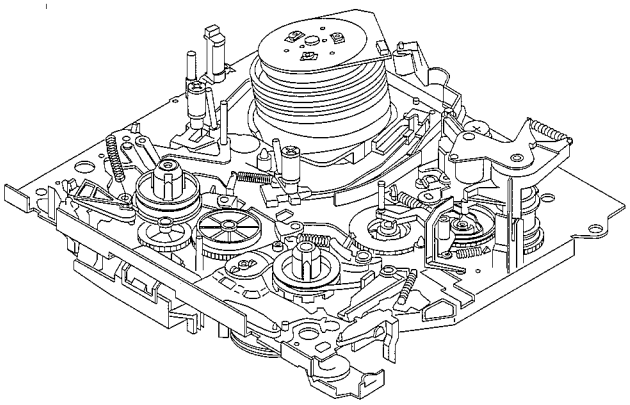
HITACHI

SERVICE MANUAL
Wartungsanleitung



TK | No.5009E,G

U4 Mechanism

This service manual includes procedures for disassembly, adjustment and maintenance of the U4 mechanism. Use this together with the service manual for each individual 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.

U4-Bandlaufwerk

Diese Wartungsanleitung schließt die Vorgänge für die Demontage, Einstellung und Wartung des U4-Bandlaufwerkes ein. Verwenden Sie diese Wartungsanleitung gemeinsam mit der Wartungsanleitung jedes einzelnen Modells.

Bitte lesen Sie diese Wartungsanleitung aufmerksam durch, bevor Sie Wartungsarbeiten ausführen. Unbedingt die in dieser Anleitung beschriebenen Vorsichtsmaßnahmen einhalten, um die hohe Sicherheit dieses Produkts beizubehalten.

VHS
SVHS
DVHS

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

Änderungen der Technischen Daten und Teile im Sinne ständiger Verbesserung vorbehalten.

VIDEO CASSETTE RECORDER
Video-Cassettenrecorder

June 2000 Digital Media Products Division, Tokai

SAFETY PRECAUTIONS

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

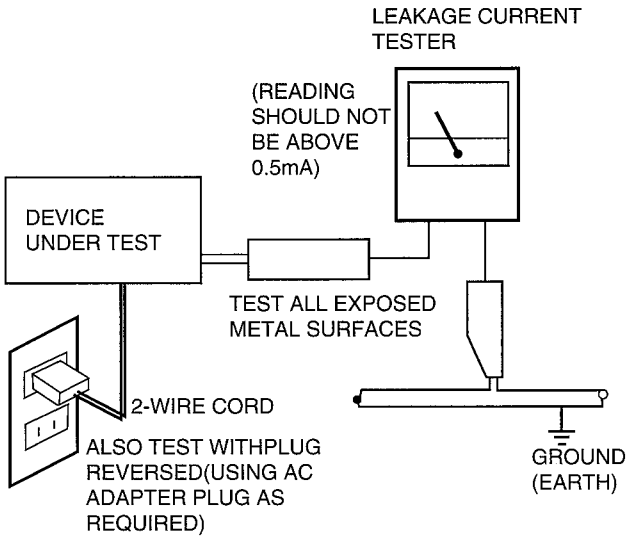
1. When replacing a chassis in the instrument, all the protective devices must be put back in place, such as barriers, non-metallic knobs, adjustment and compartment covers/shields, isolation resistors/ capacitors, etc.
2. When service is required, observe the original lead-ress. Extra precautions should 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 manufacturer's. 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 eturn 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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CONTENTS

Chapter 1 U4 Mechanism Operation Theory

1. Overview

The U4 mechanism is a revision of the US mechanism. The previous US mechanism fast forwards and rewinds tape at 260 times the standard speed. To increase the fast forward and rewind speed to 400 times for the U4 mechanism, the brake system has been drastically reexamined: The main and subbrakes on the supply and take-up sides have been converted from block brake type to band brake type.
Therefore, the band brakes are now used to turn on or off the main brakes, subbrakes and the brakes using tension servo.
The FS brake, which previously engaged only for slow play, now also operates when fast forward or rewind is switched to stop, so that the capstan motor (which rotates at high speed) can stop instantaneously.
Along with the reexamination of the brake system mentioned above, the slider, cam gear, jog arm, etc., have been changed to produce the U4 mechanism.

2. Major Changes in U4 Mechanism

Table 1 shows major changes in U4 mechanism from the US mechanism.

Table 1

System/function	U4 mechanism	Details of change
Brake on take-up reel table	Consists of tension band R, operation arm L and 2 springs	Block brake changed to band brake
Take-up reel table	Shape changed	Tension band R can be attached.
Brake on supply reel table	Consists of tension band brake, spring arm and 1 spring	Block brake changed to band brake
Jog arm	New design using press and mold	Now controlled by cam gear, instead of previous slider.
Slider	New design, U4 stamped	Control cam groove changed
Cam gear	New design, U4 stamped	Control cam groove changed
FS brake	Material of felt changed	Operates when switching to stop from fast forward/rewind, as well as during slow motion.
FL mechanism	Hole added to top of casette holder	Can now be removed from PWB with FL mechanism installed.
Ground between cassette and chassis	Jog arm spring now used	Spring for supply subbrake was used previously.

3. Operation of Major Components

Fig. 1 shows the locations of major components in the U4 mechanism. The following explains the operation of these major components along the tape run in sequence from the supply reel table, using Fig. 1. In Fig. 1, the components designated " for U4" are those used exclusively for the U4 mechanism.

(1) Supply reel table

The supply reel table supplies tape during playback, and takes it up during reverse tape run. A band brake is wound round the side of reel table in the same way as in previous mechanisms: This works not only as the band brake that activates the tension servo, but also as the main brake and subbrake. (The band brake drive mechanism will be explained in another chapter.)
The motive power of capstan motor is transmitted via a gear installed at the bottom of supply reel table: This gear meshes with the gears of idler gear 1 and jog arm.
Revolution of the supply reel table is detected by the combination of a slit in the bottom of idler gear 2, shown in Fig. 12, and light emission and reception sensors on the main PWB.
The back-tension during fast forward is provided by a thrust washer located on the surface where the supply reel table is attached: Care should be taken not to forget to reinstall the thrust washer when the reel table is removed.

(2) Jog arm

The jog arm turns the supply reel table slightly counterclockwise when forward slow motion is switched to reverse slow motion, etc., and the FR arm (swing idler) changes its direction, in order to remove slack tape.

(3) Tension band brake

This winds round the supply reel table and works as a band brake that activates tension: It also acts as main brake and subbrake. (The band brake drive mechanism will be explained in another chapter.)

(4) Tape guide S

This regulates the height and perpendicularity of tape before it reaches the tension pole: It has a flange that regulates the bottom of tape, and is designed so that the bottom of tape comes into contact with the top edge of the lower flange.

(5) Guide base (I) assembly and guide base (O) assembly

The heights of supply and take-up guide rollers have to be adjusted to ensure that the tape comes into contact with the lead on the cylinder, i.e., that the tape transport adjustment is performed.
A plastic stopper is built into the screw section of guide roller so that the screw of guide roller will not loosen after adjustment.

(6) Cylinder motor assembly

The U4 mechanism uses the same cylinder motor assembly which has been employed in the US mechanism and later models. As shown in Fig. 2, the cylinder motor assembly structure has a shaft pressed into the lower cylinder, two ball bearings in the upper cylinder to turn centering on the fixed shaft, and a motor attached at top.
The motor consists of a 16-pole N/S magnet and a motor coil. The counter-electromotive force at the motor coil is synthesized to generate a 720 Hz FG signal. Only one of the 16 poles is intensively magnetized: Its position is detected by a Hall device for three-layer driving to synthesize the tach signal.
The SW30 signal is subsequently created from the tach and FG signals.
The brush for grounding in the upper cylinder has a contact element for grounding, along with a spring inserted into a hole in the pedestal that is tightened by a screw to the fixed

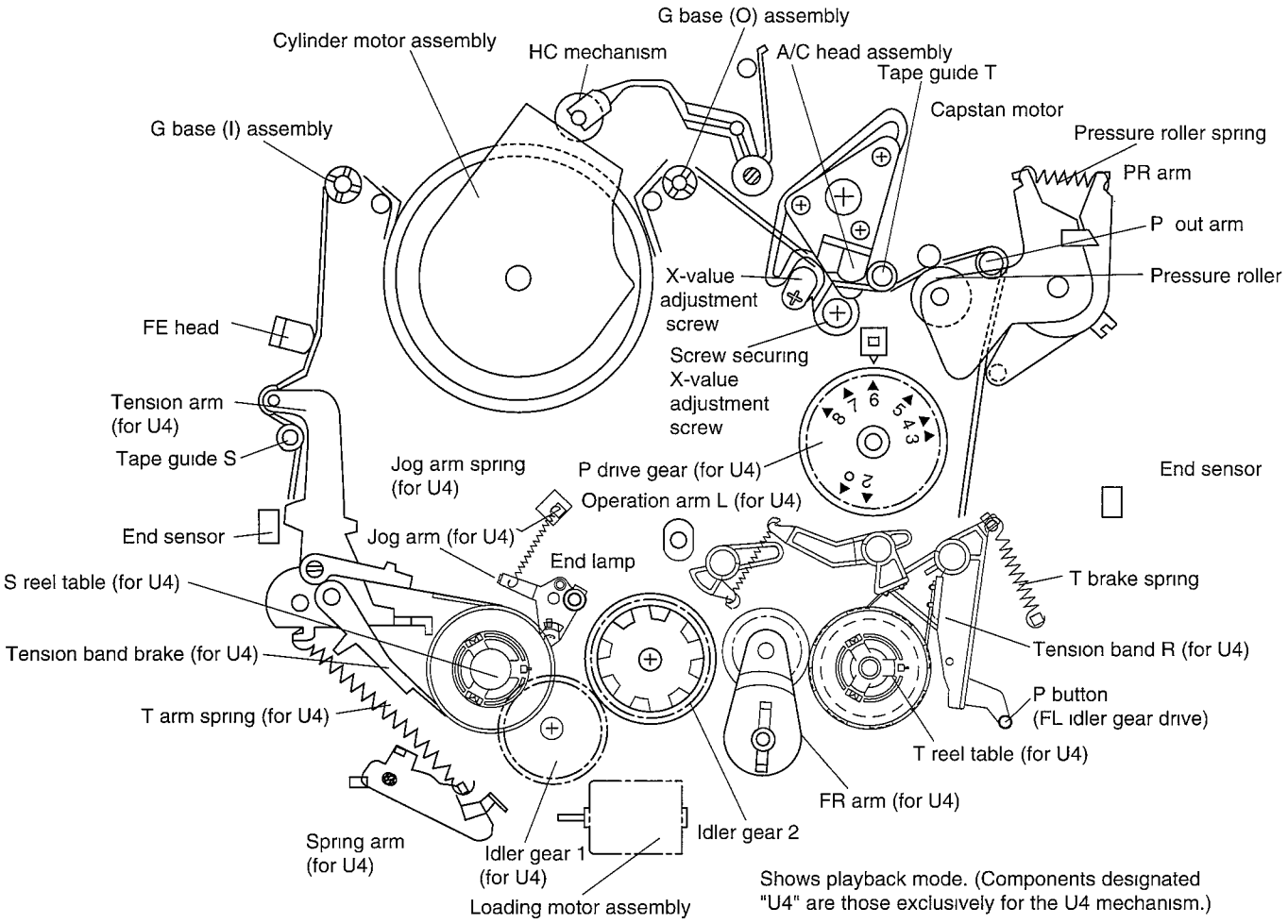


Fig. 1 Locations of Major Components in U4 Mechanism (Top View)

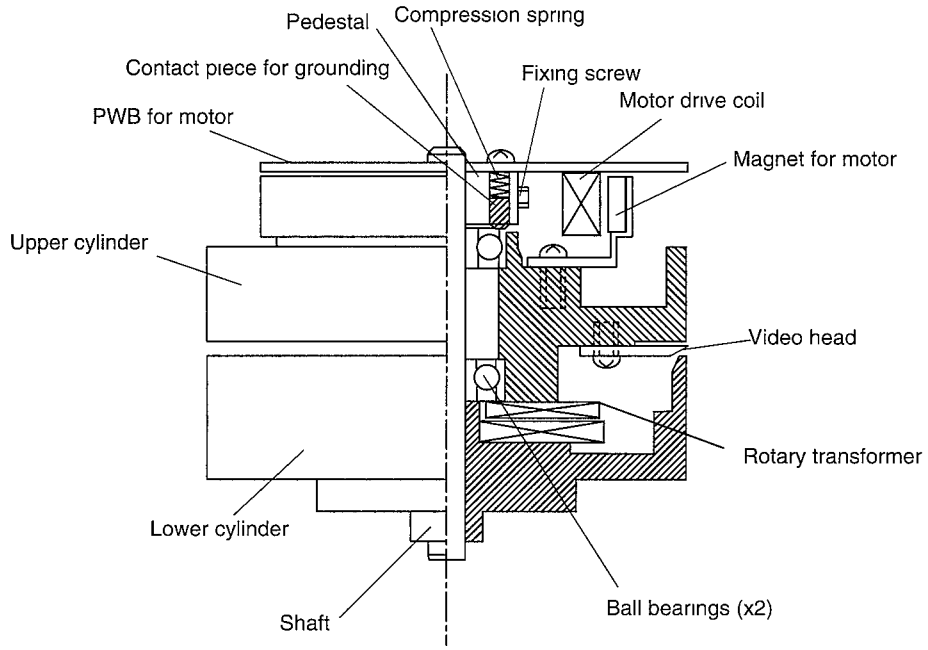


Fig. 2 Structure of Cylinder Motor Assembly

shaft, which is held by the upper cylinder drive PWB.
A bulge is provided on the cylinder around the tape outlet: This reduces noise generated by head tip around tape outlet, and also stabilizes tape transport. Since the motor is unified with the upper cylinder, the entire cylinder must be replaced whenever video heads are replaced.

(7) HC mechanism (cleaning roller)

The HC mechanism prevents dirt on video heads: It is driven by the FS brake shown in Fig. 3, during loading and unloading.
The cleaning roller is composed of thin sheets, and the removed dust is held between the sheets. Therefore, the cleaning roller must be periodically replaced for VCRs which are used frequently.

(8) A/C head assembly

The A/C head assembly consists of the audio erase head, audio head and control head.
The audio erase head erases linear audio signal.
The audio head records linear audio signal and plays it back. When stereo linear audio signal is recorded, the track width can be as narrow as 0.35 mm, so care should be taken in adjustment.
The control head separates the vertical sync signal from the video signal to create a control signal during recording, and then records the control signal on the control track. During playback, it reads the recorded signal and controls the capstan motor under the same conditions as in recording. If the control head is dirty or the tape transport around it is unstable, the capstan servo will turn off and noise will appear, or tape will be scratched. Therefore, great care should be taken when tape transport is checked.

(9) X-value adjustment screw

The X-value adjustment is necessary to maintain compatibility of VCRs because the A/C head is separated from the video heads (the X-value refers to the physical distance between these heads). The basics of adjustment are: Loosen the screw holding the X-value adjustment screw, turn the X-value adjustment screw so that the FM output is maximum, and then secure the screw while holding the X-value adjustment screw. However, since the adjustment position varies depending on the model, always check in the appropriate service manual.

(10) Tape guide T

This has a flange that regulates the bottom of tape in the same way as tape guide S: It is designed so that the bottom of tape comes into contact with the top edge of the lower flange.
Since tape guide T cannot be adjusted, the tilt and height of AC head assembly are instead adjusted while the tape running at tape guide T is being observed. It is necessary to ensure that the bottom of tape is in contact with the top edge of flange of fixed guide, in the playback and forward search modes.

(11) Capstan motor

The capstan motor plays versatile roles: it takes up and controls tape during recording, playback, forward search, etc., where the tape runs forward; it takes up and controls tape during reverse play and reverse search, where the tape runs in reverse; and it is a source for generating reel table drive torque, front loading (FL) mechanism drive torque, etc.

(12) Pressure roller

A sliding bearing is built into the center of pressure roller: Using the play characteristics of this bearing helps keep the pressure roller parallel to the capstan shaft: If the pressure roller is not pressed against the capstan shaft in parallel, the tape will shift to the direction where the pressure is higher. Rubber is used on the circumference of pressure roller, where a large friction coefficient is needed. Since rubber hardens or deteriorates because of secular changes, the pressure roller must be periodically replaced.

(13) P. out arm

The tape fed from the capstan shaft is guided by the P. out arm, and then taken up onto the reel hub inside cassette. The P. out arm is driven by the PR idler gear, shown in Fig 4, and set to the specified position.

(14) P. drive gear

The P. drive gear transmits the force generated when the slider moves left and right, to the drive force of pressure roller. Since the number engraved on the surface of this gear is identical to the mode number of mechanism state switch, the current mode can be identified when the mechanism is viewed from top. The outputs from the mechanism state switch are the same as those in the US mechanism, as shown in Table 2.

Table 2

	Abbreviation	SW No. 1	2	3	4	VCR mode
1	FL	0	1	0	0	Front loading
2	UL	1	1	1	0	Unloading
3	REV	0	0	0	1	Reverse search
4	RFS	0	0	1	0	Reverse slow
5	FS	0	0	1	1	Forward slow
6	R/P/STOP1	0	1	1	1	Recording/Playback/Stop 1
7	STOP2	1	0	1	0	Standing by for an extended time
8	FF/REW	1	1	0	0	Fast forward/Rewind
	TRANSIENT	0	0	0	0	Transient

STOP1: The capstan motor stops in the recording or playback mode.
STOP2: Mode entered when one second has elapsed after STOP1.

(15) Take-up reel table

The take-up reel table receives power from the FR arm and takes up cassette tape. A band brake is wound round the side of take-up reel table as shown in Fig. 12. (The band brake drive mechanism will be explained in another chapter.)
The motive power of capstan motor is transmitted via the gear installed at the bottom of take-up reel table, as shown in Fig. 12.
The revolution of take-up reel table is detected by the combination of a slit in the bottom of table (shown in Fig. 12) and light emission and reception sensors.
A thrust washer is provided on the surface where the take-up reel table is attached: Care should be taken not to forget to reinstall the thrust washer whenever the reel table is removed.

(16) Tension band R

A tension band is used in place of conventional main and subbrakes to control the braking force.

Generally, the conventional block brake system is cheaper, and the direction ratio of braking force (ratio between force in the engaged direction and force in the escape direction) is larger. However, the U4 mechanism requires higher speed rotation characteristics: In order that the time required for stopping high-speed rotation be shortened and braking applied more sharply, the band brake system has been used: The band brake drive mechanism will be explained in another chapter.

(17) FR arm (swing arm)

The FR arm finally transmits the rotating force of capstan motor to the reel tables. The FR arm is also called the swing arm, since it immediately transmits the rotating force to the supply and take-up reel tables to match the direction in which the capstan revolves. The disk drive mechanism will be explained in another chapter.

(18) Loading motor assembly

The loading motor assembly has three basic components: (1) A drive source of loading that moves the guide rollers around the cylinder; (2) a power source that presses the pressure roller against the capstan and drives the P. out arm; (3) and a power source that drives the cam gear, and also moves the mechanism state switch and slider to change the mode.

(The mechanisms that drive the loading mechanism, pressure roller and slider will be explained in another chapter.)

(19) Front loading (FL) mechanism

As shown in Fig. 14, the U4 FL mechanism is basically the same as in the US mechanism. However, the U4 mechanism has been improved: It can be removed with the FL mechanism attached, since round holes are provided in the top plate of FL mechanism and in the cassette insertion surface, and the screws holding the U4 mechanism can be removed with the FL mechanism attached. (The mechanism that drives the FL mechanism will be explained in another chapter.)

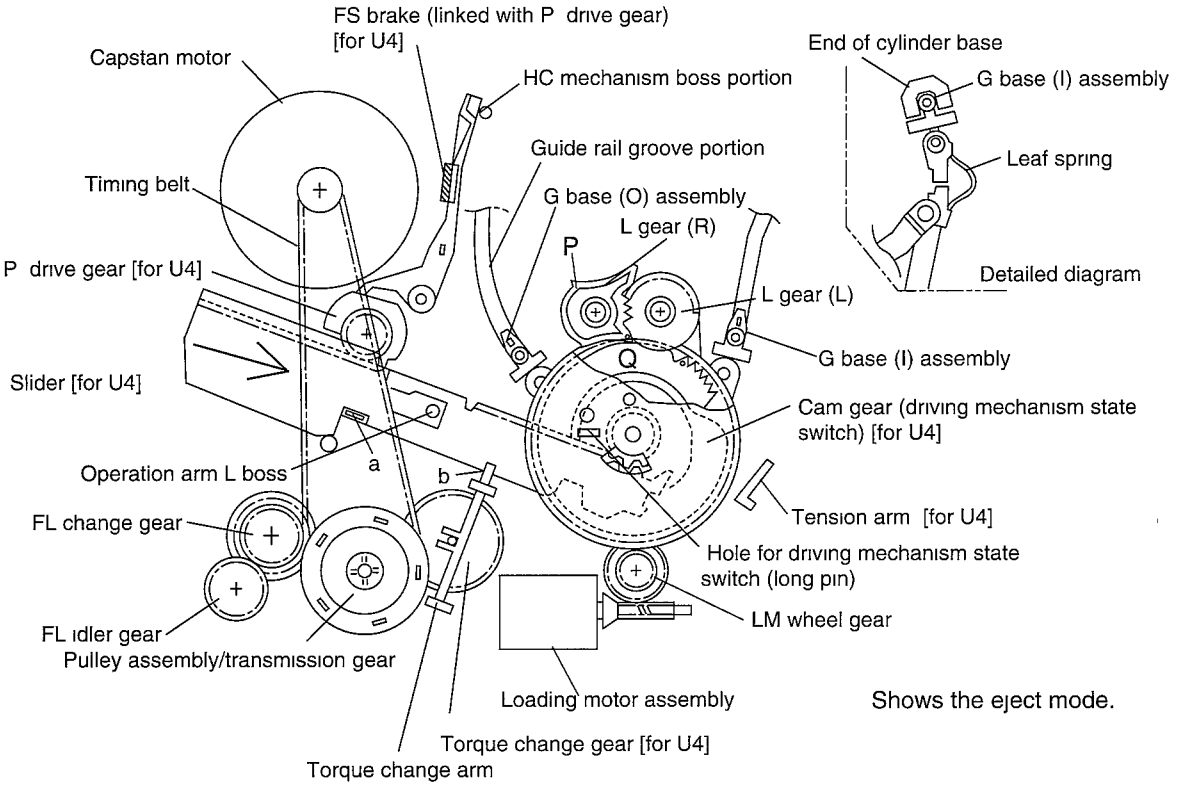


Fig. 3 Loading Mechanism Drive Mechanism (Back View)

4. Loading Motor System Drive Mechanisms

The following explains each of the drive mechanisms that use the loading motor as a power source.

4.1 Loading mechanism/slider drive mechanisms

Fig. 3 is an explanatory diagram of the mechanism that drives the loading mechanism, viewed from the back of mechanism chassis. The motive power of loading motor assembly is transmitted to the cam gear via the worm gear and LM wheel gear. The cam gear directly drives the mechanism state switch on the main PWB.

First, the loading drive mechanism is explained:

The torque at the cam gear is transmitted to the L gears (R) and (L) and slider. When loading starts and the cam gear turns counterclockwise in Fig. 3, the first tooth P of the 6 teeth provided in the cam portion on the outer circumference will engage with projection Q of the L gear (R). This causes the cam gear teeth to mesh with the L gear (L) teeth, and turns the L gear (L) clockwise. This pushes up the G base (O) assembly along the guide rail groove, and presses it against the end of cylinder base shown in the detailed diagram of Fig. 3. This pressing force is supplied by a leaf spring.

Next, the slider drive mechanism is explained:

The slider shown in Fig. 3 is viewed from the outside, and that in Fig. 4 and 5 is viewed from the inside. In Fig. 3, the slider, meshed with the cam gear, moves to the left as the cam gear turns. Projection "a" which is in contact with bottom end "b" of the torque change arm, switches the torque at the pulley assembly.

In Fig. 4 and 5, the slider moves to the left as the cam gear turns. The slider uses its cam groove B in Fig. 5 to operate boss B of tension band R shown in Fig. 6, and switches braking. In the same way, cam groove A operates boss A of tension band R to switch braking; cam groove C operates boss C of operation arm L shown in Fig. 8 to switch braking; and cam groove D operates boss D of the spring arm shown in Fig. 9 to switch the torque of tension band brake.

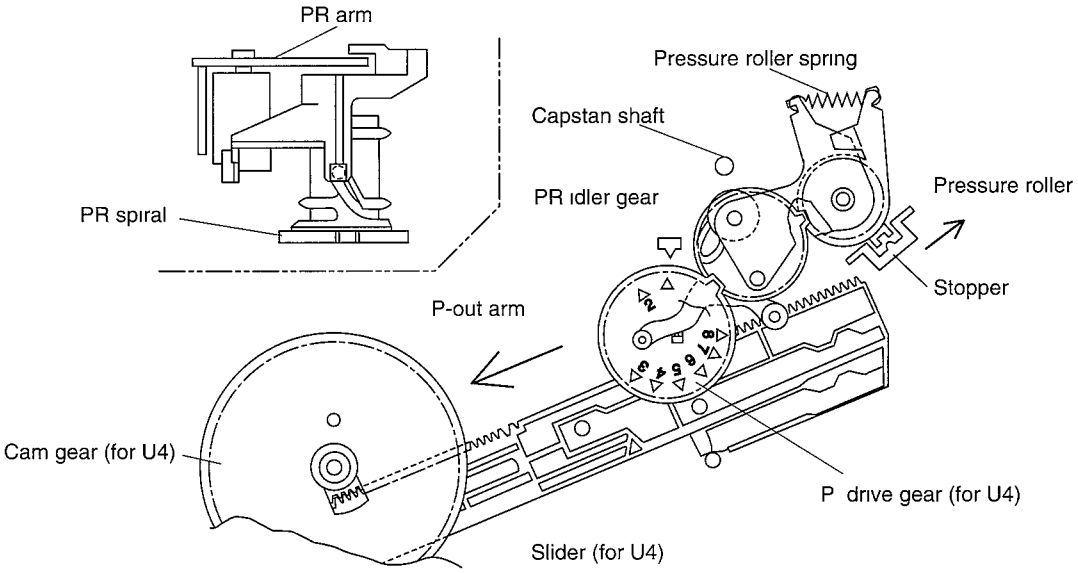


Fig. 4 Pressure Roller Drive Mechanism (Top View)

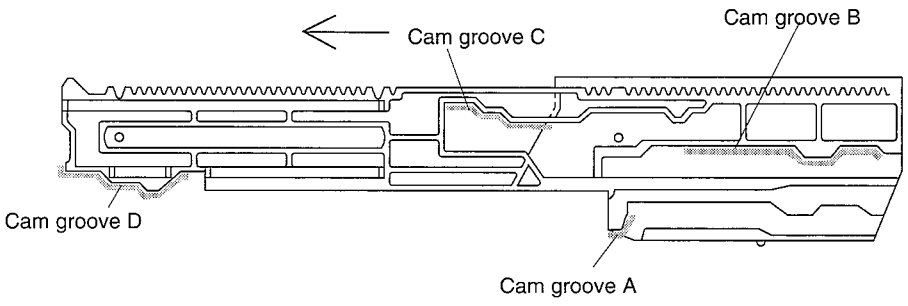


Fig. 5 Slider Cam Grooves

4.2 Band brake drive mechanism

Fig. 6 shows tension band R, which consists of arm 1, arm 2, and a felt band linking them that winds round the take-up reel table. A spring is hooked to one end of arm 1, and another spring is also hooked to one end of arm 2 and to operation arm L. Arm 1 has boss A, which engages with cam groove A in the slider, shown in Fig. 5, to control tension band R. In the same way, arm 2 has boss B which engages with cam groove B in the slider to control tension band R. Fig. 7 shows operation arm L, which has the center of turning, spring hook and boss C. A spring is hung between this hook and arm 2. Boss C of operation arm L engages with cam groove C in the slider, shown in Fig. 5, to control tension band R.

Tension band R, operation arm L, 2 springs and the slider are used to control the three types of braking (brake on, half brake on, and brake off) shown in the timing chart of Fig. 15.

Fig. 8 shows the tension band brake, which consists of the tension arm, mold portion, adjustment screw portion, and the band felt portion linking them that winds round the supply reel table. The tension arm has tension pole, boss at the center of turning and spring hook. An eccentric shaft that is built into the adjustment screw portion is used to adjust the tension pole position. Fig. 9 shows the spring arm, which consists of the spring hook, center of turning and boss D. A spring is hung onto this spring hook with the tension arm. Boss D engages with cam groove D in the slider, shown in Fig. 5, to control the three types of braking (brake on, half brake on, and brake off) of tension band shown in the timing chart of Fig. 15, and also perform on/off control of supply subbrake. (See Chapter 4 for the tension pole position adjustment.)

4.3 Pressure roller drive mechanism

The motive power of the loading motor assembly is transmitted to the slider via the cam gear as shown in Fig. 4. From the slider, power is transmitted to the pressure roller drive mechanism via the P. drive gear. The P drive gear has numbers stamped in sync with the mechanism state switch, so the mechanism mode can be checked from top of the mechanism.

The torque at the P drive gear is transmitted to the PR spiral via the PR idler gear. A guide groove is provided in the cylindrical portion at the upper section of PR spiral, and the drive boss of pressure roller arm is inserted into this guide groove. When the PR spiral turns clockwise, the pressure roller arm will descend while turning. When the pressure roller arm extends down, the drive boss will be inserted into the cam groove in the PR idler gear and turn clockwise, which compresses the pressure roller against the capstan shaft. The pressing force of pressure roller is provided by the spring of pressure roller arm.

The P. out arm is driven by the cam groove on the outer circumference of PR idler gear.

The pressure roller arm should be pulled out upward after the stopper is moved in the direction of the arrow.

4.4 Jog arm drive mechanism

Fig. 10 shows the jog arm, which consists of the center of turning, gear, spring hook and boss. The center of turning is attached so that the jog arm can turn while centering on boss E provided in the chassis. A spring hooked to the chassis is attached to the spring hook. The gear is attached to the jog arm so that it can turn and also stay in contact with the gear at the bottom of the supply reel table. Boss E is driven by the cam groove in the cam gear, shown in Fig. 11, and operates in the range shown in the timing chart of Fig. 15.

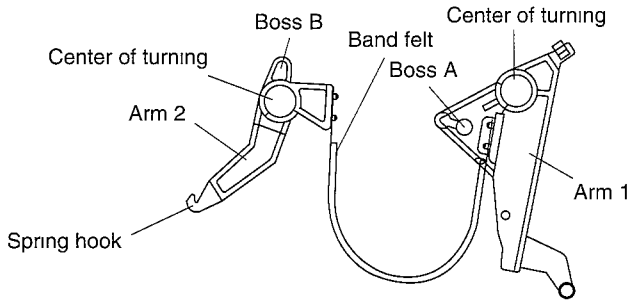


Fig. 6 Tension Band R

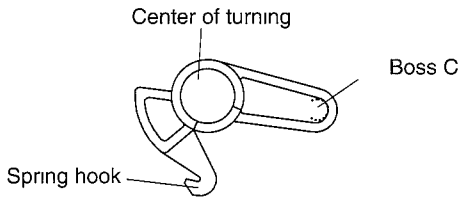


Fig. 7 Operation Arm L

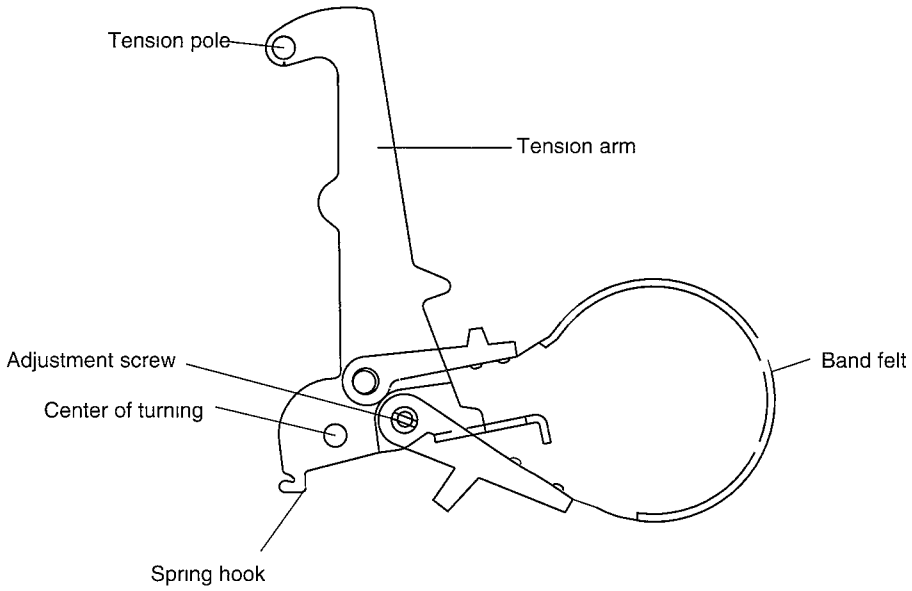


Fig. 8 Tension Band Brake

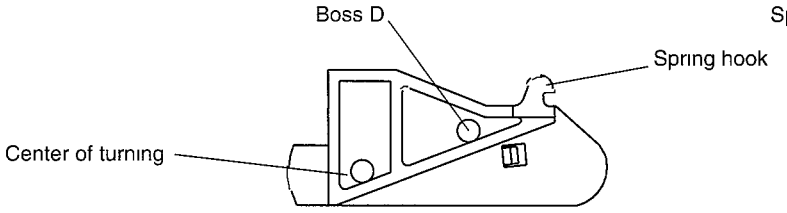


Fig. 9 Spring Arm

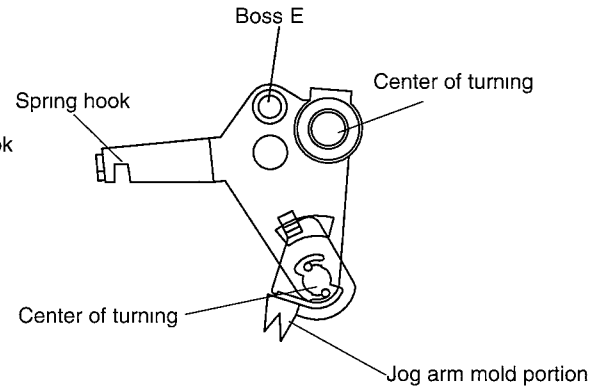


Fig. 10 Jog Arm

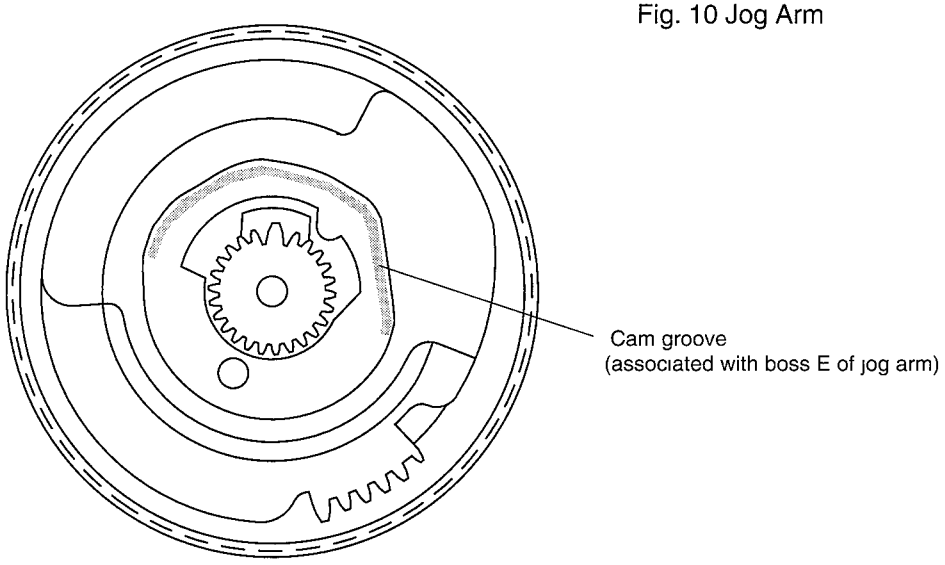


Fig. 11 Cam Gear

5. Capstan Motor System Drive Mechanisms

The following explains each of the drive mechanisms that use the capstan motor as a power source:

5.1 Reel table drive mechanism

Fig. 12 and 13 show the power transmission paths from the capstan motor to both reel tables and the front loading mechanism.

The motive power of capstan motor is transmitted to the pulley assembly via the drive belt. The pulley assembly has a friction mechanism: During playback and unloading, weak torque (via the friction mechanism) is transmitted to both reel tables to take up the tape. During fast forward and rewind, strong torque (bypassing the friction mechanism) is transmitted to both reel tables to take up the tape.

Selection as to whether torque is transmitted via the friction mechanism or not is performed by the torque change gear that moves up and down: When the torque change gear is up, strong torque will be transmitted; when it is down, weak torque will be transmitted.

The torque change gear moves up or down when projection a of the slider comes into contact with the bottom end b of the torque change arm, and the slider moves.

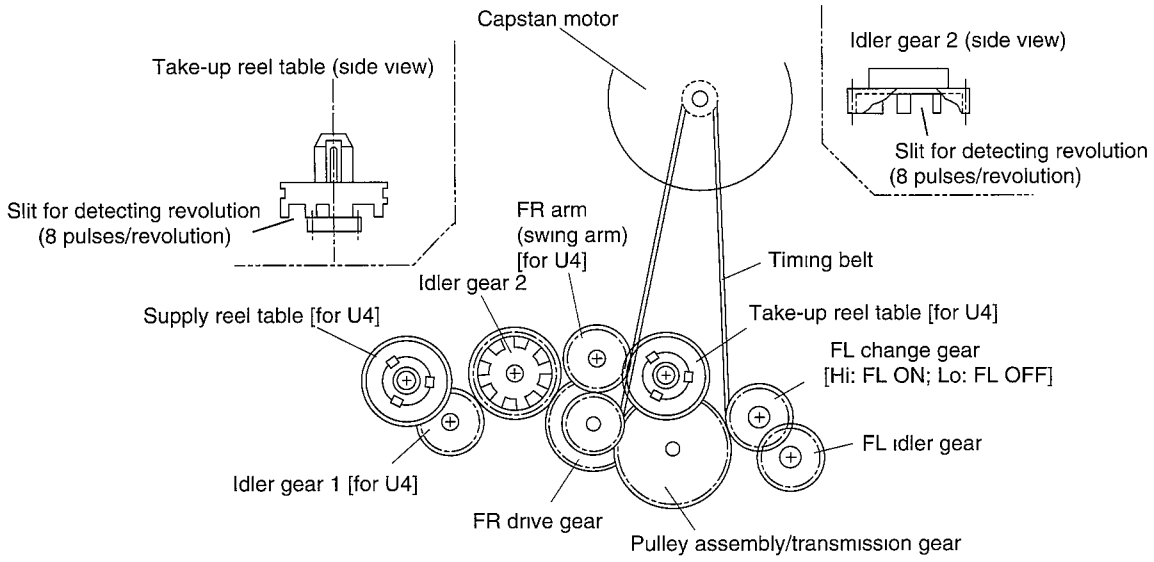


Fig. 12 Mechanism that Drives Reel Tables and FL Mechanism (Top View)

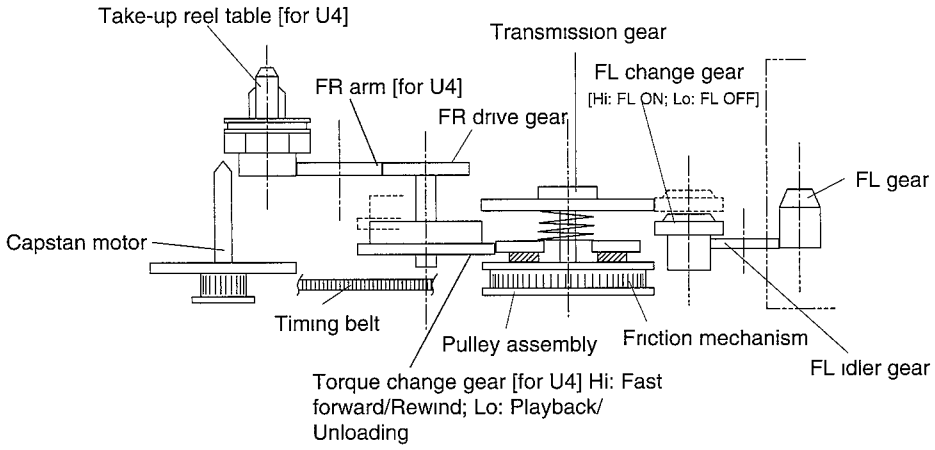


Fig. 13 Mechanism that Drives Reel Tables and FL Mechanism (Side View)

5.2 Front loading mechanism

When cassette tape is inserted into cassette housing, as shown in Fig. 14, the bevel gear turns clockwise, which releases the switch arm from the projection of bevel gear to turn it counterclockwise. This operation turns on the cassette down switch on the main PWB, and the capstan motor then turns to start loading.
The motive power from the capstan motor is transmitted to the cassette housing via the transmission gear, FL change gear and FL idler gear, as shown in Fig. 12 and 13.
When the FL change gear is in the "Hi" position at this stage, torque is transmitted to the FL idler gear in order to perform front loading.
When the cassette housing reaches the specified position, the cassette down switch turns off, and the capstan motor stops, completing front loading.
When the eject button is pressed to remove cassette, voltage is supplied to the capstan motor via a microprocessor to drive the capstan motor in reverse, and the torque is transmitted to the cassette housing via the transmission gear, FL change gear and FL idler gear, thereby ejecting the cassette. At the completion of ejection, the switch arm turns off and the capstan motor stops.
The door of cassette insertion slot is opened or closed by the door arm.
When the front loading mechanism is to be reinstalled, return the cassette housing to the front as shown in Fig. 14, and make sure that the hole for marking in the bevel gear is aligned with the hole for marking in the bracket.

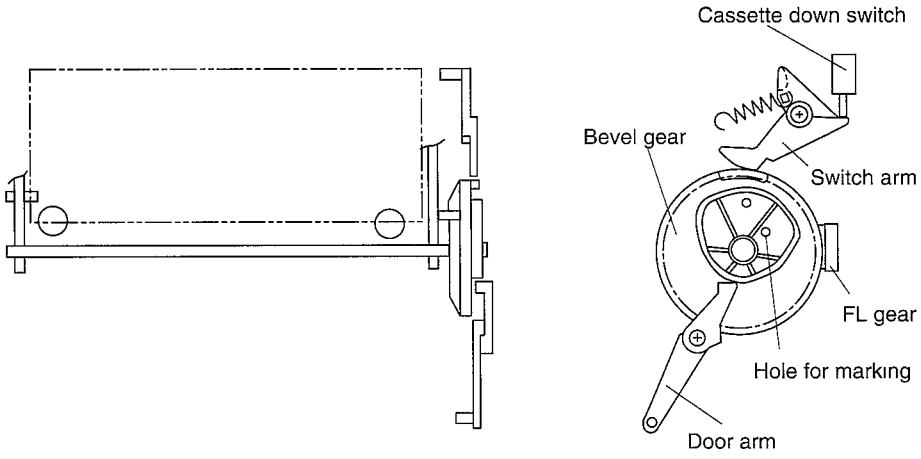


Fig. 14 FL Mechanism

6. U4 Mechanism Timing Chart

Fig. 15 is a timing chart for the U4 mechanism. The numbers on the switch are identical to those of each mode and also to the stamps on the pressure roller drive gear.

The angles in the diagram are the rotation angles of the cam gear, which is viewed from the back of mechanism and turned counterclockwise (clockwise when it is viewed from top of mechanism), using front loading as reference.

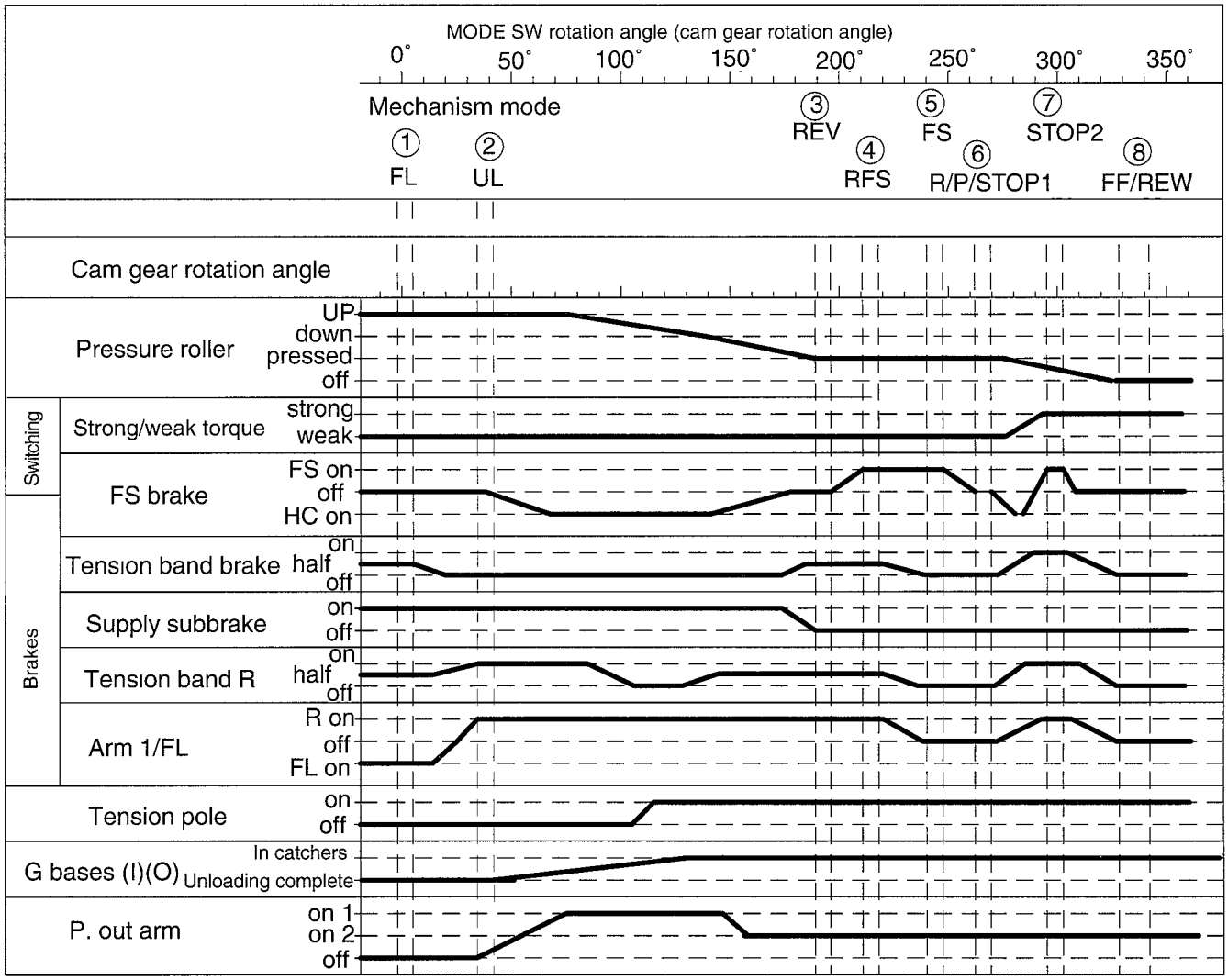


Fig. 15 U4 Timing Chart

Chapter 2 General Information

1. U4 Mechanism External Views

1-1 Top view of U4 mechanism (1)

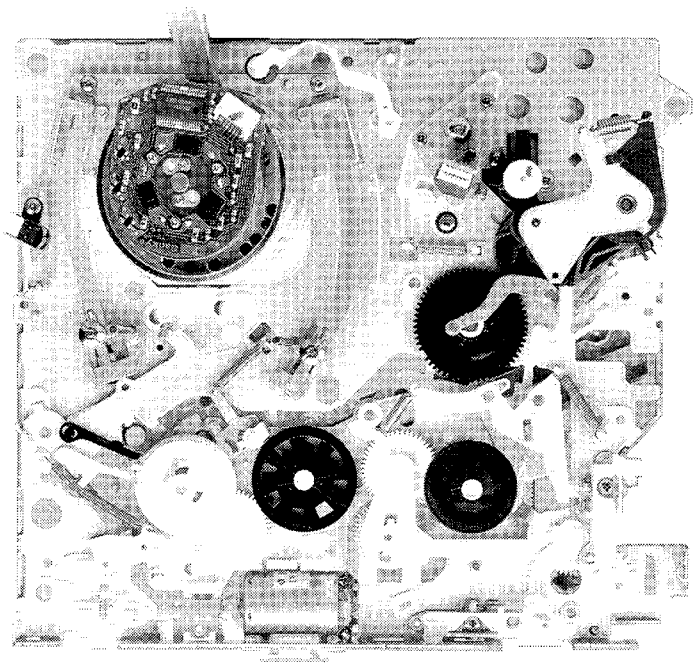


Fig. 1-1

1-2 Top view of U4 mechanism (2)

Fig. 1-2

1-3 Bottom view of U4 mechanism (1)

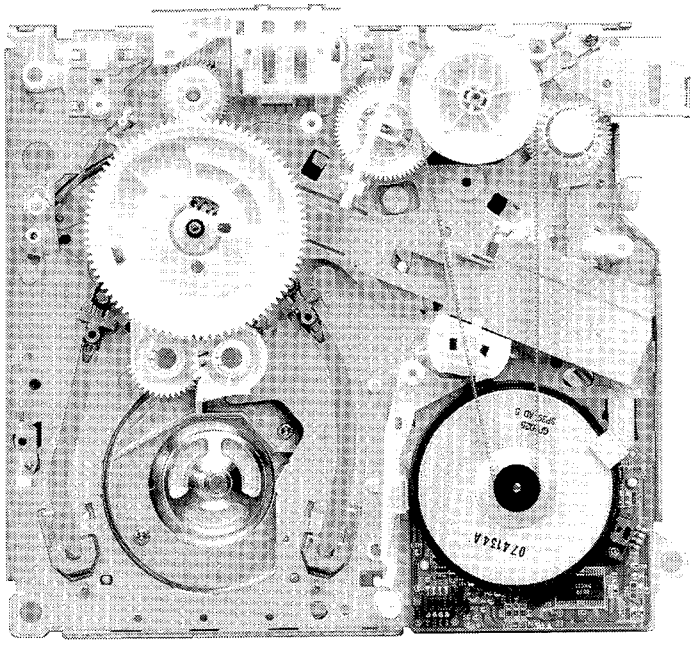


Fig. 1-3

1-4 Bottom view of U4 mechanism (2)

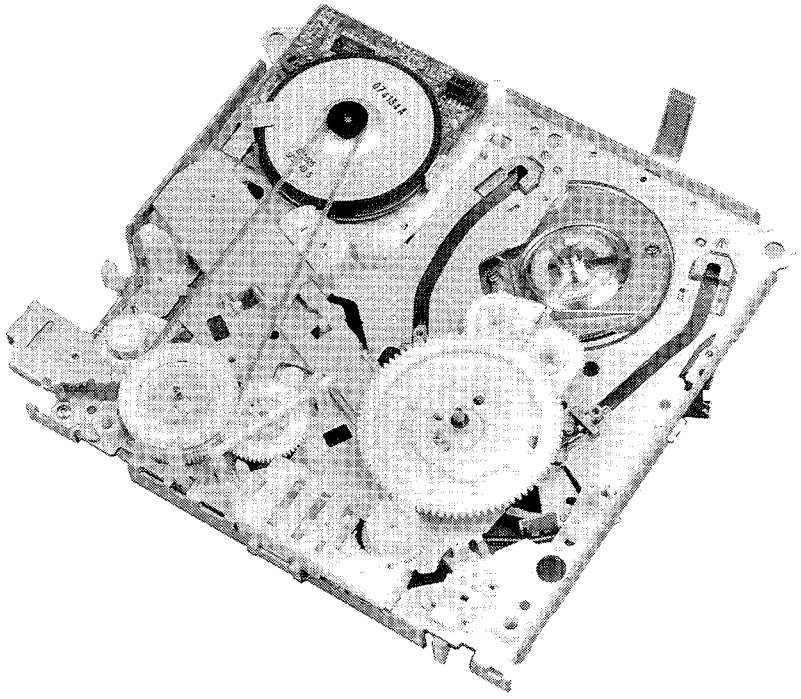


Fig. 1-4

Chapter 3 Disassembly

1. Before Starting Disassembly

> Be sure to remove all cases when replacing components: Neglecting this could cause damage to the customer VCR. Perform the reverse procedure (to removal) when reassembling components, unless otherwise specified.

[Disassembly procedure]

Where some order must be followed when dismantling components, numbers are used to indicate the procedure. Follow numbers (1), (2), (3) ... described in illustrations.

2. Names of Components in U4 Mechanism and their Locations

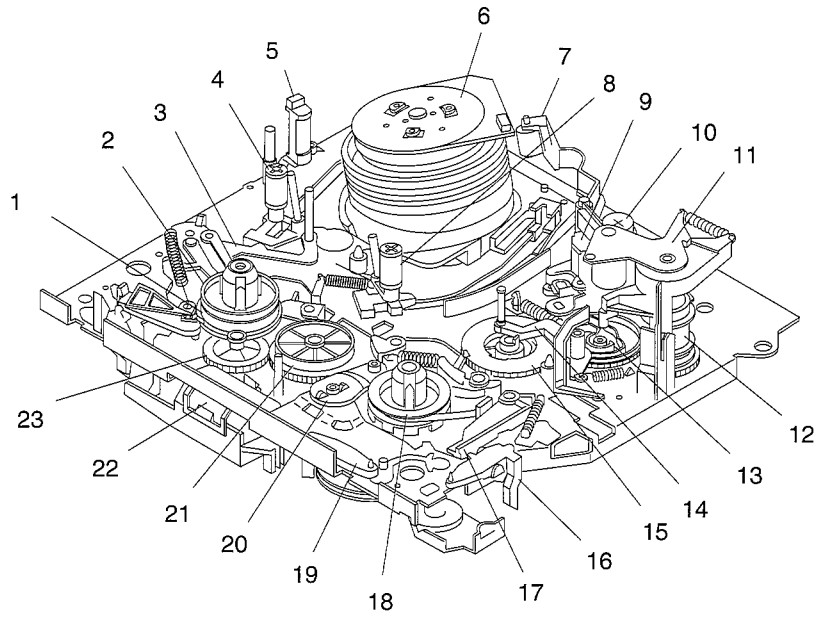


Fig. 2-1 Top View of U4 Mechanism

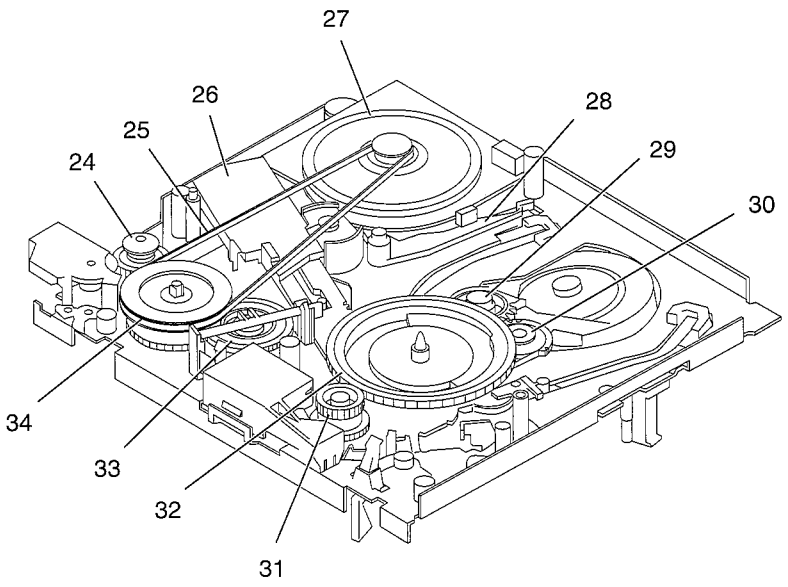


Fig. 2-2 Bottom View of U4 Mechanism

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

(*) Varies, depending on the model.

3. U4 Mechanism Disassembly Procedure

When replacing defective components, first refer to the following components hierarchy chart. This chart shows the procedure for component removal when replacing defective components.
Remove the cassette tape from the mechanism, and set mechanism to eject status when dismantling.

[How to use components hierarchy chart]

(1)Locate the component to be replaced.
(2)Check the components in the ranks above the component to be replaced and start dismantling.
(3)Replace the defective component, and then reinstall the components in the reverse order to that shown in the chart.

[Symbols]

(1)Dismantle components marked ☆ whenever the U4-FL mechanism has been removed.
(2)Dismantle components marked ★ whenever the U4 mechanism has been removed from the VCR.
(3)Components without any marks can be removed when the covers and panels are removed.

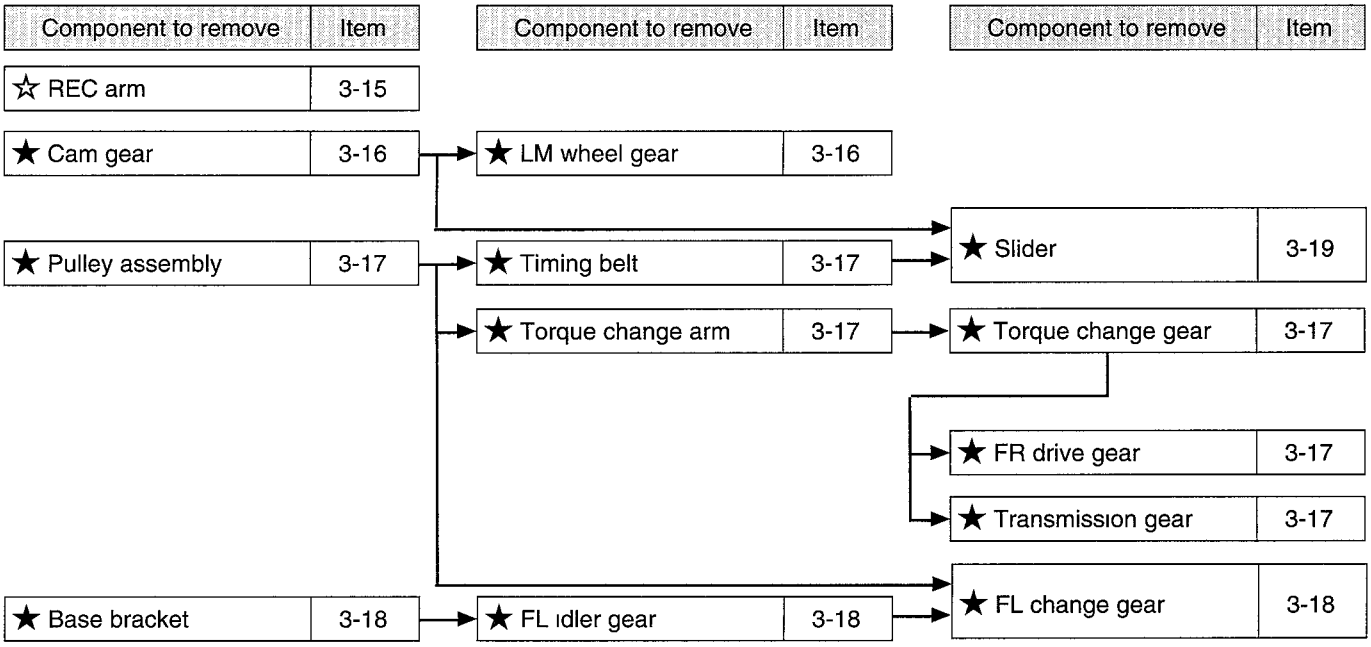
Dismantling heads and motor related components

Component to remove	Item
FE head	3-1
AC head assembly	3-2
★ Cylinder motor assembly	3-3
★ Capstan motor	3-4
★ Loading motor assembly	3-5

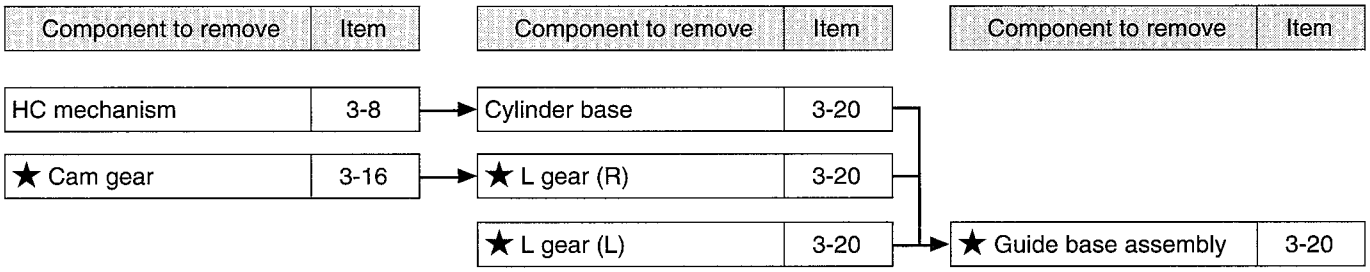
Dismantling tape transport components

Component to remove	Item	Component to remove	Item	Component to remove	Item
☆ Tension arm	3-6	☆ Tension band brake	3-6		
		☆ Spring stopper	3-6		
		☆ Supply reel table	3-7	☆ Jog arm / gear	3-7
				☆ Idler gear 1	3-7
☆ Idler gear 2	3-7				
HC mechanism	3-8	★ FS brake	3-13		
PR arm	3-9	PR spiral gear	3-10		
☆ P. out arm	3-11	☆ PR idler gear	3-12	★ P. drive gear	3-13
☆ Operation arm L	3-14	☆ Tension band R	3-14		
		☆ T reel table	3-14	☆ FR arm	3-14
☆ S-VHS switch	3-14				
☆ D-VHS switch	3-14				

Dismantling drive system components



Dismantling guide roller assembly



3-1 FE head

Caution when reinstalling:

1) Clean the surfaces of full erase head and tape guide S, with which tape comes into contact.

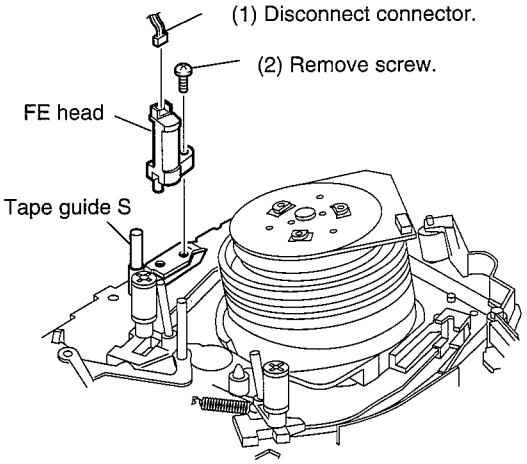


Fig. 3-1

3-2 AC head assembly

Caution when reinstalling:

1) Clean the surface of AC head, with which tape comes into contact.

Adjustments after reinstalling:

1) A/C (audio/control) head adjustment
2) X-value adjustment

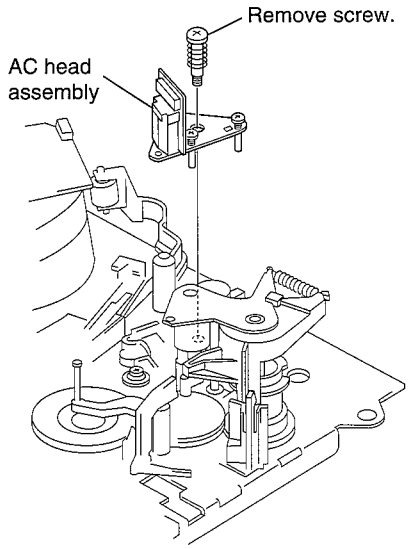


Fig. 3-2

3-3 Cylinder motor assembly

Caution during work:

1) Do not touch video head tips.

Adjustments after reinstalling:

1) Adjustment after replacing the cylinder

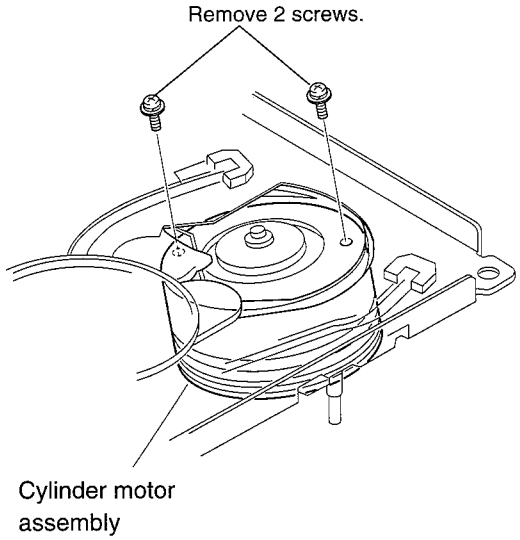


Fig. 3-3

3-4 Capstan motor

Cautions when reinstalling:

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

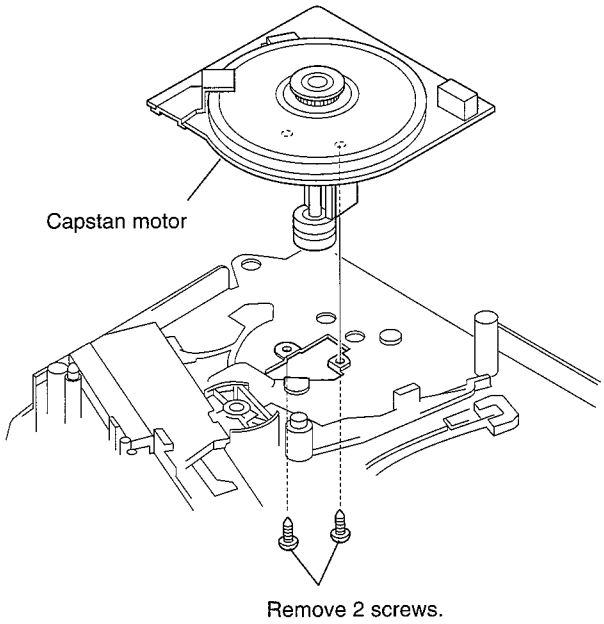


Fig. 3-4

3-5 Loading motor assembly

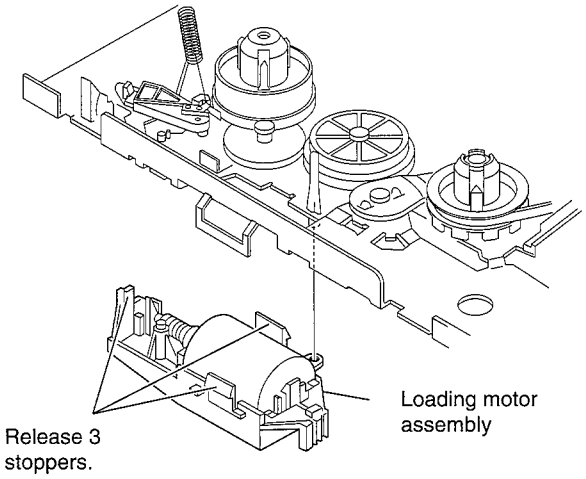


Fig. 3-5

3-6 Tension arm, tension band brake, spring stopper

Caution when reinstalling:

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

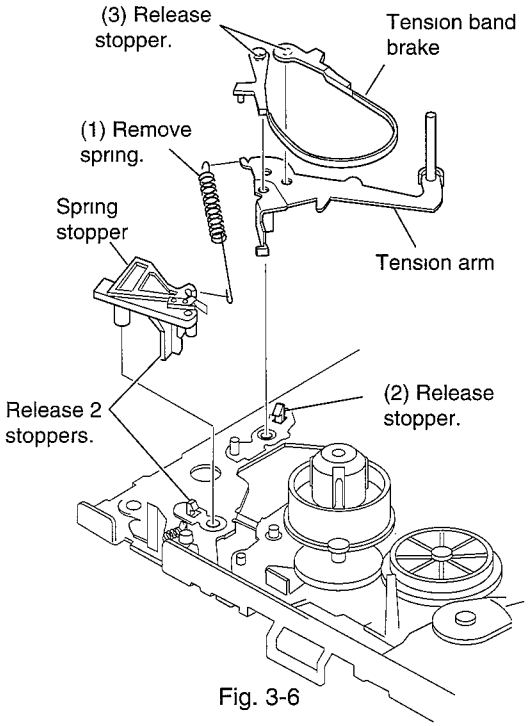


Fig. 3-6

3-7 Jog arm, jog gear, S reel table, idler gear 1, idler gear 2

Caution when reinstalling S reel table:

1) Put washer onto the S reel table shaft.

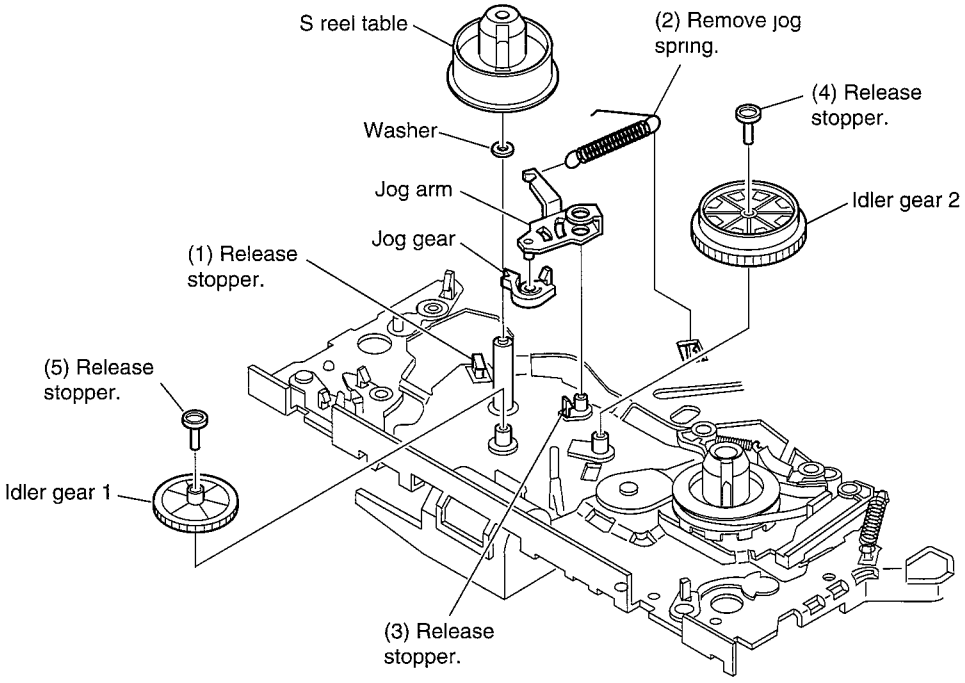


Fig. 3-7

3-8 HC mechanism

Caution when reinstalling:

1) Make sure that the HC mechanism arm is set in the specified position.

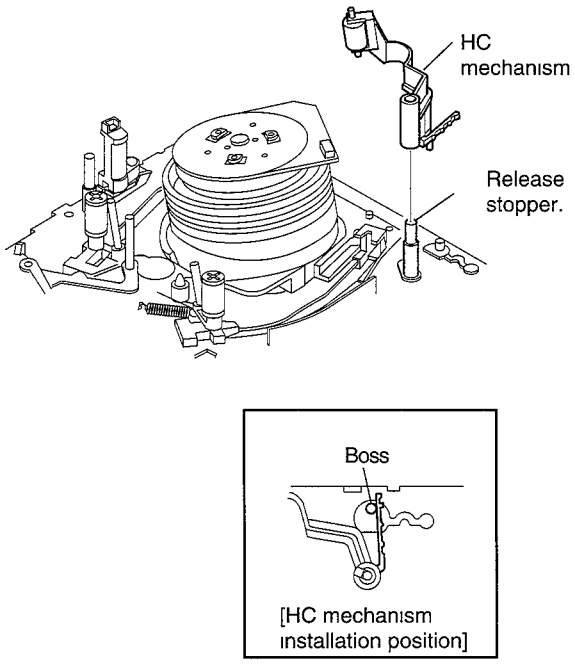


Fig. 3-8

3-9 PR arm

> The PR arm is secured by the guide of chassis mold. When removing the PR arm, take great care that the guide of chassis mold is not subject to stress.

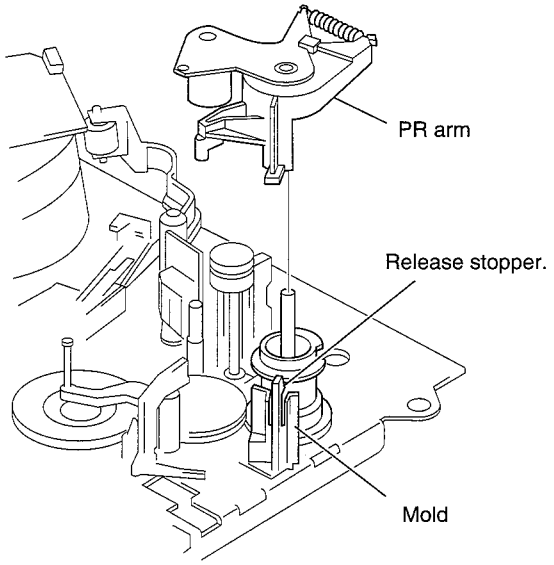


Fig. 3-9

3-10 PR spiral gear

Caution when reinstalling:

1) Align the positions of PR spiral gear and PR idler gear.

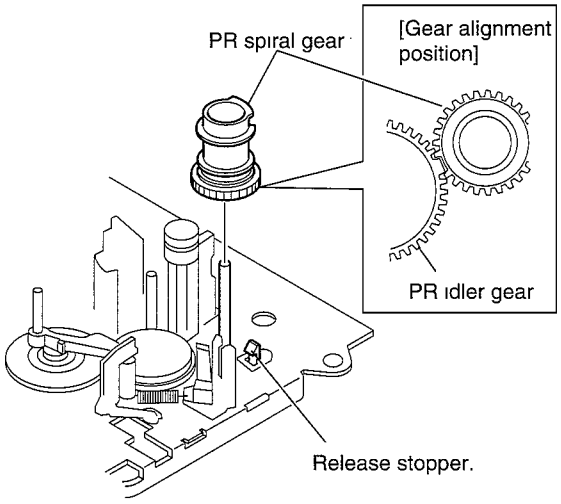


Fig. 3-10

3-11 P. out arm

Cautions when reinstalling:

1) Clean the surface of P. out arm, with which tape comes into contact.
2) Make sure that the P. out arm is set in the specified position.

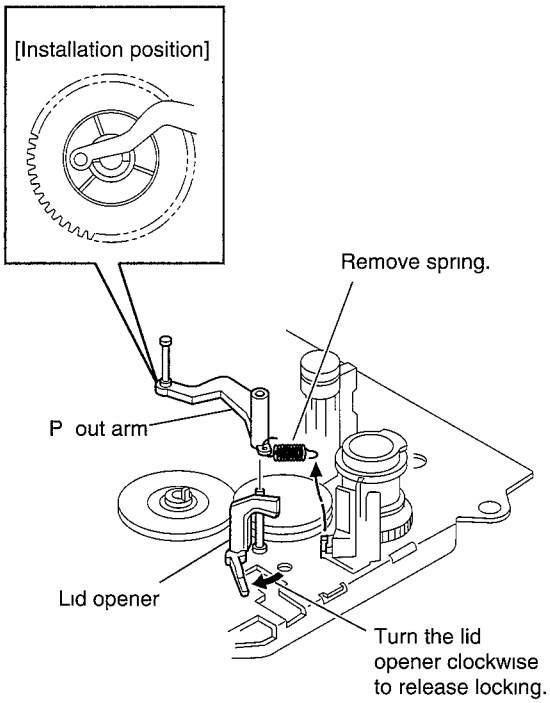


Fig. 3-11

[Cautions on lid opener]

When replacing the P. out arm, turn the lid opener clockwise to release the engagement.
The lid opener stoppers are secured by chassis mold: Take great care not to scratch the top of mold. In addition, do not turn the lid opener counterclockwise from the regular position.

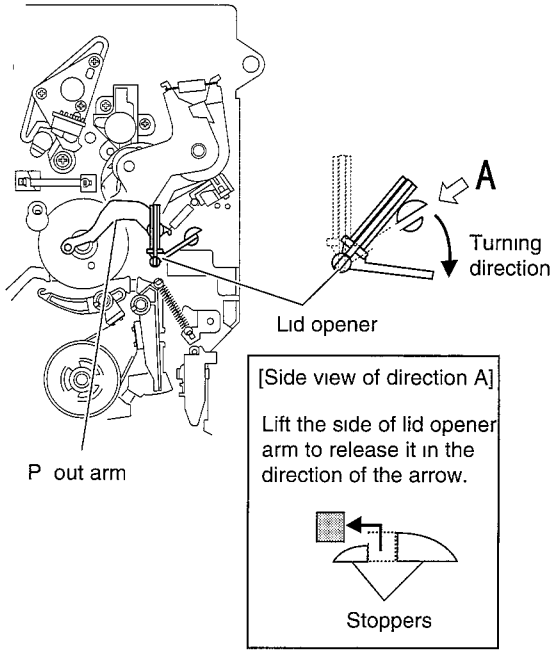
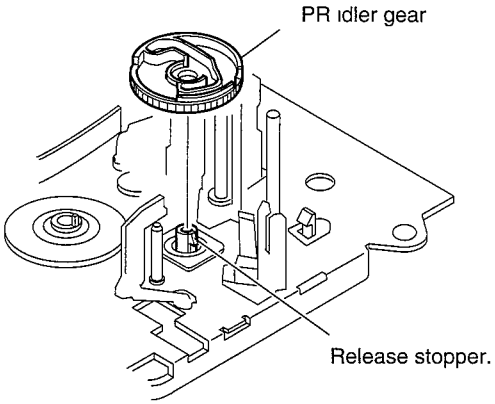


Fig. 3-12

3-12 PR idler gear

Caution when reinstalling:

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



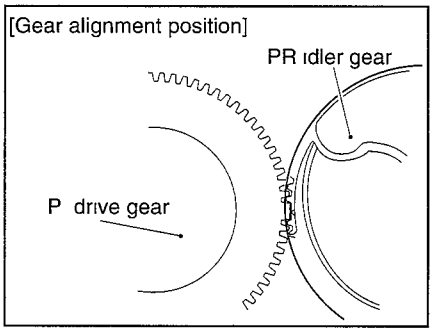


Fig. 3-13

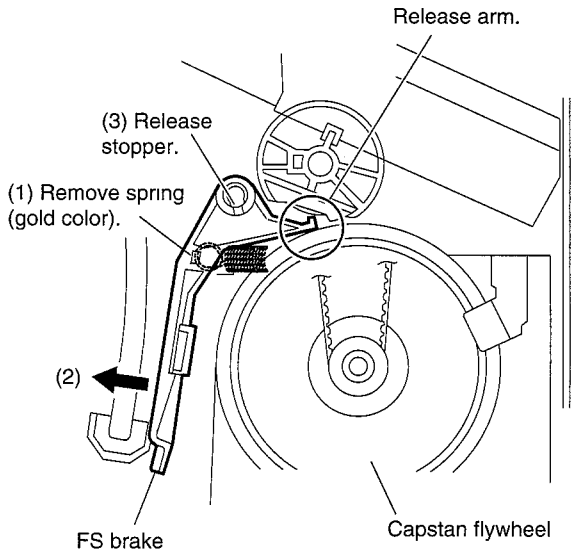
3-13 FS brake, P. drive gear

Caution during work:

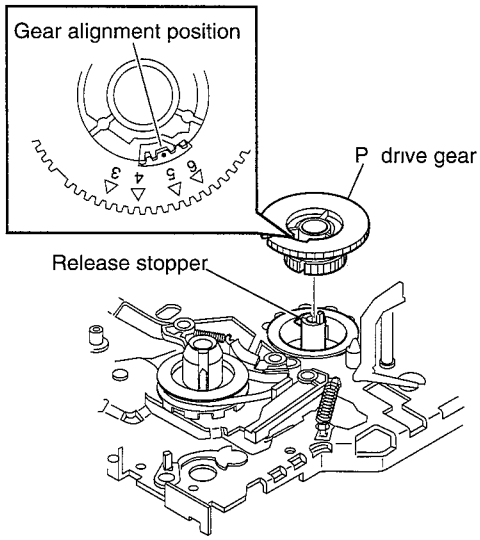
1) Lift the P. drive gear only after pulling the FS brake in the direction of the arrow to release the arm.

Caution when reinstalling:

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



[Back of mechanism]



[Surface of mechanism]

Fig. 3-14

3-14 Operation arm L, tension band R, T reel table, FR arm, S-VHS switch, D-VHS switch

Caution when reinstalling T reel table:

1) Put washer onto the T reel table shaft.

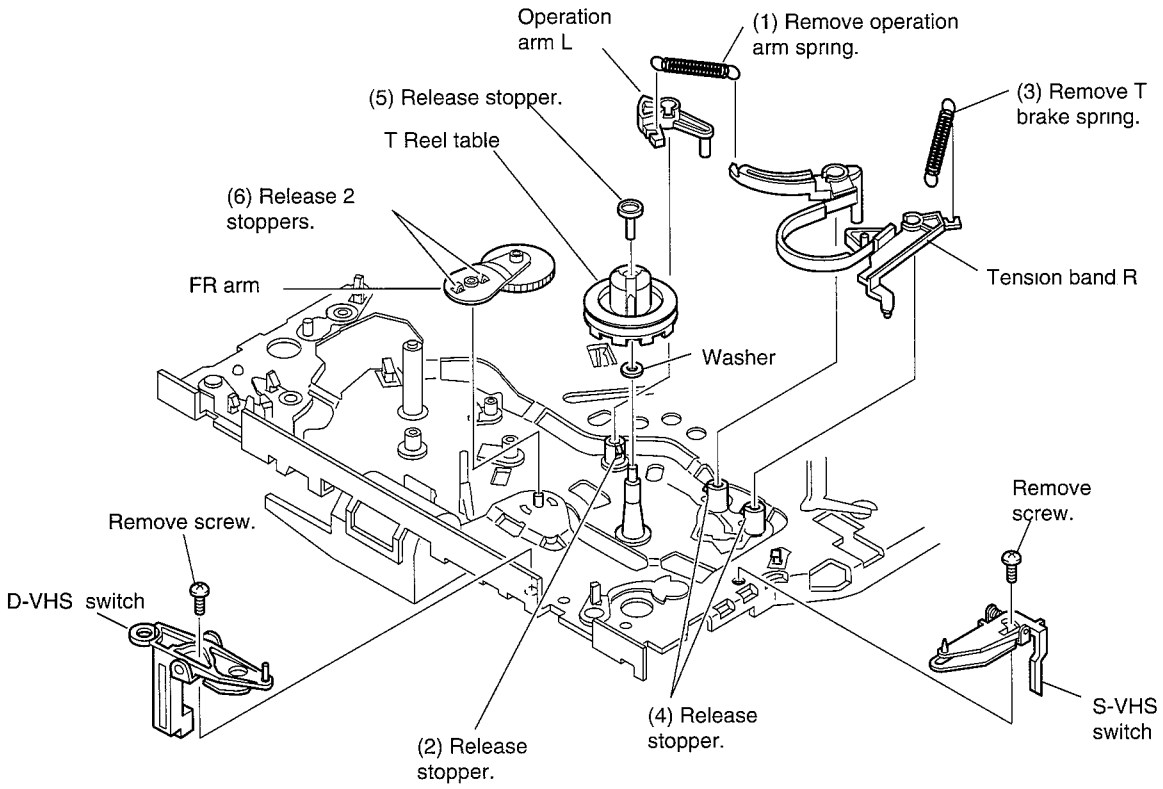


Fig. 3-15

3-15 REC arm

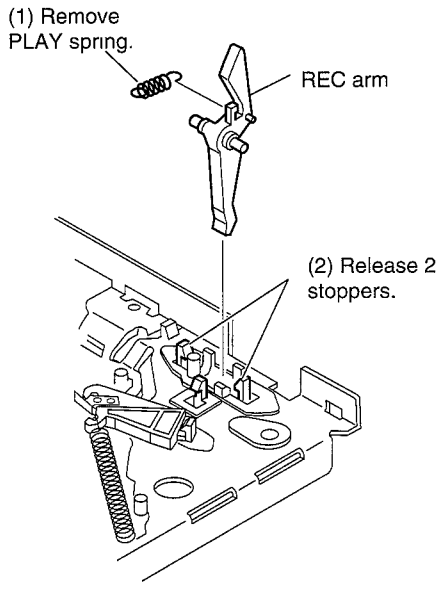


Fig. 3-16

3-16 Cam gear, LM wheel gear

Caution when reinstalling:

1) Align the positions of cam gear and slider.

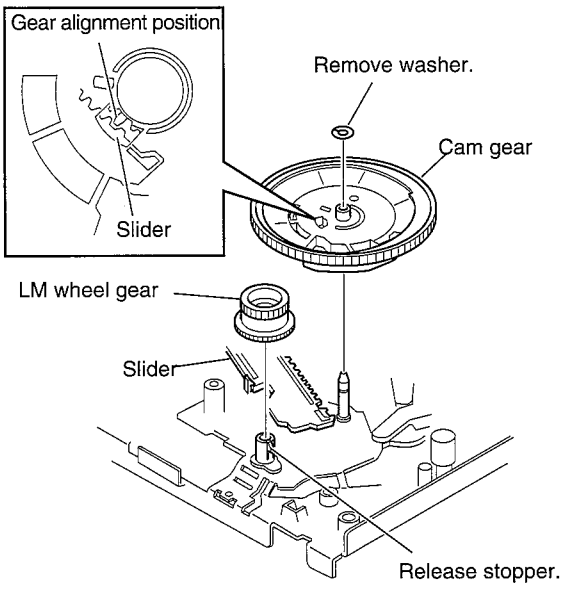


Fig. 3-17

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

Cautions when reinstalling pulley assembly and timing belt:

1) Release the 5 stoppers on the back of the pulley assembly, and then separate the pulley assembly into pulley and flange.
2) Reinstall the pulley of pulley assembly, followed by the timing belt.
3) Finally, reinstall the flange of pulley assembly.

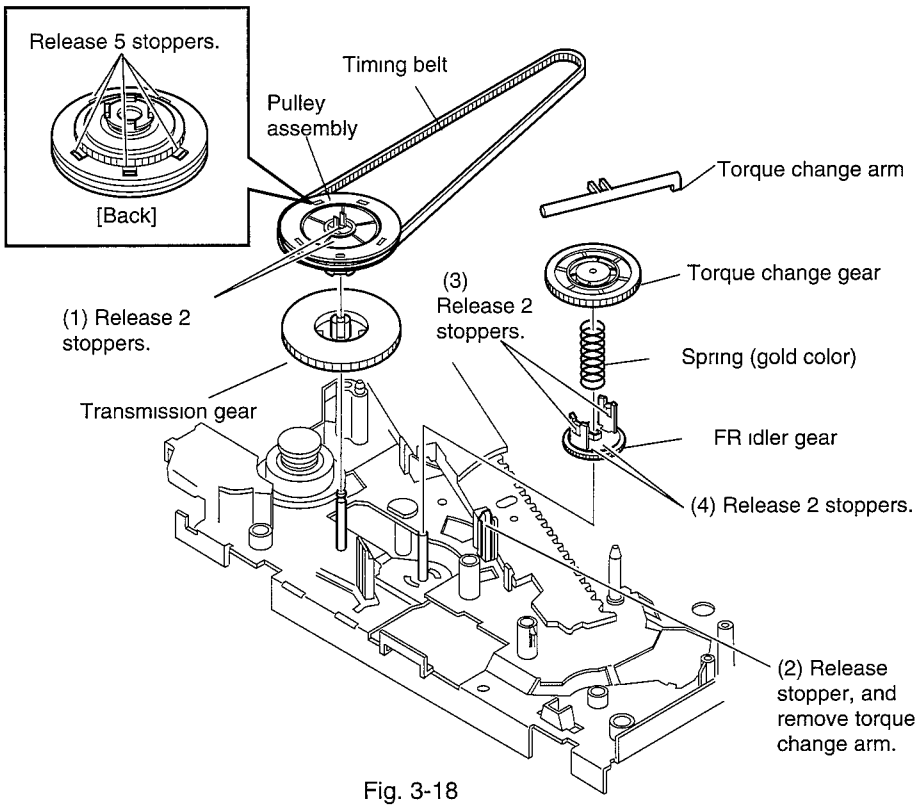


Fig. 3-18

3-18 Base bracket, FL idler gear, FL change gear

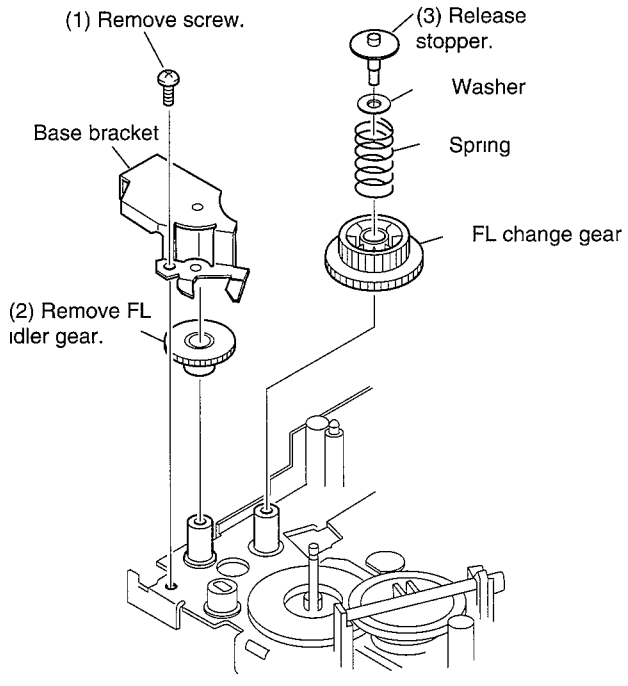


Fig. 3-19

3-19 Slider

Cautions when reinstalling:

1) Remove operation arm L and tension band R in advance.
2) Then, align the projection shown in the figure (that indicates the point when reinstalling) with the boss of chassis, to reinstall the slider.
3) Reinstall operation arm L and tension band R.

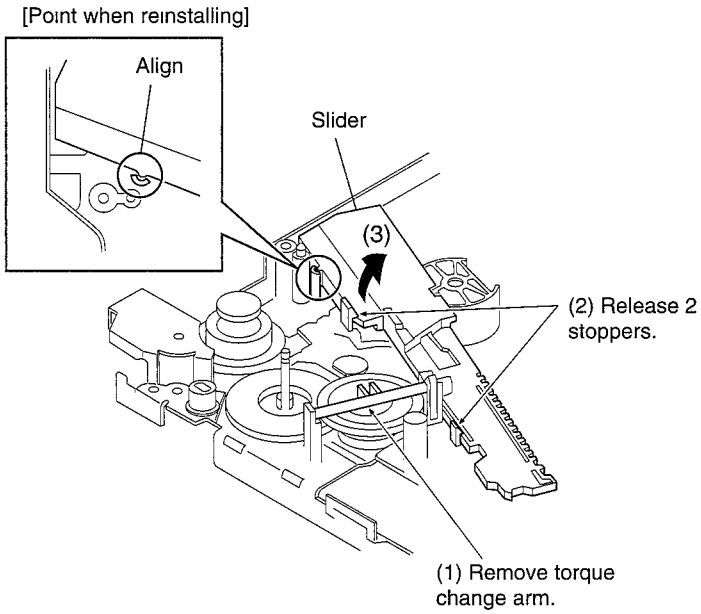


Fig.3-20

3-20 L gear (L), L gear (R), cylinder base, G base assembly

Cautions when reinstalling:

1) Clean the surfaces of guide rollers, with which tape comes into contact.
2) When reinstalling the cylinder base, align the positions securely, and then tighten screws (1) and (2) in this order.

Mechanism adjustment after reinstalling:

1) Guide roller height adjustment

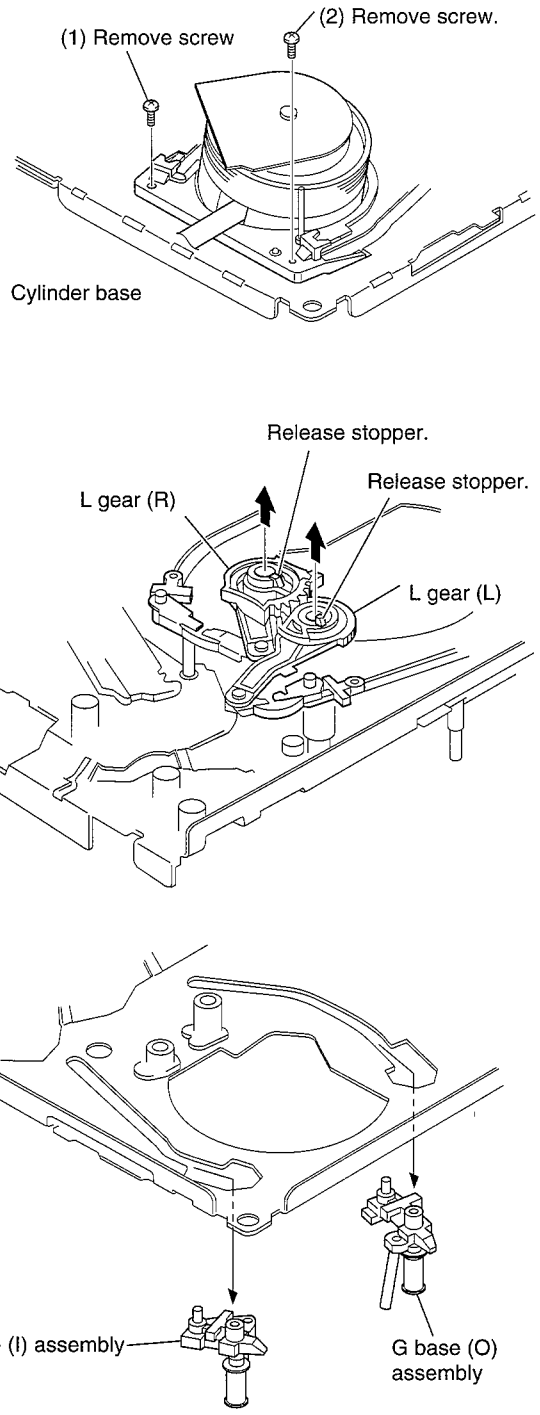


Fig. 3-21

4. Items to Be Checked After Reinstalling U4 Mechanism

After dismantling the mechanism or replacing components, be sure to reassemble the mechanism as in the original status, and then make sure of the following:

Items to be checked on the surface of U4 mechanism :

(A) The head cleaning (HC) mechanism arm must be in the correct position.
(B) The △ mark (No. 1) on the P. drive gear and the ▽ mark on the spring hook must be aligned.
(C) The engagement between the spiral gear and PR idler gear must be correct.
(D) The engagement between the PR idler gear and P. drive gear must be correct.
(E) The P. out arm must be in the correct position.
(F) The engagement between the P. drive gear and gear of slider must be correct.

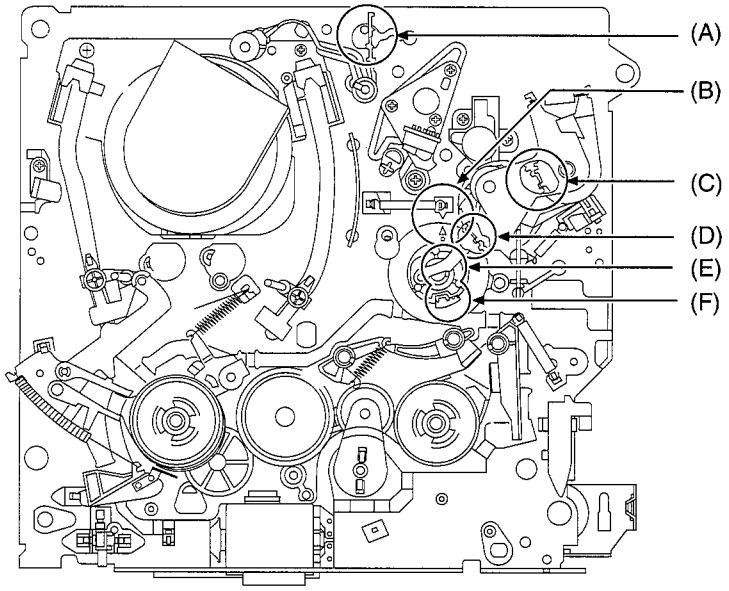


Fig. 4-1

Items to be checked on the back of U4 mechanism:

(A) The projection of slider and the boss of chassis must be aligned.
(B) The engagement between loading gears (R) and (L) must be correct.
(C) The engagement between the cam gear and gear of slider must be correct.

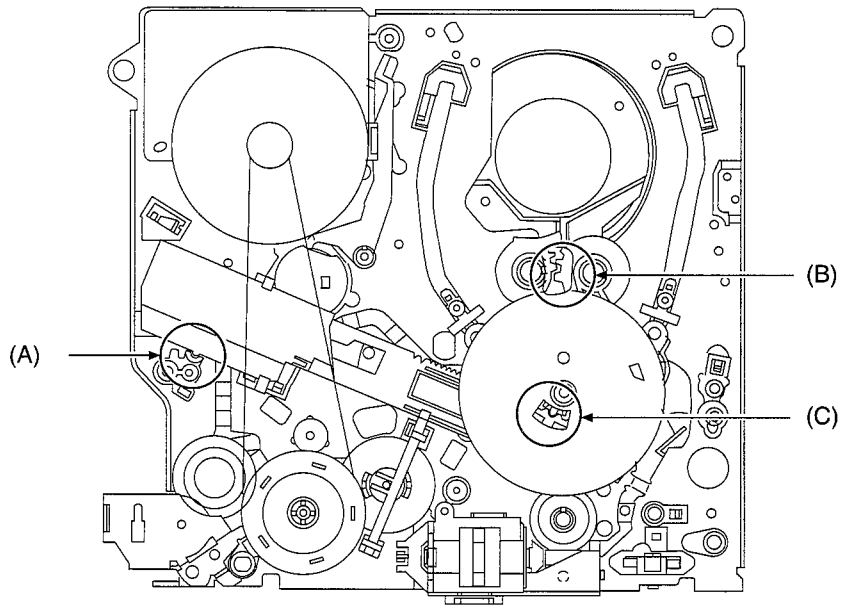
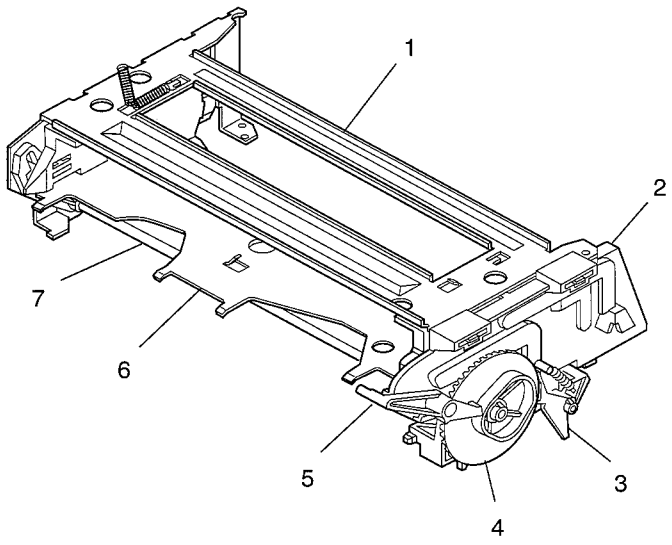


Fig.4-2

5. Names of Components in U4-FL Mechanism and their Locations



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

Fig. 5-1

6. Disassembly of U4-FL Mechanism

6-1 Door arm, switch arm, bevel gear, FL gear

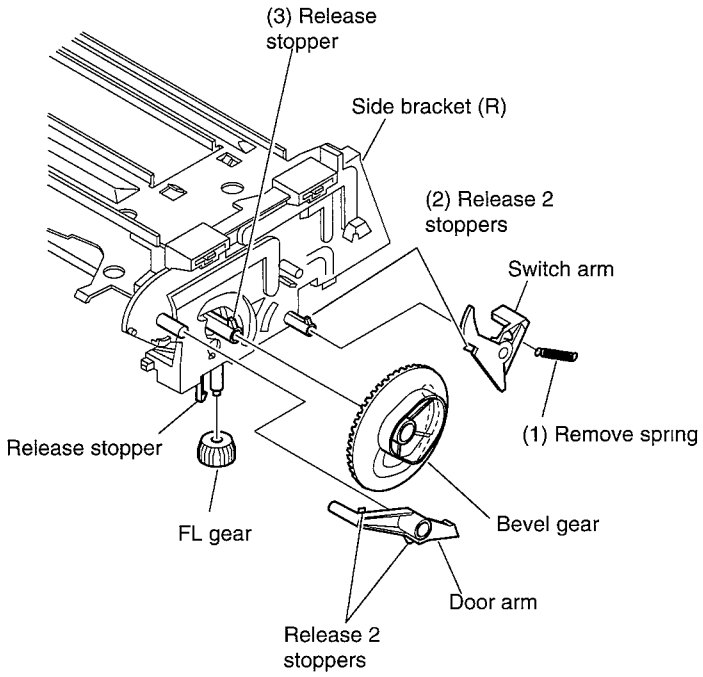


Fig. 6-1

Caution when reinstalling:

1) When reinstalling the bevel gear, align the hole in the bevel gear with the hole in the side bracket (R).

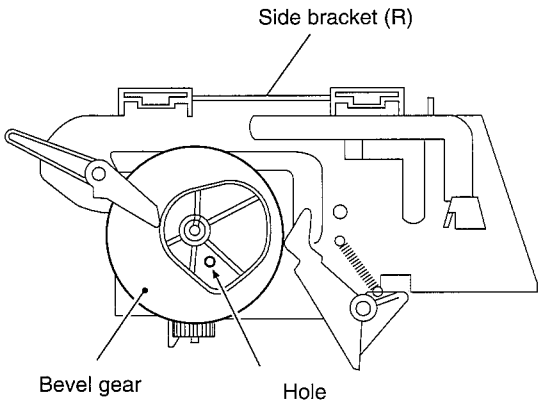


Fig. 6-2

6-2 Side bracket (R), side bracket (L), cassette holder, drive arm

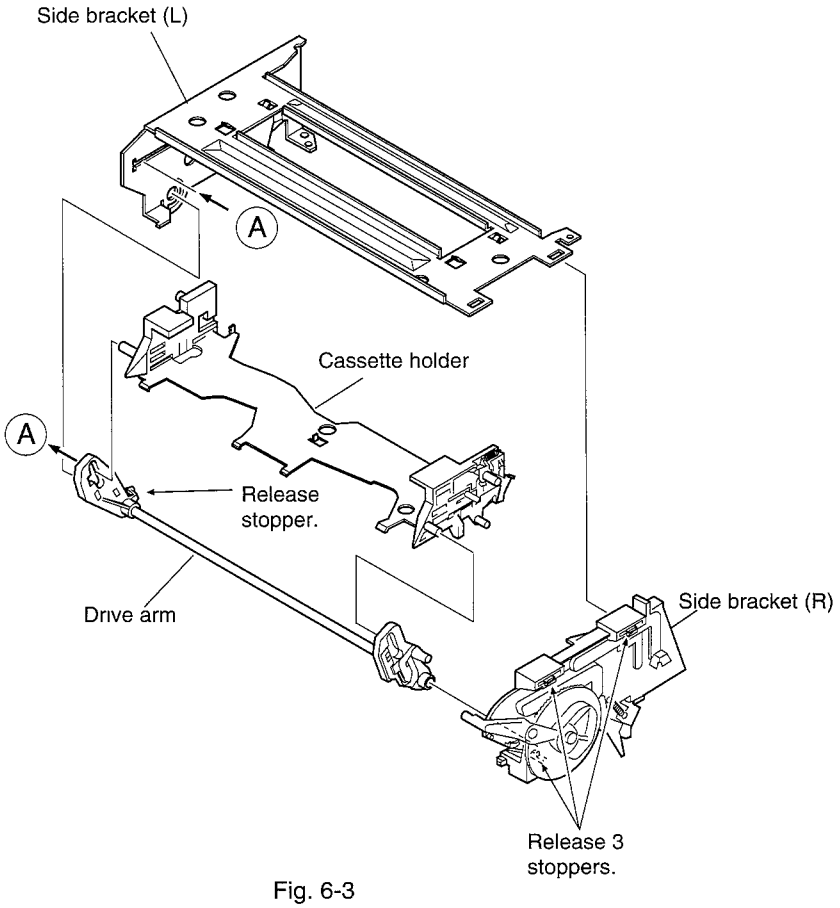


Fig. 6-3

Cautions when reinstalling:

1) Make sure that the 7 bosses are inserted correctly.
2) Align the hole in the side bracket (R) and the hole in the bevel gear.

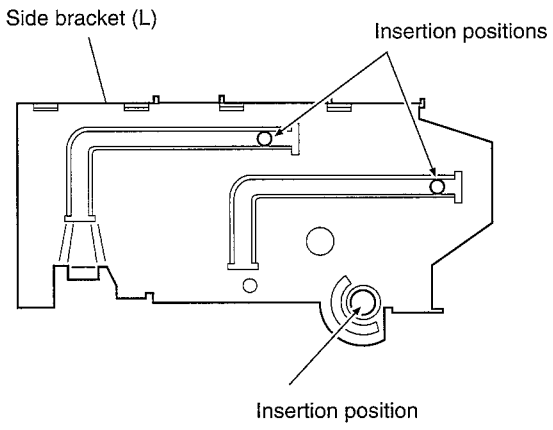


Fig. 6-4

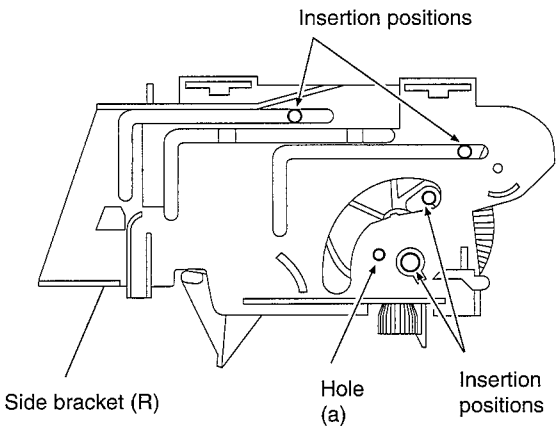
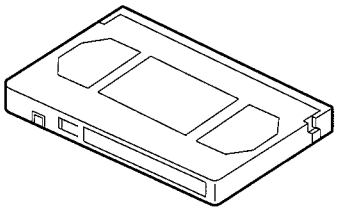
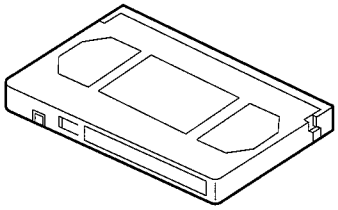
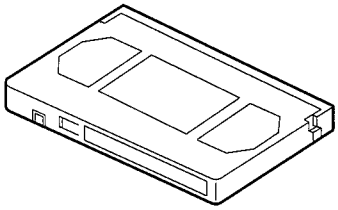
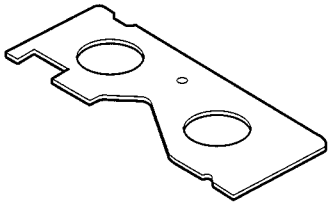
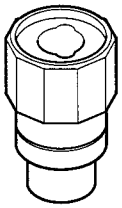
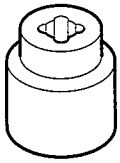
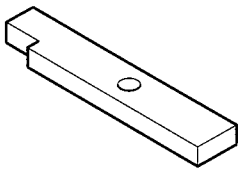
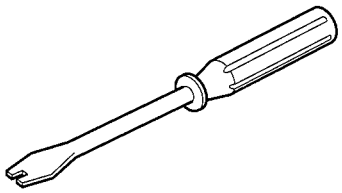


Fig. 6-5

Chapter 4 Mechanical Adjustment

1. List of Jigs for Adjustment

1. MH-1 alignment tape, [For NTSC] Part no. 7099046 	2. 30HMP2-1 alignment tape, [For NTSC] Part no. 7099089 	3. MH-2 alignment tape, [For PAL] Part no. 7099279 
4. Master plane, Part no. 7099279 	5. Torque gauge, Part no. 7099039 	6. Torque gauge adapter, Part no. 7099035 
7 Reel disk height jig, Part no. 7099038 	8. Guide roller adjustment driver, Part no. 7069064 	

2. Overview of Adjustment Points

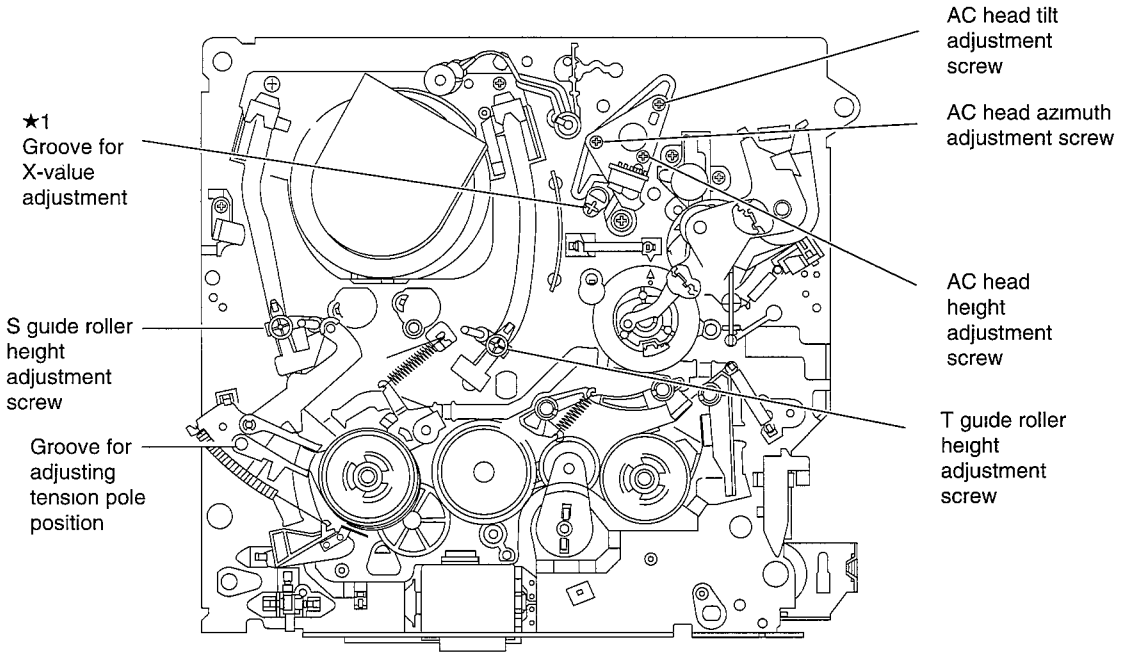


Fig. 2-1

★1: For X-value adjustment procedure, see Electrical Adjustment in the service manual of each individual model.

3. Tape Transport System Components Adjustment

The tape transport system refers to the system from the S reel table to the T reel table via the video heads. The transport system components, especially those which directly come into contact with tape, must be clean without any scratches or any dust, oil, etc. adhering to their surfaces.
After transport system components have been replaced, securely adjust the new components: The tape transport system will be stabilized.

3-1 Tension pole position adjustment

Purpose:

To keep the supplied tension constant, in order to stabilize the contact between the video heads and tape.

VCR status:

Set the VCR to the loading status without inserting cassette (see page 5-1).

Adjustment point:

Groove for adjusting tension pole position

Adjustment procedure:

Use a flat bladed screwdriver to adjust the groove to fix the tension pole position so that the groove in the tension arm is between the two grooves in the chassis base.

Check diagram:

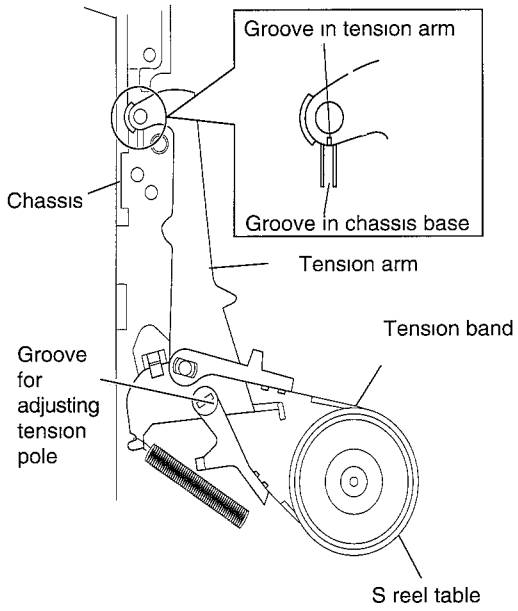


Fig. 3-1

3-2 Guide Roller Height Adjustment

> The heights of G base (I) and (O) assemblies for servicing have been adjusted at the factory: Do not turn the adjustment screws with undue force.

Purpose:

To regulate the height of tape so that bottom of tape will run along the tape guide line on the cylinder.

Rough adjustment

Test equipment/jigs:

- o Master plane (part no. 7099279)
- o Reel disk height jig (part no. 7099038)

Test equipment/jig connectionpoint:

1) Remove the U4-FL mechanism.
2) Load the master plane and place the reel disk height jig on top of it.

Adjustment point:

Guide roller height adjustment screws

Check procedure:

1) Make sure visually that the top of reel disk height jig is aligned with the upper flange of guide roller.
2) If the height is incorrect, gently turn the height adjustment screw (do not turn excessively).

Adjustment diagram:

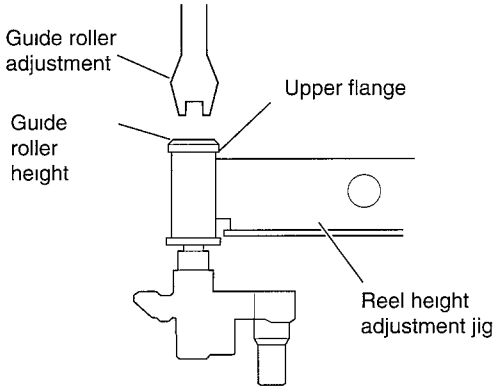


Fig. 3-2

Precise adjustment

Test equipment/jig connection points:

- o Oscilloscope CH-1: PB FM
  CH-2: SW25Hz or 30Hz
- o Alignment tape (30HMP2-1) (part no. 7099089): For NTSC
  Playback the color bar portion of MH-2: For PAL

VCR status:

- o Play back alignment tape.

Adjustment procedure:

1) Set the VCR to the X-value adjustment test mode.
2) Play back the alignment tape, and press the tracking up and down buttons simultaneously so as to set the tracking to the center.
3) Slowly turn the height adjustment screw until the FM output waveform is flat.
4) Move the tracking control up and down.
5) Precisely manipulate the height adjustment screw so that the FM drop is as shown in the diagram below.
6) Release the test mode.

Waveform diagram:

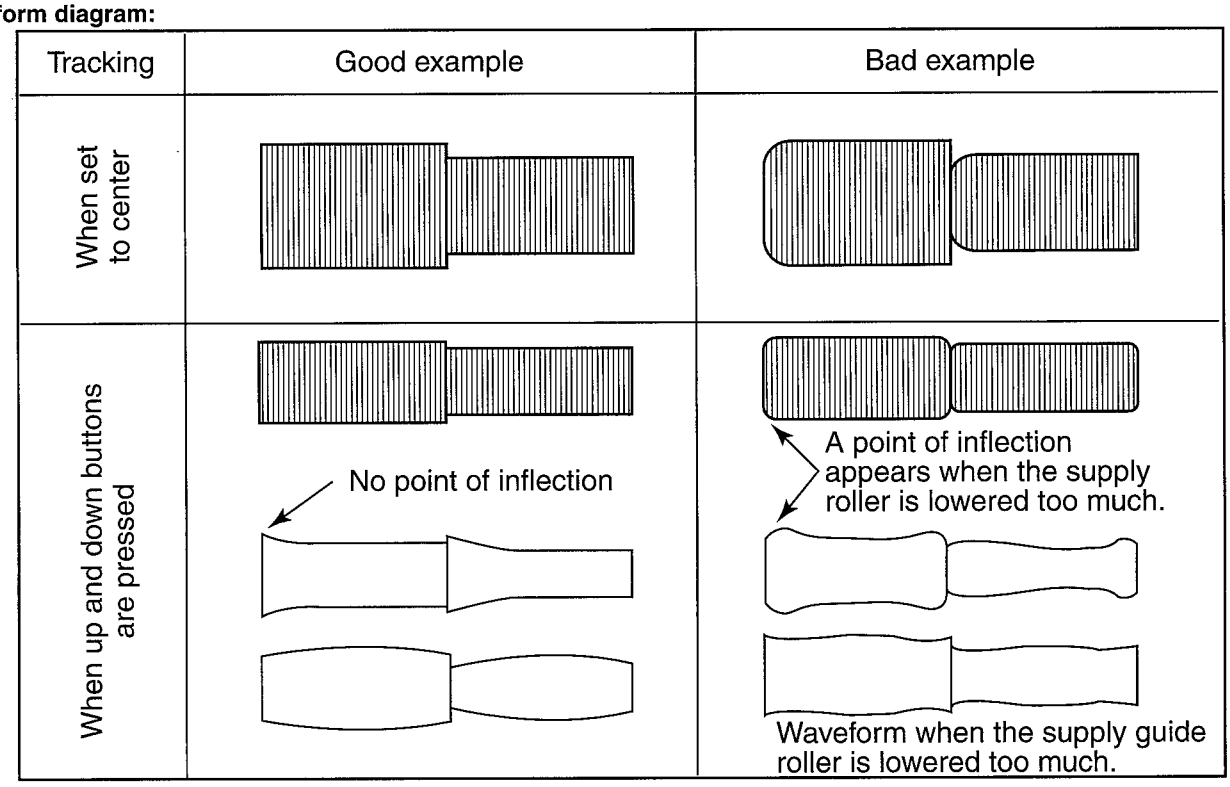


Fig. 3-3

3-3 A/C head adjustment

Purpose:

To maintain the contact between tape and head, in order to record and play back the specified track.

> The height of A/C head for servicing has been adjusted at the factory. Do not turn the height, tilt or azimuth adjustment screws with undue force.

Test equipment/jig:

o Blank tape

VCR status:

o Run the blank tape.

Adjustment points:

o Azimuth adjustment screw
o Height adjustment screw
o Tilt adjustment screw

Check procedure:

1) Perform forward search at the winding start of a blank tape.
2) Make sure that there is no gap between the bottom edge of tape and the bottom flange of T guide pole (see Fig. 3-4b).
3) Make sure that there is no twisting of tape between the capstan shaft and P. out arm (see Fig. 3-4c).
4) If there is any problem with 2-3 above, perform adjustment shown on the right.

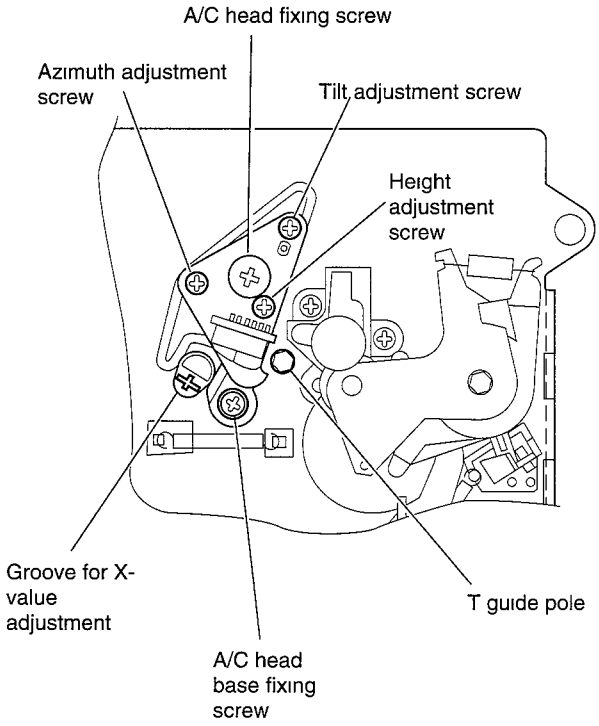


Fig. 3-4a

Adjustment procedure:

1) Perform forward search at the winding start of a blank tape.
2) Turn the A/C head tilt adjustment screw clockwise so that the tape curls around the bottom flange of T guide pole (see Fig. 3-4b).
3) Slowly (taking at least 2 seconds) turn the tilt adjustment screw counterclockwise, to remove any curling of tape (do not turn it abruptly). Make sure that there is no gap between the bottom edge of tape and the bottom flange of T guide pole. (see Fig.3-4b)
4) Carefully turn the height and azimuth adjustment screws.

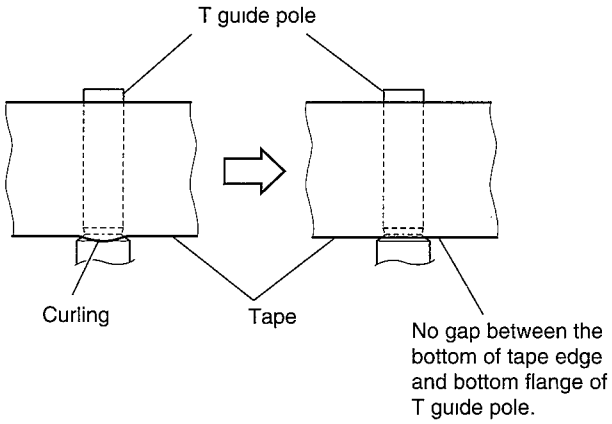


Fig. 3-4b

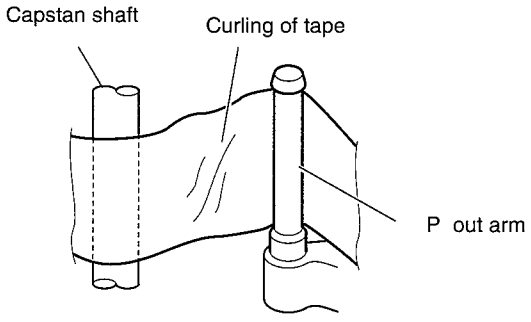


Fig. 3-4c

3-4 Adjustments after replacing the cylinder

Purpose:

To eliminate any drift in the relative height with guide rollers, in X-value, etc.. This drift will be very slight if the cylinder is replaced normally.

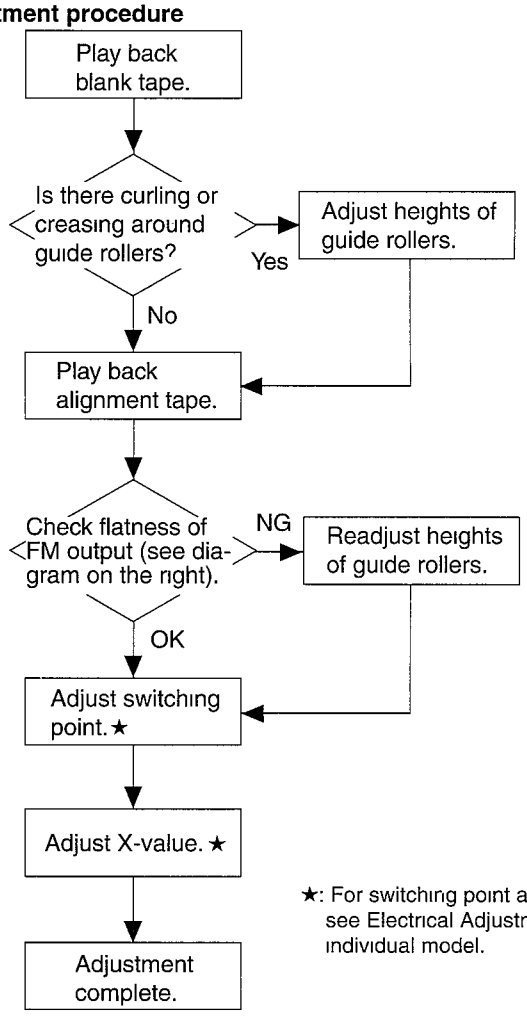
Test equipment/jig connection points:

- o Oscilloscope CH-1: PB FM
  CH-2: SW25Hz or 30Hz
- o Blank tape
- o Alignment tape
  (30HMP2-1 or stepped wave portion of MH-1):For NTSC
  (Stepped wave portion of MH-2):For PAL

Adjustment point:

- o Guide rollers (see page 4-2)
  [Electrical adjustments]
- o Switching point
- o X-value

Adjustment procedure

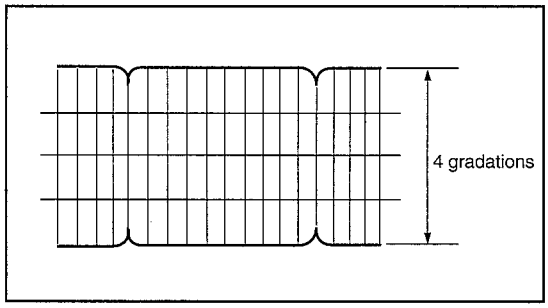


★: For switching point and X-value adjustment procedures, see Electrical Adjustment in the service manual of each individual model.

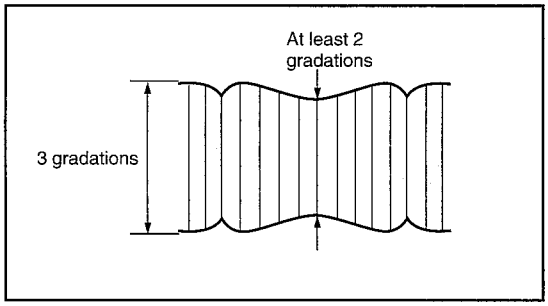
Fig. 3-5

Checking flatness, variations in FM output, and waveform diagrams:

1) Engage auto-tracking.
2) Finely adjust the voltage level range of oscilloscope to set the FM output to 4 gradations.



3) Adjust tracking to set the maximum amplitude of FM output to 3 gradations.
4) Make sure that the minimum amplitude at this time is at least 2 gradations.



5) Make sure that the variations in level between the maximum and minimum amplitudes are no more than 13%.

3-5 Tension/torque check

Purpose:

In order to smooth tape transport and satisfy the VCR basic performance, it is necessary to check the tension, torque and compression force of tape take-up and movable sections. If tape transport is not smooth or a fault occurs in the tape speed, perform this check.

Test equipment/jigs:

- o Torque gauge
- o Torque gauge adapter

Measurement method:

1) Set the VCR to each operation mode in succession without inserting cassette tape (see page 5-1).
2) Place the torque gauge adapter and torque gauge on the reel table to be measured, and fix the torque gauge with your fingers.

Item	VCR operation mode	Reel to be measured	Measurement value
Main brake torque	Stop (Note 1)	Supply	110-170 g.cm
Main brake torque	Stop (Note 1)	Take-up	80-140 g.cm
Slack removal torque	Unloading	Supply	100-180 g.cm
Fast forward/rewind torque	Fast forward/Rewind	Supply/Take-up	At least 400 g.cm
Take-up torque	Playback	Supply	60-130 g.cm
Supply reel back-tension torque	Fast forward	Supply	40-70 g.cm
Take-up reel back-tension torque	Rewind	Take-up	5-20 g.cm
Playback back-tension torque	Playback	Supply	28-44 g.cm
Reverse search torque	Reverse search	Take-up	95-250 g.cm
Reverse play torque	Reverse play	Take-up	120-200 g.cm
Slow torque	Slow	Supply	50-130 g.cm
Take-up brake torque	Reverse search	Take-up	50-100 g.cm

Note 1: Measure in the LOADING STOP 2 mode (see page 5-1).

Chapter 5 Operation Check, Maintenance and Inspection

1. Setting VCR to loading status without inserting cassette tape

Unplug the power cord from AC outlet.

↓

Remove the top cover and front panel.

↓

Remove the U4-FL mechanism.

↓

Use black masking tape, etc. to shade both end sensors.

↓

Plug the power cord into AC outlet and turn the VCR on.

↓

The cylinder will rotate and G base assemblies will be set to the loading status. The VCR will stand by in the LOADING STOP 1 mode (mode switch position: 6). ★1

↓

When the stop status has continued for one minute, the compression of pressure roller and tension arm will be released and the VCR will enter the LOADING STOP 2 mode (mode switch position: 7); after 5 minutes more, the cylinder will stop.

★1: The VCR will accept each operation mode in succession in this status. However, rewinding will shift to power off after several seconds since the take-up reel table is in the stop status and no reel pulse can be detected. Therefore, for rewinding, turn the take-up reel table manually.

[How to check the mechanism mode switch position]
Locate the arrow of spring hook in the front of AC head and arrow no. of P. drive gear, to check the mode position.

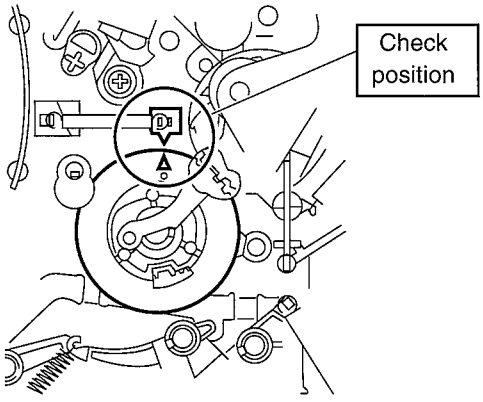


Fig. 1-1

2. Maintenance/Inspection Procedure

2-1 Necessity of maintenance and inspection

A VCR uses very precise components to ensure compatibility with other VCRs. If any of the mechanical components is dirty or worn, the effect will be the same as if the VCR malfunctions. To ensure a good picture, it is necessary to clean and lubricate the mechanism periodically and replace worn-out components.

2-2 Scheduled maintenance and inspection

Schedules for maintenance and inspection are not fixed, since they vary according to the way in which the customer uses the VCR and the environment in which the VCR is used. In general home use, a good picture is ensured if inspection and maintenance are done every 1,000 hours of use.

2-3 Before determining that the VCR is faulty

When a VCR has been used for over 1,000 hours, the symptoms shown in Table 2-1 may occur in the playback picture. These faults can usually be remedied by cleaning and lubricating mechanical components. Check the hours of use, and if you determine that the VCR is ready for inspection and maintenance, note the inspection locations in Table 2-1

Caution: If the VCR cannot be restored after cleaning components marked"O"in the part replacement column, the component(s) may be degraded, and replacement is necessary.

Table 2-1

Symptom	Cause	Inspection location	Part replacement
Color beats	Dirt on FE head	Clean the surface part of FE head which comes into contact with tape.	
Poor S/N, no color	Dirt on video heads (or they are degraded)	Clean video heads.	o
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 A/C head	Clean the surface part of A/C head which comes into contact with tape.	o
Tape does not run or is slack.	Dirt on pressure roller	Clean pressure roller and capstan shaft.	o

Inspection Locations

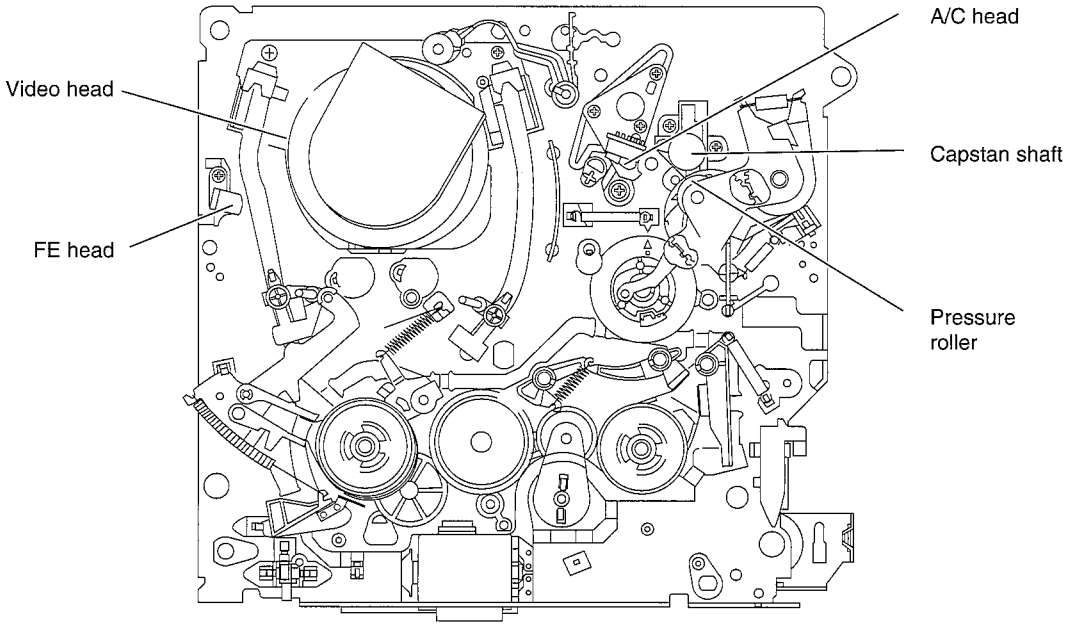


Fig. 2-1

2-4 Tools needed for inspection and maintenance

(1) Head cleaning kit
(2) Oil and grease for maintenance
(3) Alcohol
(4) Gauze

2-5 Cleaning procedure

(1) Cleaning video heads (Fig. 2-2)
It is recommended that you use a generally available cleaning tape to clean the heads: If this does not eliminate noise, use the cleaning kit to clean the heads and transport system.

[Cleaning with cleaning tape]
Play back the cleaning tape in the same way as playing back an ordinary tape for 30 seconds, and then play back a recorded tape. If noise does not appear in the played back picture, cleaning of video heads is complete. If noise is reduced, but cannot be completely removed, use a cleaning cloth to clean the heads.

[Cleaning with cloth]
1) Lightly fit the cleaning cloth to the head and gently turn the rotating cylinder to the left and right. Turn the cylinder by one turn to also clean the outer circumference of cylinder (Cleaning with cloth moistened with alcohol is more effective.)
2) Do not use a dirty cleaning cloth to which oil, etc. adheres.

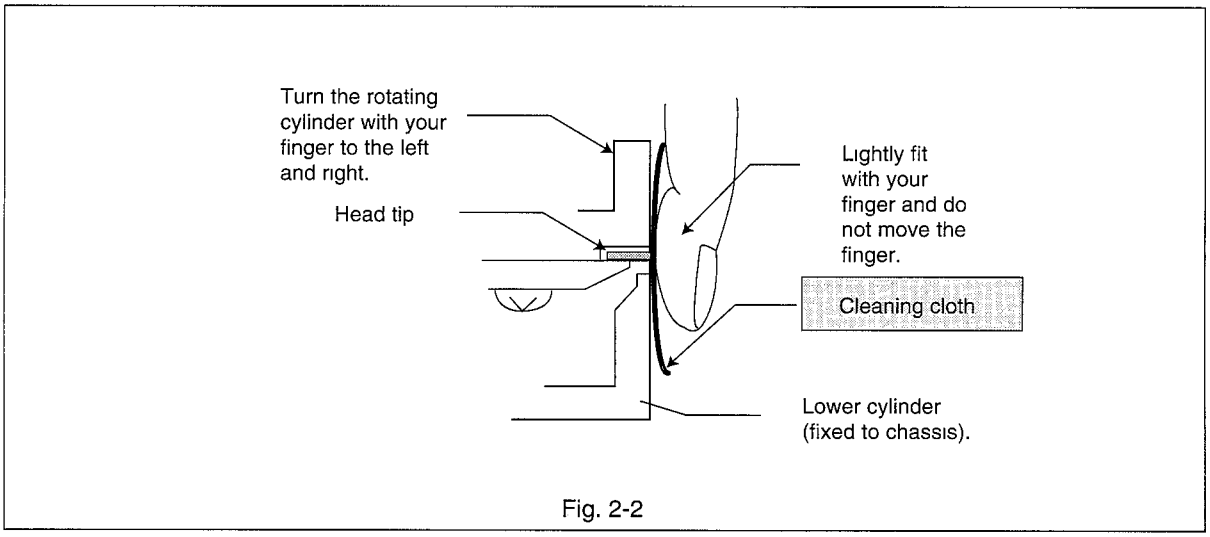


Fig. 2-2

(2) Cleaning transport system (Fig. 2-3)
Moisten gauze with alcohol and clean components (1)-(12) (see cleaning of video heads for (6)).
Caution: Take great care not to scratch transport components or use undue force.

2-6 Lubricating and greasing

(1) Lubricating guidelines

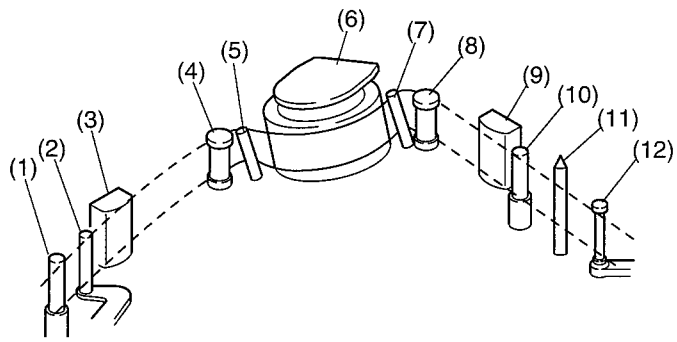
Use oiler to lubricate with one or two drops of Sonic Slidas oil. Make sure not to use too much oil: Oil may spill over and leak out, coming into contact with rotating components causing slippage or other problems. If too much oil is applied or oil leaks out, thoroughly wipe clean using gauze moistened with alcohol.

(2) Greasing guidelines

Apply grease (Molicoat) with a stick or brush. Do not use excess grease, as it may come into contact with tape transport or drive system. If grease adheres, clean using gauze moistened with alcohol.

(3) Lubricating and greasing points

Oil or grease the specified locations according to Table 2-2 on the next page.



(1) Tape guide S
(2) Tension pole
(3) FE head
(4) S guide roller
(5) S slant pole
(6) Cylinder
(7) T slant pole
(8) T guide roller
(9) AC head
(10) Tape guide T
(11) Capstan shaft
(12) Pressure roller

Fig. 2-3

2-7 Maintenance/inspection schedules of mechanical components

Caution: This table shows the times for maintenance/inspection of each component. Use the table as reference, since the maintenance/inspection times vary depending on the environment where the VCR is used and the way it is used. If the components indicated C/R do not function normally after cleaning, replace them.

Table 2-2

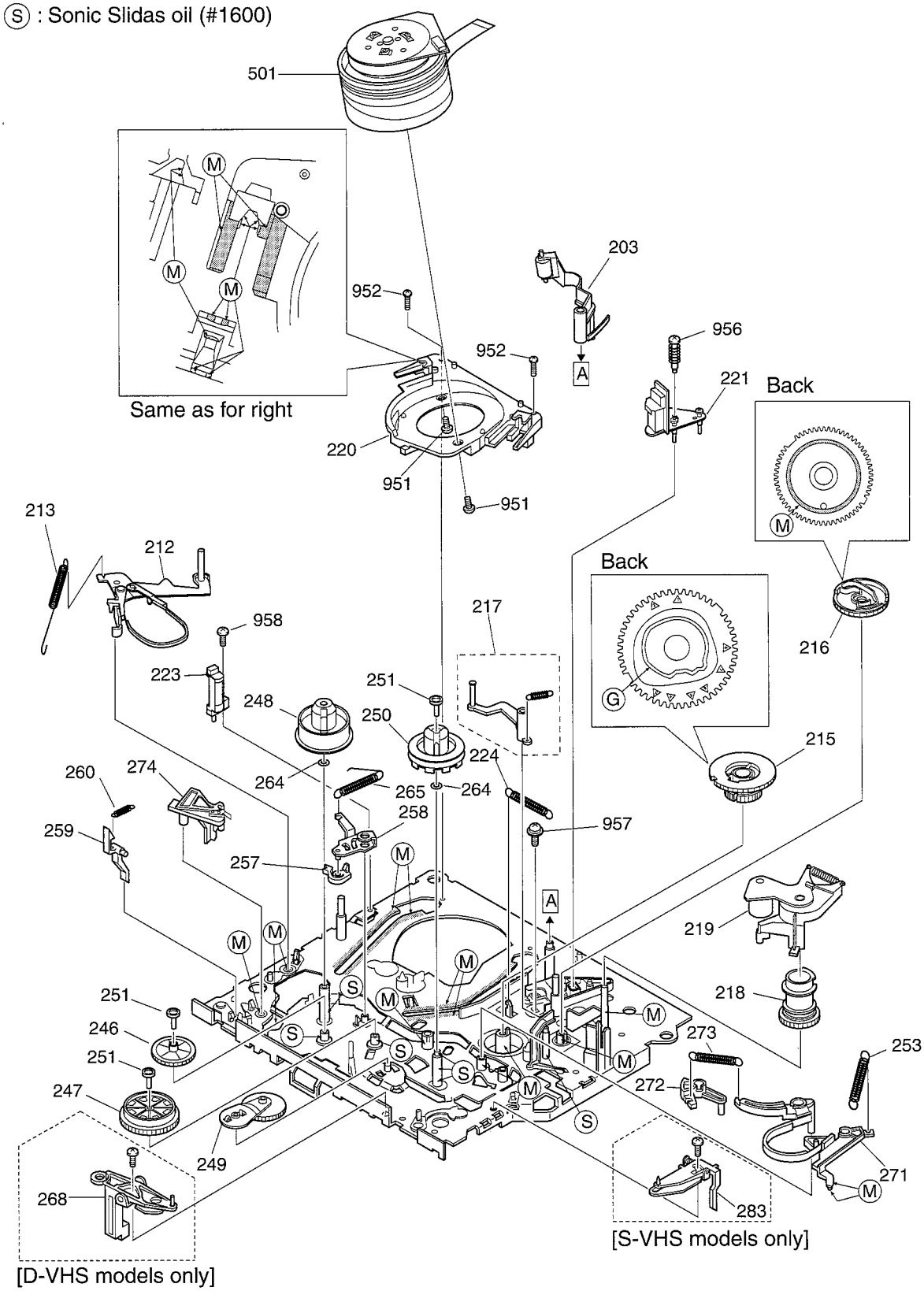
Component and point	1000 h	2000 h	3000 h	4000 h	5000 h
Cylinder motor assembly	C /R	R	C / R	R	C / R
A/C head assembly	C	C / R	C	R	C
FE head	C	C	C	R	C
S guide roller	C	C	C / R	C	C
T guide roller	C	C	C / R	C	C
Tension band brake		R		R	
Tension arm	C	C	C	C	C
S reel table		C		C	
T reel table		C		C	
FR arm	C	R	C	R	C
Timing belt		C		C	
Capstan motor	C	R	C	R	C
Loading motor assembly				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	
Take-up slant pole	C	C	C	C	C
Impedance roller	C	C	C	C	C
Tape guides	C	C	C	C	C
Tape guide line on lower cylinder	C	C	C	C	C
Tension band R		R		R	
HC arm					(R)
Shaft and bearing of S reel table		S		S	
Shaft and bearing of T reel table		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 FR arm		M		M	
G base assembly moving portions in chassis					M
Contact surface between cylinder base and G base assembly during loading					M
Contact surface between tension arm and G base (I) assembly					M

R: Component replacement
C: Cleaning
S: Oil (Sonic Slidas oil) refilling
M: Grease (Molicoat) refilling

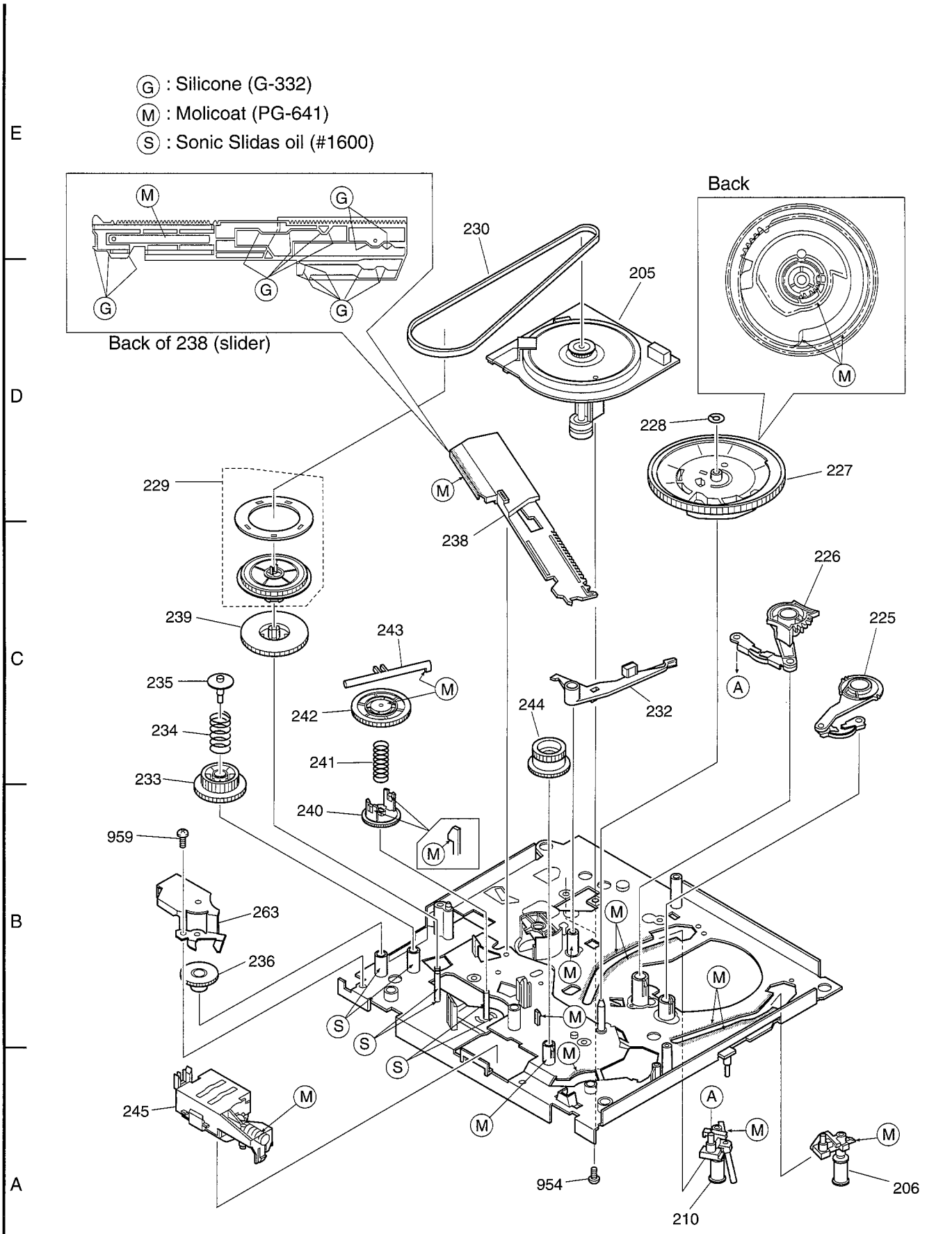
Chapter 6 Exploded Views

1. U4 Mechanism [Surface]

Ⓖ : Silicone (G-332)
Ⓜ : Molicoat (PG-641)
Ⓢ : Sonic Slidas oil (#1600)

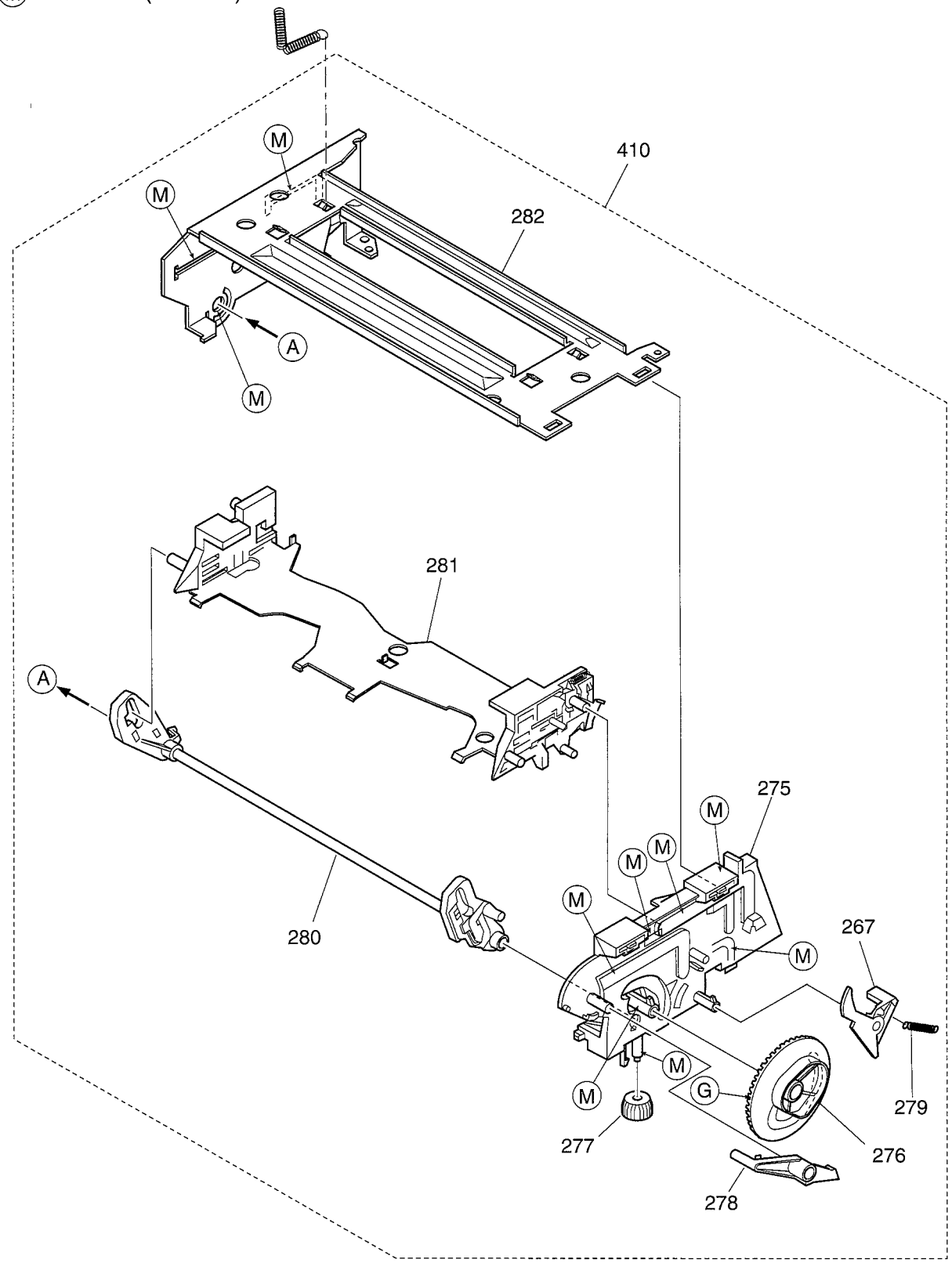


2. U4 Mechanism [Bottom]



3. U4-FL Mechanism

Ⓖ : Silicone (G-332)
Ⓜ : Molicoat (PG-641)



U4 Mechanism Component Identifications

Index no.	Component	US compatible
203	HC mechanism	○
205	Capstan motor	○
206	G base (I) assembly	○
210	G base (O) assembly	○
212	Tension arm	
213	T arm spring	
214	Tension band brake	
215	P. drive gear	
216	PR idler gear	○
217	P. out arm	○
218	PR spiral gear	○
219	PR arm	○
220	Cylinder base	○
221	AC head assembly	○
223	FE head	○
224	FS spring	
225	L gear (L)	○
226	L gear (R)	○
227	Cam gear	
228	Washer	○
229	Pulley assembly	○
230	Timing belt	○
232	FS brake	
233	FL change gear	○
234	Spring	○
235	Spring stopper	○
236	FL idler gear	○
238	Slider	
239	Transmission gear	○
240	FR drive gear	○
241	Spring	
242	Torque change gear	
243	Torque change arm	○
244	LM wheel gear	○
245	Loading motor assembly	○
246	Idler gear 1	
247	Idler gear 2	○
248	S reel table	○(★)
249	FR arm	
250	T reel table	
251	Stopper	○
252	Tension band R	
253	T brake spring	○
257	Jog gear	
258	Jog arm	
259	REC arm	○
260	PLAY spring	○
263	Base bracket	○

Index no.	Component	US compatible
264	Washer	○
265	Jog spring	
267	Switch arm	○
268	Switch arm (D-VHS)	○
271	Tension band R	
272	Operation arm L	
273	Operation arm spring	
274	Spring arm	
275	Side bracket (R)	○
276	Bevel gear	○
277	FL gear	○
278	Door arm	○
279	Spring	○
280	Drive arm	○
281	Cassette holder	
282	Side bracket (L)	
283	Switch arm (S-VHS)	○
501	Cylinder motor assembly	○

Note: Components marked o in the US compatible columns are compatible with US mechanism.

Cautions:

1) Components are subject to change for improvement without notice. When replacing components, make sure of the part numbers in the parts list of service manual for each model: Use listed components only.
2) Note that the index numbers in the table indicate components only: Numbers may be different from the assigned numbers of service parts.

(★) For S reel table, the component assigned for the U4 mechanism can be used in the US mechanism, but that assigned for the US mechanism cannot be used in the U4 mechanism.

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