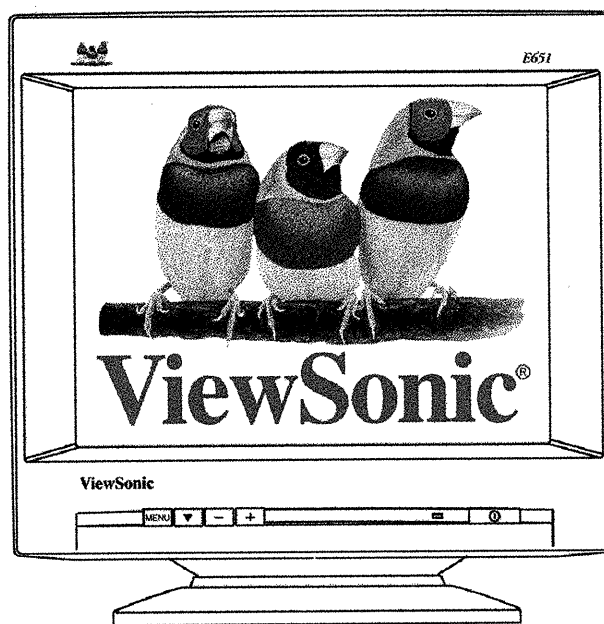


Service Manual

ViewSonic E651-3
Model No. VCDTS21524-3

15" Digital Controlled Color Monitor
(13.8" Viewable)



(Rev. 2 – January 2000)

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Revision History

Revision	Date	Description Of Changes	Approval
1.0	9/30/99	Initial Issue	T. Sears
2.0	1/24/00	Added Exploded Parts List (pg. 58a,b)	T. Sears

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WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.

It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.

Products powered by electricity should be serviced or repaired only by experienced professional technicians.

Any attempt to service or repair the product or products dealt within this service information by anyone else could result in serious injury or death.

SAFETY PRECAUTIONS

1 CAUTION:

No modification of any circuit should be attempted. Service work should only be performed after you are thoroughly familiar with all of the following safety checks and servicing guide lines.

2 SAFETY CHECK

Care should be taken while servicing this CRT display because of the high voltage used in the deflection circuits. These voltages are exposed in such areas as the associated flyback and yoke circuits.

3 FIRE & SHOCK HAZARD

- 3-1 Insert an isolation transformer between the CRT display and AC power line before servicing the chassis.
- 3-2 In servicing pay attention to original lead dress especially in the high voltage circuit. If a short circuit is found, replace all parts which have been overheated as a result of the short circuit.
- 3-3 All the protective devices must be reinstalled per original design.
- 3-4 Soldering must be inspected for possible cold solder joints, frayed leads, damaged insulation, solder splashes or sharp solder points. Be certain to remove all foreign material.

4 LEAKAGE CURRENT COLD CHECK

- 4-1 Unplug the AC cord and connect a jumper between the two prongs on the plug.
- 4-2 Turn the CRT display power switch "on".
- 4-3 Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metallic part on the CRT display such as the metal frame, screwheads, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be 1.8 megohm minimum.

5 LEAKAGE CURRENT HOT CHECK

- 5-1 Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during this check.
- 5-2 Connect a 1500 ohm, 10 watt resistor, paralleled by a 0.15 μ F capacitor between each exposed metallic part and a good earth ground (as shown in Fig.1).
- 5-3 Use an AC voltmeter with 1000 ohm/volt or more sensitivity and measure the AC voltage across the combination 1500 ohm resistor and 0.15 μ F capacitor.
- 5-4 Move the resistor connection to each exposed metallic part and measure the voltage.
- 5-5 Reverse the polarity of the AC plug in the AC outlet and repeat the above measurement.
- 5-6 Voltage measured must not exceed 7.5 volt RMS, from any exposed metallic part to ground. A leakage current tester may be used in the above hot check, in which case any current measured must not exceed 5.0 milliamp. In the case of a measurement exceeding the 5.0 milliamp value, a rework is required to eliminate the chance of a shock hazard.

Note: High voltage is present when this CRT display is operating. Always discharge the anode of the picture tube to the display chassis to prevent shock hazard.

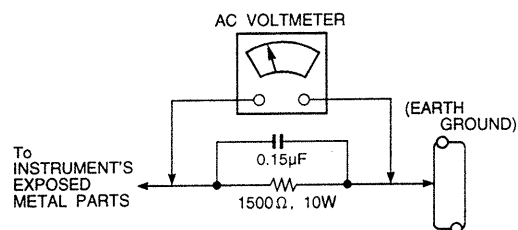


Fig.1

6 IMPLOSION PROTECTION

Picture tubes are equipped with an integral implosion protection system, but care should be taken to avoid damage and scratching during installation. Use only Panasonic replacement picture tubes.

7 X-RADIATION

WARNING : The only potential source of X-Radiation is the picture tube. However when the high voltage circuitry is operating properly there is no possibility of X-Radiation problem. The basic precaution which must be exercised is to keep the high voltage at the following factory-recommended level.

Note: It is important to use an accurate periodically calibrated high voltage meter.

- 7-1 The procedure for adjustment high voltage is as shown on page 25.
- 7-2 If can not be adjust 25.0 kV at immediate service is required to prevent the possibility of premature component failure.
- 7-3 To prevent X-Radiation possibility it is essential to use the specified picture tube.

IMPORTANT SAFETY NOTICE

There are special components used in this CRT displays which are important for safety. These parts are identified by the international symbol \triangle on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacture's specified parts to prevent X-RADIATION, shock, fire or other hazards. Do not modify the original design or this will void the original parts and labor guarantee.

1. SCOPE

The E651-3 is a high resolution and performance 15-inch (13.8" viewable) color monitor. The monitor is capable of displaying IBM PC/XT/AT and PS/2 computers.

2. INPUT REQUIREMENTS

2.1 AC Power Supply

2.1.1 Power Source : 90 ~ 264Vac , 50/60Hz \pm 3Hz .

2.1.2 Power Consumption : 80 W .

2.1.3 Inrush Current : less than 45A peak at 100Vac on cold starting .

On hot start the inrush pulse current shall not exceed 90% of the maximum rating of surge current related components.

Such as power switch, fuse, rectifier, filter, capacitors and surge limiting device etc.

2.1.4 Ripple / Noise : should not cause any visible interference .

2.1.5 Power Cord : Detachable , 3 P, 1.5m .

2.2 Input Signals

2.2.1 RGB Video : Analog , 0.7Vp-p, positive , Input impedance 75 ohm to ground .

2.2.2 Sync Signal : Separate or composite horizontal and vertical sync (TTL level)
Input impedance 1K to ground .

2.2.3 Input Connector :

a. 15 pin MINI "D" SUB :

Pin No.	Signal	Pin No.	Signal
1	Red	9	NC
2	Green	10	Ground
3	Blue	11	NC
4	NC	12	SDA
5	Ground	13	H. Sync (Composite Sync)
6	R Return	14	V. Sync (VCLK)
7	G Return	15	SCL
8	B Return		

* VESA DEFINE DDC1 CAPABLE HOST.

2.2.4 Signal memory modes : 8 (10) preset modes, 10 user modes , see Appendix A .

2.2.5 Plug & play : VESA DDC1 / 2B .

3. ELECTRICAL CHARACTERISTICS

3.1 Picture Tube

- 3.1.1 Type : 15 inch , 90 degree , 29.1mm neck diameter , in-line electron gun .
- 3.1.2 Phosphor : Medium short persistence .
- 3.1.3 Dot Pitch : 0.28mm .
- 3.1.4 Light Transmission : 57% at screen center
- 3.1.5 Coating : Anti-static .

3.2 Horizontal Deflection

- 3.2.1 Hor. Flyback retrace time
 $t_r = 3.5\mu s$, typical
 HOT collector pulse
- 3.2.2 $V_{cp} = 1300V_{p-p}$

3.3 Video Output

- 3.3.1 Pixel rate : 65MHz .
- 3.3.2 Rise And Fall Time(Video Amp) : 15ns for 35Vpp at cathode .
- 3.3.3 Overshoot And Undershoot : 10% maximum block pattern , 1024x768,
60Hz .

3.4 Scanning Frequency

- 3.4.1 Horizontal : 30 to 57KHz .
- 3.4.2 Vertical : 50 to 120Hz .

3.5 Power Saving

3.5.1 Status	Hor. sync	Vert. sync	power consumption	power LED	USB LED
Normal	Yes	Yes	< 80W	Green	Green
Stand-by	No	Yes	< 15W	Amber	Green
Suspend	Yes	No	< 15W	Amber	Green
Off	No	No	< 8W	Amber	Green

4. SCREEN CHARACTERISTICS

4.1 Standard Test Condition

4.1.1 Ambient Environment : 25 ± 2 C .

4.1.2 Magnetic field : CRT has to face East without additional magnetic components . Vert.=35uT; Horiz.=0uT.

4.1.3 Room Light : 500 ± 100 Lux .

4.1.4 AC Power Input : $100 \pm 10\%$ Vac , 60 ± 3 Hz or
 $240 \pm 10\%$ Vac , 50 ± 3 Hz .

4.1.5 Warm-up Time : 30 minutes minimum .

4.1.6 Contrast set maximum . Brightness set at detent point

4.1.7 10 preset mode , see APPENDIX A .

4.1.8 Test pattern : see APPENDIX E .

4.2 Picture display size

4.2.1 Preset mode Horizontal size: 266 ± 5 mm , vertical size: 200 ± 5 mm .

4.2.2 User adjusts image size which can fully scan under any preset mode .

4.3 Picture Center :

4.3.1 Horizontal : See Appendix B-1 .

4.3.2 Vertical : See Appendix B-1 .

4.4 Non-linearity :

4.4.1 Horizontal : See Appendix B-2 .

4.4.2 Vertical : See Appendix B-2 .

4.5 Picture Distortion :

4.5.1 Pincushion : See Appendix B-3 .

4.5.2 Trapezoid : See Appendix B-3 .

4.5.3 Barrel : See Appendix B-3 .

4.5.4 Rotation : See Appendix B-3 .

4.6 Misconvergence

4.6.1 Zone A (Center Circle) : 0.3 mm maximum .

4.6.2 Zone B (Elsewhere) : 0.4 mm maximum .

4.7 Focus

4.7.1 When contrast is adjusted to 25FL full white pattern, then changed to a character pattern filled with “Me” characters , the characters all can be readable and distinguishable .

4.8 Jitters

4.8.1 No more than one dot movement 45cm away .

4.9 White Balance

4.9.1 Color Temperature : Using the CIE color temperature coordinate system ;

Color 9300K: $X = 281 \pm 0.02$

$Y = 311 \pm 0.02$

Color 6500K: $X = 313 \pm 0.02$

$Y = 329 \pm 0.02$

4.9.2 Color Tracking : The color temperature difference at any point on the display picture shall be less than the following .

Contrast : max. to 5FLS

Brightness : Center

$X = X(\text{center}) \pm 0.02$

$Y = Y(\text{center}) \pm 0.02$

4.9.3 Color purity : The individual red , green and blue color fields shall maintain a color Purity error at any point on the display picture .

$X = X(\text{center}) \pm 0.02$

$Y = Y(\text{center}) \pm 0.02 .$

4.10 Brightness Uniformity

4.10.1 30% deviation maximum between any two points within the display picture .

4.11 Gray Scales

4.11.1 0 - 15 gray scales should be clear .

4.12 Luminance

4.12.1 Raster : Contrast: minimum

Brightness : maximum

$Y = 1FL$

- 4.12.2 Full White : Contrast : maximum
 Brightness : maximum
 Y = 30±5 FL at screen center area
- 4.12.3 20% White Window : Contrast : maximum
 Brightness : maximum
 Y = 55 FL

4.13 Stability

- 4.13.1 Center variation
 Center shift < 4mm, under the following condition .
 - a. Time after power on : 10 mins ~ 2 hrs
 - b. Ambient temperature : 5 ~ 40°C
- 4.13.2 Display area regulation
 EHT Regulation : see appendix C .
 Size variation 4mm , under the following condition .
 - a. AC input voltage : 90 ~ 264Vac
 - b. Ambient temperature : 5 ~ 40°C

4.14 Turn Off & X-ray shut down

- 4.14.1 Turn off the set unit at = 30FLS of full white picture , picture should disappear smoothly . No persistent spot and flash light .
- 4.14.2 X-ray shut down in same condition , same result.

5. REGULATIONS

5.1 The basic requirements shall comply with the latest revisions as following :

SAFETY	EMC
CB	FCC (DOC)
UL 1950	CE
CUL (CSA 950)	
TUV / MPRII	
DHHS (CFR-21)	
ISO9241-3	

6. ENVIRONMENTAL REQUIREMENTS

6.1 Operating

- 6.1.1 Temperature : 5°C to 40°C .
- 6.1.2 Humidity : 10% to 90% .
- 6.1.3 Altitude : 15000 ft

6.2 Storage and Shipment

6.2.1 Temperature : - 40°C to 60°C .

6.2.2 Humidity : 5% to 90% .


6.2.3 Altitude : 40000 ft .


7. EXTERNAL CONTROLS

7.1 Manual

7.1.1 Power switch

7.1.2 OSD key : see appendix D .

- MENU : To display control function menu and select each function .
-  : To select adjustment function and exit contrast/brightness .
- : To decrease the value for the selected function .
- + : To increase the value for the selected function .

MENU &  Exit

- & + : Contrast preset to max. & Brightness preset to 50%

7.2 Self Diagnostic Message

7.2.1 Check signal / burn-in mode.

7.2.2 Freq. over range .

7.2.3 DPMS STAND-BY / SUSPEND / OFF .

7.3 Digital

7.3.1 CONTRAST

BRIGHTNESS

EXIT

- 7.3.2 BASIC
 - HORIZONTAL SIZE
 - HORIZONTAL POSITION
 - VERTICAL SIZE
 - VERTICAL POSITION
 - RECALL
- GEOMETRY - PINCUSHION
 - TRAPEZOID
 - RECALL
- COLOR
 - 9300K
 - 6500K

OSD FUNCTION - OSD H-POSITION
- OSD V-POSITION
- OSD TIME
- RECALL

STATUS
EXIT

8. RELIABILITY

8.1 Mean Time Between Failures(MTBF)

MTBP is 25,000 hours (excluded CRT) minimum during the operating life , the phosphor will be lit with a duty cycle of 25%. Failures should not occur in either the electronics or CRT. The following defines what constitutes a failure of these two components .

8.1.1 A failure , for the electronics , is defined as any event which changes the characteristics of the electronics in such a way that the monitor no longer meets this specification .

8.1.2 A failure , for a CRT , is defined by one of the following .

- a. The inability to display an image on the CRT .
- b. The phosphor characteristics have deteriorated to the point where the contrast ,brightness or luminance criteria , as defined in this specification , can not be met even though adjustment of service controls .
- c. Phosphor burns have occurred , allowing various shapes to be distinguished with either a lit or a unlit raster .

8.2 Mean Time to Repair (MTTR)

8.2.1 The monitor is designed to allow an MTTR of less than 40 minutes to reach the Field Replaceable Unit (FRU) level .
FRU includes the main board , video board and CRT assembly .

9. VIDEO COMMUNICATION (Display Data Channel)

Byte	Byte	Header	CPT	LG	SAMSUNG
1	1	00	00	00	00
2	1	FF	FF	FF	FF
3	1	FF	FF	FF	FF
4	1	FF	FF	FF	FF
5	1	FF	FF	FF	FF
6	1	FF	FF	FF	FF
7	1	FF	FF	FF	FF
8	1	00	00	00	00
9	1	ID Manufacture Name DD556SA->"0QI"	3E	3E	3E
10	1	ID Manufacture Name DD556SA->"0QI"	29	29	29
9	1	ID Manufacture Name DD556SB/SD/SL->"VSC"	5A	5A	5A
10	1	ID Manufacture Name DD556SB/SD/SL->"VSC"	63	63	63
11	1	ID Product Code DD556SA->"CD"	43	43	43
12	1	ID Product Code DD556SA->"CD"	44	44	44
11	1	ID Product Code DD556SB->"EW"	45	45	45
12	1	ID Product Code DD556SB->"EW"	57	57	57
11	1	ID Product Code DD556SD->"GW"	47	47	47
12	1	ID Product Code DD556SD->"GW"	57	57	57
11	1	ID Product Code DD556SL->"EZ"	45	45	45
12	1	ID Product Code DD556SL->"EZ"	5A	5A	5A
13	1	ID Serial Number	00	00	00
14	1	ID Serial Number	00	00	00
15	1	ID Serial Number	00	00	00
16	1	ID Serial Number	00	00	00
17	1	Week of Manufacture (0-53,0 for n/a)	01	01	01
18	1	Year of Manufacture (Year-1990)	09	09	09
19	1	Version	01	01	01
20	1	Revision	02	02	02
21	1	Video input definition DD556SA/SL	19	19	19
21	1	Video input definition DD556SB/SD	09	09	09
22	1	Max. H. Image size 28cm	1C	1C	1C
23	1	Max. V. Image size 21cm	15	15	15
24	1	Gamma	BC	AF	7D
25	1	Feature Support (DPMS)	E8	E8	E8
26	1	Red Green Low Bits	BF	60	FB
27	1	Blue White Low Bits	C2	52	82
28	1	Redx	9E	A4	A1
29	1	Redx	58	54	55
30	1	Greenx	47	46	48
31	1	Greeny	99	98	97
32	1	Bluex	24	24	24
33	1	Bluey	0F	10	11
34	1	Whitex	48	48	48
35	1	Whitey	4F	4F	4F

	CPT	LG	SAMSUNG
Gamma	2.88	2.75	2.26
Red Green Low Bits	BF	60	FB
Blue White Low Bits	C2	52	82
Red X	0.619=9E	0.642=A4	0.632=A1
Red Y	0.347=58	0.330=54	0.335=55
Green X	0.280=47	0.273=46	0.295=48
Green Y	0.601=99	0.605=98	0.593=97
Blue X	0.144=24	0.142=24	0.143=24
Blue Y	0.059=0F	0.063=10	0.066=11
Whit X	0.281=48	48	48
Whit Y	0.311=4F	4F	4F

Established Timings 3 bytes

Bytes	bit	Established Timings	CPT	LG	SAMSUNG
36	7	720x400 @ 70Hz	1	FF	FF
	6	720x400 @ 88Hz	1		
	5	640x480 @ 60Hz	1		
	4	640x480 @ 67Hz	1		
	3	640x480 @ 72Hz	1		
	2	640x480 @ 75Hz	1		
	1	800x600 @ 56Hz	1		
	0	800x600 @ 60Hz	1		
Established Timings					
37	7	800x600 @ 72Hz DD556SA	1	FC	FC
	6	800x600 @ 75Hz DD556SA	1		
	5	832x624 @ 75Hz DD556SA	1		
	4	1024x768 @ 87Hz DD556SA	1		
	3	1024x768 @ 60Hz DD556SA	1		
	2	1024x768 @ 70Hz DD556SA	1		
	1	1024x768 @ 75Hz DD556SA	0		
	0	1280x1024 @ 75Hz DD556SA	0		
37	7	800x600 @ 72Hz DD556SB/SD	1	F8	F8
	6	800x600 @ 75Hz DD556SB/SD	1		
	5	832x624 @ 75Hz DD556SB/SD	1		
	4	1024x768 @ 87Hz DD556SB/SD	1		
	3	1024x768 @ 60Hz DD556SB/SD	1		
	2	1024x768 @ 70Hz DD556SB/SD	0		
	1	1024x768 @ 75Hz DD556SB/SD	0		
	0	1280x1024 @ 75Hz DD556SB/SD	0		
37	7	800x600 @ 72Hz DD556SL	1	FC	FC
	6	800x600 @ 75Hz DD556SL	1		
	5	832x624 @ 75Hz DD556SL	1		
	4	1024x768 @ 87Hz DD556SL	1		
	3	1024x768 @ 60Hz DD556SL	1		
	2	1024x768 @ 70Hz DD556SL	1		
	1	1024x768 @ 75Hz DD556SL	0		
	0	1280x1024 @ 75Hz DD556SL	0		
Reserve Timings					
38	7	1152x870 @ 75Hz	0	00	00
	6	640x480 @ 85Hz	0		
	5	800x600 @ 85Hz	0		
	4	1024x768 @ 85Hz	0		
	3	1280x1024 @ 85Hz	0		
	2	1600x1200 @ 75Hz	0		
	1	1600x1200 @ 85Hz	0		
	0		0		

Standard timing description

Bytes	Bytes	Description	CPT	LG	SAMSUNG
39	1	640x480 @ 60Hz , Aspect ratio 4:3	31	31	31
40	1		59	59	59
41	1	640x480 @ 70Hz , Aspect ratio 4:3	45	45	45
42	1		59	59	59
43	1	640x480 @ 75Hz , Aspect ratio 4:3	01	01	01
44	1		01	01	01
45	1	640x480 @ 85Hz , Aspect ratio 4:3	01	01	01
46	1		01	01	01
47	1	800x600 @ 75Hz , Aspect ratio 4:3	01	01	01
48	1		01	01	01
49	1	800x600 @ 85Hz , Aspect ratio 4:3	01	01	01
50	1		01	01	01
51	1	1024x768 @ 60Hz , Aspect ratio 4:3	01	01	01
52	1		01	01	01
53	1	1024x768 @ 70Hz , Aspect ratio 4:3	01	01	01
54	1		01	01	01

Detailed timing #1 description
EDID VERSION 1 REVISION 0 (640x480 @75Hz)

Bytes	Bytes	Description	CPT	LG	SAMSUNG
55	1	(Pixel Clock / 10000) , LSB first	56	56	56
56	1	(Pixel Clock / 10000) , LSB first	13	13	13
57	1	Horizontal Active pixels,lower 8 bits	20	20	20
58	1	H.Active/H.Blanking pixels,lower 8 bits	00	00	00
59	1	Active/H.Blanking upper nibble-upper 4 bits of H.Active lower nibble-upper 4 bits of H.Blanking	31	31	31
60	1	Vertical Active lines, lower 8 bits	58	58	58
61	1	Vertical Blanking lines, lower 8 bits	19	19	19
62	1	V. Active / V.Blanking upper nibble- upper 4 bits of V.Active lower nibble-upper 4 bits of V.Blanking	20	20	20
63	1	H.Sync offset pixels,from blanking start,lower 8 bits	10	10	10
64	1	H.Sync pulse width pixels,lower 8 bits	50	50	50
65	1	V.Sync offset/V.Sync pulse width upper nibble-lower 4 bits of V.Sync offset lower nibble-lower 4 bits of V.Sync pulse width	13	13	13
66	1	Bit 7,6-upper 2 bits of H.Sync offset 5,4-upper 2 bits of H.Sync pulse width 3,2-upper 2 bits of V.Sync offset 1,0-upper 2 bits of V.Sync pulse	00	00	00
67	1	H.Image size mm,lower 8 bits	04	04	04
68	1	V.Image size mm,lower 8 bits	BE	BE	BE
69	1	H/V Image size upper nibble-upper 4 bits of H.Image size lower nibble-upper 4 bits of V.Image size	10	10	10
70	1	H.Border pixels	00	00	00
71	1	V.Border lines	00	00	00
72	1	Flags	1E	1E	1E

Item	Description
Pixel Clock	49.50MHz
H.Active	800 pixels
H.Blanking	256 pixels
V.Active	600 lines
V.Blanking	25 lines
H.Sync offset(Back proch)	16 pixels
H.Sync pulse width	80 pixels
V.Sync offset(Back proch)	1 lines
V.Sync pulse width	3 lines
H.Image size	260 mm
V.Image size	190 mm
H.Border	0
V.Border	0
Flag	00011110
bit7	Non-interlaced
bit6-5	Normal display No stereo
bit4-3	Digital separate
bit2-1	V-polarity(+)-H-polarity(+)
bit0	Reserved

Detailed timing #2 description
EDID VERSION 1 REVISION 0 (640x 480 @85Hz)

Bytes	Bytes	Description	CPT	LG	SAMSUNG
73	1	Flag (00 when block used as descriptor)	00	00	00
74	1	Flag (00 when block used as descriptor)	00	00	00
75	1	Flag (00 when block used as descriptor)	00	00	00
76	1	Data Type Tag (Binary coded)	FF	FF	FF
77	1	Flag (00 when block used as descriptor)	00	00	00
78	1	ID Product Code DD556SA->"CD"	43	43	43
79	1	ID Product Code DD556SA->"CD"	44	44	44
78	1	ID Product Code DD556SB->"EW"	45	45	45
79	1	ID Product Code DD556SB->"EW"	57	57	57
78	1	ID Product Code DD556SD->"GW"	47	47	47
79	1	ID Product Code DD556SD->"GW"	57	57	57
78	1	ID Product Code DD556SL->"EZ"	45	45	45
79	1	ID Product Code DD556SL->"EZ"	5A	5A	5A
80	1	Year Manufacture (ASCII)	39	39	39
81	1	Week Manufacture (ASCII)	30	30	30
82	1	Week Manufacture (ASCII)	31	31	31
83	1	Monitor S/N (ASCII) if<13 bytes then Terminate with ASCII code "0AH" and pad field with ASCII code "20H"	30	30	30
84	1	Monitor S/N (ASCII)	30	30	30
85	1	Monitor S/N (ASCII)	30	30	30
86	1	Monitor S/N (ASCII)	30	30	30
87	1	Monitor S/N (ASCII)	30	30	30
88	1	Monitor S/N (ASCII)	0A	0A	0A
89	1	Monitor S/N (ASCII)	20	20	20
90	1	Monitor S/N (ASCII)	20	20	20

Monitor Serial Number:	CD90100000 (DD556SA)
	EW90100000 (DD556SB)
	GW90100000 (DD556SD)
	EZ90100000 (DD556SL)

Detailed timing #3 description
EDID VERSION 1 REVISION 0 (800x600 @85Hz)

Bytes	Bytes	Description	CPT	LG	SAMSUNG
91	1	Flag (00 when block used as descriptor)	00	00	00
92	1	Flag (00 when block used as descriptor)	00	00	00
93	1	Flag (00 when block used as descriptor)	00	00	00
94	1	Data Type Tag (Binary coded)	FD	FD	FD
95	1	Flag (00 when block used as descriptor)	00	00	00
96	1	Min. Vertical in Hz (Binary)	32	32	32
97	1	Max. Vertical in Hz (Binary)	78	78	78
98	1	Min. Horizontal in KHz (Binary)	1E	1E	1E
99	1	Max. Horizontal in KHz (Binary)	38	38	38
100	1	Max support PixelClock in MHz/10	08	08	08
101	1	Reserved for VESA GTF Standard	00	00	00
102	1	Reserved for VESA GTF Standard	0A	0A	0A
103	1	Reserved for VESA GTF Standard	20	20	20
104	1	Reserved for VESA GTF Standard	20	20	20
105	1	Reserved for VESA GTF Standard	20	20	20
106	1	Reserved for VESA GTF Standard	20	20	20
107	1	Reserved for VESA GTF Standard	20	20	20
108	1	Reserved for VESA GTF Standard	20	20	20

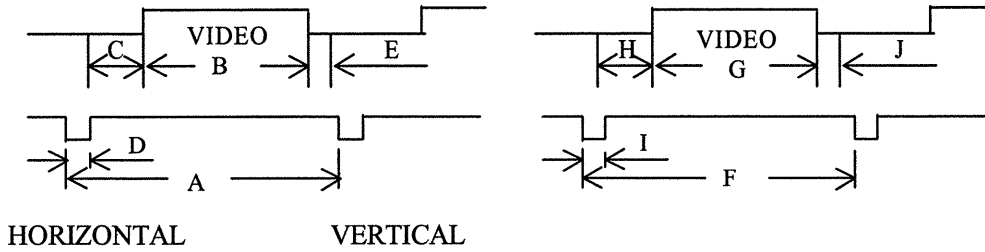
Monitor Limits:	Range	Min Vertical Freq - 50Hz
		Max Vertical Freq - 120Hz
		Min Horiz. Freq - 30KHz
		Max Horiz. Freq - 56KHz
		Pixel Clock - 80MHz
		GTF - Not Used

Detailed timing #4 description
EDID VERSION 1 REVISION 0 (1024x768 @70Hz)

Bytes	Bytes	Description	CPT	LG	SAMSUNG
109	1	Flag (00 when block used as descriptor)	00	00	00
110	1	Flag (00 when block used as descriptor)	00	00	00
111	1	Flag (00 when block used as descriptor)	00	00	00
112	1	Data Type Tag (Binary coded)	FC	FC	FC
113	1	Flag (00 when block used as descriptor)	00	00	00
114	1	Monitor Name (ASCII) if<13 bytes then Terminate with ASCII code "0AH" and pad field with ASCII code "20H" DD556SA -> "Q51-3"	51	51	51
115	1	Monitor Name DD556SA -> "Q51-3"	35	35	35
116	1	Monitor Name DD556SA -> "Q51-3"	31	31	31
117	1	Monitor Name DD556SA -> "Q51-3"	2D	2D	2D
118	1	Monitor Name DD556SA -> "Q51-3"	33	33	33
119	1	Monitor Name DD556SA -> "Q51-3"	0A	0A	0A
120	1	Monitor Name DD556SA -> "Q51-3"	20	20	20
121	1	Monitor Name DD556SA -> "Q51-3"	20	20	20
122	1	Monitor Name DD556SA -> "Q51-3"	20	20	20
123	1	Monitor Name DD556SA -> "Q51-3"	20	20	20
124	1	Monitor Name DD556SA -> "Q51-3"	20	20	20
125	1	Monitor Name DD556SA -> "Q51-3"	20	20	20
126	1	Monitor Name DD556SA -> "Q51-3"	20	20	20
114	1	Monitor Name (ASCII) if<13 bytes then Terminate with ASCII code "0AH" and pad field with ASCII code "20H" DD556SB/SD -> "E651-3"	45	45	45
115	1	Monitor Name DD556SB/SD -> "E651-3"	36	36	36
116	1	Monitor Name DD556SB/SD -> "E651-3"	35	35	35
117	1	Monitor Name DD556SB/SD -> "E651-3"	31	31	31
118	1	Monitor Name DD556SB/SD -> "E651-3"	2D	2D	2D
119	1	Monitor Name DD556SB/SD -> "E651-3"	33	33	33
120	1	Monitor Name DD556SB/SD -> "E651-3"	0A	0A	0A
121	1	Monitor Name DD556SB/SD -> "E651-3"	20	20	20
122	1	Monitor Name DD556SB/SD -> "E651-3"	20	20	20
123	1	Monitor Name DD556SB/SD -> "E651-3"	20	20	20
124	1	Monitor Name DD556SB/SD -> "E651-3"	20	20	20
125	1	Monitor Name DD556SB/SD -> "E651-3"	20	20	20
126	1	Monitor Name DD556SB/SD -> "E651-3"	20	20	20
114	1	Monitor Name (ASCII) if<13 bytes then Terminate with ASCII code "0AH" and pad field with ASCII code "20H" DD556SL -> "A50"	41	41	41
115	1	Monitor Name DD556SL -> "A50"	35	35	35
116	1	Monitor Name DD556SL -> "A50"	30	30	30
117	1	Monitor Name DD556SL -> "A50"	0A	0A	0A
118	1	Monitor Name DD556SL -> "A50"	20	20	20
119	1	Monitor Name DD556SL -> "A50"	20	20	20
120	1	Monitor Name DD556SL -> "A50"	20	20	20
121	1	Monitor Name DD556SL -> "A50"	20	20	20
122	1	Monitor Name DD556SL -> "A50"	20	20	20
123	1	Monitor Name DD556SL -> "A50"	20	20	20
124	1	Monitor Name DD556SL -> "A50"	20	20	20
125	1	Monitor Name DD556SL -> "A50"	20	20	20
126	1	Monitor Name DD556SL -> "A50"	20	20	20
127	1	Extension	00	00	00
128	1	Check sum "DD556SA"	XX	XX	XX
128	1	Check sum "DD556SB"	XX	XX	XX
128	1	Check sum "DD556SD"	XX	XX	XX
128	1	Check sum "DD556SL"	XX	XX	XX

Monitor Name: | E651-3 (DD556SB)
| E651-3 (DD556SD)

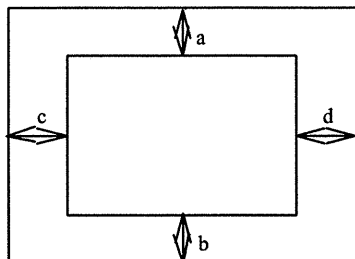
APPENDIX A. Signal Memory Modes



	PRESET MODE - 1	PRESET MODE - 2	PRESET MODE - 3	PRESET MODE - 4	PRESET MODE - 5
	640 x 400 (70)	640 x 480 (60)	640 x 480 (75)	640 x 480 (67)	800 x 600 (75)
DOT CLOCK	25.175MHz	25.175MHz	31.50 MHz	30.240 MHz	49.500 MHz
H					
H frequency	31.469 KHz	31.469 KHz	37.5 KHz	30.240 KHz	46.875 KHz
A-PERIOD (total)	31.778 us (800 dots)	31.778 us (800 dots)	26.667 us (840 dots)	28.571 us (864 dots)	21.333 us (1056 dots)
B-ACTIVE (display)	25.422 us (640 dots)	25.422 us (640 dots)	20.317 us (640 dots)	21.164 us (640 dots)	16.162 us (800 dots)
C-BACK PROCH	1.907 us (48 dots)	1.907 us (48 dots)	3.810 us (120 dots)	3.175 us (96 dots)	3.232 us (160 dots)
D-SYNC WIDTH	3.813 us (96 dots)	3.813 us (96 dots)	2.032 us (64 dots)	2.116 us (64 dots)	1.616 us (80 dots)
E-FRONT PROCH	0.636 us (16 dots)	0.636 us (16 dots)	0.508 us (16 dots)	2.116 us (64 dots)	0.323 us (16 dots)
V					
V frequency	70.087 Hz	59.94 Hz	75.00 Hz	66.667 Hz	75.000 Hz
F-PERIOD (total)	14.268ms (449 lines)	16.683ms (525 lines)	13.333ms (500 lines)	15.000 (525 lines)	13.333ms (625 lines)
G-ACTIVE (display)	12.711ms (400 lines)	15.253ms (480 lines)	12.800ms (480 lines)	13.714ms (480 lines)	12.800ms (600 lines)
H-BACK PROCH	1.112ms (35 lines)	1.048ms (33 lines)	0.427ms (16 lines)	1.114ms (39 lines)	0.448ms (21 lines)
I-SYNC WIDTH	0.064 ms (2 lines)	0.064 ms (2 lines)	0.080ms (3 lines)	0.086ms (3 lines)	0.064ms (3 lines)
J-FRONT PROCH	0.381 ms (12 lines)	0.318 ms (10 lines)	0.027ms (1 line)	0.086ms (3 lines)	0.021ms (1 line)
SYNC POLARITY	-/+	-/	-/	-/	+/+
	PRESET MODE - 6	PRESET MODE - 7	PRESET MODE - 8	PRESET MODE - 9	PRESET MODE - 10
	832 x 624 (75)	800 x 600 (85)	800 x 600 (72)	1024 x 768 (60)	640 x 480 (85)
DOT CLOCK	57.270 MHz	56.250 MHz	50.000 MHz	65.000 MHz	36.000 MHz
H					
H frequency	49.717 KHz	53.674 KHz	48.077 KHz	48.363 KHz	43.270 KHz
A-PERIOD (total)	20.115 us (1152 dots)	18.631 us (1048 dots)	20.800 us (1040 dots)	20.677 us (1344 dots)	23.111 us (832 dots)
B-ACTIVE (display)	14.528 us (832 dots)	14.222 us (800 dots)	16.000 us (800 dots)	15.754 us (1024 dots)	17.778 us (640 dots)
C-BACK PROCH	3.911 us (224 dots)	2.702 us (152 dots)	1.280 us (64 dots)	2.462 us (160 dots)	2.222 us (80 dots)
D-SYNC WIDTH	1.118 us (64 dots)	1.138 us (64 dots)	2.400 us (120 dots)	2.092 us (136 dots)	1.556 us (56 dots)
E-FRONT PROCH	0.558 us (32 dots)	0.569 us (32 dots)	1.120 us (56 dots)	0.369 us (24 dots)	1.556 us (56 dots)
BLANKING					
V					
V frequency	74.530 Hz	85.000 Hz	72.188 Hz	60.004 Hz	85.000 Hz
F-PERIOD (total)	13.417ms (667 lines)	11.756ms (631 lines)	13.853ms (666 lines)	16.666ms (806 lines)	11.764ms (509 lines)
G-ACTIVE (display)	12.552ms (624 lines)	11.179ms (600 lines)	12.480ms (600 lines)	15.880ms (768 lines)	11.093ms (480 lines)
H-BACK PROCH	0.784ms (39 lines)	0.503ms (27 lines)	0.478ms (23 lines)	0.600ms (29 lines)	0.578ms (25 lines)
I-SYNC WIDTH	0.060 ms (3 lines)	0.056 ms (3 lines)	0.125 ms (6 lines)	0.124 ms (6 lines)	0.069 ms (3 lines)
J-FRONT PROCH	0.021 ms (1 lines)	0.019 ms (1 line)	0.770 ms (37 lines)	0.062 ms (3 lines)	0.023 ms (1 lines)
SYNC POLARITY	-/	+/+	+/+	-/	-/

APPENDIX B

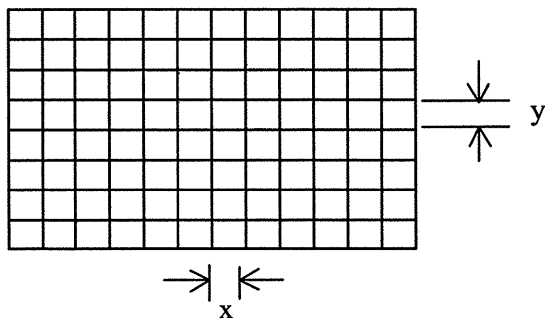
B-1 Center



Vertical $|a - b| < 4\text{mm}$
 Horizontal $|c - d| < 4\text{mm}$

B-2 Nonlinearity

Scanning nonlinearity is defined in terms of the pattern of horizontal (12 lines) and vertical (8 lines) lines produced by cross-hatch pattern generator.



Horizontal nonlinearity

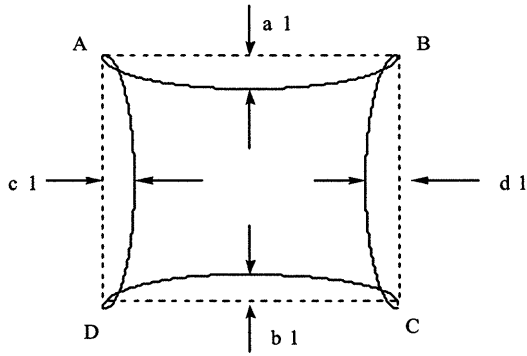
$$\left| \frac{X_{\max} - X_{\min}}{X_{\max}} \right| \times 100 (\%) \leq 12 \%$$

Vertical nonlinearity

$$\left| \frac{Y_{\max} - Y_{\min}}{Y_{\max}} \right| \times 100 (\%) \leq 8 \%$$

B-3 Geometric Distortion

1. Pincushion Distortion



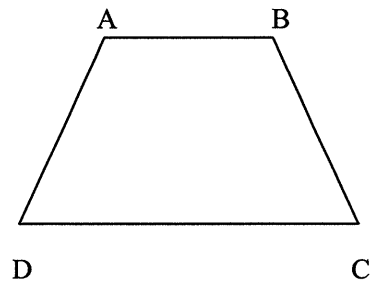
$$a1 < 2\text{mm}$$

$$b1 < 2\text{mm}$$

$$c1 < 1\text{mm}$$

$$d1 < 1\text{mm}$$

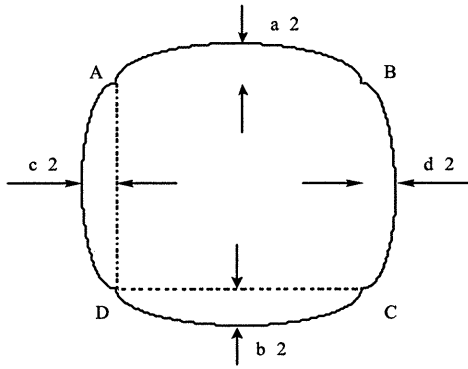
2. Trapezoid Distortion



Left / Right

$$|DC - AB| < 2\text{mm}$$

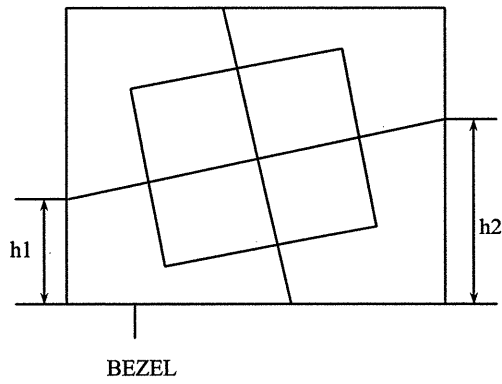
3. Barrel Distortion



$$d2 < 1\text{mm}$$

$$\begin{aligned} a2 &< 2\text{mm} \\ b2 &< 2\text{mm} \\ c2 &< 1\text{mm} \end{aligned}$$

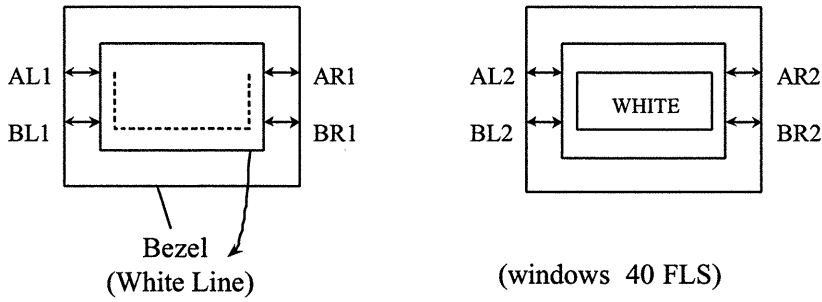
4. Rotation Distortion



PRESET MODE
 $h1 - h2 < 2\text{mm}$

APPENDIX C

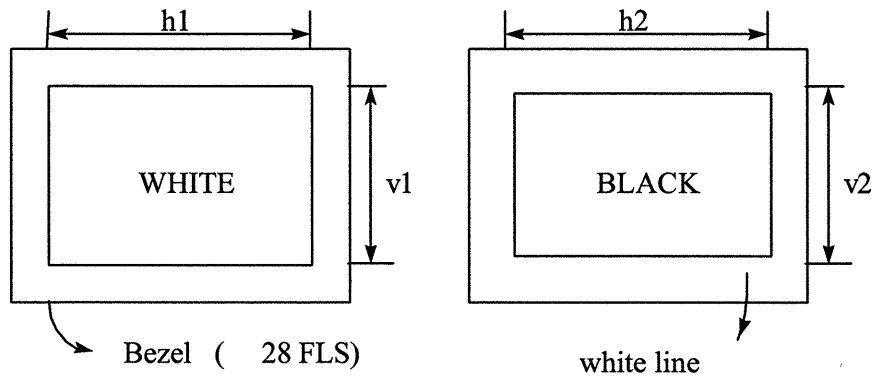
C-1 EHT Dynamic Regulation



$$(AL2 - BL2) - (AL1 - BL1) < 1\text{mm}$$

$$(AR2 - BR2) - (AR1 - BR1) < 1\text{mm}$$

C-2 EHT static regulation

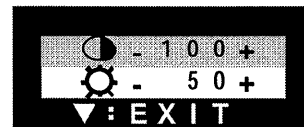
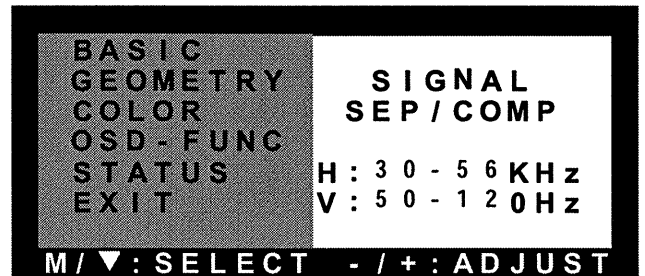
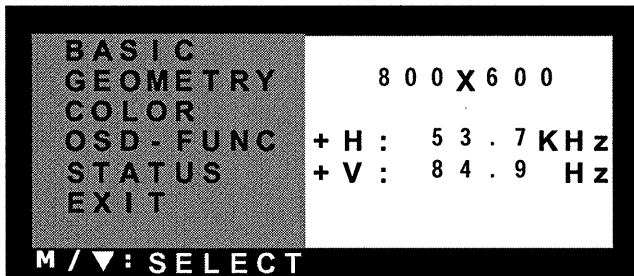
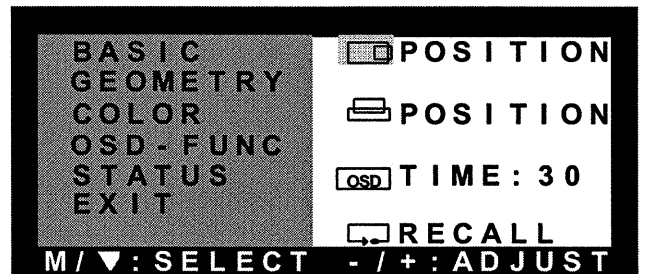
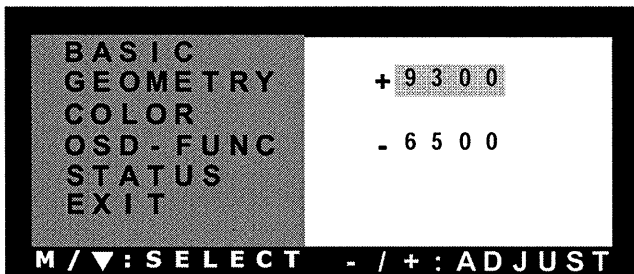
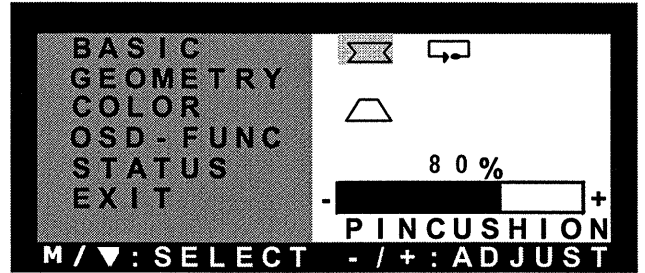
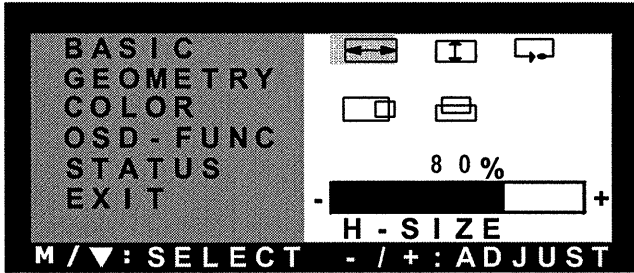


$$h1 - h2 < 1\text{mm}$$

$$v1 - v2 < 2\text{mm}$$

APPENDIX D

D-1 On Screen Display



D-2 FRONT PANEL DESCRIPTION



Power Switch

Maintain key function

P	M	▼			Entry the Self Test
P	M	▼	-		Entry The Factory Mode
P		▼	-	+	Initial EEPROM Data Then Show OSD " INITIAL OK"
P			-		Disable Burn in Flag
P	M		-	+	Enable Burn in Flag
P		▼	-		Disable Degauss
P		▼		+	Enable Degauss
P	M			+	MCU Internal DDC function
P	M		-		MCU External DDC function
P	M				Setting the DDC write protection
P	M				Power Switch

User key function

P					Power Switch
	M				Open The Main OSD
		▼			Open The Main OSD
			-		Down Adjust
				+	Up Adjust
			-		Open The C/B OSD(Contrast and Brightness OSD)
				+	Open The C/B OSD
	M	▼			Close Main OSD
		▼			Close The C/B OSD
			-	+	Recall Contrast and Brightness Value

APPENDIX E

ALL SIGNAL MUST BE AVAILABLE WITH CHROMA 2000 / 2135 / 2250

SIGNAL A FULL WHITE FIELD.

SIGNAL B STAIRSTEP: 16 GRAY LEVELS INCLUDING BLACK AND WHITE ASCENDING FROM LEFT TO RIGHT IN EQUAL PIXEL WIDTHS.

SIGNAL C COLOR BARS: EIGHT 100 PIXEL WIDE BARS.

SIGNAL D CROSSHATCH: 12 * 16 SQUARES.

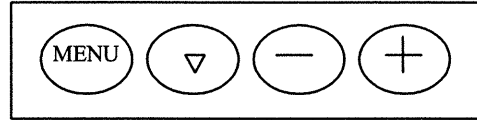
SIGNAL E "Me" PATTERN: ACTIVE DISPLAY CONTAINS ALL CHARACTERS "Me" COLOR WHITE CHARACTERS ON BLACK BACKGROUND

SIGNAL F 50mm*50mm WINDOWS FULL WHITE CENTERED IN THE MIDDLE OF THE SCREEN.

SIGNAL G FULL BLANK FIELD

2. FRONT PANEL CONTROL DESCRIPTION :

1. When OSD does not appear yet



- (1) Press MENU or ▽ key then OSD appears.
- (2) To make OSD disappear :
 - ① Select EXIT.
 - ② No operation till over 30 seconds.
 - ③ Press MENU and ▽ key at the same time.
- (3) Press + or - key will appear small OSD to adjust CONTRAST and BRIGHTNESS. PRESS MENU key choice CONTRAST or BRIGHTNESS to adjust.
Press + or - key to adjust CONTRAST and BRIGHTNESS.
Press ▽ key then small OSD disappear.

2. BASIC and GEOMETRY

- (1) Press MENU key to select BASIC or GEOMETRY, PRESS ▽ key to select item.
- (2) Press + or - key to adjust BASIC and GEOMETRY.

3. COLOR

- (1) Press MENU key to be COLOR function.
- (2) Press +, - or ▽ key to select 9300 °K or 6500° K.

4. STATUS

(1) Press MENU key to be STATUS function, show resolution, frequency and pole.

(2) If timing mode is not preset timing, it will show USER MODE.

5. OSD Function

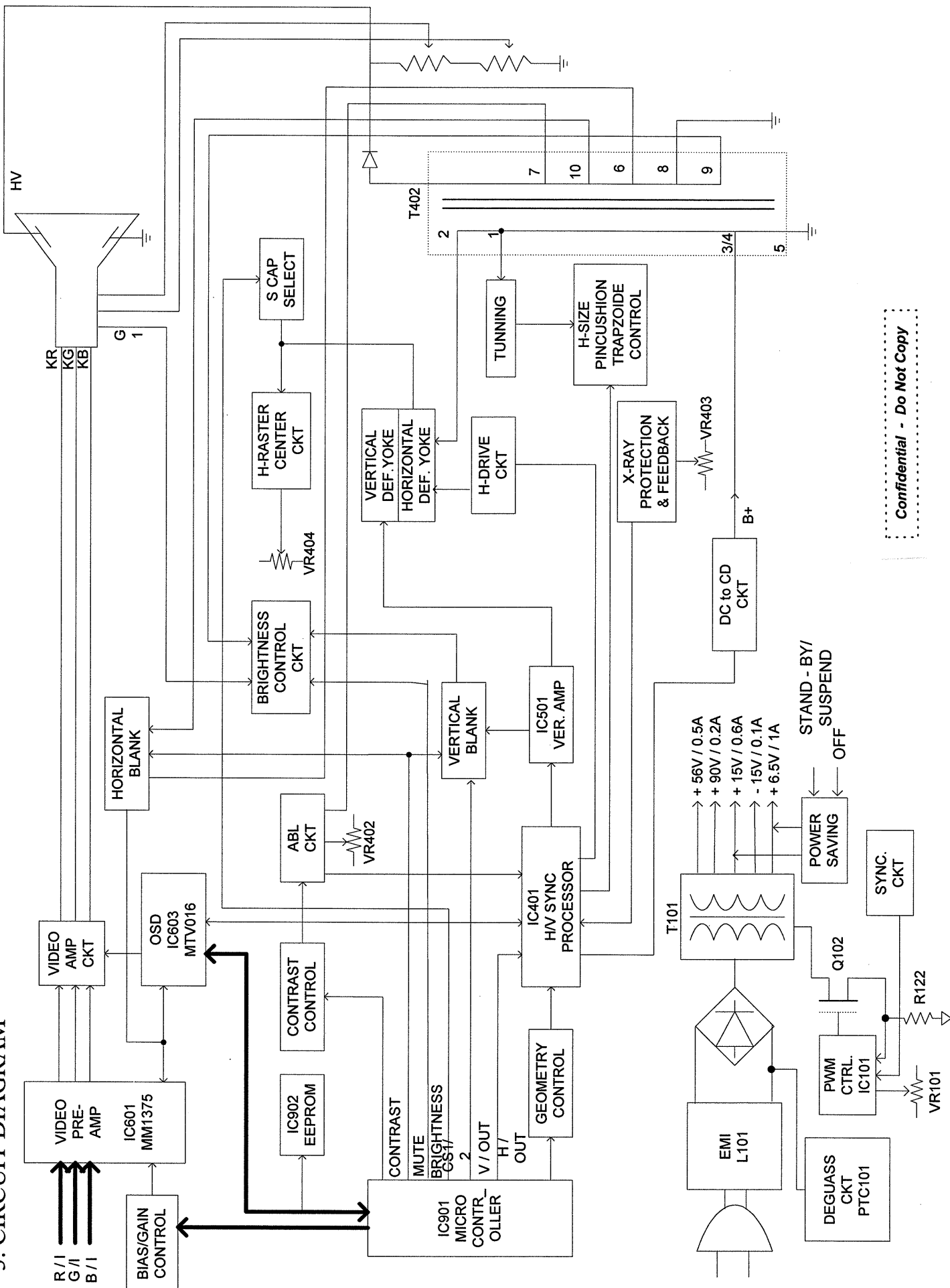
(1) Press MENU key to be OSD function, Press ▽ key to select item.

(2) Press + or – key to adjust.

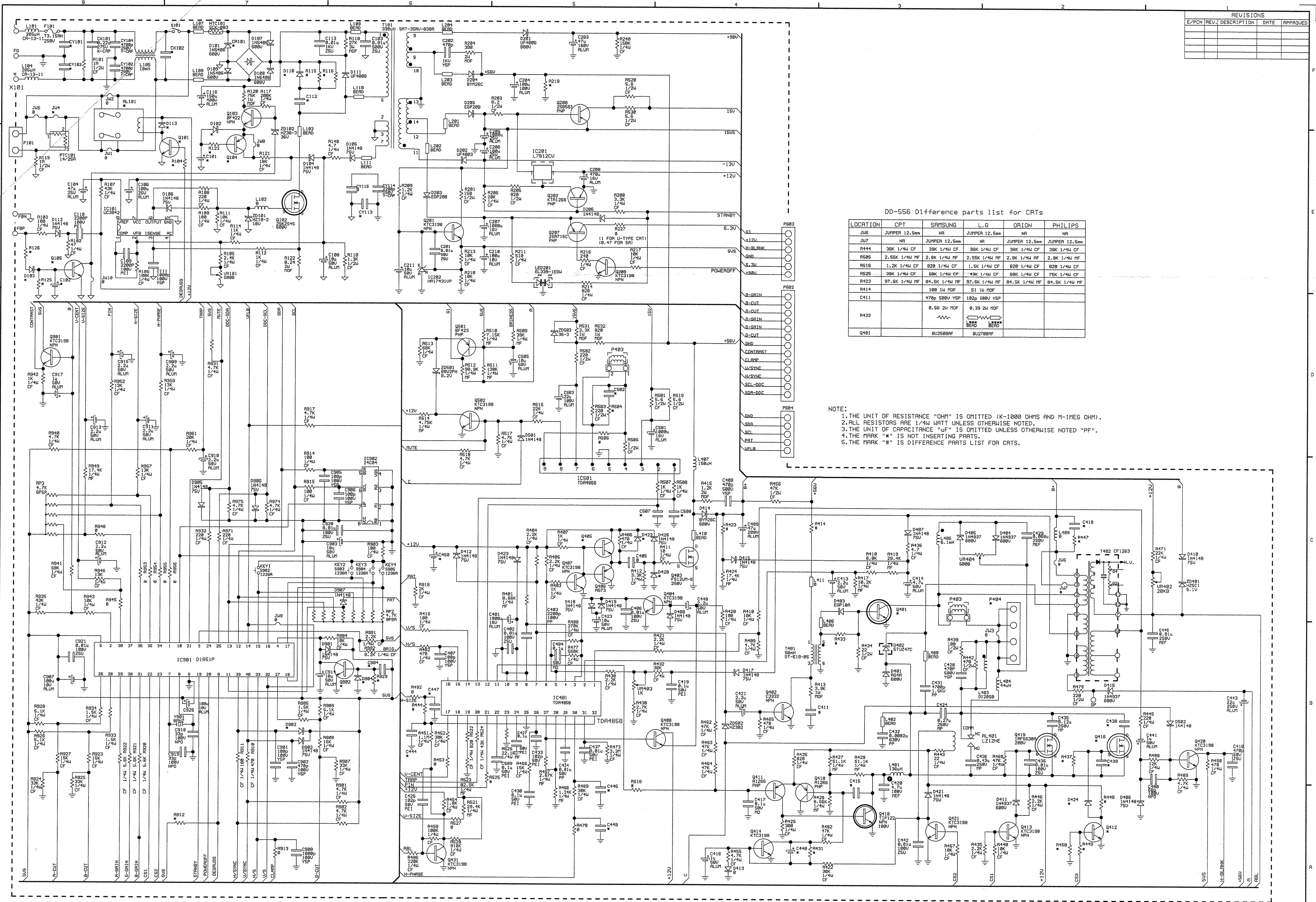
6. EXIT :

(1) Press MENU key to be EXIT function then press + or – key to EXIT.

3. CIRCUIT DIAGRAM



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REVISIONS				
E/PCN	REV.	DESCRIPTION	DATE	APPROVED

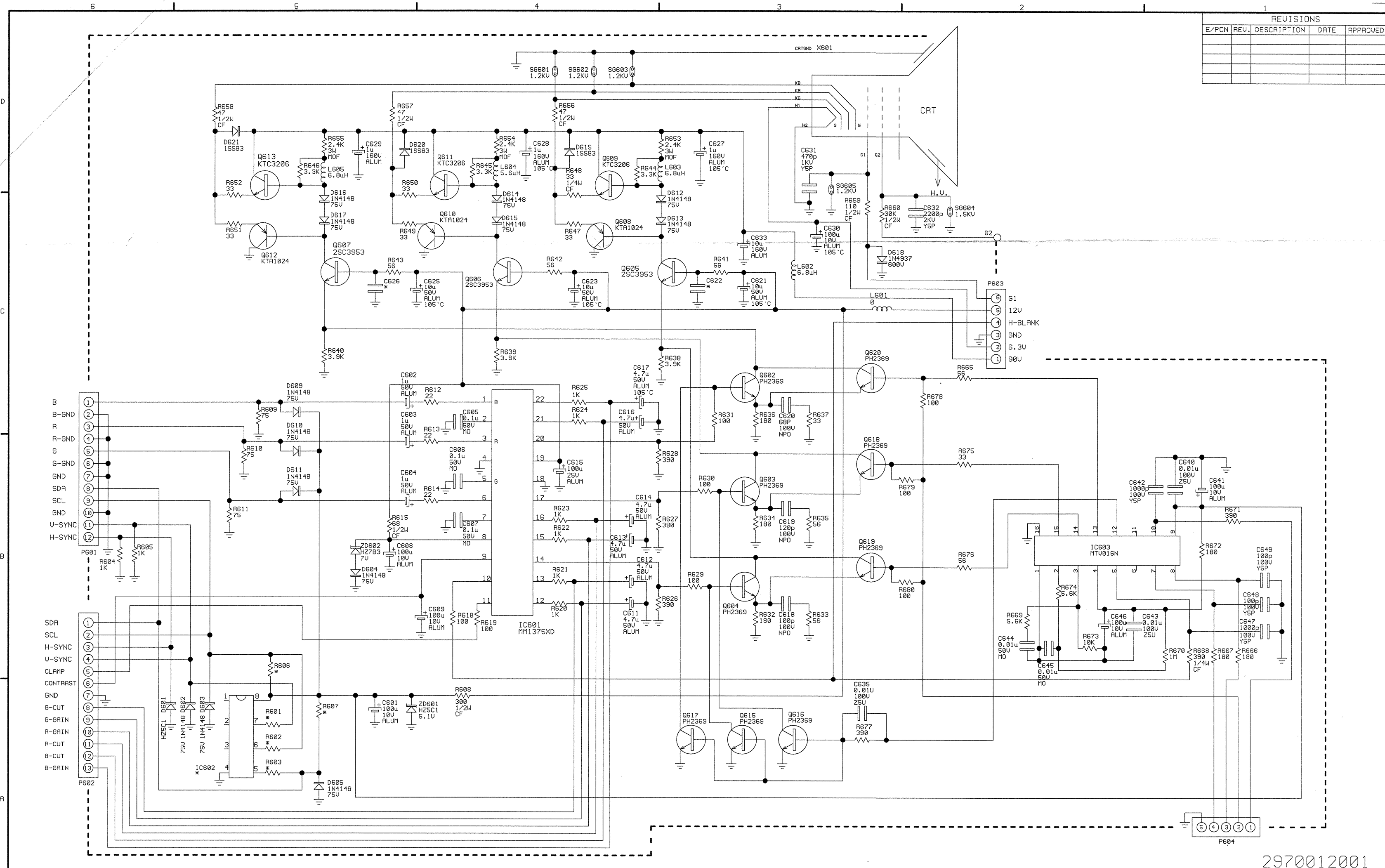
DD-556 Difference parts list for CRTs

LOCATION	CPT	SAMSUNG	LG	ORION	PHILIPS
J46	JUMPER 12.5mm	NR	JUMPER 12.5mm	NR	NR
J47	NR	JUMPER 12.5mm	NR	JUMPER 12.5mm	JUMPER 12.5mm
R444	38K 1/4W CF	38K 1/4W CF	38K 1/4W CF	38K 1/4W CF	38K 1/4W CF
R455	2.55K 1/4W HF	2.8K 1/4W HF	2.55K 1/4W HF	2.8K 1/4W HF	2.8K 1/4W HF
R516	1.2K 1/4W CF	820 1/4W CF	1.5K 1/4W CF	820 1/4W CF	820 1/4W CF
R525	38K 1/4W CF	68K 1/4W CF	43K 1/4W CF	68K 1/4W CF	75K 1/4W CF
R423	97.6K 1/4W HF	84.5K 1/4W HF	97.6K 1/4W HF	84.5K 1/4W HF	84.5K 1/4W HF
R414	100 1W MOF	51 1W MOF			
R411	470p 500V VSP	182p 500V VSP			
R433	0.56 2W MOF	0.39 2W MOF			
Q401		BU2588RF	BU2788RF		

NOTE:
 1. THE UNIT OF RESISTANCE "OHM" IS OMITTED (K-1000 OHMS AND M-1MEG OHM).
 2. ALL RESISTORS ARE 1/4W WATT UNLESS OTHERWISE NOTED.
 3. THE UNIT OF CAPACITANCE "uF" IS OMITTED UNLESS OTHERWISE NOTED "PF".
 4. THE MARK "*" IS NOT INSERTING PARTS.
 5. THE MARK "H" IS DIFFERENCE PARTS LIST FOR CRTS.

ViewSonic Corporation		FN/DCN:	DRAWER	CHECK	APPROVER	P.C.B. NAME	MODEL NAME	DATE: 05-26 '99	SHEET
START_NO:	END_NO:	Joan Lin				D556M-13.PCB	E651-3	REV: 1 CODE: 3	1 / 2

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REVISIONS				
E/PCN	REV.	DESCRIPTION	DATE	APPROVED

2970012001

ViewSonic Corporation	FN/DCN:	DRAWER	CHECK	APPROVER	P.C.B. NAME	MODEL NAME	DATE: 05-25 '99	SHEET 2 / 2
	START_NO.:	END_NO.:	Joan LIN		D556C-10.PCB	E651-3	REV: 1 CODE: 1	

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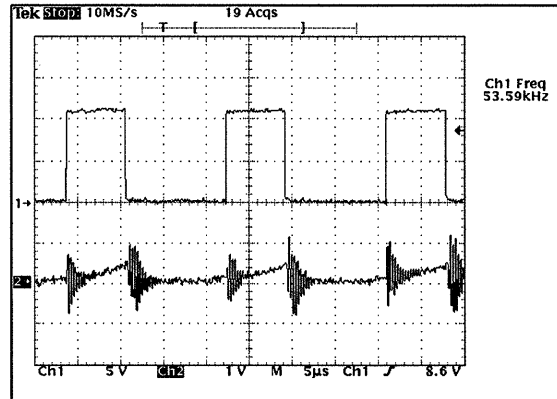
VESA 800X600

53KHZ / 85HZ

Vin = 110Vac

CH1 : (1) IC101 Pin6

CH2 : (2) IC101 Pin3



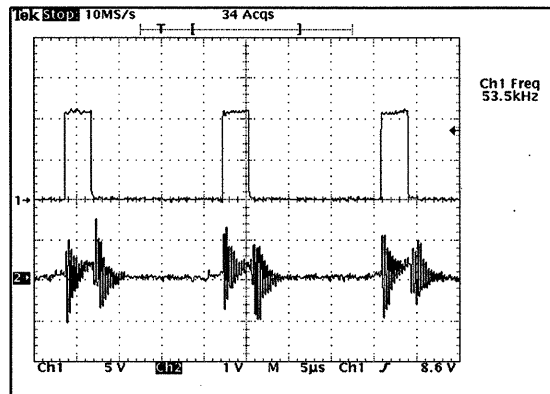
VESA 800X600

53KHZ / 85HZ

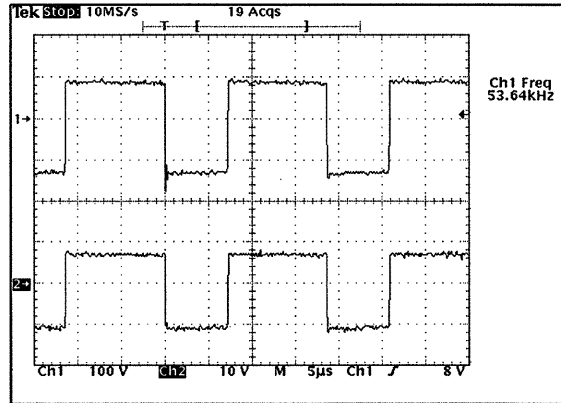
Vin = 220Vac

CH1 : (1) IC101 Pin6

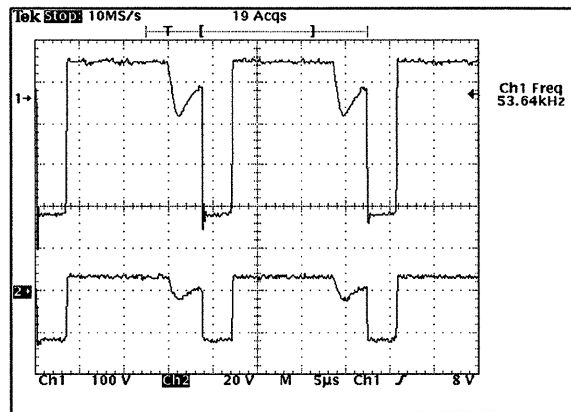
CH2 : (2) IC101 Pin3



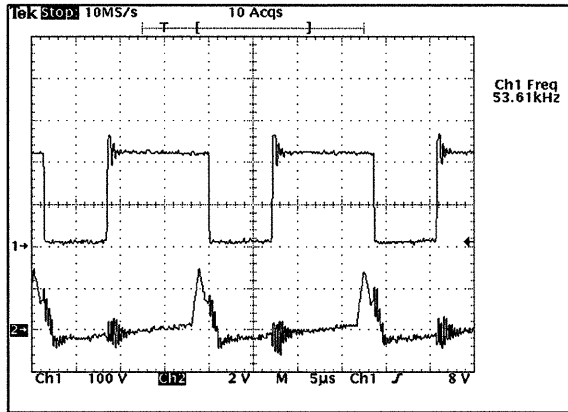
VESA 800X600
53KHZ / 85HZ
Vin = 110Vac
CH1 : (5) T101 Pin8
CH2 : (6) T101 Pin14



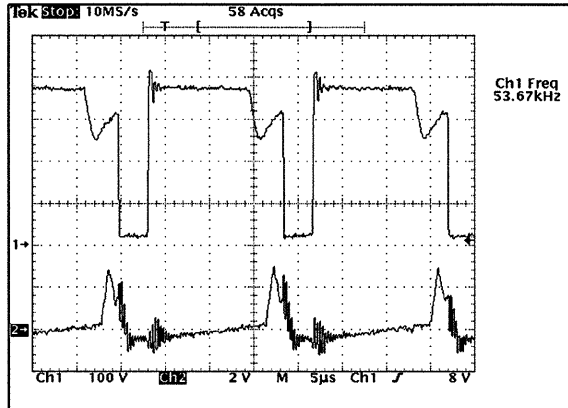
VESA 800X600
53KHZ / 85HZ
Vin = 220Vac
CH1 : (5) T101 Pin8
CH2 : (6) T101 Pin14



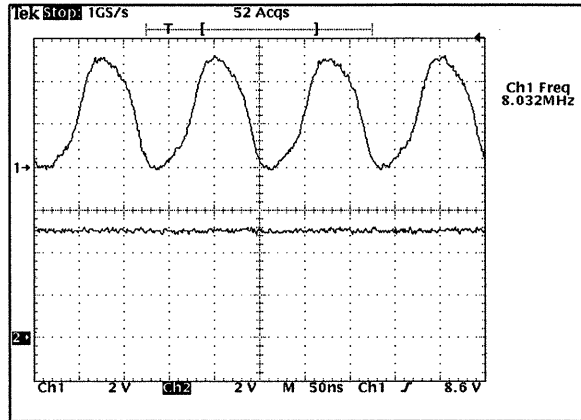
VESA 800X600
53KHZ / 85HZ
Vin = 110Vac
CH1 : (3) T101 Pin5
CH2 : (4) IC101 Pin4



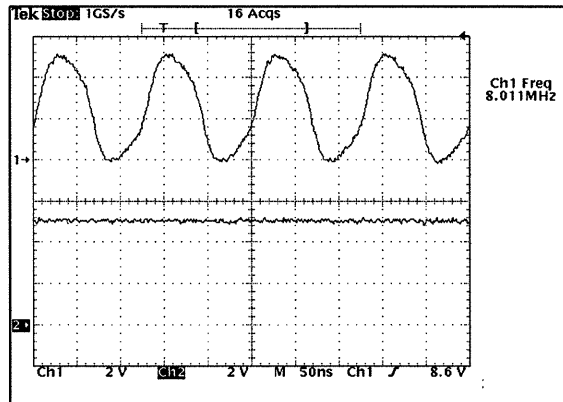
VESA 800X600
53KHZ / 85HZ
Vin = 220Vac
CH1 : (3) T101 Pin5
CH2 : (4) IC101 Pin4



VESA 800X600
53KHZ / 85HZ
Vin = 110Vac
CH1 : (7) IC901 Pin7
CH2 : (8) IC901 Pin5



VESA 800X600
53KHZ / 85HZ
Vin = 220Vac
CH1 : (7) IC901 Pin7
CH2 : (8) IC901 Pin5



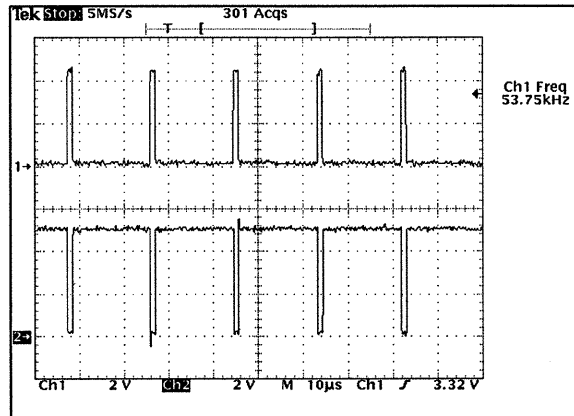
VESA 800X600

53KHZ / 85HZ

Vin = 110Vac

CH1 : (9) IC901 Pin39

CH2 : (10) IC901 Pin33



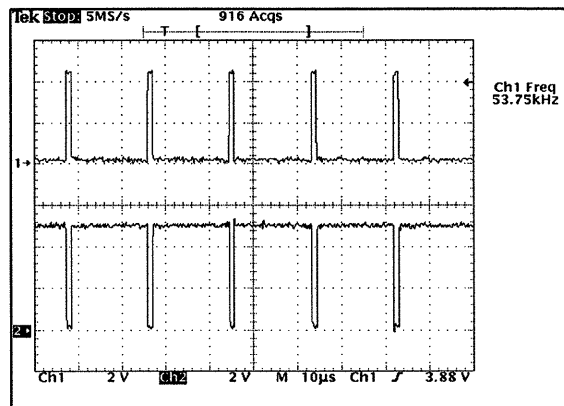
VESA 800X600

53KHZ / 85HZ

Vin = 220Vac

CH1 : (9) IC901 Pin39

CH2 : (10) IC901 Pin33



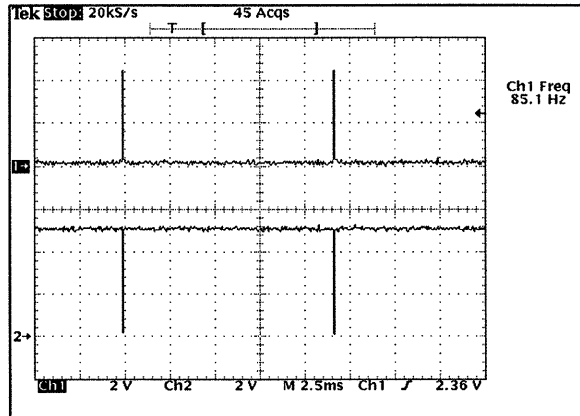
VESA 800X600

53KHZ / 85HZ

Vin = 110Vac

CH1 : (11) IC901 Pin40

CH2 : (12) IC901 Pin32



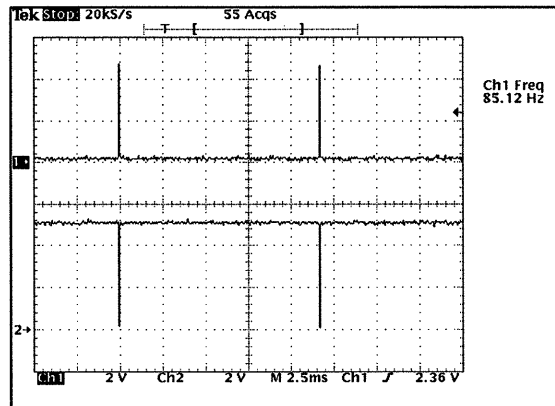
VESA 800X600

53KHZ / 85HZ

Vin = 220Vac

CH1 : (11) IC901 Pin40

CH2 : (12) IC901 Pin32



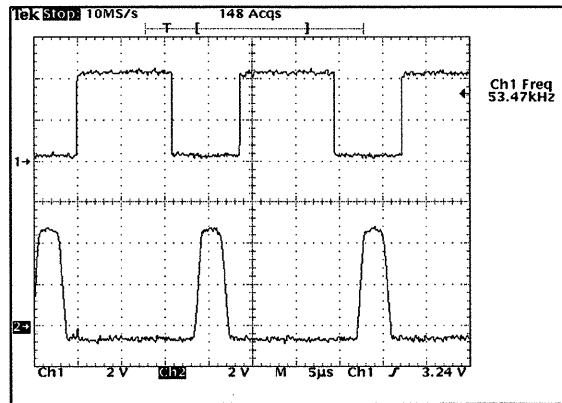
VESA 800X600

53KHZ / 85HZ

Vin = 110Vac

CH1 : (15) IC401 Pin6

CH2 : (16) IC401 Pin1



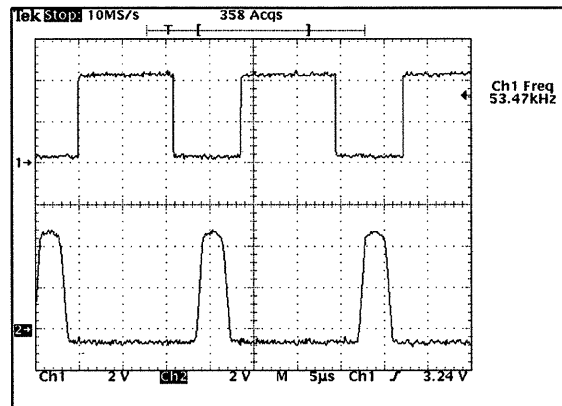
VESA 800X600

53KHZ / 85HZ

Vin = 220Vac

CH1 : (15) IC401 Pin6

CH2 : (16) IC401 Pin1



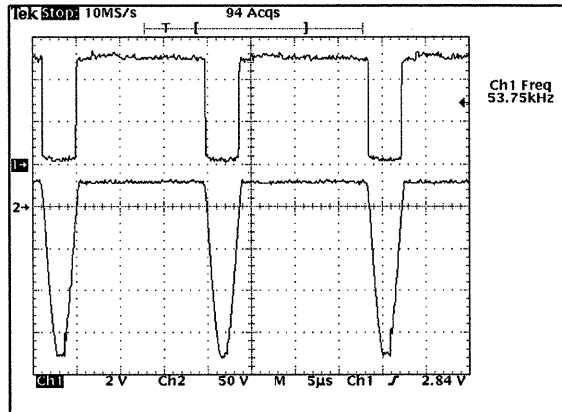
VESA 800X600

53KHZ / 85HZ

Vin = 110Vac

CH1 : (19) Q420 "C"

CH2 : (20) D416 "K"



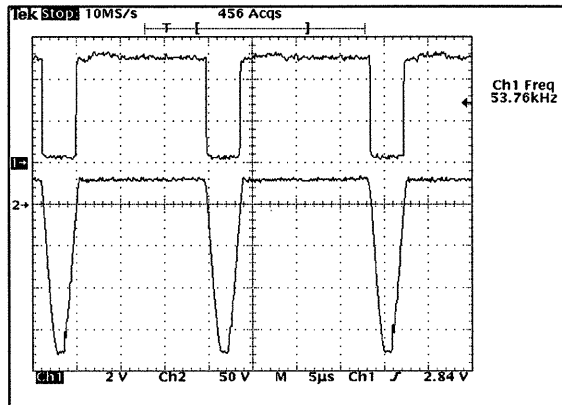
VESA 800X600

53KHZ / 85HZ

Vin = 220Vac

CH1 : (19) Q420 "C"

CH2 : (20) D416 "K"



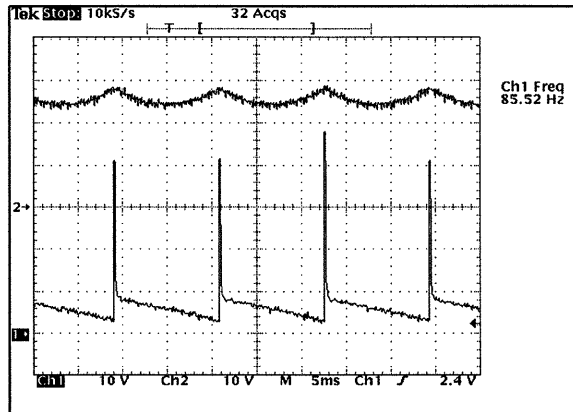
VESA 800X600

53KHZ / 85HZ

Vin = 110Vac

CH1 : (13) IC501 Pin6

CH2 : (14) Q418 "C"



VESA 800X600

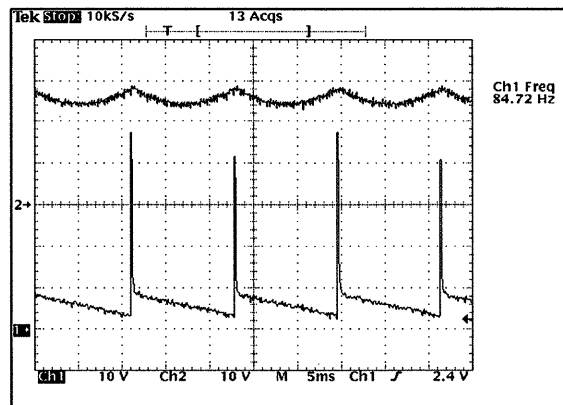
53KHZ / 85HZ

Vin = 220Vac

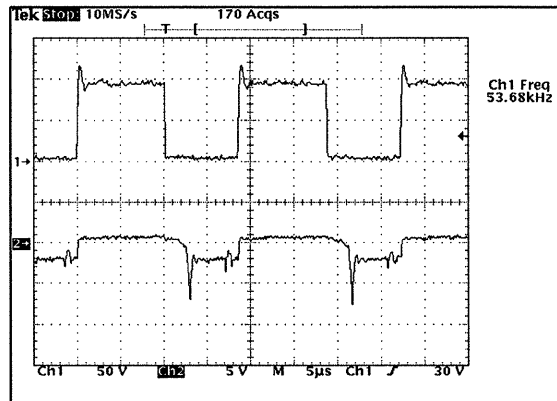
CH1 : (13) IC501

Pin6

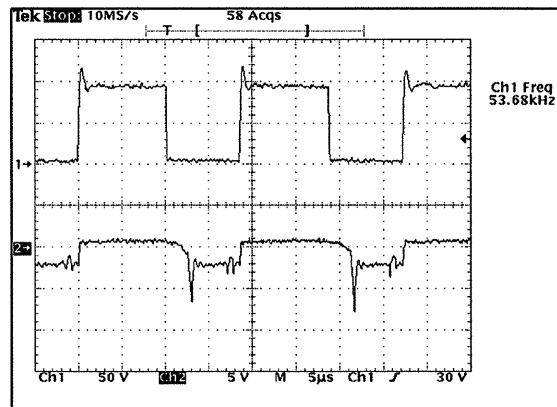
CH2 : (14) Q418 "C"



VESA 800X600
53KHZ / 85HZ
Vin = 110Vac
CH1 : (17) T401 Pin3
CH2 : (18) Q401 "B"



VESA 800X600
53KHZ / 85HZ
Vin = 220Vac
CH1 : (17) T401 Pin3
CH2 : (18) Q401 "B"



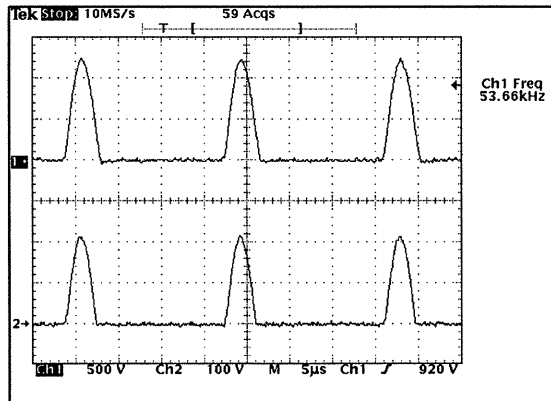
VESA 800X600

53KHZ / 85HZ

Vin = 110Vac

CH1 : (21) Q401 "C"

CH2 : (22) D401 "A"



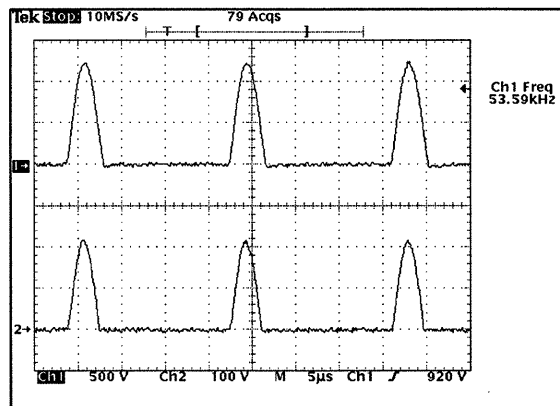
VESA 800X600

53KHZ / 85HZ

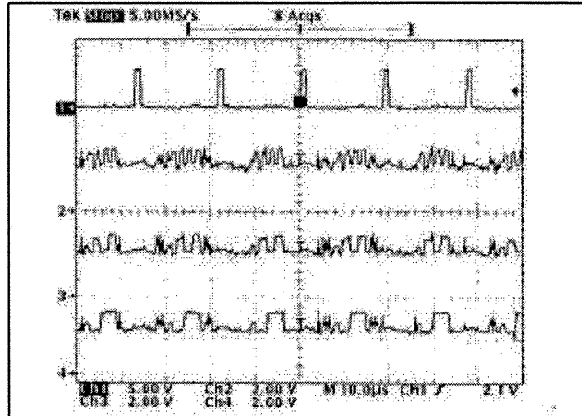
Vin = 220Vac

CH1 : (21) Q401 "C"

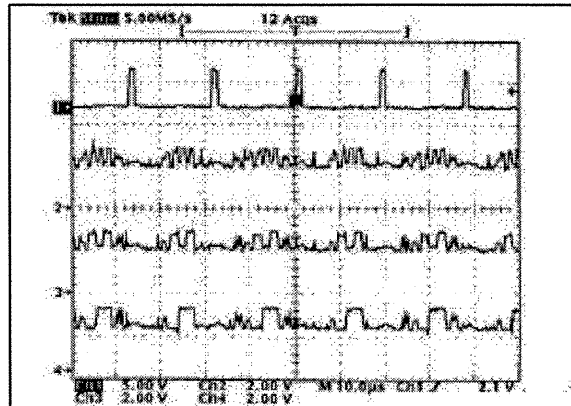
CH2 : (22) D401 "A"



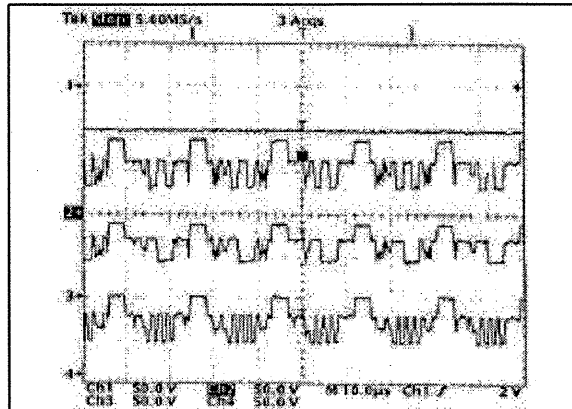
VESA 800X600
53KHZ / 85HZ
Vin = 110Vac
CH1 : (32) P602 Pin3
CH2 : (23) IC601 Pin3
CH3 : (24) IC601 Pin6
CH4 : (25) IC601 Pin1



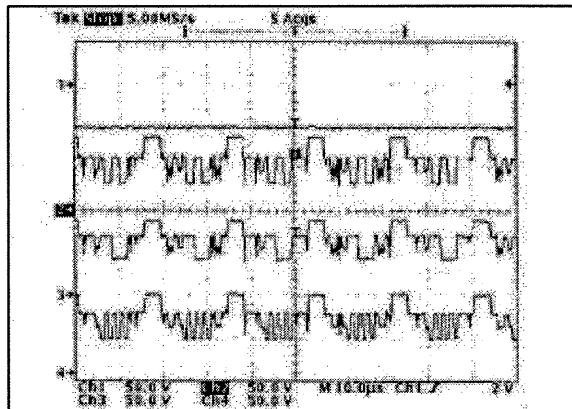
VESA 800X600
53KHZ / 85HZ
Vin = 220Vac
CH1 : (32) P602 Pin3
CH2 : (23) IC601 Pin3
CH3 : (24) IC601 Pin6
CH4 : (25) IC601 Pin1



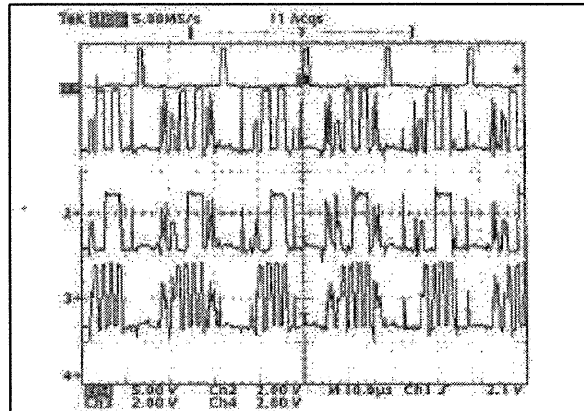
VESA 800X600
53KHZ / 85HZ
Vin = 110Vac
CH1 : (32) G1
CH2 : (29) KR
CH3 : (30) KG
CH4 : (31) KB



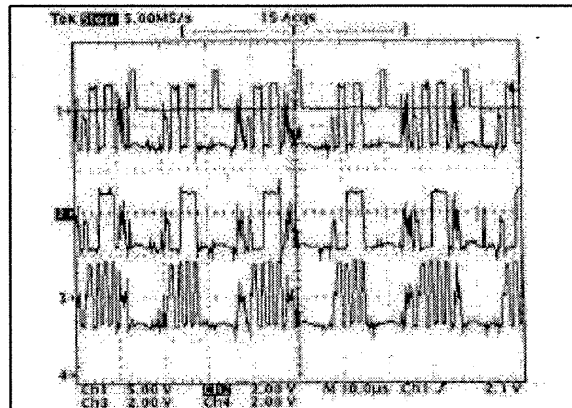
VESA 800X600
53KHZ / 85HZ
Vin = 220Vac
CH1 : (32) G1
CH2 : (29) KR
CH3 : (30) KG
CH4 : (31) KB



VESA 800X600
53KHZ / 85HZ
Vin = 110Vac
CH1 : (32) P602 Pin3
CH2 : (26) IC601 Pin17
CH3 : (27) IC601 Pin14
CH4 : (28) IC601 Pin20



VESA 800X600
53KHZ / 85HZ
Vin = 220Vac
CH1 : (32) P602 Pin3
CH2 : (26) IC601 Pin17
CH3 : (27) IC601 Pin14
CH4 : (28) IC601 Pin20



4. CIRCUIT DESCRIPTION

1. POWER SUPPLY (switching mode power supply fly-back type)

The raw DC B+ voltage is got from AC input voltage after EMI filter and rectifier. It supplies lower voltage VCC to PWM controller, IC101 (UC3842), through start-up circuit (Q103, R121, R117, R120, ZD102 to IC101 pin7). R107 & C110 generate triangle wave-form to decide switching frequency. In order to power supply synchronism, it must feedback Horizontal-Synch to “TRIGGLE” from D112, R103, R102, FBN, FBP and forced power supply synchronization with Horizontal deflection circuit. The pin6 is output of IC101 to drive power MOSFET Q102. A High-frequency & High-Voltage square wave-form is across the primary winding and transfers energy to the secondary. The output DC voltage gets after rectifying.

In order to make a stable and regulated output voltage while AC input voltage and output load change. T101 Pin7 will produce a voltage change through D105 rectify and feed to IC101 pin2. PWM controller circuit will adjust duty cycle and maintain stable voltage.

2. POWER SAVING

According to VESA standard with monitor manufacturers, please refer to the following table:

SYNC. INPUT	H. & V. PRESENTED	NO H. OR V.	NO H. AND V.
MODE TTL SIGNAL	NORMAL ON	SUSPEND OR STAND-BY	OFF
SW1	Lo	Hi	Hi
SW2	Hi	Hi	Lo
LED	Green	Amber	Amber
Power (Watt)	Normal	< 15W	< 8W

SW1 : IC901 pin15, suspend (SUS)
SW2 : IC901 pin20, power down (OFF)

- SW1 at Lo and SW2 at Hi are normal mode.
- The suspend or stand-by mode occurs when sw1 is at Hi level. (by IC901 pin15)
The B⁺ (+15V) is switched off via Q208, Q202.

- The off mode occurs when sw1 at Hi level and SW2 at Lo level. Both B⁺ (+15V) and 6.3V are switched off via Q208, Q202, Q207, Q209 respectively.

The micro-processor IC901 is driven to off mode when signal cable is not connected to PC.

3. MICRO-CONTROLLER UNIT (MCU)(IC901)

IC901(WT6018) is an 8-bit micro-controller with embedded 6502 micro-controller core, 8K byte ROM. It has 4-bit A/D converter, watch dog timer, DDC port, PWM D/A converter output, sync processor, and all the other logic blocks. It has timing detector, key control, power management, OSD control, auto-alignment, and feature control (geometry and color). The MCU through I²C bus controls RGB gain, RGB cutoff, contrast and brightness. The MCU also through I²C bus controls geometry, basic function, auto-alignment, and status information. These data are stored in EEPROM through I²C bus. In addition, this MCU can do self diagnose and offers message to indicate the condition of the monitor.

4. SYNC. PROCESSOR

The horizontal sync or composite sync, is connected from signal cable to IC901(MCU) pin39 input and from IC901 pin33 output positive polarity sync to IC401 pin15.

Vertical sync. is connected from signal cable to IC901(MCU) pin40 input and comes out at pin32, a positive polarity sync, to IC401 pin14.

The IC901(WT6018) and the IC401(TDA4858) sync input can handle either composite or separate sync input.

5. DEFLECTION CIRCUIT

5.1 Horizontal Phase Shifter:

This function are operated by a part of circuit inside IC401 (TDA4858) pin30 and IC901 pin34.

5.2 Horizontal Synchronization Processing

The horizontal synchronization processor is integrated inside the chip of TDA4858(IC401). It uses a dual phase-lock-loop (PLL1/PLL2) design. This operation ensures a smooth tuning and avoids fast changes of H-frequency during catching.

The processor can synchronize with the input sync. Up to 3times of free-run frequency which is determined by R467, R468, C434.

The PLL1 phase detector circuit is used to control the oscillator frequency and maintains it in proper frequency and phase with the incoming sync signal. One input is coupled from output of VCO which is built inside the IC.

A loop filter with a properly selected time constant (C433, C430, R466) is connected at pin26.

The PLL2 circuit is used to compare the line flyback pulse at pin HFLY with the oscillator sawtooth voltage, to compensate the delay in H-deflection by adjusting the PHASE of HDRV. One input is from the output of VCO (which is inside the IC) and a second input (pin6 of IC 401) is coupled from pin10 of T402 (FBT) via R410, R409, C421.

The control voltage formed through loop filter is to control horizontal output pulse output at proper duty cycle and maintain the phase between raster and picture.

The horizontal drive pulses are sent from pin31 of IC401.

5.3 Horizontal Driver Stage

The output of driver transformer T401 is coupled to the base of Horizontal output Transistor Q401. C411 and R413 compose of damping network which is to eliminate the leakage flux of T401 during Q402 turns off.

5.4 Horizontal Scanning

The conducting period of horizontal output transistor Q401 completes the second half of scan. The conducting period of damper diode D401 and D402 completes the first half part of horizontal scan.

The retrace capacitor are C431 and C432, the charge and discharge actions of retrace capacitor via yoke after Q401 turned off, which is designed for the same resonant frequency with the main scan circuit.

5.5 Boost Converter

In order to maintain same scan width within 30K-57KHz, the scan supply B+ tracked with continuous H-frequency is necessary, and the design is implemented by a convention method of boost converter.

The boost converter mainly composes of MOSFET (Q403) Diode (D414), choke L407 and capacitor C409.

The boost converter control signal derived from PWM control circuit. The PWM control circuit play an important role in the B⁺ scanning type circuit structure. The PWM control circuit play following functions

- ⊙Signal fetching synchronization with horizontal sync.
- ⊙H-width control and E-W pincushion correction modulation.
- ⊙Feedback compensation.
- ⊙Scan B⁺ compensation with B⁺/F-V.
- ⊙Softstart and lock-out protection.

Each function block consist of several key components.

- (1) Signal fetching synchronization with horizontal sync
R402, R421, R409 and R410.

- (2) H-Width control and E-W pincushion correction modulation
R429, C432, R482, R516, and scan B⁺ setting VR403. E-W pincushion correction signal is provided by IC401 pin11 and then pass through R516.

- (3) Feedback compensation
Feedback components are R432, D417, C419, R430 and R408, R477, C404. The DC feedback loop pass error signal fetch from T402 pin6 to error Amplifier IC401) pin5. The purpose of DC feedback loop is to compensation H-Width deviation due to temperature drift.

- (4) Scan B⁺ compensation with B⁺/F-V are R467, R468, C434, C437, R516, R462, R463, R464, R429, Q414 and C432. The circuit function of scan B⁺ compensation with B⁺/F-V is to get linear H-Width adjustment range from low frequency side to high frequency end.

- (5) Softstart and lock-out protection are D418, D419, C423, Q404, C448, R408, D408 and R420. The protection characteristic is considered from viewpoint of power on delay to avoid surge current or voltage adding to horizontal output transistor Q401 directly.

5.6 TRAPEZOID CONTROL

Trapezoid control is integrated in IC401. The function is controlled by MCU(IC901).

5.7 X-RAY-RADIATION PROTECTION

The X-RAY-Radiation protection circuit used in this monitor is a latching type. The monitor will shutdown and continue until turn-off the monitor with power switch. Pin6 of FBT supply 32V to X-RAY protection circuit. The D407, C414, R419, R418, R417 and C413 are designed for X-RAY protection (IC401 pin2).

5.8 Vertical Deflection (IC501)

Vertical deflection function is operated in the chip IC401(TDA4858), IC501 (TDA4866) which mainly contains the oscillator, ramp generator, power output amplifier and flyback generator. Vertical oscillator is obtained amplifier by means of and

integrator driven by oscillation circuit that is determined by C422, C419. The vertical sync signal is applied to the pin14 of IC401. Once the sync signal synchronized a clock pulse is generated inside this chip. The clock pulse is just as a sync input of ramp generator. A linear voltage ramp is produced at pin24 of IC401, and is coupled to IC501 pin1 for vertical output amplitude. Vertical output amplitude is controlled by MCU (IC901).

IC501 Pin6 is the outputs of the power amplifier and it drives the yoke by a current driven in opposite phase current ramp. R503 (damping function) is used to stabilize the power amplifier. Pin3 is the supply voltage 13VDC pin7 is the supply voltage 40VDC, pin9 is the flyback supply voltage which provide a blanking signal for the CRT.

Vertical centering is controlled by changing the DC voltage at vertical output that is caused from the DC shift of IC401 pin17, and that can be adjusted by MCU (IC901).

5.9 Blanking CKT

Vertical blanking pulse are inverted by Q502 and Q501. The blanking pulse O/P is fed to G1. While mode change, IC901 pin21 will be pulled high to turn on Q502 (lock-out and mute function) and Q501 will be turn off. The G1 volt will be down to -185V then CRT will cut off the video output. Horizontal blanking pulse is fed to IC601 pin10 and let video O/P Amp set cut off during the period of horizontal retrace. Horizontal blanking pulse (HBLK) is fetch from the voltage divider of C441 and Q420.

6 VIDEO

6.1 VIDEO AMPLIFIER(IC601)

The video input signal is fed to the video preamplifier IC601(MM1375) (pin1 blue, pin3 red, pin6 green) through AC coupling capacitor C601, C613, C604.

The clamping pulse comes from IC901 pin33 via P602V pin5 to IC601 pin11.

6.2 On Screen Display (OSD)(IC603)

IC603 is an on screen display generator. Pin5 for HBLK input which derived fetched from Q420 collector and P603 pin4, pin10 for VBLK (V-sync) input. The IC603 is controlled by IC901 I²C bus to IC603 (pin7, pin8).

The on screen display signal is output from IC603 pin15(R). Pin14(G), pin13(B) and connected to mixer circuit of Q618, Q619, Q620.

6.3 Auto Beam Limit CKT (A. B. L. CKT)

When beam current is over 400uA by VR402, the voltage will be limited by ZD401, then the voltage of pin9 of IC601 will be pulled down accordingly to reduce the video preamplifier gain output.

6.4 Brightness Control

Brightness is controlled by varying the DC voltage of G1. The G1 voltage is controlled by varying the dc bias of Q501.

6.5 CONTRAST, GAIN & BIAS CONTROL

The IC601 (MM1375) contains three gated single ended input black level clamp compurgators for brightness control, three matched DC controlled attenuators for contrast control.

All the DC control voltage comming from IC601 MM1375 internal is controlled by IC901 Micro controller.

6.6 DDC1/2B(IC901 or IC602)

Our monitor will provide EDID data though DDC1/2B interface. The EDID data can be offered by MCU or 24LC21. You must set configuration byte in EEPROM. The configuration byte defines in below table. Maybe your system can not read EDID from the monitor because your system does not follow VESA'S recommendation to process data protocol. However you still can use 24LC21 to solve this problem.

ADDRESS	CONTENT
EFh	EFh (dufoult)

EEh : Internal DDh : External (24LC21IC)

5. Adjust procedure

1. POWER SUPPLY ALIGNMENT

- 1.1 APPLY BURN-IN PATTERN (NO SIGNAL)**
- 1.2 SCREEN SET VR TO MINIMUM.**
- 1.3 ADJUST VR101 UNTIL $DC=90V\pm 0.3V$ AT C203 ANODE.**

2. X-RAY PROTECTION & ANODE VOLTAGE PRESET

- 2.1 APPLY BURN-IN PATTERN (NO SIGNAL)**
- 2.2 SCREEN VR SET TO MINIMUM.**
- 2.3 ADJUST VR403 UNTIL ANODE VOLTAGE= $24.6\pm 0.2KV$.**

3. PICTURE ADJUSTMENTS

3.1 APPLY MODE 1 ~ 8 , SIGNAL D

3.2 PICTURE HEIGHT

PUSH "V-HEIGHT" BUTTONS SUCH THAT PICTURE HEIGHT IS $200mm \pm 2mm$.

3.3 VERTICAL CENTERING

PUSH "V-CENTER" BUTTONS TO THE VIDEO DISPLAY VERTICALLY IS CENTERED WITH THE TOP BEZEL EDGE AND THE BOTTOM BEZEL EDGE.

3.4 PINCUSHION

PUSH "PINCUSHION" BUTTONS SUCH THAT THE PIN/BARREL DISTORTION WITHIN $1mm$.

3.5 TRAPEZOID

PUSH "TRAPEZOID" BUTTONS SUCH THAT THE DIFFERENCE OF WIDTH BETWEEN HORIZONTAL TOP AND BOTTOM OF PICTURE IS LESS THAN $2mm$.

3.6 PICTURE WIDTH

PUSH "H-WIDTH" BUTTONS TO MEET $266 \pm 2mm$.

6500°K $x=0.313 \pm 0.003$, $y=0.329 \pm 0.003$, $Y=0.8 \pm 0.2$ FLs

- 6.5 APPLY SIGNAL F
- 6.6 SET BRIGHTNESS TO THRESHOLD OF RASTER EXTINCTION, AND CONTRAST TO MAX.
- 6.7 PUSH R.G.B GAIN CONTROL BUTTONS TO MEET FOLLOWING CHROMATICITY SPEC.

9300°K $x=0.281 \pm 0.003$, $y=0.311 \pm 0.003$, $Y=48 \pm 5$ FLs

6500°K $x=0.313 \pm 0.003$, $y=0.329 \pm 0.003$, $Y=48 \pm 5$ FLs

- 6.8 APPLY SIGNAL A
- 6.9 ADJUST VR402 TO MEET OBTAIN LIGHT O/P= 30 ± 5 FLs
- 6.10 ADJUST CONTRAST BUTTONS FROM 20 FLs TO 5 FLs AND CHECK THE CHROMATICITY TO MEET FOLLOWING SPEC.

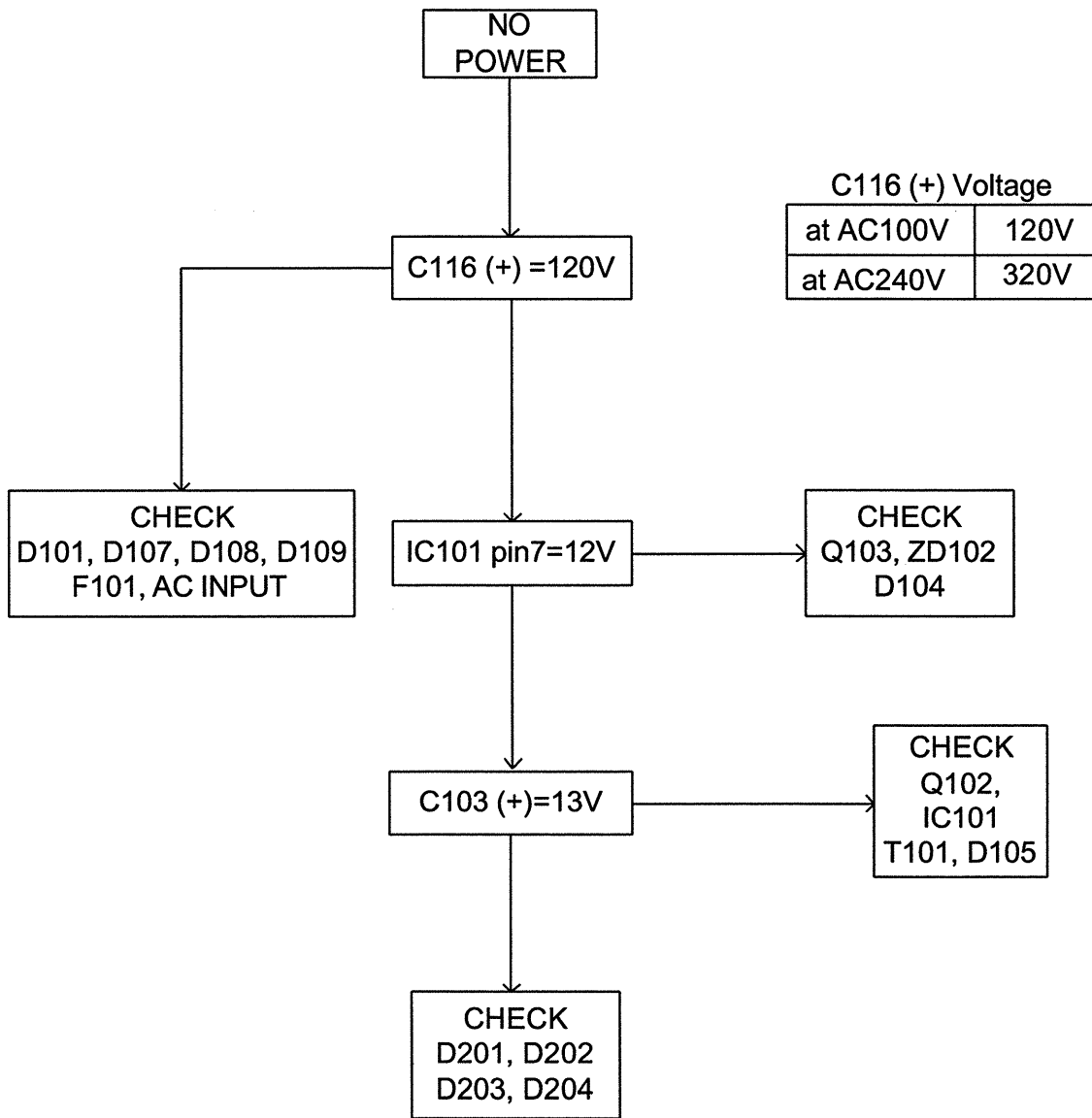
9300°K $x=0.281 \pm 0.020$, $y=0.311 \pm 0.020$

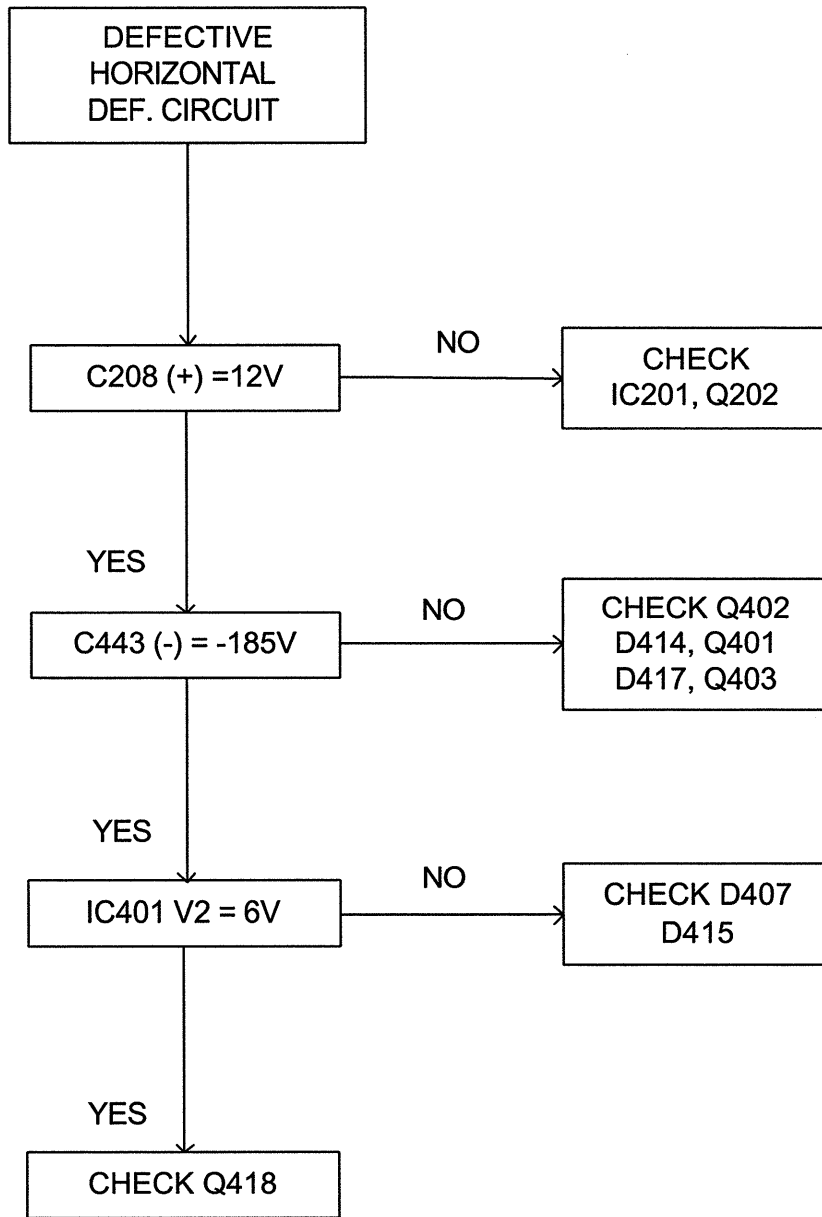
6500°K $x=0.313 \pm 0.020$, $y=0.329 \pm 0.020$

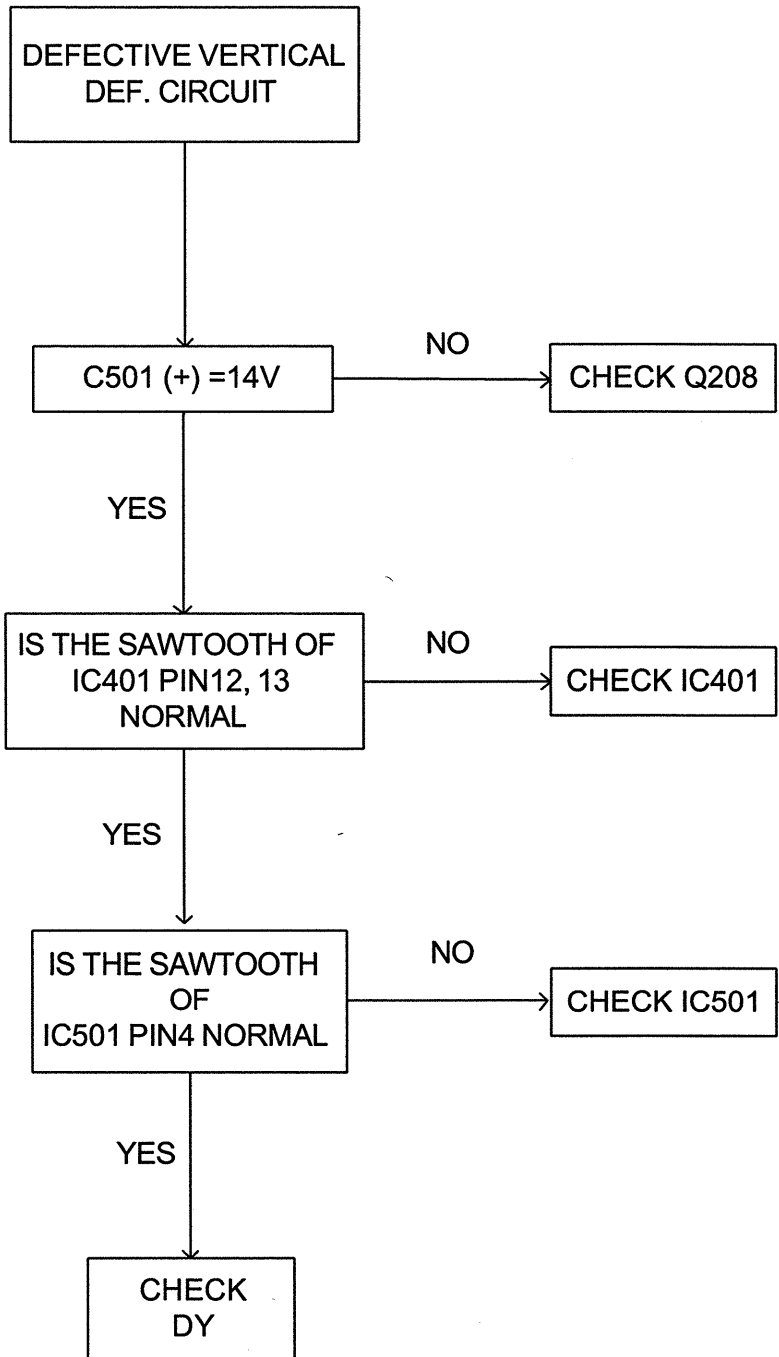
- 7. TURN OFF SPOT TEST
 - 7.1 APPLY MODE 1~8, SIGNAL A.
 - 7.2 SET CONTRAST AND BRIGHTNESS TO MAXIMUM
 - 7.3 TURN OF THE MONITOR, SPOT ON SCREEN CAN NOT BE VIEWED.

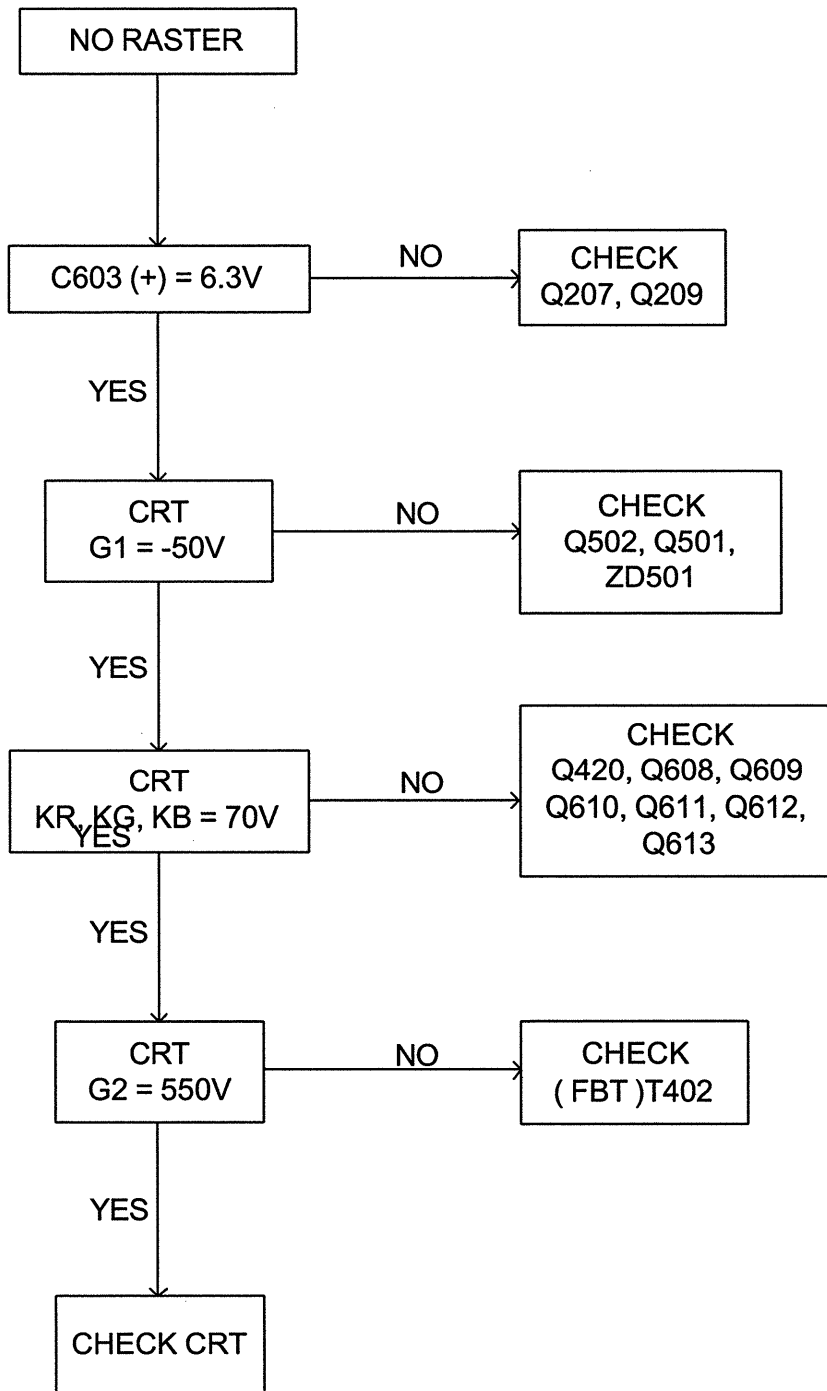
6. Trouble shooting flow chart

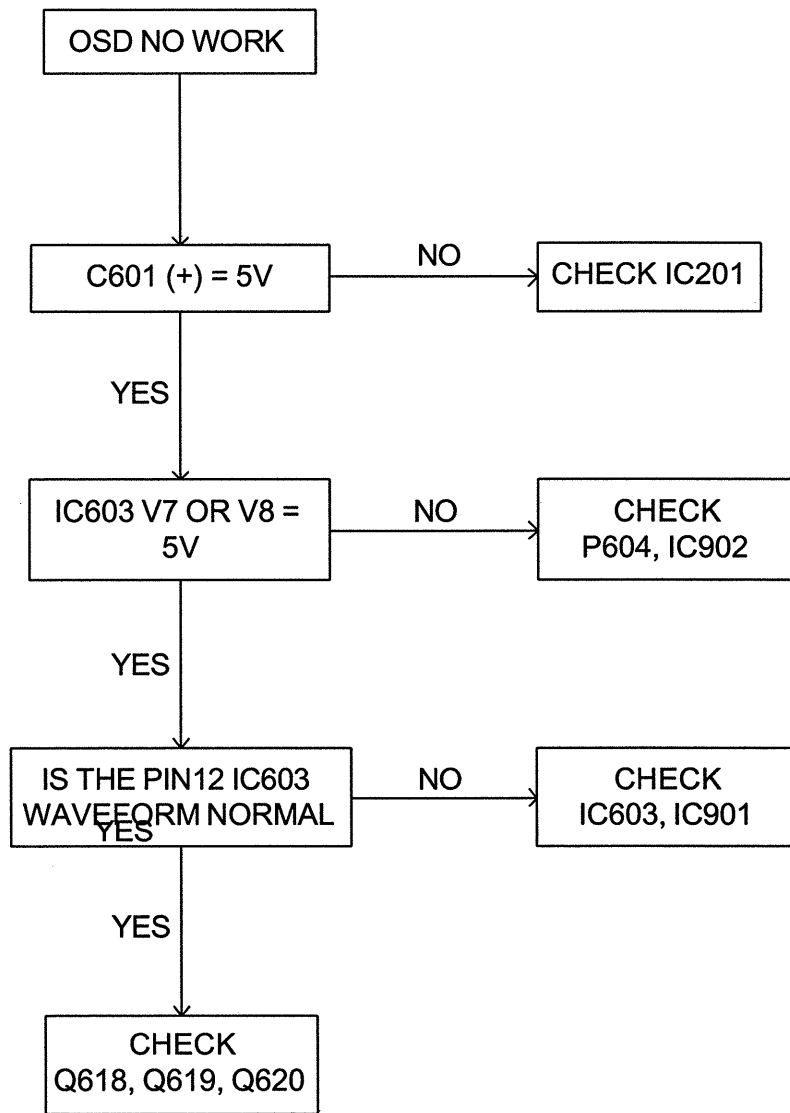
- a. NO POWER
- b. DEFECTIVE HORIZONTAL DEFLECTION
- c. DEFECTIVE VERTICAL DEFLECTION
- d. NO RASTER
- e. OSD DEFECTIVE
- f. ONE COLOR MISSING

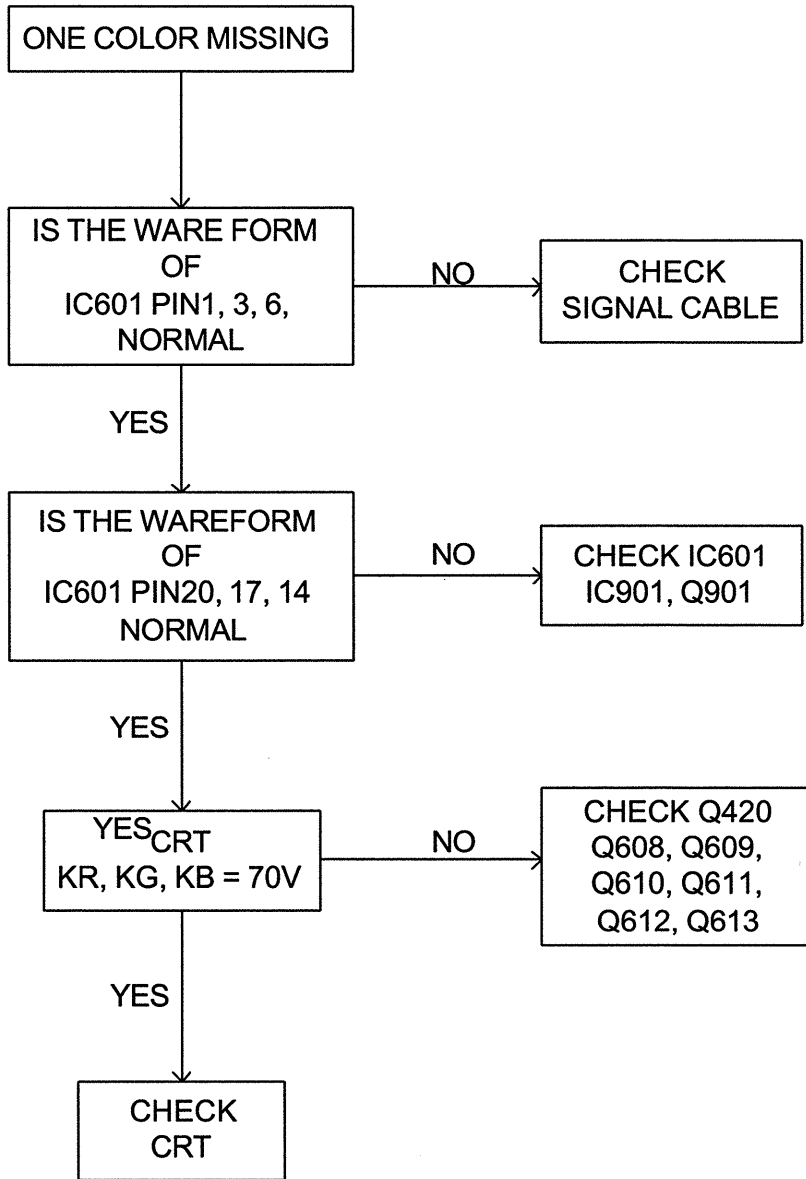










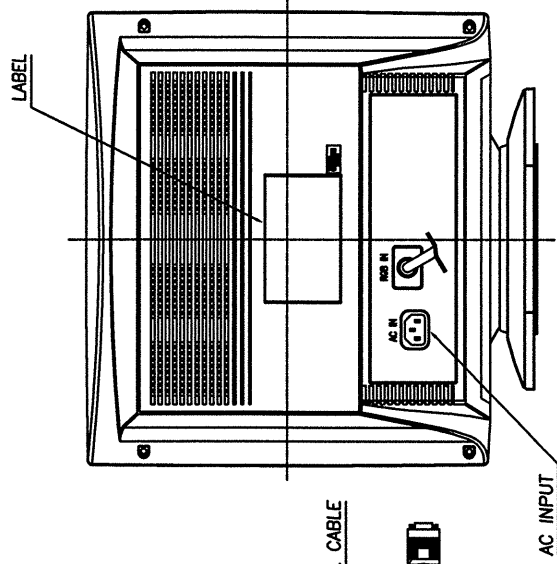
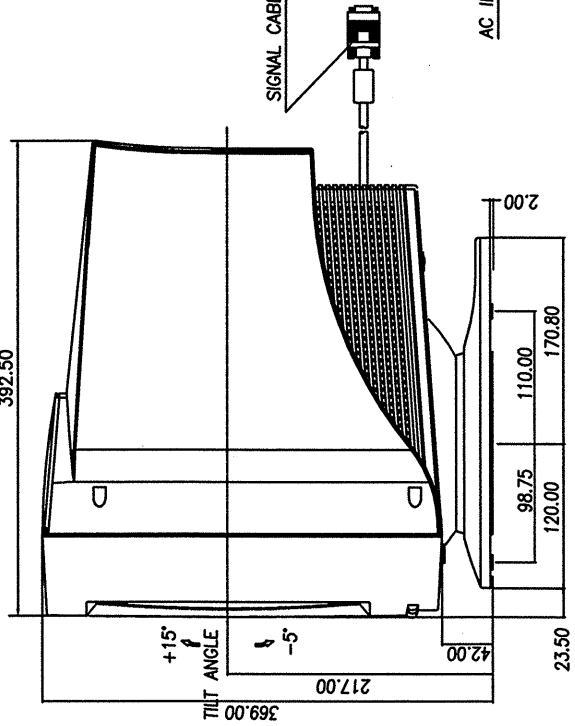
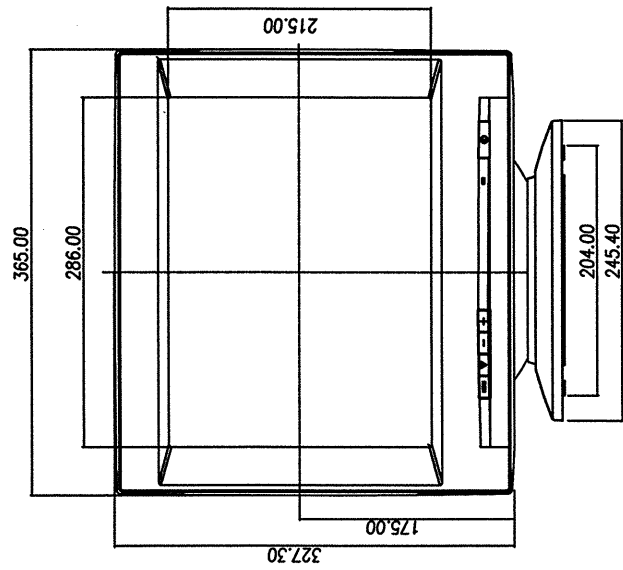
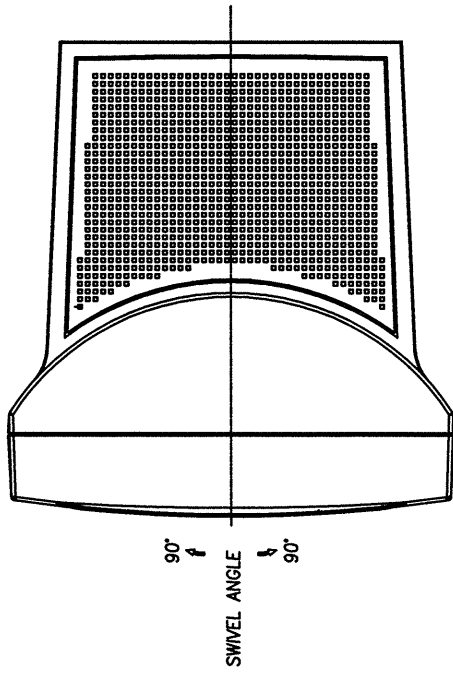


7. Mechanical assembly

- Outline drawing
- Explode drawing
- FBT assembly drawing
- Swivel base packing location drawing
- Packing assembly

a. Dimensions

Mechanical assembly



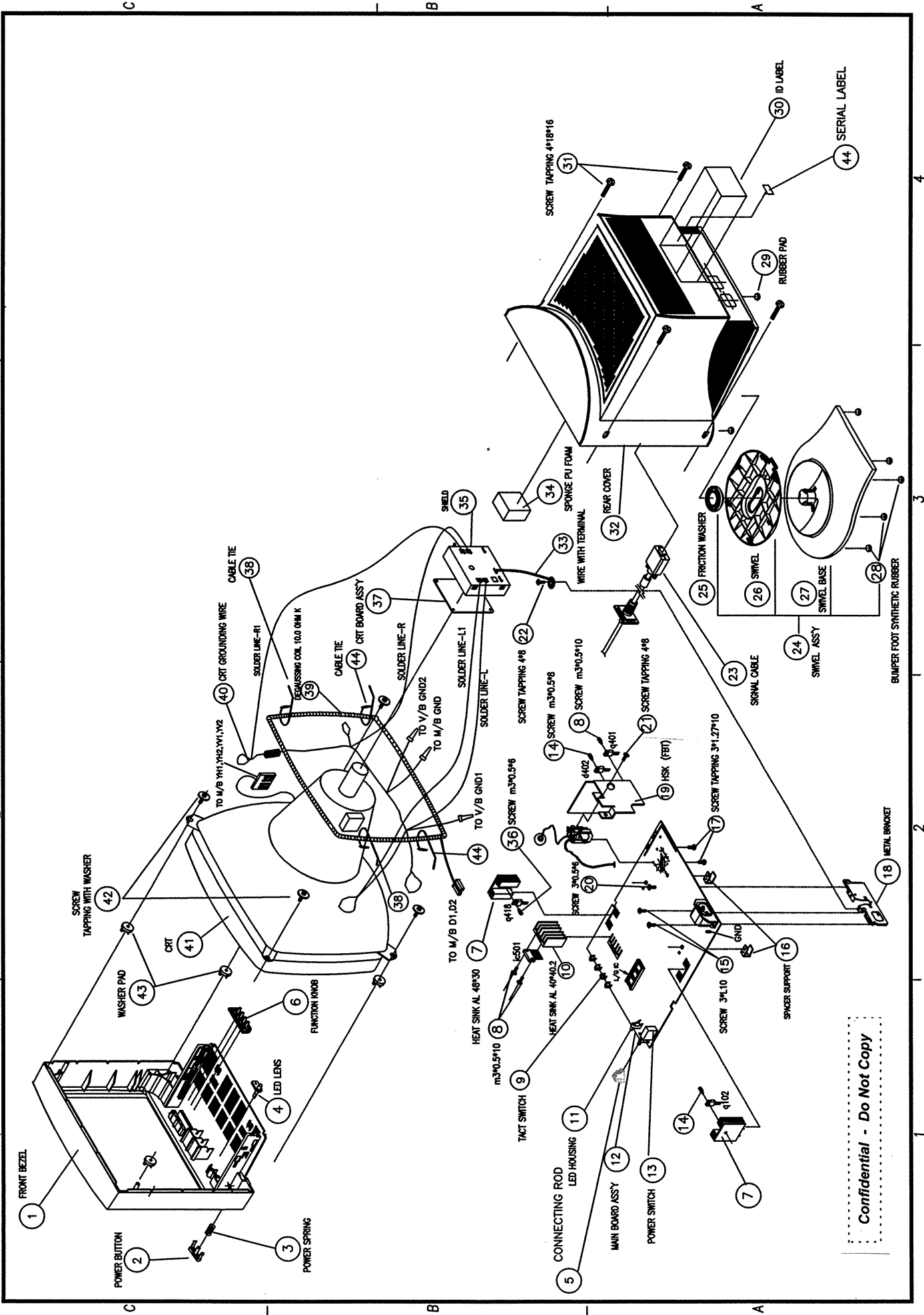
NOTES:
1. COLOR : VIEWSONIC COLOR Y0-487

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E651 SERVICE MANUAL

Mechanical assembly

b. Explode Drawing



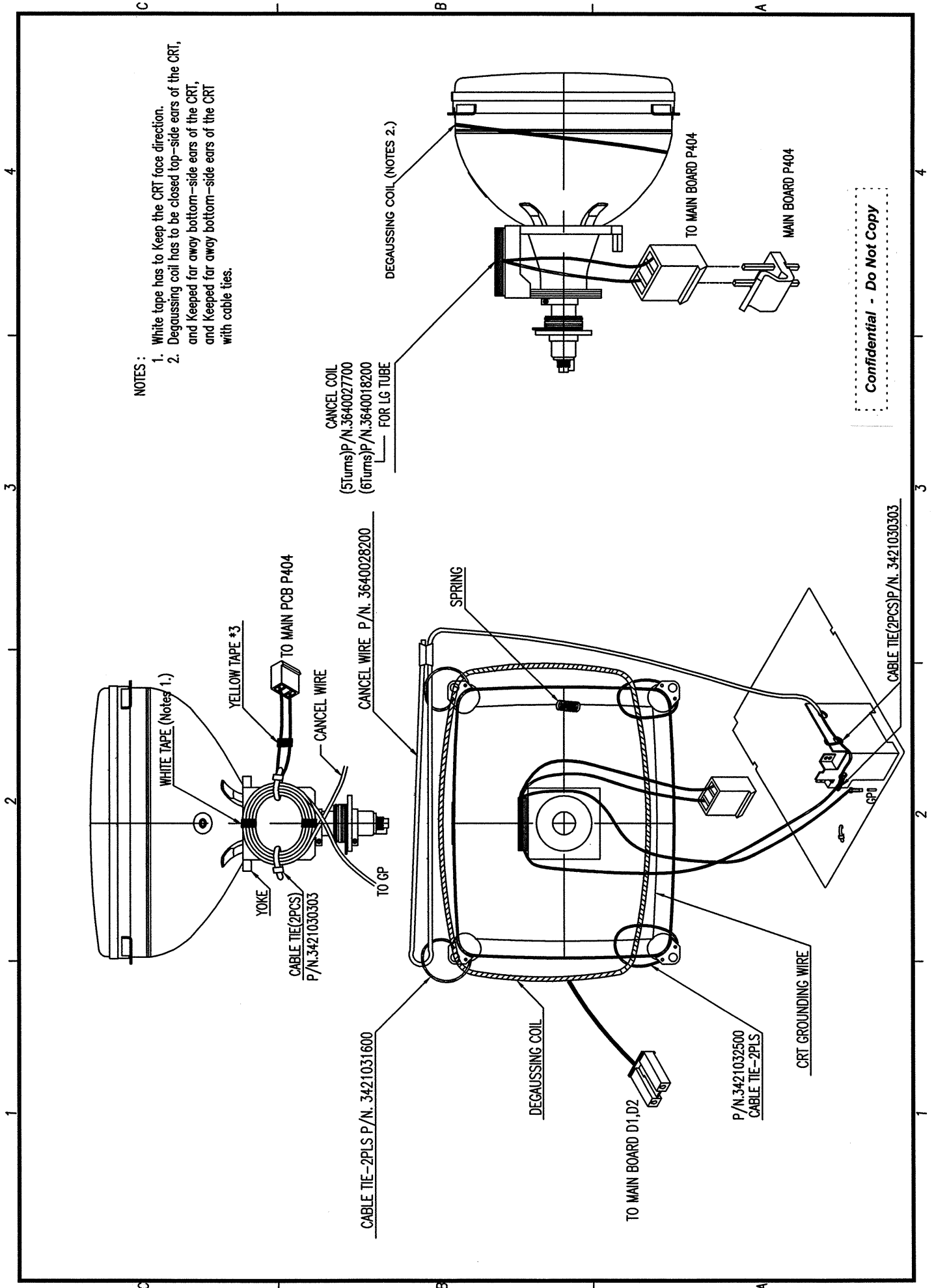
Confidential - Do Not Copy

31	SCREW TAPPING 4x8x16	3109020201
32	REAR COVER (E651-3)	3368025501
33	WIRE WITH TERMINAL	3640300101
34	SPONGE PU FORM	3240499000
35	SHEILD CAN	3421144400
36	SCREW	3100300600
37	CRT BOARD ASS'Y	5600080040
38	CABLE TIE	3421032300
39	DEGAUSSING COIL	2840002503
40	CRT GOURAND WIRE	3640014600
41	CRT	0741503007
42	SCREW TAPPING WITH WASHER	3109030201
43	WASHER PAD	3240032100
44	CABLE TIE	3421032300
45	SERIAL LABEL	3200361100

Mechanical Parts List - E651-3

Item	Part Description	Part NO.
1	FRONT BEZEL (E651-3)	3361007900
2	POWER BUTTON	3360072900
3	POWER SPRING	3421103700
4	LED LENS	3360053700
5	CONNECTING ROD	3360073500
6	FUNCTION KEY	3360702500
7	HEAT SINK	3341600100
8	SCREW M3x0.5x8MM	3100301000
9	TACTILE SWITCH	3000091800
10	HEAT SINK 40x20	3341207600
11	LED HOUSING	3360053201
12	MAIN BOARD ASS'Y	5600080039
13	POWER SWITCH	3000065526
14	SCREW 3x0.5x8	3100300800
15	SCREW 3x0.5x10	3109010300
16	SPACER SUPPORT	3421047903
17	SCREW TAPPING	3109010300
18	METAL BRACKET	3421238703
19	HSK (FBT)	3340023103
20	SCREW 3x0.5x6	3200120300
21	SCREW TAPPING	3109020400
22	SCREW TAPPING 4x8	3109020201
23	SIGNAL CABLE	3080302300
24	SWIVEL ASS'Y	3368030800
25	FRICTION WASHER	3360091500
26	SWIVEL	3360032000
27	SWIVEL BASE	3360043700
28	BUMPER FOOT SYNTHETIC RUBBER	3240497300
29	RUBBER PAD	3240496300
30	ID LABEL (E651-3)	3201085900

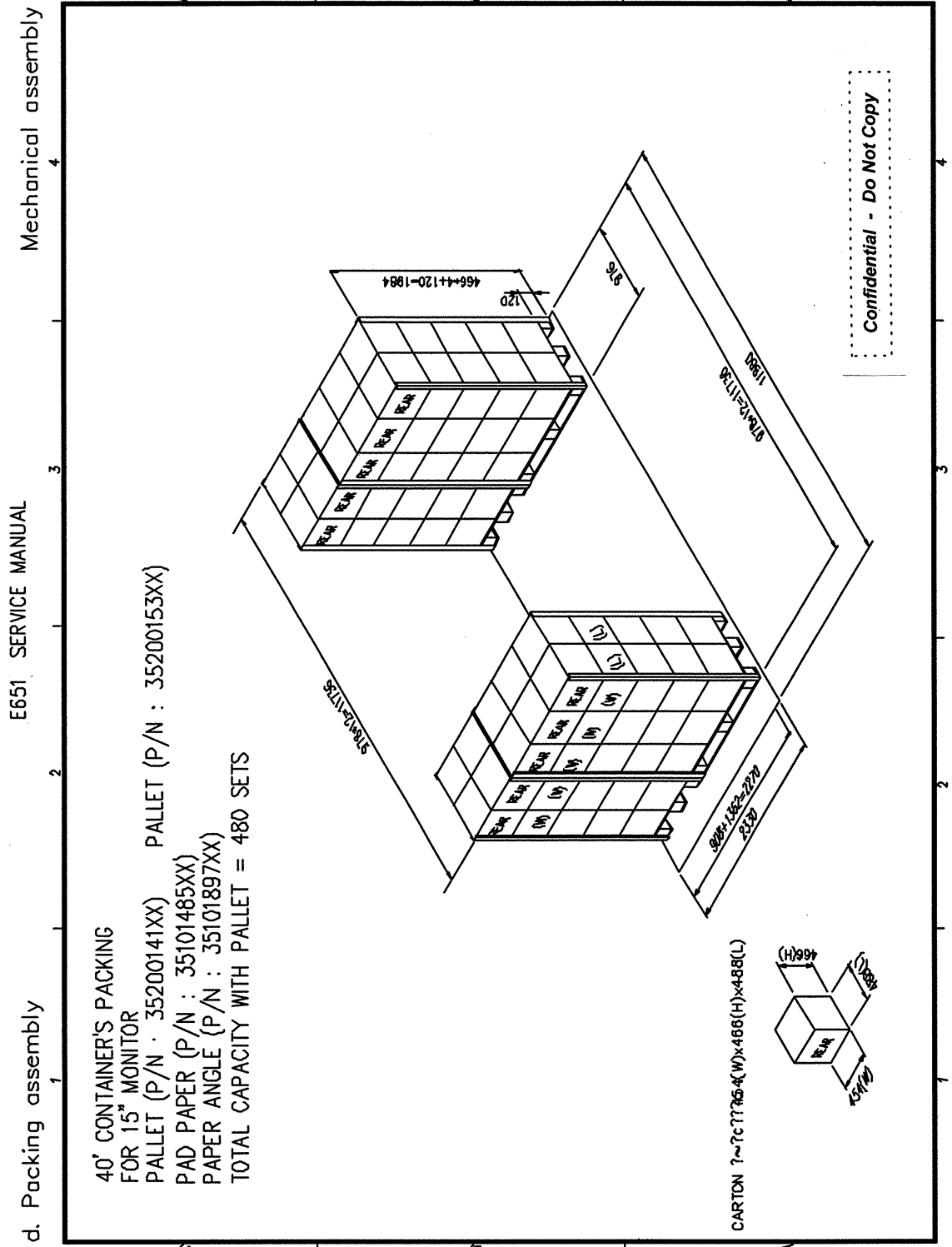
c. CRT assembly drawing



NOTES :

1. White tape has to Keep the CRT face direction.
2. Degaussing coil has to be closed top-side ears of the CRT, and Kepted far away bottom-side ears of the CRT, and Kepted far away bottom-side ears of the CRT with cable ties.

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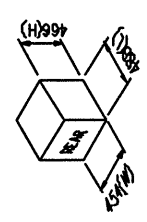
d. Packing assembly

E651 SERVICE MANUAL

Mechanical assembly

40' CONTAINER'S PACKING
 FOR 15" MONITOR
 PALLET (P/N : 35200141XX) PALLET (P/N : 35200153XX)
 PAD PAPER (P/N : 35101485XX)
 PAPER ANGLE (P/N : 35101897XX)
 TOTAL CAPACITY WITH PALLET = 480 SETS

CARTON 7~7c11765-4(W)x466(H)x488(L)



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E651 SERVICE MANUAL

Mechanical assembly

e. SCREW TORQUE LIST				
ASSEMBLY PARTS	SCREW DESCRIPTION	SCREW PART NO.	TORQUE (Kgf.CM)	REMARK
BEZEL + CRT	TAPPING SCREW Ø5*16*27	31090302XX	19~23	
BEZEL+COVER	TAPPING SCREW Ø4*18*16	31090202XX	8~10	
FBT + HS402	TAPPING SCREW Ø4*18*8	31090204XX	4~6	
FBT + MB	TAPPING SCREW Ø3*1.27*10	31090110XX	4~6	
HS401+Q418	MACHINE SCREW M3*0.5*6	31003006XX	3~5	
HS402+D402	MACHINE SCREW M3*0.5*8	31003008XX	3~5	
HS101+Q102				
AC BKT+MB	TAPPING SCREW Ø3*0.5*6	31090114XX	10~15	
HS501+IC501	TAPPING SCREW M3*0.5*10	31003010XX	3~5	
HS402+Q401	TAPPING SCREW M3*0.5*10	31090301XX	3~5	
AC BKT	TAPPING SCREW M4*0.7*8	31090207XX	8~10	
MB+X101	TAPPING SCREW Ø3*0.5*10	31090103XX	10~15	

E651

E651-3 SPARE PARTS LIST

RECOMMET SPARE PARTS LIST			
LOCATION	REFERENCE	DESCRIPTION	BOM S/N
C116	HP32G151MRY	CAP AL 400V 150U M 25*30	4.....1410033704
C116	SMG400VNSN150M25B	CAP AL 400V 150U M 25*30	4.....1410033707
C204	KMF100VB100M12.5*2	*CAP AL LD 100V 100U M 12.5*20	4.....1433021307
C409	KMF200VB47M12.5*25	CAP LD AL 47U 200V M 12.5*25	4.....1403027507
D101	1N5406	DIO SI 3A 600V D201	4.....2050031623
D107	1N5406	DIO SI 3A 600V D201	4.....2050031623
D202	UF4003 TAPING	DIO FRD 1A 200V D41	4.....2010271201
D203	UF20-01	DIO FRD 2A 100V D15	4.....2010351023
D204	BYM26C	DIO FRD 2.3A 600V	4.....2010391601
D205	UF20-03	DIO FRD 2A 300V D15	4.....2010351723
D401	RG4A-LFL1	DIO SI 3A 600V KI20	4.....X205000015
D402	5TUZ47C	DIO FRD 5A 1500V T220	4.....2011112115
F101	5HTP3.15	FUSE TSC 3.15A UL SEM PIG	4.....0805340601
IC101	UC3842AN	IC PWM 8PIN	4.....2510004003
IC101	UC3842BN	IC PWM 8PIN	4.....2510004210
IC201	L7812CV	IC REGU 12V 1.5A T220 3PIN	4.....2500007005
IC202	TL431CLP	IC VOL ADJ T92 2% 3PIN	4.....2500004001
IC202	LM431ACZ	IC VOL ADJ T92 2% 3PIN	4.....2500004002
IC202	TL431C	IC VOL ADJ T92 2% 3PIN	4.....2500004003
IC202	HA17431VP	IC VOL ADJ 1% T92 3PIN	4.....2500004215
IC401	TDA4858	IC AUTOSYNC DEFL CTRL 32P	4.....2510077047
IC501	TDA4866	IC VERT DEFLECTION 9PIN	4.....2530015016
IC601	MM1375XD	IC VIDEO AMP 22PIN	4.....2530077031
IC603	MTV016N-11	IC OSD 16PIN	4.....2530067034
IC901	WT6016-J-DD556AAA	IC MICRO PROCESSOR 40PIN	4.....2530091044
IC902	24LC04B/P	IC CMOS 4K EEPROM 8PIN	4.....2610184037
IC902	M24C04-BN6	IC CMOS 4K EEPROM 8PIN	4.....2610184242

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E651-3 SPARE PARTS LIST

RECOMMET SPARE PARTS LIST				
LOCATION	REFERENCE	DESCRIPTION	PART NO.	BOM S/N
L405		CHOKE CD 6.1mH K	4.....2816322100	204
PTC101	DGC3R9ROM27C	PTC R=100&9OHM+-20%10A110V	4.....0900150118	146
Q102	2SK2545	FET 600V 6A T220F	4.....2430095006	186
Q207	2SA715C	TR -35V -2.5A T126	4.....2130001001	1030
Q208	2SB562CTZ	TR 20V 1A T92 120-240	4.....2110003001	1025
Q401	BU2708AF	TR 825V 8A T3PF 3-7.3	4.....2120140013	182
Q402	2SC3332T	TR 180V 0.7A T92 200-400	4.....2100044110	1011
Q403	FS12KM-5	FET 250V 12A TO-220FN	4.....2430121033	187
Q403	FS12UM-5	FET 250V 12A TO220	4.....2430121133	188
Q404	KTC3198-GR	TR 50V .15A T92 PP	4.....2100055043	1014
Q406	2SA673CTZ	TR 35V 0.5A T92 100-200	4.....2100005001	1010
Q413	KTC3198-GR	TR 50V .15A T92 PP	4.....2100055043	1017
Q414	KTC3198-GR	TR 50V .15A T92 PP	4.....2100055043	1023
Q418	TIP122	TR 100V 5A T220	4.....2120067007	179
Q419	YTAF630	FET 200V 8.5A T220	4.....2430044006	184
Q419	IRFS630A	FET 200V 9A T220F	4.....2430044215	185
Q502	KTC3198-GR	TR 50V .15A T92 PP	4.....2100055043	1021
Q604	PH2369	TR 15V 0.5A T92	4.....2100063013	1644
Q607	KSC3953-D	TR 120V 0.2A T126	4.....2120096038	1659
Q608	KTA1024-Y	TR -150V -50mA T92L	4.....2110034143	1651
Q609	KTC3206-Y	TR 150V 50mA T92L	4.....2100056043	1639
Q610	KTA1024-Y	TR -150V -50mA T92L	4.....2110034143	1652
Q611	KTC3206-Y	TR 150V 50mA T92L	4.....2100056043	1640
Q612	KTA1024-Y	TR -150V -50mA T92L	4.....2110034143	1653
Q613	KTC3206-Y	TR 150V 50mA T92L	4.....2100056043	1641
Q620	PH2369	TR 15V 0.5A T92	4.....2100063013	1650
Q901	KTC3198-GR	TR 50V .15A T92 PP	4.....2100055043	1022

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E651-3 SPARE PARTS LIST

RECOMMET SPARE PARTS LIST				
LOCATION	REFERENCE	DESCRIPTION	PART NO.	BOM S/N
RL401	OUDE-SS-112D	RELAY 240VAC/12VDC 5A SPDT	4.....0720140001	142
T101	SMT-35RV-838A	X'FMR SMT 330uH J	4.....2801415000	199
T401	DT-E19-05	X'FMR DT 50mH K	4.....2802901100	200
VR402	VZ067TL1B203	RES VR HORI 20K T	4.....0606212004	139
VR403	VZ067TL1B102	RES VR HORI 1K T	4.....0606201004	136
VR404	VZ067TL1B501	RES VR HORI 500 T	4.....0606209004	138
X601	03305500-44	SOCKET FOR CRT	4.....3020005200	1747
X601		CRT SOCKET DA-1565FK	4.....3020005901	1748
Y901	ZTA8.0MT	RESONATOR 8.0MHZ +-5%	4.....0732120026	144
ZD101	HZ18-2 TA	DIO ZEN .5W 17.5-18.3V D35	4.....2030120316	909
ZD102	HZ36-3 TA	DIO ZEN .5W 36.4-38V D35	4.....2030120616	910
ZD401	HZ5C1 TA	DIO ZEN .5W 4.9-5.1V D35	4.....2030120816	911
ZD501	BZX79-B8V2	DIO ZEN .5W 8.04-8.36V D35	4.....2030122009	912
ZD502	HZ3B2TA	DIO ZEN .5W 2.9-3.1V D35	4.....2030122216	913
ZD601	HZ5C1 TA	DIO ZEN .5W 4.9-5.1V D35	4.....2030120816	1580
ZD602	HZ7B3 TAPING	* DIO ZEN .5W 7~7.3V D35	4.....2030121801	1582
ZD602	HZ7B3 TA	DIO ZEN .5W 7-7.3V D35	4.....2030121816	1583

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