

SERVICE MODE LIST

This unit is provided with the following SERVICE MODES so you can repair, examine and adjust easily.
To enter the Service Mode, press both set key and remote control key for more than 2 seconds.

Set Key	Remote Key	Operations
VOL. (-) MIN	0	Releasing of V-CHIP PASSWORD.
VOL. (-) MIN	6	Check for the firmware version. Can be checked of the INITIAL DATA of MEMORY IC. Refer to the "WHEN REPLACING EEPROM (MEMORY) IC".
VOL. (-) MIN	9	Display of the Adjustment MENU on the screen. Refer to the "ELECTRICAL ADJUSTMENT" (On-Screen Display Adjustment).

ELECTRICAL ADJUSTMENTS

1. ADJUSTMENT PROCEDURE

Read and perform these adjustments when repairing the circuits or replacing electrical parts or PCB assemblies.

CAUTION

- Use an isolation transformer when performing any service on this chassis.
- Before removing the anode cap, discharge electricity because it contains high voltage.
- When removing a PCB or related component, after unfastening or changing a wire, be sure to put the wire back in its original position.
- When you replace an IC or Transistor with a heat sink, apply silicon grease on the contact section of the heat sink. Before applying new silicon grease, remove all the old silicon grease. (Old grease may cause damages to the IC and Transistor.)

Prepare the following measurement tools for electrical adjustments.

1. Oscilloscope
2. Digital Voltmeter
3. Multi-sound Generator
4. Pattern Generator
5. AFC Oscillator

On-Screen Display Adjustment

1. In the condition of **NO** indication on the screen, press the VOL. DOWN button on the set and the Channel button (9) on the remote control for more than 2 seconds to appear the adjustment mode on the screen as shown in Fig. 1-1 .

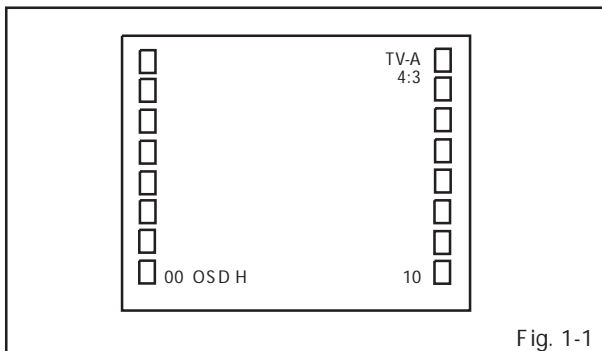


Fig. 1-1

2. Use the Channel UP/DOWN button or Channel button (0-9) on the remote control to select the options shown in Fig. 1-2 .
3. Press the MENU button on the remote control to end the adjustments.
4. To display the adjustment screen for TV-A, TV-D, AV and YUV mode, press the TV/AV button on the remote control. Press the VOL.DOWN button on the set and the channel (9) on the remote control for more than 2 seconds.

NO.	FUNCTION	NO.	FUNCTION
00	OSD H	32	CONT.CENT
01	OSD C	33	CONT.MAX
02	CUT OFF	34	CONT.MIN
03	H.POSI	35	COL.CENT
04	H.BLK L	36	COL.MAX
05	H.BLK R	37	COL.MIN
06	V.SIZE	38	TINT.CENT
07	V.POSI	39	SHARP.CENT
08	V.LIN	40	SHARP.MAX
09	VS CORR	41	SHARP.MIN
10	V.COMP	42	SUB BIAS
11	R.BIAS	43	H.SIZE
12	G.BIAS	44	PARABOLA
13	B.BIAS	45	TRAPEZIUM
14	R.DRV	46	COR TOP
15	G.DRV	47	COR BTM
16	B.DRV	48	TEST STEREO
29	BR1.CENT		
30	BR1.MAX		
31	BR1.MIN		

Fig. 1-2

2. BASIC ADJUSTMENTS

2-1: CONSTANT VOLTAGE

1. Place the set in AV MODE without signal.
2. Connect the digital voltmeter to the TP003 .
3. Adjust the VR502 until the digital voltmeter is $130 \pm 0.5V$.

2-2: AFT

1. Place the set in an Aging Test for more than 15 minutes
2. Connect the AFC Oscillator 45.75MHz to the TP002 .
3. Connect the digital voltmeter to the TP001 .
4. Adjust the L205 until the digital voltmeter is $2.3 \pm 0.1V$.

2-3: CUT OFF

1. Place the set in an Aging Test for more than 15 minutes
2. Place the set in AV MODE without signal.
3. Using the remote control, set the brightness and contrast to normal position.
4. Activate the adjustment mode display of Fig. 1-1 and press the channel button (02) on the remote control to select "CUT OFF".
5. Adjust the Screen Volume until a dim raster is obtained.

2-4: FOCUS

1. Provide a the monoscope pattern with a pattern generator.
2. Turn the Focus Volume fully counterclockwise once.
3. Adjust the Focus Volume until picture is distinct.

2-5: WHITE BALANCE

NOTE: Adjust after performing CUT OFF adjustment.

1. Place the set in Aging Test for more than 15 minutes.
2. Provide the white 100% signal from the Pattern Generator.
3. Using the adjustment control, set the brightness and contrast to normal position.
4. Activate the adjustment mode display of Fig. 1-1 and press the channel button (11) on the remote control to select "R.BIAS".
5. Using the VOL. UP/DOWN button on the remote control, adjust the R.BIAS.
6. Press the CH. UP/DOWN button on the remote control to select the "R.DRV", "B.DRV", "G.BIAS" or "B.BIAS".
7. Using the VOL. UP/DOWN button on the remote control, adjust the R.DRV, B.DRV, G.BIAS or B.BIAS.
8. Perform the above adjustments 6 and 7 until the white color is achieved.

ELECTRICAL ADJUSTMENTS

2-6: TINT

1. Provide a color bar pattern with the generator. (RF Input)
2. Using the remote control, set the brightness, contrast, color and tint to normal position.
3. Connect the oscilloscope to TP024 .
4. Activate the adjustment mode display of Fig. 1-1 and press the channel button (38) on the remote control to select "TINT".
5. Press the VOL. UP/DOWN button on the remote control until the section A1 and A2 becomes as straight line. (Refer to Fig. 2-1)
6. Provide a monoscope pattern. (Audio Video Input)
7. Press the TV/AV button on the remote control to set to the AV mode. Then perform the above adjustments 2~5.
8. Provide a monoscope pattern. (YUV)
9. Press the TV/AV button on the remote control to set to the YUV mode.
10. Using the remote control, set the brightness, contrast, color and tint to normal position.
11. Connect the oscilloscope to TP024 .
12. Activate the adjustment mode display of Fig. 1-1 and press the channel button (38) on the remote control to select "TINT".
13. Press the VOL. UP/DOWN button on the remote control until the section A1 and A2 becomes as straight line. (Refer to Fig. 2-2)
14. Provide a ATSC monoscope pattern. (Digital)
15. Press the TV/AV button on the remote control to set to the DIGITAL mode. Then perform the above adjustments 2~5.

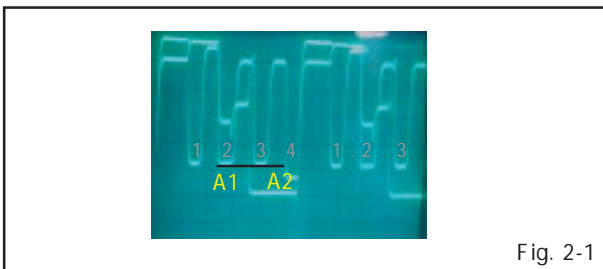


Fig. 2-1

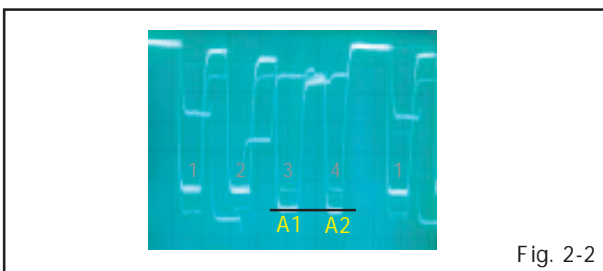


Fig. 2-2

2-7: COLOR CENT

1. Provide a color bar pattern with the generator. (RF Input)
2. Using the remote control, set the brightness, contrast, color and tint to normal position.
3. Connect the oscilloscope to TP022 .
4. Activate the adjustment mode display of Fig. 1-1 and press the channel button (35) on the remote control to select "COL.CENT".
5. Adjust the VOLTS RANGE VARIABLE knob of the oscilloscope until the range between white 100% and 0% is set to 5 scales on the screen of the oscilloscope.
6. Press the VOL. UP/DOWN button on the remote control until the red color level is adjusted to $105 \pm 5\%$ of the white level. (Refer to Fig. 2-3)
7. Provide a video color bar pattern. (Audio Video Input)
8. Press the button on the remote control to set to the AV mode. Then perform the above adjustments 2~6.
9. Provide a color bar pattern. (YUV)
10. Press the TV/AV button on the remote control to set to the YUV mode. Then perform the above adjustments 2~6.
11. Provide a Digital (ATSC) color bar pattern.
12. Press the TV/AV button on the remote control to set to the DIGITAL mode.
13. Using the remote control, set the brightness, contrast, color and tint to normal position.
14. Connect the oscilloscope to TP022 .
15. Activate the adjustment mode display of Fig. 1-1 and press the channel button (35) on the remote control to select "COL.CENT".
16. Adjust the VOLTS RANGE VARIABLE knob of the oscilloscope until the range between white 100% and 0% is set to 5 scales on the screen of the oscilloscope.
17. Press the VOL. UP/DOWN button on the remote control until the red color level is adjusted to $95 \pm 5\%$ of the white level. (Refer to Fig. 2-4)

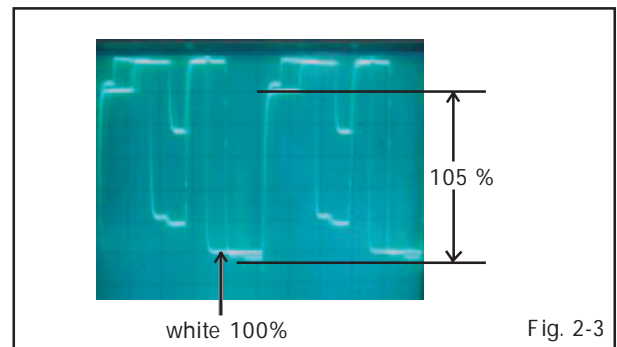


Fig. 2-3

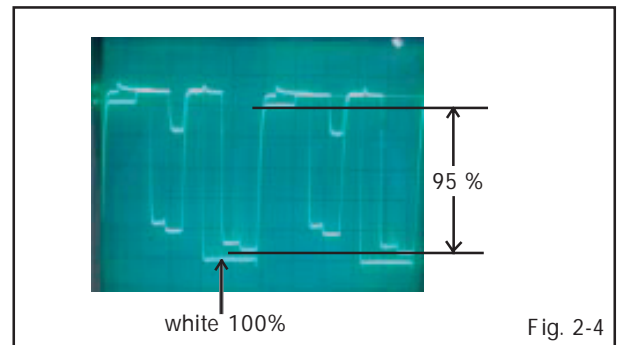


Fig. 2-4

ELECTRICAL ADJUSTMENTS

2-8: OSD POSITION

1. Provide a monoscope pattern from the Pattern Generator.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of Fig. 1-1 and press the channel button (00) on the remote control to select "OSD H".
4. Press the VOL. UP/DOWN button on the remote control until the difference of A and B becomes minimum.
(Refer to Fig. 2-5)

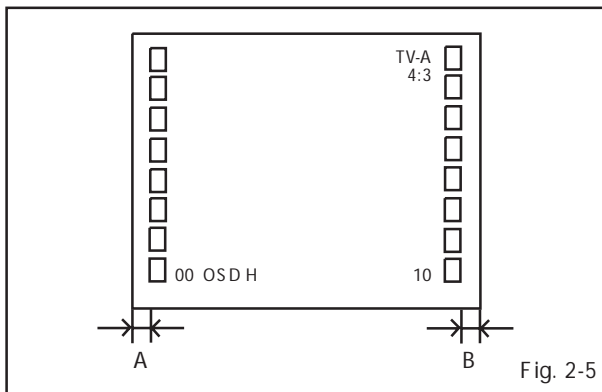


Fig. 2-5

2-9: HORIZONTAL POSITION

1. Provide a Analog monoscope pattern with a generator.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of Fig. 1-1 and press the channel button (03) on the remote control to select "H.POSI".
4. Press the VOL. UP/DOWN button on the remote control until the SHIFT quantity of the OVER SCAN on right and left becomes minimum.
5. Provide a Digital (ATSC) monoscope pattern.
6. Press the TV/AV button on the remote control to set to the DIGITAL mode. Then perform the above adjustments 2~4.

2-10: HORIZONTAL SIZE

1. Provide a monoscope pattern with the pattern generator.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of Fig. 1-1 and press the channel button (43) on the remote control to select "H.SIZE".
4. Press the VOL. UP/DOWN button on the remote control until the SHIFT quantity of the OVER SCAN on the right and left becomes $10 \pm 3\%$.

2-11: VERTICAL LINEARITY

1. Provide a monoscope pattern with the generator.
2. Using the remote control, set the brightness, contrast, to normal position.
3. Activate the adjustment mode display of Fig. 1-1 and press the channel button (08) on the remote control to select "V.LIN".
4. Press the VOL. UP/DOWN button on the remote control until the SHIFT quantity of the OVER SCAN on upside and downside becomes minimum.

2-12: VERTICAL POSITION

1. Provide a monoscope pattern with the pattern generator.
2. Using the remote control, set the brightness and contrast to normal position.
3. Adjust the VR401 until the horizontal line becomes fit to the notch of the shadow mask.
(Refer to Fig. 2-6)

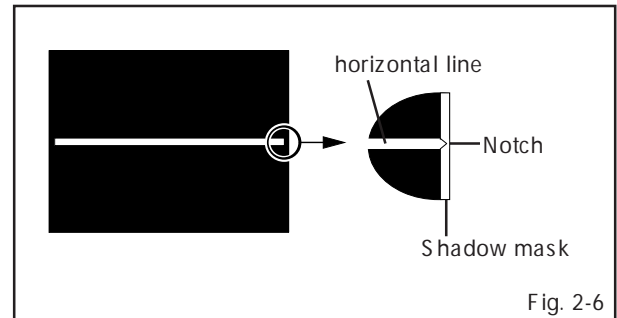


Fig. 2-6

2-13: VERTICAL SIZE

1. Provide a monoscope pattern with the generator.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of Fig. 1-1 and press the channel button (06) on the remote control to select "V.SIZE".
4. Press the VOL. UP/DOWN button on the remote control until the SHIFT quantity of the OVER SCAN on upside and downside becomes $9 \pm 2\%$.

2-14: PARABOLA

1. Provide a crosshatch pattern with a pattern generator.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of Fig. 1-1 and press the channel button (44) on the remote control to select "PARABOLA".
4. Press the VOL. UP/DOWN button on the remote control, so that the line becomes straight from the outside of the right and left.

2-15: TRAPEZIUM

1. Provide a crosshatch signal from the Pattern Generator.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of Fig. 1-1 and press the channel button (45) on the remote control to select "TRAPEZIUM".
4. Press the VOL. UP/DOWN button on the remote control until both ends of the right and left vertical lines of the 4th length lines screen become parallel.

ELECTRICAL ADJUSTMENTS

2-16: CORT OP/BTM

1. Provide a crosshatch signal from the Pattern Generator .
2. Set the screen mode to FULL.
3. Using the remote control, set the brightness and contrast to normal position.
4. Activate the adjustment mode display of Fig. 1-1 and press the channel button (46) on the remote control to select "COR.TOP".
5. Press the VOL. UP/DOWN button on the remote control until both ends of the vertical lines become parallel.
6. Activate the adjustment mode display of Fig. 1-1 and press the channel button (47) on the remote control to select "COR.BTM".
7. Press the VOL. UP/DOWN button on the remote control until both ends of the vertical lines of the screen become parallel.

2-17: BRIGHT CENT

1. Provide a monoscope pattern. (RF Input)
2. Set the screen mode to FULL.
3. Using the remote control, set the brightness and contrast to normal position.
4. Activate the adjustment mode display of Fig. 1-1 and press the channel button (29) on the remote control to select "BRI. CENT".
5. Press the VOL. UP/DOWN button on the remote control until the white 10% is starting to be visible
6. Provide a monoscope pattern. (Audio Video Input)
7. Press the TV/AV button on the remote control to set to the AV mode. Then perform the above adjustments 2~5.
8. Provide a monoscope pattern. (YUV)
9. Press the TV/AV button on the remote control to set to the YUV mode. Then perform the above adjustments 2~5.

2-18: CONTRAST MAX

1. Provide a color bar pattern. (RF Input)
2. Activate the adjustment mode display of Fig. 1-1 and press the channel button (33) on the remote control to select "CONT.MAX".
3. Press the VOL. UP/DOWN button on the remote control until the contrast step No. becomes "95".
4. Receive a broadcast and check if the picture is normal.
5. Provide a color bar pattern. (Audio Video Input)
6. Press the TV/AV button on the remote control to set to the AV mode. Then perform the above adjustments 2~4.
7. Provide a monoscope pattern. (YUV)
8. Press the TV/AV button on the remote control to set to the YUV mode. Then perform the above adjustments 2~4.

2-19: Confirmation of Fixed Value (Step No.)

Please check if the fixed values of each adjustment item is set correctly referring below.

NO.	FUNCTION	RF	AV	CS	DIGITAL
01	OSD C	01	01	01	01
04	H BLK L	02	02	02	02
05	H BLK R	00	00	00	00
07	V.POSI	01	01	01	01
09	VS CORR	14	14	14	14
10	V COMP	03	03	03	03
30	BRI.MAX	65	65	65	65
31	BRI.MIN	10	10	10	10
32	CONT.CENT	55	55	55	50
34	CONT.MIN	10	10	10	10
36	COL.MAX	127	127	127	127
37	COL.MIN	00	00	00	00
39	SHARP.CENT	27	27	27	27
40	SHARP.MAX	63	63	63	63
41	SHARP.MIN	05	05	05	05
42	SUB BIAS	00	00	00	00
48	TEST STEREO	00	00	00	00

ELECTRICAL ADJUSTMENTS

3. PURITY AND CONVERGENCE ADJUSTMENTS

NOTE

1. Turn the unit on and let it warm up for at least 30 minutes before performing the following adjustments.
2. Place the CRT surface facing east or west to reduce the terrestrial magnetism.
3. Turn ON the unit and demagnetize with a Degauss Coil.

3-1: STATIC CONVERGENCE (ROUGH ADJUSTMENT)

1. Tighten the screw for the magnet. Refer to the adjusted CRT for the position. (Refer to Fig. 3-1)
If the deflection yoke and magnet are in one body, untighten the screw for the body.
2. Provide a green raster pattern from the color bar generator.
3. Slide the deflection yoke until it touches the funnel side of the CRT.
4. Adjust center of screen to green, with red and blue on the sides, using the pair of purity magnets.
5. Switch the color bar generator from the green raster pattern to the crosshatch pattern.
6. Combine red and blue of the 3 color crosshatch pattern on the center of the screen by adjusting the pair of 4 pole magnets.
7. Combine red/blue (magenta) and green by adjusting the pair of 6 pole magnets.
8. Adjust the crosshatch pattern to change to white by repeating steps 6 and 7.

NOTE

Adjust after performing adjustments in section 3-1.

1. Provide a green raster pattern from color bar generator.
2. Adjust the pair of purity magnets to center the color on the screen.
Adjust the pair of purity magnets so the color at the ends are equally wide.
3. Move the deflection yoke backward (to neck side) slowly, and stop it at the position when the whole screen is green.
4. Confirm red and blue colors.
5. Adjust the slant of the deflection yoke while watching the screen, then tighten the fixing screw.

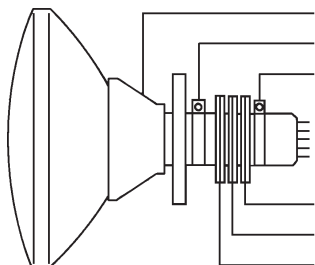


Fig. 3-1

DEFLECTION YOKE
DEFLECTION YOKE SCREW
MAGNET SCREW

6 POLE MAGNETS
4 POLE MAGNETS
PURITY MAGNETS

3-3: STATIC CONVERGENCE

NOTE

Adjust after performing adjustments in section 3-2.

1. Provide a crosshatch pattern from the color bar generator.
2. Combine red and blue of the 3 color crosshatch pattern on the center of the screen by adjusting the pair of 4 pole magnets.
3. Combine red/blue (magenta) and green by adjusting the pair of 6 pole magnets.

3-4: DYNAMIC CONVERGENCE

NOTE

Adjust after performing adjustments in section 3-3.

1. Adjust the differences around the screen by moving the deflection yoke upward/downward and right/left. (Refer to Fig. 3-2-a)
2. Insert three wedges between the deflection yoke and CRT funnel to fix the deflection yoke. (Refer to Fig. 3-2-b)

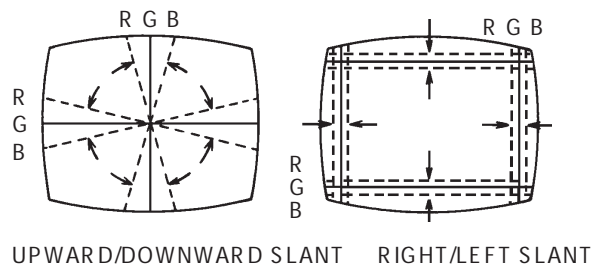


Fig. 3-2-a

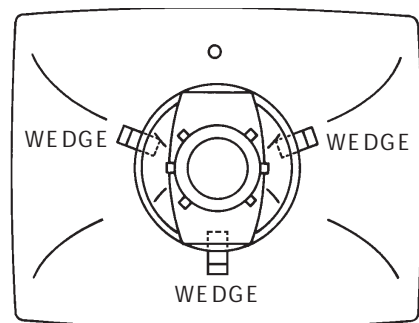


Fig. 3-2-b