PREPARATION FOR SERVICING

How to Enter the Service Mode

Caution: 1

1. Optical sensors system are used for Tape Start and End Sensor on this equipment. Read this page carefully and prepare as described on this page before starting to service; otherwise, the unit may operate unexpectedly.

Preparing: 1

1. Cover Q202 (START SENSOR) and Q201 (END SENSOR) with Insulation Tape or enter the service mode to activate Sensor Inhibition automatically.

Note: Avoid playing, rewinding or fast forwarding the tape to its beginning or end, because both Tape End Sensors are not active.

How to Enter the Service Mode

1. Turn power on.
2. Use service remote control unit and press "DISC MENU" key. (See page 1-7-1.)
3. When entering the service mode, one of the number (1, 2 or 4) will display at corners of the screen.
4. During the service mode, electrical adjustment mode can be selected by remote control key. (Service remote control unit).

   Details are as follows.

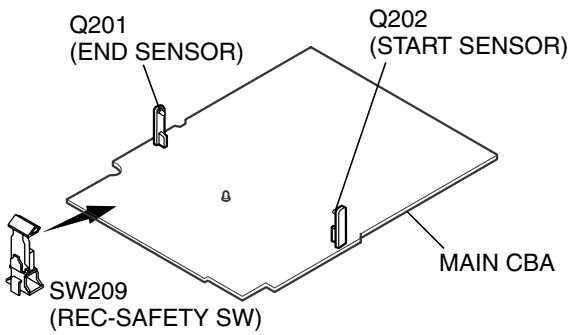
Key	Adjustment Mode
PICTURE	Picture adjustment mode: Press the "PICTURE" button to change from BRT (Bright), *CNT (Contrast), *COL (Color), *TNT(Tint) and *V-T(V-Tint). Press "CH ▲/▼" key to display Initial Value. *Marked items are not necessary to adjust normally.
0	C-Trap and Y DL Time TV/Y DL Time EXT/Y SW LPF/Black Stretch Off/ Black Stretch CONT/C. Angle adjustment mode: See adjustment instructions page 1-7-3.
1	No need to use.
2	H fo adjustment mode: See adjustment instructions page 1-7-4.
3	No need to use.
4	Auto record mode: Perform recording (15 Sec.)-->Stop-->Rewind (Zero return) automatically.
5	Head switching position adjustment mode: See adjustment instructions page 1-7-7.
6	No need to use.
7	Purity check mode: Shows Red, Green, Blue or White cyclically on the screen each time the "7" key is pressed.
8	H. Position Adjustment: See adjustment instructions page 1-7-6.
9	V.size/V. shift adjustment: See adjustment instructions page 1-7-7.
VOL ▲	CD-VOL/VCR-BRT Adjustment mode: See adjustment instructions page 1-7-4.
VOL ▼	Cut-off Adjustment mode: See adjustment instructions page 1-7-4. White balance Adjustment mode: See adjustment instructions page 1-7-5.

Caution: 2

1. The deck mechanism assembly is mounted on the Main CBA directly, and SW209 (REC-SAFETY SW) is mounted on the Main CBA. When deck mechanism assembly is removed from the Main CBA due to servicing, this switch can not be operated automatically.

Preparing: 2

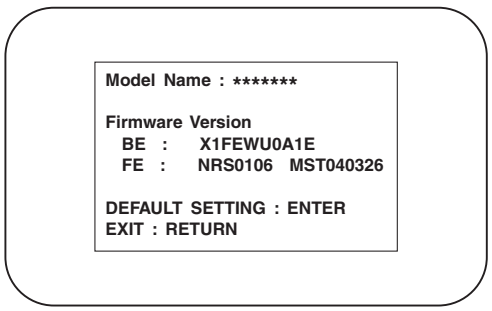
1. To eject the tape, press the "STOP/EJECT" button on the unit (or Remote Control).
2. When you want to record during the Service mode, press the "Rec" button while depressing SW209 (REC-SAFETY SW) on the Main CBA.



HOW TO INITIALIZE THE DVD RECORDER

To put the program back at the factory-default, initialize the DVD recorder as the following procedure.

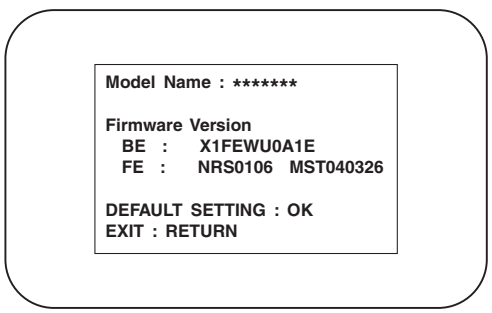
1. Turn the DVD recorder on.
2. Confirm that no disc is loaded or that the disc tray is open. To put the DVD recorder into the Version display mode, press [PAUSE], [1], [2], and [3] buttons on the remote control in the order.
   Fig. A appears on the screen.



*1: "*******" differ depending on the models.
*2: Firmware Version differ depending on the models, and indication is one example.

Fig. A: Version Display Mode Screen

3. Press [ENTER] button, then the DVD recorder starts initializing.
   When the initializing is completed, Fig. B appears on the screen.



*1: "*******" differ depending on the models.
*2: Firmware Version differ depending on the models, and indication is one example.

Fig. B: Completed Initialize Screen

4. Unplug the AC cord from the AC outlet. After waiting for about 30 seconds, plug it again.

ELECTRICAL ADJUSTMENT INSTRUCTIONS

General Note:

"CBA" is abbreviation for "Circuit Board Assembly."

NOTE:

Electrical adjustments are required after replacing circuit components and certain mechanical parts.
It is important to perform these adjustments only after all repairs and replacements have been completed.
Also, do not attempt these adjustments unless the proper equipment is available.

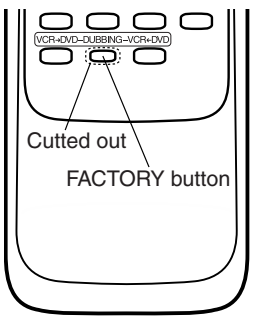
Test Equipment Required

1. NTSC Pattern Generator (Color Bar W/White Window, Red Color, Dot Pattern, Gray Scale, Monoscope, Multi-Burst)
2. AC Milli Voltmeter (RMS)
3. Alignment Tape (FL8A, FL8N), Blank Tape
4. DC Voltmeter
5. Oscilloscope: Dual-trace with 10:1 probe,
   V-Range: 0.001~50V/Div,
   F-Range: DC~AC-60MHz
6. Frequency Counter
7. Plastic Tip Driver
8. Color Analyzer

How to Set up the Service mode:

Service mode:

1. Use the remote control unit.
2. Turn the power on. (Use main power on the TV unit.)
3. To enter the TV mode, press "CH ▲ / ▼" button on the TV unit.
4. Press "FACTORY" button on the remote control unit. Version of micro computer will be displayed on the CRT. (Ex: 057-001)
   (There is a "FACTORY" button between "VCR→DVD-DUBBING" button and "VCR←DVD-DUBBING" button and it is covered with a panel. Therefore, cut out a part of a figure of a panel with a cutter knife, etc. and press "FACTORY" button.)



X-Ray Protection Test

X-Ray protection test should be done when replacing any parts of this chassis.

1. Short both ends of R592 (on H.V. CBA).
2. Confirm that the main power turns off.
3. If the main power does not turn off, then replace the following parts (D591, Q591, R592, R593, R594 and IC201).
4. Perform steps 1 to 3 again.

1. DC 138V (+B) Adjustment

Purpose: To obtain correct operation.

Symptom of Misadjustment: The picture is dark and unit does not operate correctly.

Test point	Adj. Point	Mode	Input
D626 Cathode (+B), HEAT SINK (GND)	VR601	---	-----
Tape	**M. EQ.**	**Spec.**	
---	DC Voltmeter	+138±1.0V DC	

Note: D626 Cathode (+B), HEAT SINK,
VR601 --- Main CBA

1. Connect the unit to AC Power Outlet.
2. Connect DC Volt Meter to D626 Cathode (+B) and HEAT SINK (GND).
3. Adjust VR601 so that the voltage of D626 Cathode (+B) becomes +138±1.0V DC.

2. Setting for CONTRAST, COLOR, TINT and V-TINT Data Values

General

1. Enter the Service mode. (See page 1-7-1.)
2. Press "PICTURE" button on the remote control unit. Display changes "BRT," "CNT," "COL," "TNT," and "V-T" cyclically when "PICTURE" button is pressed.

CONTRAST (CNT)

1. Press "PICTURE" button on the remote control unit. Then select "CONTRAST (CNT)" display.
2. Press "CH ▲ / ▼" buttons on the remote control unit so that the value of "CONTRAST (CNT)" becomes 90.

COLOR (COL)

1. Press "PICTURE" button on the remote control unit. Then select "COLOR (COL)" display.
2. Press "CH ▲ / ▼" buttons on the remote control unit so that the value of "COLOR (COL)" becomes 58.

TINT (TNT)

1. Press "PICTURE" button on the remote control unit. Then select "TINT (TNT)" display.
2. Press "CH ▲ / ▼" buttons on the remote control unit so that the value of "TINT (TNT)" becomes 57.

V-TINT (V-T)

1. Press "PICTURE" button on the remote control unit. Then select "V-TINT (V-T)" display.
2. Press "CH ▲ / ▼" buttons on the remote control unit so that the value of "V-TINT (V-T)" becomes 56.

Note: BRIGHT data value does not need to be adjusted at this moment.

3-1. C-Trap Adjustment

Purpose: To get minimum leakage of the color signal carrier.

Symptom of Misadjustment: If C-Trap Adjustment is incorrect, stripes will appear on the screen.

Test point	Adj. Point	Mode	Input
J1078 (B-OUT)	CH ▲ / ▼ buttons	---	Color Bar
Tape	**M. EQ.**	**Spec.**	
---	Oscilloscope Pattern Generator	---	

Figure

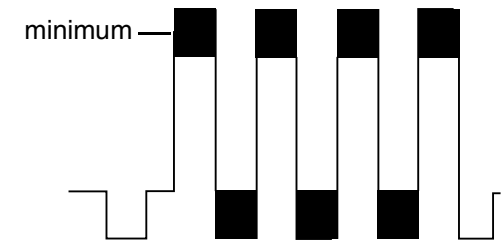


Fig. 2

Note: J1078 (B-OUT)--- Sub-A CBA

1. Connect oscilloscope to J1078.
2. Input a color bar signal from RF input.
   Enter the Service mode. (See page 1-7-1.)
3. Press "0" button on the remote control unit and select C-TRAP mode. (Fig. 3)
4. Press "CH ▲ / ▼" buttons on the remote control unit so that the carrier leakage B-Out (3.58MHz) value becomes minimum on the oscilloscope.
5. Turn the power off and on again.

3-2. Setting for Y DL Time TV, Y DL Time EXT, Y SW LPF, Black Stretch Off, Black Stretch CONT and C. Angle Data Values

1. Enter the Service mode. (See page 1-7-1.)
2. **Y DL Time TV Adjustment:** Press "0" button on the remote control unit twice to show "D-T TV" on the display.
   Y DL Time EXT Adjustment: Press "0" button on the remote control unit three times to show "D-T EXT" on the display.
   Y SW LPF Adjustment: Press "0" button on the remote control unit four times to show "Y SW" on the display.
   Black Stretch Off Adjustment: Press "0" button on the remote control unit five times to show "B-S" on the display.
   Black Stretch CONT Adjustment: Press "0" button on the remote control unit six times to show "BS2" on the display.
   C. Angle Adjustment: Press "0" button on the remote control unit seven times to show "C-ANG" on the display.
3. **Y DL Time TV Adjustment:** Select "2" by pressing "CH ▲ / ▼" buttons on the remote control unit.
   Y DL Time EXT Adjustment: Select "2" by pressing "CH ▲ / ▼" buttons on the remote control unit.
   Y SW LPF Adjustment: Select "0" by pressing "CH ▲ / ▼" buttons on the remote control unit.
   Black Stretch Off Adjustment: Select "OFF" by pressing "CH ▲ / ▼" buttons on the remote control unit.
   Black Stretch CONT Adjustment: Select "0" by pressing "CH ▲ / ▼" buttons on the remote control unit.
   C. Angle Adjustment: Select "103" by pressing "CH ▲ / ▼" buttons on the remote control unit.

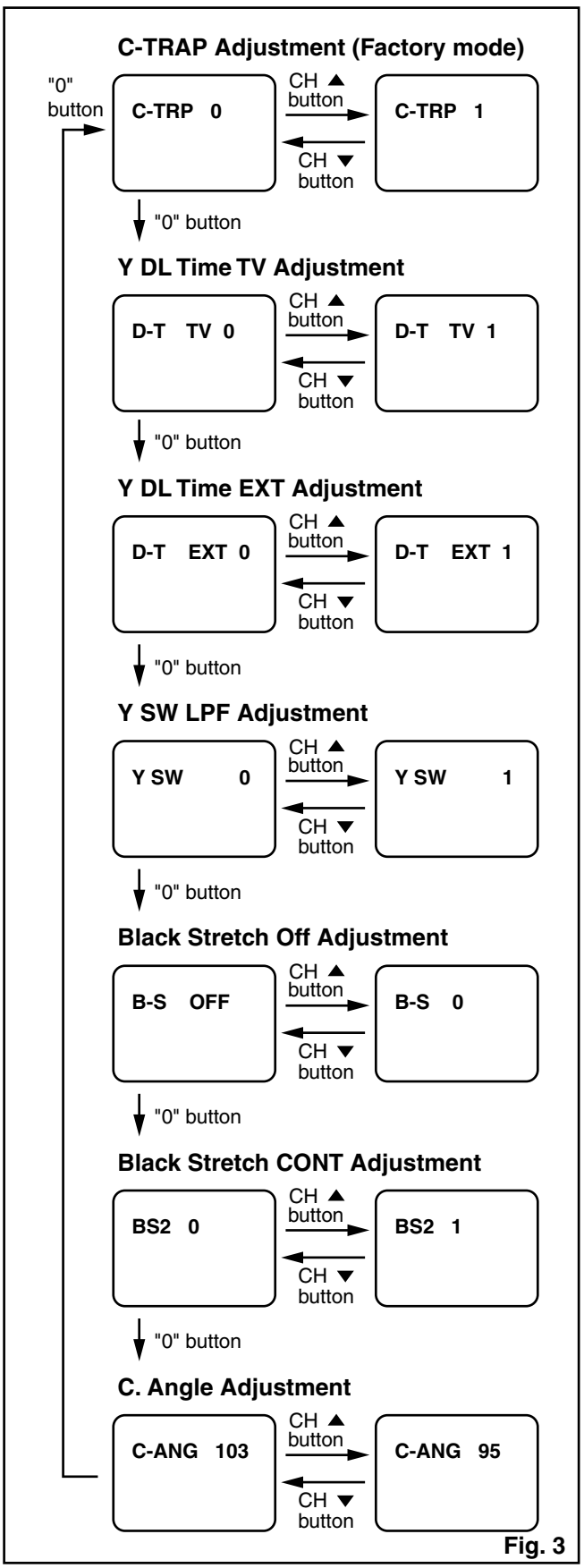


Fig. 3

4. Setting for CD-VOL and VCR-BRT Data Values

1. Enter the Service mode. (See page 1-7-1.)
2. **CD-VOL Adjustment:** Press "VOL ▲" button on the remote control unit once to show "CD VOL" on the display.
   VCR-BRT Adjustment: Press "VOL ▲" button on the remote control unit twice to show "VCR BRT" on the display.
3. **CD-VOL Adjustment:** Select "0" by pressing "CH ▲ / ▼" buttons on the remote control unit.
   VCR-BRT Adjustment: Select "0" by pressing "CH ▲ / ▼" buttons on the remote control unit.

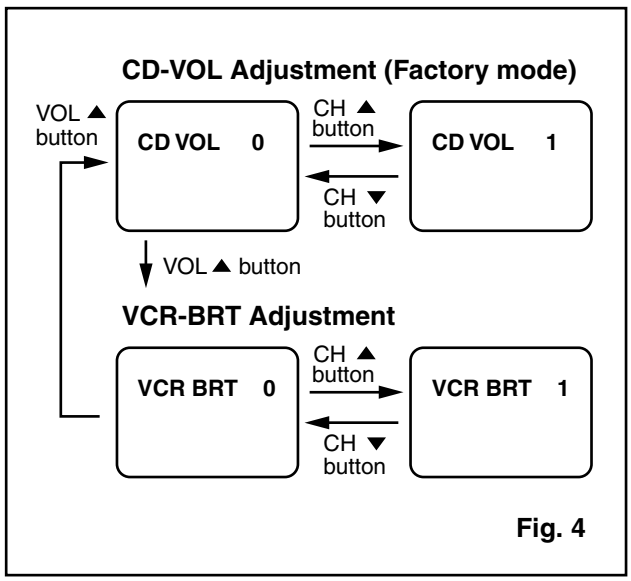


Fig. 4

5. H fo Adjustment

Purpose: To get correct horizontal position and size of screen image.

Symptom of Misadjustment: Horizontal position and size of screen image may not be properly displayed.

Test point	Adj. Point	Mode	Input
R583	CH ▲ / ▼ buttons	Video	---
Tape	**M. EQ.**	**Spec.**	
---	Frequency Counter	15.734kHz±300Hz	

Note: R583 --- H.V. CBA

1. Connect frequency counter to R583.
2. Operate the unit for at least 20 minutes.
3. Enter the Service mode. (See page 1-7-1.) Press "2" button on the remote control unit and select H-ADJ mode.
4. Press "CH ▲ / ▼" buttons on the remote control unit so that the display will change "0" to "7."
5. At this moment, choose display "0" to "7" when the frequency counter display is closest to 15.734kHz±300Hz.
6. Turn the power off and on again.

6. Cut-off Adjustment

Purpose: To adjust the beam current of R, G, B, and screen voltage.

Symptom of Misadjustment: White color may be reddish, greenish or bluish.

Test point	Adj. Point	Mode	Input
---	Screen-Control CH ▲ / ▼ buttons	RF	Black Raster
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator	See Reference Notes below	
Figure			

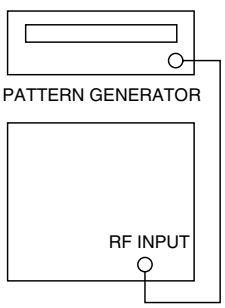


Fig. 5

Notes: Screen Control --- FBT (H.V. CBA), FBT= Fly Back Transformer,
Use the Remote Control Unit.

1. Degauss the CRT and allow the unit to operate for 20 minutes before starting the alignment.
2. Input the Black raster signal from RF input.
3. Enter the Service mode. (See page 1-7-1.)
4. Press the "VOL ▼" button.
   (Press "VOL ▼" then display will change CUT OFF/ DRIVE and 7Fh adjustment).
5. Choose CUT OFF/DRIVE mode then press "1" button. This adjustment mode is CUT OFF (R).
6. Increase the screen control so that the horizontal line just appears on the CRT.
7. Press the "CH ▲ / ▼" button until the horizontal line becomes white.
8. Choose CUT OFF/DRIVE mode then press "2" button. This adjustment mode is CUT OFF (G). Press "CH ▲ / ▼" until the horizontal line becomes white.
9. Choose CUT OFF/DRIVE mode then press "3" button. This adjustment mode is CUT OFF (B). Press "CH ▲ / ▼" until the horizontal line becomes white.
10. Turn the power off and on again.

7. H. Size Adjustment

Purpose: To obtain correct size of screen image.

Symptom of Misadjustment: Size of screen image may not be properly displayed.

Test point	Adj. Point	Mode	Input
---	VR531	---	Monoscope
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator	90+1%/-5%	

Note: VR531 --- H.V. CBA

1. Input monoscope pattern.
2. Adjust VR531 so that the monoscope pattern is 90+1%/-5% of display size and the circle is round.

8. H. Pincushion Adjustment

Purpose: To obtain straight line on the screen.

Symptom of Misadjustment: Straight line image may not be properly displayed.

Test point	Adj. Point	Mode	Input
---	VR530	---	Crosshatch
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator	See below	

Note: VR530 --- H.V. CBA

1. Input crosshatch pattern.
2. Adjust VR530 so that the lines of the crosshatch pattern become straight.

9. White Balance Adjustment

Purpose: To mix red, green and blue beams correctly for pure white.

Symptom of Misadjustment: White becomes bluish or reddish.

Test Point	Adj. Point	Mode	Input
Screen	CH ▲ / ▼ buttons	RF	White Raster (APL 100%)
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator, Color analyzer	See below	
Figure			

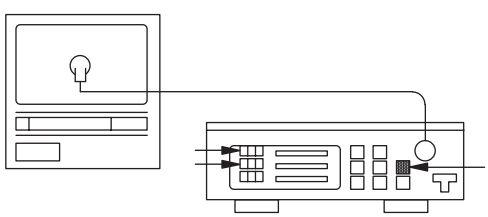


Fig. 6

Note: Use remote control unit

1. Operate the unit more than 20 minutes.
2. Face the unit to the east. Degauss the CRT using a degaussing coil.
3. Input the White Raster (APL 100%).
4. Set the color analyzer to the CHROMA mode and after zero point calibration, bring the optical receptor to the center on the tube surface (CRT).
5. Enter the Service mode. Press "VOL ▼" button on the remote control unit and select "C/D" mode. (Display changes "C/D" and "7F" cyclically when "VOL ▼" button is pressed.)
6. Press "4" button on the remote control unit for Red adjustment. Press "5" button on the remote control

unit for Blue adjustment.

7. In each color mode, press "CH ▲ / ▼" button to adjust the values of color.
8. Adjust Red and Blue color so that the temperature becomes 9200K (x: 286 / y: 294) ±3%.
9. At this time, re-check that horizontal line is white. If not, re-adjust Cut-off Adjustment until the horizontal line becomes pure white.
10. Turn off and on again to return to normal mode. Receive APL 100% white signal and confirm that Chroma temperatures become 9200K (x: 286 / y: 294) ±3%.

Note: Confirm that Cut Off Adj. is correct after this adjustment, and attempt Cut Off Adj. if needed.

10. Sub-Brightness Adjustment

Purpose: To get proper brightness.

Symptom of Misadjustment: If Sub-Brightness is incorrect, proper brightness cannot be obtained by adjusting the Brightness Control.

Test point	Adj. Point	Mode	Input
---	CH ▲ / ▼ buttons	---	SMPTE 7.5IRE
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator	See below	

Figure

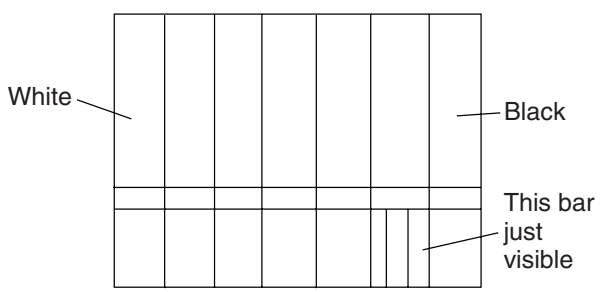


Fig. 7

Note: SMPTE Setup level --- 7.5 IRE

1. Enter the Service mode. (See page 1-7-1.)
   Then input SMPTE signal from RF input.
2. Press "PICTURE" button. (Press "PICTURE" button then display will change BRT, CNT, COL, TNT, and V-T). Select BRT and press "CH ▲ / ▼" buttons so that the bar is just visible (See above figure).
3. Turn the power off and on again.

11. Focus Adjustment

Purpose: Set the optimum Focus.

Symptom of Misadjustment: If Focus Adjustment is incorrect, blurred images are shown on the display.

Test point	Adj. Point	Mode	Input
---	Focus Control	---	Monoscope
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator	See below.	

Note: Focus VR --- FBT (H.V. CBA), FBT= Fly Back Transformer

1. Operate the unit more than 30 minutes.
2. Face the unit to the East and degauss the CRT using a degaussing coil.
3. Input the monoscope pattern.
4. Adjust the Focus Control on the FBT to obtain a clear picture.

12. H. Position Adjustment

Purpose: To obtain correct horizontal position and size of screen image.

Symptom of Misadjustment: Horizontal position and size of screen image may not be properly displayed.

Test point	Adj. Point	Mode	Input
---	CH ▲ / ▼ buttons	---	Monoscope
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator	---	

1. Enter the Service mode. (See page 1-7-1.)
   Press "8" button on the remote control unit and select H-P mode.
2. Input monoscope pattern.
3. Press "CH ▲ / ▼" buttons on the remote control unit so that the left and right side of the monoscope pattern are equal to each other.
4. Turn the power off and on again.

13. V. Shift Adjustment

Purpose: To obtain correct vertical position of screen image.

Symptom of Misadjustment: If V. position is incorrect, vertical position of image on the screen may not be properly displayed.

Test point	Adj. Point	Mode	Input
---	CH ▲ / ▼ buttons	---	Monoscope
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator	---	

1. Enter the Service mode. (See page 1-7-1.)
   Press "9" button on the remote control unit and select V-P mode. (Press "9" button then display will change to V-P and V-S).
2. Input monoscope pattern.
3. Press "CH ▲ / ▼" buttons on the remote control unit so that the top and bottom of the monoscope pattern are equal to each other.

14. V. Size Adjustment

Purpose: To obtain correct vertical height of screen image.

Symptom of Misadjustment: If V. Size is incorrect, vertical height of image on the screen may not be properly displayed.

Test point	Adj. Point	Mode	Input
---	CH ▲ / ▼ buttons	---	Monoscope
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator	90±5%	

1. Enter the Service mode. (See page 1-7-1.)
   Press "9" button on the remote control unit and select V-S mode. (Press "9" button then display will change to V-P and V-S).
2. Input monoscope pattern.
3. Press "CH ▲ / ▼" buttons on the remote control unit so that the monoscope pattern is 90±5% of display size and the circle is round.

15. Head Switching Position Adjustment

Purpose: Determine the Head Switching Position during Playback.

Symptom of Misadjustment: May cause Head Switching Noise or Vertical Jitter in the picture.

Note: Unit reads Head Switching Position automatically and displays it on the screen (Upper Left Corner).

1. Playback test tape (FL8A, FL8N).
2. Enter the Service mode. (See page 1-7-1.)
   Then press the number "5" button on the remote control unit.
3. The Head Switching position will display on the screen; if adjustment is necessary follow step 4. 6.5H(412.7μs) is preferable.
4. Press "CH ▲" or "CH ▼" button on the remote control unit if necessary. The value will be changed in 0.5H steps up or down. Adjustable range is up to 9.5H. If the value is beyond adjustable range, the display will change as:
   Lower out of range: 0.0H
   Upper out of range: -.-H
5. Turn the power off and on again.

The following 2 adjustments normally are not attempted in the field. They should be done only when replacing the CRT then adjust as a preparation.

16. Purity Adjustment

Purpose: To obtain pure color.

Symptom of Misadjustment: If Color Purity Adjustment is incorrect, large areas of color may not be properly displayed.

Test point	Adj. Point	Mode	Input
---	Deflection Yoke Purity Magnet	---	*Red Color
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator	See below.	
Figure			

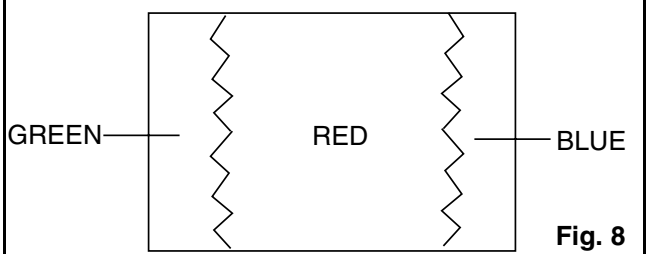


Fig. 8

* This becomes RED COLOR if the 7KEY is pressed while in service mode.

1. Set the unit facing east.
2. Operate the unit for over 30 minutes before adjusting.
3. Fully degauss the unit using an external degaussing coil.
4. Set the unit to the AUX mode which is located before CH2 then input a red raster from video in.
5. Loosen the screw on the Deflection Yoke Clamper and pull the Deflection Yoke back away from the screen. (See Fig. 9.)
6. Loosen the Ring Lock and adjust the Purity Magnets so that a red field is obtained at the center of the screen. Tighten Ring Lock. (See Fig. 8,9.)
7. Slowly push the Deflection Yoke toward the bell of the CRT and set it where a uniform red field is obtained.
8. Tighten the clamp screw on the Deflection Yoke.

17. Convergence Adjustment

Purpose: To obtain proper convergence of red, green and blue beams.

Symptom of Misadjustment: If Convergence Adjustment is incorrect, the edge of white letters may have color edges.

Test point	Adj. Point	Mode	Input
---	C.P. Magnet (RB), C.P. Magnet (RB-G), Deflection Yoke	---	Dot Pattern or Crosshatch
Tape	**M. EQ.**	**Spec.**	
---	Pattern Generator	See below.	
Figure			

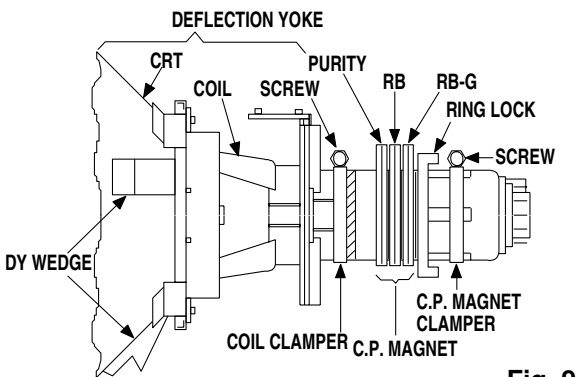


Fig. 9

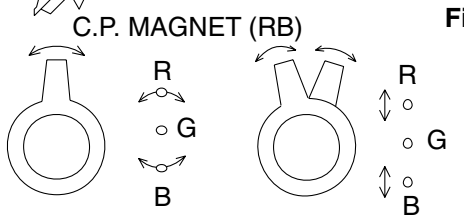


Fig. 10

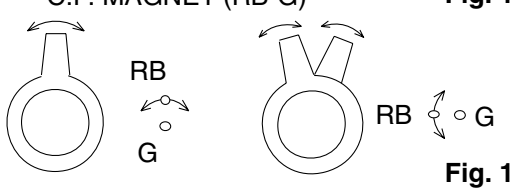


Fig. 11

1. Set the unit to the AUX mode which is located before CH2 then input a dot or crosshatch pattern.
2. Loosen the Ring Lock and align red with blue dots or crosshatch at the center of the screen by rotating (RB) C.P. Magnets. (See Fig. 10.)
3. Align red / blue with green dots at the center of the screen by rotating (RB-G) C.P. Magnet. (See Fig. 11.)
4. Fix the C.P. Magnets by tightening the Ring Lock.
5. Remove the DY Wedges and slightly tilt the Deflection Yoke horizontally and vertically to obtain the best overall convergence.
6. Fix the Deflection Yoke by carefully inserting the DY Wedges between CRT and Deflection Yoke.

FIRMWARE RENEWAL MODE

1. Turn the power on and remove the disc on the tray.
2. To put the DVD recorder into version up mode, press [PAUSE], [6], [5], and [4] buttons on the remote control unit in the order. The tray will open automatically.
   Fig. a appears on the screen.

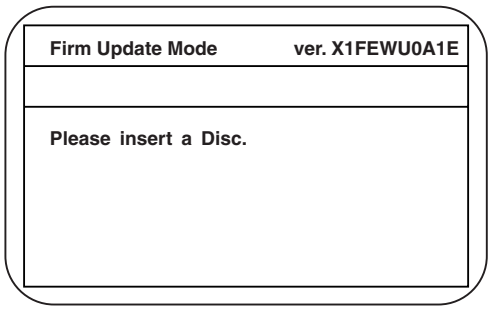


Fig. a Version Up Mode Screen

3. Load the disc for version up.
   Fig. b appears on the screen. The file on the top is highlighted as the default.
   When there is only one file to exist, Step 4 will start automatically.

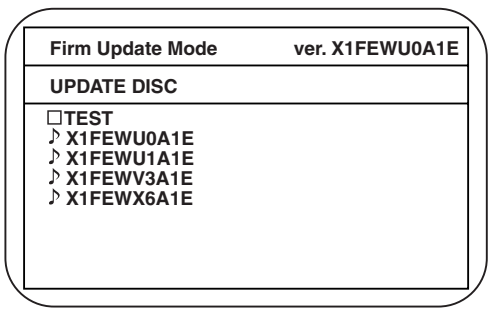


Fig. b Update Disc Screen

4. Select the firmware version using arrow buttons, then press [ENTER] button on the remote control unit.
   Fig. c appears on the screen. The DVD recorder starts updating.

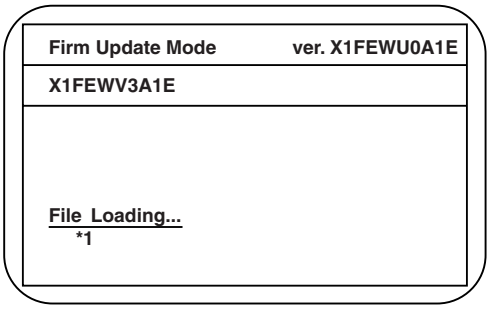


Fig. c Programming Mode Screen

The appearance shown in *1 of Fig. d is described as follows.

No.	Appearance	State
1	File Loading...	Sending files into the memory.
2	Firmware Updating...	Writing new version data.
-	Firm Update Failure	Failed in updating.

5. After updating is finished, the tray opens automatically.
   Fig. d appears on the screen.

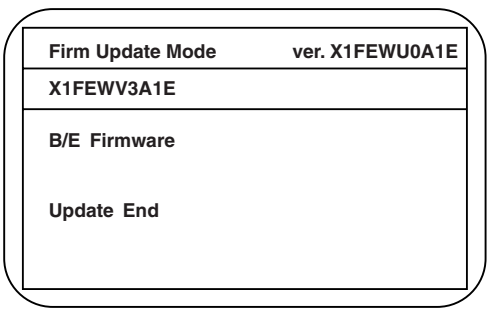


Fig. d Completed Program Mode Screen

6. Unplug the AC cord from the AC outlet. Then plug it again.