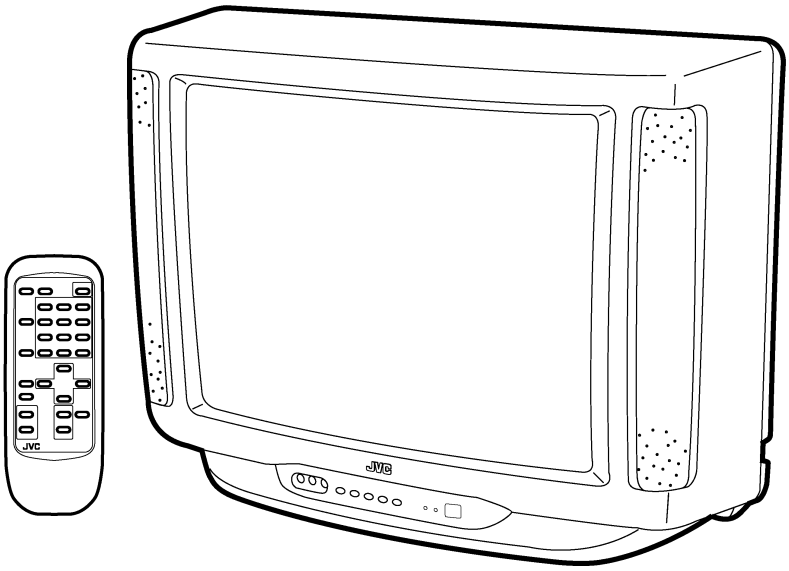
JVC

SERVICE MANUAL

COLOUR TELEVISION

BASIC CHASSIS
CL

AV-G2171/EG



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No.51900
Sept. 2001

SPECIFICATIONS

Item		Content
Dimensions(W × H × D)		60.3cm × 45.5cm × 47.4cm
Mass		21.6kg
TV RF System		B / G, D / K, K1, M
Colour System	TV Mode	PAL / SECAM / NTSC3.58 / NTSC4.43
	VIDEO Mode	PAL / SECAM / NTSC3.58 / NTSC4.43
Receiving Frequency	VHF (VL)	46.25MHz～168.25MHz
	VHF (VH)	175.25MHz～463.25MHz
	UHF	471.25MHz～863.25MHz
	CATV	● Cable TVs of Mid (X～Z_{+2}, S1～S10) Super (S11～S20) & Hyper (S21～S41) bands receivable
Intermediate Frequency	VIF Carrier	38.0MHz
	SIF Carrier	32.5MHz (5.5MHz) / 31.5MHz (6.5MHz) / 33.5MHz (4.5MHz)
Colour Sub Carrier Frequency		PAL : 4.43MHz SECAM : 4.40625MHz / 4.25MHz NTSC : 3.58MHz / 4.43MHz
Aerial Input Terminal		75Ω Unbalanced
Power Input Voltage	Rated	AC120～240V, 50 / 60Hz
	Operation	AC90～260V, 50 / 60Hz
Power Consumption		97W (Max.) / 67W (Avg.)
Picture Tube		Visible size : 51cm measured diagonally
High Voltage		26.5kV±1kV(at zero beam current)
Speaker		5cm × 9 cm Oval type × 2
Audio Output		3W (monaural)
Input	Video	1Vp-p, 75Ω
	Audio	500mVrms (-4dBs), High impedance
Output	Video	1Vp-p, 75Ω
	Audio	500mVrms (-4dBs), Low impedance
Remote Control Unit		RM-C565 (Battery size : AA / R06 / UM-3 × 2)

Design & specifications are subject to change without notice.

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 with a measuring apparatus (oscilloscope etc.) the LIVE side GND and ISOLATED(NEUTRAL) side GND or EARTH side GND at the same time.
   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 ADJUSTMENT OF B1 POWER SUPPLY).

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.

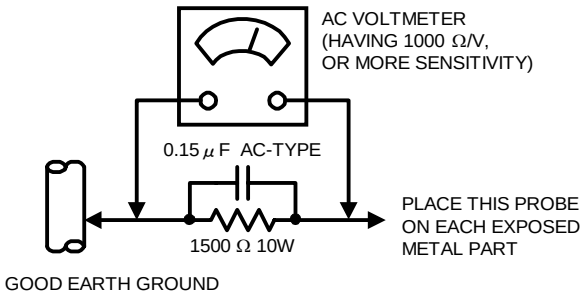
8. When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the manufacturer's replacement 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, screwheads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

(1) **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.

(2) **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.).

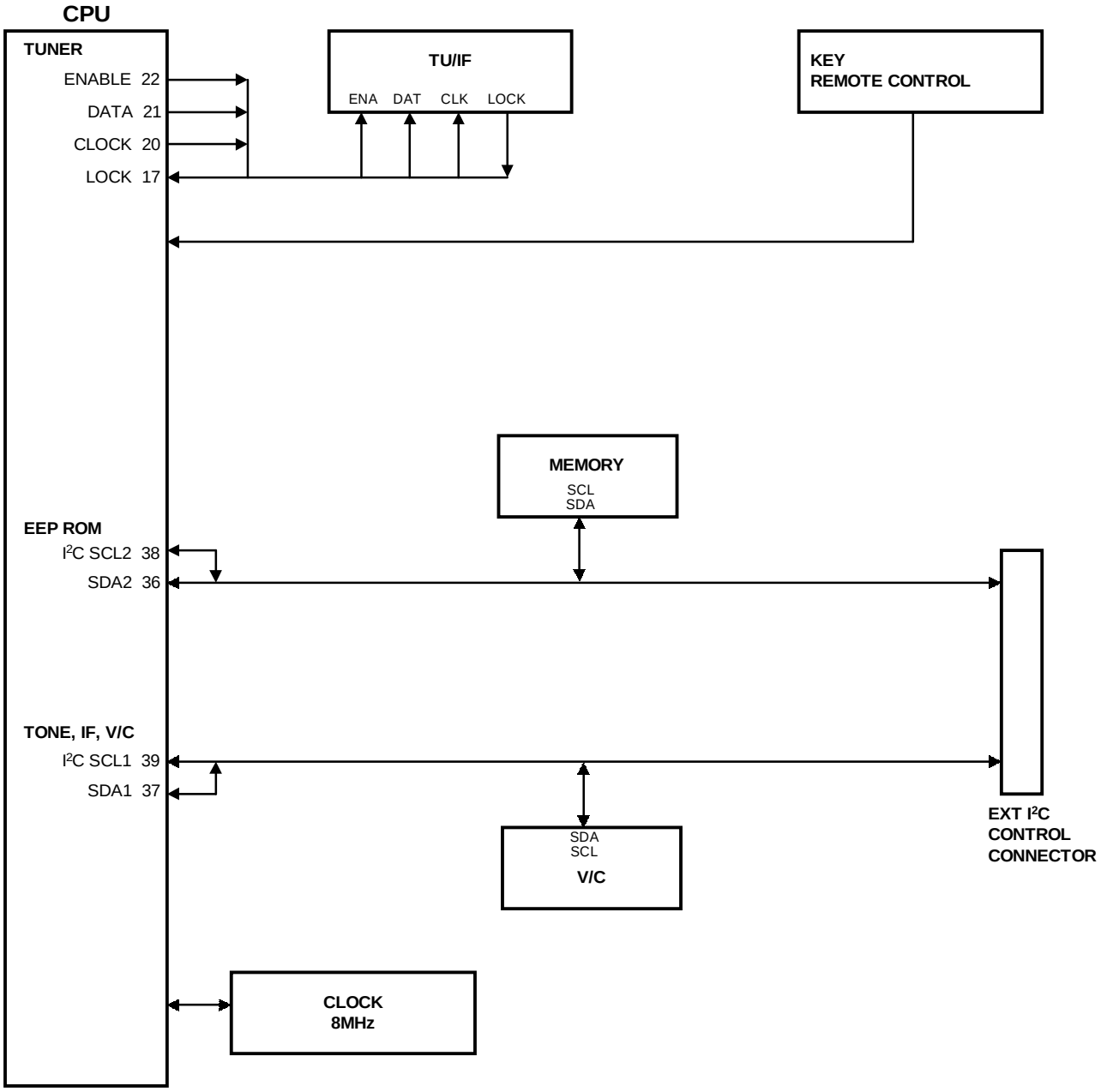
● **Alternate Check Method**
Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Use an AC voltmeter having 1000 ohms per volt or more sensitivity in the following manner. Connect a 1500Ω 10W resistor paralleled by a 0.15μF AC-type capacitor 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.).



FEATURES

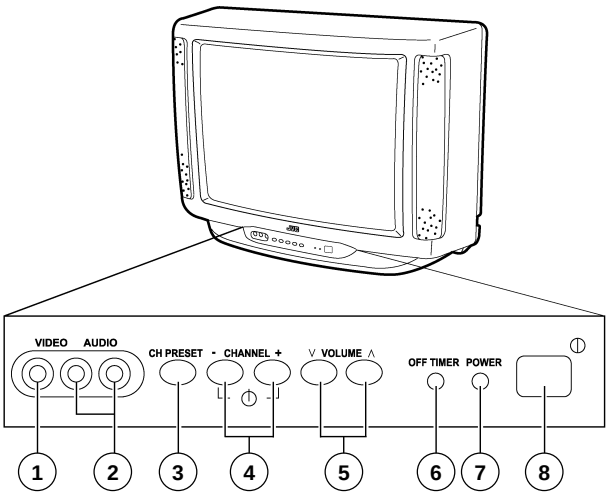
- New chassis design enables use of an interactive on-screen control.
- Wide range voltage (90V～260V) AC power input.
- With AUDIO / VIDEO INPUT & OUTPUT terminal.
- MUTING button can reduce the audio level to zero instantly.
- Functional remote control to operate TV set (for channel select, volume control, power ON/OFF, etc.) from a distance.
- I^2C bus control utilizes single chip ICs for IF, V/C and VSM.
- By means of AUTO CH PRESET, the TV stations can be selected automatically and the TV channels can also be rearranged automatically.

■SYSTEM BLOCK DIAGRAM



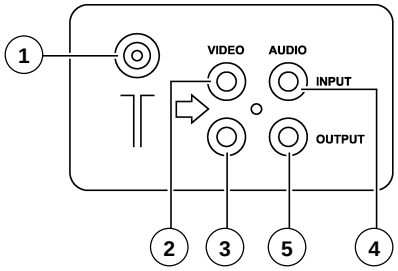
FUNCTIONS

■Front control



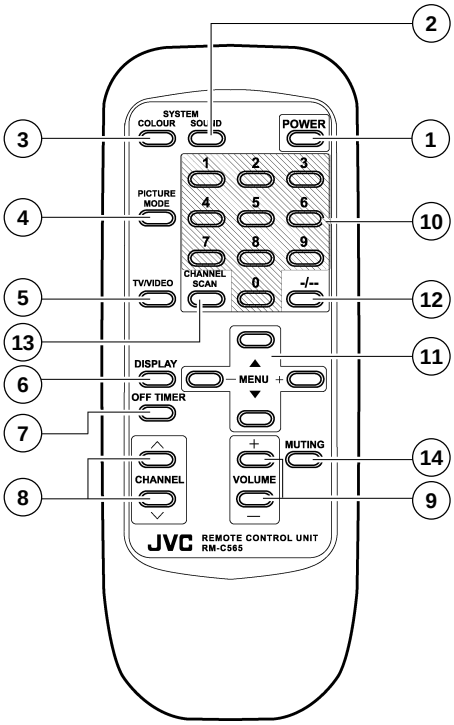
①	VIDEO INPUT Terminal
②	AUDIO (L/R) INPUT Terminal
③	CHANNEL PRESET Button
④	CHANNEL ＋/— Button
⑤	VOLUME ∧/∨ Button
⑥	OFF TIMER IND.
⑦	POWER IND.
⑧	MAIN POWER SW Button

■Rear terminal



①	ANT Terminal
②	VIDEO-INPUT Terminal
③	VIDEO-OUTPUT Terminal
④	AUDIO INPUT Terminal
⑤	AUDIO OUTPUT Terminal

■Remote control unit (RM-C565)



①	POWER SW key
②	SOUND SYSTEM key
③	COLOUR SYSTEM key
④	PICTURE MODE key
⑤	TV/VIDEO key
⑥	DISPLAY key
⑦	OFF TIMER key
⑧	CHANNEL ∧/∨ key
⑨	VOLUME ＋/— key
⑩	NUMBER(CH.) key
⑪	MENU(▲/▼ & ＋/—) key
⑫	-/-- key
⑬	CHANNEL SCAN key
⑭	MUTING key

SPECIFIC SERVICE INSTRUCTIONS

DISASSEMBLY PROCEDURE

REMOVING THE REAR COVER

1. Unplug the power supply cord.
2. Remove the **7** screws marked Ⓐ & Ⓑ as shown in figure.
3. Withdraw the rear cover toward you.

∗ When reinstalling the rear cover, carefully push it inward after installing the main board into the rear cover groove.

REMOVING THE MAIN CHASSIS

- After removing the rear cover.

1. Slightly raise the both sides of the MAIN chassis by hand and remove the craws marked Ⓓ under the MAIN chassis from the FRONT CABINET.
2. Withdraw the MAIN chassis backward.
   (If necessary, take off the wire clamp, connectors etc.)

REMOVING THE SPEAKER

- After removing the rear cover.

1. Remove the **4** screws marked Ⓒ as shown in figure.
2. Follow the same steps when removing the other hand speaker.

REMOVING THE PIN JACK PWB

1. Remove the screw marked Ⓔ as shown in figure.
2. Pull out the PIN JACK PWB.

CHECKING THE PWB

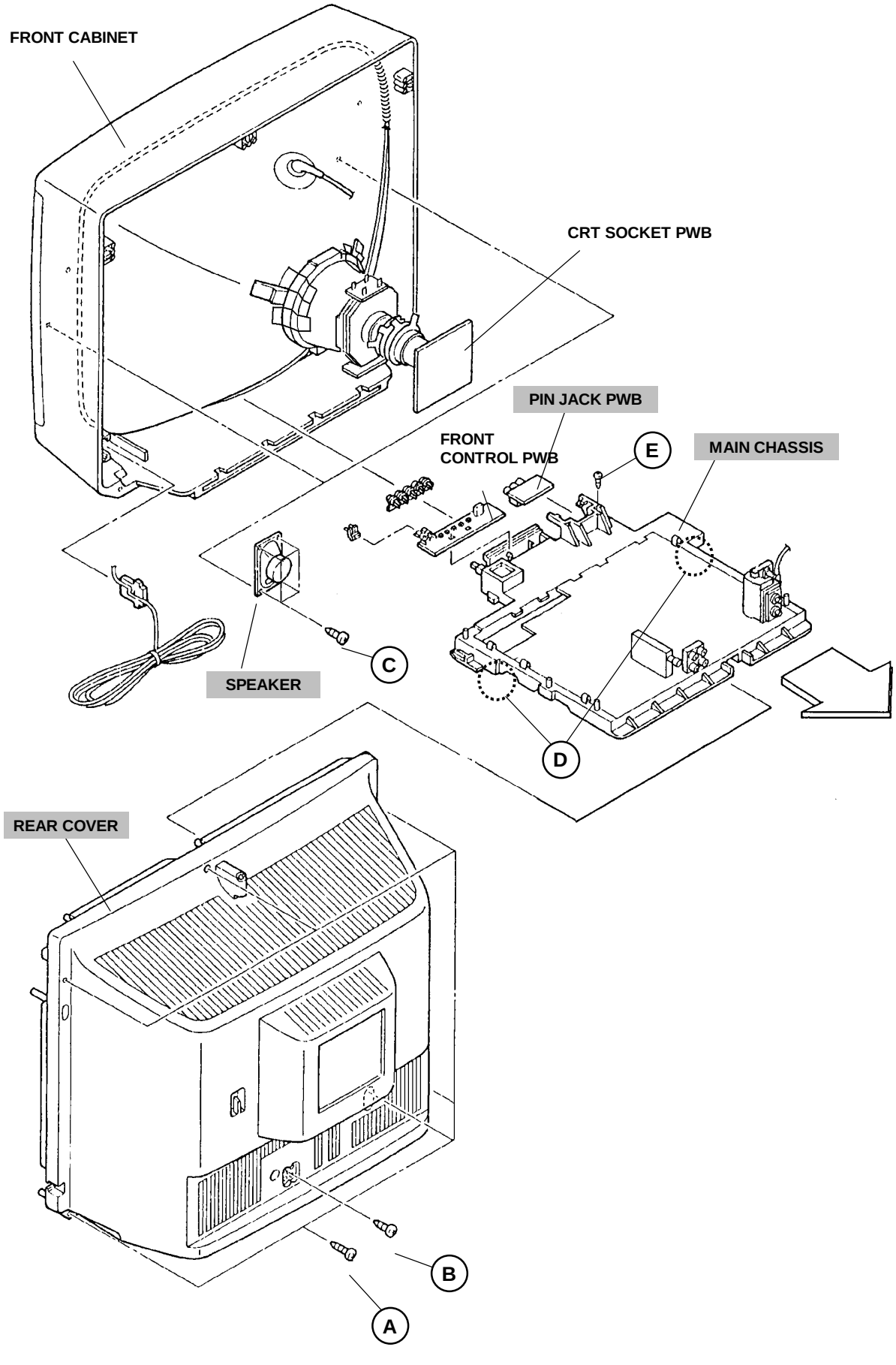
1. To check the back side of the PW Board.
   1) Pull out the chassis. (Refer to REMOVING THE MAIN CHASSIS.)
   2) Erect the PWB vertically so that you can easily check the back side of the PWB.

[CAUTION]

- When erecting the PWB, be careful so that there will be no contacting with other PWB.
- Before turning ON power, make sure that the wire connector is properly connected.

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.


FRONT CABINET
CRT SOCKET PWB
PIN JACK PWB
FRONT
CONTROL PWB
E
MAIN CHASSIS
SPEAKER
C
D
REAR COVER
B
A

REPLACEMENT OF MEMORY ICs

1. MEMORY ICs

This TV uses memory ICs. In the memory ICs are memorized data for correctly operating the video and deflection circuits. When replacing memory ICs, be sure to use ICs written with the initial values of data.

2. PROCEDURE FOR REPLACING MEMORY ICs

(1) Power off

Switch the power off and unplug the power cord from the wall outlet.

(2) Replace ICs

Be sure to use memory ICs written with the initial data values.

(3) Power on

Plug the power cord into the wall outlet and switch the power ON.

(4) Check and set SYSTEM CONSTANT SET:

∗ It must not adjust without signal.

1) Press the DISPLAY key and the PICTURE MODE key of the REMOTE CONTROL UNIT simultaneously.
2) The SERVICE MENU screen of Fig. 1 will be displayed.
3) While the SERVICE MENU on display, press the DISPLAY key and PICTURE MODE key simultaneously, and the SYSTEM CONSTANT SET screen of Fig. 2 will be displayed
4) Check the setting value of the SYSTEM CONSTANT SET of Table 1. If the value is different, select the setting item with the MENU ▼／▲ key, and set the correct value with the MENU - / + key.
5) Press the DISPLAY key twice, and return to the normal screen.

(5) Receive channel of setting

Refer to the **OPERATING INSTRUCTIONS** and set the receive channels (channels preset) as described

(6) User Setting

Check the user setting value of Table 2, and if setting value is different, set the correct value.

For setting, refer to the **OPERATING INSTRUCTIONS**.

(7) Setting of SERVICE MENU

Verify the setting items of the SERVICE MENU of Table 3, and reset where necessary.

For setting, refer to the **SERVICE ADJUSTMENTS**.

SERVICE MENU

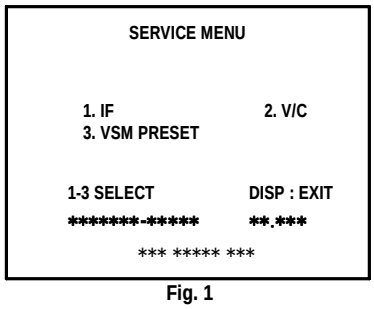
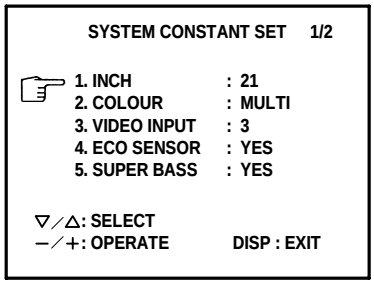


Fig. 1

SYSTEM CONSTANT- Ⅰ



SYSTEM CONSTANT- Ⅱ

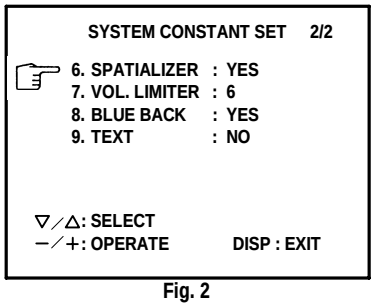
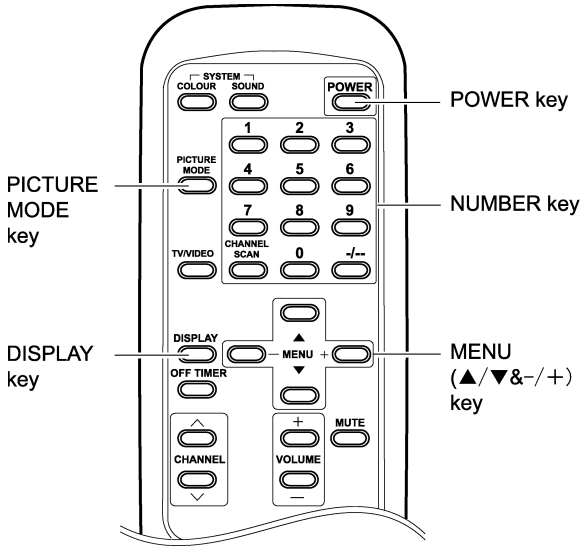


Fig. 2

KEY NAME of REMOTE CONTROL UNIT



SETTING OF SYSTEM CONSTANT SET

Setting item	Setting contents	Setting value
1. INCH	→ 29 → 25 → 21 → 14 →	21
2. COLOUR	→ MULTI. → TRIPLE → PAL →	MULTI
3. VIDEO INPUT	→ 1 → 3 →	3
4. ECO SENSOR	→ YES → NO →	YES
5. SUPER BASS	→ YES → NO →	YES
6. SPATIALIZER	→ YES → NO →	YES
7. KEY INPUT	→ 1 → 2 → ~6 → 7~ → 0 →	6
8. BLUE BACK	→ YES → NO →	YES
9. TEXT	→ YES → NO →	NO

Table 1

USER SETTING VALUES

Setting item	Setting value	Setting item	Setting value
SUB POWER	ON	SOUND SYSTEM	B/G
CHANNEL	1 POSITION	COLOUR SYSTEM	PAL
CHANNEL PRESET	Refer to OPERATING INSTRUCTION	SURROUND	OFF
		LANGUAGE	Viet
		OFF TIMER	00
VOLUME	Appropriate sound volume	PICTURE MODE (VSM)	BRIGHT
TV/VIDEO	TV	BLUE BACK	NO
ON SCREEN DISPLAY	POSITION NUMBER DISPLAY	VNR	OFF

Table 2

SERVICE MENU SETTING ITEMS

Service menu	Setting item	Service menu	Setting item	
1. IF	1. VCO 2. DELAY POINT	**2. V / C**	1. CUT OFF (R / G / B) 2. DRIVE (R / B) 3. BRIGHT 4. CONT. 5. COLOUR (P / S / N) 6. TINT (N3 / N4) 7. BLACK OFFSET (R-Y / B-Y)	8. SHARP 9. TEXT(R / G / B)CONT. 10. H. CENTER 11. V. HEIGHT 12. V. LIN. 13. V. S-CR 14. V. CENTER **Do not adjust**
3. VSM PRESET (BRIGHT/STD/SOFT)	TINT COLOUR BRIGHT CONT. SHARP			

Table 3

REPLACEMENT OF CHIP COMPONENT

■ 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.

■ SOLDERING IRON

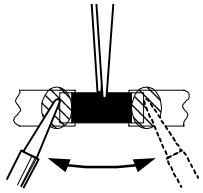
1. Use a high insulation soldering iron with a thin pointed end of it.
2. A 30w soldering iron is recommended for easily removing parts.

■ REPLACEMENT STEPS

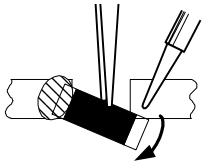
1. How to remove Chip parts

◆ **Resistors, capacitors, etc.**

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

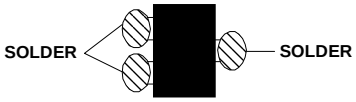


(2) Shift with tweezers and remove the chip part.

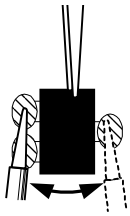


◆ **Transistors, diodes, variable resistors, etc.**

(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.

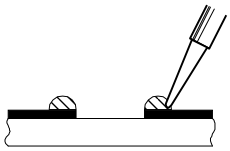


Note : After removing the part, remove remaining solder from the pattern.

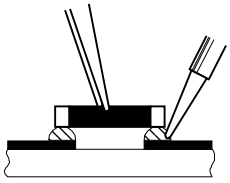
2. How to install Chip parts

◆ **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.

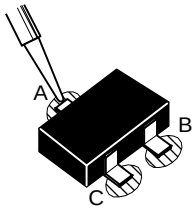


◆ **Transistors, diodes, variable resistors, etc.**

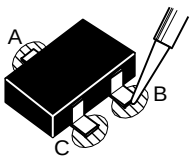
(1) Apply solder to the pattern as indicated in the figure.

(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**.



SERVICE ADJUSTMENT

BEFORE STARTING SERVICE ADJUSTMENT

1. **There are 2 ways of adjusting this TV: One is with the REMOTE CONTROL UNIT and the other is the conventional method using adjustment parts and components.**
2. **The setting (adjustment) using the REMOTE CONTROL UNIT is made on the basis of the initial setting values. The setting values which adjust the screen to the optimum condition can be different from the initial setting values.**
3. Make sure that connection is correctly made to AC power source.
4. Turn on the power of the TV and measuring instrument for warming up for at least 30 minutes before staring adjustment.
5. If the receive or input signal is not specified, use the most appropriate signal for adjustment.
6. Never touch parts (such as variable resistors, transformers and condensers) not shown in the adjustment items of this service adjustment.
7. Preparation for adjustment (presetting):
   Unless otherwise specified in the adjustment items, preset the following functions with the REMOTE CONTROL UNIT.

PICTURE MODE (VSM)	BRIGHT
OFF TIMER	OFF
VNR	OFF

MEASURING INSTRUMENT AND FIXTURES

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

ADJUSTMENT ITEMS

Adjustment item	Adjustment item
B1 POWER SUPPLY	VIDEO/CHROMA (With DEF.) circuit adjustment
FOCUS adjustment	VSM PRESET setting
IF circuit adjustment	PURITY, CONVERGENCE

BASIC OPERATION OF SERVICE MENU

1. TOOL OF SERVICE MENU OPERATION

Operate the SERVICE MENU with the REMOTE CONTROL UNIT.

2. SERVICE MENU ITEMS

With the SERVICE MENU, various settings (adjustments) can be made, and they are broadly classified in the following items of settings :

- **1. IF** ····· This mode adjusts the setting values of the IF circuit.
- **2. V/C** ····· This mode adjusts the setting values of the VIDEO/CHROMA circuit and DEFLECTION circuit.
- **3. VSM PRESET** ····· For setting the values of STANDARD, SOFT and BRIGHT.
  (VSM : video status memory)

3. BASIC OPERATION OF SERVICE MENU

(1) How to enter SERVICE MENU

Press the DISPLAY key and the PICTURE MODE key of the REMOTE CONTROL UNIT simultaneously.
The SERVICE MENU screen of Fig. 1 will be displayed.

SERVICE MENU

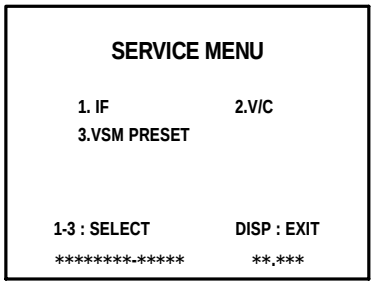


Fig. 1

(2) Selection of SUB MENU SCREEN

Press one of the keys 1 ～ 3 of the REMOTE CONTROL UNIT, and select the SUB MENU SCREEN (See Fig.2) from the SERVICE MENU.

SERVICE MENU → SUB MENU **1. IF**
2. V / C
3. VSM PRESET

(3) Method of Setting

- Once the setting values are set, they are memorized automatically.
- It must not adjust without signal.

1) **1. IF**

[1. VCO]

① 1 Key ····· Select **1. IF**.
② 1 Key ····· Select 1. VCO. CW)
③ The VCO(CW) screen will be displayed in yellow when the AFC voltage is at a certain level and in blue when it is at other levels.
④ DISPLAY Key ····· When this is pressed, you will return to the **SERVICE MENU**.

[2. DELAY POINT]

① 1 Key ····· Select **1. IF**.
② 2 Key ····· Select 2. DELAY POINT.
③ MENU - / + Key ····· Set (adjust) the setting values of the setting items.
④ DISPLAY Key ····· When this is pressed twice, you will return to the **SERVICE MENU**.

2) **2. V/C and 3. VSM PRESET**

① 2 and 3 Keys ····· Select one from **2. V/C and 3. VSM PRESET**
② MENU ▼/▲ key ····· Select setting items.
③ MENU - / + Key ····· Set (adjust) the setting values of the setting items.
(Use the number keys of the REMOTE CONTROL UNIT for setting of WHITE BALANCE and BLACK OFFSET. For the setting, refer to each item concerned.)
④ DISPLAY Key ····· When this is pressed, you will return to the **SERVICE MENU**.

(4) Release of SERVICE MENU

After completing the setting, return to the SERVICE MENU, then again press the DISPLAY key.

SUB MENU SCREEN

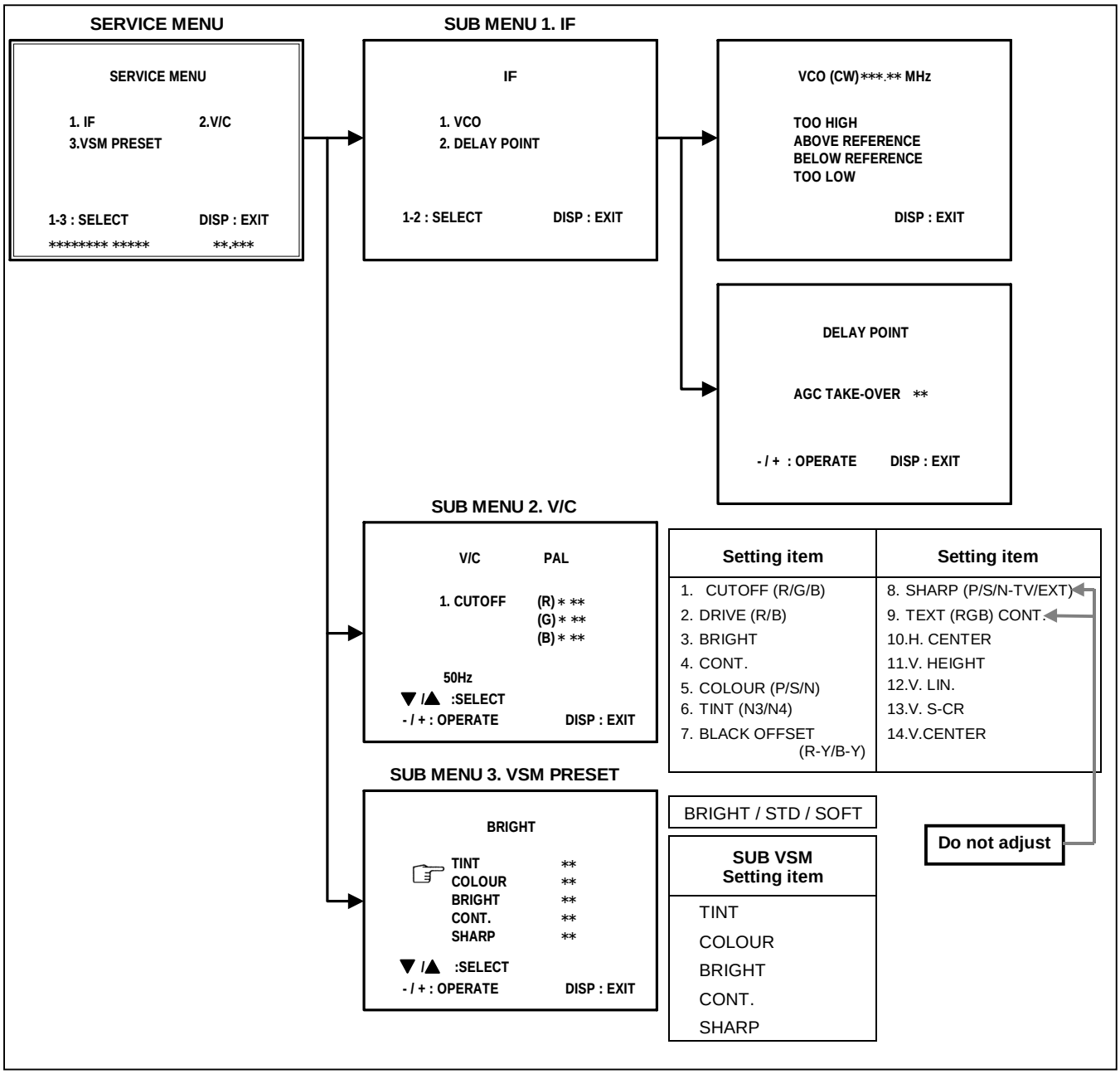
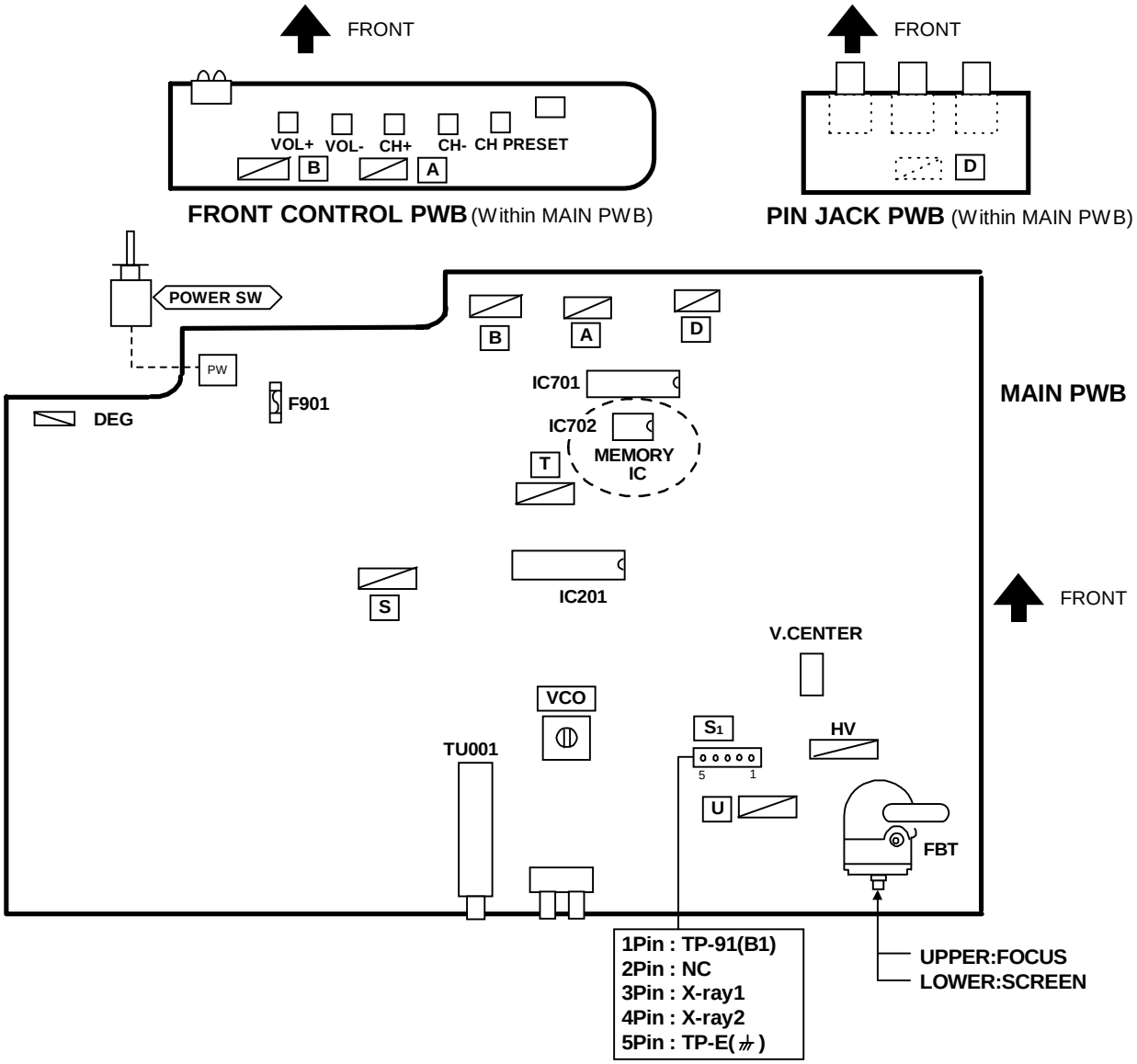
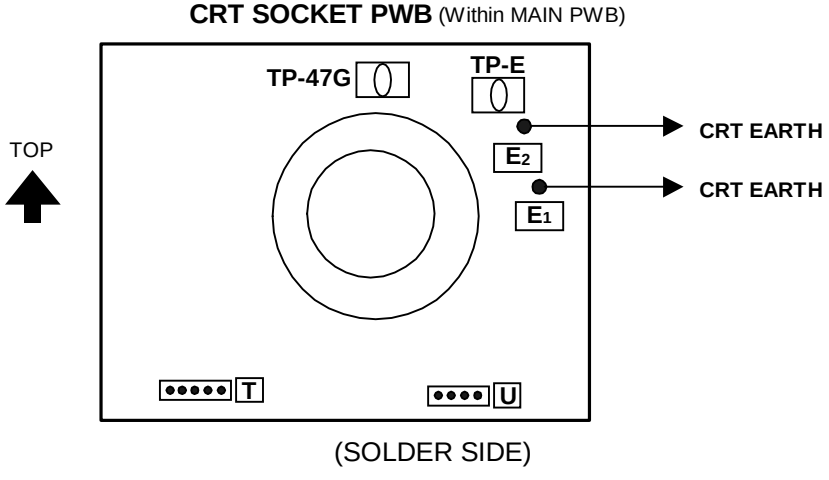


Fig. 2

ADJUSTMENT LOCATIONS





ADJUSTMENT

B1 POWER SUPPLY

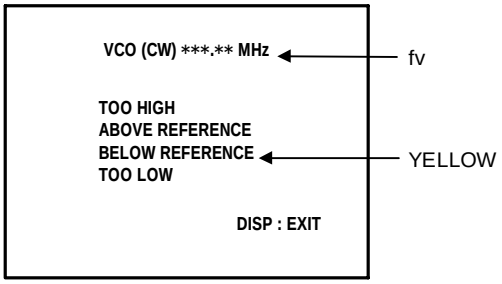
Item	Measuring instrument	Test point	Adjustment part	Description
Check of B1 power supply	**Signal generator** **DC Volt-meter**	**TP-91 (B1)** **TP-E (⏚)** **[S1 Connector]**		1. Receive a whole black signal. 2. Connect a DC voltmeter to TP-91(B1) and TP-E (⏚). 3. Make sure that the voltage is DC114.5±1.0V.

FOCUS ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
Adjustment of FOCUS	**Signal generator**		**FOCUS VR** **[In FBT]**	1. Receive a cross-hatch signal. 2. While watching the screen, adjust the FOCUS VR to make the vertical and horizontal lines as fine and sharp as possible. 3. Make sure that when the screen is darkened, the lines remain in good focus.

IF CIRCUIT ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
Adjustment of VCO(CW)	**Remote control unit**		**VCO(CW) TRANSF.**	• Under normal conditions, no adjust is reguired. 1. Select 1. IF from the SERVICE MENU. 2. Press the **1** key and select 1. VCO. 3. Select a receivable broadcast channel with the CHANNEL key. 4. Turn the core of VCO TRANSF. Until the colour of the characters TOO HIGH displayed on the screen changes from blue to **yellow**. (Step 1) 5. Then slowly turn the core of VCO TRANSF to the **left** until the colour of the characters BELOW REFERENCE changes from blue to **yellow**. (Step 3) 6. Press the display key three times to return to normal screen. 7. Perform CHANNEL PRESET again, and make sure that each broadcast is being received properly.



Screen display	Step 1 → 2 → 3
TOO HIGH	**Yellow** → Blue → Blue
ABOVE REFERENCE	Blue → **Yellow** → Blue
BELOW REFERENCE	Blue → Blue → **Yellow**
TOO LOW	Blue → Blue

Item	Measuring instrument	Test point	Adjustment part	Description
Adjustment of DELAY POINT (AGC)	**Remote control unit**		**DELAY POINT (AGC TAKE-OVER)**	1. Receive a black and white signal (colour off). 2. Select **1. IF** from the SERVICE MENU. 3. Select **2. DELAY POINT** by pressing the **2** key on the remote control. 4. Adjust the MENU - or + key until video noise disappears. 5. Turn to other channels and make sure that there are no irregularities.

Setting (adjustment) item	Variable range	Initial setting value
DELAY POINT (AGC TAKE-OVER)	0～63	20

V / C CIRCUIT ADJUSTMENT (With DEF. Adjustment)

- There are 2 modes of adjustment —— 50Hz mode and 60Hz mode —— depending upon the kind of signals (VERTICAL FREQUENCY 50Hz / 60Hz).
- When adjusted in 50Hz mode, 60Hz mode will be automatically set.

The setting (adjustment) using the REMOTE CONTROL UNIT is made on the basis of the initial setting values.
The setting values which adjust the screen to the optimum condition can be different from the initial setting values.

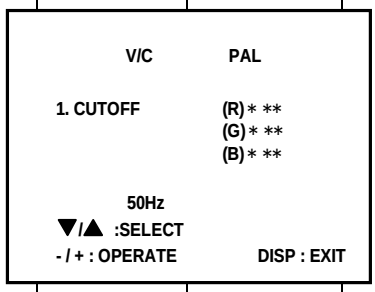
Setting item \ Colour system		Variable range	Initial setting value							
			PAL		SECAM		NTSC 3.58		NTSC 4.43	
1. CUT OFF (R / G / B)		-128～+127	+00		←		←		←	
2. DRIVE (R / B)		-128～+127	+00		←		←		←	
3. BRIGHT		-64～+63	-20		←		←		←	
4. CONT.		-58～+28	-03		←		←		←	
5. COLOUR		-128～+127	+07		+11		+12		-02	
6. TINT	TV / VIDEO	-128～+127	——		——		+20 / +00		-02 / +00	
7. BLACK OFFSET (R-Y / B-Y)		-8～+7	——		+03 / -06		——		——	
8. SHARP (DO NOT ADJ.)	TV / VIDEO	-32～+31	-08/ +02 (FIXED)		←		←		←	
9. TEXT (RGB) CONT. (DO NOT ADJ.)		-128～+47	+15 (FIXED)		←		←		←	
10. H. CENTER		-16～+15	**50Hz**	**60Hz**	**50Hz**	**60Hz**	**50Hz**	**60Hz**	**50Hz**	**60Hz**
			-06	-01	←	←	←	←	←	←
11. V. HEIGHT		-64～+63	-39	+00	←	←	←	←	←	←
12. V. LIN		-16～+15	+00	←	←	←	←	←	←	←
13. V. S-CR		-64～+63	+00	←	←	←	←	←	←	←
14. V. CENTER		0～+127	+00	←	←	←	←	←	←	←

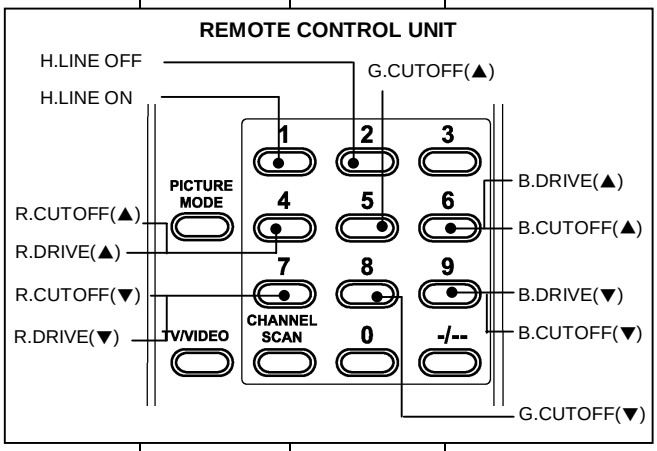
<table>
<tr><th>Item</th><th>Measuring instrument</th><th>Test point</th><th>Adjustment part</th><th>Description</th></tr>
<tr><td>Adjustment of WHITE BALANCE (Low light)</td><td>● Signal generator
● Remote control unit</td><td></td><td>1. CUT OFF (R)
CUT OFF (G)
CUT OFF (B)

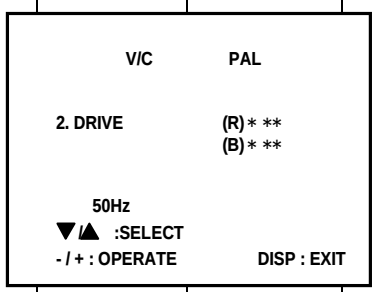
SCREEN VR (IN FBT)</td><td>1. Receive a black and white signal (colour off).
2. From the SERVICE MENU, selct 2. V/C.
3. Select 1. CUT OFF (R), (G) and (B), with MENU ▼/▲ key, and set each value to initial setting value with 4～9 keys of the remote control unit.
4. Press the 1 key of the remote control unit to produce a single horizontal line.
5. Turn the SCREEN VR fully counter-clockwise, then slowly turn it clockwise to where a red, blue and green colour is faintly visible.
6. Use keys 4～9 of the remote control unit and adjust the other 2 colours to where the single horizontal line appears white.
7. Turn the SCREEN VR to where the single horizontal line glows faintly.
8. Press the 2 key to return to 1. CUT OFF screen.
9. Press the DISPLAY key twice to return to the nomal screen.

<table><tr><th>Setting (Adjustment) item</th><th></th><th>Variable range</th><th>Initial setting value</th></tr><tr><td rowspan="3">1. CUT OFF</td><td>R</td><td>-128～+127</td><td>+00</td></tr><tr><td>G</td><td>-128～+127</td><td>+00</td></tr><tr><td>B</td><td>-128～+127</td><td>+00</td></tr></table></td></tr>
<tr><td>Adjustment of WHITE BALANCE (High light)</td><td>● Signal generator
● Remote control unit</td><td></td><td>2. DRIVE (R)
DRIVE (B)</td><td>1. Receive a black and white signal (colour off).
2. From the SERVICE MENU, selct 2. V/C.
3. Select 2. DRIVE (R) / (B) with MENU ▼/▲ keys, and set each value to initial setting value with 4 and 7 or 6 and 9 keys of the remote control unit.
4. Use the keys 4 and 7 or 6 and 9 to produce a white screen
5. Press the DISPLAY key twice to return to the nomal screen.

<table><tr><th>Setting (Adjustment) item</th><th></th><th>Variable range</th><th>Initial setting value</th></tr><tr><td rowspan="2">2. DRIVE</td><td>R</td><td>-128～+127</td><td>+00</td></tr><tr><td>B</td><td>-128～+127</td><td>+00</td></tr></table></td></tr>
</table>

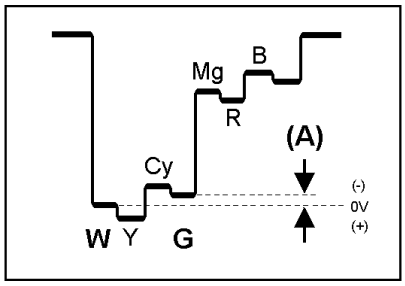




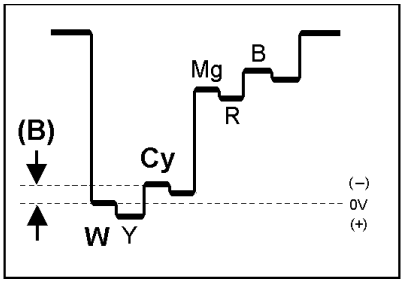


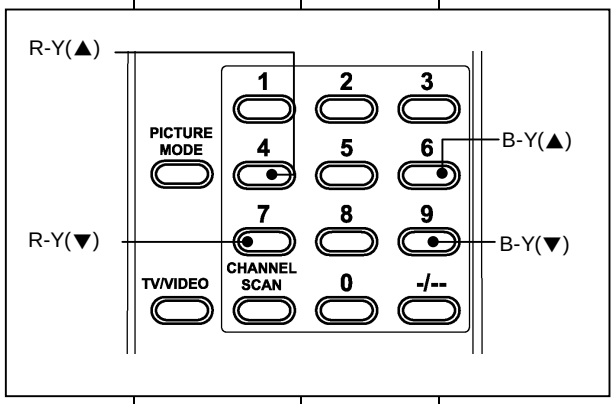
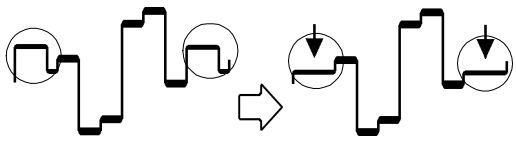
Item	Measuring instrument	Test point	Adjustment part	Description
Adjustment of SUB BRIGHT	● **Remote control unit**		**3. BRIGHT**	1. Receive any broadcast. 2. Select **2. V/C** from SERVICE MENU. 3. Select **3. BRIGHT** with the MENU ▼/▲ key. 4. Set the initial setting value with the MENU - or + key. 5. If the brightness is not the best with the initial set value, make fine adjustment until you get the best brightness.
Adjustment of SUB CONT.	● **Remote control unit**		**4. CONT.**	1. Receive any broadcast. 2. Select **2. V/C** from SERVICE MENU. 3. Select **4. CONT**. with the MENU ▼/▲ key. 4. Set the initial setting value with the MENU - or + key. 5. If the contrast is not the best with the initial set value, make fine adjustment until you get the best contrast.
Adjustment of SUB COLOUR	● **Remote control unit**		**5. COLOUR**	**[Method of adjustment without measuring instrument]**
			PAL COLOUR	**(PAL COLOUR)** 1. Receive a PAL broadcast. 2. Select **2. V/C** from the SERVICE MENU. 3. Select **5. COLOUR** with the MENU ▼/▲ key. 4. Set the initial setting value for PAL COLOUR with the MENU - or + key. **5.** If the colour is not the best with the initial set value, make fine adjustment until you get the best colour.
			SECAM COLOUR	**(SECAM COLOUR)** 1. Receive a SECAM broadcast. **2.** Make fine adjustment of SECAM COLOUR as previously.
			NTSC 3.58 COLOUR	**(NTSC 3.58 COLOUR)** 1. Recive a NTSC 3.58MHz broadcast. **2.** Make similar fine adjustment of NTSC 3.58 COLOUR as previously.
				(NTSC 4.43 COLOUR) When NTSC 3.58 is set, NTSC 4.43 will be automatically set at the respective values.

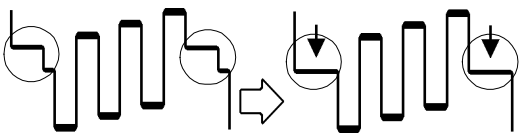
Item	Measuring instrument	Test point	Adjustment part	Description
Adjustment of SUB COLOUR Ⅱ	● **Signal generator** ● **Oscillo-scope** ● **Remote control unit**	**TP-47G** **TP-E (⏚)** **[CRT SOCKET PWB]**	**5. COLOUR**	**[Method of adjustment using measuring instrument]**
			PAL COLOUR	**(PAL COLOUR)** 1. Receive a PAL full field colour bar signal (75% white). 2. Select **2. V/C** from SERVICE MENU. 3. Select **5. COLOUR** with the MENU ▼/▲ key. 4. Set the initial setting value of PAL COLOUR with the MENU - or + key. 5. Connect the oscilloscope between TP-47G and TP-E. 6. Adjust PAL COLOUR and bring the value of **(A)** in the illustration to +11V (W & G).
			SECAM COLOUR	**(SECAM COLOUR)** 1. Receive a SECAM full field colour bar signal (75% white). 2. Set the initial setting value of SECAM COLOUR with the MENU - or + key. 3. Adjust SECAM COLOUR and bring the value of **(A)** in the illustration to +5V (W & G).
			NTSC 3.58 COLOUR	**(NTSC 3.58 COLOUR)** 1. Receive a NTSC 3.58 full field colour bar signal (75% white). 2. Set the initial setting value of NTSC 3.58 COLOUR with the MENU - or + key. 3. Adjust NTSC 3.58 COLOUR and bring the value of **(A)** in the illustration to +12V (W & G).
				(NTSC 4.43 COLOUR) When NTSC 3.58 is set, NTSC 4.43 will be automatically set at the respective values.



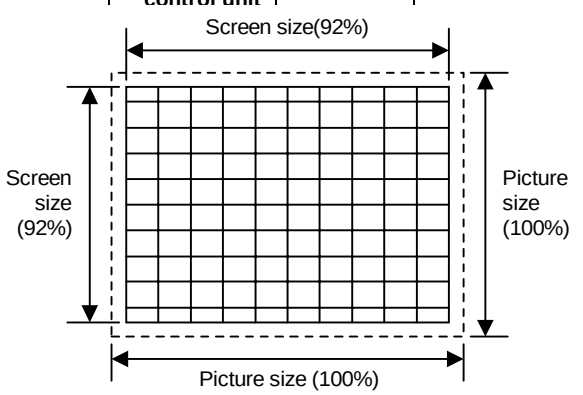
Item	Measuring instrument	Test point	Adjustment part	Description
Adjustment of TINT Ⅰ	● **Remote control unit**		**6. TINT**	**[Method of adjustment without measuring instrument]**
			NTSC 3.58 TINT	**(NTSC 3.58 TINT)** 1. Receive a NTSC 3.58 colour bar signal (full field colour bar 75% white). 2. Select **2. V/C** from SERVICE MENU. 3. Select **6. TINT** with the MENU ▼/▲ key. 4. Set the initial setting value of NTSC 3.58 with the MENU - or + key. 5. If you cannot get the best tint with the initial setting value, make fine adjustment until you get the best tint.
				(NTSC 4.43 COLOUR) When NTSC 3.58 is set, NTSC 4.43 will be automatically set at the respective values.
Adjustment of TINT Ⅱ	● **Signal generator** ● **Oscillo-scope** ● **Remote control unit**	**TP-47G TP-E (⏚) [CRT SOCKET PWB]**	**6. TINT**	**[Method of adjustment using measuring instrument]**
			NTSC 3.58 TINT	**(NTSC 3.58 TINT)** 1. Receive a NTSC 3.58 colour bar signal (full field colour bar 75% white). 2. Select **2. V/C** from SERVICE MENU. 3. Select **6. TINT** with the MENU ▼/▲ key. 4. Set the initial setting value of NTSC 3.58 with the MENU - or + key. 5. Connect the oscilloscope between TP-47G and TP-E. **6.** Adjust NTSC 3.58 TINT to bring the value of **(B)** in the illustration to +11V (W & Cy).
				(NTSC 4.43 TINT) When NTSC 3.58 is set, NTSC 4.43 will be automatically set at the respective values.

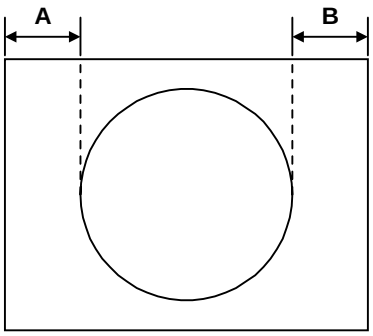


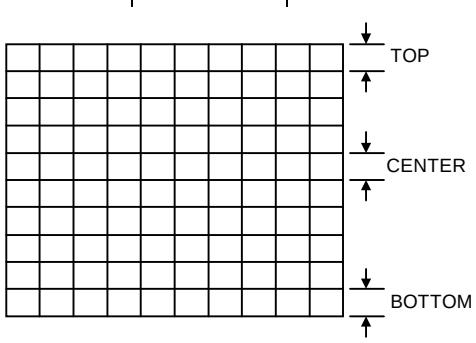
<table>
<tr><th>Item</th><th>Measuring instrument</th><th>Test point</th><th>Adjustment part</th><th>Description</th></tr>
<tr><td rowspan="2">Adjustment of BLACK OFFSET-Ⅰ (SECAM)</td><td rowspan="2">● Remote control unit</td><td rowspan="2"></td><td></td><td>[Method of adjustment without measuring instrument]</td></tr>
<tr><td>7. BLACK OFFSET
(R-Y)
(B-Y)
 
</td><td>1. Receive a SECAM broadcast.
2. Select 2. V/C from SERVICE MENU.
3. Select 7. BLACK OFFSET with the MENU ▼/▲ key.
4. Set the initial setting value for BLACK OFFSET (R-Y) and (B-Y) with 4 and 7 or 6 and 9 keys of the remote control.
5. If the picture is not the best with the initial setting value, make fine adjustment until you get the best picture.
6. Press the DISPLAY key twice to return to the normal screen.</td></tr>
<tr><td rowspan="2">Adjustment of BLACK OFFSET-Ⅱ (SECAM)</td><td rowspan="2">● Signal generator
● Oscillo-scope
● Remote control unit</td><td rowspan="2">35 PIN (R-Y)
36 PIN (B-Y)
IC 201 OF MAIN PWB</td><td></td><td>[Method of adjustment using measuring instrument]</td></tr>
<tr><td>7. BLACK OFFSET
(R-Y)
(B-Y)
[R-Y]
 

[B-Y]
 
</td><td>1. Receive a SECAM COLOUR bar signal (full field colour bar 75% white).
2. Select 2. V/C from SERVICE MENU.
3. Select 7. BLACK OFFSET with the ▼/▲ key.
4. Connect the oscilloscope between 35 pin of IC 201 and TP-E.
5. By using 4 and 7 keys of the remote control, adjust the BLACK OFFSET (R-Y) so that it becomes the waveform changes from (a) to (b) shown in the figure.
6. Connect the oscilloscope between 36 pin of IC 201 and TP-E.
7. By using 6 and 9 keys of the remote control, adjust the BLACK OFFSET (B-Y) so that it becomes the waveform changes from (c) to (d) shown in the figure.
8. If the picture is not the best with the adjusted picture, make fine adjustment until you get the best picture.
9. Press the DISPLAY key twice to return to the normal screen.</td></tr>
</table>

Item	Measuring instrument	Test point	Adjustment part	Description
Adjustment of V. HEIGHT	● **Signal generator** ● **Renote control unit**		**11. V. HEIGHT** **V. CENTER**	[fv : 50Hz mode] 1. Receive a cross-hatch signal. 2. Select **2. V/C** from SERVICE MENU. 3. Select the **V. CENTER SW** and switch it to be equal top and bottom. 4. Select **11. V. HEIGHT** with the MENU ▼/▲ key. 5. Set the initial setting value with the MENU - / + key. 6. Adjust **V. HEIGHT** and make the vertical screen size **92%** of the picture size with the MENU + / - keys of remote control unit.
Adjustment of H. CENTER	● **Signal generator** ● **Renote control unit**		**10. H. CENTER**	7. Receive a circle pattern signal. 8. Select **10. H. CENTER** with the MENU ▼/▲ key. 9. Set the initial setting value of **10. H. CENTER** with the MENU - / + key. 10. Adjust **10. H. CENTER** to make **A=B** with the MENU - / + key.
Adjustment of V.LIN & V.S-CR			**12. V. LIN** **13. V. S- CR**	● **When the vertical linearity has been deteriorated remarkably, Perform the following steps.** 11. Receive a cross-hatch signal. 12. Select **12. V. LIN** with the MENU ▼/▲ key. 13. Set the initial setting value of **12. V. LIN** with the MENU - / + key. 14. Select **13. V. S-CR** with the MENU ▼/▲ key. 15. Set the initial setting value of **13. V. S-CR** with the MENU - / + key. 16. Adjust **12. V. LIN** and **13. V. S-CR** so that the spaces of each line on **TOP**, **CENTER** and **BOTTOM** become uniform.
				17. Make sure that the adjustment is properly done on the screen of 60Hz mode. **[NOTE]** ● Adjust to make both 50Hz & 60Hz are the same V. SIZE and fine straight line. ● When adjust again, adjust 50Hz mode first. ● When adjust in 60Hz mode, only 60Hz mode is adjust.

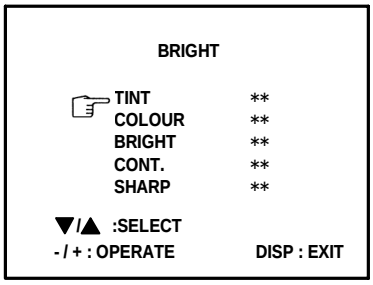






VSM ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
Setting of VSM PRESET	● **Remote control unit**		**TINT** **COLOUR** **BRIGHT** **CONT.** **SHARP**	(VSM PRESET) 1. Select **3. VSM PRESET** from the SERVICE MENU. 2. Select BRIGHT with the PICTURE MODE key. 3. Adjust the MENU ▼/▲ and MENU - or + key to bring the set values of **TINT ～ SHARP** to the values shown in the table. 4. Respectively select the VSM PRESET mode for SOFT and STANDARD, and make similar adjustment as in 3 above.



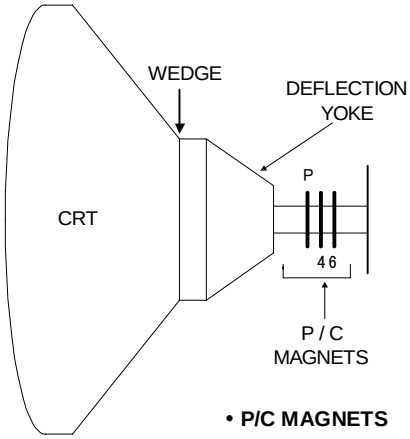
VSM preset mode / VSM Setting item	BRIGHT	STANDARD	SOFT
TINT SETTING VALUE	15	←	←
COLOUR SETTING VALUE	15	←	←
BRIGHT SETTING VALUE	15	←	←
CONT. SETTING VALUE	30	19	11
SHARP SETTING VALUE	15	←	12

SETTING VALUE OF VSM PRESET

PURITY / CONVERGENCE ADJUSTMENT

PURITY ADJUSTMENT

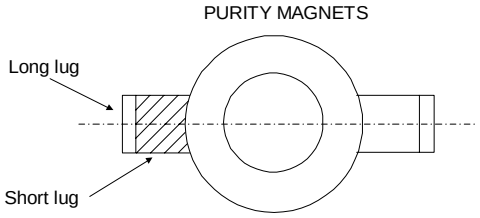
1. Demagnetize CRT with the demagnetizer.
2. Loosen the retainer screw of the deflection yoke.
3. Remove the wedges.
4. Input a green raster signal from the signal generator, and turn the screen to green raster.
5. Move the deflection yoke backward.
6. Bring the long lug of the purity magnets on the short lug and position them horizontally. (Fig.2)
7. Adjust the gap between two lugs so that the GREEN RASTER will come into the center of the screen. (Fig.3)
8. Move the deflection yoke forward, and fix the position of the deflection yoke so that the whole screen will become green.
9. Insert the wedge to the top side of the deflection yoke so that it will not move.
10. Input a crosshatch signal.
11. Verify that the screen is horizontal.
12. Input red and blue raster signals, and make sure that purity is properly adjusted.



• P/C MAGNETS

P : PURITY MAGNET
4 : 4 POLES (convergence magnets)
6 : 6 POLES (convergence magnets)

Fig.1



Bring the long lug over the short lug and position them horizontally.

Fig.2

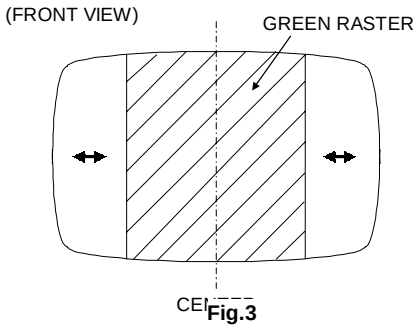


Fig.3

STATIC CONVERGENCE ADJUSTMENT

1. Input a crosshatch signal.
2. Using 4-pole convergence magnets, overlap the red and blue lines in the center of the screen (Fig.1) and turn them to magenta (red/blue).
3. Using 6-pole convergence magnets, overlap the magenta(red/blue) and green lines in the center of the screen and turn them to white.
4. Repeat 2 and 3 above, and make best convergence.

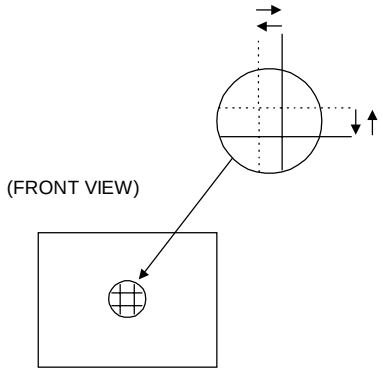


Fig.1

DYNAMIC CONVERGENCE ADJUSTMENT

1. Move the deflection yoke up and down and overlap the lines in the periphery. (Fig. 2)
2. Move the deflection yoke left to right and overlap the lines in the periphery. (Fig. 3)
3. Repeat 1 and 2 above, and make best convergence.

(FRONT VIEW)

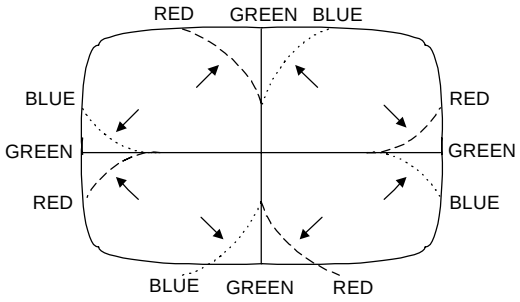


Fig.2

● After adjustment, fix the wedge at the original position.
Fasten the retainer screw of the deflection yoke.
Fix the 6 magnets with glue.

(FRONT VIEW)

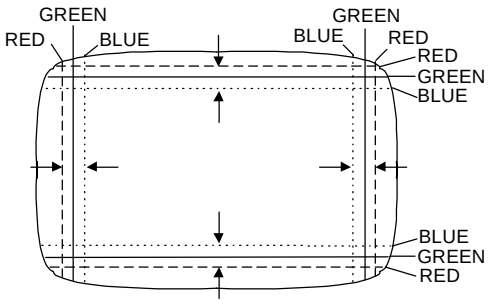


Fig.3

SELF CHECK FUNCTIONS

1. Outline

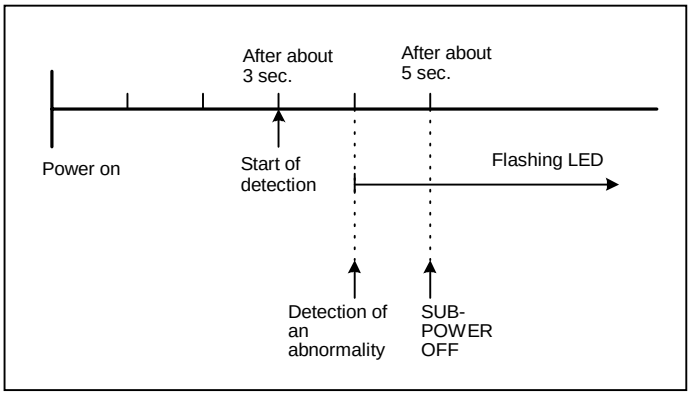
This model has self check functions given below. When an abnormality has been detected, the SUB POWER is turned off and the LED flashes to inform of the failure. An abnormality is detected by the signal input state of the control line connected to the microcomputer.

2. Self check items

Check item	Details of detection	Method of detection	State of abnormality
Over-current protection	An over-current on the LOW B line is detected.	The main microcomputer detects the possible abnormality at 30-msec. intervals and judges the results in every 16 time. Of the 16 times, if NG is detected more than 9 times, it is judged that there is an abnormality	When an abnormality has been detected, the SUB-POWER is turned off. While the SUB-POWER is being turned off, the power key of the remote controller is not operational until the power code is taken out and put in again.
CRT NECK protection	Operation of Vertical deflection circuit.	DITTO	DITTO
X-ray protection	Operation of X-ray protection circuit	DITTO	DITTO

3. Self check indicating function

At about 3 seconds after the power is turned on, the self-check function starts.
In the case where an abnormality has been detected within the subsequent 2 seconds, the LED flashes, but the SUB-POWER is not turned off.
When an abnormality has been detected at about 5 seconds after the power is turned on, the SUB POWER is turned off immediately and the LED flashes.



[Indication by LED]

Item	LED flashing intervals	Priority of detection
① Over-current protection	At 0.25-second intervals	1
② CRT NECK protection / X-ray protection	At 0.5-second intervals	2

Note : In case of ① + ②, the item ① is indicated

[NOTE]

X-RAY : There are two different types of models with and without X-RAY PROTECTION.

LED : There are two kinds of LEDs — OFF TIMER LED and ECO LED. In the models equipped with OFF TIMER LED and ECO LED, both LEDs flash (turn on and off) simultaneously. In the models with one of the above LEDs, the LED flashes.

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