17" COLOR DISPLAY UNIT CDU1754/LO01
(DSM 60-730)

This display unit is manufactured by **LITE-ON** and is identified as **DSM 60-730** on the front and rear of the case, and in the Progetto di Gestione. This unit is also identified as **CDU 1754/LO01** on the homologation plate on the rear of the case.

CHARACTERISTICS

VGA-compatible, high resolution, multiscan analog color monitor with power management and DDC-1/2B features.

- CRT diagonal size: 17"
  Angle of deflection: 90° diagonal
  Trio spacing: 0.39 mm dot pitch

- Horizontal size: 300 ± 4 mm
  Vertical size: 225 ± 3 mm

- Input voltage: 90-264 Vac RMS (Universal power supply)
  Line frequency: 50-60 Hz $\pm$ 3 Hz
  Degaussing: Manual and automatic at power on
  Power dissipation: 85 W
  Current: 2 A

- Video input signals:

  Analog Red, Green, Blue, separate H.s. and V.s.

  Video input: 75 Ω to ground
  Level: 0-700 mV
  Polarity: Positive
  Up/down time: $\leq$ 8 ns

- External controls: ON/OFF BUTTON
  DEGAUSS BUTTON
  SELECT BUTTON
  + AND - ADJUSTMENT BUTTONS
  IMAGE ROTATION

- Adjustment parameters: CONTRAST
  BRIGHTNESS
  HORIZONTAL SIZE
  VERTICAL SIZE
  HORIZONTAL SHIFT
  VERTICAL SHIFT
  PINCUSHION DISTORSION
  KEYSTONE DISTORSION

- Input timing limits

Parameter	Horizontal	Vertical
Frequency	30 - 54 KHz	50 - 95 Hz
Blanking	$\geq$ 3.5 μs	$\geq$ 0.4 ms
Back Porch	$\geq$ 1.0 μs	$\geq$ 0.4 ms
Front Porch	$\leq$ Back Porch	
Sync Pulse	$\geq$ 1 μs	$\geq$ 0.05 ms

- Preset timings

HORIZ. (DOTS)	640	720	640	640	640	640	800	800	800	800	1024	1024
FREQ. (KHz)	31.47	31.47	31.47	37.86	37.5	43.27	37.88	48.07	46.87	53.67	35.52	48.36
VERT. (LINES)	350	400	480	480	480	480	600	600	600	600	768	768
FREQ. (Hz)	70.08	70,08	59.95	72.8	75	85	60.31	72.18	75	85.06	87	60
LINE SPACING	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO
V/H POLARITY	-/+	+/-	-/-	-/-	-/-	-/-	+/+	+/+	+/+	+/+	+/+	-/-
PIXEL R. (MHz)	25.17	28.32	25.17	31.5	31.5	36	40	50	49.5	56.25	44.9	65

NOTE: This monitor is compatible with other video modes. The new video modes must differ from the existing ones by at least $\pm$ 1 KHz on the horizontal scan frequency or by $\pm$ 2 Hz on the vertical scan frequency, or the polarity of the synchronization signals must be different. These additional video modes may be stored in 12 memory positions.

- Power Management

VIDEO MODE	HORIZ. SYNC	VERTICAL SYNC	VIDEO	POWER	RESTORE TIME	LED STATUS
ON	PULSE	PULSE	ACTIVE	< 85 W		GREEN
STAND-BY	NO PULSE	PULSE	BLANKED	< 15 W	< 3 SEC	YELLOW
SUSPEND	PULSE	NO PULSE	BLANKED	< 15 W	< 3 SEC	YELLOW
OFF	NO PULSE	NO PULSE	BLANKED	< 5 W	< 15 SEC	AMBER

- VGA connector

1   Red video input
2   Green video input
3   Blue video input
4   Identify output
5   Lodic 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
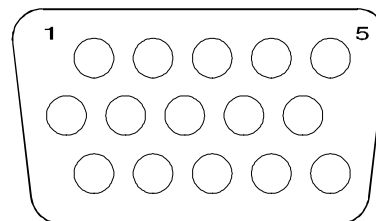15   SCL (Serial Clock)

Fig. 6-1   DDC-1/2B VGA Connector

DISASSEMBLY PROCEDURES

REMOVING THE MONITOR CASE

1. Unplug the power cord from connector (A) on the rear of the monitor and power supply cable (A) and signals cable (S) from the connectors of the multimedia audio base.
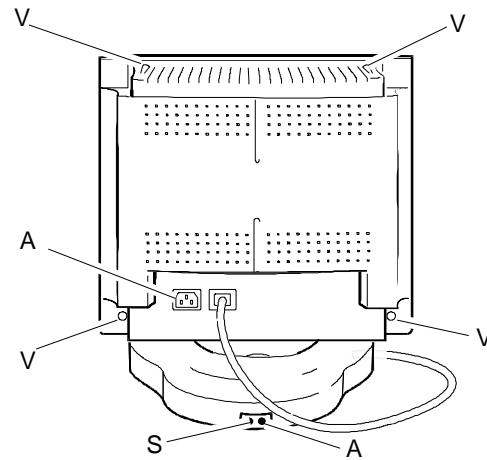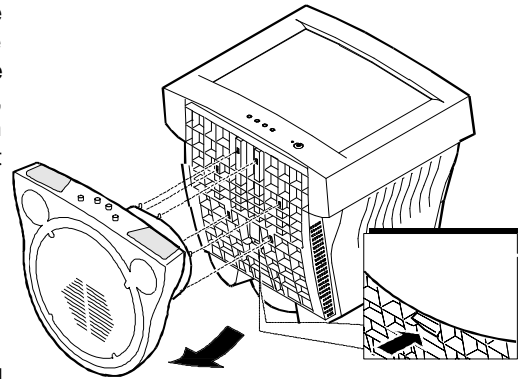

Fig. 6-2   Rear View of the Monitor Case

2. The monitor is equipped with a swivel support that can be oriented according to the user's requirements and which is integral with the multimedia audio base. To separate the display unit from the audio base, position the display unit with its screen facing upwards, push the audio base securing catch downwards and move the swivel support frontwards until it is released.
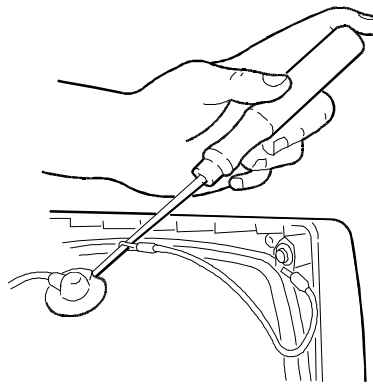

3. Position the display unit with its screen facing downwards. Using a Phillips screwdriver, remove the four screws (V) located in figure 6-2 and then remove the case.

Fig. 6-3   Removing the Display Unit from the Multimedia Audio 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.
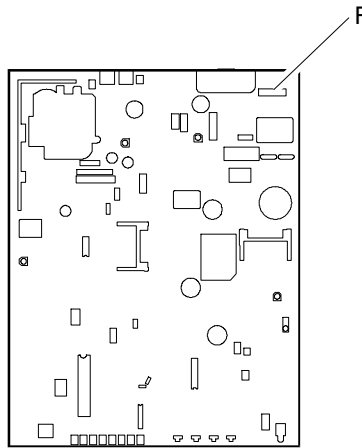

Fig. 6-4   Discharging the CRT Anode

REPLACING THE FUSE

5. If the display unit does not work due to a blown fuse, the fuse needs to be replaced. The location of the fuse (F) on the main boad is show in figure 6-5.
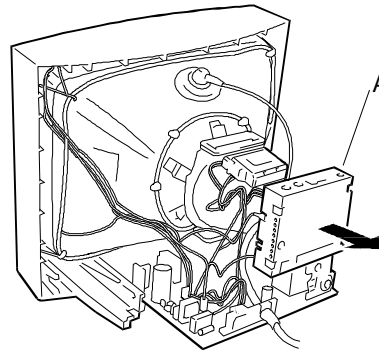

Fig. 6-5   Locating the Fuse
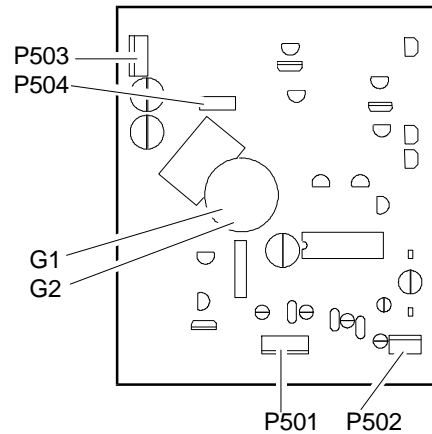
REMOVING THE VIDEO AMPLIFIER BOARD

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

7. Remove 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. 6-6   Removing the Video Amplifier Board

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

P503
P504

G1
G2

P501   P502

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Fig. 6-7   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: P301, P302, P101, P304, P302A, P803, P902A, P102, P802, A, GND1, GND2.

P302A P304 P902A

A

GND1

P802

P301
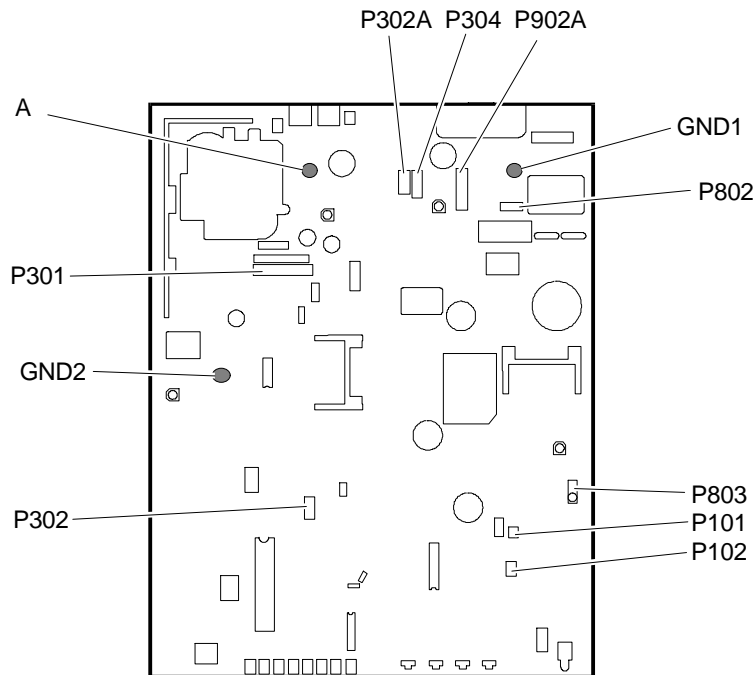
GND2

P302

P803
P101
P102

Fig. 6-8   Locating the Connectors on the Main Board

12. Slightly widen the two securing guides (G) on the main board (B) and remove this board by sliding it outwards.
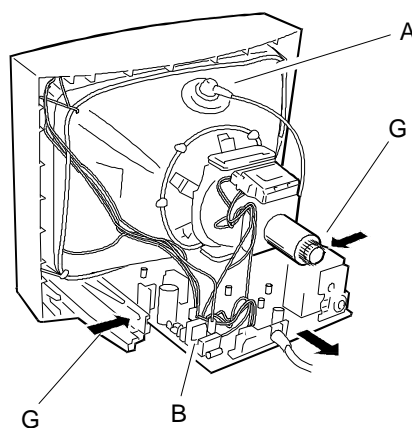
Fig. 6-9   Removing the Main Board

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.
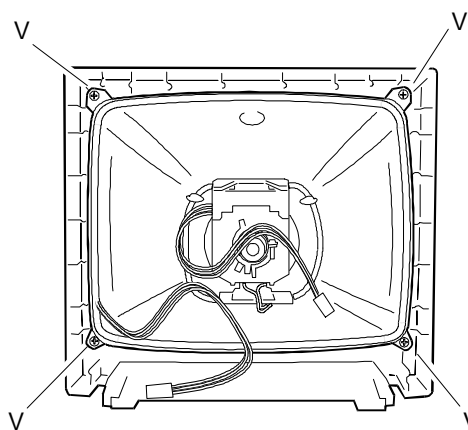
Fig. 6-10   Removing the CRT

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.

EXTERNAL CONTROLS AND ADJUSTMENTS

The buttons on the display unit's external control panel are available to use the external controls and make adjustments,

1. ON/OFF BUTTON
2. DEGAUSS BUTTON
3. ADJUSTMENT SELECTION BUTTON
4. + AND - ADJUSTMENT BUTTONS
5. IMAGE ROTATION CONTROL

Fig. 6-11   Display Unit

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The following parameters can be set using selection button (3) and adjustment button (4):

6. CONTRAST
7. BRIGHTNESS
8. HORIZONTAL SIZE
9. HORIZONTAL SHIFT
10. VERTICAL SIZE
11. VERTICAL SHIFT
12. PINCUSHION DISTORSION
13. KEYSTONE DISTORSION

Pressing the "**SELECT**" button selects the different adjustment parameters with the lighting of the corresponding LED. Selection sequence ranges from Contrast to Keystone distorsion. When the parameter value reaches its extreme setting (maximum or minimum), the LED will begin to flash indicating that the value of the parameter cannot be further increased/decreased. 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 present timings.

The manual "**DEGAUSS**" function eliminates any display hash caused when changing the position/orientation of the display unit.

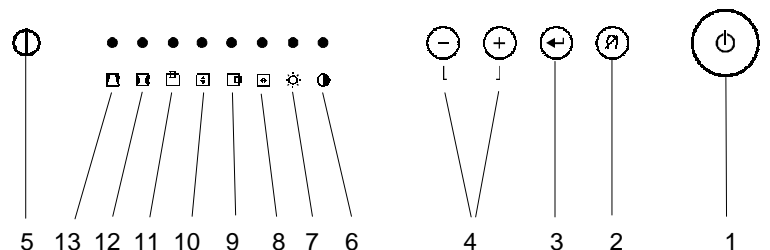Use the "**ROTATION**" command to correct the inclination of the image.

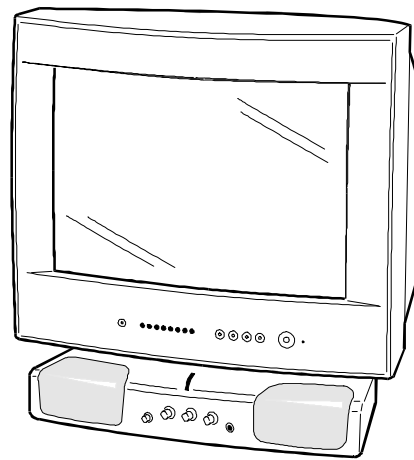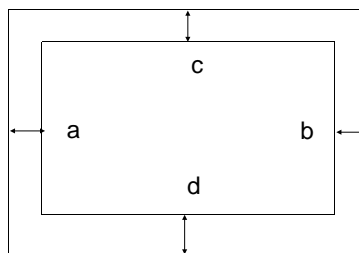Fig. 6-12   External Controls and Adjustments

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

Horizontal size: 300 ± 4 mm

Vertical size: 225 ± 3 mm

$|a\text{-}b| \leq 4$ mm
$|c\text{-}d| \leq 4$ mm

CONTRAST

Adjusts image 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

Adjusts image 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

Adjusts image 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

Adjusts 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

Adjusts image 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

Adjusts 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 DISTORSION

Adjusts image pincushion distorsion.
Press the **SELECT** button to select the **PINCUSHION DISTORSION LED.**
Press the adjust **+** button to correct pincushion distortion outwards.
Press the adjust **-** button to correct pincushion distortion inwards.

KEYSTONE DISTORTION

Adjusts image keystone distorsion.
Press the **SELECT** button to select the **KEYSTONE DISTORTION LED.**
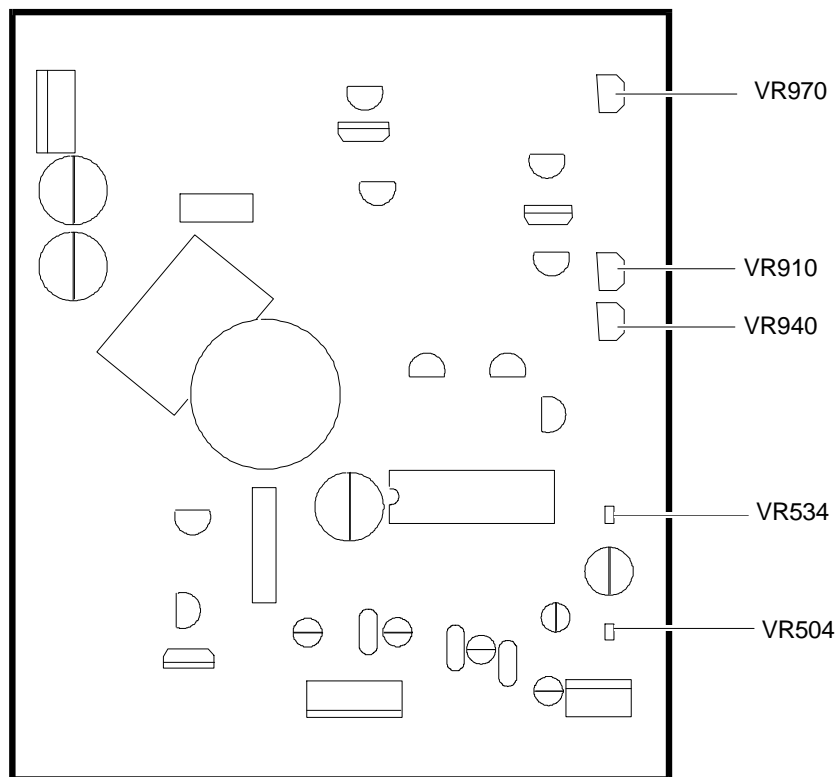Press the adjust **+** button to correct keystone distortion upwards.
Press the adjust **-** button to correct keystone distortion downwards.

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INTERNAL ADJUSTMENTS

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

VIDEO AMPLIFIER BOARD ADJUSTMENT TRIMMER

VR910   Red bias adjustment
VR940   Green bias adjustment
VR970   Blue bias adjustment
VR504   Red gain adjustment
VR534   Green gain adjustment.

Fig. 6-13   Video Amplifier Board Adjustments

MAIN BOARD ADJUSTMENT TRIMMER

VR408   Horizontal hold adjustment
VR401   ABL adjustment
VR801   Power supply adjustment
VR802   High voltage adjustment
FOCUS   Focus adjustment
SCREEN   Screen adjustment
VR101   Image rotation adjustment (onboard)
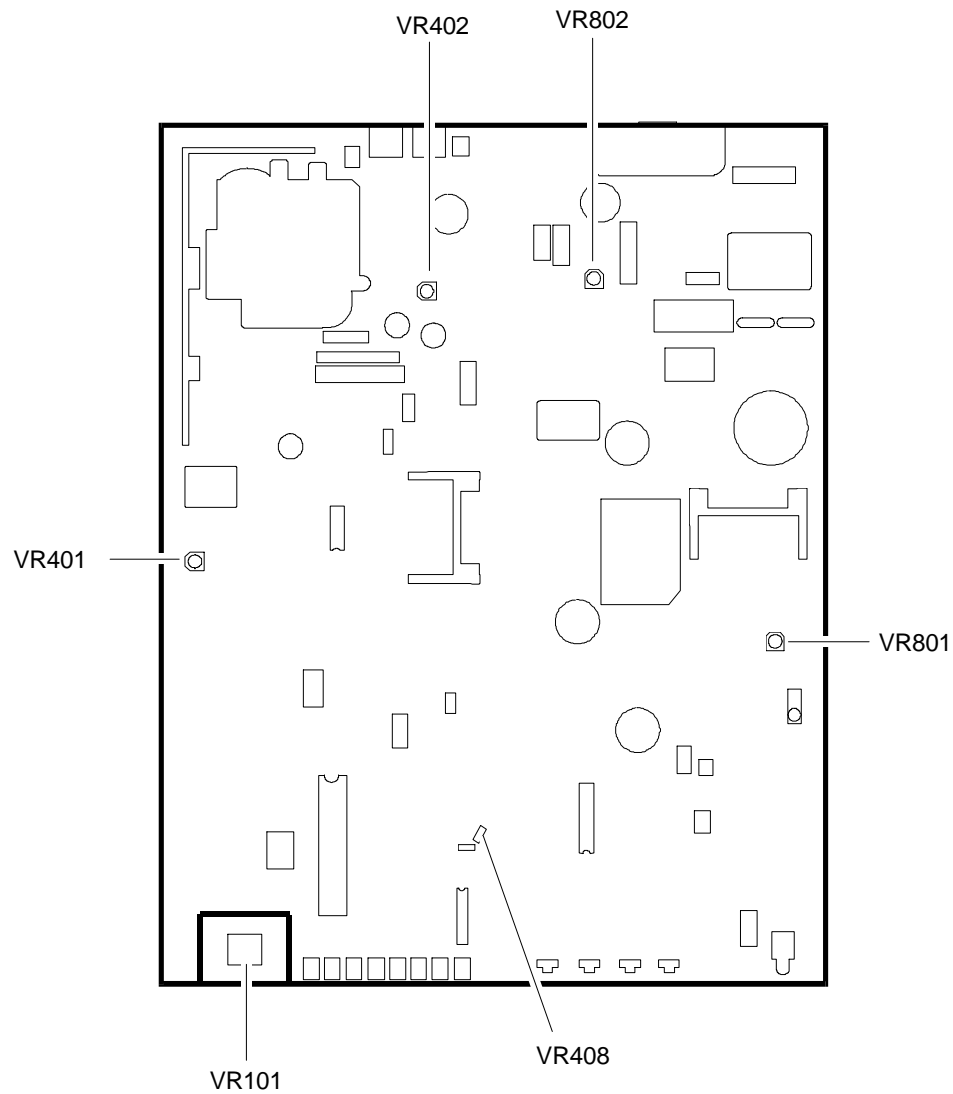VR402   Horizontal phase adjustment

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Fig. 6-14   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.

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 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:
  142 V $\pm$ 1 V for the LG M41QAV803X01 CRT.

HORIZONTAL HOLD SETTING

- Display a cross-hatch pattern in the 640x480 VGA mode.
- Attach test point TP3 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 ADJUSTMENT 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 to obtain the raster.
- Attach a voltmeter to grid G1 and adjust the brightness until reading a voltage level of -40 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 trimmers VR910, VR940, VR970 on the video amplifier board to their minimum setting.

- Adjust trimmer VR970 on the video amplifier board to set the Y chromaticity coordinate to 0.311 ± 0.02.

- Adjust trimmer VR504 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 VGA mode.

- Set the brightness control to its cut-off position (with -40V at grid G1) 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 0.311 ± 0.02.

- Adjust trimmer VR504 on the video amplifier board to set the X chromaticity coordinate to 0.281 ± 0.02.

- Adjust brightness until reading a voltage level of -40 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 45 ± 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 27 ± 1 FL is obtained.

- Check the white balance in the VGA mode with a brightness of 4 FL and 25 FL.

- Repeat this operation until the best white balance is obtained.

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FOCUS SETTING

- Display a page of character H's in the 640x480 VGA mode.

- Set the contrast and brightness to their normal operational values.

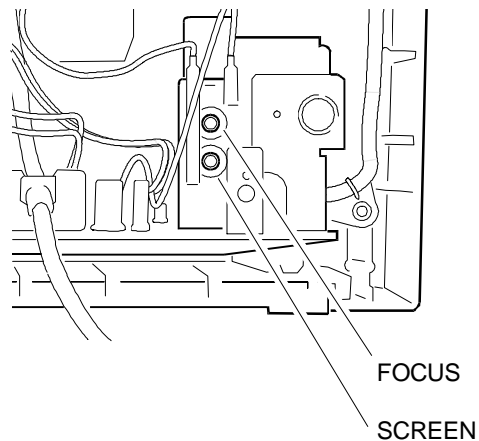- Adjust the transformer's FOCUS potentiometer until the best focus possible is obtained.

FOCUS

SCREEN

Fig. 6-15   Focus and Screen Potentiometers

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