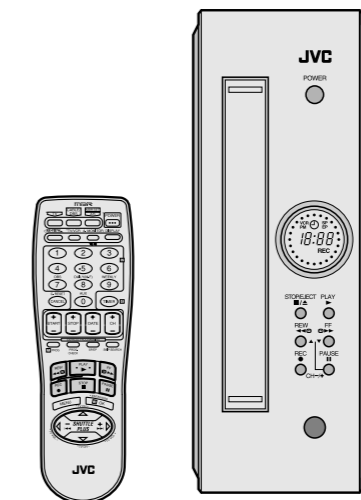


SERVICE MANUAL

VIDEO CASSETTE RECORDER

HR-FS1U



JVC SERVICE & ENGINEERING COMPANY OF AMERICA DIVISION OF JVC AMERICAS CORP.

Head office : 1700 Valley Road Wayne, New Jersey 07470-9976 (973)315-5000
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HR-FS1U

No. 82839

SPECIFICATIONS

GENERAL

Power requirement : AC 120 V ~ , 60 Hz
 Power consumption
 Power on : 19 W
 Power off : 1.8 W
 Temperature
 Operating : 5°C to 40°C (41°F to 104°F)
 Storage : -20°C to 60°C (-4°F to 140°F)
 Operating position : Horizontal or vertical
 Dimensions (W x H x D) : 275 mm x 100 mm x 275 mm
 (10-7/8" x 3-15/16" x 10-7/8")
 Weight : 3.6 kg (7.9 lbs)
 Format : VHS NTSC standard
 Maximum recording time
 SP : 210 min. with ST-210 video cassette
 EP : 630 min. with ST-210 video cassette

VIDEO/AUDIO

Signal system : NTSC-type color signal and EIA monochrome signal, 525 lines/60 fields
 Recording/Playback system : DA-4 (Double Azimuth) head helical scan system
 Signal-to-noise ratio : 45 dB
 Horizontal resolution : 230 lines
 Frequency range
 Normal audio : 70 Hz to 10,000 Hz
 Hi-Fi audio : 20 Hz to 20,000 Hz
 Input/Output : RCA connectors (IN x 1, OUT x 1)

TUNER

Tuning system : Frequency-synthesized tuner
 Channel coverage
 VHF : Channels 2-13
 UHF : Channels 14-69
 CATV : 113 Channels
 RF output : Channel 3 or 4 (switchable; preset to Channel 3 when shipped) 75 ohms, unbalanced

TIMER

Clock reference : Quartz
 Program capacity : 1-year programmable timer/8 programs
 Memory backup time : Approx. 10 min.

ACCESSORIES

Provided accessories : RF cable (F-type), Infrared remote control unit, "AA" battery x 2, Foot x 4, Wire clamp, Adhesive tape with two sides

Specifications shown are for SP mode unless specified otherwise.
 E. & O.E. Design and specifications subject to change without notice.

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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 \triangle 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.

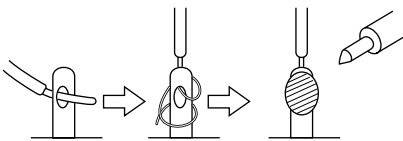


Fig.1

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.

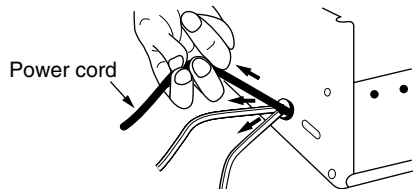


Fig.2

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.

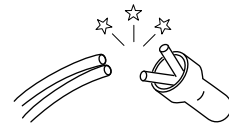
1) Connector part number : E03830-001

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).



cut close to connector

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.

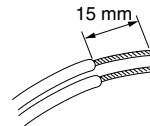


Fig.4

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

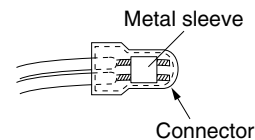


Fig.5

(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.

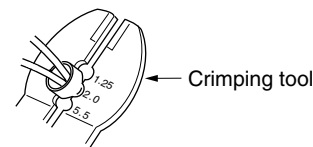


Fig.6

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

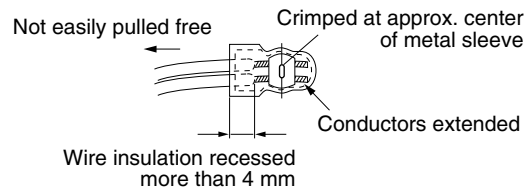


Fig.7

● 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

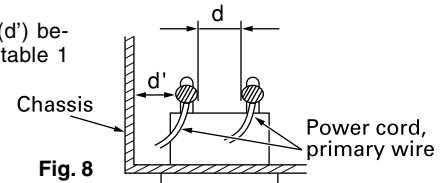
Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

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.



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.

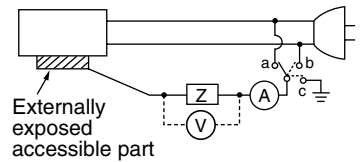


Fig. 9

5. Grounding (Class 1 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.

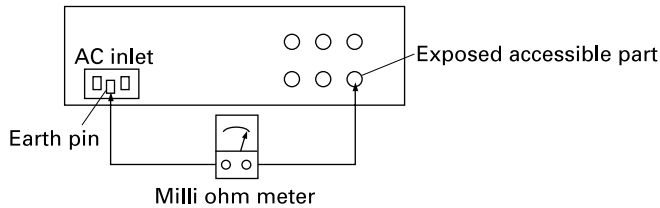


Fig. 10

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 200 to 240 V	Europe & Australia	$R \geq 10 \text{ M}\Omega/500 \text{ V DC}$	AC 3 kV 1 minute (Class II) AC 1.5 kV 1 minute (Class I)	$d \geq 4 \text{ mm}$ $d' \geq 8 \text{ mm}$ (Power cord) $d' \geq 6 \text{ mm}$ (Primary wire)

Table 1 Specifications for each region

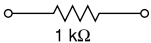
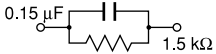
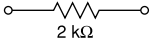
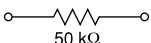
AC Line Voltage	Region	Load Z	Leakage Current (i)	a, b, c
100 V	Japan		$i \leq 1 \text{ mA rms}$	Exposed accessible parts
110 to 130 V	USA & Canada		$i \leq 0.5 \text{ mA rms}$	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe & Australia		$i \leq 0.7 \text{ mA peak}$ $i \leq 2 \text{ mA dc}$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

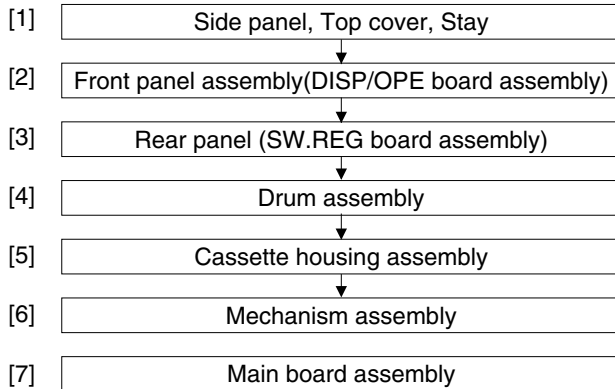
Table 2 Leakage current specifications for each region

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 Disassembly flow chart

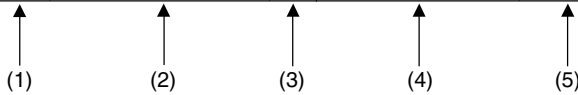
This flowchart lists the disassembling steps for the cabinet parts and P.C. boards in order to gain access to item(s) to be serviced. When reassembling, perform the step(s) in reverse order. Bend, route and dress the flat cables as they were originally laid.



1.2 How to read the disassembly and assembly

<Example>

Step/ Loc.No.	Part Name	Fig. No.	Point	Note
[1]	Top cover Bracket	D1	4(S1a),(S1b),3(L1a), 2(SD1a), (P1a), CN1(WR1a), 2(S1c)	<Note 1>



(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

1.3 Disassembly/assembly method

Step/ Loc.No.	Part Name	Fig. No.	Point	Note
[1]	Side panel, Top cover, Stay	D1	4(S1a), 4(S1b), 2(L1a), 2(L1b), 2(L1c), 2(L1d), 2(L1e)	
[2]	Front panel assembly (DISP/OPE board assembly)	D2	2(L2a), 3(L2b), CN3006(WR2) 5(S2)	<Note 2a> <Note 2b>
[3]	Rear panel (SW.REG board assembly)		(S3a), 3(L3a), CN5003(WR3) 2(L3b), Bushing, 3(S3b), (S3c)	<Note 3>
[4]	Drum assembly	D4	CN1(WR4a), CN1(WR4b), (S4a), (S4b), (S4c)	<Note 2a> <Note 4>
[5]	Cassette housing assembly	D5a, D5b	2(S5a), 2(S5b), 2(L5)	<Note 5>
[6]	Mechanism assembly	D6	CN1(WR6a), CN3003(WR6b), (WR6c), 2(S6), 2(L6)	<Note 2a> <Note 6>
[7]	Main board assembly	D7	(S7)	<Note 7>

<Note 2a>

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

<Note 2b>

- When reattaching the Front panel assembly, make sure that the door opener "a" of the Cassette housing assembly is lowered in position prior to the reinstallation.

<Note 3>

- When tightening the screw(S3c), tighten an earth plate together it.

<Note 4>

- When installing the Drum assembly, secure the screws (S4a to S4c) in the order of a , b , c .

<Note 5>

- When installing the Cassette housing assembly, make sure that the Control cam and the Main deck alignment holes are aligned. if they are not, rotate the Loading motor belt to the front align the holes.
- When installing the Cassette housing assembly, be careful not to damage the parts of the Main board and Mechanism assemblies.

<Note 6>

- When removing the Mechanism assembly only, unhook the two spacers connecting it with the Main board assembly with pliers from the back side of the Main board assembly first, and then remove the Mechanism assembly.
- When reattaching the Mechanism assembly to the Main board assembly, take care not to damage the sensors and switch on the Main board assembly.

<Note 7>

- When tightening the screw(S7), tighten an earth plate together it.

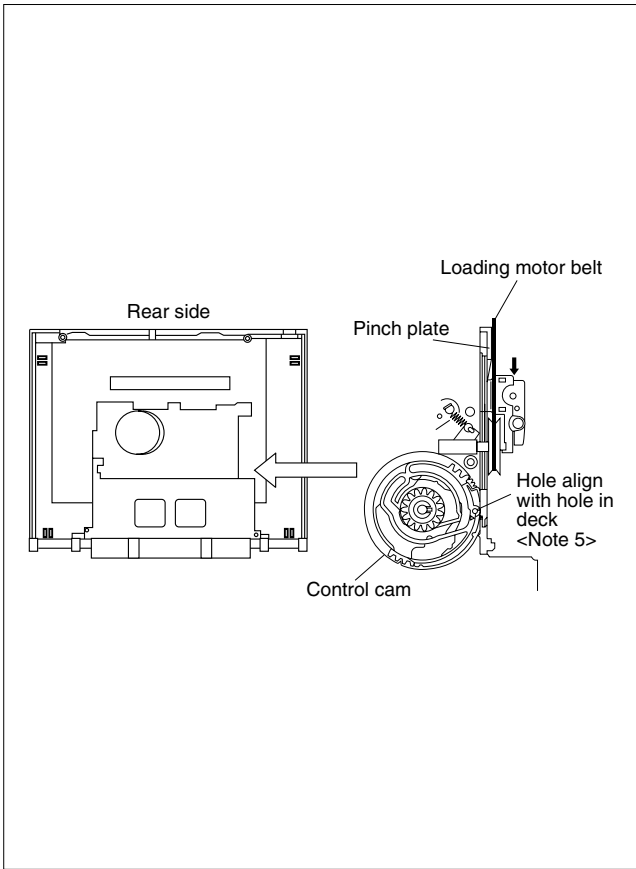


Fig. D5b

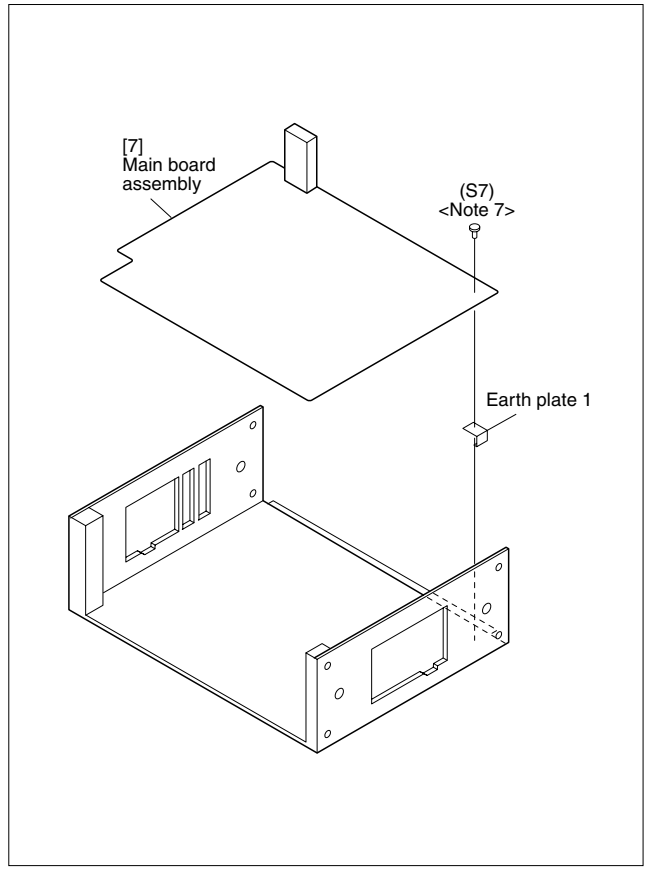


Fig. D7

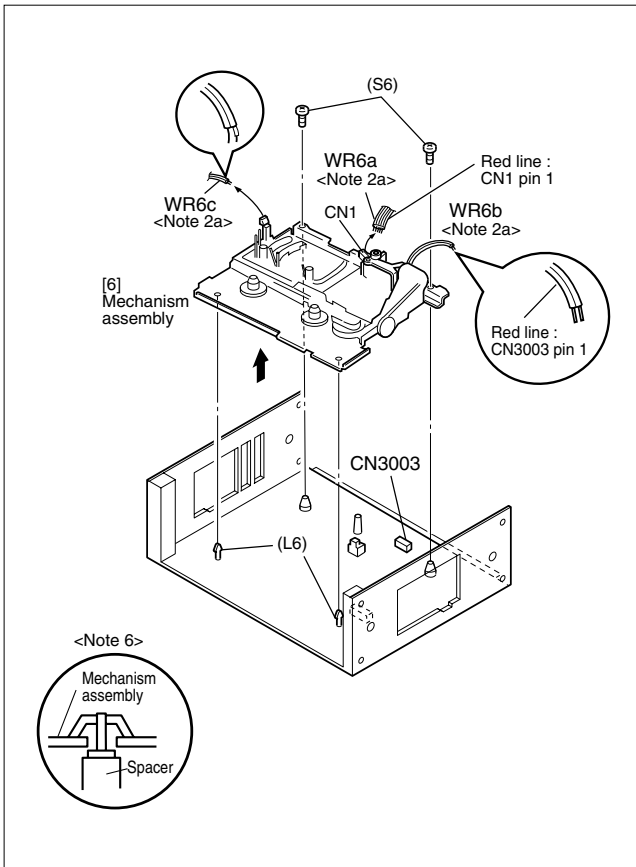


Fig. D6

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 disassembly of the major parts before removing the Drum assembly.
- (2) Remove the combined Cassette housing, Mechanism and Main board assemblies.
- (3) Connect the wires and connectors of the major parts that have been removed in step (1). (Refer to Fig. 1-4-1a.)
- (4) Place the combined Mechanism and Main board assemblies upside down.
- (5) 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 "1.3 Disassembly/assembly method".**
- **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 in-operative 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.**

1.5 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".

1.5.1 How to set the "Mechanism service mode"

- (1) Unplug the power cord plug from the power outlet.
- (2) Remove the Front panel assembly and Cassette housing assembly. (Take care not to pull the flat wire.)
- (3) Connect TP7001(MECHA TEST) and TP7002(MECHA TEST) on the DISP/OPE board assembly.
- (4) Insert the power cord plug into the power outlet.
- (5) Turn on the power. When the loading has completed, the mechanism enters the desired mode.

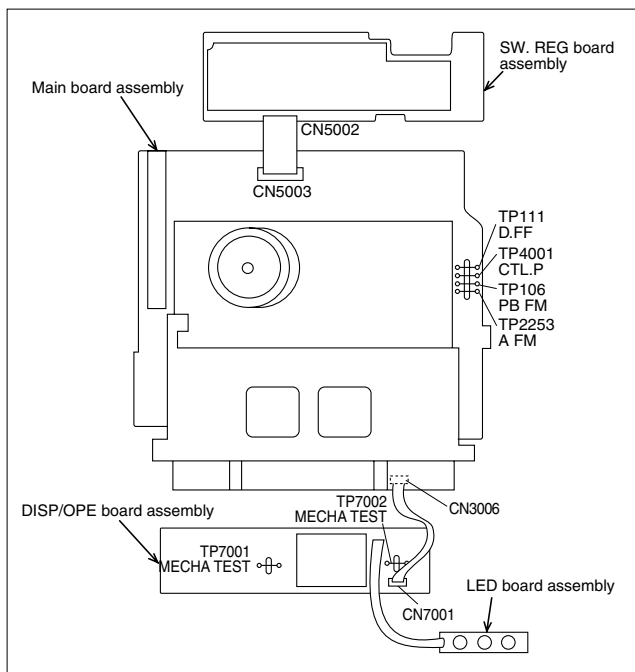
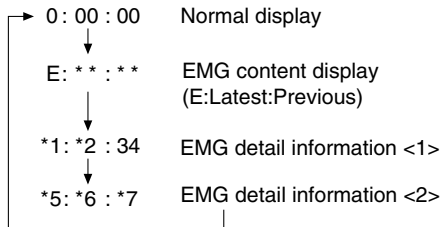


Fig. 1-4-1a

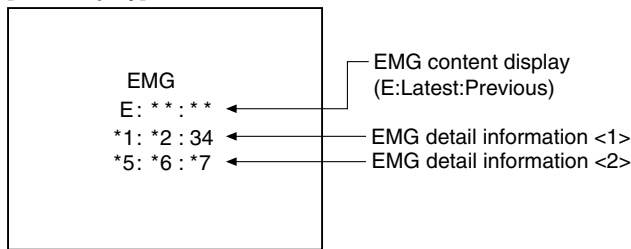
1.6 Emergency display function

This unit has a function for storing the history of the past two emergencies (EMG) and displaying them on each FDP (or OSD). With the status of the VCR and mechanism at the moment an emergency occurred can also be confirmed.

FDP display model [FDP display]



OSD display model [OSD display]



Notes:

- The EMG detail information <1><2> show the information on the latest EMG. It becomes “-- : -- : --” when there is no latest EMG record.
- When using the Jig RCU, set its custom code to match the custom code of the VCR.

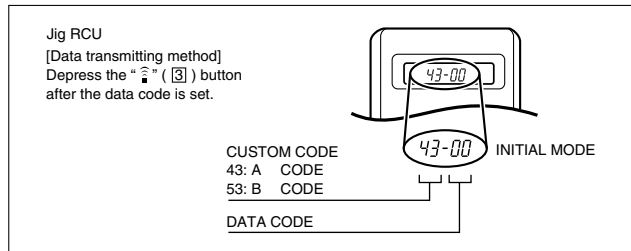
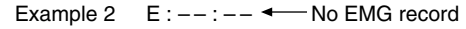
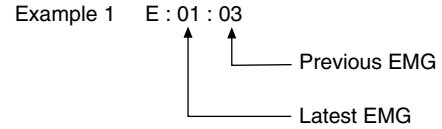


Fig. 1-6a Jig RCU [PTU94023B]

1.6.1 Displaying the EMG information

- (1) Transmit the code “59” from the Jig RCU.

The FDP shows the EMG content in the form of “E: * * : * *”.



Notes:

- For the OSD display model, all EMG information are showed by transmitting first code from the Jig RCU.
- For the EMG content, see “1.6.3 EMG content description”.

- (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

Note:

- For the EMG detail information <1>, see “1.6.4 EMG detail information <1>”.

- (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)

Note:

- For the EMG detail information <2>, see “1.6.5 EMG detail information <2>”.

- (4) Transmit the code “59” from the Jig RCU once again to reset the display.

1.6.2 Clearing the EMG history

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

1.6.3 EMG content description

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

FDP	CONTENT	CAUSE
E01: Loading 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 loading direction, [E:01] is identified and the power is turned off.	<ol style="list-style-type: none"> The mechanism is locked in the middle of mode transition. The mechanism is locked at the loading end due to the encoder position reading error during mode transition. Power is not supplied to the loading MDA.
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"> The mechanism is locked in the middle of mode transition. The mechanism is locked at the unloading end due to the encoder position reading error during mode transition. Power is not supplied to the loading MDA.
E03: Take Up Reel Pulse EMG	When 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. However, the reel EMG is not detected in STILL/SLOW modes.	<ol style="list-style-type: none"> 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"> The idler gear is not meshed with the take-up reel gear; The idler gear is meshed with the take-up reel gear, but incapable of winding due to too large mechanical load (abnormal tension); The take-up reel sensor does not output the FG pulse. The supply reel pulse is not generated in the REV transport modes (REV SEARCH/REW, etc.) because; <ol style="list-style-type: none"> The idler gear is not meshed with the supply reel gear. The idler gear is meshed with the supply reel gear, but incapable of winding due to too large a mechanical load (abnormal tension); The supply reel sensor does not output the FG pulse. Power is not supplied to the reel sensors.
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"> 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"> The tape tension is abnormally high; The tape is damaged or a foreign object (grease, etc.) adheres to the tape. The drum FG pulse did not reach the System controller CPU because; <ol style="list-style-type: none"> The signal circuit is disconnected in the middle; The FG pulse generator (hall device) of the drum is faulty. The drum control voltage (DRUM CTL V) is not supplied to the MDA. Power is not supplied to the drum MDA.
E05: Cassette Eject EMG	When the eject operation does not complete in 3 seconds after the start, [E:05] is identified, the pinch rollers are turned off and stopped, and the power is turned off. When the cassette insertion operation does not complete in 3 seconds after the start, the cassette is ejected. In addition, when the operation does not complete within 3 seconds after the start, [E:05] is also identified and the power is turned off immediately.	<ol style="list-style-type: none"> The cassette cannot be ejected due to a failure in the drive mechanism of the housing. 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. The sensor/switch for detecting the end of ejection are not functioning normally. The loading motor drive voltage is lower than specified or power is not supplied to the motor (MDA). 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 STILL/SLOW/FF/REW modes.	<ol style="list-style-type: none"> 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"> The tape tension is abnormally high (mechanical lock); The tape is damaged or a foreign object (grease, etc.) is adhered to the tape (occurrence of tape entangling, etc.). The capstan FG pulse did not reach the System controller CPU because; <ol style="list-style-type: none"> The signal circuit is disconnected in the middle; The FG pulse generator (MR device) of the capstans is faulty. The capstan control voltage (CAPSTAN CTL V) is not supplied to the MDA. Power is 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"> The SW 5 V power supply circuit is shorted with GND. 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"> The absolute value sensor is defective. (The soldered parts have separated.) The pull-up resistor at the absolute sensor output is defective. (The soldered parts have separated.) Contact failure or soldering failure of the pins of the connector (board-to-board) to the absolute value sensor. 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"> The FG sensor is defective. (The soldered parts have separated.) The pull-up resistor at the FG sensor output is defective. (The soldered parts have separated.) Contact failure or soldering failure of the pins of the connector (board-to-board) to the FG sensor. The power to the sensor is not supplied. (Connection failure/soldering failure) The FG pulse is not sent to the System Controller CPU. The tilt motor is defective. (The soldered parts have separated.) The drive power to the tilt motor is not supplied. (Connection failure/soldering failure) The tilt motor drive MDA - IC is defective. Auto-recovery of the DD tilting cannot take place due to overrun.
E0A: Supply Reel Pulse EMG	When 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). However, note that the reel EMG is not detected in the SLOW/STILL mode.	<ol style="list-style-type: none"> The supply reel pulse is not generated in the FWD transport mode (PLAY/FWD SEARCH/FF, etc.) because; <ol style="list-style-type: none"> PLAY/FWD or SEARCH/FF is started while the tape in the inserted cassette is cut in the middle; 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; The FG pulse output from the supply reel sensor is absent. The take-up reel pulse is not generated in the REV transport mode (REV SEARCH/REW, etc.). <ol style="list-style-type: none"> REV SEARCH/REW is started when the tape in the inserted cassette has been cut in the middle; 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; The FG pulse output from the take-up reel sensor is absent. The power to a reel sensor is not supplied.
EC1 or EU1: Head clog warning	<p>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:C1] or [E:U1] is identified and recorded in the emergency history. During the period in which a head clog is detected, the FDP and OSD repeat the "3-second warning display" and "7-second noise picture display" alternately.</p> <p>EMG code : "E:C1" or "E:U1" / FDP : "U:01" / OSD : "Try cleaning tape." or "Use cleaning cassette."</p> <p>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.</p>	

Table 1-6-3a

1.6.4 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 FDP (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*, HD* and M3*]

Display		Deck operation mode
MN*/M3*	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
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

[Common table of MN* and M3*]

Display		Mechanism operation mode
MN*	M3*	
00	00	Command standby (Status without executing command)
02	02	POWER OFF by EMG occurrence
04	04	Moving to the adjacent position in the LOAD direction
06	06	Moving to the adjacent position in the UNLOAD direction
08	08	Cassette ejection being executed / Cassette housing ejection being executed
-	0A	Mode transition to STOP with cassette ejection end
0A	0C	Cassette insertion being executed
0C	0E	Tape being loaded
0E	10	Tape being unloaded
10	12	Mode transition to STOP with pinch roller compression ON
12	14	Mode transition to STOP with pinch roller compression OFF
14	16	Mode transition to STOP with pinch roller compression OFF as a result of POWER OFF
16	18	Mode transition to STOP with pinch roller compression ON as a result of POWER ON
18	1A	Mode transition to PLAY
1A	1C	Mode transition to FWD SEARCH
1C	1E	Mode transition to REC
1E	20	Mode transition to FWD STILL / SLOW
20	22	Mode transition to REV STILL / SLOW
22	24	Mode transition to REV SEARCH
24	26	Mode transition from FF / REW to STOP
26	28	Mode transition to FF
28	2A	Mode transition to REW
2A	2C	4 sec. of REV as a result of END sensor going ON during loading
2C	2E	Short FF / REV as a result of END sensor going ON during unloading
2E	30	Mechanism position being corrected due to overrun
80	80	Mechanism in initial position (Dummy command)

[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
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)

3- : Mechanism sensor information
[Common table of MN*, HD* and M3*]

Display	Mechanism sensor information				
	MN* / HD* S-VHS SW	M3* CASS SW	REC safety SW	Start sensor	End sensor
0-	VHS	Cassette insertion	Tab broken	ON	ON
1-	VHS	Cassette insertion	Tab broken	ON	OFF
2-	VHS	Cassette insertion	Tab broken	OFF	ON
3-	VHS	Cassette insertion	Tab broken	OFF	OFF
4-	VHS	Cassette insertion	Tab present	ON	ON
5-	VHS	Cassette insertion	Tab present	ON	OFF
6-	VHS	Cassette insertion	Tab present	OFF	ON
7-	VHS	Cassette insertion	Tab present	OFF	OFF
8-	S-VHS	Cassette ejection	Tab broken	ON	ON
9-	S-VHS	Cassette ejection	Tab broken	ON	OFF
A-	S-VHS	Cassette ejection	Tab broken	OFF	ON
B-	S-VHS	Cassette ejection	Tab broken	OFF	OFF
C-	S-VHS	Cassette ejection	Tab present	ON	ON
D-	S-VHS	Cassette ejection	Tab present	ON	OFF
E-	S-VHS	Cassette ejection	Tab present	OFF	ON
F-	S-VHS	Cassette ejection	Tab present	OFF	OFF

-4 : Mechanism mode position
[Common table of MN*, HD* and M3*]

Display			Mechanism mode position
MN*	HD*	M3*	
-0	-7	-	Initial value
-1	-0	-	EJECT position
-	-	-0	EJECT position (Cassette housing drive mode)
-2	-7	-	Housing operating
-	-	-1	Between EJECT and U / L STOP
-3	-1	-2	U / L STOP position
-	-	-3	Guide arm drive position
-4	-7	-4	Tape being loaded / unloaded (When the pole base is located on the front side of the position just beside the drum)
-5	-2	-5	Tape being loaded / unloaded (When the pole base is located on the rear side of the position just beside the drum)
-6	-7	-6	Pole base compressed position
-7	-3	-F	FF / REW position
-8	-7	-F	Between FF / REW and STOP with pinch roller compression ON
-9	-4	-F	STOP with pinch roller compression OFF
-A	-7	-E	Between STOP with pinch roller compression OFF and REV
-B	-5	-	REV (REV STILL / SLOW) position
-	-	-D	REV position
-	-	-C	Between REV and REV STILL / SLOW
-	-	-B	REV STILL / SLOW position
-C	-7	-	Between REV and FWD
-	-	-A	Between REV STILL / SLOW and FWD STILL / SLOW
-D	-6	-	FWD (FWD STILL / SLOW) position
-	-	-9	FWD STILL / SLOW position
-E	-7	-	Between FWD and PLAY
-	-	-8	Between FWD STILL / SLOW and PLAY
-F	-6	-7	PLAY position

Note:

- In the case of the "HD*" microprocessor, as the display is always "-7" at any intermediate position between modes, the position of transitory EMG may sometimes not be located.

1.6.5 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 22 sections using a hex number from "00" to "15".

- "00" : End of winding
- "15" : Beginning of winding
- "FF" : Tape position not identified

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

Display	Cassette tape type <2>
00	Cassette type not identified
07	Small reel, thick tape T-5
08 - 0E	C cassette, thick tape TC-10
09 - 15	C cassette, thick tape TC-20P
0A - 0B	Small reel, thick tape T-20
0A - 16	C cassette, thin tape TC-30
0A - 16	C cassette, thin tape TC-40
0D - 0F	Small reel, thick tape T-40
11 - 14	Small reel, thick tape T-60
15 - 18	Small reel, thick tape T-80 / DF-160
17 - 1A	Small reel, thick tape T-90 / DF-180
19 - 1D	Small reel, thick tape T-100
1D - 21	Small reel, thick tape T-120 / DF-240
1E - 1F	Small reel, thin tape T-140
1F - 23	Small reel, thick tape T-130
21 - 23	Small reel, thin tape T-160
21 - 23	Small reel, thin tape T-168
22 - 24	Small reel, thick tape DF-300
22 - 24	Small reel, thin tape T-180 / DF-360
22 - 24	Small reel, thin tape T-210 / DF-420
22 - 23	Large reel T-5
23 - 24	Large reel T-10
25 - 26	Large reel T-20
27 - 29	Large reel T-30
29 - 2B	Large reel T-40
2D - 2F	Large reel T-60

Note:

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

SECTION 2 MECHANISM ADJUSTMENT

2.1 Before starting repair and adjustment

2.1.1 Precautions

- (1) Unplug the power cord plug of the VCR before using your soldering iron.
- (2) Take care not to cause any damage to the conductor wires when plugging and unplugging the connectors.
- (3) Do not randomly handle the parts without identifying where the trouble is.
- (4) Exercise enough care not to damage the lugs, etc. during the repair work.
- (5) Install the cassette housing assembly only when the mechanism is in the "Mechanism assembling mode" position. (See 2.2.2.)
- (6) When reattaching the front panel assembly, make sure that the door opener of the cassette housing assembly is lowered in position prior to the reinstallation. (See SECTION 1 DISASSEMBLY.)

2.1.2 Checking for proper mechanical operations

Enter the mechanism service mode when you want to operate the mechanism when no cassette is loaded. (See SECTION 1 DISASSEMBLY.)

2.1.3 Manually removing the cassette tape

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

- (1) Unplug the power cord plug from the power outlet.
- (2) Refer to the disassembly procedure and perform the disassembly of the major parts before removing the Cassette housing assembly.
- (3) Unload the pole base assembly by manually turning the loading motor of the mechanism assembly toward the front. In doing so, hold the tape by the hand to keep the slack away from any grease. (See Fig.2-1-3a.)
- (4) Bring the pole base assembly and guide arm assembly to a pause when it reaches the position where it is hidden behind the cassette tape.
- (5) Remove the cassette housing assembly by holding both the slackened tape and the cassette lid.
- (6) Take up the slack of the tape into the cassette. This completes removal of the cassette tape.

Note:

- For the disassembly procedure of the major parts and details of the precautions to be taken, see "SECTION 1 DISASSEMBLY".

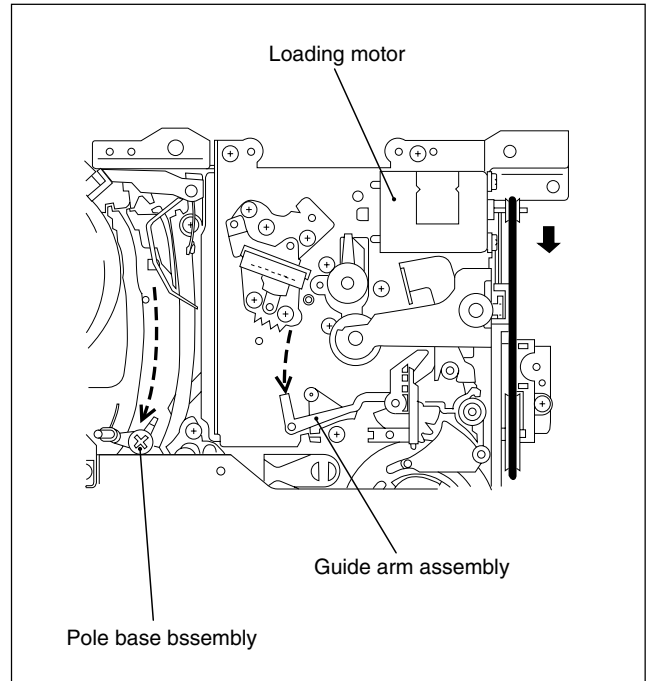
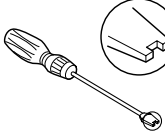
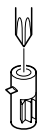
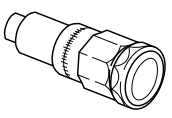
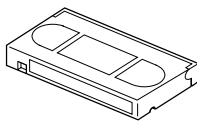
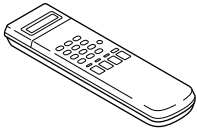
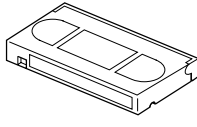
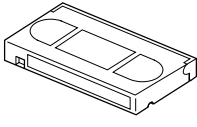


Fig. 2-1-3a

2.1.4 Jigs and tools required for adjustment

Roller driver PTU94002	A/C head positioning tool PTU94010	Torque gauge PUJ48075-2
		
Back tension cassette gauge PUJ48076-2	Jig RCU PTU94023B	
		
Alignment tape (SP, stairstep, NTSC) MHP	Alignment tape (EP, stairstep, NTSC) MHP-L	
		

2.1.5 Maintenance and inspection

1. Location of major mechanical parts

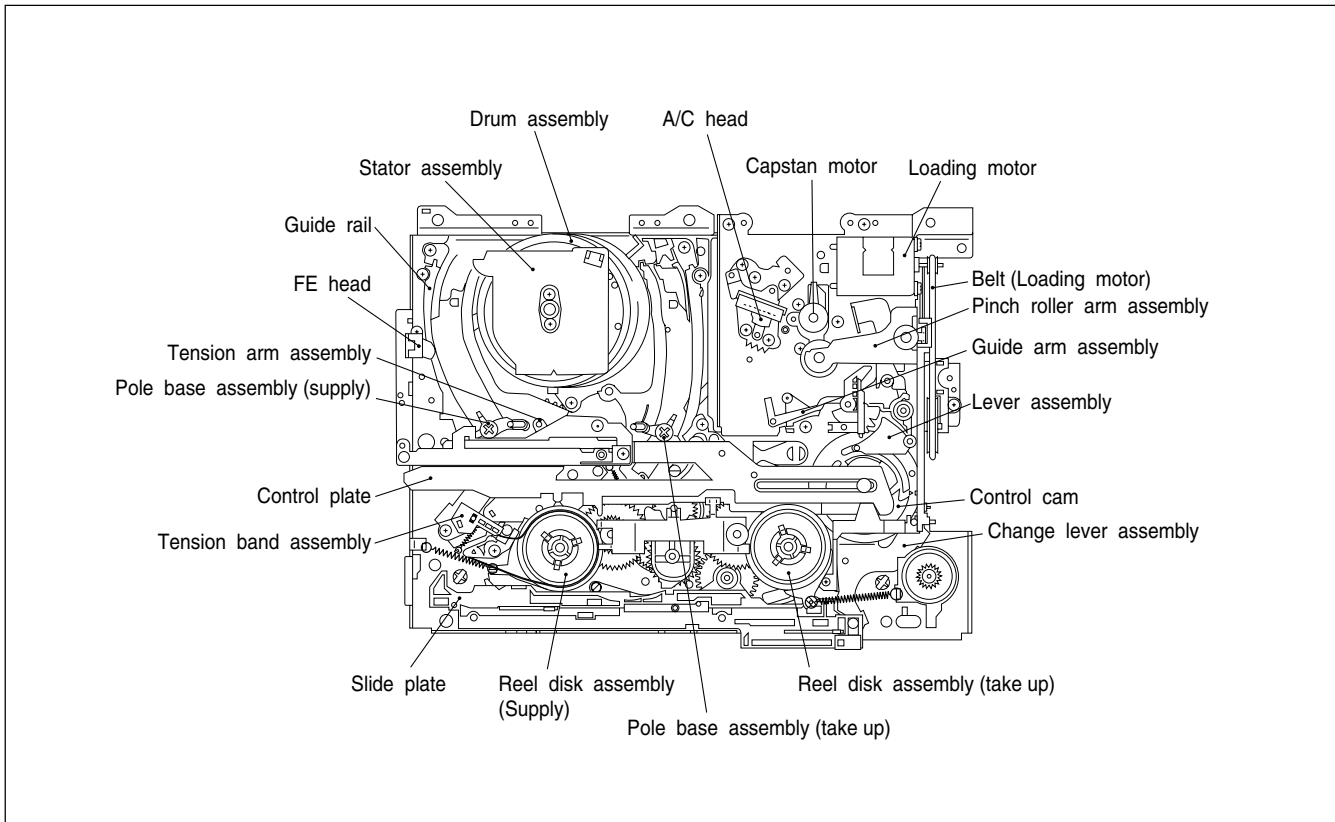


Fig. 2-1-5a Mechanism assembly top side

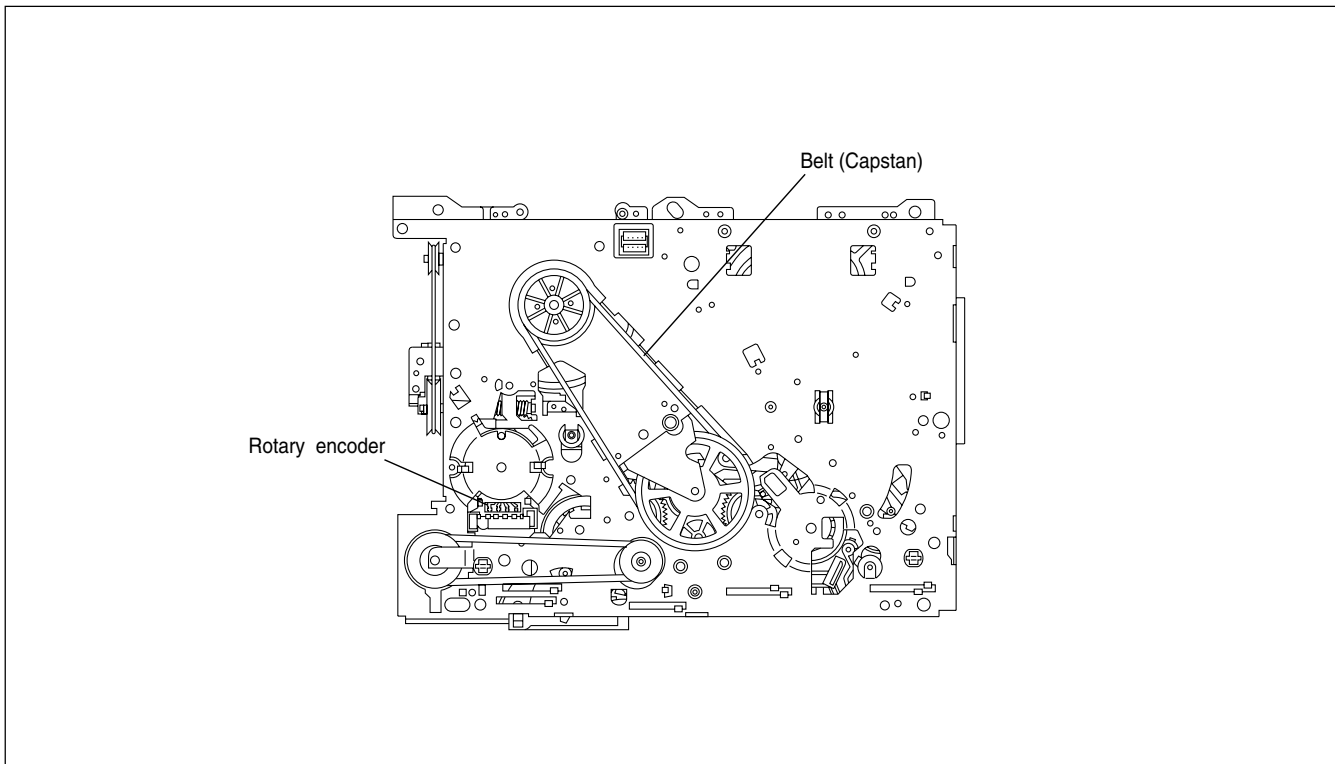


Fig. 2-1-5b Mechanism assembly bottom side

2. 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.

- (1) When cleaning the upper drum (especially the video head), soak a piece of closely woven cloth or Kimu-wipe with alcohol and while holding the cloth onto the upper drum by the fingers, turn the upper drum counterclockwise.

Note:

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

- (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 video tape.

3. 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.**
- **Grease is not required for a replacement cassette housing assembly, as this has been applied at the factory.**

4. 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	Upper drum assembly	★ ○	○
	A/C head	★ ○	★ ○
	Lower drum motor assembly	★	★ ○
	Pinch roller arm assembly	★	★
	Full erase head	★	★
	Tension arm assembly	★	★
	Guide arm assembly	★	★
Drive	Capstan motor		○
	Belt (Capstan)	○	○
	Belt (Loading motor)		○
	Loading motor		○
	Reel disk (supply, take up)		○
	Clutch unit (supply, take up)		○
	Worm gear assembly		○
	Control plate		○
	Slide plate		○
Other	Brush	★ ○	★ ○
	Tension band assembly	○	○
	Rotary encoder		○

★ : Cleaning

○ : Inspection or replacement if necessary

Table 2-1-5a

2.2 Replacement of major parts

2.2.1 Before starting disassembling

This mechanism has an exclusive operation mode provided for disassembling and installation of the mechanism (Mechanism assembling mode), and it is suggested to set the mechanism to this mode before disassembly and installation. The "Mechanism assembling mode" is not generally used and becomes available by manual setting only. Then this procedure starts with the condition that the cabinet parts and cassette housing assembly have been removed.

2.2.2 How to set the "Mechanism assembling mode"

- (1) Turn the loading motor belt by hand.
- (2) Confirm that the hole of the control cam are aligned to the deck hole as shown in Fig.2-2-2a.

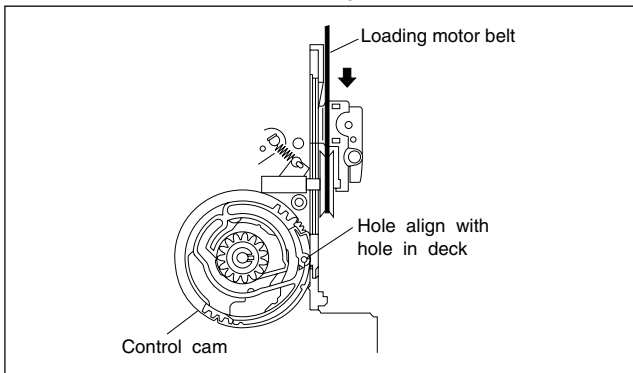


Fig. 2-2-2a

2.2.3 Pinch roller arm assembly

- (1) Remove the slit washer.
- (2) Lift the pinch roller arm assembly, and pull out it while pushing the pinch plate toward outside.

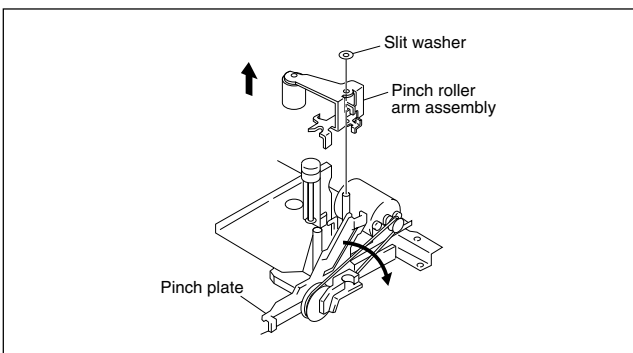


Fig.2-2-3a

2.2.4 A/C head

1. How to remove

- (1) Take out the 2 screws (A).
- (2) Remove the A/C head with the head base.
- (3) When replacing the A/C head only, remove the 3 screws (B), use care not to misplace the 3 springs.

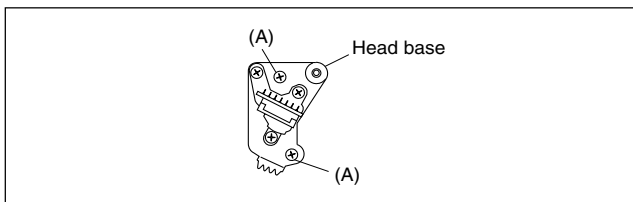


Fig.2-2-4a

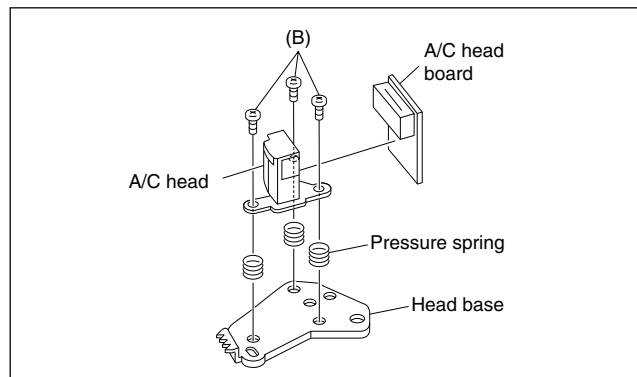


Fig.2-2-4b

2. How to install

- (1) Temporarily set the A/C head height as indicated in Fig. 2-2-4c.

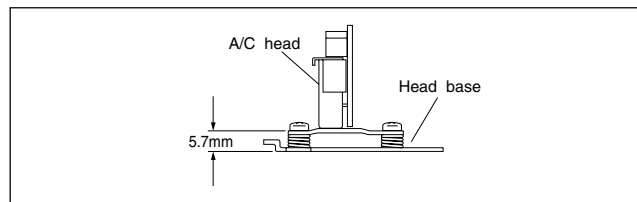


Fig.2-2-4c

2.2.5 Pinch plate

1. How to remove

- (1) Disengage the 2 claws, then remove the pinch plate.

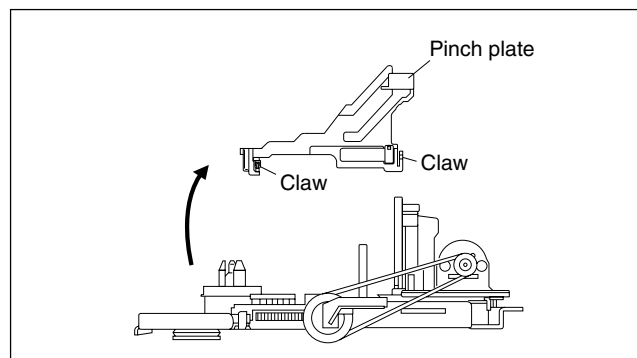


Fig. 2-2-5a

2. How to install

- (1) When installing the pinch plate, align rack of the pinch plate and triangle mark of the control cam as indicated in Fig. 2-2-5b.

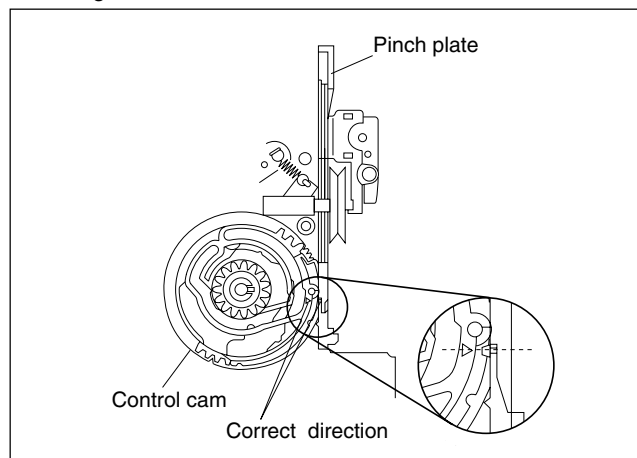


Fig. 2-2-5b

2.2.6 Loading motor

- (1) Remove the belt from the worm gear assembly.
- (2) Take out the 2 screws (A) and then remove the loading motor.

Note:

- **When installing the loading motor, hold it so that the label faces upward. Also take care with the wire colors.**

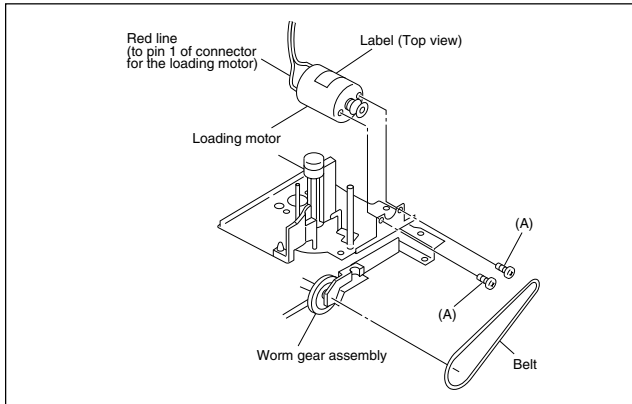


Fig.2-2-6a

2.2.7 Lever assembly, sub deck assembly, capstan motor

- (1) First remove the belt from the rear side (capstans) of the mechanism assembly.
- (2) Take out the slit washer, then remove the lever assembly.
- (3) Take out the 3 screws (A), then remove the capstan motor and sub deck assembly together.
- (4) Take out the 3 screws (B), then remove the capstan motor from the sub deck assembly.

Note:

- **Before removing the capstan brake assembly, it is required to first remove the worm gear assembly and the control cam.**

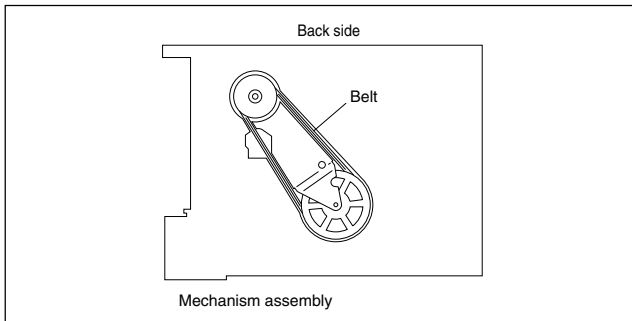


Fig.2-2-7a

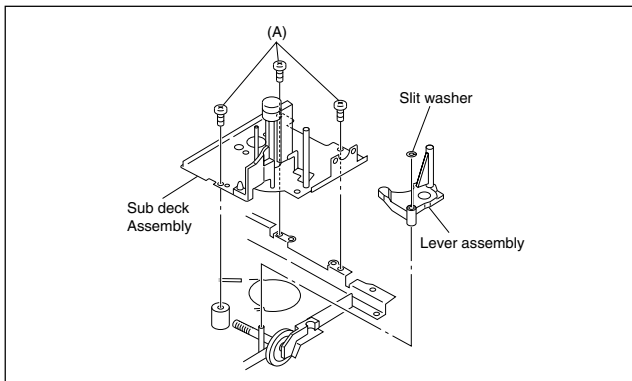


Fig.2-2-7b

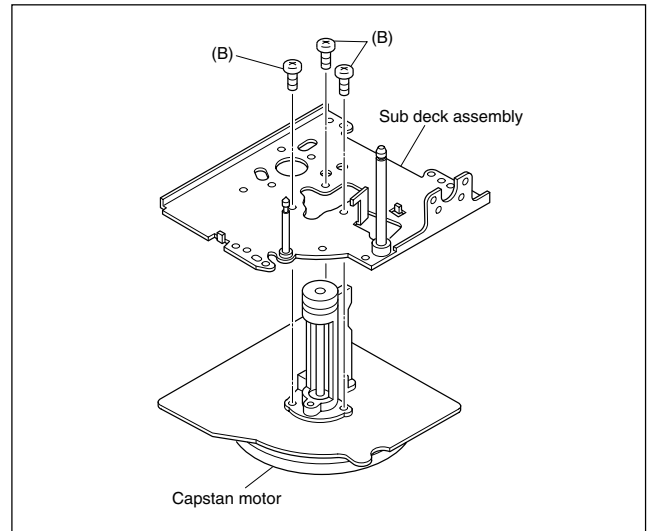


Fig.2-2-7c

2.2.8 Control bracket

- (1) Take out the screw (A) and screw (B).
- (2) Remove the control bracket.

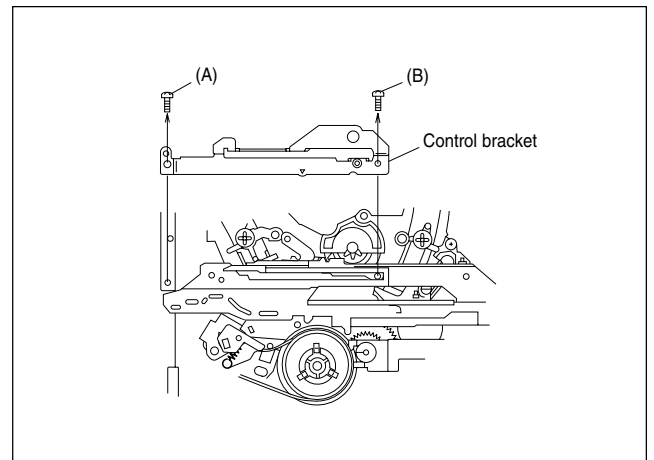


Fig.2-2-8a

2.2.9 Reel disk assembly (take up)

- (1) Take out the slit washer.
- (2) Remove the reel disk assembly (take up).

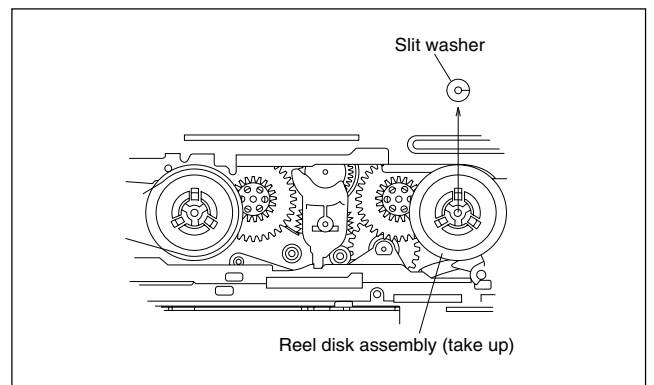


Fig.2-2-9a

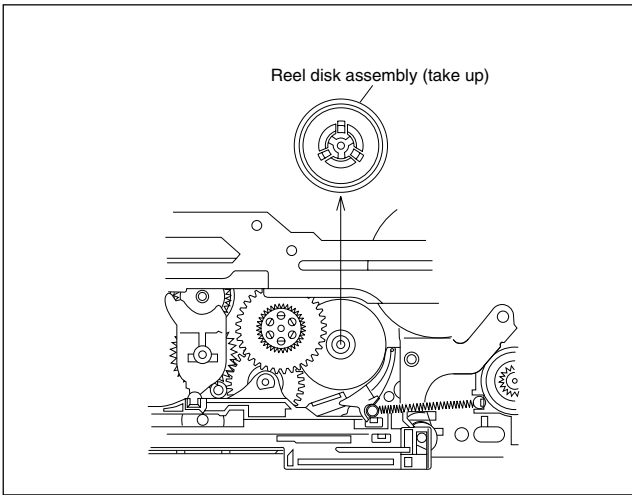


Fig.2-2-9b

2.2.10 Control plate

(1) Take out the slit washer, disengage the 2 hooks while lifting the control cam side of the control plate, and remove the control plate.

Notes:

- After removing the control plate, be careful not to turn the main deck assembly upside down. Otherwise, parts such as the idler lever and clutch unit (take up) may slip out.
- After removing the control plate, the parts shown in the following figure can be removed. The numbers [*] indicate the removal sequence.

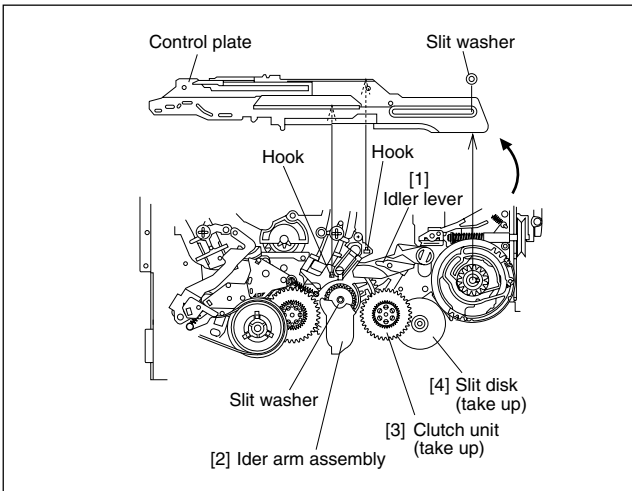


Fig.2-2-10a

2.2.11 Sub brake assembly (take up), control cam

(1) Disengage the spring (a) of the sub-brake assembly (take up) and, while pushing the hook in the direction of the arrow, remove the sub brake assembly (take up) upward.

(2) While pushing the claw in the disengaging direction, remove the control cam.

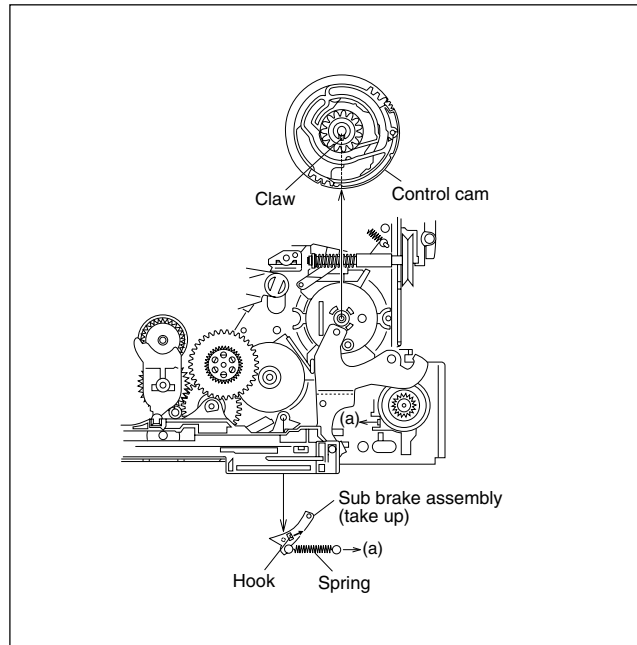


Fig.2-2-11a

2.2.12 Slide plate

(1) Disengage the 7 claws on the back side of the mechanism assembly by following the order from the claw on one end to that on the opposite end, then remove the slide plate.

Note:

- After removing the slide plate, it is possible to remove the main brake assembly (take up) and the change arm assembly.

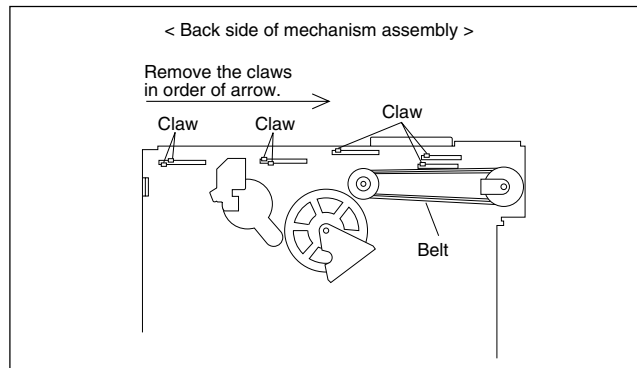


Fig.2-2-12a

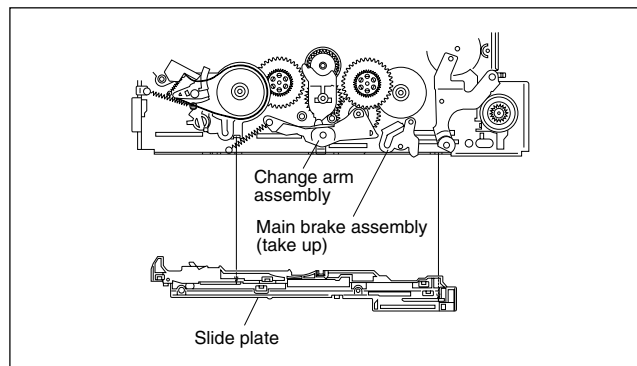


Fig.2-2-12b

2.2.13 Change lever assembly, rotary encoder

- (1) Slide the change lever assembly in the direction of the arrow and remove.
- (2) While pushing the claws on both sides in the disengaging directions, take out the rotary encoder.
- (3) When attaching the rotary encoder, position it so that the alignment markings face each other as shown in Fig. 2-2-13a, then attach the rotary encoder.

Notes:

- Before removing the change lever assembly, it is required to remove the belt (Fig. 2-2-12a).
- Take care of the cassette gear, which is disengaged at the same time as the change lever assembly is removed.

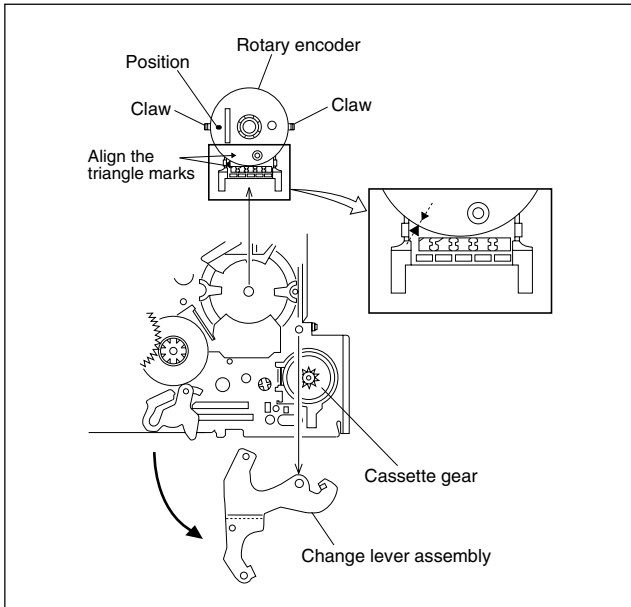


Fig.2-2-13a

2.2.14 Tension arm assembly, tension band assembly, reel disk assembly (supply), sub brake assembly (supply), clutch unit (supply), take up lever

- (1) Disengage the spring (a) of the sub brake assembly (supply) from the hook.
- (2) Disengage the spring (c) from the hook.
- (3) Take out the slit washer, and remove the tension arm assembly. Also remove the tension band assembly by disengaging the claw.
- (4) Take out the slit washer, and remove the reel disk assembly (supply).
- (5) While pushing the claw in the disengaging direction, remove the sub brake assembly (supply).
- (6) Remove the clutch unit (supply).
- (7) Remove the take up lever assembly.

Notes:

- When attaching the tension arm assembly, be sure to adjust the phase of the tension arm lever.
- After removing the clutch unit (supply), it is possible to remove the slit disk (supply) and main brake assembly (supply).

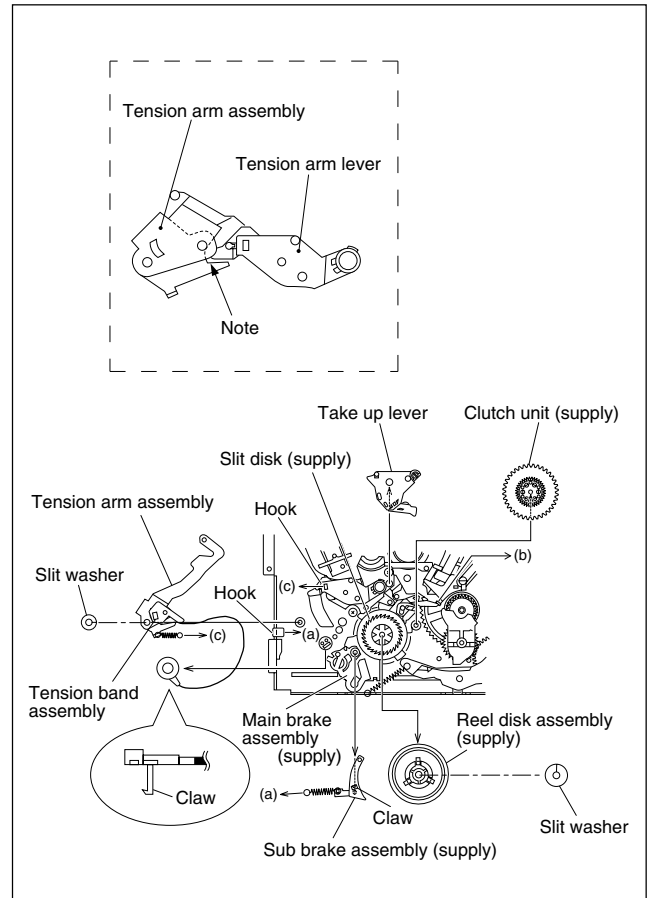


Fig.2-2-14a

2.2.15 Take up head, tension arm lever

- (1) Remove the take up head and tension arm lever.

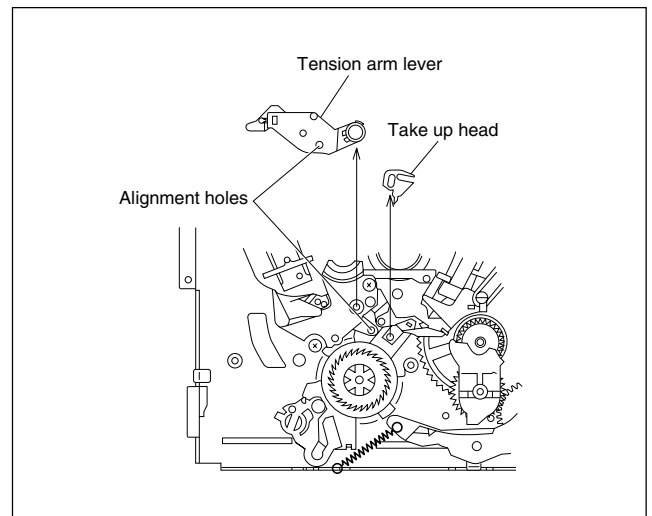


Fig.2-2-15a

2.2.16 Guide rail

- (1) Take out the 5 screws (A) and 1 screw (B).
- (2) By expanding the rails on the outer sides of the guide rail, remove the 2 pole base assemblies (supply, take up).
- (3) Disengage the 4 claws and remove the guide rail.

Note:

- **Before removing the guide rail, it is required to remove the drum assembly.**

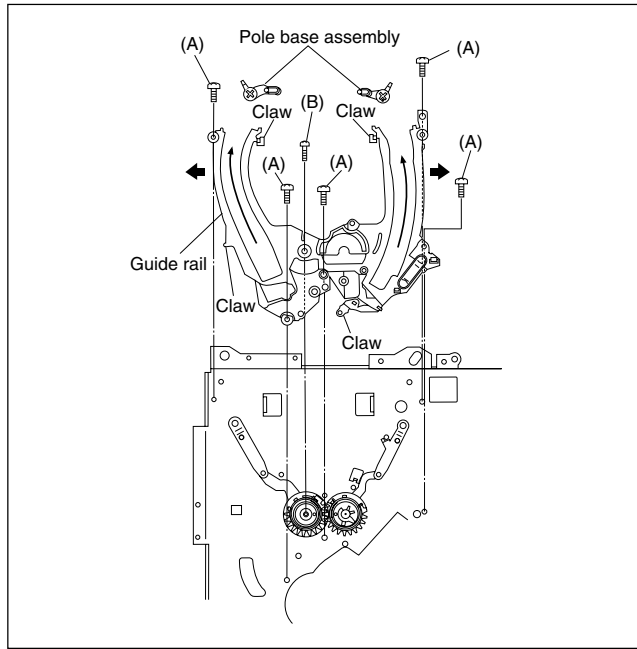


Fig.2-2-16a

2.2.17 Stator assembly

- (1) Remove the flat cable.
- (2) Remove the two screws (A), (B) and remove the lug wire.
- (3) Remove the stator assembly by lifting in the arrow-indicated direction. (Take care that the brush spring does not jump out.)

Notes:

- **Be careful not to lose the brush and spring.**
- **There are some models that do not use the lug wire. Refer to the parts list for these models.**
- **When tightening the screw (B), place the caulked part of the lug terminal near to the shaft of the drum and then tighten it.**
- **After installation, be sure to perform the switching point adjustment according to the electrical adjustment procedure.**

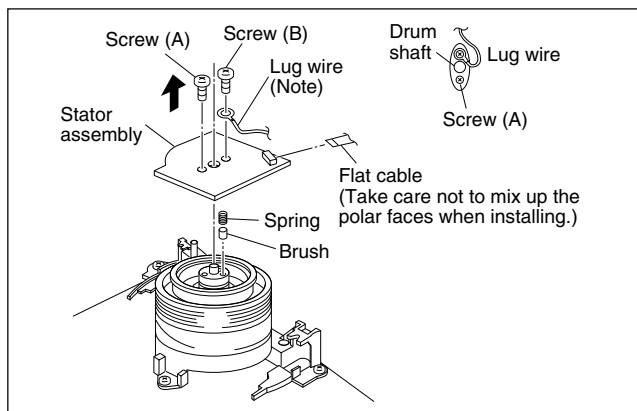


Fig.2-2-17a

2.2.18 Rotor assembly

1. How to remove

- (1) Remove the stator assembly.
- (2) Remove the two screws (B) and remove the rotor assembly.

2. How to install

- (1) Match the phases of the upper drum assembly and the rotor assembly as indicated in Fig.2-2-18a.
- (2) Place the upper drum assembly hole (a) over the rotor assembly holes (b) (with three holes to be aligned) and tighten the two screws (B). (See Fig.2-2-18a.)

Note:

- **When installing the rotor assembly, note that a normal picture cannot be obtained without ensuring the phase matching as mentioned below.**

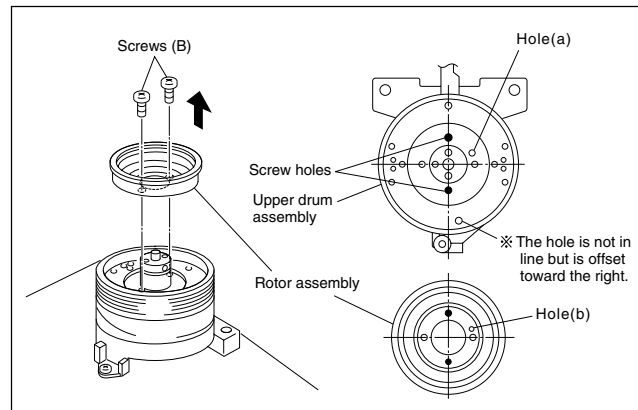


Fig.2-2-18a

2.2.19 Upper drum assembly

Notes:

- **To replace the upper drum assembly only may not be possible with some models. For upper drum assembly replacement, refer to the parts list. (When the parts number of the upper drum assembly is not listed on the parts list, then this cannot be replaced.)**
- **When replacement is required, control the up-down movement of the brush. Never apply grease.**
- **When replacing the upper drum assembly, replace it together with the washer.**

1. How to remove

- (1) Remove the stator assembly and rotor assembly.
- (2) Loosen the screw of the collar assembly using a 1.5 mm hexagonal wrench and remove the collar assembly. Also remove the brush, spring and cap at one time.
- (3) Remove the upper drum assembly and remove the washer using tweezers.

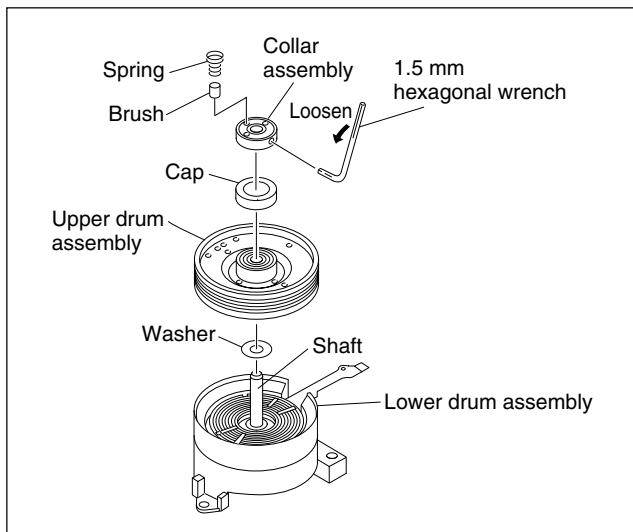


Fig. 2-2-19a

2. How to install

- (1) Clean the coil parts of the lower drum assembly and the newly installed upper drum assembly with an air brush in advance. (See Fig.2-2-19b.)
- (2) Install a new washer and upper drum assembly on the drum shaft. (See Fig.2-2-19a.)
- (3) Install the cap to the upper drum assembly.
- (4) Position the collar assembly as indicated in Fig.2-2-19c while controlling its up- down movement.
- (5) Secure the collar assembly in position with a hexagonal wrench while pressing its top with the fingers.
- (6) After installation, gently turn the upper drum assembly with your hand to make sure that it turns normally. Then install the brush and the spring.
- (7) Install the rotor assembly and stator assembly according to Fig 2-2-17a and 2-2-18a.
- (8) When installation is complete, clean the upper drum assembly and lower drum assembly and carry out the following adjustments.
 - PB switching point adjustment
 - Slow tracking adjustment
 - Compatibility adjustment (Be sure to check for compatibility for the EP (or LP) mode.)

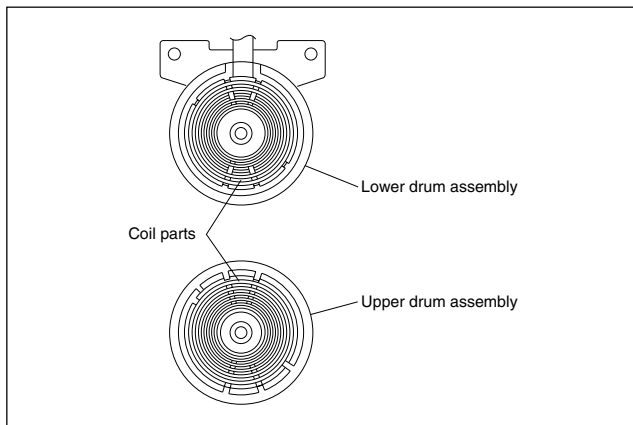


Fig. 2-2-19b

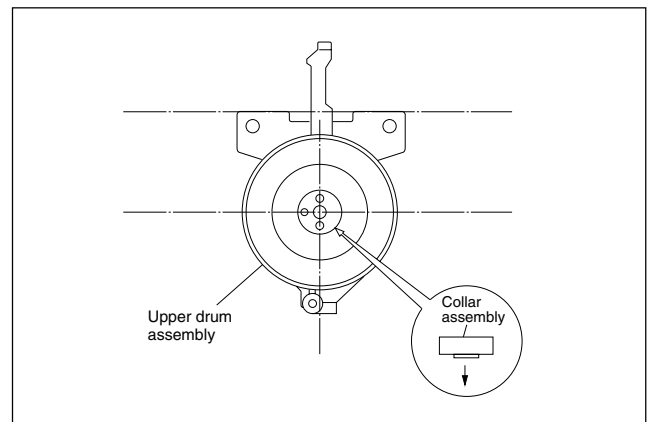


Fig. 2-2-19c

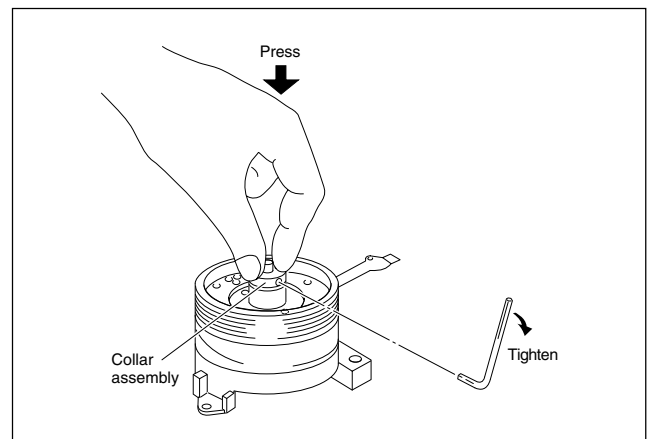


Fig. 2-2-19d

2.3 Installation of major parts (Mechanism phase alignment)

2.3.1 Before assembly

The mechanism of this model is closely related with the rotary encoder and the system control circuitry. The connection between the rotary encoder and control cam determines the movement of all mechanical parts including the slide plate, loading arm assembly, control plate and brake. If these parts are not installed in the correct positions, operations such as loading and unloading will not be possible. Installation of the major parts (mechanism phase alignment) should be performed exclusively in the mechanism assembling mode, as with the operations in the previous sections.

2.3.2 Loading arm assemblies (supply, take up)

- (1) Attach the loading arm assembly (supply) and loading arm assembly (take up) so that the alignment markings on their gears face each other and the holes on their arms are respectively aligned with the holes on the main deck.
- (2) Attach the guide rail, attach the pole base assemblies onto the extremities of the arms, then perform the unloading operation so that the pole base assemblies come to the most forward positions.

Note:

- **When attaching the pole base assemblies (supply/take up), temporarily tighten the 3 screws other than the 2 screws on the sides of the guide rail extremities so that the parts do not slip out.**

- (3) Attach the surrounding parts of the guide rail.

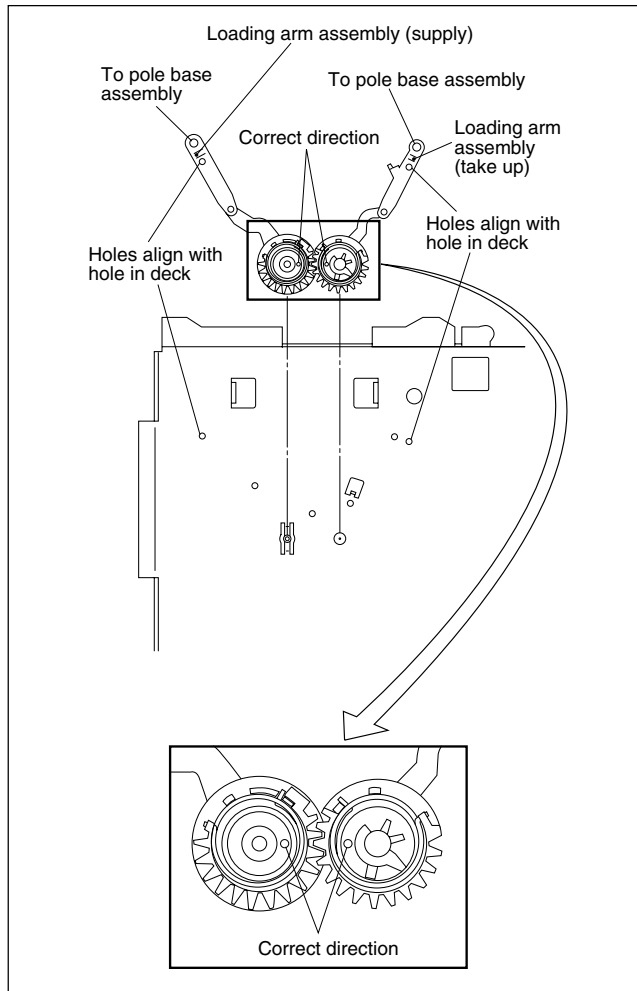


Fig. 2-3-2a

2.3.3 Rotary encoder, change lever assembly, control cam

- (1) To attach the rotary encoder, align the triangular alignment markings and push the rotary encoder in until the claws are locked.
- (2) To attach the change lever assembly, align its holes with the holes on the mechanism assembly. As the change lever assembly is projected on the rear side of the mechanism assembly, take care that the assemblies are not separated from each other.
- (3) To attach the control cam, align its holes with the holes on the mechanism assembly by pushing the capstan brake assembly downward.

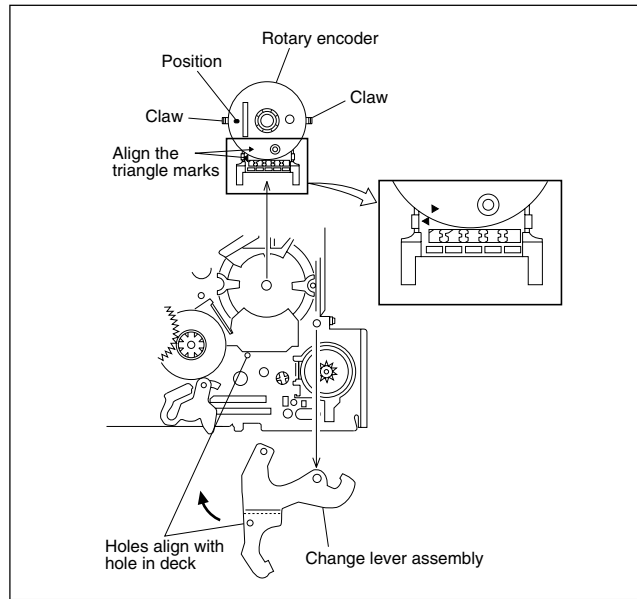


Fig. 2-3-3a

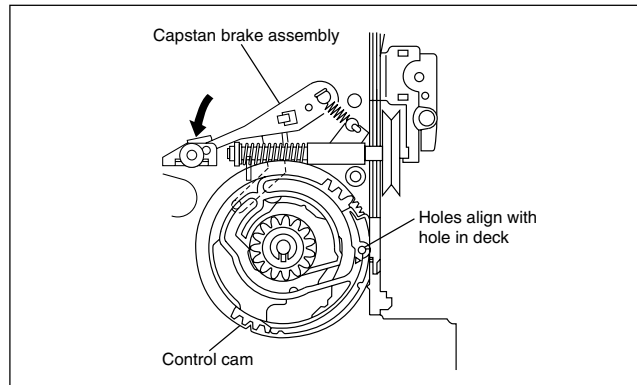


Fig. 2-3-3b

2.3.4 Slide plate

- (1) While pushing down the main brake assemblies (supply, take up) so that they come in contact with the extremity of the mechanism assembly, attach the slide plate so that its alignment holes are aligned with the holes of the mechanism assembly.

Note:

- **Free the spring of the sub brake assembly (supply) during installation.**

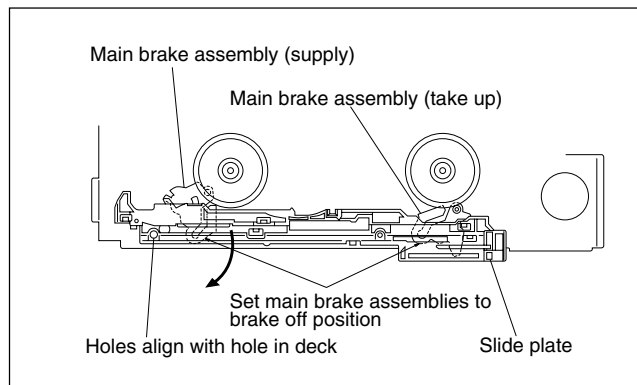


Fig. 2-3-4a

2.3.5 Control plate

- (1) Attach the control plate by aligning the 2 alignment holes on the control plate with the alignment holes on the main deck assembly as well as the alignment holes on the take up lever. As the take up lever is pulled by a tension spring, use a pair of tweezers or similar too to align the holes.
- (2) After attaching the control plate, lock it with the slit washer and control bracket.

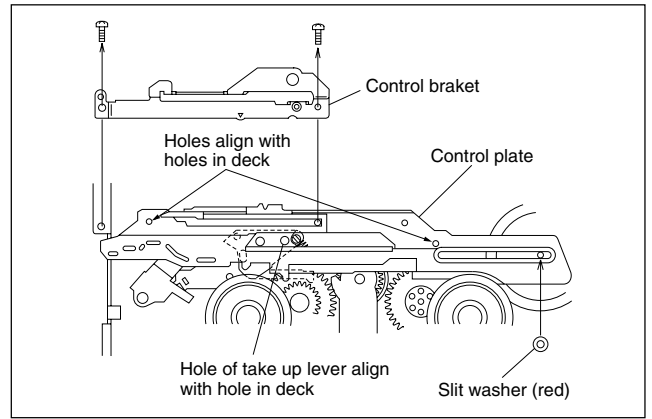


Fig. 2-3-5a

2.4 Mechanism timing chart

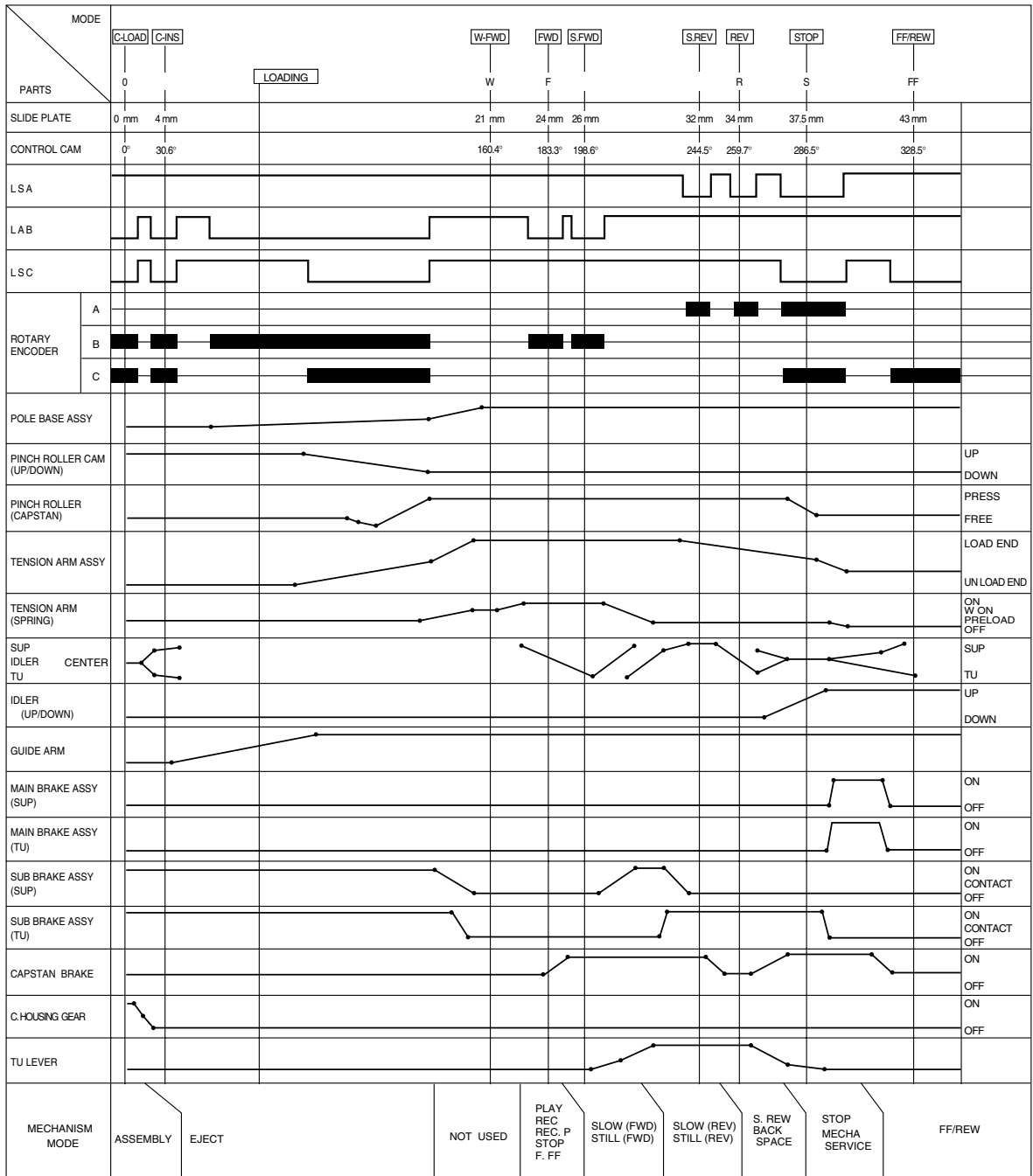


Table 2-4a

2.5 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 audio control head, drum assembly or any part of the tape transport system.**
- **To avoid any damage to the alignment tape while performing the compatibility adjustment, get a separate cassette tape (for recording and play back) ready to be used for checking the initial tape running behavior.**
- **Unless otherwise specified, all measuring points and adjustment parts are located on the Main board.**
- **When using the Jig RCU, set its custom code to match the custom code of the VCR.**

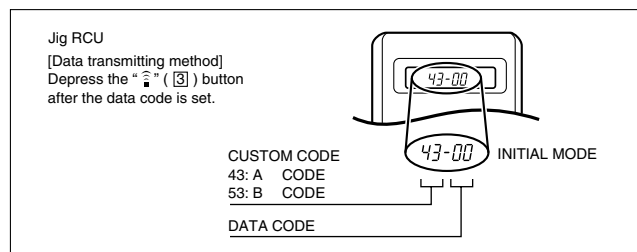


Fig. 2-5a Jig RCU [PTU94023B]

2.5.1 FM waveform linearity

Signal	(A1) (A2)	<ul style="list-style-type: none"> • Alignment tape(SP, stairstep, NTSC) [MHP] • Alignment tape(EP, stairstep, NTSC) [MHP-L]
Mode	(B)	<ul style="list-style-type: none"> • PB
Equipment	(C)	<ul style="list-style-type: none"> • Oscilloscope
Measuring point	(D)	<ul style="list-style-type: none"> • TP106 (PB FM)
External trigger	(E)	<ul style="list-style-type: none"> • TP111 (D.FF)
Adjustment part	(F)	<ul style="list-style-type: none"> • Guide roller [Mechanism assembly]
Specified value	(G)	<ul style="list-style-type: none"> • Flat V.PB FM waveform
Adjustment tool	(H)	<ul style="list-style-type: none"> • Hexagonal wrench (1.25 mm) • 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) 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. 2-5-1a.)
- (5) Using a hexagonal wrench, gently loosen the set screw at the bottom of the pole base assembly. (Be careful not to loosen it too much.) (See Fig. 2-5-1b.)
- (6) 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. 2-5-1c.)

- (7) 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).
- (8) Unload the cassette tape once, play back the alignment tape (A1) again and confirm the V.PB FM waveform.
- (9) After adjustment, confirm that the tape wrinkling does not occur at the roller upper or lower limits. (See Fig. 2-5-1d.)
- (10) After completing adjustment, tighten the set screw at the bottom of the pole base assembly. (Be careful not to tighten it too much.) (See Fig. 2-5-1b.)

[Perform adjustment step (11) only for the models equipped with SP mode and EP (or LP) mode.]

- (11) Repeat steps (1) to (10) by using the alignment tape (A2).

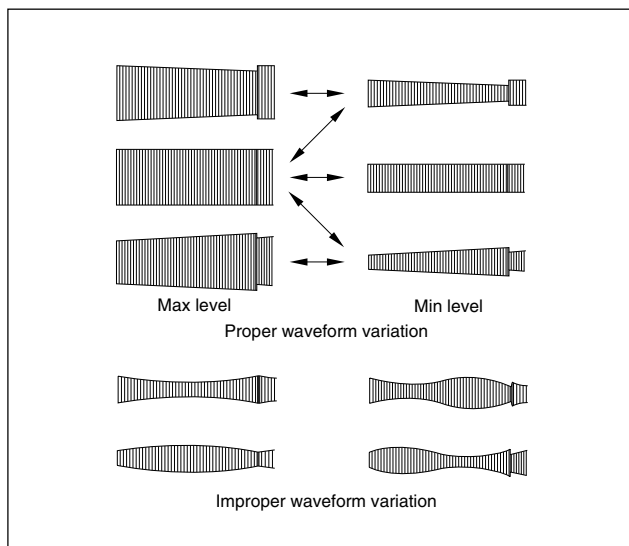


Fig. 2-5-1a

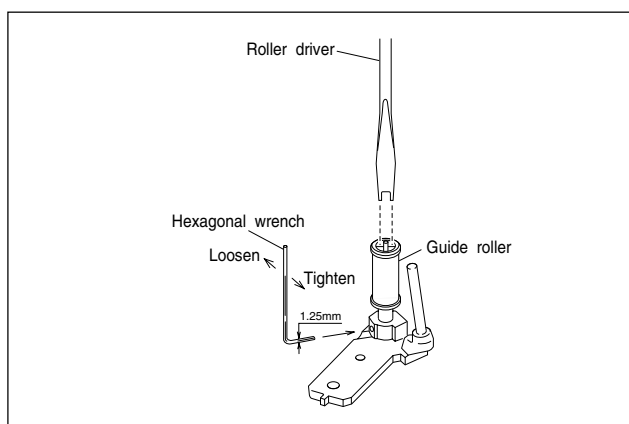


Fig. 2-5-1b

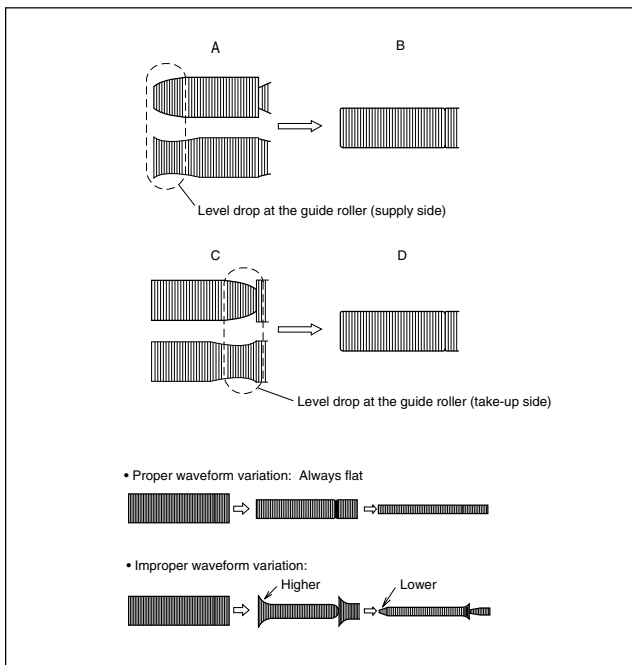


Fig. 2-5-1c

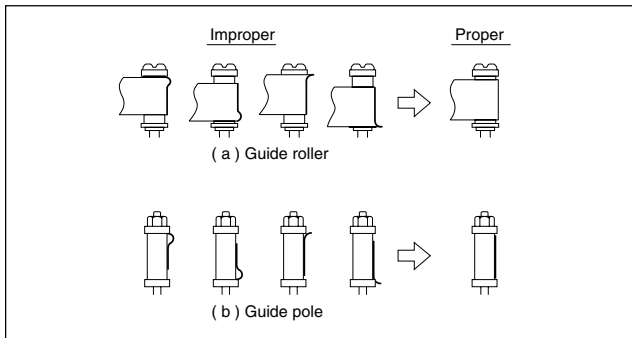


Fig. 2-5-1d

2.5.2 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 Fig.2-2-4c.)**

Signal	(A)	• Alignment tape(SP, stairstep, NTSC) [MHP]
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

- (1) Play back the alignment tape (A).
- (2) 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.
- (3) Set the VCR to the manual tracking mode.

- (4) 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.

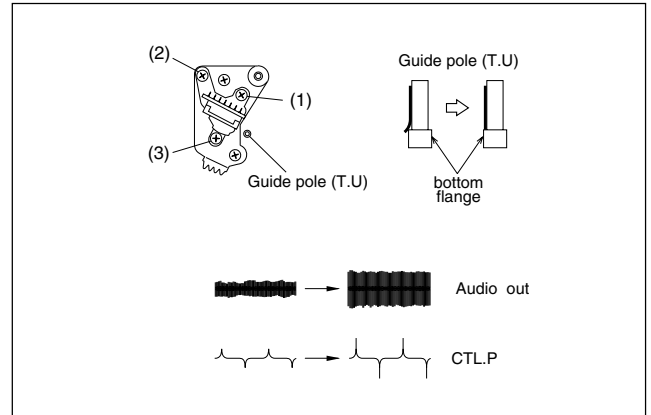


Fig. 2-5-2a

2.5.3 A/C head phase (X-value)

Signal	(A1)	• Alignment tape(SP, stairstep, NTSC) [MHP]
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)	• A/C head positioning tool [PTU94010]

- (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 A/C head positioning tool to the projected part in front of the A/C head. (See Fig. 2-5-3a.)
- (5) Turn the A/C head positioning tool fully toward the capstan. Then turn it back gradually toward the drum and stop on the first peak point position of the V.PB FM waveform output level. Then tighten the screws (4) and (5).
- (6) Perform the tracking operation and make sure that the V.PB FM waveform is at its maximum.

If it is not at maximum, loosen the screws (4) and (5), and turn the A/C head positioning tool to bring the A/C head to a position, around where the waveform reaches its maximum for the first time. Then tighten the screws (4) and (5).

[Perform adjustment steps (7) to (10) only for 2 Head models equipped with LP mode.]

- (7) Then play back the alignment tape (A2).
- (8) Set the VCR to the manual tracking mode.
- (9) Perform the tracking operation and make sure that the V.PB FM waveform is at its maximum.
- (10) If it is not at maximum, loosen the screws (4) and (5), and turn the A/C head positioning tool to bring the A/C head to a position, around where the waveform reaches its maximum for the first time. Then tighten the screws (4) and (5).

Note:

- After adjusting, always perform the confirmation and re-adjustment of the item 2.5.4.

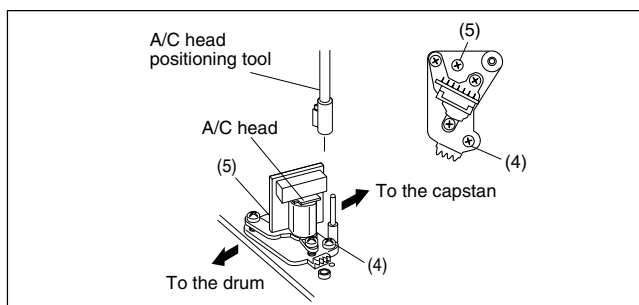


Fig. 2-5-3a

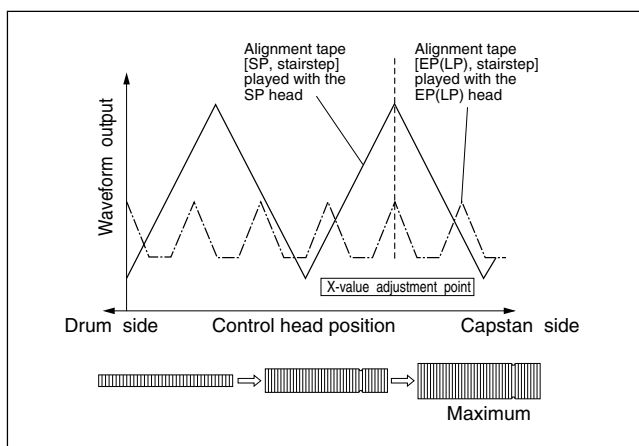


Fig. 2-5-3b

- (1) Play back the alignment tape (A).
- (2) Apply the external trigger signal to D.FF (E), to observe the V.PB FM waveform at the measuring point (D).
- (3) Confirm that the automatic tracking operation is completed.
- (4) Set the VCR to the Auto adjust mode by transmitting the code (F) twice from the Jig RCU. When the VCR enters the stop mode, the adjustment is completed.
- (5) If the VCR enters the eject mode, perform adjustment for the A/C head phase (X-value) again.

2.5.5 Tension pole position

Signal	(A)	• Back tension cassette gauge [PUJ48076-2]
Mode	(B)	• PB
Adjustment part	(F)	• Adjust pin [Mechansim assembly]
Specified value	(G)	• 29 - 46 gf•cm (2.84 - 4.5 × 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.
 - 1) Set the VCR to the mechanism service mode. (See 1.5 Mechanism service mode.)
 - 2) Set the VCR to the play back mode and turn the adjust pin using the flat-blade screwdriver, etc. by paying attention not to come into contact with the 2.5 mm dia. pole. (See Fig. 2-5-5a.)

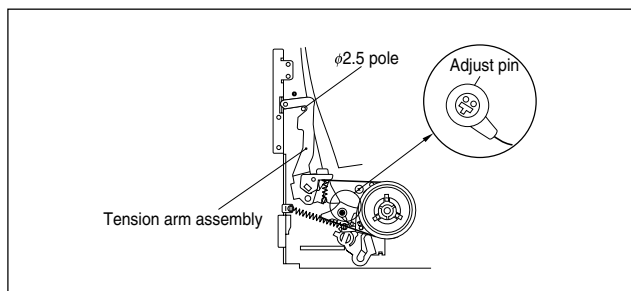


Fig. 2-5-5a

2.5.4 Standard tracking preset

Signal	(A)	• Alignment tape(EP, stairstep, NTSC) [MHP-L]
Mode	(B)	• PB → Auto adjust
Equipment	(C)	• Oscilloscope
Measuring point	(D)	• TP106 (PB FM)
External trigger	(E)	• TP111 (D.FF)
Adjustment part	(F)	• Jig RCU: Code "50"
Specified value	(G)	• STOP mode (Maximum V.PB FM waveform)
Adjustment tool	(H)	• Jig RCU [PTU94023B]

SECTION 3 ELECTRICAL ADJUSTMENT

3.1 Precaution

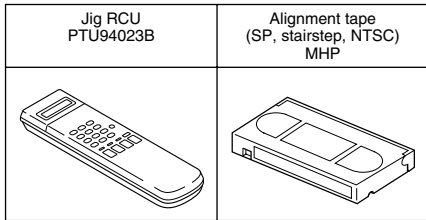
The following adjustment procedures are not only necessary after replacement of consumable mechanical parts or board assemblies, but are also provided as references to be referred to when servicing the electrical circuitry.

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.

3.1.1 Required test equipments

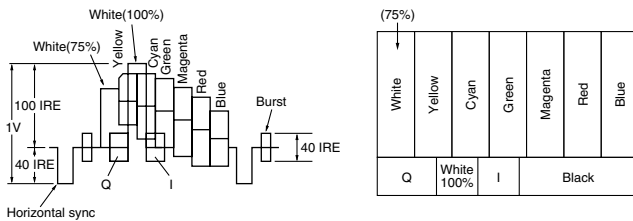
- Color (colour) television or monitor
- Oscilloscope: wide-band, dual-trace, triggered delayed sweep
- Signal generator: RF / IF sweep / marker
- Audio level meter
- Frequency counter
- Signal generator: stairstep, color (colour) bar [NTSC]
- Recording tape
- Digit-key remote controller(provided)

3.1.2 Required adjustment tools



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

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



3.1.4 Switch settings and standard precautions

The SW settings of the VCR and the standard precautions for the electrical adjustments are as follows.

- **When using the Jig RCU, set its custom code to match the custom code of the VCR.**

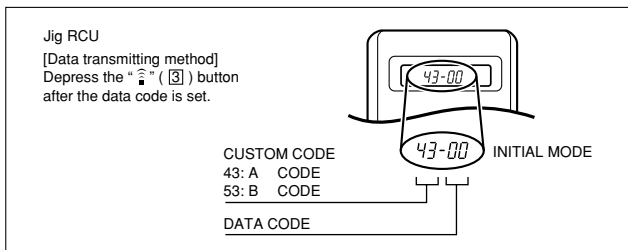


Fig. 3-1-4a Jig RCU [PTU94023B]

- **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

- **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.**

3.1.5 EVR Adjustment

Some of the electrical 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.**

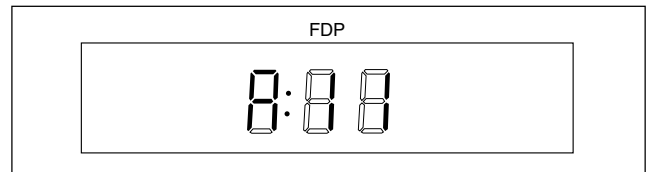


Fig. 3-1-5a EVR mode

3.2 Servo circuit

3.2.1 Switching point

Signal	(A1) (A2)	• Stairstep signal • Alignment tape (SP, stairstep, NTSC) [MHP]
Mode	(B)	• PB
Equipment	(C)	• Oscilloscope
Measuring point	(D1) (D2)	• VIDEO OUT terminal (75Ω terminated) • TP106 (PB FM)
External trigger	(E)	• TP111 (D.FF)/slope : -
Adjustment part	(F)	• Jig RCU: Code "5A"
Specified value	(G)	• 6.5 ± 0.5H
Adjustment tool	(H)	• Jig RCU [PTU94023B]

- Play back the signal (A1) of the alignment tape (A2).
- 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).
- Set the VCR to the manual tracking mode.
- Adjust tracking so that the V.PB FM waveform becomes maximum.
- 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.
- If the VCR enters the eject mode, repeat steps (1) to (5) again.
- Play back the alignment tape (A2) again, confirm that the switching point is the specified value (G).

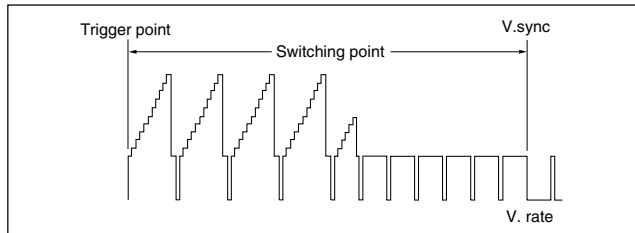


Fig. 3-2-1a Switching point

3.2.2 Slow tracking preset

Signal	(A1) (A2)	• Ext. input • Color (colour) bar signal [NTSC]
Mode	(B1) (B2)	• VHS SP • VHS EP
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]

- Record the signal (A2) in the mode (B1), and play back the recorded signal.
- Set the VCR to the manual tracking mode.
- Set the VCR to the FWD slow (+1/6x) mode.
- 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.
- Set the VCR to the Stop mode.
- Confirm that the noise bar is (G) on the TV monitor in the slow mode.
- Repeat steps (3) to (6) in the REV slow (-1/6x) mode.
- 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 Video circuit

3.3.1 Auto picture initial setting

Signal	(A1) (A2) (A3)	• Ext. input • Video: Optional • VHS tape
Mode	(B)	• EE → Auto adjust (SP/EP REC → PB)
Adjustment part	(F)	• Jig RCU : Code "58"
Specified value	(G)	• STOP mode
Adjustment tool	(H)	• Jig RCU [PTU94023B]

- Insert the cassette tape (A3).
- 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. When the VCR enters the eject mode, repeat steps (1) to (2) again.

3.4 Demodulator circuit

Note:

- Unless otherwise specified, set an audio multiplex TV signal generator as follows;
RF signal : 70 dBμ / 75Ω, color bar 87.5% modulation.

3.4.1 Input level

Signal	(A)	• RF signal (Audio: mono 300 Hz)
Mode	(B)	• Tuner • EE
Equipment	(C)	• Audio level meter
Measuring point	(D)	• IC6501 pin 26
EVR mode	(F1)	• Jig code "57"
EVR address	(F2) (F3) (F4)	• A : 20 • Jig code "22" and "20" • Jig code "18" or "19" (Channel +/-)
Specified value	(G)	• 500 ± 10 mVrms
Adjustment tool	(H)	• Jig RCU [PTU94023B]

- Set an audio signal mode of the RF signal generator to mono 300 Hz.
- Connect the equipment (C) to the measuring point (D).
- Set the VCR to the EVR mode by transmitting the code (F1) from the Jig RCU.
- Set the EVR address to (F2) by transmitting the code (F3) from the Jig RCU.
- Transmit the code (F4) from the Jig RCU to adjust so that the level of the measuring point (D) becomes the specified value (G).
- 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.)

3.4.2 Stereo VCO

Signal	(A)	• No signal
Mode	(B)	• Tuner • EE
Equipment	(C)	• Frequency counter
Measuring point	(D1)	• IC6501 pin 26
Short point	(D2)	• C6505(-) terminal
EVR mode	(F1)	• Jig code "57"
EVR address	(F2)	• A : 21
	(F3)	• Jig code "22" and "21"
	(F4)	• Jig code "18" or "19" (Channel +/-)
Specified value	(G)	• 15.73 ± 0.1 kHz
Adjustment tool	(H)	• Jig RCU [PTU94023B]

- (1) Connect the short wire between the short point (D2) and the GND (Ground).
- (2) Connect the equipment (C) to the measuring point (D1).
- (3) Set the VCR to the EVR mode by transmitting the code (F1) from the Jig RCU.
- (4) Set the EVR address to (F2) by transmitting the code (F3) from the Jig RCU.
- (5) Transmit the code (F4) from the Jig RCU to adjust so that the frequency of the measuring point (D1) becomes the specified value (G).
- (6) 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.)
- (7) Disconnect the short wire between the short point (D2) and the GND (Ground).

3.4.3 Stereo filter

Signal	(A)	• RF signal (Audio: No signal)
Mode	(B)	• Tuner • EE
Equipment	(C)	• Oscilloscope
Measuring point	(D)	• IC6501 pin 26
EVR mode	(F1)	• Jig code "57"
EVR address	(F2)	• A : 22
	(F3)	• Jig code "22" twice
	(F4)	• Jig code "18" or "19" (Channel +/-)
Specified value	(G)	• Minimum level
Adjustment tool	(H)	• Jig RCU [PTU94023B]

- (1) Set an audio signal mode of the RF signal generator to no signal.
- (2) Connect the equipment (C) to the measuring point (D).
- (3) Set the VCR to the EVR mode by transmitting the code (F1) from the Jig RCU.
- (4) Set the EVR address to (F2) by transmitting the code (F3) from the Jig RCU.
- (5) Transmit the code (F4) from the Jig RCU to adjust so that the level of the measuring point (D) becomes the specified value (G).
- (6) 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.)

3.4.4 Separation - 1

Signal	(A)	• RF signal (Audio: L-ch 300 Hz 14% modulated)
Mode	(B)	• Tuner • EE
Equipment	(C)	• Audio level meter
Measuring point	(D)	• IC6501 pin 26
EVR mode	(F1)	• Jig code "57"
EVR address	(F2)	• A : 23
	(F3)	• Jig code "22" and "23"
	(F4)	• Jig code "18" or "19" (Channel +/-)
Specified value	(G)	• Minimum level
Adjustment tool	(H)	• Jig RCU [PTU94023B]

- (1) Set an audio signal mode of the RF signal generator to alternate L-ch 300 Hz 14% modulated.
- (2) Connect the equipment (C) to the measuring point (D).
- (3) Set the VCR to the EVR mode by transmitting the code (F1) from the Jig RCU.
- (4) Set the EVR address to (F2) by transmitting the code (F3) from the Jig RCU.
- (5) Transmit the code (F4) from the Jig RCU to adjust so that the level of the measuring point (D) becomes the specified value (G).
- (6) 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.)

3.4.5 Separation - 2

Signal	(A)	• RF signal (Audio: L-ch 5 kHz 14% modulated)
Mode	(B)	• Tuner • EE
Equipment	(C)	• Audio level meter
Measuring point	(D)	• IC6501 pin 26
EVR mode	(F1)	• Jig code "57"
EVR address	(F2)	• A : 24
	(F3)	• Jig code "22" and "24"
	(F4)	• Jig code "18" or "19" (Channel +/-)
Specified value	(G)	• Minimum level
Adjustment tool	(H)	• Jig RCU [PTU94023B]

- (1) Set an audio signal mode of the RF signal generator to alternate L-ch 5 kHz 14% modulated.
- (2) Connect the equipment (C) to the measuring point (D).
- (3) Set the VCR to the EVR mode by transmitting the code (F1) from the Jig RCU.
- (4) Set the EVR address to (F2) by transmitting the code (F3) from the Jig RCU.
- (5) Transmit the code (F4) from the Jig RCU to adjust so that the level of the measuring point (D) becomes the specified value (G).
- (6) 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.)

3.4.6 SAP VCO

Signal	(A)	• No. signal
Mode	(B)	• Tuner • EE
Equipment	(C)	• Frequency counter
Measuring point	(D1)	• IC6501 pin 26
Short point	(D2)	• C6505 (-) terminal
EVR mode	(F1)	• Jig code "57"
EVR address	(F2)	• A : 25
	(F3)	• Jig code "22" and "25"
	(F4)	• Jig code "18" or "19" (Channel +/-)
Specified value	(G)	• 78.67 ± 0.5 kHz
Adjustment tool	(H)	• Jig RCU [PTU94023B]

- (1) Connect the short wire between the short point (D2) and the GND (Ground).
- (2) Connect the equipment (C) to the measuring point (D1).
- (3) Set the VCR to the EVR mode by transmitting the code (F1) from the Jig RCU.
- (4) Set the EVR address to (F2) by transmitting the code (F3) from the Jig RCU.
- (5) Transmit the code (F4) from the Jig RCU to adjust so that the frequency of the measuring point (D1) becomes the specified value (G).
- (6) 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.)
- (7) Disconnect the short wire between the short point (D2) and the GND (Ground).