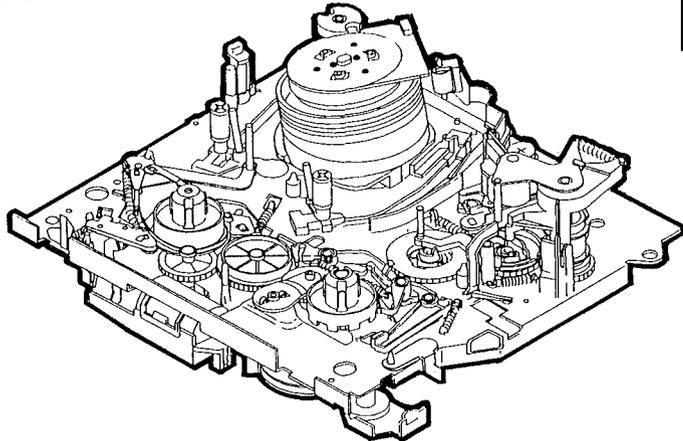


HITACHI

SERVICE MANUAL



V17007



TK

No.4527E

US Mechanism

This service manual includes the procedures to dismantle, adjust and maintain the US mechanism. Use this together with the manual of each VCR model.



Please read this service manual thoroughly before servicing. Be sure to observe the cautions described in this manual so the safety of the product can be maintained.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CASSETTE RECORDER

October 1995 Video & Personal Media Systems Division, Tokai Operation

SAFETY PRECAUTIONS

NOTICE: Comply with all cautions and safety related notes located on or inside the cabinet and on the chassis.

1. When replacing a chassis in the instrument, all the protective devices must be put back in place, such as barriers, non-metallic knobs, adjustment and compartment covers/shields, isolation resistors/capacitors, etc.
2. When service is required, observe the original lead-dress. Extra precautions should be taken to assure correct lead dress in the high voltage circuit.
3. Always use the manufacturer's replacement components. Especially critical components as indicated on the circuit diagram should not be replaced by other manufacturers'. Furthermore, where a short-circuit has occurred, replace those components that indicate evidence of overheating.
4. Before returning an instrument to the customer, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the instrument by the manufacturer has become defective or inadvertently defeated during servicing. Therefore, the following checks should be performed for the continued protection of the customer and service technician.

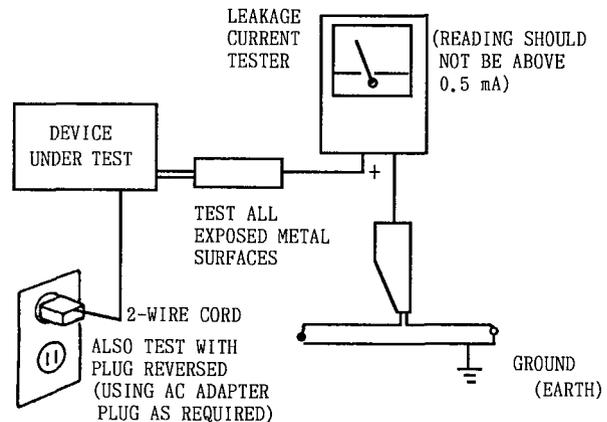
Leakage Current Cold Check

With the AC plug removed from the AC120V, 60Hz source, place a jumper across the two plug prongs. Turn the AC power switch on. Using an insulation tester (DC500V), connect one lead to the jumpered AC plug and touch the other lead to exposed metal parts (antennas, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistor reading of 0.3 Mohm and a maximum resistor reading of 5 Mohm. Any resistor value below or above this range indicates an abnormality which requires corrective action. Exposed metal parts not having a return path to the chassis will indicate an open circuit.

Leakage Current Hot Check

Plug the AC line cord directly into a AC120V, 60Hz outlet (do not use an isolation transformer for this check).

Turn the AC power switch on. Using a "Leakage Current Tester", measure for current from all exposed metal parts of the cabinet (antennas, screwheads, metal overlays, control shaft, etc.), particularly an exposed metal part having a return path to the chassis, to a known ground (earth) (water pipe, conduit, etc.). Any current measured must not exceed 0.5 mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE UNIT TO THE CUSTOMER.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts have special safety-related characteristics. These are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for a higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual. Electrical components having such features are identified by marking with a  on the schematics and the parts list in this Service Manual. The use of a substitute replacement component which does not have the same safety characteristics as the HITACHI recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards. Product safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current HITACHI Service Manual. A subscription to, or additional copies for, HITACHI Service Manual may be obtained at a nominal charge from HITACHI SALES CORPORATION.

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Appearances of US Mechanism

1. Top View of US Mechanism (I)

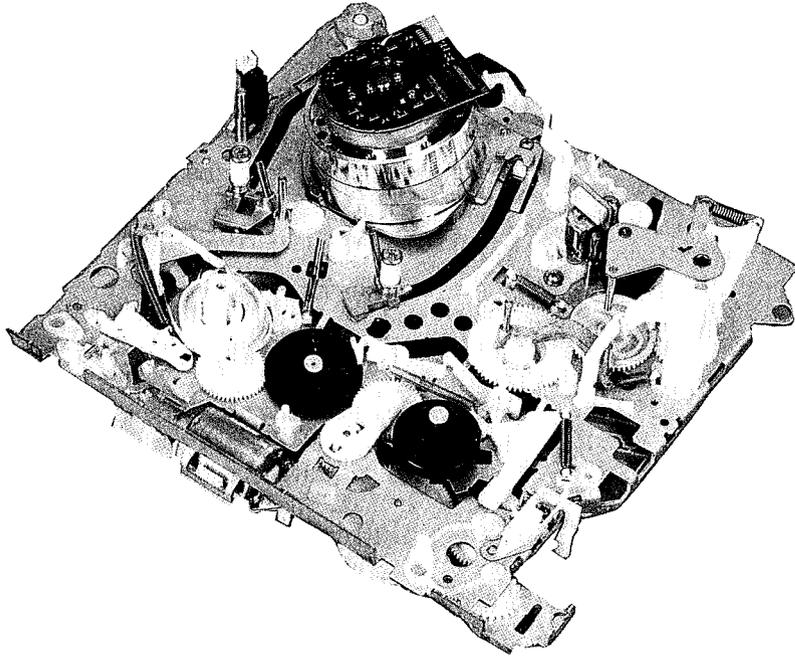


Fig. 1-1

2. Top View of US Mechanism (II)

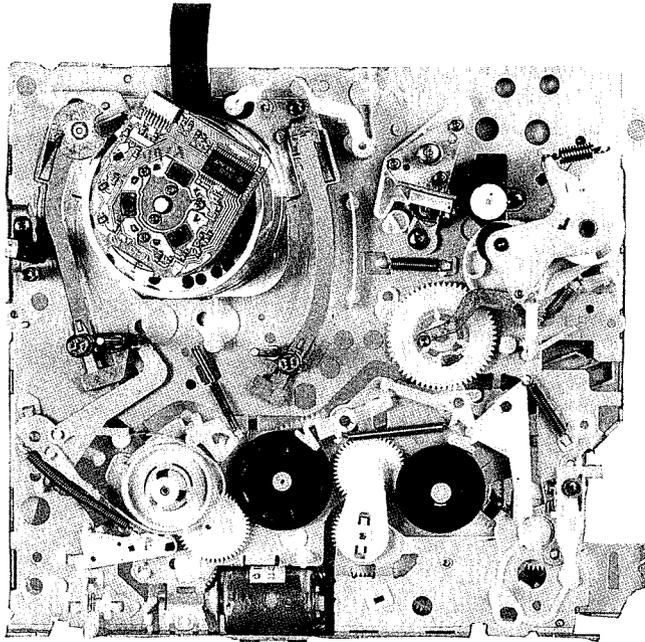


Fig. 1-2

3. Bottom View of US Mechanism (I)

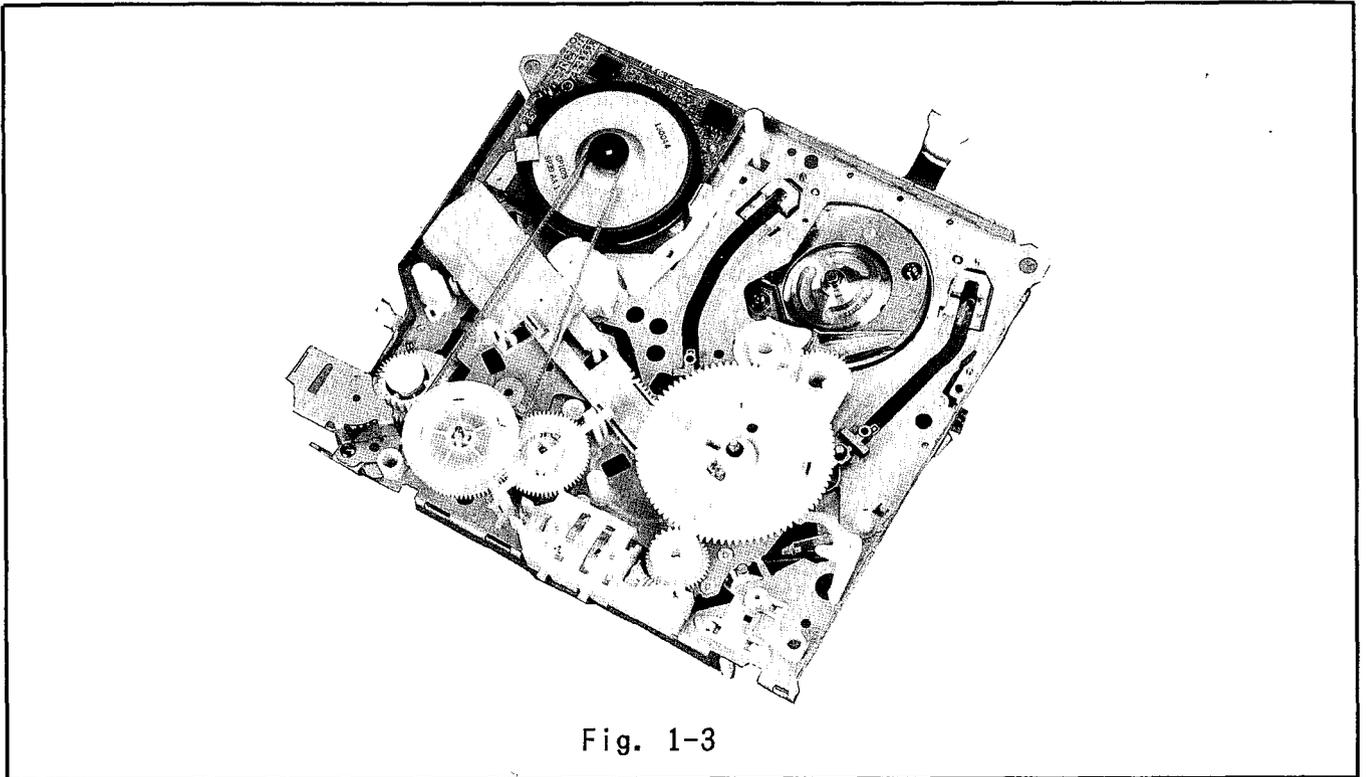


Fig. 1-3

4. Bottom View of US Mechanism (II)

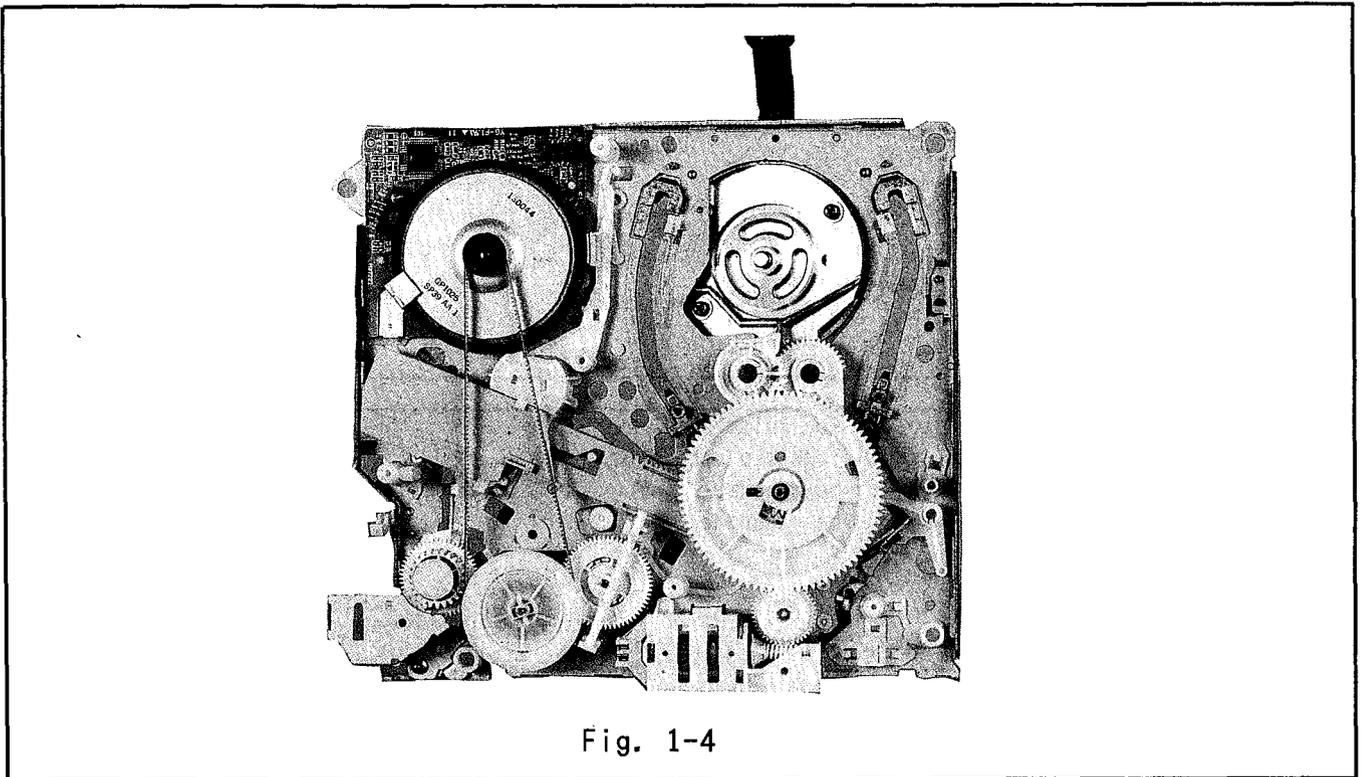


Fig. 1-4

How to Remove the Cassette when a Malfunction Has Occurred in the Mechanism

If a cassette is caught in the mechanism because of a malfunction in the mechanism, remove it by the following procedure.

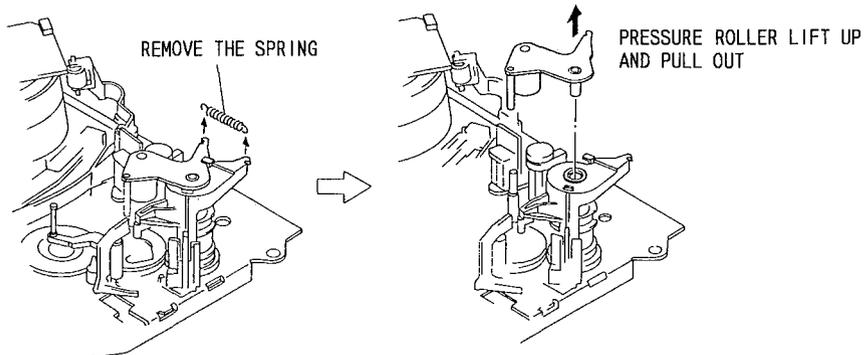
[Work Procedure]

1. Remove the top cover.
2. Remove the front panel.

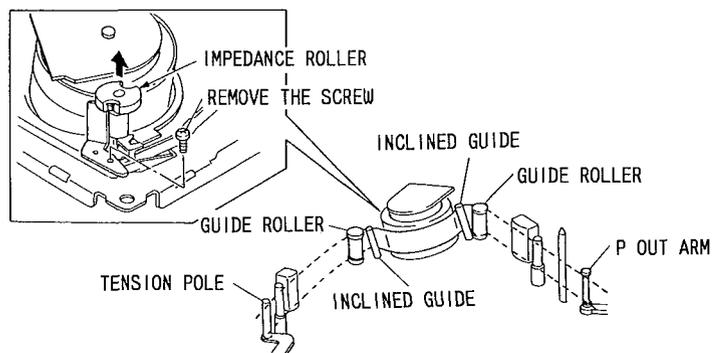
If the tape is wound round the cylinder in the loading state

If the cassette does not come out from the FL mechanism in the unloading state.

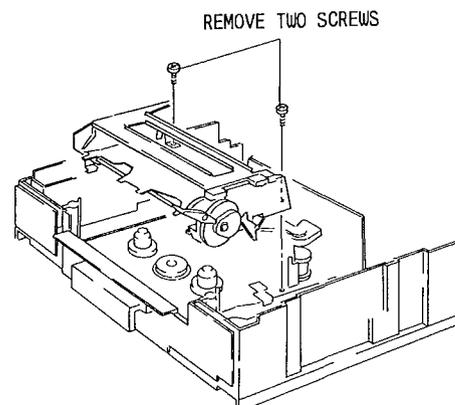
Remove the spring and lift the pressure roller to pull it out.



- 1) Remove the screw and lift the impedance roller together with the impedance plate.
- 2) Slacken the tape and release it from the tension pole, guide rollers, inclined guides and P out arm.



- 1) Remove two screws holding the FL mechanism.
- 2) Hold the cassette lid with your fingers so the tape is not damaged and remove the FL mechanism.
- 3) Remove the slack tape and eject the cassette.



1. Before Starting Disassembly

- 1) Unplug the power cord from the AC outlet.
- 2) [Removal procedure]
If a special procedure is required when dismantling any component, it is indicated using numbers. Follow the numbers (①, ②, ③ ...) shown in the illustrations.

[Reinstallation procedure]

Reinstall each component in the reverse order to removal when otherwise not specified.

2. Identifications and Locations of Components of US Mechanism

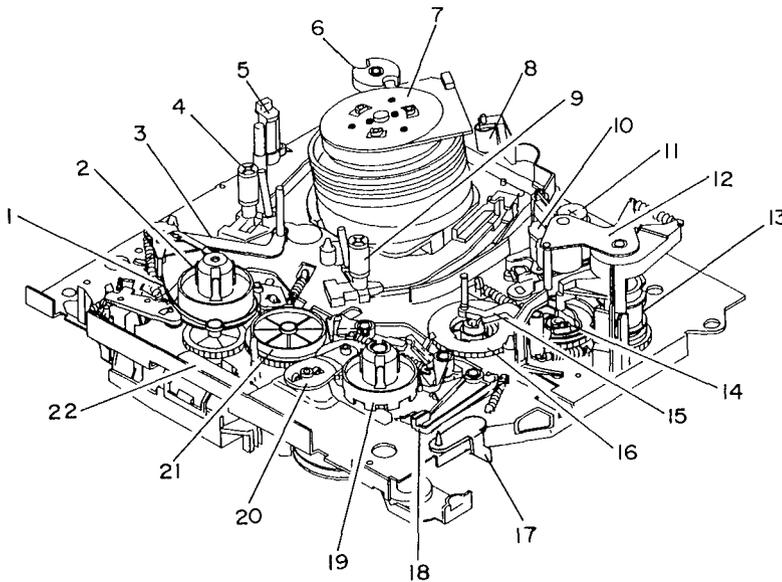


Fig. 2-1 Top View of US Mechanism

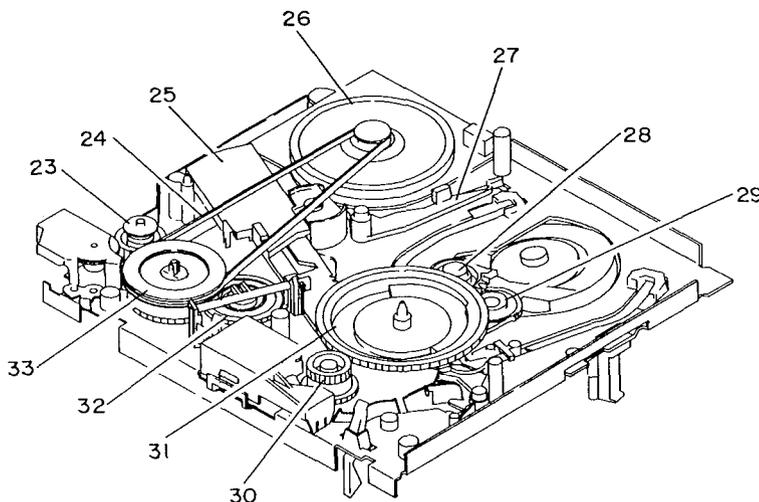


Fig. 2-2 Bottom View of US Mechanism

1. Tension band
2. Supply reel disk
3. Tension arm
4. Supply guide roller
5. Full erase (FE) head
6. Impedance roller
7. Cylinder motor
8. HC mechanism
9. Take-up guide roller
10. Audio/control (A/C) head
11. Capstan shaft
12. Pressure roller arm
13. Spiral gear
14. PR idler gear
15. P. out arm
16. P. drive gear
17. S-VHS switch (S-VHS VCR only)
18. Take-up brake
19. Take-up reel disk
20. FR arm
21. Idler gear 2
22. Loading motor
23. FL change gear
24. Drive belt
25. Slider
26. Capstan motor
27. FS brake
28. Loading gear (R)
29. Loading gear (L)
30. LM wheel gear
31. Cam gear
32. Torque change gear
33. Pulley assembly

3. US Mechanism Disassembly Method

When replacing defective parts, first refer to the "parts hierarchy chart" shown below. This chart shows the procedure for parts removal when replacing defective parts.

[How to use the parts hierarchy chart]

- (1) Locate the part to be replaced.
- (2) Check the parts in the ranks above the part to be replaced and start dismantling.
- (3) Replace the defective part and reinstall the parts in the reverse order to that shown in the parts hierarchy chart.

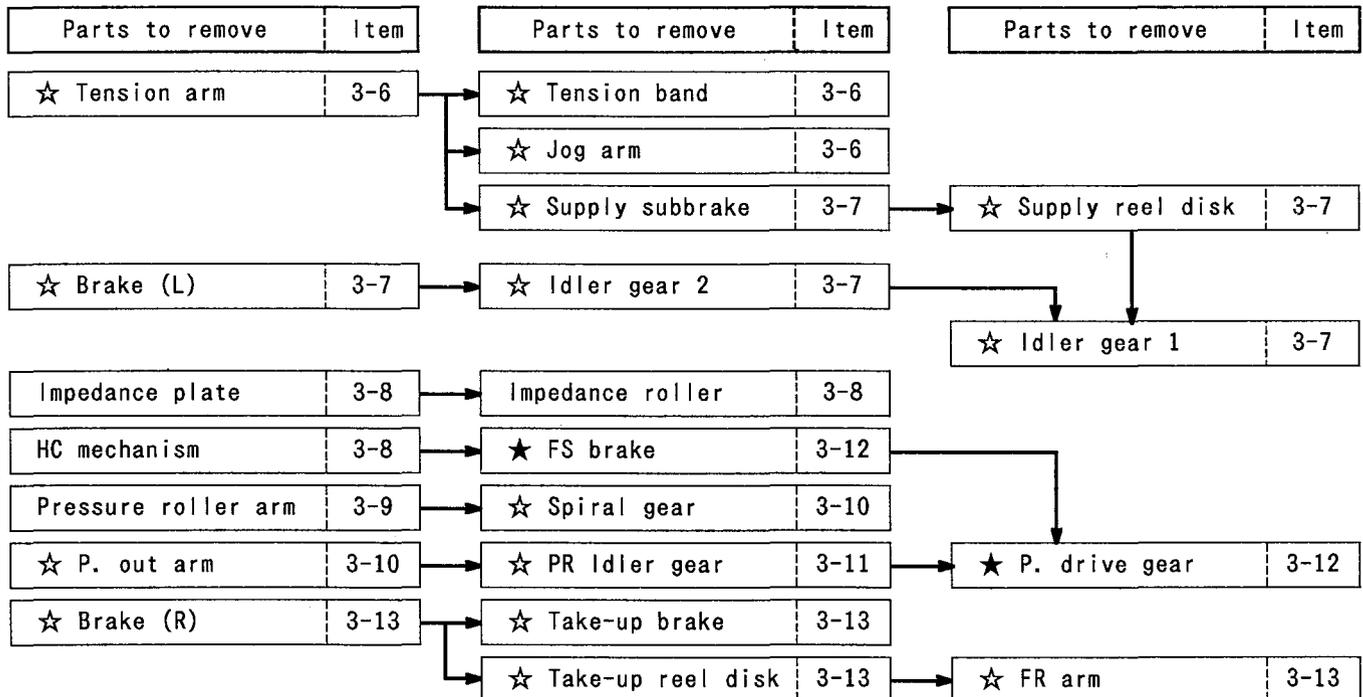
Removal of Heads and Motors

Note: Dismantle parts in the eject state.

Parts to remove	Item	Parts to remove	Item	Parts to remove	Item
FE head	3-1				
A/C head	3-2				
★ Cylinder motor	3-3				
★ Capstan motor	3-4				
★ Loading motor	3-5				

Removal of Tape Transport Parts

Note: Dismantle parts in the eject state.

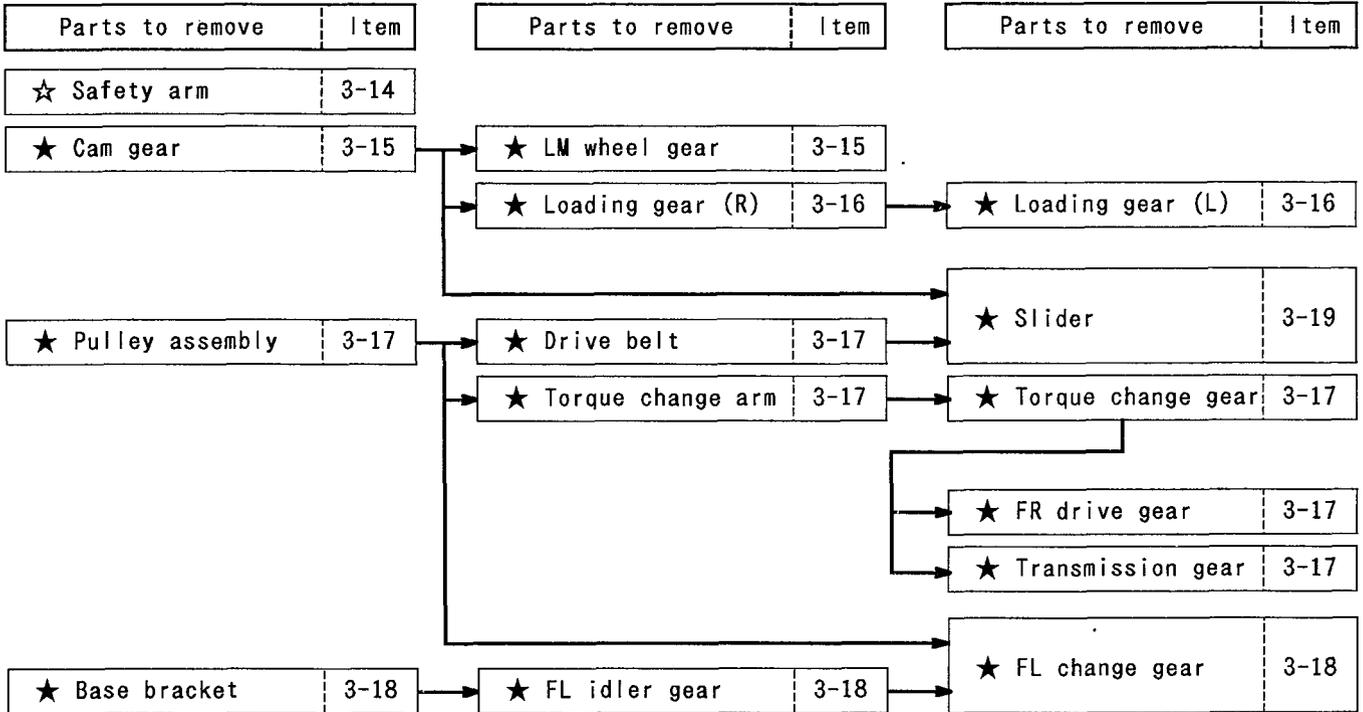


◆ How to interpret the symbols

- Dismantle the parts marked ★ after the FL mechanism has been removed.
- Dismantle the parts marked ☆ after the US mechanism has been removed from the VCR.
- The parts without any marks can be replaced with the top cover removed.

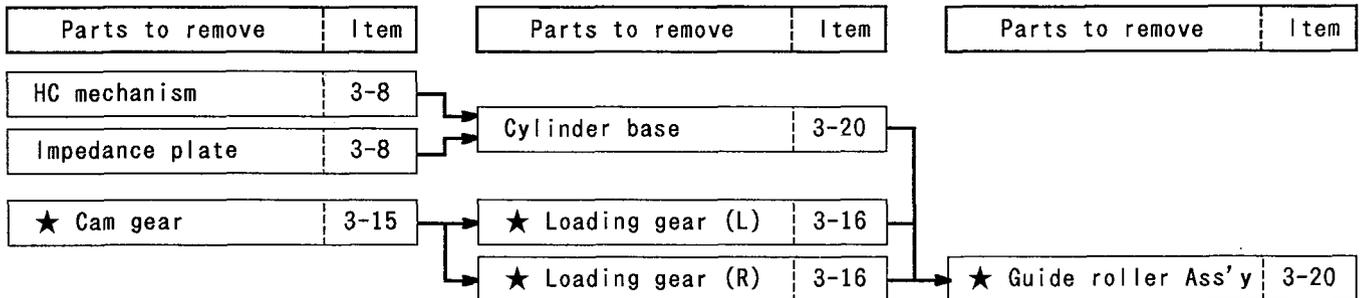
Removal of Tape Drive Parts

Note: Dismantle parts in the eject state.



Removal of Guide Roller Assemblies

Note: Dismantle parts in the eject state.



◆ How to interpret the symbols

- Dismantle the parts marked ☆ after the FL mechanism has been removed.
- Dismantle the parts marked ★ after the US mechanism has been removed from the VCR.
- The parts without any marks can be replaced with the top cover removed.

3-1. FE head

◆ Caution when reinstalling

- 1) Clean the surfaces of the FE head and supply guide roller with which the tape comes into contact.

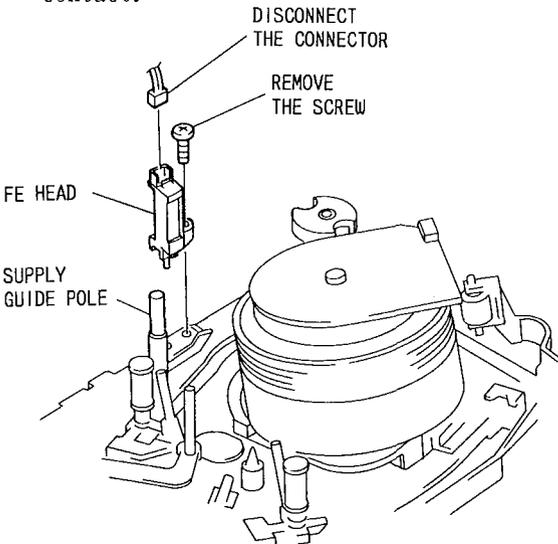


Fig. 3-1

3-2. A/C head

◆ Caution when reinstalling

- 1) Clean the surface of the A/C head with which the tape comes into contact.

◆ Mechanism adjustment after reinstalling

- 1) Audio/control (A/C) head adjustment

◆ Electrical adjustment after reinstalling

- 1) X-value adjustment

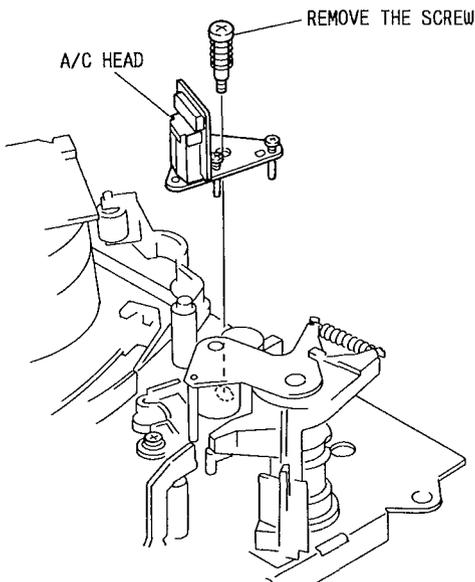


Fig. 3-2

3-3 Cylinder motor assembly

◆ Caution during work

- 1) Do not touch the video head tips.

◆ Mechanism adjustment after reinstalling

- 1) Adjustments after replacing the cylinder

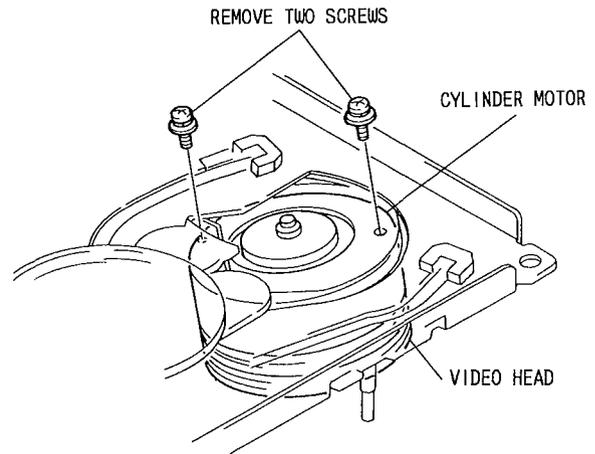


Fig. 3-3

3-4. Capstan motor

◆ Caution when reinstalling

- 1) Clean the surface of the capstan shaft with which the tape comes into contact.

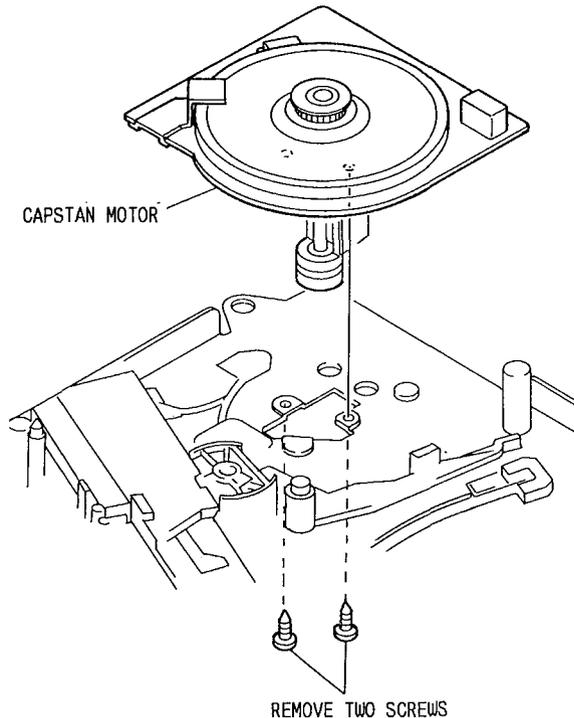


Fig. 3-4

3-5. Loading motor

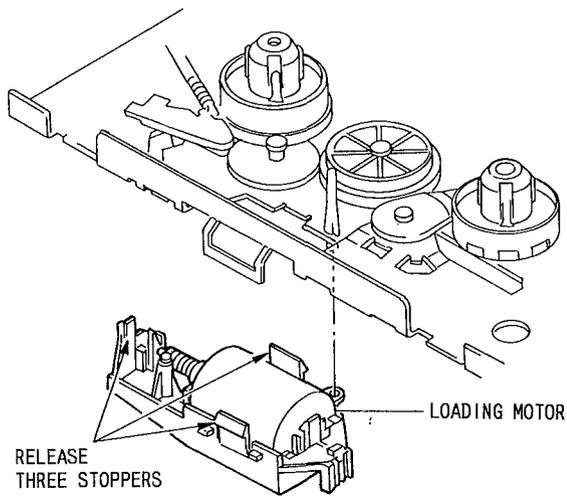


Fig. 3-5

3-6. Tension arm, tension band and jog arm

◆ Caution when reinstalling

- 1) Clean the surface of the tension pole with which the tape comes into contact.

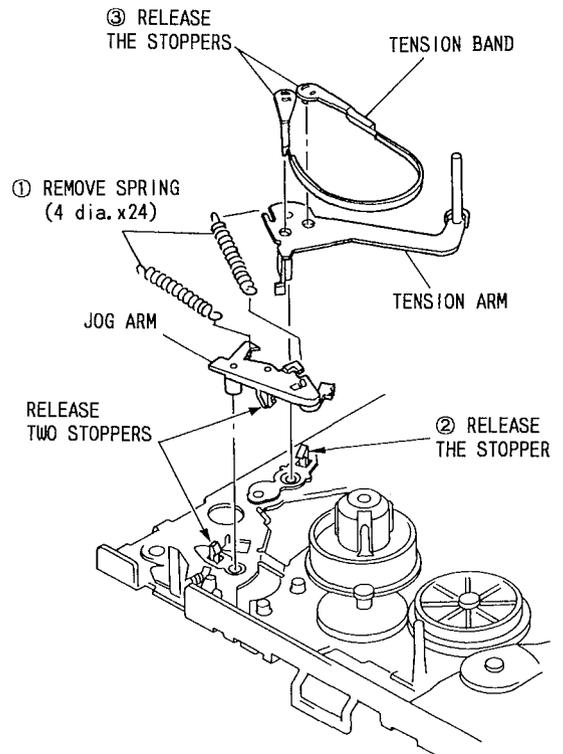


Fig. 3-6

3-7. Supply subbrake, supply reel disk, brake (L), idler gears 1 and 2

◆ Mechanism adjustment after reinstalling

- 1) Reel disk height adjustment

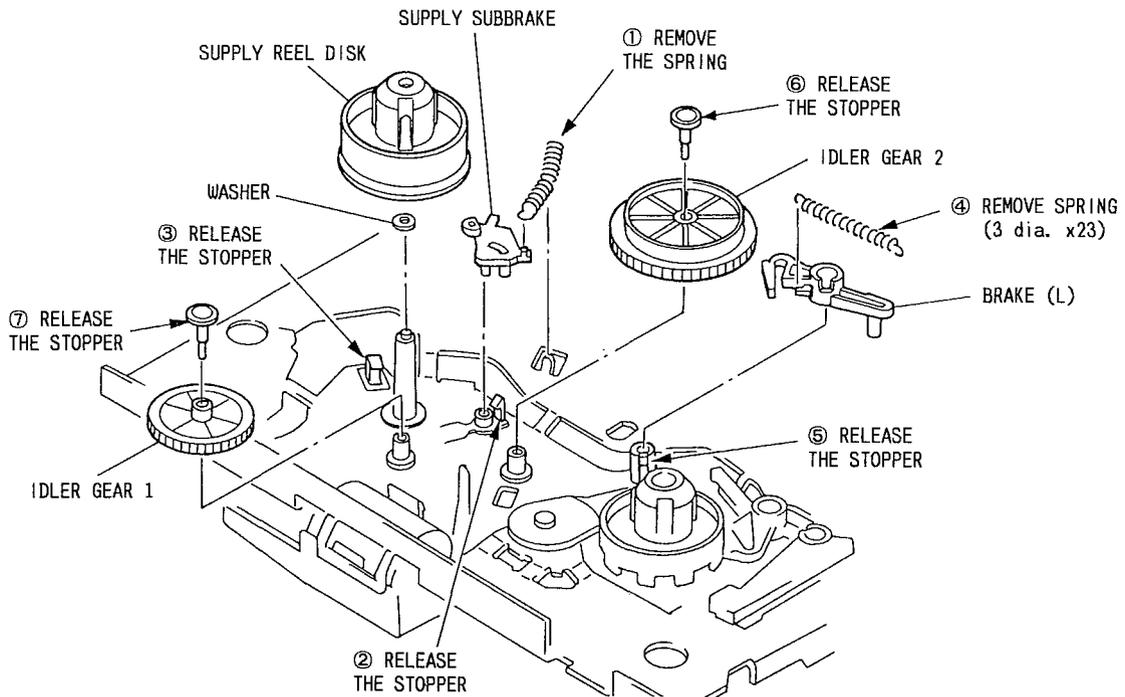


Fig. 3-7

3-8. Impedance roller and HC mechanism

◆ Caution when reinstalling

- 1) Check that the HC mechanism arm is set to the specified position.

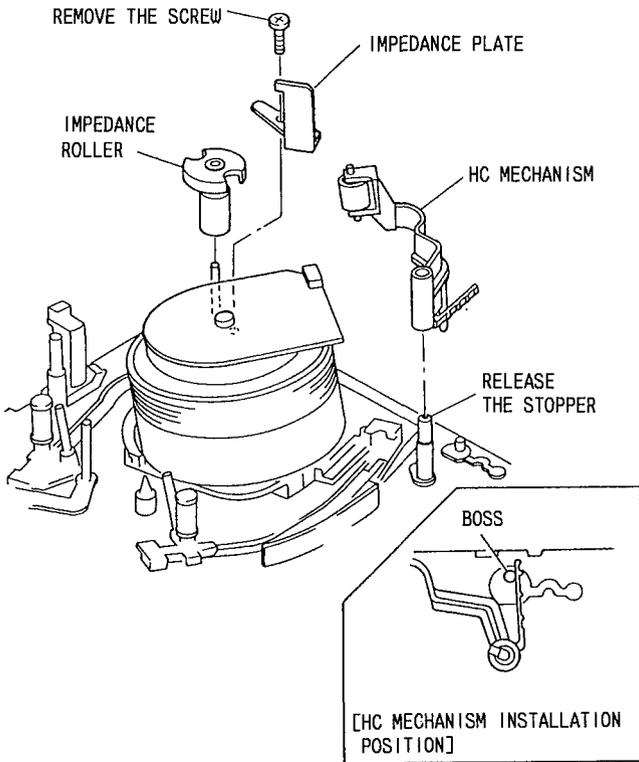


Fig. 3-8

3-9. Pressure roller arm

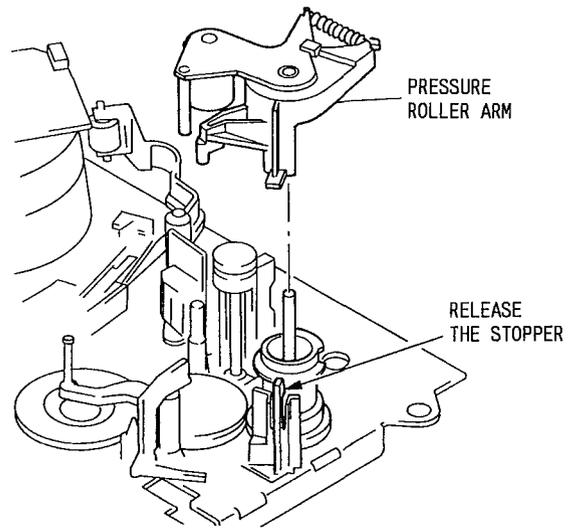


Fig. 3-9

3-10. Spiral gear and P. out arm

◆ Cautions when reinstalling

- 1) Align the gear positions of the spiral gear and PR idler gear.
- 2) Clean the surface of the P. out arm with which the tape comes into contact.
- 3) Check that the P. out arm is set to the specified position.
- 4) Turn the lid opener counterclockwise to lock it.

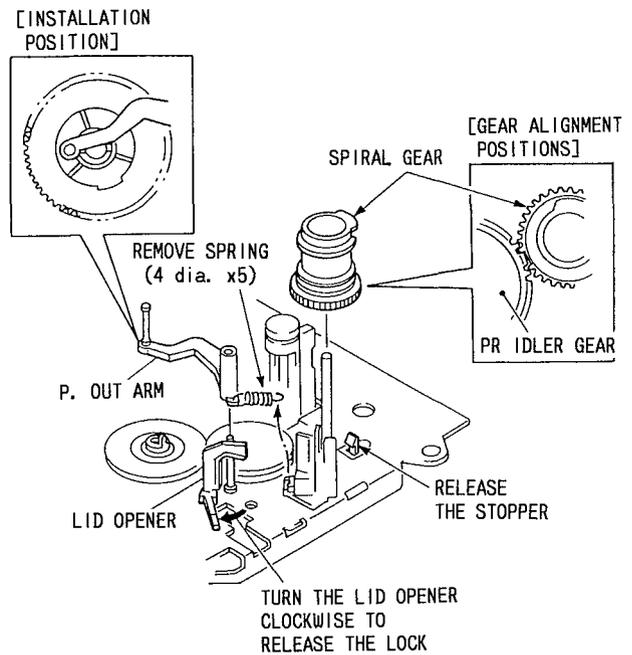


Fig. 3-10

3-11. PR idler gear

◆ Caution when reinstalling

- 1) Align the gear positions of the P. drive gear and PR idler gear.

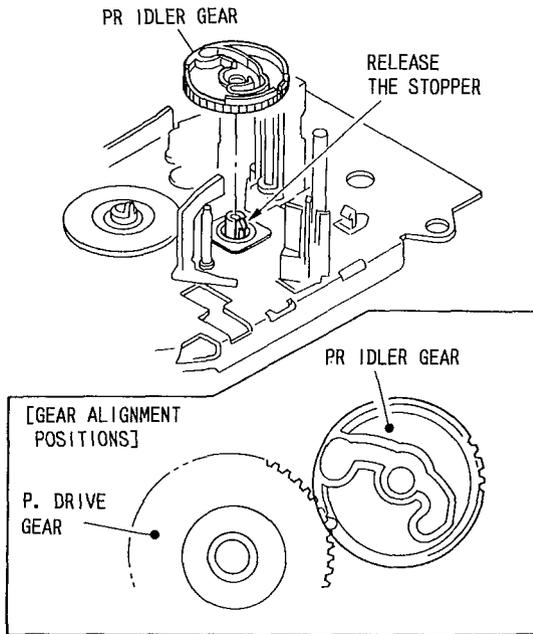


Fig. 3-11

[Items to be checked around the pressure roller]

- (A) Engaged section between the spiral gear and PR idler gear
- (B) Δ mark (No. 1) on the P. drive gear and ∇ mark on the spring hook
- (C) Engaged section between the PR idler gear and P. drive gear
- (D) The lid opener is locked in the specified position.
- (E) Engaged section between the P. drive gear and slider

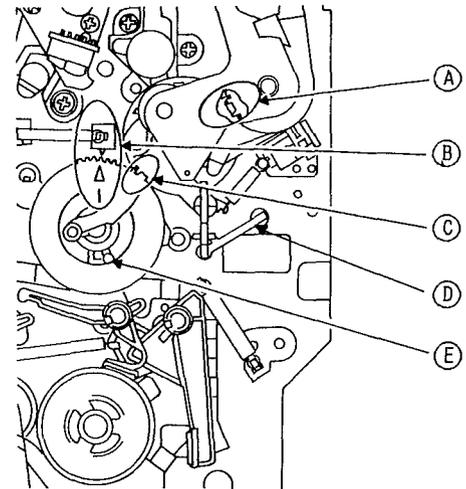


Fig. 3-12

3-12. FS brake and P. drive gear

◆ Caution when reinstalling

- 1) Align the positions of the P. drive gear and slider.

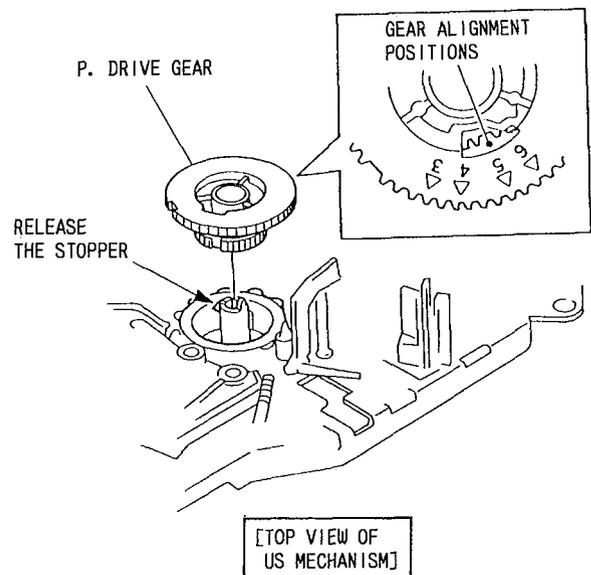
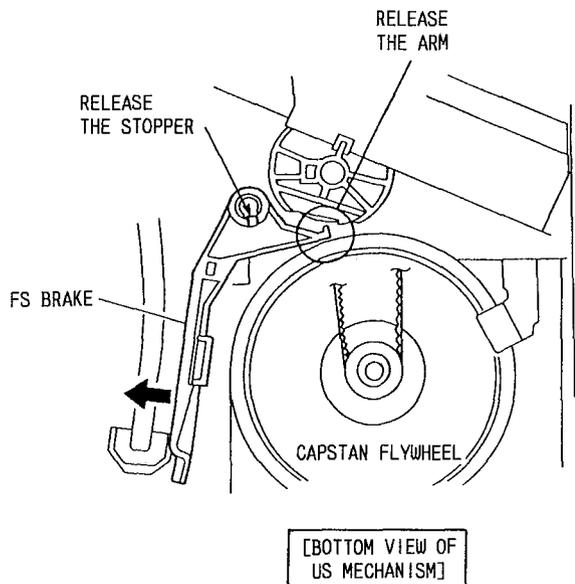


Fig. 3-13

3-13. Brake (R), Take-up brake, take-up reel disk and FR arm

◆ Mechanism adjustment after reinstalling

- 1) Reel disk height adjustment

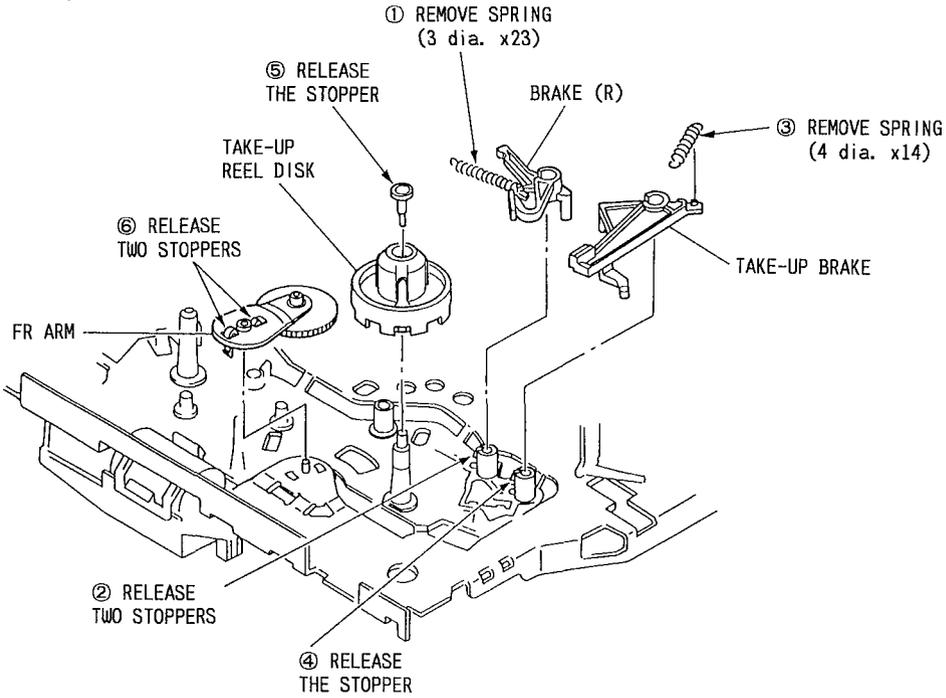


Fig. 3-14

3-14. Safety arm

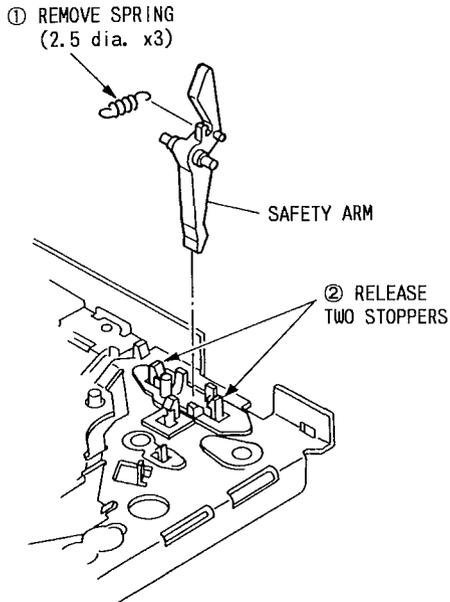


Fig. 3-15

3-15. Cam gear and LM wheel gear

◆ Caution when reinstalling

- 1) Align the positions of the cam gear and slider.

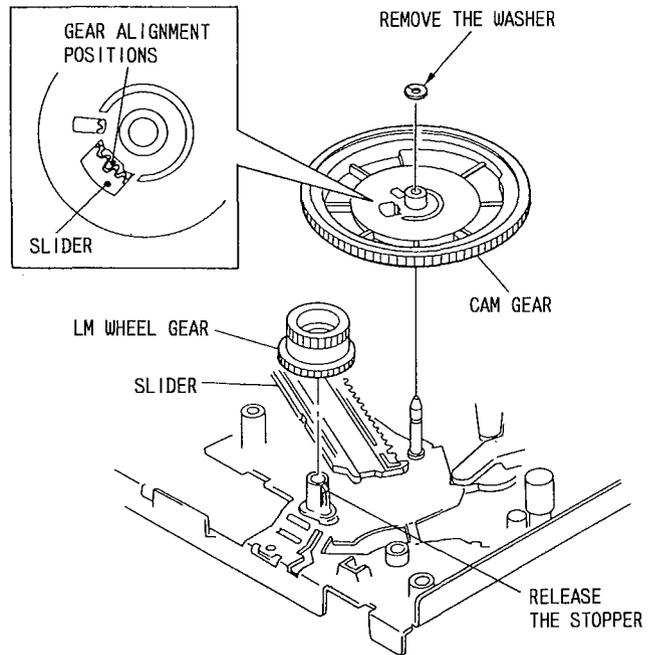


Fig. 3-16

3-16. Loading gears (R) and (L)

◆ Caution when reinstalling

- 1) Align the positions of loading gears (R) and (L).

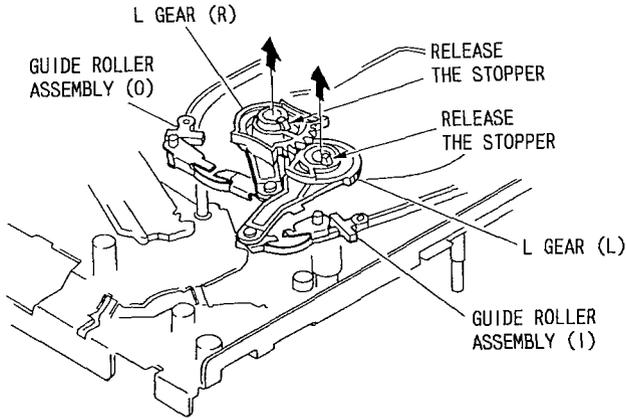


Fig. 3-17

[Items to check concerning gear alignment around loading gears]

- (A) Engaged section between loading gears (R) and (L)
- (B) Engaged section between the cam gear and slider

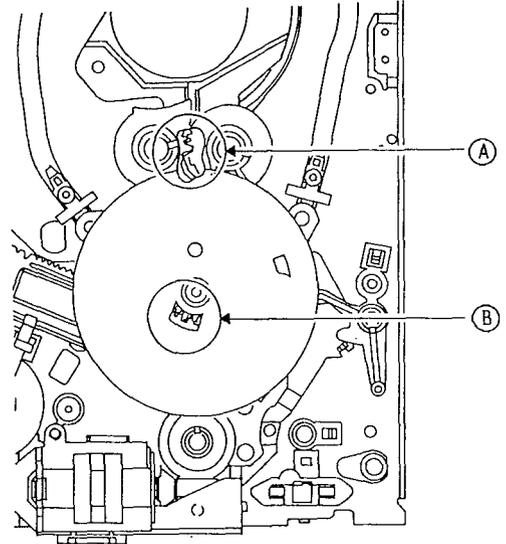


Fig. 3-18

3-17. Pulley assembly, drive belt, torque change arm, torque change gear, FR drive gear and transmission gear

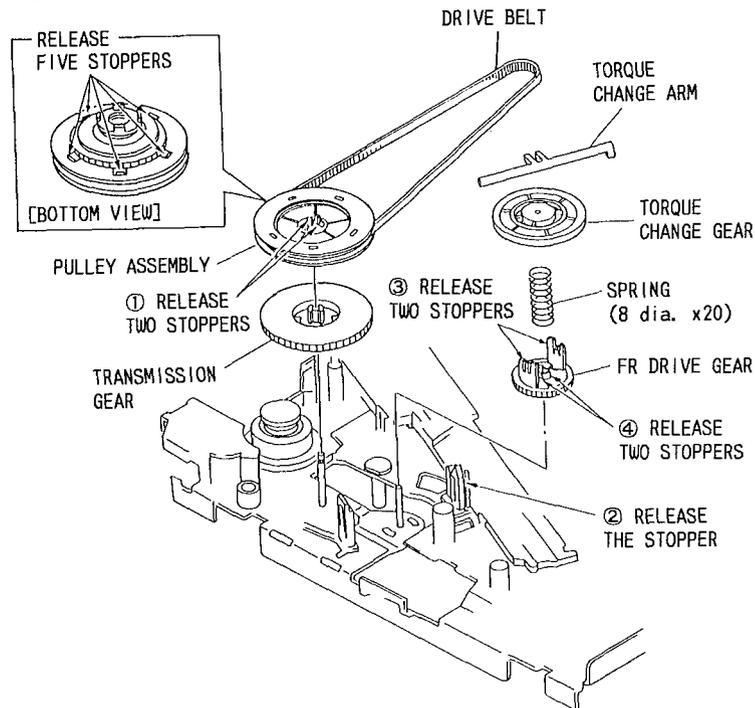


Fig. 3-19

3-18. FL idler gear and FL change gear

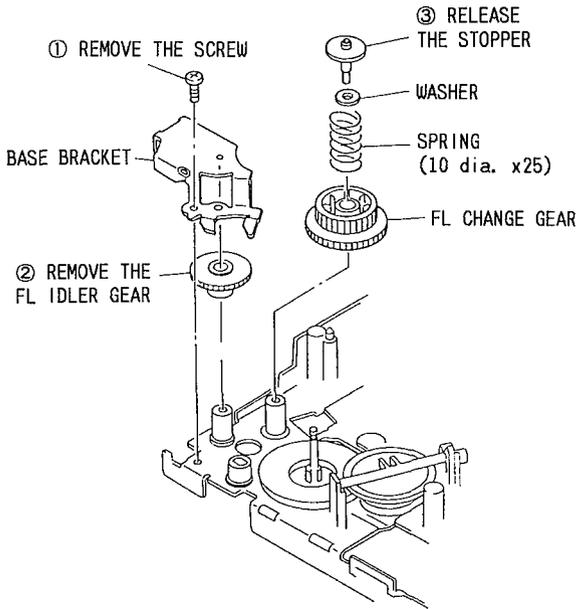


Fig. 3-20

3-19. Slider

◆ Tips when reinstalling

- 1) Align the projection at the left of the slider and the boss of the chassis.
- 2) Pull the take-up brake in the direction of the arrow and reinstall the slider.

[TIP FOR INSTALLATION (1)]

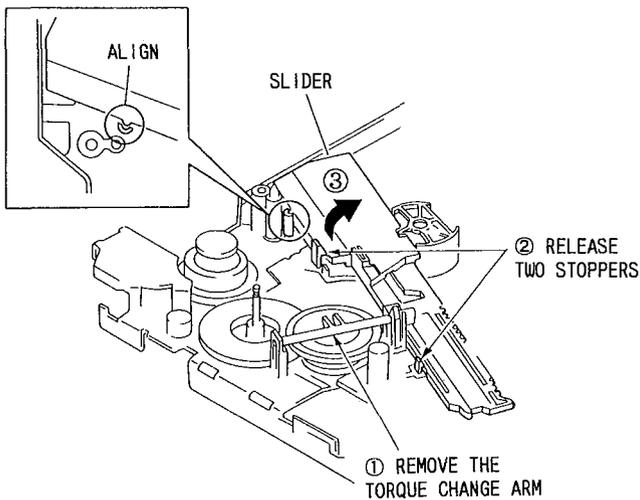


Fig. 3-21

[TIP FOR INSTALLATION (2)]

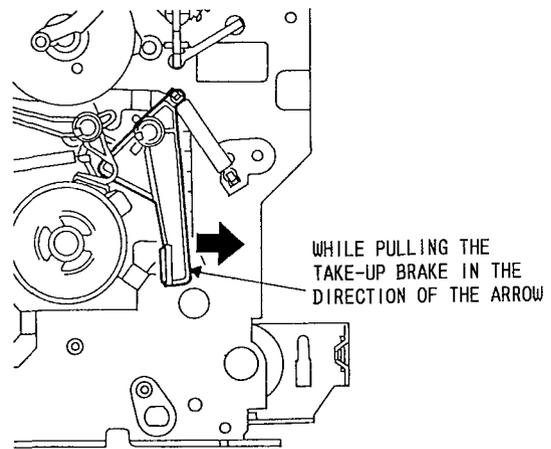


Fig. 3-22

3-20. Cylinder base and guide roller assemblies

◆ Caution when reinstalling

- 1) Clean the surfaces of the guide rollers with which the tape comes into contact.

◆ Mechanism adjustment after reinstalling

- 1) Guide roller height adjustment

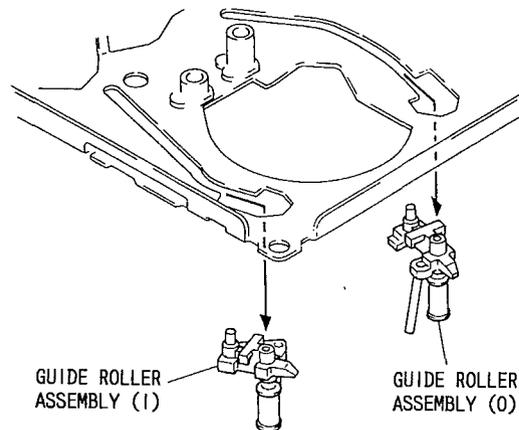
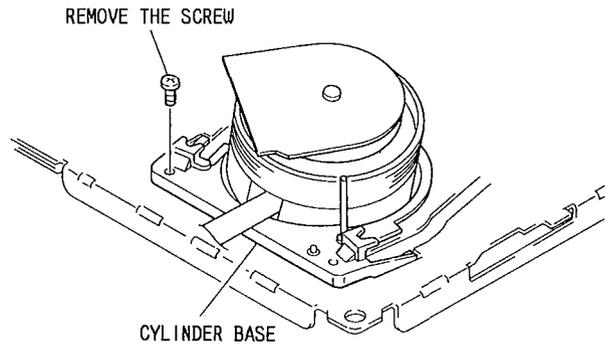


Fig. 3-23

Item to Check After Reinstalling the US Mechanism

After dismantling the mechanism or replacing its components, reinstall the components in their original positions correctly and perform the following checks.

Checking the surface of US mechanism

- (A) The HC mechanism is set in the correct position.
- (B) The engaged section between the spiral gear and PR idler gear is correct.
- (C) The engaged section between the PR idler gear and P. drive gear is correct.
- (D) The P. out arm is set to the correct position.
- (E) The engaged section between the P. drive gear and slider is correct.

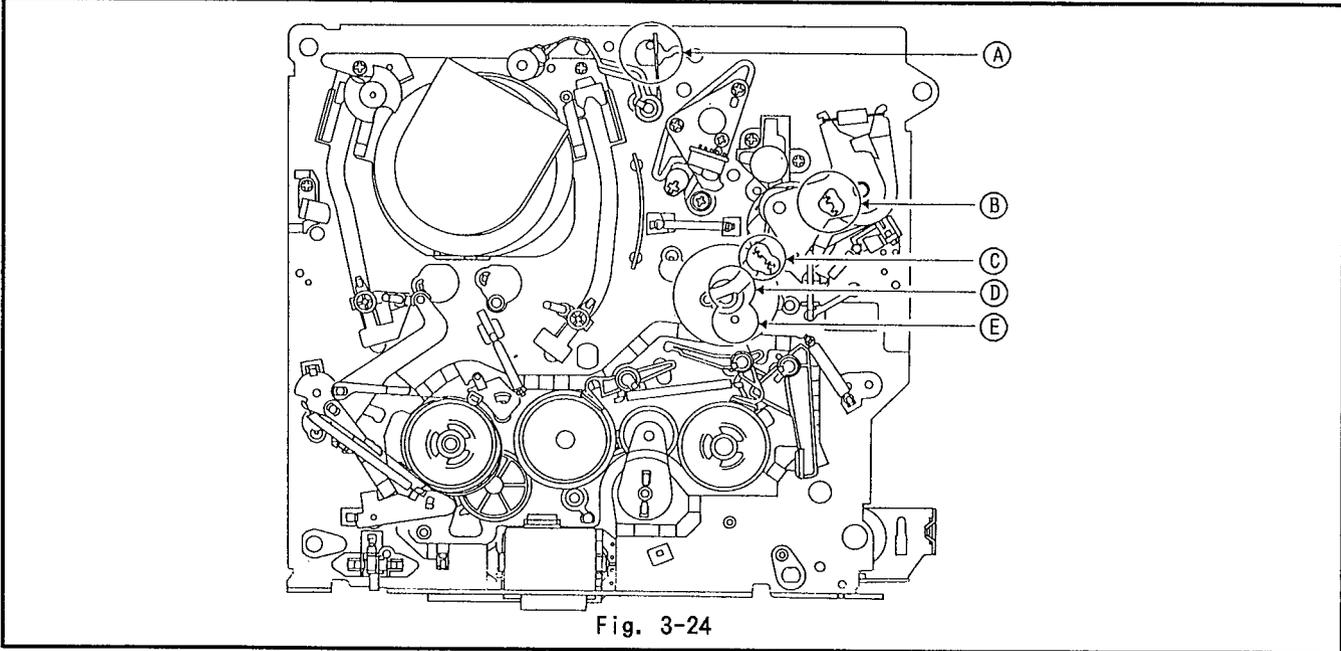


Fig. 3-24

Checking the bottom of US mechanism

- (A) The projection of the slider and the boss of chassis are aligned.
- (B) The engaged section between the loading gears (R) and (L) is correct.
- (C) The sections in which the cam gear and slider are engaged are correct.

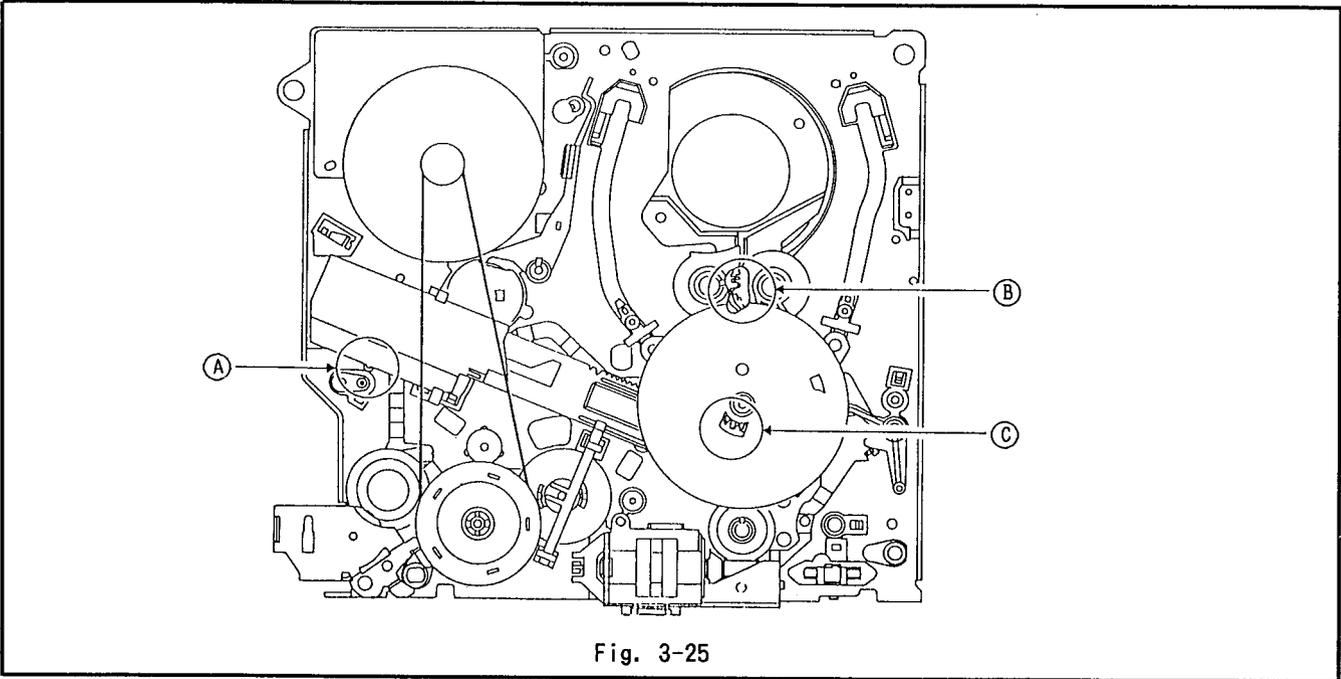
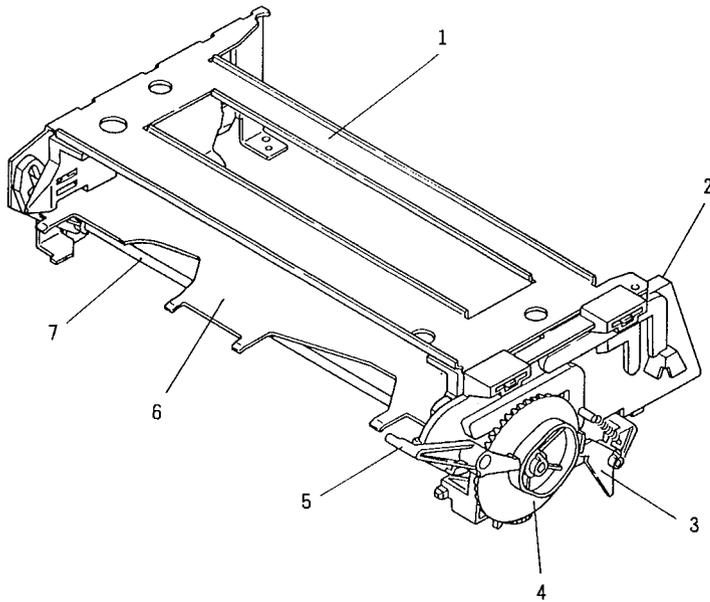


Fig. 3-25

4. Identifications and Locations of Parts in US-FL Mechanism



1. Side bracket (L)
2. Side bracket (R)
3. Switch arm
4. Bevel gear
5. Door arm
6. Cassette holder
7. FL drive arm

Fig. 4-1

5. Procedure to Dismantle the US-FL Mechanism

5-1. Door arm, switch arm, bevel gear and FL gear

◆ Caution when reinstalling

- 1) Reinstall the bevel gear so the holders in the bevel gear and side bracket (R) are aligned.

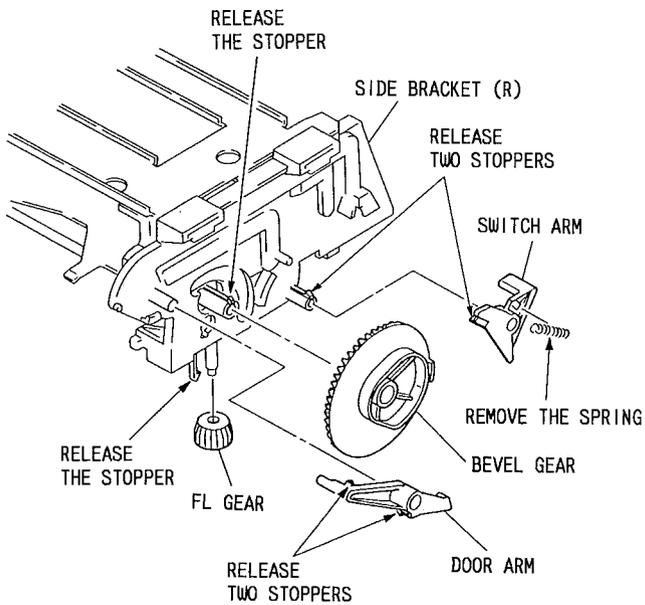


Fig. 5-1

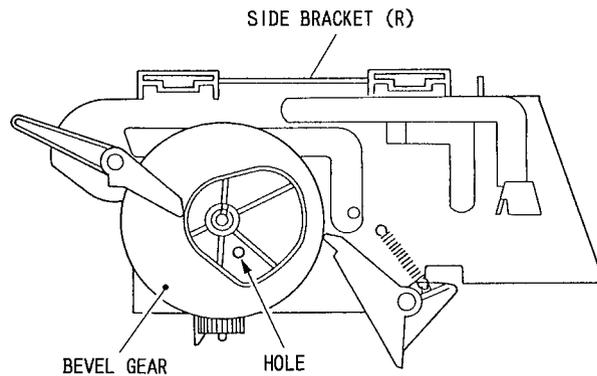


Fig. 5-2

5-2. Side brackets (R) and (L), cassette holder and FL drive arm

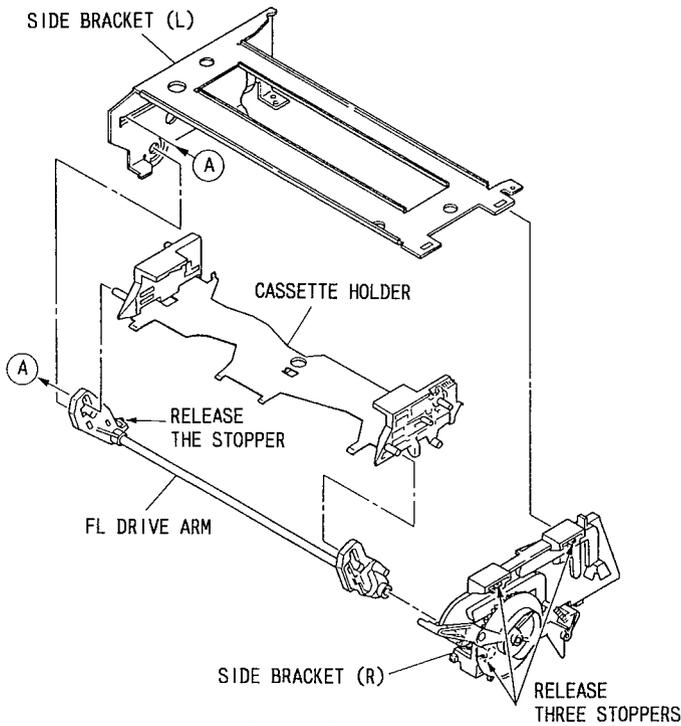


Fig. 5-3

◆ Cautions when reinstalling

- 1) Check the insertion of seven bosses.
- 2) Align hole (a) in side bracket (R) and the hole in the bevel gear.

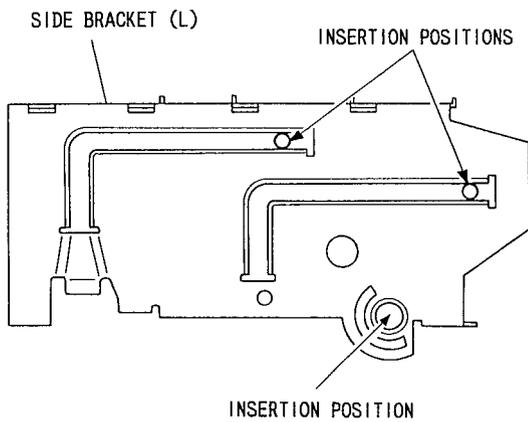


Fig. 5-4

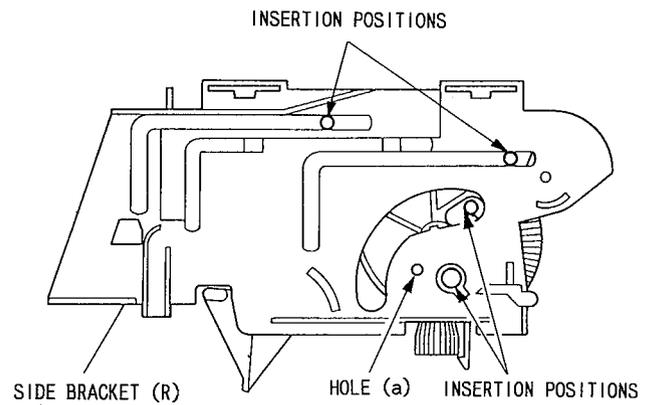
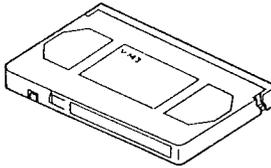
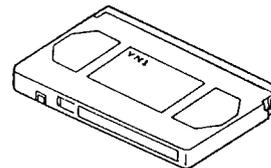
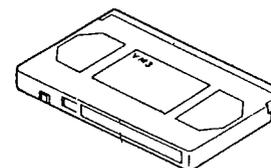
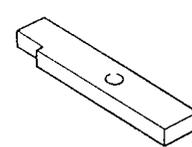
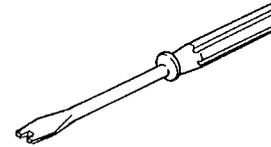
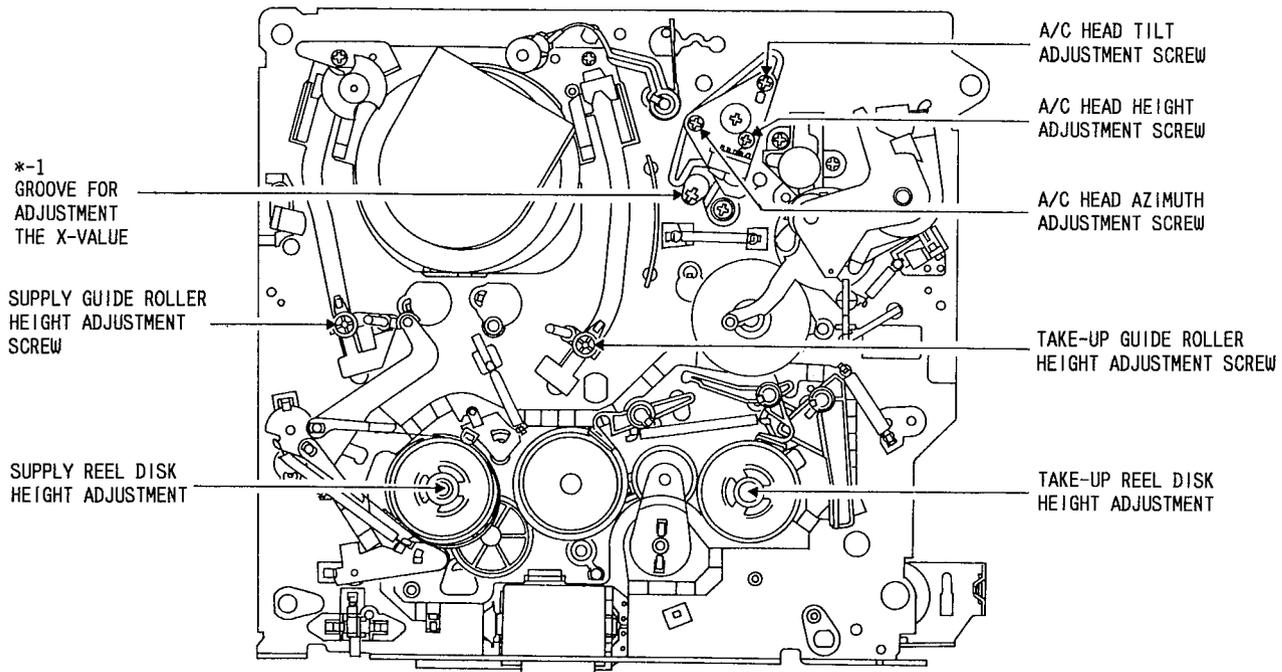


Fig. 5-5

1. List of Adjustment Jigs

<p>1. NTSC Alignment Tape [For NTSC] Part No.7099046</p> 	<p>2. 30HMP2-1 Alignment Tape [For NTSC] Part No.7099089</p> 	<p>3. PAL Alignment Tape [For PAL] Part No.7099052</p> 
<p>4. Master Plane Part No.7099279</p> 	<p>5. Torque Gauge Part No.7099039</p> 	<p>6. Torque Gauge Adapter Part No.7099035</p> 
<p>7. Reel Disk Height Jig Part No.7099038</p> 	<p>8. Guide Roller Adjustment Screwdriver Part No.7069064</p> 	

2. Diagram showing Adjustment Locations



*-1: For X-value adjustment, refer to the chapter on electrical adjustment in the service manual of each model.

3. Tape Transport Component Adjustments

The tape transport system is a generic term for the path from the supply reel disk to the take-up reel disk via the cylinder (video heads). The tape transport components, especially the components which come into direct contact with the tape, must be kept clean without damage, dust, oil, etc. adhering to the contact surfaces.

When replacing components in the tape transport system, adjust only the new components so the transport system is stabilized.

3-1. Reel disk height adjustment

Purpose: To set the height of reels in the cassette to the specified value so the tape height is determined.

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
<ul style="list-style-type: none"> • Master plane (Parts No. 7099279) • Reel disk height jig (Parts No. 7099038) 	<ol style="list-style-type: none"> 1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it. 	—	<ul style="list-style-type: none"> • Washers in the supply and take-up reel disks

Adjustment procedure

- 1) Check that the reel disk is placed between sections A and B of the reel disk height jig.
- 2) If the above cannot be confirmed, replace the washers (0.5 mm thick) of the reel disk or adjust the number of washers.

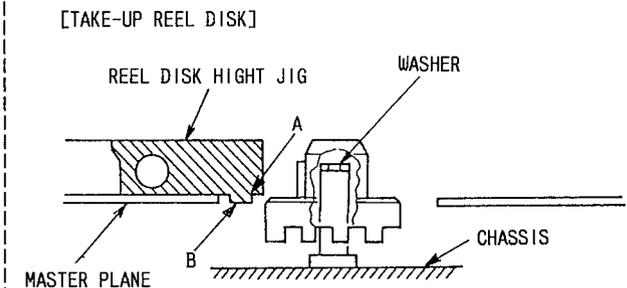
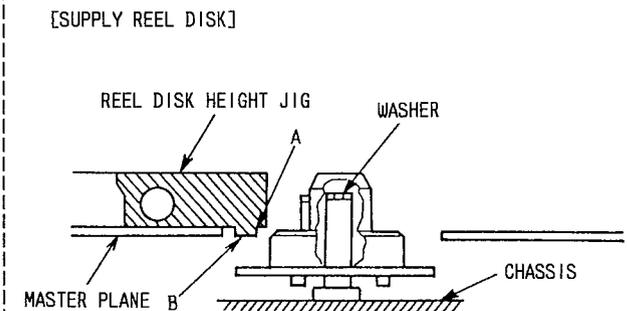
[Procedure to replace supply reel disk washers]

- 1) Remove the tension arm and tension band.
- 2) Remove the supply subbrake.
- 3) Lift the supply reel disk and replace the washers or adjust the number of washers.

[Procedure to replace take-up reel disk washers]

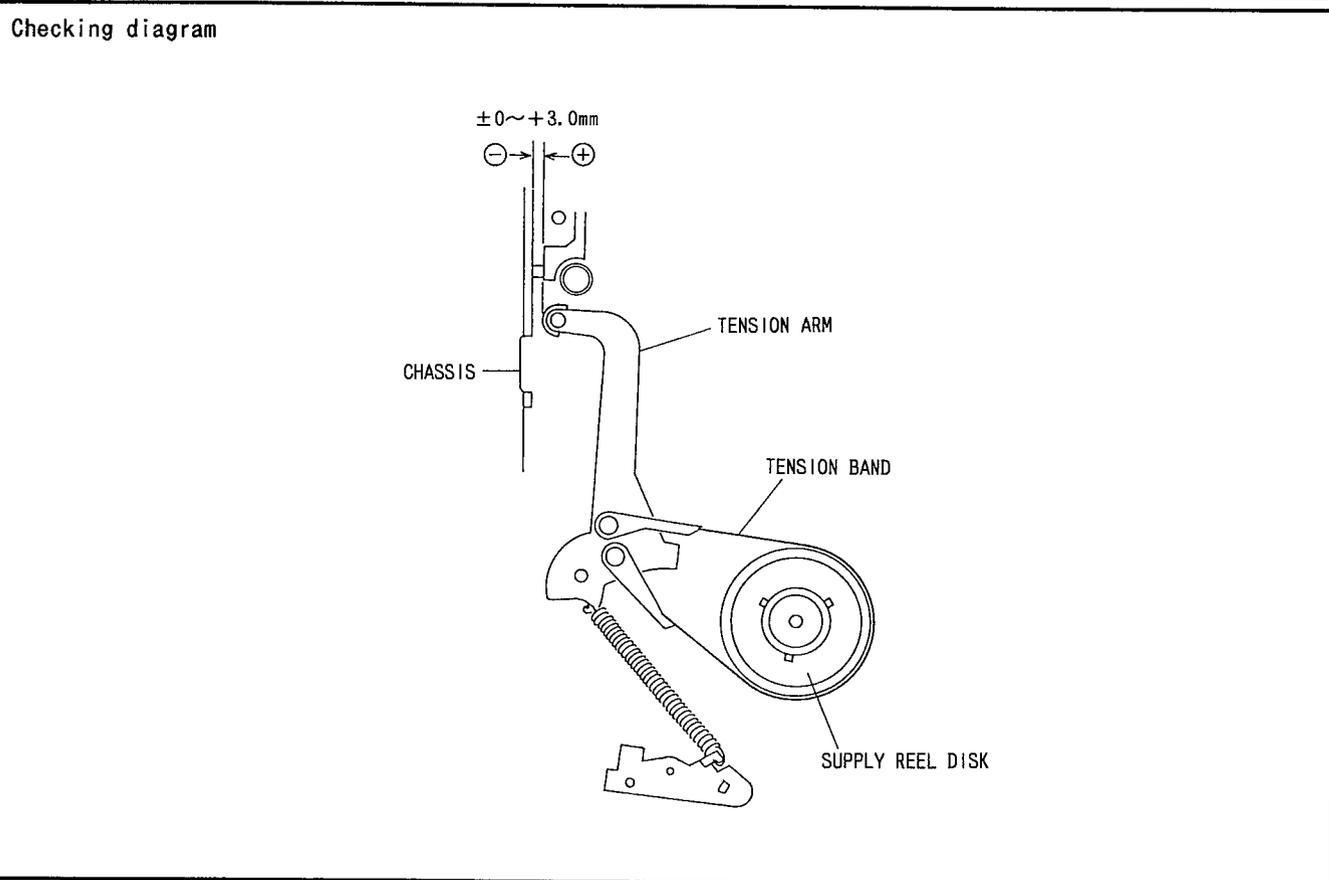
- 1) Remove brake (R).
- 2) Lift the take-up reel disk and replace the washers or adjust the number of washers.

Adjustment diagram



3-2. Tension pole position check

Purpose: To keep the tension of the tape to be supplied constant so the contact between the heads and tape is stabilized.			
Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
—	—	1) Remove the top cover. 2) Set the VCR to the loading state without inserting a cassette. (See page 4-1)	—
Checking procedure 1) Check that the gap between the tension arm and the end of the chassis is $\pm 0 - +3.0$ mm. 2) If the tension pole position drifts greatly after checking, replace the tension band.			



3-3. Guide roller height adjustment

Purpose: To regulate the height of the tape so the bottom of tape runs along the tape guideline on the cylinder.

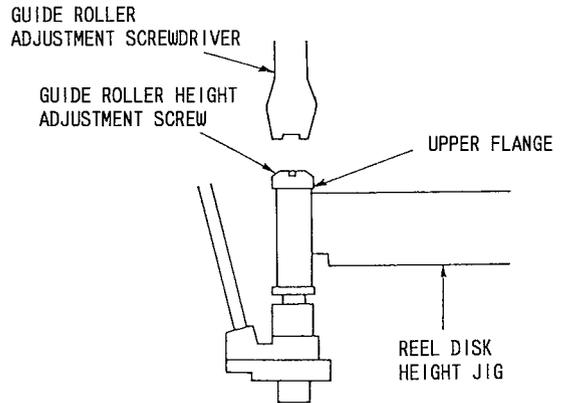
Coarse adjustment

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
<ul style="list-style-type: none"> • Master plane (Part No. 7099279) • Reel disk height jig (Part No. 7099038) • Adjustment screwdriver (Part No. 7069064) 	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	—	Height adjustment screws on the supply and take-up guide rollers

Adjustment procedure

- 1) Turn the height adjustment screw so the upper flange of the guide roller and the top surface of the reel disk height jig are aligned.
- 2) Continue the precise adjustment.

Adjustment diagram



Precise adjustment

Test equipment/jig	Test equipment connection points	State of VCR	Adjustment points
• Oscilloscope	• CH-1: PB FM • CH-2: SW25Hz or 30Hz	• Play alignment tape (Color bars section)	• Guide roller height adjustment screws
• Alignment tape	_____		

Adjustment procedure

- 1) Set the VCR to the X-value adjustment test mode.
- 2) Play the alignment tape and press the tracking up and down buttons simultaneously to set the tracking to the center.
(When performing this adjustment after replacing the cylinder, set the tracking so the FM output is maximum.)
- 3) Turn the height adjustment screw little by little so the FM output waveform is flat.
- 4) Press the tracking up and down buttons and fine adjust the height adjustment screw so the drop in the figure.
- 5) Release the test mode.

Waveforms

Tracking	Good example	Bad example
When set to center		
When up and down buttons are pressed	 No point of inflection	 A point of inflection appears when the supply guide roller is lowered too much.
		 Waveform when the supply guide roller is lowered too much.

3-4. Audio/control (A/C) head adjustment

Purpose: To keep the contact between the tape and head constant so the specified track can be recorded and played back.

Since the height of A/C head (service part) is adjusted when the VCR leaves the factory, do not turn the height adjustment screw, tilt adjustment screw or azimuth adjustment screw unnecessarily.

Rough adjustment

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
• Blank tape		• Run the blank tape.	• Azimuth adjustment screw • Height adjustment screw • Tilt adjustment screw
<p>Adjustment procedure/adjustment diagrams</p> <p>1) Load a blank tape and set the VCR to the playback mode.</p> <p>2) Check that there is no conspicuous curling or riding over of the tape around the A/C head. If conspicuous curling or riding over, etc. occurs, adjust the tilt adjustment screw and azimuth adjustment screw.</p>		<p>When adjusting the height of the A/C head</p> <p>Set the VCR to the playback mode. If the height of the A/C head drifts greatly, adjust it by the following procedure.</p> <p>1) Adjust the height so the tape's bottom edge is approximately 0.25mm above the bottom edge of the control head core.</p> <p>2) Check that there is no conspicuous curling or riding over of the tape around the A/C head.</p> <p>3) Continue the precise adjustment.</p>	

Precise adjustment

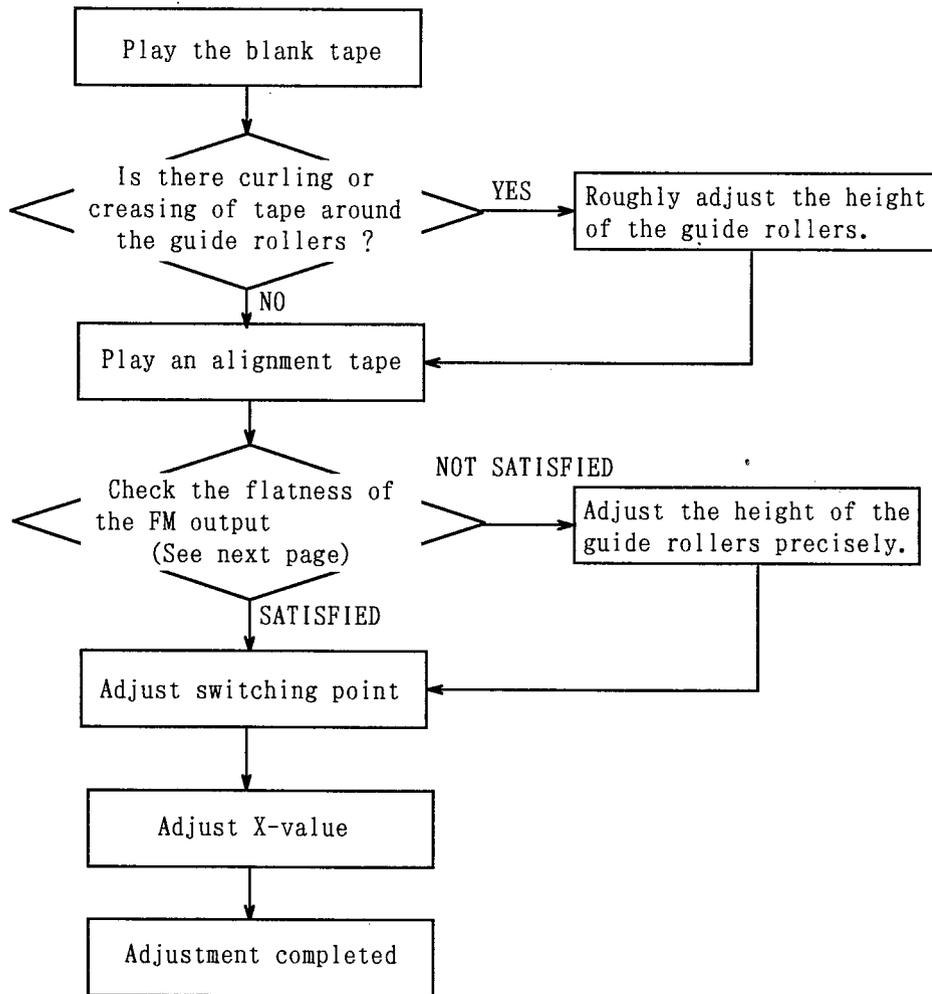
Test equipment/jig	Test equipment connection point	State of VCR	Adjustment points
• Oscilloscope • Alignment tape	• AUDIO output jack	• Play alignment tape (Stairsteps section)	• Azimuth adjustment screw • Tilt adjustment screw • Height adjustment screw
<p>Adjustment procedure</p> <p>1) Adjust the azimuth adjustment screw and tilt adjustment screw alternately little by little so the audio output is maximum and flat (with minimum fluctuations).</p> <p>Supplement: When the A/C head height has been adjusted, also adjust the height adjustment screw alternately with the azimuth and tilt adjustment screws.</p>		<p>Waveform diagram</p> <p>A: Maximum B B': Minimum</p>	

3-5. Adjustments after replacing the cylinder

Purpose: To eliminate drift in the relative height with the guide rollers, the X-value, etc.
 However, this drift is very small when the cylinder has been replaced correctly.

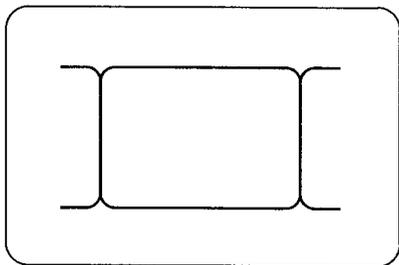
Test equipment/jig	Test equipment connection points	State of VCR	Adjustment points
• Oscilloscope	• CH-1: PB FM • CH-2: SW25Hz or 30Hz	• Run the blank tape	• Guide rollers (precise adjustment on page 3-4)
• Alignment tape	_____	• Play alignment tape (Stairsteps section)	(Electrical adjustment) • Head switching point • X-value
• Blank tape	_____		

Adjustment procedure

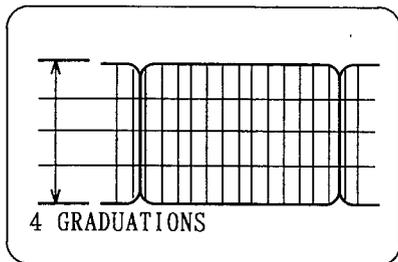


Checking the flatness and fluctuations of FM output / waveform diagrams

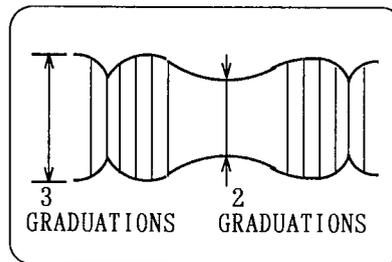
1) Activate autotracking.



2) Finely adjust the voltage level range of the oscilloscope so the FM output is set to 4 graduations.



- 3) Adjust the tracking so the maximum amplitude of the FM output is set to 3 graduations.
- 4) Check that the minimum amplitude is more than 2 graduations at this time.



- 5) Check that the difference between the maximum and minimum level fluctuations is less than 13%.

3-6. Tension/Torque Checks

Purpose: It is necessary to check the tension, torque, compression strength at the tape take-up and moving sections to smooth the running of tape and satisfy the basic performance of the VCR. Perform this check if the running of tape is not smooth or the tape speed is abnormal.

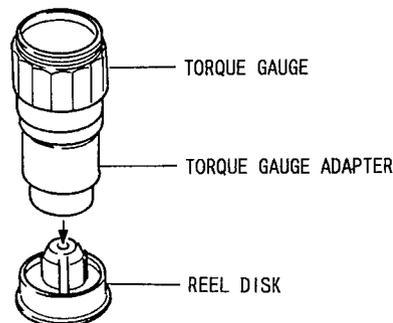
Test equipment/jigs		State of VCR	
<ul style="list-style-type: none"> • Torque gauge • Torque gauge adapter 		<ul style="list-style-type: none"> • Set the VCR to each operation mode without inserting a cassette. (See page 4-1) 	
Item	VCR operation mode	Measured reel	Measured value
Main brake torque	Stop (Note)	Supply & take-up reels	100 ~ 300 g·cm
Slack removal torque	Unloading	Supply reel	95 ~ 180 g·cm
Fast forward torque	Fast forward	Take-up reel	400 g·cm or more
Rewind torque	Rewind	Supply reel	400 g·cm or more
Take-up torque	Playback	Take-up reel	45 ~ 75 g·cm
Back-tension torque	Fast forward/Rewind	Supply & take-up reels	5 ~ 20 g·cm
Playback back-tension torque	Playback	Supply reel	25 ~ 36 g·cm
Reverse search torque	Reverse search	Supply reel	95 ~ 250 g·cm
Reverse play torque	Reverse play	Supply reel	95 ~ 150 g·cm
Slow torque	Slow	Take-up reel	30 ~ 75 g·cm
Take-up brake torque	Reverse search	Take-up reel	65 ~ 100 g·cm

Checking procedure

Mount the torque gauge and torque gauge adapter and hold the torque gauge with your fingers for measurement.

Note : Measure in the loading stop-2 state.
(See next page.)

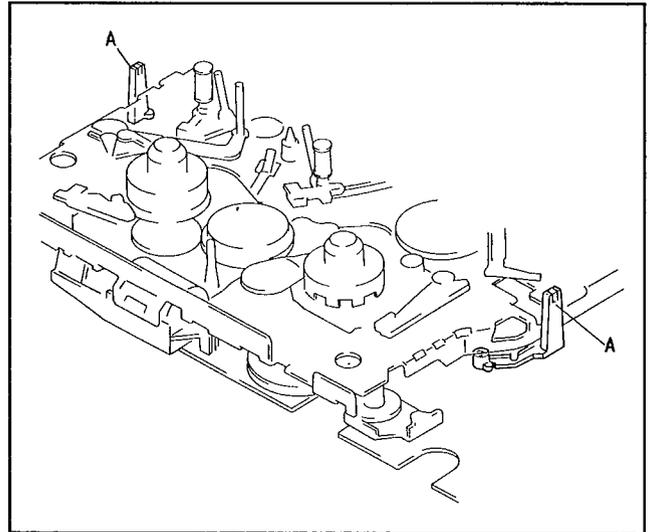
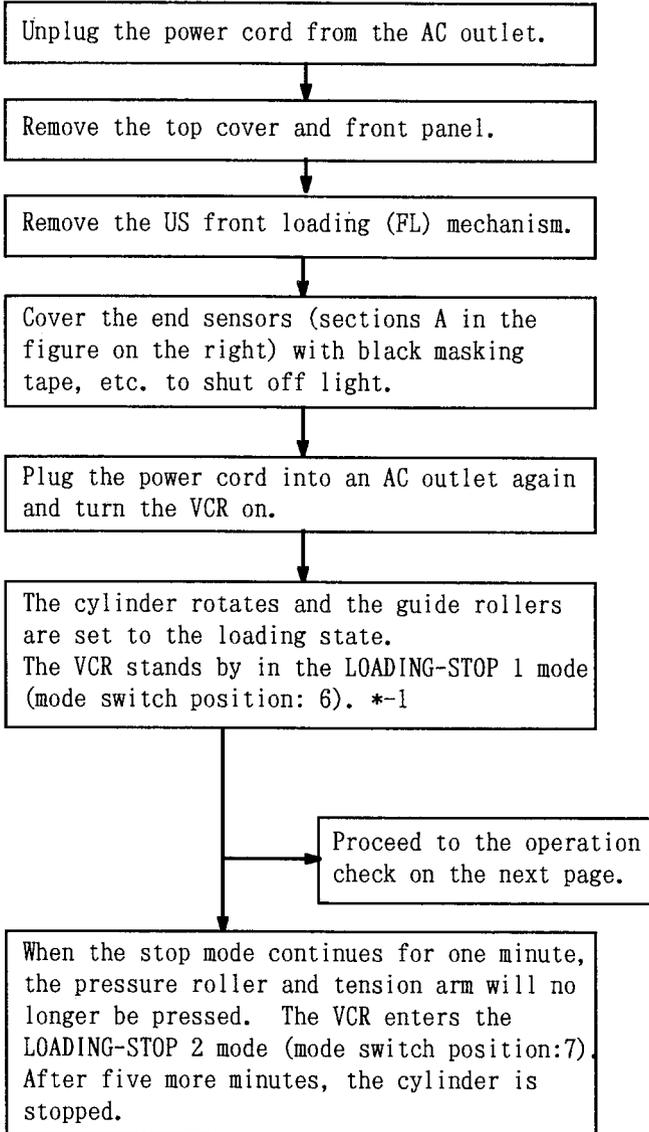
Adjustment diagram



Mechanism Operation Check

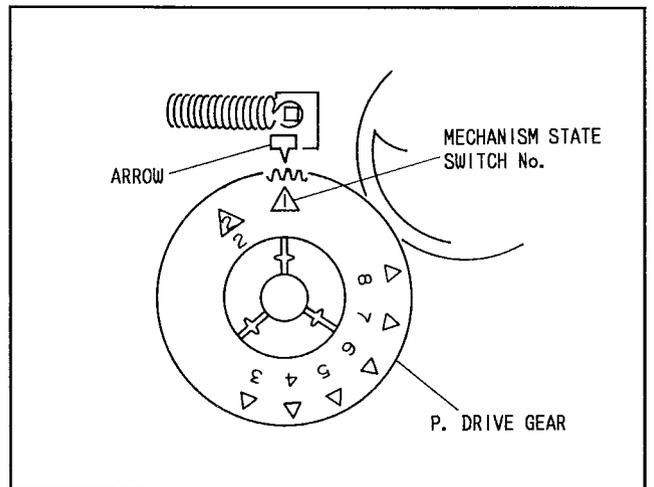
Check the mechanism operation after dismantling and adjusting the mechanical block.
 Check the operation after setting the mechanism to the loading state without loading a cassette.
 If the mechanism does not operate normally, recheck the components and sections related to the area of the abnormality.

1. Method to set the VCR to the loading state without loading a cassette



*-1: The VCR can accept the inputs of each mode in this state. However, rewinding can be done for no more than several seconds and the power is shut off because the take-up reel disk is in the stop state and reel pulses cannot be detected. Turn the take-up reel disk manually for rewind operation.

[Method to check the position of the mechanism mode switch]
 Check the mode position by observing the arrow on the spring hook which is positioned in front of the A/C head and the arrow no. on the P. drive gear.



2. Checking the operation in each mode

Operation in each mode	Mode switch position
LOADING-STOP 1 mode	6

Recording/playback modes

Press the record or playback button of the VCR. The take-up reel disk starts to turn.	6
---	---

Press the stop button of the VCR. The take-up reel disk stops.	6
--	---

* To set to the record mode, pull the safety arm forward.

Still play mode

Press the playback button of the VCR. The take-up reel disk starts to turn.	6
---	---

Press the pause button. Take-up reel disk and capstan stop.	5
---	---

Press the stop button. The take-up reel disk and capstan turn forward and then stop.	6
--	---

Record pause mode

Press the record button of the VCR. The tension arm is released and the supply reel disk turns in reverse.	3
--	---

The tension arm is pressed and the take-up reel disk and capstan shaft to turn forward.	6
---	---

Press the pause button. The tension arm is released and the supply reel disk turns in reverse, then the take-up reel disk and capstan shaft turn forward. When the start of a program is located, the VCR enters the pause mode.	3 ↓ 5
--	-------------

Rewind mode

Press the rewind button. The tension arm is released and the T-brake is applied.	6 ↓ 3
--	-------------

The reel disk starts to turn.	3
-------------------------------	---

Press the stop button. The T-brake is released and the tension arm is pressed.	6
--	---

After completing the check, be sure to reset the VCR to the original state by the following procedure.

- 1) Turn the VCR off.
- 2) Remove the masking tape, etc. from the supply and take-up end sensors.
- 3) Unplug the power cord from the AC outlet to reset the microprocessor(s).
- 4) Install the cassette loading mechanism to complete the work.

Maintenance/ Inspection Procedure

1. Necessity of Maintenance and Inspection

The recording density of a VCR is much higher than that of an audio recorder. A VCR uses very precise components to ensure compatibility with other VCRs. If any of mechanical components are worn or dirty, the symptoms will be the same as if the VCR has malfunctioned. To ensure a good picture, it is necessary to clean and lubricate the mechanism periodically and replace worn-out components.

2. Scheduled Maintenance and Inspection

Schedules for maintenance and inspection are not fixed because they vary greatly according to the way in which the customer uses the VCR and the environment in which the VCR is used. But, in general home use, a good picture is ensured if inspection and maintenance are done every 1,000 hours of use. Table 1 shows the relation between the time used and inspection period.

3. Before Determining that the VCR is Faulty

When a VCR has been used for over 1,000 hours, the symptoms shown in Table 2 may be seen in the

playback picture. These faults may be remedied by cleaning and lubricating mechanical components. Check the hours for which the VCR has been used referring to Table 1. If you determine that the VCR is ready for inspection and maintenance, check the inspection locations shown in Table 2. **Caution:** If the VCR cannot be restored to normal operation after cleaning components marked "○" in the part replacement column, they are degraded. Replace them.

Table 1

Average hours used per day	When inspection is necessary		
	1 year	18 months	3 years
One hour	/	/	/
Two hours	/	/	/
Three hours	/	/	/

Table 2

Symptom	Cause	Inspection location	Replacement
Color beats	Dirt on full erase (FE) head	Clean the surface of FE head which is in contact with tape	
Poor S/N, no color	Dirt on video heads (or they are degraded)	Clean video heads	○
Vertical jitter, horizontal jitter	Dirt on video heads and cylinder. Dirt in tape transport system.	Clean video heads and cylinder. Clean guide rollers and inclined guides.	
Low volume or sound distorted	Dirt on audio/control (A/C) head	Clean the surface of the A/C head which is in contact with tape	○
Tape is slack or does not run	Dirt on pressure roller	Clean pressure roller and capstan shaft	○

Inspection Locations

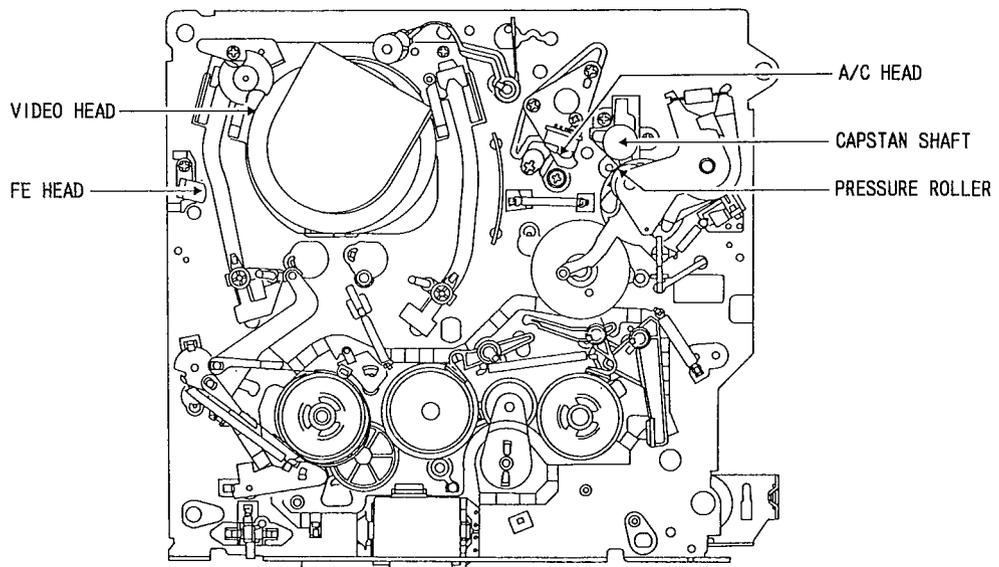


Fig. 1 Inspection Location Diagram

4. Tools Needed for Inspection and Maintenance

- (1) Head cleaning kit (Fig. 2)
- (2) Grease and oil for maintenance (Fig. 3)
- (3) Alcohol
- (4) Gauze

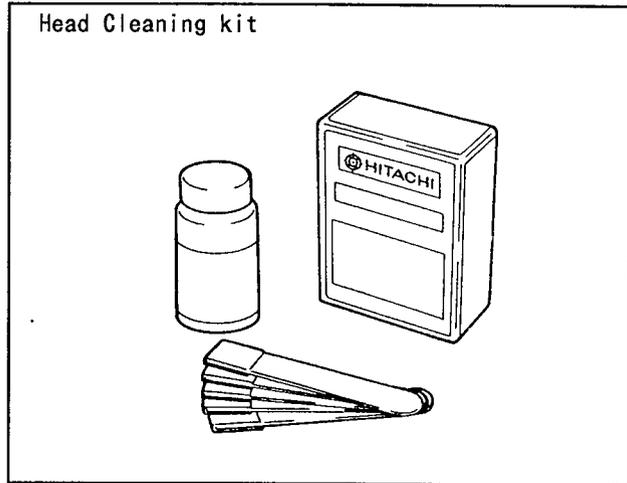


Fig. 2

Table 3 Locations for Use of Oil and Grease for Maintenance

Name	Lubricating or greasing location
Sonic Slidas Oil (#1600)	Lubricate low-speed rotating sections
Molicoat (PG-641)	Coat metal and mold sections under light load

5. Cleaning Procedure

1) Cleaning the video heads (Fig. 4)

First use a cleaning tape. If the dirt on the heads is too stubborn to be removed by the tape, use the head cleaning kit to clean the heads by the following procedure.

Moisten the cleaning stick with cleaning fluid and touch the head tip with the stick and gently turn the head (rotate the cylinder) to the left and right. (Do not move the stick vertically and be sure that only the chamois leather on the stick touches the head tips. Otherwise, the heads may be damaged.) After cleaning, thoroughly dry the heads, then run the tape. If cleaning fluid remains on the heads, the tape may be damaged when it comes into contact with the heads.

2) Cleaning the tape transport system (Fig. 3)

Moisten gauze with alcohol and use it to clean components ① - ⑬ (see "cleaning the video heads" for component ⑦).

Caution: When cleaning, take great care not to damage tape transport components or deform them by applying excessive force.

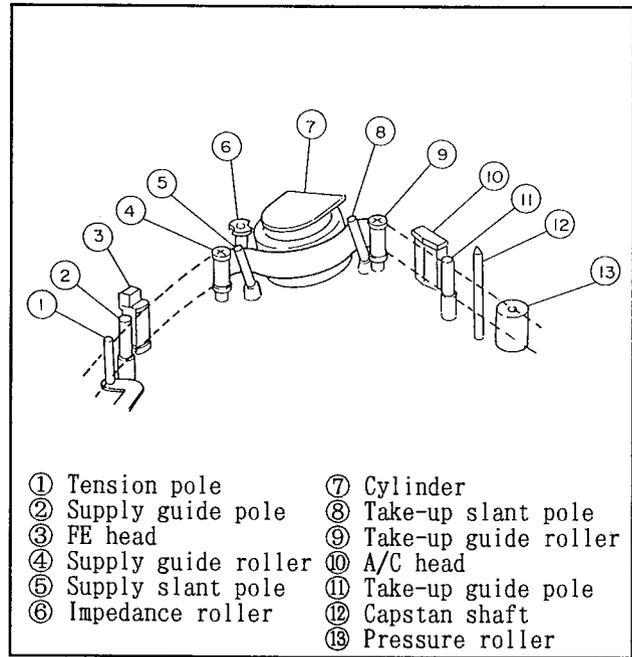


Fig. 3

6. Lubricating and Greasing

1) Lubricating guidelines

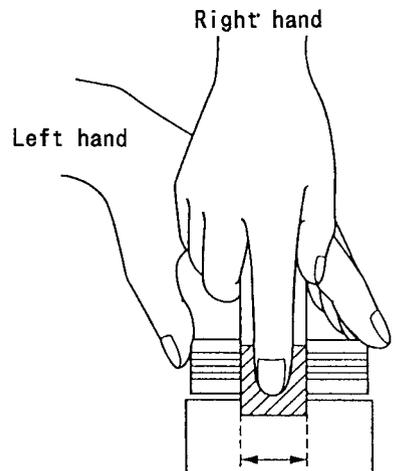
Use the oiler to apply one or two drop of Sonic Slidas oil. Make sure not to use too much oil because it may spill over and leak out, coming into contact with rotating parts and causing slippage or other problems. If too much oil is applied, wipe clean using gauze moistened with alcohol.

2) Greasing guidelines

Apply grease (Molicoat) with a stick or brush. Do not use too much grease. It may come into contact with the tape transport or drive system. Wipe off any excess and clean with gauze moistened with alcohol.

3) Oil or grease the specified locations referring to Table 4 on the next page.

[Cleaning method]



Range in which the upper cylinder is moved

Fig. 4

7. Maintenance/Inspection Schedules of Mechanical Parts

Caution: This timetable shows the period when each component is required to be maintained and inspected. Use the following table as a reference as the maintenance/inspection period depends on how the unit is used and the environment in which it is used.

For components indicated as C/R, replace components if the VCR does not become normal after being cleaned.

Table-4

Component	hours				
	1000	2000	3000	4000	5000
Video heads (cylinder motor)	C/R	C/R	C/R	C/R	C/R
Audio/control (A/C) head	C	C/R	C	R	C
Full erase (FE) head	C	C	C	R	C
Supply guide roller	C	C	C/R	C	C
Take-up guide roller	C	C	C/R	C	C
Tension band		R		R	
Tension arm	C	C	C	C	C
Supply reel disk		C		C	
Take-up reel disk		C		C	
Pressure roller assembly	C	R	C	R	C
Drive belt		C		C	
Capstan motor	C	R	C	R	C
Loading motor				R	
Cylinder motor		R		R	
Mechanism state switch				(R)	
Idler gear 1		R		R	
Idler gear 2		R		R	
FR gear		R		R	
Supply slant pole	C	C	C	C	C
Take-up slant pole	C	C	C	C	C
Impedance roller	C	C	C	C	C
Guide pole	C	C	C	C	C
Tape guideline on cylinder	C	C	C	C	C
Brake (L)	C	C/R	C	C/R	C
Brake (R)	C	C/R	C	C/R	C
HC arm					(R)
Shaft and bearing of supply reel disk		S		S	
Shaft and bearing of take-up reel disk		S		S	
Shaft and bearing of idler gear 1		S		S	
Shaft and bearing of idler gear 2		S		S	
Shaft of pulley assembly		S		S	
Shafts of torque change gear and FR drive gear		S		S	
Shaft of pressure roller arm		M		M	
Guide roller base moving sections in chassis					M
Surface of contact between cylinder motor base and guide roller base during loading					M
Surface of contact between tension arm and supply guide roller base					M

R: Replacement of parts

C: Cleaning

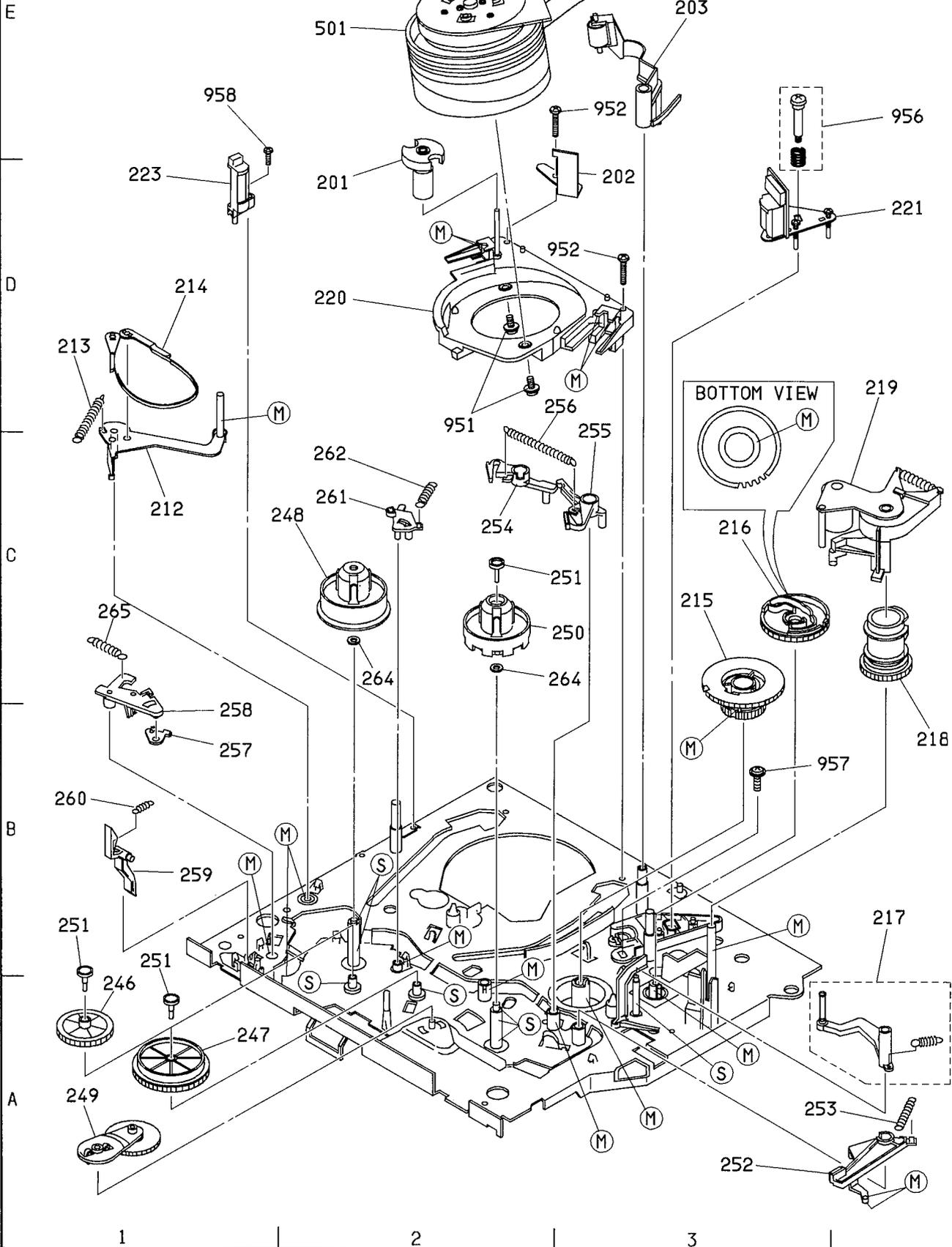
S: Lubricating oil (Sonic Slidas oil)

M: Coating grease (Molicoat)

1. US-MECHANISM (TOP VIEW) SECTION

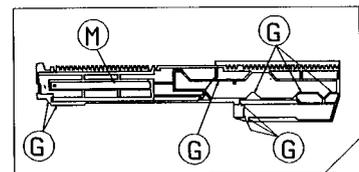
(M) = MOLICOAT (PG-641)

(S) = SONIC SLIDAS OIL (#1600)

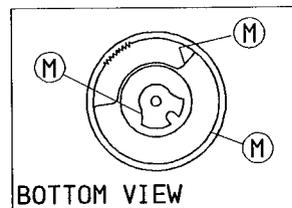


2. US-MECHANISM (BOTTOM VIEW) SECTION

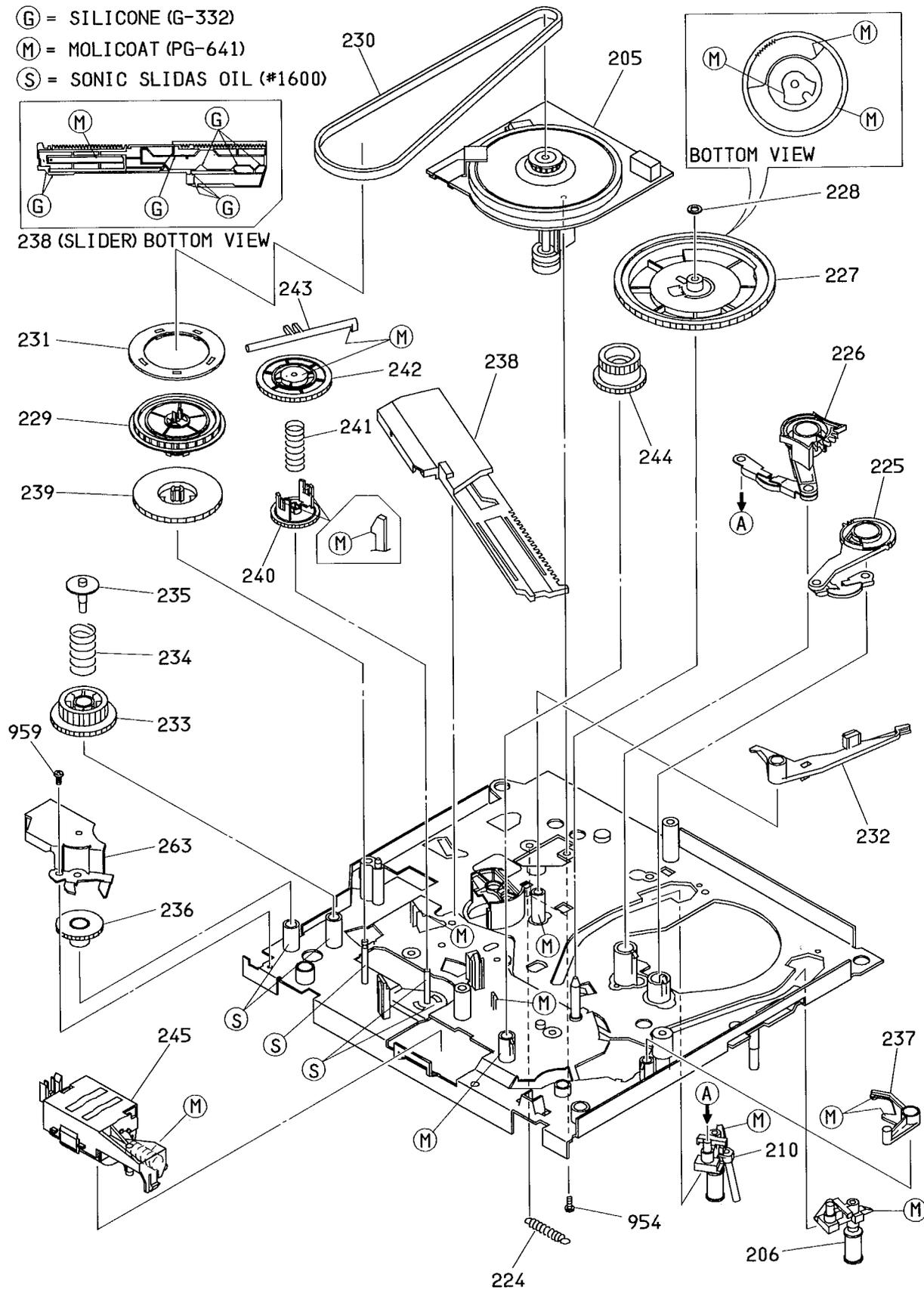
- (G) = SILICONE (G-332)
- (M) = MOLICOAT (PG-641)
- (S) = SONIC SLIDAS OIL (#1600)



238 (SLIDER) BOTTOM VIEW



BOTTOM VIEW



1

2

3

4

3. US-FL MECHANISM SECTION

(M) = MOLICOAT (PG-641)

(G) = SILICONE (G-332)

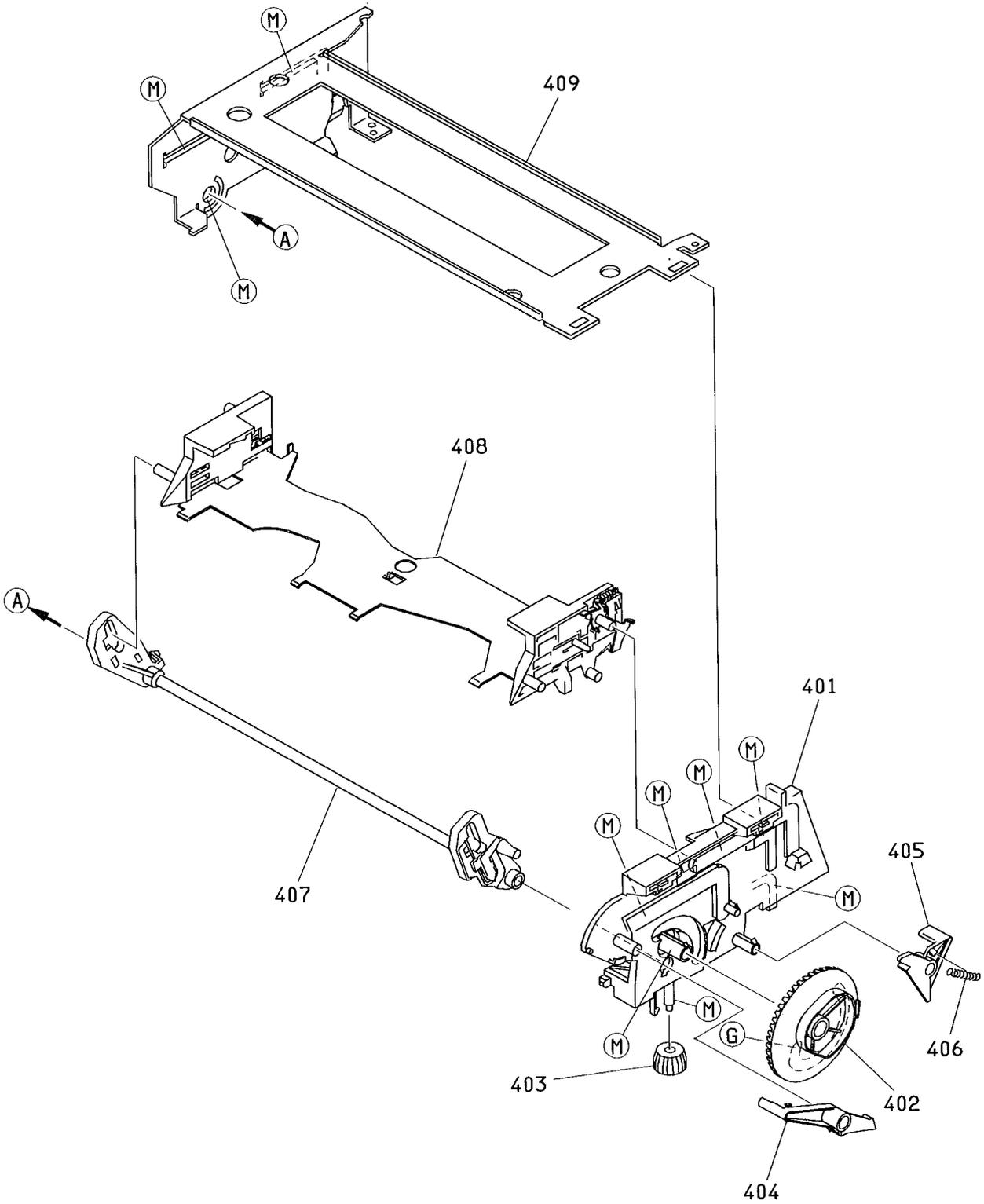
E

D

C

B

A



1

2

3

4

Identifications of Components in US Mechanism

Index No.	Component
2 0 1	Impedance roller
2 0 2	Impedance plate
2 0 3	Head cleaning (HC) mechanism
2 0 4	FL mechanism assembly
2 0 5	Capstan motor
2 0 6	Guide roller base (I) assembly
2 1 0	Guide roller base (0) assembly
2 1 2	Tension arm
2 1 3	Spring
2 1 4	Tension band
2 1 5	P. drive gear
2 1 6	PR idler gear
2 1 7	P. out arm
2 1 8	Spiral gear
2 1 9	Pressure roller arm
2 2 0	Cylinder base
2 2 1	A/C head assembly
2 2 3	FE head
2 2 4	Spring
2 2 5	Loading gear (L)
2 2 6	Loading gear (R)
2 2 7	Cam gear
2 2 8	Poly-slider washer
2 2 9	Pulley assembly
2 3 0	Drive belt
2 3 1	Flange
2 3 2	FS brake
2 3 3	FL change gear
2 3 4	Spring
2 3 5	Spring hook
2 3 6	FL idler gear
2 3 7	Take-up operation arm
2 3 8	Slider
2 3 9	Transmission gear
2 4 0	FR drive gear
2 4 1	Spring
2 4 2	Torque change gear
2 4 3	Torque change arm
2 4 4	LM wheel gear
2 4 5	Loading motor assembly
2 4 6	Idler gear 1
2 4 7	Idler gear 2
2 4 8	Supply reel disk
2 4 9	FR arm
2 5 0	Take-up reel disk

Index No.	Component
2 5 1	Stopper
2 5 2	Take-up brake
2 5 3	Take-up brake spring
2 5 4	Brake (L)
2 5 5	Brake (R)
2 5 6	Spring
2 5 7	Jog gear
2 5 8	Jog arm
2 5 9	Safety arm
2 6 0	Spring
2 6 1	Supply subbrake
2 6 2	Spring
2 6 3	Base bracket
2 6 4	Washer
2 6 5	Spring
4 0 1	Side bracket (R)
4 0 2	Bevel gear
4 0 3	FL gear
4 0 4	Door arm
4 0 5	Switch arm
4 0 6	Spring
4 0 7	Drive arm
4 0 8	Cassette holder
4 0 9	Side bracket (L)
5 0 1	Cylinder motor
9 5 1	Screws (3 x 8)
9 5 2	DT screws (2.6 x 10)
9 5 3	DT screws (2.6 x 6)
9 5 4	BT screws (2.6 x 6)
9 5 6	Screws
9 5 7	Screws (M2.6)
9 5 8	DT screws (2.6 x 8)
9 5 9	DT screws (2.6 x 5)

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