4.Alignment and Adjustments

4-1 When entering the service mode:

1. Turn on the TV, and then select "STANDARD" on the picture adjustment mode.

2. Turn off the TV (STAND-BY).

3. Enter the service mode by pressing the remote control keys in the following sequence :
   MUTE →1→8→2→Power On

Note : If necessary, re-do steps 1~3.

Initial display when the service mode is switched.

1. When a RF signal is received

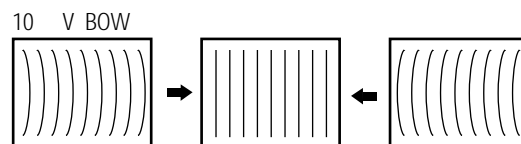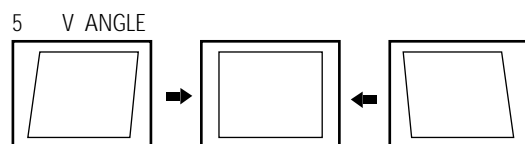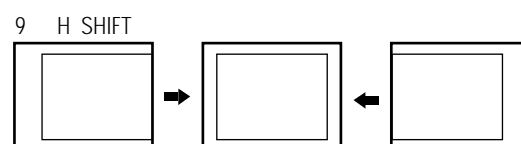```
FACTORY

GEOMETRIC
PICTURE
SOUND
PIP
OPTION
READ
RESET
```
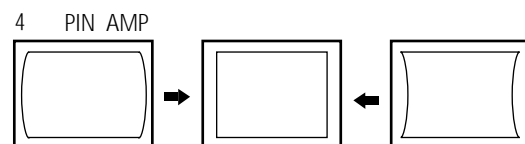
2. Service Mode Control Keys

| MAIN MENU | MENU DISPLAY |
|-----------|--------------|
| CH UP/DOWN | Select item by moving cursor |
| VOL UP/DOWN | Decrease or increase the adjustment values |

## 4-1-1 Factory Data

| ITEM | INITIAL VALUE | FUNCTION | ITEM | INITIAL VALUE | FUNCTION |
|------|---------------|----------|------|---------------|----------|
| **GEOMETRIC** | | | | | |
| VS | 32 | V-SHIFT | HLC | 8 | PIN-LO-CORR |
| VA | 32 | V-SIZE | VAS | 40 | V-ASPECT-SIZE |
| VCP | 0 | V-COMP | VSR | 25 | V-SCROLL |
| VLN | 5 | V-LIN | VUV | 0 | V-UP-LIN |
| VSC | 3 | V-S-CORR | VLV | 0 | V-LO-LIN |
| HS | 0 | H-SHIFT | VJS | 0 | V-JUMP-SW |
| HPC | 17 | PIN-AMP | VZS | 0 | V-ZOOM-SW |
| HA | 20 | H-SIZE | VRP | 3 | VBLKW |
| HPP | 8 | PIN-PHASE | VBS | 3 | V-BLK-SW |
| HAA | 7 | V-ANGLE | HBS | 0 | H-BLK-SW |
| HAB | 5 | V-BOW | HLB | 15 | H-LEFT-BLK |
| HUC | 8 | PIN-UP-CORR | HRB | 15 | H-RIGHT-BLK |
| **PICTURE** | | | | | |
| DCT | 1 | | GC | 8 | |
| DPI | 1 | | BC | 8 | |
| AS | 1 | | GAM | 2 | |
| DCL | 1 | | AFC | 2 | |
| ABL | 1 | | TOC | 1 | |
| POV | 3 | | SSP | 40 | |
| SFO | 1 | | AMS | 1 | |
| TA | 1 | | FHS | 0 | |
| SCT | 5 | | CFS | 0 | |
| SBT | 8 | | SC | 40 | |
| SCR | 4 | | LWC | 32 | |
| STT | 11 | | COR | 45 | |
| GA | 32 | | | | |
| BA | 32 | | | | |
| **SOUND** | | | | | |
| STEREO | 9 | | ALIGN1 | 27 | |
| SAP | 9 | | ALIGN2 | 25 | |
| LEVEL | 9 | | ALIGN3 | 4 | |
| **PIP** | | | | | |
| CONTRAST | 10 | | | | |
| HUE | 32 | | | | |
| POS-HOR | 137 | | | | |
| POS-VER | 34 | | | | |
| **OPTION** | | | | | |
| BYTE O : | 91 | | | | |
| BYTE 1 : | 00 | | | | |

## 4-2 Screen Change (When adjusting I²C Bus Geometric items)

1    V  SHIFT

6    V  SIZE

2    V  LINEARITY

7    V - S - CORRECTION

3    H  SIZE

8    PIN PHASE

4    PIN  AMP

9    H  SHIFT

5    V  ANGLE

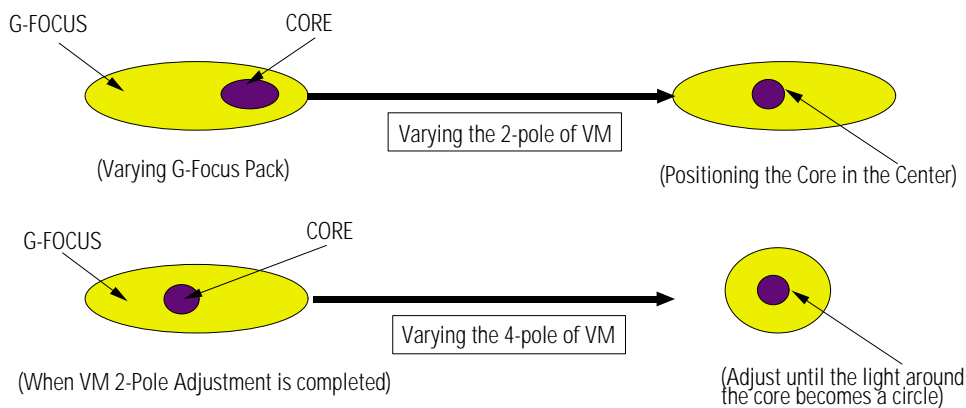10    V  BOW
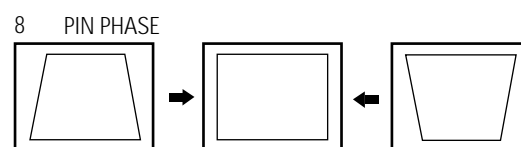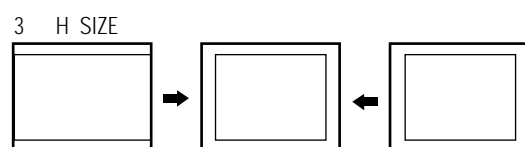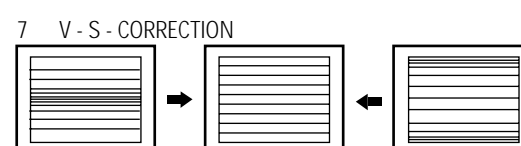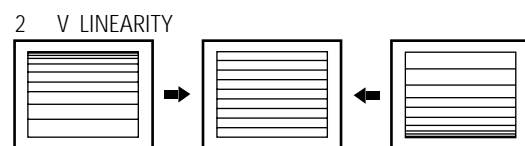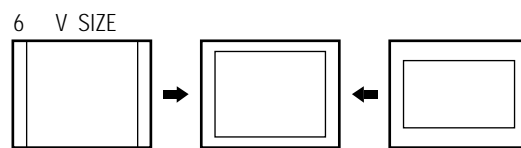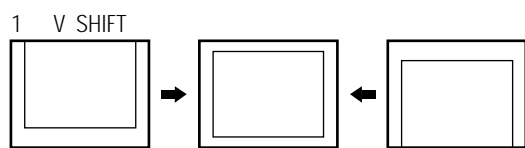
## 4-3 Beam Alignment

PRECAUTION

1.   Input a crosshatch and dot pattern.

2.   Select the "STANDARD" video mode.

3.   Warm up the TV for at least 10 minutes.

4.   Connect an audio oscillator to the pin jig between GT401~GT402 (located on the deflection PCB) and GND.

5.   Determine the ZERO-magnet area (using the beam-alignment CY)

6.   Check the squarewave at the point where the focus is misaligned (Use an audio oscillator).

(Creation of CPM Zero Magnet)          (Creation of the 2-pole/4-pole zero magnets)
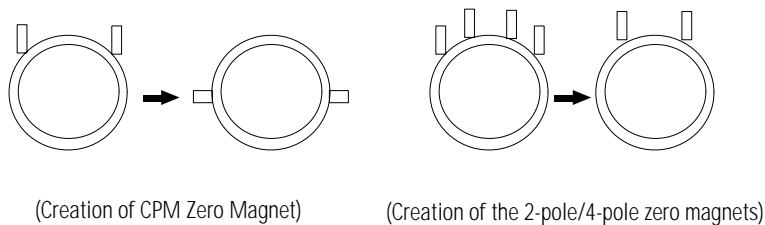
ADJUSTMENT

1.   Cover the Red and Blue lenses.

2.   Adjust the Green lens as shown in the figures below

G-FOCUS          CORE

Varying the 2-pole of VM

(Varying G-Focus Pack)          (Positioning the Core in the Center)

G-FOCUS          CORE

Varying the 4-pole of VM

(When VM 2-Pole Adjustment is completed)          (Adjust until the light around the core becomes a circle)

3.   Adjust the G-Focus  until any light around the core disappears.

4.   Cover the Green and Blue lenses.

5.   Adjust the Red lens using the same method as with the Green lens.

6.   Note: The Blue lens is not adjusted because its focus varies little (VM-coil is installed).

7.   After the adjustments are completed, disconnect the jig pin connector.

# 4-4 Other Adjustments

### 4-4-1 Screen Adjustment

1. Warm up the TV for at least 30 minutes.

2. Turn to the Video Mode (No Signal) using a remote-control.

3. Connect an oscilloscope to RK,GK,BK.

4. Adjust the VR (VR501, VR531, VR561) screen so that RK, GK, BK pulse is 20Vp-p each. (Turn the R,G,B VR screen fully counterclockwise in the area of each flyback line.)

### 4-4-2 White Balance Adjustment

1. Select the "STANDARD" video mode.

2. Input 100% white pattern.

3. In the stand-by mode, press the remote-control keys in the following sequence:
   Mute → 1 → 8 → 2 → Power ON

4. Warm up the TV for at least 30 minutes.

5. Input a 10-step signal.

6. R-cut off, B-cut off, and G-cut off by pressing the Volume +/- keys.

7. Adjust the low light with viewing the dark side of the screen.

8. Select R-drive, G-drive, and B-drive by pressing the Volume +/- keys.

9. Adjust the high light with viewing the light side of the screen.

10. If necessary, redo adjustments 6~9.

11. Press the Menu key to exit.

### 4-4-3 Sub-Brightness Adjustment

1. Input a sub-brightness adjustment signal. (TOSHIBA PATTERN)

2. In the stand-by mode, press the remote-control keys in the following sequence :
   Mute - 1 - 8 - 2 - Power ON

3. Select SBT by pressing the Volume +/- keys.

4. Adjust so that the 7th step on the right side of the screen is not seen (Use the Volume +/- keys).

5. Press the Menu key to exit.

### 4-4-4 High Voltage (31KV) Check

PRECAUTION

1. Input a lion head pattern.

2. Select "STANDARD" video mode.

3. Warm up the TV for at least 10 minutes.

4. Use a 1000:1 probe.

ADJUSTMENT

1. Connect the (+) terminal of the 1000:1 probe to the high voltage distributor and the (-) terminal to GND (located on the deflection board).

2. Adjust VR471 (located on the deflection board) so that the digital meter indicates DC 31V ± 0.1V.

## 4-4-5 F.S. (Fail Safe) Circuit Check

Note : The F.S. Circuit check must be performed after servicing.

1. Turn on the TV.

2. Select the "STANDARD" video mode.

3. Short GT18, GT17 (located on the Convergence PCB). Then, both sound and picture disappear. (Note: Even if the shorted terminals are removed, both sound and picture do not appear. This proves the F.S. circuit is working. )

4. To restore both sound and picture, turn off the TV and reset it after about 30 seconds.
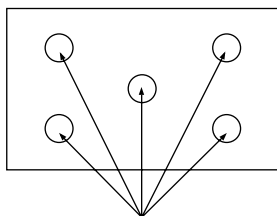
## 4-4-6 Static Focus Adjustment

PRECAUTION

1. Select the "STANDARD" video mode.

2. Input a crosshatch pattern.

3. Cover the lenses that are not being adjusted.

4. Connect a convergence jig and read data.

5. Adjust the lens for best focus.
(See Fig, 4-1, next page)

STATIC FOCUS (CONTINUED)

Vary the focus pack VR (Red, Blue) on the front cabinet. Adjust the TV for best possible focus around the center of the crosshatch pattern, without losing overall screen balance.
Figure Crosshatch Pattern
Examine these points together.



Examine these points together

Fig. 4-1 Crosshatch Pattern.

## 4-4-7 Lens Focus Adjustment

PRECAUTIONS

1. Do this adjustment after the static focus adjustment and the tilt adjustment.

2. Select the "STANDARD" video mode. (Contrast:64, Brightness:32)

3. Input a crosshatch pattern.

ADJUSTMENT

1. Loosen the lens screws.

2. Cover the two lenses that are not being adjusted.

3. Adjust the lens, observing the color aberration vertically and horizontally within 3 blocks of the center of the crosshatch pattern.

4. When the lens is turned clockwise, the color aberration will change as follows:

| Lens | Color Aberration Change |
|------|-------------------------|
| R | Orange - Crimson |
| G | Blue - Red |
| B | Purple - Green |

5. Green lens adjustment:
Set the lens at the point where Blue just changes to Red. If the color aberration is irregular throughout the picture screen, adjust the lens to show Red color aberration (approximately 1~3 mm area) within a 3-block grid around the horizontal center-line. If the color aberration is irregular, adjust the lens as shown in the diagram below. (Accurate alignment of Green is important for overall color quality.)

6. Red lens adjustment
Set the Red lens at the point where Orange becomes Crimson.

7. Blue lens adjustment
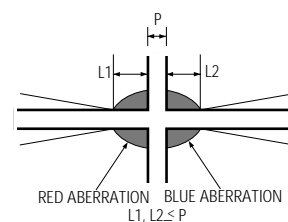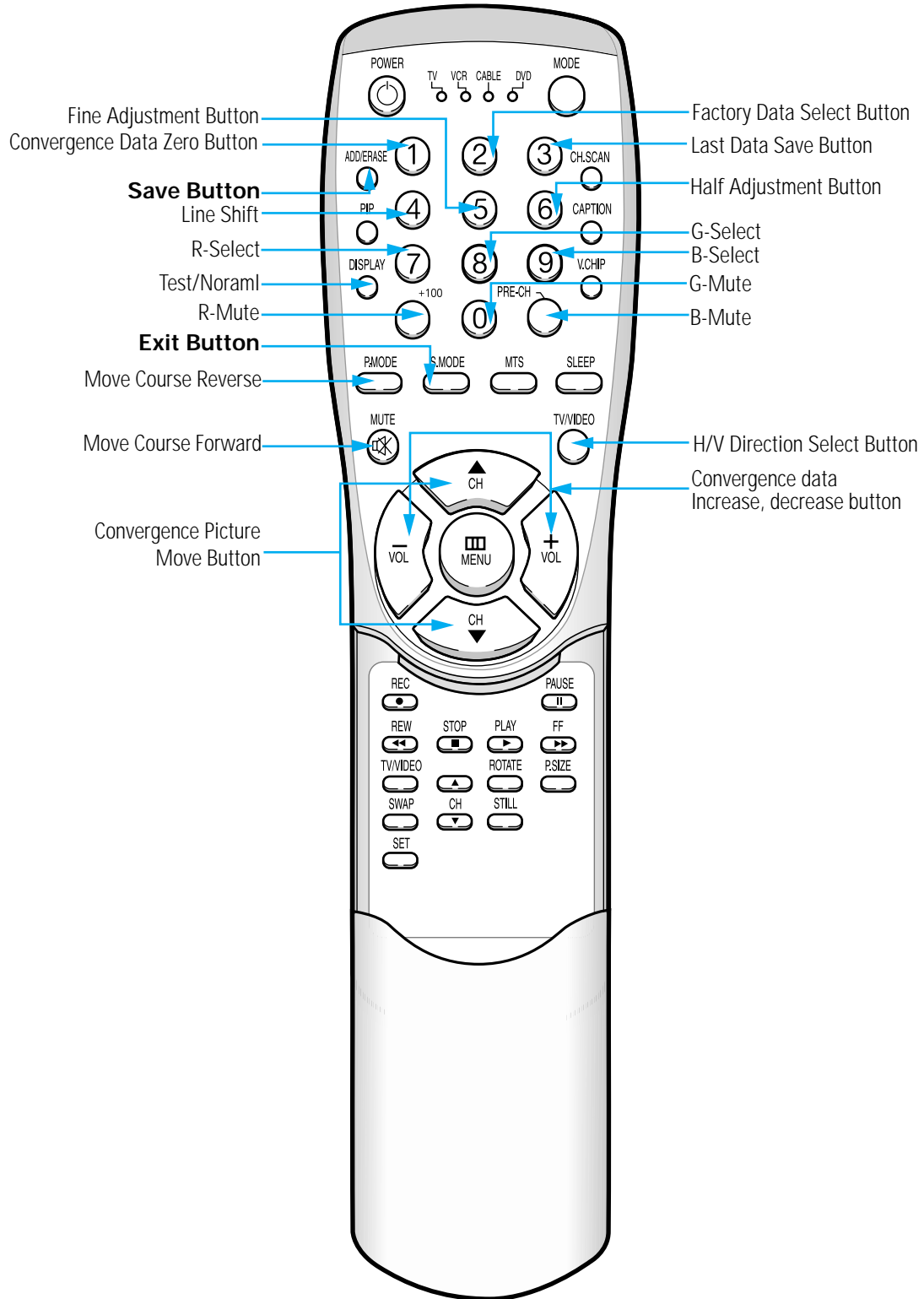Set the Blue lens at the point where Purple becomes Green.



Fig. 4-2 Color Aberration

## 4-4-8 Horizontal Dynamic Focus Adjustment

PRECAUTION

1. Input a crosshatch pattern.

2. Select the "STANDARD" video mode.

3. Warm up the set for at least 10 minutes.

ADJUSTMENT

1. Cover the Red and Blue lenses.

2. Adjust VR491 (located on the convergence PCB, H-Parabola).

3. Balance the left and right sides of the dynamic focus lines.

# 4-5 Screen-Jig

Unit : cm



(FRONT MASK)

## 4-6 Remote Control for Servicing (Convergence Mode)

Fine Adjustment Button

Convergence Data Zero Button

**Save Button**

Line Shift

R-Select

Test/Noraml

R-Mute

**Exit Button**

Move Course Reverse

Move Course Forward

Convergence Picture
Move Button

Factory Data Select Button

Last Data Save Button

Half Adjustment Button

G-Select

B-Select

G-Mute

B-Mute

H/V Direction Select Button

Convergence data
Increase, decrease button

## 4-6-1 KEY Function

1. R-SELECT ⑦
   Press to select RED color.

2. G-SELECT ⑧
   Press to select GREEN color.

3. B-SELECT ⑨
   Press to select BLUE color.

4. R-MUTE ◯ (+100)
   Press to mute RED color.

5. G-MUTE ⓪
   Press to mute GREEN color.

6. B-MUTE ◯ (PRE-CH)
   Press to mute BLUE color.

7. CANCEL KEY ③
   Press to revert to the previous data during the Convergence
   Adjustment.

8. FINE/COARSE SELECT BUTTON ⑤
   Press for minor adjustment.
   If the width of the big-adjustment step is 1, then the width of the minor
   adjustment step is 0.5.

9. TEST/NORMAL ◯ (DISPLAY)
   Press to check TV mode in the Convergence Mode.

10. LINE SHIFT ④
    Press to move a line up/down or left/right.

11. FACTORY DATA SELECT BUTTON ②
    Press to call the factory default values.

12. H/V DIRECTION SELECT BUTTON  <span>TV/VIDEO</span> ◯

   Press to switch the cursor direction horizontally or vertically.

13. SAVE BUTTON  <span>ADD/ERASE</span> ◯

   After the Convergence Adjustments are completed, press to save data.

14. EXIT BUTTON  <span>S.MODE</span> ⬭

   After the Convergence adjustments are completed, press to exit to
   TV mode.

15. MOVE CURSOR FORWARD  <span>MUTE</span> ⊗

   Press to move the cursor right or down.

16. MOVE CURSOR REVERSE  <span>P.MODE</span> ⬭

   Press to move the cursor left or up.

17. CONVERGENCE PICTURE MOVE BUTTON
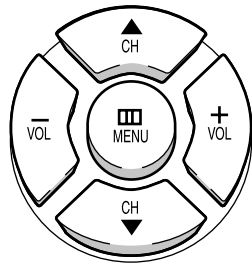


18. CONVERGENCE DATA ZERO BUTTON ①

   Press to zero the convergence correction data.

19. HALF ADJUSTMENT BUTTON ⑥

   After big adjustments are made, press for improvement of
   minor adjustment.

## 4-7 Convergence Adjustment

1. Warm up the TV for at least 30 minutes.

2. Input an NTSC Signal. (Use an antenna or AV source.)

   **NOTE** Make sure that both deflection and convergence yokes are
   properly adjusted so that the center of Green, Red, Blue pattern
   is aligned on the center of screen jig.

3. Enter the Convergence Mode by pressing the remote control keys in the following sequence:

   MUTE → 1 → 8 → 3
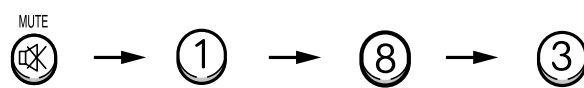
   **NOTE** If OSD is displayed as shown in figure below, press the S.MODE key to exit.
   Then, redo step 3 to enter the Convergence Mode.
   After entering the Convergence Mode, Stand by for about five seconds before
   doing the adjustments.
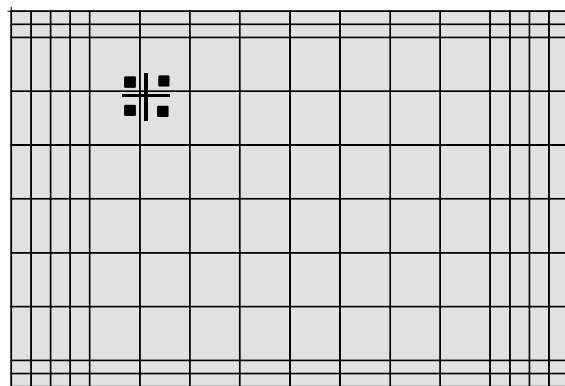
4.   To adjust GREEN, first press the ◯ and the ◯ keys, and then press the ⑧ key.

5. The key moves the cursor right, and the key moves the cursor left.
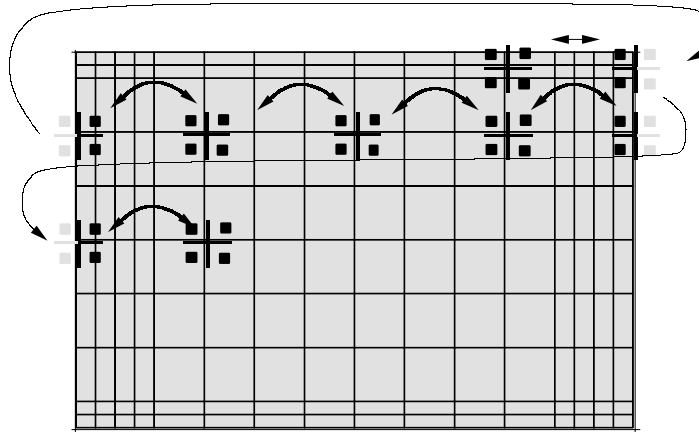
6.   The ⬭ key moves the cursor horizontally or vertically.
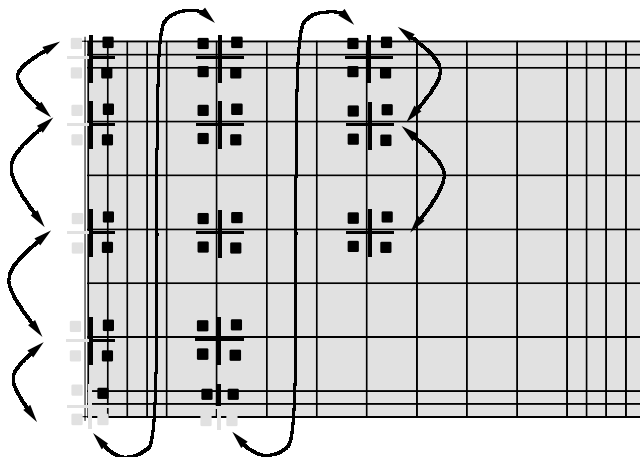
TV/VIDEO



NOTE   When the ⬭ key is pressed once again, the cursor moves horizontally.

7.    Use the  ⊕₄  key for overall balance.
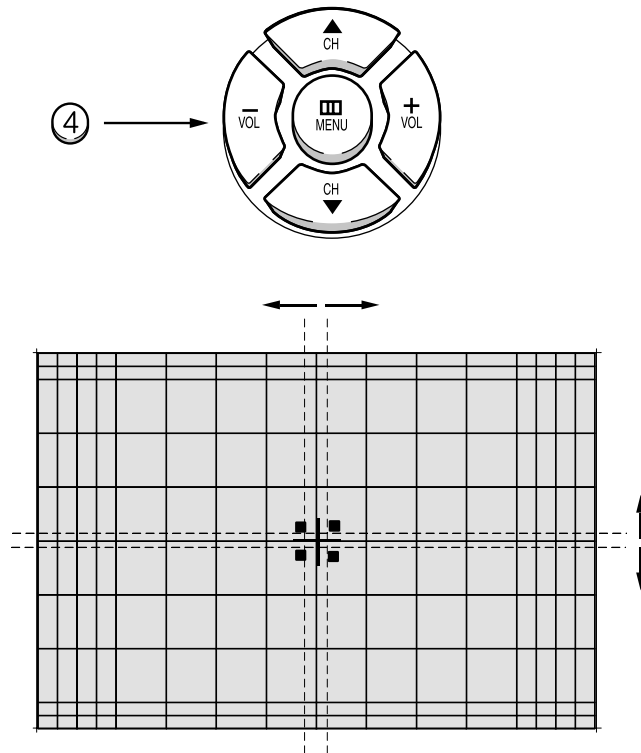


8.    After the Line Shift is cancelled by pressing the  ⊕₄  key, use the Channel
      and Volume keys (Up/Down) to make big adjustments.

9.    After the green convergence adjustments are completed, press the  ○ key to
      save the data (The minor adjustments can be done only when adjusting Red and Blue).

10. Superimpose the Red and Green colors by pressing the ⬭ $^{+100}$ and

the ⑦ keys.

11. To adjust RED, redo steps 5~8.

12. Use the ⑤ $^+$ key to make minor adjustments.

(Or the ⑥ $^+$ key can be used for minor adjustment.)
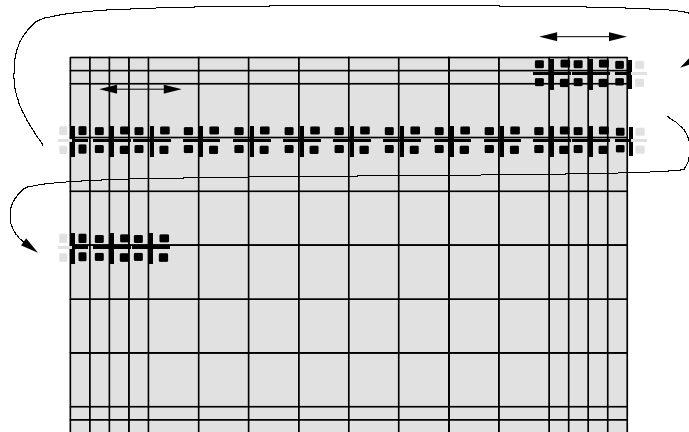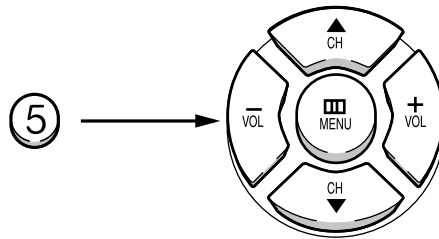




Cursor Movement (when making minor adjustments)
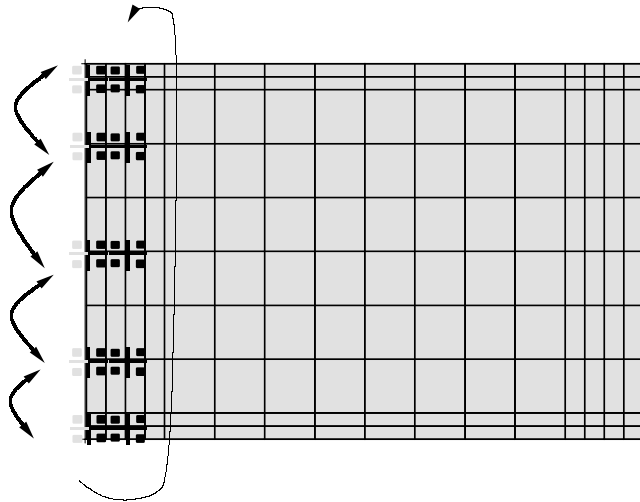
When the cursor moves vertically ◯ TV/VIDEO

13. To superimpose the blue and green colors, press (1) the ◯ key for R-Mute, (2) the ◯ key to cancel the B-Mute, and (3) the ⑨ key for B-select.

14. To adjust BLUE, redo steps 5 ~ 8, 12.

15. If any color is not properly adjusted when displaying the red, blue and green colors, readjust the color.

> **NOTE** When readjusting a color, enter the minor adjustment mode. Otherwise, the existing adjustment data might be distorted.

16. After the color adjustments are completed, press the ( ○ ) key to save the data.

ADD/ERASE

NOTE  The cursor moves to center, and then automatically moves up and to the left about five seconds later.
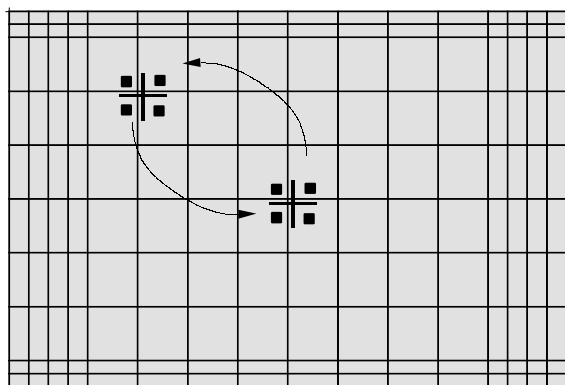


17. After the Convergence Adjustments are completed, press the ⊂⊃ key to exit.

S.MODE

# 4-8 MICOM and Pins Voltage

## 4-8-1 Pin Layput

| Signal | Pin | | Pin | Signal |
|---|---|---|---|---|
| POWER | 1 | | 52 | D2 |
| IR-IN | 2 | | 51 | CTRL 1 |
| V-MUTE | 3 | | 50 | BUS-STOP |
| 3D-SDA | 4 | | 49 | HOLD |
| N.C | 5 | | 48 | SCL-3 |
| N.C | 6 | | 47 | SDA-3 |
| CRTL 3 | 7 | | 46 | TIMER-LED |
| N.C | 8 | | 45 | S/W-MUTE |
| PROTECT | 9 | | 44 | D1 |
| N.C | 10 | | 43 | AMP-MUTE |
| SCL 2 | 11 | | 42 | CTRL 2 |
| SDA 2 | 12 | | 41 | N.C |
| CVBS | 13 | | 40 | XTAL GND |
| LOOP FILTER | 14 | | 39 | VCC |
| ANALOG GND | 15 | | 38 | GND |
| SUB-AFT | 16 | | 37 | XTAL2 |
| KEY1 | 17 | | 36 | XTAL1 |
| MAIN-AFT | 18 | | 35 | /RESET |
| KEY2 | 19 | | 34 | N.C |
| KEY3 | 20 | | 33 | N.C |
| ANALOG GND | 21 | | 32 | D3 |
| ANALOG VCC | 22 | | 31 | SCL-1 |
| HALF TONE | 23 | | 30 | SDA-1 |
| OSD B | 24 | | 29 | VSYNC |
| OSD G | 25 | | 28 | HSYNC |
| OSD R | 26 | | 27 | BLANK |

Z9035112PSC

## 4-8-2 Micom Pins

| PIN NO. | ITEM | FUNCTION | OUT VOLT |
|---|---|---|---|
| 1 | POWER | POWER ON/OFF RELAY CONTROL | H--> L |
| 2 | IR IN | REMOCON INPUT | 5V |
| 3 | V-MUTE | VIDEO SIGNAL MUTE | 3V |
| 4 | N.C | N.C | - |
| 5 | N.C | N.C | - |
| 6 | CRTL 3 | CONTROL-3PORT | 5V |
| 7 | N.C | N.C | - |
| 8 | N.C | N.C | - |
| 9 | PROTECT | PROTECT PORT | - |
| 10 | N.C | N.C | - |
| 11 | SCL 2 | CLOCK BUS LINE | 4.5V |
| 12 | SDA 2 | DATA BUS LINE | 4.5V |
| 13 | CVBS | CVBS | 1.7V |
| 14 | LOOP FILTER | LOOP FILTER | 1.9V |
| 15 | ANALOG GND | GND | GND |
| 16 | SUB-AFT | SUB AUTO FINE TURNING CONTROL | 2.64V |
| 17 | KEY 1 | KEY SCAN 1 | 4.84V |
| 18 | MAIN-AFT | MAIN TUNER AFT | 1.9V |
| 19 | KEY 2 | KEY SCAN 2 | - |
| 20 | KEY 3 | KEY SCAN 3 | - |
| 21 | ANALOG GND | GND | - |
| 22 | ANALOG VCC | VCC | 5V |
| 23 | HALF TONE | SIGNAL FOR OSC-FREQUENCY OSD CONTROL | - |
| 24 | OSD B | ON SCREEN DISPLAY BLUE OUTPUT | - |
| 25 | OSD G | ON SCREEN DISPLAY GREEN OUTPUT | - |
| 26 | OSD R | ON SCREEN DISPLAY RED OUTPUT | - |

| PIN NO. | ITEM | FUNCTION | OUT VOLT |
|---------|------|----------|----------|
| 27 | BLANK | BLAKING SIGNAL OUTPUT | - |
| 28 | HSYNC | HORIZONTAL SYNC INPUT | - |
| 29 | VSYNC | VERTICAL SYNC INPUT | - |
| 30 | SDA-1 | DATA BUS LINE | 4.5V |
| 31 | SCL-1 | CLOCK BUS LINE | 4.12V |
| 32 | D3 | CONVERGENCE D3 | - |
| 33 | N.C | N.C | - |
| 34 | N.C | N.C | - |
| 35 | /RESET | RESET | 4.74V |
| 36 | XTAL1 | XTAL 1 | 1.72V |
| 37 | XTAL2 | XTAL 2 | 2.2V |
| 38 | GND | GND | - |
| 39 | VCC | VCC | 5V |
| 40 | XTAL GND | GND | - |
| 41 | N.C | N.C | - |
| 42 | CRTL 2 | CONTROL - 2 PORT | 5V |
| 43 | AMP-MUTE | MAIN AMP MUTE | - |
| 44 | D1 | CONVERGENCE D1 | - |
| 45 | S/W-MUTE | SWITCH MUTE (NOT USED) | - |
| 46 | TIMER-LED | TIMER LED | 4.7V |
| 47 | SDA-3 | DATA BUS LINE | 4.6V |
| 48 | SCL-3 | CLOCK BUS LINE | 4.6V |
| 49 | HOLD | HOLD | 4.65V |
| 50 | BUS-STOP | I²C BUS STOP | 5V |
| 51 | CRTL 1 | CONTROL - 1 PORT | 4.65V |
| 52 | D2 | CONVERGENCE D2 | - |

Samsung Electronics

## 4-8-3 Chroma MDL

| PIN NO. | ITEM | FUNCTION | OUT VOLT |
|---|---|---|---|
| 1 | N.C | N.C | - |
| 2 | GND | GND | GND |
| 3 | CVBS/Y | CVBS/Y INPUT | 1.76V |
| 4 | CIN | C-INPUT | 2.92V |
| 5 | GND | GND | GND |
| 6 | E-Pr/R | E-Pr/R INPUT | 2.0V |
| 7 | E-Y/G | E-Y/G INPUT | 2.0V |
| 8 | E-Pb/B | E-Pb/B INPUT | 2.0V |
| 9 | E-FB | FAST BLANKING INPUT | 0.25V |
| 10 | GND | GND | GND |
| 11 | HS1 | 1H-SYNC OUT | - |
| 12 | VS1 | VS1 OUT | - |
| 13 | GND | GND | GND |
| 14 | SDA-2 | SERIAL DATA LINE 2 | 4.7V |
| 15 | SCL-2 | SERIAL CLOCK LINE 2 | 4.8V |
| 16 | N.C | N.C | - |
| 17 | HD | H-DRIVE OUT | 1.6V |
| 18 | H-BLK | H-BLANK INPUT | - |
| 19 | VD+ | VERTICAL DRIVE (+VOLTAGE) | 2.90V |
| 20 | VD- | VERTICAL DRIVE (-VOLTAGE) | 2.95V |
| 21 | ABL | ABL INPUT | 2.15V |
| 22 | V-BLK | V-BLANKING | - |
| 23 | EW | EAST WEST OUT | 2.2V |
| 24 | N.C | N.C | - |
| 25 | GND | GND | GND |
| 26 | N.C | N.C | - |
| 27 | FSC | FSC | - |
| 28 | HC | 5V INPUT | - |
| 29 | GND | GND | GND |
| 30 | TEST-Y | WHEN CG ADJ PATTERN INPUT | - |

| PIN NO. | ITEM | FUNCTION | OUT VOLT |
|---|---|---|---|
| 31 | N.C | N.C | - |
| 32 | N.C | N.C | - |
| 33 | N.C | N.C | - |
| 34 | CRTL - 3 | CRTL - 3 | 5V |
| 35 | CRTL - 1 | CRTL - 1 | 5V |
| 36 | GND | GND | GND |
| 37 | OSD-R | OSD-R INPUT | - |
| 38 | OSD-G | OSD-G INPUT | - |
| 39 | OSD-B | OSD-B INPUT | - |
| 40 | YS | BLANK(MICOM OUT) | - |
| 41 | YM | HALF TONE INPUT | - |
| 42 | V-MUTE | VIDEO MUTE (V-CHIP ON) | 4.72V |
| 43 | GND | GND | GND |
| 44 | 9V | 9V | 9V |
| 45 | N.C | N.C | - |
| 46 | N.C | N.C | - |
| 47 | N.C | N.C | - |
| 48 | PIP-F/B | N.C | - |
| 49 | GND | GND | |
| 50 | R-OUT | R-OUT | - |
| 51 | G-OUT | G-OUT | - |
| 52 | B-OUT | B-OUT | - |
| 53 | GND | GND | GND |
| 54 | IK | IK OUT | 3.65V |
| 55 | SPOT | SPOT OUT | - |
| 56 | GND | GND | GND |
| 57 | VM-Y | VM-Y OUT | 5.42V |
| 58 | CTRL - 2 | CTRL - 2 | 5V |

## 4-8-4 PIP MODULE

| PIN NO. | ITEM | FUNCTION | OUT VOLT |
|---|---|---|---|
| 1 | GND | GND | GND |
| 2 | TV | SUB-V INPUT | 2.93V |
| 3 | GND | GND | GND |
| 4 | N.C | N.C | - |
| 5 | 8V | 8V INPUT | 8V |
| 6 | N.C | N.C | - |
| 7 | PIP-Pr/R | PIP-Pr/R (DVD SIG) OUT | 2.02V |
| 8 | PIP-Y/G | PIP-Y/G (DVD SIG) OUT | 2.04V |
| 9 | PIP-Pb/B | PIP-Pb/B (DVD SIG) OUT | 2.02V |
| 10 | PIP-FB | PIP FAST BLANKING | 2.02V |
| 11 | 12V | 12V INPUT | 12V |
| 12 | PIP-F/B | N.C | N.C |
| 13 | PIP-B | DVD-B IN | - |
| 14 | PIP-G | DVD-G IN | - |
| 15 | PIP-R | DVD-R IN | - |
| 16 | N.C | N.C | - |
| 17 | V-SYNC | V-SYNC INPUT | - |
| 18 | H-SYNC | H-SYNC INPUT | - |
| 19 | SCL | SERIAL CLOCK LINE | 4.11V |
| 20 | SDA | SERIAL DATA LINE | 4.5V |
| 21 | 5V | 5V INPUT | 5V |
| 22 | GND | GND | GND |

## 4-8-5 2D/COMB MODULE

| PIN NO. | ITEM | FUNCTION | OUT VOLT |
|---------|------|----------|----------|
| 1 | VIDEO | MAIN VIDEO INPUT | 2.74V |
| 2 | GND | GND | GND |
| 3 | 9V | 9V INPUT | 9V |
| 4 | GND | GND | GND |
| 5 | FSC | FSC | - |
| 6 | N.C | N.C | - |
| 7 | N.C | N.C | - |
| 8 | 5V | 5V INPUT | 5V |
| 9 | Y-OUT | MAIN Y OUT | - |
| 10 | GND | GND | GND |
| 11 | C-OUT | MAIN C OUT | - |
| 12 | GND | GND | GND |

## 4-8-6 IF MODULE

| PIN NO. | ITEM | FUNCTION | OUT VOLT |
|---------|------|----------|----------|
| 1 | SIF | SIF OUT | 3.25V |
| 2 | 9V | 9V INPUT | 9V |
| 3 | GND | GND | GND |
| 4 | IF | IF INPUT | 4.5V |
| 5 | GND | GND | GND |
| 6 | AGC | RF AGC IN | 5.37V |
| 7 | TV-VIDEO | TV-VIDEO OUT | - |
| 8 | AFT | MAIN AFT INPUT | 2V |
| 9 | GND | GND | GND |

## 4-8-7 MTS MODULE

| PIN NO. | ITEM | FUNCTION | OUT VOLT |
|---------|------|----------|----------|
| 1 | TV-R | TV R-SOUND OUT | - |
| 2 | TV-L | TV L-SOUND OUT | - |
| 3 | SCL | SERIAL CLOCK LINE | - |
| 4 | SDA | SERIAL DATA LINE | - |
| 5 | N.C | N.C | - |
| 6 | GND | GND | GND |
| 7 | SIF | SIF INPUT | - |
| 8 | N.C | N.C | - |
| 9 | N.C | N.C | - |
| 10 | 9V | 9V INPUT | 9V |

## 4-8-8  H/V MODULE

| PIN NO. | ITEM | FUNCTION | OUT VOLT |
|---------|------|----------|----------|
| 1 | 12V | 12V INPUT | 12V |
| 2 | GND | GND | GND |
| 3 | HD | H-DRIVE INPUT | 1.6V |
| 4 | V-BLK | V-BLANK INPUT | 0.72V |
| 5 | H-BLK | H-BLANK OUT | 0.54V |
| 6 | GND | GND | GND |
| 7 | PROTECT | PROTECT | ACTIV H |
| 8 | FBT-DC | FBT DC FEED BACK | 4.87V |
| 9 | X-RAY | X-RAY PROTECT F/B | 2.10V |
| 10 | N.C | N.C | - |
| 11 | HV-REG | HV-REG | 3.54V |
| 12 | HV-DRIVE | HIGH VOLTAGE DRIVE | 0.32V |
| 13 | H-DRIVE | H-DRIVE OUT | 25V |
| 14 | GND | GND | GND |
| 15 | HEATER | HEATER INPUT | AC[0.7V] |
| 16 | N.C | N.C | - |
| 17 | 208V | 208V INPUT | 208V |
| 18 | N.C | N.C | - |
| 19 | GND | GND | GND |
| 20 | V2 | V2 INPUT | |
| 21 | N.C | N.C | - |
| 22 | N.C | N.C | - |
| 23 | D-FOCUS | DYNAMIC FOCUS OUT | - |
| 24 | N.C | N.C | - |
| 25 | N.C | N.C | - |
| 26 | SCREEN | SCREEN INPUT | 1356V |

## 4-8-9 CONV- MODULE

| PIN NO. | ITEM | FUNCTION | OUT VOLT |
|---|---|---|---|
| 1 | SDA | D2 | - |
| 2 | SCL | D1 | - |
| 3 | GND | GND | GND |
| 4 | BV | BLUE VERTICAL OUT | - |
| 5 | BH | BLUE HORIZONTAL OUT | - |
| 6 | GV | GREEN VERTICAL OUT | - |
| 7 | GH | GREEN HORIZONTAL  OUT | - |
| 8 | RV | RED VERTICAL OUT | - |
| 9 | RH | RED HORIZONTAL OUT | - |
| 10 | -5.4V | -5.4V INPUT | -5.4V |
| 11 | 5.4V | 5.4V INPUT | +5.4V |
| 12 | V-BLK | V-BLK INPUT | - |
| 13 | GND | GND | GND |
| 14 | H-BLK | H-BLK INPUT | 0.52V |
| 15 | COMP | COMP VIDEO OUTPUT (N.C) | - |
| 16 | IR | INPUT REMOCON | 3V |
| 17 | CTRL | CTRL (N.C) | N.C |
| 18 | D3/SEL | D3 | 0.2V |
| 19 | B | WHEN TEST PATTERN B OUT | - |
| 20 | G(TEST) | WHEN TEST PATTERN G OUT | N.C |
| 21 | R | WHEN TEST PATTERN R OUT | - |
| 22 | SYNC | SYNC OUTPUT | 4.41V |

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