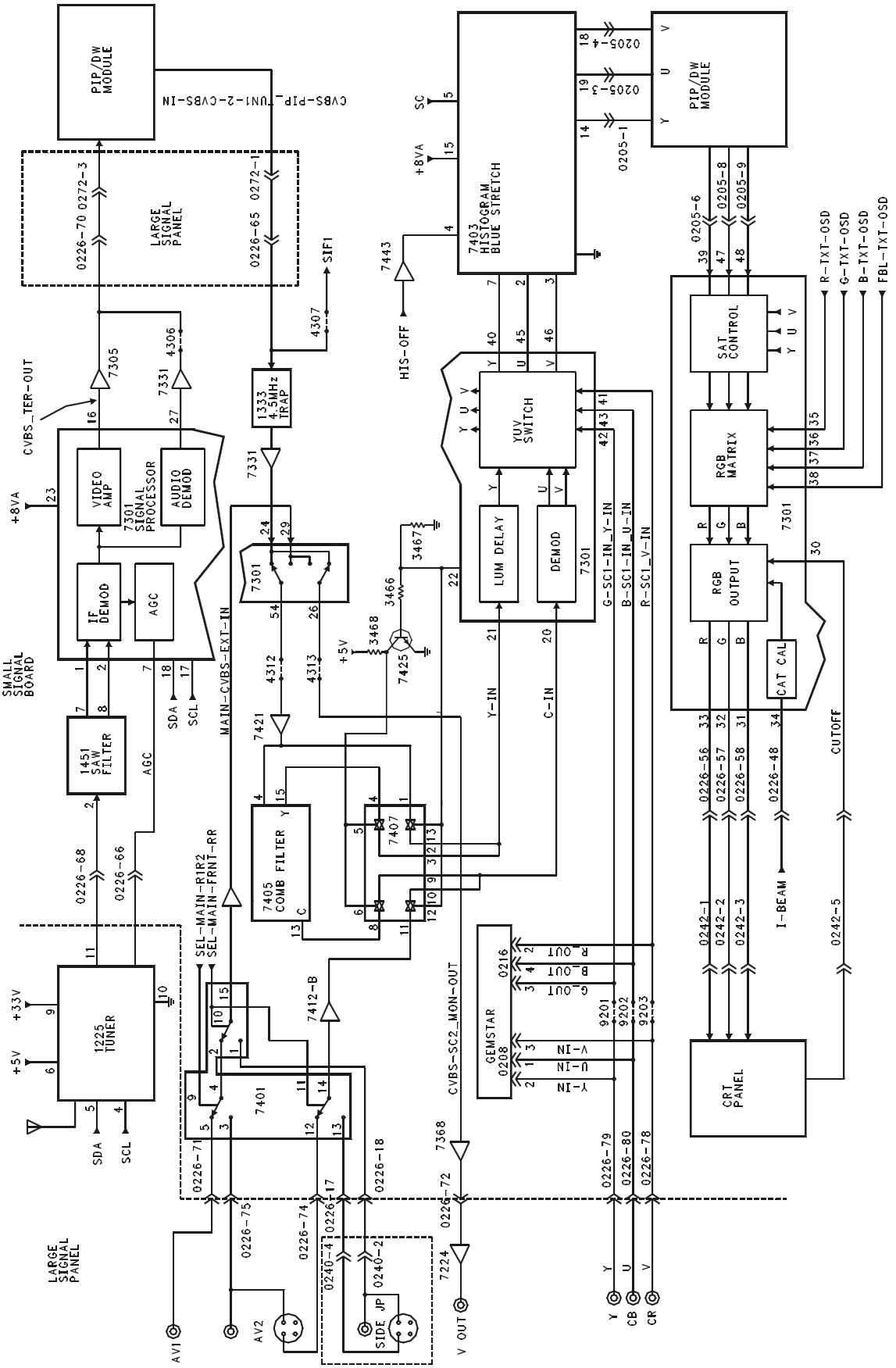


Figure 14 - Video Signal Flow with PIP/Double Window

Video Signal Flow with Double Window **(Figure 14)**

The XXPT91 versions of the H8 chassis have the DOUBLE WINDOW panels. This allows for both a single PIP window and a split screen. Each Time the PIP On/Off button on the remote is selected, the PIP window goes from a small window to a large window and then to a split screen. Composite Video and YUV switching between the PIP panel and the SSB is the same as the standard PIP. Two other differences are the Histogram IC 7403 and the Gemstar module. The component YUV input is routed through the Gemstar module. If there is a Component input to the set, such as the output of a DVD, it is combined with the on-screen Gemstar information in the Gemstar module and output from the Gemstar module as RGB. The RGB signal is then fed to the RGB/YUV switch in 7301. Another addition to this chassis version is the Histogram IC, 7403. The Histogram circuit is a Contrast improvement circuit. The Y or Luminance signal is divided into 5 discrete histogram sections for processing. Each level is adjusted to improve the overall contrast level. The Blue Stretch circuit shifts colors near white toward Blue to give a brighter impression. The HIS-OFF is used to switch the Histogram circuit On and Off.

Double Window Tuner and Video Switching **(Figure 15)**

The PIP/Double Window panel allows for both a standard PIP window and a split screen. The PIP/Double Window module has a separate Tuner, SAW filter, and Signal Processor. The output of the Signal Processor, 7301, on Pin 16 is fed to switching IC 7402 which selects between the PIP Tuner and Composite Video from the SSB for feedback to the SSB on Pin 15 or Video for the PIP window on Pin 14. IC 7401 selects Composite Video or Luminance (Y) from AV1, AV2, or AV3. The other part of 7401 selects Chroma from the rear Jack or the Side Jack panel. These selections are fed to 7301 on Pins 24, 29, and 20. If Composite Video is selected, it is fed to a YC separator, then to a Delay Line and Demodulator. If it is a YC signal, it bypasses the YC separator. The YUV signal is then fed to the YUV switch which selects between the output of the Delay Line and Demodulator, and external YUV from the Large Signal Board. The YUV (SY, SU, and SV) is output to the PIP processor IC. Selected Composite Video is fed to the V-Chip processor. V-Chip processing for the main picture is done by the Microprocessor on the SSB.

Double Window Output **(Figure 16)**

The PIP or Double Window YUV signal is fed to the PIP/DW processor, 7801. The I2C buss controls the IC from the Microprocessor on the SSB. The PIP/DW processor outputs YUV for the PIP window or Split Screen to the YUV switch 7803 where it is mixed with the YUV signal from the SSB for the main picture. The Fast Blanking line from 7801 on Pin 68 controls the switch point in which the PIP window or Split Screen is inserted. The SDA and SCL lines are switched by the +3VD line. The PIP processor is powered by the +3 volt supply. The +3.3 volt, +3 volt, and +3VD volt supplies are produced by the regulator 7802 which is driven by the +5VS supply. This supply is switched On when the PIP window is selected.

Double Window Control and Power Supply **(Figure 17)**

The PIP/Double Window module is controlled by the I2C buss through 7403 on the PIP module. Pins 4, 5, 6, and 7 perform Video selection functions. Pin 10 produces a reset signal for the Guide Plus module. Pin 12 controls the +5VS and +8VS supplies.

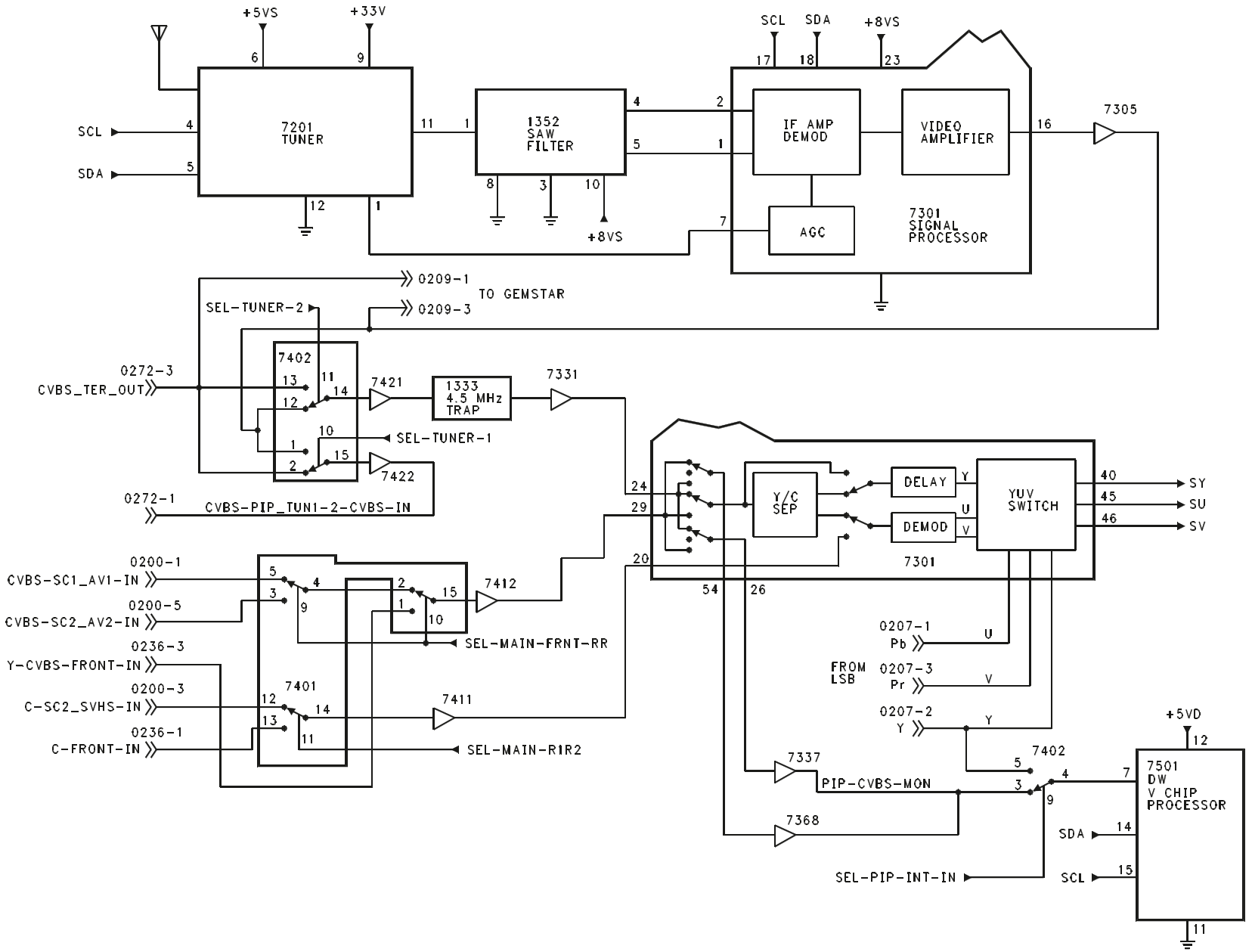


Figure 15 - PIP/Double Window Tuner and Video Switching

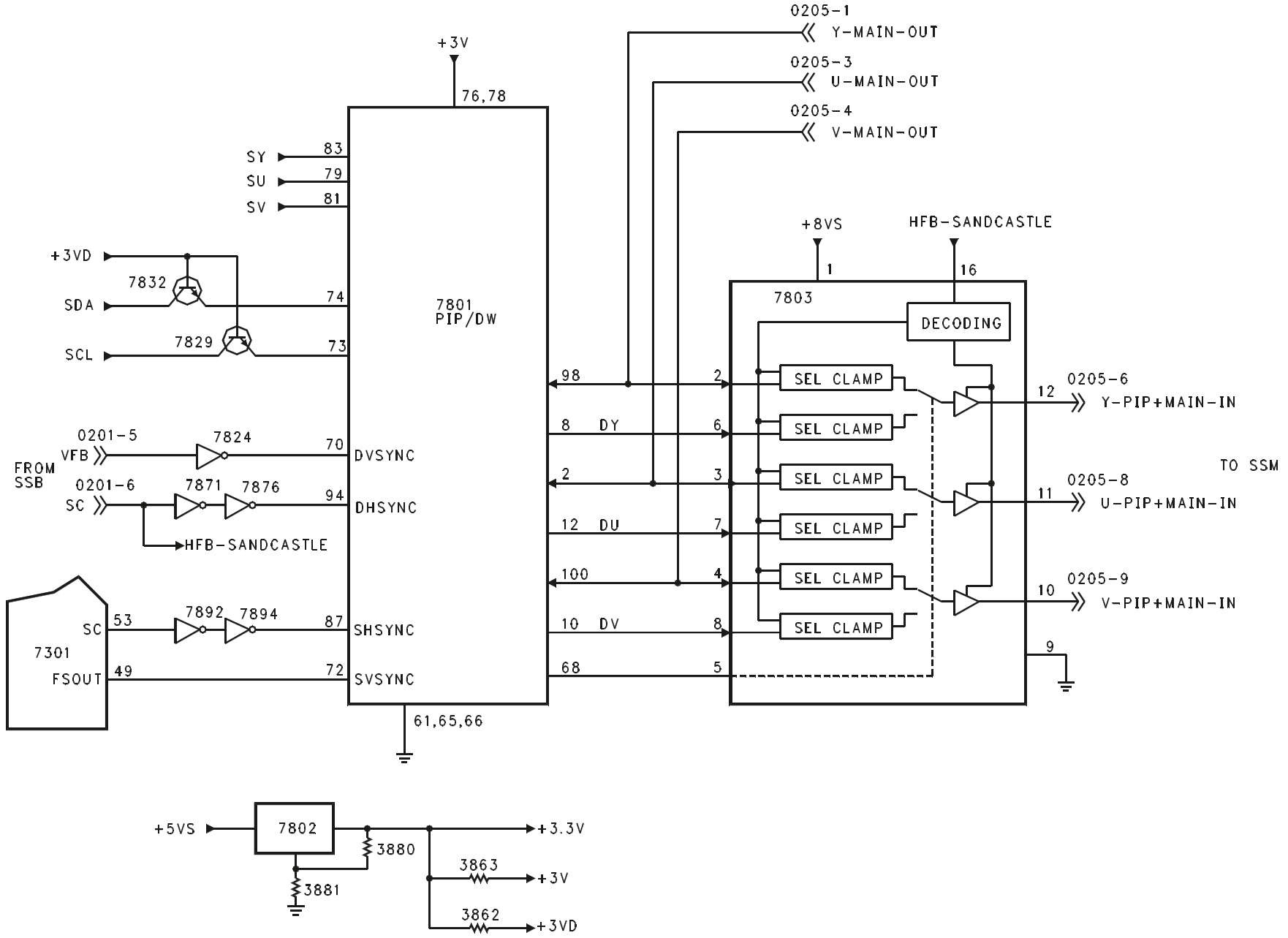


Figure 16 - PIP/Double Window Output

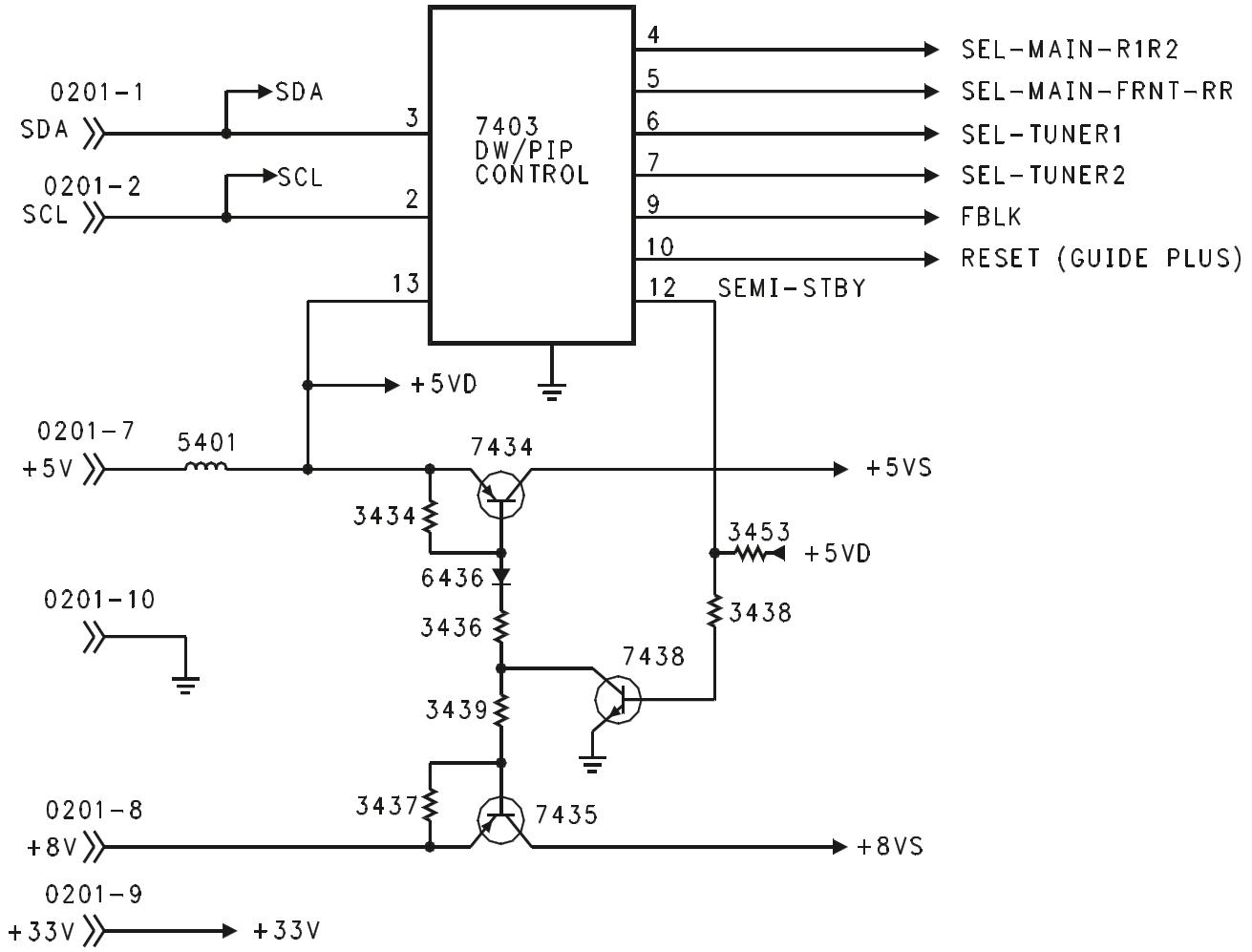
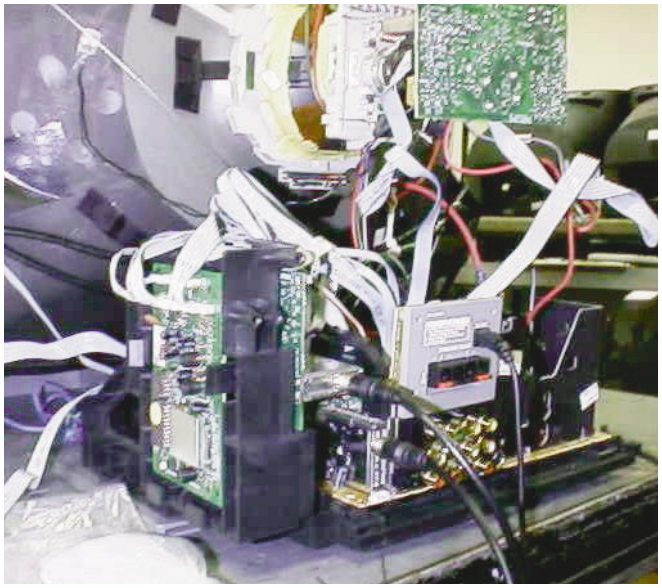


Figure 17 - PIP/Double Window Control and Power Supply

Very Flat CRT Drive Circuit **(Figure 18)**

The CRT panel for the Very Flat CRT's has an SVM circuit to sharpen the transitions from dark to light and light to dark. The RGB signals are combined and fed to 7860 which performs impedance matching. The signal is then buffered by 7861. Capacitors 2867, 2870, and 2874 along with diodes 6867 and 6868 act as a differentiator to separate the pulses for the contrast difference. Transistors 7862 and 7863 drive the SVM yoke. To ensure the SVM switching occurs at the correct point in the picture, delay lines 5886, 5888, and 5890 delay the RGB signal to the RGB amplifier.



Model 27PT91 with PIP/Double Window and Gemstar

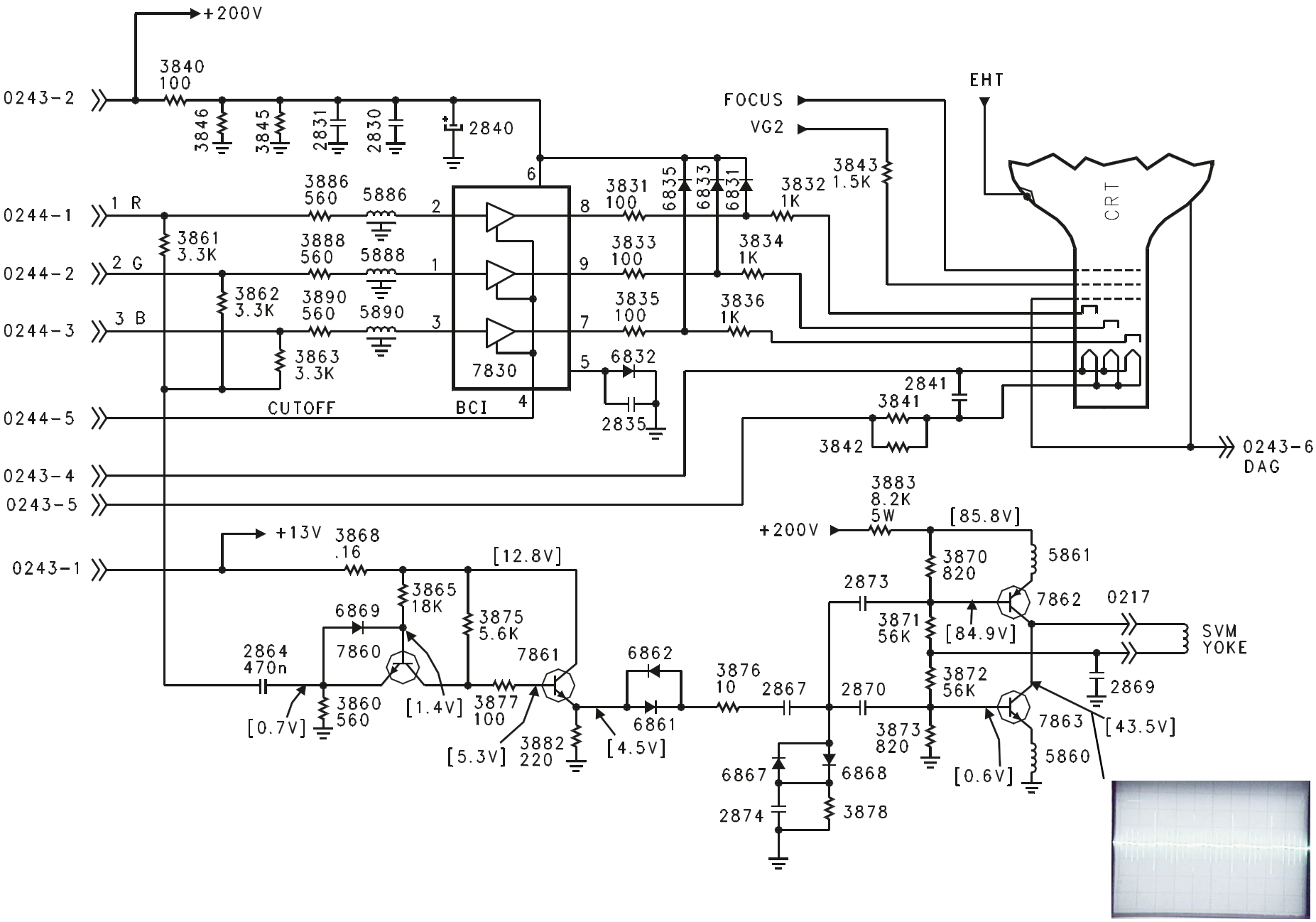


Figure 18 - Flat CRT Drive

AUDIO SIGNAL PATH

Audio Signal Processing **(Figure 19)**

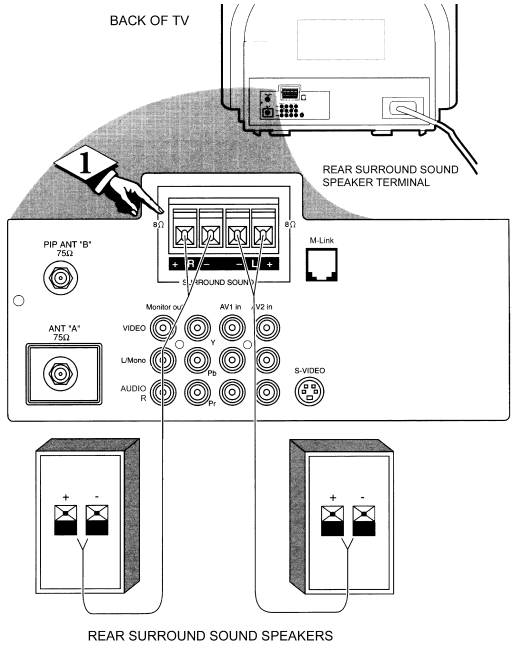
All Audio Processing is performed by 7651, which is located on the SSB. The Sound IF is fed to Pin 50 and to the Sound Demodulator for decoding. The internal Switch selects between AV1, AV2, and AV3. The Audio is digitally processed inside the IC to separate the Second Audio Program and process volume levels to maintain a constant audio level if the AVL feature is selected by the user. The AUDIO-L and AUDIO-R are fed to the audio amplifier on the Large Signal Board. The Headphone output on Pins 18 and 17 is fed to the Headphone amplifier on the LSB. SC1_OUT-L and SC1_OUT_R on Pins 28 and 29 are fed to the monitor audio jacks on the LSB. The AUDIO-SW, Subwoofer output, is fed to the LSB and then to the Subwoofer module. Audio frequencies above 100 Hz are filtered out for this output. Volume levels are controlled in the Audio Processor IC.

Audio Amplifier **(Figure 20)**

Audio from the SSB is fed to the Audio Amplifier on the LSB. Left Channel Audio is fed to Pin 2 of 7702 while Right Channel Audio is fed to Pin 5. Audio is output to the speakers on Pins 12 and 7. Left and Right outputs are also fed to the Surround Sound Speaker Jack. The output of the Surround Jacks is the difference between the Left and Right Channels. The Amplifier is powered by a 27 volt supply which is present as soon as power is applied to the set. When the set is in the Stand By mode, a High on the Stand By line turns transistors 7710 and 7704 On placing a Low on Pins 11 and 3 of 7702. This turns the output stage of 7702 Off during Stand By. When the User selects the Mute function, the SOUND-ENABLE line goes Low, turning transistor 7701 Off. Pin 8 of 7702 will go High, muting drive to the output stage. When Sound is present, the SOUND-ENABLE line is High. When Power is removed from the set, the POWER-DOWN line goes Low, turning transistor 7711 On, causing the SOUND-ENABLE line to go Low. This mutes the audio output during Power Down to prevent a POP in the speakers.

Headphone Amplifier **(Figure 21)**

Headphone audio from the SSB is fed to the Headphone Amplifier, 7703-A, located on the LSB. The Audio is then output to the Side Jack panel. This circuit is powered by the +5 volt supply.



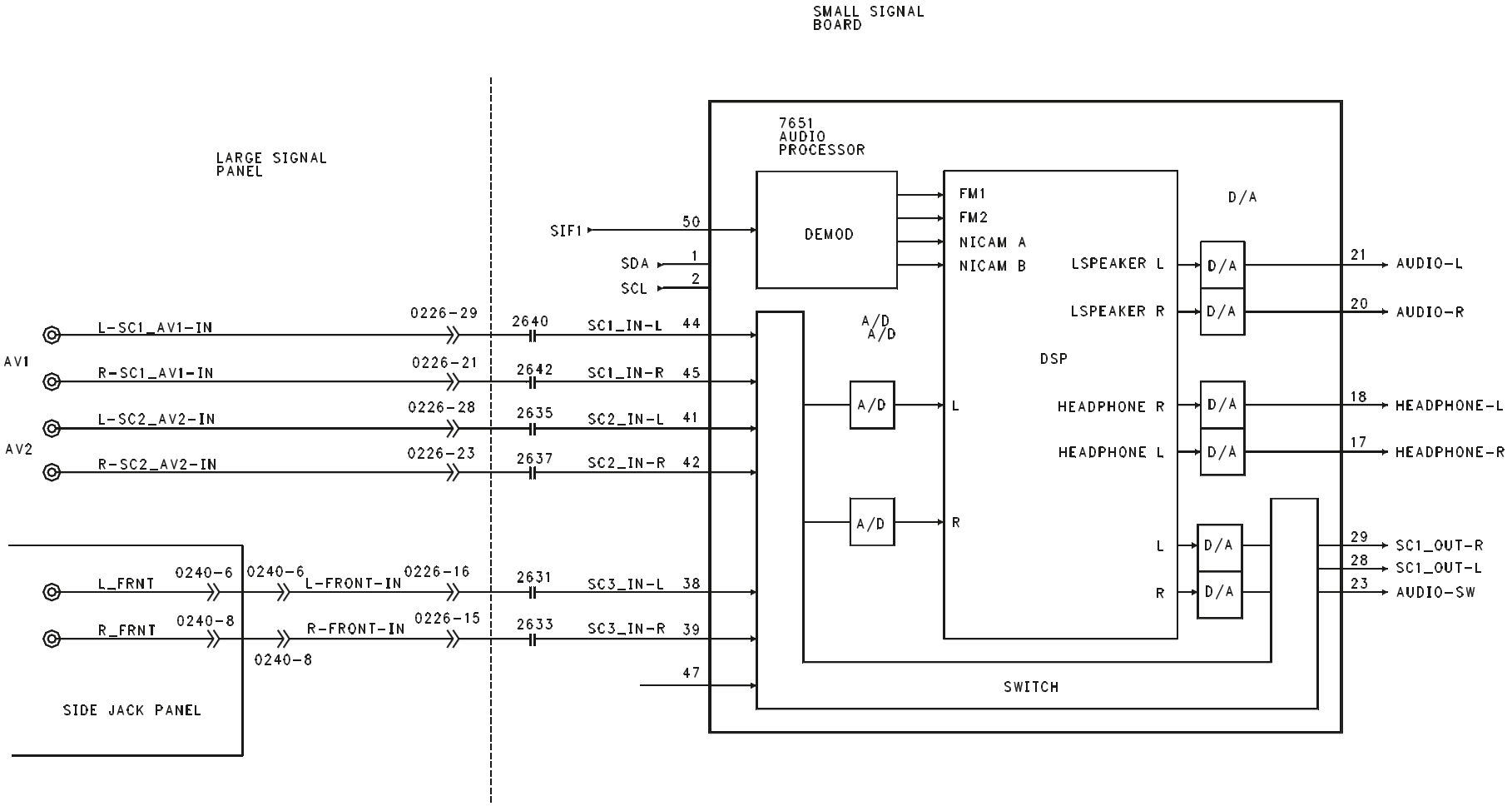
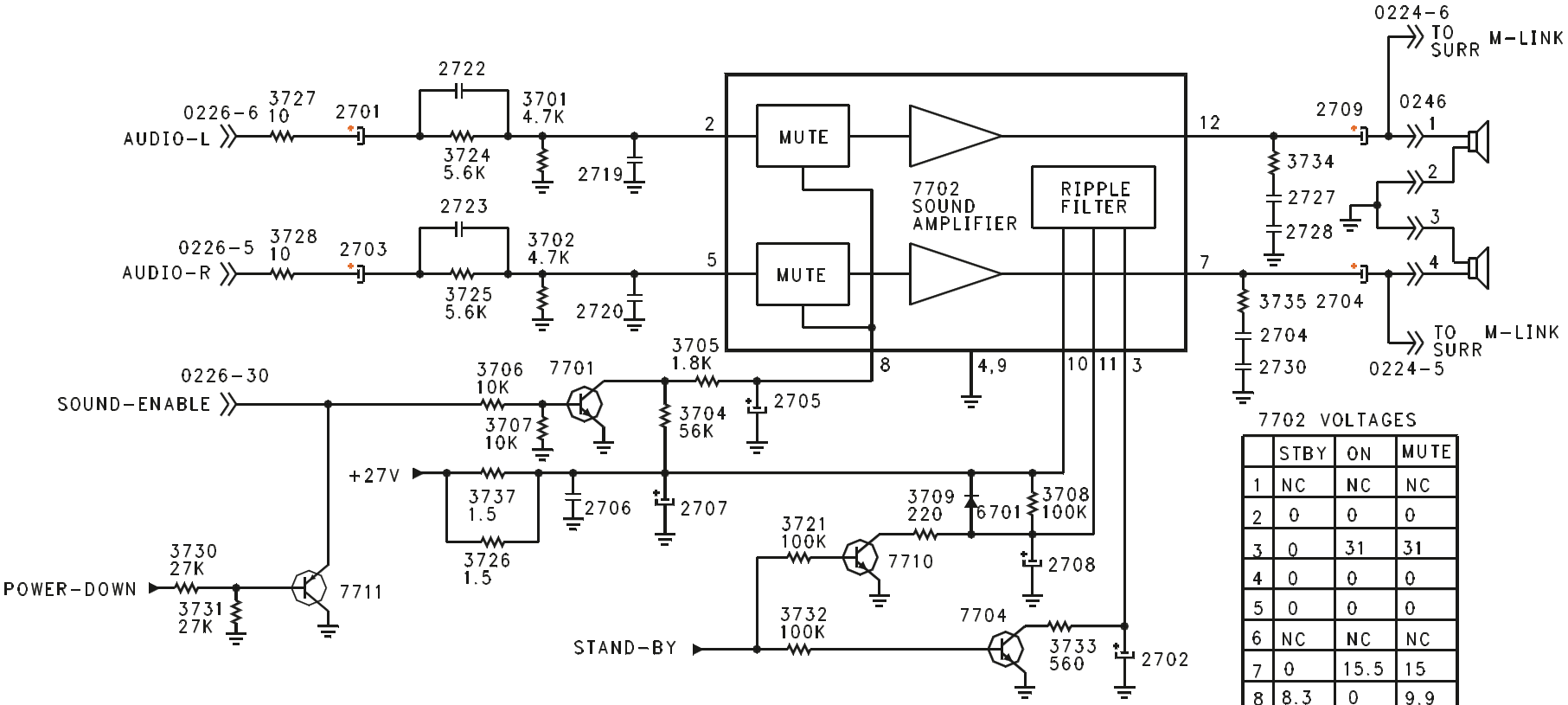


Figure 19 - Audio Signal Processing



7702 VOLTAGES

	STBY	ON	MUTE
1	NC	NC	NC
2	0	0	0
3	0	31	31
4	0	0	0
5	0	0	0
6	NC	NC	NC
7	0	15.5	15
8	8.3	0	9.9
9	0	0	0
10	31.7	32.5	32
11	0	10.7	10.7
12	0	15.4	15.5

Figure 20 - Audio Amplifier

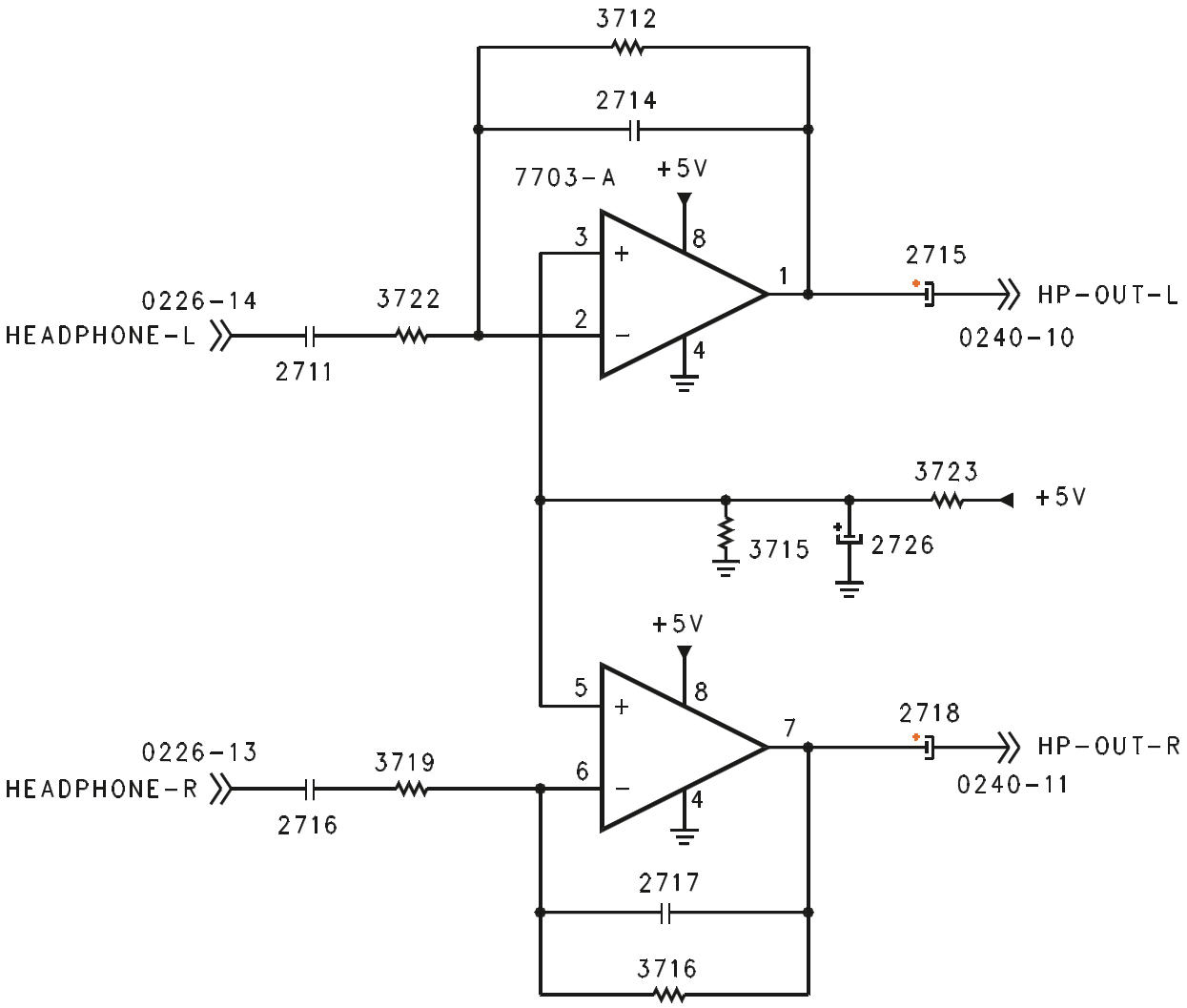
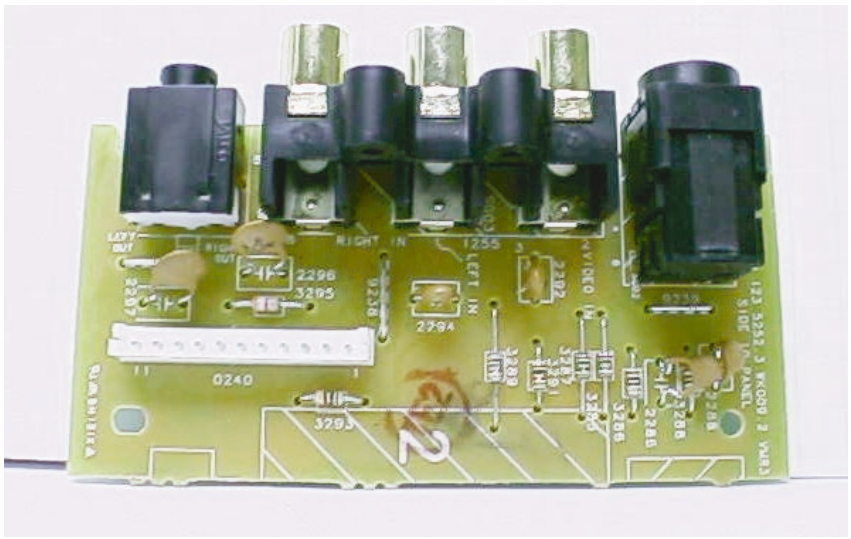


Figure 21 - Headphone Amplifier



H8 Side Jack panel

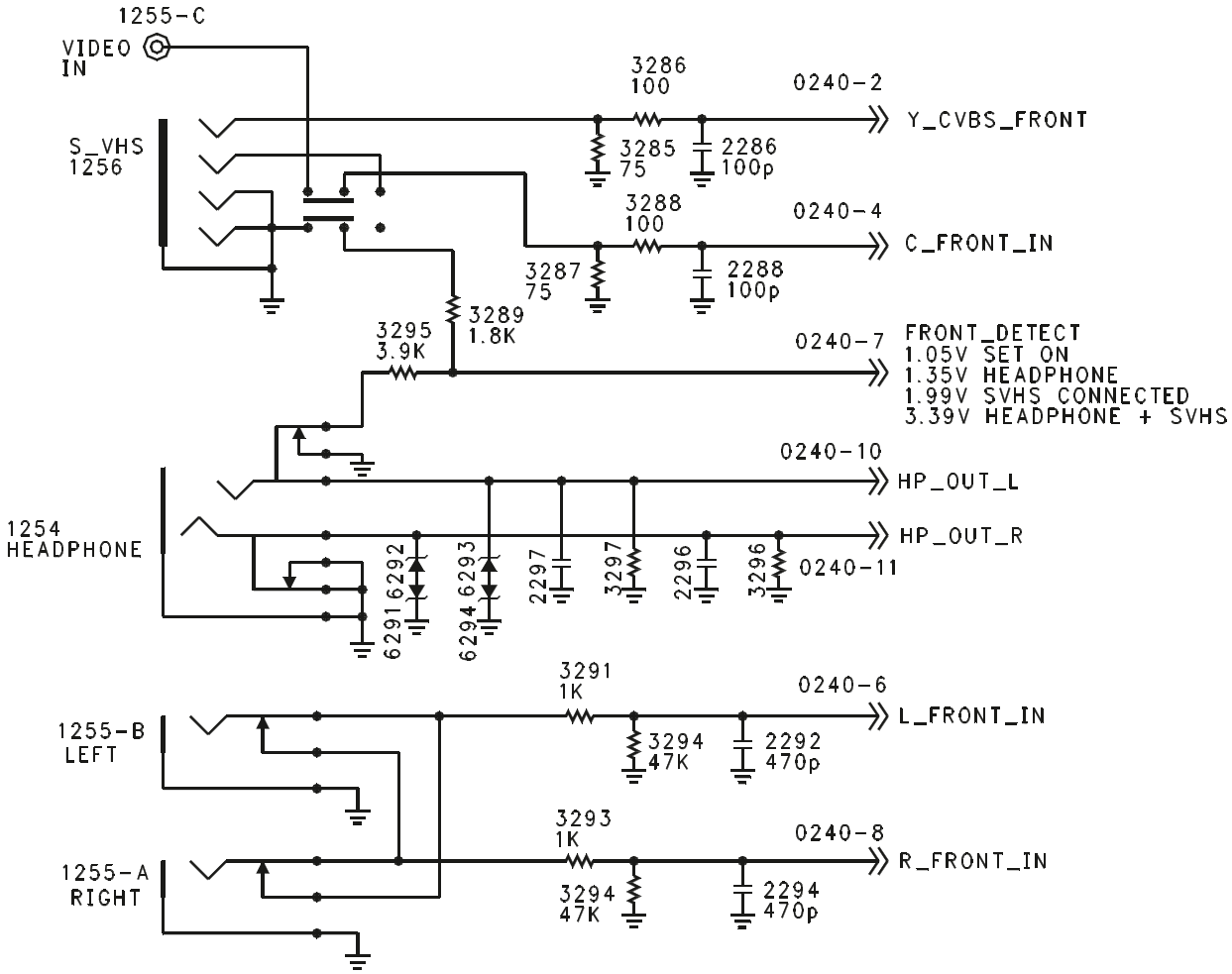


Figure 22 - Side Jack Panel

Side Jack Panel **(Figure 22)**

The Side Jack panel is the AV3 input in the Customer Menu. It has a Composite Video Input, SVHS Input, and a Stereo Audio input. It also has a headphone output. If an SVHS connector is plugged into the Side Jack panel, the Composite Video input is muted. The Audio inputs are designed so that if audio is plugged into only one input, the signal will be fed to both the Left and Right Channel lines. The Front Detect line tells the Microprocessor if an SVHS or Headphone is connected to the Side Jack panel. In normal operation, the FRONT-DETECT line is approximately 1.05 volt. When a Headphone is plugged in, resistor 3295 is taken out of the circuit causing the voltage to increase to 1.35 volts. The Microprocessor will activate the Mute line. With only the SVHS connected, resistor 3289 is out of the circuit, causing the FRONT-DETECT line to increase to 1.99 volts. An indicator will appear in the Menu to indicate that SVHS is present on AV3. With both a SVHS and Headphone connected to the Side Jack panel, both resistors are out of the circuit and the voltage will increase to 3.39 volts. This will give the SVHS indication in the Menu and Mute the Audio. If the Side Jack panel is disconnected while troubleshooting the set, the Audio will be muted.

Microprocessor **(Figure 23)**

The Microprocessor, 7064, is located on the SSB. User control of the Microprocessor is accomplished via the Keyboard or Remote. In case of Overcurrent or a failure in the Horizontal sweep circuit, The PROT-UP line will go High turning transistor 7276 On, placing a Low on Pin 5 of the Keyboard line. The Microprocessor will then shut the set Off. Composite Video for Data Capture, for Closed Caption or Text, is fed to the IC on Pins 32 and 31. The Microprocessor is connected to the Memory IC 7066 which stores information for Option Codes, Geometry, Gray Scale, and Customer settings. Two I2C busses, SDA and SDA-2, communicate with the set along with several analog outputs. The set is turned On when the STAND BY line on Pin 13 is pulled Low by 7064. Horizontal and Vertical sync for the On-Screen display is fed to the IC on Pins 53 and 55. The Reset for the Microprocessor is located on the SSB. Transistor 7063 turns Off as 2043 charges causing Pin 73 to go High when power is first applied to the set for Reset. When the set is operating normally, the Reset pin should measure Low. The FRONT-DETECT line monitors the Side Jack panel for the Headphone or an SVHS connection. It also monitors 7992 for a Power Down. A Low on Pin 6 will disable the Keyboard and IR inputs.

Customer Control Interface **(Figure 24)**

The Keyboard line is a voltage level controlled input. With no buttons pressed, this line should read approximately 3.38 volts when the set is On. It will be approximately 0.2 volts higher when the set is in Standby. In the XXPT31 versions, the Keyboard Switches are located on the LSB. In the XXPT41 and above models, the Keyboard Switches are located on the Top Control panel for Volume Down, Volume Up, Channel Up, and Channel Down. The Power Switch is located on the Front Interface panel.

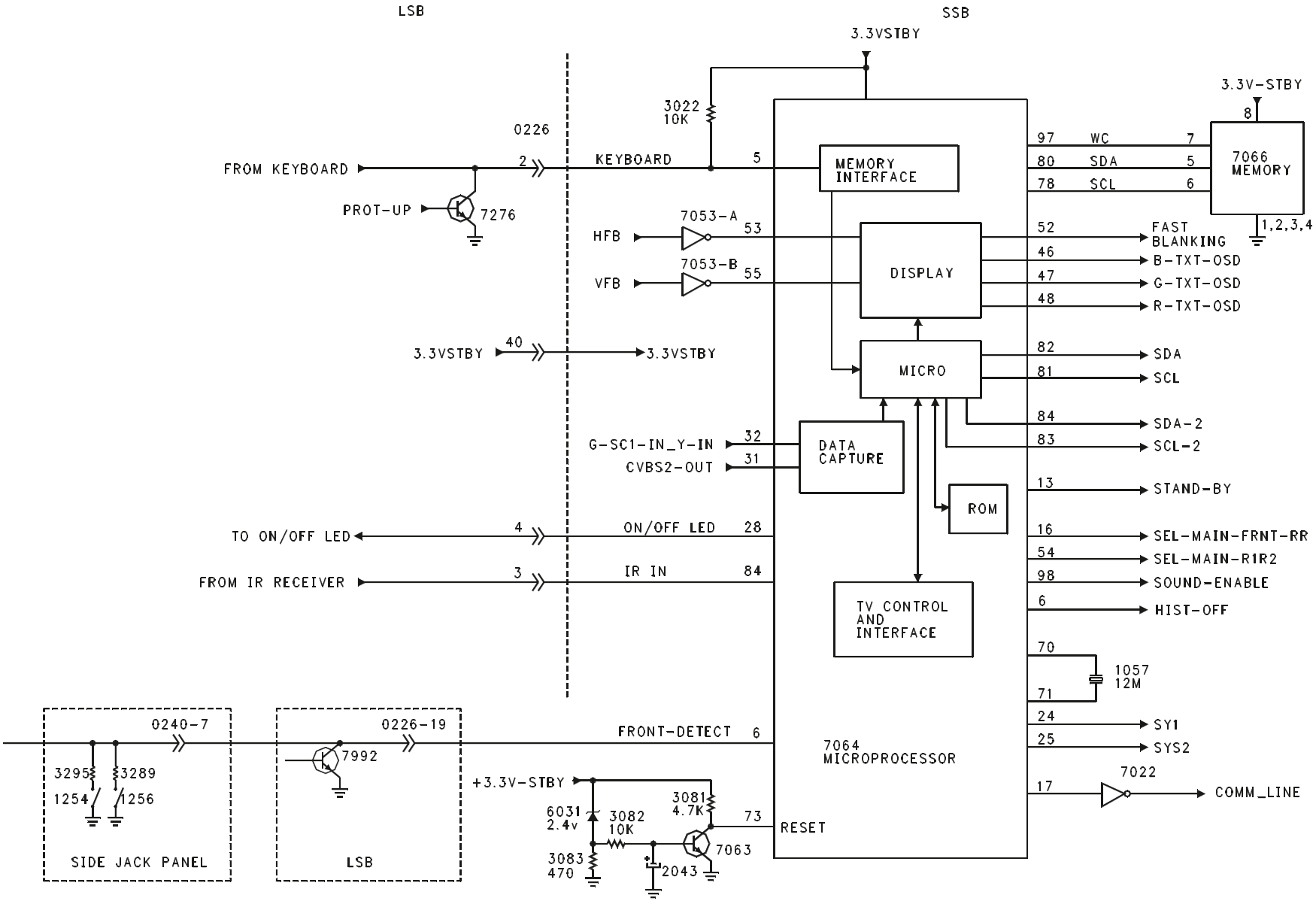


Figure 23 - Microprocessor

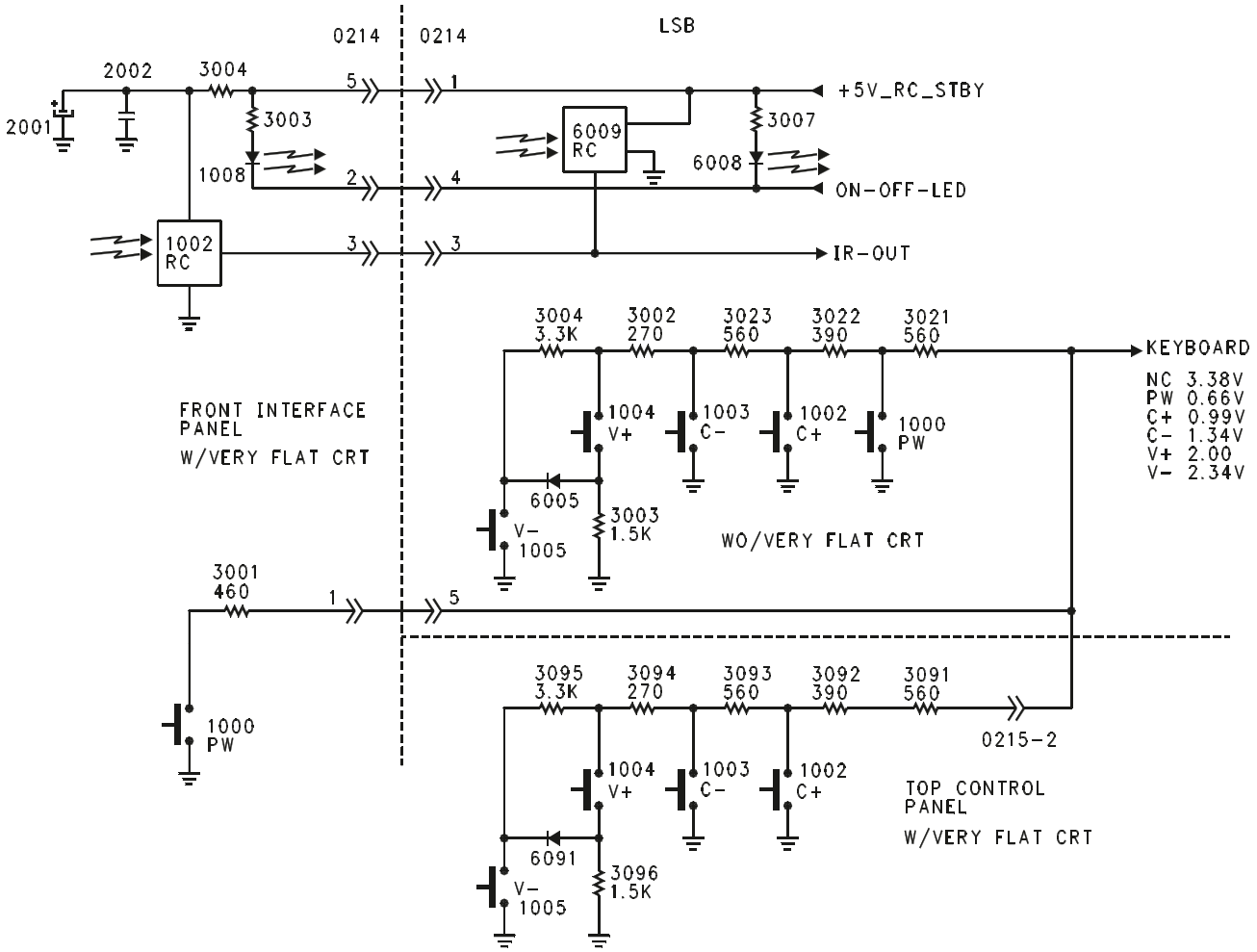


Figure 24 - Customer Control Interface

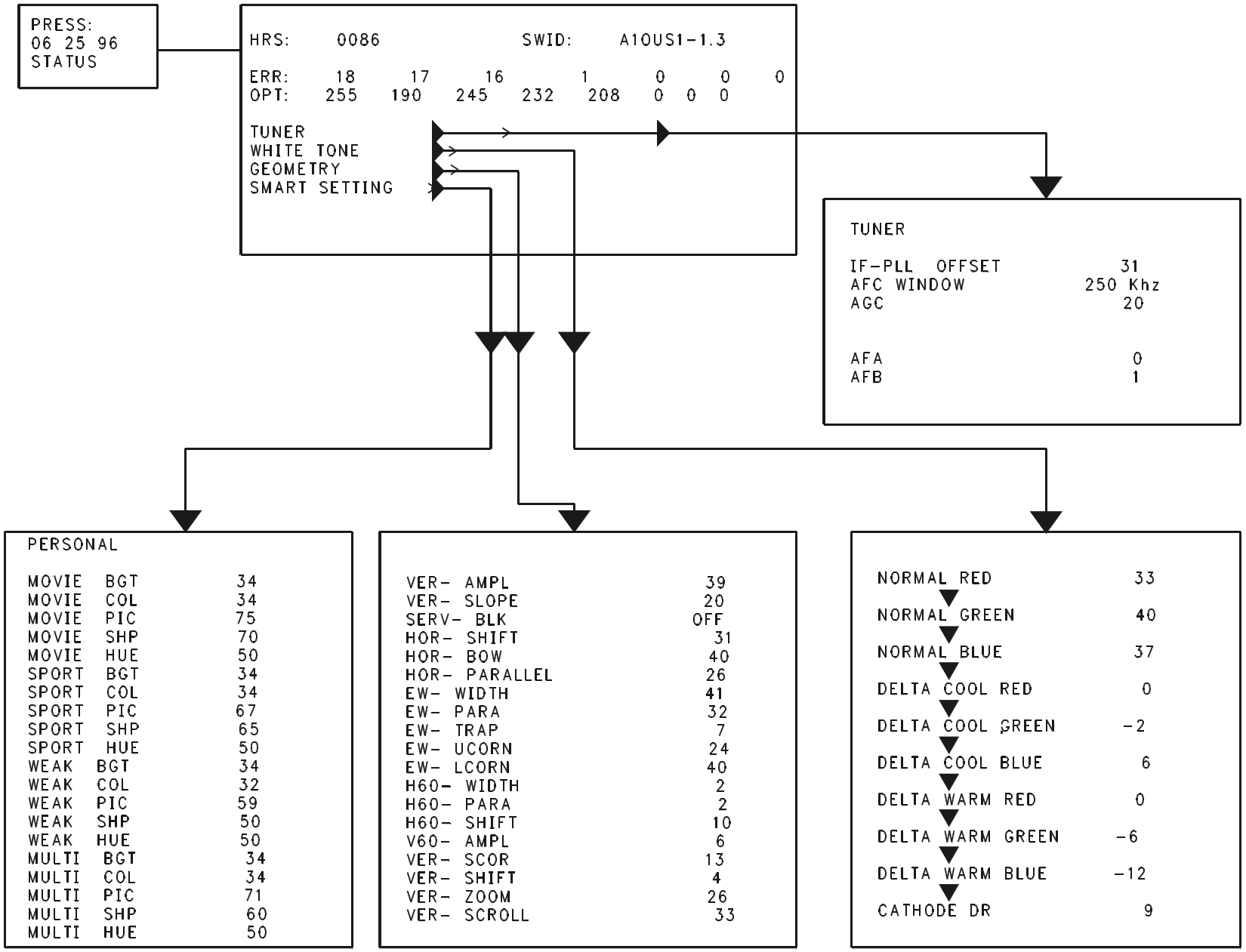


Figure 25 - Service Alignment Mode (SAM) Menus

SERVICE MODES

All of the adjustments in the set are performed via the On-Screen Service mode. There are three different Service Modes. The SDM (Service Default Mode) allows Error Codes to be read through an On-Screen menu or from a blinking Power light. It also pre-sets certain conditions and disables certain functions.

The next Service mode is the SAM (Service Adjustment Mode). This mode is used to align the set, adjust option settings, and read and clear the error buffer.

The final mode is the CSM (Customer Service Mode). This mode can be entered by the Customer on instruction of the Service Technician to read error codes.

Service Default Mode (SDM)

The Service Default Mode can be entered by pressing 0-6-2-5-9-6-Menu, on the remote control transmitter. The Service Default Mode sets the following conditions:

Tuning Frequency is set to 61.25 MHz (Channel 3).
Volume level set to 25%.
Other Picture and Sound settings set to 50%.
Timer, Sleep Timer, Parental Lock, and Blue Mute disabled.

The SDM can also be entered by shorting jumpers 9261 and 9262 while turning the set On. Caution should be used when using this procedure because the 5-volt protection is disabled. After entering the SDM, the Error Codes can be read by the blinking power LED. The LED will blink the number of times equal to the value of the error codes. After the SDM has been entered, the LED will light for 750 milliseconds, followed by a pause of 1500 milliseconds, followed by the number of blinks equal to the error code. If more than one error code is present, the procedure will repeat itself for the next Error Code. When all of the Error Codes have been displayed, the LED will light for three seconds. The procedure will then repeat itself.

Service Alignment Mode (SAM) **(Figure 25)**

The Service Alignment Mode is used to read Error Codes, Reset Error Codes, Set Option Codes, and perform Service Alignments. Pressing 0-6-2-5-9-6-Status on the remote control transmitter enters the SAM. To save the Error Codes, remove AC power to the set without turning it Off. When power is reapplied and the set is turned On, the SAM will still be active. Use the Cursor Up-Down keys to select a function in the menu. Press the Cursor Right-Left keys to select a function or make an adjustment. Under White Tone, there are three sets of settings which are Normal, Cool, and Warm. Normal settings is for a normal Gray Scale and should be selected when doing a White Balance or Gray Scale adjustment. When the User selects Cool, a slight Blue tint is added to the picture. When Warm is selected, a slight Red tint is added to the picture. Refer to the Service Manual for the proper alignment procedure.

To Save changes in SAM, return to the main menu and turn the set Off from either the Remote Control or the Front Keyboard.

Customer Service Mode (CSM)

The Customer Service Mode allows the Customer to read the Error codes upon instruction form the Technician.

The Customer Service Mode can be entered by pressing the Mute button on the Remote Control and any key on the set Keyboard at the same time.

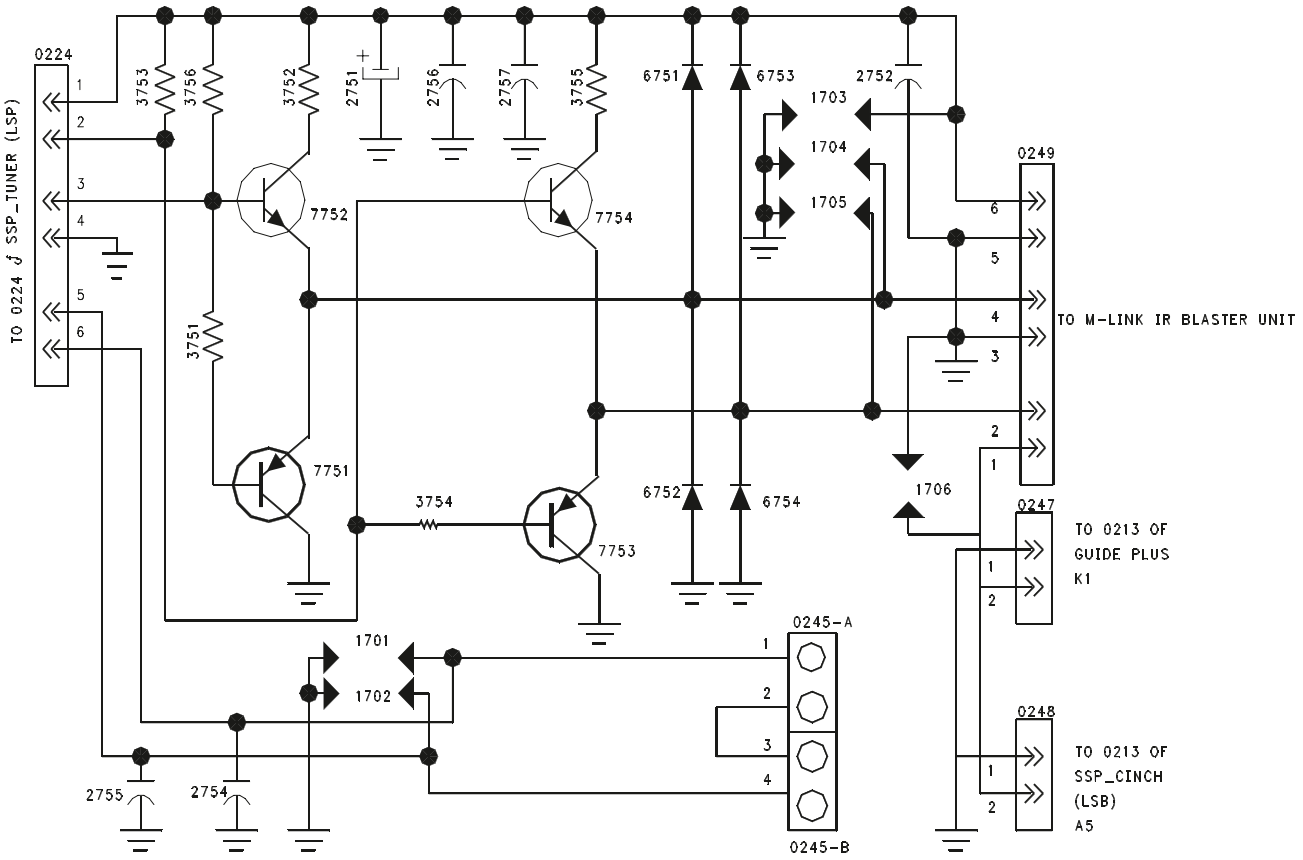
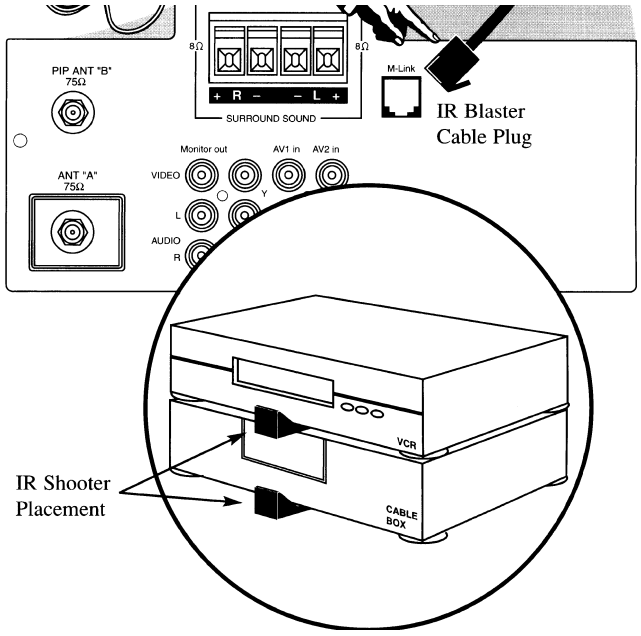


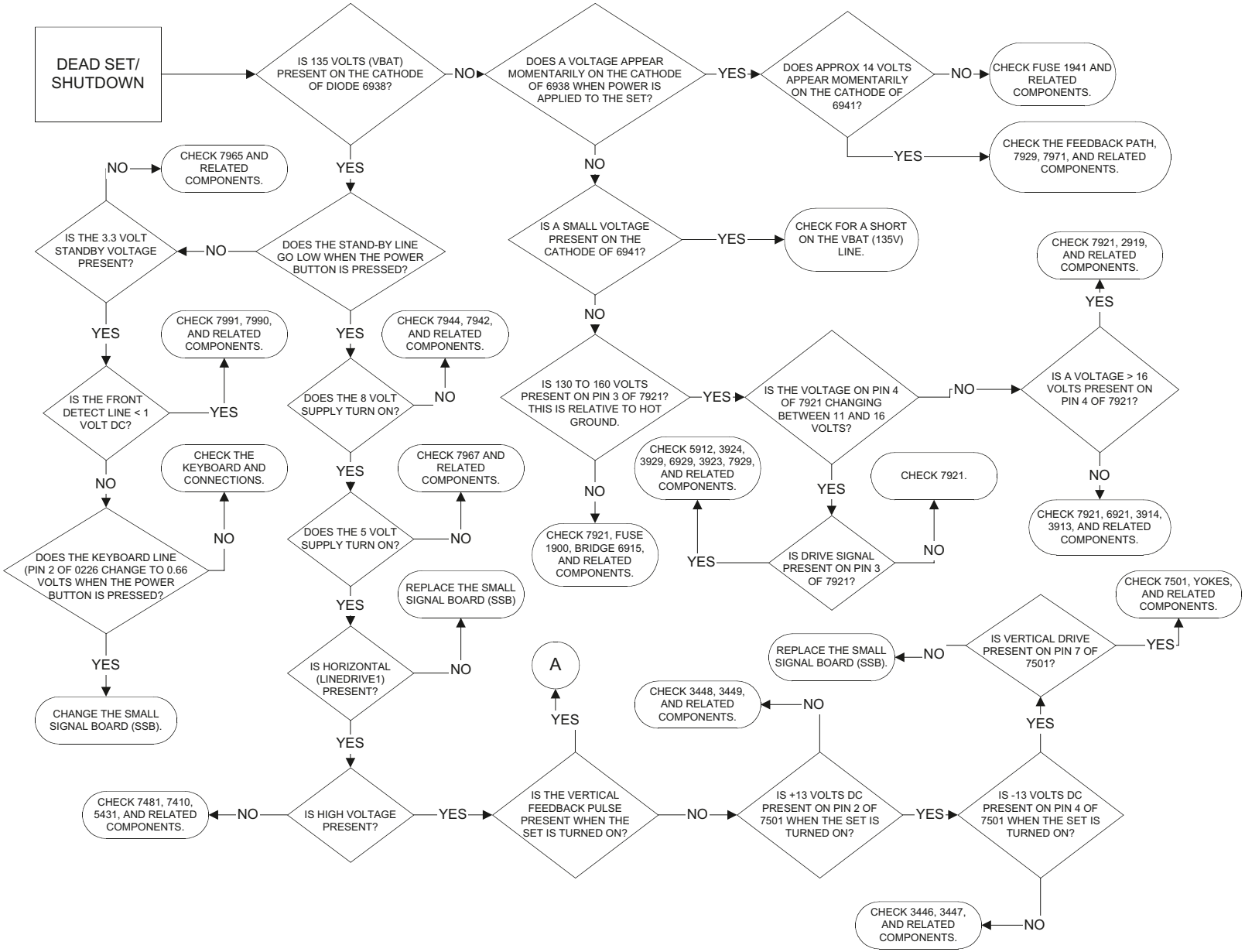
Figure 26 - M-Link driver circuit

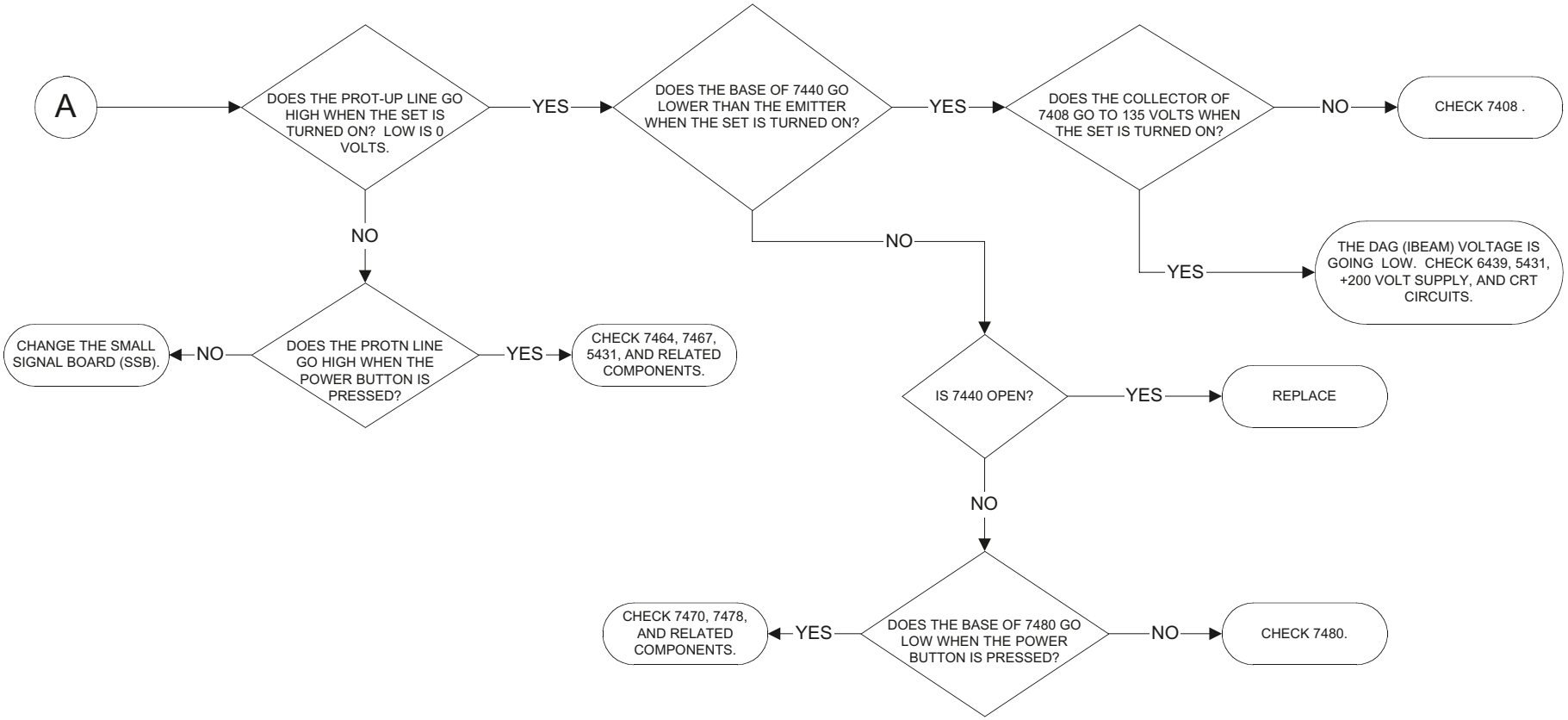
M-link **(Figure 26)**

The M-Link feature is on all sets above models XXPT41 and above. This feature allows external devices such as DVD players and VCRs to be controlled by the TV set. The M-Link panel has a driver circuit which is connected to the I2C buss to drive the IR Blaster which communicates with external devices. The Surround Sound Speaker Jacks are also located on the M-Link panel.

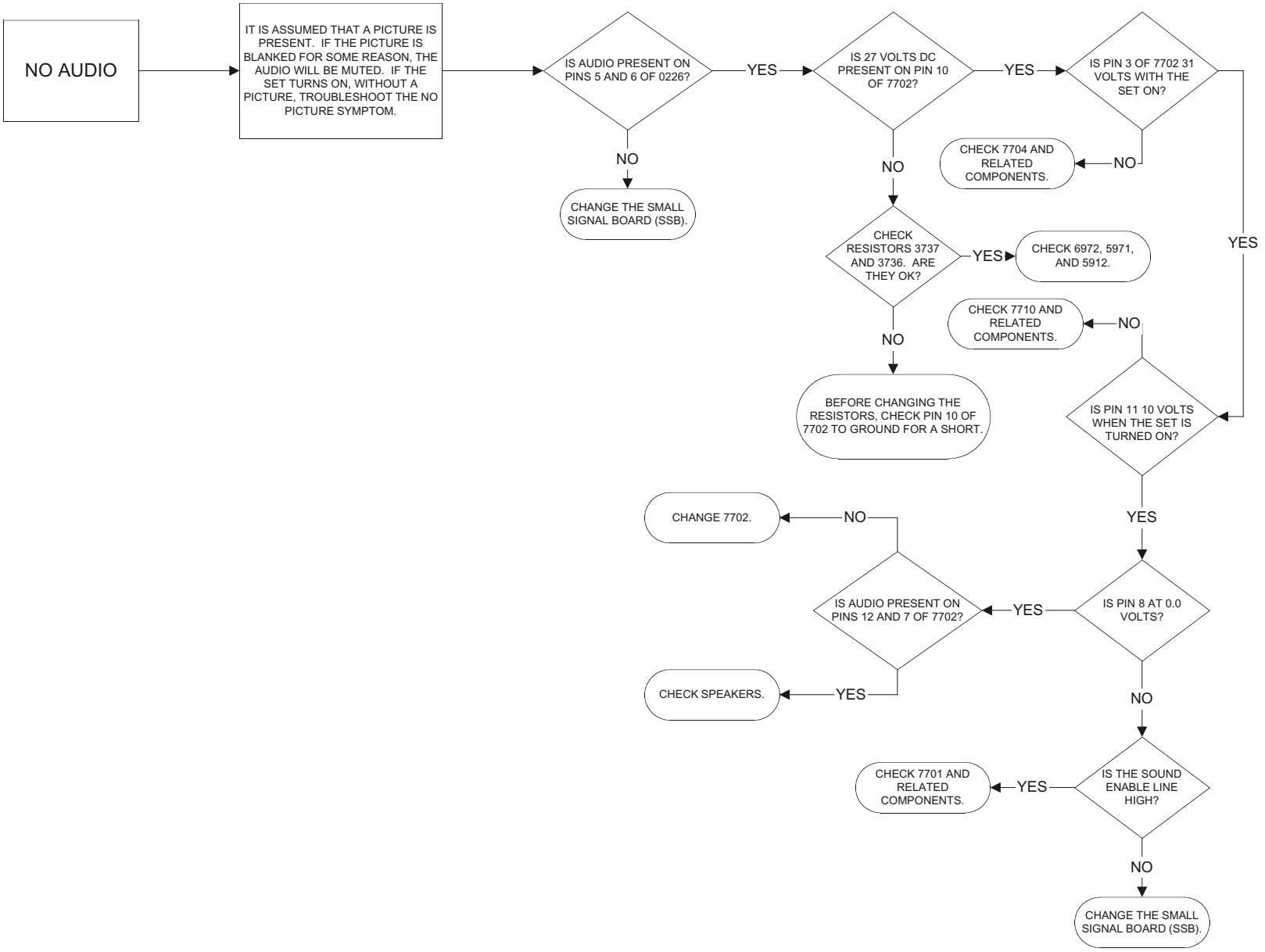


MLINK HOOKUP


DEAD SET/ SHUTDOWN
IS 135 VOLTS (VBAT) PRESENT ON THE CATHODE OF DIODE 6938?
NO
DOES A VOLTAGE APPEAR MOMENTARILY ON THE CATHODE OF 6938 WHEN POWER IS APPLIED TO THE SET?
YES
DOES APPROX 14 VOLTS APPEAR MOMENTARILY ON THE CATHODE OF 6941?
NO
CHECK FUSE 1941 AND RELATED COMPONENTS.
YES
CHECK THE FEEDBACK PATH, 7929, 7971, AND RELATED COMPONENTS.
YES
NO
CHECK 7965 AND RELATED COMPONENTS.
NO
IS THE 3.3 VOLT STANDBY VOLTAGE PRESENT?
NO
DOES THE STAND-BY LINE GO LOW WHEN THE POWER BUTTON IS PRESSED?
YES
IS A SMALL VOLTAGE PRESENT ON THE CATHODE OF 6941?
YES
CHECK FOR A SHORT ON THE VBAT (135V) LINE.
NO
CHECK 7921, 2919, AND RELATED COMPONENTS.
YES
YES
CHECK 7991, 7990, AND RELATED COMPONENTS.
YES
CHECK 7944, 7942, AND RELATED COMPONENTS.
IS THE FRONT DETECT LINE < 1 VOLT DC?
YES
DOES THE 8 VOLT SUPPLY TURN ON?
NO
IS 130 TO 160 VOLTS PRESENT ON PIN 3 OF 7921? THIS IS RELATIVE TO HOT GROUND.
YES
IS THE VOLTAGE ON PIN 4 OF 7921 CHANGING BETWEEN 11 AND 16 VOLTS?
NO
IS A VOLTAGE > 16 VOLTS PRESENT ON PIN 4 OF 7921?
NO
CHECK THE KEYBOARD AND CONNECTIONS.
YES
CHECK 7967 AND RELATED COMPONENTS.
CHECK 5912, 3924, 3929, 6929, 3923, 7929, AND RELATED COMPONENTS.
YES
CHECK 7921.
NO
CHECK 7921, 6921, 3914, 3913, AND RELATED COMPONENTS.
NO
DOES THE KEYBOARD LINE (PIN 2 OF 0226 CHANGE TO 0.66 VOLTS WHEN THE POWER BUTTON IS PRESSED?
NO
DOES THE 5 VOLT SUPPLY TURN ON?
NO
NO
CHECK 7921, FUSE 1900, BRIDGE 6915, AND RELATED COMPONENTS.
YES
IS DRIVE SIGNAL PRESENT ON PIN 3 OF 7921?
NO
CHECK 7501, YOKES, AND RELATED COMPONENTS.
YES
YES
REPLACE THE SMALL SIGNAL BOARD (SSB)
YES
REPLACE THE SMALL SIGNAL BOARD (SSB).
NO
IS VERTICAL DRIVE PRESENT ON PIN 7 OF 7501?
YES
CHANGE THE SMALL SIGNAL BOARD (SSB).
IS HORIZONTAL (LINEDRIVE1) PRESENT?
NO
A
CHECK 3448, 3449, AND RELATED COMPONENTS.
NO
YES
YES
CHECK 7481, 7410, 5431, AND RELATED COMPONENTS.
NO
IS HIGH VOLTAGE PRESENT?
YES
IS THE VERTICAL FEEDBACK PULSE PRESENT WHEN THE SET IS TURNED ON?
NO
IS +13 VOLTS DC PRESENT ON PIN 2 OF 7501 WHEN THE SET IS TURNED ON?
YES
IS -13 VOLTS DC PRESENT ON PIN 4 OF 7501 WHEN THE SET IS TURNED ON?
CHECK 3446, 3447, AND RELATED COMPONENTS.
NO


A
DOES THE PROT-UP LINE GO HIGH WHEN THE SET IS TURNED ON? LOW IS 0 VOLTS.
YES
DOES THE BASE OF 7440 GO LOWER THAN THE EMITTER WHEN THE SET IS TURNED ON?
YES
DOES THE COLLECTOR OF 7408 GO TO 135 VOLTS WHEN THE SET IS TURNED ON?
NO
CHECK 7408 .
NO
YES
THE DAG (IBEAM) VOLTAGE IS GOING LOW. CHECK 6439, 5431, +200 VOLT SUPPLY, AND CRT CIRCUITS.
NO
DOES THE PROTN LINE GO HIGH WHEN THE POWER BUTTON IS PRESSED?
YES
CHECK 7464, 7467, 5431, AND RELATED COMPONENTS.
NO
CHANGE THE SMALL SIGNAL BOARD (SSB).
IS 7440 OPEN?
YES
REPLACE
NO
DOES THE BASE OF 7480 GO LOW WHEN THE POWER BUTTON IS PRESSED?
YES
CHECK 7470, 7478, AND RELATED COMPONENTS.
NO
CHECK 7480.


NO PICTURE
IS OSD (ON SCREEN DISPLAY) PRESENT?
YES
SELECT AUX 1 IN THE MENU AND INSERT A SIGNAL INTO THAT INPUT.
IS A PICTURE PRESENT ON THE TV SCREEN?
YES
SELECT THE TUNER INPUT AND SUB AN IF SIGNAL ON PIN 68 OF 0226.
IS A PICTURE PRESENT ON SCREEN?
YES
IS APPROX 33 VOLTS PRESENT ON PIN 9 OF THE TUNER?
NO
CHECK 3409 AND 6481.
YES
NO
REPLACE THE SMALL SIGNAL PANEL (SSB).
NO
DOES THE SET HAVE A SECOND TUNER?
NO
YES
IS 5 VOLTS DC PRESENT ON PIN 6 OF THE TUNER?
NO
CHECK 5261 AND RELATED CONNECTIONS.
YES
REPLACE THE TUNER.
NO
CHECK CIRCUIT BOARD CONNECTIONS.
IS CLOCK AND DATA PRESENT ON PINS 4 AND 5 OF THE TUNER?
YES
NO
REPLACE THE SMALL SIGNAL BOARD (SSB).
IS COMPOSITE VIDEO PRESENT ON 0272, PIN 3?
YES
NO
CHANGE THE SMALL SIGNAL BOARD (SSB).
IS COMPOSITE VIDEO PRESENT ON 0272, PIN1?
YES
NO
CHECK 7916 AND 7910 ON THE PIP MODULE.
CHECK 7402 AND 7403 ON THE DOUBLE WINDOW PANEL.
IS THE SET AN XXPT91 MODEL?
NO
YES
NO
CHANGE THE SMALL SIGNAL BOARD (SSB).
DOES THE SET HAVE A PIP (PICTURE IN PICTURE) PANEL?
YES
NO
CHANGE THE SMALL SIGNAL BOARD (SSB).
IS THE YUV SIGNAL PRESENT ON 0205, PINS 1, 3, AND 4?
YES
NO
REPLACE THE SMALL SIGNAL BOARD (SSB).
IS THE YUV SIGNAL PRESENT ON 0205, PINS 6, 8, AND 9?
YES
NO
CHECK 7919 ON THE PIP MODULE.
IS THE SET AN XXPT91 MODEL?
NO
YES
CHECK 7803 ON THE PIP/DOUBLE WINDOW PANEL.
REPLACE THE SMALL SIGNAL BOARD (SSB).
IS A NEGATIVE GOING PULSE PRESENT ON PINS 7, 8, AND 9 OF 7830? THIS PULSE SHOULD BE 100 VOLTS P-P OR GREATER.
YES
NO
IS A POSITIVE GOING PULSE PRESENT ON PIN 5 OF 7830?
YES
NO
IC 7830 OR THE CRT IS THE PROBLEM.
IS A 2 VOLT P-P OR GREATER PULSE PRESENT ON PINS 1, 2, AND 3 OF 7830?
YES
NO
CHECK 7830 AND RELATED COMPONENTS.
CHANGE THE SMALL SIGNAL BOARD (SSB).


NO AUDIO
IT IS ASSUMED THAT A PICTURE IS PRESENT. IF THE PICTURE IS BLANKED FOR SOME REASON, THE AUDIO WILL BE MUTED. IF THE SET TURNS ON, WITHOUT A PICTURE, TROUBLESHOOT THE NO PICTURE SYMPTOM.
IS AUDIO PRESENT ON PINS 5 AND 6 OF 0226?
YES
NO
CHANGE THE SMALL SIGNAL BOARD (SSB).
IS 27 VOLTS DC PRESENT ON PIN 10 OF 7702?
YES
NO
IS PIN 3 OF 7702 31 VOLTS WITH THE SET ON?
NO
CHECK 7704 AND RELATED COMPONENTS.
YES
CHECK RESISTORS 3737 AND 3736. ARE THEY OK?
YES
CHECK 6972, 5971, AND 5912.
NO
BEFORE CHANGING THE RESISTORS, CHECK PIN 10 OF 7702 TO GROUND FOR A SHORT.
CHECK 7710 AND RELATED COMPONENTS.
NO
IS PIN 11 10 VOLTS WHEN THE SET IS TURNED ON?
YES
CHANGE 7702.
NO
IS AUDIO PRESENT ON PINS 12 AND 7 OF 7702?
YES
CHECK SPEAKERS.
YES
IS PIN 8 AT 0.0 VOLTS?
YES
NO
CHECK 7701 AND RELATED COMPONENTS.
YES
IS THE SOUND ENABLE LINE HIGH?
NO
CHANGE THE SMALL SIGNAL BOARD (SSB).

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