

TOSHIBA

2007 DLP Television DLP-07-1 Disassembly, Block Diagram & Troubleshooting

Course: Servicing the HM67 DLP Televisions
Model Year: 2007
Chassis: DLP67
Models: 50HM67, 57HM67, 65HM67, 57HM117/167, and 65HM117/167
Purpose: Training Module DLP-07-1 introduces the HM67 DLP Television by providing an operational overview, preferred disassembly method and "Fix-on-first-Call" troubleshooting methods.

Objectives: Upon completion of this training module, the technician will:

1. Become familiar with methods used to analyze basic symptoms leading to "board level repair on the first call".
2. Develop an understanding of the controls and inputs associated with the 2007 DLP Television.
3. Become familiar with the disassembly of these units.
4. Become familiar with PCB locations and their functions as they relate to general diagrams of the units.

Product Specific Service Manuals:

This training is designed as an aid to the technician in servicing Toshiba products. It is not a replacement for the appropriate service manual(s). Toshiba service manuals contain product and model specific information and must be consulted prior to servicing any product.

Product Safety Precautions:

Product Safety Precautions are described in the Toshiba service manual(s) for products and models covered in this training. All safety precautions and checks must be complied with before returning any product to the customer. Servicers who defeat safety features or fail to perform safety checks may be liable for any resulting damages and may expose themselves and others to possible injury.

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Introduction

Capabilities of the 2007 DLP Televisions:

- Fully Integrated – Receives NTSC, ATSC, and QAM cable signals in High Definition. In order for these sets to display a High Definition picture, the set must receive one of the following:
 - An “Off Air” (terrestrial) HD broadcast.
 - An HD cable broadcast.
 - An HD satellite broadcast.
 - An HD input from an HD DVD unit.

Screen Resolution:

- Limited by the Light Engines capabilities.
 - Several Models within the series will contain Light Engines capable of processing and reproducing 1080p, while others will except 1080p as an HDMI input but will down convert it to 720p for display purposes.
 - Models ending in just 67 will display 720p.
 - Models ending in 167 will display 1080p.

Screen Sizes:

- Three screen sizes (listed by model)
 - 50HM67 – 50”
 - 57HM167 – 57”
 - 65HM67 – 65” 65HM167 – 65”

HDMI Inputs:

- Three HDMI inputs.
 - Only HDMI 1 can be used to input a DVI signal (via an adaptor cable).
 - The OSD menu must be set to Analog Audio.
 - The audio cables must be connected to the PC/HDMI-1 audio connectors.
 - HDMI 2 & 3 are normal HDMI inputs.

Features:

- Integrated Digital and Analog Tuning.
- Three HDMI Digital HD multimedia interfaces.
- Two sets of ColorStream HD component inputs.
- SRS WOW
- Digital Audio Output (Optical connection with Dolby).
- Cable Clear DNR (digital noise reduction – Picture).

Figure 1 is a photo of the front of the 50HM67, the unit we used for this training module.

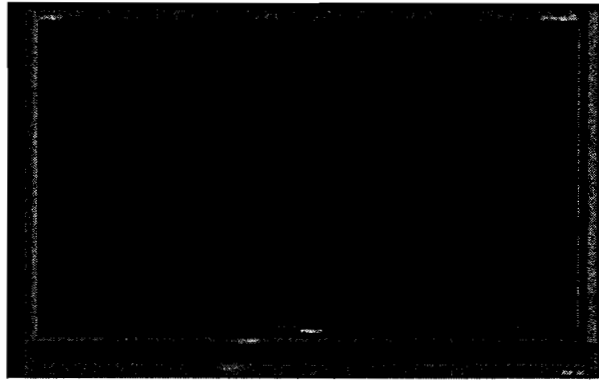


Figure 1

Figure 2 is a photo of the rear jack panel and inputs to the Digital (Seine) module.
Note: The cover plate has been removed from the Smart Card slot for clarity purposes.

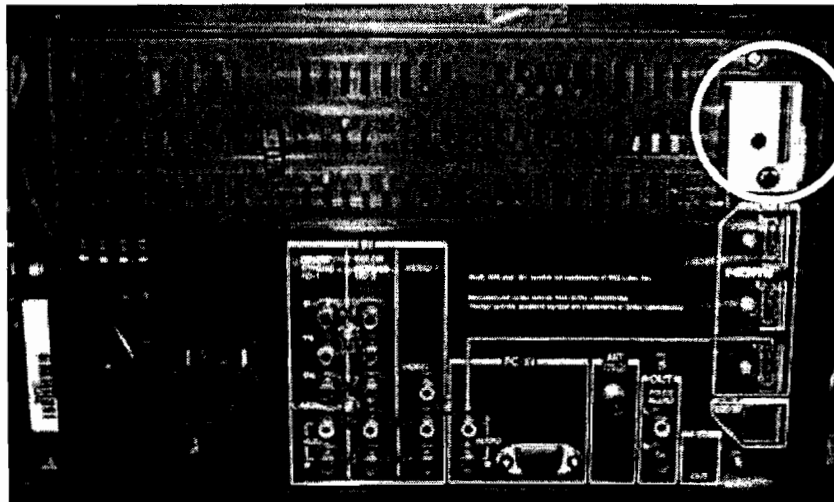


Figure 2

Disassembly

Figure 3 is a photo showing screw proximities to aid in removing the back cover.

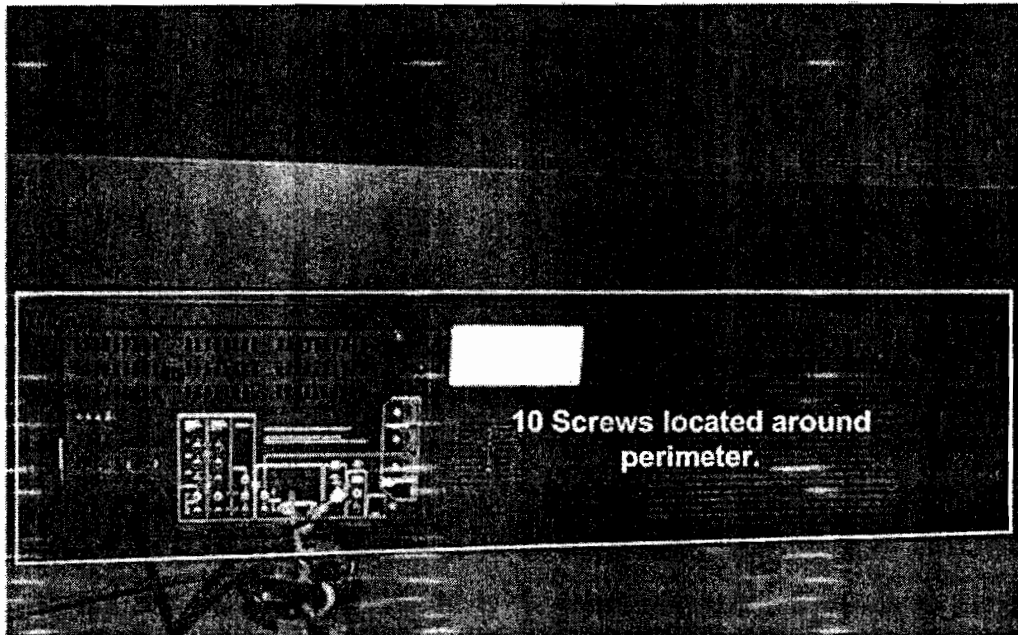


Figure 3

Once the ten screws are removed from the back cover, we will see a split chassis much like we have seen in the past. Figure 4 is a photo depicting a split chassis.

Split Chassis

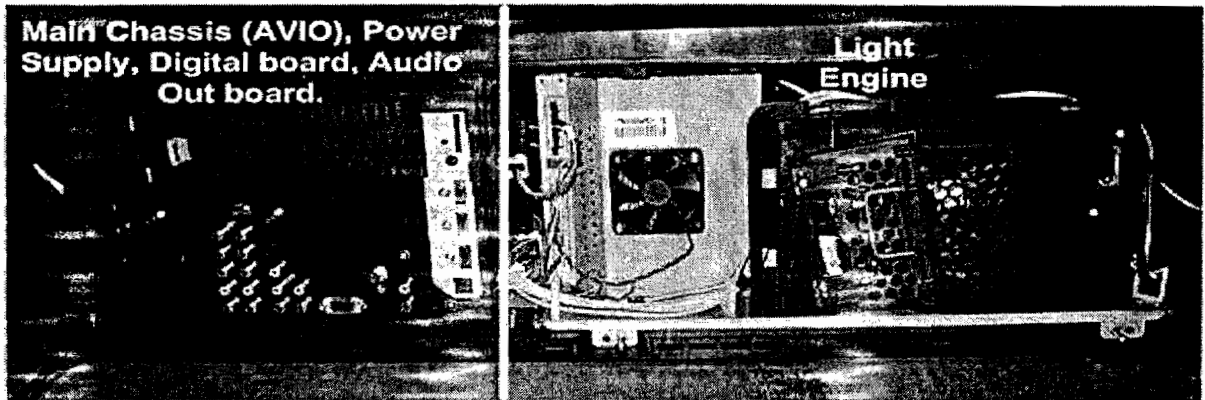


Figure 4

Figure 5 is a photo showing the four screws that must be removed to move the Main chassis and Light Engine chassis'.

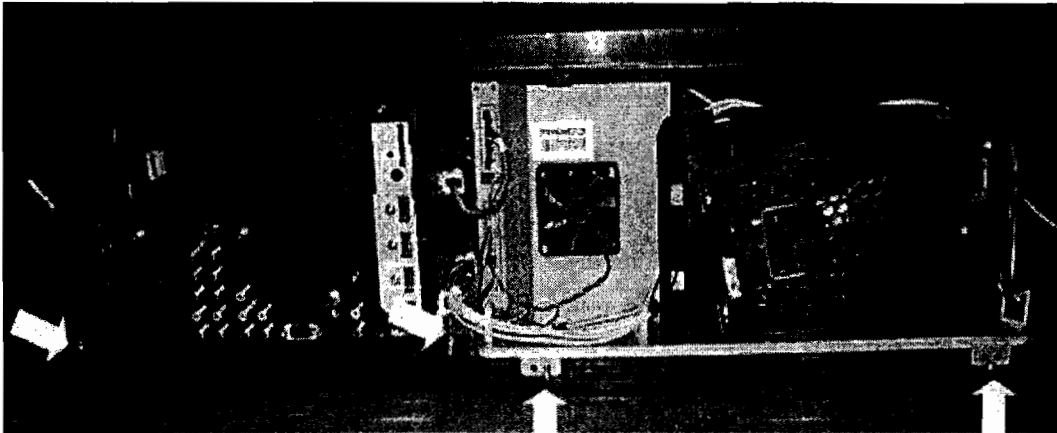


Figure 5

Figure 6 shows a wire tie that can be squeezed and removed.

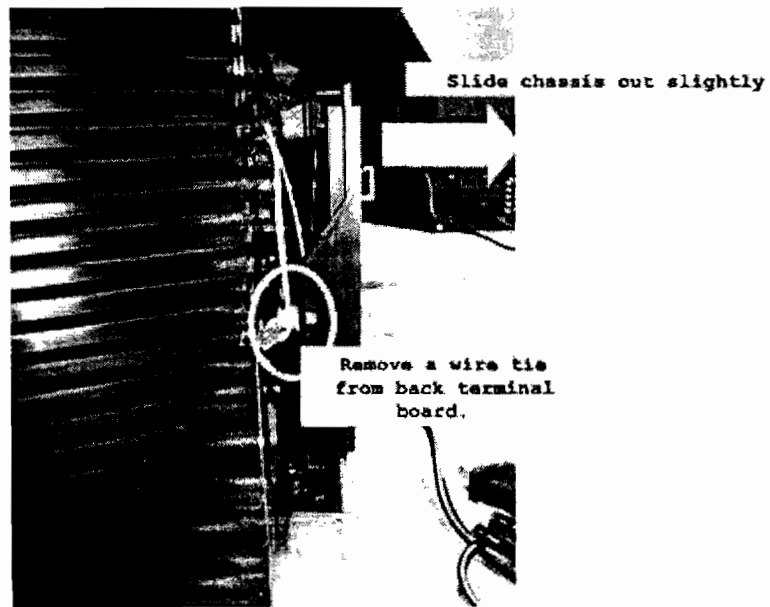
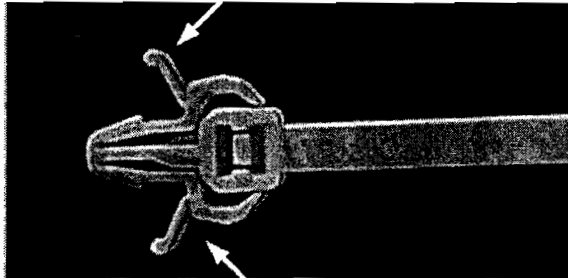


Figure 6

Figure 7 is a pictorial of how to squeeze the new type wire tie.

Reusable wire tie

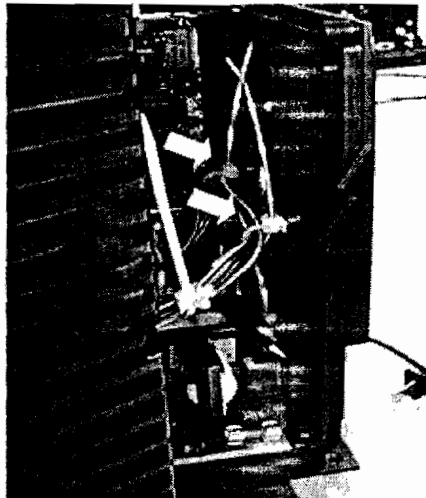


**You can pull out this tie by
pushing from both sides**

Figure 7

Figure 8 explains the rest of the tie/clip removal.

**You can now move the chassis
more toward the rear to release
the remaining ties.**



**Remove wire from
clips**

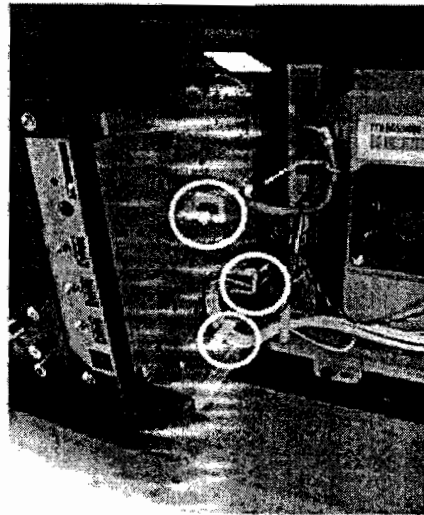


Figure 8

Board/Function Familiarization

The two chassis sides can now be pulled from the cabinet where complete access will be available for any necessary troubleshooting. Figure 9 is a graphic layout of the Main side chassis half. This layout is exactly as it appears looking from the top.

HM67 Board Layout

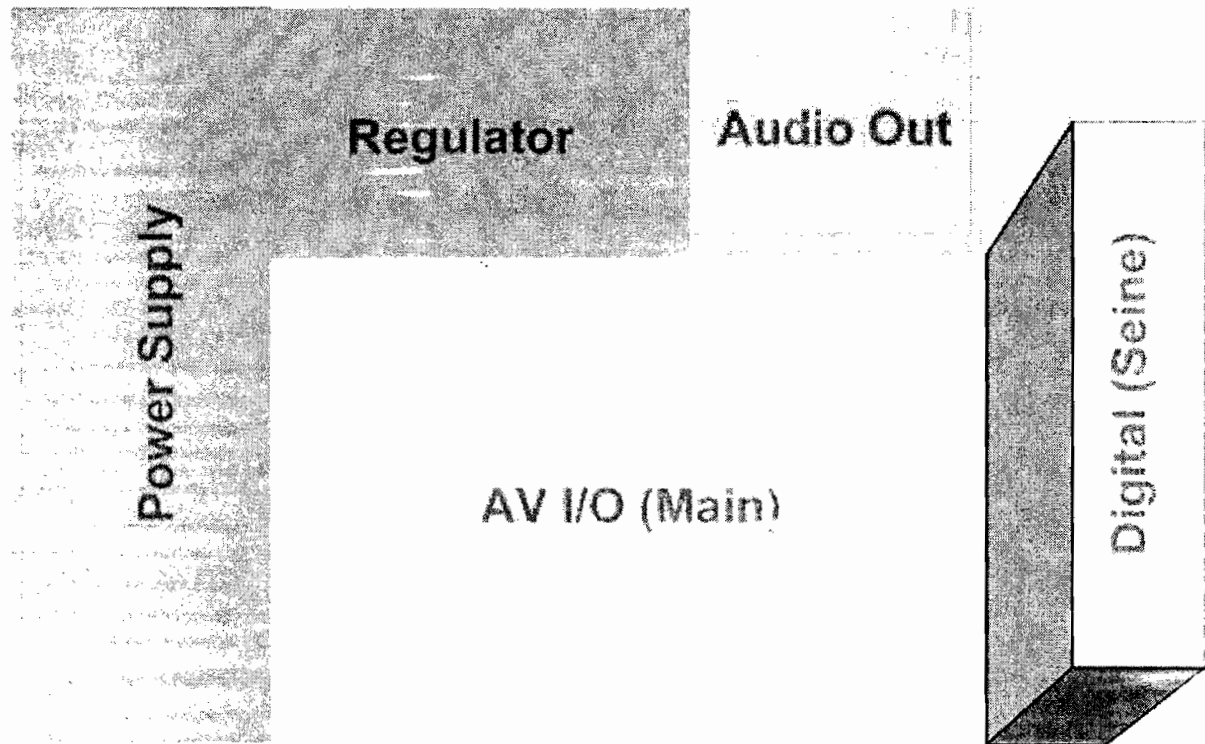


Figure 9

Now, let's examine each of the boards that comprise our chassis. We will begin by looking at Figure 10, a photo of the entire chassis, taken from a top left viewing angle.

Comparing Figure 10 with Figure 9, we can see that the photo and graphic representations are identical. Therefore, as we progress, we will use the graphic representation for our training purposes.

Using Figures 11 thru 14 we will discuss each individual board.

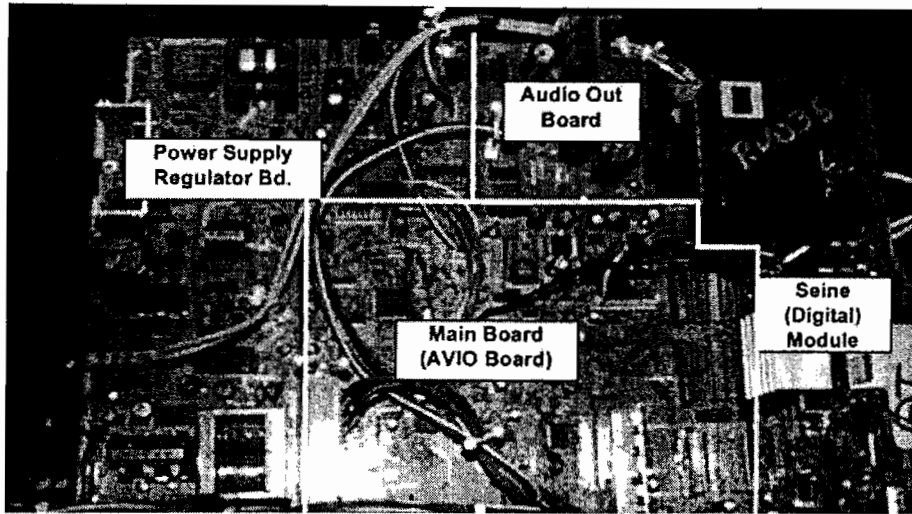
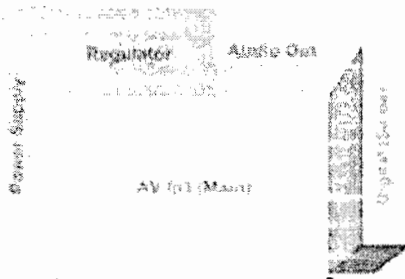


Figure 10

HM67 Board Layout



Input device for all analog signals: Video, ColorStream, RGB, S-Video, Analog Audio.

Output device for fixed Left and Right Analog Audio.

Switching for analog inputs.

TV Microprocessor functions: ATSC/NTSC tuning, MTS Processor, Audio Processor, AV Switching, Digital Light Engine, Power to chassis, LED functions, Remote and Front Keyboard commands.

Audio processing (except final amp).

ATSC/NTSC tuner on board.

Figure 11

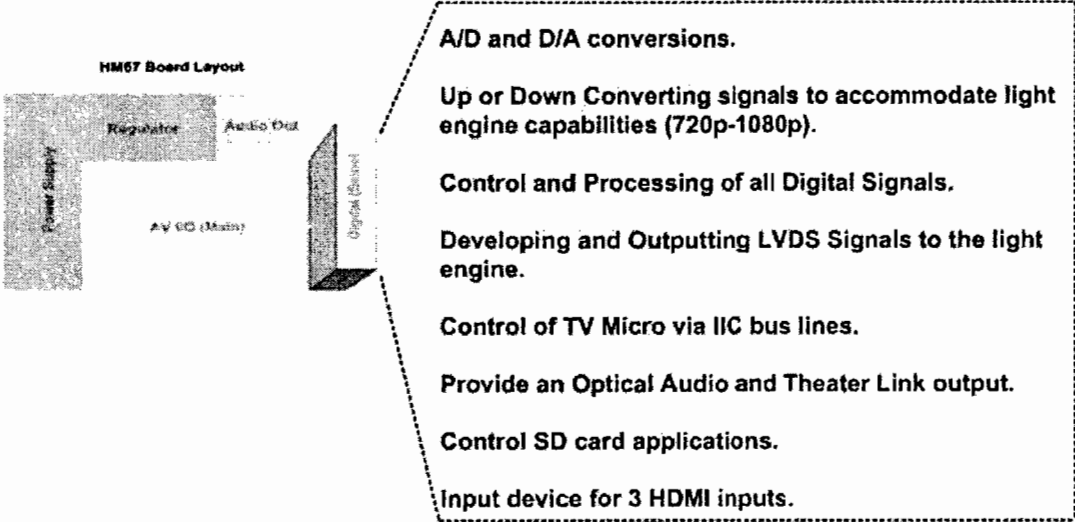


Figure 12

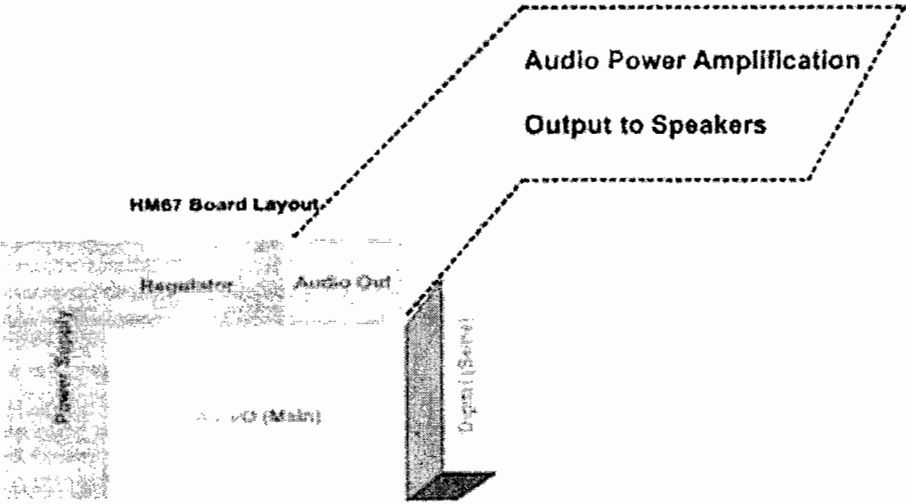


Figure 13

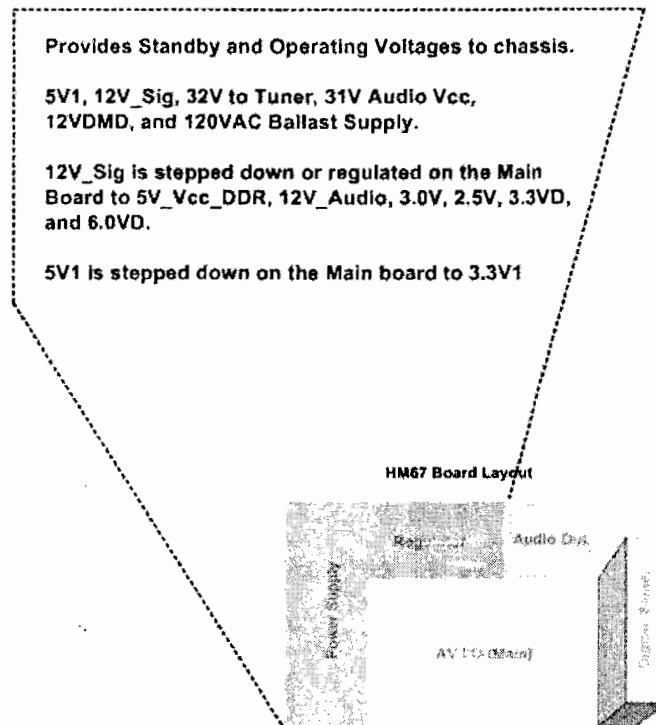


Figure 14

Fix on the First Call

Knowing the functions of each board is invaluable in determining what to bring on the service call before leaving the shop. Once this learning curve is mastered, the technician can apply a basic troubleshooting flowchart to any symptom that a customer may describe during his/her initial call requesting service.

The key to success is to spend a small amount of time talking to the customer and asking the right questions.

During this training, we will use basic flowcharts to provide enough information to accomplish this worthwhile goal.

We will also provide a graphic of the LED "Blink" codes that can be helpful in determining problem areas in the HM67 and HM167 series DLP sets.

Dead Set

Figures 15 through 15b are prime examples of a basic flowchart of what the customer thinks is a "Dead Set".

Dead Set

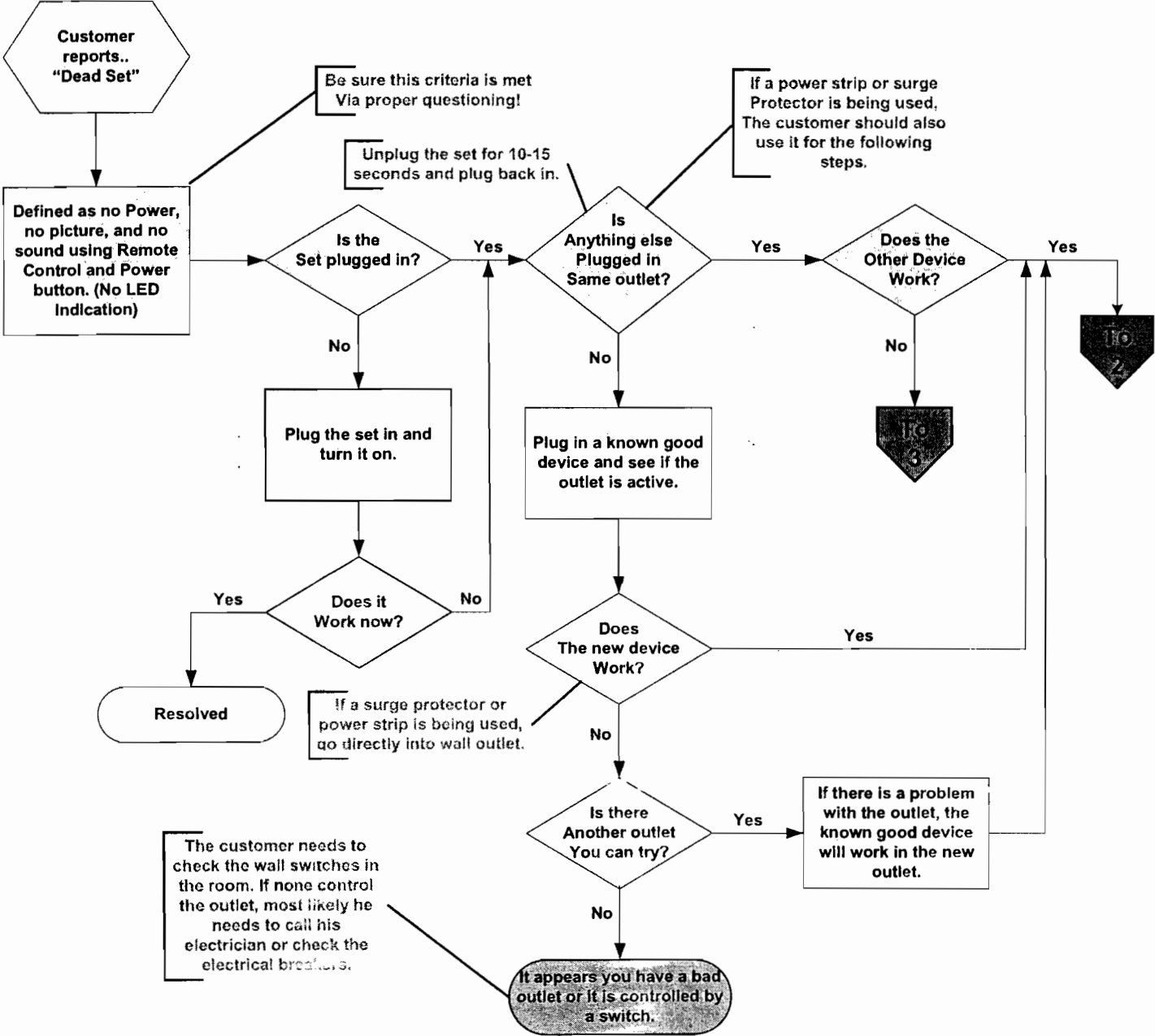


Figure 15
(1 of 3)

Dead Set (Continued)

Insure the Following Steps are Taken

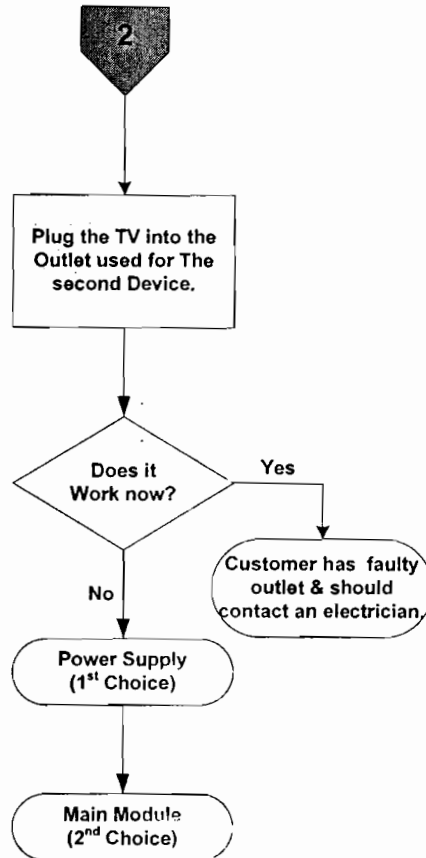


Figure 15a
(2 of 3)

Dead Set (Continued)

Insure the Following Steps are Taken

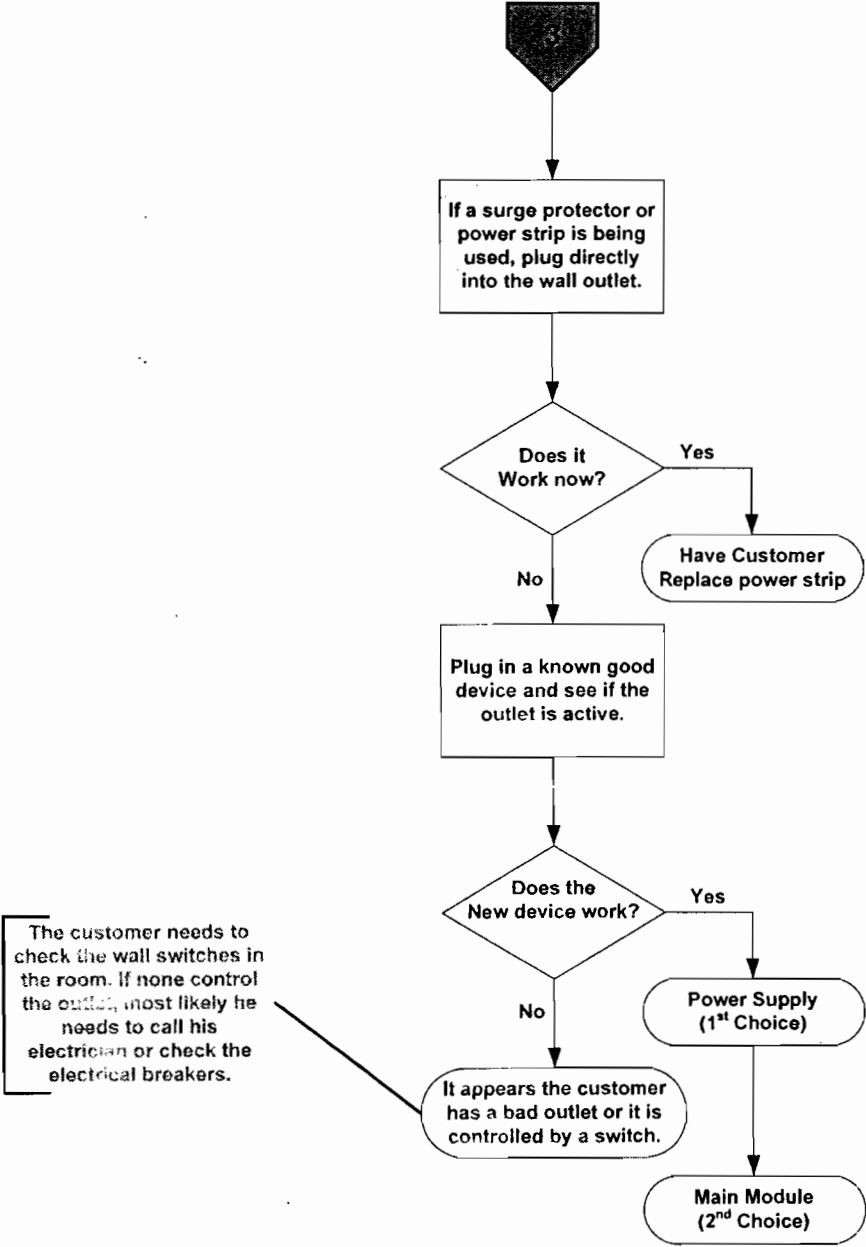


Figure 15b
(3 of 3)

Video Problems

Figures 16 through 16e will walk us through several paths involved in analyzing video problems.

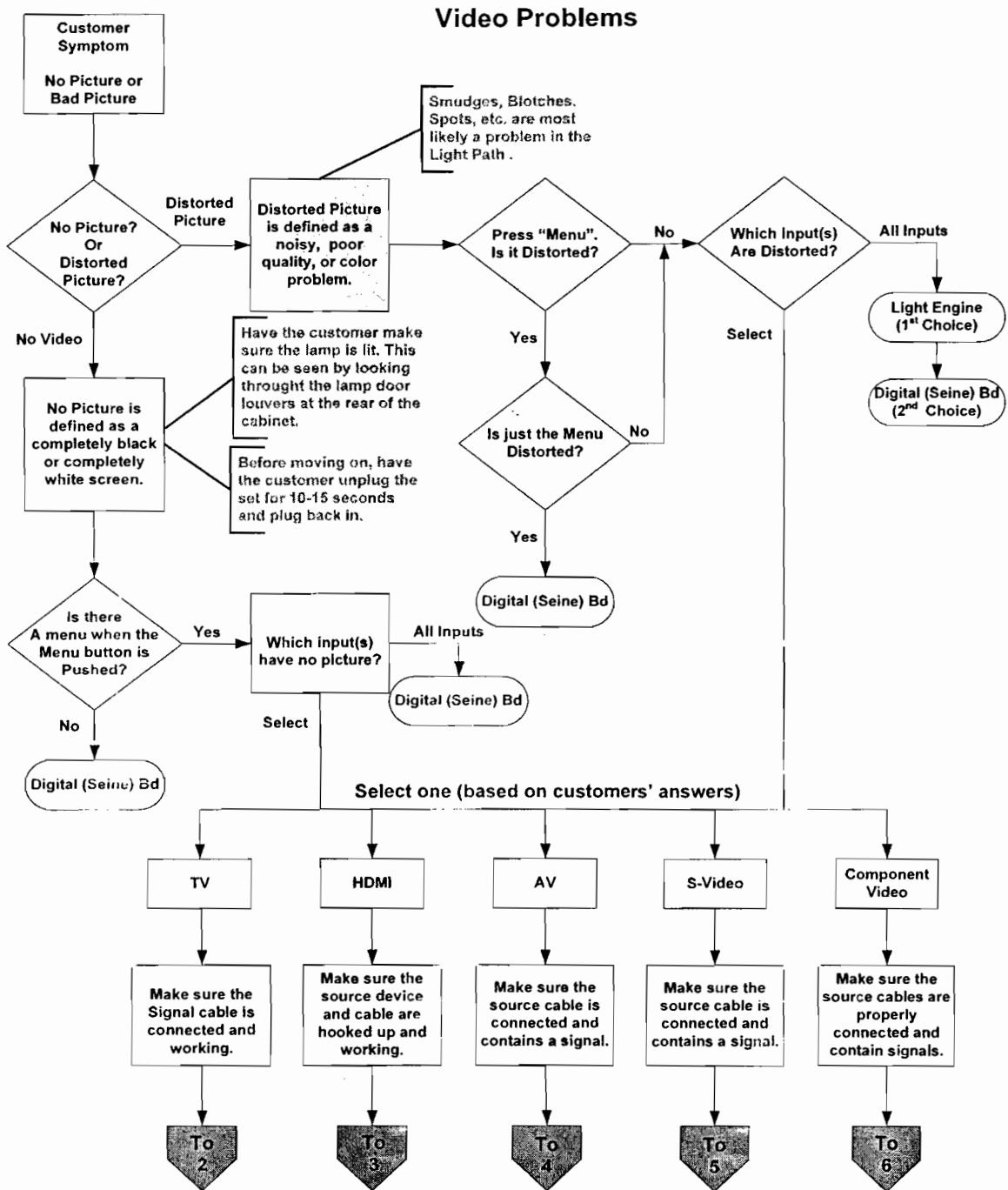


Figure 16
(1 of 6)

Insure the Following Steps are Taken

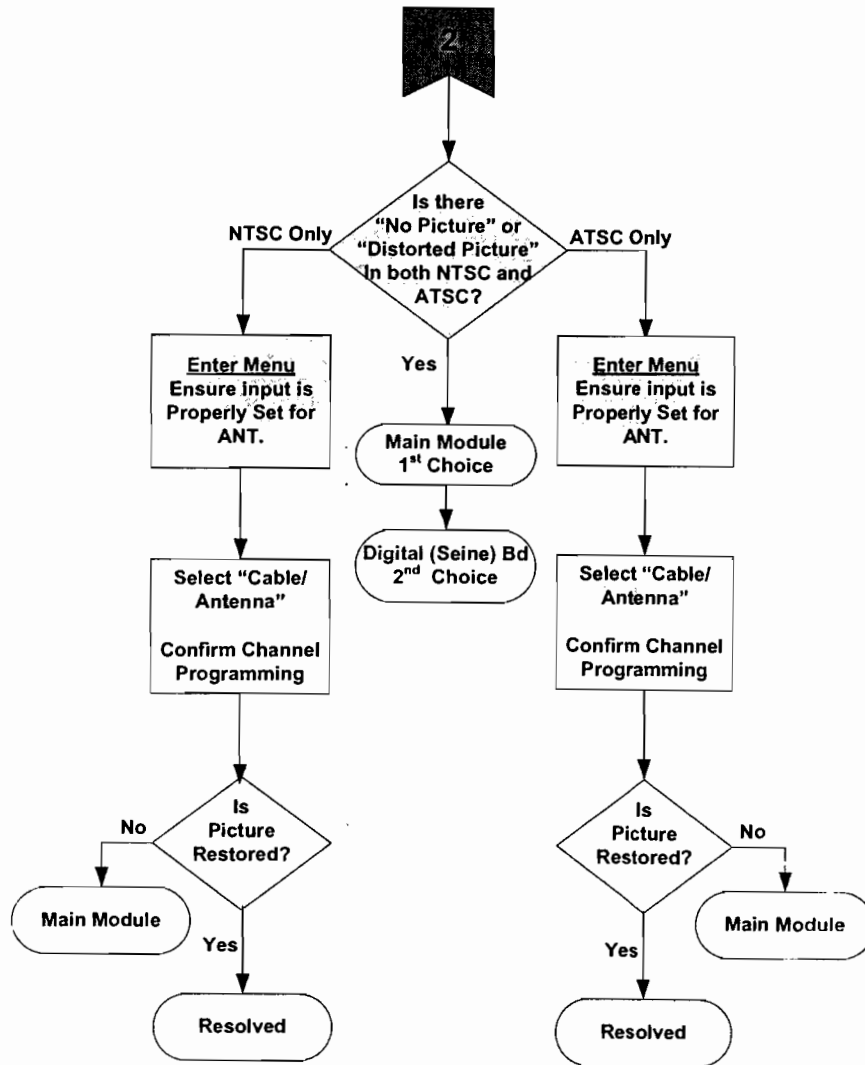


Figure 16a
(2 of 6)

Insure the Following Steps are Taken

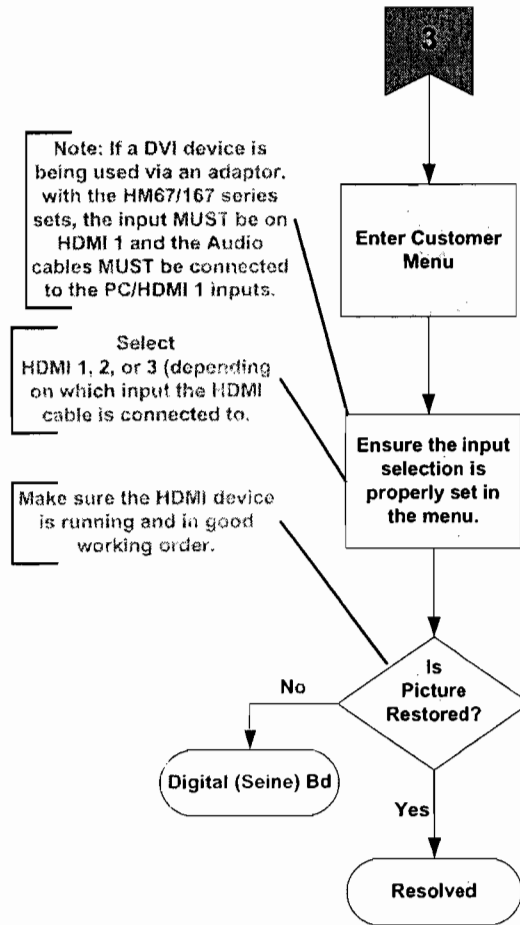


Figure 16b
(3 of 6)

Insure the Following Steps are Taken

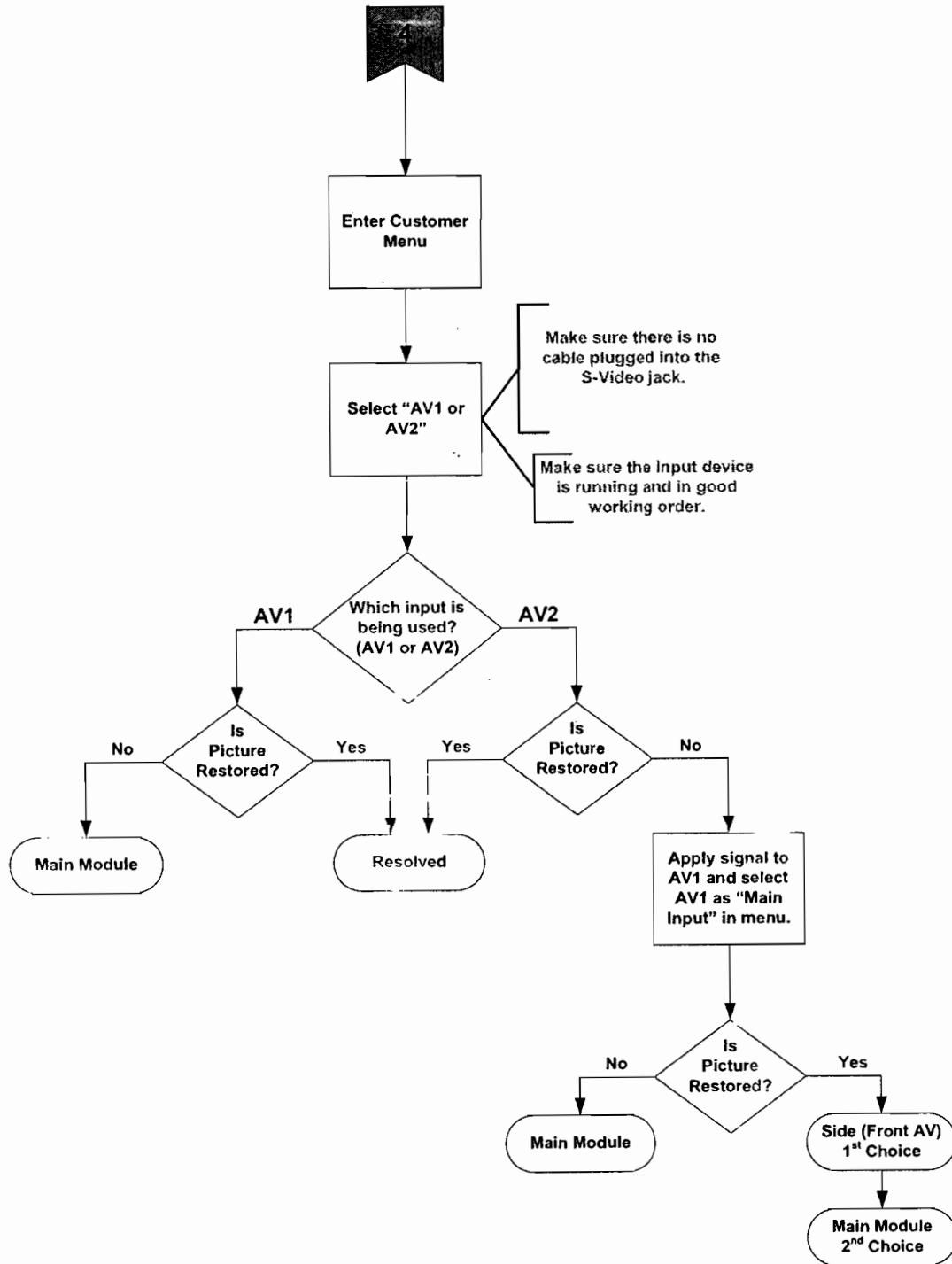


Figure 16c
(4 of 6)

Insure the Following Steps are Taken

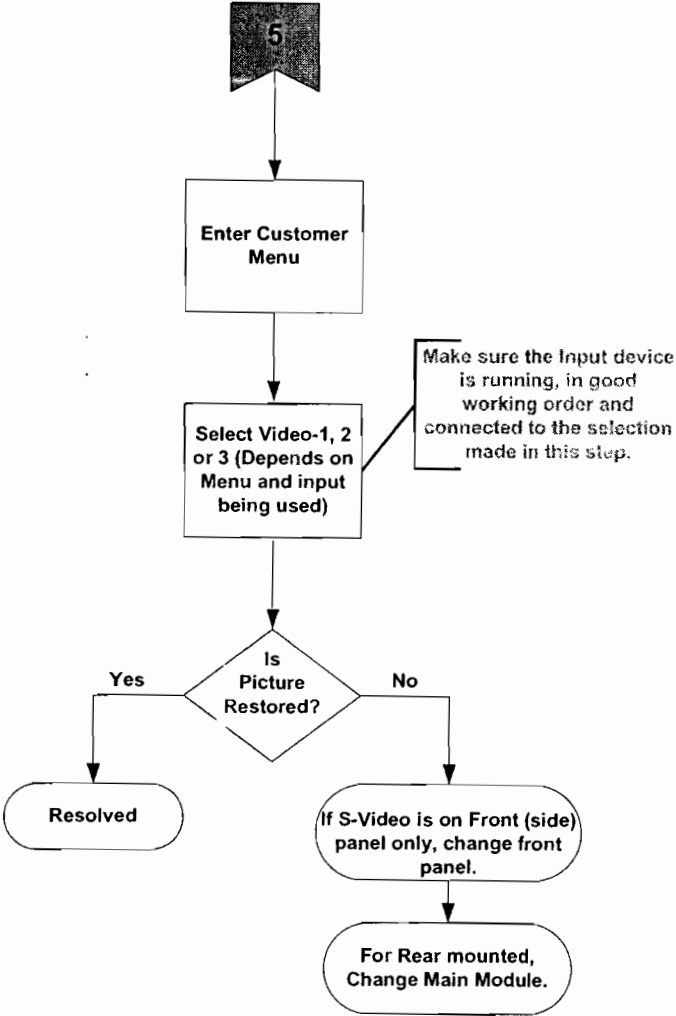


Figure 16d
(5 of 6)

Insure the Following Steps are Taken

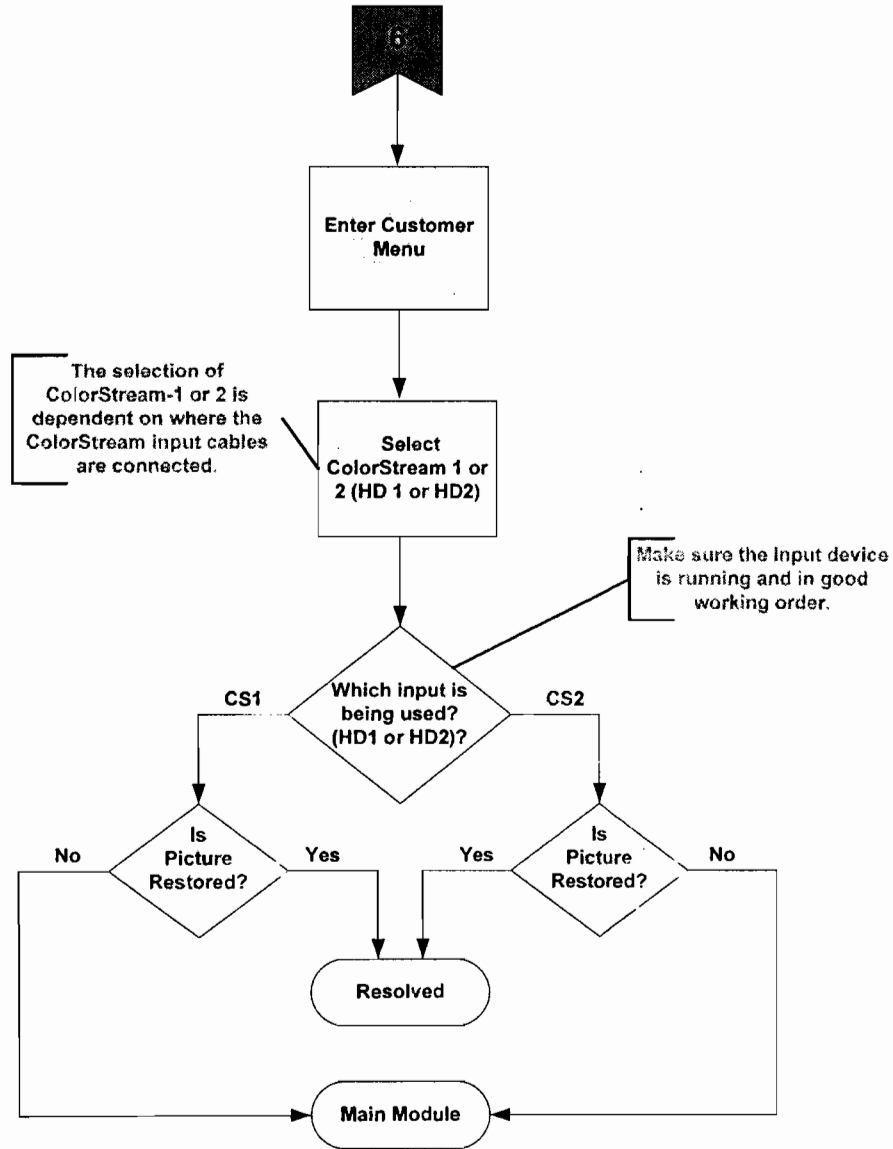


Figure 16e
(6 of 6)

Audio Problems

Figures 17 through 17e will walk us through several paths involved in analyzing audio problems.

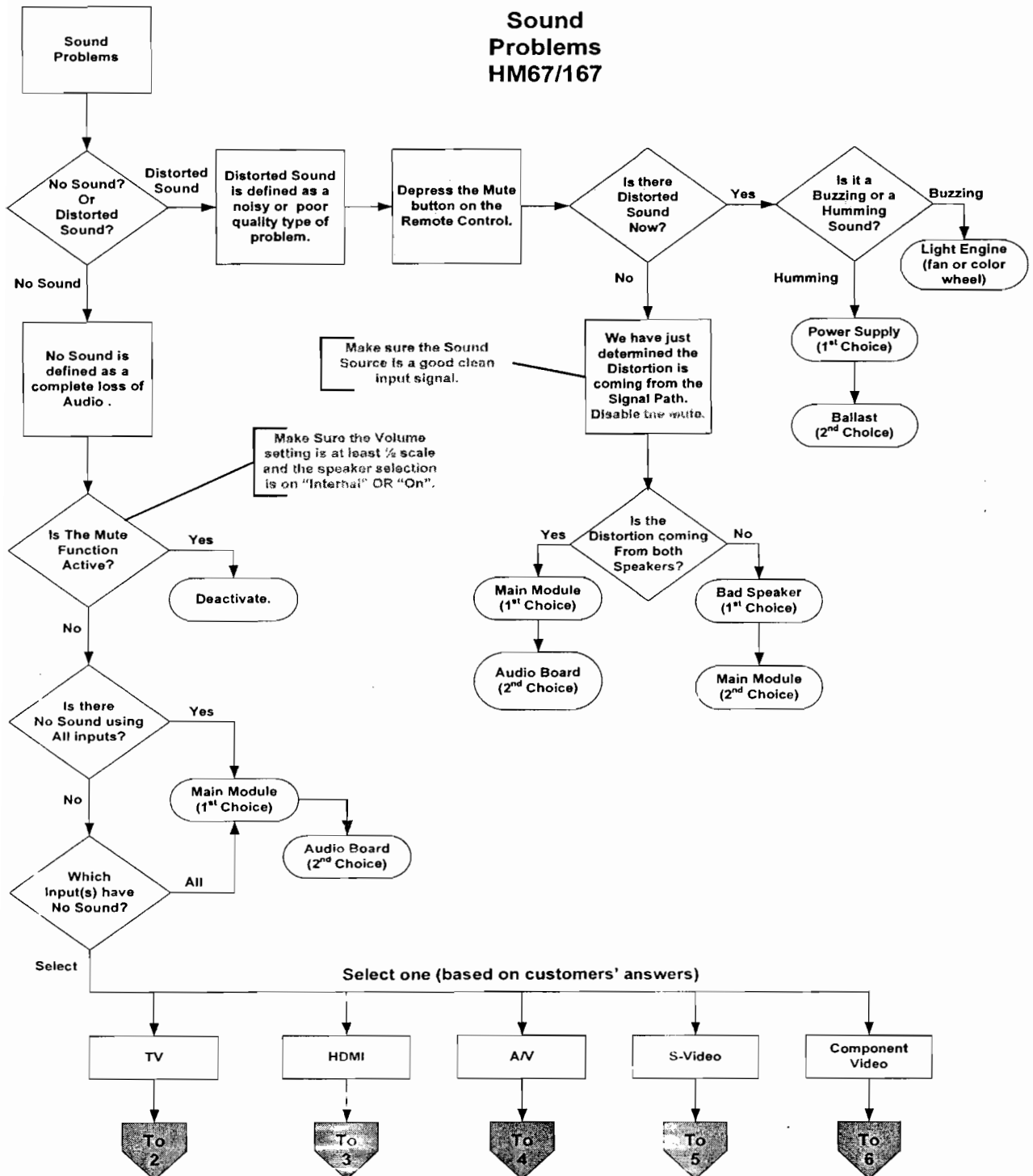


Figure 17
(1 of 6)

Insure the Following Steps are Taken

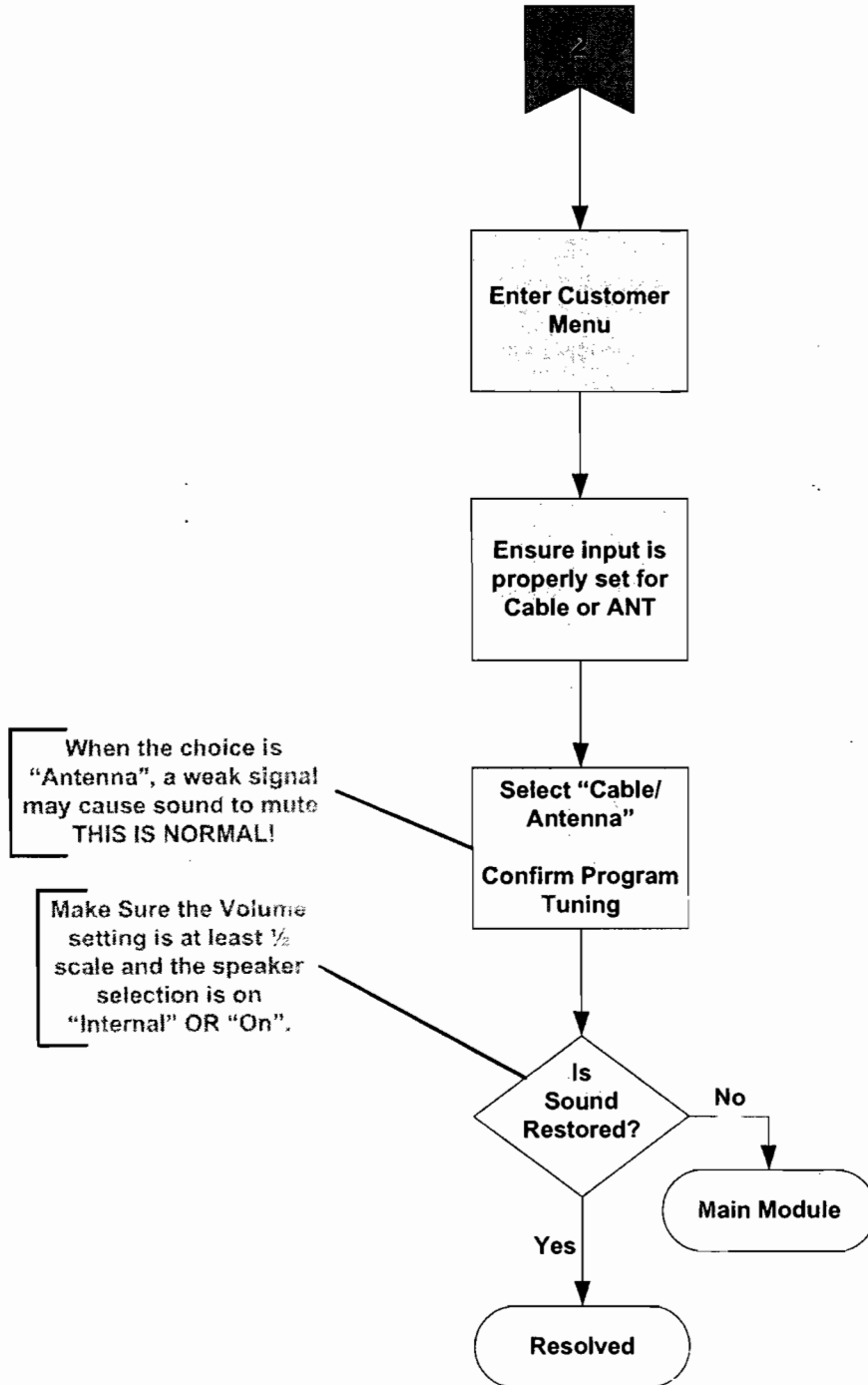


Figure 17a
(2 of 6)

Insure the Following Steps are Taken

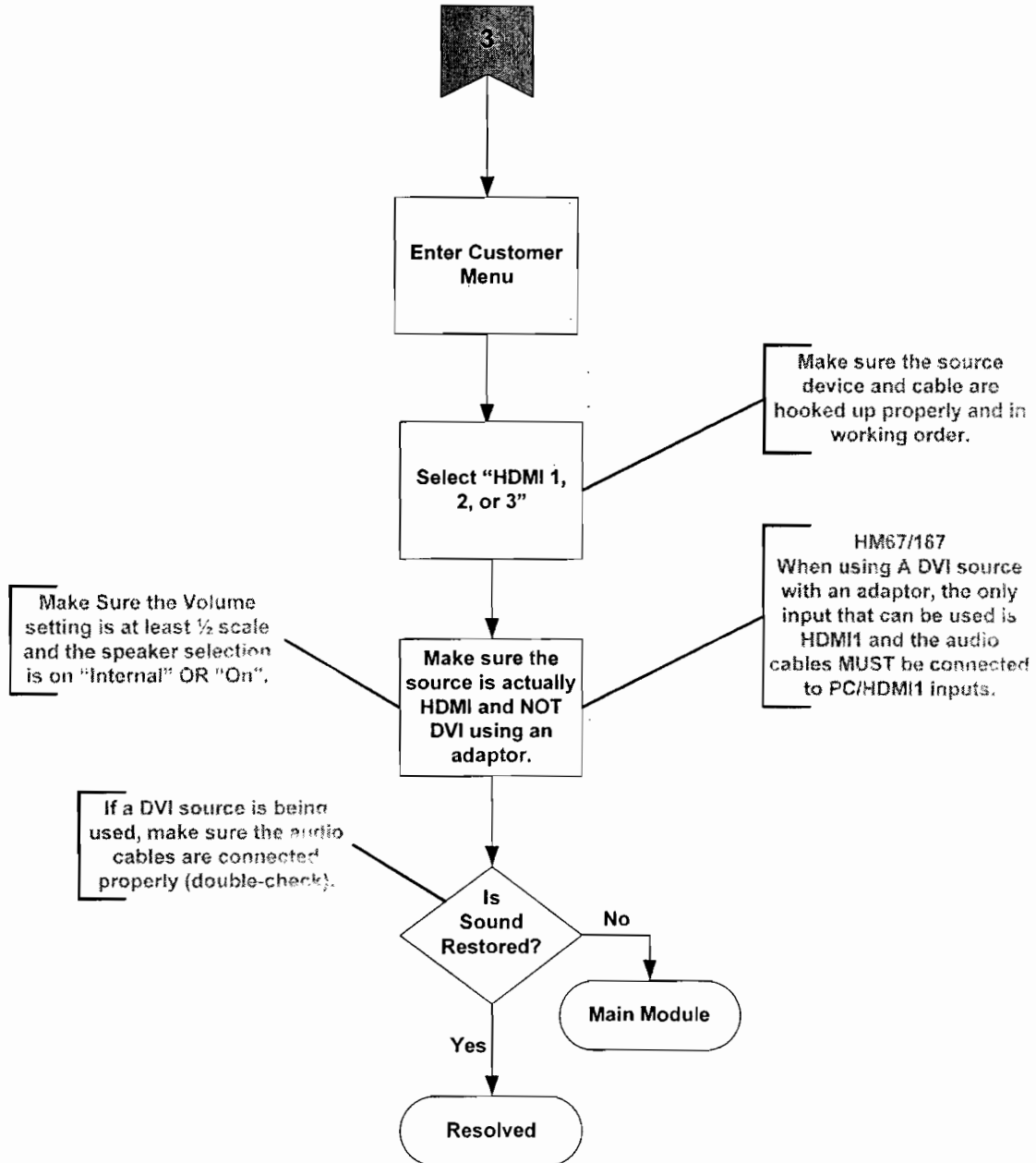


Figure 17b
(3 of 6)

Insure the Following Steps are Taken

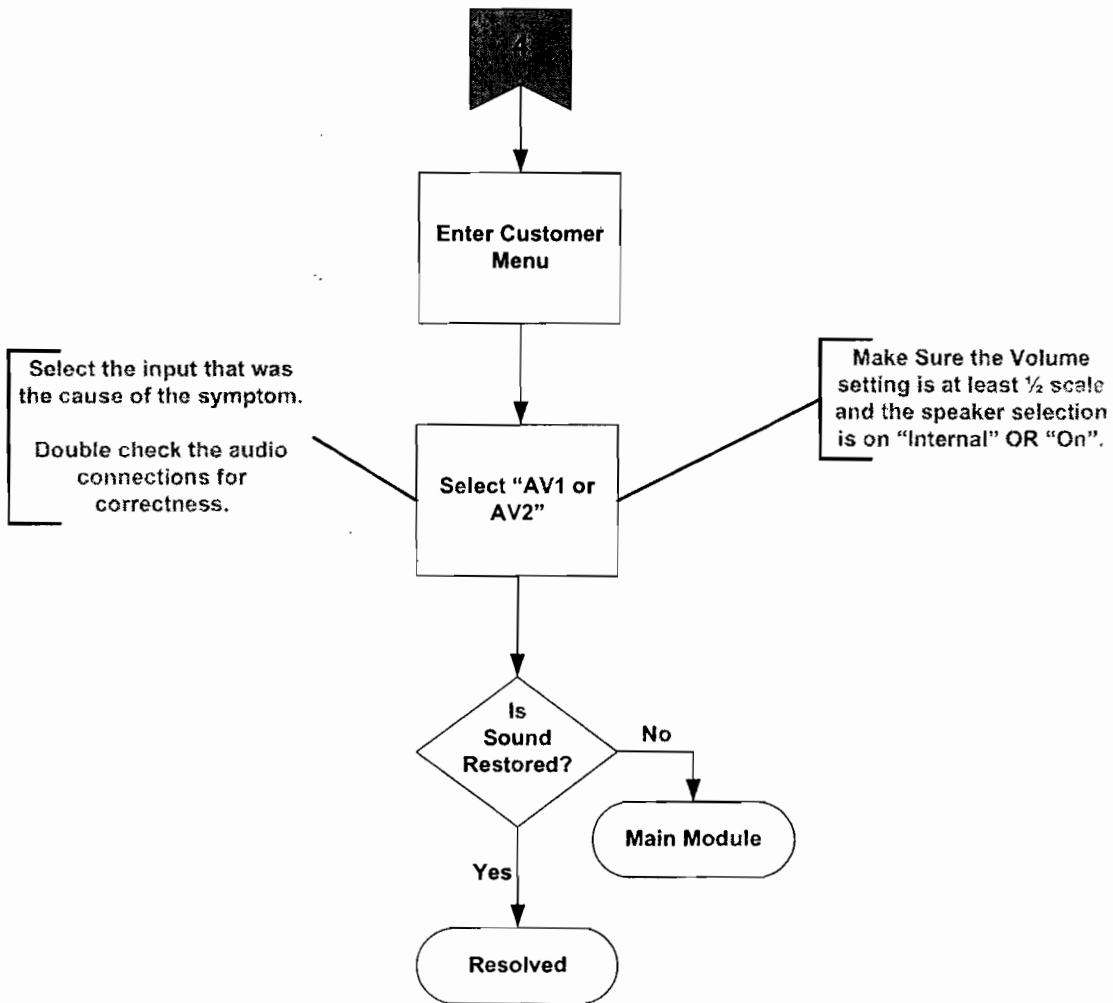


Figure 17c
(4 of 6)

Insure the Following Steps are Taken

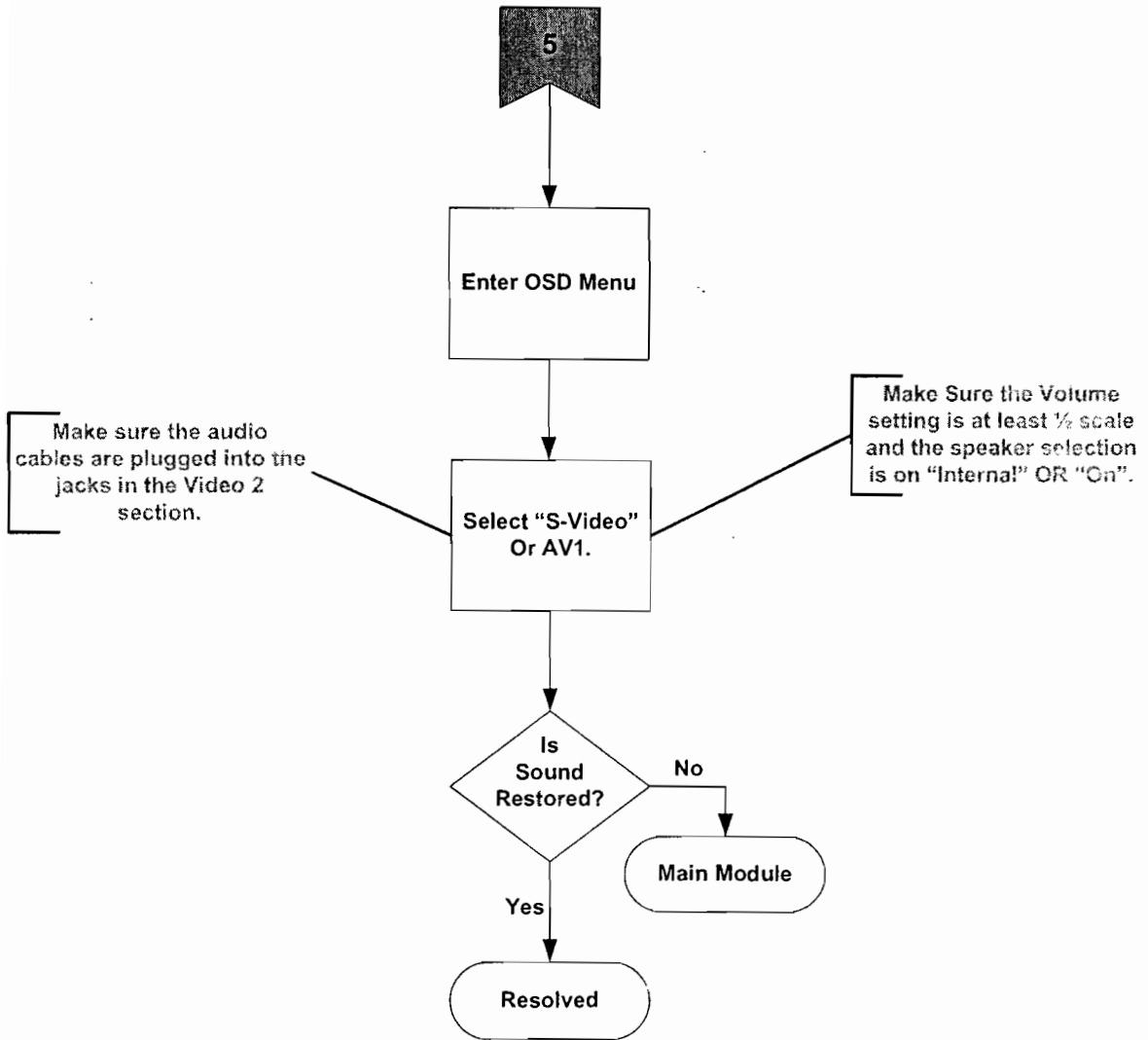


Figure 17d
(5 of 6)

Insure the Following Steps are Taken

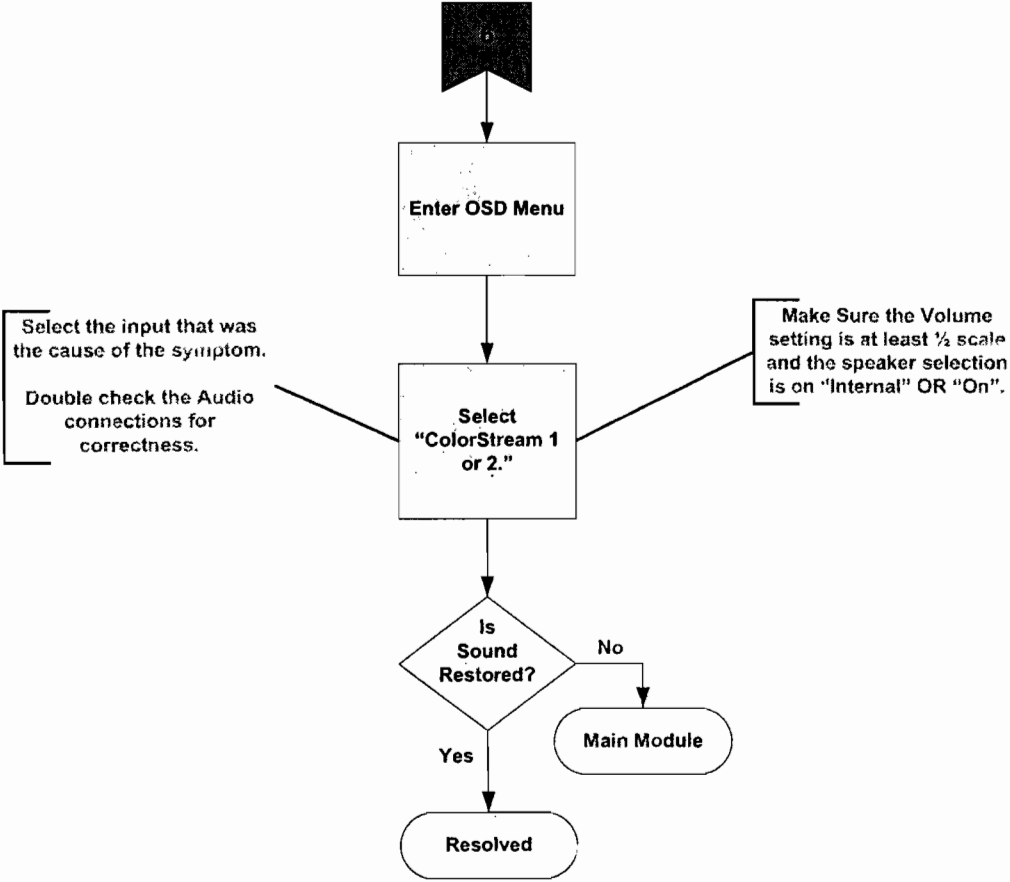


Figure 17e
(6 of 6)

Error Codes

Figure 18 is a graphic of the LED "Blink" codes used in the 2007, HM67/167 series DLP sets.

LED Specifications (2007 DLP)




























































 Blinking  Off		LED Colors	 Blue	 Yellow	 Red/Green	
	STATUS		POWER	LAMP		Voice Alert
1	Power Off (No AC)					
2	Power Off (Standby)					
3	Power On					
4	Power On – Active Standby					
5	Standby – Quick Restart On					
6	Waiting for Lamp Start					
7	Lamp Won't Light					YES
8	Lamp Door Open					YES
9	Fan Stop Detection					YES
10	IIC Bus Error (Light Engine)		 Slow			YES
11	IIC Bus Error		 Slow			
12	Power Protect Detection		 Fast			
13	Color Wheel Stop		 Fast			YES
14	Thermo Sensor		 Fast			YES
15	Seine Booting			 3 Times		
16	Upgrade in Progress					
17	Upgrade Successful					
18	Upgrade Failed					

Figure 18

Used prior to or in conjunction with the flowcharts, while talking with the customer, the error code blink sequence is another aid in making the right decision on what part/parts to leave the shop with.

Model to PCB Chart

Figure 19 is a chart indicating Board names across the top, model numbers down the left side and part numbers that intersect the model number and board name.

This will be helpful when you decide which section of the set is causing the symptom, i.e. analog, tuning, system control, digital, optical, power supply, or audio/audio output.

Model	Power	Main	Light Eng.	Seine	Audio Out
50HM67	75006603	75007557	75006624	75007554	75006604
57HM117/167	75006603	75007558	75006657	75007555	75006604
65HM117/167	75006603	75007559	75006693	75007556	75006604
Replacement Seine modules will include any option code change instructions if needed					

Figure 19

Plan B

Realizing no flowchart can be perfect, pre-call analysis may sometime fail, and the fact that some customers can't or won't cooperate on the phone, we will obviously have to make a service call blind or troubleshoot the set because the board we determined to be the cause of the symptom did not fix the set.

To assist us in troubleshooting we have developed a wiring interconnect diagram showing the full-run voltages, connector numbers, pin numbers, and voltage derivation. We also have a physical layout of the connectors as you would view them when troubleshooting the chassis'. Figure 20 is a graphic showing the wiring interconnect, full-run voltages, their derivation, and direction of application. It also contains indications of the standby voltages (Power Save mode & Fast Start mode) that are present when the set is in one of the standby modes. The letter "F" designates Fast Start and the letter "P" designates Power Save.

HM67/167 Series Wiring Interconnect -Supply Voltages-

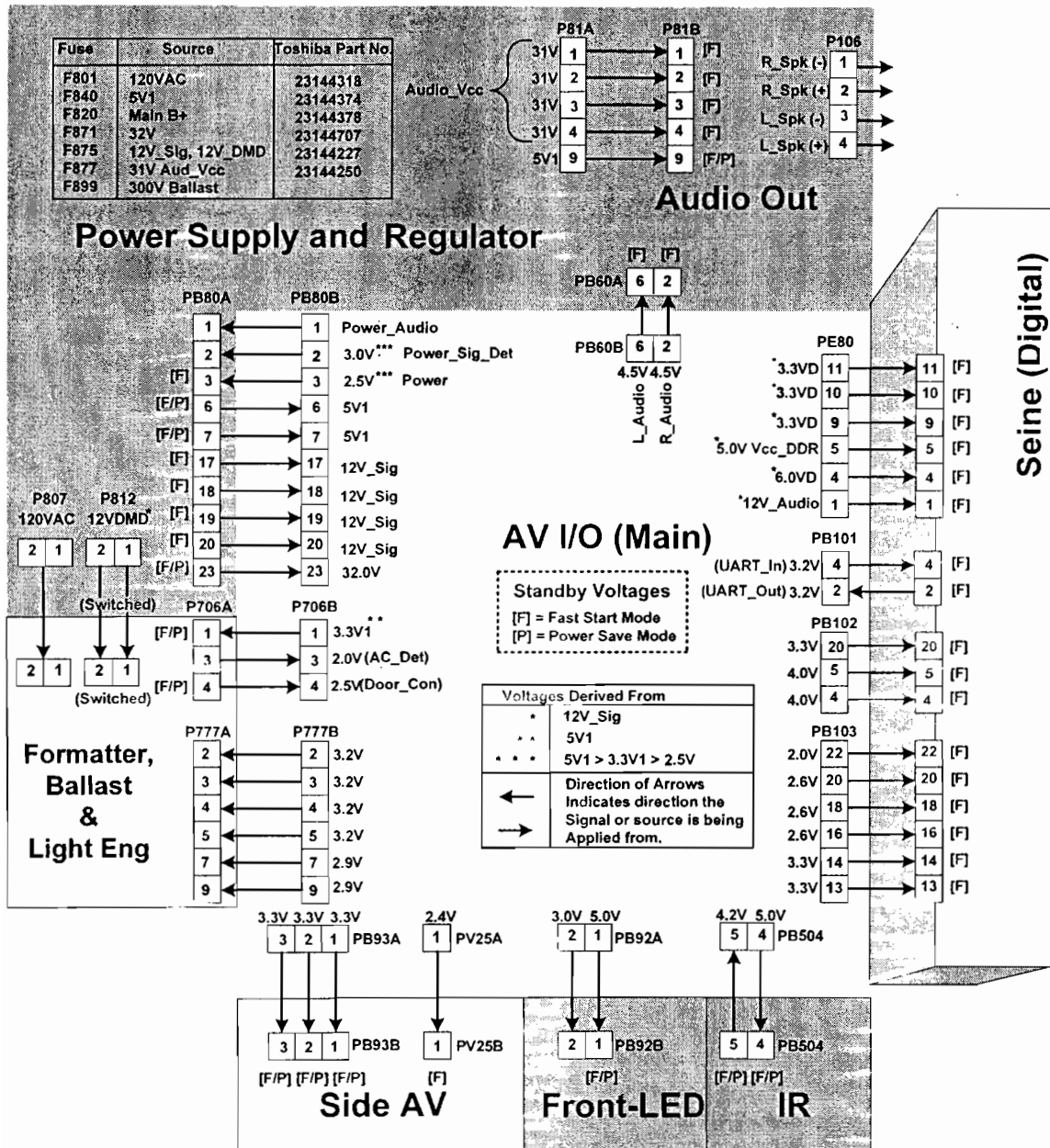
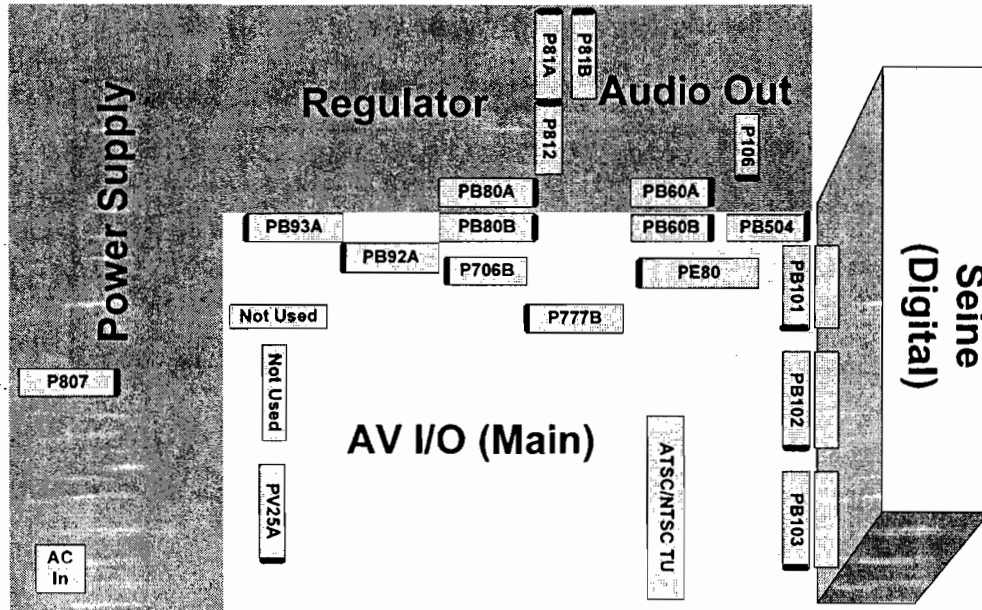


Figure 20

Figure 21 is a graphic of the physical layout of the connectors mentioned above.

Board Layout & Connector Placement HM67/167 Series



Connector	From	To	Pin Numbers & Voltages – FULL RUN MODE
PV25A	Main	Side AV	P-1 (2.4V)
PB93A	Main	Side AV	P-1, P2, P3 (3.3V)
PB92A	Main	Front-LED	P-1 (5.0V), P-2 (3.0V)
P706B	Main	Light Engine	P-1 (3.3V), P-3 (2.0V), P-4 (2.5V)
PB80A to B	Power	Main	P-2 (3.0V), P-3 (2.5V), P-6, P-7, (5.0V), P-17, P-18, P19, P20, (12.0V), P-23 (32V)
P812	Power	Formatter	P-1, P2, (12.0V)
P81A to B	Power	Audio Out	P-1, P2, P3, P4 (31.0V), P-9 (5.0V)
PB60A to B	Main	Audio Out	P-2 (4.5V), P-6 (4.5V)
P106	Audio Out	Speakers	
PB504	Main	IR Board	P-4 (5.0V), P-5 (4.2V)
PE80	Main	Seine	P-1 (12.0V), P-4 (6.0V), P-5 (5.0V), P-9, P10, P11 (3.3V)
PB101	Main	Seine	P-2 (3.2V), P-4 (3.2V)
PB102	Main	Seine	P-4 (4.0V), P-5 (4.0V), P20 (3.3V)
PB103	Main	Seine	P-13 (3.3V), P-14 (3.3V), P16, P18, P20 (2.6V), P22 (2V)
P777B	Main	Light Engine	P-2, P-3, P-4, P-5 (3.2V), P-7 (2.9V), P-9 (2.9V)
P807	Power	Light Engine	P-1 to P-2 (120VAC)

Legend:

- Power Supply/Regulator Board
- AVIO/Main Board
- Audio Output Board
- Seine/Digital Board
- Indicates Pin #1

Figure 21

Figure 22 is a chart showing the voltages present on the connectors during Standby when the set is in the "Power Saving" mode (Customer Menu Selection).

Standby Voltages in Power Savings Mode

Connector	From	To	Pin Numbers & Voltages – STANDBY – Power Save Mode
PB93A	Main	Side AV	P-1, P2, P3 (3.3V)
PB92A	Main	Front-LED	P-1 (5.0V)
P706B	Main	Light Engine	P-1 (3.3V), P-4 (2.5V)
PB80A to B	Power	Main	P-6, P-7 (5.0V), P-23 (30-32V)
P81A to B	Power	Audio Out	P-9 (5.0V)
PB504	Main	IR Board	P-4 (5.0V), P-5 (4.2V)

Figure 22

Figure 23 is a chart showing the voltages present on the connectors during Standby when the set is in the "Fast Start" mode (Customer Menu Selection).

Standby Voltages - Fast Start Mode

Connector	From	To	Pin Numbers & Voltages – STANDBY – Fast Start Mode
PV25A	Main	Side AV	P-1 (2.4V)
PB93A	Main	Side AV	P-1, P2, P3 (3.3V)
PB92A	Main	Front-LED	P-1 (5.0V)
P706B	Main	Light Engine	P-1 (3.3V), P-4 (2.5V)
PB80A to B	Power	Main	P-3 (2.5V), P-6, P-7, (5.0V), P-17, P-18, P19, P20, (12.0V), P-23 (31V)
P81A to B	Power	Audio Out	P-1, P2, P3, P4 (31.0V), P-9 (5.0V)
PB60A to B	Main	Audio Out	P-2 (4.5V), P-6 (4.5V), P-8 (2.7V), P-9 (2.7V)
PB504	Main	IR Board	P-3 (3.2V), P-4 (5.0V), P-5 (4.2V)
PE80	Main	Seine	P-1 (12.0V), P-4 (6.0V), P-5 (5.0V), P-9, P10, P11 (3.3V)
PB101	Main	Seine	P-2 (3.2V), P-4 (3.2V)
PB102	Main	Seine	P-4 (4.0V), P-5 (4.0V), P-18 (3.2V) P20 (3.3V)
PB103	Main	Seine	P-13 (3.3V), P-14 (3.3V), P16, P18, P20 (2.6V), P22 (2.3V)

Figure 23

Switched Voltages (Main Board)

There are several voltages derived from the power supply that are developed on the Main Board. Figure 24 is a block Diagram showing those voltages and Protect Circuits.

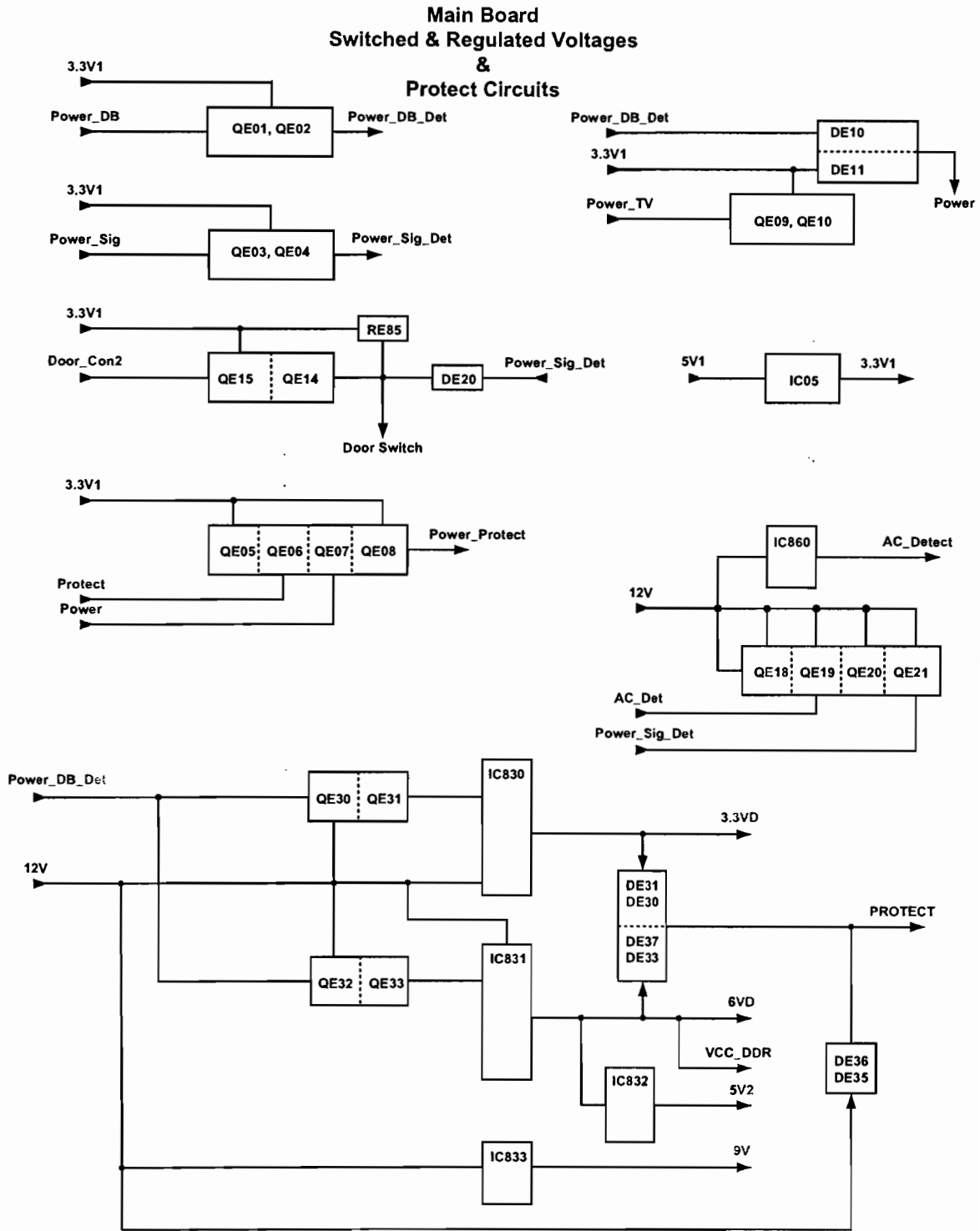


Figure 24

Implementing Plan B

Plan B becomes necessary for a number of reasons; however, they all boil down to one basic procedure. That is, the set needs to be repaired and some troubleshooting needs to be implemented. "Dead Set" flowcharts 2 and 3 (previously covered) will be used to demonstrate this procedure.

The 2007 DLP sets have two power settings; "Power Saving" and "Fast Start". When a Dead Set condition is encountered, we have no way of confirming which power setting was being used by the customer. Therefore, two charts were developed to aid in determining the cause of our "Dead Set". Those charts are on page 29 and are labeled Figure 22 and Figure 23.

The two voltage charts, used in conjunction with the two flowcharts mentioned above, will be used to determine which board/boards is or could be the cause of our dead set.

Note: When a set is placed in the "Power Saving" mode, the only voltages made available to the chassis are the voltages necessary for a basic standby condition. That means the TV micro, EEprom, IR receiver, Light Engine micro, and front LED supplies.

When a set is placed in the "Fast Start" mode, almost all of the "Full Run" voltages are made available to the chassis during standby. This feature allows the Seine module to remain in the "booted" condition. There will be no time delay to allow the Seine module to "boot-up". This provides us with a fast start-up but uses a bit more power when idle.

Flowchart 2 will be labeled Figure 25 & 26 and will be used to provide a troubleshooting example in each of the two "start" modes.

Flowchart 3 will be labeled Figure 27 & 28 and will also be used as an example in each of the two "start" modes.

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Dead Set
(Continued)

Insure the Following Steps are Taken

**Fast Start
Mode**

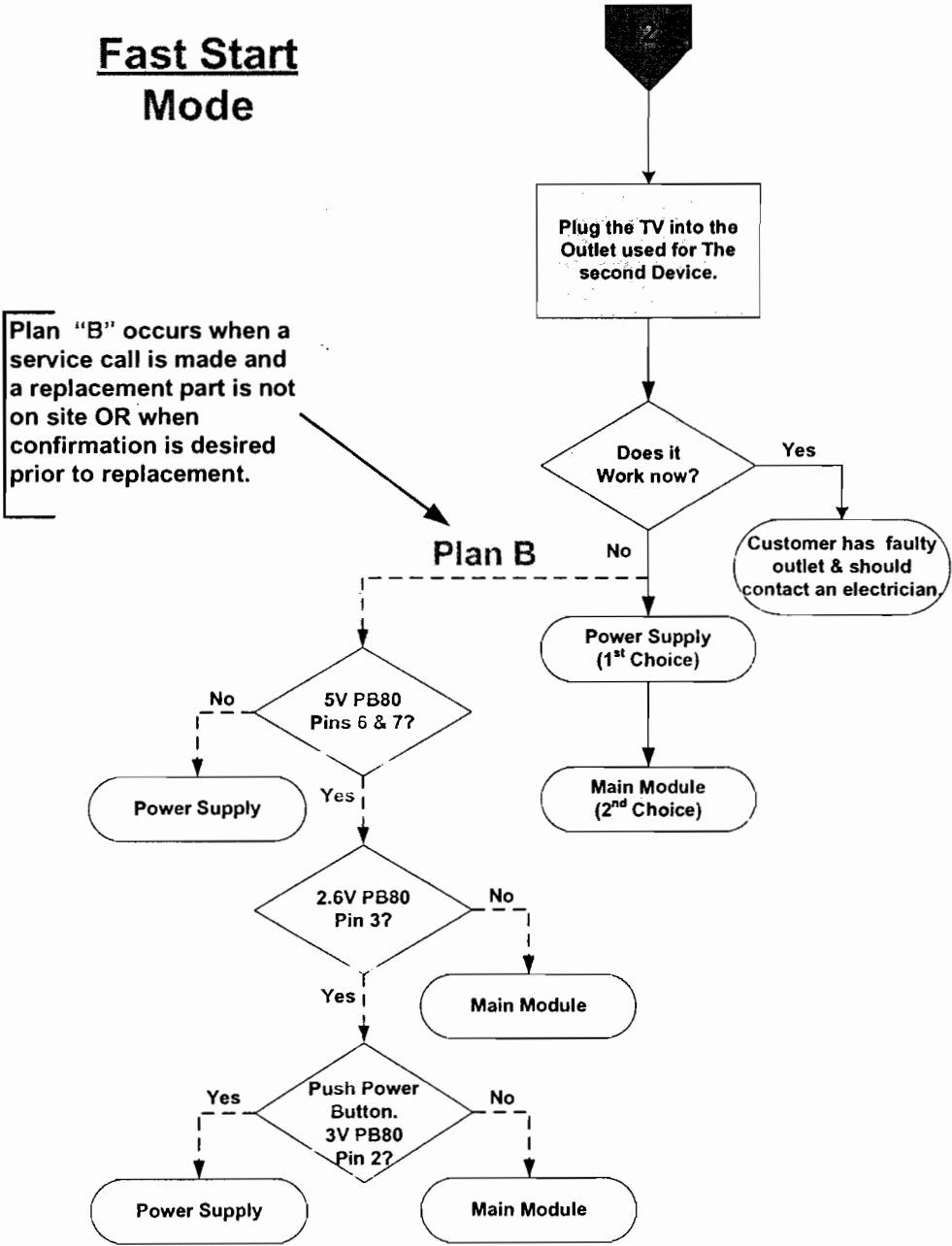


Figure 25

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**POWER SAVINGS
MODE**

**Dead Set
(Continued)**

Insure the Following Steps are Taken

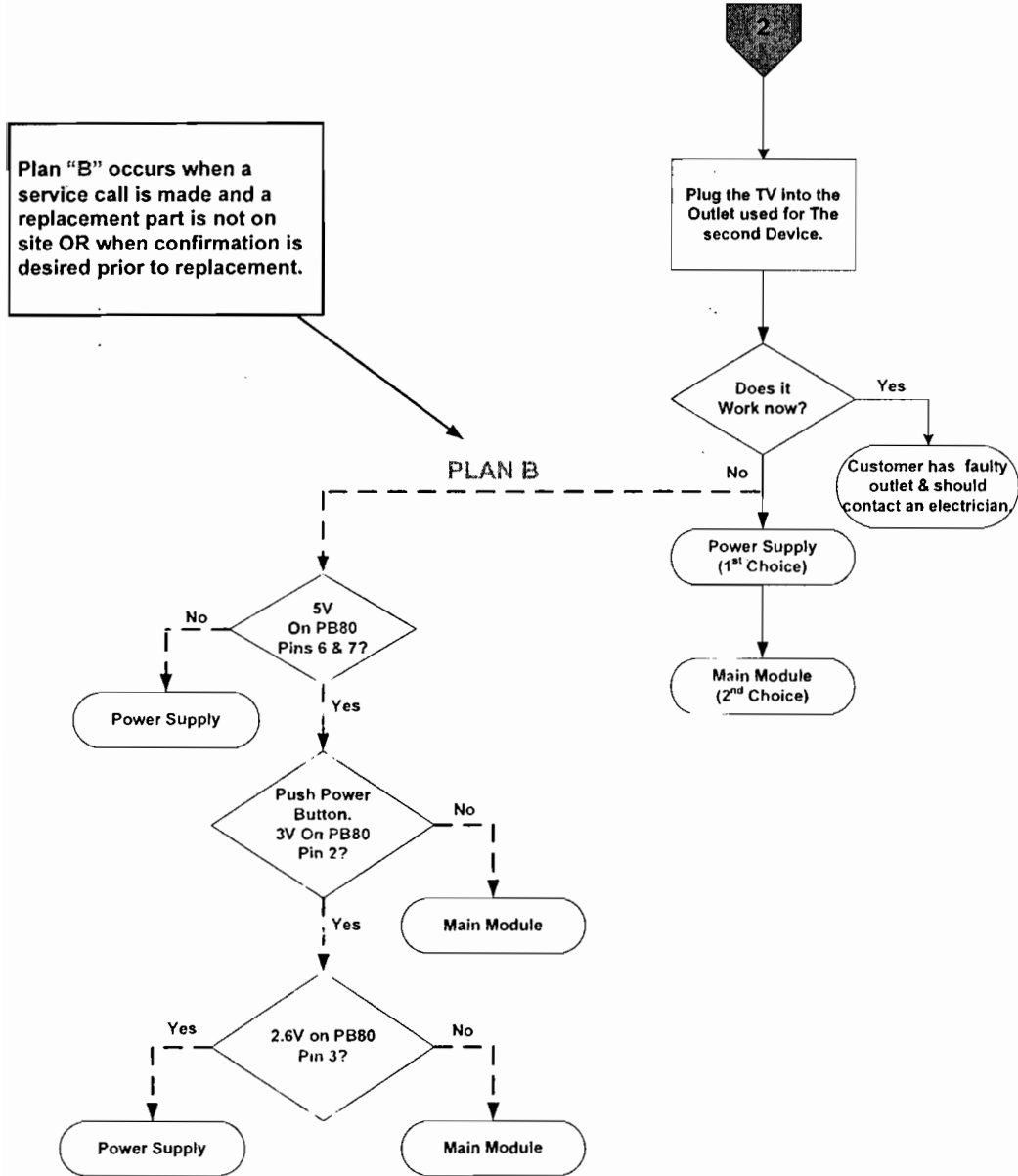


Figure 26