PHILIPS

TECHNICAL TRAINING

FL9.1 LCD TV CHASSIS FOR 2009



P & F USA, INC
SUITE 100
3015 WINDWARD PLAZA
ALPHARETTA, GA 30005

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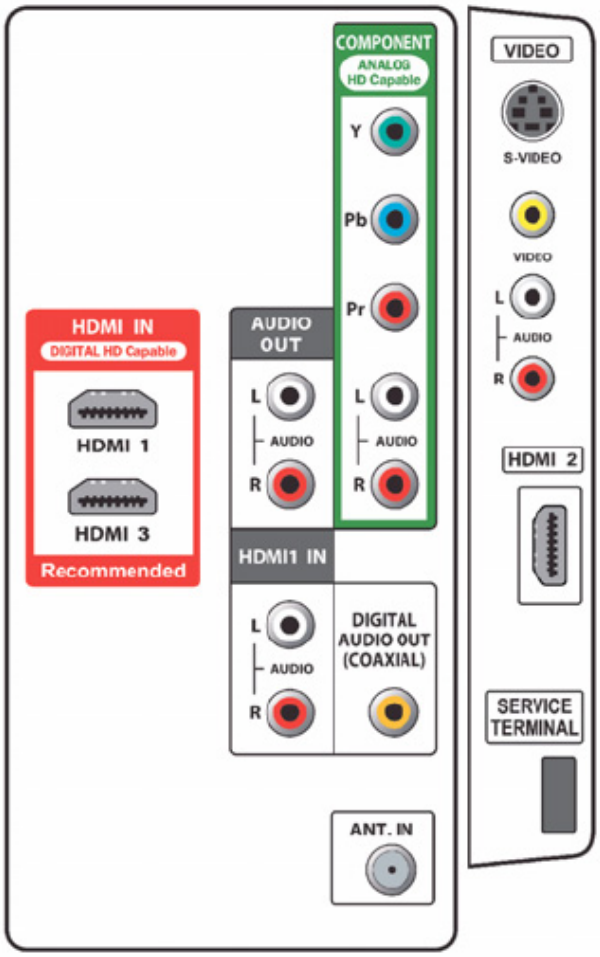
Introduction

The FL9.1 TV chassis is designed for the 2009 model year. The tuning system is designed to tune both antenna and cable analog and digital signals. The screen size for this chassis is 32 inches with a pixel resolution of 1366 x 768p. Whatever signal is fed to the set will be rescaled to fit the resolution of the screen.

Models covered by this chassis:

Model	Brand
32PFL3504D/F7	Philips
32PFL3514D/F7	Philips
32MF339B/F7	Magnavox
LC320SLX	Sylvania
LC320SSX	Sylvania
LC320EMX	Emerson

The following is the Jack panel for the Magnavox version. The Jack panel is the same for all models using this chassis.



Supported display resolutions

Computer

Resolution	Refresh rate
640 x 480	60Hz
720 x 480	60Hz
800 x 600	60Hz
1024 x 768	60Hz
1280 x 768	60Hz
1360 x 768	60Hz

Video formats

Resolution	Refresh rate
480i	60Hz
480p	60Hz
720p	60Hz
1080i	60Hz

The audio amplifier output is two channels at 10 watts per channel.

Connectivity

AV1	Audio L/R in, YPbPr
HDMI1	HDMI v1.3, Analog audio L/R in
HDMI2	HDMI v1.3

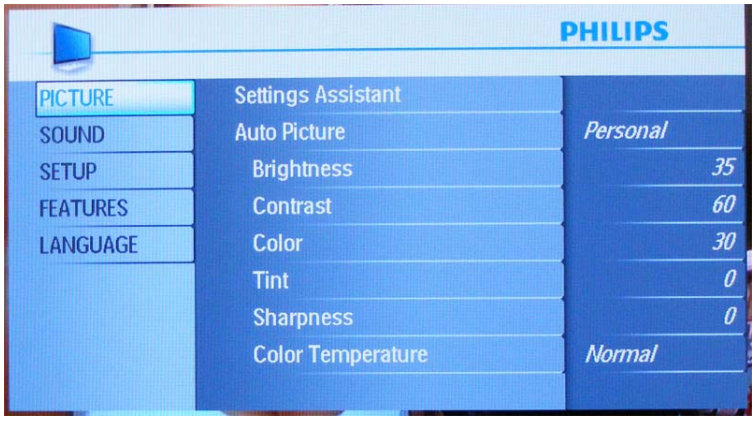
Audio output Digital Coaxial

Side HDMI v1.3, S-video in, CVBS in, Audio L/R in, USB (software upgrade only)

The FL9.1 chassis has the Philips EasyLink (HDMI-CEC) capability. This feature has additional function compared to the 2008 Philips sets. This feature is referred to as CEC in the Magnavox, Sylvania and Emerson products.

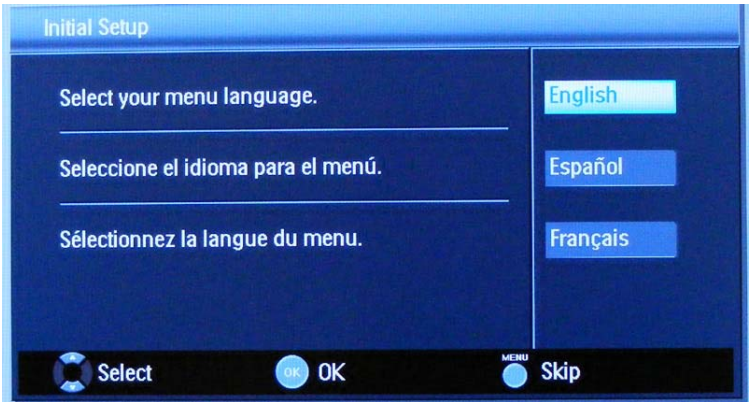
Menus

Once the set is programmed after the out of box set up, the menu to the right appears when pressing the menu button on the remote. The Settings Assistant is only present on the Philips branded product.



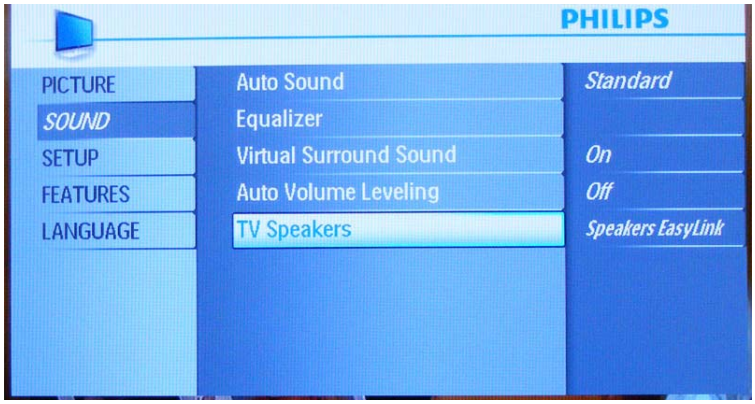
The Magnavox, Sylvania and Emerson sets have menus with a similar look and the same function.

The screen to the right is the Sylvania first screen from the initial out of box setting. In the Service mode this is called initialized mode. The initialized mode will be explained in the service mode.



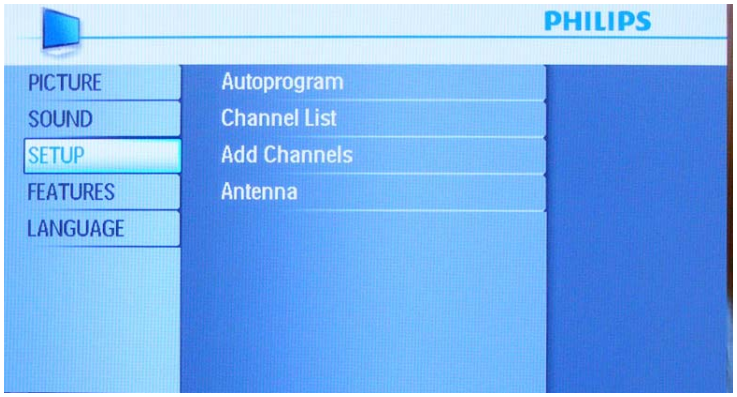
In the Sound menu is a new feature, TV Speakers.

If Speakers EasyLink is selected, the sound from the TV will be re-routed via the HDMI to a Home Theatre with CEC function. If On is selected, the TV speakers remain On. If Off is selected, the speakers in the TV are switched Off.



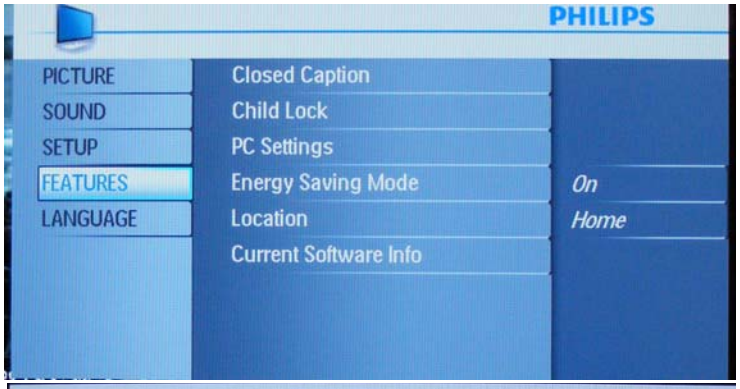
Setup Menu

In the Setup Menu, channels can be programmed using Autoprogram. Channels can be deleted from the channel ring using Channel List. Add Channels can be used to to add channels not picked up during Autoprogram. Antenna is only available in the Antenna mode.



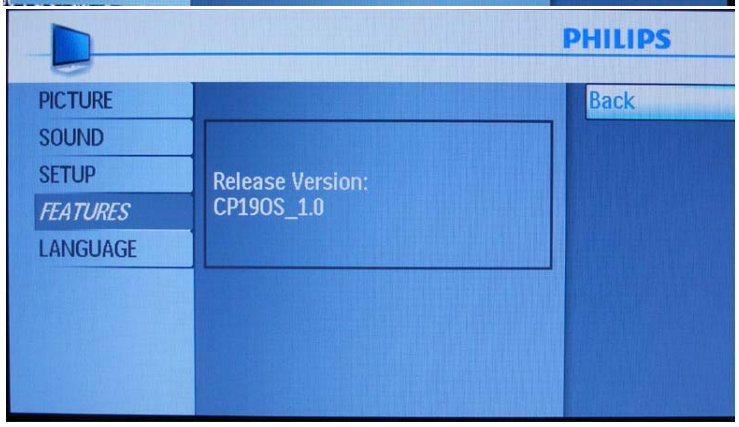
Features

Among other things, Location, Child lock, and Closed Caption can be selected in the Features menu. This is called the Details menu in the Magnavox, Sylvania and Emerson sets.



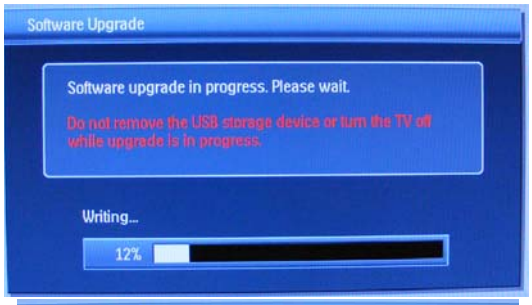
Out of box, the Child Lock pin is 0000. If the customer forgets their pin, unplugging the set will reset the pin to 0000.

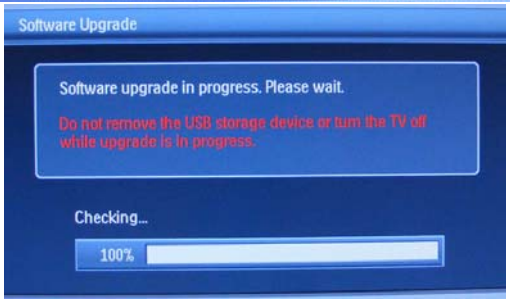
Current Software can also be viewed.



To load new software: (Philips Only)

1. Down the latest version from the customer website *.zip.
2. Unzip the file and extract the *.ecc file and load it in to the root directory of a USB drive.
3. Unplug the TV from AC power.
4. Insert the USB drive into the TV.
5. Re-apply power and turn the set On.
6. Do not unplug the set on use the remote while the set is programming as this will damage the TV.







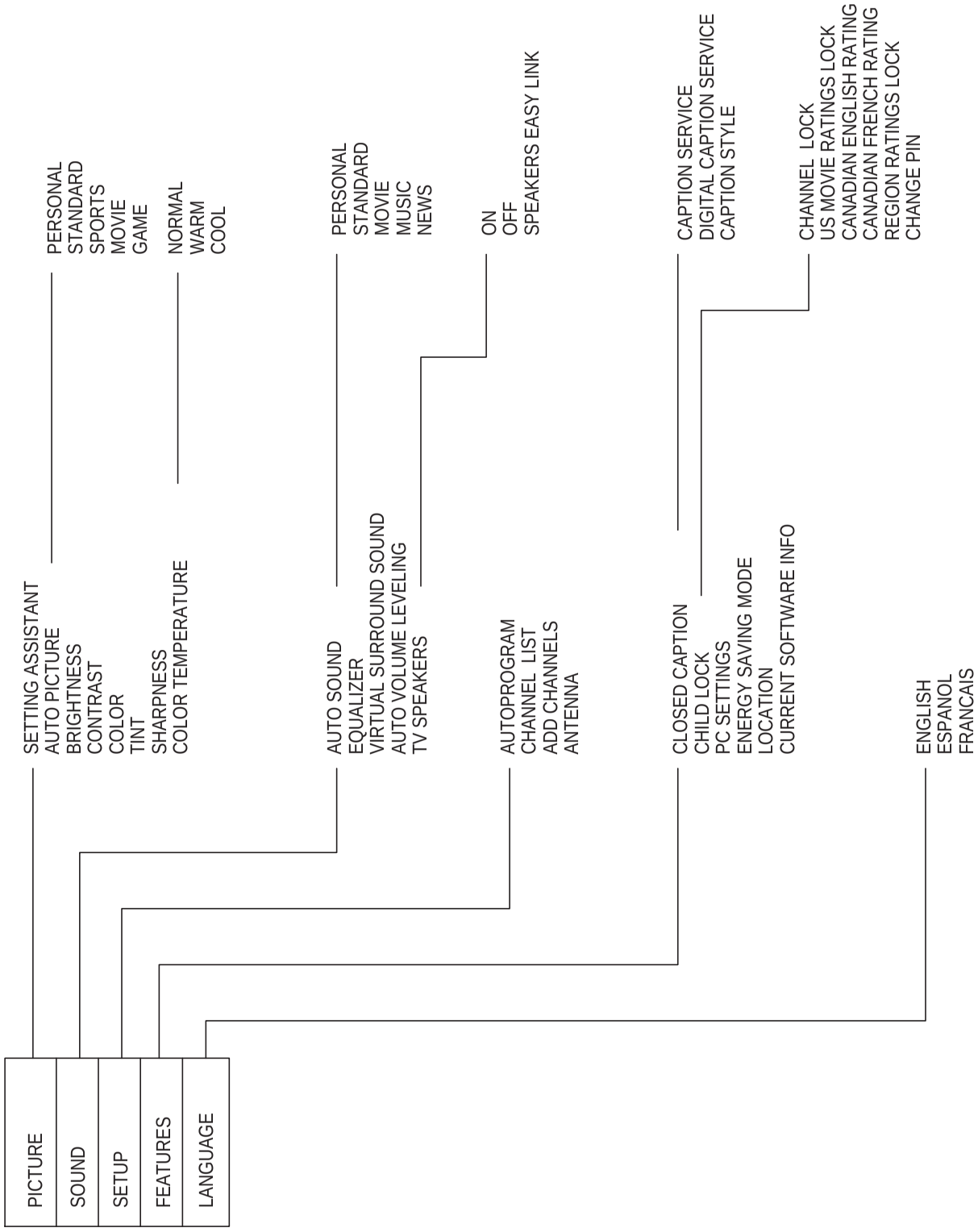
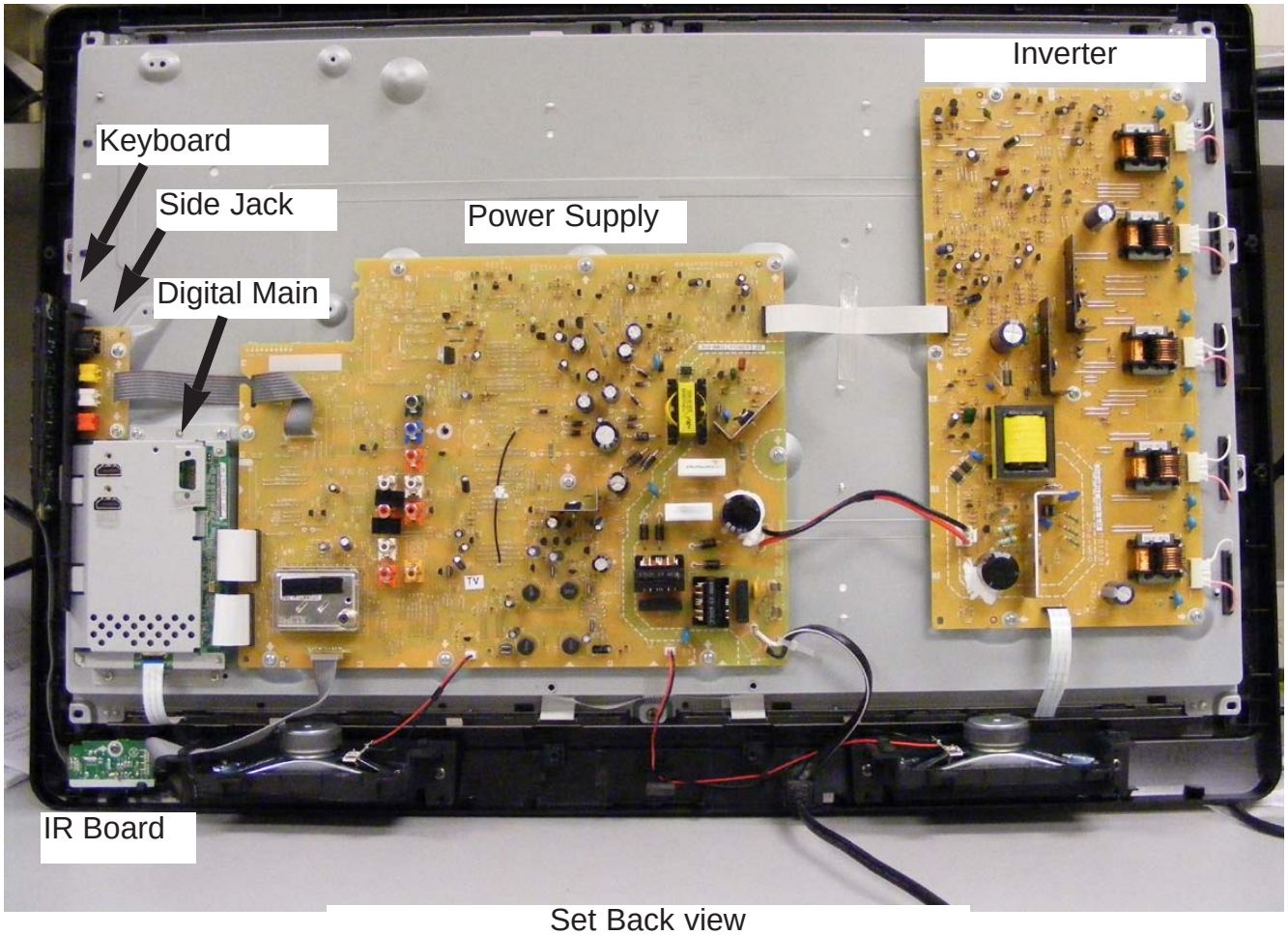


FIGURE 1 - CUSTOMER MENU MAP



Set Back view

Repair

The FL9.1 chassis is designed for board level repair. To assist with troubleshooting, component level function will be discussed.

The Digital Main board has the microprocessor and signal processing circuits. The HDMI and USB inputs are located on the Digital Main board. The USB port on this chassis is only used for software upgrade.

The Tuner AV inputs and Audio Amplifier are located on the Power Supply board. The power supply produces a AL3.3V supply for standby power. When the set is turned On, the supply produces a 16, 3.3, 3, 7, 5, 9, 13, and 33 volt supplies.

The Inverter Provides the drive voltage for the panel backlights.

Board Level Repair (Figure 2)

The Fl9.1 chassis is designed for board level repair.

Standby mode

In Standby, the processor on the Digital Main board is powered by the AL+3.3V supply. This voltage can be measured on pins 21 and 22 of connector CN301 on the power supply board.

Power On

When the set is turned On by the keyboard or the remote, the processor on the Digital Main board switches the P-ON-H1 and P-ON-H2 lines High. This switches the power supply to the full power mode.

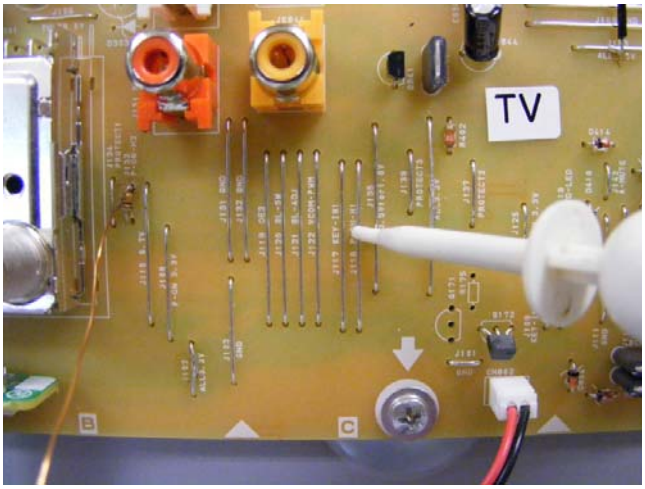
Protect

If any of the supplies fail or the Inverter board is not functioning the Protect lines will cause the set to shut down. In normal operation the Protect lines should read as follows:

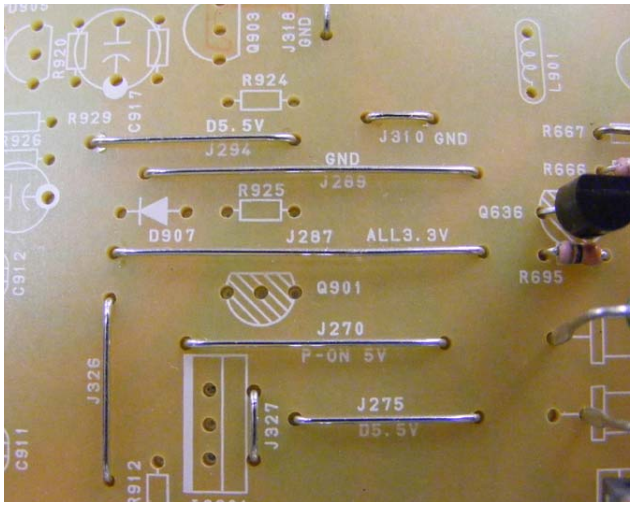
Protect 1	2.4V
Protect 2	0.0V
Protect 3	3.3V

Since a failure in the Protect lines will cause an immediate shutdown, the power supply should be forced On to check for missing supplies.

1. First unplug CN301 and CN302 to disconnect the Digital Main board.
2. Jumper the AL3.3V supply to P-ON-H1 and P-ON-H2.

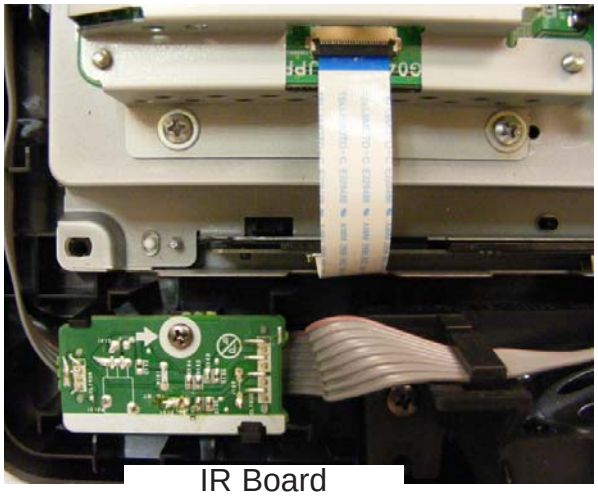


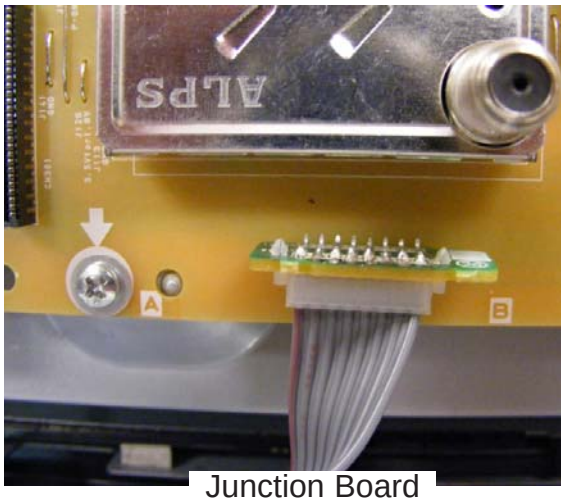
P-ON-H1 and P-ON-H2 test points



AL3.3V test point (top center)

The Function (Keyboard) is hard-wired to the IR Sensor board and it to the Junction board. Only the KEY-IN1 is used for the keyboard. The KEY-IN2 is used in other chassis with a built in DVD player.

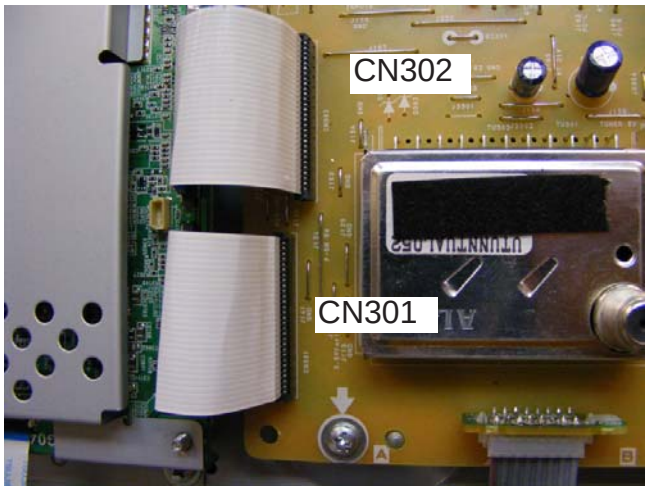

IR Board



Junction Board

Raw DC is supplied to the Inverter board via connector CN602 on the power supply board. Operating voltages INV+16V, LCD+16, P-ON+3.3V and LCD-6.8V supplies are fed to the Inverter board via connector CN201.

The Inverter is switched On by the BACKLIGHT-SW voltage. This voltage is generated on the Digital Main board and routed through the Power Supply board to the Inverter via connector CN201, pin 5 on the power supply. The voltage from the Digital Main to the Power Supply can be checked on pin 26 of CN301 on the power supply. This voltage should be approximately 3 volts.



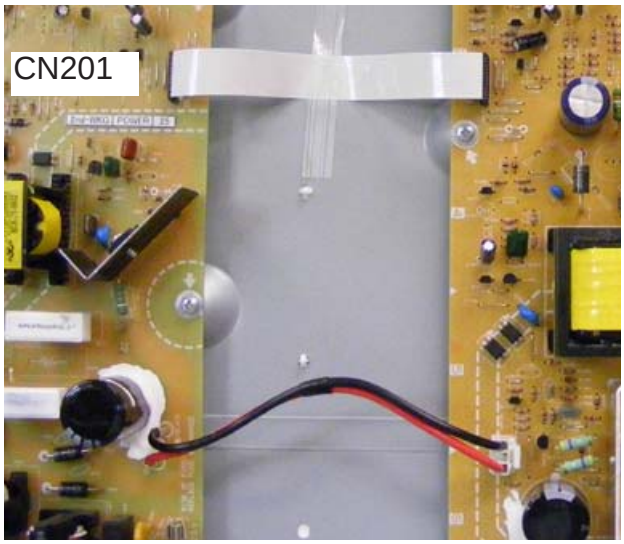
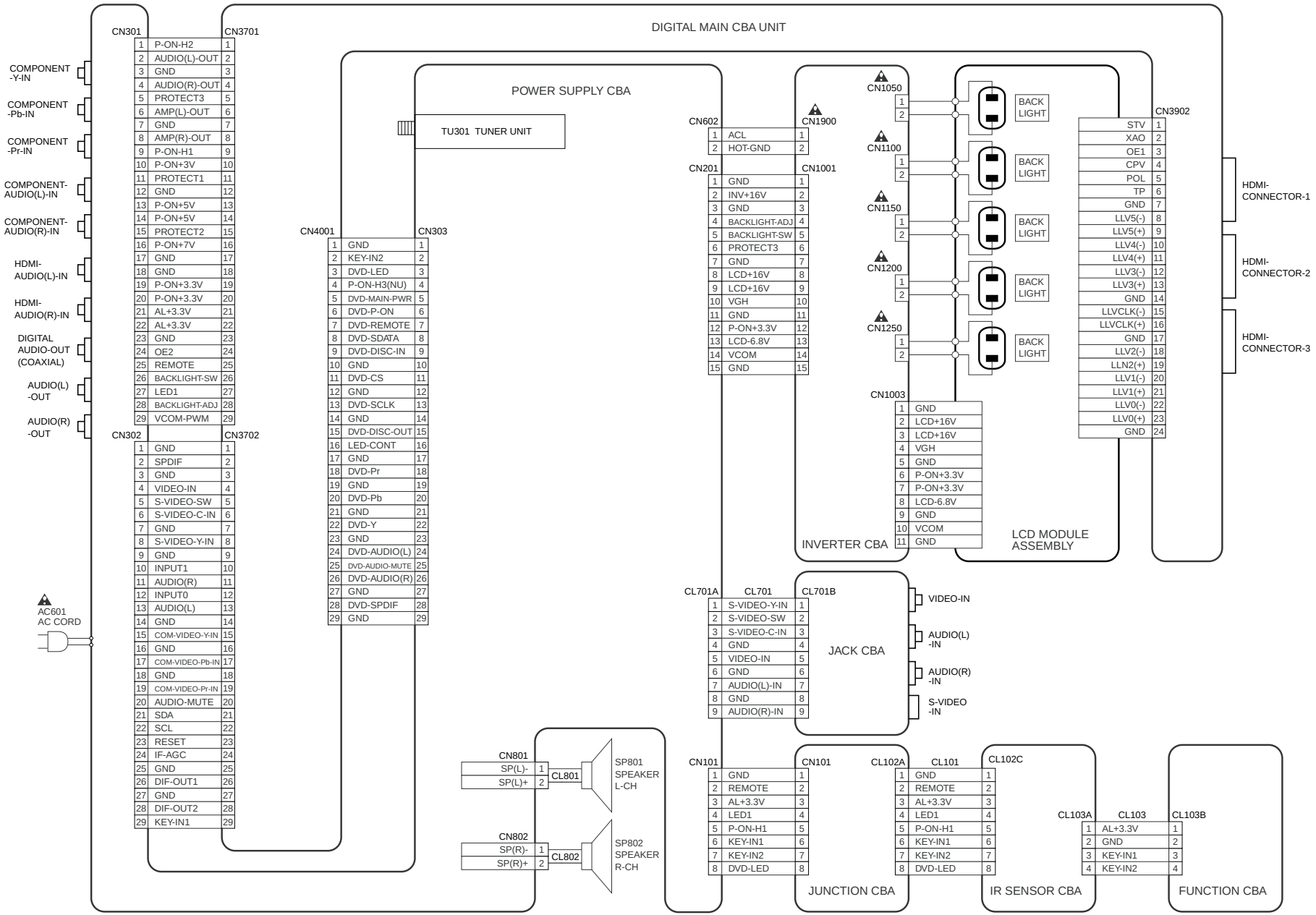


FIGURE 2 - WIRING INTERCONNECT DIAGRAM



Video Signal flow (Figure 3 & 4)

Figure 3

The composite and S-video inputs are located on the side jack panel. These signals are fed to the the power supply on hard wired connecter CL701A. The one component input is located on the power supply panel. All of these signals are fed to the Digital Main board via connector CN302 on the power supply board.

Tuner TU301 tunes both analog and digital channels. The IF signal, DIF-OUT1 and DIF-OUT2 is fed to the Digital Main board via connector CN302 on the power supply.

Figure 4

All of the system control, audio processing and video processing is performed by IC3301. The component and AV inputs are fed to an internal switch and A/D converter. Tuner IF is fed to an internal Demodulator and Digital processor.

The three HDMI inputs are fed to an internal HDMI switch and receiver.

Whatever signal is fed to IC3301, the IC rescales the video to fit the resolution of the screen which in this case is 720p.

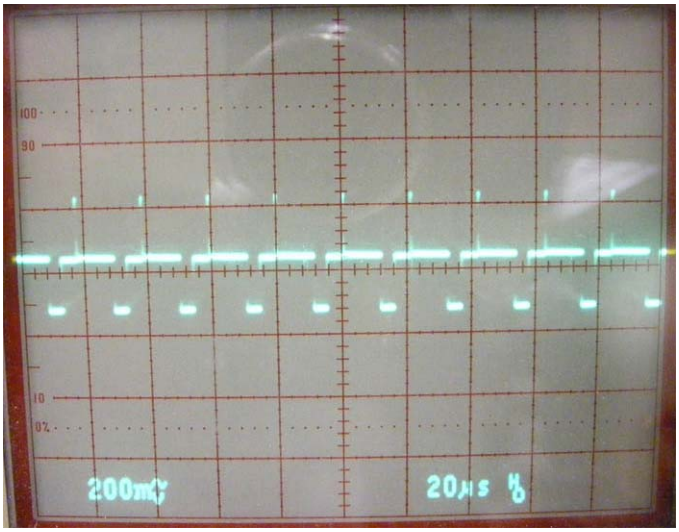
The signal is output from IC3301 in an LVDS format and then fed to IC3901.

IC3901 develops the drive signals for the LCD panel and is output using a RSDS format.

RSDS (Reduced Swing Differential Signaling) is a new format designed to drive LCD panels. This format is designed to provide a higher data rate to newer thinner LCD panels. As with LVDS, this format produces an offsetting positive and negative signal of approximately 200mv to reduce RFI.

If the picture is distorted or has lines, check the RSDS signal from the Digital Main board to the panel to determine where the problem is located.

This is the CPV signal which can be checked on CN3902, pin 4.



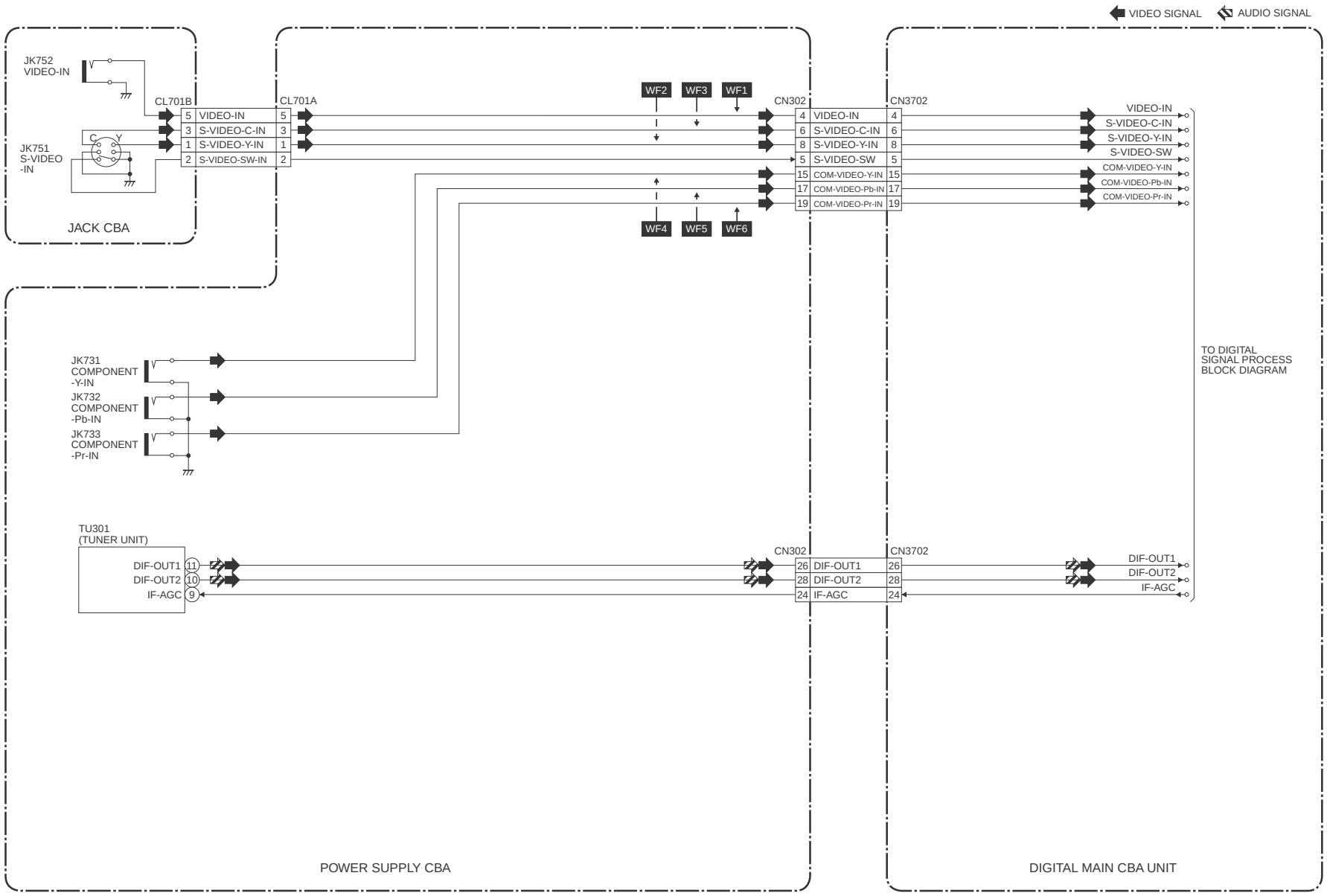


FIGURE 3 - VIDEO SIGNAL FLOW ONE

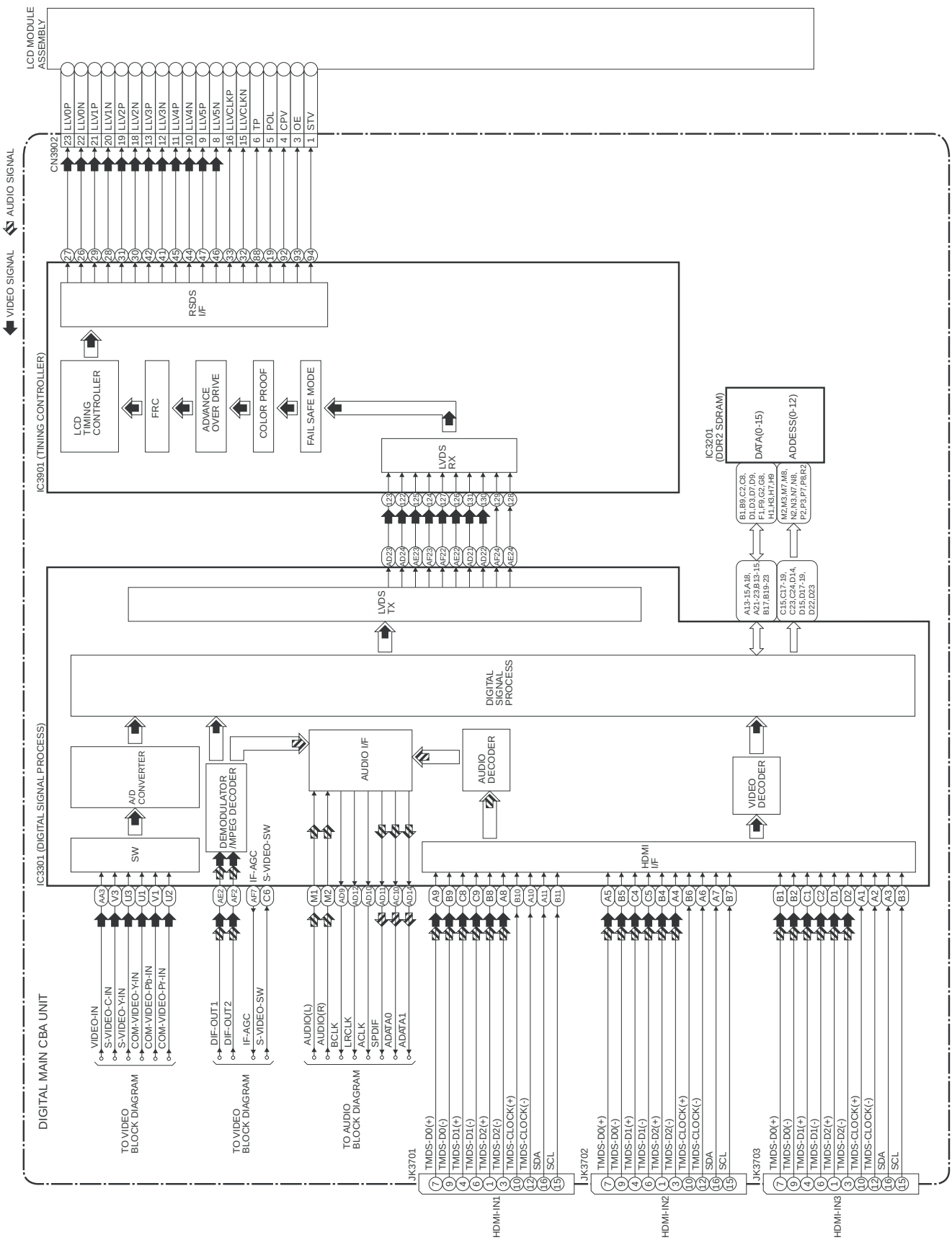
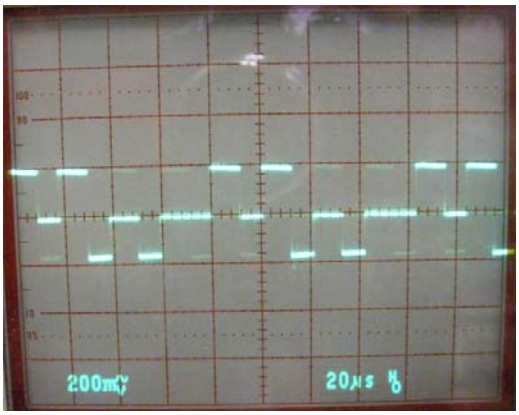
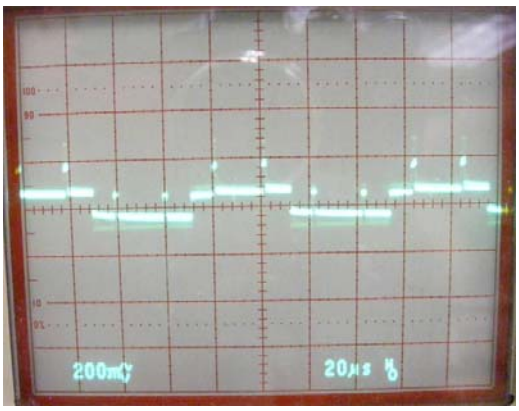


FIGURE 4 - VIDEO SIGNAL FLOW TWO

The waveform to the right is the POL signal on CN3902, pin 5.

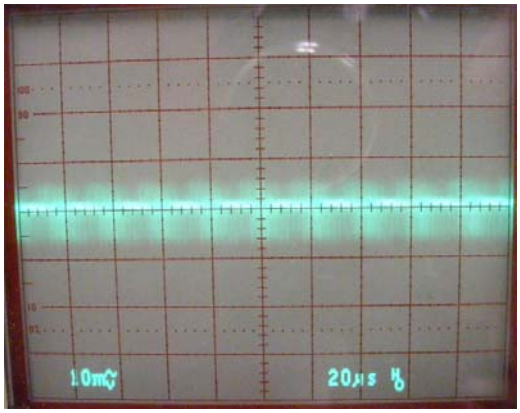


The waveform to the right is the TP signal on CN3902, pin 6.



The waveform to the right is typical of the ones carrying the picture information.

This signal is measured on pin 8 of CN3902. Similar signals are present on pins 9, 10, 11, 12, 13, 15, 16, 18, 19, 20, 21, 22 and 23.



Audio Signal Flow (Figure 5)

AV audio from the side jack panel is fed to the power supply via connector CL701A. The AV audio inputs are all located on the power supply board. The audio input is selected by IC771 which is controlled by the INPUT1 and INPUT0 lines from the microprocessor. Selected audio is fed to the Digital Main board via connector CN302 on the power supply board. Digital and analog tuner audio is processed by the signal processor on the digital main board.

Selected audio from the processor on the digital main board is fed to IC3803 and then to two D/A converters, IC3802 and IC3801 and then to the power supply board via connector CN301 on the power supply.

Audio is then fed to the audio amplifier, IC801, and then to the speakers.

Monitor analog audio is buffered by IC871 before being fed to the left and right audio outputs.

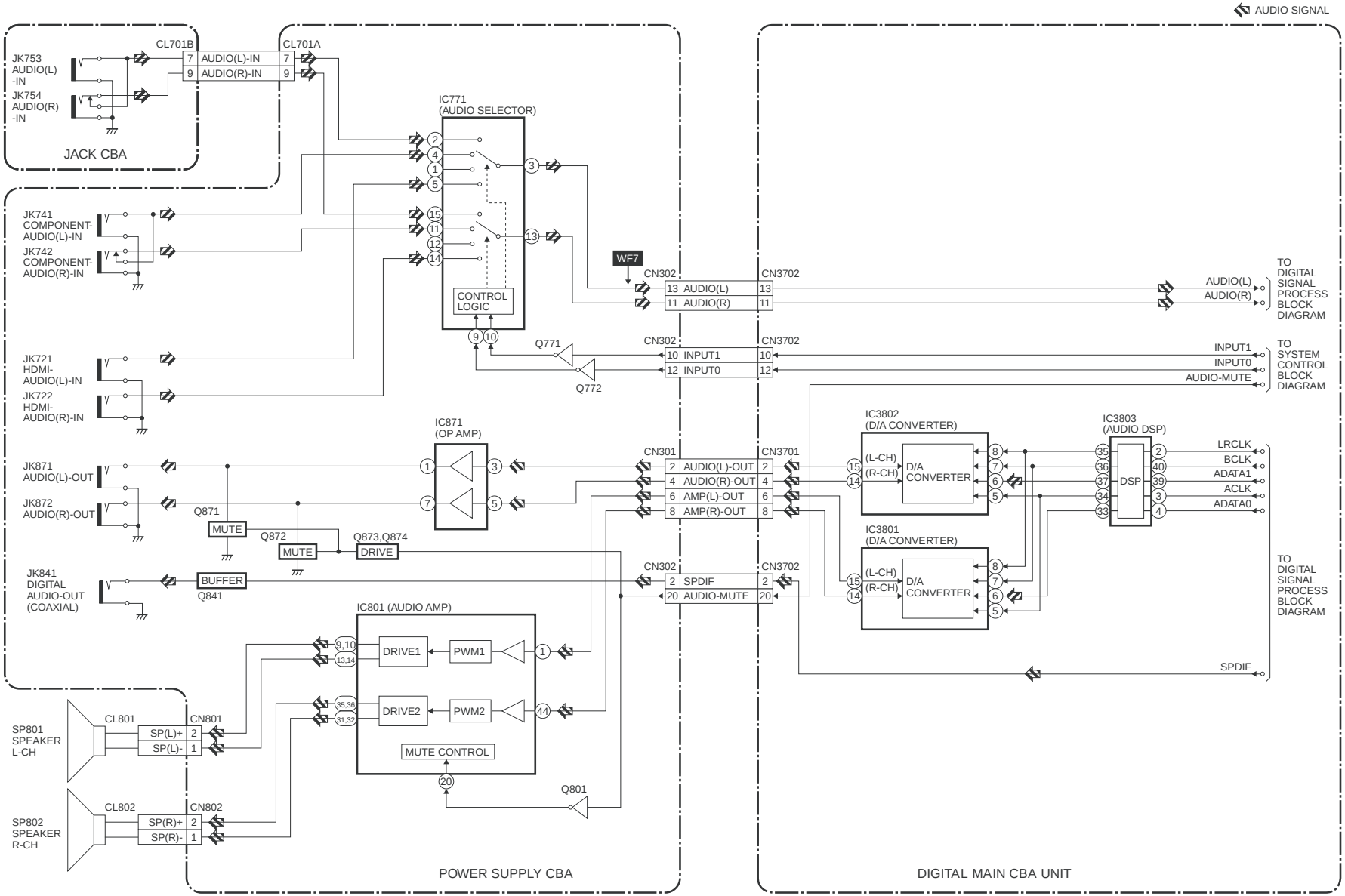


FIGURE 5 - AUDIO BLOCK

CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F601) is blown , check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.

4A/125V

CAUTION ! : For continued protection against risk of fire, replace only with same type 4 A, 125V fuse.
ATTENTION : Utiliser un fusible de rechange de même type de 4A, 125V.

NOTE:
The voltage for parts in hot circuit is measured using hot GND as a common terminal.

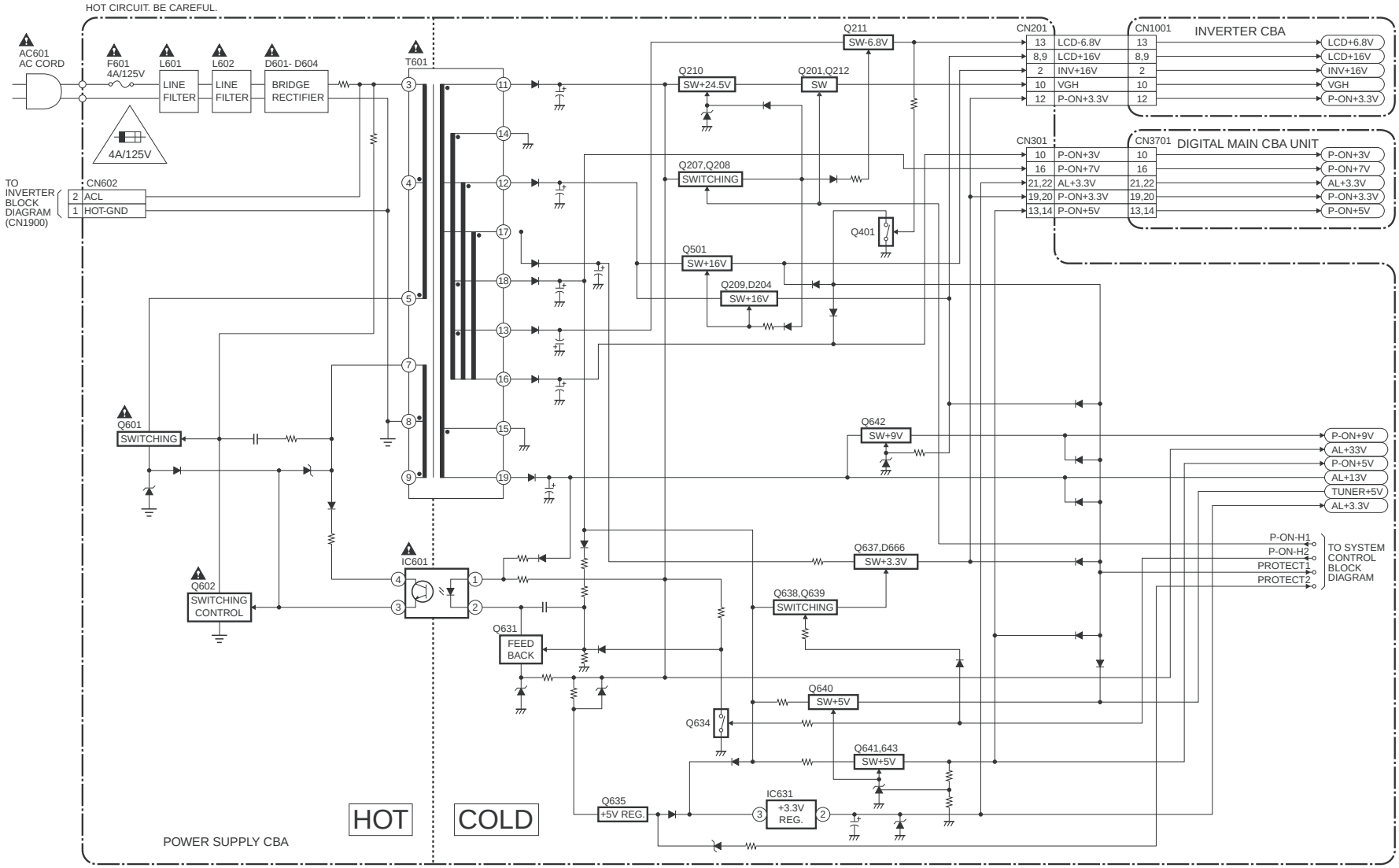


FIGURE 6 - POWER SUPPLY

Power Supply (Figure 6)

AC is fed the line filters and bridge rectifier. RAW DC is fed to the Inverter via connector CN602 on the power supply board and to transformer T601.

The switch mode supply consist of transistors Q601 and Q602. In standby, the power supply is running in a low power pulsating mode controlled by Q634 on the secondary side.

When the set is turned On, the P-ON-H1 and P-ON-H2 lines goes High. P-ON-H2 changes turns on transistor Q634 to change the bias of the feed back circuit switching the power supply to a full power mode. It also turns on transistors Q638, Q639 and Q637 to turn the P-ON-3.3V supply On. The P-ON-H1 line switches Q207 and Q208. This switches Q210, Q201 and Q212 to switch the VGH voltages. Q211 is turned On switching the LCD-6.8V supply. It also switches Q209 switching the LCD+16V supply. Q501 is switched to turn on the INV+16V supply. Q642 is switched to produce the P-ON+9V supply.

Protect 1 (Figure 7)

Protect 1 is connected to all of the supplies via diodes. If any one of the supplies shorts, the protect line will go Low causing the set to turn Off. The pull up voltage for Protect 1 is R401.

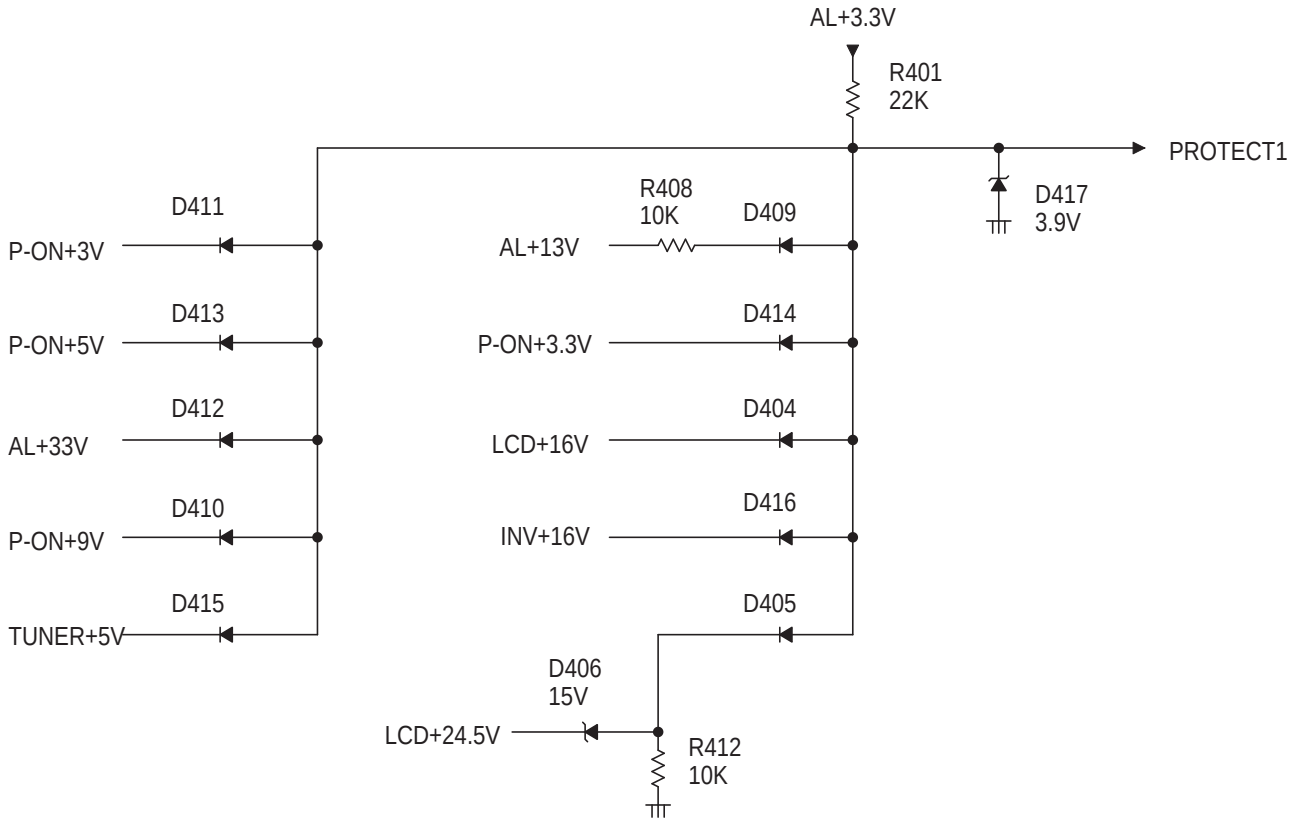


FIGURE 7 - PROTECT 1

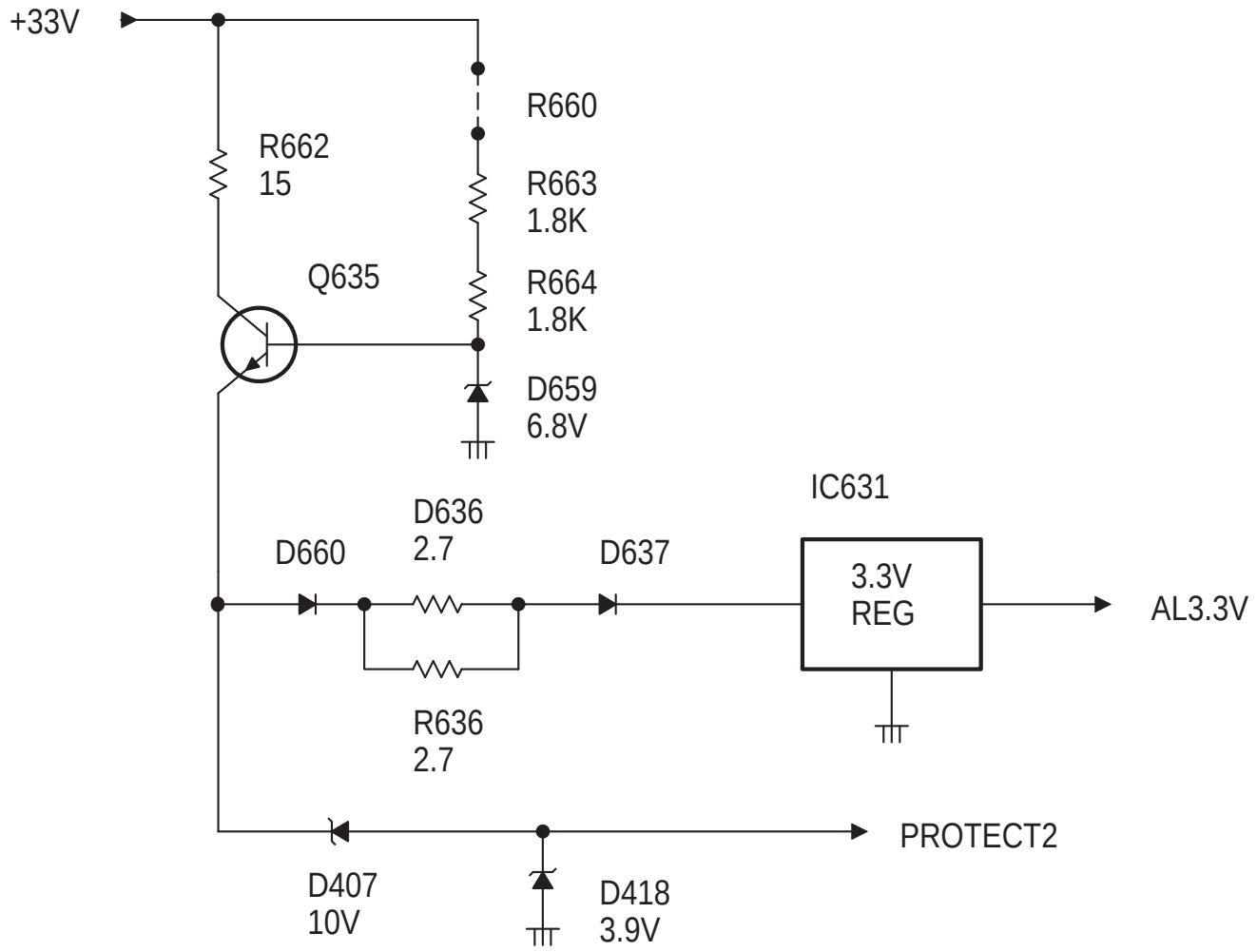


FIGURE 8 - PROTECT 2

Protect 2 (Figure 8)

Protect 2 monitors the circuit feeding the 3.3V standby supply.

In the standby mode, the +33V supply will measure approximately 8 volts. When the set is turned On, it will go to +33V as the power supply goes to a full power mode. Q635 regulates the voltage feeding IC631, AL3.3V regulator.

If Q635 fails, the voltage at the emitter of Q635 would exceed the voltage of the 10 volt zener, D407 causing it to conduct. This will cause the PROTECT 2 line to go High resulting in the TV set turning Off.

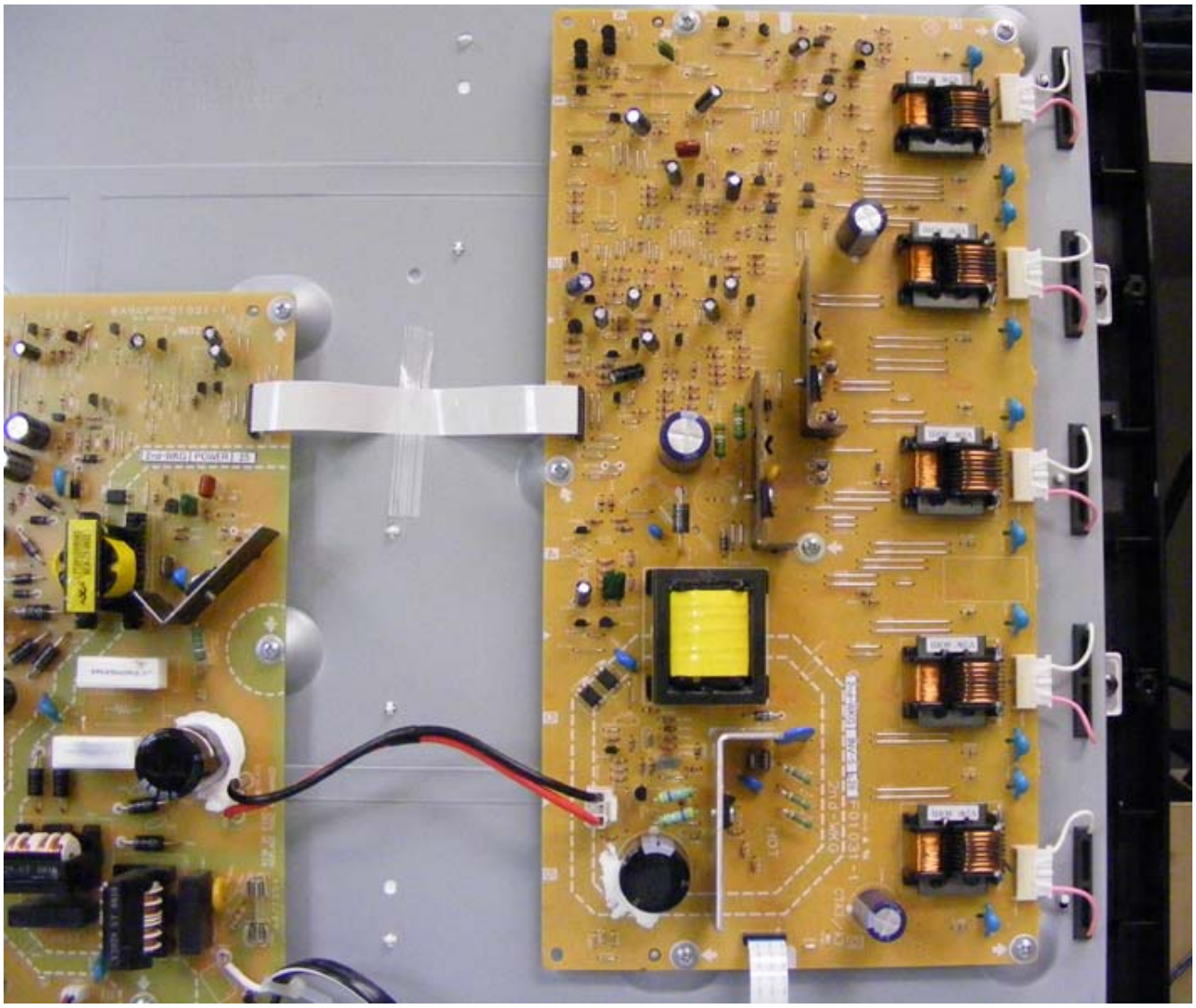
Inverter (Figure 9)

The inverter power supply is switched On by the BACKLIGHT-SW line from the digital board. The BACKLIGHT-ADJ line is fed to IC1000 to control the pulse width output of IC1000 and the brightness of the backlight. The outputs to the backlights are fed to over voltage protection circuits. If a problem is detected in one of the outputs, Q1600 is turned On causing the Protect 3 line to go Low. This will cause the set to turn Off.

System Control (Figure 10)

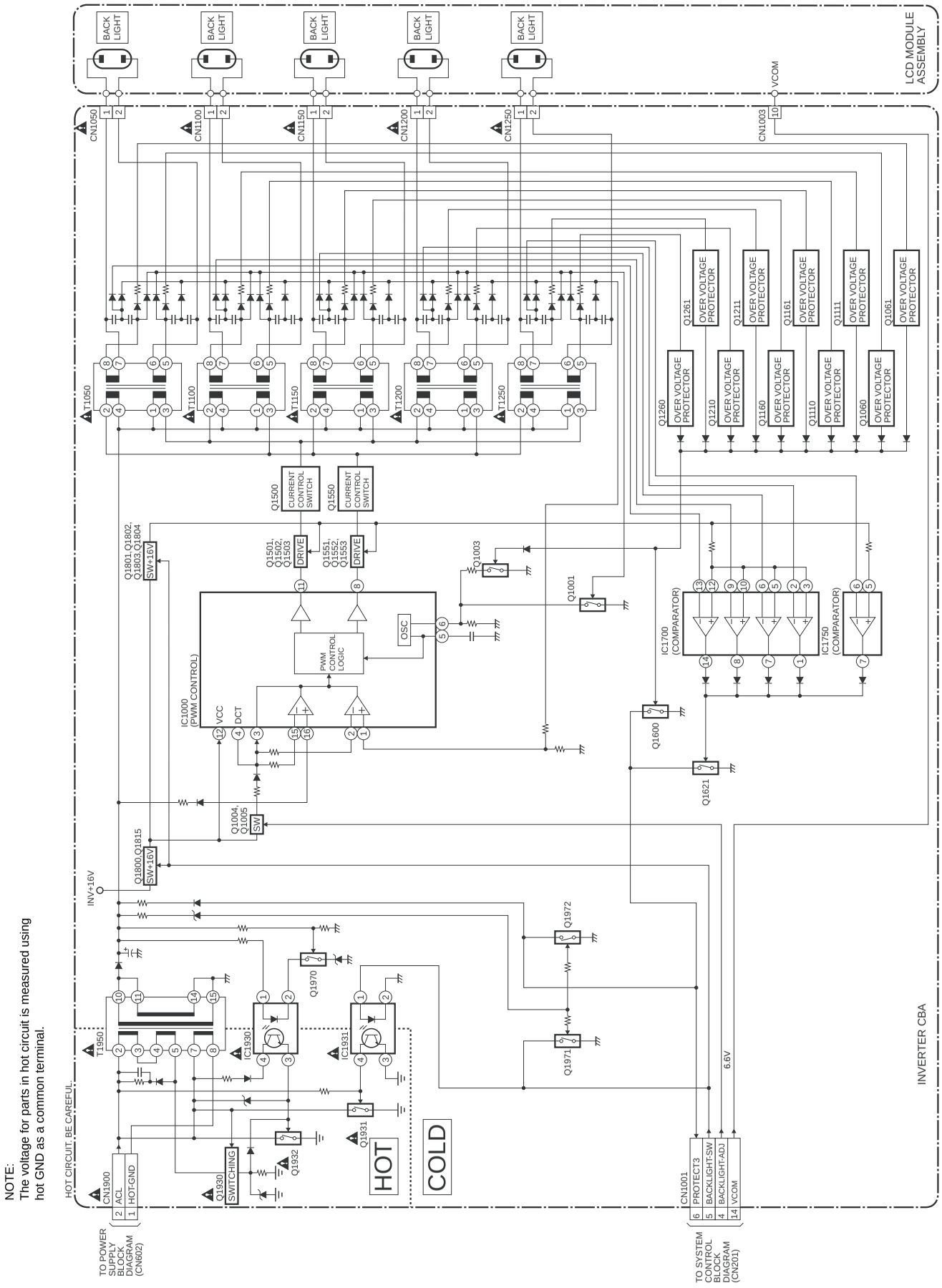
Control signals from the Function board and IR Sensor board are routed through the power supply board to IC3301. IC3301 preforms all of the system control functions.

Note that the P-ON-HI voltage in pin 5 of CN101 is inverted from the pin with the same label, CN301, pin 9.



Inverter Board

Inverter Block Diagram



NOTE:
The voltage for parts in hot circuit is measured using hot GND as a common terminal.

FIGURE 9 - INVERTER

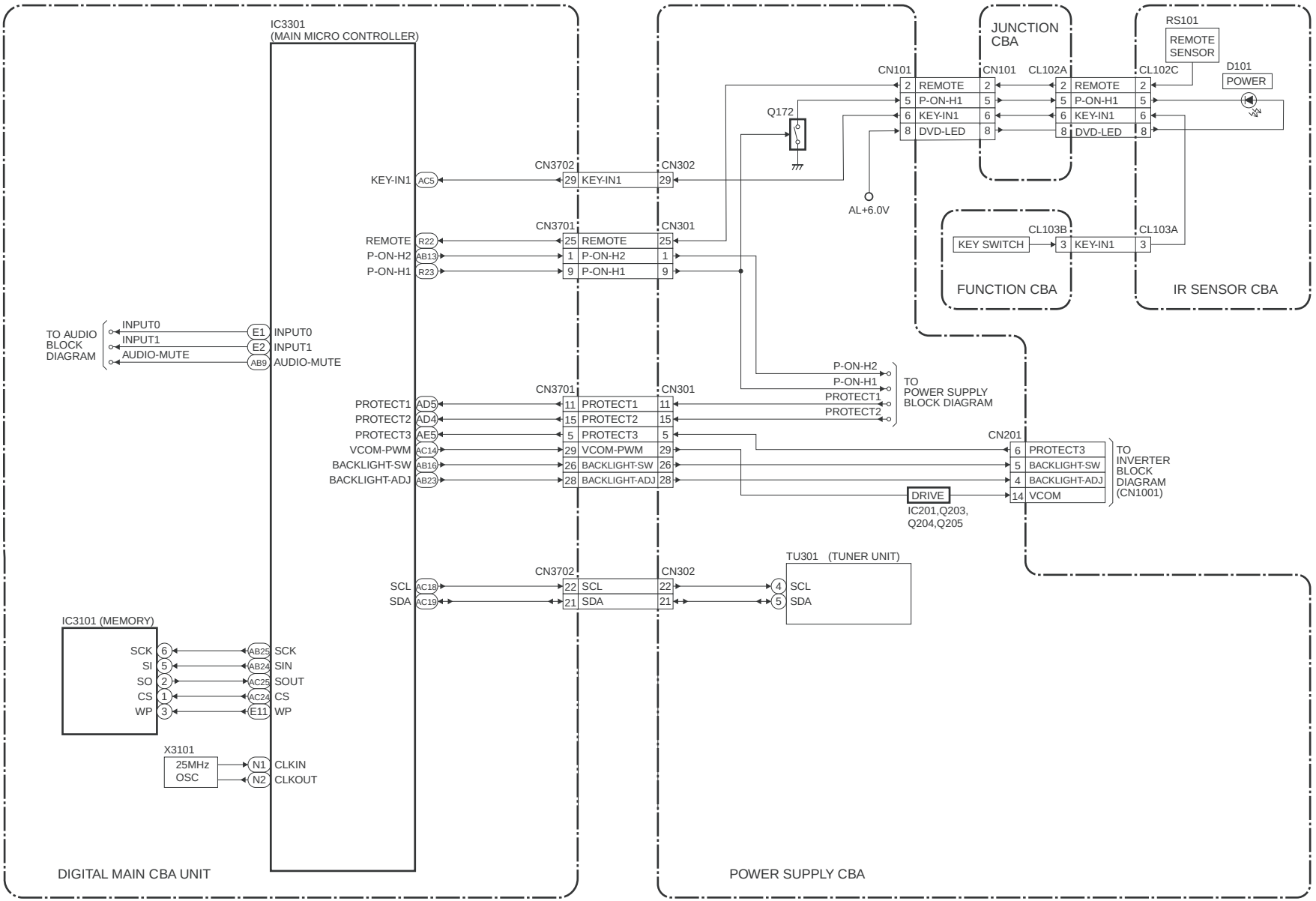


FIGURE 10 - SYSTEM CONTROL

Service Mode

In the service mode, it is possible to generate screen test patterns, Initialize the set or make grey scale alignments.

To enter the service mode, it is necessary to press a hidden button on the remote control.

As shown to the right, it is necessary to have a Magnavox remote for entering the service mode for the Magnavox and Philips models.

How to make the Service remote control unit:

1. Prepare the MAGNAVOX remote control unit. (Part No. NF800UD or NF802UD)
2. Cut “A” portion of the attached remote control unit as shown in Fig. 1.

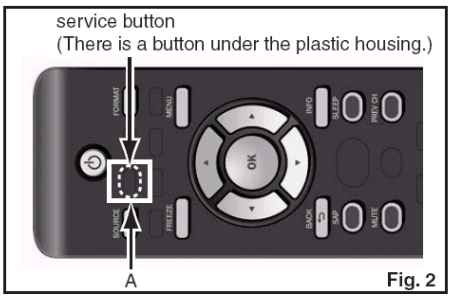


Fig. 2

Service mode for the Sylvania LC320SLX and Emerson LC320EMX.

[LC320SLX, LC320EMX]

Cut “A” portion of the attached remote control unit as shown in Fig. 1.

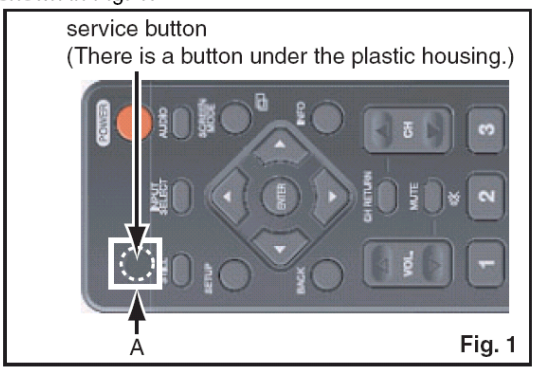


Fig. 1

Remote for the LC320SSX. With the LC320SSX remote, the remote cover can be peeled back rather than cutting a hole in the remote.

[LC320SSX]

Cut “A” portion of the attached remote control unit as shown in Fig. 3

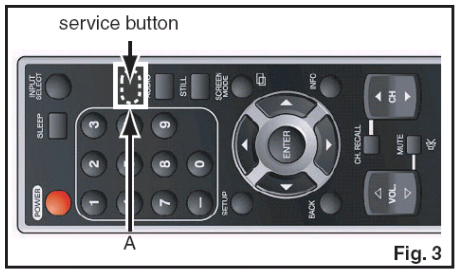
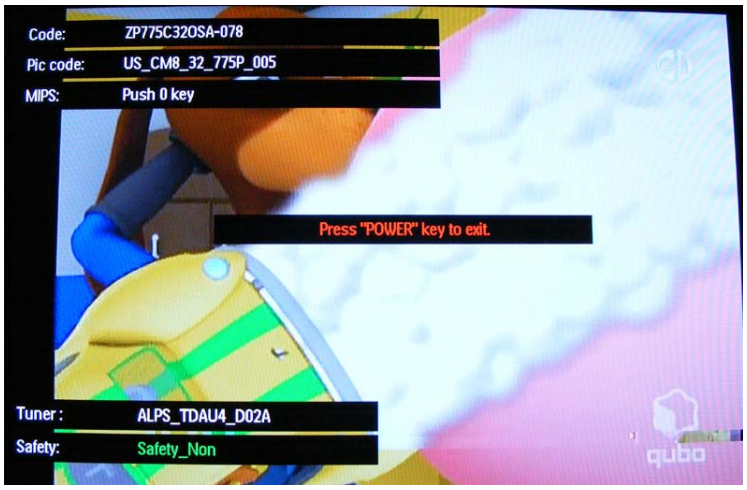


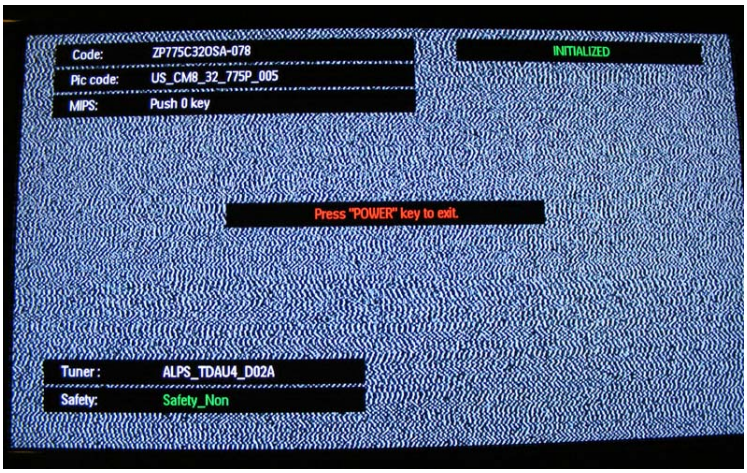
Fig. 3

The Service screen is shown to the right.



Refer to Figure 11 for the service menu map.

To Initialize the set which puts it in an out of box condition, press the Info button on the remote while in the service screen.



The word Initialized will turn green indicating that the initialization is complete.

After initializing the set, the customer will be prompted to enter a language and program the TV when it is turned On for the first time.

Grey Scale alignment

To perform the grey scale alignment, press the Vol- button three times until C/D appears on the screen. Then select the desired Cutoff and Drive adjustments. Use the channel up/down button on the remote to adjust the respective cutoffs or drives. Default values are listed below.

Select	Adjustment	Value
1	COR - Cutoff Red	187
2	COG - Cutoff Green	0
3	COB - Cutoff Blue	56
4	DR - Red Drive	-46
5	DG - Green Drive	0
6	DB - Blue Drive	-21

VCOM 1 and 2 are used to calibrate the A/D converter for the Component inputs.

2	VCOM1	90
3	VCOM2	90

Refer to the service manual for more details.

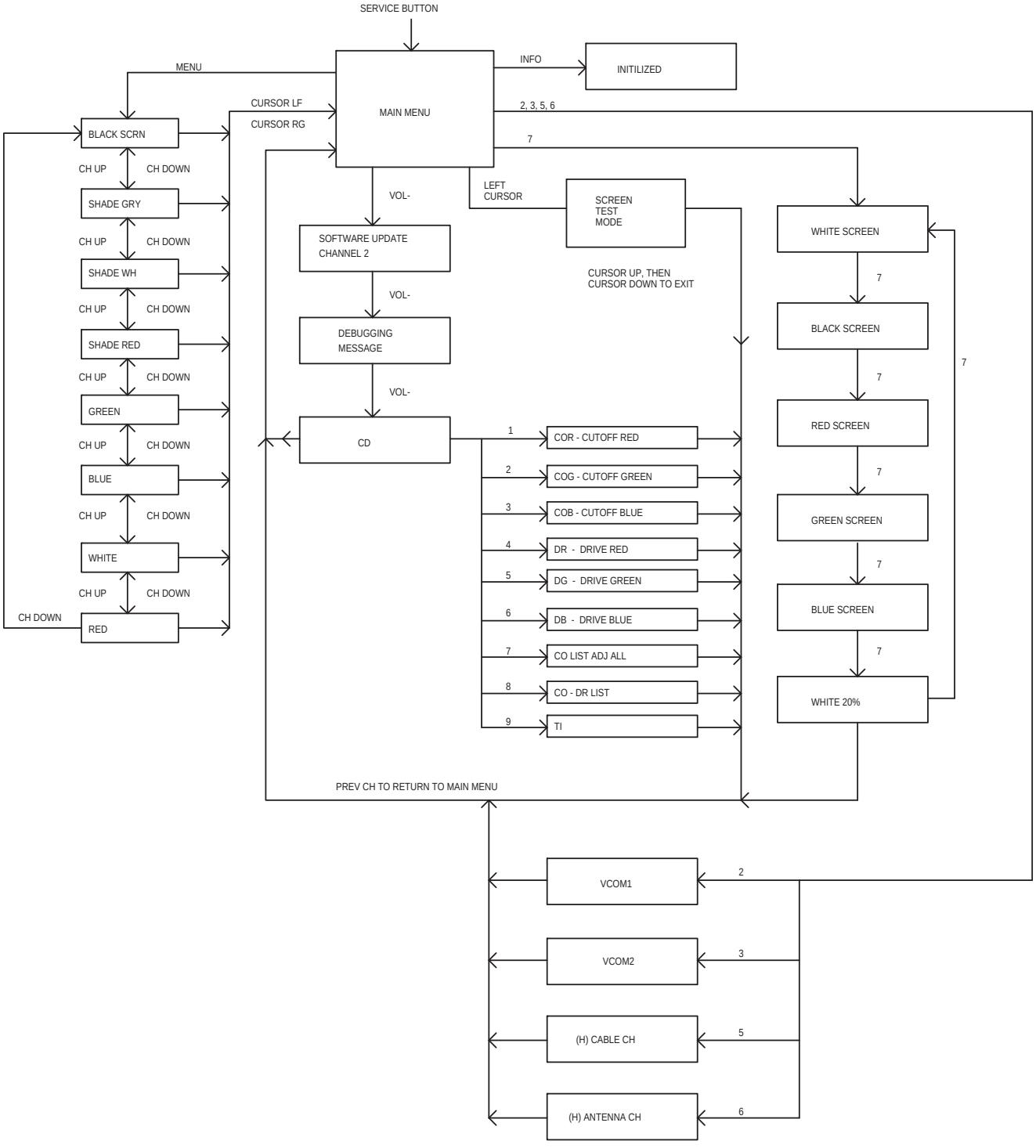
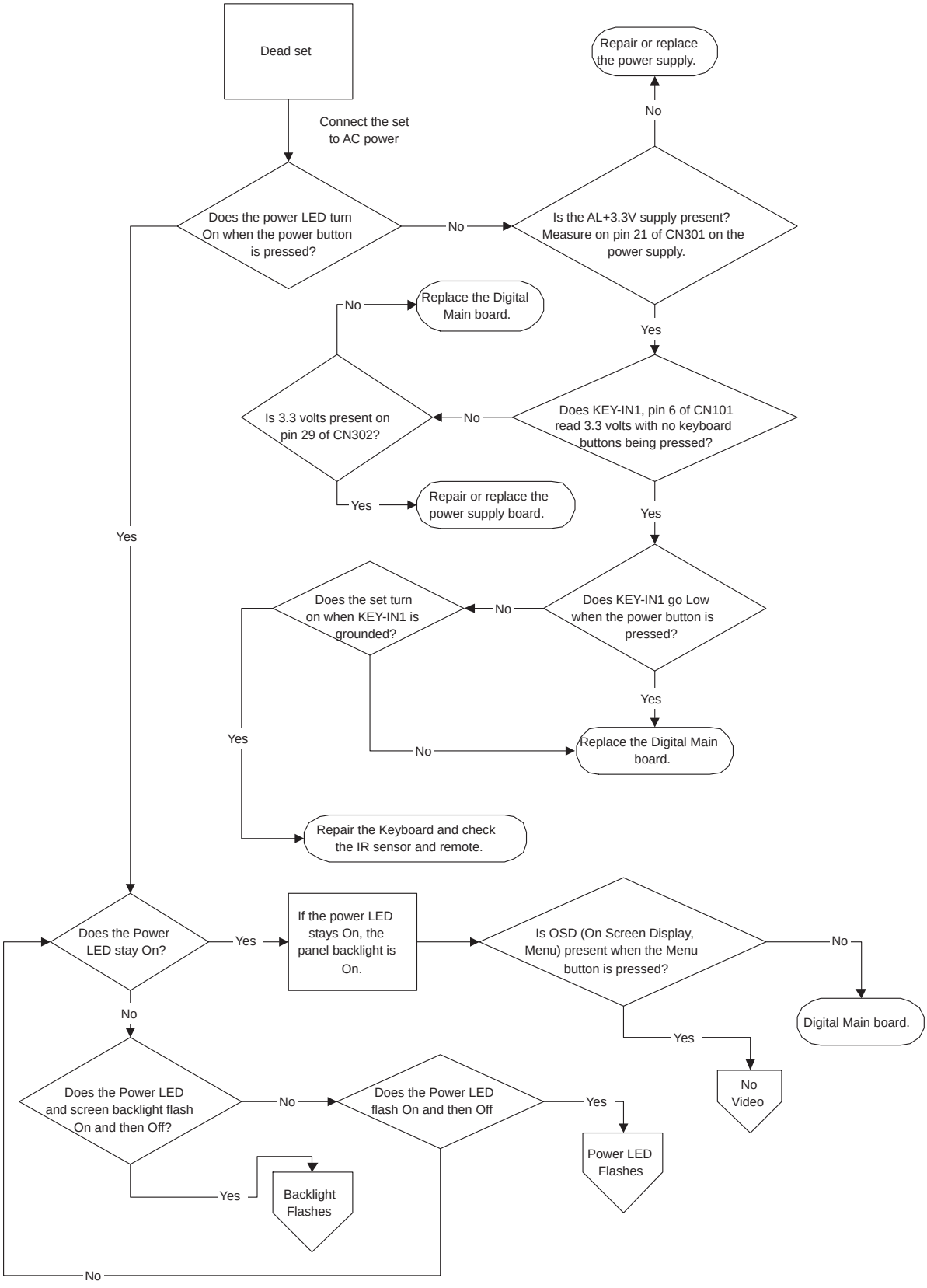


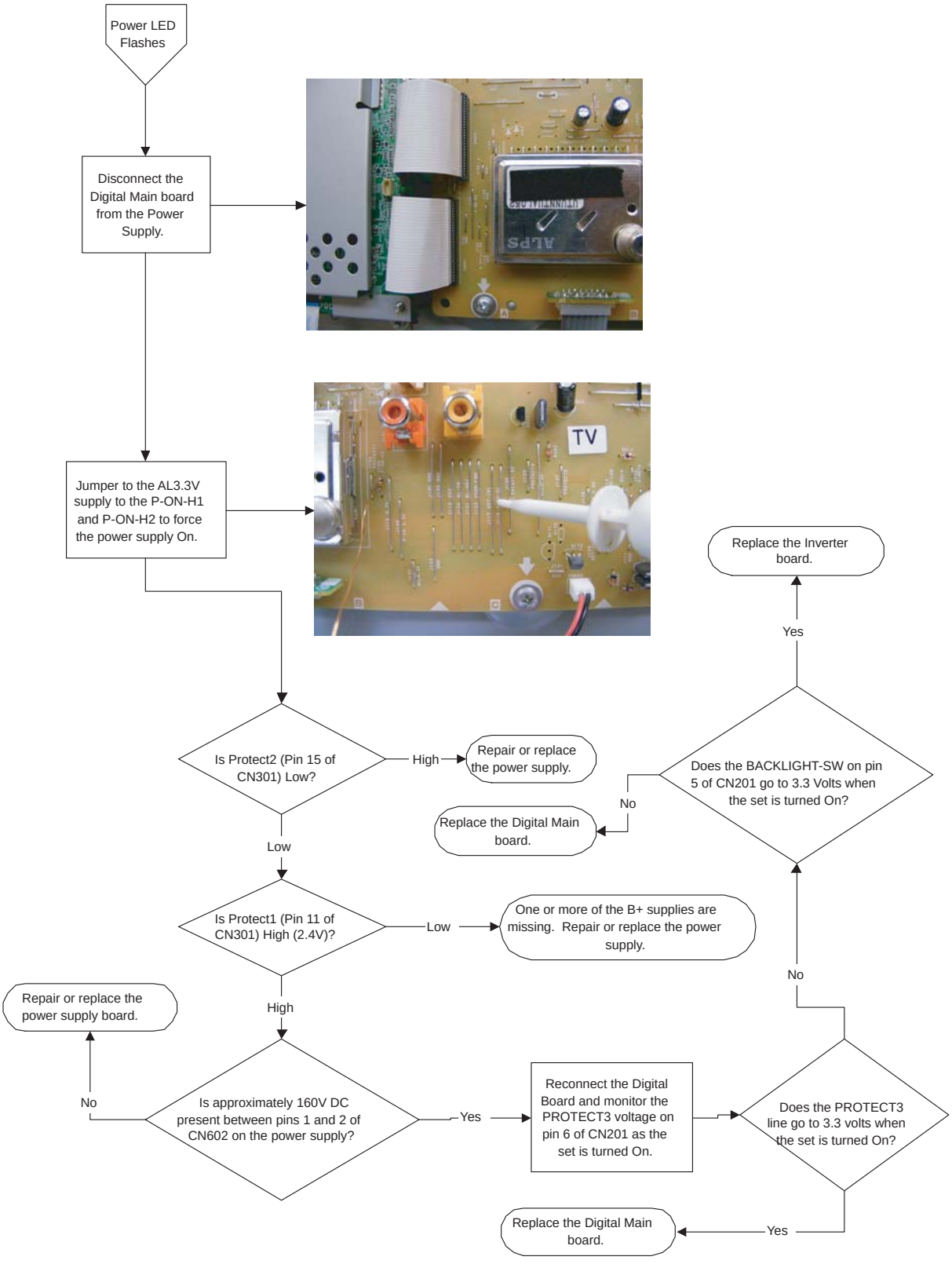
FIGURE 11 - SERVICE MENU

Other Test Modes

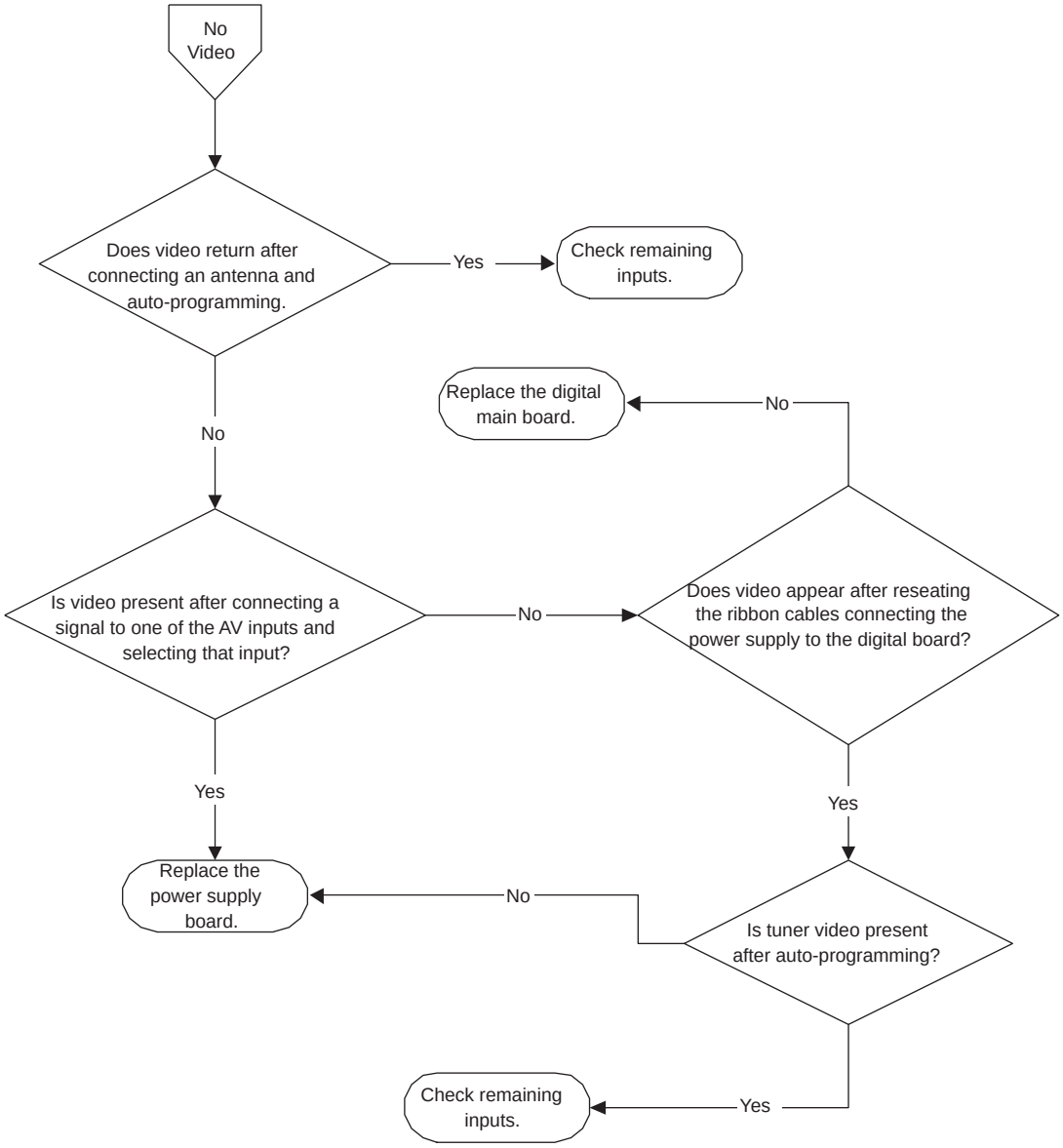
Pressing the left cursor button on the remote while in the service mode will switch on a screen test mode. Press the cursor up followed by the cursor down button on the remote to exit. Pressing the Menu button will switch on a second screen test mode. Pressing the ch up/down button will cycle the screen through different patterns. Press the cursor left followed by the cursor right button to exit this mode.



TROUBLESHOOTING FLOW CHART

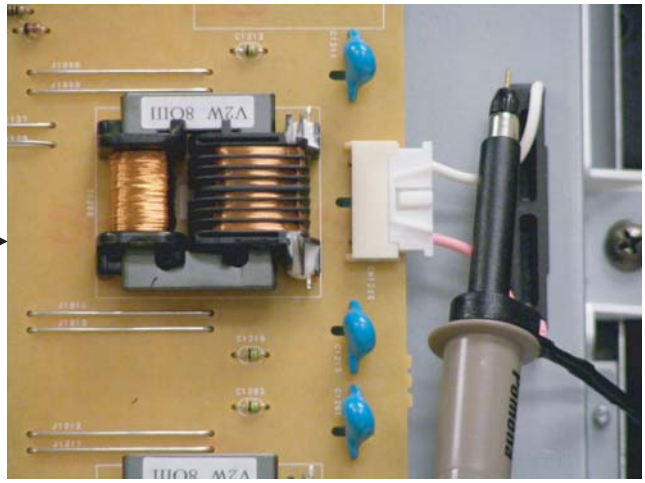


TROUBLESHOOTING FLOW CHART

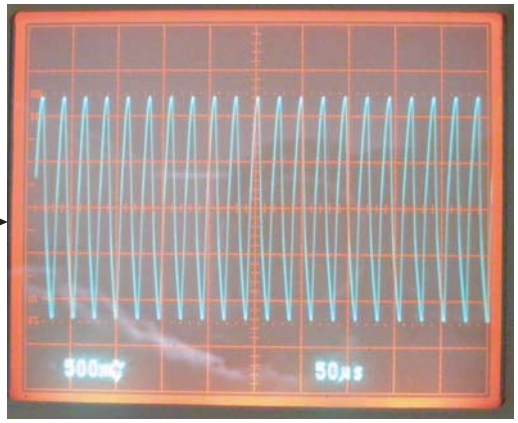

No Video
Does video return after connecting an antenna and auto-programming.
Yes
Check remaining inputs.
No
Replace the digital main board.
No
Is video present after connecting a signal to one of the AV inputs and selecting that input?
No
Does video appear after reseating the ribbon cables connecting the power supply to the digital board?
Yes
Yes
Replace the power supply board.
No
Is tuner video present after auto-programming?
Check remaining inputs.
Yes

Backlight Flashes

Turn the set On while monitoring the HV output from the Inverter board at each output one at a time.
Repeat for each of the five locations.
It is only necessary to place the scope probe in the proximity of the output as shown at the right.
If you connect directly, use a X100 probe.



The waveform will appear as shown to the right if the output is working.



Is output present at each location?

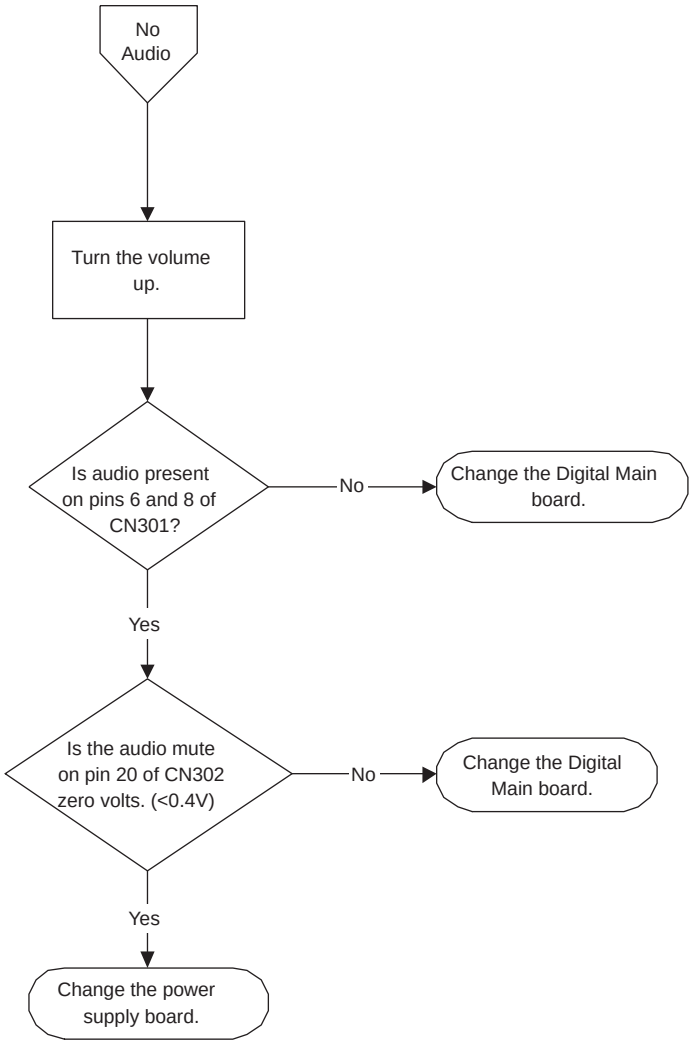
No

Replace the Inverter board.

Yes

The panel is most likely defective. Check panel connections to make sure they are sucure.

TROUBLESHOOTING FLOW CHART


No Audio
Turn the volume up.
Is audio present on pins 6 and 8 of CN301?
No
Change the Digital Main board.
Yes
Is the audio mute on pin 20 of CN302 zero volts. (<0.4V)
No
Change the Digital Main board.
Yes
Change the power supply board.

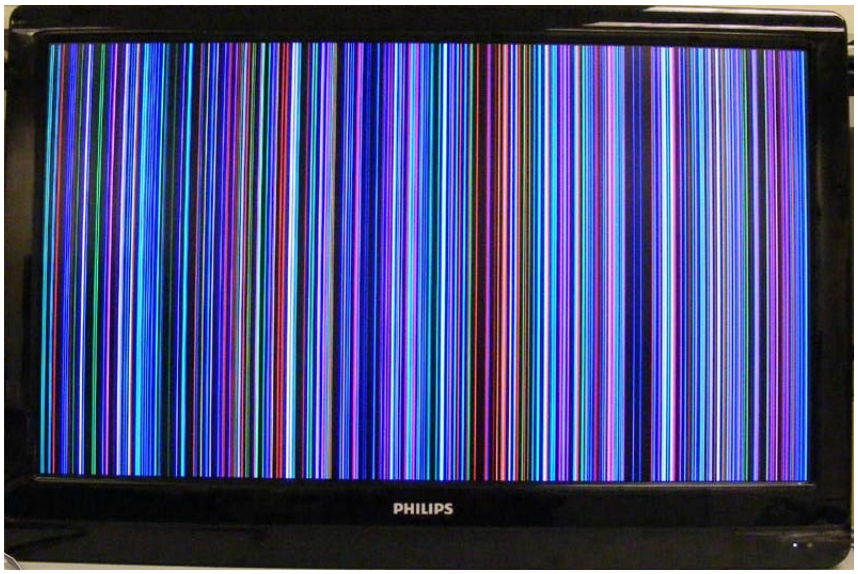
Abbreviation list

Description	
1080i	1080 visible lines, interlaced
1080p	1080 visible lines, progressive scan
480i	480 visible lines, interlaced
480p	480 visible lines, progressive scan
ADC A/D	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
AV	Audio Video
C-FRONT	Chrominance front input
CBA	Circuit Board Assembly (or PWB)
ComPair	Computer aided rePair
CSM	Customer Service Mode
CVBS	Composite Video Blanking and Synchronization
CVBS-EXT	CVBS signal from external source (VCR, VCD, etc.)
CVBS-INT	CVBS signal from Tuner
CVBS-MON	CVBS monitor signal
CVBS-TER-OUT	CVBS terrestrial out
DAC	Digital to Analogue Converter
DFU	Directions For Use: owner's manual
DNR	Dynamic Noise Reduction
DRAM	Dynamic RAM
DSP	Digital Signal Processing
DTS	Digital Theatre Sound
DVD	Digital Video Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EPLD	Electronic Programmable Device
EXT	EXTernal (source), entering the set by cinches (jacks)
FBL	Fast Blanking: DC signal accompanying RGB signals
FLASH	FLASH memory
FM	Field Memory / Frequency Modulation
FMR	FM Radio
FRC	Frame Rate Converter
FRONT-C	Front input chrominance (SVHS)
FRONT-DETECT	Front input detection
FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)
H	H_sync to the module
HD	High Definition
HDMI	High Definition Multimedia Interface
HP	HeadPhone

I2C	Integrated IC bus
I2S	Integrated IC Sound bus
IC	Integrated Circuit
IF	Intermediate Frequency
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in 'pairs', causing line flicker.
IR	Infra Red
IRQ	Interrupt ReQuest
Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according the customers wishes.
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LINE-DRIVE	Line drive signal
LVDS	Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.
MPEG	Motion Pictures Experts Group
NVM	Non Volatile Memory: IC containing TV related data (for example, options)
OSD	On Screen Display
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
RAM	Random Access Memory
RC	Remote Control transmitter
RC5	Remote Control system 5, the signal from the remote control receiver
RGB	Red, Green, and Blue. The primary colour signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.
RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync
ROM	Read Only Memory
SAM	Service Alignment Mode
SIF	Sound Intermediate Frequency
SC	SandCastle: two-level pulse derived from sync signals
SCL	CLock Signal on I2C bus
SDA	DAta Signal on I2C bus
SDRAM	Synchronous DRAM
SIF	Sound Intermediate Frequency
STBY	STandBY
VGA	Video Graphics Array
XTAL	Quartz crystal
YPbPr	Component video (Y= Luminance, Pb/Pr= Colour difference signals)
Y/C	Luminance (Y) and Chrominance (C) signal
Y-OUT	Luminance-signal

Symptom: Lines in the picture as shown in the picture to the right.

Cause: Defective Digital Main board.



Symptom: High frequency noise from the TV when Off.

Cause: Audio amplifier not being shut off during standby.

Cure: Upgrade software.

Symptom: No audio on some analog channels.

Cause: Low sensitivity to 4.5mHz carrier.

Cure: Upgrade software.