# 17" COLOR DISPLAY UNIT CDU1769/LO01 (DSM 60-740)

This display unit is manufactured by **LITE-ON** and is identified as **DSM 60-740** on the front and rear of the case, and in the Progetto di Gestione. This unit is also identified as **CDU 1769/LO01** on the homologation plate on the rear of the case.

**CHARACTERISTICS**



VGA-compatible, high resolution, multiscan analog color monitor with the power management and DDC-1/2B features, OSD function (On Screen Display).

- CRT size: 17" diagonal
  Deflection angle: 90° diagonal
  Trio spacing: 0.28 mm dot pitch
- Horizontal size: 300 ± 3 mm (281± 3 mm for a 1280x1024 resolution)
  Vertical size: 225 ± 3 mm
- Input voltage: 90-264 V (Universal power supply)
  Line frequency: 50-60 Hz ± 5 %
  Degaussing: Manual and automatic at power on
  Power dissipation: 100 W (at 64 KHz)
  Current: < 1.5 A
- Video input signals: Separate Red, Green, Blue, H.s. and V.s.

  Video input: 75 Ω to ground
  Level: 0-700 mV
  Polarity: Positive
  Rise/fall time: ≤ 10 ns
- External controls: POWER ON/OFF SWITCH
  POWER LED
  DISPLAYS MENU AND EXITS MENU
  SCROLLS THROUGH MENU AND ADJUSTS LEVEL OF SELECTED ITEM
  CONFIRMS MENU SELECTION

  Using external controls and OSD function (On Screen Display) it is possible adjust the following parameters:

  CONTRAST, BRIGHTNESS, HORIZONTAL SIZE, HORIZONTAL POSITION, VERTICAL SIZE, VERTICAL POSITION, VERTICAL PINCUSHION, TRAPEZOIDAL, ROTATION, COLOR SELECTION, USER COLOR, LANGUAGE SELECTION, INPUT FREQUENCY DISPLAY, MANUAL DEGAUSSING, MEMORY RECALL.
- Input timing limits

| **Parameter** | **Horizontal** | **Vertical** |
|---|---|---|
| **Frequency** | 30 - 69 KHz | 50 - 100 Hz |
| **Blanking** | ≥ 3.5 µs | ≥ 0.5 ms |
| **Back Porch** | ≥ 1.0 µs | ≥ 0.5 ms |
| **Front Porch** | ≤ Back Porch | |
| **Sync Pulse** | ≥ 1 µs | ≥ 0.05 ms |

- Preset Timings

| **VIDEO MODE** | **VGA** | | | | **SVGA** | | | | **VGA PLUS** | | | **H.R.** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HORIZ. (DOTS)** | 640 | | | 720 | 800 | | | | 1024 | | | 1280 |
| **FREQ. (KHz)** | 37.5 | 43.27 | 52.95 | 31.47 | 48.07 | 46.87 | 53.67 | 63.92 | 56.47 | 60.02 | 68.67 | 63.97 |
| **VERT. (LINES)** | 480 | | | 400 | 600 | | | | 768 | | | 1024 |
| **FREQ. (Hz)** | 75 | 85 | 99.9 | 70.08 | 72.18 | 75 | 85.06 | 100 | 70.07 | 75.03 | 84.99 | 60.01 |
| **INTERL.** | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| **V/H POLARITY** | -/- | -/- | -/- | +/- | +/+ | +/+ | +/+ | +/+ | -/- | +/+ | +/+ | +/+ |
| **PIXEL R. (MHz)** | 31.5 | 36 | 44.9 | 28.32 | 50 | 49.5 | 56.25 | 67.5 | 75 | 78.75 | 94.5 | 108.5 |

**NOTE**: The monitor is compatible with 8 additional modes within the specified frequency ranges provided that they are different at least for ± 500 Hz for the horizontal frequency or ± 1 Hz for the vertical frequency.

- Power Management

| **STATE** | **HORIZ. SYNC.** | **VERTIC. SYNC** | **VIDEO** | **POWER SAVING** | **RECOVERY TIME** | **LED STATE** |
|---|---|---|---|---|---|---|
| ON | PULSES | PULSES | ACTIVE | < 120 W | | GREEN |
| STAND-BY | NO PULSES | PULSES | BLANKED | < 15 W | < 4 SEC | YELLOW |
| SUSPEND | PULSES | NO PULSES | BLANKED | < 15 W | < 4 SEC | YELLOW |
| OFF | NO PULSES | NO PULSES | BLANKED | < 8 W | < 20 SEC | AMBER |

- VGA Connector

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

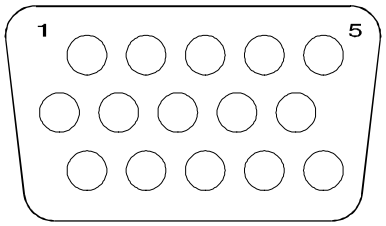



Fig. 4-1 DDC-1/2B VGA Connector

## DISASSEMBLY PROCEDURE

### REMOVING THE MONITOR CASE

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

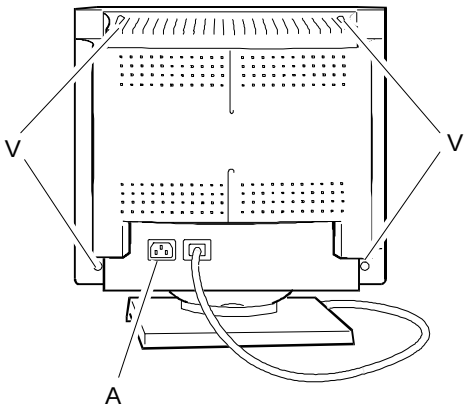



Fig. 4-2 Rear View of the monitor Case

2. Rest the monitor on a workbench with its screen facing upwards. Press the securing clip and release the base from its slots by pushing it upwards.
3. Rest the monitor on a workbench with its screen facing downwards. Using a Phillips screwdriver, remove the four screws (V) indicated in figure 4-2. During this operation pass the signal cable through the cover.

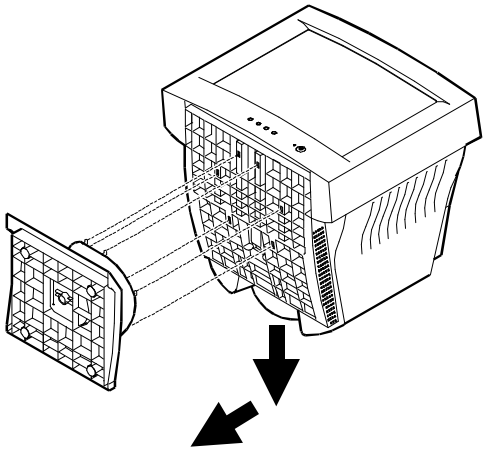


Fig. 4-3 Removing of the Base

**DISCHARGING THE ANODE**

4. 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.

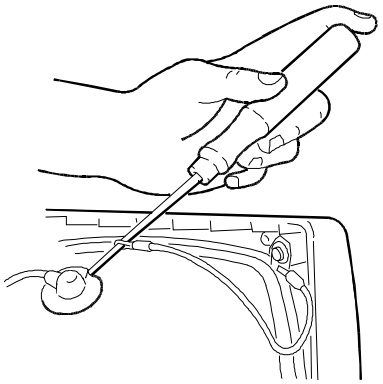


Fig. 4-4 Discharging the CRT Anode

**REPLACING THE FUSE**

5. 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.

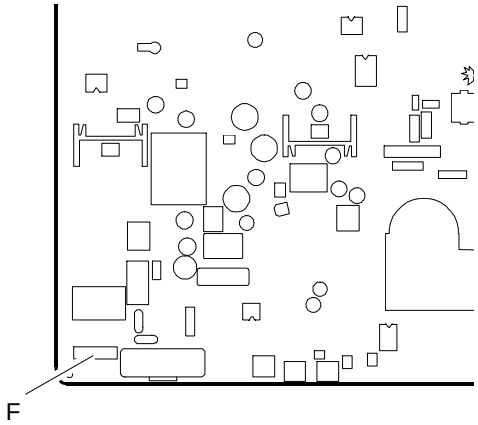



Fig. 4-5 Locating the Fuse

**REMOVING THE VIDEO AMPLIFIER BOARD**

6. Remove all connections from the metal cover of the video amplifier board (A).
7. Remove and turn over the video amplifier board.

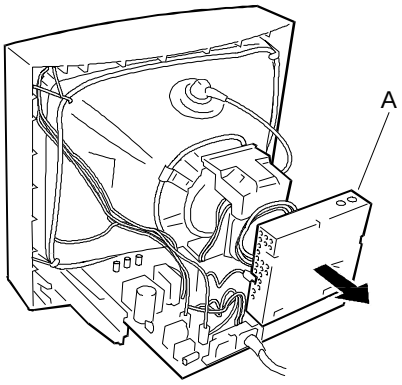



Fig. 4-6 Removing the video amplifier board

8. Free the board by disconnecting the cables from the following connectors: P501, P502, P503, P504, G1, G2.

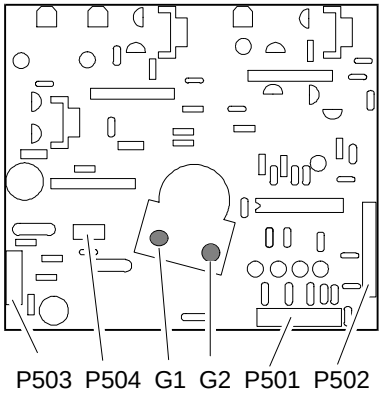



Fig. 4-7 Locating the Connectors on the Video Amplifier Board



**REMOVING THE MAIN BOARD**

9. Be sure to have discharged the EHT high voltage before removing the anode.
10. 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.
11. To remove the main board firstly disconnect the cables from the following connectors: P502A, P502B, P104B, P804, P802, P503A, P302, P102A, P103A, P104A, 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.

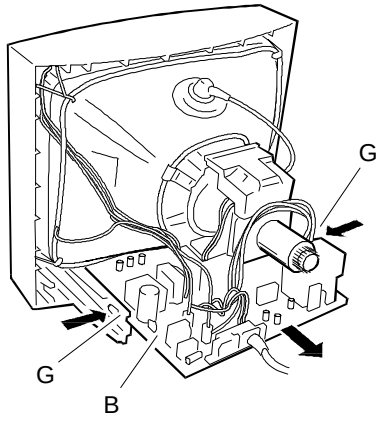



Fig. 4-8 Removing the Main Board

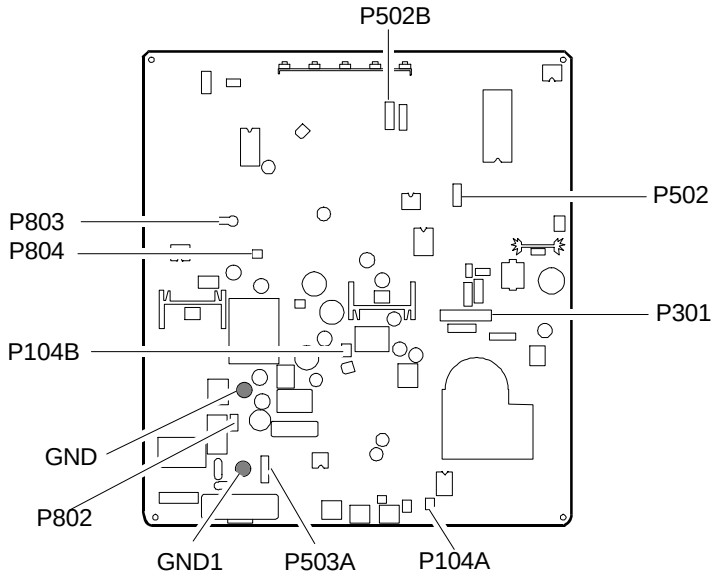



Fig. 4-9 Locating the Connectors on the Main Board

**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.

12. Remove the four screws (V) that secure the CRT to the front cover of the display unit.
13. 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.

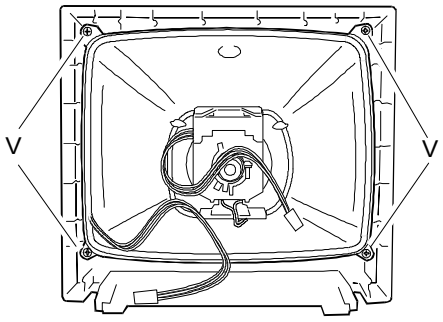



Fig. 4-10 Removing the CRT

**REASSEMBLY PROCEDURE**

14. 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.

### CONTROL PANEL AND EXTERNAL ADJUSTMENT

In order to use the external controls and make adjustments, the user has to use the buttons on the external control panel.

**a.** DISPLAYS MENU AND EXITS MENU
**b.** SCROLLS THROUGH MENU AND ADJUSTS LEVEL OF SELECTED ITEM
**c.** CONFIRMS MENU SELECTION
**d.** POWER LED
**e.** POWER ON/OFF SWITCH

Using external controls and OSD function (On Screen Display) it is possible adjust the following parameters:

- CONTRAST
- BRIGHTNESS
- HORIZONTAL SIZE
- HORIZONTAL POSITION
- VERTICAL SIZE
- VERTICAL POSITION
- VERTICAL PINCUSHION
- TRAPEZOIDAL
- ROTATION
- COLOR SELECTION
- USER COLOR
- LANGUAGE SELECTION
- INPUT FREQUENCY DISPLAY
- MANUAL DEGAUSSING
- MEMORY RECALL.

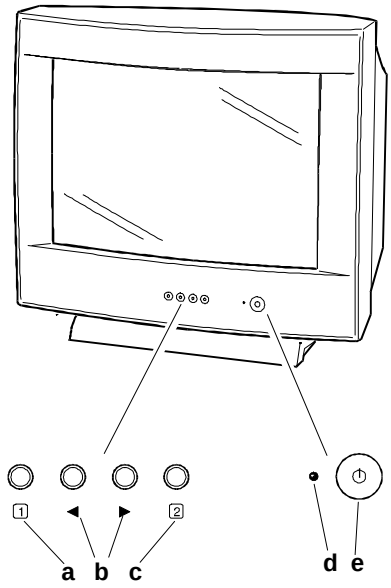
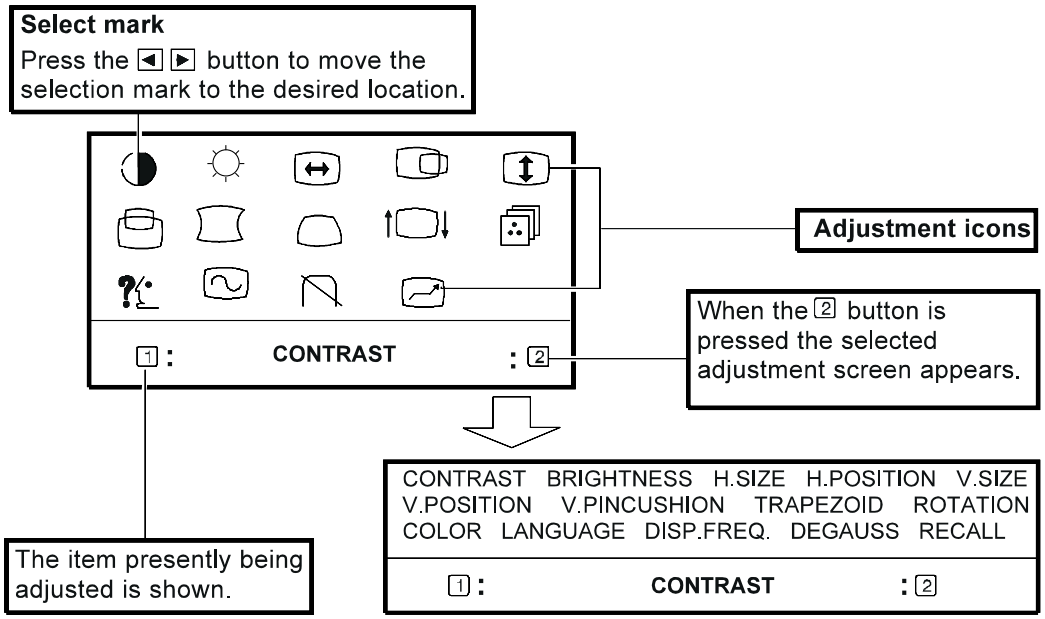


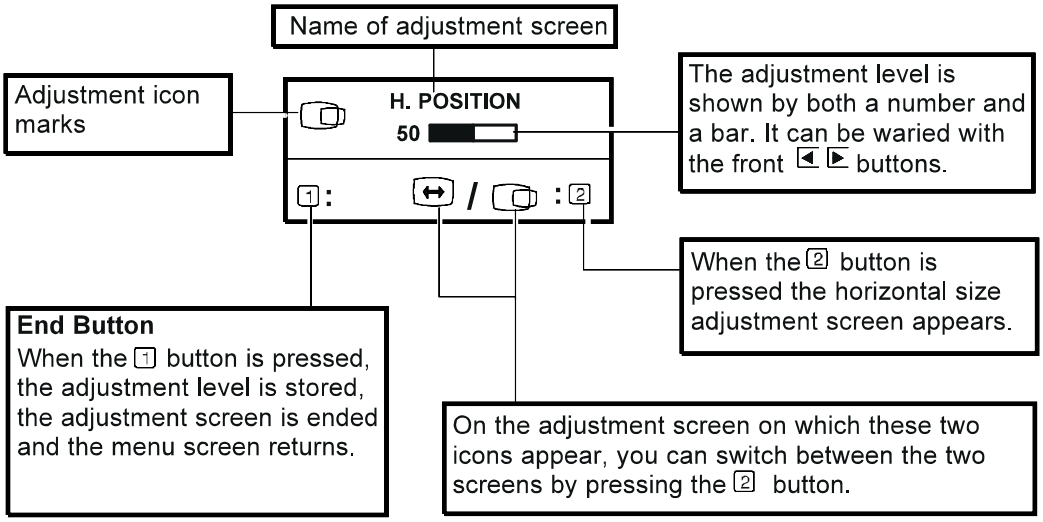

Fig. 4-11 Display Unit

**USING THE ON-SCREEN MENU**

Menu screen-press the **1** button to display the menu below and exit menus.




Adjustment screen (example: horizontal position adjustment).



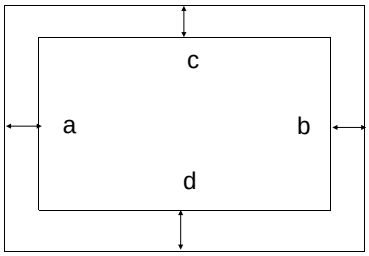

**NOTE:** The amount of adjustment depends upon how long you depress the adjustment button. You may only have to tap the button to obtain the desired results.

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

Horizontal size: 300 ± 3 mm
(for 1280x1024: 281 ± 3 mm)

Vertical size: 225 ± 3 mm

|a-b| ≤ 4 mm
|c-d| ≤ 4 mm






**NOTE:** The procedure for accessing the controls is described in the **"USING THE ON-SCREEN MENU"** section and the adjustment buttons are described in the **"CONTROL PANEL AND EXTERNAL ADJUSTMENT"** section.

**INDIVIDUAL ADJUSTMENT**

**CONTRAST**

Adjust the screen contrast. Press the **b** buttons to decrease and to increase contrast.
Direct operation: you can access the CONTRAST adjustment screen by pressing one of the two **b** buttons before entering the menu screen. Press the **c** key toggles between CONTRAST and BRIGHTNESS.

**BRIGHTNESS**

Adjust the brightness to get the desired background level.
Press the **b** buttons to make the background lighter or darker.
Press the **c** key toggles between CONTRAST and BRIGHTNESS.

**HORIZONTAL SIZE**

Fills the viewable area horizontally.
Press the **b** buttons to make the image wider or narrower.
Press the **c** key toggles between HORIZONTAL SIZE and HORIZONTAL POSITION.

**HORIZONTAL POSITION**

Shifts the image on the screen horizontally.
Press the **b** buttons to move the screen image to the left or to the right.
Press the **c** key toggles between HORIZONTAL SIZE and HORIZONTAL POSITION.

**VERTICAL SIZE**

Fills the viewable area vertically.
Press the **b** buttons to make the image smaller or larger.
Press the **c** key toggles between VERTICAL SIZE and VERTICAL POSITION.

**VERTICAL POSITION**

Shifts the image on the screen vertically.
Press the **b** buttons to move the screen image downward or upward.
Press the **c** key toggles between VERTICAL SIZE and VERTICAL POSITION.

**VERTICAL PINCUSHION**

The image can be corrected for barrel distorsion.
Press the **b** buttons to eliminate curved vertical lines.
Press the **c** key toggles between VERTICAL PINCUSHION and TRAPEZOIDAL POSITION.

**TRAPEZOIDAL DISTORTION**

The image can be corrected for trapezoidal distorsion.
Press the **b** buttons to narrow the top edge or to make the top edge wider.
Press the **c** key toggles between VERTICAL PINCUSHION and TRAPEZOIDAL POSITION.

**ROTATION**

The image can be corrected for tilt picture.
Press the b buttons to tilt the image to the left or to the right.

**COLOR SELECTION**

The white in the image can be adjusted.
Use the **b** buttons to select (1):9300K, (2):6550K or (3):the user's preferred color.
If (3):user's color is selected, "2" appears in the lower right of the On-Screen Menu.
Press the front **c** button to display the USER COLOR adjustement screen.

**USER COLOR**

The white in the video image can be adjusted to the user's preferred color.

1. Use the **c** button to select R (red) or B (blue).
2. Use the **b** buttons to adjust the color as desidered.

**NOTE:** The GREEN color is fixed and cannot be adjusted. IMPORTANT-Memory recall of the user's color is not possible, so take note of the initial setting before adjusting. When the monitor is turned OFF, user color keeps the last adjustments.

**LANGUAGE SELECTION**

The language of the On-Screen Menu can be selected from among English, French, German, Italian and Spanish. Select with the **b** buttons.

**DISPLAY FREQUENCY (INPUT FREQUENCY DISPLAY)**

This displays the input synchronization signal frequency.
This identifies the horizontal and vertical frequency sent to the monitor from the video card and currently in use.

**MANUAL DEGAUSSING**

After moving the selector to the degauss icon, press the c button. The degaussing action takes place a few second later.

**NOTE:** A sharp snap noise may be heard when degaussing occurs. This is normal.

**MEMORY RECALL**



It is possible to restore adjustments to the original factory settings. If the monitor is operating in a user defined mode, this control has no effect.

## NTERNAL 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 |

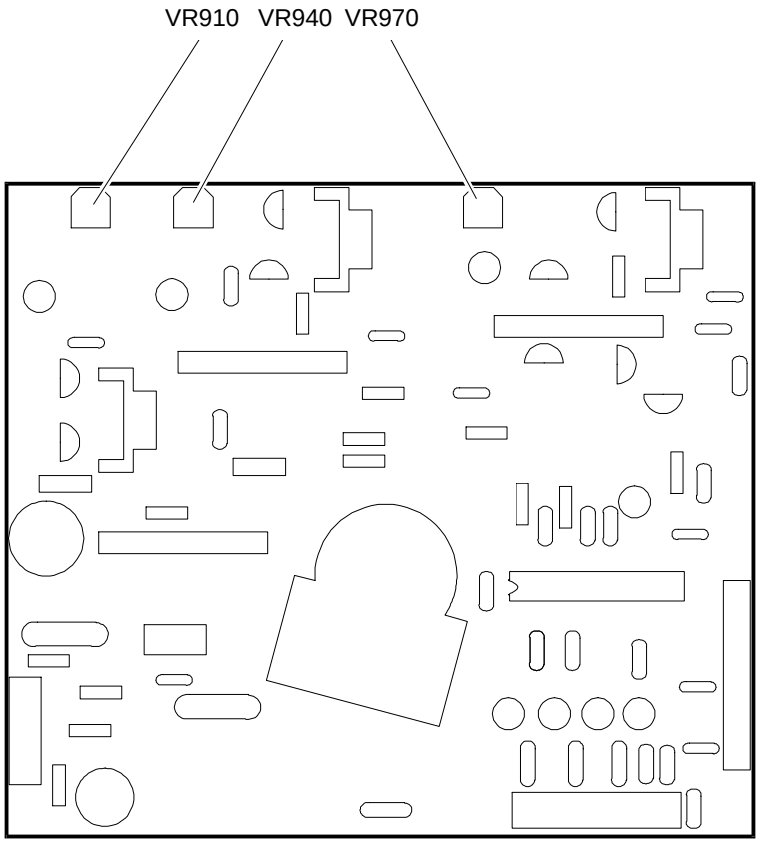



Fig. 4-12 Video Amplifier Board Adjustments

**MAIN BOARD ADJUSTMENT TRIMMER**

| | |
|---|---|
| VR401 | Beam-limiter adjustment |
| VR402 | Horizontal centering adjustment |
| VR408 | Horizontal hold adjustment |
| VR801 | Voltage adjustment |
| VR802 | High voltage adjustment |
| VR101 | Dinamic focus adjustment |



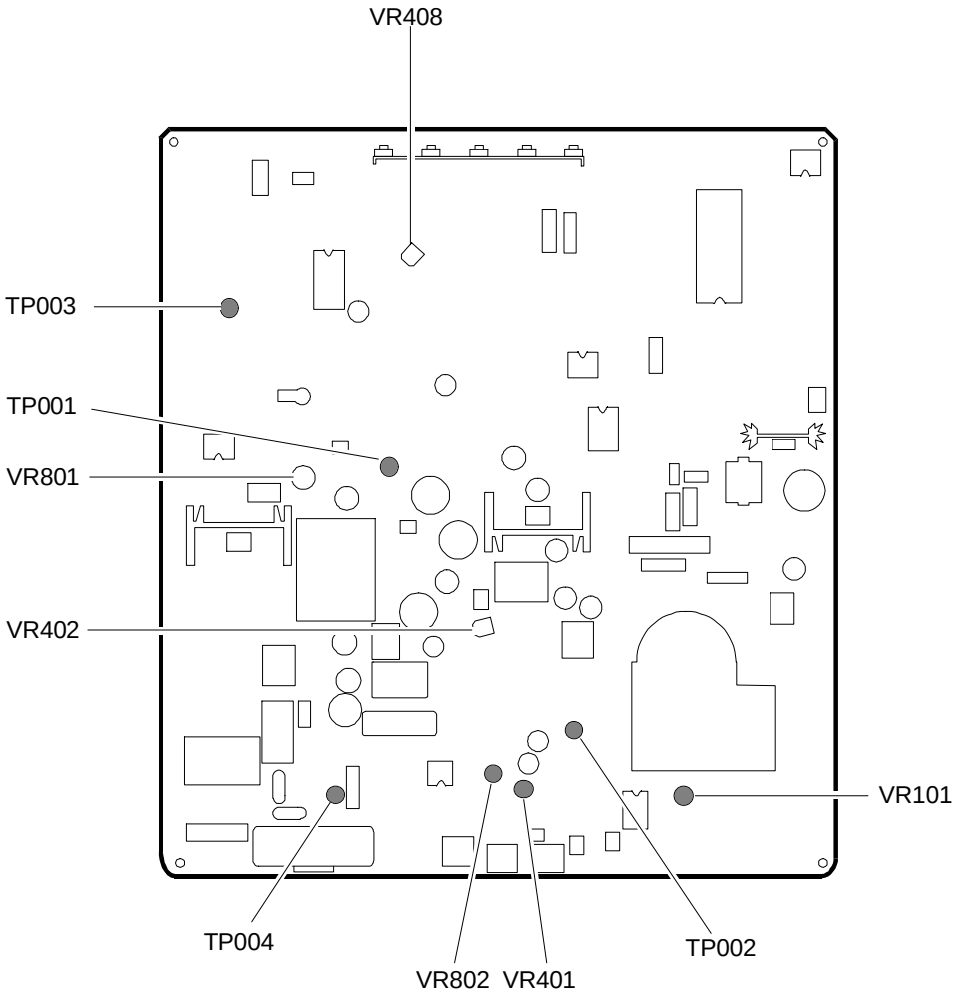



Fig. 4-13 Main Board Adjustments

**CONDITIONS FOR ADJUSTMENT**

- The power supply must be within the 90-264 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.
- All adjustment should be made using a signal of resolution 640x480, horizontal frequency 37.5 KHz, vertical frequency 75 Hz, unless otherwise resolution are defined.

**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.
- Screwdriver.

**VOLTAGE SETTING**

- Display a cross-hatch pattern in the 640x480 37.5 KHz/75 Hz VGA mode.
- Attach a voltmeter to the test point TP001 on the main board.
- Adjust the voltage to 12.3 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 37.5 KHz/75 Hz VGA mode.
- Attach a voltmeter to the test point TP002.
- Using trimmer VR802 on the main board, set the voltage at -148 V $\pm$ 0.3 V.

**HORIZONTAL HOLD SETTING**

- Display a cross-hatch pattern in the 1280x1024 video mode.
- Attach test point TP003 to ground.
- Adjust image synchronism using trimmer VR408 on the main board.
- Repeat the same operations for the 640x480 37.5 KHz/75 Hz video mode to obtain image synchronization.

**SCREEN SETTING AND WHITE BALANCE**

- Display a cross-hatch pattern in the 640x480 37.5 KHz/75 Hz VGA mode.
- Use the pincushion distortion external control to minimize the image trapezoidal distortion.
- Disconnect the signals cable so as to obtain the raster.
- Set brightness external control to read -40 V at test point TP004.
- 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 0.311 ± 0.02.
- Adjust trimmer VR910 on the video amplifier board to set the X chromaticity coordinate to 0.281 ± 0.02.
- Display a screen with a white CENTRAL BOX 20% in the 640x480 37.5 KHz/75 Hz 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 the blue in OSD (On Screen Display) to set the Y color coordinate to 0.311 ± 0.02.
- Adjust the red in OSD (On Screen Display) to set the Y color coordinate to 0.281 ± 0.02.
- Adjust brightness until reading a voltage level of -40 V at test point TP004 and contrast to its maximum setting.
- Set the SCREEN potentiometer before the raster disappears.
- Adjust the contrast until obtaining a brightness of 40 ± 5 FL.
- Display a white pattern in the 640x480 37.5 KHz/75 Hz 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 28 ± 2 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 37.5 KHz/75 Hz VGA mode.
- Set the contrast and brightness to their normal operational values.
- Adjust the static focus control ( transformer's FOCUS potentiometer) and the dynamic focus control (VR101 trimmer on main board) until the best focus possible is obtained.

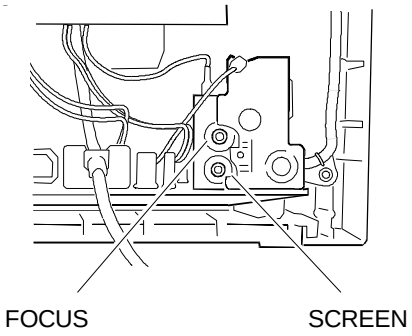



Fig. 4-14 Focus and Screen Potentiometers

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