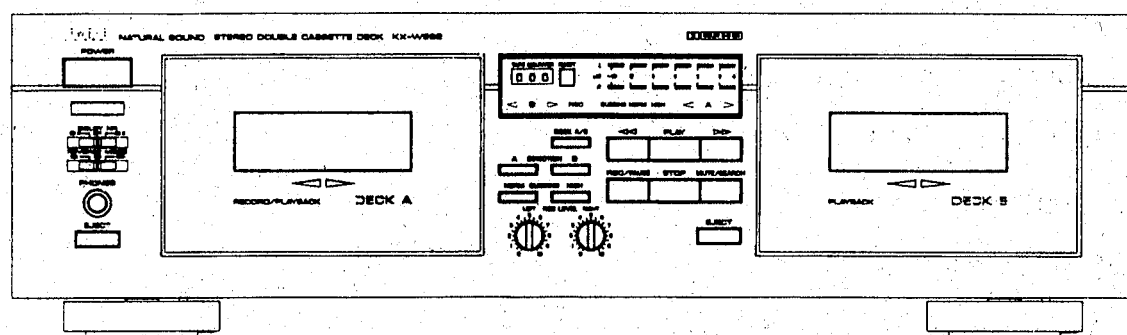


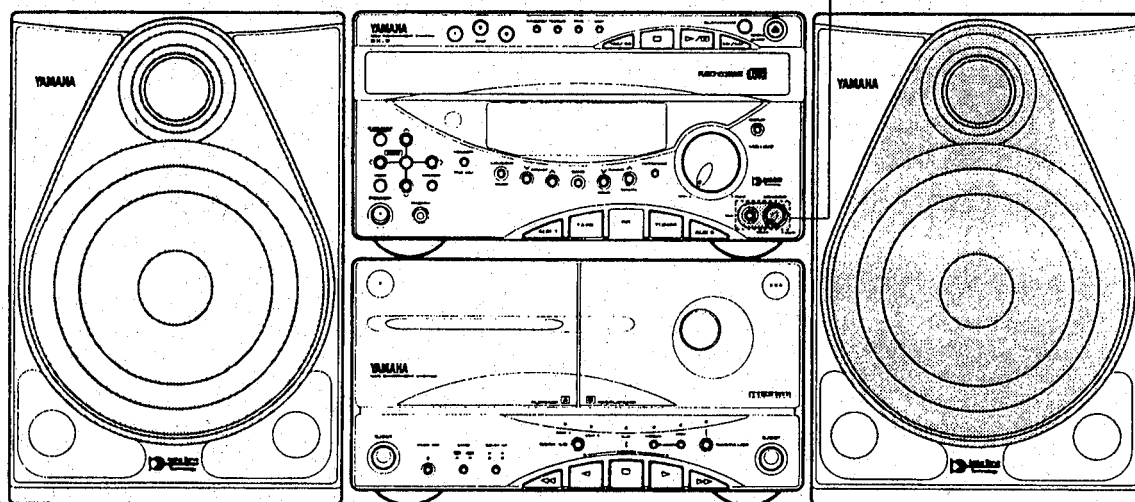
# OUTLINE OF CASSETTE MECHANISM OPERATION

## KX-W282/382/482/582 K-98 GX-5 KX-380

### TECHNICAL GUIDE



R, A, L models only



200025

# YAMAHA

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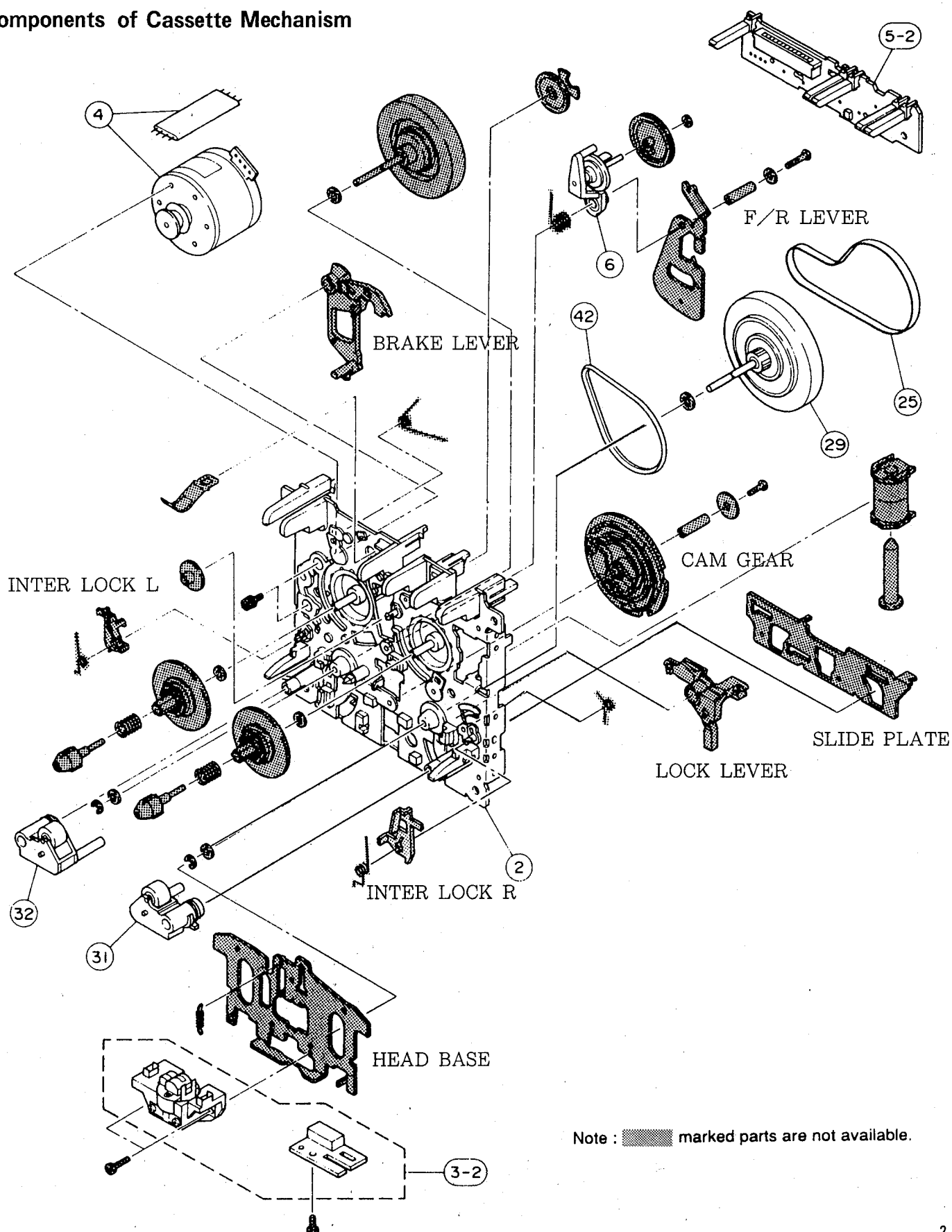
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# OUTLINE OF CASSETTE MECHANISM OPERATION

KX-W282/ 382/ 482/ 582 K-98 GX-5 KX-380

## Components of Cassette Mechanism



## Description of Cassette Mechanism Operation

### Applicable models

Type	Model	Part.No.	(DECK A)	Part.No.	(DECK B)
Double Cassette Reverse Play	KX-W282	VS906400	REC/PB	VR029800	PB
	KX-W382	VS906400	REC/PB	VR029800	PB
	KX-W482	VS906400	REC/PB	VS906400	REC/PB
	KX-W582	VS906400	REC/PB	VS906400	REC/PB
	K-98	VS906400	REC/PB	VR029800	PB
	GX-5	VR029800	PB	VS906400	REC/PB
Single Cassette One-Way	KX-380	VR029600	REC/PB	-----	-----

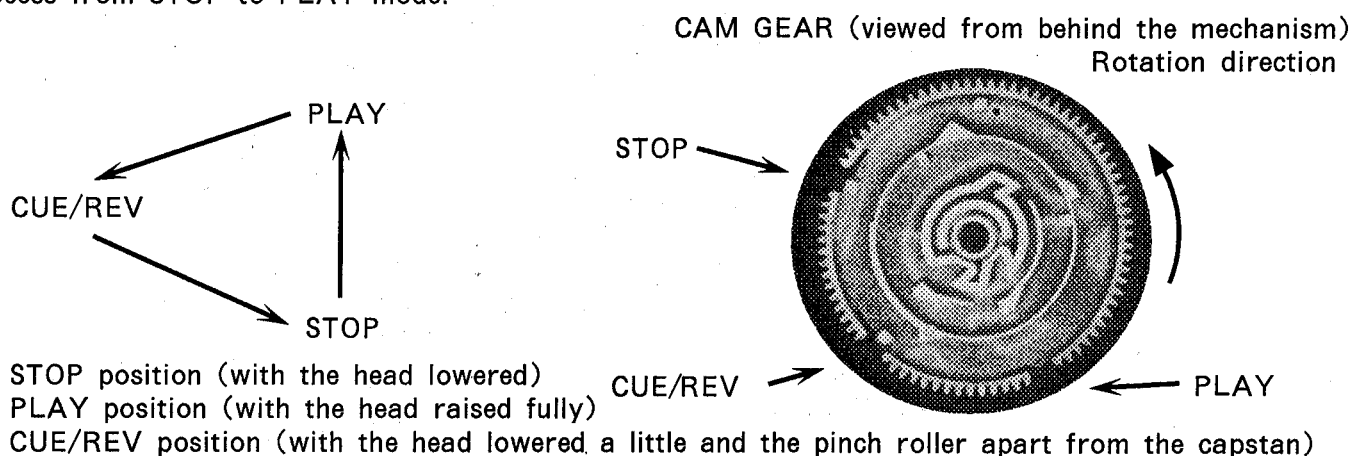
This cassette mechanism features one motor and one solenoid control of all operations for five functions as described below. Although the motor runs only in one direction at all times, forward/reverse play is possible by switching grooves in the cam gear. Each function is achieved as the cam gear located at the center of this cassette mechanism turns according to the plunger timing and moves the F/R lever, the slide plate and the head base. The cam gear has grooves in both sides. In each of these grooves, the F/R lever, the slide plate and the head base are engaged and thus their tracks differ depending on each operation mode.

### 1. Function

- 1. FORWARD PLAY/(REC)
- 2. REVERSE PLAY/(REC)
- 3. STOP
- 4. CUE
- 5. REVIEW

### 2. Operation

Within one rotation of the cam gear, 3 modes (STOP, PLAY and CUE/REVIEW) are included. The mode position shifts cyclically through the power assist operation provided as the solenoid trigger and flywheel cause the gear to rotate to the next open-toothed "blank" gear area. The reverse direction made for the head, the pinch roller and the reelbase is selected by switching the solenoid ON/OFF in the process from STOP to PLAY mode.



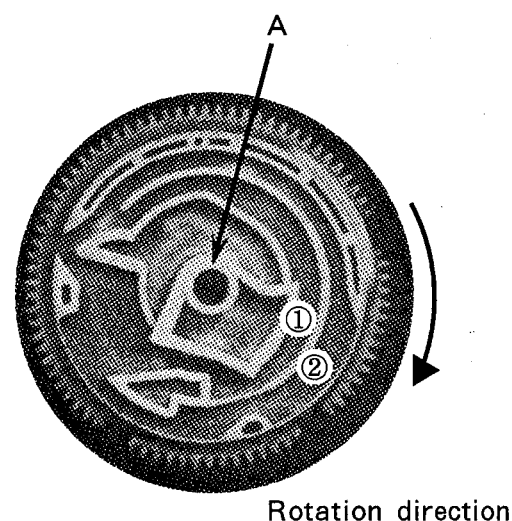
With the conventional cassette mechanism, the head is lowered during the fast forward and rewinding operation. With this mechanism, however, The head is in contact with the tape, that is, at the CUE/REVIEW position.

## Operation of Components

### ■CAM GEAR

Front of the mechanism

The section indicated as "A" in the figure controls the vertical movement of the head base. The movement of the rotary head in FWD or REV direction is switched by the pin of the slide plate which shifts into either of the two grooves. When the pin is shifted into the inner groove ①, the head will turn in the direction for REV PLAY and when in the outer groove ② in the direction for FWD PLAY. When the pin is in the small hole in the top section, the head will be at a stop position.

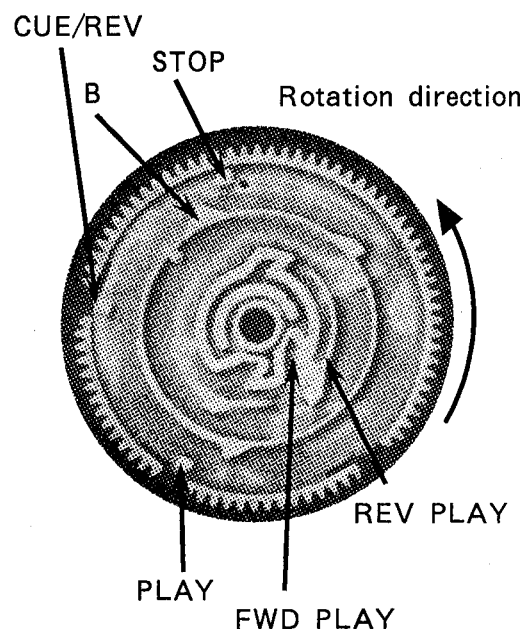


### Rear of the mechanism

3 square bosses are provided to lock the head at STOP, PLAY or CUE/REV position by the lock lever which is linked to the plunger.

Next, the F/R lever pin shifts into either of 2 grooves to select the winding direction of the reel base.

Also, the triangle shaped lug "B" is provided to force the cam gear to mesh with the flywheel gear when the head moves from the STOP position to the PLAY position. This is because cam gear to flywheel gear mesh does not occur in case of movement from the STOP position while in other modes. The cam gear turns by itself to be in mesh with the flywheel gear due to the spring force of the head base (front side), plus the pressing force of the pinch roller in case of movement from the PLAY position to the CUE position and due to the spring force of the head base (front side) in case of movement from the CUE position to the STOP position.

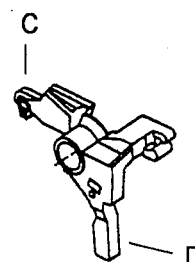


### ■LOCK LEVER

This lock lever is linked with the plunger and locks the cam gear securely at 3 square bosses for STOP, PLAY and CUE/REV positions.

Also, by locking the F/R lever with its tip "C" for a certain time, it selects the winding direction of the reel base.

At the same time, its lower end "D" serves as a trigger to rotate the rotary head by moving the slide plate.

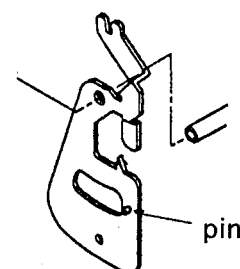


### ■F/R LEVER

This F/R lever is connected with the flywheel by the belt and normally pulled toward the center of the cam gear.

The pin located on the right side traces the groove in the cam gear.

It changes the winding direction of the reel base as it is locked by the lock lever for a certain time. When the triangle shaped lug is engaged with the cut in the lock lever, it winds the reel base on the REV side.

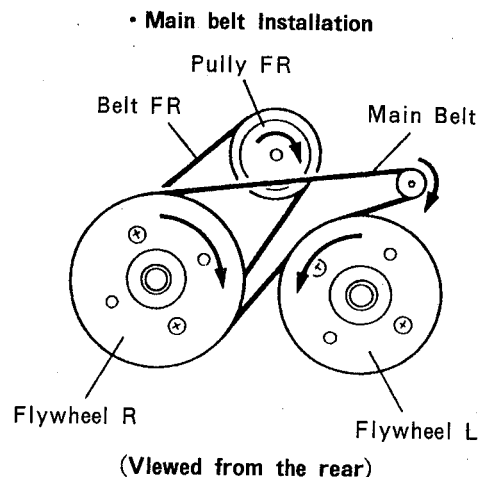


## ■ MAIN BELT & BELT F/R

Each belt is installed as shown at the right. The motor runs clockwise viewed from the rear. The lever F/R is connected to the pulley F/R and normally pulled toward the reel base on the forward side.

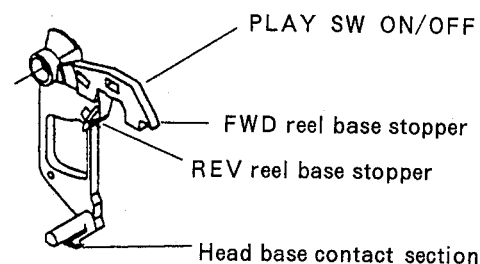
The pinch roller presses against the flywheel R during forward operation and against the flywheel L during reverse operation.

As the slide plate moves, the pinch roller contacts the shaft of the capstan with its spring in the forward or reverse direction caught by the head base.



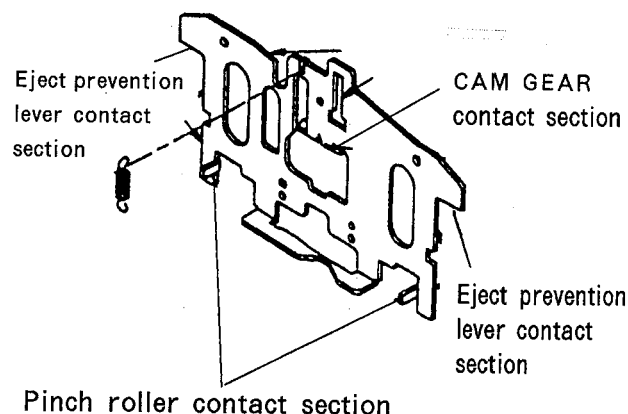
## ■ BRAKE LEVER

The brake lever forces the reel base on the forward and reverse sides to stop with the head base lowered and braking is canceled when the head base is raised. Also, its tip turns ON the PLAY switch installed to the control P.C.B.



## ■ HEAD BASE

The head base moves up and down according to the cam gear rotation. The lower bent part catches the spring of either right or left pinch roller to pull it up. The pinch roller selects either the right or the left according to the slide plate. The upper left part releases the brake lever. The eject prevention levers projected from both right and left sides to prevent ejection. In other words, if the head rises even a little, ejection will not take place.



## 3. Operation Control Matrix

INPUT MODE	STOP	F.PLAY	*R.PLAY	F.CUE	F.REVIEW	*R.CUE	*R.REVIEW
STOP	—	1	*2	3	4	*5	*6
F.PLAY	7	—	*7+2	9	7+4	*7+5	*7+6
*R.PLAY	*7	*7+1	—	*7+3	*7+4	*9	*10
CUE	8	8+1	*8+2	—	8+4	—	*8+6
REVIEW	8	8+1	*8+2	8+3	—	*8+5	—

Numerical figures represent the timing chart No. described in the following section. The mechanism condition when in the "PAUSE" mode is the same as that in the "STOP" mode.

Regardless of FWD or REVERSE setting, fast-forwarding in the forward direction occurs for "CUE" and in the reverse direction for "REVIEW".

Note) \*marked figures apply to the reverse type mechanism only and not to the one-way type (KX-380).

#### 4. Timing Chart

There are ten types of mechanism timings as in the previous table. As can be seen from the table, before every reverse mode operation, the mechanism enters the STOP mode where the directions of the head rotation as well as the reel base and the pinch roller are changed.

##### Abbreviation and Description

KEY IN :Key input in each mode

SOL :Solenoid which serves as a trigger

CPM :ON/OFF of capstan motor

MMS :Capstan motor speed change (double speed at "H" ). Always at "L" during mode change

PLAY SW :At "L" during PLAY or CUE/REW mode and at "H" during STOP mode

It is also used to initialize the mechanism and to detect malfunction. When the PLAY switch condition does not match the mode after shifting to each mode, the solenoid is pulled 8 times.

INHIBIT :During this period, starting to proceed to the next mode is inhibited as the mode is changed.

	1 STOP→F•PLAY	2 STOP→R•PLAY	3 STOP→F•CUE
KEY IN			
SOL			
CPM			
MMS			
PLAY SW			
INHIBIT			
	4 STOP→F•REV	5 STOP→R•CUE	6 STOP→R•REV
KEY IN			
SOL			
CPM			
MMS			
PLAY SW			
INHIBIT			
	7 PLAY→STOP	8 CUE•REV→STOP	9 F•PLAY→F•CUE/R•PLAY→R•CUE
KEY IN			
SOL			
CPM			
MMS			
PLAY SW			
INHIBIT			
	10 R•PLAY→R•REV		
KEY IN			
SOL			
CPM			
MMS			
PLAY SW			
INHIBIT			

## Troubleshooting

Malfunctions reported from the market so far are following two types.

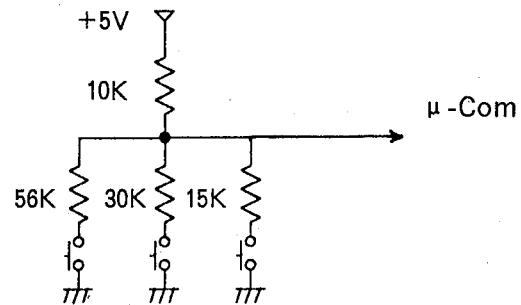
1. Malfunction of cassette detection switch
2. Jamming of cassette mechanism

### 1. Malfunction of cassette detection switch

6 to 3 switches on the control P.C.B which is installed to the cassette mechanism indicate high resistance value due to their poor contact and fail to operate properly. The signals from these switches undergo A/D input to the port of the microprocessor. The microprocessor detects not ON/OFF operation of each switch but the SW mode by the voltage value from combination of 3 switches.

Each switch to voltage value relation is as shown in the table below.

	PSA	RRA	CAA
	FRA	70A	META
	PSB	RRB	CAB
	FRB	70B	METB



	15K $\Omega$	30K $\Omega$	56K $\Omega$	Mix Resistance	Voltage	Threshold level
1	ON	ON	ON	8.48K $\Omega$	2.30V	.....2.52V
2	ON	ON	OFF	10.00K $\Omega$	* 2.50V	.....2.56V
3	ON	OFF	ON	11.83K $\Omega$	2.71V	.....2.85V
4	ON	OFF	OFF	15.00K $\Omega$	3.00V	.....3.14V
5	OFF	ON	ON	19.53K $\Omega$	3.31V	.....3.52V
6	OFF	ON	OFF	30.00K $\Omega$	3.75V	.....3.98V
7	OFF	OFF	ON	56.00K $\Omega$	4.24V	.....4.61V
8	OFF	OFF	OFF	$\infty$	5.00V	

\*Since such state as represented by items in No.2 does not exist actually, the voltage range for No.1 and No.3 is made wider.

PSA	:A DECK Play	PSB	:B DECK Play
RRA	:A DECK REV Record Inhibit	RRB	:B DECK REV Record Inhibit
CAA	:A DECK Cass, In	CAB	:B DECK Cass, In
FRA	:A DECK FWD Record Inhibit	FRB	:B DECK FWD Record Inhibit
70A	:A DECK CrO2 Tape	70B	:B DECK CrO2 Tape
META	:A DECK Metal Tape	METB	:B DECK Metal Tape

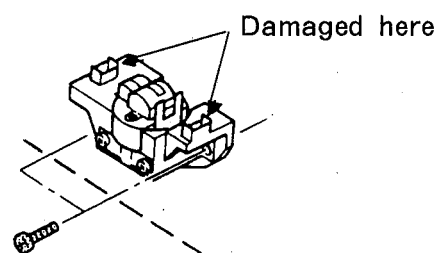
All switches other than the PLAY switch use a carbon contact. The normal value for the carbon contact is 30 ohms to 50 ohms while the resistance value of the PLAY switch is nearly 0 ohms. Faulty switches indicate a vary unstable resistance as much as 100 ohms to some K ohms. Also, note that an analog tester, if used for resistance measurement, may indicate lower values. As can be seen from the above table, even when the record inhibit switch contacts improperly, it is considered as cassette tape IN not being detected, and the mechanism will stop. The symptom is from each DETECTION switch and occurs from time to time as the switch experiences poor contact. Once the mechanism has stopped during PLAY or REC PLAY mode, however, it will not resume PLAY operation. Also, malfunction in chrome or metal tape detection will affect sound production adversely.



## 2. Jamming of Cassette Mechanism

When the head hits against the cassette shell and the mechanism gets locked, the head base remains at the raised position and the tape cannot be ejected. At this time, the microprocessor detects the condition of the PLAY switch of the cassette mechanism and the operation mode and starts initialization operation. As the solenoid of the cassette mechanism is pulled 8 times, the lock lever moves to allow the cam gear to turn. Should the normal operation not be resumed even after initialization, the microprocessor judges that there is an abnormality in the cassette mechanism and will not accept any key input. As the microprocessor saves this abnormality in the cassette mechanism in memory, mechanism initialization will not take place even if the POWER switch of the main unit is turned OFF and ON. In order to initialize the mechanism again, unplug the power cord and then plug it in again. There may be cases where the mechanism is locked and the cam gear would not move at all. In such case, forcing to unload the cassette tape will cause serious damage to the critical components of the cassette mechanism. In most cases, the cassette tape unloaded by force will have the plastic part of the tape guide in the head section broken.

In addition, the plastic groove in the cam gear can be scraped off or the pin of the slide plate, F/R lever and the head base can be bent. The following section describes how to remove the cassette tape when the head hits against the cassette shell and the mechanism is locked.



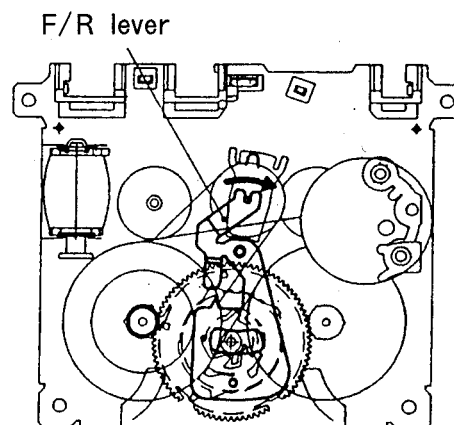
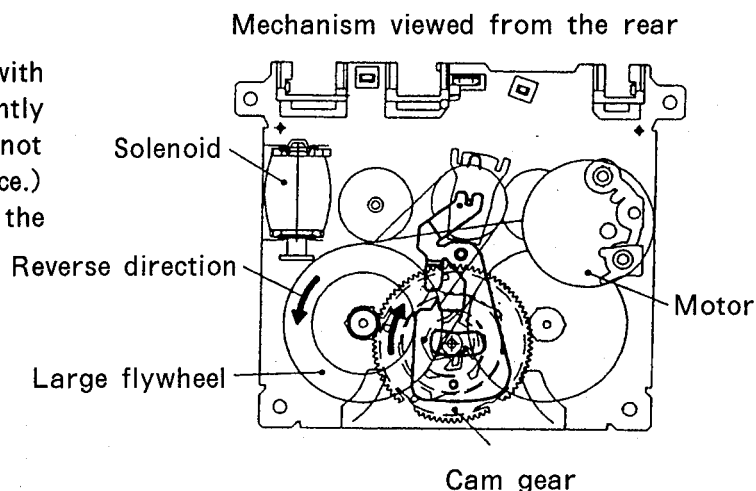
## ■ Removal of Cassette Tape in a of Locked Tape Mechanism

### Procedure

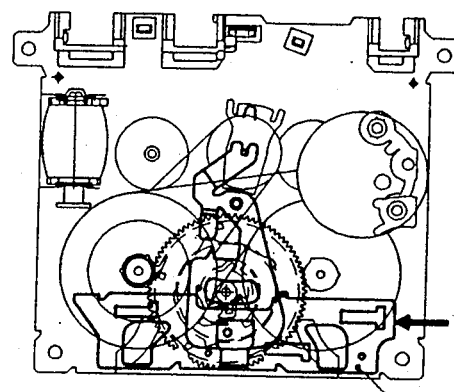
(1) Turn the flywheel in the reverse direction with a finger very lightly. (If the head is in tightly contact with the cassette shell, the flywheel cannot be turned in the normal direction with a light force.) At the same time the cam gear will turn in the reverse direction.

(2) While turning in the reverse direction, there is a point where the flywheel is caught and cannot be turned any further. At this point, move the F/R lever in the arrow direction as shown in the figure lightly with a finger. If it is hard to move, turn the flywheel a little in the normal direction, and it will move easily again.

If the flywheel is turned in the reverse direction with the F/R lever moved lightly in the arrow direction, the flywheel will be turned more in the reverse direction without being caught. If the flywheel is caught even after moving the F/R lever in the arrow direction lightly with a finger, proceed to Step(3).



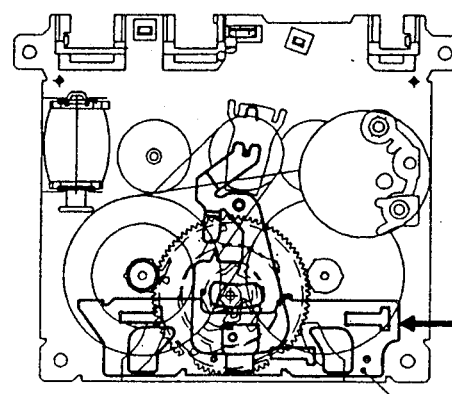
(3) Again there is a point where the flywheel cannot be turned in the reverse direction. At this point, move the slide plate in the arrow direction shown in the figure lightly with a finger. If it is hard to move, turn the flywheel a little in the normal direction, and it will move easily again. If the flywheel is turned in the reverse direction with the slide plate moved lightly in the arrow direction, the flywheel will be turned more in the reverse direction without being caught.



Slide plate

(4) Then again, there is a point where the flywheel is caught and prevented from turning in the reverse direction but by that time, the head has been lowered enough to allow the cassette tape to be unloaded.

If the flywheel is turned further in the reverse direction with the slide plate moved in the arrow direction lightly with a finger, the flywheel will not be caught and will be turned more in the reverse direction. However, as the cam gear has turned in the reverse direction as far as the open-toothed "blank" gear, the cam gear will not turn in the reverse direction any further even when the flywheel is turned in the reverse direction.



Slide plate

The point where the mechanism is unlocked varies depending on the cam gear position but as pins of the F/R lever and the slide plate are fitted in grooves in the cam gear respectively, it can be adjusted by moving the F/R lever and the slide plate at the point where the flywheel is caught.

In short, the procedure consists of following 3 actions.

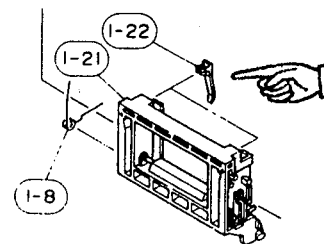
1. To turn the flywheel in the reverse direction
2. To move the F/R lever to the right, looking at it from the rear
3. To move the slide plate to the left, looking at it from the rear

In each action, it is important not to apply force more than necessary.

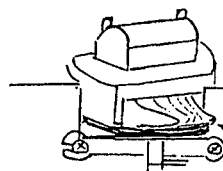
## Cause for jamming of mechanism

In most cases, jamming occurred with the reverse type caused by the rotary head which failed to turn smoothly. Specific causes confirmed so far are as listed below.

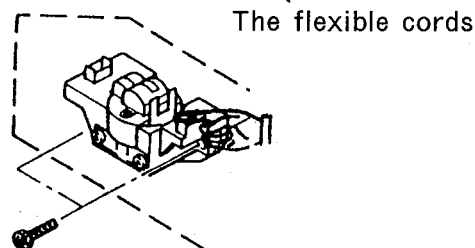
1. The cassette guide is not installed.



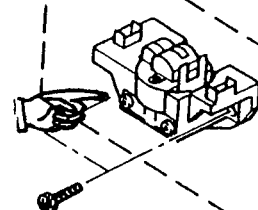
2. The flexible cords are out of the rotary head.



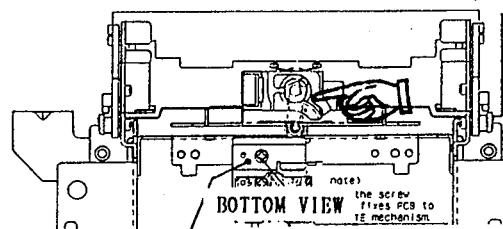
3. A foreign object has entered the rotary head.



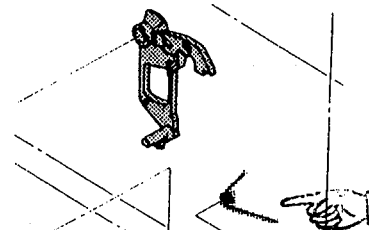
4. Thread lock agent is on the rotary head.



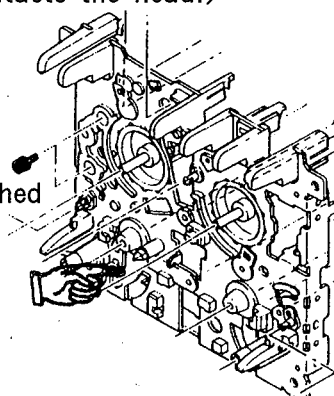
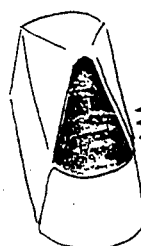
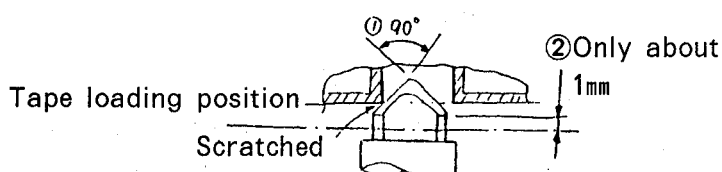
5. The rotary spring in the rotary head is deformed.



6. The spring of the brake lever has come off.

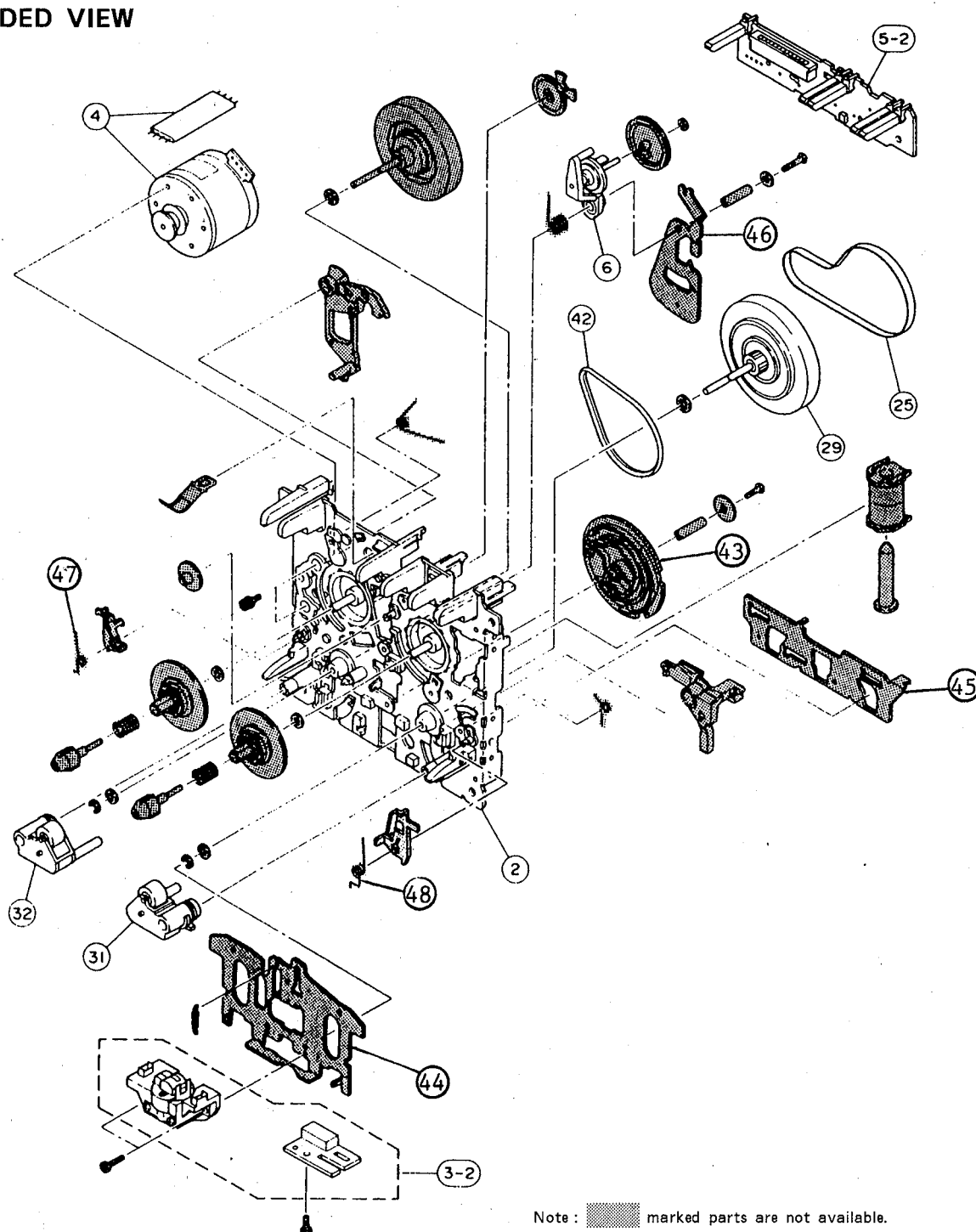


7. The guide pin for tape installation is in poor shape. In the worst case, the slanted face of the guide pin is scratched and jamming is easy to occur. (When the cassette tape is loaded, the tape goes over the slanted face of the guide pin, becomes loose by 1mm in the housing and contacts the head.)



It has been decided to supply those parts that may be damaged from jamming of the cassette mechanism as spare parts.

## EXPLODED VIEW



Note: [hatched box] marked parts are not available.

Ref.No	Part No.	Description	Remarks
43	CX677140	CAM GEAR	FD52Y-20
44	AX622240	HEAD BASE	FC61K-18
45	AX622210	PLATE SLIDE	FC61L-17
46	CX677130	LEVER F/R	FC62G-12
47	AX622220	SP INTER LOCK L	FK32N-11
48	AX622230	SP INTER LOCK R	FK32P-11