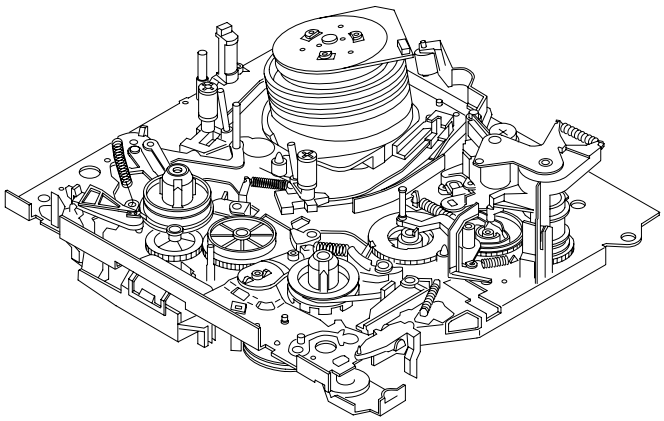
HITACHI

SERVICE MANUAL

SM 8107

UT Mechanism

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



S-VHS

This video deck is a S-VHS type video recorder. For proper operation, only the S-VHS or VHS type cassette must be used.

VHS

This video deck is a VHS type video recorder. For proper operation, only the VHS type cassette must be used.

Information on UT Mechanism

The UT mechanism is the result of upgrading the U4 mechanism found in home-use VCRs and applying it to time-lapse VCRs.
Although some components still have the stamp "U4", the method of servicing the UT mechanism differs from that for U4 mechanism, and the UT mechanism also uses exclusive components. When repairing or performing inspection/maintenance of UT mechanism, be sure to refer to this manual along with the manual for each individual VCR model.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CASSETTE RECORDER

November 2001 Digital Media Products Division,Tokai

Contents

Memo

Safety Precautions

NOTICE:

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

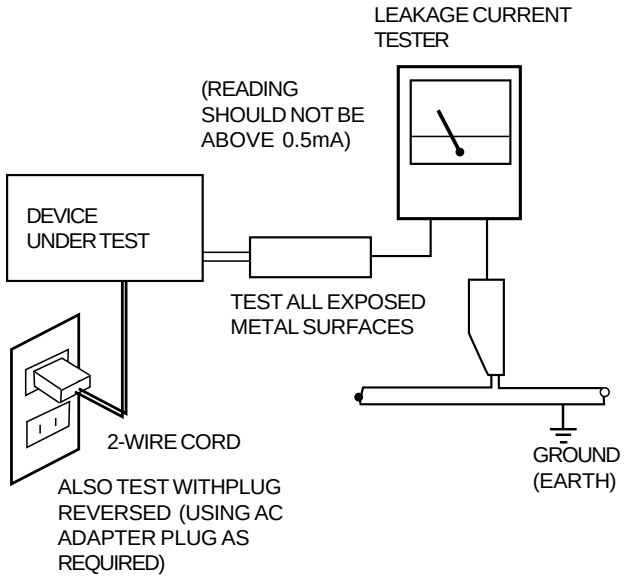
1. When replacing a chassis in the instrument, all the protective devices must be put back in place, such as barriers, non-metallic knobs, adjustment and compartment covers/shields, isolation resistors/ capacitors, etc.
2. When service is required, observe the original lead-ress. Extra precautions should 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 AC110-240V,50/60Hz 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 AC110-240V, 50/60Hz 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.

Cautions

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.

CHAPTER 1 UT MECHANISM OPERATION THEORY

1. Overview

In the UT mechanism the capstan motor is located at the right corner of the chassis in the same way as in the AF mechanism. This provides the UT mechanism with the following advantages.

1) The diameter of the drive gear can be made lager, so noise can be reduced when torque is transmitted.

2) The pressure roller comes into contact with the base surface of tape ,so its magnetic surface is protected and dust etc. is not likely adhere to it.

All the alarm detection devices including the end lamp, end sensors and reel disk rotation sensors, etc. are installed on the main circuit board and are set to the appropriate positions when the chassis is fixed in the specified position.

And 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 securely.

2. Operation of Major Components

Fig. 1 shows the locations of major components in the UT mechanism. The following explains the operation of these major components along the tape run in sequence from the supply reel table, using Fig. 1.

(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 PCB.

The 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 counter-clockwise 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) Full erase (FE) head

The 70kHz audio bias current which is used to record a linear audio signal is made to flow to erase the previously recorded video signal. If this does not operate, color noise due to overwriting occurs.

(6) 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.

(7) Cylinder motor assembly

The UT mechanism uses a new cylinder developed for this mechanism. Fig.2 is a detailed diagram.

In conventional mechanisms, the shaft was inserted into the ball bearings (two, at the top and bottom) installed in the lower cylinder. A pedestal called a disk was attached to this shaft and the upper cylinder was fixed to the pedestal using screws.

In the UT mechanism, the shaft is pressed into the lower cylinder and the upper cylinder assembly which has two ball bearings at the top and bottom is put onto the shaft. That is, the cylinder has a structure in which a shaft is fixed and the upper cylinder is turned.

The motor drive magnet of the upper cylinder is magnetized with 16 "N" and "S" poles. This cylinder FG synthesizes the counterelectromotive voltage of the motor coil to generate a 720Hz signal.

One of 16 poles is strongly magnetized and this position is detected by a three-phase drive Hall device to generate a tach signal. The SW30(25)Hz siganl is created from this tach signal and the FG signal.

Since the motor drive magnet has one "N" tach magnet, care should be taken in its orientation when it is assembled.
A hole is drilled into the pedestal pressed in the fixed shaft and a ground contact piece and a compression spring are put into this hole, then they depressed by the upper cylinder drive board, thus the upper cylinder is grounded.
Since the drive motor is built into the upper cylinder, the whole upper and lower cylinder mechanism must be replaced when the video heads are to be replaced.
A bulge is provided at the tape take-up section (around 180 degree). This reduces the tapping of the video head tip against the tape around the tape take-up sectino to prevent jitter in the played back picture and stabilize the running of tape.

(8) 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.

(9) 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.

(10) 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

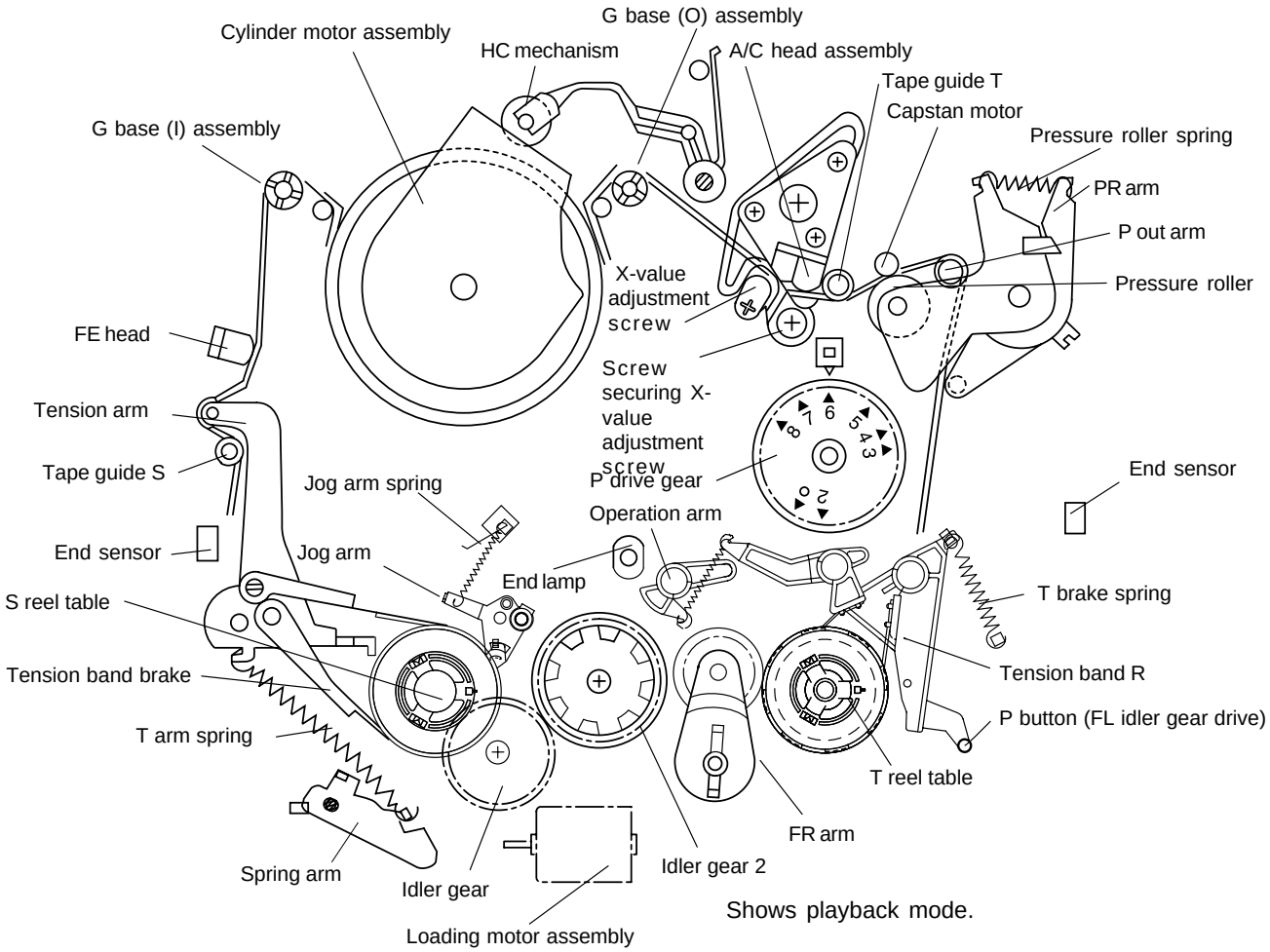


Fig. 1 Locations of Major Components in UT Mechanism (Top View)

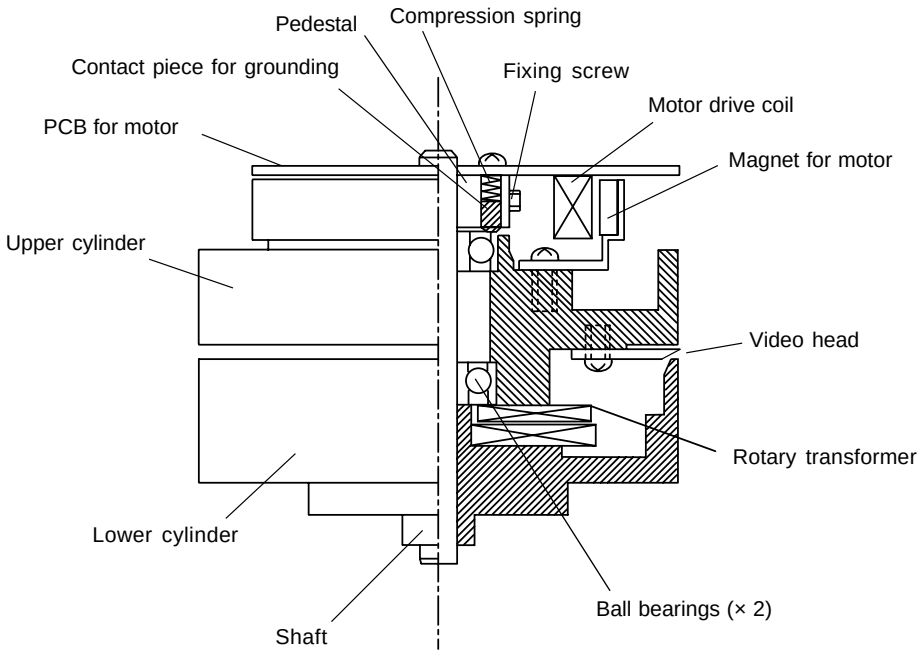


Fig. 2 Structure of Cylinder Motor Assembly

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.

(11) 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.

(12) Capstan motor

The capstan motor plays versatile rôles: it takes up and controls tape during recording, playback, forward search, etc., where the tape runs forward; it control, 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.

(13) Pressure roller

Two ball bearings are 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.

(14) 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.

(15) 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

Table 1

Abbreviation	SW No. 1	2	3	4	VCR mode
FL	0	1	0	0	Front loading
UL	1	1	1	0	Unloading
REV	0	0	0	1	Reverse search
RFS	0	0	1	0	Reverse slow
FS	0	0	1	1	Forward slow
R/P/STOP1	0	1	1	1	Recording/Playback/ Stop 1
STOP2	1	0	1	0	Standing by for an extended time
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.

mechanism is viewed from top. The outputs from the mechanism state switch are shown in Table 1.

(16) 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.

(17) 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. 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.

(18) 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.

(19) 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.)

(20) Front loading (FL) mechanism

As shown in Fig. 14, the FL mechanism can be removed from the UT mechanism easily , since round holes are provided in the top plate of FL mechanism and in the cassette insertion surface, and the screws holding the UT mechanism can be removed with the FL mechanism attached. (The mechanism that drives the FL mechanism will be explained in another chapter.)

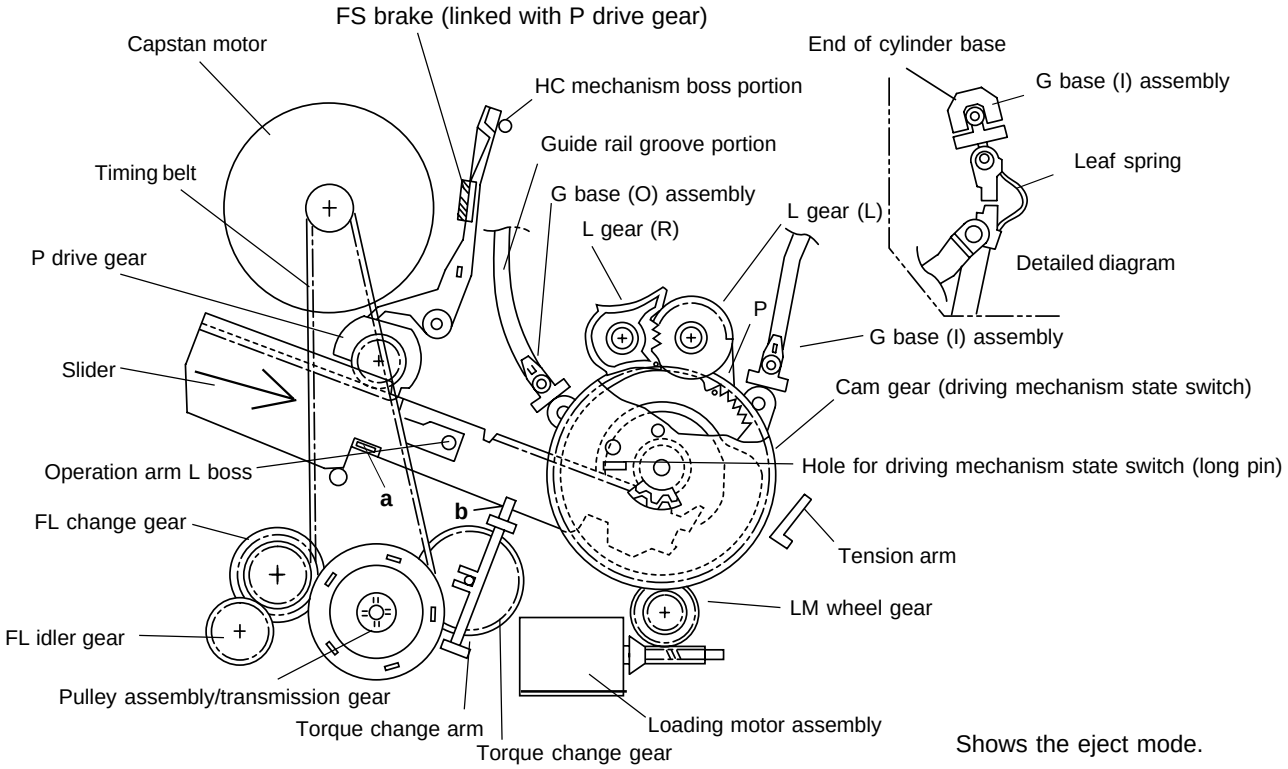


Fig. 3 Loading Mechanism Drive Mechanism (Back View)

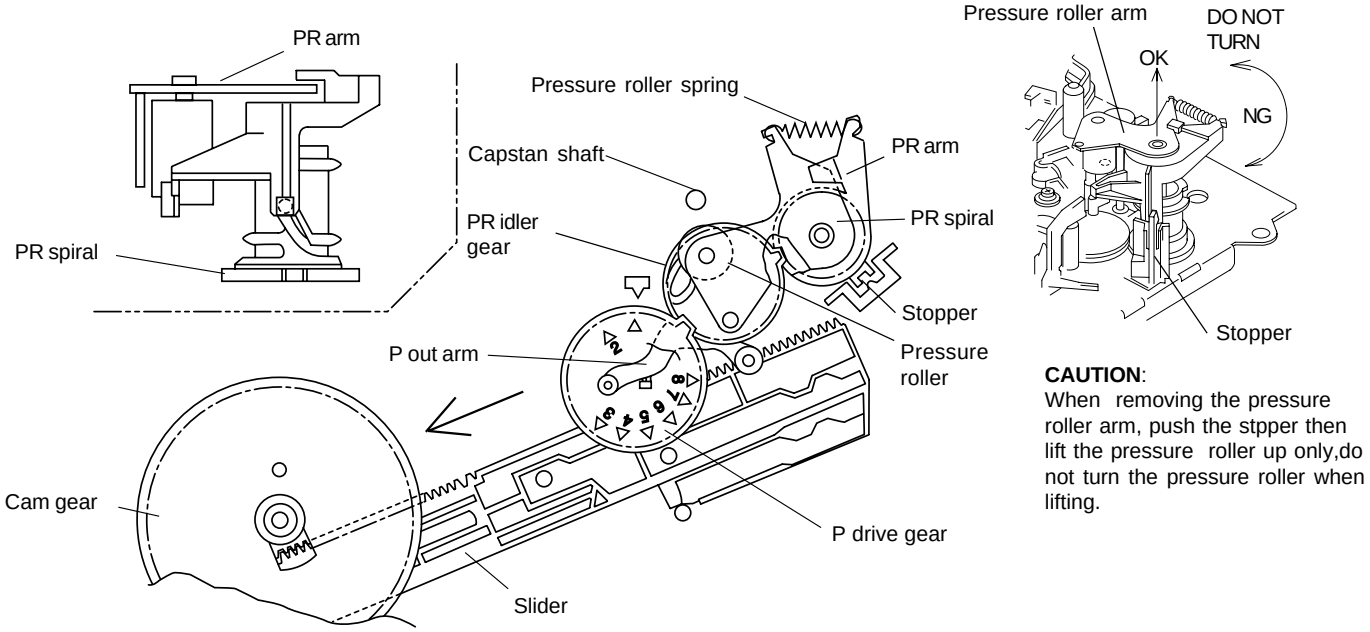
3. Loading Motor System Drive Mechanisms

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

3.1 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 PCB.
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. 7 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.



CAUTION:
When removing the pressure roller arm, push the stpper then lift the pressure roller up only,do not turn the pressure roller when lifting.

Fig. 4 Pressure Roller Drive Mechanism (Top View)

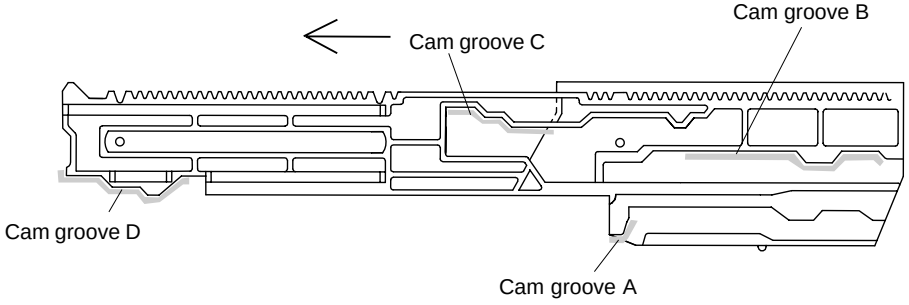


Fig. 5 Slider Cam Grooves

3.2 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.)

3.3 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.

3.4 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 disk. Boss 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.

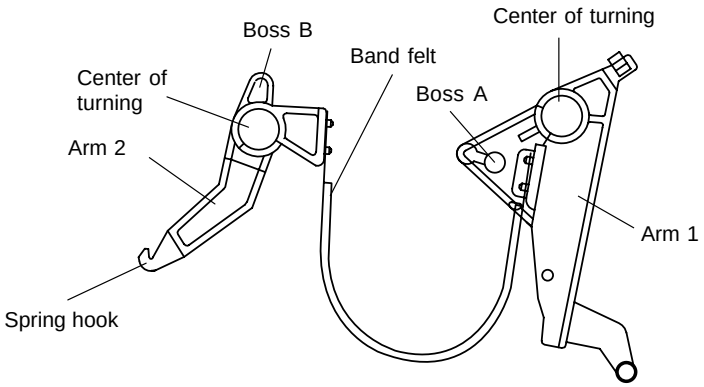


Fig. 6 Tension Band R

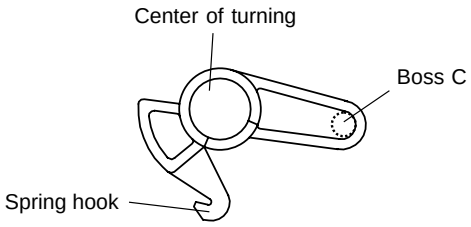


Fig. 7 Operation Arm L

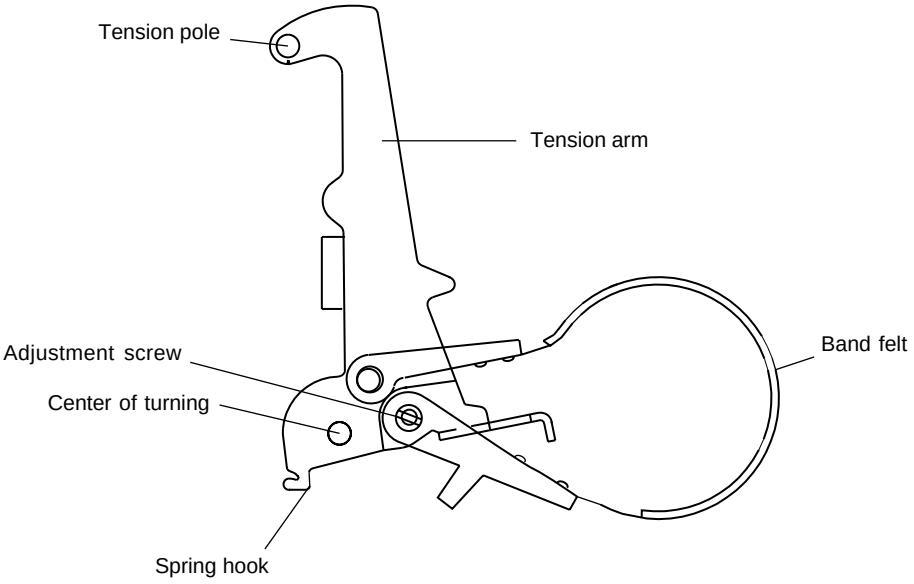


Fig. 8 Tension Band Brake

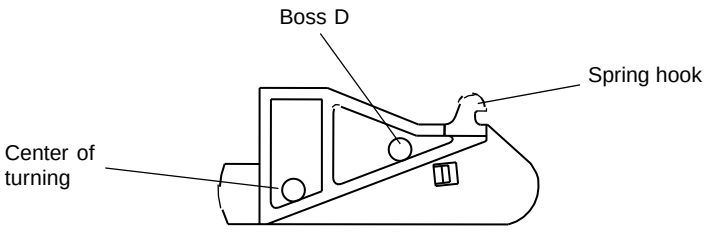


Fig. 9 Spring Arm

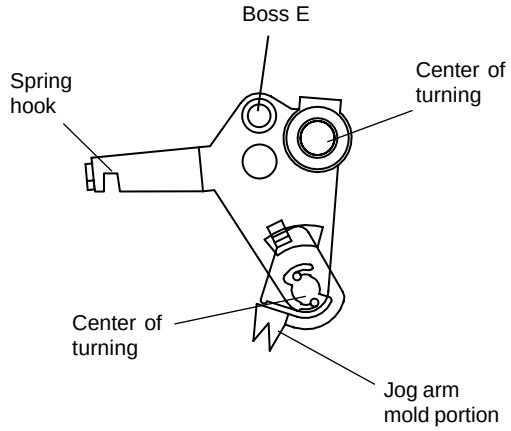


Fig. 10 Jog Arm

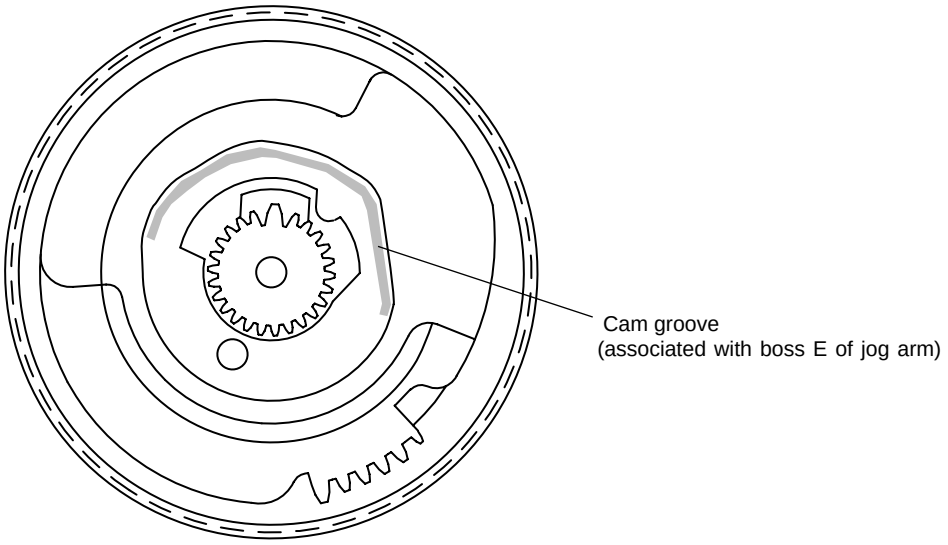


Fig. 11 Cam Gear

4. Capstan Motor System Drive Mechanisms

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

4.1 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 timing 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.

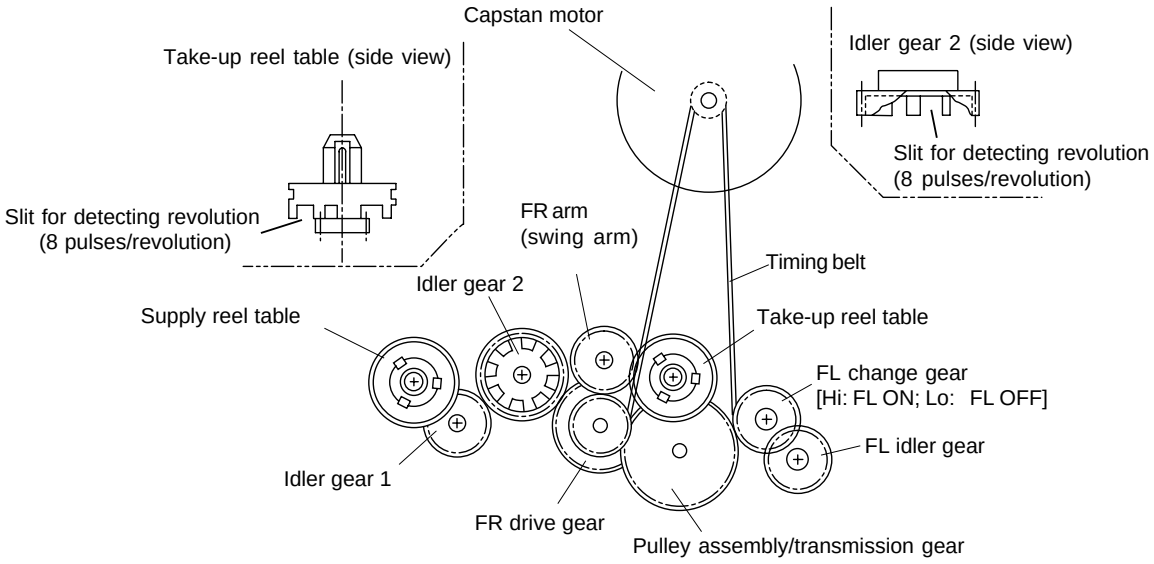


Fig. 12 Mechanism that Drives Reel Tables and FL Mechanism (Top View)

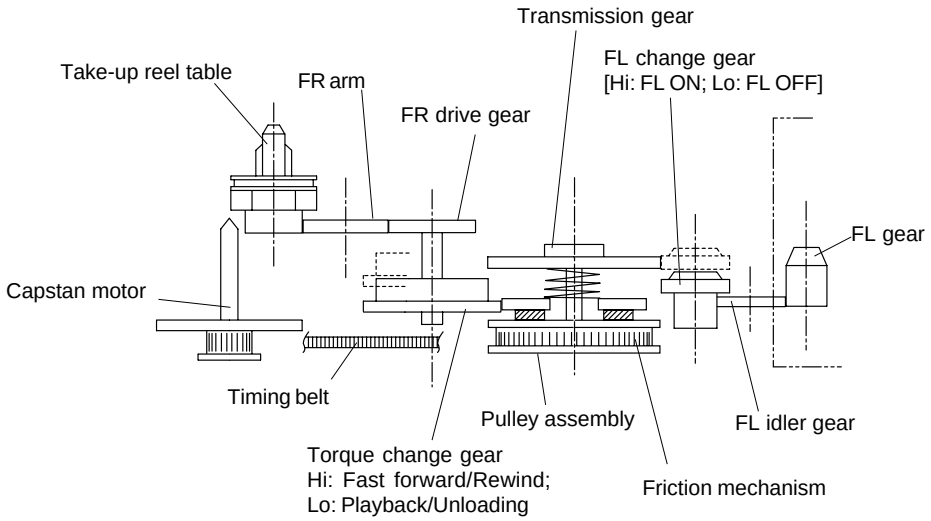


Fig. 13 Mechanism that Drives Reel Tables and FL Mechanism (Side View)

4.2 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 PCB, 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.

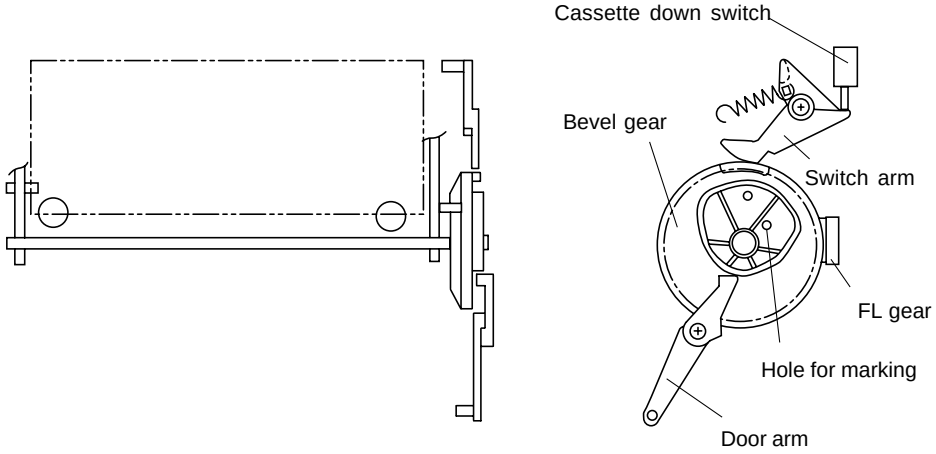
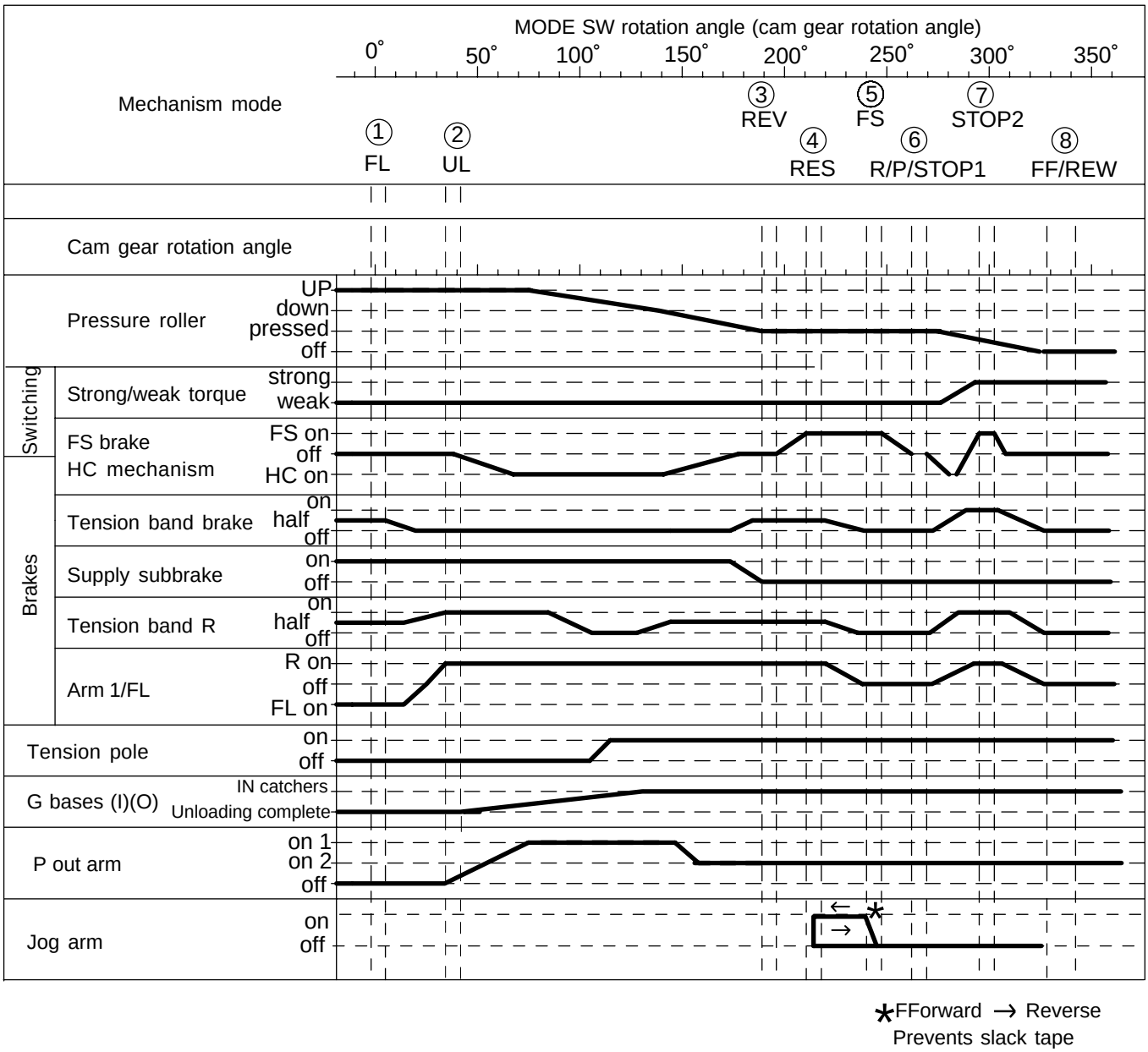


Fig. 14 FL Mechanism

5. UT Mechanism Timing Chart

Fig. 15 is a timing chart for the UT 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.



*FForward → Reverse
Prevents slack tape

Fig. 15 UT Timing Chart

CHAPTER 2 GENERAL INFORMATION

1. UT Mechanism External Views

1.1 Top view of UT mechanism (1)

Fig.1-1

1.2 Top view of UT mechanism (2)

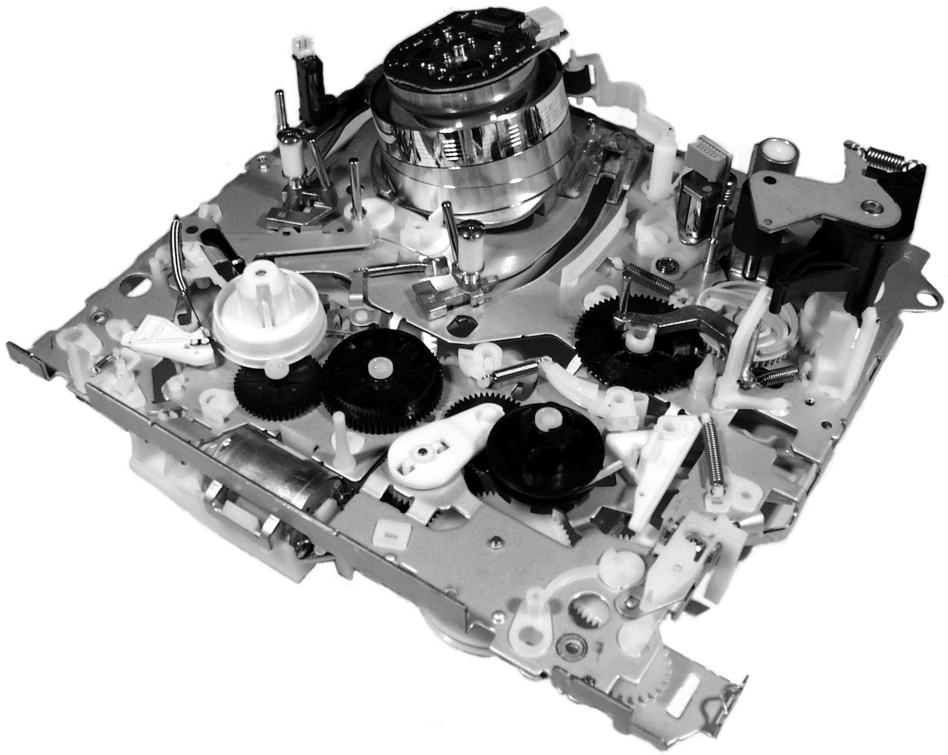


Fig.1-2

1.3 Bottom view of UT mechanism (1)

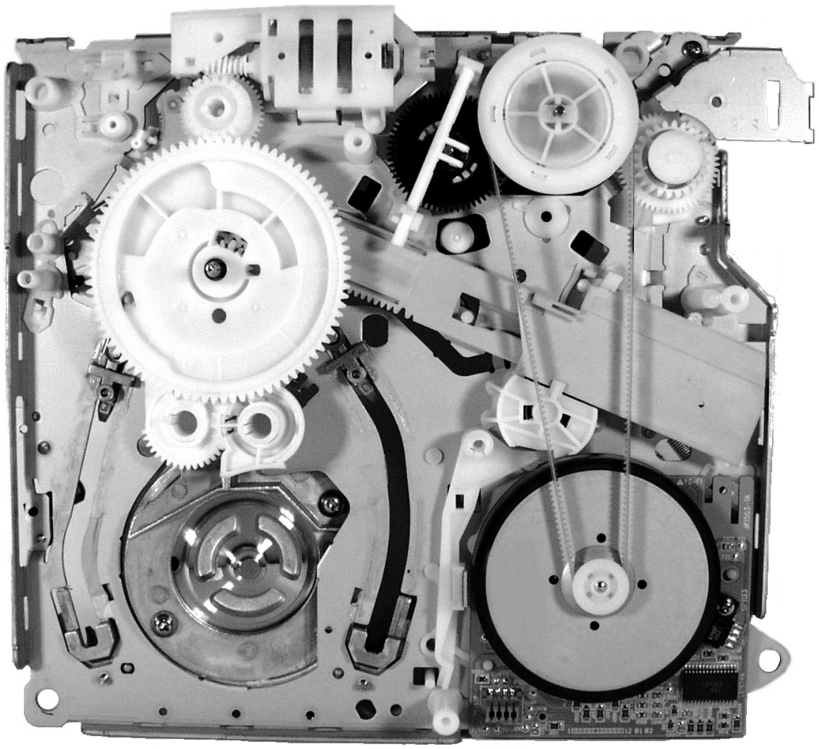


Fig.1-3

1.4 Bottom view of UT mechanism (2)

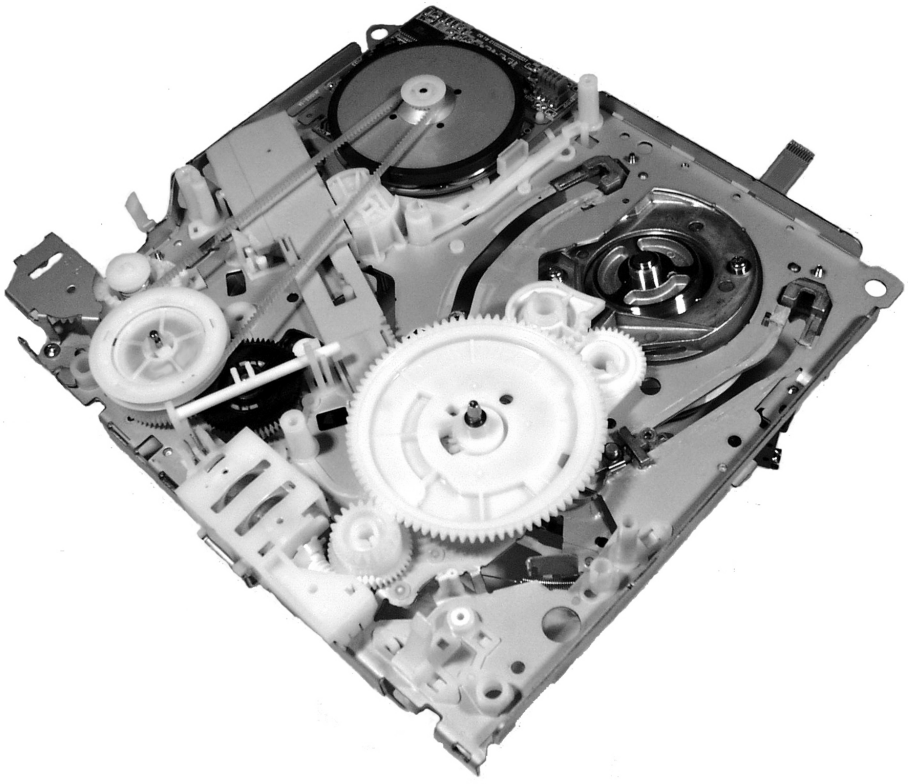


Fig.1-4

CHAPTER 3 DISASSEMBLY

1. Before Starting Disassembly

Caution: 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 UT Mechanism and their Locations

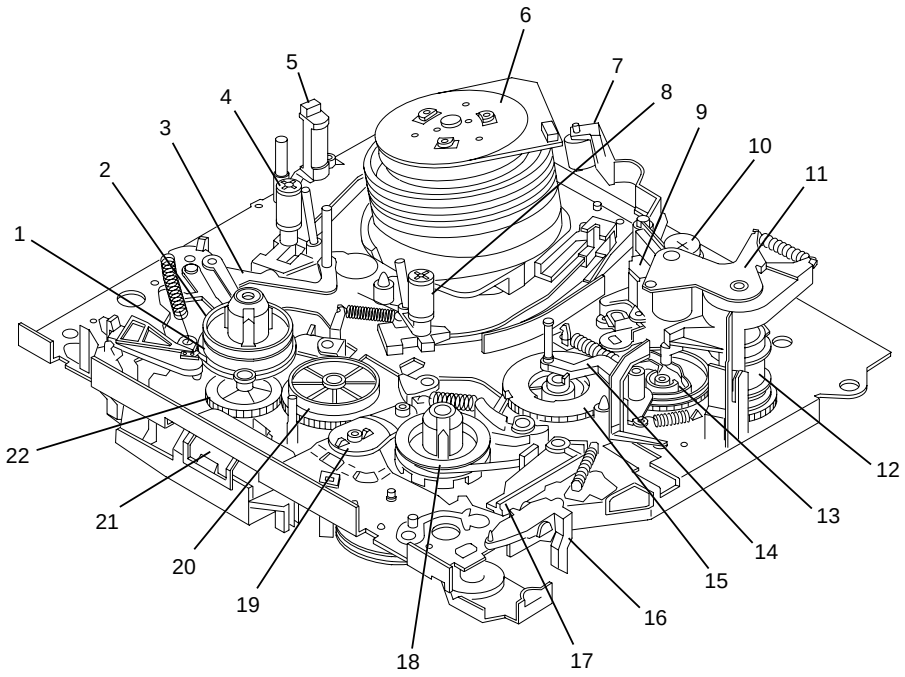


Fig. 2-1 Top View of UT Mechanism

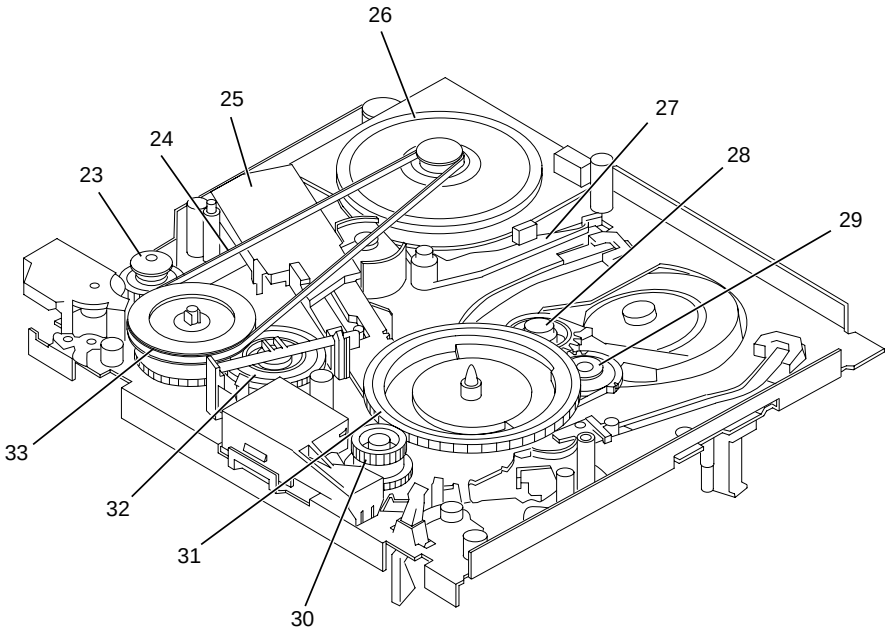


Fig. 2-2 Bottom View of UT Mechanism

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 (A/C) 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 **(*1)**
17. Tension band R
18. Take-up (T) reel table
19. FR arm
20. Idler gear 2
21. Loading motor
22. Idler gear 1
23. FL change gear
24. Timing belt
25. Slider
26. Capstan motor
27. FS brake
28. Loading (L) gear (R)
29. Loading (L) gear (L)
30. LM wheel gear
31. Cam gear
32. Torque change gear
33. Pulley assembly

***1**: Not mounted in some models

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

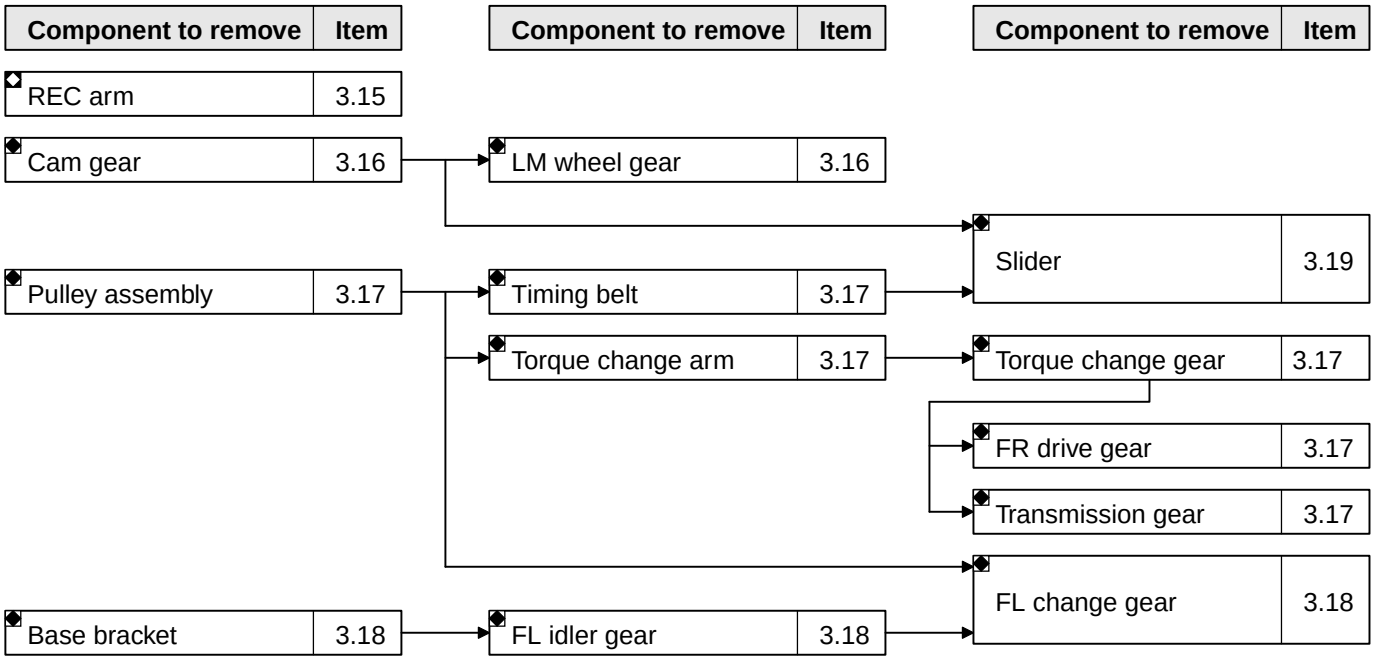
Dismantling heads and motor related components

Component to remove	Item
FE head	3.1
A/C head assembly	3.2
◆ Cylinder motor assembly	3.3
◆ Capstan motor	3.4
◆ Loading motor assembly	3.5

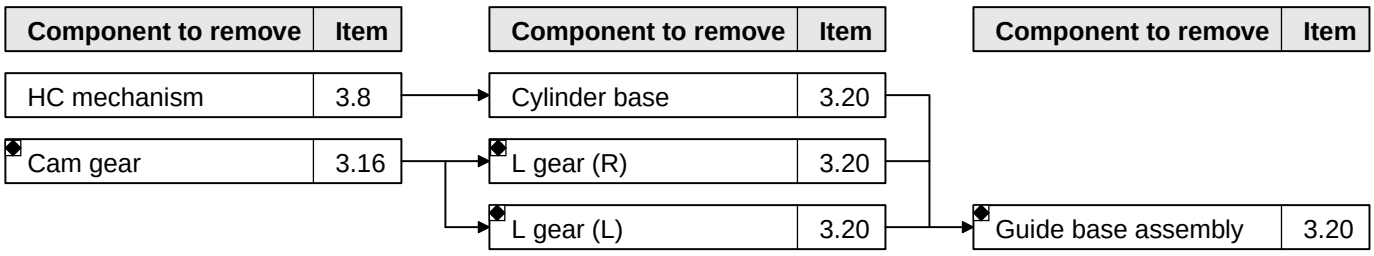
Dismantling tape transport components

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 (S) 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		
		◇ Take-up (T) reel table	3.14	◇ FR arm	3.14
◇ S-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.

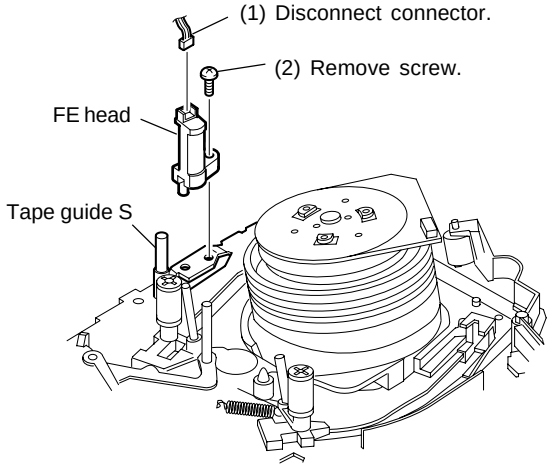


Fig. 3-1

3.2 A/C head assembly

Caution when reinstalling:

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

Adjustments after reinstalling:

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

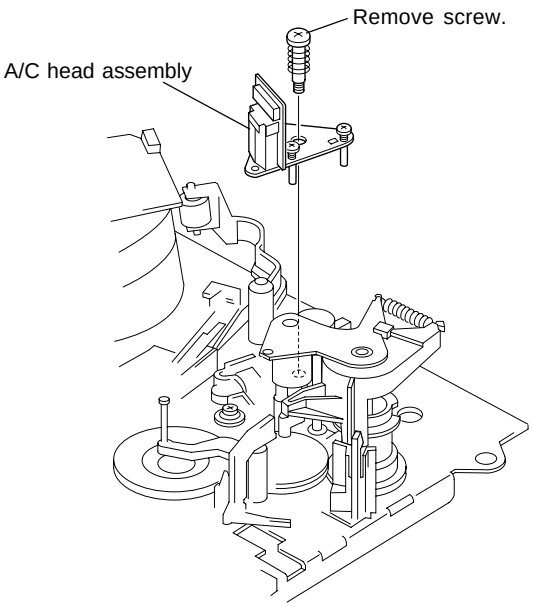


Fig. 3-2

3.3 Cylinder motor assembly

Caution during work:

1) Do not touch video head tips.

Adjustments after reinstalling:

1) Adjustment after replacing the cylinder

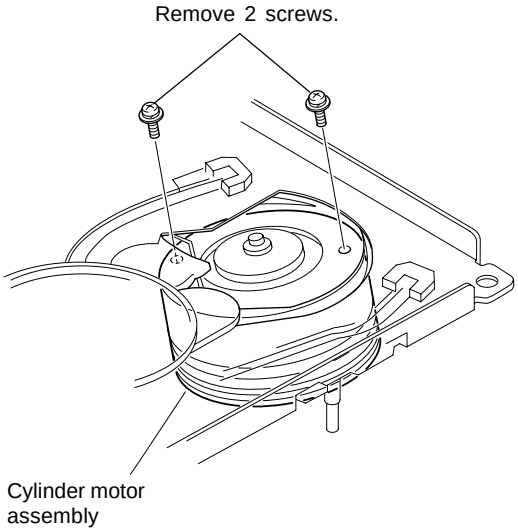


Fig. 3-3

3.4 Capstan motor

Caution when reinstalling:

1) Clean any surfaces of capstan motor shaft that come into contact with tape or FS brake.

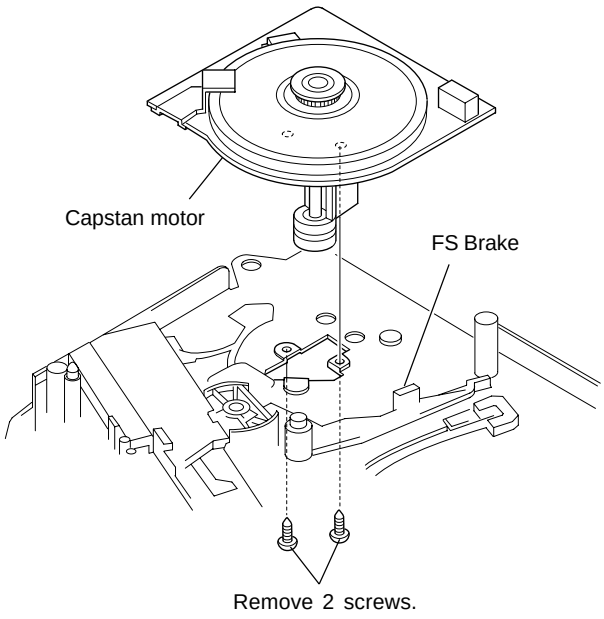


Fig. 3-4

3.5 Loading motor assembly

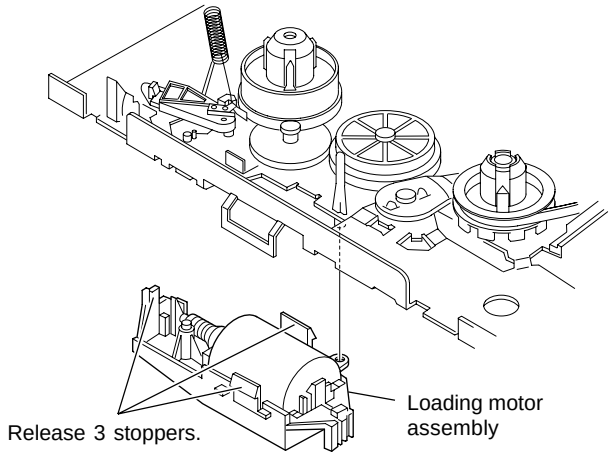


Fig. 3-5

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.
2) Take care With orientation of spring (attach the spring as shown in the illustration).

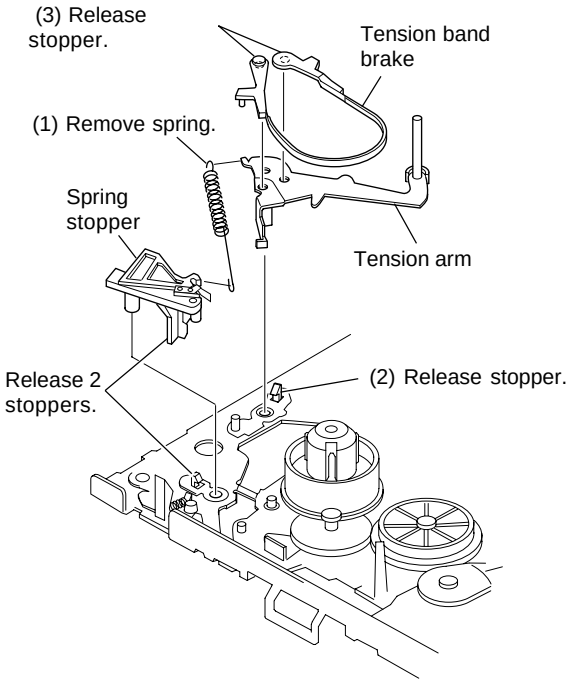


Fig. 3-6

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.

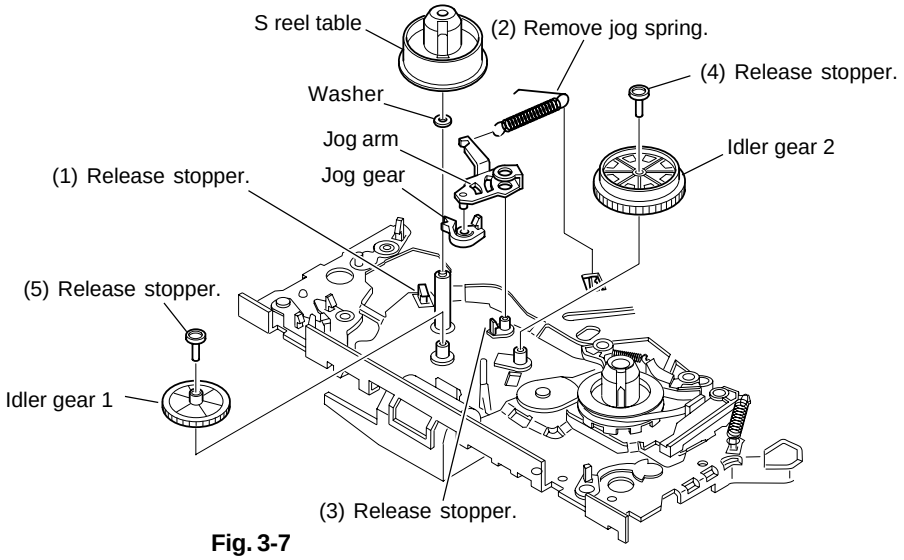


Fig. 3-7

3.8 HC mechanism

Caution when reinstalling:

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

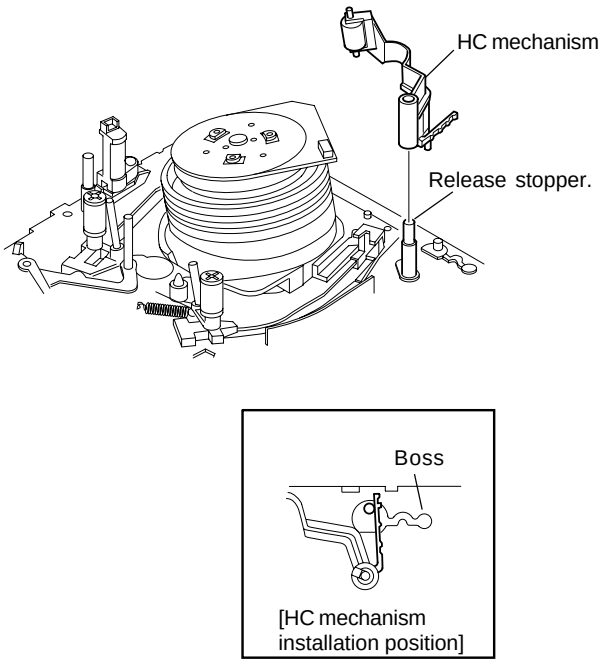


Fig. 3-8

3.9 PR arm

Caution during work:

1) 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.
2) Bend the stopper only in the direction of the arrow. (Bending the stopper in any other direction could damage the mold section.)

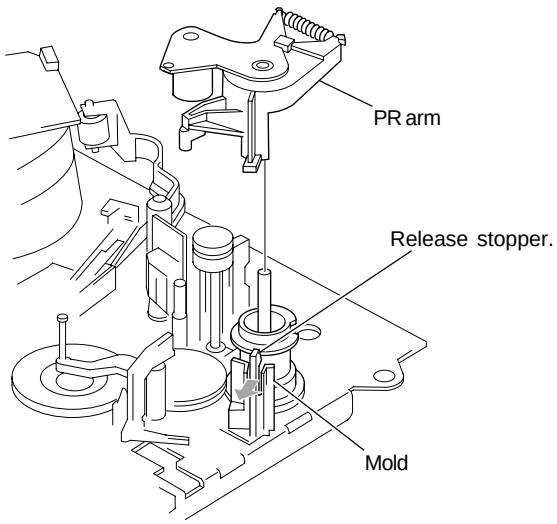


Fig. 3-9

3.10 PR spiral gear

Caution when reinstalling:

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

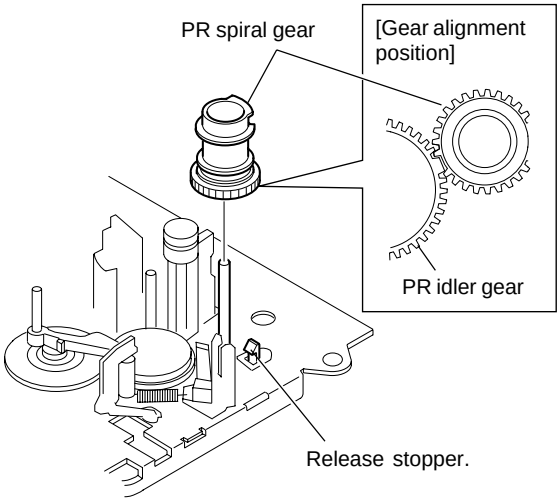


Fig. 3-10

3.11 P out arm

Cautions when reinstalling:

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

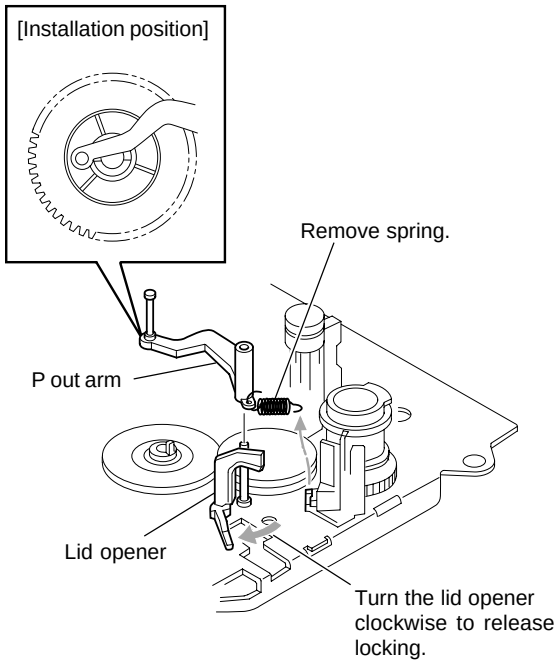


Fig. 3-11-1

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.

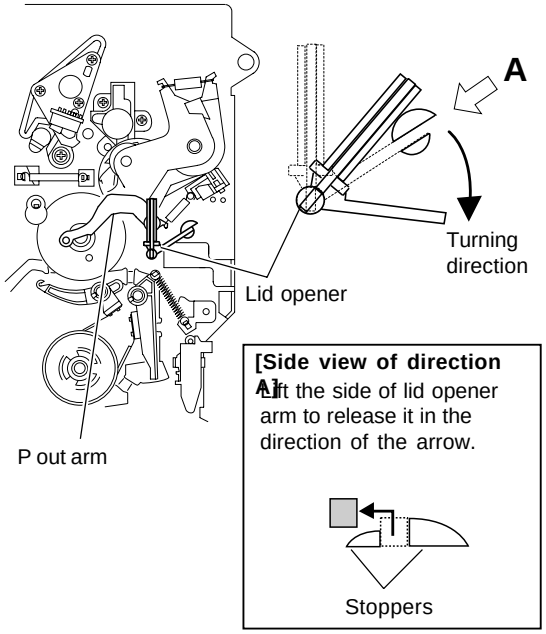


Fig. 3-11-2

3.12 PR idler gear

Caution when reinstalling:

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

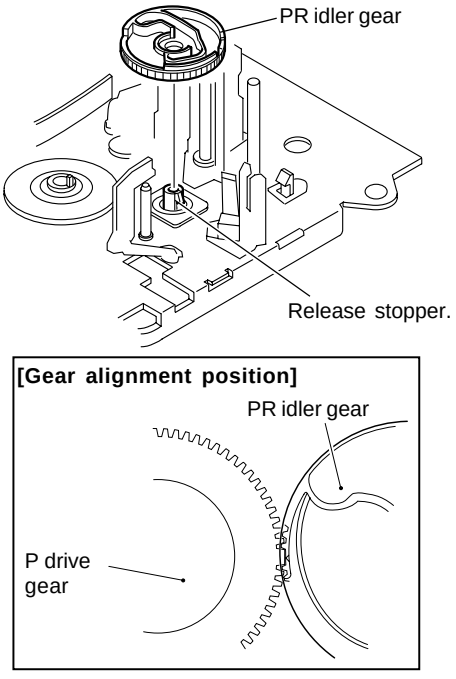


Fig. 3-12

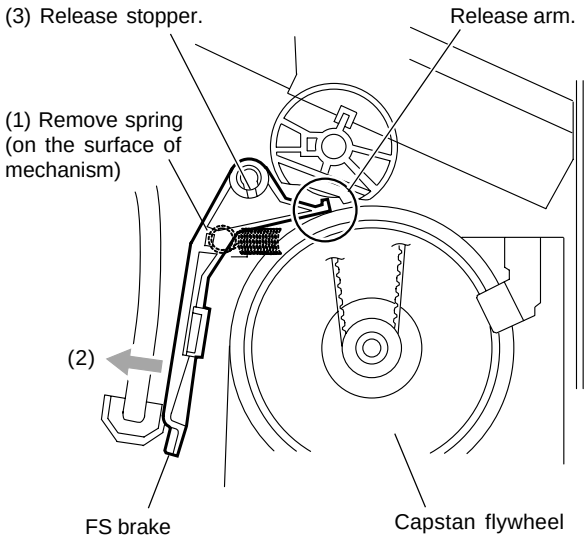
3.13 FS brake, P drive gear

Caution during work:

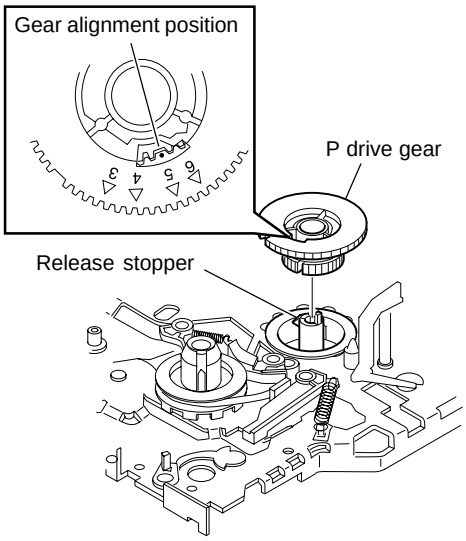
1) Lift the P drive gear only after pulling the FS brake in the direction of the arrow to release the arm.

Caution when reinstalling:

1) Align the positions of P drive gear and slider.
2) Clean any part of surface that comes into contact with capstan motor.



[Back of mechanism]



[Surface of mechanism]

Fig. 3-13

3.14 Operation arm L, tension band R, T reel table, FR arm, S-VHS switch

Note: Some models do not have an S-VHS switch.

Caution when reinstalling T reel table:

1) Put washer onto the T reel table shaft.

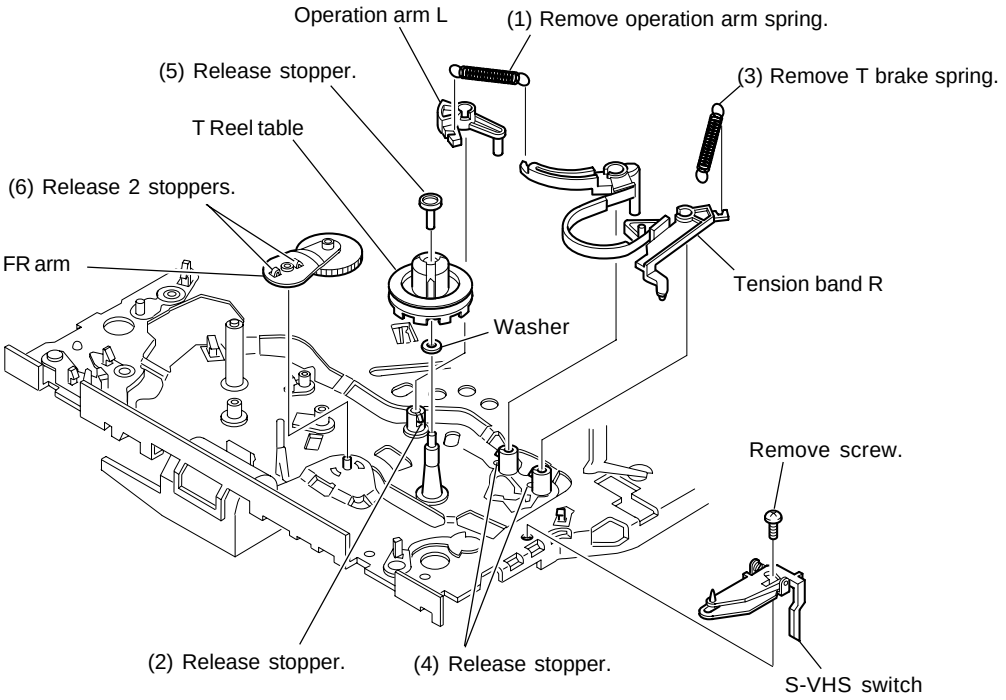


Fig. 3-14

3.15 REC arm

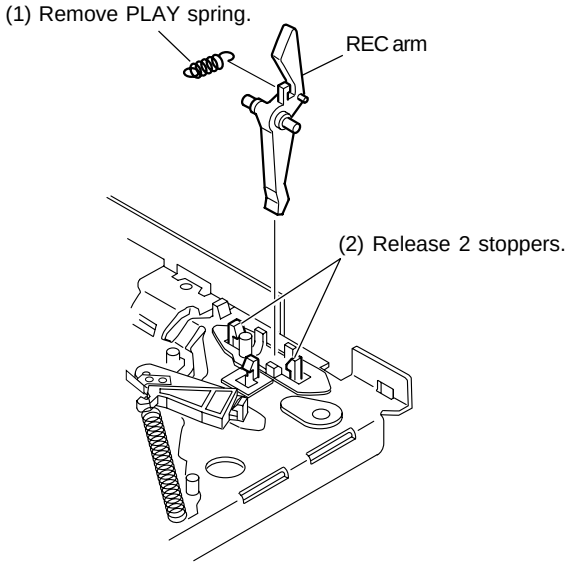


Fig. 3-15

3.16 Cam gear, LM wheel gear

Caution when reinstalling:

1) Align the positions of cam gear and slider.

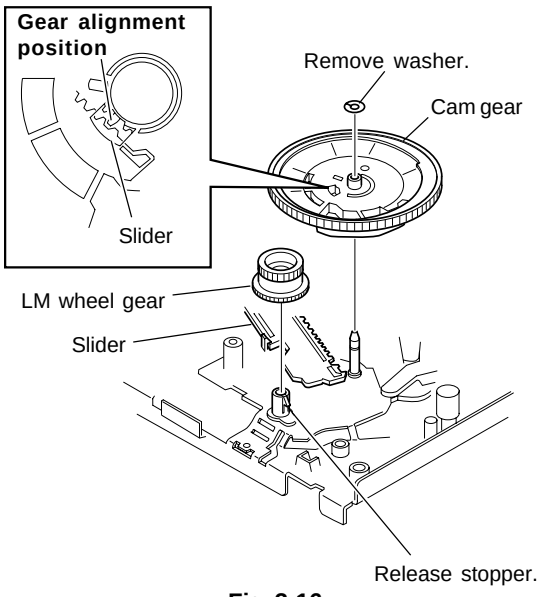


Fig. 3-16

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 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.

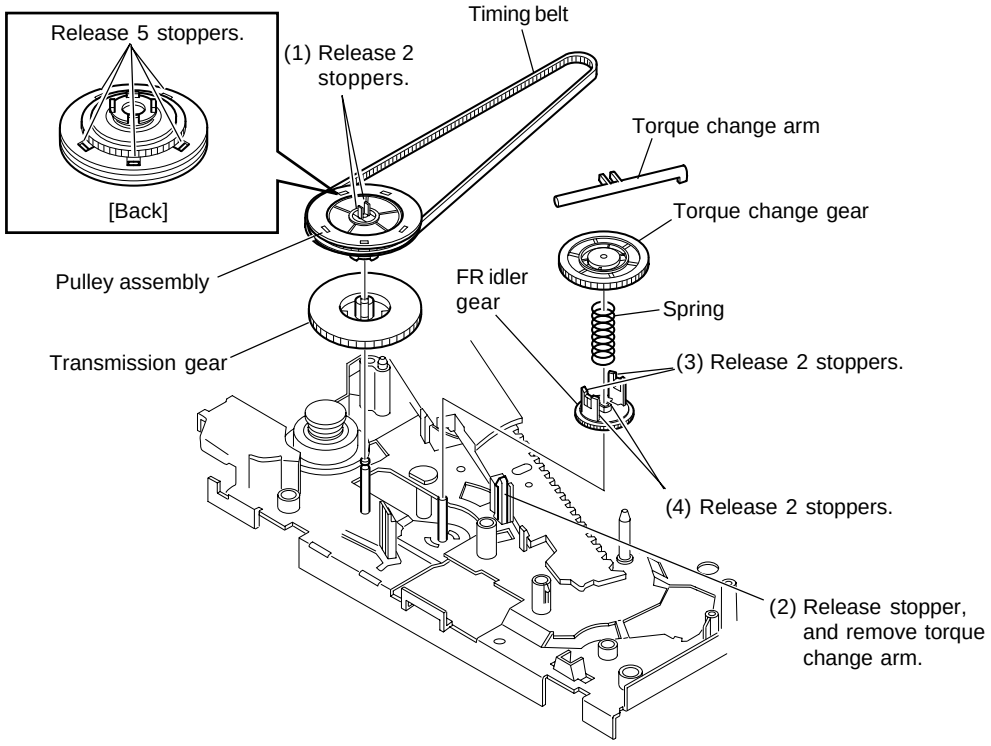


Fig. 3-17

3.18 Base bracket, FL idler gear, FL change gear

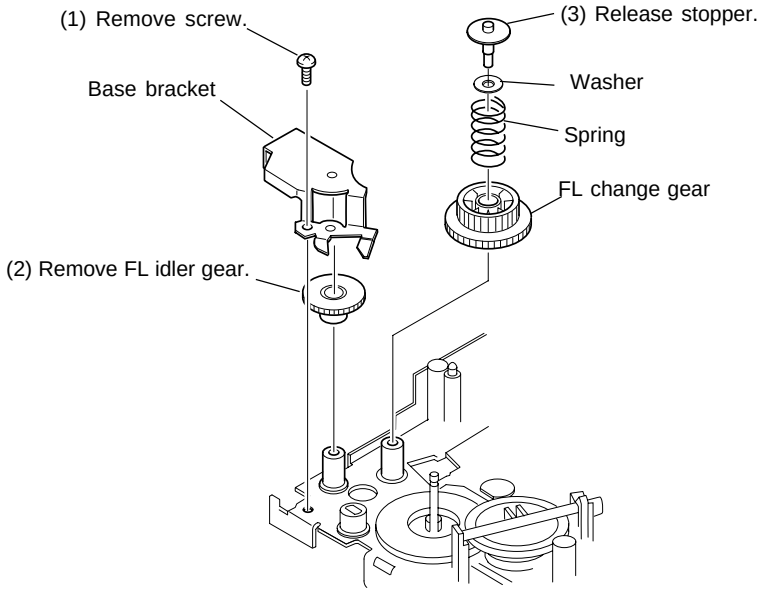


Fig. 3-18

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.

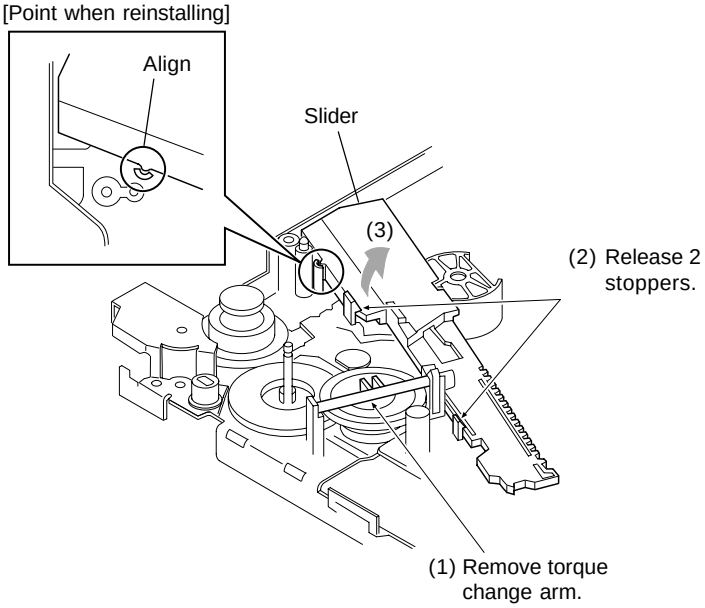


Fig. 3-19

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

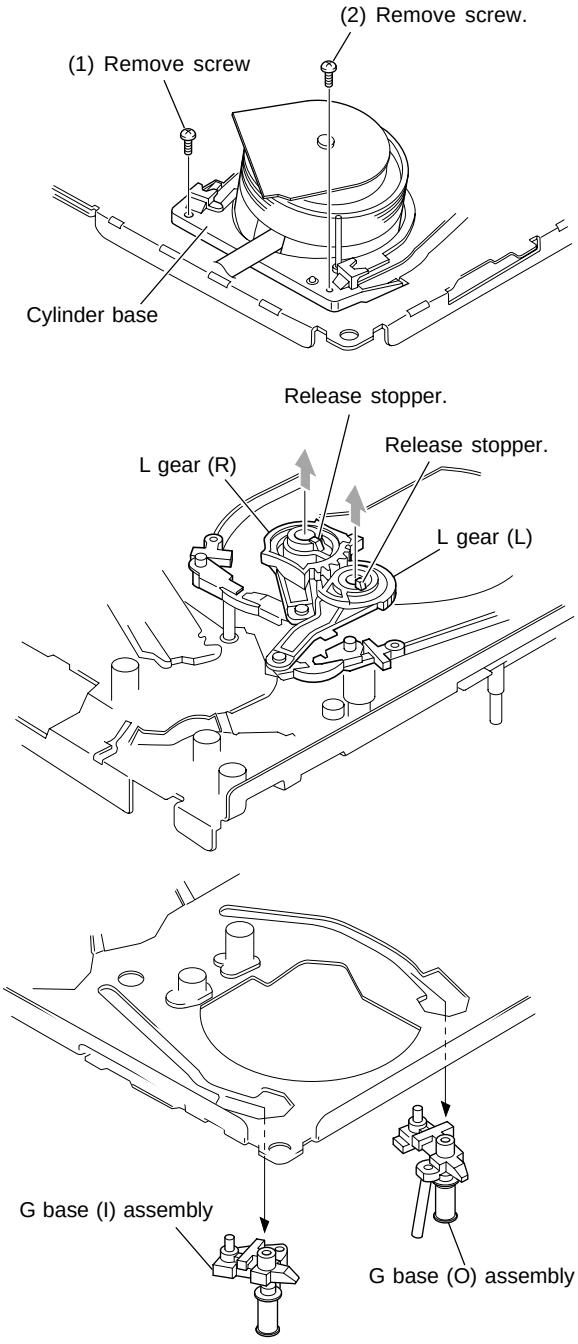


Fig. 3-20

4. Items to Be Checked After Reinstalling UT 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:

4.1 Items to be checked on the surface of UT 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

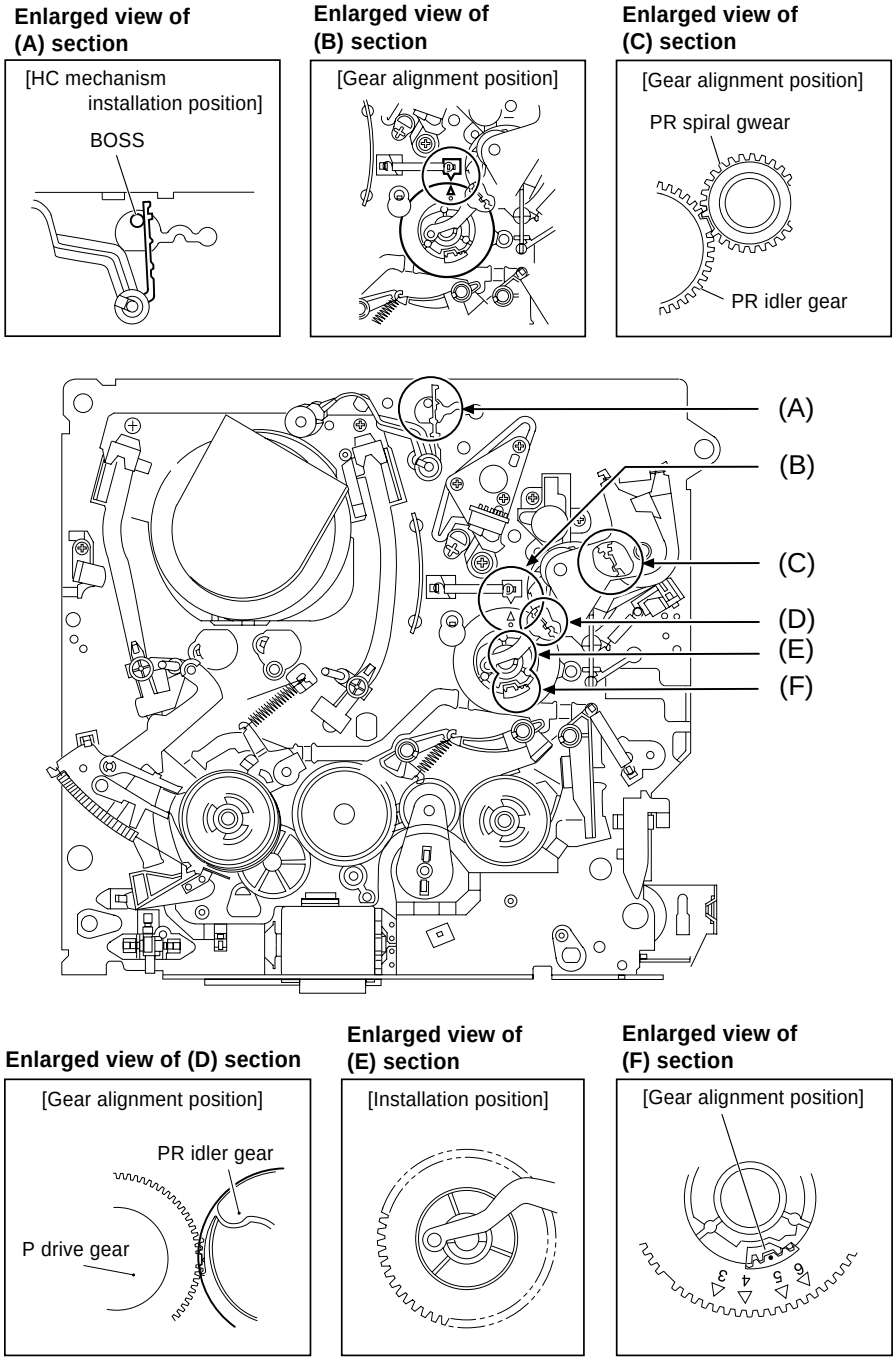


Fig. 4-1

4.2 Items to be checked on the back of UT 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.

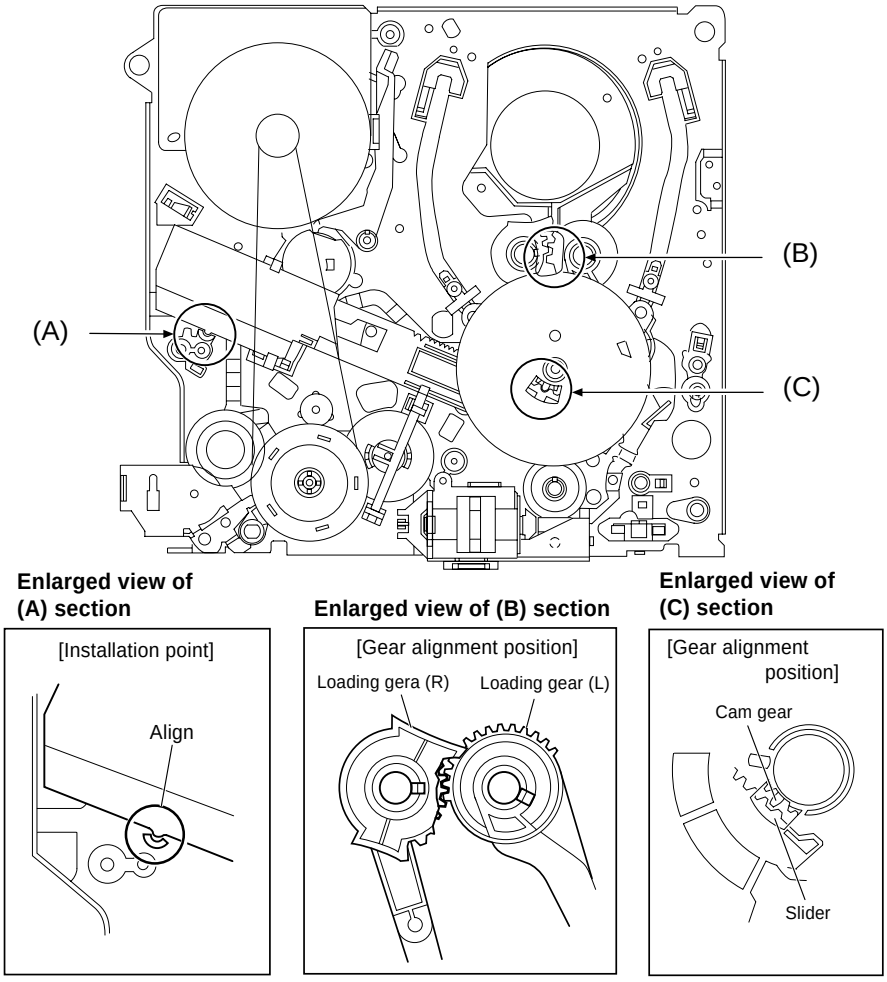
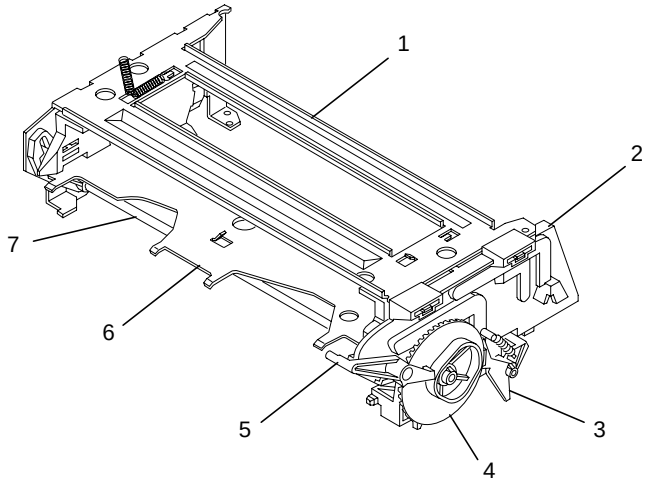


Fig.4-2

5. Names of Components in UT-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 UT-FL Mechanism

6.1 Door arm, switch arm, bevel gear, FL gear

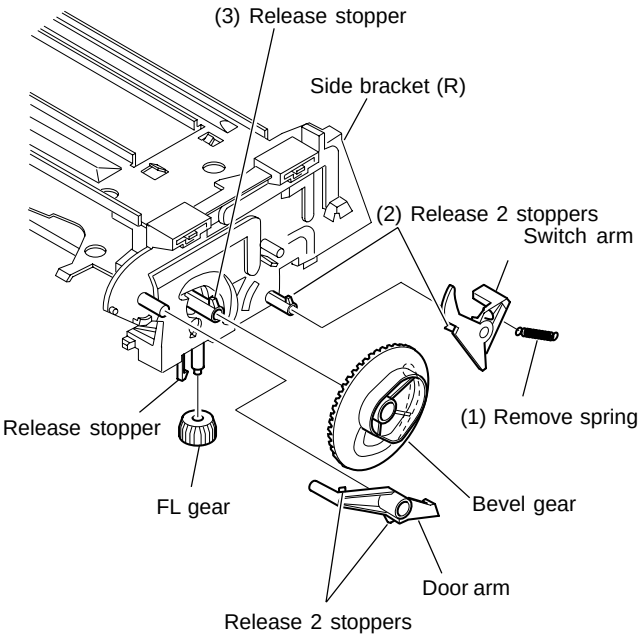


Fig. 6-1

Caution when reinstalling:

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

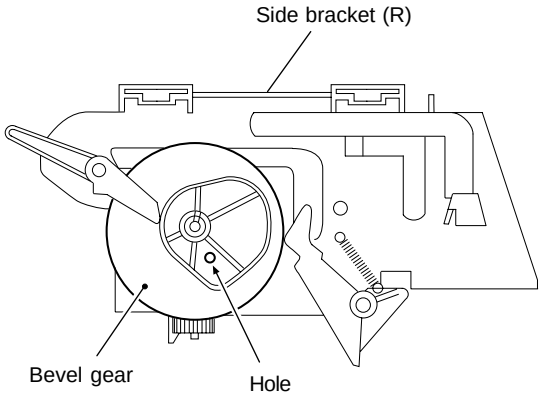


Fig. 6-2

6.2 Side bracket (R), side bracket (L), cassette holder, drive arm

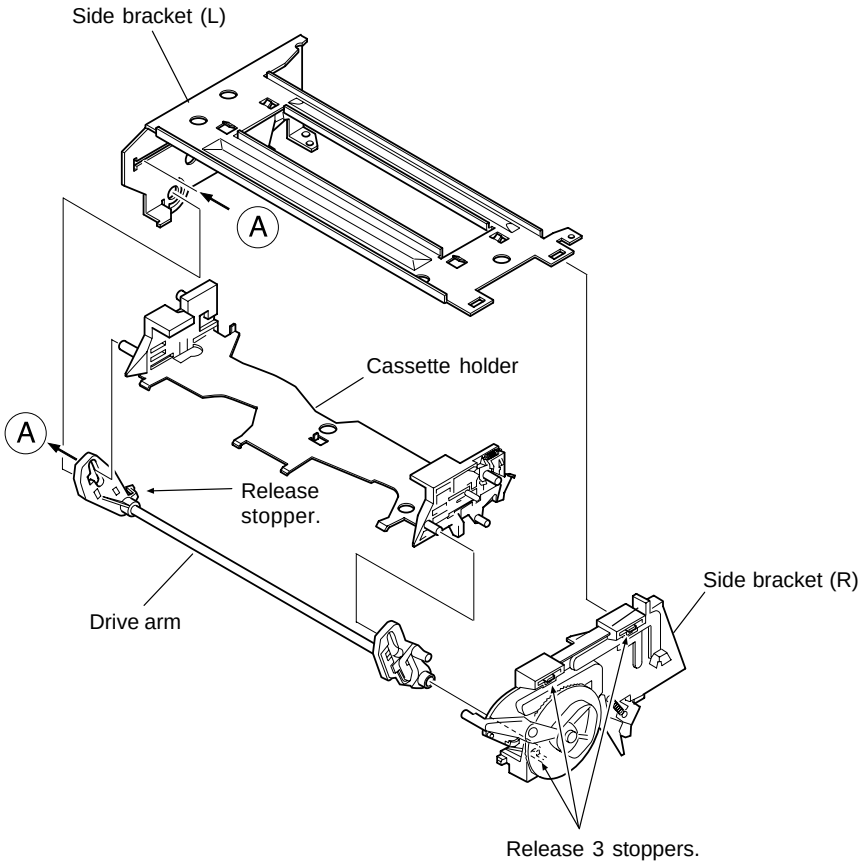


Fig. 6-3

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.

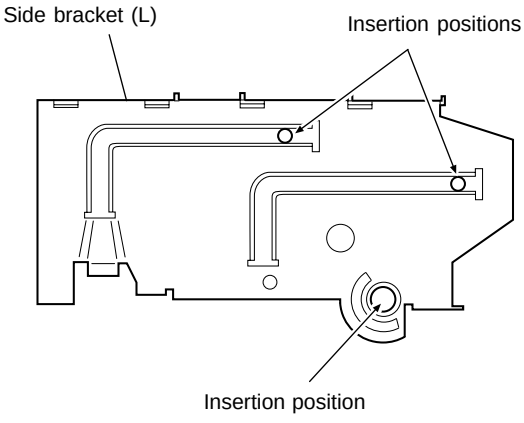


Fig. 6-4

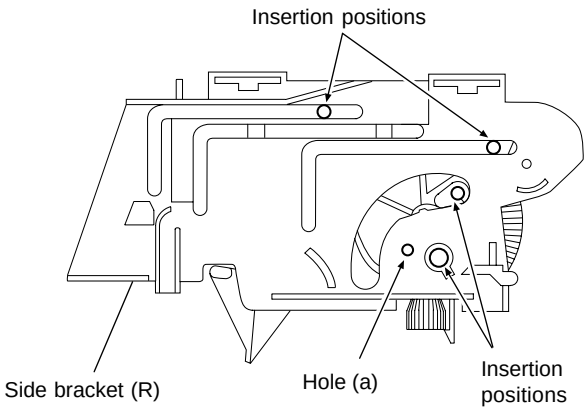
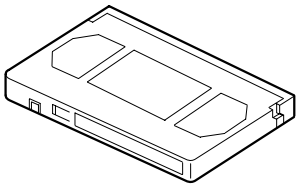


Fig. 6-5

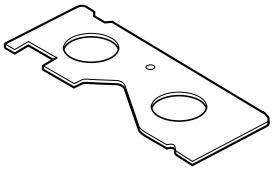
CHAPTER 4 MECHANICAL ADJUSTMENT

1. List of Tapes and Jigs for Adjustment

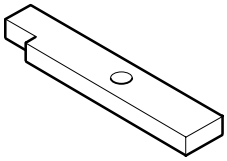
Alignment Tape
NTSC models: 60HMP-2-1 Parts No. 7099090
NTSC models: 30HMP-2-1 Parts No. 7099080
PAL models: 50HMGE-3 Parts No. TP13141



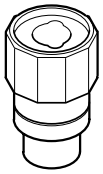
Master Plane
Parts No. 7099279



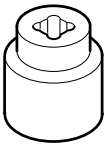
Reel Disk Height Jig
Parts No. 7099038



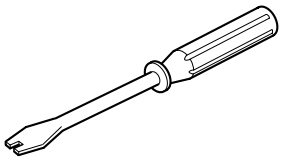
Torque Gauge
Parts No. 7099039



Torque Gauge Adapter
Parts No. 7099035



Guide Roller Adjustment Driver
Parts No. 7069064



Information on alignment tape:
The 60HMP-2-1 alignment tape is a replacement for MH-1 (part no. 7099046), the supply of which has been discontinued; the 50HMGE-3 alignment tape is a replacement for MH-2 (part no. 7099052).

2. Adjustment Locations

***1**: For X-value adjustment, refer to Electrical Adjustment in individual service manual of each model: It is not included in this manual.

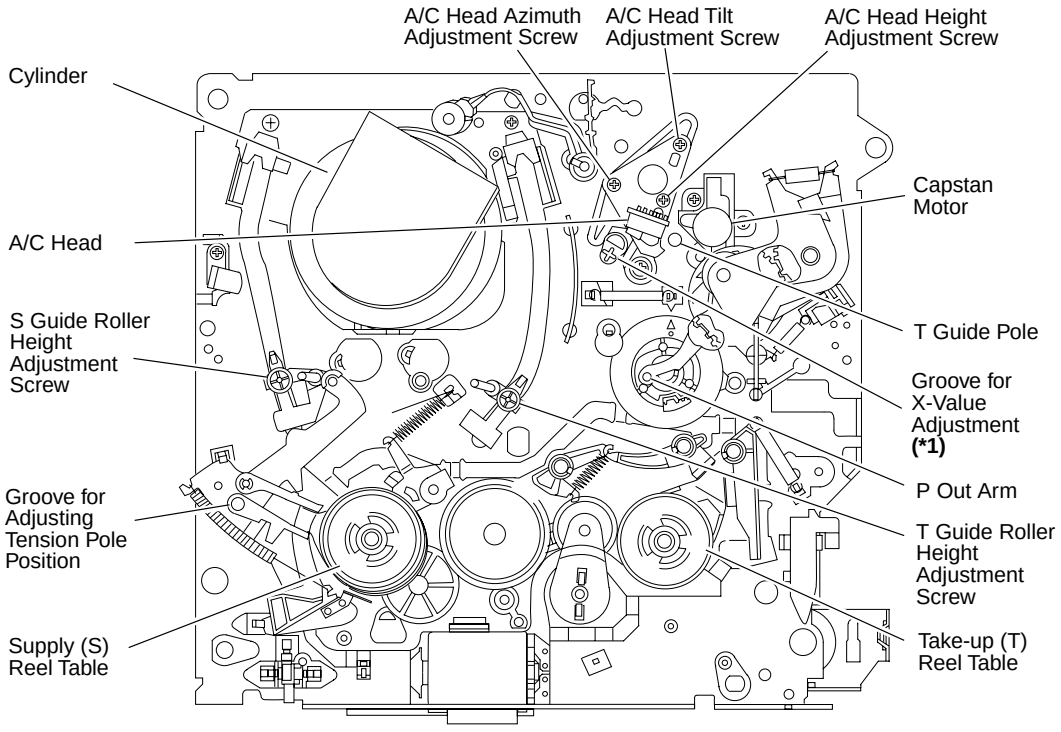


Fig. 2-1

3. Checking and Adjusting Tape Transport Components

The tape transport system refers to the path from the supply reel table to take-up reel table via video heads. The tape transport components, especially components that directly come into contact with tape, must be kept clean without any damage on their contact surfaces: If dust or oil adheres to any part of transport components, clean them, referring to "CHAPTER 5 OPERATION CHECK/MEINTENANCE AND INSPECTION".
If any damage on tape transport components is found, replace them, referring to "CHAPTER 3 DISASSEMBLY". Secure adjustment of new components will stabilize the tape transport system.

3.1 Tension Pole Position Adjustment

Purpose:

To keep constant the tension of tape supplied, thereby stabilizing the contact of tape with video heads.

VCR status:

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

Adjustment point:

Groove for adjusting tension pole

Adjustment procedure:

Use a flat bladed screwdriver to adjust the groove for tension pole adjustment: The groove in the tension arm should be placed between the two grooves in the chassis base.

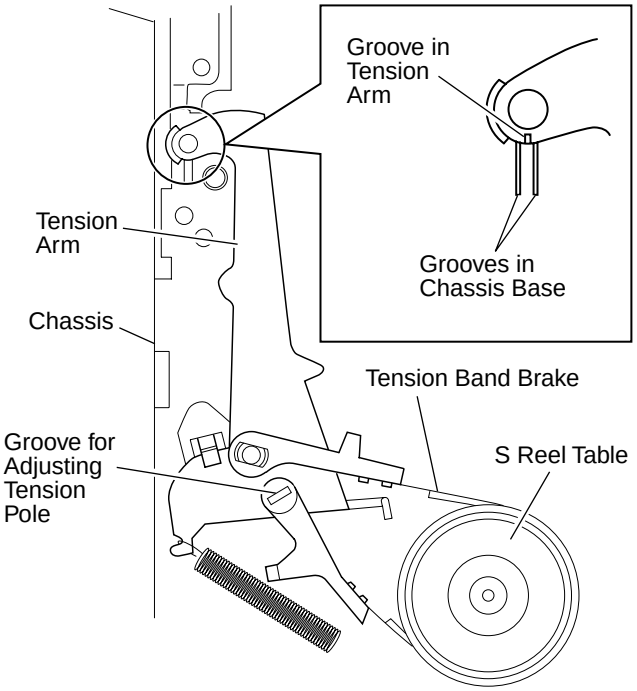


Fig. 3-1

3.2 Reel Table Height Adjustment

Purpose:

To regulate the heights of reel tables, thereby fixing the heights of tape reels in cassette (tape).

Jigs used:

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

VCR status:

1) Remove the UT-FL (front loading) mechanism.
2) Mount the master plane, and place the reel disk height jig on it.

Adjustment point:

Washers in reel tables

Adjustment procedure:

1) Make sure that surface C of reel table is placed between portion A and B of reel disk height jig for both supply and take-up reel tables.
2) If step 1) cannot be confirmed, replace the washers (0.5 mm thick) in reel table, or increase or decrease the number of washers. **(*1)**

***1**: The washers cannot be accessed unless the reel table is removed. Refer to "CHAPTER 3 DISASSEMBLY"for removing each reel table.

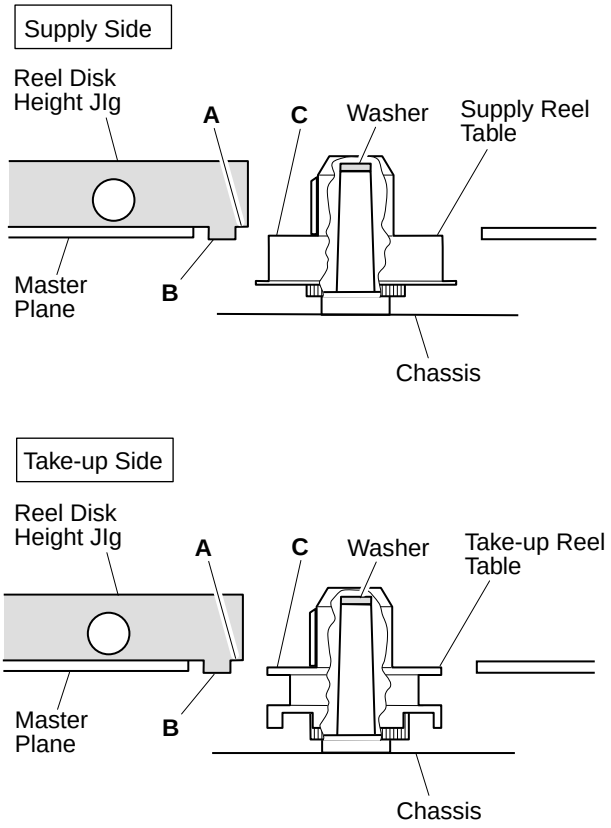


Fig. 3-2

3.3 Guide Roller Height Adjustment

Caution:
The guide roller height adjustment has been set at the factory for service parts of G base (I) assembly and G base (O) assembly. Therefore, do not perform this adjustment item unless it is absolutely necessary after replacing components.

■ Check and Coarse Adjustment

Purpose:

To regulate the height of tape so that the bottom edge of tape runs along the tape guide on cylinder.

Jigs used:

Master plane (part no. 7099279)
Reel disk height jig (part no. 7099038)
Guide roller adjustment driver (part no. 7099064)

VCR status:

1) Remove the UT-FL (front loading) mechanism.
2) Mount the master plane, and place the reel disk height jig on it.

Adjustment point:

T or S guide roller height adjustment screw

Check/Adjustment procedure:

1) Visually ascertain that the top surface of reel disk height jig is aligned with the bottom surface of upper flange of guide roller.
2) If step 1) cannot be confirmed, adjust the guide roller height adjustment screw so that the two surfaces are aligned (do not turn it too far).
   After coarse adjustment is complete, be sure to perform the following precise adjustment:

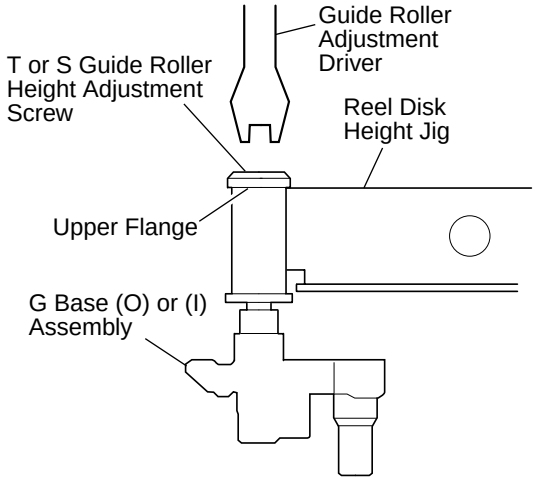


Fig. 3-3

■ Precise Adjustment

Purpose:

To regulate the height of tape so that the bottom of tape runs along the tape guide on cylinder.

Test equipment/jigs and connection points:

Oscilloscope CH-1: PB FM **(*1)**
CH-2: SW25/SW30 **(*1)**
Alignment tape **(*1)**
Guide roller adjustment driver (part no. 7099064)

VCR status:

1) Set the tracking control to its center. **(*2)**
2) Play back alignment tape. **(*1)**
3) Set to the X-value adjustment mode. **(*1)**

Adjustment point:

T or S guide roller height adjustment screw

Adjustment procedure:

1) Set the tracking control to its center. **(*2)**
2) Play back the alignment tape. **(*1)**
3) Set the VCR to the X-value adjustment mode. **(*1)**
4) Gradually turn the S and T guide roller height adjustment screws so as to flatten the PB FM signal output waveform.
5) Move the tracking control up or down, or left or right **(*2)**, and finely adjust the S and T guide roller height adjustment screws so that the PB FM signal output waveform changes as shown in the good example in Fig. 3-4.
6) Release the X-value adjustment mode. **(*1)**

***1**: The following items will vary depending on the VCR model. Therefore, perform this precise adjustment referring to "X-value Adjustment", included in Electrical Adjustment of corresponding manual for each model (The following are the same as for "X-value Adjustment".):

- Test equipment connection points (test points)
- Alignment tape used
- X-value adjustment mode setting/release method (not necessary for models on which the X-value adjustment mode has previously been set)

***2**: The tracking control varies depending on the model, knob (VR) type, button type, etc. Refer to the service manual for each model or instruction manual when performing this precise adjustment.

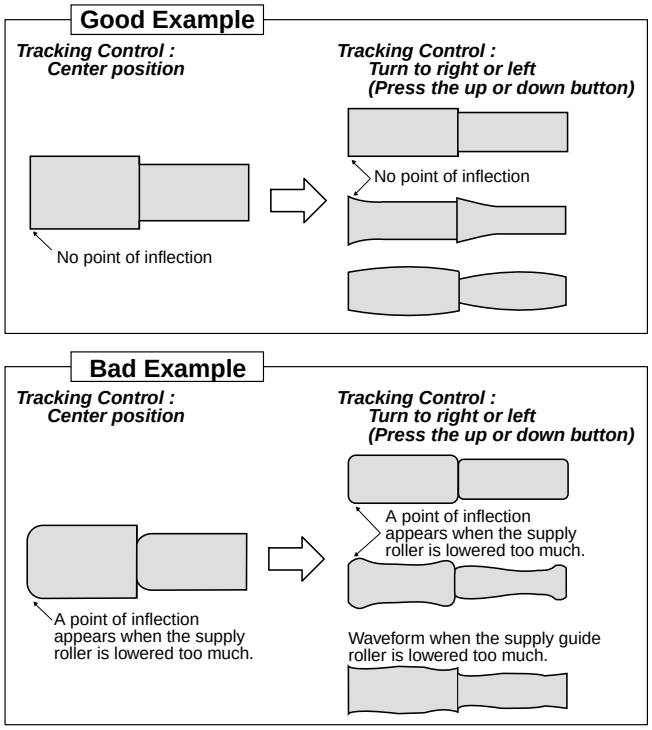


Fig. 3-4

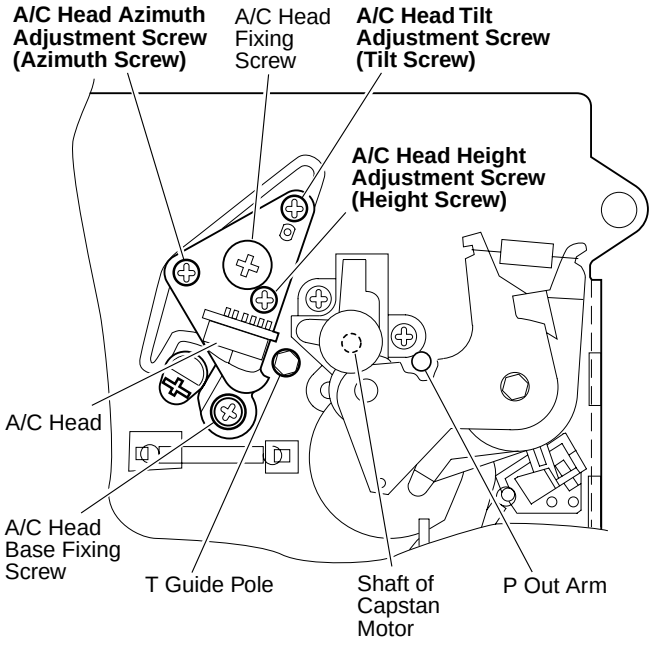


Fig. 3-5

3.4 A/C Head Adjustment

Caution:
For A/C head service parts, the necessary adjustments, height, tilt, etc., have been completed at the factory. Therefore, do not perform this adjustment item unless it is absolutely necessary after replacing components.

■ Check

Purpose:

To check that the A/C head height, tilt, etc. are properly set.

Jig used:

Blank tape

NTSC models: T-120

PAL models: E-180

VCR status:

Insert a blank tape, and perform forward search at the start of winding.

Check procedure:

1) Insert a blank tape, and perform forward search at the winding start portion.
2) Visually ascertain check that the top surface of lower flange of T guide pole is aligned with the bottom edge of tape. (See Fig. 3-6(A))
3) Visually make sure that the tape is not twisted between the capstan motor shaft and P Out arm. (See Fig. 3-7)
4) If both steps 2) and 3) can be confirmed, it is not necessary to adjust the A/C head: Proceed with A/C head adjustment only when either of these steps cannot be confirmed.

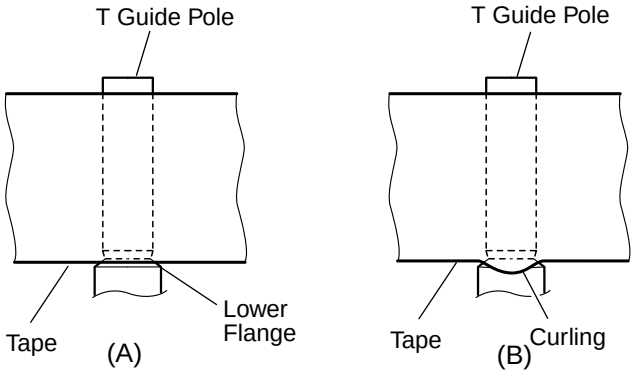


Fig. 3-6

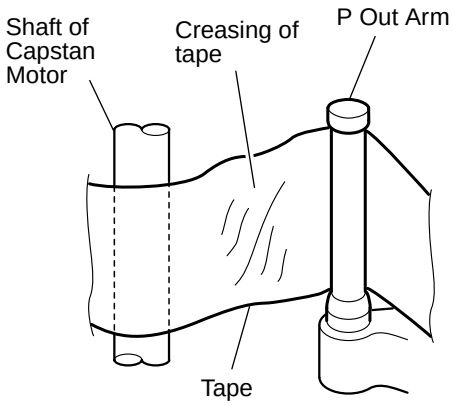


Fig. 3-7

■ Adjustment

Purpose:

To set the height, azimuth, etc. of A/C head, thus keeping the contact between heads and tape uniform, thereby allowing specified tracks to be recorded and played back.

Test equipment/jigs and connection points:

Oscilloscope: AUDIO OUT

Blank tape

NTSC models: T-120

PAL models: E-180

Alignment tape

NTSC models: 30HMP-2-1 (part no. 7099080)

PAL models: 50HMGE-3 (part no. TP13141)
[MH-2 can also be used]

VCR status:

1) Set the tracking control to its center. **(*1)**
2) Insert a blank tape for coarse adjustment.
3) Play back the alignment tape for precise adjustment (play back the staristeps/6kHz signal portion when using MH-2).

Adjustment points:

A/C head azimuth adjustment screw (Azimuth Screw)
A/C head tilt adjustment screw (Tilt Screw)
A/C head height adjustment screw (Height Screw)

Adjustment procedure:

1) Set the tracking control to its center. **(*1)**

[Tilt Coarse Adjustment (Figs. 3-5, 3-6)]

2) Insert a blank tape, and perform forward search at start of winding.
3) Gradually turn the Tilt Screw clockwise, allowing curling of tape to occur at the lower flange of T guide pole. (See Fig. 3-6(B))
4) Turn the Tilt Screw counterclockwise slowly (at least 2 seconds), so that tape curling which was generated in step 3) ceases, and the bottom edge of tape is aligned with the top surface of lower flange of T guide pole. (See Fig. 3-6(A))

[Height Coarse Adjustment (Figs. 3-5, 3-8)]

5) Insert a blank tape, and set the VCR to the playback mode.
6) Adjust the Height Screw so that the bottom edge of tape is aligned with the bottom edge of control head core.
7) Slightly turn the Height Screw counterclockwise to lower the A/C head from the height set in step 6). (The bottom edge of control head core should be approximately 0.25 mm lower than the bottom edge of tape.)

[Precise Adjustment (Figs. 3-5, 3-9)]

8) Play back the alignment tape. (Play back the staristeps/6kHz signal portion when using MH-2.)
9) Finely adjust the Azimuth, Height and Tilt screws alternately, so that the audio output waveform is maximum and flat (with minimum fluctuations).

***1**: The tracking control varies depending on the model, knob (VR) type, button type, etc. Refer to the service manual for each model or instruction manual when performing this precise adjustment.

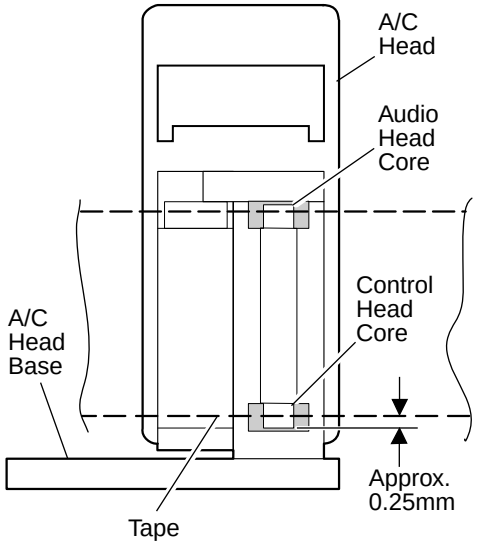
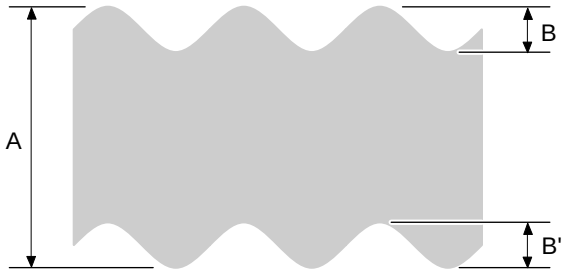


Fig. 3-8



A : Maximum
B & B': Minimum

Fig. 3-9

3.5 Adjustment After Replacing Cylinder

Purpose:

To eliminate drift in relative height between cylinder and guide rollers, and in X-value: Note that if the cylinder was replaced properly, the drift will be minimum.

Test equipment/jigs and connection points:

Oscilloscope CH-1: PB FM **(*1)**
CH-2: SW25/SW30 **(*1)**

Blank tape
NTSC models: T-120
PAL models: E-180

Alignment tape
NTSC models: 30HMP-2-1 (part no. 7099080)
PAL models: 50HMGE-3 (part no. TP13141)
[MH-2 can also be used]

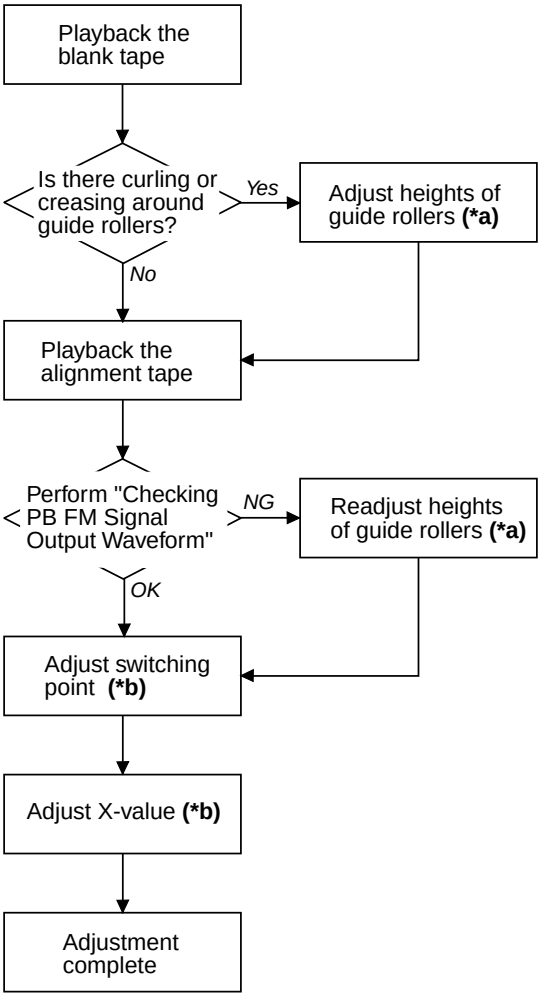
VCR status:

1) Set the tracking control to its center. (*2)
2) Insert a blank tape for first half of adjustment.
3) Play back the alignment tape for latter half (play back the staristeps/6kHz signal portion when using MH-2).

Adjustment point:

T or S guide roller height adjustment screw

Adjustment procedure:



Checking PB FM Signal Output Waveform:

1) Set the tracking control to its center. **(*2)**
2) Adjust the Volts/Div knob on oscilloscope **(*3)** so that the output waveform level of PB FM signal shows 4 graduations on oscilloscope.

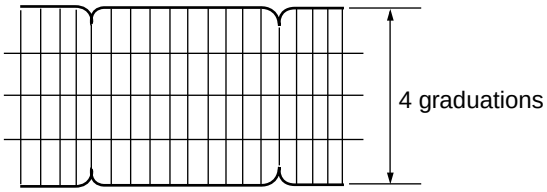


Fig. 3-10

3) Adjust the tracking control to the left or right, or up or down **(*2)**, so that the maximum amplitude of PB FM output waveform is 3 graduations on oscilloscope.
4) After step 3) is complete, make sure that the minimum amplitude of PB FM output waveform is 2 graduations or more on oscilloscope.

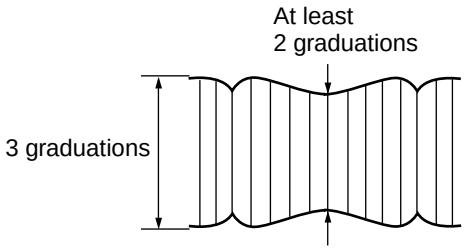


Fig. 3-11

5) Return the tracking control to its center **(*2)**, and make sure that the fluctuation ratio of PB FM signal level is 13% or less.

***1**: The oscilloscope connection points (test points) are different for each model. The test points in this adjustment item are the same as in "X-value adjustment": Refer to "X-value Adjustment", included in Electrical Adjustment of corresponding manual for each model.

***2**: The tracking control varies depending on the model, knob (VR) type, button type, etc. Refer to the service manual for each model or instruction manual when performing this precise adjustment.

***3**: The name of knob on oscilloscope may be different, depending on maker and model.

***a**: Refer to "3.3 Guide Roller Height Adjustment" for details on guide roller height adjustment.

b*: Refer to Electrical Adjustment in the corresponding service manual of each model for head switching point

adjustment and X-value adjustment.

3.6 Tension/Torque Check

Purpose:

The tension, torque and compression force at the tape take-up portion and movable portion are essential for smooth tape running and satisfactory basic performance of VCR. If tape running is unstable or tape speed is abnormal, perform this check.

Jigs used:

Torque gauge (part no. 70999039)
Torque gauge adapter (part no. 70999035)

Check procedure:

1) Attach the torque gauge adapter to torque gauge.
2) Set to each mode according to Table 3-1, referring to "Setting VCR to loading status without inserting cassette tape" (on page 5-1).
3) Mount the torque gauge on the measurement point according to Table 3-1, and fix it by hand.

Item	VCR Operation Mode	Point to be Measured	Measurement Value (*1)
Main Brake Torque	Stop **(*2)**	Supply Reel Table	10.8×10^{-3} to 16.7×10^{-3} N·m (110 to 170 g.cm)
	Stop **(*2)**	Take-up Reel Table	7.8×10^{-3} to 13.7×10^{-3} N·m (80 to 140 g.cm)
Slack Removal Torque	Unloading	Supply Reel Table	9.8×10^{-3} to 17.6×10^{-3} N·m (100 to 180 g.cm)
Fast Forward/Rewind Torque	Fast Forward/Rewind	Supply & Take-up Reel Tables	39.2×10^{-3} N·m (At least 400 g.cm)
Take-up Torque	Playback	Supply Reel Table	5.9×10^{-3} to 12.7×10^{-3} N·m (60 to 130 g.cm)
Supply Reel Back-tension Torque	Fast Forward	Supply Reel Table	4.4×10^{-3} to 7.4×10^{-3} N·m (45 to 75 g.cm)
	Rewind	Take-up Reel Table	0.5×10^{-3} to 2.0×10^{-3} N·m (5 to 20 g.cm)
Take-up Reel Back-tension Torque	Playback	Supply Reel Table	2.7×10^{-3} to 4.3×10^{-3} N·m (28 to 44 g.cm)
Playback Back-tension Torque	Reverse Search	Take-up Reel Table	9.3×10^{-3} to 24.5×10^{-3} N·m (95 to 250 g.cm)
Reverse Search Torque	Reverse Play	Take-up Reel Table	11.8×10^{-3} to 19.6×10^{-3} N·m (120 to 200 g.cm)
Reverse Play Torque	Slow	Supply Reel Table	4.9×10^{-3} to 12.7×10^{-3} N·m (50 to 130 g.cm)
Slow Torque	Reverse Search	Take-up Reel Table	4.9×10^{-3} to 9.8×10^{-3} N·m (50 to 100 g.cm)
T Brake Torque			

Table 3-1

***1**: Measured values are shown in SI units: Measured values in conventional units are shown in parentheses ( ).
***2**: Measure in LOADING-STOP2 mode (see page 5-1).

Memo

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 UT-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 A/C head and arrow no. of P. drive gear, to check the mode position.

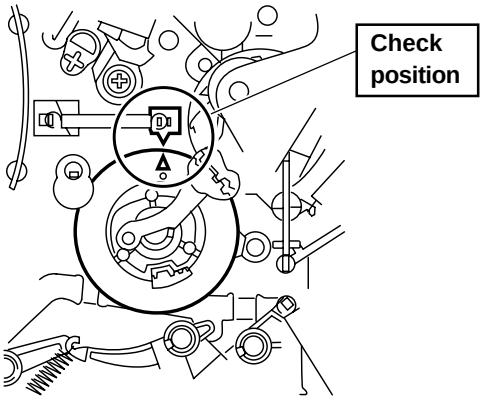


Fig. 1-1

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.

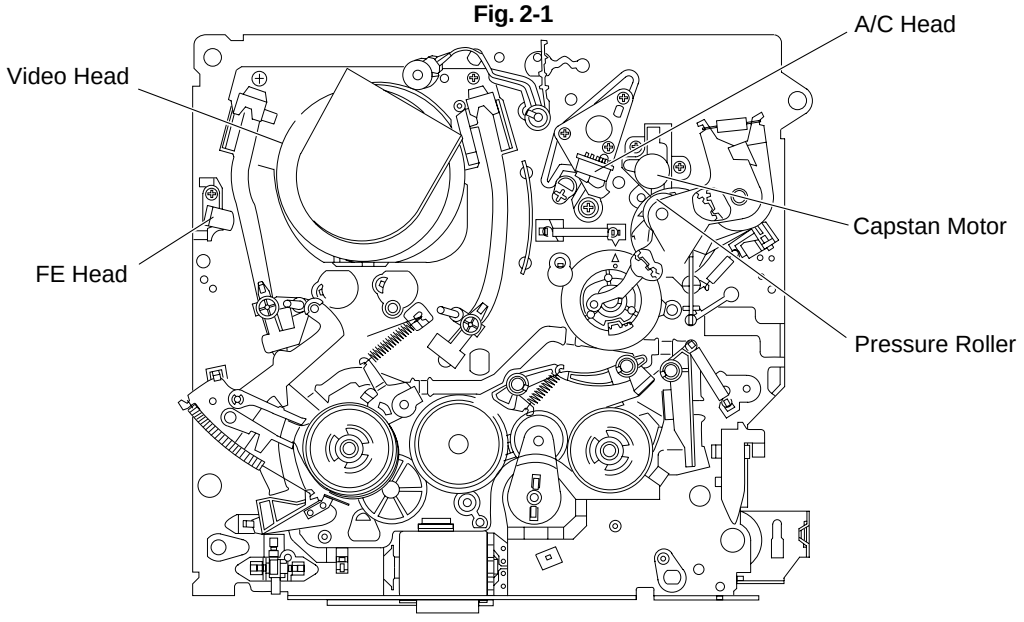
Caution: If the VCR cannot be restored after cleaning components marked"O"in the part replacement column, the component(s) may be degraded, and replacement is necessary.

Table 2-1

Inspection Locations

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.	Yes
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.	Yes
Tape does not run or is slack.	Dirt on pressure roller	Clean pressure roller and capstan shaft.	Yes

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

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.)

Caution: Do not use a dirty cleaning cloth to which oil, etc. adheres.

(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.

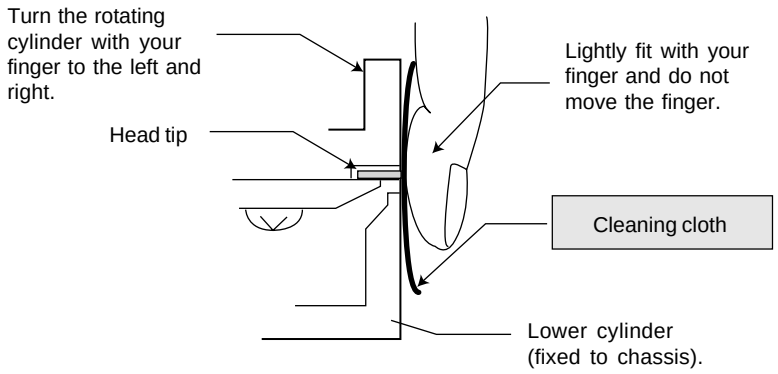


Fig. 2-2

2.6 Lubricating and greasing

(1) Lubricating guidelines

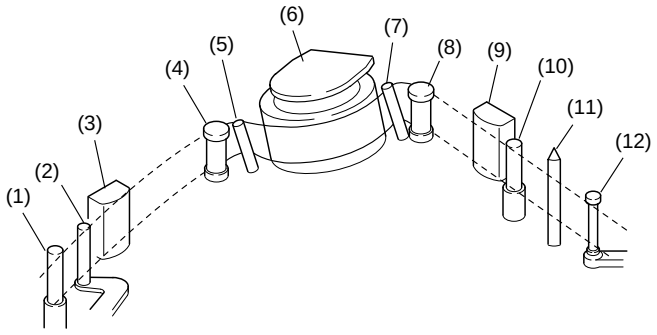
Use oiler to lubricate with one or two drops of Sonic Slidas oil. Make sure not to use too much oil: Oil may spill over and leak out, coming into contact with rotating components causing slippage or other problems. If too much oil is applied or oil leaks out, thoroughly wipe clean using gauze moistened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

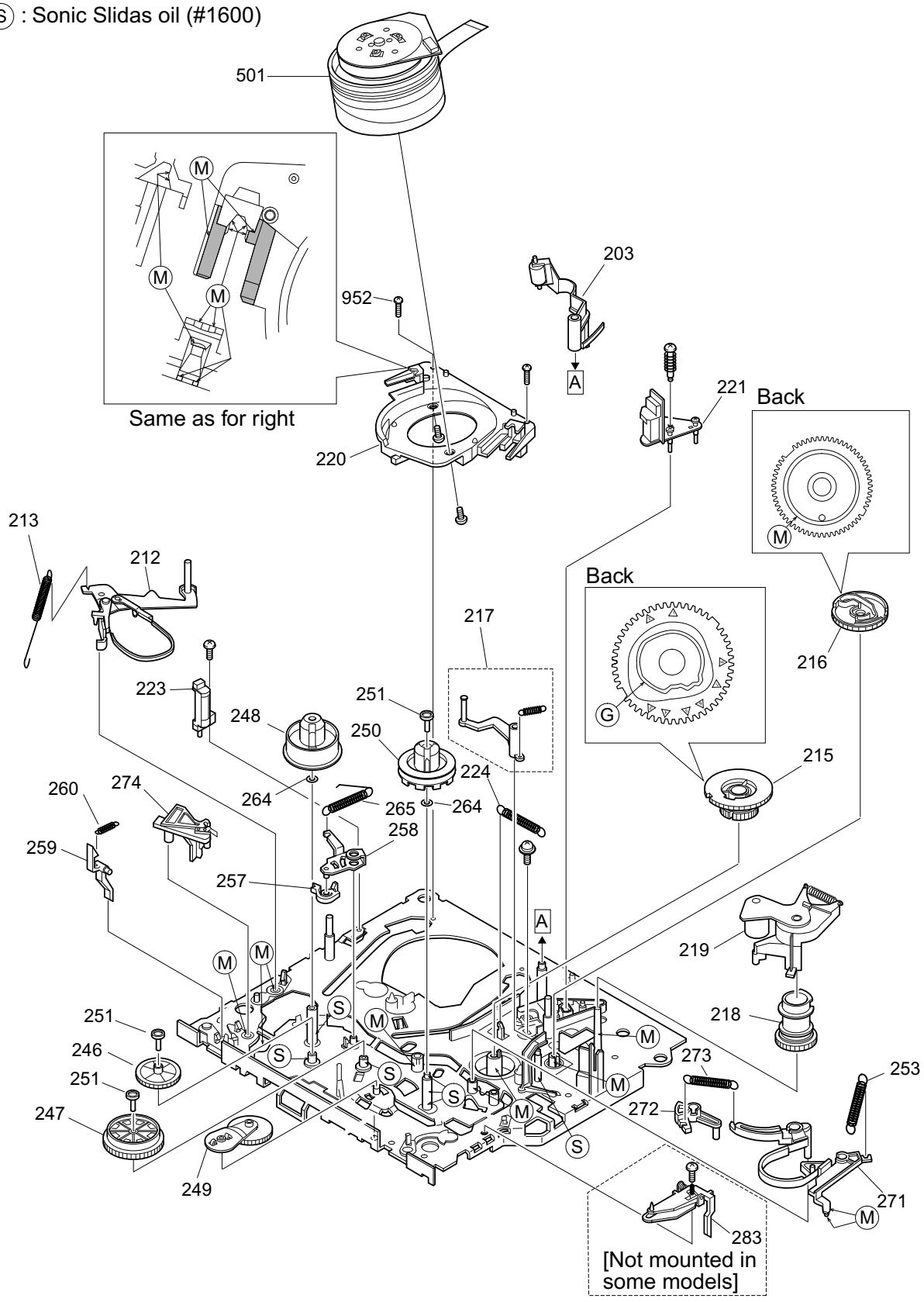
Table 2-2

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	
PR 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	
Jog gear	C	C/R	C	C/R	C
Supply slant pole	C	C	C	C	C
Take-up slant pole	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	
FS brake	C	C/R	C	C/R	C
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 PR arm		M		M	
G base assembly moving portions in chassis					M
Contact surface between cylinder base and G base assembly during loading					M

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

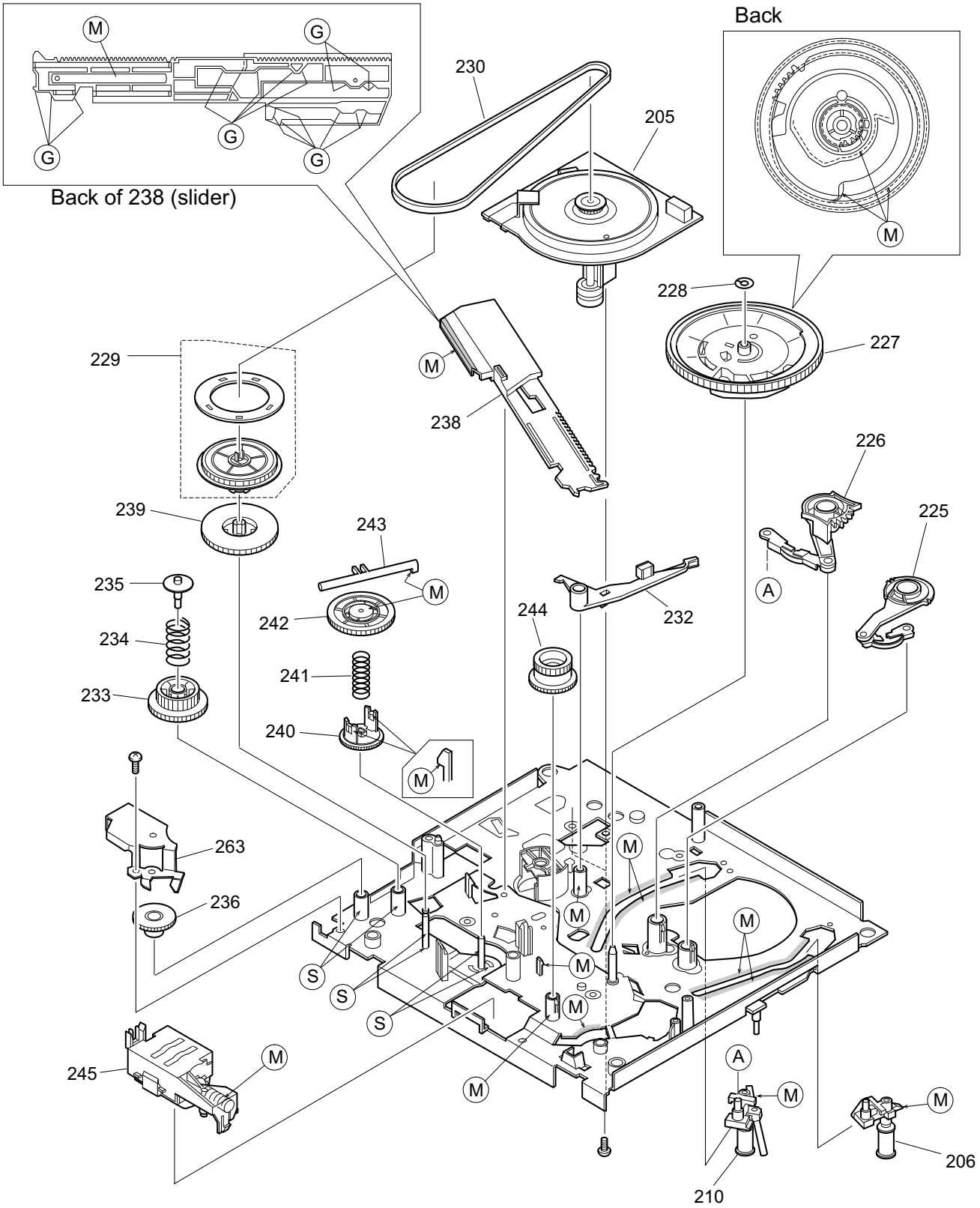
1. UT Mechanism [Top view]

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



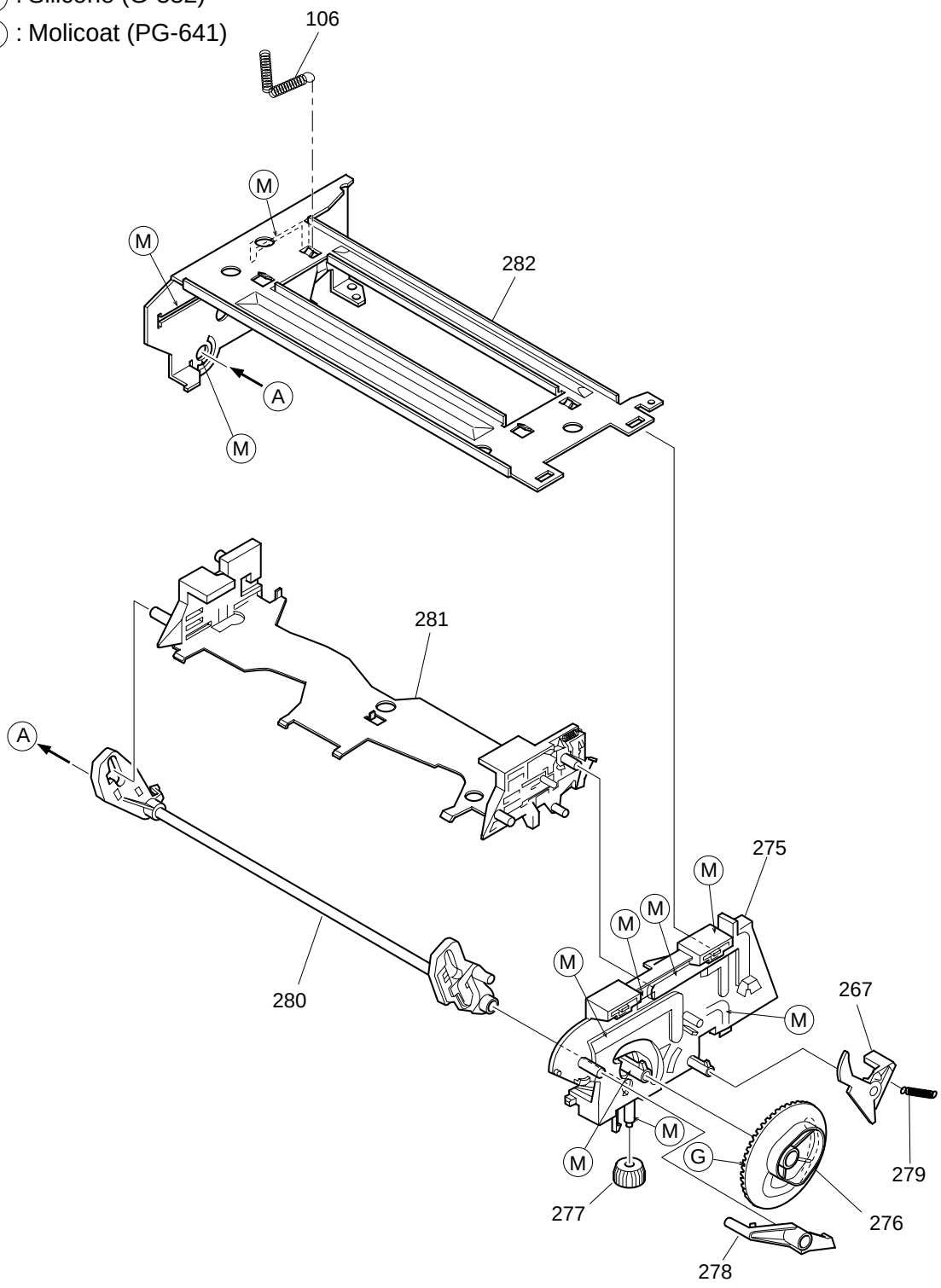
2. UT Mechanism [Bottom view]

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



3. UT-FL Mechanism

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



4. UT and UT-FL Mechanism Component Identifications

Index no.	Component
106	Sub spring
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	A/C 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
253	T brake spring
257	Jog gear
258	Jog arm
259	REC arm
260	PLAY spring
263	Base bracket
264	Washer
265	Jog spring
267	Switch arm
271	Tension band R
272	Operation arm L
273	Operation arm spring
274	Spring arm

Index no.	Component
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

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.

HITACHI

Hitachi, Ltd. Tokyo, Japan

International Sales Division
THE HITACHI ATAGO BUILDING,
No. 15 –12 Nishi Shinbashi, 2 – Chome,
Minato – Ku, Tokyo 105-8430, Japan.
Tel: 03 35022111

HITACHI HOME ELECTRONICS (EUROPE) LTD.
Dukes Meadow
Millboard Road
Bourne End
Buckinghamshire
SL8 5XF
UNITED KINGDOM
Tel: 01628 643000
Fax: 01628 643400
Email: consumer-service@hitachi-eu.com

HITACHI HOME ELECTRONICS (HELLAS) S. A.
Faliroy 91
11741
Athens
GREECE
Tel: 01-9242620
Fax: 01-9240789
Email: dimitra.vlachou@hitachi-eu.com

HITACHI SALES EUROPA GmbH.
Am Seesterns 18
40547 Dusseldorf
GERMANY
Tel: 02 11 – 5 29 15 – 0
Fax: 02 11 – 5 29 15 – 190
Email: HSE-DUS.Service@Hitachi-eu.com

HITACHI SALES IBERICA, S. A
Gran Via Carlos III,, 101 - 1
08028 Barcelona
SPAIN
Tel: 093 409 2550
Fax: 093 491 3513
Email: rplan@hitachi-eu-com

HITACHI SALES ITALIANA SPA
Via Gulli n.39
20147 MILAN
ITALY
Tel: 02 38073415
Fax: 02 48786381/2
Email: customerservice.italy@hitachi-eu.com

HITACHI HOME ELECTRONICS (NORDIC) AB
Box 77
S-164 94 KISTA
SWEDEN
Tel: 08 562 711 00
Fax: 08 562 711 11
Email: csgswe@hitachi-eu.com

HITACHI FRANCE S.A.
BP 45, 69671 Bron Cedex
FRANCE
Tel: 04 -72.14.29.70
Fax: 04 -72.14.29.99
Email: conso-hitachi@compuserve.com

HITACHI HOME ELECTRONICS NORWAY
Brugata 14
N-0186
OSLO
NORWAY
Tel: 02205 9060
Fax: 02205 9061
Email csgnor@hitachi-eu.com

ITEM N.V./S.A. (INTERNATIONAL TRADE FOR ELECTRONIC MATERIAL & MEDIA N.V./S.A)
UCO Tower – Bellevue,
17 – B – 9050 GENT
BELGIUM (for BENELUX)
Tel: 02 9 230 4801
Fax: 02 9 230 9680
Email: hitachi.item@skynet.be

SM 8107
November 2001