SERVICE MANUAL

HIGH－RESOLUTION DISPLAY MONITOR

MODEL　XC－3715C

MITSUBISHI ELECTRIC CORPORATION

SEP. 1989

3. ELECTRIC SPECIFICATION

3.1 CRT Description

1) Size : 37inch Diagonal
2) Deflection : 110 degree Diagonal
3) Electron gun : In-line type
4) Focusing method : Electro static
5) Focus lens : High focus voltage bi potential
6) Convergence method : Magnetic
7) Mask type : Black matrix
8) Trio Spacing : 0.85mm (center), 1.1mm (corner)
9) Array : Stripe
10) Phosphor type : B22

color	X	Y
Red	0.64	0.34
Green	0.30	0.60
Blue	0.15	0.060

(Typ. Value)

11) Phosphor persistence : Medium short
12) Light transmission : 47%
13) Face plate : Polished
14) Implosion Protection : Banded with mounting lugs

3.2 Power Supply

1) Voltage and Frequency : 100~120V / 220~240V ±10%, switchable 50 / 60 Hz
2) Power Consumption : 260 W
3) AC leakage current : less than 0.75mA

3.3 Video Signal Input

Input	Type of Signal	Sync. Signal	Input Impedance	Connector
VIDEO – 1 VIDEO – 2	Composite Video Signal NTSC (3.58MHz) M – NTSC (4.43MHz) PAL SECAM (Auto – detecting)		75Ω / High switchable	BNC RCA pin type
	Y / C Seperate signal (S – VHS) (VIDEO – 1 only)		75Ω	DIN – 4P
ANALOG – 1	R, G, B 0~0.7Vp-p	H, V separate 0.3~4Vp-p TTL (free – polarity)	75Ω / High switchable	BNC
		H, V composite 0.3~4Vp-p TTL (free – polarity)		
		Sync. on green 0.3V		
ANALOG – 2	R, G, B 0~0.7Vp-p	H, V separate 0.3~4Vp-p TTL (free – polarity)	Video Signal 75Ω Sync. Signal 75Ω / High	D – sub 15P
		H, V composite 0.3~4Vp-p TTL (free – polarity)		
TTL	R, G, B R, G, B, I R, R', G, G', B, B' Polality – Posi	H, V separate TTL (free – polarity)	Video Signal 330Ω to GND 470Ω to 5V Sync. Signal 330Ω to GND 470Ω to 5V	D – sub 9P
		H, V composite TTL (free – polarity)		

Note – 1) On VIDEO – 1 and VIDEO – 2, only one connector of BNC, RCA pin type, and DIN – 4P should be used.

Note – 2) TTL level

Low : 0~0.5V

High : 2.5~5.0V

3.4 Display Color

1) R, G, B analogue input : infinite
2) R, G, B TTL input
   (1) R, G, B input : 8 colors
   (2) R, G, B, I input : 16 colors
   (3) R, R', G, G', B, B' input : 64 colors

3.5 Deflection

1) Horizontal Deflection
   Scanning Frequency : 15~36 KHz (±0.5 KHz)
   Retrace Period : less than 5.3 μsec.
2) Vertical Defection
   Scanning Frequency : 40~120 Hz (±1 Hz)
   Retrace Period : less than 0.65 msec.

3.6 High Voltage : 32^{+1}_{-3} KV

3.7 Degaussing : Auto-degaussing by power on and manual degaussing.

3.8 Audio

1) Amplifire	Input	: 200mV RMS 47KΩ
	Line output	: 200mV RMS
	Control output	: 0~200mV RMS
	Output	: 2W/2W at 8Ω
2) Speakers	Size	: 7cm×4cm
	Frequency	: 165~10KHz
	Output	: 1.6 W

(Internal speakers/external speakers changeable.)

INDEX

X－RADIATION WARNING

The surface of picture tube may generate X-Radiation. Precaution during servicing, and if possible use of a lead apron or metal for shielding is recommended. To avoid possible exposure to X-Radiation and electrical shock hazard, the high voltage compartment and the picture tube shield must be kept in place whenever the chassis is in operation. When replacing picture tube use only designated replacement part since it is a critical component with regard to X-Radiation as noted above. The high-voltage specification is described on page 4.

CRITICAL COMPONENT REPLACEMENT WARNING

The components marked "⚠" are critical components for X-Radiation. When replacing these parts, use exactly the same one. If broken the critical component, please contact with qualified personnel of Mitsubishi Electric Corp. or the company which indicated on name plate.

注 意

本品は外国為替及び外国貿易管理法に定める戦略物資(又は役務) に該当するため、輸出する場合、同法に基づく輸出(又は役務取引) 許可が必要です。

CAUTION

These products or technologies are subject to Japanese and / or COCOM strategic restrictions, and diversion contrary thereto is prohibited.

TECHNICAL
SPECIFICATION
FOR
37" COLOR DISPLAY MONITOR
MODEL NO. XC-3715C

MITSUBISHI ELECTRIC CORPORATION
NAGASAKI WORKS

DOCUMENT NO. DSP-B0081

INDEX

7. ENVIRONMENTAL CONDITIONS
   - 7.1 Temperature
   - 7.2 Relative Humidity
   - 7.3 Altitude

8. RASTER DISTORTION (Attachment)

9. OUTLINE (Attachment)

1. SCOPE

This specification contains specifications that establish the technical informations for high performance color display monitor which is operated with TV signals of NTSC, PAL, SECAM and with a any type of personal computer, such as IBM EGA, VGA, Mac II, and so on.
The color monitor is high resolution, multi-line rate (200~480 line) with auto-tracking (15.0~36KHz).

2. REGURATION

2.1	Safety	: UL478, CSA C22.2 No.154, IEC380
2.2	Electromagnetic	: FCC-Part 15 Subject J Class-A VDE0871 Class-B VCCI Class-1
2.3	X-ray radiation	: DHHS, HWS, PTB

4. SCREEN CHARACTERISTICS

4.1 Display Resolution : 640 dots x 200~480 lines

4.2 Display Size : Display size is pre-set as follows.
- NTSC/PAL/SECAM signal over scanning (5~10 %)
- EGA Mode (21.85 KHz) 645 ± 20mm x 485 ± 15mm
- VGA Mode (31.5 KHz) 645 ± 20mm x 485 ± 15mm

(Above figures are adjustable by user)

4.3 Misconvergence (As display size is 645mm x 485mm)

Center	:	1.0mm max.
Other	:	2.0mm max.

4.4 Geometric Distortion (As display size is 645mm x 485mm)

1) Trapezoid Distortion	:	Horizontal	1.5% max.
		Vertical	1.5% max.
2) Pincushion Distortion	:	Top & Bottom	2.5% max.
		Right & Left	2.5% max.
3) Barrel Distortion	:	Top & Bottom	2.5% max.
		Right & Left	2.5% max.
4) Parallelogram Distortion	:	±1% max.	
5) Rotation	:	±1% max.	
6) Non Linearity	:	Horizontal	10% max.
		Vertical	10% max.

5. CONTROL FUNCTION

5.1 Front Panel Control

1) Main Power Switch : Main power circuit on / off.

2) Power Switch : Stand – by power on / off.

3) Source Select Switch : Video source selection.
(VIDEO – 1 / 2, ANALOG – 1 / 2, TTL)

4) Brightness Switch : Brightness control with Up and Down switches.

5) Contrast Switch : Contrast control with Up and Down switches.

6) Volume Switch : Audio volume control with Up and Down switches.

7) Balance Switch : Audio balance control of left and right sound with Up and Down switches.

8) Set Switch : For adjusting following functions
- Cancel Coil adjusting
- Display Mode preset
- Color select for TTL input
- Color adjusting for Video input
- Sharpness adjusting for Video input
- Tint adjusting for Video input
- H – Width adjusting
- H – Phase adjusting
- V – Height adjusting
- V – Position adjusting

9) Call switch : Request for a indication on screen of video source and mode selected.

10) Display Off switch : Cancellation of the above indication.

11) Degauss switch : Manual degauss

5.2 Display Mode

The screen data which can be adjusted for each mode and each input are as following table.

INPUT / MODE	VIDEO-1 / VIDEO-2		ANALOG-1		ANALOG-2		TTL	
	NTSC M-NTSC	PAL SECAM	1	2	1	2	1	2
H-WIDTH	○	○	○	○	○	△×7	○	△×2
H-PHASE	○	○	○	○	○	△×7	○	△×2
V-HEIGHT	○	○	○	○	○	△×7	○	△×2
V-POSITION	○	○	○	○	○	△×7	○	△×2
BRIGHTNESS	○	○	○		○		○	
CONTRAST	○	○	○		○		○	
COLOR	○	○	–		–		–	
TINT	○	–	–		–		–	
SHARPNESS	○	○	–		–		–	
COLOR SELECT	–	–	–		–		○	

1) User adjustable functions (marked ○)
User can adjust screen controls marked ○ by the switches of the front panel or a wireless remote control.

2) Marker pre-set functions (marked △)
Maker pre-set screen controls marked △ which are for compatibility with typical PC's (CGA, EGA, PGA, VGA, MAC-II).

3) Auto-detecting function on mode-2 of ANALOG-2 and TTL input, the typical PC's (CGA, EGA, PGA, VGA, MAC-II) are detected and the screen controls pre-set are applied automatically.

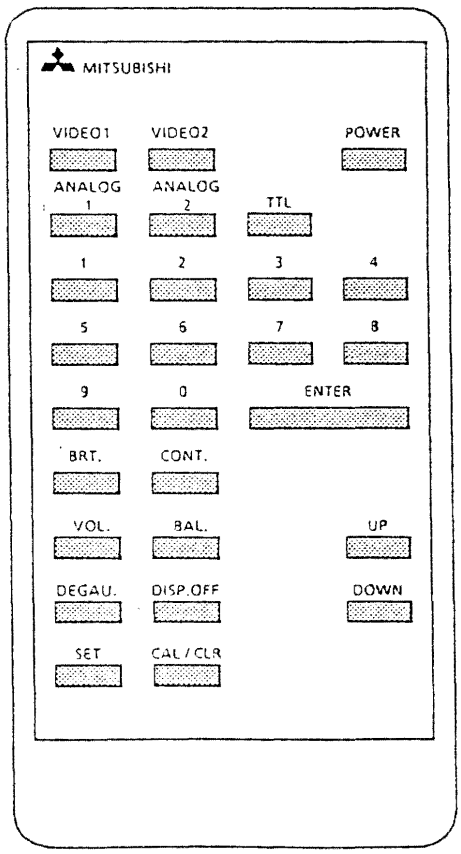
5.3 Wireless Remotecontrol (Model No. PCB-02)

1) Remote Control Method : Infrared

2) Power Source : DC 2.2V~3.3V
Battery UM-4 (1.5V) x 2

3) Controlable Distance : 6m min. (0°)
3m min. (±30°)

4) Control Switches
- ◦ Power Switch : Stand-by power on/off
- ◦ Video-1 Switch : Video source selection (Video-1 input)
- ◦ TTL Switch : Do. (TTL input)
- ◦ Ten Keys : Setting address No. on monitors and calling a monitor during multi-monitors controled by a wireless remote-controller.
- ◦ Other Switches : Same as 5.1 4)~11).



5.4 External Control

The following functions are controlled with TTL level signal via [EXT CONT] connector (D – Sub 9P) on back panel during the wireless remote – control disable.

- Video source selection — VIDEO – 1, VIDEO – 2, ANALOG – 1, ANALOG – 2, TTL
- Display mode selection — MODE – 1 / 2
- Wireless remote – control — Able / Disable
- Power (Stand – by power) — ON / OFF
- Manual degaussing

6. MECHANICAL SPECIFICATION

6.1 Enclosure

1) Enclosure Material

Bezel and Connetor – Panel	: P. S
Others	: Steel Plate

2) Color

Bezel	: 5Y5 / 0.5 and 5Y2 / 0.5
Others	: 5Y7 / 0.5
Connector – Panel	: 5Y8.5 / 0.5

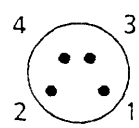
3) Dimensions

Width	: 865 mm
Height	: 742 mm
Depth	: 585 mm max.

4) Weight : 99 Kg approx.

6.2 Input / Output Connectors

1) Video – 1 input

Connector	Pin No.	Signal	
BNC	—	NTSC (3.58 MHz) M – NTSC (4.43 MHz) PAL SECAM	1.0 Vp-p, 75Ω Sync – nega.
RCA Pin			
DIN – 4P for S – VHS 	1	GND – (Y)	
	2	GND – (C)	
	3	Y	1.0 Vp-p, 75Ω, Sync – nega.
	4	C	Burst level 0.266 Vp-p, 75Ω

2) Video – 2 input

Connector	Pin No.	Signal	
BNC	—	NTSC (3.58 MHz) M – NTSC (4.43 MHz) PAL SECAM	1.0 Vp-p, 75Ω Sync – nega.
RCA Pin	—		

3) Analog – 1 input

Connector	Pin No.	Signal	
BNC	—	Red	0.7Vp-p, 75Ω / High
BNC	—	Green	0.7Vp-p, 75Ω / High
BNC	—	Blue	0.7Vp-p, 75Ω / High
BNC	—	H / COMP – Sync.	0.3~4Vp-p, 75Ω / High
BNC	—	V – Sync.	0.3~4Vp-p, 75Ω / High

4) Analog – 2 input

Connector	Pin No.	Signal	
D – Sub 15P	1	Red	0.7Vp-p, 75Ω
	2	Green	〃
	3	Blue	〃
	4	H / COMP – Sync.	0.3~4Vp-p, 75Ω
	5	V – Sync.	〃
	6	Half – Tone (Ym)	3V: – 3dB, 5V: – 6dB, 75Ω
	7	Video Output ※	1Vp-p, 75Ω
	8	PGA (400 / 480) Cont.	TTL
	9	GND – Red	
	10	GND – Green	
	11	GND – Blue	
	12	H / COMP – Sync.	TTL
	13	V – Sync.	〃
	14	Super Impose Control (Ys)	0~1.0V : Video – 1, 1.0~5V : Analog – 2 75Ω
	15	GND – Video Out	

5) TTL input

Connector	Pin No.	Signal	
D-Sub 9P	1	GND	
	2	Secondary Red	TTL
	3	Primary Red	TTL
	4	Primary Green	TTL
	5	Primary Blue	TTL
	6	Secondary Green / Intensity	TTL
	7	Secondary Blue	TTL
	8	H-Sync.	TTL-Posi / Nega.
	9	V-Sync.	TTL-Posi / Nega.

6) Audio input

Connector	Pin No.	Signal	
RCA Pin	—	Video-1 (R, L)	0.4Vrms, 47KΩ
〃	—	Video-2 (R, L)	〃
〃	—	Analog-1 (R, L)	〃
〃	—	Analog-2 (R, L)	〃
〃	—	TTL (R, L)	〃

7) Audio Output

Connector	Pin No.	Signal	
RCA Pin	—	Line out (R, L)	0.4Vrms, 47KΩ
〃	—	Controlled out (R, L)	〃

8) External Control

Connector	Pin No.	Signal	
D – Sub 9P	1	Video – 1 Select	TTL Low
	2	Video – 2 Select	TTL Low
	3	Analog – 1 Select	TTL Low
	4	Analog – 2 Select	TTL Low
	5	TTL Select	TTL Low
	6	Mode (Mode 1/2)	TTL High – Mode 1 Low – Mode 2
	7	Control Method (Remote – Cont/) External – Cont.	TTL High – Remo-Cont Mode Low – External Cont Mode
	8	Power on/off	TTL Low – Power on
	9	GND	
		Manual Degauss	Pin 8 Low and Pin 7 High

7. ENVIRONMENTAL CONDITIONS

7.1 Temperature

1) Operating : 5 °C ~ 40° C

2) Storage : – 10 °C ~ 55 °C

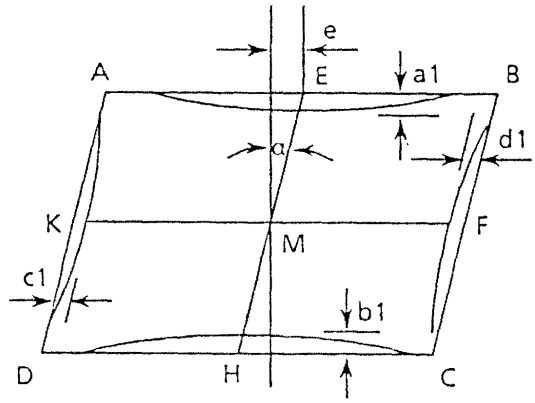
7.2 Relative Humidity

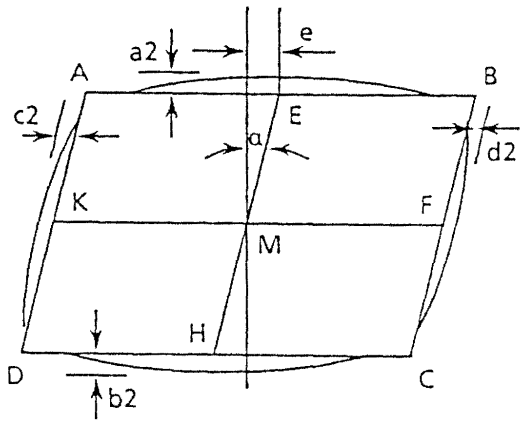
Operating : 10% ~ 95% (Not condensed)

7.3 Altitude : Sea level to 2133.6 m (at 25 °C)

MITSUBISHI ELECTRIC CORPORATION

* GEOMETRIC DISTORTION





· TRAPEZOID DISTORTION

HORIZONTAL : $\frac{AD-BC}{AD+BC} \times 100$ (%)

VERTICAL : $\frac{AB-DC}{AB+DC} \times 100$ (%)

· PINCUSHION DISTORTION

TOP : $4\frac{a1}{AD+BC} \times 100$ (%)

BOTTOM : $4\frac{b1}{AD+BC} \times 100$ (%)

LEFT : $4\frac{c1}{AB+DC} \times 100$ (%)

RIGHT : $4\frac{d1}{AB+DC} \times 100$ (%)

TITLE	8. RASTER DISTORTION	

MITSUBISHI ELECTRIC CORPORATION

· BARREL DISTORTION

TOP : $4\frac{a2}{AD+BC} \times 100$ (%)

BOTTOM : $4\frac{b2}{AD+BC} \times 100$ (%)

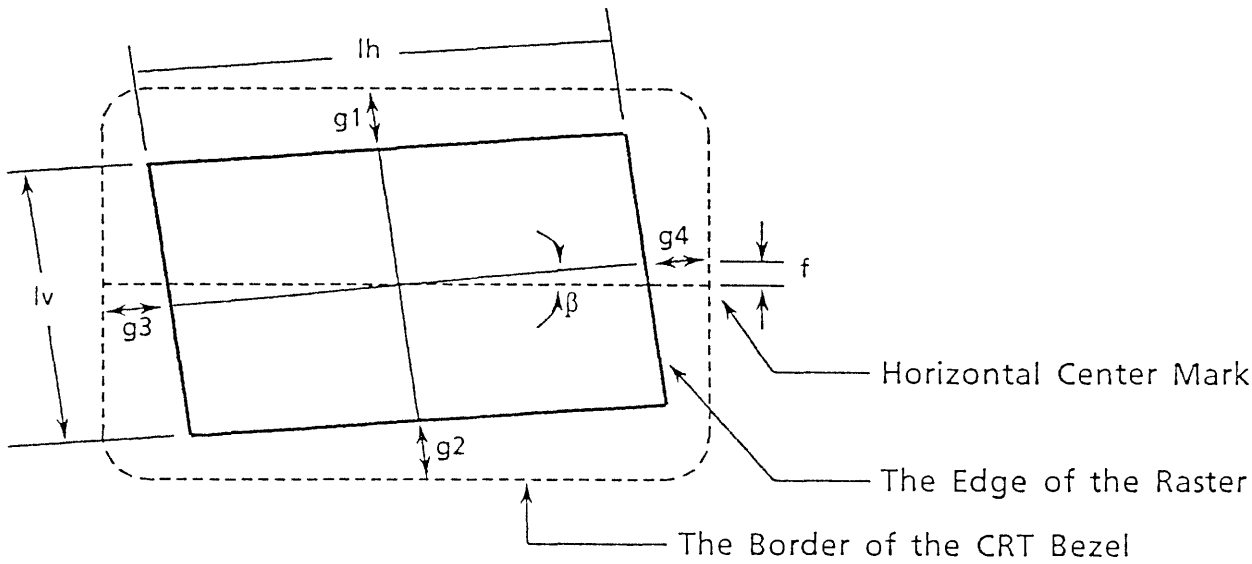
LEFT : $4\frac{c2}{AB+DC} \times 100$ (%)

RIGHT : $4\frac{d2}{AB+DC} \times 100$ (%)

· PARALLELOGRAM DISTORTION : $\alpha \leqq 1°$

TITLE 8. RASTER DISTORTION

MITSUBISHI ELECTRIC CORPORATION



· CENTERING

HORIZONTAL : $|g3 - g4|$
To be adjustable to center by Horiz. Centering VR

VERTICAL : $|g1 - g2|$

· ROTATION : $\beta \leqq \pm 1°$

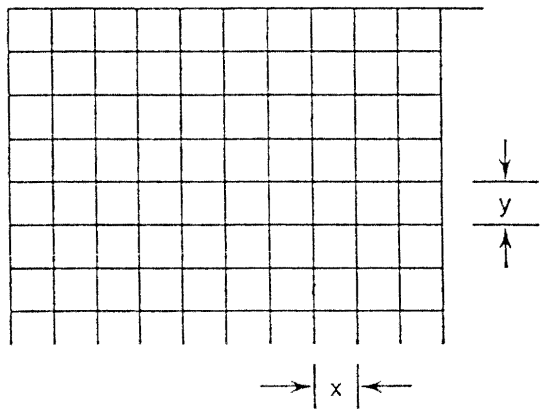
Including the condition of rotating the monitor through 360 degrees on a non – metalic surface.

TITLE	8. RASTER DISTORTION	

NONLINEARITY

Scanning nonlinearity is defined in terms of the pattern of horizontal (more than 16 lines) and vertical (more than 12 lines) lines produced by the cross-hatch pattern generator.

ex)



Horizontal nonlinearity

$$\frac{(Xmax - Xmin) / 2}{\overline{X}} \times 100 \quad (\%)$$

Vertical nonlinearity

$$\frac{(Ymax - Ymin) / 2}{\overline{Y}} \times 100 \quad (\%)$$

TITLE	8. RASTER DISTORTION	