14" COLOUR DISPLAY UNIT - CDU 1435S/HA81

This unit is manufactured by **HANTAREX** and bears the marking "CDU 1435S/HA81" on the rear. It can display 5 different vertical resolutions: 350, 400, 480 lines (VGA standard mode); 600 lines (Super VGA mode) and 768 lines (XGA mode). Vertical scan frequency varies from 70 to 87 Hz (interlacing frequency).
The horizontal scan frequency may be of: 31.5 HKz (VGA standard mode); 35.15 KHz (Super VGA mode) or 35.5 KHz (XGA mode).

CHARACTERISTICS

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

- Screen dimensions: 14"
  Horizontal dimension: 240 mm +/- 3 mm
  Vertical dimension: 180 mm +/- 3 mm
- Input voltage: 110 V: 90 - 132 V a.c.
  220 V: 180 - 264 V a.c.
  Mains frequency: 50 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 VGA mode)
  35.524 KHz +/- 300 Hz (XGA mode)
  Polarity: Negative or positive
  Level: TTL
- Vertical Synchronism:
  Frequency: 59.94 - 70.08 Hz (VGA standard mode)
  56.3 Hz (Super VGA mode)
  87 Hz (XGA mode)
  Polarity: Negative or positive
  Level: TTL
- Input signals:
  Video: R, G, B (Red, Green, Blue) driving
  Signal: Linear voltage steps (63 steps of 11 mV)
  Level: 0 - 700 mV
  Polarity: Positive
- Resolutions displayed: 640 x 350 (rows x columns - VGA standard mode)
  640 x 400 (rows x columns - VGA standard mode)
  640 x 480 (rows x columns - VGA standard mode)
  800 x 600 (rows x columns - Super VGA mode)
  1024 x 768 (rows x columns - XGA mode)
- External Controls: Brightness - Contrast - Horizontal Width - Vertical Width - Horizontal Phase

REMOVING THE COVER AND DISASSEMBLY

1. For access to the two screws securing the cover, first remove the plastic cover (A) by pressing in the direction shown in the figure.

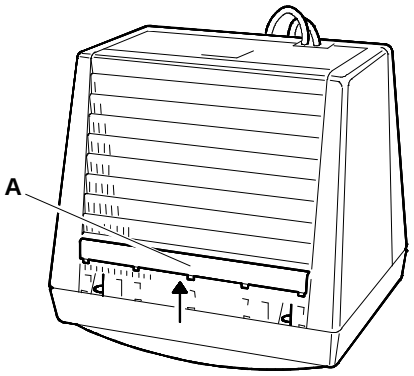


Fig. 19-1 Removal of Plastic Cover

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).

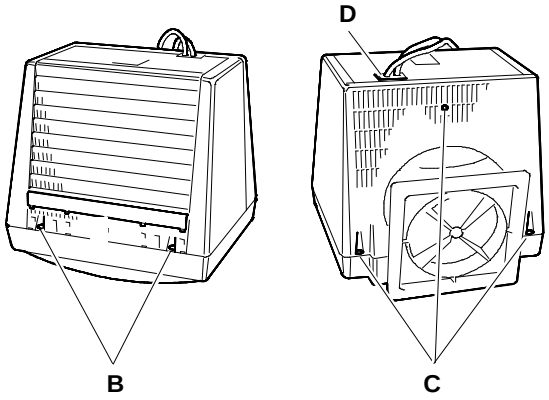


Fig. 19-2 Removal of 6 Screws Securing the Video Cover

HIGH VOLTAGE DISCHARGE

3. Before removing any boards, the high voltages (25 KV CRT anode voltage) must first be discharged. Use a screwdriver to discharge the CRT anode, connecting it with a lead to the monitor frame ground.

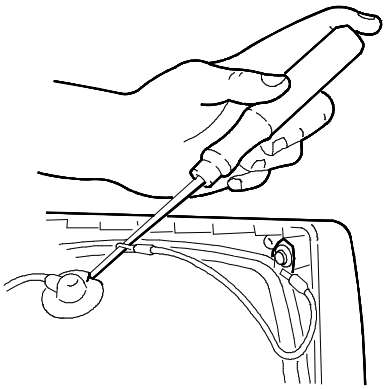


Fig. 19-3 Connection of Screwdriver to Ground

4. Press the cables support (P) in the direction shown in the figure in order to release the cables. Push the support inside the cover.

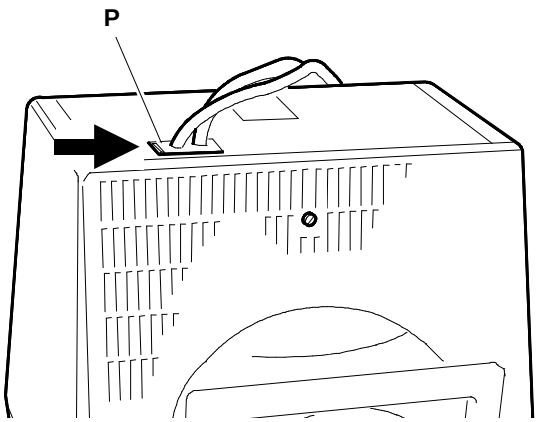


Fig. 19-4 Removal of Video Cables Support

5. Remove the cover, passing the cables through the slot. Be careful not to damage the cables or any components of the boards.
6. If the **power cord or signals cable have to be replaced,** proceed as follows:
   - Remove screw (E) from cables support (P) to separate the two cables.

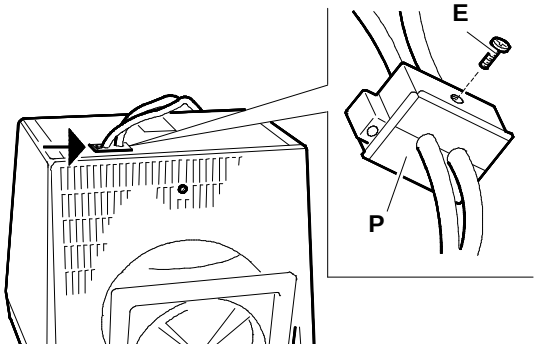


Fig. 19-5 Removal of Cables Support (P)

   - To remove the power cord, unscrew the screw (F) securing the cable 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 board from the CRT, unscrew screw (G) securing the cable to the metal support of the main board, disconnect connector J103 from the main board and disconnect connector J2 from the video amplifier board.

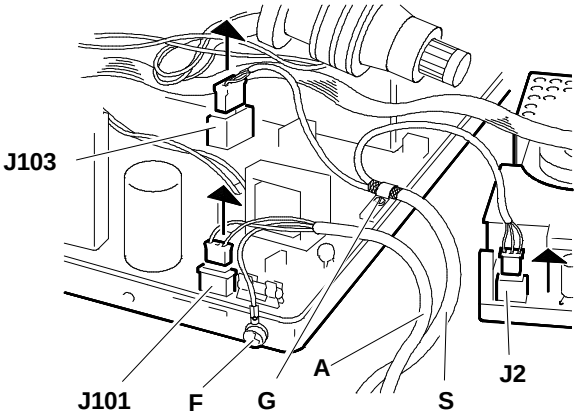


Fig. 19-6 Removal of Video Signals Cable (S) and Power Cord (A)

REMOVAL OF VIDEO AMPLIFIER BOARD

7. Remove the silicon adhesive securing the CRT to the video amplifier board connector (for protection in transport).
8. 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.
9. 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.
10. Disconnect the video amplifier board (V) from the cathode ray tube (CRT).

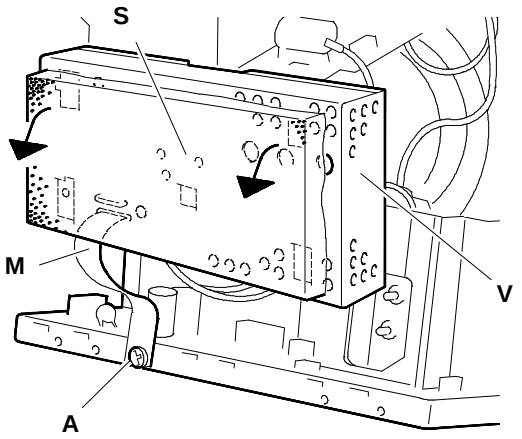


Fig. 19-7 - Removal of Adhesive Sponge (S)
- Disconnection of Ground Strap (M)

11. 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 J3 of the CRT ground cable.

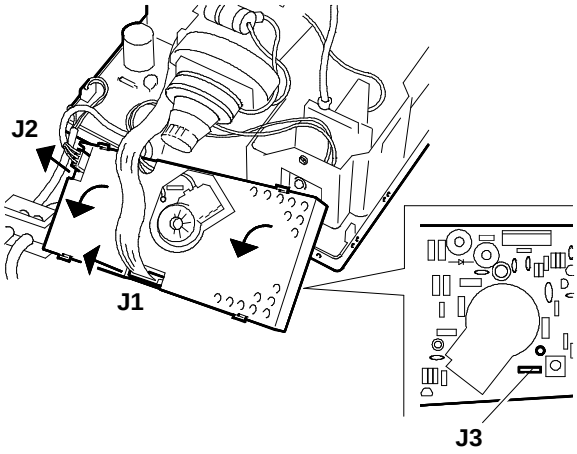


Fig. 19-8 Disconnection of the Cables from the Video Amplifier Board

12. 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.
13. 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, access is possible to connection G2. If the cable has to be disconnected, it will have to be desoldered first.
14. At this point, the video amplifier board is completely free of all cables.

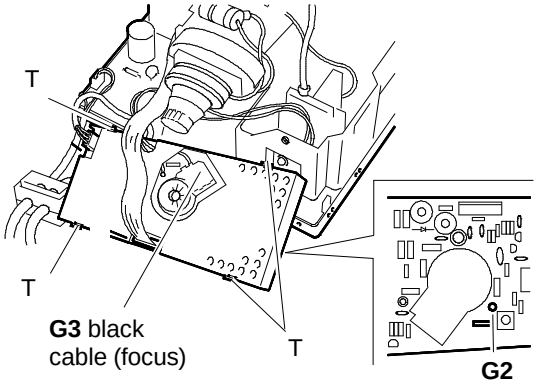


Fig. 19-9 Disconnection of Connections G3 and G2 from Video Amplifer Board

REMOVAL OF MAIN BOARD

15. Disconnect the signals cable from connector (A) and remove the cable stop (B).
16. Disconnect the power cord from connector (C) and from the ground sink (T).

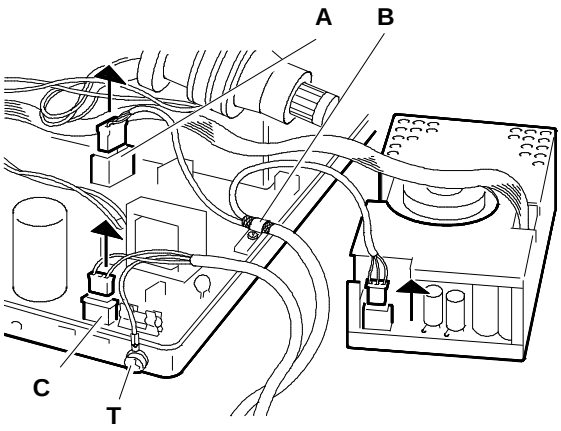


Fig. 19-10 Disconnection of Signals Cable and Power Cord

17. 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).

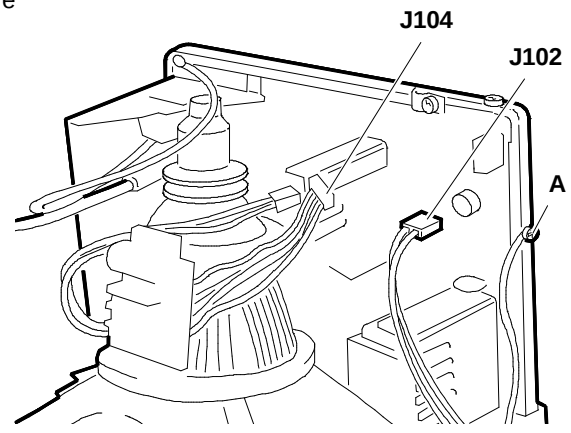


Fig. 19-11 Disconnection of Cables from Main Board

18. 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.
19. To remove the anode, turn the plastic cover upside down and remove the two contacts.
20. Remove the screw (A) securing the potentiometers for adjustment of contrast and brightness (C & B). Push these potentiometers to the inside of the casing.
21. Disconnect the cables connecting the two potentiometers to connectors J306 and J106 on the main board.
22. 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.

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

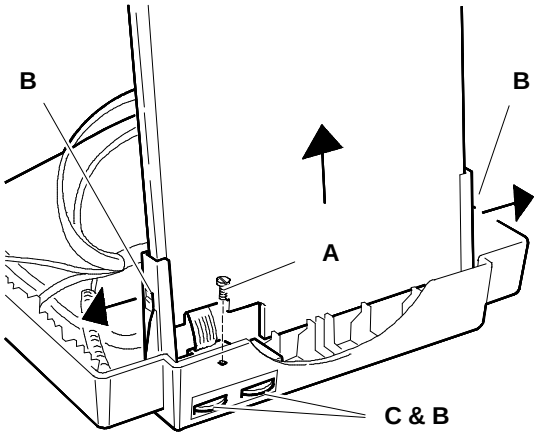


Fig. 19-12 Removal of the Main Board Structure from the Video Casing

23. 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 grants easy access to the adjustment points on the main board.

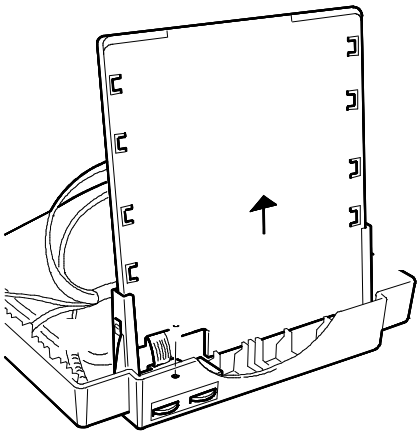


Fig. 19-13 Removal of the Metal Protection Panel from the Solder Side of the Main Board

24. 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.

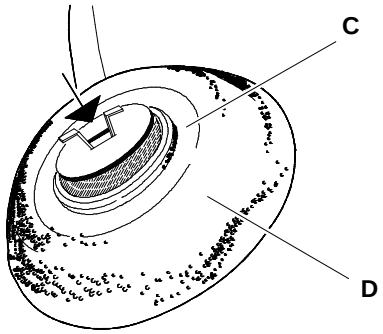


Fig. 19-14 Correct Assembly of CRT Anode

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.

25. Unscrew the 4 screws (V) securing the CRT to the front of the casing.
26. Cut the two straps (F) on the degauss winding.
27. Lift the CRT away from the front casing, freeing the DEGAUSS winding.
28. 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.

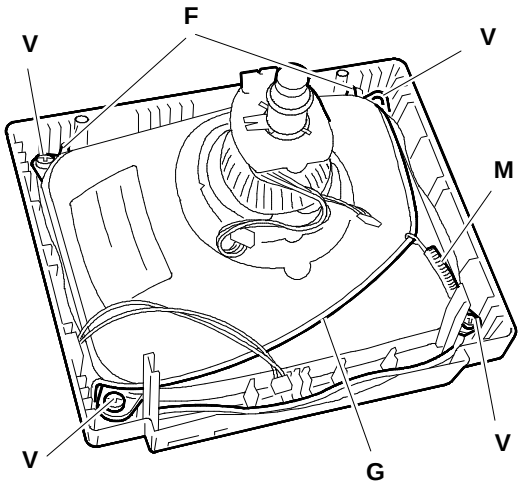


Fig. 19-15 Removal of Cathode Ray Tube

VIDEO ADJUSTMENTS

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

Adjustments to **main board**.

ADJUSTMENT OF TRANSFORMER TH103 POWER SUPPLY VOLTAGE

- Set the contrast and brightness controls to the middle position.
- Turn the beam limiter potentiometer RV118 fully clockwise.
- Switch the system on.

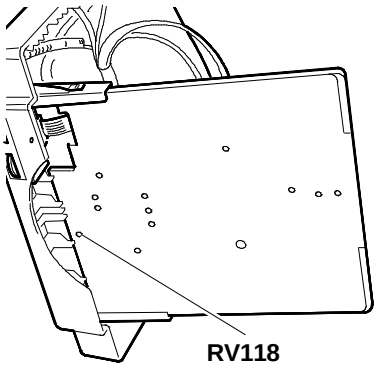


Fig. 19-16 Location of potentiometer 'beam limiter'

- Blank the monitor out fully with the contrast and brightness controls and with potentiometer G2 SCREEN of transformer TH102.

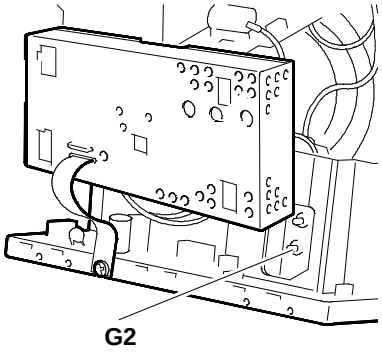


Fig. 19-17 Location of Potentiometer G2 SCREEN

- Adjust RV101 to give a voltage reading of 83 V on a voltmeter between diode D114 and ground.

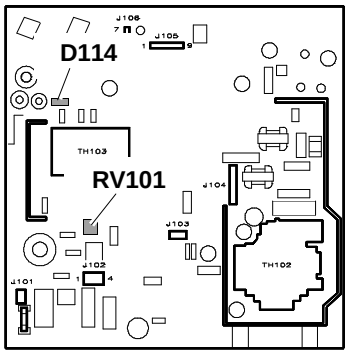


Fig. 19-18 Voltage Adjustment

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 RV117 to give a frequency signal reading of 29.5 KHz.

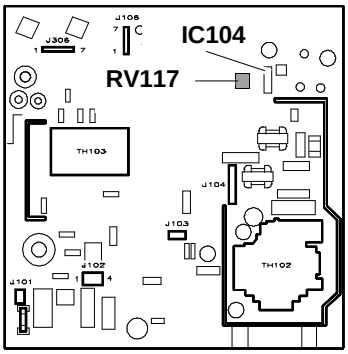


Fig. 19-19 Frequency Adjustment

ADJUSTMENT OF THE 31/35 KHZ FREQUENCY LEVEL

- System Test: *SETUP UTILITY - VIDEO REFRESH RATE.*
- The options available are: VGA Standard mode 31 KHz or Super VGA mode 35 KHz.
- Connect a voltmeter between IC103 PIN 4 and ground.
- Measure the voltage when the horizontal scan frequency is 31 KHz (VGA standard mode).
- Measure the voltage when the horizontal scan frequency is 35 KHz (Super VGA mode). To change the scan frequency, use the VIDEO REFRESH RATE option of the System Test SETUP utility.
- Take the average of the two voltages read at 31 KHz and 35 KHz.
- Connect the voltmeter between IC103 PIN 5 and ground.
- Adjust RV104 to give a voltage reading that is the average of the two measured previously on PIN 4 of IC103.
- Check L108 for presence of 92 V in SVGA mode and 83 V in VGA mode

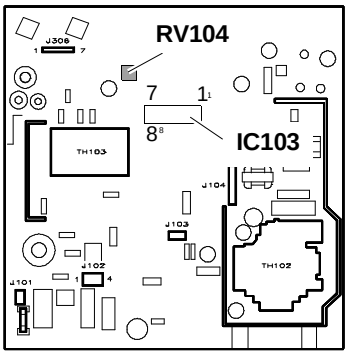


Fig. 19-20 Adjustment of the 31/35 KHz frequency level

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

- System Test: *640 x 480 GRAPHICS.*
- Adjust RV120 to produce a horizontal width of 240 mm +/- 4 mm.
- Adjust RV109 to produce a vertical height of 180 mm +/- 4 mm.

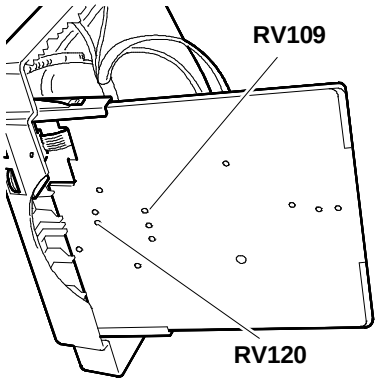


Fig. 19-21 Adjustment of data area dimensions (VGA standard)

ADJUSTMENT OF PINCUSHION DISTORTION

- System Test: *640 BY 400 GRAPHICS.*
- Adjust distortion using potentiometer RV119.

ADJUSTMENT OF HORIZONTAL LINEARITY

- System Test: *640 BY 400 GRAPHICS.*
- Adjust horizontal linearity using coil L105 (H LIN).

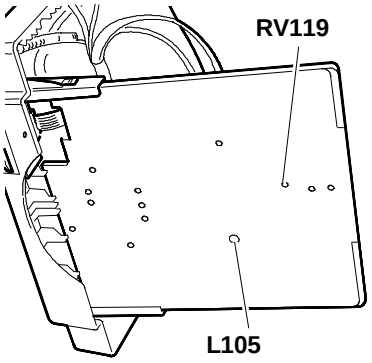


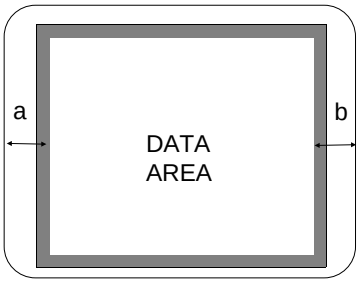
Fig. 19-22 - Adjustment of Pincushion Distortion
- Adjustment of Horizontal Linearity

ADJUSTMENT OF VERTICAL LINEARITY

- System Test: *640 BY 480 GRAPHICS.*
- Adjust vertical linearity using potentiometer RV115.

ADJUSTMENT OF HORIZONTAL CENTERING (VGA STANDARD 31 KHz)

- System Test: *640 BY 480 GRAPHICS.*
- Centre the image horizontally on the screen using potentiometer RV111. |a - b| < 4 mm.



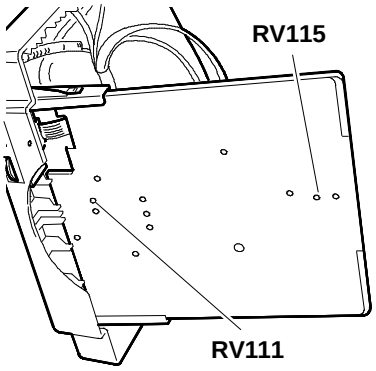
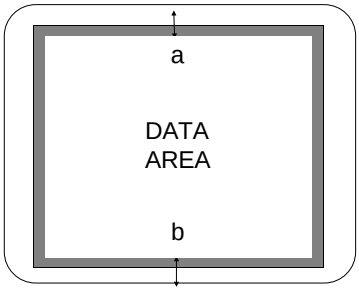


Fig. 19-23 - Adjustment of Vertical Linearity
- Adjustment of Horizontal Centering (VGA standard 1 KHz)

ADJUSTMENT OF VERTICAL CENTERING

- System Test: *640 BY 480 GRAPHICS.*
- Adjust potentiometer RV116 until the picture is centered vertically on the screen. |a - b| < 4 mm.



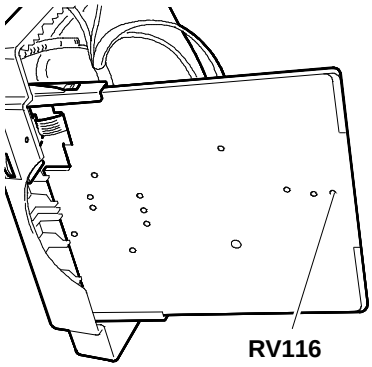


Fig. 19-24 Adjustment of Vertical Centering

ADJUSTMENT OF VERTICAL WIDTH

- System Test: *640 BY 350 GRAPHICS.*
- Adjust RV107 to give a horizontal width of 180 mm +/- 4 mm.
- System Test: *640 BY 400 GRAPHICS.*
- Adjust RV108 to give a vertical width of 180 mm +/- 4 mm.

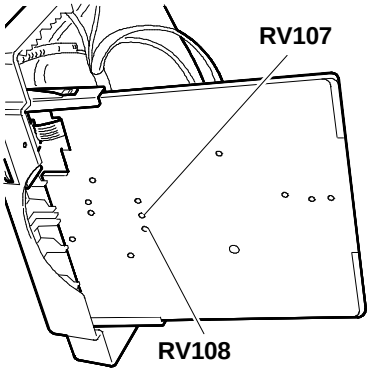


Fig. 19-25 Adjustment of Vertical Width

ADJUSTMENT OF FOCUS

- System Test: *PATTERN OF HIGHLIGHT CHARACTERS.*
- Adjust potentiometer G3 “FOCUS” on transformer TH102 to obtain the best focus possible.

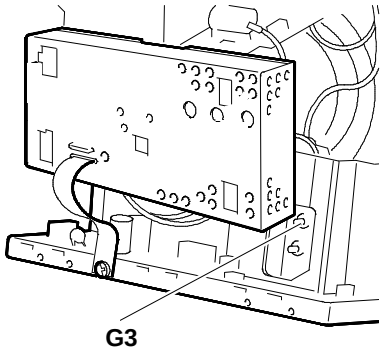
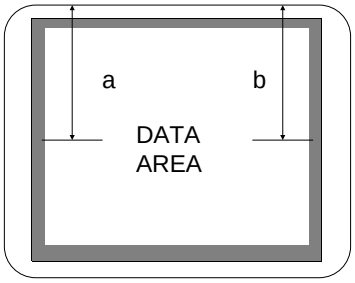


Fig. 19-26 Adjustment of Focus

ADJUSTMENT OF TILT

- System Test: *CROSS HATCH WITH CIRCLE IN THE CENTRE OF SCREEN*.
- Check that the measurements of the picture on the screen are within the parameters in the figure.



|a - b | >= 1.7 mm <= 2,3 mm: minimum deviation
|a - b | >= 2.3 mm: maximum deviation

- If not, move the picture tube by acting on the mounting screws shown in figure 19-7.

SETTING OF THE SVGA-XGA BOARD

ADJUSTMENT OF HORIZONTAL AND VERTICAL WIDTH

- System Test: *800 BY 600 GRAPHICS*.
- Adjust horizontal width using potentiometer RV403 to give a value of 240 mm.
- Adjust vertical width using potentiometer RV401 to give a value of 180 mm.
- System Test: *1024 BY 768 GRAPHICS*.
- Adjust horizontal width using potentiometer RV403 to give a value of 240 mm.
- Adjust vertical width using potentiometer RV401 to give a value of 180 mm.

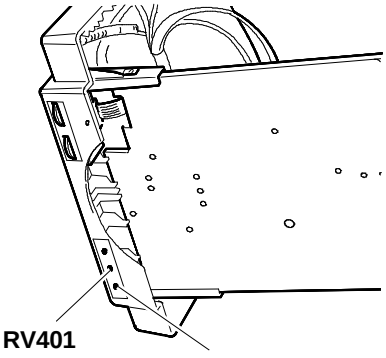


Fig. 19-27 Adjustment of Horizontal and Vertical Width with Resolutions of 600x800 (SVGA) and 1024x768 (XGA)

ADJUSTMENT OF HORIZONTAL PHASE (VGA STANDARD 31 KHZ)

- System Test: *800 BY 600 GRAPHICS*.
- Adjust potentiometer RV402 (HORIZONTAL PHASE) to centre the picture horizontally on the screen.
- System Test: *1024 BY 768 GRAPHICS*.
- Adjust potentiometer RV402 (HORIZONTAL PHASE) to centre the picture horizontally on the screen.

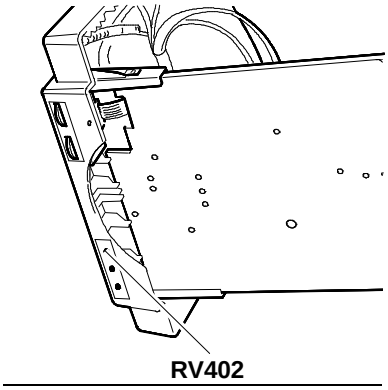


Fig. 19-28 Adjustment of Horizontal Width (VGA standard)

SETTING OF THE VIDEO BOARD

NOTE: To perform the settings on the video amplifier board, a **bright level tester à** 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 TH102, 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).
- 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 +/- 0.020.
- Set the external brightness trimmer to the middle position (CLICK POINT).

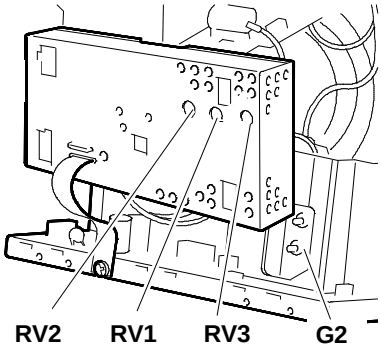


Fig. 19-29 Location of the Potentiometers on the Main Board

- Adjust potentiometer G2 (SHIELD) so that the *raster* is just about visible < 1 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 +/- 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 +/- 2 nits.
- Set the Personal Computer to give a fully white page (467 mV) and adjust potentiometer RV118 (see figure 19-16) to give a luminosity of between 90-100 nits.

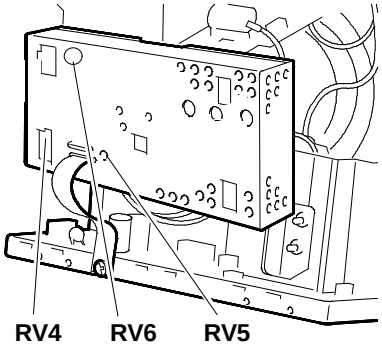


Fig. 19-30 Location of the Potentiometers on the Video Board

■