www.ceronix.com

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530 886-6400 Phone
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Making the Miracle of Video Displays Come to Life...

Good Morning and Welcome

Ceronix CRT and LCD Monitors at Mystic Lake!

Thursday, May 8th 2008

Introductions

Ceronix Overview – Virtual Tour

Monitor Identification

Circuit Description and Troubleshooting

LCD Description and Troubleshooting

Development

For 20 years we have been developing and manufacturing monitors based on the differing needs of our customers.

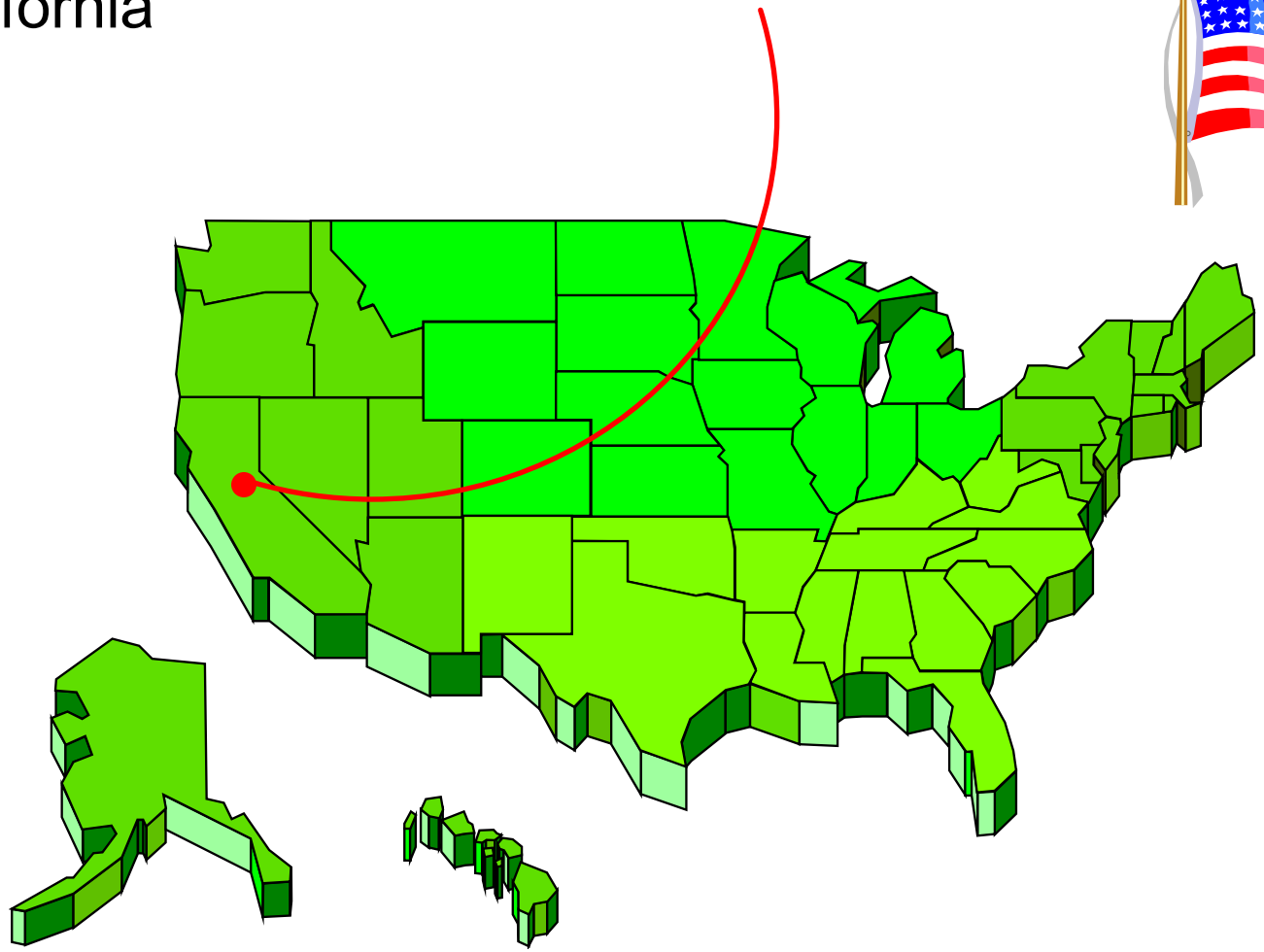
Providing solutions to a global market

ISO9001 CERTIFIED

Today, Ceronix meets the display requirements for a diverse group of industries:

- Gaming
- Automotive Diagnostics
- Horse Racing
- Bowling / Automatic Score Keeping
- Amusement
- Medical Imaging

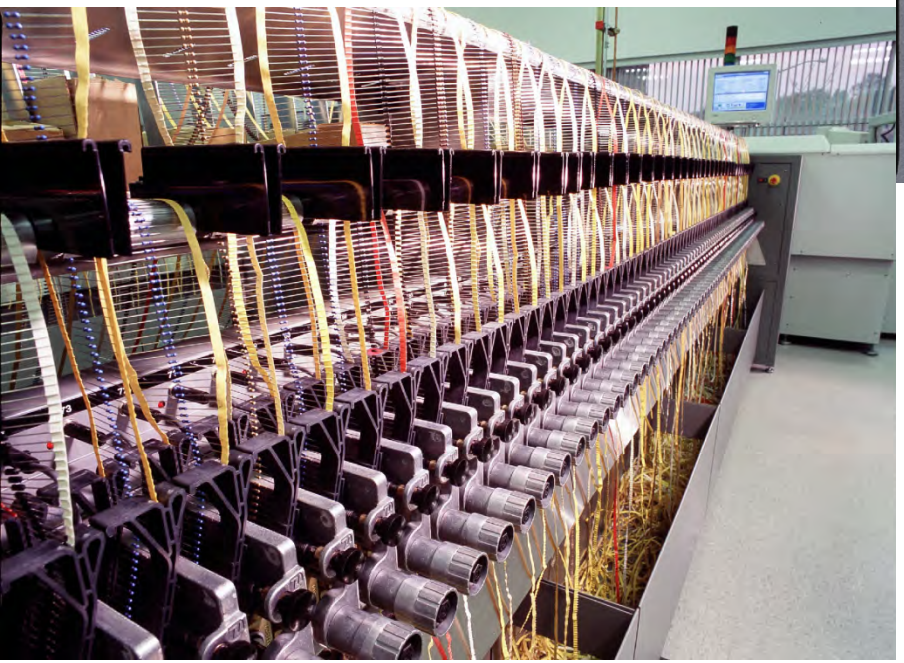
Engineered & Manufactured in Auburn California



Our 63,000 Square Foot Free Trade Zone Facility

Manufacturing

Auto Insertion



Manufacturing

Wave Solder

Manufacturing

Touch-Up and Electronic Test

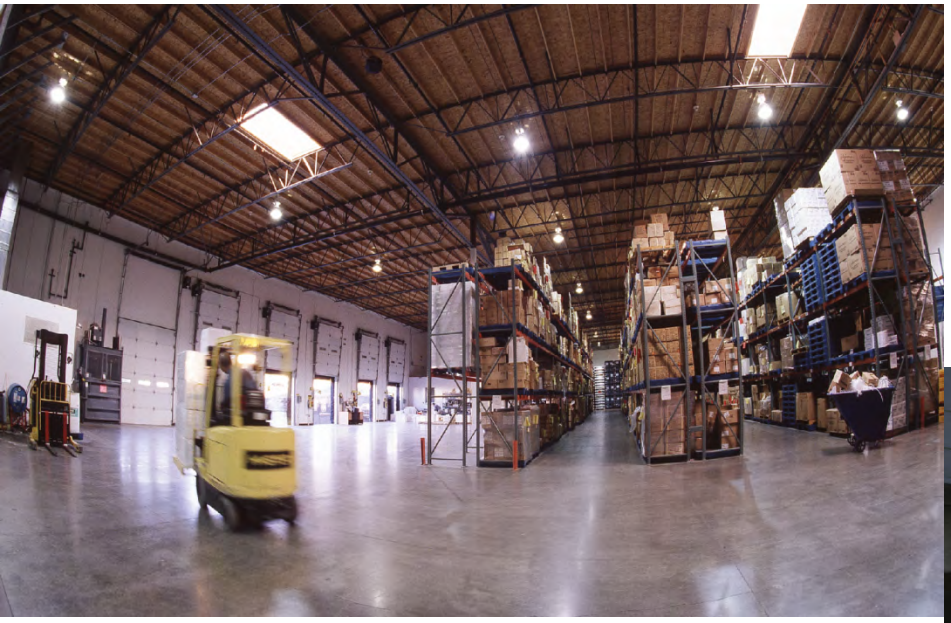
Manufacturing

Mechanical Assembly

Manufacturing

Burn-In

Shipping and Receiving



Providing Service to Our Customers

Customer Repairs

On-Site Technical Training

History of CERONIX Monitor Design:

Meeting Customer Needs

Multiple Video Formats

Digital

Analog: Positive, Negative, Various Levels.

Multiple Scanning Frequencies

Multiple Enclosure Requirements

CRT Monitor Design:

Versatile:
- One Main Circuit Board
- One Video Circuit Board

Proven Reliability:
- 1.5M Units in operation around the world.

Fixed Frequency:
- Monitor Locks to single Horizontal Frequency.
- Power Supply V+ and Horizontal Deflection Tuned for Specific Frequency.

Remote Adjustments:
- Analog Potentiometers.

Power Supply:
- Isolation Transformer

Working on Ceronix Monitors

- Be safe: Use isolation transformer
  Keep away from high voltage
- Replacement parts: CPA4208 “RF KIT”
  This is the Randy Fromm Kit!
- Tools: Digital Multi-meter, Power supply, Soldering Iron, Screw driver, Needle nose pliers, Wire cutter, No Clean Solder, Solder wick, Power cord, Video Generator or Video jumper, Ceronix Service Manual, Ceronix Web Site, Tech Forums……..

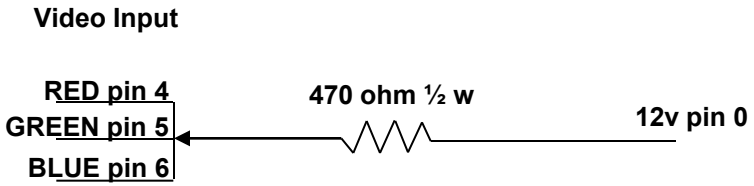
BOARD IDENTIFICATION

New label adds the Ceronix part number

The label identifies input Voltage and size of tube.

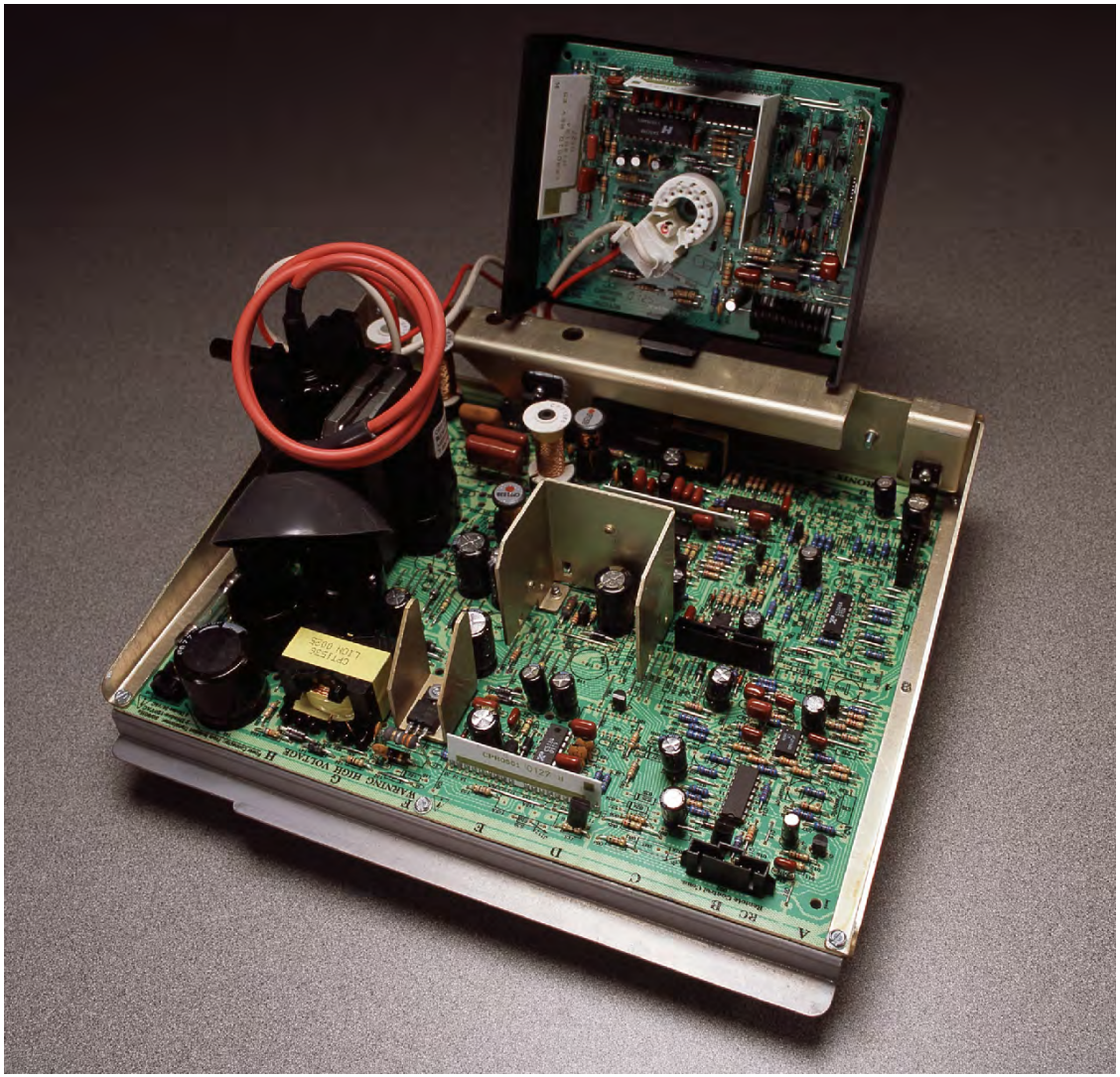
Ceronix Monitor Setup

Make sure boards match CRT.
Plug in all necessary connectors/cables (7-COUNT).
Use video test jumper or generator.

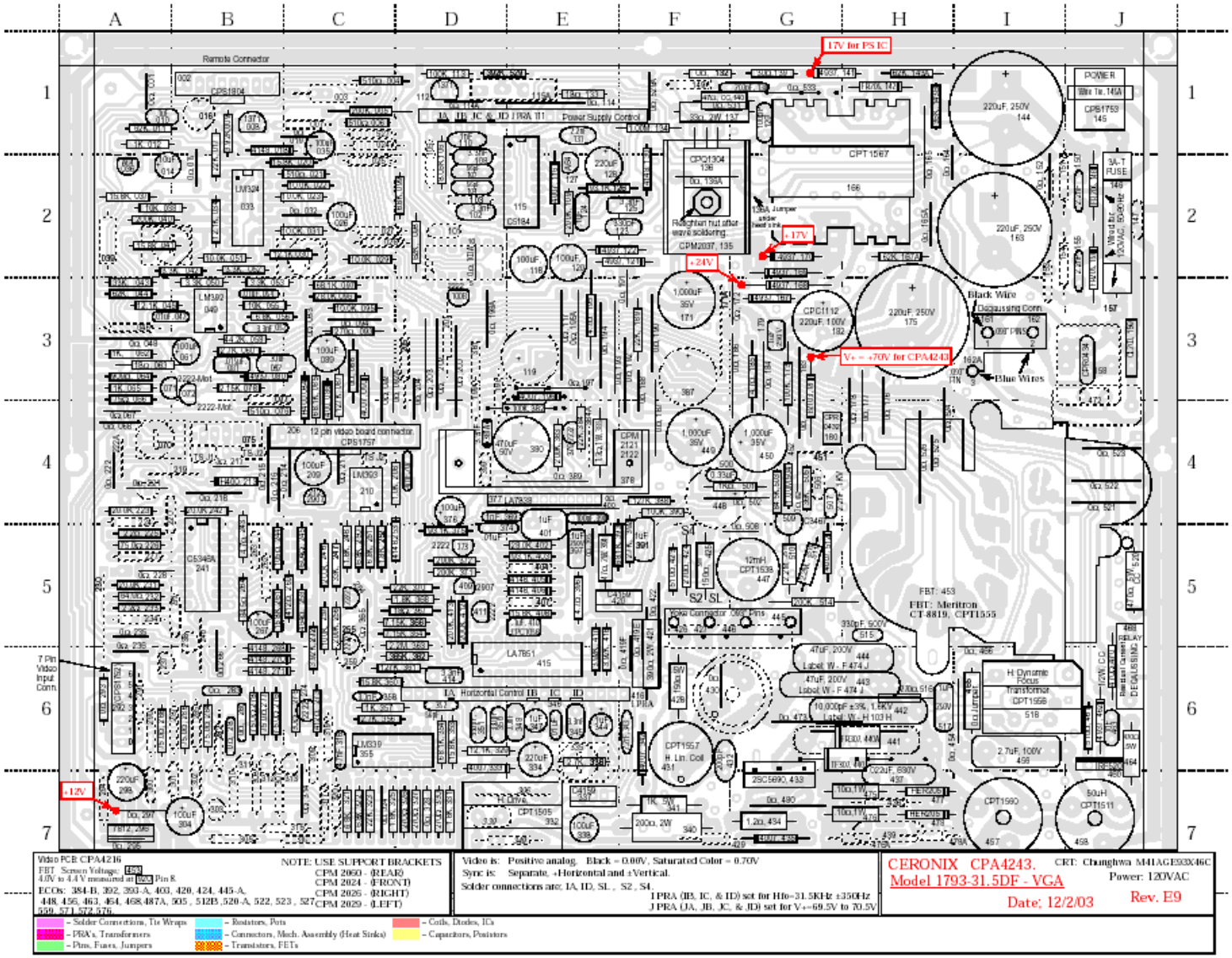


Power up unit.
Check V+.
Check Screen Voltage.
Check focus

Board Assembly



Production Assembly Drawing (PAD) Available online @ ceronix.com



CROSS REFERENCE TABLE

MODEL	DESCRIPTION PART LOCATION/TYPE	TYPE OF TUBE	MANUFACTURING MODEL#	VIDEO BOARD	ECO
1490	301/CPT1506 302/CPT1506	RCA	33ACD42X	CPA4101	
1492	301/JUMPER 302/CPT1506	CHUNGHWA	E2971B22 TC17ET(Y)	CPA4101	
1492	301/CPT1523 302/CPT1506	ORION	M34JZT20X22	CPA4101	
MODEL	**DESCRIPTION**	**TYPE OF TUBE**	**MANUFACTURING MODEL #**	**VIDEO BOARD**	**ECO**
CPA4110	1493 MAIN PCB ASSM. CGA IGT	ORION	M34JZT20X22	CPA4124	
CPA4124	1493 VIDEO PCB ASSM., CGA	ORION	M34JZT20X22	N/A	
CPA4136	1493 MAIN PCB ASSM. CGA IGCA	ORION	M34JZT20X22	CPA4124	
OLD P/N	**DESCRIPTION**	**TYPE OF TUBE**	**MANUFACTURING MODEL #**	**VIDEO BOARD**	**ECO**
CPA 4107	1493 MAIN PCB,VGA 220V	ORION	M34KZM40XX11 &M34KZM40XX15	CPA4113	377FR
CPA 4132	1493 MAIN PCB,VGA 120V	ORION	M34KZM40XX11 &M34KZM40XX15	CPA4113	
CPA 4149	1493 MAIN PCB,VGA UNITED COIN	ORION	M34KZM40XX11 &M34KZM40XX15	CPA4113	
CPA 4152	1493 MAIN PCB,CGA BRUNSWICK	ORION	M34KZM40XX11 &M34KZM40XX15	CPA4153	
CPA 4153	1493 VIDEO PCB, CGA	ORION	M34KZM40XX11 &M34KZM40XX15	N/A	
CPA 4154	1493 MAIN PCB, CGA IGT	ORION	M34KZM40XX11 &M34KZM40XX15	CPA4153	
CPA 4155	1493 MAIN PCB, CGA BALLY	ORION	M34KZM40XX11 &M34KZM40XX15	CPA4153	
CPA 4156	1493 VIDEO PCB, CGA FICHE PAPER	ORION	M34KZM40XX11 &M34KZM40XX15	N/A	
CPA 4157	1493 MAIN PCB , CGA IGT	ORION	M34KZM40XX11 &M34KZM40XX15	CPA4156	
CPA 4167	1493 MAIN PCB, CGA ARISTOCRAT	ORION	M34KZM40XX11 &M34KZM40XX15	CPA4153	
CPA 4168	1493 MAIN PCB, CGA WEB PRINTING	ORION	M34KZM40XX11 &M34KZM40XX15	CPA4153	
CPA 4170	1493 MAIN PCB, CGA AUTOMATION/LOGIC	ORION	M34KZM40XX11 &M34KZM40XX15	CPA4153	
NEW P/N	**DESCRIPTION**	**TYPE OF TUBE**	**MANUFACTURING MODEL #**	**VIDEO BOARD**	**ECO**
CPA 4200	1493 MAIN PCB,VGA 220V	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4134	
CPA 4201	1493 MAIN PCB,VGA 120V	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4134	
CPA 4202	1493 MAIN PCB,VGA UNITED COIN	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4134	
CPA 4203	1493 MAIN PCB,CGA BRUNSWICK	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4134	
CPA 4204	1493 VIDEO PCB, CGA	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	N/A	
CPA 4205	1493 MAIN PCB, CGA IGT	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4234	
CPA 4206	1493 MAIN PCB, CGA BALLY	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4234	
CPA 4207	1493 VIDEO PCB, CGA FICHE PAPER	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	N/A	
CPA 4208	1493 MAIN PCB , CGA IGT	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4207	
CPA 4209	1493 MAIN PCB, CGA ARISTOCRAT	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4234	
CPA 4210	1493 MAIN PCB, CGA WEB PRINTING	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4234	
CPA 4211	1493 MAIN PCB, CGA AUTOMATION/LOGIC	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4234	
CPA4265	1493 MAIN PCB,VGA 220V **FLAT TOP**	CHUNGHWA/SAMSUNG	M34AFA13X07/M34QBB351X111/M34AFA83X21	CPA4134	

CROSS REFERENCE TABLE

CPT1516	CGA MONITORS	TYPE OF TUBE	MANUFACTURING MODEL #	VIDEO BOARD	ECO
FLYBACK					
CPA 4203	1493 MAIN PCB,CGA BRUNSWICK	SAMSUNG/CHUNGHWA	M34AFA13X07/ M34QBB351X111	CPA4204	
CPA 4204	1493 VIDEO PCB, CGA	SAMSUNG/CHUNGHWA	M34AFA13X07/ M34QBB351X111	N/A	
CPA 4205	1493 MAIN PCB, CGA IGT	SAMSUNG/CHUNGHWA	M34AFA13X07/ M34QBB351X111	CPA4204	
CPA 4206	1493 MAIN PCB, CGA BALLY	SAMSUNG/CHUNGHWA	M34AFA13X07/ M34QBB351X111	CPA4204	
CPA 4207	1493 VIDEO PCB, CGA FICHE PAPER	SAMSUNG/CHUNGHWA	M34AFA13X07/ M34QBB351X111	N/A	
CPA 4208	1493 MAIN PCB , CGA IGT	SAMSUNG/CHUNGHWA	M34AFA13X07/ M34QBB351X111	CPA4207	
CPT1558	CGA MONITORS	TYPE OF TUBE	MANUFACTURING MODEL #	VIDEO BOARD	ECO
FLYBACK					
CPA4212	1493 MAIN PCB,CGA LOGIC	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	CPA4234	
CPA 4233	1493 MAIN PCB,CGA BRUNSWICK	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	CPA4242	
CPA 4234	1493 VIDEO PCB, CGA	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	N/A	
CPA 4235	1493 MAIN PCB, CGA IGT 120V	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	CPA4234	
CPA 4236	1493 MAIN PCB, CGA BALLY	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	CPA4242	
CPA 4237	1493 VIDEO PCB, CGA FICHE PAPER	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	N/A	
CPA 4238	1493 MAIN PCB , CGA IGT	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	CPA4237	
CPA4239	1493 MAIN PCB, CGA ARISTOCRAT	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	CPA4234	
CPA4240	1493 MAIN PCB, CGA WEB PRINTING	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	CPA4234	
CPA4241	1493 MAIN PCB, CGA AUTOMATION/LOGIC	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	CPA4234	
CPA4242	1493 VIDEO PCB, CGA	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	N/A	
CPA4246	1493 MAIN PCB, CGA WORLD TOUCH	CHUNGHWA/SAMSUNG	M34AFA13X07/ M34QBB351X111	CPA4234	
17" MODELS	DESCRIPTION	TYPE OF TUBE	MANUFACTURING MODEL #	VIDEO BOARD	ECO
CPA 4129	17" IGT MAIN PCB	LG ELECTRONICS	M41QAV803X	CPA4131	
CPA 4131	17" VIDEO PCB WITH FICHE PAPER	LG ELECTRONICS	M41QAV803X	N/A	
CPA4146	17" ARISTOCRAT MAIN PCB	LG ELECTRONICS	M41QAV803X	CPA4161	
CPA 4150	17" ATRONICS MAIN PCB	LG ELECTRONICS	M41QAV803X	CPA4161	
CPA4161	17" VIDEO PCB	LG ELECTRONICS	M41QAV803X	N/A	
17" MODELS	DESCRIPTION	TYPE OF TUBE	MANUFACTURING MODEL #	VIDEO BOARD	ECO
CPA 4215	17" IGT E8 MAIN PCB	CHUNGHWA	M41AGE13X46	CPA4216	
CPA 4216	17" VIDEO PCB WITH FICHE PAPER	CHUNGHWA	M41AGE13X46	N/A	
CPA 4219	17" VIDEO PCB	CHUNGHWA	M41AGE13X46	N/A	
CPA 4243	17" IGT E7 MAIN PCB	CHUNGHWA	M41AGE13X46	CPA4216	
CPA 4222	17" ATRONICS E7MAIN PCB	CHUNGHWA	M41AGE13X46	CPA4219	
CPA 4228	17" ATRONICS E8 MAIN PCB	CHUNGHWA	M41AGE13X46	CPA4219	
CPA 4229	17" ARISTOCRAT E8 MAIN PCB	CHUNGHWA	M41AGE13X46	CPA4219	

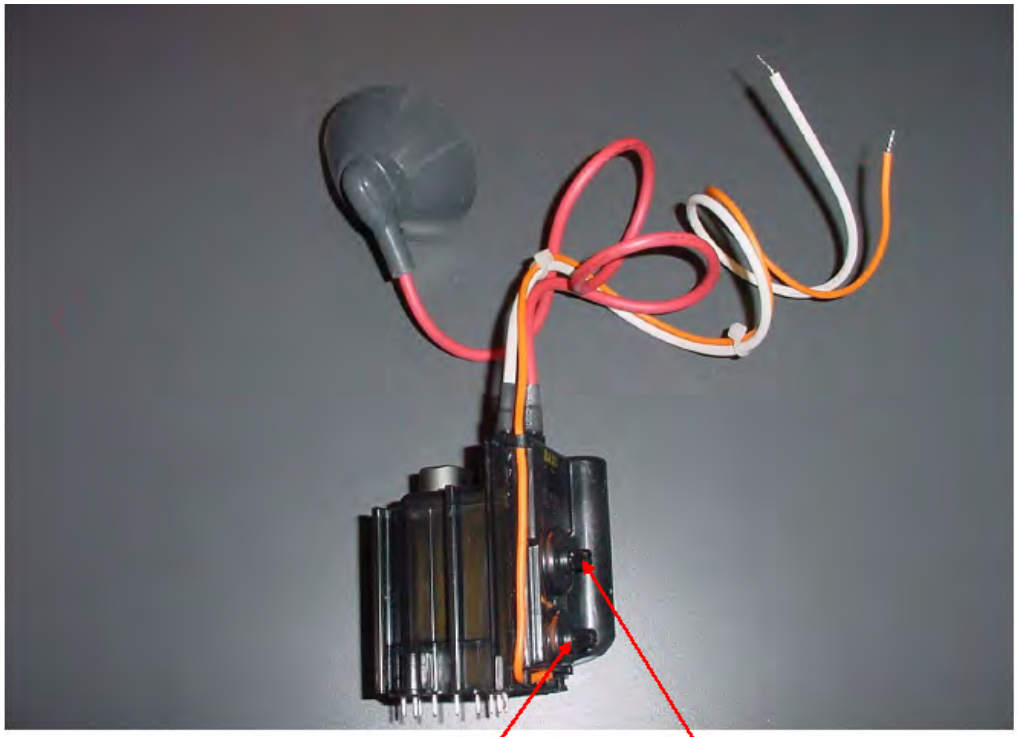
CROSS REFERENCE TABLE

CPA 4243	17" IGT E8 MAIN PCB	CHUNGHWA	M41AGE13X47	CPA4216	
CPA 4244	17" ATRONICS/WILLIAMS E8 MAIN PCB	CHUNGHWA	M41AGE13X47	CPA4219	
CPA 4245	17" ARISTOCRAT E8 MAIN PCB 31.0KHZ	CHUNGHWA	M41AGE13X47	CPA4219	
CPA4275	17" ARISTOCRAT E8 MAIN PCB 29.6KHZ	CHUNGHWA	M41AGE13X47	CPA4219	
CPA 4283	17" IGT E8 MAIN PCB USE ONLY WITH CPA4051	CHUNGHWA	M41AGE93X46 C(L)	CPA4216	
CPA 4284	17" ATRONICS/WILLIAMS E8 MAIN PCB	CHUNGHWA	M41AGE93X46 C(L)	CPA4219	
CPA 4285	17" ARISTOCRAT E8 MAIN PCB 31.0KHZ	CHUNGHWA	M41AGE93X46 C(L)	CPA4219	
CPA4247	17" KONAMI PCB S-VGA 37.9KHZ	SAMSUNG	M41QCJ761X172	CPA4248	
1493 MODELS	**DESCRIPTION**	**CUSTOMER #**	**TUBE MANUFACTURING MODEL#**	**VIDEO BOARD**	**ECO**
CPA 4059	14" COLOR MONITOR,CGA	69914190 REV B	M34KZM40XX11 &M34KZM40XX15		
CPA 4060	14" S/T COLOR MONITOR,CGA	69917600 REV B	M34KZM40XX11 &M34KZM40XX15		
CPA 4061	14" FLAT TOP COLOR MONITOR, CGA	69917700 REV B	M34KZM40XX11 &M34KZM40XX15		
CPA 4062	14" COLOR MONITOR,CGA	69918100 REV B	M34KZM40XX11 &M34KZM40XX15		
CPA 4063	14" COLOR MONITOR,CGA T/S	69918000 REV B	M34KZM40XX11 &M34KZM40XX15		
CPA 4064	14" COLOR MONITOR, CGA	69917300 REV C	M34KZM40XX11 &M34KZM40XX15		
CPA 4066	14" COLOR MONITOR, CGA BALLY	E832-27A	M34KZM40XX11 &M34KZM40XX15		
CPA 4067	14" COLOR MONITOR, CGA BALLY	E832-69	M34KZM40XX11 &M34KZM40XX15		
CPA 4070	14" COLOR MONITOR, CGA IGCA	57020700	M34KZM40XX11 &M34KZM40XX15		
CPA 4072	14" COLOR MONITOR, CGA ARISTOCRAT		M34KZM40XX11 &M34KZM40XX15		
CPA 4074	14" COLOR MONITOR, CGA CEI		M34KZM40XX11 &M34KZM40XX15		
CPA 4076	14" COLOR MONITOR, CGA WEB PRINTING		M34KZM40XX11 &M34KZM40XX15		
CPA 4077	14" COLOR MONITOR, CGA AUTOMATION/LOGIC		M34KZM40XX11 &M34KZM40XX15		
CPA 4000	14" COLOR MONITOR,CGA	69914190 REV B	M34KZM40XX11 &M34KZM40XX15		
CPA 4002	14" COLOR MONITOR,CGA	69918100 REV B	M34KZM40XX11 &M34KZM40XX15		
CPA 4005	14" COLOR MONITOR, CGA BALLY	E832-27A	M34KZM40XX11 &M34KZM40XX15		
CPA 4006	14" S/T COLOR MONITOR,CGA	69917600 REV B	M34KZM40XX11 &M34KZM40XX15		
CPA 4009	14" COLOR MONITOR, CGA WEB PRINTING		M34KZM40XX11 &M34KZM40XX15		
CPA 4011	14" FLAT TOP COLOR MONITOR, CGA	69917700 REV B	M34KZM40XX11 &M34KZM40XX15		
CPA 4014	14" COLOR MONITOR, CGA ARISTOCRAT		M34KZM40XX11 &M34KZM40XX15		
CPA 4015	14" COLOR MONITOR, CGA CEI		M34KZM40XX11 &M34KZM40XX15		
CPA 4016	14" COLOR MONITOR, CGA BALLY	E832-69	M34KZM40XX11 &M34KZM40XX15		
CPA 4026	14" COLOR MONITOR, CGA	69917300 REV C	M34KZM40XX11 &M34KZM40XX15		
CPA 4037	14" COLOR MONITOR, CGA IGCA	57020700	M34KZM40XX11 &M34KZM40XX15		
CPA 4041	14" COLOR MONITOR,CGA T/S	69918000 REV B	M34KZM40XX11 &M34KZM40XX15		
CPA 4043	14" COLOR MONITOR, CGA AUTOMATION/LOGIC		M34KZM40XX11 &M34KZM40XX15		

CROSS REFERENCE TABLE

				VIDEO BOARD	ECO
CPA 4108	2093 MAIN PCB, VGA IGT 220V	RCA	A48AAB37X03	CPA4264/4161	
CPA 4121	2093 MAIN PCB, VGA PACIFIC GAMING	RCA	A48AAB37X503	CPA4161	
CPA 4126	2093 MAIN PCB, VGA ARISTOCRAT AUSTRALIA	RCA	A48AAB37X503	CPA4161	
CPA 4133	2093 MAIN PCB, VGA ARISTOCRAT TRUCKEE	RCA	A48AAB37X03	CPA4264/4161	
CPA 4161	2093 VIDEO PCB, VGA	RCA	A48AAB37X503,X03,X473	N/A	
CPA4264	2093 VIDEO PCB, VGA	RCA	A48AAB37X503,X03,X473	N/A	
CPA4268	2093 MAIN PCB,VGA WILLIAMS	RCA	A48AAB37X03	CPA4264	
2093 VGA	**DESCRIPTION**	**CUSTOMER #**	**TUBE MANUFACTURING MODEL#**	VIDEO BOARD	ECO
CPA 4223	2093 MAIN PCB, VGA PACIFIC G. REPLACES CPA4121	CHUNGHWA	A48AGY13X87	CPA4225	
CPA 4224	2093 MAIN PCB, VGA ARIST. A.U. REPLACES CPA4126	CHUNGHWA	A48AGY13X87	CPA4259	
CPA 4225	2093 VIDEO PCB, VGA	CHUNGHWA	A48AGY13X87	N/A	
CPA 4226	2093 MAIN PCB, VGA IGT REPLACES CPA4108	CHUNGHWA	A48AGY13X87	CPA4225	551
CPA 4227	2093 MAIN PCB, VGA ARIST. RENO REPLACES CPA4133	CHUNGHWA	A48AGY13X87	CPA4225	
CPA4259	2093 VIDEO PCB, VGA	CHUNGHWA	A48AGY13X87	N/A	
CPA4277	2093 MAIN PCB, VGA WILLIAMS REPLACES CPA4268	CHUNGHWA	A48AGY13X87	CPA4225	
2093 CGA	**DESCRIPTION**	**CUSTOMER #**	**TUBE MANUFACTURING MODEL#**	VIDEO BOARD	ECO
CPA4279	2093 MAIN PCB, CGA LEISURE TIME REPLACES CPA4128	CHUNGHWA	A48AGY13X87	CPA4280	549
CPA4280	2093 VIDEO PCB, CGA	CHUNGHWA	A48AGY13X87	N/A	
CPA4281	2093 MAIN PCB, CGA IGT REPLACES CPA4112	CHUNGHWA	A48AGY13X87	CPA4280	550

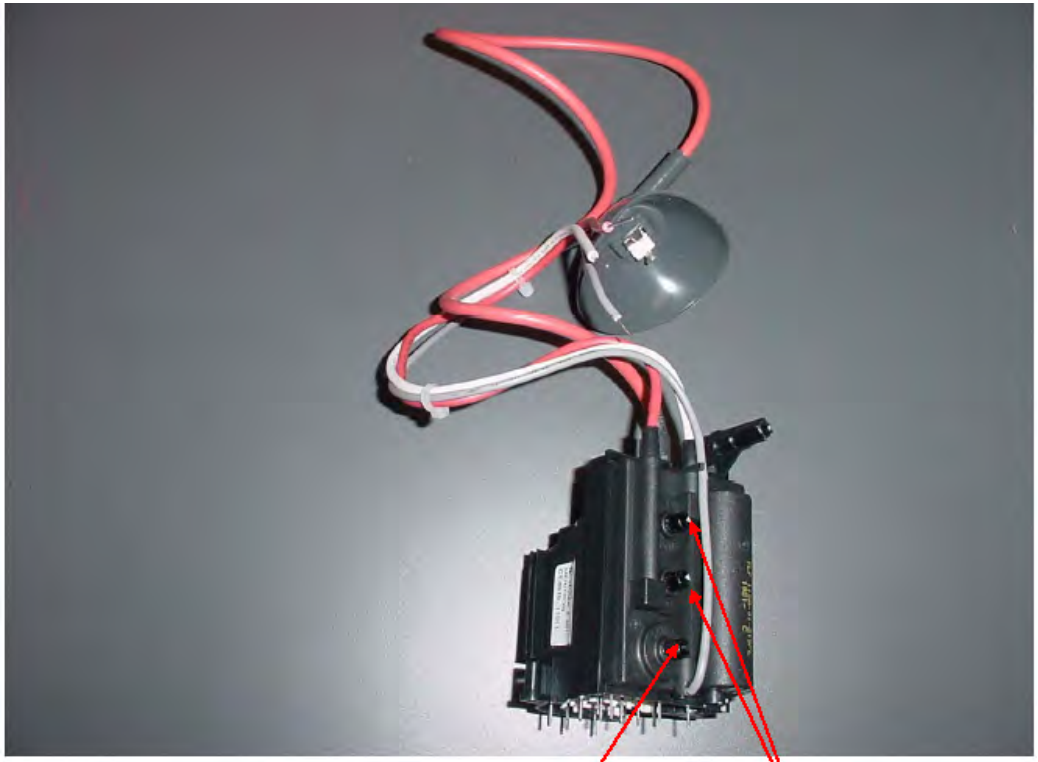
Single Focus Flyback Transformer



NOTE: The Single focus flyback is used on the 1493, 2093, 2793, 3693. it is also used on some 1793 models that do not use a chunghwa tube.

1

Dual Focus Flyback Transformer



NOTE: This type of Flyback at this time (1-31-03) is used only on two models, 1793 models that use a Chunghwa tube and 1993 models.

2

COLOR PROBLEMS

A helpful hint when working with color problems is to first identify the color of the three grid lines at the top of the screen.

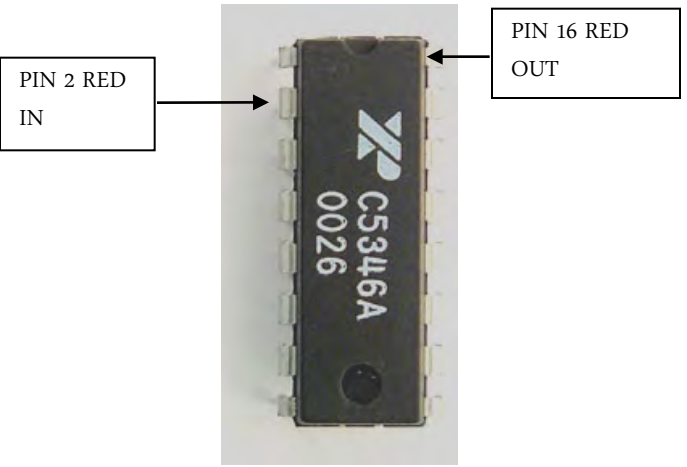
When there is a missing color and the lines are white, the problem lies in the video interface section. This means it can be found in between the video source and pin #8 of the Video Amplifiers (K-PRA).
If the lines were not white it would be an output problem, which is anything after pin 8 to the picture tube.

Use the following steps when troubleshooting a missing color.

1. First determine if it is an input or output problem.
2. If it is an input problem check pins 16, 13, and 9 on IC 241(Video Interface IC). If the color you are missing has a DC voltage higher or lower than the other two colors by .3V replace IC 241.
3. If the voltages are all the same check for an open between the output pins of IC 241 and pin 8 of Video Amplifiers (K-PRA).
4. If you determine it to be an output problem check pin 20 of the Video Amplifiers (K-PRA). If the voltage at pin 20 for the color that is missing is a minimum of 20 volts higher than the other two colors. Replace the Video Amplifier (K-PRA) and Transistor at 945, 812 or 822, depending on which Video amplifier is being changed.

C5346A: VIDEO INTERFACE IC (Location 241).

TABLE DISPLAYS CORRECT DC VOLTAGES FOR VGA BOARDS

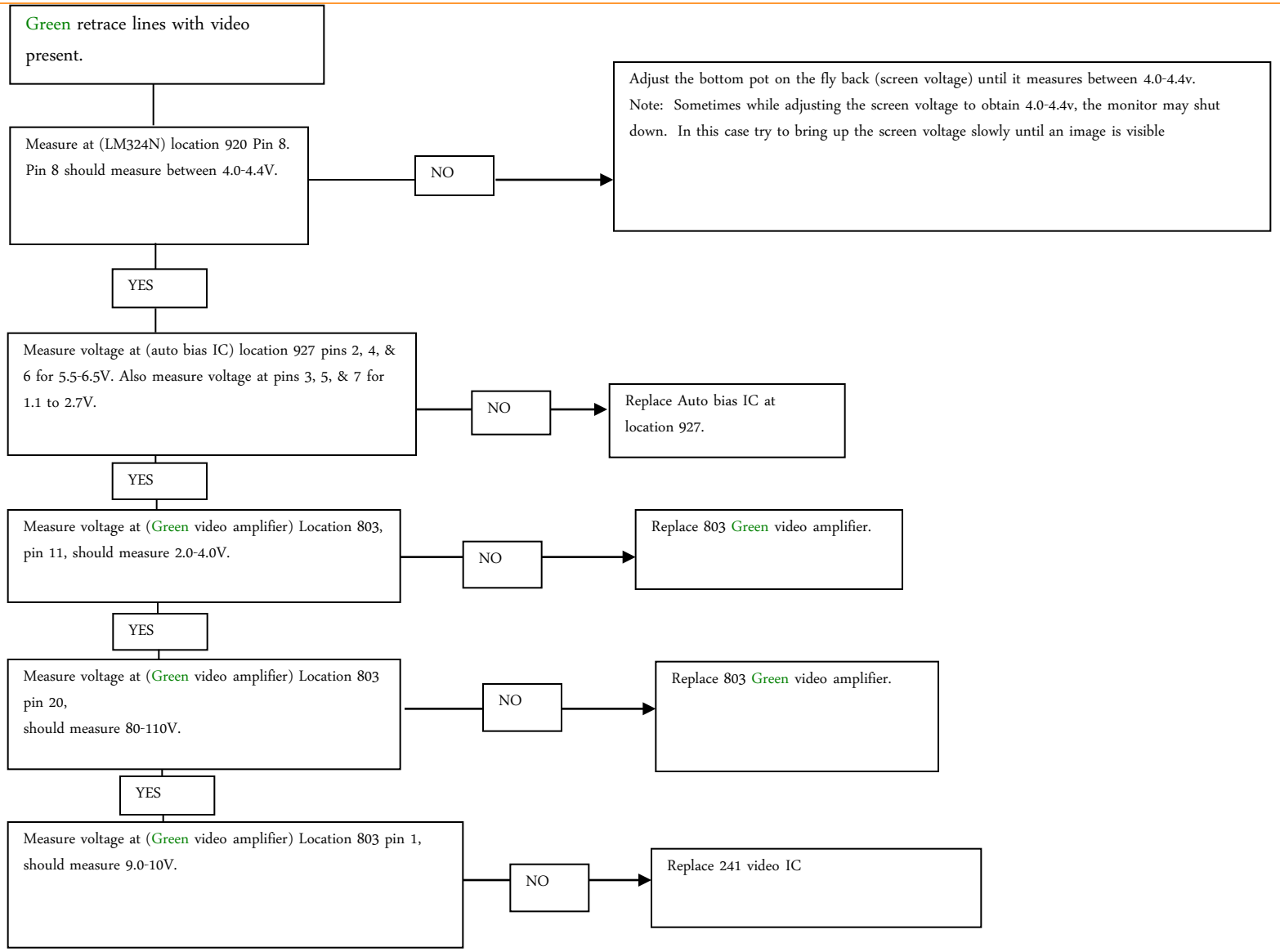


PIN 1	RED REFERENCE	.630
PIN 2	RED IN	.756
PIN 3	BLACK LEVEL	5.7
PIN 4	GND	0
PIN 5	TTL	0
PIN 6	BLACK LEVEL	6.3
PIN 7	BLUE IN	.755
PIN 8	BLUE REFERENCE	.630
PIN 9	BLUE OUT	9.4
PIN 10	Vcc	11.97
PIN 11	+ ENABLE	10
PIN 12	MASTER GAIN	5.9
PIN 13	GREEN OUT	9.4
PIN 14	GREEN IN	.755
PIN 15	GREEN REFERENCE	.640
PIN 16	RED OUT	9.30

If the grid lines are white Look for the .3V difference

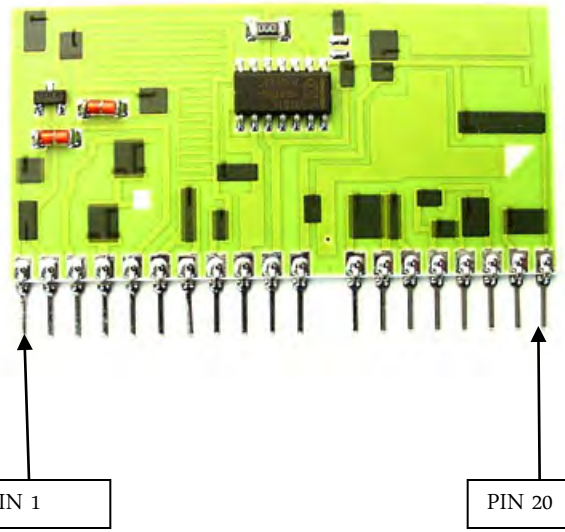
Troubleshooting flow charts: **Symptom – Green Retrace with Video.**

Note: Use video generator or Ceronix test jumper for video input.



K-PRA: VIDEO AMPLIFIER CIRCUIT.
TABLE DISPLAYS CORRECT DC VOLTAGES

PIN 1	VIDEO INPUT	9.5
PIN 2	+12 V LINE	11.9
PIN 3	+ 16 V LINE	17.17
PIN 4	NPN B	10
PIN 5	GND	0
PIN 6	NPN E	9.4
PIN 7	9.25 V LINE	9.4
PIN 8	NE592 OUTPUT	9.4
PIN 9	GND	0
PIN 10	+12 V LINE	11.99
PIN 11	AUTO BIAS	4.3
PIN 12	GND	0
PIN 13	127V LINE	129
PIN 14	PNP E. CAP	128
PIN 15	PNP E.	128
PIN 16	PNP B	127
PIN 17	PNP B DIODE	127
PIN 18	120V LINE	123
PIN 19	PNP C	78
PIN 20	AMP OUTPUT	77



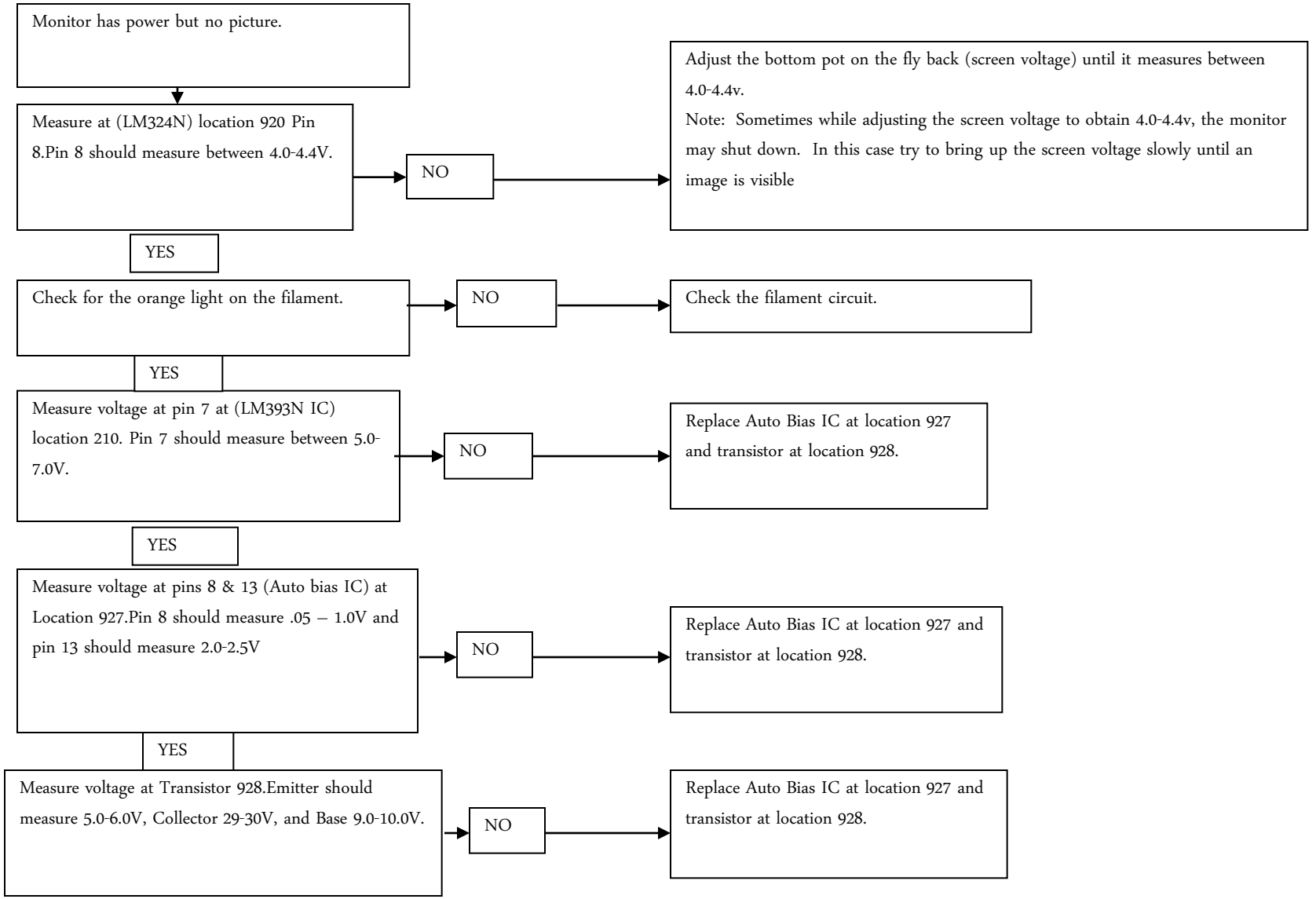
Input 9 to 10V

Measure 2 to 6V

Measure 80 to 110V

Troubleshooting flow charts: Symptom – No picture, monitor powers up.

Note: Use video generator or Ceronix test jumper for video input.



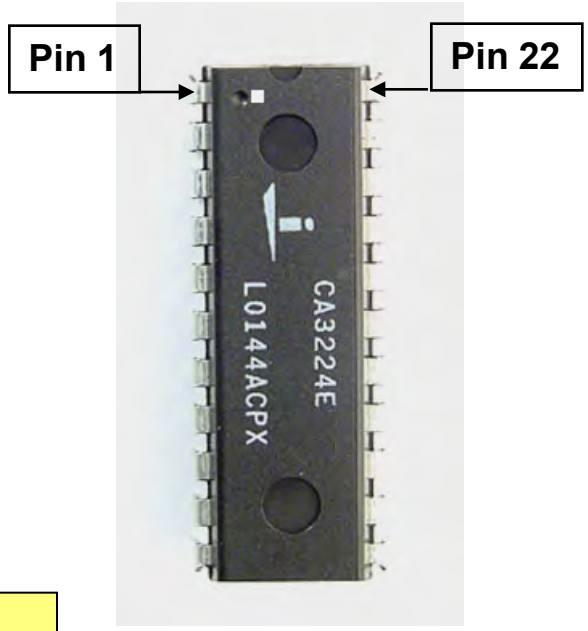
CA3224E: AUTOMATIC BIAS CONTROL CIRCUIT.
TABLE DISPLAYS CORRECT DC VOLTAGES FOR VGA BOARDS

PIN 1	GND	0
PIN 2	BLUE INPUT	5.25
PIN 3	COMPARATOR	1.6
PIN 4	GREEN INPUT	5.3
PIN 5	COMPARATOR	1.8
PIN 6	RED INPUT	5.1
PIN 7	COMPARATOR	1.8
PIN 8	**VERTICAL INPUT**	.053
PIN 9	GND	0
PIN 10	HORIZONTAL INPUT	1.6
PIN 11	GRID PULSE OUTPUT	9.7
PIN 12	PROGRAM PULSE OUTPUT	8.4
PIN 13	AUTO BIAS ACTIVE PULSE OUTPUT	2.5
PIN 14	**5V REFERENCE**	4.9
PIN 15	VERTICAL REFERENCE BIAS	4.9
PIN 16	RED OUTPUT	3.5
PIN 17	RED HOLD CAP	3.4
PIN 18	GREEN OUTPUT	4.2
PIN 19	GREEN HOLD CAP	4.2
PIN 20	BLUE OUTPUT	4.2
PIN 21	BLUE HOLD CAP	4.2
PIN 22	Vcc	9.8

5.0 to 6.5V

1.1 to 2.7V

2 to 6V

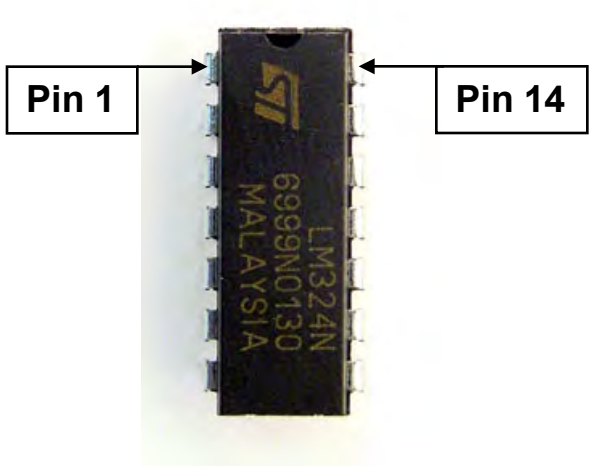


LM324N: AUTO BRIGHT CONTROL CIRCUIT.

TABLE DISPLAYS CORRECT DC VOLTAGES

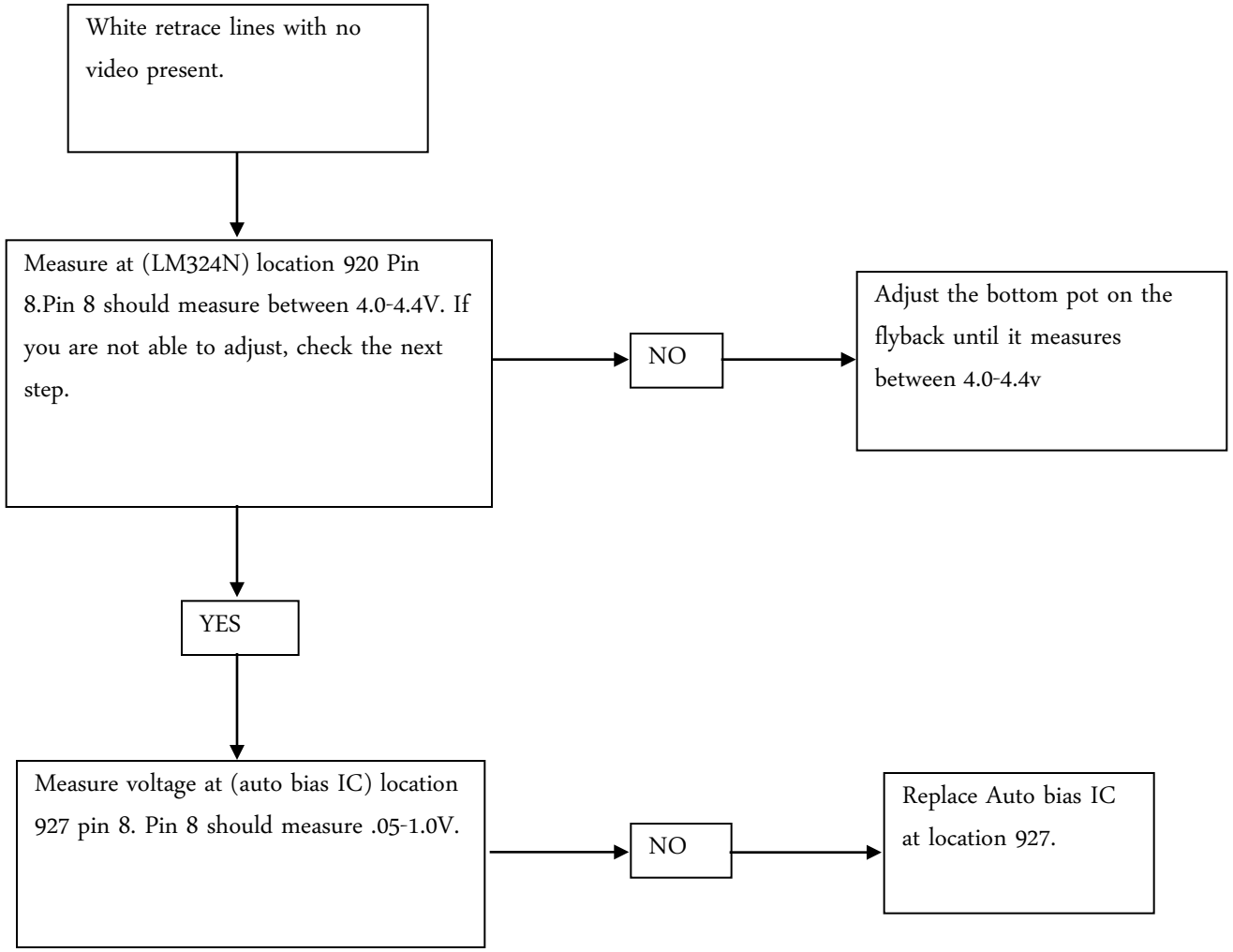
PIN 1	GREEN CHANNEL OUTPUT	3.4
PIN 2	INVERTING INPUT	4.0
PIN 3	NON- INVERTING INPUT	4.0
PIN 4	Vcc	11.95
PIN 5	NON- INVERTING INPUT	4.0
PIN 6	INVERTING INPUT	4.0
PIN 7	BLUE CHANNEL OUTPUT	3.3
PIN 8	SCREEN VOLTAGE ADJUSTMENT	4.0
PIN 9	INVERTING INPUT	4.0
PIN 10	NON- INVERTING INPUT	4.0
PIN 11	GND	0
PIN 12	NON- INVERTING INPUT	4.0
PIN 13	INVERTING INPUT	4.0
PIN 14	RED CHANNEL OUTPUT	3.1

SCREEN VOLTAGE 3.5 TO 4.2 V



Troubleshooting flow charts: Symptom – White Retrace Lines and no video.

Note: Test generator needs to be set-up with color bar pattern.



VIDEO PROBLEM 1

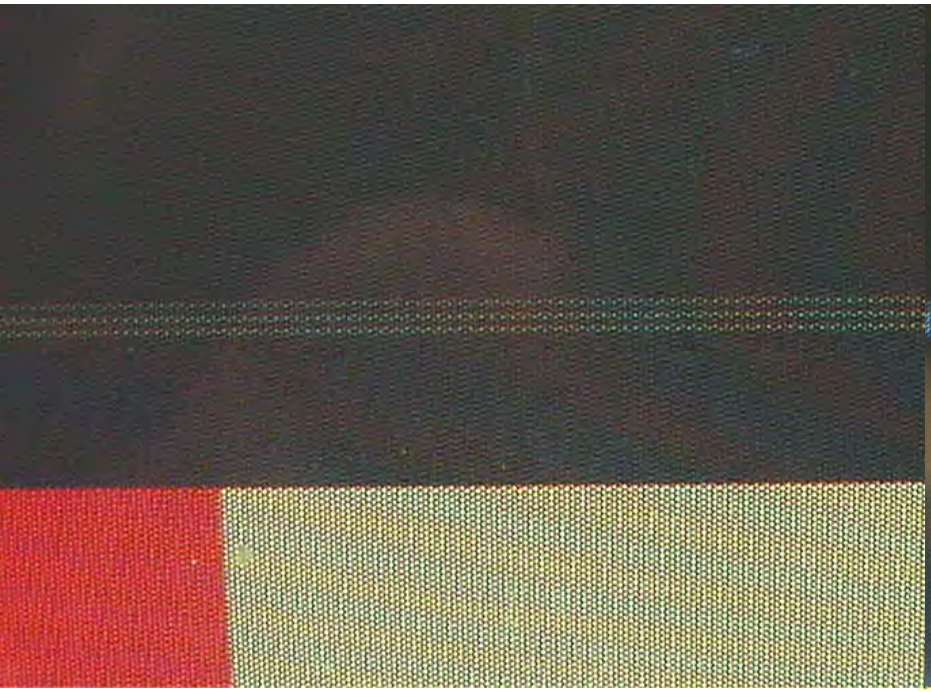
GRID PULSE COLOR = YELLOW

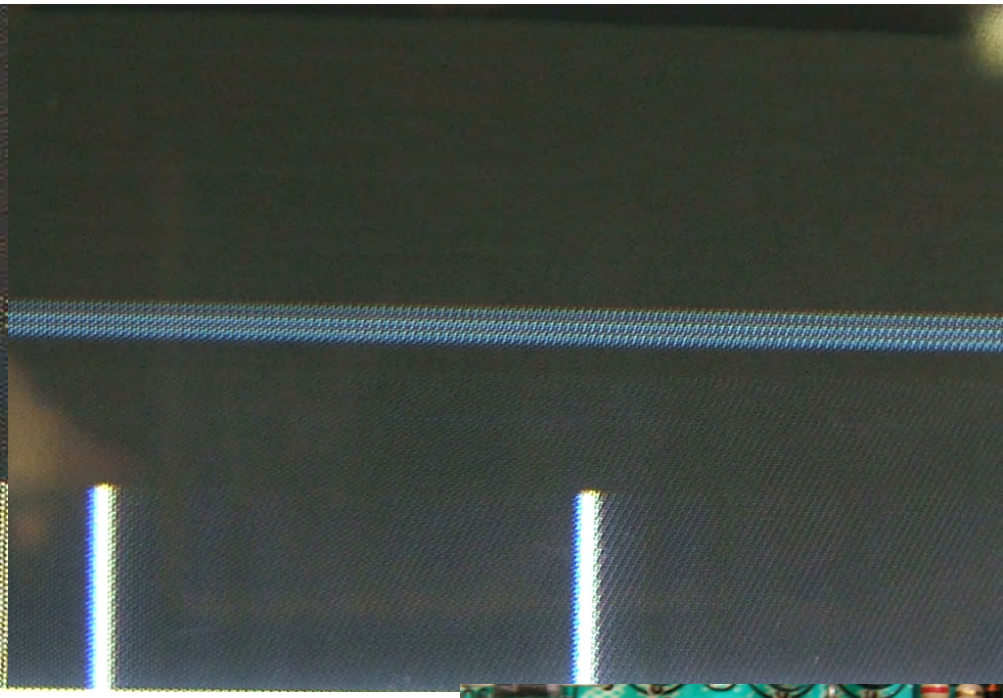
BAD

WHAT COLOR IS WEAK OR LOW?

GRID PULSE COLOR = WHITE

GOOD



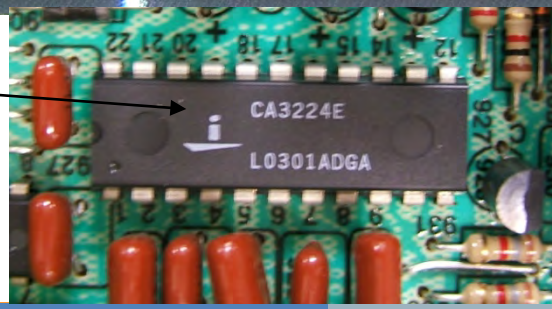


Auto-Bias IC CA3224 at location 927 is bad.

Pin 2 (Blue Input) measures normal, ~ 5.7 to 6.3 volts.

Pin 3 (Blue Comparator) measures normal, ~ 1.2 to 2.5 volts.

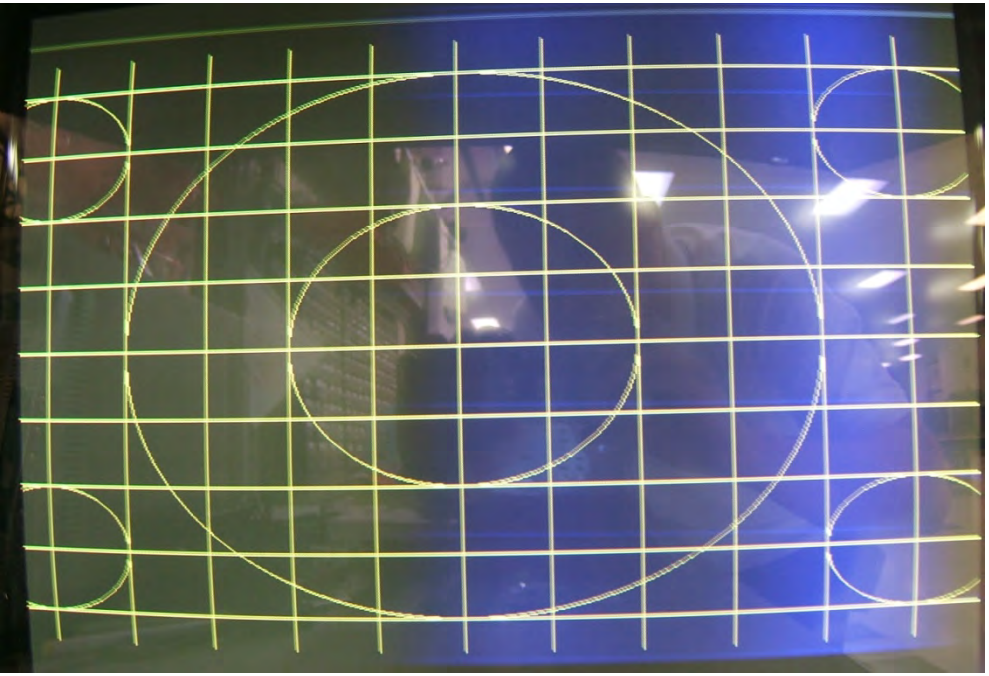
Pin 20 (Blue Bias Control Out) measures abnormal, .049 volts. Should be ~ 2.1 to 6.3 volts.

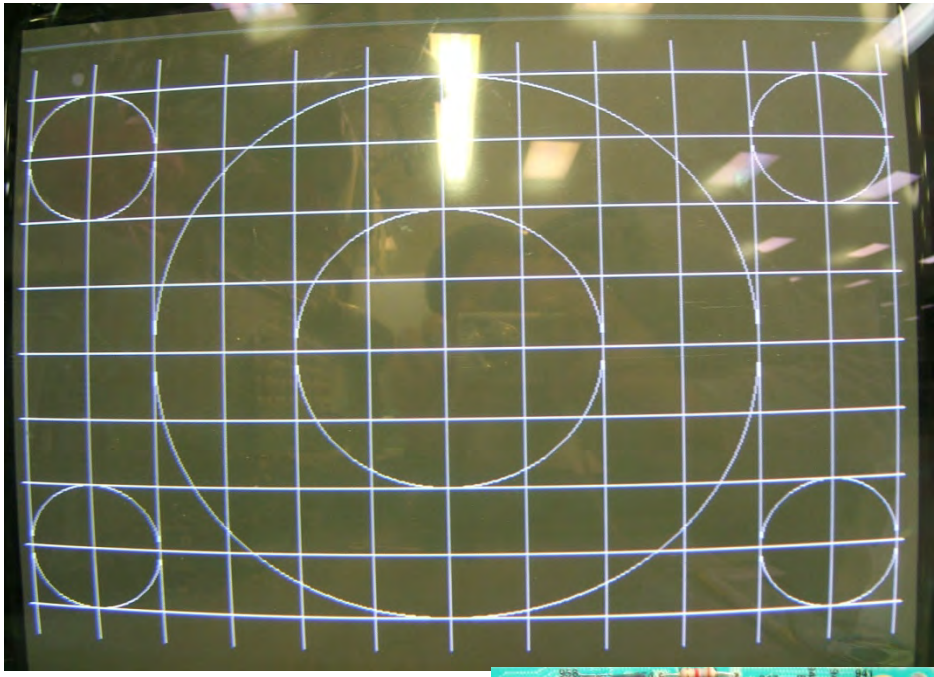


VIDEO PROBLEM 2

MISSING BLUE WITH RETRACE BAD

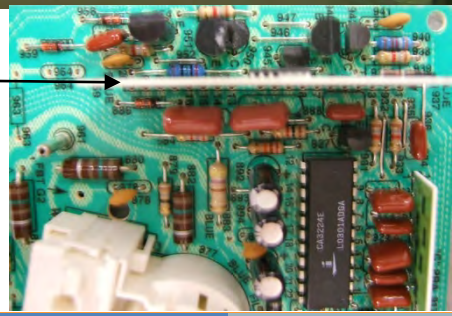
BLUE PRESENT AND NO RETRACE GOOD





K-PRA at location 937 is bad.

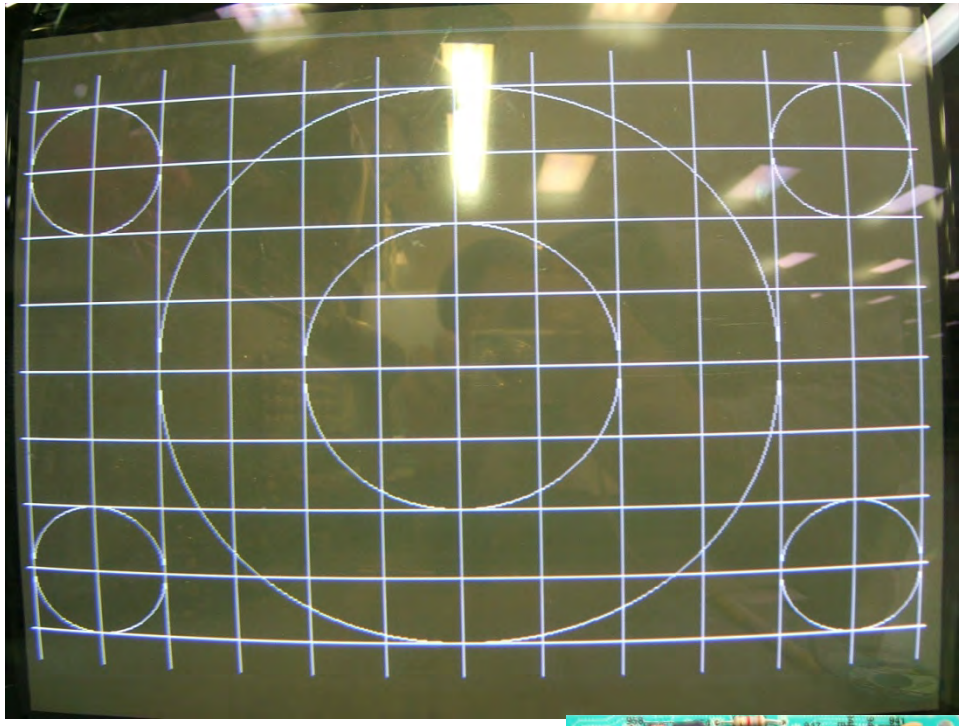
Pin 8 measures bad, ~ 6.92 volts. Should be ~ 9 to 10 volts.



VIDEO PROBLEM 3

BLUE RETRACE
WITH VIDEO BAD

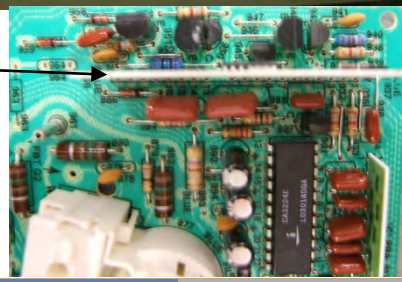
VIDEO GOOD



K-PRA at location 937 is bad.

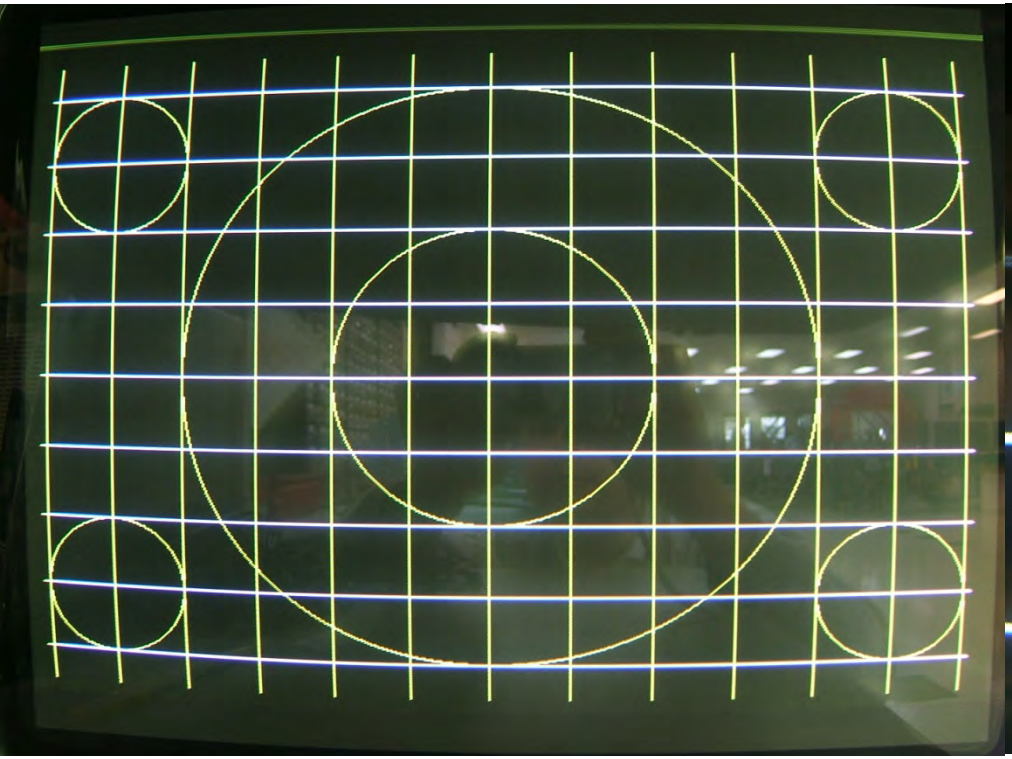
Pin 11 measures bad, ~ 1.7 volts. Should be ~ 2 to 4 volts.

Pin 20 measures bad, ~ 9.72 volts. Should be ~ 80 to 110 volts.

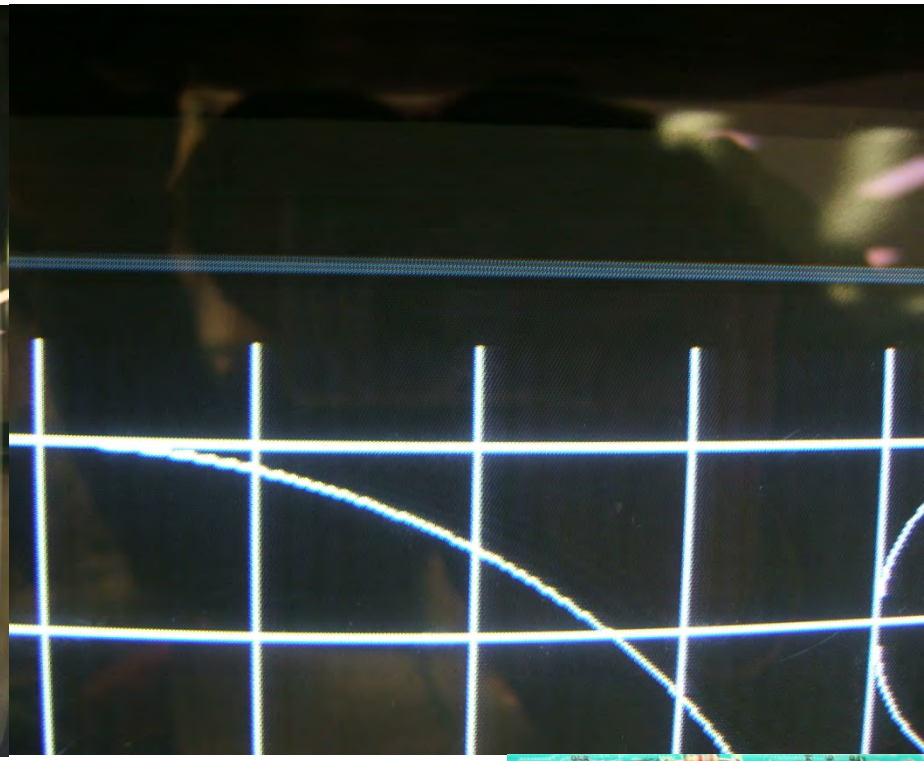


VIDEO PROBLEM 4

BLUE IS WEAK AND GRID
PULSE IS MISSING BLUE

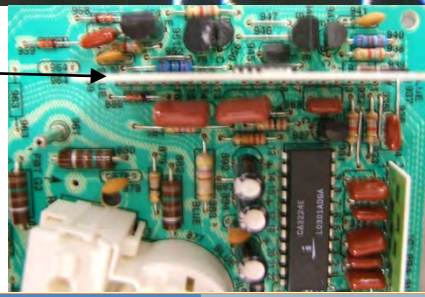


GOOD GRID



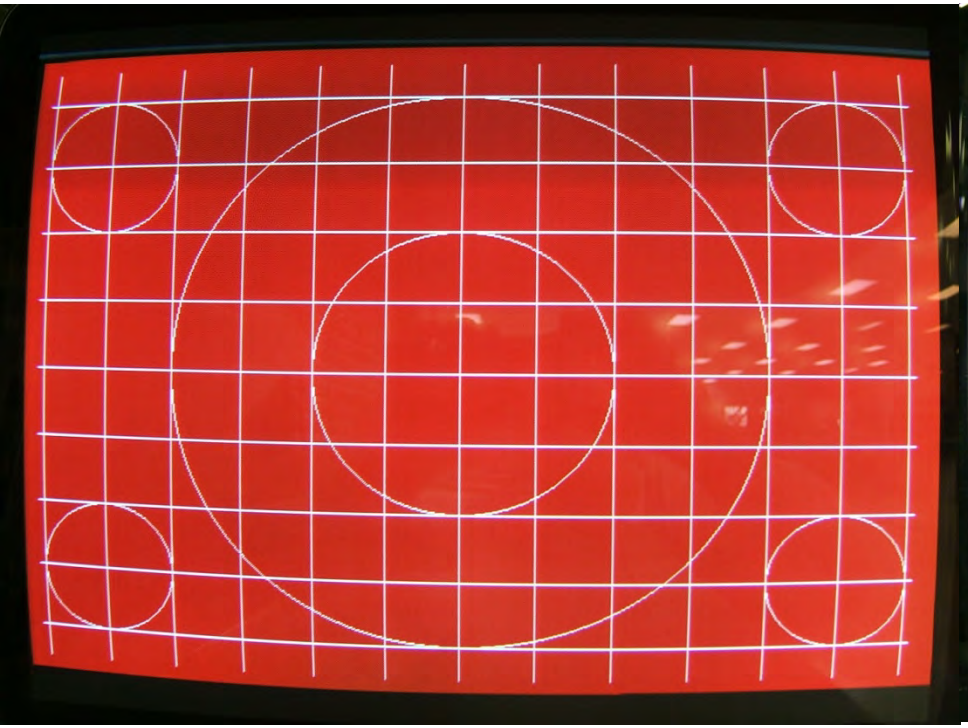
K-PRA at location 937 is bad.

Pin 1 measures bad, ~ 11.56 volts. Should be ~ 9 to 10 volts.

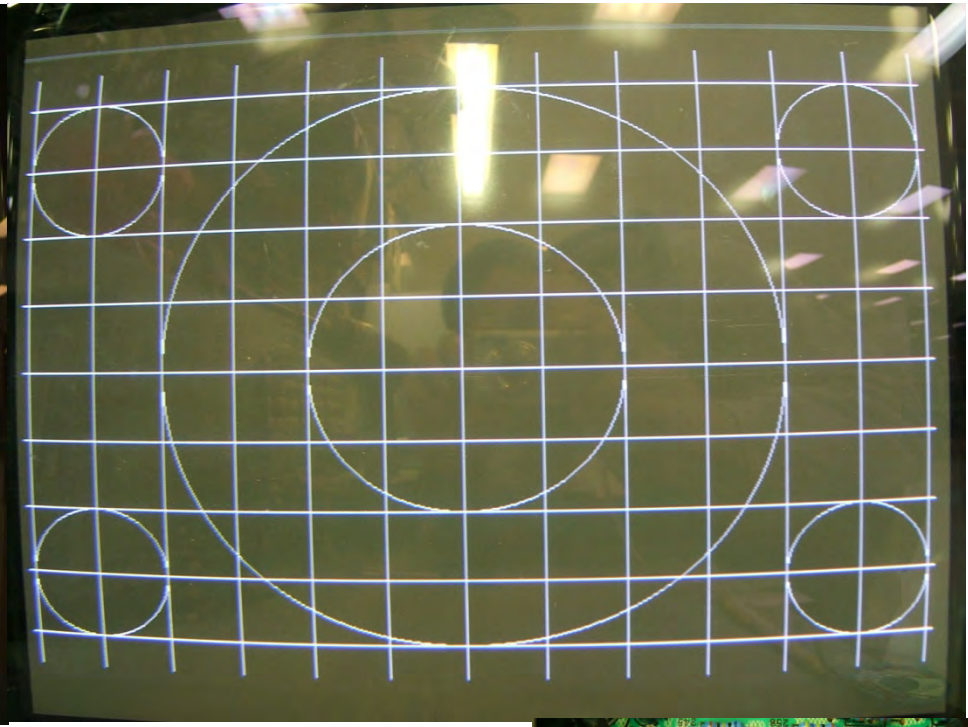


VIDEO PROBLEM 5

GRID PULSE IS WHITE
BACKGROUND IS RED BAD

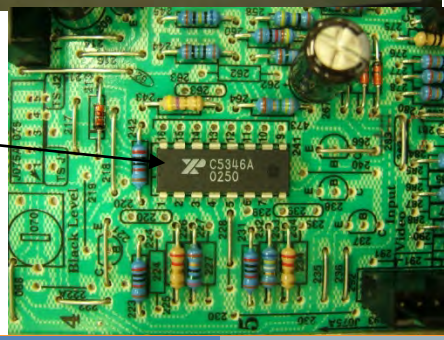


BACKGROUND IS BLACK



Video Input IC, XRC5346A at location 241 is bad

Pin 1 at location 811 measures bad. Voltage is lower than green and blue.



C182 FAILURE

220uF@100V, Electrolytic (CPC1112)

C182 is the filter capacitor for Video V+

Normal ripple voltage reading ~ .031VAC(rms)

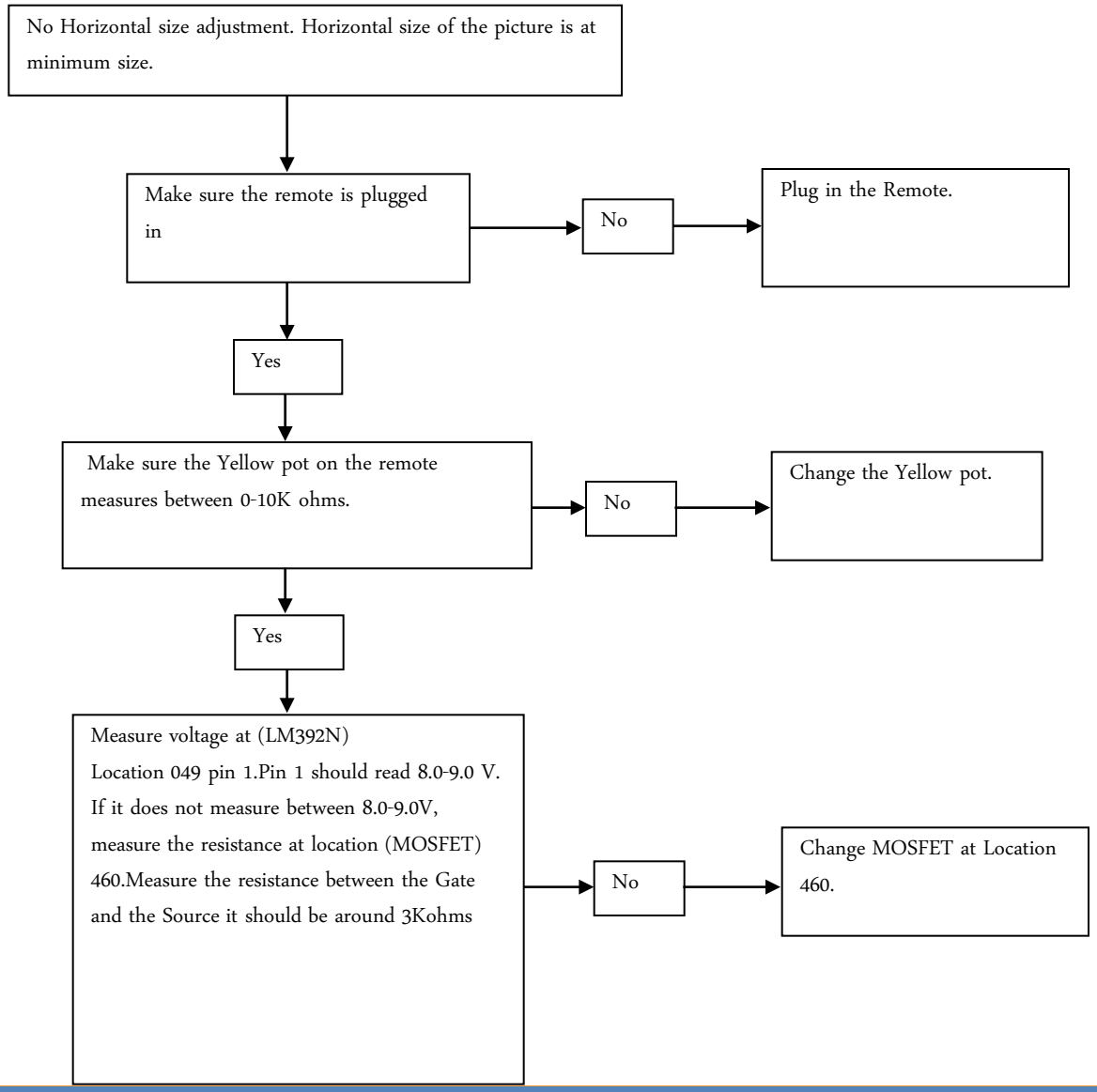
When cap fails this ripple voltage will jump to ~.418VAC(rms)

Image with Color Bar Signal

Image with full white test jumper

Troubleshooting flow charts: Symptom – No H-Size adjust.

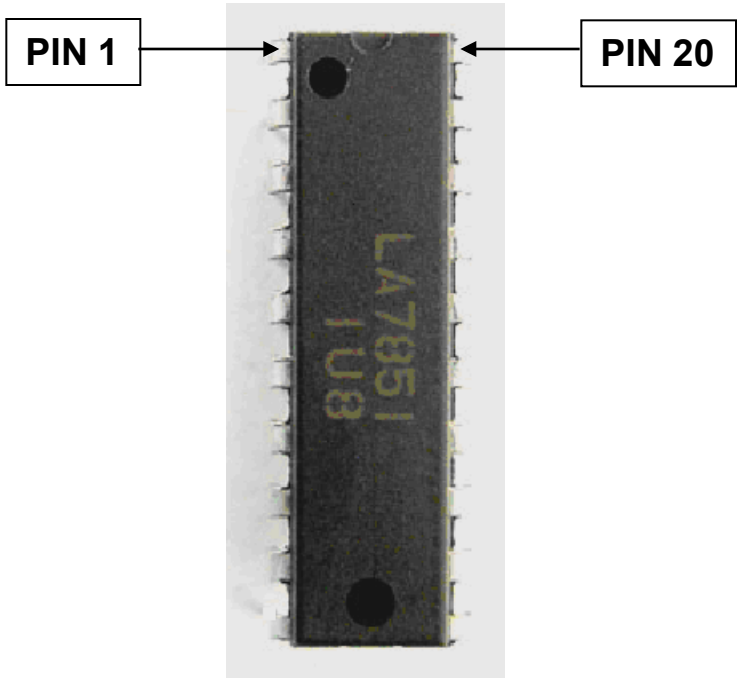
Note: Test generator need to be set-up with color bar pattern.



LA7851: VERTICAL AND HORIZONTAL DEFLECTION CONTROL CIRCUIT.

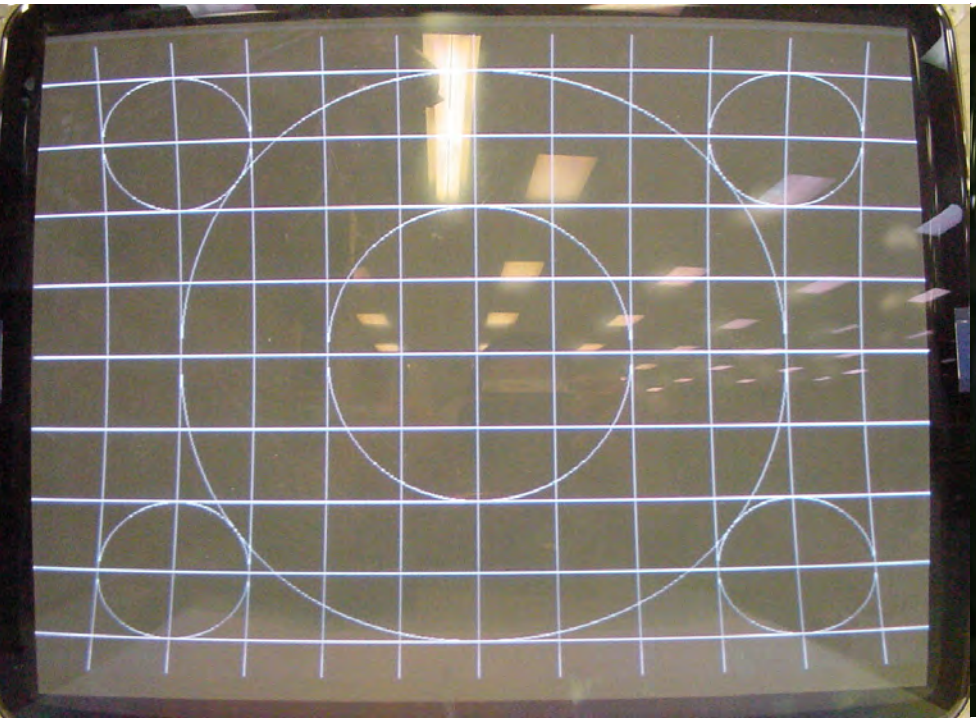
TABLE DISPLAYS CORRECT DC VOLTAGES

PIN 1	H-SYNC INPUT	3.8
PIN 2	PICTURE POS. O/S	8.2
PIN 3	DELAYED SYNC O/S	8.3
PIN 4	TRIGGER	.1
PIN 5	SAW TOOTH GEN.	3.5
PIN 6	BIAS	2.9
PIN 7	MULTIPLIER	5.8
PIN 8	HORZ. OSCILLATOR	5.8
PIN 9	DISCHARGE	5.4
PIN 10	H. V+	11.25
PIN 11	FIXED VOLTAGE FOR COMP.	5.6
PIN 12	OUTPUT COMP.	.396
PIN 13	GND	0
PIN 14	GND	0
PIN 15	**OUTPUT OF OP AMP.**	**2.4**
PIN 16	**V. REF**	**5.0**
PIN 17	VERTICAL OSC. O/S	.137
PIN 18	VERTICAL OSCILLATOR	5.8
PIN 19	VERTICAL +/- SYNC INPUT	5.9
PIN 20	VERTICAL V+	11.25

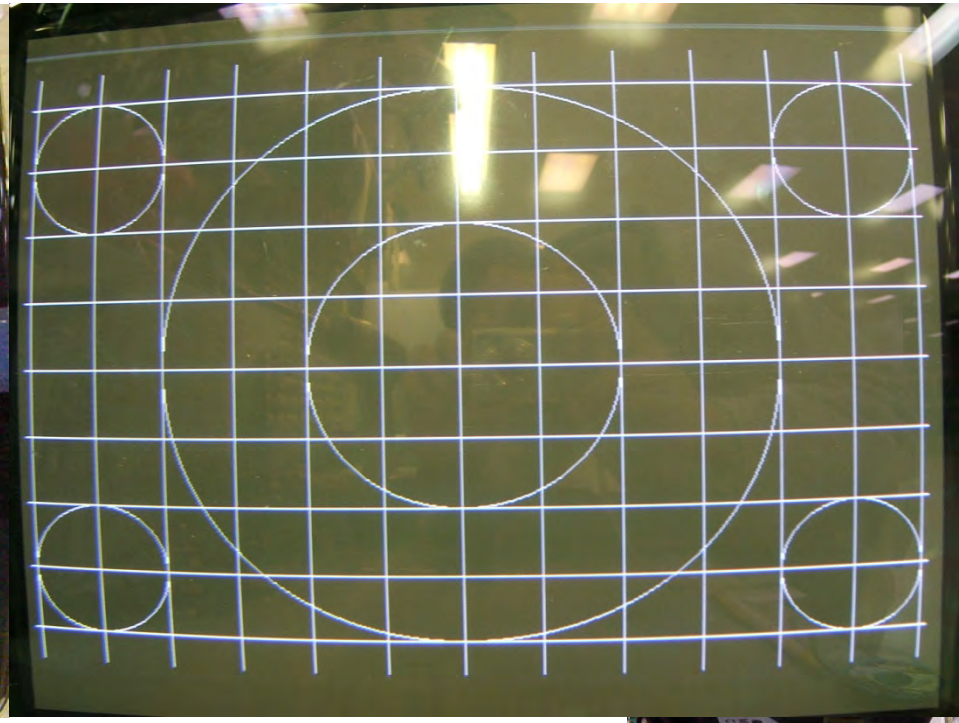


PROBLEM NUMBER 7

NO HORIZONTAL SIZE
IMAGE IS PINCUSHIONED
BAD



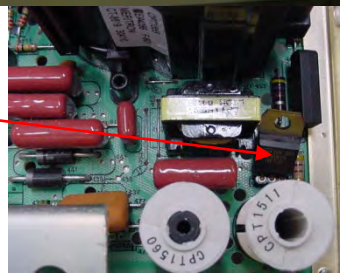
HORIZONTAL SIZE FUNCTIONAL
IMAGE IS GOOD



Power MOSFET IRF520 at location 460 is bad.

Pin 1 (H-Size Output) measures normal, ~ .3 to 7 volts.

Resistance between Gate and source measure normal, 3Kohms.



Power supply troubleshooting technique

NOTE: All voltage measurements are DC with –lead to GND unless otherwise noted.

Monitors with zero voltage at V+

•Ohm out the zener diode at location 181.
•Replace the zener if it is shorted, check the FET to make sure it is not shorted.
•Replace the FET if it is shorted and the switching mode transformer at location 136.
•Apply power to the monitor.
•If the V+ reads between 10-35V DC, turn your power off and apply external power to the Power supply IC (SEE ILLUSTRATION 101).
•Once the external power supply has been properly hooked up measure the voltage at pins 16,15,10 and 8 on IC (C5184) at location 115. If any of the readings are in correct replace IC 115 and Transistor (MPSA64) 127. After the IC has been replaced repeat the step above. If the readings are correct remove the external power supply and power up the monitor.

Monitors with 10–35 volts at V+

•If the V+ reads between 10-35V DC, turn your power off and apply external power to the Power supply IC (SEE ILLUSTRATION 101).
•Once the external power supply has been properly hooked up measure the voltage at pins 16,15,10 and 8 on IC (C5184) at location 115. If any of the readings are in correct replace IC 115 and Transistor (MPSA64) 127. After the IC has been replaced repeat the step above. If the readings are correct remove the external power supply and power up the monitor.

Monitors with a fluctuating V+

•Check the 16V line at diode 170(See illustration 102).
•Measure the 12V-regulator input and output.
•Measure pins 8,11 and 12 on IC (LA7851) at location 415.

Monitors with a fluctuating V+

•Check the 24V line at diode 168. (See illustration 103)
•Check the vertical IC (LA7838) and relay (location 468) for degaussing circuit that requires 24V.

ILLUSTRATION 101
EXTERNAL 17V SUPPLY HOOK UP TO POWER IC (C5184) 115.

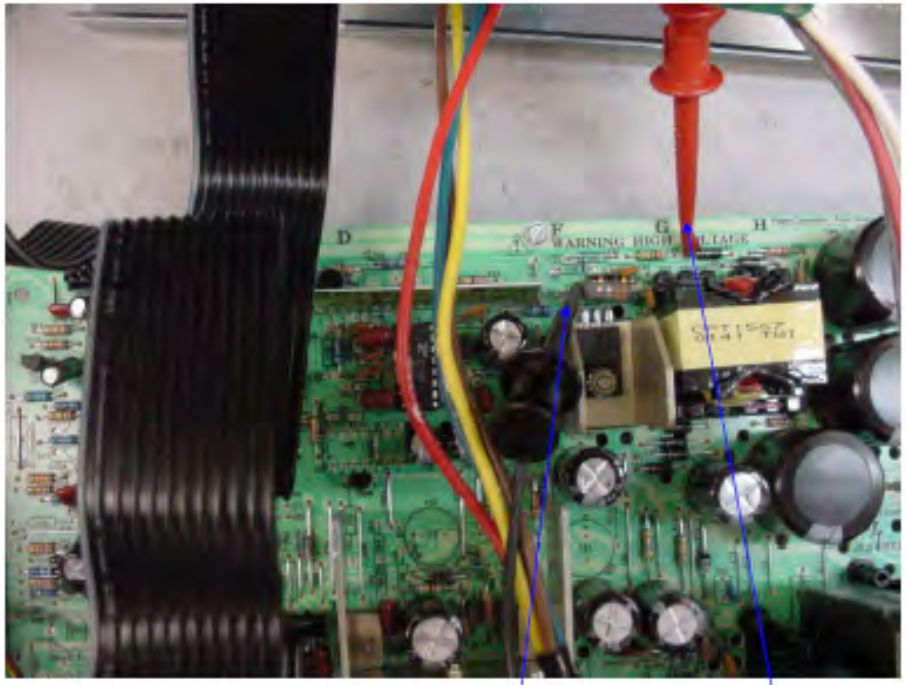


ILLUSTRATION 102
EXTERNAL 16V LINE HOOK UP

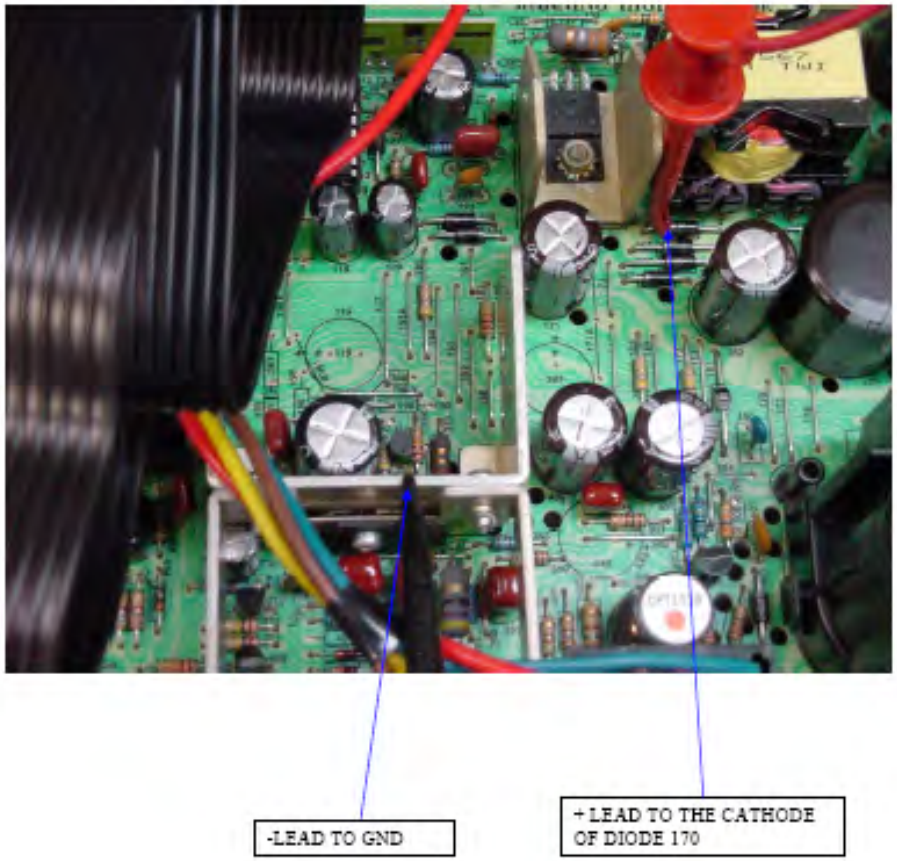
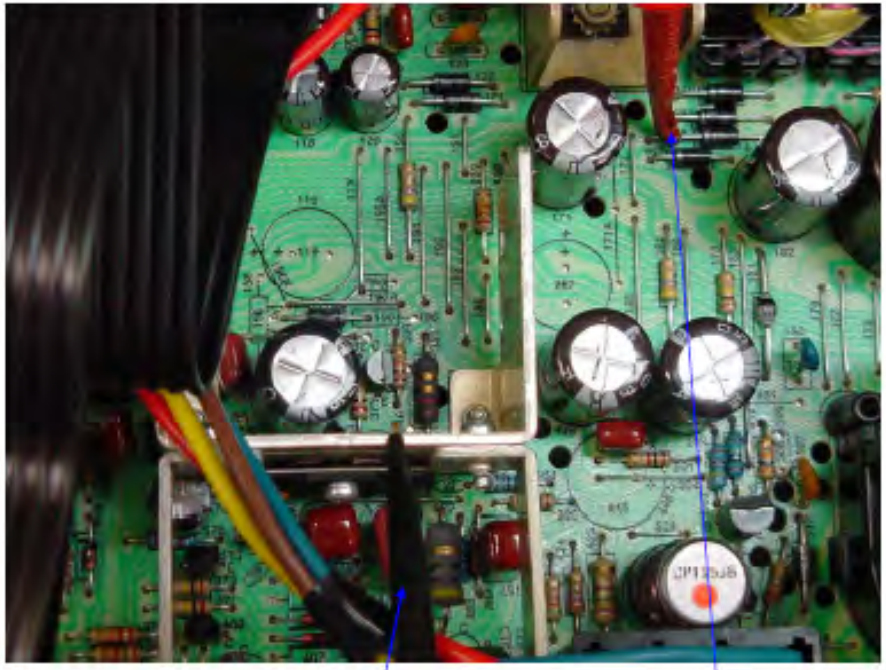


ILLUSTRATION 103
EXTERNAL 24V LINE HOOK UP



C5184: POWER SUPPLY CONTROL CIRCUIT

TABLE DISPLAYS CORRECT DC VOLTAGES WITH REFERENCE TO V-

PIN 1	+ INPUT ERROR AMP	5.7
PIN 2	- INPUT ERROR AMP	5.7
PIN 3	COMPARATOR	0.5
PIN 4	OUTPUT	4.23
PIN 5	CONTROL & FAULT SENSE 4Us delay	0.1
PIN 6	Rx OSCILLATOR	6.0
PIN 7	Cx OSCILLATOR	3.7
PIN 8	+7.5 REFERENCE	7.7
PIN 9	GND	0
PIN 10	DRIVE	1.4
PIN 11	CURRENT SENSE	0.06
PIN 12	CONTROL & FAULT SENSE – COMP.	3.6
PIN 13	CONTROL & FAULT SENSE + COMP.	4.4
PIN 14	OVER VOLTAGE PROTECT INPUT	6.5
PIN 15	+17V INPUT	19
PIN 16	15V	17

CERONIX ECO	Date: May 07, 2003
13350 New Airport Road Auburn, California 95602 Phone (530) 888-1044 FAX (530) 888-1065	FEILD RETROFIT
Model Affected: CPA4243, CPA4244 , CPA4245 , CPA4283.	
Engineering Change Order ECO No. 560F	

Model 1793-31.5DF, CRT Yoke Change; CRT #M41AGE93X46C(L), Yoke #TLY7701C1

Reason for change:

NEW TUBE M41AGE93X46C (L) TUBE- CPP1722 , Yoke TLY7701C1

1. CPA4243-IGT

   Start with a CPA4243 Chassis , CPA4050 - Tube right side up

2. CPA4283-IGT

   Start with a CPA4243 Chassis , CPA4051- Tube right side up , Reverse Blue & Red Yoke wires.(Horizontal)

3. CPA4244-ATRONIC

   Start with a CPA4244 Chassis , CPA4077. Tube right side up

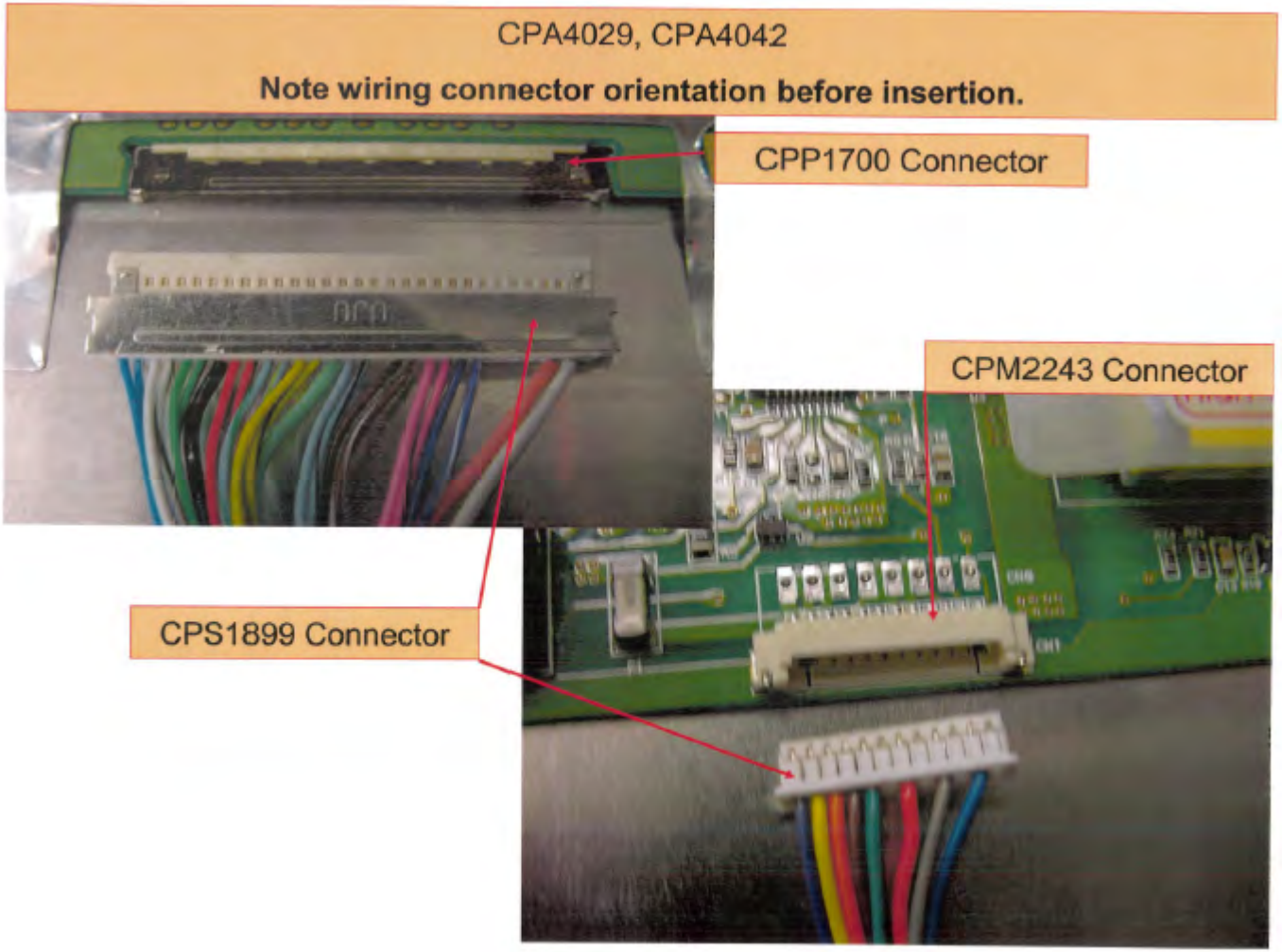
   Start with a CPA4244 Chassis , CPA4095. Tube right side up

4. CPA4245-ARISTOCRAT

   Start with a CPA4245 Chassis , CPA4085. Tube right side up

   Start with a CPA4245 Chassis , CPA4027. Tube right side up

LCD Connection Atronic Emotion Displays



HARNESS PINOUT FOR ATRONIC EMOTION LCD

Connector A: Mini Delta Ribbon 36pin						B:UJU HS-30-BB100 C:Molex 51021-1200		
Pin	Signal	Description	Size	Color	Pair	Pin	Signal	Description
A1	LVDSA0-	Differential Signal DLVDS (1.Pixel)	AWG28	ws	Pair 1	B1	RXO0-	LVDS ODD 0- SIGNAL
A2	LVDSA1-	Differential Signal DLVDS (1.Pixel)	AWG28	ws	Pair 2	B3	RXO1-	LVDS ODD 1- SIGNAL
A3	LVDSA2-	Differential Signal DLVDS (1.Pixel)	AWG28	ws	Pair 3	B5	RXO2-	LVDS ODD 2- SIGNAL
A4	LVDSACL-	Differential Signal DLVDS (1.Pixel CLK)	AWG28	ws	Pair 4	B8	RXOC-	LVDS ODD C- SIGNAL
A5	LVDSA3-	Differential Signal DLVDS (1.Pixel)	AWG28	ws	Pair 5	B10	RXO3-	LVDS ODD 3- SIGNAL
A6	GND	Panel Ground	AWG26	ra/br	—	B7	GND	Panel Ground
A7	LVDSB0-	Differential Signal DLVDS (2.Pixel)	AWG28	ws	Pair 6	B12	RXE0-	LVDS EVEN 0- SIGNAL
A8	LVDSB1-	Differential Signal DLVDS (2.Pixel)	AWG28	ws	Pair 7	B15	RXE1-	LVDS EVEN 1- SIGNAL
A9	LVDSB2-	Differential Signal DLVDS (2.Pixel)	AWG28	ws	Pair 8	B18	RXE2-	LVDS EVEN 2- SIGNAL
A10	LVDSBCL-	Differential Signal DLVDS (2.Pixel CLK)	AWG28	ws	Pair 9	B20	RXEC-	LVDS EVEN C- SIGNAL
A11	LVDSB3-	Differential Signal DLVDS (2.Pixel)	AWG28	ws	Pair 10	B22	RXE3-	LVDS EVEN 3- SIGNAL
A12	GND	Panel Ground	AWG26	ws/bl	—	B14	GND	Panel Ground
A13	SVCC	Switched Panel Power Supply	AWG26	lu/bl	—	B28	VDD	PANEL POWER SUPPLY +5V
A14	EBKL	Enable Backlight Signal	AWG26	gn/rs	—	C9	EBKL	BL ON / OFF SIGNAL
A15	SBKL	Switched Backlight Power Supply +5V / +12V	AWG26	rt/bl	—	C1	+12V	Inverter DC Input Power
A16	BRC	Backlight Control Signal	AWG26	ws/gn	—	C11	BRT-ADJ	0-5V (Min.hell =0V)
A17	TOUCH_LL	TOUCH_LL	AWG28	br	—	D1	TOUCH_LL	offene Enden
A18	TOUCH_LR	TOUCH_LR	AWG28	ge	—	D2	TOUCH_LR	offene Enden
A19	LVDSA0+	Differential Signal DLVDS (1.Pixel)	AWG28	br	Pair 1	B2	RXO0+	LVDS ODD 0+ SIGNAL
A20	LVDSA1+	Differential Signal DLVDS (1.Pixel)	AWG28	gn	Pair 2	B4	RXO1+	LVDS ODD 1+ SIGNAL
A21	LVDSA2+	Differential Signal DLVDS (1.Pixel)	AWG28	ge	Pair 3	B6	RXO2+	LVDS ODD 2+ SIGNAL
A22	LVDSACL+	Differential Signal DLVDS (1.Pixel CLK)	AWG28	gr	Pair 4	B9	RXOC+	LVDS ODD C+ SIGNAL
A23	LVDSA3+	Differential Signal DLVDS (1.Pixel)	AWG28	ra	Pair 5	B11	RXO3+	LVDS ODD 3+ SIGNAL
A24	GND	Backlight Inverter Ground	AWG26	br/ge	—	C4	GND	Inverter Ground
A25	LVDSB0+	Differential Signal DLVDS (2.Pixel)	AWG28	bl	Pair 6	B13	RXE0+	LVDS EVEN 0+ SIGNAL
A26	LVDSB1+	Differential Signal DLVDS (2.Pixel)	AWG28	rt	Pair 7	B16	RXE1+	LVDS EVEN 1+ SIGNAL
A27	LVDSB2+	Differential Signal DLVDS (2.Pixel)	AWG28	sw	Pair 8	B19	RXE2+	LVDS EVEN 2+ SIGNAL
A28	LVDSBCL+	Differential Signal DLVDS (2.Pixel CLK)	AWG28	vio	Pair 9	B21	RXEC+	LVDS EVEN C+ SIGNAL
A29	LVDSB3+	Differential Signal DLVDS (2.Pixel)	AWG28	or	Pair 10	B23	RXE3+	LVDS EVEN 3+ SIGNAL
A30	GND	Backlight Inverter Ground	AWG26	ws/ge	—	C5	GND	Inverter Ground
A31	SVCC	Switched Panel Power Supply	AWG26	ge/br	—	B29	VDD	PANEL POWER SUPPLY +5V
A32	SEKL	Switched Backlight Power Supply +5V / +12V	AWG26	ws/gr	—	C2	+12V	Inverter DC Input Power
A33	SEKL	Switched Backlight Power Supply +5V / +12V	AWG26	gr/br	—	C3	+12V	Inverter DC Input Power
A34	GND	Backlight Inverter Ground	AWG26	ws/rs	—	C7	GND	Inverter Ground
A35	TOUCH_UR	TOUCH_UR	AWG28	ws	—	D3	TOUCH_UR	offene Enden
A36		TOUCH_UL	AWG28	gn	—	D4	TOUCH_UL	offene Enden
FG	Metallhood			Outer	Shield			

P/NO.: FIP1742-40A

REV NO.: 0

INVERTER PINOUT FOR ATRONIC EMOTION LCD

2. Functional Pin Description

2.1. Input Connector CN1 : 12505WR-12A00 (YEON-HO)

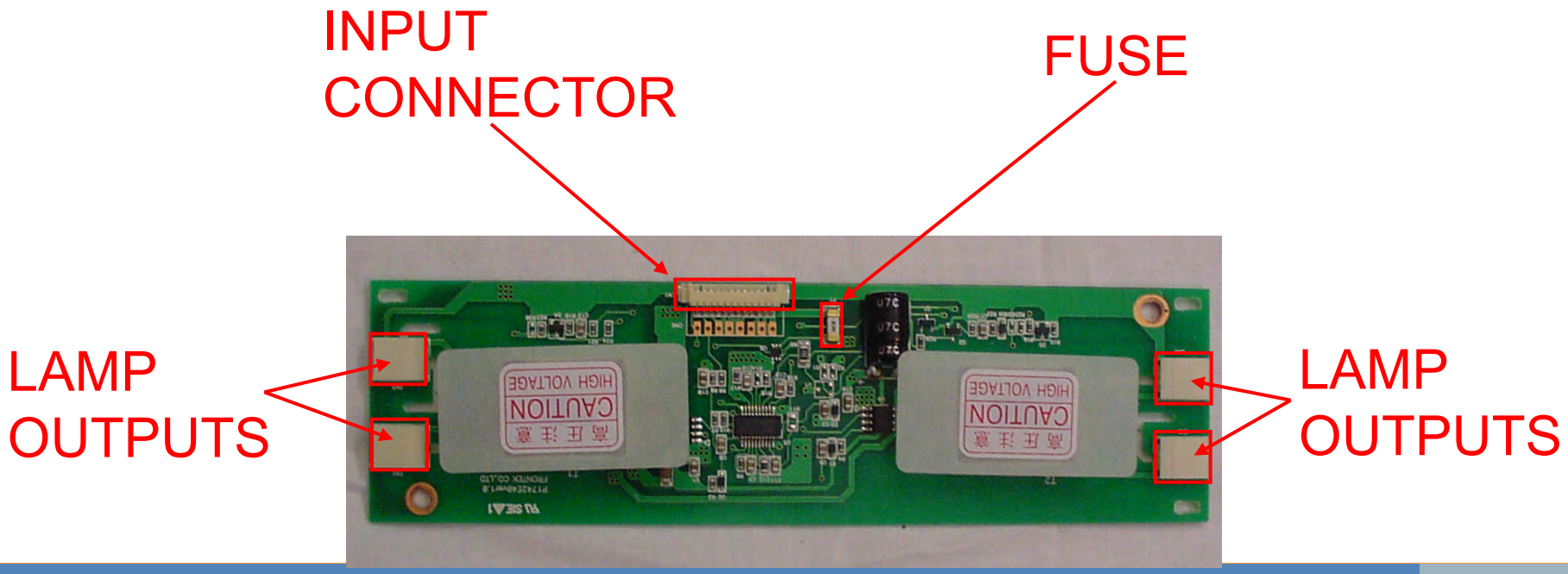
Pin No.	Symbol	Description
10,11,12	Vin	Input Voltage : 12V ± 1V
1,3,5,6,8,9	GND	GND
2	CTRL	Dim Adjust, Apply 0V ~ 5Vdc to Control Lamp Current 0 V : 6.3mA, 5V : 3.0mA (Each Lamp)
4	ON / OFF	Power System Return (5V:ON, 0V:OFF)

2.2. Output Connector CN2,CN3,CN4,CN5 : SM02B-BHS-1-TB (JST,연호,MOLEX)

Pin No.	Symbol	Description
1	Lamp H1	High Voltage connection to high side of lamp.
2	Lamp L1	Low Voltage connection to low side of lamp.

EMOTION INVERTER

CPM2243



5. Input Terminal Pin Assignment

Approval

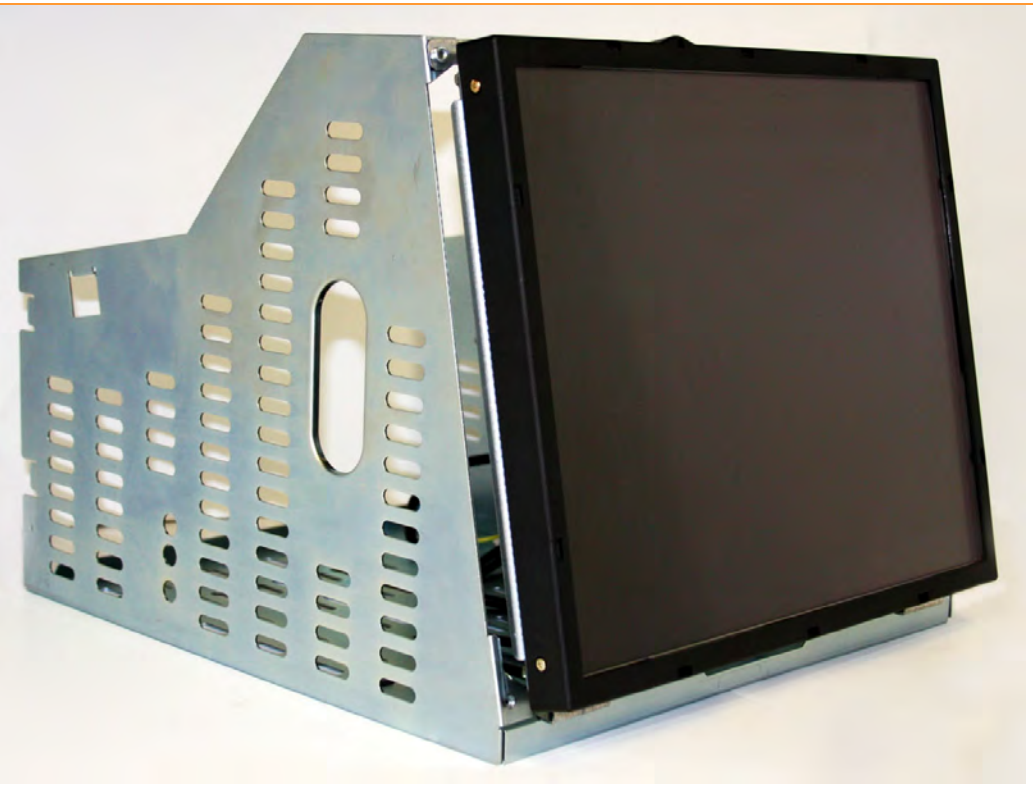
5.1. Input Signal & Power (Connector : Uju IN-30-09100 or equivalent)

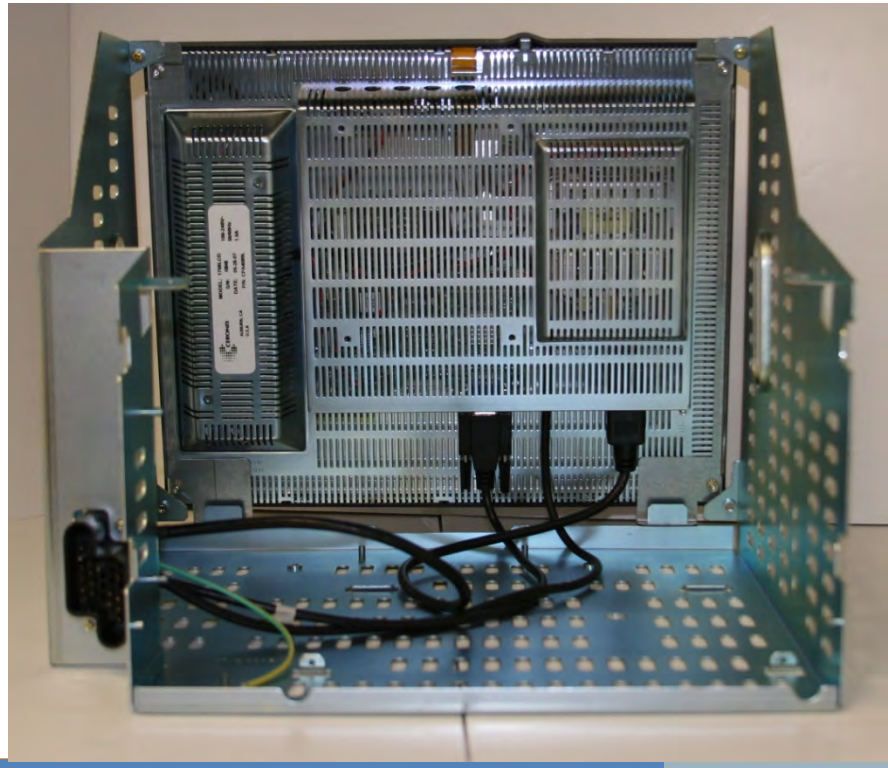
PIN NO	SYMBOL	FUNCTION
1	RXO0-	Negative Transmission Data of Pixel 0 (ODD data)
2	RXO0+	Positive Transmission Data of Pixel 0 (ODD data)
3	RXO1-	Negative Transmission Data of Pixel 1 (ODD data)
4	RXO1+	Positive Transmission Data of Pixel 1 (ODD data)
5	RXO2-	Negative Transmission Data of Pixel 2 (ODD data)
6	RXO2+	Positive Transmission Data of Pixel 2 (ODD data)
7	GND	Power Ground
8	RXOC-	Negative Sampling Clock (ODD data)
9	RXOC+	Positive Sampling Clock (ODD data)
10	RXO3-	Negative Transmission Data of Pixel 3 (ODD data)
11	RXO3+	Positive Transmission Data of Pixel 3 (ODD data)
12	RXE0-	Negative Transmission Data of Pixel 0 (EVEN data)
13	RXE0+	Positive Transmission Data of Pixel 0 (EVEN data)
14	GND	Power Ground
15	RXE1-	Negative Transmission Data of Pixel 1 (EVEN data)
16	RXE1+	Positive Transmission Data of Pixel 1 (EVEN data)
17	GND	Power Ground
18	RXE2-	Negative Transmission Data of Pixel 2 (EVEN data)
19	RXE2+	Positive Transmission Data of Pixel 2 (EVEN data)
20	RXEC-	Negative Sampling Clock (EVEN data)
21	RXEC+	Positive Sampling Clock (EVEN data)
22	RXE3-	Negative Transmission Data of Pixel 3 (EVEN data)
23	RXE3+	Positive Transmission Data of Pixel 3 (EVEN data)
24	GND	Power Ground
25	*CE	For LCD internal use only. Do not connect
26	*CTL	For LCD internal use only. Do not connect
27	NC	No connection
28	V_{cc}	Power Supply : +6V
29		
30		

Note) Refer to page 30 for the 1st pin of interface connector marked with ▼.

* If the system already uses the 25, 26pins, it should keep under GND level.
The voltage applied to those pins should not exceed -200mV.

Ceronix LCD





CERONIX

Ceronix LCD A/D Controller Board for 17" and 19" Displays

Ceronix Part Number: CPM2281

General Description

This specification defines the characteristics and performance of the Ceronix CPM2281 LCD A/D controller board. This product is capable of displaying resolutions from VGA to SXGA. The controller is capable of displaying up to 16,777,216 colors based on its red, green, and blue analog video input. Video synchronization signals of applicable resolution modes can be automatically detected in the range of 31.5kHz to 80kHz horizontal and 56Hz to 75Hz vertical. Unless otherwise specified, the product shall meet the specifications described in this document.

Applicable Timing

RESOLUTION	VERTICAL FREQUENCY	HORIZONTAL FREQUENCY	PIXEL FREQUENCY
640 x 400	70 Hz	31.46 KHz	
720 x 400	70 Hz	31.46 KHz	
640 x 480	60 Hz	31.50 KHz	25.175 MHz
	72 Hz	37.90 KHz	31.500 MHz
	75 Hz	37.50 KHz	31.500 MHz
800 x 600	60 Hz	37.9 KHz	40.000 MHz
	72 Hz	48.10 KHz	50.000 MHz
	75 Hz	46.90 KHz	49.500 MHz
1024 x 768	60 Hz	48.40 KHz	65.000 MHz
	70 Hz	56.5 KHz	75.000 MHz
	75 Hz	60.00 KHz	78.750 MHz
1280 x 1024	60 Hz	64.00 KHz	108.000 MHz
	75 Hz	80.00 KHz	135.000 MHz

The CPM2281 A/D controller board supports the video timing listed above. There are many different video cards and video signal formats in gaming applications. In general, the video signal of various VGA cards are compatible with VESA recommendations, but many gaming machines are not. The Ceronix A/D controller board is designed under the assumption that every video signal is standardized, therefore some signals may not lock in perfectly during auto signal detect. To avoid this compatibility issue, the Ceronix A/D Board is tested with popular VGA cards and various gaming machines. The compatibility can be up-dated as soon as a new signal can be evaluated. The following procedure should be followed if the controller board is not displaying an image correctly.

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OSD (On Screen Display) Navigation

The CPM2281 A/D controller board uses a five button key pad that allows the user to make certain adjustments to the display. The buttons are labeled and have the following functions;

MENU: Activates OSD Menu.
UP: Increases value of selected item, scrolls up the menu.
DOWN: Decreases value of selected item, scrolls down the menu.
SELECT: Selects adjust item, Auto adjust function.
POWER: Used to turn A/D controller on or off.
The key pad can be configured with the LCD monitor assembly as shown in the images below.

It is best to display an image that has a full window of active video. This allows the controller board to detect and center the image on the display. See example below.

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If the image does not fill the screen and center it self after power up, press the "SELECT" button. The display will attempt to adjust the image to fill the screen. If the image is centered and fills the screen try cycling the power to the display. If the image appears centered and fills the screen then the auto detect functioned properly.

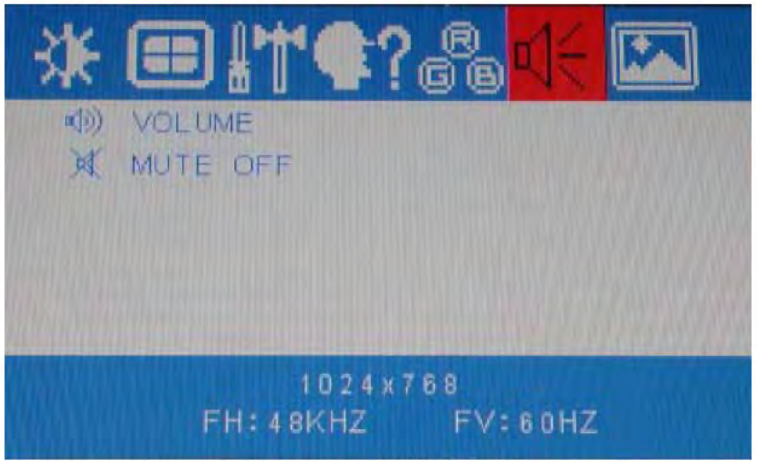
If the image is shifted or does not fill the screen after cycling the power, please try the following. Using the OSD buttons, navigate to the image adjustment window. See below.

Using the "LEFT RIGHT", "DOWN UP", AND "HORIZONTAL SIZE" functions adjust the display so that the image is centered and fills the screen. Press the "MENU" button to suppress the OSD. Cycle power to the display. If the image appears centered and fills the screen then the controller has stored the new settings properly.

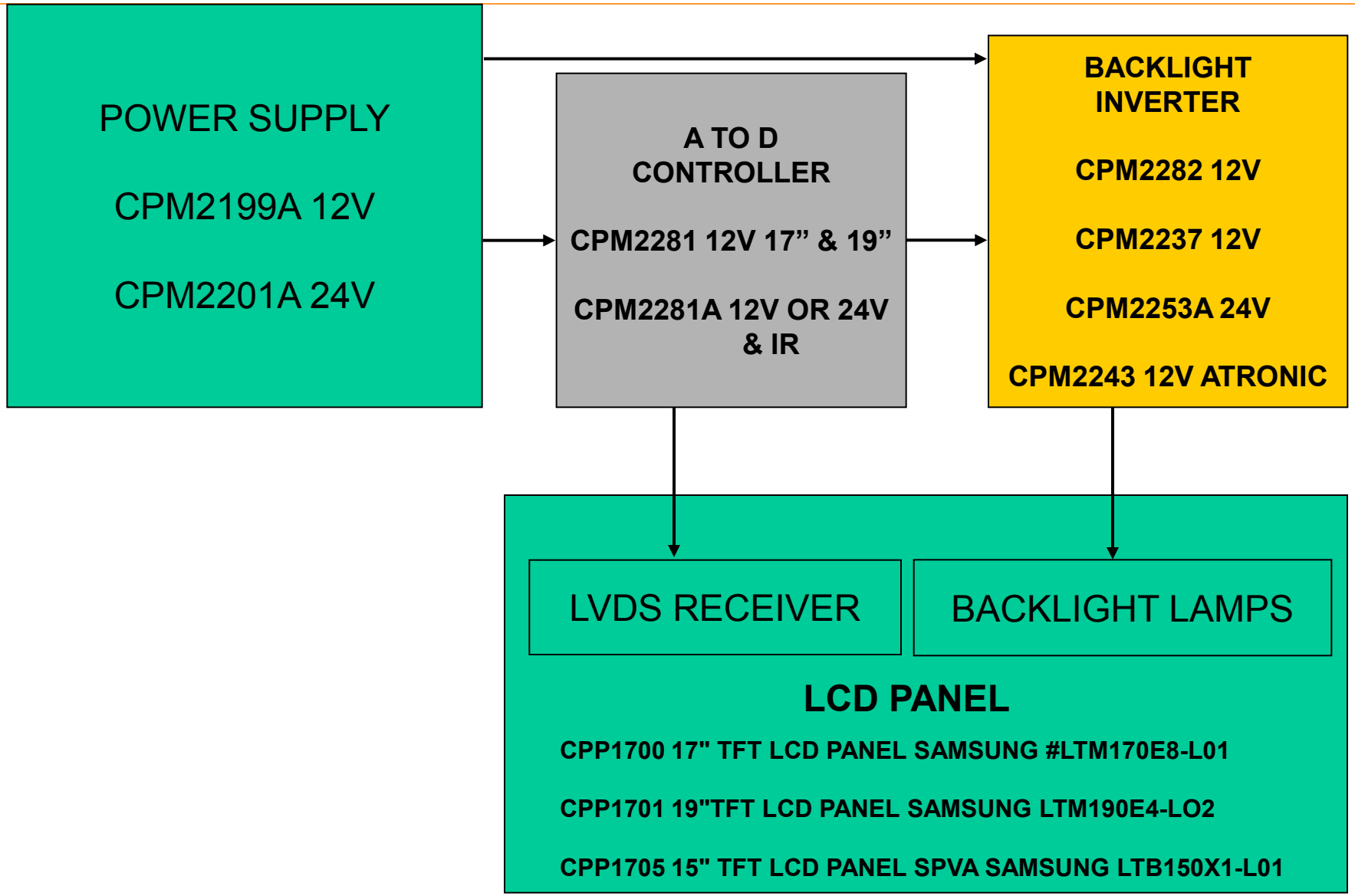
If the image is shifted or does not fill the screen after cycling the power, please contact Ceronix and provide the following information.

Video Source	Video Card	Gaming Machine
Manufacturer		
Model Number		
Date of Manufacture		
Name of game		
Resolution		
Horizontal Frequency		
H-Sync Pulse Width		
H-Sync Pulse Delay		
Vertical Frequency		
V-Sync Pulse Width		
V-Sync Pulse Delay		

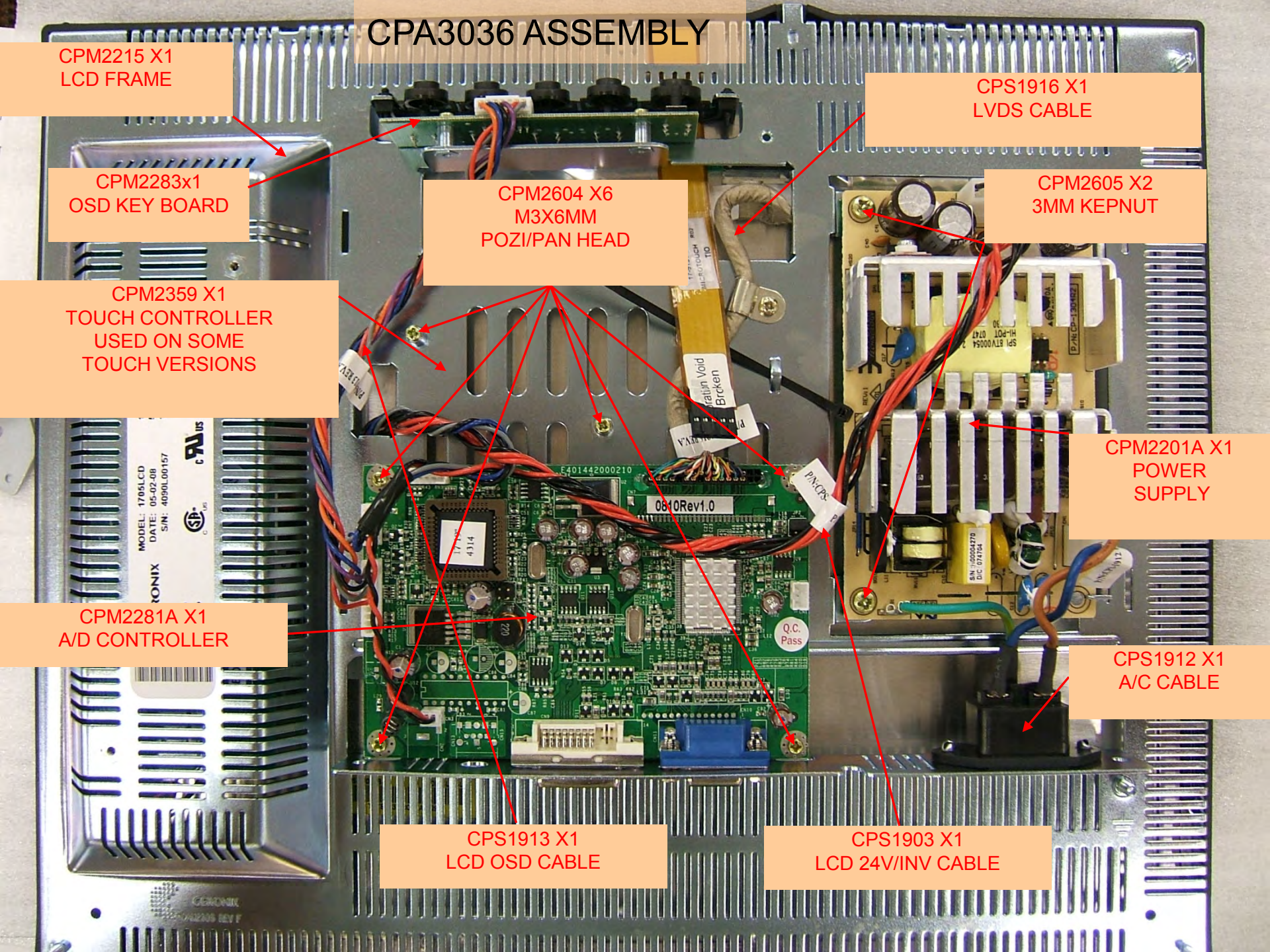
If it is not possible for the detailed information to be acquired, the information that appears on the lower blue field of the OSD can be used (Example: The OSD image above shows the Resolution=1024x768, Horizontal Frequency=48kHz, and Vertical Frequency=60Hz).



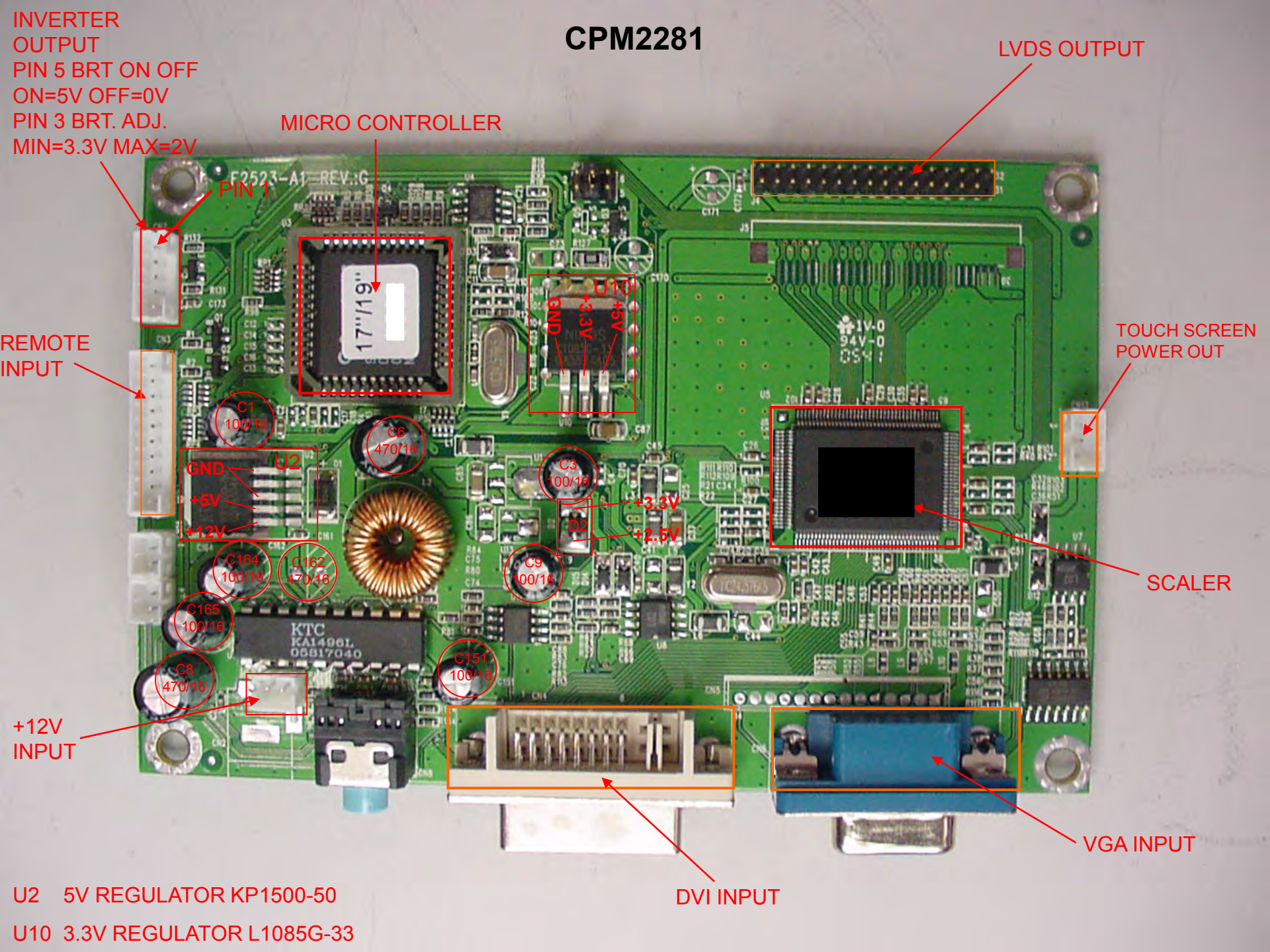
LCD BLOCK DIAGRAM



CPA3036 ASSEMBLY



CPM2281

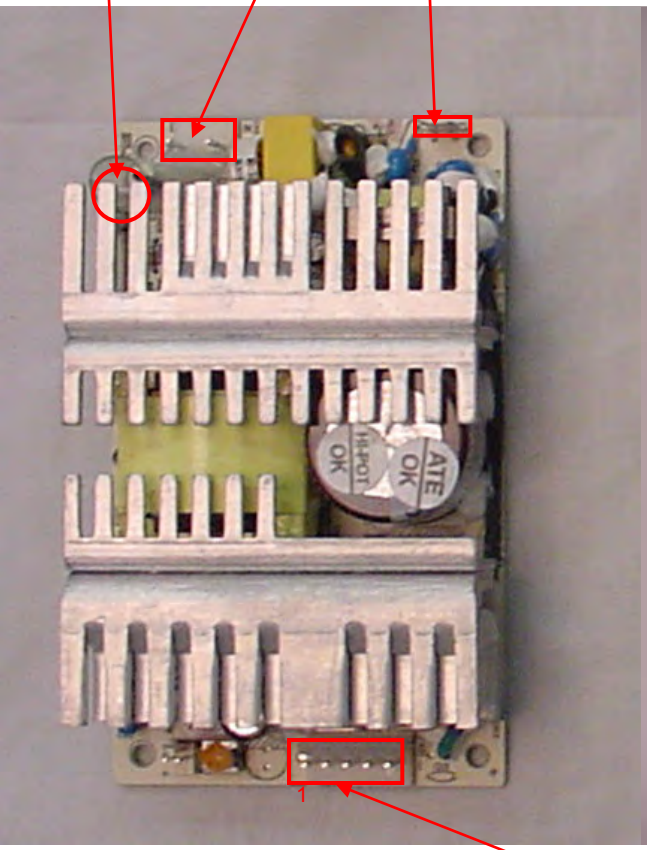


U2 5V REGULATOR KP1500-50

U10 3.3V REGULATOR L1085G-33

POWER SUPPLIES 12V & 24V

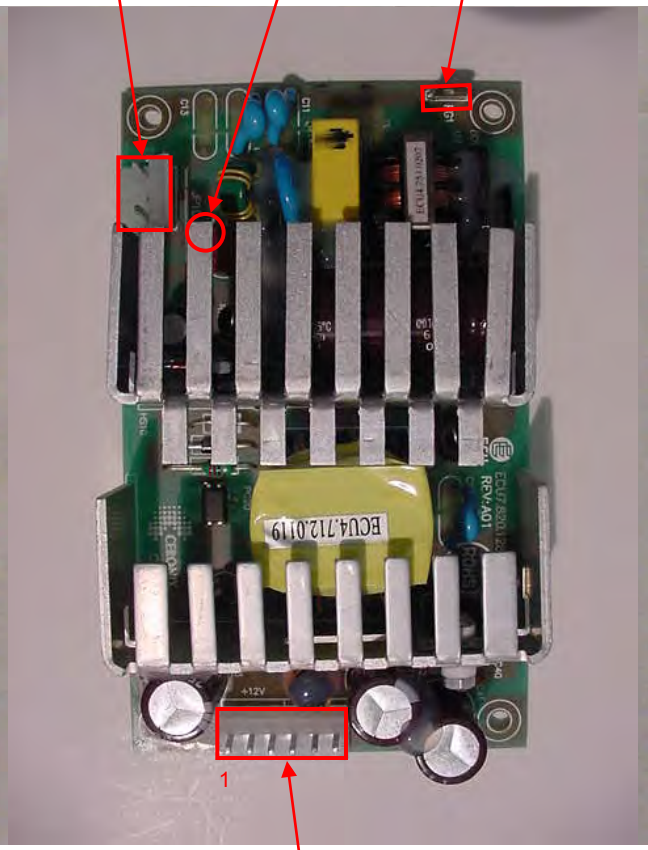
CPM2239 12V



5 PIN 12V OUTPUT

PIN 1&2 – GND
PIN 4&5 – 12V

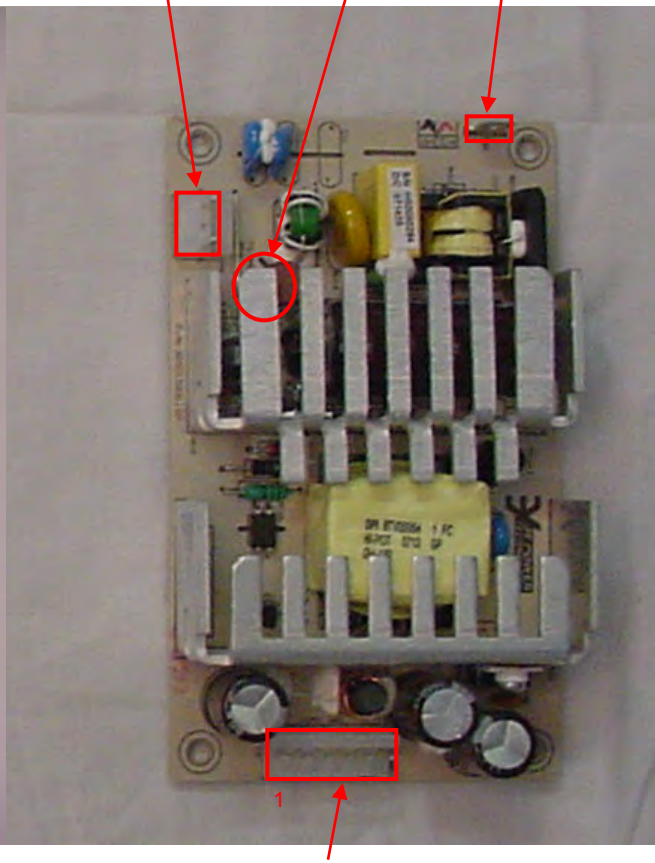
CPM2199A 12V



6 PIN 12V OUTPUT

PIN 1,2,&3 – 12V
PIN 4,5,&6 – GND

CPM2201A 24V

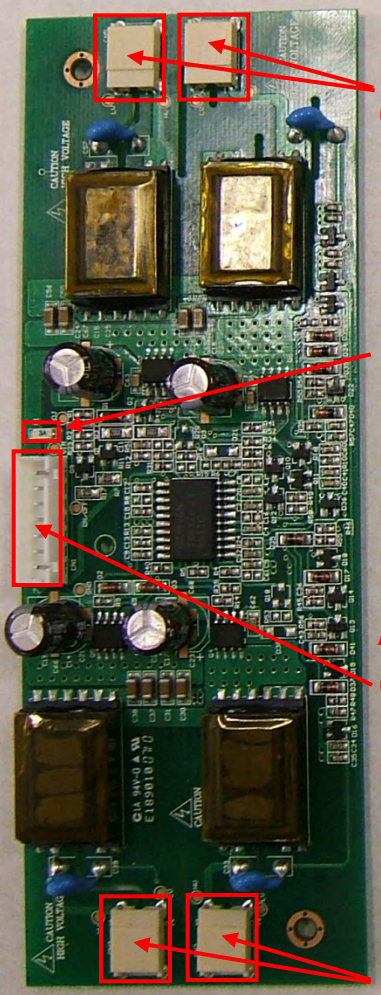


6 PIN 24V OUTPUT

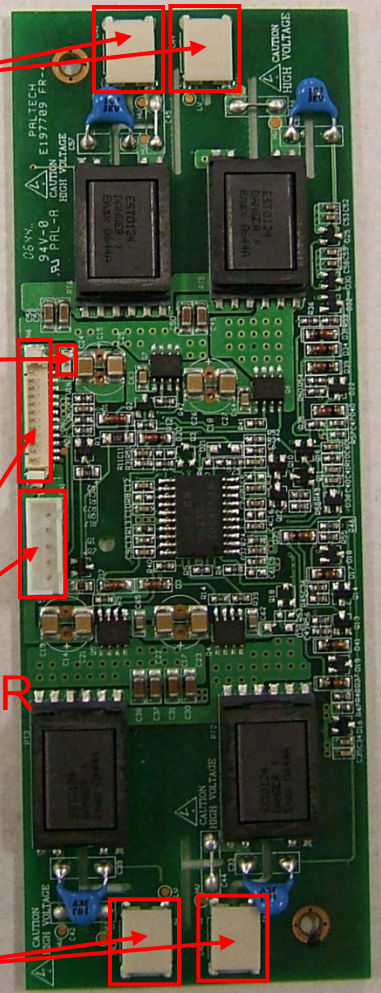
PIN 1,2,&3 – 24V
PIN 4,5,&6 – GND

INVERTER'S

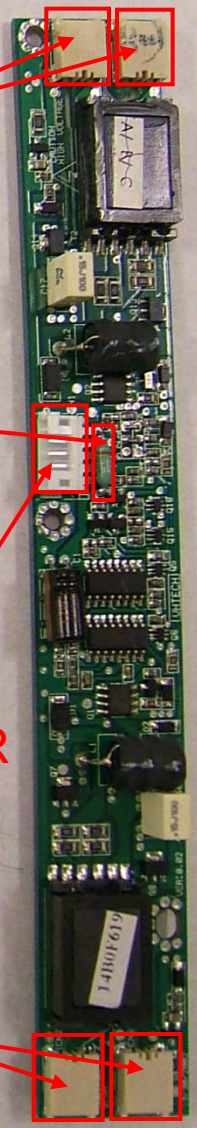
CPM2253A



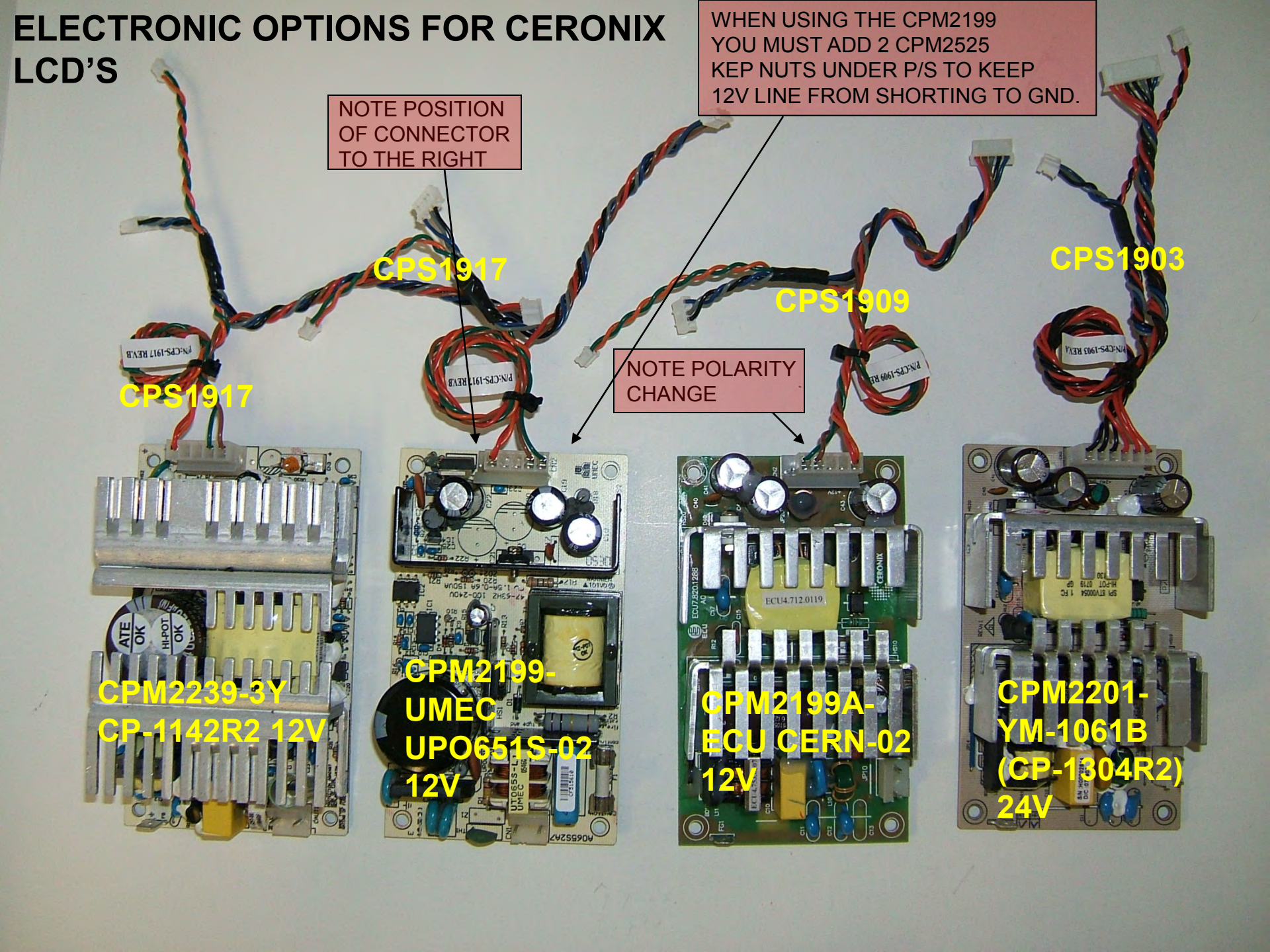
CPM2237A

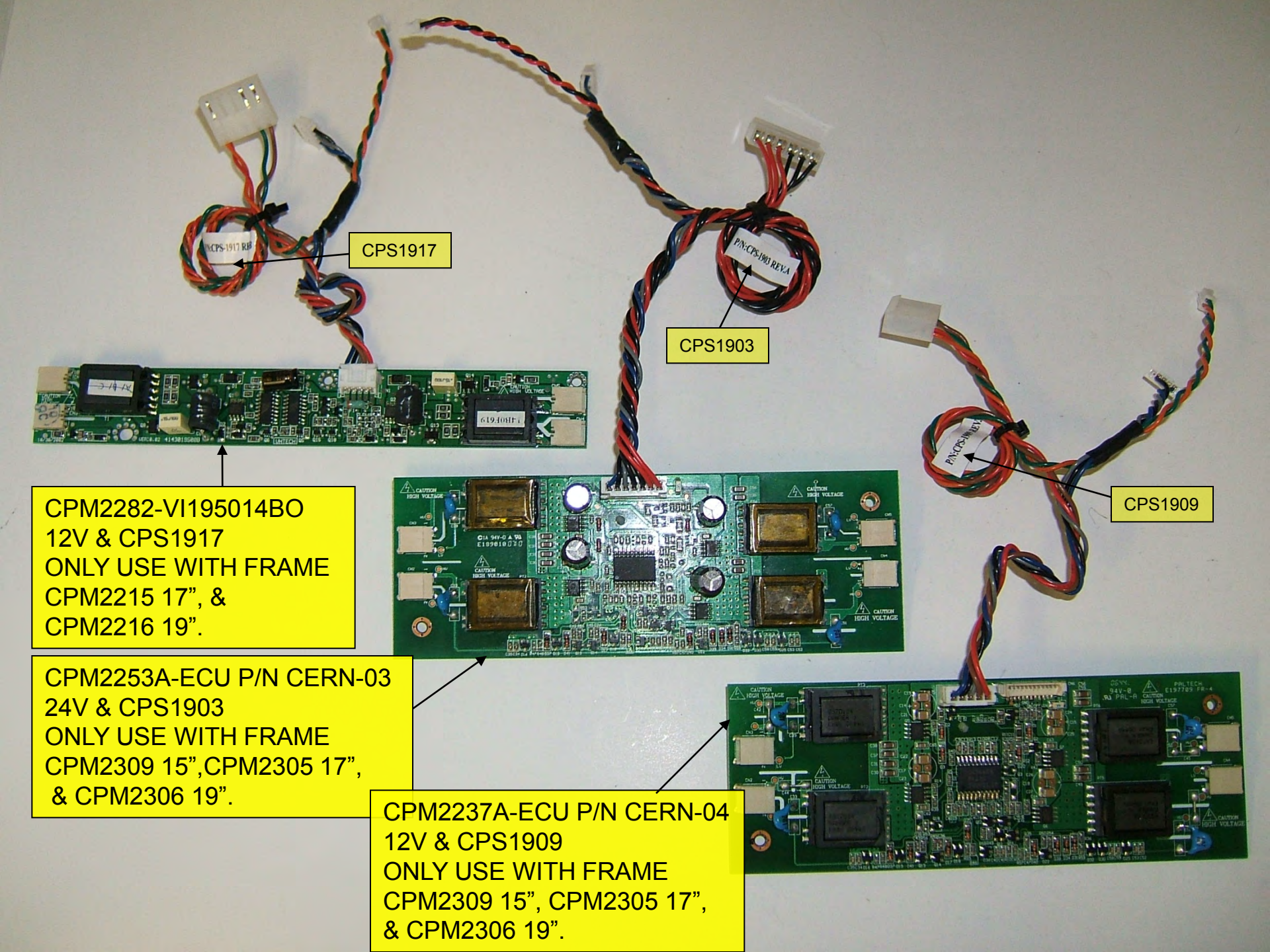


CPM2282

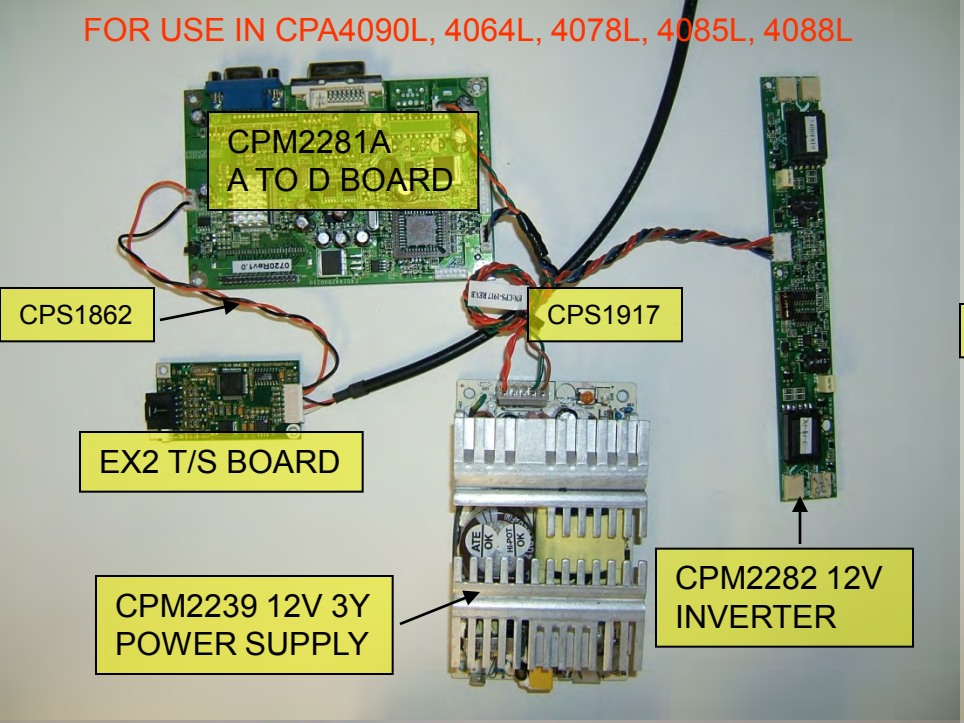


ELECTRONIC OPTIONS FOR CERONIX LCD'S

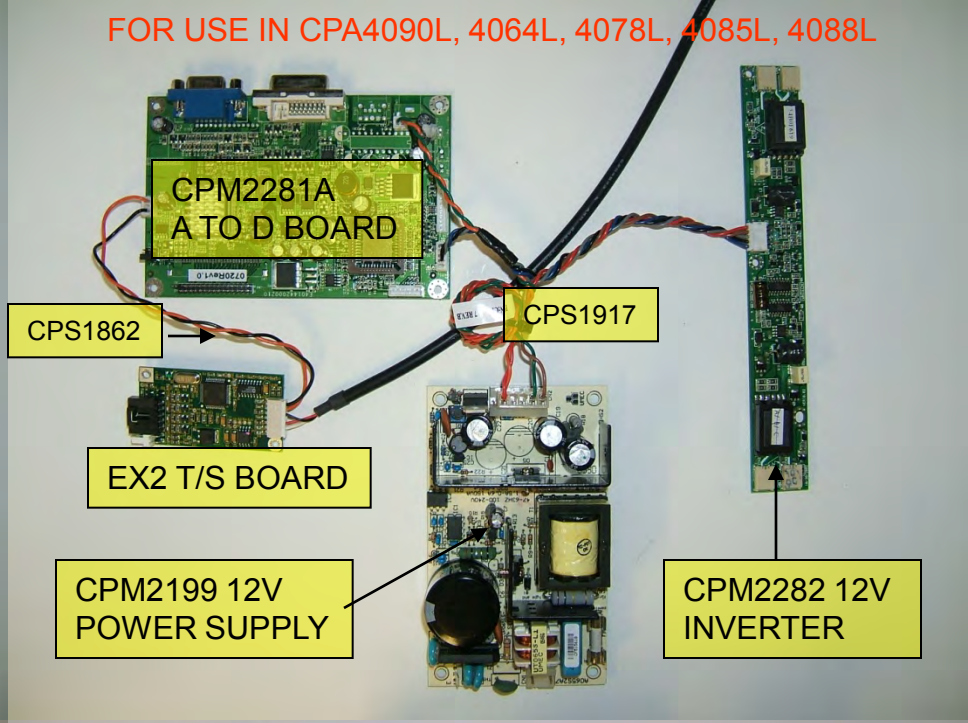


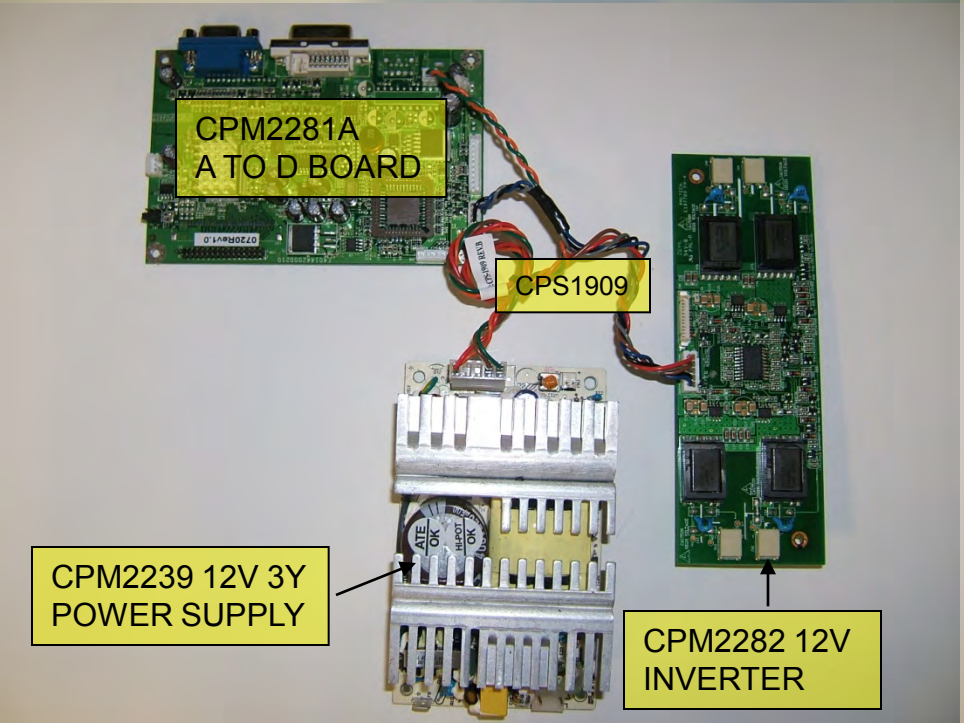

CPS1917
CPS1903
CPS1909
CPM2282-VI195014BO
12V & CPS1917
ONLY USE WITH FRAME
CPM2215 17”, &
CPM2216 19”.
CPM2253A-ECU P/N CERN-03
24V & CPS1903
ONLY USE WITH FRAME
CPM2309 15”,CPM2305 17”,
& CPM2306 19”.
CPM2237A-ECU P/N CERN-04
12V & CPS1909
ONLY USE WITH FRAME
CPM2309 15”, CPM2305 17”,
& CPM2306 19”.

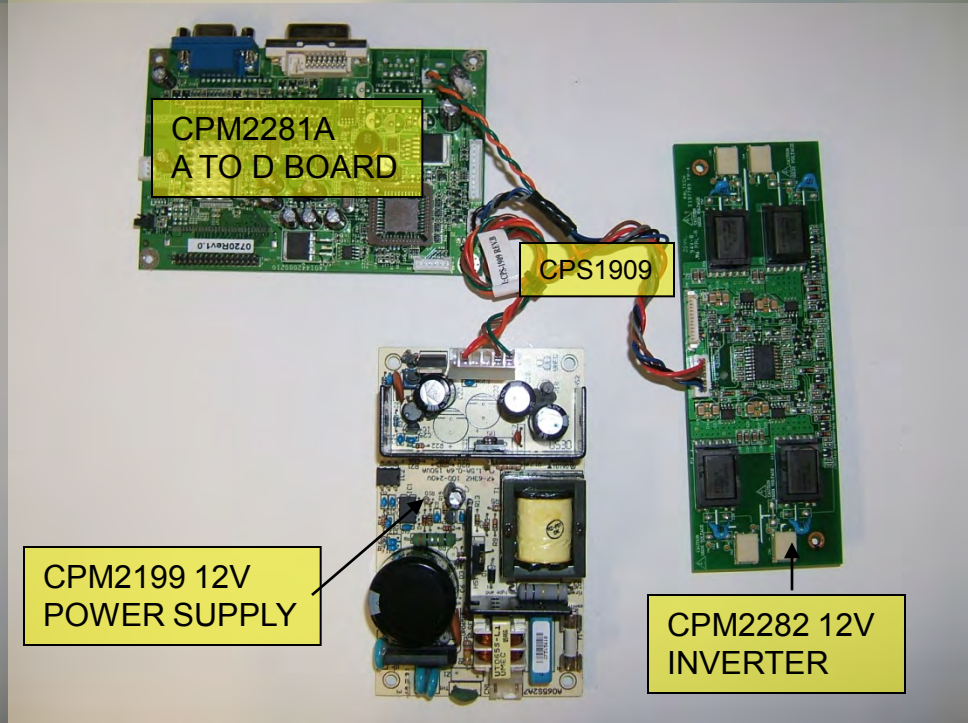
FOR USE IN CPA4090L, 4064L, 4078L, 4085L, 4088L

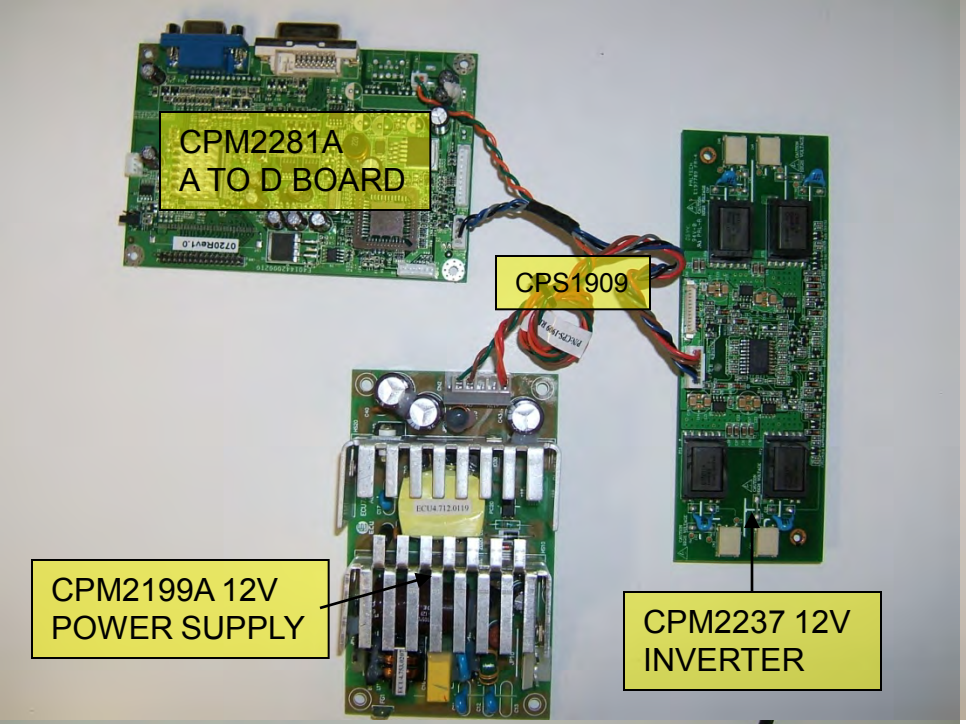


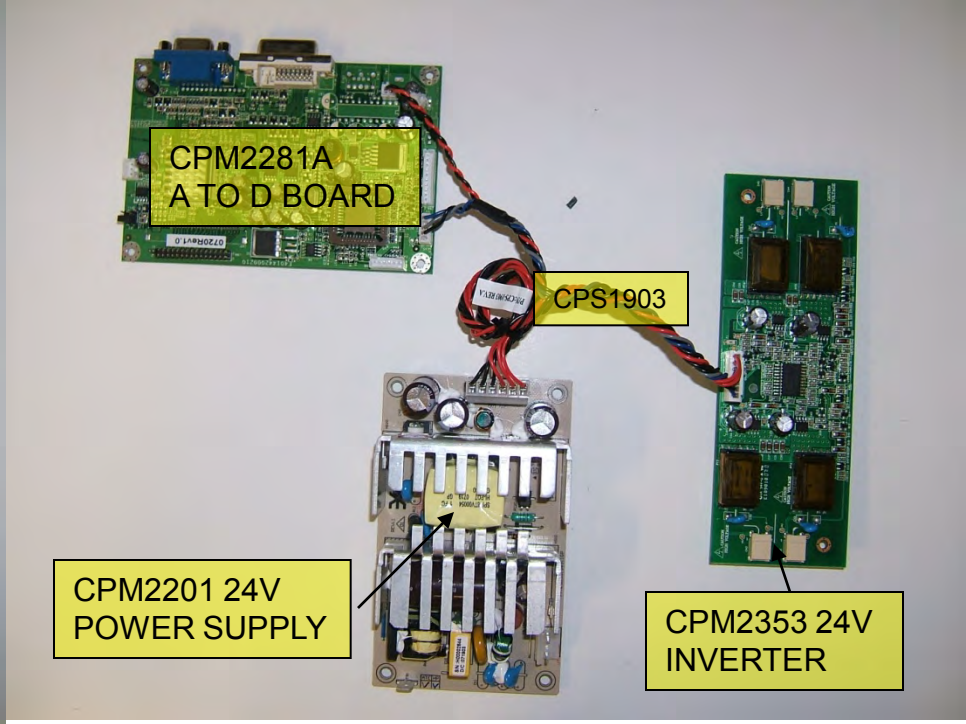
FOR USE IN CPA4090L, 4064L, 4078L, 4085L, 4088L



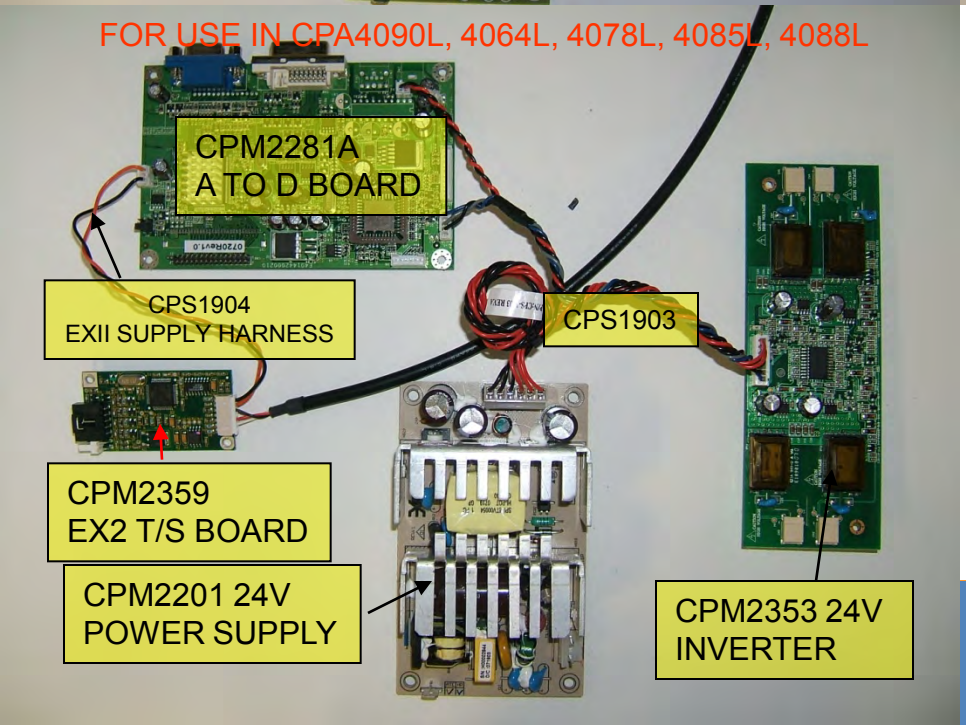




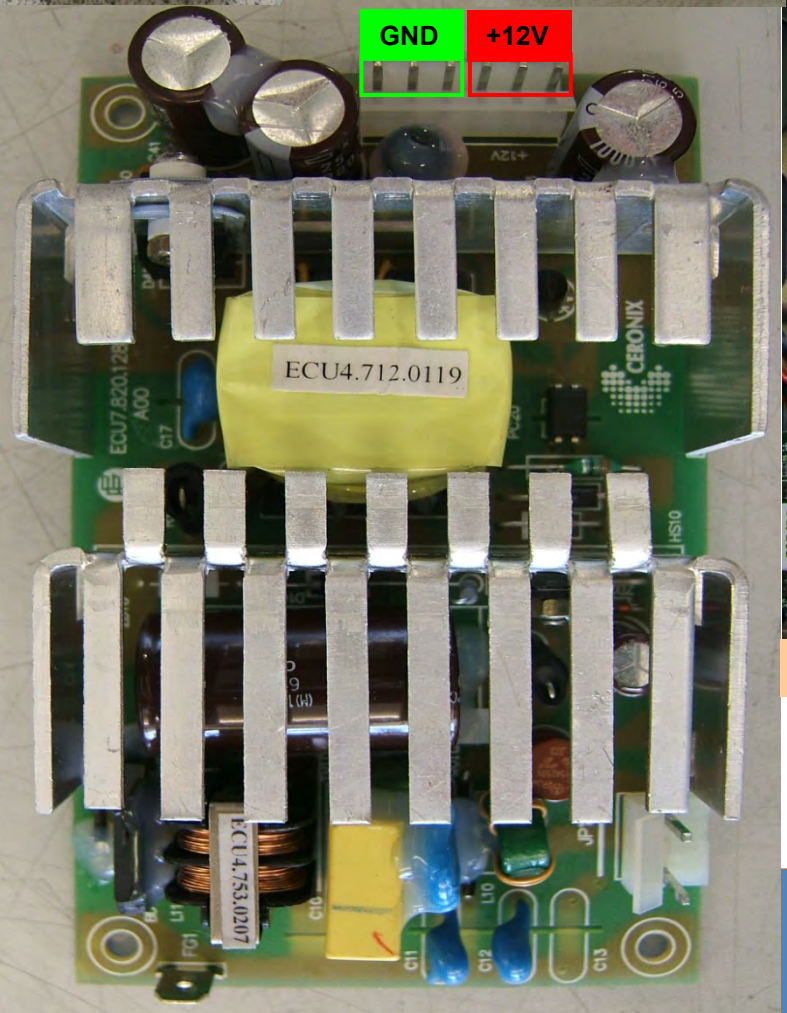




FOR USE IN CPA4090L, 4064L, 4078L, 4085L, 4088L

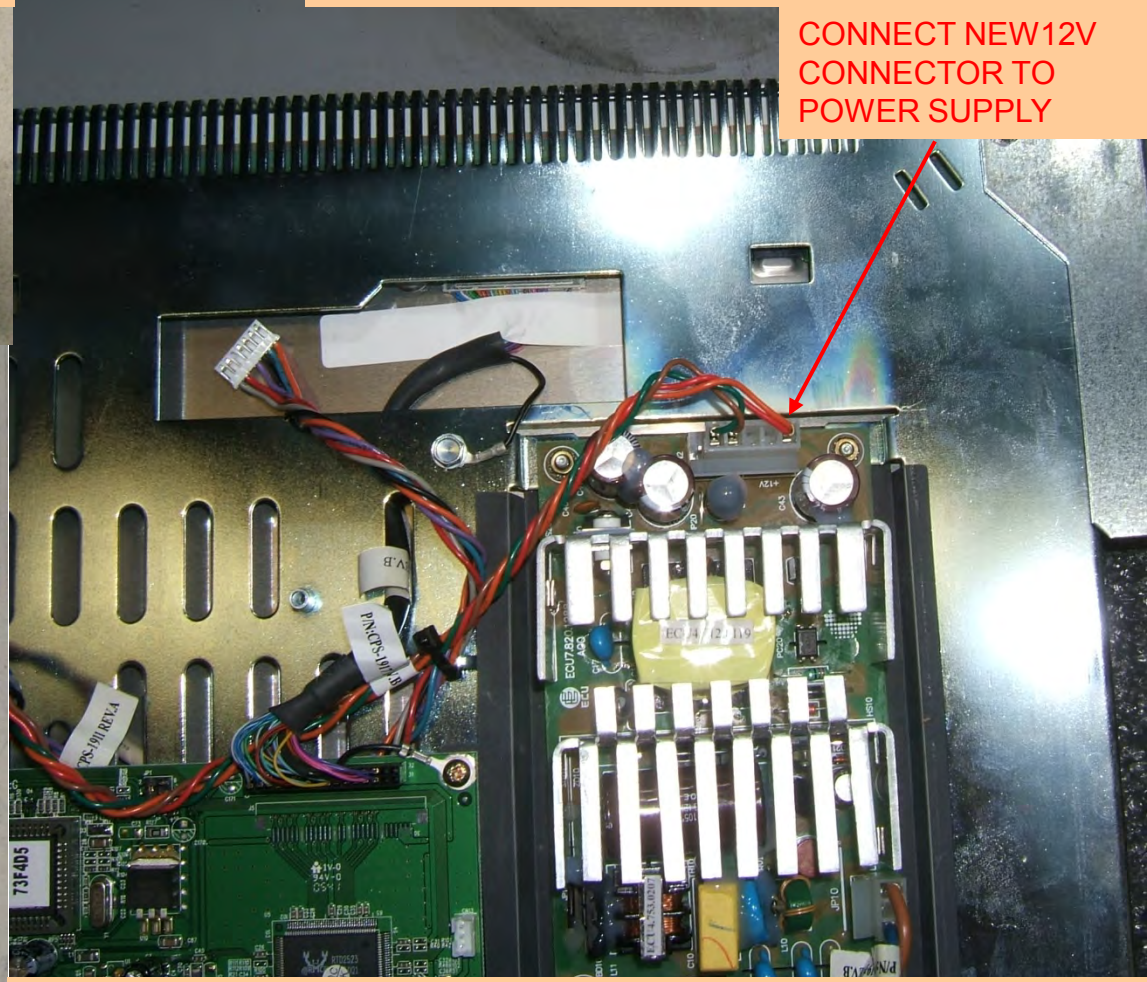


NOTE: CHECK POLARITY OF HARNESS. IF NOT CORRECT, CHANGE AS SHOWN BELOW RIGHT.



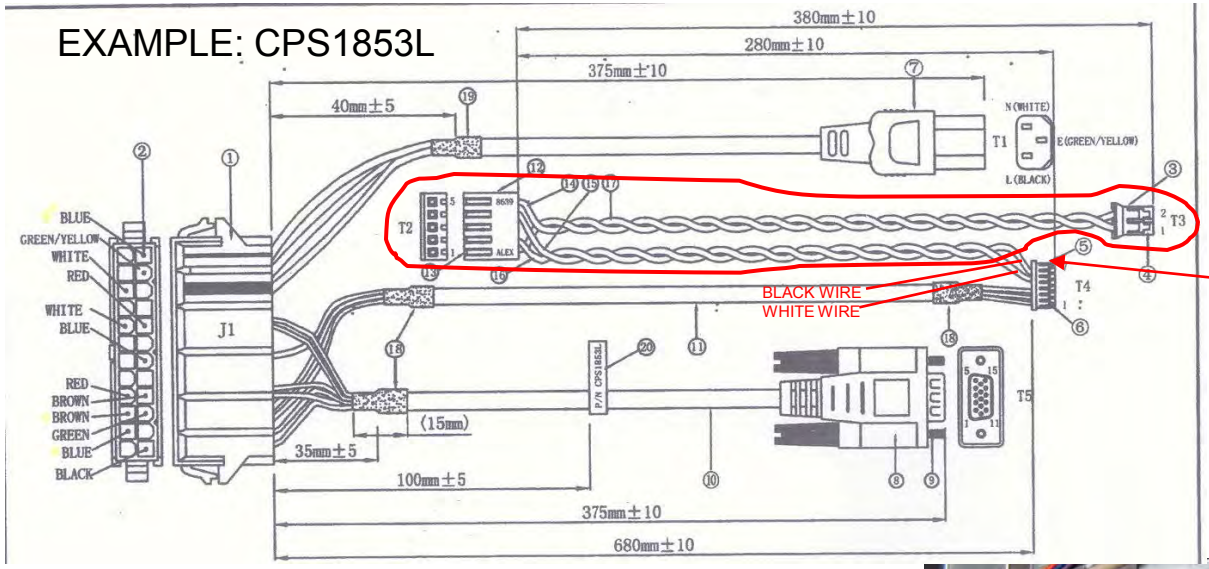
INSERT NEW POWER SUPPLY (CPM2199A). AND FASTEN WITH TWO M3 KEP-NUTS.

CONNECT NEW12V CONNECTOR TO POWER SUPPLY

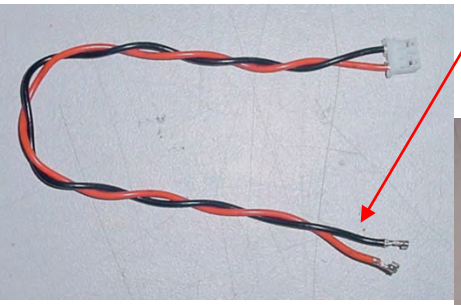


CONNECT AC CONNECTOR AND GROUND TERMINAL

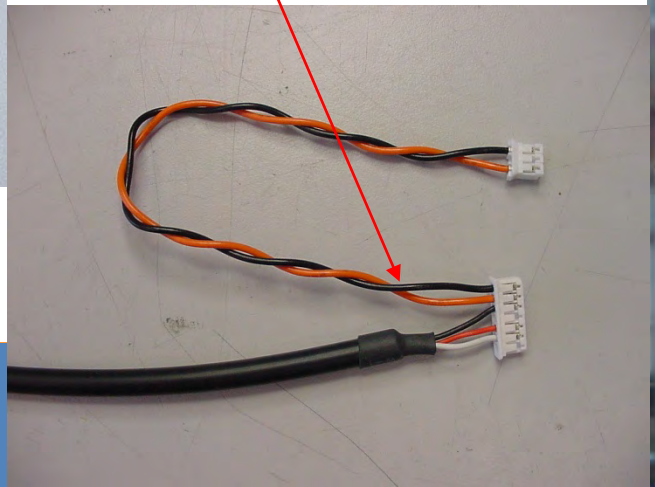
HARNESS MODIFICATION FOR CPS1853L, CPS1861L, AND CPS1896 USED IN CPA4090L, 4064L, 4078L, 4085L, 4088L. THIS PAGE FOR UNITS THAT HAVE THE STANDARD 3M CONTROL BOARD (NOT NETPLEX)



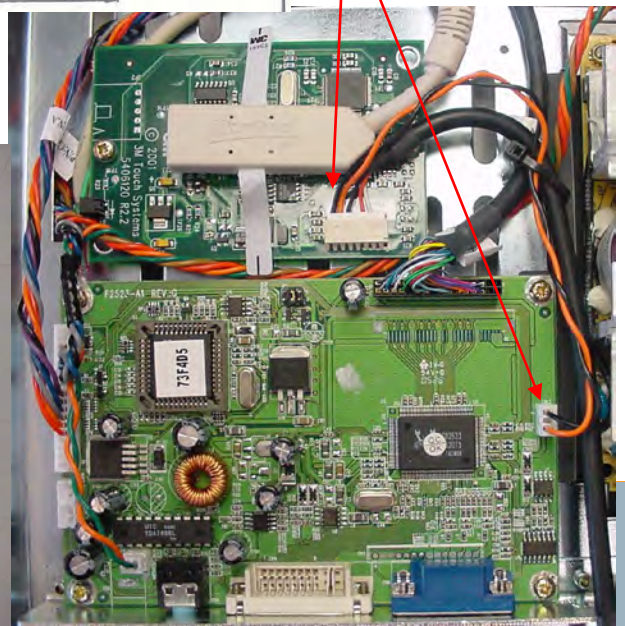
1. DISCONNECT 7-PIN CONNECTOR FROM TOUCH CONTROLLER. CAREFULLY EXTRACT PINS CONNECTED TO BLACK AND WHITE WIRE FROM CONNECTOR T4. AN OBJECT WITH A FINE POINT SUCHAS AN XACTO KNIFE CAN BE USED TO LIFT UP ON THE PLASTIC PIN RETAINER TO RELEASE PINS. DISCARD WIRES CONNECTED WITH T2 AND T3.



2. INSERT BLACK AND ORANGE WIRES OF NEW HARNESS (CPS1862) INTO CONNECTOR T4 AS SHOWN BELOW



3. THIS NEW HARNESS CAN BE PLUGGED BACK INTO THE TOUCH CONTROLLER AND INTO THE A/D BOARD CN13 AS SHOWN BELOW.

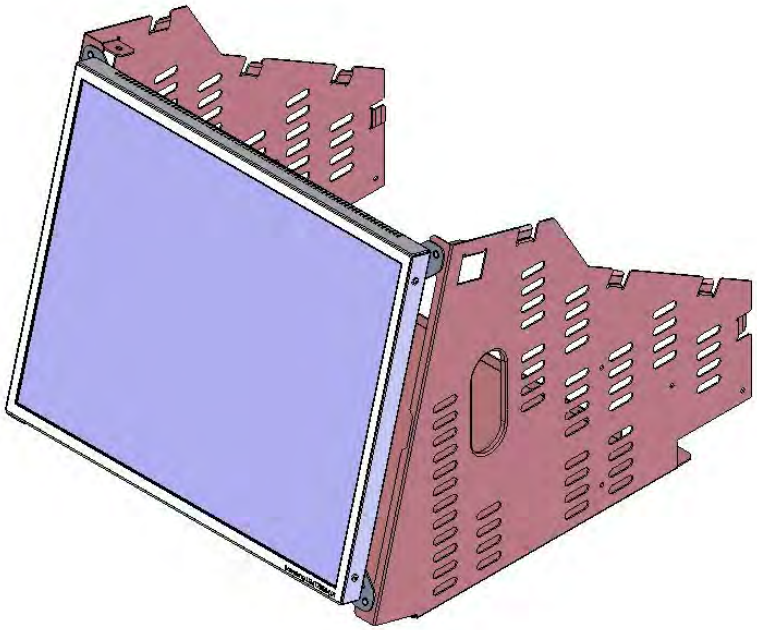


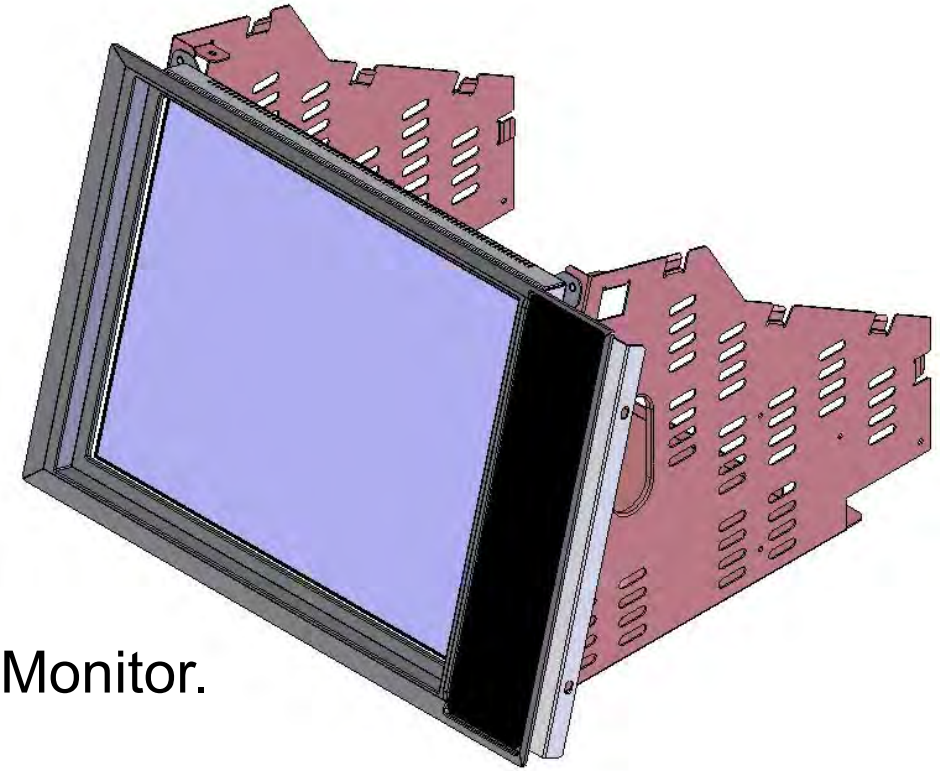
LCD has larger viewing area compared to CRT

LCD

CRT Display

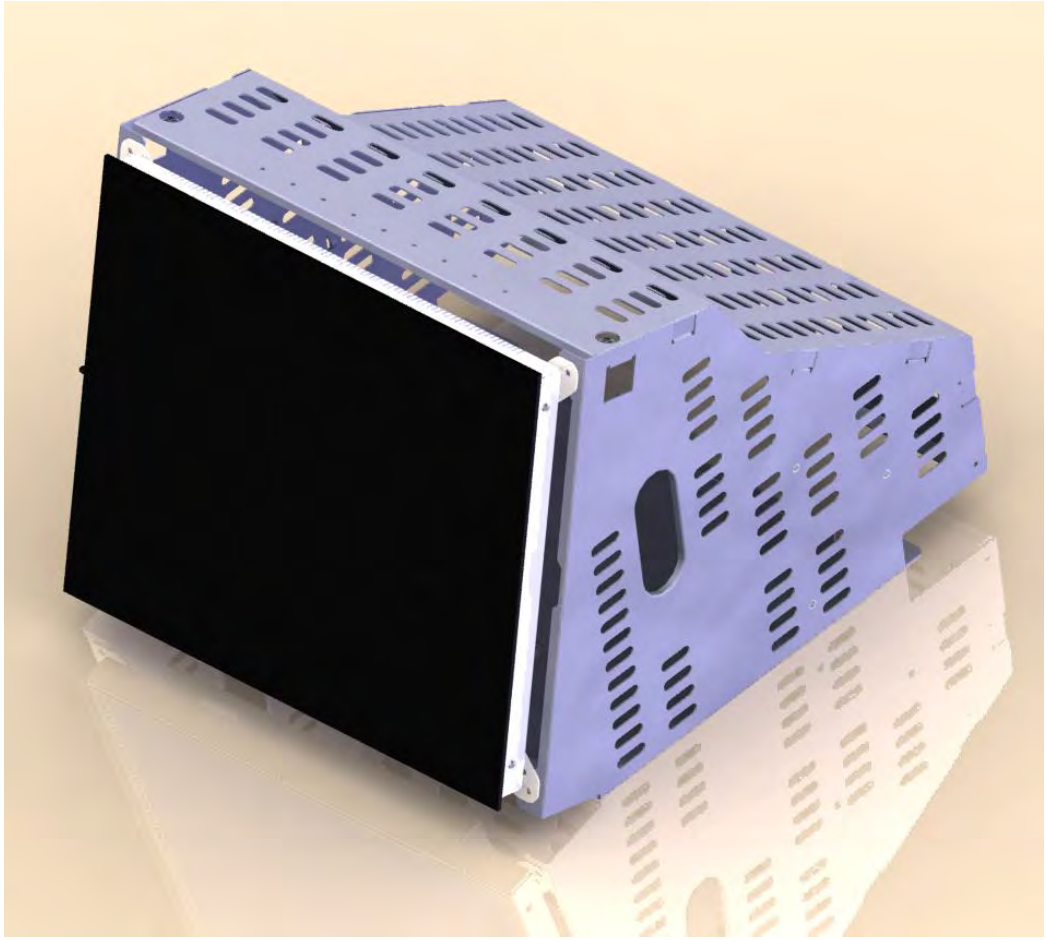
LCD Monitor Assembly with new Game Bezel





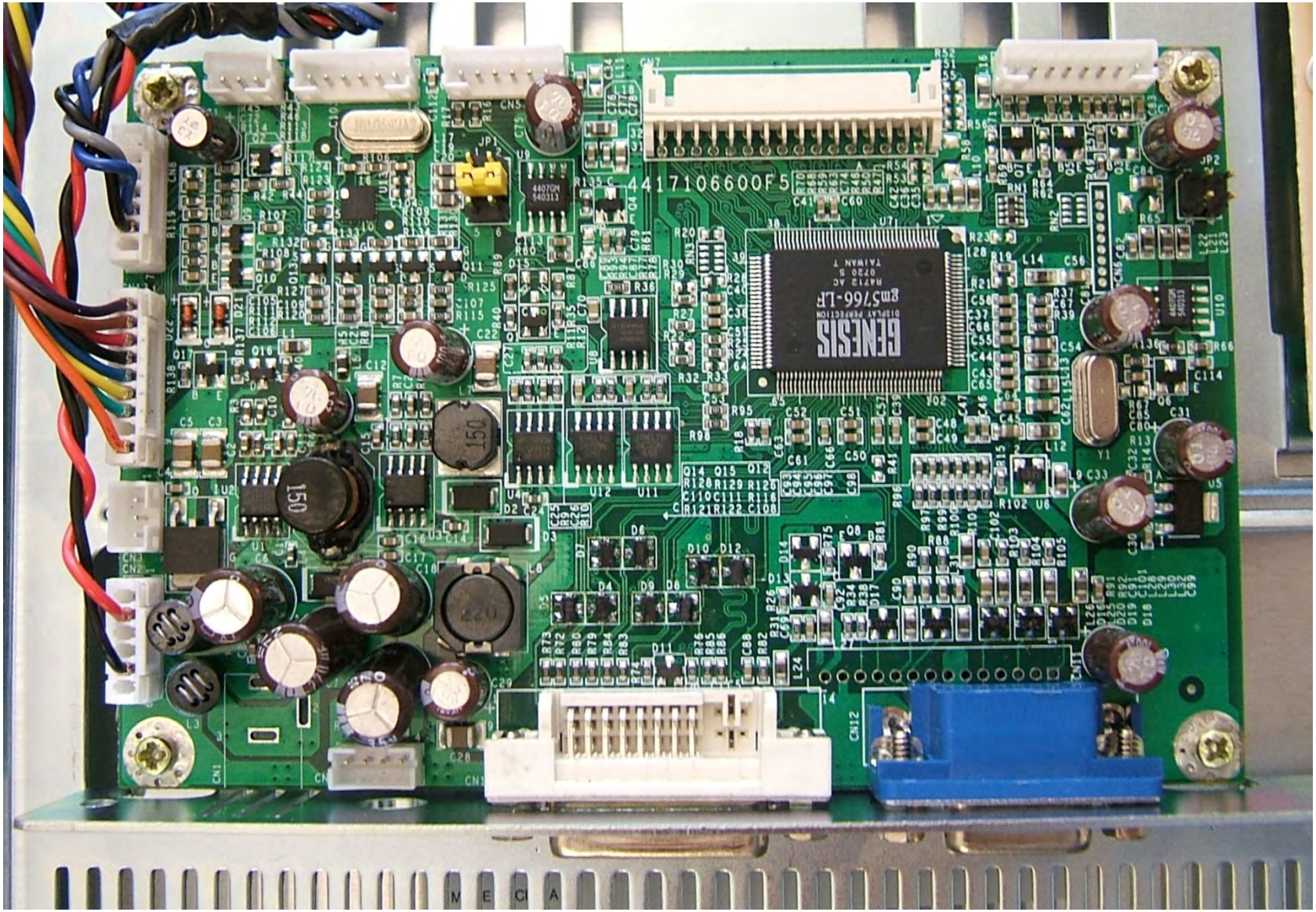
- Drop in replacement for CRT Monitor.
- Does not mount to door.
- Bezel replacement takes a few minutes.

LCD Drop In Replacements for 14”, 17”, and 19” CRTs.

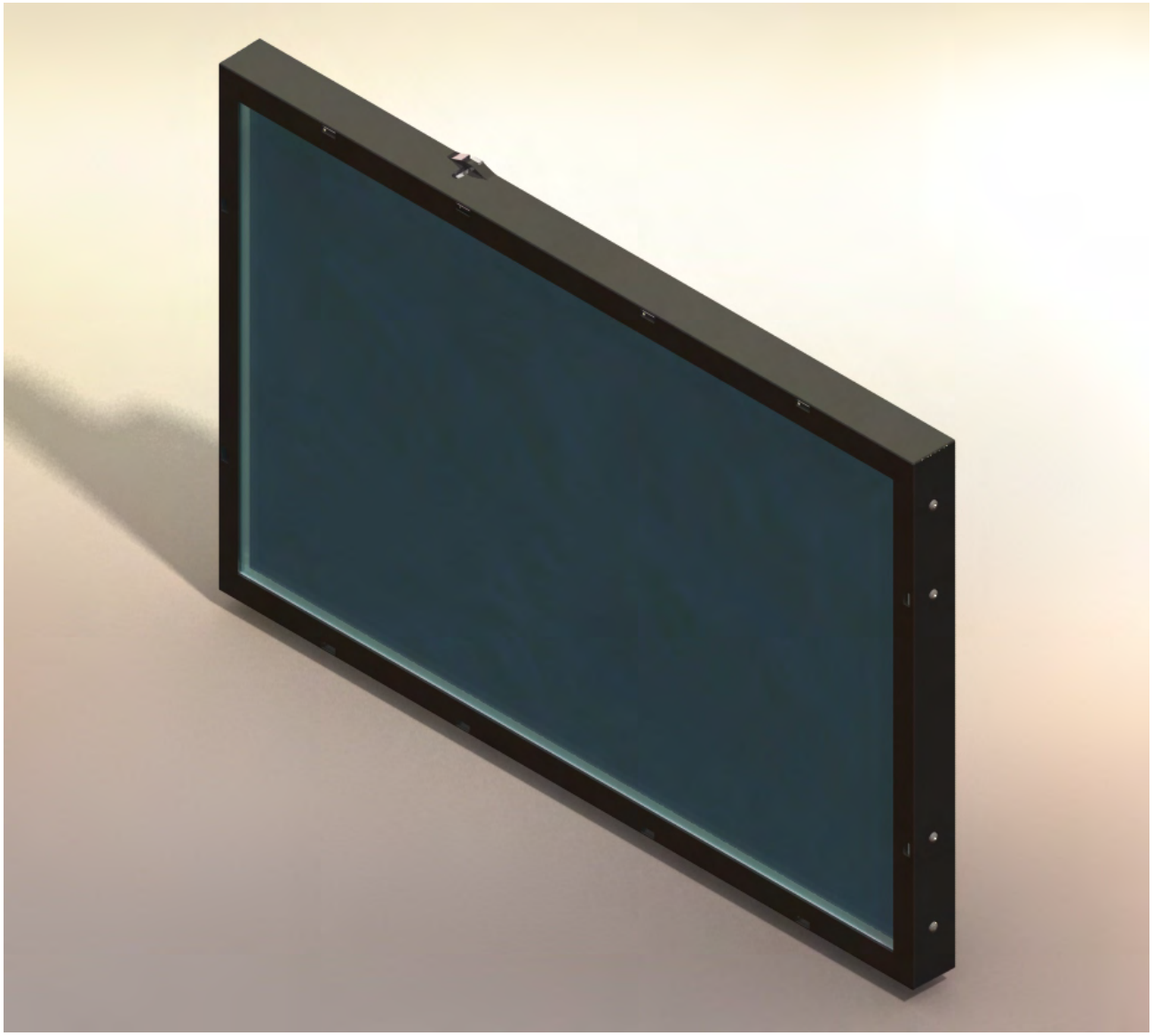


- Uses same frame.
- Convert to True-Flat.
- Provide New Game Bezel.

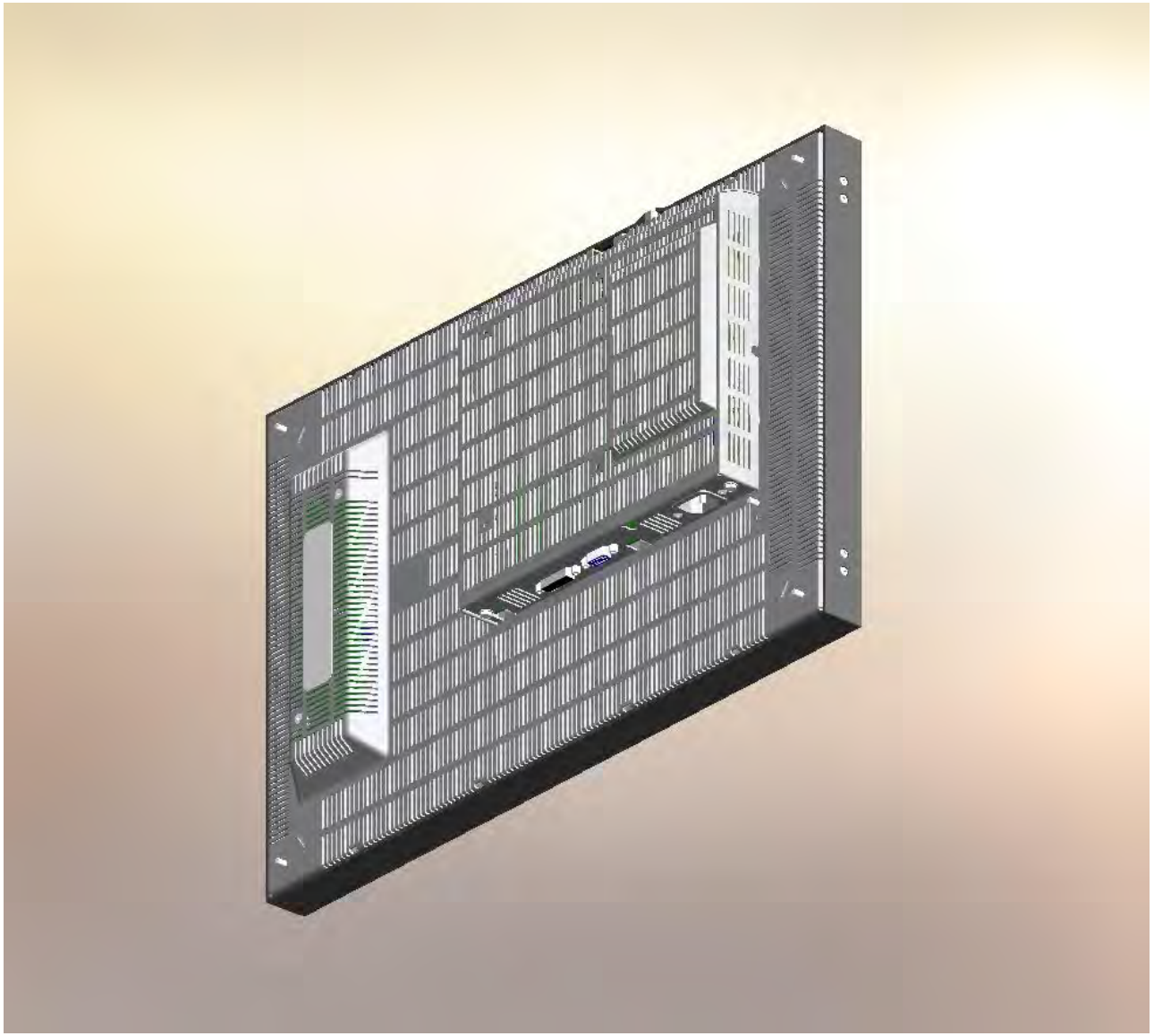
New Genesis A to D controller board



New 16x9 aspect ratio 22” LCD CPA4072



Development



Thank you, from the CERONIX team!