

## DX2P Geometry, Convergence, and Purity Adjustments

The procedures explained in this package apply to the models CT-32HX40B, CT-36HX40B and subsequent models using similar CRT design.

Before performing the adjustments below, try to adjust the picture geometry, using the customer setup menu. This adjustment is provided to correct for picture geometry errors caused by the earth magnetic field.

Certain televisions may exhibit symptoms such as poor alignment of geometry or bowing at the sides of the picture, similar to those caused by problems in the pincushion correction circuit. Improperly aligned geometry would clearly be apparent when viewing a crosshatch pattern. The customer may complain about the picture while viewing letterbox movies or programs that display text information at the bottom of the screen, such as the stock market ticker. Because of the nature of the Flat screen tube, the convergence and pincushion adjustment procedures are more complex than are those for a standard television CRT. There are more Serviceman-mode adjustments than in previous television models.

**Note: As you go through this procedure, it is a good idea to degauss the set frequently as you go along, since some of the procedures may temporarily offset the purity.**

### Step 1

Apply a white field pattern to the television for 60 minutes to stabilize the CRT. It is best to reposition the TV, so that the screen faces East or West. This minimizes the effect of the earth's magnetic field on the CRT.

### Step 2

Degauss the CRT using an external degaussing coil. Any of the large magnetic strips that may have been applied by non-factory personnel should be removed.

### Step 3 - Yoke Adjustment:

Be sure that the yoke is flush against the bell of the CRT (Pushed all the way in). It is very important that the yoke is not tilted. Adjust the yoke so that it is parallel to the CRT face, and secure it with the mounting screw, using a non-magnetized screwdriver. Otherwise, degauss the CRT before continuing.

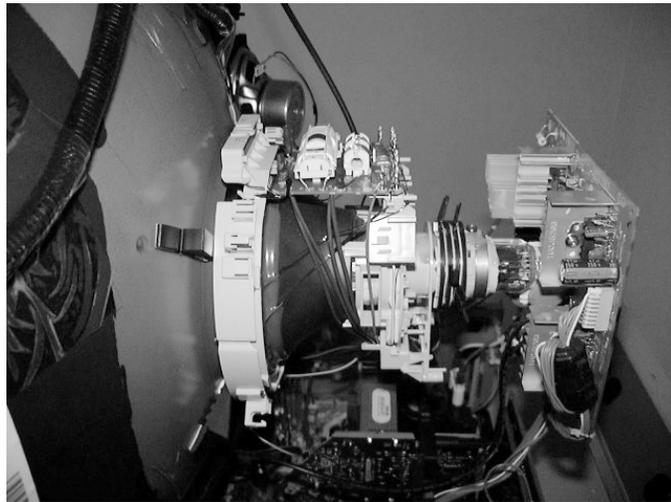


Fig. 1

Slight adjustments of the yoke can still be made to correct the tilt. Apply a crosshatch pattern. Rotate the yoke to correct for any tilt. Do not worry about the line position (raster position) as this will be fixed with a later adjustment.

It is best to mark the initial position of the CRT rings for reference. Do not adjust the purity rings (first set of rings and closest to the face of the CRT, see fig. 2 & 3) as this may cause major purity changes. This set of rings is **not** needed to complete the geometric adjustments. The adjustments of the VRS (Vertical Raster Shift) and convergence rings do not normally interact with or affect the purity, if the procedure is followed correctly.

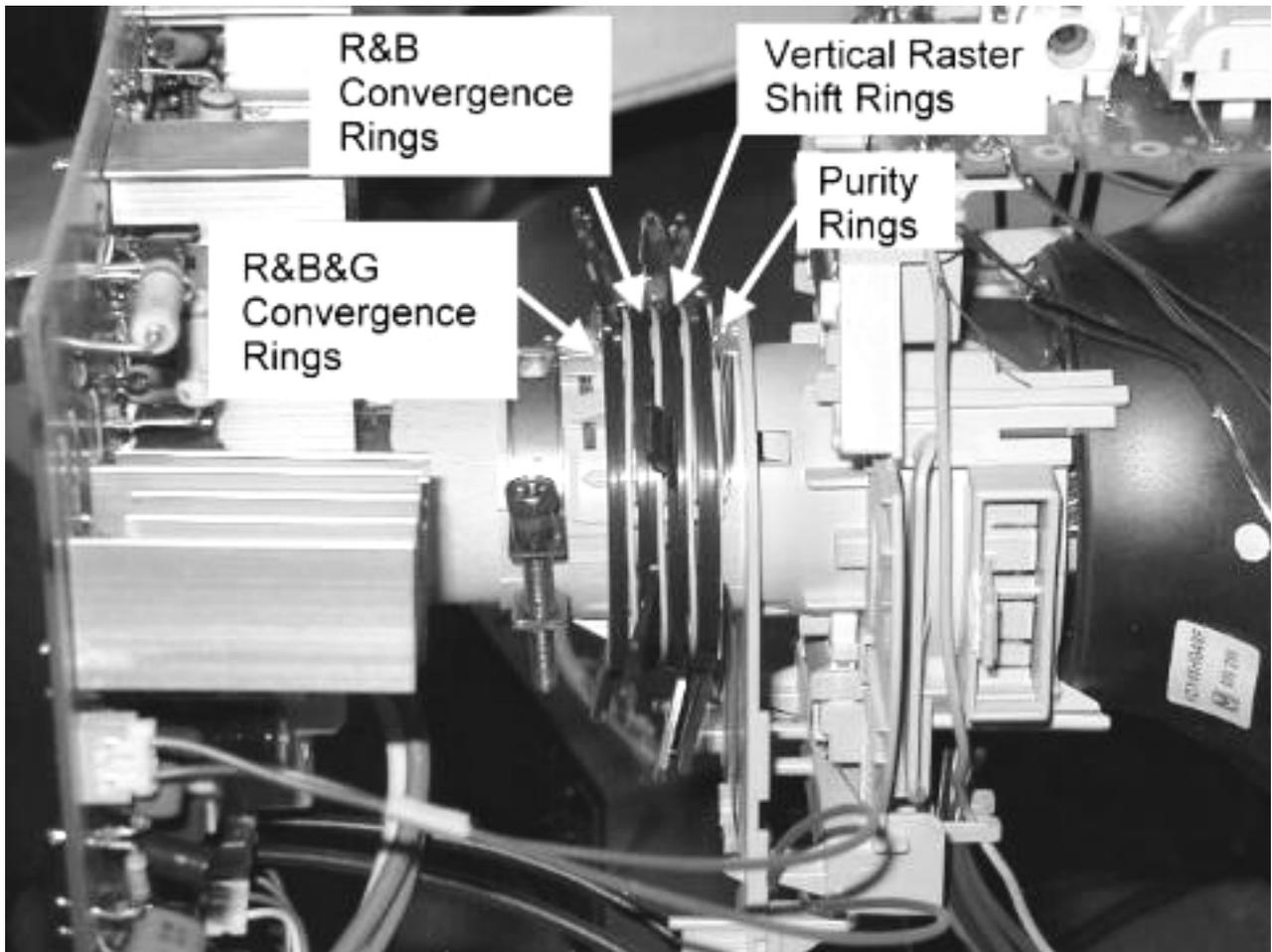


Fig. 2

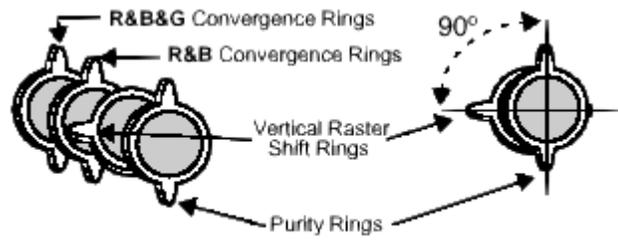
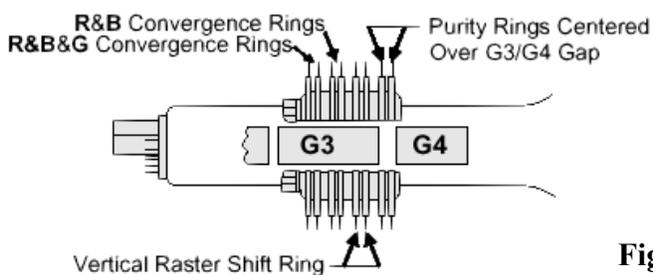
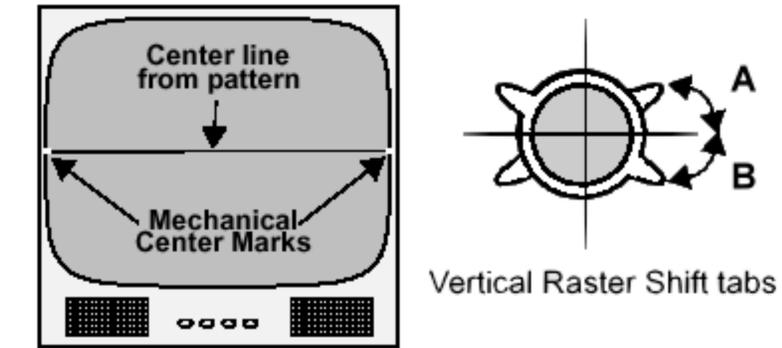


Fig. 3

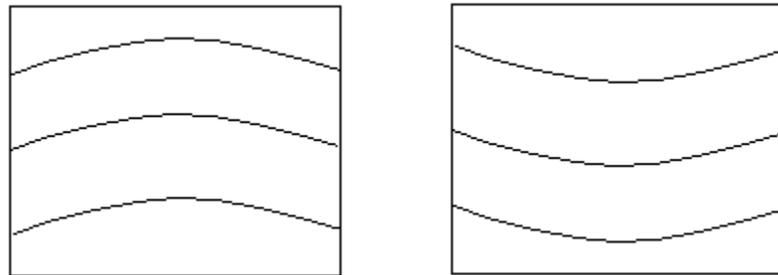
**Step 4 - Vertical Raster Shift Adjustment:**

Start with the Vertical Raster Shift rings together in the three and nine o'clock positions. Spread the tabs to adjust for a straight horizontal line (not bowed). If the pattern lines are bowed as shown in figure 4-1, adjust to obtain straight lines. However, if the lines are curved as shown in figure 4-2, adjust to balance the curvature on the top and bottom of the screen. If the centerline is not aligned with the mechanical center-marks on the CRT, use the raster centering adjustment available in the serviceman mode menu to vertically center the raster. Do not rotate the tabs, as this will affect the purity. Referencing the drawing in figure 4, make sure that the angle "A" matches angle "B".

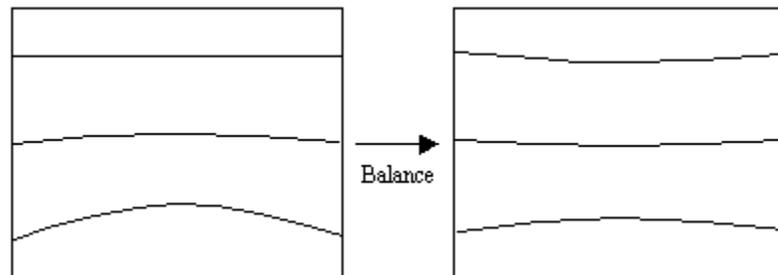


**Vertical Raster Shift Adjustment**

**Fig. 4**



**Fig. 4-1**



**Fig. 4-2**

Note: changes in the VRS will affect the convergence.

## Convergence Adjustments

### Step 5 - Initial Static Convergence:

With the crosshatch pattern applied, observe the convergence at the center of the screen only. Adjust the Red & Blue convergence rings (referred to as ring #3 in figure 5A), by spreading the tabs and rotating the poles so that the red and blue raster lines converge creating a magenta pattern. You may find that the outside edges of the screen do not converge. These areas will be corrected using the Dynamic Convergence adjustment.

### Step 6

Continue adjusting the convergence by rotating and spreading the R & G & B rings (referred to as ring #4 in figure 5A), to merge the previously converged Red and Blue with the Green Raster lines. A properly converged set will show white lines. Again, you are only adjusting the convergence in the center of the screen. Notice that the adjustments in steps 5 and 6 interact. Therefore, you may have to go back and forth as you perform the two adjustments.

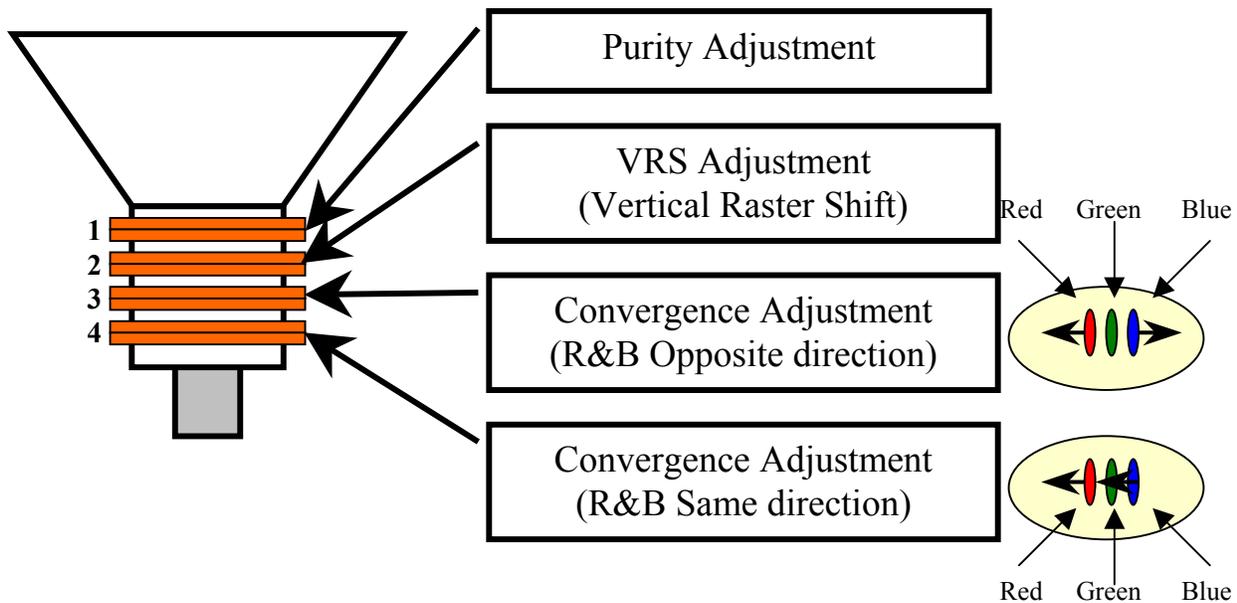
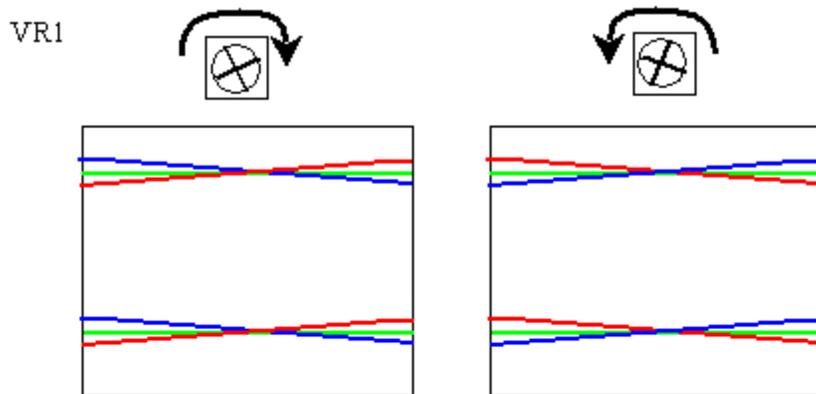


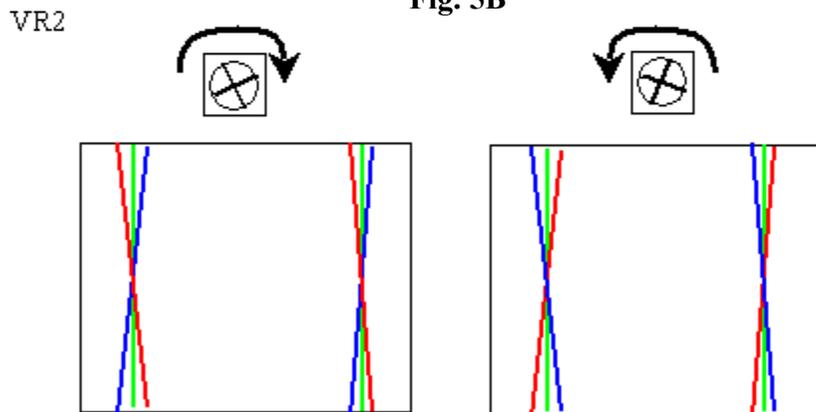
Fig. 5A

**Step 7 - Dynamic Convergence:**

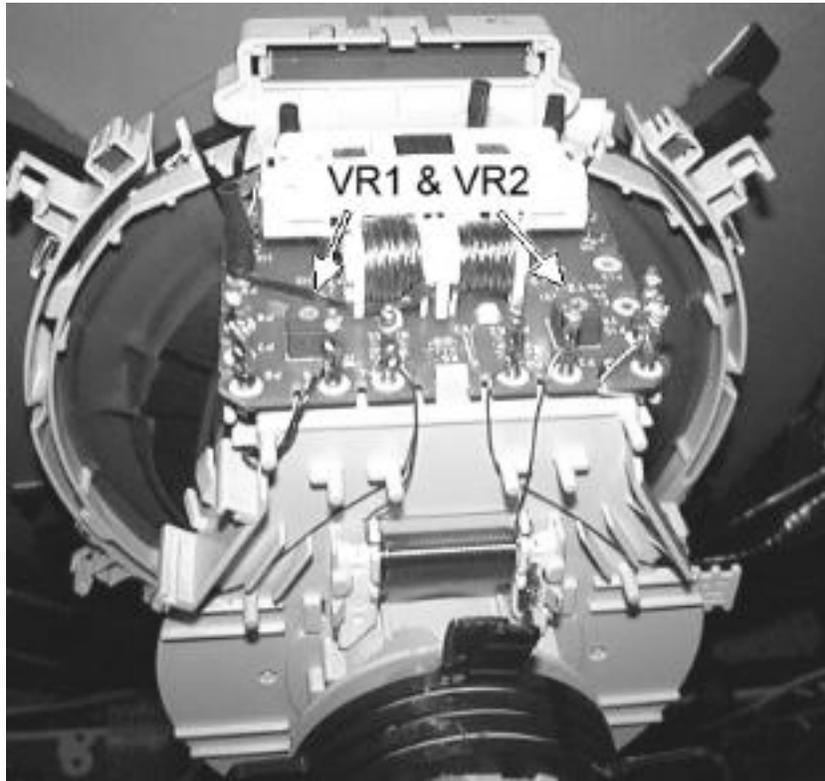
Apply a crosshatch pattern, and adjust VR1 (see figure 5D) on the deflection yoke board to obtain proper convergence of the red and blue horizontal lines at the top and bottom of the screen, see figure 5B. Continue by adjusting VR2 to obtain proper convergence of the red and blue vertical lines at the left and right sides of the screen, see figure 5C. Do not worry that the crosshatch lines are not straight. The lines will be straightened, using serviceman mode adjustments.



**Fig. 5B**



**Fig. 5C**



Locations of VR1 and VR2 on the yoke assembly

Fig. 5D

**Step 8 - (Convergence):**

In some cases, adjusting VR1 and VR2 does not yield satisfactory convergence results in some fringe areas of the CRT, see figure 6A. ***If convergence is satisfactory, skip this step.***

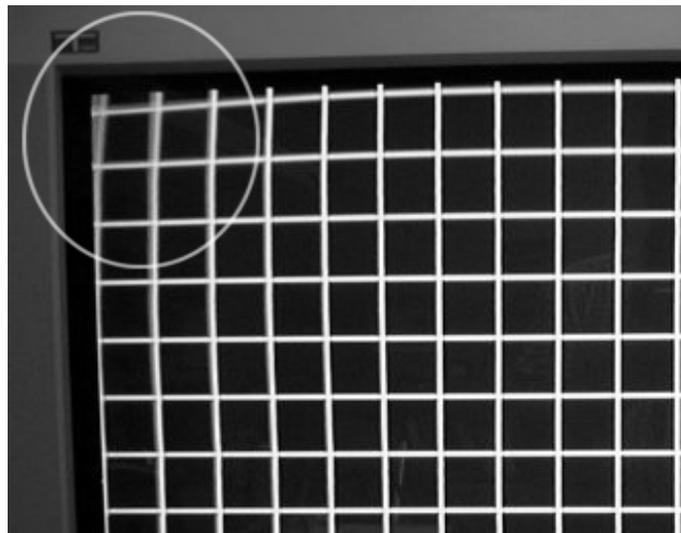


Fig. 6A

To correct this condition, Permalloy strips can be used. Permalloy strips are made of a non-magnetic alloy. A Permalloy strip is shown in figure 6B below. It can be inserted between the deflection yoke and the bell of the tube and carefully positioned to optimize convergence in the affected fringe area of the CRT. See figure 6C.

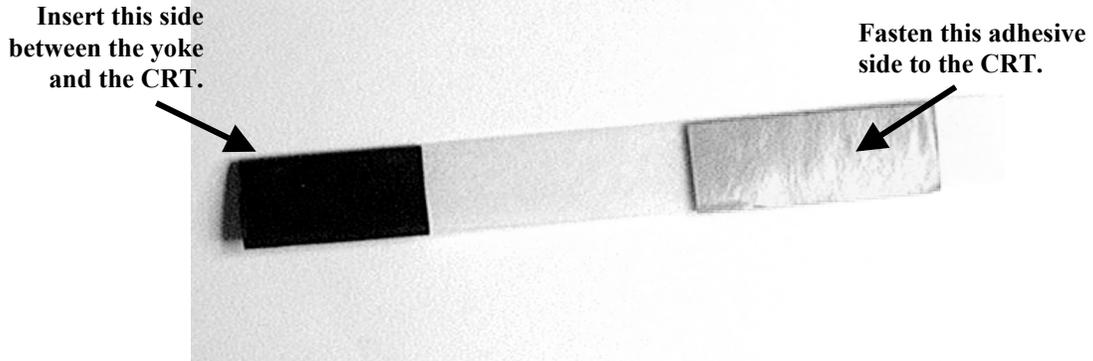


Fig. 6B

Satisfactory results can be obtained by using Permalloy strips as shown in figure 6D.

**Caution:**  
Avoid using too many Permalloy strips as they do affect the geometry of the picture.

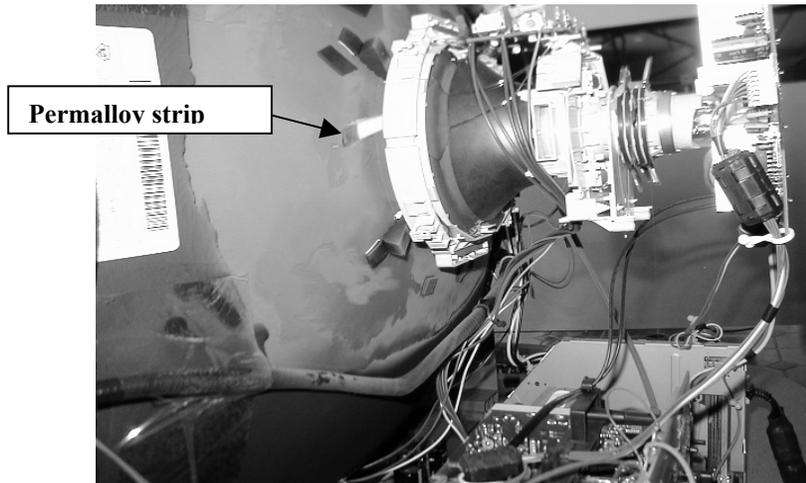


Fig. 6C

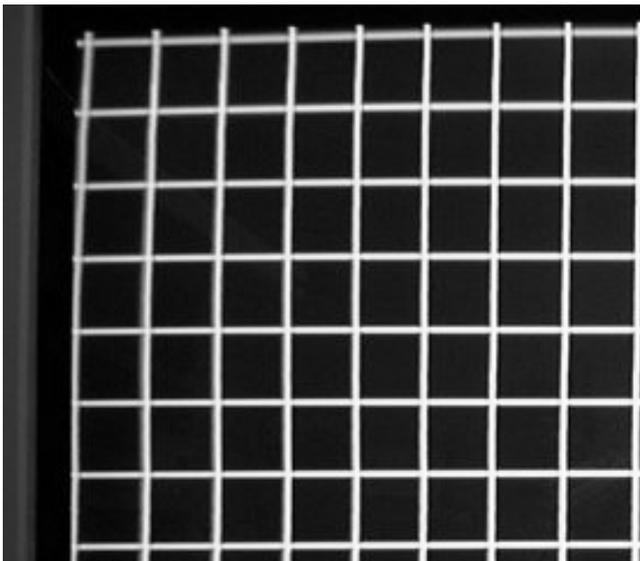


Fig. 6D

## Picture Geometry Adjustments

### Step 9 - (Entry to Serviceman Mode):

1. Use the Remote Control unit, and select the Set-Up icon and select Cable Mode.
2. Select the Timer icon and set the sleep timer to 30 minutes or higher.
3. Press Action button twice to exit the menus.
4. Tune to channel 124.
5. Press the Volume Down button *on the TV's front panel* until the volume is set to minimum and a red CHK is displayed on the screen.
6. Press the Power button on the Remote Control to display the serviceman Mode adjustment menu, see figure 7 below.



**Serviceman Mode Menu**

**Fig. 7**

**Picture geometry adjustments should be performed in all five modes, 480I, 480P (16:9), 480P Split Screen Mode, 1080I (16:9), and 1080I Split Screen Mode.**

The two tables in figure 7A show the default values of the adjustments for the 32" and 36" models. Values shown in **bold** characters can be accessed and adjusted according to the following steps. However, adjustments not emphasized in bold characters should be left at their default values.

It is recommended that you print or copy the table shown on the following page and record each data value before changing it.

32"	480I	480P		1080I	
		Split Screen	16:09	16:09	Split Screen
Adjust. Name					
HLIN	4F			FF	
<b>HPOS</b>	<b>34</b>			<b>51</b>	
<b>HWID</b>	<b>45</b>			<b>37</b>	
<b>PCC</b>	<b>63</b>	<b>10</b>	<b>25</b>	<b>53</b>	<b>2B</b>
PCCHG	0C	10	12	06	13
PCCLG	07	22	15	09	00
PCCHS	08	00	00	00	01
PCCLS	0B	00	00	03	04
<b>TOPG</b>	<b>10</b>	<b>15</b>	<b>13</b>	<b>12</b>	<b>12</b>
<b>BTMG</b>	<b>12</b>	<b>11</b>	<b>10</b>	<b>0E</b>	<b>13</b>
TPOSL	00	08	00	00	00
BTMSL	03	07	0B	04	05
<b>TRAP</b>	<b>72</b>	<b>7F</b>	<b>75</b>	<b>7C</b>	<b>7F</b>
<b>PARA</b>	<b>09</b>	<b>08</b>	<b>0A</b>	<b>0A</b>	<b>09</b>
<b>SIDE</b>	<b>01</b>	<b>06</b>	<b>03</b>	<b>05</b>	<b>06</b>
<b>V-RAS</b>	<b>36</b>	<b>6A</b>	<b>40</b>	<b>48</b>	<b>40</b>
<b>VAMP</b>	<b>56</b>	<b>4B</b>	<b>4B</b>	<b>18</b>	<b>12</b>
V-C	21	1F	24	20	20
V-S	16	14	0B	0F	14

36"	480I	480P		1080I	
		Split Screen	16:09	16:09	Split Screen
Adjust. Name					
HLIN	CF			FF	
<b>HPOS</b>	<b>3D</b>			<b>57</b>	
<b>HWID</b>	<b>5F</b>			<b>4F</b>	
<b>PCC</b>	<b>45</b>	<b>0E</b>	<b>31</b>	<b>53</b>	<b>29</b>
PCCHG	0C	0D	0A	0A	0A
PCCLG	02	19	0A	0A	0A
PCCHS	09	00	0A	08	0A
PCCLS	01	00	0D	09	0A
<b>TOPG</b>	<b>11</b>	<b>15</b>	<b>14</b>	<b>09</b>	<b>12</b>
<b>BTMG</b>	<b>14</b>	<b>14</b>	<b>14</b>	<b>10</b>	<b>12</b>
TPOSL	02	09	02	05	05
BTMSL	04	06	08	04	07
<b>TRAP</b>	<b>75</b>	<b>80</b>	<b>78</b>	<b>7C</b>	<b>7C</b>
<b>PARA</b>	<b>08</b>	<b>06</b>	<b>08</b>	<b>06</b>	<b>06</b>
<b>SIDE</b>	<b>02</b>	<b>04</b>	<b>05</b>	<b>04</b>	<b>05</b>
<b>V-RAS</b>	<b>43</b>	<b>57</b>	<b>37</b>	<b>48</b>	<b>3D</b>
<b>VAMP</b>	<b>68</b>	<b>56</b>	<b>53</b>	<b>19</b>	<b>20</b>
V-C	22	1F	22	1F	22
V-S	17	0B	09	0D	10

Changes can be made only to values indicated in **BOLD** characters. Other adjustments should be kept at their default values.

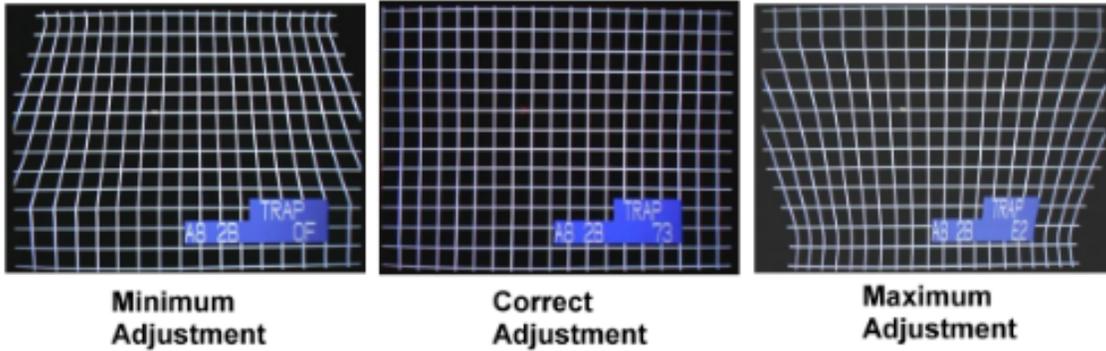
**Fig. 7A**

	480I	480P		1080I	
Adjust.					
Name		Split Screen	16:09	16:09	Split Screen
HLIN	CF			FF	
<b>HPOS</b>					
<b>HWID</b>					
<b>PCC</b>					
PCCHG	0C	0D	0A	0A	0A
PCCLG	02	19	0A	0A	0A
PCCHS	09	00	0A	08	0A
PCCLS	01	00	0D	09	0A
<b>TOPG</b>					
<b>BTMG</b>					
TPOSL	02	09	02	05	05
BTMSL	04	06	08	04	07
<b>TRAP</b>					
<b>PARA</b>					
<b>SIDE</b>					
<b>V-RAS</b>					
<b>VAMP</b>					
V-C	22	1F	22	1F	22
V-S	17	0B	09	0D	10

Use this table to record the current values prior to making any changes.

**Step 10 - Trapezoid adjustment:**

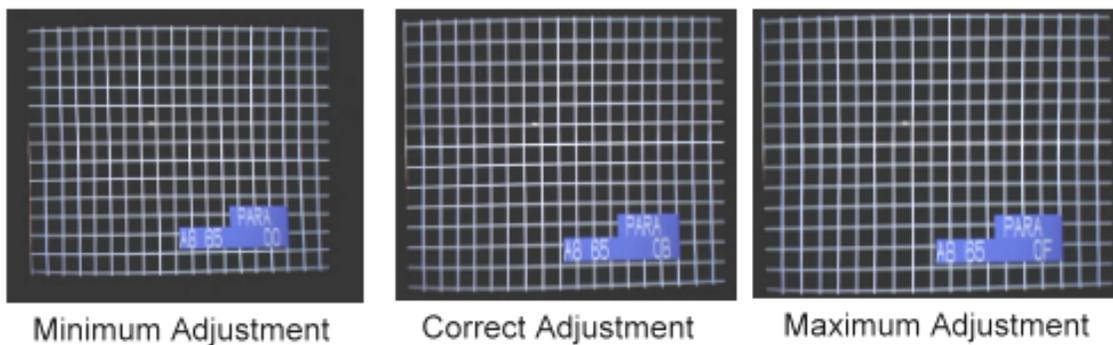
Apply a crosshatch pattern and put the set into Serviceman Mode. Using the channel up / down and volume up/ down buttons, move the cursor to highlight TRAP then press the Action button. The address and data values appear on the screen. Adjust the data value so that the vertical lines on the left and right sides are as straight as possible. Refer to figure 8.



**Fig. 8**

**Step 11 - Parallelogram Adjustment:**

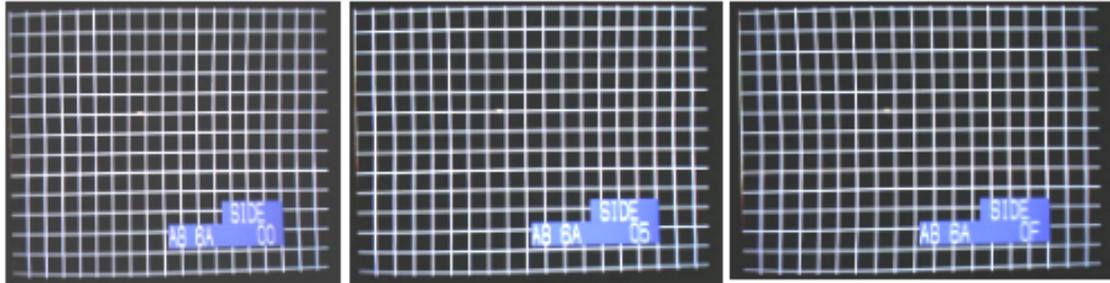
Apply a crosshatch pattern and put the set into Serviceman Mode. Use the channel up / down and volume up / down buttons to move the cursor and highlight PARA, then press the Action button. Adjust the Parallelogram data value so that the vertical lines on the left and right of the screen are as vertical as possible. See figure 9.



**Fig. 9**

**Step 12 - E-W PCC Balance Adjustment:**

Apply a crosshatch pattern and put the set into Serviceman Mode. Use the channel up / down and volume up / down buttons to move the cursor and highlight SIDE, then press the Action button. Adjust the data value so that the vertical lines on the left and right of the screen are as straight as possible. See figure 10 below.



Minimum Adjustment

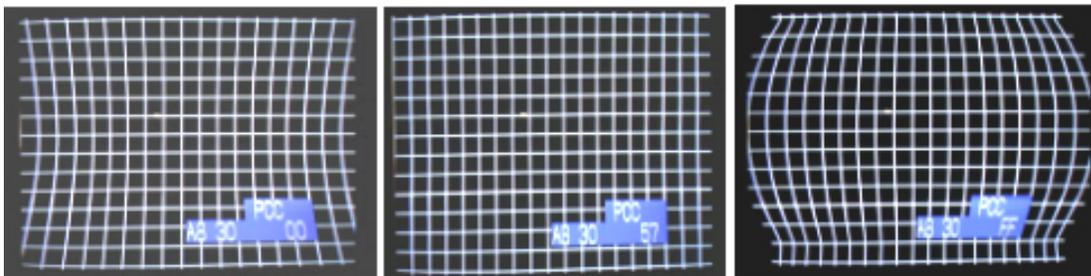
Correct Adjustment

Maximum Adjustment

**Fig. 10**

**Step 13 - E-W PCC Adjustment:**

Apply a crosshatch pattern and put the set into Serviceman Mode. Use the channel up / down and volume up / down buttons to move the cursor and highlight PCC, then press the Action button. Adjust the data value so that the vertical lines are as straight as possible. See figure 11. Depending on the severity of the problem additional Pincushion adjustments may be required. These are listed in steps 14 and 15.



Minimum Adjustment

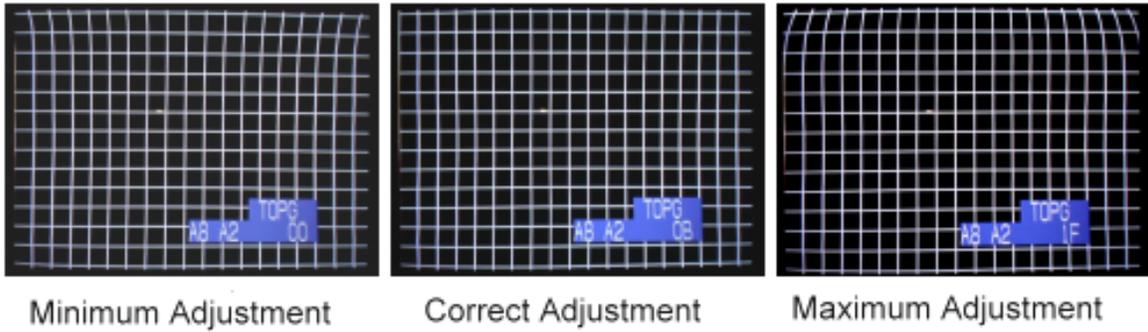
Correct Adjustment

Maximum Adjustment

**Fig. 11**

**Step 14A - Corner PCC Adjustment part 1:**

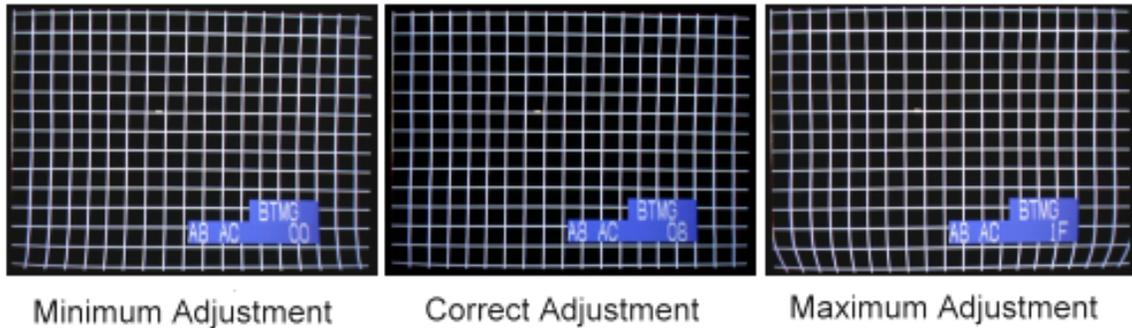
Apply a crosshatch pattern and put the set into Serviceman Mode. Use the channel up / down and volume up / down buttons to move the cursor and highlight TOPG, then press the Action button. Adjust the data value, so that the vertical lines near the top of the screen are as straight as possible. See figure 12A.



**Fig. 12A**

**Step 14B - Corner PCC Adjustment part 2:**

Apply a crosshatch pattern and put the set into Serviceman Mode. Use the channel up / down and volume up / down buttons to move the cursor and highlight BTMG, then press the Action button. Adjust the data value, so that the vertical lines near the bottom of the screen are as straight as possible. See figure 12B.



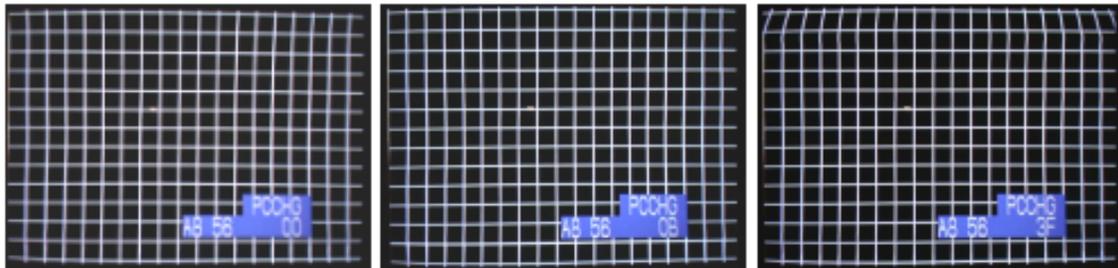
**Fig. 12B**

## Advanced PCC Adjustment

Adjustments in steps 15 and 16 are critical and require precision. Therefore, these two adjustments should not be made except by an experienced technician. Otherwise skip to step 17.

### Step 15 - E-W PCCHG Adjustment:

Apply a crosshatch pattern and put the set into Serviceman Mode. Use the channel up / down and volume up / down buttons to move the cursor and highlight PCCHG, then press the Action button. Adjust the data value, so that the vertical lines on the upper third of the screen are as straight as possible. See figure 13.



Minimum Adjustment

Correct Adjustment

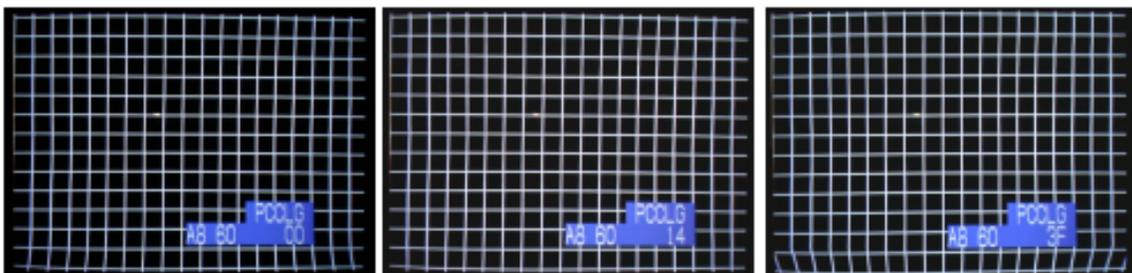
Maximum Adjustment

Fig. 13

### Step 16 - E-W PCCLG Adjustment:

Apply a crosshatch pattern and put the set into Serviceman Mode. Use the channel up / down and volume up / down buttons to move the cursor and highlight PCCLG, then press the Action button. Adjust the data value, so that the vertical lines on the lower third of the screen are as straight as possible. See figure 14.

Adjustments made in PCCHG or PCCLG interact with other Pincushion adjustment. Therefore, a touch up of some of the pincushion adjustment, previously made, may become necessary.



Minimum Adjustment

Correct Adjustment

Maximum Adjustment

Fig. 14

**Step 17 - Horizontal Size Adjustment:**

This adjustment should be performed in the 480I and 1080I modes. Apply a monoscope pattern and put the set into Serviceman Mode. Use the channel up / down and volume up / down buttons to move the cursor and highlight H WID, then press the Action button. Adjust the data value so that the width is  $5.00 \pm 0.40$  on both sides of the screen. See figures 15 and 16.

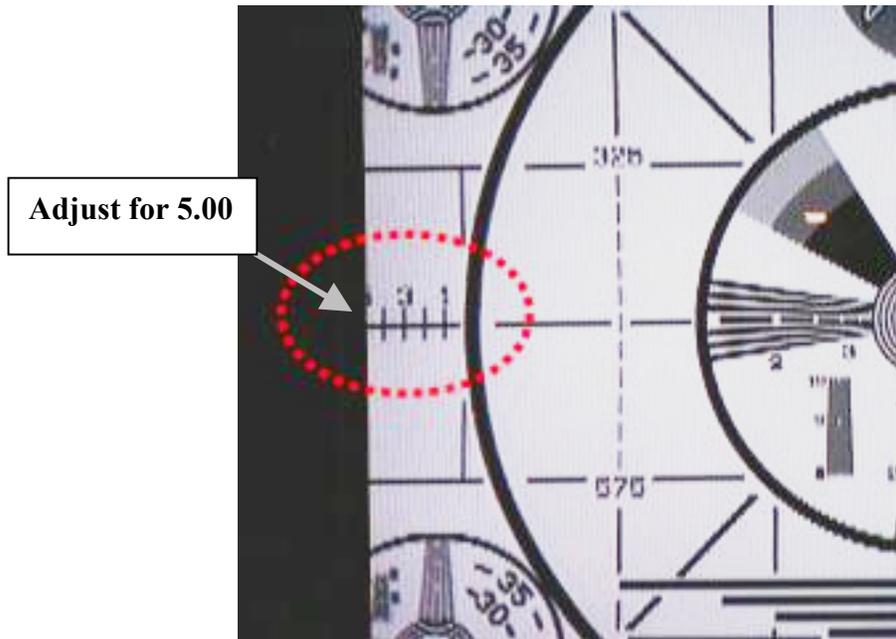


Minimum Adjustment

Correct Adjustment

Maximum Adjustment

**Fig. 15**



**Fig. 16**

## CRT Purity

To obtain a uniform purity field on the screen, put the TV into Serviceman mode, then press the Recall button on the remote control unit. The Recall function cycles through red, green, blue and white uniform fields.

When adjusting purity, **the deflection yoke should not be pulled back**. It should always be flush against the bell of the CRT (pushed in all the way).

### Step 1 - CRT Degaussing:

Use an external degaussing coil to demagnetize the CRT.

### Step 2 - purity Rings Adjustment:

#### Warning:

**This adjustment should not be performed unless the CRT has been replaced.** It requires that a microscope be used to check beam landing on the CRT phosphors. Furthermore, the purity rings do not usually change position from their factory setting. **Unless the CRT has been replaced, skip to step 3 below.**

- a- Ensure that the CRT is facing either East or West.
- b- Using the Recall button as mentioned above, select the green field.
- c- Set both tabs of the purity ring (closest to the yoke) in the 12 O'clock position.
- d- Spread the tabs apart until a uniform red field is visible on the screen. Use a microscope to confirm beam-landing uniformity.

### Step 3 - Optimizing Purity:

In situations where a purity imperfection is apparent on the screen such as in figure 17, purity can be optimized as in the following:

- a- Use the Recall button and select the Red field.
- b- Use a small magnetic strip and position it on the bell of the CRT, at least three to four inches away from the outer perimeter of the yoke.
- c- Move the strip so the impurity is minimized or eliminated.
- d- Affix the strip to the bell of CRT.
- e- Select the blue field to confirm its uniformity.



Fig. 17

## **Cautions:**

- a- Do not use the white field to check for purity, as the phosphor dot size difference in this CRT causes non-uniformity, which can be confused with impurity.
- b- Magnetic strips should be kept at least three to four inches away from the outer perimeter of the yoke. Placing magnetic strips close to the yoke causes geometric distortion.
- c- Care should be taken to avoid using big magnetic strips.
- d- Do not overuse magnetic strips. Use as few as possible.

If small magnetic strips are not available, a big magnetic strip can be cut to size and placed in a position where it minimizes the impurity spot.