

Alignments

Index of this chapter:

1. General Alignment Conditions
2. Hardware Alignments
3. Software Alignments and Settings

Note: The Service Default Alignment Mode (SDAM) is described in the "Service Modes, Error Codes and Fault Finding" section. SDAM menu navigation is performed by using the MENU UP, MENU DOWN, MENU LEFT, and MENU RIGHT keys of the remote control transmitter.

General Alignment Conditions

Perform all electrical adjustments under the following conditions:

- AC voltage and frequency: 110 V ($\pm 10\%$), 60 Hz ($\pm 5\%$).
- Connect the television set to the AC power via an isolation transformer.
- Allow the television set to warm up for approximately 20 minutes.
- Measure the voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply). Never use heatsinks as ground.
- Test probe: $R_i > 10\text{ M}\Omega$; $C_i < 2.5\text{ pF}$.
- Use an isolated trimmer/screwdriver to perform the alignments.

Hardware Alignments

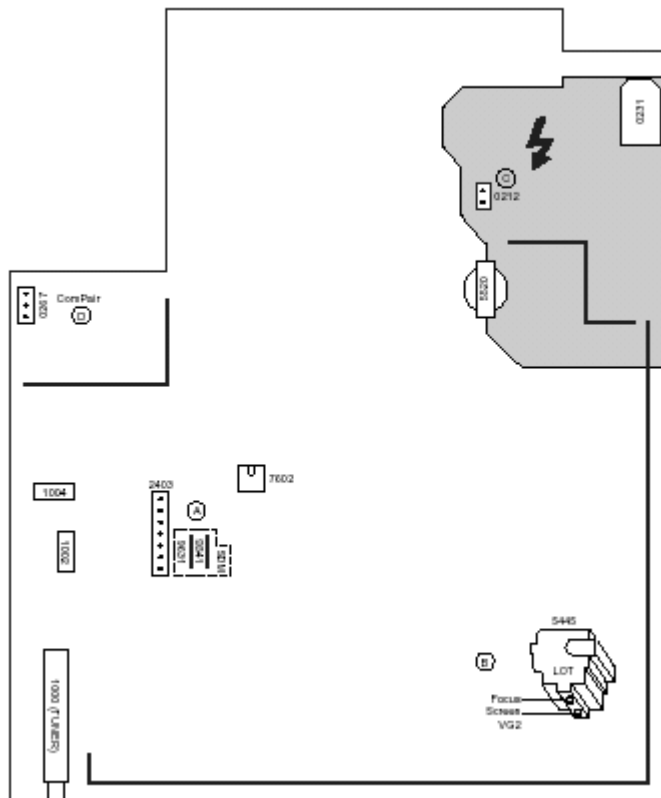


Figure: Family board (top view)

Vg2 Adjustment

1. To enter SDAM, press the following key sequence on the remote control transmitter: **0 6 2 5 9 6** directly followed by the **MENU** button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the WHITE TONE sub menu.
3. Press the MENU LEFT or MENU RIGHT key to enter the WHITE TONE sub menu.
4. In the WHITE TONE sub menu, press the MENU UP/DOWN keys to select NORMAL RED, NORMAL GREEN, or NORMAL BLUE.
5. Use the MENU LEFT/RIGHT keys to set the values of NORMAL RED, NORMAL GREEN and NORMAL BLUE to '40'.
6. Press the MENU button twice to enter the normal user menu.
7. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).

8. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
9. Use the MENU UP/DOWN keys to select PICTURE. Be sure to record the current value of PICTURE.
10. Use the MENU LEFT/RIGHT keys to set the value of PICTURE to '0'.
11. Use the MENU UP/DOWN keys to select BRIGHTNESS. Be sure to record the current value of BRIGHTNESS.
12. Use the MENU LEFT/RIGHT keys to set the value of BRIGHTNESS to minimum (OSD just visible in a dark room).
13. Press the MENU button twice to return to the top level SDAM menu.
14. Press the STATUS/EXIT button to hide the SDAM onscreen display.
15. Connect the RF output of a video pattern generator to the antenna input.
16. Input a 'black picture' test pattern to the television set.
17. Set the oscilloscope to 50 V/div and the time base to 0.2 milliseconds (external triggering on the vertical pulse).
18. Ground the scope at the CRT panel and connect a 10:1 probe to one of the cathodes of the picture tube socket (see schematic diagram B).
19. Measure the 'cut off pulse' during the first full line after the frame blanking (see Fig. 8-2). You will see two pulses, one being the 'cut off pulse' and the other being the 'white drive pulse'. Choose the one with the lowest value; this is the 'cut off pulse'.
20. Select the cathode with the highest VDC value for the alignment. Adjust the Vcutoff of this gun with the SCREEN potentiometer (see Fig. 8-1) on the LOT to the correct value (see table 8-1).
21. Press the STATUS/EXIT button to display the SDAM onscreen display.
22. Press the MENU button to enter the normal user menu.
23. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
24. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
25. Use the MENU UP/DOWN keys to select PICTURE.
26. Use the MENU LEFT/RIGHT keys to reset the value of PICTURE to the original value.
27. Use the MENU UP/DOWN keys to select BRIGHTNESS.
28. Use the MENU LEFT/RIGHT keys to reset the value of BRIGHTNESS to the original value.
29. Press the MENU button twice to return to the top level SDAM menu.

30. Use the POWER button on the remote control transmitter or the POWER button on the television set to turn off the television set. This will save the changes made in SDAM.

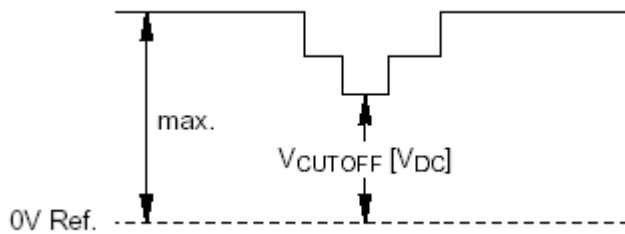


Figure: Vcutoff

Table: Vg2 cut-off point (Large Screen)

Screen Size (RF= Real Flat)	Cut-off point (V)
20RF Matsushita 20RF Samsung 20RF LG Philips 25V Curved Face 27V Curved Face	+145 V +/- 4 V
27RF 29RF LG Philips	+155 V +/- 4 V
20RF Philips 27RF Samsung 32RF 26 Wide Screen RF 30 Wide Screen RF	+160 V +/- 4 V

RF = Real Flat

V = (Visible) Diagonal Screen Measurement of Phosphor

Focusing

1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a circle or crosshatch test pattern to the television set.
3. Press the AUTO PICTURE button on the remote control transmitter repeatedly to choose PERSONAL or MOVIES picture mode.

4. Adjust the FOCUS potentiometer (see Fig. 8-1) until the vertical lines near the left and right sides of the screen, and near the horizontal center of the screen, are at minimum width without visible haze.

Software Alignments and Settings

The following options are performed in the Service Default Alignment Mode (SDAM). SDAM is described in the 'Service Modes, Error Codes and Fault Finding' section.

The following alignments are explained:

1. OPTIONS
2. TUNER
3. WHITE TONE
4. GEOMETRY
5. AUDIO

Options

Options are used to control the presence or absence of certain features and hardware.

How to change an Option Byte

An Option Byte represents a number of different options. Changing these bytes directly makes it possible to set all options very quickly. All options are controlled via seven option bytes.

Note: Each option byte controls several features of the television set; therefore, before changing option byte information, it is important to record the current option byte values. This ensures that the television features can be restored to the original settings, if necessary.

1. To enter SDAM, press the following key sequence on the remote control transmitter: **0 6 2 5 9 6** directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the OPTIONS sub menu.
3. Press the MENU LEFT or MENU RIGHT key to enter the OPTIONS sub menu.
4. In the OPTIONS sub menu, press the MENU UP/DOWN keys to select 'OP 1' through 'OP 7'.
5. Use the number keys on the remote control transmitter to enter a new value for the selected option byte. The value must be entered as a three-digit value (for example, '4' would be entered as '0 0 4').
6. The selected value must be between '0' and '255'.

7. When all desired changes to the option bytes are made, press the MENU button to return to the top level SDAM menu. This will save changes to the option byte settings.
8. To ensure the option byte changes take effect: Turn the television set OFF by using the POWER button on the remote control transmitter or the local keyboard. Disconnect the television set from AC power for at least ten seconds. Reconnect the television set to AC power. Turn the television set ON by using the POWER button on the remote control transmitter or the local keyboard.

	S
OP 1	X X X
OP 2	X X X
OP 3	X X X
OP 4	X X X
OP 5	X X X
OP 6	X X X
OP 7	X X X

Figure: Options menu

How to change iTV Option Bytes

An Option Byte represents a number of different options. Changing these bytes directly makes it possible to set all options very quickly. All options are controlled via five option bytes.

Note: Each option byte controls several features of the television set; therefore, before changing option byte information, it is important to record the current option byte values. This ensures that the television features can be restored to the original settings, if necessary.

1. To enter SDM, you must use a Philips ITV commercial setup transmitter (such as the RC2573GR or the RG4172BK). Use the following method to enter SDM:

First, place the setup remote in setup mode. To place the the RG4172BK in setup mode, press TV SETUP; to place the the RC2573GR in setup mode, set the switch to the TV SETUP position. Then press the following key sequence on the remote control transmitter: '0 6 2 5 9 6' directly followed by the 'MENU' button (do not allow the display to time out between entries while keying the sequence).

2. Use the MENU UP/DOWN keys to scroll through the OPTIONS until you reach OB1 through OB5.
3. Use the number keys on the remote control transmitter to enter a new value for the selected option byte. The value must be entered as a three-digit value (for example, '4' would be entered as '0 0 4').
4. The selected value must be between '0' and '255'.
5. When all desired changes to the option bytes are made, press the MENU button to return to the

top level SDM menu. This will save changes to the option byte settings.

6. To ensure the option byte changes take effect: Turn the television set OFF by using the POWER button on the remote control transmitter or the local keyboard. Disconnect the television set from AC power for at least ten seconds. Reconnect the television set to AC power. Turn the television set ON by using the POWER button on the remote control transmitter or the local keyboard.

Option Code Tables

Table: Option code settings

Model Number	OP1	OP2	OP3	OP4	OP5	OP6	OP7
20DV693R01	0	23	65	162	252	153	64
20DV693R02	0	23	65	162	252	153	80
20MS334R37	0	23	65	1	144	88	0
20PT633R/37	0	23	1	1	144	152	0
20PT643F/35R	64	23	65	1	236	152	0
20PT643R01	0	23	1	1	236	152	0
20PT653R/37	0	23	1	1	252	152	0
21PT6331/44R	16	23	65	1	144	152	0
21PT633R/85C	0	23	1	1	144	152	0
21PT6431/44R	16	23	65	1	236	152	0
21PT643R/85C	0	23	1	1	236	152	0
24PT633F/35R	64	23	193	1	252	152	0
24PT633R/37	0	23	129	1	252	152	0
25PT533S/37C	0	23	1	1	252	152	0
25PT633R/85C	0	23	129	1	252	152	0
27DV693R37A	0	23	209	162	252	153	64
27MS3404/17	0	23	65	1	252	152	0
27MS4504/17	0	23	193	1	252	152	0
27PT541S37A	0	23	65	1	252	152	0
27PT543F35A	64	23	65	1	252	152	0
27PT543S/37A	0	23	1	1	252	152	0
27PT563S37A	0	23	65	162	252	153	80
27PT633R/37C	0	23	145	162	252	153	80
27PT643F35A	64	23	193	1	252	152	0
27PT643R/37C	0	23	193	1	252	152	0
27PT643R/37A	0	23	193	1	252	152	0
27PT643R/97A	0	23	193	1	252	152	0

27PT663R/37A	0	23	145	162	252	153	80
27PT663R/37C	0	23	145	162	252	153	80
29DV6931/85R	16	23	209	162	252	153	64
29PT543S/44A	0	23	1	1	252	152	0
29PT543S/85A	0	23	1	1	252	152	0
29PT563S/85A	0	23	1	162	252	153	80
29PT633R/85A	0	23	129	1	252	152	0
29PT633R/85C	0	23	129	1	252	152	0
29PT643R85A	16	23	193	1	252	152	0
29PT6631/44R	16	23	209	162	252	153	80
29PT663R/85A	0	23	145	162	252	153	80
29PT663R/85C	0	23	145	162	252	153	80
29PT663S85A	16	23	209	162	252	153	80
30DV693R37A	0	31	149	162	252	153	64
30DV693R37C	0	31	149	162	252	153	64
30PW633F35A	0	31	149	162	252	153	80
30PW633R37A	0	31	149	162	252	153	80
30PW633R37C	0	31	149	162	252	153	80
32PT541S37G	0	23	193	1	252	152	0
32PT543S/37A	0	23	129	1	252	152	0
32PT543S/37G	0	23	129	1	252	152	0
32PT553S/37A	0	23	129	1	252	152	64
32PT553S/37G	0	23	129	1	252	152	64
32PT563S37A	0	23	193	162	252	153	80
32PT563S37G	0	23	193	162	252	153	80
32PT633R/37D	0	31	145	162	252	153	80
32PT663R/37A	0	31	145	162	252	153	80
MS3252S431	0	23	129	1	189	88	0
MS3652S427	0	23	129	1	189	88	0

Table: Option code settings for iTV/Commercial models

Model Number	OP1	OP2	OP3	OP4	OP5
25LT220L/17	212	16	2	65	168
25LT421L/17	196	252	3	33	172
25ST220L/17	212	16	2	67	8
27LT220L/17	212	16	2	65	168
27LT621L/17	198	252	3	33	172
27ST110P/35	212	16	2	67	8

27ST220L/17	212	16	2	67	8
27ST230P/35	212	16	2	67	8
27ST240P/35	212	16	2	67	8
27ST420L/17	196	220	3	35	12
27ST421L/17	196	220	3	35	12
32LT621L/17	198	252	11	41	252
32ST220P/17	198	220	11	43	12
32ST230P/35	198	220	11	43	12
36ST220P/35	198	220	11	43	12
36ST230P/35	198	220	11	43	12

Tuner

Note: Described alignments are only necessary when the NVM (part reference number 7602) is replaced.

IF-PLL

This adjustment is auto-aligned. Therefore, no action is required.

AGC (AGC take over point)

1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a color bar test pattern to the television set.
3. Set the amplitude of the video pattern generator to 10 mV and set the frequency to 61.25 MHz (channel 3).
4. Connect a DC multimeter to pin 1 of the tuner (item 1000 on the main chassis).
5. To enter SDAM, press the following key sequence on the remote control transmitter: **0 6 2 5 9 6** directly followed by the **MENU** button (do not allow the display to time out between entries while keying the sequence).
6. Use the MENU UP/DOWN keys to highlight the TUNER sub menu.
7. Press the MENU LEFT/RIGHT keys to enter the TUNER sub menu.
8. Use the MENU UP/DOWN keys to select AGC.
9. Use the MENU LEFT/RIGHT keys to adjust the AGC value (default value is 27) until the DC-voltage at pin 1 of the tuner lies between 3.8 V and 2.3 V.
10. Press the MENU button to return to the top level SDAM menu.

11. To ensure the AGC change takes effect:

- Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
- Disconnect the television set from AC power for at least ten seconds.
- Reconnect the television set to AC power.
- Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

SL (Slicing Level)

This adjustment sets the sync slicing level for non-standard signals. You must turn it 'on' to help correct picture instability in premium decoded cable channels.

- OFF: slicing level dependent on noise detector.
- ON: fixed slicing level of 70 %.

To adjust SL:

1. To enter SDAM, press the following key sequence on the remote control transmitter: **0 6 2 5 9 6** directly followed by the **MENU** button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the TUNER sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the TUNER sub menu.
4. Use the MENU UP/DOWN keys to select SL.
5. Use the MENU LEFT/RIGHT keys to toggle SL 'Off' and 'On'.
6. Press the MENU button to return to the top level SDAM menu.
7. To ensure the SL setting is saved:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
 - Disconnect the television set from AC power for at least ten seconds.
 - Reconnect the television set to AC power.
 - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

White Tone

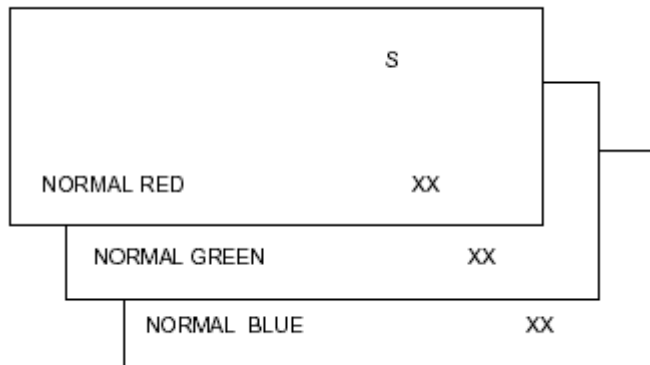


Figure: White tone alignment menu

The values of the 'black cut off level' can be adjusted in the 'WHITE TONE' sub menu.

Normally, no alignment is needed for 'WHITE TONE', and the given default values are used.

Default settings:

NORMAL (color temperature = 9600 K):

- NORMAL RED = 40
- NORMAL GREEN = 40
- NORMAL BLUE = 40

To adjust NORMAL RED, NORMAL GREEN, and NORMAL BLUE:

1. To enter SDAM, press the following key sequence on the remote control transmitter: **0 6 2 5 9 6** directly followed by the **MENU** button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the WHITE TONE sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the WHITE TONE sub menu.
4. Use the MENU UP/DOWN keys to select NORMAL RED, NORMAL GREEN, or NORMAL BLUE.
5. Use the MENU LEFT/RIGHT keys to adjust the value of NORMAL RED, NORMAL GREEN, or NORMAL BLUE.

6. When all desired changes to the WHITE TONE sub menu values are made, press the MENU button to return to the top level SDAM menu.
7. To ensure the WHITE TONE settings are saved:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
 - Disconnect the television set from AC power for at least ten seconds.
 - Reconnect the television set to AC power.
 - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

Geometry

The geometry alignments menu contains several items for correct picture geometry alignment.

1. Connect the RF output of a video pattern generator to the antenna input.
2. Input a crosshatch test pattern to the television set.
3. Set the amplitude of the video pattern generator to at least 1 mV and set the frequency to 61.25 MHz (channel 3).
4. Press the AUTO PICTURE button on the remote control transmitter repeatedly to choose PERSONAL or MOVIES picture mode.
5. To enter SDAM, press the following key sequence on the remote control transmitter: **0 6 2 5 9 6** directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
6. Use the MENU UP/DOWN keys to highlight the GEOMETRY sub menu.
7. Press the MENU LEFT/RIGHT keys to enter the GEOMETRY sub menu.
8. Use the MENU UP/DOWN keys to highlight either the HORIZONTAL sub menu or the VERTICAL sub menu.
9. Press the MENU LEFT/RIGHT keys to enter either the HORIZONTAL sub menu or the VERTICAL sub menu.
10. Use the MENU UP/DOWN keys to select items in the HORIZONTAL sub menu or the VERTICAL sub menu.
11. Use the MENU LEFT/RIGHT keys to adjust the values of items in the HORIZONTAL and VERTICAL sub menus.
12. When all desired changes to the HORIZONTAL and VERTICAL sub menu values are made, press the MENU button twice to return to the top level SDAM menu.

13. To ensure the GEOMETRY settings are saved:

- Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
- Disconnect the television set from AC power for at least ten seconds.
- Reconnect the television set to AC power.
- Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

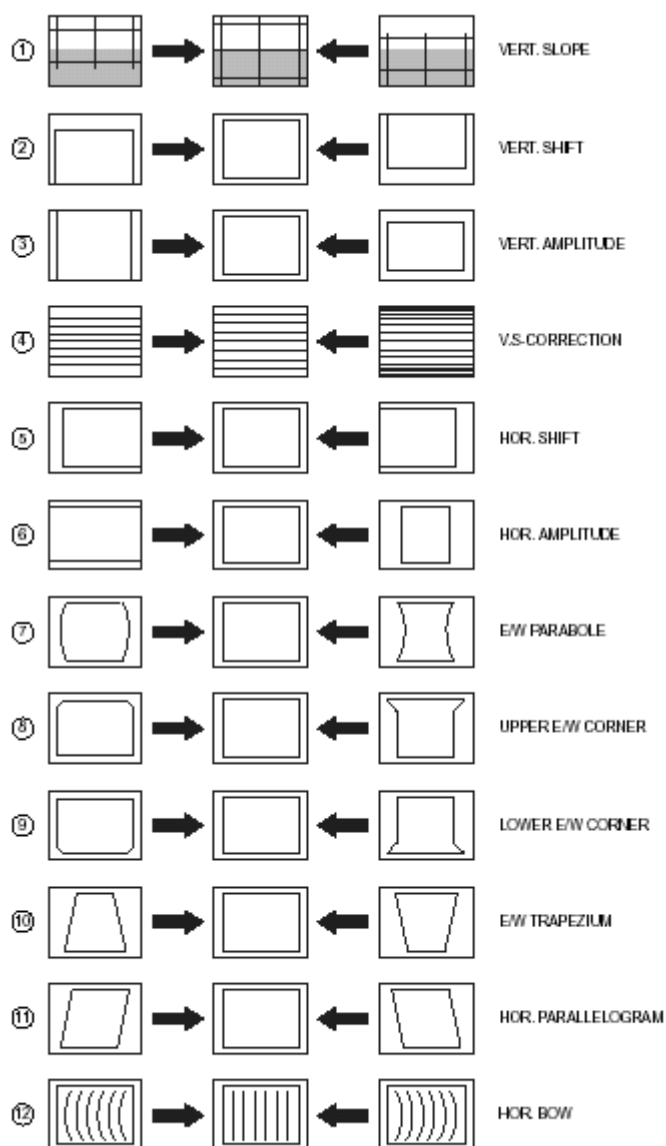


Figure: Geometry alignments

The following alignments can be performed in the GEOMETRY sub menu:

Horizontal Amplitude and Phase:

Horizontal Amplitude and Phase:

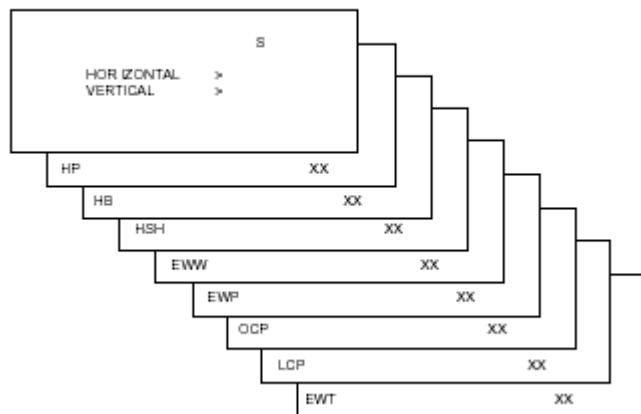


Figure: Horizontal alignment menu

- **Horizontal Shift (HSH).** Select Horizontal Shift to center the picture on the screen.
- **Horizontal Parallelogram (HP).** Set Horizontal Parallelogram to prevent the picture from slanting to one side.
- **Horizontal Bow (HB).** Set Horizontal Bow to prevent the top and bottom of picture from bending to the sides.
- **East West Width (EWW).** Select East-West Width and align the picture width until the complete test pattern is visible.
- **East West Parabola (EWP).** Select East-West Parabola and align the vertical sides until the sides are straightened.
- **Upper Corner Parabola (UCP).** Select Upper Corner Parabola to straighten the top of the vertical lines at the sides.
- **Lower Corner Parabola (LCP).** Select Lower Corner Parabola to straighten the bottom of the vertical lines at the sides.
- **East West Trapezium (EWT).** Align straight vertical lines in the middle of the screen.

Vertical Amplitude and Position:

Vertical Amplitude and Position:

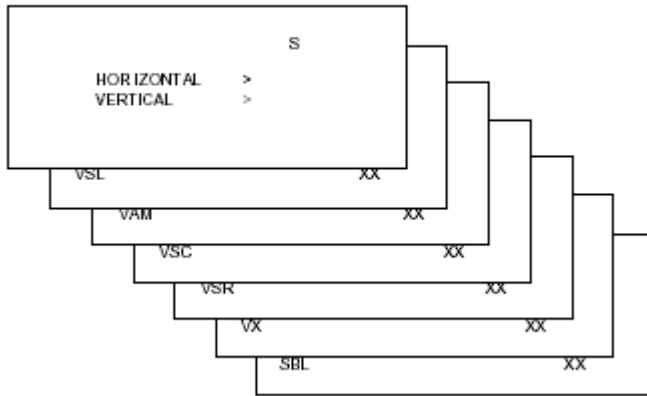


Figure: ertical alignment menu

- **Vertical Amplitude (VAM).** Aligns the height of the picture (other vertical alignments are NOT compensated).
- **Vertical slope (VSL).** Aligns the picture so the proportions are the same at the top and bottom of the screen. This alignment must be performed first, before all other vertical alignments. Turning SBL 'on' will assist in performing this alignment.
- **Service blanking (SBL).** Turns the blanking of the lower half of the screen 'on' or 'off' (to be used in combination with the vertical slope alignment).
- **Vertical S-Correction (VSC).** Aligns the vertical linearity, so that the vertical intervals of the grid-patterns are the same over the entire height of the screen.
- **Vertical Shift (VSH).** Aligns the vertical center of the picture to the vertical center of the CRT. After performing this alignment, it may be necessary to perform the VAM alignment again.
- **Vertical Zoom (VX).** Adjusts the picture height.
- **Delta Horizontal Shift 60 Hz (H60).**
- **Delta Vertical Amplitude 60 Hz (V60).**

Methods of adjustment

1. Select Service Blanking (SBL) and set it to 1. The lower half of the picture will be blanked.

2. Press the MENU UP/DOWN buttons to select Vertical Slope (VSL).
3. Align VSL to start the blanking exactly at the horizontal white line at the center of the test circle (align the bottom of the screen so that castellations just disappear).
4. Press the MENU UP/DOWN buttons to select SBL and set it back to 0. The full picture reappears.
5. Select Vertical Amplitude (VAM) and align the picture height to approximately 13.0 - 13.1 blocks (align the top of the screen so that castellations just disappear).
6. Select Vertical Shift (VSH) and align for vertical centering of the picture on the screen.

Repeat the last two steps if necessary.

The table below lists the default GEOMETRY values for the different television sets.

Table: Default geometry values (Large Screen)

Parameter	20RF, 21RF, 25RF, 27RF, 29RF, 25", 28", 29"SF, 32V, 33"	25V	27V/29"	35V	28WS	32WS	28WSRF	32WSRF
HP Horizontal- Parallelogram	31	31	31	45	47	32	36	45
HB Horizontal- Bow	31	31	31	25	32	32	40	30
HSH Horizontal Shift	35	35	35	23	27	24	31	29
EWV East- West Width	34	-	-	45	36	39	40	33
EWP East- West Parabola	33	-	-	23	21	21	37	16
UCP Upper Corner Parabola	35	-	-	25	26	23	14	16
LCP Lower								

Corner Parabola	35	-	-	31	30	30	25	23
EWT East-West Trapezium	35	-	-	24	28	26	18	27
VSL Vertical Slope	33	25	25	19	42	35	31	25
VAM Vertical Amplitude	26	32	32	31	30	23	23	30
VSC Vertical S-Correction	23	23	23	27	24	24	12	20
VSH Vertical Shift	31	28	28	26	18	23	36	34
VX Vertical Zoom	25	-	-	25	25	25	25	25

Audio

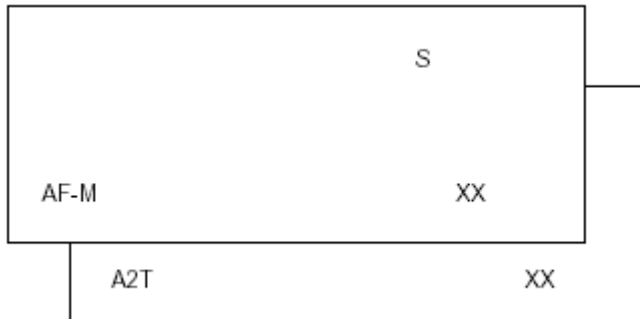


Figure: Audio alignment menu

No alignments are necessary for the AUDIO sub menu. Use the default values.

AF-M (NICAM threshold)

Default value is 300.

To adjust AF-M:

1. To enter SDAM, press the following key sequence on the remote control transmitter: **0 6 2 5 9 6** directly followed by the **MENU** button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select AF-M.
5. Use the MENU LEFT/RIGHT keys to adjust the value of AF-M to 300.
6. Press the MENU button to return to the top level SDAM menu.
7. To ensure the AF-M setting is saved:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.
 - Disconnect the television set from AC power for at least ten seconds.
 - Reconnect the television set to AC power.
 - Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard.

A2T (TV A2 Threshold)

Default value is 250.

To adjust A2T:

1. To enter SDAM, press the following key sequence on the remote control transmitter: **0 6 2 5 9 6** directly followed by the **MENU** button (do not allow the display to time out between entries while keying the sequence).
2. Use the MENU UP/DOWN keys to highlight the AUDIO sub menu.
3. Press the MENU LEFT/RIGHT keys to enter the AUDIO sub menu.
4. Use the MENU UP/DOWN keys to select A2T.
5. Use the MENU LEFT/RIGHT keys to adjust the value of A2T to 250.
6. Press the MENU button to return to the top level SDAM menu.
7. To ensure the A2T setting is saved:
 - Turn the television set 'off' by using the 'POWER' button on the remote control transmitter or the local keyboard.

- Disconnect the television set from AC power for at least ten seconds.
- Reconnect the television set to AC power.
- Turn the television set 'on' by using the 'POWER' button on the remote control transmitter or the local keyboard