14" COLOR DISPLAY UNIT CDU1448MS/LO01 (DSM 60-400)

This display unit is manufactured by **LITE-ON** and is identified as **DSM 60-400** on the front and rear of the case, and in the Progetto di Gestione. This unit is also identified as **CDU1448MS/LO01** on the homologation plate on the rear of the case.

CHARACTERISTICS

14" VGA-compatible, multiscan color monitor with analog input signals, the power management and DCC-1/2B features.

- Diagonal screen size: 14"
  Horizontal size: 250 ± 3 mm
  Vertical size: 188 ± 3 mm
- Input voltage: 94-264 V (Universal power supply)
  Line frequency: 50-60 Hz ± 5%
  Degaussing: Automatic at power on
  Power dissipation: 100 W
  Current consumption: 2 A
- Video input signals: Analog R.G.B. (Red, Green, Blue), separate H.s. and V.s. (horizontal and vertical synchronisms)
  Video input: 75 Ω to ground
  Level: 0-700 mV
  Polarity: Positive
- External controls: Power switch
  Power on LED
  Brightness
  Contrast
  Horizontal amplitude
  Vertical amplitude
  Horizontal shift
  Vertical shift
  Pincushion distortion
  Keystone distortion
- Input Timing Limits

Parameter	Horizontal	Vertical
Frequency	30 - 50 KHz	50 - 100 Hz
Blanking	≥ 3.5 µs	≥ 0.5 ms
Back Porch	≥ 1 µs	≥ 0.5 ms
Front Porch	≤ Back Porch	
Sync Pulse	≥ 1 µs	≥ 0.05 ms

- Preset Timings

VIDEO MODE	VGA					ERGO VGA		SVGA				XGA	VGA+
HORIZ. (DOTS)	640	720	640	640	720	640		800				1024	1024
FREQ. (KHz)	31.5	31.5	31.5	37.9	37.9	37.5	37.9	35.2	37.9	48.1	46.9	35.5	48.4
VERT. (LINES)	350	400	480	350	400	480		600				768	768
FREQ. (Hz)	70.1	70.1	59.9	85.1	85	75	72.8	56.2	60.3	72.2	75	87	60
INTERL.	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO
V/H POLARITY	-/+	+/-	-/-	-/+	+/-	-/-	-/-	+/+	+/+	+/+	+/+	+/+	-/-
PIXEL R. (MHz)	25.2	28.3	25.2	31.5	35.5	31.5	31.5	36	40	50	49.5	44.9	65

NOTE: The monitor can automatically store 12 video modes. The new video modes must differ from the existing ones by at least a 1 KHz horizontal scan frequency or by a 5 Hz vertical scan frequency, or the sync signal must have different polarities.

- Power Management

VIDEO MODE	HORIZ. SYNC	VERTICAL SYNC	VIDEO	POWER SAVING	RESTORE TIME	LED STATUS
ON	PULSE	PULSE	ACTIVE	< 75 W		GREEN
STAND-BY	NO PULSE	PULSE	BLANKED	< 15 W	< 5 SEC	ORANGE
SUSPEND	PULSE	NO PULSE	BLANKED	< 15 W	< 5 SEC	ORANGE
OFF	NO PULSE	NO PULSE	BLANKED	< 8 W	< 15 SEC	DARK ORANGE

- DDC-1/2B VGA Connector

1 Red video input
2 Green video input
3 Blue video input
4 Identify output
5 Logic ground
6 Red video ground
7 Green video ground
8 Blue video ground
9 Not connected
10 Logic ground
11 Identify output
12 SDA (Serial Data)
13 Horizontal sync
14 Vertical sync
15 SCL (Serial Clock)

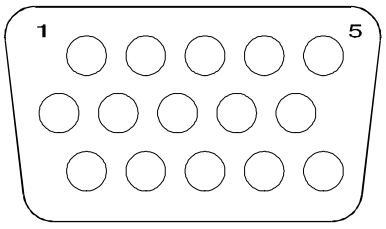


Fig. 2-1 DDC-1/2B VGA Connector

REMOVING THE MONITOR CASE

1. Unplug the power cord from connector (A) on the rear of the monitor.

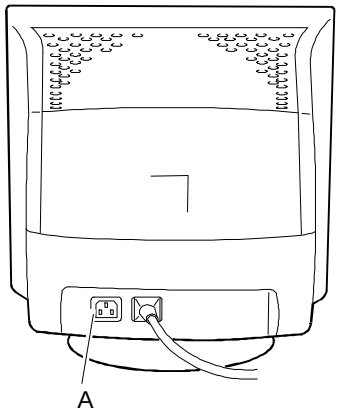


Fig. 2-2 Rear View of the Monitor Case

2. Rest the monitor on a workbench with its screen facing downwards. Press the securing clip and release the base from its slots by pushing it upwards.
3. Using a Phillips screwdriver, remove the two screws (V) indicated in figure 2-4.
4. Always with the monitor screen resting on the workbench, gently lift the cover so that it opens wide from the bottom. Hold the monitor's front frame with one hand and turn the rear of the case with the other. This will release the two securing holes (A) on the upper part of the case so that it can then be removed.

NOTE: During this operation be careful not to damage the monitor case securing holes.

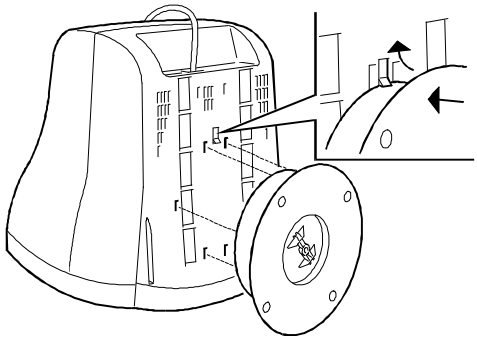


Fig. 2-3 Removing the Base

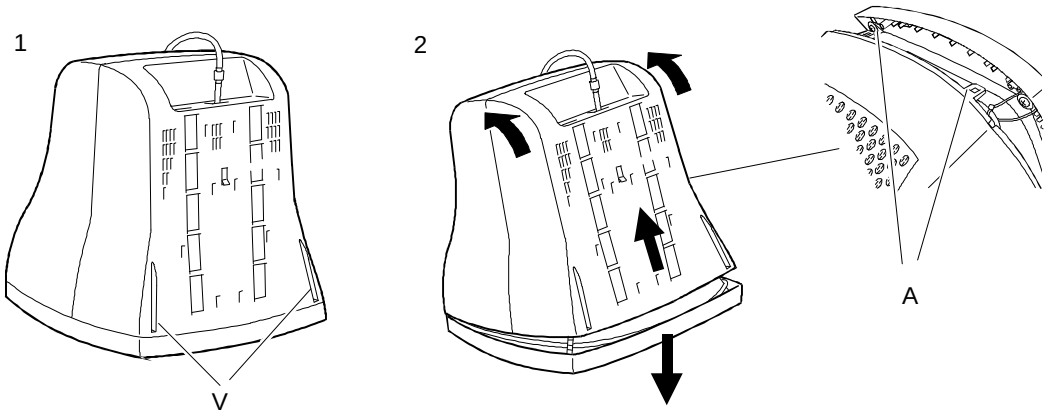


Fig. 2-4 Removing the Monitor Case

DISCHARGING THE ANODE

5. After having removed the case and before performing any other operation with the boards and cables of the display unit, discharge the high voltage. Use a screwdriver connected to the display unit's frame ground by means of a cable to discharge the CRT anode.

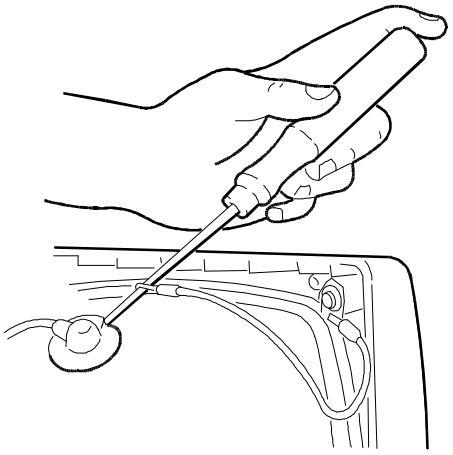


Fig. 2-5 Discharging the CRT Anode

REPLACING THE FUSE

6. If the display unit does not work due to a blown fuse, the fuse needs to be replaced. The figure on the side shows the location of the fuse (F) on the main board.

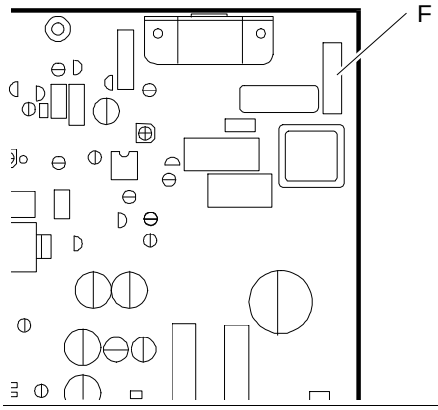


Fig. 2-6 Locating the Fuse

REMOVING THE VIDEO AMPLIFIER BOARD

7. Remove all connections from the metal cover of the video amplifier board (A).
8. Remove the layer of adhesive silicone from the connection between the CRT connector and the video amplifier board connector. This layer is used to protect the display unit during transport. Turn over the video amplifier board.

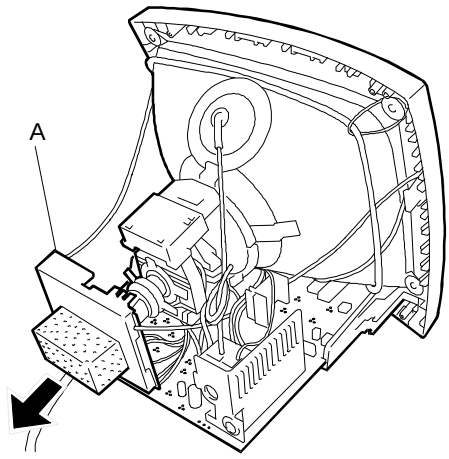


Fig. 2-7 Removing the Video Amplifier Board

9. Free the board by disconnecting the cables from the following connectors: P501, P502, P503, P504 and G1.

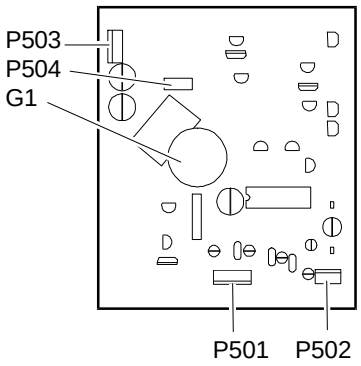


Fig. 2-8 Locating the Connectors on the Video Amplifier Board

REMOVING THE MAIN BOARD

10. Be sure to have discharged the EHT high voltage before removing the anode.
11. Remove the anode by lifting the rubber cap, squeezing the two metal contacts with a pair of pliers and removing the contacts through the hole in the CRT.
12. To remove the main board firstly disconnect the cables from the following connectors: P902, P802, P303, P302A, P301, P302 and P803. Then slightly widen the two securing guides (G) on the main board (B) and remove this board by sliding it outwards. The location of these connectors is shown in the following figure.

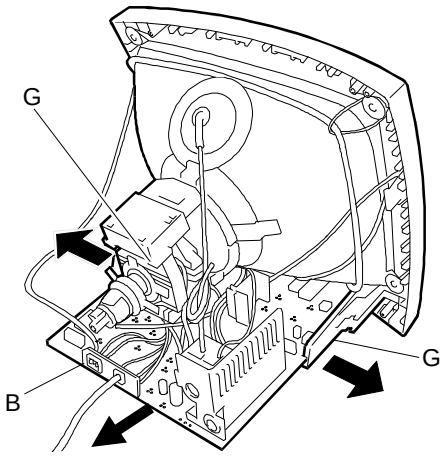


Fig. 2-9 Removing the Main Board

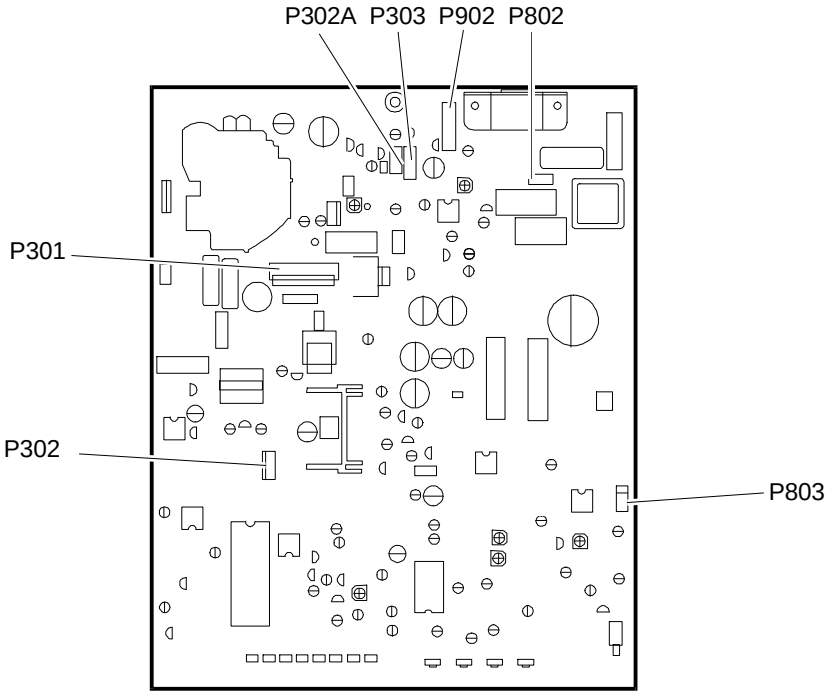


Fig. 2-10 Locating the Connectors on the Main Board

REMOVING THE CRT

NOTE: The CRT and yoke form a single unit on which the deflection coils and convergence magnets are fitted. The magnets are set by the manufacturer and must not be moved so as to avoid convergence errors that are difficult to correct. A spare tube comes with the yoke already fitted.

13. Remove the four screws (V) that secure the CRT to the front cover of the display unit.
14. Remove ground winding (M) by removing the spring that holds this coil and the degauss winding (D) in place. Both coils must be fitted back onto the new CRT.

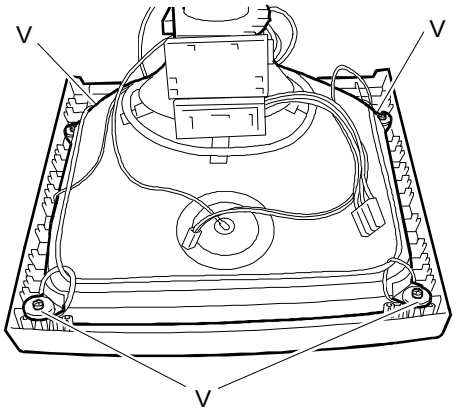


Fig. 2-11 Removing the CRT

REASSEMBLY PROCEDURE

15. To reassemble the display unit follow its disassembly procedure in reverse order.

DISPLAY ADJUSTMENTS

Two kinds of display adjustments are available for this display unit:

- External controls and adjustments that can be performed by the user.
- Internal adjustments to be performed by the field engineering service.

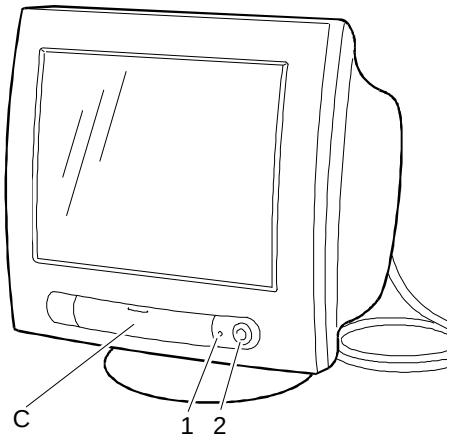


Fig. 2-12 Display Unit

EXTERNAL CONTROLS AND ADJUSTMENTS

In order to use the external controls and make adjustments, the user has to use the buttons on the display unit's external control panel (C) shown in the figure on the side. Press on the central part of the panel to open it. External controls can be used by the user or field engineer to adjust:

- Contrast
- Brightness
- Horizontal size
- Vertical size
- Horizontal shift
- Vertical shift
- Pincushion distortion
- Keystone distortion.

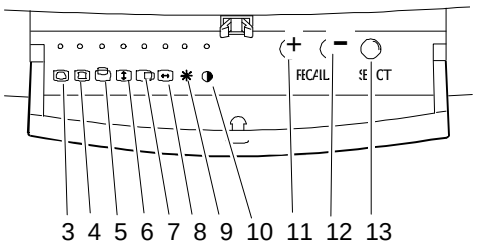


Fig. 2-13 External Controls and Adjustments

Pressing the **SELECT** button selects the different adjustment parameters with the lighting of the corresponding LED. Selection sequence ranges from Contrast to Keystone distortion.

Pressing the **+** and **-** buttons adjusts the selected parameter. This adjustment is stored after three seconds of inactivity.

Pressing the **+** and **-** buttons simultaneously activates the **RECALL** function which is used to recall the adjustments made by the manufacturer for the 13 preset timings.

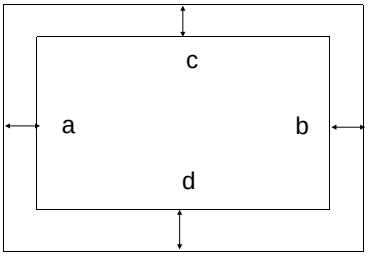
EXTERNAL CONTROLS			
1	POWER SWITCH	8	HORIZONTAL SIZE LED
2	POWER LED	9	BRIGHTNESS LED
3	KEYSTONE DISTORTION LED	10	CONTRAST LED
4	PINCUSHION DISTORTION LED	11	ADJUST +
5	VERTICAL SHIFT LED	12	ADJUST -
6	VERTICAL SIZE LED	13	SELECT BUTTON
7	HORIZONTAL SHIFT LED		

Listed below are the adjustments that can be made by the user with the following image characteristics:

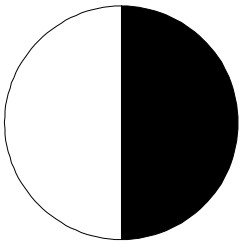
Horizontal size: 250 ± 3 mm

Vertical size: 188 ± 3 mm

|a-b| ≤ 4 mm
|c-d| ≤ 4 mm

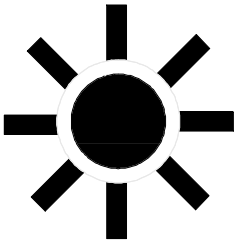


CONTRAST



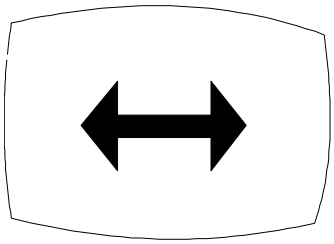
- Press the SELECT button to select the CONTRAST LED
- Press the ADJUST + button to increase image contrast.
- Press the ADJUST - button to decrease image contrast.

BRIGHTNESS



- Press the SELECT button to select the BRIGHTNESS LED.
- Press the ADJUST + button to increase image brightness.
- Press the ADJUST - button to decrease image brightness.

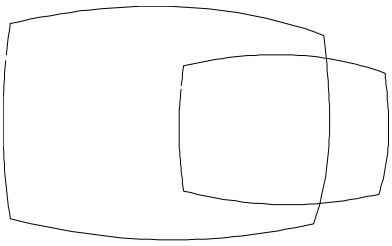
HORIZONTAL SIZE



- Press the SELECT button to select the HORIZONTAL SIZE LED.
- Press the ADJUST + button to increase the horizontal size of the image.
- Press the ADJUST - button to decrease the horizontal size of the image.

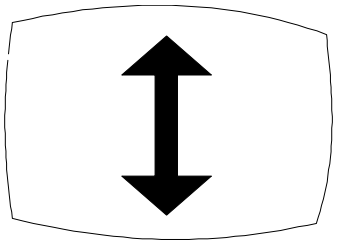
HORIZONTAL SHIFT

- Press the SELECT button to select the HORIZONTAL SHIFT LED.



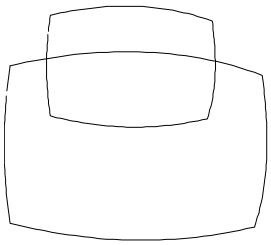
- Press the ADJUST + button to move the image to the right.
- Press the ADJUST - button to move the image to the left.

VERTICAL SIZE



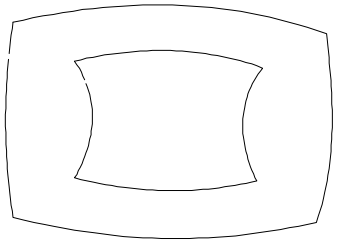
- Press the SELECT button to select the VERTICAL SIZE LED.
- Press the ADJUST + button to increase the vertical size of the image.
- Press the ADJUST - button to decrease the vertical size of the image.

VERTICAL SHIFT



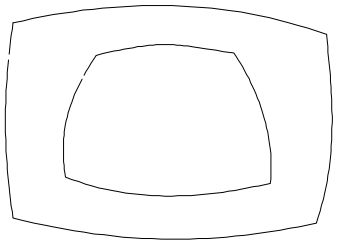
- Press the SELECT button to select the VERTICAL SHIFT LED.
- Press the ADJUST + button to move the image upwards.
- Press the ADJUST - button to move the image downwards.

PINCUSHION DISTORTION



- Press the SELECT button to select the PINCUSHION DISTORTION LED.
- Press the ADJUST + button to correct pincushion distortion outwards.
- Press the ADJUST - button to correct pincushion distortion inwards

KEYSTONE DISTORTION



- Press SELECT to select the KEYSTONE DISTORTION LED.
- Press the ADJUST + button to correct keystone distortion upwards.
- Press the ADJUST - button to correct keystone distortion downwards.

RECALL

- Press the + and - buttons simultaneously to use the RECALL function to restore the adjustments made by the manufacturer.

POWER LED

- The power LED is green and is on when the display unit works normally.
- The power LED is orange and is on when the display unit works in the Power Management mode.

POWER SWITCH

- The power switch is used to power the display unit on or off.

INTERNAL ADJUSTMENTS

Internal adjustments are carried out by the field engineer. Follow these procedures step-by-step since some adjustments affect those that follow.

VIDEO AMPLIFIER BOARD ADJUSTMENT TRIMMER

VR910	Red cut-off adjustment
VR940	Green cut-off adjustment
VR970	Blue cut-off adjustment
VR504	Red gain adjustment
VR534	Green gain adjustment

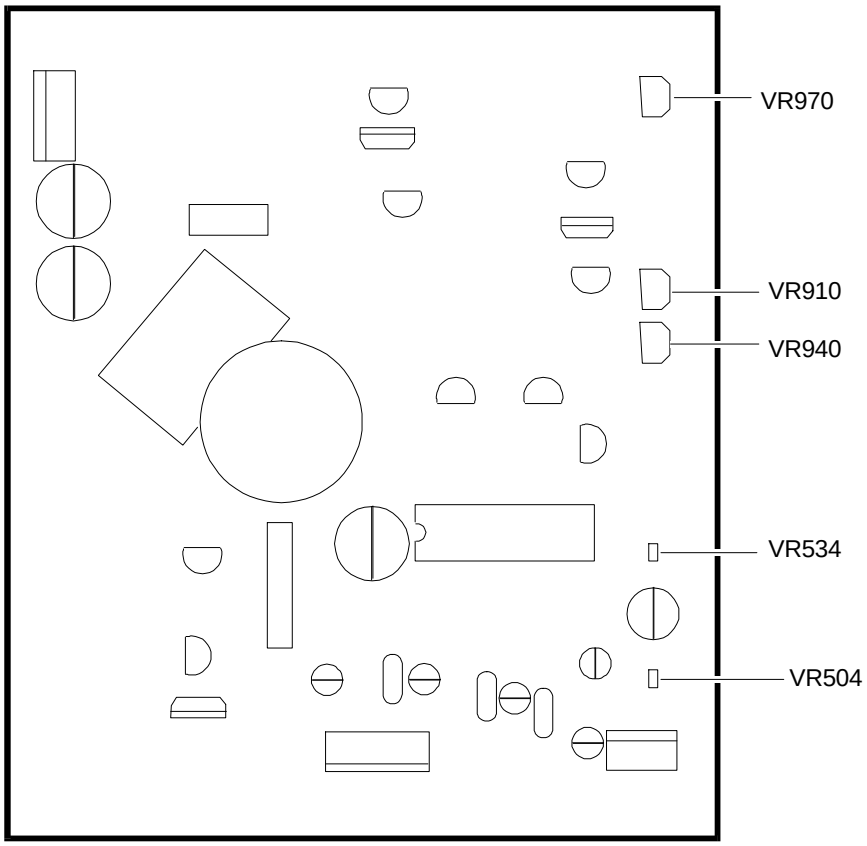


Fig. 2-14 Video Amplifier Board Adjustments

MAIN BOARD ADJUSTMENT TRIMMER

VR408	Horizontal hold adjustment
VR401	Sub-contrast adjustment
VR801	Power supply adjustment
VR802	High voltage adjustment

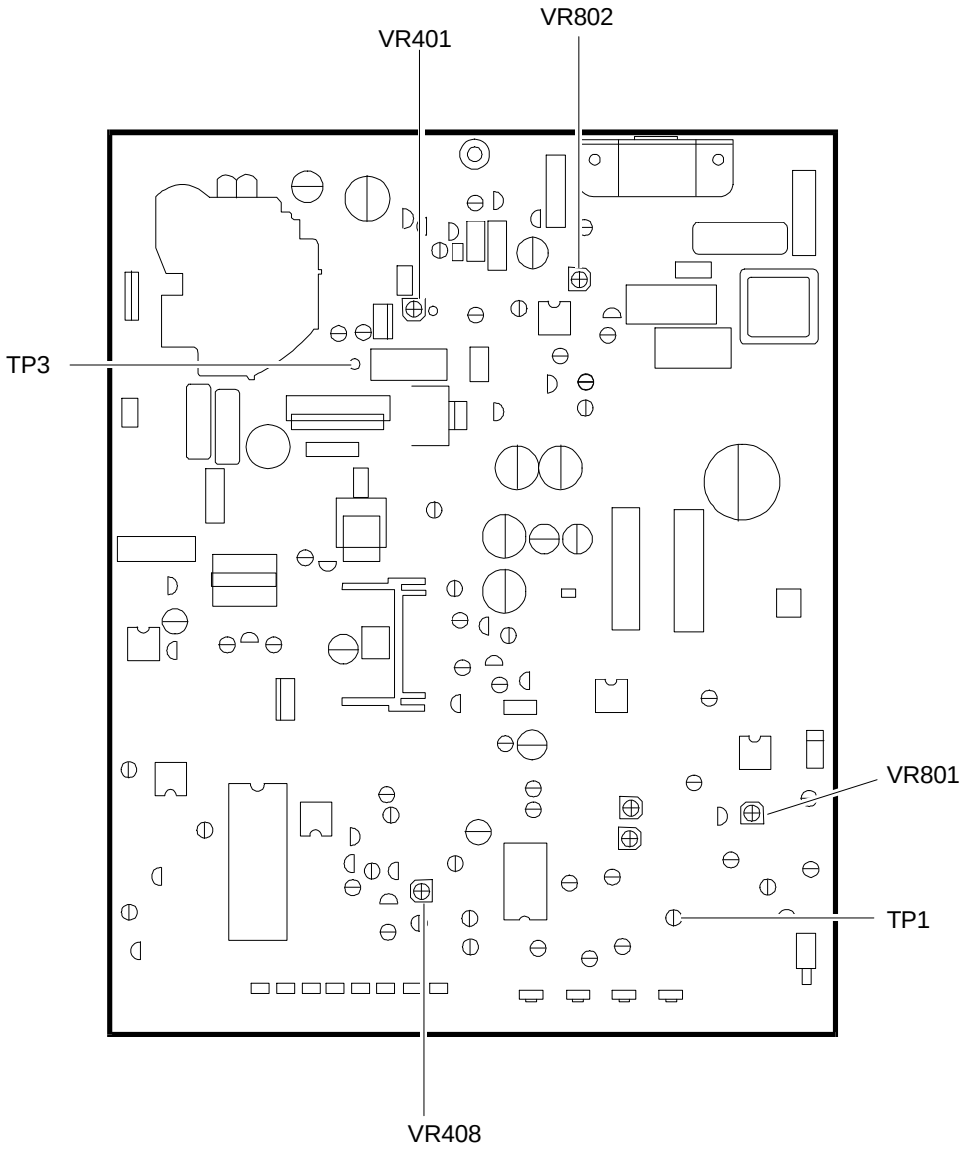


Fig. 2-15 Main Board Adjustments

CONDITIONS FOR ADJUSTMENT

- The power supply must be within the 94-264 V range.
- The display unit must be powered on for at least 15 minutes so that it becomes sufficiently warmed up for any kind of adjustment to be made with the exception of convergence, which requires a 30-minute warm up.
- The voltage level for the video analog input signals (Red, Green, Blue) must be 0.7 Vpp, with positive polarity.
- The horizontal and vertical sync signals must be separate, either positive or negative.

EQUIPMENT REQUIRED

- Voltmeter and a 30 KV high voltage probe.
- Oscilloscope.
- Color coordinate analizer.
- Video signal generator or System Test diskette in the case of Olivetti personal computers.

VOLTAGE SETTING

- Display a cross-hatch pattern in the 640x480 VGA mode.
- Attach a voltmeter to the D814 diode on the main board.
- Adjust the voltage to 12 V $\pm$ 0.1 V using trimmer VR801 on the main board.
- If the fuse blows during adjustment, replace it with a new one of the same type.

HIGH VOLTAGE SETTING

- Display a cross-hatch pattern in the 640x480 VGA mode.
- Attach a voltmeter to test point TP3.
- Using trimmer VR802 on the main board, set the voltage as follows:
  152 V $\pm$ 1 V for the CPT M34AFA83X18 CRT
  149 V $\pm$ 1 V for the CPT M34AFA83X03 CRT
  146 V $\pm$ 1 V for the SAMSUNG M34KUK35X13 CRT.

HORIZONTAL HOLD SETTING

- Display a cross-hatch pattern in the 640x480 VGA mode.
- Attach test point TP1 to ground.
- Adjust image synchronism using trimmer VR408 on the main board.
- Repeat the same operations for the 800x600 46.9 KHz video mode to obtain image synchronization.

SCREEN SETTING AND WHITE BALANCE

- Display a cross-hatch pattern in the 640x480 VGA mode.
- Use the pincushion distortion external control to minimize the image keystone distortion.
- Disconnect the signals cable so as to obtain the raster.
- Attach a voltmeter to grid G1 and adjust the brightness until reading a voltage level of -30 V.
- Affix the color coordinate analizer to the center of the screen and adjust the SCREEN potentiometer to obtain a brightness of 1 FL.
- Set trimmer VR940 on the video amplifier board to its center position.
- Adjust trimmer VR970 on the video amplifier board to set the Y chromaticity coordinate to 0.280 $\pm$ 0.02.

- Adjust trimmer VR504 on the video amplifier board to set the X chromaticity coordinate to 0.290 ± 0.02.
- Display a screen with a white CENTRAL BOX 20% in the 640x480 VGA mode.
- Set the brightness control to its cut-off position and then adjust the contrast until reaching a brightness equivalent to 25 FL.
- Adjust trimmer VR534 on the video amplifier board to set the Y chromaticity coordinate to 0.280 ± 0.02.
- Adjust trimmer VR504 on the video amplifier board to set the X chromaticity coordinate to 0.290 ± 0.02.
- Adjust brightness until reading a voltage level of -30 V at grid G1, and contrast to its maximum setting.
- Set the SCREEN potentiometer before the raster disappears.
- Adjust the contrast until obtaining a brightness of 50 ± 2 FL.
- Display a white pattern in the 640x480 VGA mode.
- Set the brightness control to its cut-off position and then adjust the contrast to its maximum setting.
- Adjust trimmer VR401 on the main board until a brightness of 31 ± 1 FL is obtained.
- Check the white balance in the VGA mode with a brightness of 2 FL and 25 FL.
- Repeat this operation until the best white balance is obtained.

FOCUS SETTING

- Display a page of character H's in the 640x480 VGA mode.
- Set the contrast and brightness to their normal operational values.
- Adjust the transformer's FOCUS potentiometer until the best focus possible is obtained.

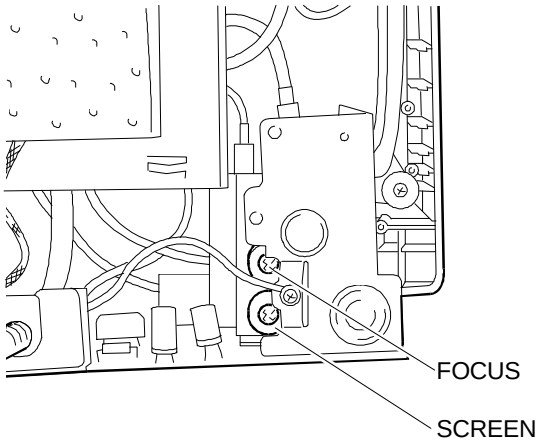


Fig. 2-16 Focus and Screen Potentiometers

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