Diamond View Monitor

1786FD2

Service Guide

July 2002

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Diamond View 1786FD2

Manual Contents

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0. Introduction :

The subject model is designed for a value line 17” color monitor. It has the following figures :

- 0.25mm dot pitch CRT, 135MHz video bandwidth, 1280x1024 max. resolution.
- Low radiation TCO99 standard.
- ISO 14000 certificated green design. (Refer Table 5)

1. Electrical Characteristics

1.1 POWER SUPPLY	Condition	Spec	OK	N.A	Remark
Voltage	Universal input full range	90~264VAC /47~63Hz	√		
Input Current	90 ~ 264VAC	2.0 Arms	√		
Power consumption	On	≤ 100 W max	√		LED : Green
DPMS	Standby	≤ 5 W	√		LED : Amber
	Suspend	≤ 5 W	√		LED : Amber
	Off	≤ 5 W	√		LED : Amber
Inrush Current	110 VAC/50Hz	40 Amp peak	√		cold-start
Leakage Current	264 VAC/50Hz	< 3.5mA	√		
Hi-Pot	1. 1500VAC, 1 sec 2. Ground test : 30A, 1sec	w/o damage < 0.1 ohm	√		(in-line test) (in-lab test)
Power cord	Length : 1800 mm	Color : Flint Gray	√		KC-003
1.2SIGNALINTERFACE	**Condition**	**Spec**	**OK**	**N.A**	**Remark**
Pin assignment		5V on Pin 9	√		
Video input	Level / Impedance	700mV / 75 Ohm	√		
Sync input		TTL-Positive/Negative	√		0.7 μs<H-sync width<25% of H period 2 μs<V-sync width< 400 μs
	Impedance	50 Ohm on H-sync cable	√		
Signal Cable	D-Sub	1.5M +/- 20mm	√		
	BNC			√	
	Color	Flint Gray	√		
1.3 SCAN RANGE		**Spec**	**OK**	**N.A**	**Remark**
Horizontal		31 ~ 86 KHz	√		
Vertical		50~ 120 Hz	√		

1.4VIDEO PERFORMANCE	**Condition**	**Spec**	**OK**	**N.A**	**Remark**
Dot Rate		135 MHz	√		
Max. Resolution		1280 x 1024	√		
Rise time/Fall time		5.5 ns	√		
Video Ringing		5% max	√		
Sag		5% max	√		
Bandwidth -3db		135 MHz	√		
DDC Version		DDC1/2B	√		see table 1
EDID		Ver 2 ,Rev 1, Ver 3	√		
1.5 TIMINGS	Preset mode No. : 6	User mode No. : 10			
Preset	**Resolution**	**Fh (KHz) / Fv (Hz)**	**OK**	**N.A**	**Remark**
VGA400	640x400	31.47KHz/70Hz	√		
VGA480	640x480	31.47KHz/59.94Hz	√		
6448A	640X480	37.5KHz/75Hz		√	
6448B	640X480	43.269KHz/85Hz		√	
SVGA4	800x600	46.88KHz/75Hz		√	
SVGA3	800x600	48.09KHz/72.01Hz		√	
SVGA5	800x600	53.67KHz/85Hz	√		
Apple 16”	832x624	49.71KHz/74.533Hz		√	
UVGA2	1024x768	56.476KHz/70.069Hz		√	
UVGA7	1024x768	60.023KHz/75.029Hz	√		
Super MAC 19	1024x768	60.24KHz/75Hz		√	
UVGA8	1024x768	68.68KHz/85Hz	√		
VESA-XGA	1280x1024	63.981KHz/60.020Hz		√	
WS7	1280x1024	79.98KHz/75Hz	√		
WS8	1280x1024	91.15KHz/85Hz		√	
VESA1600	1600x1200	93.75KHz/75Hz		√	

2.Environment & Reliability

	Condition	Spec	OK	N.A	Remark
Operation Temp./Humidity		+5 ~ +40°C/ 20~90% R.H.	√		Non-condensing
Non- Operation Temp./Humi.		-20~ +60°C/ 10~90% R.H.	√		Non-condensing
Altitude	Operating condition	0~3048m (10,000ft)	√		Without packing
	Non-operating condition	0~12,192m (40,000ft)	√		With packing
Vibration 1)Sine Wave Vibration	Package, Non-Operating	5 ~ 26.6Hz /0.6g 26.6 ~ 50Hz /0.016” 50~500Hz/ 2.0g (104 Minutes/Axis for x, y, z)	√		
2)Random Vibration	Package, Non-Operating	5 ~ 100Hz, 0 dB/Oct. 0.015g^2/Hz 100 ~ 200Hz, -6 dB/Oct., ----- 200Hz, ------ , 0.0038g^2/Hz	√		
	Non-package, Non-Operating	20Hz~2000/ 0.0185g^2/Hz	√		
Drop (With packing)	Package, Non-Operating	19.4kg - 61cm Height 1 corner, 3 edges, 6 faces.	√		
Electrostatic Discharge	IEC801-2 standard	Contact:8KV, Air:15KV	√		0.5~8KV tip table no blanking
Acoustical Noise		≤ 40 dB/A	√		
Power Line Transient	IEC801-4,IEC1000-4-4	Coupling clamp 0 ~ 4KV	√		
	IEC1000-4-5 (Surge)	Common:2KV,Differential:1KV	√		
	IEC1000-4-12 (100KHz ringwave)	Common:3KV,Differential:1KV		√	
MTBF Demonstration	90% confidence level	≥ 60,000 Hrs	√		Excluding the CRT
MTBF Prediction	MIL-217F	≥ 40,000 Hrs	√		Excluding the CRT
CRT Life	78% degradation	> 10000 Hrs	√		

3.CRT Characteristics

		Spec	OK	N.A	Remark
CRT Vender		SAMSUNG	√		
Technology		FST	√		
Coating		Anti-reflection/Anti-static	√		
Dot pitch		0.25mm	√		
Phosphor		P22	√		
Light transmittance		52.6%	√		
Viewable size		16”	√		
Deflection angle		90 deg	√		
Blemishes and scratches		1 trio missing, as approval sheet	√		see table 2

4.Front of Screen

4.1 GEOMETRY			OK	N.A	Remark
Magnetic Environment	Northern Hemisphere	H = 0 ± 0.05 V = +0.45 ± 0.05	√		
	Southern Hemisphere	H = 0 ± 0.05 V = -0.45 ± 0.05	√		
	Equatorial	H = 0 ± 0.05 V = 0 ± 0.05	√		
Size	Hor.	310 ± 4 mm	√		
	Ver.	230 ± 4 mm	√		
Centering	Hor. & Ver.	|A-B|,|C-D|< 4 mm	√		See table 4
Geometric Distortion	Top/Bottom / Side Pincushion	≤ 2 mm	√		See table 5 for TCO99
	Top/Bottom / Side Barreling	≤ 2 mm	√		“
	Hor./Ver. Trapezoid	≤ 2 mm	√		
	Tilt	≤ 1.2 mm	√		
	Orthogonal	≤ 2 mm	√		
	S-curve	≤ 0.5 mm within 40mm	√		
Linearity	Hor. & Ver.	≤ 5 %	√		(Xmax-Xmin)/(Xmax+Xmin)*100

4.2SHARPNESS CRISPNESS			**OK**	**N.A**	**Remark**
Focus	Reverse character(white background and black characters)	"e,w,m" at cut-off and 1024 x 768 resolution	√		The distance of watch is 30cm from eyes to screen
Mis-convergence		Center ≤ 0.15 mm A ≤ 0.25mm ,B≤ 0.35mm	√		
Moire	Over 25Ft-L	no visible moire	√		
Swing		not permitted	√		"
Jitter		≤ 2mm	√		"
4.3 LIGHT QUALITY	**Condition**	**Spec**	**OK**	**N.A**	**Remark**
White Balance	Full white center (Brit. cut-off & Cont. max.)	x = 0.283 ± 0.010 y = 0.297 ± 0.010	√		@ UVGA8 1024x768 68.68KHz/85Hz
Purity W,R,G,B	X max-X min & Y max-Y min	< 0.015	√		"
Color Tracking	Brightness cut off	x, y (nominal) ± 0.015	√		"
Max Brightness with ABL	Full white pattern	28Ft-L min.(Cut-off)	√		"
Max Brightness no ABL	3" Block	40Ft-L min.(Cut-off)	√		"
Brightness Uniformity	Full white pattern	≥ 70% (center to corner)	√		"
Raster light O/P	Bright max./Cont. min.	0.5 ~ 1.5Ft-L	√		"
Contrast ratio	Max/Min	5:1	√		"
4.4 IMAGE STABILITY			**OK**	**N.A**	**Remark**
H/V regulation		≤ 1 mm per side at cut-off	√		
Flicker		No flicker	√		
Ringing	Video at center	No visible DY Hor. Video ringing	√		

5. User Controls

5.1 BASIC	Function	Spec	OK	N.A	Remark
	Power Switch		√		
	Contrast		√		
	Brightness		√		
	H Size		√		
	H Position		√		
	V Size		√		
	V Position		√		
	Barrel/Pincushion		√		
	Parallelogram		√		
	Trapezoid		√		
	I-Key			√	
5.2 ADVANCED	**Function**	**Spec**	**OK**	**N.A**	**Remark**
	OSD position		√		See Table 3
	Color Gain		√		
	Corner		√		
	Pin-balance		√		
	Tilt		√		
	Color Temp. C1, C2	9300K, 6500K	√		
	Manual Degauss		√		
	Recall		√		
	Languages	5 languages	√		
	Mis-convergence adj.			√	
	Moire adj.		√		
	D-sub/BNC switch			√	

6. Mechanical Characteristics

6.1 DIMENSION		**Spec**	**OK**	**N.A**	**Remark**
Bezel opening		324.8 x 243.5 mm	√		
Monitor w/o Stand	L x W x H mm	417.5x406x371 mm	√		
Monitor w Stand	L x W x H mm	417.5x406x422 mm	√		
Carton Box (outside)	L x W x H mm	575x540x470 mm	√		
Tilt and Swivel range		Tilt : -4/+12 degree Swivel:- 45/ +45 degrees	√		
6.2 WEIGHT		**Spec**	**OK**	**N.A**	**Remark**
Monitor (Net)		16.4 Kg	√		
Monitor w packaging(Gross)		19.4 Kg	√		
6.3 PLASTIC		**Spec**	**OK**	**N.A**	**Remark**
Flammability		UL 94-V0	√		
Heat deflection To	ABS PC + ABS	65 ℃ 70 ℃	√		
UV stability	ABS PC + ABS	Delta E< 5 after 300Hr Xted test Delta E< 1.5 after 300Hr Xted test	√		MPR2 Model TCO Model
Resin		MPR2 : ABS TCO : PC + ABS	√		
Texture		RE-6625	√		
Color		Light Gray	√		
6.4 CARTON		**Spec**	**OK**	**N.A**	**Remark**
Color		Kraft	√		
Material		A B Flute	√		
Compression strength		530 KGF	√		
Burst Strength		23 KGF/cm2	√		
Stacked quantity		5 Layers	√		

7. Pallet & Shipment

7.1 Dimension

Transport Type		Pallet A	Pallet B	Pallet C
Shipping Pallet Dimension(mm)	Length	1150	X	X
	Width	1080	X	X
	Height	120	X	X
Air Transport Pallet Dimension(mm)	Length	1150	1725	X
	Width	1080	1080	X
	Height	120	120	X

7.2 Shipping Container

Stowing Type		Quantity of products (sets) (Every container)	Quantity of Products (sets) (Every Pallet)	Quantity of pallet (sets) (Every Container)
With pallet	20'	160	Pallet A: 16	Pallet A: 10
			Pallet B: X	Pallet B: X
	40'	352	Pallet A: 16	Pallet A: 22
			Pallet B: X	Pallet B: X
Without pallet	20'	160	X	X
			X	X
	40'	440	X	X
			X	X

7.3 Air Transport Container

Container Type	Quantity of products (sets) (Every container)	Quantity of Products (sets) (Every Pallet)	Quantity of pallet (sets) (Every Container)
Container 3048 * 2286 * 2438	80	Pallet A: 16	Pallet A: 2
		Pallet B: 24	Pallet B: 2

8. Certification

	Condition	Spec	OK	N.A	Remark
Environment	Green design	API Doc. 715-C49	√		ISO14000 Requirement
	Blue Angel	German Standard		√	
	E-2000	Switzerland		√	
	NUTEK	Swedish Standard	√		
	EPA	USA Standard	√		
	EN61000-3-2 Harmonics		√		
	TCO92/95			√	
	TCO99		√		
PC-Monitor	Microsoft Windows	PC98/99	√		
	DPMS	VESA	√		
	DDC 1/2B	Version 3.0	√		
	USB	External		√	
Safety	UL (USA)	UL 1950 3rd edition	√		
	CSA (Canada)	C22.2 No. 950-M95	√		
	DNSF	EN60950	√		
	IEC950	+A1+A2+A3+A4	√		
	EN60950	+A1+A2+A3+A4	√		
	73/23/EEC		√		

	CB (Nordics)		√		
	TUV/GS	EN60950	√		
	CCEE (China)		√		
	EIAJ/JEIDA (Japan)			√	
	NOM (Mexico)			√	
	IAA (Korea)			√	
EMC	CE Mark	89/336/EEC	√		
	FCC (USA)	Class B	√		
	EN55022	Class B	√		
	CISPR 22	Class B	√		
	VCCI (Japan)	Class B	√		
	BSMI (Taiwan)		√		
	C-Tick (Australia)	AS3548	√		
	RRL (Korean)			√	
X- Ray Requirement	DHHS (21 CFR)	USA X- Ray Standard	√		
	DNHW			√	
	PTB	German X- Ray standard	√		
	MPRII(EN50279)		√		
	MPRIII		√		
Ergonomics	2 PfG 1041/1299	German ergonomic	√		
	ISO 9241-3 -7 & 8		√		

9. Appendix Table

Table 1 - DDC Table

Address	Data	Description
00	00	
01	FF	
02	FF	
03	FF	Header
04	FF	
05	FF	
06	FF	
07	00	
08	06	ID Manufacturer Name = API
09	09	
0A	05	ID Product Code = G781
0B	98	(Vender Assigned code)
0C	*	ID Serial Number
0D	*	32 bits serial no.
0E	*	(use 0 if n/a)
0F	*	
10	*	Week of Manufacture (0-53),use 0 if n/a
11	*	Year of Manufacture (year - 1990)
12	01	EDID version
13	03	Revision
14	08	Video Input Define
15	1F	Max. H. Image Size (cm)
16	17	Max. V. Image Size (cm)
17	*	(gamma*100) - 100
18	EA	DPMS
19	*	Red Green Bits Rx1Rx0Ry1Ry0Gx1Gx0Gy1Gy0
1A	*	Blue White Bits Bx1Bx0By1By0Wx1Wx0Wy1Wy0
1B	*	Red x bit9-2
1C	*	Red y bit9-2
1D	*	Green x bit9-2
1E	*	Green y bits9-2
1F	*	Blue x bit9-2
20	*	Blue y bit9-2

21	*	White x bit9-2
22	*	White y bit9-2

Address	Data	Description
23	AF	Established Timing I
24	CF	Established Timing II
25	00	Established Timing III
26	45	Standard Timing Identification
27	59	#1 800x600 @85Hz
28	61	#2 1024x768 @85Hz
29	59	
2A	01	#3
2B	01	
2C	01	#4
2D	01	
2E	01	#5
2F	01	
30	01	#6
31	01	
32	01	#7
33	01	
34	01	#8
35	01	
36	EA	Detailed Timing Description # 1
37	24	
38	00	Pixel clock = 94.5Mhz
39	60	Hor. Display = 1024 pixels
3A	41	Hor. Blanking = 352 pixels
3B	00	Hor. Front porch = 48 pixels
3C	28	Hor. Back porck = 208 pixels
3D	30	Hor. Sync pulse = 96 pixels
3E	30	Hor. Border = 0 pixels
3F	60	Hor. Size = 310 mm
40	13	Ver. Display = 768 lines
41	00	Ver. Blanking = 40 lines
42	36	Ver. Front porch = 1 lines
43	E6	Ver. Back porch = 36 lines
44	10	Ver. Sync pulse = 3 lines
45	00	Ver. Border = 0 lines
46	00	Ver. Size = 230 mm

47	00	

Address	Data	Description
48	00	
49	00	
4A	00	
4B	FC	Monitor name=Acer G781
4C	00	
4D	41	A
4E	63	c
4F	65	e
50	72	r
51	20	
52	47	G
53	37	7
54	38	8
55	31	1
56	0A	
57	20	
58	20	
59	20	
5A	00	SN 00001
5B	00	
5C	00	
5D	FF	
5E	00	
5F	30	
60	30	
61	30	
62	30	
63	31	
64	0A	
65	20	
66	20	
67	20	
68	20	
69	20	
6A	20	
6B	20	

Address	Data	Description
6C	00	
6D	00	Range limit
6E	00	V.Freq range 50-120Hz
6F	FD	H.Freq range 30-86KHz
70	00	Max pix clock 150 MHz
71	32	
72	78	
73	1E	
74	56	
75	0F	
76	00	
77	0A	
78	20	
79	20	
7A	20	
7B	20	
7C	20	
7D	20	
7E	00	Extension Flag
7F	*	Check sum

Samsung TCO99 Tube

17	**BE**	(gamma*100) – 100
18	*****	DPMS
19	**03**	Red Green Bits Rx1Rx0Ry1Ry0Gx1Gx0Gy1Gy0
1A	**94**	Blue White Bits Bx1Bx0By1By0Wx1Wx0Wy1Wy0
1B	**A5**	Red x bit9-2
1C	**52**	Red y bit9-2
1D	**46**	Green x bit9-2
1E	**97**	Green y bits9-2
1F	**24**	Blue x bit9-2
20	**10**	Blue y bit9-2
21	**48**	White x bit9-2
22	**4C**	White y bit9-2

Samsung MPRII Tube

17	**BE**	(gamma*100) – 100
18	*****	DPMS
19	**03**	Red Green Bits Rx1Rx0Ry1Ry0Gx1Gx0Gy1Gy0
1A	**9E**	Blue White Bits Bx1Bx0By1By0Wx1Wx0Wy1Wy0
1B	**A5**	Red x bit9-2
1C	**52**	Red y bit9-2
1D	**46**	Green x bit9-2
1E	**97**	Green y bits9-2
1F	**24**	Blue x bit9-2
20	**10**	Blue y bit9-2
21	**47**	White x bit9-2
22	**4F**	White y bit9-2

Philips MPRII Tube

17	**A7**	(gamma*100) – 100
18	*****	DPMS
19	**94**	Red Green Bits Rx1Rx0Ry1Ry0Gx1Gx0Gy1Gy0
1A	**AE**	Blue White Bits Bx1Bx0By1By0Wx1Wx0Wy1Wy0
1B	**9E**	Red x bit9-2
1C	**58**	Red y bit9-2
1D	**4A**	Green x bit9-2
1E	**9C**	Green y bits9-2
1F	**27**	Blue x bit9-2
20	**10**	Blue y bit9-2
21	**47**	White x bit9-2
22	**4F**	White y bit9-2

Philips TCO99 Tube

17	**A7**	(gamma*100) – 100
18	*****	DPMS
19	**94**	Red Green Bits Rx1Rx0Ry1Ry0Gx1Gx0Gy1Gy0
1A	**A4**	Blue White Bits Bx1Bx0By1By0Wx1Wx0Wy1Wy0
1B	**9E**	Red x bit9-2
1C	**58**	Red y bit9-2
1D	**4A**	Green x bit9-2
1E	**9C**	Green y bits9-2
1F	**27**	Blue x bit9-2
20	**10**	Blue y bit9-2
21	**48**	White x bit9-2
22	**4C**	White y bit9-2

ChungHwa MPRII Tube

17	**C3**	(gamma*100) – 100
18	*****	DPMS
19	**EB**	Red Green Bits Rx1Rx0Ry1Ry0Gx1Gx0Gy1Gy0
1A	**2E**	Blue White Bits Bx1Bx0By1By0Wx1Wx0Wy1Wy0
1B	**A2**	Red x bit9-2
1C	**55**	Red y bit9-2
1D	**47**	Green x bit9-2
1E	**99**	Green y bits9-2
1F	**25**	Blue x bit9-2
20	**0F**	Blue y bit9-2
21	**47**	White x bit9-2
22	**4F**	White y bit9-2

Note 1

Bit	Bit Description
7	Analog / Digital Signal Level
6	Signal Level Standard (6)
5	Signal Level Standard (5)
4	Setup
3	Sync Inputs Supported (3)
2	Sync Inputs Supported (2)
1	Sync Inputs Supported (1)
0	Sync Inputs Supported (0)

<table>
<tr><td>Bit</td><td colspan="2">Description</td></tr>
<tr><td>7</td><td colspan="2">Analog / Digital Input : Defines usage of the rest if the byte as "analog input" or digital input". Analog=0, Digital=1 .
If input is described as analog, the following definitions apply to bits 6-0.</td></tr>
<tr><td>6:5</td><td colspan="2">Signal Level Standard (6:5) : Refer to the following bit definitions. Identified by the level of reference white volts above blank, followed by the level of the sync tips in volts below
blank.

<u>Bit 6</u> <u>Bit 5</u> <u>Operation</u>
0 0 0.700V/0.300V (1.000V p-p)
0 1 0.714V/0.286V (1.000V p-p)
1 0 1.000V/0.400V (1.400V p-p)
1 1 Reserved; TBD</td></tr>
<tr><td>4</td><td colspan="2">Setup: If set, the display is set to expect a blank-to-black setup or pedestal per the appropriate signal level standard.</td></tr>
<tr><td>3:0</td><td colspan="2">Sync Inputs (See Bit Operation below)</td></tr>
<tr><td></td><td>3</td><td>Separate Sync</td></tr>
<tr><td></td><td>2</td><td>Composite Sync (on H Sync line)</td></tr>
<tr><td></td><td>1</td><td>Sync on Green Video</td></tr>
<tr><td></td><td>0</td><td>Serration of the V.Sync Pulse is required when composite sync or sync-on-
green video is used</td></tr>
</table>

Note 2

Bit 7	Stand-by
Bit 6	Suspend
Bit 5	Active off
Bit 4:3	Display Type
	0,0 - Monochrome/gray scale display 0,1 - RGB color display 1,0 - Non-RGB multicolor display (example:RGY) 1,1 - Undefined.
Bit 2:0	Reserved. Set at 00h until defined.

Note 3

CRT Vender	Red (x/y)	Green (x/y)	Blue (x/y)	Gamma
SAMSUNG	0.645/0.321	0.274/0.593	0.143/0.064	2.9

Note 4

Byte 1	bit	Established Timings 1	Source
	7	640*400 @ 70Hz (720x400)	(VGA, IBM)
	6	720*400 @ 88Hz	(XGA2, IBM)
	5	640*480 @ 60Hz	(VGA, IBM)
	4	640*480 @ 67Hz	(Mac II, Apple)
	3	640*480 @ 72Hz	(VESA)
	2	640*480 @ 75Hz	(VESA)
	1	800*600 @ 56Hz	(VESA)
	0	800*600 @ 60Hz	(VESA)
Byte 2	bit	Established Timings II	
	7	800*600 @ 72Hz	(VESA)
	6	800*600 @ 75Hz	(VESA)
	5	832*624 @ 75Hz	(Mac II, Apple)
	4	1024*768 @ 87Hz (interlaced)	(IBM)
	3	1024*768 @ 60Hz	(VESA)
	2	1024*768 @ 70Hz	(VESA)
	1	1024*768 @ 75HZ	(VESA)
	0	1280*1024 @ 75HZ	(VESA)
Byte 3	bit	Manufacturer's Timings	Manufacturer's Specified Timing
	7	1152*870 @ 75Hz	(Mac II, Apple)
	6	640*480 @ 85HZ	
	5	800*600 @ 85HZ	
	4	1024*768 @ 85HZ	
	3	1280*1024 @ 85HZ	
	2	1600*1200 @ 75HZ	
	1	1600*1200 @ 85HZ	
	0	Flag	If set = 1,then bits 6 - 1 (inclusive) should be interpreted as Manufacture Timings as EDID Ver 1 Rev 0.

Table 2 - CRT Blemish & Scratch Spec

The following criteria is applied to high-contrast blemishes.

Blemishes			Allowable No. of Blemishes			Allowable Minimum Separation	
			Zone A	Zone B	Total (Zones A & B)	Zone A	Zone B
A	1 trio		1	1	2	---	---
B	(1)		0	0	0	---	---
C	(2)		0	2	2	---	20
	(3)		1	2	2	---	20
D	1 dot	Green	3	4	6	50	20
		Red	5	6			
		Blue	5	6			

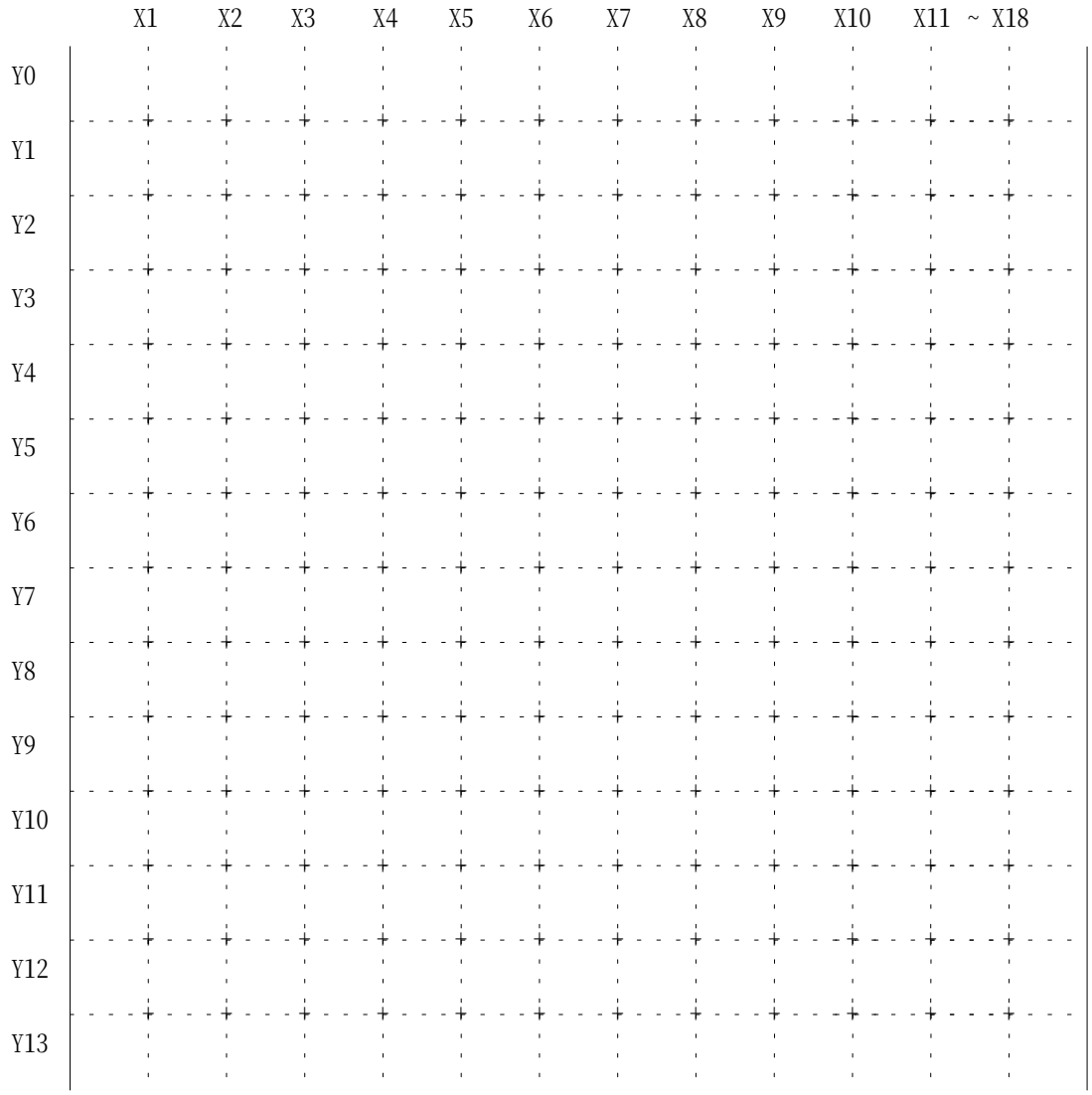
(1) 3 or more consecutive same color phosphor dots.
(2) 2 consecutive same color phosphor dots.
(3) 2 consecutive different color phosphor dots.

Table 3 - OSD Menu

Please refer to Release 001-C01

Table 4 - Geometry Fig.

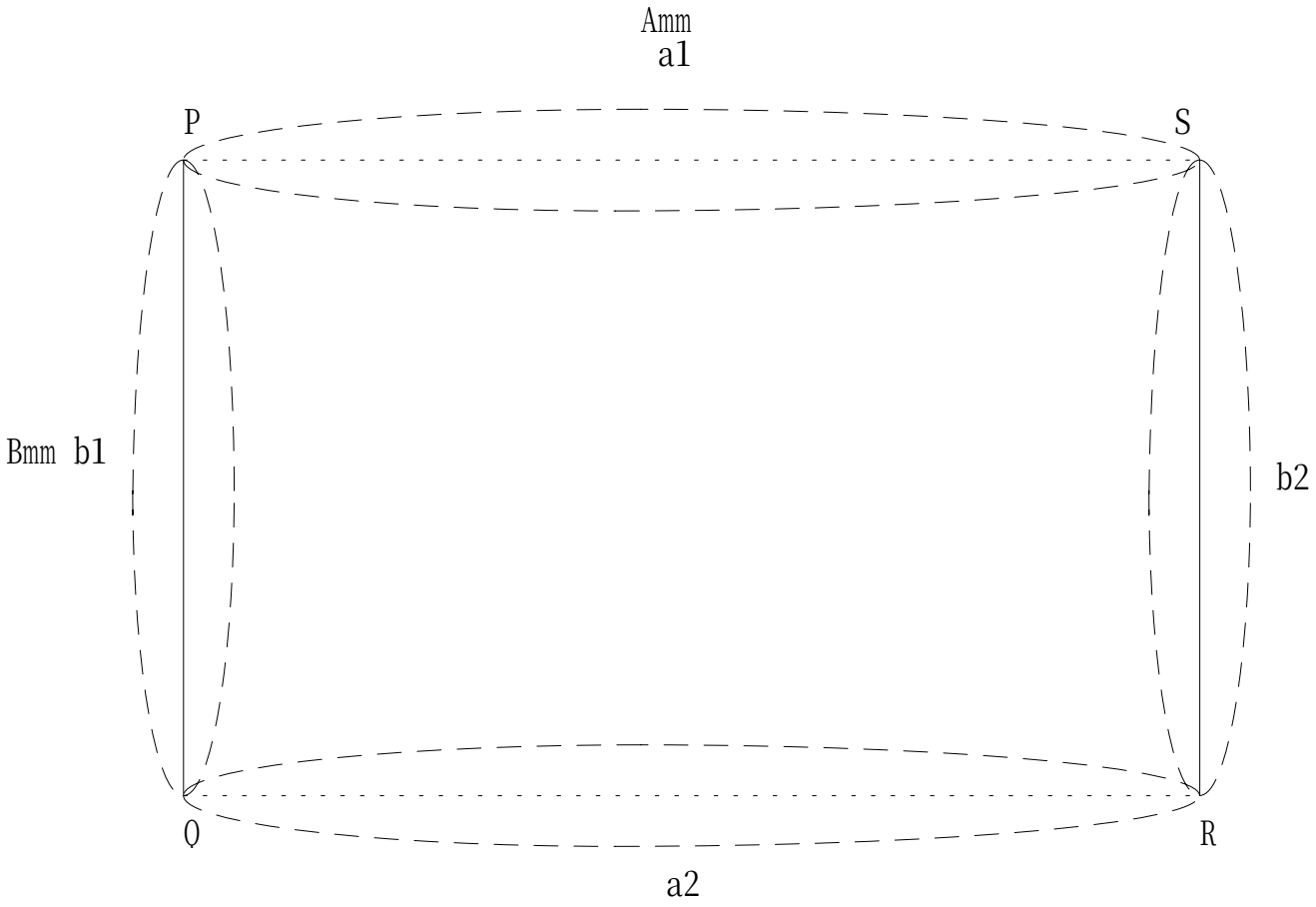
Fig.1 Linearity Measurements



$$\frac{Xmax - Xmin}{Xmax + Xmin} \times 100\% <= 5\%$$

$$\frac{Ymax - Ymin}{Ymax + Ymin} \times 100\% < = 5\%$$

Fig.2 General Pincushion Measurements



A, B represented as display area width and height

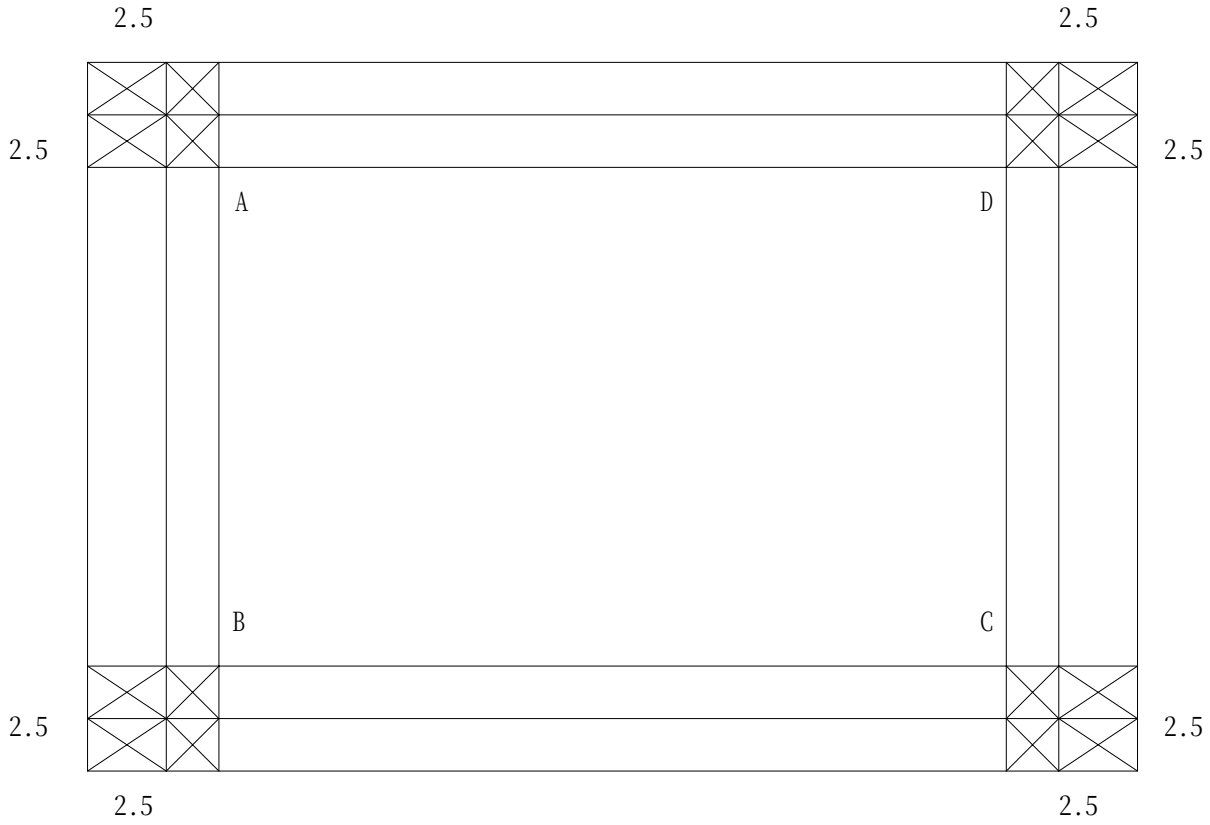
Top/Bottom Pincushion = (a1 or a2)

Side Pincushion = (b1 or b2)

Substituted A by (PS + QR)/2

B by (PQ + RS)/2

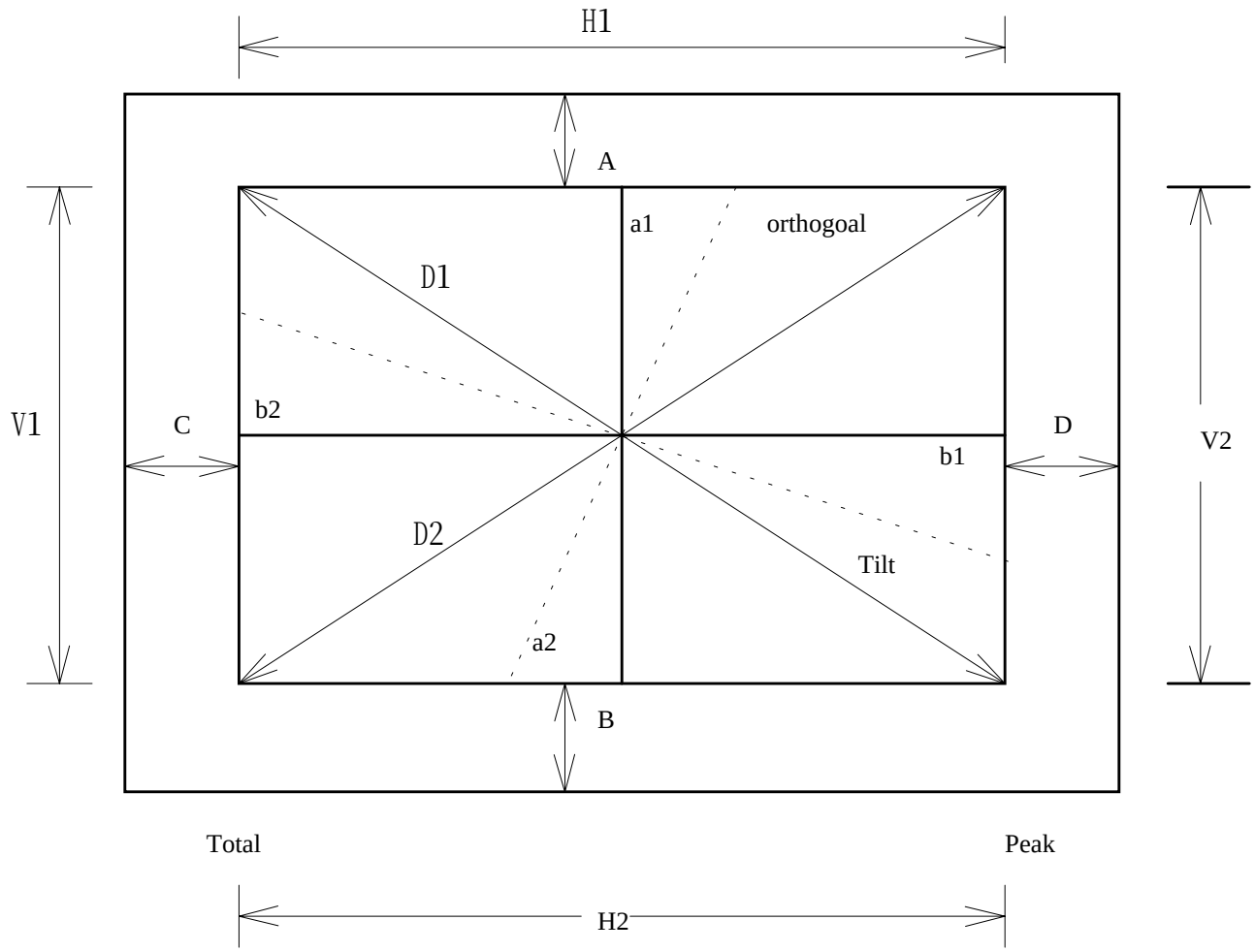
Fig.3 Trapezoid Measurements



* Each of the 4 corners of picture shall fall within the relevant area (F) illustrated up (hatched)

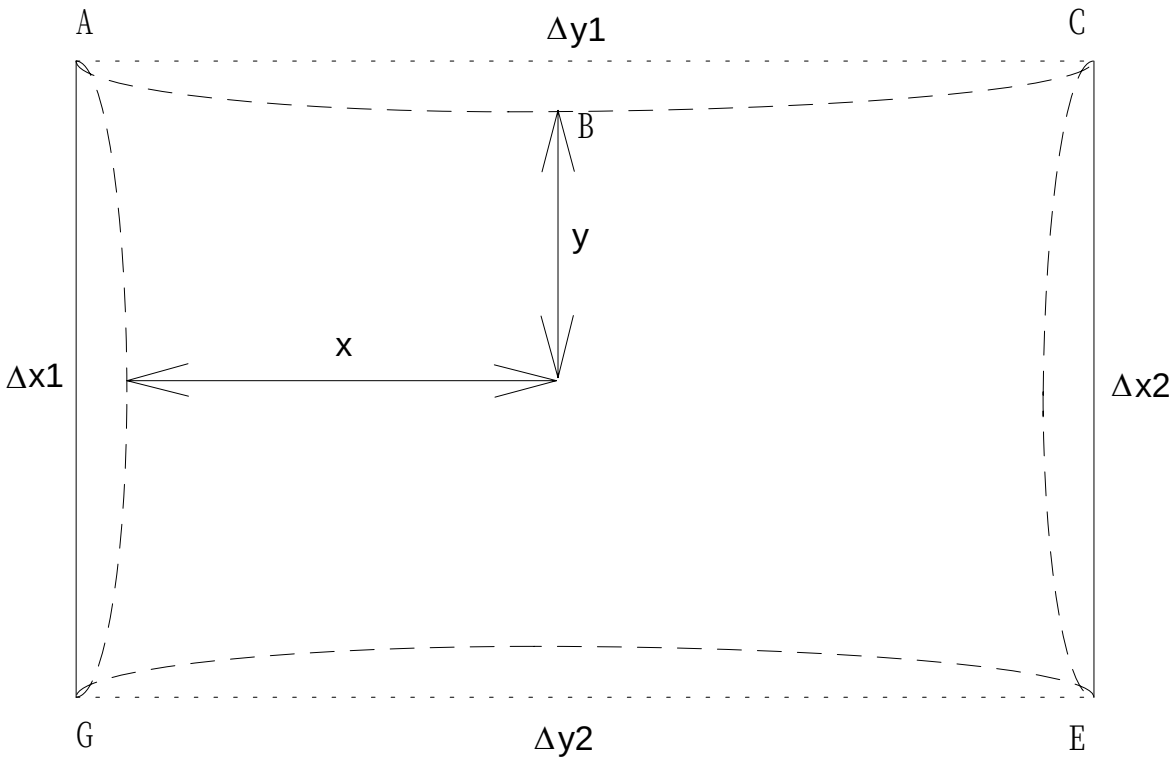
* ABCD is the picture outlines.

Fig.4 Picture Distortion & Phase Measurements



$$\frac{|H1-H2]}{0.5(H1+H2)} \le 0.02 \qquad \frac{|V1-V2]}{0.5(V1+V2)} \le 0.02 \qquad \frac{|D1-D2]}{0.5(D1+D2)} \le 0.03$$

Fig.5 TCO 99 Pincushion Measurements



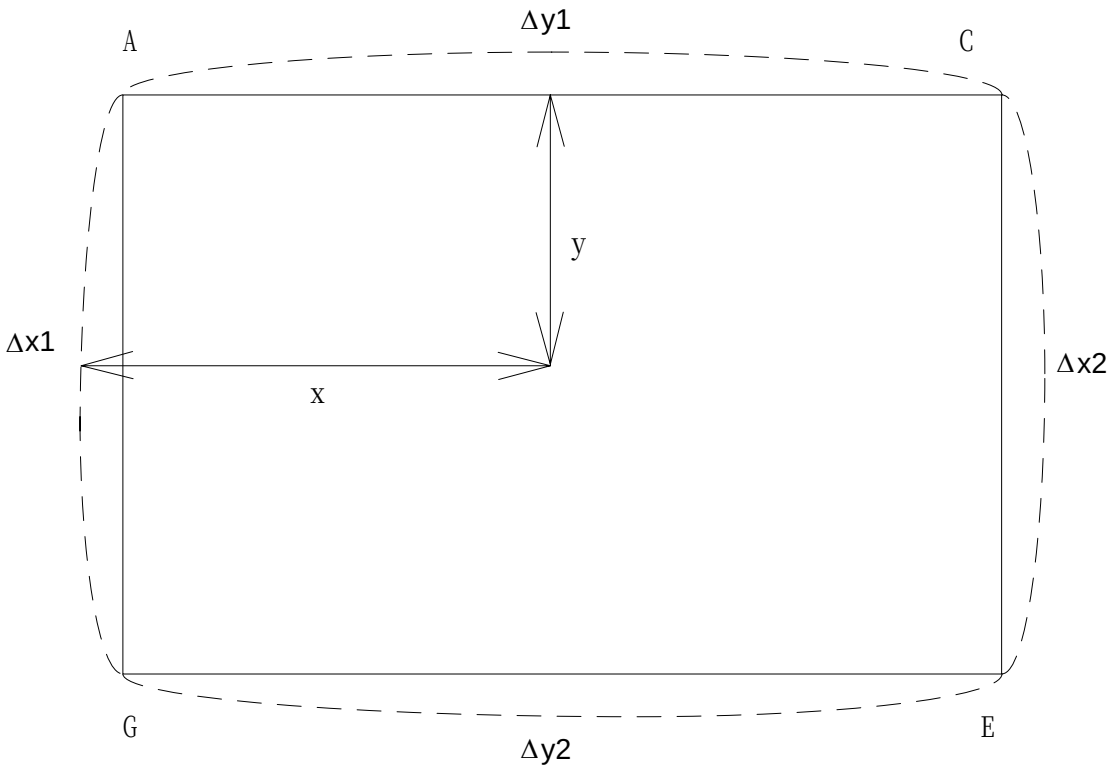
→ [AC+EG]/2, [AG+CE]/2 represented as display area width and height

→ Top/Bottom Pincushion = Δy1 or Δy2

→ Side Pincushion = Δx1 or Δx2

→ Linearity (TCO99) = Δx1/x or Δy1/y

Fig.6 TCO 99 Barreling Measurements



[AC+EG]/2, [AG+CE]/2 represented as display area width and height

Top/Bottom Pincushion = Δy1 or Δy2

Side Pincushion = Δx1 or Δx2

Linearity (TCO99) = Δx1/x or Δy1/y

Note 5

EDID test (W2K) 8/9/2000 8:34:46 AM

EDID test (W2K): Info retrieved from edidw2k.log by TSHELL

Pooltag Disabled

EDID Test Log file opened 08/09/00 - 08:34:38

EDID Dump follows:

********** CheckSum validation **********

PASS - Checksum valid - Proceeding with test

****

128 bytes EDID Data (Hex):

```
     0   1   2   3   4   5   6   7   8   9
  0: 00  FF  FF  FF  FF  FF  FF  00  06  09
 10: 05  98  00  00  0F  00  00  0A  01  03
 20: 08  1F  17  BE  EA  03  9E  A5  52  46
 30: 97  24  10  47  4F  AF  CF  00  45  59
 40: 61  59  01  01  01  01  01  01  01  01
 50: 01  01  01  01  EA  24  00  60  41  00
 60: 28  30  30  60  13  00  36  E6  10  00
 70: 00  00  00  00  00  FC  00  41  63  65
 80: 72  20  47  37  38  31  0A  20  20  20
 90: 00  00  00  FF  00  30  30  30  30  31
100: 0A  20  20  20  20  20  20  20  00  00
110: 00  FD  00  32  78  1E  56  0F  00  0A
120: 20  20  20  20  20  20  00  AA
```

Monitor Type: CRT

Connector Type: VGA

Testing 17 inch monitor

Decoded EDID data

<---Header--->

veHeader: 00 FF FF FF FF FF FF 00

<-x-Header-x->

<---Vendor/Product Identification--->

ID Manufacturer Name:

ID Product Code:

********** Product Code Validation **********

PASS - Product code valid.

****

ID Serial Number: 000F0000

Week of Manufacture: 0

Year of Manufacture: 2000

<-x-Vendor/Product Identification-x->

<---EDID Structure Version/Revision--->

EDID Version#: 1

EDID Revision#: 3

<-x-EDID Structure Version/Revision-x->

<---Basic Display Parameters/Features--->

Video i/p definition: Analog

Setup: Blank-to-Black not expected

Seperate Syncs. support: Yes

Composite Sync. support: No

Vsync. Pulse: serration not required

Max Horz Image Size: 31 cm.

Max Vert Image Size: 23 cm.

Display Gamma: 2.9

Display Type: RGB color display

Features, Preferred Timing Mode: No

Features, Preferred Timing Mode: In first detailed block

Features, GTF support: No

DPMS Features, Stand-by: Yes

DPMS Features, Suspend: Yes

DPMS Features, Active Off: Yes

********** DPMS Support Check **********

PASS - DPMS Suspend Supported

PASS - DPMS Active Off Supported

****

<-x-Basic Display Parameters/Features-x->

<---Color Characteristics--->

Red x: 0.644531

Red y: 0.320313

Green x: 0.273438

Green y: 0.592773

Blue x: 0.142578

Blue y: 6.34766e-002

White x: 0.280273

White y: 0.310547

<-x-Color Characteristics-x->

<---Established Timings--->

Established Timimgs 1: AF

- 720x400 @70Hz
- 640x480 @60Hz
- 640x480 @72Hz
- 640x480 @75Hz
- 800x600 @56Hz
- 800x600 @60Hz

Established Timimgs 2: CF

- 800x600 @72Hz
- 800x600 @75Hz
- 1024x768 @60Hz
- 1024x768 @70Hz
- 1024x768 @75Hz

- 1280x1024 @75Hz

********** Timing Support Check for 640x480 @75Hz **********

PASS - 640x480 @75Hz support established

****

********** Timing Support Check for 800x600 @75Hz **********

PASS - 800x600 @75Hz support established

****

********** Timing Support Check for 1024x768 @75Hz **********

PASS - 1024x768 @75Hz support established

****

Established Timings 3: 00

<-x-Established Timings-x->

<---Standard Timing Identification--->

Standard Timing: 800x600 @85Hz

Standard Timing: 1024x768 @85Hz

<-x-Standard Timing Identification-x->

<---Detailed Timing Descriptions--->

Detailed Timing: 1024x768 @84Hz

Detailed Timing: FC (Monitor name) 'Acer G781'

Detailed Timing: FF (Monitor SN) '00001'

Detailed Timing: FD (Monitor limits)

Vert: 50 - 120 Hz

Horz: 30 - 86 KHz

Clk: 150 MHz

<-x-Detailed Timing Descriptions-x->

Extension Flag: 00

Checksum: AA

********** EDID Test Report **********

Congratulations - This Monitor has Passed the EDID Test

****

End of EDID Test Log

EDID Test Log file closed 08/09/00 - 08:34:46

Note 6

EDID test (W2K) 8/9/00 8:34:46 AM

EDID test (W2K): Info retrieved from edidw2k.log by TSHELL

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20: 08  1F  17  BE  EA  03  9E  A5  52  46
30: 97  24  10  47  4F  AF  CF  00  45  59
40: 61  59  01  01  01  01  01  01  01  01
50: 01  01  01  01  EA  24  00  60  41  00
60: 28  30  30  60  13  00  36  E6  10  00
70: 00  00  00  00  00  FC  00  41  63  65
80: 72  20  47  37  38  31  0A  20  20  20
90: 00  00  00  FF  00  30  30  30  30  31
100: 0A  20  20  20  20  20  20  20  00  00
110: 00  FD  00  32  78  1E  56  0F  00  0A
```

120: 20 20 20 20 20 20 00 AA

Monitor Type: CRT

Connector Type: VGA

Testing 17 inch monitor

Decoded EDID data

<---Header--->

veHeader: 00 FF FF FF FF FF FF 00

<-x-Header-x->

<---Vendor/Product Identification--->

ID Manufacturer Name:

ID Product Code:

****************** Product Code Validation ******************

PASS - Product code valid.

****

ID Serial Number: 000F0000

Week of Manufacture: 0

Year of Manufacture: 2000

<-x-Vendor/Product Identification-x->

<---EDID Structure Version/Revision--->

EDID Version#: 1

EDID Revision#: 3

<-x-EDID Structure Version/Revision-x->

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Features, GTF support: No

DPMS Features, Stand-by: Yes

DPMS Features, Suspend: Yes

DPMS Features, Active Off: Yes

********** DPMS Support Check **********

PASS - DPMS Suspend Supported

PASS - DPMS Active Off Supported

****

<-x-Basic Display Parameters/Features-x->

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Blue y: 6.34766e-002

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- 640x480 @75Hz

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- 800x600 @60Hz

Established Timimgs 2: CF

- 800x600 @72Hz

- 800x600 @75Hz

- 1024x768 @60Hz

- 1024x768 @70Hz

- 1024x768 @75Hz

- 1280x1024 @75Hz

****

****

Established Timings 3: 00

<-x-Established Timings-x->

<---Standard Timing Identification--->

Standard Timing: 800x600 @85Hz

Standard Timing: 1024x768 @85Hz

<-x-Standard Timing Identification-x->

<---Detailed Timing Descriptions--->

Detailed Timing: 1024x768 @84Hz

Detailed Timing: FC (Monitor name) 'Acer G781'

Detailed Timing: FF (Monitor SN) '00001'

Detailed Timing: FD (Monitor limits)

Vert: 50 - 120 Hz

Horz: 30 - 86 KHz

Clk: 150 MHz

<-x-Detailed Timing Descriptions-x->

Extension Flag: 00

Checksum: AA

********** EDID Test Report **********

Congratulations - This Monitor has Passed the EDID Test

****

End of EDID Test Log

EDID Test Log file closed 08/09/00 - 08:34:46

Table 5 - TCO 99 Spec

A. Ecology

1 General Criteria

1.1 Manufacturing Processes

1.1.1 Ozone Depleting Substances:

*** PCB and any Process shall not use any ozone depleting substance**.

1.1.2 Chlorinated Solvent:

*** PCB and any Process shall not use any Chlorinated Solvent substance**.

1.2 Environmental Hazards

1.2.1 Mercury and Cadmium in Electronic Components:

* **None of electronic components** contain any mercury or cadmium.

1.2.2 Flame Retardants in Plastic Components:

* **Plastic > 25g** shall not contain retardants of organically bound **Chloride or Bromide.**

1.3 Preparation for Recycling:

1.3.1 Labelling of Plastic:

* **Plastic > 25g** shall be labelled in accordance with **ISO11469**

1.3.2 Variety of Plastic:

* **Plastic >100g** shall be made from the **same type of plastic material**

1.3.3 Painting of Plastic:

* **Plastic > 25g** shall not be having **paint weight >1% of plastic weight**.
* **Mould decoration** (IMD) is not allowed
* All paints, lacquers, vanishes or colour additives used shall be declared by the type and mount.

1.3.4 Metallization of Plastic Housing:

*The plastic housing shall have neither internal nor external metallization.

B. CRT Display

Part 1: Visual Ergonomic - Legibility

1.3 Linearity: * **<= 1%**, (See Fig.5 & Fig.6)

1.4 Orthogonality:
* H/V: **<= 2%,** Diagonal: **<= 3%**

1.5.1: Display Luminance: * **>=100cd/m²** (80% Loading)

1.5.2 Luminance Uniformity: * **< 1.5:1**

1.5.3 Luminance Contrast: * **> 3:1** (test at 5% of corner and center)

1.6 Front Frame Reflectance:
* Diffuse reflectance: **> 20%**
* Gloss **<= 30%** gloss unit

1.7.1: Color Temperature Variations:
* Δu'v': <+- 0.01 of White
* 9300 °K: **8500-10250 °K**
* 7500 °K: **6980-8100 °K**
* 6500 °K: **6100-6950 °K**
* 5000 °K: **4700-5350 °K**
* and actual measured **Pre-set of Lower CCT should not exceed Higher CCT**

	Reference White Color Spec. in TCO'99	
CCT (oK)	**x,y**	**u'v'**
9300	0.283, 0.297	0.189, 0.446
7500	0.299, 0.315	0.194, 0.459
6500	0.313, 0.329	0.198, 0.469
5000	0.346, 0.359	0.209, 0.488
5600		

1.7.2: Color Uniformity and Characteristics:
* Δu'v': **<= 0.01** (between any two point of display area (White Color))

Part 2: External Alternate Magnetic Fields:

2.1: External Alternating Magnetic Fields: * **< 0.1 mm** (500 mm Viewing Distance; 80Hz, 200nT.)

Part 3: Emission and Energy Saving

3.1 X-Ray : * **< 0.5 mR/Hr**

3.2 Electrostatic Potential: * **<+-0.5KV**

3.3 Electric Field (AC):

* **Band I < 10V/m (100cd/m^{2,}, "+" Pattern)**
* **Band II< 1V/m (100cd/m^{2,}, "+" Pattern)**

Note: **Shielded Power Cord is not acceptable**

3.4 Magnetic Field (AC):

* **Band I < 200 nT (100cd/m^{2,}, "+" Pattern)**
* **Band II< 25 nT (100cd/m^{2,}, "+" Pattern)**

Note: **Shielded Power Cord is not acceptable**

3.5 Energy Saving:

*** 1st stage: <15W (recover time: 3 sec.)**
2nd stage: <5W
*** Single stage: <5W (recover time: <3 sec.)**
* Monitor **with USB Hub**: same as above or **single stage < 15W (recover time < 3sec)**

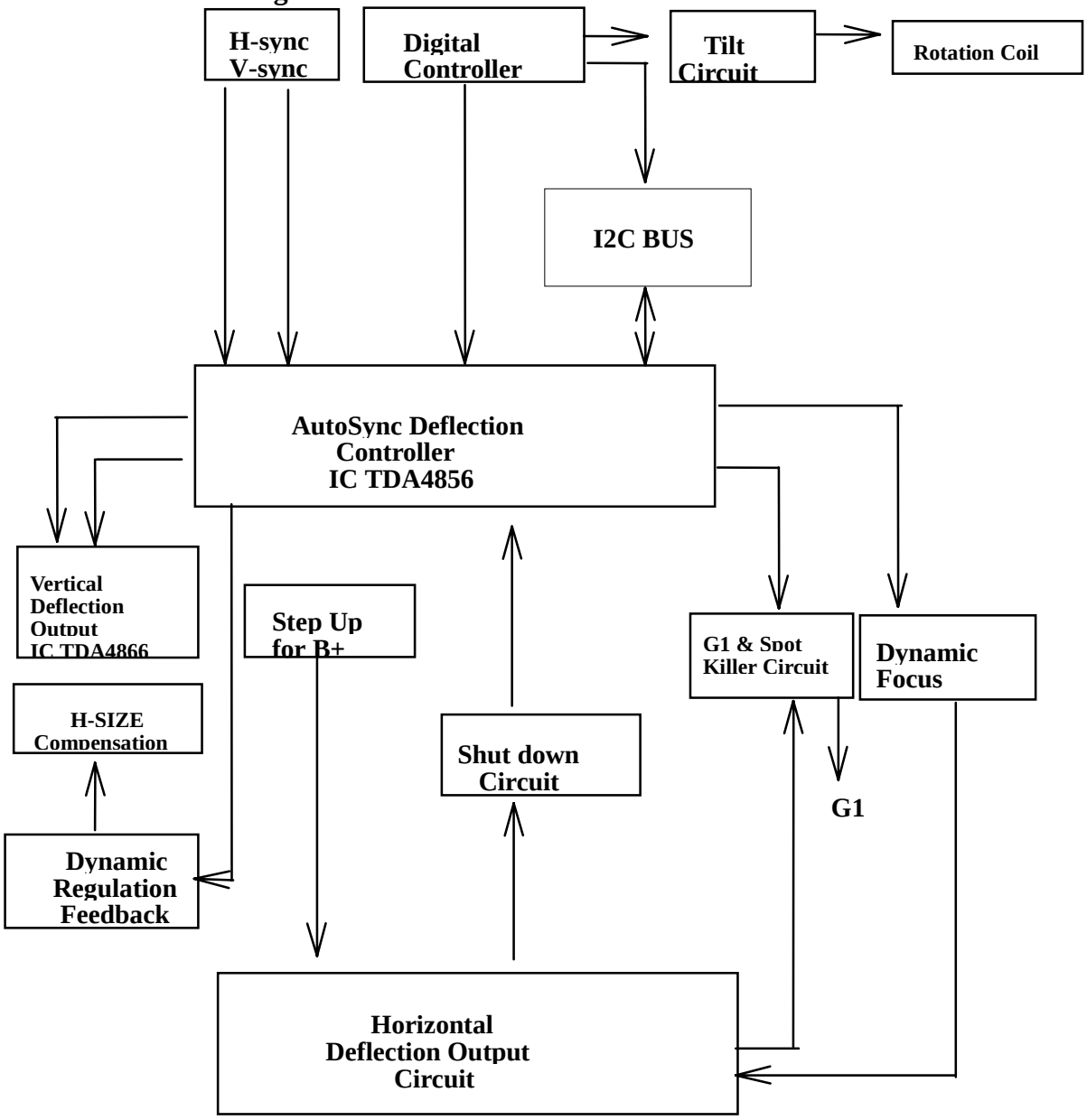
Part 4. Acoustic Noise:

4.1 Acoustic Noise (VDUs with fan):

* **Operating: < 5.5 B** (bels)
* **Idle: < 4.8 B** (bels)

DEFLECTION CIRCUIT OPERATION THEORY

1. The Block Diagram of Deflection :



2. Autosync Deflection Controller (TDA4856)

2.1 pin 1 is AFC feedback .
2.2 pin XRAY: if V XRAY > threshold (6.25V typical) switches the whole IC into protection mode.
2.3 pin 3,4,5,6,8 for B+ control function block.
2.4 pin 11(EWDRV) is a parabolic waveform used for pincushion correction
2.5 pin 16 generates video claming & blanking pulse.
2.6 pin 18,19 is I2C data.
2.7 pin 21 V-regulation.
2.8 the resistor from pin 28 (HREF) to ground determines the maximum oscillator frequency.
2.9 the resistor from pin 27 (HBUF) to pin 28 defines the frequency range.
2.10 pin 31 H-regulation.
2.11 pin 32 focus.

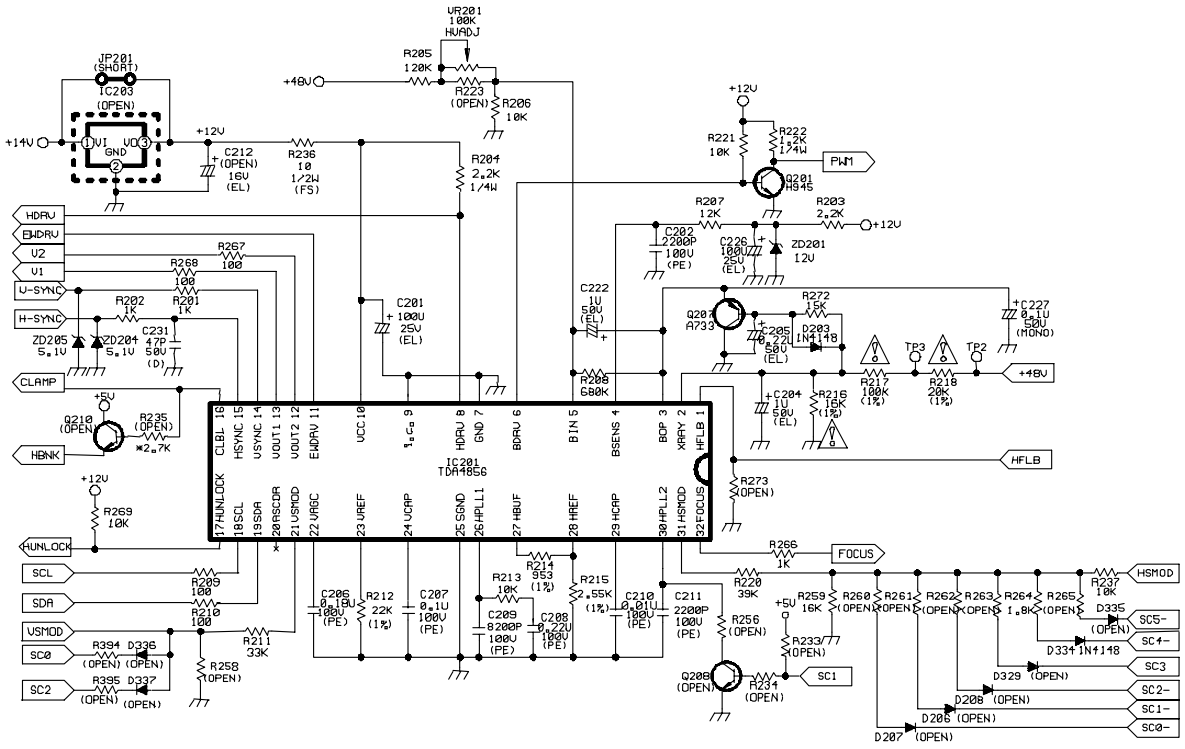


Fig 2 Autosync Deflection Controller Circuit

3. H-Driver & Output CKT :

3.1 HDRV signal comes from IC201 pin8 , then goes into Q301, Q301 constitutes an inverting stage and combines with T302 to drive Q302.

3.2 Q302, C306,C309, D305, C350 constitute the H-output CKT with diode modulator mode.

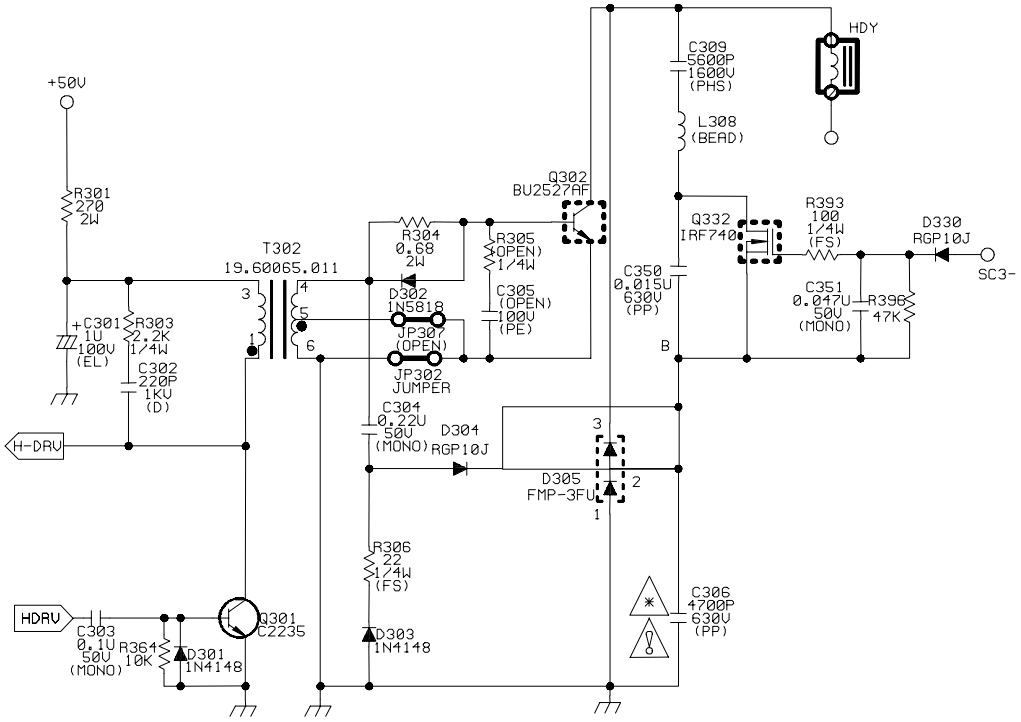


Fig 3 HDRV & output circuit

4. Dynamic focus CKT

According to the CRT spec

H dynamic focus Vpp = 350 V H dynamic focus Vpp = 150 V

4-1 Vertical dynamic focus

The signal from IC201 (pin 32) is a vertical frequency parabolic waveform.

Q321 : an inverting amplifier stage.

4-2 Horizontal dynamic focus:

The horizontal frequency parabolic waveform is amplified by T304.

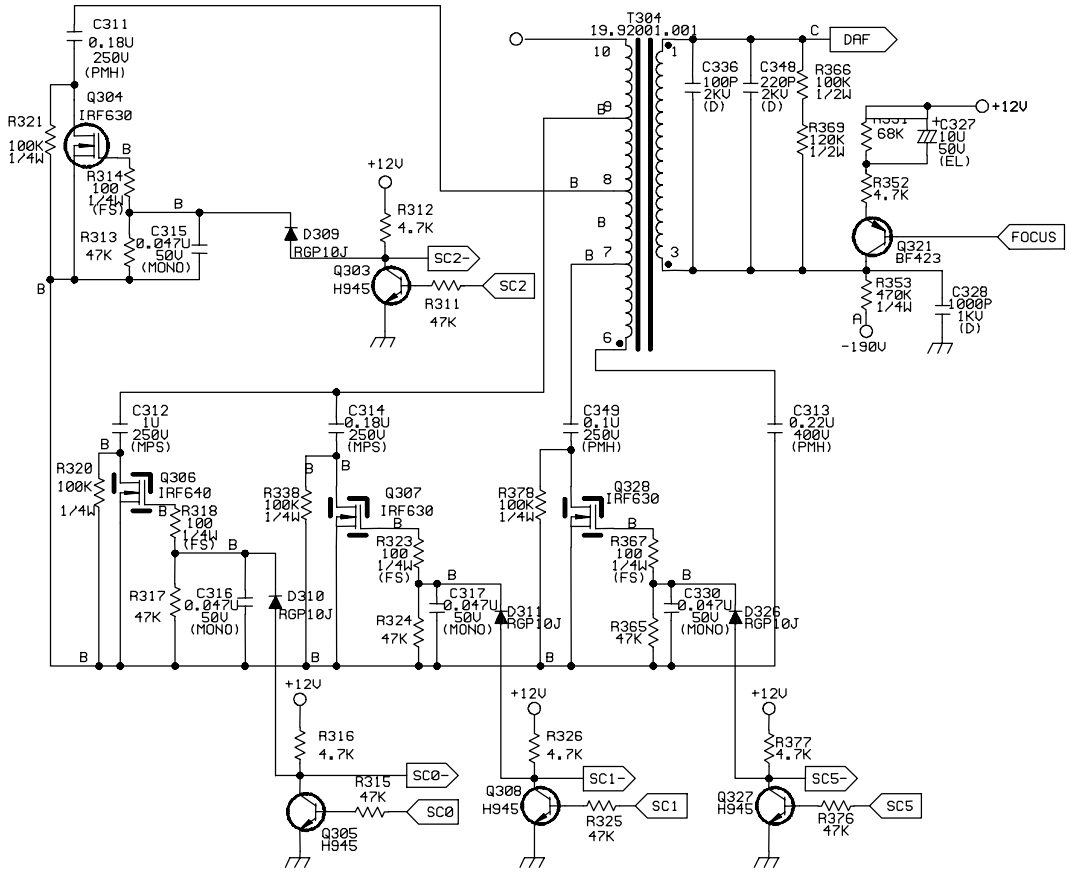


Fig 4 Dynamic Focus circuit

5. Brightness & spot killer CKT.

5.1 G1 CKT

The bright control signal from UC controller is about 0 ~ 5V, when the voltage of bright control signal increases, the current flow through R241 increases and the voltage of G1 decreases.

5.2 Blanking CKT

To avoid the disturbed picture display on the screen , we have to blank the monitor in the following situations.

(1) when display mode is changed.

(2) when the monitor enter the power saving mode.

(3) blank the vertical retrace line

when the " blank" signal becomes "high" Q209 "ON" , Q203 "OFF".G1 voltage is about (-190 * R253/(R253+R241)) -184V. The signal which is IC201 (pin 16) is inverted and amplified by Q202, and coupling to G1.During the vertical retrace interval , the G1 voltage will be drop down about 48V.

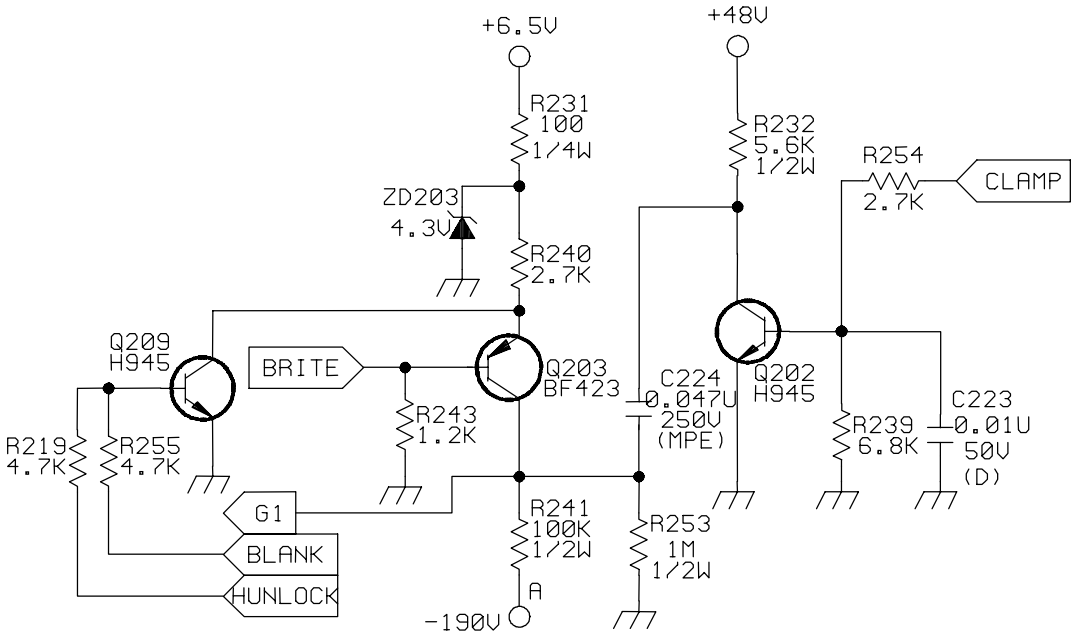


Fig5 Brite & Spotkiller circuit

6. BDRV and step-up CKT

6.1 The "BDRV" signal from TDA4856 pin6 is a square waveform. It is inverted and amplified by Q201. Q310 and Q311 constitute a buffer stage.

6.2 Q312, L301, D318, C323 is step-up circuit B+ = 50V * (ton + toff) / toff.

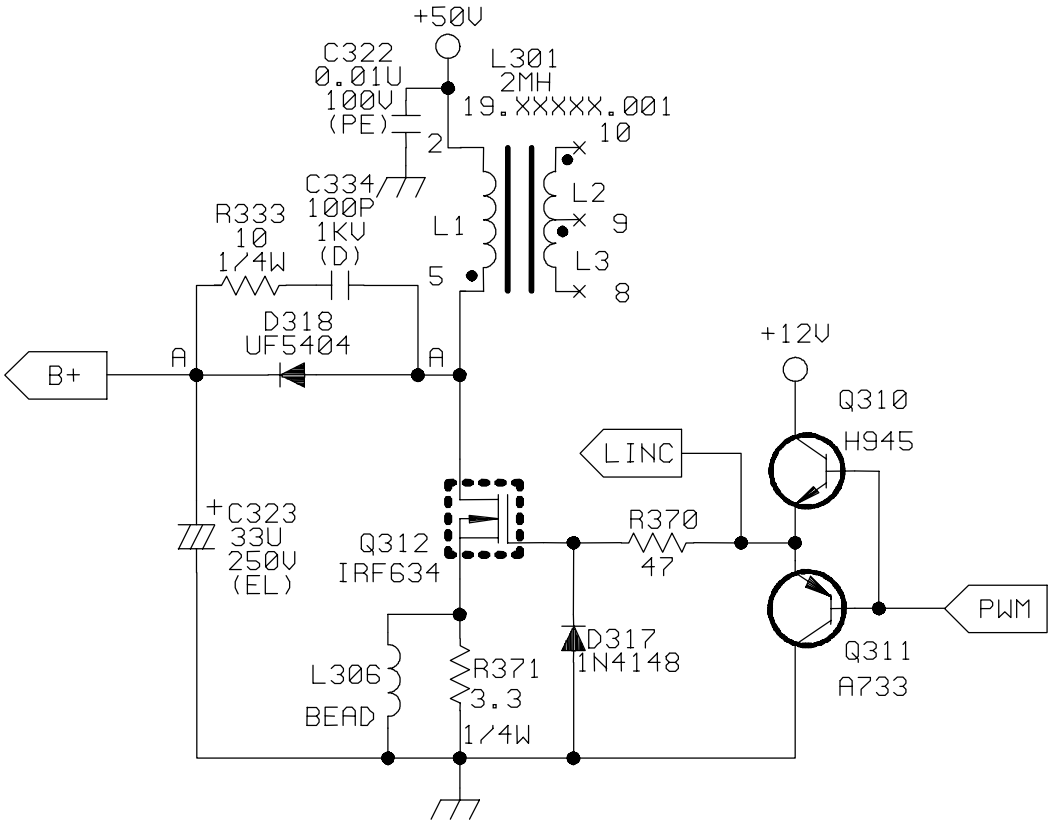


Fig 6 BDRV & Step-up circuit

7. HV Shutdown Circuit

The IC201 pin2 (XRAY) provides a voltage detector with a threshold . If the voltage at pin XRAY exceeds this threshold (6.25v typical) the pins HDRV, BDRV, VOUT1 and VOUT2 are floating. When anode voltage increases , the voltage at FBT (pin3) increases. the voltage at IC201 pin2 increases. The shutdown voltage is about 28KV.

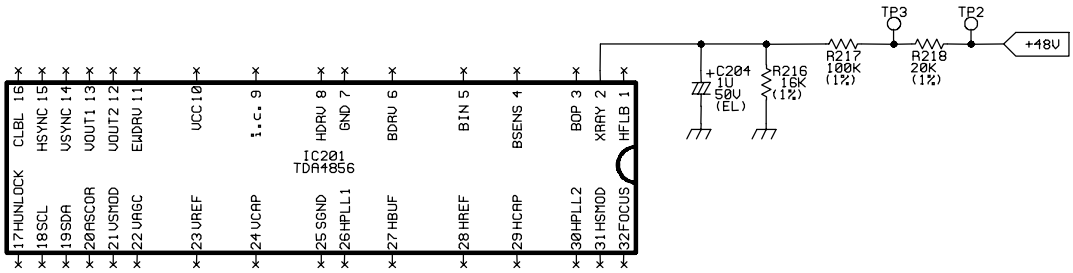


Fig 7 HV- shutdown CKT

8.Horizontal linearity CKT

G781 Cs control truth table

Frequency range	SC5	SC2	SC1	SC0	Cs Capacitor
Fh＜ 36K	0	0	0	0	C313 +C349+C311+C314+C312
36K＜Fh＜40K	1	1	1	0	C313+C312
40K＜Fh＜51K	0	0	0	1	C313 +C349+C311+C314
51K＜Fh＜62K	0	0	1	1	C313+C349+C311
62K＜Fh＜73K	0	1	1	1	C313+C349
73K＜Fh＜86K	1	1	1	1	C313

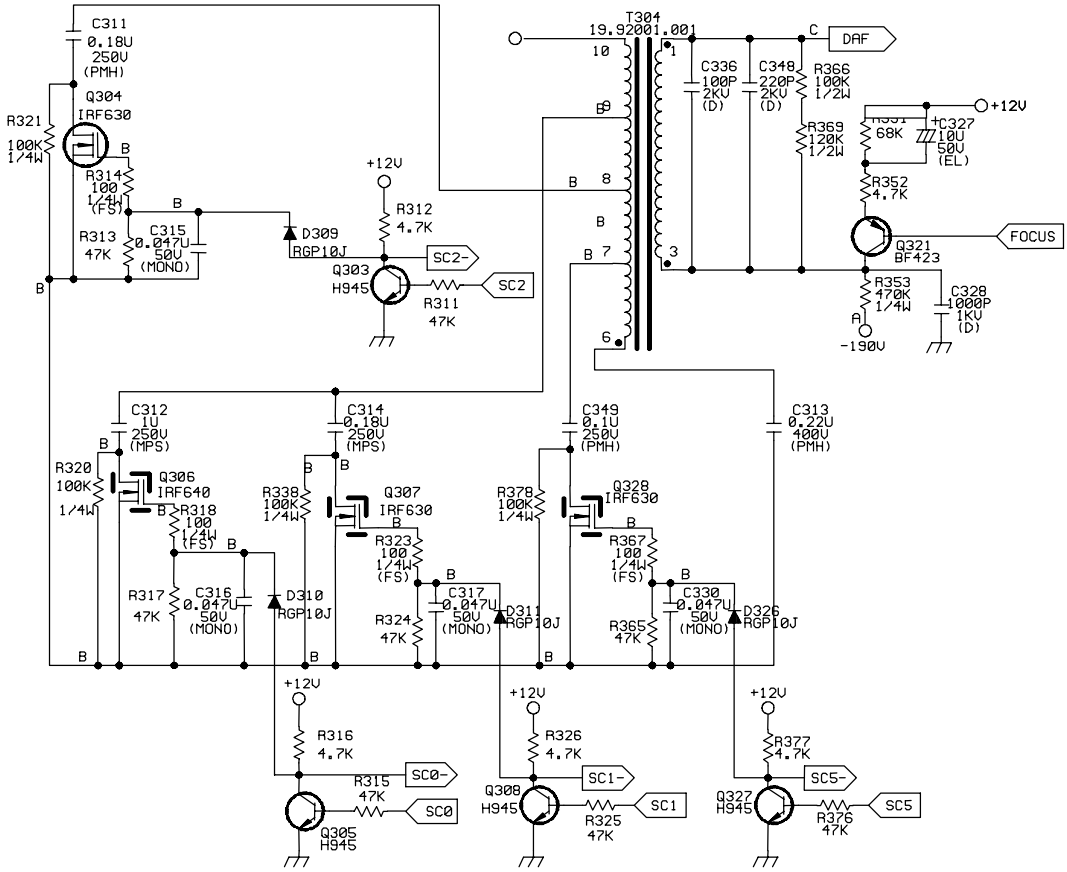


Fig 8 Linear circuit

9. ABL CIRCUIT

When the beam current is over the limited current , the ABL circuit will pull down the voltage of the video preamp (pin 11) to reduce the gain of video amplifier.

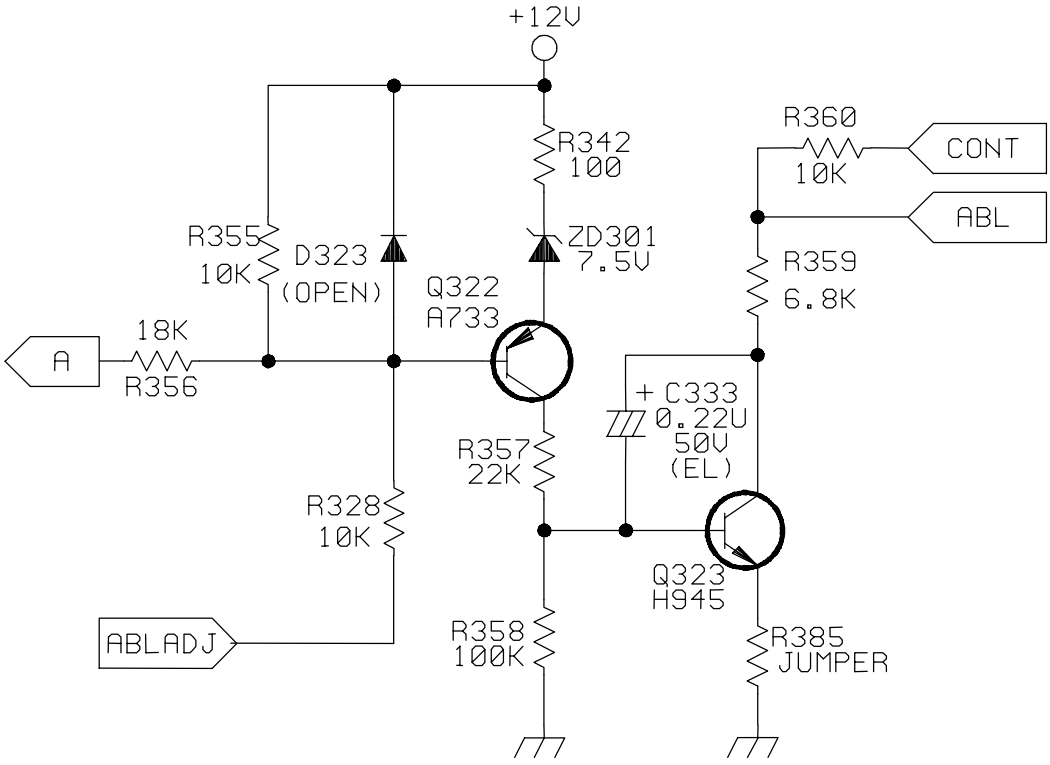


Fig 9 ABL circuit

10. TILT CKT

We can rotate raster clockwise or counterclockwise by changing the direction of the current flow through the tilt coil.

When the voltage of MP202(pin3) is larger than 6.5V, the current flows from Q205 to Tilt coil, other wise , the current flows from tilt coil to Q206

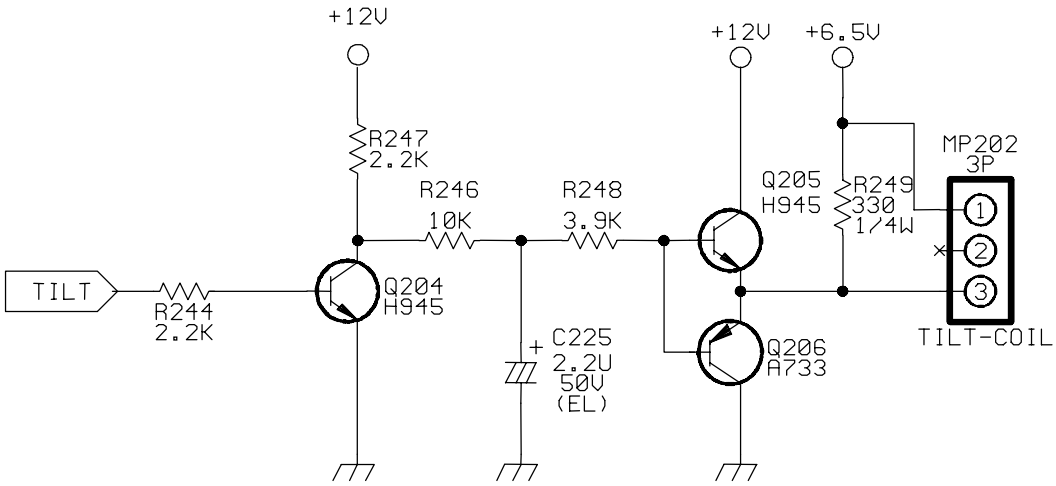


Fig 10 TILT circuit

11. Vertical Output Circuit

This vertical driver IC circuit is a bridge configuration
The signals from TDA4856 differential output VOUT1 and VOUT2 are connected to TDA4866 via DC-Coupled.

The vertical deflection coil is connected between the output amplifier (TDA 4866 pin4 and Pin6) ,Which are driven in phase opposite . The TDA4866 can output current to drive vertical deflection yoke .

PIN8 (GUARD) is used for vertical blanking.

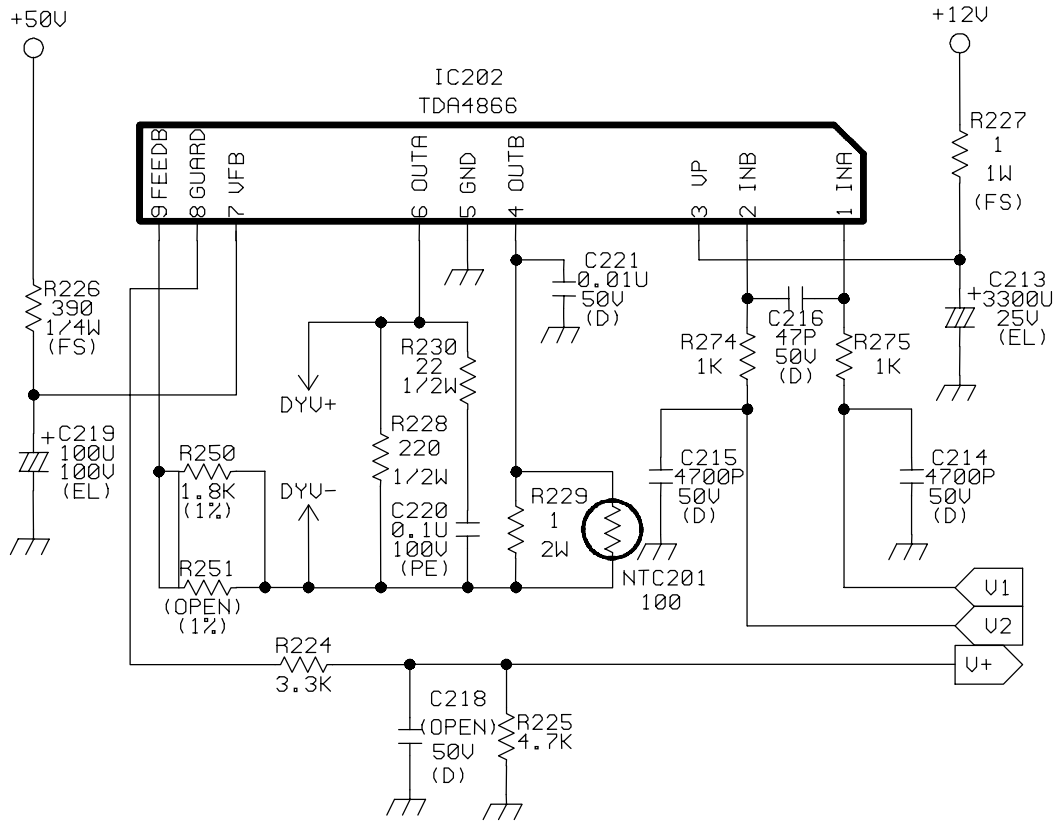


Fig11 Vertical output circuit

Switching Power Supply Operation Theory

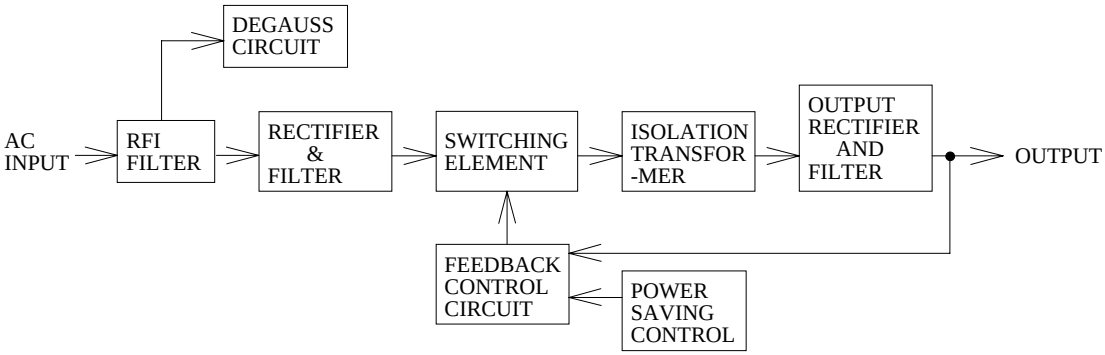
1. General Specification

Input Voltage : 90~264VAC (FULL RANGE)

Input Frequency : 47~63Hz

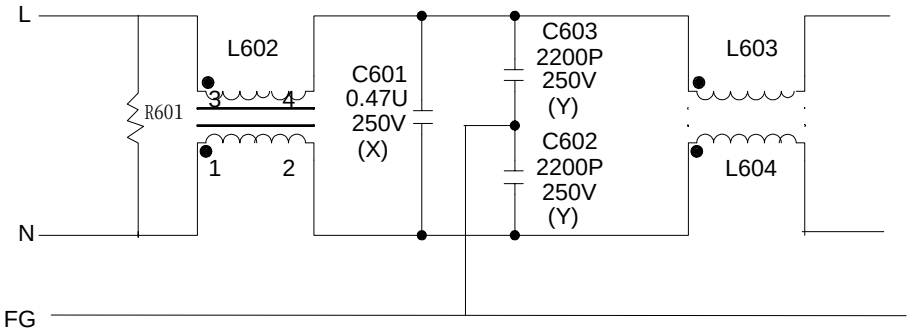
Output Requirement:	Output	MAX. Load Current
	+6.3V	0.7A
	+13V	1.0A
	+80V	0.15A
	+45V	1.0A

2. Block Diagram



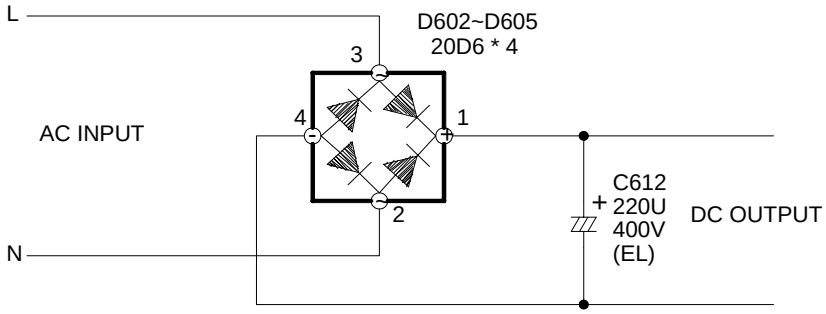
3. Circuit Operation Theorem

3.1 RFI FILTER



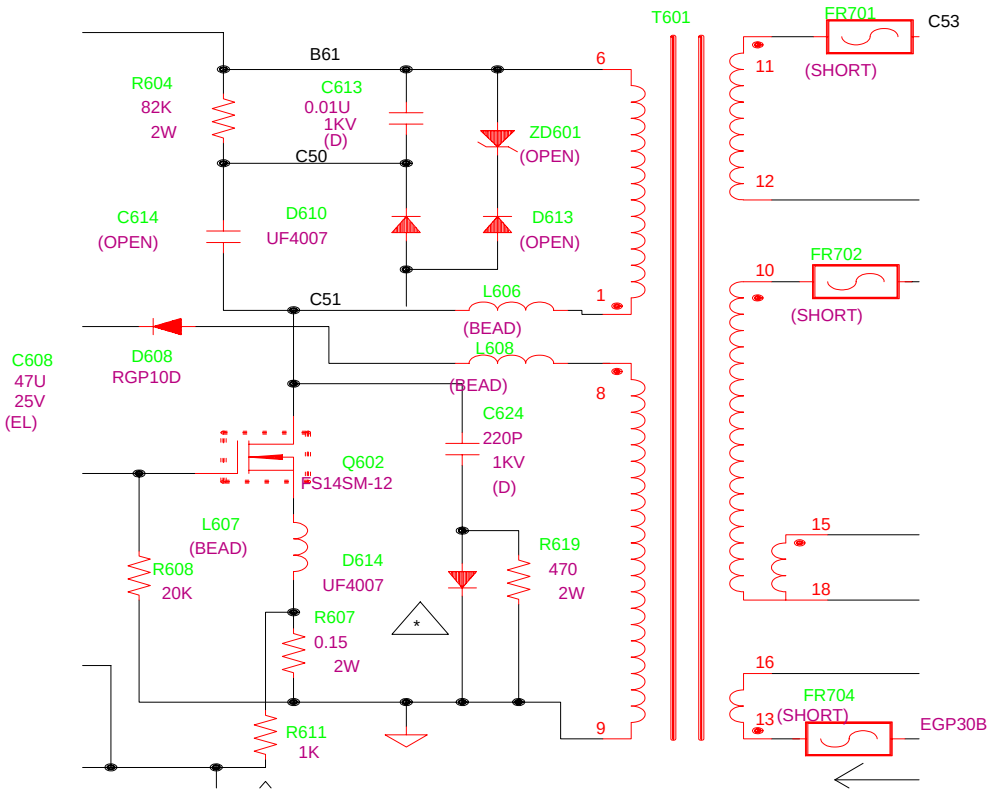
This circuit designed to inhibit electric and magnetic interference for meet FCC, VDE, VCCI standard requirements.

3.2 Rectifier and filter



When power switch is turn on, the AC voltage is Rectifier and filter by D602~D605, C612. The DC output voltage will be 1.4*(ac input)

3.3 switching Element and isolation transformer

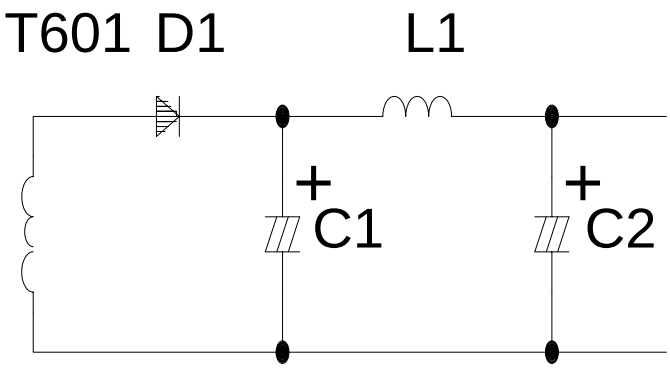


In a flyback converter operated in the discontinuous mode, the energy stored in the flyback transformer (actually an inductor) must be zero at the beginning and end of each switching period .

During the "ON" time, energy taken from the input is stored in the transformer when the switching transistor turn-off, this stored energy is all delivered to the output.

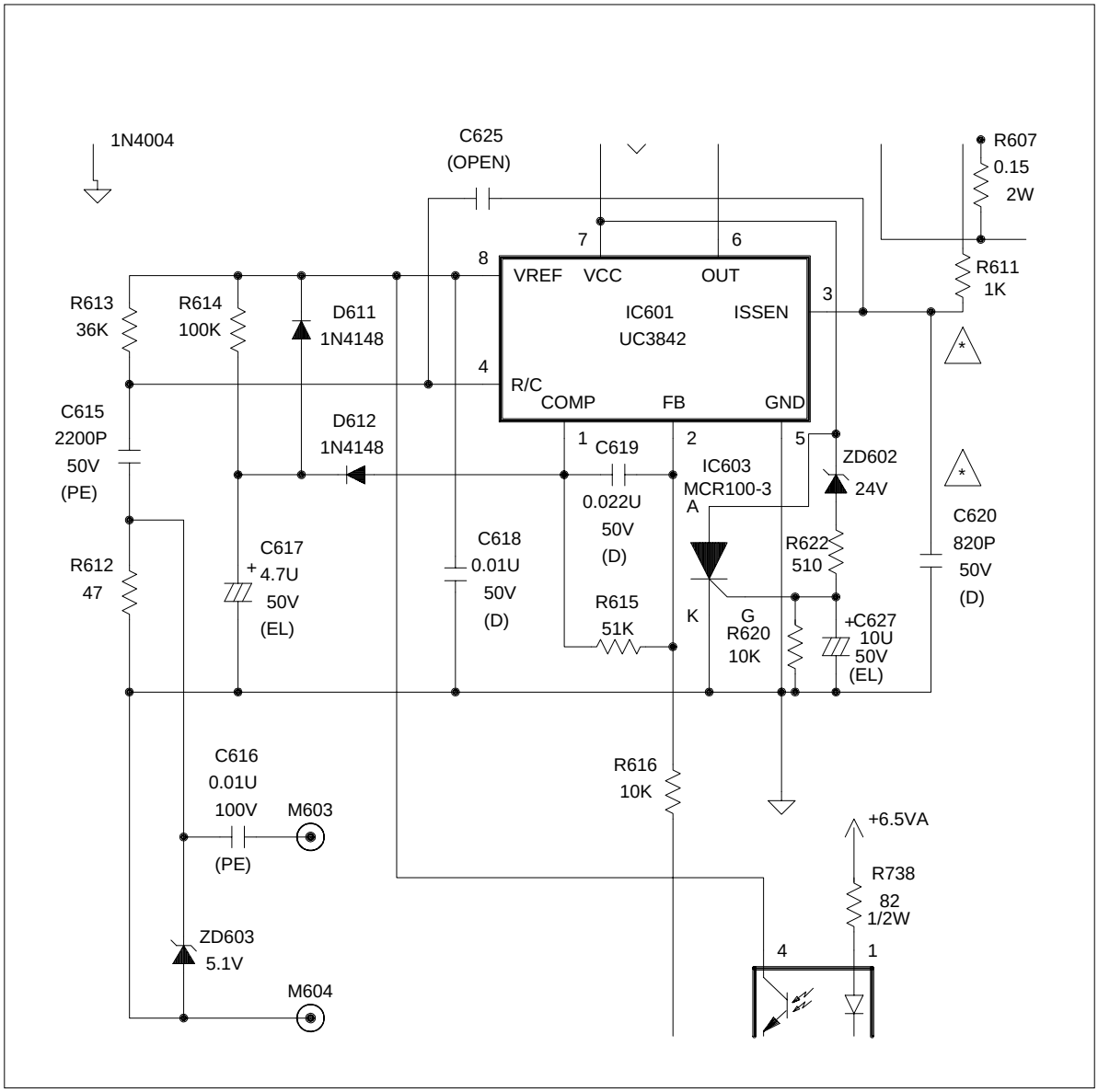
3.4 Output Rectifier and filter

The structure of each output is illustrated as below



since the transformer T601 acts as a storing energy inductance, diode D1 and capacitor C1 are to produce a dc output and additional L1, C2 to suppress high-frequency switching spikes.

3.5 Control circuit



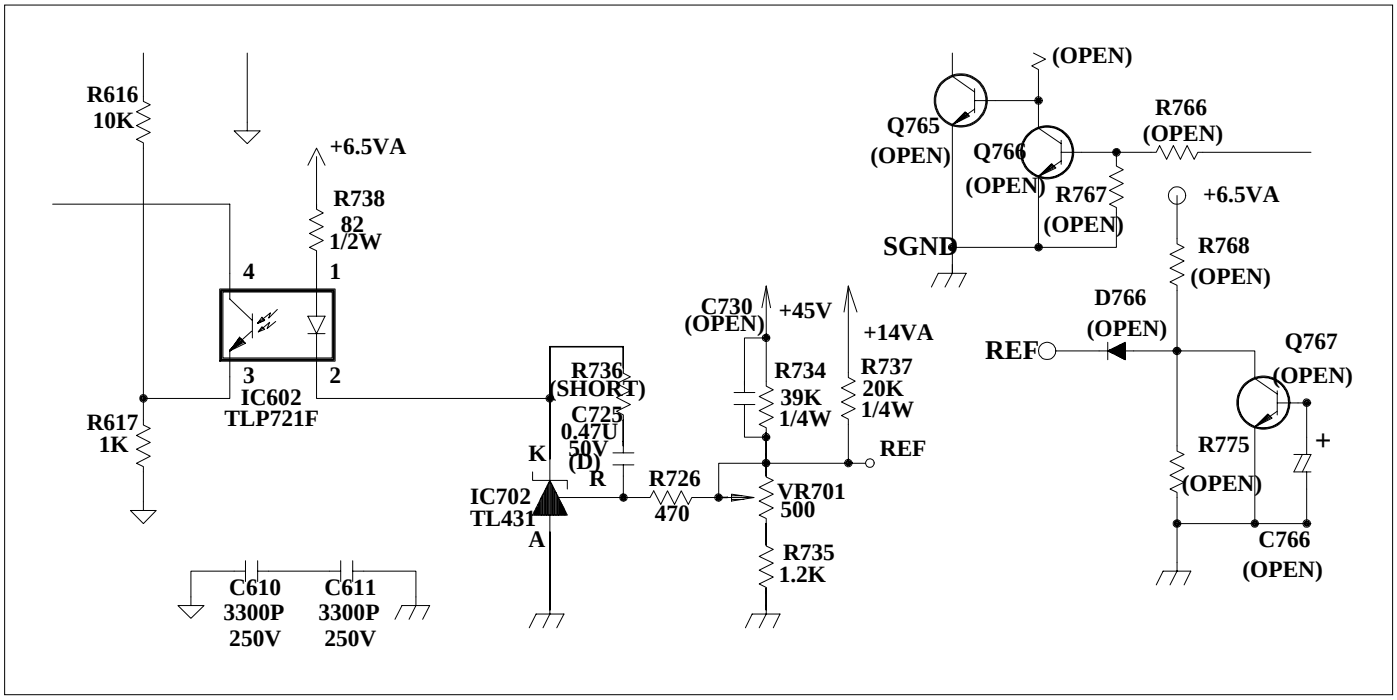
The current mode control IC UC3842 is used in the switching power supply which function of each pin
described as follows.

pin 1 : Error amplifier output
pin 2 : Error amplifier reverse input
pin 3 : Current sense
pin 4 : OSC sawtooth
pin 5 : Ground
pin 6 : Output
pin 7 : VCC
pin 8 : Reference Voltage:5V

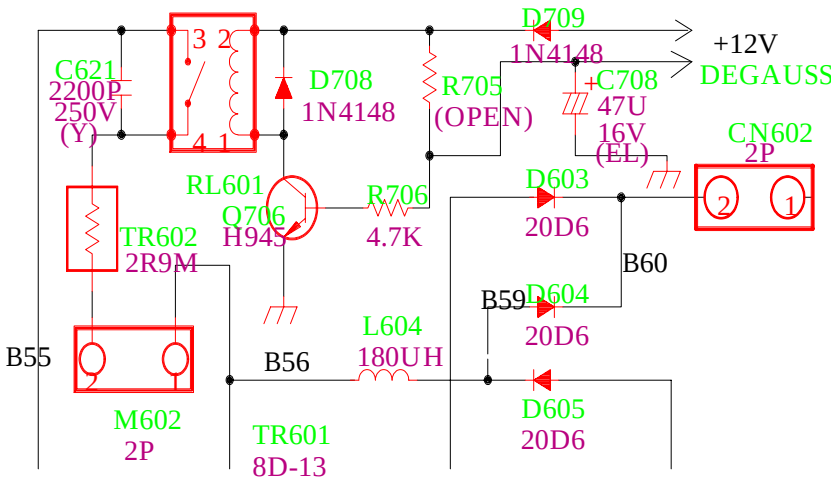
When power is initially applied to the circuit, capacitor C626 charges through R624, R623, ZD601. When the voltage across C607 reaches a level of 16V, IC601 is turn-on the +5Vdc will be set up at pin8 then R613, C615 generate a fixed frequency sawtooth wave to pin4, at this time MOSFET will be drived by pin6 with square wave the pulse width of square wave is decided by pin2 , pin3 is current feedback control, It will to sense MOSFET current. The D613, D612, R614, C617 are soft start components to avoid the duty too large when power starts up.

3.6 Feedback circuit

This power supply adopt feedback circuit of +45V and +13V. It used IC702 for voltage regulation and IC602 for primary-secondary isolation, The output voltage differential signal will be detected and sensed to the pin2 of UC3842 for comparison then the duty cycle of MOSFET will be decided to control the output voltage.



3.7 DEGAUSS CIRCUIT



This circuit has the function of auto degaussing and manual degaussing. When power supply is switched ON it is auto degaussing stage. When user make the selection of the manual degaussing function in OSD, the degaussing current will flow through coil to degauss the screen of monitor. TR602 is a PTCR to control degaussing coil current

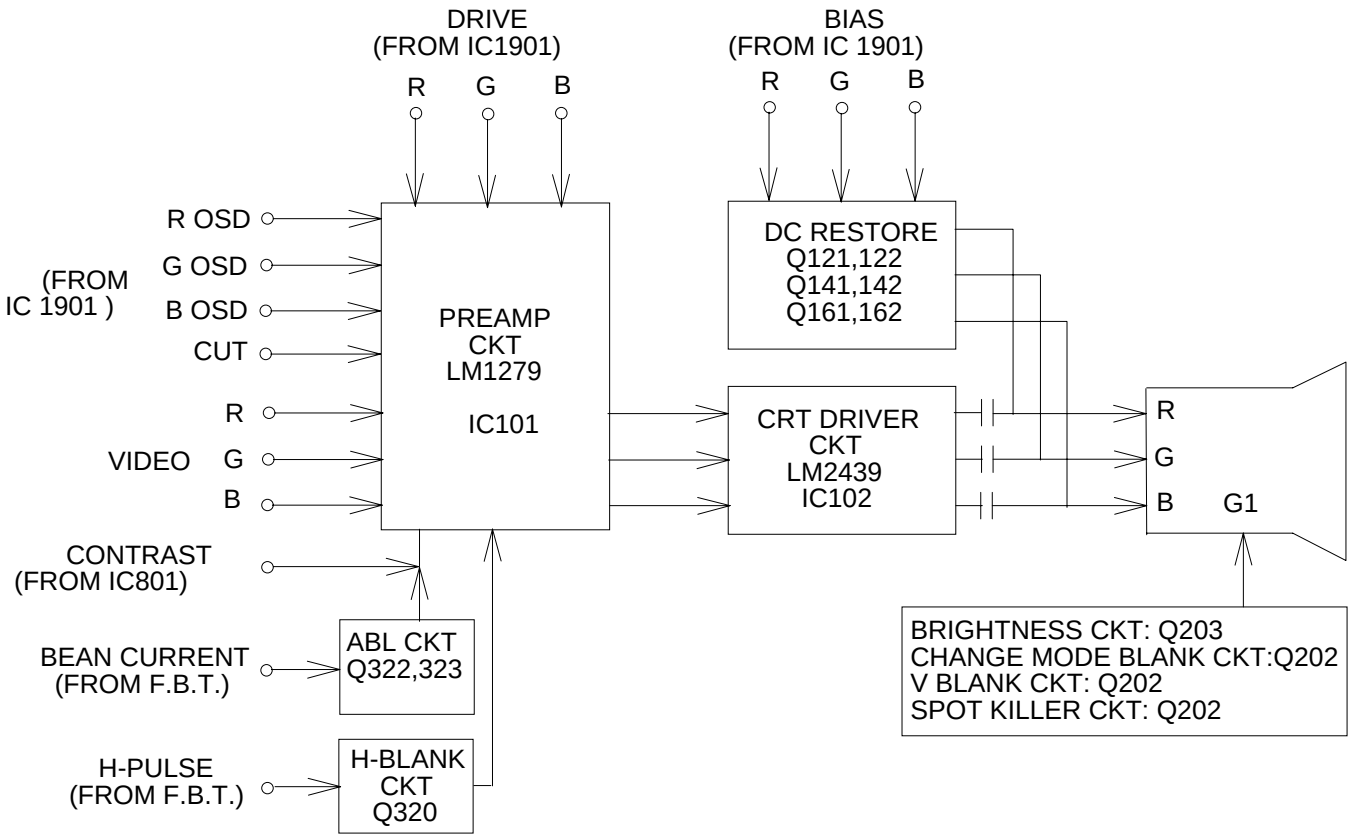
3.8 power saving control

Mode	H-sync	V-sync	LED	Power Rating
Normal	Normal	Normal	Green	100 %
Stand-by	None	Normal	Orange	≦ 5W
Suspend	Normal	None	Orange	≦ 5W
Off	None	None	Orange	≦ 5W

When the H-sync or V-sync are none, the power supply +6.3v and+13v output will be cut-off. The power input will be under 5W.

30. Video CKT

VIDEO C.K.T. BLOCK DIAGRAM：



31. OSD Preamp CKT:

(a) AS shown in the block diagram:
The R/G/B signals will generate an enough amplitude of Vpp to show up on the CRT screen after the amplification of two amplifiers. The first one, preamp CKT, process the signal and mix up the OSD, and the second one does the power amplification.

(b) OSD preamp IC101, LM1279, will output the R.G.B signals seperately. The R.G.B driver will control the gain of these three guns individually to approach the white balance of CRT.

(c) The signal H-Blank is to let the output of LM1279 down to 0.2V while non-display duration. Then the CRT driver CKT will generate a level higher than Black Level. (i.e. SYNC TIP), therefore the video signal will be blanked in order to prevent the fold over to occure while adjusting H-phase. Besides, the SYNC TIP is used for the DC Restoration of cascode CKT.

(d) LM1279 is equipped with OSD mixer. when signal CUT is Low, the output of LM1279 is video signal when signal CUT goes high, the output will be OSD signal.

32. CRT DRIVER CKT:

Output stage adopts CRT driver LM2439 to amplify the signal which has been recessed by LM1279 to a enough amplitude of Vpp, then display on the CRT. The IC contains three high input impedance, wide band amplifiers which directly drive the RGB cathodes of a CRT. The gain of each channel is internally set at -15 and can drive CRT capacitive loads as well as resistive loads presented by other application limited only by the package's power dissipation.

33. DC Restore CKT:

(a) The video signal amplified by the output stage is coupled to CRT by way of AC coupling. SO DC restoration CKT is needed to do the white balance adjustment.

(b) This DC restoration circuit adopts SYNC TIP CLAMP, In the duration of SYNC TIP the capacitor charges, and the capacitor discharge in the other time. The Black Level is kept to the level of DC restoration setted by UC.

34. ABL CKT: (Auto Brightness Limit)

ABL is a protection circuit. When the anode current goes higher than the setting value of ABL circuit . ABL will pull down the voltage of contrast to limit the anode current. This is helpful to protect CRT.

35. H-BLANK CKT:

Affair the collect pulse comes from FBT being shaped and inverted, it will be sent to preamp CKT and used as the H-Blank.

36. Brightness, V-blank, change mode blank, spotkiller CKT:

(a) About the cut off voltage , while the voltage, cathode to G1 , over the cut off , voltage, the picture will disappear, If cut off voltage off the CRT G Gru is setted at 110V and the black level of cathode is 60v, the picture wont show, the signals higher the black level once the G1 voltage is lower than-50v.

(b) As described above, we may using the voltage control G1 as the brightness control. Generally the G1 control range is about 10~15V if the raster brightness is form 0 to 1.5 ft-L.

(c) Similarly, we may overlap a negative pulse of vertical duration on the G1 voltage to prevent the vertical retrace line from showing on the picture , This is to keep the voltage cathode to G1 over the cut off voltage during the period of vertical retrace.

(d) In order to avoid the picture occur transiently while change mode, pull down the G1 voltage and let the voltage cathode to G1 over CUT OFF voltage. This will make the picture blanking.

(e) While monitor turned off , the discharge speed of high voltage circuit is slow since there is no deflection scan act on the electronic beam, a spot which will destroy the phosphor of CRT. So the SPOT KILLER circuit will generate a

negative voltage higher than CUT OFF to the G1 to beam this is to protect the CRT.

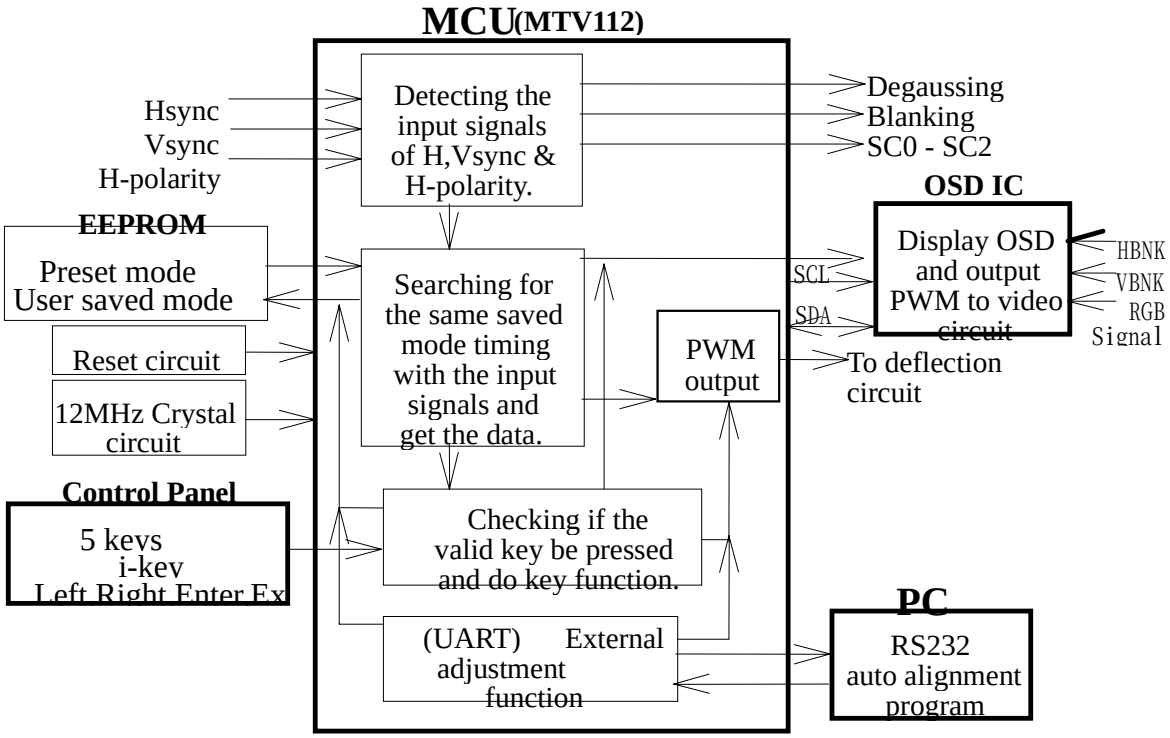
MICROCONTROLLER CIRCUIT OPERATION THEORY

1. **Introduction :**

This model will support powerful OSD function to help end user fine adjustment. The Microcontroller circuit can determine what mode it is by detecting the frequency of horizontal and vertical synchronous and the polarity of horizontal synchronous, and provide DC voltages to control the picture and save the adjusted value into the EEPROM by using the OSD, "On Screen Display control", that means the user can get any information of the picture display or adjust it and save the status values into the EEPROM by choosing and pressing the proper key according to the indication of the OSD. In addition, user can press i-key to do auto-calibration.

2. **Block diagram :**

The major parts of Microcontroller circuit are MCU, EEPROM, OSD IC, and Auto Calibration Module. The circuit block diagram is shown as below.



3.MCU and the peripheral circuit operation theory:

3-1.MCU function:

The MCU is MTV112, it is an 87C51 with PWM output controlled microcontroller, after power on,the reset circuit output a "High" to "Low" signal(>40mS) and the 12MHz crystal oscillated circuit working , the MCU begin to manages the following functions,

(1) To detect mode and output proper SC0, SC1 and SC2 to deflection circuit.

(2) To check if there is the same saved mode in the EEPROM and get the data to transfer into DC voltages by PWM output and RC filter circuits to control the picture, color, contrast and brightness.

(3) To check if there is the valid key be pressed and do the key function.

(4) To memorize mode timings and any adjustable parameters of the picture into EEPROM.

(5) To output data to OSD IC for making an "on screen display control" menu.

(6) The inner registers and PWM output of MCU can be controlled by the external PC alignment program.

(7) To calibrate the size, position, and geometry of the picture by pressing i-key. It will be placed right size and position.

3-2.How to detect mode timing:

Only when the mode timing input is stable, we can adjust the picture and check the horizontal and vertical sync frequency by the OSD menu, and the mode timing input mean the horizontal sync signal and the vertical sync signal.

(1) The vertical sync frequency measurement:

We use the base timer, it can generate a count during a fixed time, this fixed time is 12/12MHz and we call it "Time_base", so when the first vertical sync generated, we enable the base timer,and the next vertical sync generated,we disable the base timer,and we only need to calculate how many counts are during a vertical sync period. The formula is

Vertical sync frequency
= FV
= 1 / Vertical sync period
= 1 / [Counts * (Time_base)]
==> **Vertical sync frequency = 1000000 / Counts**

(2) The horizontal sync frequency measurement:

We use the event counter for calculating how many counts are during a long fixed time, because the vertical sync period is longer than the horizontal sync period, we can enable the event counter when the first vertical sync generated and disable the event counter when the next vertical sync generated, this time,we can get the horizontal sync counts during a vertical sync period.

The formula is Horizontal sync frequency
= FH
= Horizontal sync counts / Vertical sync period
==> **Horizontal sync frequency**
= Horizontal sync Counts / Vertical sync period

3-3.What are the valid key functions for user:

There are Five keys on control panel. They are "i-key, "Left," "Right," "Enter," and "Exit." The one, i-key, is for auto calibration function, the others are used for OSD controlling. "Enter" for entering sub-menu of main menu, "Exit" for escaping to main menu from sub-menu or leaving OSD menu, and "Left," "Right" for adjusting the bar value.

Except the OSD basic key functions, the user can only press "Right" for brightness adjustment, or "Left" for contrast adjustment.

3-4.How to memorize the timing and adjusted data:

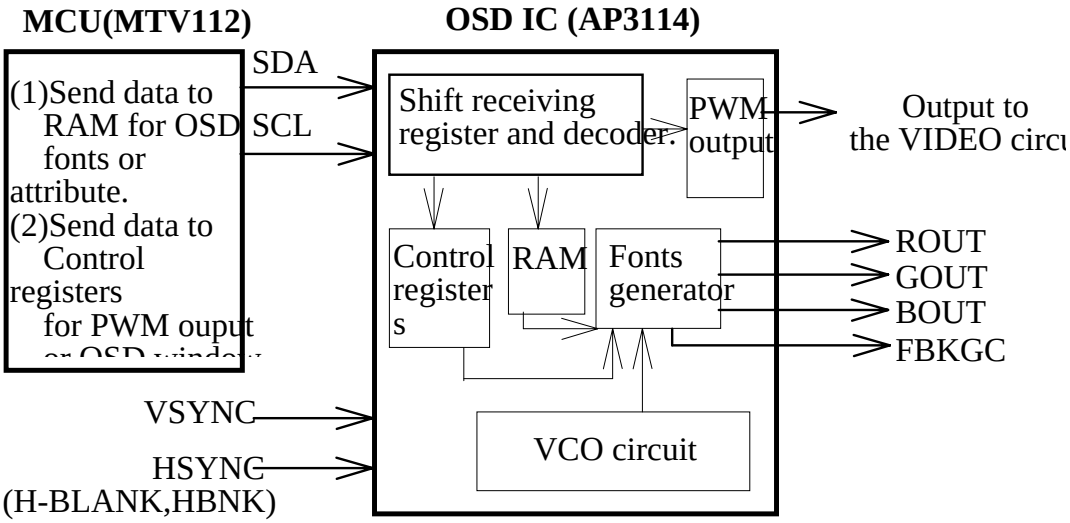
The EEPROM is 24C08, it has 1024 bytes memory size and communicates with MCU by two wires of I^2C bus, one wire is "SCL," the other is "SDA".

The MCU send clock and data to EEPROM to do "Write" function and send clock and receive data from EEPROM to do "Read" function by these two wires.

We define three parts of storage area. One is for the storage of the factory preset data, another is for saving user adjusted data, the other is for common settings area where stored the data of the OSD color temperature settings, contrast and brightness value .

3-5.How to display the OSD menu:

The OSD IC is AP3114/AP315 which is developed by vender, it receives the data of the OSD fonts and attribute what we want to display on the screen from the MCU by 2 wires of communication, and exports OSD window data and PWM volume to the VIDEO circuit, the block diagram is shown as below,



3-6.How to execute the auto alignment function:

The MCU MTV112 supports the UART function, it has 2 I/O serious ports, one is the receiver, the other is the transmitter, they are connected with an interface to PC and PC can execute alignment program by RS232 communication to send the formatted data to the MCU for adjusting any adjustable parameters of the picture and saving the adjusted values into

EEPROM. By this way, we can get the products with the same quality and reduce the manufacturing time.

Preparation for alignment :

(I) Setup unit and keep it warm up at least 30 minutes

(II) Signal mode

Mode	Frequency (H/V)	Display
1	31.47k/70Hz (- /+)	640 * 400 (VGA400)
2	31.47k/60Hz (- / -)	640 * 480 (VGA480)
3	53.6 k / 85Hz (+ /+)	800 * 600 (SVGA5)
4	60.0 k / 75Hz (+ / +)	1024 * 768 (UVGA 7)
5	68.6 k/ 85Hz (+/+)	1024 * 768 (UVGA8)
6	79.98k / 75Hz (+/+)	1280 * 1024 (WS7)

1. B + Adjustment

a. Input mode 79.98K [WS7] with crosshatch Pattern.

b. Set contrast in OSD to maximal value and brightness in cut off.

c. Adjust main board VR701, let output Voltage : 50 ± 0.2V at D704(near L702).

2. HV Adjustment

a. Input mode 79.98K [WS7] with crosshatch pattern.

b. Adjust VR201to let anode voltage be 26 ± 0.1kV

3. H-size preset :

a. Input mode 31.47K with crosshatch pattern

b. Use OSD to adjust H-size maximum

c. Adjust VR301 to make H-size just over-screen above 16mm

4. Factory setting mode adjustment

1. H-phase : Set picture to the center of screen
2. H-Size : Set picture to 310 ± 2 mm
3. V-center : Set picture to the center of screen
4. V-size : Set picture to 230 ± 2㎜
5. Parallelogram : Set picture to rectangular or balance
6. Trapezoid : Set picture to rectangular or balance of top and bottom
7. Pincushion : Set picture to a real rectangular
8. Tilt : Let top tilt ±1.0mm and bottom tilt ±1.5mm between edge to edge
9. ABL :Let Y=31Ft-L ± 2Ft-L.

5. Focus adjustment

a. Input mode 68.68K [UVGA8] with green crosshatch pattern

b. Adjust V(F2) Focus VR of FBT to make vertical line between center and corner area of CRT clear

c. Adjust H(F1) to make horizontal line between center and corner area of CRT clear

d. Repeat step b and c to get the best focus

6. Convergence adjustment

a. Input mode 80K [WS7] with crosshatch patterns

b. Adjust VRs of Yoke and 4-pole , 6-pole to meet specification

7. Color Temperature auto alignment

A. PREPARING ITEMS

a. PC

b. RS232 BOX

c. RS232 CABLE (9P) TO PC

d. RS232 BOX TO MONITOR CABLE (3P)

e. COLOR ANALYZER (CA100)

f. CA100 CABLE TO PC

g. ADJUST PROGRAM (Release NEW Version)

B. Alignment procedure

a. Press "SPACE BAR " to get raster pattern and set contrast and brightness to maximum position, adjust the G2 VR such that the max. color of R.G.B color bar on the monitor is in the mark region

b. Press "SPACE BAR" to do auto color temperature adjustment and color tracking

C1: 9300K X= 283 ± 15 Y=297 ± 15

C2: 6500K X= 313 ± 15 Y=329 ± 15

c. Press "SPACE BAR" to get full white pattern and set contrast and brightness to maximum position , adjust ABL adjustment to let Y = 31ft-l ± 2 ft-l

d. Press "SPACE BAR" to get 3" block and finish the adjustment

8. Clear all of user mode data

After finishing all factory setting , Press enter or exit key to main menu.

Press right or left key to scroll light bar to reset to default and press enter key, then at this time all of user mode data have been cleared

9. Geometry Specification

ITEM	DESCRIPTION	SPECIFICATION
1	HORI SIZE	310 ± 2 mm
2	VERT SIZE	230 ± 2 mm
3	SIDE PIN	≦2.0 mm
4	TOP/BOTTOM PIN	≦2.0 mm
5	SIDE BARREL	≦1.5 mm
6	TOP/BOTTOM BARREL	≦1.5 mm
7	TRAPEZOID	≦2.0 mm
8	VIDEO OFFSET	≦4.0 mm
9	PARALLELOGRAM	≦3.5 mm

10. Power Saving Function Check

a. Input mode 31KHz [VGA SIZE] with full white pattern.
b. Press both contrast and brightness keys to maximum position.
c. Remove the horizontal sync signal from input, the unit will go into "Standby" mode.
The picture will disappear, and the LED indicator is amber. The power consumption should be less than 5W.
d. Remove vertical sync signal from the input, the unit will go into "Suspend" mode. The picture will disappear, and the LED indicator is amber. The power consumption should be less than 5W.
e. Remove both syncs from input, the unit will go into "Off" mode.
The picture will disappear, and the LED indicator should be amber
The power consumption should be less than 5W in this case.
f. Input H-sync and V-sync signals in case c, d and e, the unit will recover to normal state, and the LED indicator is green.
g. Disconnect the signal cable from input, the unit will go into "Override" mode.
The raster should be extinguished, and the LED indicator is green. The power consumption is normal.
h. Re-connect the signal cable in case g, the unit will recover to normal state, and the LED indicator is green.

11. Eyelet point define

(1). Main board

-C309(*2)

-C612(*2)

-IC202 Heat sink(*2)

-Q602 Heat sink(*2)

-C313(*3)

-L302(*2)

-Q602 “D”(*1)

-L304 pin3, 4(*2)

-M303(*4)

-T301 pin1, 4, 8, 13 and 14(*5)

(2). Video board

-M105 pin5, 9, 11 and focus GND(*4)

12. Touch up point define

(1). Main board

-CN601

-TR602

-IC801 pin1 and pin 21

-IC201 pin 1 and pin 17

-IC202 pin 1 and pin 9

-RL601

-M602

-Q312

-Q302

-D305

-Q318

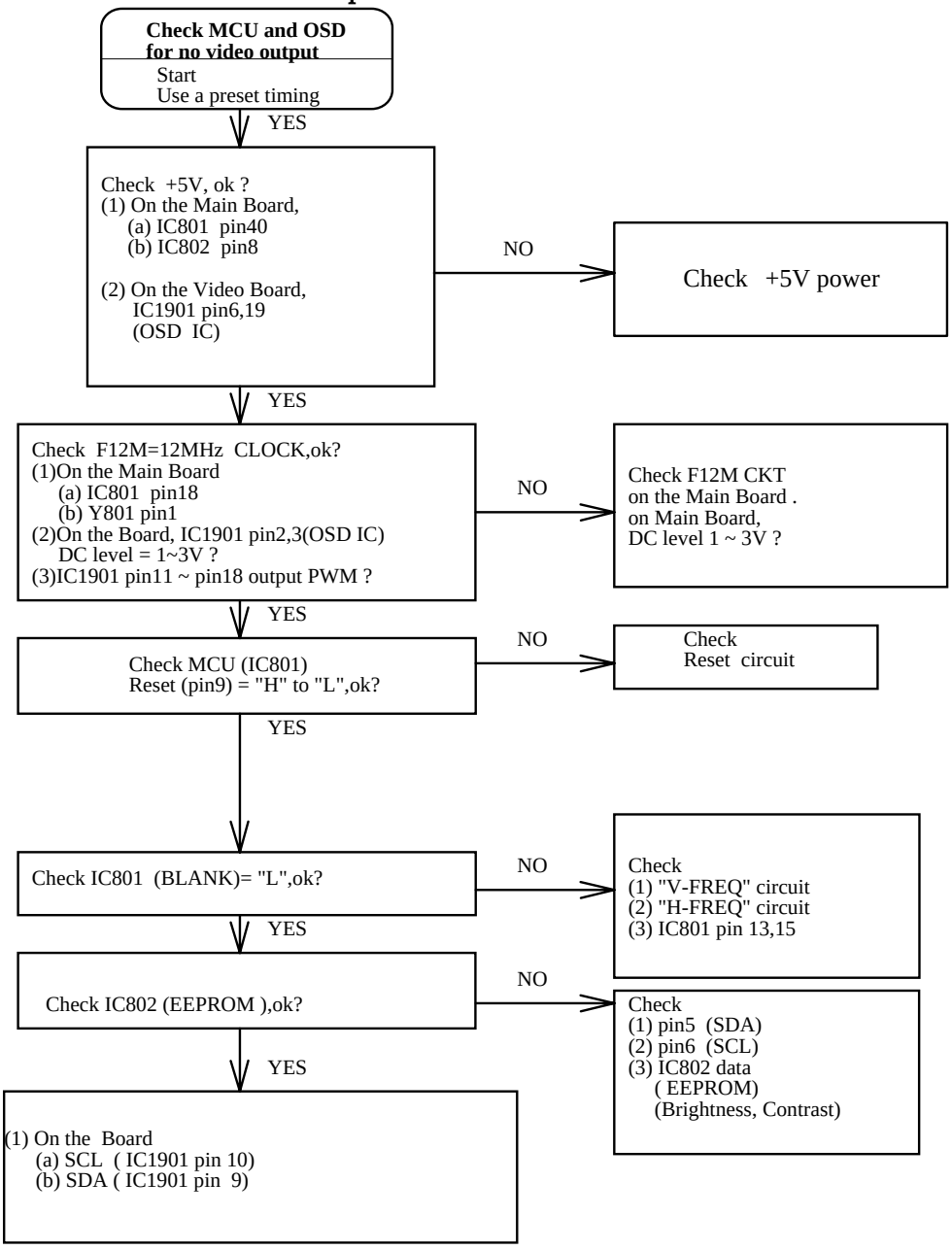
(2). Video board

-M101 pin 1 and 13

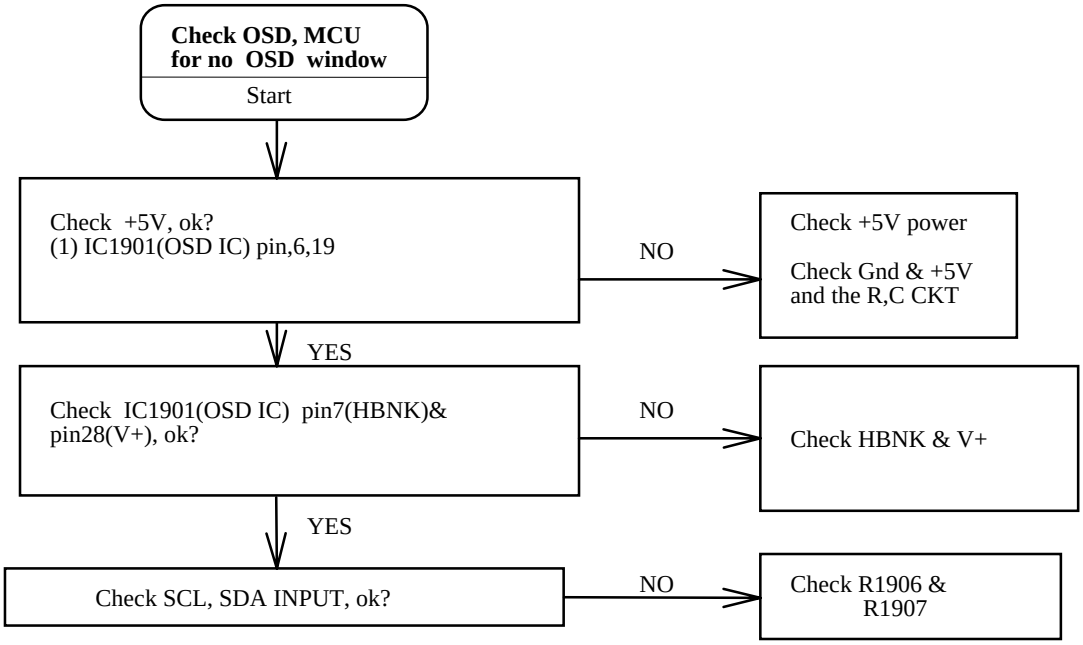
-M102 pin 1 and 11

-M103 pin 1 and 9

Check MCU and OSD for no video output:



Check OSD,MCU for no OSD window:



2.Video board

Caution: Before power on, you must check whether all connectors and components of the set are correct, otherwise it maybe to destroy the set. There assume that following cases depend on above setup OK. Please follow as below and check it step by step.

Case 1:No video display on screen

· Check IC101 pin 10 (Video Contrast). If it is 0 volt, check IC1901 or maybe IC101 pin 10 short.
· Check IC101 pin 18,15,13 If they are 0 volts, replace a new IC to IC101.
· Check RGB cathode. If anyone pin is 0 volt, replace a new IC to IC102.
· Check IC102 output path. It must be right and without short circuit.
· Check G1 voltage. If it is lower equal than -182 volts, check spot killer circuit and check IC801 pin6(Blank).
· Check CRT heater. If it is dark, check +8v supply voltage of heater.
· Replace CRT if it burns out.

Case 2: one or more of R, G, B channel does no display

· Check IC101 pin 18,15,13. If anyone is 0 volt, replace a new IC to IC101.
· Check RGB cathode. If anyone pin is 0 volt, replace a new IC to IC102.
· Check IC102 output path. It must be right and without short circuit.
· Replace CRT if it burns out.

Case 3: OSD does not display on screen

· Check IC101 pin 1,19,20. If they are 0 volt, check IC101 and IC1901.

Case 4: No video display on screen, but OSD can display on screen

· Check IC101 pin 10 (Video Contrast). If it is 0 volt, check IC1901 or maybe IC101 pin 10 short.

Case 5: OSD control cannot adjust Bias

· Check IC1901.
· Check DC restore circuit.

Case6: OSD control cannot adjust Drive

· Check IC101 and IC1901.

Case 7: OSD control cannot adjust Contrast

· Check IC 101 and IC1901.

Case 8: OSD control cannot adjust Brightness

· Check brightness control circuit (G1) and IC801 BRITE output.

Case 9: ABL cannot adjust

· Check ABL circuit.

Case 10: Spot killer function failure

· Check SG101(300KV spark gap). Replace it if it is inserted error.
· check spot killer circuit.

Case 11: Picture quality is not so good

· Check CRT socket. Fix it if it is loose.
· Check IC101 pin 11(clamp gate). If it has no clamping pulse, check H-clamp pulse switch circuit.
· Replace IC102.

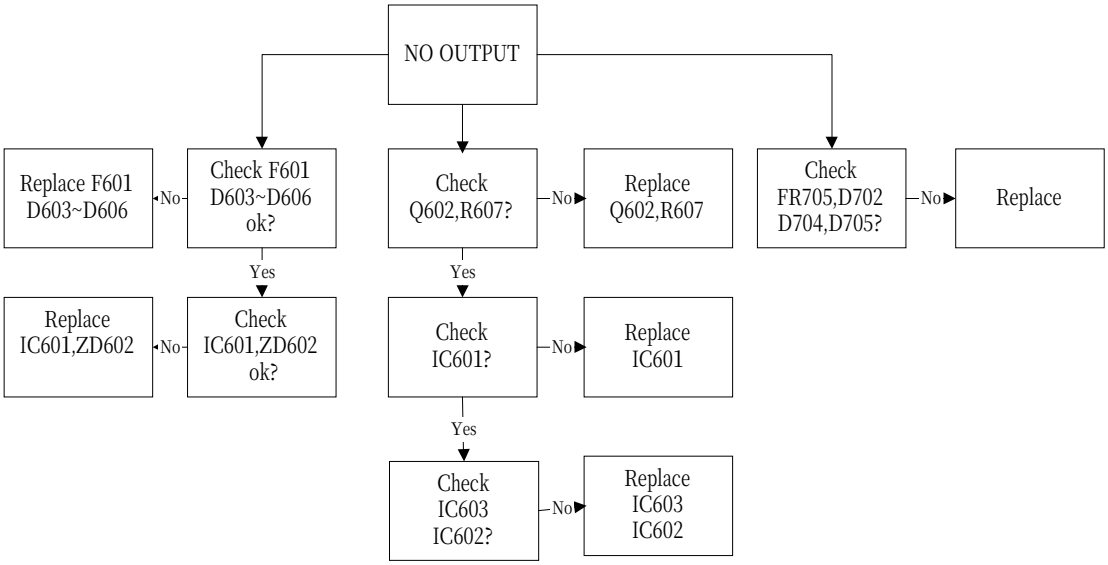
Case 12: Moire appears when Y is greater than 18 Ft-l

· Run auto-alignment procedure to acquire optimum G2 voltage.
· If necessary, decrease G2 voltage.

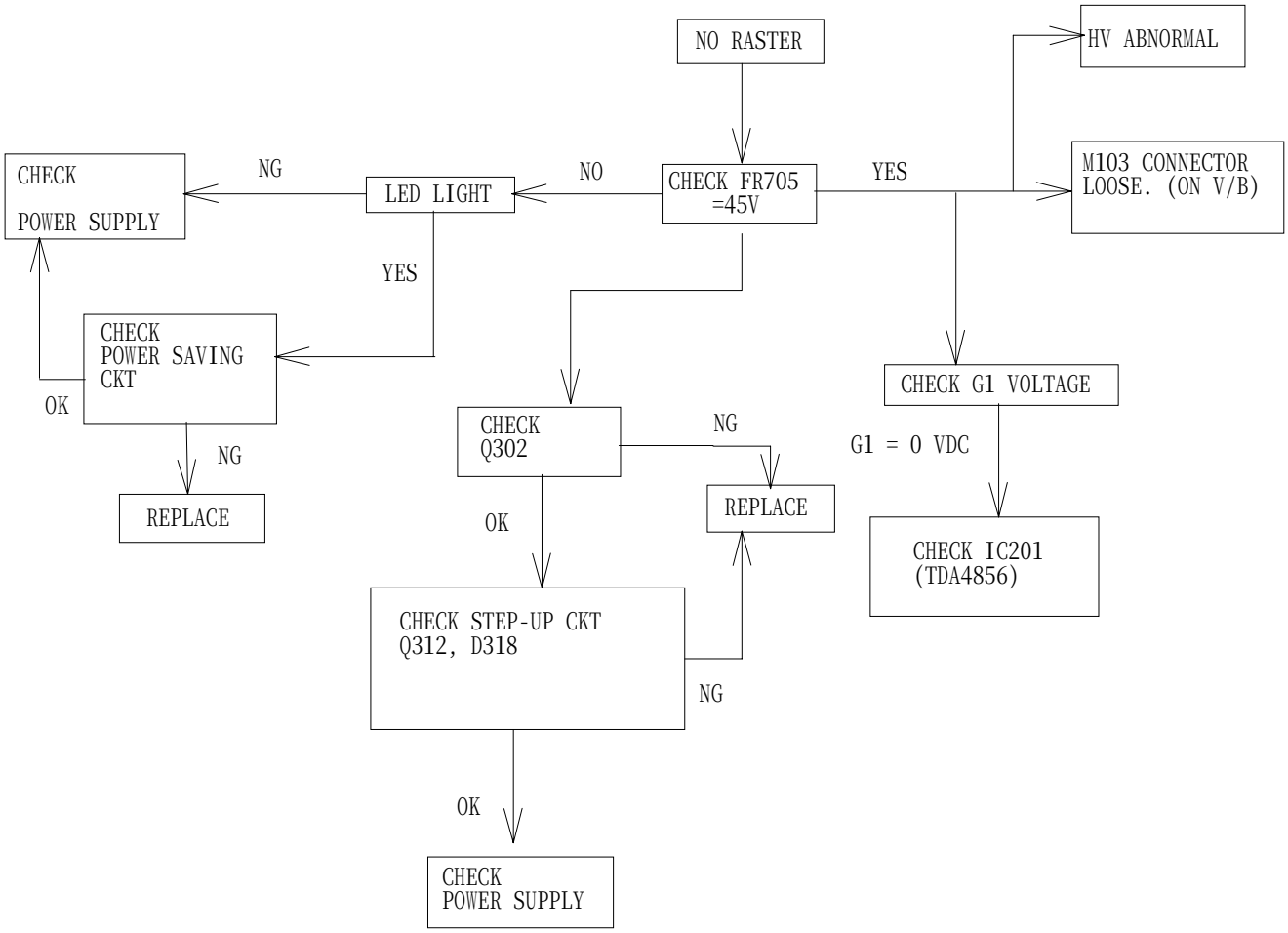
Case 13: H-blank function failure

· Check H-blank circuit
· Case 14: H-blank phase error

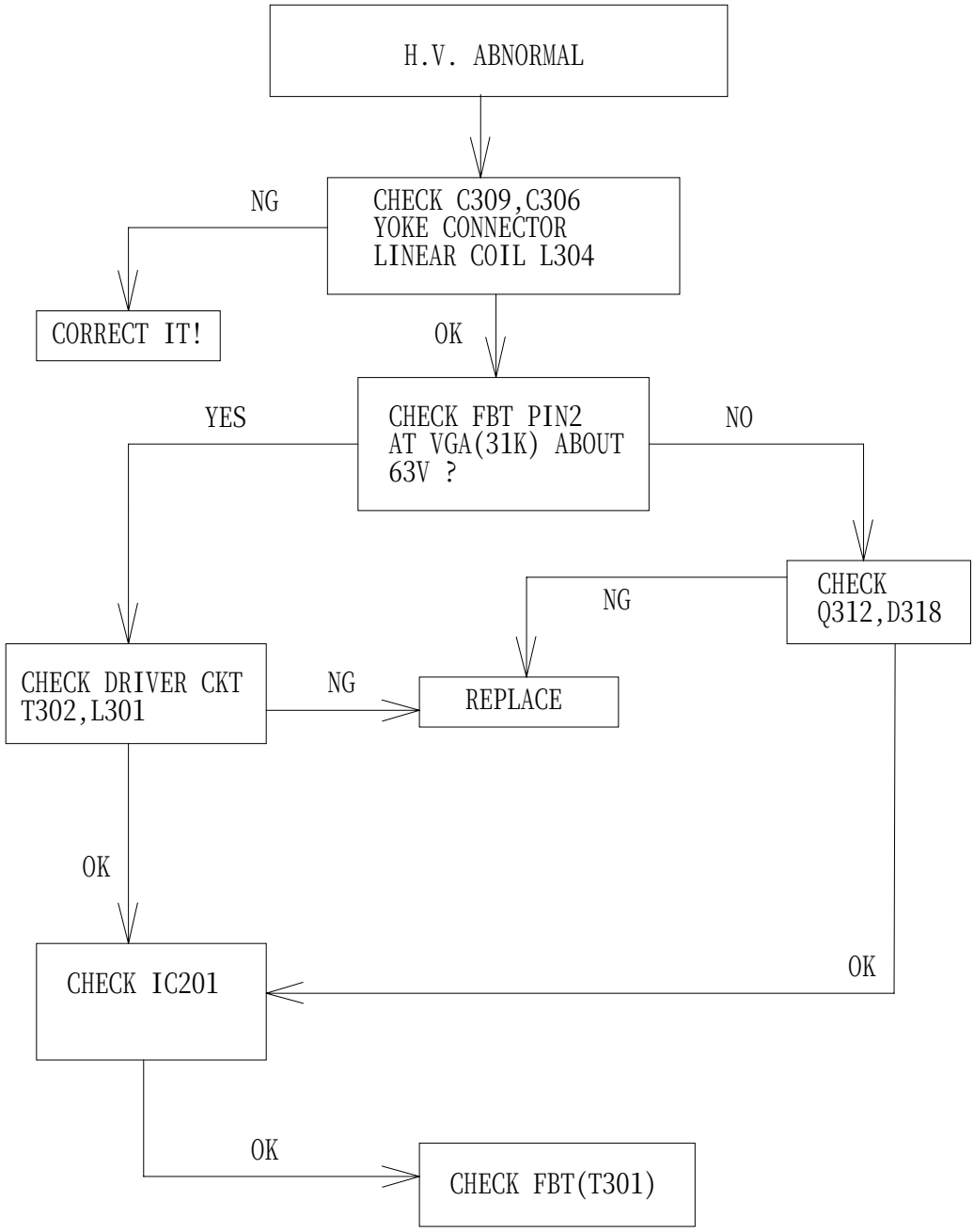
3.NO OUTPUT POWER



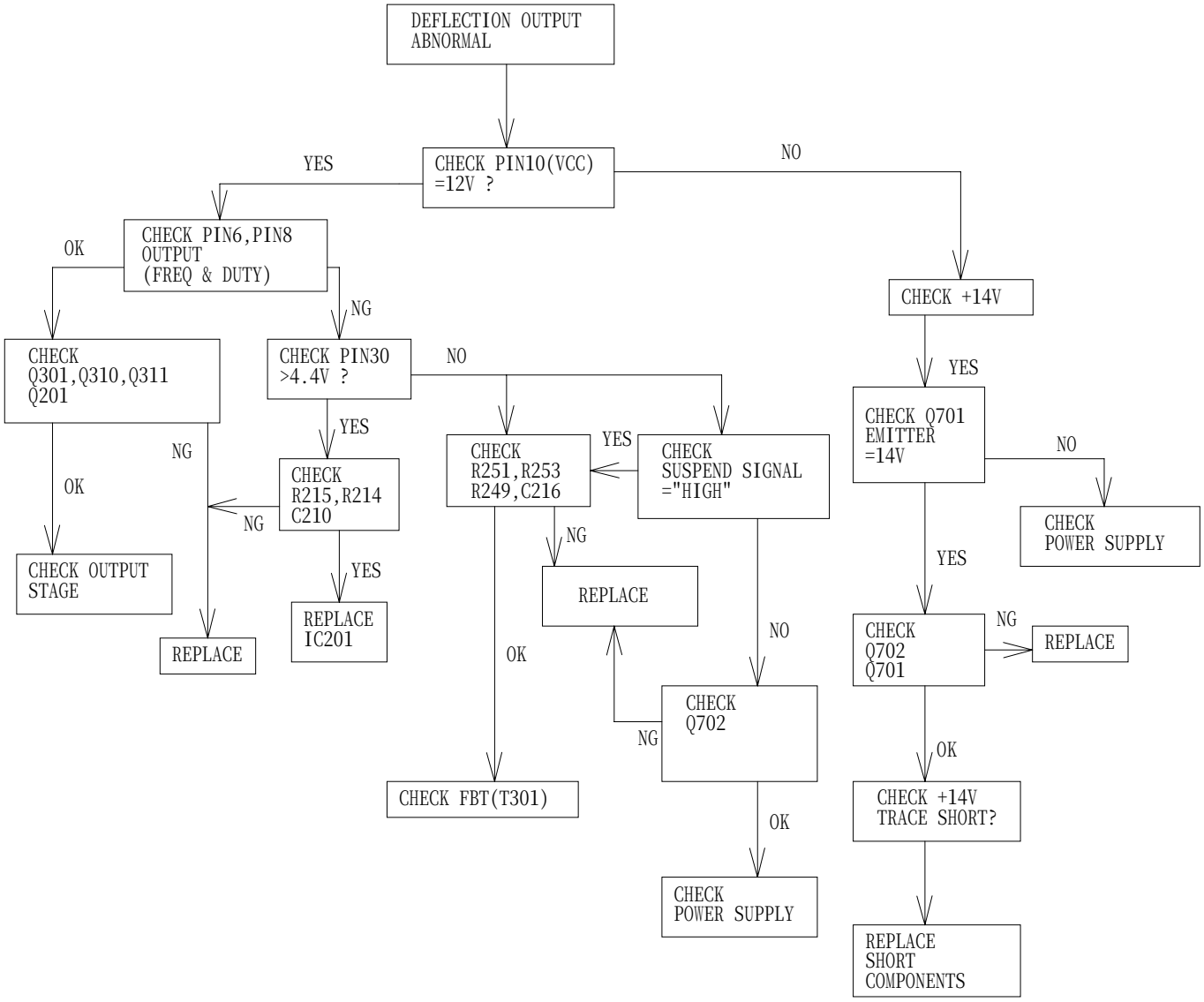
4. No Raster


NO RASTER
HV ABNORMAL
CHECK
POWER SUPPLY
NG
LED LIGHT
NO
CHECK FR705
=45V
YES
M103 CONNECTOR
LOOSE. (ON V/B)
YES
CHECK
POWER SAVING
CKT
OK
NG
REPLACE
CHECK
Q302
NG
REPLACE
OK
CHECK G1 VOLTAGE
G1 = 0 VDC
CHECK IC201
(TDA4856)
CHECK STEP-UP CKT
Q312, D318
NG
OK
CHECK
POWER SUPPLY

5. H.V. ABNORMAL



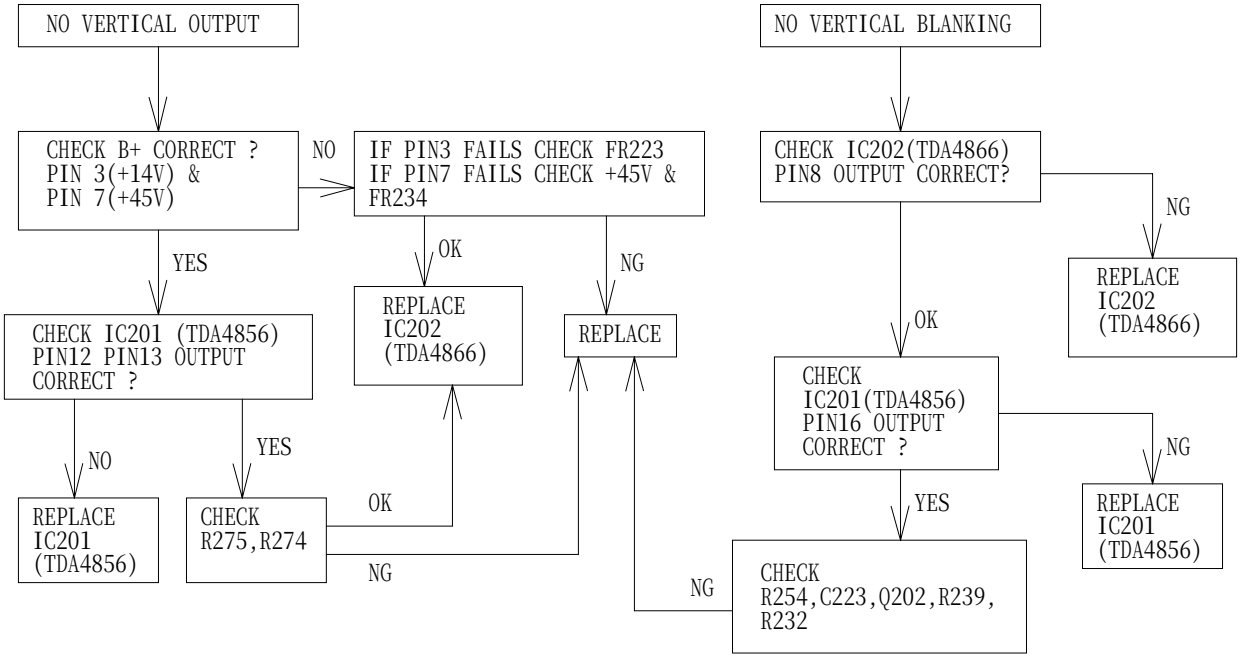
6. CHECK IC201(TDA4856)



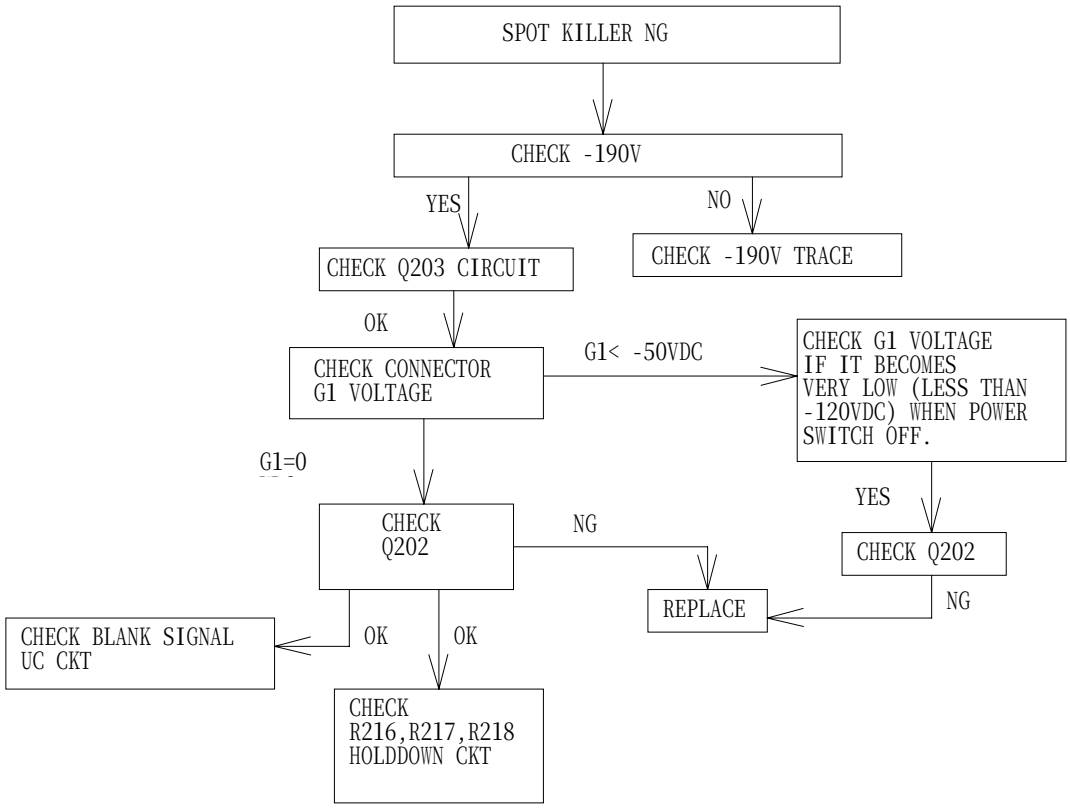
7. PINCUSHION NG
   TRAPEZOID NG
   UNBALANCE NG
   PARALLEGRAM NG
   H-PHASE NG
   V-CENTER NG

→ GEOMETRIC FUNCTION NG
CHECK MCU,IF OK REPLACE IC201

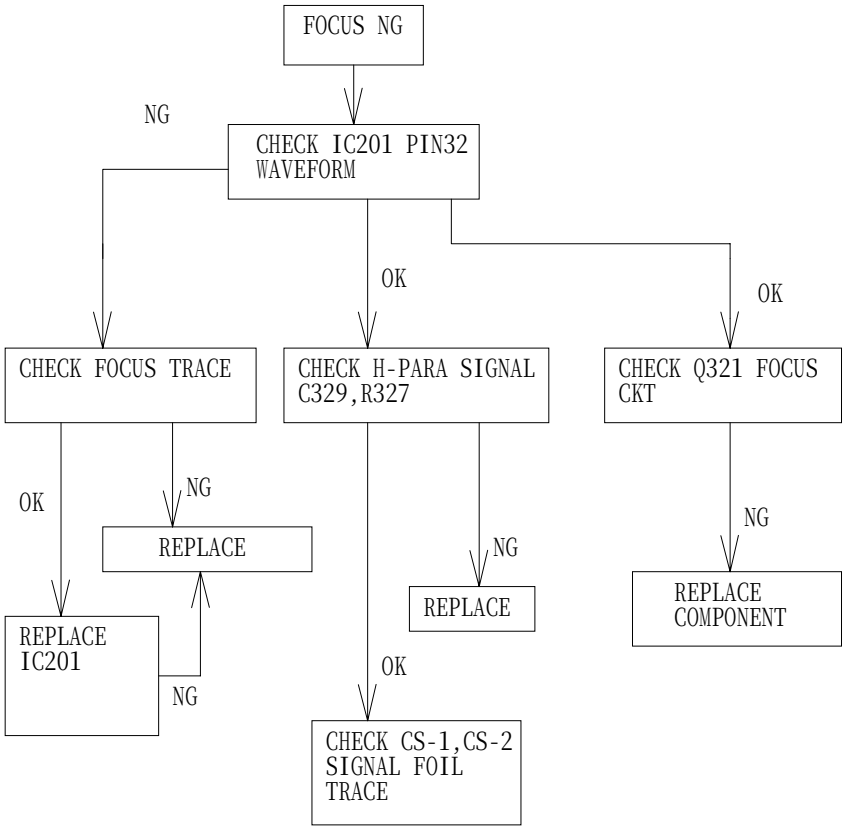
8. NO VERTICAL OUTPUT &
   RETRACE LINE NO BLANKING



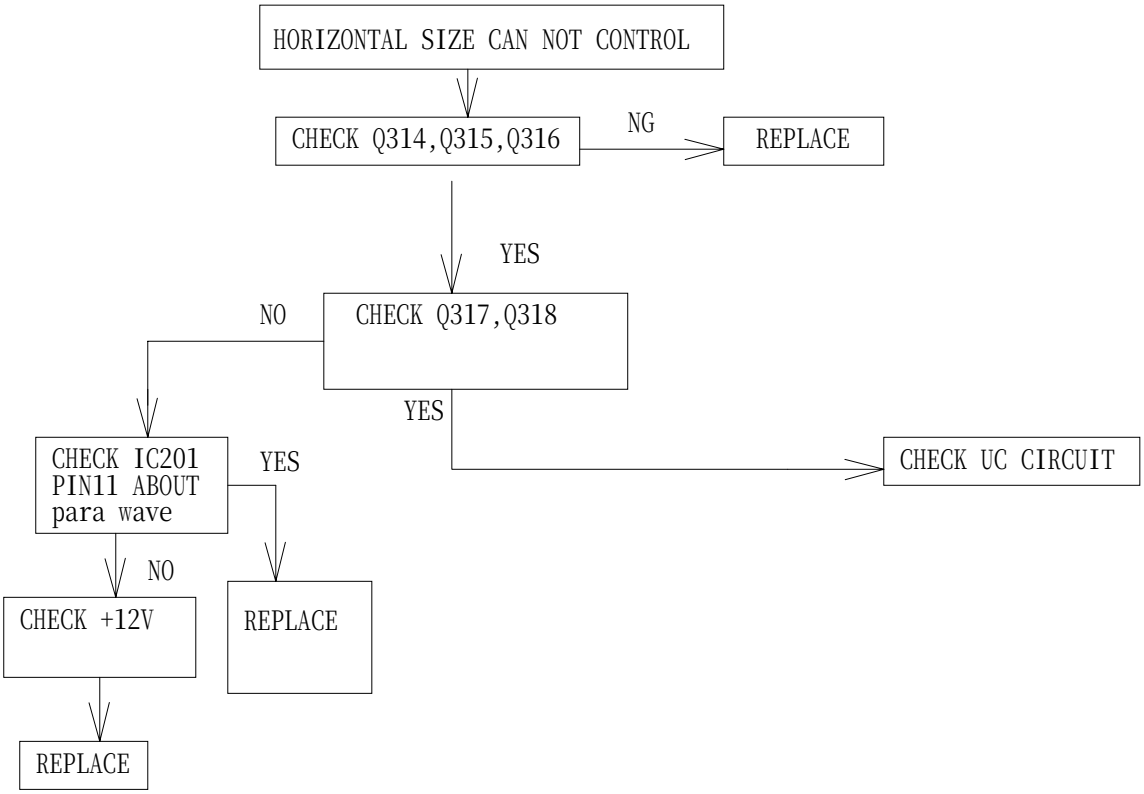
9. SPOT KILLER NG



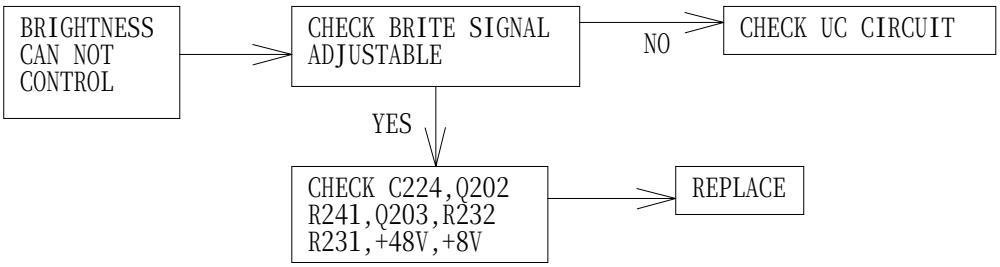
10. FOCUS NG


FOCUS NG
NG
CHECK IC201 PIN32 WAVEFORM
OK
OK
CHECK FOCUS TRACE
CHECK H-PARA SIGNAL C329,R327
CHECK Q321 FOCUS CKT
OK
NG
NG
NG
REPLACE
REPLACE
REPLACE COMPONENT
REPLACE IC201
NG
OK
CHECK CS-1,CS-2 SIGNAL FOIL TRACE

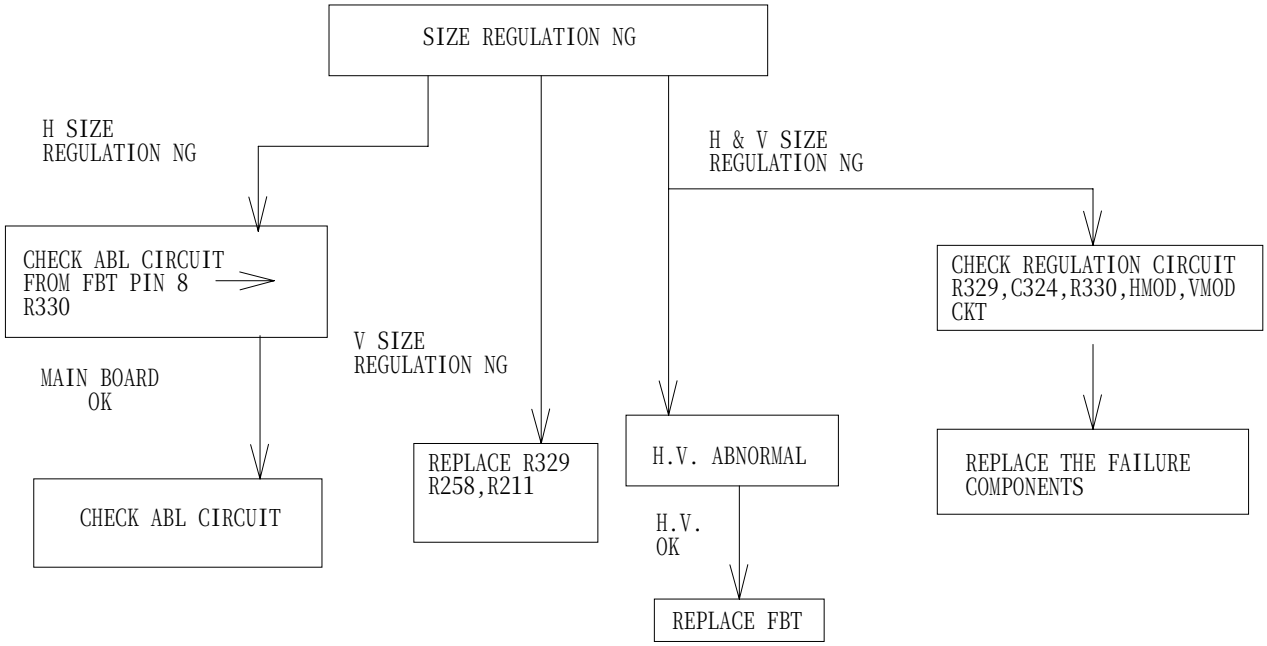
11. HORIZONTAL SIZE CAN NOT CONTROL



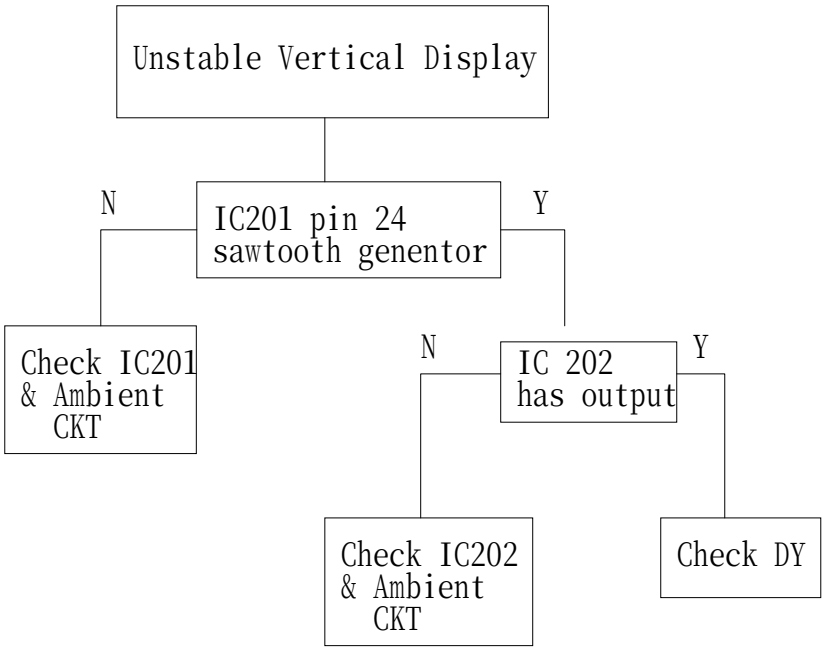
12.BRIGHTNESS CAN NOT CONTROL



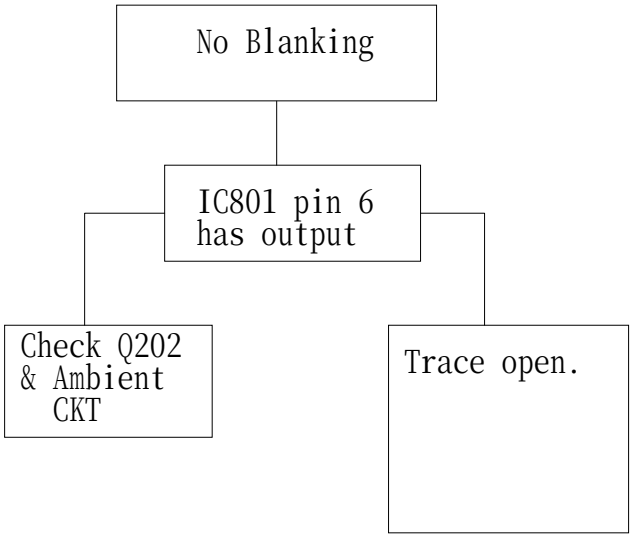
13. SIZE REGULATION NG

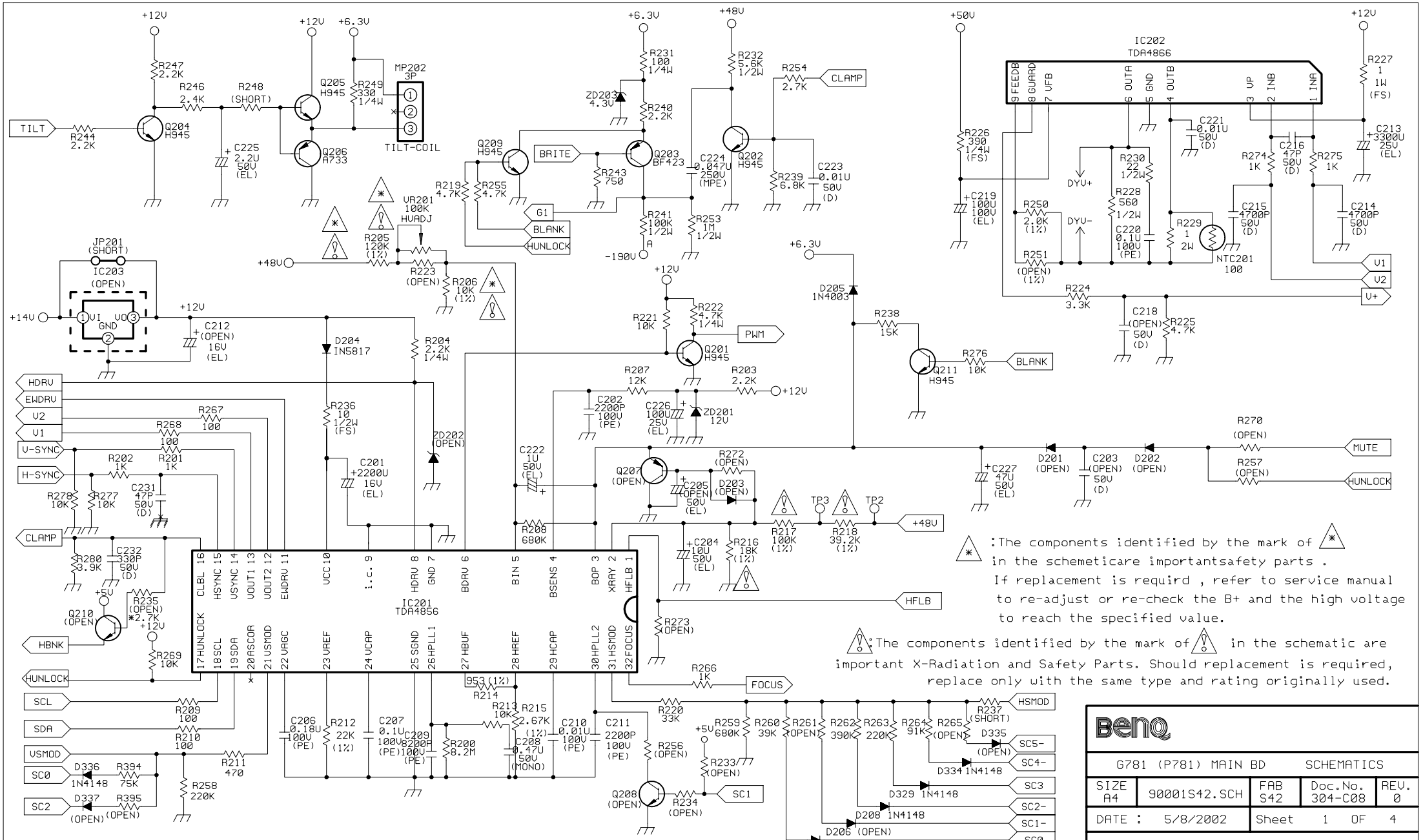


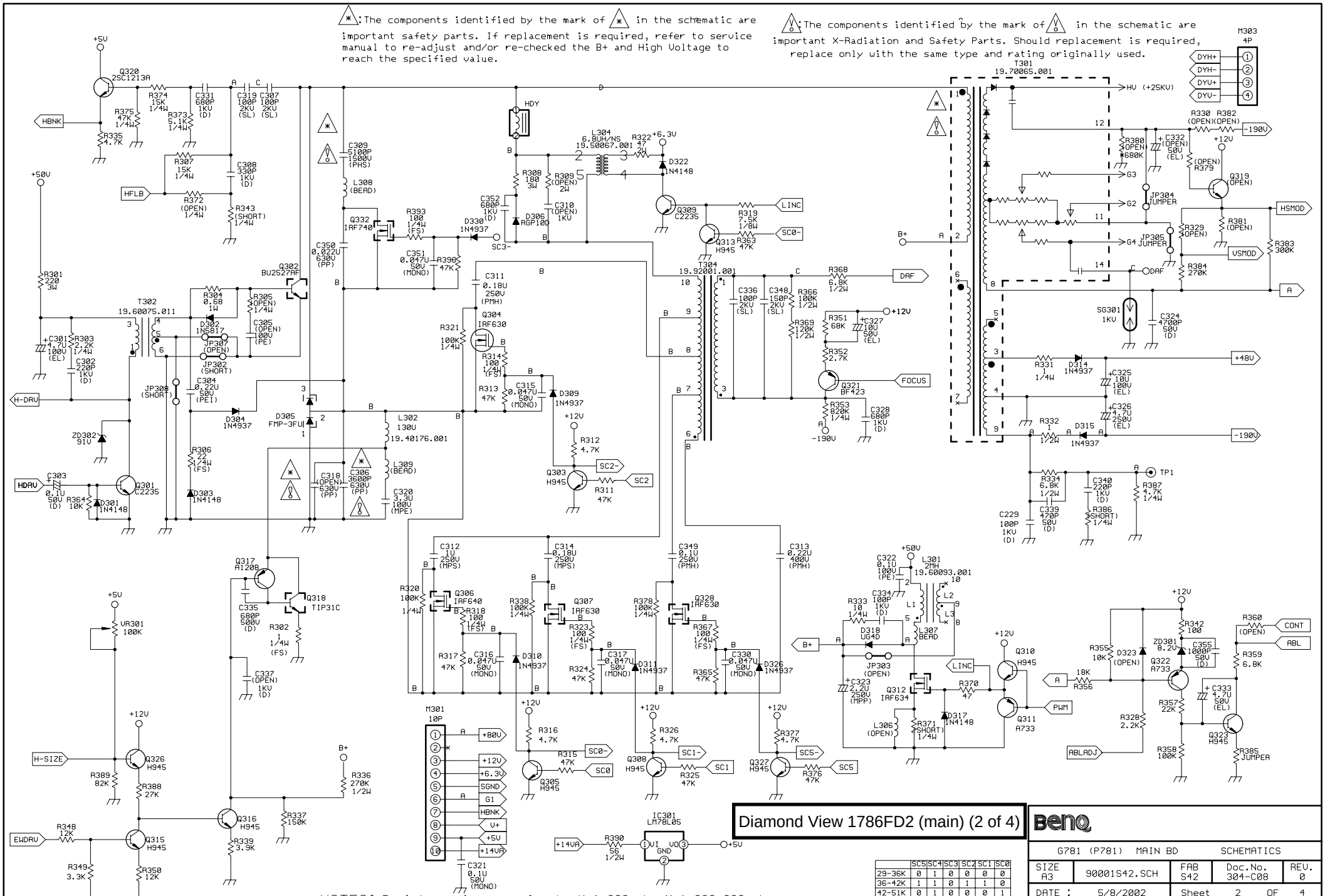
14.Unstable Vertical Display



15. No Blanking




IC201 TDA4856
IC202 TDA4866
IC203 (OPEN)
JP201 (SHORT)
MP202 3P
TILT-COIL
TILT
CLAMP
BRITE
BLANK
HUNLOCK
PWM
MUTE
HFLB
FOCUS
HSMOD
HDRV
EWDRV
V2
V1
V-SYNC
H-SYNC
HBNK
SCL
SDA
VSMOD
SC0
SC2
SC1
SC3
SC4-
SC5-
SC2-
SC1-
+12V
+6.3V
+48V
+50V
+14V
+5V
-190V
DYU+
DYU-
NOTES:
1. Resistor values are in ohm,K=1,000 ohm,M=1,000,000 ohm
2. All resistors are 1/8 watt,5% except where otherwise indicated
3. Represents PCB common ground.
: The components identified by the mark of in the schemeticare importantsafety parts . If replacement is requird , refer to service manual to re-adjust or re-check the B+ and the high voltage to reach the specified value.
: The components identified by the mark of in the schematic are important X-Radiation and Safety Parts. Should replacement is required, replace only with the same type and rating originally used.
BenQ
G781 (P781) MAIN BD SCHEMATICS
SIZE A4
90001S42.SCH
FAB S42
Doc.No. 304-C08
REV. 0
DATE : 5/8/2002
Sheet 1 OF 4
Project Code. 99.90071.001
Prepared By ANGEL HU 5/8/2002
Reviewed By RICHARD WU 5/8/2002
Approved By TONY CHANG 5/8/2002
Diamond View 1786FD2 (Main) (1 of 4)



Diamond View 1786FD2 (main) (2 of 4)

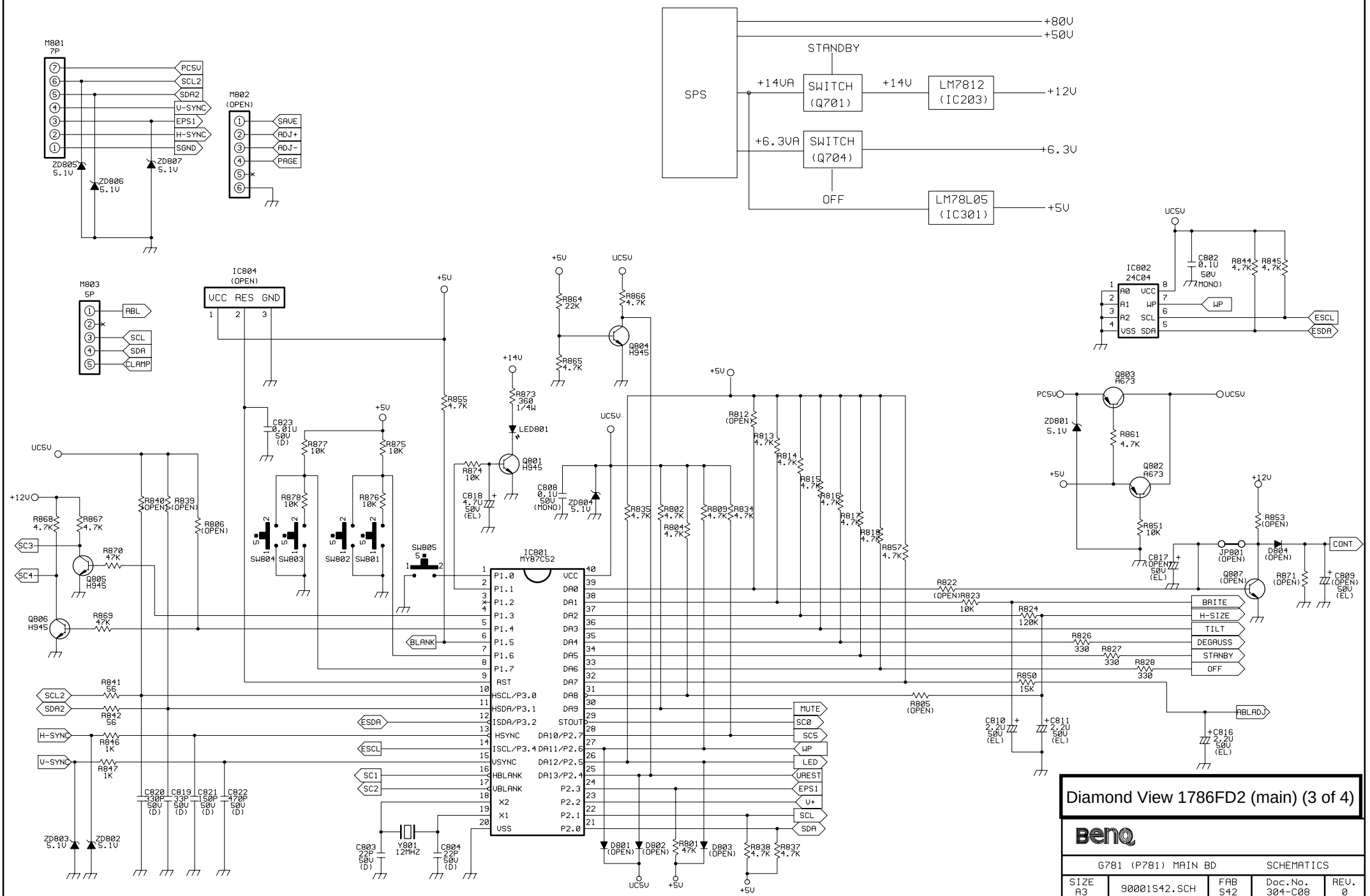
	SC5	SC4	SC3	SC2	SC1	SC0
29-36K	0	1	0	0	0	0
36-42K	1	1	0	1	1	0
42-51K	0	1	0	0	0	1
51-62K	0	1	0	0	1	1
62-73K	0	0	0	1	1	1
73-86K	1	0	1	1	1	1
86K-	1	0	1	1	1	1

BenQ

G781 (P781) MAIN BD SCHEMATICS

SIZE		FAB	Doc.No.	REV.
A3	90001S42.SCH	S42	304-C08	0
DATE : 5/8/2002		Sheet 2 OF 4		
Project Code. 99.90071.001				

Prepared By	Reviewed By	Approved By
ANGEL HU 5/8/2002	RICHARD WU 5/8/2002	TONY CHANG 5/8/2002

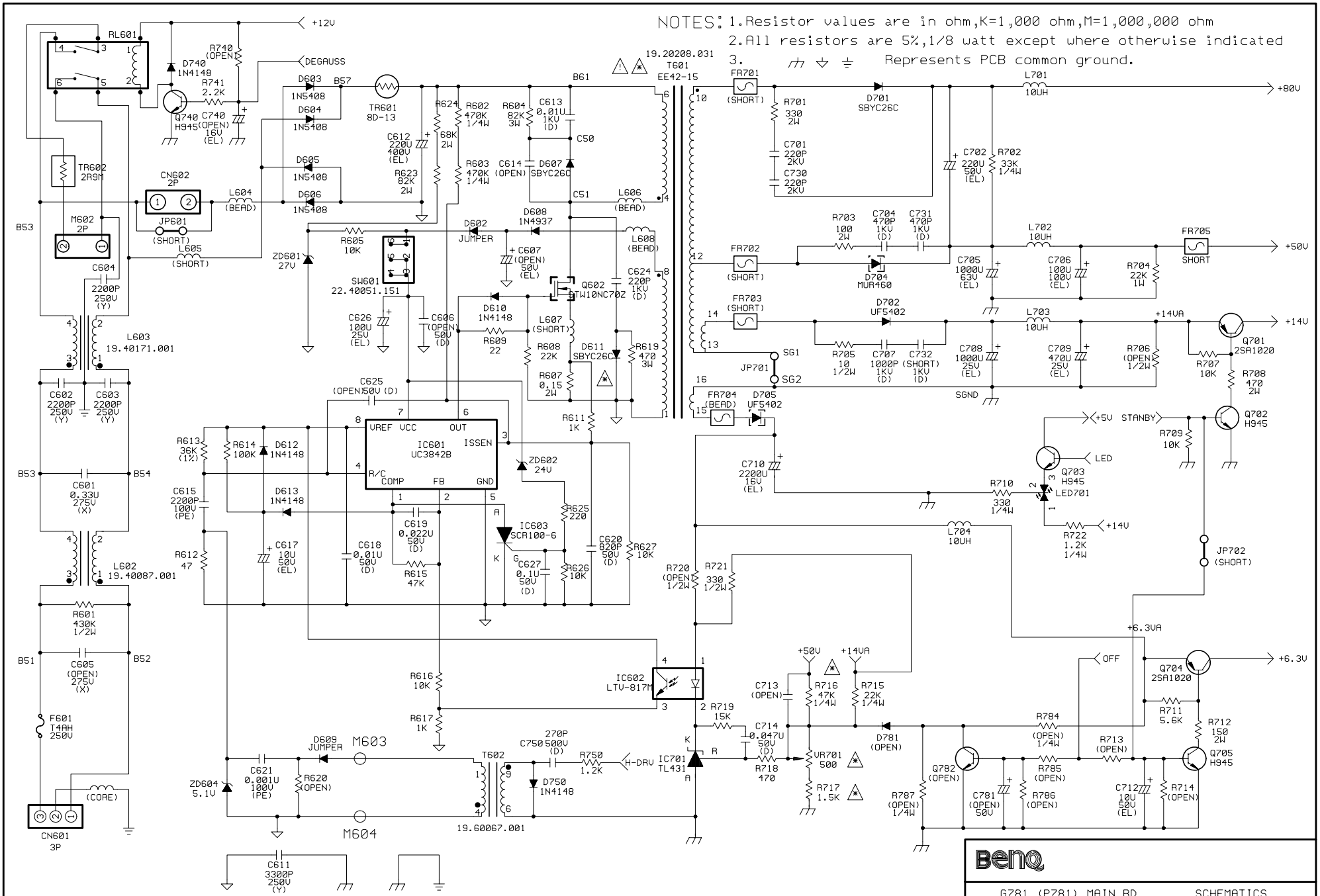


NOTES: 1. Resistor values are in ohm, K=1,000 ohm, M=1,000,000 ohm
2. All resistors are 1/8 watt, 5% except where otherwise indicated
3. ⏚ ⏚ ⏚ Represents PCB common ground.

Diamond View 1786FD2 (main) (3 of 4)

BenQ

G781 (P781) MAIN BD			SCHEMATICS	
SIZE A3	90001S42.SCH	FAB S42	Doc.No. 304-C08	REV. 0
DATE : 5/8/2002		Sheet 3 OF 4		
Project Code. 99.90071.001				
Prepared By	Reviewed By	Approved By		
ANGEL HU 5/8/2002	RICHARD WU 5/8/2002	TONY CHANG 5/8/2002		



⚠ : The components identified by the mark of ⚠ in the schematic are important X-Radiation and Safety Parts. Should replacement is required, replace only with the same type and rating originally used. T601.

✱ : The components identified by the mark of ✱ in the schematic are important safety parts. If replacement is required, refer to service manual to re-adjust and/or re-checked the B+ and High Voltage to reach the specified value. T601,R734,R735,VR701.

Diamond View 1786FD2 (Main) (4 of 4)

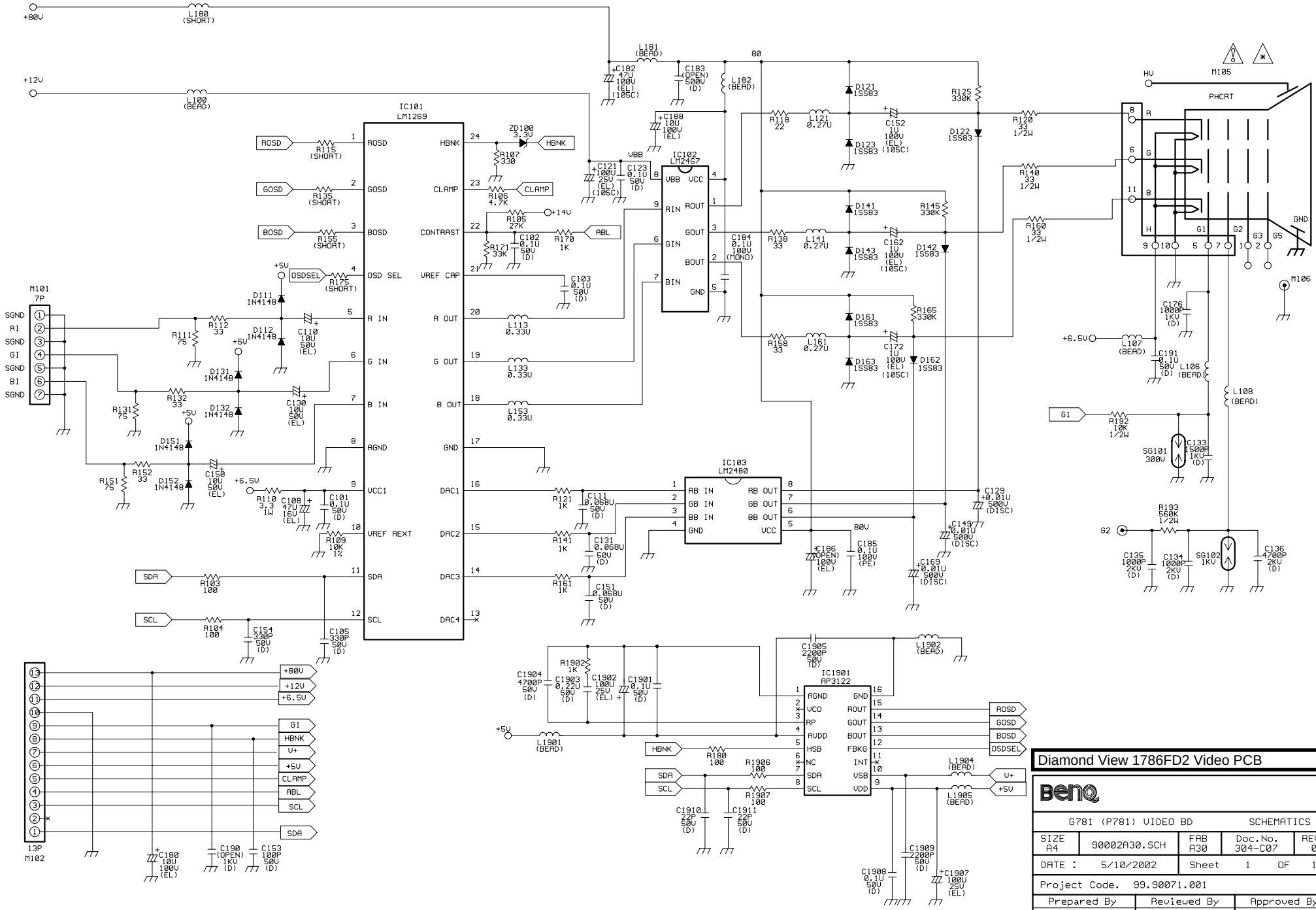
BenQ

G781 (P781) MAIN BD		SCHEMATICS		
SIZE A3	90001S42.SCH	FAB S42	Doc.No. 304-C08	REV. 0
DATE : 5/8/2002		Sheet 4 OF 4		
Project Code. 99.90071.001				
Prepared By	Reviewed By	Approved By		
ANGEL HU 5/8/2002	RICHARD WU 5/8/2002	TONY CHANG 5/8/2002		

⚠*: The components identified by the mark of ⚠* in the schematic are important safety parts. If replacement is required, refer to service manual to re-adjust and/or re-checked the B+ and High Voltage to reach the specified value.

⚠: The components identified by the mark of ⚠ in the schematic are important X-Radiation and Safety Parts. Should replacement is required, replace only with the same type and rating originally used.

NOTES:
1. Resistor Values are in ohm, k=1,000ohm, M=1,000,000ohm
2. All resistors are 1/8W, 5% except where otherwise indicated
3. ⏚ Represents PCB common ground.

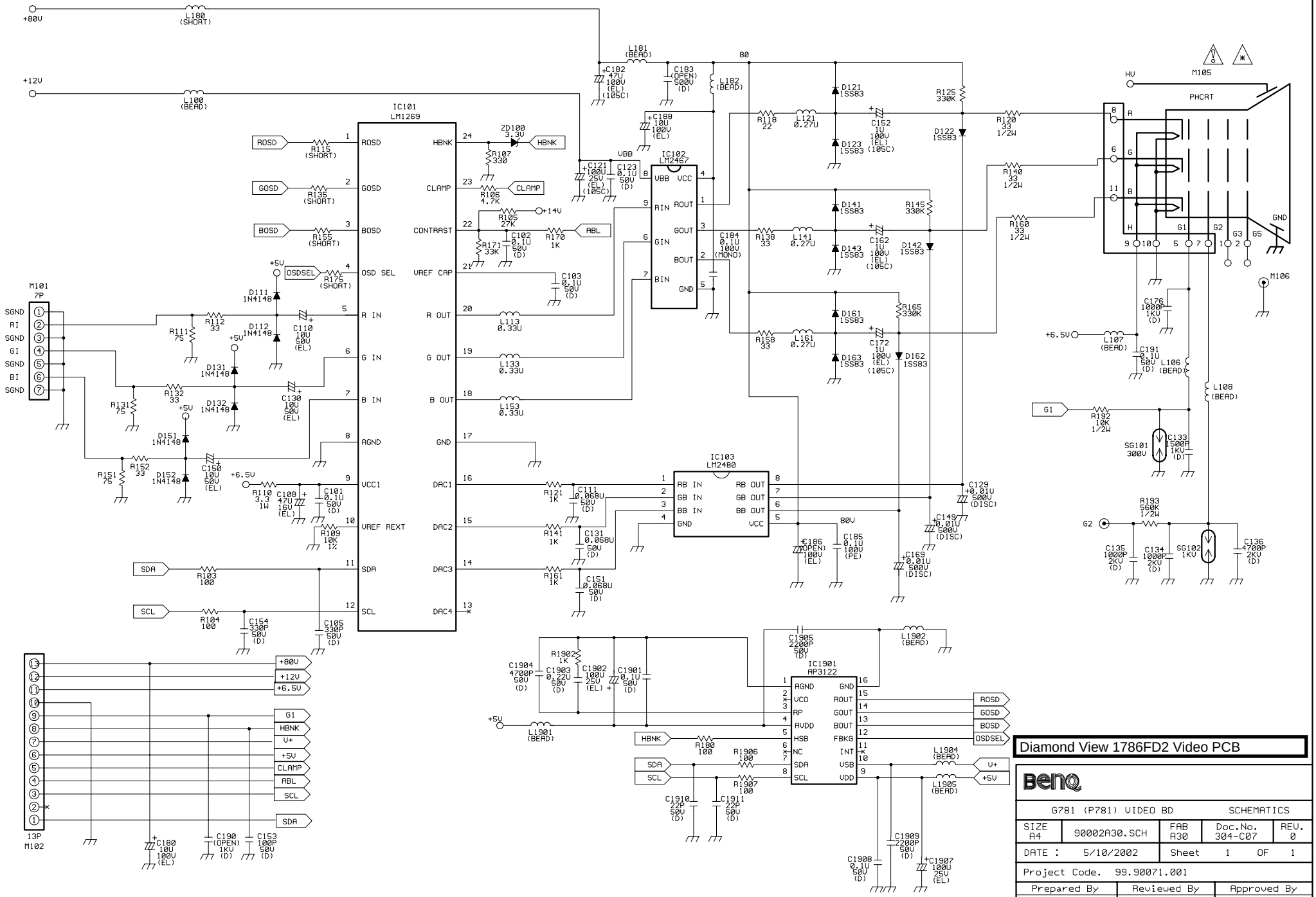


Diamond View 1786FD2 Video PCB				
BenQ				
G781 (P781) VIDEO BD			SCHEMATICS	
SIZE A4	90002A30.SCH	FAB A30	Doc.No. 304-C07	REV. 0
DATE : 5/10/2002		Sheet 1	OF 1	
Project Code. 99.90071.001				
Prepared By	Reviewed By	Approved By		
ANGEL HU 5/10/2002	RICHARD WU 5/10/2002	TONY CHANG 5/10/2002		

⚠*: The components identified by the mark of ⚠* in the schematic are important safety parts. If replacement is required, refer to service manual to re-adjust and/or re-checked the B+ and High Voltage to reach the specified value.

⚠: The components identified by the mark of ⚠ in the schematic are important X-Radiation and Safety Parts. Should replacement is required, replace only with the same type and rating originally used.

NOTES:
1. Resistor Values are in ohm, k=1,000ohm, M=1,000,000ohm
2. All resistors are 1/8W, 5% except where otherwise indicated
3. ⏚ Represents PCB common ground.



Diamond View 1786FD2 Video PCB				
BenQ				
G781 (P781) VIDEO BD			SCHEMATICS	
SIZE A4	90002A30.SCH	FAB A30	Doc.No. 304-C07	REV. 0
DATE : 5/10/2002		Sheet 1	OF 1	
Project Code. 99.90071.001				
Prepared By	Reviewed By	Approved By		
ANGEL HU 5/10/2002	RICHARD WU 5/10/2002	TONY CHANG 5/10/2002		