

MITSUBISHI

DIGITAL CONTROL 19 INCH MULTISYNC

FFT9905SKHFW

TROUBLE SHOOTING

SERVICE MANUAL

REPORT NO. TS980715

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1. Engineering specification

- Application
- Construction
- Charge of Working (Testing , Maintenance , Other)
- Approval of “Cosmetic Parts and Accessories”
- Requirement for Performance
- Power Supply Voltage
- Environment Condition
- Color/Plating
- Logos and Label
- Packaging
- Accessories
- Inspections Items
- Environment Test
- Tender Documents
- Others

FFT9905SKHFW ENGINEERING SPECIFICATION

1. Application These specifications shall be applied to purchase the 19" color display monitor (Model name FFT9905SKHFW).

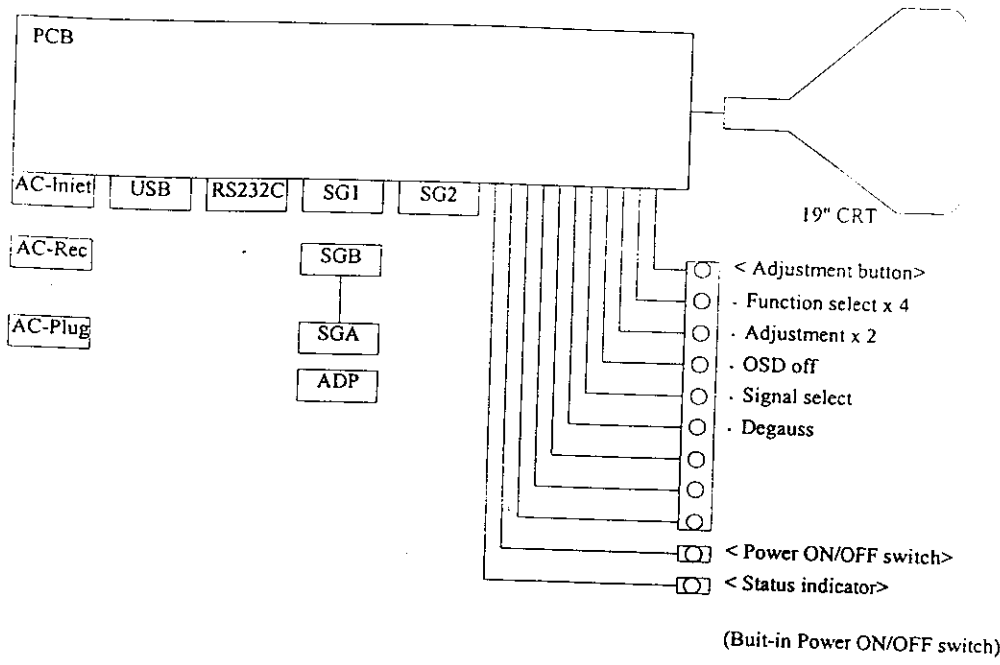
2. Construction Construction drawing is as Fig. 2-1.

Construction is as follows:

1) Tube	Type	ZENTAN tube: M46LNS180X18
	Size	19" (46cm)
	Base angle	100°
	Phosphor	Crystal Pigment
	Faceplate Treatment	Advanced Anti-Glare, Anti-Reflection and Anti-Static coating (A-AGRAS)
	Transmission Ratio	46%
	Dot Pitch	0.25mm
	Deflection Yoke	MEY46KHA2

- 2) PCB Assy
- 3) Signal cable, AC inlet
- 4) Metal plates
- 5) Cabinet, T/S stand
- 6) Degauss coil, Earth wire

Fig.2-1 Construction Drawing



Note: The name of connectors in this figure are assigned for purposes of convenience, but they don't mean the symbol silk printed on the connectors.

< Connectors of unit >

- AC-inlet : IEC 3p male AC
- USB : HEC0630-01-010 (Hoshiden) or equivalent
- RS232C : mini DIN 8p female
- SG1 : mini D-SUB 15p female
- SG2 : BNC 5pcs

< AC power cable >

W/W

- AC-Rec : IEC 3p female AC
- AC-plug : 3p plug

Japan

- AC-Rec : IEC 3p female AC
- AC-plug : T Mark 2p male AC with GND wire

< Signal cable >

- SGA : mini D-SUB 15p male
- SGB : mini D-SUB 15p male

< Adaptor >

- ADP : Machintosh adaptor

3. Charge of Working

Described in the Tables of Principal items.
However,

- (1) In case purchaser requests its original supplement function, in conformity with these specification, manufacturer shall confirm this supplement function, design and manufacturing through meeting.
- (2) Regarding the functional or performance troubles, the countermeasure must be worked out through discussion between purchaser and manufacturer.
- (3) Regarding details of inspection and quality control, manufacturer shall discuss with inspection section and quality assurance section of purchaser. Refer to section 5, 13 and 14 for details.
- (4) Regarding details of maintenance, manufacturer shall discuss with maintenance section of purchaser.
- (5) Quality control system of manufacturing must be in conformity with ISO-9001 or ISO-9002.
- (6) Manufacturer must show to purchaser the factories that manufacture this model and in the event, that the factory has to be moved to other place, manufacturer must inform the purchaser. Additionally, if purchaser judges that the investigation of the factory is necessary, manufacturer must comply with this requirement.

4. Approval of "Cosmetic parts and accessories"

Following items must be submitted to purchaser (MITSUBISHI) and gotten approval from purchaser (MITSUBISHI).

- (1) Brand Logo
- (2) Spec. Label
- (3) Carton Box
- (4) Carton Labels
- (5) Warranty Card
- (6) Packing materials
- (7) User's Guide
- (8) Signal cable
- (9) Power cord
- (10) OSD indication
- (11) Mac adapter

5. Requirement for performance

5.1 Function, Performance, Operation, Described in section 5 and 6

5.2 General Specification

Items	Specifications
Dimensions	(Width) 470mm x (Height) 468mm x (Depth) 408mm (including T/Stand) Signal Cable : 1,800 ± 50mm AC power supply cord : 2,500 ± 50mm
Weights	Net weight : app. 24.5kg Shipping weight : app. 29.0kg
Isolation (insulation resistance)	More than 10Mohm at DC500V between AC input and FG.
Withstand voltage	AC 1500V 50/60Hz, 2.0sec. between AC input and FG.
Leakage current	Leakage current must be less than 3.5mA
Environmental conditions	Operate Temperature : 5~35deg Relative Humidity : 10~90% without condensation Altitude : 3,000m (10,000ft) Storage & shipment Temperature : -20~60deg Relative Humidity : 10~95% without condensation Altitude : 12,800m (40,000ft)
Regulatory approvals	Safety : UL, C-UL, TUV-GS EMC : FCC-B, DOC-B, EN55022-B, EN50082-1, EN61000-3-2, EN61000-3-3, VCCI-2 Guide line for suppression of harmonics in appliances and general use equipment X-Ray : DHHS, HWC, ROV ELF/VLF : MPR-2, TCO'91 Power management : Energy Star, NUTEK Ergonomics : TUV-ERGO Miscellaneous : TCO'95, CE-Marking
DC power supply	6.2V, 2.2A can be supplied from monitor to USB HUB. Over current protector can be work.

5.3 Operating condition

(1) Mean Time Between Failure

The MTBF of the display unit shall be longer than 49,000 hours under MIL-HDBK-217E.

Manufacturer shall tender calculation data and DEMO-MTBF data which is based on the MIL-STD-781C.

(2) CRT Lifetime

The lifetime of cathode ray tube shall be longer than 10,000 hours.

The lifetime of cathode ray tube shall be defined as a period between the beginning of use and the time when its brightness decreases to 70% of its beginning.

Heater voltage at normal operation mode shall be applied 6.0 (or -6.0) ± 0.2 Vrms.

Heater voltage at power saving mode shall be applied 4.0-6.2Vrms (or -6.2 ~ -4.0 Vrms).

5.4 Functional Specification

5.4.1 Test Condition

All the tests to verify the specification in this section must be performed under the following standard conditions unless otherwise noted. The standard conditions are :

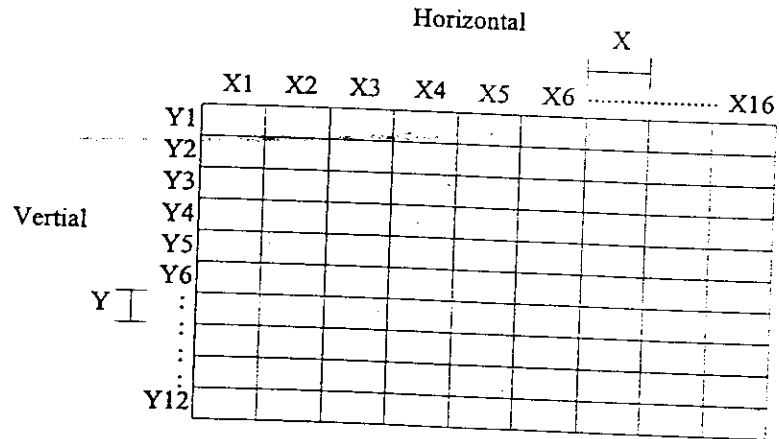
Temperature	: 25°C
Magnetic field	: Hor.: 0mT, Vert.: 0.040mT (For Australia -0.05mT, S'pore -0.01mT) : No additional magnetic field in near side.
AC input voltage	: AC 120V \pm 10%, 60Hz (W/W) : AC 240V \pm 10%, 50Hz (W/W) : AC 100V \pm 10%, 60Hz (Japan)
Warm up time	: 30 minutes (minimum)
Checking display mode	: All the presetting mode
Distance of watch	: 50cm
Brightness control	: center
Contrast control	: maximum

5.4.2 Display Quality

- (1) Frequency range (auto scanning)
 Horizontal : 30 ~ 95KHz
 Vertical : 50 ~ 152Hz
- (2) Display Data Area (at full white pattern)
 Horizontal : 340 ± 4mm
 Vertical : 255 ± 4mm
 Horizontal : 330 ± 4mm
 Vertical : 264 ± 4mm
 for 4:3 aspect ratio
 for 5:4 aspect ratio
- (3) Video Amplifier Performance
 Video Band width : 50Hz ~ 150MHz ± 3dB
 Resolution : 1600 dote x 1200 lines
- (4) Light Output (At timing 8)
 At 3" white block pattern : 135 ± 10cd/m²
 At full-white pattern : 105 ~ 125cd/m²
 At raster : 0.3 ± 0.2cd/m² at 9300K
 All the above is based on the conditions that Brightness at center and contrast at maximum Level.
- (5) High Voltage
 25KV (typical) at 0uA beam current
- (6) Linearity at crosshatch pattern
 - 1) Vertical Non-Linearity : 8% (max)
 : 5% (max) Adjacent
 - 2) Horizontal Non-Linearity : 8% (max)
 : 5% (max) Adjacent

The linearity measurement is as following Fig. 5-1.

Fig. 5-1 Linearity measurement



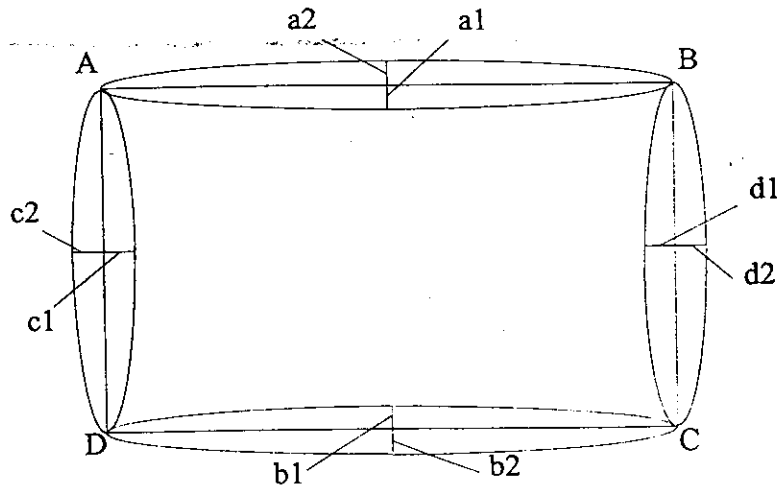
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- Horizontal : $\{(X_{max} - X_{min}) / X_{max}\} \times 100\%$
 Horizontal adjacent : $\{\text{Max} (|X1 - X2|, |X2 - X3|, \dots, |X5 - X6|) / X_{max}\} \times 100\%$
 Vertical : $\{(Y_{max} - Y_{min}) / Y_{max}\} \times 100\%$
 Vertical adjacent : $\{\text{Max} (|Y1 - Y2|, |Y2 - Y3|, \dots, |Y11 - Y12|) / X_{max}\} \times 100\%$
 Xmax, Ymax : This symbol shows one of the longest horizontal / vertical length of the display area which is divided by crosshatch pattern as shown above.
 Xmin, Ymin : This symbol shows one of the shortest horizontal / vertical length of the display area which is divided by crosshatch pattern as shown above.

(7) Geometric Distortion (at reverse cross-hatch pattern)

- | | | |
|-----------------------------------|------------------------------------|------------------------|
| 1) Side Pincushion | : 1.0mm (max.) | (as Fig. 5-2 c1 or d1) |
| 2) Side Barreling | : 0.5mm (max.) | (as Fig. 5-2 c2 or d2) |
| 3) Top / Bottom Pincushion | : 1.5mm (max.) | (as Fig. 5-2 a1 or b1) |
| 4) Top / Bottom Barreling | : 1.5mm (max.) | (as Fig. 5-2 a2 or b2) |
| 5) Vertical Trapezoid | : within 1.5mm frame | (as Fig. 5-3) |
| 6) Horizontal Trapezoid | : within 2.0mm frame | (as Fig. 5-3) |
| 7) Parallelogram | : within 1.5(H) / 2.0(V) mm frame | (as Fig. 5-3) |
| 8) Picture Centering | : 3.0mm (max.) at Timing 1,2,3 | (as Fig. 5-4) |
| | : 4.0mm (max.) at Timing 4,5,6,7,8 | |
| 9) Tilt | : 1.5mm (max.) | (as Fig. 5-5) |
| 10) Waviness / slope (Horizontal) | : 1.0mm (max.) / 50mm | |

Fig. 5-2 Pincushion & Barreling measurements



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A, B, C, D represented as display area

Top / Bottom Pincushion = (a1 or b1)

Top Bottom Barreling = (a2 or b2)

Side Pincushion = (c1 or d1)

Side Barreling = (c2 or d2)

Fig. 5-3 Trapezoid / Parallelogram measurements

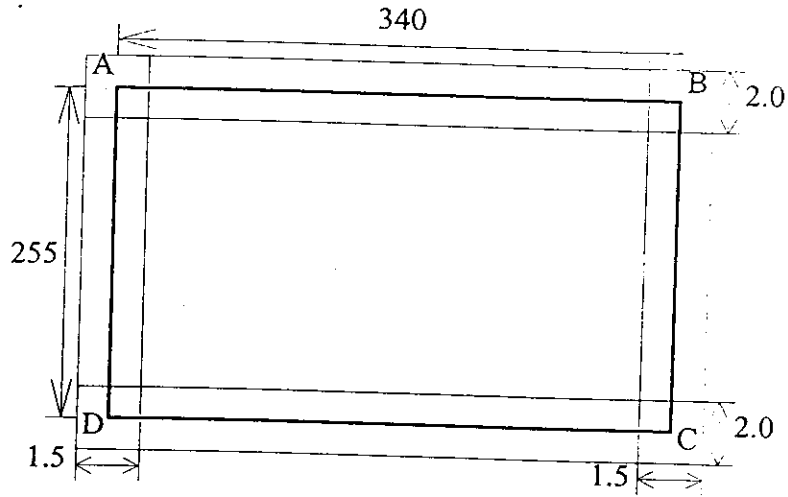
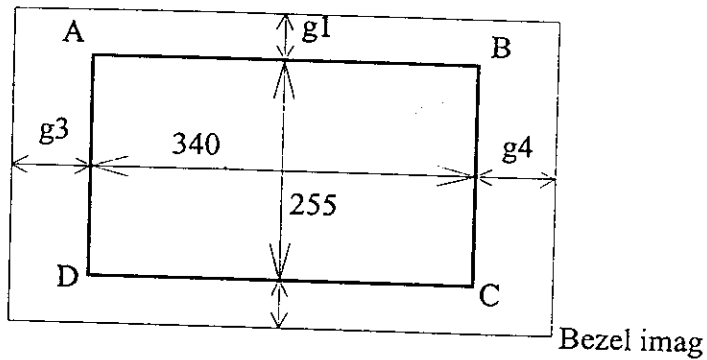


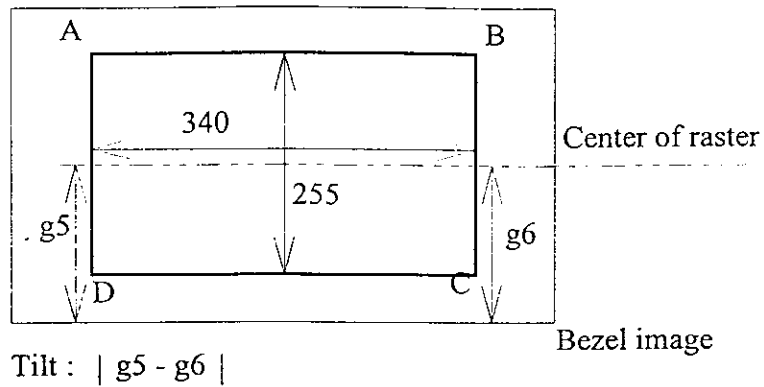
Fig. 5-4 Picture Centering measurements



Vertical centering : $| g1 - g2 |$

Horizontal centering : $| g3 - g4 |$

Fig. 5-5 Picture Tilt measurements



(8) Regulation

1) Static Regulation

Picture growth from minimum light output to maximum light output shall be less than 0.3%.

2) Dynamic Regulation

Picture growth shall be less than 1.0mm when picture is exchanged from Fig. 5-6 to Fig. 5-7.

Fig. 5-6

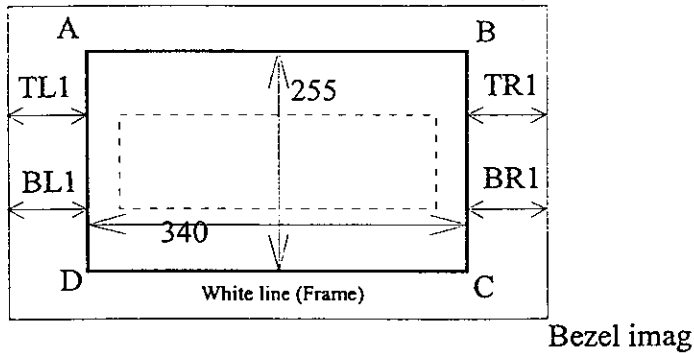
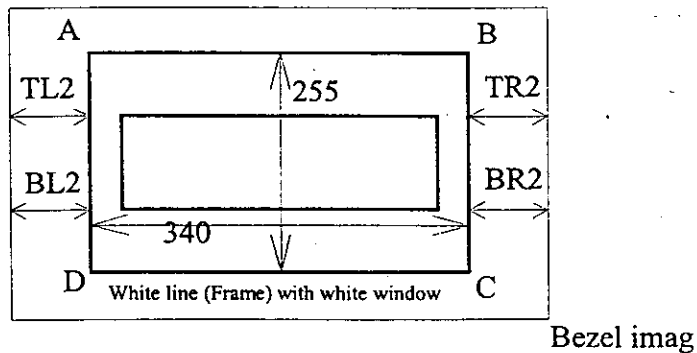


Fig. 5-6



$$\text{Dynamic Regulation } \begin{cases} | (TL2 - BL2) - (TL1 - BL1) | \\ | (TR2 - BR2) - (TR1 - BR1) | \end{cases}$$

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Condition:	White line size	340mm x 255mm
	White windows size	335mm x 55mm
	Brightness	Center
	Contrast	Maximum
	Timing	All preset Timing

(9) Focus

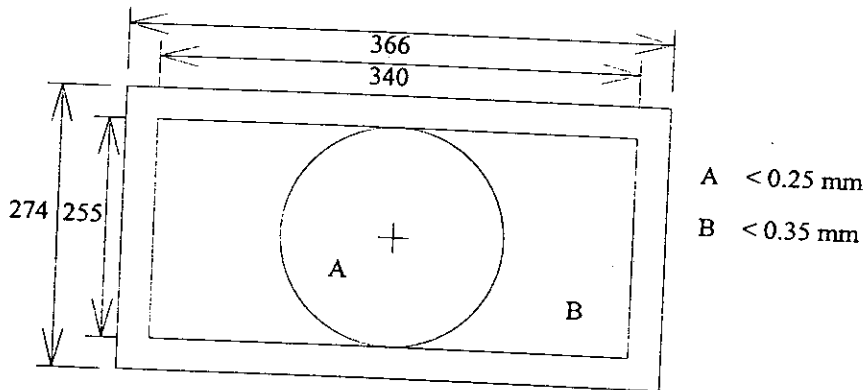
Input "mE" characters (5pixel x 7line) with white reverse pattern signal
 Entire screen must be readable with clearly discernible characters.
 (Focus at all point on the screen must be sharp and even throughout the screen)

Condition:	Screen size	340mm x 255mm	for 4:3 aspect ratio
		330mm x 264mm	for 5:4 aspect ratio
	Brightness	Center	
	Contrast	Maximum	
	Timing	All preset Timing	

5.4.3 Color Quality

(1) Misconvergence

Use crosshatch pattern to examine the convergence.
 The Misconvergence must strictly meet the requirements stated as follows.



(2) Moire

In the pattern of all green, all blue, all red or all white, moire is not allowed to appear.

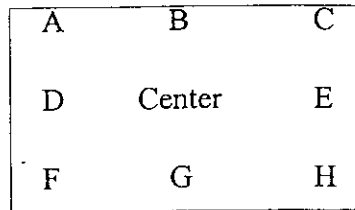
(3) Purity

Impurity should not appear in the pattern of all green, all blue, all red or all white.

(4) White Balance of white window

1) 9300K	2) 6500K	3) 5000K
X : 0.283 ± 0.015	X : 0.316 ± 0.015	X : 0.345 ± 0.015
Y : 0.297 ± 0.015	Y : 0.326 ± 0.015	Y : 0.359 ± 0.015

- (5) **Uniformity**
 When the full white pattern is displayed at preset condition, the difference in brightness Between center and eight positions must be less than 25% as indicated on the diagram Shown below.



- (6) **Color Tracking Error (only for "9300K")**
 When the white window pattern (approx. 70mm x 70mm) is displayed at preset condition, The difference of white balance between contrast max. and low contrast (25cd/m²) must be Less than following value.

$$| X \text{ (at cont. max)} - X \text{ (at 25cd/m}^2\text{)} | < 0.015$$

$$| Y \text{ (at cont. max)} - Y \text{ (at 25cd/m}^2\text{)} | < 0.015$$

- (7) **Magnetic Allowance**
 When the full red pattern is displayed at preset condition, impurity should not appear Within below range.

$$\text{Horizontal} : 0 \pm 0.04\text{mT}$$

- (8) **Stability over Operation Temperature Range.**

Display Size	H : $\pm 2\%$, V : $\pm 2\%$
Luminance Window, Full White	$\pm 10\%$
Color	X, Y : ± 0.015 (at center screen)
Display Centering	H : $\pm 4.0\text{mm}$, V : $\pm 4.0\text{mm}$

5.4.4 Controls

- (1) **User Controls**

- 1) Power ON / Off switch
- 2) Power on indicator
- 3) Degauss Button
- 4) Adjustment Button
- 5) Function Select Button
- 6) OSD Off Button
- 7) BNC/D-Sub Select Button

2) On Screen Display Function

All controls can be operated by OSD menu which is superimposed on the screen. (except power ON/OFF SW, Degauss and BNC/D-Sub Select Button)

The monitor shall allow quick OSD OFF function by pressing OSD Off Button

OSD indication is attached in Appendix-9.

5.4.5 Display timing set

(1) Presetting

To meet all the requirement of this specification, the display modes, with their details, shown in Table 5-1. Must be preset by factory.

When reset function on OSD menu is selected, picture's geometry should be over-written by factory adjustment condition.

(2) Factory preset area

There shall be 8 memory boxes which are used to memorize 8 display modes showed in Table 5-1, Each memory box shall contain adjustment items such as H-size, V-size, H-phase, V-center, Side-pincushion, Trapezoid.

They are pre-initialized by manufacturer in the factory and the user is not allowed to change these factory settings. All changes modified by user will be saved in user's area automatically, therefore no over-written of data in factory preset area is allowed.

(3) User settings

When user changes the display settings, such as H-size, H-phase, V-size, V-center, side-pincushion, Trapezoid, Brightness and Contrast, they will be saved when OSD menu disappears.

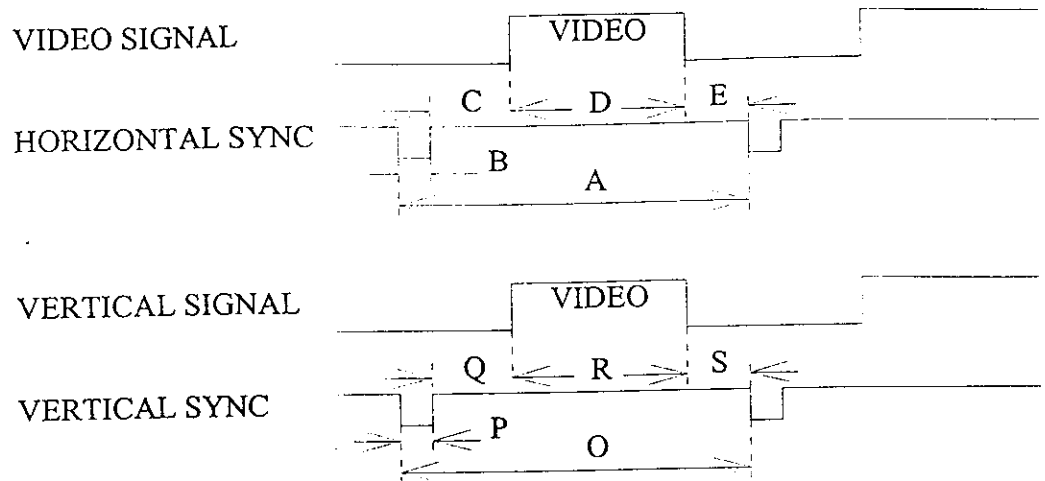
(4) User settings area

When user be 14 memory boxes are used to memorize 14 display modes, 8 from preset and 6 from other different modes.

The H-size, V-size, H-phase, V-center, Side-pincushion, Trapezoid of any memory box can be changed in this user setting area. Any timing that is different from the 8 preset ones is termed as user timing. This type of timing is allocated by the remaining 6 memory boxes.

If the number of user timing's inputs exceed the capacity (i.e. 6), it shall overlap from the 1st setting area of the 6 memory boxes.

TIMING OF INPUT SIGNALS



A : HITOTAL TIME

B : H-SYNC PULSE WIDTH

C : H-BACK PORCH

D : H-DISPLAY TIME

E : H-FRONT PORCH

O : V-TOTAL TIME

P : V-SYNC PULSE WIDTH

Q : V-BACK PROCH

R : V-DISPLAY TIME

S : V-FRONT PORCH

TABLE 5-1 FACTORY PRESET TIMINGS

MODE NO.	1	2	3	4	5	6	7	8
MODE NAME	VGA 640X 480	VESA 1024X 768	VESA 1280X 1024	VESA 640X 480	VESA 800X 600	VESA 1280X 1024	VESA 1600X 1200	APPLE 1152X 870
HORIZONTAL DOTS	640	1024	1280	640	800	1280	1600	1152
VERTICAL LINES	480	768	1024	480	600	1024	1200	870
PIXEL CLOCK (MHz)	21.175	78.75	135.00	31.5	49.05	157.5	202.5	100
HORIZONTAL FREQ (KHz)	31.47	60.023	79.976	37.50	46.875	91.146	93.75	68.681
SYNC. POLARITY	-	+	+	-	+	+	+	-
A H.TOTAL (us) (PIXELS)	31.778 (800)	16.660 (1312)	12.504 (1688)	26.667 (840)	21.333 (1056)	10.971 (1728)	10.667 (2160)	14.56 (1456)
B H.SYNC (us) (PIXELS)	3.813 (96)	1.129 (96)	1.067 (144)	2.032 (64)	1.616 (80)	1.016 (160)	0.948 (192)	1.280 (128)
C H.SYNC PORCH (us) (PIXELS)	1.907 (48)	2.235 (176)	1.837 (284)	3.810 (120)	3.232 (160)	1.422 (224)	1.501 (304)	1.44 (144)
D H.ACTIVE (us) (PIXELS)	25.422 (640)	13.003 (1024)	9.481 (1280)	20.317 (640)	16.162 (800)	8.127 (1280)	7.901 (1600)	11.52 (1152)
E H.FRONT PORCH (us) (PIXELS)	0.636 (16)	0.203 (16)	0.119 (16)	0.508 (16)	0.323 (16)	0.406 (64)	0.316 (64)	0.32 (32)
VERTICAL FREQ (Hz)	59.94	75.029	75.025	75.00	75.00	85.024	75.00	75.00
SYNC. POLARITY	-	+	+	-	+	+	+	-
O V.TOTAL (ms) (LINES)	16.684 (525)	13.328 (800)	13.329 (1066)	13.333 (500)	13.333 (625)	11.761 (1072)	13.333 (1250)	13.322 (915)
P V.SYNC (ms) (LINES)	0.064 (2)	0.050 (3)	0.038 (3)	0.080 (3)	0.064 (3)	0.033 (3)	0.032 (3)	0.044 (3)
Q V.BACK PORCH (ms) (LINES)	1.048 (33)	0.466 (28)	0.475 (38)	0.427 (16)	0.448 (21)	0.483 (44)	0.491 (46)	0.568 (39)
R V.ACTIVE (ms) (LINES)	15.254 (480)	12.795 (768)	12.804 (1024)	12.800 (480)	12.800 (600)	11.235 (1024)	12.800 (1200)	12.667 (870)
S V.FRONT PORCH (ms) (LINES)	0.318 (10)	0.017 (1)	0.013 (1)	0.027 (1)	0.021 (1)	0.011 (1)	0.011 (1)	0.044 (3)
SCANTYPE INTERLACED	NO	NO	NO	NO	NO	NO	NO	NO

5.4.6 EDID DATA TABLE

Head 8 bytes

Address	Bytes	Header
00H	1	00H
01H	1	FFH
02H	1	FFH
03H	1	FFH
04H	1	FFH
05H	1	FFH
06H	1	FFH
07H	1	00H

Vendor/Product ID information 10bytes

Address	Bytes	Vendor/Product Identification	Value
08H	2	ID Manufacture Name	" ⇨ 34ACH
0AH	2	ID Product Code	2042H
0CH	4	ID Serial Number	00000000H
10H	1	Week of Manufacture (0-53, 0 for n/a)	MFG Week 00H
11H	1		MFG Year 08H

ID PRODUCT CODE FOR JAPAN(DB-995 MJ 0001) : 7042H

ID PRODUCT CODE FOR WORLDWILD (US,EU,UK/DB-995 MP 0001) : 2042H

EDID Version/Revision 2 bytes

Address	Bytes	Description	Value
12H	1	Version	01H
13H	1	Revision	01H

Basic display parameters and features 5 bytes

Address	Bytes	Basic display parameters/features	Value
14H	1	Video input definition	0EH
15H	1	Max. H. Image size	43CM ⇨ 22H
16H	1	Max. V. Image size	25CM ⇨ 19H
17H	1	Gamma	2.79 ⇨ B3H
18H	1	Feature Support (DPMS)	E08H

Video input definition

bit7 : analog ⇨ 0
 bit6,5 : 0.7/0.3 ⇨ 00
 bit4 : setup ⇨ 0
 bit3 : support separate sync. ⇨ 1
 bit2 : support composite sync. ⇨ 1
 bit1 : support sync. on green. ⇨ 1
 bit0 : support serration of v-sync. ⇨ 0
 Byte : → 00001110 → 0EH

Gamma = 2.79

(Gamma * 100) - 100 = 179 → B3H

Feature (DMPS)

- bit7 : Stand-by ⇔ 1
- bit6 : Suspend ⇔ 1
- bit5 : Active Off ⇔ 1
- bit4,3 : RGB color display ⇔ 01
- bit2,0 : Reserved ⇔ 000

Byte : → 11101000 → E8H

RGB phosphor or Filter Chromaticity 10 bytes

Address	Bytes	Color Characteristics	Value
19H	1	Red Green Low Bits	10100010 ⇔ 90H
1AH	1	Blue White Low Bits	01100010 ⇔ 28H
1BH	1	Red x 0.635	10100010 ⇔ A2H
1CH	1	Red y 0.333	01010101 ⇔ 55H
1DH	1	Green x 0.285	01001000 ⇔ 49H
1EH	1	Green y 0.605	10011010 ⇔ 9BH
1FH	1	Blue x 0.152	00100110 ⇔ 17H
20H	1	Blue y 0.068	00010001 ⇔ 11H
21H	1	White x 0.283	01001000 ⇔ 48H
22H	1	White y 0.297	01001100 ⇔ 4CH

- Red x : 0.635 ⇔ 0.1010001010
- Red y : 0.333 ⇔ 0.0101010100
- Green x : 0.285 ⇔ 0.0100100011
- Green y : 0.605 ⇔ 0.1001101011
- Blue x : 0.152 ⇔ 0.0010011011
- Blue y : 0.068 ⇔ 0.0001000101
- White x : 0.283 ⇔ 0.0100100001
- White y : 0.297 ⇔ 0.0100110000

Established Timings 3 bytes

Address	bit	Established Timings I	24H
23H	7	720 x 400 @70Hz	0
	6	720 x 400 @88Hz	0
	5	640 x 480 @60Hz	1
	4	640 x 480 @67Hz	0
	3	640 x 480 @72Hz	0
	2	640 x 480 @75Hz	1
	1	800 x 600 @56Hz	0
	0	800 x 600 @60Hz	0
Address	bit	Established Timings II	43H
24H	7	800 x 600 @72Hz	0
	6	800 x 600 @75Hz	1
	5	832 x 624 @75Hz	0
	4	1024 x 768 @87Hz	0
	3	1024 x 768 @60Hz	0

	2	1024 x 768 @70Hz	0
	1	1024 x 768 @75Hz	1
	0	1280 x 1024 @75Hz	1
Address	bit	Reserved Timing	80H
25H	7	1152 x 870 @75Hz	1
	6	reserve	0
	5	reserve	0
	4	reserve	0
	3	reserve	0
	2	reserve	0
	1	reserve	0
	0	reserve	0

NOTE: A BIT SET TO "1" INDICATES SUPPORT FOR THAT TIMING

Standard timing description

Address	Bytes	Description	Value
26H	2	1600 HORIZONTAL ACTIVE PIXELS VESA 1600x1200 @75Hz 4:3 ASECT RATIO 75Hz REFRESH RATE	A49FH A94Fh
28H	2	1280 HORIZONTAL ACTIVE PIXELS VESA 1280X960 @85Hz 4:3 ASECT RATIO	8159H
2AH	2	NOT USER	0101H
2CH	2	NOT USER	0101H
2EH	2	NOT USER	0101H
30H	2	NOT USER	0101H
32H	2	NOT USER	0101H
34H	2	NOT USER	0101H

NOTE : UNUSED FIELD IN THIS SECTION SHALL BE SET TO 01H
STANDARD TIMING IDENTIFICATION → (Hz. ACTIVE PIXELS/8)-31

H.ACTIVE : 640 PIXELS ⇒ 31H
800 PIXELS ⇒ 45H
1024 PIXELS ⇒ 61H
1152 PIXELS ⇒ 71H
1280 PIXELS ⇒ 81H
1600 PIXELS ⇒ A9H

IMAGE ASPECT RATIO → REFRESH RATIO (Hz)-60

BIT7	BIT6	BIT5 → BIT0
0	0	1:1 ASPECT RATIO 85Hz : 85-60 = 25 ⇒ 011001
0	1	4:3 ASPECT RATIO 60Hz : 60-60 = 0 ⇒ 000000
1	0	5:4 ASPECT RATIO 75Hz : 75-60 = 15 ⇒ 001111
1	1	16:9 ASPECT RATIO 70Hz : 70-60 = 10 ⇒ 001010

4:3 60Hz → 01000000 ⇒ 40H
4:3 70Hz → 01001010 ⇒ 4AH
4:3 75Hz → 01001111 ⇒ 4FH
4:3 85Hz → 01011001 ⇒ 59H
5:4 60Hz → 10000000 ⇒ 80H
5:4 85Hz → 10011001 ⇒ 99H

Detailed timing description-18BYTES EACH

• EDID VERSION 1 REVISION 0 (VESA 1600x1200 @ 75Hz)

Address	Bytes	Detailed	Value
36H	1	(Pixel Clock/10000), LSB first	1A4F
38H	1	Horizontal Active pixels, lower 8 bits	40
39H	1	Horizontal Blanking pixels, lower 8 bits	30
3AH	1	H. Active/H.Blanking upper nibble-upper 4 bits of H. Active Lower nibble-upper 4 bits of H. Blanking	62
3BH	1	Vertical Active lines, lower 8 bits	B0
3CH	1	Vertical Blanking lines, lower 8 bits	32
3DH	1	V. Active/V. Blanking upper nibble-upper 4 bits of V. Active lower nibble-upper 4 bits of V. Blanking	40
3EH	1	H. Sync offset pixels, from blanking starts, lower 8 bits	40
3FH	1	H. Sync pulse width pixels, lower 8 bits	C0
40H	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
41H	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 width	00
42H	1	H. Image size mm, lower 8 bits	54
43H	1	V. Image size mm, lower 8 bits	FF
44H	1	H/V Image size upper nibble-upper 4 bits of H. Image size lower nibble-upper 4 bits of V. Image size	10
45H	1	H. Border Pixels	00
46H	1	V. Border Lines	00
47H	1	Flags	1E

- Pixel clock = 36.00 MHz ⇨ 0E10H
- H. Active = 640 pixels ⇨ 0280H
- I. Blanking = 192 pixels ⇨ 00C0H
- V. Active = 480 lines ⇨ 01E0H
- VI. Blanking = 29 lines ⇨ 001DH
- H. Sync offset = 56 pixels ⇨ 0038H
- I. Sync pulse width = 56 pixels ⇨ 0038H
- V. Sync offset = 1 lines ⇨ 0001H

VI. Sync pulse width = 1 lines ⇨ 0003H
 H. Image size = 360mm ⇨ 0168H
 V. Image size = 270mm ⇨ 010EH
 H. Border = 0 ⇨ 0000H
 V. Border = 0 ⇨ 0000H
 bit 7 : Non-interlaced ⇨ 0
 bit 6,5 : Normal display, No stereo ⇨ 00
 bit 4,3 : Digital separate ⇨ 11
 bit 2,1 : V. polarity = -, H. polarity = - ⇨ 00
 bit 0 : Reserved ⇨ 0
Flag = 18H = 00011000

Detailed timing description-18BYTES EACH

• EDID VERSION 1 REVISION 0()

Address	Bytes	Detailed	Value
48H	1		00
49H	1		00
4AH	1		00
4BH	1	Data Type Tag	FD
4CH	1		00
4DH	1	Monitor Range Limit Byte 5	32
4EH	1	Monitor Range Limit Byte 6	98
4FH	1	Monitor Range Limit Byte 7	1E
50H	1	Monitor Range Limit Byte 8	5F
51H	1	Monitor Range Limit Byte 9	16
52H	1	Gtf Data Byte 10	00
53H	1	Gtf Data Byte 11	0A
54H	1	Gtf Data Byte 12	20
55H	1	Gtf Data Byte 13	20
56H	1	Gtf Data Byte 14	20
57H	1	Gtf Data Byte 15	20
58H	1	Gtf Data Byte 16	20
59H	1	Gtf Data Byte 17	20

Address	Bytes	Detailed	Value
5AH	1		00
5BH	1		00
5CH	1		00
5DH	1	Data Type Tag	FC
5EH	1		00
5FH	1	Monitor Name Byte 0	39

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60H	1	Monitor Name Byte 1	30
61H	1	Monitor Name Byte 2	65
62H	1	Monitor Name Byte 3	0A
63H	1	Monitor Name Byte 4	20
64H	1	Monitor Name Byte 5	20
65H	1	Monitor Name Byte 6	20
66H	1	Monitor Name Byte 7	20
67H	1	Monitor Name Byte 8	20
68H	1	Monitor Name Byte 9	20
69H	1	Monitor Name Byte 10	20
6AH	1	Monitor Name Byte 11	20
6BH	1	Monitor Name Byte 12	20

ADDRESS 5FH TO 6BH

MONITOR NAME FOR JAPAN (DB-995 MJ 0001)

52H,44H,31H,39H,5AH,54H,0AH,20H,20H,20H,20H,20H,20H

MONITOR NAME FOR WORLDWILD (US,EU,UK/DB-995 MP 0001)

39H,30H,65H,0AH,20H,20H,20H,20H,20H,20H,20H,20H

Address	Bytes	Detailed	Value
6CH	1		00
6DH	1		00
6EH	1		00
6FH	1	Data Type Tag	FF
70H	1		00
71H	1	Monitor Serial Number	4E
72H	1	Monitor Serial Number	4E
73H	1	Monitor Serial Number	4E
74H	1	Monitor Serial Number	4E
75H	1	Monitor Serial Number	4E
76H	1	Monitor Serial Number	4E
77H	1	Monitor Serial Number	4E
78H	1	Monitor Serial Number	4E
79H	1	Monitor Serial Number	4E
7AH	1	Monitor Serial Number	0A
7BH	1	Monitor Serial Number	20
7CH	1	Monitor Serial Number	20
7DH	1	Monitor Serial Number	20

EXTENSION FLAG AND CHECKSUM

Address	Bytes	Description	Value
7EH	1	Extention flag	00H
7FH	1	Check sum	

6. Power Supply Voltage

Items	Specifications
Power Supply Voltage	Phase single AC90V ~ 264V
Power Supply Frequency	45 ~ 66Hz
Power Consumption	150W (1.5A: 100-120VAC, 0.9A: 220-240VAC) with USB load 130W without USB load
AC Power Supply Cord	2500mm ± 50mm
Input Current	1.5A (maximum) at 120V
Inrush Current Peak	Less than 50Ao-p at 264Vac with cold start

* Power Management unction

This model must have the power management function described as follows.



Mode	H-sync	V-sync	Power Consumption	Recovering Time	LED Status Indicator
Normal	Active	Active	< 130W without USB unit	-----	Green
Stand-by	Inactive	Inactive	< 90W	in an instance	Green
Suspend	Active	Inactive	< 12W	3 Sec	Orange
Off	Inactive	Inactive	< 8W	12 Sec	Orange

* All specification for power consumption are in worst case and without USB unit.

7. Environmental Conditions

No	Item	Test Condition	EUT	Criterion
1	Vibration	Sine Wave: 5-200Hz 0.5G (O-p) Reconvene Search and Dwell = 2min 5min. x 1 Resonances x 3axis Random: 5-200Hz 1.47Grms 30min. x 3axis = 90min	2sets	After Test Must have no damage on a. Cabinet b. Plastic parts (without whitening) c. PCB (Copper pattern, Solder) d. Lead Wire e. Screw f. Metal g. Component lead Cushion must not apart Before & After Test No shift between CRT and Bezel (0.5mm) No gap change between CRT and Bezel
2	Drop	61cm Height One Corner: Front/right(left)/under Three Edges: Front/Under Front/right(left) Right(Left)/Under Six Faces: 1. Front 2. Rear 3. Right 4. Left 5. Bottom 6. Upper	2sets	No screen performance change (Picture size & position, Luminance, Convergence)
3	Shock	Without Packing 6 surfaces with 30G (1 surface/1 set) $\Delta V = 678\text{cm/s}$	6sets	Under or after test Must have no fire and no smoke No components failure
4	Condensation	Keep 2hr at -20deg with no-operation Operate 1hr with normal condition	2sets	Off time : 30mS or less No picture change Auto recover is not accepted Off time : 40mS or more No picture change Auto recover is accepted No component failure
5	Line Failure	Off time: 10 mS - 150mS (10mS inc.) 160mS - 990mS (50mS inc.) On time: Get picture (around 3sec) Phase: 0 to 360deg. (search worst point) Voltage: Rated $\pm 10\%$ Test time 30Sec./each	2sets	No component failure No performance change No miss operation at 1KV or less Picture noise should be not so serious, and recovered automatically after AC line become normal
6	AC line noise	Line Interference Test Amplitude 1.3KV Pulse Width 50nS, 100nS, 400nS, 800nS Phase 0~360deg. Polarity + / - Test time 1min.	2sets	No component failure Miss operation should recover Automatically after removed ESD
7	ESD	Discharge Mode Single Discharge Volt. 10KV (Contact) with Signal Test Point All of the EUT surface R/C 330ohm/150pF Discharge Mode Single Discharge Volt. 5KV (Contact) Without Signal Test Point Signal connector & AC Inlet pins R/C 330ohm/150pF	2sets	No component failure No S/W damage No EEPROM data damage
8	Leakage Current		2sets	< 0.25mA (at 100VAC)
9	Isolation resistance		2sets	> 10Mohm
<p>Note : For vibration and drop tests, the same packaged monitor without changing cushion and carton box will be tested in sequence of vibration test and followed by drop test.</p>				

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No	Item	Test Condition	EUT	Criterion
10	Strife	50deg. -20deg. 52 cycles Temperature (Two chambers are required) 	2sets	After test at normal condition All performance should be in specification No serious deformation, break, and rust are found on Cabinet and motel parts. Detailed criteria is attached
11	Heat Shock	With packing 60deg. : 2hr -20deg. : 2hr 4 cycles (Two chambers are required) 		
12	High temp. storage	With packing 60deg. 60% RH 1 week		
13	Low temp. storage	With packing -20deg. 1 week		
14	High humidity storage	With packing 40deg. 90% RH 1 week		
15	Arcing	Each pin 300 Times except filament Spark Method With C/R (Capacitor value = CRT max. spec.)	2sets	No component failure No miss operation (Should recovery by automatically) Must have no latch up Must have no S/W hang up *Laser spark test should be applied
	Laser spark	Each pin 50 Times except filament		
16	Power on/off	Power = On - Off (5sec each) at 90/264VAC, 40deg. 20000cycles	2sets	No component failure No EEPROM data destroy
	Mode change	Mode = Low Fh-High Fh-Low Fh-DPMS (5sec each) at 100/240VAC, 40deg. 20000cycles	2sets	
17	Performance	By Delta Spec.	2sets	With in Spec * Focus and distortion should be same as MITSUBISHI level
18	Temperature drift	Base on 25deg. Compare 0deg. And 40deg. Ta = 0deg. Low temperature power up	2sets	Picture size < 1.5% Picture position < 4mm Brightness < 0.3cd/m ² Contrast > 10% No miss operation and no too long Power on time at low temperature
19	Inrush Current	Cold Start	2sets	< 50Ao-p at 264VAC (< 80Ao-p at 264VAC, Hot etart)
20	Lift Drift	16days: 90VAC, 17days: 264VAC	32sets	No component failure No picture drift Can be adjusted to original condition by front panel Solder condition Visual check by 100 to 200 scale of magnifying scope
21	High temp. life test	Contrast & Brightness = Maximum Ta = 40 ± 5deg. 45min: on, 15min: off duration: 33days (eq. to MTBF = 50000hr)		
22	Low pressure	25deg. 10000feet (3040m) 40deg. 7000feet (2128m)	1sets	No component failure No miss operation

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- 8. Color / Plating Cabinet color must be designated by purchaser
Color code : Apple platinum gray
- 9. Loges and Labels Loges and Labels must be designated by purchaser.
For details, refer to Appendix-1 and 2.
- 10. Packaging Manufacturer's standard carton box, and printing item are designated by purchaser.
For details, refer to Appendix-3, 4 and 6.
- 11. Accessories and Printing item
See Attached 1

Note 1 : Above parts must be followed to the approval procedure stated in "4. Approval of Cosmetic parts and accessories".

Note 2 : Shipping destination is below.

US : USA / CANADA

EU : HONG KONG / UNITED KINGDOM / GERMANY / FRANCE / ITALY

Note 3 : 4 Languages of user's guide are English, German, French and Ltsalian.

- 12. Inspections items Manufacturer shall define the concrete inspection items and its method which are used by their QC outgoing section. Details of each item shall be explained in quality meeting.
- 13. Environmental test Test Report shall be submitted including the following items in compliance with purchaser's request.
Manufacturer shall define the concrete environmental test item and its method, and they shall be explained in quality meeting.

Test items	Substance, method
1. Temperature Test	Operate at the temperature cycle within the limit of operate condition defined at section 7.
2. Power Une interference Test	Test under the condition that defined at section 7.
3. Arcing Test	Test under the condition that defined at section 7.
4. Electrostatic discharge Test	Test under the condition that defined at section 7.
5. Vibration Test	Test under the condition that defined at section 7.
6. Drop test	Test under the condition that defined at section 7.
7. Shock Test	Test under the condition that defined at section 7.

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14. Tender Document Described in the Table in Principle items (pages 2,3).
Manufacturer shall tender the required document immediately which defined on the body.
Manufacturer shall comply to the purchaser's requirement for document that are not defined on the body which is agreeable with the manufacturer.
15. Others
- (1) If system unit has some dangerous points for operation or maintenance, the matter comes into question which does not defined on these, manufacturer shall notify purchaser and ask for instruction.
 - (2) When entertain a doubt about the description on these specifications, or when the matter comes into question which does not defined on these, manufacturer shall notify purchaser and ask for instruction.
In this case, purchaser will sometimes request manufacturer to attend a meeting.
 - (3) Manufacturer must not leak these purchaser specifications to third parties.
 - (4) When purchaser intends to revise these specifications, purchaser will discuss with manufacturer over its application.
 - (5) Manufacturer's submitted documents and manuals will be sometimes used as purchaser's materials and submitted to end user by quoted or rewritten.
Manufacturer shall approve this.

2. OSD (On Screen Display) Function Control Method

- Contrast
- Brightness
- Color-Temperature
- Information
- H-Size
- H-Phase
- V-Size
- V-Position
- Side-Bow
- Key Stone
- PIN-Balance
- KEY-Balance
- H-MOIRE
- V-MOIRE
- Rotation
- Geometry Reset
- Power-Save
- Video Level
- CLAMP-POSITION
- USB PORT SELECT

USER CONTROLS

3.1 Control Names

See Figure 6 and 7 for the location of the following user controls and indicators. Each control is identified by number and is described individually on page 14.

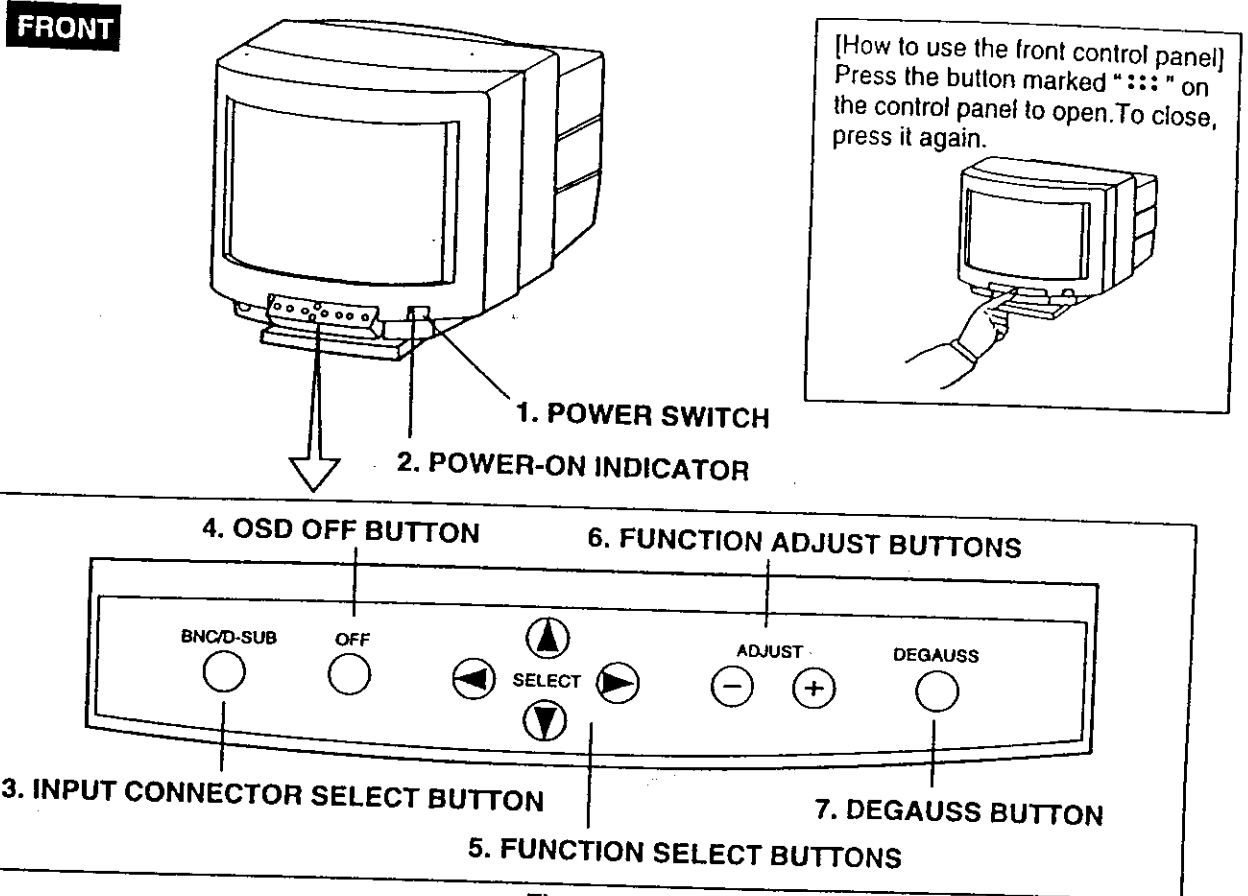


Figure 6

3.2 Function

1. **POWER SWITCH:** A push-on push-off switch for AC power.
2. **POWER-ON INDICATOR:** This indicator illuminates Green when AC power is on or Stand-by mode, and illuminates Amber when suspend or power-off mode.
3. **INPUT CONNECTOR SELECT BUTTON:** Push the BNC/D-SUB button to select the input signal BNC or D-SUB.
4. **OSD OFF BUTTON:** A push type button that is used to turn off the OSD.
5. **FUNCTION SELECT BUTTONS:** Push the select buttons to choose one of the functions that is superimposed on the display screen.
6. **FUNCTION ADJUST BUTTONS:** Push the adjust buttons to adjust the image on the screen that is selected via the function select buttons.
7. **DEGAUSS BUTTON:** A push type button that is used to eliminate possible color shading or impurity.

REAR

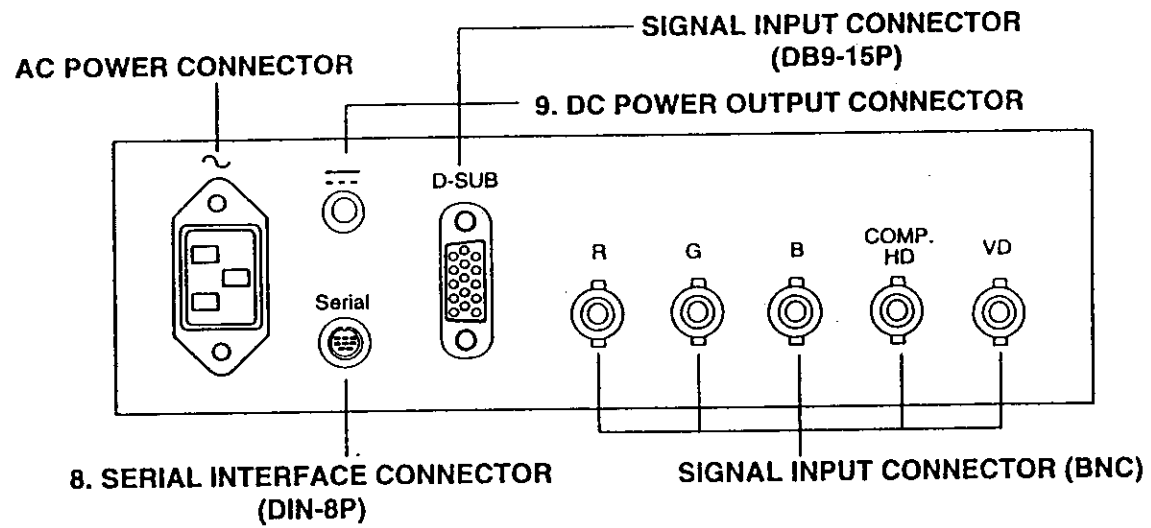
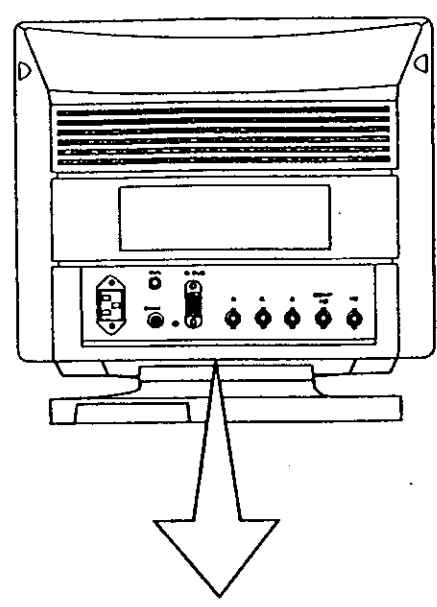


Figure 7

8. **SERIAL INTERFACE CONNECTOR:** The monitor has a DIN-8P connector for serial interface communication. This connector will be used for optional USB unit. For the information about connecting, please refer to the instruction which is included in each optional kit.

For further information about the optional USB kit, please contact your authorized MITSUBISHI dealer.

9. **DC POWER OUTPUT CONNECTOR:**

CAUTION

Do not connect the DC power connector with any models except MITSUBISHI USB unit.

OSD(On Screen Display) FUNCTIONS

- (1) **CONTRAST:** Adjusts to the desired contrast level.
- (2) **BRIGHTNESS:** Adjusts to the black level of the screen.
- (3) **COLOR-TEMPERATURE:** Adjusts the color temperature of the screen image.
- (4) **INFORMATION:** Indicate current Scanning frequency and input Video signal port (signal connector)
- (5) **H-SIZE (Horizontal Size):** Controls the horizontal size of the image on the screen.
- (6) **H-PHASE (Horizontal Position):** Controls the horizontal position of the image on the screen.
- (7) **V-SIZE (Vertical Size):** Controls the vertical size of the image on the screen.
- (8) **V-POSITION (Vertical Position):** Controls the vertical position of the image on the screen.
- (9) **SIDE-BOW (Pincushion or Bow Amplitude):** Straightens the left and right sides of the screen image.
- (10) **KEY STONE:** Adjusts the parallelism of the left and right sides of the screen image.
- (11) **PIN-BALANCE:** Adjusts the curvature of the left and right sides of the screen image.
- (12) **KEY-BALANCE:** Adjusts the vertical slant or tilt of the screen image.
- (13) **H-MOIRE:** Adjusts the horizontal moire level on the screen.
- (14) **V-MOIRE:** Adjusts the vertical moire level on the screen.
- (15) **ROTATION:** Adjusts the rotation or twist of the picture.
- (16) **GEOMETRY-RESET:** Restore to factory preset following mode; H-SIZE, H-PHASE, V-SIZE, V-POSITION, SIDE-BOW, KEY STONE, PIN-BALANCE, KEY-BALANCE.
- (17) **POWER-SAVE (ON/OFF):** When adjusting ON, reduces the power consumption of the monitor when not in use.
- (18) **VIDEO LEVEL:** Selects video levels 1.0V or 0.7V.
- (19) **CLAMP-POSITION:** Use this function to eliminate excessive green or white background that may occur when both Sync-On-Green and external sync signals are applied to the monitor.
- (20) **USB PORT SELECT:** Control upstream connection with using optional USB unit KT-X406.

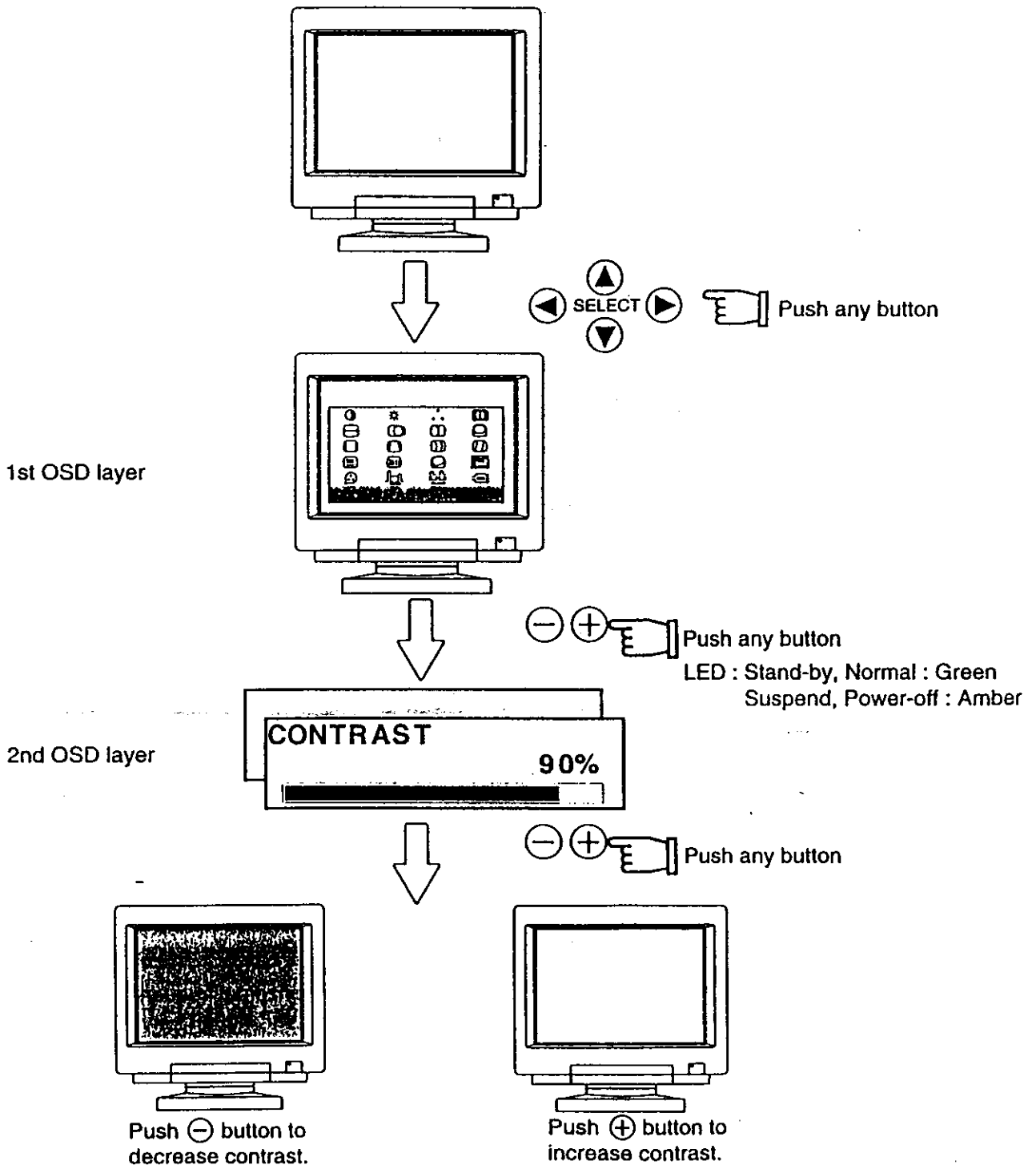
4.1 Operation

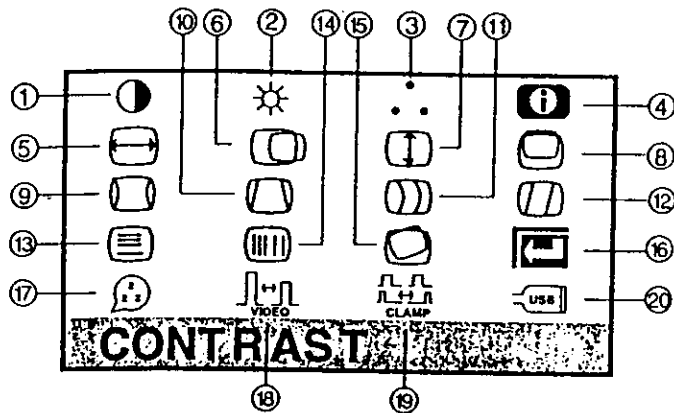
Press any select button and control indicators will be superimposed on the display screen called 1st layer.




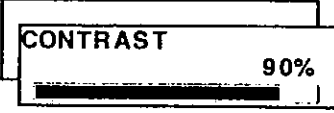
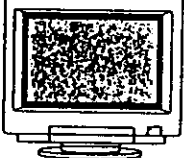








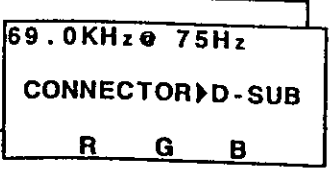
Refer to Figure 6 for the location of the monitor function (◀ ▶ ▲ ▼) controls. Press the select buttons to choose one of the following controls.






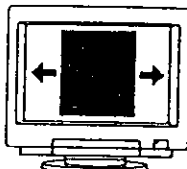

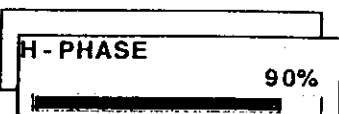





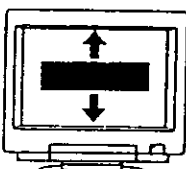

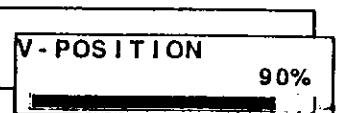



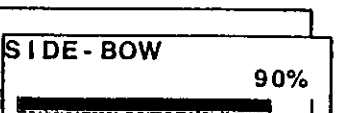
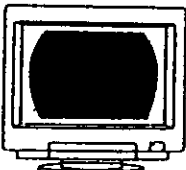
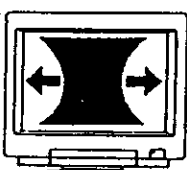
The indication of a function symbol changes to blue.


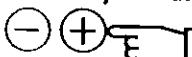

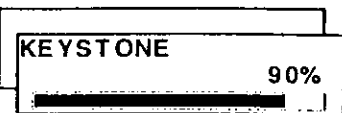

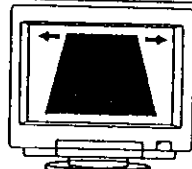

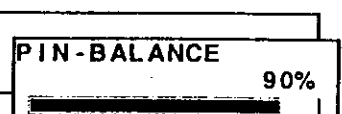
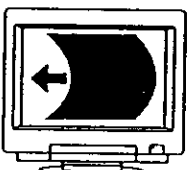
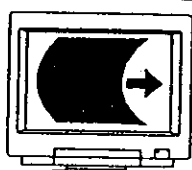

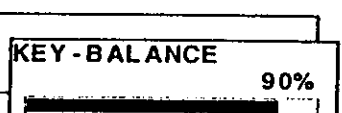
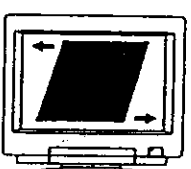


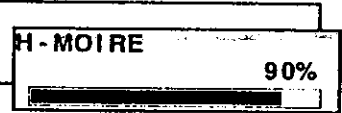

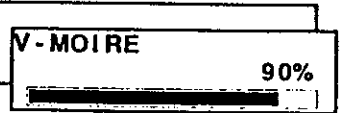
When selected the function symbol of above OSD, press the adjust button (⊕ or ⊖), the OSD screen changes to following called 2nd layer. Then you can adjust each function by ⊕ ⊖ buttons.


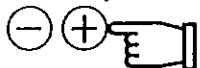

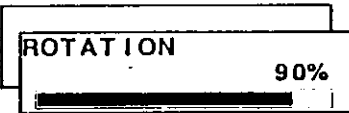






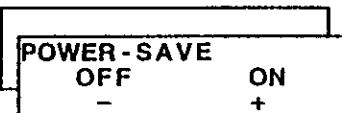

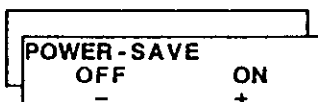

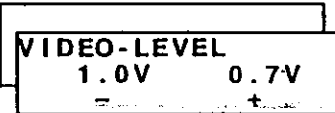
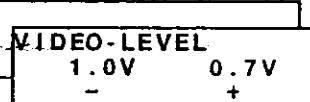
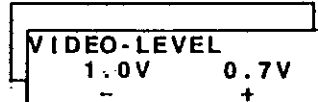

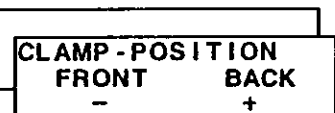
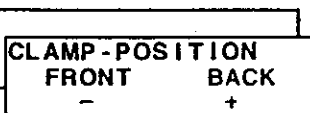
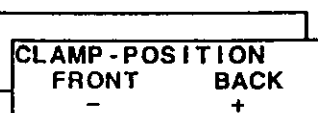




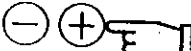


Symbol of 1st OSD layer	2nd OSD layer	Press the Minus Adjust Button:  - +	Press the Plus Adjust Button:  - +
① CONTRAST 	 LEVEL: 00 - 100%	 To decrease the contrast. Press plus and minus buttons together, to restore to factory preset level.	 To increase the contrast.
② BRIGHTNESS 	 LEVEL: 00 - 100%	 To decrease the brightness. Press plus and minus buttons together, to restore to factory preset level.	 To increase the brightness.
③ COLOR TEMPERATURE 	 LEVEL: 5000 - 9950K	To increase the red color level. Data indicates color temperature (k:kelvin)	To increase the blue color level.
④ INFORMATION 		<ul style="list-style-type: none"> • Indicate the horizontal frequency and the vertical frequency of input signal. • Indicate input connector. 	

Symbol of 1st OSD layer	2nd OSD layer	Press the Minus Adjust Button: 	Press the Plus Adjust Button: 
⑤ H-SIZE 	 LEVEL: 00 - 100%	 To narrow the width of the image on the screen.	 To expand the width of the image on the screen.
⑥ H-PHASE 	 LEVEL: 00 - 100%	 To move the image to the left.	 To move the image to the right.
⑦ V-SIZE 	 LEVEL: 00 - 100%	 To narrow the height of the image on the screen.	 To expand the height of the image on the screen.
⑧ V-POSITION 	 LEVEL: 00 - 100%	 To move the image down.	 To move the image up.
⑨ SIDE-BOW 	 LEVEL: 00 - 100%	 To collapse the center of the image.	 To expand the center of the image.

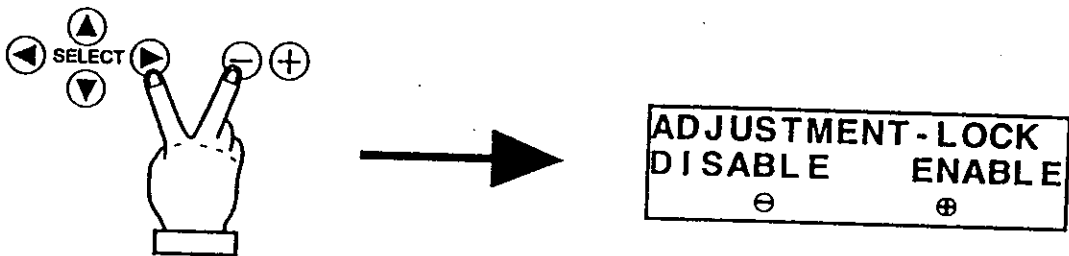
Symbol of 1st OSD layer	2nd OSD layer	Press the Minus Adjust Button: 	Press the Plus Adjust Button: 
⑩ KEYSTONE 	 LEVEL: 00 - 100%	 The decrease the width at the top of the screen image and to increase the width at the bottom.	 The increase the width at the top of the screen image and to decrease the width at the bottom.
⑪ PIN-BALANCE 	 LEVEL: 00 - 100%	 To move the top and bottom of the screen image to the right.	 To move the top and bottom of the screen image to the left.
⑫ KEY-BALANCE 	 LEVEL: 00 - 100%	 To make the screen slant to the left.	 To make the screen slant to the right.
⑬ H-MOIRE 	 LEVEL: 00 - 100%	<p>Press the plus or minus button to decrease the level of the horizontal moire wave.</p> <p>Press plus and minus buttons together, to restore to factory preset level.</p>	
⑭ V-MOIRE 	 LEVEL: 00 - 100%	<p>Press the plus or minus button to decrease the level of the vertical moire wave.</p> <p>Press plus and minus buttons together, to restore to factory preset level.</p>	

Symbol of 1st OSD layer	2nd OSD layer	Press the Minus Adjust Button: 	Press the Plus Adjust Button: 
⑮ ROTATION 	 LEVEL: 00 - 100%	 To rotate to the left. Press plus and minus buttons together, to restore to factory preset level.	 To rotate to the right.
⑯ GEOMETRY RESET 		To cancel the geometry reset operation.	To reset the geometry data to factory adjusted condition. 
⑰ POWER-SAVE 		To select the constant power-on mode. 	To select the power-save mode. 
⑱ VIDEO-LEVEL 		To select 1.0V of video input. 	To select 0.7V of video input. 
⑳ CLAMP-POSITION 		To clamp the video signal at the front of the H-Sync pulse. 	To clamp the video signal at the back of the H-Sync pulse. 

Symbol of 1st OSD layer	2nd OSD layer	Press the Minus Adjust Button:	Press the Plus Adjust Button:
	<div style="border: 1px solid black; padding: 5px; text-align: center;"> USB STATUS PLEASE CHECK MONITOR CONNECTION OR USB IS SUSPENDED </div>		 <p>This "USB PORT SELECT" is prepared for optional part "USB-unit KT-X406" installed only.</p> <p>Attention OSD screen is displayed without USB unit.</p> <p>For installing USB-unit, please read the manual of USB kit.</p>

② ADJUST LOCK

1. Press the right of select button and minus of adjust button together, the "ADJUST LOCK" screen appears.



2. Press the plus button to lock on the OSD, and "LOCKED" character is indicated on 1st layer. You can operate OSD menu only CONTRAST, BRIGHTNESS and INFORMATION.



3. Press the minus button to lock off the OSD. You can operate OSD and all can be selected menu again.



4.2 POWER SAVE

NOTE

When the monitor has no sync signal or incorrect connection and the signal frequency is out of range, the following CAUTION comes on the screen. Check input signal, signal cable connection and signal frequency.

1. POWER SAVE IS OFF

When POWER SAVE is OFF and there is no sync signal, the following screen is displayed.

**ATTENTION
NO SIGNAL
PLEASE CHECK
INPUT SIGNAL OR
CONNECTION.**

2. POWER SAVE IS ON

(1) When POWER SAVE is ON and there is no sync signal, the following screen is displayed for 5 seconds.

**ATTENTION
NO SIGNAL
PLEASE CHECK
INPUT SIGNAL OR
CONNECTION.**

(2) Before 2 seconds POWER SAVE function works, the following screen is displayed. The power on indicator illuminates to change Amber.

POWER SAVE

3. POWER SAVE IS ON OR OFF

When signal frequency is out of range, the following screen(ex. 96.8kHz/73Hz timing input) is displayed.

**ATTENTION
SIGNAL FREQUENCY
IS OUT OF RANGE.
PLEASE CHANGE
SIGNAL TIMING.**

3. Adjusting procedure

- Deflection Preset
- Power Supply Alignment
- Extreme High Voltage Alignment
- H-Drive Adjustment
- Horizontal Alignment
- Vertical Section Adjustment
- Dynamic Focus Adjustment
- Focus Adjustment
- Video Preset Condition
- Video Alignment
- X-RAY Adjustment/Factory Mode Disable

FFT9905SKHFW ADJUSTING PROCEDURE

1. DEFLECTION PRESETS

CONTROL POTS (VR201, VR401, VR402, VR4100) ARE SET AT MIDDLE POINT. SCREEN VR SET TO MIN.

2. POWER SUPPLY ALIGNMENT

2.1 INPUT 1152x870 / 75Hz MODE & CROSS-HATCH PATTERN.

2.2 ADJ VR201 UNTIL VOLTAGE AT TP201 = $80V \pm 0.2V$.

2.3 TEST USB SUPPLY VOLTAGE RANGE IN 5.9~6.2V; ADD DUMING LOAD 0~2.2A.

3. EXTREME HIGH VOLTAGE ALIGNMENT

3.1 INPUT VESA640x480 31.5KHz/60Hz MODE & CROSS-HATCH PATTERN.

3.2 CONTRAST 100%, BRIGHTNESS 50%.

3.3 ADJUST VR402 LET H.V= 24.8KV~25.1KV.

3.4 ADJUST SCREEN (G2 KNOB) LET G2 POINT = $580 \pm 5VDC$.

3.5 SET FOCUS (G3 / G5 KNOB) TO BE DISTINGUISH.

4. H-DRIVE ADJUSTMENT

4.1 INPUT 30KHz / 50Hz CROSS-HATCH PATTERN

4.1.1 CONNECT DC VOLTMETER ACROSS TEST PIN WP303 (R4139).

4.1.2 PRESS SELECT THE OSD TO "30KHz-NARROW"

4.1.3 ADJUST HDRV TO GET A MINIMUM DC VOLTAGE INDICATION BY PRESSING ADJUST "+" AND "-".

4.1.4 PRESS SELECT THJE OSD TO "30KHz-WIDE".

4.1.5 ADJUST HDRV TO GET A MINIMUM DC VOLTAGE INDICATION BY PRESSING ADJUST "+" AND "-".

4.1.6 30KHz - NARROW VALUE < 30KHz - WIDE VALUE.

4.2 INPUT 95KHz / 150Hz CROSS-HATCH PATTERN

FFT9905SKHFW ADJUSTING PROCEDURE

- 4.2.1 PRESS SELECT THE OSD TO "95KHz NARROW".
- 4.2.2 ADJUST HDRV TO GET A MINIMUM DC VOLTAGE INDICATION BY PRESSING ADJUST "+" AND "-".
- 4.2.3 PRESS SELECT THE OSD TO "95KHz-WIDE".
- 4.2.4 ADJUST HDRV TO GET A MINIMUM DC VOLTAGE INDICATION BY PRESSING ADJUST "+" AND "-".
- 4.2.5 95KHz-NARROW VALUE < 95KHz - WIDE VALUE.

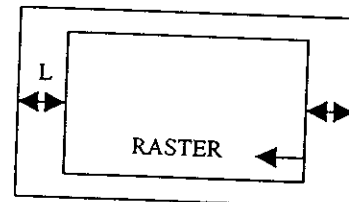
5. HORIZONTAL ALIGNMENT

5.1 RASTER CENTERING

- 5.1.1 INPUT TEST SIGNAL VESA1600x1200 / 75Hz MODE & CROSS-HATCH PATTERN.
- 5.1.2 CONTRAST 0%, BRIGHTNESS 100%.

- 5.1.3 ADJUST VR4100 TO CENTER RASTER ON SCREEN SUCH THAT THE HORIZONTAL DISTANCE FROM THE LEFT DISPLAY EDGE TO THE LEFT BEZEL EDGE IS WITHIN 3mm OF THE DISTANCE FROM THE RIGHT DISPLAY EDGE TO THE RIGHT BEZEL EDGE.

$$|L-R| \leq 3\text{mm}$$



5.2 PICTURE CENTERING

- 5.2.1 INPUT TEST SIGNAL 1152x870 / 75Hz MODE & CROSS-HATCH PATTERN.

- 5.2.2 CONTRAST 100%, BRIGHTNESS 100%, CROSS-HATCH PATTERN.

- 5.2.3 ADJUST "PHASE" SUCH THAT THE PICTURE IS CENTERED WITH THE RASTER.

5.3 E-W SIDE PINCUSHION (SIDE-BOW, KEYSTONE, TOP-PCC, BOTTOM-PCC, CENTER-PCC, PCC-PHASE)

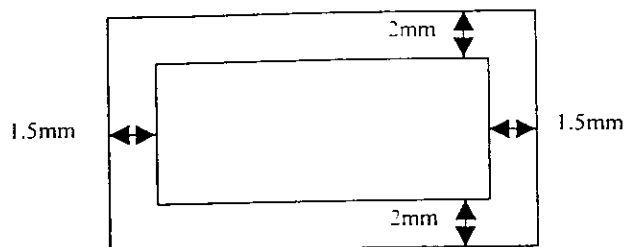
- 5.3.1 INPUT TEST SIGNAL D AT 1152x870 / 75Hz MODE & CROSS-HATCH PATTERN.

- 5.3.2 ADJUST "E-W" SUCH THAT PINCUSHION / BARREL DISTORTION OF THE

FFT9905SKHFW ADJUSTING PROCEDURE

MOMINAL RECTANGLE SPECIFIED.

5.3.3 TRAPIZUM / PARALLOGRAM / TOP & BOTTORM CORNER ROTATION ADJUSTMENT.



5.3.4 GEOMETRY DISTORTION MUST LIMIT AS RIGHT DIAGRAM.

5.4 PICTURE WIDTH

5.4.1 INPUT PRESET TIMING ADJUST,

4:3 RATIO H-SIZE (OSD) TO ACHIEVE 340 ± 4 mm,

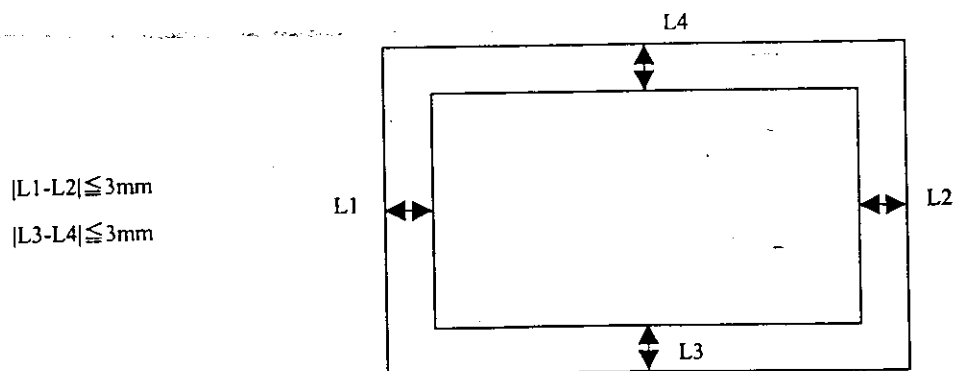
5:4 RATIO THE OTHER TIMING H-SIZE IS 330 ± 4 mm IN RESOLUTION 1280X1024.

6. VERTICAL SECTION ADJUSTMENTS

6.1 CENTERING (WITH MAGNETIC FIELD)

6.1.1 APPLY SIGNAL AT 1152x870 / 75Hz MODE, CROSS-HATCH PATTERN.

6.1.2 ADJUST "V-CENTER" TO THE VIDEO DISPLAY VERTICALLY SUCH THAT THE VERTICAL DISTANCE FROM THE CENTER OF PICTURE TO THE TOP BEZEL EDGE AND THE BOTTOM BEZEL EDGE IS WITHIN 3mm.



6.2 VERTICAL HEIGHT

6.2.1 APPLY PRESET TIMING CROSS-HATCH PATTERN.

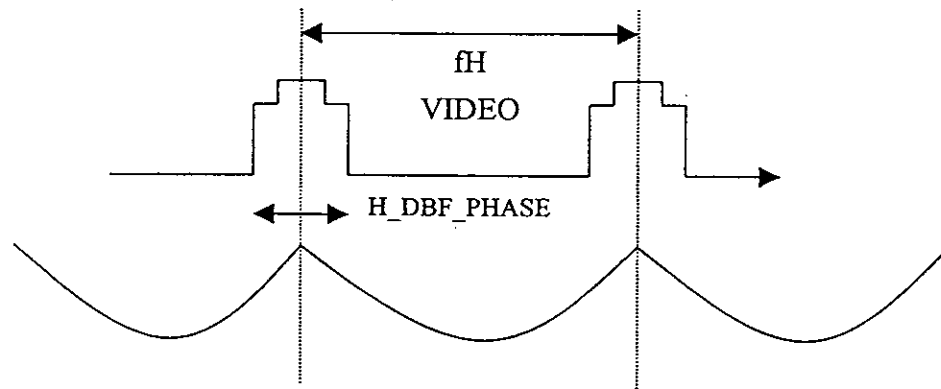
FFT9905SKHFW ADJUSTING PROCEDURE

- 6.2.2 ADJUST "V-HEIGHT" SUCH THAT VERTICAL HEIGHT IS $255\text{mm} \pm 3\text{mm}$
(4:3 RATIO)
V-HEIGHT IS $264 \pm 3\text{mm}$ (5:4 RATIO) IN RESOLUTION 1280X1024.

7. DYNAMIC FOCUS ADJUSTMENT

7.1 DYNAMIC FOCUS PHASE ADJUSTMENT

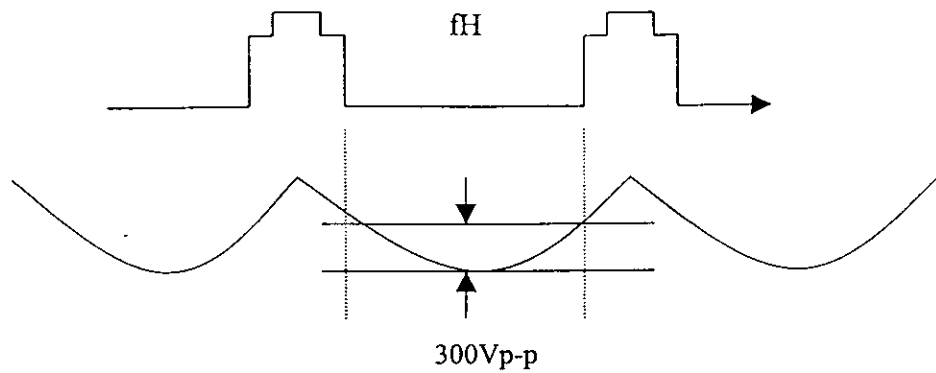
- 7.1.1 APPLY VESA 1280x1024 80KHz/ 75Hz MODE FULL WHITE PATTERN.
- 7.1.2 CONNECT OSCILLOSCOPE ACROSS TP405 ON PWB-MAIN WITH GND.
- 7.1.3 DISPLAY SIZE WIDTH: 330mm, HEIGHT 264mm.
- 7.1.4 PRESS SELECT THE OSD TO "H-DBF-PHASE".
- 7.1.5 ADJUST H-DBF-PHASE TO GET HORIZONTAL PARABOLIC WAVEFORM AT CENTER WITH VIDEO SIGNAL CENTER BY PRESSING ADJUST "+" AND "-".



7.2 DYNAMIC FOCUS PARABOLIC WAVEFORM ADJUSTMENT

- 7.2.1 APPLY 30KHz/50Hz, 95KHz/150Hz & 93.75KHz/75Hz TIMING DISPLAY SIZE
WIDTH: 340mm, HEIGHT: 255mm.
- 7.2.2 INPUT 30.0KHz / 50Hz FULL WHITE PATTERN.
- 7.2.3 PRESS SELECT THE OSD TO "HDBF_30KHz".
- 7.2.4 ADJUST HORIZONTAL PARABOLIC WAVEFORM TO GET $300\text{V}_{\text{p-p}} \pm 10\text{V}_{\text{p-p}}$ BY
PRESSING ADJUST "+" AND "-".

FFT9905SKHFW ADJUSTING PROCEDURE



7.2.5 PRESS SELECT THE OSD TO "VDBF_50Hz".

7.2.6 ADJUST VERTICAL PARABOLIC WAVEFORM TO GET $130V_{p-p} \pm 5V_{p-p}$ BY PRESSING ADJUST "+" AND "-".

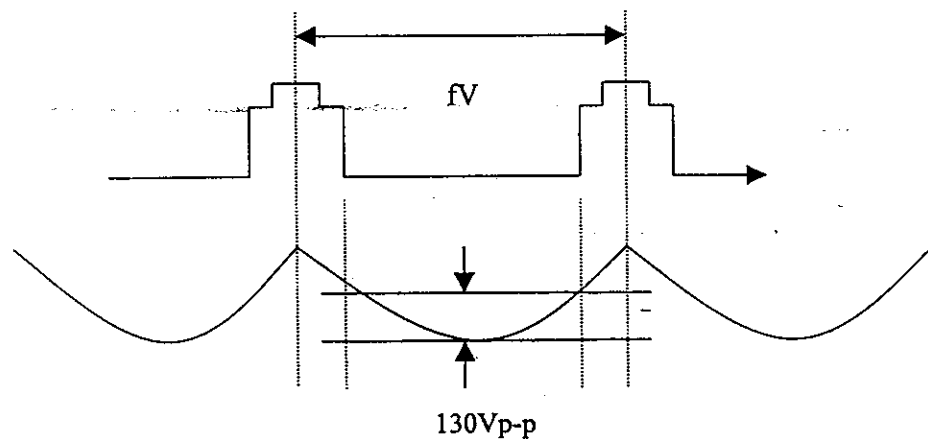
7.2.7 INPUT 93.75KHz / 75Hz FULL WHITE PATTERN.

7.2.8 PRESS SELECT THE OSD TO "HDBF_95KHz".

7.2.9 ADJUST HORIZONTAL PARABOLIC WAVEFORM TO GET $300V_{p-p} \pm 10V_{p-p}$ BY PRESSING ADJUST "+" AND "-".

7.2.10 INPUT 95KHz/150Hz FULL WHITE PATTERN, PRESS SELECT THE OSD TO "VDBF_150Hz".

7.2.11 ADJUST VERTICAL PARABOLIC WAVEFORM TO GET $130V_{p-p} \pm 5V_{p-p}$ BY PRESSING ADJUST "+" AND "-".



8. FOCUS ADJUSTMENT

FFT9905SKHFW ADJUSTING PROCEDURE

- 8.1 SET BRIGHTNESS TO 50% AND CONTRAST AT 100%.
- 8.2 APPLY SIGNAL (ALL "ME" PATTERN) AT VESA1280x1024 / 91KHz/85Hz MODE.
- 8.3 DISCONNECT THE RED AND BLUE VIDEO INPUTS SO AS TO PRODUCE A GREEN ONLY SCREEN.
- 8.4 SET FOCUS CONTROL F1, F2 FOR BEST FOCUS AT MIDPOINT OF DIAGONAL LINE FROM 10:00 CORNER TO CENTER OF SCREEN. F1 CONTROL FOR VERTICAL LINE; F2 CONTROL FOR HORIZONTAL LINE; INDIVIDUAL PIXELS SHOULD BE DISTINGUISHABLE OVER ENTIRE DISPLAY AREA.
9. VIDEO PRESET CONDITION
 - 9.1 BRIGHTNESS "128"
 - 9.2 CONTRAST "255"
 - 9.3 R.G.B BIAS "100"
 - 9.4 R.G.B DRIVER "128"
 - 9.5 G1-FINE "100" (RANGE 50 - 205)
 - 9.6 G1-COARSE "200"
 - 9.7 ABL " 150 "
 - 9.8 DISPLAY SIZE WIDTH: $340 \pm 4\text{mm}$, HEIGHT: $255 \pm 4\text{mm}$
 - 9.9 APPLY 1152x870 / 75Hz BLACK PATTERN.
10. VIDEO ALIGNMENT
 - 10.1 VIDEO CUT OFF ADJUSTMENT
 - 10.1.1 ADJUST G1-COARSE TO GET THE RASTER $0.5 \sim 1\text{cd/m}^2$. (CENTER = 0.7cd/m^2)
 - 10.1.2 ADJUST "R-C-93", "G-C-93", B-C-93" TO GET COLOR COORDINATION.
 $x = 0.2830.010$ $y = 0.297 \pm 0.010$

FFT9905SKHFW ADJUSTING PROCEDURE

- 10.1.3 SELECT THE OSD TO "G1-FINE", ADJUST G1-FINE TO GET THE RASTER $Y = 0.3 \pm 0.2 \text{cd/m}^2$.
- 10.1.4 ENSURE THAT COLOR COORDINATION IS $x = 0.283 \pm 0.010$, $y = 0.297 \pm 0.010$, IF COLOR COORDINATION OUT SPECIFICATION, REPEATLY ITEM 10.1.1~10.1.3, UNTIL IT MEET SPECIFICATION.
- 10.1.5 ADJUST R.G.B BIAS CONTROL TO MEET FOLLOWING CHROMATICITY SPEC.

9300° K → $x = 0.283 \pm 0.010$, $y = 0.297 \pm 0.010$, $Y = 0.3 \pm 0.2 \text{cd/m}^2$

6500° K → $x = 0.316 \pm 0.010$, $y = 0.326 \pm 0.010$

5000° K → $x = 0.345 \pm 0.010$, $y = 0.359 \pm 0.010$

10.2 BRIGHTNESS AND WHITE BALANCE ADJUSTMENT

- 10.2.1 SET 1152x870 / 75Hz WINDOW PATTERN, CONTRAST = 255(100%)
BRIGHTNESS = 128.(50%)
- 10.2.2 APPLY GREEN WHITE WINDOW PATTERN, ADJUST G-DRIVER TO OBTAIN GREEN WINDOW PATTERN LIGHT O/P ABOUT $Y = 96.5 \pm 1 \text{cd/m}^2$.
- 10.2.3 APPLY WHITE WINDOW PATTERN, ADJUST R-DRIVER, B-DRIVER TO MEET FOLLOWING CHROMATICITY SPEC. AFTER G-DRIVER FIXED.
- 9300° K → $x = 0.283 \pm 0.010$, $y = 0.297 \pm 0.010$
- 10.2.4 GET $\bar{Y} = 135 \pm 10 \text{cd/m}^2$.
- 10.2.5 APPLY GREEN WHITE WINDOW PATTERN LIGHT O/P ABOUT ($Y = 95 \pm 2 \text{cd/m}^2$).
- 10.2.6 APPLY WHITE WINDOW PATTERN, ADJUST R-DRIVER, B-DRIVER FOLLOWING CHROMATICITY SPEC. AFTER G-DRIVER FIXED.
- 6500° K → $x = 0.316 \pm 0.010$, $y = 0.326 \pm 0.010$
- 10.2.7 APPLY GREEN WHITE WINDOW PATTERN, ADJUST G-DRIVER TO OBTAIN GREEN WINDOW PATTERN LIGHT O/P ABOUT ($Y = 95 \pm 2 \text{cd/m}^2$).

FFT9905SKHFW ADJUSTING PROCEDURE

10.2.8 APPLY WHITE WINDOW PATTERN, ADJUST R-DRIVER, B-DRIVER TO MEET FOLLOWING CHROMATICITY SPEC. AFTER G-DRIVER FIXED.
5000° K → $x = 0.345 \pm 0.010$, $y = 0.359 \pm 0.010$

10.3 APPLY FULL WHITE PATTERN, ADJUST ABL TO GET $Y = 115 \pm 10 \text{cd/m}^2$ AND CHECK THE CHROMATICITY MEET FOLLOWING SPEC.

9300° K ONLY FOR 1152x870 / 75Hz

$|x(Y=110) - x(Y=20)| \leq 0.010$

$|y(Y=110) - y(Y=20)| \leq 0.010$

11. X-RAY ADJUSTMENT/FACTORY MODE DISABLE

11-1 X-RAY ADJUSTMENT & CHECK

11-1-1 INPUT 1024X768 60kHz/75Hz MODE, CROSS-HATCH PATTERN.

11-1-2 SET CONTRAST 100%, BRIGHTNESS 50%.

11-1-3 USE JUMP SHORT P401 BETWEEN PIN1 AND PIN2.

11-1-4 ADJUST VR401 LET PICTURE SHUT DOWN.

11-1-5 REMOVE JUMP, POWER OFF/ON AGAIN. UNTIL PICTURE STABLE, SHORT P401 ONCE MORE FOR DOUBLE CHECK.

11-1-6 USE 390 Ω PARALL TO P401, THE PICTURE MUST BE OK.

11-1-7 INPUT 1600*1200 93KHz/75Hz MODE, FULL WHITE > CONT. 100%, BRIT. 50%, USE 5.1K Ω PARALL TO P401, THE PICTURE MUST BE OK.

11.2 FACTORY MODE DISABLE, PICTURE SIZE = 340*255mm

11.2.1 TURN ON SET PRESS "+" KEY OSD VALUE FROM 05 TO 10.
PRESS "▼" RIGHT KEY ONE TIME FOR USER MODE.

11.2.2 OSD FUNCTION: VIDEO LEVEL SET AT "+0.7v",

11.2.3 CLAMP SET AT "- FRONT"

11.2.4 POWER SAVING SET AT "+ ON".

4. Circuit description

4.1 Power supply (switching power supply)

4.2 Power saving

4.3 Micro-controller unit

4.4 BNC/D-sub selector

4.5 Sync Processor

4.6 Deflection

4.6.1 Horizontal Phase Shifter

4.6.2 Horizontal synchronization processing

4.6.3 Horizontal Driver stage

4.6.4 Horizontal scanning

4.6.5 Buck converter and width control circuit

4.6.6 The E-W Pincushion correction and corner pincushion

4.6.7 Trapezoid control / Parallel Control

4.6.8 High voltage power supply circuit

4.6.9 X-Ray-radiation protection

4.6.10 Vertical Deflection

4.6.11 Focus

4.7 Video

4.7.1 Video amplifier

4.7.2 On screen Display (OSD)

4.7.3 Auto Beam Limit CKT (A,B,L,CKT)

4.7.4 Brightness control

4.7.5 Blanking CKT

4.7.6 Contrast, gain & Bias control

4.7.7 DDC 1/2B

4.8 Tilt

4.9 Universal Serial Bus (USB) (Option)

4. CIRCUIT DESCRIPTION

4.1 POWER SUPPLY (switching mode power supply fly-back type) (IC103)

The raw DC B+ voltage is got from AC input voltage after EMI filter rectifier and PFC CKT. It supplies lower voltage VCC to PWM controller, IC103 (UC3842), through start-up circuit (R119, Q103, R122, D103 to IC103 pin7). R143 & C125 generate triangle wave-form to decide switching frequency. In order to power supply synchronism, it must feedback Horizontal-Synch to "TRIGGLE" from T103, Q107 and forced power supply synchronization with Horizontal deflection circuit. The pin6 is output of IC101 to drive power MOSFET Q106. 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 and filtering.

In order to make a stable and regulated output voltage while AC input voltage and output load change. IC203 will produce a current change through IC105 couple a volt change on R140, and through R141 feed to IC103 pin2. PWM controller circuit will adjust duty cycle and maintain stable voltage.

The PWM controller IC103 is started up from the raw B+. The lower voltage VCC is provided by T101's AUX-Winding(pin1) through D105, C111, D104, C110 to IC103 pin7.

The PFC CKT (IC101 TDA4862, Q102, T102 and D101, C103) control a boost converter in a way that sinusoidal current is taken from the single-phase line supply (CX101, FL101, NTC101, NTC102, CX102) and produce about 385VDC at C103, The power factor is 0.93~1 (INPUT VOLTAGE IS 100~264VAC).

At power saving mode, IC102, Q101 will be off, then IC101 will be turned off. The power factor is about 0.45.

Degauss CKT : When the power is on and press manual degauss, the IC301 pin21 will be high level to turn on Q204 and RL201, degauss will be active about 4 seconds.

Power protection circuit:

The PFC circuit OVP parts are R116, R117, R137, IC106.

The main power circuit OVP parts are R147, ZD106, R148, C123, SCR101.

The main power circuit OCP parts are R150, C121, R136, R138, D108, C116, R128, R129, R127, Q105

4.2 POWER SAVING

According to TCO agreement with monitor manufacturers, please refer to the following table:

MODE	SYNC PULSE			POWER CONSUMPTION	LED	RECOVERY TIME
	HORIZONTAL	VERTICAL	VIDEO			
NORMAL ON	YES	YES	YES	< 130W	GREEN	-
STANDBY	NO	YES	BLANK	< 90W		< 3S
SUSPEND	YES	NO	BLANK	< 15W	AMBER	< 10S
POWER OFF	NO	NO	BLANK	< 8W		< 10S

IC301 pin13: suspend (SUSP), normal mode is HI, suspend mode is LOW.

IC301 pin14: power down (STDW), normal mode is LOW, power down mode is HI.

- The suspend mode occurs when IC301 pin13 is at low level.
The B⁺ (12V) is switched off via Q206, Q203.
- The power-off mode occurs when IC301 pin13 is low and pin14 is HI.
Both B⁺ (12V) and 6.3V are switched off via Q206, Q203, Q201, Q202 ... respectively.

The micro-processor IC301 is drive to power off mode when signal cable is not connected to PC.

4.3 MICRO-CONTROLLER UNIT (MCU)(IC301)

IC301(D16X54) is an 8-bit micro-controller with embedded 8031 micro-controller core, 16K byte ROM. It has 6-bit A/D converter, watch dog timer, DDC port, PWM D/A converter output, sync processor, and all the other logic blocks. It uses dynamic PWM output to generate parabolic and triangle wave to replace DAC. It have timing detector, key control, power management, OSD control CS control, Degauss control, G1 control, auto-alignment by RS232 bus of IC304(ADM232LJN), and feature control (geometry and color). The MCU through I²C bus controls RGB gain, RGB cutoff, contrast and brightness. These datas are stored in IC302 EEPROM through I²C bus. In addition, this MCU can do self diagnose and offers message to indicate the condition of the monitor. We can use D-SUB or BNC terminal to input signal with MCU auto detection.

4.4 BNC & D-SUB SELECTOR CIRCUIT

IC1 (BA7657S) is designed for BNC signal or D-sub signal selectors. IC1 pin16 is controlled by IC301 pin43 BNC/D-SUB that is the control pin to decide signal input and when pin16 set to HI level, the BNC signal will produce via IC1 to IC602 video pre-amp, when pin16 set to LOW level, the D-sub signal will produce via IC1 to IC602 video pre-amp.

4.5 SYNC. PROCESSOR

The horizontal sync or composite sync, is connected from IC1 pin22 to IC301 (MCU) pin17 input and from IC301 pin19 output positive polarity sync to IC401 pin15.

Vertical sync. is connected from IC1 pin14 to IC301(MCU) pin18 input and comes out at pin20, a positive polarity sync, to IC401 pin14 and D603 Q605 (vertical blanking CKT).

The IC301 and the IC401(TDA4858) sync input can handle either composite or separate sync input.

IC305(HD74HC244P) can eliminate jitters noise from IC301 and IC1.

4.6 DEFLECTION CIRCUIT

4.6.1 Horizontal Phase Shifter:

This function is operated by a part of circuit inside IC401 (TDA4858). The picture phase adjustment is controlled by a current range at pin30. The current of this point changes from PWM DAC voltage pin2 of IC301 (DAC).

4.6.2 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 triple of free-run frequency which is determined by R445 , R443 and C420.

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 (C419, C418, R441) is connected at pin26.

The PLL2 circuit is used to compare the line flyback pulse at pin HFLB 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 (pin1 of IC 401) is coupled from pin12 of T4103 (choke transformer) via R462.

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(HDRV) are sent from pin7 of IC401.

4.6.3 Horizontal Driver Stage

The horizontal drive pulse(HDRV) is applied to the gate of driver transistor Q4117. B⁺ is provided by the regulated 19V voltage source via R102,R4121,R4122,R4124,R4125,Q4113,Q4114 and C4122. The output of driver transformer T4100 is coupled to the base of Horizontal output Transistor Q4118.C4123,R4128,D4106 and c125 compose of damping network which is to eliminate the leakage flux of T4100 during Q4117 turns off.

4.6.4 Horizontal Scanning

The horizontal scanning is accomplished in a diode modulator method. Except the basic horizontal scan output, the diode modulator add one second resonant circuit during retrace time, which also performs the parabola modulation in yoke current to compensate the pincushion effect. Linearity coil T4101 corrects the asymmetrical distortion. C4100/C4102/C4104/C4105/C4107/C4109/C4111 C4120 are S-Correction capacitors, Q4100/Q4101/Q4102/Q4103/Q4104/Q4105 are switched on/off according to different H-frequency.

The conducting period of horizontal output transistor Q4118 completes the second half of scan. The conducting period of damper diode D4107 completes the first half part of horizontal scan.

The retrace capacitor is C4126/C4127 (30K-95KHz), the charge and discharge actions of retrace capacitor via yoke after Q4118 turned off, which is designed for the same resonant frequency with the main scan circuit.

4.6.5 Buck Converter and width control circuit

In order to maintain same scan width within 30K-95KHz, the scan supply B⁺ tracked with continuous H-frequency is necessary, and the design is implemented by a convention method-of buck converter.

The buck converter mainly composes of a P-channel MOSFET (Q4120), choke L4107, capacitor C4134 and rectifier diode (D4121).

The BUCK converter control circuit is integrated in IC401, pin6 is inverting, pin5 is output of error amplifier, both for frequency compensation and gain setting and pin5(BIN) is DC controlled by BSFH feedback of T4103. PWM pulse width (BDRV)output at pin6 is modulated according to internal error amplifier output and pin5 current sense. BDRV can control buck converter B+ output(B+ output decide H-size width).

4.6.6 The E-W Pincushion Correction and Corner pincushion

The voltage across C4132 can be varied in accordance with a vertical parabolic wave-form which is generated by two amplifier stage drive Q4122,Q4121 to control amplitude that is controlled by IC403 pin7. The parabolic wave-form is generated from IC403 pin6(PCC) by buffer IC305 pin18 which is controlled by pin41 of IC301.

Corner pincushion is superimposed to the E-Wpincushion control current pin on IC403 pin7, the waveform amplitude is adjusted by IC301 pin41.

4.6.7 TRAPEZOID CONTROL / PARALLEL CONTROL

Trapezoid/parappel is controlled by pin30(HPOS) of IC401 that square waveform from IC301 pin38 to IC403 integer circuit by buffer iC305(74HC244P) pin14.

Trapezoid/Parallel CKT (C439, Q410, IC403) is superimposed the vertical saw tooth current on IC401 pin30 (H-POS), the wave form amplitude is adjusted by IC301 pin38.

4.6.8 MODULATED HIGH VOLTAGE POWER SUPPLY CIRCUIT

PCB401 (MSPAC006 PCB) is a high voltage regulation control circuit. Pin1 of PCB401 is PWM pulse to drive gate of Q401. The output of Q401 is applied to the primary winding of flyback transformer (FBT T401) and drives the FBT to supply CRT anode voltage of about 25KV by stepping up FBT during retrace period.VR401 can adjust the value of high voltage. Pin6 of FBT supply -180V to G1 control circuit.

The R402,R403,R404,D401,ZD401 and IC401 PIN8,9,10 is designed for over beam current protect , then beam current over 1000 μ A, the pin10 of PCB401 will be driven, the high voltage will be to shut down.

4.6.9 X-RAY-RADIATION PROTECTION

The X-Ray-radiation protection circuit is usually used in the monitor latching type circuit. Therefore, should a fault occur which would activate the X-ray protect circuit, Should a fault occur which would cause the high voltage to increase above a predetermined level, the positive pulse at pin1 of the FBT (T401) would go more positive. This action in turn would increase the voltage applied to pin10 of PCB401 to exceed its breakdown voltage for a certain time. An internal latch switches the PCB401 into protection mode. Shutting down the drive pulse.

NOTE: 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.

4.6.10 Vertical Deflection (IC501)

Vertical deflection function is operated in the chip IC401(TDA4858), IC501 (TDA8351) 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 R522, C511, C512(pin23,24 of IC401). The vertical sync signal is applied to the pin14 of IC401 through R523. 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 liner voltage ramp is produced at pin12,13 of IC401, and is coupled to IC501 pin1,2 for vertical output amplitude Vertical output amplitude is controlled by pin18 of IC401.R501 can set the gain of IC501.

The CKT of the TDA8351 provides a high CMRR current driven differential input (pin1,2), two output stages (pin4,7) in a full bridge configuration, a flyback generator, a protection CKT for the output stage and a guard CKT.

Pin4, pin7 are the outputs of the power amplifier and it drives the yoke by a current driven in opposite phase current ramp. R507 and the series network R506, C505(damping function) are used to stabilize the power amplifier. Pin3 is the supply voltage 19VDC, pin6 is the flyback supply voltage, pin8 is the guard output,

which provide a blanking signal for the CRT. Pin9 is the feedback input (fed back to the input stage).

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 DC control (pin47 of IC301).

V-moire canceling is operated by changing the vertical position at next frame. The 50% duty FV/2 sync is from IC301 pin44, and through C508, C509, R514, R520 to IC401 pin17.

4.6.11 FOCUS

Horizontal parabolic wave from the IC902 pin7(M52723ASP), sync triggered by pin1 of IC901. IC902 pin7 is horizontal parabolic O/P to drive Q901, Q902, Q903& via T901 pin2 coupling to FBT pin13. Vertical parabolic waveform is taken from Q904 via T901 pin8 to FBT pin13. Q903 is buffer, Q904, Q905 is cascade amplifier to drive FBT pin13. IC902 pin6/pin15 can control IC902 pin7 amplitude/phase by IC301 pin4/pin39.

4.7 VIDEO

4.7.1 VIDEO AMPLIFIER(IC602)

The video amplifier module is composed of three amplifiers for red, green, blue channel.

The video input signal is fed to the video preamplifier IC602(M52743ASP) (pin2 blue, pin6 red, pin11 green) through AC coupling capacitor. C614, C617, C620.

The clamping pulse comes from IC301 pin35 to IC601 pin19. The blanking pulse come from P602 pin5(HBLK), P603 pin2(VBLK) to IC602 pin27.

IC603 is an integrated high voltage CRT driver circuit designed to drive B.R.G channel of CRT.

4.7.2 On Screen Display (OSD)(IC601)

IC601 is an on screen display generator. Pin5 for H-sync input, pin10 for V-sync input. The IC603 is controlled by IC301 I²C bus to IC601 (pin7, pin8).

The on screen display signal is output from pin15(R). Pin14(G), pin13(B) and connected to mixer circuit of IC602 pin4, pin9, pin13.

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

When beam current is over 870uA by IC602 pin20 control IC604 pin5, the voltage build at pin3 of IC604 will be low enough to hold max beam current, then the voltage of pin15 of IC602 will be pulled down accordingly to reduce the video preamplifier gain output.

4.7.4 Brightness(G1) Control

Brightness(G1) is controlled by IC301 pin5,6(BRT+RC).IC401 are G1 control circuit by varying DC voltage(pin7) and over beam current(pin8,9,10) protection circuit.

4.7.5 Blanking CKT

IC501 (TDA8351) pin8 vertical blanking pulse are fed to the base of Q605. The blanking pulse O/P is coupled to horizontal blanking pulse by D601. Horizontal & vertical blanking pulse is fed to IC602 pin27 and let video O/P Amp set to cut off during the period of horizontal retrace. While mode change, IC301 pin15 will be pulled high to turn on Q405 (mute function) . The G1 volt will be down to -200V then CRT will cut off the video output.

4.7.6 CONTRAST, GAIN & BIAS CONTROL

The IC602 (M52743ASP) contains three gated single ended input black level clamp compurgators for brightness control, three matched DC controlled attenuators for contrast control, and three DC controlled sub-contrast attenuators providing gain trim capability for white balance.

All the DC control voltage coming from IC602 M52743ASP internal (DAC) is controlled by IC301 Micro controller via a I²C bus. (IC301 pin31, pin32). The IC602 DAC output from pin24, 25, 26 for G.R.B (cut-off) controller.

4.7.7 DDC1/2B(IC2)

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

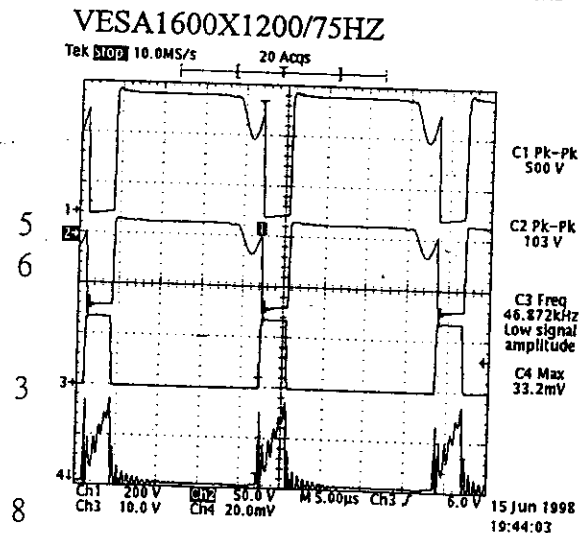
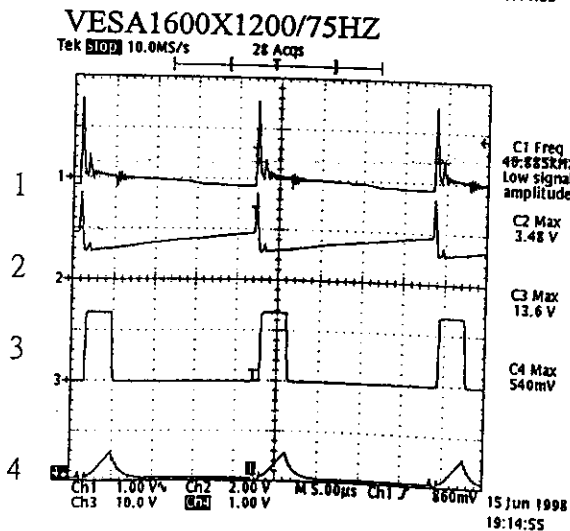
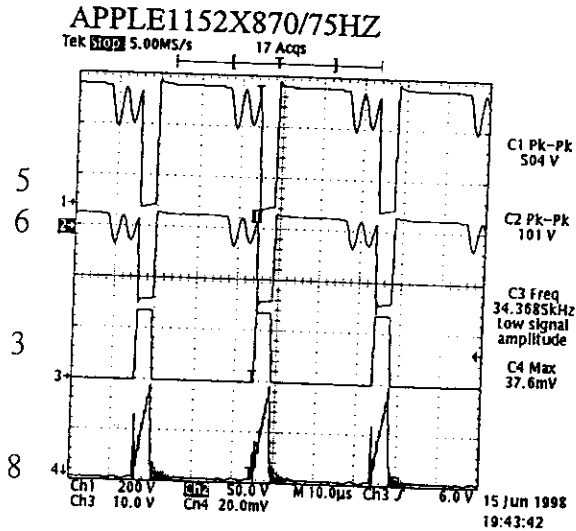
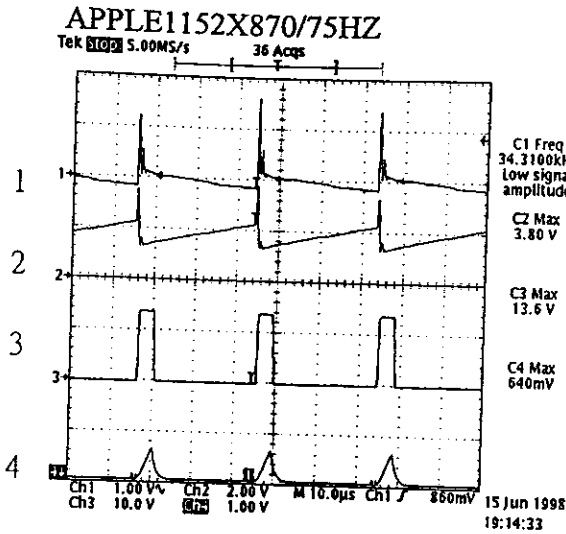
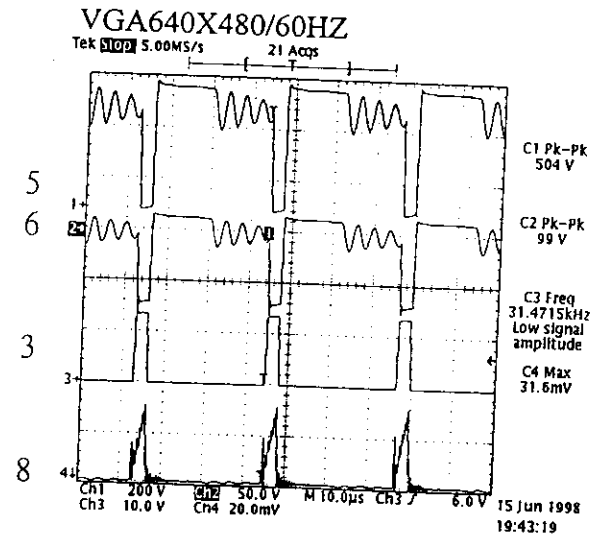
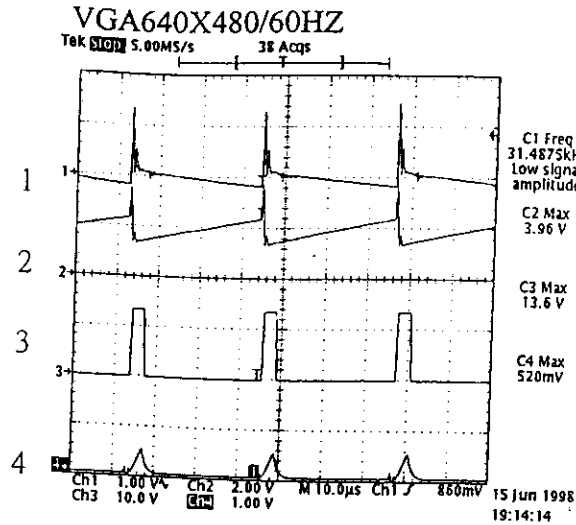
4.8 Rotation

Rotation CKT is operated a volt difference on rotation coil. The IC301 pin45 output 0~5V to IC701 pin2 to control the volt amplitude and polarity on IC701, IC701 pin1 output via Q701, Q702 to drive rotation coil.

4.9 Universal Serial Bus (USB) (OPTION)

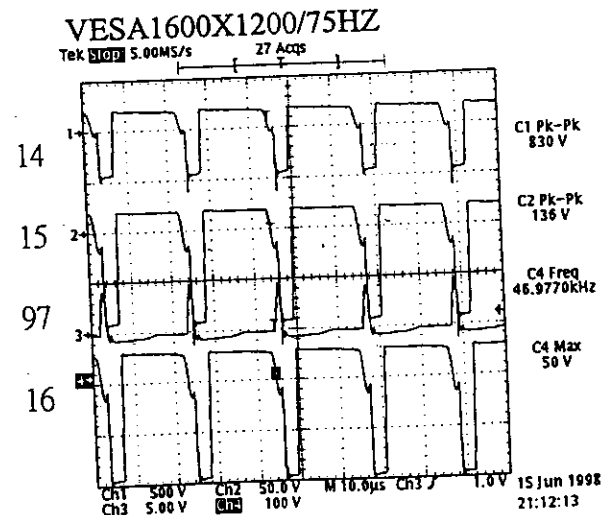
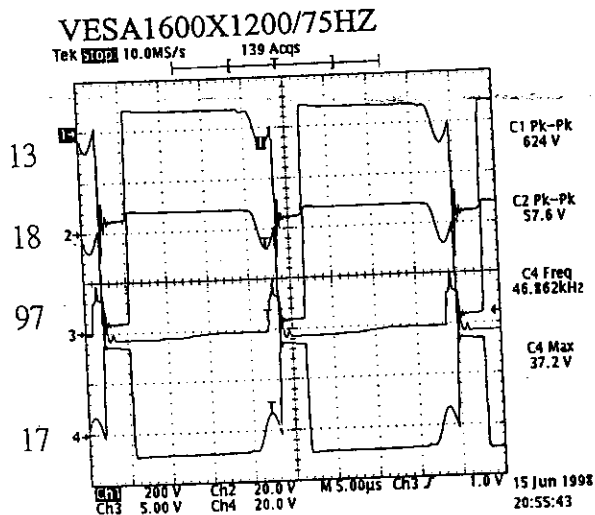
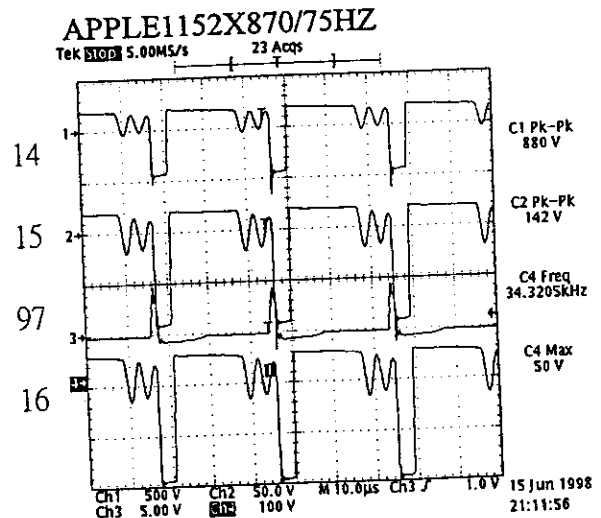
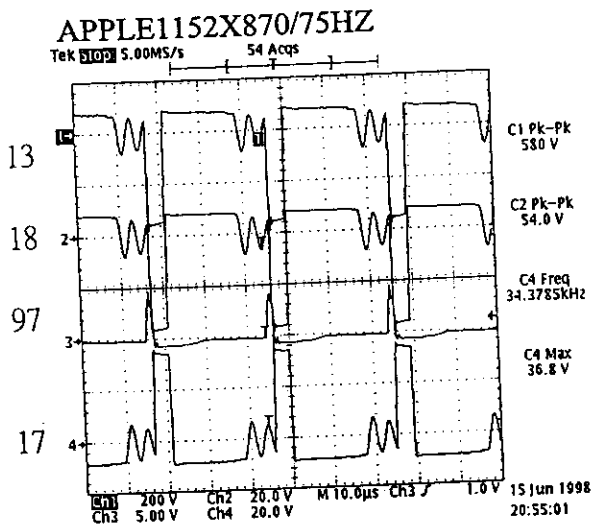
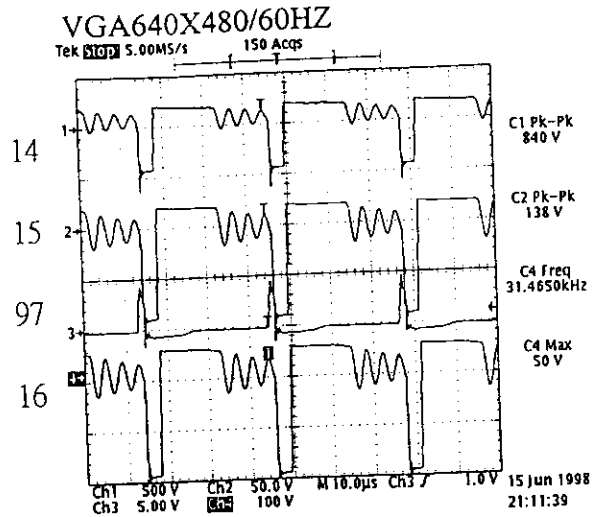
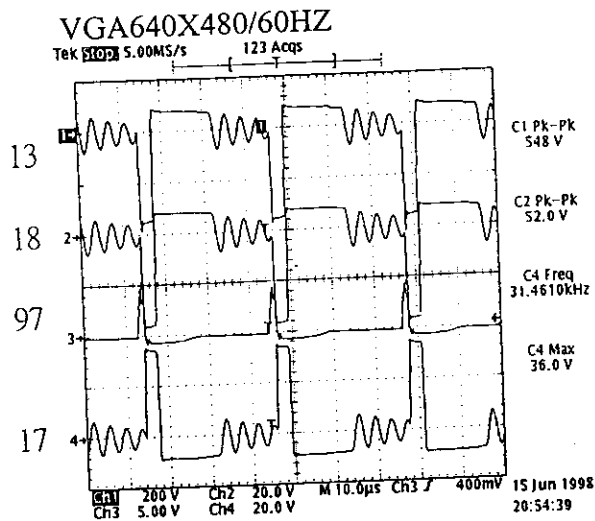
Our USB HUB with embedded function in swivel base is not pure HUB. User, through this HUB, can control monitor by Microsoft windows application program. So we can use this program to replace OSD IC to make cost down. User can connect keyboard, mouse, modem, printer and numerous other peripherals with hot-swappable interchange, eliminating the need for dedicated hardware cards and perpetual reconfiguration. One standard connector will serve nearly all your peripheral needs. Our USB HUB is self-power HUB if user do not turn off the power, otherwise the HUB will turn to bus-power automatically. If it is self-power HUB, it will support 500mA per port, otherwise it will only supply 100mA per port. It has over current detector to avoid hardware damage. If over current condition is happened, HUB will turn off the power and let LED flash in swivel base. Our HUB provides four downstream ports. If downstream ports are not enough to use, user just need to buy another HUB box to extend number of port.

FFT9905SKHFW POWER SUPPLY CIRCUIT WAVEFORM



POWER SUPPLY CIRCUIT WAVEFORM

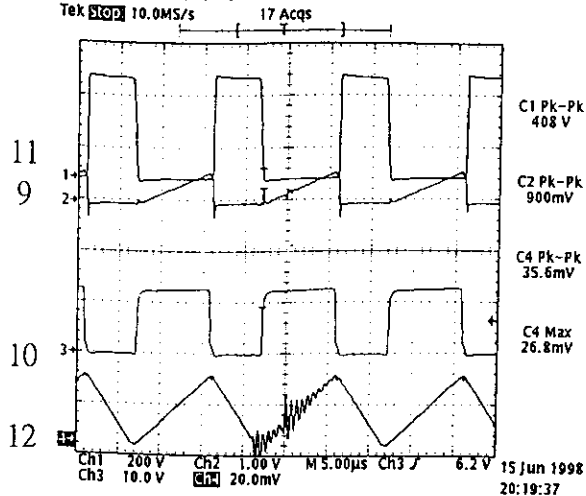
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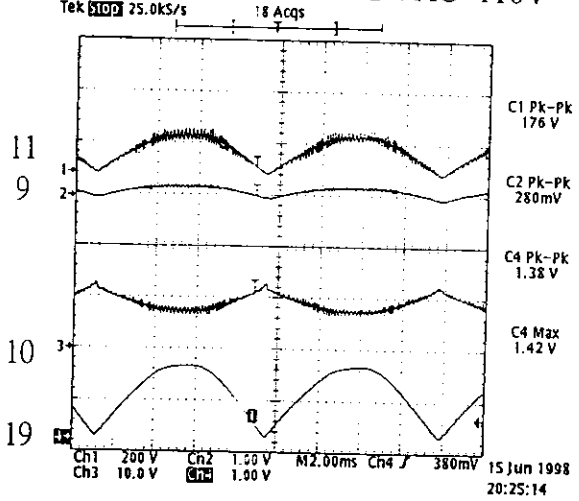
POWER SUPPLY CIRCUIT WAVEFORM

FFT9905SKHFW POWER SUPPLY CIRCUIT WAVEFORM

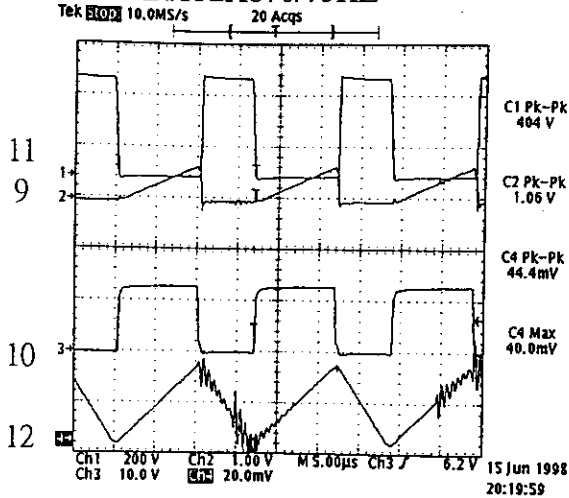
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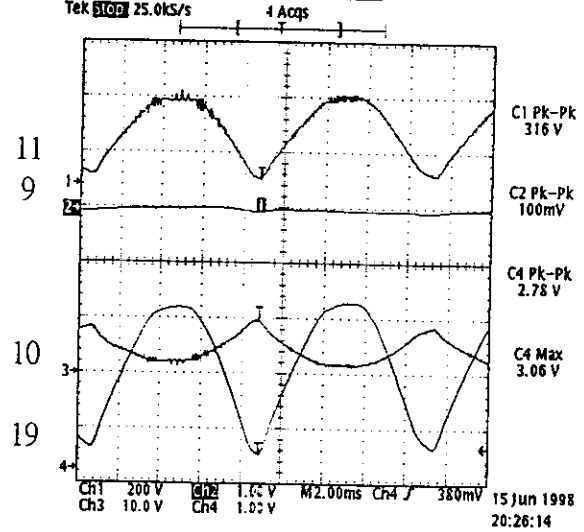
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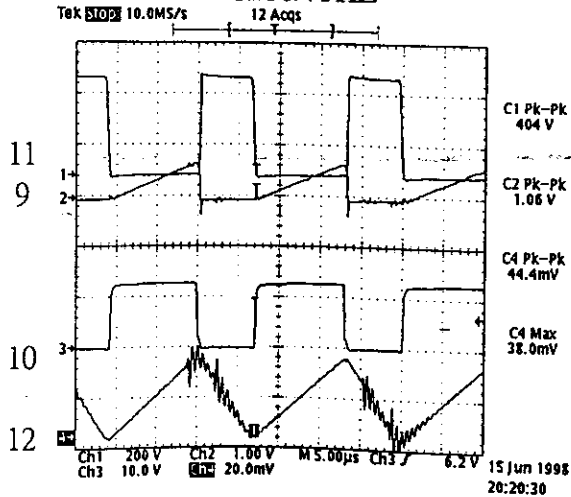
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APPLE1152X870/75HZ



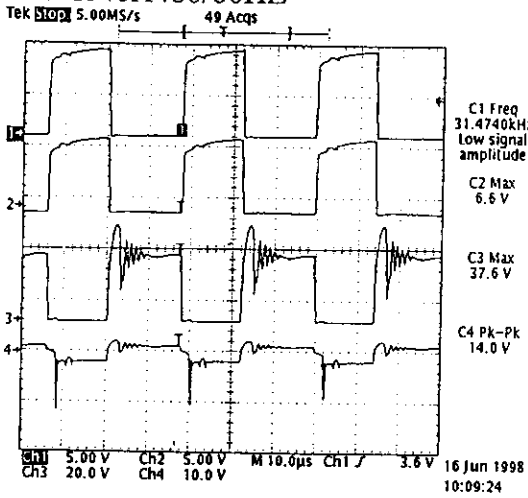
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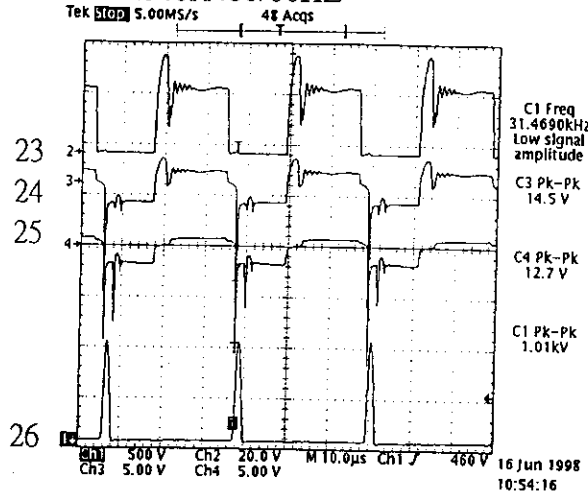
POWER FACTORY CIRCUIT WAVEFORM

FFT9905SKHFW HORIZONTAL CIRCUIT WAVEFORM

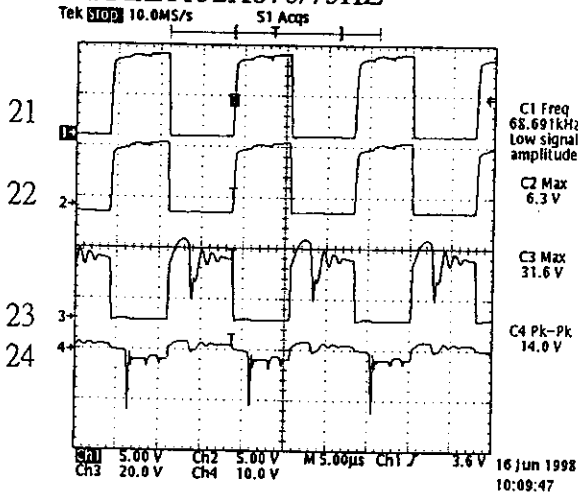
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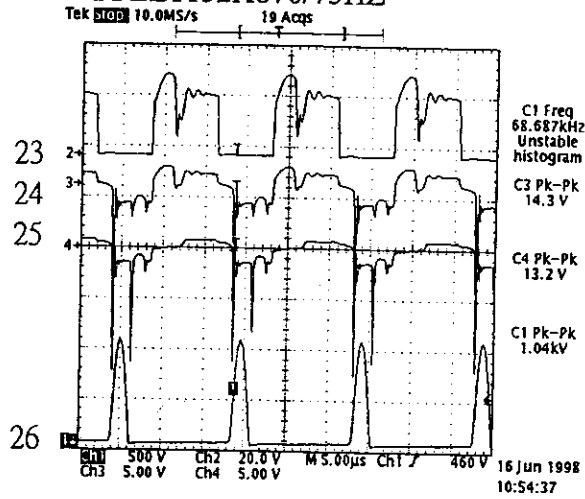
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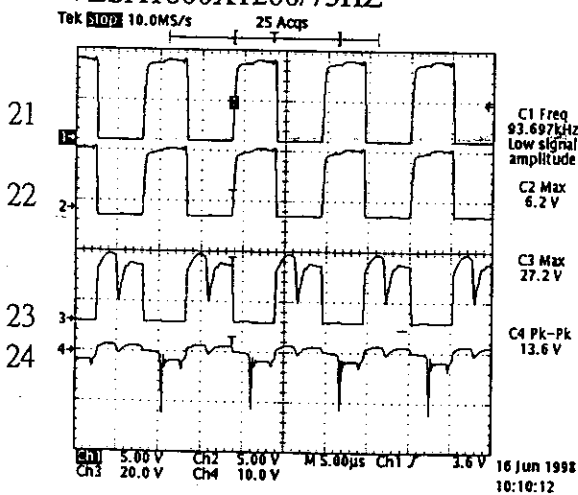
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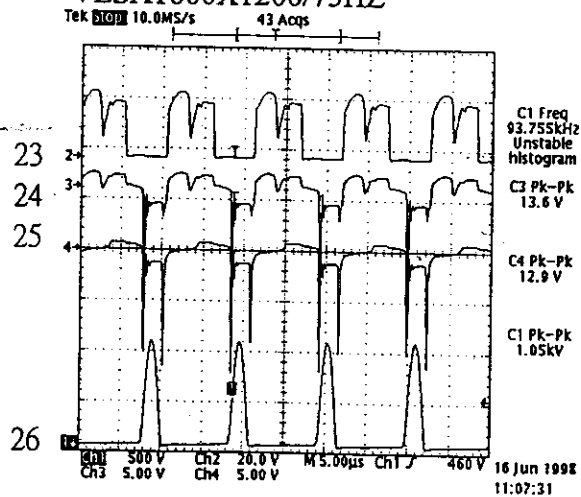
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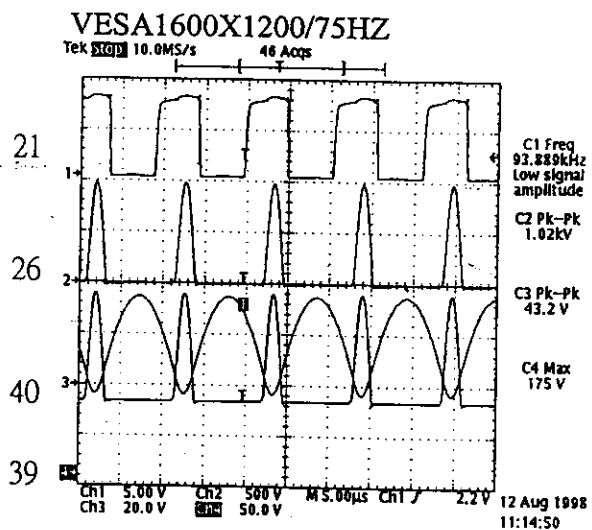
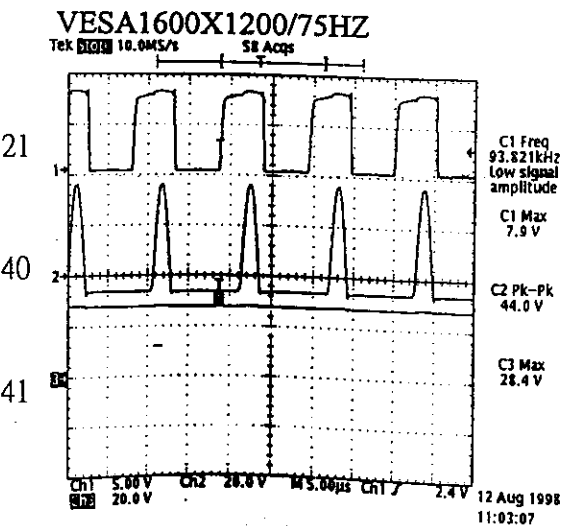
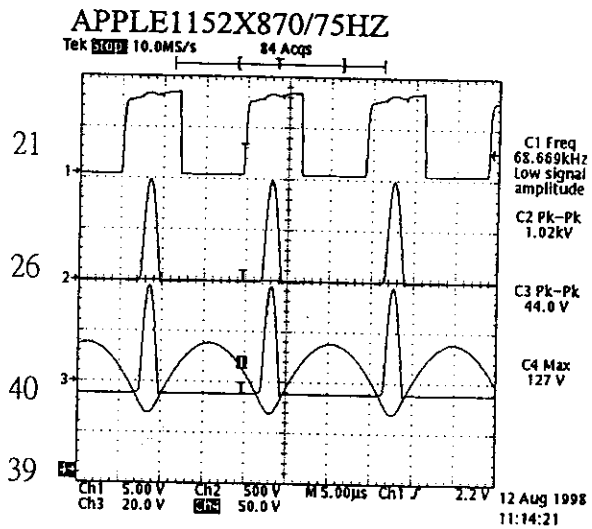
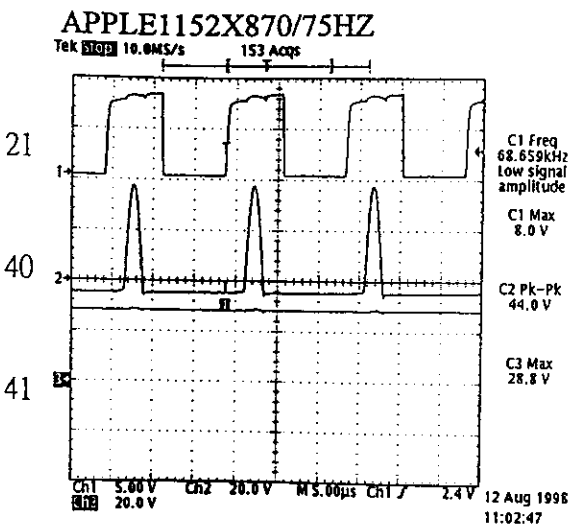
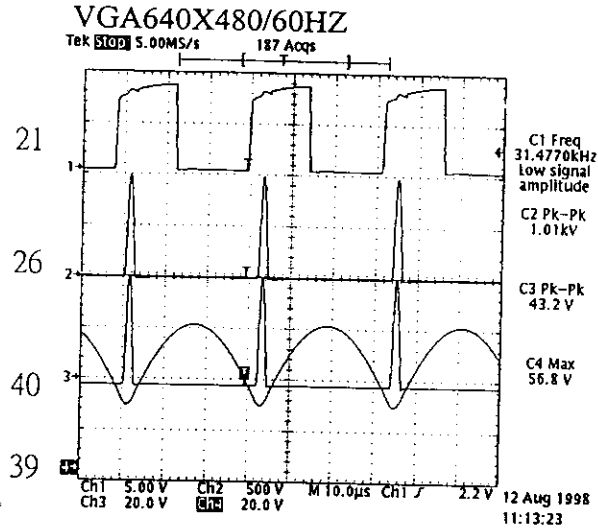
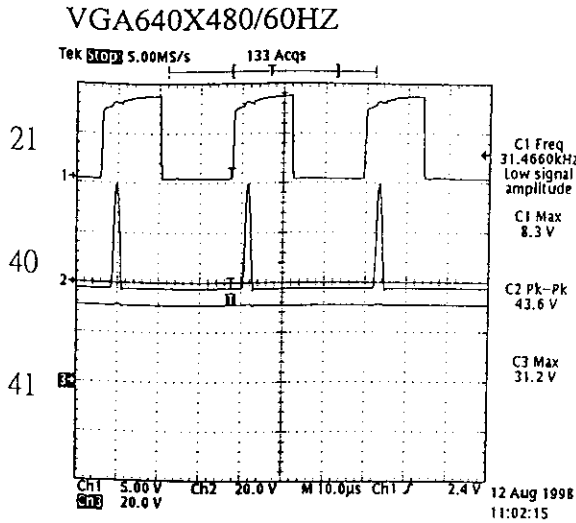


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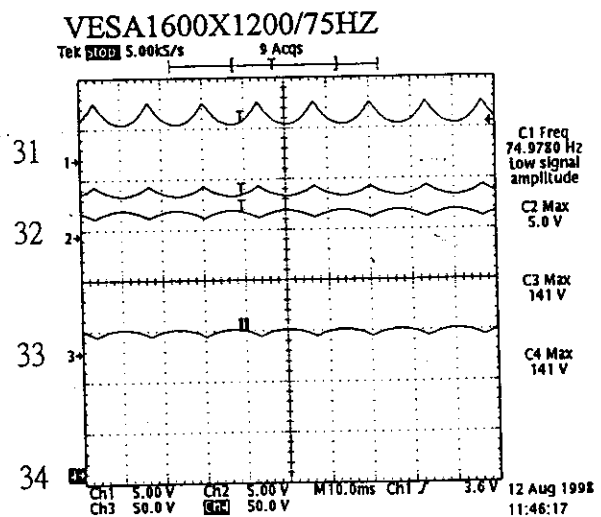
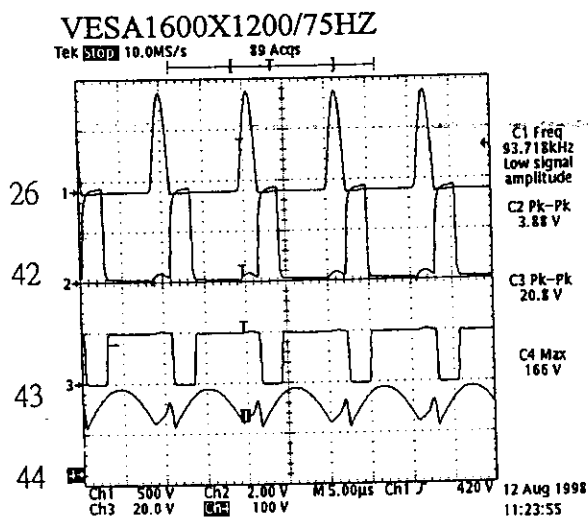
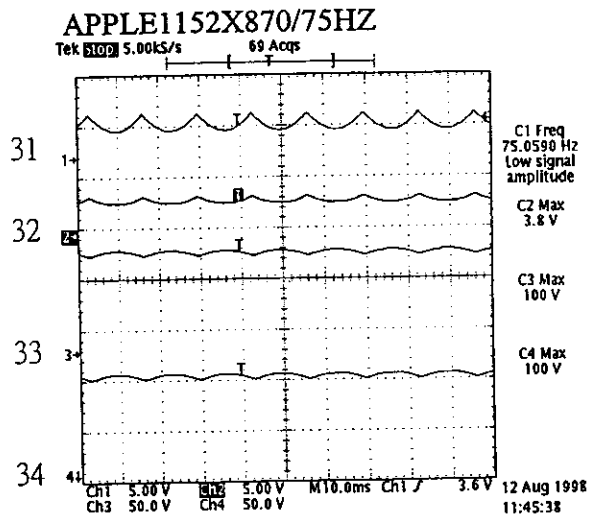
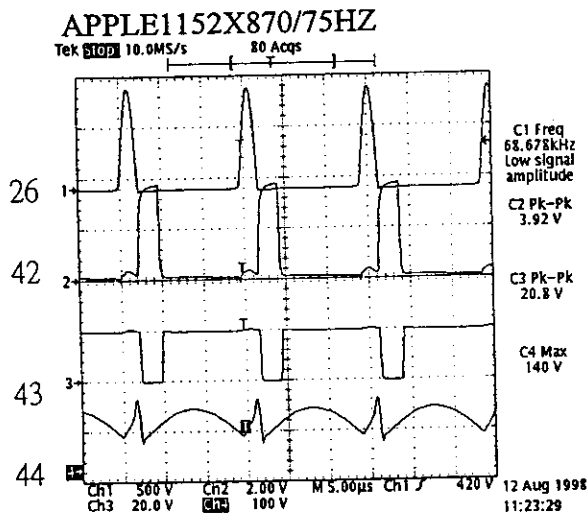
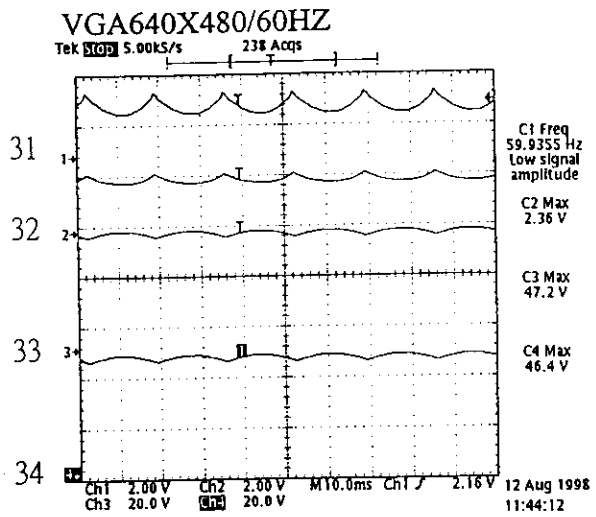
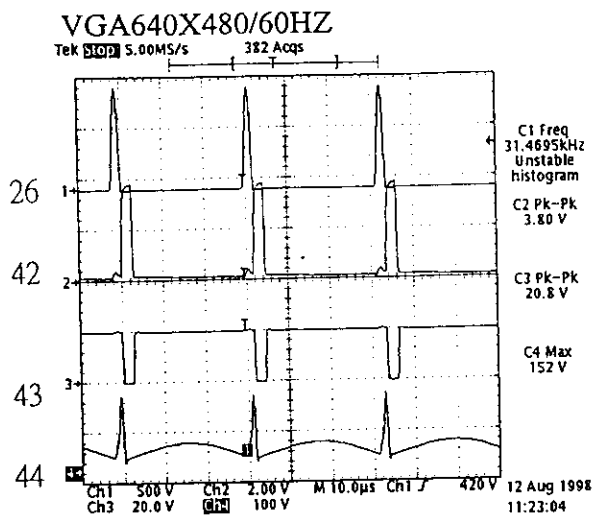
HORIZONTAL DEFLECTION CIRCUIT WAVEFORM

FFT9905SKHFW HORIZONTAL CIRCUIT WAVEFORM



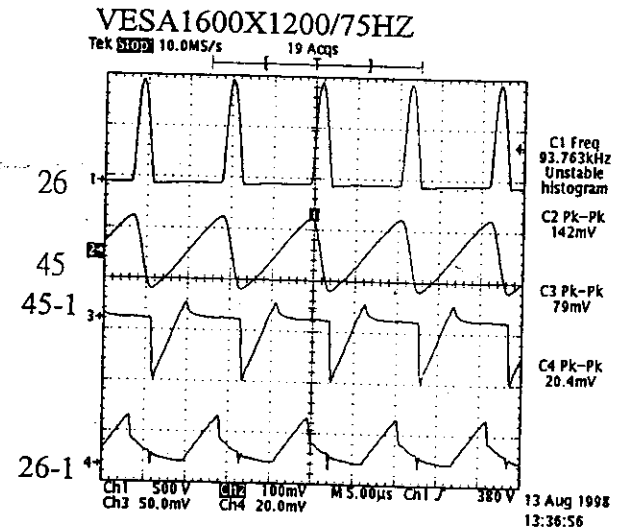
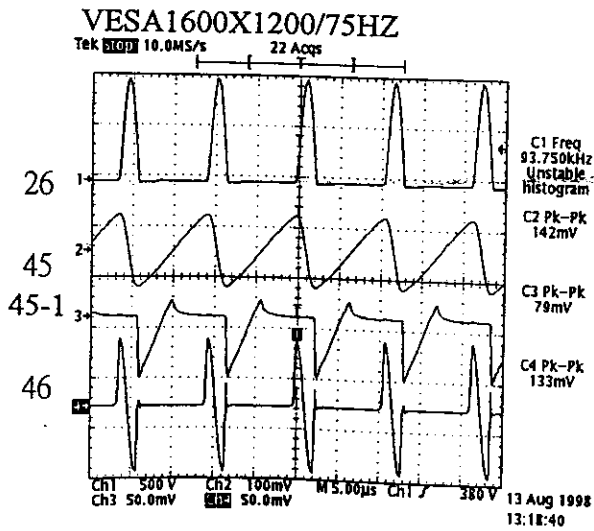
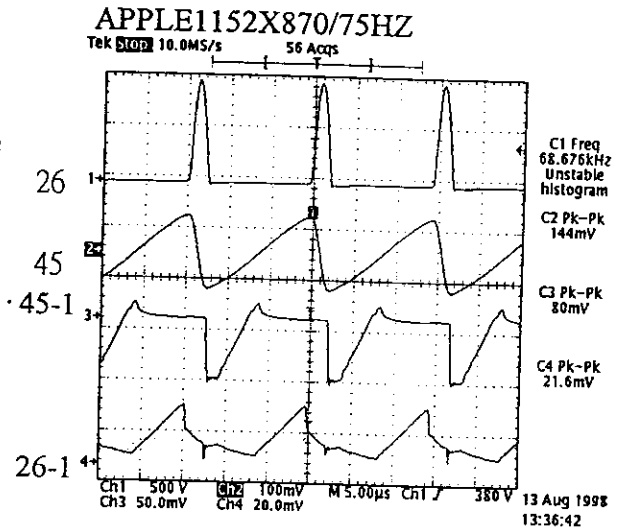
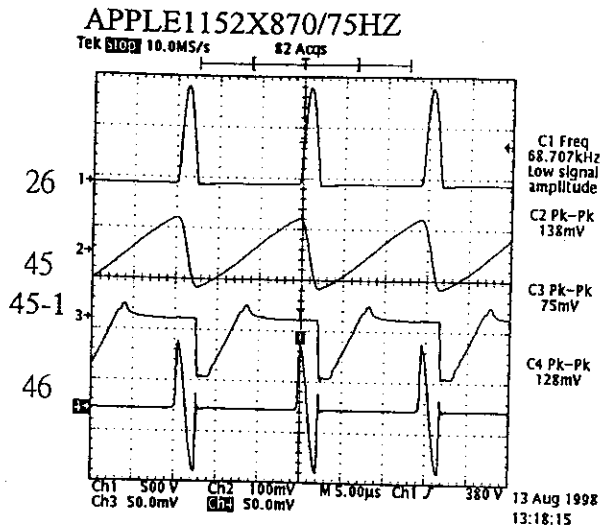
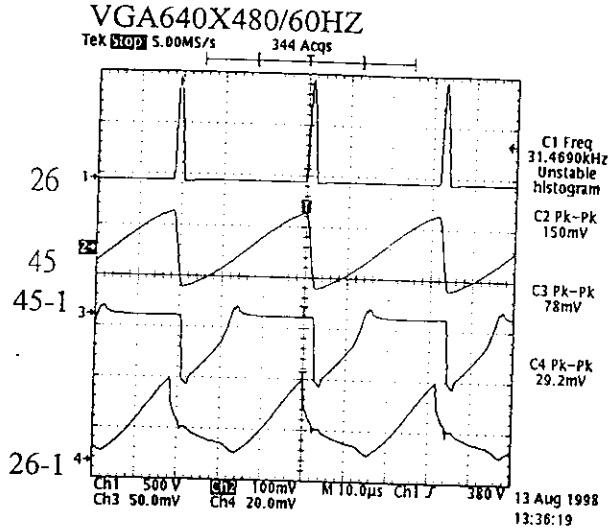
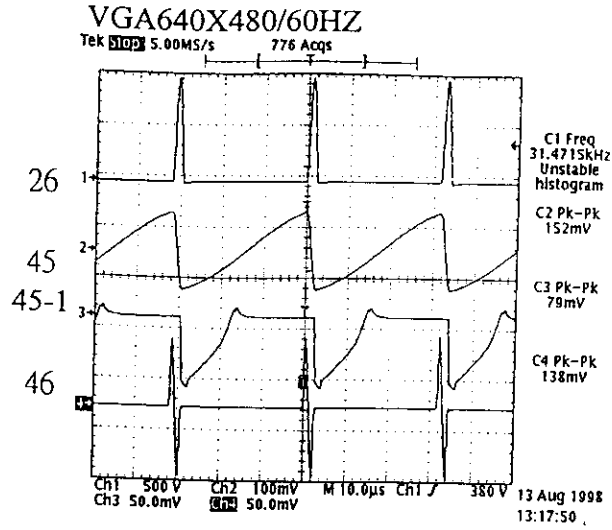
HORIZONTAL DEFLECTION CIRCUIT WAVEFORM

FFT9905SKHFW HORIZONTAL CIRCUIT WAVEFORM



HORIZONTAL DEFLECTION CIRCUIT WAVEFORM

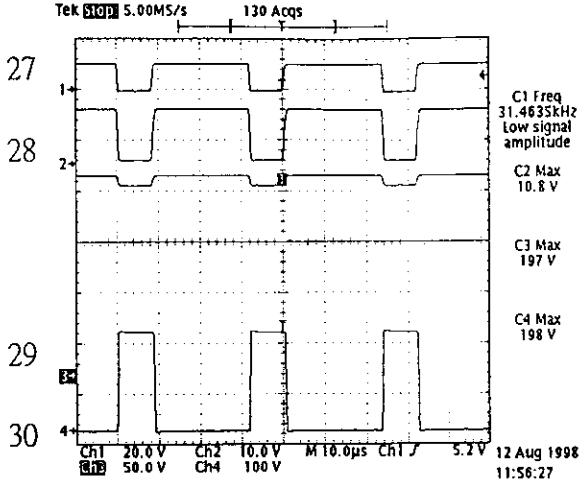
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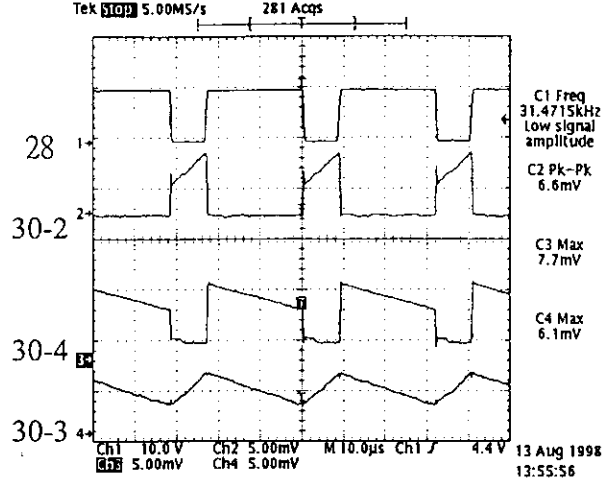
HORIZONTAL DEFLECTION CIRCUIT WAVEFORM

FFT9905SKHFW HORIZONTAL CIRCUIT WAVEFORM

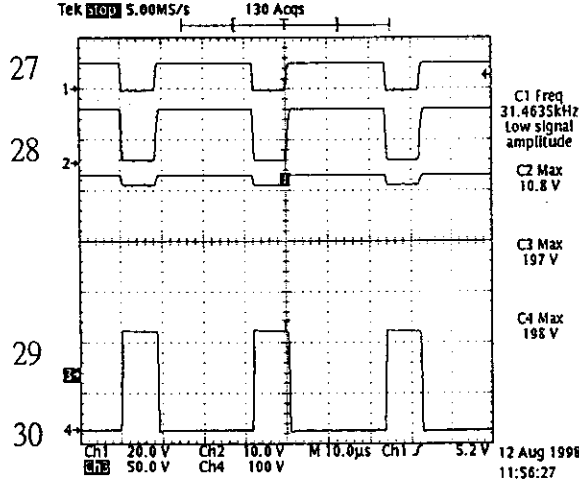
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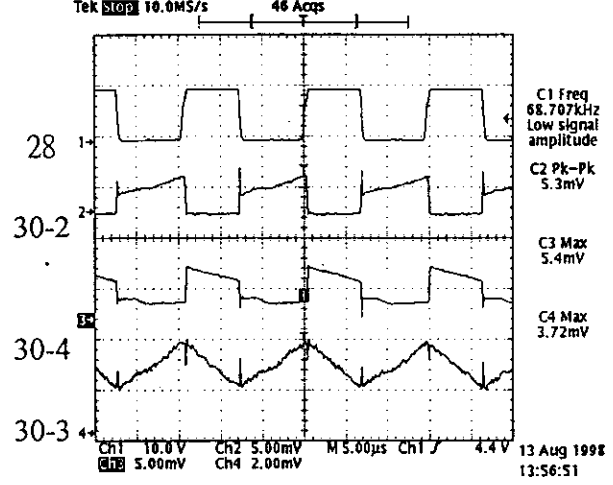
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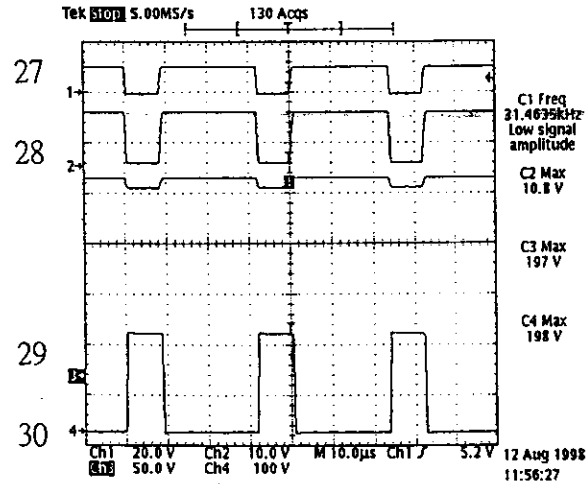
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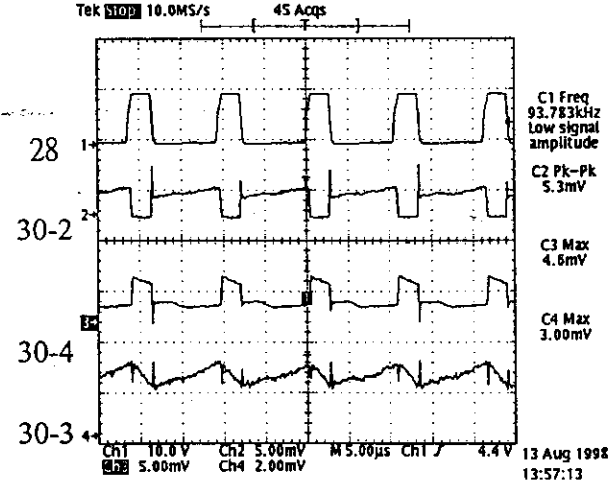
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VESA1600X1200/75HZ



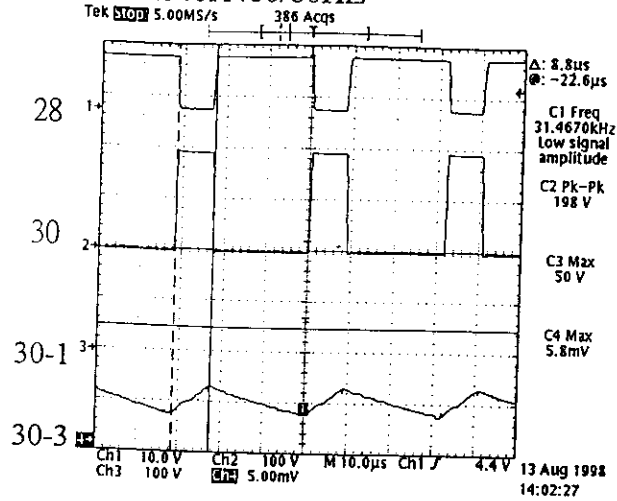
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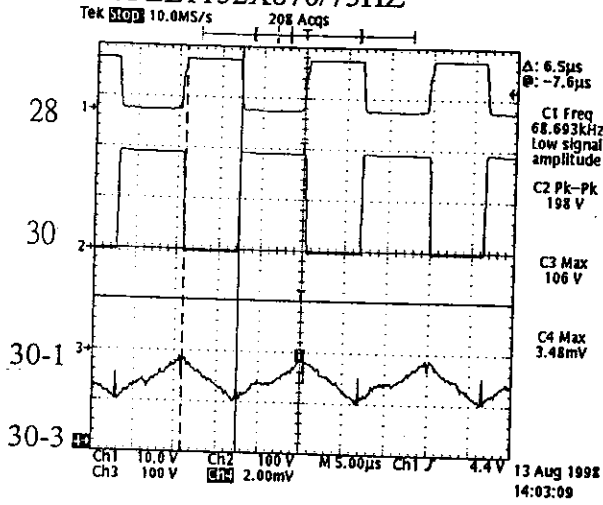
HORIZONTAL DEFLECTION BUCK CIRCUIT WAVEFORM

FFT9905SKHFW HORIZONTAL CIRCUIT WAVEFORM

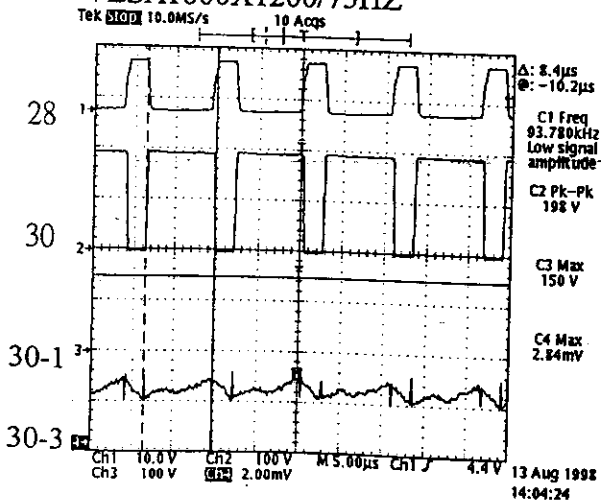
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APPLE1152X870/75HZ



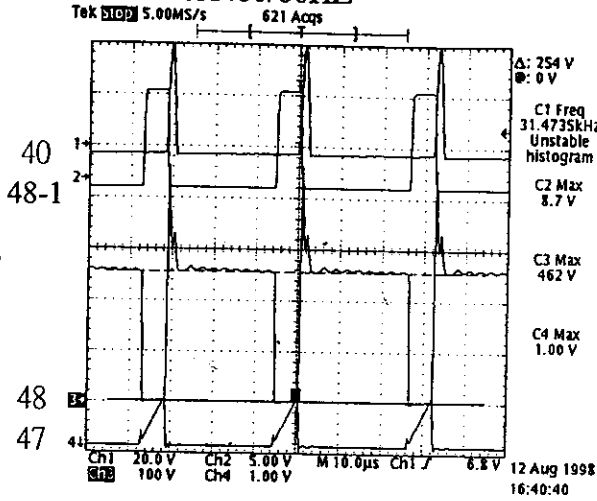
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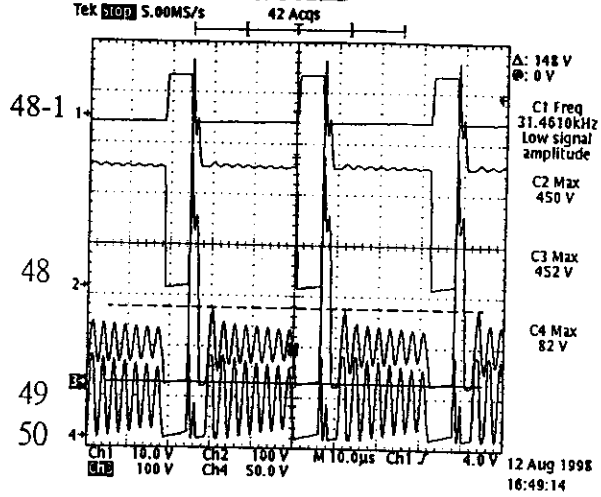
HORIZONTAL DEFLECTION BUCK CIRCUIT WAVEFORM

FFT9905SKHFW H.V DEFLECTION CIRCUIT WAVEFORM

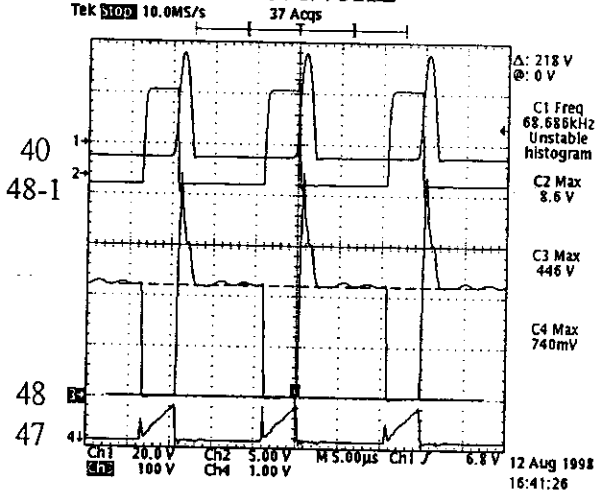
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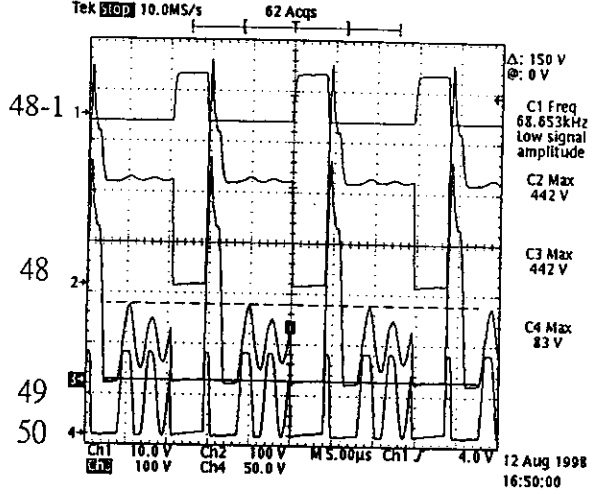
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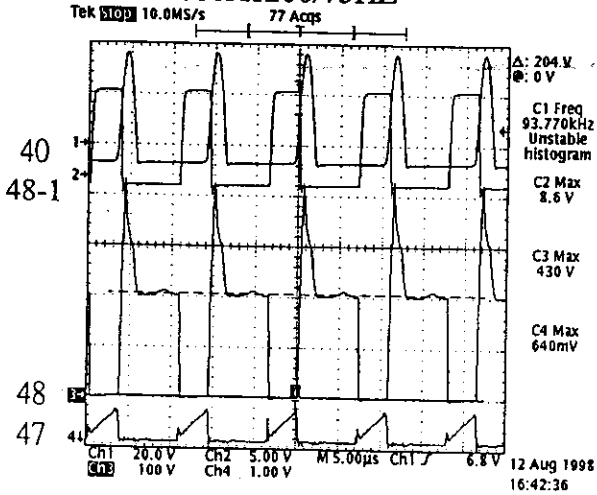
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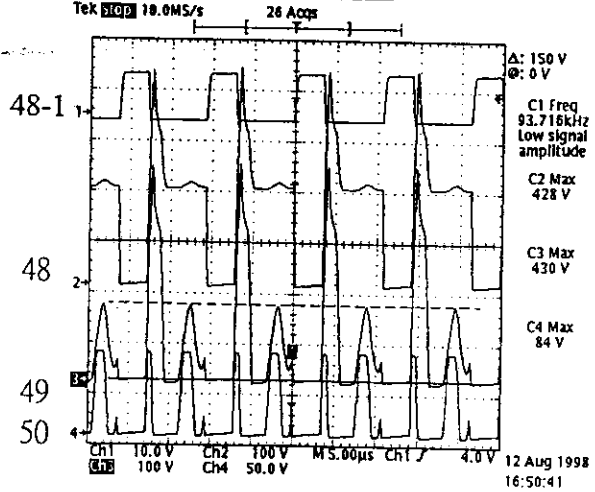
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VESA1600X1200/75HZ



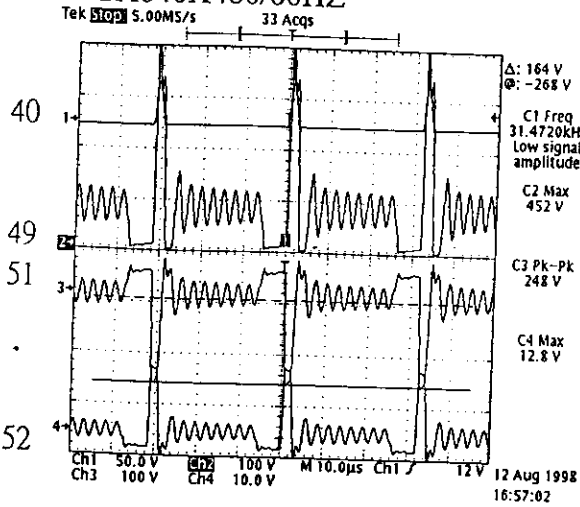
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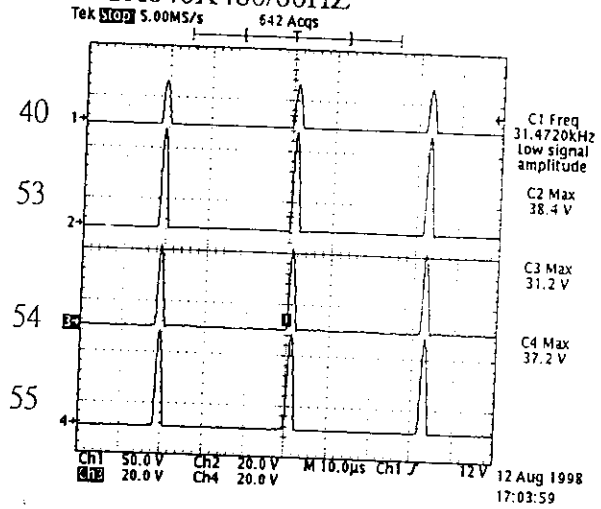
H.V DEFLECTION CIRCUIT WAVEFORM

FFT9905SKHFW H.V DEFLECTION CIRCUIT WAVEFORM

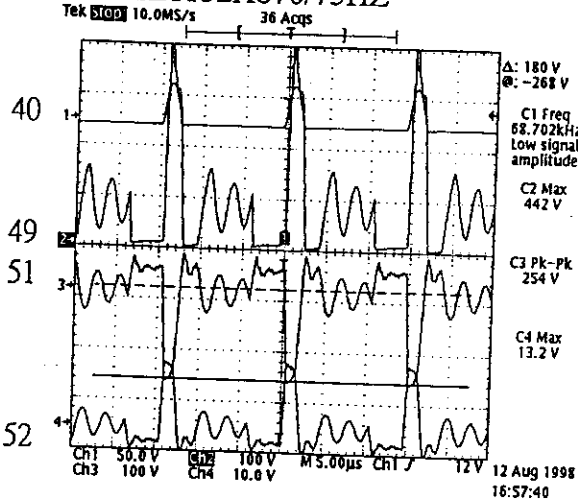
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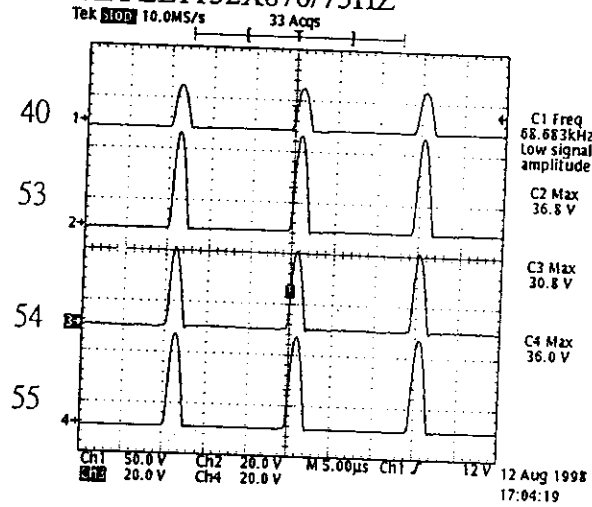
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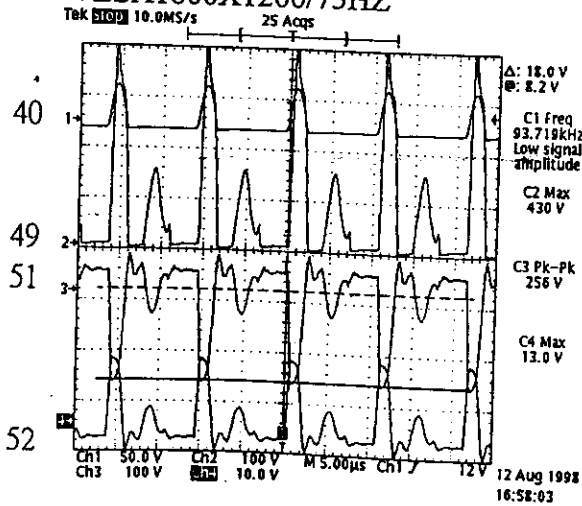
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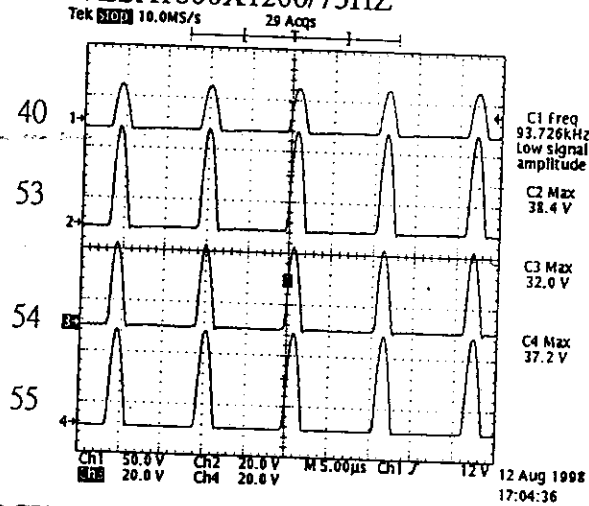
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VESA1600X1200/75HZ



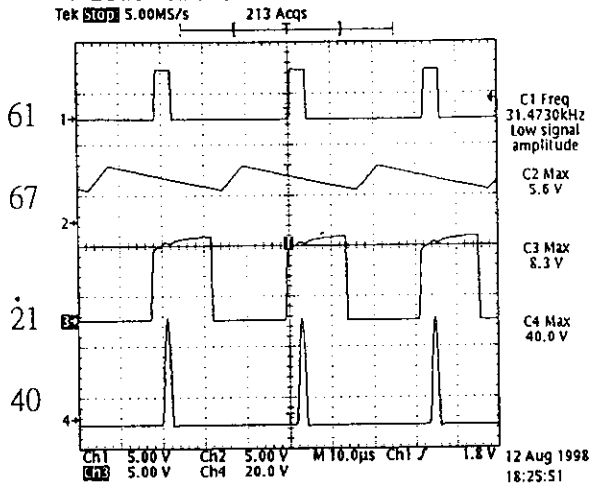
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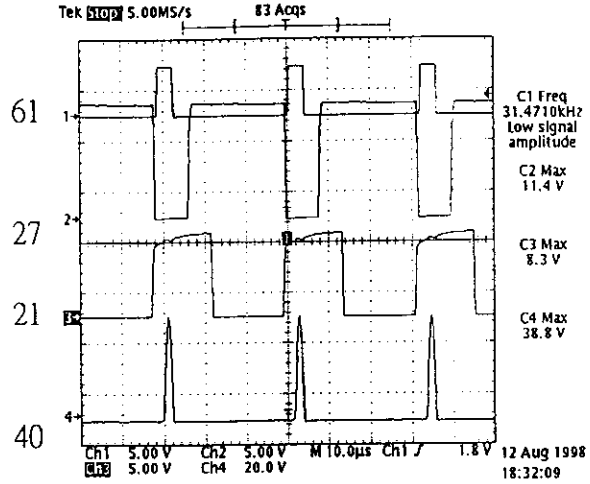
H.V DEFLECTION CIRCUIT WAVEFORM

FFT9905SKHFW IC402 AUTOSYNC DEFLECTION CONTROLLER WAVEFORM

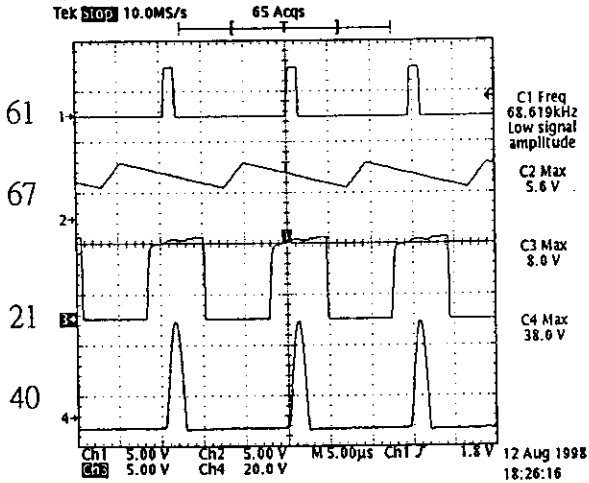
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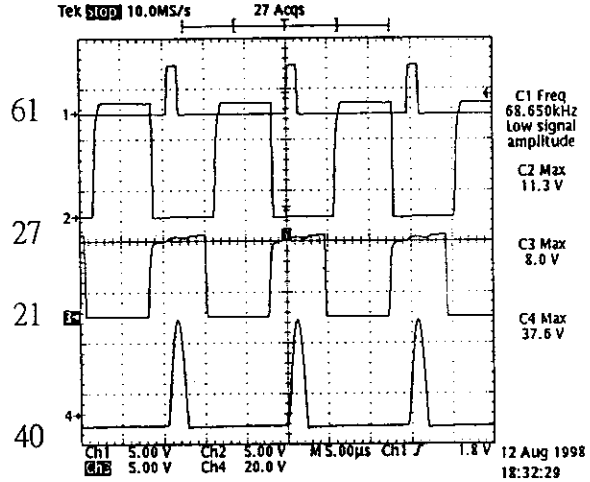
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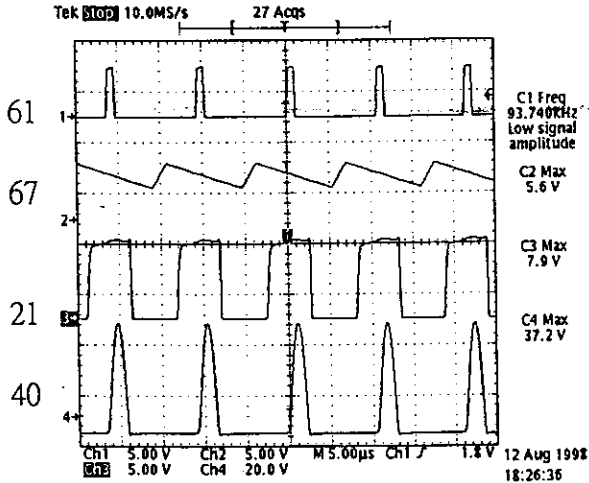
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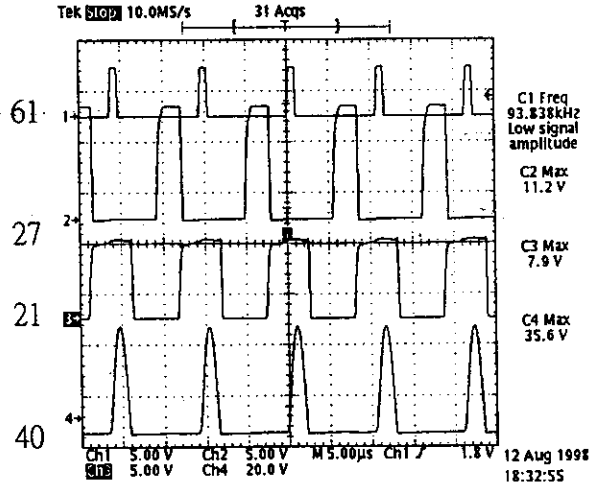
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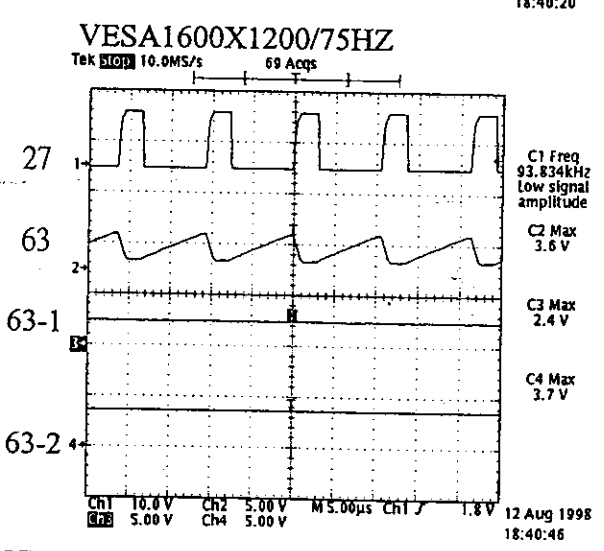
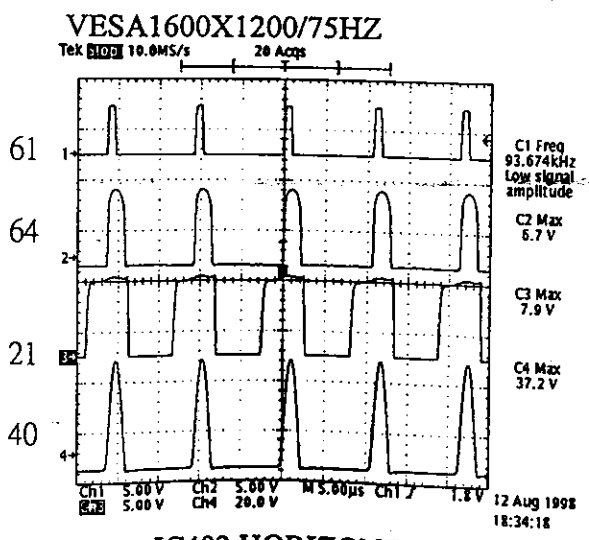
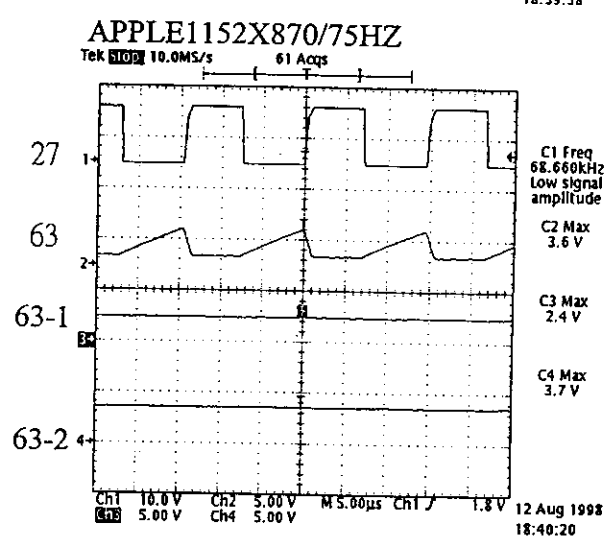
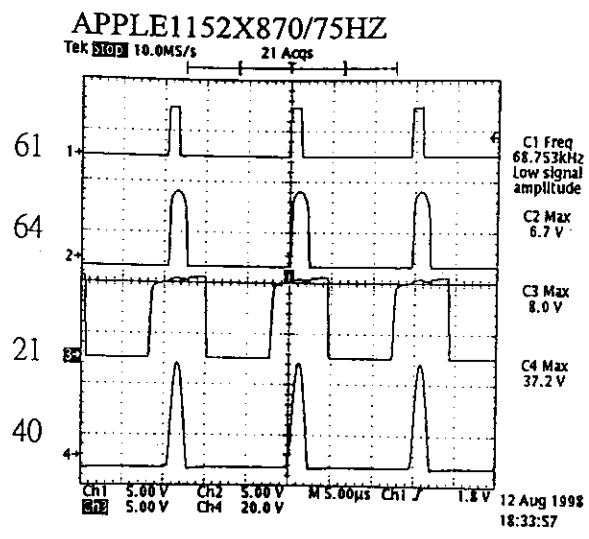
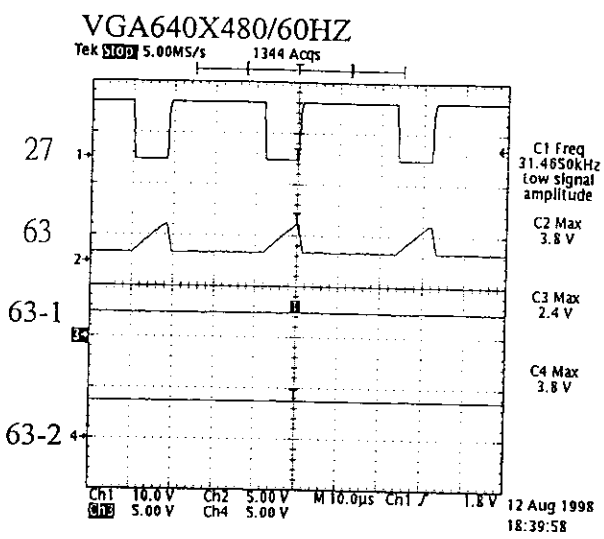
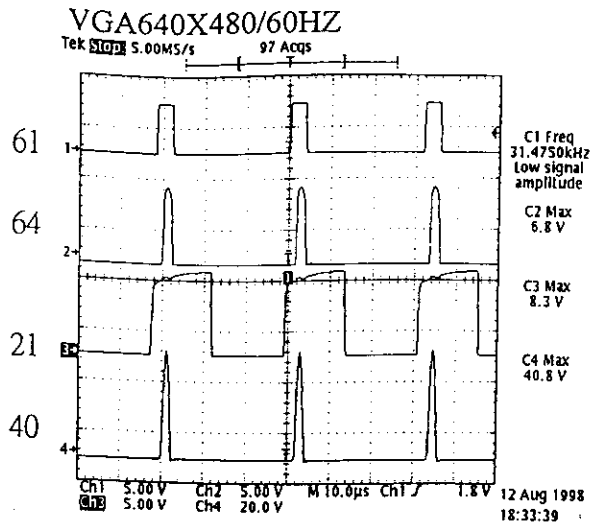


VESA1600X1200/75HZ



IC402 HORIZONTAL AUTOSYNC DEFLECTION WAVEFORM

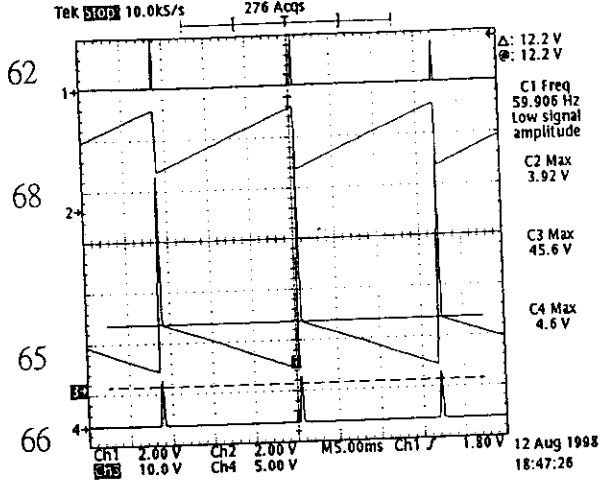
FFT9905SKHFW IC402 AUTOSYNC DEFLECTION CONTROLLER WAVEFORM



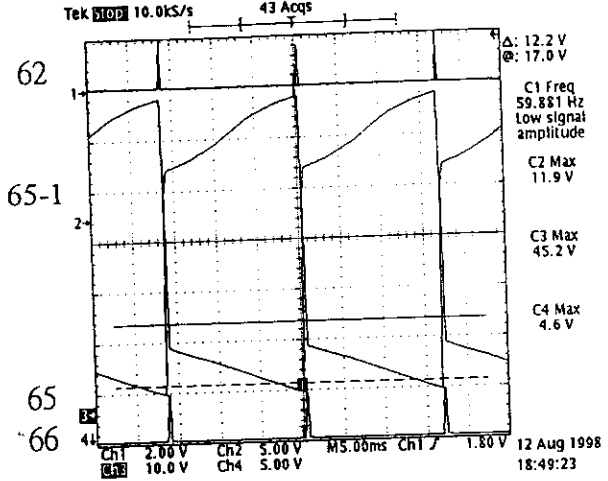
IC402 HORIZONTAL AUTOSYNC DEFLECTION WAVEFORM

FFT9905SKHFW IC402 AUTOSYNC/IC501 DC-COUPLED VERTICAL DEFLECTION CIRCUIT WAVEFORM

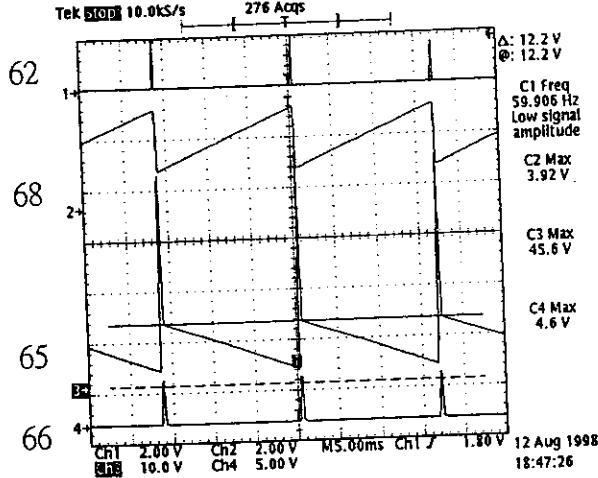
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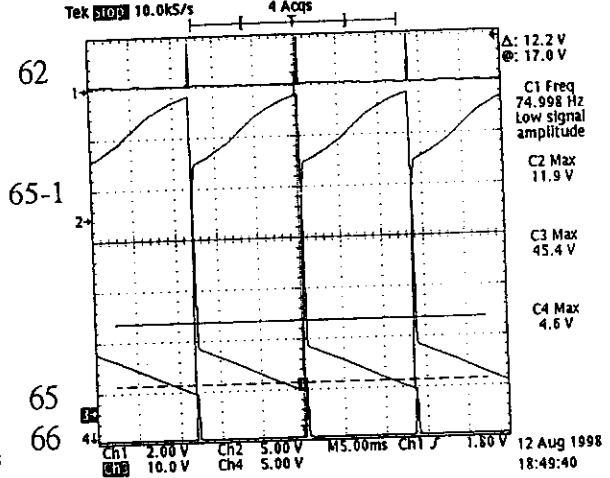
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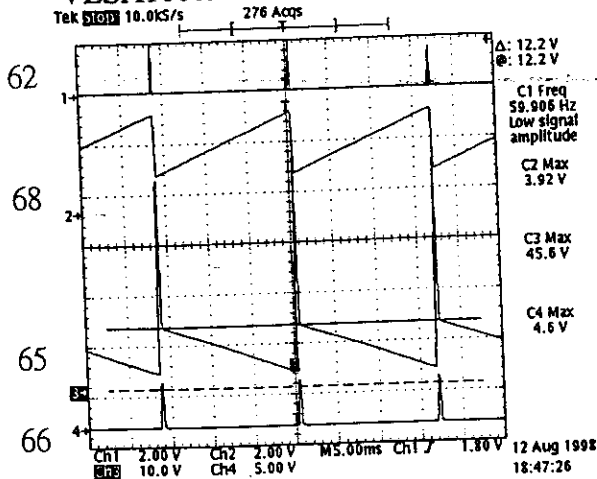
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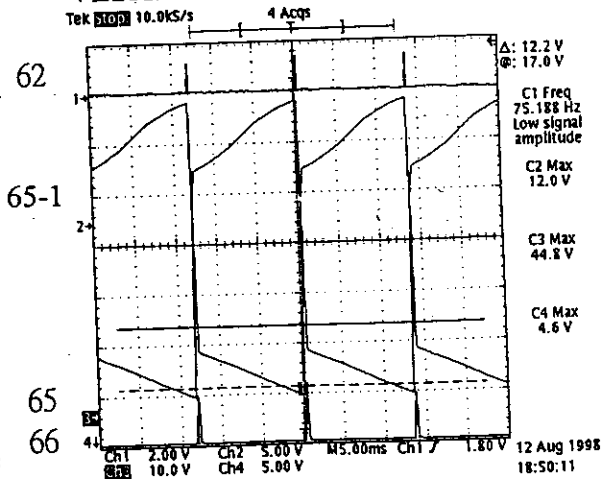
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VESA1600X1200/75HZ



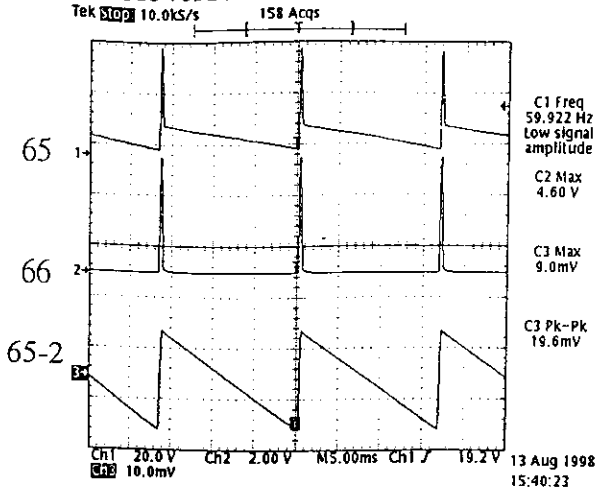
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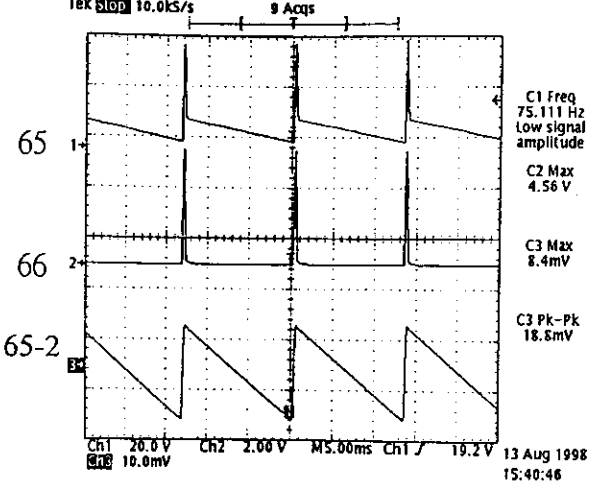
IC402/IC501 AUTOSYNC DC-COUPLED VERTICAL CIRCUIT WAVEFORM

FFT9905SKHFW IC402 AUTOSYNC/IC501 DC-COUPLED VERTICAL DEFLECTION CIRCUIT WAVEFORM

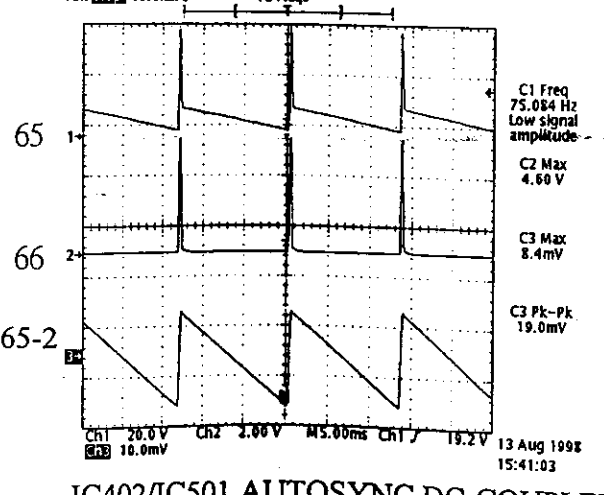
VGA640X480/60HZ



APPLE1152X870/75HZ

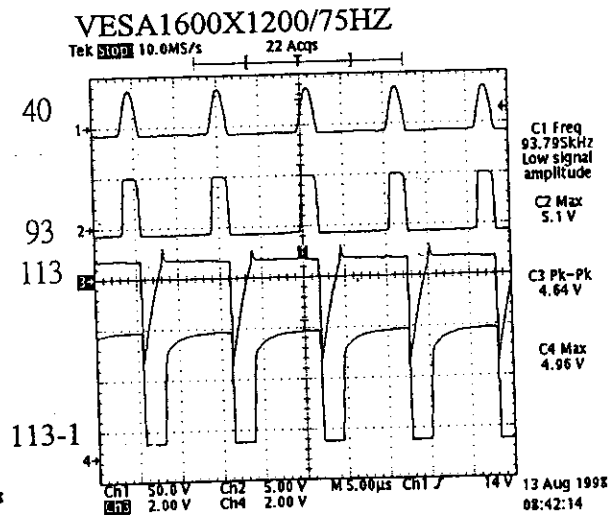
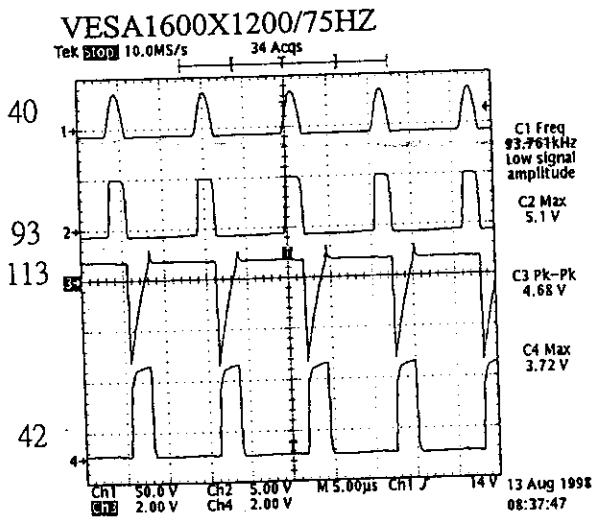
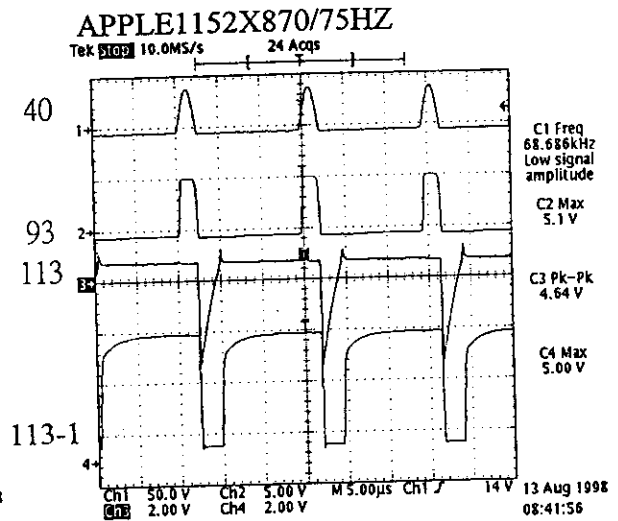
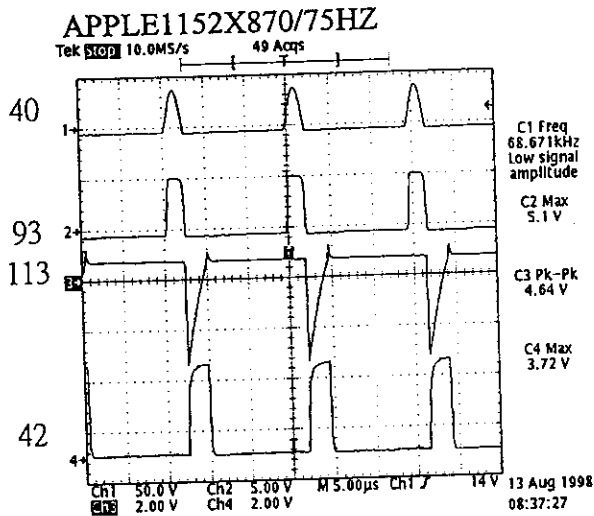
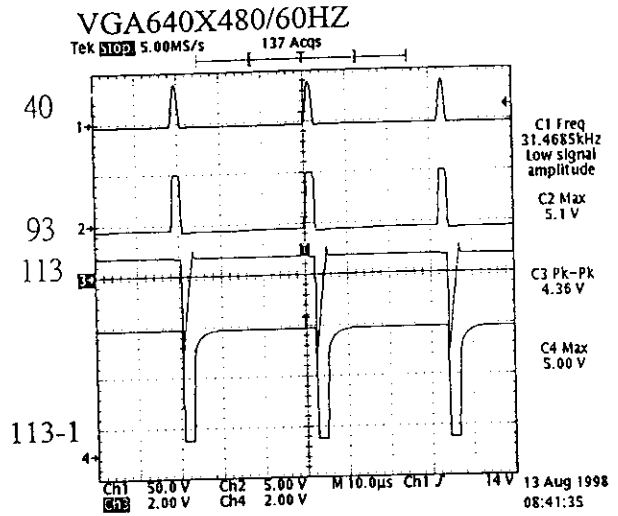
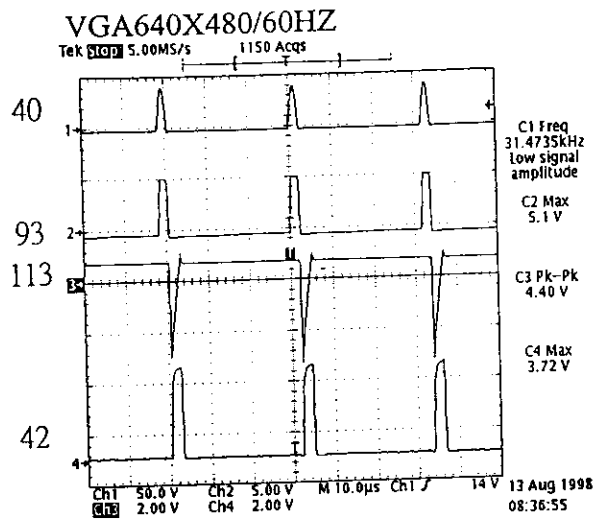


VESA1600X1200/75HZ



IC402/IC501 AUTOSYNC DC-COUPLED VERTICAL CIRCUIT WAVEFORM

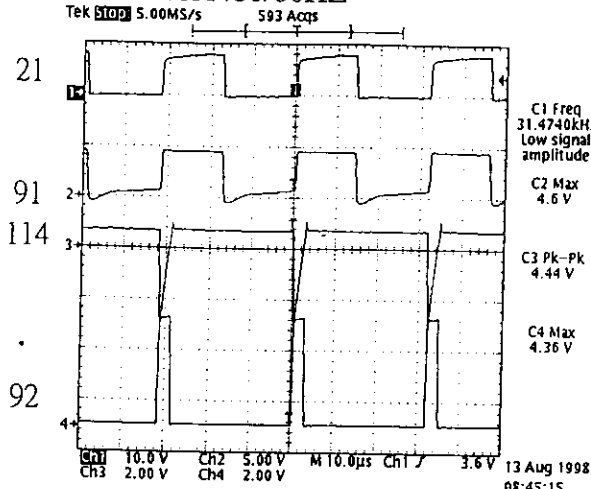
FFT9905SKHFW IC901 LINEARITY/DYNAMIC FOCUS PHASE CONTROL CIRCUIT WAVEFORM



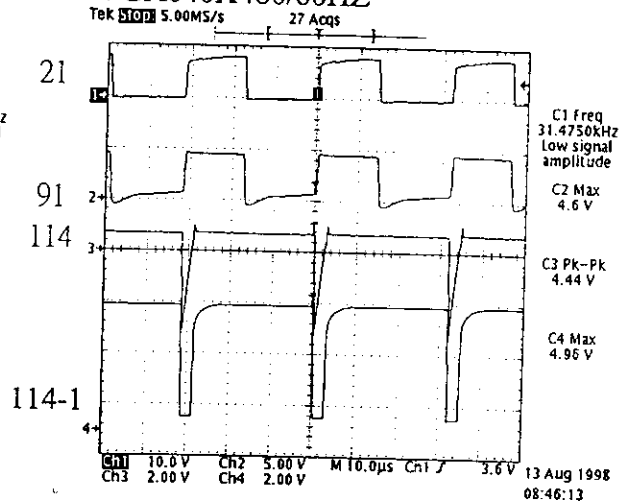
IC901 LINEARITY/DYNAMIC FOCUS PHASE CONTROL CIRCUIT WAVEFORM

FFT9905SKHFW IC901 LINEARITY/DYNAMIC FOCUS PHASE CONTROL CIRCUIT WAVEFORM

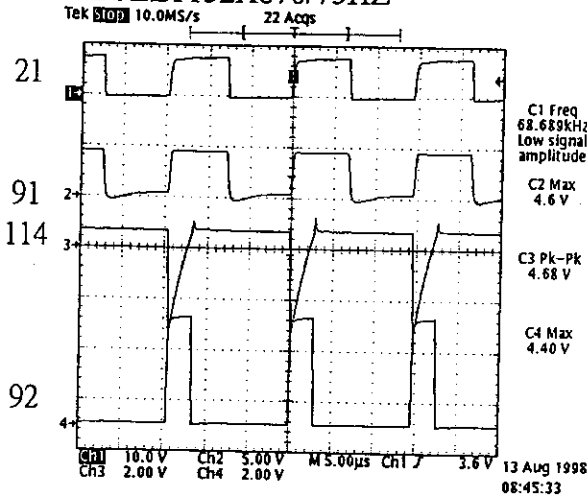
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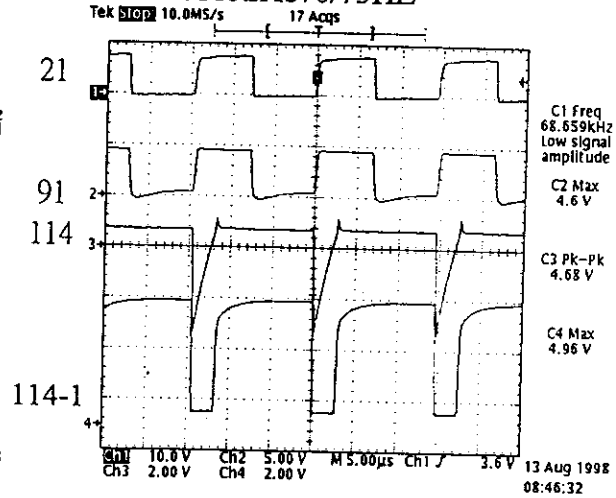
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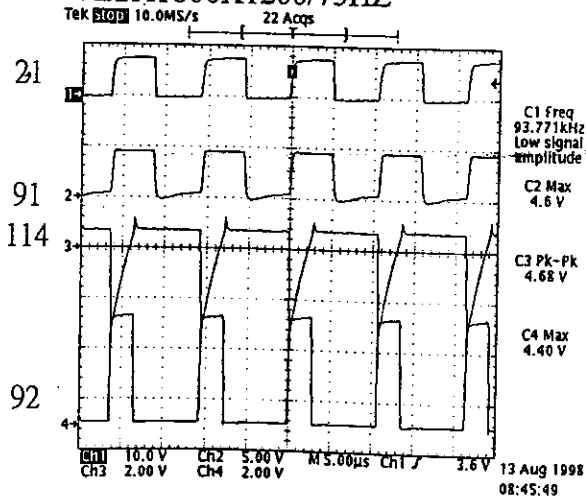
APPLE1152X870/75HZ



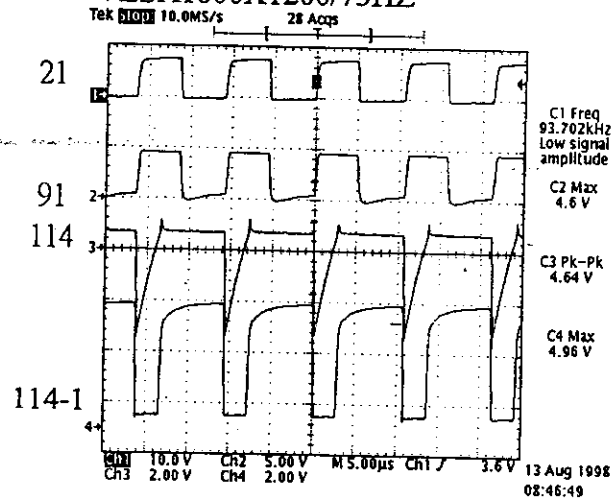
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VESA1600X1200/75HZ

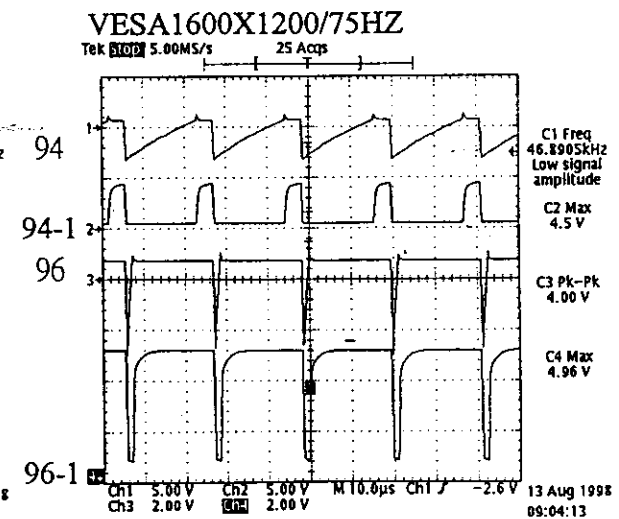
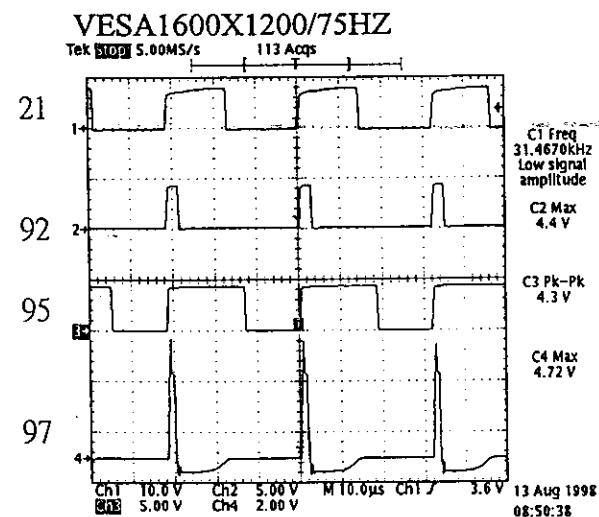
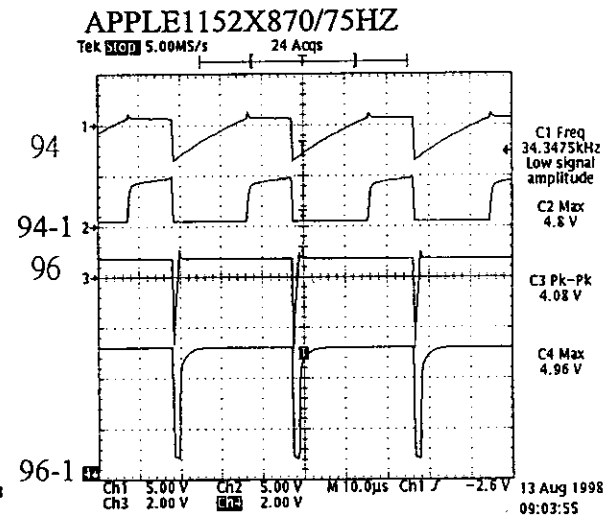
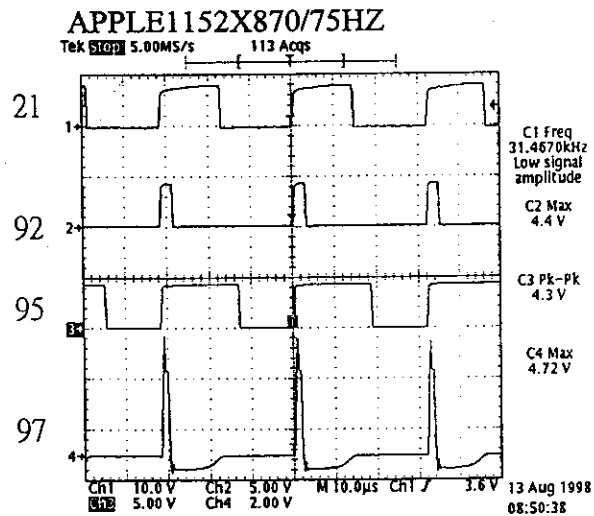
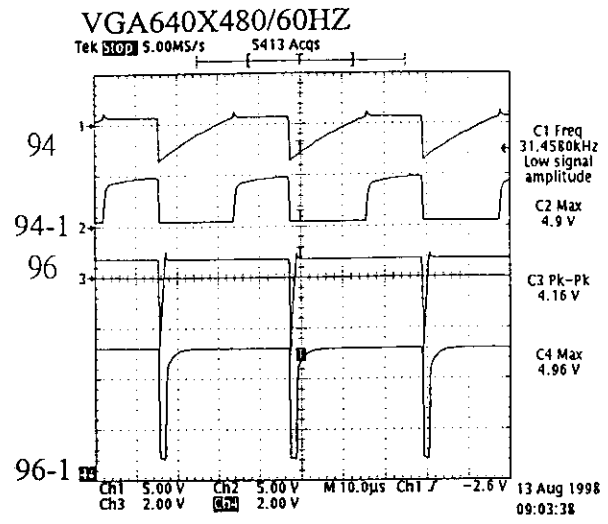
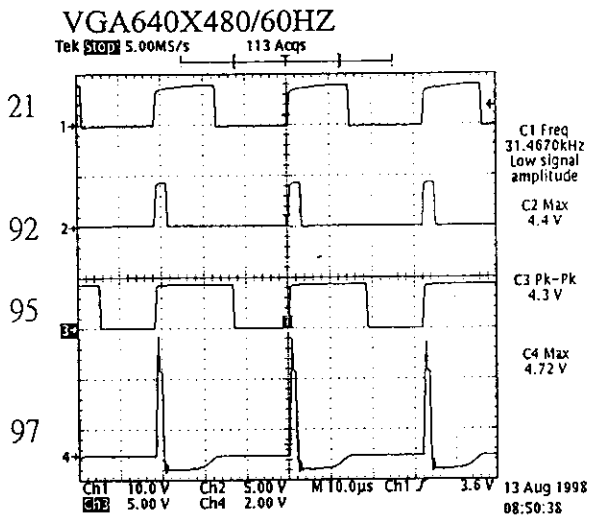


VESA1600X1200/75HZ



IC901 LINEARITY/DYNAMIC FOCUS PHASE CONTROL CIRCUIT WAVEFORM

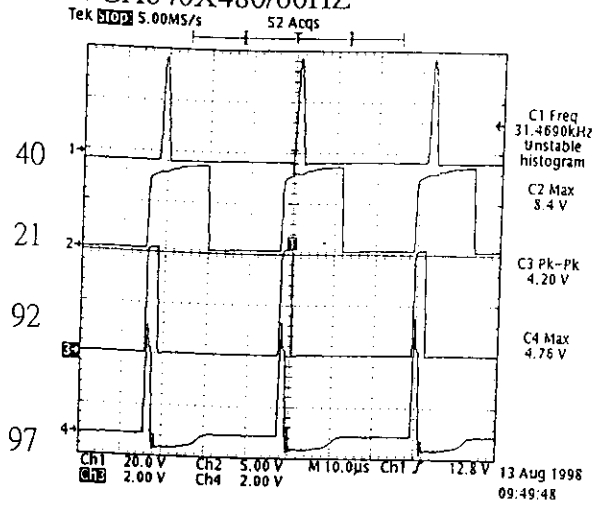
FFT9905SKHFW IC751 POWER SUPPLY DIVISION FREQUENCY CIRCUIT WAVEFORM



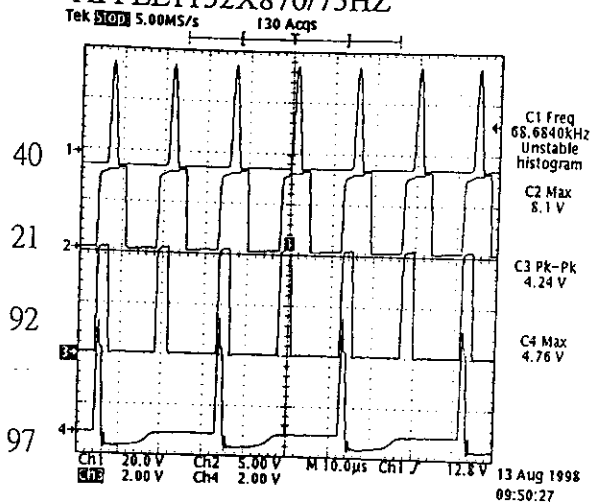
IC751 POWER SUPPLY DIVISION FREQUENCY CIRCUIT WAVEFORM

FFT9905SKHFW IC751 POWER SUPPLY DIVISION FREQUENCY CIRCUIT WAVEFORM

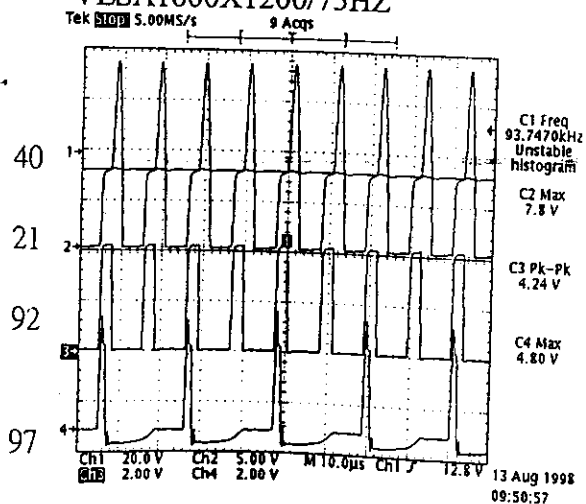
VGA640X480/60HZ



APPLE1152X870/75HZ

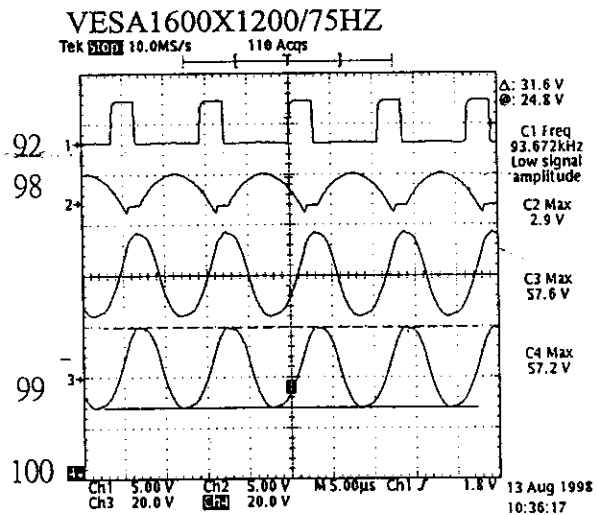
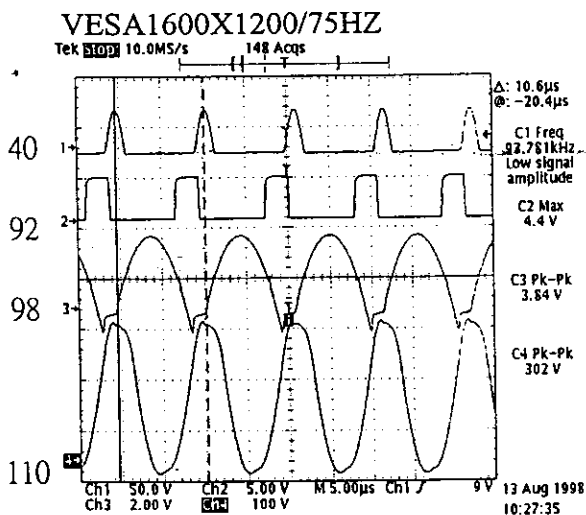
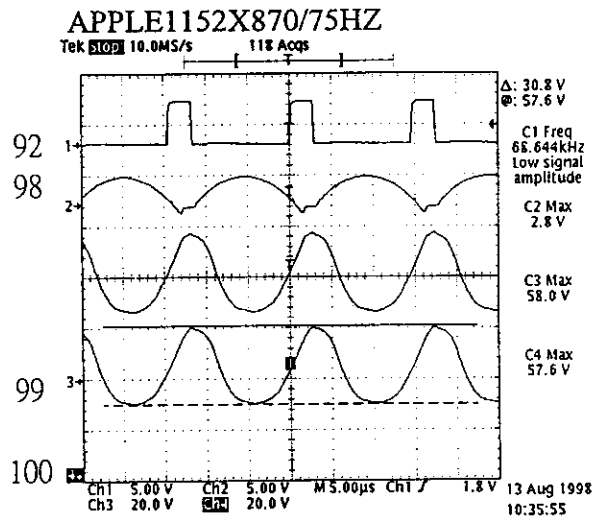
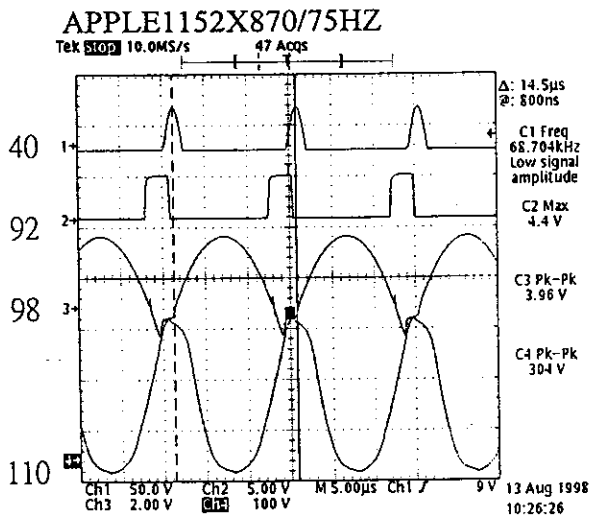
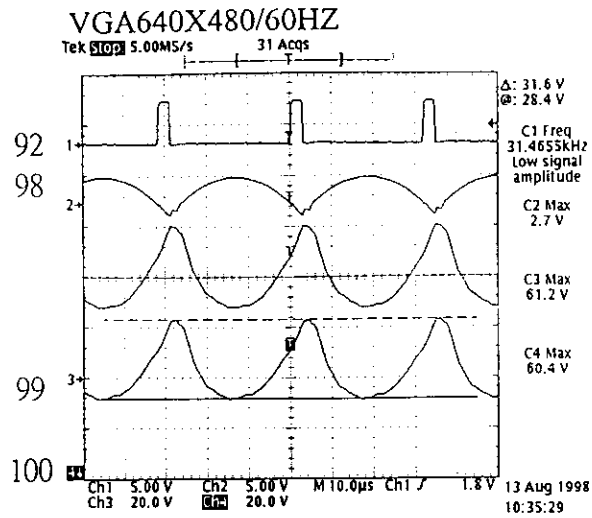
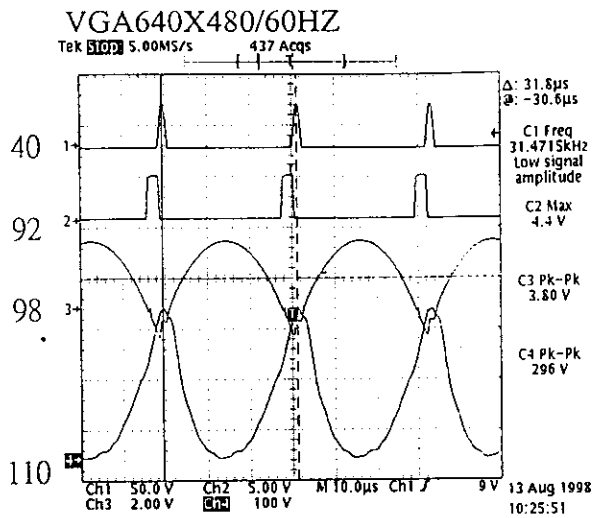


VESA1600X1200/75HZ



IC751 POWER SUPPLY DIVISION FREQUENCY CIRCUIT WAVEFORM

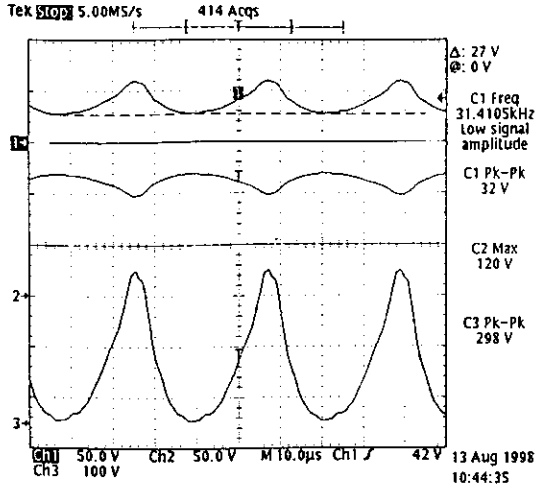
FFT9905SKHFW IC902 DYNAMIC FOCUS CIRCUIT WAVEFORM



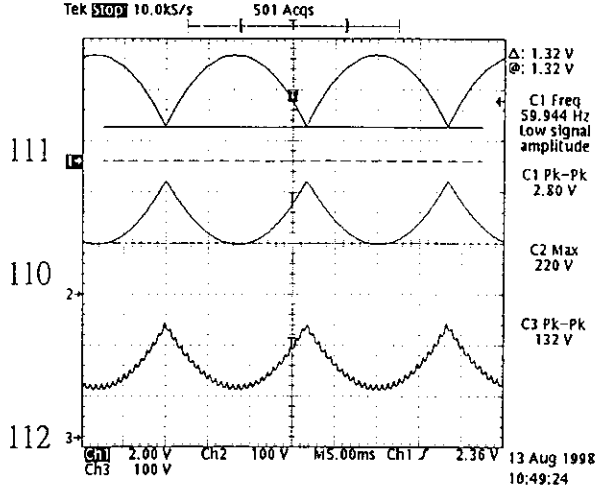
DYNAMIC FOCUS CIRCUIT WAVEFORM

FFT9905SKHFW IC902 DYNAMIC FOCUS CIRCUIT WAVEFORM

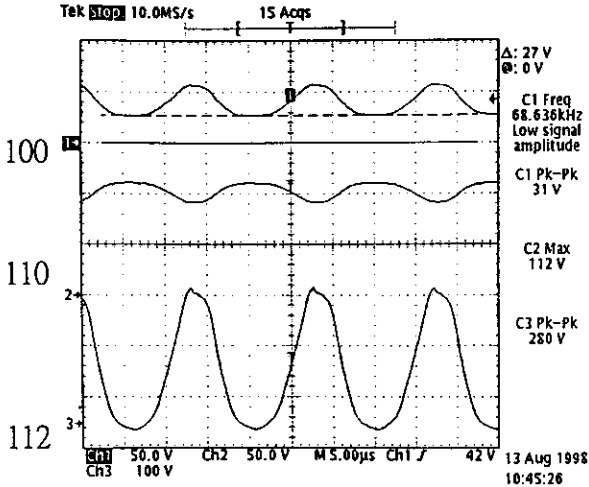
VGA640X480/60HZ



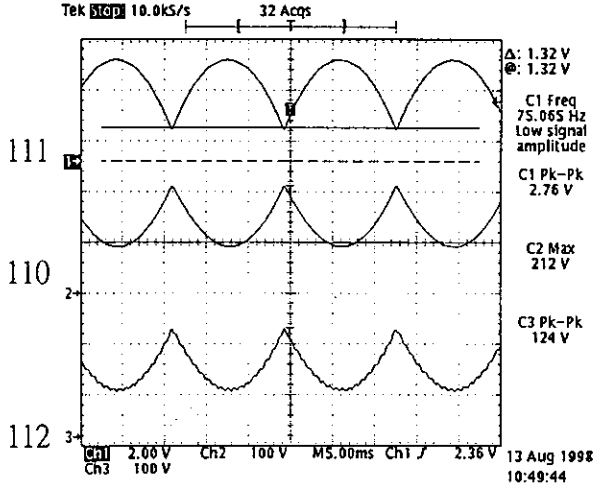
VGA640X480/60HZ



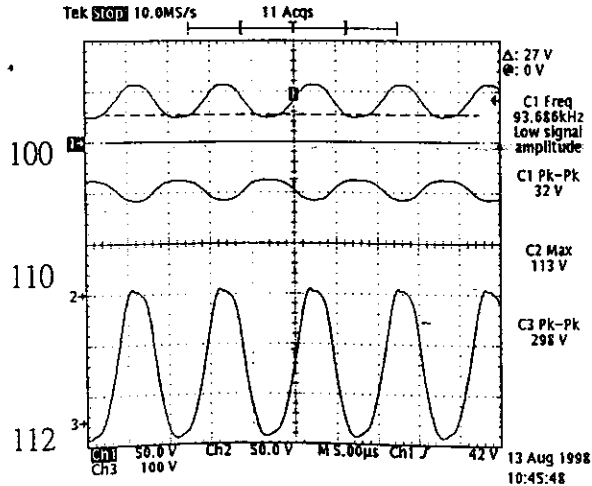
APPLE1152X870/75HZ



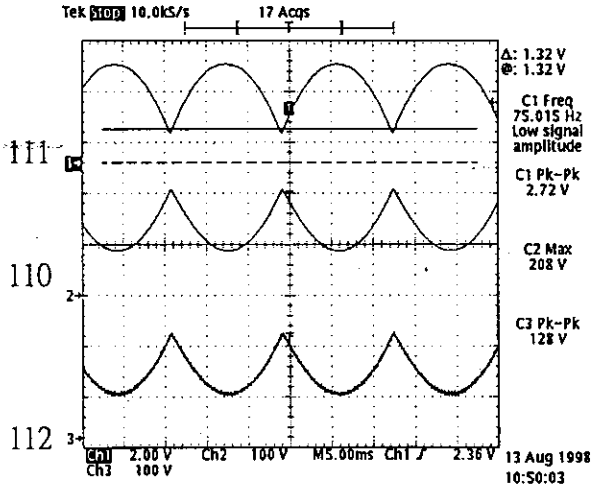
APPLE1152X870/75HZ



VESA1600X1200/75HZ



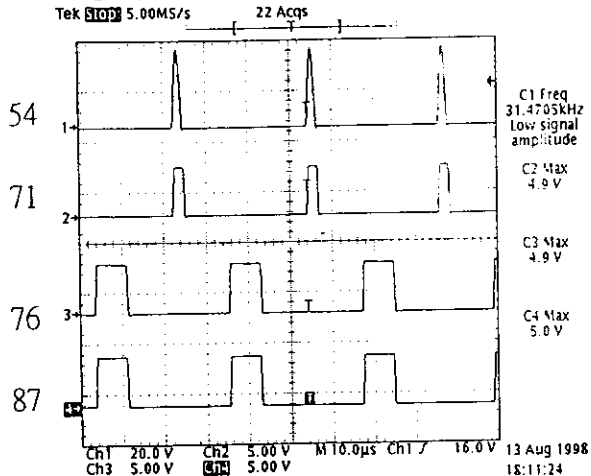
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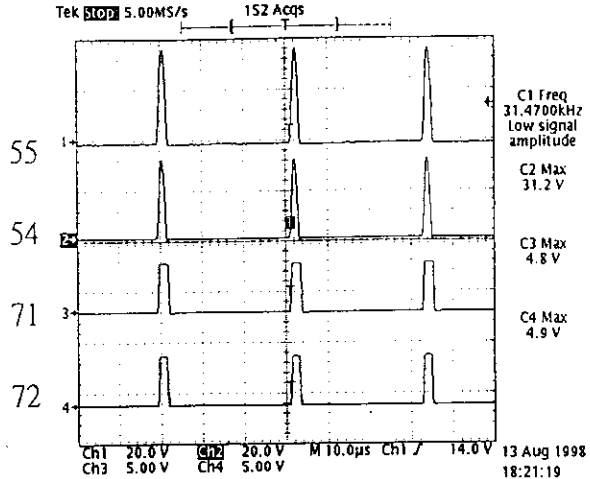
DYNAMIC FOCUS CIRCUIT WAVEFORM

FFT9905SKHFW VIDEO CIRCUIT WAVEFORM

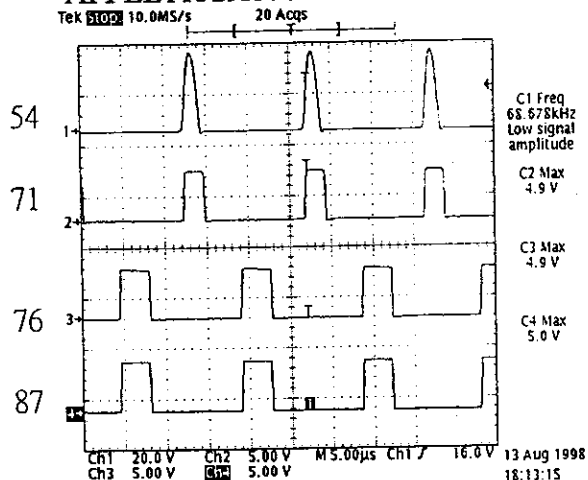
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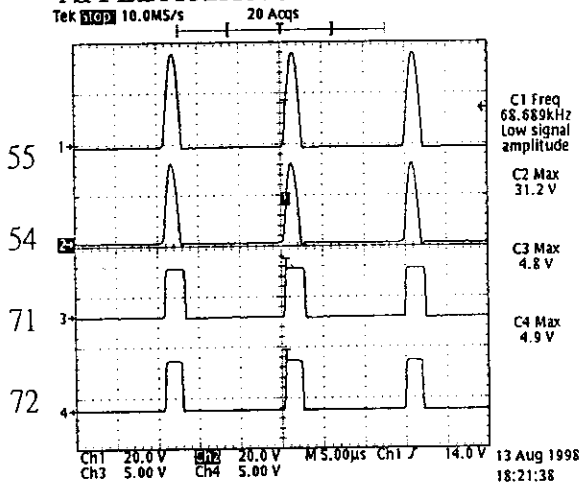
VGA640X480/60HZ



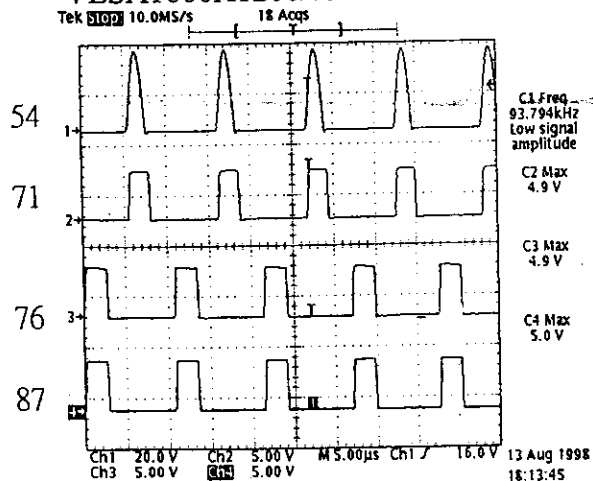
APPLE1152X870/75HZ



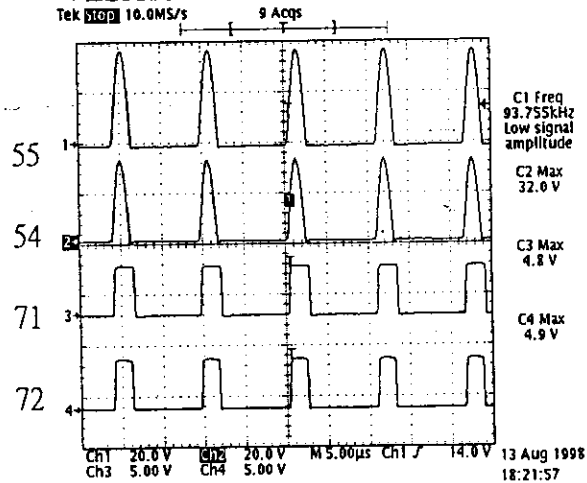
APPLE1152X870/75HZ



VESA1600X1200/75HZ



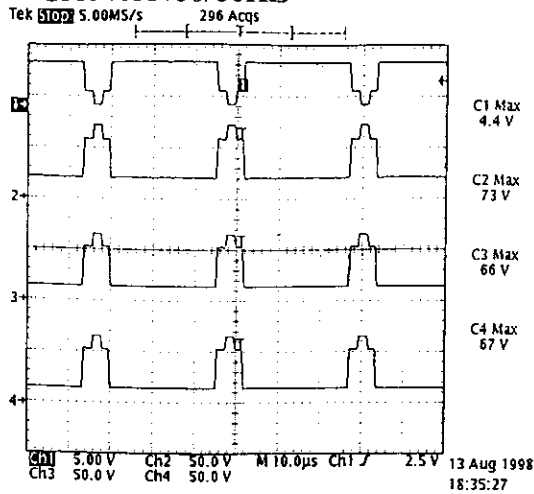
VESA1600X1200/75HZ



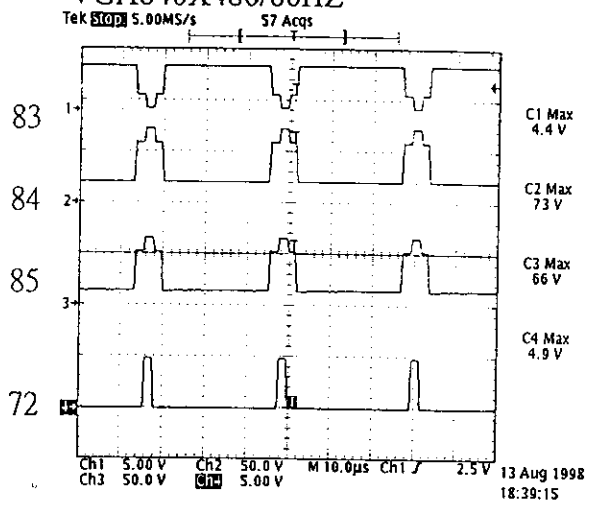
VIDEO CIRCUIT WAVEFORM

FFT9905SKHFW VIDEO CIRCUIT WAVEFORM

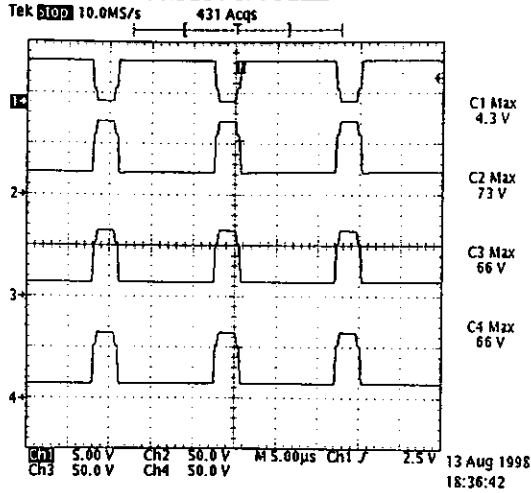
VGA640X480/60HZ



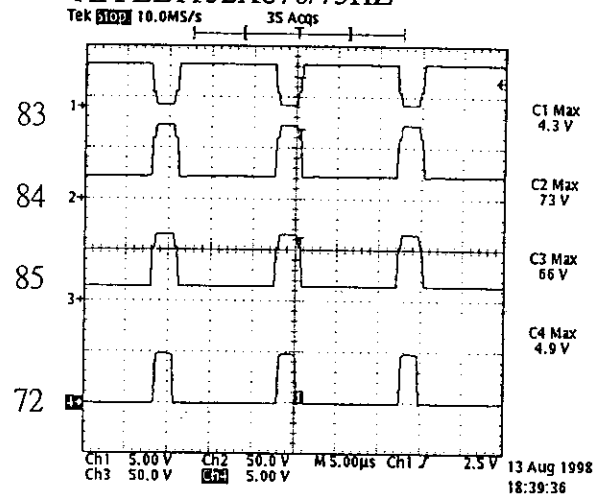
VGA640X480/60HZ



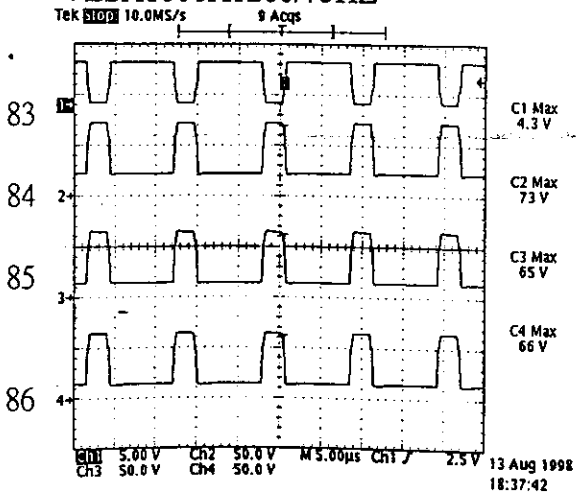
APPLE1152X870/75HZ



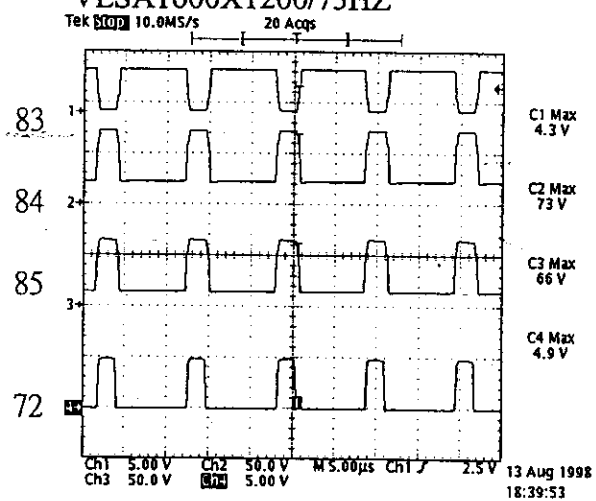
APPLE1152X870/75HZ



VESA1600X1200/75HZ



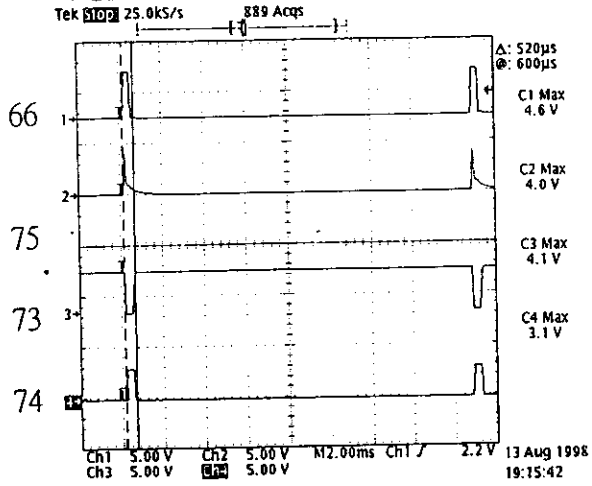
VESA1600X1200/75HZ



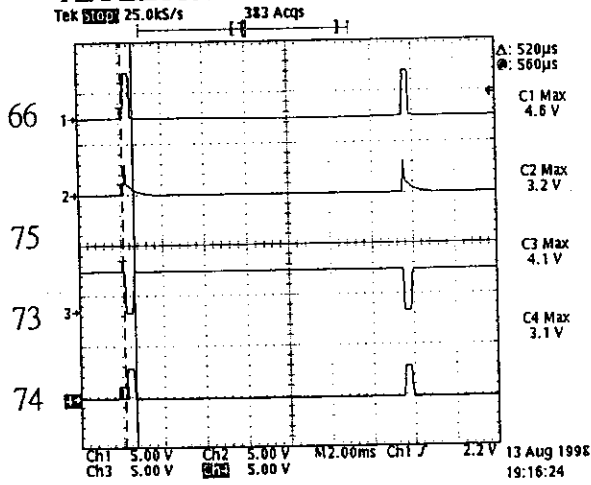
VIDEO CIRCUIT WAVEFORM

FFT9905SKHFW VIDEO CIRCUIT WAVEFORM

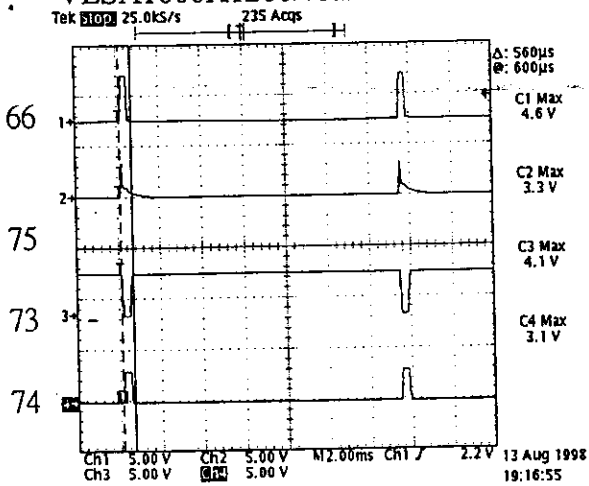
VGA640X480/60HZ



APPLE1152X870/75HZ



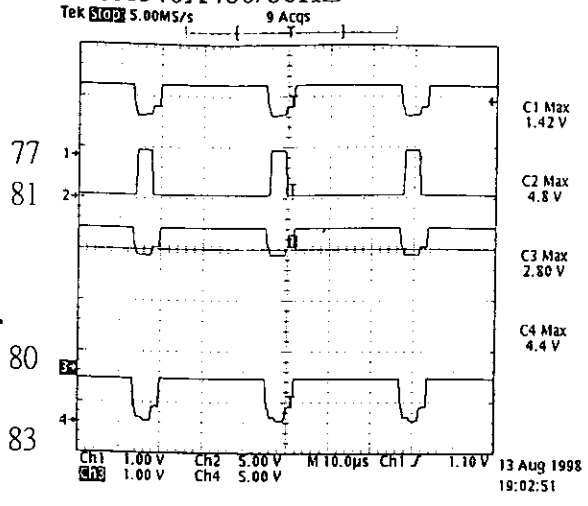
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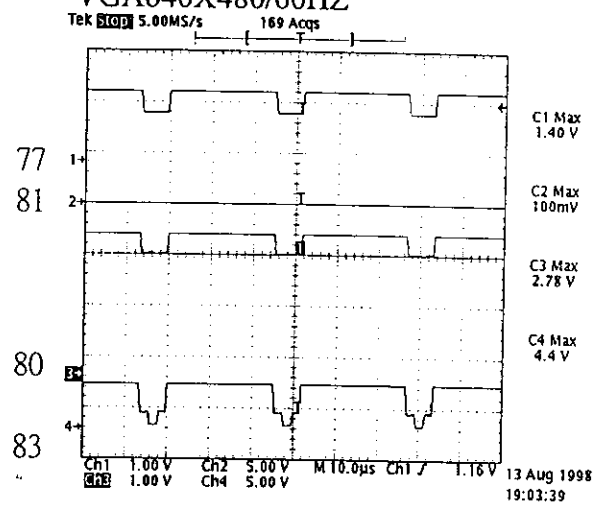
VIDEO CIRCUIT WAVEFORM

FFT9905SKHFW VIDEO (SOG) CIRCUIT WAVEFORM

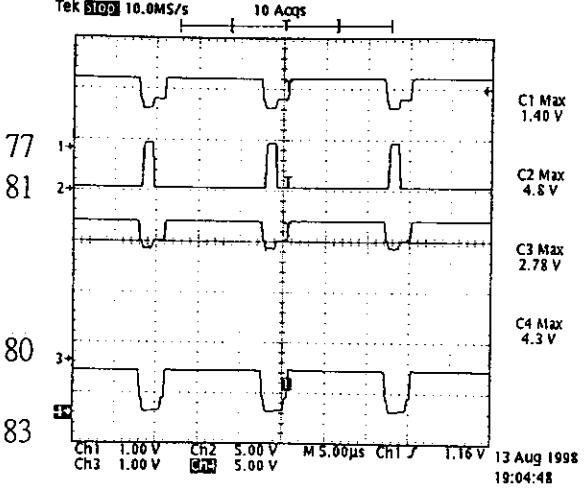
VGA640X480/60HZ



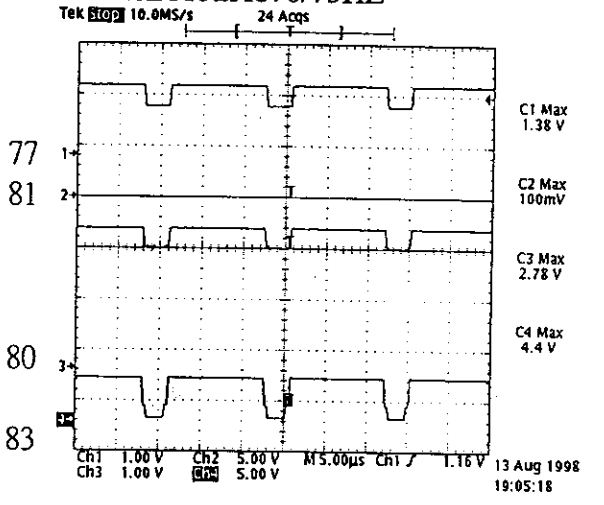
VGA640X480/60HZ



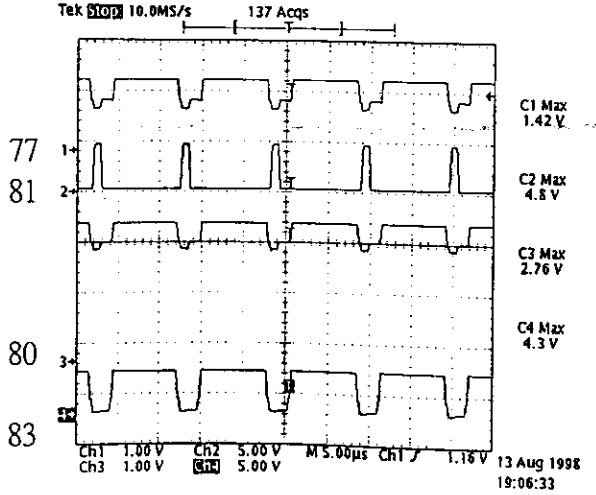
APPLE1152X870/75HZ



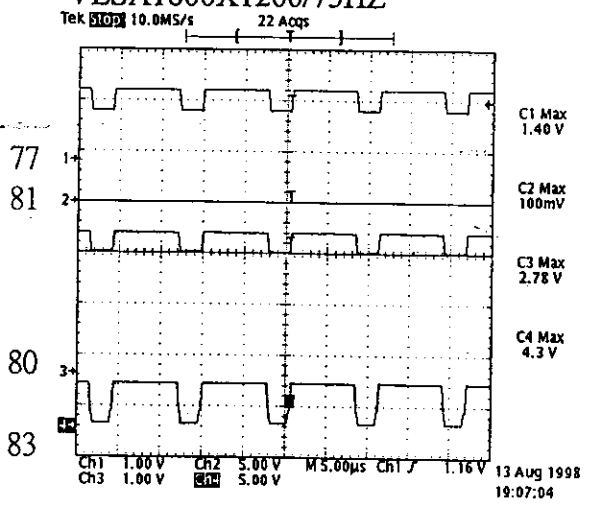
APPLE1152X870/75HZ



VESA1600X1200/75HZ



VESA1600X1200/75HZ



SOG SIGNAL

NON-SOG SIGNAL

VIDEO SOG/NON-SOG CIRCUIT WAVEFORM

Advance Information High Performance Current Mode Controller

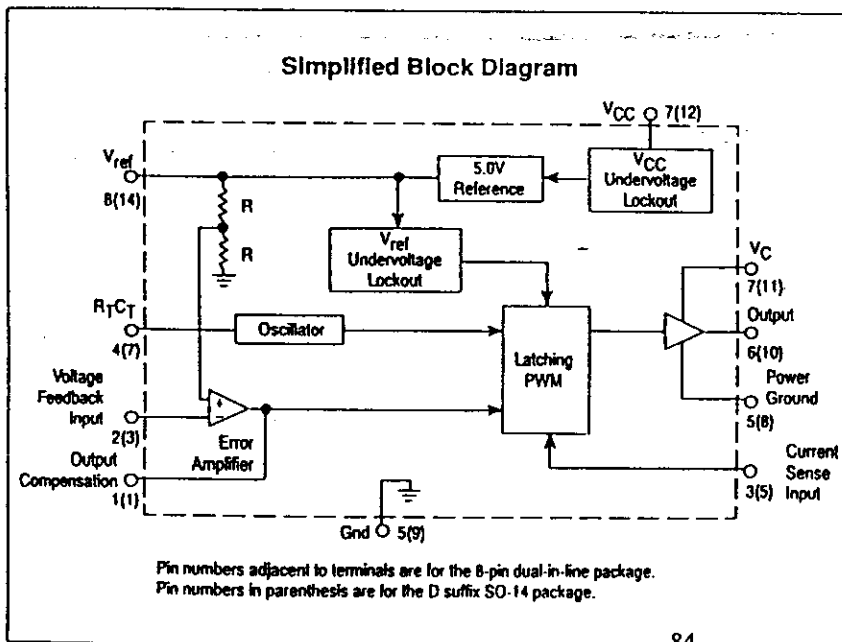
The UC3842A, UC3843A series are high performance fixed frequency current mode controllers. They are specifically designed for Off-Line and DC-to-DC converter applications offering the designer a cost effective solution with minimal external components. These integrated circuits feature a trimmed oscillator for precise duty cycle control, a temperature compensated reference, high gain error amplifier, current sensing comparator, and a high current totem pole output ideally suited for driving a power MOSFET.

Also included are protective features consisting of input and reference undervoltage lockouts each with hysteresis, cycle-by-cycle current limiting, programmable output deadtime, and a latch for single pulse metering.

These devices are available in 8-pin dual-in-line ceramic and plastic packages as well as the 14-pin plastic surface mount (SO-14). The SO-14 package has separate power and ground pins for the totem pole output stage.

The UCX842A has UYLO thresholds of 16 V (on) and 10 V (off), ideally suited for off-line converters. The UCX843A is tailored for lower voltage applications having UVLO thresholds of 8.5 V (on) and 7.6 V (off).

- Trimmed Oscillator Discharge Current for Precise Duty Cycle Control
- Current Mode Operation to 500 kHz
- Automatic Feed Forward Compensation
- Latching PWM for Cycle-By-Cycle Current Limiting
- Internally Trimmed Reference with Undervoltage Lockout
- High Current Totem Pole Output
- Undervoltage Lockout with Hysteresis
- Low Start-Up and Operating Current
- Direct Interface with Motorola SENSEFET Products



UC3842A, 43A
UC2842A, 43A

HIGH PERFORMANCE
CURRENT MODE CONTROLLER

N SUFFIX
PLASTIC PACKAGE
CASE 626

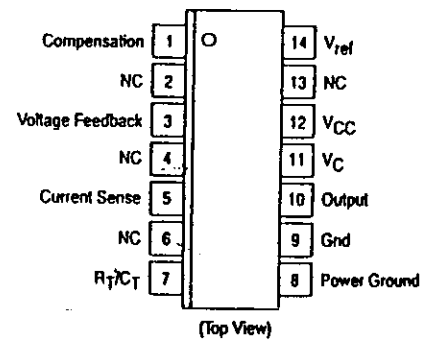
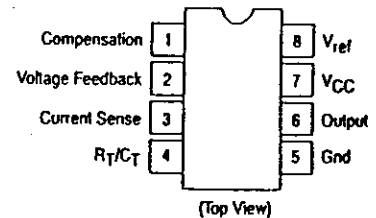


D SUFFIX
PLASTIC PACKAGE
CASE 751A
(SO-14)

J SUFFIX
CERAMIC PACKAGE
CASE 693



PIN CONNECTIONS



ORDERING INFORMATION

Device	Temperature Range	Package
UC3842AD	0° to + 70°C	SO-14
UC3843AD		SO-14
UC3842AN		Plastic
UC2843AN		Plastic
UC2842AD	-25° to + 85°C	SO-14
UC2843AD		SO-14
UC2842AJ		Ceramic
UC2843AJ		Ceramic
UC2842AN		Plastic
UC2843AN		Plastic



MOTOROLA

Programmable Precision References

The TL431, A, B integrated circuits are three-terminal programmable shunt regulator diodes. These monolithic IC voltage references operate as a low temperature coefficient zener which is programmable from V_{ref} to 36 V with two external resistors. These devices exhibit a wide operating current range of 1.0 mA to 100 mA with a typical dynamic impedance of 0.22 Ω . The characteristics of these references make them excellent replacements for zener diodes in many applications such as digital voltmeters, power supplies, and op amp circuitry. The 2.5 V reference makes it convenient to obtain a stable reference from 5.0 V logic supplies, and since the TL431, A, B operates as a shunt regulator, it can be used as either a positive or negative voltage reference.

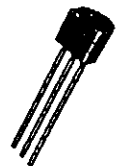
- Programmable Output Voltage to 36 V
- Voltage Reference Tolerance: $\pm 0.4\%$, Typ @ 25°C (TL431B)
- Low Dynamic Output Impedance, 0.22 Ω Typical
- Sink Current Capability of 1.0 mA to 100 mA
- Equivalent Full-Range Temperature Coefficient of 50 ppm/°C Typical
- Temperature Compensated for Operation over Full Rated Operating Temperature Range
- Low Output Noise Voltage

TL431, A, B Series

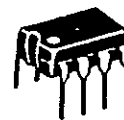
PROGRAMMABLE PRECISION REFERENCES

SEMICONDUCTOR TECHNICAL DATA

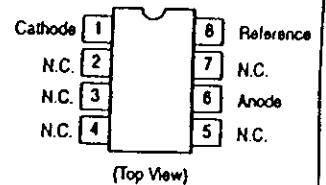
Z, LP SUFFIX
PLASTIC PACKAGE
CASE 29
(TO-92)



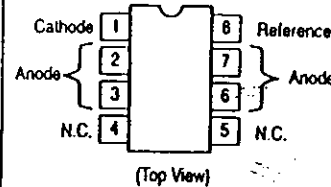
- Pin 1. Reference
2. Anode
3. Cathode



P SUFFIX
PLASTIC PACKAGE
CASE 626

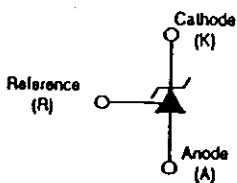


D SUFFIX
PLASTIC PACKAGE
CASE 751
(SOP-8)

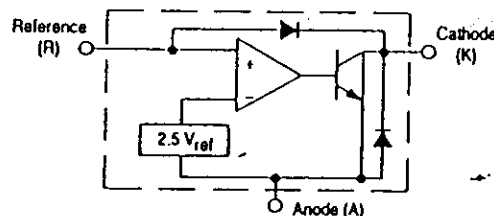


SOP-8 is an internally modified SO-8 package. Pins 2, 3, 6 and 7 are electrically common to the die attach flag. This internal lead frame modification decreases power dissipation capability when appropriately mounted on a printed circuit board. SOP-8 conforms to all external dimensions of the standard SO-8 package.

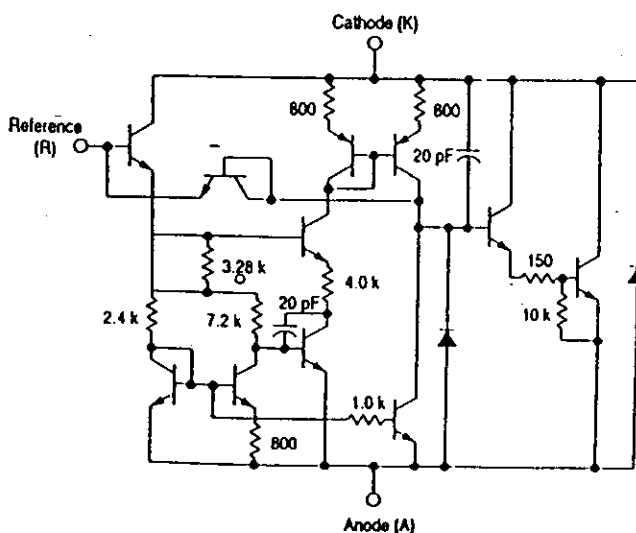
Symbol



Representative Block Diagram



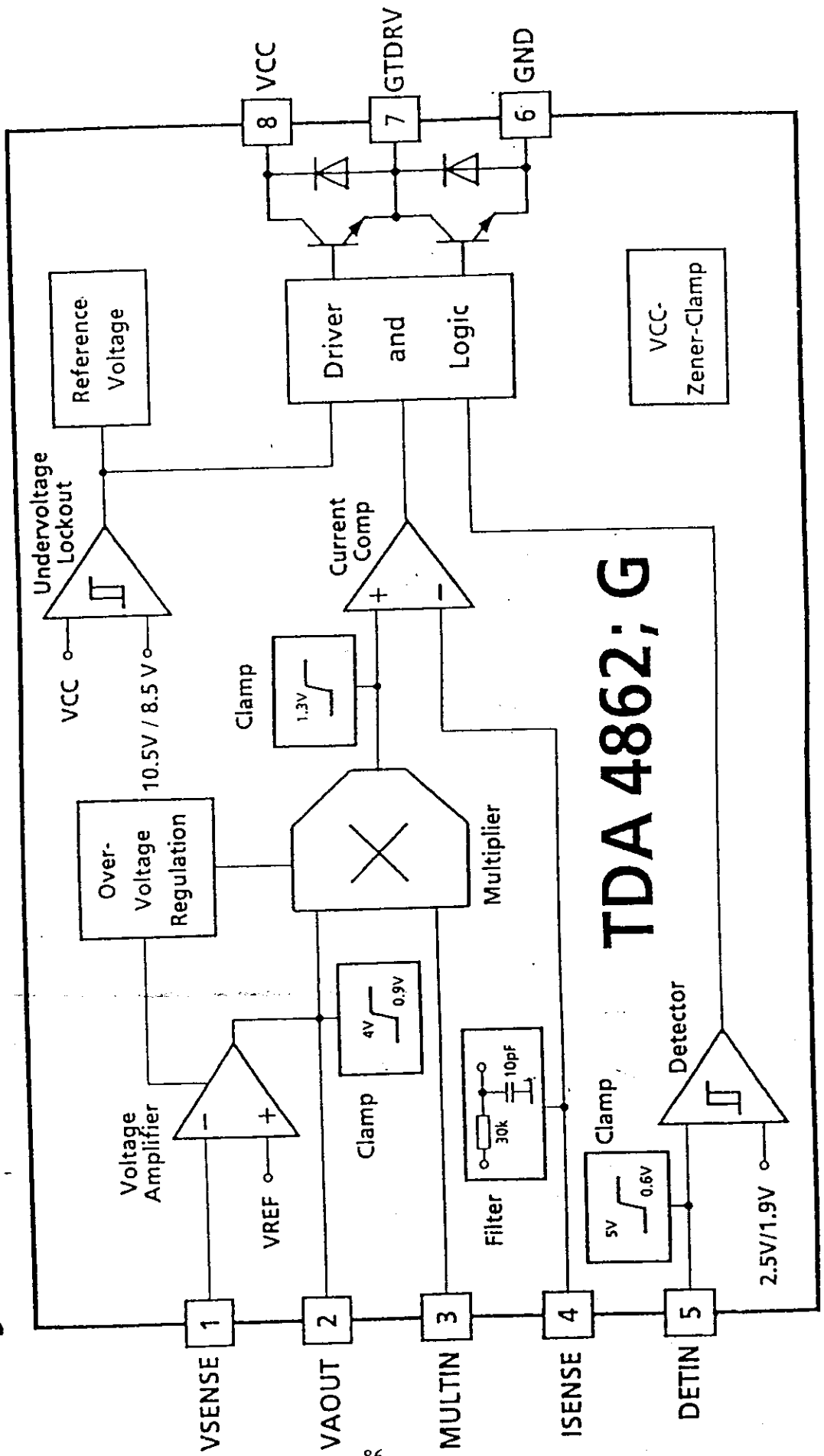
Representative Schematic Diagram Component values are nominal.



ORDERING INFORMATION

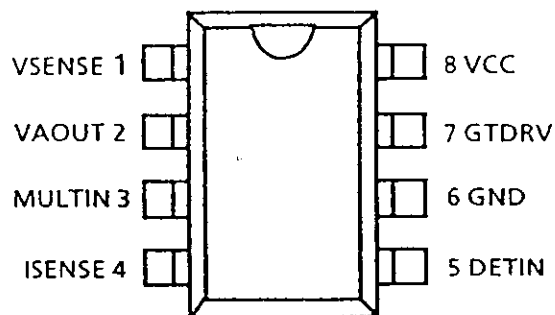
Device	Operating Temperature Range	Package
TL431CLP, ACLP, BCLP	$T_A = 0^\circ \text{ to } +70^\circ \text{C}$	TO-92
TL431CP, ACP, BCP		Plastic
TL431CD, ACD, BCD		SOP-8
TL431ILP, AILP, BILP	$T_A = -40^\circ \text{ to } +85^\circ \text{C}$	TO-92
TL431IP, AIP, BIP		Plastic
TL431ID, AID, BID		SOP-8

Block Diagram

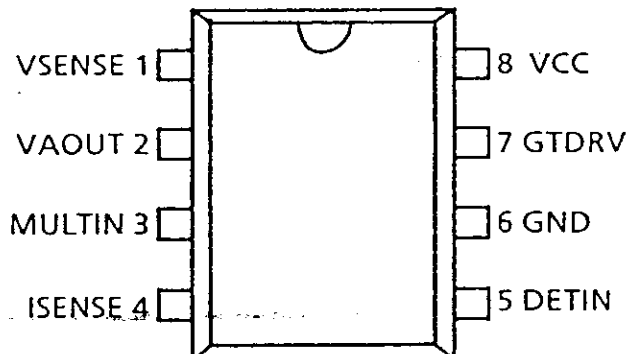


Pin Configuration
Top view

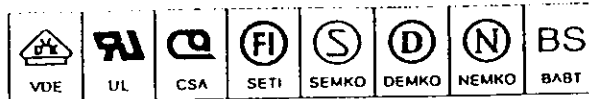
TDA 4862 G



TDA 4862



MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA



6-Pin DIP Optoisolators Transistor Output

The H11AV1,A, H11AV2,A and H11AV3,A devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector.

- Guaranteed 70 Volt $V_{(BR)CEO}$ Minimum
- 'A' Suffix for 0.400" Wide Spacing Same as 'T' Suffix for this Series

Applications

- General Purpose Switching Circuits
- Interfacing and coupling systems of different potentials and impedances
- Monitor and Detection Circuits
- Regulation and Feedback Circuits
- Solid State Relays

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
--------	--------	-------	------

INPUT LED

Reverse Voltage	V_R	6	Volts
Forward Current — Continuous	I_F	60	mA
LED Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power In Output Detector Derate above 25°C	P_D	120	mW
		1.41	mW/ $^\circ\text{C}$

OUTPUT TRANSISTOR

Collector-Emitter Voltage	V_{CEO}	70	Volts
Emitter-Base Voltage	V_{EBO}	7	Volts
Collector-Base Voltage	V_{CBO}	70	Volts
Collector Current — Continuous	I_C	150	mA
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power In Input LED Derate above 25°C	P_D	150	mW
		1.76	mW/ $^\circ\text{C}$

TOTAL DEVICE

Isolation Surge Voltage (1) (Peak ac Voltage, 60 Hz, 1 sec Duration)	V_{ISO}	7500	Vac
Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	250	mW
		2.94	mW/ $^\circ\text{C}$
Ambient Operating Temperature Range (2)	T_A	-55 to +100	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^\circ\text{C}$
Soldering Temperature (10 sec, 1/16" from case)	T_L	260	$^\circ\text{C}$

(1) Isolation surge voltage is an internal device dielectric breakdown rating. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

(2) Refer to Quality and Reliability Section for test information.

H11AV1,A*

[CTR = 100% Min]

H11AV2,A

[CTR = 50% Min]

H11AV3,A

[CTR = 20% Min]

*Motorola Preferred Devices
STYLE 1 PLASTIC



STANDARD THRU HOLE
CASE 730A-04



"T" LEADFORM
WIDE SPACED 0.4"
CASE 730D-05

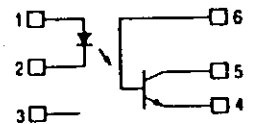


"S"/"F" LEADFORM
SURFACE MOUNT
CASE 730C-04
(STANDARD PROFILE)



CASE 730F-04
(LOW PROFILE)

SCHEMATIC



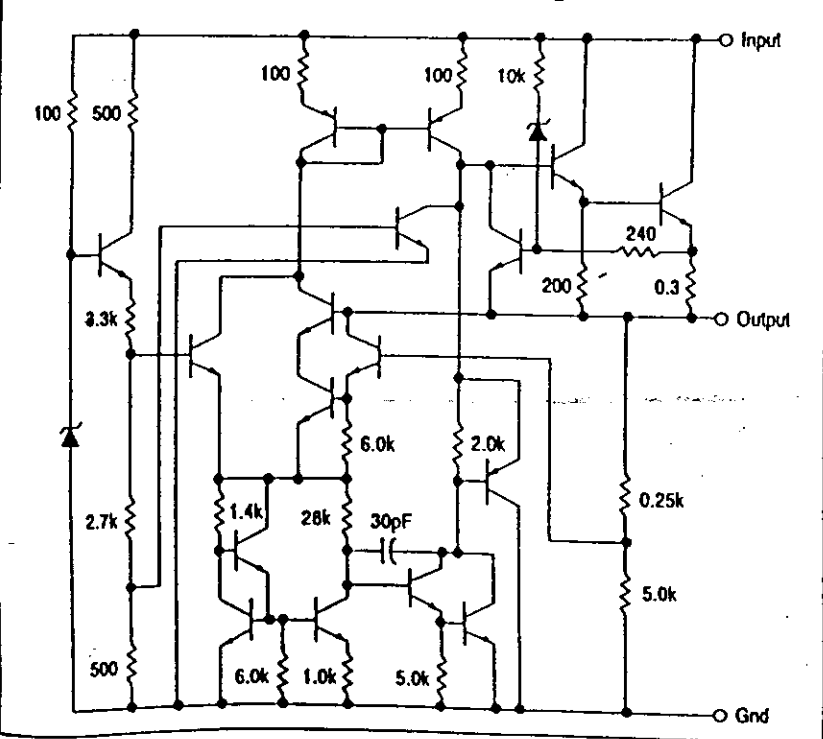
- PIN 1. LED ANODE
2. LED CATHODE
3. N.C.
4. EMITTER
5. COLLECTOR
6. BASE

Three-Terminal Positive Voltage Regulators

These voltage regulators are monolithic integrated circuits designed as fixed-voltage regulators for a wide variety of applications including local, on-card regulation. These regulators employ internal current limiting, thermal shutdown, and safe-area compensation. With adequate heatsinking they can deliver output currents in excess of 1.0 A. Although designed primarily as a fixed voltage regulator, these devices can be used with external components to obtain adjustable voltages and currents.

- Output Current in Excess of 1.0 A
- No External Components Required
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe-Area Compensation
- Output Voltage Offered in 2% and 4% Tolerance

Representative Schematic Diagram



ORDERING INFORMATION

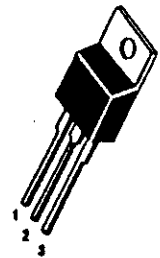
Device	Output Voltage Tolerance	Tested Operating Junction Temp. Range	Package
MC78XXCT	4%	0° to +125°C	Plastic Power 89
MC78XXACT	2%		
MC78XXBT	4%	-40° to +125°C	

MC7800 Series

THREE-TERMINAL POSITIVE FIXED VOLTAGE REGULATORS

SILICON MONOLITHIC INTEGRATED CIRCUITS

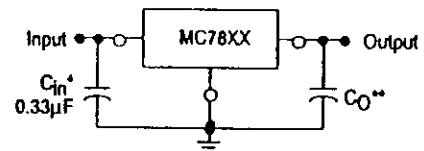
T SUFFIX
PLASTIC PACKAGE
CASE 221A



- PIN 1. Input
2. Ground
3. Output

Heatsink surface connected to Pin 2

STANDARD APPLICATION



A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

XX = these two digits of the type number indicate voltage.

* - C_{in} is required if regulator is located an appreciable distance from power supply filter.

** - C_o is not needed for stability; however, it does improve transient response.

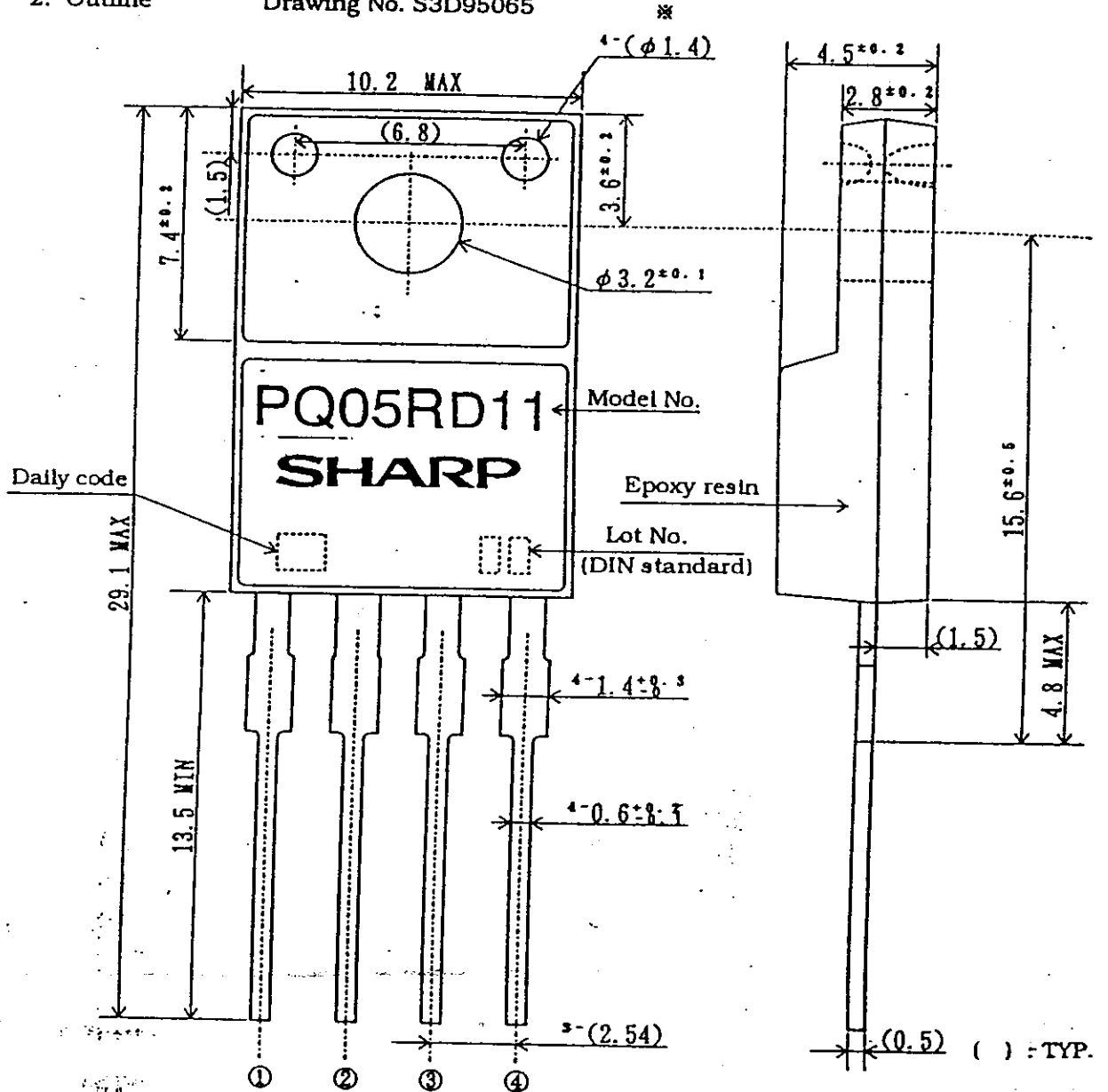
XX indicates nominal voltage

TYPE NO./VOLTAGE

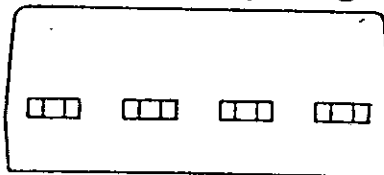
MC7805	5.0 V	MC7812	12 V
MC7806	6.0 V	MC7815	15 V
MC7808	8.0 V	MC7818	18 V
MC7809	9.0 V	MC7824	24 V

2. Outline

Drawing No. S3D95065



Date	Daily code indication
1	1
2	2
3	3
	.
	.
	.
30	30
31	31



Applied model No.	Marked model No.
PQ05RD11	PQ05RD11
PQ09RD11	PQ09RD11
PQ12RD11	PQ12RD11

- ① DC input (Vin)
- ② DC output (Vo)
- ③ GND
- ④ ON/OFF control (Vc)

• Unit : mm
• Scale : 5/1

• Lead finish : Solder plating
• Lead material : Cu
• Weight : 1.6±0.2g

※ The holes are both the surface and the under surface.

STR9000 Series

Dropper Type — Low-Dropout Voltage Type

Features

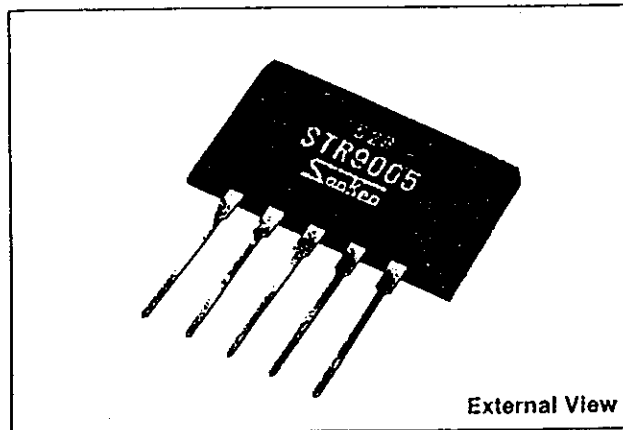
- Low-dropout voltage type with input/output voltage difference of 1V
- Reduces power loss for electronic equipment
- Small size and high output
- Easy-to-use 5-terminal plastic-mold regulator
- Output ON/OFF by external signal
- Fine adjustment of output voltage
- Built-in foldback overcurrent protection circuit
- Use of SANKEN's semiconductor elements ensures high reliability

Applications

- For automotive devices
- For various types of electronic equipment including micro computers, personal computers, floppy disk drives, CATV sets, VCRs, and printers
- For stabilization of the secondary side of multi-output switching regulators

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Ratings			Unit
		STR9005	STR9012	STR9015	
DC Input Voltage	V _{IN}	25	30	30	V
DC Output Current	I _O	4.0			A
Power Dissipation	P _D	75 (T _C = 25°C)			W
		3.2 (without heatsink)			
Junction Temperature	T _J	+125			°C
Operating Case Temperature	T _C	-20 to +100			°C
Storage Temperature	T _{stg}	-30 to +125			°C
Thermal Resistance (between junction and case)	R _{th(j-c)}	1.25 max			°C/W



Electrical Characteristics (Ta=25°C)

Parameter	Symbol	Ratings									Unit
		STR9005			STR9012			STR9015			
		min	typ	max	min	typ	max	min	typ	max	
DC Input Voltage	V _{IN}	6		15	13		25	16		25	V
Output Voltage	V _O	4.9	5.0	5.1	11.8	12.0	12.2	14.8	15.0	15.2	V
	Condition	V _{IN} =8.0V, I _O =2.0A			V _{IN} =16V, I _O =2.0A			V _{IN} =20V, I _O =2.0A			
Dropout Voltage	V _{DIF}			0.5			0.5			0.5	V
	Condition	I _O =2.0A									
				1.0			1.0			1.0	
Line Regulation	ΔV _{OLINE}		10	30		30	80		50	100	mV
	Condition	V _{IN} =6 to 15V, I _O =2.0A			V _{IN} =13 to 25V, I _O =2.0A			V _{IN} =16 to 25V, I _O =2.0A			
Load Regulation	ΔV _{OLOAD}		40	100		80	200		100	200	mV
	Condition	V _{IN} =8.0V, I _O =0 to 3.0A			V _{IN} =16V, I _O =0 to 3.0A			V _{IN} =20V, I _O =0 to 3.0A			
Temperature Coefficient of Output Voltage	ΔV _O /ΔT		±0.5			±1.5			±1.5		mV/°C
Ripple Rejection	R _{REJ}		54			54			54		dB
	Condition	f=100 to 120Hz									
Foldback Current	I _{S1}	4.1			4.1			4.1			A
	Condition	V _{IN} =8.0V			V _{IN} =16V			V _{IN} =20V			
Output ON/OFF Control Vtg.	V _O (ON)			0.6			0.6			0.6	V
	V _O (OFF)	2.0			2.0			2.0			
Voltage with output off	V _O			0.5			0.5			0.5	V
	Condition	V _{IN} =8.0V, I _O =0A			V _{IN} =15V, I _O =0A			V _{IN} =20V, I _O =0A			

*Output is turned on when voltage between terminal No. 3 and 5 is less than 0.6V, and turned off if more than 2.0V.

A. General Description

The D165X is an MCU with embedded 8031 microcontroller core, 16KB/ 8KB/ 4KB code memory , 512/ 384/ 256 byte data memory, 6-bit A/D converter, watch dog timer, DDC port, PWM D/A converter outputs, sync processor, and all the other logic blocks that are designed especially for multi-sync computer monitor controller application.

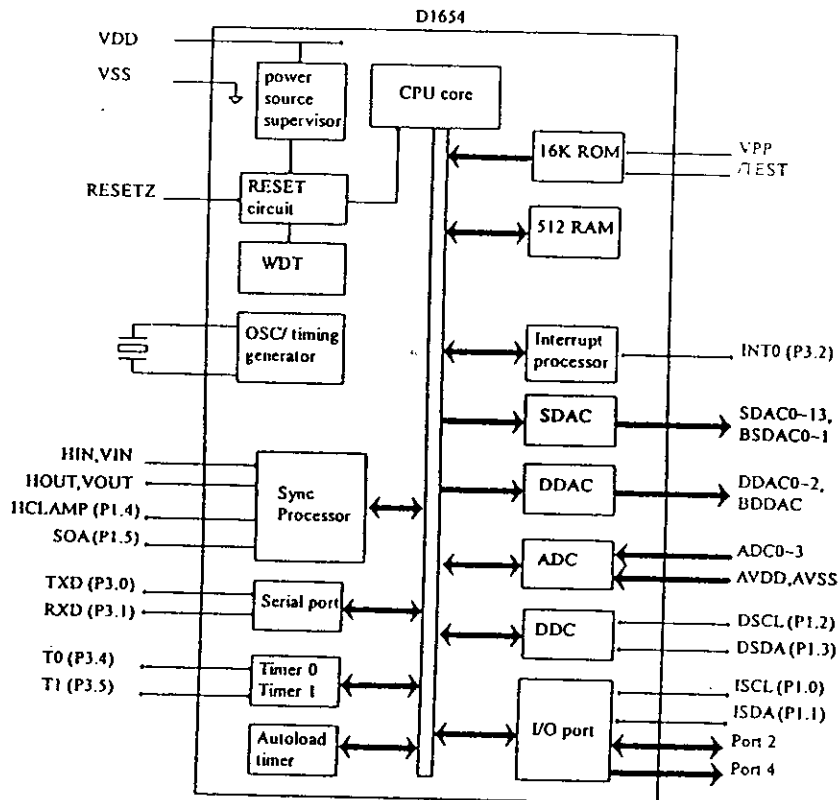
The MCU is available in mask type "D16C5X" and also in Flash type "D16F5X". The Flash type MCU is especially useful in the engineering and pre-production stage of the monitor development, it provides the best quick to market solution to the monitor business. The D165X family are available in various package types for the versatile monitor design application.

	ROM	RAM	Package
D16x54	16K	512	68PLCC, 48DIP, 40DIP
D16x52	8K	384	48DIP, 40DIP
D16x51	4K	256	40DIP

B. Features

- 1 40pin DIP, 48pin DIP, 68pin PLCC package available.
- 2 80C31 MCU core included.
- 3 16K bytes of Flash memory / Mask ROM, (8K bytes for D1652).
- 4 512 bytes of Static RAM , (384 bytes for D16x52).
- 5 PWM Outputs:
 - * Two 12-bit SDAC (Static PWM/BRM output).
 - * Fourteen 8-bit SDAC (Static PWM output).
 - * One 12-bit DDAC (Dynamic PWM/BRM output).
 - * Three 8-bit DDAC (Dynamic PWM output).
- 6 Four channels of 6-bit Analog to Digital Converter.
- 7 Sync Processor:
 - * Horizontal & Vertical Polarity Detector.
 - * Sync Separator for composite sync.
 - * Horizontal & Vertical Frequency Counter.
 - * Programmable dummy frequency generator.
 - * Programmable H Clamp pulse output.
 - * SOA output.
 - * Self-Test Pattern output.
- 8 One software I²C bus interface.
- 9 One DDC port , support DDC1/DDC2B/DDC2B+.
- 10 One SPI /RS232 port.
- 11 Watch Dog Timer.
- 12 Power down reset.
- 13 One external interrupt input.
- 14 Three Timer/Counters.
- 15 Clock = 16Mhz ~ 20Mhz.
- 16 Two 15mA output pin for driving LED.
- 17 Twenty-two bit-addressable I/O pin, seven output only pin.
- 18 Moire Cancellation.

C. Block Diagram



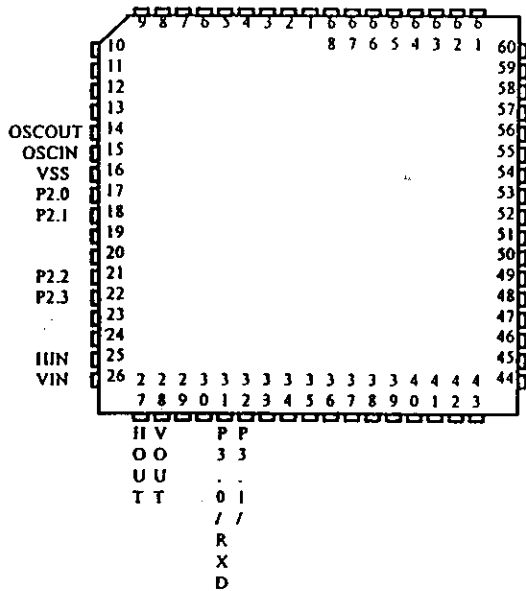
The I/O and PWM number are determined by the package type, as listed in the following table:

	40pin DIP	48pin DIP	68pin PLCC
8bit SDAC	8 + 4*	8 + 4*	14
12bit SDAC	1	1	2
8bit DDAC	1	3	3
12bit DDAC	1	1	1
Port 1 (I/O)	6	6	6
Port 2 (I/O)	4 + 4*	4 + 4*	8
Port 3 (I/O)	1	7	8
Port 4 (Out)	0	0	7
RS232 port	1	1	1
ADC channel	1	1	4

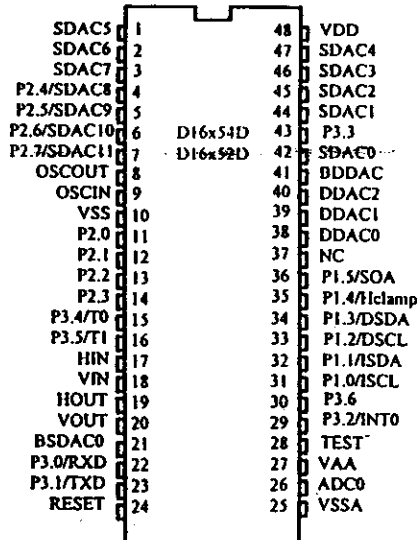
Note: * : the four SDACs share the I/O pins with P2.4~ P2.7.

DYNACOLOR D165X

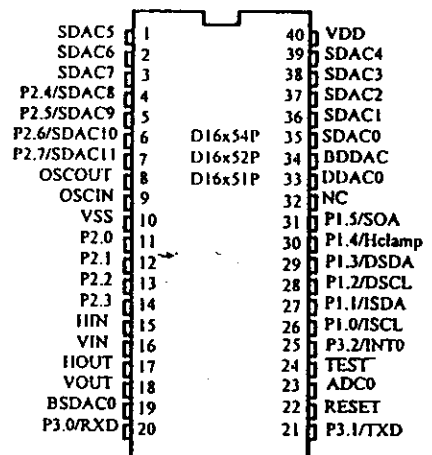
D. Pin Assignment & Description (40pin DIP / 48pin DIP / 68Pin PLCC)



48pin DIP



40pin DIP



DYNACOLOR D165X

40pin DIP	48pin DIP	68pin PLCC	Pin Name	Type	Function Description	Note
22	24	33	RESET	I/P	Reset input, with internal pull high resistor	
15	17	25	HIN	I/P	Hsync/ composite sync in; with internal pull low resistor	
16	18	26	VIN	I/P	Vsync input, with internal pull low resistor	
17	19	27	HOUT	O/P	Hsync output	
18	20	28	VOUT	O/P	Vsync output	
35	42	60	SDAC0	O/P	8 bit static PWM output	
36	44	62	SDAC1	O/P	8 bit static PWM output	
37	45	63	SDAC2	O/P	8 bit static PWM output	
38	46	65	SDAC3	O/P	8 bit static PWM output	
39	47	66	SDAC4	O/P	8 bit static PWM output	
1	1	3	SDAC5	O/P	8 bit static PWM output	
2	2	4	SDAC6	O/P	8 bit static PWM output	
3	3	5	SDAC7	O/P	8 bit static PWM output	
-	-	6	SDAC8	O/P	8 bit static PWM output	
-	-	7	SDAC9	O/P	8 bit static PWM output	
-	-	10	SDAC10	O/P	8 bit static PWM output	
-	-	11	SDAC11	O/P	8 bit static PWM output	
-	-	19	SDAC12	O/P	8 bit static PWM output	
-	-	20	SDAC13	O/P	8 bit static PWM output	
19	21	29	BSDAC0	O/P	12 bit static PWM/BRM output	
-	-	30	BSDAC1	O/P	12 bit static PWM/BRM output	
40	48	68	VDD		Positive Power for Digital circuit	
10	10	16	VSS		Ground	
34	41	59	BDDAC	O/P	12 bit dynamic PWM/BRM output	
33	38	56	DDAC0	O/P	8 bit dynamic PWM output	
-	39	57	DDAC1	O/P	8 bit dynamic PWM output	
-	40	58	DDAC2	O/P	8 bit dynamic PWM output	
26	31	46	PI.0 (ISCL)	I/O	General purpose IO / I ² C clock	Open drain
27	32	47	PI.1 (ISDA)	I/O	General purpose IO / I ² C data	Open drain
28	33	48	PI.2 (DSCL)	I/O	General purpose IO / SIO1 (DDC) clock	Open drain
29	34	49	PI.3 (DSDA)	I/O	General purpose IO / SIO1 (DDC) data	Open drain
30	35	50	PI.4 (HCLAMP)	I/O	General purpose IO / H clamp pulse output	
31	36	51	PI.5 (SOA)	O/P	General purpose Output / SOA output	
23	26	36	ADC0	I/P	ADC channel 0	
-	-	37	ADC1	I/P	ADC channel 1	
-	-	39	ADC2	I/P	ADC channel 2	

DYNACOLOR D165X

-	-	40	ADC3	I/P	ADC channel 3	
-	27	38	V _{AA}		Positive Power for Analog circuit	
-	25	35	V _{SSA}		Analog Ground	
11	11	17	P2.0	I/O	General purpose IO	15mA Sink
12	12	18	P2.1	I/O	General purpose IO	15mA Sink
13	13	21	P2.2	I/O	General purpose IO	
14	14	22	P2.3 (STP)	I/O	General purpose IO (STP)	
4	4	8	P2.4 (SDAC10)	I/O	General purpose IO (SDAC10 output)	
5	5	9	P2.5 (SDAC11)	I/O	General purpose IO (SDAC11 output)	
6	6	12	P2.6 (SDAC12)	I/O	General purpose IO (SDAC12 output)	
7	7	13	P2.7 (SDAC13)	I/O	General purpose IO (SDAC13 output)	
20	22	31	P3.0 (RXD)	I/O	General purpose IO (RXD)	
21	23	32	P3.1 (TXD)	I/O	General purpose IO (TXD)	
25	29	42	P3.2 (INT0)	I/O	General purpose IO (INT0)	
-	43	61	P3.3	I/O	General purpose IO	
-	15	23	P3.4 (T0)	I/O	General purpose IO / Timer/counter 0 external input	
-	16	24	P3.5 (T1)	I/O	General purpose IO / Timer/counter 1 external input	
-	30	43	P3.6	I/O	General purpose IO	
-	-	67	P3.7	I/O	General purpose IO	
-	-	44	P4.0	O/P	Output Port	
-	-	45	P4.1	O/P	Output Port	
-	-	53	P4.2	O/P	Output Port	
-	-	55	P4.3	O/P	Output Port	
-	-	64	P4.4	O/P	Output Port	
-	-	1	P4.5	O/P	Output Port	
-	-	2	P4.6	O/P	Output Port	
24	28	41	TEST	I/P	Used in function test mode, with internal pull high resistor.	Open for normal operation
32	37	54	V _{pp}		In D16F5x: Power for program flash cell In D16C5x: this pin is N.C.	
-	-	52	V _{DD}		Positive Power for Digital circuit	
-	-	34	V _{SS}		Ground	
8	8	14	OSCOUT	O/P	Crystal Oscillator output	
9	9	15	OSCIN	I/P	Crystal Oscillator input	

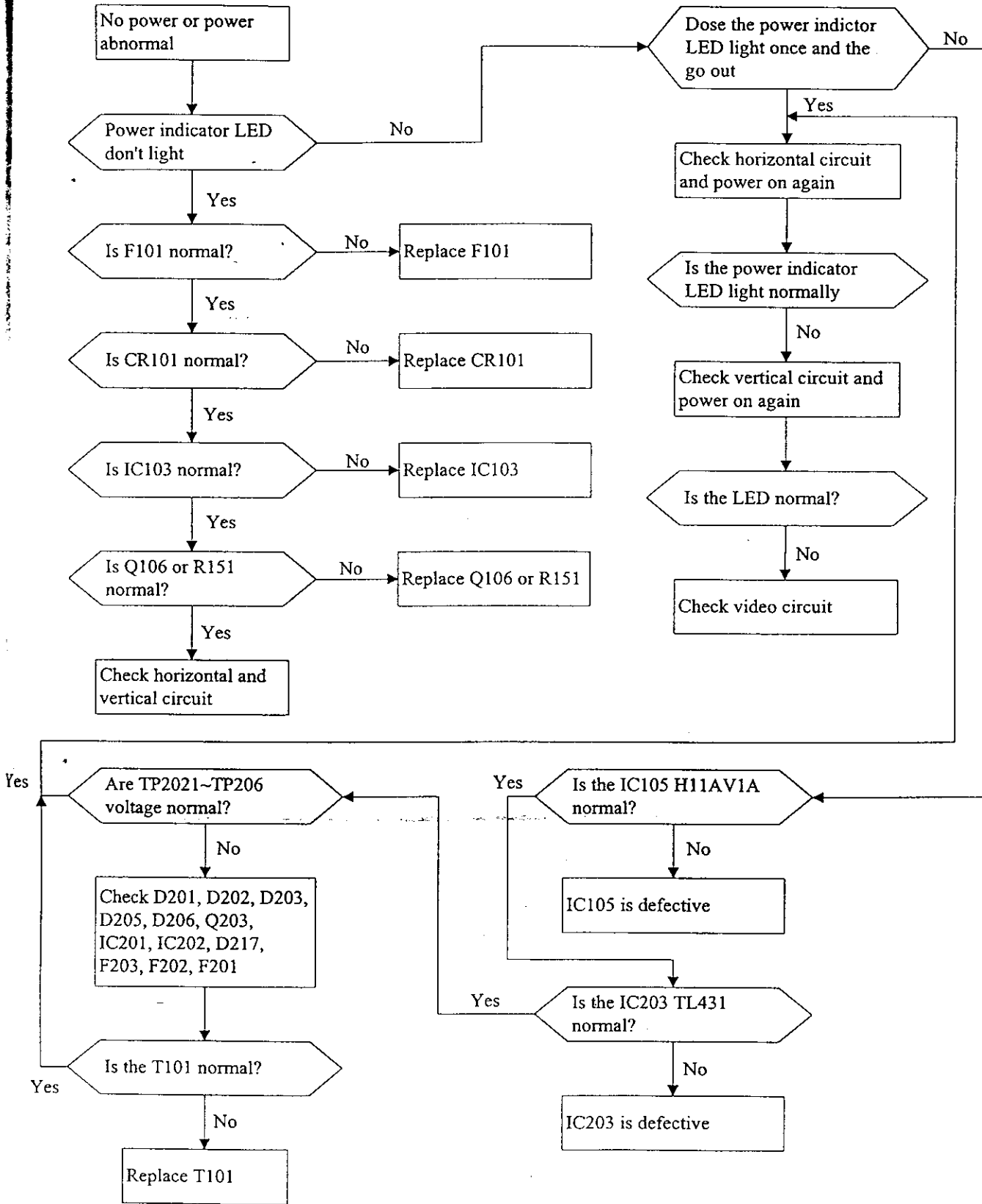
Note: The internal pull low resistor of IIN and VIN pins is between 176K and 264K ohm.

The internal pull high resistor of RESET and TEST pin is between 24K and 36K ohm.

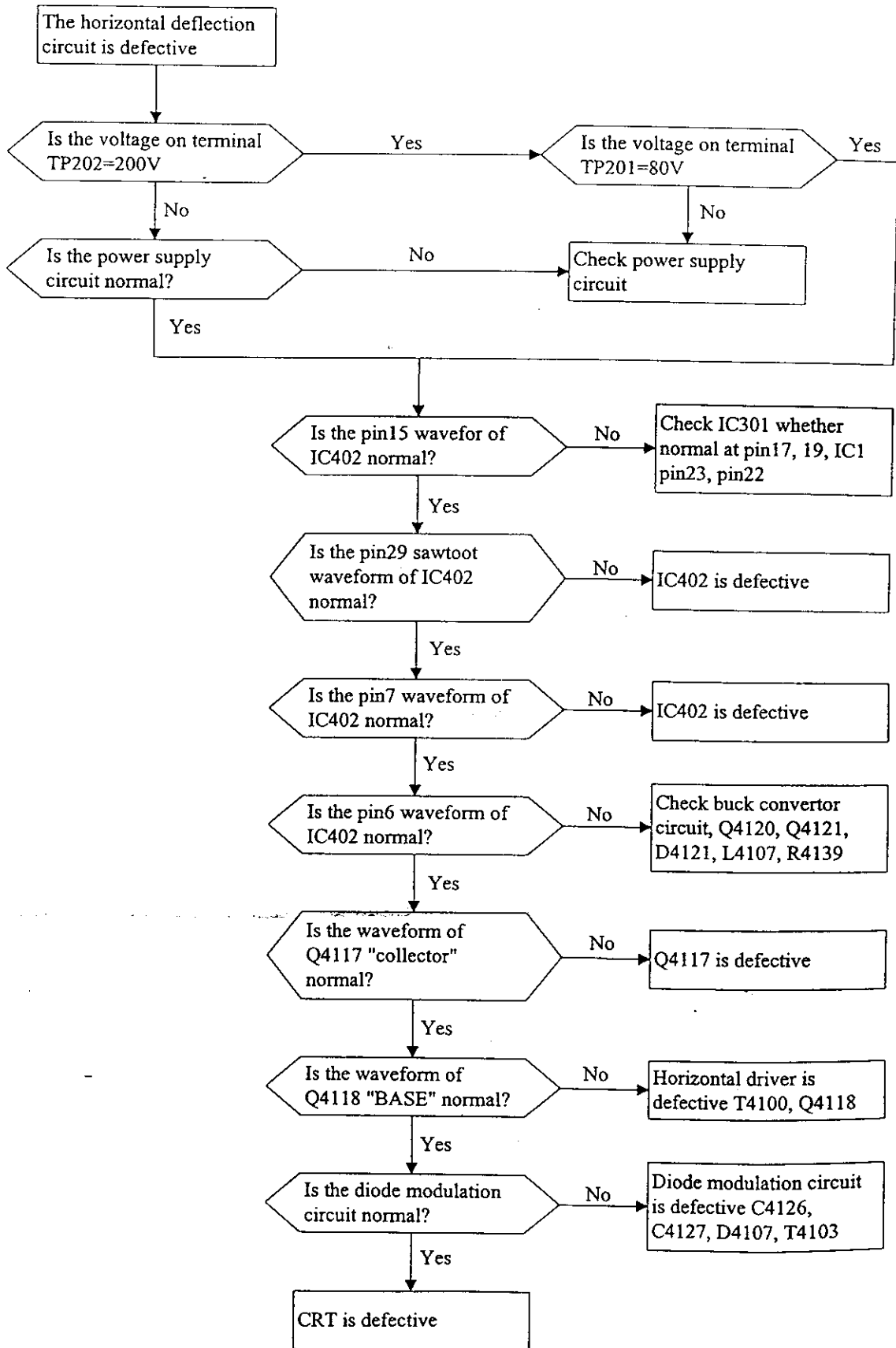
5. Trouble shooting flow chart

- Power Supply is Defective
- Horizontal Deflection Circuit is Defective
- The Raster Don't Appear
- One Color Missing
- Video is Defective
- OSD is Defective

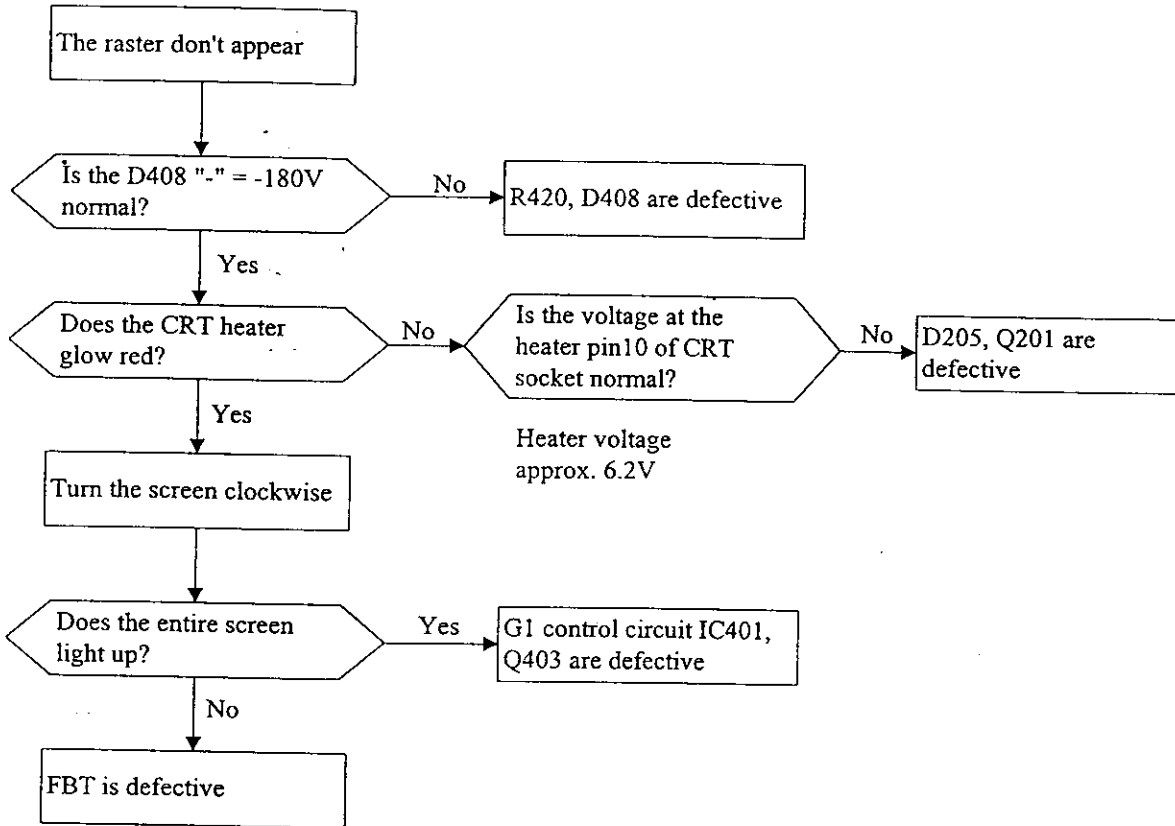
NO POWER



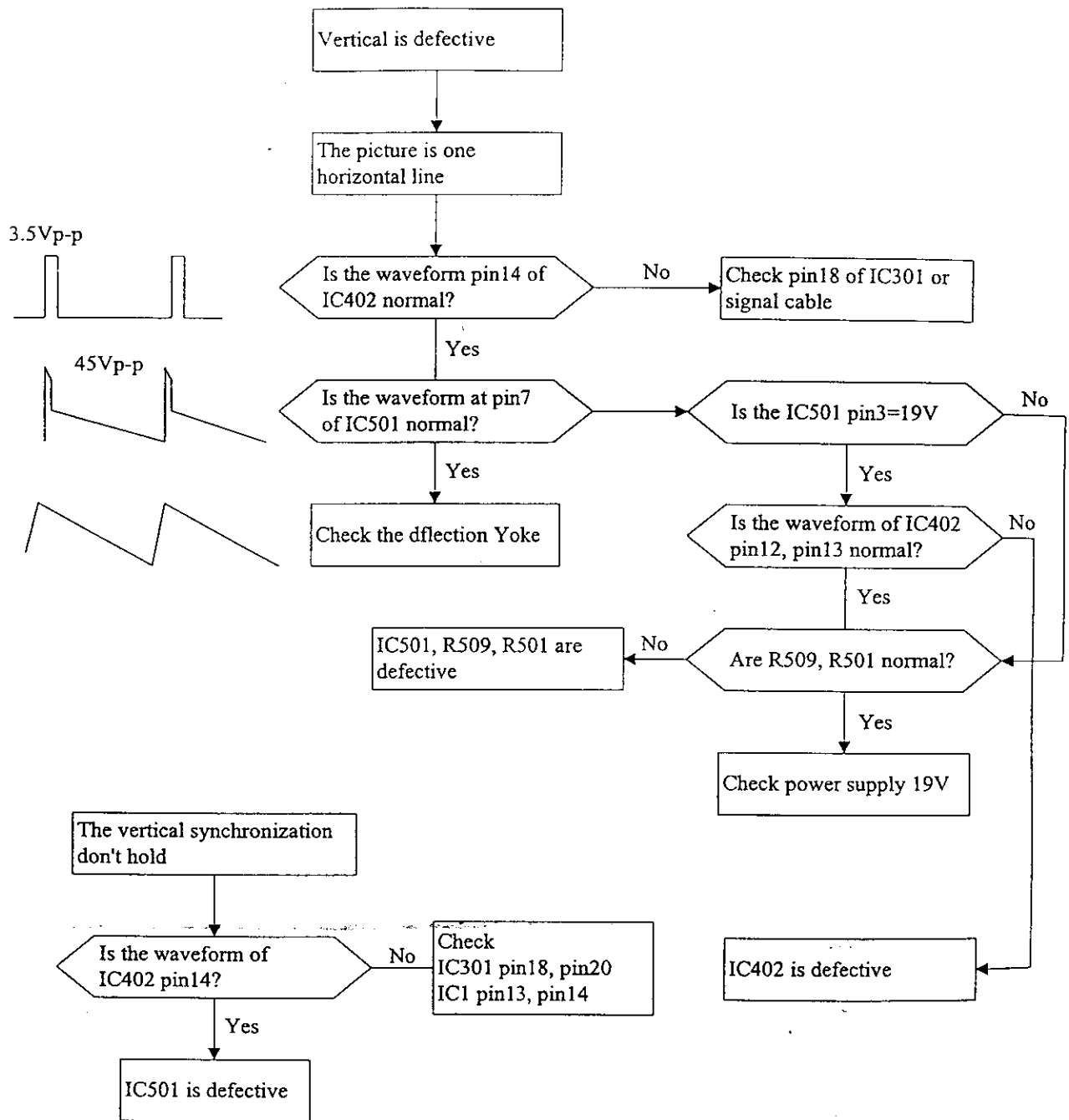
HORIZONTAL



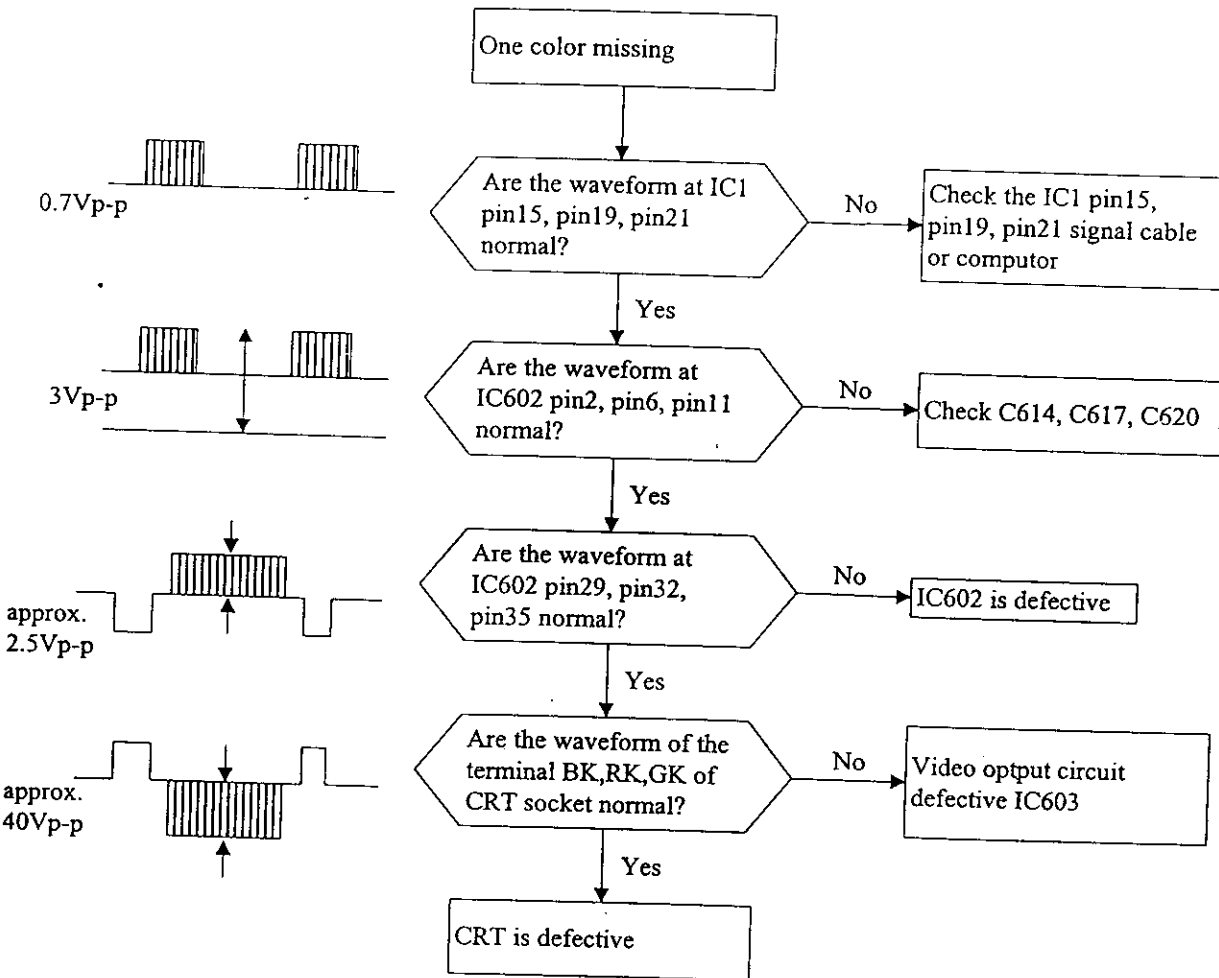
NO RASTER



VERTICAL

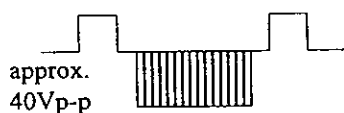
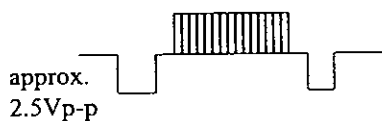


ONE COLOR

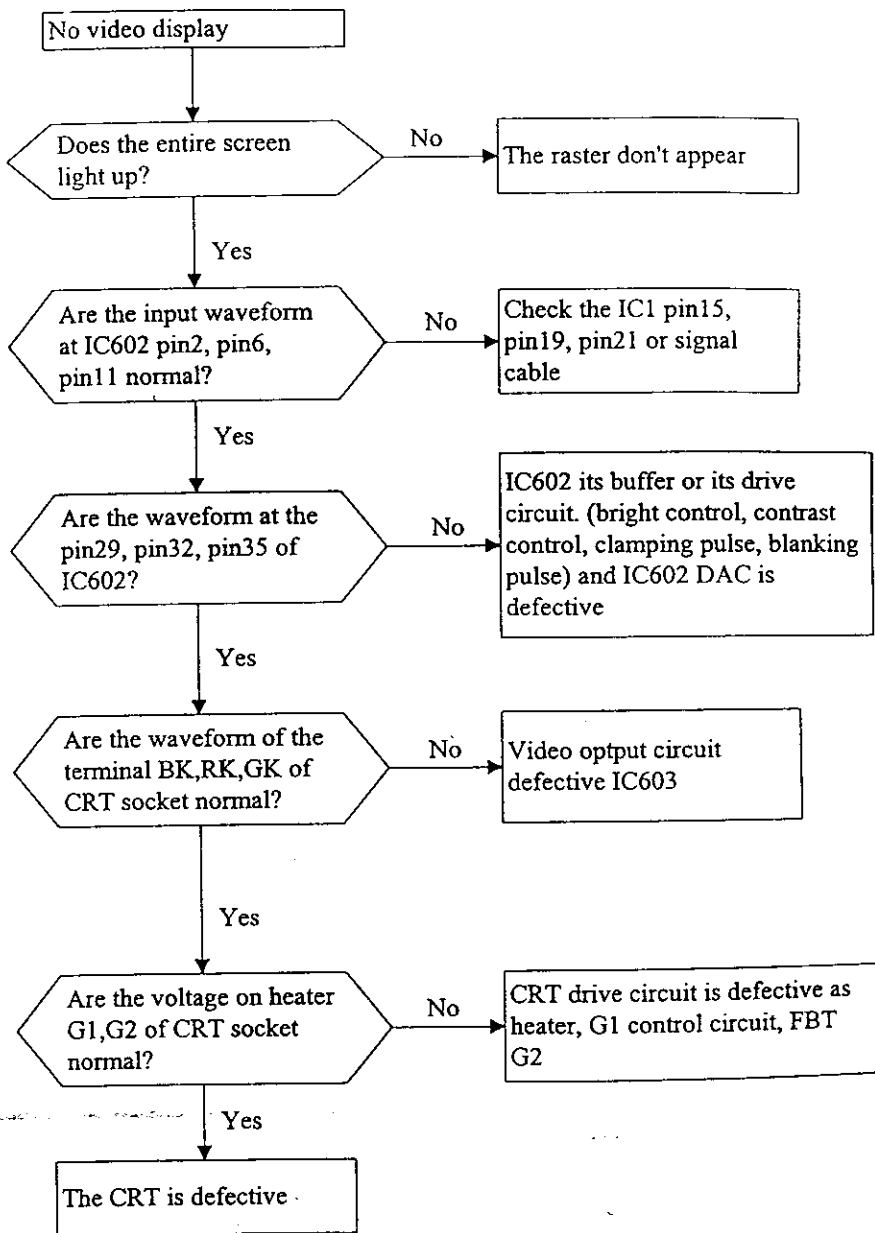


NO VIDEO

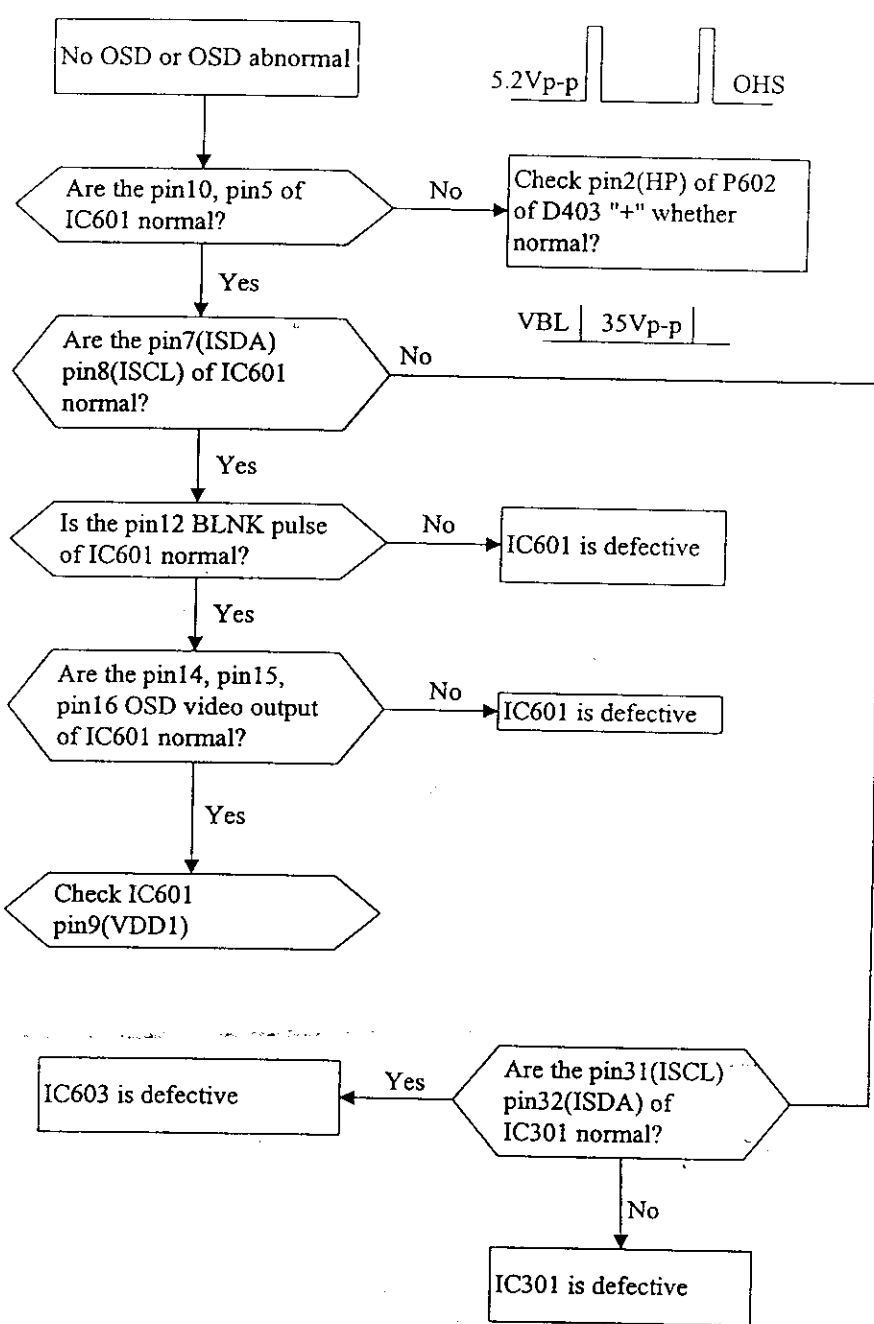
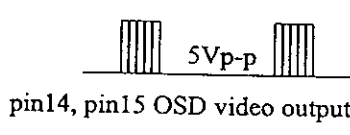
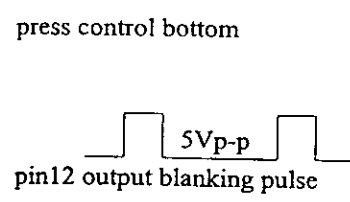
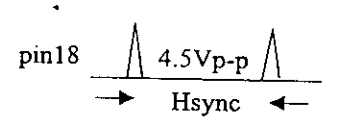
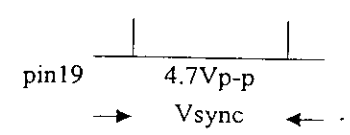
Turn up the screen control and check whether the raster appear.



heater: -6.3VDC
G1: -70V
G2: 580V

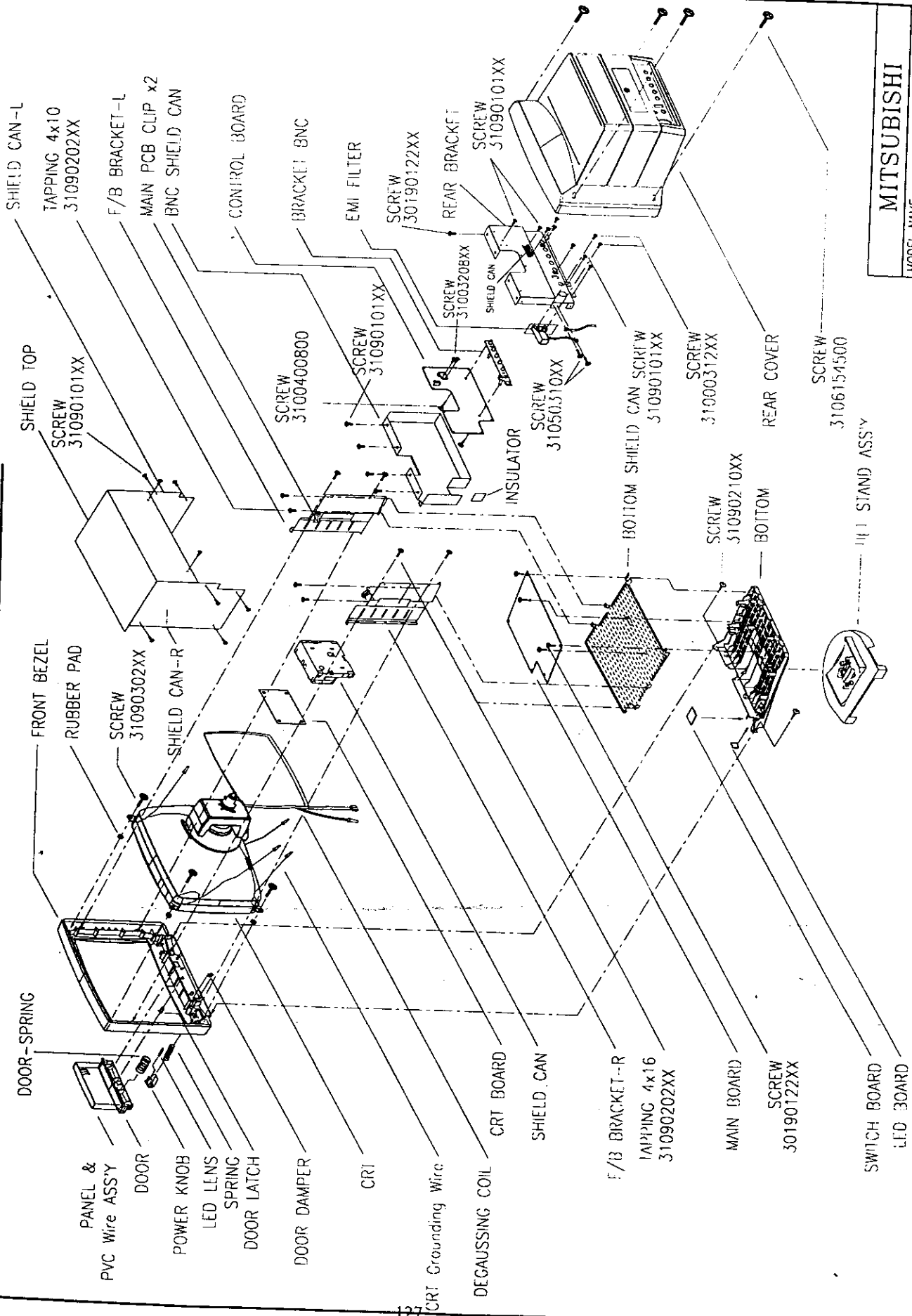


NO OSD



6. Mechanical assembly

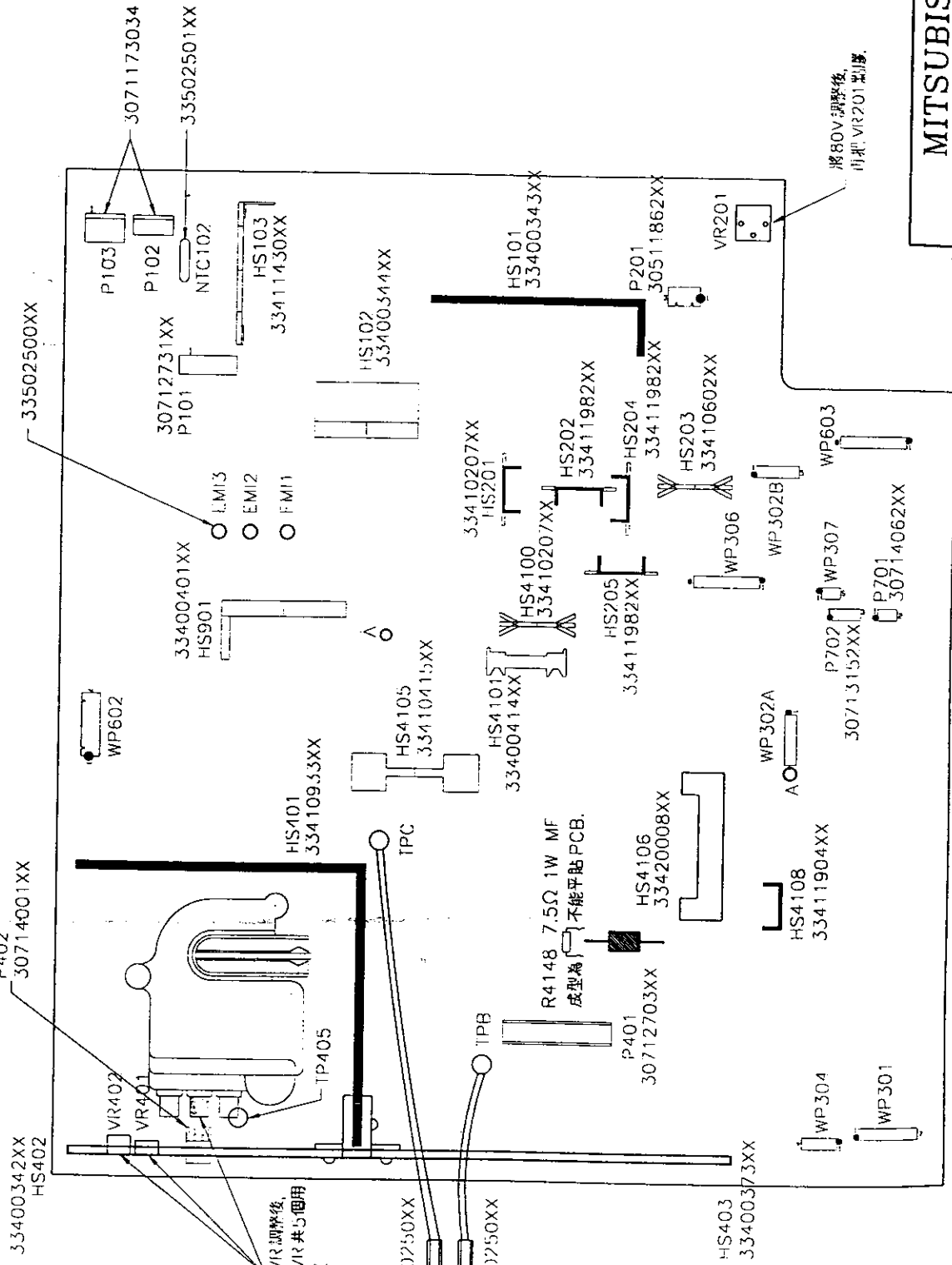
- Explode Drawing
- PCB Assembly Drawing
- Packing Assembly
- Container's Packing
- Label Drawing



MITSUBISHI	
MODEL NAME: FF19905SKHFV	
PAGE 1	OF X-0

FFT9905SKHFW ENGINEERING NOTICE ITEM

MAIN BOARD HI ASS'Y



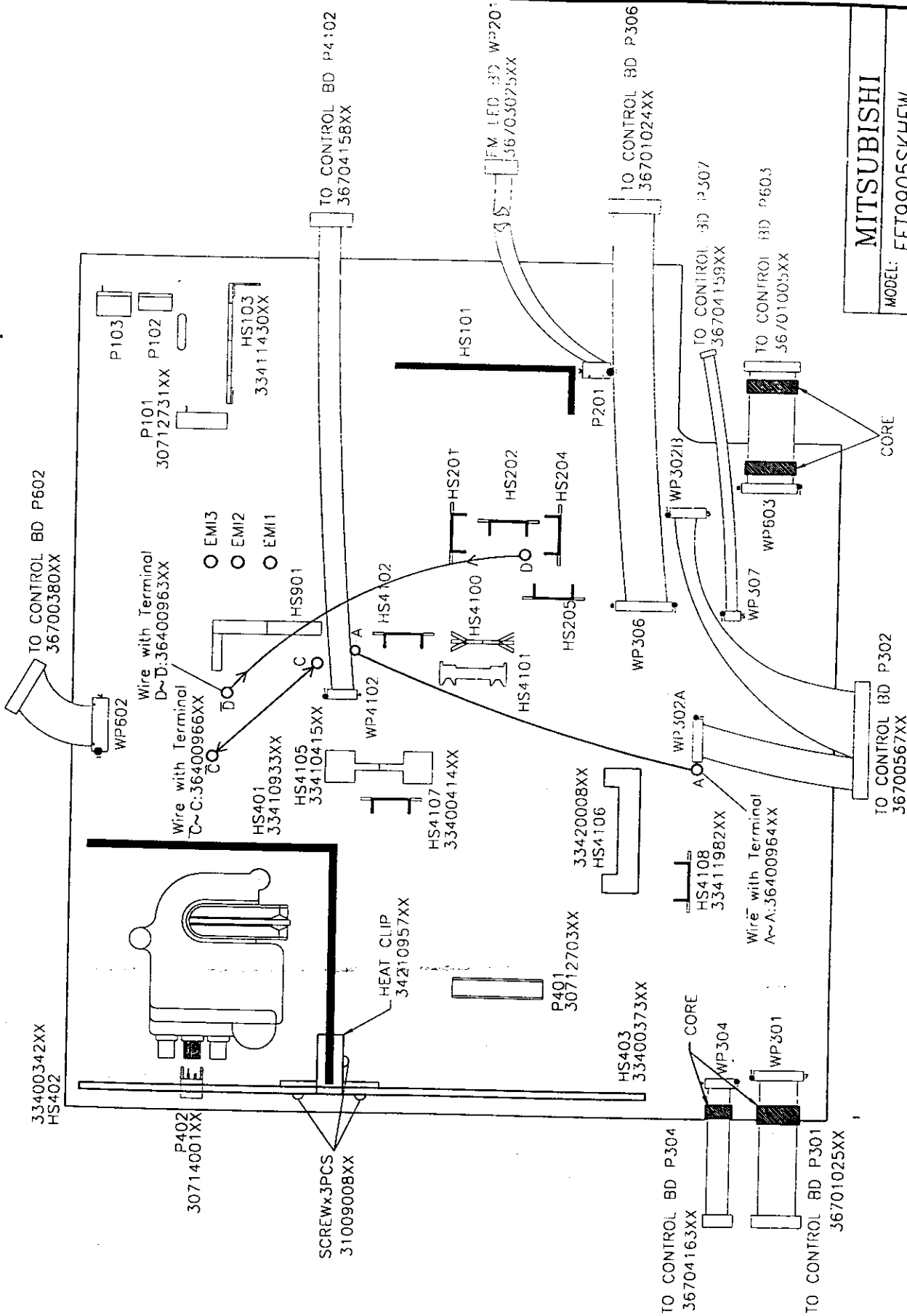
將H.V.X-RAY, C2及TBI上的VR調整後，
 再把VR401及402,及TBI上的VR共5個用
 VR撐P/N:4020119200固定

將80V調整後，
 再把VR201調整。

MITSUBISHI	
MODEL:	FFT9905SKHFW
PAGE	2 OF X-0

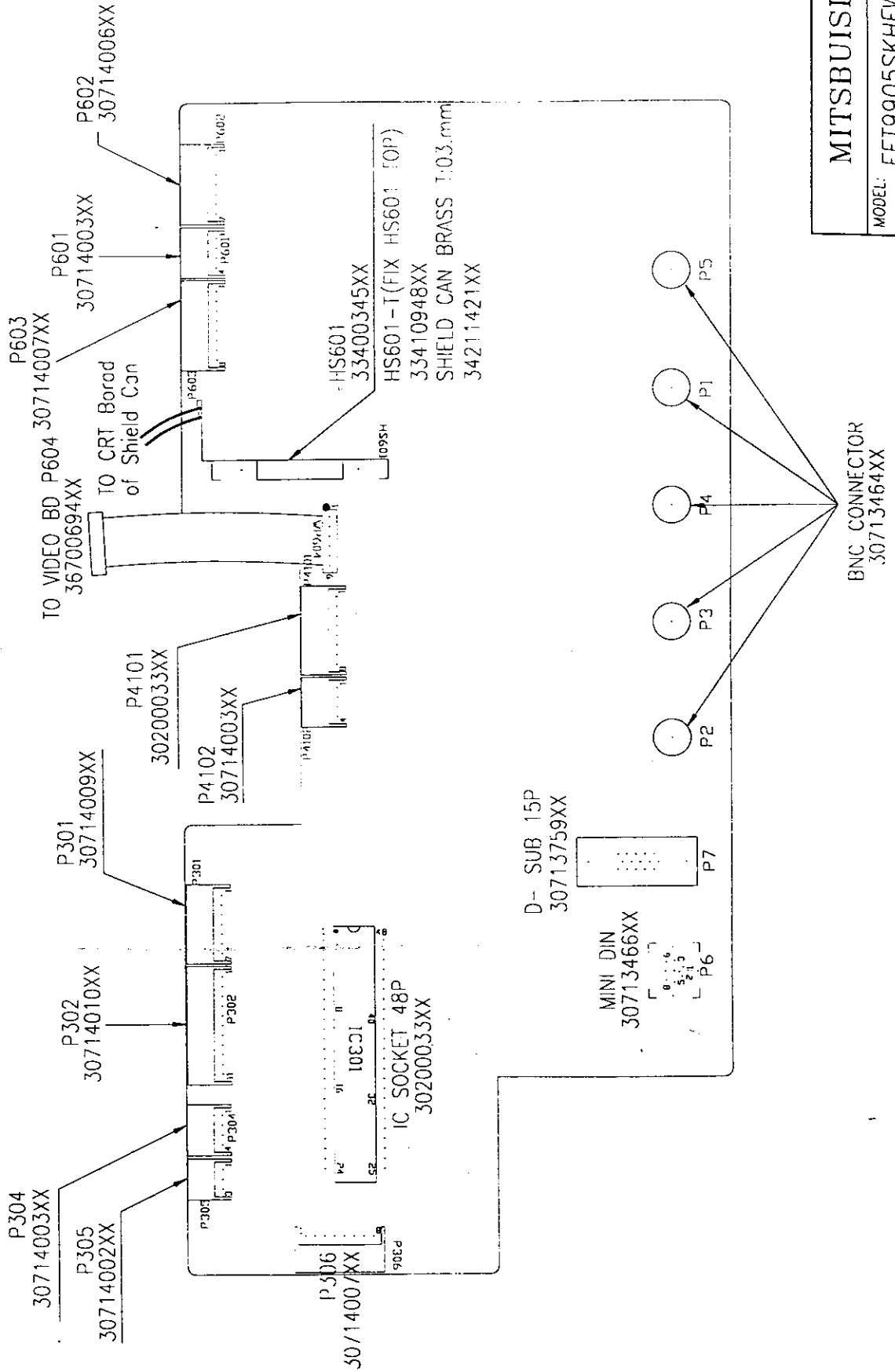
FFT9905SKHFW ENGINEERING NOTICE ITEM

MAIN BOARD WIRE ASS'Y



MITSUBISHI
MODEL: FFT9905SKHFW
PAGE 3 OF X-0

FFT9905SKHFW ENGINEERING NOTICE ITEM
CONTROL BOARD HI ASS'Y



MITSUBISHI

MODEL: FFT9905SKHFW

PAGE 4 OF X-0

4

3

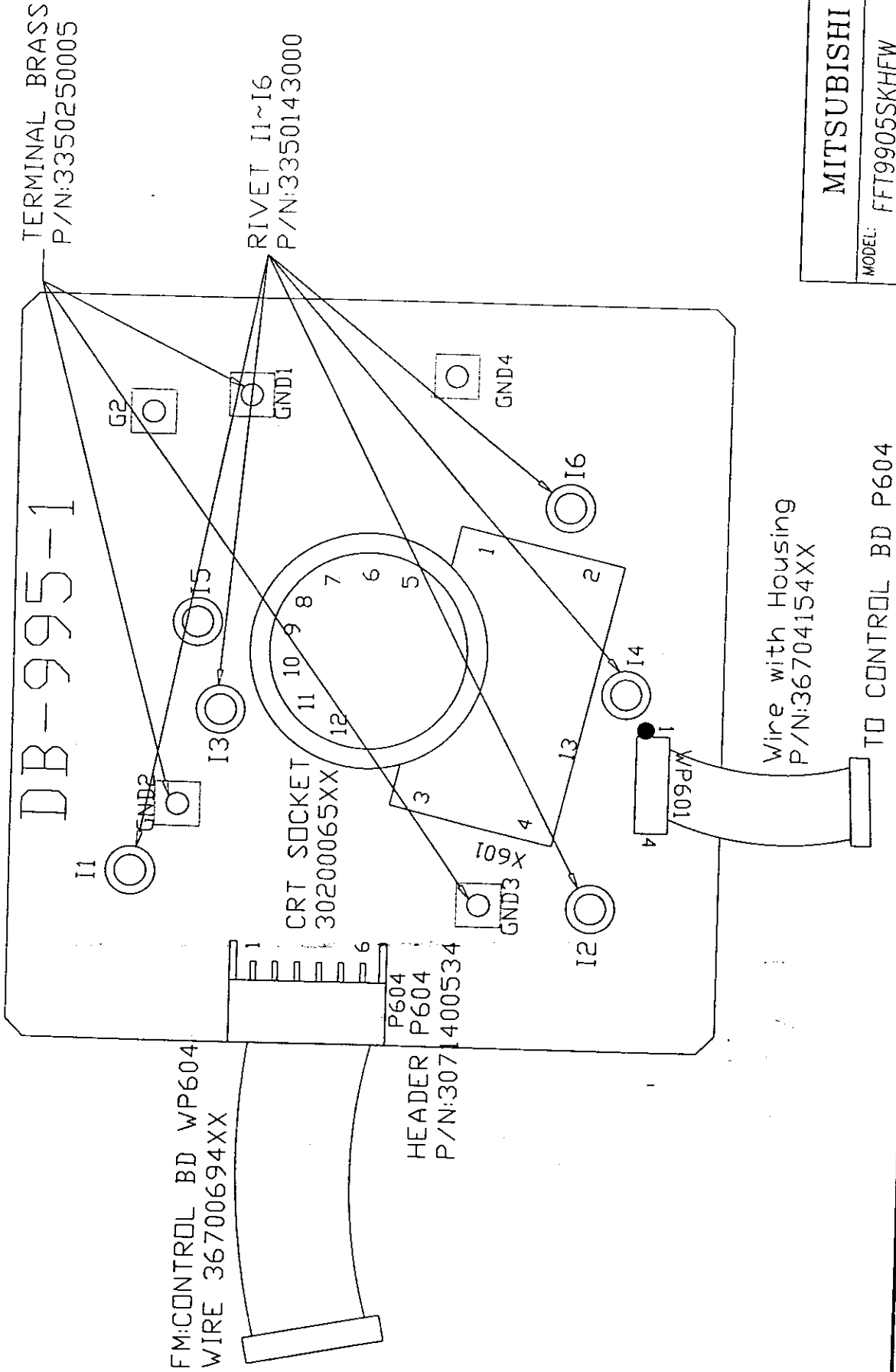
2

1

FFT9905SKHFW ENGINEERING NOTICE ITEM

CRT BOARD HI ASS'Y

DB-995-1



FM:CONTROL BD WP604
WIRE 36700694XX

HEADER P604
P/N:307400534

Wire with Housing
P/N:36704154XX

TO CONTROL BD P604

TERMINAL BRASS
P/N:3350250005

RIVET I1~I6
P/N:3350143000

MITSUBISHI

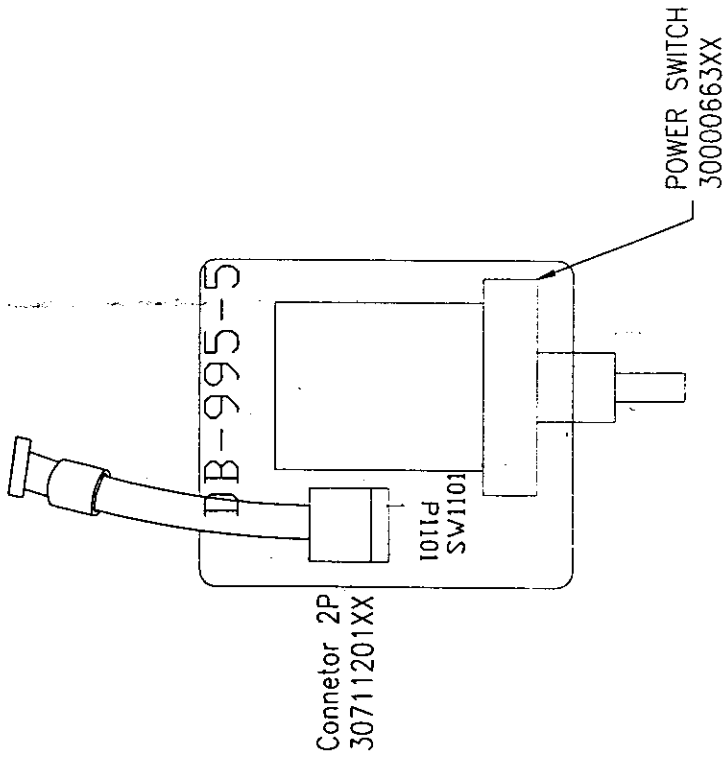
MODEL: FFT9905SKHFW

PAGE 5 OF X-0

FFT9905SKHFW ENGINEERING NOTICE ITEM
SWITCH & KEY BOARD HI ASSY

SWITCH BOARD HI ASSY

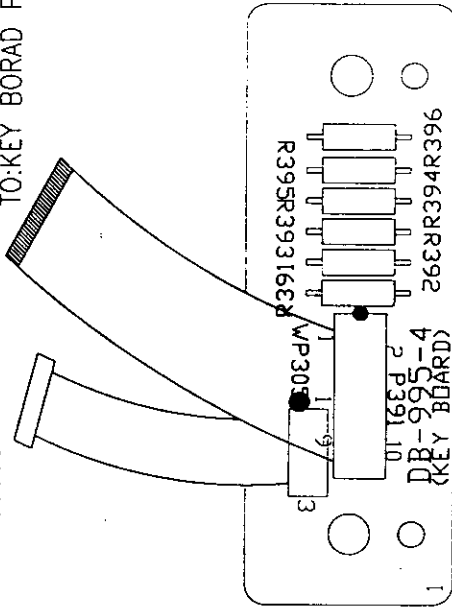
TO MAIN BD P102
36702044XX



KEY BOARD HI ASSY

TO CONTROL BD P305
36703033XX

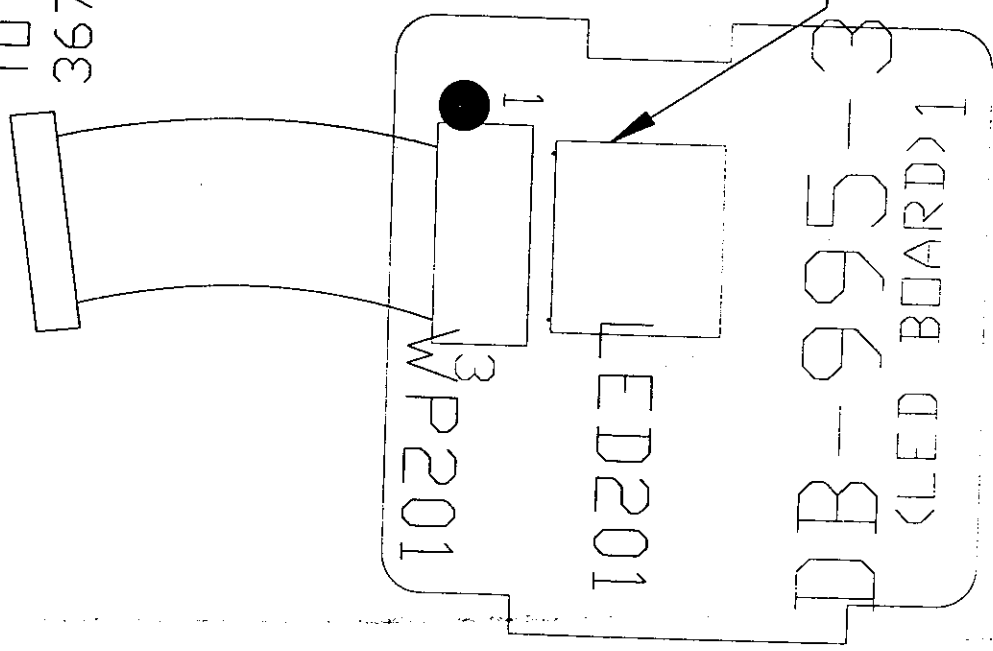
FM:CONTROL-SWITCH(DOOR)
TO:KEY BORAD P391



FFT9905SKHFW ENGINEERING NOTICE ITEM

LED BOARD HI ASS'Y

TO MAIN BD P201
36703025XX



LED HOLDER
34220067XX

DB-995-3
(LED BOARD) 1

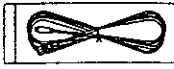
MITSUBISHI

MODEL: FFT9905SKHFW

PAGE 7 OF X-0

FFT9905SKHFW ENGINEERING NOTICE ITEM
PACKING ASS'Y

CABLE SIGNAL
P/N:330720168XX



POWER CORD (USA)
P/N:30720392XX

MAC ADATOR
P/N:30713732XX

END BLOCK-L
P/N:35000397XX

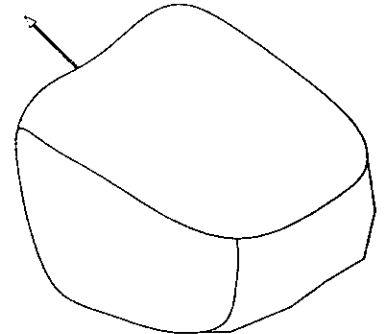
END BLOCK-R
P/N:35000398XX

MANUAL PACKING ASS'Y
P/N:35203123XX



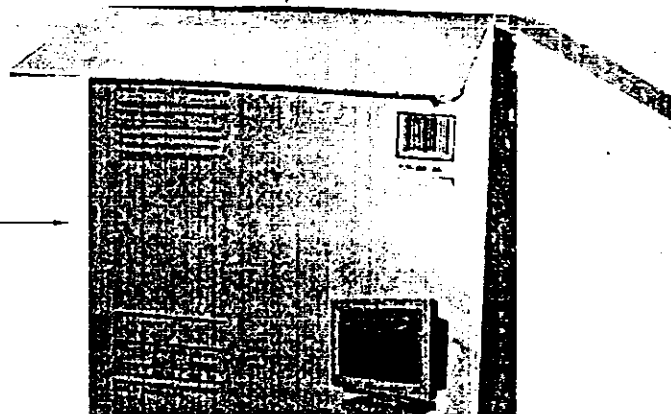
ELECTRICAL GLASS
FILAMENT
P/N:32201803XX

PE BAG
P/N:35200930XX



END BLOCK BOTTOM
P/N:35000399XX

CARTON
P/N:35103103XX

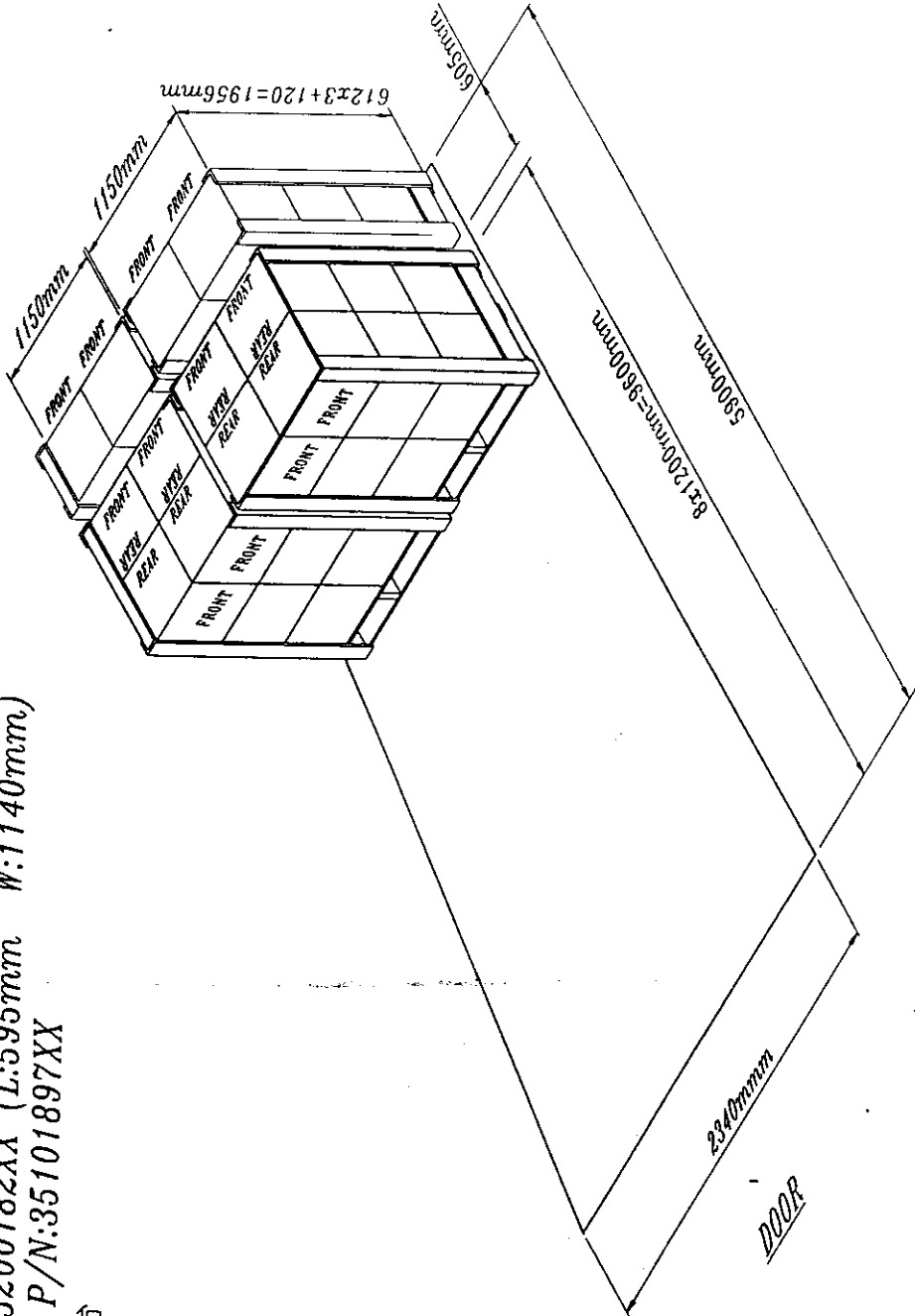


FFT9905SKHFW ENGINEERING NOTICE ITEM

20' CONTAINER'S PACKING
FOR 19" MONITOR

PALLET P/N:35200174XX (L:1190mm W:1140mm)
PALLET P/N:35200182XX (L:595mm W:1140mm)
ANGLE PAPER P/N:35101897XX

裝載數量共 108 台



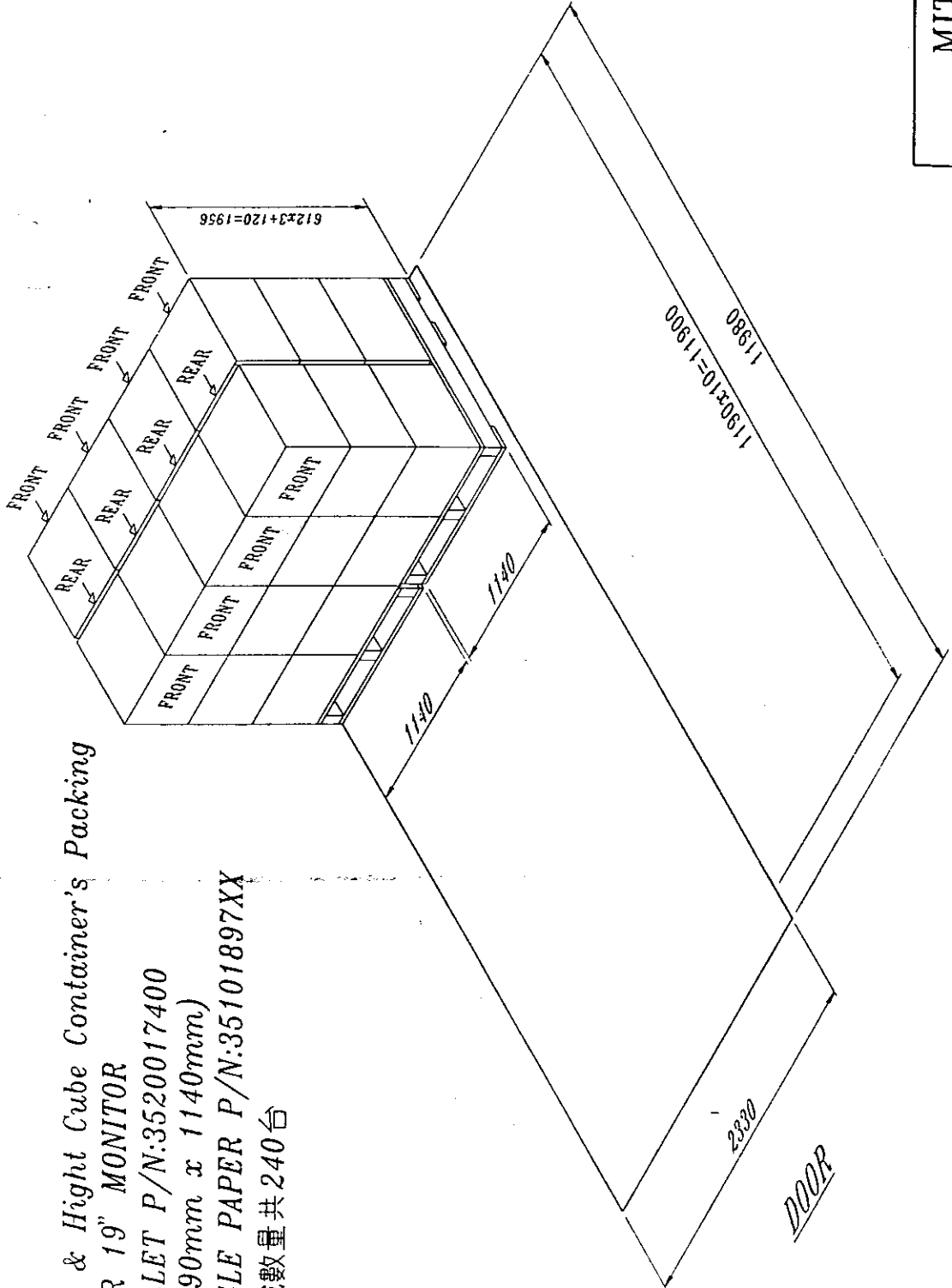
MITSUBISHI

MODE NAME : FFT9905SKHFW

PAGE : 9 OF X-0

FFT9905SKHFW ENGINEERING NOTICE ITEM

40' & Hight Cube Container's Packing
 FOR 19" MONITOR
 PALLET P/N:3520017400
 (1190mm x 1140mm)
 ANGLE PAPER P/N:35101897XX
 裝載數量共 240 台



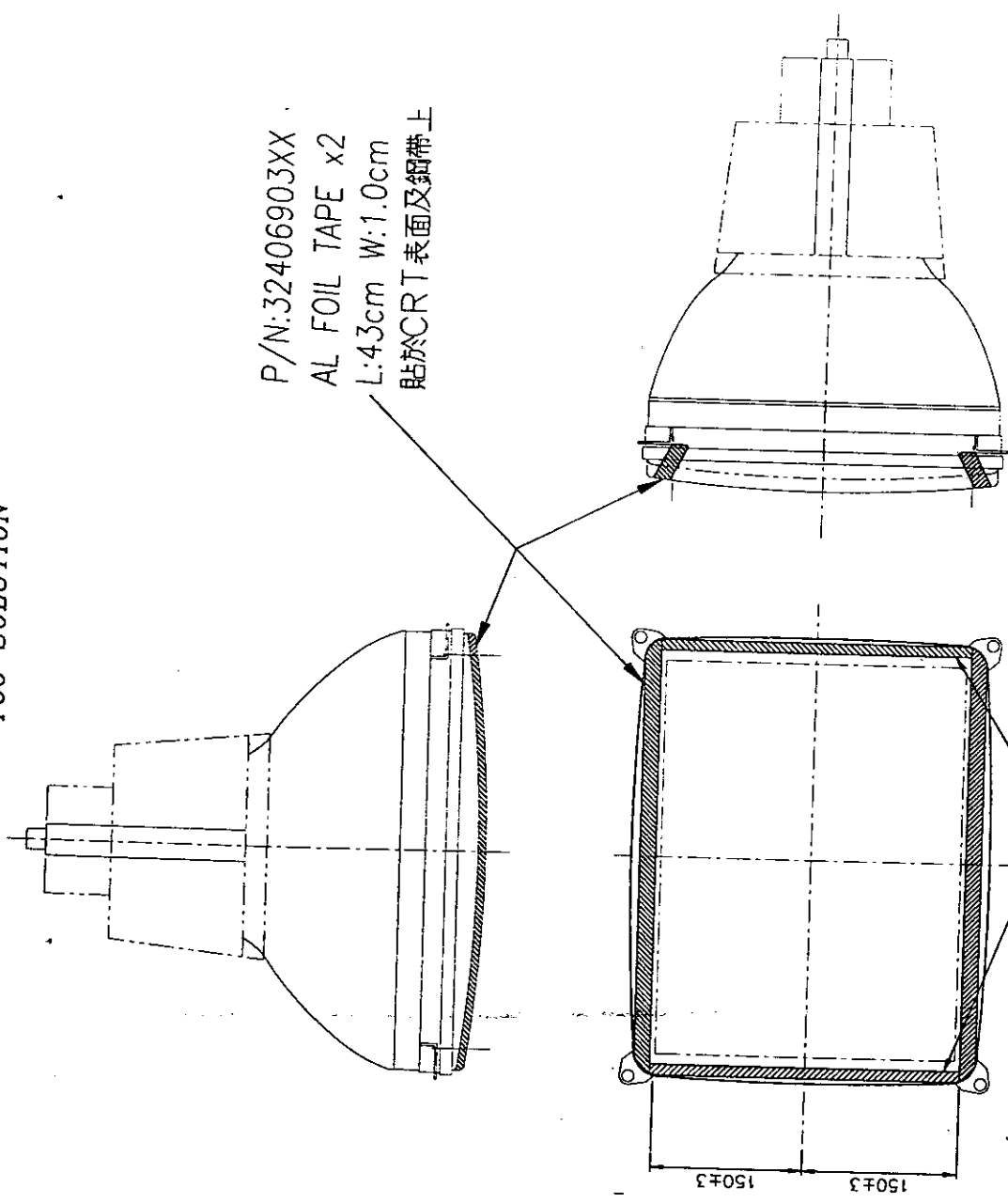
MITSUBISHI

PART NO. FFT9905SKHFW

PAGE 10 OF 10

FFT9905SKHFW ENGINEERING NOTICE ITEM

ENGINEERING NOTICE ITEM
TCO SOLUTION



P/N:32406903XX
AL FOIL TAPE x2
L:43cm W:1.0cm
貼於CRT表面及頸帶上

P/N:32406909XX
AL FOIL TAPE x2
L:34cm W:1.0cm
貼於CRT表面及頸帶上

MITSUBISHI

MODE NAME : FFT9905SKHFW

PAGE : 11 OF X-0

FFT9905SKHFW ENGINEERING NOTICE ITEM

805600001	805600001
805600001	805600001

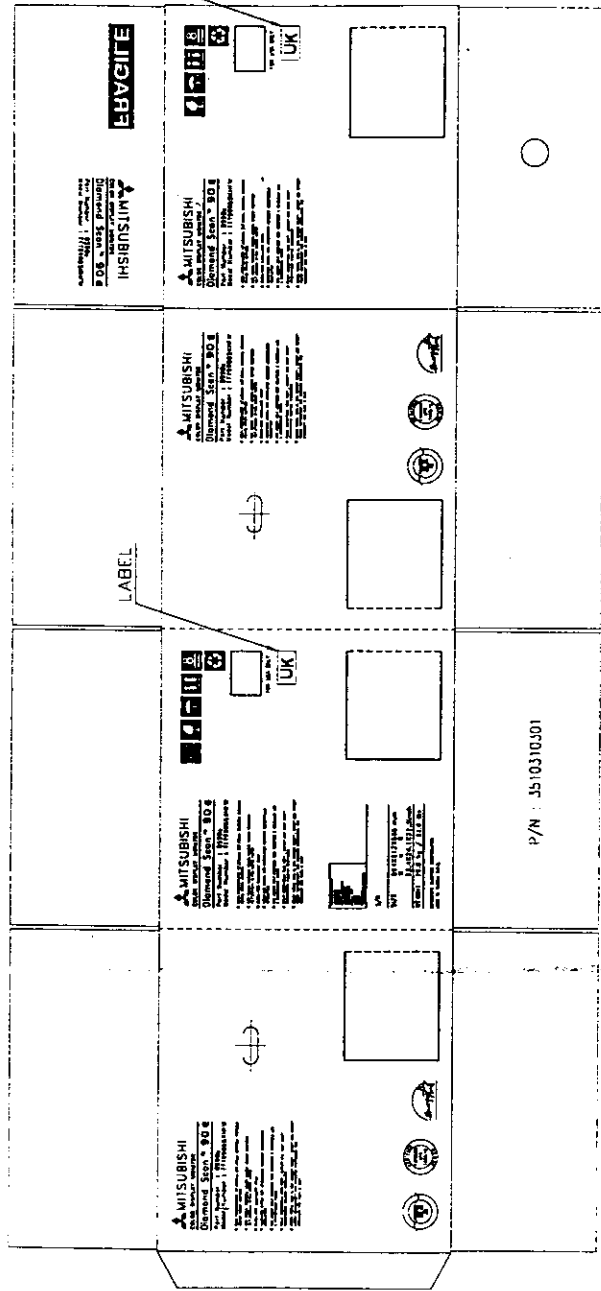
SUPPLIER PART #: FFT9905K-USA

PRODUCT SERIAL #: S804600001

SUPPLIER ID #: 1449

MANUFACTURE NAME :
 MITSUBISHI ELECTRONICS MFG (S) PTE LTD
 3000 MARSILING ROAD, SINGAPORE 739108

- ① SERIAL NUMBER: 805600001
- 8 = LAST DIGIT OF MANUFACTURING YEAR
 05 = MANUFACTURING MONTH
 6 = PRODUCTION PERMANENT NUMBER
 00001 = PRODUCTION SEQUENCE NUMBER
- ② PRODUCT SERIAL #: FFT9905K-XXX
- USA = FOR U.S.A. & CANADA
 UK = FOR U.K.
 F = FOR FRANCE
 G = FOR GERMANY
- ③ PRODUCT SERIAL #: S804600001
- S = PRODUCTION PERMANENT NUMBER
 8 = LAST DIGIT OF MANUFACTURING YEAR
 05 = MANUFACTURING MONTH
 00001 = PRODUCTION SEQUENCE NUMBER
- ④ SUPPLIER ID #: 1449
- ⑤ MANUFACTURE NAME:



805600001	805600001
805600001	805600001

SUPPLIER PART # FT9905K-USA

PRODUCT SERIAL # S804600001

SUPPLIER ID #: 1449

MANUFACTURE NAME
 MITSUBISHI ELECTRONICS MFG (S) PTE LTD
 3000 MARSHLUG ROAD SINGAPORE 738108

EU

UK

US

LABEL
 P/N:32090476XX

LABEL
 P/N:32090477XX

LABEL
 P/N:32090478XX

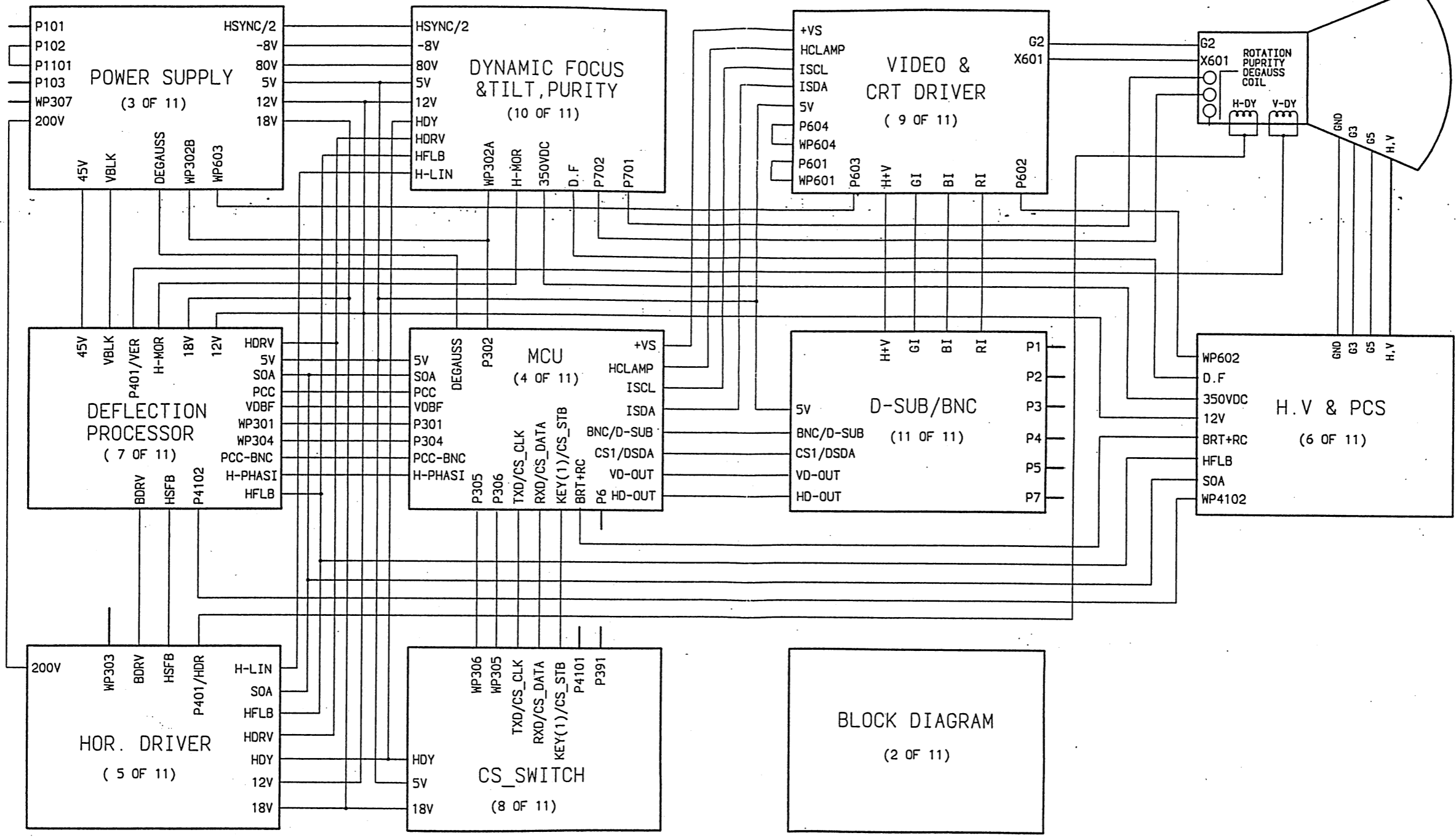
SERIAL LABEL
 P/N:32001288XX

MITSUBISHI

MODE NAME : FT9905SKHFW

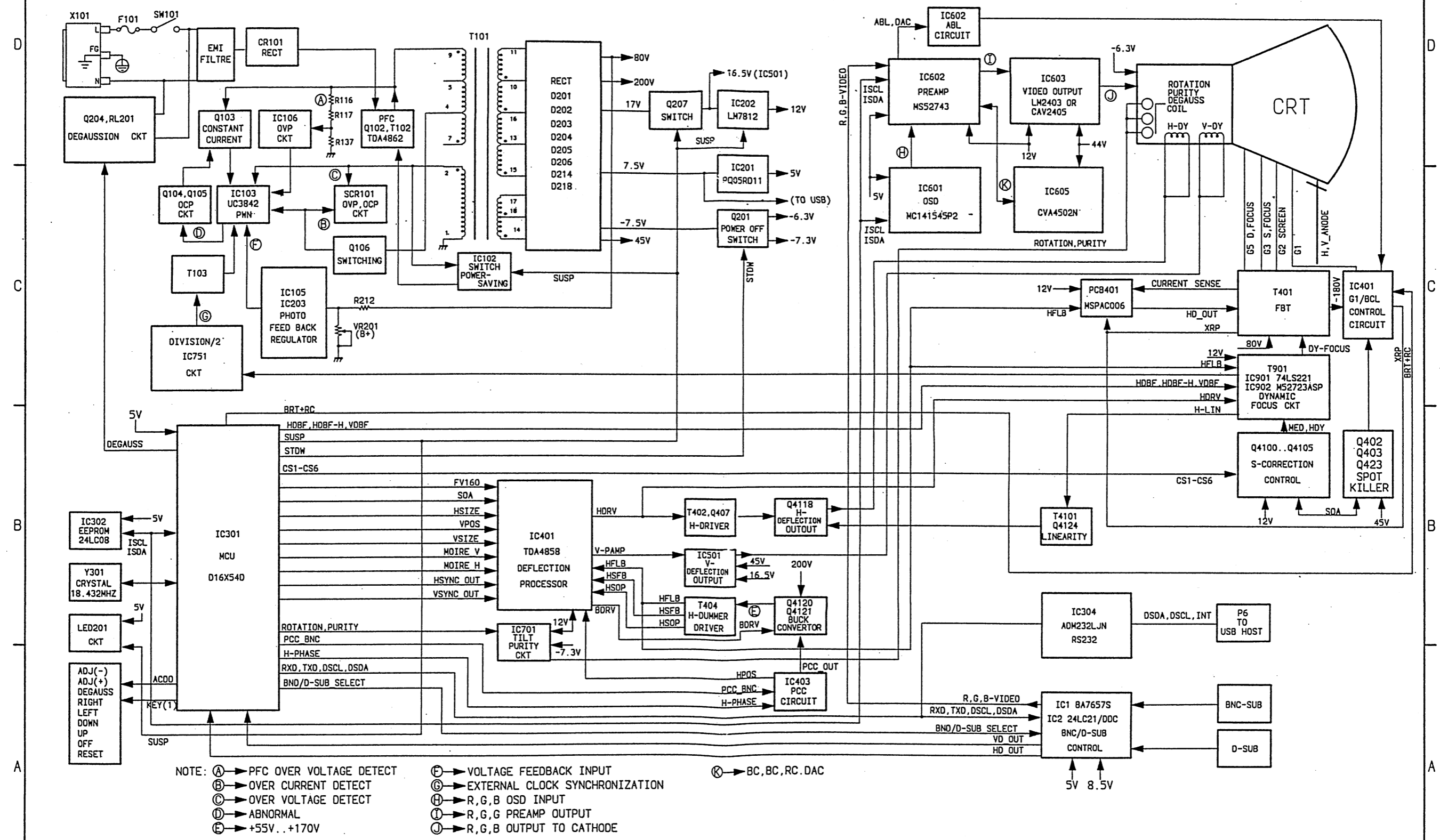
PAGE : 13 OF X-0

DB-995MJ

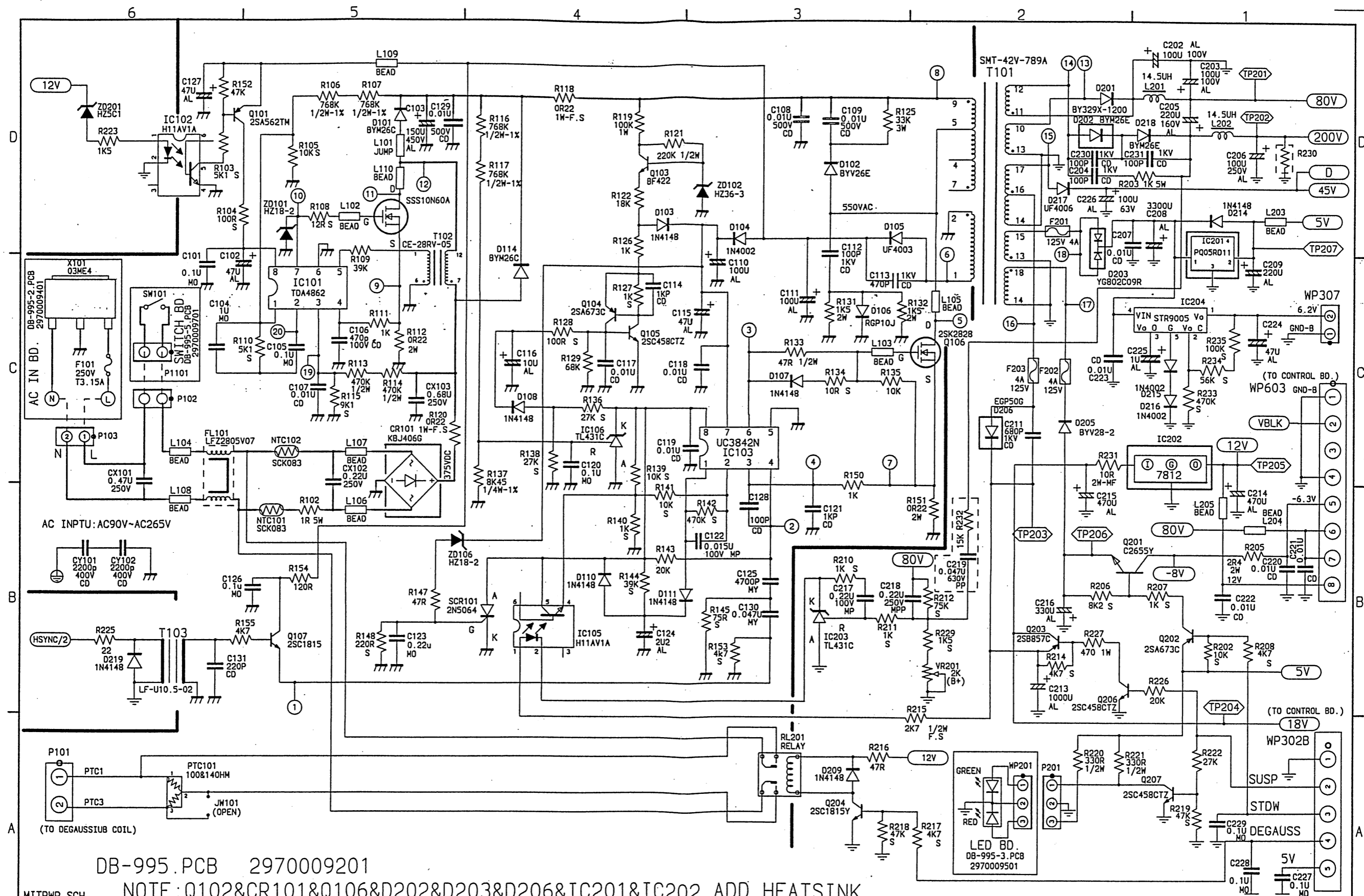


	FN/DCN	DRAWER I.P. CHANG	CHECK	APPROVER	P.C.B. NAME	MODEL NAME	DATE: 07/13/98*	SHEET
	START_NO.: D207698033 END_NO.: F207698015				DB-995	DB-995MJ	REV: 01 CODE: 02	1/11

DB-995MJ COLOR MONITOR BLOCK DIAGRAM



	FN/DCN	DRAWER	CHECK	APPROVER	P.C.B. NAME	MODEL NAME	DATE: 07/13/98*	SHEET
	START_NO.: D207698033	END_NO.: F207698015	I.P.CHANG		DB-995	DB-995MJ	REV: 01 CODE: 02	2/11

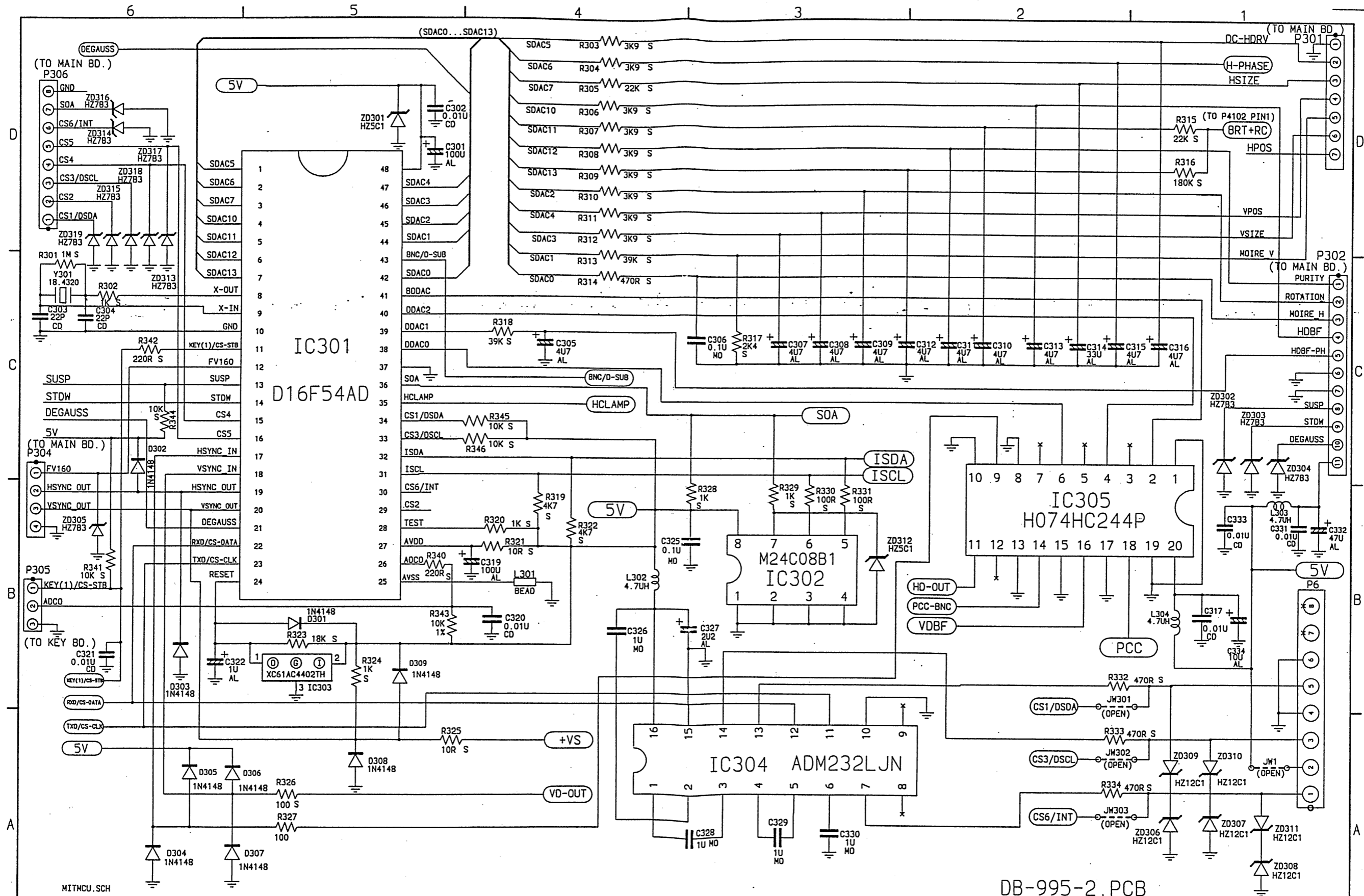


DB-995.PCB 2970009201

NOTE; Q102&CR101&Q106&D202&D203&D206&IC201&IC202 ADD HEATSINK.

MITPWR.SCH	FN/DCN		DRAWER	CHECK	APPROVER	P.C.B. NAME	MODEL NAME	DATE: 07/13/98"	SHEET
	START_NO.: D207698033	END_NO.: F207698015							

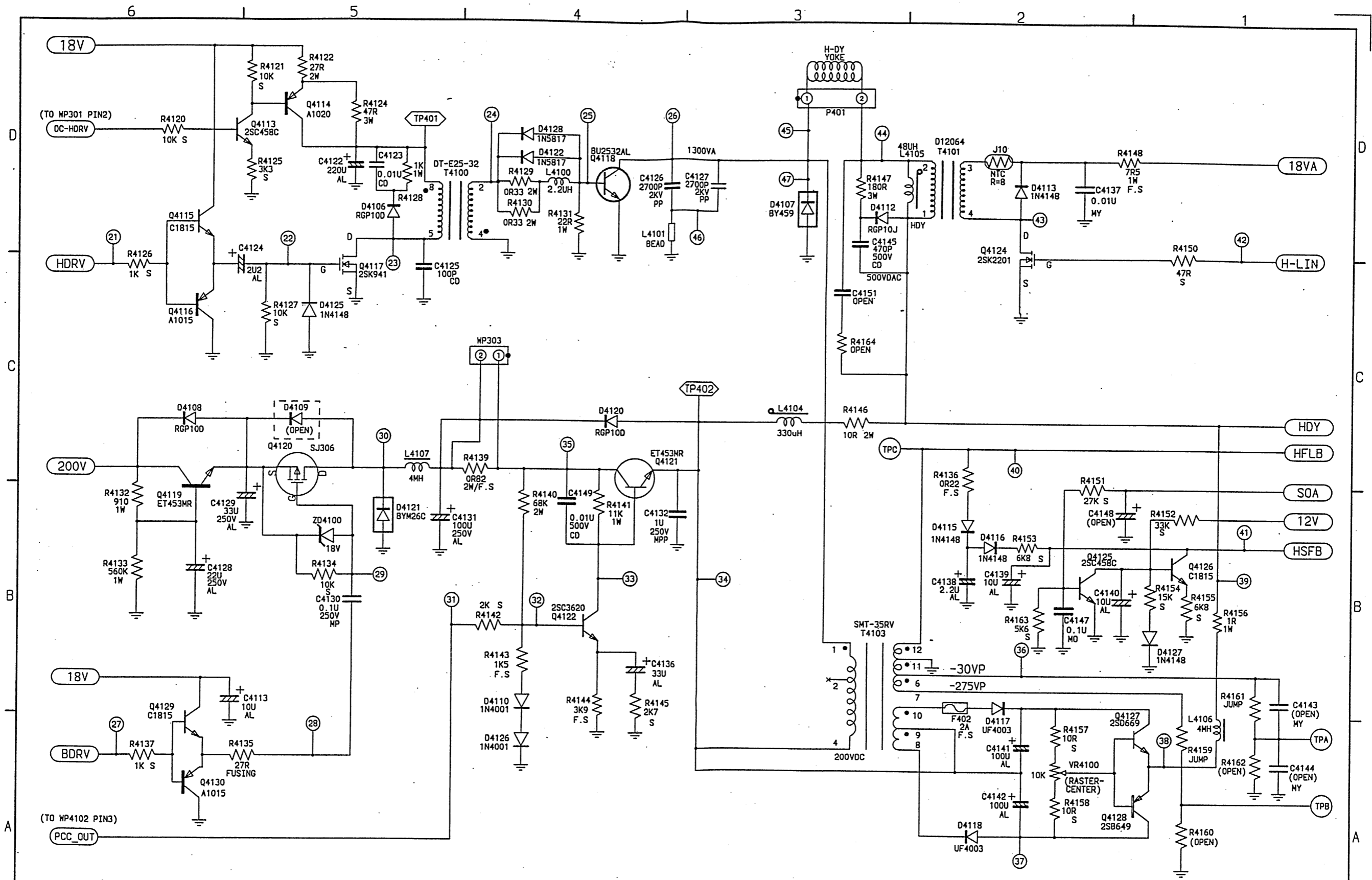




MITMCU.SCH

DB-995-2.PCB

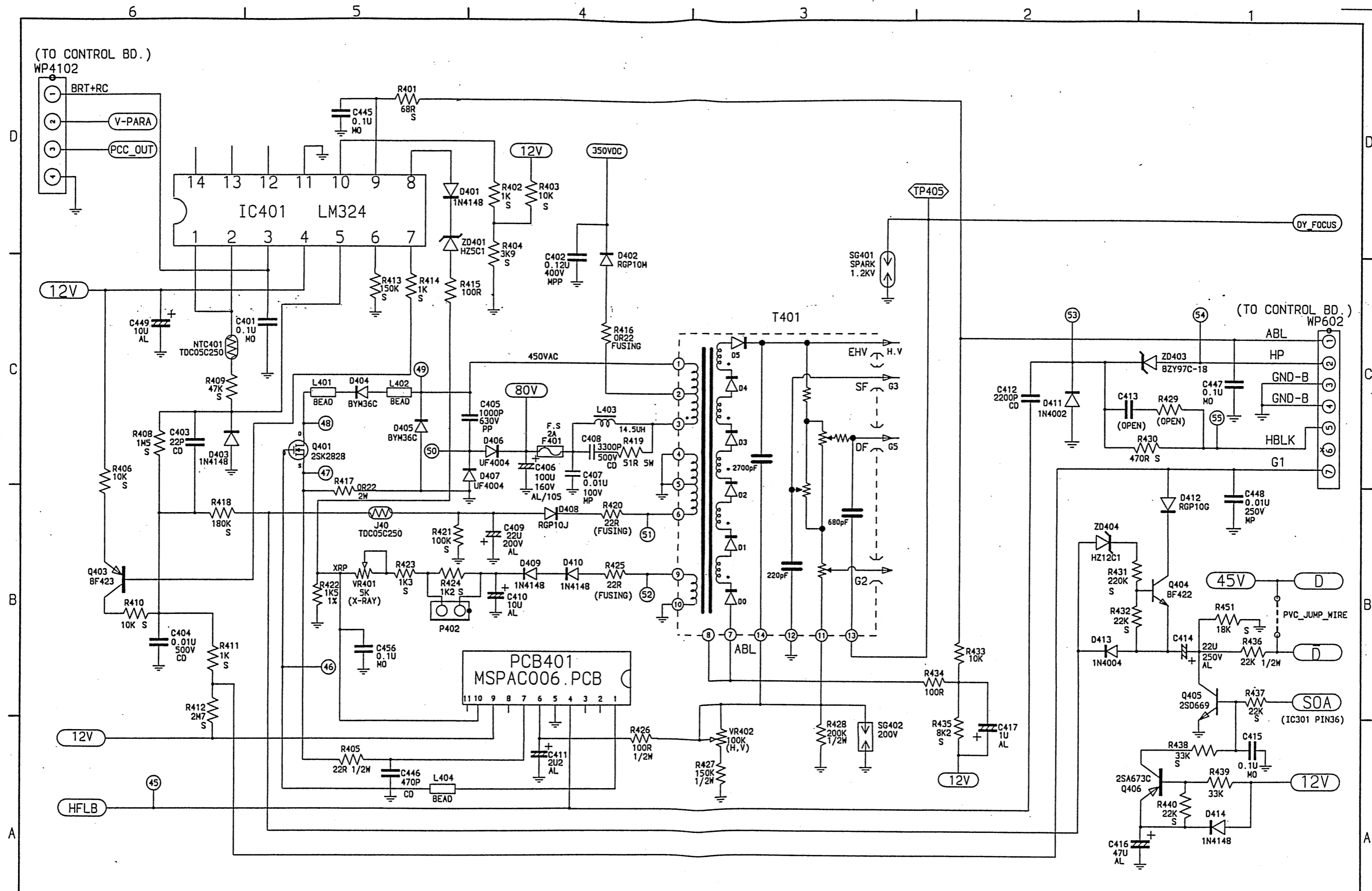
	FN/DCN		DRAWER	CHECK	APPROVER	P.C.B. NAME	MODEL NAME	DATE: 07/13/98"	SHEET
	START_NO.: D207698033 END_NO.: F207698015		I.P. CHANG			DB-995-2	DB-995MJ	REV: 01 CODE: 01	4/11



MITHDR.SCH

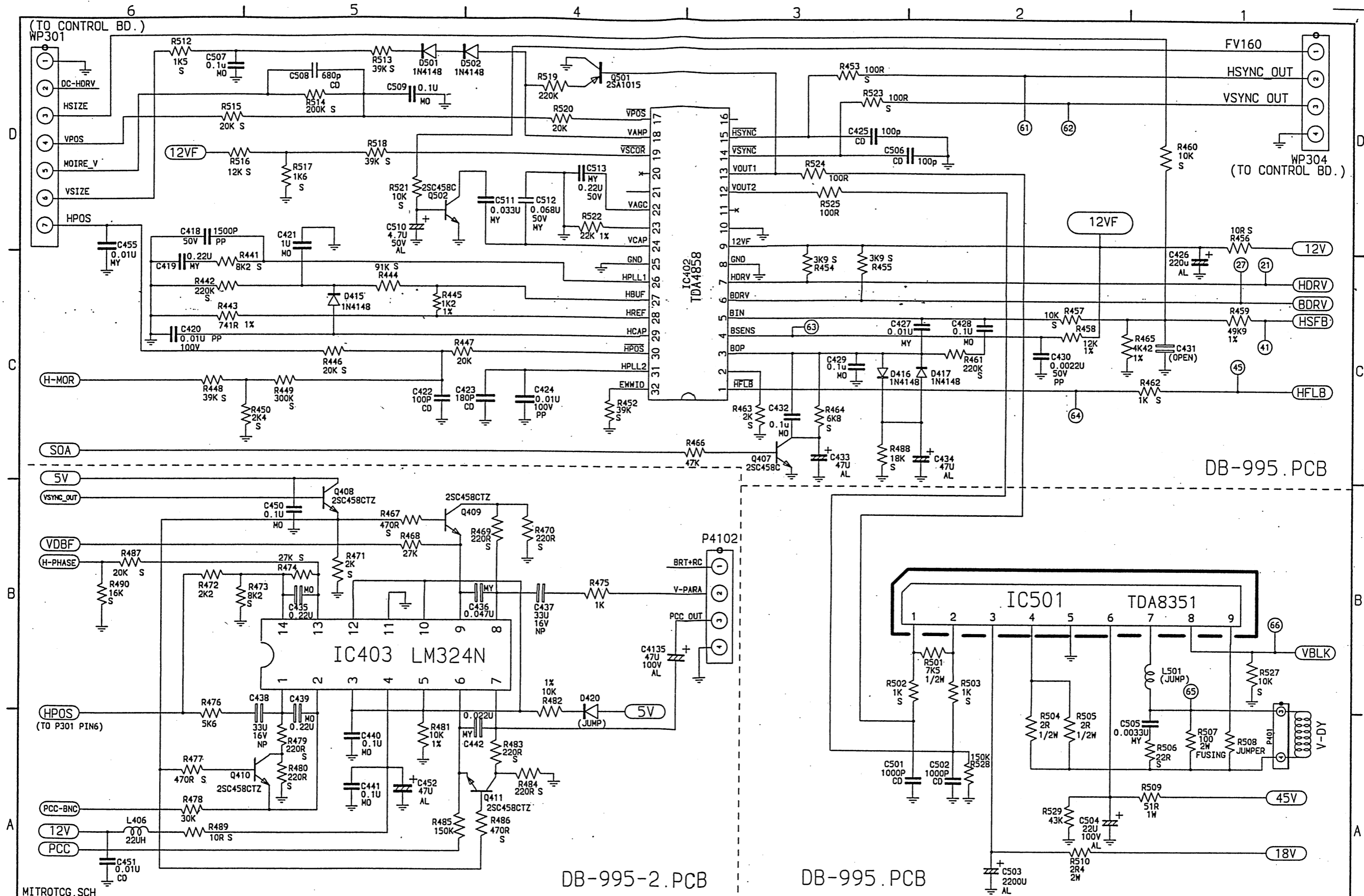
DB-995.PCB

		FN/DCN START_NO.: D207698033 END_NO.: F207698015	DRAWER I.P.CHANG	CHECK	APPROVER	P.C.B. NAME DB-995	MODEL NAME DB-995MJ	DATE: 07/13/98 REV: 01 CODE: 02	SHEET 5/11
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MITFBT.SCH

		FN/DCN START_NO.: D207698033 END_NO.: F207698015	DRAWER I.P.CHANG	CHECK	APPROVER	P.C.B. NAME DB-995	MODEL NAME DB-995MJ	DATE: 07/13/98* REV: 01 CODE: 02	SHEET 6/11
--	--	---	---------------------	-------	----------	-----------------------	------------------------	-------------------------------------	---------------

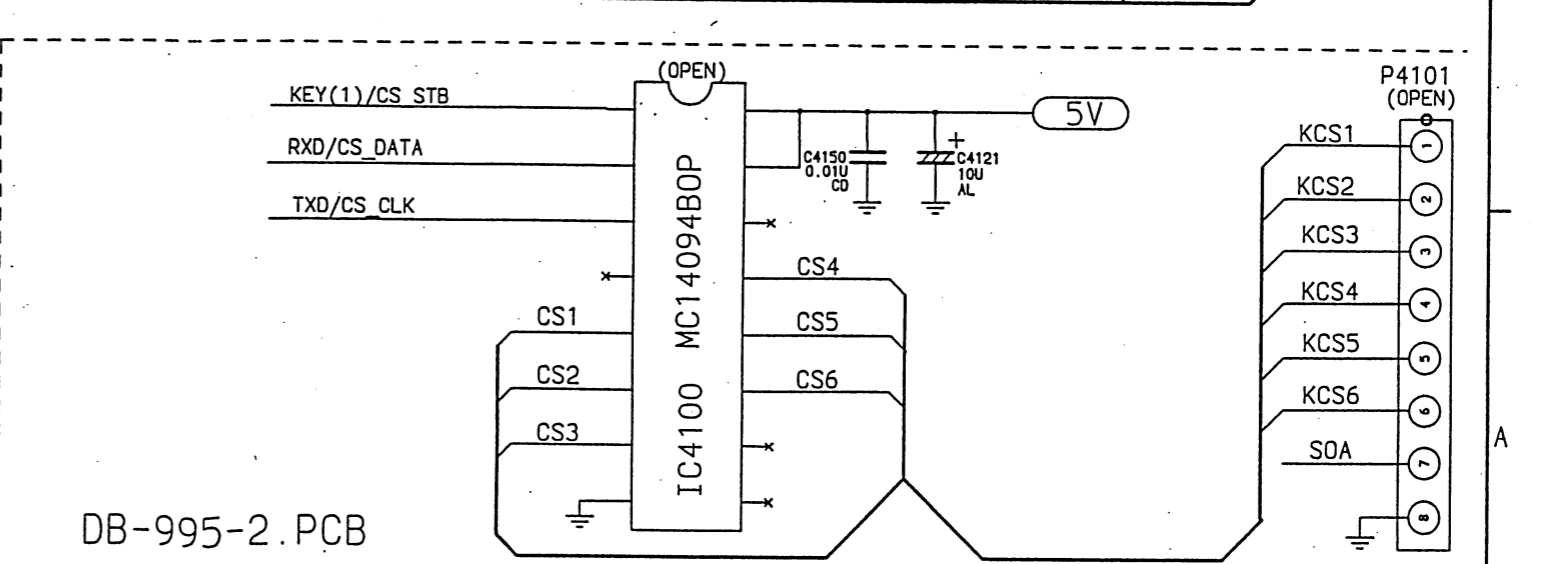
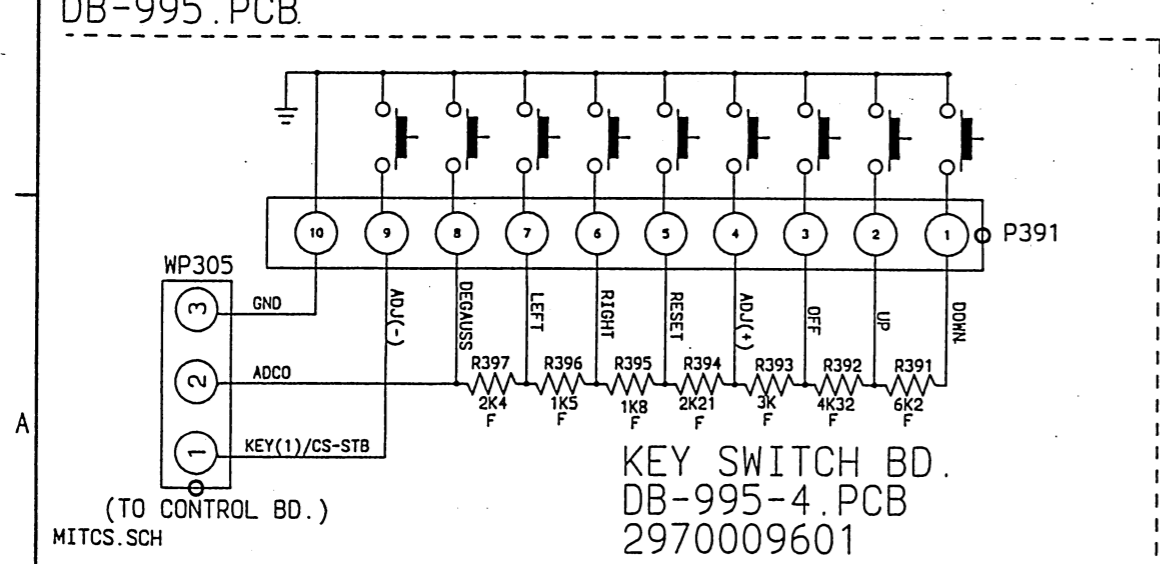
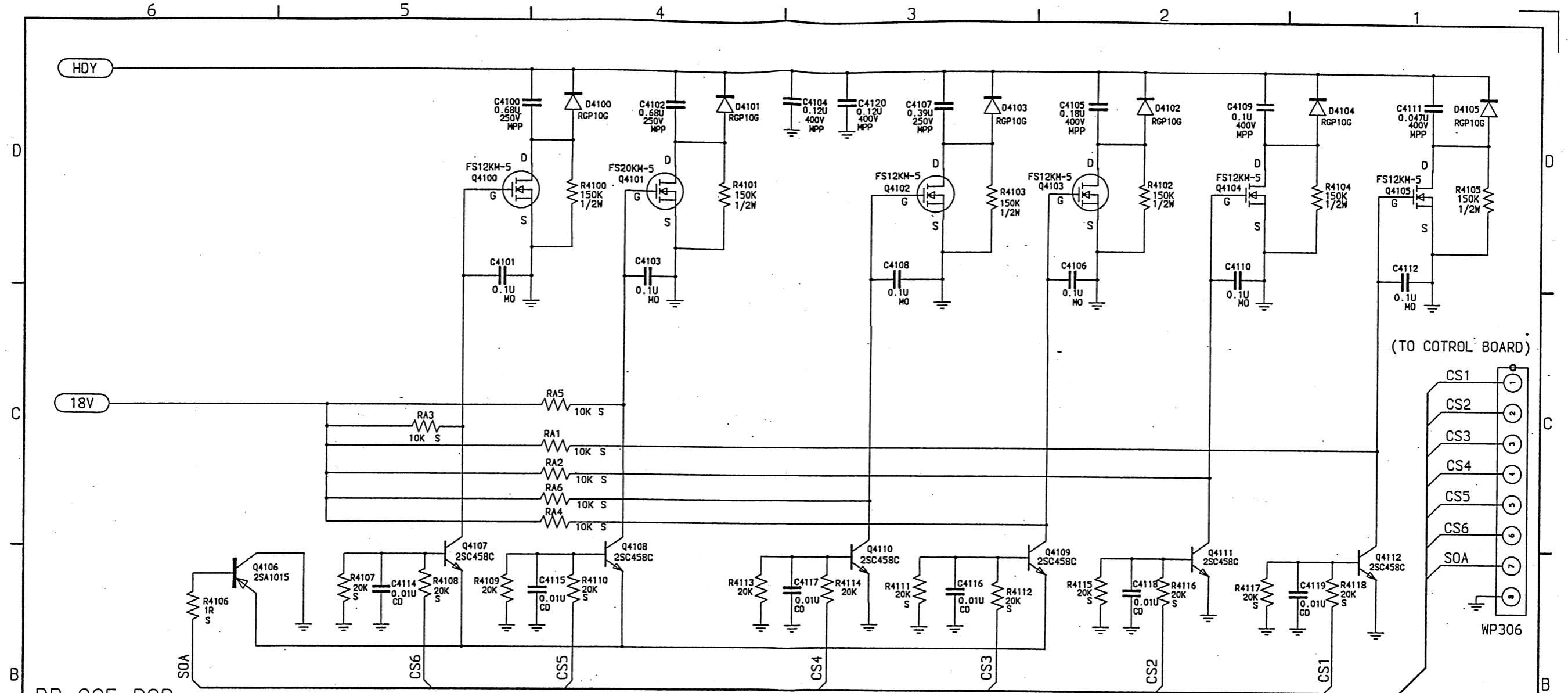


MITROTCG.SCH

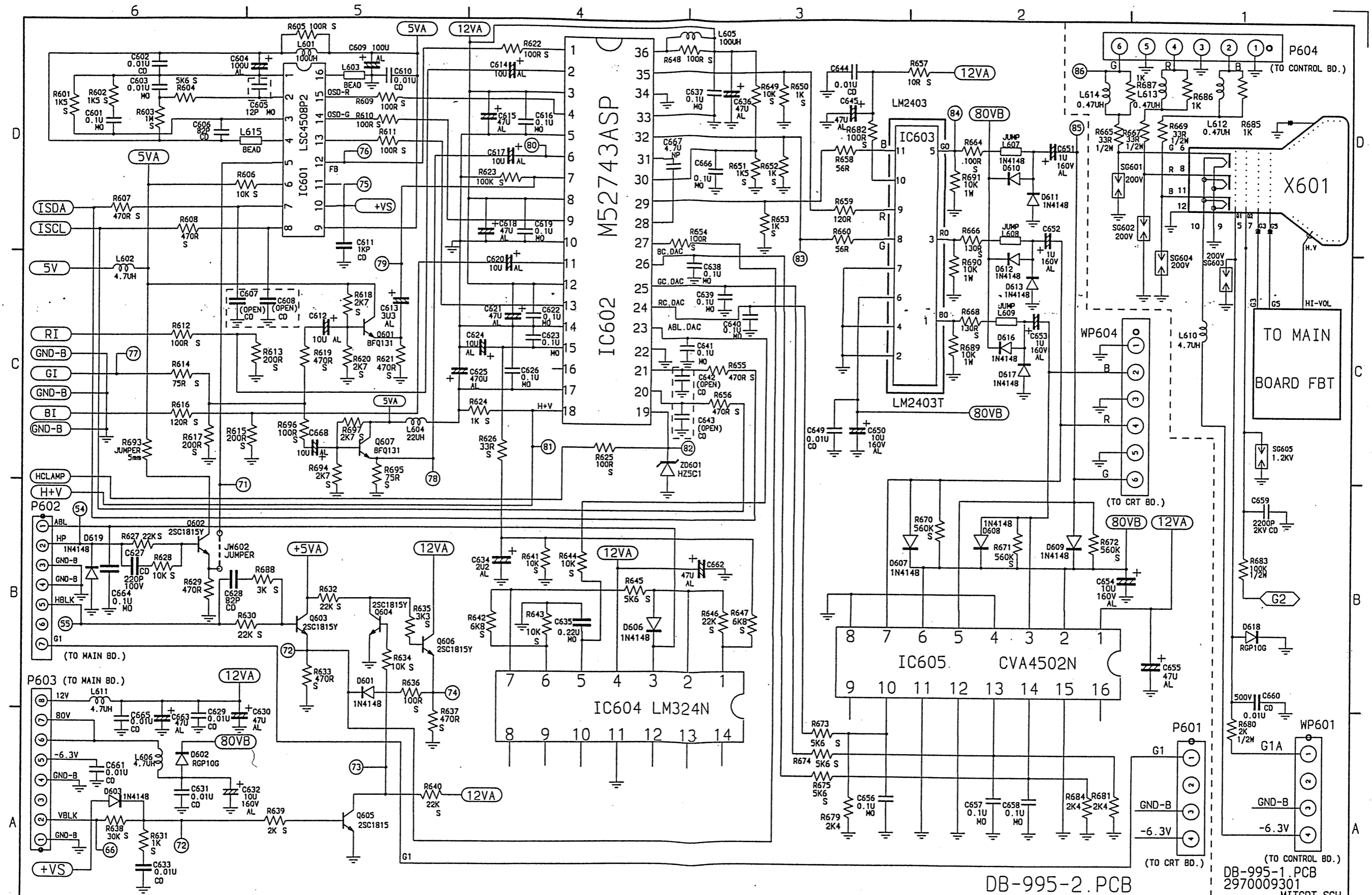
DELTA DELTA ELECTRONICS, INC.

FN/DCN
 START_NO.: D207698033 END_NO.: F207698015

DRAWER I.P.CHANG	CHECK	APPROVER	P.C.B. NAME DB-995 DB-995-2	MODEL NAME DB-995MJ	DATE: 07/13/98*	SHEET 7/11
					REV: 01 CODE:	

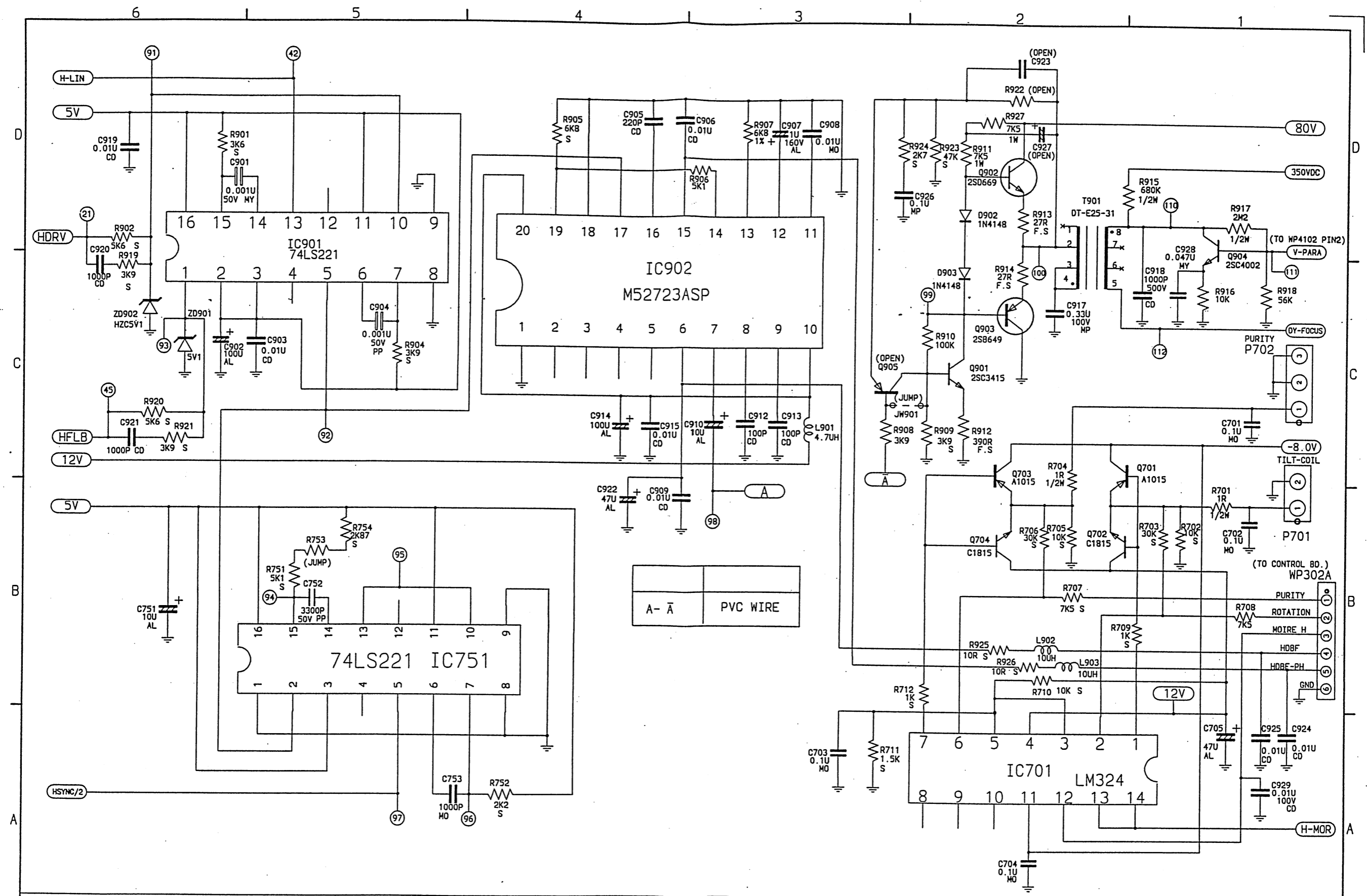


		FN/DCN START_NO.: D207698033 END_NO.: F207698015	DRAWER I.P. CHANG	CHECK	APPROVER	P.C.B. NAME DB-995, DB-995-4 DB-995-2	MODEL NAME DB-995MJ	DATE: 07/13/98* REV: 01 CODE:	SHEET 8/11
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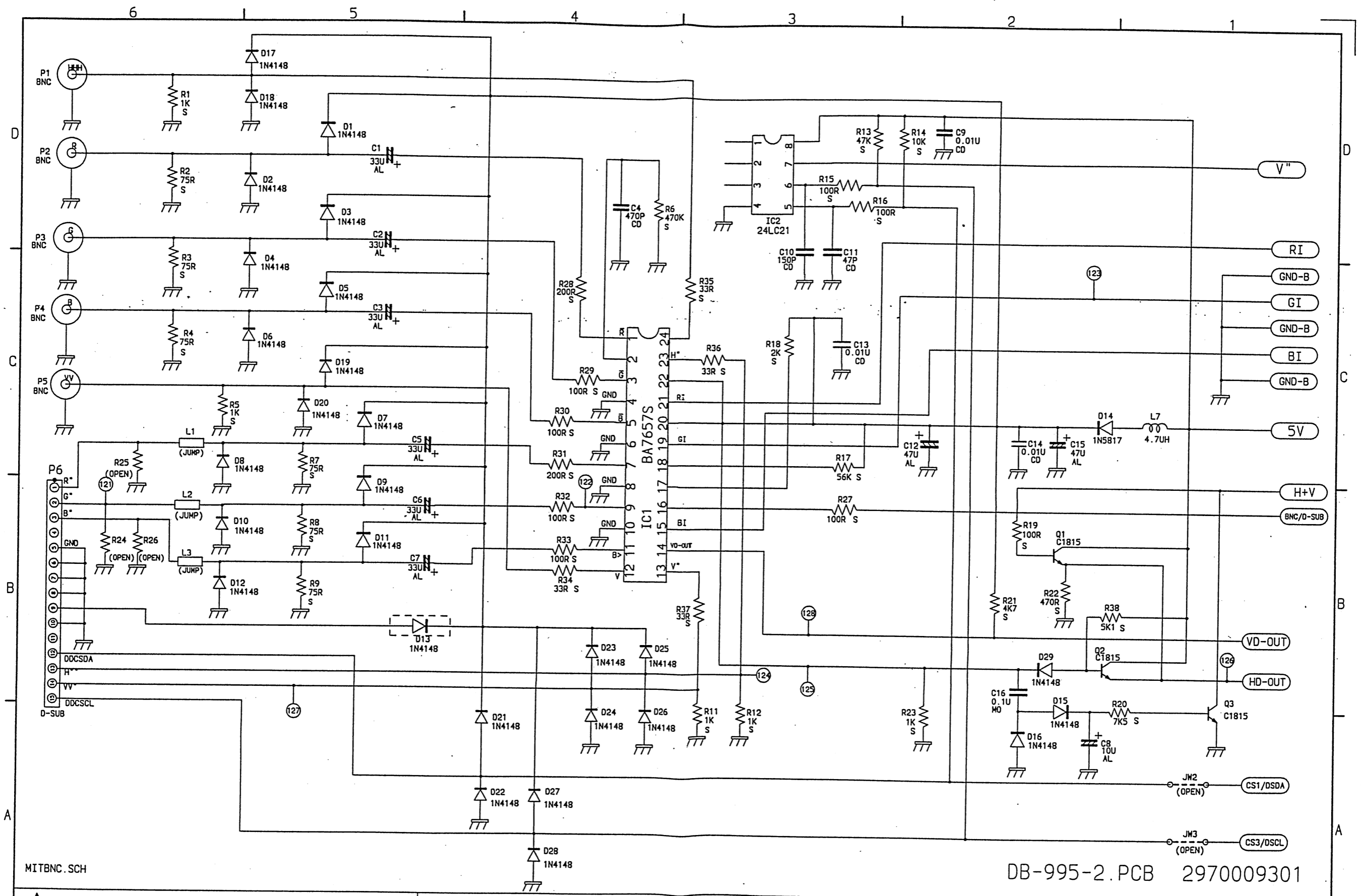


DB-995-2.PCB
 (TO CRT BD.)
 (TO CONTROL BD.)
 DB-995-1.PCB
 2970009301
 MITCRT.SCH

		FN/DCN START_NO.: D207698033 END_NO.: F207698015	DRAWER I.P.CHANG	CHECK APPROVER	P.C.B. NAME DB-995-1(CRT) DB-995-2	MODEL NAME DB-995MJ	DATE: 07/13/98 REV: 01 CODE:	SHEET 9/11
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DELTA ELECTRONICS, INC.	FN/DCN		DRAWER	CHECK	APPROVER	P.C.B. NAME	MODEL NAME	DATE: 07/13/98*	SHEET
	START_NO.: D207698033 END_NO.: F207698015		I.P. CHANG			DB-995	DB-995MJ	REV: 01 CODE: 02	10/11



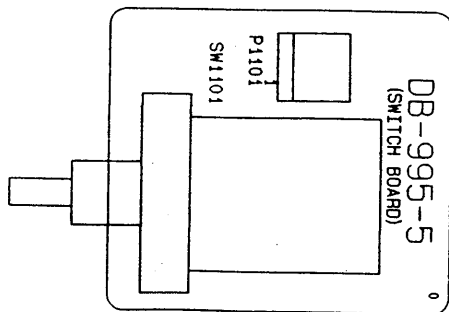
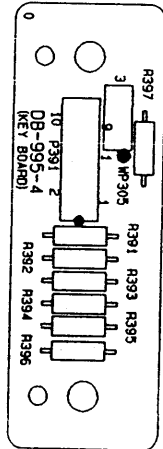
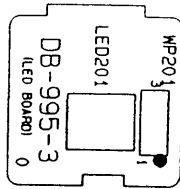
MITBNC.SCH

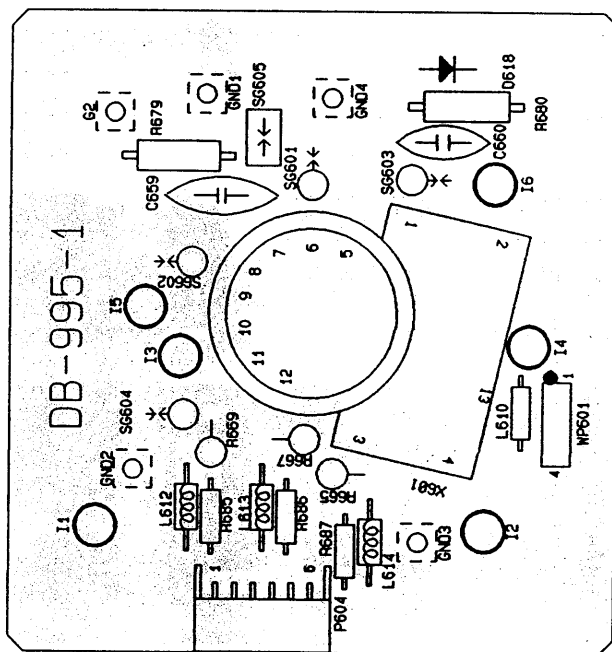
DB-995-2.PCB 2970009301

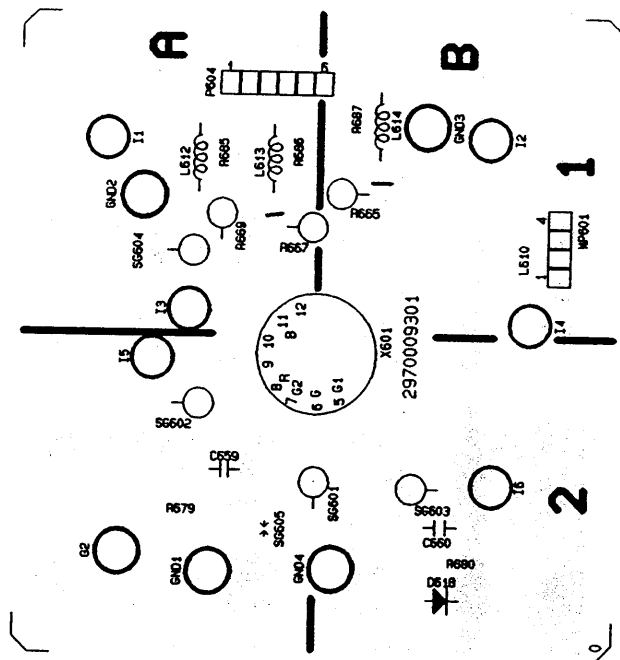
	FN/DCN		DRAWER	CHECK	APPROVER	P.C.B. NAME	MODEL NAME	DATE: 07/13/98*	SHEET
	START_NO.: D207698033 END_NO.: F207698015		I.P.CHANG			DB-995-2	DB-995MJ	REV: 01 CODE: 01	11/11

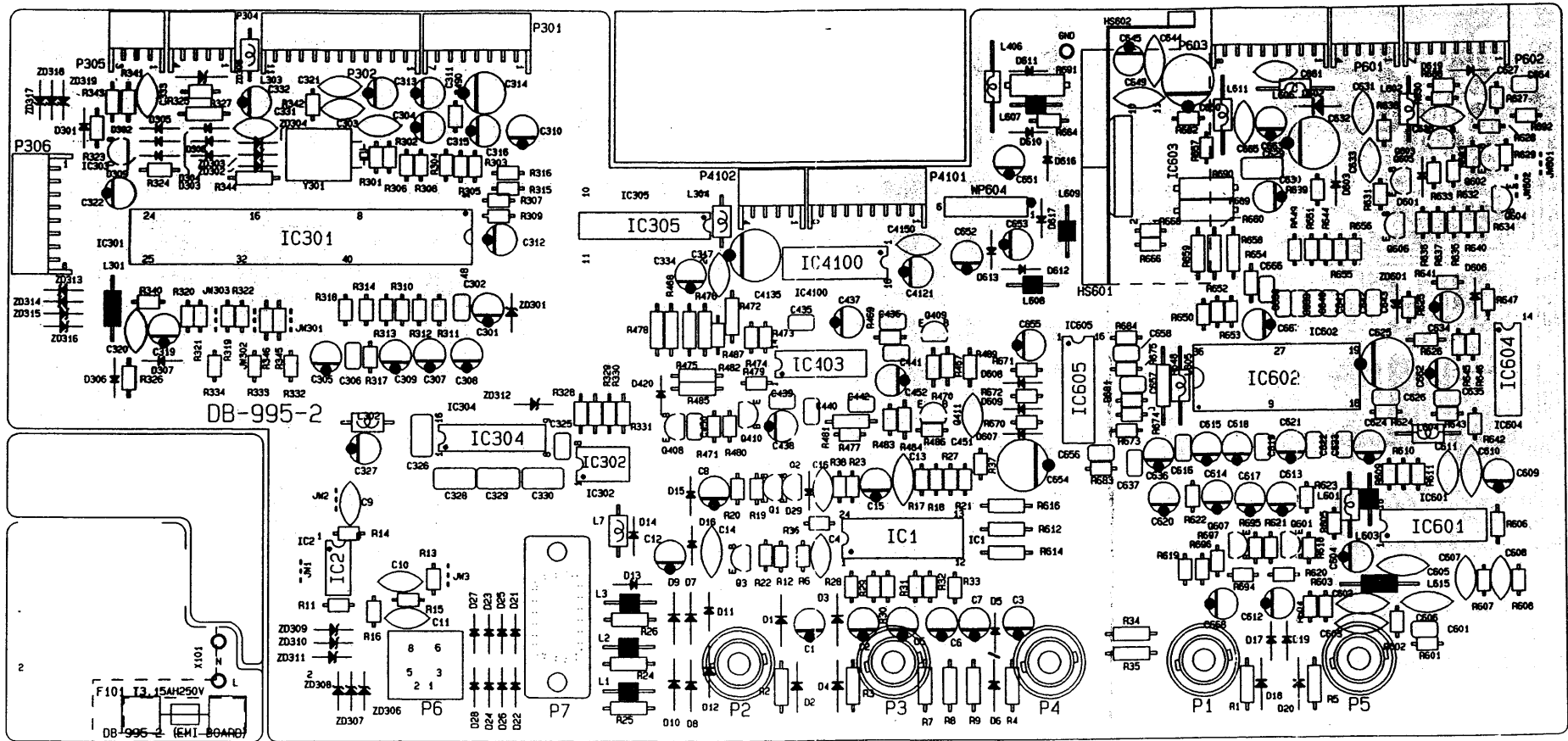
9.PCB Layout Diagram

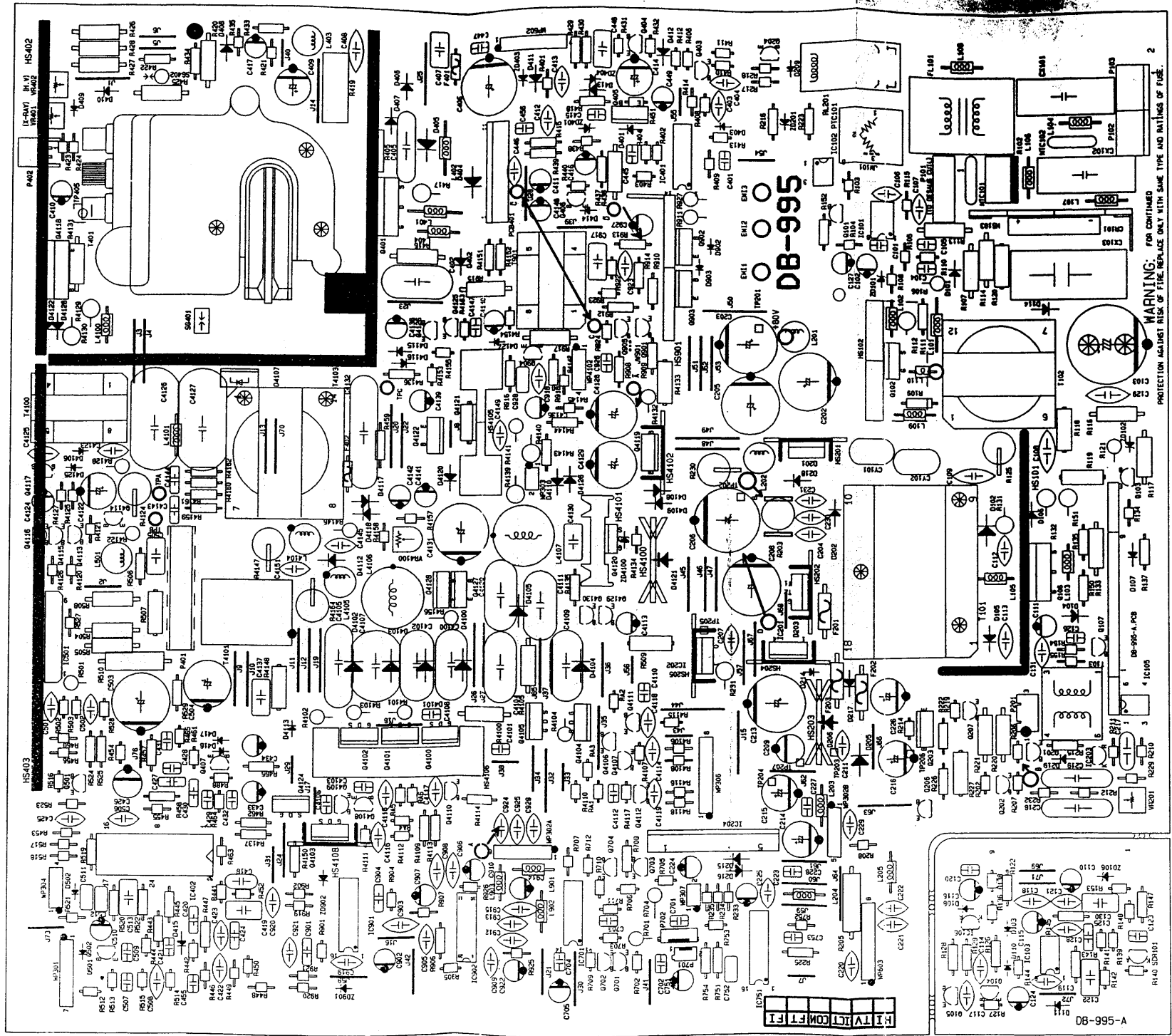
- Main Board
- Video Board











DB-995

WARNING: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AND RATINGS OF FUSE.

FUNCTIONAL BLOCKS	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

DB-995-A

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: FFT9905

REVISION : 10. Feb 99
ISSUED : 20. Jan 99

THIS LIST IS VALID FOR MASS-PRODUCTION

SYMBOL NO.	DESCRIPTION	SPECIFICATION	PART NO.
C103		CAP AL 450V 150U M 105C	1430036503,07,14
C202		CAP AL 100V 100U M 105C	1430821305,07,14
C203		CAP AL 100V 100U M 105C	1430821305,07,14
C205		CAP AL 160V 220U M 105C	1430824505,07,14
C206		CAP AL 250V 100U M 105C	1430830005,07,14
C208		CAP AL 16V 3300U M 105C	1430807205,07,14
C209		CAP AL 25V 220U M 105C	1432309305,07,14
C213		CAP AL 25V 1000U M 105C	1430809205,07,14
C214		CAP AL 25V 470U M 105C	1432309605,07,14
C216		CAP AL 35V 330U M 105C	1432313305,07,14
C402		CAP MPP 400V 0.12U J K115	1763144006
C405		CAP PP 630V 1000P J K110	1803125015
C4129		CAP AL 250V 33U M 105C	1430831505,07
C4131		CAP AL 250V 100U M 105C	1430830005,07,14
C414		CAP AL 250V 22U M 105C	1430831305,07
C437		CAP AL NP 16V 33U 105C	1435308907
C438		CAP AL NP 16V 33U 105C	1435308907
CR101	KBJ406G	DIO BRD 4A 600V	2000141603,12
CX101		CAP X MM 250V 0.47U K	1604314215
CX102		CAP X MM 250V 0.22U M	1604313007,11,13
CX103		CAP AX MM 250V AC 0.68U M	1604316007,11,13
CY101		CAP Y CD 400V AC 2200P M	1100046003,07,12,15
CY102		CAP Y CD 400V AC 2200P M	1100046003,07,12,15
D114	BYM26C	DIO FRD 2.3A 600V	2010391601
D201	BY329X-1200	DIO FRD 8A 1200V 145nS T220F	2011582409
D202	BYM26E	DIO FRD 2.3A 1000V	2010392001
D203	FMB-29L	DIO SBD 8A 90V D220F	2021050914
D205	BYV28-200	DIO FRD 3.5A 200V 30nS SOD-64	2011561209
D206	EGP50G	DIO FRD 5A 400V D201AD	2010481401
D217	UF4006	DIO FRD 1A 800V D41	2010271801
D218	BYM26E	DIO FRD 2.3A 1000V	2010392001
D402	RGP10M	DIO FRD 1A 1KV D41	2010102001,19
D404	BYM36C	DIO FRD 3A 600V SOD-64	2011371609
D405	BYM36C	DIO FRD 3A 600V SOD-64	2011371609

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: FFT9905

REVISION : 10. Feb 99
ISSUED : 20. Jan 99

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SYMBOL NO.	DESCRIPTION	SPECIFICATION	PART NO.
D406	UF4004	DIO FRD 1A 400V D41	2010271401
D407	UF4004	DIO FRD 1A 400V D41	2010271401
D4107	BY459X-1500	DIO FRD 10A 1500V 250nS SOD113	2011502109
D4108	RGP10D	DIO FRD 1A 200V D41	2010101201,04,19
D4121	BYM26C	DIO FRD 2.3A 600V	2010391601
D4128	1N5817	DIO SBD 1A 20V D41	2020280201,02
F101	5HT3.15	FUSE TSC 3.15A 250V UL SEM	0805240601,02,04,06
F201	R251004T1	FUSE F/P 4A 125V UL CSA (AI)	0841110702
F202	R251004T1	FUSE F/P 4A 125V UL CSA (AI)	0841110702
F203	R251004T1	FUSE F/P 4A 125V UL CSA (AI)	0841110702
F401	MQ2	FUSE F/P 2A 125V UL CSA (AI)	0841110301,02
F402	MQ2	FUSE F/P 2A 125V UL CSA (AI)	0841110301,02
FL101	LFZ2805V07	LINE FILTER 15mH MIN	2817203000
IC1	BA7657S	IC INPUT SIGNAL SELECTOR 24PIN	2530064005
IC101	TDA4862	IC POWER-FACTOR CENTRER 8 PIN	2510067009
IC102	H11AV1A	PHOTO 30V 6PIN 10~300% VDE	2310002001,14
IC103	UC3842N	IC PWM 8PIN	2510004001,03
IC105	H11AV1A	PHOTO 30V 6PIN 100~300V% VDE	2310002001,14
IC106	TL431C	IC VOL ADJ T92 3PIN	2500004001,03
IC2	24LC21-P	IC 1K EEPROM 8PIN	2610099037
IC201	PQ05RD11	IC REGU 20V 1.3A T0-220F 4PIN	2500052220
IC202	MC7812CT	IC REGU 12V 1.5A T220 3PIN	2500007001,03,04,05
IC203	TL431C	IC VOL ADJ T92 3PIN	2500004001,03
IC204	STR9005	IC REGU 5V 4A (LO-DROP) 5PIN	2500095009
IC301	D16F54AD	IC MICRO PROCESSOR 16K 48PIN	2510097149
IC302	M24C08B1	IC EEPROM 8K 8PIN	2610185242
IC303	X261AC4402T	IC VOL DETECTOR 4.4V T92 3P	2500088036
IC304	ADM232LJN	IC RS232 DRIVER/RECEIVER 16PIN	2540072043
IC305	HD74HC244P	IC OCTAL BUFFERS W/3 STATE 20P	2600069413
IC401	LM324N	IC OP AMP 14PIN	2520016001
IC402	TDA4858	IC AUTOSYNC DEFL CTRL 32P	2510077047
IC403	LM324N	IC OP AMP 14PIN	2520016001
IC501	TDA8351	IC DC-COUPLE VERT DEFL 9PIN	2530070016
IC601	LSC4508P2	IC GRAPHIC MONITOR OSD 16PIN	2610219211

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: FFT9905

REVISION : 10. Feb 99
ISSUED : 20. Jan 99

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SYMBOL NO.	DESCRIPTION	SPECIFICATION	PART NO.
IC602	M52743ASP	IC 3CH VIDEO PRE-AMP 36PIN	2530063107
IC603	LM2403T	IC MONOTRIPLE CRT DRIVER I1S1	2500084011
IC604	LM324N	IC OP AMP 14PIN	2520016001
IC605	CVA4502N	IC 3CH VIDEO CUT-OFF 36PIN	2530068010
IC701	LM324N	IC OP AMP 14PIN	2520016001
IC751	74LS221	IC MONOSTABLE DUAL 16PIN	2600035000
IC901	74LS221	IC MONOSTABLE DUAL 16PIN	2600035000
IC902	M52723ASP	IC DYNAMIC FOCUS 20DIP	2530054107
J10	08SP008L	NTC R=8 OHM L 3A	0910800211,16
L201	CD-6.0-04	CHOKE CD 14.5uH K	2816300400
L202	CD-6.0-04	CHOKE CD 14.5uH K	2816300400
L4104	D12048	CHOKE CD 330uH K	2816322401
L4105	D12049	CHOKE CD 48uH K	2816322501
L4106	CD-16-06	CHOKE CD 4mH K	2816902500
L4107	CD-16-06	CHOKE CD 4mH K	2816902500
NTC101	08SP008L	NTC R=8 OHM L 3A	0910800211
P201	EL339-1EGW	LED 5mm ORG/GRN 3PIN	2300062706
PCB401	MSPAC006-1A-	IC HB HV STABILE SIP-11	2639900471
PTC101	PTH451C262BF	PTC R=100&14 OHM 25A	0900090008,18
Q101	2SA562TM	TR 35V 0.5A T92	2110022001
Q102	SSS10N60A	FET 600V 9A T220F	2430078115
Q103	BF422(TE2.T)	TR 250V 50mA TO-92 hfe=50min	2100067006
Q106	2SK2828	FET 700V 12A T3P	2430127011
Q201	2SC2655Y TEP2	TR 50V 2A T92	2100024001
Q202	2SA673C	TR 35V 0.5A T92 100~200	2100005001
Q203	2SB857C	TR 50V 4A T220	2130007001
Q401	2SK2828	FET 700V 12A T3P	2430127011
Q403	BF423(TE2.T)	TR 250V 50mA TO-92 hfe=50min	2110037006
Q404	BF422(TE2.T)	TR 250V 50mA TO-92 hfe=50min	2110037006
Q405	2SD669AWC	TR 160V 1.5A hfe=100~200 TO-126	2120137009
Q406	2SA673C	TR 35V 0.5A T92 100~200	2100005001
Q4100	FS12KM-5	FET 250V 12A TO-220FN	2430121033
Q4101	FS20KM-5	FET 250V 20A TO-220FN	2430201033
Q4102	FS12KM-5	FET 250V 12A TO-220FN	2430121033
Q4103	FS12KM-5	FET 250V 12A TO-220FN	2430121033

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: FFT9905

REVISION : 10. Feb 99
ISSUED : 20. Jan 99

THIS LIST IS VALID FOR MASS-PRODUCTION

SYMBOL NO.	DESCRIPTION	SPECIFICATION	PART NO.
Q4104	FS12KM-5	FET 250V 12A TO-220FN	2430121033
Q4105	FS12KM-5	FET 250V 12A TO-220FN	2430121033
Q4106	2SA1015-Y	TR 50V .15A T92 TP	2110041106
Q4116	2SA1015-Y	TR 50V .15A T92 TP	2110041106
Q4117	2SK941	FET 100V 0.6A T92	2400013006
Q4118	BU2532AL	TR 800V 16A T220	2120142013
Q4119	ET453MR	TR 250V 4A T220	2120143017
Q4120	2SJ306	FET -250V -3A TO-220ML	2420014032
Q4121	ET453MR	TR 250V 4A T220	2420143017
Q4122	2SC3620	TR 300V .1A T-126 (IS)	2120144006
Q4124	2SK2201	FET 100V 3A SC-64	2430200006
Q4127	2SD669AWC	TR 160V 1.5A hfe=100~200 TO-126	2120137009
Q4128	2SB649AC	TR-160V -1.5A 100~200 TO-126	2130022009
Q601	BFQ131	TR 18V 0.15A SOT54	2100093013
Q607	BFQ131	TR 18V 0.15A SOT54	2100093013
Q901	2SC3415	TR 300V 100mA hfe=32-180 T92	2100054018
Q902	2SD669AWC	TR 160V 1.5A hfe=100~200 TO-126	2120137009
Q903	2SB649AC	TR -160V -1.5A 100~200 TO-126	2130022009
Q904	2SC4002E	TR 400V .2A hfe=100-200 T92	2100106010
R118		RES MF FUSING 1W 0.22J	0190300406
R120		RES MF FUSING 1W 0.22J	0190300406
R231		RES MF 2W 10J	0143100002,05,10
R4139		RES MF FUSING 2W 0.82 J VERT	0190400406
R417		RES MF 2W 0.22 J VERT	0143229205
RL201	OMIT-SS-212L	RELAY 240VAC/12VDC 5A DPST	0720060501
SCR101	2N5064	SCR 200V 0.8A T92	2200010001
T101	SMT -42V -789A	X'FRM SMT 400uH +/-5%	2801001600
T102	CE-28RV-05	CHOKE CE L=470uH	2806530200
T103	LF-U10.5-02	LF L3-7mH	2805251900
T401	MSU1FVT-207	FBT 19"	2850003401
T4100	DT-E25-32	X'FRM DT 5mH L	2802202500
T4101	D12064	LINEAITY COIL 7.8uH L 4P	2820401201
T4103	SMT-35RV-800	X'FRM SMT 5mH L	2801413800
T901	DT-E25-31	X'FRM DT 1mH L	2802202400
X101	03ME4	FILTER 115/250V AC 3A	2900301001

RECOMMENDED SERVICE PARTS AND PRICE LIST

MODEL NO.: FFT9905

REVISION : 10. Feb 99
ISSUED : 20. Jan 99

THIS LIST IS VALID FOR MASS-PRODUCTION

SYMBOL NO.	DESCRIPTION	SPECIFICATION	PART NO.
Y301	HC-49/U	CRYSTAL 18.432MHZ 30PPM 30PF	0730520012
ZD102	HZ36-3TA	DIO ZEN .5W 36.4-38V D35	2030120616
ZD301	HZ5C1TA	DIO ZEN .5W 4.9-5.1V D35	2030120816
ZD302	HZ7B3TA	DIO ZEN .5W 7-7.35V D35	2030121816
ZD306	HZ12C1TA	DIO ZEN .5W 13.45V 1.85% D35	2030124616
ZD403	BZY97C18	DIO ZEN 1.5W 17.95V 6.4% D15 (AI)	2030351208
	19" ZENTAN CRT		074190020
	FRONT BEZEL ASSY		3360017300
	REAR COVER ASSY		3360020900
	SWIVEL BASE ASSY		3360043000
	CHASSIS		5610007300
	SIGNAL CABLE		3072016800
	CARTON BOX		3510310300
	CUSHION		3240497400
	POWER CORD	[JAPAN]	3072039100
	POWER CORD	[UK]	3072038000
	POWER CORD	[EUROPE]	3072037900
	POWER CORD	[USA]	3072039200
	MANUAL	[JAPANESE]	5011023200
	MANUAL	[UK/EUROPE 4-LANGUAGE]	5011023100
	MANUAL	[ENGLISH]	5011022800