



Rear Projection TV Service Manual

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1 Scope

This Service Manual provides detailed service operations for Digital Video Labs, Inc. (DVLX) Digital Light Processing™ (DLP™) Rear Projection Television (RPTV), designated DVLX4xCx. This Service Manual is intended for the reference of qualified maintenance personnel servicing the DVLX4xCx.

1.1 Important Safety Instructions

Please pay attention to the following important safety instructions before carrying out the maintenance work.

1. If you want to conduct maintenance work when the set is in normal operation or just after the power is turned off, you must take proper measures to avoid electric shock from the circuitry or metal parts. Within a short time after the power is turned off, relatively high voltage is present.
2. Do not apply any voltages higher than the specification. If the power supply used deviates from the values given in the specification, there is a possibility of fire or damage to the TV.
3. Never operate the TV in an unsuitable environment, such as in the vicinity of water or sources of fire. Otherwise there is a possibility of fire or damage to the TV.
4. If a foreign substance such as a liquid, a metal slice, or other accidentally falls into the TV, turn off the power immediately. Otherwise there is a possibility of fire or damage to the TV.
5. If there is smoke, abnormal smell, or abnormal sound from the TV, turn off the power immediately.
6. To avoid overheating, do not block any ventilation openings. The TV must be located where there is adequate ventilation.
7. Guard against static electricity which can destroy integrated circuits.
8. Guard against dust during assembling or dismantling lest it should impair the screen image.

2 DVLX4xCx Description

This Section of the specifications provides a general description of the DVLX4xCx RPTV, including the feature set of the product, as well as the physical characteristics of the product.

2.1 Product Designation

The product designation consists of four letters preceded by DVLX. The first letter identifies the enclosure size. For this product, the enclosure is designed to accommodate screen sizes in the 42-46 inch diagonal range, and the enclosure size designation is "4". The first and second letters together identify the product screen size. The third and fourth letters together identify the bezel/enclosure configurations {C1, C2 or C3}, since the product main enclosure is designed such that it can be used with multiple front-view assemblies. The different products covered by this document have product designations summarized in Table 1 and are depicted in Figure 1.

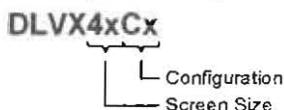


Table 1: DVLX4xCx Products

Designation	Screen Diagonal	Bezel/Enclosure Configuration
DVLX44C1	44"	C1
DVLX44C2	44"	C2
DVLX44C3	44"	C3
DVLX46C1	46"	C1
DVLX46C2	46"	C2
DVLX46C3	46"	C3



Figure 1: DVLX4xCx Product View

Predominately, the entire DVLX4xCx product line is composed of common parts. The few parts which apply only to specific products are associated with the front bezel to give product differentiation in appearance.

3 Product Architecture

This section provides details of the DVLX4xCx architecture.

3.1 Critical Subassemblies

Figure 2 shows the Critical Subassemblies of the DVLX4xCx. As shown in Figure 2, the DVLX4xCx is composed of the following groups of critical subassemblies:

1. Mechanical Subassemblies:
 - a. Main Enclosure
 - b. Remote Control Enclosure
2. Optical Subassemblies:
 - a. Light Projection Engine
 - b. Mirrors
 - i. Small mirror
 - ii. Large mirror
 - c. Screen
3. Electrical Subassemblies:
 - a. Formatter Board
 - b. Video Board
 - c. Tuner Board
 - d. Audio Subsystem:
 - i. Audio Board
 - ii. Speakers
 - e. Control Board

- f. I/O panel
- g. Remote Control Board
- h. Power supply
- i. Lamp and housing
- j. Ballast
- k. Fans
 - i. Lamp fan
 - ii. Enclosure fans

The detailed design specifications of each of these subassemblies are provided in subsequent subsections of this document. The most important design architecture aspects are:

1. The light projection architecture utilizes a two-fold configuration that allows for achieving a minimal depth chassis design.
2. The main enclosure mechanical design concept has as few as possible mechanical components to help in reducing the tooling cost and the assembly cost of the chassis.
3. The main enclosure mechanical design concept allows the main assemblies to be used with multiple front-view assemblies to offer different aesthetic look industrial designs with different screen sizes.
4. In order to allow for competitive procurement of the most costly subassembly, the main enclosure is designed to allow for the use of optical engines from at least two different optical engine suppliers
5. In order to provide AKAI with the ability to address different distribution channels with a different aesthetic look and screen size designs, the main enclosure is designed such that it allows mounting of the optical engine platform in such a way to accommodate the throw distances for sizes ranging from a 42" diagonal screen to a 46" diagonal screen.
6. The Formatter Board, which provides the video and graphics for display on the screen, features:
 - Low-voltage differential signal (LVDS) video input interface for reduced EMI emission.
 - Cost effective Single Board Design
 - Wide-screen format: 1280x720 Texas Instruments HD2 DMD (High-definition)
 - Support for a variety of color wheel drive solutions.
 - RDRAM support for compact electronics design.
7. The Video Board is designed utilizing highly integrated digital video application specific integrated circuits (ASIC) and components

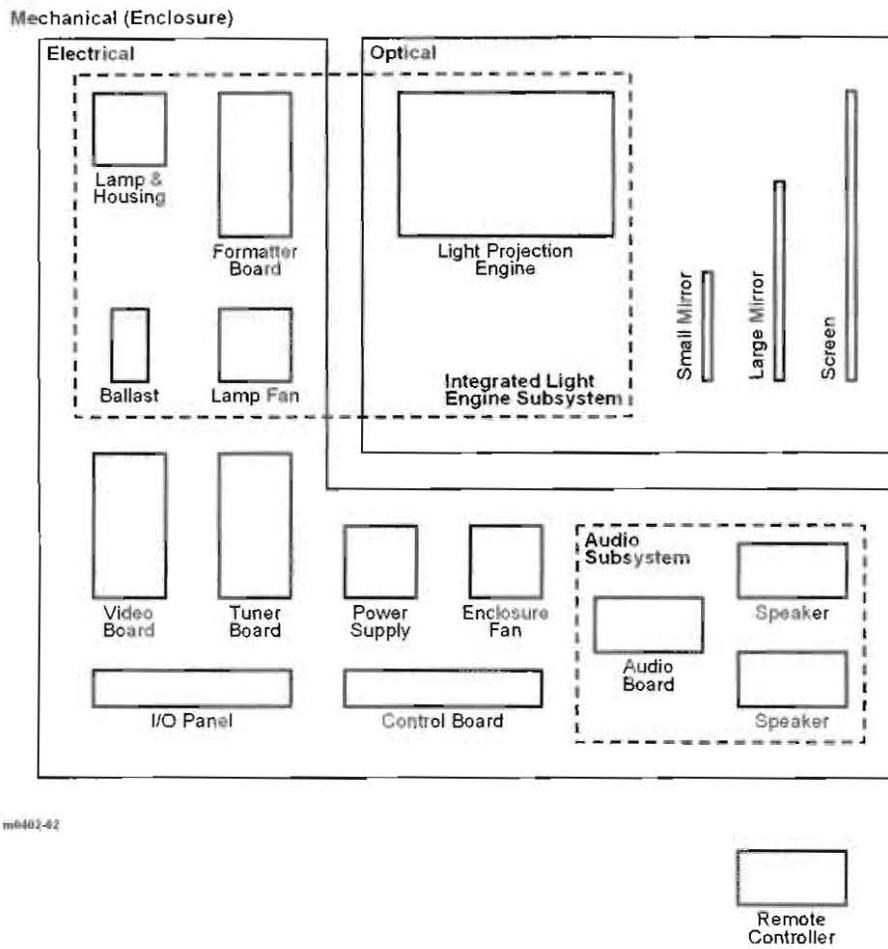


Figure 2: DVLX4xCx Critical Subassemblies

3.2 Block Diagram

Figure 3 shows a block diagram of the DVLX4xCx, which highlights the internal interfaces between the critical subassemblies and identifies cable IDs.

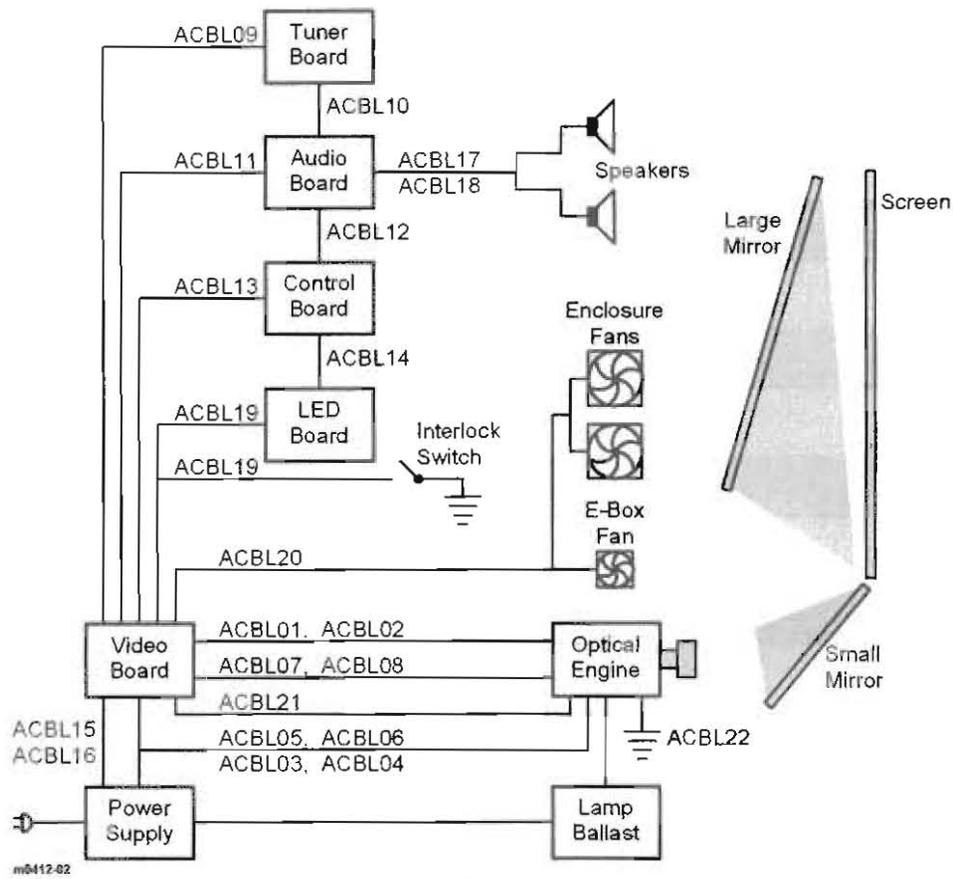


Figure 3: DVLX4xCx Block Diagram

4 Product Test Environment

The test environment includes a test controller and multiple audio/video sources assembled from multiple PCs and DVD players, along with a barcode reader. The DVLX4xCx Unit Under Test (UUT) is connected to the test equipment in the test environment as shown in Figure 4 and summarized below. Specific DVLX4xCx inputs to which the test equipment is connected are identified by name as printed on the DVLX4xCx front panel and back panel labels.

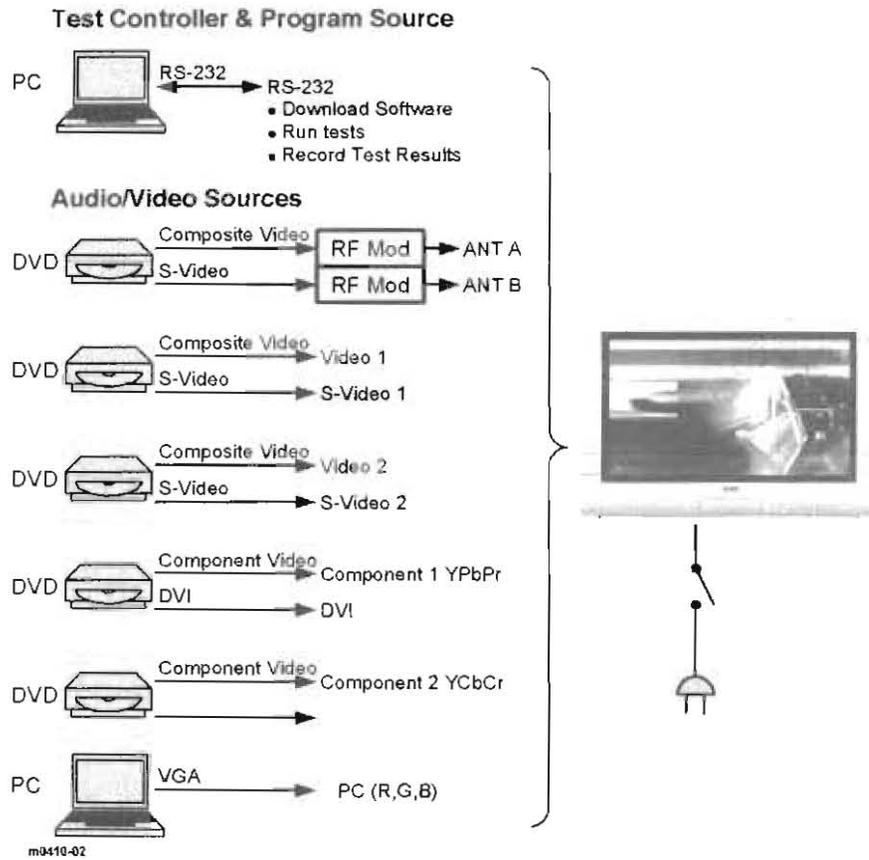


Figure 4: Test Environment

1. PC test controller with the Microsoft Windows XP or Windows 2000 operating system and with the following programs and binary files installed on the hard disc:
 - a. PC application diagnostic support software:
 - Diagnostic.exe
 - b. DVLX4xCx Diagnostic Software:
 - Test1.hex
 - Test2 hex
 - c. PC application Flash Loader program.
 - FLASHLoader.exe
 - d. DVLX4xCx Operational Software files:
 - MN203.hex
 - MN203_OSD1.hex

Use the 9-pin serial cable to connect this PC to the RS-232 input of the DVLX4xCx.

2. DVD player audio/video source unit connected to the following DVLX4xCx front panel inputs:
 - a. VIDEO 1 video input and AUDIO L/MONO and AUDIO R audio inputs.
 - b. S-VIDEO 1 video inputs.

3. DVD player audio/video source unit connected to the following DVLX4xCx rear panel inputs:
 - a. VIDEO 2 video input and AUDIO L/MONO and AUDIO R audio inputs.
 - b. S-VIDEO 2 video inputs
4. DVD player audio/video source unit connected to the following DVLX4xCx rear panel inputs:
 - a. COMPONENT 1 (YPbPr) video input and COMP.1-L and COMP.1-R audio inputs.
 - b. DVI video input and DVI-L and DVI-R audio inputs.
5. DVD player audio/video source unit connected to the following DVLX4xCx rear panel inputs:
 - a. COMPONENT 2 (YCbCr) video input and COMP.2-L and COMP.2-R audio inputs.
6. DVD player audio/video source unit connected through RF modulators to the following DVLX4xCx rear panel inputs:
 - a. The DVD player's S-Video output to the RF modulator; the RF modulator's output to the ANT A input with a coaxial cable.
 - b. The DVD player's Video output to the RF modulator; the RF modulator's output to the ANT B input with a coaxial cable.
7. PC audio/video source unit displaying the VGA test pattern shown in Figure 5.

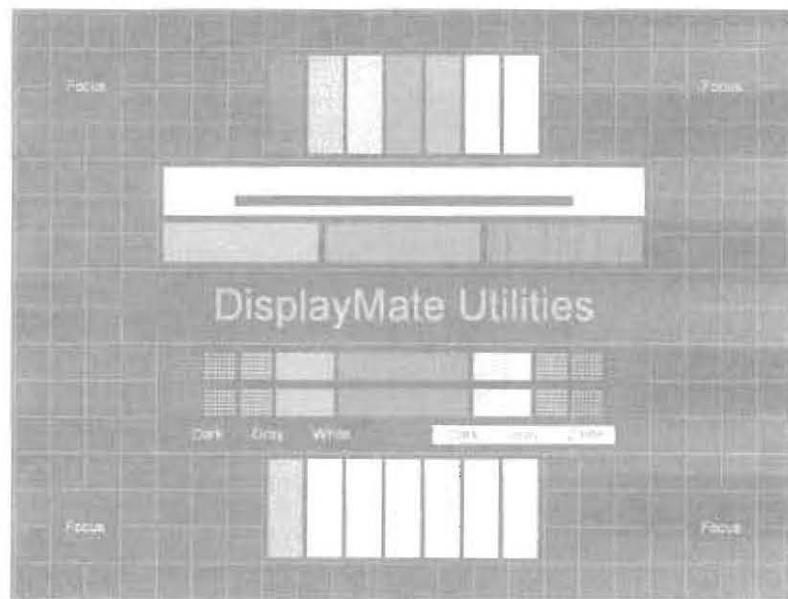


Figure 5: VGA Test Pattern

Use the VGA cable to connect this PC to the PC input of the DVLX4xCx.

8. Barcode reader to enter the DVLX4xCx Serial Number (S/N) into the PC test controller.
9. Disconnect switch on the 110 VAC powering the DVLX4xCx.

The DVD players in the test environment are not exclusive to any specific manufacturer's model. However, one example of a DVD player suitable for the test environment is the Samsung Model DVD-HD841/XAA.

After the test equipment in the test environment is connected to the DVLX4xCx and the 110 VAC power is applied to the DVLX4xCx, the test procedure proceeds as described in the following sections.

5 Service Procedure

Table 2 is a service checklist showing the most typical repair scenarios when the UUT is capable of functioning normally but with degraded operation; i.e., is exhibiting problems while functioning as a TV. Table 2 lists typical problem symptoms, possible causes, and remedy actions. If the problem still persists after following the test checklist remedy actions or if the UUT is incapable of functioning as a TV, then you need to proceed directly to the detailed Service Procedure, which addresses a more complete set of repair scenarios. A flowchart of the detailed Service Procedure is shown in Figure 6 through Figure 8. The references SP-A, SP-C, SP-C1, etc., identified in Table 2 correspond to specific positions in the flowchart. Table 3 provides further details to specific remedy actions shown in the flowchart. These details are numbered SPN-1 through SPN-23 corresponding to the numbers in the flowchart for identification with specific remedy actions.

Table 2: Service Checklist

Symptom	Possible Problem	Remedy Action	Reference
Image problems	<ul style="list-style-type: none"> • Configuration wrong 	<ul style="list-style-type: none"> • Reset to factory defaults a Settings menu selection in the Operational Software 	<ul style="list-style-type: none"> • Section 7
LAMP LED on	<ul style="list-style-type: none"> • Lamp exceeds rated lifetime 	<ul style="list-style-type: none"> • Replace Lamp 	<ul style="list-style-type: none"> • SPN-21
Screen darker and less clear	<ul style="list-style-type: none"> • Lamp exceeds rated lifetime 	<ul style="list-style-type: none"> • Replace Lamp 	<ul style="list-style-type: none"> • SPN-21
IR malfunction, Keypad OK	<ul style="list-style-type: none"> • LED Board fault • LED Board cable fault • Power Supply 	<ul style="list-style-type: none"> • Run Service Procedure first. • If problem persists, change Power Supply. 	<ul style="list-style-type: none"> • SP-A • SPN-12
IR malfunction, Keypad malfunction	<ul style="list-style-type: none"> • Control Board fault • Control Board cable fault • Power Supply 	<ul style="list-style-type: none"> • First replace Control Board and ACBL14 cable. • If problem persists, Replace Power Supply 	<ul style="list-style-type: none"> • SPN-6 • SPN-12
POWER LED not on	<ul style="list-style-type: none"> • Video Board fault • Power Supply fault • LED Board fault • LED Board cable fault 	<ul style="list-style-type: none"> • Run Service Procedure 	<ul style="list-style-type: none"> • SP-A
Following inputs are not available: Component2 Video 2 S-Video 2	<ul style="list-style-type: none"> • Video Board fault 	<ul style="list-style-type: none"> • Replace Video Board 	<ul style="list-style-type: none"> • SPN-6
No image, normal menu	<ul style="list-style-type: none"> • Video Board fault 	<ul style="list-style-type: none"> • Replace Video Board 	<ul style="list-style-type: none"> • SPN-6
Distorted image, normal menu	<ul style="list-style-type: none"> • Video Board fault 	<ul style="list-style-type: none"> • Replace Video Board 	<ul style="list-style-type: none"> • SPN-6
Distorted image, distorted menu	<ul style="list-style-type: none"> • LVDS cable connector J15 fault • Video Board fault • LVDS cable fault • Optical Engine fault 	<ul style="list-style-type: none"> • Run Service Procedure. 	<ul style="list-style-type: none"> • SP-A

Symptom	Possible Problem	Remedy Action	Reference
Extreme color domination (e.g. extremely green)	<ul style="list-style-type: none"> • Video Board fault 	<ul style="list-style-type: none"> • Replace Video Board 	<ul style="list-style-type: none"> • SPN-6
Extreme low brightness	<ul style="list-style-type: none"> • Video Board fault • Optical Engine fault 	<ul style="list-style-type: none"> • First replace Video Board • If problem persists, Replace Optical Engine 	<ul style="list-style-type: none"> • SPN-6 • SPN-23
No tuner input	<ul style="list-style-type: none"> • Tuner Board fault • Tuner Board cable fault 	<ul style="list-style-type: none"> • Replace Tuner Board • Replace Tuner ACBL09 cable 	<ul style="list-style-type: none"> • SPN-6 • Table 4
No sound normal beeper	<ul style="list-style-type: none"> • Audio Board fault (filter or mux) • Cable fault 	<ul style="list-style-type: none"> • Replace Audio Board • Replace Audio Board ACBL10 & ACBL11 cables 	<ul style="list-style-type: none"> • SPN-6 • Table 4
	•	•	•
	•	•	•
Fan malfunction	<ul style="list-style-type: none"> • Fan fault • Cable fault • 	<ul style="list-style-type: none"> • First replace fan and ACBL17 or ACBL18 cable. • If problem persist, run Service Procedure. 	<ul style="list-style-type: none"> • Table 4 • SP-A
Lamp turns on once but fails on several more attempts	<ul style="list-style-type: none"> • Power Supply fault • 	<ul style="list-style-type: none"> • First replace Power Supply • If problem persists, run Service Procedure. 	<ul style="list-style-type: none"> • SPN-12 • SP-A

A flowchart of the test procedure is shown in Figure 6 through Figure 8.

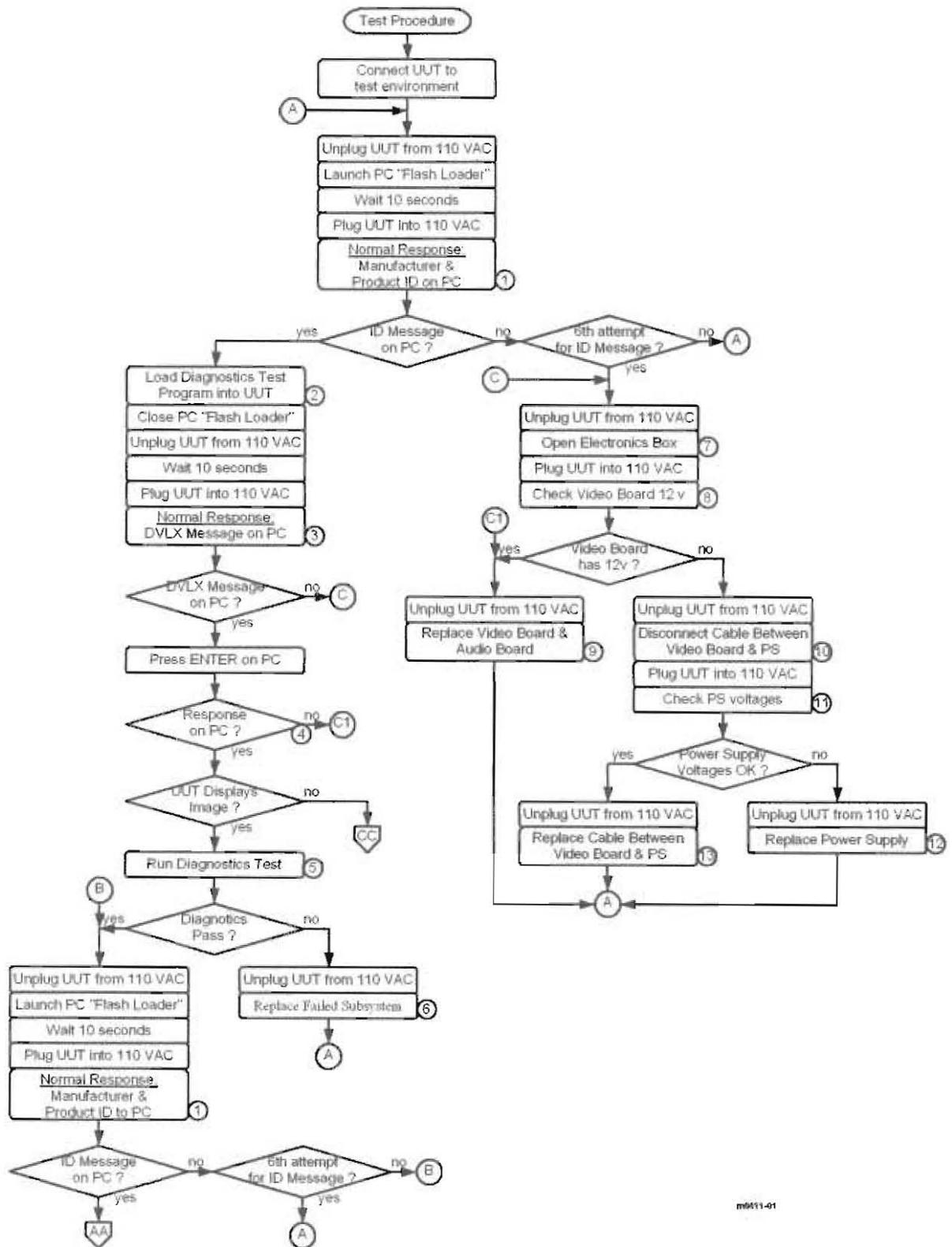
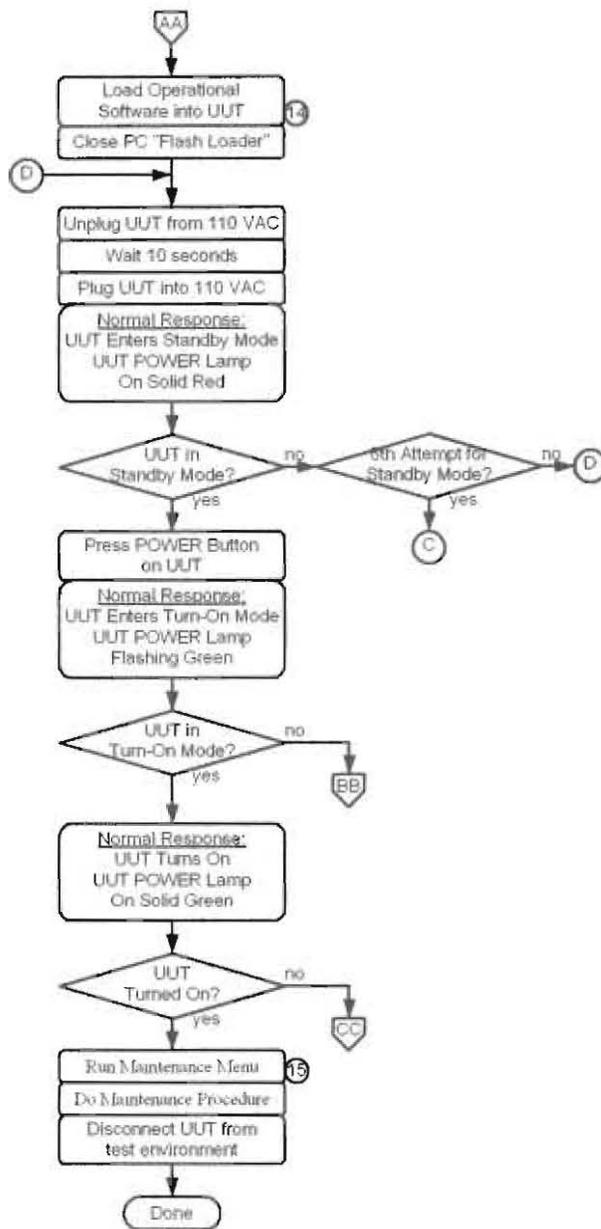
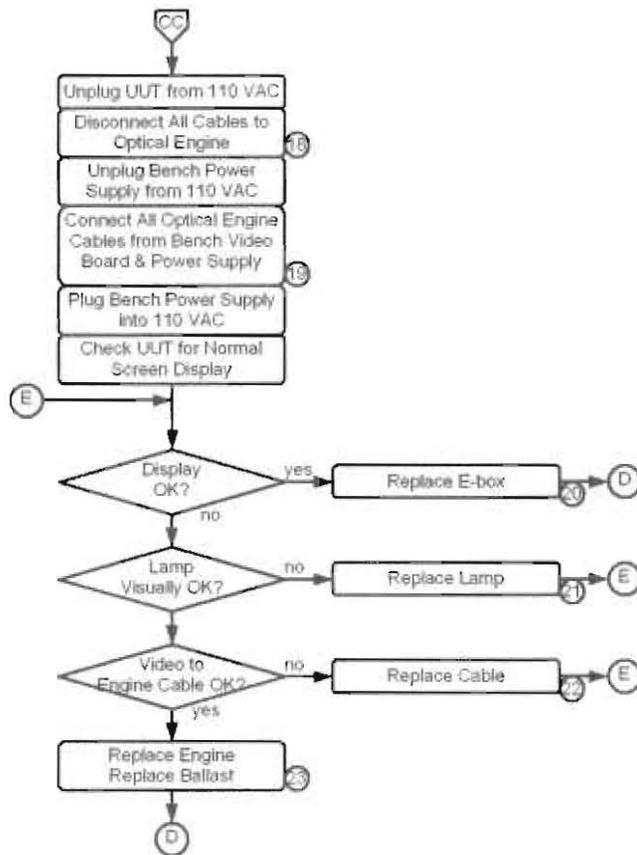
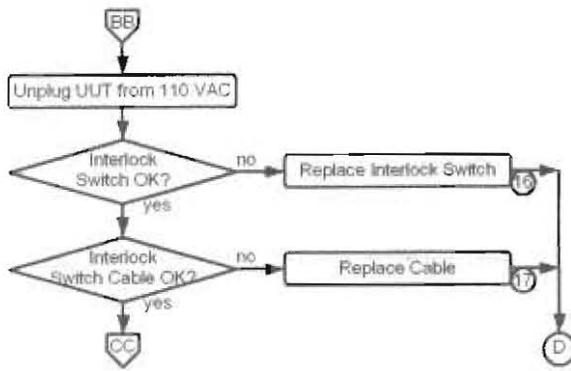


Figure 6: Service Procedure Flowchart



m0411-01

Figure 7: Service Procedure Flowchart (Continued)



m6411-01

Figure 8: Service Procedure Flowchart (Continued)

Table 3: Service Procedure Number (SPN) Description

- | SPN | Description |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ① | You will see the menu below. When the UUT is not plugged into 110 VAC, the Browse button and the Start button will be non-selectable and correspondingly shaded gray. When the UUT is plugged into 110 VAC, the Browse button will be selectable and correspondingly not shaded. Use the Browse button to find the file to be loaded. Once a file is selected, it will appear in the bottom area and the Start button will be selectable and correspondingly not shaded. |



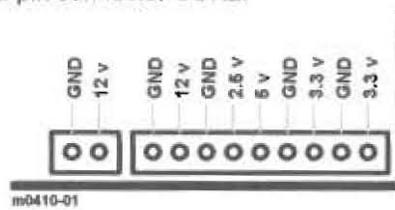
- ② In the PC Flash Loader, click on browse and select files Test1.hex and Test2.hex. and then click on Start.
- ③ The DVLX message appearing on the PC is shown below.



SPN	Description
⑥	A message written on the PC screen identifies whether the components passed or whether a component failure is found. Furthermore, a file is written with the SN as a file name to record this information. After the failed component is replaced, the Diagnostics test is run again to either completion or to identify another failed component. This continues until all components pass the test.

Component	Replace Procedure
Video Board	E-Box Contents Replacement Procedure, Section 5.1
Audio Board	E-Box Contents Replacement Procedure, Section 5.1
Tuner Board	E-Box Contents Replacement Procedure, Section 5.1
Control Board	Control Board and LED Board Replacement Procedure, Section 5.3.
LED Board	Control Board and LED Board Replacement Procedure, Section 5.3.

- ⑦ See E-Box Contents Replacement Procedure, Section 5.1.
- ⑧ See E-Box Contents Replacement Procedure, Section 5.1, 4th picture.
- ⑨ See E-Box Contents Replacement Procedure, Section 5.1.
- ⑩ See E-Box Contents Replacement Procedure, Section 5.1, 1st picture.
- ⑪ The figure below is the pinout of connectors for the output voltages on the Power Supply showing the 9-pin connector CON1 and the 2-pin connector CON2.



- ⑫ See E-Box Contents Replacement Procedure, Section 5.1.
- ⑬ See E-Box Contents Replacement Procedure, Section 5.1, 4th picture. Replace cable ACBL16 (see Table 4)
- ⑭ In the Flash Loader on the PC, click on browse, select the files MN203.hex and MN203_OSD1.hex and then click on Start.
- ⑮ On the UUT Remote Control, press the keypad sequence 20498354 to bring up the Maintenance Menu shown below.

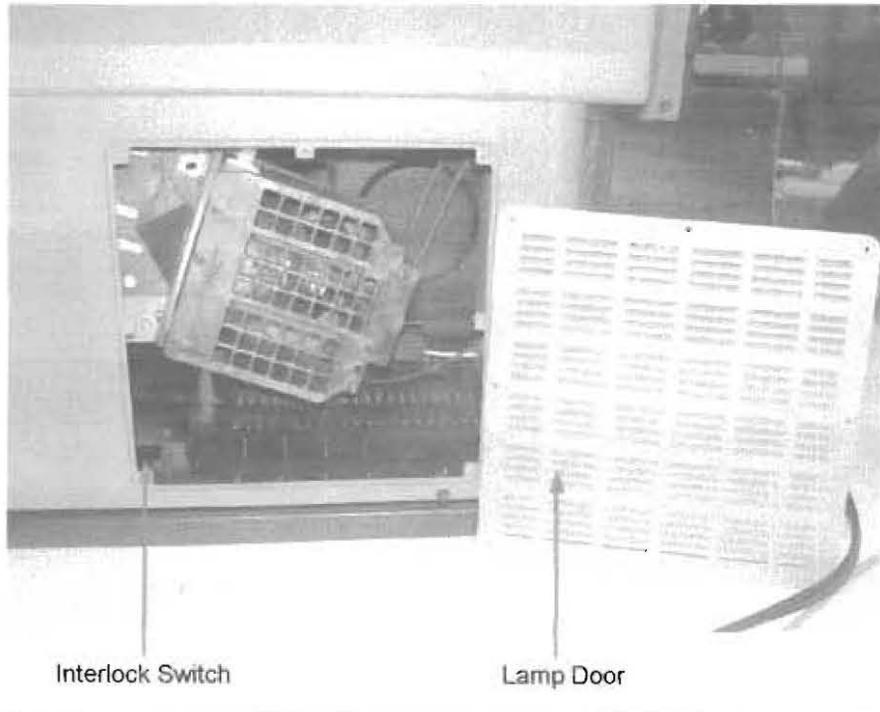


See Section 9 for running Maintenance Menu.

SPN

Description

- ⑩ 1. Use the remote control or front panel push button switches to turn the power off, and after waiting several minutes unplug the TV. (The cooling fans will continue to blow for several minutes after turning the power off.)
2. Use a screwdriver to remove the six (6) screws fastening the lamp door, which is the panel with louvers located on the back of the TV, and remove the lamp door.
3. Replace the Interlock Switch.
4. Replace the lamp door.

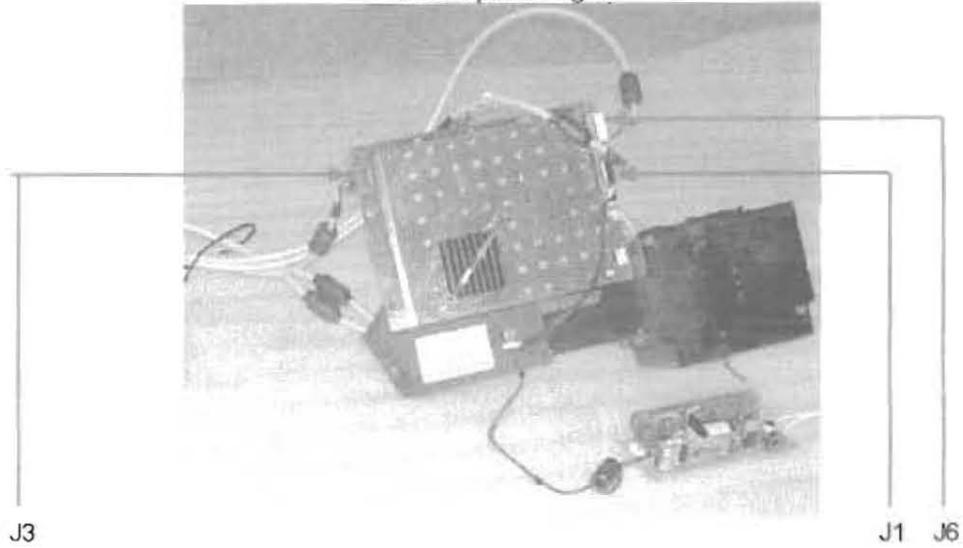


- ⑪ Replace cable ACBL19 (see Table 4)

SPN

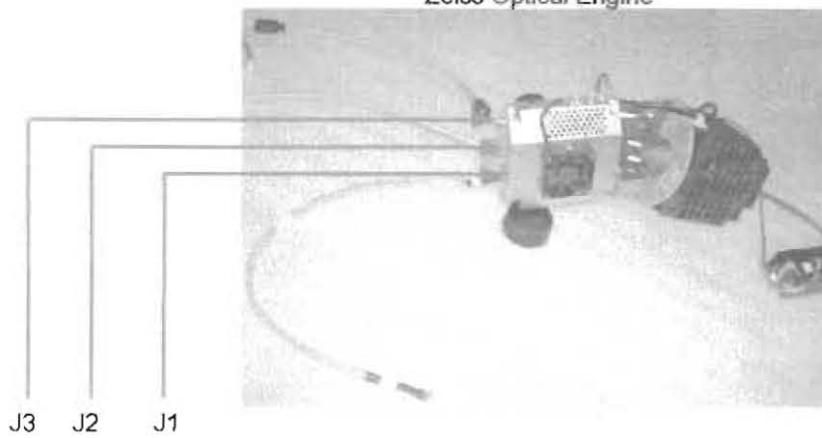
Description

- ⑱ Disconnect cables from the following connectors of the Optical Engine.

JDSU Optical Engine

<u>Cable</u>	<u>JDSU connector</u>
ACBL01	J1
ACBL04	J3
ACBL07	J6

Disconnect Ballast connect from Power Supply.

Zeiss Optical Engine

<u>Cable</u>	<u>Zeiss connector</u>
ACBL02	J1
ACBL08	J2
ACBL06	J3

Disconnect Ballast connect from Power Supply.

SPN

Description

①9 Connect the Optical Engine to the bench Video Board and the bench Power Supply cables as follows

<u>Cable</u>	<u>JDSU connector</u>	<u>JDSU Optical Engine Bench Video Board</u>	<u>Bench Power Supply</u>
ACBL01	J1	J15	
ACBL07	J6	J25	
ACBL04	J3		CON1

Connect Ballast to bench Power Supply.

<u>Cable</u>	<u>Zeiss connector</u>	<u>Zeiss Optical Engine Bench Video Board</u>	<u>Bench Power Supply</u>
ACBL02	J1	J15	
ACBL08	J2	J25	
ACBL06	J3	J28	CON1

Connect Ballast to bench Power Supply.

②0 See E-Box Contents Replacement Procedure, Section 5.1, 1st picture.

②1 See Lamp replacement procedure Section 5.2

②2 Replace the following cables (see Table 4)

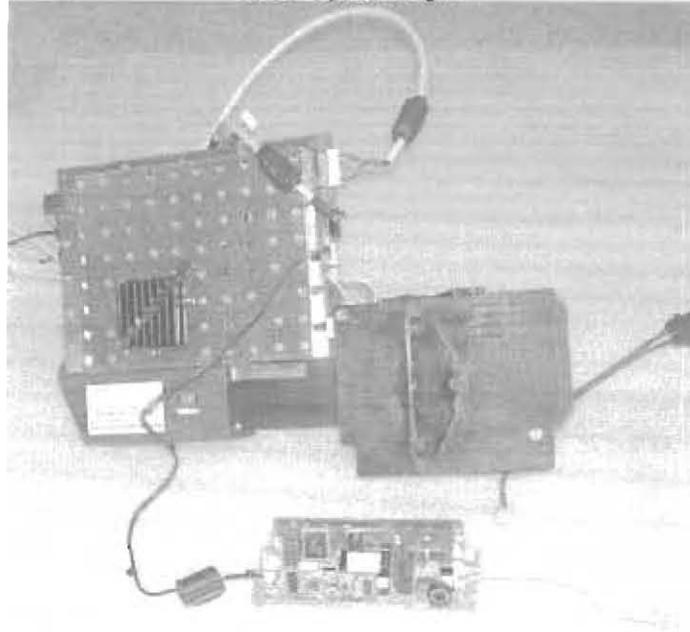
JDSU
ACBL01
ACBL07

Zeiss
ACBL02
ACBL08

SPN

23

Description
JDSU Optical Engine



Zeiss Optical Engine



Table 4: Cable Routing Description

Cable	Description	Component #1	Component #2	Component #3
ACLB01	JDSU/ LVDS Cable	Video Board J15	JDSU Engine J1	
ACLB02	ZEISS/ LVDS Cable	Video Board J15	Zeiss Engine J1	
ACLB03	FSP/JDSU Power Cable		JDSU Engine J3	FSP PS (CN2)
ACLB04	Hipro/JDSU Power Cable		JDSU Engine J3	Hipro PS (CON1)
ACLB05	FSP/Zeiss Power Harness	Video Board J28	Optical Engine J3	FSP PS (CN2)
ACLB06	Hipro/Zeiss Power Harness	Video Board J28	Zeiss Engine J3	Hipro PS (CON1)
ACLB07	Video/JDSU Cable	Video Board J25	JDSU Engine J6	
ACLB08	Video/Zeiss Cable	Video Board J25	Zeiss Engine J2	
ACLB09	Tuner/Video Cable	Video Board J1	Tuner Board J2	
ACLB10	Tuner/Audio Cable	Audio Board J18	Tuner Board J1	
ACLB11	Audio/Video Cable	Video Board J5	Audio Board J8	
ACLB12	Audio/Control Cable	Audio Board J17	Control Board J16	
ACLB13	Video /Control Cable	Video Board J24	Control Board J1	
ACLB14	Control/LED Cable	LED Board J1	Control Board J2	
ACLB15	FSP/Video Board	Video Board J3		FSP PS (CN3)
ACLB16	Hipro/Video Board	Video Board J3		Hipro PS (CON2)
ACLB17	Audio/speaker (C1, C2)	Audio Board J10		L & R Speakers
ACLB18	Audio/speaker (C3)	Audio Board J10		L & R Speakers
ACLB19	Video/sensors Harness	Video Board J27	LED (sensors)	Interlock Switch
ACLB20	Video /fans Harness	Video Board J2	E-Box Fan	L & R Fans
ACLB21	Video/JDSU fan	Video Board J28	JDSU Engine Fan	
ACLB22	Grounding Cable	Enclosure Grd.	Engine Mount	

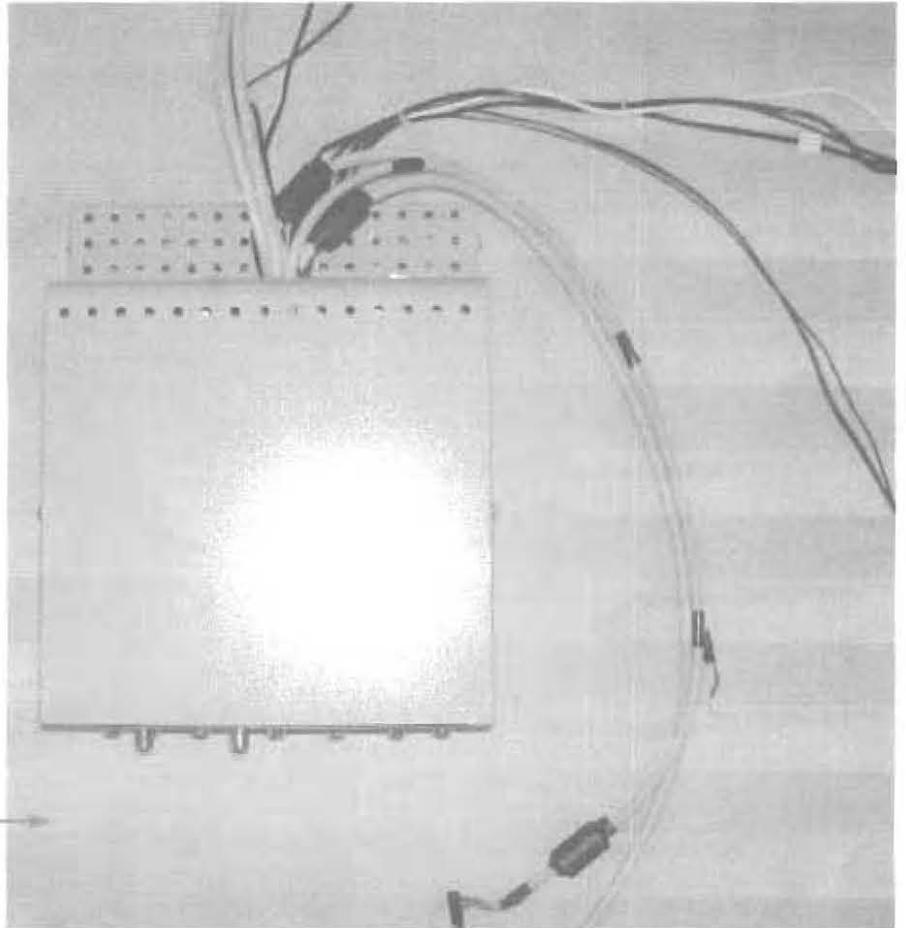
5.1 E-Box Disassembly & Board Replacement Procedure

The narrated photos give a detailed description of the procedure for disassembly E-Box and replacement of the following electronics boards:

1. Power Supply
2. Video Board
3. Audio Board
4. Tuner Board

- Disconnect cable
- Remove screws holding the E-Box Cover
- With E-Box Cover partially open, disconnect the Cables from the electronics boards
- Pass the Power Supply output cable through the cable opening on the E-Box Cover
- Remove E-Box Cover

E-box

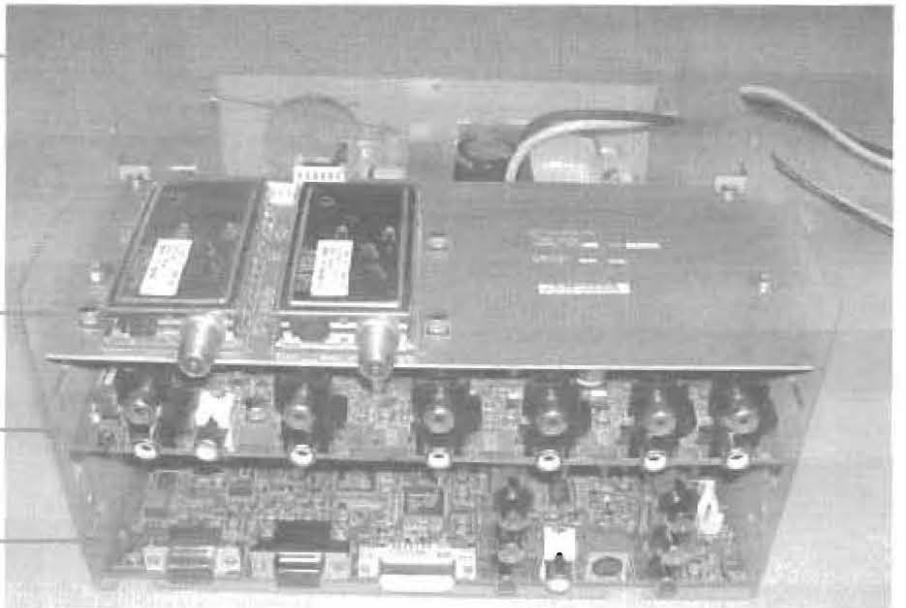


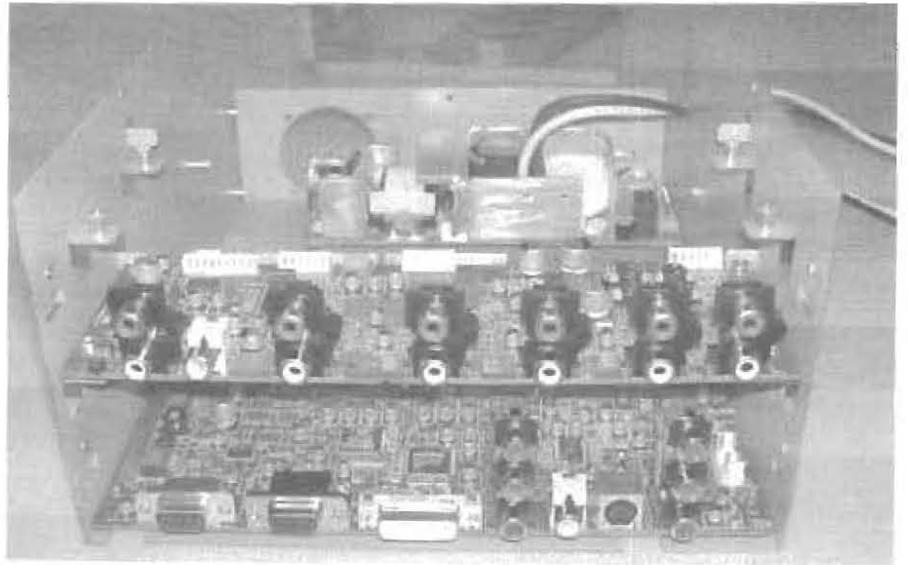
Power Supply

Tuner Board

Audio Board

Video Board



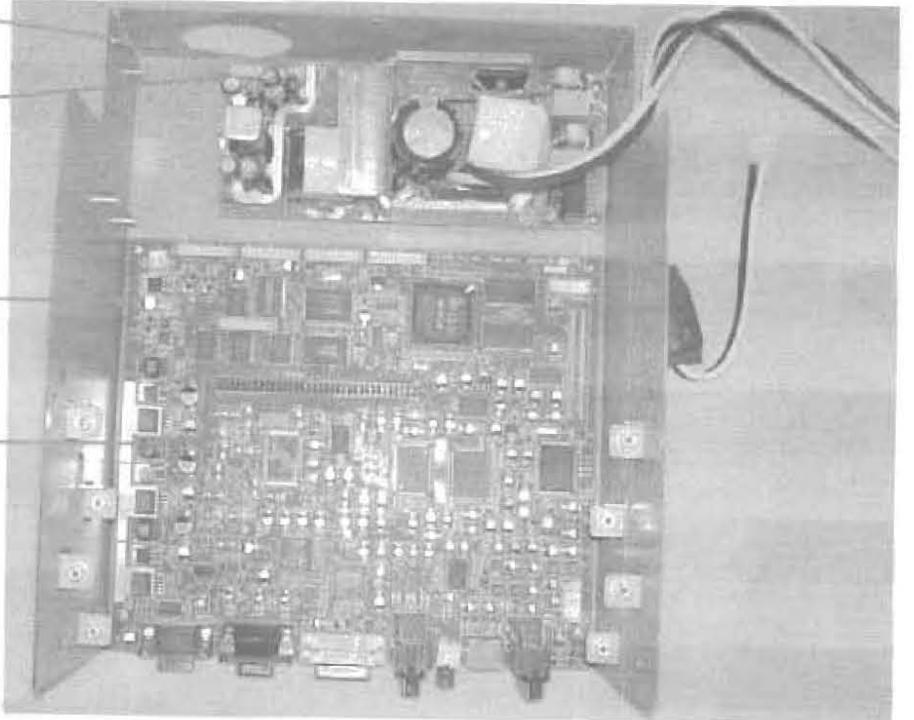


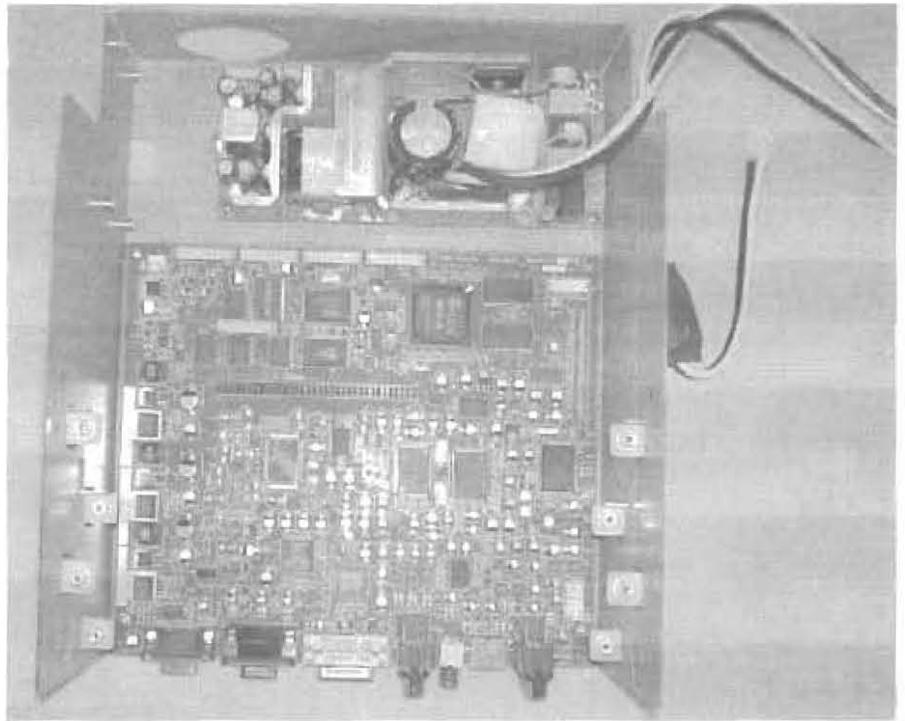
CON2 (2 pins)

CON1 (9 pins)

12 v

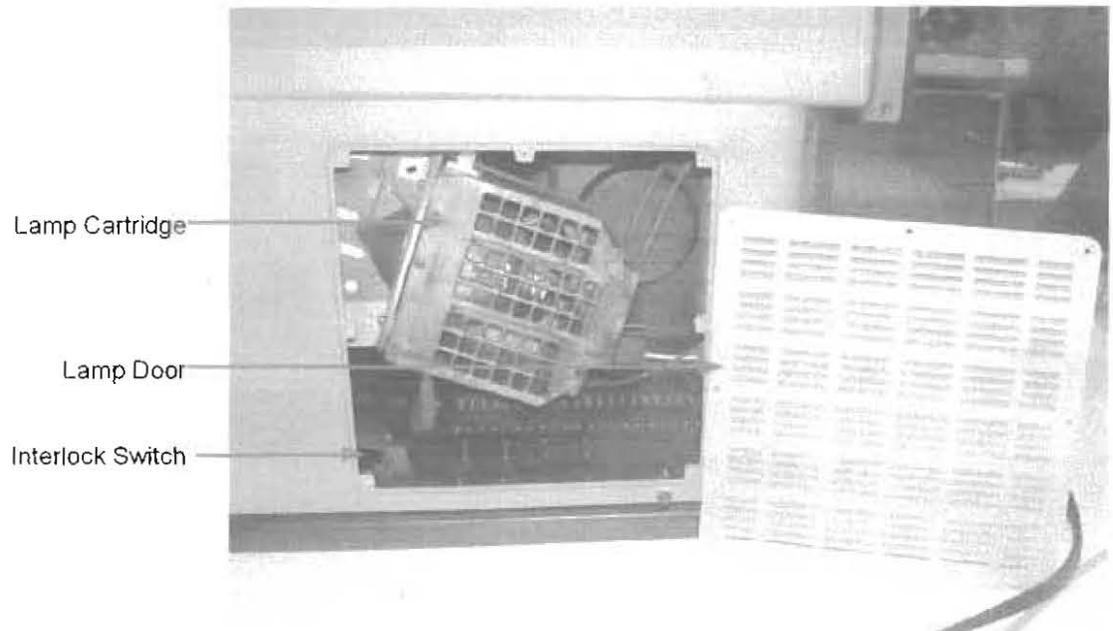
3.3 v





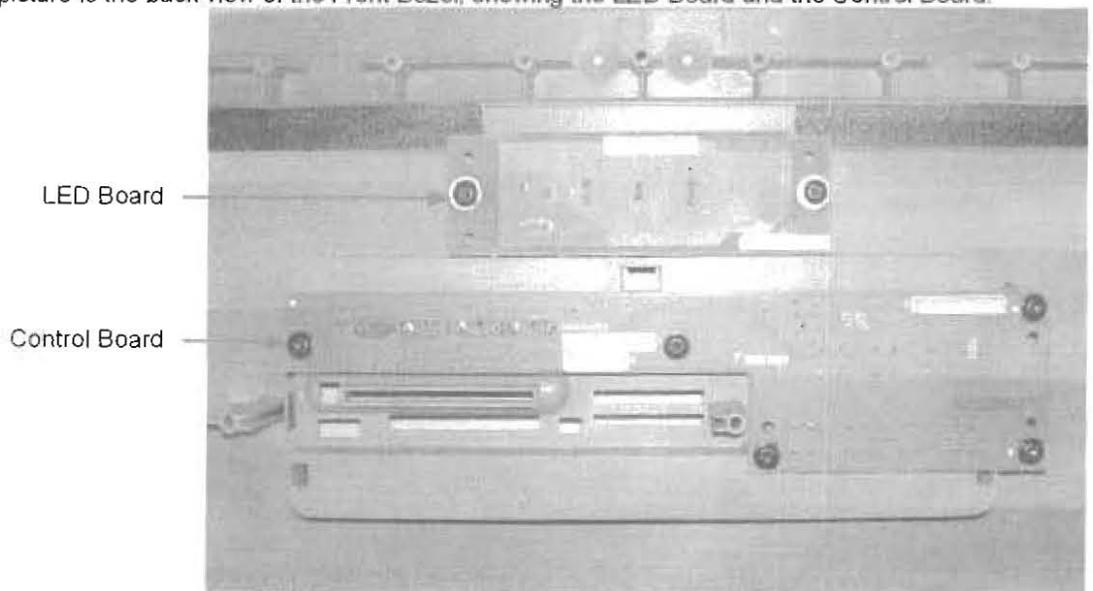
5.2 Lamp Cartridge Replacement Procedure

1. Use the remote control or front panel push button switches to turn the power off, and after waiting several minutes unplug the TV. (The cooling fans will continue to blow for several minutes after turning the power off.)
2. Wait for 30 minutes before replacing the lamp cartridge; otherwise, it may be too hot to touch.
3. Use a T-8 TROX screwdriver to remove the six (6) screws fastening the Lamp Door, which is the panel with louvers located on the back of the TV, and remove the door.
4. Remove the screws holding the old Lamp Cartridge in place in the Lamp housing.
5. Remove the old lamp cartridge from the lamp housing by pulling on the lamp cartridge handle.
 - Do not place the old lamp cartridge near flammable objects.
 - Do not place the old lamp cartridge within the reach of children.
6. Insert a new lamp cartridge obtainable from your dealer electronics supply stores, which must be the same type as the original lamp cartridge to avoid damage to the TV. The lamp cartridge type is indicated on the case.
 - Do not touch the glass part of the lamp cartridge with your bare hands to avoid fingerprints.
 - Do not allow the glass part of the lamp cartridge to become scratched to avoid compromising its strength.
 - Do not insert any foreign object inside the TV to avoid possible poor screen quality, electric shock or fire.
7. Secure the screws holding the lamp cartridge in the lamp housing.
8. Place the Lamp Door in position, holding it with the protrusion at the bottom right corner, and use a screwdriver to secure the six (6) screws fastening it to the chassis.
9. Plug in the TV.
10. Reset the lamp timer by entering the sequence 90918988 on the Remote Control keypad when running operational software.



5.3 Control Board and LED Board Replacement Procedure

The following picture is the back view of the Front Bezel, showing the LED Board and the Control Board.



6 DVLX4xCx Diagnostic Software Downloading and Operation

6.1 Downloading the Diagnostic Software into the DVLX4xCx unit

- 1 Connect the DVLX4xCx unit to the main PC via the RS-232 connector cable provided.

2. On the PC test controller, launch the Flash Loader program FLASHLoader.exe.
3. Connect the DVLX4xCx unit to 110 VAC.
4. On the Flash Loader program make sure that in the window labeled Flash, alphanumeric text is displayed after the captions "Manufacturer" and "Product ID". If no text is present, the communication between the PC and the DVLX4xCx unit is not correctly established, proceed to step 5. Otherwise, proceed to step 7.
5. Press the "Init" button, if this does not solve the problem, proceed to step 6, else go to step 7.
6. Press the "Com" button. Make sure that in the "Com Port" section, correct Com port number is selected (depends on which com port the cable between the PC and the DVLX4xCx unit is connected). Also, make sure that the "Baud Rate" is 115,200. Press OK when done and hard reset the power to the DVLX4xCx unit.
7. When "Manufacturer" and "Product ID" is correctly displayed, click "Browse" and select the files "Test1.hex" and "Test2.hex".
8. Press the "Start" button on the Flash Loader program to download the files onto the board. Make sure that the procedure completes, and the "Program OK" screen shows. Press "OK" to accept the message and exit the Flash Loader by pressing the "X" button on the upper right corner of the program window.
9. Disconnect the DVLX4xCx unit from 110 VAC.

6.2 Running the Diagnostic Software

1. Connect the DVLX4xCx unit to 110 VAC.
2. From the main PC, launch the "BIT.exe" file.
3. Enter the Serial Number (or read from barcode reader).
4. Press "Start" on the program screen.
5. As the test proceeds, answer the pop-up questions that appear on the program screen.
6. When the software displays "Test has finished", press the "Continue" button.
7. Disconnect the DVLX4xCx unit from 110 VAC.

7 Operational Software Downloading and Operation

7.1 Downloading the Operational Software into the DVLX4xCx unit

1. From the PC, launch the Flash Loader program.
2. Connect the DVLX4xCx unit to 110 VAC.
3. On the Flash Loader program make sure that in the window labeled Flash, alphanumeric text is displayed after the captions "Manufacturer" and "Product ID". If no text is present, the communication between the PC and the DVLX4xCx unit is not correctly established, proceed to step 4. Otherwise, proceed to step 6.
4. Press the "Init" button, if this does not solve the problem, proceed to step 5, else go to step 6.
5. Press the "Com" button. Make sure that in the "Com Port" section, correct Com port number is selected (depends on which com port the cable between the PC and the DVLX4xCx unit is connected). Also, make sure that the "Baud Rate" is 115200. Press OK when done and hard reset the power to the DVLX4xCx unit.
6. When "Manufacturer" and "Product ID" is correctly displayed, click "Browse" and select the files "MN203.hex" and "MN203_OSD1.hex".

7. Press the "Start" button on the program to burn the files onto the board. Make sure that the procedure completes, and the "Program OK" screen shows. Press "OK" to accept the message and exit the program by pressing the "X" button on the upper right corner of the program.
8. Disconnect the DVLX4xCx unit from 110 VAC.
9. Connect the DVLX4xCx unit to 110 VAC.
10. Wait for 1 minute and power the unit on by pressing the POWER button either on the remote control or on the front panel keypad.
11. When display is enabled, by pressing the remote control buttons, input the following keypad sequence "20498354".
12. Immediately, you should see the "Maintenance Menu" popping up on the screen (See Figure 9).
13. If you don't see the maintenance menu appearing on the screen, re-input the keypad sequence "20498354" until you see the Maintenance Menu



Figure 9: Maintenance Menu

Note: If at any point in the test the maintenance menu disappears, you can press the "MENU" button to display the maintenance menu again.

Info: There are 2 boxes on the right side of the caption "Maintenance Menu". The first one denotes the version of the Operational Software (e.g. V 1.2). The second one displays the type of the DLP engine present in the unit (i.e. it will read "OCLI" or "SN")

7.2 Reset Picture Settings

- a. On the maintenance menu, go to the text button named "Reset Settings" and press "OK" button on the remote control.
- b. You should see a message on the screen indicating that the picture settings have been reset. The input of the unit should be switched to S-Video 2.

Important! This step should be done before "Video Fine Tuning".

7.3 VGA Scaling and Border Alignment

1. Connect the PC output of the DVLX4xCx unit to the PC displaying the VGA test screen.
2. On the remote control, press the "INPUT" button and using the navigation arrows, switch the main input to PC so that the VGA Test Pattern (See Figure 5) appears on the screen.
3. In the maintenance menu, by using the cursor buttons on the remote control, go to the menu button labeled "VGA". (see Figure 10)

4. Press either the "OK" button or the "▶" button on the remote control to display the submenu of the VGA button.
5. Go to the button named "Scaling Factor". Press "OK" button. A slider will appear in the center of the screen.
6. Verify that the words "Focus" which appears in the four corners of the test pattern are in proper focus as they appear on the PC screen. Resize the VGA picture onto the screen to adjust the focus, by pressing the "◀" or the "▶" buttons.
7. Press "OK" button when done to accept the adjustment.
8. Go to the button named "Horizontal Offset". Press "OK" button. A slider will appear in the center of the screen.
9. Verify that the test pattern is horizontally centered within the product screen. Move the picture to the left or to the right to adjust the horizontal alignment, by pressing the "◀" or the "▶" buttons respectively.
10. Press "OK" when done to accept the adjustment.
11. Go to the button named "Vertical Offset". Press "OK" button. A slider will appear in the center of the screen.
12. Verify that the test pattern is vertically centered within the product screen. Align the picture to the top or to the bottom to adjust the vertical alignment, by pressing the "◀" or the "▶" buttons respectively.
13. Press "OK" when done to accept the adjustment.
14. Press "◀" to exit from the "VGA" Caption.



Figure 10: Maintenance Menu and VGA Submenu

7.4 Video Fine Tuning adjustment

1. Go to the "Video Fine Tuning" caption of the maintenance menu by using the cursor buttons on the remote control (see Figure 11).
2. Display its submenu by pressing either the "OK" button or the "▶" button on the remote control.
3. To do video fine tuning, please see the document "Video Calibration" and proceed from there.



Figure 11: Maintenance Menu and Video Fine Tuning Submenu

7.5 Checking and verifying each input on the DVLX4xCx unit

1. Go to the "Input" caption of the maintenance menu by using the cursor buttons on the remote control (see Figure 12).
2. Display its submenu by pressing either the "OK" button or the "▶" button on the remote control.
3. Switch between each input by pressing the "▲" or "▼" buttons on the remote control
4. At each input verify that the picture is displayed on the screen and the audio can be heard from both speakers.



Figure 12: Maintenance Menu and Input Submenu

7.6 Running the remote control test

1. Go to the "Remote Control Test" caption of the maintenance menu by using the cursor buttons on the remote control.
2. Press "OK" on the remote control to start the remote control test
3. Immediately, a small window in the bottom center of the screen will appear displaying "Key <empty> Pressed".
4. Press the remote control buttons one-by-one and one at a time. When buttons are pressed, the window in the center bottom of the screen should display the caption of the button pressed. Example: If INPUT button on the remote control is pressed, the screen should read "Key INPUT Pressed".
5. When all the remote control buttons are pressed and their corresponding captions are seen and verified on the screen, press the front panel keypad button labeled "MENU-EXIT". The screen should disappear immediately

Important! When the remote control test is running, the ONLY way to stop the test is to press the keypad button labeled "MENU-EXIT". The DVLX4xCx unit will not respond to remote control buttons as in the normal operation and it will not respond to any other front panel keypad buttons. If needed, the power of the DVLX4xCx unit could be recycled.

7.7 Running the front panel keypad test

1. Go to the "Front Panel Keypad Test" caption of the maintenance menu by using the cursor buttons on the remote control.
2. Press "OK" button the remote control to start the front panel keypad test
3. Immediately, a small window in the bottom center of the screen will appear displaying "Key <empty> Pressed".
4. Press the front panel keypad buttons one-by-one and one at a time. When buttons are pressed, the window in the center bottom of the screen should display the caption of the button pressed. Example: If INPUT/ENTER button on the front panel keypad is pressed, the screen should read "Key INPUT/ENTER Pressed".
5. When all the front panel keypad buttons are pressed and their corresponding captions are seen and verified on the screen, press the remote control button labeled "OK". The screen should disappear immediately.

Important! When the front panel keypad test is running, the ONLY way to stop the test is to press the remote control button labeled "OK". The DVLX4xCx unit will not respond to front panel keypad buttons as in the normal operation and it will not respond to any other remote control buttons. If needed, the power of the DVLX4xCx unit could be recycled.

7.8 Reverting to user mode and finishing the test

1. If the maintenance menu is not showing, press the "Menu" button to display it.
2. Go to the button labeled "End Maintenance" by using the arrow keys.
3. Press OK button. The Maintenance Menu should disappear.
4. Press the "MENU" button on the remote control and verify that the Operational OSD Menu is displayed on the screen.
5. If the Maintenance Menu is showing instead of the Operational OSD Menu, repeat from step 2 until the Operational OSD Menu is correctly displayed when the "MENU" button is pressed.
6. Disconnect the DVLX4xCx unit from 110 VAC.

8 Load and Run Operational Software

In the Flash Loader on the PC, browse and select the files MN203.hex and MN203_OSD1.hex and then click on Start. The On Screen Display (OSD) top level menu, shown below, then appears on the UUT. You then can adjust settings and set parameters through the menu system (see the Owner's Manual).

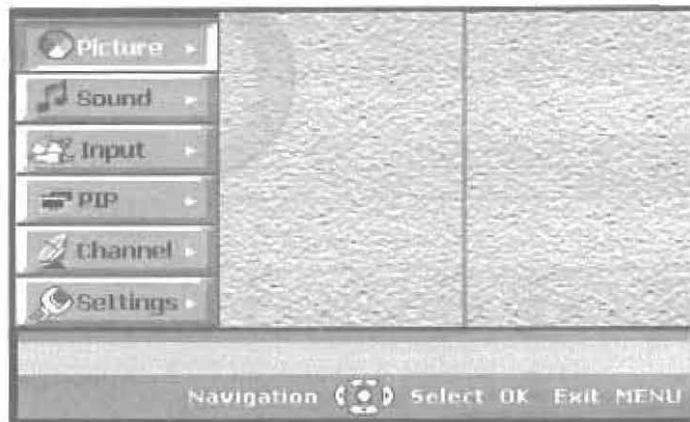


Figure 13: Operational On Screen Display (OSD) Menu

9 Run Maintenance Menu BIT

The Maintenance Menu allows you to change the default settings of the UUT. The Maintenance Menu also provides a Remote Control keypad test and a front panel keypad test, in which pressing of the keys will cause the UUT screen to display a confirmation of which key is pressed if heard. When finished with Maintenance Menu activities, you must use End Maintenance to return to the Operational On Screen Display (OSD) Menu.



Figure 14: Maintenance Menu

10 Run Calibration Procedure

All commands in this procedure are entered on either the TV Remote Control or the DVD Remote Controls. To differentiate between the Remote Controls, the convention used is to precede the command with TV: or DVD. Scrolling through menu items by a Remote Control is with the ▲ ▼ buttons.

1. Cable the DVD player outputs into the TV back panel and front panel inputs as shown in the table below. The table also shows which calibration tests are run on the individual inputs.

DVD Cable	TV Input	Contrast	Brightness	Grayscale	Color
S-Video 1	→ S-VIDEO 1	●	●	●	●
Video 1	→ VIDEO 1	●	●	●	●
S-Video 2	→ S-VIDEO 2	●	●	●	●
Video 2	→ VIDEO 2	●	●	●	●
DVI	→ DVI	●	●	●	●
Component 1	→ COMPONENT 1	●	●	●	●
Component 2	→ COMPONENT 2	●	●	●	●

- Turn on the TV.
- Launch the TV maintenance program by pressing **20498354** on the TV Remote Control.
- Press TV:"INPUT"; scroll to highlight "S-VIDEO 1" as the main input; press TV:"OK".

Contrast Adjustment

- From the DVD pop-up menu, scroll to highlight "1-Contrast"; press DVD:"ENTER". You should see a white image on the screen with the label "1-Contrast".
- Press TV:"MENU"; scroll to highlight "VIDEO FINE TUNING"; press TV:"OK"; scroll to highlight "CONTRAST"; press TV:"OK".

This will split the picture on the screen; on the left is the image from the DVD player, and on the right is an internally created image, while on the bottom is the "CONTRAST" sliding bar  controlled by pressing ◀ or ▶.

- Decrease or increase the contrast by pressing TV:◀ or ▶; select the minimum setting, such that the left and right white images look the same. If they look the same in the beginning, don't change the setting. Press TV:"OK" to close the sliding bar. Press DVD:"■" to close the split image screen.

Brightness Adjustment

- From the DVD pop-up menu, scroll to highlight "2-Brightness"; press DVD:"ENTER". You should see a black image with the label "2-Brightness" on the screen.
- Press TV:"MENU"; scroll to highlight "VIDEO FINE TUNING"; press TV:"OK"; scroll to highlight "BRIGHTNESS"; Press TV:"OK".

This will split the picture on the screen; on the left is the image from the DVD player, and on the right is an internally created image, while on the bottom is the "BRIGHTNESS" sliding bar  controlled by pressing ◀ or ▶.

- Decrease or increase the brightness by pressing TV:◀ or ▶; select the maximum setting, such that the left and right black images look the same. If they look the same in the beginning, don't change the setting. Press TV:"OK" to close the sliding bar. Press DVD:"■" to close the split image screen.

Color Adjustment

- From the DVD pop-up menu, scroll to highlight "4-RColor"; press DVD:"ENTER". You should see a red image with the label "red-saturation" on the screen.
- Press TV:"MENU"; scroll to highlight "VIDEO FINE TUNING"; press TV:"OK"; scroll to highlight "COLOR"; press TV:"OK".

This will split the picture on the screen; on the left is the image from the DVD player, and on the right is an internally created image, while on the bottom is the "COLOR" sliding bar  controlled by pressing ◀ or ▶.

13. Decrease or increase the color by pressing TV:◀ or ▶; select the minimum setting, such that the left and right red images look the same. If they look the same in the beginning, don't change the setting. Press TV:"OK" to close the sliding bar. Press DVD:"■" to close the split image screen.
14. Press TV:"INPUT"; scroll to highlight "VIDEO 1" as the main input; press TV:"OK".
15. Repeat steps 5-13.
16. Press TV:"INPUT"; scroll to highlight "S-VIDEO 2" as the main input; press TV:"OK".
17. Repeat steps 5-13.
18. Press TV:"INPUT"; scroll to highlight "VIDEO 2" as the main input; press TV:"OK".
19. Repeat steps 5-13.
20. Press TV:"INPUT"; scroll to highlight "DVI"; press TV:"OK".
21. Repeat steps 5-13.
22. Press TV:"INPUT"; scroll to highlight "COMPONENT 1" as the main input; press TV:"OK".
23. Repeat steps 5-10.

Grayscale Adjustment

24. From the DVD pop-up menu, scroll to highlight "3-Grayscale"; press DVD:"ENTER". You should see a black and gray image with the label "grayscale" on the screen.
25. Press TV:"MENU"; scroll to highlight "VIDEO FINE TUNING"; press TV:"OK"; scroll to highlight "VIDEO FINE TUNING" press TV:"OK"; scroll to highlight "GRAYSCALE"; press TV:"OK".

This will split the picture on the screen and everything on the screen will darken; on the left is a very dark trace from the DVD player, and on the right is an internally created black image, while on the bottom are three sliding bars  controlled by pressing ◀ or ▶; namely, "Red", "Green" and "Blue".

26. If the DVD image on the left has color, try to eliminate it by pressing TV:◀ or ▶ in the appropriate sliding bar; select the minimum setting that eliminates the color. For instance, if the left image has a red color, decrease the "Red" slider. Similarly with green and blue. The goal is for the left image to be black with no color as is the right image. If they look the same in the beginning, don't change the setting. Press TV:"OK" to close the sliding bars. Press DVD:"■" to close the split image screen.
27. Repeat steps 11-13.
28. Press TV:"INPUT"; scroll to highlight "COMPONENT 2" as the main input; press TV:"OK".
29. Repeat steps 5-13.
30. Scroll to "End Maintenance"; press TV:"OK" to exit the TV maintenance program.
31. Unplug the DVD player output cables from the TV back panel and front panel inputs.

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ELECTRICAL SPECIFICATIONS :

1.0 AC INPUT CHARACTERISTICS :

The supply shall operate over the input voltage ranges shown in the below table.

1.1 AC INPUT VOLTAGE :

MINIMUM	NORMAL	MAXIMUM	UNITS
90	100-240	264	VRMS

NOTE: The input voltage should remain within limits +/- 1.0V

1.2 AC INPUT FREQUENCY :

MINIMUM	NORMAL	MAXIMUM	UNITS
47	50/60	63	HZ

1.3 AC INPUT CURRENT :

5A Maximum @ 115Vrms

1.4 PHASE :

The switcher is being connected to single phase power system.

1.5 ISOLATION (HIGH POTENTIAL TESTING) :

1.5.1 AC Input to DC output

Hi-Pot: 1.5KVrms, 1 minute, 10mA

The test shall be applied between the primary to earth ground.

1.5.2 Insulation Resistance: 50M Ω min. at 500Vdc (room temperature)

1.6 INRUSH CURRENT

INPUT VOLTAGE	MAXIMUM
115Vrms	100A
230Vrms	200A

NOTE: The power supply is at full load and cold start. at 25 degree c ambient .

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2.0 DC OUTPUT CHARACTERISTICS :

2.1 DC OUTPUT VOLTAGE :

OUTPUT	TOLERANCE	MINIMUM	NORMAL	MAXIMUM	UNITS
+2.5V	+/-5%	2.375	2.5	2.625	Volts
+3.3V	+/-5%	3.135	3.3	3.465	Volts
+12V	+/-5%	11.4	12.0	12.6	Volts
+5V	+/-5%	4.75	5.0	5.25	Volts
+380V	+/-5%	361	380	399	Volts

Note : The above voltage is include ripple and noise.

2.2 DC OUTPUT CURRENT :

OUTPUT	MINIMUM	MAXIMUM	UNITS
+2.5V	0.01	2.5	Amps
+3.3V	0.4	2.0	Amps
+12V	0.5	3.0	Amps
+5V	0.01	1.0	Amps
+380V	0.0	0.6	Amps

2.3 CROSS REGULATION :

+380V	+2.5V	+3.3V	+12V	+5V	UNITS
0.6	2.5	2.0	3.0	1.0	Amps
0	0.01	0.4	0.5	0.01	Amps
0.6	2.5	0.4	3.0	0.01	Amps
0	2.5	2.0	0.5	0.01	Amps
0.6	2.5	2.0	0.5	1.0	Amps
0	0.01	2.0	3.0	1.0	Amps
0.6	2.5	0.4	0.5	1.0	Amps

2.4 RIPPLE AND NOISE:

Periodic and random deviation (PARD) includes RIPPLE voltage and normal frequency spikes up to bandwidth DC- 20 MHz with a differential easurement.

It will be measured at the output connector of the power supply. The measuring will be terminated with a 47-microfarad electrolytic and a 0.10 microfarad ceramic capacitors.

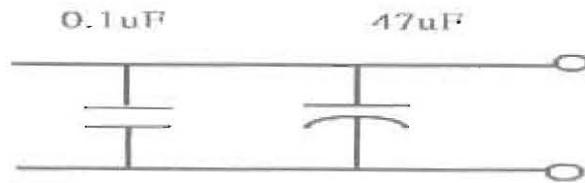
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LOAD NAME	RIPPLE & NOISE MAX	UNITS
+2.5V	100	mVp-p
+3.3V	100	mVp-p
+12V	150	mVp-p
+5V	150	mVp-p

Note1: Ripple is measured by using a 12 inch twisted pair terminated with a 47uF parallel with a 0.1uF ceramic capacitor at maximum load.

The discharge time is defined from output to 0.1 Volt.



2.5 HOLD-UP TIME :

8.33ms Typical with full load , Rated output and at 240Vrms/60HZ input ac line.

3.0 EFFICIENCY

The switcher at full load provide dc conversion efficiency 80% minimum at 220V AC input voltage ranges.

4.0 PROTECTION REQUIREMENTS :

4.1 SHORT CIRCUIT PROTECTION :

Output 380V: To use a fuse breaking

Output 12V:none

Output 5V:none

Output 3.3V:none

Output 2.5V:none

5.0 ENVIRONMENTAL (TEMPERATURE and HUMIDITY) :

5.1 Operating temperature: 0~40°C

5.2 Operating humidity: 20~80% RH(Non-condensing)

5.3 Storage temperature: -10~+80°C

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5.4 Storage humidity: 10~90% RH(Non-condensing)

5.5 Typical 450LFM airflow (output connector to opposite side or else)

5.6 Vibration:

Frequency range : 10 – 55HZ

Amplitude 2g over entire frequency range sweep 1 minute for x,y,z axis each.

Cycle : 20

6.0 SAFETY & EMI REQUIREMENT

6.1 PRODUCT SAFETY(OPTION) :

The power supply meet the following requireme:

- * (none)UL 6500
- * (none)LVD 65065
- * (none)BSM1

6.2 EMI :

Only reference(The power supply meet the standard of FCC class A , EN55022 Class A)

6.3 Construction Specification of the Power Supply

6.3.1 Mechanical Dimension: L(170) * W(70) * H(35) mm

6.3.2 Power Factor Correction : Harmonic line currents must meet IEC1000-3-2 at 100VAC, 120VAC , 220VAC and 240VAC.

7.0 LIGHTING SURGE :

1KV on common mode

1KV on differential mode

8.0 RELIABILITY :

MTBF 30000 HR at Full load @25°C ambient temperature

9.0 BURN IN:

Min duration : 4 hours

Temperature: 40+/- deg C

Percent Load : 80% All output

Typical 450LFM airflow

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- 03. Video Input Buffers
- 04. 3D Comb Filter
- 05. Video Decoder VPC3230D
- 06. Teletext & Caption
- 07. Video Decoder VPC3230D_CR
- 08. 3D_Comb_Filter_Graphic
- 09. Graphics Input_Buffers
- 10. AD9833A
- 11. \$41169
- 12. ME203
- 13. SDRAM_64Mbit_n_2
- 14. I2VDS_Tx_DS90C385
- 15. 120-pin Output Module
- 16. CPU_FLASH_SDRAM
- 17. Auxiliary
- 18. POWER

	
Legal Name List File	
888-888-8888	
J. K. Smith	
Rev	Video Board Design
Doc	Engineering Module
Proj	888-888-8888
File	888-888-8888

Tuner Board Design

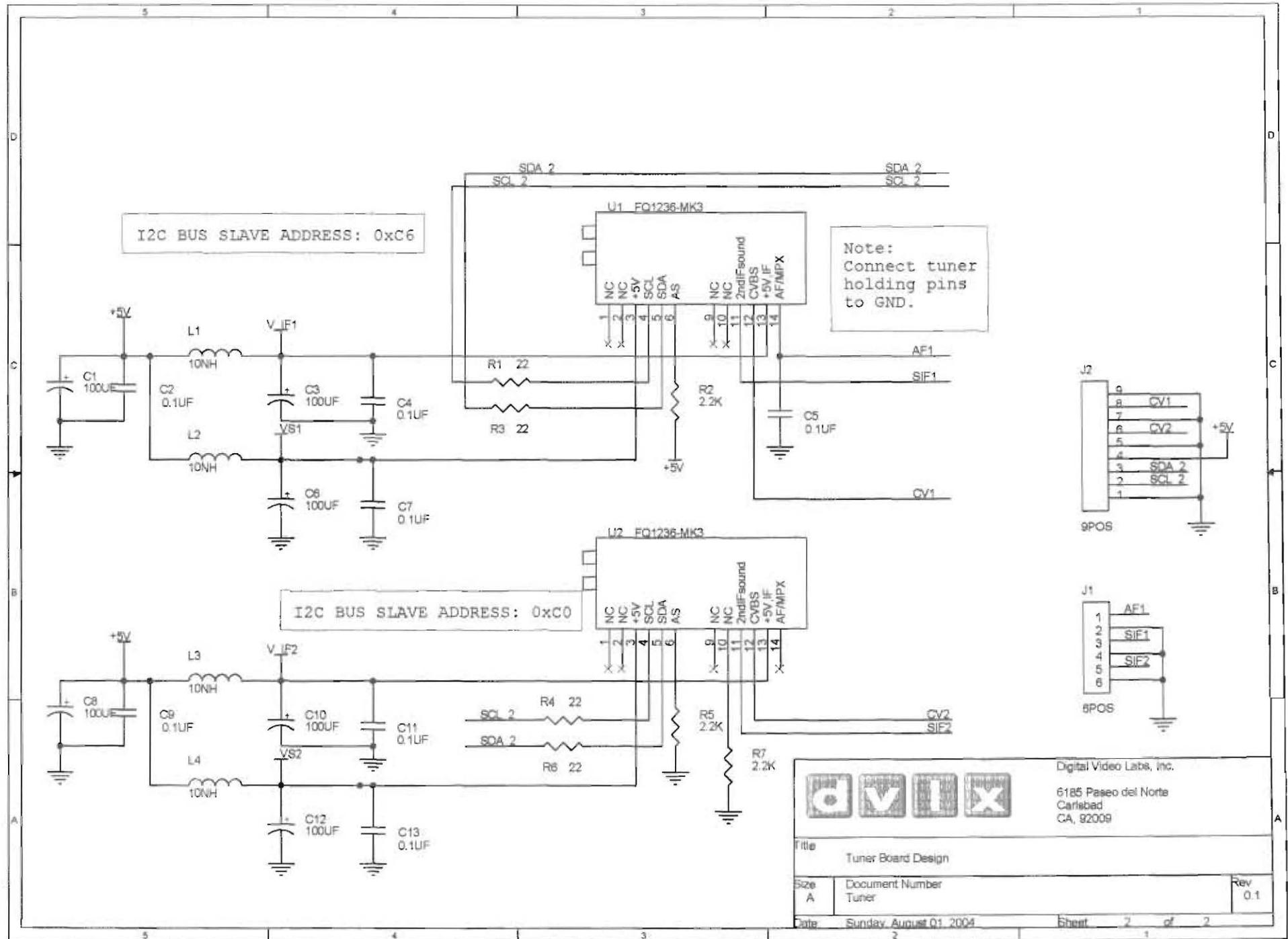
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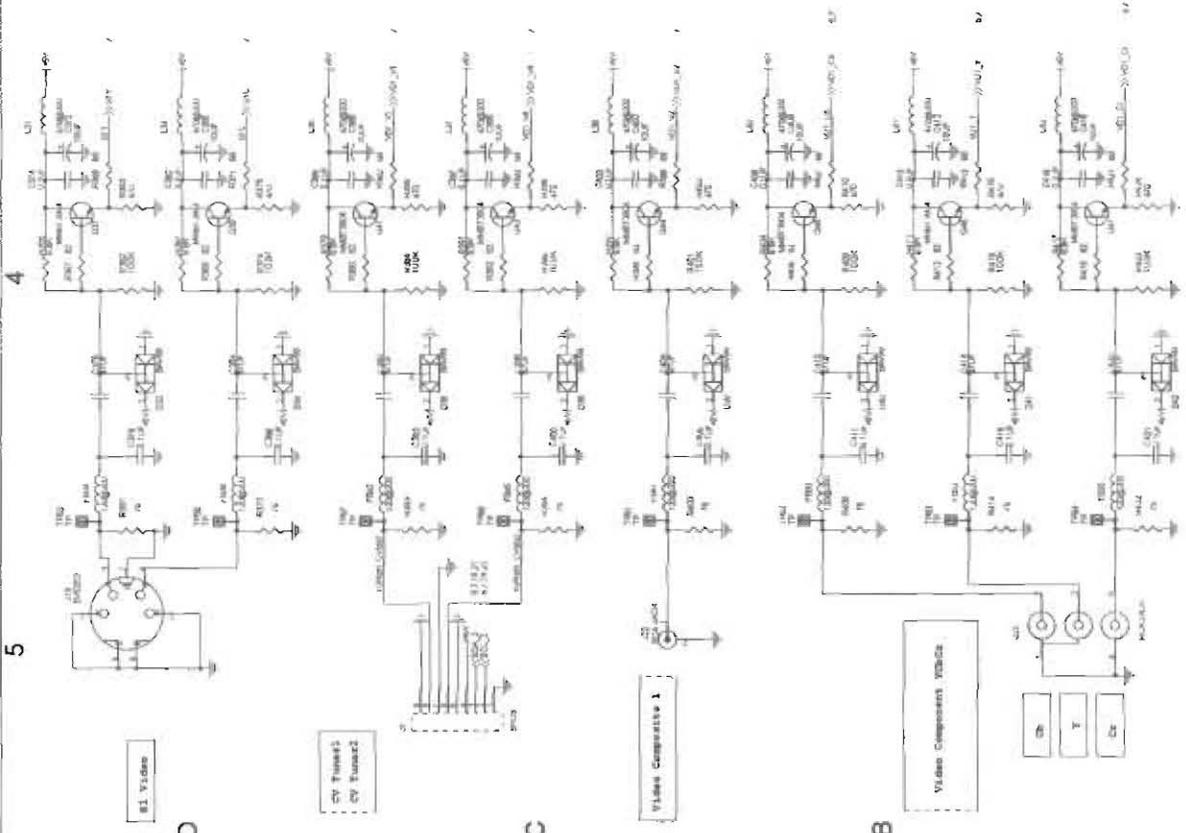
- 01. Cover
- 02. Tuner



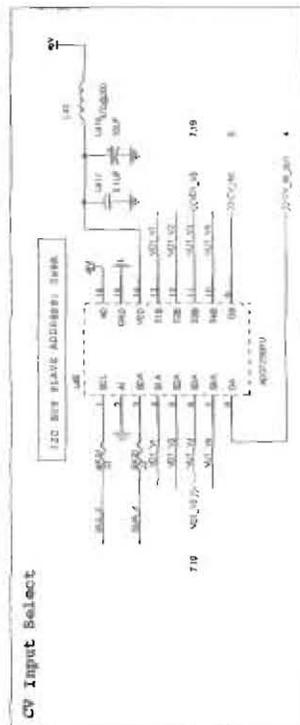
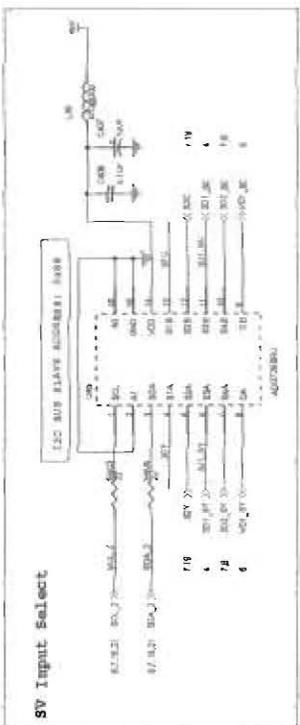
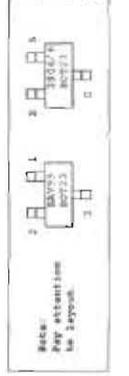
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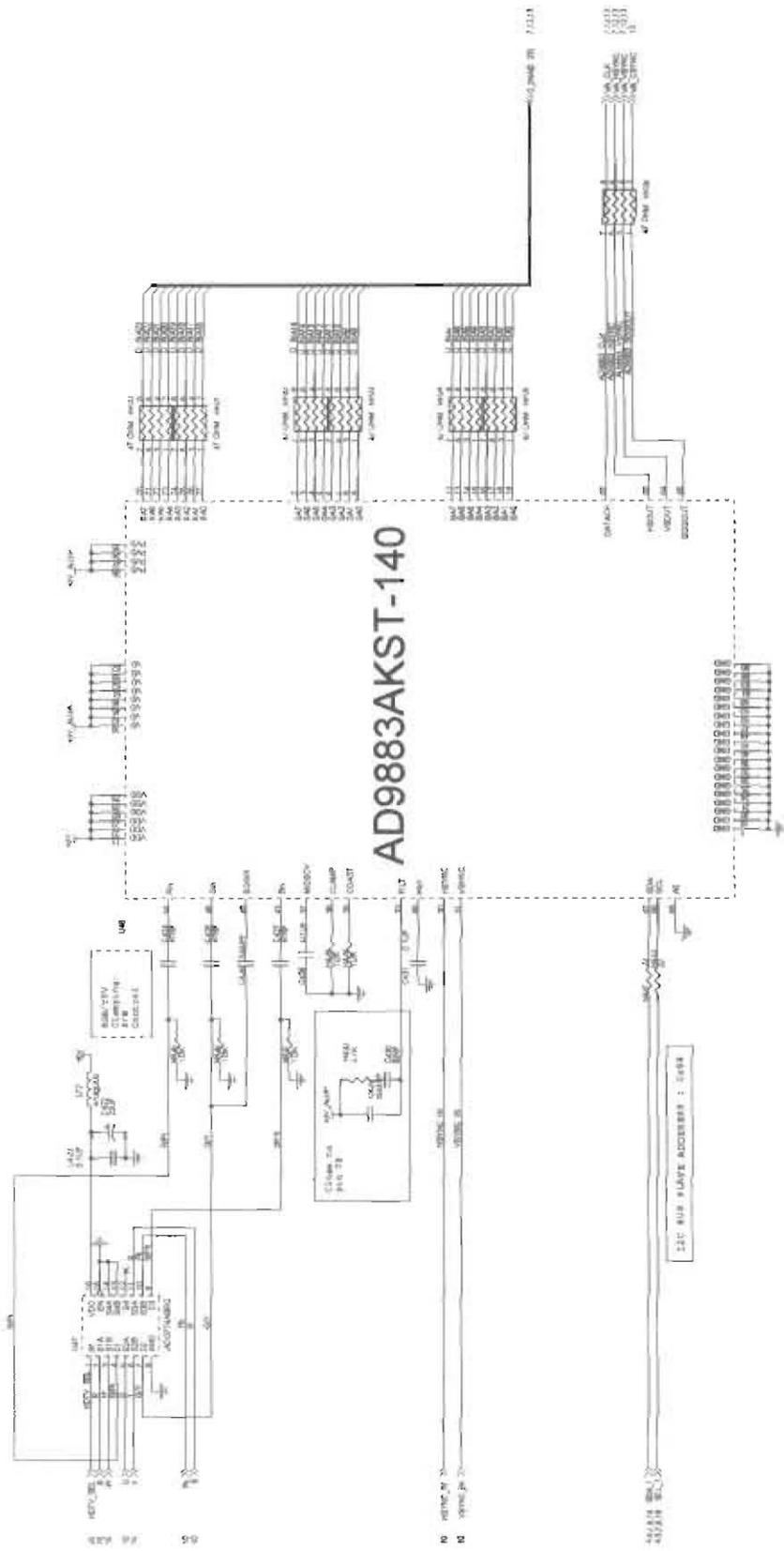
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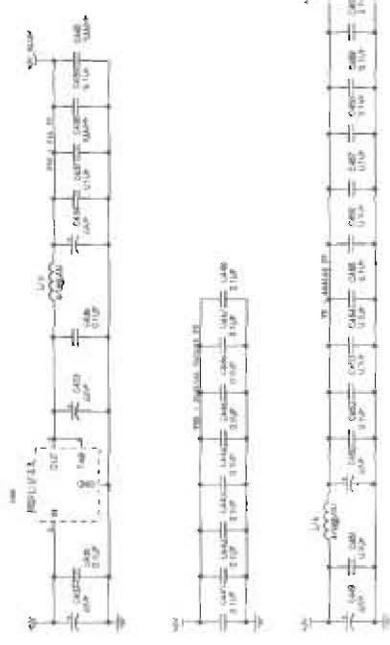


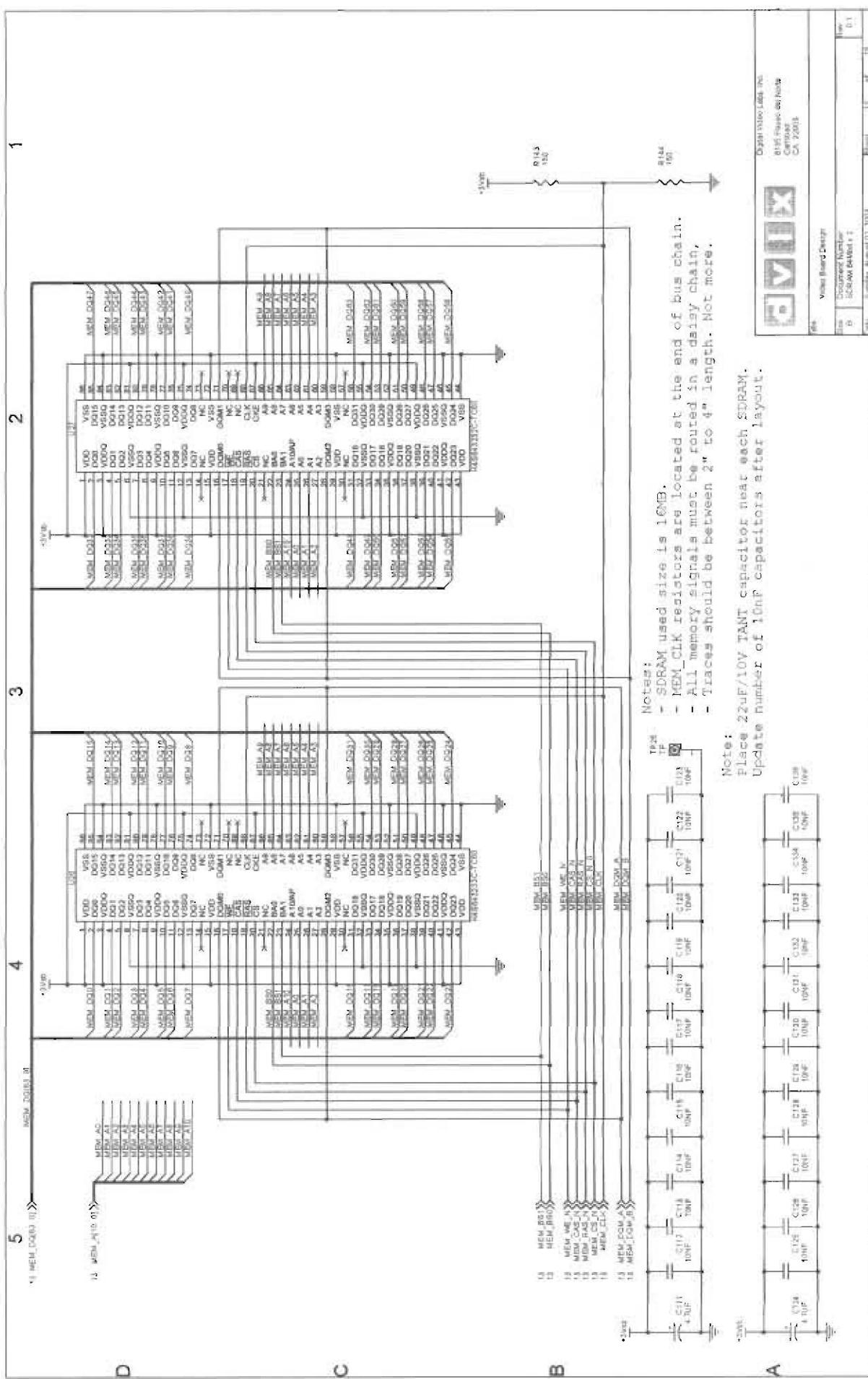
Notes:
 1. All input components should be as close as possible to the connector pins for all video inputs.
 2. Video signals should be wired in daisy chain.





AD9883AKST-140





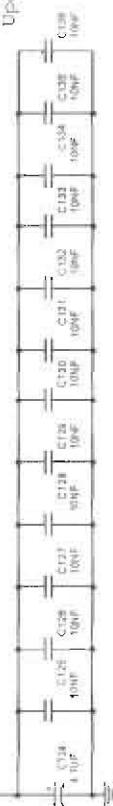
Notes:

- SDRAM used size is 16MB.
- MEM_CLK resistors are located at the end of bus chain.
- All memory signals must be routed in a daisy chain.
- Traces should be between 2" to 4" length. Not more.

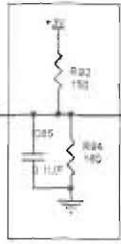
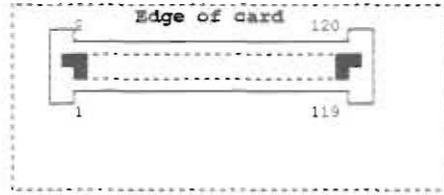
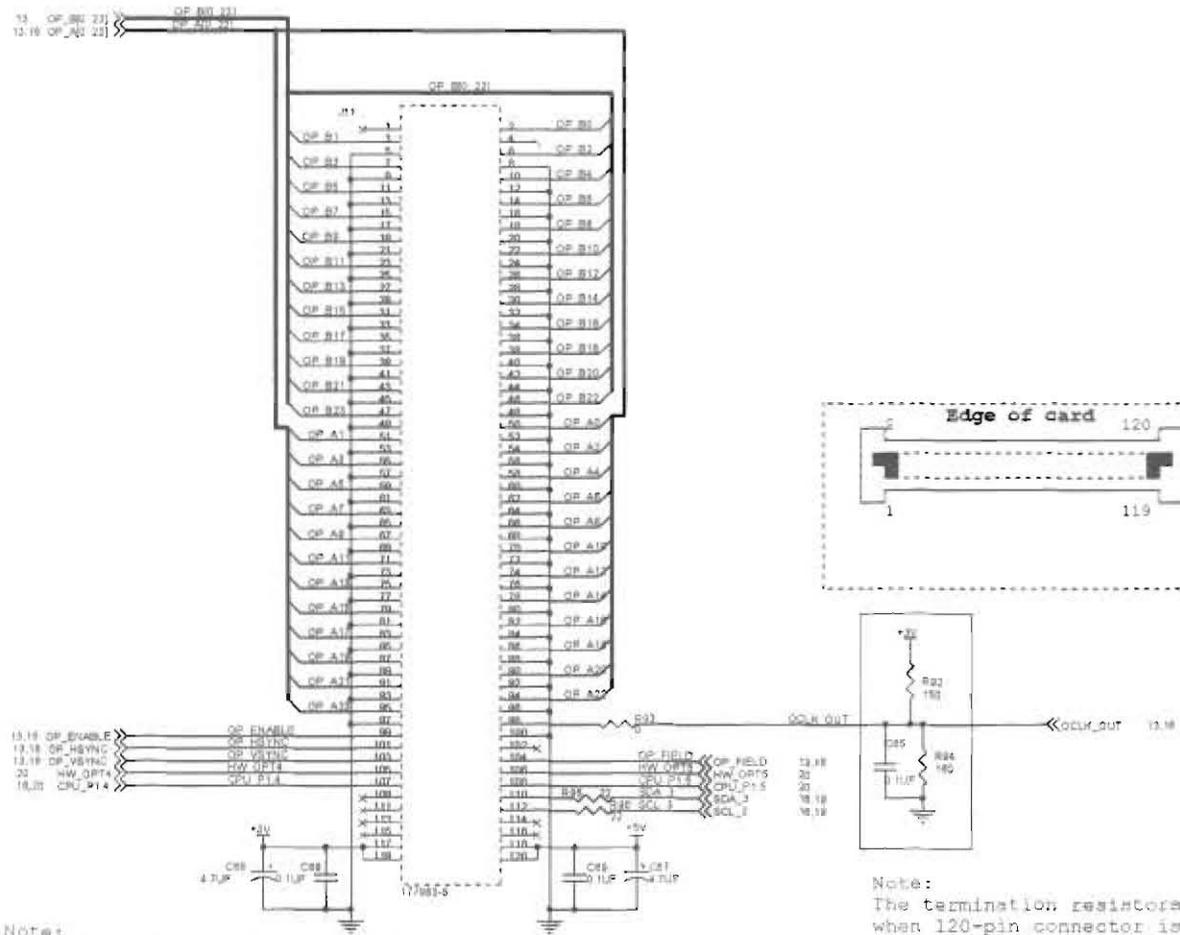
Note:

Place 22uF/10V TANT capacitor near each SDRAM.

Update number of 10nF capacitors after layout.



Output Module Connector

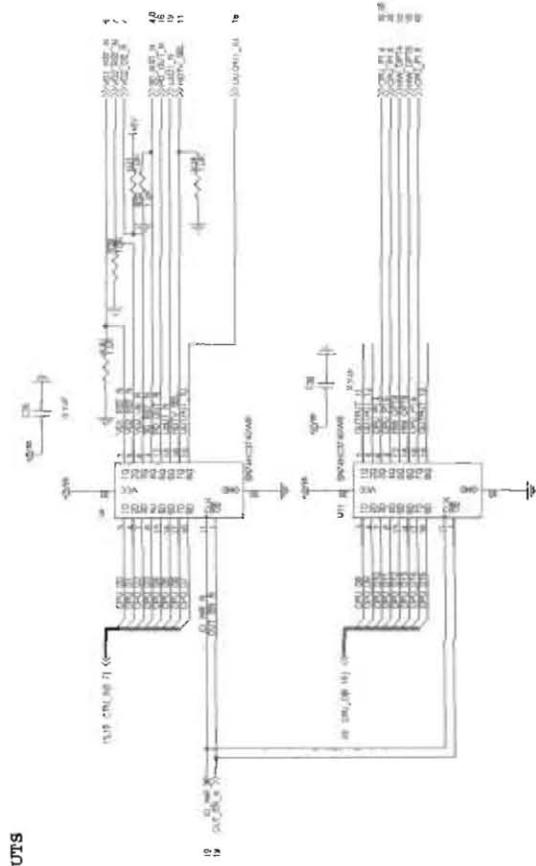


Note:
RM102 OP signals should be wired in daisy chain as follows:
1. LVDS 1x DS90C385.
2. 120-pin connector to output module.
3. CLK termination at the end of trace.

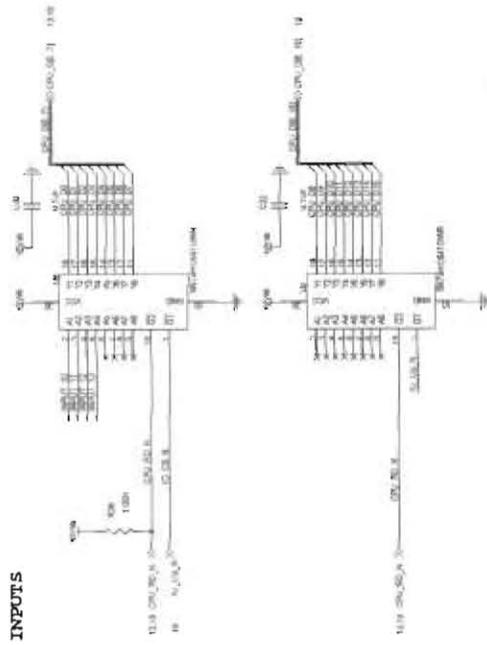
Note:
The termination resistors should be placed when 120-pin connector is removed.

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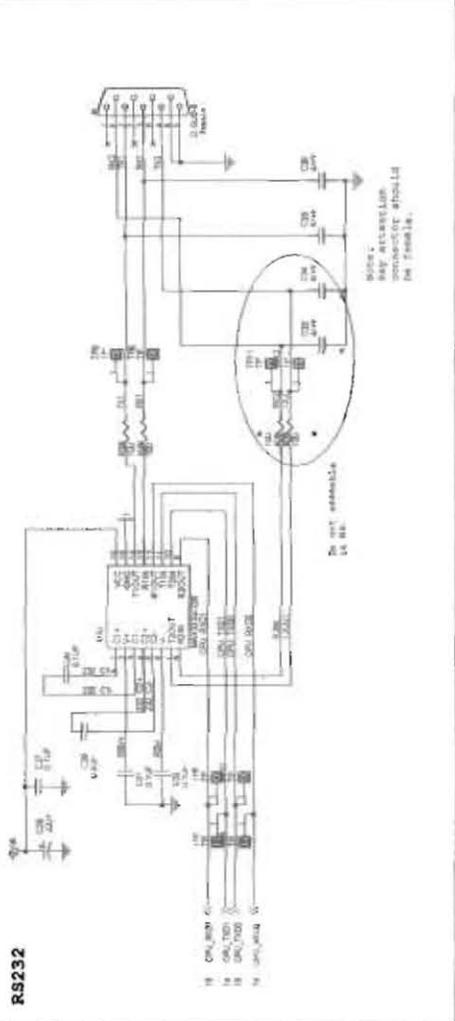
OUTPUTS



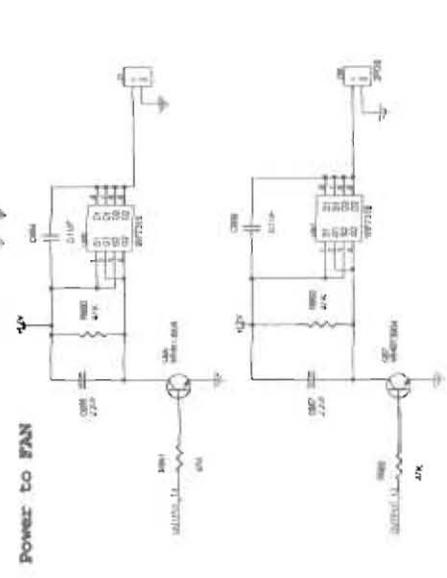
INPUTS



RS232



Power to FAN



Tuner Board Design

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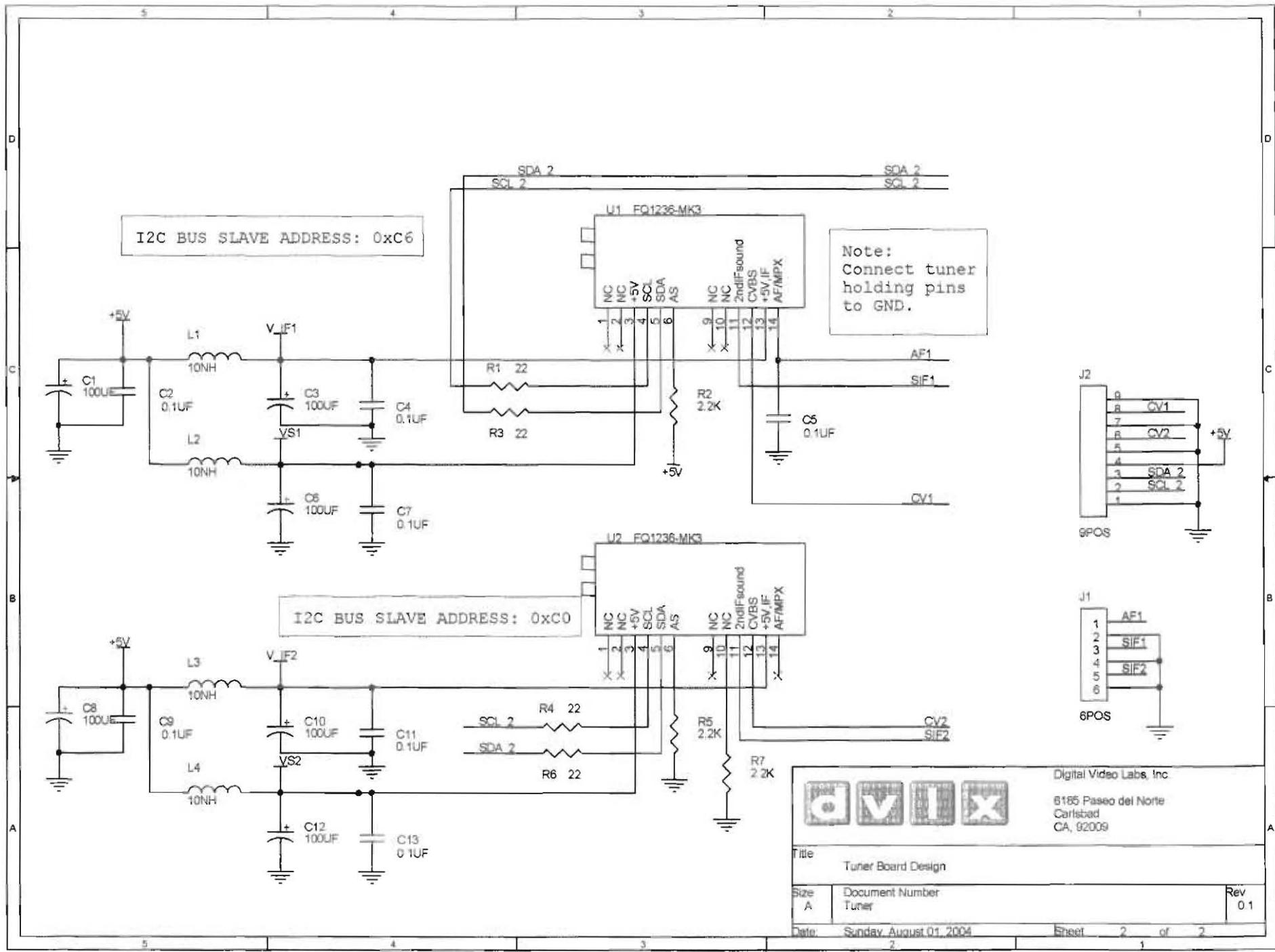


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