

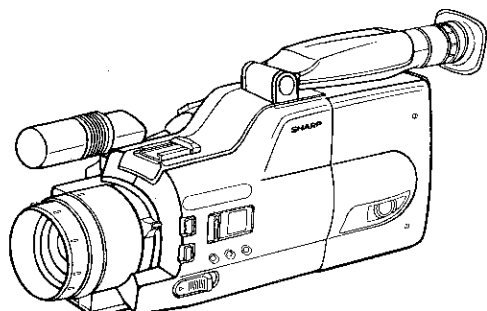
SHARP

SERVICE MANUAL

S41B6VL-C790S

VHS CAMCORDER
(PAL)

HQ HIGH QUALITY



VL-C790S/H/X MODELS VL-C7450E

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

The Technical Manual for this model will be issued later.

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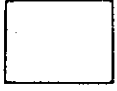




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ADJUSTMENT OF VCR MECHANISM UNIT

Note: N indicates the new jigs.


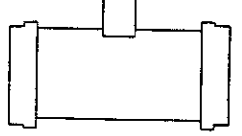
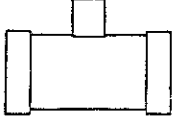


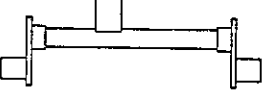

No.	Jig Item		Parts Code	Price Code	Configuration	Note
1-1	Torque Cassette (for PB)		JIGCTM0020P	CV		
1-2	Torque Cassette (for V/S-R)		JIGVHC032	CV		
2	Torque Gauge (90g. cm)		JIGTG0090	CM		
3	Torque Gauge Head		JIGTH0006	AW		
4	Tape Guide Adjusting Screw Driver		JIGDRIVER-8	AW		
5	Master Plane		JIGMP-C73	BZ		
6	Hexagon Wrench (1.5mm)		JIGHW0015	AE		
7	Alignment Cassett Tape		VR1HPSV	CG		
8-1	Height Adjusting Jigs A		JIGGH-C73	BS		
8-2	Height Adjusting Jigs B		JIGACH-C73	BV		
9	Box Driver	3mm	JIGDRIVER-46-3	AH		
		4.5mm	JIGDRIVERN8645	AM		
10-1	Micrometer		JIGPUJ96016	CR	<p>Micro checker stand (JIGPIN-C73) Micrometer (JIGPUJ96016) Stand</p>	
10-2	Micro checker Stand		JIGPUJ94195	CA		
10-3	Stand Pin		JIGPIN-C73	AY		
11	Torque Measuring Jig		JIGTS0020P	BP		
12	Tension Gauge		JIGSG2000	BF		
13	Torque Driver		JIGTD0200	CA		
14	Gear Type Driver		JIGDRIVER-6	BM		

ADJUSTMENT OF CAMERA UNIT

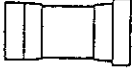
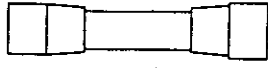

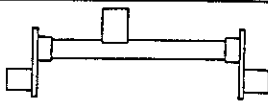

No.	Jig Item	Parts Code	Price Code	Configuration	Note
1	Camera Stand	JIGSTAND-C680	BG		N
2	Gray Scale Chart (390 x 520 mm)	JIGCHART-1	CP		
3	White Pattern Chart (390 x 520 mm)	JIGCHART-2	CG		
4	Colour Bar Chart (240 x 520 mm)	JIGCHART-4	CV		
5	Tracking Driver	JIGDRIVER-11	BR		
6	Illuminometer (0~3000 Lx)	JIGMETER-1	CT		
7	Colour Thermometer (1600~400000°K)	JIGMETER-2	**		
8	Colour Temperature Conversion Filter	HOYA "W12"	—		
9	Colour Temperature Conversion Filter	JIGHOYA-LB165	BH		
10	Siemens Star Chart (Master Lens Adjustment Chart)	JIGCHART-11	CE		

- Note:
1. You may use normal solder but in order to maintain the performance of PWB, we recommend to use the solder containing silver (jig item No.6) when replacing the chip parts.
 2. Colour temperature conversion filter (jig item No. 9) may be obtained from HOYA Corporation in your local market.

LIST OF CAMERA EXTENSION CABLES

No.	Jig Item	Parts Code	Price Code	Configuration	Note
1	Extension Wire (P401 (MF) ↔ P15 (BG)) Camera Proses ↔ video Y/C	QCNW-1051TAZZ	AN		N
2	Extension Wire (P709 (FB) ↔ P18 (BJ)) A/F PWB ↔ Power Unit	QCNW-1050TAZZ	AN		N
3	Extension Wire (P701 (ME) ↔ P11 (AL)) Camera Proses ↔ Main PWB	QCNW-1049TAZZ	AP		N
4	Extension Wire (P708 (FA) ↔ P001 (CA)) A/F PWB ↔ Operation PWB	QCNW-1048TAZZ	BG		N
5	Extension Wire (P601 (FE) ↔ LENS) A/F PWB ↔ Lens unit	QCNW-1047TAZZ	BG		N
6	Extension Wire (P703 (MC) ↔ P705 (FC)) Camera Proses ↔ A/F PWB	QCNW-1046TAZZ	BG		N
7	Extension Wire (P704 (MD) ↔ P706 (FD)) Camera Proses ↔ A/F PWB	QCNW-1045TAZZ	BA		N

LIST OF VCR EXTENSION CABLES

No.	Jig Item	Parts Code	Price Code	Configuration	Note
1	BE-Mecha Signal PWB-Mechanism (Audio head)	QCNW-1036TAZZ	AA		N
2	AA-Mecha Control PWB-Mechanism (loading motor)	QCNW-1037TAZZ	AM		N
3	BC-AJ Signal PWB-Control PWB	QCNW-1062TAZZ	BG		N
4	BA-AK Signal PWB-Control PWB	QCNW-1063TAZZ	BG		N
5	BD-AK Signal PWB-Control PWB	QCNW-1064TAZZ	BF		N
6	AG-Mecha Control PWB-Mechanism (Video head)	QCNW-1075TAZZ	AQ		N

FEATURES

- 1 12x NEW ZOOM SYSTEM
- 2 Full Auto Camera Recording System
— Automatic Focus, Iris, and White Balance
- 3 1/10,000, 1/2,000, 1/500, 1/100 of a sec. variable range, high speed shutter.
- 4 Ultra low light recording down to 3 lx (with Gain-up function)
- 5 Intelligent Auto Iris for shooting backlit subjects
- 6 Flying erase head and camera search
- 7 Self timer for Camera Recording
- 8 3-way power source with AC, battery, and car battery

SPECIFICATIONS

Format	VHS standard
Power source	DC9.6V
Power consumption	8.5W
Signal system	PAL-type
Recording system	Luminance: FM recording (FM carrier 3.8MHz) Colour: Low frequency converted direct recording Conforms to VHS standard
Cassette	VHS-C cassette
Tape speed (SP)	23.39mm/sec
(LP)	11.70mm/sec
Recording time (Max.) (SP)	30 minutes (with EC-30 cassette)
(LP)	60 minutes (with EC-30 cassette)
Video Output	1.0Vp-p, 75ohms, unbalanced (via A/V out connector)
S/N ratio	45dB (with Rohde & Schwarz noise meter)
Audio output	-8dBs, 1kohm (via A/V out connector)
Microphone input	-65dB, high impedance, unbalanced
Pickup	1/2" -format CCD
Minimum required illumination	3 lx (at F 1.6 with Gain up)
Lens	F1.6, f = 8-64 mm/F2.4 f = 12-96 mm, 12 x power zoom lens (VL-C790S. H. X. 7450E) with built-in extender function, auto iris control and macro position, filter diameter 46 mm.
Viewfinder	Electronic viewfinder with 0.7" black/white CRT
Colour temperature compensation	Auto white balance with white balance lock
Operating temperature	0°C to 40°C
Operating humidity	35%~80% RH
Storage temperature	-20°C to 60°C
Weight	Approx. 1.2kg (without battery)
Dimensions	126 (W) mm (without viewfinder) 151 (H) mm (135mm with view finder) 322 (D) mm (292 mm with view finder folded)

AC ADAPTOR SPECIFICATIONS

Power requirement	AC110~240V (50/60Hz)
Power consumption	28W
Rated output voltage	DC9.6V
Rated output current	1.3A
Charging system	Constant current, peak detection, timer controlled
Dimensions	70 (W) x 43 (H) x 154 (D) mm
Weight	Approx. 380g

VHS cassette adaptor SPECIFICATIONS

Type	VHS cassette adaptor
Dimensions	188 (W) x 25 (H) x 104 (D) mm
Weight	Approx 200 g
Accessory	"AA" Size battery x 1

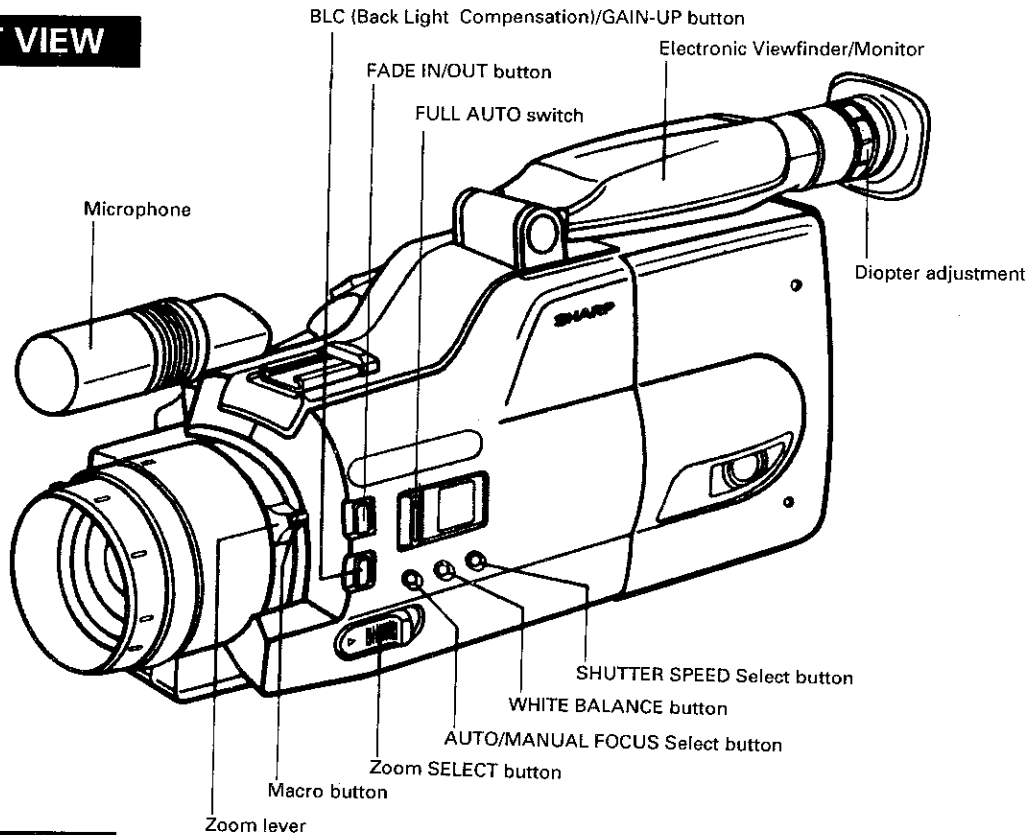
RF CONVERTOR SPECIFICATIONS

Output channel	channel UHF 30~39CH (S, H, E) VHF 0CH/1CH (X)
Initial setting	channel UHF 36CH (S, H, E) VHF 0CH (X)
Broadcast system	CCIR-G (S) CCIR-G/I (H,E) CCIR-B (X)

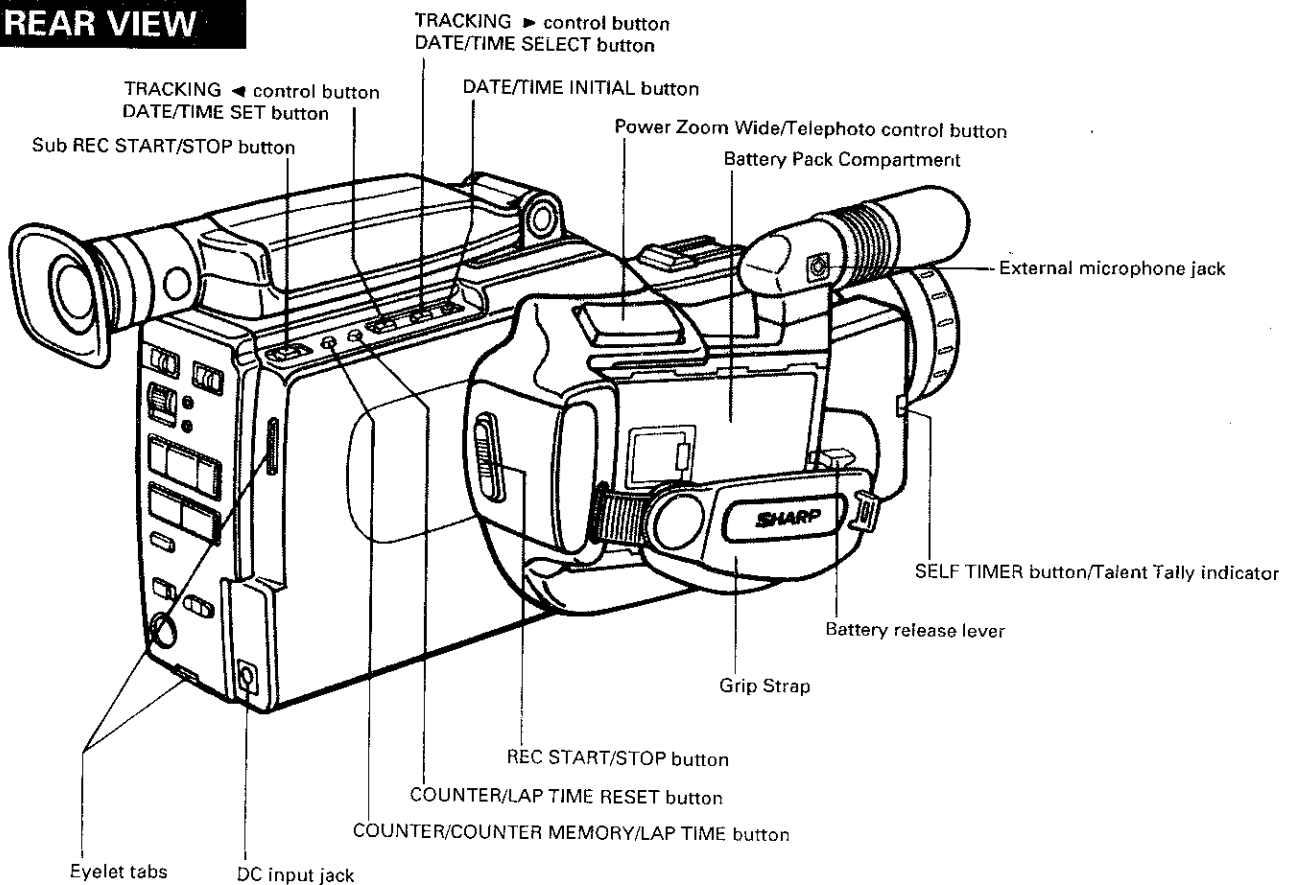
Design and specifications are subject to change without notice.

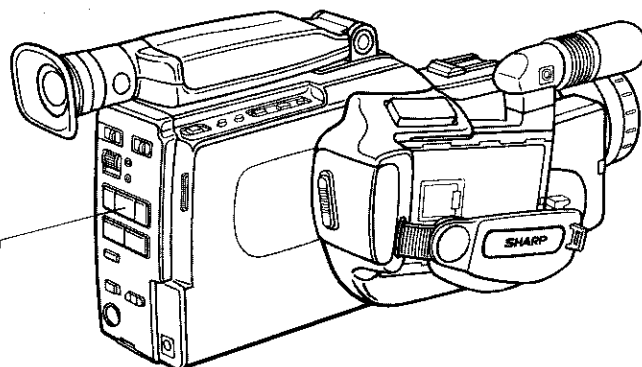
MAJOR OPERATING COMPONENTS AND THEIR FUNCTIONS

FRONT VIEW

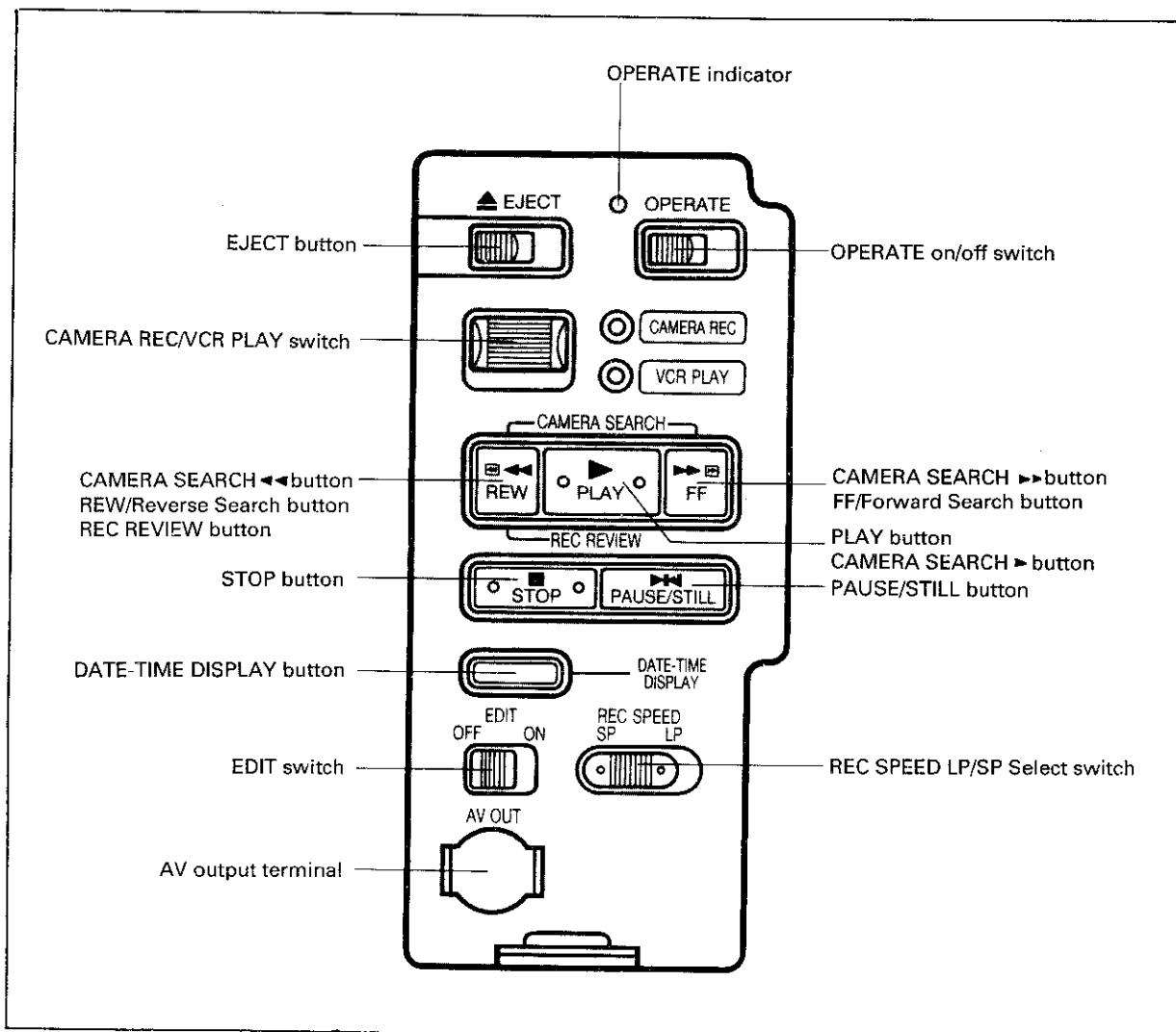


REAR VIEW





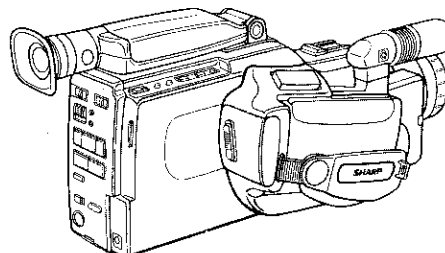
CONTROL PANEL



CAMERA RECORDING

CAMERA RECORDING

- 1** Attach the recharged battery pack. However, use the supplied AC adaptor for indoor camera recording or an optional Sharp car battery adaptor/charger for recording in a car.

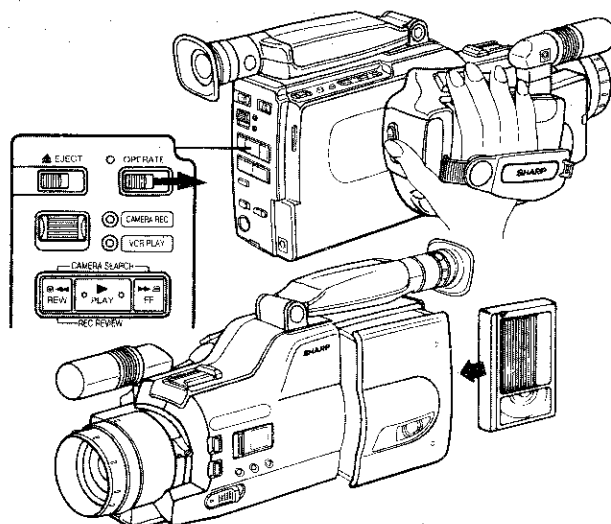


- 2** Slide the OPERATE switch on — the operate indicator will light. Press the EJECT button and open the cassette holder. Insert a **VHS** video cassette with its tab intact and with its window facing outward. Press on the "PUSH" mark to close the compartment door.

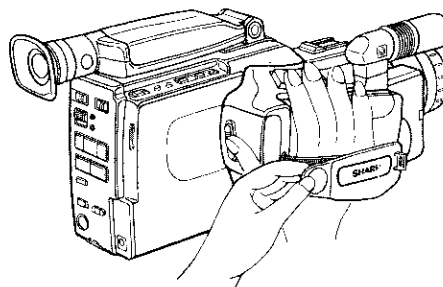
Caution:

Before inserting the video cassette, be sure to check that the tape is not slack. If there is tape slack, turn the reel in the direction of the arrow.

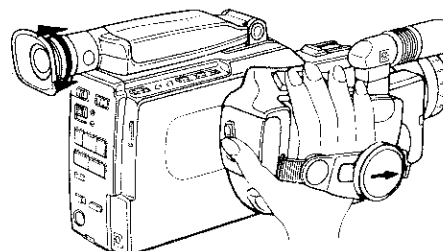
Remove
tape slack



- 3** Position your hand properly to allow your fingers to press the REC START/STOP button and Power Zoom button. Then adjust the grip strap to suit your hand.

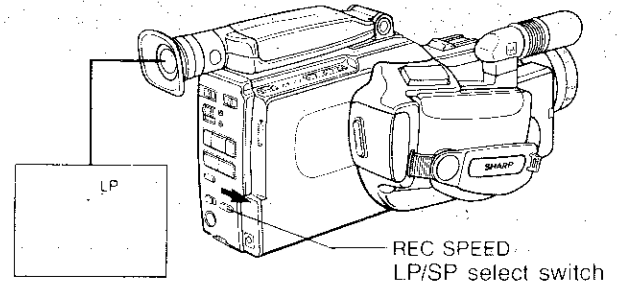


- 4** Remove the lens cap and secure it to the grip band. Then aim the camera at a solid colour subject (the sky or a white wall) and adjust the diopter adjustment so the display in the viewfinder becomes clear.

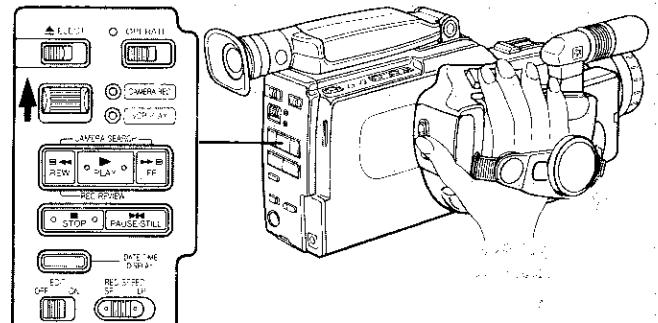


- 5** Press the REC Speed LP/SP select switch and set the recording time. This causes the selected recording mode to appear in the viewfinder. Recording time on the **VHS** tape EC-30 is as follows.

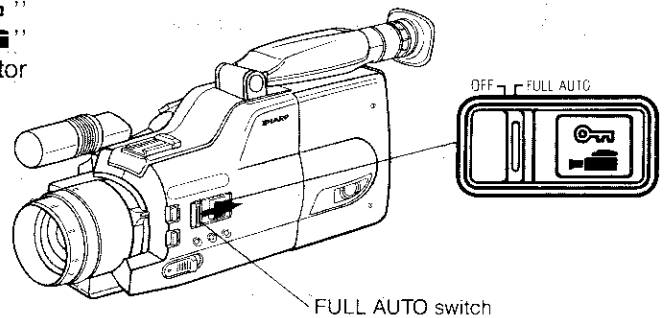
SP mode: 30 minutes
LP mode: 60 minutes



- 6** Set the CAMERA REC/VCR PLAY switch to "CAMERA REC" position.



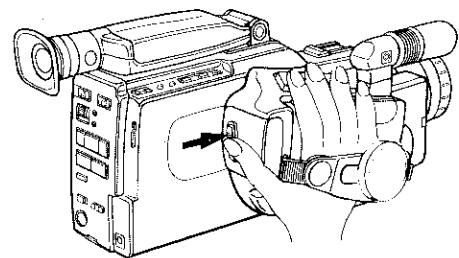
- 7** Set the FULL AUTO switch to "FULL AUTO" position. Make certain that the "⏏" and "🔑" marks appear in the LCD display. If the "⏏" and "🔑" marks are flashing, an alarm indicator will appear in the viewfinder.



- 8** Press the REC START/STOP button. While recording, "▶▶▶▶" in the viewfinder moves in sequence from left to right.

Note

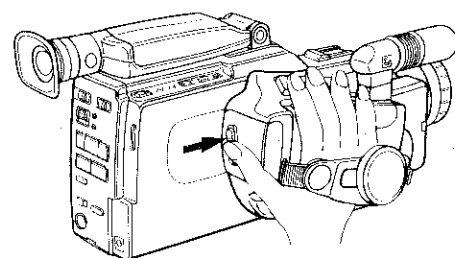
If recording for an extended period of time, the handgrip may become hot. However, this does not indicate malfunction.



- 9** When you wish to finish recording, press the REC START/STOP button once again.

Note

If the Camcorder is in the REC PAUSE mode for more than 5 minutes, it will switch itself off. To restart recording just slide the OPERATE switch to ON.



PLAYBACK

The VL-C790S can playback VHS-C cassettes you have recorded. They can be played back on the viewfinder or a TV.

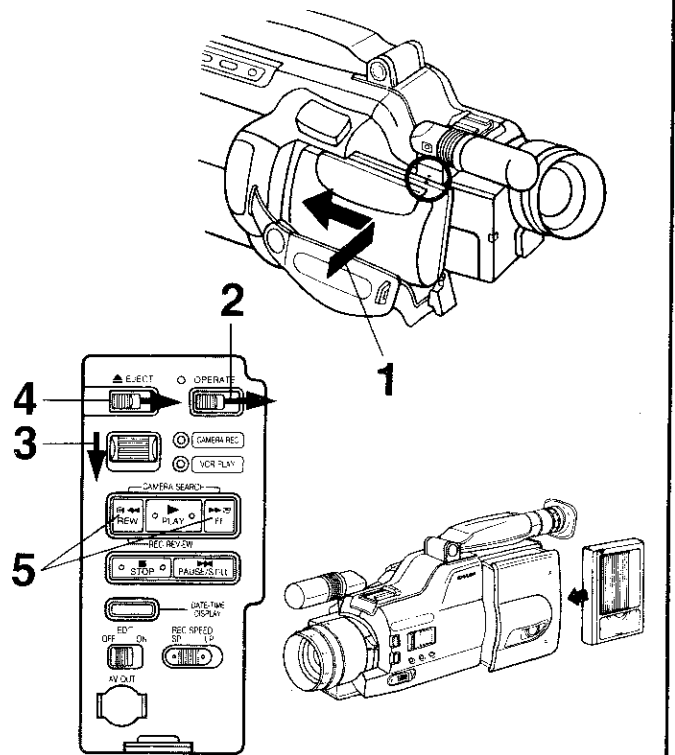
PLAYBACK IN THE VIEWFINDER

- 1** Attach a Battery Pack or use the AC Adaptor/ Battery Charger.
- 2** Slide the OPERATE switch on — the OPERATE indicator will light.
- 3** Slide the CAMERA REC/VCR PLAY switch to the "VCR PLAY" position.
- 4** Press the EJECT button and insert a video cassette.

Note

Remove any tape slack first.

- 5** Cue the tape to the scene you want to watch by pressing the FF or the REW button. Then press the PLAY button and playback starts.



Note

The LP/SP select switch may be in either mode. The recording speed is automatically sensed and the tape is played back at the correct speed.

TRACKING ADJUSTMENT

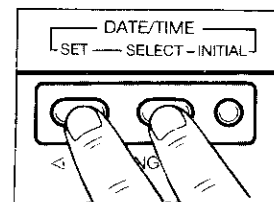
If noise bars are visible or if the picture is noisy, adjust the TRACKING control. Press either of the TRACKING buttons to reduce the picture noise. After playback, press both of the TRACKING buttons at the same time to return the tracking to the centre position.



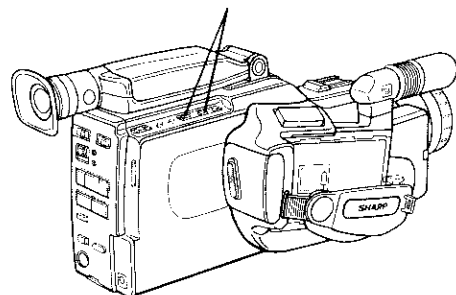
Visual "Noise"



Clear



TRACKING control



ADVANCED OPERATION

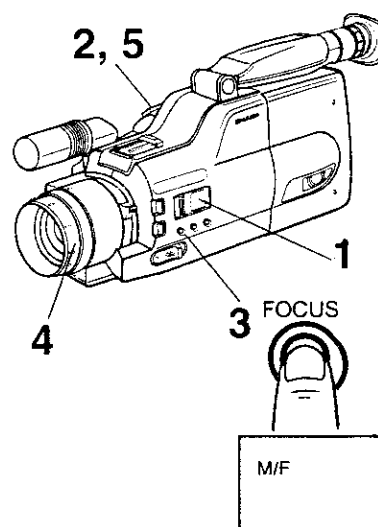
MANUAL FOCUS

In the following cases, it may be difficult to use the Autofocus, so you might want to focus the lens yourself.

1. When the object is not in the middle of the scene.
2. When you want the background or the front of the scene blurred.
3. When you want to have the beginning of the scene out-of-focus.

USING THE MANUAL FOCUS

- 1** Turn off the FULL AUTO switch.
- 2** Press T to zoom in on your subject.
- 3** Press the FOCUS button to select MANUAL FOCUS.
- 4** Turn the focus ring until the subject is focused.
- 5** Lightly press W and zoom out to compose the scene.



In the manual focus mode, "M/F" is displayed in the viewfinder.

WHITE BALANCE

White balance ensures that all the colours in a scene are correctly reproduced. In the auto mode, white balance is adjusted automatically.

Using the White Balance Lock mode

Colour shift may occur when a solid coloured object is recorded, so that the viewfinder is filled with one colour, eg., when a close up of solid coloured paper is taken. The Auto White Balance mode is locked into place to avoid a colour shift in such situations. Follow the procedure described below to lock the Auto White Balance mode.

(1) When Quick Action is required.

Zoom out all the way on a subject that is not one solid colour. Under this condition, the proper white balance will be set automatically.

Press the WHITE BALANCE button to lock the white balance setting. "WB" appears in the viewfinder. Colour shift can be avoided when the white balance is locked even when recording a close up of a solid coloured subject.

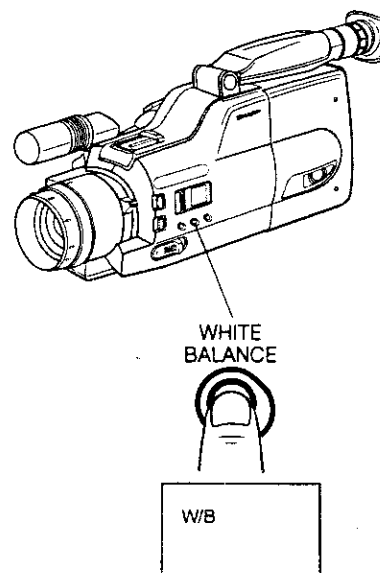
(2) When a very accurate white balance setting is required.

Focus on a white piece of paper so that the viewfinder is filled with it and keep focusing for about 2 seconds. Then the proper white balance will be set automatically. Turn off the FULL AUTO switch, and press the WHITE BALANCE button to lock the white balance setting. "WB" appears in the viewfinder.

To disengage the White Balance Lock mode, press the WHITE BALANCE button, or slide the FULL AUTO switch to FULL AUTO mode to return to the Auto White Balance mode. The colour temperature of a light source varies. For instance, the colour temperature of sunlight will vary depending on the weather and time of day. Reset the White Balance Lock if the colour temperature changes.

Notes

- If power to the Camcorder is interrupted during White Balance Lock, if or the Camcorder is switched to the VCR mode. White Balance Lock will be cancelled.
- Even through the White Balance Lock mode is on, the White Balance is not perfectly locked. Therefore the White Balance compensation function can adjust to small variations in colour temperature, giving your recordings more natural colour.



In the White Balance Lock mode, "WB" is displayed in the upper left of the viewfinder. (If the White Balance Lock mode is disengaged, the display disappears.)

Under the following conditions Auto White Balance may not function correctly.

- When mixing natural and artificial light. Beware of window scenes containing a mixture of artificial and natural light. Likewise all lighting should have the same colour temperature.
- When using special effects lighting.
- When recording a subject against a background with an intense hue.
- When there is insufficient light.
- When the colour temperature of a scene changes too rapidly or there is too much contrast.
- When the object is a solid colour.

BACKLIGHT COMPENSATION

The Auto Iris in this Camcorder uses a new light measuring system to automatically control bleaching and adjust to backlit subjects. However, if the background is too bright and the subject appears dark, press the BLC/GAIN-UP button to prevent the subject from appearing dark on the recording.

Note

The Camcorder will automatically return to the AUTO IRIS mode after you release the BLC/GAIN-UP button.

GAIN-UP

"LIGHT" is displayed in the viewfinder when recording a dark subject. If the BLC/GAIN-UP button is pressed, the scene becomes brighter.

"* LIGHT *" is displayed in the viewfinder to indicate that the gain-up mode is engaged.

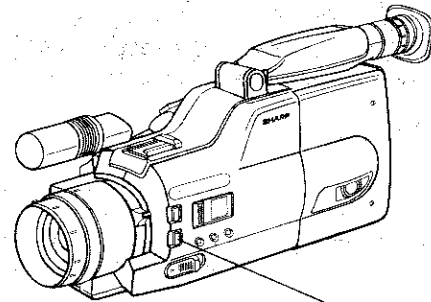
When the subject becomes brighter, "* LIGHT *" disappears.

However, memory of the gain-up mode remains.

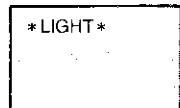
In order to disengage the gain-up mode completely, press the BLC/GAIN-UP button while "* LIGHT *" is displayed in the viewfinder.

Note

- In the Gain-up mode, there will be more picture noise.
- If power is interrupted or the Camcorder is switched to the playback mode, the Gain-up mode will be cancelled.



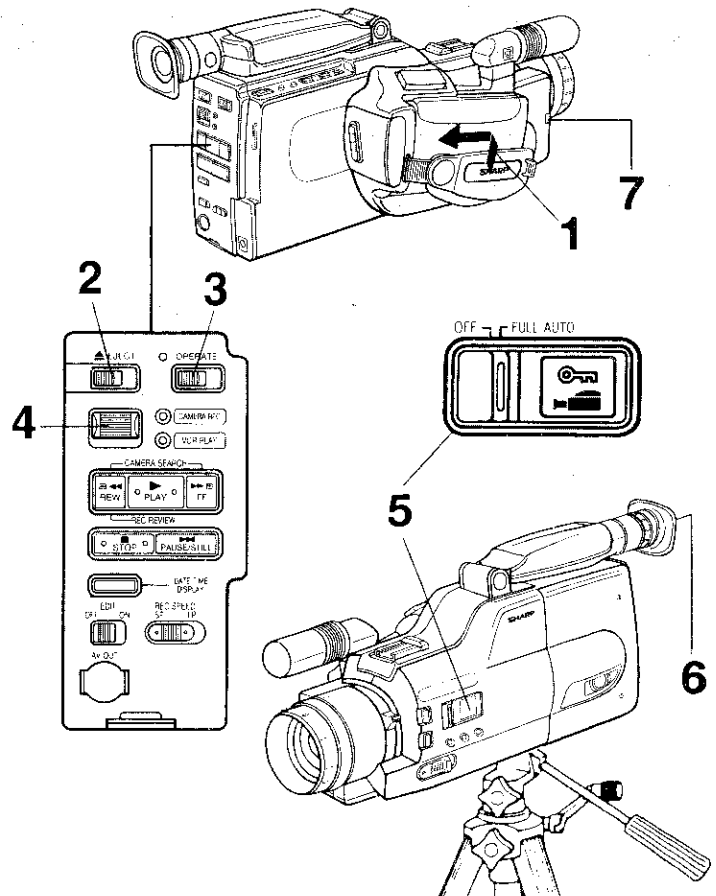
BLC/GAIN-UP



If the gain-up mode is engaged, "* LIGHT *" is displayed in the viewfinder.

SELF TIMER RECORDING

- 1 Attach the battery pack.
- 2 Press the EJECT button and open the cassette holder. Insert a video cassette with its tab intact with its window facing outward. Press the corner of the cassette holder marked "PUSH" until it clicks into place.
- 3 Mount this Camcorder on a stable tripod designed for video use, then slide the OPERATE switch on.
- 4 Set the CAMERA REC/VCR PLAY switch to the "CAMERA REC" position.
- 5 Set the FULL AUTO switch to the "FULL AUTO" position, and check that and are displayed in the LCD.
- 6 Pointing the Camcorder at the subject, press the Power Zoom button and adjust the angle of view.
- 7 Press the SELF TIMER button. The talent tally indicator flashes for 10 seconds, then the Camcorder will record for 20 seconds, then change to REC PAUSE mode. If you wish to record for an extended time, press the SELF TIMER button twice in succession.



Note

If you press the SELF TIMER button three times, the SELF TIMER is cancelled.

HIGH SPEED SHUTTER

Use the HIGH SPEED SHUTTER (1/10,000, 1/2,000, 1/500, 1/100 sec.) mode when recording fast moving objects like sports (tennis, golf, etc.). When you playback the scene on a 4-head VCR, the playback picture will be clear even in the STILL and SLOW modes.

USING THE HIGH SPEED SHUTTER

1 While in the REC PAUSE mode, slide the FULL AUTO switch to OFF, and press the SHUTTER SPEED select button. Select the shutter speed desired. Shutter speeds change in the following order: 1/10,000 sec., 1/2,000 sec., 1/500 sec., 1/100 sec., standard (1/50 sec.), and back to 1/10,000 sec.

2 Press the REC START/STOP button to start recording as normal.

Since the High Speed Shutter is faster than normal, it requires more light. Use the High Speed Shutter in appropriate light (minimum required lighting is listed below.)

1/10000 sec.: 3000 lux

1/2000 sec.: 600 lux

1/500 sec.: 150 lux

1/100 sec.: 30 lux

It is recommended to use the High Speed Shutter outdoors or with extra light.

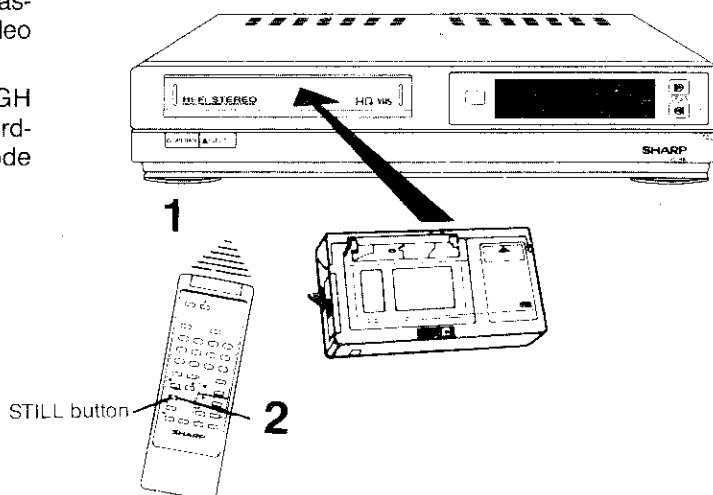
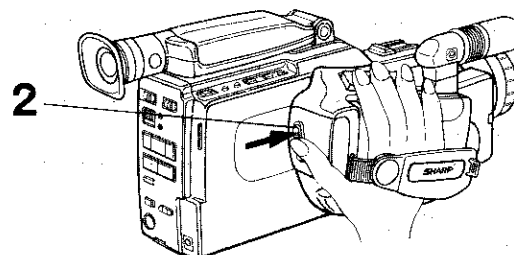
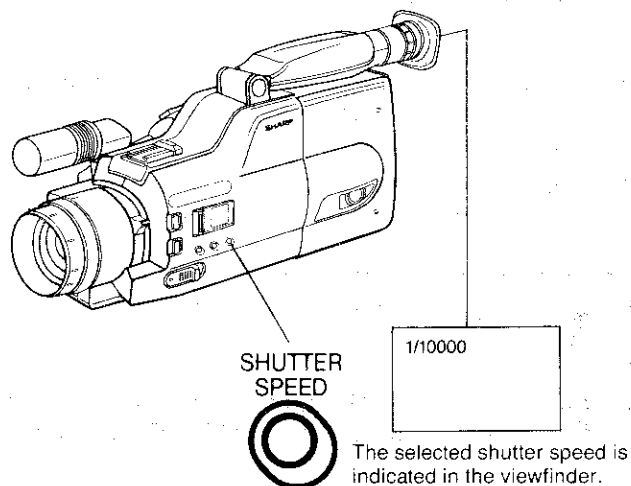
Notes

- Avoid using High Speed Shutter under fluorescent lighting as this will cause flickering in the picture.
- Recording with shutter speeds higher than 1/50 sec. (standard) tends to darken the picture. Record in bright locations when using other shutter speeds.

PLAYBACK OF SCENES RECORDED WITH THE HIGH SPEED SHUTTER MODE

1 Place the recorded tape into the optional VHS cassette adaptor and then into a VHS 4-head video cassette recorder.

2 When watching scenes taken with the HIGH SPEED SHUTTER you can enjoy blur-free recordings even during STILL and SLOW mode playback.



MACRO SHOTS

Small plants, insects, even photos in the family album can be recorded using Macro and enlarged to fill the screen. You can also use Macro to record titles for your videos.

Normally the lens can only focus on subjects that are more than 1.1m away from the front of the Camcorder.

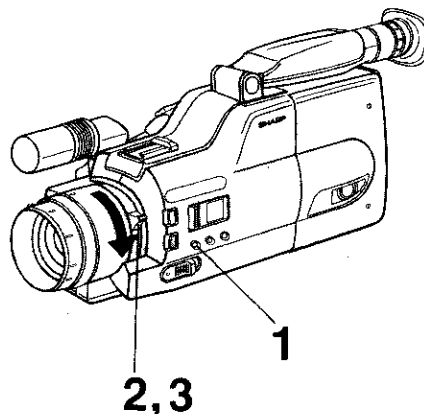
By setting the lens to Macro, you can manually focus on any subject within the macro range, 8mm-110cm, right up to the front of the lens.

Mount the Camcorder on a steady tripod as the smallest movement is magnified when shooting macro subjects.

- 1** Set the FOCUS button to MANUAL.
- 2** Hold the MACRO button down and turn and lock the zoom lever in the MACRO position.
- 3** Focus by slowly turning the zoom lever.

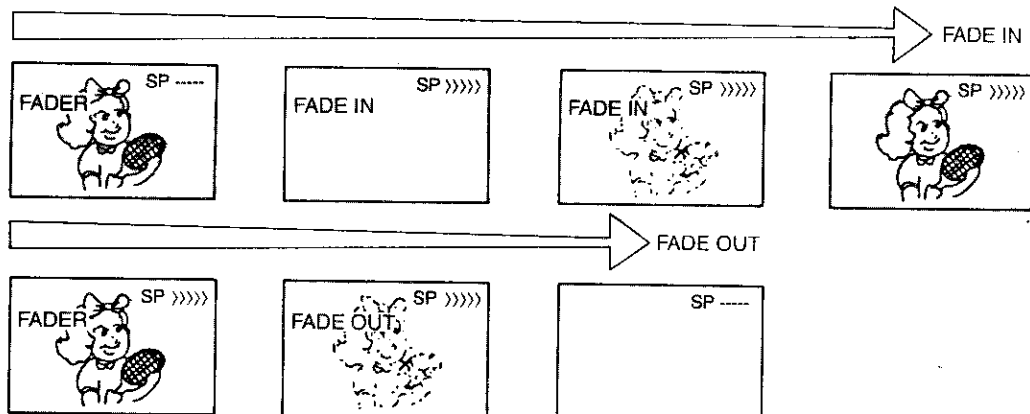
Notes

- Turn the zoom lever back to the normal focus range when you have finished with Macro.
- When recording a solid coloured object such as a flower petal, the colour may shift. In this event, use the white balance lock mode.



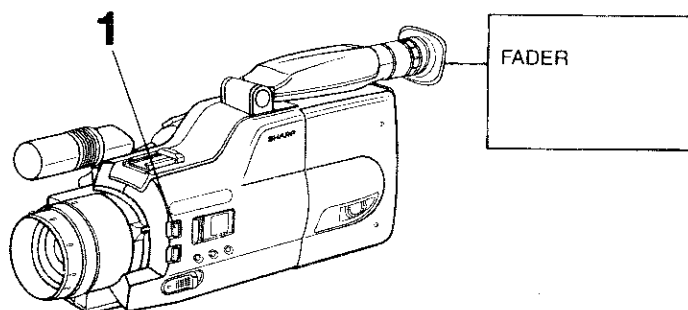
FADE IN & OUT

With this Camcorder you can enjoy the special effect of fading in and out of the scenes in your recordings.



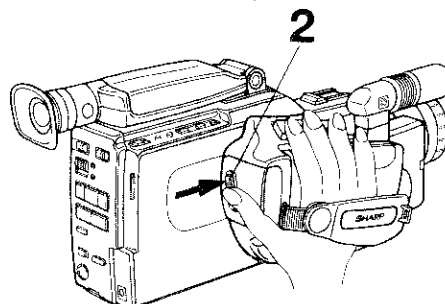
FADE IN

- 1** With REC PAUSE on, press the FADE IN/OUT button. The viewfinder will display "FADER".
- 2** Press the REC START/STOP button to start recording. The viewfinder will turn black, and then gradually focus on the subject. ("FADE IN" will appear in the viewfinder.)



FADE OUT

- 1** While recording, press the FADE IN/OUT button. The viewfinder will display "FADER".
- 2** Press the REC START/STOP button. The viewfinder will slowly turn black creating a fade-out of the scene. ("FADE OUT" will appear in the viewfinder. If you select the REC PAUSE mode, the FADE will be cancelled.)



Handing of Ni-Cad battery

Please be noted that two types of battery are used in our CAMCORDER, and each of them should be handled in a different manner respectively: One is Ni-Cad battery employed in this model
(and the other is conventional Sealed Lead-Acid battery.)

1. Storage

- (1) The battery should be stored in normal room temperature and humidity. It will have a shorter life if it is placed and stored in high or low temperature.
- (2) Ni-Cad battery should be stored in discharged condition.
(On the contrary, Sealed Lead-Acid battery should be stored in full-charged condition.)

2. Charging

- (1) Battery charger must be a genuine one.
If a wrong charger is used, the electrodes (+ and -) will be damaged.
- (2) This Ni-Cad battery should be charged just before use.
For a longer life, keep it in discharged condition and charge it just before use.
(As for Sealed Lead-Acid battery, charge should be done periodically.)
- (3) Over charge should be avoided.
Over charging will affect the life of the battery. Attempting to charge a full-charged battery again in a short period (say within half a day) may result in an overcharge, causing a shorter life of the battery.
- (4) Charging in a hot place should be avoided.
As it will affect the life of the battery, charging should be done in a cool place.
If it is charged in a hot place, the battery may have abnormally high temperature, causing a shorter life of it.

Protect your environment!

Batteries must not be thrown into household waste; they need a special treatment.

Der Umwelt zuliebe!

Batterien dürfen nicht mit den Siedlungsabfällen entsorgt werden, sondern verlangen Sonderbehandlung.

Pensez à votre environnement!

Ne pas jeter les piles avec les ordures ménagères, exige un traitement spécial.

DISASSEMBLY OF SET

1. Removal of External Components

1-1 Removal of Electronic Viewfinder

(1) As shown in Fig. 1-1, lift up the viewfinder in the direction of allow mark **(A)**.

(2) As shown in Fig. 1-2, remove two screws **(1)** and remove shoe **(B)**.

Then, after removing two screws **(2)** and sliding the top panel in the direction of allow mark **(C)**, pull out connector **(D)** and remove the viewfinder from the SET.

1-2 Removal of Cassette Holder Lid

(1) As shown in Fig. 1-3, remove two screws **(3)** fixing the cassette holder.

Then lift up the cassette holder lid in the direction of allow mark **(E)** to remove it.

If it is difficult to remove the cassette holder lid because it touches cabinet A, turn the power ON and slide the EJECT button to open the cassette holder, which enables easy removal.

1-3 Removal of Cabinet A

(1) As shown in Fig. 1-4, remove screw **(4)** (take care not to forget to remove this screw), two screws **(5)**, three screws **(6)** and two screws **(7)**. Then open the cabinet A in the direction of arrow mark **(F)** to detach it.

1-4 Removal of Camera Unit

(1) As shown in Fig. 1-5, remove two screws **(8)** and screw **(9)**.

Then disconnect the connector with the camera unit lifted up slightly in the direction G, which makes the camera unit detached from the deck and cabinet B.

1-5 Removal of Deck

(1) As shown in Fig. 1-6, remove three screws **(10)**, screw **(11)**, three screws **(12)** and screw **(13)**. Then disconnect the connector with the deck lifted up slightly in the direction H, which makes the deck and operation panel detached from the deck and cabinet B.

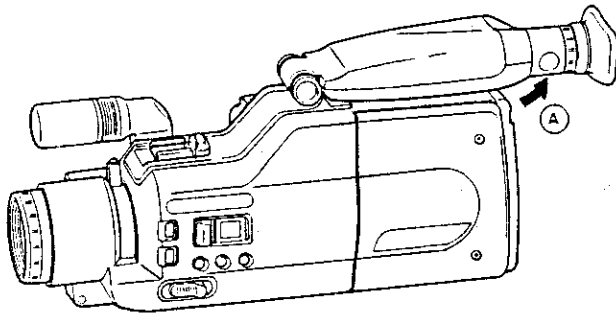


Figure 1 - 1

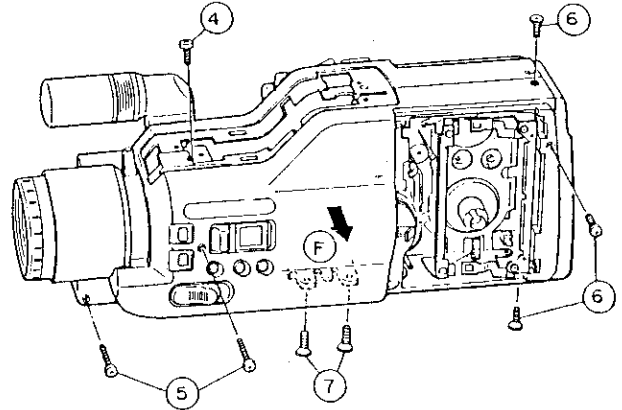


Figure 1 - 4

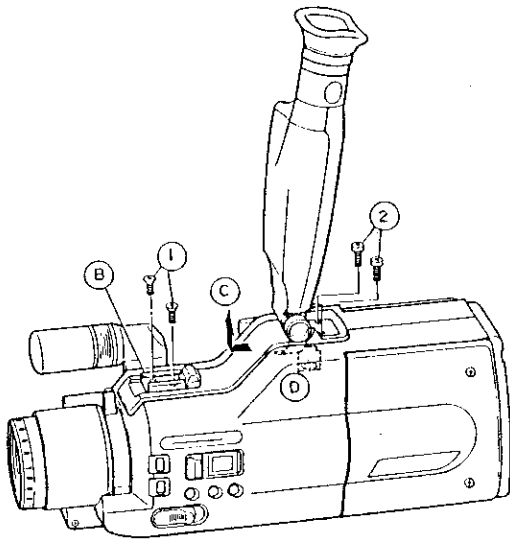


Figure 1 - 2

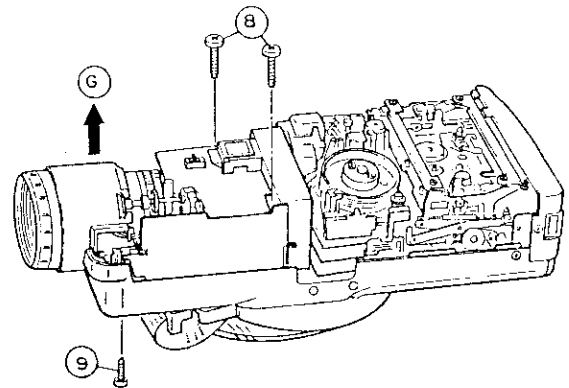


Figure 1 - 5

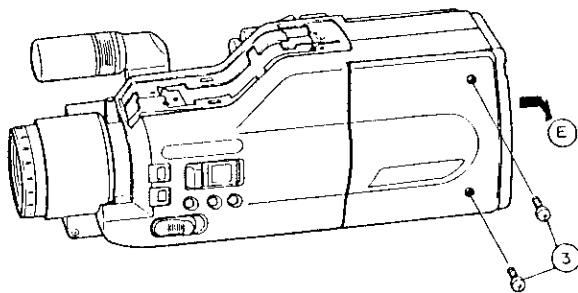


Figure 1 - 3

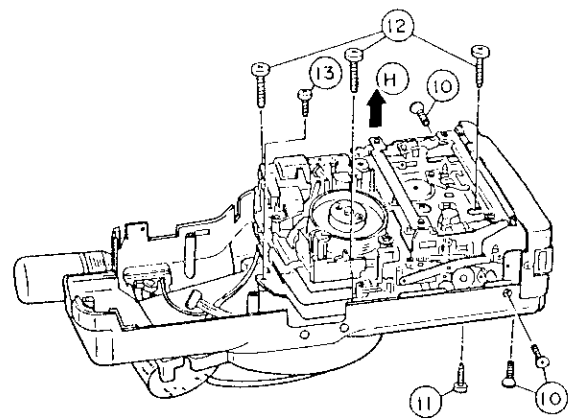


Figure 1 - 6

TROUBLESHOOTING

1) Camera Section

No.	Symptoms	Possible causes
1	No picture. (Picture does not appear if iris is manually opened.)	<ol style="list-style-type: none"> 1) Voltage at each pin of P709 (A/F board) is abnormal. → Power source unit and connection and defective. 2) Y signal at P401 (process board Y-OUT) is normal. → Connection is defective and VCR EE circuit is defective. 3) YH signal at Q418 (process board) emitter is normal. → IC401 (process board) and peripheral circuits are defective.* 4) YH signal at Q403 (process board) emitter is normal. → FL401, Q418 and peripheral circuits are defective. 5) Y1H signal at Q213 (process board) emitter is normal. → Defect is caused between pins 3 and 4 of IC201 and soldering of C216 is defective. 6) Y signal at Q211 (process board) emitter is normal. → IC203, Q212, FL203 and peripheral circuits are defective. 7) Y signal at Q205 (process board) emitter is normal. → Q206, Q207, Q208, Q209, Q211 and peripheral circuits are defective. 8) Y signal at pin 28 of IC201 (process board) is normal. → FL201, FL202, Q205, Q206 and peripheral circuits are defective. 9) CDS signal at pin 34 of IC201 (process board) is normal. → IC201 and peripheral circuits are defective. 10) CDS signal at pin 2 of sensor board FPC cable (check land) is normal. → Connection of flexible wire and connector is defective. 11) Source wave form at Q107 (sensor board) is normal. → IC104, Q105, Q106 and peripheral circuits are defective. 12) Voltage and wave form at each terminal of CCD sensor are normal. → CCD sensor is defective. 13) 4fsc signal at pin 8 of sensor board FPC cable (check land) is normal. → IC102, IC103, IC105, IC106 and peripheral circuits are defective. 14) 4fsc signal at pin 8 of sensor board FPC cable (check land) is abnormal. → IC101 or X101 is defective. <p>* When checking IC401, if C-Sync is not normally applied to pin 26 of IC401, check 4fsc signal. If 4fsc signal is normal, IC501 or peripheral circuits are defective.</p>
2	No colour. Colour appears, but it is not normal.	<ol style="list-style-type: none"> 1) C signal at P401 (process board) is normal. → Connection and VCR EE circuit are defective. 2) C signal at pin 47 of IC401 (process board) is normal. → Q401, D401 and peripheral circuits are defective. 3) SC signal at pins 39 and 40 of IC401 (process board) is abnormal. → IC501 and peripheral circuits are defective.

No.	Symptoms	Possible causes
2		<p>4) Colour-difference signal at pins 1 and 2 of Q416 (process board) is normal. → Soldering of C412 and C413 is defective or IC401 and peripheral circuits are defective.</p> <p>5) Colour-difference signal at pins 15 and 12 of IC201 (process board) is normal. → IC201 and peripheral circuits are defective.</p> <p>6) Colour-difference line sequential signal at pins 17 and 18 of IC201 (process board) is normal. → IC201 and peripheral circuits are defective.</p> <p>7) C-AGC signal at pin 26 of IC201 (process board) is normal. → Colour-difference line sequential coincidence circuit, CNR circuit and peripheral circuits are defective.</p> <p>8) Colour-difference line sequential signal at pin 38 of IC201 (process board) is normal. → IC201 and peripheral circuits are defective.</p> <p>9) Colour-differential line sequential signal at pin 20 of IC201 (process board) is normal. → Q216, Q217 and peripheral circuits are defective.</p> <p>10) CDS signal at pin 34 of IC201 (process board) is normal. → IC201 and peripheral circuits are defective.</p>
3	High speed shutter does not operate.	<p>1) Transmission signal does not appear at pins 3, 4 and 5 of S202 (process board). → P701 (process board) connector is not connected well or VCR side circuits are defective.</p> <p>2) Transmission signal at P701 (process board) is normal. → IC655 and peripheral circuits are defective.</p> <p>3) Transmission signal does not appear at pins 23, 24 and 25 of IC101 (sensor board). → Connection of MB flexible pin 14 connector is defective.</p> <p>4) Input voltage at pins 23, 24 and 25 of IC101 (sensor board) is normal. → IC101 is defective.</p>
4	Iris does not open.	<p>1) Output signal at pin 32 of IC201 (process board) is abnormal. → Peripheral circuits of IC201 are defective.</p> <p>2) Wave form at pin 7 of IC802 (process board) is abnormal. → IC802, Q803 and peripheral circuits are defective.</p> <p>3) Voltage at each pin of P901 (process board) is abnormal. → Q806, Q808, IC813 and peripheral circuits are defective.</p> <p>4) Voltage at each pin of P901 (process board) is normal. → Connection is defective or lens unit is defective. Voltage when P901 is normal. Pin 1: approx. 1.7V Pin 2: approx. 1.7V Pin 3: approx. 8.4V Pin 4: approx. 2 to 8V when light enters after lens is uncapped.</p>

No.	Symptoms	Possible causes
5	Power zoom does not operate.	1) Voltage at pin 3 of P606 (A/F board) is abnormal. → Zoom SW or connection is defective. 2) Voltage between pins 1 and 2 of P601 (A/F board) is abnormal. → IC001 and peripheral circuit are defective. 3) Voltage between pins 10 and 11 of P601 (A/F board) is normal. → Connection is defective or lensunit is defective.
6	No alignment of W/B.	1) Voltage at pins 12 and 18 of IC301 (process board) does not become Vref (approx. 1.7V). → Connection is defective or peripheral circuits are defective. 2) Colour-difference signal at pins 4 and 24 of IC301 (process board) is normal. → IC301, IC302 and peripheral circuits are defective.
7	Auto focus does not operate. (in auto focus mode).	1) Voltage at each pin of P601 (A/F board) is normal. → Connection is defective or lens unit is defective.
8	Only white picture appears.	1) FADE CTL signal at pin 8 of P701 (process board) does not become "H". → Connection is defective or VCR side circuits are defective. 2) Voltage at pin 7 of IC401 (process board) does not become approx. 2.5V. → Q404 and peripheral circuits are defective. 3) Iris remains closing. → Iris is defective.

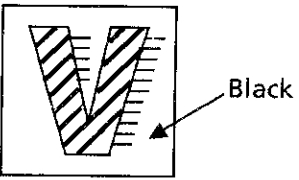
List of Ref. No. used for each board

Name	Ref. No.
Sensor board	101 ~ 199
Process board	201 ~ 499, 501 ~ 599
Process board	801 ~ 899, 601 ~ 699, 701 ~ 799
A/F board	001 ~ 099, 901 ~ 999

2) Viewfinder

No.	Trouble	Possible causes
1	No picture.	1) Flyback transformer faulty 2) Cathode ray tube faulty 3) Deflection yoke faulty 4) Transistor (Q002) faulty 5) Diode (D004) faulty 6) Diode (D005) faulty 7) IC BA7145F (IC001) faulty 8) Brightness control turned down too much 9) Transistor (Q001) faulty
2	Out of sync	1) Horizontal sync control (R008) maladjusted 2) IC BA7145F (IC001) faulty
3	Improper vertical size	1) Vertical size control (R013) maladjusted 2) IC BA7145F (IC001) faulty
4	Out of focus	1) Focus control (R027) maladjusted 2) Capacitor (C017) faulty 3) CRT socket in poor contact
5	Improper horizontal size	1) Horizontal linearity coil (L002) contaminated 2) Horizontal linearity coil (L002) faulty 3) Deflection yoke improperly installed

3) Y/C Section Poor Picture

No.	Symptoms		Possible causes
1	No picture	at Camera Mode EE	1) Is camera Y signal applied to pin 3 of connector BG and camera C signal to pin 1? 2) Is camera Y signal applied to pin 1 of IC201? 3) Does camera Y signal appear at pin 40 of IC201? 4) Is voltage at each pin of IC2201 normal? 5) Is voltage at each pin of IC202 normal? 6) Does camera C signal appear at pin 1 of IC501?
		at Alignment Cassette Tape	1) Before playing back the tape, check that EE picture comes out. 2) Does PBFM signal appear at pin 7 of connector AH? 3) Is PBFM signal applied to pin 56 of IC201? 4) Does PB video signal appear at pin 10 of IC2201? 5) Is FM signal played back by pin 41 of IC301? 6) Is video head clogged or defective? 7) Is IC301 defective?
		at Self REC/PB	1) Check that above-mentioned EE and Alignment Tape are played back. 2) Does REC FM signal come out of pin 55 of IC201? 3) Does REC FM current signal appear between pin 1 and pin 2 of AQ at REC?
2	Chroma System (No colour)	at Alignment Cassette Tape	1) Is chroma signal applied to pin 16 of IC201? 2) Does chroma signal appear at pin 20 of IC201? 3) Is DC voltage between pin 8 and pin 20 of IC201 normal?
		at Self REC PB	Check that Alignment Tape is played back. 1) Does chroma signal appear at pin 22 of IC201 at REC?
3	Picture collapses at Self REC/PB 		1) Is head amp defective? 2) Is clip level misadjusted?
4	Noise appears at Self REC/PB		1) Is head amp defective? 2) Is head clogged? 3) Is tracking SW misadjusted?
5	No REC characters recorded		1) Is view finder connected? 2) Does Y signal character mixed appear at TP401 or TP2201?

4) Audio Circuit Section

No.	Symptoms	Possible causes
1	No sound at PB	1) Audio head is defective. 2) Does PB audio signal go into pin 24 of IC601?
2	Sound distorted	1) Audio head is magnetized or damaged. 2) Distortion of bias current value.
3	Low sensitivity at REC/PB	1) Audio head is magnetized or defective. 2) Bias oscillator circuit is defective.
4	No recording	1) Bias oscillator circuit does not operate.
5	Too much hum and noise	1) Head is defective.
6	Mic input absent	1) Cable from microphone is disconnected.


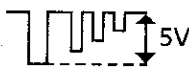


5) Servo Section

No.	Symptoms	Possible causes
1	Tape runs wild at PB or REC.	1) CAPFG is not applied to pin 9 of IC801.
2	Periodical noise appears vertically on PB picture or picture flows.	1) CAP lock is distorted. Check pulse duty at pin 18 of IC801 (CAP.PWM output). 2) Is PB CTL signal applied? Check pin 11 of IC801.
3	Picture flows horizontally.	1) Is Drum FG signal applied? Check pin 10 of IC801. 2) Is Drum PG signal normal? Check pin 1 of IC801.

6) Power Supply Circuit Section

No.	Symptoms	Possible causes
1	Is 9.6V applied to L910?	NO → Check DC jack, D925 and F901.
2	Is 9.6V applied to pin 9 of IC901 at power SW ON?	NO → Check system controller circuit.
3	Is chopping wave oscillated at pin 1 of IC901?	NO → Check IC901 and peripheral circuits of IC901.
4	Is there short or excess load on P con 9V line?	YES → Check short point on 9V line.
5	Is there short or excess load on P con 5V line?	YES → Check short point on 9V line.
6	Does pulse appear at pin 10 of IC901 when power supply is turned ON?	NO → Check IC901 and peripheral circuits of IC901. (R946, etc.)
7	Does pulse appear at collector Q940 in the same case as above-mentioned?	NO → Check Q940, Q941 and peripheral circuits. → Check parts of 17V, 11V and -13V lines.
8	Does pulse appear at pin 7 of IC901 when power supply is turned ON?	NO → Check IC901 and peripheral circuits. (R928, etc.)
9	Does pulse appear at collector Q920 in the same case as above-mentioned?	NO → Check Q920, Q921 and peripheral circuits. → Check parts of 5V line.

7) Description of Error Indications

No.	Error indications	Causes and remarks	Check point	Normal wave form and voltage
1	E007	CAP FG is not applied to pin 9 of IC801 for one second or more.	Pin 9 of IC801	
2	E011	Loading motor rotating in Loading direction for 5 seconds, unit does not get in the next mode.	Pin 25 of IC801	 Voltage varies every time getting in another mode.
3	E012	Loading motor rotating in un Loading direction for 5 seconds, unit does not get in the next mode.	Same as above.	Same as above.
4	E020	DRUM FG is not applied. (pin 10 of IC801)	Pin 10 of IC801	
5	E025	TU REEL sensor is not applied.	Pin 8 of IC801	
6	E026	SUP REEL sensor is not applied.	Pin 7 of IC801	The same as NO. 5.
<p>* If any abnormality is found at check point, search for the cause according to the troubleshooting.</p>				

8) Countermeasures after Error Occurance

No.	Error indications	Countermeasures
1	E007	<ul style="list-style-type: none"> ● Set in Test Mode (connect a 56.8K resistor between pin 2 and pin 4 of AQ) and operate FF or REW. ① Is pulse at pin ⑨ of IC801 absent? ② Dose pulse come out of pin 27 of IC804? ③ If pulse does not come out of pin 27 of IC804, check soldering of pins 24, 25 and 27 of IC804 and pin 18 of IC801, R877 and C841.
2	E011	<ul style="list-style-type: none"> ① Is voltage applied to both Terminals of L/M when PB and REC are operated to reach Loading from STOP? ② If applied, check the following; <ul style="list-style-type: none"> a. Is mechanism stuck? b. Is connector AA connected well? ③ If not applied, check the following; <ul style="list-style-type: none"> a. Does Forward-Reverse signal (5V DC) appear at pins 9 and 7 of IC805? b. Does output appear at pins 13 and 4 of IC805? c. Is power supplied to pins 11 and 15 of IC805?
3	E012	Same as above.
4	E020	<ul style="list-style-type: none"> ① Set in Test Mode and check that drum turns in PB mode. ② If drum turns, <ul style="list-style-type: none"> 2-1 Is DRUM FG pulse applied to pin 10 of IC801? 2-2 Does DRUM FG appear at pin 1 of IC804? 2-3 Dose FG input of 40mVp-p appear between pins 2 and 4 of IC804? ③ If drum does not turn, <ul style="list-style-type: none"> 3-1 Does voltage (5V or more) appear at pin 10 of IC701? 3-2 Is DRUM CTL sent to pin 6 of IC902? (1.5V or more)
5	E025	<ul style="list-style-type: none"> ① Set in Test Mode (short between pins 2 and 4 of AQ) and operate PB, FF or REW. ② Is reel pulse applied to pin 8 of IC801? ③ Check soldering of Q812 and D702.
6	E026	<ul style="list-style-type: none"> ① Set in Test Mode (short between pins 2 and 4 of AQ) and operate PB, FF and REW. ② Is reel pulse applied to pin 7 of IC801? ③ Check soldering of Q812 and D701.

ADJUSTMENT, REPLACEMENT, ASSEMBLY AND CLEANING OF MECHANICAL UNITS

Here we will describe a relatively simple service work in the field, not referring to the more complicated repairs which would require the use of special equipment and tools (drum assembly or replacement, for example, which should be performed by a qualified service personnel.)

* AC adapter must be used for the power supply when checking and adjustment of mechanism are performed.

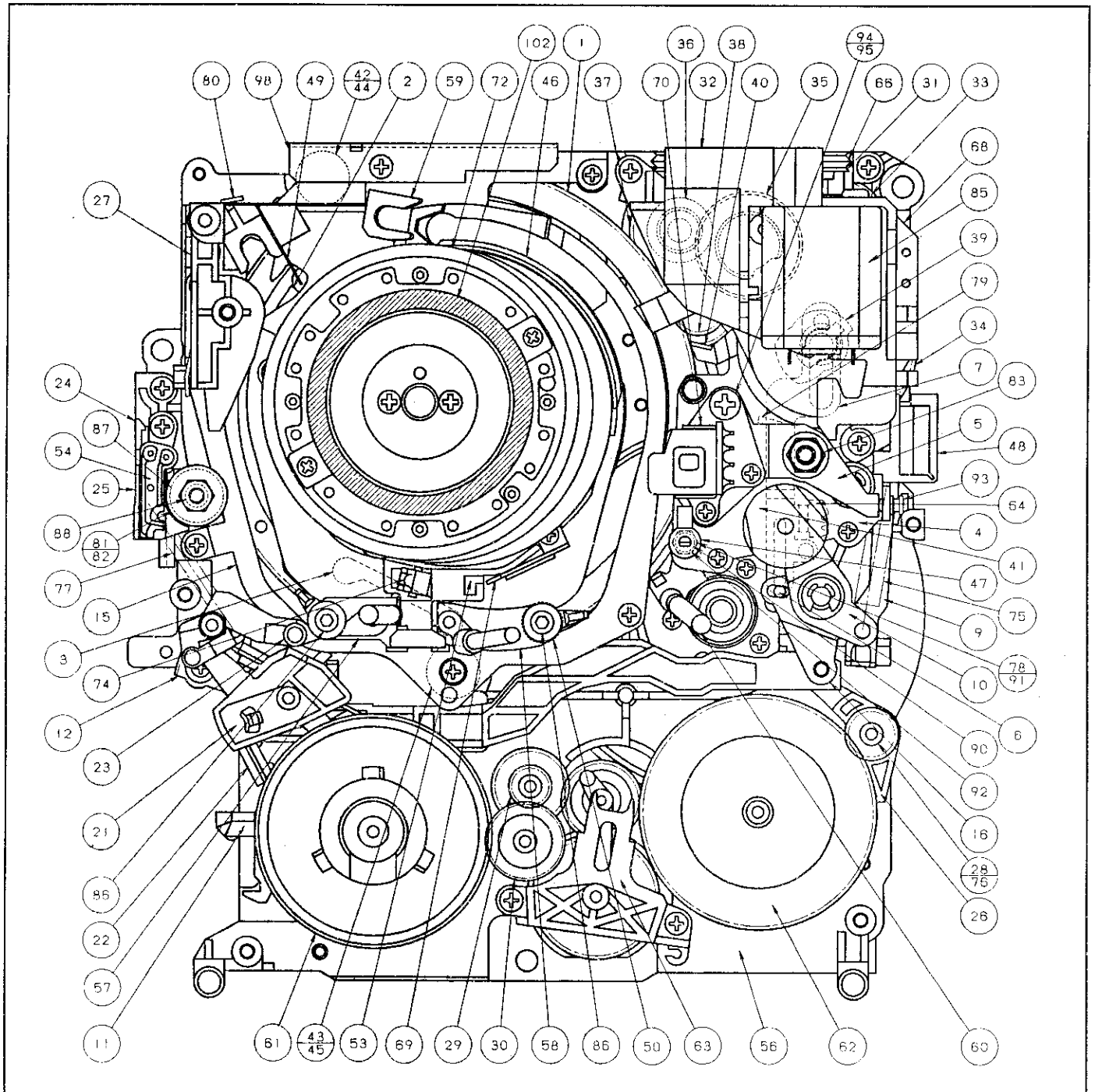


Figure 2-1

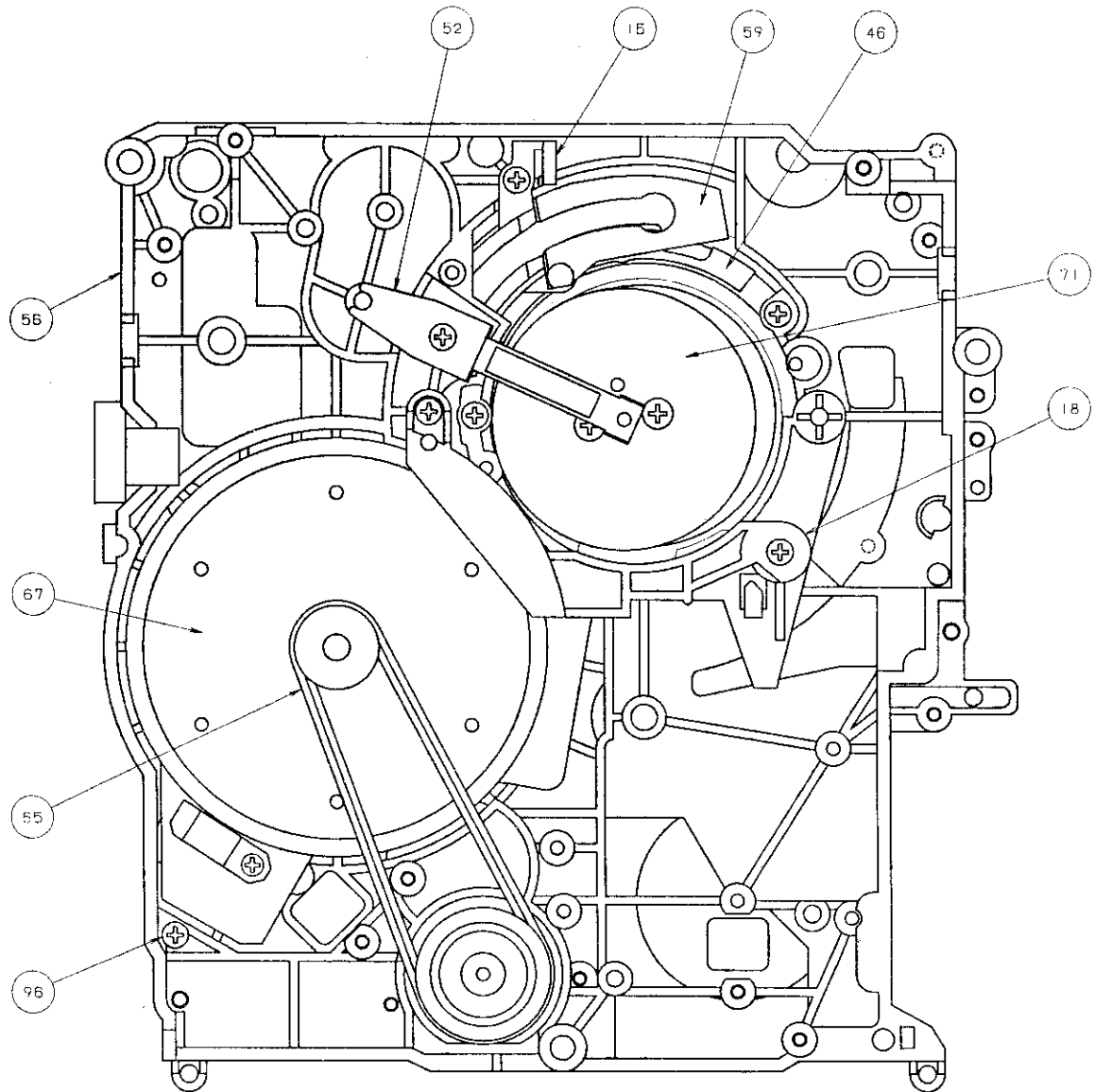


Figure 2-2

Mechanical Parts

No.	Name	No.	Name
1.	L Ring (A) ass'y	52.	Ground brush ass'y
2.	L Ring (B) ass'y	53.	LED PWB
3.	Pole base (B) lever	54.	End sensor PWB
4.	A/C head base ass'y	55.	—
5.	A/C head arm ass'y	56.	Main chassis ass'y
6.	Main shifter operation panel ass'y	57.	Pole base (A) ass'y
7.	Slant pole (C) arm lever ass'y	58.	Pole base (B) ass'y
8.	—	59.	Base stopper ass'y
9.	Pinch operation lever ass'y	60.	Slant pole (C) arm ass'y
10.	Pinch lever ass'y	61.	Reel disk ass'y
11.	Eject lever	62.	Limitter ass'y
12.	Tension band adjusting lever	63.	Drive unit
13.	—	64.	Pinch roller ass'y
14.	—	65.	Drive belt
15.	Guide rail	66.	Loading belt
16.	Change lever	67.	Capstan DD motor
17.	Main shifter	68.	Mode switch
18.	Rotor holder	69.	Dew sensor
19.	—	70.	A/C, AC/E head
20.	—	71.	Drum D.D motor
21.	Tension band base	72.	Drum ass'y
22.	Tension band ass'y	73.	—
23.	Tension arm ass'y	74.	Cassette LED
24.	Tension arm spring lever	75.	Pinch spring
25.	End sensor holder	76.	Lock-brake spring
26.	Lock-brake	77.	Tension arm spring
27.	TS roller lever	78.	Retaining guide
28.	Take-up gear	79.	A/C head arm spring
29.	Decelerator gear	80.	Full erase head arm spring
30.	Relay gear	81.	Supply impedance roller flange
31.	Loading motor pulley	82.	Supply impedance roller flange B
32.	Loading motor holder ass'y	83.	Nylon nut
33.	Master cam drive gear	84.	—
34.	Master cam	85.	Loading motor
35.	Loading gear	86.	Guide roller ass'y
36.	Reciprocating gear	87.	Supply impedance roller
37.	Loading ring drive gear (A)	88.	Supply impedance roller inner
38.	Loading ring drive gear (B)	89.	—
39.	Slant pole (C) pinch cam	90.	Retaining guide (B)
40.	Slant pole (C) pinch lever	91.	Guide flange
41.	Pinch roller cap	92.	Guide flange B
42.	L ring gear (A)	93.	X-value adjusting screw
43.	L ring gear (B)	94.	A/C head screw
44.	L ring washer (A)	95.	A/C head spring
45.	L ring washer (B)	96.	Spacer screw E
46.	Pole base (B) guide	97.	—
47.	Tape guide	98.	FPC holder
48.	Wire holder	99.	—
49.	Pole base (A) guide	100.	—
50.	Slider	101.	—
51.	—	102.	Dynamic damper ass'y

Preventive Checks and Service Intervals

The following intervals for checks and servicing should be observed in order to maintain the high quality of mechanical components.

Maintained every Parts	500 hrs	1000 hrs	1500 hrs	2000 hrs	3000 hrs	Remarks
Guide Roller Ass'y	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Abnormal rotation of significant vibration requires replacement.
SI Roller	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
SI Roller Inner		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	Clean with industrial-grade methyl alcohol.
SI Roller Flange	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Clean tape contact area with the specified cleaning liquid.
Retaining Guide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Guide Flange	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Slant Pole	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flying Erase Head	<input type="checkbox"/>	○ <input type="checkbox"/>	<input type="checkbox"/>	○ <input type="checkbox"/>	○ <input type="checkbox"/>	Clean tape contact area with the specified cleaning liquid.
A/C Head	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pinch Roller	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	○ <input type="checkbox"/>	<input type="checkbox"/>	Clean rubber and rubber contact area with the specified cleaning liquid.
Drive Belt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	○	<input type="checkbox"/>	
Loading Belt		<input type="checkbox"/>		○	<input type="checkbox"/>	
Capstan Motor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	○ <input type="checkbox"/>	<input type="checkbox"/>	Clean capstan shaft with industrial-grade ethyl alcohol.
Loading Motor				○		
Supply Reel Disk		<input type="checkbox"/> △		<input type="checkbox"/> △	<input type="checkbox"/> △	Clean with industrial-grade ethyl alcohol. Lubricate the shaft.
Tension Band Ass'y				○		
Dynamic Damper Ass'y				○		
Take-up Gear, Relay Gear, Decal. Gear and Drive Pully	△	△	△	△	△	Lubricate each shaft.
○ Replacement □ Cleaning △ Lubricate						

<Specified>

<Note> The cut washers and E rings which have been used should be replaced with new ones.

Cleaning liquid should be Industrial-grade ethyl alcohol.

* The control adjustment of Mechanism is not available in this mechanism and, if the setting value is not obtained, cleaning or parts replacement should be done.

REMOVAL AND REASSEMBLY OF CASSETTE HOUSING CONTROL ASSEMBLY

Note:

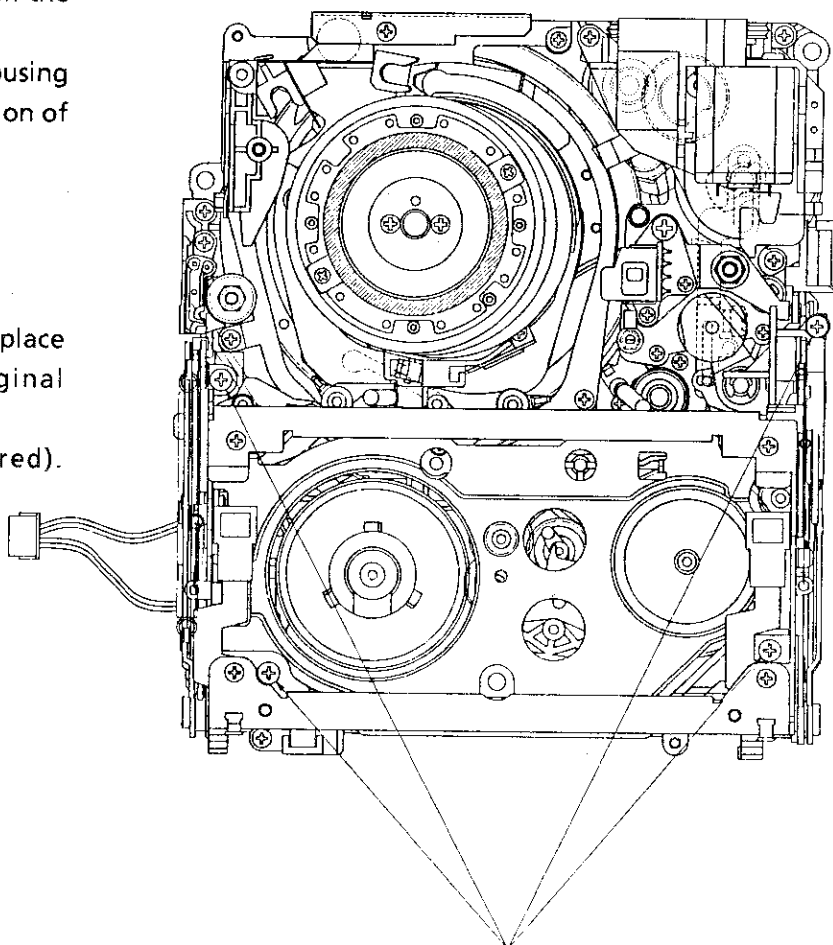
1. During removal and reassembly of the cassette housing, take care not to hit the nearby parts.
2. When reassembling, the lock lever of the cassette housing must be placed before the eject lever of the mechanism

Removal

- 1) Remove the VCR from the cabinet. Detach the mechanism from the VCR board.
- 2) Put the cassette housing in loading.
- 3) Remove four fixing screws (red) from the cassette housing. (See Fig. 2-3-a)
- 4) Lift the drum side of the cassette housing slightly upward and with the condition of about 30° tilted, detach it upward.

Reassembly

- 1) In the reverse manner of removal, place the cassette housing to the original position.
- 2) Fix it with four fixing screws (red). Tightening torque: 1.5 ± 0.1 kg·cm

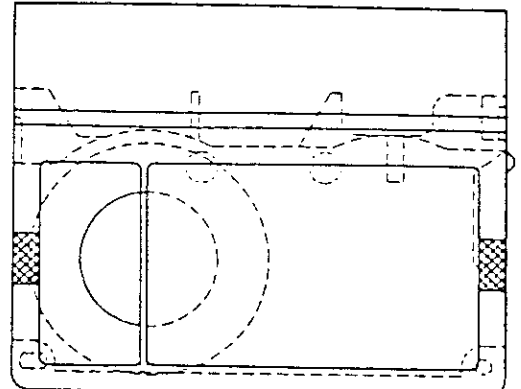


Cassette housing set-screws
(XSPS320P04000)

Figure2-3-a

WHEN RUNNING A TAPE WITHOUT CASSETTE HOUSING.REPLACEMENT AND HEIGHT

- 1) Remove the VCR from the cabinet. Detach the cassette housing. Make pins 3 and 4 of the P2 connector on the control PWB short-circuited.
- 2) Set a cassette tape in the tape mechanism. Then stabilize the cassette tape with a weight. The weight should not be more than 350g and the mechanism operation should be performed after making sure that the cassette is stabilized with the weight. (See Fig. 2-3-b)
- 3) After the specified mechanical adjustment have been completed, be sure to relieve the P2 connector from the short-circuited state. (See Step 1)



Place a weight well balanced on the hatched areas.

Figure2-3-b

REPLACEMENT AND HEIGHT ADJUSTMENT OF REEL DISKS

Note:

1. During removal and reassembly, take care not to damage the reel disk and the reel disk shaft with the jig.
2. Take care not to damage the tension band, nor to stain the felt with oil. (See Item 2-12)
3. After replacing either of the reel disks, be sure to perform its height adjustment.
4. Use a new cut washer.

Removal of supply reel disk

- 1) Remove the cut washer ①.
- 2) Remove the clearance adjusting washer ②.
- 3) Pull off the supply reel disk ③ upwards, and replace it.
- 4) Remove the height adjusting washer ④ and clean it. (See Fig. 2-4)

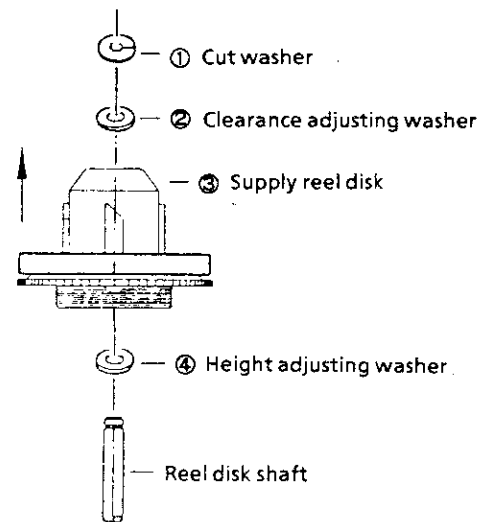


Figure2-4

Reassembly

- 1) Clean the reel disk shaft and fix the height adjusting washer ④.
- 2) Fix the replacement supply reel disk.
- 3) Adjust the height of the reel disk with the master plane and reel disk height adjusting jig. (See Item 5-5)
- 4) Remove the new reel disk. Apply oil (Shell Terrace #32) to the reel disk shaft, and then fix the new reel disk again.
- 5) Fix the clearance adjusting washer ② so that the thrust tolerance of the reel disk is 0.1~0.5mm after the cut washer of Step 6 is fixed.
- 6) Fix the cut washer ①.

HEIGHT CHECKING AND ADJUSTMENT OF REEL DISK

Note: Be sure to perform height checking and adjustment of reel disk whenever reel disk is replaced.

Checking and adjustment

- 1) Remove the cassette housing and set the master plane in the mechanism as shown in Fig.2-5, taking care not to hit the drum or the guide roller gear.
- 2) Make sure that the reel disk is lower than the part (A) and higher than the part (B) in the figure below by using the reel disk height adjusting jig. If the height is not within the setting value, adjust it with the height adjusting washer.

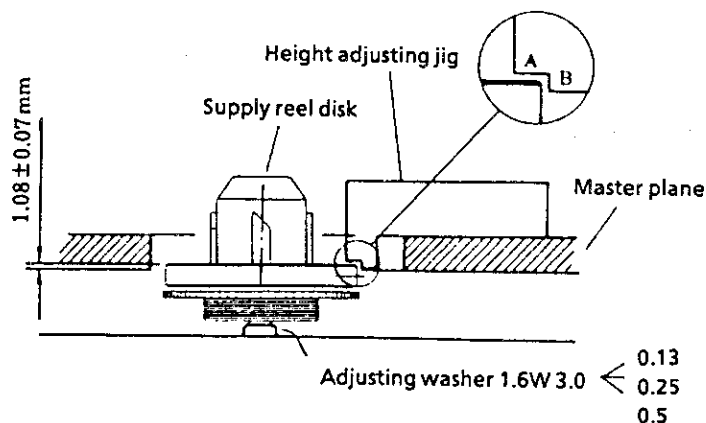


Figure. 2-5

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE

- 1) Set the torque cassette (JIGCTM0020P) on the take-up reel disk and get the unit in the REC mode (in the case of recorded tape, PB mode). Then check that the take-up torque is within the specification.

Specification

SP mode REC (PB) : 36 ± 6 g.cm

Take-up torque Ripple is under 5 g.cm

(If torque ripple appears, read its average value.)

Note: Take care not to catch the tape with the lid of the cassette, since there is a possibility of the tape slacking at unloading or ejecting caused by the internal spring of the torque cassette.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN VIDEO SEARCH REWIND MODE

- 1) Set the torque cassette (JIGVHC032) and get the unit in the V/S REW mode. Then check that the torque of the supply side is within the specification.

Specification

V/S REW take-up torque : 116 ± 15 g.cm

Note: Take care not to catch the tape with the lid of the cassette, since there is a possibility of the tape slacking at unloading or ejecting caused by the internal spring of the torque cassette.

CHECKING OF TAKE-UP TORQUE IN FAST FORWARD MODE

This is the same as the PB take-up torque. Refer to the PB take-up torque.

CHECKING OF TAKE-UP TORQUE IN REWIND MODE

This is the same as V/S REC take-up torque. Refer to V/S REC take-up torque.

CHECKING OF BACK TENSION IN VIDEO SEARCH REWIND

- 1) Set the torque cassette (JIGVHC032) and get the unit in VS-REW mode. Then check that the back tension of the take-up side is within the specification.

Specification

V/S REW back tension : 50 ± 10 g.cm

CHECKING OF REWIND BACK TENSION

- 1) Remove the cassette housing.
- 2) Get the mechanism in REW mode.
- 3) Check that the change gear swings to the supply side.
- 4) Set the torque measuring jig to the mechanism. Rotate the torque gauge slowly counterclockwise to measure back tension. (See Fig 2-6)
- 5) Check that the measured value is within the setting value.

Setting value: 8 ± 3 g.cm

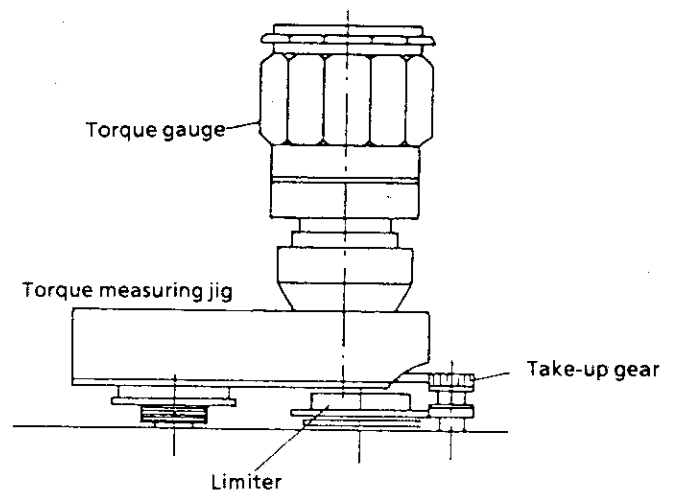


Figure. 2-6

CHECKING AND ADJUSTMENT OF TENSION POLE POSITION

<Checking Position>

- 1) Run the EC-30 tape at its beginning. Check that the center of the tension pole is within ± 0.4 mm from the tip of the triangle mark of the end sensor holder. (See Fig. 2-7-a)
- 2) If the measured value is not within the setting value, adjust as follows.

<Adjustment>

- 1) Short pin 2 of the AO connector on the control PWB to ground. By so doing, the unit becomes in the Test Mode in which the end sensor and reel sensor are inoperative, and it can get in PB mode without inserting the tape.
- 2) Get the unit in PB mode.
- 3) Loosen the tension arm position adjusting screw and adjust the tension arm position adjusting bracket so that the right side of the tension pole fits the tip of the triangle mark. (See Fig. 2-7- b)
- 4) Relieve the above pin 2 from the short-circuited state to clear the Test Mode.
- 5) Check the position according to Step 1 of <Checking Position>.

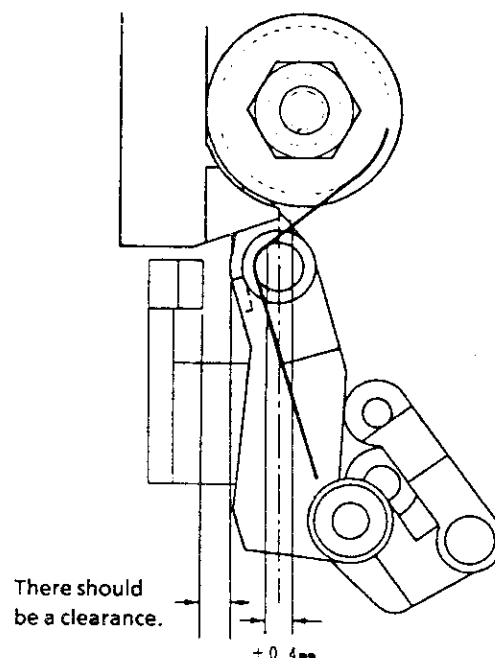


Figure. 2-7-a

Note:

1. After adjustment, apply screw lock to the tension arm position adjusting screw.
2. The tightening torque of screw is 1 ± 0.05 kg.cm.
3. Be sure to release Test Mode when the tape is set.
4. Load the mechanism with the tape before checking the tension pole position.
5. With the cassette controller in place, run the EC-30 tape at its beginning. Make sure that the tension arm does not come in contact with the cassette controller side. (See Fig. 2-7-a)

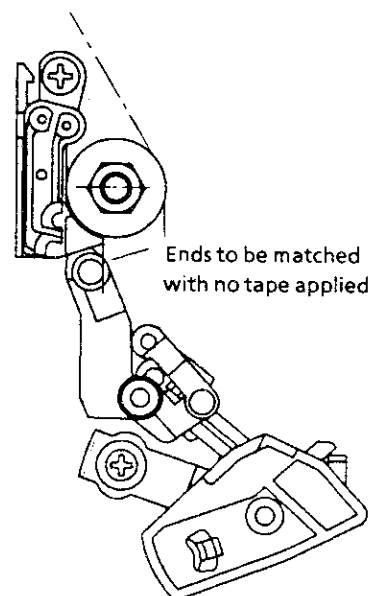


Figure. 2-7-b

CHECKING VERTICALITY OF TENSION POLE

- 1) Set master plane on the mechanism.
- 2) Check the verticality of the tension pole with the height adjusting jig A.

CHECKING AND ADJUSTMENT OF BACK TENSION OF RECORDING AND PLAYBACK

<Checking>

- 1) Set the torque cassette (JIGCTM0020P) and get the unit in the REC mode (in the case of the recorded tape, in the PB mode). Then check that the back tension of the supply side is within the specification.

Specification

SP mode REC (PB) $22 \pm 3\text{g}\cdot\text{cm}$
(Ripple less than $3\text{g}\cdot\text{cm}$)

Note: Take care not to catch the tape with the lid of the cassette, since there is a possibility of the tape slacking at unloading or ejecting caused by the internal spring of the torque cassette.

<Adjustment>

- 1) If the measured value is out of specification, adjust the position of the tension arm spring as shown in Fig.2-8: If the back tension is high, hang the tension arm spring at near side and if it is low, hang it to far side.

Note: After the back tension adjustment, be sure to check the tension pole position.

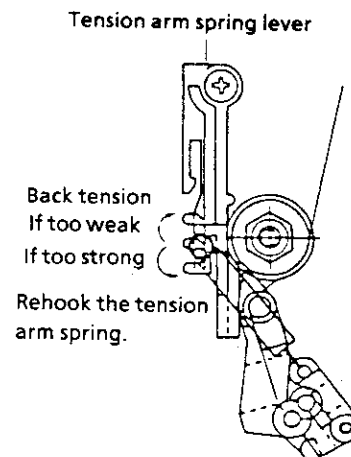


Figure. 2-8

CHECK OF PINCH ROLLER PRESSURE

- 1) Short pin 2 of the AO connector on the control PWB to the ground. By so doing, the unit gets into Test Mode in which the end sensor and reel sensor are inoperative, and may become PB mode without the tape set.
- 2) Get the unit in PB mode.
- 3) Turn OFF the power supply. (Remove battery or turn OFF the power supply AC adaptor.)
- 4) Insert the pinch roller pressure tape between the pinch roller and the capstan shaft.
- 5) Set the tension gauge to the pinch roller pressure tape. Pull the pinch roller in the reverse direction (arrow mark $\text{\textcircled{A}}$) of engaging direction to be slightly away from the capstan shaft.
- 6) After that, return the pinch roller gradually (arrow mark $\text{\textcircled{B}}$). Measure the tension just when the pinch roller has reached the capstan shaft.
- 7) Check that the measured value is within the setting value.

Setting value : $1.1\text{ kg} \pm 0.1\text{kg}$

(See Fig. 2-9)

- 8) Relieve the above pin 2 from the short-circuited state and clear the Test Mode

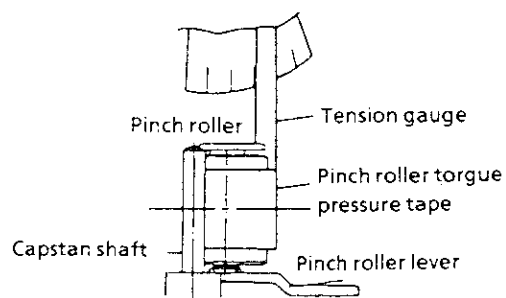
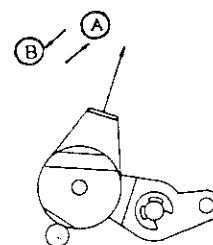


Figure. 2-9

ADJUSTMENT OF TAPE TRAVEL

1. Preparation for Adjustment and Checking of Tape Travel System (See Fig. 2-10-a.)

- 1) Connect each signal to oscilloscope as follows.
 - 1 ch : AP pin 4 (Control PWB)
 - 2 ch : AP pin 3 (Control PWB)
 - GND: AP pin 1 (Control PWB)
- 2) Loosen the guide roller lock screw. With a hexagon wrench for guide roller adjustment, tighten the lock screw lightly so that the tape guide rollers P2 and P3 turn smoothly. The tightening should be neither too loose nor too tight.
- 3) Play back a normal tape other than the alignment tape. Check that the tape is free from wrinkles or creases to travel normally along the edge of the tape guides P1, P2, P3 and P5 as shown in Fig. 2-10-b. If wrinkles or creases appear in PB mode, make an adjustment according to 2. SI Roller Retaining Guide Height & A/C Head Tilt Adjustment to eliminate all wrinkles and creases.
- 4) If no wrinkles and creases appear, make an adjustment according to 3. Travel Precision Adjustment.

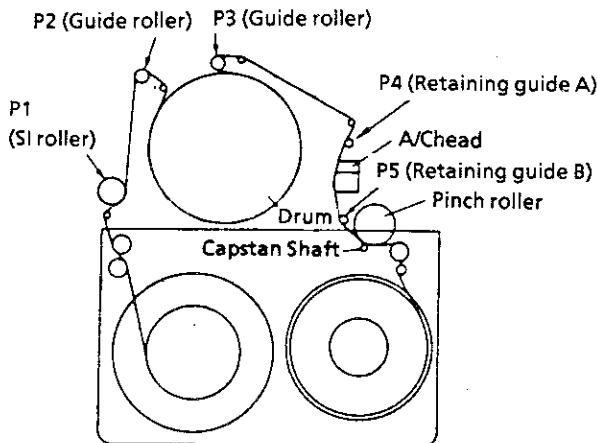
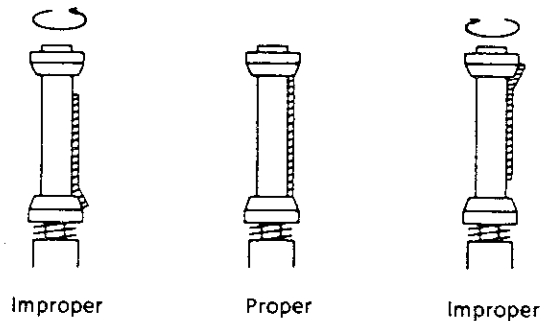


Figure2-10-a



Tape travel condition

Figure2-10-b

2. Checking and Adjustment of SI Roller Retaining Guide Height & A/C Head Tilt

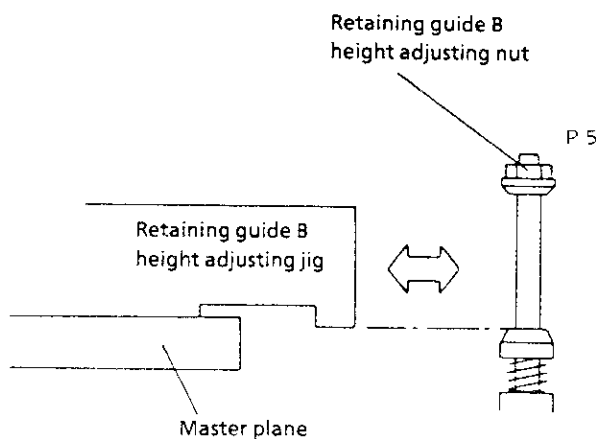


Figure2-11

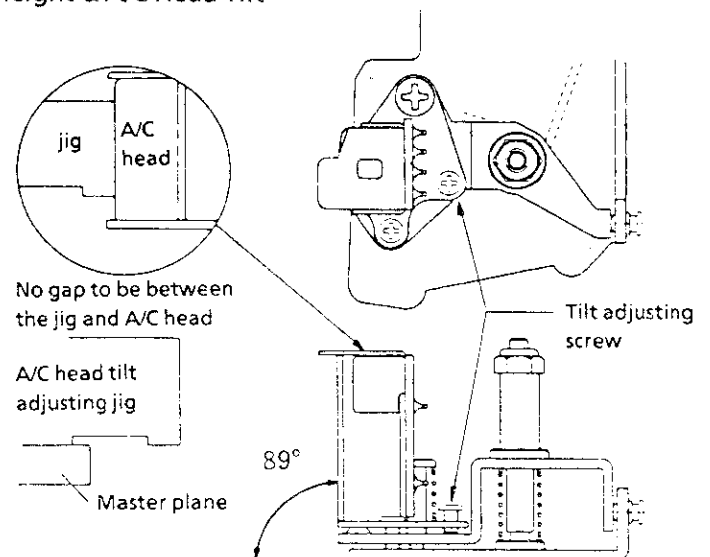


Figure2-12

- 1) Set the master plane to the main chassis.
- 2) Set the retaining guide B height adjusting jig as shown in Fig. 2-11 and check the height. Turn the adjusting nut slowly with the height adjusting driver to adjust the setting height.

- 3) Set the A/C head tilt adjusting jig as shown in Fig. 2-12 and check the tilt. Turn the adjusting screw with the Phillips screwdriver to adjust so that there is no clearance between the jig and A/C head.
- 4) After the jig is set, play back a normal tape to check that no wrinkles and creases appear in it.
- 5) If wrinkles or creases still appear at the retaining guide B after the proper jig setting, turn its height adjusting nut little by little to eliminate wrinkles.

3. Travel Precision Adjustment

- 1) Play back the monoscope part of the alignment tape (VR1HPSV) after checking that the tape travel system is free from abnormal phenomena.
- 2) Observe RF waveform on the oscilloscope. Push the tracking controls + and - alternately to check the flatness of RF waveform. When changing the RF waveform from MAX to MIN or vice versa with the tracking controls + and -, make sure that the waveform shifts almost flat. If not, readjust the guide rollers P2 and P3.

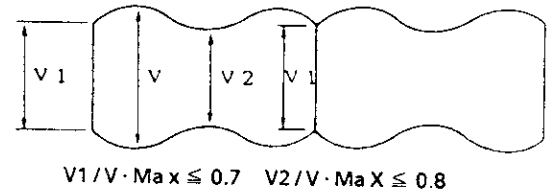


Figure 2-13-a

The standard value of flatness is shown in Fig.2-13-a. The waveform should be adjusted as flat as possible. For easy adjustment, roughly adjust the X-position adjusting screw so that the RF waveform is nearly maximum in the tracking control preset position (by pressing the tracking controls + and - at a time). (See Item 5 and Fig. 2-13-a)

- 3) Adjustment of entry side guide roller P2. Push the tracking controls + and - with the RF output at maximum and make sure that the entry side of the waveform changes keeping its analogous Figure. If the Figure differs in pushing the control + and -, it means that the height of P2 has been maladjusted. Readjust the height of P2 so that the Figure should be kept as similar as possible. (See Fig. 2-13-b)
- 4) Adjustment of exit side guide roller P3. Adjust the height of P3 in the same manner as entry side so that RF waveform change becomes as similar as possible. (See Fig. 2-14)

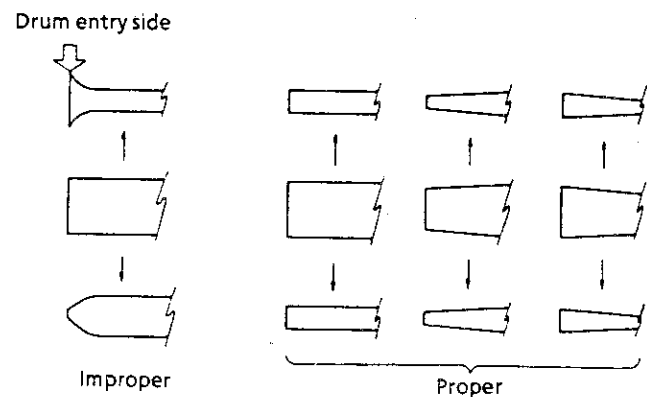


Figure 2-13-b

- 5) After steps 3) and 4), pushing the tracking controls + and - alternately, observe whole RF waveform. Make a fine adjustment of guides, rollers P2 and P3 so that the waveform becomes as flat as possible even when RF output is either maximum or minimum.
- 6) After adjustment, turning P2 approx. 25° counterclockwise, lock the lock screws of guide, rollers P2 and P3 with care not to overtighten them.

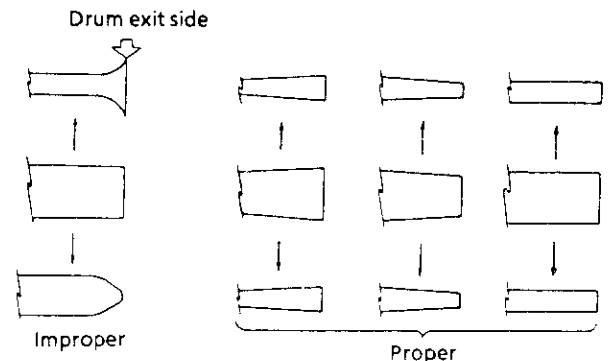


Figure 2-14

4. A/C Head Azimuth Height Adjustment

- 1) Connect audio output to oscilloscope.
- 2) Play back the monoscope part of alignment tape (VR1HPSV). Make azimuth adjustment by turning the azimuth adjusting screw so that audio level becomes maximum.
- 3) Slowly turn the height adjusting nut with the box driver (N8645) to adjust the height so that audio output becomes maximum. (See Fig. 2-15)

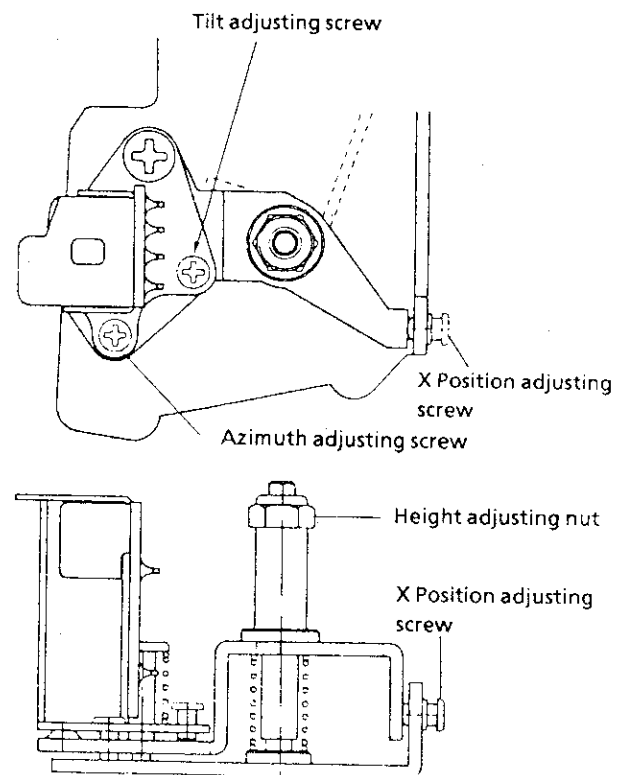


Figure. 2-15

5. X Position Adjustment

- 1) Push the tracking controls + and - at the same time to adjust the tracking to the preset position.
- 2) Playback the monoscope part of alignment tape (VR1HPSV). Adjust X position adjusting screw with the Phillips screwdriver to the position in which RF waveform of L ch side becomes maximum. (See Fig. 2-15)
- 3) Push the tracking controls + and -, and make sure the R-channel RF waveform becomes maximum at the preset position.
- * Connection of oscilloscope should be made in the same manner as in 3. Travel Precision Adjustment.

6. Checking and Adjustment of Playback Switching Point

- 1) Connect oscilloscope as follows:
CH1: Video output
CH2: AP pin 3 (Control PWB): 30Hz Trigger
GND: AP pin 1 (Control PWB): GND
- 2) Be sure to play back the alignment tape.
- 3) Push the tracking controls + and - at the same time to adjust the tracking to the preset position.
- 4) Make the sync slope of oscilloscope to be (-), and adjust R837 so that the space between trigger point and V sync is 6.5H. (See Fig. 2-16-a)
- 5) Make the sync slope to be (+), and check that the space between trigger point and V sync is 6.5H. (See Fig. 2-16-b)

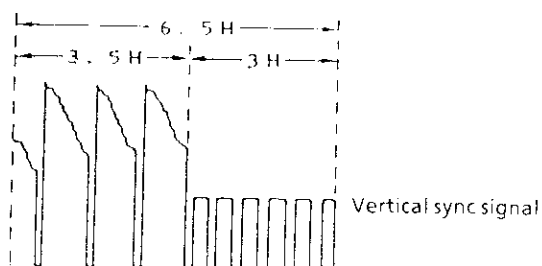


Figure. 2-16-a

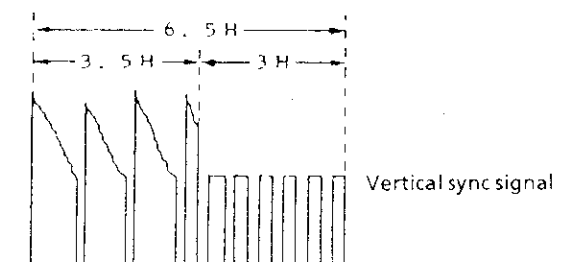


Figure. 2-16-b

7. Checking of Self-Recording

- 1) After all adjustments are completed, check the flatness of RF waveform and audio sounds by self-recording.

REPLACEMENT AND REASSEMBLY OF MECHANISM

1. Replacement of Capstan Motor (See Fig. 2-17)

<Removal>

- 1) Remove the drive belt.
- 2) Disconnect the leads from the rotor holder.
- 3) Remove the two fixing screws from the rotor holder, and take out the rotor holder.
- 4) Remove three fixing screws of capstan motor and pull out the motor downwards.

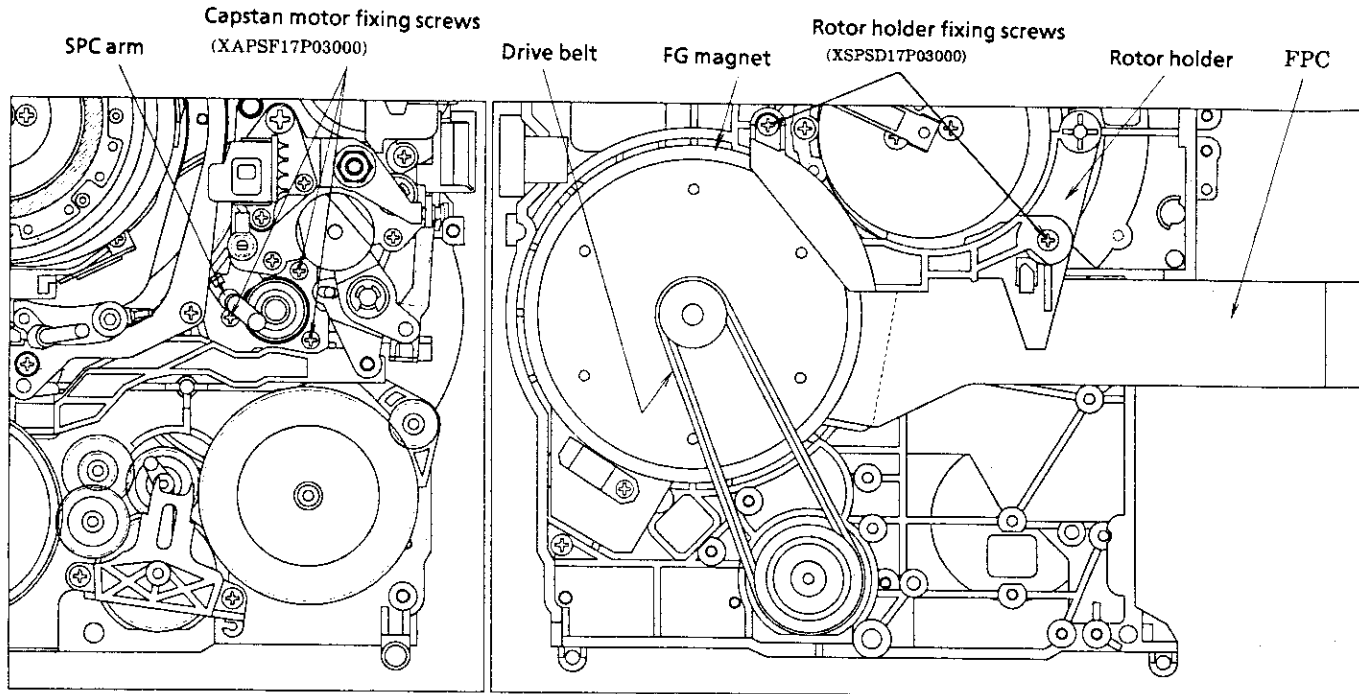


Figure. 2-17

<Reassembly>

- 1) Reassemble in the reverse manner of Removal.

Note:

- 1) Take care not to damage the capstan shaft or SPC arm with the screwdriver while reassembling the capstan motor.
- 2) Lay and dress the leads properly when mounting the rotor holder. The rotor holder fixing screws should be tightened to the torque of $0.7 \pm 0.05\text{kg}\cdot\text{cm}$.
- 3) Use the specified fixing screws to secure the capstan motor. Otherwise the motor might be damaged. The screws should be tightened to the torque of $1 \pm 0.05\text{kg}\cdot\text{cm}$.
- 4) Rotate the capstan motor. Check that the belt travel is normal.
- 5) Check and adjust the servo circuit.
- 6) Check and adjust tape travel.
- 7) Take care not to bring a magnetized screwdriver into contact with the FG magnet around the rotor.

2. Reassembly of Loading Gear

- 1) After inserting the L.R. drive gear B, fix L ring B assembly to the proper position.
- 2) Insert the L.R. drive gear A assembly. At this time, fit each mark (1) of L ring B and L.R. drive gear A. Also, fit each mark (2) of L.R. drive gear B and L.R. drive gear A. (See Fig. 2-18-a)
- 3) Fix the L ring A assembly to the proper position. At this time, fit each mark (3) of L ring A and L.R. drive gear B. (See Fig. 2-18-b)
- 4) After fixing the cut washer, check that the L.R. drive gear A assembly moves smoothly by turning it.
- 5) Before fixing the loading gear, insert a pin gauge ($\phi 1.5$) in order to fit the position holes of L ring A and L ring B. (See Fig. 2-18- c)

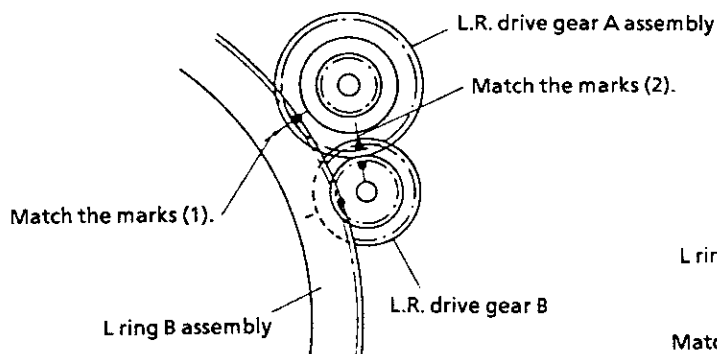


Figure. 2-18-a

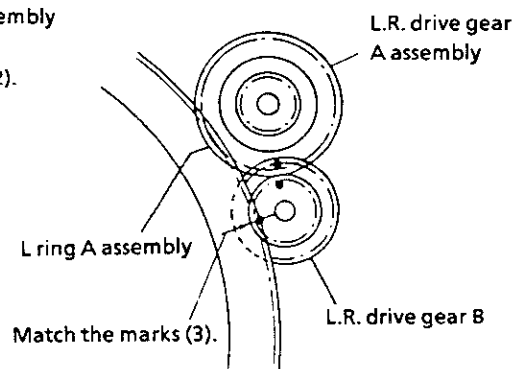


Figure. 2-18-b

- 6) Insert the loading gear. At this time, turn the double-acting gear against the double-acting SPR to fit the marks of double-acting gear and loading gear. (See Fig. 2-18-c)
- 7) While performing Step 6), fit the toothless part of loading gear to the toothless part of master cam. (See Fig. 2-18-c)
- 8) After inserting loading gear, check that the L.R. drive gear A engages with the double-acting gear.

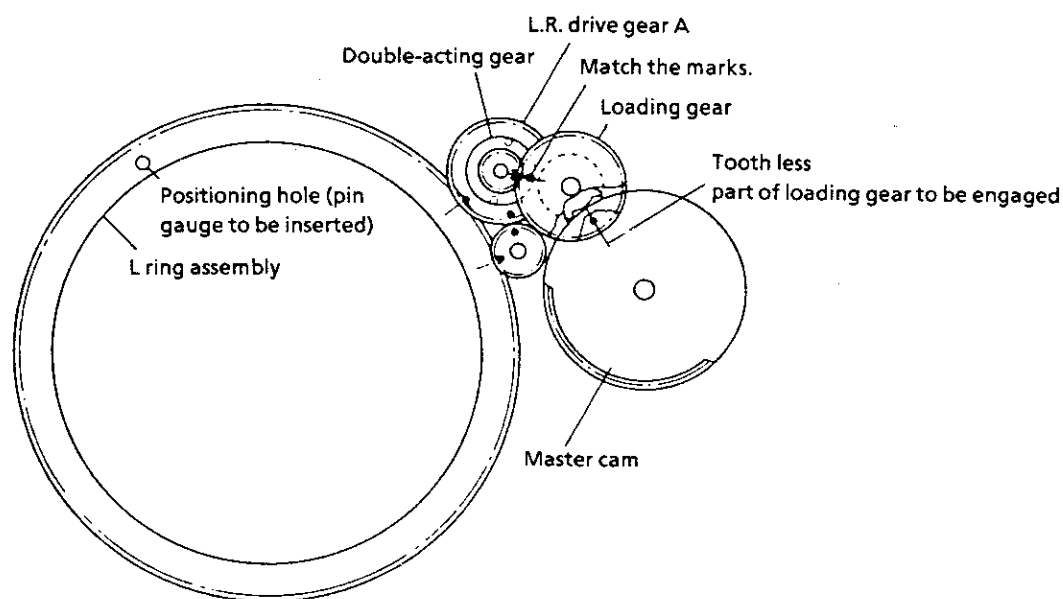


Figure. 2-18-c

3. Replacement of Drum Motor

- 1) Take the mechanism out of the VTR.
(See Fig. 2-19)
- 2) Remove one earth brush fixing screw and detach the earth brush. Take care not to deform the earth brush. (See Fig. 2-20)
- 3) Disconnect the leads from the rotor holder.
- 4) Remove the two rotor holder fixing screws, and take out the rotor holder. (See Fig. 2-20)
- 5) Remove the two rotor fixing screws and detach the rotor of drum motor. (See Fig. 2-21)
- 6) Remove three stator fixing screws and pull off the drum motor stator.
- 7) Fix new drum motor stator in the reverse manner of Step 5) and 6). Tightening torque should be $1.0 \pm 0.1\text{kg}\cdot\text{cm}$.
- 8) Fix the new drum motor rotor in the reverse manner of Step 5).

Tightening torque: $2.0\text{kg}\cdot\text{cm}$

Note: At fixing, the phase fixing hole (Fig. 2-21) of prepressure collar and that (Fig. 2-20) of motor rotor should be fit..

- 9) Fix the rotor holder in the reverse manner of removing it. ($0.7 \pm 0.05\text{kg}\cdot\text{cm}$) Be careful to dress the leads correctly.
- 10) Fix the earth brush in the reverse manner of removing. ($1.0 \pm 0.1\text{kg}\cdot\text{cm}$)
- 11) Check the tape travel and X-position, and readjust the switching point if necessary.

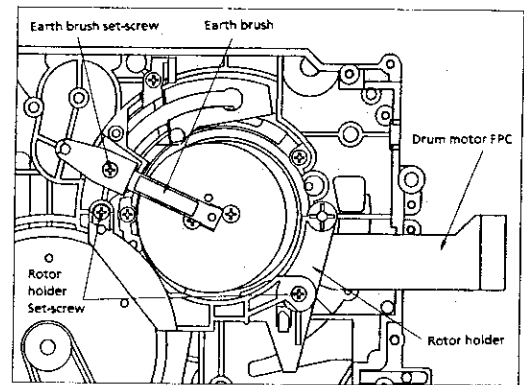


Figure. 2-19

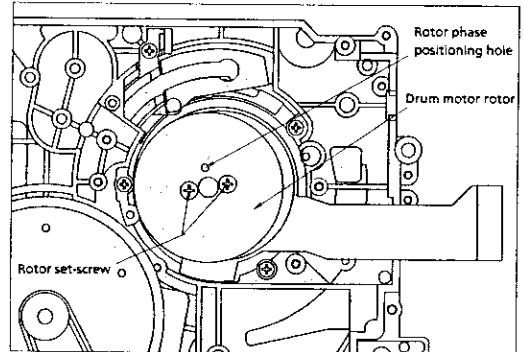


Figure. 2-20

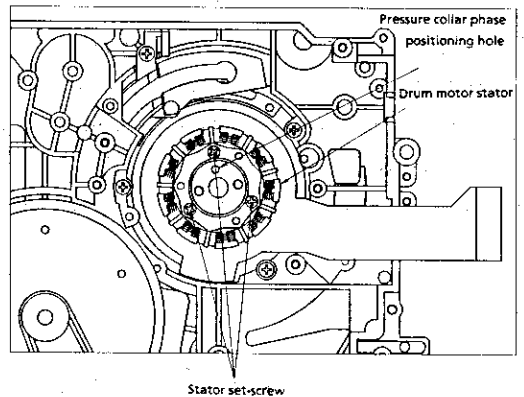


Figure. 2-21

4. Replacement of Upper Drum

<Preparation of Replacement>

Before replacement of the upper drum, fix the micro checker stand and micro checker to the master plane in order to assemble the upper drum peripheral swing meter. (See Fig. 2-22)

- 1) Remove two damper fixing screws and detach the damper ass'y. (See Fig. 2-23)
- 2) Remove two fixing screws of upper drum to detach the upper drum. (See Fig. 2-23)
- 3) Place the new upper drum referring to the match marks, and tighten up its two fixing screws. In installing the upper drum, be careful not to hit the rotary transformer (black, cylindrical ferrite core) of the lower drum and that (black, cylindrical ferrite core) of the upper drum against each other. (See Fig. 2-24)

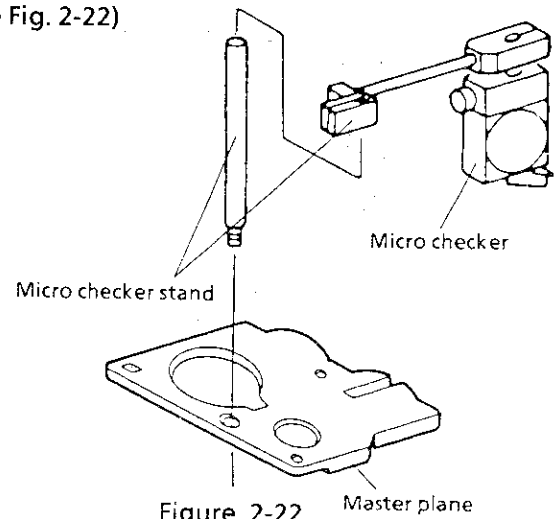


Figure. 2-22

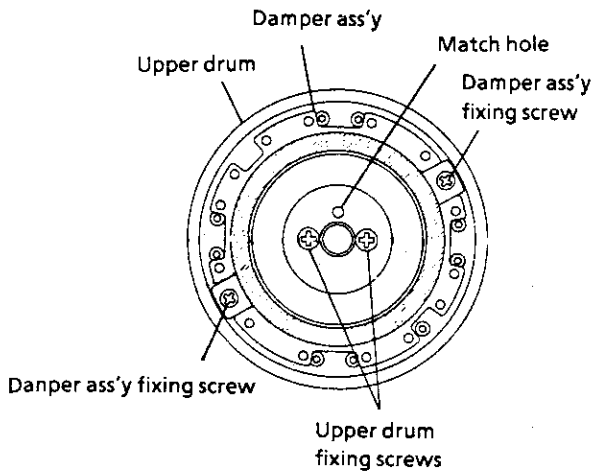


Figure. 2-23

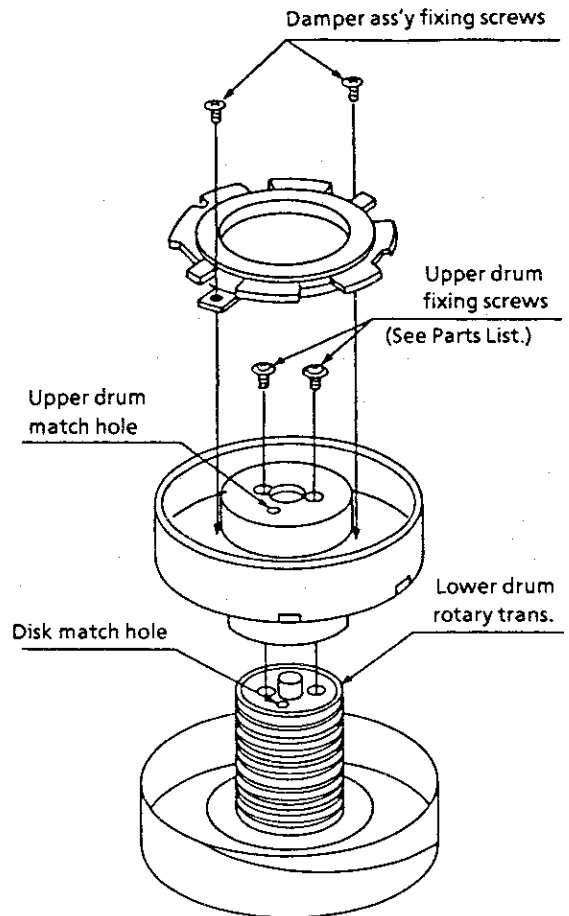


Figure. 2-24

4) Checking of Peripheral Swing

- (1) Fix micro checker prepared beforehand with care that the meter does not hit the drum. (See Fig. 2-25-a)
The meter should be placed between GR-B and SP-C facing drum center and within the range of 2~5mm from the top of upper drum. (See Fig. 2-25-b)

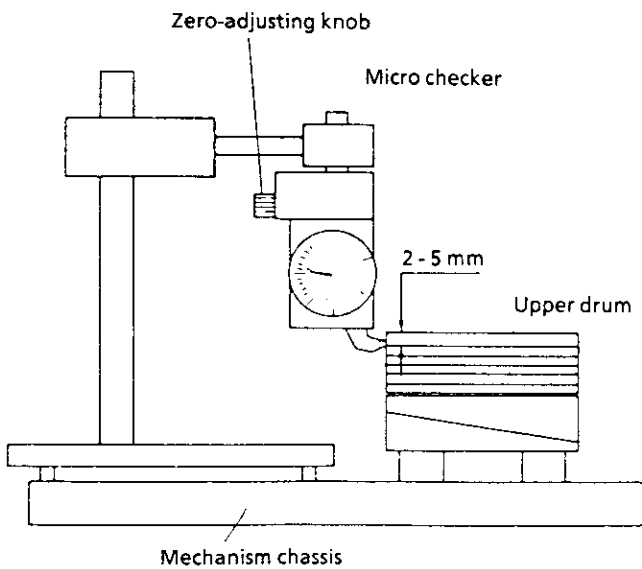


Figure. 2-25-a

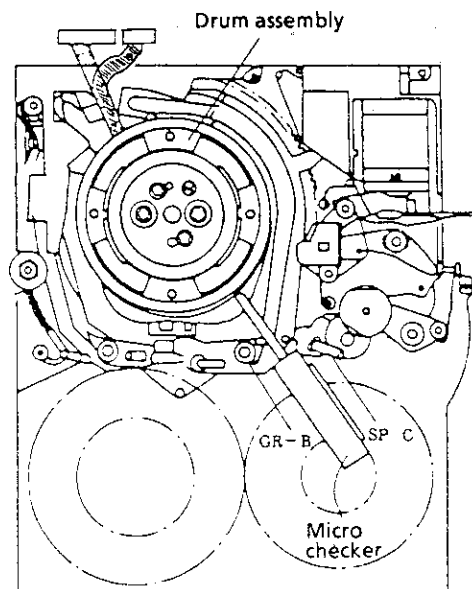


Figure. 2-25-b

- (2) Turn the 'zero' adjusting knob of micro checker so that the needle points '0'.
- (3) Turn the upper drum slowly with care not to put force to it, and check that upper drum peripheral swing is within 4 μm . If not, loosen two upper drum fixing screws and make the adjustment as follows: As shown in Fig 2-26, to begin with, insert a watch screwdriver between the upper drum in opposite side of (+) peak direction of upper drum peripheral swing and shaft. Move upper drum in the opposite side of (+) peak direction to make the peripheral swing within 4 μm . (See Fig. 2-26) Then, tighten the upper drum fixing screws and measure the peripheral swing. Check that it is within 4 μm the upper drum fixing screws should be tightened to the torque of $2.0 \pm 0.2\text{kg}\cdot\text{cm}$.

- 5) Fix the damper ass'y in the reverse manner of removing it.
- 6) After upper drum replacement, make X-position adjustment in switching point and Tape travel adjustment.

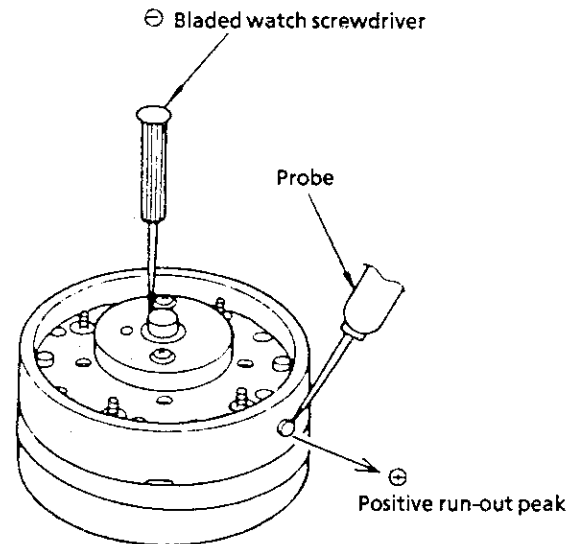


Figure. 2-26

5. Replacement of Upper and Lower Drums

Note: Take extreme care during removal or replacement of upper & lower drum units. Never touch the video head.

- 1) Take the mechanism out of the VCR. (See Fig. 2-27-a)
- 2) Remove the earth brush rotor holder in the same manner as in Drum Motor Replacement 2) thru 4). (See Page 44)
- 3) Remove three drum fixing screws to detach the component of upper & lower drum assemblies and drum motor assembly. (See Fig. 2-27-b)

Note: Take care not to damage the upper & lower drum assemblies and their peripheral parts.
- 4) Place the component detached in 3) with upper drum downwards and remove drum motor in the same manner as Steps 5) and 6) of Drum Motor Replacement. (See Page 44)
- 5) Fix the drum motor detached in step 4) to new upper & lower drum assemblies. Reassemble them in the reverse manner of above mentioned removal.
 - ※ Take care not to damage upper & lower drum ass'y and their peripheral parts.
 - ※ The tightening torque fixing the upper & lower drum assemblies to chassis should be $1.0 \pm 0.1\text{kg}\cdot\text{cm}$. (See Fig. 2-27-b)
- 6) After replacing of upper and lower drums, be sure to make tape travel adjustment, X-position adjustment and switching point adjustment.

Note: Pass the FPC through the slit of the FPC holder. (See Fig. 2-27-c)

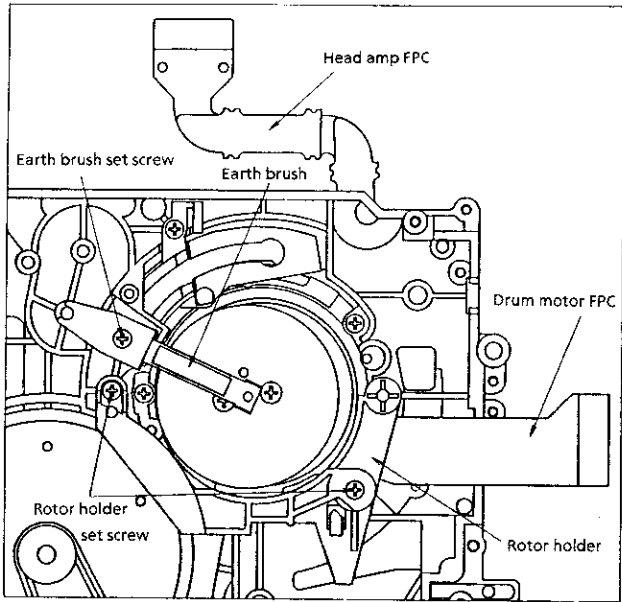


Figure 2-27-a

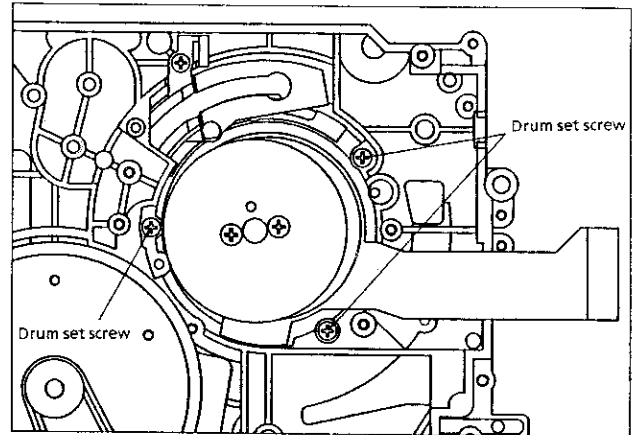


Figure 2-27-b

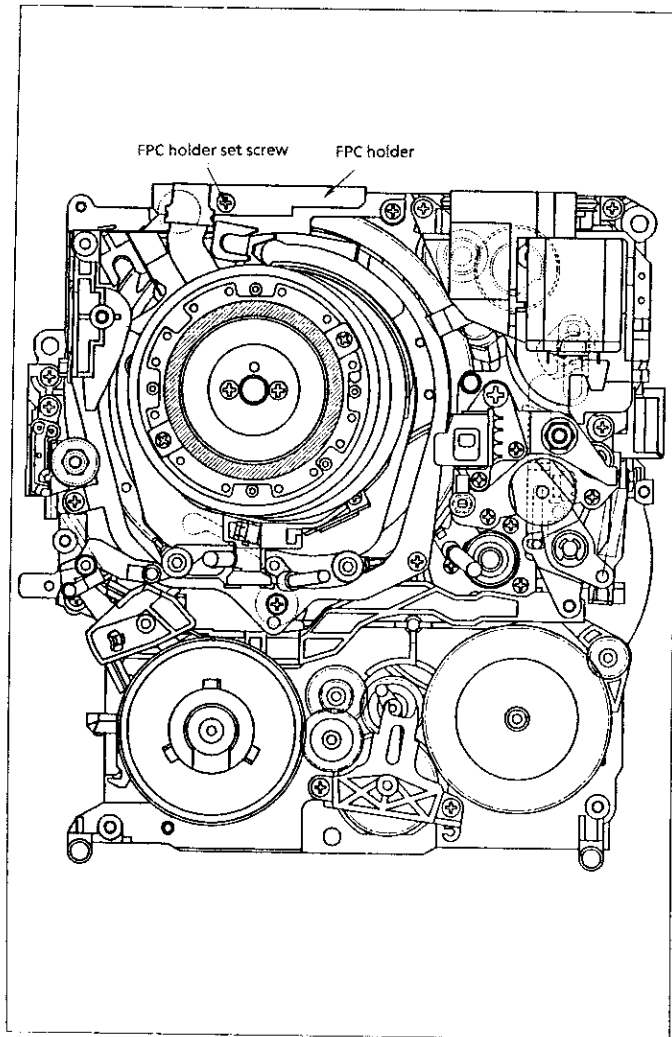


Figure 2-27-c

ADJUSTMENT OF ELECTRICAL CIRCUIT

ADJUSTMENT OF CAMERA SECTION

1. Service for Camera Section

1) Servicing Method

The following extension cords are required in performing PWB repair and re-adjustment of the camera section.

Cable for camera PWB service

Parts code	Connecting point	Connector name
QCNW-1051TAZZ	Camera section process board ↔ Video section Y/C board (pin 4)	P401(MF)↔P15(BG)
QCNW-1050TAZZ	Camera section A/F board ↔ Video section power source unit (pin 8)	P709(FB)↔P18(BJ)
QCNW-1049TAZZ	Camera section process board ↔ Video section main board (pin 10)	P701(ME)↔P11(AL)
QCNW-1048TAZZ	Camera section A/F board ↔ Camera operating board (pin 14)	P708(FA)↔ P001 (CA)
QCNW-1047TAZZ	A/F board ↔ Lens unit (pin 18)	P601(FE)↔ Lens
QCNW-1046TAZZ	Process board ↔ A/F board (pin 20)	P703(MC)↔P705 (FC)
QCNW-1045TAZZ	Process board ↔ A/F board (pin 30)	P704(MD)↔P706 (FD)

When mounting the camera section on the tripod, use special table (JIGSTAND-C680) and attach it to the lens holder of camera section as shown in the figure below.

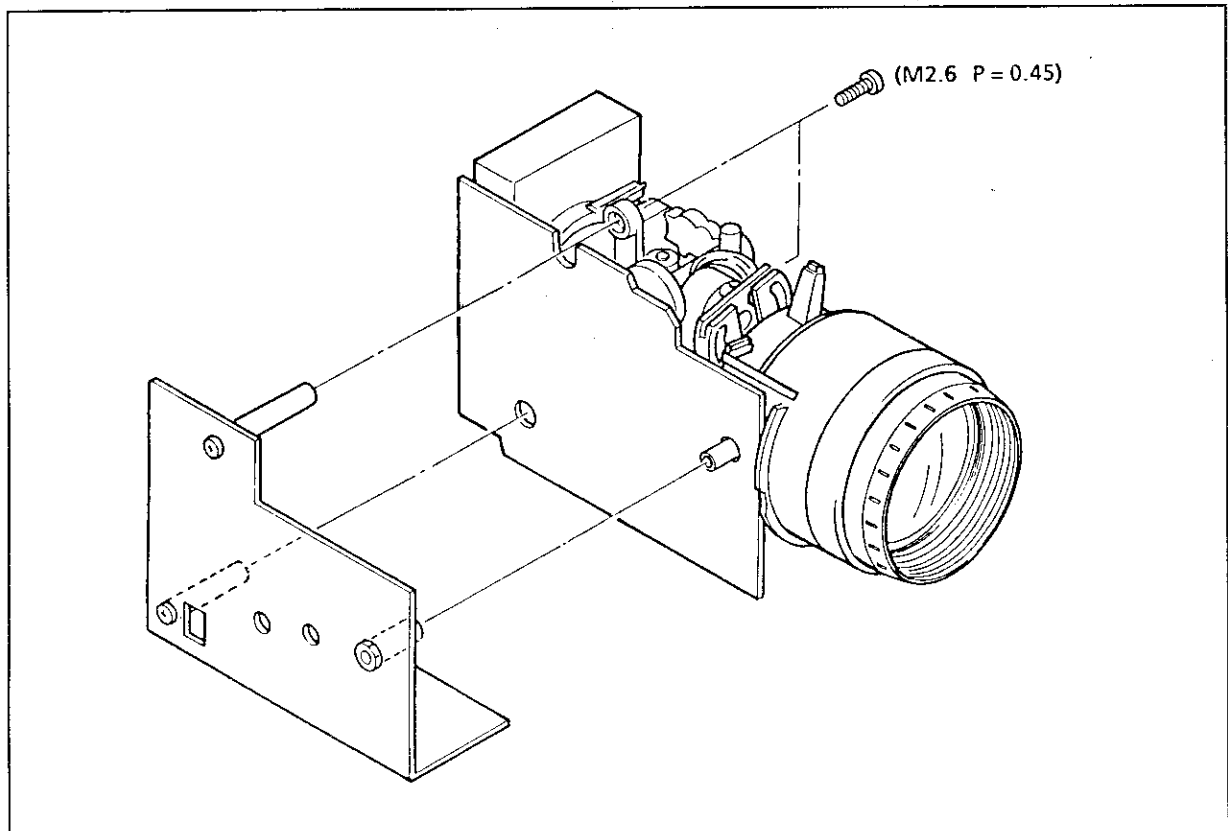
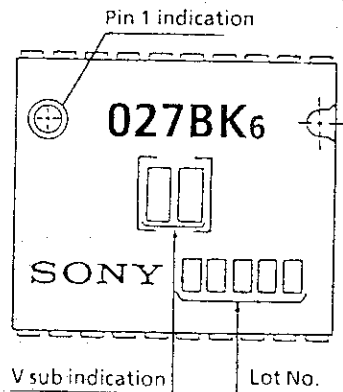


Fig.3-1

2. CCD Sensor Replacement

● Before replacement

- 1) The CCD image sensor has weaker characteristic than C-MOS LSI against the damage caused by static electricity. Therefore, Electro-static Damage Prevention Technique must thoroughly be carried out at replacement.
 - The soldering iron must be grounded.
 - Human body must also be grounded by wearing the wrist strap (via 1 MΩ resistor).
 - The CCD sensor must be put into the conductive sponge for its foot lead to be shorted until it is fixed on the board.
- 2) Take good care not to stick any stain, dust or scar on the surface glass or optical filter of CCD sensor. If any stain such as fingerprints sticks, wipe it off with silicon paper or clean chamois.
- 3) When replacing the CCD sensor, use the soldering iron with protection against static electricity and make soldering within a very short time.
- 4) Before installing the CCD sensor, read the indicated value of V-SUB voltage shown on the back of CCD sensor and put it down on a note, etc. As for V-SUB voltage adjustment, see item 2 of adjustment procedure.



NOTE: Indication of board voltage (V_{SUB}) set value

Board voltage set value is indicated in code of the back of CCD sensor. Make adjustment so that the indicated voltage is obtained at V-SUB terminal.

V-SUB code - 2 digits



The relation between indications in integer portion and real values is as follows:

Indication in integer portion	7	8	9	A	B	C	D	E	F	G	H	I	J
Real value	7	8	9	10	11	12	13	14	15	16	17	18	19

<Example> F5 → 15.5 (V)

Fig.3-2

● Removal of CCD sensor

- 1) Remove four screws ㊶ and detach shielding case ①.
- 2) Remove two screws ㊵ and separate the lens unit and sensor board unit ②.
- 3) Remove two screws ㊴ fixing the sensor board unit and CCD sensor holder ③.
- 4) Pull out the CCD sensor from the sensor board unit by unsoldering.

● Fixing of CCD sensor

- 1) Put crystal filter ④ and dust protection rubber ⑤ in the CCD holder of lens unit in this order with the lens unit standing (which means that the CCD sensor mounting unit turned upward). Put in the crystal filter so that its marking faces the lens side.
- 2) Make insertion aligning the upper left corner (pin 1) of CCD sensor with that of CCD holder. (AT this time, the CCD locating holder ⑥ installed on the CCD holder functions as a spring and fits the center of CCD sensor to the light axis of lens.)
 - * Take care not to make the CCD sensor turned in wrong direction.
 - * If the spring characteristic of CCD locating holder is weak, replace it.
- 3) Put on the CCD sensor holder and install it on the lens unit with two screws ㊴.
- 4) Carefully insert into the sensor board the pin of CCD sensor projecting from the CCD sensor holder and fix the sensor board with two screws ㊵.
- 5) Solder the pin of CCD sensor to the sensor board.
 - * Take care not to apply excessive heat.

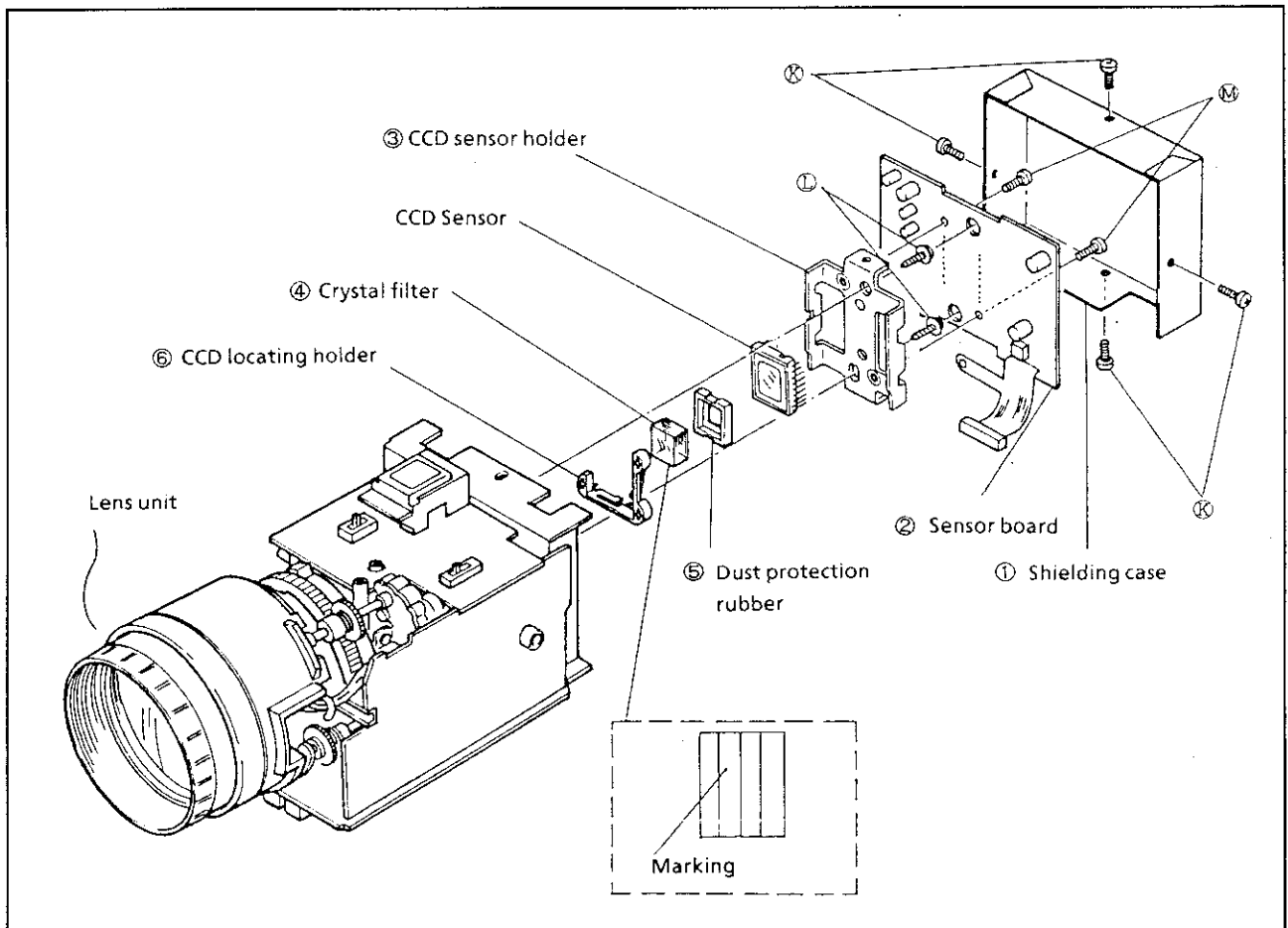


Fig.3-3

3. Adjustment of Camera

1) Object, Meter and Jlg necessary for Camera Adjustment

- | | | |
|------------------------|---|--|
| ● Gray scale chart | ● White pattern chart | ● AV output cable |
| ● Colour bar chart | ● Siemens star chart | ● Colour temperature conversion filter |
| ● Oscilloscope | ● Frequency counter | Cold conversion |
| ● Digital voltmeter | ● Vectorscope | HOYA "LB-165 |
| ● Illuminometer | ● Colour Temperature meter | Hot conversion (W12) |
| ● Colour video monitor | ● Tripod fixing jig | ● Halogen light (2) |
| ● Extension cable | ● DC power supply 9.6V
(Separate cord) | |

2) Standard Connection at Camera Adjustment

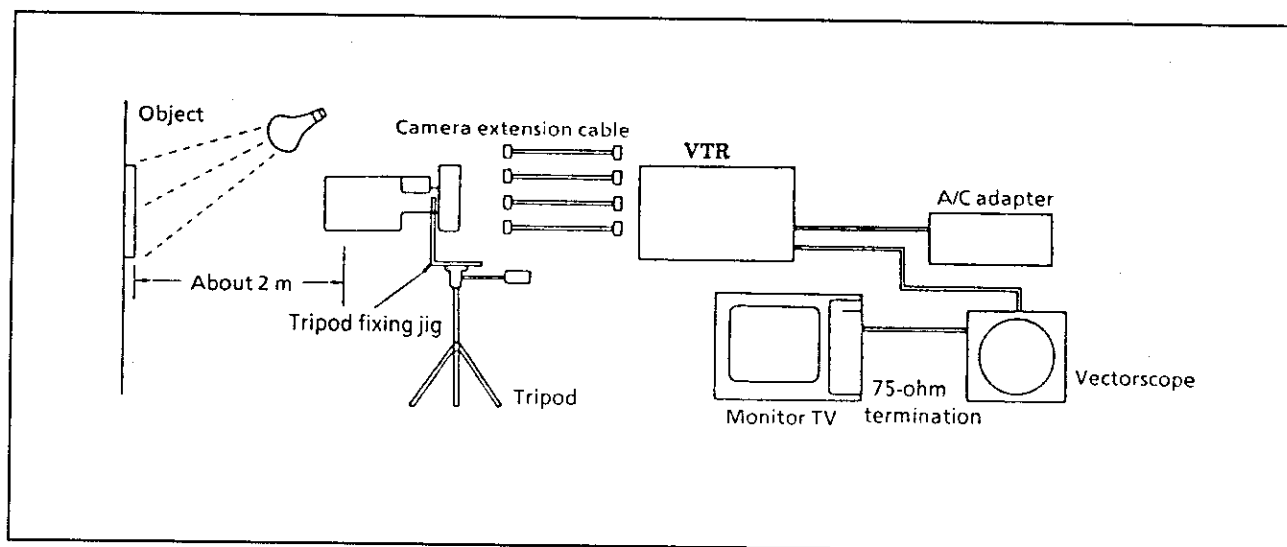


Fig.3-4

When adjusting the camera section:

For sensor board adjustment or repair, CCD replacement or lens replacement, separate the camera section from the VTR section and connect them with an extension cable. Mount the camera section on the tripod with the tripod fixing jig.

3) Preparation before Adjustment and Checking

[1] Illumination

Intensity of illumination:

Make adjustment so that the intensity of illumination becomes around 3000 Lux and even on the whole pattern.

(More than two lights for illumination source is preferable.)

Color temperature 3200°k.

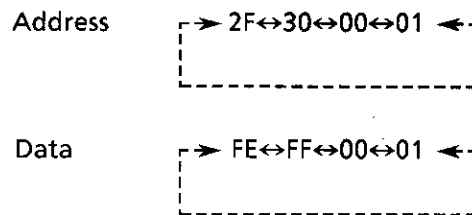
[2] Use a new test pattern free from blemish or dye.

[3] In the case when something wrong occurs with the electric circuit, be sure to find out the defective part with meter and make adjustment after repairing or replacing it.
Do not move any adjusting control unnecessarily without finding out the defective part.

- [4] Micro computer is used for main adjustments in this unit.
To perform adjustment, it is necessary to short between pins 2 (TEST) and 4 (GND) of VTR control board AQ connector (TEST3) using a resistor of 1.2 kΩ and set in camera adjustment mode.
After adjustment is completed, be sure to remove the resistor.

No	Adjustment procedure	View finder screen display (***** is flashing)
1	Rewrite the figure flashing on the screen by using FF and REW keys to select the item (address) to be adjusted.	ADJ 30
2	Press PB key to call the data of the specified address.	ADJ 30 FF
3	Make adjustment by rewriting the data with FF and REW keys. (When the data is rewritten, the display starts flashing.)	ADJ 30 00
4	Press PB key to write the data in the specified address, by which adjustment is completed. (Data display stops flashing.)	ADJ 30 00
5	If STOP key is pressed in the state of No.2 or 4, the unit returns to the state of No.1, where the item (address) to be adjusted can be selected.	ADJ 30

If pressed for 0.3 sec. or more, FF and REW keys perform repeat operation. At data setting, if pressed for another 2 sec. or more, these keys rewrite the data by ± 4.
Address and data are displayed in hexadecimal. The selecting order is as follows:



Address and data are displayed on the DATE-TIME display portion of the view finder.

Items (addresses) to be adjusted are as follows:

CH01	Iris Level	CH11	White Balance Mode
CH02	AGC Level	CH12	R Offset
CH03	Black Clip	CH13	B Offset
CH04	Red/White Balance	CH14	R Gain
CH05	Blue/White Balance	CH15	B Gain
CH06	R-Y Gain	CH16	B-Y Carrier Balance
CH07	B-Y Gain	CH17	R-Y Carrier Balance
CH08	R-Y Matrix	CH18	PAL Burst
CH09	B-Y Matrix	CH19	Burst Phase
CH0A	R-Pedestal Correction	CH1A	Highlight Chroma Suppression
CH0B	Colour Difference between 2H Offset Correction	CH1B	B-Y level
CH0C	Hall Offset	CH1C	R-Y level
CH00	Initialize	CH30	Back Light Correction

The following are free addresses having no relation to adjustment.

CH0D, CH0E, CH0F
CH10, CH1D, CH1E, CH1F
CH20~CH2F

(CAUTION)

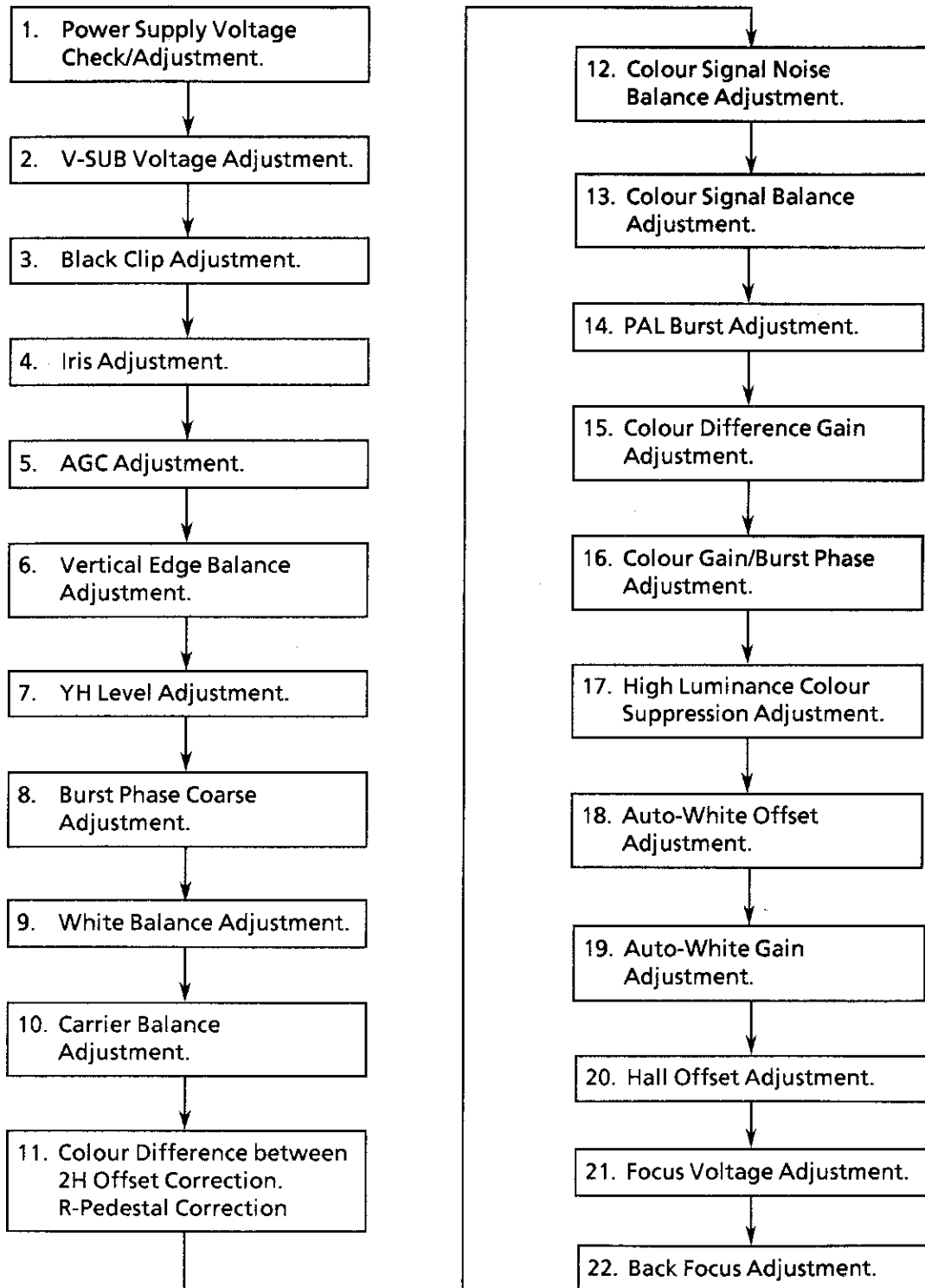
- In adjustment mode, take care not to touch the keys having no relation to adjustment. If it becomes impossible to read or rewrite the data, cancel adjustment mode and turn power supply ON once more, and then set in adjustment mode again.
- If the data of Back Light Correction (CH30) is rewritten into the ones other than 00, the unit is set in Back Light Correction mode. As the camera operating switch (except Green Lock) becomes ineffective in adjustment mode, this address should be used at High Luminance Colour Suppression Adjustment.
- White balance is set to the following modes by the data of White Balance Mode (CH11).

White Balance Data	White Balance Mode
1E (00~3B)	Auto White
7F (6B~93)	Indoor
D8 (C4~ED)	Outdoor

- In the case when E²PROM (BR93C46F) is replaced, the data of Initialize (CH00) should be rewritten into the ones other than FF. (The microcomputer is so set that all outputs of D/A become 7F when the data in Initialize is FF.)

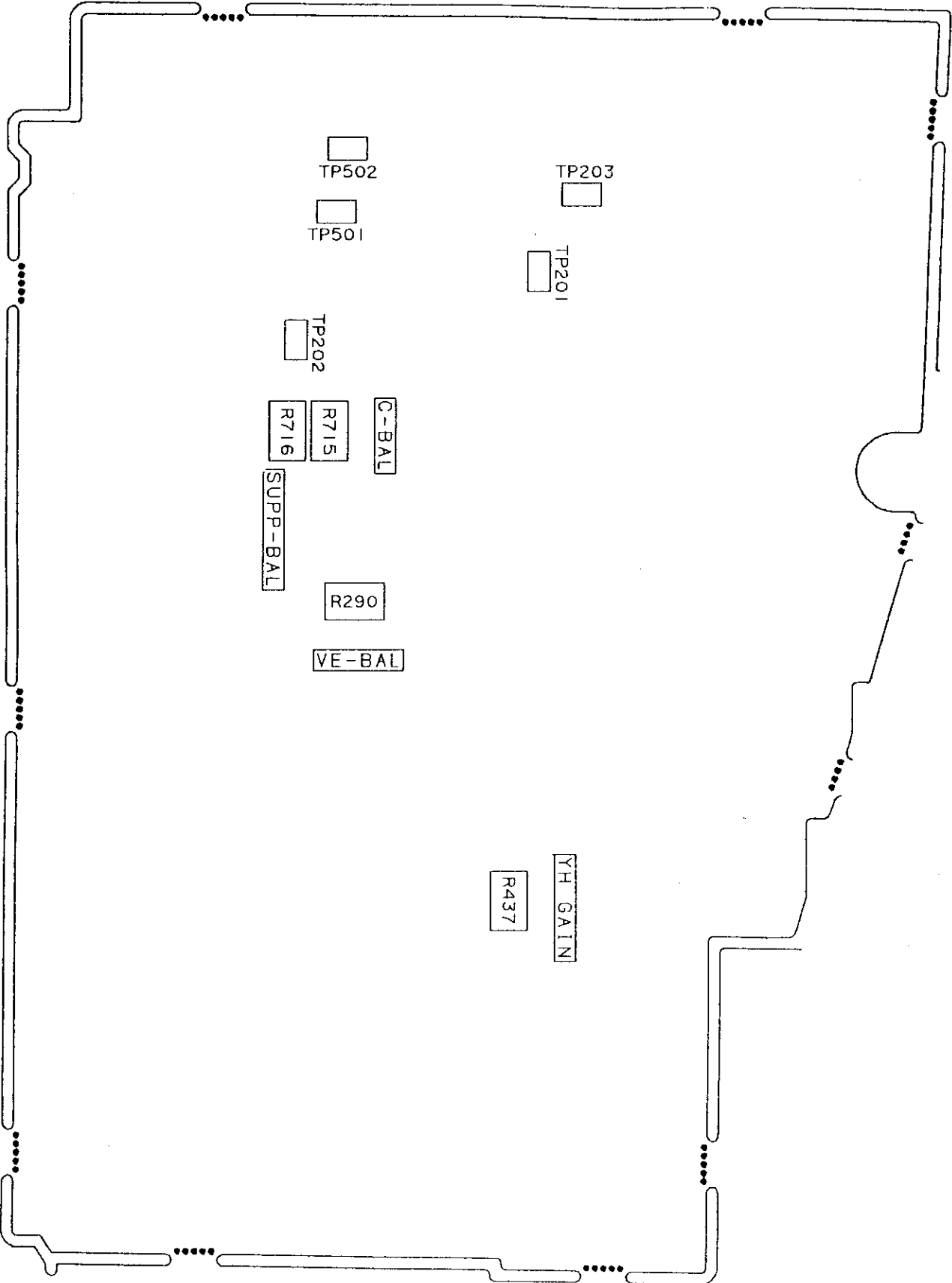
[5] Camera Adjustment Procedure

This adjustment procedure indicates the order necessary for following all adjustments in case of replacement of CCD, etc. Therefore, some items may be unnecessary to adjust according to the cases.

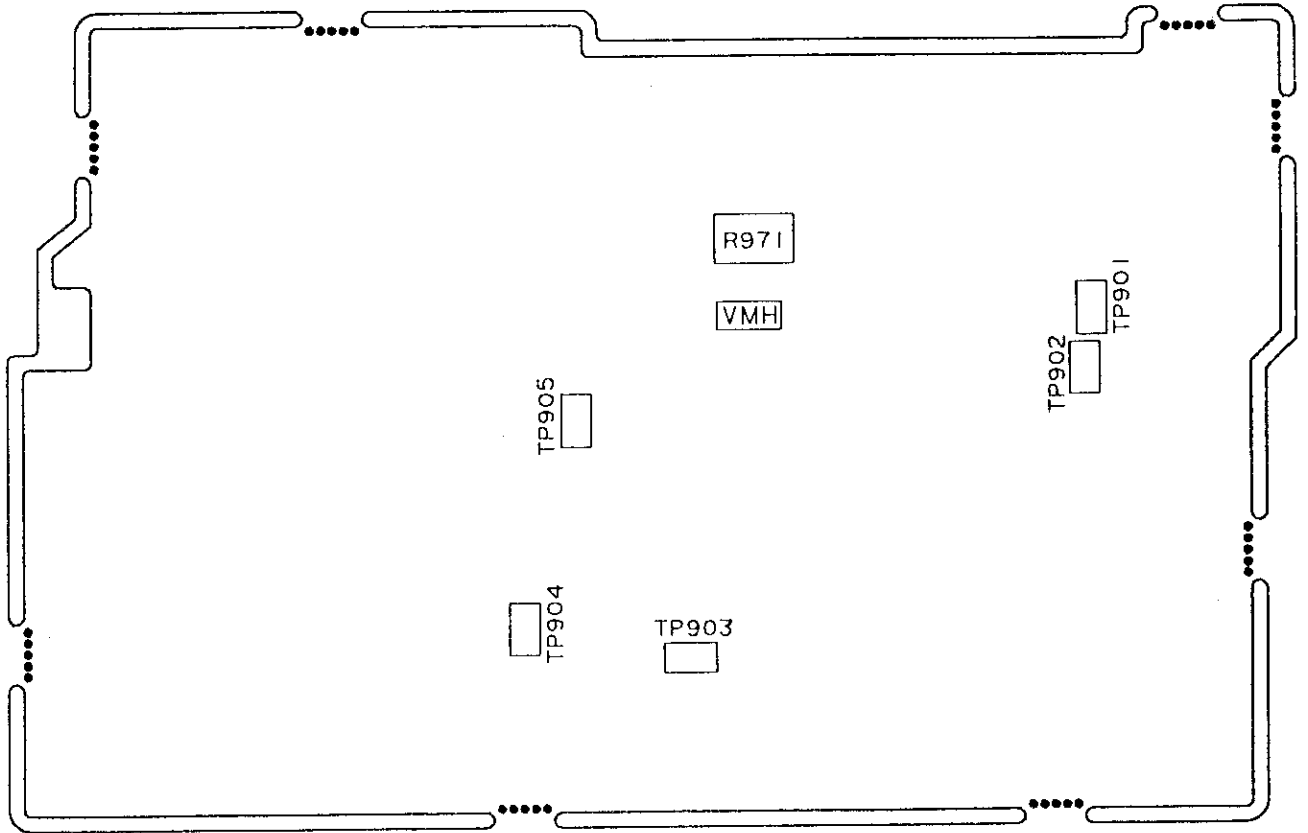


Location of Test Points and Controls

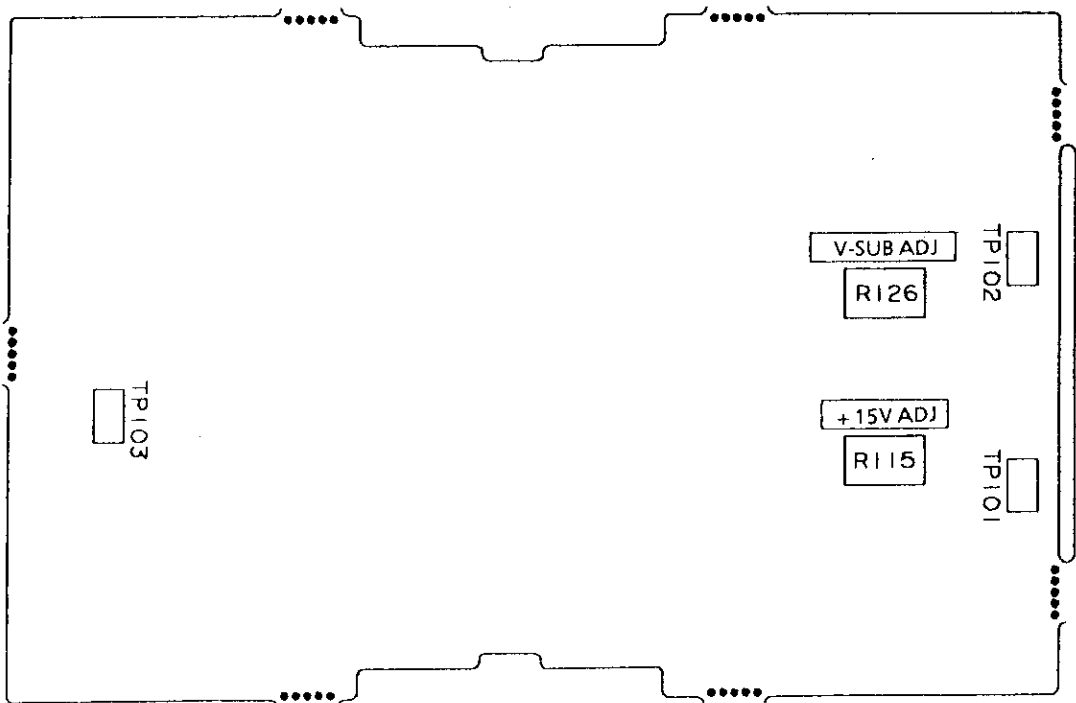
• Main Circuit



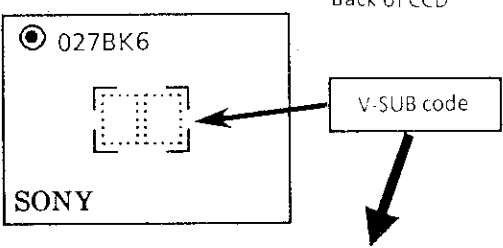
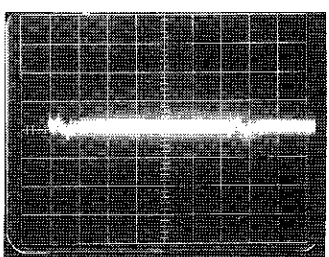
· Auto Focus/Superimpose Circuit

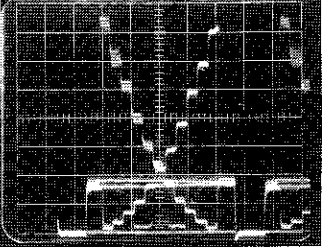
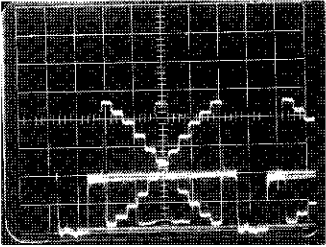
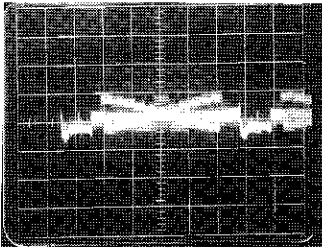
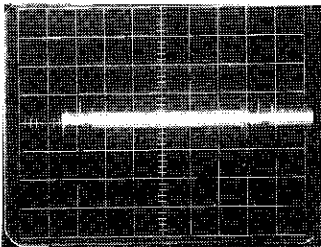


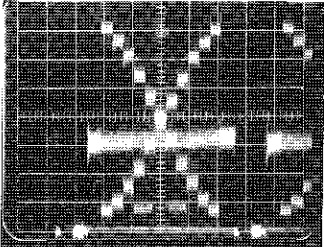
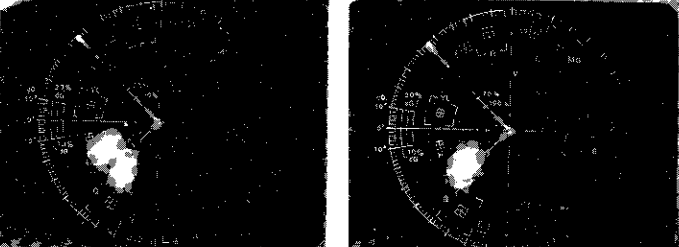

· Sensor Circuit

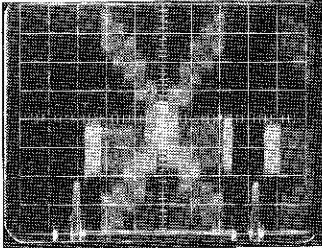
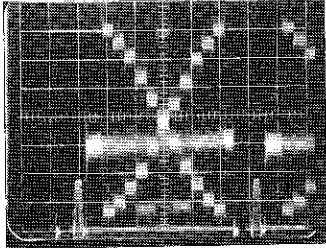


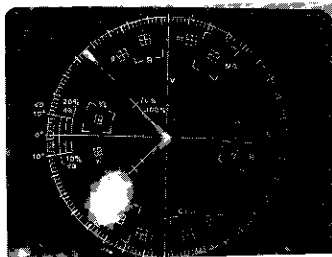
Adjustment procedure

Item	Adjusting method
<p>1. Power Voltage Check/Adjustment</p> <ul style="list-style-type: none"> Terminal: P709 ① (- 13V) P709 ② (+ 17V) P709 ③ (+ 5V) P709 ④ (+ 9V) P709 ⑦ (9.6V) Place: R115 (15V Adjustment) Meter: Digital voltmeter (DGVM) 	<ul style="list-style-type: none"> Check voltage at each terminal of P709 connector on the auto focus board. (Take care not to short between terminals.) P709 ① - 13.1 ± 1.0V - 4.0V P709 ② + 16.7 ± 0.8V P709 ③ + 5.1 ± 0.1V P709 ④ + 9.0 ± 0.1V P709 ⑦ 9.6V (NON-REG, 9.3~11.5V) Observe TP101 with DGVM and adjust R115 so that 15.0 ± 0.05V is obtained.
<p>2. V-SUB Voltage Adjustment</p> <div style="border: 1px solid black; padding: 5px;"> <p>CAUTION: This adjustment is performed for each CCD sensor. Accordingly, make this adjustment only when the CCD sensor is replaced. If R126 is turned by mistake, remove the sensor board from the CCD sensor, read the indicated value of V-SUB voltage shown in the back of CCD sensor, and then install the sensor board on the CCD sensor, after which make adjustment according to the following procedure.</p> </div>	
<ul style="list-style-type: none"> Terminal: TP102 (V-Sub) Place: R126 (V-Sub adjustment) Meter: Digital voltmeter 	<ul style="list-style-type: none"> Observe TP102 with DGVM and adjust R126 so that (Voltage indicated on the back of CCD sensor) ± 0.05V is obtained.
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">V-SUB Voltage Reading</div> <div style="text-align: center;">  <p>Back of CCD</p> <p>V-SUB code</p> </div> </div> <p>Left did it of indication → 7 8 9 a b c d e f g h i j Voltage → 7 8 9 10 11 12 13 14 15 16 17 18 19</p> <p>The right digit of indication means the first decimal place.</p> <p>EXAMPLE: Indication Indicated voltage [b1] → 11.1 ± 0.05V</p>	
<p>3. Black Clip Adjustment</p> <ul style="list-style-type: none"> Terminal: MG (P702) ② (Y) Address: CH03 Black clip Meter: Oscilloscope (Horizontal cycle) 	<ul style="list-style-type: none"> With lens capped, observe pin 2 of MG (P702). Rewrite the data of CH03 so that scan time and flyback time become equal to each other. <div style="text-align: center;">  <p>50 mV/div 10 μsec/div</p> </div>

Item	Adjusting method
<p>4. Iris Adjustment</p> <ul style="list-style-type: none"> ● Terminal: MG (P702) ① (YC) ● Address: CH01 <u>Iris level</u> ● Meter: Oscilloscope (Horizontal cycle) ● Object: Gray scale 	<ul style="list-style-type: none"> ● Projecting gray scale in standard condition, observe pin 1 of MG (P702) with oscilloscope. Rewrite the data of CH01 so that amplitude becomes <u>380 ± 15 mVp-p</u>. <div style="text-align: center;">  <p>50 mV/div 10 μsec/div</p> </div>
<p>5. AGC Adjustment</p> <ul style="list-style-type: none"> ● Terminal: MG (P702) ② (Y) ● Address: CH02 <u>AGC level</u> ● Meter: Oscilloscope (Horizontal cycle) ● Object: Gray scale 	<ul style="list-style-type: none"> ● Projecting gray scale in standard condition, observe pin 2 of MG (P702) with oscilloscope. Rewrite the data of CH02 so that amplitude becomes <u>450 ± 15 mVp-p</u>. <div style="text-align: center;">  <p>100 mV/div 10 μsec/div</p> </div>
<p>6. Vertical Edge Balance Adjustment</p> <ul style="list-style-type: none"> ● Terminal: TP203 (Vertical contour) ● Place: R290 Vertical edge balance ● Meter: Oscilloscope (Horizontal cycle) ● Object: Gray scale 	<ul style="list-style-type: none"> ● Projecting gray scale in standard condition, observe TP203 with oscilloscope. Adjust R290 so that wave form leakage is minimized. <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>50 mV/div 10 μsec/div</p> <p>Incomplete adjustment</p> </div> <div style="text-align: center;">  <p>50 mV/div 10 μsec/div</p> <p>Optimum adjustment</p> </div> </div>

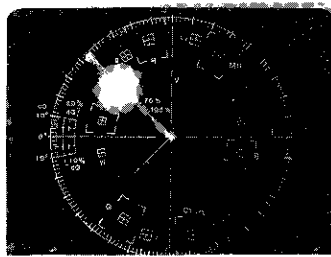
Item	Adjusting method
<p>7. YH Level Adjustment</p> <ul style="list-style-type: none"> ● Terminal: MG (P702) ⑤ (CAM-Y) ● Place: R437 <u>YH level</u> ● Meter: Oscilloscope (Horizontal cycle) ● Object: Gray scale 	<ul style="list-style-type: none"> ● Projecting gray scale in standard condition, observe pin 5 of MG (P702) with oscilloscope. Adjust R437 so that Y signal amplitude (not including synchronizing signal) becomes <u>710 ± 20mVp-p</u>.  <p style="text-align: right;">100 mV/div 10 μsec/div</p>
<p>8. Burst Phase Coarse Adjustment</p> <ul style="list-style-type: none"> ● Terminal: EE output ● Address: CH19 <u>Burst phase</u> ● Meter: Vectorscope ● Object: Gray scale 	<ul style="list-style-type: none"> ● With lens capped, rewrite the data of CH19 so that the dispersion of brightness point vectorscope is minimized.  <p style="text-align: center;">EE output EE output</p> <p style="text-align: center;">Example of incomplete adjustment Completed adjustment</p>
<p>9. White Balance Adjustment</p> <ul style="list-style-type: none"> ● Terminal: EE output ● Address: CH04 <u>Red/White balance</u> CH05 <u>Blue/White balance</u> ● Meter: Vecotrscope ● Object: Gray scale <p>CAUTION: Set the data of white balance mode (CH11) at 7F to set white balance in indoor mode.</p>	<ul style="list-style-type: none"> ● Project gray scale in standard condition. By rewriting the data of CH04 and CH05, adjust white balance in 3200°K halogen luminous source so that the brightness point on vectorscope focuses becoming minimum.  <p style="text-align: center;">EE output EE output</p> <p style="text-align: center;">Example of incomplete adjustment Completed adjustment</p>

Item	Adjusting method
<p>10. Carrier Balance Adjustment</p> <ul style="list-style-type: none"> ● Terminal: EE output MG (P702) ⑤ (CAM-Y) MG (P702) ⑦ (CAM-C) ● Address: CH17 <u>R-Y carrier balance</u> CH16 <u>B-Y carrier balance</u> ● Meter: Vectorscope Oscilloscope (Horizontal cycle) ● Object: Gray scale 	<ul style="list-style-type: none"> ● Projecting gray scale in standard condition, make addition (1:1) of pins 5 and 7 of MG (P702) to obtain composite video signal. ● Rewrite the data of CH16 and CH17 so that carrier leakage of gray scale black 1st gradation is minimized. ● At this time, if carrier balance is dislocated with lens capped, make fine adjustment of it together with item 10. <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>100 mV/div 10 μsec/div</p> <p>Extremely dislocated adjustment</p> </div> <div style="text-align: center;">  <p>100 mV/div 10 μsec/div</p> <p>Optimum adjustment</p> </div> </div>
<p>11. Colour Difference between 2H Offset Correction R-Pedestal Correction</p> <ul style="list-style-type: none"> ● Terminal: EE output ● Address: CH0B <u>Colour difference between 2H Offset Correction</u> CH0A <u>R-Pedestal Correction</u> ● Meter: Vectorscope 	<ul style="list-style-type: none"> ● With lens capped, rewrite the data of CH0A and CH0B by turns so that the bright point of vectorscope comes to the center. ● At this time, if carrier balance is dislocated with gray scale projected in standard condition, adjust it repeatedly together with item 9.



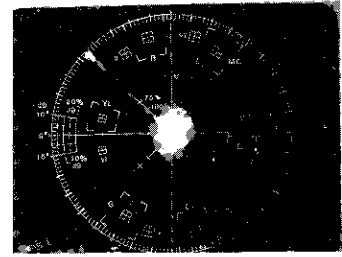
EE output

Direction of shift of brightness point at CH0B data rewriting.



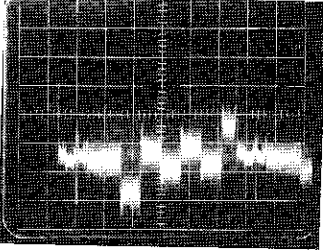
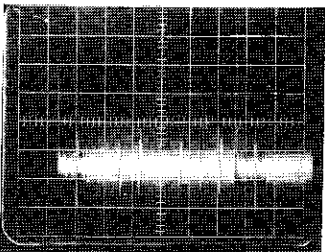
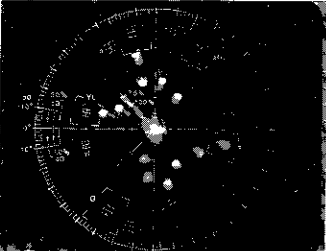
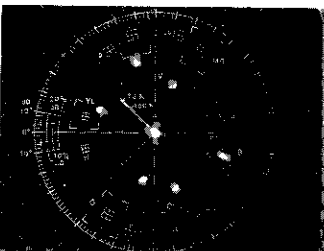
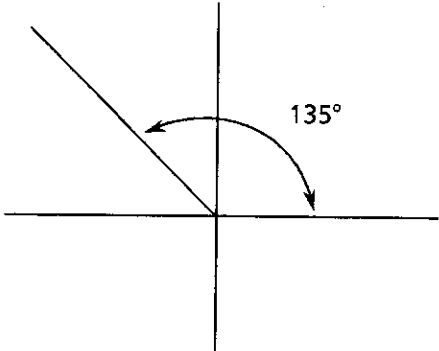
EE output

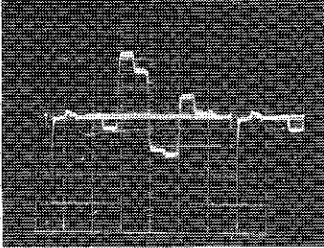
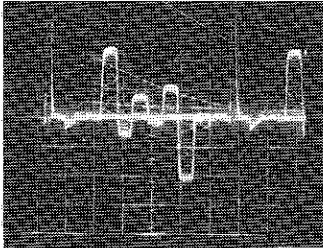
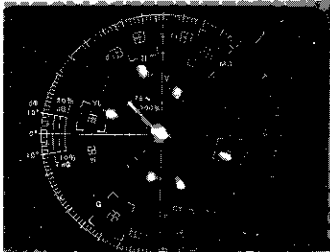
Direction of shift of brightness point at CH0A data rewriting.

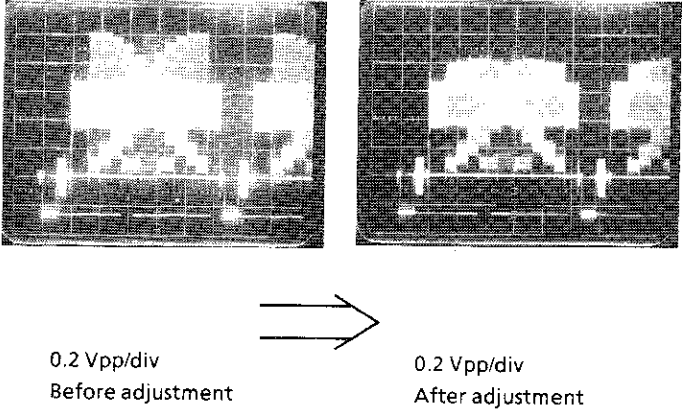
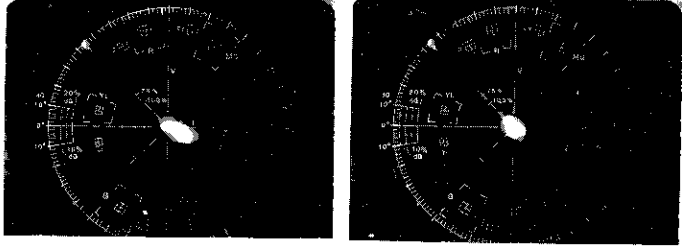


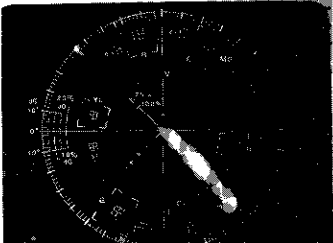
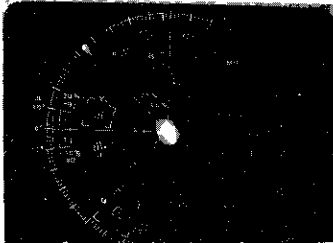
EE output

Completion of adjustment

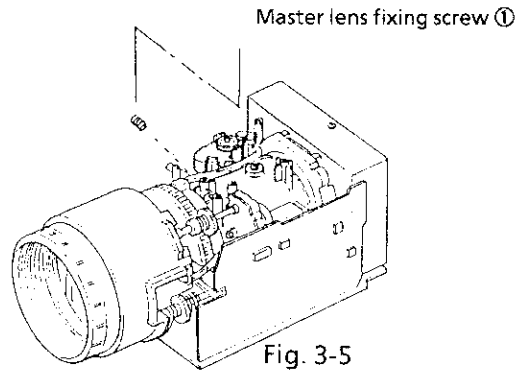
Item	Adjusting method
<p>12. Colour Signal Noise Balance Adjustment</p> <ul style="list-style-type: none"> ● Terminal: TP202 (CNR TP) ● Place: R716 <li style="padding-left: 20px;">Colour difference 0H, 2H level setting ● Meter: Oscilloscope (Horizontal cycle) ● Object: Colour bar chart 	<ul style="list-style-type: none"> ● Projecting colour bar chart, observe TP202 with oscilloscope. Adjust R716 so that signal leakage is minimized. <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>100 mV/div 10 μsec/div</p> <p>Incomplete adjustment</p> </div> <div style="text-align: center;">  <p>100 mV/div 10 μsec/div</p> <p>Optimum adjustment</p> </div> </div>
<p>13. Colour Signal Balance Adjustment</p> <ul style="list-style-type: none"> ● Terminal: EE output ● Place: R715 <li style="padding-left: 20px;"><u>Colour difference between H level setting</u> ● Meter: Vectorscope ● Object: Colour bar chart 	<ul style="list-style-type: none"> ● Projecting colour bar chart, adjust R715 so that dispersion of brightness point of each colour vanishes. <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>EE output</p> <p>Incomplete adjustment</p> </div> <div style="text-align: center;">  <p>EE output</p> <p>Optimum adjustment</p> </div> </div>
<p>14. PAL Burst Adjustment</p> <ul style="list-style-type: none"> ● Terminal: EE output ● Address: CH18 <u>PAL Burst</u> ● Meter: Vectorscope 	<ul style="list-style-type: none"> ● Set vectorscope in NTSC mode. Rewrite the data of CH8 so that burst phase is set at 135°. <div style="text-align: center;">  </div>

Item	Adjusting method								
<p>15. Colour Difference Gain Adjustment</p> <ul style="list-style-type: none"> ● Terminal: MG (P702) ③ (R-Y) MG (P702) ④ (B-Y) ● Address: CH06 <u>R-Y Gain</u> CH07 <u>B-Y Gain</u> ● Meter: Oscilloscope (Horizontal cycle) ● Object: Colour bar chart 	<ul style="list-style-type: none"> ● Projecting colour bar chart, set the screen angle at 75%. ● Observe pin 3 of MG (P702) connector with oscilloscope. Rewrite the data of CH06 so that amplitude of R-Y wave form becomes <u>350 ± 15 mVp-p</u>. ● Observe pin 4 of MG (P702) connector with oscilloscope. Rewrite the data of CH07 so that amplitude of B-Y wave form becomes <u>450 ± 15 mVp-p</u>. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>100 mV/div 10 μsec/div</p> <p>R-Y wave form</p> </div> <div style="text-align: center;">  <p>100 mV/div 10 μsec/div</p> <p>B-Y wave form</p> </div> </div>								
<p>16. Colour Gain/Burst Phase Adjustment</p> <ul style="list-style-type: none"> ● Terminal: EE output ● Address: CH1C <u>R-Y Level</u> CH1B <u>B-Y Level</u> CH08 <u>R-Y Matrix Correction</u> CH09 <u>B-Y Matrix Correction</u> CH19 <u>Burst Phase</u> 	<ul style="list-style-type: none"> ● Projecting colour bar chart, set the screen angle at 75%. ● Rewrite the data of CH1C, CH1B, CH08 and CH09 so that the red and blue brightness points come to the marked position shown below. <p>At this time, gain must be set at 75% amplitude point on B-Y axis with vectorscope.</p> <p>If the brightness point disperses, adjust CH19 so that the dispersion is minimized.</p> <div style="text-align: center;">  <p>EE output</p> </div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Red phase</td> <td style="padding: 2px;">$107^\circ \pm 3^\circ$</td> </tr> <tr> <td style="padding: 2px;">Red amplitude</td> <td style="padding: 2px;">1.6 ± 0.2 times (ratio to burst)</td> </tr> <tr> <td style="padding: 2px;">Blue amplitude</td> <td style="padding: 2px;">1.6 ± 0.2 times (ratio to burst)</td> </tr> <tr> <td style="padding: 2px;">Blue phase</td> <td style="padding: 2px;">$345 \pm 5^\circ$</td> </tr> </table>	Red phase	$107^\circ \pm 3^\circ$	Red amplitude	1.6 ± 0.2 times (ratio to burst)	Blue amplitude	1.6 ± 0.2 times (ratio to burst)	Blue phase	$345 \pm 5^\circ$
Red phase	$107^\circ \pm 3^\circ$								
Red amplitude	1.6 ± 0.2 times (ratio to burst)								
Blue amplitude	1.6 ± 0.2 times (ratio to burst)								
Blue phase	$345 \pm 5^\circ$								

Item	Adjusting method
<p>17. Highlight Luminance colour Suppression Adjustment</p> <ul style="list-style-type: none"> ● Terminal: MG (P702) ⑤ (CAM-Y) MG (P702) ⑦ (CAM-C) ● Address: CH1A <u>Highlight Chroma Suppression</u> ● Meter: Oscilloscope (Horizontal cycle) ● Object: Gray scale 	<ul style="list-style-type: none"> ● By using oscilloscope, make addition (1:1) of pins 5 and 7 of MG (P702) connector to obtain composite video signal. ● Project gray scale with white balance fixed in indoor mode. ● Attach colour temperature conversion filter (W12) to lens and rewrite the data of CH30 so as to set in back light correction mode. ● Rewrite the data of CH1A so that carrier amplitude of gray scale 9th gradation becomes 250 ± 30 mVp-p. ● Rewrite the data of CH30 so as to return to standard mode and check that colour of gray scale 11th gradation is light on the monitor. <div style="text-align: center;">  </div>
<p>18. Auto White Offset Adjustment</p> <ul style="list-style-type: none"> ● Terminal: EE output ● Address: CH12 <u>R-Offset</u> CH13 <u>B-Offset</u> ● Meter: Vectorscope ● Object: Gray scale 	<ul style="list-style-type: none"> ● Projecting gray scale in standard condition, rewrite the data of white balance mode (CH11) into IE to set in auto white balance mode. ● At this time, pin 9 of MG (P702) should be connected to 5V with a resistance of 1 k. (After adjustment is completed, be sure to disconnect pin 9.) ● Rewrite the data of CH12 and CH13 so that the brightness point of vectorscope comes to the center. <div style="text-align: center;">  </div>

Item	Adjusting method
<p>19. Auto White Gain Adjustment</p> <ul style="list-style-type: none"> ● Terminal: EE output ● Address: CH14 <u>R-Gain</u> CH15 <u>B-Gain</u> ● Meter: Vectorscope ● Object: Gray scale 	<ul style="list-style-type: none"> ● Rewrite the data of white balance mode (CH11) into D8 to set white balance in outdoor mode. ● Attach colour temperature conversion filter (LB165) to lens. ● Rewrite the data of CH14 and CH15 so that the brightness point of vectorscope comes to the center. ● After adjustment is completed, rewrite the data of white balance mode (CH11) into 1E to set in auto white mode. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>EE output Incomplete adjustment</p> </div> <div style="text-align: center;">  <p>EE output Optimum adjustment</p> </div> </div>
<p>20. Hall Offset Adjustment</p> <ul style="list-style-type: none"> ● Terminal: MG (P702) ® (Iris position) ● Address: CH0C <u>Hall Offset</u> ● Meter: Digital voltmeter ● Object: Gray scale 	<ul style="list-style-type: none"> ● Projecting the gray scale in standard condition, obtain the point where the iris position voltage changes from Low to High. Rewrite the CH0C data to be 7 below the above point. When the CH0C point at the Low-to-High switching is 79, for example, the correct data should be 72.
<p>21. Focus Voltage Adjustment</p> <ul style="list-style-type: none"> ● Terminal: TP901 TP902 ● Place: R971 <u>Focus voltage</u> ● Meter: Digital voltmeter 	<ul style="list-style-type: none"> ● Adjust R971 so that peak voltage at both ends of TP901 to TP902 becomes $4.1 \pm 0.2V$ when focus motor is rotating.

Item	Adjusting method
<p>22. Back Focus Adjustment</p> <ul style="list-style-type: none"> ● Distance of object: 200 ± 1 cm ● Illumination: Iris open (both TELE and WIDE) ● Object: Siemens Star <p>NOTE: As dislocation of back focus adjustment directly affects zoom switching and auto focus, take great care in making adjustment.</p>	<ol style="list-style-type: none"> 1. Make focus manual and set zoom switching in 8 times mode. 2. Adjust the center of siemens star to the center of monitor and loosen one master lens fixing screws ①. 3. Make zoom lever at TELE side. Turn focus ring to obtain the best point of focus lens. 4. Make zoom level at WIDE side. Fitting tracking adjusting jig or minus driver (with fine tip) to the adjusting groove of master chassis, move lens back and forth to obtain the best point of lens focus. 5. Repeat steps 3 and 4. Back focus adjustment is completed when lens focus after adjustment of step 4 and lens focus with zoom lever at TELE side (do not turn focus ring at this time) are both at the best point. 6. After adjustment is completed, tighten one master lens fixing screws ①. Tightening torque $800 \text{ g}\cdot\text{cm} \pm 100\text{g}\cdot\text{cm}$ <p>NOTE: Set zoom switching in 12 times mode and check if lens focus is at the best point.</p>



No	Procedures
	<p>View Finder Adjustment</p> <ol style="list-style-type: none"> 1. Horizontal Synchronization adjustment (Ground pin 8 of P001 connector using condenser of about 100 F.) Turn off video input signal and connect frequency counter to TP002. Adjust R008 so that 15.625 kHz is obtained. 2. Vertical Size Adjustment Observing the picture of view finder, adjust R013 so that picture amplitude becomes normal. 3. Brightness Adjustment Observing the picture of view finder, adjust R022 (black level adjusting control) so that gradation of gray scale becomes optimum. 4. Focus Adjustment Observing the picture of view finder, adjust R027 so that the image in the center of screen becomes clear.

– Before Electrical Adjustment –

- This adjustment will be performed chiefly when the electrical circuit should be adjusted because of replacement of worn mechanical parts or video head. When adjusting the electrical circuit, make sure that the unit has perfect mechanical operation (which means that mechanism adjustment has been done completely). In case a failure occurs in the electrical circuit, as described in the following electrical adjustment procedure, the defective part must be found with meters. After that, service, replacement and adjustment should be done. Also, avoid moving any adjusting control unnecessarily without using adequate meters.
- In this unit, most of the electrical circuit parts are composed of small size face packaging parts for miniaturization and high packaging density.

When making service or replacement of parts, perform it quickly with a soldering gun. In general, because of their small size, face packaging parts have lower heat resistance than large size discrete parts used in television sets, etc. Therefore, care should be taken to avoid heating unnecessarily for a long time the electrode of parts with a soldering gun, which may cause defect.

In particular, care should be taken when replacing chip laminating condensers and IC-LINC (F901).

Use of a ceramic soldering gun with temperature control (head temperature: 250°C, contacting time: 5 seconds or less) is recommended.

- New type coils are adopted in the electrical section.
When replacement is performed for L910, L918, L931 and L940, make sure that secure soldering is made and check continuity with a tester.
As L919, L920 and L930 are directional, make sure that the white mark of coil and the silk mark on the board are turned in the same direction.
- As electrolytic condensers C911, C921, C943, C944 and C950 and chip electrolytic condensers C922 and C923 are nonstandard components, care should be taken not to make an error when replacing them.

<Video Section>

Measuring Instrument Colour Monitor TV, Oscilloscope, Colour Bar Generator, Frequency Counter, DC Rated Voltage Power Source, Audio Generator (CR Generator), Alignment Tape, Recording Tape (VHS spec), VTVM and Y/C Separator.

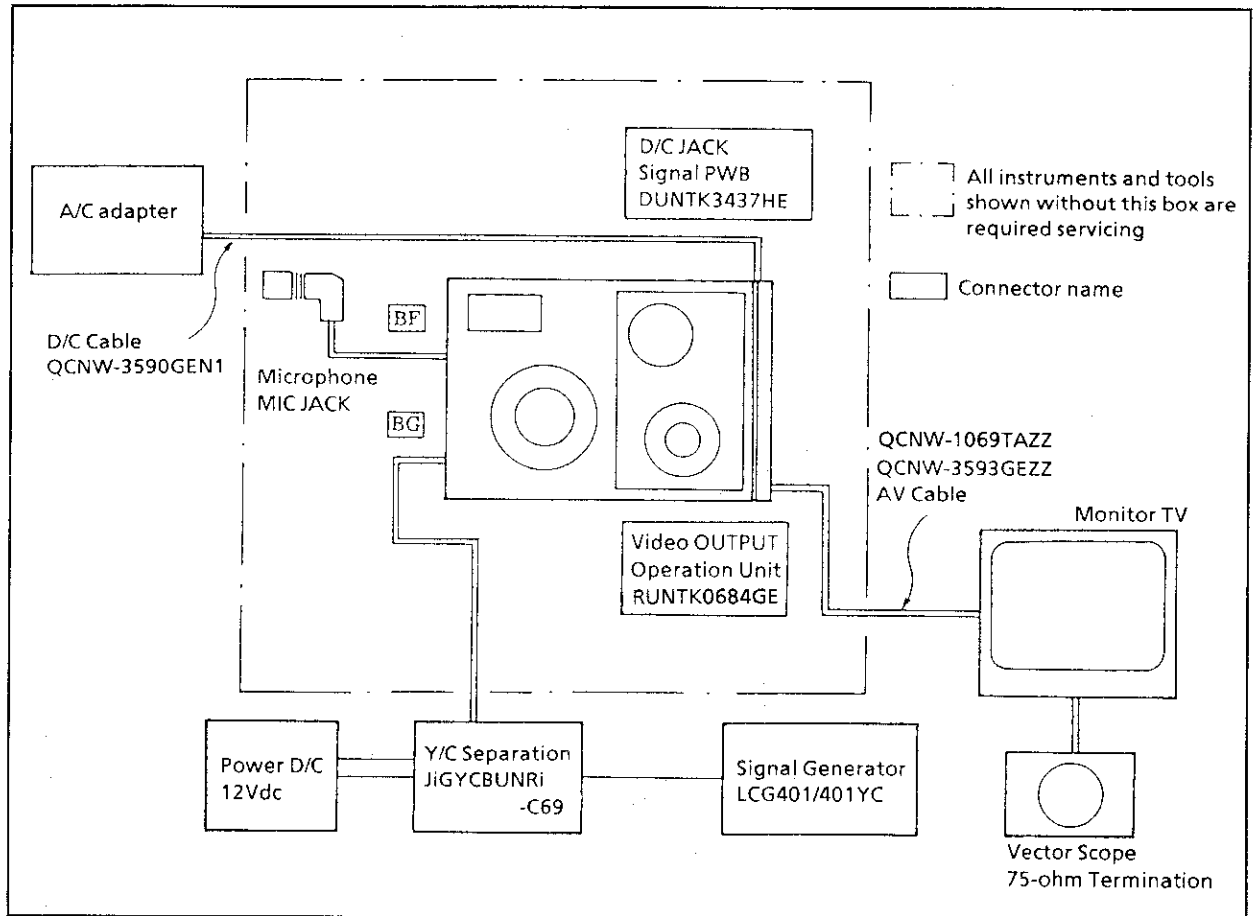


Fig. 4-1

Location of Test Points and Controls

- Test Points (Signal Process Circuit)

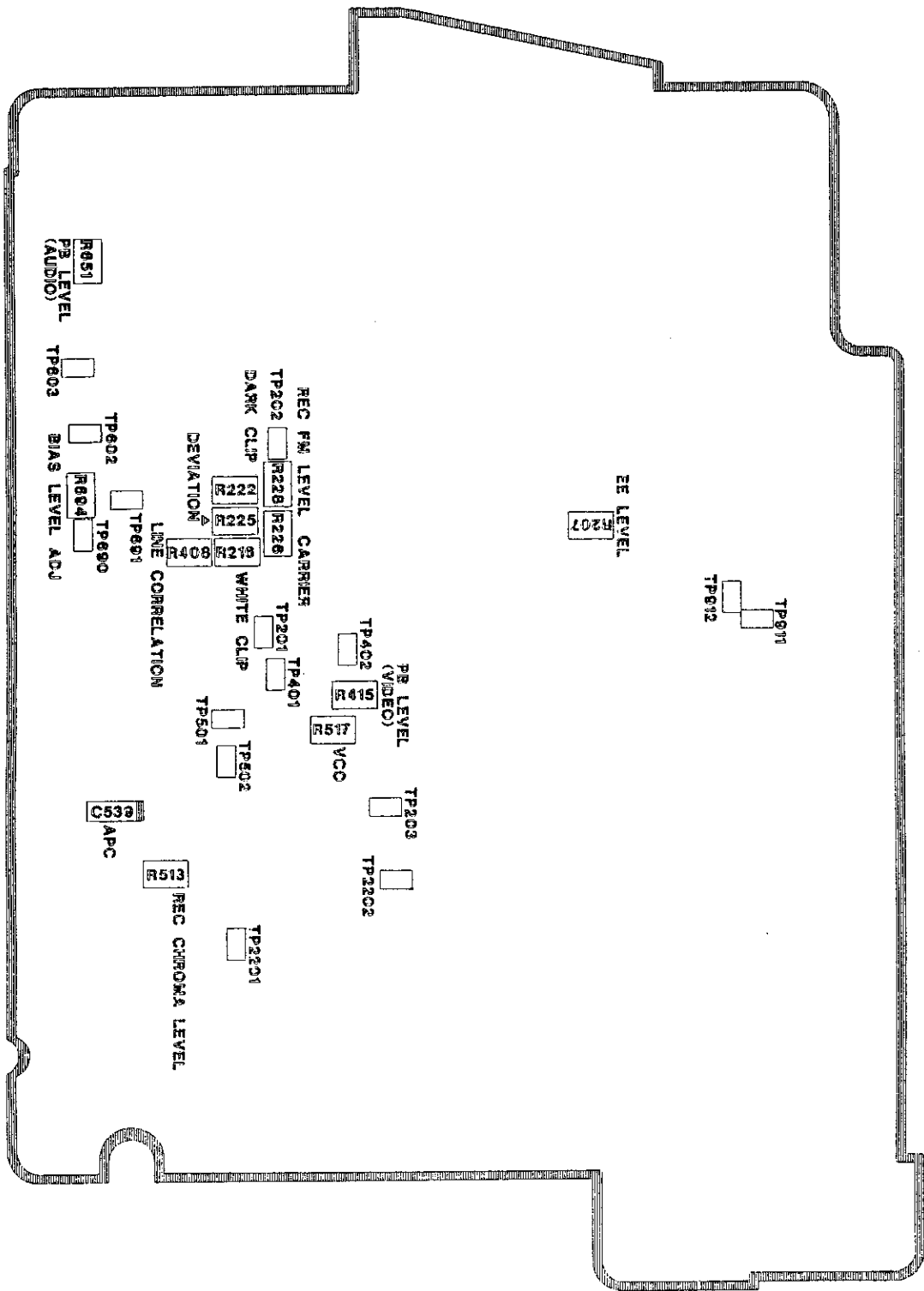
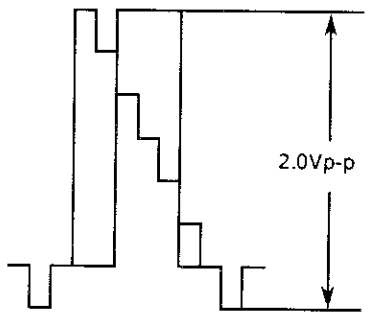
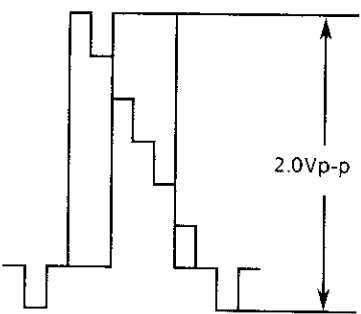
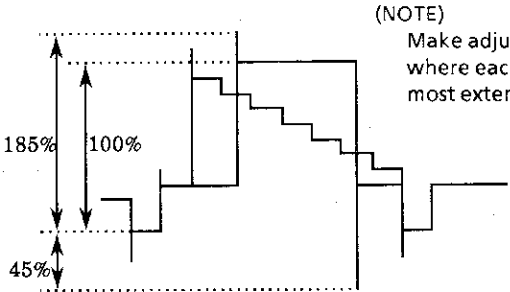
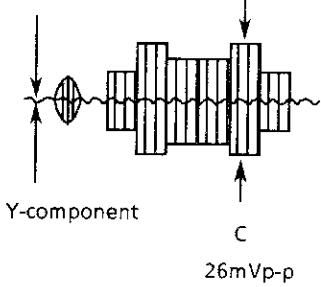
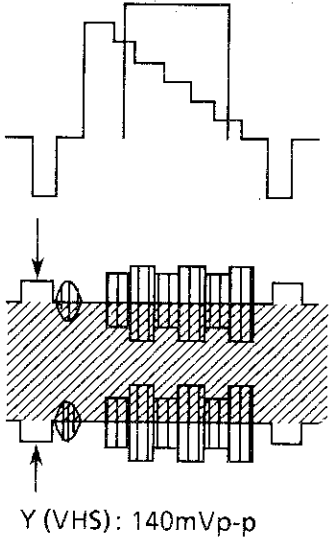



Fig. 4-2

1. Y/C Circuit Adjustment

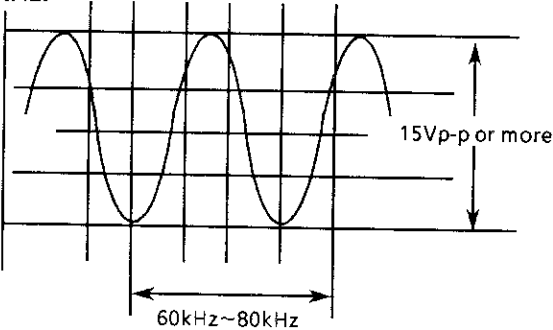
Item	Adjusting method
<p>1. VCO adjustment</p> <ul style="list-style-type: none"> ● Terminal: TP502 ● Place: R517 ● Signal: No signal ● Spec: 627 kHz \pm 5 kHz ● Meter: Frequency counter 	<p>1) Make all the 4 pins of the test connector p29 short-circuited.</p> <p>2) Adjust R517 so that frequency becomes 627 kHz at TP502.</p> <p>(NOTE) Do not apply signal to EE system and PB system.</p>
<p>2. EE level adjustment</p> <ul style="list-style-type: none"> ● Mode: EE ● Terminal: TP2201 ● Place: R207 ● Signal: Colour bar ● Spec: 2.0Vp-p \pm 0.1Vp-p ● Meter: Oscilloscope <p>(NOTE) The colour bar signal should contain 100% white signal</p>	<p>1) Connect oscilloscope to TP2201.</p> <p>2) Apply colour bar signal and adjust R207 so that the level between sync and white becomes 2.0Vp-p.</p> <p>(CAUTION) 75 termination of picture output terminal</p>  <p>0.5V/div</p> <p>Fig. 4-3</p>
<p>3. Y-PB level adjustment</p> <ul style="list-style-type: none"> ● Mode: PB ● Terminal: TP2201 ● Place: R415 ● Signal: Colour bar ● Tape: Alignment tape ● Spec: 2.0Vp-p \pm 0.1Vp-p ● Meter: Oscilloscope 	<p>1) Connect oscilloscope to TP2201.</p> <p>2) Play back a lignment tape.</p> <p>3) Adjust R415 so that the level between sync and white becomes 2.0Vp-p.</p> <p>(CAUTION) 75 termination of picture output terminal</p>  <p>0.5V/div</p> <p>Fig. 4-4</p>

Item	Adjusting method
<p>4. White/Dark clip adjustment</p> <ul style="list-style-type: none"> ● Mode: EE ● Terminal: TP201 ● Place: R216 (W) R222 (D) ● Signal: Colour bar ● Spec: 185 ± 5% (W) 45 ± 5% (D) ● Meter: Oscilloscope <p>(NOTE) The colour bar signal should contain 100% white signal</p>	<ol style="list-style-type: none"> 1) Connect oscilloscope to TP201. 2) Apply colour bar signal. 3) Adjust R216 so that the level becomes 185% from sync tip at TP201. 4) Adjust R222 so that the level becomes 45% from sync tip at TP201. <div style="text-align: right;"> <p>(NOTE) Make adjustment where each level most extends.</p> </div>  <p style="text-align: center;">Fig. 4-5</p>
<p>5. FM carrier adjustment</p> <ul style="list-style-type: none"> ● Mode: EE ● Terminal: TP202 ● Place: R226 ● Signal: No signal ● Spec: 3.8 MHz ± 50 kHz ● Meter: Frequency counter 	<ol style="list-style-type: none"> 1) Make video input terminal (P15) open (no signal). 2) Connect frequency counter to TP202. 3) Adjust R226 so that reading of counter becomes 3.8 MHz ± 50 kHz.
<p>6. Deviation adjustment</p> <ul style="list-style-type: none"> ● Mode: EE ● Terminal: TP2201 ● Place: R225 ● Signal: Colour bar ● Tape: SELF REC ● Spec: 4.8 MHz ± 50 kHz ● Meter: Oscilloscope <p>(NOTE) The 100% Y signal should be adjusted to the peak level</p>	<ol style="list-style-type: none"> 1) Make sure that EE level and PB level and each adjusted to 2.0 ± 0.1Vp-p. 2) Apply colour bar and make REC (SELF REC). 3) Play back the tape on which REC is made in the above step and measure PB level at TP2201. If the level is under 2.0Vp-p, slightly turn R225 clockwise; if over 2.0Vp-p, slightly turn R225 counterclockwise. Then record colour bar again and check PB level. 4) Repeat the above adjustment until SELF REC PB level becomes 2.0 ± 0.1Vp-p.

Item	Adjusting method
<p>7. Chroma REC current adjustment</p> <ul style="list-style-type: none"> ● Mode: REC ● Terminal: Pin 1 of AO Pin 2 of AO (GND) ● Place: R513 R228 ● Signal: Colour bar ● Spec: 26 mVp-p ± 2 mVp-p ● Meter: Oscilloscope 	<ol style="list-style-type: none"> 1) Connect oscilloscope to pins 1 and 2 of AO. 2) Apply colour bar signal and set in REC mode. 3) Adjust R228 so that Y-component (FM) becomes zero at pins 1 and 2 of AO. 4) Adjust R513 so that red level of chroma signal becomes 26 mVp-p. <div style="text-align: center; margin-top: 20px;">  <p>Y-component</p> <p>C</p> <p>26mVp-p</p> </div> <p style="text-align: center;">Fig. 4-6</p>
<p>8. Y-FM REC current adjustment</p> <ul style="list-style-type: none"> ● Mode: REC ● Terminal: Pin 1 of AO Pin 2 of AO (GND) ● Place: R228 ● Signal: Colour bar ● Spec: 140 mVp-p ± 10 mVp-p ● Meter: Oscilloscope 	<ol style="list-style-type: none"> 1) Adjust R228 so that sync level becomes 140 mVp-p at pins 1 and 2 of AO. <div style="text-align: center; margin-top: 20px;">  <p>Sync Tip</p> <p>Y (VHS): 140mVp-p</p> </div> <p style="text-align: center;">Fig. 4-7</p>

Item	Adjusting method
<p>9. Line correlation adjustment</p> <ul style="list-style-type: none"> ● Mode: PB ● Terminal: TP401 TP402 ● Place: R408 ● Tape: Alignment tape ● Spec: Same signal level ● Meter: Oscilloscope 	<ol style="list-style-type: none"> 1) Connect oscilloscope to TP401 and TP402. 2) Play back alignment tape. 3) Adjust R408 so that TP401 and TP402 have the same signal level. <div style="text-align: center;">  <p>Level at TP402 = Level at TP401</p> </div> <p style="text-align: center;">Fig. 4-8</p>
<p>10. APC adjustment</p> <ul style="list-style-type: none"> ● Mode: PB ● Terminal: TP501 ● Place: C539 ● Tape: Alignment tape ● Spec: 4.433619 MHz ± 10 Hz ● Meter: Frequency counter 	<ol style="list-style-type: none"> 1) Connect frequency counter to TP501. 2) Play back alignment tape. 3) Adjust C539 so that reading of counter becomes 4.433619 MHz.

2. Audio Circuit

Item	Adjusting method
<p>1. EE level check</p> <ul style="list-style-type: none"> ● Mode: EE ● Terminal: Audio output terminal ● Place: — ● Signal: <ul style="list-style-type: none"> (Audio) – 62.8 dBs/1 kHz (562 μVrms) (SIN wave) (Video) Optional ● Tape: — ● Spec: – 8 dBs \pm 3 dB (308 mVrms) ● Meter: VTVM 	<ol style="list-style-type: none"> 1) Apply 1 kHz SIN wave/ – 62.8 dBs (562 μVrms) to mic input terminal and connect VTVM to audio output. 2) Check that output level is – 8 dBs (308 mVrms) \pm 3 dB. (Make measurement of input signal level with mic input terminal connected.)
<p>2. PB level adjustment</p> <ul style="list-style-type: none"> ● Mode: PB ● Terminal: Audio output terminal ● Place: R651 ● Signal: <ul style="list-style-type: none"> (Audio) — (Video) — ● Tape: Alignment tape ● Spec: – 8 dBs \pm 1 dB (308 mVrms) ● Meter: VTVM 	<ol style="list-style-type: none"> 1) Connect VTVM to audio output terminal. 2) Play back alignment tape. 3) Adjust R651 so that audio output becomes – 8 dBs (308 mVrms) \pm 1 dB.
<p>3. AE erasing voltage oscillating frequency check</p> <ul style="list-style-type: none"> ● Mode: REC ● Terminal: TP690 (ETP) TP691 ● Place: — ● Signal: <ul style="list-style-type: none"> (Audio) Optional (Video) Optional ● Tape: Normal SELF REC ● Spec: 15 Vp-p or more 70 kHz \pm 10 kHz ● Meter: Oscilloscope 	<ol style="list-style-type: none"> 1) Connect oscilloscope between TP690 (ETP) and TP691. 2) Make REC and check that oscillating voltage is 15Vp-p or more and oscillating frequency is 70 kHz \pm 10 kHz. <div style="text-align: center;">  <p>The diagram shows a sine wave on an oscilloscope grid. A vertical double-headed arrow on the right indicates the peak-to-peak voltage is 15Vp-p or more. A horizontal double-headed arrow at the bottom indicates the frequency is 60kHz~80kHz.</p> </div> <p style="text-align: center;">Fig. 4-9</p>

Item	Adjusting method
<p>4. Bias current adjustment</p> <ul style="list-style-type: none"> ● Mode: REC ● Terminal: TP602 (hot) TP603 (cold) ● Place: R694 ● Signal: <ul style="list-style-type: none"> (Audio) No signal (Video) Optional ● Tape: Normal SELF REC ● Spec: 2.4 mVrms \pm 0.1 mV ● Meter: VTVM 	<ol style="list-style-type: none"> 1) Connect VTVM to TP602 (hot) and TP603 (cold). 2) Set in REC mode and adjust R694 so that VTVM indicates 2.4 mVrms \pm 0.1 mV.
<p>5. SELF REC PB level check</p> <ul style="list-style-type: none"> ● Mode: REC/PB ● Terminal: Audio output terminal ● Place: — ● Signal: <ul style="list-style-type: none"> (Audio) – 62.8 dBs/1 kHz (562 μVrms) (SIN wave) (Video) PAL ● Tape: Normal SELF REC ● Spec: – 8 dBs \pm 4 dBs (308 mVrms) ● Meter: VTVM 	<ol style="list-style-type: none"> 1) Apply 1 kHz SIN wave/ – 62.8 dBs (562 μVrms) to mic input terminal and connect VTVM to audio output. 2) Make SELF REC PB and check that PB level is – 8 dBs \pm 4 dBs (308 mVrms).
<p>6. Mic operation check</p> <ul style="list-style-type: none"> ● Mode: REC or REC PAUSE ● Terminal: Audio output terminal ● Place: — ● Signal: <ul style="list-style-type: none"> (Audio) Environmental sound (Video) Optional ● Tape: — ● Spec: Audible 	<ol style="list-style-type: none"> 1) Set in REC or REC PAUSE mode. Check that environmental sound comes out of audio output terminal with camera docked or mic installed.

Location of Test Points and Controls

• Test Points (Control Circuit)

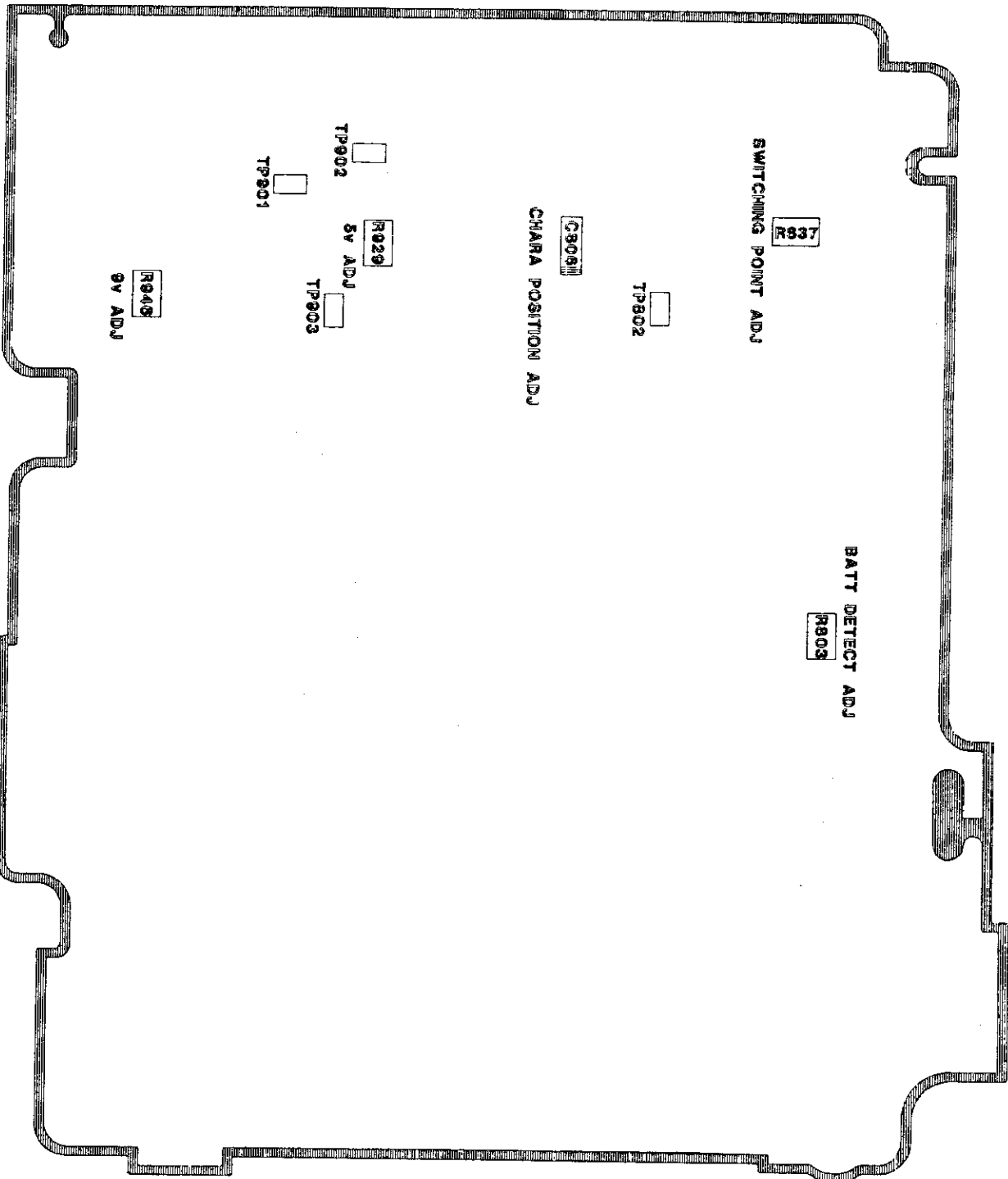
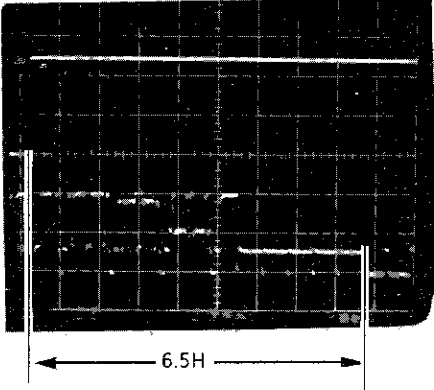
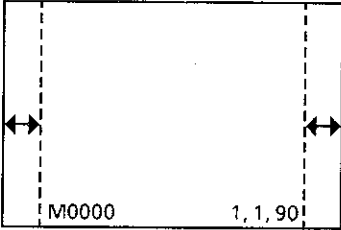


Fig. 4-10

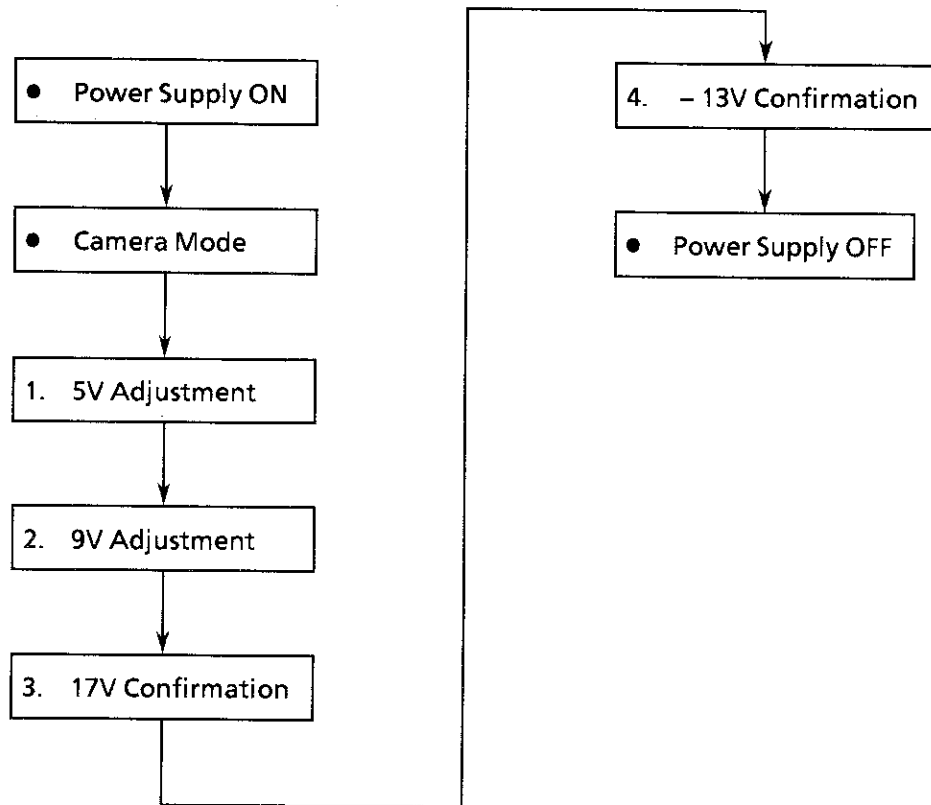
3. System Controller and Servo Circuit Adjustment

Item	Adjusting method
<p>1. PB switching point adjustment</p> <ul style="list-style-type: none"> ● Mode: PB ● Terminal: Pin 1 of AQ TP2201 ● Place: R837 ● Signal: Alignment tape monoscope portion ● Tape: — ● Spec: $6.5H \pm 1H$ ● Meter: Oscilloscope 	<ol style="list-style-type: none"> 1) Connect resistor of $4.9\text{ k}\Omega$ ($2.7\text{ k}\Omega + 2.2\text{ k}\Omega$) between pins 2 and 4 of AQ. (Set in tracking display mode.) 2) Play back alignment tape and make triggering at pin 1 of AQ (H-SW-P). 3) Press tracking \oplus and \ominus SW (up and down) simultaneously to set in tracking preset mode. 4) Adjust R837 so that the first position of vertical synchronization of TP2201 (video output) is at $6.5H \pm 1H$. <div style="text-align: center;">  <p>Fig. 4-11</p> </div> <p>(NOTE) This adjustment should be made after mecha assembly.</p>
<p>2. Battery alarm adjustment</p> <ul style="list-style-type: none"> ● Mode: REC ● Measuring place: View finder ● Adjusting place: R803 ● Signal: — ● Spec: Counter display inside V/F + 0 ● Meter: 	<ol style="list-style-type: none"> 1) Connect resistor of $13.8\text{ k}\Omega$ ($12\text{ k}\Omega + 1.8\text{ k}\Omega$) between pins 2 and 4 of AQ. 2) Turn power supply ON. 3) Turn Camera/PB switch to camera side. 4) Set power supply voltage at 8.8V at AK connector (pins 21 and 22). 5) Adjust R803 so that counter display inside view finder becomes + 0. <p>(NOTE) Check that camera load is connected to power supply.</p>

Item	Adjusting method
<p>3. Character position adjustment</p> <ul style="list-style-type: none"> ● Mode: EE ● Measuring place: View finder ● Adjusting place: C806 	<ol style="list-style-type: none"> 1) Operate DATE-TIME display key and COUNTER/MEMORY/LAP TIME display key to obtain display mode as shown below. 2) Adjust C806 so that the width of portion of the left of COUNTER MEMORY display becomes about the same as that on the right of DATE-TIME display. <div style="text-align: center;">  </div> <p style="text-align: center;">Fig. 4-12</p>

4. Power Supply Circuit Adjustment Method

Power Supply circuit adjustment procedure



Item	Adjusting method
<p>1. 5V adjustment Terminal TP912 Place R929 Spec $5.1V \pm 0.05V$ Meter Digital voltmeter</p> <p>2. 9V adjustment Terminal TP911 Place R946 Spec $9.0V \pm 0.05V$ Meter Digital voltmeter</p> <p>3. 17V Confirmation Terminal Pin 2 of BJ Spec $16.7V \pm 0.8V$</p> <p>4. - 13V Confirmation Terminal Pin 1 of BJ Spec $13V \pm 1.5V$</p>	<ul style="list-style-type: none"> ● Apply 10V through DC jack. (Use AC adapter.) ● Turn power supply ON and set in camera mode. <p>1. Adjust R929 so that digital voltmeter indicates 5.10V.</p> <p>2. Adjust R946 so that digital voltmeter indicates 9.00V.</p> <p>3. Check that $16.7V \pm 0.8V$ appears at pin 2 of BJ.</p> <p>4. Check that $- 13V \pm 1.5V$ appears at pin 1 of BJ.</p> <ul style="list-style-type: none"> ● Turn power supply OFF.

