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# 14" CDU 1438 COLOUR MONITOR UNIT

This monitor is manufactured by **HANTAREX** and is identified by **HA51** written on the rear of the monitor.

It can display 4 different vertical resolutions: 350, 400, 480 lines (VGA standard mode) and 480 lines (VGA ERGO mode). The vertical scanning frequency ranges from 60 to 73 Hz (72 Hz for VGA ERGO mode).

The horizontal scanning frequency can be 31 KHz for VGA standard or 38 KHz for VGA ERGO mode.

## CHARACTERISTICS

Analogous monitor compatible VGA, high resolution, ergonomic

- Screen dimensions: 14"  
Horizontal dimension: 240 mm +/- 4 mm  
Vertical dimension: 180 mm +/- 4 mm
- Input voltage: 110 V: 90 - 132 V a.c.  
220 V: 170 - 264 V a.c.  
Network frequency: 50 Hz: 47 - 63 Hz  
Degauss: At switch on
- Horizontal synchronism:  
Frequency: 31.469 KHz +/- 300 Hz (VGA standard mode)  
37.860 KHz +/- 300 Hz (VGA ergo mode)  
Polarity: Negative or positive  
Level: TTL
- Vertical synchronism:  
Frequency: 59.94 - 70.08 Hz (VGA standard mode)  
72.81 Hz (VGA ergo mode)  
Polarity: Negative or positive  
Level: TTL
- Input signals:  
Monitor: Control R, G, B (Red, Green, Blue)  
Signal: Linear voltage steps (63 steps of 11 mV)  
Level: 0 - 700 mV  
Polarity: Positive
- Displayed resolutions: 640 x 350 lines by columns (VGA standard mode)  
640 x 400 lines by columns (VGA standard mode)  
640 x 480 lines by columns (VGA standard mode)  
640 x 480 lines by columns (VGA ergo mode)
- External controls: Brightness  
Contrast

## REMOVING THE CASING AND DISASSEMBLY

1. To have access to the two casing securing screws, remove the plastic casing (A) pressing in the direction indicated in the figure.

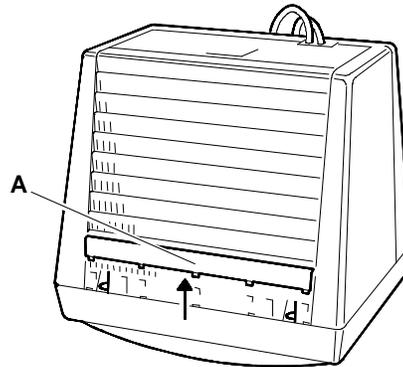


Fig. 11-1 Removal of video casing

2. Position the monitor as indicated in the figure (place a cloth between the monitor and the work table to avoid scratching the screen). Remove the 6 screws that secure the casing (B, C and D).

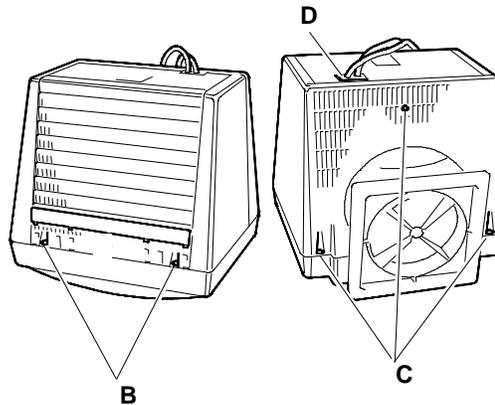


Fig. 11-2 Removal of video casing 6 fixing screws

## DISCHARGING THE HIGH VOLTAGE

3. Discharge the high voltage (25 KV CRT anode voltage) before removing any boards. To discharge the CRT anode connect a screwdriver to a ground cable on the monitor frame.

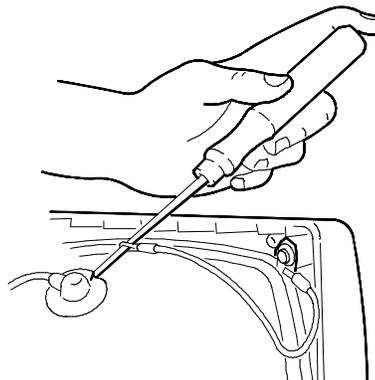


Fig. 11-3 Screwdriver to ground connection

4. Press the cable support (P) in the direction indicated in the figure to free the cables. Push the support inside the casing.

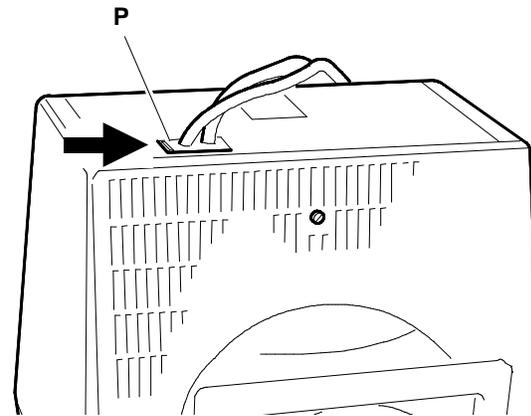
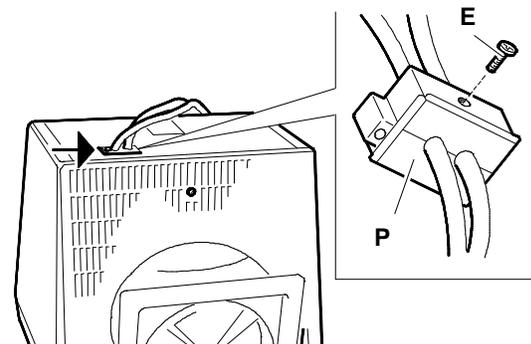


Fig. 11-4 Removing the video cables support

5. Remove the casing passing the cables through the passage slot. Take care not to damage the cables or the board components.
6. If it is necessary to **change the power or signals cable** the procedure is the following:

- Remove screw (E) from cable support (P) to separate the two cables.



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Fig. 11-5 Cables support (P) removal

- To remove the power cable, loosen screw (F) that connects the cable to the motherboard metal support (ground) and disconnect J101 from the motherboard.
- To remove the monitor signals cable, remove the video amplifier board from the CRT, loosen screw (G) that secures the cable to the motherboard metal support, unplug connector J103 from the motherboard and connector J2 from the video amplifier board.

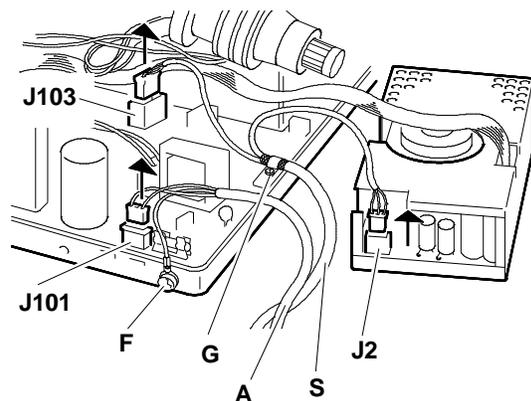


Fig. 11-6 Video signal cable (S) and power cable (A) removal

## REMOVING THE VIDEO AMPLIFIER BOARD

7. Remove the silicone adhesive which secures the CRT to the video amplifier board (this is a transport precaution).
8. Remove the adhesive sponge (S) on the metal casing solder side of the video amplifier board (V) to have access to the adjustment potentiometers on this board.
9. Loosen the screw (A) that holds the earthing ribbon (M) connecting the video amplifier board support to the motherboard as indicated in the figure.
10. Disconnect the video amplifier board (V) from the CRT.

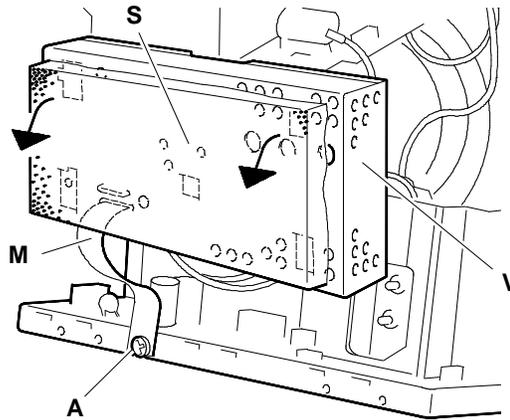


Fig. 11-7 - Adhesive sponge (S) removal  
- Earthing ribbon (M) disconnection

11. Disconnect from the video amplifier board:
  - Interface cable connector J1 to the motherboard
  - Interface cable connector J2 to monitor signals cable
  - CRT ground cable connector J3.
12. With a pair of pliers turn the four fixing tabs (B) of the video amplifier board upper cover and remove.

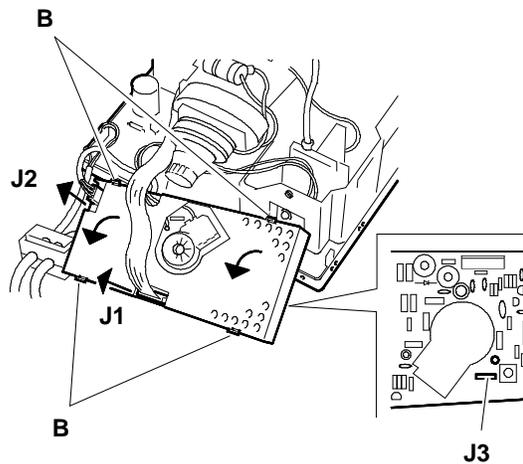


Fig. 11-8 Video amplifier board cables disconnection

13. Unhook and turn the casing of connection G3 (focus) on the video amplifier board. Unsolder the cable to disconnect it.
14. To have access to connection G2 (screen cable) remove the video amplifier metal protection screen. To remove this protection unsolder the 6 solder spots. Once the protection has been removed it is possible to reach connection G2. Unsolder the cable to disconnect it.
15. The video amplifier board is now completely free from all cables.

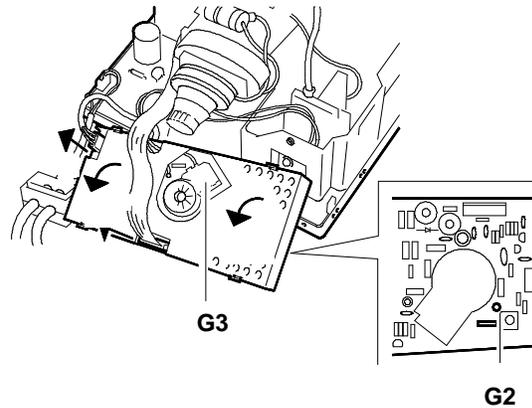
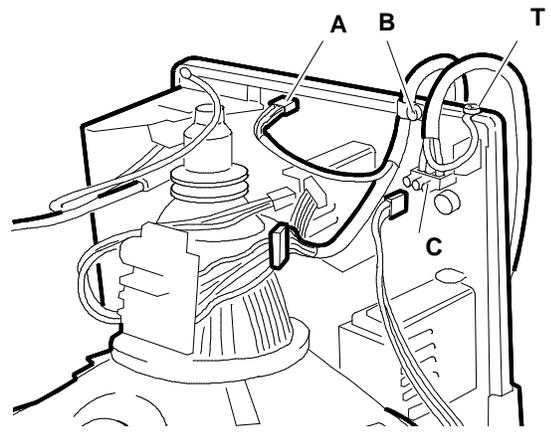


Fig. 11-9 Disconnection of G3 and G2 connection from video amplifier board

### REMOVING THE MOTHER BOARD

16. Disconnect the signals cable from connector (A) and remove the cable clamp (B).
17. Disconnect the power cable from connector (C) and from the ground tank (T).



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Fig. 11-10 Signal and power cable disconnection

18. Loosen screw (A) that fixes the degausser connection to the motherboard metal support. Disconnect connections J102 (degausser connection) and J104 (Deflection coil connection).

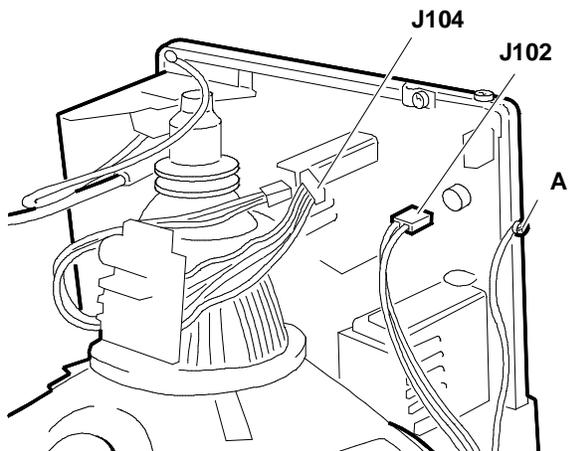


Fig. 11-11 Disconnection of cables from motherboard

19. Before disconnecting the CRT anode, make sure it is completely discharged inserting the tip of a screwdriver connected to ground through the CRT earthing ribbon.
20. To remove the anode, turn the plastic cover upside-down and remove the two contacts.
21. Remove screw (A) that secure the adjusting potentiometers for contrast and brightness (C & L). Push these potentiometers into the casing.
22. Disconnect the cables connecting the two potentiometers to connectors J306 and J106 on the motherboard.
23. Press the retaining clips (B) outwards to free the motherboard. Remove the motherboard from the casing. Take care not to damage any of the components.

**NOTE:** The motherboard is secured to a support which should not be removed.

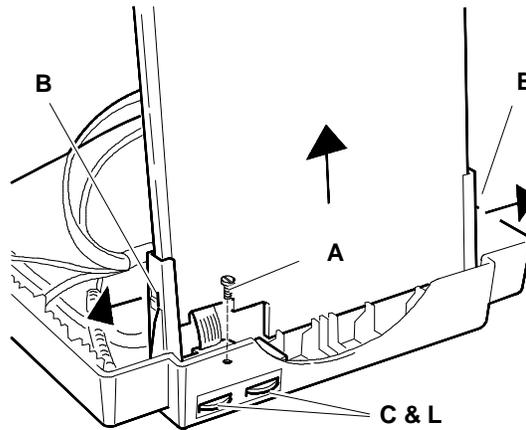


Fig. 11-12 Motherboard structure removal from video frame

24. To remove the metal casing panel on the solder side of the motherboard, slide it until the securing tabs are free, then remove it. It is now possible to have access to the motherboard adjustment points.

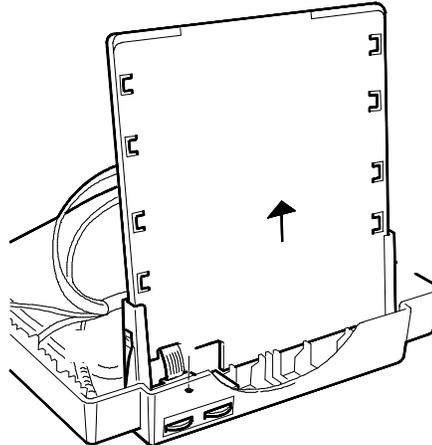


Fig. 11-13 Motherboard solder side protection removal

25. When re-installing the motherboard make sure that the metal ring (C) on the CRT anode contact is correctly fastened under the fixing ring (D) of the anode suction cup.

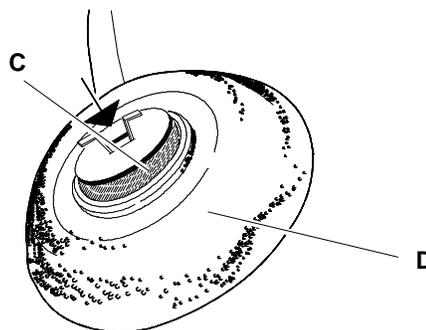


Fig. 11-14 CRT anode correct mounting

## REMOVING THE CRT

**NOTE:** In addition to the cathode ray tube, the CRT also integrates the deflection yoke and the adjustment magnets for geometric distortion. These magnets should not require adjustment.

26. Loosen the 4 screws (V) that secure the CRT to the front casing of the monitor.
27. Cut the two bands (F) that retain the degauss coil.
28. Lift the CRT from the monitor front casing to free the DEGAUSS coil.
29. Remove the earthing ribbon (G) from the CRT and unhook the tensioning spring (M) from the mounting brackets.

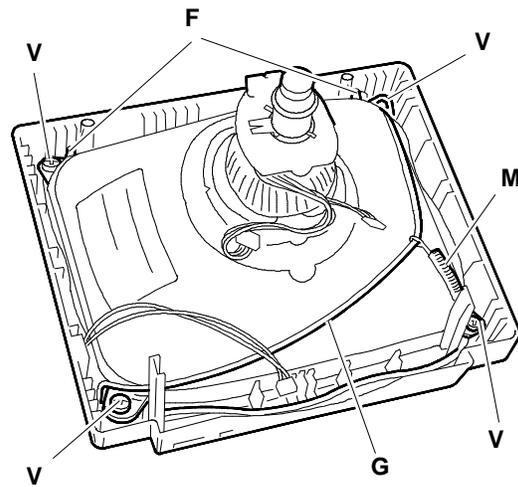


Fig. 11-15 CRT removal

## ADJUSTING THE MONITOR

The sequence indicated should be followed step by step because some adjustments affect the subsequent modifications.

### Motherboard adjustments

#### ADJUSTING THE VOLTAGE

- Set the contrast and brightness controls half-way.
- Turn beam limiter potentiometer RV118 clockwise to the end of its travel.
- Switch on the system.

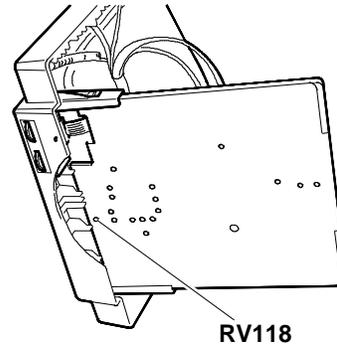


Fig. 11-16 Beam limiter potentiometer position

- Darken the monitor completely with the contrast and brightness controls and potentiometer G2 SCREEN of transformer TH02.

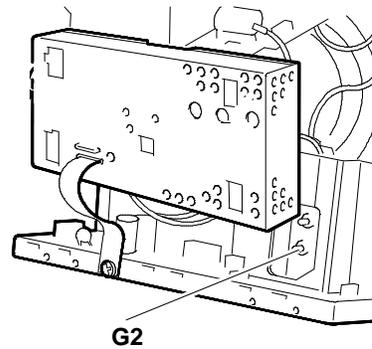


Fig. 11-17 G2-SCREEN potentiometer position

- Adjust RV101 until a voltmeter connected between diode D114 and ground measures a voltage of 83 V.

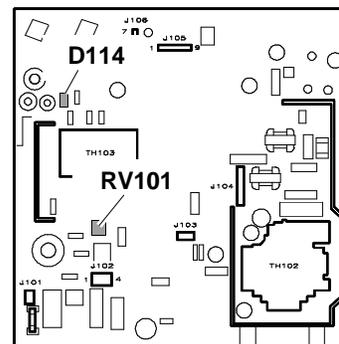


Fig. 11-18 Voltage adjustment

### ADJUSTING THE FREQUENCY

- Connect the signals cable to stabilize the horizontal synchronism.
- Connect a frequency meter on PIN 4 of component IC104.
- Adjust trimmer RV117 until the frequency signal measures 29.5 KHz.

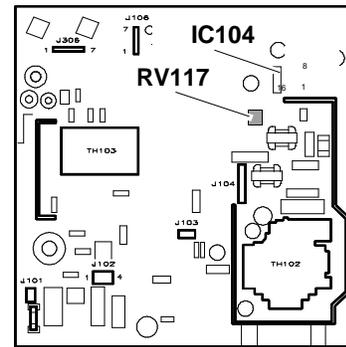


Fig. 11-19 Frequency adjustment

### ADJUSTING THE FREQUENCY LEVEL 31/38 KHZ

- System Test: *640 x 480 GRAPHICS*.
- Connect a voltage meter between PIN 4 on IC103 and ground.
- Measure to find the voltage when the horizontal scanning frequency is 31 KHz (VGA standard mode).
- Measure to find the voltage when the horizontal scanning frequency is 38 KHz (VGA ERGO mode) . To change the scanning frequency use the VIDEO REFRESH RATE option of the SET UP utility on the System Test.
- Connect the voltmeter between PIN 5 on IC103 and ground.
- Adjust RV104 until the voltage measured is the average of the two previous measurements on PIN 4 of IC103.

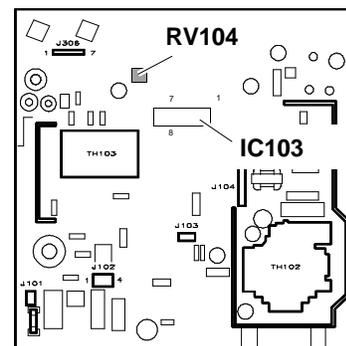


Fig. 11-20 31/38 KHz frequency level adjustment

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### ADJUSTING THE DATA AREA DIMENSIONS (VGA STANDARD 31 KHz)

- System Test: *640 x 480 GRAPHICS*.
- Adjust RV113 until the horizontal width measures 240 mm +/- 4 mm.
- Adjust RV109 until a vertical height measures 180 mm +/- 4 mm.

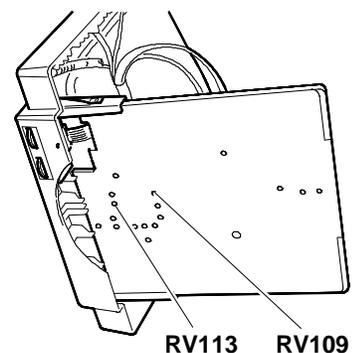


Fig. 11-21 Data area dimensions (VGA standard) adjustment

### ADJUSTING THE DISTORTION (PINCUSHION)

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

### ADJUSTING THE HORIZONTAL LINEARITY

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

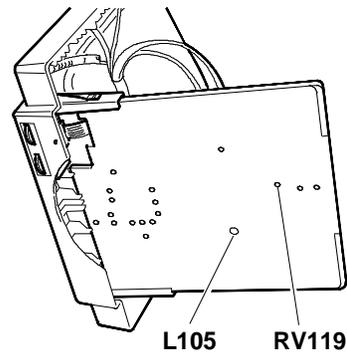


Fig. 11-22 - Pincushion distortion adjustment  
- Horizontal linearity adjustment

### ADJUSTING THE VERTICAL LINEARITY

- System Test: *640 BY 400 GRAPHICS*.
- Adjust the vertical linearity using potentiometer RV115.

### ADJUSTING THE HORIZONTAL CENTERING (VGA STANDARD 31 KHz)

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

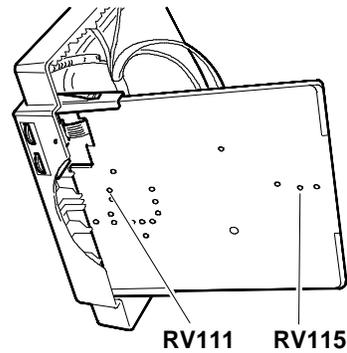
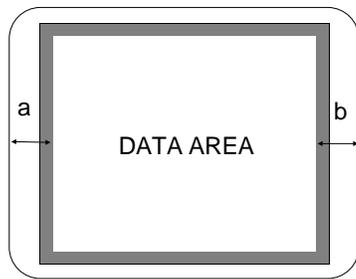


Fig. 11-23 - Vertical linearity adjustment  
- Horizontal centering adjustment (VGA standard 31 KHz)



### ADJUSTING THE VERTICAL CENTERING

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

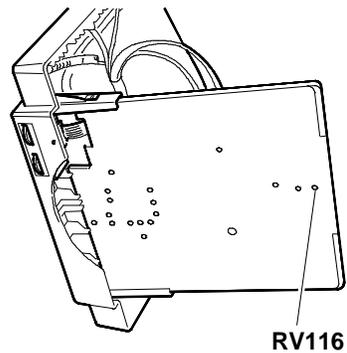
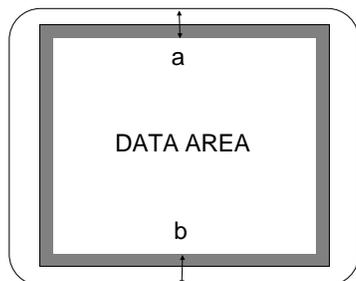


Fig. 11-24 Vertical centering adjustment

### ADJUSTING THE VERTICAL WIDTH

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

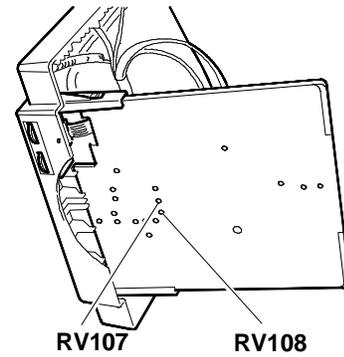


Fig. 11-25 Vertical width adjustment

### ADJUSTING THE DATA AREA DIMENSIONS (VGA ERGO 38 KHz)

- System Test: *640 BY 480 GRAPHICS*.
- Adjust RV124 until the horizontal width measures 240 mm +/- 4 mm.
- Adjust RV106 until the vertical height measures 180 mm +/- 4 mm.

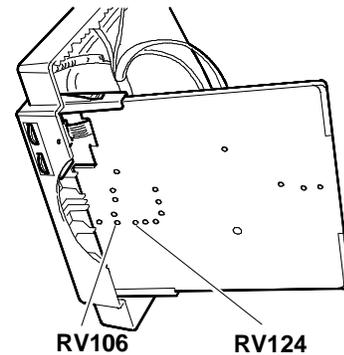


Fig. 11-26 Data area dimensions adjustment (VGA ergo 38 KHz)

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### ADJUSTING THE HORIZONTAL CENTERING (VGA ERGO 38 KHz)

- System Test: *640 BY 480 GRAPHICS*.
- Centre the picture horizontally on the screen using potentiometer RV112.  $|a - b| < 4\text{mm}$ .

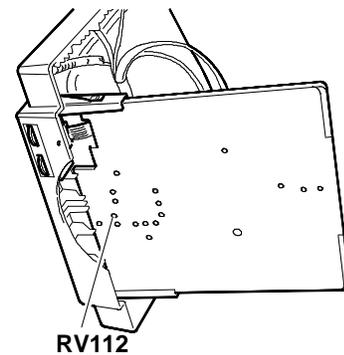
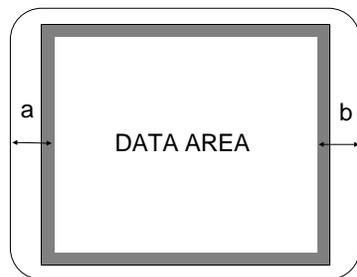


Fig. 11-27 Horizontal centering adjustment (VGA ergo 38 KHz)

## ADJUSTING THE FOCUS

- System Test: *CHECK LINEARITY.*
- Adjust potentiometer G3 "FOCUS" on transformer TH102 to obtain the best possible focus.

**NOTE:** The vertical width adjustments with trimmers RV110 and RV122, for operating modes 640 x 350 and 640 x 400 with a horizontal scanning frequency of 38 KHz, are not used.

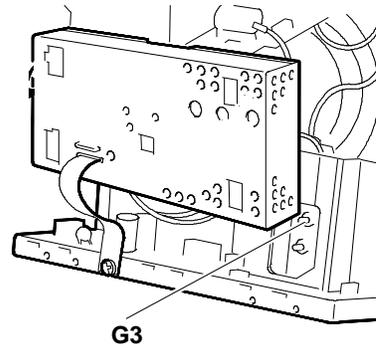
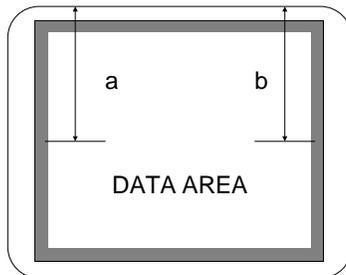


Fig. 11-28 Focus adjustment

## ADJUSTING THE TILT

- System Test: *CROSS HATCH WITH CIRCLE IN THE CENTRE OF SCREEN.*
- Make sure the the monitor picture measurements are within the parameters indicated in the figure.



$|a - b| \geq 1,7 \text{ mm} \leq 2,3 \text{ mm}$ : minimum defect  
 $|a - b| \geq 2,3 \text{ mm}$ : maximum defect

- If they are not, move the CRT by means of the fixing screws indicated in figure 11-15.

