Service Manual

TOP NEXT

ORDER NO. MTNC010522A1

B2

HDTV MONITOR

Service Manual

Simplified

- PT-47WX49E
  PT-47WX51E
  PT-47WX51CE

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic

TOP NEXT

ORDER NO. MTNC020409C1
B2

Service Manual

HDTV MONITOR

Main Manual
(P7W)

Panasonic

Models	Chassis
PT-47WX52F	**EP824**
PT-47WX52CF	**EP824**
PT-47WX42F	**EP824**
PT-47WX42CF	**EP824**

This service manual is issued as a service guide for the models of the **P7W** family listed above. Included in this manual are a set of schematics, alignment procedures, disassembly procedures and a complete parts list.

"**WARNING!** This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death."

The service technician is required to read and follow the "**Safety Precautions**" and "**Important Safety Notice**" in the Main Manual.

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Feature table

FEATURE	PT-47WX52F PT-47WX52CF	PT-47WX42F PT-47WX42CF
Chassis	P7W	
Number of channels	181	
Menu language	Eng/Span/Fr	
Closed caption (CC)	X	
V-Chip (USA/CANADA)	X	
Picture in Picture (PIP)	2T split	
VIDEO INPUT MEMORY/SKIP	SKIP	
2RF	X	
Remote control number	EUR7603Z30	EUR7603Z40
Screen protector	W/PROT SCRN	W/O PROT SCRN
Comb filter	ADV 3D Y/C (NEW)	
Color temp	X	
NEW YNR	X	
VM	X (DIGITAL)	
V/A norm	X	
DIGITAL SCAN RATE	1080i, 480p	
NTSC LINE-DOUBLER	480p SMOOTH PROGRESSIVE	
MTS/SAP/DBX	X	
Bass/Bl/Treb control	X	
AI sound	X	
SURROUND	X	
Spatializer/BBE	BBE	
Built-in audio power	15WX2 (10%)	10WX2 (10%)
Number of speakers	4	2
A/V in (rear/front)	4 (3/1)	
S-VHS in (rear/front)	2/1	
Audio out	Fixed & Variable	
COMPONENT INPUT (Y, Pb, Pr)	2	
Dimensions mm WxDxH in	1111x1236x626 43.74x48.66x24.64	
Weight (kg/lbs)	82/180.78	
Power source (V/Hz)	120V 60Hz	
Anode voltage	31.5kV ± 1.0kV	
Video input jack	1Vp-p 75Ω, phono jack	
Audio input jack	500mV RMS 47kΩ	

Table 1: **Feature Table**

Specifications are subject to change without notice or obligation. Dimensions and weights are approximate.

Boards designation

BOARD	PART NUMBER	BOARD DESCRIPTION
A-Board	TNP2AH035	signal processing
D-Board	TNPH0371	power and deflection
LB-Board	TNP2AA110	blue driver
LG-Board	TNP2AA111	green driver
LR-Board	TNP2AA112	red driver
G-Board	TNP2AA090	front A/V panel
K-Board	TNP2AA089	front button panel
R-Board	TNPA0615AB	IR receiver

Table 2: **Boards designation**

Note: ***The A-Board (*****TNP2AH035*****) is non-serviceable****. Except for A-Board both tuners, IC2302, IC7001, IC7002, IC871, IC872, IC873. If any of these components or board is defective repleace it with a new one and take back the defective board to the service center.*

Notice: *When ordering any board, add and " S" after the board suffix application.*

Example: *If Order D-Board, should be ordered as:* TNPH0371*S.*

Auto diagnosis feature

This receiver incorporates a new auto-diagnosis feature. With this new feature will be easier for the technicial to detect the failures. There is a LED located by the keyboard on the front panel, this LED will start flashing when a failure is detected by the circuits located in specific areas, depending on how many times the LED is flashing, this will tell you what circuit should be checked.
Make a count of flashing and see Table 3.
Please use this feature effectively especially for intermittent problems.

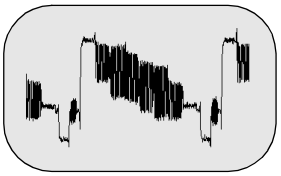
NUMBER OF FLASHES	POSSIBLE CIRCUIT
1	+140
2	LOW DC
3	CONVEREGENCE
4	HHS
5	IC4011
6	IC4018

Table 3: **SOS of front LED**

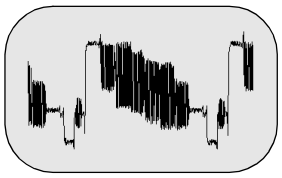
After the count:

Proceed to check that area, verify what board is the problem located, this way the area to check will be reduced until the failure is found.

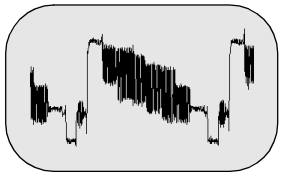
A-Board check points waveforms



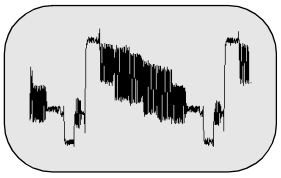
Main tuner video output
15.72 kHz, 1 Vpp,
10µs sec/div



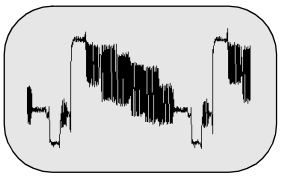
Sub tuner video output
15.72kHz, 1.00Vpp,
10µs sec/div



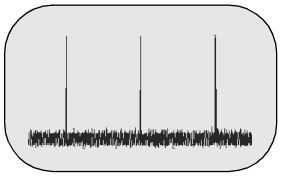
Main Y
15.72kHz, 1.00Vpp
10µs sec/div



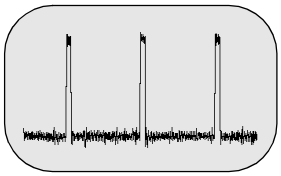
Sub Y
15.72kHz, 1.92Vpp,
10µs sec/div



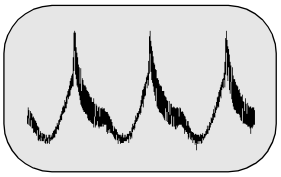
NTSC video
15.72kHz, 2.02Vpp,
10µs sec/div



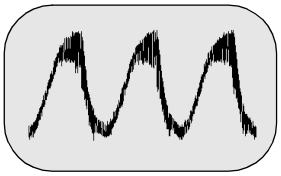
VP
60Hz, 3.36Vpp,
5µs sec/div



HP
31.65kHz, 3.32Vpp,
10µs sec/div



Conv -18
60.24Hz, 0.75Vpp,
5µs sec/div



Conv +18
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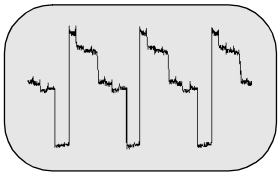
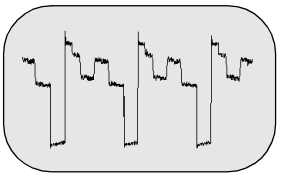
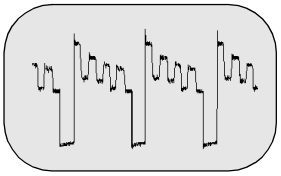
5µs sec/div



G
31.65kHz, 4.72Vpp,
10µs sec/div



R
31.65kHz, 4.44Vpp,
10µs sec/div



B
31.65kHz, 4.40Vpp,
10µs sec/div

Figure 9. A-Board check points waveforms.

> ***Note:*** *Waveforms were obtained with colorbar pattern, picture settings normalized and sound set to minimum.*

CRT set up

CAUTION: Insure yoke plugs on the A-Board are reconnected before turning the PTV ON to prevent damage to the horizontal output transistor and/or CRTs.

1. Connect test generator to the antenna terminal and set for a monoscope pattern.
2. Loosen yoke clamp, seat yoke against bell of CRT and rotate to correct yoke tilt (compare to adjacent CRT). Tighten yoke clamp.
3. Remove adhesive from centering tabs and set centering tabs for zero correction. (figure 25)

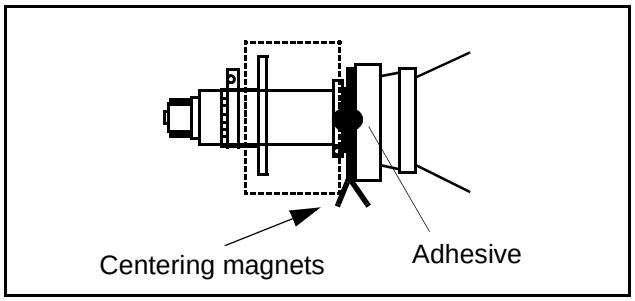


Figure 25. **Adhesive removal**

4. Cover replacement CRT lens and static converge the tubes not replaced, if needed. Check size and linearity of pattern and adjust as required.
5. Uncover replacement CRT lens and cover other two CRT lenses. Adjust electrical and optical focus (lens), if required.
6. Uncover all CRT lenses and use yoke centering magnet to converge replacement CRT (in center area of screen only) with other two CRTs. Disregard non-convergence in areas other than center area.
7. Perform white balance adjustments.

Dynamic focus adjustments

1. Focus adjustments should be performed after 1 hour of aging.
2. Use oscilloscope with 100 : 1 probe.
3. Apply a NTSC crosshatch pattern to adjust focus.
4. Adjust the red, blue and green focus VR on the focus block for best focus of overall picture of each CRT. (figure 28)

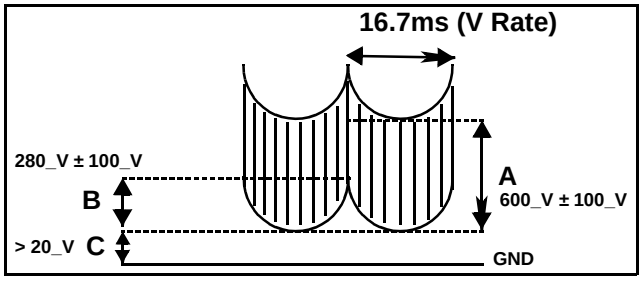


Figure 26. **D. Focus adjustment waveform**

5. To change DAF DATA, enter to service mode, then press POWER on remote to display DACs menu, then select DAC by pressing CH (RIGHT/LEFT) and VOL (UP/DOWN), then press ACTION to enter to DAC, then adjust by pressing VOL (RIGHT/LEFT); press ACTION, to save press ACTION again or OTHER to exit without saving.

Procedure:

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.*

1. Enter to service mode and set the following default DATA:

	NTSC	NTSC ZOOM	1125i
H-PARA	+317	+263	+317
V-SAW	-23	-35	-23
V-PARA	+69	+117	+69

Note: *The signal (NTSC, 1125i) (NTSC ZOOM option), should be displayed to enter values for specific format adjustment.*

2. For 1125i (1080i) set the default values.
3. For NTSC and NTSC ZOOM apply a white pattern and perform the following steps.
4. Connect the scope probe to TPD30, GND to TPD31.
5. Confirm that level of A is 600_V ± 100_V, adjust H-PAR DAC to set to specification level.
6. Confirm that level of B is 280_V ± 50_V, adjust V-PAR DAC to set to specification level.
7. Confirm that level of C is more tha 20 V, adjust H-PAR DAC to set to specification level.

Focus - Electrical & optical adjustments

(use for minor adjustment or for final adjustment, for complete adjustment see following section.)

Electrical adjustment

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.*

1. Apply a NTSC crosshatch with dots pattern.

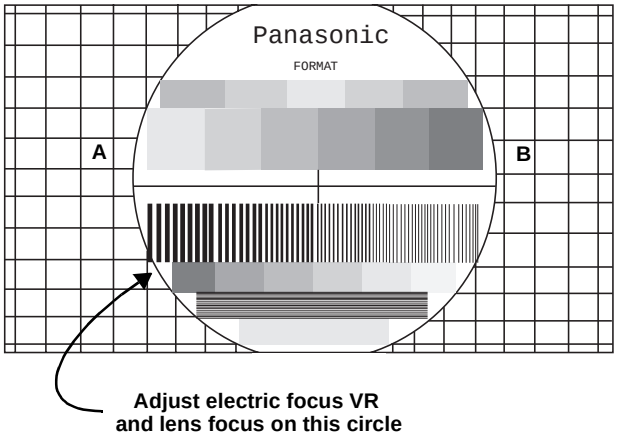


Figure 27. **Lens focus adjustment**

Table 5: **Focus points**

	RED	GREEN	BLUE
Electric focus	B	A/B	A
Optical Focus	B	A/B	A

2. Set VIDEO C_OFF DAC from 00 to 02, and project only red. Adjust red focus VR so that focus is best..

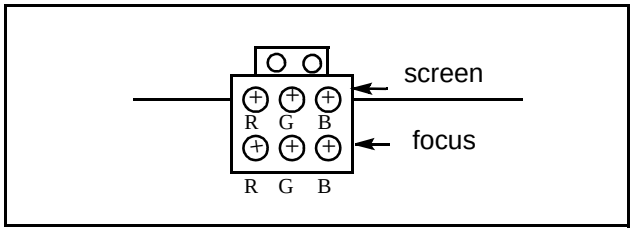


Figure 28. **Focus pack**

3. Adjust red lens focus (mechanical) until focus is best.
4. Adjust red focus VR again.
5. Set VIDEO C_OFF DAC from 00 to 01, and project only green.
6. Repeat steps for green only.
7. Set VIDEO C_OFF DAC from 00 to 03, and project only blue.
8. Repeat steps for blue only.

Focus - Optical lens adjustment

Optical adjustments

Note: *This adjustment normally should not require resetting unless the lens has been replaced or adjustment has changed.*

1. Optical focus adjustment is located on the top of each CRT lens system. Loosen the adjustment knurled locking knob. (figure 29)

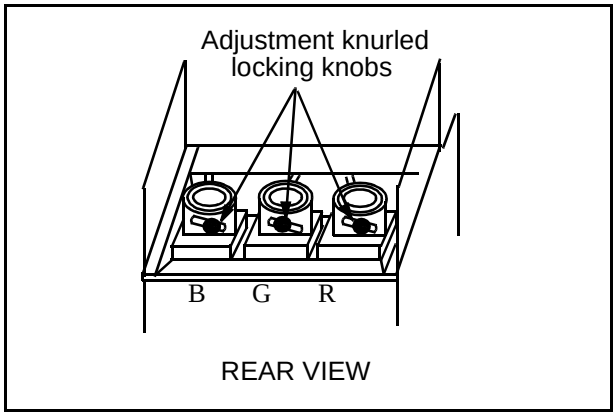


Figure 29. **Optical lens focus adjustment**

2. Turn the PTV ON. Apply and view a crosshatch with dots pattern.
3. Adjust each lens focus for best focus while viewing each CRT.
4. Cover the red and blue CRT, projecting green only. Rotate the green lens for best focus around screen center area.
5. Do the same for the red focus lens while projecting red only.
6. Repeat for blue.

Electric & VM focus adjustment, complete adjustment

(Perform this adjustment when a CRT is replaced or when major adjustment is required)

Preparation:

1. Apply a NTSC crosshatch pattern with dots.
2. Set CONV "MUTE" DAC from 0 to 1 (disabling digital convergence.)
3. Position the longer tab of the four-pole magnet to 90 degrees (uncorrected position). (see figure 31).

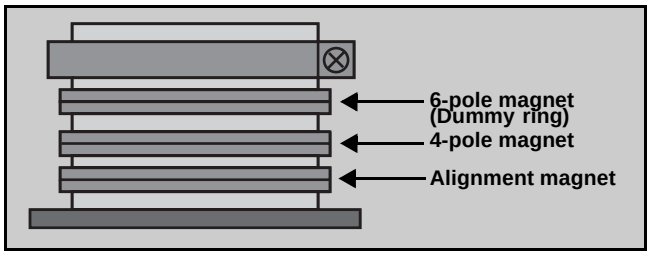


Figure 30. **VM coil with focus correction magnet**

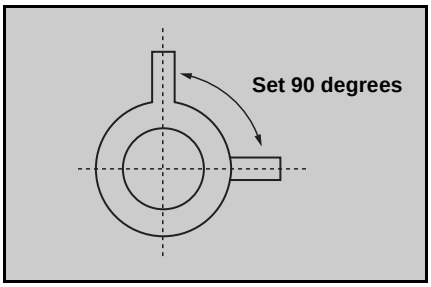


Figure 31. **4-pole magnet**

4. Position the long tab of all alignment magnets and of the dummy ring together in an uncorrected position. (See figure 32).

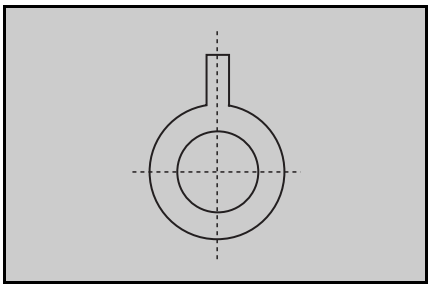


Figure 32. **Alignment magnet (or dummy ring)**

Procedure:

1. Apply an NTSC cross hatch pattern with dots.
2. Assure that digital convergence is disabled (DAC MUTE from 0 to 1).
3. Set VIDEO "C_OFF" DAC from 00 to 02, to project red only.
4. Turn the red electrical focus adjustment VR (on focus pack) fully counterclockwise and note the position of the dots at the center of the picture.
5. Turn the red electrical focus adjustment VR fully clockwise.

6. If the position of the dots at the center of the screen moves from the position noted in step 4., adjust the alignment magnets until the dots are in the same position as noted in step 4.
7. Turn the red electrical focus adjustment VR (on focus pack) fully counterclockwise and confirm that the position of the dots at the center of the screen did not move from their position noted in step 4.
8. If the position of the dots at the center of screen moved, repeat from step 4.
9. If the position of the dots moved after repeated adjustments, adjust until the movement of the dots is minimized.
10. Turn the red focus VR fully clockwise.
11. Adjust the 4-pole magnets until the shape of the dots at the center of the screen is circular.
12. Adjust red focus VR until optimum focus is achieved.
13. Apply NTSC crosshatch with dots or any other available pattern applicable to the following.
14. Confirm that the picture is correctly aligned in the center of the screen, shown in figure 33, adjust the centering magnets. Repeat the alignment magnet adjustments and four pole magnet adjustments (step 1. ~ step 12.).

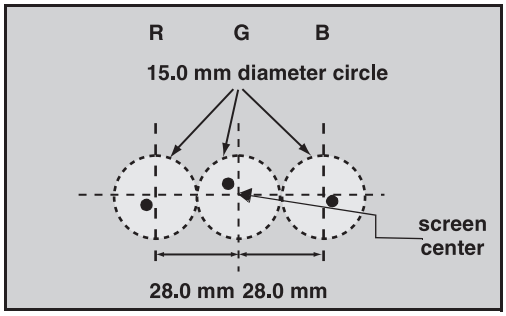


Figure 33. **Centering magnet**

15. Apply an NTSC cross hatch pattern with dots.
16. Set VIDEO “C_OFF” DAC from 00 to 01, to project green only.
17. Repeat above procedures for the green.
18. Set VIDEO “C_OFF” DAC from 00 to 02, to project red only.
19. Repeat above procedures for the blue.
20. Enable digital convergence by changing DAC MUTE from 01 to 00.
21. Following adjustments, paint position of DY centering magnets and fix the centering magnets of DY, dummy rings of VM coil, four pole magnets of VM coil and the alignment magnets of VM coil to prevent them from moving.

Note: *Please See “Service mode (electronic controls)” on page 34 for entering and exiting service mode.*

NTSC Vertical size adjustment (VSIZE)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic’s TU-DST51 set-top box DTV decoder.*

1. Apply a NTSC pattern (see avobe note) .
2. Set VIDEO “C_OFF” DAC from 00 to 01 (to project only green).
3. Adjust centering magnets so that the center of the pattern get aligned with screen frame center.
4. Adjust VDEF “VSIZE” DAC until vertical size is proportional on top and bottom. (See figure 34)
5. Set VIDEO “C_OFF” DAC from 01 to 00

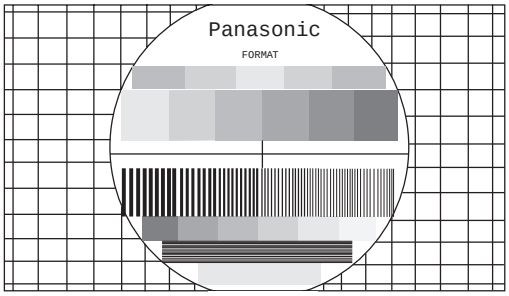


Figure 34. **Vertical size adjustment**

HD 1080i Vertical size adjustment (VSIZE)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic’s TU-DST51 set-top box DTV decoder.*

1. Apply a HD 1080i pattern (see avobe note).
2. Repeat vertical size adjustment from step 2

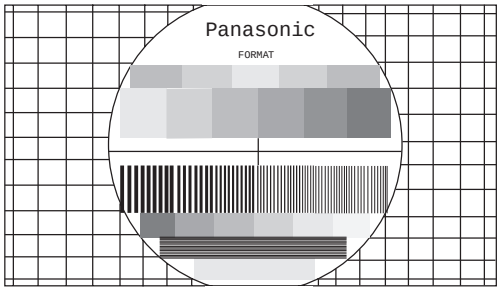


Figure 35. **Vertical size adjustment**

NTSC ZOOM Vertical size adjustment (VSIZE)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.*

1. Apply a NTSC pattern (see avobe note) .
2. Change aspect to ZOOM mode.
3. Repeat vertical size adjustment from step 2
4. Try making circle seem rounded (in proportion)

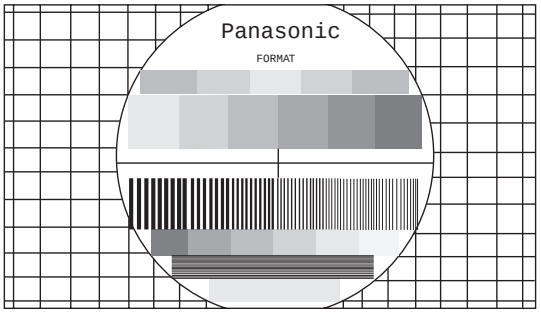


Figure 36. **Vertical size adjustment**

NTSC Horizontal phase adjustment (H-POS)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.*

1. Apply a NTSC crosshatch pattern with dots.
2. Set CONV "MUTE" DAC from 00 to 01 (disabling digital convergence).
3. Set VIDEO "C_OFF" DAC from 00 to 01 to project only green.
4. Turn green deflection yoke until line is perfectly horizontal.
5. Adjust H-POS DAC data so that pattern is in the center of screen.

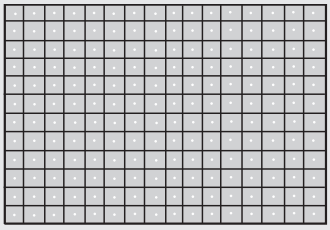


Figure 37. **H phase adjustment**

6. Enable digital convergence by changing DAC MUTE from 01 to 00.
7. Set VIDEO "C_OFF" DAC from 01 to 00.

HD 1080i Horizontal phase adjustment (H-POS)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.*

1. Apply a HD 1080i pattern.
2. Repeat NTSC horizontal phase adjustment from step 2.

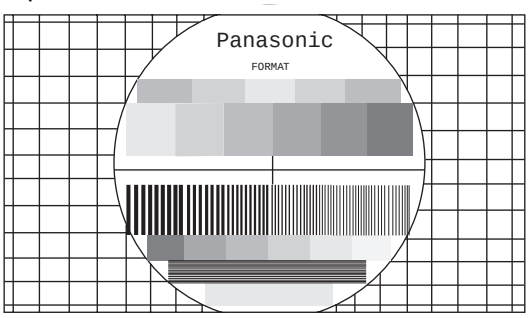


Figure 38. **H Phase adjustment**

Trapezoid adjustment (EWTRA)

1. Set default value

NTSC Pincushion adjustment (PCC)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.*

Procedure:

1. Apply a NTSC crosshatch pattern with dots.
2. Set VIDEO "C_OFF" DAC from 00 to 01 to project only green.
3. Set DAC MUTE from 00 to 01 (disabling digital convergence).
4. If the distance at "A" is not 10 ± 5mm, enter "H DEF" "H WID" mode and adjust by VOLUME UP/ DOWN until it is 10 ± 5mm. See figure 39.

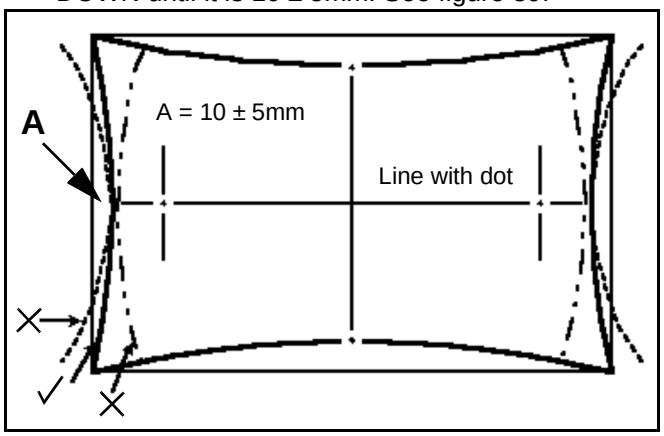
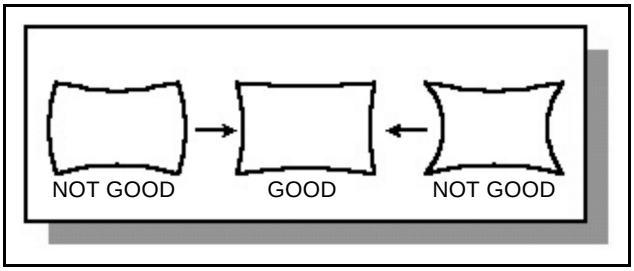


Figure 39. Pincushion adjustment



5. If not all corners of cross hatch appear in screen, enter V DEF "V SIZE" mode and adjust until they appear.

6. Confirm that measurement of “A” has not changed.
7. Enable digital convergence by changing DAC MUTE from 01 to 00.
8. Set VIDEO “C_OFF” DAC from 01 to 00.

HD 1080i Pincushion adjustment (PCC)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic’s TU-DST51 set-top box DTV decoder.*

Procedure:

1. Apply a HD 1080i pattern.
2. Repeat NTSC pincushion adjustment from step 2

Centering magnets adjustment

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic’s TU-DST51 set-top box DTV decoder.*

Procedures:

1. Apply a NTSC crosshatch pattern with dots.
2. Set VIDEO “C_OFF” DAC from 00 to 01 to project only green.
3. Set DAC MUTE from 00 to 01 (disabling digital convergence).
4. Loosen the deflection coil screw on the green CRT.
5. Adjust green deflection coil until the horizontal center line is horizontal.
6. Adjust centering magnets until the green pattern is equal on left and right. Adjust also for horizontal and vertical tilt.

Note: *Push deflection coil to top of CRT neck, then tighten deflection screw after adjusting each CRT centering and tilt.*

---

7. Set VIDEO “C_OFF” DAC from 01 to 03 to project only blue. Adjust deflection coil until the horizontal center line matches the pattern of the grid and is leveled.
8. Adjust blue centering magnets until the pattern center is at the appropriate distance as indicated on figure 40.

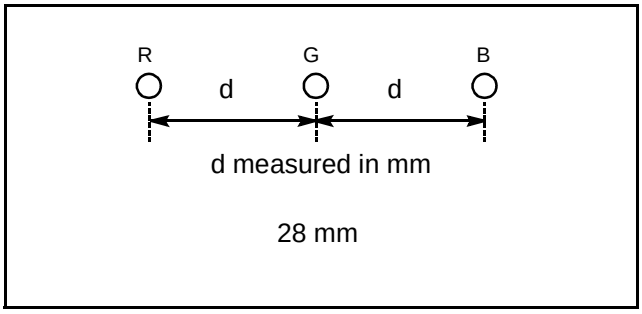


Figure 40. **Centering magnets adjustment.**

9. Set VIDEO “C_OFF” DAC from 01 to 02 to project only red.
10. Adjust red deflection coil until the horizontal center line matches the pattern of the grid and is leveled.
11. Adjust red centering magnets until the pattern center is at the appropriate distance as indicated on figure 40.
12. Enable digital convergence by changing DAC MUTE from 01 to 00.
13. Set VIDEO “C_OFF” DAC from 02 to 00. Following the adjustment, make sure that all deflection coils are pushed completely toward the CRT cones and that all screws are tightened.

NTSC Horizontal size adjustment (H WID)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic’s TU-DST51 set-top box DTV decoder.*

This adjustment is intended to adjust horizontal size of the picture.

1. Apply a NTSC pattern.
2. Set VIDEO “C_OFF” DAC from 00 to 01 to project only green.
3. Set DAC MUTE from 00 to 01 (disabling digital convergence).
4. In service mode, adjust H-WID DAC until the picture horizontal size is balanced at left and right side of screen.
5. Set DAC MUTE from 01 to 00 (disabling digital convergence).
6. Set VIDEO “C_OFF” DAC from 01 to 00.

HD 1080i Horizontal size adjustment (H WID)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic’s TU-DST51 set-top box DTV decoder.*

This adjustment is intended to adjust horizontal size of the picture.

1. Apply a HD 1080i pattern.
2. Repeat NTSC horizontal size adjustment from step 2.

Convergence adjustment

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic’s TU-DST51 set-top box DTV decoder.*

Note: *It is strongly recommended to first read and understand the following section prior to make any adjustment.*
Convergence adjustment must be perform for 480i-p (same for interlace & progressive), 1080i and ZOOM 480i.

Turn PTV on and allow it to warm up for 30 minutes prior to making adjustments (WHITE PATTERN).

Note: This PTV uses the scheme described below to correct for misconvergence of the three CRT projection tubes. There are various modes to this operation.

Preparation:

Place the convergence alignment template (see “Convergence alignment template” on page 33) over the PTV screen. Align the center lines of the template with the mechanical center markers on the PTV screen

frame. If the template is not available, create one using the dimensions provided in “Convergence alignment template” on page 33.
Remote control must be used during the procedure.

Note: *Apply the convergence alignment template to the PTV screen frame to converge the **green raster only**. Remove the convergence alignment template following this alignment. The red and blue rasters can then be aligned to the green raster.*

Raster Setup:

1. Enter to service mode (red CHK).
2. In SET-UP (roller guide menu) CONVERGENCE 1 set all values to 0.
3. Cover red & blue lens with caps.
4. Apply a pattern to adjust specific format:
   - **NTSC signal to adjust 480i-p (same for interlace and progressive)**
   - **1080i signal to adjust 1080i**
   - **480i signal with PTV in ZOOM aspect to adjust Z480i**
5. Select DAC COARSE, then press ACTION to enter to “CONVERGENCE ADJ” mode.
6. Press “0” key on remote.
7. Press ACTION key on remote to enter to “TEST_POS” mode.
8. Move pattern by pressing VOL right - left and CH up - down so that the cursor center overlap monoscope pattern center.

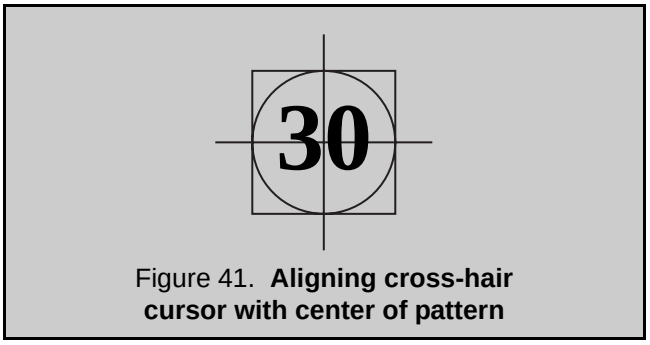


Figure 41. **Aligning cross-hair cursor with center of pattern**

9. Press “5” key on remote to exit superimpose mode (monoscope pattern disappear).
10. Press “TV/VIDEO” key to enter “DATA_POS” mode
11. Adjust by pressing VOL right - left so that peak of curve is the same position as center of cursor.

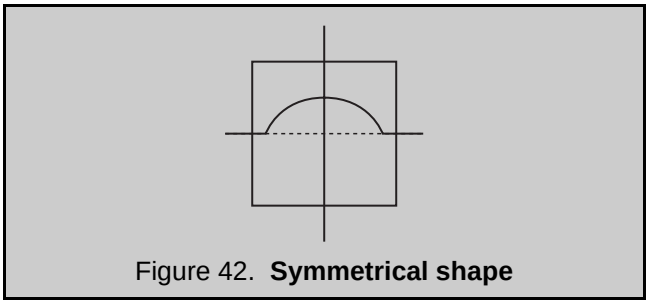


Figure 42. **Symmetrical shape**

12. Press “TV/VIDEO” key on remote to enter “OSD_POS” mode.
13. Press “5” key on remote so that monoscope pattern appears (superimpose mode)
14. Move cursor by pressing VOL right - left and CH up - down so that cursor center overlap monoscope pattern center
15. Press “0” key to go back to “CONVERGENCE ADJ” mode.
16. Press “TV/VIDEO” key to cycle through “COARSE ADJ. MODE” options.

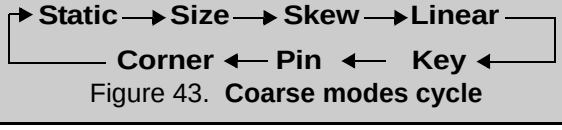


Figure 43. **Coarse modes cycle**

17. To change to “FINE ADJUSTMENT MODE” options (DAC FINE), press “TV/VIDEO” key on remote for at least 3 seconds, to go back to “COARSE ADJ MODE” options press “TV/VIDEO” on remote again for 3 seconds.
18. In “FINE ADJUSTMENT MODE” options, press “MUTE” key on remote to switch between “cursor” mode and “data” mode.
    - ***Cursor mode: Allows cursor movement by pressing VOL right - left and CH up - down.***
    - ***Data mode: Allows making adjustment by pressing VOL right - left and CH up - down.***
19. Either “COARSE ADJUSTMENT MODE” options or “FINE ADJUSTMENT MODE” options, press “R-TUNE” repeatedly key on remote to cycle through different color adjustments (R, G , B, White)
20. To store adjustments press “7”, then “ACTION” key on remote, otherwise press “POWER” then “ACTION” to exit adjustments without saving.
21. Remote functions:
    - **1, 3 . . . . . change color view adj**
    - **2 . . . . . change pattern**
    - **7 . . . . . save data**
    - **5 . . . . . overlap**
    - **POWER . . . . . to exit**
    - **RECALL . . . . . display values**
    - **R-TUNE . . . . . cycle colors**
    - **TV/VIDEO . . . . . change mode**
      3 secs . . . . . change options

Coarse adjustment mode (COARSE)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic’s TU-DST51 set-top box DTV decoder.*

Note: *It is strongly recommended to first read and understand the following section prior to make any adjustment.*
Convergence adjustment must be perform for 480i-p (same for interlace & progressive), 1080i and ZOOM 480i.

Procedure:

1. Enter to “G-SIZE” mode:
   - **DAC COARSE**
   - **Press ACTION on remote**
   - **TV/VIDEO (repeatedly)**
   - **R-TUNE (repeatedly)**

2. Press “2” repeatedly and apply the pattern of border and cross.
3. Press RECALL to display values
4. Adjust size so that the line of the border closes to the screen frame at top, bottom, left and right by pressing CH up-down and VOL right-left.

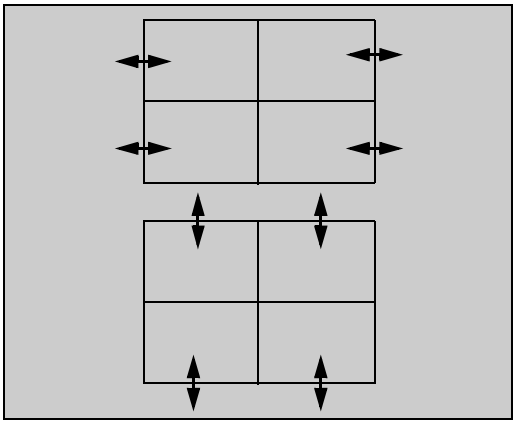


Figure 44. **H & V size adjustment**

5. Press “7” then “ACTION” key on remote to save changes.
6. Enter to linearity “G-LINEAR” mode by pressing “TV/VIDEO”.
7. Adjust linearity by pressing VOL right-left until A=B (see figure 45)

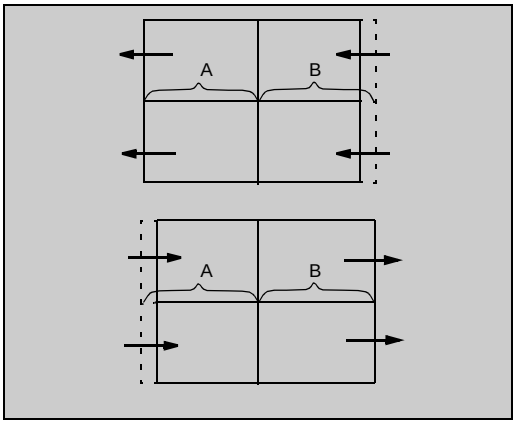


Figure 45. **Linear mode adjustment**

8. Press “7” then “ACTION” key on remote to save changes.
9. Enter to PIN “G-PIN” mode by pressing “TV/VIDEO”.
10. Adjust V_PIN by pressing CH up-down (see figure 46).
11. Adjust H_PIN by pressing VOL right-left.
12. Press “7” then “ACTION” key on remote to save changes.

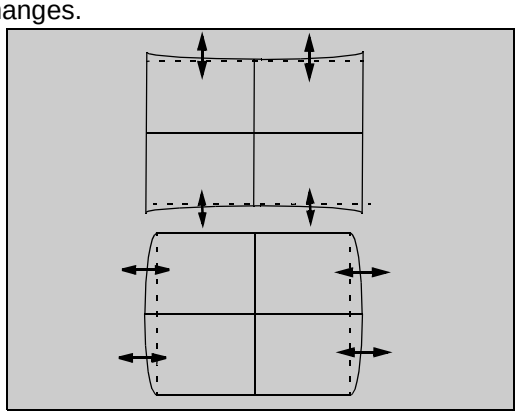


Figure 46. **H & V PIN adjustment**

13. Enter to CORNER “G-CORNER” mode by pressing TV/VIDEO.
14. Adjust by pressing VOL right-left (see figure 47).
15. Press “7” then “ACTION” key on remote to save changes.

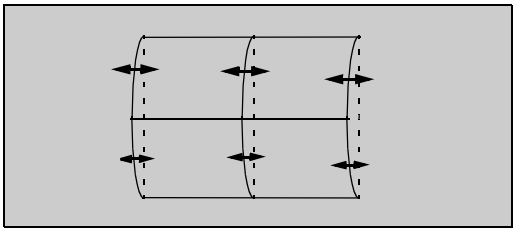


Figure 47. **Corner adjustment**

16. Enter to KEY “G-KEY” mode by pressing TV/VIDEO.
17. Adjust by pressing CH up-down (see figure 48)
18. Press “7” then “ACTION” key on remote to save changes

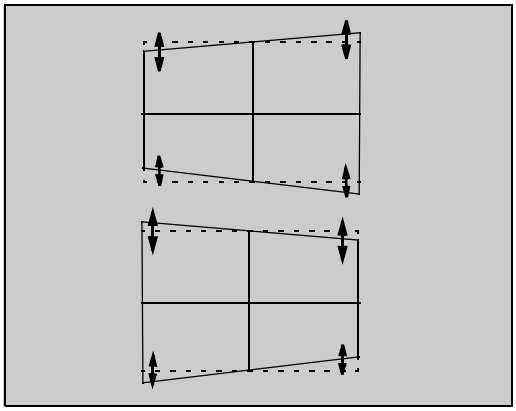


Figure 48. **KEY mode adjustment**

Note: *Confirm that pattern looks like a square and almost overlaps the screen frame, check that vertical and horizontal line center match with the marks on screen frame, if linearity is not good enough, repeat adjustments.*

19. Enter to “STATIC” mode by pressing TV/VIDEO.
20. Press “1” or “3” repeatedly until green and red only are shown.

21. Adjust “R-STATIC” so that the center of red overlaps with the center of green.

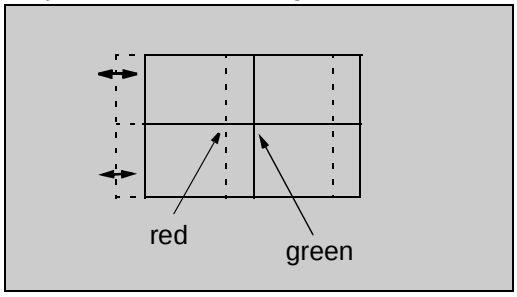


Figure 49. **STATIC mode adjustment**

22. Enter to SKEW “R-SKEW” mode by pressing TV/VIDEO
23. Adjust “R-SKEW” so that the vertical and horizontal line of center overlaps with green (see figure 50)
24. Press “7” then “ACTION” key on remote to save changes.

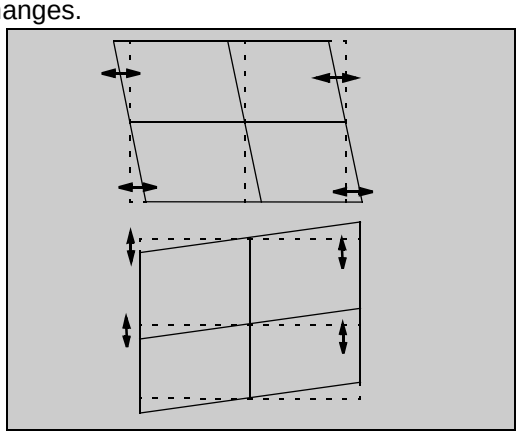


Figure 50. **SKEW adjustment**

Note: *Remember always save data following each adjustment by pressing “7” key on remote, then ACTION.*

25. Enter to LINEARITY “R-LINEAR” mode by pressing TV/VIDEO.
26. Adjust Horizontal linearity (see figure 45)
27. Enter to SIZE “R-SIZE” mode by pressing TV/VIDEO
28. Adjust so that the line on the border closes to the screen frame at top, bottom, left and right (see figure 44)
29. Enter to PIN “R-PIN” mode by pressing TV/VIDEO
30. Adjust horizontally and vertically (see figure 46)
31. Enter to CORNER “R-CORNER” mode by pressing TV/VIDEO.
32. Adjust corners (see figure 47)
33. Enter to KEY “R-KEY” mode by pressing TV/VIDEO
34. Adjust KEY (see figure 48)
35. Display pattern of border and cross, then check that red overlaps green pattern, if it is not satisfactory, repeat from step 19.
36. Enter to STATIC “B-STATIC” mode.
37. Press “1 or 3” key repeatedly on remote until only green and blue pattern are displayed
38. Adjust B-STATIC so that the center of blue overlaps with the center of green (see figure 51).

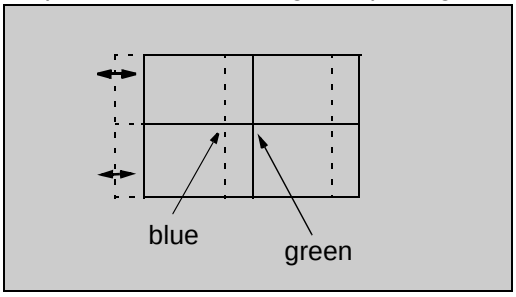


Figure 51. **B-STATIC adjustment**

39. Perform all adjustments for blue (B-SKEW, B-LINEAR, B-SIZE, B-PIN, B-CORNER, B-KEY)
40. Display border and cross pattern and confirm that blue overlaps with green pattern, if it is not satisfactory, repeat for blue.
41. Press “1 or 3” key repeatedly on remote until green, red and blue (white), confirm that red and blue overlaps with green pattern.
42. Press “7” key on remote, then ACTION to save changes.
43. Press POWER then ACTION to exit adjustments or press TV/VIDEO for at least 3 seconds to change to Fine Adjustment Mode.

Fine adjustment mode (FINE) (convergence)

Note: *It is strongly recommended to first read and understand the following section prior to make any adjustment.*
Convergence adjustment must be perform for 480i-p (same for interlace & progressive), 1080i and ZOOM 480i.

Helpful hint:

The easiest way to adjust convergence is to begin from the center of the screen, to the border in all the convergence adjustments.

Remote functions:

- 1, 3. . . . . change color view adj
- 2. . . . . change pattern
- 7. . . . . .save data
- 5. . . . . overlap
- POWER . . . . . .to exit
- RECALL. . . . . display values
- R-TUNE . . . . . cycle colors
- TV/VIDEO . . . . . change mode
  3 secs . . . . . change options
- MUTE (“fine”) . . . . . .cursor & data mode

About pattern:

- NTSC to adjust 480ip (same for interlace and progressive)
- 1080i to adjust 1080i
- 480i with ptv in zoom aspect to adjust Z480i

In “FINE ADJUSTMENT MODE” options, press “MUTE” key on remote to switch between “cursor” mode and “data” mode.

- Cursor mode (cursor flashing): Allows cursor movement by pressing VOL right - left and CH up - down.
- Data mode (cursor fixed): Allows making adjustment by pressing VOL right - left and CH up - down.

Procedure:

1. Enter to “G-EASY” mode (for green):
   - DAC EASY
   - Press POWER on remote
   - TV/VIDEO (repeatedly)
   - R-TUNE (repeatedly)
2. Press “2” repeatedly and apply the pattern of crosshatch.
3. Press “1 or 3” repeatedly until the pattern becomes green.
4. Press RECALL to display values.
5. In “EASY” mode, the adjustment value changes by 4 steps
6. EASY mode allows to move lines horizontally and vertically from the center of cursor.

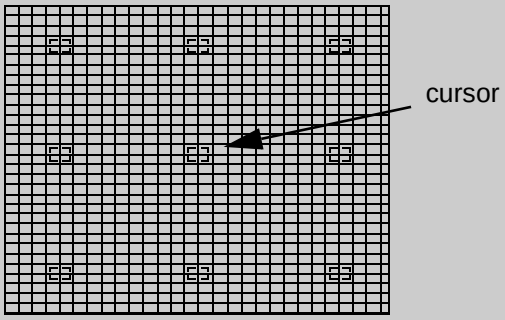


Figure 52. **EASY adjustment cursor positions**

7. This mode afects a wide area around the cursor than other adjustment modes, See values on screen by pressing RECALL on remote (see figure 53)
8. Begin adjustment from the center to the edge of the screen.
9. Adjust by pressing CH up/down and VOL right/left on the remote control when the cursor is not flashing, if the cursor is flashing press MUTE on the remote.

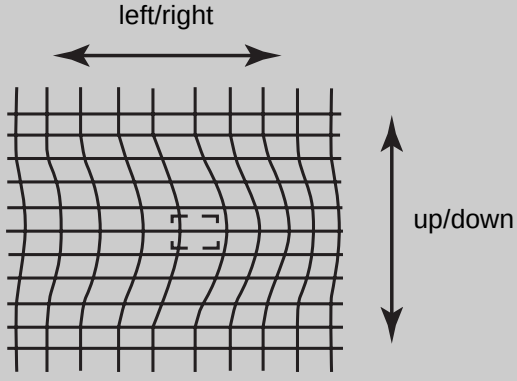


Figure 53. **EASY adjustment**

10. To move the cursor press MUTE on the remote (cursor flashes), then move the cursor to any of the 9 positions for “EASY” mode(see figure 52)
11. This adjustment may help to make rounded lines become straight lines
12. Adjust to make lines as straight as possible
13. Enter to POINT “G-POINT” (for green) mode by pressing TV/VIDEO.
14. “POINT” mode allows to move line horizontally and vertically from the perimeter of cursor making rounded lines become straight (see figure 54)
15. In “POINT” mode, the adjustment data changes by 2 steps, See values on screen by pressing RECALL on remote.

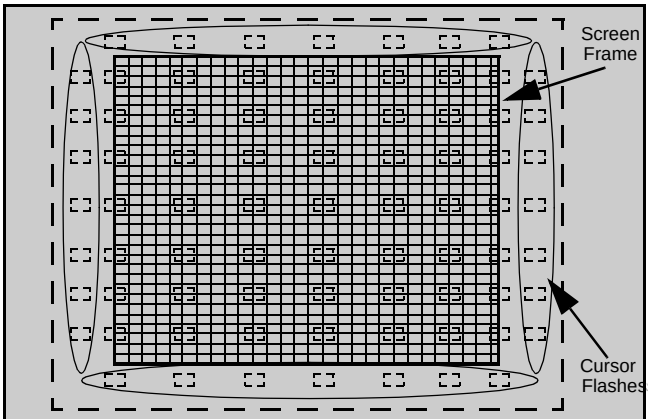


Figure 54. **POINT & ORIG. POINT cursor positions**

16. When the cursor is located in the outer area of the border the cursor starts to flash from one side to other and the adjustment is for the non-visible area (inside the ovals area, see figure 54); This applies to “LINE”, “POINT” & “ORIGIN. POINT” modes.
17. Begin adjustment from the center to the edge of the screen.

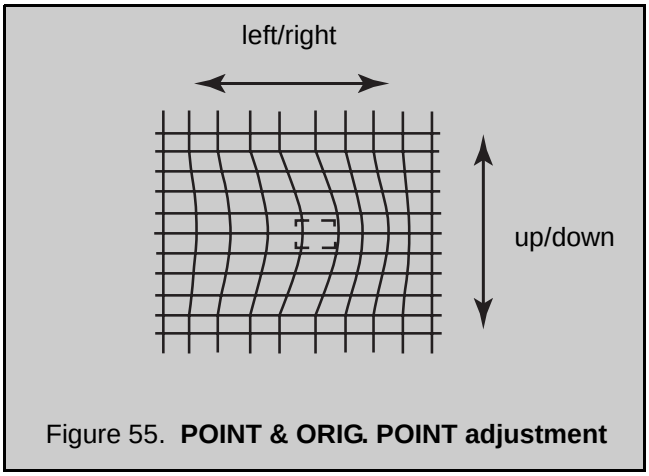


Figure 55. **POINT & ORIG. POINT adjustment**

18. Adjust to make lines as much straight as possible
19. When slightly adjustment is needed, use “ORIG. POINT” mode.
20. To enter to “G-ORIG. POINT” (for green) mode press TV/VIDEO.
21. With “ORIG. POINT”, the adjustment data changes by 1 step, this allows more detail in the adjustment. Display values on screen by pressing RECALL on remote

22. Confirm that green adjustment is good enough, if adjustment is not satisfactory, repeat adjustments.
23. Enter to LINE “G-LINE” mode by pressing TV/ VIDEO.
24. LINE mode allows to move each single line horizontally and vertically (see figure 57).
25. Begin adjustment from the center to the edge of the screen (see figure 56)
26. Adjust to make distribute lines

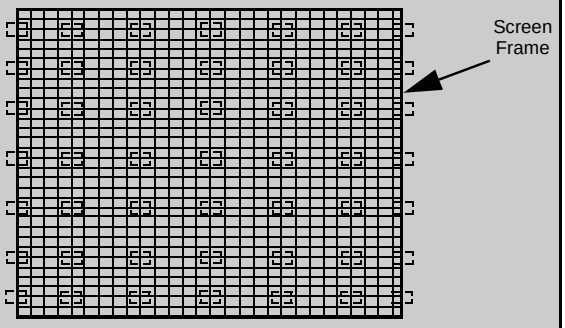


Figure 56. **LINE adjustment cursor positions**

27. Then press “1 or 3” on the remote until red and green appears.

Note: *Since convergence adjustment will not allows to adjust every single cross section of the grid, it is very important to adjust, so that overall looks best.*

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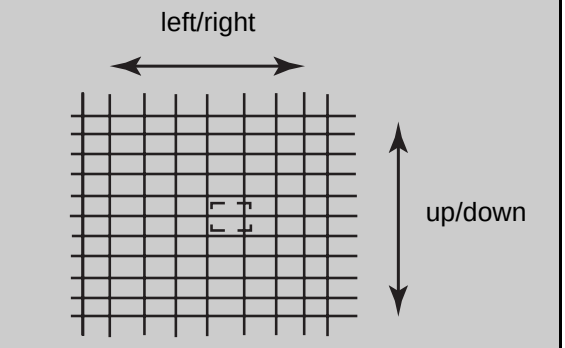


Figure 57. **LINE adjustment**

28. Perform adjustments for red so that red overlaps green, do not move green.
29. Press “1 or 3” on the remote until yellow (red and green) and blue appears, do not move green or red.
30. Perform adjustments so that blue overlaps Yellow (red and green).
31. Press “1 or 3” key on remote to display red, green and blue (white).
32. At this point the crosshatch pattern should look white
33. If the crosshatch pattern is not only white, repeat adjustment for that color (red or blue)
34. Once the crosshatch pattern looks only white, perform the adjustments for White (“POINT”, “ORIG. POINT” & “LINE”), notice that each adjustment is only for white (red, green, blue)
35. Adjust white for a good line distribution and make lines completely straight.
36. Press “7” key on remote, then ACTION to save changes.
37. Press POWER then ACTION to exit convergence adjustments (DACs menu appears).

Horizontal and vertical size check

1. Apply a pattern that permits to check that horizontal and vertical proportion of the image is correct.

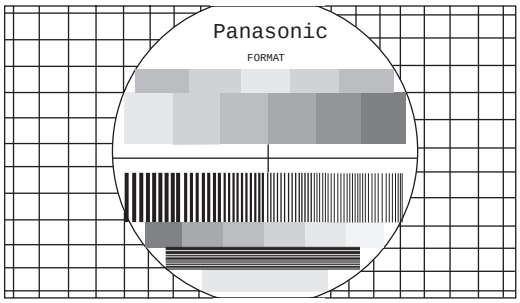


Figure 58. **H & V size check**

Note: *1080i, 480p, 480i pattern obtained from Panasonic's TU-DST51 set-top box DTV decoder.*

2. Confirm that horizontal and vertical center of the picture is located in the center of the screen.
3. Check that the image is proportional horizontally and vertically, proportion is different on every aspect.

Convergence alignment template

The **convergence alignment template** is a grid approximately the size of the viewing screen used to ensure the proper size and shape of the alignment rasters. It is 6 blocks across by 6 blocks high. The grid dimensions vary with the mode of operation.

Apply a **convergence alignment template** to the viewing screen of the PTV. Make sure the center lines are properly aligned. If a template is not available, one can be created by following the instructions below.

Create a convergence alignment template by drawing a pattern, as in figure 59, in the actual dimensions on transparent film or tracing paper. Start with the Horizontal and Vertical Center Axis and work outwards until the pattern is complete. Pay attention to the actual dimensions of the pattern.

Grid dimensions:

47" Models: 1036mm horizontal X 584mm vertical.

Note: *A convergence alignment template, part number **TXFQD01ESER1 for 47",** is available through Matsushita/Panasonic Services.*

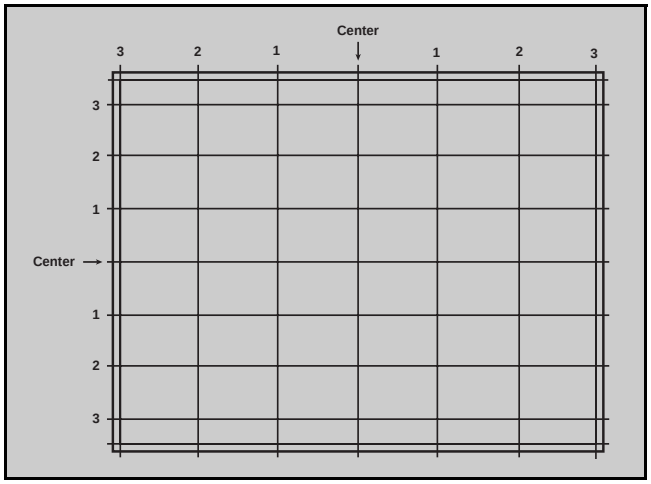


Figure 59. **Convergence adjustment grid**

Service mode (electronic controls)

This receiver has electronic technology using the I²C bus concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using “on screen display menu”. (The **service adjustment mode**.)

Note: *It is suggested that the technician reads all the way through and understand the following procedure for entering/exiting the **service adjustment mode**; then proceed with the instructions working with the receiver. When becoming familiar with the procedure, the flow chart for service mode may be used as a quick guide.*

Quick entry to service mode:

When minor adjustments need to be done to the electronic controls, the method of entering the service mode without removal of the cabinet back is as follows using the remote control:

1. Select SET-UP icon and select CABLE mode.
2. Select TIMER icon and set SLEEP time for 30 Min.
3. Press “ACTION” twice to exit menus.
4. Tune to the Channel 124.
5. Adjust VOLUME to minimum (0).
6. Press VOL ◀ (decrease) **on receiver**. Red “CHK” appears in upper corner.

Note: *After receiver is set into SERVICE MODE, set TIMER back to NO.*

To toggle between aging and service modes:

While the “CHK” is displayed on the left top corner of the CRT, pressing “ACTION” and “VOL” UP on the TV simultaneously will toggle between the modes. Red “CHK” for service mode and yellow “CHK” for Aging.

7. **Press POWER** on the **remote control** to display the service adjustment modes menu, select adjustment by pressing the VOL right/left buttons and CH up/down buttons on the remote and ACTION to enter the adjustment.

	480I	480P	1080I	HX WX
MODE	4.3	16:9	DW	
MTS	MTSIN	SEPAL	SEPAH	
CLOCK	CLOCK			
VIDEO	COLOR	B-Y_G	TINT	R-Y_A
	BRIGHT	CONT	CUT R	CUT B
	R DR	B DR	I-ABL	C_OFF
HDEF	H POS	H WID	PCC	EWCOR
	EWTRA	H CORR		
VDEF	VSIZE	VLIN	V-S	V-I
	VSYM	VCORR		
CONV	MUTE	COARS	FINE	
DAF	H-PAR	V-SAW	V-PAR	
OTHER	ACL	HHS	W-POS	LIMIT

Figure 60. Service mode menu adjustments.

Note: *Some adjustments are available only in some modes (480i, 480p, 1080i); it is needed to apply the format; For some adjustments is required to perform adjustment for each format; convergence adjustment must be perform for 480i-p (same for interlace & progressive), 1080i and ZOOM 480i. A 1080i, 480p, 480i pattern can be obtained from Panasonic’s TU-DST51 set-top box DTV decoder.*

Exiting the service mode:

This PTV goes out from service mode when it is unpluged or turned OFF. To exit the service mode, turn the TV OFF or unplug the PTV from AC.

Other method

Press **ACTION** and **POWER** on the **receiver** simultaneously for at least 2 seconds.

The receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound.

Any programmed channels, channels caption data and some others user defined settings will be erased when exited by pressing ACTION and POWER on receiver.

IMPORTANT NOTE:
Always check that the PTV exits the service mode.

To check colors:

Press **RECALL** on the **remote control** when in service mode (red “CHK” is displayed) to enter the purity field check mode.

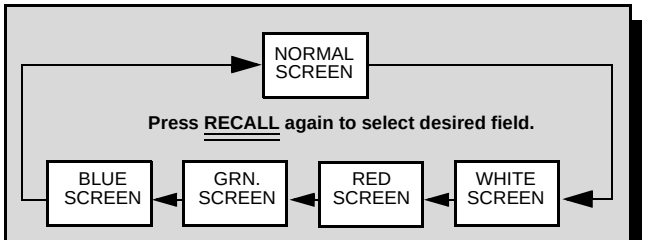


Figure 61. Colors check.

Table of the service adjustment item available for each format

Signal Formated		Format		
		480i	480p	1080i
	MTS			
MTSIN	*INPUT LEVEL*	*X*	*N/A*	*N/A*
SEPAL	LOW LEVEL SEPARATION	*X*	*N/A*	*N/A*
SEPAH	*HIGH LEVEL SEPARATION*	*X*	*N/A*	*N/A*
	CLOCK			
CLOCK	*CLOCK*	*X*	*N/A*	*N/A*
	VIDEO			
COLOR	*COLOR*	*X*	*N/A*	*X*
TINT	TINT	*X*	*N/A*	*X*
BRIGHT	*SUB-BRIGHTNESS*	*X*	*N/A*	*X*
CONT	*SUB-CONTRAST*	*X*	*N/A*	*X*
B-G_Y	*MAGENTA TINT ADJ*	*X*	*N/A*	*X*
R-Y_A	*YELLOW TINT ADJ*	*X*	*N/A*	*X*
CUT-R	*RED CUT-OFF*	*X*	*N/A*	*X*
CUT-B	*BLUE CUT-OFF*	*X*	*N/A*	*X*
R DR	*RED DRIVE*	*X*	*N/A*	*X*
B DR	*BLUE DRIVE*	*X*	*N/A*	*X*
I ABL	*ABL*	*X*	*X*	*X*
C_OFF	*COLOR ADJ. CUT-OFF*	*X*	*X*	*X*
	HDEF			
H POS	*HORIZONTAL POSITIONING*	*X*	*N/A*	*X*
HWID	*HORIZONTAL WIDTH*	*X*	*N/A*	*X*
PCC	*PINCUSHION CORRECTION*	*X*	*N/A*	*X*
EWCOR	*CORNER CORRECTION*	*X*	*N/A*	*X*
EWTRA	*TRAPEZOID*	*X*	*N/A*	*X*
HCORR	*HORIZONTAL CORRECTION*	*X*	*N/A*	*X*
	VDEF			
VSIZE	*VERTICAL SIZE*	*X*	*N/A*	*X*
VLIN	*VERTICAL LINEARITY*	*X*	*N/A*	*X*
V-S	*VERTICAL S CORRECTION*	*X*	*N/A*	*X*
V-I	*VERTICAL ENDING CORRECTION*	*X*	*N/A*	*X*
VSYM	*VERTICAL MAGNET CORRECTION*	*X*	*N/A*	*X*

Signal Formated		Format		
		480i	480p	1080i
VCORR	*VERTICAL CORRECTION*	*X*	*N/A*	*X*
	CONV			
MUTE	*DIGITAL CONV (ON/OFF)*	*X*	*X*	*X*
COARS	*COARSE ADJUSTMENT*	*X*	*X*	*X*
FINE	*FINE ADJUSTMENT*	*X*	*X*	*X*
	DAF			
H-PAR	*HORIZONTAL PARABOLA*	*X*	*X*	*X*
V-SAW	*VERTICAL SAW*	*X*	*X*	*X*
V-PAR	*VERTICAL PARABOLA*	*X*	*X*	*X*
	OTHER			
ACL	----------	*X*	*N/A*	*X*
HHS	----------	*X*	*N/A*	*X*

Note: *PTV detects automatically the format of the input signal (480i, 480p or 1080i)*

480i Service mode (electronic controls, continued)

Note: *Registers marked as **FIXED** are factory preset, the default value must not be changed*

Important note:
Write down the original values ("b" in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section.)

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. ("a" in figure 60)

b. Press

The ◀ ▶ buttons on the remote control to adjust the level of the selected service adjustments.

MTS Adjustments	Description	Default Level	New Level
MTSIN	INPUT LEVEL	21	
SEPAL	LOW LEVEL SEPARATION	06	
SEPAH	HIGH LEVEL SEPARATION	1A	
CLOCK Adjustments	**Description**	**Default Level**	**New Level**
CLOCK	CLOCK	128	
VIDEO Adjustments	**Description**	**Default Level**	**New Level**
COLOR	COLOR	13	
TINT	TINT	80	
BRIGHT	SUB-BRIGHTNESS	01 DB	
CONT	SUB-CONTRAST	89	
B-Y_G	MAGENTA TINT ADJ	40	
R-Y_A	YELLOW TINT ADJ	80	
CUT R	RED CUT-OFF	01 FB	
CUT B	BLUE CUT-OFF	01 EC	
R DR	RED DRIVE	57	
B DR	BLUE DRIVE	70	
I ABL	ABL	VARIABLE	
C_OFF	COLOR ADJ. CUT-OFF	00	
HDEF Adjustments	**Description**	**Default Level**	**New Level**
H POS	HORIZONTAL POSITIONING	01 48	
H WID	HORIZONTAL WIDTH	1D	
PCC	PINCUSHION CORRECTION	20	
EWCOR	CORNER CORRECTION	03	
EWTRA	TRAPEZOID	08	
HCORR	HORIZONTAL CORRECTION	0D	

Note: *Registers marked as **FIXED** are factory preset, the default value must not be changed*

Important note:
Write down the original values ("b" in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section).

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. ("a" in figure 60)

b. Press

The ◀ ▶ buttons on the remote control to adjust the level of the selected service adjustments.

VDEF Adjustment	Description	Default Level	New Level
VSIZE	VERTICAL SIZE	00	
VLIN	VERTICAL LINEARITY	10	
V-S	VERTICAL S CORRECTION	0A	
V-I	VERTICAL ENDING CORRECTION	0F (DEFAULT)	
VSYM	VERTICAL MAGNET CORRECTION	04 (DEFAULT)	
VCORR	VERTICAL CORRECTION	0C	
CONV Adjustments	**Description**	**Default Level**	**New Level**
MUTE	DIGITAL CONV (ON/OFF)	00	
COARS	COARSE ADJUSTMENT	ADJUSTMENT	
FINE	FINE ADJUSTMENT	ADJUSTMENT	
DAF Adjustments	**Description**	**Default Level**	**New Level**
H-PAR	HORIZONTAL PARABOLA	+317	
V-SAW	VERTICAL SAW	-23	
V-PAR	VERTICAL PARABOLA	+69	
OTHER Adjustments	**Description**	**Default Level**	**New Level**
ACL	-------	01 CO	
HHS	-------	01 CO	

About format aspect switching (WX 16:9 or HX 4:3):

Widescreen 16:9 and non-widescreen 4:3 PTVs use the same light box, for this reason is important to set it to the correct version (16:9 or 4:3). To change the format please refer to figure 62 on page 43.
Be sure to select the correct format for the serviced PTV.

480p Service mode (electronic controls, continued)

Note: *Registers marked as **FIXED** are factory preset, the default value must not be changed*

Important note:
Write down the original values ("b" in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section.)

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. ("a" in figure 60)

b. Press

The ◀ ▶ buttons on the remote control to adjust the level of the selected service adjustments.

MTS Adjustments	Description	Default Level	New Level
MTSIN	INPUT LEVEL	N/A	
SEPAL	LOW LEVEL SEPARATION	N/A	
SEPAH	HIGH LEVEL SEPARATION	N/A	
CLOCK Adjustments	**Description**	**Default Level**	**New Level**
CLOCK	CLOCK	N/A	
VIDEO Adjustments	**Description**	**Default Level**	**New Level**
COLOR	COLOR	N/A	
TINT	TINT	N/A	
BRIGHT	SUB-BRIGHTNESS	N/A	
CONT	SUB-CONTRAST	N/A	
B-Y_G	MAGENTA TINT ADJ	N/A	
R-Y_A	YELLOW TINT ADJ	N/A	
CUT R	RED CUT-OFF	N/A	
CUT B	BLUE CUT-OFF	N/A	
R DR	RED DRIVE	N/A	
B DR	BLUE DRIVE	N/A	
I ABL	ABL	VARIABLE	
C_OFF	COLOR ADJ. CUT-OFF	00	
HDEF Adjustments	**Description**	**Default Level**	**New Level**
H POS	HORIZONTAL POSITIONING	N/A	
H WID	HORIZONTAL WIDTH	N/A	
PCC	PINCUSHION CORRECTION	N/A	
EWCOR	CORNER CORRECTION	N/A	
EWTRA	TRAPEZOID	N/A	
HCORR	HORIZONTAL CORRECTION	N/A	

Note: *Registers marked as **FIXED** are factory preset, the default value must not be changed*

Important note:
Write down the original values ("b" in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section).

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. ("a" in figure 60)

b. Press

The ◀ ▶ buttons on the remote control to adjust the level of the selected service adjustments.

VDEF Adjustment	Description	Default Level	New Level
VSIZE	VERTICAL SIZE	N/A	
VLIN	VERTICAL LINEARITY	N/A	
V-S	VERTICAL S CORRECTION	N/A	
V-I	VERTICAL ENDING CORRECTION	N/A	
VSYM	VERTICAL MAGNET CORRECTION	N/A	
VCORR	VERTICAL CORRECTION	N/A	
CONV Adjustments	**Description**	**Default Level**	**New Level**
MUTE	DIGITAL CONV (ON/OFF)	00	
COARS	COARSE ADJUSTMENT	ADJUSTMENT	
FINE	FINE ADJUSTMENT	ADJUSTMENT	
DAF Adjustments	**Description**	**Default Level**	**New Level**
H-PAR	HORIZONTAL PARABOLA	+317	
V-SAW	VERTICAL SAW	-23	
V-PAR	VERTICAL PARABOLA	+69	
OTHER Adjustments	**Description**	**Default Level**	**New Level**
ACL	-------	01 CO	
HHS	-------	01 CO	

About format aspect switching (WX 16:9 or HX 4:3):

Widescreen 16:9 and non-widescreen 4:3 PTVs use the same light box, for this reason is important to set it to the correct version (16:9 or 4:3). To change the format please refer to figure 62 on page 43.
Be sure to select the correct format for the serviced PTV.

1080i Service mode (electronic controls, continued)

Note: *Registers marked as **FIXED** are factory preset, the default value must not be changed*

Important note:
Write down the original values ("b" in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section.)

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. ("a" in figure 60)

b. Press

The ◀ ▶ buttons on the remote control to adjust the level of the selected service adjustments.

MTS Adjustments	Description	Default Level	New Level
MTSIN	INPUT LEVEL	N/A	
SEPAL	LOW LEVEL SEPARATION	N/A	
SEPAH	HIGH LEVEL SEPARATION	N/A	
CLOCK Adjustments	**Description**	**Default Level**	**New Level**
CLOCK	CLOCK	N/A	
VIDEO Adjustments	**Description**	**Default Level**	**New Level**
COLOR	COLOR	1C	
TINT	TINT	80	
BRIGHT	SUB-BRIGHTNESS	02 00	
CONT	SUB-CONTRAST	89	
B-Y_G	MAGENTA TINT ADJ	40	
R-Y_A	YELLOW TINT ADJ	80	
CUT R	RED CUT-OFF	01 FB	
CUT B	BLUE CUT-OFF	01 EC	
R DR	RED DRIVE	57	
B DR	BLUE DRIVE	70	
I ABL	ABL	00	
C_OFF	COLOR ADJ. CUT-OFF	00	
HDEF Adjustments	**Description**	**Default Level**	**New Level**
H POS	HORIZONTAL POSITIONING	00 C2	
H WID	HORIZONTAL WIDTH	2B	
PCC	PINCUSHION CORRECTION	0C	
EWCOR	CORNER CORRECTION	03	
EWTRA	TRAPEZOID	08	
HCORR	HORIZONTAL CORRECTION	0E	

Note: *Registers marked as **FIXED** are factory preset, the default value must not be changed*

Important note:
Write down the original values ("b" in the adjustment mode details, figure 60) for each address adjustment before modifying values.

Follow the procedure below to access the various service adjustments. (Same procedures applies to each section).

a. Press

CH ▲▼ buttons on the remote control to select any of the seven service sub adjustment addresses. ("a" in figure 60)

b. Press

The ◀ ▶ buttons on the remote control to adjust the level of the selected service adjustments.

VDEF Adjustment	Description	Default Level	New Level
VSIZE	VERTICAL SIZE	40	
VLIN	VERTICAL LINEARITY	15	
V-S	VERTICAL S CORRECTION	19	
V-I	VERTICAL ENDING CORRECTION	0F (DEFAULT)	
VSYM	VERTICAL MAGNET CORRECTION	04 (DEFAULT)	
VCORR	VERTICAL CORRECTION	0C	
CONV Adjustments	**Description**	**Default Level**	**New Level**
MUTE	DIGITAL CONV (ON/OFF)	00	
COARS	COARSE ADJUSTMENT	ADJUSTMENT	
FINE	FINE ADJUSTMENT	ADJUSTMENT	
DAF Adjustments	**Description**	**Default Level**	**New Level**
H-PAR	HORIZONTAL PARABOLA	+263	
V-SAW	VERTICAL SAW	-35	
V-PAR	VERTICAL PARABOLA	+117	
OTHER Adjustments	**Description**	**Default Level**	**New Level**
ACL	-------	01 CO	
HHS	-------	01 CO	

About format aspect switching (WX 16:9 or HX 4:3):

Widescreen 16:9 and non-widescreen 4:3 PTVs use the same light box, for this reason is important to set it to the correct version (16:9 or 4:3). To change the format please refer to figure 62 on page 43.
Be sure to select the correct format for the serviced PTV.

Instructional flow chart for format aspect switching (WX 16:9 or HX 4:3)

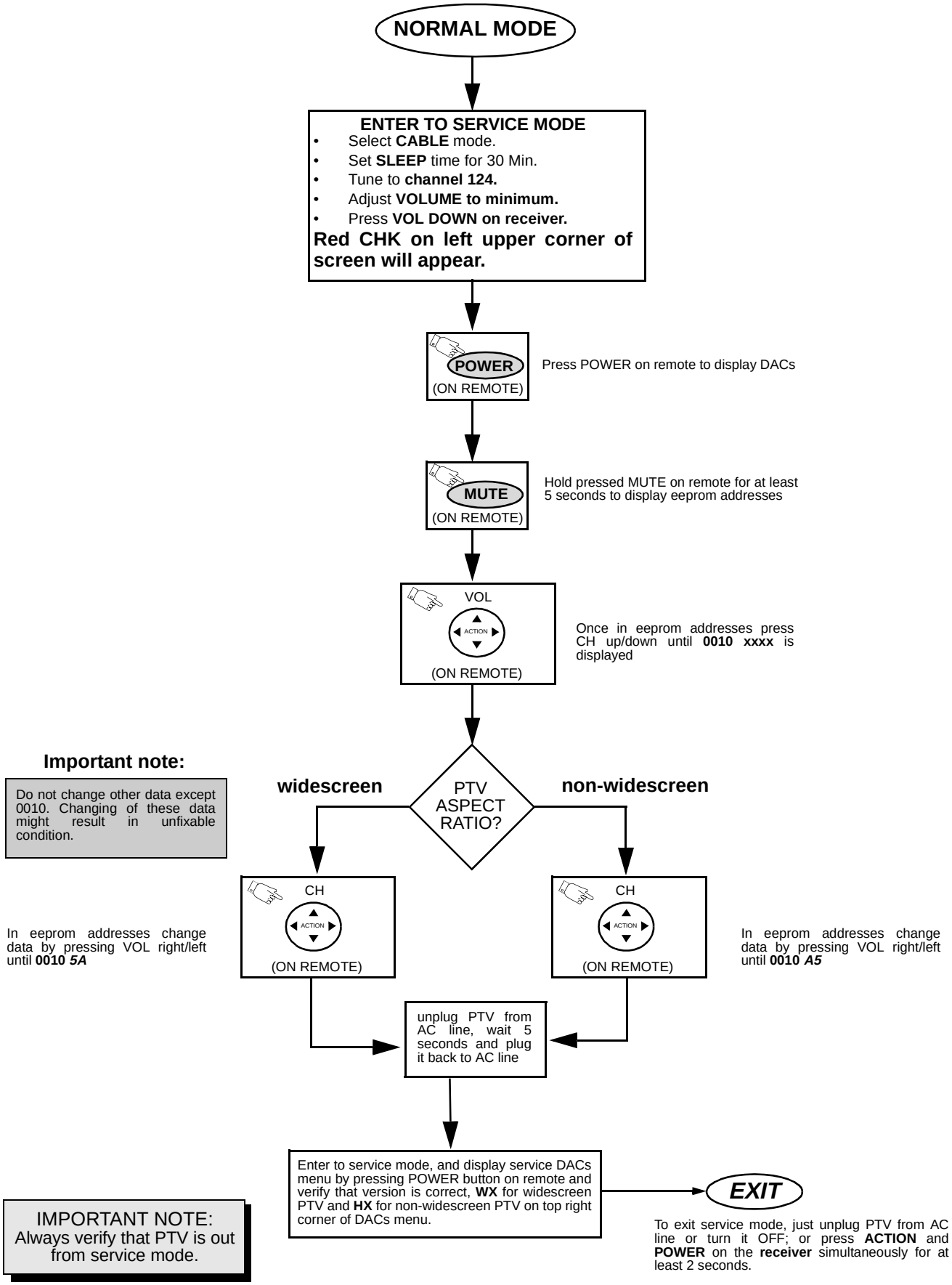


Figure 62.**Flow chart for aspect ratio switching**.

Instructional flow chart for service mode

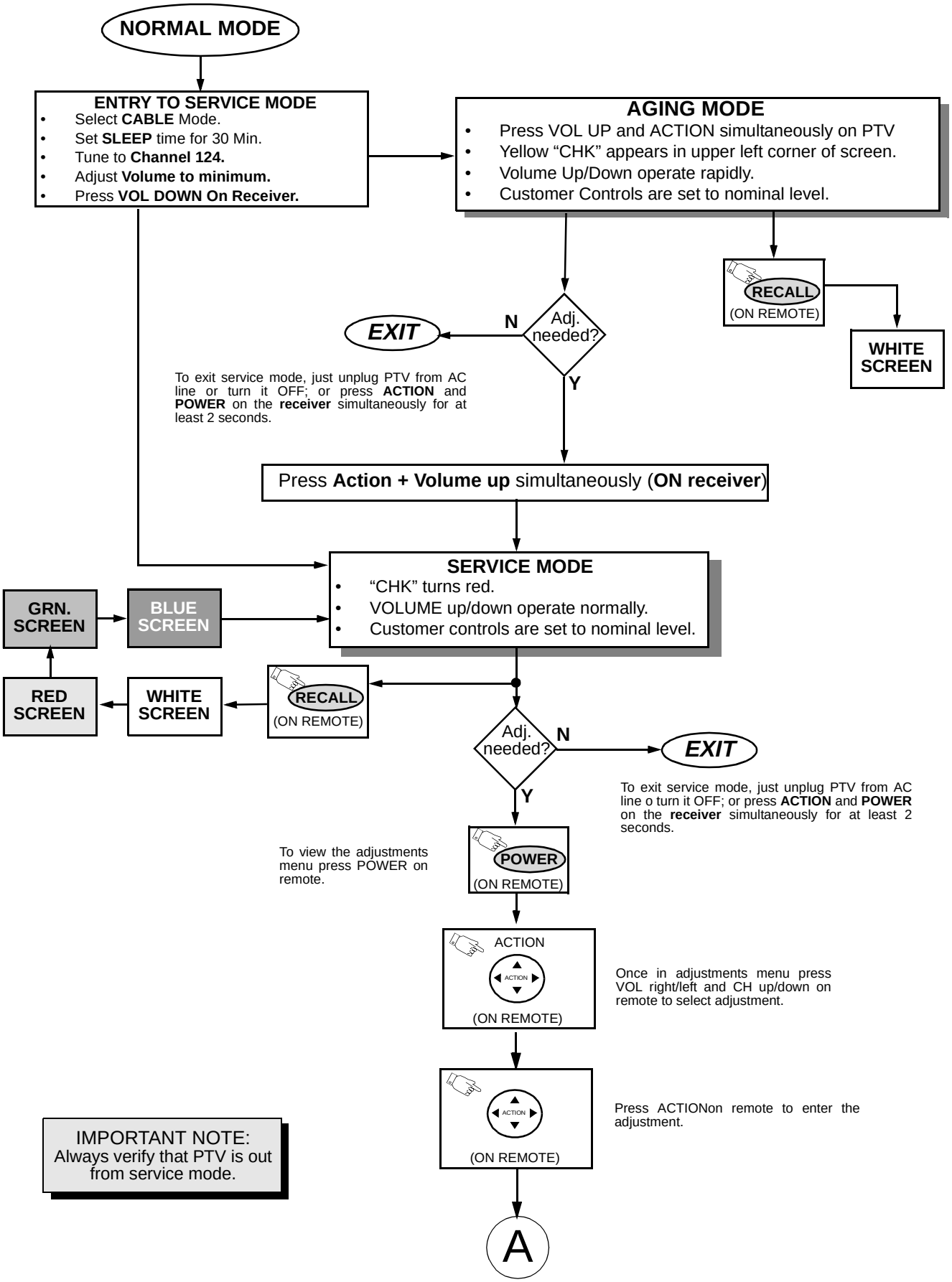
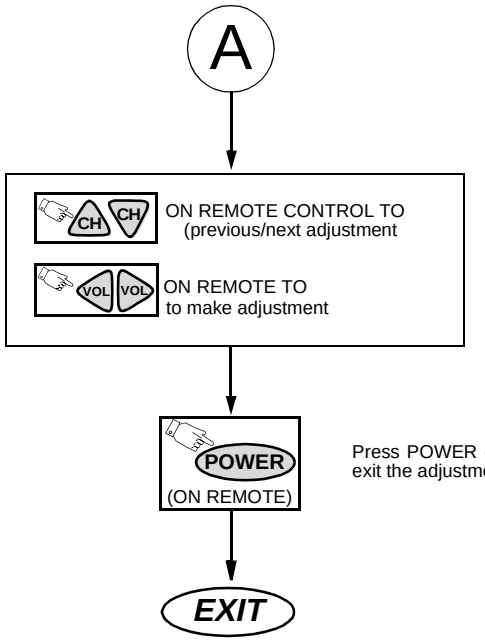


Figure 63.**Flow chart for service mode**.

Instructional flow chart for service mode - continued



IMPORTANT NOTE:
Always verify that PTV is out from service mode.

To exit service mode, just unplug PTV from AC line or turn it OFF; or press **ACTION** and **POWER** on the **receiver** simultaneously for at least 2 seconds.

Flow chart for service mode (continued).

NTSC Sub-Bright adjustment (BRIGHT)

Procedure:

1. Set PIC MODE TO VIVID, PICTURE settings to normal, NATURAL COLOR to OFF and COLOR TEMPERATURE to NORMAL.
2. Connect meter (+) to TPD50 and (-) to TPD51.
3. Apply a NTSC color bar with no color or if available a grey levels pattern.
4. Adjust DAC BRIGHT data so that bar near to black bar becomes near black .
5. Apply a white pattern and put user bright control to max. and confirm reading on meter is 12.4±1_V.

1080i Sub-Bright adjustment (BRIGHT)

Procedure:

1. Set same settings as NTSC adjustment
2. Apply a 1080i signal, and repeat adjustments as from step 2 in NTSC adjustment.
3. If pattern is not available, use a color signal in 1080i and adapt the adjustment to that available signal
4. Adjust DAC CONT so that black and white level are in good balance (white is white and black is black)

NTSC Color adjustment (TINT, B-Y_G, R-Y_A)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.*

This adjustment requires that the servicer use its skills in observing what a colorbar pattern should looks like.

Preparation:

1. Set the following in the user picture menu as follows:
   PIC MODE:VIVID
   COLOR: center (31)
   PICTURE: max (63)
   BRIGHT: center (31)
   SHARPNESS: min. (0)
   TINT:(31)
   NATURAL COLOR:OFF
   COLOR TEMPERATURE:NORMAL

Procedure:

1. Apply a NTSC color bar pattern
2. Adjust DAC TINT so that the fourth bar from right to left becomes purple and good color balance.
3. If the adjustment is high, the bar will look pinkish, if it is low will look bluish.
4. Adjust B-Y_G so blue look natural, and the rest of the colors become in balance.
5. Adjust R-Y_A so red look natural, and rest of the colors become in balance.
6. Check that white bar is real white, no bluish or redish or tending to become grey.

1080i Color adjustment (TINT, B-Y_G, R-Y_A)

Note: *1080i, 480p, 480i pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.*

1. Set same settings as NTSC adjustment
2. Apply a 1080i signal, and repeat adjustments as from step 2 in NTSC adjustment.
3. If pattern is not available, use a color signal in 1080i and adapt the adjustment to that available signal.

Service mode (electronic controls, continued)

Red, green & blue screen cutoff

1. Use either a no input signal condition or raster from the NTSC generator.
2. Observing the green tube directly or via a reflective surface, adjust the VR on focus pack for the green tube for minimum noise.
3. Adjust the noise level in the red and blue tubes to match the noise level in the green tube.

White balance adjustment

Note: *1080I, 480p, 480I pattern can be obtained from Panasonic's TU-DST51 set-top box DTV decoder.*

Prior to this adjustment, perform sub-contrast adjustment. This adjustment requires that the service use skills in observing what a screen without color should look like (white picture).

1. Enter the service mode.
2. Apply a NTSC black and white pattern to one of the video inputs (see above note) color bar with no color.

High light white balance adjustment

1. Adjust DAC R_DR for red and B_DR for blue adjustments.
2. Make sure the screen is not blue or green. The screen should be white in the white area.
3. Check the black and white area for a black and white picture with even shades of gray and no color tint in the picture.

Low light white balance adjustment

1. Adjust DAC CUT_R for red and DAC CUT_B for blue.
2. Check the screen for even white in all areas, no color.
3. Check the black and white pattern for a black and white picture, even shades of gray and no color tint in the low light areas.
4. Repeat the High Light and Low Light White Balance again until the white balance tracks from high light to low light.

Tint and color check

Set picture mode to VIVID mode.

Again, the service ability to see color and the balance of color is important for theses adjustments.

Tint check

1. In picture menu set PICTURE NORM to YES.
2. Apply color bars to the video input.
3. Magenta is composed of two colors, blue and red.
4. Check to see that magenta does not have too much blue or too much red.
5. Check cyan. Cyan is composed of blue and green. It should not have too much blue or green.
6. Use a test signal from a VCR or laser disk that has a pre-recorded close up of a signal that has good flesh tones.
7. The signal on the VCR or laser disk should look normal.

Color check

Using a clean RF or video signal, set the color level so that it does not saturate or appear harsh. Make sure that color is not set so that it appears dull and washed out. Look for natural colors, try to adjust the picture to appear as a normal photograph.

MTS circuit adjustments

Note: *It is important to adjust the MTS circuit in the order shown below.*

The MTS circuit adjustments require two steps:

1. Input level adjustment.
2. Stereo separation adjustment.

Input level adjustment (MTSIN)

Preparation:

1. Connect an RMS meter (AC range) with filter jig as shown in figure 64 .

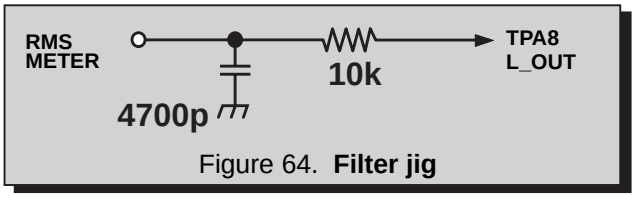


Figure 64. **Filter jig**

2. Connect an RF signal generator to the RF antenna input.

Procedure:

1. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 100% modulation, monaural (70 ± 5dB, 75Ω open, P/S 10dB). Make sure to turn off 75µs pre-emphasis.
2. Adjust DAC "MTSIN" *MTS-INPUT* data until the voltage measured is 106mV ± 6.0mV RMS.

Stereo separation adjustment (SEPAL & SEPAH)

Preparation:

1. Connect an RF signal generator to the RF antenna input.
2. Connect an oscilloscope probe to TPA7 (R_out).

Procedure:

1. Set PTV to Stereo Mode (in the audio menu).
2. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 30% modulation, stereo (left only) (70dB ± 5dB, 75Ω OPEN, P/S 10dB).

Note: *Set the 30% modulation with the pilot light SW and N.R. switches OFF then turn them ON while testing.*

---

3. Adjust MTS low-level separation "SEPAL" DAC data (in the service menu) until the amplitude of the measured waveform on the scope is minimum.

4. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 3KHz, 30% modulation, stereo (left only).
   (70dB ± 5dB, 75Ω OPEN, P/S 10dB).

Note: *Set the 30% modulation with the P.L and N.R. switches OFF then turn them ON while testing.*

---

5. Adjust MTS High-Level Separation “SEPAH” DAC data until the amplitude of the waveform measured on the scope is minimum.
6. Repeat above steps 2 through 5 until the amplitude is at minimum for both signals.

Clock Adjustment (CLOCK)

Preparation:

Connect the frequency counter from IC001 MPU Pin 10 or TPA009, to cold ground (⏚).

Note: *Frequency Counter probe capacitance should be 8pF or less.*

Procedure:

1. Turn the PTV “ON” with the AC power applied.
2. Measure TPA009 IC001 MPU pin 10 for frequency and record the reading.

Note: *Pin 10 measurement must have at least four digits of resolution following the decimal point. Example: 000.0000*

---

3. Place the PTV into service mode for making electronic adjustment, select the clock adjustment DAC CLOCK and change value to 128.
4. Calculate and set CLOCK based on the following formula:

$$CLOCK = 128 + 0.450x106x\frac{\{732.422 - pin(10)[\mathrm{Hz}]\}}{732.4220}$$

Note: *Pin 10 measurement will not change regardless of the value stored in CLOCK.*
