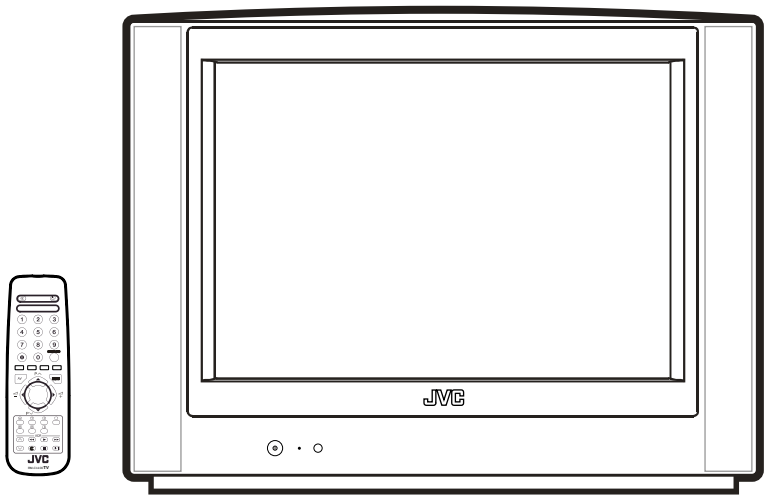
JVC

# SERVICE MANUAL

## COLOUR TELEVISION

# AV-28KT1BUF/A, /B, /C,
# AV-28KT1SUF/A, /B, /C



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No.52137
2003/9

# SPECIFICATION

| Items | | Contents |
|---|---|---|
| Dimensions ( W × H × D ) | | 76cm × 57cm × 47.3cm |
| Mass | | 33kg |
| TV RF System | | B/G, D/K, L/L' |
| Colour System | TV Mode | PAL / SECAM |
| | Video Mode | PAL / SECAM / NTSC 3.58 / NTSC 4.43 |
| Sound System | | NICAM / A2 (Germany system) |
| Teletext System | | FLOF (Fastext) / TOP (German system) |
| Tuning System | | Frequency synthesizer tuning system |
| Number of CH memory position | | 100 ch |
| Receiving Frequency | VHF Low | 46.25MHz ~ 168.25MHz |
| | VHF High | 175.25MHz ~ 463.25MHz |
| | UHF | 471.25MHz ~ 863.25MHz |
| | CATV | S01-S41 & S75-S79 |
| Intermediate Frequency | VIF | 38.9MHz (B/G, D/K, L) / 33.9MHz (L') |
| | SIF | 33.4MHz (5.5MHz:B/G) / 32.9MHz (6.0MHz:D/K) / 32.4MHz (6.5MHz:L) / 40.4MHz (6.5MHz:L') |
| Colour Sub Carrier Frequency | | PAL (4.43MHz), SECAM (4.43MHz), NTSC (3.58MHz/4.43MHz) |
| Power Input | | AC220V ~ AC240V, 50Hz |
| Power Consumption | | 120W(Max), 3W(Standby) |
| Aerial Input Terminal | | 75Ω unbalanced, coaxial |
| Picture Tube | | Visible size : 66cm (Measured diagonally) |
| High Voltage | | 30kV |
| Speaker | | Main:5.7cm × 16cm oval type × 2 |
| Audio Output | | 10W + 10W |
| Input | Video | 1V(p-p) 75Ω |
| | S-Video | Y : 1V(p-p) positive |
| | | C : 0.286V(p-p) |
| | Audio (L/R) | 500mV(rms) (-4dBs), High impedance (RCA pin jack × 2) |
| Output | Video | 1V(p-p) 75Ω |
| | Audio (L/R) | 500mV(rms), Low Impedance |
| Input Terminal | Rear Side | EXT-1 (Video / Audio / RGB) |
| | | EXT-2 (Video / Audio / RGB / S-VHS) |
| | Right Side | EXT-3 (Video / Audio) |
| Output Terminal | Rear Side | EXT-1 (Video / Audio) |
| | | EXT-2 (Video / Audio) |
| | Right Side | Headphone Jack (Stereo mini jack Ø3.5mm × 1) |
| Remote Control Unit | | VE-30017763 (RM-C1100), (AA/R06 dry battery × 2) |

Design & specifications are subject to change without notice.

# SECTION 1
# PRECAUTION

## 1.1 SAFETY PRECAUTIONS

(1) The design of this product contains special hardware, many circuits and components specially for safety purposes. For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.

(2) Alterations of the design or circuitry of the products should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.

(3) Many electrical and mechanical parts in the products have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. **Electrical components having such features are identified by shading on the schematics and by ( ⚠ ) on the parts list in Service manual**. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list of Service manual may cause shock, fire, or other hazards.

(4) **Don't short between the LIVE side ground and ISOLATED (NEUTRAL) side ground or EARTH side ground when repairing.**
Some model's power circuit is partly different in the GND. The difference of the GND is shown by the LIVE : ( ⊥ ) side GND, the ISOLATED (NEUTRAL) : ( ⏚ ) side GND and EARTH : ( ⏚ ) side GND.
Don't short between the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND and never measure the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND at the same time with a measuring apparatus (oscilloscope etc.). If above note will not be kept, a fuse or any parts will be broken.

(5) If any repair has been made to the chassis, it is recommended that the B1 setting should be checked or adjusted (See B1 POWER SUPPLY check).

(6) The high voltage applied to the picture tube must conform with that specified in Service manual. Excessive high voltage can cause an increase in X-Ray emission, arcing and possible component damage, therefore operation under excessive high voltage conditions should be kept to a minimum, or should be prevented. If severe arcing occurs, remove the AC power immediately and determine the cause by visual inspection (incorrect installation, cracked or melted high voltage harness, poor soldering, etc.). To maintain the proper minimum level of soft X-Ray emission, components in the high voltage circuitry including the picture tube must be the exact replacements or alternatives approved by the manufacturer of the complete product.

(7) Do not check high voltage by drawing an arc. Use a high voltage meter or a high voltage probe with a VTVM. Discharge the picture tube before attempting meter connection, by connecting a clip lead to the ground frame and connecting the other end of the lead through a 10kΩ 2W resistor to the anode button.

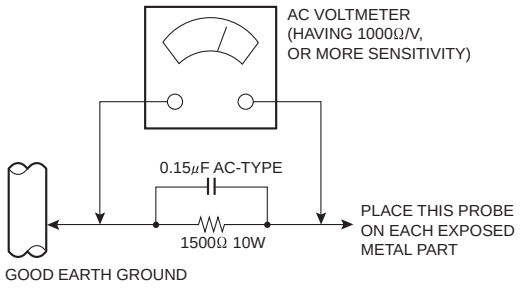
(8) When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the manufacturer's replacement components.

(9) **Isolation Check (Safety for Electrical Shock Hazard)**
After re-assembling the product, always perform an isolation check on the exposed metal parts of the cabinet (antenna terminals, video/audio input and output terminals, Control knobs, metal cabinet, screw heads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

a) **Dielectric Strength Test**
The isolation between the AC primary circuit and all metal parts exposed to the user, particularly any exposed metal part having a return path to the chassis should withstand a voltage of 3000V AC (r.m.s.) for a period of one second. (. . . . Withstand a voltage of 1100V AC (r.m.s.) to an appliance rated up to 120V, and 3000V AC (r.m.s.) to an appliance rated 200V or more, for a period of one second.)
This method of test requires a test equipment not generally found in the service trade.

b) **Leakage Current Check**
Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5mA AC (r.m.s.).
However, in tropical area, this must not exceed 0.2mA AC (r.m.s.).

**Alternate Check Method**
Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Use an AC voltmeter having 1000Ω per volt or more sensitivity in the following manner. Connect a 1500Ω 10W resistor paralleled by a 0.15μF AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.). Measure the AC voltage across the resistor with the AC voltmeter. Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75V AC (r.m.s.). This corresponds to 0.5mA AC (r.m.s.).
However, in tropical area, this must not exceed 0.3V AC (r.m.s.). This corresponds to 0.2mA AC (r.m.s.).



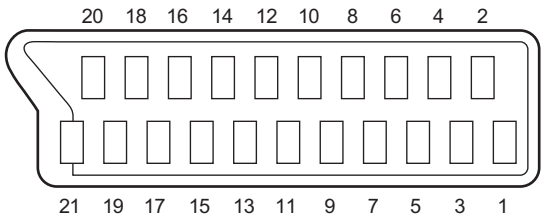
# SECTION 2
# SPECIFIC SERVICE INSTRUCTIONS

### 2.1 21-pin Euro connector (SCART) : EXT-1 / EXT-2

| Pin No. | Signal Designation | Matching Value | EXT-1 | EXT-2 |
|---|---|---|---|---|
| 1 | AUDIO R output | 500mV(rms) (Nominal), Low impedance | Used | Used |
| 2 | AUDIO R input | 500mV(rms) (Nominal), High impedance | Used (R1) | Used (R2) |
| 3 | AUDIO L output | 500mV(rms) (Nominal), Low impedance | Used | Used |
| 4 | AUDIO GND | --- | Used | Used |
| 5 | GND (B) | --- | Used | Used |
| 6 | AUDIO L input | 500mV(rms) (Nominal), High impedance | Used (L1) | Used (L2) |
| 7 | B input | 700mV(B-W), 75 Ω | Used | Used |
| 8 | FUNCTION SW<br>(SLOW SW) | Low : 0V-3V, High : 8V-12V,<br>High impedance | Used | Used |
| 9 | GND (G) | --- | Used | Used |
| 10 | SCL / T-V LINK | --- | Not used | Used (SCL / TV-LINK) |
| 11 | G input | 700mV(B-W), 75 Ω | Used | Used |
| 12 | SDA3 | --- | Not used | Not used |
| 13 | GND (R) | --- | Used | Used |
| 14 | GND (YS) | --- | Used | Used |
| 15 | R / C input | R : 700mV(B-W), 75 Ω<br>C : $300mV_{(P-P)}$, 75 Ω | Used (R) | Used (C2/R) |
| 16 | Ys input<br>(FAST SW) | Low : 0V-0.4V, 75 Ω<br>High : 1V-3V, 75 Ω | Used | Used |
| 17 | GND (VIDEO output) | --- | Used | Used |
| 18 | GND (VIDEO input) | --- | Used | Used |
| 19 | VIDEO output | $1V_{(P-P)}$ (Negative sync), 75 Ω | Used | Used |
| 20 | VIDEO / Y input | $1V_{(P-P)}$ (Negative sync), 75 Ω | Used | Used |
| 21 | COMMON GND | --- | Used | Used |

(P-P= Peak to Peak, B-W= Blanking to white peak)

[Pin assignment]



### 2.2 FEATURES

- It is a remote controlled color television.
- 100 programs from VHF, UHF bands or cable channels can be preset.
- It can tune cable channels.
- Controlling the TV is very easy by its menu driven system.
- It has two Euroconnector sockets for external device (such as video recorder, video games, audio set, etc.)
- Side AV Input (EXT-3) available.
- Stereo sound systems (German + Nicam) are available.
- Full function Teletext (Fastext, Toptext).
- It is possible to connect headphone.
- Direct channel access.
- APS (Automatic Programming System).
- All programs can be named.
- Forward or backward automatic tuning.
- Sleep timer.
- Child Lock.
- Blue Background
- T-V Link
- Automatic sound mute when no transmission.
- 5 minutes after the broadcasting (close down), the TV switches itself automatically to stand-by mode.
- WSS (Wide Screen Signaling)
- NTSC Playback.

### 2.3 MAIN DIFFERENCE LIST

| ⚠ | Part Name | AV-28KT1BUF | AV-28KT1SUF |
|---|---|---|---|
| | MODEL COLOUR | BLACK MODEL | SILVER MODEL |
| ⚠ | FRONT CABINET | VE-20121492 | VE-20119985 |
| ⚠ | BACK COVER | VE-20121494 | VE-20111863 |
| ⚠ | BACK DOOR | VE-20108124 | VE-20120043 |
| ⚠ | FUNCTION BUTTON | VE-20091798 | VE-20096498 |
| ⚠ | POWER BUTTON | VE-20111864 | VE-20120046 |
| | JVC LOGO | VE-40013592 | VE-40013593 |
| | CARTON BOX | VE-50038917 | VE-50038907 |

### 2.4 DIFFERENCE LIST BY ELECTRONICS

| Part Name | AV-28KT1BUF/A<br>AV-28KT1SUF/A | AV-28KT1BUF/B<br>AV-28KT1SUF/B | AV-28KT1BUF/C<br>AV-28KT1SUF/C |
|---|---|---|---|
| MAIN PWB | VE-20120604 | VE-20127801 | VE-20127796 |
| IC500 (MI-COM) | VE-20139901 | VE-20137151 | VE-20139902 |
| IC502 (MEMORY) | VE-20120610 | VE-20134092 | VE-20126318 |

### 2.5 DIFFERENCE LIST BY OSD LANGUAGE

| Part Name | AV-28KT1BUF/A<br>AV-28KT1SUF/A | AV-28KT1BUF/B<br>AV-28KT1SUF/B | AV-28KT1BUF/C<br>AV-28KT1SUF/C |
|---|---|---|---|
| OSD LANGUAGES | ENG, GER, FRE, ITA<br>SPA, DUT, POR, TUR | ENG, GER, FRE, SWE<br>NOR, DAN, FIN, GRE | ENG, GER, CZE, POL<br>HUN, BUL, ROM, CRO |

# SECTION 3
# DISASSEMBLY

## 3.1 DISASSEMBLY PROCEDULE

### 3.1.1 REMOVING THE REAR COVER

(1) Unplug the power cord.
(2) Remove the 8 screws **[A]** as shown in the Fig. 1.
(3) Remove the 4 screws **[B]**.
(4) Withdraw the REAR COVER toward you.

### 3.1.2 REMOVING THE BACK DOOR

- Remove the REAR COVER
  (1) Remove the 2 screws **[C]**.
  (2) Withdraw the BACK DOOR toward you.

### 3.1.3 REMOVING THE SPEAKER

- Remove the REAR COVER.
  (1) Remove the 4 screws **[I]**, and remove the SPEAKER.
  (2) Remove the other hand SPEAKER in the same steps.

### 3.1.4 REMOVING THE MAIN PWB

- Remove the REAR COVER.
- Remove the BACK DOOR.
  (1) Remove the 4 screws **[D]**.
  (2) Slightly raise the both sides of the MAIN PWB by hand and withdraw the MAIN PWB backward.

**CAUTION:**
If necessary, take off the wire clamp, connectors etc.
Be careful enough when developing a MAIN PWB.

### 3.1.5 REMOVING THE SIDE CONTROL PWB

- Remove the REAR COVER.
  (1) Remove the 4 screws **[E]**.
  (2) Remove the SIDE PWB.

### 3.1.6 REMOVING THE BASE

- Remove the REAR COVER.
  (1) Remove the 2 screws **[F]**.
  (2) Remove the BASE.

**NOTE:**
Work after fixing so that a CRT screen may be placed upside down or it may not fall.

### 3.1.7 REMOVING THE POWER SWITCH PWB

- Remove the REAR COVER.
- Remove the BASE.
  (1) Remove the 2 screws **[G]**, and remove the POWER SWITCH PWB.

### 3.1.8 REMOVING THE LED PWB

- Remove the REAR COVER.
- Remove the BASE.
- Remove the POWER SWITCH PWB.
  (1) Remove the 2 screws **[H]**, and remove the LED PWB.

### 3.1.9 CHECKING THE PW BOARD

- To check the back side of the PW Board.
  (1) Pull out the PW Board. (Refer to REMOVING THE MAIN PWB).
  (2) Erect the PW Board vertically so that you can easily check the back side of the PW Board.

### 3.1.10 CAUTION

- When erecting the PW Board, be careful so that there will be no contacting with other PW Board.
- Before turning on power, make sure that the wire connector is properly connected.
- When conducting a check with power supplied, be sure to confirm that the CRT EARTH WIRE (BRAIDED ASS'Y) is connected to the CRT SOCKET PW board.

### 3.1.11 WIRE CLAMPING AND CABLE TYING

(1) Be sure to clamp the wire.
(2) Never remove the cable tie used for tying the wires together.
Should it be inadvertently removed, be sure to tie the wires with a new cable tie.

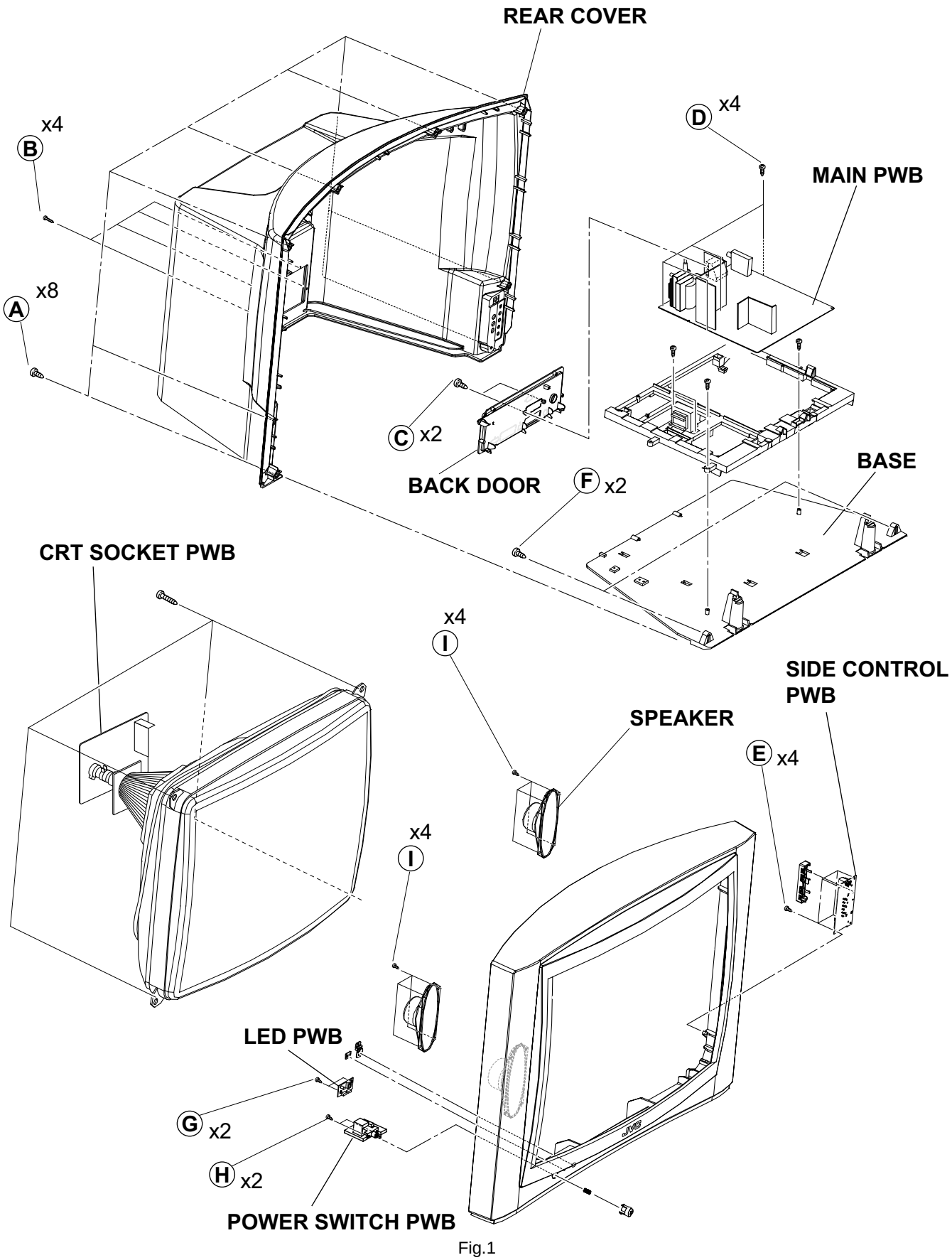

REAR COVER
x4
B
x4
D
MAIN PWB
x8
A
C x2
BACK DOOR
F x2
BASE
CRT SOCKET PWB
x4
I
SIDE CONTROL PWB
SPEAKER
E x4
x4
I
LED PWB
G x2
H x2
POWER SWITCH PWB

Fig.1

### 3.2 REPLACEMENT OF CHIP COMPONENT

#### 3.2.1 CAUTIONS

(1) Avoid heating for more than 3 seconds.
(2) Do not rub the electrodes and the resist parts of the pattern.
(3) When removing a chip part, melt the solder adequately.
(4) Do not reuse a chip part after removing it.

#### 3.2.2 SOLDERING IRON

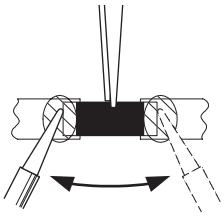
(1) Use a high insulation soldering iron with a thin pointed end of it.
(2) A 30w soldering iron is recommended for easily removing parts.

#### 3.2.3 REPLACEMENT STEPS

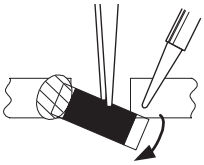
**1. How to remove Chip parts**

**[Resistors, capacitors, etc.]**

(1) As shown in the figure, push the part with tweezers and alternately melt the solder at each end.



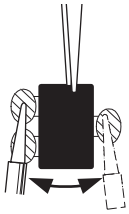
(2) Shift with the tweezers and remove the chip part.



**[Transistors, diodes, variable resistors, etc.]**

(1) Apply extra solder to each lead.


(2) As shown in the figure, push the part with tweezers and alternately melt the solder at each lead. Shift and remove the chip part.



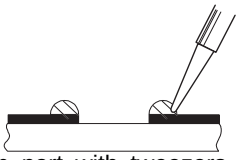
**NOTE :**

After removing the part, remove remaining solder from the pattern.

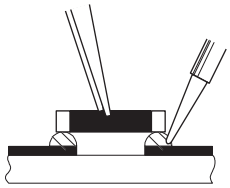
**2. How to install Chip parts**

**[Resistors, capacitors, etc.]**

(1) Apply solder to the pattern as indicated in the figure.

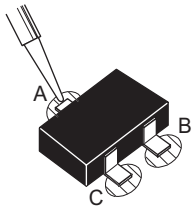


(2) Grasp the chip part with tweezers and place it on the solder. Then heat and melt the solder at both ends of the chip part.

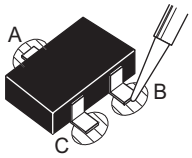


**[Transistors, diodes, variable resistors, etc.]**

(1) Apply solder to the pattern as indicated in the figure.
(2) Grasp the chip part with tweezers and place it on the solder.
(3) First solder lead **A** as indicated in the figure.




(4) Then solder leads **B** and **C**.



### 3.3 SETTING OF THE LAST MEMORY FOR SHIPMENT

#### 3.3.1 USER SETTING VALUES

<table>
<tr><th>Setting Item</th><th>Setting Value</th><th>Setting Item</th><th>Setting Value</th></tr>
<tr><td colspan="2">SOUND MENU</td><td colspan="2">FEATURE MENU</td></tr>
<tr><td>BALANCE</td><td>CENTER</td><td>SLEEP TIMER</td><td>OFF</td></tr>
<tr><td>BASS</td><td>CENTER</td><td>CHILD LOCK</td><td>OFF</td></tr>
<tr><td>TREBLE</td><td>CENTER</td><td>LANGUAGE</td><td>ENGLISH</td></tr>
<tr><td>HYPER SOUND</td><td>OFF</td><td>EXT-2 OUTPUT</td><td>TV</td></tr>
<tr><td colspan="2">PICTURE MENU</td><td>BLUE BACKGROUND</td><td>ON</td></tr>
<tr><td>BRIGHTNESS</td><td rowspan="5">These adjust are automatically restored when A.P.S. bit in Service menu is set.<br>The procedure for setting APS bit is described bellow.</td><td colspan="2">INSTALL. MENU</td></tr>
<tr><td>CONTRAST</td><td>PROGRAMME</td><td rowspan="9">Refer to instruction book</td></tr>
<tr><td>COLOUR</td><td>BAND</td></tr>
<tr><td>SHARPNESS</td><td>CHANNEL</td></tr>
<tr><td>HUE (only NTSC)</td><td>STANDARD</td></tr>
<tr><td>PICTURE MODE</td><td>USER</td><td>COLOUR SYSTEM</td></tr>
<tr><td>COLOUR TEMP</td><td>NORMAL</td><td>DECODER (EXT-2)</td></tr>
<tr><td>ZOOM</td><td>AUTO</td><td>FINE TUNING</td></tr>
<tr><td colspan="2" rowspan="2"></td><td>SEARCH</td></tr>
<tr><td>STORE</td></tr>
</table>

#### 3.3.2 SETTING A.P.S. (AUTO STORE)

(1) Press [MENU] key on the remote control unit to display the main menu.
(2) Press [▲/▼] keys to select PROGRAM item, them [◀/▶] keys to display the PROGRAM menu.
(3) Press the [BLUE] key to enter the AUTOSTORE mode.
(4) Press [▲/▼] keys to choose the COUNTRY, then press [◀/▶] keys the choose country you are nou located.
(5) Press [▲/▼] keys to choose the CONTINUE, then press [▶] key to start A.P.S. The following message appears.

**NOTE:**
To cancel the A.P.S., press the [STANDARD] key.

(6) After A.P.S. is finalized, the PROGRAM menu appears again.
(7) Press [STANDARD] key to exit main menu.

# SECTION 4
# ADJUSTMENT

## 4.1 ADJUSTMENT PREPARATION

(1) You can make the necessary adjustments for this unit with either the Remote Control Unit or with the adjustment tools and parts as given below.
(2) Adjustment with the Remote Control Unit is made on the basis of the initial setting values, however, the new setting values which set the screen to its optimum condition may differ from the initial settings.
(3) Make sure that AC power is turned on correctly.
(4) Turn on the power for set and test equipment before use, and start the adjustment procedures after waiting at least 30 minutes.
(5) Unless otherwise specified, prepare the most suitable reception or input signal for adjustment.
(6) Never touch any adjustment parts which are not specified in the list for this adjustment - variable resistors, transformers, condensers, etc.
(7) Presetting before adjustment.
Unless otherwise specified in the adjustment instructions, preset the following functions with the remote control unit:

| Setting Item | Setting value |
|---|---|
| BRIGHTNESS | CENTER |
| CONTRAST | |
| COLOUR | |
| SHARPNESS | |
| COLOUR TEMP | |
| ZOOM | AUTO |

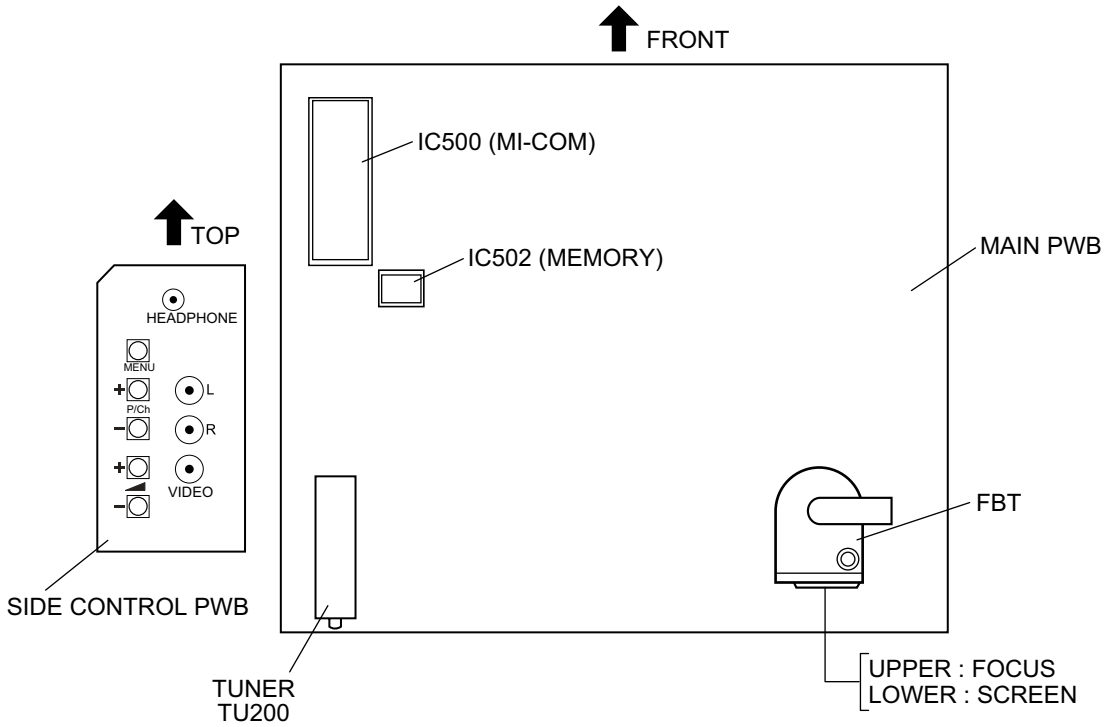
## 4.2 MEASURING EQUIPMENT

(1) DC voltmeter (or digital voltmeter)
(2) Signal generator (Pattern generator)
[PAL / SECAM / NTSC]
(3) Remote control unit

## 4.3 ADJUSTMENT ITEM

- SCREEN ADJUSTMENT
- DEFLECTION CIRCUIT ADJUSTMENT
- WHITE BALANCE ADJUSTMENT

## 4.4 ADJUSTMENT LOCATIONS



## 4.5 BASIC OPERATION OF SERVICE MENU

### 4.5.1 HOW TO ENTER THE SERVICE MENU

(1) Press the [INFORMATION] key and [MUTING] key simultaneously in the main menu, and the SERVICE MENU screen (Fig.1) will be displayed.

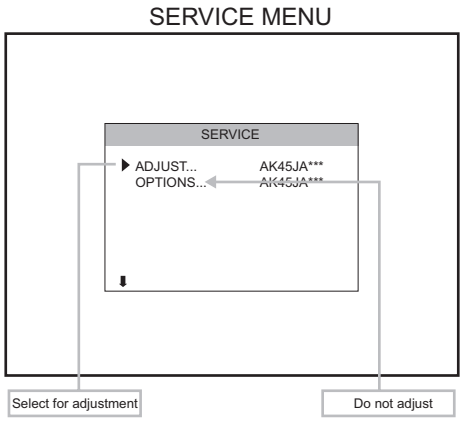



Fig.1

(2) While the SERVICE MENU screen is displayed, press the [▲/▼] and [◀/▶] key and select the "ADJUST...", then ADJUST MENU sucreen (Fig.2) will be displayed.

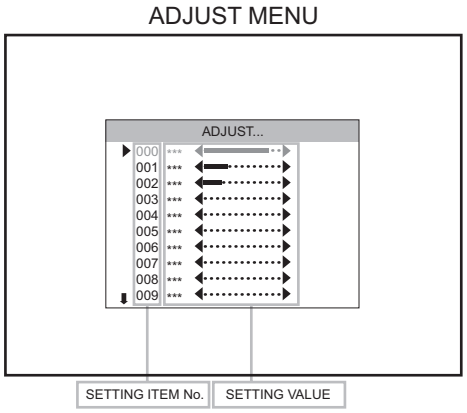


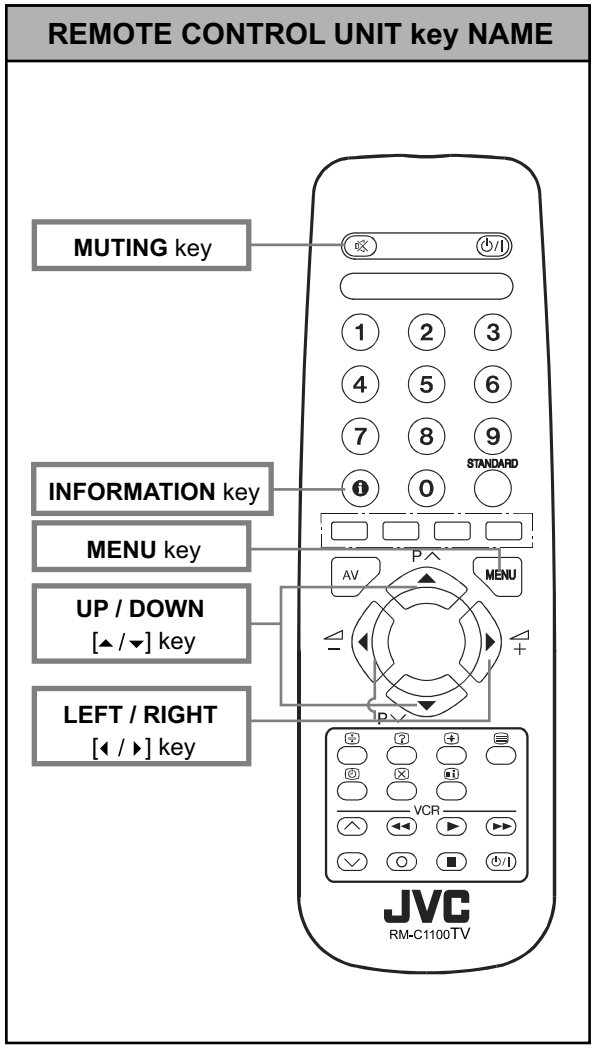

Fig.2

### 4.5.2 SELECTION OF ADJUSTMENT ITEMS

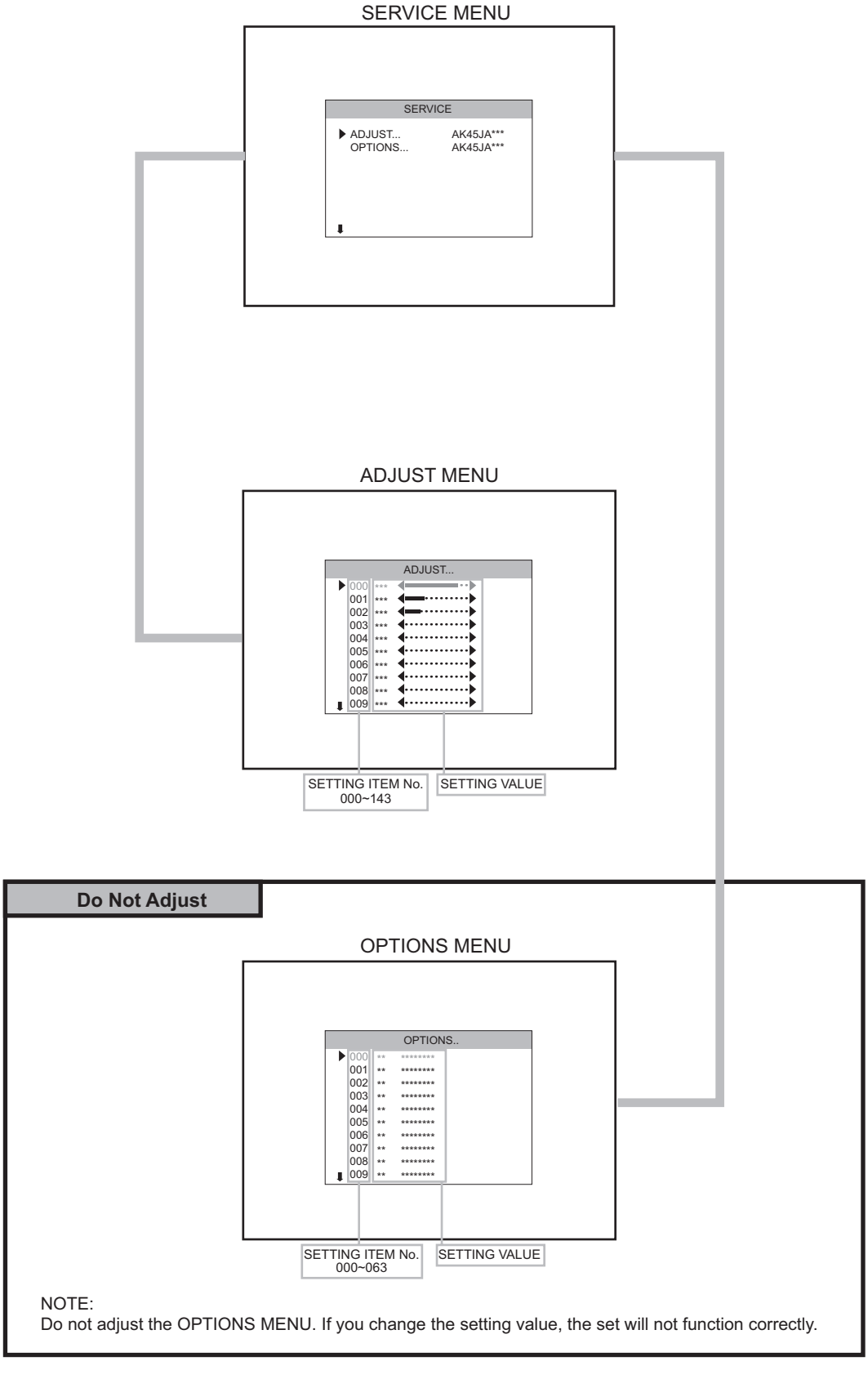
(1) Enter the SERVICE MENU and select ADJUST.
(2) Press the [▲/▼] key and select the ADJUSTMENT ITEM.
(3) Press the [◀/▶] key and set the SETTING VALUE.
(4) Changed values are stored automatically.

### 4.5.3 HOW TO EXIT SERVICE MODE

(1) Press the [MENU] key.



### 4.5.4 SERVICE MENU SCREEN




NOTE:
Do not adjust the OPTIONS MENU. If you change the setting value, the set will not function correctly.

**ADJUSTMENT ITEM**

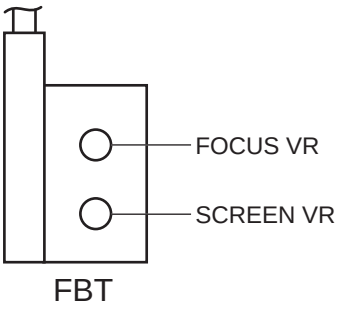
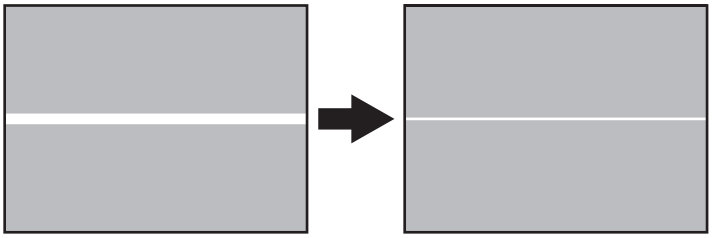
| adjustment No. | adjustment part | description |
|---|---|---|
| 000 | White Point RED | Not used |
| 001 | White Point GREEN | Not used |
| 002 | Whit Point BLUE | Not used |
| 003 | AGC (Automatic Gain Control) | |
| 004 | IF-PLL Negative | Not used |
| 005 | IF-PLL Positive | Not used |
| 006 | Y-Delay | |
| 007 | Y-Delay SECAM | |
| 008 | Y-Delay NTSC | |
| 009 | Y-Delay OTHER | Not used |
| 010 | Vertical Position Offset | Fixed |
| 011 | Vertical Amplitude Offset | Fixed |
| 012 | Horizontal Position Offset | Fixed |
| 013 | Horizontal Amplitude Offset | Fixed |
| 014 | Vertical Blank Start (It will be used only at 4:3 tube for 16:9 mode adjustment) | |
| 015 | Vertical Blank Stop (It will be used only at 4:3 tube for 16:9 mode adjustment) | |
| 016 | Angle | |
| 017 | Bow | |
| 018 | 4:3 Horz. Blank Start | Do not adjust |
| 019 | 4:3 Horz. Blank Stop | Do not adjust |
| 020 | EHTV compensation | |
| 021 | EHTTM compensation | |
| 022 | EHTEW compensation | |
| 023 | WDR | Video processor adjust itself. |
| 024 | WDG | |
| 025 | WDB | |
| 026 | CR | |
| 027 | CG | |
| 028 | CB | |
| 029 | COR coring level | |
| 030 | REGULAR VERT_POS (Vertical Position) | |
| 031 | REGULAR VERT_AMPL (Vertical Amplitude) | |
| 032 | REGULAR VERT_SCOR (Vertical S Correction) | |
| 033 | REGULAR VERT_SSYM (Vertical S Symmetry) | |
| 034 | REGULAR TRAPEZE | |
| 035 | REGULAR CUSHION | |
| 036 | REGULAR HOR_COR_SYM(Horizontal Corner Symmetry) | |
| 037 | REGULAR HOR_CORNER (Horizontal Corner) | |
| 038 | REGULAR HORZ_POS (Horizontal Position) | |
| 039 | REGULAR HORZ_AMPL (Horizontal Amplitude) | |
| 040 | PANORAMIC VERT_POS | Not used |
| 041 | PANORAMIC VERT_AMPL | Not used |
| 042 | PANORAMIC VERT_SCOR | Not used |
| 043 | PANORAMIC VERT_SSYM | Not used |
| 044 | PANORAMIC TRAPEZE | Not used |
| 045 | PANORAMIC CUSHION | Not used |
| 046 | PANORAMIC HOR_COR_SYM | Not used |
| 047 | PANORAMIC HOR_CORNER | Not used |
| 048 | PANORAMIC HORZ_POS | Not used |

| adjustment No. | adjustment part | description |
|---|---|---|
| 049 | PANORAMIC HORZ_AMPL | Not used |
| 050 | 14:9 ZOOM VERT_POS | Not used |
| 051 | 14:9 ZOOM VERT_AMPL | Not used |
| 052 | 14:9 ZOOM VERT_SCOR | Not used |
| 053 | 14:9 ZOOM VERT_SSYM | Not used |
| 054 | 14:9 ZOOM TRAPEZE | Not used |
| 055 | 14:9 ZOOM CUSHION | Not used |
| 056 | 14:9 ZOOM HOR_COR_SYM | Not used |
| 057 | 14:9 ZOOM HOR_CORNER | Not used |
| 058 | 14:9 ZOOM HORZ_POS | Not used |
| 059 | 14:9 ZOOM HORZ_AMPL | Not used |
| 060 | 16:9 ZOOM VERT_POS | Not used |
| 061 | 16:9 ZOOM VERT_AMPL | Not used |
| 062 | 16:9 ZOOM VERT_SCOR | Not used |
| 063 | 16:9 ZOOM VERT_SSYM | Not used |
| 064 | 16:9 ZOOM TRAPEZE | Not used |
| 065 | 16:9 ZOOM CUSHION | Not used |
| 066 | 16:9 ZOOM HOR_COR_SYM | Not used |
| 067 | 16:9 ZOOM HOR_CORNER | Not used |
| 068 | 16:9 ZOOM HORZ_POS | Not used |
| 069 | 16:9 ZOOM HORZ_AMPL | Not used |
| 070 | 16:9 ZOOM SUBTITLE VERT_POS | Not used |
| 071 | 16:9 ZOOM SUBTITLE VERT_AMPL | Not used |
| 072 | 16:9 ZOOM SUBTITLE VERT_SCOR | Not used |
| 073 | 16:9 ZOOM SUBTITLE VERT_SSYM | Not used |
| 074 | 16:9 ZOOM SUBTITLE TRAPEZE | Not used |
| 075 | 16:9 ZOOM SUBTITLE CUSHION | Not used |
| 076 | 16:9 ZOOM SUBTITLE HOR_COR_SYM | Not used |
| 077 | 16:9 ZOOM SUBTITLE HOR_CORNER | Not used |
| 078 | 16:9 ZOOM SUBTITLE HORZ_POS | Not used |
| 079 | 16:9 ZOOM SUBTITLE HORZ_AMPL | Not used |
| 080 | OSD Position | |
| 081 | BCLTHR Beam current threshold | |
| 082 | BCLG Beam current loop gain | |
| 083 | ROTATION (TILT) | |
| 084 | LSLSA Luma soft limiter | Fixed |
| 085 | LSLSB Luma soft limiter | Fixed |
| 086 | LSL2 Luma soft limiter | Fixed |
| 087 | LSLTA Luma soft limiter | Fixed |
| 088 | LSLTB Luma soft limiter | Fixed |
| 089 | REFERENCE WDR RED (NORMAL) | |
| 090 | REFERENCE WDR GREEN (NORMAL) | |
| 091 | REFERENCE WDR BLUE (NORMAL) | |
| 092 | REFERENCE CUTOFF RED | Fixed |
| 093 | REFERENCE CUTOFF GREEN | Fixed |
| 094 | REFERENCE CUTOFF BLUE | Fixed |
| 095 | IBRM | |
| 096 | WDRV | |
| 097 | ACC_SAT (COLOUR OFFSET) | |
| 098 | G2_CUTOFF_REFERENCE | Fixed |

| adjustment No. | adjustment part | description |
|---|---|---|
| 099 | G2_WDR_REFERENCE | Fixed |
| 100 | POFS2 (RGB HORIZANTAL SHIFT) | |
| 101 | REFERENCE WDR RED COOL | |
| 102 | REFERENCE WDR GREEN COOL | |
| 103 | REFERENCE WDR BLUE COOL | |
| 104 | REFERENCE WDR RED WARM | |
| 105 | REFERENCE WDR GREEN WARM | |
| 106 | REFERENCE WDR BLUE WARM | |
| 107 | STANDARD MODE BRIGHTNESS | |
| 108 | STANDARD MODE COLOUR | |
| 109 | STANDARD MODE CONTRAST | |
| 110 | FULL VERT_POS (16:9 MODE) | |
| 111 | FULL VERT_AMPL | |
| 112 | FULL VERT_SCOR | |
| 113 | FULL VERT_SSYM | |
| 114 | FULL TRAPEZE | |
| 115 | FULL CUSHION | |
| 116 | FULL HOR_COR_SYM | |
| 117 | FULL HOR_CORNER | |
| 118 | FULL HORZ_POS | |
| 119 | FULL HORZ_AMPL | |
| 120 | BRIGHT MODE BRIGHTNESS | |
| 121 | BRIGHT MODE COLOUR | |
| 122 | BRIGHT MODE CONTRAST | |
| 123 | SOFT MODE BRIGHTNESS | |
| 124 | SOFT MODE COLOUR | |
| 125 | SOFT MODE CONTRAST | |
| 126 | PERSONAL MODE FACTORY SETTING BRIGHTNESS | Fixed |
| 127 | PERSONAL MODE FACTORY SETTING COLOUR | Fixed |
| 128 | PERSONAL MODE FACTORY SETTING CONTRAST | Fixed |
| 129 | SCINC FOR PANORAMIC MODE | |
| 130 | SCINC1 FOR PANORAMIC MODE | |
| 131 | VOLUME AFTER APS | |
| 132 | VERTICAL SCROLL | |
| 133 | 14:9 HORIZONTAL START | Not used |
| 134 | 14:9 HORIZONTAL STOP | Not used |
| 135 | 4:3 RGB HORIZONTAL AMPLITUDE | |
| 136 | 4:3 RGB CUSHION | |
| 137 | 14:9 RGB HORIZONTAL AMPLITUDE | Not used |
| 138 | 14:9 RGB CUSHION | Not used |
| 139 | PANAROMIC RGB HORIZONTAL AMPLITUDE | Not used |
| 140 | 16:9 RGB HORIZONTAL AMPLITUDE | Not used |
| 141 | 16:9 SUBTITLE RGB HORIZONTAL AMPLITUDE | Not used |
| 142 | FULL RGB HORIZONTAL AMPLITUDE | |
| 143 | TELETEXT HORIZONTAL POSITION | |

### 4.6 ADJUSTMENT PROCEDURE

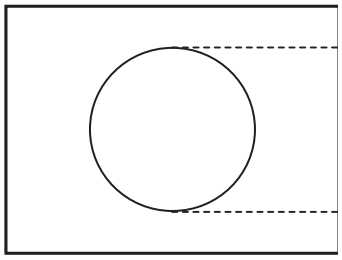
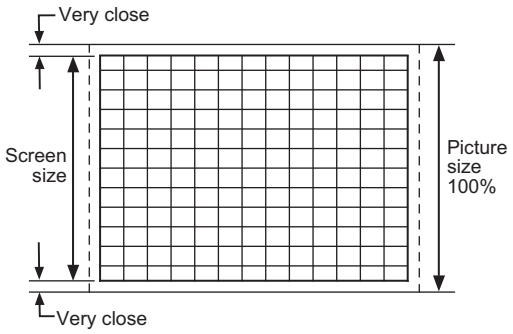
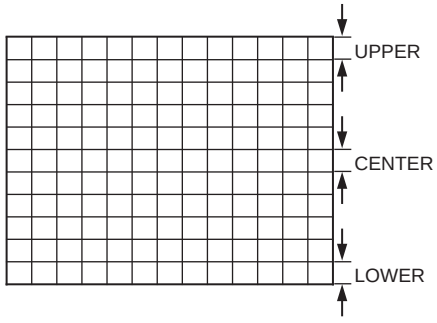
#### 4.6.1 FOCUS / SCREEN ADJUSTMENT

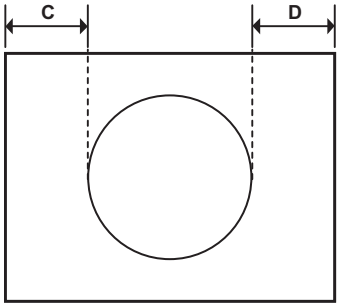
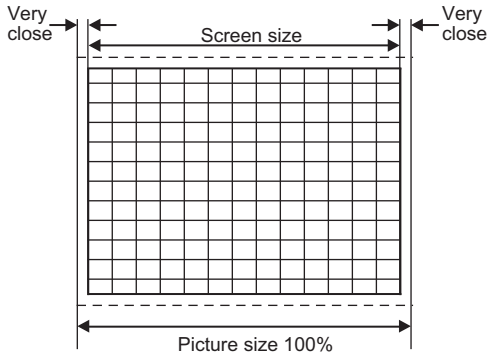
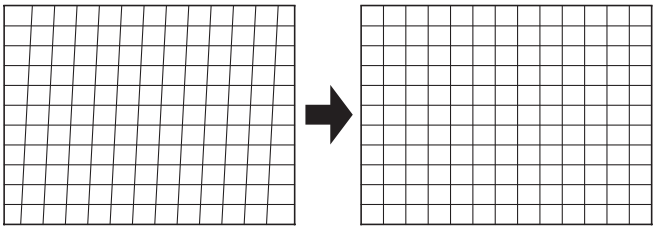
| Item | Measuring instrument | Test point | Adjustment part | Description |
|---|---|---|---|---|
| **FOCUS adjustment** | Signal generator<br><br>Remote control unit | | FOCUS VR<br>[On the FBT] | (1) Receive a PAL cross-hatch signal.<br>(2) Adjust FOCUS VR on the FBT as thin as possible.<br>  |
| **SCREEN adjustment** | Remote control unit | | SCREEN VR<br>[On the FBT] | (1) Enter the OPTIONS MENU.<br>(2) Select option No.002 and change bit 6 from 0 to 1 disabling vertical scan. Then horizontal line appears.<br>(3) Adjust horizontal line as thin as possible via screen adjust pot.<br>(4) Press number 0 key to leave service menu. |
|  | | | | |

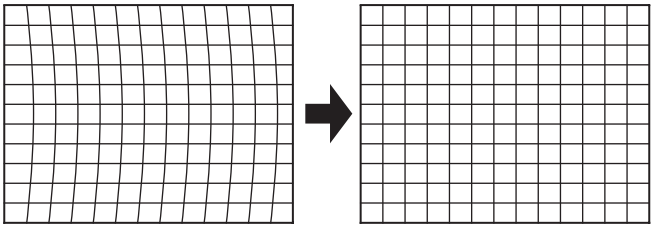
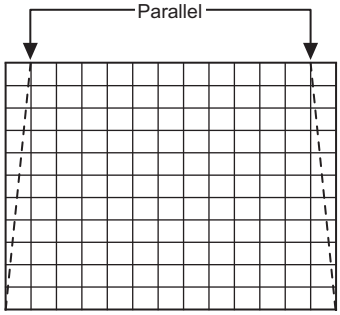
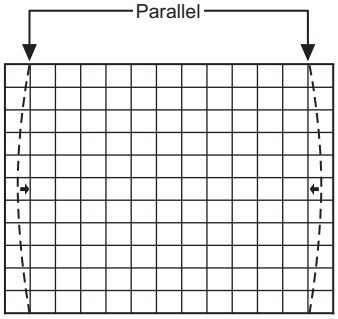
#### 4.6.2 AGC ADJUSTMENT

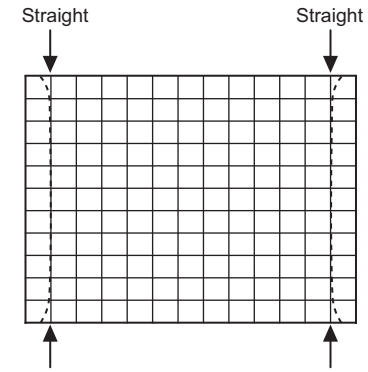
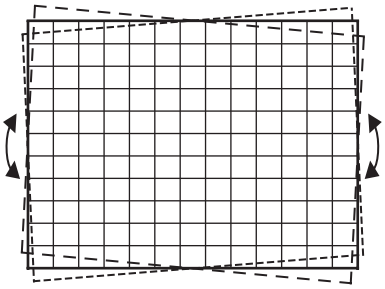
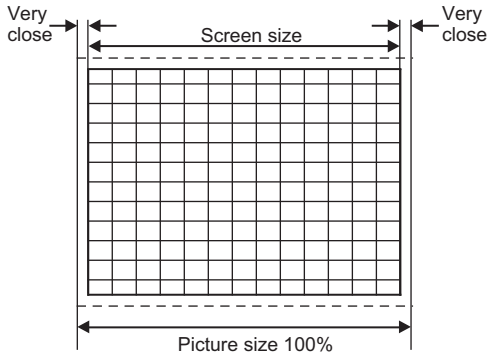
| Item | Measuring instrument | Test point | Adjustment part | Description |
|---|---|---|---|---|
| **AGC adjustment** | Signal generator<br><br>Remote control unit<br><br>Volt meter | | 003 | (1) Receive a PAL BG signal at 60dBμV RF signal level.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 003.<br>(5) Adjust 003 by pressing till voltage at pin 1 of TUNER is equal to 3.0V. |

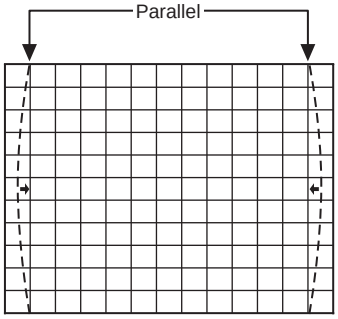
### 4.6.3 DEFLECTION CIRCUIT ADJUSTMENT

| Item | Measuring instrument | Test point | Adjustment part | Description |
|---|---|---|---|---|
| **VERTICAL POSITION adjustment** | Signal generator<br><br>Remote control unit | | 030<br><br>110 (16:9 mode) | (1) Receive a PAL circle pattern signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 030.<br>(5) Adjust 030 to make A=B.<br>(6) Check and readjust 030 item if the adjustment becomes improper after some other geometric adjustments are done.<br>(7) Select 110 (16:9 mode).<br>(8) Adjust 110 in the same procedure. |
|  | | | | |
| **VERTICAL SIZE adjustment** | Signal generator<br><br>Remote control unit | | 031<br><br>111 (16:9 mode) | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 031.<br>(5) Adjust 031 until horizontal black lines on both the upper and lower part of the cross-hatch pattern become very closeted the upper and lower horizontal sides of picture size and nearly about to disappear.<br>(6) Check and readjust 031 item if the adjustment becomes improper after some other geometric adjustments are done.<br>(7) Select 111 (16:9 mode).<br>(8) Adjust 111 in the same procedure. |
|  | | | | |
| **VERTICAL S-CORRECTION & LINEARITY adjustment** | Signal generator<br><br>Remote control unit | | 032<br><br>033<br><br>112 (16:9 mode)<br><br>113 (16:9 mode) | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 032.<br>(5) Adjust 032 till the size of squares on both the upper and lower part of cross-hatch pattern become equal to the squares laying on the vertical center of the cross-hatch pattern.<br>(6) Check and readjust 032 item if the adjustment becomes improper after some other geometric adjustments are done.<br>(7) Select 033.<br>(8) Adjust 033 till all the size of squares of the cross-hatch pattern become in equal size from the top of the screen to its bottom of the whole screen.<br>(9) Check and readjust 033 item if the adjustment becomes improper after some other geometric adjustments (especially after than S-COR adjustment) are done.<br>(10) Select 112 (16:9 mode).<br>(11) Adjust 112 in the same procedure as 5.<br>(12) Select 113 (16:9 mode).<br>(13) Adjust 113 in the same procedure as 8. |
|  | | | | |

| Item | Measuring instrument | Test point | Adjustment part | Description |
|---|---|---|---|---|
| **HORIZONTAL POSITION adjustment** | Signal generator<br><br>Remote control unit | | 038<br><br>118 (16:9 mode) | (1) Receive a PAL circle pattern signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 038.<br>(5) Adjust 038 to make C=D.<br>(6) Check and readjust 038 item if the adjustment becomes improper after some other geometric adjustments are done.<br>(7) Select 118 (16:9 mode).<br>(8) Adjust 118 in the same procedure. |
|  | | | | |
| **HORIZONTAL SIZE adjustment** | Signal generator<br><br>Remote control unit | | 039<br><br>119 (16:9 mode) | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 039.<br>(5) Adjust 039 until vertical lines on both the left and right part of the cross-hatch will be visible nor screen will be so wide.<br>(6) Check and readjust 039 item if the adjustment becomes improper after some other geometric adjustments are done.<br>(7) Select 119 (16:9 mode).<br>(8) Adjust 119 in the same procedure. |
|  | | | | |
| **ANGLE adjustment** | Signal generator<br><br>Remote control unit | | 016 | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 016.<br>(5) Adjust 016 till the vertical lines of the cross-hatch pattern become straight.<br>(6) Check and readjust 016 item if the adjustment becomes improper after some other geometric adjustments are done. |
|  | | | | |

| Item | Measuring instrument | Test point | Adjustment part | Description |
|---|---|---|---|---|
| **BOW adjustment** | Signal generator<br><br>Remote control unit | | 017 | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 017.<br>(5) Adjust 017 till the vertical lines become straight.<br>(6) Check and readjust 017 item if the adjustment becomes improper after some other geometric adjustments are done.<br>**NOTE:**<br>In case where there is a bow-shaped distortion of images on the screen. (Figure) |
|  | | | | |
| **TRAPEZIUM adjustment** | Signal generator<br><br>Remote control unit | | 034<br><br>114 (16:9 mode) | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 034.<br>(5) Adjust 034 till vertical lines, especially lines at the sides of the picture frame become parallel to the both sides of picture tubes as close as possible.<br>(6) Check and readjust 034 item if the adjustment becomes improper after some other geometric adjustments are done.<br>(7) Select 114 (16:9 mode).<br>(8) Adjust 114 in the same procedure. |
|  | | | | |
| **SIDE PIN adjustment** | Signal generator<br><br>Remote control unit | | 035<br><br>115 (16:9 mode) | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 035.<br>(5) Adjust 035 till vertical lines close to the both sides of the picture frame become parallel to vertical sides of picture tube without any bending to left or to right side of the screen.<br>(6) Check and readjust 035 item if the adjustment becomes improper after some other geometric adjustments are done.<br>(7) Select 115 (16:9 mode).<br>(8) Adjust 115 in the same procedure. |
|  | | | | |

| Item | Measuring instrument | Test point | Adjustment part | Description |
|---|---|---|---|---|
| **CORNER adjustment** | Signal generator<br><br>Remote control unit | | 036<br><br>037<br><br>116 (16:9 mode)<br><br>117 (16:9 mode) | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 036.<br>(5) Adjust 036 till vertical lines at the upper corners of the picture frame become vertical and parallel to vertical corner sides of picture tube.<br>(6) Check and readjust 036 item if the adjustment becomes improper after some other geometric adjustments are done.<br>(7) Select 037.<br>(8) Adjust 037 till vertical lines at the lower corners of the picture frame become vertical and parallel to vertical corner sides of picture tube.<br>(9) Check and readjust 037 item if the adjustment becomes improper after some other geometric adjustments are done.<br>(10) Select 116 (16:9 mode).<br>(11) Adjust 116 in the same procedure as 5.<br>(12) Select 117 (16:9 mode).<br>(13) Adjust 117 in the same procedure as 8. |
|  | | | | |
| **ROTATION adjustment** | Signal generator<br><br>Remote control unit | | 083 | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 083.<br>(5) Adjust 083 to rotate the complete master clock-wise and counter clock-wise depending on the CRT.<br>(6) Check and readjust 083 item if the adjustment becomes improper after some other geometric adjustments are done. |
|  | | | | |
| **NTSC HORIZONAL SIZE adjustment** | Signal generator<br><br>Remote control unit | | 135<br><br>142 (16:9 mode) | (1) Receive a NTSC cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 135.<br>(5) Adjust 135 till vertical lines on both the left and right part of the cross-hatch will be visible nor screen will be so wide.<br>(6) Check and readjust TRAPEZ item if the adjustment becomes improper after some other geometric adjustments are done.<br>(7) Select 142 (16:9 mode).<br>(8) Adjust 142 in the same procedure. |
|  | | | | |

| Item | Measuring instrument | Test point | Adjustment part | Description |
|---|---|---|---|---|
| **NTSC SIDE PIN adjustment** | Signal generator<br><br>Remote control unit | | 136 | (1) Receive a NTSC cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 136.<br>(5) Adjust 136 till vertical lines close to the both sides of the picture frame become parallel to vertical sides of picture tube without any bending to left or to right side of the screen.<br>(6) Check and readjust 136 item if the adjustment becomes improper after some other geometric adjustments are done. |
|  | | | | |
| **TELETEXT SCREEN adjustment** | Signal generator<br><br>Remote control unit | | 143 | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 143.<br>(5) Adjust 143 to adjust the proper vertical size of Teletext screen.<br>(6) Check and readjust 143 item if the adjustment becomes improper after some other geometric adjustments are done. |

### 4.6.4 VIDEO CIRCUIT

| Item | Measuring instrument | Test point | Adjustment part | Description |
|---|---|---|---|---|
| **WHITE BALANCE adjustment** | Signal generator<br><br>Remote control unit | | 023<br><br>024<br><br>025 | (1) Receive a PAL black & white signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 023, 024 and 025 respectively.<br>(5) Adjust 023, 024 and 025 respectively, until the white part turns to pure white without any other colour. |
| **COLOUR CUTOFF LEVEL adjustment** | Signal generator<br><br>Remote control unit | | 026<br><br>027<br><br>028 | (1) Receive a PAL cross-hatch signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 026, 027 and 028 respectively.<br>(5) Adjust 026, 027 and 028 respectively, until the black part turns to pure black without any other colour. |
| **PAL Y DELAY adjustment** | Signal generator<br><br>Remote control unit | | 006 | (1) Receive a PAL colour bar signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 006.<br>(5) Adjust 006 till the colour transients on the colour bar pattern becomes as sharper and possible as colours between transients do not mix with each other. |
| **SECAM Y DELAY adjustment** | Signal generator<br><br>Remote control unit | | 007 | (1) Receive a SECAM colour bar signal.<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 007.<br>(5) Adjust 007 by pressing till the colour transients on the colour bar pattern becomes as sharper and possible as colouers between transients do not mix with each other. |
| **NTSC Y DELAY adjustment** | Signal generator<br><br>Remote control unit | | 008 | (1) Receive a NTSC colour bar signal from an external source (e.g. FRONT AV : EXT-3).<br>(2) Enter the SERVICE MENU.<br>(3) Select ADJUST MENU.<br>(4) Select 008.<br>(5) Adjust 008 by pressing till the colour transients on the colour bar pattern becomes as sharper and possible as colouers between transients do not mix with each other. |

# SECTION 5
# TROUBLESHOOTING

This service manual does not describe TROUBLESHOOTING.

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