14" COLOUR DISPLAY UNIT CDU 1438G/HA01

This unit is manufactured by **HANTAREX** and bears the marking **CDU 1438G/HA01** on the rear and **DSM 27-141/PS** on the Progetto di Gestione. Followings are the video characteristics.

CHRACTERISTICS

Ergonomic, high resolution, VGA-compatible, analog video.

- Screen dimensions: 14"
  Horizontal dimension: 240 mm ± 3 mm
  Vertical dimension: 180 mm ± 3 mm

- Input voltage: 100 - 120 V: 90 - 132 V c.a.
  220 - 240 V: 180 - 264 V c.a
  Mains frequency: 50 - 60 Hz: 47 - 63 Hz
  Degauss: At power-on time

- Horizontal synchronism:
  Frequency: 31.469 KHz ± 300 Hz (VGA standard mode)
  35.2 KHz ± 300 Hz (Super VGA1 mode)
  37.87 KHz ± 300 Hz (Super VGA2 mode)
  35.524 KHz ± 300 Hz (XGA mode)
  37.86 KHz ± 300 Hz (VGA ergo mode)
  Polarity: Negative or positive
  Level: TTL

- Vertical synchronism:
  Frequency: 59.95 - 70.08 Hz (VGA standard mode)
  56.3 Hz (Super VGA1 mode)
  60.3 Hz (Super VGA2 mode)
  87 Hz (XGA mode)
  72.8 Hz (VGA ergo mode)
  Polarity: Negative or positive
  Level: TTL

- Input signals:
  Video: R, G, B (Red, Green, Blue) driving
  Signal: depend by the video controller (i.e. voltage steps)
  Level: 0 - 700 mV
  Polarity: Positive

- Power Saving function

VIDEO STATUS	HORIZ. SYNC.	VERT. SYNC.	VIDEO	POWER. SAV.	CONSUMPTION
On	Present	Present	Active	No	60 W
Stand-by	Not present	Present	Dark	Minimum	≤ 45 W
Pending	Present	Not present	Dark	Considerable	< 8 W
Off	Not present	Not present	Dark	Maximum	< 8 W

- Resolutions displayed: 640 x 350 dots x lines (VGA standard mode)
  640 x 400 dots x lines (VGA standard mode)
  640 x 480 dots x lines (VGA standard mode)
  640 x 480 dots x lines (VGA Ergo mode)
  800 x 600 dots x lines (Super VGA1/2 mode)
  1024 x 768 dots x lines (XGA mode)

- External controls: Brightness - Contrast - Horizontal size -
  Vertical size - Horizontal shift

24

REMOVING THE COVER AND DISASSEMBLY

1. For access to the two screws securing the cover, first remove ìthe plastic cover (A) by pressing in the direction shown in the figure.
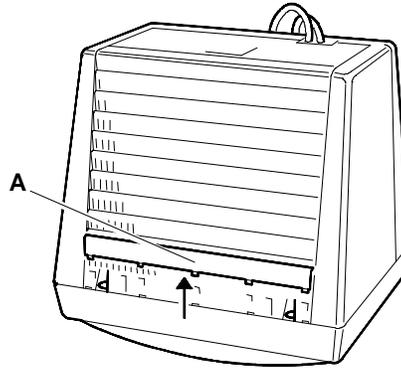
Fig. 24-1   Removal of Plastic Cover

2. Position the monitor as shown in the figure (first lay a cloth on the work table so as not to scratch the glass screen). Remove the 6 cover securing screws (B, C and D).
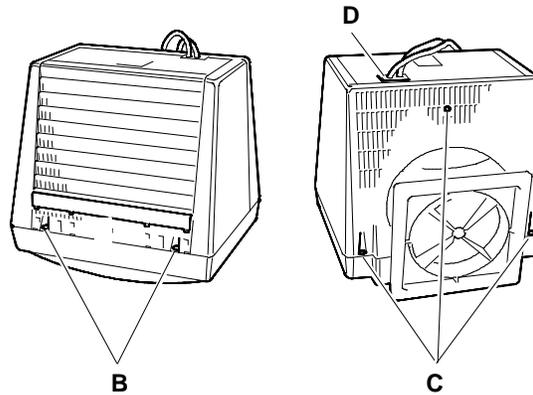
Fig. 24-2   Removal of 6 Screws Securing the Video Cover

3. Remove screw (V) and press the cable support (P) in the direction shown in the figure, to free the cables. Press the support inside the cover.

4. Remove the cover drawing the cables through the hole. Take care not to damage the cables or board components.
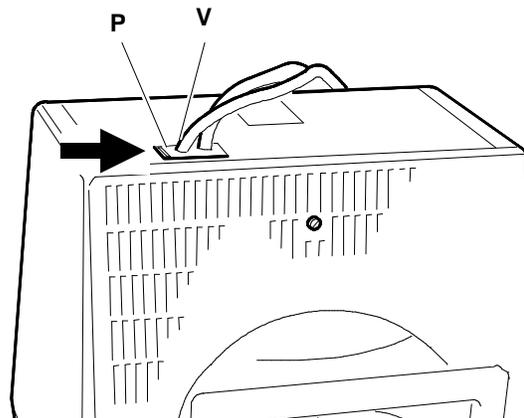
Fig. 24-3   Removing the Video Cables Support

14" COLOUR DISPLAY UNIT CDU 1438G/HA01

DISCHARGING THE HIGH VOLTAGE

5. Before removing any board, you must first discharge the high voltages (25 KV CRT anode voltage). To discharge the CRT anode, use a screwdriver, connecting it with a wire conductor to the monitor chassis ground.

6. Put the point of the screwdriver under the rubber suction cap of the anode until it touches the two contacts of the CRT anode. Hold the screwdriver in contact with the anode for a few seconds until the high voltage is fully discharged.
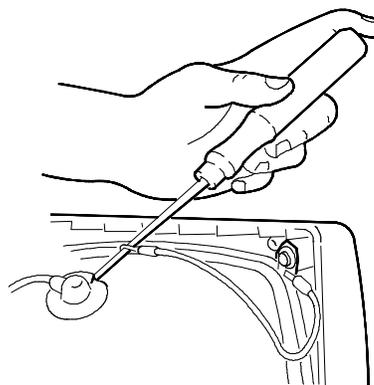
Fig. 24-4   Connection of Screwdriver to Ground

REPLACING CABLES

7. If the **power cord or signals cable** have to be replaced, proceed ìas follows::

    • Remove screw (E) from cables support (P) to separate the two cables.
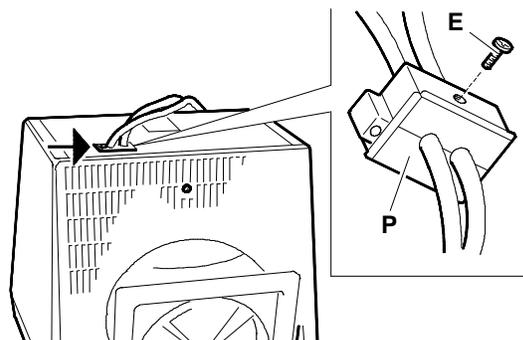
Fig. 24-5   Removal of Cables Support (P)

    • To remove the power cord, unscrew the screw (F) securing the ìcable to the metal support of the main board (ground) and disconnect connector J101 from the main board.

    • To remove the video signals cable, remove the video amplifier ìboard from the CRT, unscrew screw (G) securing the cable to the metal ìsupport of the main board, disconnect connector J604 from the main board and disconnect connector J2 from the video amplifier board.
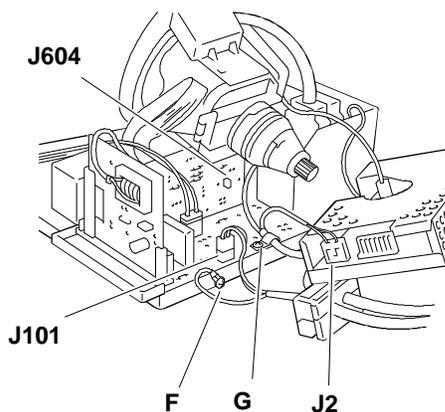
Fig. 24-6   Riemoval of Video Signals Cable and Power Cord

24

REMOVAL OF VIDEO AMPLIFIER BOARD

8. Remove the silicon adhesive securing the CRT to the video amplifier board connector (for protection in transport).

9. Remove the adhesive sponge (S) from the metal cover on the solder side of the video amplifier board to grant access to the adjustment potentiometers on this board.

10. Unscrew screw (A) on the ground strap (M) between the video amplifier board support structure and the main board structure as shown in the following figure.

11. Disconnect the video amplifier board (V) from the cathode ray tube (CRT).
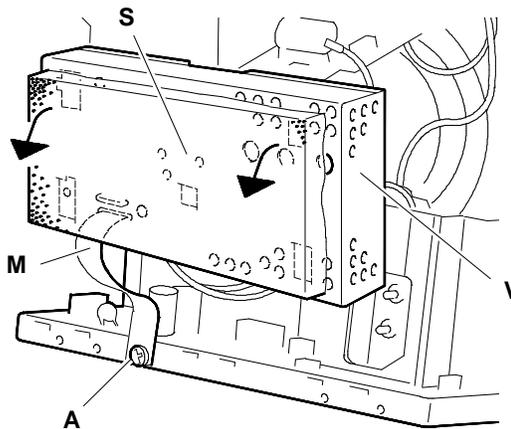
Fig. 24-7 - Removal of Adhesive Sponge (S)
        - Disconnection of Ground Strap (M)

12. Disconnect from their connectors on the video amplifier board:

- Connector J1 of the main board interface cable

- Connector J2 interfacing with the video signals cable

- Connector J4 of the CRT ground cable.
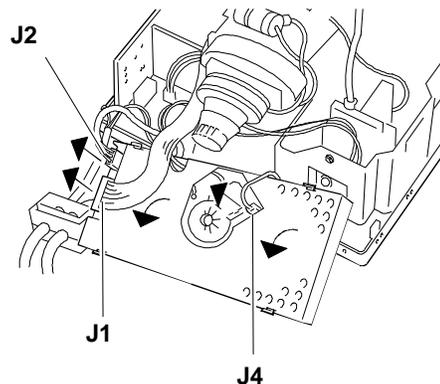
Fig. 24-8 Disconnection of the Cables from the Video Amplifier Board

14" COLOUR DISPLAY UNIT CDU 1438G/HA01

13. Free and rotate the cover on connection G3 (focus) on the video amplifier board. If the cable has to be disconnected, it will have to be desoldered first.

14. To have access to connection G2 (shield cable), the metal protection shield on the video amplifier board must first be removed.
    To remove this protection, the 4 solder points (T) must be desoldered.
    After the protection shield has been removed, it is possible to access connection G2. If the cable has to be disconnected, it will have to be desoldered first.

15. At this point, the video amplifier board is completely free of all cables.
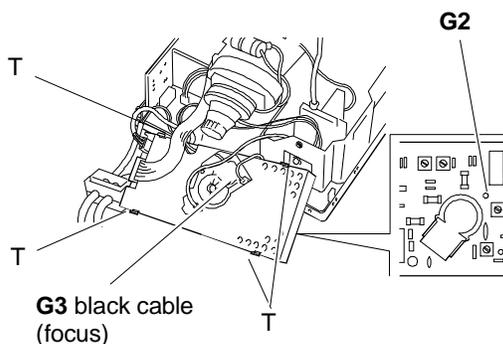
Fig. 24-9   Disconnection of Connections G3 and G2 from Video Amplifier Board

REMOVAL OF MAIN BOARD

16. Disconnect the signals cable from connector (A) and remove the cable stop (B).

17. Disconnect the power cord from connector (C) and from the ground sink (T).
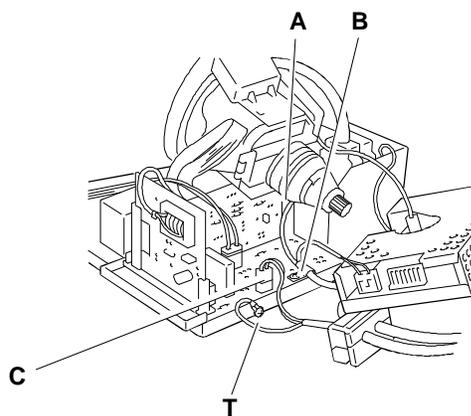
Fig. 24-10   Disconnection of Signals Cable and Power Cord

18. Unscrew the screw (A) securing the degauss connection to the metal support of the main board. Disconnect connections J102 (degauss connection) and J104 (deflection coil connection).

19. Disconnect the cable from J1 on the main board.
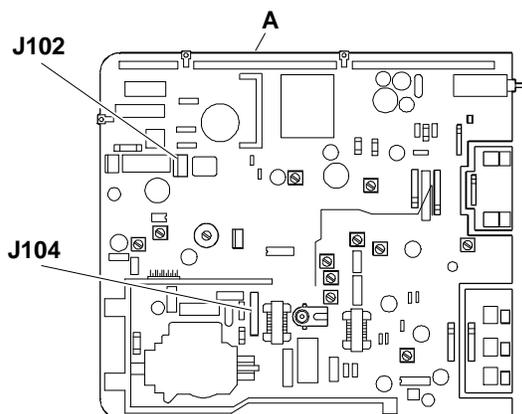
Fig. 24-11   Disconnection of Cables from Main Board

20. Before disconnecting the CRT from the anode, ensure that the anode is fully discharged by inserting the tip of a screwdriver connected to ground through the conductive rubber of the CRT.

21. To remove the anode, turn the plastic cover upside down and remove the two contacts.

22. Remove the screw (A) securing the potentiometers for adjustment of contrast and brightness. Push these potentiometers to the inside of the casing.

23. Remove the screw (V) that fixes the adjustment trimmers for horizontal width, vertical width and horizontal centering.

24. Disconnect the cables connecting the two potentiometers to connectors J106 and J111 on the main board.

25. Push the mounting brackets (B) outwards in order to free the main board. Remove the main board from the casing. Check that no components are damaged while removing the main board.
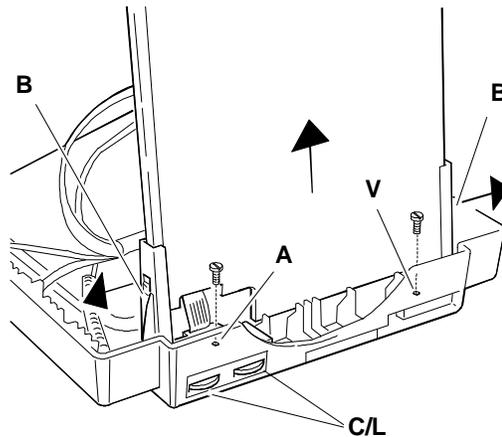
Fig. 24-12   Removal of the Main Board Structure from the Video Casing

NOTE: The main board is mounted on a support from which it must not be removed.

26. To remove the metal cover panel from the solder side of the main board, slide it until the securing tabs are freed and then lift it off. This provides easy access to the adjustment points on the main board.
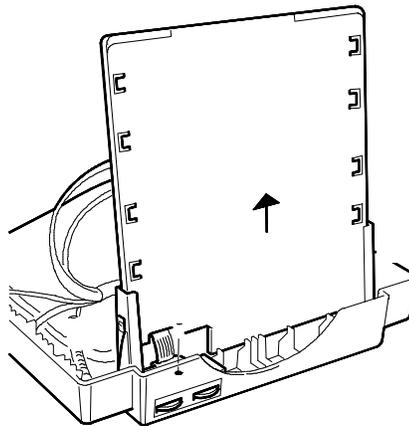
Fig. 24-13   Removal of the Metal Protection Panel from the Solder Side of the Main Board

27. When putting the main board back in, check that the metal ring (C) on the CRT anode contact is correctly positioned under the locking ring (D) of the anode suction cap.
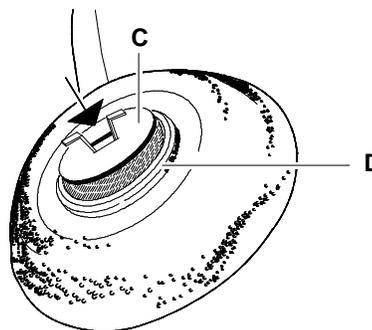
Fig. 24-14   Correct Assembly of CRT Anode

REMOVING THE CRT

NOTE: The CRT, as well as the picture tube itself, also comprises the deflection yoke and the geometric distortion correction magnets. These magnets should not require any adjustment.

28. Unscrew the 4 screws (V) securing the CRT to the front of the casing.

29. Lift the CRT away from the front casing, freeing the DEGAUSS winding.

30. Remove the conductive rubber cap (G) from the CRT after releasing the spring (M) that keeps it taut and freeing it from its mounting brackets.
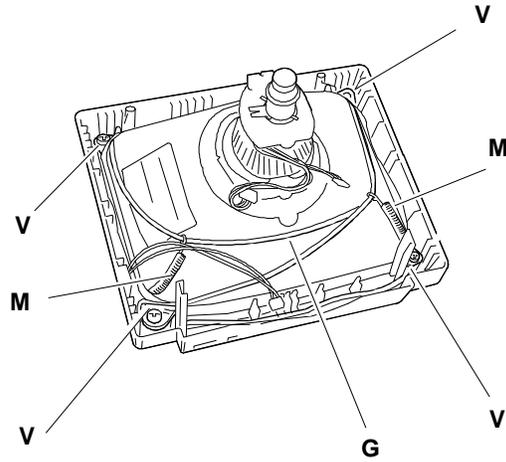
Fig. 24-15   Removal of Cathode Ray Tube

24

EXTERNAL VIDEO ADJUSTMENT

On the CDU 1435S/GS01 video unit front panel there are trimmers that can be used by the user or service engineer to adjust:

- Contrast
- Brightness
- Horizontal size
- Vertical size
- Horizontal shift

The last three trimmers are in a control panel.
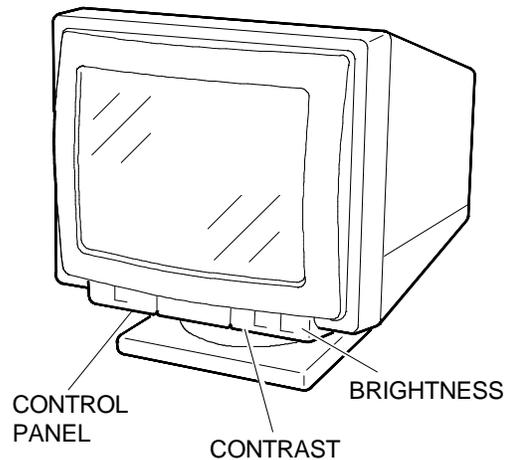
Fig. 24-16 External Video Adjustment

NOTE: The three commands **horizontal size**, **vertical size** and **horizontal phase** are not operating in the **VGA standard** mode (640x350, 640x400, 640x480). These parameters are adjusted in factory.

CONTRAST AND BRIGHTNESS TRIMMERS

CONTRAST - By turning the trimmer knob to the right or the left the picture contrast is increased or decreased.

BRIGHTNESS - By turning the trimmer knob to the right or the left, the picture brightness is increased or decreased. When turning a "click" will be heard that indicates that the best position has been obtained (click point), if desired this point can be changed.

CONTROL PANEL

To have access to the control panel commands, lightly press the hatch cover, pushing downwards. The control panel contains three trimmers to adjust the following:

- Horizontal size
- Vertical size
- Horizontal shift

Fig. 24-17 Control Panel

HORIZONTAL SIZE
Use the trimmer to obtain a picture size of
240 mm ± 2 mm.

DATA AREA

← 240 mm →

VERTICAL SIZE
Use the trimmer to obtain a picture height of
180 mm ± 2 mm.

180mm

HORIZONTAL SHIFT
Use the trimmer to centre the picture horizontally
|a-b|< 4 mm.

DATA AREA

a   b
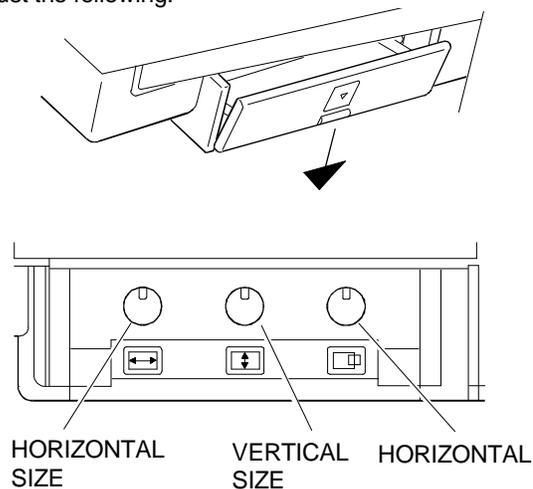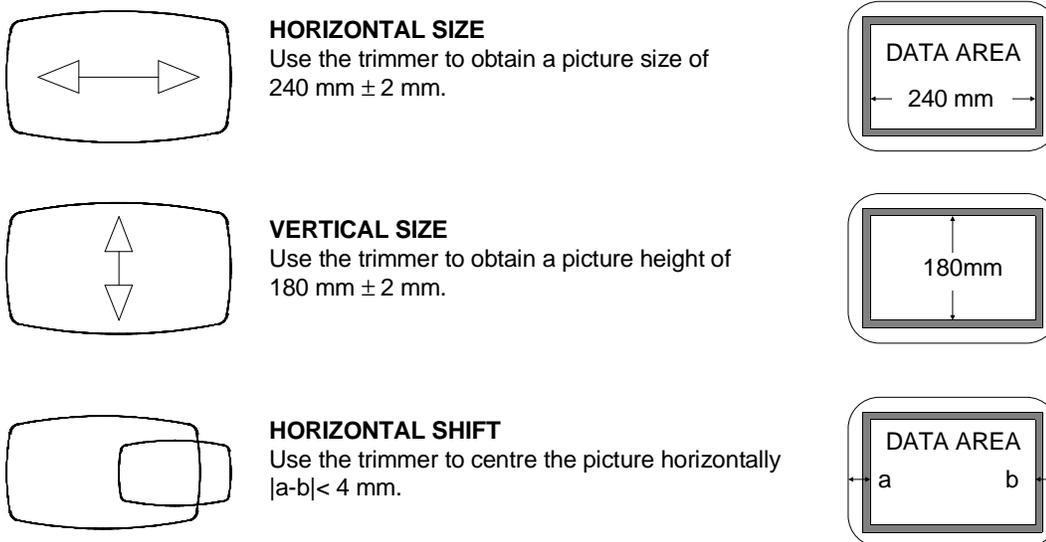
INTERNAL VIDEO ADJUSTMENTS

ADJUSTMENT TRIMMERS

The following is a list of the trimmer to use during the video adjustments. The sequence illustrated must be followed in the order because some of the adjustments influence those coming afterwards.

VIDEO AMPLIFIER BOARD

RV1   Red cut-off adjustment
RV2   Green cut-off adjustment
RV3   Blue cut-off adjustment
RV4   Red gain adjustment
RV5   Blue gain adjustment
RV6   Contrast preset adjustment
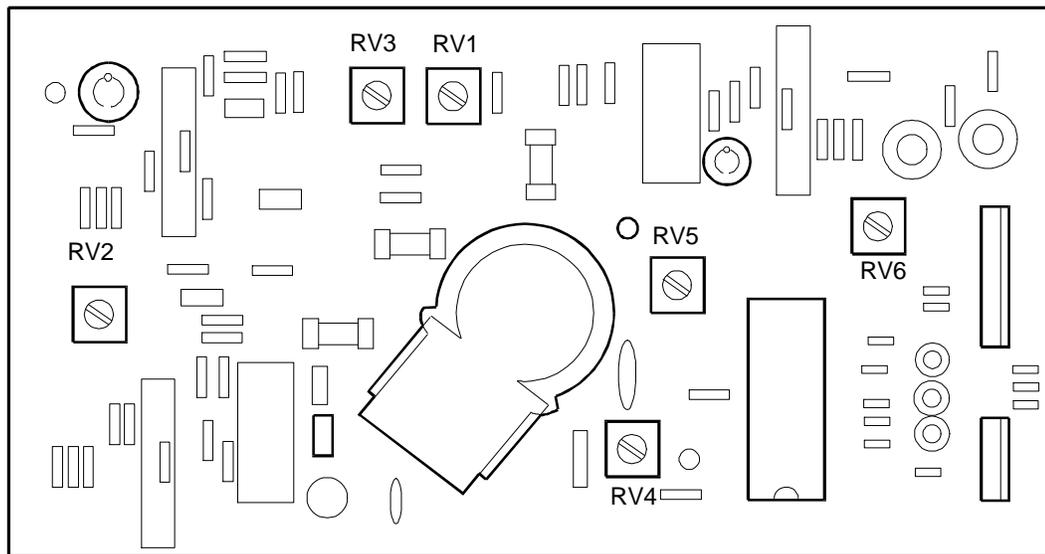
Fig. 24-18 Video Amplifier Board Adjustments

MAIN BOARD

RV101	Power supply output voltage adjustment
RV102	Beam adjustment
RV103	Frequency level adjustment
RV104	350 lines vertical size adjustment
RV105	400 lines vertical size adjustment
RV106	480 lines vertical size adjustment
RV107	31 KHz phase adjustment
RV108	Horizontal size adjustment (VGA standard 31 KHz)
RV110	Free frequency adjustment
RV111	Vertical linearity adjustment
RV112	Vertical shift adjustment
RV113	Pin-cushion adjustment
L106	Horizontal linearity adjustment
RV301	Contrast adjustment (External access)
RV302	Brightness adjustment (External access)
RV401	Vertical size adjustment (External access)
RV402	Horizontal shift adjustment (External access)
RV403	Horizontal size adjustment (External access)
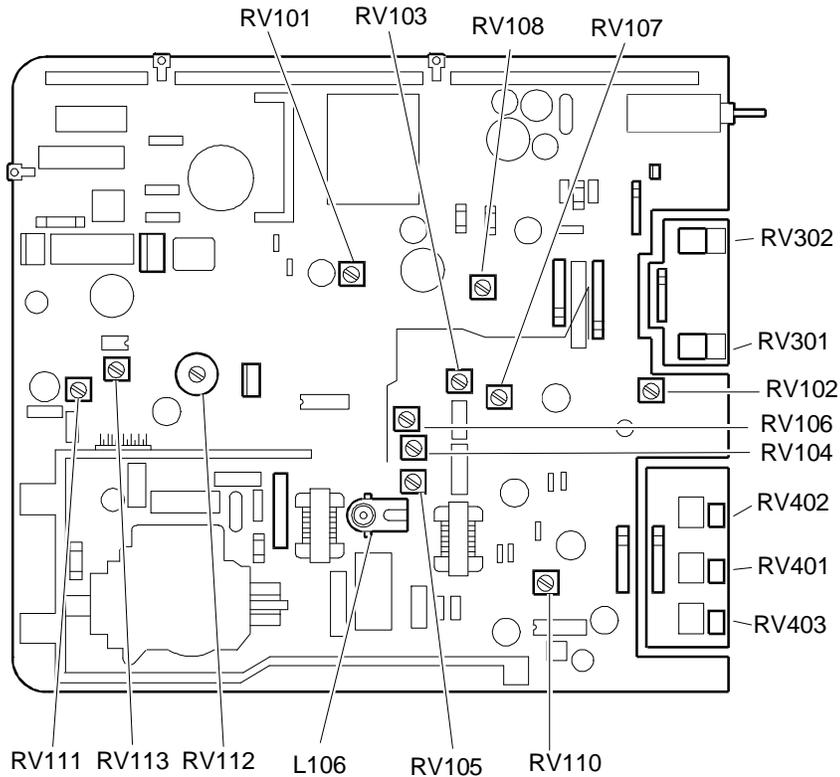
Fig. 24-19 Main Board Adjustments

MAIN BOARD ADJUSTMENTS

The sequence illustrated on the next pages must be followed in the order because some of the adjustments influence those coming afterwards

POWER SUPPLY OUTPUT VOLTAGE ADJUSTMENT OF THE TH103 TRANSFORMER

- Set the contrast and brightness controls to the middle position.

- Completely turn beam adjustment trimmer RV102 counterclockwise, and frequency level adjustment trimmer RV103 clockwise.

- Power on the system and select a VGA standard 31 KHz test menu.
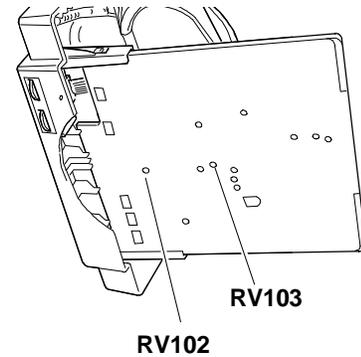
Fig. 24-20   Location of Trimmers RV102 and RV103

- Blank the monitor out fully with the contrast and brightness controls and with potentiometer G2 SCREEN of transformer TH103.
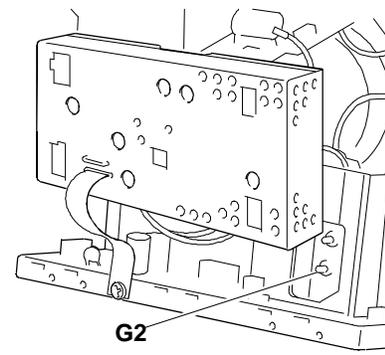
Fig. 24-21   Location of Trimmer G2 SCREEN

- Adjust RV101 to give a voltage reading of 90 V on a voltmeter between diode D114 and ground.
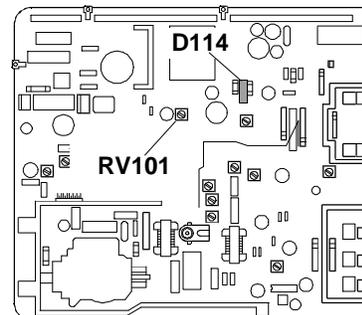
Fig. 24-22   Voltage Adjustment

FREQUENCY ADJUSTMENT

- Disconnect the signals cable in order to close out horizontal sync.

- Connect a **frequency meter** on PIN 4 of component IC104.

- Adjust trimmer RV110 to give a frequency signal reading of 29.5 KHz.

RV110   IC104
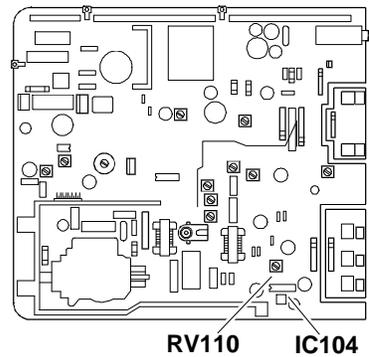
Fig. 24-23   Frequency Adjustment

ADJUSTMENT OF SIZE OF THE DATA AREA (VGA STANDARD 31 KHz)

- System Test: *640 BY 480 GRAPHICS.*

- Adjust RV108 to produce a horizontal size of 240 mm ± 4 mm.

- Adjust RV106 to produce a vertical size of 180 mm ± 4 mm.

RV108

RV106
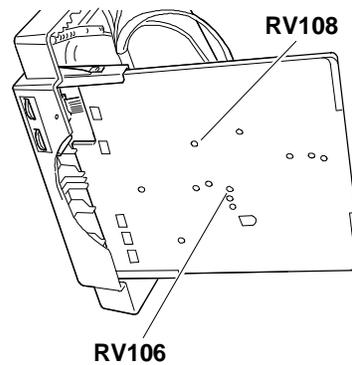
Fig. 24-24   Adjustment of Data Area Dimensions (VGA standard)

ADJUSTMENT OF HORIZONTAL LINEARITY

- System Test: *640 BY 400 GRAPHICS.*

- Adjust horizontal linearity using coil L106 (H LIN).

ADJUSTING OF VERTICAL LINEARITY

- System Test: *640 BY 480 GRAPHICS.*

- Adjust vertical linearity using trimmer RV111.

- Make the data area size adjustment again.

RV111

L106
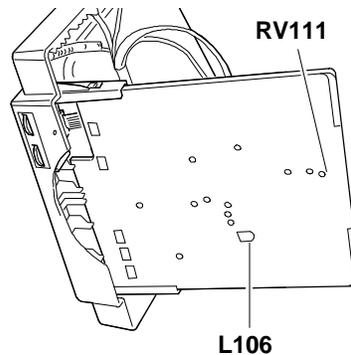
Fig. 24-25 - Vertical Linearity Adjustment
       - Horizontal Linearity Adjustment

**EAST-WEST DISTORTION ADJUSTMENT
(PINCUSHION DISTORTION)**

- System Test: *640 BY 400 GRAPHICS.*

- Adjust distortion using trimmer RV113.

- Make the data area size adjustment again
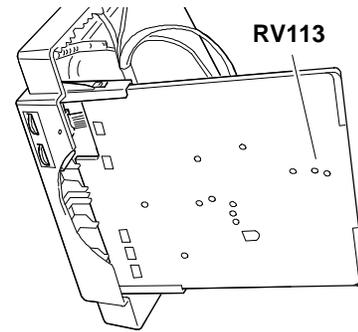
Fig. 24-26   East-West Distortion
Adjustment

ADJUSTMENT OF VERTICAL CENTERING

- System Test: *640 BY 480 GRAPHICS.*

- Adjust trimmer RV112 until the picture is centered
vertically on the screen. |a - b| < 4 mm.
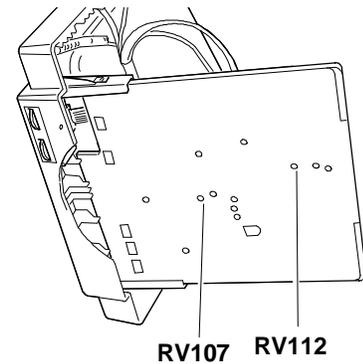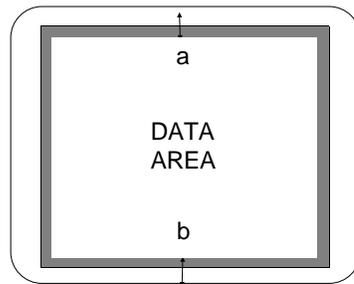
Fig. 24-27   Adjustment of Vertical
and Horizontal
Centering

ADJUSTMENT OF HORIZONTAL CENTERING

- System Test: *640 BY 480 GRAPHICS.*

- Adjust trimmer RV107 until the picture is centered horizontally on the screen.
|a - b| < 4 mm.

24
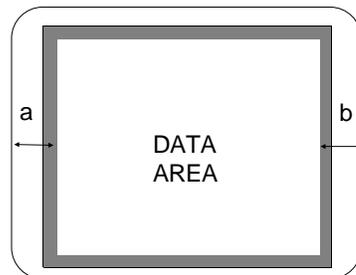
ADJUSTMENT OF VERTICAL SIZE

- System Test: *640 BY 350 GRAPHICS.*

- Adjust RV104 to give a vertical size of 180 mm ± 4 mm.

- System Test: *640 BY 400 GRAPHICS.*

- Adjust RV105 to give a vertical size of 180 mm ± 4 mm.
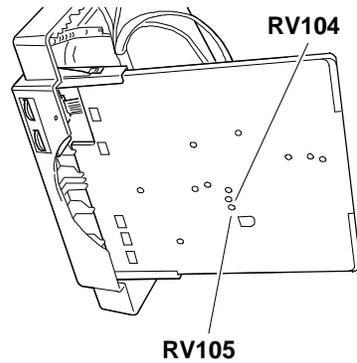
Fig. 24-28   Adjustment of Vertical Size

ADJUSTMENT OF FOCUS

- System Test: *PATTERN DI CARATTERI HIGHLIGHT.*

- Adjust potentiometer G3 "FOCUS" on transformer TH103 to obtain the best focus possible.
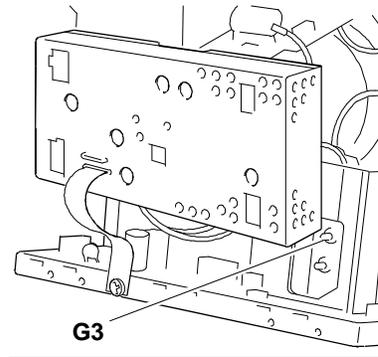
Fig. 24-29   Adjustment of Focus

ADJUSTMENT OF TILT

- System Test: *CROSS HATCH WITH CIRCLE IN THE CENTRE OF SCREEN.*

- Check tha the measurements of the picture on the screen are within the parameters i nthe figure.
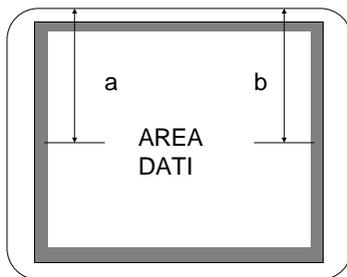
|a - b | >= 1,7 mm <= 2,3 mm: miminum deviation
|a - b | >= 2,3 mm: maximum deviation

If not, move the picture tube by acting on the mounting screws shown in figure 24-7.

POWER SAVING ABSORPTION VERIFICATION

- Use a wattmeter to measure the power absorbed by the video when working.

- Switch off the Personal Computer and measure again. The power absorbed by the video should be < 8 W.

NOTE: The monitor must not be switched off and the power supply must be separate from that for the Personal Computer.

SVGA 1/2 - XGA - VGA ERGO SETTING-UP BY THE EXTERNAL CONTROLS

Adjust the horizontal width, vertical width and horizontal centering again using the external controls whenever the resolution changes.

- System Test: 800 BY 600 GRAPHICS

- Adjust the horizontal size with trimmer RV403 to obtain a value of 240 mm ± 4 mm

- Adjust the vertical size with trimmer RV401 to obtain a value of 180 mm ± 4 mm

- System Test: 1024 BY 768 GRAPHICS

- Adjust the horizontal size with trimmer RV403 to obtain a value of 240 mm ± 4 mm

- Adjust the vertical size with trimmer RV401 to obtain a value of 180 mm ± 4 mm

- System Test: 800 BY 600 GRAPHICS

- Adjust trimmer RV402 (HORIZONTAL SHIFT) to centre the picture horizontally on the screen.

- System Test: 1024 BY 768 GRAPHICS

- Adjust trimmer RV402 (HORIZONTAL SHIFT) to centre the picture horizontally on the screen.
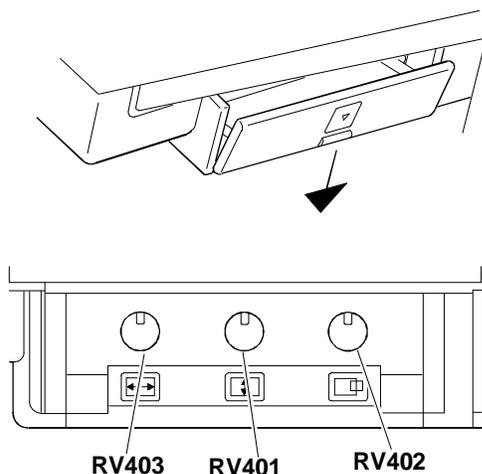
Fig. 24-30 Horizontal and Vertical Size and Horizontal Shift Adjustment with Super VGA1/2 - XGA - VGA Ergo resolutions.

24

SETTING OF THE VIDEO BOARD

NOTE: To perform the settings on the video amplifier board, a **bright level tester** and **chromaticity graph paper** must be used.

- With the System Test, set the Personal Computer to display a video page with a voltage level of 0. (black video).

- Adjust potentiometer G2 (SHIELD) on row transformer TH103, bring it to the minimum by turning in anti-clockwise and produce a completely black picture on the screen.

- Adjust RV1, RV2 and RV3 (RED, GREEN, BLUE CUT-OFF) to give a voltage of 70 V d.c. on the respective cathodes.

- Set the external brightness trimmer to maximum.

- Turn potentiometer G2 (SHIELD) so that the *raster* lights (approx. 5 nits).

RV1   **RV3**   **RV2**   **G2**

Fig. 24-31 Location of the Trimmers on the Video Board

- Adjust RV1, RV2 and RV3 (RED, GREEN, BLUE) of the two non-predominant colours so as to give chromaticity coordinates of X=0.290 Y=0.280 $\pm$ 0.020.

- Set the external brightness trimmer to the maximum.

- Adjust potentiometer G2 (SHIELD) so that the *raster* is 15 $\pm$ 2 nits.

- With the System Test, set the Personal Computer to give a white page with a level of 700 mV.

- Set the external contrast trimmer to maximum. Leave brightness in the intermediate position.

- Act on the colour gain level RV5 (BLUE GAIN) and RV4 (RED GAIN) to give chromaticity coordinates X=0.290 Y=0.280 $\pm$ 0.020.

- Adjust RV6 (PRESET CONTRAST) to give a light value of 95 nits +0 -4.

- With the brightness control trimmer in the half-way position and contrast at maximum, set the BEAM limiter VR103 so as to lower the previous light reading to 85 $\pm$ 2 nits.

RV6   **RV5**   **RV4**

Fig. 24-32 Location of the Trimmers on the Video Board

■