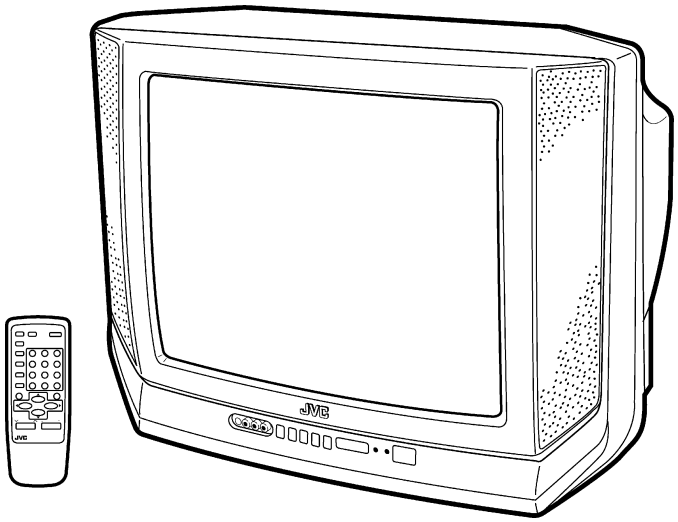
JVC

SERVICE MANUAL

COLOR TELEVISION

BASIC CHASSIS
GA2

AV-T2122/AR



CONTENTS

No.51866
Sept. 2001

SPECIFICATIONS

Items	Contents
Dimensions (W × H × D)	61.9cm × 45.8cm × 48.7cm
Mass	22.0kg
TV RF System	CCIR (M)&(N)
Color/ Sound System	NTSC-M / PAL-M / PAL-N MTS (Multi Channel Sound)
TV Receiving Channels and Frequency **VL Band** **VH Band** **UHF Band**	 (02～06) 55.25MHz～83.25MHz (07～13) 175.25MHz～211.25MHz (14～69) 471.25MHz～801.25MHz
CATV Receiving Channels and Frequency **Low Band** **High Band** **Mid Band** **Super Band** **Hyper Band** **Ultra Band** **Sub Mid Band**	(02～06) (07～13) (14～22) (23～36) (37～64) (65～94, 100～125) (01, 96～99) (55.25MHz～799.25MHz)
TV/CATV Total Channel	181 Channels
Intermediate Frequency **Video IF Carrier** **Sound IF Carrier** **Color Sub Carrier**	 45.75MHz 41.25MHz (4.5MHz) NTSC-M : 3.579545MHz PAL-M : 3.57561149MHz PAL-N : 3.58205625MHz
Antenna terminal	75Ω (VHF/UHF) Terminal, F-Type Connector
Power Input	Rated Voltage : 120V～240V AC, 50Hz/60Hz Operating Voltage : 90V～260V AC, 50Hz/60Hz
Power Consumption	87W (max.) / 63W (Avg.)
Picture Tube	Visible size: 51 cm measured diagonally
High Voltage (at zero been current)	26.5kV±1.0kV
Speaker	6 × 12cm oval type × 2
Audio Power Output	1.5W＋1.5W (Stereo)
Input **Video input** **Audio input**	(Front / Rear) 1Vp-p 75Ω (RCA pin jack) 500mVrms (-4dBs),High Impedance (RCA pin jack)
Variable Audio Output	More then 0～1550mVrms (+6dBs) Low Impedance (400Hz when modulated 100%) (RCA pin jack)
Headphone Jack / Earphone Jack	3.5mm stereo mini jack (Headphone Jack)
Remote Control Unit	RM-C373 (AA/R6/UM-3 battery × 2)

Design & specification 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.

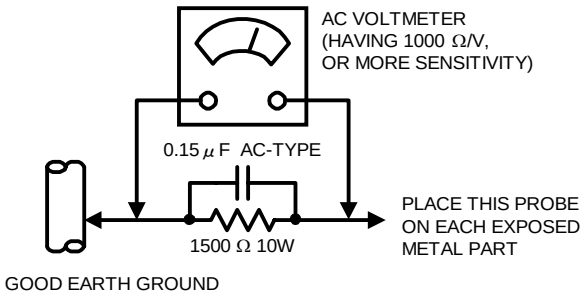
8. When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the manufacturer's replacement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

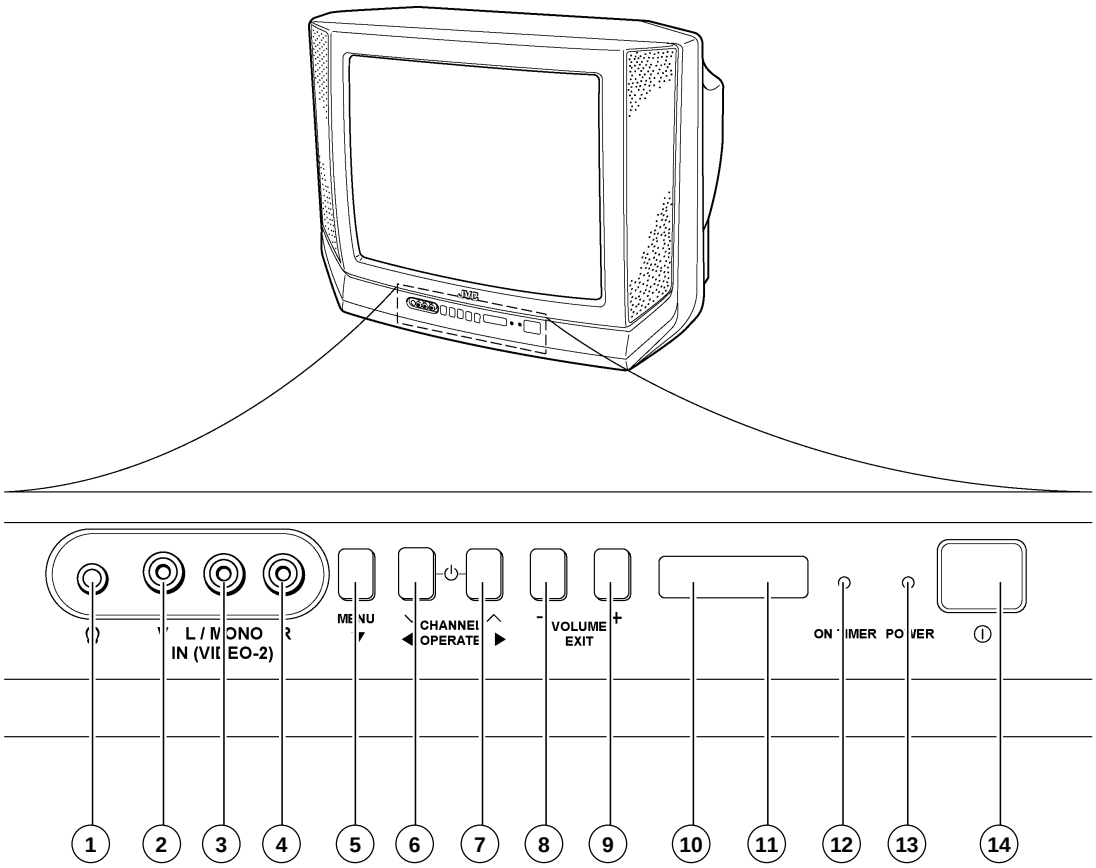


FEATURES

- New chassis design enables use of a main board with simplified circuitry.
- Provided with miniature tuner (TV/CATV).
- PLL synthesizer system TV/CATV totaling 181 channels.
- Multifunctional remote control permits picture adjustment.
- With AUDIO. VIDEO INPUT terminal.
- Adoption of the VIDEO STATUS function.
- Adoption of the ON/OFF TIMER function.
- With 75Ω V/U in common (F-Type) ANT Terminal.
- SLEEP TIMER for setting in real time.
- Wide range voltage (90V～260V) AC power input.
- Variable audio output terminal.

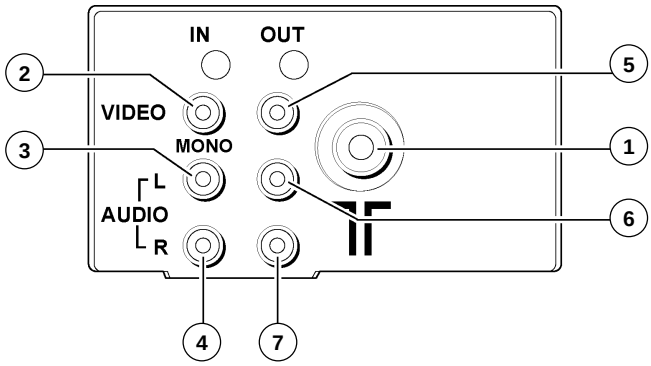
FUNCTIONS

■Front control



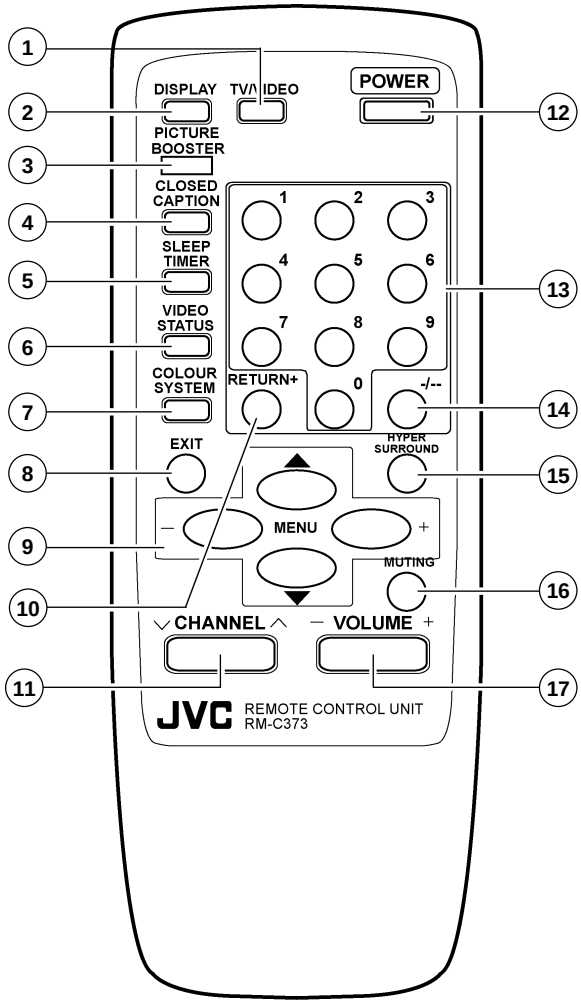
①	HEADPHONE JACK Teminal	⑧	VOLUME - Buttom
②	VIDEO INPUT Teminal	⑨	VOLUME + Buttom
③	AUDIO L INPUT Teminal	⑩	ECO sensor
④	AUDIO R INPUT Teminal	⑪	Remote control sensor
⑤	MENU Button	⑫	ON TIMER lamp
⑥	CHANNEL ∨Button	⑬	POWER lamp
⑦	CHANNEL ∧Button	⑭	MAIN POWER SW Button

■Rear terminal



①	ANT Terminal
②	VIDEO INPUT Terminal
③	AUDIO L INPUT Terminal
④	AUDIO R INPUT Terminal
⑤	VIDEO OUTPUT Terminal
⑥	AUDIO L OUTPUT Terminal
⑦	AUDIO R OUTPUT Terminal

■Remote control unit (RM-C373)



①	TV / VIDEO key
②	DISPLAY key
③	PICTURE BOOSTER key
④	CLOSED CAPTION key
⑤	SLEEP TIMER key
⑥	VIDEO STATUS key
⑦	COLOUR SYSTEM key
⑧	EXIT key
⑨	MENU (▲/▼& +/-)key
⑩	RETURN+ key
⑪	CHANNEL key
⑫	POWER key
⑬	Number (CH.) key
⑭	- /- - key
⑮	HYPER SURROUND key
⑯	MUTING key
⑰	VOLUME key

SPECIFIC SERVICE INSTRUCTIONS

DISASSEMBLY PROCEDURE

REMOVING THE REAR COVER

1. Unplug the power supply cord.
2. Remove the 6 screws marked Ⓐ and 2 screws marked Ⓑ .
3. Withdraw the rear cover toward you.

REMOVING THE MAIN PW BOARD

- After removing the rear cover.

1. Slightly raise both sides of the MAIN PW Board by hand and withdraw it backward.
   (If necessary, take off the wire clamp and connectors, etc.)

REMOVING THE SPEAKER

- After removing the rear cover.

1. Remove the 2 screws marked Ⓒ .
2. Follow the same step for removing the other hand speaker.

CHECKING THE MAIN PW BOARD

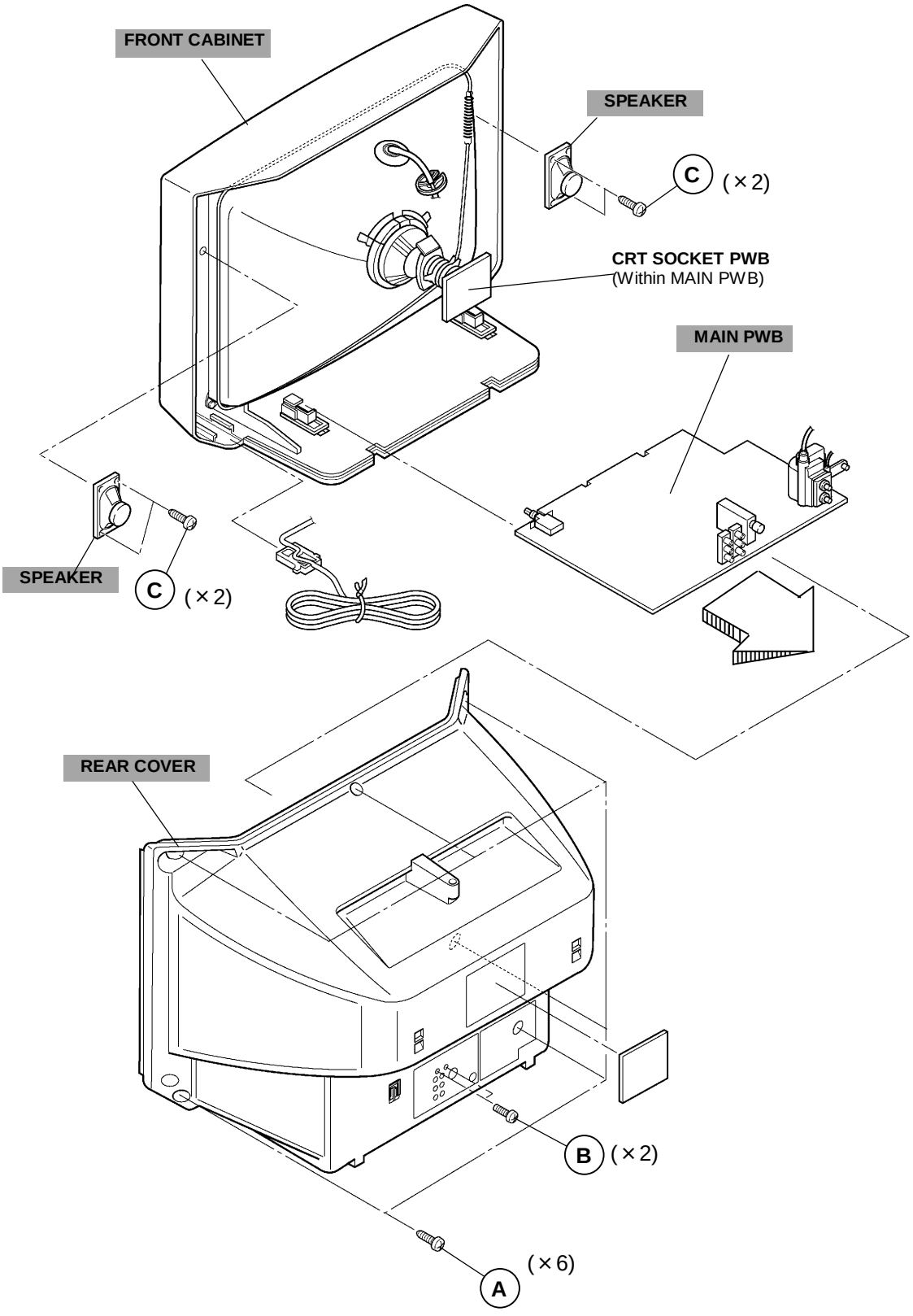
1. To check the backside of the MAIN PW Board.
   1) Pull out the MAIN PW Board. (Refer to REMOVING THE MAIN PWB).
   2) Erect the chassis vertically so that you can easily check the backside of the MAIN PW Board.

[CAUTION]

- When erecting the MAIN PW Board, be careful so that there will be no contacting with other PW Board.
- Before turning on power, make sure that all connectors are properly connected.

WIRE CLAMPING AND CABLE TYING

1. Be sure 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.

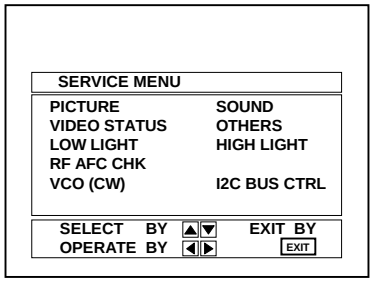
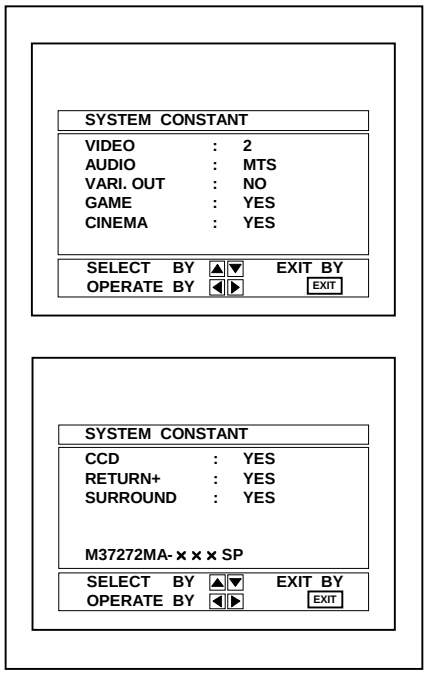

FRONT CABINET
SPEAKER
C
(× 2)
CRT SOCKET PWB
(Within MAIN PWB)
MAIN PWB
SPEAKER
C
(× 2)
REAR COVER
B
(× 2)
(× 6)
A

MEMORY IC REPLACEMENT

1. Memory IC

This model uses a memory IC.
The memory IC stores data for proper operation of video and deflection circuits.
When replacing, be sure to use an IC containing this (initial value) data.

2. Memory IC replacement procedure

PROCEDURE	SCREEN DISPLAY
(1) **Power off** Switch off the power and disconnect the power cord from the wall outlet.	
(2) **Replace the memory IC**. Be sure to use memory ICs written with the initial data values.	
(3) **Power on** Connect the power cord to the wall outlet and switch on the power.	
(4) **System constant check and setting** 1) Simultaneously press the DISPLAY key and VIDEO STATUS key of the remote control unit. 2) The SERVICE MENU screen of Fig.1 is displayed. 3) While the SERVICE MENU is displayed, again simultaneously press the DISPLAY and VIDEO STATUS keys to display the Fig.2 SYSTEM CONSTANT screen. 4) Refer to the SYSTEM CONSTANT table and check the setting items. Where these differ, select the setting item with the MENU UP / DOWN key and adjust the setting with the MENU LEFT / RIGHT keys. (The letters of the selected item are displayed in yellow.) 5) After adjusting, release the MENU LEFT / RIGHT key to store the setting value. 6) Press the EXIT key twice to return the normal screen.	 Fig.1
(5) **Receive channel setting** Refer to the OPERATING INSTRUCTIONS (USER'S GUIDE) and set the receive channels (Channels Preset) as described.	 Fig.2
(6) **User settings** Check the user setting items according to Table 2-1 and 2-2. Where these do not agree, refer to the OPERATING INSTRUCTIONS (USER'S GUIDE) and set the items as described.	
(7) **SERVICE MENU setting** Verify what to set in the SERVICE MENU, and set whatever is necessary. (Fig.1) Refer to the SERVICE ADJUSTMENT for setting.	

SETTING OF SYSTEM CONSTANT SET

Setting item	Setting content	Setting value
VIDEO	1 → 2	2
AUDIO	MONO → PH.MONO → MTS	MTS
VARI. OUT	YES → NO	NO
GAME	YES → NO	YES
CINEMA	YES → NO	YES
CCD	YES → NO	YES
RETURN +	YES → NO	YES
SURROUND	YES → NO	YES

Table 1

USER SETTING VALUES

1.Setting of FUNCTION

Setting item	Setting value	Setting item	Setting value
MAIN POWER	OFF	DISPLAY	OFF
SUB POWER	ON	SLEEP TIMER	0 MIN
CHANNEL	CH 02	VIDEO STATUS	ESTANDAR
CAPTION	OFF(CC1/T1)	PICTURE BOOSTER	OFF
VOLUME	10	COLOR SYSTEM	AUTO
TV/VIDEO	TV	HYPER SURROUND	OFF

Table 2-1

2.Setting of MENU

Setting item	Setting value	Setting item	Setting value
TINTE	ESTANDAR	ALTAVOCES	SI
COLOR	ESTANDAR	CHILD LOCK	NO
CONTRASTE	ESTANDAR	TEMPORIZADOR	NO
BRILLO	ESTANDAR	LISTA DE CANAIS	SET OPTIONALLY
DETALLE	ESTANDAR	AJUSTE CODIGO DE ACCESO	Unnecessary to Set
GRAVES	CENTER	PANTALLA AZUL	NO
AGUDOS	CENTER	FONDO NEGRO	SI (SIM)
BALANCE	CENTER	IDIOMA	ESP.
MTS	ESTÉREO	SUBTITULOS OCULTOS	NO(CC1/T1)

Table 2-2

SERVICE ADJUSTMENTS

ADJUSTMENT PREPARATION:

1. **You can make the necessary adjustments for this unit with either the remote control unit or with the adjustment equipment 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 the 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.

VIDEO STATUS	ESTANDAR
GRAVES, AGUDOS, BALANCE	CENTER

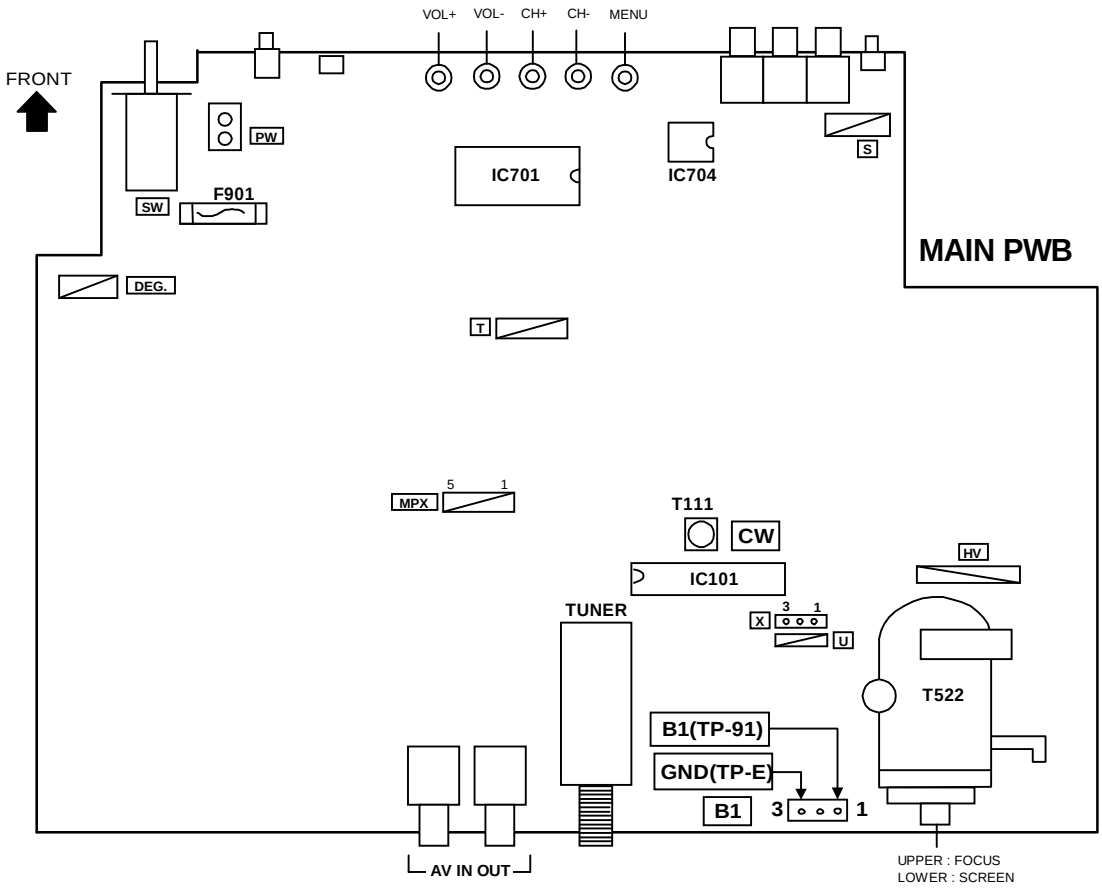
ADJUSTMENT EQUIPMENT

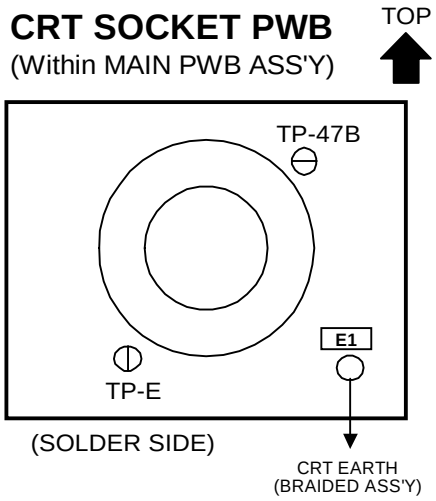
1. DC voltmeter(or digital voltmeter)
2. Oscilloscope
3. Signal generator (Pattern generator) [NTSC–M] [PAL-M] [PAL-N]
4. Remote control unit
5. TV audio multiplex signal generator
6. Frequency counter

ADJUSTMENT ITEMS

●B1 POWER SUPPLY
●IF VCO adjustment
●RF AGC adjustment
●FOCUS adjustment
●DEFLECTION adjustment
  V. HEIGHT, V. POSITION, V. LIN., V S CR adjustment
  H. POSITION adjustment
●VIDEO / CHROMA adjustment
  WHITE BALANCE (Low light) adjustment
  WHITE BALANCE (High light) adjustment
  SUB BRIGHT adjustment
  SUB CONTRAST adjustment
  SUB COLOR adjustment
  SUB TINT adjustment
●MTS adjustment
  INPUT LEVEL adjustment
  STEREO VCO adjustment
  SAP VCO adjustment
  FILTER check
  SEPARATION adjustment

ADJUSTMENT LOCATIONS





BASIC OPERATION OF SERVICE MENU

1. Operate the SERVICE MENU with the REMOTE CONTROL UNIT.

2. In general basic setting (adjustments) items or verifications are performed in the SERVICE MENU.

(1) PICTURE ····· This set the setting values (adjustment values) of the VIDEO/CHROMA and DEFLECTION circuits.
(2) SOUND ····· This set the setting values (adjustment values) of the AUDIO circuit.
(3) VIDEO STATUS ····· This is used when the THEATER and GAME MODE is adjusted.
(4) OTHERS ····· This is used when the OTHERS MODE is adjusted.
(5) LOW LIGHT····· This sets the setting values (adjustment values) of the WHITE BALANCE circuit.
(6) HIGH LIGHT ····· This sets the setting values (adjustment values) of the WHITE BALANCE circuit.
(7) RF AFC CHK····· This is used when the RF AFC CHK MODE is verified. **[Do not adjust]**
(8) VCO (CW) ····· This is used when the IF VCO is adjusted.
(9) I^2C BUS CTRL····· This is used when ON/OFF of the I^2C BUS CTRL is set. **[Fixed ON]**

3. Basic Operations of the SERVICE MENU

(1) How to enter the SERVICE MENU.

Press the DISPLAY key and VIDEO STATUS key of the remote control unit at the same time to enter the SERVICE MENU screen ① shown in figure page later.

(2) SERVICE MENU screen selection

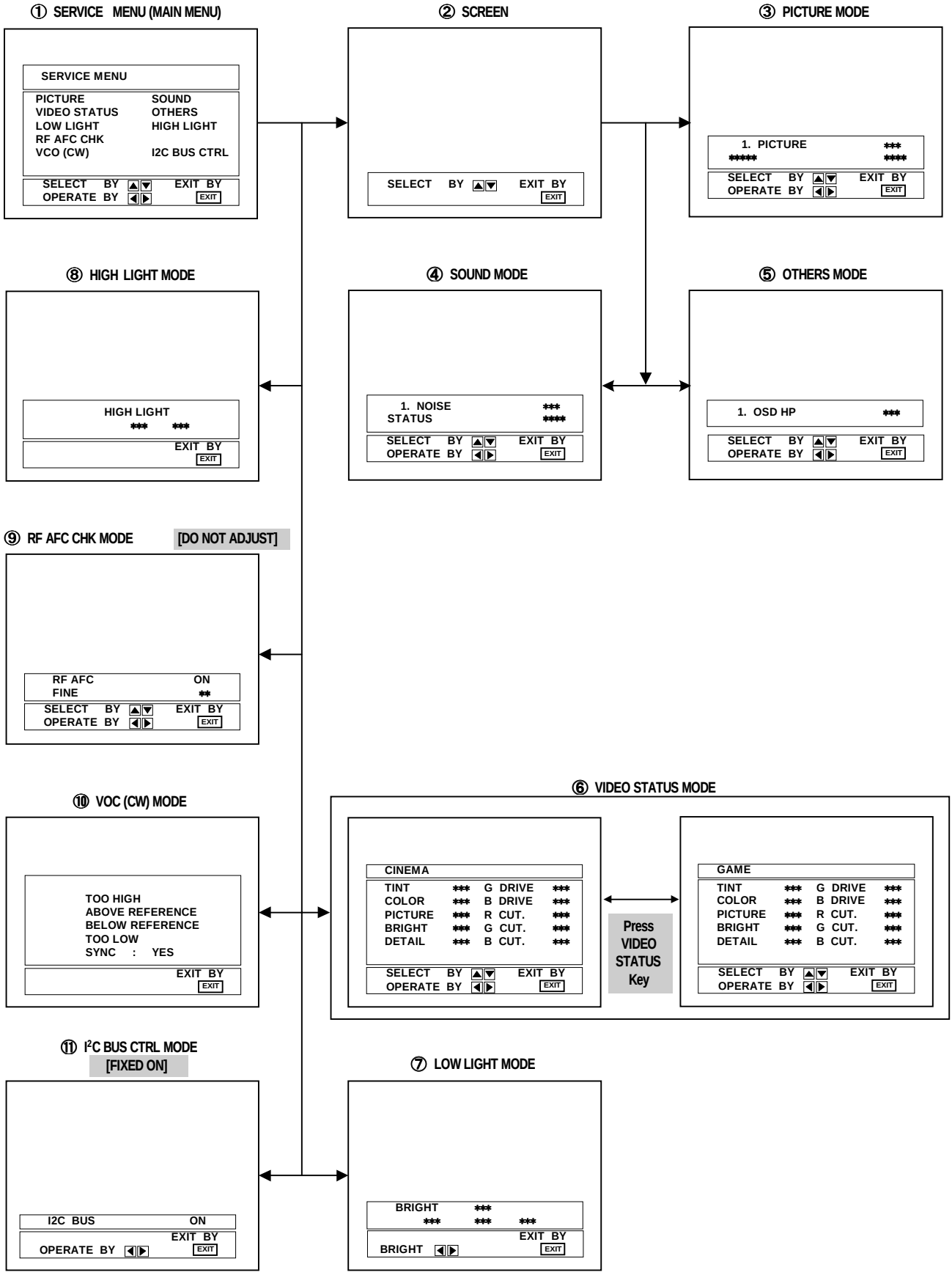
Press the UP / DOWN key of the MENU to select any of the following items.
(The letters of the selected items are displayed in yellow.)

- PICTURE
- SOUND
- VIDEO STATUS
- OTHERS
- LOW LIGHT
- HIGH LIGHT
- RF AFC CHK
- VCO (CW)
- I^2C BUS CTRL

(3) Enter the any setting (adjustment) mode

- **PICTURE, SOUND and OTHERS mode**
  1) If select any of PICTURE, SOUND or OTHERS items, and the LEFT / RIGHT key is pressed from SERVICE MENU (MAIN MENU), the screen ② will be displayed as shown in figure page later.
  2) Then the UP / DOWN key is pressed, the PICTURE mode screen ③ or the SOUND mode screen ④ or the OTHERS mode screen ⑤ is displayed, and the PICTURE, SOUND or OTHERS setting can be performed.

- **VIDEO STATUS, LOW LIGHT, HIGH LIGHT, RF AFC CHK, VCO (CW) and I^2C BUS CTRL mode**
  1) If select any of VIDEO STATUS / LOW LIGHT / HIGH LIGHT / RF AFC CHK / VCO (CW) / I2C BUS CTRL items, and the LEFT / RIGHT key is pressed from SERVICE MENU (MAIN MENU), the screens ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ will be displayed as shown in figure page later.
  2) Then the settings or verifications can be performed.


① SERVICE MENU (MAIN MENU)
SERVICE MENU
PICTURE
SOUND
VIDEO STATUS
OTHERS
LOW LIGHT
HIGH LIGHT
RF AFC CHK
VCO (CW)
I2C BUS CTRL
SELECT BY
EXIT BY
OPERATE BY
EXIT
② SCREEN
SELECT BY
EXIT BY
EXIT
③ PICTURE MODE
1. PICTURE
SELECT BY
EXIT BY
OPERATE BY
EXIT
⑧ HIGH LIGHT MODE
HIGH LIGHT
EXIT BY
EXIT
④ SOUND MODE
1. NOISE
STATUS
SELECT BY
EXIT BY
OPERATE BY
EXIT
⑤ OTHERS MODE
1. OSD HP
SELECT BY
EXIT BY
OPERATE BY
EXIT
⑨ RF AFC CHK MODE
[DO NOT ADJUST]
RF AFC
ON
FINE
SELECT BY
EXIT BY
OPERATE BY
EXIT
⑥ VIDEO STATUS MODE
CINEMA
TINT
G DRIVE
COLOR
B DRIVE
PICTURE
R CUT.
BRIGHT
G CUT.
DETAIL
B CUT.
SELECT BY
EXIT BY
OPERATE BY
EXIT
Press VIDEO STATUS Key
GAME
TINT
G DRIVE
COLOR
B DRIVE
PICTURE
R CUT.
BRIGHT
G CUT.
DETAIL
B CUT.
SELECT BY
EXIT BY
OPERATE BY
EXIT
⑩ VOC (CW) MODE
TOO HIGH
ABOVE REFERENCE
BELOW REFERENCE
TOO LOW
SYNC : YES
EXIT BY
EXIT
⑪ I²C BUS CTRL MODE
[FIXED ON]
I2C BUS
ON
EXIT BY
OPERATE BY
EXIT
⑦ LOW LIGHT MODE
BRIGHT
EXIT BY
BRIGHT
EXIT

(4) Setting method

1) UP / DOWN key of the MENU
   Select the SETTING ITEM.

2) LEFT / RIGHT key of the MENU
   Setting (adjust) the SETTING VALUE of the SETTING ITEM.
   When the key is released the SETTING VALUE will be stored (memorized).

3) EXIT key
   Returns to the previous screen.

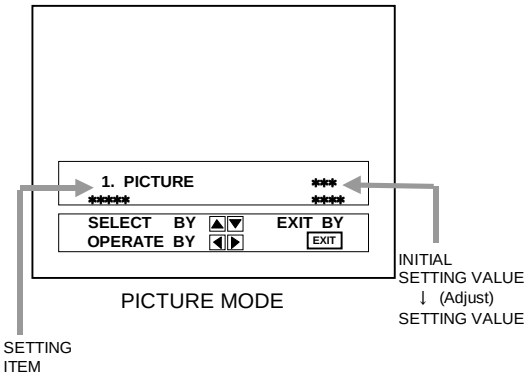
[NOTE] (PICTURE MODE ONLY)
When the INITIAL SETTING VALUE is turned to yellow, you can adjust the values but you cannot adjust the values when it is turned to red.
(Because the signal conditions, etc. are not met.)

(5) Releasing SERVICE MENU

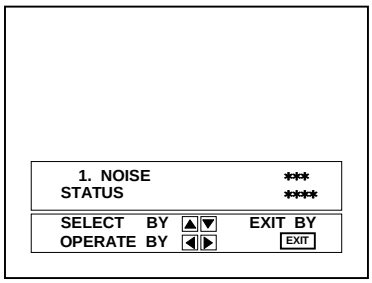
1) After returning to the SERVICE MENU upon completion of the setting (adjustment) work, press the EXIT key again.

★ The settings for LOW LIGHT and HIGH LIGHT are described in the WHITE BALANCE page of ADJUSTMENT.

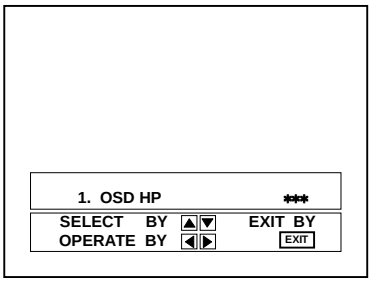
★ The setting for VCO (CW) are described in the IF VCO page of ADJUSTMENT.



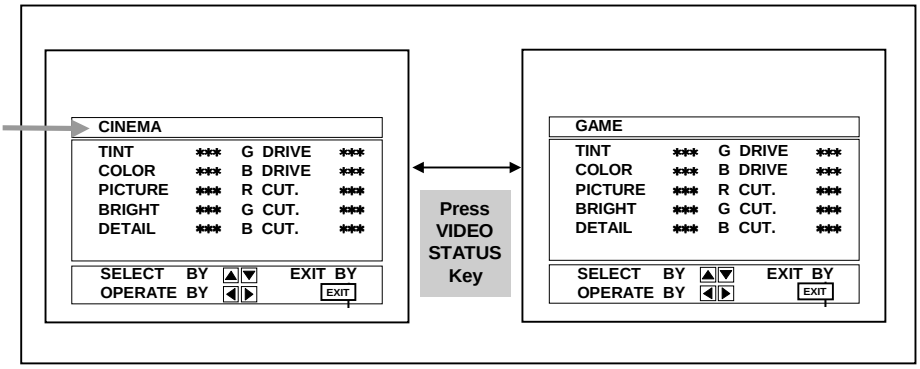
PICTURE MODE



SOUND MODE



OTHERS MODE



VIDEO STATUS MODE

INITIAL SETTING VALUE OF SERVICE MENU

1. Adjustment of the SERVICE MENU is made on the basis of the initial setting values; however, the new setting values which set the screen in its optimum condition may differ from the initial setting.
2. Do not change the initial Setting Values of the Setting (Adjustment) items not listed In "ADJUSTMENT".

● PICTURE MODE

✧ The four setting items in the video mode No.8 EXT PIC., No.9 EXT BRI., No.10 EXT COL. and No.11 EXT TINT are linked to the items in the TV MODE No.1 PICTURE, No.2 BRIGHT, No.5 COL. NTSC and No.6 TINT, respectively. When the setting items in the TV mode are adjusted, the values in the setting items in the video mode are revised automatically to the same values in the TV mode.(The initial setting values given in ( ) are off-set values.)

✧ When the four items (No.8, 9, 10 and 11) are adjusted in the video mode, the setting values in each item are revised independently.

No.	Setting item	Variable range	Initial setting value	No.	Setting item	Variable range	Initial setting value
1.	PICTURE	0～127	65	31.	C-TRAP	0 / 1	0
2.	BRIGHT	0～127	64	32.	C-TR. FO	0～3	2
3.	COL. PALM	0～127	70	33.	C-TRAP Q	0～3	0
4.	COL. PALN	0～127	70	34.	FIX B/W	0 / 1	0
5.	COL. NTSC	0～127	80	35.	APA P. FO	0～3	1
6.	TINT	0～127	65	36.	DC TRAN.	0～7	7
7.	TV DTL	0～63	38	37.	B. ST. SW	0～7	0
8.	EXT PIC.	±25	(0)	38.	B. ST. PO.	0 / 1	0
9.	EXT BRI.	±25	(+5)	39.	ABL GAIN	0～7	4
10.	EXT COL.	±25	(0)	40.	ABL PO	0～7	0
11.	EXT TINT	±25	+1	41.	HALF T.	0～2	1
12.	EXT DTL	0～63	35	42.	DRV G SW	0 / 1	0
13.	P/N KILL	0 / 1	1	43.	NT. COMB	0 / 1	1
14.	Y S CONT	0～31	31	44.	COIN DET	0～3	3
15.	TV Y-DL	0～7	1	45.	NOISE L	0～3	3
16.	EXT Y-DL	0～7	2	46.	VCD MODE	0 / 1	0
17.	WPL SW	0 / 1	0	47.	V AGC SP	0 / 1	0
18.	Y GAMMA	0 / 1	0	48.	H POS. 50	0～31	7
19.	P/N G P	0 / 1	0	49.	H BLK. 50	0～7	0
20.	COL. L SW	0 / 1	1	50.	V POS. 50	0～7	0
21.	COL. LMT.	0～3	1	51.	V SIZE50	0～127	87
22.	PN C. ATT	0～3	1	52.	V S CR50	0～127	28
23.	OFST. SW	0 / 1	0	53.	V LIN. 50	0～31	4
24.	OFSET. B-Y	0～15	8	54.	H POS. 60	0～31	12
25.	OFSET. R-Y	0～15	8	55.	H BLK. 60	0～7	0
26.	C-TOF SW	0 / 1	1	56.	V POS. 60	0～7	0
27.	TV T FO	0～3	1	57.	V SIZE60	0～127	88
28.	TV T Q	0～3	0	58.	V S CR60	0～127	48
29.	EXT T FO	0～3	0	59.	V LIN. 60	0～31	4
30.	EXT T Q	0～3	0	60.	RF AGC	0～255	160

● SOUND MODE

No.	Setting item	Variable range	Initial setting value
1.	NOISE	0 / 1	1
2.	IN LEVEL	0～63	20
3.	FH MON.	0 / 1	0
4.	ST VCO	0～63	25
5.	PILOT	0 / 1	0
6.	FILTER	0～63	30
7.	LOW SEP.	0～63	22
8.	HI SEP.	0～63	23
9.	5FH MON.	0 / 1	0
10.	SAP VCO	0～63	26
11.	IN GAIN	0 / 1	0
12.	FIL. OFF	±10	0

● VIDEO STATUS MODE

No.	Setting (Adjustment) item	Variable range	Initial setting value	
			CINEMA	GAME
1.	TINT	±20	0	0
2.	COLOR	±20	-3	-3
3.	PICTURE	±20	-10	-10
4.	BRIGHT	±20	0	0
5.	DETAIL	±15	0	-5
6.	G DRIVE	-99～+50	-22	0
7.	B DRIVE	-99～+50	-54	0
8.	R CUT.	±10	0	0
9.	G CUT.	±10	0	0
10.	B CUT	±10	0	0

● OTHERS MODE

No.	Setting (Adjustment) item	Variable range	Initial setting value
1.	OSD HP	0～31	23
2.	OSD VP	0～15	12
3.	H CK SW	0 / 1	0

● LOW LIGHT MODE

Setting (Adjustment) item	Variable range	Initial setting value
R CUTOFF	0～255	20
G CUTOFF	0～255	20
B CUTOFF	0～255	20

● HIGH LIGHT MODE

Setting (Adjustment) item	Variable range	Initial setting value
G DRIVE	0～255	128
B DRIVE	0～255	128

● RF AFC CHECK MODE

Setting (Adjustment) item	Variable range	Initial setting value
RF AFC	ON / OFF	ON **(DO NOT ADJUST)**
FINE	-77～+77	± ＊＊

● I^2C BUS CTRL MODE

Setting (Adjustment) item	Variable range	Initial setting value
I^2C BUS	ON / OFF	**[Fixed ON]**

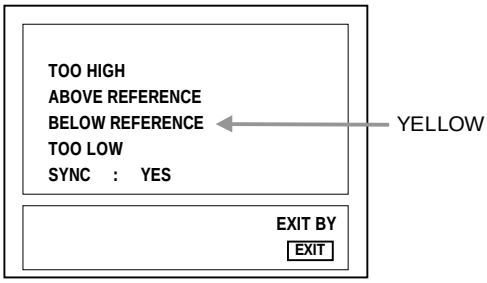
■ ADJUSTMENTS

B1 POWER SUPPLY

Item	Measuring instrument	Test point	Adjustment item	Description
Check of B1 POWER SUPPLY	**DC Voltmeter**	**B1 (B1 Connector 1 pin) (TP-91)** **TP-E(⏚) (B1 Connector 3 pin)**		1. Receive a black and white signal (color off). (NTSC) 2. Connect the DC voltmeter to B1 connector 1 pin (TP-91) and TP-E(⏚) (B1 connector 3 pin). 3. Confirm that the voltage is DC134.5V±2V.

IF VCO ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment item	Description
IF VCO adjustment	**Signal generator**		**CW TRANSF. (T111)** **[VCO (CW)] mode**	● **Under normal conditions, no adjustment is required.** 1. Receive a broadcast. (use channels without offset frequency). 2. Select the VCO(CW) mode from the SERVICE MENU. 3. Confirm the color change (yellow) from "TOO HIGH" to "TOO LOW" by CW TRANSF. and "SYNC : YES" being shown on the screen. Then, adjust CW TRANSF. until "BELOW REFERENCE" mark turns yellow and confirm again " SYNC : YES" being shown on the screen.



RF AGC ADJUSTMENT

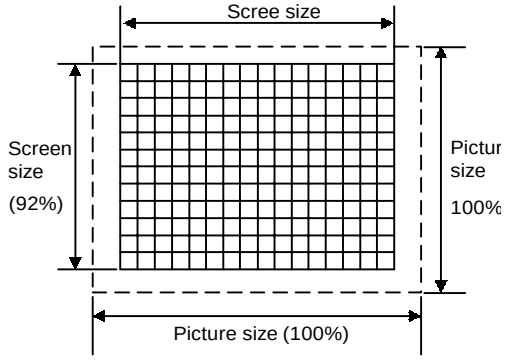
RF AGC adjustment			**No.60 RF AGC**	1. Receive a broadcast. 2. Select "No.60 RF AGC" of the PICTURE mode in SERVICE MENU. 3. Press the MUTE key and turn off color. 4. With the MENU LEFT key, get noise in the screen picture. (0 side of setting value) 5. Press the MENU RIGHT key and stop when noise disappears from the screen. 6. Change to other channels and make sure that there is no irregularity. 7. Press the MUTE key and get color out.

FOCUS ADJUSTMENT

FOCUS adjustment	**Signal generator**		**FOCUS VR [In HVT]**	1. Receive a crosshatch signal. 2. While looking at the screen, adjust FOCUS VR so that the vertical and horizontal lines will be clear and in fine detail. 3. Make sure that the picture is in focus even when the screen gets darkened.

DEFLECTION ADJUSTMENT

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.

Item	Measuring instrument	Test point	Adjustment item	Description
V. HEIGHT, V. POSITION, V. LIN. V. S CR adjustment	**Signal generator**		**No.56 V POS. 60** **No.57 V SIZE 60** **No.58 V S CR60** **No.59 V. LIN. 60**	**[60Hz]** 1. Receive a crosshatch signal.(NTSC or PAL-M) 2. Confirm that the value of PICTURE MODE "No.56 V POS. 60" is 0. 3. Confirm the initial setting value of the "No.57 V SIZE 60", No.58 V S CR60" and "No.59 V LIN. 60". 4. Adjust the vertical screen size to 92% with the PICTURE MODE "No.57 V SIZE60". 5. Adjust the PICTURE MODE "No.59 L LIN. 60" and "No.58 V S CR60" to get the best vertical linearity. NOTE : The PICTURE MODE "No.56 V POS. 60" is fixed on value 0.
			No.50 V POS.50 **No.51 V SISE 50** **No.52 V S CR50** **No.53 V LIN.50**	**[50Hz]** 1. Receive a crosshatch signal. (PAL-N) 2. Confirm the initial setting value of the "No.50 V POS.50", "No.51 V SIZE 50" , "No.52 V S CR 50" and "No.53 V LIN.50". 3. Adjust the vertical screen size to 92% with the PICTURE MODE "No.51 V SIZE50". 4. Adjust the PICTURE MODE "No.53 V LIN.50" and "No.52 V S CR50" to get the best vertical linearity. 5. Adjust the PICTURE MODE "No.50 V POS.50" so that the vertical center line comes close to the CRT vertical center as much as possible. ● Readjust V SIZE, V LIN., V S CR if necessary.
				
H. POSITION adjustment	**Signal generator**		**No.54 H POS.60**	**[60Hz]** 1. Receive a crosshatch signal. (NTSC or PAL-M) 2. Select the "No.54 H POS. 60" of the PICTURE mode in SERVICE MENU. 3. Confirm the initial setting value of the "No.54 H POS. 60". 4. Adjust the "No.54 H POS. 60" until the screen will be horizontally centered.
			No.48 H POS.50	**[50Hz]** 1. Receive a crosshatch signal. (PAL-N) 2. Select the "No.48 H POS. 50" of the PICTURE mode in SERVICE MENU. 3. Confirm the initial setting value of the "No.48 H POS. 50". 4. Adjust the "No.48 H POS. 50" until the screen will be horizontally centered.

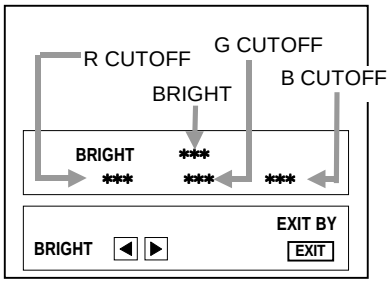
VIDEO / CHROMA ADJUSTMENT

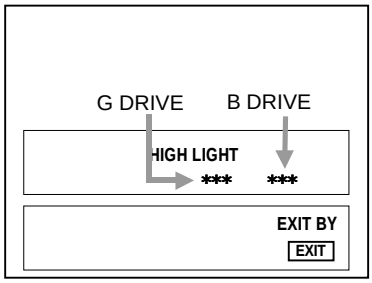
The setting (adjustment) using the REMOTE CONTROL UNIT is made on the basis of the initial setting values.
The setting values which adjust the screen to the optimum condition can be different from the initial setting values.
Do not change the initial setting values of the setting items not listed in "ADJUSTMENT".

<table>
<tr><th>Item</th><th>Measuring instrument</th><th>Test point</th><th>Adjustment item</th><th>Description</th></tr>
<tr><td>WHITE BALANCE (Low Light) adjustment</td><td>Signal generator
Remote control unit</td><td></td><td>BRIGHT

R CUTOFF
G CUTOFF
B CUTOFF

SCREEN VR</td><td>1. Receive a black and white signal (color off).
2. Select the LOW LIGHT mode from the SERVICE MENU.
3. Confirm the Initial setting value of "BRIGHT", "R CUTOFF", "G CUTOFF" and "B CUTOFF".
4. Display a single horizontal line by pressing the ① key of the remote control unit.
5. Turn the screen VR all the way to the left.
6. Turn the screen VR gradually to the right from the left until either one of the red, blue or green colors appears faintly.
7. Adjust the two colors which did not appear until the single horizontal line that is displayed becomes white using the ④ to ⑨ keys of the remote control unit.
8. Turn the screen VR until the single horizontal line is displayed faintly.
9. Press the ② key to return to the regular screen.

[LOW LIGHT] MODE
 
</td></tr>
<tr><td>WHITE BALANCE (High Light) adjustment</td><td>Signal generator
Remote control unit</td><td></td><td>G DRIVE
B DRIVE</td><td>1. Receive a black and white signal (color off).
2. Select the HIGH LIGHT mode in the SERVICE MENU.
3. Confirm the initial setting value of "G DRIVE" and "B DRIVE".
4. Adjust the screen color to white with the⑤, ⑥, ⑧ and ⑨ keys of the remote control unit.

[HIGH LIGHT] MODE
 
</td></tr>
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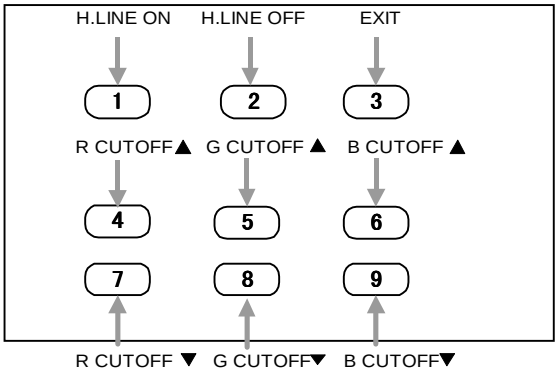
REMOTE CONTROL UNIT



Remote Control Unit

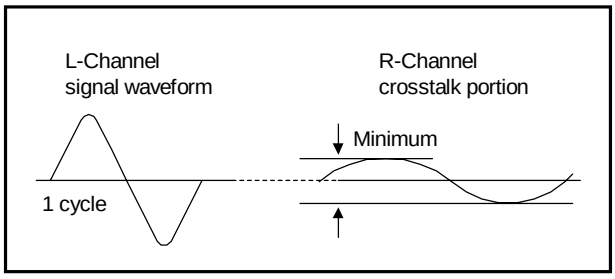
①key : H.LINE ON
②key : H.LINE OFF
③key : EXIT
⑤key : G DRIVE ▲
⑥key : B DRIVE ▲
⑧key : G DRIVE ▼
⑨key : B DRIVE ▼

Item	Measuring instrument	Test point	Adjustment item	Description
SUB BRIGHT adjustment	**Remote control unit**		**No.2 BRIGHT**	1. Receive a broadcast. 2. Select “No.2 BRIGHT” of the PICTURE mode in SERVICE MENU. 3. Confirm the initial setting value of the “No.2 BRIGHT” . 4. If the brightness is not the best with the initial setting value, make fine adjustment of the “No.2 BRIGHT” until you get the optimum brightness.
SUB CONTRAST adjustment	**Remote control unit**		**No.1 PICTURE**	1. Receive a broadcast. 2. Select “No.1 PICTURE” of the PICTURE mode in SERVICE MENU. 3. Confirm the initial setting value of the “No.1 PICTURE”. 4. If the contrast is not the best with the initial setting value, make fine adjustment of the “No.1 PICTURE” until you get the optimum contrast.
SUB COLOR adjustment	**Remote control unit**		**No.3 COL. PALM**	**[PAL-M]** 1. Receive a PAL-M color bar signal. 2. Select “No.3 COL. PALM” of the PICTURE mode in SERVICE MENU. 3. Confirm the initial setting value of the “No.3 COL. PALM”. 4. If the color is not the best with the initial setting value, make fine adjustment until you get the best color.
			No.4 COL. PALN	**[PAL-N]** 1. Receive a PAL-N color bar signal. 2. Select “No.4 COL. PALN” of the PICTURE mode in SERVICE MENU. 3. Confirm the initial setting value of the “No.4 COL. PALN”. 4. If the color is not the best with the initial setting value, make fine adjustment until you get the best color.
			No.5 COL. NTSC	**[NTSC]** 1. Receive a NTSC color bar signal. 2. Select “No.5 COL. NTSC” of the PICTURE mode in SERVICE MENU. 3. Confirm the initial setting value of the “No.5 COL. NTSC”. 4. If the color is not the best with the initial setting value, make fine adjustment until you get the best color.
SUB TINT adjustment	**Remote control unit**		**No. 6 TINT**	1. Receive a NTSC color bar signal. 2. Select “No. 6 TINT” of the PICTURE mode in SERVICE MENU. 3. Confirm the initial setting value of the “No. 6 TINT”. 4. If the tint is not the best with the initial setting value, make fine adjustment until you get the best tint.

MTS ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
INPUT LEVEL adjustment			**No.2 IN LEVEL**	1. Select the "No.2 IN LEVEL" of the SOUND mode in SERVICE MENU. 2. Verify that the "No.2 IN LEVEL" is set at its initial setting value.
STEREO VCO adjustment	**Signal generator** **Frequency counter**	**MPX Connector 2 pin TVR [MAIN PWB]**	**No.3 FH MON** **No.4 ST VCO**	1. Receive a NTSC RF signal (non modulated sound signal) from the antenna terminal. 2. Select the "No.3 FH MON" of SOUND mode in SERVICE MENU, change the setting value from 0 to 1. 3. Connect the frequency connector to pin 2 of MPX connector. 4. Select the "No.4 ST VCO". 5. Confirm the initial setting value of the "No.4 ST VCO". 6. Adjust the "No.4 ST VCO" so that the frequency counter will display 15.73kHz±0.1kHz. 7. Select the "No.3 FH MON" of the SOUND mode, and reset the setting value from 1 to 0.
SAP VCO adjustment	**Signal generator** **Frequency counter**	**MPX Connector 4 pin SDA 3 pin GND 2 pin TVR [MAIN PWB]**	**No.9 5FH MON.** **No.10 SAP VCO.**	1. Receive a NTSC RF signal (non modulated sound signal) from the antenna terminal. 2. Connect between pin 4 of MPX connector and GND (pin 3 of MPX connector) through 1MΩ resistor. 3. Select the "No.9 5FH MON." of the SOUND mode in SERVICE MENU, and reset the setting value from 0 to 1. 4. Connect the frequency connector to pin 2 (R.OUT) of MPX connector. 5. Select the "No.10 SAP VCO". 6. Confirm the initial setting value of "No.10 SAP VCO". 7. Adjust the "No.10 SAP VCO" so that the frequency connector will display 78.67kHz±0.5kHz. 8. Select the "No.9 5FH MON." of the SOUND mode, and reset the setting value from 1 to 0.
FILTER check			**No.6 FILTER**	1. Select the "No.6 FILTER" of the SOUND mode in SERVICE MENU. 2. Verify that the "No.6 FILTER" is set at its initial setting value.

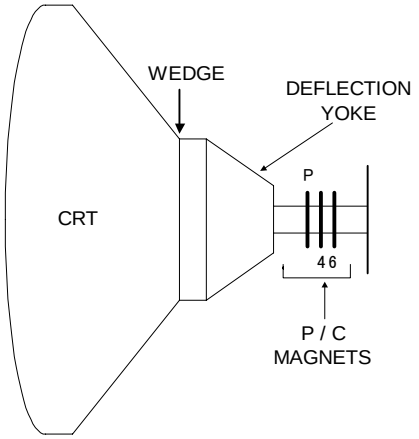
Item	Measuring instrument	Test point	Adjustment part	Description
SEPARATION adjustment	**TV audio multiplex signal generator** **Oscilloscope**	**MPX Connector** **1 pin TVL** **2 pin TVR** **[MAIN PWB]**	**No.7 LOW SEP.** **No.8 HI SEP.**	1. Input a stereo L signal (300Hz) from the TV Audio multiplex signal generator to the antenna terminal. (NTSC) 2. Connect an oscilloscope to pin 2 (R.OUT) of MPX connector, and display one cycle portion of the 300Hz signal. 3. Select the “No.7 LOW SEP.” of the SOUND mode in SERVICE MENU. 4. Confirm the initial setting value of the “No.7 LOW SEP.”. 5. Adjust the “No.7 LOW SEP.” so that the stroke element of the 300Hz signal will become minimum. 6. Change the connection of the oscilloscope to pin 1 (L.OUT) of MPX connector, and enlarge the voltage axis. 7. Change the signal to 3kHz, and similarly adjust the “No.8 HI SEP.”.



PURITY, CONVERGENCE

PURITY ADJUSTMENT

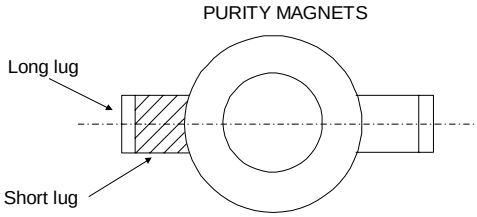
1. Demagnetize CRT with the demagnetizer.
2. Loosen the retainer screw of the deflection yoke.
3. Remove the wedges.
4. Input a green raster signal from the signal generator, and turn the screen to green raster.
5. Move the deflection yoke backward.
6. Bring the long lug of the purity magnets on the 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

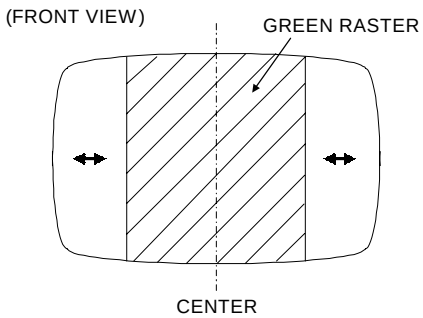


Fig.3

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.

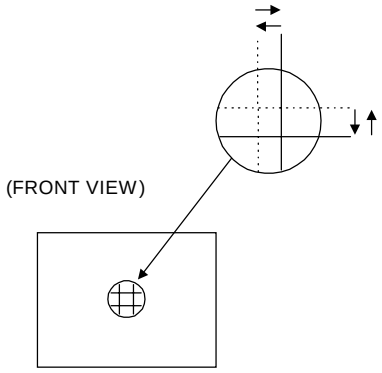


Fig.1

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)

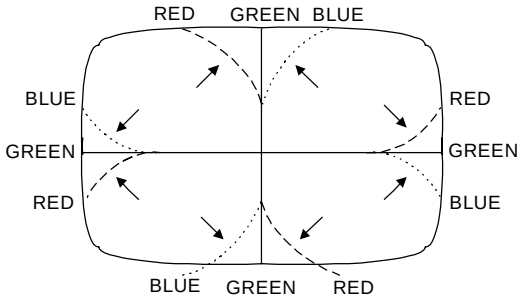


Fig.2

- 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)

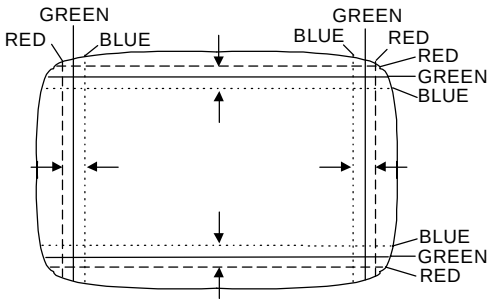


Fig.3

HOW TO CHECK THE HIGH VOLTAGE HOLD DOWN CIRCUIT

1. HIGH VOLTAGE HOLD DOWN CIRCUIT

After repairing the high voltage hold down circuit shown in Fig. 1.
This circuit shall be checked to operate correctly.

2. CHECKING OF THE HIGH VOLTAGE HOLD DOWN CIRCUIT

(1) Turn the POWER SW ON.
(2) As shown in Fig.2, set the resistor (between X connector 1 & 3).
(3) Make sure that the screen picture disappears.
(4) Temporarily unplug the power cord.
(5) Remove the resistor (between X connector 1 & 3).
(6) Again plug the power cord, make sure that the normal picture is displayed on the screen.

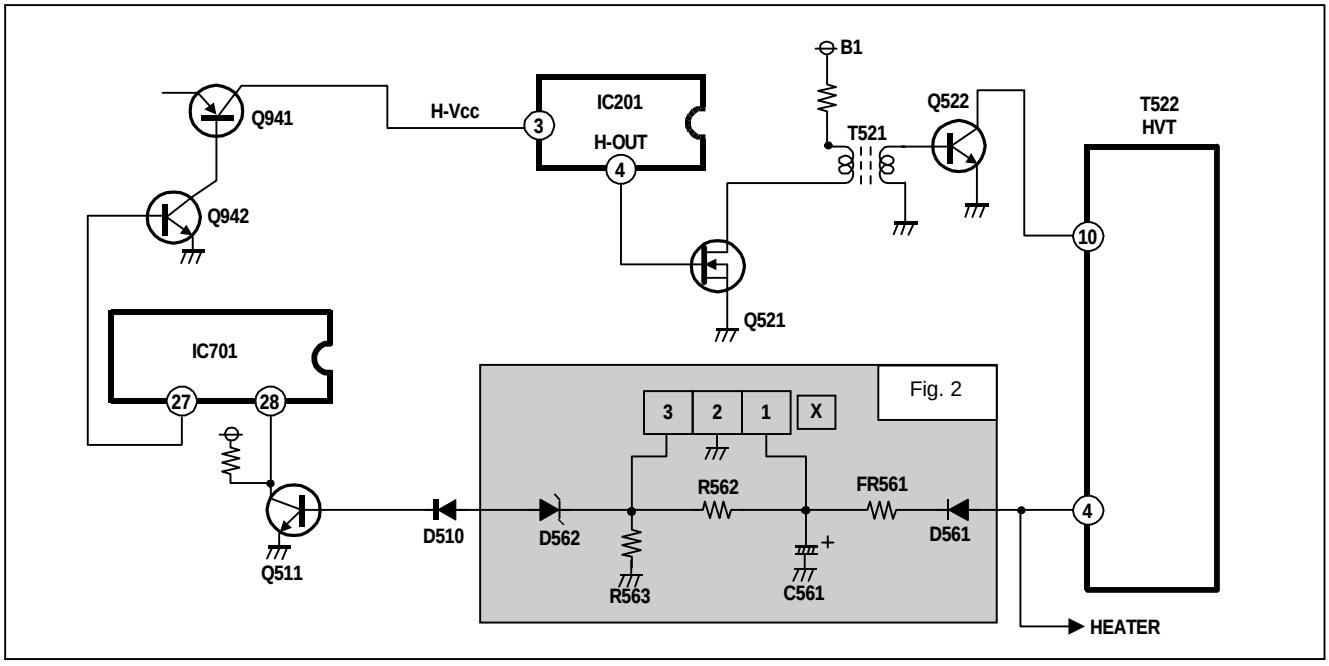


Fig. 1

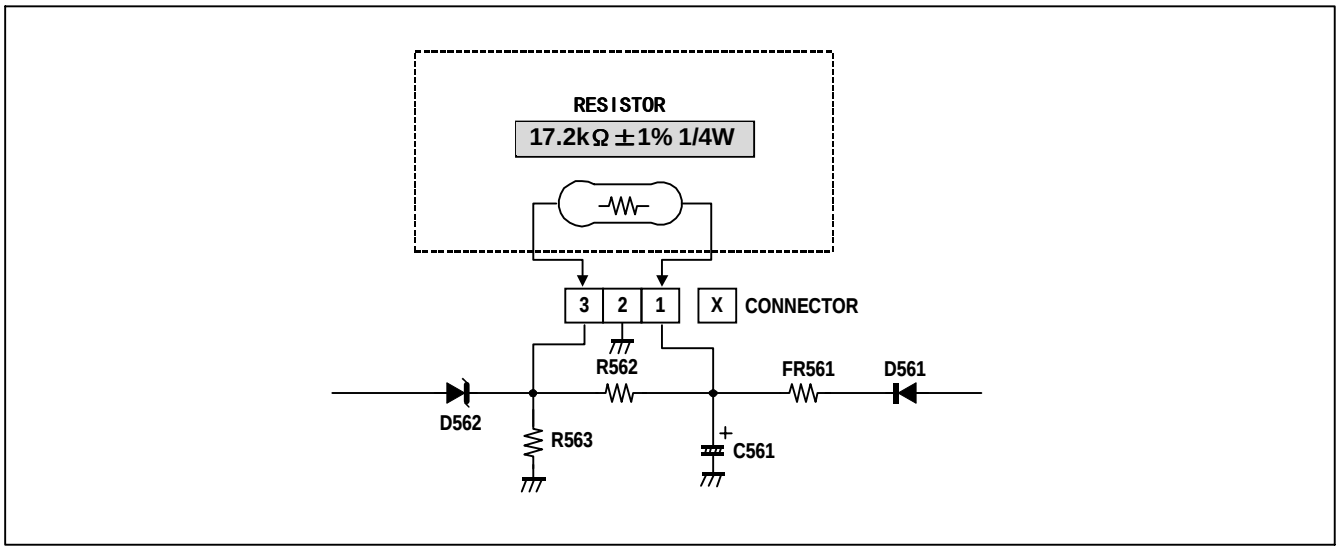


Fig. 2

SELF CHECK FUNCTIONS

1. Outline

This model includes protector functions for Over-current, X-ray and CRT NECK which cutoff the sub-power in the event of a malfunction and inform of the malfunction by flashing POWER/ON TIMER LED.

The malfunction is detected according to the state of the control line input connected to the main CPU.

2. Self check items

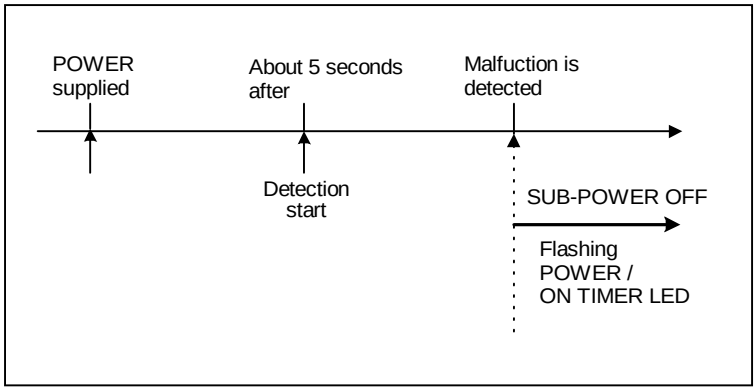
Check item	Detected contents	Detection method	Abnormality state
Over-current protector	Operation of over-current protection circuit	The main CPU detects at 1second intervals. If NG is detected for more than 1ms, a malfunction is interpreted	During an abnormality the sub-power is cutoff. The remote controller power key operation is not recognized and sub-power off is maintained until the power cord is unplugged and reinserted.
X-ray protector	Operation of X-ray protection circuit	The main CPU detects at 1second intervals. If NG is detected for more than 1ms, a malfunction is interpreted	During an abnormality the sub-power is cutoff. The remote controller power key operation is not recognized and sub-power off is maintained until the power cord is unplugged and reinserted.
CRT NECK protector	When the vertical circuit S-correction capacitor C413 is shorted, detect the potential drop of the C413, and prevent the burn damage to the CRT NECK.	The main CPU detects at 1second intervals. If NG is detected for more than 1ms, a malfunction is interpreted	During an abnormality the sub-power is cutoff. The remote controller power key operation is not recognized and sub-power off is maintained until the power cord is unplugged and reinserted.

3. Self check indicating function

The self check function begins detection about 5 seconds after power is supplied.

In the event a malfunction is detected, the sub-power is cutoff immediately.

At this time, the POWER/ON TIMER LED flashes to inform of the malfunction.



Item	LED flashing intervals	Priority of detection
OCP/X-ray	Red and green LED flash alternately at 0.5 second intervals	1
NECK	Red and green LED flash alternately at 1.0 second intervals	2

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

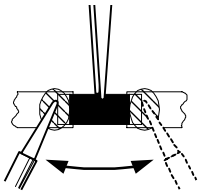
1. Use a high insulation soldering iron with a thin pointed end of it.
2. A 30w soldering iron is recommended for easily removing parts.

■ REPLACEMENT STEPS

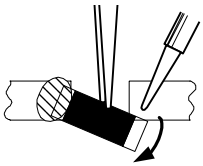
1. How to remove Chip parts

◆ **Resistors, capacitors, etc.**

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

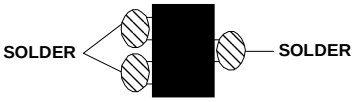


(2) Shift with tweezers and remove the chip part.

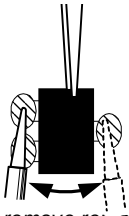


◆ **Transistors, diodes, variable resistors, etc.**

(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.

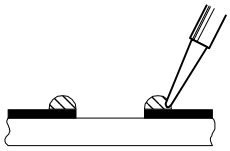


Note : After removing the part, remove remaining solder from the pattern.

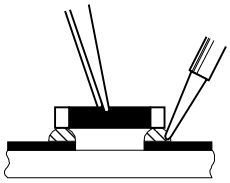
2. How to install Chip parts

◆ **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.

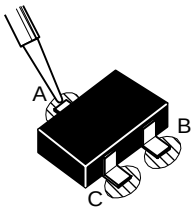


◆ **Transistors, diodes, variable resistors, etc.**

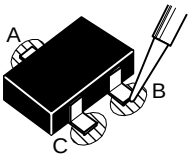
(1) Apply solder to the pattern as indicated in the figure.

(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**.



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