

JVC

SERVICE MANUAL

VIDEO CASSETTE RECORDER

HR-S6950EU, HR-S6955MS, HR-S7950EU, HR-S7955EK, HR-S7955MS



SHOWVIEW[®]
DELUXE
Hi-Fi S-VHS
625
Super VHS ET

SPECIFICATIONS *(The specifications shown pertain specifically to the model HR-S7950EU.)*

GENERAL

Power requirement : AC 220 V – 240 V~, 50 Hz/60 Hz

Power consumption

Power on : 18 W

Power off : 3.6 W

Temperature

Operating : 5°C to 40°C

Storage : –20°C to 60°C

Operating position : Horizontal only

Dimensions (WxHxD)

: 400 mm x 94 mm x 270 mm

Weight

: 3.4 kg

Format

: S-VHS/VHS PAL standard

Maximum recording time

(SP) : 240 min. with E-240 video cassette

(LP) : 480 min. with E-240 video cassette

(EP) : 720 min. with E-240 video cassette

VIDEO/AUDIO

Signal system : PAL-type colour signal and CCIR monochrome signal, 625 lines
50 fields

Recording system : DA4 (Double Azimuth) head helical scan system

Signal-to-noise ratio: 45 dB

Horizontal resolution

(SP/LP) : 250 lines (VHS)

400 lines (S-VHS)

(EP) : 220 lines (VHS)

350 lines (S-VHS)

Frequency range : 70 Hz to 10,000 Hz (Normal audio)
20 Hz to 20,000 Hz (Hi-Fi audio)

Input/Output

: 21-pin SCART connectors:
IN/OUT x 1, IN/DECODER x 1

RCA connectors:

VIDEO IN x 1, AUDIO IN x 1,

AUDIO OUT x 1

S-Video connector:

IN x 1, OUT x 1

TUNER/TIMER

TV channel storage capacity

: 99 positions (+AUX position)

Tuning system : Frequency synthesized tuner

Channel coverage : VHF 47 MHz – 89 MHz/

104 MHz – 300 MHz/

302 MHz – 470 MHz

UHF 470 MHz – 862 MHz

Aerial output : UHF channels 22 – 69 (Adjustable)

Memory backup time

: Approx. 10 min.

ACCESSORIES

Provided accessories

: RF cable,

Infrared remote control unit,

“R6” battery x 2

Specifications shown are for SP mode unless otherwise specified.

E. & O.E. Design and specifications subject to change without notice.

V15S1/S2/S15

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The following table lists the differing points between models HR-S6950EU, HR-S6955MS, HR-S7950EU, HR-S7955EK and HR-S7955MS.

ITEM	MODEL	HR-S6950EU	HR-S6955MS	HR-S7950EU	HR-S7955EK	HR-S7955MS
POWER PLUG		CEE	←	←	3PIN	CEE
DIGITAL SLOW		NOT USED	←	USED	←	NOT USED
RETAKE		NOT USED	←	←	←	USED
ZERO FRAME EDIT		NOT USED	←	←	←	USED
INSERT / AUDIO DUBBING		NOT USED	←	←	←	USED
MESECAM		USED(MANUAL)	USED(PB ONLY)	USED(MANUAL)	NOT USED	USED(PB ONLY)
SECAM		NOT USED	USED	NOT USED	←	USED
TBC		NOT USED	←	USED	←	NOT USED
REAR S OUT(4-pin)		NOT USED	←	USED	←	←
REMOTE PAUSE TERMINAL		NOT USED	←	USED	←	←
BROADCASTING STANDARD		B/G, D/K	L, B/G	B/G, D/K	I	L, B/G
RF OUT		USED	NOT USED	USED	←	NOT USED
VPS		USED	NOT USED	USED	NOT USED	←
OSD LANGUAGE		13 LANGUAGES	FRENCH	13 LANGUAGES	ENGLISH	FRENCH
x1.5 PLAYBACK with AUDIO		NOT USED	←	USED	←	NOT USED


Notes: Mark ← is same as left.

Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

●Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the  symbol and shaded (■) parts are critical for safety.

Replace only with specified part numbers.

Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Fuse replacement caution notice.
Caution for continued protection against fire hazard.
Replace only with same type and rated fuse(s) as specified.

4. Use specified internal wiring. Note especially:
1) Wires covered with PVC tubing
2) Double insulated wires
3) High voltage leads

5. Use specified insulating materials for hazardous live parts.
Note especially:
1) Insulation Tape 3) Spacers 5) Barrier
2) PVC tubing 4) Insulation sheets for transistors

6. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

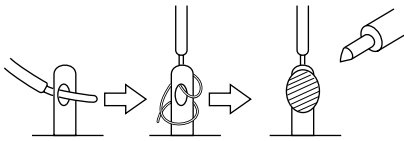


Fig.1

7. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

8. Check that replaced wires do not contact sharp edged or pointed parts.

9. When a power cord has been replaced, check that 10-15 kg of force in any direction will not loosen it.

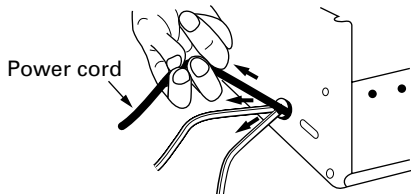


Fig.2

10. Also check areas surrounding repaired locations.

11. Products using cathode ray tubes (CRTs)
In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

12. Crimp type wire connector

In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

1) **Connector part number** : E03830-001

2) **Required tool** : Connector crimping tool of the proper type which will not damage insulated parts.

3) **Replacement procedure**

(1) Remove the old connector by cutting the wires at a point close to the connector.

Important : Do not reuse a connector (discard it).

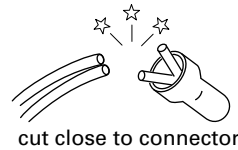


Fig.3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

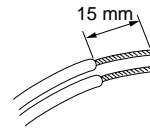


Fig.4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

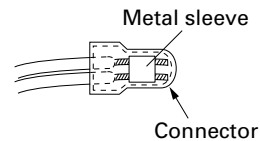


Fig.5

(4) As shown in Fig.6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

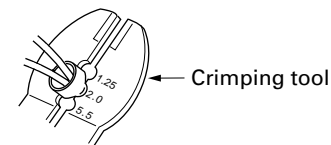


Fig.6

(5) Check the four points noted in Fig.7.

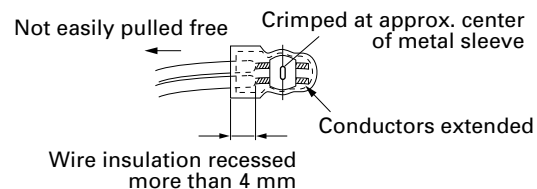


Fig.7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. Insulation resistance test

Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

2. Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

3. Clearance distance

When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

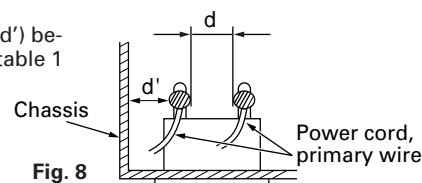


Fig. 8

4. Leakage current test

Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

Measuring Method : (Power ON)

Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.

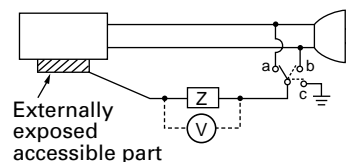


Fig. 9

5. Grounding (Class I model only)

Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).

Measuring Method:

Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.

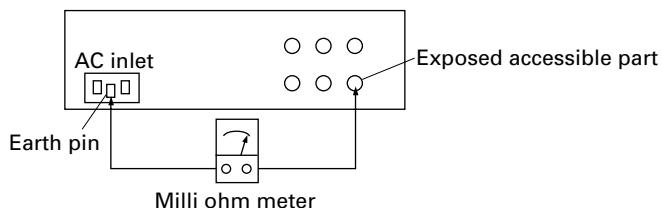


Fig. 10

Grounding Specifications

Region	Grounding Impedance (Z)
USA & Canada	$Z \leq 0.1 \text{ ohm}$
Europe & Australia	$Z \leq 0.5 \text{ ohm}$

AC Line Voltage	Region	Insulation Resistance (R)	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	$R \geq 1 \text{ M}\Omega/500 \text{ V DC}$	AC 1 kV 1 minute	$d, d' \geq 3 \text{ mm}$
100 to 240 V			AC 1.5 kV 1 minute	$d, d' \geq 4 \text{ mm}$
110 to 130 V	USA & Canada	$1 \text{ M}\Omega \leq R \leq 12 \text{ M}\Omega/500 \text{ V DC}$	AC 1 kV 1 minute	$d, d' \geq 3.2 \text{ mm}$
110 to 130 V	Europe & Australia	$R \geq 10 \text{ M}\Omega/500 \text{ V DC}$	AC 3 kV 1 minute (Class II)	$d \geq 4 \text{ mm}$
200 to 240 V			AC 1.5 kV 1 minute (Class I)	$d' \geq 8 \text{ mm (Power cord)}$ $d' \geq 6 \text{ mm (Primary wire)}$

Table 1 Specifications for each region

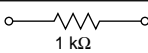
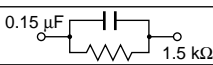
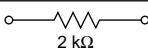
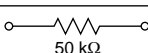
AC Line Voltage	Region	Load Z	Leakage Current (i)	a, b, c
100 V	Japan		$i \leq 1 \text{ mA rms}$	Exposed accessible parts
110 to 130 V	USA & Canada		$i \leq 0.5 \text{ mA rms}$	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe & Australia		$i \leq 0.7 \text{ mA peak}$ $i \leq 2 \text{ mA dc}$	Antenna earth terminals
			$i \leq 0.7 \text{ mA peak}$ $i \leq 2 \text{ mA dc}$	Other terminals

Table 2 Leakage current specifications for each region

Note: These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

SECTION 1 DISASSEMBLY

1.1 Manually removing the cassette tape

If you cannot remove the cassette tape which is loaded because of any electrical or mechanical failures, manually remove it by taking the following steps.

- (1) Unplug the power cord plug from the power outlet.
- (2) Refer to the disassembly procedure of the VCR and perform the disassembly of the major parts before removing the mechanism assembly. (See Fig. 1-1a)

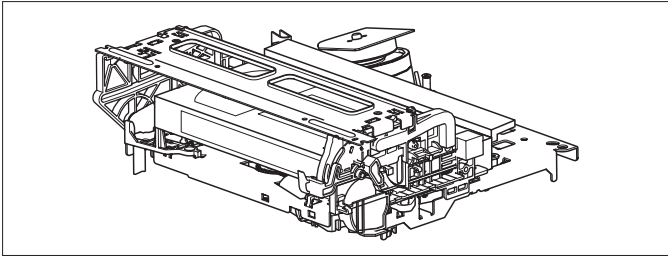


Fig. 1-1a

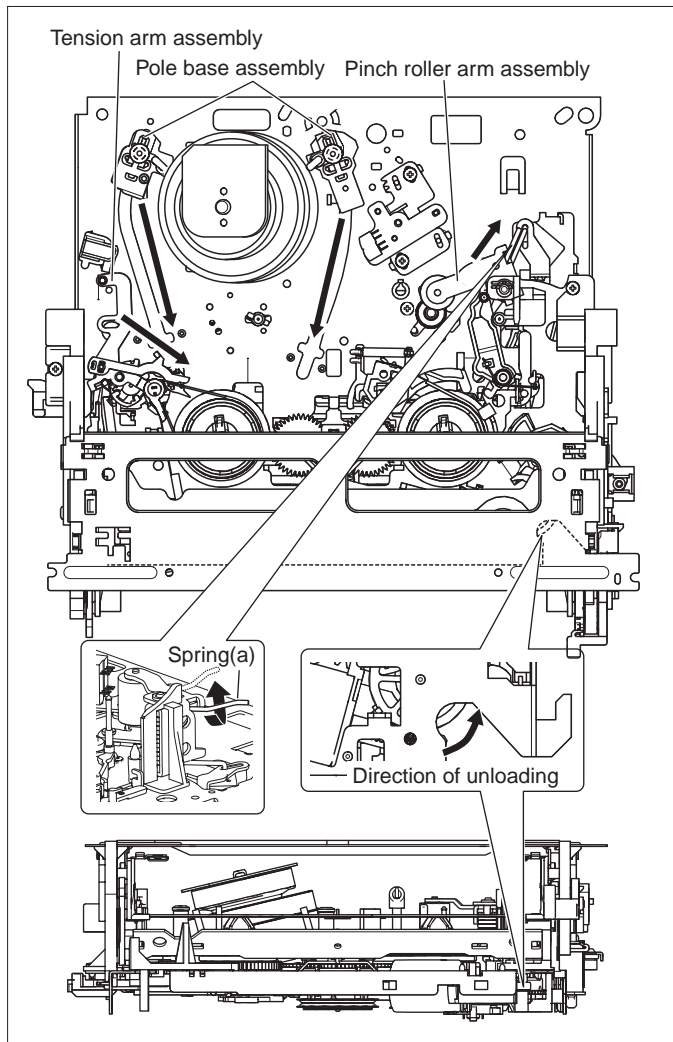


Fig. 1-1b

- (3) Unload the pole base assembly by manually turning the gear of the loading motor until the pole base assembly is hidden behind the cassette lid. In doing so, hold the tape by the hand to keep the slack away from any grease. (See Fig. 1-1b.) In case of mechanical failures, while keeping the tension arm assembly free from tension, pull out the tape on the pole base assembly. Take the spring(a) of the pinch roller arm assembly off the hook, and detach it from the tape.
- (4) Remove the screw (a) of the side frame (L/R).
- (5) Hold the slack tape and cassette cover together, lift the cassette tape, top frame, cassette holder and side frames (L, R) together from the rear and remove them by disengaging the hooks (a) and (b).

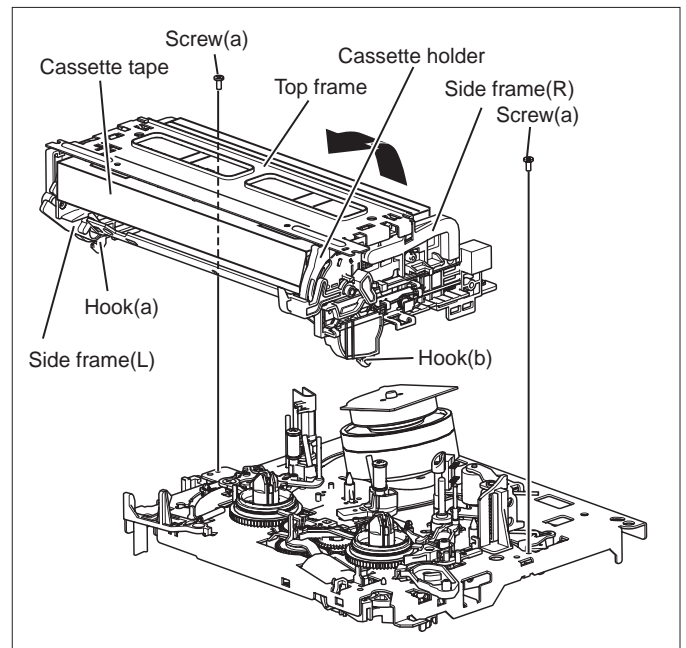


Fig. 1-1c

- (6) Take up the slack of the tape into the cassette. This completes removal of the cassette tape.

1.2 Removing the major parts

1.2.1 How to read the procedure table

This table shows the steps for disassembly of the externally furnished parts and board assemblies. Reverse these steps when re-assembling them.

<Example>

Step/ LocNo.	Part Name	Fig. No.	Point	Note
[1]	Top cover, Bracket	1-3a	4(S1a),(S1b),3(L1a), 2(SD1a),(P1a),(W1a), CN1(WR1a), 2(S1c)	<Note 1a>
(1)	(2)	(3)	(4)	(5)

(1) Order of steps in Procedure

When reassembling, perform the step(s) in the reverse order.

These numbers are also used as the identification (location) No. of parts Figures.

(2) Part name to be removed or installed.

(3) Fig. No. showing procedure or part location.

(4) Identification of part to be removed, unhooked, unlocked, released, unplugged, unclamped or unsoldered.

P= Spring, W= Washer, S= Screw, L= Locking tab, SD= Solder, CN**(WR**)= Remove the wire (WR**) from the connector (CN**).

Note:

- The bracketed () WR of the connector symbol are assigned nos. in priority order and do not correspond to those on the spare parts list.

(5) Adjustment information for installation

1.2.2 Disassembly procedure

Step/ LocNo.	Part Name	Fig. No.	Point	Note
[1]	Top cover	1-2-2d	4(S1a), (S1b)	
[2]	Front panel assembly	1-2-2d	[HR-S7955MS] CN7005(WR2a)	<Note 2a> <Note 2b>
			[HR-S6950EU, S6950MS HR-S7950EU, S7955EK] CN7001(WR2a), CN916(WR2b), 2(S2a), 4(L2a), 3(L2b)	
	[HR-S7955MS] Mini front board assembly		CN7001(WR2c) (L2c), (L2d), PC Support	
	(ADV. Jog board assembly)		2(S2b), Knob assembly	
	(Front S jack board assembly)		2(S2c)	
[3]	Mechanism assembly (Drum assembly)	1-2-2d	CN2001(WR3a), (S3a), (S3b)	<Note 2a> <Note 3a>
			CN1(WR3b), (S3c), (S3d), (S3e)	<Note 3b>
	(Inertia plate)		4(L3b)	<Note 3c>
	(Roller arm assembly)		(S3g), (W3a), (P3a), (L3c)	
[4]	[HR-S6955MS, S7955MS] S/P Converter board assembly	1-2-2d	CN511(WR4a) 2(S4a), (L4a)	
[5]	Main board assembly	1-2-2d	(S5a), 3(S5b), (L5a)	
[6]	Bottom cover	1-2-2d	3(L6a), 5(L6b), 2(L6c)	

<Note 2a>

- Be careful not to damage the connector and wire etc. during connection and disconnection.
- When connecting the flat wire to the connector, be careful with the flat wire direction.

<Note 2b>

- When reattaching the Front panel assembly, make sure that the door opener of the Side frame (R) is lowered in position prior to the reinstallation.
- When reattaching the Front panel assembly, pay careful attention to the switch lever of the Front panel assembly not to make it touch the switch knob of the Main board assembly from the side.
- When reattaching the Front panel assembly, lift the Cassette door slightly.

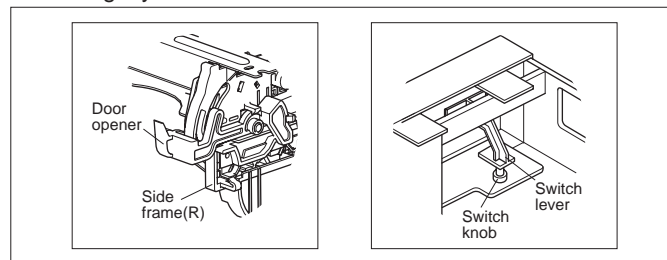


Fig. 1-2-2a

<Note 3a>

- When reattaching the Mechanism assembly, secure the screws (S3a to S3b) in the order of a, b.

<Note 3b>

- When reattaching the Mechanism assembly, be sure to align the phase of the Rotary encoder on the Main board assembly.
- When reattaching the Mechanism assembly, set the "Mechanism assembling mode". (See "section 2 mechanism".)
- When reattaching the Mechanism assembly to the Main board assembly, take care not to damage the sensors and switch on the Main board assembly.

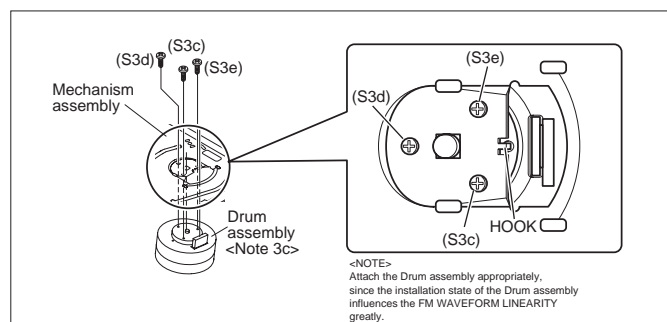


Fig. 1-2-2b

<Note 3c>

- When reattaching the Drum assembly, secure the screws (S3c to S3e) in the order of c, d, e.
- When handling the drum assembly alone, hold it by the motor or shaft. Be careful not to touch other parts, especially the video heads. Also take care not to damage the connectors.

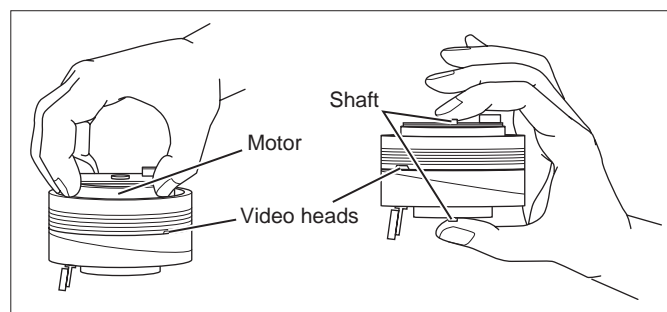


Fig. 1-2-2c

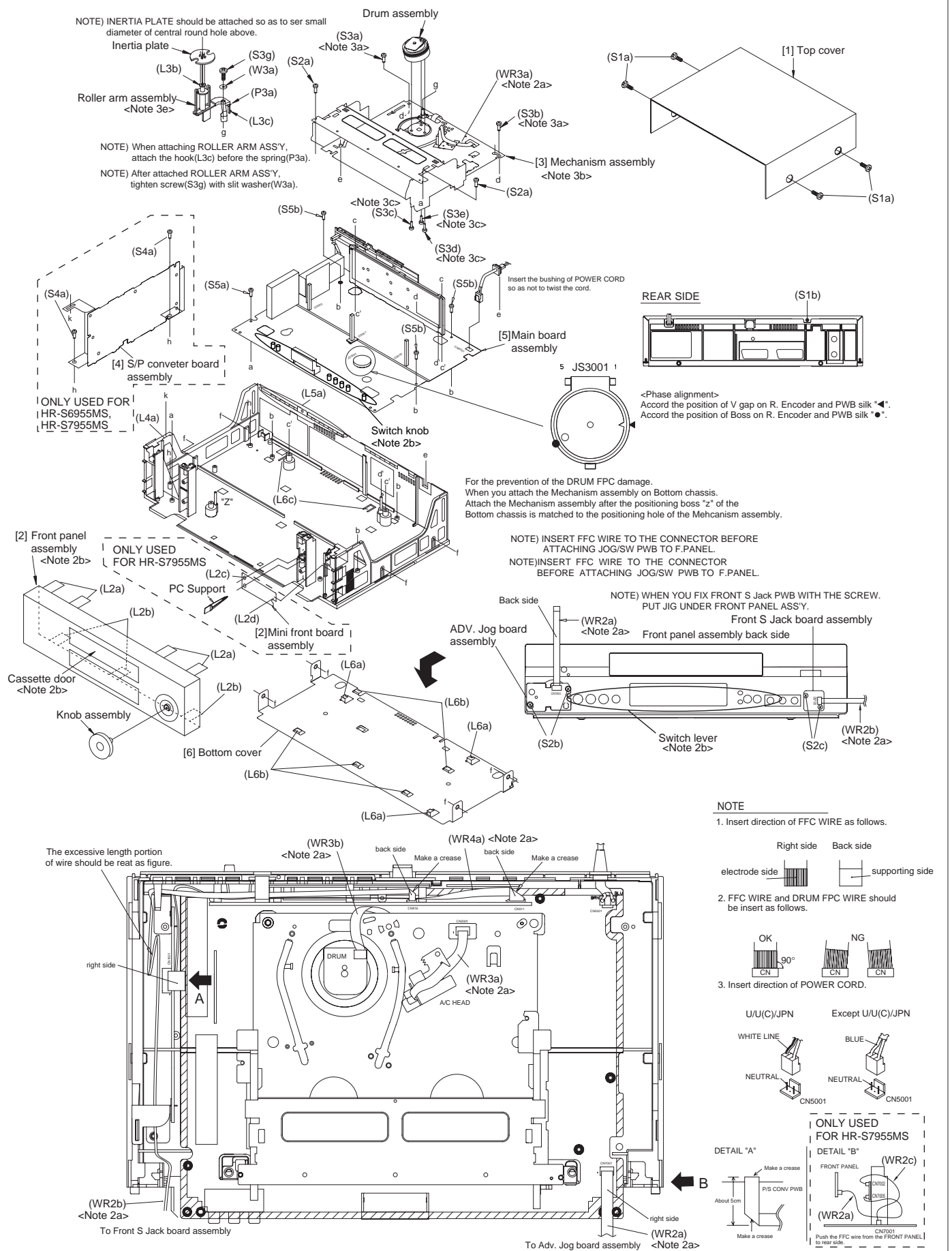


Fig. 1-2-2d

1.3 Emergency display function

This unit saves details of the last two emergencies as the EMG history and allows the status of the VCR and the mechanism of each emergency to be shown both on the display and as OSD information.

When using the emergency function, it is required to set the VCR to the Jig RCU mode (the mode in which codes from the Jig RCU can be received).

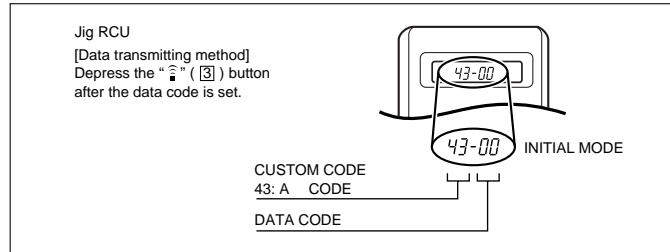


Fig. 1-3a Jig RCU [PTU94023B]

1.3.1 Displaying the EMG information

The EMG detail of information can be displayed by transmitting the code "59" from the Jig RCU.

Note:

- **The EMG detail information <1><2> show the information on the latest EMG.**
It becomes " -- : -- : -- " when there is no latest EMG record.

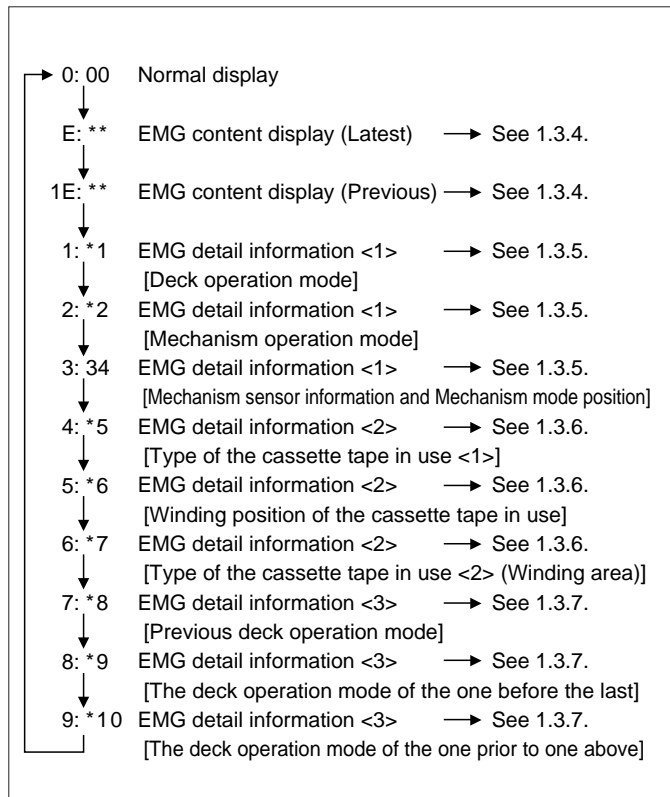


Fig. 1-3-1a EMG display of 7segment LED display model

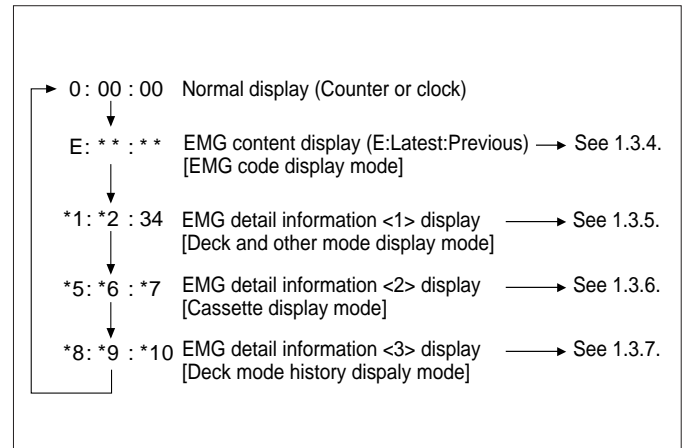
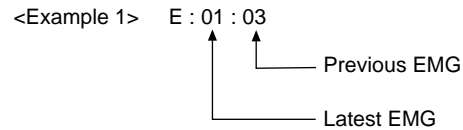


Fig. 1-3-1b EMG display of FDP display model

<Reference> EMG display of FDP display mode

- (1) Transmit the code "59" from the Jig RCU.
The FDP shows the EMG content in the form of "E: ** : **".



- <Example 2> E : -- : -- ← No EMG record

- (2) Transmit the code "59" from the Jig RCU again.
The FDP shows the EMG detail information <1> in the form of " * 1 : * 2 : 34 ".
 * 1 : Deck operation mode at the moment of EMG
 * 2 : Mechanism operation mode at the moment of EMG
 3- : Mechanism sensor information at the moment of EMG
 -4 : Mechanism mode position at the moment of EMG
- (3) Transmit the code "59" from the Jig RCU once again.
The FDP shows the EMG detail information <2> in the form of " * 5 : * 6 : * 7 ".
 * 5 : Type of the cassette tape in use <1> .
 * 6 : Winding position of the cassette tape in use
 * 7 : Type of the cassette tape in use <2> (Winding area)
- (4) Transmit the code "59" from the Jig RCU once again.
The FDP shows the EMG detail information <3> in the form of " * 8 : * 9 : * 10 ".
 * 8 : Previous deck operation mode at the moment of EMG
 * 9 : The deck operation mode of the one before the last at the moment of EMG
 * 10 : The deck operation mode of the one prior to one above at the moment of EMG
- (5) Transmit the code "59" from the Jig RCU once again to reset the display.

1.3.2 Clearing the EMG history

- (1) Display the EMG history.
- (2) Transmit the code "36" from the Jig RCU.
- (3) Reset the EMG display.

1.3.3 Details of the OSD display in the EMG display mode

During the EMG display, the OSD shows the data on the deck mode, etc. The details of the display contents are as follows.

Notes:

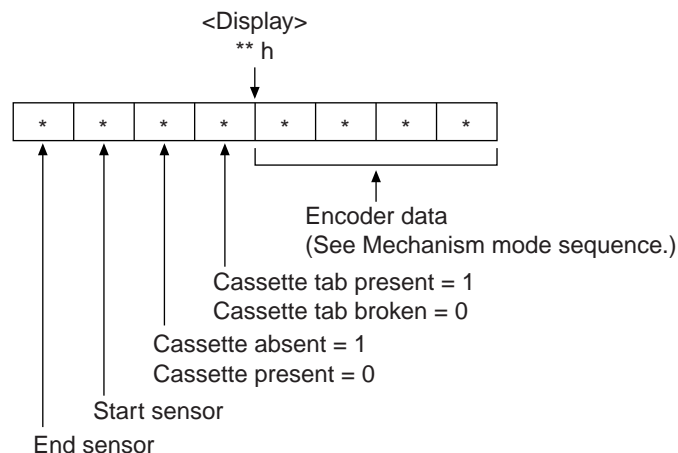
- The display is variable depending on the part No. of the System Control microcomputer (IC3001) built into the VCR. In the following, refer to the figure carrying the same two characters as the top two characters of the part number of your IC.
- The sensor information in the OSD display contents is partially different from the mechanism sensor information in EMG detail information <1>.

[For MN* only]

AA	BB	CC	DD	EE
FF	GG	HH	II	JJ
KK	LL	MM	NN	OO
PP	QQ	RR	SS	TT
UU	VV	WW	XX	YY

AA : Deck operation mode (See EMG detail information <1>.)
BB : Mechanism operation mode (See EMG detail of information <1>.)
CC : Mechanism transition flag
DD : Capstan motor control status
EE : Loading motor control status
FF : Sensor information (See sensor information details.)
GG : Capstan motor speed
HH : Key code (JVC code)
II : Supply reel winding diameter data, higher 8 bits.
JJ : Supply reel winding diameter data, lower 8 bits.
KK : Mechanism sensor information & mechanism mode position (See EMG detail of information <1>.)
LL : Tape speed data, higher 8 bits.
MM : Tape speed data, lower 8 bits.
NN : Cassette tape type <2>, higher 8 bits. (See EMG detail of information <2>.)
OO : Cassette tape type <2>, lower 8 bits. (See EMG detail of information <2>.)
PP : General data display area
YY : General data display area

*FF: Sensor information details

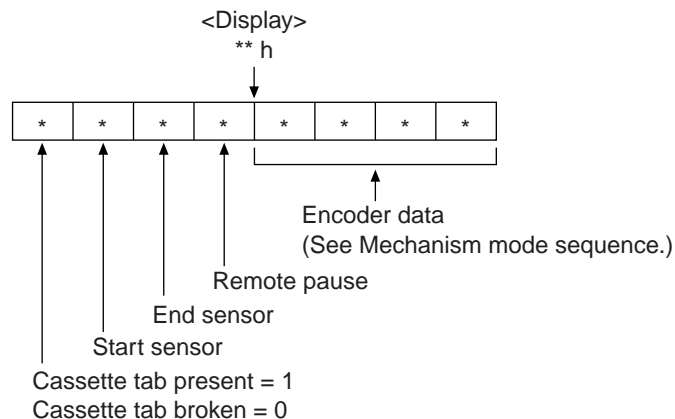


[For *HD only]

AA	BB	CC
DD	EE	FF
GGGG	HHHH	
II	JJJJ	
KKKK	LLLL	MMMM
ROM No.		

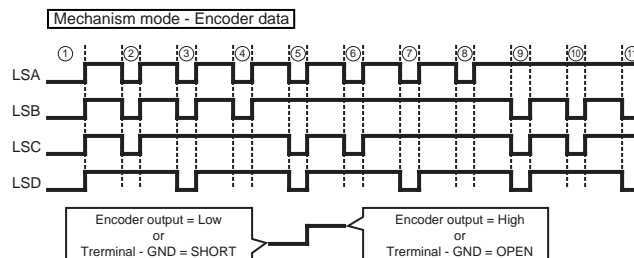
AA : Key code (JVC code)
BB : Deck operation mode (See EMG detail information <1>.)
CC : Mechanism operation mode (See EMG detail information <1>.)
DD : Sensor information (See sensor information details.)
EE : Capstan motor speed (Search, double speed)
FF : Tracking value
GGGG : Cassette tape type <2>, 16 bits. (See EMG detail information <2>.)
HHHH : Supply reel winding diameter data
II : Capstan motor speed (FF/REW, double speed)
JJJJ : Tape speed data, lower 8 bits.
KKKK : General data display area
LLLL : General data display area
MMMM : General data display area

*DD: Sensor information details

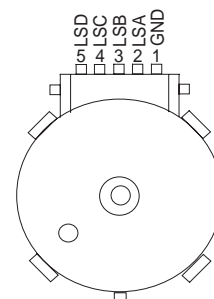


[For both MN*/HD*]

Mechanism mode sequence



No.	Position	Encoder data
①	EJECT	0 h = 0000
②	EJECT1	1 h = 0001
③	EJECT2	2 h = 0010
④	ULSTOP	3 h = 0011
⑤	UPPER	4 h = 0100
⑥	ONSTOP(PLAY)	5 h = 0101
⑦	FWD/SS	6 h = 0110
⑧	REV/SS	7 h = 0111
⑨	OFFSTOP	8 h = 1000
⑩	FFREW-BRAKE	9 h = 1001
⑪	FFREW	A h = 1010
⑫	MIDDLE	F h = 1111



1.3.4 EMG content description

Note: EMG contents “E08/E09” are for the model with Dynamic Drum (DD).

FDP	CONTENT	CAUSE
E01: Loading EMG	If the mechanism mode does not change to the next mode within 4 seconds after the loading motor starts rotating in the loading direction, while the mechanism is in the after-loading position (with the tape up against the pole base), [E:01] is identified and the power is switched OFF. However, if the tape loading is not completed within 4 seconds after the loading motor starts rotating in the loading direction, the tape is simply unloaded and ejected. No EMG data is recorded in this case.	<ol style="list-style-type: none"> 1. The mechanism is locked in the middle of the mode transition during a tape loading operation. 2. The mechanism overruns during the tape loading operation because the SYSCON cannot recognize the mechanism mode normally. This problem is due to a cause such as a rotary encoder failure. 3. Power is not supplied to the loading MDA. (M12V/Vcc/Vref/ICP are disconnected in the middle.)
E02: Unloading EMG	When the mechanism mode cannot be changed to another mode even when the loading motor has rotated for more than 4 seconds in the unloading direction, [E:02] is identified and the power is turned off.	<ol style="list-style-type: none"> 1. The mechanism is locked in the middle of mode transition. 2. Without an eject signal being sent from the SYSCON, unloading is attempted (i.e. Ejection is attempted while the tape is still inside the mechanism.) because the SYSCON cannot recognize the mechanism mode normally. This is due to a cause such as a rotary encoder failure. (Mechanism position: UPPER) 3. Power is not supplied to the loading MDA. (M12V/Vcc/Vref/ICP are disconnected in the middle.)
E03: Take Up Reel Pulse EMG	When the falling edge of the take-up reel pulse has not been generated for more than 4 seconds in the capstan rotating mode, [E:03] is identified, the pinch rollers are turned off and stopped, and the power is turned off. In this case, however, the mechanism should be in position after tape loading. Note that the reel EMG is not detected during Slow/Frame advance operations.	<ol style="list-style-type: none"> 1. The take-up reel pulse is not generated in the FWD transport modes (PLAY/FWD SEARCH/FF, etc.) because; <ol style="list-style-type: none"> 1) The idler gear is not meshed with the take-up reel gear because the mechanism malfunctions for some reason. 2) The idler gear is meshed with the take-up reel gear, but incapable of winding due to too large mechanical load (abnormal tension); 3) The reel is rotating normally but an FG pulse is not generated due to the take-up reel sensor failure. 2. The supply reel pulse is not generated in the REV transport modes (REV SEARCH/REW, etc.) because; <ol style="list-style-type: none"> 1) The idler gear is not meshed with the supply reel gear because the mechanism malfunctions for some reason. 2) The idler gear is meshed with the supply reel gear, but incapable of winding due to too large a mechanical load (abnormal tension); 3) The reel rotates normally but the FG pulse is not generated due to a supply reel sensor failure. 3. Power(SW5V) is not supplied to the reel sensor on the tape winding side.
E04: Drum FG EMG	When the drum FG pulse has not been input for more than 3 seconds in the drum rotating mode, [E:04] is identified, the pinch rollers are turned off and stopped, and the power is turned off.	<ol style="list-style-type: none"> 1. The drum could not start or the drum rotation has stopped due to too large a load on the tape, because; <ol style="list-style-type: none"> 1) The tape tension is abnormally high; 2) The tape is damaged or a foreign object (grease, etc.) adheres to the tape. 2. The drum FG pulse did not reach the System controller CPU because; <ol style="list-style-type: none"> 1) The signal circuit is disconnected in the middle; 2) The FG pulse generator (hall device) of the drum is faulty. 3. The drum control voltage (DRUM CTL V) is not supplied to the MDA. 4. Power (M12V) is not supplied to the drum MDA.
E05: Cassette Eject EMG	If the cassette does not reach the eject position within about 0.7 seconds after the cassette housing has started the cassette ejection operation, [E:05] is identified, the drive direction is reversed to load the tape, the mode is switched to STOP mode with the pinch roller OFF, and the power is switched OFF. During the cassette insertion process, the drive direction is reversed and the cassette is ejected if the tape is not up against the pole base within about 3 seconds after the start of the cassette pulling-in operation. If the cassette does not reach the eject position within about 0.7 seconds after the drive mode reversal operation, [E:05] is identified and the power is switched OFF immediately.	<ol style="list-style-type: none"> 1. The cassette cannot be ejected due to a failure in the drive mechanism of the housing. 2. When the housing load increases during ejection, the loading motor is stopped because of lack of headroom in its drive torque. <ul style="list-style-type: none"> Housing load increasing factors: Temperature environment (low temperature, etc.), mechanism wear or failure. 3. The sensor/switch for detecting the end of ejection are not functioning normally. 4. The loading motor drive voltage is lower than specified or power (M12V) is not supplied to the motor (MDA). 5. When the user attempted to eject a cassette, a foreign object (or perhaps the user's hand) was caught in the opening of the housing.
E06: Capstan FG EMG	When the capstan FG pulse has not been generated for more than 1 second in the capstan rotating mode, [E:06] is identified, the pinch rollers are turned off and stopped, and the power is turned off. However, the capstan EMG is not detected in SLOW/STILL modes. Note that, if the part number of the System Control IC begins with "MN" or "M3", the capstan EMG is not detected even during the FF/REW operation.	<ol style="list-style-type: none"> 1. The capstan could not start or the capstan rotation has stopped due to too large a load on the tape, because; <ol style="list-style-type: none"> 1) The tape tension is abnormally high (mechanical lock); 2) The tape is damaged or a foreign object (grease, etc.) is adhered to the tape (occurrence of tape entangling, etc.). 2. The capstan FG pulse did not reach the System controller CPU because; <ol style="list-style-type: none"> 1) The signal circuit is disconnected in the middle; 2) The FG pulse generator (MR device) of the capstans is faulty. 3. The capstan control voltage (CAPSTAN CTL V) is not supplied to the MDA. 4. Power (M12V, SW5V) are not supplied to the capstan MDA.
E07: SW Power Short-Circuit EMG	When short-circuiting of the SW power supply with GND has lasted for 0.5 second or more, [E:07] is identified, all the motors are stopped and the power is turned off.	<ol style="list-style-type: none"> 1. The SW 5 V power supply circuit is shorted with GND. 2. The SW 12 V power supply circuit is shorted with GND.
E08: DD Initialized (Absolute Position Sensor) EMG	When DD tilting does not complete in 4 seconds, [E:08] is identified, the tilt motor is stopped and the power is turned off.	<ol style="list-style-type: none"> 1. The absolute value sensor is defective. (The soldered parts have separated.) 2. The pull-up resistor at the absolute sensor output is defective. (The soldered parts have separated.) 3. Contact failure or soldering failure of the pins of the connector (board-to-board) to the absolute value sensor. 4. The absolute value sensor data is not sent to the System Controller CPU.
E09: DD FG EMG	When the DD FG pulse is not generated within 2.5 seconds, [E:09] is identified, the tilt motor is stopped and the power is turned off.	<ol style="list-style-type: none"> 1. The FG sensor is defective. (The soldered parts have separated.) 2. The pull-up resistor at the FG sensor output is defective. (The soldered parts have separated.) 3. Contact failure or soldering failure of the pins of the connector (board-to-board) to the FG sensor. 4. The power (5V) to the sensor is not supplied. (Connection failure/soldering failure) 5. The FG pulse is not sent to the System Controller CPU. 6. The tilt motor is defective. (The soldered parts have separated.) 7. The drive power to the tilt motor is not supplied. (Connection failure/soldering failure) 8. The tilt motor drive MDA - IC is defective. 9. Auto-recovery of the DD tilting cannot take place due to overrun.
E0A: Supply Reel Pulse EMG	When the falling edge of the supply reel pulse has not been generated for more than 10 seconds in the capstan rotating mode, [E:0A] is identified and the cassette is ejected (but the power is not turned off). In this case, however, the mechanism should be in the position after tape loading (with the tape up against the pole base). Also note that the reel EMG is not detected during Slow/Frame advance operations.	<ol style="list-style-type: none"> 1. The supply reel pulse is not generated in the FWD transport mode (PLAY/FWD SEARCH/FF, etc.) because; <ol style="list-style-type: none"> 1) PLAY/FWD or SEARCH/FF is started while the tape in the inserted cassette is cut in the middle; 2) A mechanical factor caused tape slack inside and outside the supply reel side of the cassette shell. In this case, the supply reel will not rotate until the tape slack is removed by the FWD transport, so the pulse is not generated until then; 3) The reel is rotating normally but the FG pulse is not generated due to a supply reel sensor failure. 2. The take-up reel pulse is not generated in the REV transport mode (REV SEARCH/REW, etc.). <ol style="list-style-type: none"> 1) REV SEARCH/REW is started when the tape in the inserted cassette has been cut in the middle; 2) A mechanical factor caused tape slack inside and outside the take-up reel side of the cassette shell. In this case, the supply reel will not rotate until the tape slack is removed by the REV transport, so the pulse will not be generated until that time; 3) The reel is rotating normally but the FG pulse is not generated due to a take-up reel sensor failure. 3. The power (SW 5V) to a reel sensor is not supplied.
EU1: Head clog warning history	Presupposing the presence of the control pulse output in the PLAY mode, when the value obtained by mixing the two V.FM output channels (without regard to the A.FM output) has remained below a certain threshold level for more than 10 seconds, [E:U1] is identified and recorded in the emergency history. During the period in which the head clog is detected, the FDP shows "U:01" and the OSD repeats the "3 seconds of warning display" and the "7 seconds of noise picture display" alternately. EMG code : "E:C1" or "E:U1" / FDP : "U:01" / OSD : "Try cleaning tape." or "Use cleaning cassette." The head clog warning is reset when the above-mentioned threshold has been exceeded for more than 2 seconds or the mode is changed to another mode than PLAY.	

1.3.5 EMG detail information <1>

The status (electrical operation mode) of the VCR and the status (mechanism operation mode/sensor information) of the mechanism in the latest EMG can be confirmed based on the figure in EMG detail information <1> .

[FDP/OSD display]

* 1 : * 2 : 34

- * 1 : Deck operation mode at the moment of EMG
- * 2 : Mechanism operation mode at the moment of EMG
- 3— : Mechanism sensor information at the moment of EMG
- 4 : Mechanism mode position at the moment of EMG

Note:

- For EMG detailed information <1>, the content of the code that is shown on the display (or OSD) differs depending on the parts number of the system control microprocessor (IC3001) of the VCR. The system control microprocessor parts number starts with two letters, refer these to the corresponding table.

* 1 : Deck operation mode

[Common table of MN* and HD]

Display		Deck operation mode
MN*	HD*	
00	-	Mechanism being initialized
01	00	STOP with pinch roller pressure off (or tape present with P.OFF)
02	01	STOP with pinch roller pressure on
03	-	POWER OFF as a result of EMG
04	04	PLAY (Normal playback)
0C	0E	REC
10	11	Cassette ejected
20	22	FF
21	-	Tape fully loaded, START sensor ON, short FF
22	-	Cassette identification FWD SEARCH before transition to FF (SP x7-speed)
24	26	FWD SEARCH (variable speed) including x2-speed
2C	2E	INSERT REC
40	43	REW
42	-	Cassette identification REV SEARCH before transition to REW (SP x7-speed)
44	47	REV SEARCH (variable speed)
4C	4C	AUDIO DUB
6C	6E	INSERT REC (VIDEO + AUDIO)
84	84	FWD STILL / SLOW
85	85	REV STILL / SLOW
8C	8F	REC PAUSE
8D	-	Back spacing
8E	-	Forward spacing (FWD transport mode with BEST function)
AC	AF	INSERT REC PAUSE
AD	-	INSERT REC back spacing
CC	CD	AUDIO DUB PAUSE
CD	-	AUDIO DUB back spacing
EC	EF	INSERT REC (VIDEO + AUDIO) PAUSE
ED	-	INSERT REC (VIDEO + AUDIO) back spacing

* 2 : Mechanism operation mode

[Table of MN*]

Display	Mechanism operation mode
00	Command standby (No command to be executed)
01	Immediate Power OFF after EMG occurrence
02	Loading from an intermediate position during mechanism initialization
03	Unloading due to EMG occurrence during mechanism initialization
04	Ejecting cassette (ULSTOP to EJECT)
05	Inserting cassette (EJECT to ULSTOP)
06	Loading tape (ULSTOP to PLAY)
07	Unloading tape (PLAY to ULSTOP)
08	Transition from pinch roller ON to STOP
09	Transition from pinch roller OFF to STOP (PLAY to OFFSTOP)
0A	Transition from pinch roller OFF to STOP at power OFF
0B	Transition from pinch roller ON to STOP at power ON
0C	Transition to PLAY
0D	Transition to Search FF
0E	Transition to REC
0F	Transition to FWD STILL/SLOW
10	Transition to REV STILL/SLOW
11	Transition to Search REV
12	Transition from FF/REW to STOP
13	Transition to FF
14	Transition to REW
15	Tape end detection processing during loading
16	Short FWD/REV at tape sensor ON during unloading
17	Transition to FF/REW brake mode

[Table of HD*]

Display	Mechanism operation mode
00	STOP with pinch roller pressure off
01	STOP with pinch roller pressure on
02	U/L STOP (or tape being loaded)
04	PLAY (Normal playback)
05	PLAY (x1-speed playback using JOG)
0E	REC
11	Cassette ejected
22	FF
26	FWD SEARCH (variable speed) including x2-speed
2E	INSERT REC
43	REW
47	REV SEARCH
4C	AUDIO DUB
6E	INSERT REC (VIDEO + AUDIO)
84	FWD STILL/SLOW
85	REV STILL/SLOW
8F	REC PAUSE
AF	INSERT REC PAUSE
C7	REV SEARCH (x1-speed reverse playback using JOG)
CD	AUDIO DUB PAUSE
EF	INSERT REC (VIDEO + AUDIO) PAUSE
F0	Mechanism being initialized
F1	POWER OFF as a result of EMG
F2	Cassette being inserted
F3	Cassette being ejected
F4	Transition from STOP with pinch roller pressure on to STOP with pinch roller pressure off
F5	Transition from STOP with pinch roller pressure on to PLAY
F6	Transition from STOP with pinch roller pressure on to REC
F7	Cassette type detection SEARCH before FF/REW is being executed
F8	Tape being unloaded
F9	Transition from STOP with pinch roller pressure off to STOP with pinch roller pressure on
FA	Transition from STOP with pinch roller pressure off to FF/REW
FB	Transition from STOP with pinch roller pressure off to REC.P (T.REC,etc.)
FC	Transition from STOP with pinch roller pressure off to cassette type detection SEARCH
FD	Short REV being executed after END sensor on during unloading
FE	Tension loosening being executed after tape loading (STOP with pinch roller pressure on)
FF	Tape being unloaded

3- : Mechanism sensor information

[Common table of MN* and HD*]

Display	Mechanism sensor information			
	REC safety SW	Start sensor	End sensor	Mechanism position sensor
0-	Tab broken	ON	ON	ON
1-	Tab broken	ON	ON	OFF
2-	Tab broken	ON	OFF	ON
3-	Tab broken	ON	OFF	OFF
4-	Tab present	OFF	ON	ON
5-	Tab present	OFF	ON	OFF
6-	Tab present	OFF	OFF	ON
7-	Tab present	OFF	OFF	OFF
8-	Tab broken	ON	ON	ON
9-	Tab broken	ON	ON	OFF
A-	Tab broken	ON	OFF	ON
B-	Tab broken	ON	OFF	OFF
C-	Tab present	OFF	ON	ON
D-	Tab present	OFF	ON	OFF
E-	Tab present	OFF	OFF	ON
F-	Tab present	OFF	OFF	OFF

Tab broken = 0

Tab present = 1

Sensor ON = 0

sensor OFF = 1

Sensor ON = 0

Sensor OFF = 1

-4 : Mechanism mode position

[Common table of MN* and HD*]

Mechanism sensor information	Display	Deck operation mode	
Even number (0, 2, 4, 6, 8, A, C, E)	-0	Not established	
	-1	EJECT	EJECT position
	-2	EJECT-EJECT1	Intermodal position
	-3	EJECT1	EJECT1 position
	-4	EJECT1-EJECT2	Intermodal position
	-5	EJECT2	EJECT2 position
	-6	EJECT2-ULSTOP	Intermodal position
	-7	ULSTOP	ULSTOP position
	-8	ULSTOP-UPPER	Intermodal position
	-9	UPPER	Loading (unloading) tape
	-A	UPPER-ONSTOP	Intermodal position
	-B	ONSTOP	PLAY position
	-C	PLAY-FWD/SS	Intermodal position
	-D	FWD/SS	FWD (FWD Still/Slow) position
	-E	FWD/SS-REV	Intermodal position
	-F	REV	REV (REV Still/Slow) position
Odd number (1, 3, 5, 7, 9, B, D, F)	-0	REV-OFFSTOP	Intermodal position
	-1	OFFSTOP	Pinch roller OFF position
	-2	OFFSTOP-FFREWB	Intermodal position
	-3	FFREWB	FF/REW Brake position
	-4	FFREWB-FFREW	Intermodal position
	-5	FFREW	FF/REW position

1.3.6 EMG detail information <2>

The type of the cassette tape and the cassette tape winding position can be confirmed based on the figure in EMG detail information <2> .

[FDP/OSD display]

*5 : *6 : *7

*5 : Type of the cassette tape in use <1>

*6 : Winding position of the cassette tape in use

*7 : Type of the cassette tape in use <2> (Winding area)

Note:

- **EMG detail information <2> is the reference information stored using the remaining tape detection function of the cassette tape. As a result, it may not identify cassette correctly when a special cassette tape is used or when the tape has variable thickness.**

*5 : Cassette tape type <1>

Display	Cassette tape type <1>
00	Cassette type not identified
16	Large reel/small reel (T-0 to T-15/T-130 to T-210) not classified
82	Small reel, thick tape (T-120) identified/thin tape (T-140) identified
84	Large reel (T-0 to T-60) identified
92	Small reel, thick tape (T-130) identified/thin tape (T-160 to T-210) identified
93	Small reel, thick tape/C cassette (T-0 to T-100/C cassette) not classified
C3	Small reel, thick tape/C cassette (T-0 to T-100/C cassette) being classified
D3	Small reel, thick tape/C cassette (T-0 to T-100/C cassette) being classified
E1	C cassette, thick tape (TC-10 to TC-20) identified
E2	Small reel, thick tape (T-0 to T-100) identified
E9	C cassette, thin tape (TC-30 to TC-40) identified
F1	C cassette, thick tape/thin tape (TC-10 to TC-40) not classified

Notes:

- **Cassette tape type <1> is identified a few times during mode transition and the identification count is variable depending on the cassette tape type. If an EMG occurs in the middle of identification, the cassette tape type may not be able to be identified.**
- **If other value than those listed in the above table is displayed, the cassette tape type is not identified.**

*6 : Cassette tape winding position

The cassette tape winding position at the moment of EMG is displayed by dividing the entire tape (from the beginning to the end) in 21 sections using a hex number from "00" to "14".

"00" : End of winding

"14" : Beginning of winding

"FF" : Tape position not identified

*7 : Cassette tape type <2> (Winding area)

Display	Cassette tape type <2>	(Reference) Word data (Beginning) (End)
00	Cassette type not identified	
04 - 08	C cassette, thick tape TC-10	(0497 - 0506) (0732 - 0858)
05 - 06	Small reel, thick tape T-20	(05A9 - 0661)
05 - 0C	C cassette, thick tape TC-20P	(0599 - 05FF) (0AA1 - 0C07)
06 - 0C	C cassette, thin tape TC-40	(0623 - 063D) (0C41 - 0CC3)
06 - 0C	C cassette, thin tape TC-30	(0611 - 0638) (0C0C - 0CB2)
07 - 08	Small reel, thick tape T-40	(07CC - 08E5)
09 - 0B	Small reel, thick tape T-60	(09FD - 0B78)
0C - 0D	Small reel, thick tape T-80(DF-160)	(0C20 - 0DFC)
0D - 0F	Small reel, thick tape T-90(DF-180)	(0D31 - 0F3E)
0E - 10	Small reel, thick tape T-100	(0E43 - 107F)
10 - 12	Small reel, thin tape T-140	(10E1 - 120C)
10 - 13	Small reel, thick tape T-120(DF-240)	(1073 - 1313)
11 - 14	Small reel, thick tape T-130	(1185 - 1429)
12 - 14	Small reel, thin tape T-160	(12D3 - 141F)
13 - 14	Small reel, thin tape T-210(DF-420)	(1373 - 14C3)
13 - 14	Small reel, thin tape T-180(DF-360)	(1357 - 14C0)
13 - 14	Small reel, thin tape T-168	(1395 - 14EE)
13 - 14	Small reel, thick tape DF-300	(13A8 - 14CE)
15 - 16	Large reel T-20	(1536 - 1618)
16 - 17	Large reel T-30	(1647 - 175A)
17 - 18	Large reel T-40	(1759 - 189C)
19 - 1B	Large reel T-60	(1989 - 1B2F)

Note:

- **The values of cassette tape type <2> in the above table are typical values with representative cassette tapes.**

1.3.7 EMG detail information <3>

Three deck operation modes preceding the deck operation mode in which the EMG occurs may be confirmed based on the figures in the EMG information detail <3>. For the contents of the displayed information, see the table "Deck operation mode" in section "1.3.5 EMG detail information <1>".

1.4 Service position

This unit has been designed so that the Mechanism and Main board assemblies can be removed together from the chassis assembly. Before diagnosing or servicing the circuit boards, take out the major parts from the chassis assembly.

1.4.1 How to set the "Service position"

- (1) Refer to the disassembly procedure and perform the disassembly of the major parts before removing the Mechanism assembly.
- (2) Remove the screws that fix the Mechanism assembly to the Chassis assembly. If any other screws are used to fix the boards, remove them also.
- (3) Remove the combined Mechanism and Main board assemblies.
- (4) If any other major parts are used, remove them also.
- (5) Connect the wires and connectors of the major parts that have been removed in steps (1) to (4). (Refer to Fig. 1-2-2d.)
- (6) Place the combined Mechanism, Main board and other board assemblies upside down.
- (7) Insert the power cord plug into the power outlet and then proceed with the diagnostics and servicing of the board assembly.

Notes:

- **Before inserting the power cord plug into the power outlet, make sure that none of the electrical parts are able to short-circuit between the workbench and the board assembly.**
- **For the disassembly procedure of the major parts and details of the precautions to be taken, see "1.2 Removing the major parts".**
- **If there are wire connections from the Main board and Mechanism assemblies to the other major parts, be sure to remove them (including wires connected to the major parts) first before performing step (2).**
- **When carrying out diagnosis and repair of the Main board assembly in the "Service position", be sure to ground both the Main board and Mechanism assemblies. If they are improperly grounded, there may be noise on the playback picture or FDP counter display may move even when the mechanism is kept in an inoperative status.**
- **In order to diagnose the playback or recording of the cassette tape, set the Mechanism assembly to the required mode before placing it upside down. If the mechanism mode is changed (including ejection) while it is in an upside down position the tape inside may be damaged.**
- **For some models, the mechanism and board assemblies are attached by connectors only. When carrying out a diagnosis or repair of the boards in the "Service position", make sure that the connectors are not disconnected.**

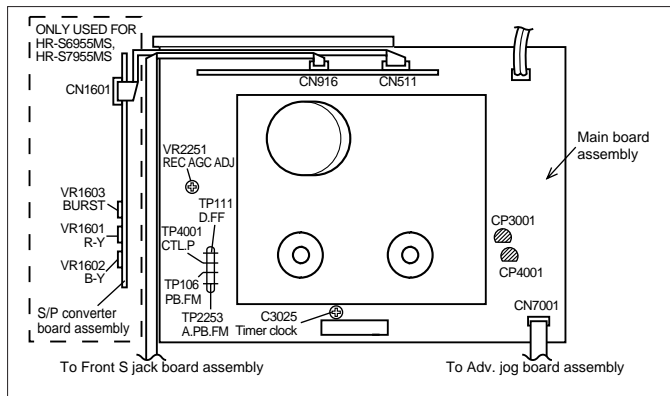


Fig. 1-4-1a

1.5 Jig RCU mode

This unit uses the following two modes for receiving remote control codes.

- 1) User RCU mode : Ordinary mode for use by the user.
- 2) Jig RCU mode : Mode for use in production and servicing.

When using the Jig RCU, it is required to set the VCR to the Jig RCU mode (the mode in which codes from the Jig RCU can be received). As both of the above two modes are stored in the EEPROM, it is required to set the VCR back to the User RCU mode each time that an adjustment is made or to check that the necessary operations have been completed. These modes can be set by the operations described below.

1.5.1 Setting the Jig RCU mode

- (1) Unplug the power cord plug from the power outlet.
- (2) Press and hold the "REC" and "PAUSE" buttons on the VCR simultaneously, while plugging the power cord plug into the power outlet.

When the VCR is set to the Jig RCU mode, the symbols (" : ") in the time display of the FDP are turned off.

1.5.2 Setting the User RCU mode

- (1) Turn off the power.
- (2) Press the "REC" and "PAUSE" buttons of the VCR simultaneously. Alternatively, transmit the code "80" from the Jig RCU.

1.6 Mechanism service mode

This model has a unique function to enter the mechanism into every operation mode without loading of any cassette tape. This function is called the "Mechanism service mode".

1.6.1 How to set the "Mechanism service mode"

- (1) Set the VCR to the Jig RCU mode (the mode in which codes from the Jig RCU can be received).
- (2) Transmit the code "E5" from the Jig RCU.
- (3) Release the lug of the Cassette holder and then slide the Cassette holder toward the direction where the Cassette holder is loaded by manually.
- (4) The cassette holder lowers and, when the loading has completed, the mechanism enters the desired mode.

When the VCR is set to the Mechanism service mode, the symbols ("Timer") in the FDP (LED) are blinked.

1.6.2 How to exit from the "Mechanism service mode"

- (1) Unplug the power cord plug from the power outlet.

1.7 Maintenance and inspection

1.7.1 Cleaning

Regular cleaning of the transport system parts is desirable but practically impossible. So make it a rule to carry out cleaning of the tape transport system whenever the machine is serviced.

When the video head, tape guide and/or brush get soiled, the playback picture may appear inferior or at worst disappear, resulting in possible tape damage.

Note:

- **Absolutely avoid sweeping the upper drum vertically as this will cause damage to the video head.**

- (1) When cleaning the upper drum (especially the video head), soak a piece of closely woven cloth with alcohol and while holding the cloth onto the upper drum by the fingers, turn the upper drum counterclockwise.
- (2) To clean the parts of the tape transport system other than the upper drum, use a piece of closely woven cloth or a cotton swab soaked with alcohol.
- (3) After cleaning, make sure that the cleaned parts are completely dry before using the cassette tape.

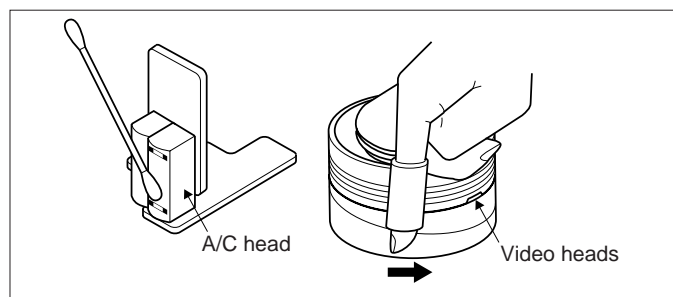


Fig. 1-7-1a

1.7.2 Lubrication

With no need for periodical lubrication, you have only to lubricate new parts after replacement. If any oil or grease on contact parts is soiled, wipe it off and newly lubricate the parts.

Note:

- **See the “mechanism assembly” diagram of the “parts list” for the lubricating or greasing spots, and for the types of oil or grease to be used.**

1.7.3 Suggested servicing schedule for main components

The following table indicates the suggested period for such service measures as cleaning, lubrication and replacement. In practice, the indicated periods will vary widely according to environmental and usage conditions. However, the indicated components should be inspected when a set is brought for service and the maintenance work performed if necessary. Also note that rubber parts may deform in time, even if the set is not used.

System	Parts name	Operation hours	
		1000H	2000H
Tape transport	Drum assembly	C,X	X
	A/C head	C,X	C,X
	Pinch roller arm assembly	C	C
	Full erase head	C	C
	Tension arm assembly	C	C
	Capstan motor (Shaft)	C	C
	Guide arm assembly	C	C
Drive	Capstan motor		X
	Capstan brake assembly		X
	Main brake assembly		X
	Belt (Capstan)	X	X
	Loading motor		X
	Clutch unit		X
	Worm gear		X
	Control plate		X
Other	Rotary encoder		X

C : Cleaning

X : Inspection or Replacement if necessary

1.8 Servicing items related to video navigation

The video navigation function built into this unit works by storing the video navigation data in the internal EEPROM and writing data in the cassette tape simultaneously.

The video navigation data stored in the EEPROM cannot be copied to another EEPROM. Therefore, when the circuit board mounting the EEPROM is replaced, the original EEPROM should be mounted on the new board. This will make the user's video navigation data usable with the new circuit board after replacement. However, the user's data cannot be restored if the EEPROM on the original circuit board is damaged.

Note:

- **If the circuit board mounting the EEPROM or the EEPROM alone has been replaced, it is required to perform confirmation/re-adjustment on all of the adjustment items using the EVR as well as those which are adjusted by transmitting adjustment codes from the Jig RCU.**

SECTION 2 MECHANISM

2.1 Before disassembling

2.1.1 Notes

This model's mechanism relates closely to the rotary encoder and system control circuit (the rotary encoder is meshed with the control cam).

The system control circuit detects the mechanism condition using the rotary encoder's phase (internal switch phase). Therefore, the parts such as the rotary encoder, control plate, loading gear and control cam need to be installed correctly in order for the mechanism to operate properly. (For the mechanism phase adjustment, refer to the installation of each part.)

- For the disassembly procedure of the major parts of the main unit and notes, refer to the "section 1 disassembly".
- Before using a soldering iron, be sure to disconnect the power plug from the AC outlet.
- Do not touch any of the adjustment points until a defect position is specified.
- When plugging or unplugging the connector, be sure not to damage the wire.
- Be sure the springs are hooked all the way around and in the correct direction.
- When performing repairs, take care not to damage a catch, etc.

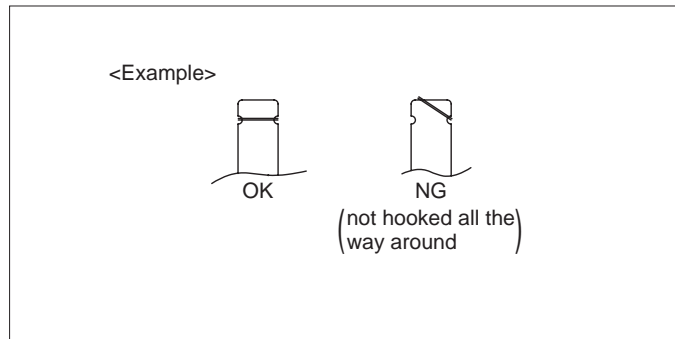


Fig. 2-1-1a

2.1.2 Mechanism operation check

When the mechanism is operated without a cassette loaded, operate the mechanism in the mechanism service mode. (Refer to the "section 1 disassembly".)

2.1.3 Setting the mechanism assembling mode

The mechanism-assembling mode is provided with this mechanism. When disassembling and assembling, it is required to engage this mode.

Set the mode by adopting the following procedures.

- (1) Remove the mechanism assembly using the disassembling procedure.
- (2) Turn gear (a) of the loading motor manually to set the mechanism assembly to the eject end mode. Make sure that the main deck is connected to the guide hole (a) of the drive lever and the seal (a) of the main deck is connected to the mark "E" of the control plate. This condition is called the mechanism-assembling mode.

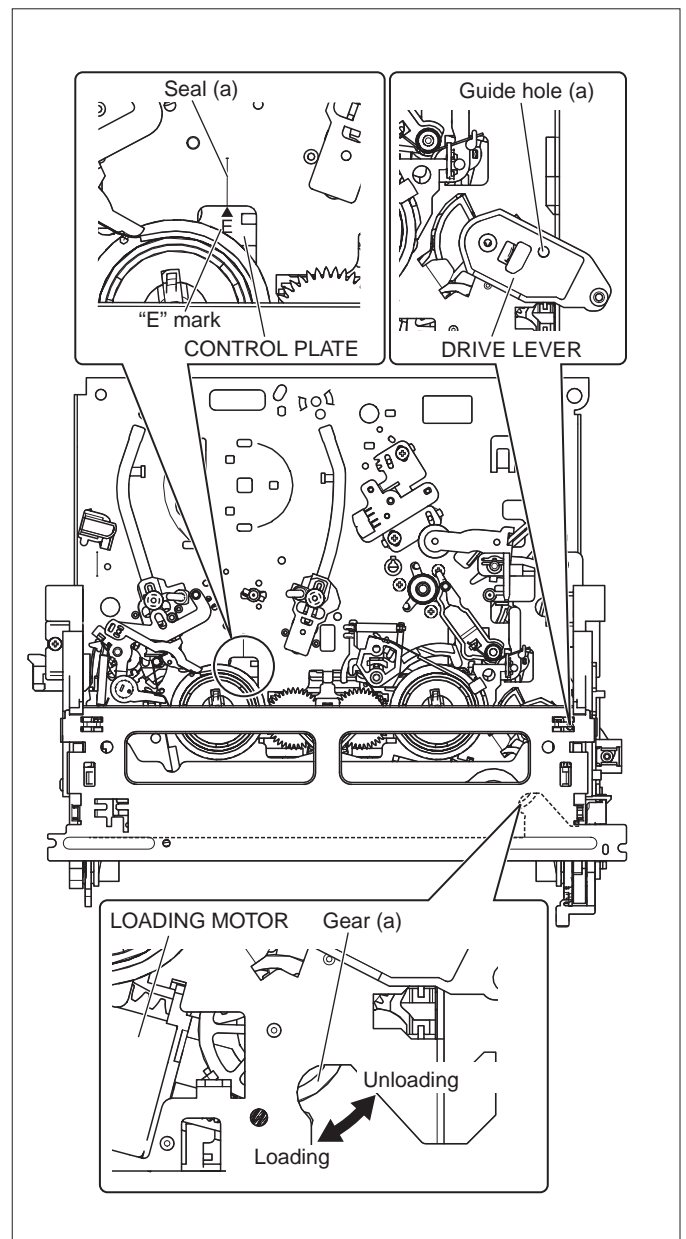


Fig. 2-1-3a

2.1.4 Layout of the main mechanism parts

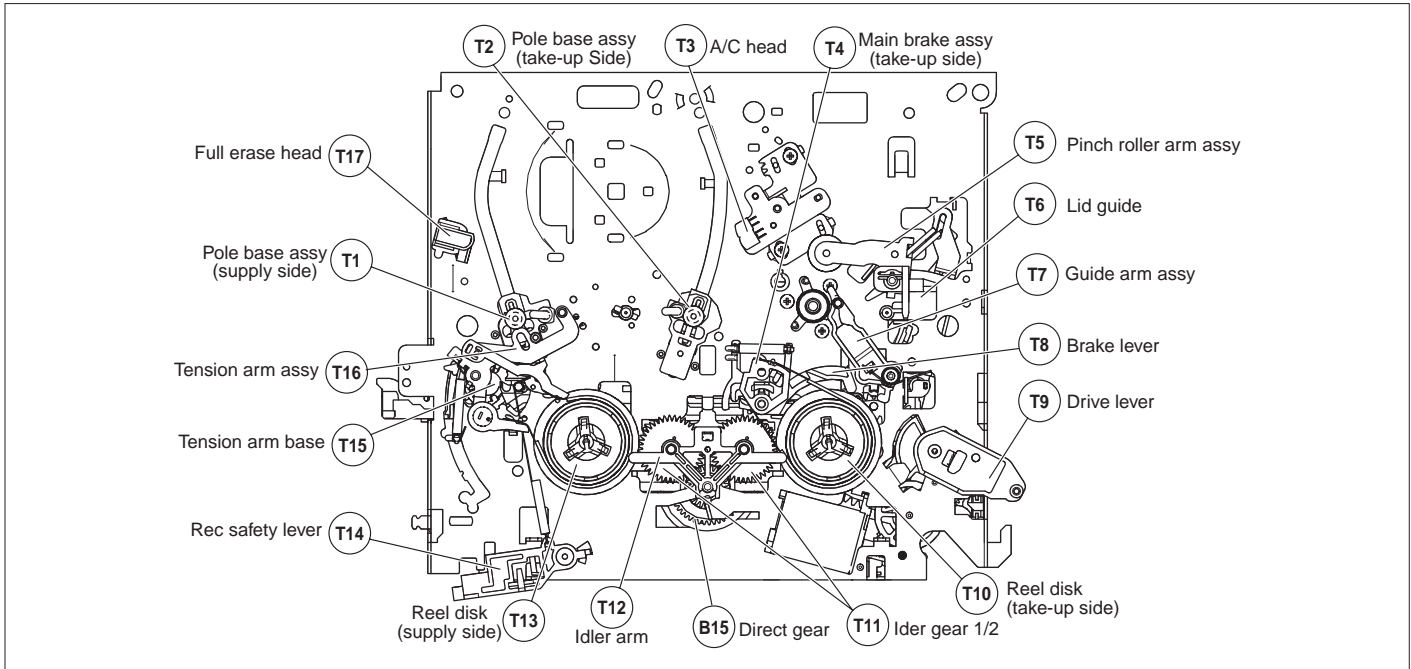


Fig. 2-1-4a

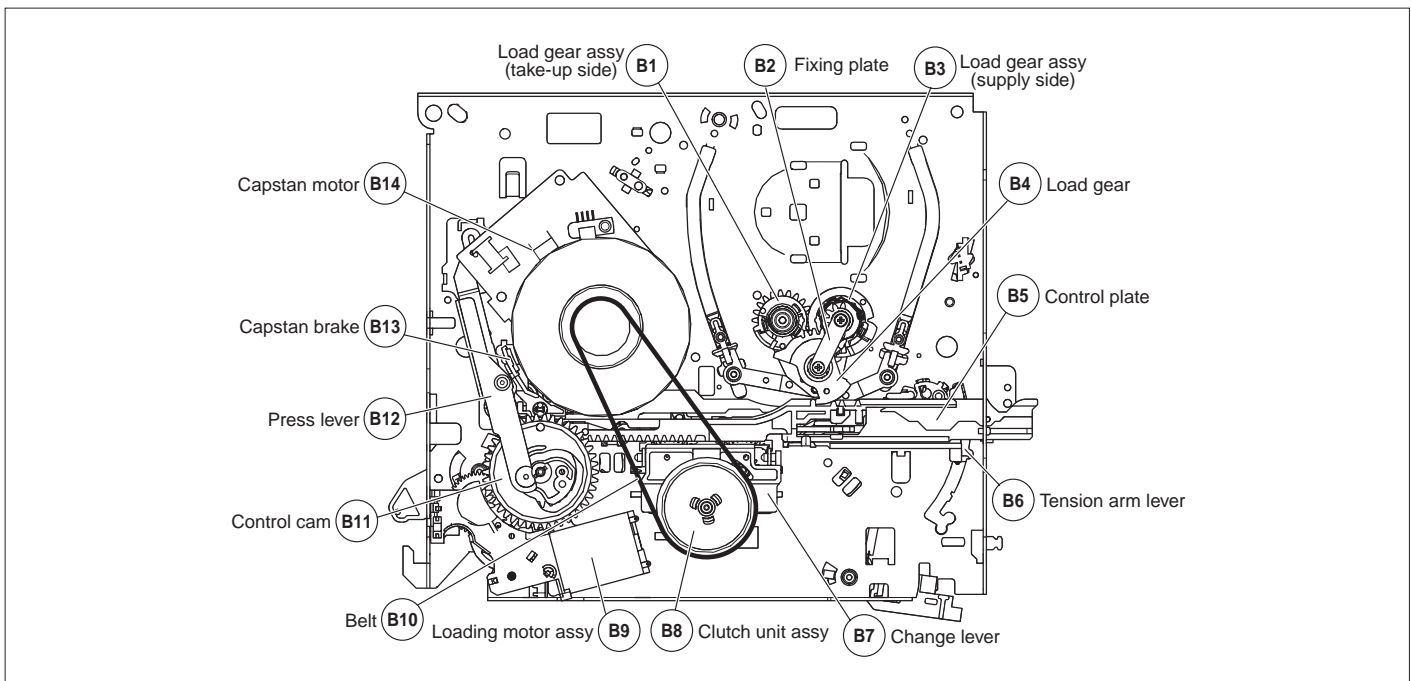


Fig. 2-1-4b

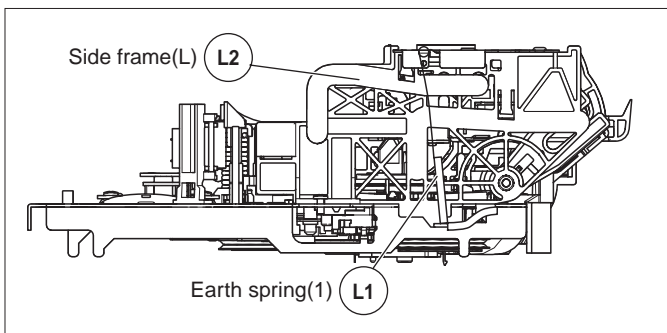


Fig. 2-1-4c

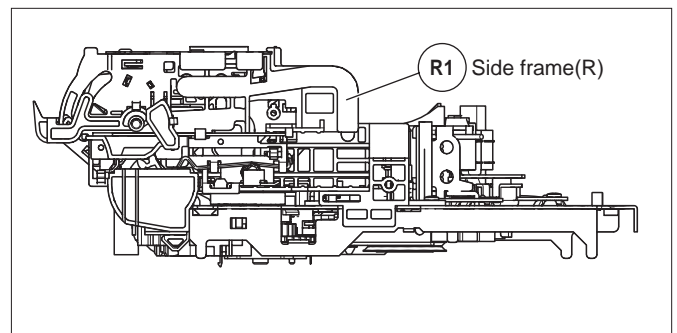


Fig. 2-1-4d

2.1.5 Disassembling procedure table

This table shows the order of parts removal when replacing each part. For replacement, remove the parts in the order of 1 to 13 shown in the table and install the parts in the reverse order.

The symbol number before each part name shows the number in the figure "Layout of the main mechanism parts". T and B on the right of each part name show the side from which the part should be removed (T: From the front of the mechanism, B: From the rear of the mechanism, T/B: From both sides).

Symbols and numbers					L1	-	-	L2	-	R1	T6	T12	T11	T4	T10	T16	T15	B12	B11	B13	B9	B10	B2	B4	B3	B1	B5	B8	B15	
Symbols and numbers	Removal parts		Front(T)/Back(B) of mechanism	Number of removal steps	Earth spring (1)	Top frame	Cassette holder	Side frame (L)	Drive arm	Side frame (R)	Lid guide	Idler arm	Idler gear 1/2	Main brake (T)	Reel disk (T)	Tension arm	Tension arm base	Press lever	Control cam	Capstan brake assy	Loading motor assy	Belt	Fixing plate	Load gear	Loading gear assy (S)	Loading gear assy (T)	Control plate	Clutch unit	Direct gear	
	(Reference items)	Replacement parts																												
L1	2.1	Earth spring (1)	T	1																										
-	2.1	Top frame	T	2	1																									
-	2.1	Cassette holder	T	3	1	2																								
L2	2.1	Side frame (L)	T	3	1	2																								
-	2.1	Drive arm	T	5	1	2	3	4																						
R1	2.1	Side frame (R)	T	3	1	2																								
T3	2.2	A/C head	T	1																										
T17	-	FE head	T/B	1																										
T7	2.3	Guide arm assy	T	1																										
T6	2.3	Lid guide	T	1																										
T5	2.3	Pinch roller arm assy	T	2							1																			
T12	2.4	Idler arm	T	4	1	2	3																							
T11	2.4	Idler gear 1/2	T	5	1	2	3					4																		
T4	2.5	Main brake assy (T)	T	6	1	2	3					4	5																	
T10	2.5	Reel disk (T)	T	7	1	2	3					4	5	6																
T16	2.5	Tension arm	T	6	1	2	3					4	5																	
T13	2.5	Reel disk (S)	T	7	1	2	3					4	5			6														
T15	2.5	Tension arm base	T	7	1	2	3					4	5			6														
-	-	T-up head	T	8	1	2	3					4	5			6	7													
-	-	T-up lever	T	8	1	2	3					4	5			6	7													
T8	2.5	Brake lever	T	8	1	2	3					4	5	6	7															
T14	2.5	Rec safety lever	T	7	1	2	3	4	5	6																				
B12	2.6	Press lever	B	1																										
B11	2.6	Control cam	B	2														1												
B13	2.6	Capstan brake assy	B	3														1	2											
B9	2.6	Loading motor assy	B	4														1	2	3										
B10	2.7	Belt	B	1																										
B14	2.7	Capstan motor	T/B	2																		1								
-	-	Wire holder	T/B	1																										
B2	2.7	Fixing plate	B	1																										
B4	2.7	Load gear	B	2																			1							
B3	2.7	Loading gear assy(S)	B	3																			1	2						
B1	2.7	Loading gear assy(T)	B	4																			1	2	3					
T1	-	Pole base assy(S)	T/B	4																			1	2	3					
T2	-	Pole base assy(T)	T/B	5																			1	2	3	4				
-	-	Load gear base	B	5																			1	2	3	4				
B5	2.7	Control plate	B	6														1	2			3	4	5						
T9	-	Drive lever	T/B	10	1	2	3	4	5	6								7	8		9									
B8	2.8	Clutch unit	B	2																		1								
B15	2.8	Direct gear	B	3																		1							2	
B7	-	Change lever	T/B	6								1	2									3							4	5
B6	-	Tension arm lever	T/B	14	1	2	3					4	5			6	7	8	9			10	11	12			13			

2.2 Replacement of the main mechanism parts

2.2.1 Cassette holder

2.2.1.1 Removal

- (1) Remove the screws (a) and (b).
- (2) Hold up the top frame, cassette holder assembly, drive arm assembly and side frames (L/R) all together and remove them by releasing the hooks (a) and (b).

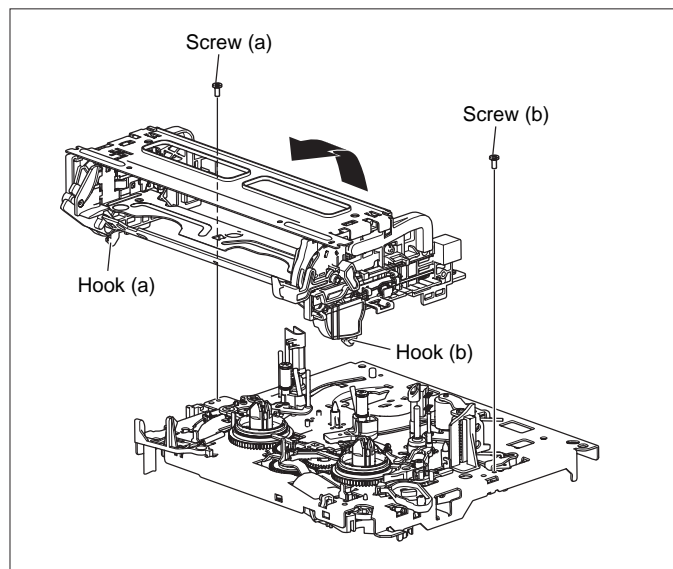


Fig. 2-2-1a

2.2.1.2 Installation (phase adjustment)

- (1) Turn gear (a) of the loading motor assembly so that the main deck connects to the guide hole (a) of the drive lever.
- (2) Hook the main deck to hooks (a) and (b).
- (3) Place the projection of the drive lever to section (a) of the side frame (R) and install the cassette holder to the main deck. Make sure that the bosses of the side frame (L/R) connect with the holes (a) and (b) of the main deck.
- (4) Secure screws (a) and (b).

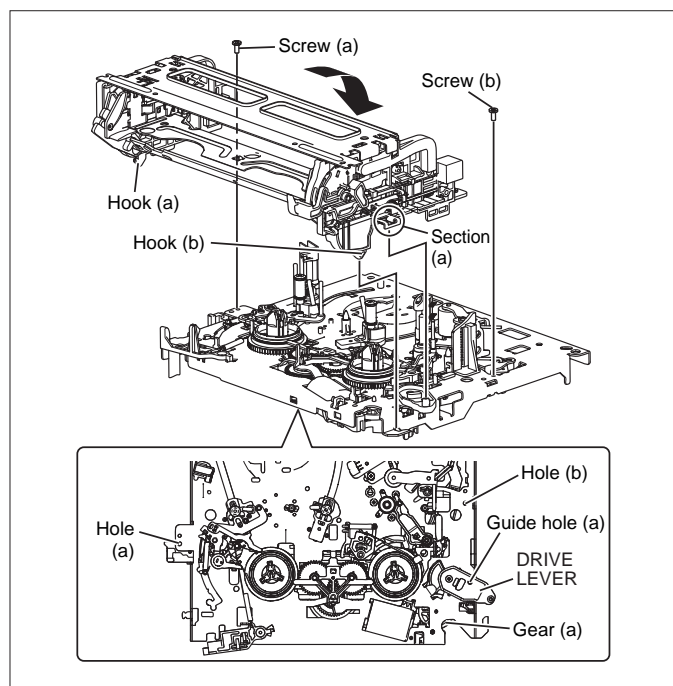


Fig. 2-2-1b

2.2.1.3 Disassembling

- (1) Release hook (a) to remove the earth spring (1) from the top frame.
- (2) Release the catches (a) and (b) and pull the top frame in the direction shown by the arrow (a) to remove it.
- (3) Pull out the side frame (R).
- (4) Pull out the cassette holder assembly and drive arm assembly from the side frame (L).

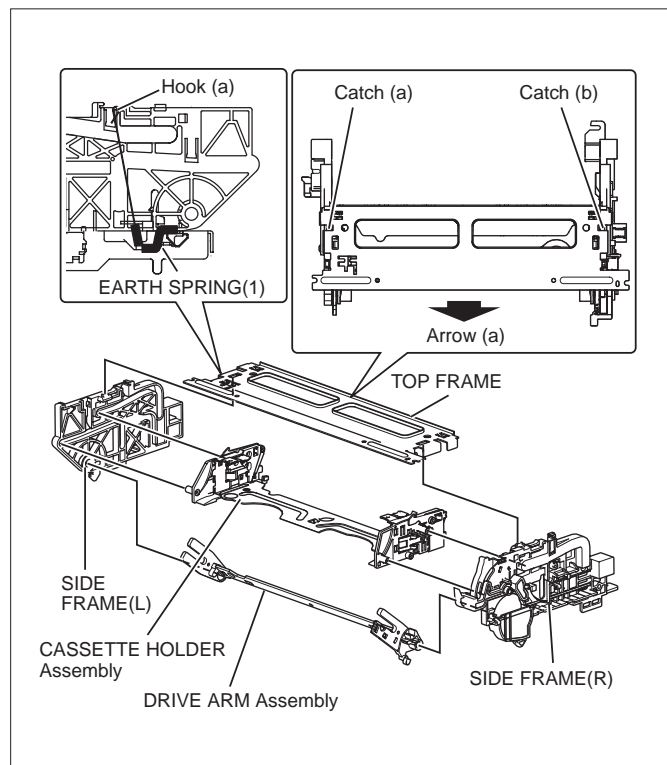


Fig. 2-2-1c

2.2.1.4 Assembling (installation and phase adjustment)

- (1) Turn gear (a) of the loading motor assembly so that the main deck connects to the guide hole (a) of the drive lever.
- (2) Place the projection of the drive lever on section (a) of the side frame (R) and install the side frame (R) to the main deck.
- (3) Secure screw (b).
- (4) Place section (b) of the drive arm on the gear of the side frame (R). Make sure that the pin of the door opener connects with section (c) of the drive arm.
- (5) Place the drive arm on section (d) of the side frame (L) and install the side frame (L) on the main deck. Be sure to connect the earth spring (1) to the side frame (L).
- (6) Secure screw (a).
- (7) Turn gear (a) of the loading motor assembly until the drive arm is vertical.
- (8) Place the slit of the side frame (L/R) at the foot of the cassette holder assembly and install the cassette holder.
- (9) Place the top frame on the position guide (a) of the side frame (L/R) and push it in the direction shown by the arrow (a) for installation.
- (10) Hook the earth spring (1) to the hook (a) of the top frame.

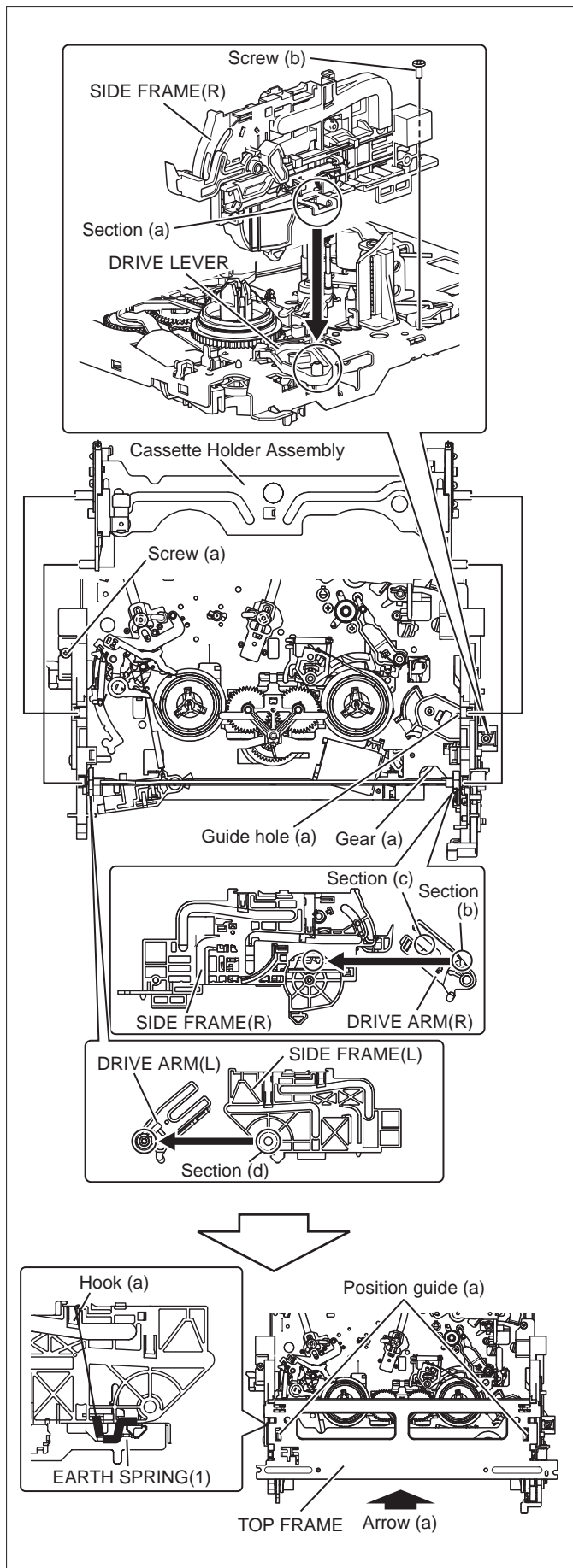


Fig. 2-2-1d

2.2.2 A/C head

2.2.2.1 Removal

- (1) Remove screws (a) and (b).
- (2) Remove the A/C head together with the head base.
- (3) Remove the screws (c), (d) and (e) to remove the spring (a) and the A/C head from the Head base.

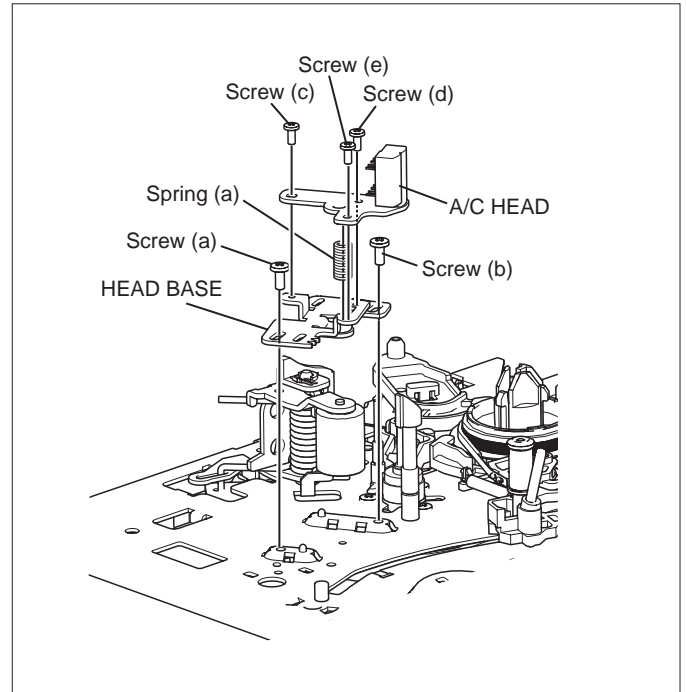


Fig. 2-2-2a

2.2.2.2 Installation (initial setting)

To install the A/C head to the head base, secure the screws in the order of (c), (d) and (e). To make the adjustment easy, temporarily elevate the A/C head.

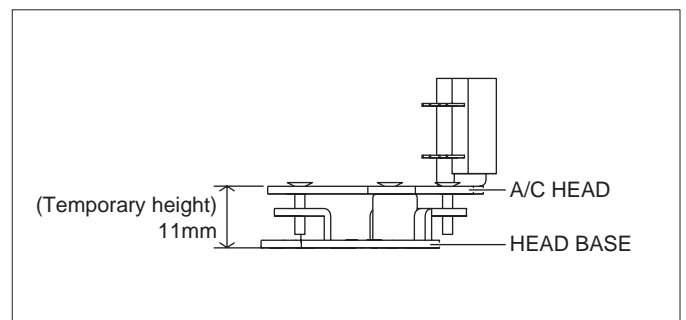


Fig. 2-2-2b

2.2.3 Guide arm, pinch roller arm

2.2.3.1 Removal

- (1) Remove the spring (a) from the hook (a) and detach the guide arm assembly.
- (2) Release the catch (a) to remove the lid guide.
- (3) Remove the spring (b) from the hook (b) and detach the pinch roller arm assembly.

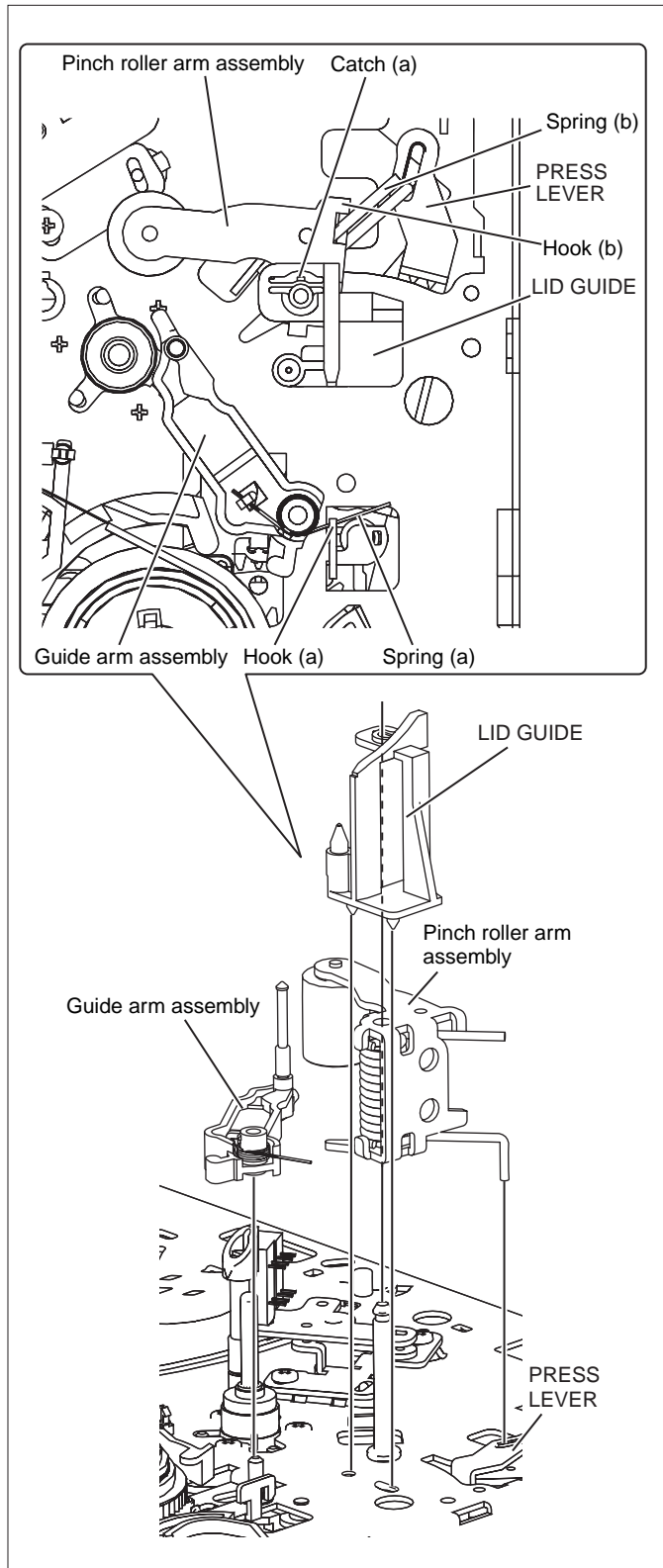


Fig. 2-2-3a

2.2.4 Idler arm, idler gear 1/2

2.2.4.1 Removal

- (1) Release the catches (a) and (b) to detach the idler arm.
- (2) Detach the idler gear 1/2.

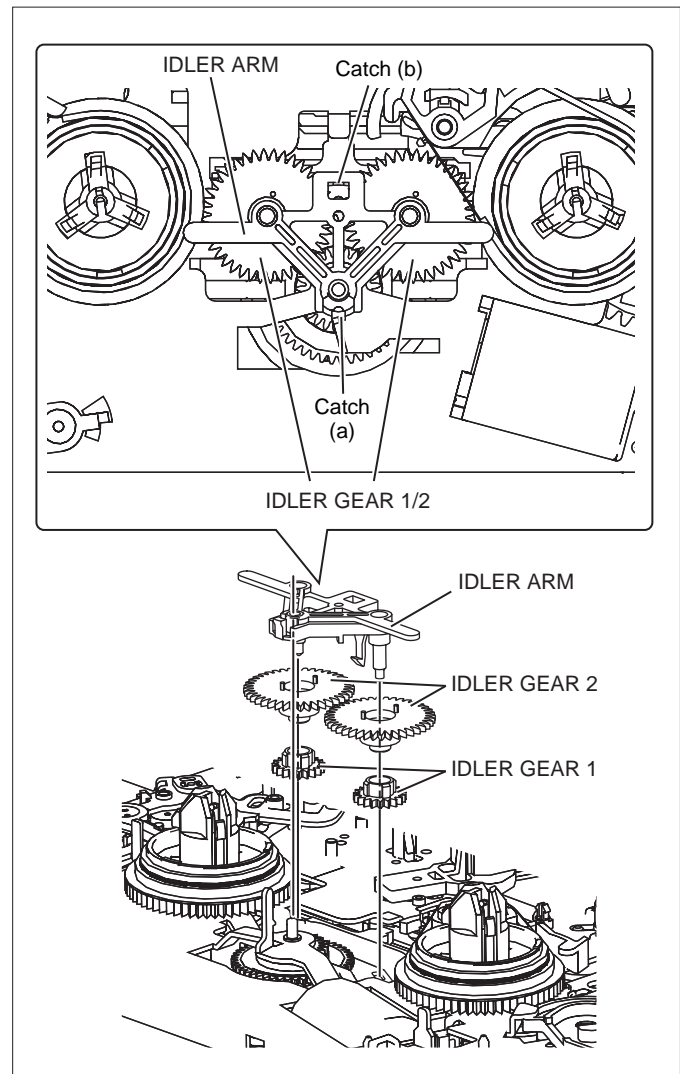


Fig. 2-2-4a

2.2.5 Main brake (T), brake lever, tension arm, reel disk (S/T), Rec safety lever

2.2.5.1 Removal

- (1) Remove the spring (a). (Detach section (b) of the spring (a).)
- (2) Release the catch (a) to detach the main brake (T).
- (3) Release the catch (b) to detach the reel disk (T) and the spacer.
- (4) Lift up and turn section (b) of the brake lever counterclockwise to remove the brake lever.
- (5) Remove the spring (b) from the hook (a).
- (6) Release the catch (c) to detach the tension arm.
- (7) Release the catch (d) to detach the reel disk (S) and the spacer.
- (8) Remove the spring (c) from the hook (b).
- (9) Turn the tension arm base in the direction shown by arrow (a) to release catch (e). Place the projections of the tension arm base to the holes (a) to detach the tension arm base.
- (10) While releasing the catch (f), turn the Rec safety lever counterclockwise to remove it.

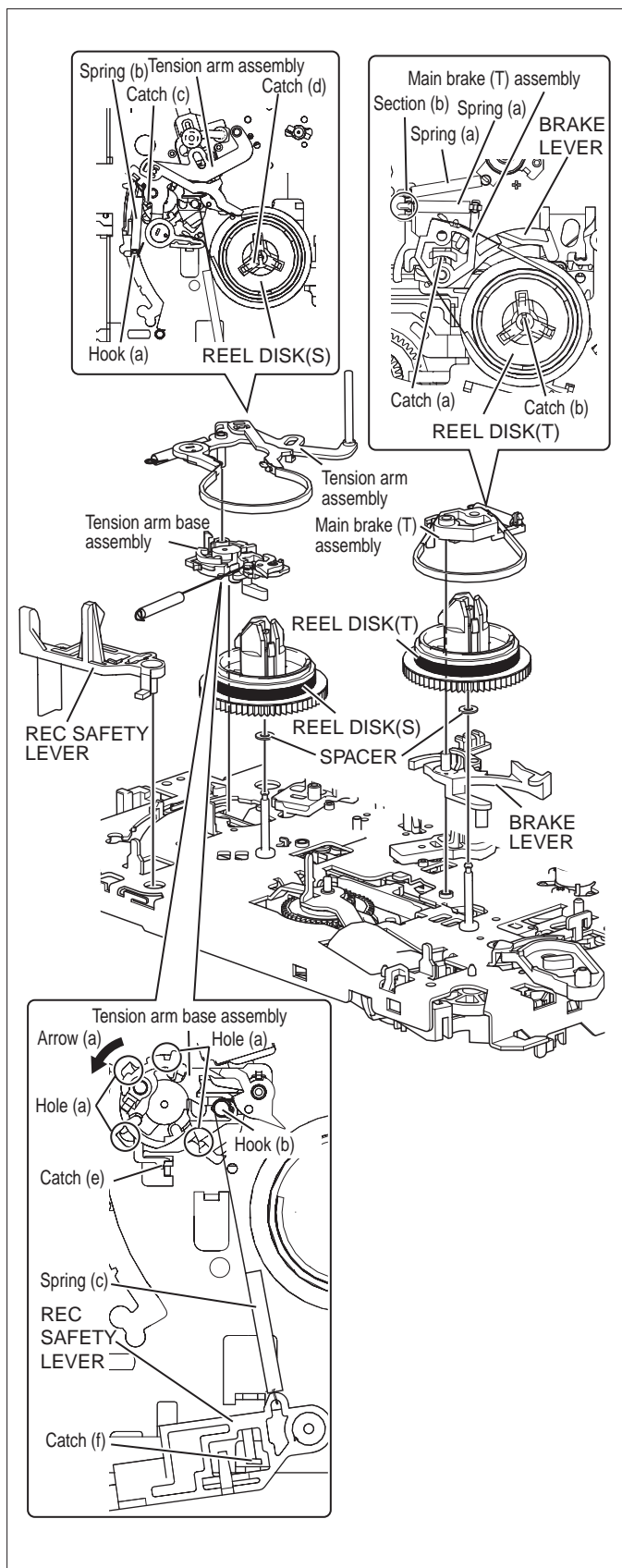


Fig. 2-2-5a

2.2.6 Press lever, control cam, capstan brake assembly, loading motor assembly

2.2.6.1 Removal

- (1) Remove the slit washer (a) to detach the press lever.
- (2) Release the slit washer (b) to detach the control cam.
- (3) Release the catch (b) to detach the capstan brake assembly.
- (4) Remove the solder (a).
- (5) Remove the screw (a).
- (6) Release the catches (c) and (d) to detach the loading motor assembly.

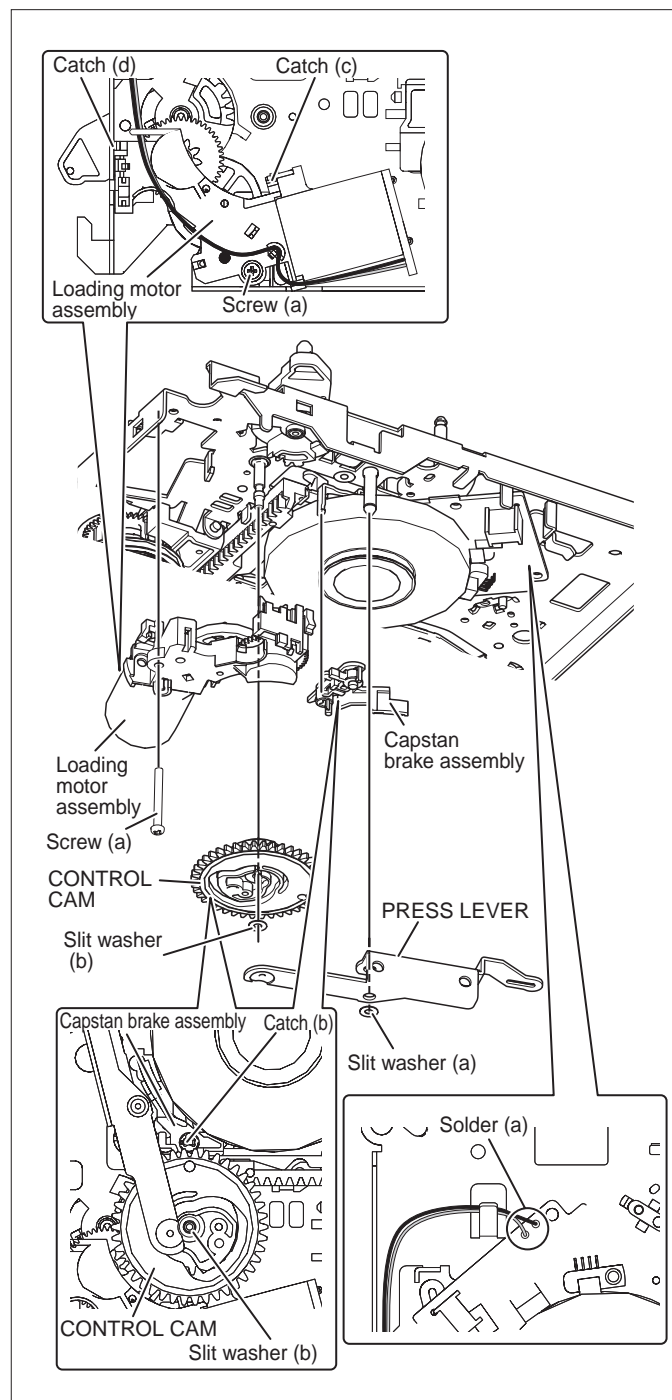


Fig. 2-2-6a

2.2.6.2 Installation (phase adjustment)

- (1) Attach the loading motor assembly to the main deck.
- (2) Secure the screw (a).
- (3) Solder the wire to section (a).
- (4) Arrange the wire along with the position guide (b).
- (5) Attach the capstan brake assembly to the main deck.
- (6) Place the main deck on the guide hole (a) of the control plate.
- (7) Place the main deck on the guide hole (b) of the drive lever.
- (8) Place the main deck no guide hole (c) of the control cam to install the control cam.
- (9) Move the capstan brake in the direction shown by the arrow (a) to attach the press lever to the shaft (a). Make sure that the boss of the press lever fits in the control cam, and that the shaft (b) of the pinch roller arm assembly connects with the hole of the press lever.
- (10) Attach slit washer (a) to shaft (a).

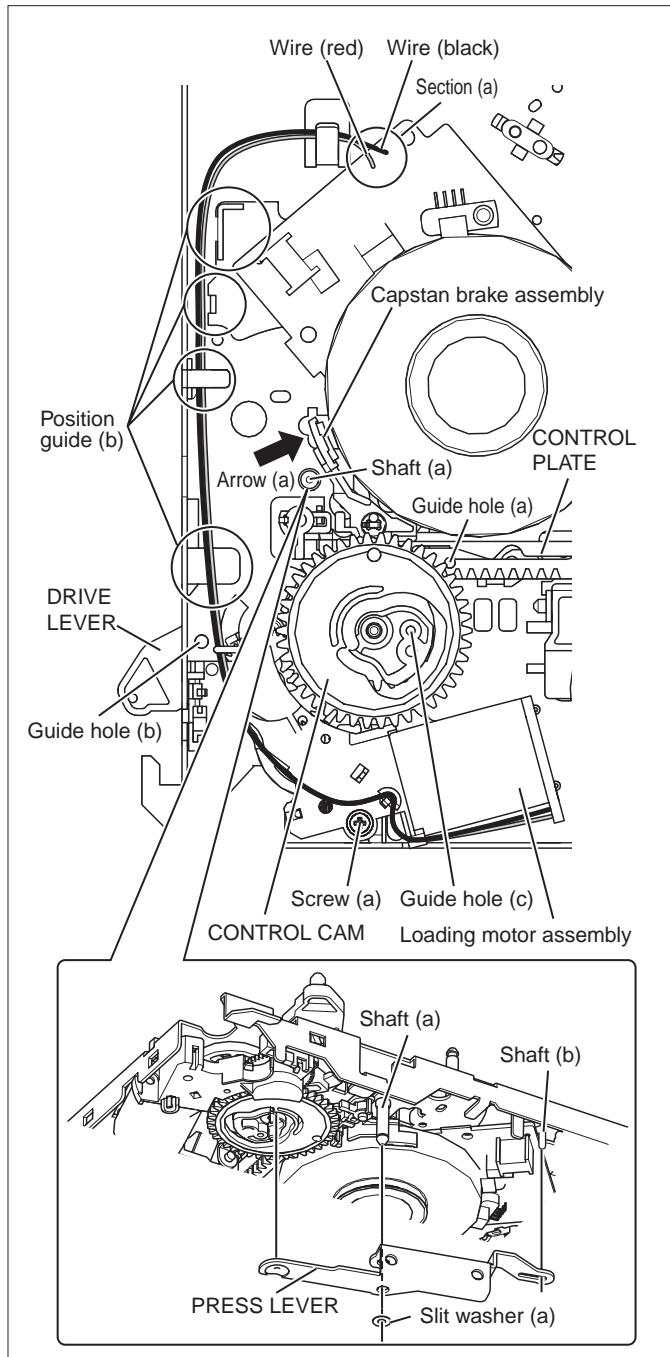


Fig. 2-2-6b

Note:

- When replacing the worm bearing of the loading motor assembly, attach it according to the following specification. If worm bearing is not attached correctly, a mechanism noise may occur. (See Fig. 2-2-6c)

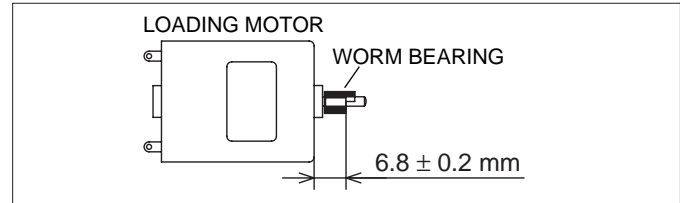


Fig. 2-2-6c

2.2.7 Capstan motor, load gear, control plate

2.2.7.1 Removal

- (1) Detach the belt.
- (2) Check that the FFC connector on the drum is disconnected.
- (3) Release the catch (a) to remove the FFC wire.
- (4) Remove the screws (a) to detach the capstan motor.
- (5) Remove the screws (b) to detach the fixing plate.
- (6) Release the catch (b) to detach the load gear.
- (7) Turn the load gear (S/T) in the loading direction to detach it.
- (8) Remove the control plate.

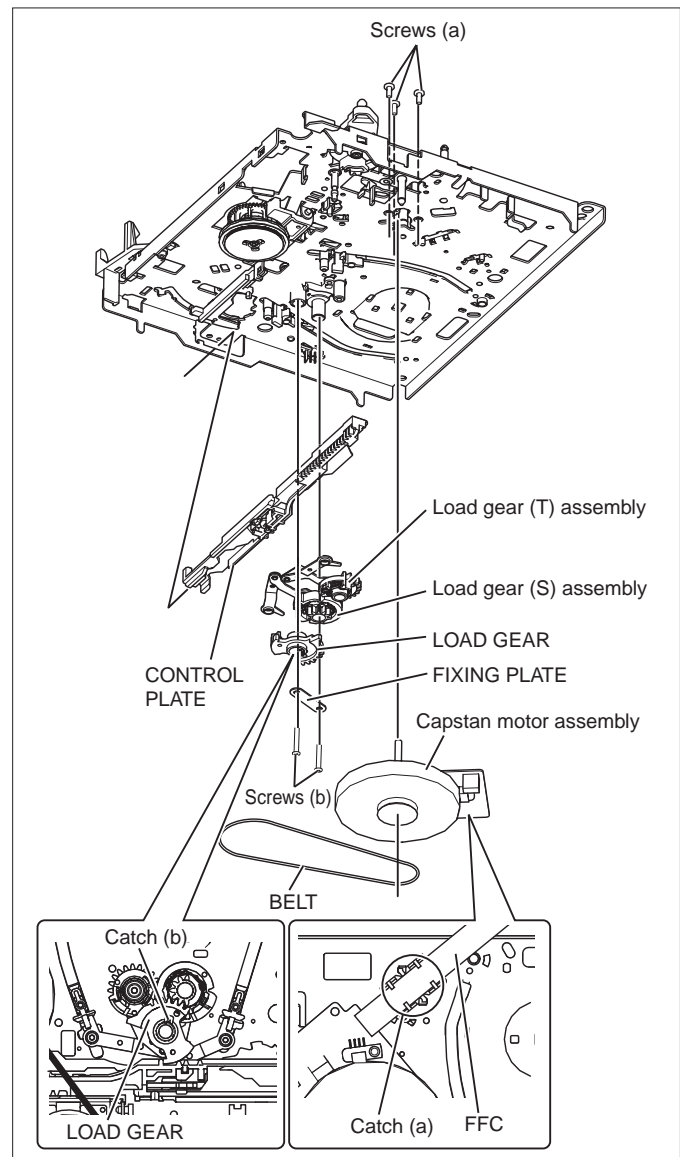


Fig. 2-2-7a

2.2.7.2 Installation (phase adjustment)

- (1) Place the main deck on the guide hole (a) of the tension arm lever.
- (2) Place the main deck on the guide hole (b) of the brake lever.
- (3) Attach the control plate to align with the position guide (a).
- (4) Place the hole (c) of the load arm (T) on the pole base (T) and the load gear (T) on the load gear base.
- (5) Place the hole (d) of the load arm (S) on the pole base (S) and the load gear (S) on the load gear base. Be sure to align the guide mark (e) of the load gear (T) to that of the load gear (S).
- (6) Turn the load gear (S/T) in the unloading direction to place the main deck on the guide hole (f) of the load gear (T).
- (7) Place the main deck on the guide hole (g) of the control plate.
- (8) Attach the load gear on the load gear base so that the control plate is placed on the edge (h) of the load gear.
- (9) Place the fixing plate on the shaft of the load gear base and secure the screws (b).

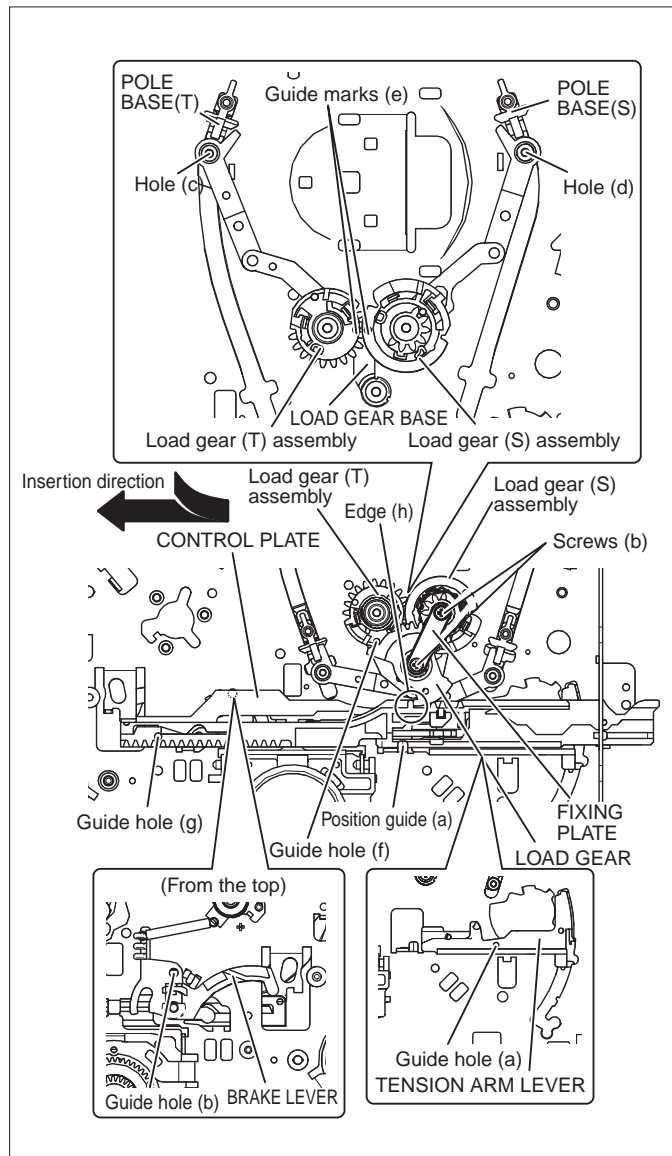


Fig. 2-2-7b

2.2.8 Clutch unit assembly, direct gear

2.2.8.1 Removal

- (1) Remove the slit washer (a) to detach the clutch unit assembly.
- (2) Remove the spring (a) and the direct gear.

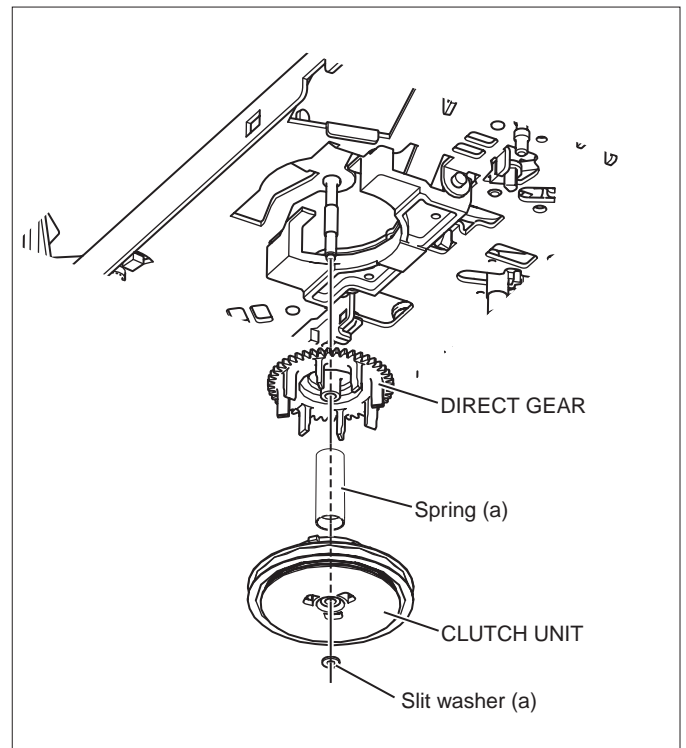
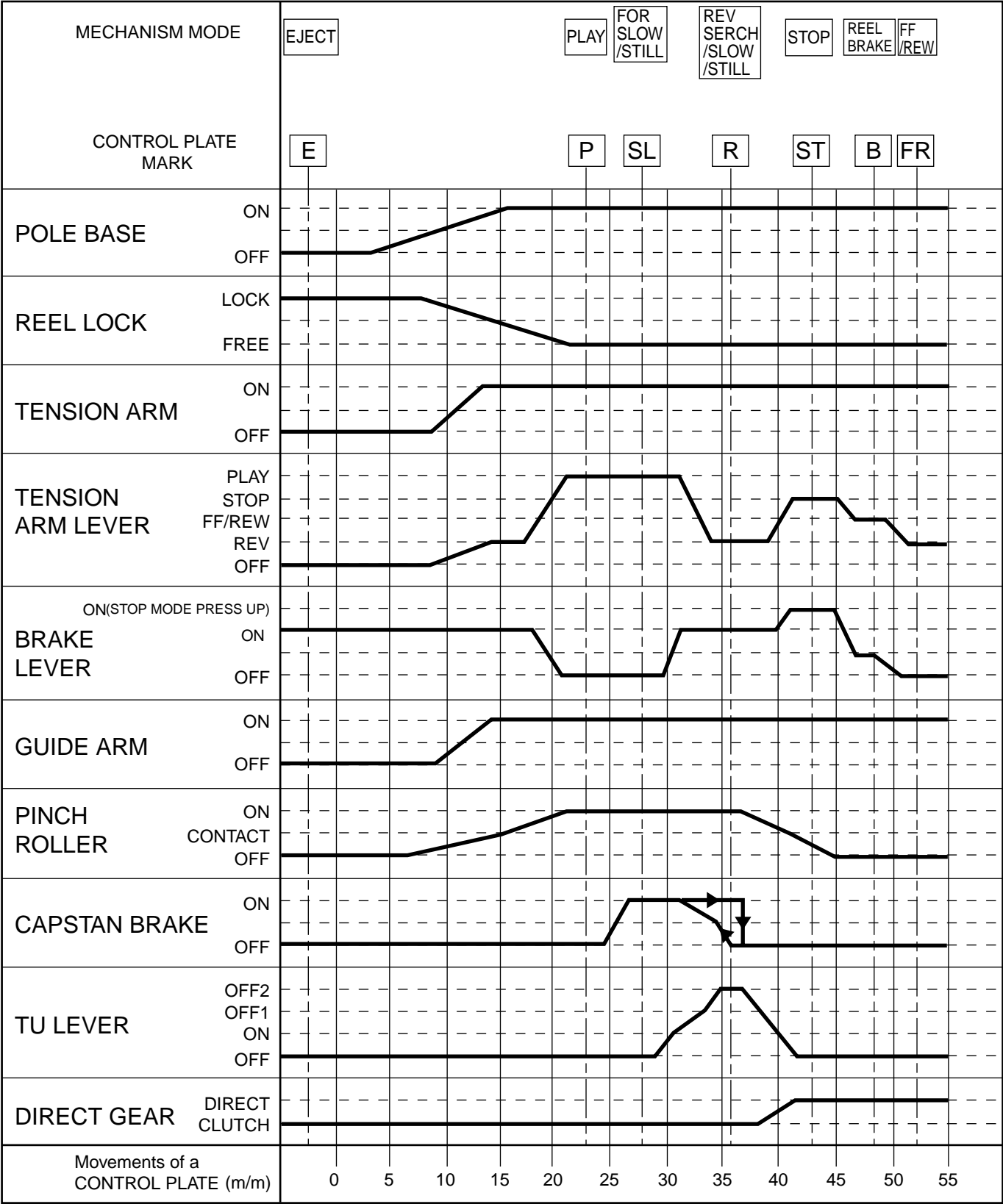


Fig. 2-2-8a

2.3 Mechanism timing chart



SECTION 3 ADJUSTMENT

3.1 Before adjustment

3.1.1 Precaution

- The adjustments of this unit include the mechanism compatibility and electrical adjustments. During the performance of this work, be sure to observe the precautions for each type of adjustment.
- If there is a reference to a signal input method in the signal column of the adjustment chart, "Ext. S-input" means the Y/C separated video signal and "Ext. input" means the composite video signal input.
- Unless otherwise specified, all measuring points and adjustment parts are located on the Main board.

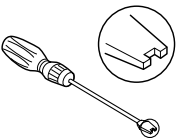
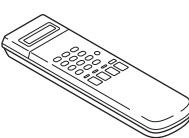
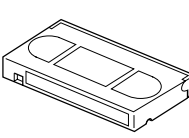
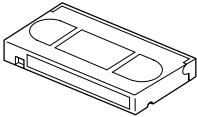
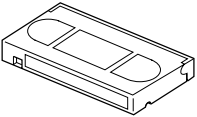
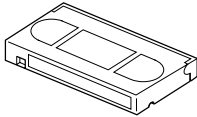
3.1.2 Required test equipments

- Color (colour) television or monitor
- Oscilloscope: wide-band, dual-trace, triggered delayed sweep
- Signal generator: RF / IF sweep / marker
- Signal generator: staircase, color (colour) bar [PAL/SECAM]
- Recording tape
- Digit-key remote controller(provided)

3.1.3 Required adjustment tools

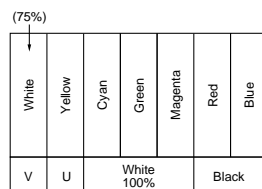
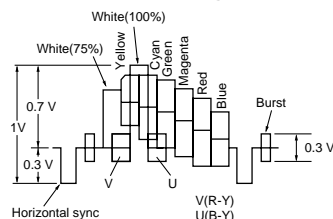
	Machanism compatibility adjustment	Electrical adjustment
Roller driver	○	—
Jig RCU	—	○
Back tension cassette gauge	○	—
Alignment tape(MHPE)	○	○
Alignment tape(MHPE-L)	○	○

○ : Used — : Not used

Roller driver PTU94002	Jig RCU PTU94023B	Back tension cassette gauge PUJ48076-2
		
Alignment tape (SP, staircase, PAL) MHPE	Alignment tape (LP, staircase, PAL) MHPE-L	Alignment tape (EP, staircase, NTSC) MHP-L
		

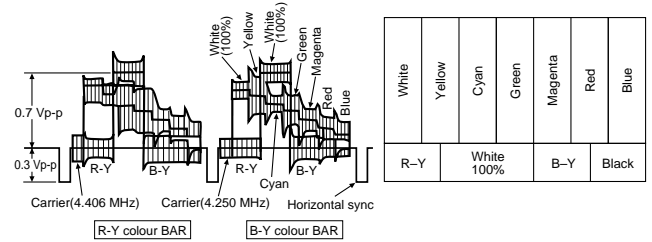
3.1.4 Color (colour) bar signal, color (colour) bar pattern

- Color(colour) bar signal [PAL]
- Color(colour) bar pattern [PAL]



- Colour bar signal [SECAM]

- Colour bar pattern [SECAM]



3.1.5 Switch settings

When adjusting this unit, set the VCR mode and switches as described below.

- When using the Jig RCU, it is required to set the VCR to the Jig RCU mode (the mode in which codes from the Jig RCU can be received). (See SECTION 1 DIS-ASSEMBLY.)

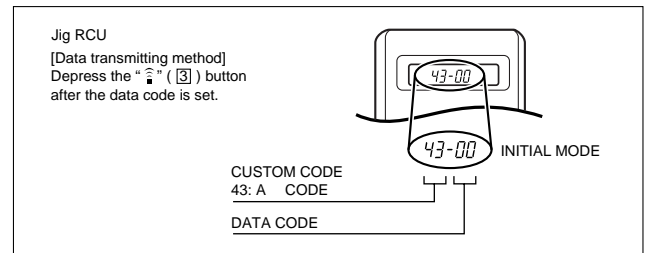


Fig. 3-1-4a Jig RCU [PTU94023B]

- Set the switches as shown below unless otherwise specified on the relevant adjustment chart. The switches that are not listed below can be set as desired. If the VCR is not equipped with the functions detailed below, setup is not required.

AUTO PICTURE/VIDEO CALIBRATION/ B.E.S.T./D.S.P.C.	OFF
PICTURE CONTROL/SMART PICTURE	NORMAL/NATURAL
VIDEO STABILIZER	OFF
TBC	ON
Digital 3R	ON
VIDEO NAVIGATION/TAPE MANAGER	OFF
BLUE BACK	OFF

3.1.6 Manual tracking mode (Auto tracking ON/OFF) setting

- (1) In order to set to the manual tracking mode during tape playback, press the "SP/EP(LP)" button on the remote control unit.

- Each press of the button switches the auto tracking ON or OFF.
- When the auto tracking is OFF, the monitor screen displays "AT: OFF".
- When the manual tracking mode is set, the tracking is placed at the center position.

- (2) Press "channel +/-" to adjust the tracking manually.

3.1.7 EVR adjustment

Some of the adjustments require the adjustment performed by the EVR system. The main unit have EEPROMs for storing the EVR adjustment data and user setups.

Notes:

- In the EVR adjustment mode, the value is varied with the channel buttons (+, -). The adjusted data is stored when the setting mode changes (from PB to STOP, when the tape speed is changed, etc.). Take care to identify the current mode of each adjustment item when making an adjustment.
- When changing the address setting in the EVR adjustment mode, use the Jig RCU or the remote controller having numeric keypad with which a numeric code can be directly input.
The remote control code of the Jig RCU corresponds to each of the digit keys on the remote controller as follows.

Digit-key	0	1	2	3	4	5	6	7	8	9
Code	20	21	22	23	24	25	26	27	28	29

- As the counter indication and remaining tape indication are not displayed FDP during the EVR adjustment mode, check them on the TV monitor screen.
- When performing the EVR adjustment, confirm that the FDP indication is changed to the EVR mode, as shown below.

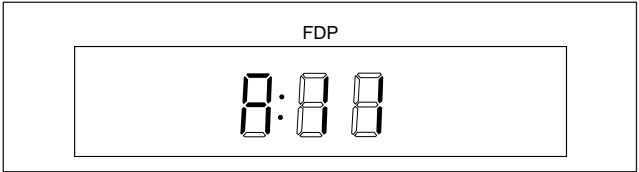


Fig. 3-1-7a EVR mode

3.2 Mechanism compatibility adjustment

Notes:

- Although compatibility adjustment is very important, it is not necessary to perform this as part of the normal servicing work. It will be required when you have replaced the A/C head, drum assembly or any part of the tape transport system.
- To prevent damaging the alignment tape in the compatibility adjustment, prepare a cassette tape (for self-recording/play-back), perform a test on it by transporting it and making sure that the tape is not bent by the tape transport mechanisms such as in the guide rollers.(See Fig.3-2-2a)

3.2.1 Tension pole position

Notes:

- This adjustment must be performed every time the tension band is replaced.

Signal	(A)	• Back tension cassette gauge [PUJ48076-2]
Mode	(B1) (B2)	• Play back position • Eject end
Adjustment part	(F)	• Adjust pin [Mechansim assembly]
Specified value	(G)	• 25 - 51 gf•cm (2.45 – 5 × 10 ⁻³ Nm)

- (1) Play back the back tension cassette gauge (A).
- (2) Check that the indicated value on the left side gauge is within the specified value (G).
- (3) If the indicated value is not within the specified value (G), perform the adjustment in a following procedure.(See Fig.3-2-1a.)
 - 1) Remove the top frame, cassette holder and side frames (L/R) all together. (See “section 2 mechanism”.)
 - 2) Rotate the loading motor gear to move the control plate so that the triangular stamping to the left of the “P” stamping is aligned with the stamping (a) on the main deck. This positioning is mode (B1).
 - 3) Adjust by turning the adjustment pin so that the tip of the tension arm is aligned with the stamping (b) on the main deck.
 - 4) Rotate the reel disk (S) by about one turn clockwise and make sure that the round hole of the adjustment pin is located in the “OK” range.
If it is outside this range, restart the adjustment from the beginning.

After completion of the adjustment, rotate the loading gear motor to return it to the mode (B2) position.

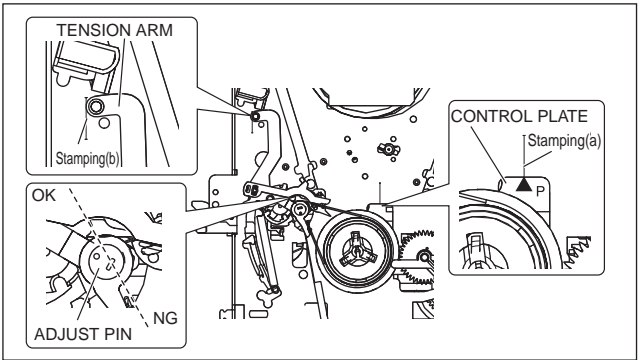


Fig. 3-2-1a

3.2.2 FM waveform linearity

Signal	(A1) (A2)	• Alignment tape(SP, staircase, PAL) [MHPE] • Alignment tape(LP, staircase, PAL) [MHPE-L]
Mode	(B)	• PB
Equipment	(C)	• Oscilloscope
Measuring point	(D)	• TP106 (PB. FM)
External trigger	(E)	• TP111 (D.FF)
Adjustment part	(F)	• Guide roller [Mechanism assembly]
Specified value	(G)	• Flat V.PB FM waveform
Adjustment tool	(H)	• Roller driver [PTU94002]

- Play back the alignment tape (A1).
- Apply the external trigger signal to D.FF (E), to observe the V.PB FM waveform at the measuring point (D).
- Set the VCR to the manual tracking mode.
- Make sure that there is no significant level drop of the V.PB FM waveform caused by the tracking operation, with its generally parallel and linear variation ensured. Perform the following adjustments when required. (See Fig. 3-2-2b.)
- Reduce the V.PB FM waveform by the tracking operation. If a drop in level is found on the left side, turn the guide roller of the pole base assembly (supply side) with the roller driver to make the V.PB FM waveform linear. If a drop in level is on the right side, likewise turn the guide roller of the pole base assembly (take-up side) with the roller driver to make it linear. (See Fig. 3-2-2b.)
- Make sure that the V.PB FM waveform varies in parallel and linearly with the tracking operation again. When required, perform fine-adjustment of the guide roller of the pole base assembly (supply or take-up side).
- Unload the cassette tape once, play back the alignment tape (A1) again and confirm the V.PB FM waveform.
- After adjustment, confirm that the tape wrinkling does not occur at the roller upper or lower limits. (See Fig. 3-2-2a.)

[Perform adjustment step (9) only for the models equipped with SP mode and EP (or LP) mode.]

- Repeat steps (1) to (8) by using the alignment tape (A2).

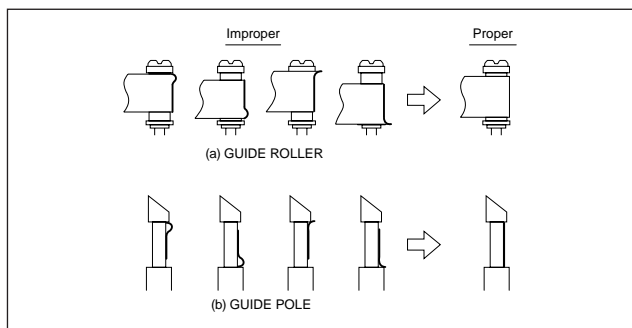


Fig. 3-2-2a

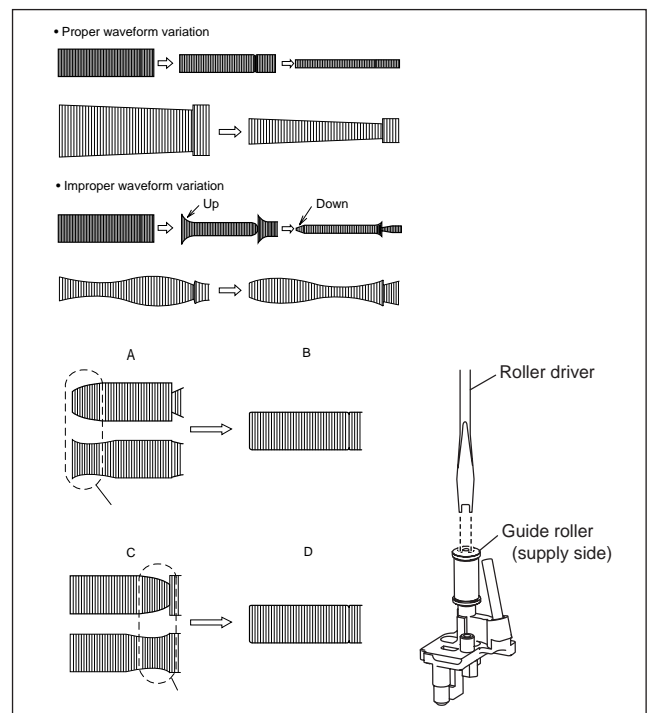


Fig. 3-2-2b

3.2.3 Height and tilt of the A/C head

Note:

- Set a temporary level of the height of the A/C head in advance to make the adjustment easier after the A/C head has been replaced. (See "section 2 mechanism".)

Signal	(A)	• Alignment tape(SP, staircase, PAL) [MHPE]
Mode	(B)	• PB
Equipment	(C)	• Oscilloscope
Measuring point	(D1) (D2)	• AUDIO OUT terminal • TP4001 (CTL. P)
External trigger	(E)	• TP111 (D.FF)
Adjustment part	(F)	• A/C head [Mechanism assembly]
Specified value	(G)	• Maximum waveform

- Play back the alignment tape (A).
- Apply the external trigger signal to D.FF (E), to observe the AUDIO OUT waveform and Control pulse waveform at the measuring points (D1) and (D2) in the ALT mode.
- Set the VCR to the manual tracking mode.
- Adjust the AUDIO OUT waveform and Control pulse waveform by turning the screws (1), (2) and (3) little by little until both waveforms reach maximum. The screw (1) and (3) are for adjustment of tilt and the screw (2) for azimuth.

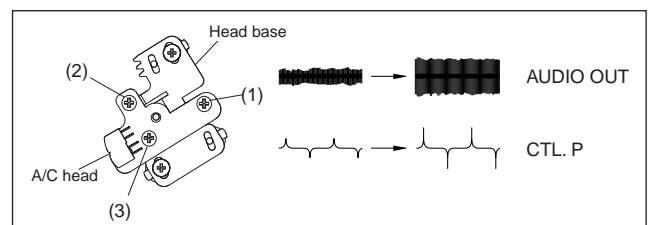


Fig. 3-2-3a

3.2.4 A/C head phase (X-value)

Signal	(A1) (A2)	<ul style="list-style-type: none"> • Alignment tape(SP, staircase, PAL) [MHPE] • Alignment tape(LP, staircase, PAL) [MHPE-L]
Mode	(B)	• PB
Equipment	(C)	• Oscilloscope
Measuring point	(D)	• TP106 (PB. FM)
External trigger	(E)	• TP111 (D.FF)
Adjustment part	(F)	• A/C head base [Mechanism assembly]
Specified value	(G)	• Maximum V.PB FM waveform
Adjustment tool	(H)	• Roller driver [PTU94002]

- (1) Play back the alignment tape (A1).
- (2) Apply the external trigger signal to D.FF (E), to observe the V.PB FM waveform at the measuring point (D).
- (3) Set the VCR to the manual tracking mode.
- (4) Loosen the screws (4) and (5), then set the Roller driver to the innermost projected part of the A/C head. (See Fig. 3-2-4a.)
- (5) Rotate the roller driver so that the A/C head comes closest to the capstan. From there, move the A/C head back gradually toward the drum until the point where the FM waveform is maximized for the second time, and then tighten the screws (4) and (5) temporarily.
- (6) Play an alignment tape (A2) and set to the manual-tracking mode.
- (7) Fine-adjust A/C head base position to maximize the FM waveform, and then tighten the screws (4) and (5) firmly.
- (8) Play alignment tapes (A1) and (A2) and confirm that the FM waveforms are maximized when the tracking is at the center position.

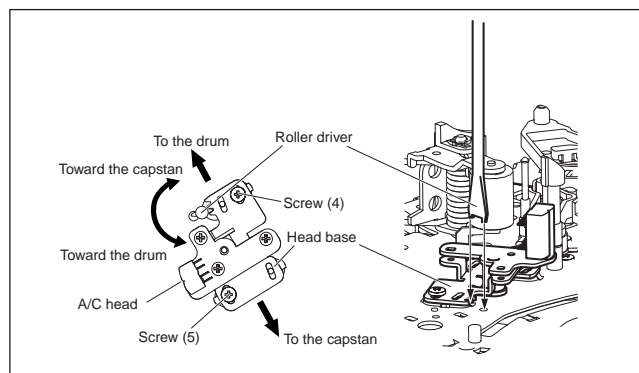


Fig. 3-2-4a

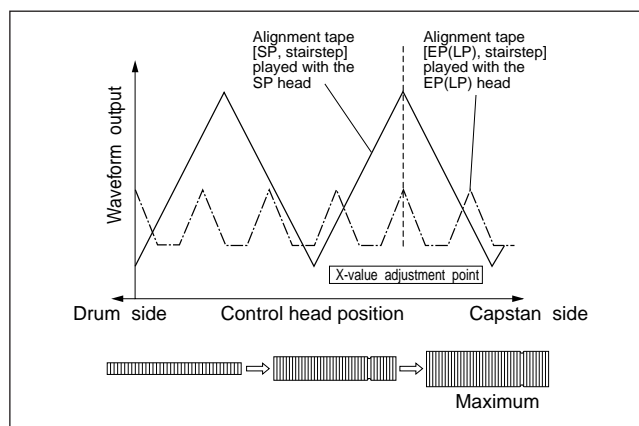


Fig. 3-2-4b

3.3 Electrical adjustment

Note:

The following adjustment procedures are not only necessary after replacement of consumable mechanical parts or board assemblies, but are also provided as references to be referred to when servicing the electrical circuitry. In case of trouble with the electrical circuitry, always begin a service by identifying the defective points by using the measuring instruments as described in the following electrical adjustment procedures. After this, proceed to the repair, replacement and/or adjustment. If the required measuring instruments are not available in the field, do not change the adjustment parts (variable resistor, etc.) carelessly.

3.3.1 Servo circuit

3.3.1.1 Switching point

Signal	(A1) (A2) (A3)	<ul style="list-style-type: none"> • Stairstep signal • Alignment tape (LP, staircase, PAL) [MHPE-L] • Alignment tape (EP, staircase, NTSC) [MHP-L]
Mode	(B)	<ul style="list-style-type: none"> • PB • TBC:OFF
Equipment	(C)	• Oscilloscope
Measuring point	(D1) (D2)	<ul style="list-style-type: none"> • VIDEO OUT terminal (75Ω terminated) • TP106 (PB. FM)
External trigger	(E)	• TP111 (D.FF)
Adjustment part	(F) (F1)	<ul style="list-style-type: none"> • Jig RCU: Code "5A" • Jig RCU: Code "51" or "52"
Specified value	(G) (G)	<ul style="list-style-type: none"> • 7.5 ±0.5 H • 8.0 ±0.5 H (PAL) • 7.5 ±0.5 H (NTSC)
Adjustment tool	(H)	• Jig RCU [PTU94023B]

[For the model without TBC function]

- (1) Play back the signal (A1) of the alignment tape (A2).
- (2) Apply the external trigger signal to D. FF (E) to observe the VIDEO OUT waveform and V. PB FM waveform at the measuring points (D1) and (D2).
- (3) Set the VCR to the manual tracking mode.
- (4) Adjust tracking so that the V. PB FM waveform becomes maximum.
- (5) Set the VCR to the Auto adjust mode by transmitting the code (F) from the Jig RCU. When the VCR enters the stop mode, the adjustment is completed.
- (6) If the VCR enters the eject mode, repeat steps (1) to (5) again.
- (7) Play back the alignment tape (A2) again, confirm that the switching point is the specified value (G).

[For the model equipped with TBC function]

Steps (1) to (4) are the same as previous steps (1) to (4).

- (5) Transmit the code (F1) from the Jig RCU to adjust so that the trigger point of the VIDEO OUT waveform is changed from the trailing edge of the V. sync signal becomes the specified value (G1).
- (6) Set the VCR to the stop mode or eject mode.
- (7) Play back the signal (A1) of the alignment tape (A3).
- (8) Repeat steps (2) to (6).

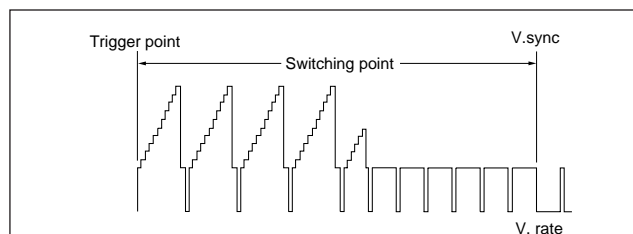


Fig. 3-3-1-1a Switching point

3.3.1.2 Slow tracking preset

Signal	(A1) (A2)	• Ext. input • Color (colour) bar signal [PAL]
Mode	(B1) (B2)	• VHS SP • VHS LP
Measuring point	(D)	• TV-Monitor
Adjustment part	(F)	• Jig RCU: Code "71" or "72"
Specified value	(G)	• minimum noise
Adjustment tool	(H)	• Jig RCU [PTU94023B]

- (1) Record the signal (A2) in the mode (B1), and play back the recorded signal.
- (2) Set the VCR to the manual tracking mode.
- (3) Set the VCR to the FWD slow (+1/6x) mode.
- (4) Transmit the code (F) from the Jig RCU to adjust so that the noise bar becomes the specified value (G) on the TV monitor in the slow mode.
- (5) Set the VCR to the Stop mode.
- (6) Confirm that the noise bar is (G) on the TV monitor in the slow mode.
- (7) Repeat steps (3) to (6) in the REV slow (−1/6x) mode.
- (8) Repeat steps (1) to (7) in the mode (B2).

Note:

- **For FWD slow (+1/6x) playback, transmit the code "08" from the Jig RCU to enter the slow playback mode, and transmit the code "D0" for REV slow (−1/6x) mode.**

3.3.2 Video circuit

3.3.2.1 EE Y/PB Y (S-VHS/VHS) level

Signal	(A1) (A2) (A3)	• Ext. S-input • Ext. input • Color (colour) bar signal [PAL]
Mode	(B1) (B2) (B3)	• EE SP • S-VHS SP • VHS SP
Equipment	(C)	• Oscilloscope
Measuring point	(D)	• Y OUT terminal (75Ω terminated)
EVR mode	(F1)	• Jig code "57"
EVR address	(F2) (F3) (F4)	• A : 11 • Jig code "21" twice • Jig code "18" or "19" (Channel +/-)
Specified value	(G)	• 1.00 ± 0.05 Vp-p
Adjustment tool	(H)	• Jig RCU [PTU94023B]

- (1) Input the signal (A3) from the input point (A1).
- (2) Set the VCR to the mode (B1).
- (3) Observe the Y OUT waveform at the measuring point (D).
- (4) Set the VCR to the EVR mode by transmitting the code (F1) from the Jig RCU.
- (5) Set the EVR address to (F2) by transmitting the code (F3) from the Jig RCU.
- (6) Transmit the code (F4) from the Jig RCU to adjust so that the Y level of the Y OUT waveform becomes the specified value (G).
- (7) Release the EVR mode of the VCR by transmitting the code (F1) from the Jig RCU again. (When the EVR mode is released, the adjusted data is memorized.)
- (8) Input the signal (A3) from the input point (A2).
- (9) Repeat steps (3) to (7) in the mode (B1).

- (10) Record the signal (A3) in the mode (B2), and play back the recorded signal.
- (11) Set the VCR to the manual tracking mode.
- (12) Repeat steps (3) to (7) in the mode (B2).
- (13) Record the signal (A3) in the mode (B3), and play back the recorded signal.
- (14) Set the VCR to the manual tracking mode.
- (15) Repeat steps (3) to (7) in the mode (B3).

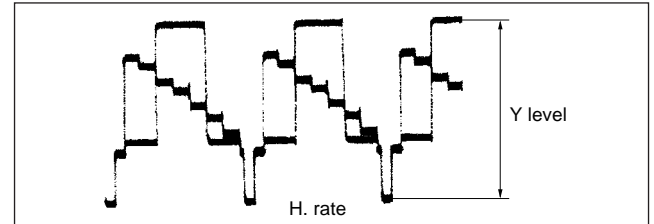


Fig. 3-3-2-1a EE/PB Y level

3.3.3 Audio circuit

Notes:

- **GND (Ground) should be taken from the Tuner shield case.**

3.3.3.1 Audio REC FM

Signal	(A1) (A2) (A3)	• Ext. input • Audio: No signal • Video: Color (colour) bar signal [PAL]
Mode	(B)	• S-VHS LP
Equipment	(C)	• Oscilloscope
Measuring point	(D)	• TP2253 (A. PB. FM)
External trigger	(E)	• TP111 (D.FF)
Adjustment part	(F)	• VR2251
Specified value	(G1) (G2)	• 600 ± 100 mVp-p • More than 400 mVp-p

- (1) Apply the external trigger signal to D.FF (E) to observe the Audio PB FM waveform at the measuring point (D).
- (2) Record the signal (A3) with no audio signal input in the mode (B), and play back the recorded signal.
- (3) Set the VCR to the manual tracking mode.
- (4) If the A.PB FM level is not within the specified value (G1), perform the adjustment in a following procedure.
- (5) Adjust the Adjustment part (F) so that the A. PB FM level of the higher channel level becomes the specified value (G1). (Adjust before recording, then confirm it by playing back.)
- (6) If the specified value (G1) is not obtained, adjust the Adjustment part (F) so that the waveform level of the lower channel level becomes the specified value (G2). (Adjust before recording, then confirm it by playing back.)

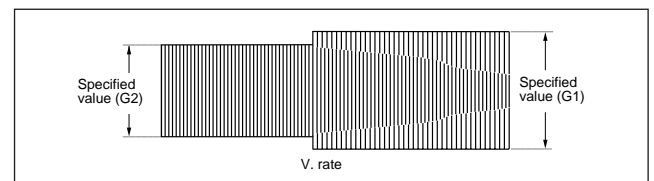


Fig. 3-3-3-1a Audio REC FM

3.3.4 Syscon circuit [EU/EK MODEL]

Note:

- When perform this adjustment, remove the Mechanism assembly.

3.3.4.1 Timer clock

Signal (A)	• No signal
Mode (B)	• EE
Equipment (C)	• Frequency counter
Measuring point (D1)	• IC3001 pin 61
Short point (D2)	• IC3001 pin 24
(D3)	• C3026 + and –
Adjustment part (F)	• C3025 (TIMER CLOCK)
Specified value (G)	• 1024.008 ± 0.001 Hz (976.5549 ± 0.0010 μ sec)

- (1) Connect the frequency counter to the measuring point (D1).
- (2) Connect the short wire between the short point (D2) and Vcc (5V).
- (3) Short the leads of capacitor (D3) once in order to reset the microprocessor of the SYSCON.
- (4) Disconnect the short wire between the short point (D2) and Vcc then connect it again.
- (5) Adjust the Adjustment part (F) so that the output frequency becomes the specified value (G).

3.3.5 PAL/SECAM converter circuit [MS MODEL]

Note:

- Unless otherwise specified in this P/S Converter circuit adjustments, all measuring points and adjustment parts are located on the S-P Converter board.

3.3.5.1 Colour difference level

Signal (A1)	• Color (colour) bar signal [SECAM]
Mode (B)	• EE
Equipment (C)	• Oscilloscope
Measuring point (D)	• CN1601 Pin 7
Adjustment part (F1)	• VR1602 (B-Y ADJ)
(F2)	• VR1601 (R-Y ADJ)
Specified value (G1)	• 460 ± 20 mVp-p (B-Y)
(G2)	• 620 ± 20 mVp-p (R-Y)

- (1) Observe the C (converted colour) waveform at the measuring point (D).
- (2) Adjust the adjustment part (F1) so that the higher level of the Yellow and Blue of the C waveform becomes the specified value (G1).
- (3) Adjust the adjustment part (F2) so that the higher level of the Green and Magenta of the C waveform becomes the specified value (G2).

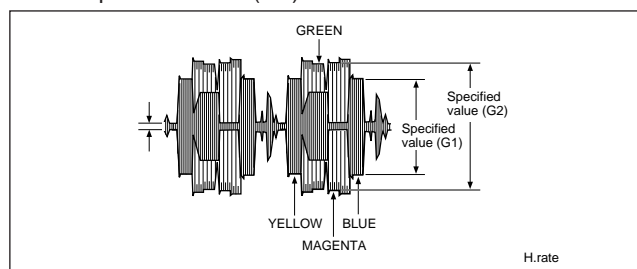


Fig. 3-5-1a Colour difference level

3.3.5.2 SECAM burst position

Signal (A1)	• Ext. input
(A2)	• Color (colour) bar signal [SECAM]
Mode (B)	• EE
Equipment (C)	• Oscilloscope
Measuring point (D1)	• CN1601 Pin 7
(D2)	• CN1601 Pin 3
Adjustment part (F)	• VR1603
Specified value (G)	• $Tr = 5.6 \pm 0.1$ μ sec

- (1) Observe the waveforms appeared at the measuring points (D1) and (D2).
- (2) Adjust the adjustment part (F) so that the waveforms timing width between the H-SYNC and the colour burst signal becomes the specified value (G).

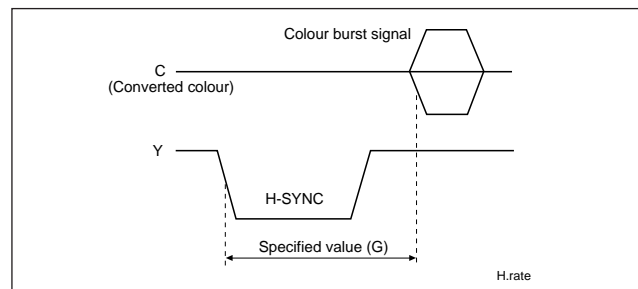


Fig. 3-5-2a PAL burst position



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