

TECHNICAL SERVICE MANUAL

32 INCH LCD TV

REVISION HISTORY

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PREFACE

This manual is prepared for the maintenance service for ELT-3220AP 32" LCD TV. Maintenance procedures described in this manual are intended to isolate faulty parts and replace them in the field. It also aims to serve as a guide in procuring replacement parts for this product.

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This manual includes system overview, major system assembly, components' description, and the "Troubleshooting" making explanations on how to detect errors. It also includes a flow chart for checking or correcting faults.

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. NOTICE:

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ELT-3220AP Service Manual
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CHAPTER 1

Introduction

_____ This manual provides an integral information you need to maintain the LCD TV, and the manual is applied to the model of ELT-3220AP LCD TV. There are nine topics in this manual, and you can immediately identity the problem through the manual.

This manual is for the technicians and people who have the electronic background. Send the product back to the distributor for repairing and do not attempt to do anything, which is complex or isn't mentioned in the Troubleshooting. _____

1-1 **Product Highlight**

The major advanced features of this product are:

- ◆ 32" Color LCD panel 1366 X 768 Pixels (16:9)
- ◆ High Speed Response
- ◆ 550 cd/m2 higher brightness and 1000:1 Contrast Ratio
- ◆ 1280*1024 SXGA @ 60Hz resolution support
- ◆ Wide compatibility with 31~64KHz for horizontal scan
- ◆ Multi-functional OSD (On Screen Display) for user control
- ◆ PIP (Picture in Picture) Function
- ◆ 88° Wide Viewing Angle.

1-2 **Technical Specification**

1-2.1 LCD Module

CMO V320B1-L01

Screen Size	32" diagonal
Dimension Outline	760(H) X 450(V) X 47(D) ± 1 mm
Active Area	708.954(H) X 398.592(V)
Interface	LVDS (Low-Voltage-Differential-Signal) Interface
Display Pixels	1366 X 768
Brightness	550 cd/m2 (typ.)
Contrast Ratio	1000: 1 (min.)
Number of Color	16.7 M colors (true)
Viewing Angle	88°

1-2.2 Compatibility

Input Signal

7

Video	TV	PAL, SECAM
	Analog RGB	VGA~SXGA
	Digital RGB	VGA~SXGA
	Composite1, 2	PAL, NTSC
	S-Video1, 2	PAL, NTSC
	Component1, 2	480i(60Hz), 576i(50Hz), 480P, 576P, 720P(50/60Hz) 1080i(50/60Hz)
Synchronization	Separate Sync	H-Sync, V-Sync
	Sync On Green.	Yes
Displayable Color	16.77 million colors	

Compatibility Range

Maximum Pixel Frequency	108MHz
Horizontal Frequency	31KHz ~ 64KHz (SXGA)
Vertical Refresh	56Hz~75Hz

1-2.3 Electrical Power

Power Supply

AC220 ~240V / 50Hz 3.5A
CB.CE Mark compliant

1-2.4 Mechanical

With Stand

Length 37.4inch/949.6mm
Height 22inch/559.6mm
Width 10.6inch/270mm
Weight 50.6lbs/23Kg

Wall Bracket

Width 18inch/457mm
Height 10.2inch/259.5mm
Depth 1.27inch/30mm
Weight 6.6lbs/3Kg
Angle Adjustment 0 ° , 10 ° , 15 ° , 20 °

1-2.5 Safety/Regulation

CB.CE

1-3 **Environmental Requirements**

1-3.1 Temperature

Operating	0 ° C ~ 40 ° C (Neglect altitude)
Non-Operating	-20 ° C ~ 65 ° C (For all altitude)

1-3.2 Humidity

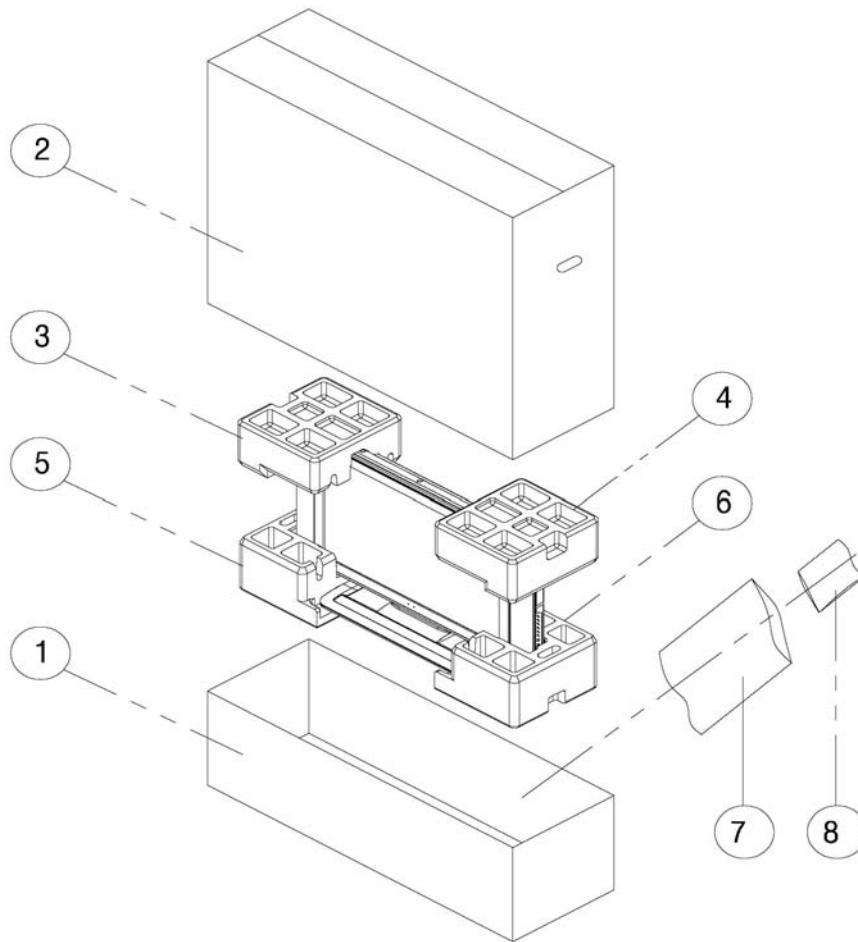
Operating	20% ~ 80% (Without condensation)
Non-Operating	10% ~ 90% (Without condensation)

CHAPTER 2

Mechanical Construction

_____ This section provides the package and exploded overview, replaceable parts list and recommendation parts list for the 32" LCD TV. You can place an order for correct parts in the recommendation parts list.

2-1 Package Overview

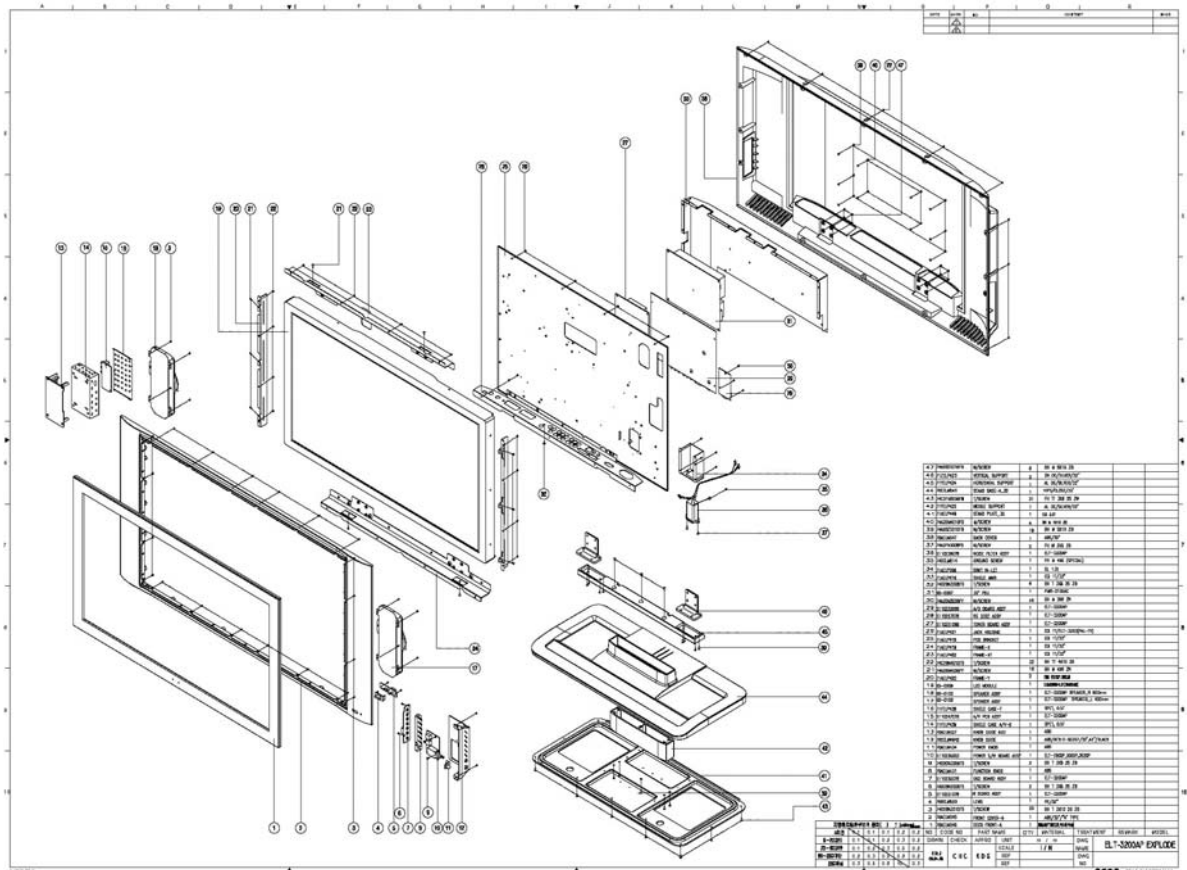


2-1.1 Replacement Parts List

No.	Code Number	Description
1	86AELB321	BOX DOWN
2	86AELB405	BOX TOP
3	93CELB317	PAD TOP-L
4	93CELB316	PAD TOP-R
5	93CELB319	PAD DOWN-L
6	93CELB318	PAD DOWN-R
7	S110231078	ACCESSORY ASSY
8	AL-00016	SILICA-GEL

2-2 Exploded Overview

1. LCD SET OVERVIEW



2-2.1 Replacement Parts List

No.	Code Number	Description
1	70AELM546	DECO FRONT-A
2	70AELM545	FRONT COVER-A
3	74B2BN3010FB	T/SCREW
4	70BELM550	LENS
5	S110221078	IR BOARD ASSY
6	74B2BN3008FB	T/SCREW
7	S110232078	OSD BOARD ASSY
8	70AELM431	FUNCTION KNOB
9	74B2CN3006FB	T/SCREW
10	S110235003	POWER S/W BOARD ASSY
11	70AELM434	POWER KNOB
12	70CELM4942	KNOB GUIDE
13	70AELM527	KNOB GUIDE AUD
14	71FELP439	SHIELD CASE A/V-B
15	S110247078	A/V PCB ASSY
16	71FELP438	SHIELD CASE-T
17	60-0103	SPEAKER ASSY(L)
18	60-0102	SPEAKER ASSY(R)
19	65-0059	LCD MODULE
20	71AELP420	FRAME-Y
21	74A2BN4006FY	M/SCREW
22	74C2BN4010FB	T/SCREW
23	71AELP482	FRAME-XT
24	71AELP419	FRAME-X
25	71AELP418	PCB BRACKET
26	71AELP421	JACK HOUSING
27	S110221099	TUNER BOARD ASSY
28	S110227078	RS 232C ASSY
29	S110220099	A/D BOARD ASSY
30	74A2BN3006FY	M/SCREW
31	60-0097	32" PSU
32	74B2BN3008FB	T/SCREW
33	71AELP416	SHIELD MAIN
34	71AELP366	BRKT IN-LET
35	74GELM014	GROUND SCREW

No.	Code Number	Description
36	S110238078	NOISE FILTER ASSY
37	74A2FN3008FB	M/SCREW
38	70AELM547	BACK COVER
39	74A9BZ5010FB	M/SCREW
40	74A2BN4010FB	M/SCREW
41	71AELP449	STAND PLATE_32
42	71YELP425	MIDDLE SUPPORT
43	74C2FN3008FW	T/SCREW
44	70CELM549	STAND BASE-A_32
45	71YELP424	HORIZONTAL SUPPORT
46	71ZELP423	VERTICAL SUPPORT
47	74A9BZ5016FB	M/SCREW

2-3 Recommendation **Spare Parts List**

2-3.1 Spare Parts List

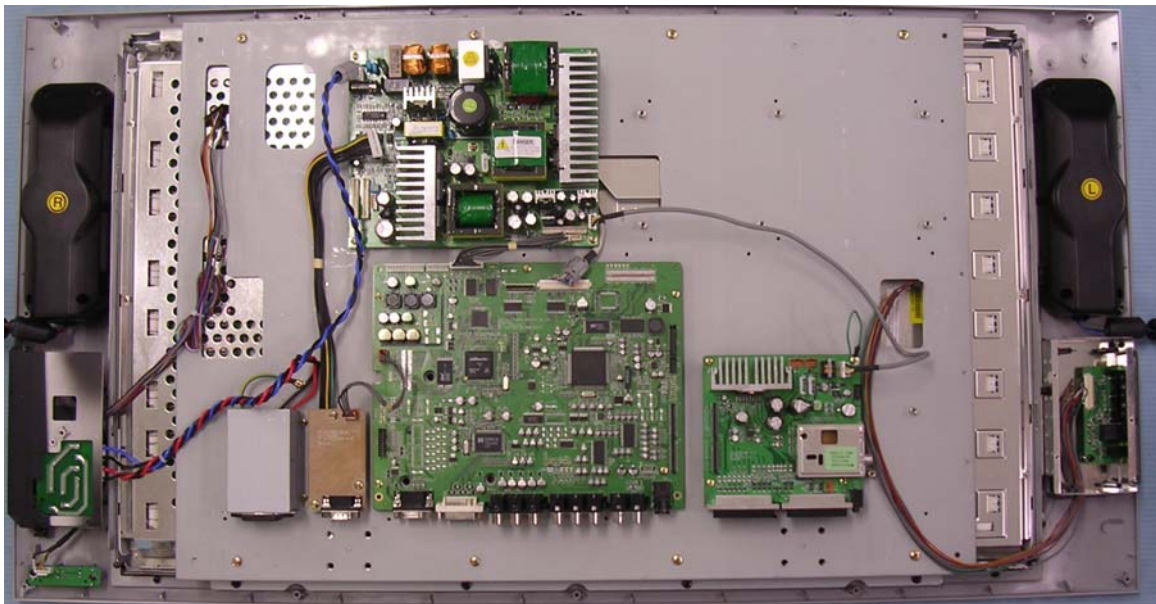
No.	Code number		Description	Remark
1		S110220099	A/D BOARD ASSY	CM
2		S110221099	TUNER BOARD ASSY	CM
3		60-0097	P.S.U ASSY	CM
4		S110223078	OSD ASSY	CM
5		S110221078	IR BOARD ASSY	CM
6		S110224078	A/V ASSY	CM
7		S110227078	RS-232C ASSY	CM
8				
9				
10				
11				
12				
13				
14				
15				
16				

Note: SW = Swap Spare Parts, CM = Consume Spare Parts. You can place an order for swap or consume spare parts to do replacement. Or just return swap spare parts back for repair, but consume spare parts is not acceptable for repair or return.

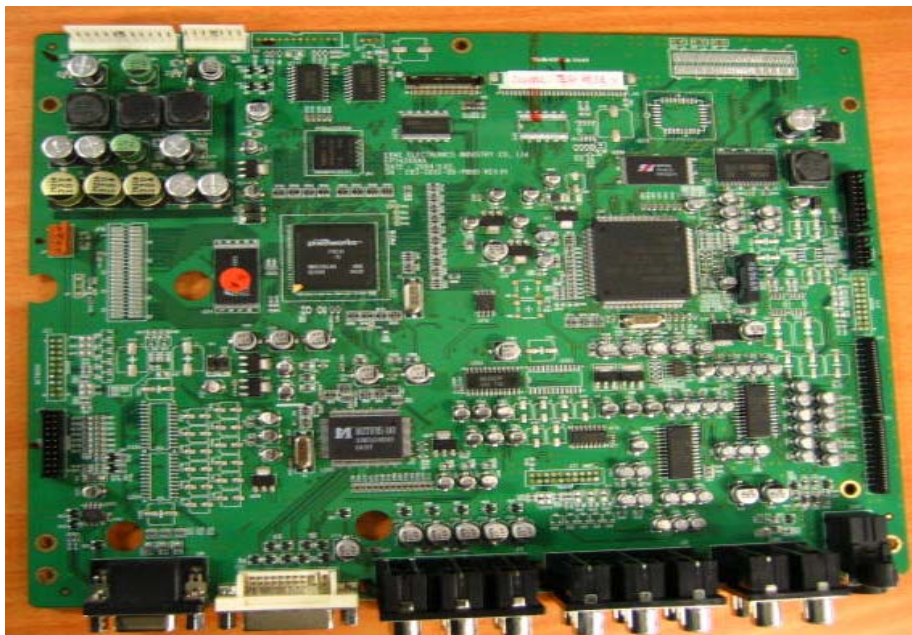
SW is repairable; when it's defective please return back the defective but complete parts

to swap for good parts. Regarding CM, it's not repairable and you should give the order to do replacement and discard the defective parts directly.

2-3.2 Parts Illustration



1. A/D BOARD ASSY



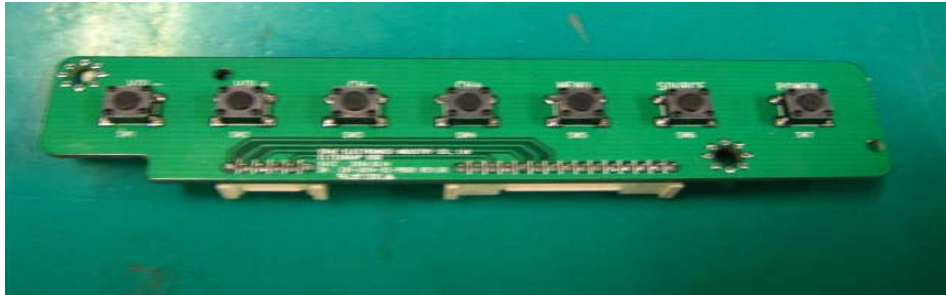
2. Tuner B/D Assy



3. Power B/D Assy



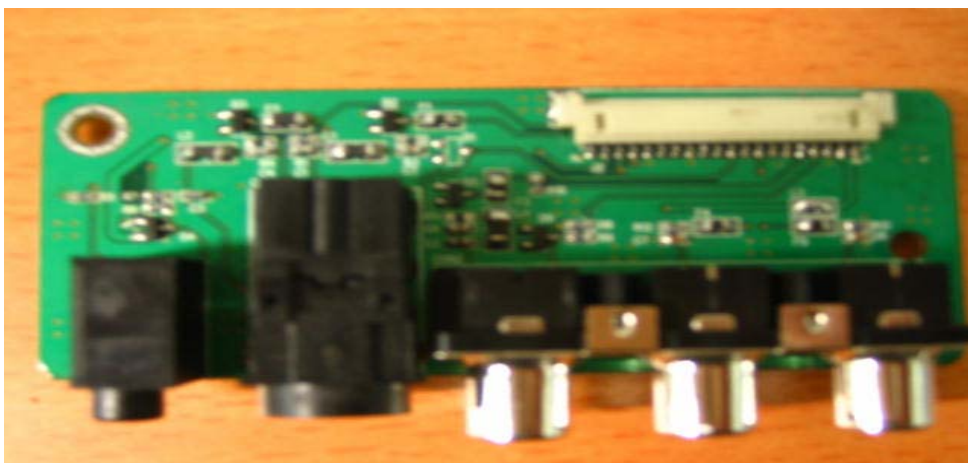
4.OSD B/D ASSY



5. IR B/D ASSY



6. A/V B/D ASSY



7. RS-232C ASSY



CHAPTER 3

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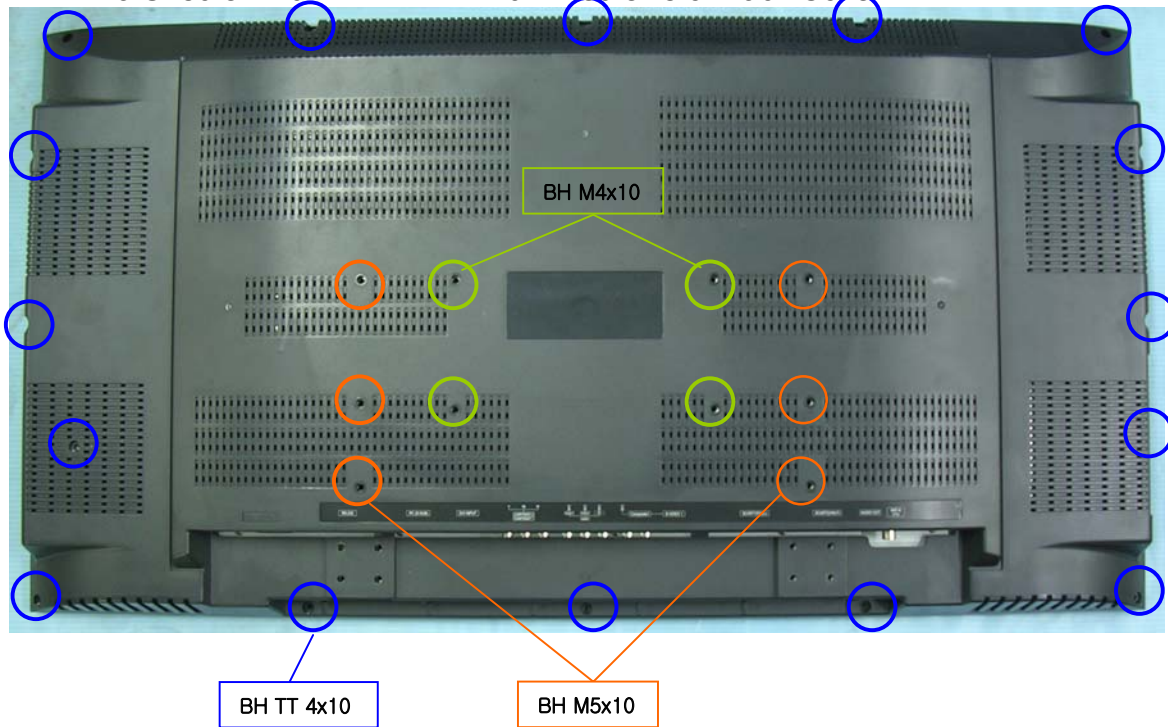
Disassembly Procedure

_____ This section provides disassembly procedures for 32" LCD TV. Before you begin any of these procedures, be sure to turn off the power and other attached devices; then disconnect the power cable from the electronically outlet. Moreover, when you disassemble the LCD TV, be sure to put the screws in a safe place and separate them according to grouping. _____

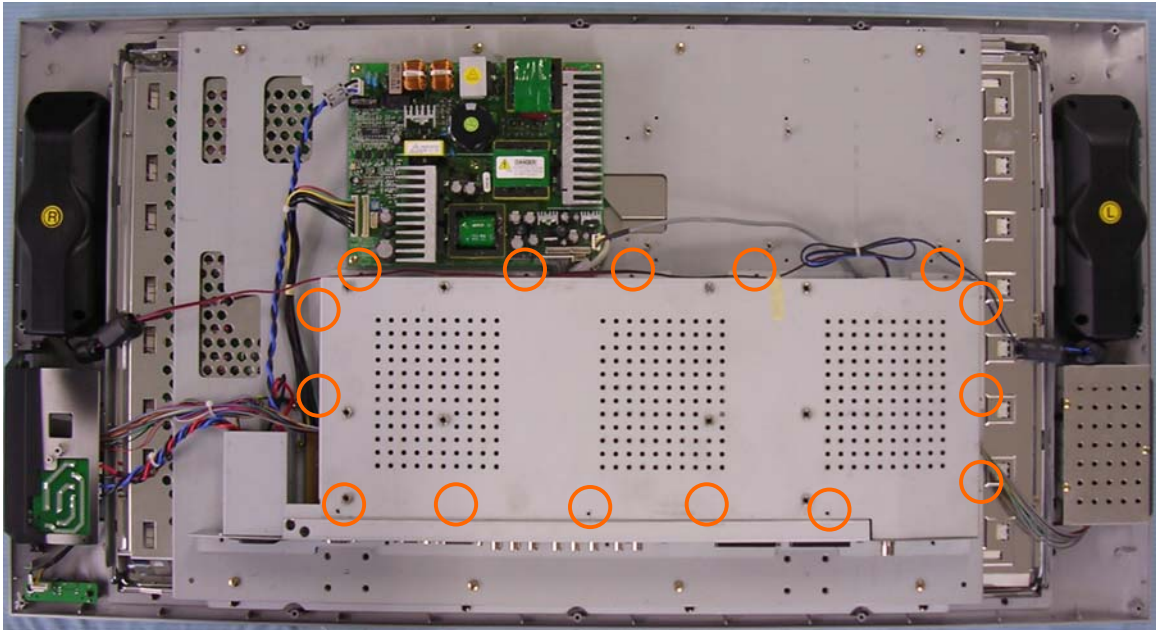
3-1 Disassemble Back Cover and Jack Housing

- 1.

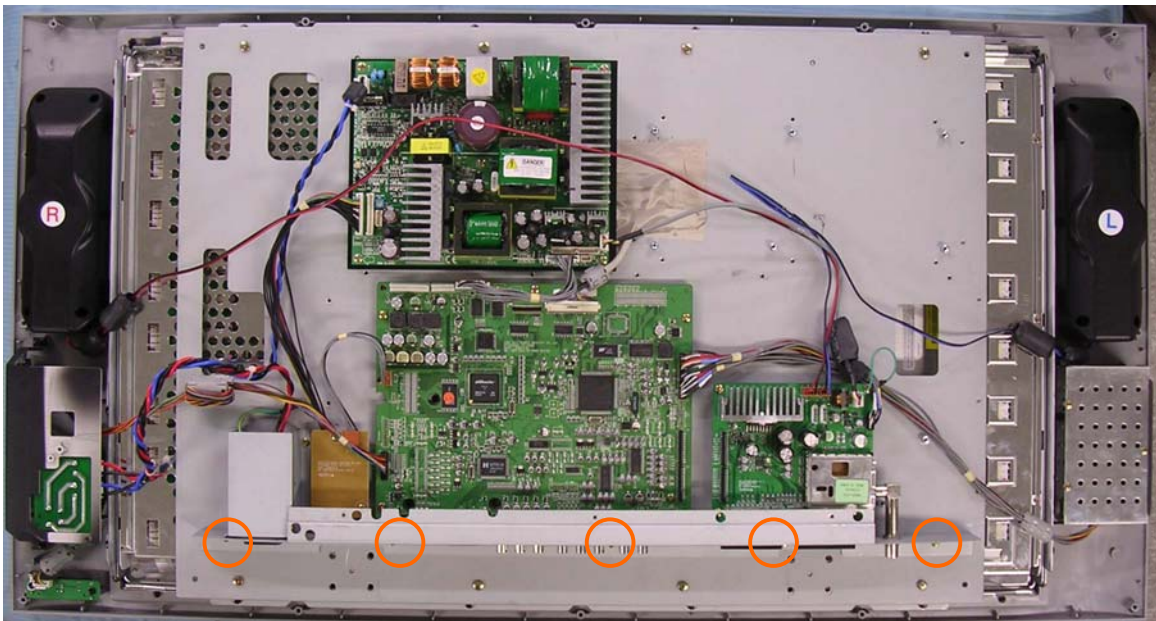
- 1-1 Unscrew 4EA BH M 4X10 ZB screws of Back Cover
- 1-2 Unscrew 6EA BH M 5X10 ZB screws of Back Cover
- 1-3 Unscrew 26EA BH TT 4X10 ZB screws of Back Cover



- 2. Unscrew 15EA BH M 3X6 ZN screws of PCB Bracket.

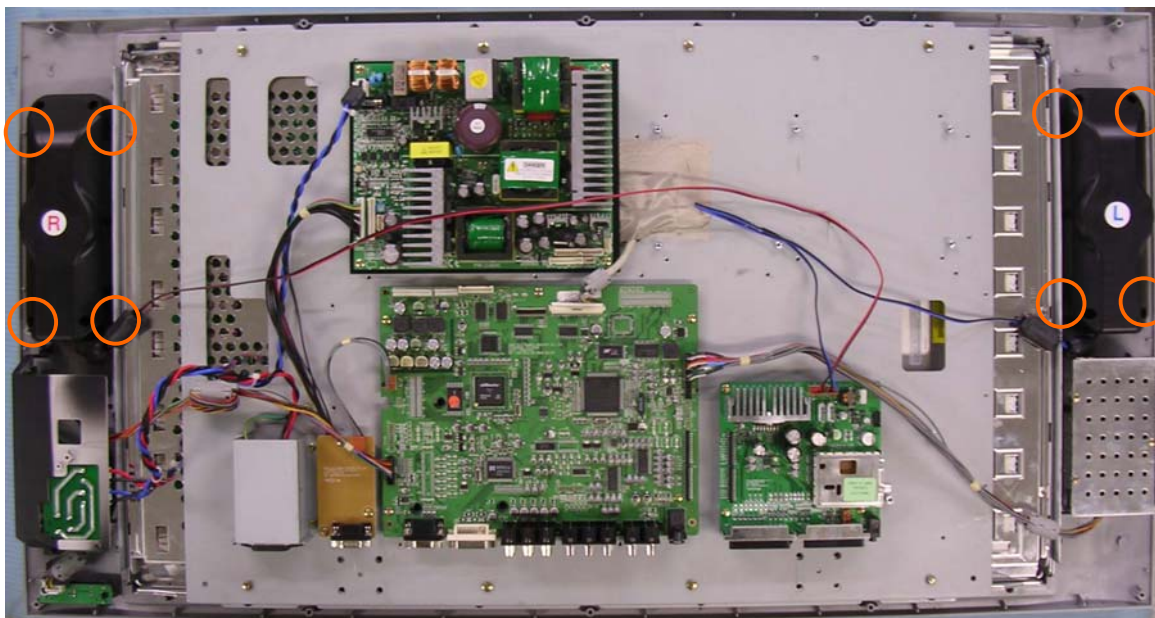


3. Unscrew 5EA BH M 3X6 ZN screws of Jack Housing.

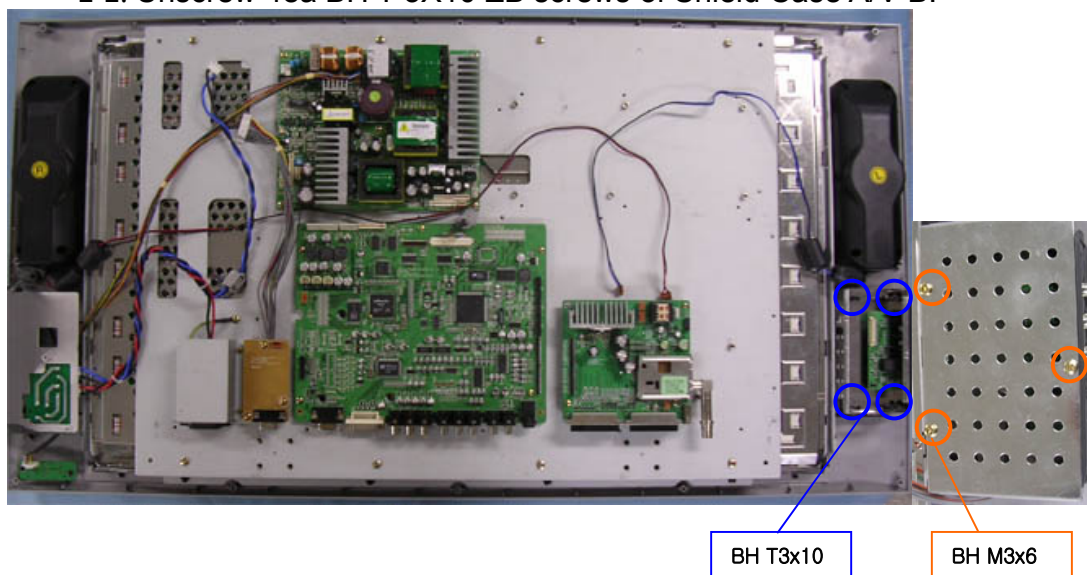


3-2 Disassemble parts and board

1. Unscrew 8EA BH T 3X10 2S ZB screws of Two Side Speakers and Wires.

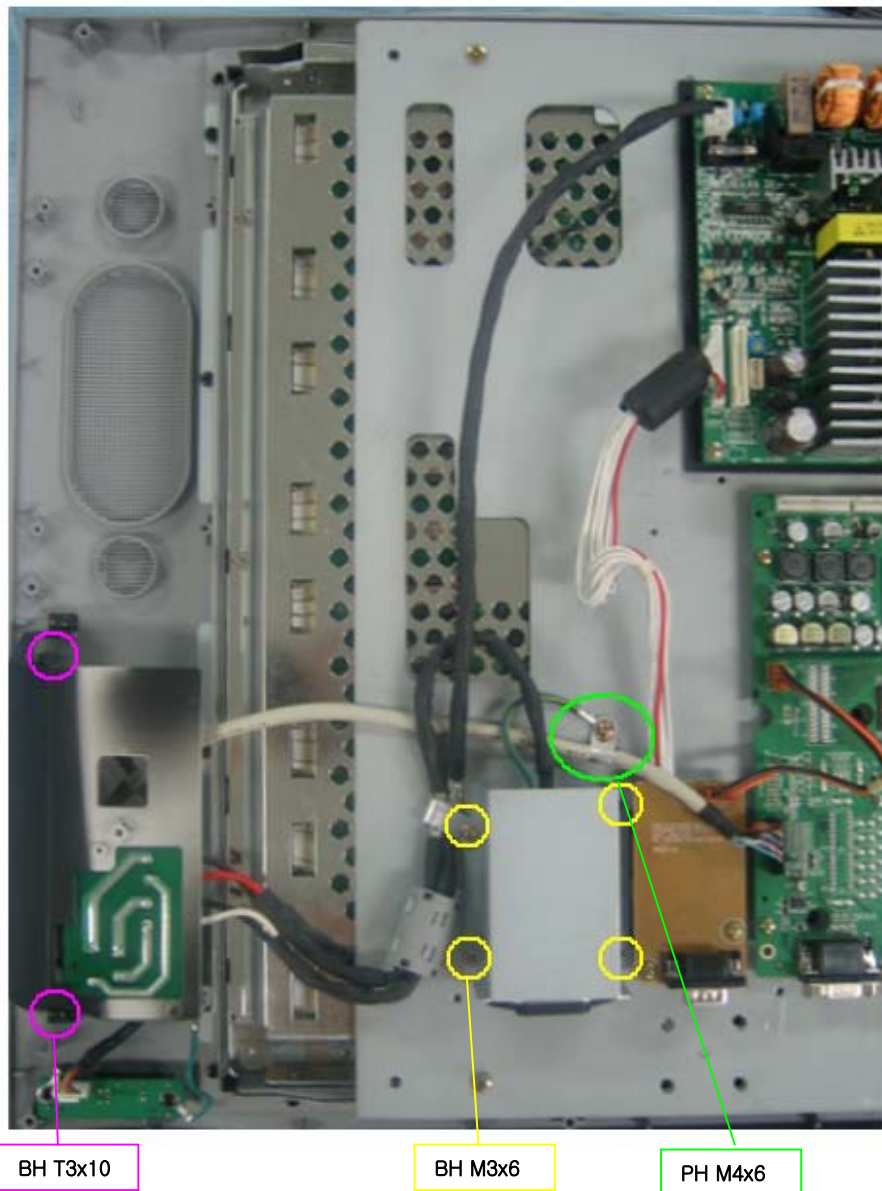


2.
 - 2-1. Unscrew 3ea BH M 3X6 ZN screws of AV Shield Case T.
 - 2-2. Unscrew 4ea BH T 3X10 ZB screws of Shield Case A/V-B.

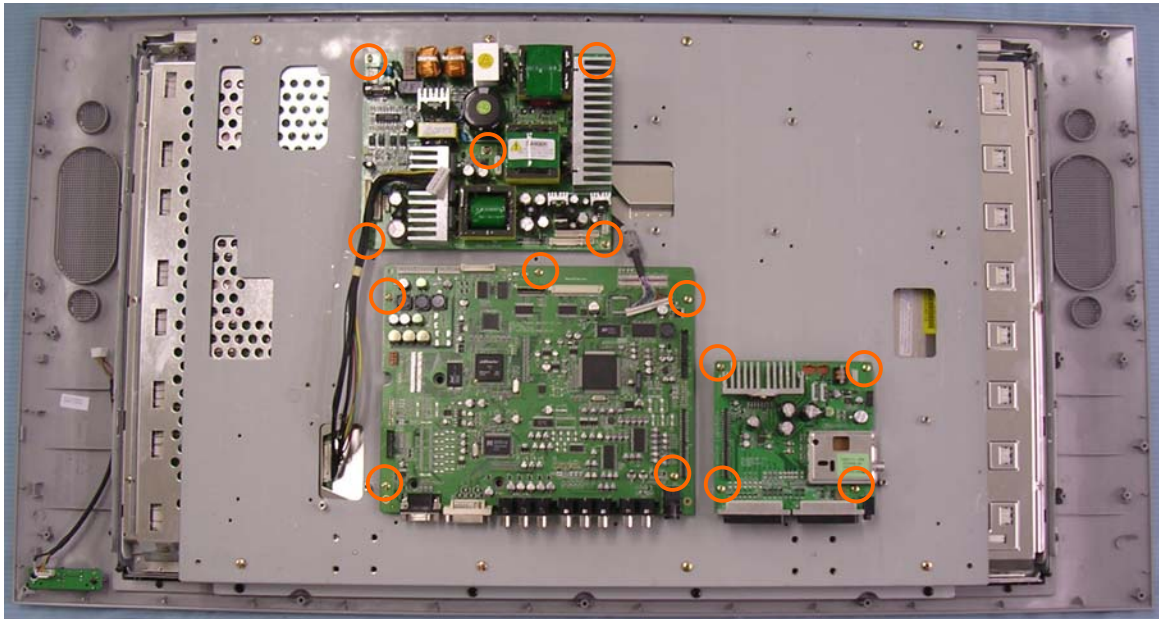


- 3.

- 3-1. Unscrew 2ea BH T 3X10 ZB screws of Knob Guide.
- 3-2. Unscrew 1ea PH M 4X6(Special) screws of Power Noise Filter Ground Cable.
- 3-3. Unscrew 4ea BH M 3X6 ZN screws of Bracket Inlet.



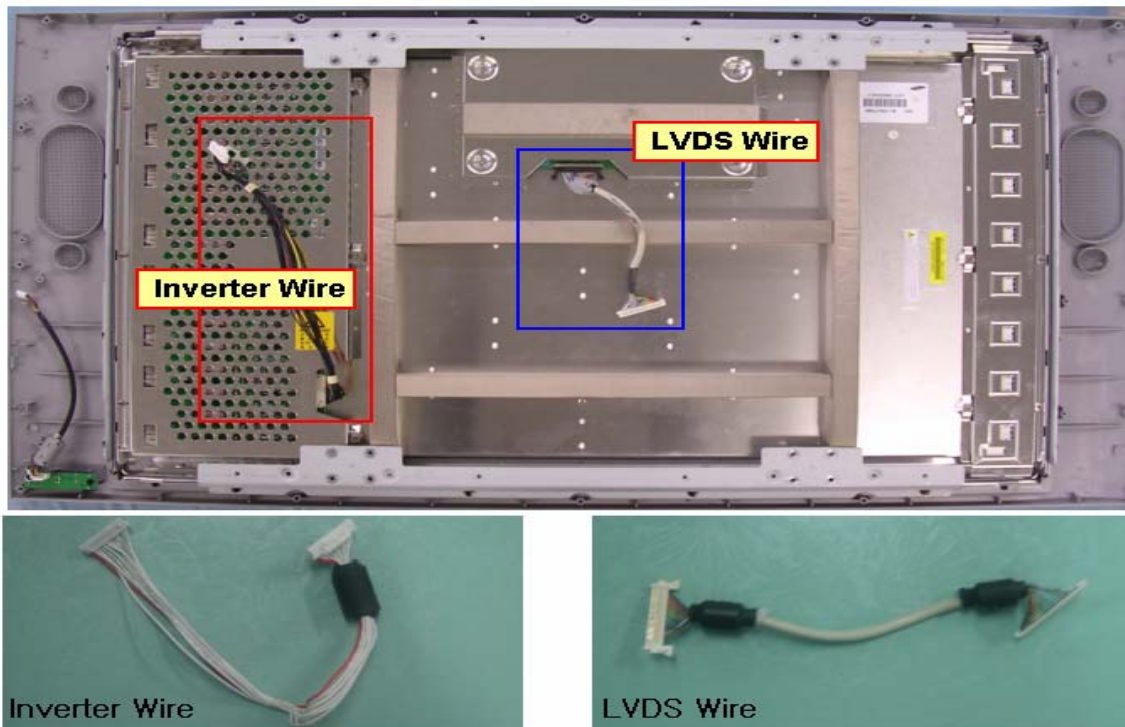
4. Unscrew 14ea BH M 3X6 ZN screws of Board.



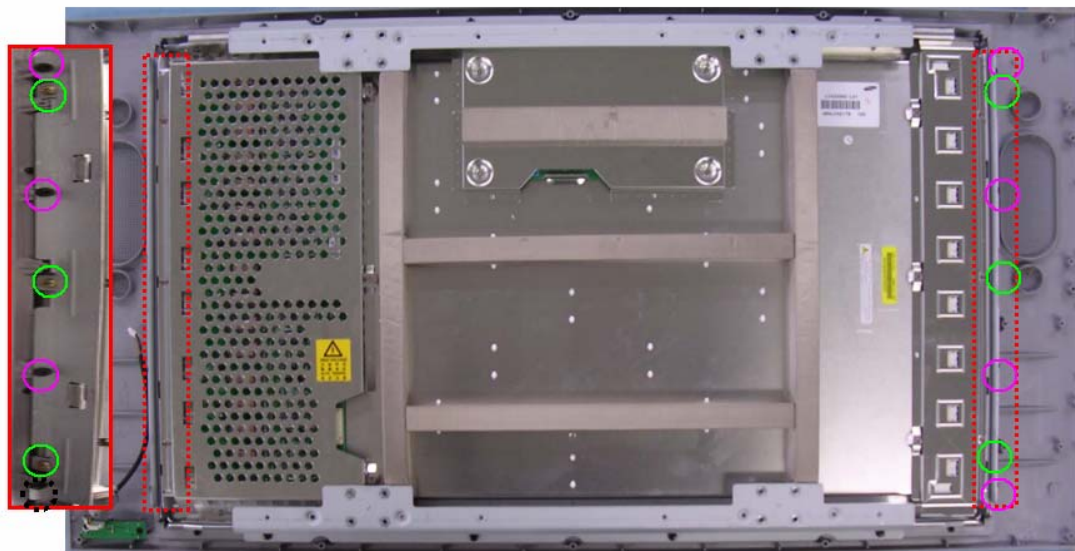
5. Unscrew 8ea BH M 4X6 ZN screws of PCB Bracket.



6. Disassembly to LVDS, INVERTER Wire

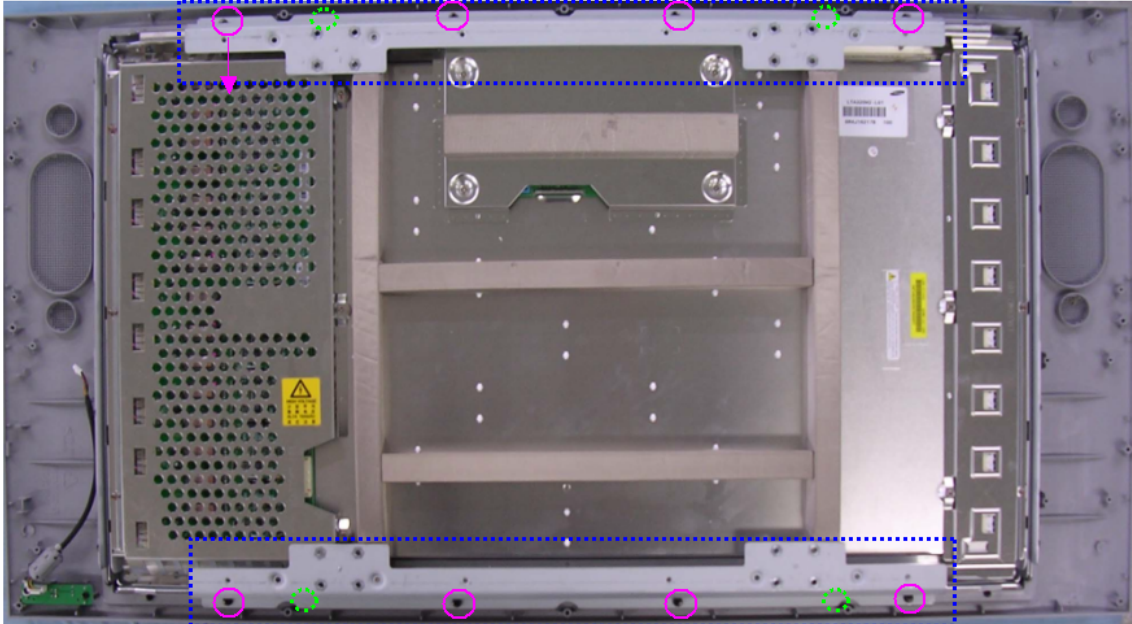


7.
 - 7-1 Unscrew 6 m/screw of Frame-Y
 - 7-2 Unscrew 8 t/screw of Frame-Y



8.
 - 8-1 Unscrew 4 m/screw of Frame-XT &Frame-X

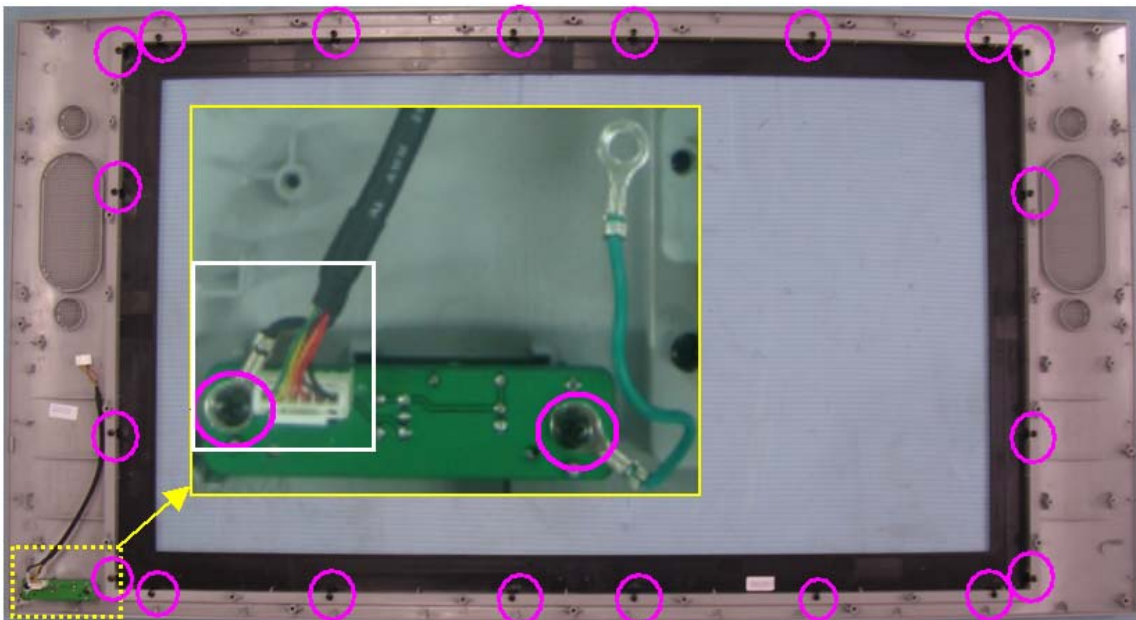
8-2 Unscrew 8 t/screw of Frame-XT &Frame-X



9.

9-1 Unscrew 2 m/screws of IR PCB.

9-2 Unscrew 20 t/screws of Front cover & Deco front.



CHAPTER 4

Function of Boards

_____ This section provides each connector location on boards, signal and function of each board. They will be useful for your detecting the defective boards. _____

4-1 VSC Board

4-1.1 The Location of Connector



4-1.2 J17: RS232C CONNECTOR

Pin No	I/O	Specification	Description
1 (GND)			RS232C GROUND PORT
2 (Rx)	I		RS232C RECEIVE DATA PORT
3 (Tx)	O		RS232C TRANSMIT DATA PORT
4 (5V)	I	5V	RS232C POWER PORT

4-1.3 J10: LVDS CONNECTOR

Pin No	I/O	Specification	Description
1 (N.C)			NOT CONNECTED
2 (VCC)	O		VCC 5V
3 (VCC)	O		VCC 5V
4 (VCC)	O		VCC 5V
5 (VCC)	O		VCC 5V
6 (VCC)	O		VCC 5V
7 (GND)			GROUND

8 (GND)	O		GROUND
9 (GND)	O		GROUND
10 (N.C)	O		NOT CONNECTED
11 (OP)	O		LVDS OPTION
12 (N.C)	O		NOT CONNECTED
13 (GND)			GROUND
14 (RX3+)	O		LVDS OUT 3-
15(RX3-)	O		LVDS OUT 3+
16(GND)			GROUND
17 (RXCLK+)	O		LVDS CLOCK +
18(RXCLK-)	O		LVDS CLOCK -
19(GND)			GROUND
20(RX2+)	O		LVDS OUT 2+
21(RX2-)	O		LVDS OUT 2-
22(GND)			GROUND
23(RX1+)	O		LVDS OUT 1+
24(RX1-)	O		LVDS OUT 1-
25(GND)			GROUND
26(RX0+)	O		LVDS OUT 0+
27(RX0-)	O		LVDS OUT 0-
28(GND)			GROUND
29(N.C)			NOT CONNECTED
30(N.C)			NOT CONNECTED

4-1.4 J15: OSD Board Connector

Pin No	I/O	Specification	Description
1 (POWER)		5V	LOCAL KEY INPUT PORT FOR POWER
2 (SOURCE)	I	5V / 0V	LOCAL KEY INPUT PORT FOR SOURCE
3 (MENU)	I	5V / 0V	LOCAL KEY INPUT PORT FOR MENU
4 (CH+)	I	5V / 0V	LOCAL KEY INPUT PORT FOR CH+
5 (CH-)	I	5V / 0V	LOCAL KEY INPUT PORT FOR CH-
6 (VOL+)	I	5V / 0V	LOCAL KEY INPUT PORT FOR VOL+
7 (VOL-)	I	5V / 0V	LOCAL KEY INPUT PORT FOR VOL-
8 (GND)			

9 (LED-G)	O	5V / 0V	GREEN LED: High Active
10 (LED-R)	O	5V / 0V	RED LED: High Active
11(REMOCON)	I	5V / 0V	Monitor transmitter signal input port
12 (GND)			LOCAL KEY INPUT PORT FOR CH-
13 (VSS5)	I	5V	
14(GND)			
15(GND)			
16~20(NC)			

4-1.5 J14: VSC TO TUNER B/D CONNECTOR 1

Pin No	I/O	Specification	Description
1 (VCC12)	I	12V	12V INPUT
2 (VCC12)	I	12V	12V INPUT
3 (VTT5)	I	5V	5V INPUT
4 (GND)			
5(AMP_L_OUT)	I		AMP_L_OUTPUT
6 (GND)			
7 (AMP_R_OUT)	I		AMP_R_OUTPUT
8 (GND)			
9 (S_MUTE)	I		SOUND MUTE PORT
10 (GND)			
11 (AMP_STBY)	I		AMP STAND BY OUTPUT
12(RF SW)	I		RF SWITCH SELECT
14,16,18, 20,22,24 (GND)			
13,15,17,19 21,23 (N.C)			
24(ETS MUTE)	I		EXTERNAL SOUND MUTE

4.1-6 J24: VSC TO TUNER B/D CONNECTOR 2

Pin No	I/O	Specification	Description
1 (SCART_R)	O	V	SCART RGB_R
2 (GND)			
3 (SCART_G)	O		SCART RGB_G
4 (GND)			
5 (SCART_B)	O		SCART RGB_B
6 (GND)			
7 (SCART FB)	O		SCART FB

8 (GND)			
9 (H_CVBS_L_OUT)	O		HALF SCART CVBS L OUT
10 (GND)			
11 (H_CVBS_R_OUT)	O		HALF SCART CVBS R OUT
12 (GND)			
13 (F_CVBS_L_OUT)	O		FULL SCART CVBS L OUT
14 (GND)			
15 (F_CVBS_L_OUT)	O		FULL SCART CVBS R OUT
16 (GND)			
17 (H_SC_L_IN)	I		HALF SCART L IN
18 (GND)			
19 (H_SC_R_IN)	I		HALF SCART R IN
20 (GND)			
21 (F_SC_L_IN)	I		FULL SCART L IN
22 (GND)			
23 (F_SC_R_IN)	I		FULL SCART R IN
24 (GND)			

4-1.7 J13: VSC TO TUNER B/D CONNECTOR 3

Pin No	I/O	Specification	Description
1 (GND)			
2 (IF+)	O		IF+ OUTPUT PORT
3 (GND)			
4 (IF-)	O		IF- OUTPUT PORT
5 (GND)			
6 (SDA3)	O		DATA LINE
7 (GND)			
8 (SCL3)	O		CLOCK LINE
9 (GND)			
10 (TAGC)	O		TAGC OUTPUT PORT

4-1.8 J16: VSC TO SUB AV CONNECTOR

Pin No	I/O	Specification	Description
1 (VCC5)		5V	5V INPUT
2 (VCC5)		5V	5V INPUT

3 (GND)			
4 (AV2_CVBS_DET)	I	5V / 0V	CVBS2 DETECTING PORT
5 (AV2_CVBS_IN)	I		CVBS2 INPUT PORT
6 (GND)			
7 (AV2_L_IN)	I		CVBS2 AUDIO_L_INPUT
8 (AV2_R_IN)	I		CVBS2 AUDIO_R_INPUT
9 (GND)			
10 (S-VIDEO2_DET)	I	5V / 0V	S-VIDEO2 DETECTING PORT
11(S-VIDEO2_LU_OUT)	I		S-VIDEO2 LUMINANCE INPUT PORT
12 (S-VIDEO2_CH)	I		S-VIDEO2 CHROMINANCE INPUT PORT
13 (GND)			
14(N.C)			
15(N.C)			
16(GND)			
17(HEAD_MUTE_IN)	I		HEADPHONE MUTE INPUT PORT
18(HP_L)	O		HEADPHONE_L_OUTPUT PORT
19(HP_R)	O		HEADPHONE_R OUTPUT PORT
20(GND)			

4-1.6 J6: LCD Power Connector

Pin No	I/O	Specification	Description
1 (12V)	I	12V	VSC 12V Input
2 (12V)	I	12V	VSC 12V Input
3 (AC DET)	I	5V/0V	AC POWER DETECT PORT : AC POWER ON → High , AC POWER OFF → LOW
4 (GND)		GND	Ground
5 (VDD5)	I	5V	VSC 5V Input
6 (VDD5)	I	5V	VSC 5V Input
7 (5V STBY)	I	5V	5V INPUT PORT FOR VSC STANDBY
8 (GND)		GND	Ground
9 (BRI-ADJ)	O	BRI-ADJ	LCD Brightness Adjustment
10 (GND)		GND	Ground
11 (BK-ON)	O	BK-ON	LCD Backlight ON
12(POWERON/OFF)	O	POW ON/OFF	POWER ON_OFF Control

4-2 TUNER Board

4-2.1 The Location of Connector



4-2.2 J4: VSC TO TUNER B/D CONNECTOR 1

Pin No	I/O	Specification	Description
1 (VCC12)	I	12V	12V INPUT
2 (VCC12)	I	12V	12V INPUT
3 (VTT5)	I	5V	5V INPUT
4 (GND)			
5(AMP_L_OUT)	I		AMP_L_OUTPUT
6 (GND)			

7 (AMP_R_OUT)	I		AMP_R_OUTPUT
8 (GND)			
9 (S_MUTE)	I		SOUND MUTE PORT
10 (GND)			
11 (AMP_STBY)	I		AMP STAND BY OUTPUT
12,14,16,18, 20,22,24 (GND)			
13,15,17,19 21,23 (N.C)			

4.2-3 J6: VSC TO TUNER B/D CONNECTOR 2

Pin No	I/O	Specification	Description
1 (SCART_R)	O		SCART RGB_R
2 (GND)			
3 (SCART_G)	O		SCART RGB_G
4 (GND)			
5 (SCART_B)	O		SCART RGB_B
6 (GND)			
7 (SCART_FB)	O		SCART FB
8 (GND)			
9 (H_CVBS_L_OUT)	O		HALF SCART CVBS L OUT
10 (GND)			
11 (H_CVBS_R_OUT)	O		HALF SCART CVBS R OUT
12 (GND)			
13 (F_CVBS_L_OUT)	O		FULL SCART CVBS L OUT
14 (GND)			
15 (F_CVBS_R_OUT)	O		FULL SCART CVBS R OUT
16 (GND)			
17 (H_SC_L_IN)	I		HALF SCART L IN
18 (GND)			
19 (H_SC_R_IN)	I		HALF SCART R IN
20 (GND)			
21 (F_SC_L_IN)	I		FULL SCART L IN
22 (GND)			
23 (F_SC_R_IN)	I		FULL SCART R IN
24 (GND)			

4-2.4 J7: VSC TO TUNER B/D CONNECTOR 3

Pin No	I/O	Specification	Description
1,3,5,7,9 (GND)			
2 (IF+)	O		IF+ OUTPUT PORT
4 (IF-)	O		IF- OUTPUT PORT
6 (SDA3)	O		DATA LINE
8 (SCL3)	O		CLOCK LINE
10 (TAGC)	O		TAGC OUTPUT PORT

4-2.5 J3: Audio Power Connector

Pin No	I/O	Specification	Description
1 (24V)	I	24V	Audio AMP POWER INPUT PORT
2 (24V)	I	24V	Audio AMP POWER INPUT PORT
3 (GND)		0V	Audio AMP POWER GROUND PORT
4 (GND)		0V	Audio AMP POWER GROUND PORT

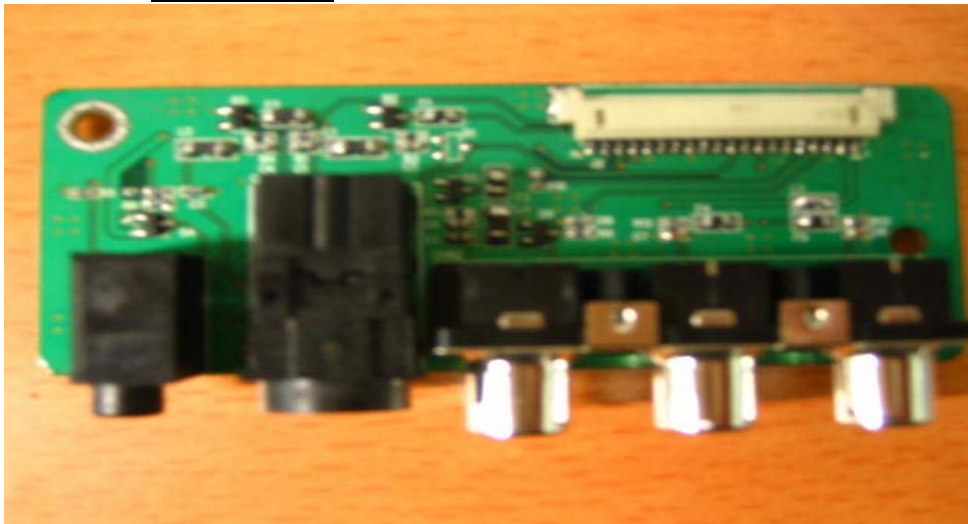
4-2.6 J1: Audio out Connector

Pin No	I/O	Specification	Description
1 (R_OUT1)	O		Audio AMP RIGHT OUTPUT PORT1(8Ω)
2 (R_OUT2)	O		Audio AMP RIGHT OUTPUT PORT2 (8Ω)
3 (R GND)			Audio AMP RIGHT GROUND PORT
4 (R GND)			Audio AMP RIGHT GROUND PORT

4-2.7 J2: Audio out Connector

Pin No	I/O	Specification	Description
1 (L GND)			Audio AMP LEFT GROUND PORT
2 (L OUT1)	O		Audio AMP LEFT OUTPUT PORT1(8Ω)
3 (L OUT2)	O		Audio AMP LEFT OUTPUT PORT2(8Ω)

4-3 SUB AV Board



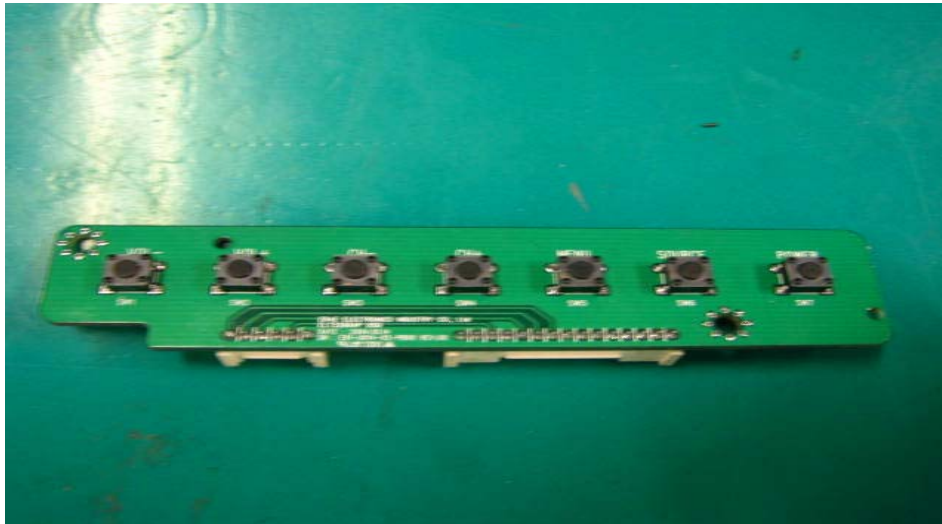
4-3.1 J2: SUB AV Board Connector

Pin No	I/O	Specification	Description
1 (VCC5)		5V	5V INPUT
2 (VCC5)		5V	5V INPUT
3,6,9,13,16,20(GND)			
4 (AV2_CVBS_DET)	I	5V / 0V	CVBS2 DETECTING PORT
5 (AV2_CVBS_IN)	I		CVBS2 INPUT PORT
7 (AV2_L_IN)	I		CVBS2 AUDIO_L_INPUT
8 (AV2_R_IN)	I		CVBS2 AUDIO_R_INPUT
10 (S-VIDEO2_DET)	I	5V / 0V	S-VIDEO2 DETECTING PORT
11	I		S-VIDEO2 LUMINANCE INPUT PORT

(S-VIDEO2_LU_OUT)			
12 (S-VIDEO2_CH)	I		S-VIDEO2 CHROMINANCE INPUT PORT
14,15(N.C)			
17 (HEAD_MUTE_IN)	I		HEADPHONE MUTE INPUT PORT
18(HP_L)	O		HEADPHONE_L_OUTPUT PORT
19(HP_R)	O		HEADPHONE_R OUTPUT PORT

4-4 **OSDBoard**

4-5



4-4.1 P1: OSD Board Connector 1

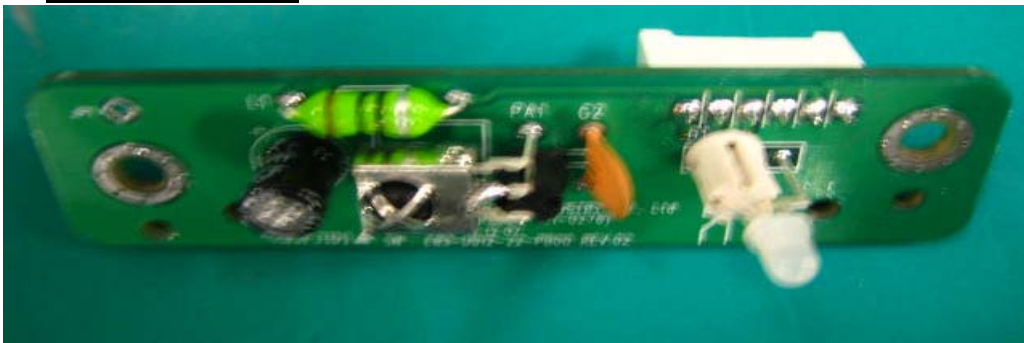
Pin No	I/O	Specification	Description
1 (GND)			
2 (GND))			
3 (5V_REMOCON)	I	5V	Monitor transmitter 5V input port
4 (GND)			
5 (IRRCVR)	O	5V / 0V	Monitor transmitter signal input port

6 (LED_R)	I	5V / 0V	RED LED OUTPUT : High Active
7 (LED_G)	I	5V / 0V	GREEN LED OUTPUT : High Active
8 (GND)			
9 (VOL-)	O	5V / 0V	LOCAL KEY INPUT PORT FOR VOL-
10 (VOL+)	O	5V / 0V	LOCAL KEY INPUT PORT FOR VOL+
11(CH-)	O	5V / 0V	LOCAL KEY INPUT PORT FOR CH-
12 (CH+)	O	5V / 0V	LOCAL KEY INPUT PORT FOR CH+
13 (MENU)	O	5V / 0V	LOCAL KEY INPUT PORT FOR MENU
14(SOURCE)	O	5V / 0V	LOCAL KEY INPUT PORT FOR SOURCE
15(POWER)	O	5V / 0V	LOCAL KEY INPUT PORT FOR POWER

4-4.2 P2: OSD Board Connector 2

Pin No	I/O	Specification	Description
1(LED_G)	I	5V / 0V	GREEN LED OUTPUT : High Active
2(LED_R)	I	5V / 0V	RED LED OUTPUT : High Active
3(IRRCVR)	O	5V / 0V	Monitor transmitter signal input port
4(GND)			
5(5V_REMOCON)	I	5V	Monitor transmitter 5V input port
6(GND)			

4-5 IR & LED Board



4-5.1 P1: IR & LED Board Connector

Pin No	I/O	Specification	Description
1(LED_G)	I	5V / 0V	GREEN LED OUTPUT : High Active
2(LED_R)	I	5V / 0V	RED LED OUTPUT : High Active
3(IRRCVR)	O	5V / 0V	Monitor transmitter signal input port
4(GND)			
5(5V_REMOCON)	I	5V	Monitor transmitter 5V input port

6(GND)			
--------	--	--	--

4-6 **RS232C Board**

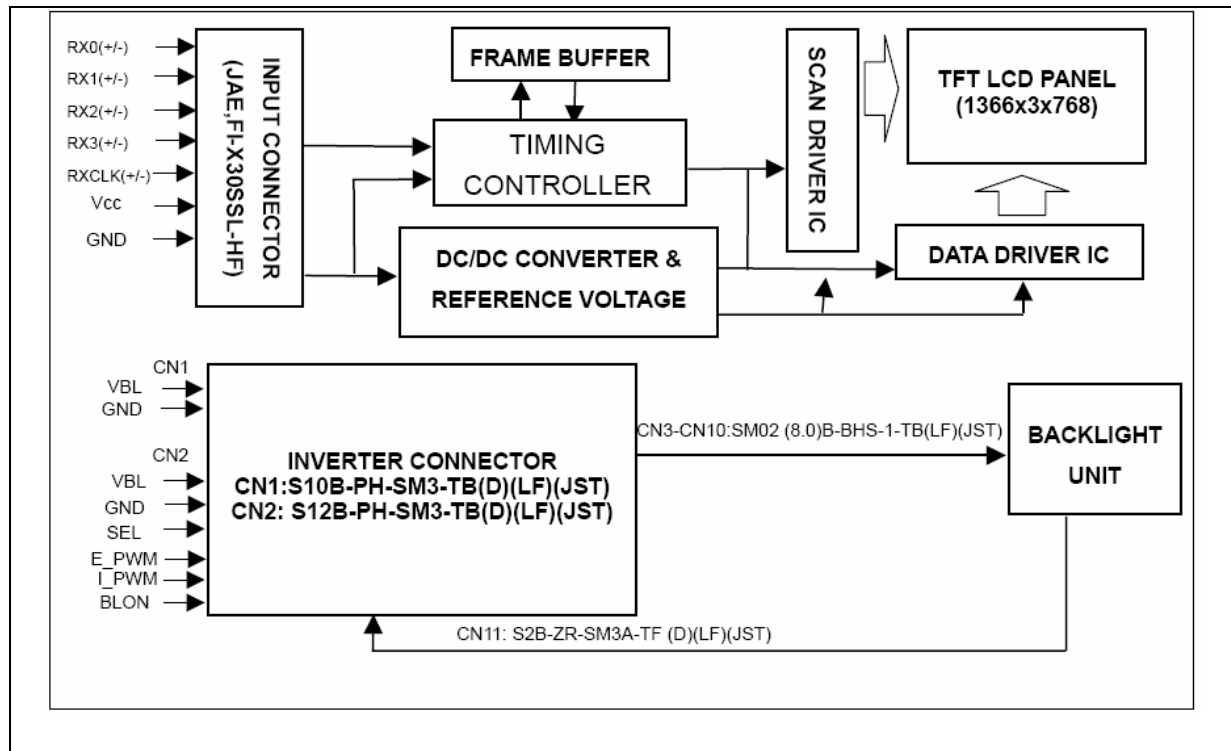


4-6.1 J3: RS-232 Connector

Pin No	I/O	Specification	Description
1 (GND)		0V	RS232C GROUND PORT
2 (Rx)	I		RS232C RECEIVE DATA PORT
3 (Tx)	O		RS232C TRANSMIT DATA PORT
4 (5V)	I	5V	RS232C POWER PORT

4-8 **LCD Module**

4-8.1 BLOCK DIAGRAM



4-8.2 LVDS Input Signal Connector INPUT CONNECTOR FI-X30SSL-HF(JAE)

Pin No.	Symbol	Description	Note
1	GND	Ground	
2	RPF	Display Rotation	(3)
3	SELLVDS	Select LVDS data format	(5)
4	NC	No Connection	(2)
5	NC	No Connection	
6	ODSEL1	Overdrive Lookup Table Selection	(4)
7	ODSEL2	Overdrive Lookup Table Selection	
8	GND	Ground	
9	RX0-	Negative transmission data of pixel 0	
10	RX0+	Positive transmission data of pixel 0	
11	RX1-	Negative transmission data of pixel 1	
12	RX1+	Positive transmission data of pixel 1	
13	RX2-	Negative transmission data of pixel 2	
14	RX2+	Positive transmission data of pixel 2	
15	RXCLK-	Negative of clock	
16	RXCLK+	Positive of clock	
17	RX3-	Negative transmission data of pixel 3	
18	RX3+	Positive transmission data of pixel 3	
19	GND	Ground	
20	GND	Ground	
21	GND	Ground	
22	GND	Ground	
23	GND	Ground	
24	GND	Ground	
25	GND	Ground	
26	VCC	Power supply: +5V	
27	VCC	Power supply: +5V	
28	VCC	Power supply: +5V	
29	VCC	Power supply: +5V	
30	VCC	Power supply: +5V	

4-8.3 Inverter Input Signal Connector

CN1(Header): S10B-PH-SM3-TB(D)(LF)(JST) or equivalent.

Pin No.	Symbol	Description
1	VBL	+24V Power input
2		
3		
4		
5		
6	GND	Ground
7		
8		
9		
10		

CN2(Header): S12B-PH-SM3-TB(D)(LF)(JST) or equivalent..

Pin No.	Symbol	Description
1	VBL	+24V Power input
2		
3		
4		
5	NC	NC
6	GND	Ground
7		
8		
9	SEL	Internal/external PWM selection High : external dimming Low : internal dimming
10	E_PWM	External PWM control signal E_PWM should be connected to low when internal PWM was selected (SEL = low).
11	I_PWM	Internal PWM control signal I_PWM should be connected to ground when external PWM was selected (SEL = high).
12	BLON	Backlight on/off control

CN3-CN10(Header): SM02(8.0)B-BHS-1-TB(LF)(JST)

Pin No.	Symbol	Description
1	CCFL HOT	CCFL high voltage
2	CCFL HOT	CCFL high voltage

CN11(Header): S2B-ZR-SM3A-TF(D)(LF)(JST) or equivalent

Pin No.	Symbol	Description
1	CCFL COLD	CCFL low voltage (+)
2	CCFL COLD	CCFL low voltage (-)

CHAPTER 5

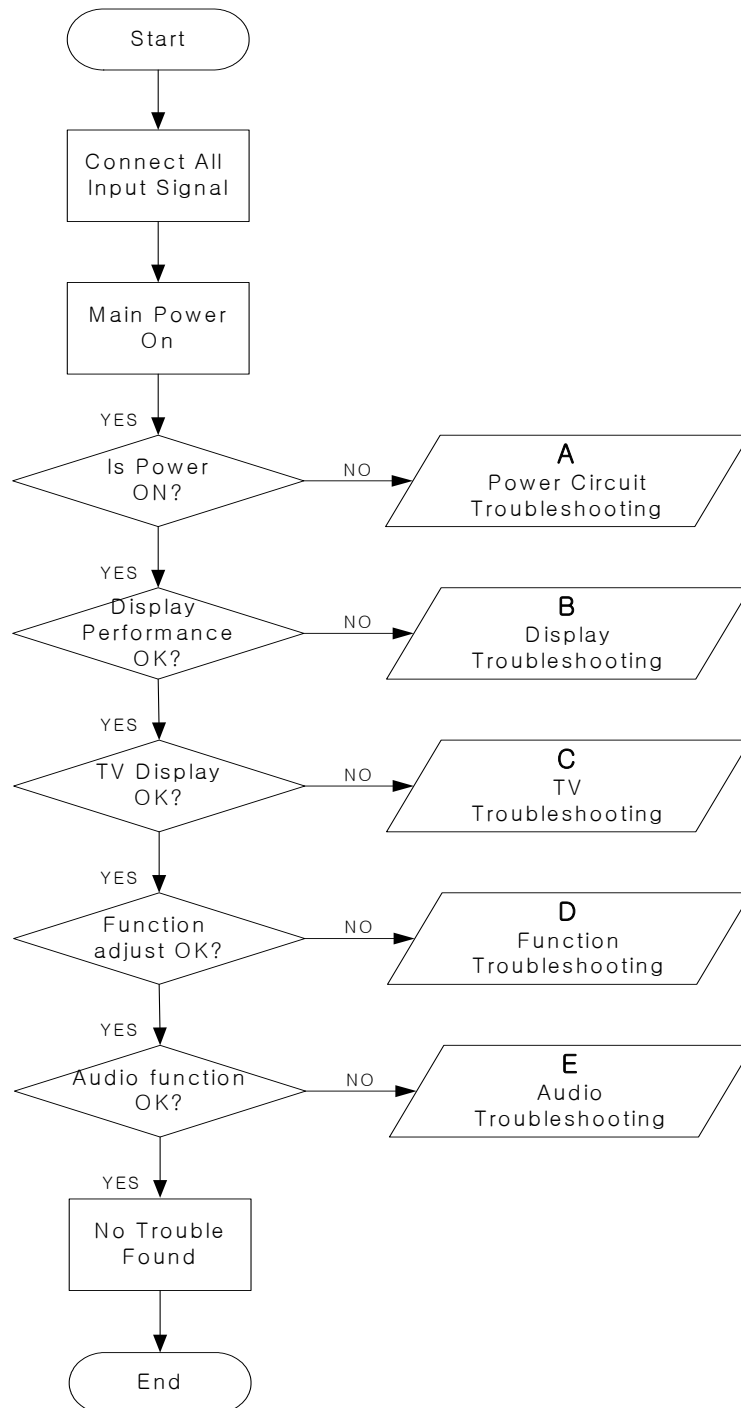
Troubleshooting Procedure

_____ *This chapter provides technicians and people who have an electronic background a primary description about maintaining the product. Moreover, you can get the appropriate operation to solve some complicated problems of component repairing and professional problems.* _____

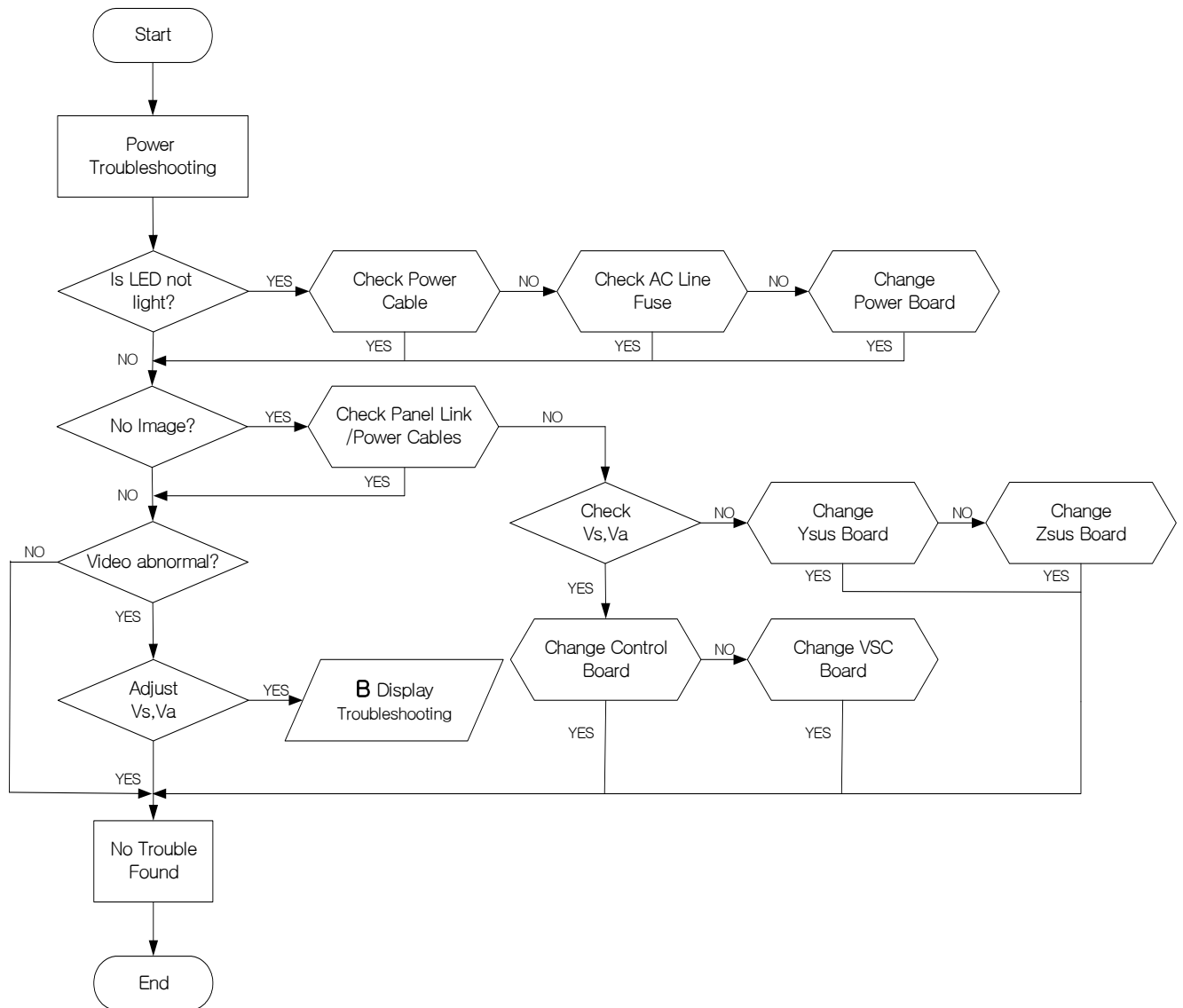
5-1 **Equipment Needed**

- ☐ ELT-3220AP
- ☐ Pattern Generator
- ☐ Volt meter
- ☐ Screw Driver

5-2 Main Procedure



5-2.1 A. Power Circuit Troubleshooting



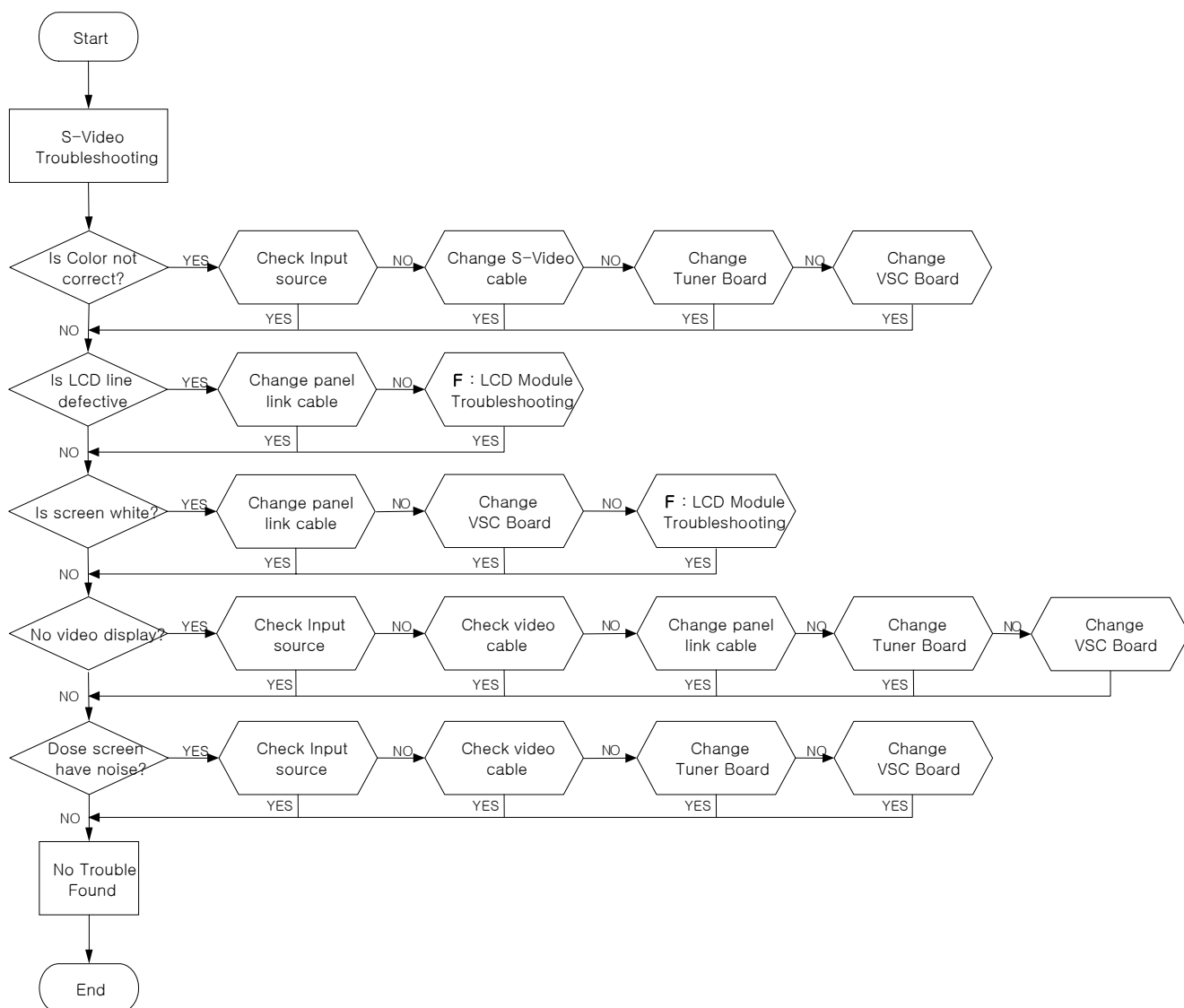
5-2.2 B-1. Analog/Digital RGB Troubleshooting



5-2.3 B-2. Composite/Component Video Troubleshooting



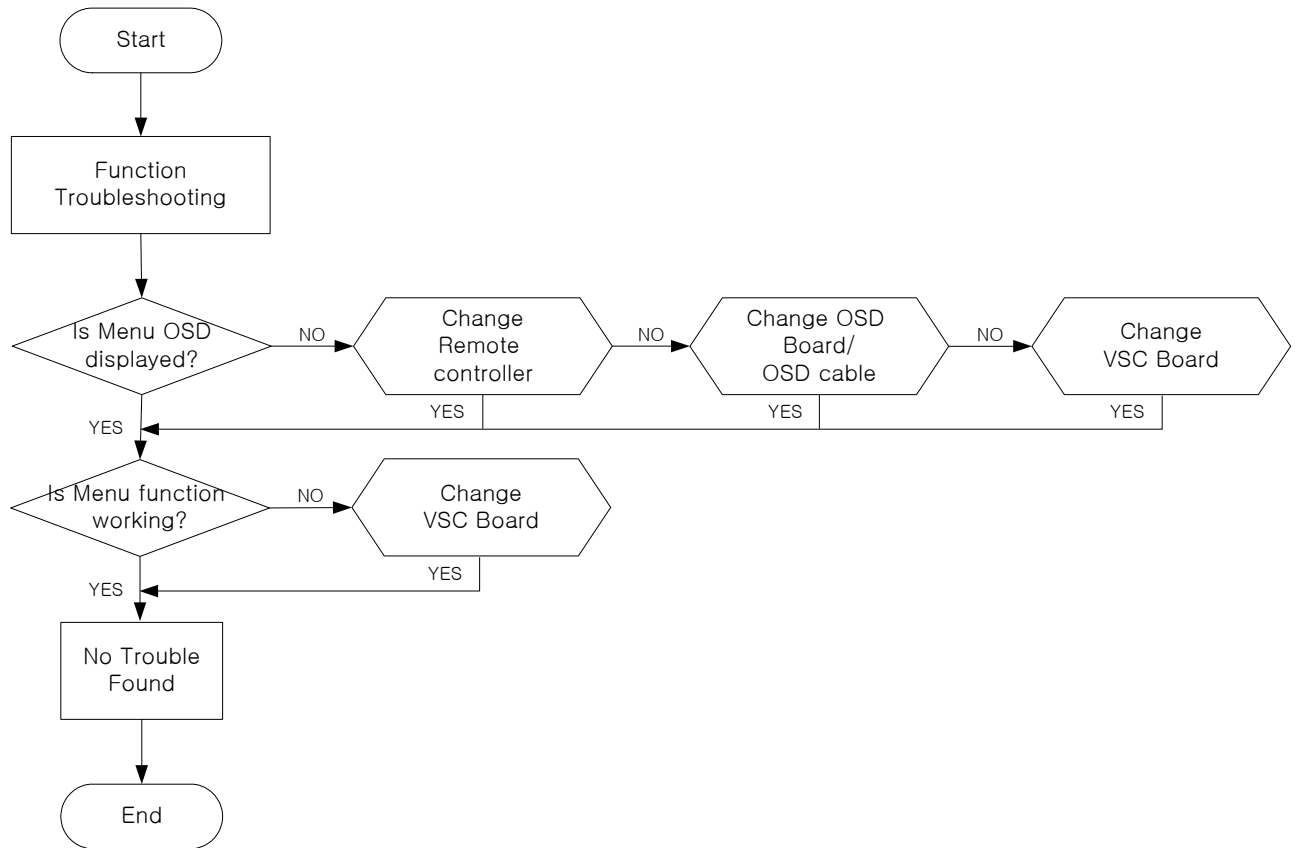
5-2.4 B-3. S-Video Troubleshooting



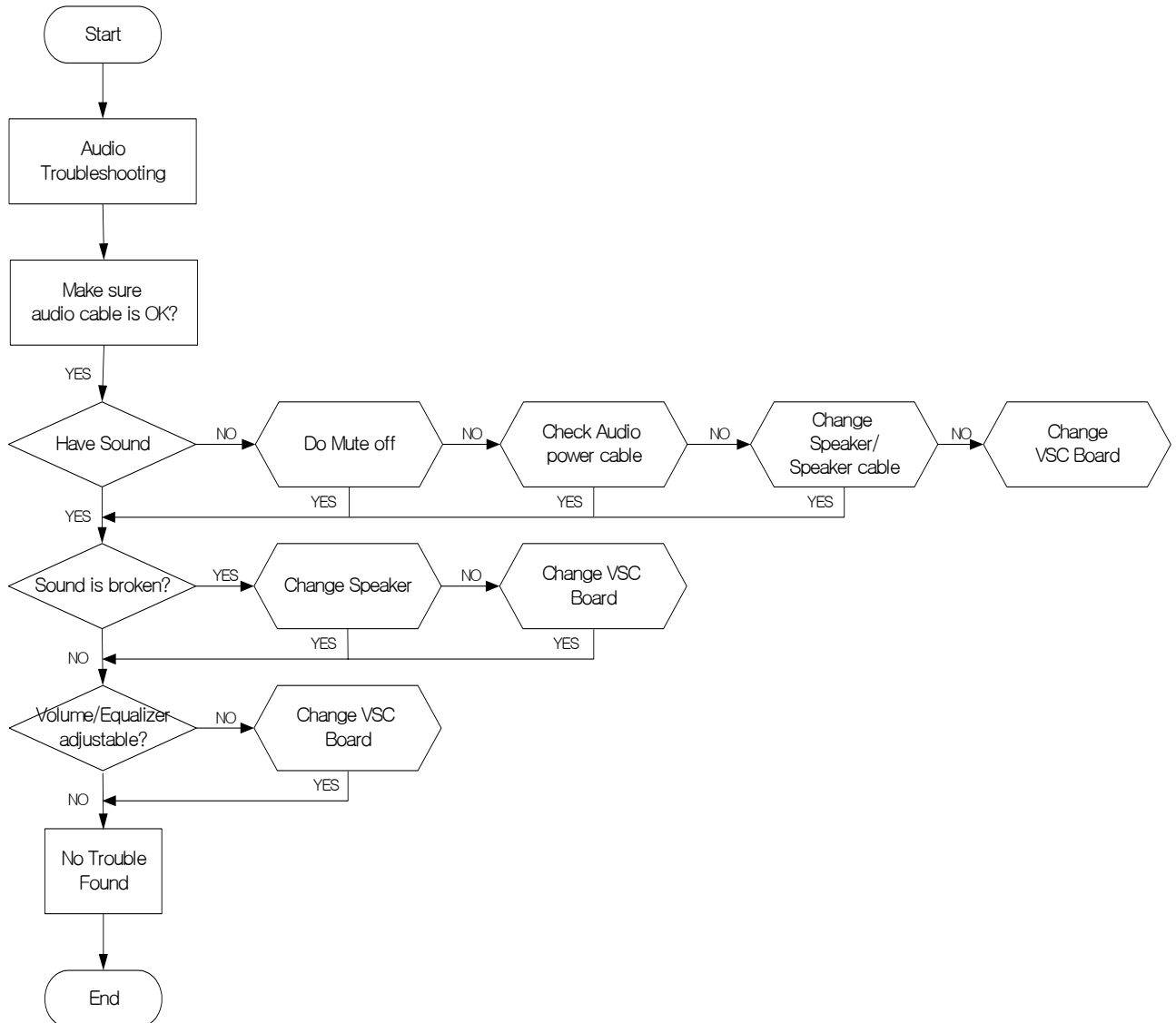
5-2.5 C. TV Troubleshooting



5-2.6 D. Function Troubleshooting



5-2.7 E. Audio Troubleshooting



CHAPTER 6

Panel Specification

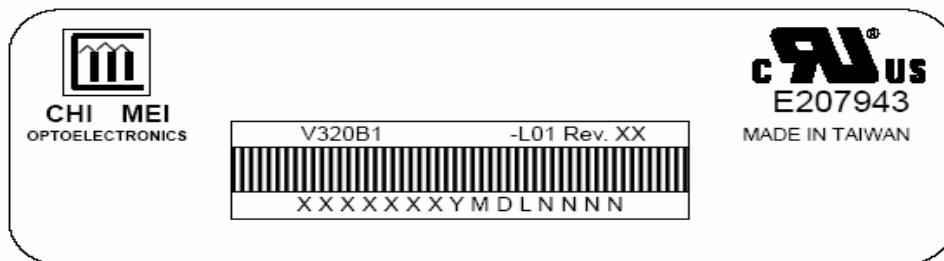
_____ *This chapter provides the 32" LCD panel specification, including optical characteristics and dot defects. All information is for your reference.* _____

6-1 General Specifications

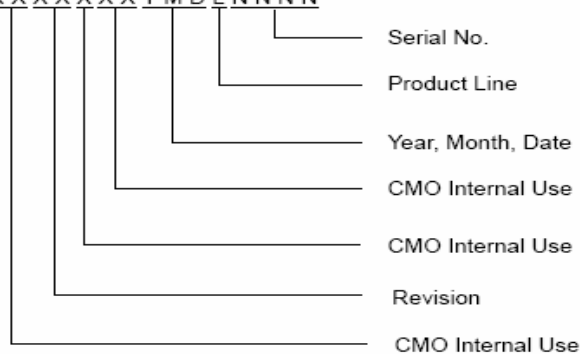
Item	Specification
Display area	708.954.(H) x 398.592 (V)
Driver Element	a-si active matrix
Aspect ratio	16:9
Number of pixels	1366 (H) x 768 (V) (1 pixels = 3 RGB cells)
Cell Pitch(Sub Pixel)	0.1730mm (H) x 0.5190m (V)
Display Color	16.7M(TRUE)
Peak brightness	Typical 550cd/m ² (Center of Screen)
Display Mode	Normally Black
Contrast ratio	Typical 1000:1 (Center of Screen)

6-2 Electrical Characteristics

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



- (a) Model Name: V320B1-L01
 (b) Revision: Rev. XX, for example: A0, A1... B1, B2... or C1, C2...etc.
 (c) Serial ID: XXXXXXYMDLNNNN



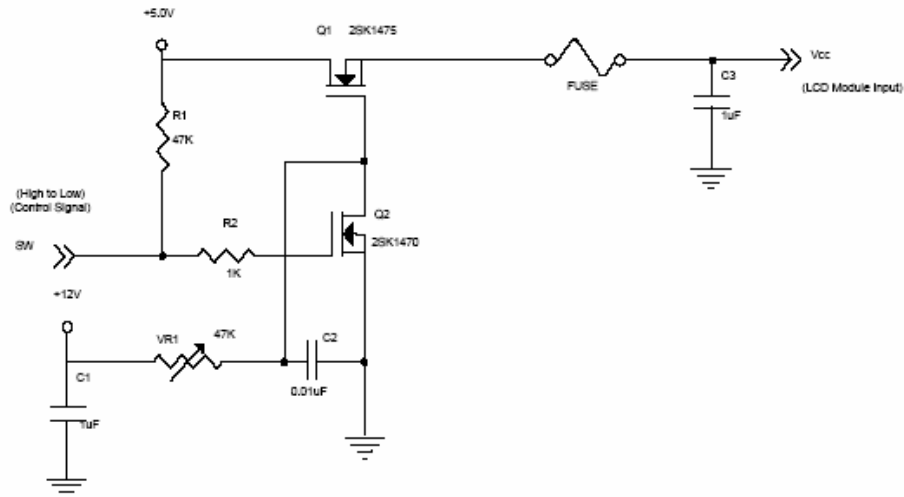
Serial ID includes the information as below:

- (a) Manufactured Date: Year: 0~9, for 2000~2009
 Month: 1~9, A~C, for Jan. ~ Dec.
 Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.
 (b) Revision Code: Cover all the change
 (c) Serial No.: Manufacturing sequence of product
 (d) Product Line: 1 -> Line1, 2 -> Line 2, ...etc.

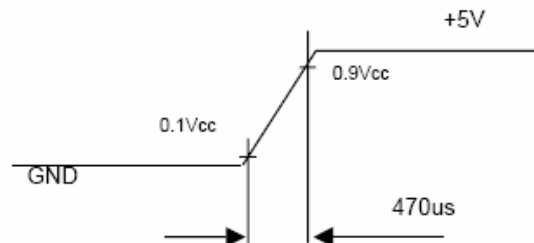
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V_{CC}	4.5	5.0	5.5	V	(1)
Power Supply Ripple Voltage		V_{RP}	-	-	100	mV	
Rush Current		I_{RUSH}	-	-	3.0	A	(2)
Power Supply Current	White	I_{CC}	-	1.48	-	A	(3)
	Black		-	0.85	-	A	
	Vertical Stripe		-	1.23	-	A	
LVDS Interface	Differential Input High Threshold Voltage	V_{LVTH}	-	-	+100	mV	
	Differential Input Low Threshold Voltage	V_{LVTL}	-100	-	-	mV	
	Common Input Voltage	V_{LVC}	1.125	1.25	1.375	V	
	Terminating Resistor	R_T	-	100	-	ohm	
CMOS interface	Input High Threshold Voltage	V_{IH}	2.7	-	3.3	V	
	Input Low Threshold Voltage	V_{IL}	0	-	0.7	V	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:



Vcc rising time is 470us



Note (3) The specified power supply current is under the conditions at $V_{CC} = 5\text{ V}$, $T_a = 25 \pm 2\text{ }^\circ\text{C}$, $f_v = 60\text{ Hz}$, whereas a power dissipation check pattern below is displayed.

a. White Pattern



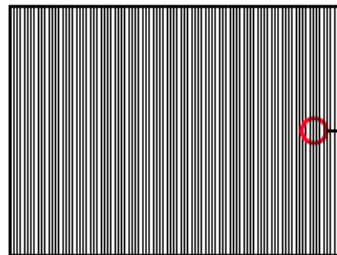
Active Area

b. Black Pattern

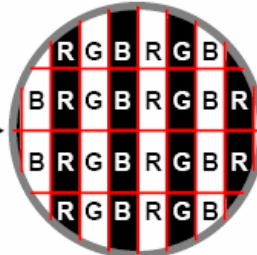


Active Area

c. Vertical Stripe Pattern



Active Area



3.2 BACKLIGHT INVERTER UNIT

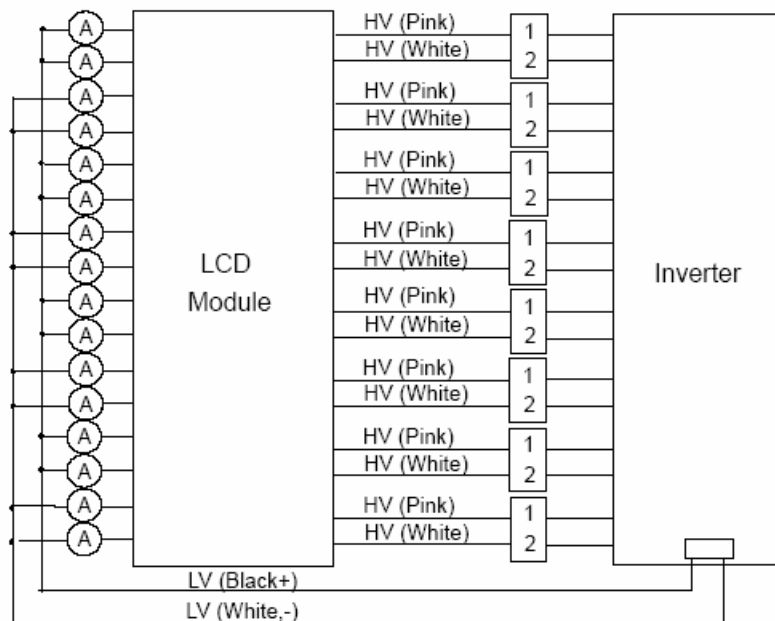
3.2.1 CCFL (Cold Cathode Fluorescent Lamp) CHARACTERISTICS ($T_a = 25 \pm 2\text{ }^\circ\text{C}$)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Voltage	V_W	-	1280	-	V_{RMS}	$I_L = 4.5\text{mA}$
Lamp Current	I_L	4.0	4.5	5.0	mA_{RMS}	(1)
Lamp Starting Voltage	V_S	-	-	2450	V_{RMS}	(2), $T_a = 0\text{ }^\circ\text{C}$
		-	-	2360	V_{RMS}	(2), $T_a = 25\text{ }^\circ\text{C}$
Operating Frequency	F_O	40	-	70	KHz	(3)
Lamp Life Time	L_{BL}	50,000	60,000	-	Hrs	(4)

3.2.2 INVERTER CHARACTERISTICS (Ta = 25 ± 2 °C)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Consumption	P _{BL}	-	103	-	W	(5),(6), I _L = 4.5mA
Input Voltage	V _{BL}	22.8	24	25.2	V _{DC}	
Input Current	I _{BL}	-	4.3	-	A	Non Dimming
Input Ripple Noise	-	-	-	500	mV _{P-P}	V _{BL} =22.8V
Backlight Turn on Voltage	V _{BS}	2450	-	-	V _{RMS}	Ta = 0 °C
		2360	-	-	V _{RMS}	Ta = 25 °C
Oscillating Frequency	F _W	61.5	62.5	63.5	kHz	
Dimming frequency	F _B	150	160	170	Hz	
Minimum Duty Ratio	D _{MIN}	-	20	-	%	

Note (1) Lamp current is measured by utilizing high frequency current meters as shown below:



Note (2) The lamp starting voltage V_S should be applied to the lamp for more than 1 second under starting up duration. Otherwise the lamp could not be lighted on completed.

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency of the display input signals, and it may result in line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) The life time of a lamp is defined as when the brightness is larger than 50% of its original value and the effective discharge length is longer than 80% of its original length (Effective discharge length is defined as an area that has equal to or more than 70% brightness compared to the brightness at the center point of lamp.) as the time in which it continues to operate under the

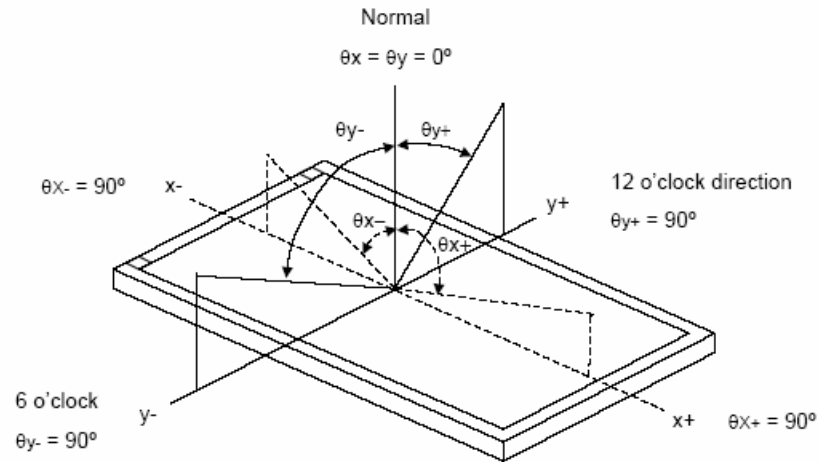
6-3 Optical Characteristics

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	800	1000	-	-	(2)
Response Time		Gray to gray average		-	8	12	ms	(3)
Center Luminance of White		L_C		450	550	-	cd/m ²	(4)
Average Luminance of White		L_{AVE}		400	450	-	cd/m ²	
White Variation		δW		-	-	1.3	-	(7)
Cross Talk		CT		-	-	4.0	%	(5)
Color Chromaticity	Red	R _x		0.622	0.652	0.682	-	(6)
		R _y		0.302	0.332	0.362	-	
	Green	G _x		0.240	0.270	0.300	-	
		G _y		0.559	0.589	0.619	-	
	Blue	B _x		0.111	0.141	0.171	-	
		B _y		0.038	0.068	0.098	-	
	White	W _x		0.255	0.285	0.315	-	
		W _y		0.263	0.293	0.323	-	
	Color Gamut		CG	72	75		%	NTSC
Viewing Angle	Horizontal	θ_{x+}	CR≥20	80	88	-	Deg.	(1)
		θ_{x-}		80	88	-		
	Vertical	θ_{y+}		80	88	-		
		θ_{y-}		80	88	-		

Note (1) Definition of Viewing Angle (θ_x , θ_y):

Viewing angles are measured by EZ-Contrast 160R (Eldim)



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

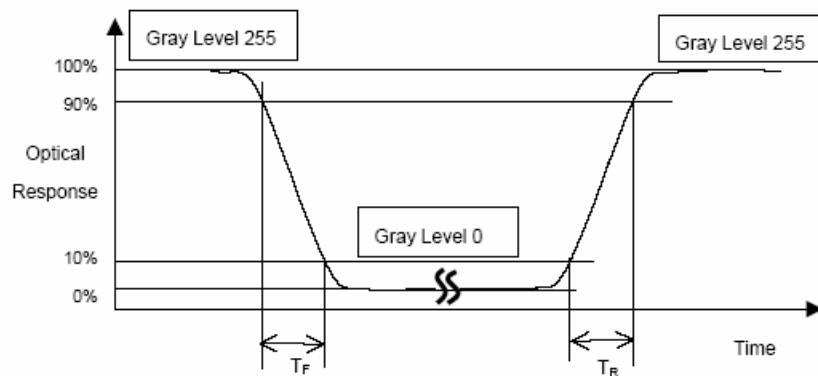
L_{255} : Luminance of gray level 255

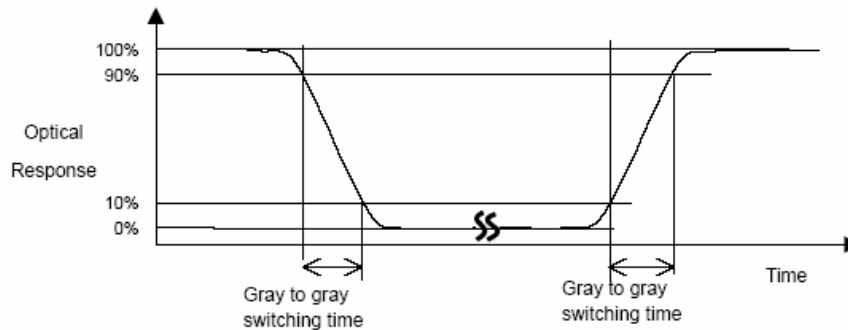
L_0 : Luminance of gray level 0

$$CR = CR(5)$$

$CR(X)$ is corresponding to the Contrast Ratio of the point X at the figure in Note (8).

Note (3) Definition of Response Time (T_R , T_F):





The driving signal means the signal of gray level 0, 63, 127, 191, 255.

Gray to gray average time means the average switching time of gray level 0, 63, 127, 191, 255 to each other.

Note (5) Definition of Luminance of White (L_C , L_{AVE}):

Measure the luminance of gray level 255 at center point and 5 points

$$L_C = L(5)$$

$$L_{AVE} = [L(1) + L(2) + L(3) + L(4) + L(5)] / 5$$

$L(x)$ is corresponding to the luminance of the point X at the figure in Note (8).

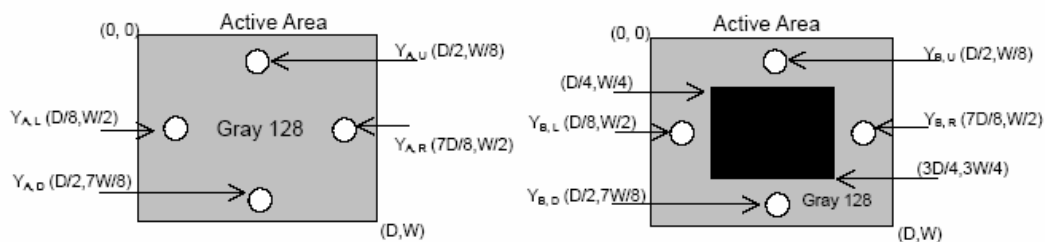
Note (6) Definition of Cross Talk (CT):

$$CT = |Y_B - Y_A| / Y_A \times 100 (\%)$$

Where:

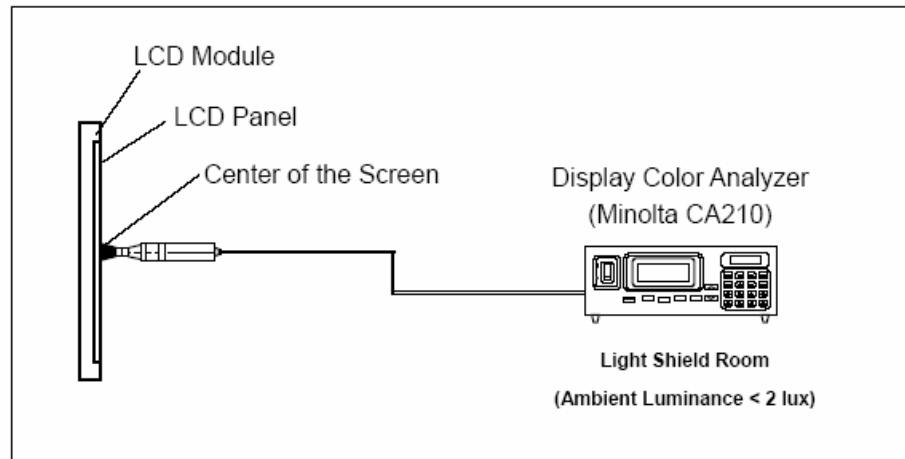
Y_A = Luminance of measured location without gray level 0 pattern (cd/m^2)

Y_B = Luminance of measured location with gray level 0 pattern (cd/m^2)



Note (7) Measurement Setup:

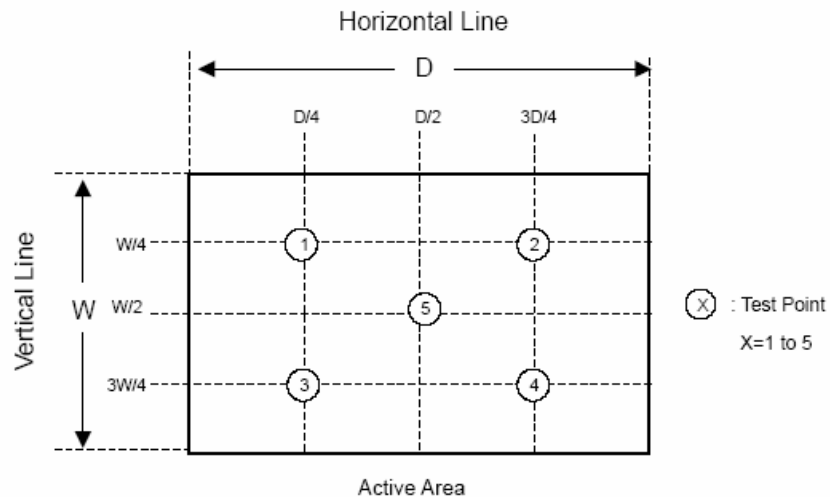
The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



Note (8) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

$$\delta W = \text{Maximum} [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum} [L(1), L(2), L(3), L(4), L(5)]$$



CHAPTER 7

Function Test and Align Procedure

This chapter provides equipment, conditions, patterns, and procedure needed for Function Test and Alignment. It also includes compatible modes. All information is for your reference.

7-1 **Test Equipment**

Pattern Generator (Composite, S-Video, Component1/2, SCART1/2, Analog RGB,)

7-2 **Test Condition**

Before function test and alignment, each LCD TV should be run-in and warned-up for at least 2 hours with the following conditions:

- a). In room temperature
- b). With full-white screen
- c). With cycled display modes,

7-3 Test Display Modes and Pattern

7-3.1 Supporting Display Modes

COMPONENT Mode (Y,Cb/Pb,Cr/Pr)

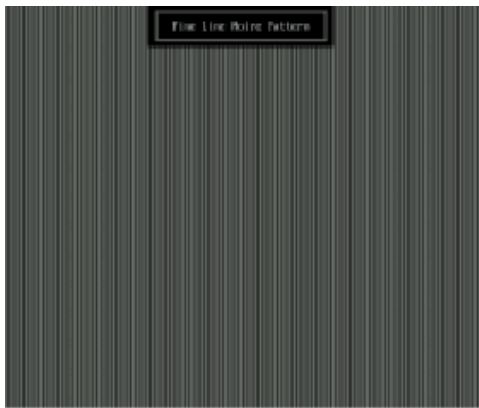
RESOLUTION	H-Freq. (KHz)	V-Freq. (Hz)	Proposed
720*480	15.73	60.00	SDTV,DVD 480I
720*576	15.63	50.00	SDTV,DVD 576I
720*480	31.47	59.94	SDTV 480P
720*576	31.25	50.00	HDTV,576P
1280*720	37.50	50.00	HDTV 720P
1280*720	45.00	60.00	HDTV 720P
1920*1080	28.12	50.00	HDTV 1080I
1920*1080	33.75	60.00	HDTV 1080I

RGB Mode

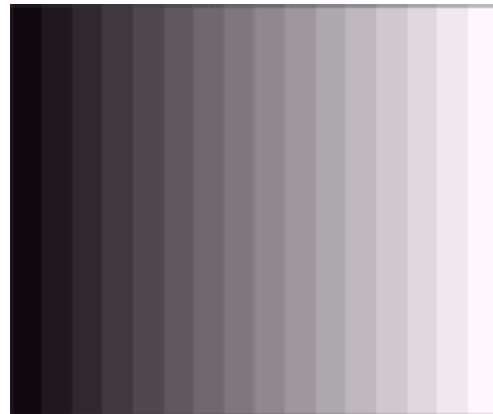
RESOLUTION		V-Freq. (Hz)	H-Freq. (KHz)
VGA	640 x 480	60	31.47
		72	37.86
		75	37.50
	720 x 400	70	31.47
SVGA	800 x 600	56	35.15
		72	48.88
		75	46.88
XGA	1024 x 768	60	48.36
		70	56.48
		75	60.02
SXGA	1280 x 1024	60	64.00

7-3.2 Function Test Display Pattern

Item	Test Content	Pattern	Specification	Remark
1	Frequency & Tracking	Fine Line Moire	Eliminate visual Wavy noise	Figure1
2	Contrast/Brightness	16 Gray Scale	16 gray level should be distinguishable	Figure2
3	Boundary	Horizontal & Vertical Thickness	Horz. And Vert. Position of video should be adjustable to be within the screen frame	Figure3
4	R,G,B Color Performance	R,G, B Color Intensities	Contrast of each R,G,B, color should be normal	Figure 4-6
5	Screen Uniformity & Flicker	Full White	Should be compliant with the spec	Figure 7
6	Dead Pixel/Line	White Screen Dark Screen	The numbers of dead pixels should be compliant with the spec	Figure 8



Fine Line Moire Pattern (Figure 1)



Gray Scale Pattern (Figure 2)



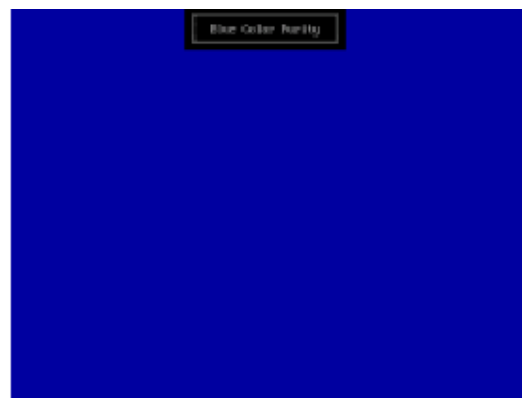
Horizontal & Vertical Thickness Pattern (Figure 3)



R. Color Pattern (Figure 4)



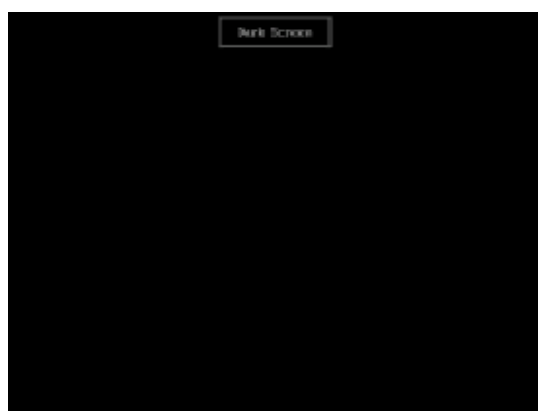
G. Color Pattern (Figure 5)



B. Color Pattern (Figure 6)



Full White Pattern (Figure 7)



Dark Screen Pattern (Figure 8)

7-4 **Function Test and Alignment procedure**

7-4.1 All Mode Reset

Please press the "MENU" button and use ◀, ▶ button to move to "Setup" menu. Press ▼ button to move to "Reset" and press "Enter" to select. Use ▲, ▼ button to select "Yes" and press "Enter" button. The PDP TV will turn off then back on in few seconds. The parameters will be set to factory default.

7-4.2 Changing Picture Setting.

Please press the "MENU" button and use ◀, ▶ button to move to "Picture" menu. Press ▼ button to move to "Custom adjust" and press "Enter" to select. Use ▲, ▼ button to the desired category to control and use ◀, ▶ button to adjust the setting. Use ▲, ▼ to select between Brightness, Contrast, Color, Tint, Sharpness.

※ Test Pattern : Any Pattern or video input with supporting display mode.

7-4.3 Changing Sound Setting.

Please press the "MENU" button and use ◀, ▶ button to move to "Sound" menu. Press ▼ button to move to "Custom adjust" and press "Enter" to select. Use ▲, ▼ button to the desired category to control and use ◀, ▶ button to adjust the setting. Use ▲, ▼ to select between Volume, Balance, Equalizer.

7-4.4 Setting Channels

Please press the "MENU" button and use ◀, ▶ button to move to "Channel" menu. Press ▼ button to move to "Auto Search" and press "Enter" to select. Use ▲, ▼ button to move to "Start" and press "Enter" to start the automatic channel search. All broadcasting channels will be set.

7-4.4 Adjusting PC Screen (Analog RGB)

Please press the "MENU" button and use ◀, ▶ button to move to "Picture" menu. Press ▼ button to move to "PC" and press "Enter" to select. Use ▲, ▼ button to the desired category to control and use ◀, ▶ button to adjust the setting. Use ▲, ▼ to select between Auto Adjustment, Phase, H-Position, V-Position.

※ Test Pattern : Any Pattern with supporting display mode.

7-4.5 Cell Defect and Line Defect

Check and see if there are Cell defect and Line defect on the PDP panel. The total numbers of Cell defect should be compliant with the spec.

※ Test Pattern : Full white, Red, Green, Blue, and full black pattern with supporting display mode.

CHAPTER 8

Firmware Upgrade Procedure

_____ This chapter provides the equipment needed, setup and upgrading procedure for firmware upgrade. According to the instruction, you could finish FW upgrade successfully. _____

8-1 **Equipment Needed**

- # RS232 Cable (P/N)
- # PC (Personal computer)
- # Firmware Upgrade Program



RS232 Cable

COM1 : to
RS232 cable



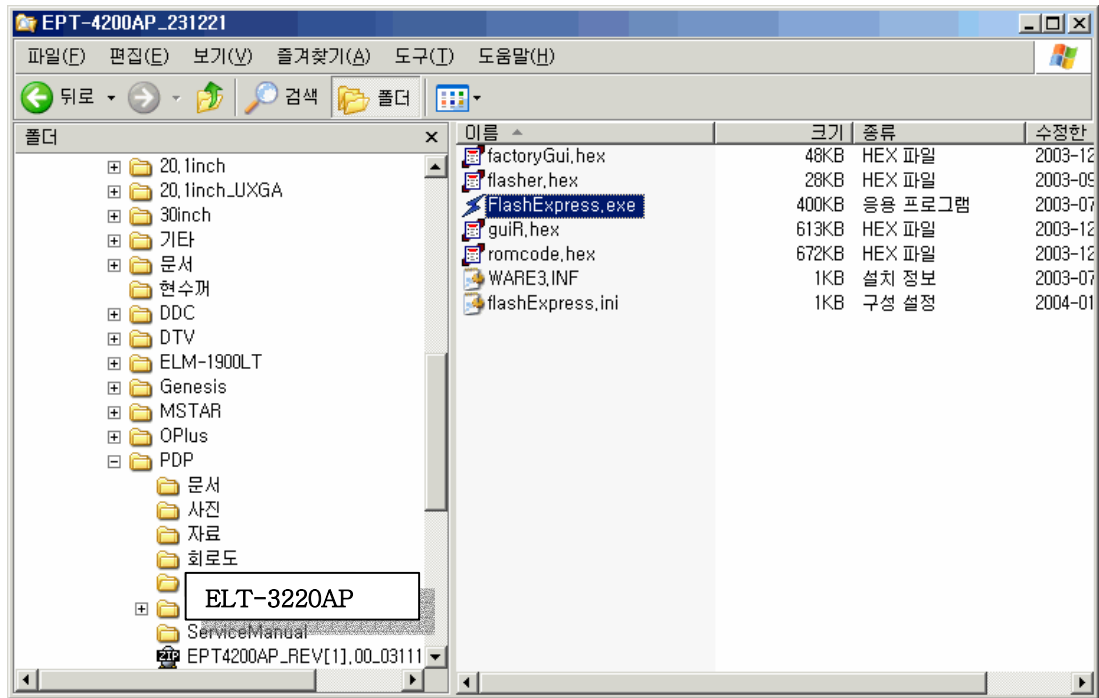
PC

8-2 **Setup Procedure**

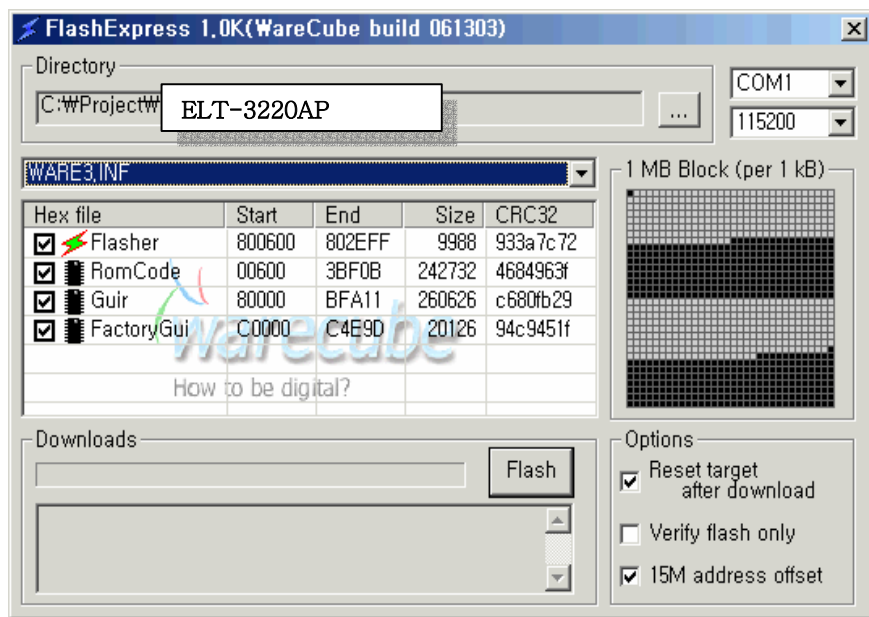
1. Connect RS232 cable between RS232 connector of LCD TV and COM1 of PC
2. Connect LCD TV Power

8-3 Upgrade Procedure

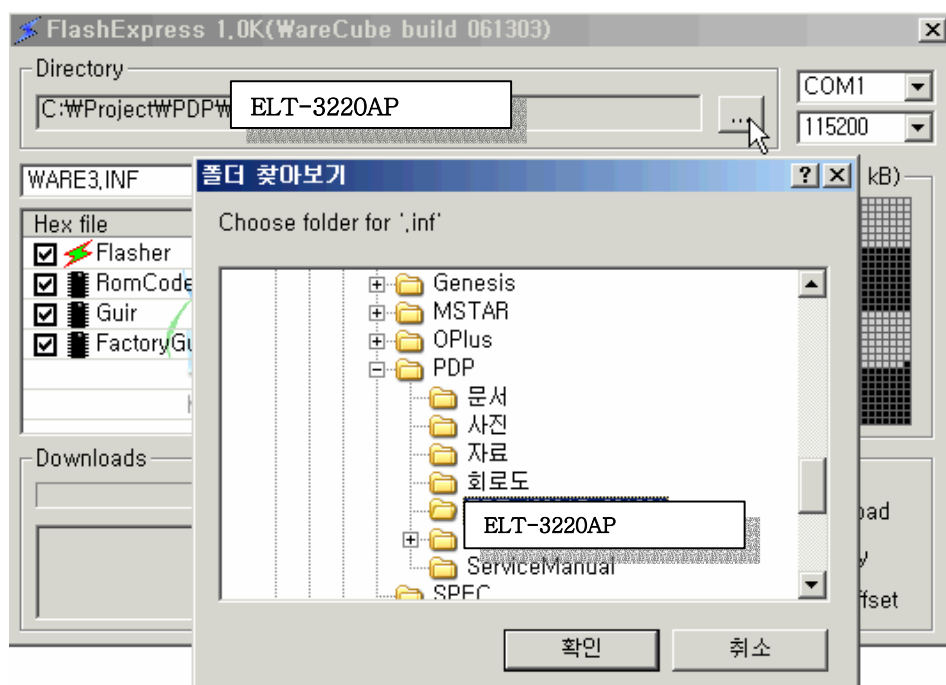
1. Find <FlashExpress.exe> program in the computer.



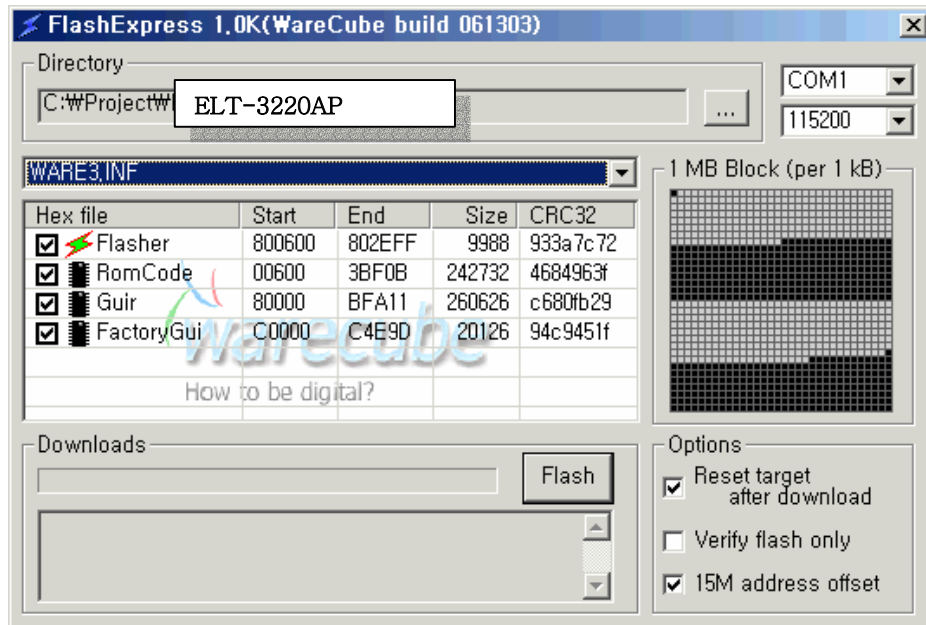
2. Run < FlashExpress.exe > program.



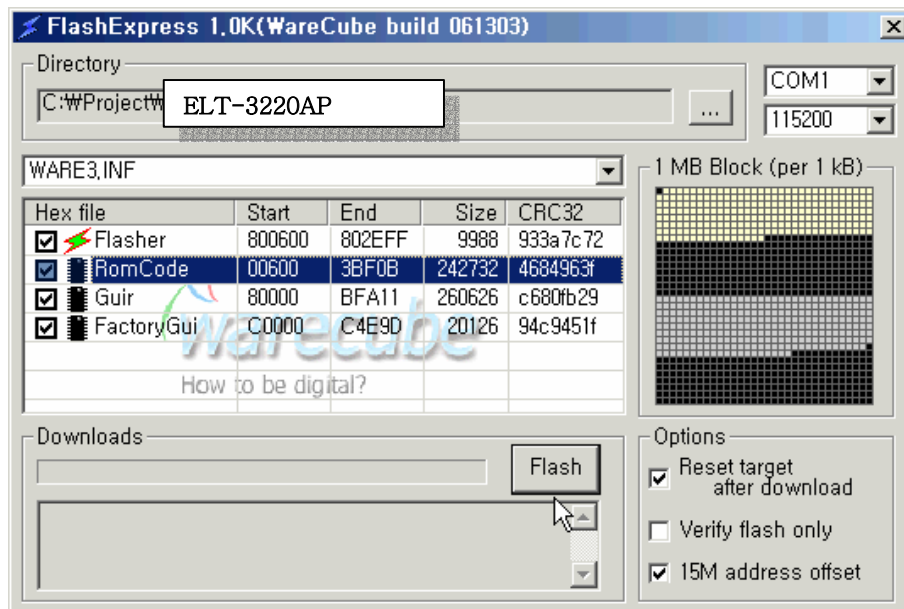
- Click where mouse is located and find a directory, which <WARE3.INF> file is in. \
- And click "OK"



4. Check if the port is COM1 and the protocol speed is 115200.



5. Click "Flash" to upgrade program.



CHAPTER 9

Appendix

9-1 Serial Number System Definition

10-1.1 Serial Number for PDP TV

<u>ER</u>	<u>YY</u>	<u>M</u>	<u>SSSSS</u>	<u>A</u>
①	②	③	④	⑤

- ① : ER = ERAE Electronics
- ② : YY = Last two numbers of the year (ex: 2003 = 03, 2004 = 04)
- ③ : M = number of month (ex: January = 1, March = 3)
- ④ : SSSSS = Serial code (from 00001 ~)
- ⑤ : A = Major change (A= revision 0, B = revision 1)

EX : ER04100075A

This label “ER0400075A” represents whole serial number for LCD TV. It is produced in January of 2004, and serial number is 00075.