

SERVICE ADJUSTMENTS

■ PRIOR TO STARTING ADJUSTMENT

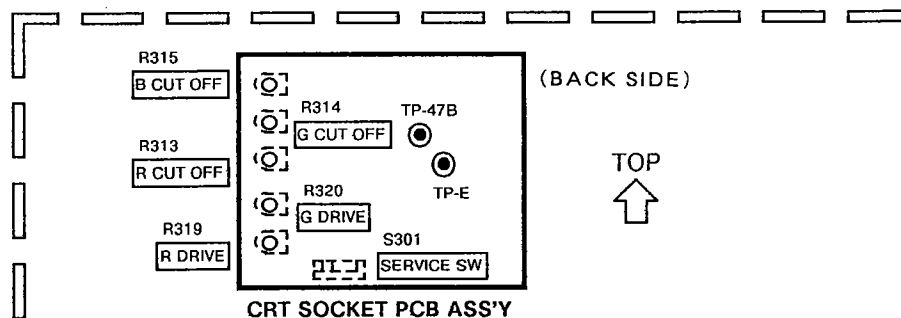
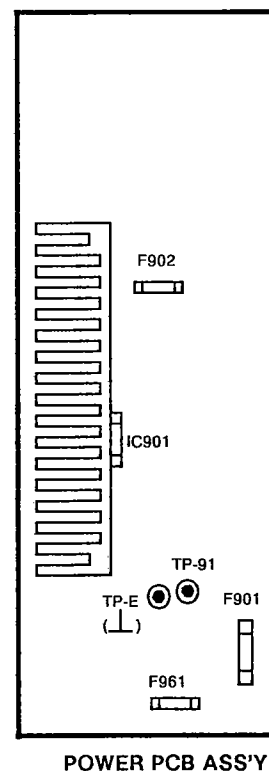
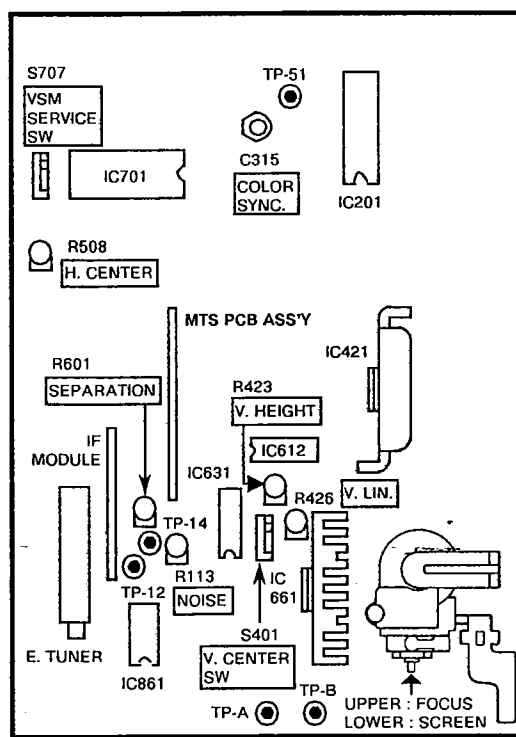
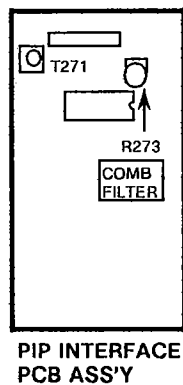
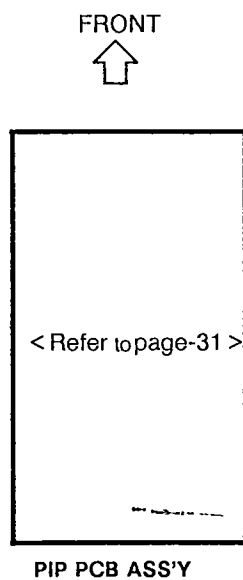
- Allow set and test equipment to warm up fully before adjusting.
- Confirm proper AC 120V power supply input.
- Set AV STATUS (BRIGHT, PICTURE, COLOR etc.) to standard settings.
- Use care not to disturb controls other than those mentioned in the adjustment steps.
- Unless otherwise mentioned, use a reception signal that provides the optimum picture for adjustment.

■ TOOLS AND FIXTURES FOR ADJUSTMENT

● MEASURING INSTRUMENTS

1. DC voltmeter (Digital DC voltmeter)
2. Oscilloscope
3. Frequency counter
4. Pattern generator (NTSC type)
5. TV multichannel sound generator
6. Remote control unit (RM-C687)

■ ADJUSTMENT LOCATIONS



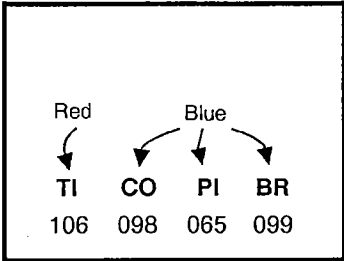
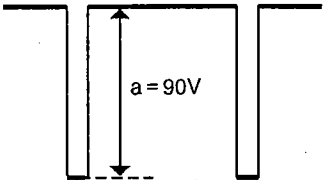
■ ADJUSTMENT PROCEDURE

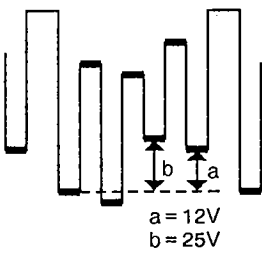
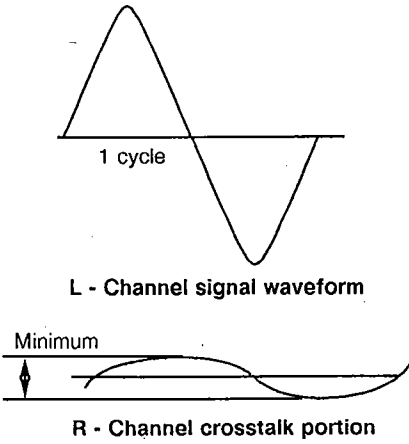
Item	Measuring instrument	Test point	Adjustment part	Description
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● POWER CIRCUIT

B1 POWER SUPPLY check	DC voltmeter	TP-91 TP-E (\perp)		1. Confirm that the voltage between TP-91 and TP-E (\perp) is DC 129.3V.
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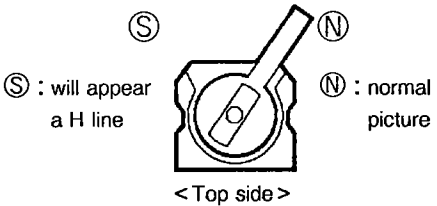
● MAIN CIRCUIT

NOISE (RF AGC) adjustment			NOISE VR (R135)	<ol style="list-style-type: none"> 1. Adjust the NOISE VR so that the noise appears in the picture. 2. Next the NOISE VR in a direction that the noise disappears from the picture and stop at the point where the noise has disappeared from the picture. 3. Turn to another channel and confirm that there are no abnormalities.
SUB BRIGHT adjustment	Pattern generator Remote control unit		VSM SERVICE switch (S707)	<ol style="list-style-type: none"> 1. Use the remote control unit and reset the AV STATUS (TINT, COLOR, PICTURE, BRIGHT and DETAIL). 2. Set the VSM SERVICE switch to the S position. 3. Press a FUNCTION key (Δ, ∇, +, -) of the remote control unit. Confirm picture as indicated in the figure. 4. Select BRIGHT and adjust the +/- key to optimum brightness. 5. After adjusting, return the VSM SERVICE switch to N position.
<div style="text-align: center;">  <p>Red Blue</p> <p>TI CO PI BR</p> <p>106 098 065 099</p> </div> <p>Screen produced by setting the VSM SERVICE switch to the service mode and pressing a remote control unit FUNCTION key.</p>				
SUB PICTURE adjustment	Pattern generator Oscilloscope (H-rate 10:1) Remote control unit	TP-47B [CRT SOCKET PCB Ass'y]	VSM SERVICE switch (S707)	<ol style="list-style-type: none"> 1. Use the remote control unit and reset the AV STATUS (TINT, COLOR, PICTURE, BRIGHT and DETAIL). 2. Receive the crosshatch signal. 3. Set the VSM SERVICE switch to the S position. 4. Correct the oscilloscope to TP-47B 5. Select PICTURE and adjust the +/- keys so that waveform "a" indicated in the figure is 90V. 6. After adjusting, return the VSM SERVICE switch to N position.
				

Item	Measuring instrument	Test point	Adjustment part	Description
SUB COLOR & TINT adjustment	Pattern generator Oscilloscope (H-rate 10:1) Remote control unit	TP-47B [CRT SOCKET PCB Ass'y]  a = 12V b = 25V	VSM SERVICE switch (S707)	<ol style="list-style-type: none"> 1. Use the remote control unit and reset the AV STATUS(TINT, COLOR, PICTURE, BRIGHT and DETAIL) . 2. Receive the color bar signal. 3. Set the VSM SERVICE switch to the S position. 4. Correct the oscilloscope to TP-47B 5. Press a FUNCTION key(△, ▽, +, -) of the remote control unit. Confirm picture as indicated in the figure. 6. Select COLOR and adjust the +/- keys so that waveform "a" indicated in the figure for 12V. 7. Select PICTURE and adjust the +/- keys so that waveform "b" indicated in the figure for 25V. 8. Repeat above steps 6 and 7 to obtain the specified values for waveform "a" and "b" . 9. After adjusting, return the VSM SERVICE switch to N position.
COLOR SYNCHRONIZATION adjustment	Pattern generator Oscilloscope (H-rate 10:1)	TP-51 IC101 pin-③ IC101 pin-④ (9V line)	COLOR SYNC. trimmer capacitor (C315)	<ol style="list-style-type: none"> 1. Receive the color bar signal. 2. Use ashorting clip or other means to connect TP-51, IC101 pin-③ and IC101 pin-④ (9V line) . 3. Adjust the COLOR SYNC. trimmer capacitor to change the picture from color stripes to still color bar. 4. Remove the connections and check that the color synchronization does not deteriorate on any of the channels.
SEPARATION adjustment	TV multi - channel sound generator Oscilloscope (H-rate 10:1)	VARIABLE AUDIO OUTPUT L & R 	SEPARATION VR (R601)	<ol style="list-style-type: none"> 1. Set the TV multichannel sound signal generator for generating stereo signal and output signal of about 3kHz from the left channel. 2. Connect an oscilloscope to the "L" output and obtain a clear view of 1-cycle portion of 3kHz waveforms. 3. Change connection of the oscilloscope to the "R" output and expand the voltage axis. 4. Adjust the SEPARATION VR and minimize the 3kHz crosstalk portion.
FOCUS adjustment			FOCUS VR (built-in FBT)	<ol style="list-style-type: none"> 1. Adjust the FOCUS VR to obtain clear pictures. 2. Check that pictures have been adjusted to optimum appearance in both center and peripheral areas of the screen.

Item	Measuring instrument	Test point	Adjustment part	Description
VERTICAL HEIGHT & LINEARITY adjustment	Pattern generator		V HEIGHT VR (R423) V LIN. VR (R426)	<ol style="list-style-type: none"> 1. Receive a picture that enable a vertical symmetry to be checked. 2. Turn the V HEIGHT VR to compress the picture vertically. 3. Adjust the V LIN. VR to where the picture is symmetrical top and bottom. 4. Again adjust the V HEIGHT VR to return the normal height.
VERTICAL CENTER adjustment			V. CENTER switch (S401)	<ol style="list-style-type: none"> 1. The V. CENTER switch can be used to shift the picture up and down. <p>※ Use this function as required for "VERTICAL HEIGHT & LINEARITY", and other adjustments.</p>
HORIZONTAL CENTER adjustment	Pattern generator		H. CENTER VR (R508)	<ol style="list-style-type: none"> 1. Turn the H. CENTER VR and adjust for the optimum left and right position. <p>※ Where possible, use a symmetrical pattern such as a circle or crosshatch.</p>

●CRT SOCKET CIRCUIT

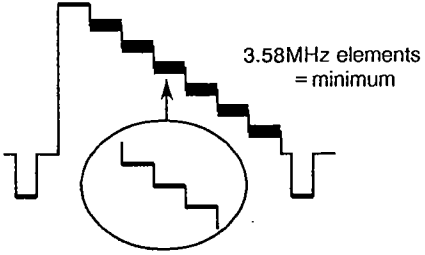
HORIZONTAL LINE display			SERVICE switch (S301)	<ol style="list-style-type: none"> 1. Turning the SERVICE switch from the N side to the S side will bring the horizontal line display to the screen. <div style="text-align: center;">  <p>Ⓢ : will appear a H line Ⓝ : normal picture</p> <p>< Top side ></p> </div>
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●MULTI-CHANNEL SOUND CIRCUIT

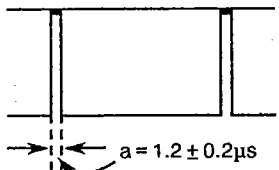
- Do not touch the VRs inside the MTS PCB ASS'Y.

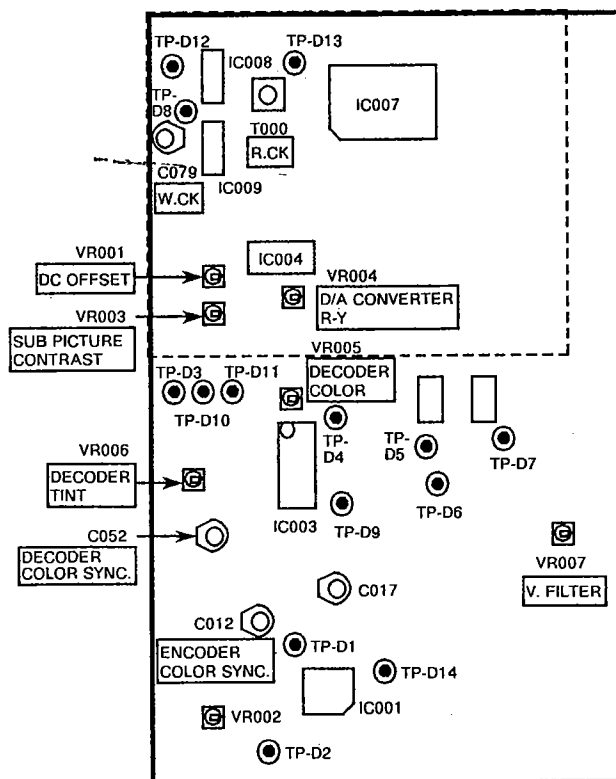
●PIP INTERFACE CIRCUIT

COMB FILTER adjustment	Pattern generator Oscilloscope (H-rate 10:1)	IC251 pin-⑫	DL PHASE transformer (T271) COMB FILTER VR (R273)	<ol style="list-style-type: none"> 1. Receive the color bar signal. 2. Connect the oscilloscope to pin-⑫ of IC251. 3. Magnify the chroma signal portions of the color bar waveform so that the 3.58MHz elements become easy to observe. 4. Adjust the DL PHASE transf. and minimize the 3.58MHz elements. 5. Regulate the COMB FILTER VR to further minimize the 3.58MHz elements. 6. Repeat steps 4 and 5 to fully minimize the 3.58MHz elements.
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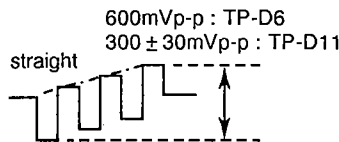

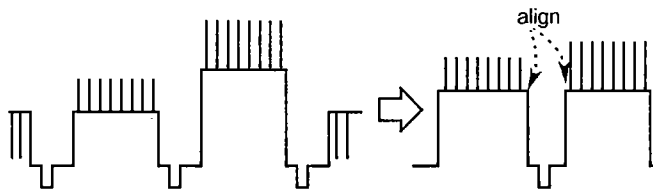
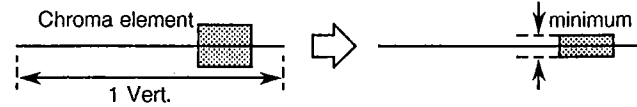
3.58MHz elements = minimum

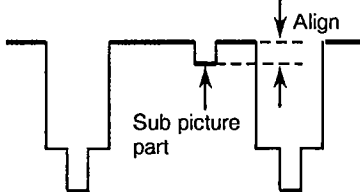
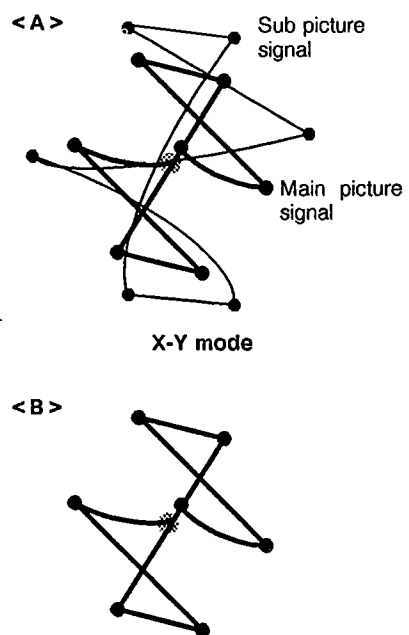
Item	Measuring instrument	Test point	Adjustment part	Description
• PIP CIRCUIT				
READ CLOCK adjustment	Frequency counter	TP-D12 TP-D13	R.CK transformer (T000)	<ol style="list-style-type: none"> 1. Use shorting clips or other means to short TP-D12 to the 5V line. 2. Connect the frequency counter to TP-D13. Adjust R.CK transf. to obtain $30.2\text{MHz} \pm 10\text{kHz}$.
WRITE CLOCK INTERVAL adjustment	Pattern generator Oscilloscope (H-rate 10:1) Remote control unit	TP-D8	W.CK trimmer capacitor (C079)	<ol style="list-style-type: none"> 1. Receive the crosshatch signal to both TV(antenna) and VIDEO input. 2. Set for the PIP mode. 3. Connect the oscilloscope to TP-D8. Adjust W.CK trimmer capacitor to interval "a" in figure to $1.2 \pm 0.2\mu\text{s}$. 
ENCODER COLOR SYNCHRONIZATION adjustment	Pattern generator Oscilloscope (H-rate 10:1)	TP-D1 TP-D14	ENCODER COLOR SYNC. trimmer capacitor (C012)	<ol style="list-style-type: none"> 1. Receive the color bar signal. 2. Set for the PIP mode. 3. Use shorting clips or other means to short TP-D1 to TP-D14. 4. Adjust ENCODER COLOR SYNC trimmer capacitor until when the color changes from strip pattern to color bar and almost stands still. 5. Remove the connection between TP-D1 and TP-D14. 6. Check that when the channel is changed and return to color bar, it immediately catches without color synchronization being destroyed.



FRONT
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PIP PCB ASS'Y

Item	Measuring instrument	Test point	Adjustment part	Description
DECODER COLOR SYNCHRONIZATION adjustment	Pattren generator Frequency counter Remote control unit	PY connector pin-⑤ TP-D4 TP-D9	DECODER COLOR SYNC. trimmer capacitor (C052)	<ol style="list-style-type: none">1. Use shorting clips or other means to connect PY connector pin-⑤ to ground.2. Receive the color bar signal to both TV(antenna) and VIDEO input.3. Set for the PIP mode.4. Use shorting clips or other means to connect TP-D4 to 5V line.5. Connect the frequency counter with TP-D9.6. Adjust DECODER COLOR SYNC trimmer capacitor so that the frequency is $3.579545\text{MHz} \pm 50\text{Hz}$.7. Remove the connection between TP-D4 and the 5V line.
SUB PICTURE COLOR DEMODULATION LEVEL adjustment	Pattren generator Oscilloscope (H-rate 10:1) Remote control unit	TP-D6 TP-D11 TP-D10	DECODER TINT VR (VR006) DECODER COLOR VR (VR005) D/A CONVERTER R-Y VR (VR004)	<ol style="list-style-type: none">1. Receive the color bar signal to both TV(antenna) and VIDEO input.2. Set for the PIP mode.3. Connect the oscilloscope to TP-D6. Adjust the DECODER TINT VR so that the right rising component of the waveform is straight, as indicated in Fig. A.4. Adjust the DECODER COLOR VR so that the waveform in Fig. A is 600mVp-p.5. Connect the oscilloscope to TP-D11. Confirm waveform and $300 \pm 30\text{mVp-p}$ as indicated in Fig. A. If waveform sharp and value differ, repeat above steps 3 and 4.6. Connect the oscilloscope to TP-D10. Adjust the D/A CONVERTER R-Y VR to obtain 420mVp-p waveform level as indicated in Fig. B.
 <p>600mVp-p : TP-D6 300 ± 30mVp-p : TP-D11</p> <p>straight</p> <p>Fig. A -B-Y-</p>		 <p>420mVp-p</p> <p>Fig. B -R-Y-</p>		
VERTICAL FILTER adjustment	Pattren generator Oscilloscope (V-rate 10:1) Remote control unit	TP-D7	V. FILTER VR (VR007)	<ol style="list-style-type: none">1. Receive the color bar signal to both TV(antenna) and VIDEO input.2. Connect the oscilloscope to TP-D7.3. Set for the PIP mode and adjust V. FILTER VR so that the heights of the white of the two waveforms
				
SUB PICTURE DC OFFSET adjustment	Pattren generator Oscilloscope (V-rate 10:1) Remote control unit	TP-D2	DC OFFSET VR (VR001)	<ol style="list-style-type: none">1. Receive the full white signal with color burst to both the TV(antenna) and VIDEO input.2. Set for the PIP mode.3. Connect the oscilloscope to TP-D2 and adjust DC OFFSET VR to minimize the sub picture color
				

Item	Measuring instrument	Test point	Adjustment part	Description
MAIN / SUB BRIGHTNESS RATIO adjustment	Pattern generator Oscilloscope (H-rate 10:1) Remote control unit	PY connector pin-⑤ PY connector pin-①	SUB PICTURE CONTRAST VR (VR003)	<ol style="list-style-type: none"> 1. Use shorting clips or other means to connect PY connector pin-⑤ to ground. 2. Receive the full white signal with color burst to both the TV(antenna) and VIDEO input. 3. Set for the PIP mode. 4. Connect the oscilloscope to PY connector pin-①. Adjust SUB PICTURE CONTRAST VR to equalize the main sub picture levels, as indicated in figure. 
MAIN / SUB COLOR & TINT RATIOS adjustment	Pattern generator Oscilloscope (H-rate 10:1) Remote control unit	K connector pin-②(R-Y) K connector pin-④(B-Y) [CRT SOCKET PCB ASS'Y]	DECODER TINT VR (VR006) DECODER COLOR VR (VR005)	<ol style="list-style-type: none"> 1. Receive the color bar signal to both TV(antenna) and VIDEO input. 2. Set for the PIP mode. 3. Connect the oscilloscope to CRT SOCKET PCB ASS'Y K connector pin-②(R-Y) and pin-④(B-Y). 4. Set the oscilloscope mode to X-Y. 5. As shown in the figure, adjust DECODER TINT VR to align the sub picture phase with the main picture red phase. 6. Then adjust DECODER COLOR VR to equalize the sub and main picture saturation levels. 

●HOW TO CHECK THE HIGH VOLTAGE HOLD DOWN CIRCUIT

1. High voltage hold down circuit (in MAIN PCB ASS'Y)

- After repair of the high voltage hold down circuit shown in Fig. 1, this circuit shall be checked to operate correctly.

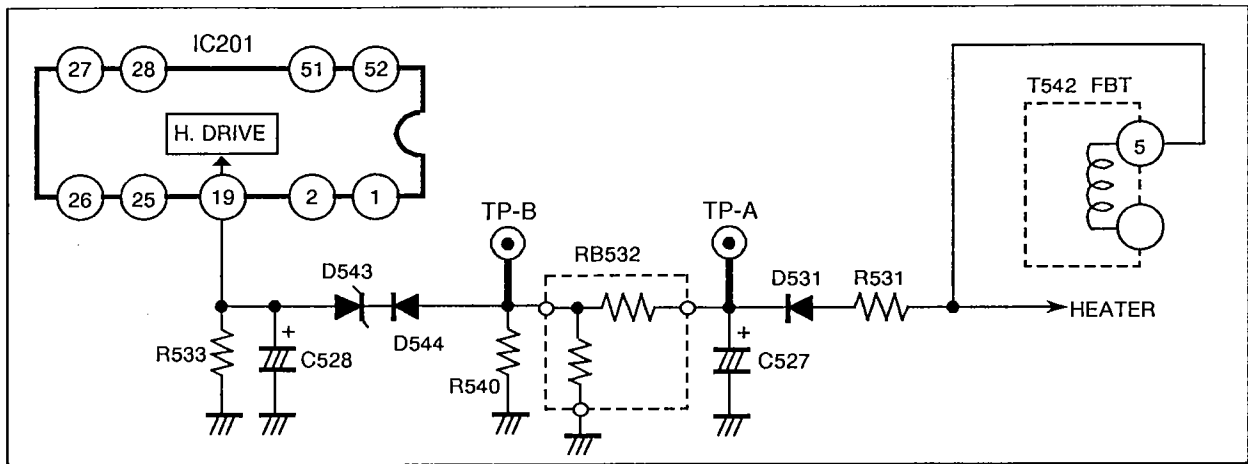


Fig. 1

2. Checking method of the high voltage hold down circuit (in POWER PCB ASS'Y)

- Make the short circuit across R905 and R909, (shown in Fig. 2) under normal operating condition.
- Confirm the picture goes out.

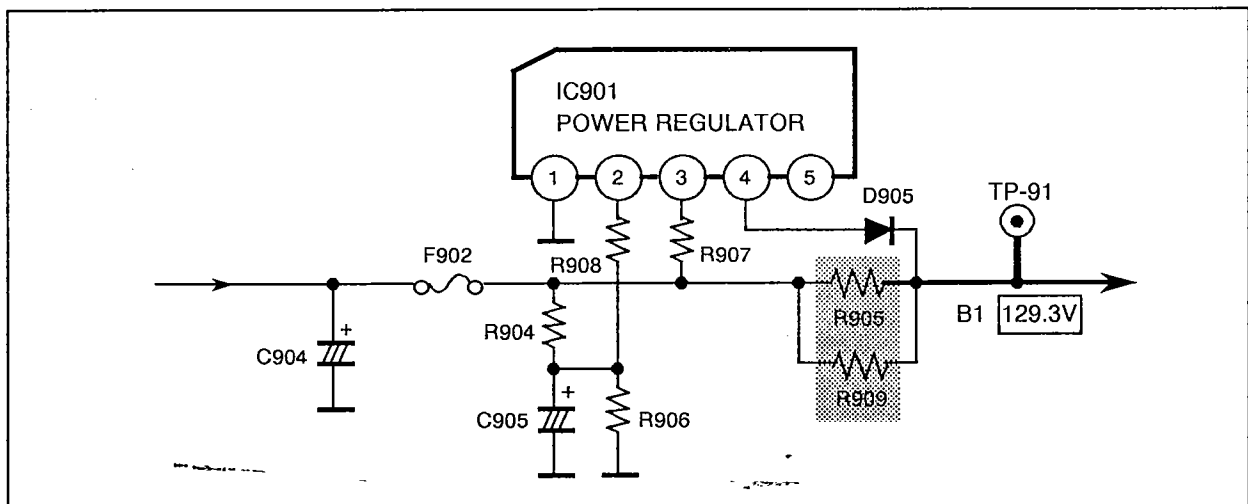


Fig. 2

■ PURITY, CONVERGENCE AND WHITE BALANCE ADJUSTMENTS

* The locations of SERVICE SWITCH, SCREEN VR, CUT-OFF VR and DRIVE VR are described in the ALIGNMENT LOCATION of SERVICE ADJUSTMENT or the SCHEMATIC DIAGRAM.

● PICTURE TUBE

The picture tube is a precision in-line gun type. For this picture tube, dynamic convergence is carried out by a precision deflection yoke which eliminated the use of convergence yoke and convergence circuit. The adjustment of picture tube is therefore made easier as only the adjustment of static convergence by using a magnetic is enough. The deflection yoke and purity/convergence magnets assembly has been set at the factory and requires no field adjustments. However, should the assembly be accidentally jarred or tampered with, some or all adjustments may be necessary.

● COLOR PURITY & VERTICAL CENTER

Loosen yoke retaining screw (Fig. B-1). With a sharp knife cut between the picture tube and the wedge. Remove wedges completely and clean off dried adhesive from the picture tube. PAINT is used to lock the tabs of the purity/convergence magnet assembly in place (Fig. B-1). The paint must be removed with the end of a screwdriver before any adjustments are attempted.

(As to models equipped with a magnet locking ring, beforehand loosen it.)

1. Select no signal UHF channel. (or Display a monochrome pattern)
2. Let the purity tabs come in line horizontally as is shown in Fig. B-2. A long tab should be in the same direction as the other short tab.
3. Move the yoke slowly backward.
4. Turn the GREEN CUT-OFF VR to maximum and the RED and BLUE CUT-OFF VRs to minimum. Then adjust the SCREEN VR so that the green band can be seen best. (Fig. B-3)
5. Rotate the two tabs in the opposite directions and with them kept at an angle, together in either direction so that the green band is centered on the picture tube.
6. Check the vertical center position by displaying a horizontal line. (Select the CUT-OFF SERVICE SWITCH from N to S and a HORIZONTAL LINE will appear.) Unless correct, bring it to the nearest center by rotating the two tabs, kept at an angle, together in either direction. (Fig. B-4)
7. Repeat steps 5 and 6 alternately until the green band and the vertical center come to the center.
8. Move the yoke slowly towards the bell of the tube so that the whole surface of the picture tube is filled with a green pure raster.
9. Turning RED or BLUE CUT-OFF VR to maximum and GREEN CUT-OFF VR to minimum, make sure of a red or blue pure raster.
10. Secure yoke retaining screw (do not install wedges at this time) .

(As to models equipped with a magnet locking ring, secure it and keep six magnets from moving even if it is touched slightly.)

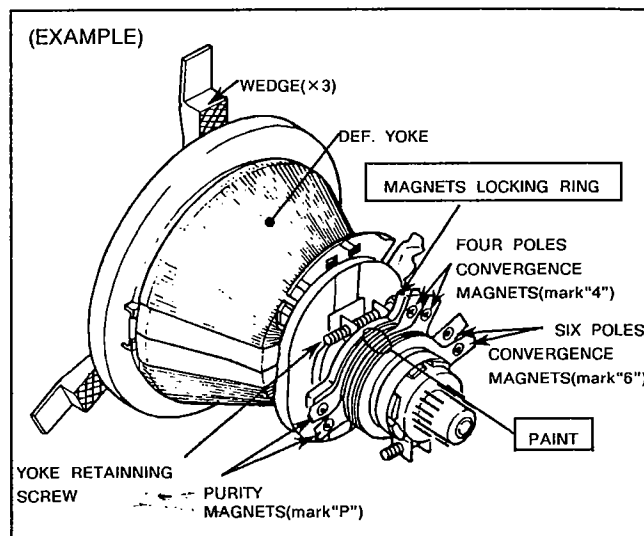


Fig. B-1

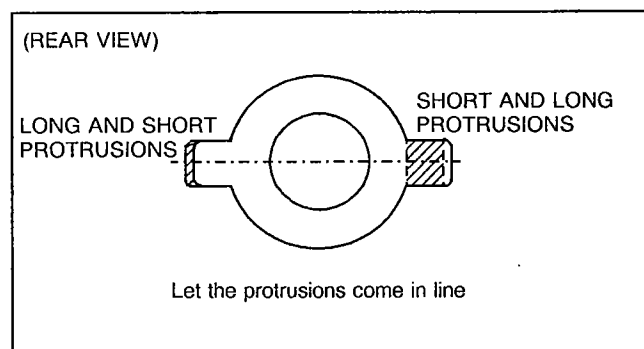


Fig. B-2

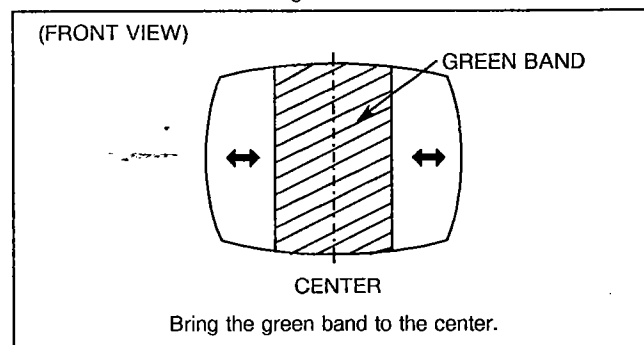


Fig. B-3

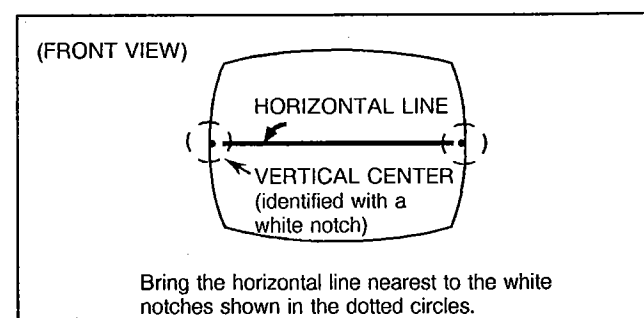


Fig. B-4

•STATIC CONVERGENCE & DYNAMIC CONVERGENCE

1. Connect a crosshatch generator to the input terminals and adjust BRIGHTNESS and CONTRAST control for a distinct pattern.
2. Adjust the convergence around the edges of the picture tube by tilting the yoke, up-down and left-right, and temporarily install one wedge at the top of the yoke. (Fig. B-7, 8, 9)
3. Rotate the front pair of tabs (four pole convergence magnet) as a unit to minimize the separation of the red and blue lines around the center of the screen. To adjust the convergence of red and blue, vary the angle between the tabs (Fig. B-5)
4. Rotate the rear pair of tabs (six pole convergence magnets) as a unit to minimize the separation of the magenta (R/B) and green lines. (Fig. B-6)
5. Adjust the spacing of the rear tabs to converge the magenta and green lines.
6. Apply paint to fix six magnets.
- (As to models equipped with a magnet locking ring, tighten it.)
7. Remove the wedge installed temporarily on the yoke.
8. Tilting the angle of the yoke up, down and sideways, and adjust the yoke so as to obtain the circumference convergence. (Fig. B-8, 9)
9. Insert wedges to the position as shown in Fig. B-10 to obtain the best circumference convergence.
10. Wedge has a backing of double sided adhesive tape. Therefore, tear off one side of adhesive tape, and fix the wedges.
11. White balance adjustment (Black & White tracking) can now be performed.

•WHITE BALANCE ADJUSTMENT

(Black and White Tracking)

1. Display a monochrome pattern.
2. Set the RED and GREEN DRIVE VRs for their mechanical center.
3. Turn the RED, GREEN and BLUE CUT-OFF VRs and the SCREEN VR fully counterclockwise.
4. Display a horizontal line. (Select the CUT-OFF SERVICE SWITCH from N to S and a HORIZONTAL LINE will appear.)
5. Turn SCREEN VR ~~slowly~~ clockwise until a very faint horizontal line appears.
6. Turn the CUT-OFF VR of the color which has appeared first, clockwise by about 10° and then adjust the SCREEN VR again so that the color may shine faintly.
7. Turn the other color CUT-OFF VRs slowly clockwise until a reasonable white line appears.
8. Return the monochrome pattern. (When returning a monochrome pattern select the CUT-OFF SERVICE SWITCH from S to N and a monochrome pattern will appear.)
9. Adjust the RED and GREEN DRIVE VRs for best white highlights.

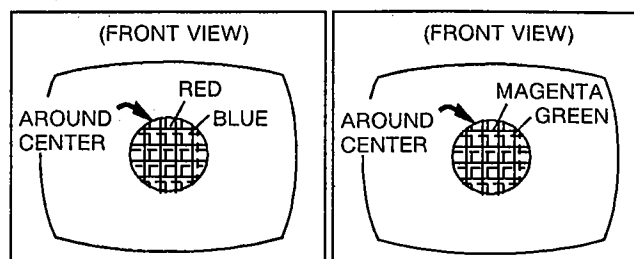


Fig. B-5

Fig. B-6

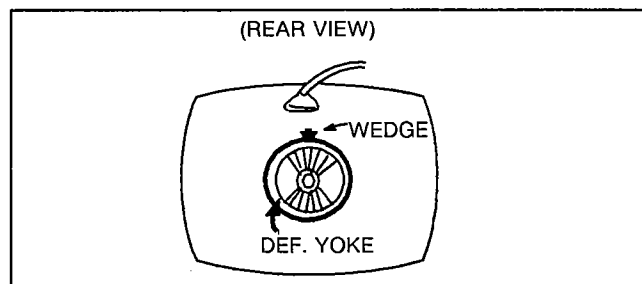


Fig. B-7

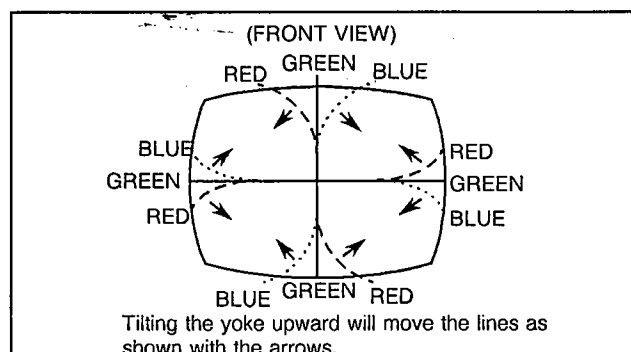


Fig. B-8

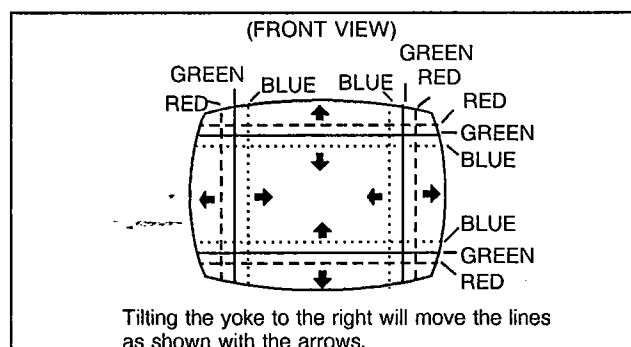


Fig. B-9

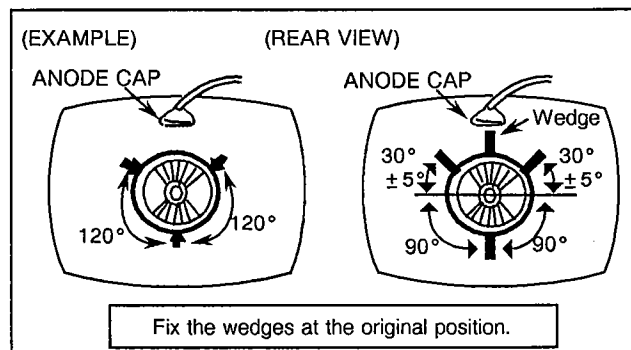


Fig. B-10