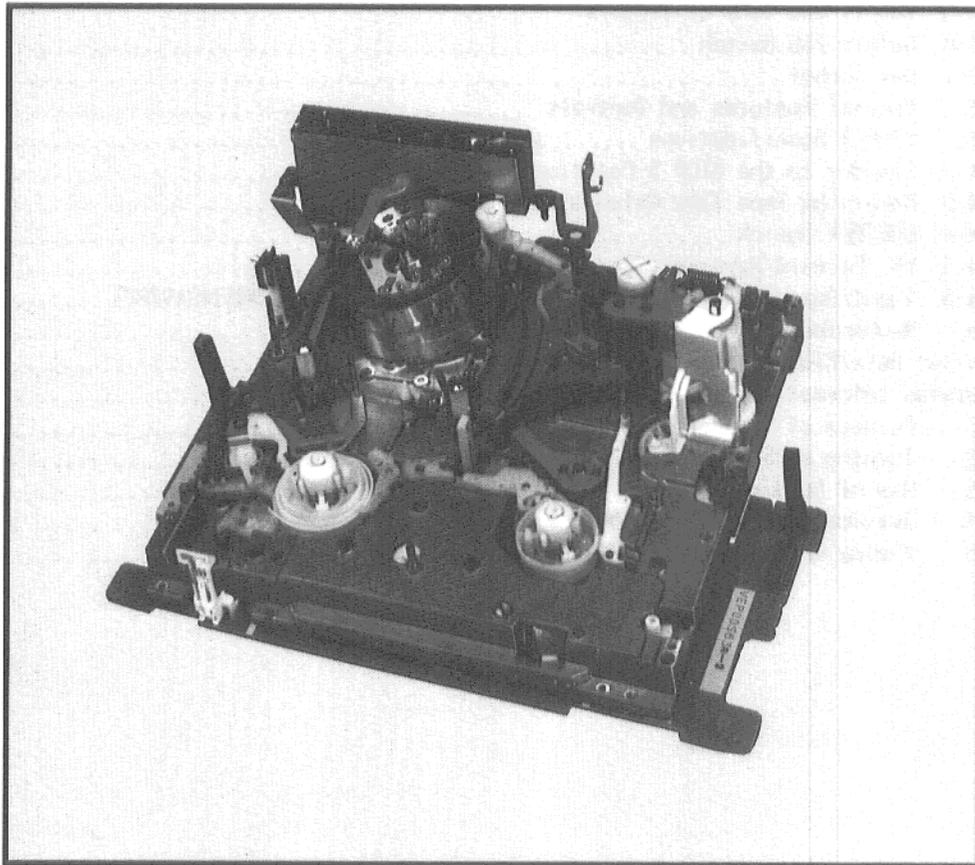


Training Manual

VHS Video Cassette Recorder

K-MECHANISM CHASSIS



INTRODUCTION

The K-Mechanism chassis are built in several Panasonic VHS Video Cassette Recorders from NV-SD series in 1992.

Panasonic

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1. Outline of the K Mechanism

This mechanism maintains the high performance of the G2 mechanism but with a great decrease the quantity of mounted parts, 40% less than the G2.

(1) Parts Reduction

<K Mechanism>

- Reduction in the number of drive mechanisms through the use of a single motor to perform front loading and unit loading.
- Direct drive of the brakes and loading gears with the multi-function main lever.
- Elimination of sub-levers and solenoids.

<Front Loading Unit>

- Tape end/beginning detector LED is utilized, instead of a slide switch, to reduce the wiring.
- Elimination or combining joint parts.
- Smaller and thinner top plate and rack.

Mechanical Types	Number of G Mech. parts	Number of G2 Mech. parts	Number of K Mech. parts	Ratio with G Mech.	Ratio with G2 Mech.
Total Number	398	445	266	-33.1%	-40.2%

(2) No adjustment of the following is required:

- * take-up reel incline position
- * P5 post height

(3) Reduced Gear Phase Position Alignments

The K mechanism has only 6 gear phase alignment positions and the G mechanism has 12 gear phase alignment positions.

1-1. Operation of the K Mechanism

The K mechanism has two motors, the loading motor and the capstan motor. The loading motor operates the front loading/unloading and posts loading/unloading. The capstan motor operates each mode. The bottom C.B.A. connects the mechanism to the

system control circuit. On the C.B.A. there are take-up and Supply photosensors, Sensor LED, Mode Switch Connector, Safety Tab Switch, Supply and Take-up Reel Sensors and Loading Motor Connector.

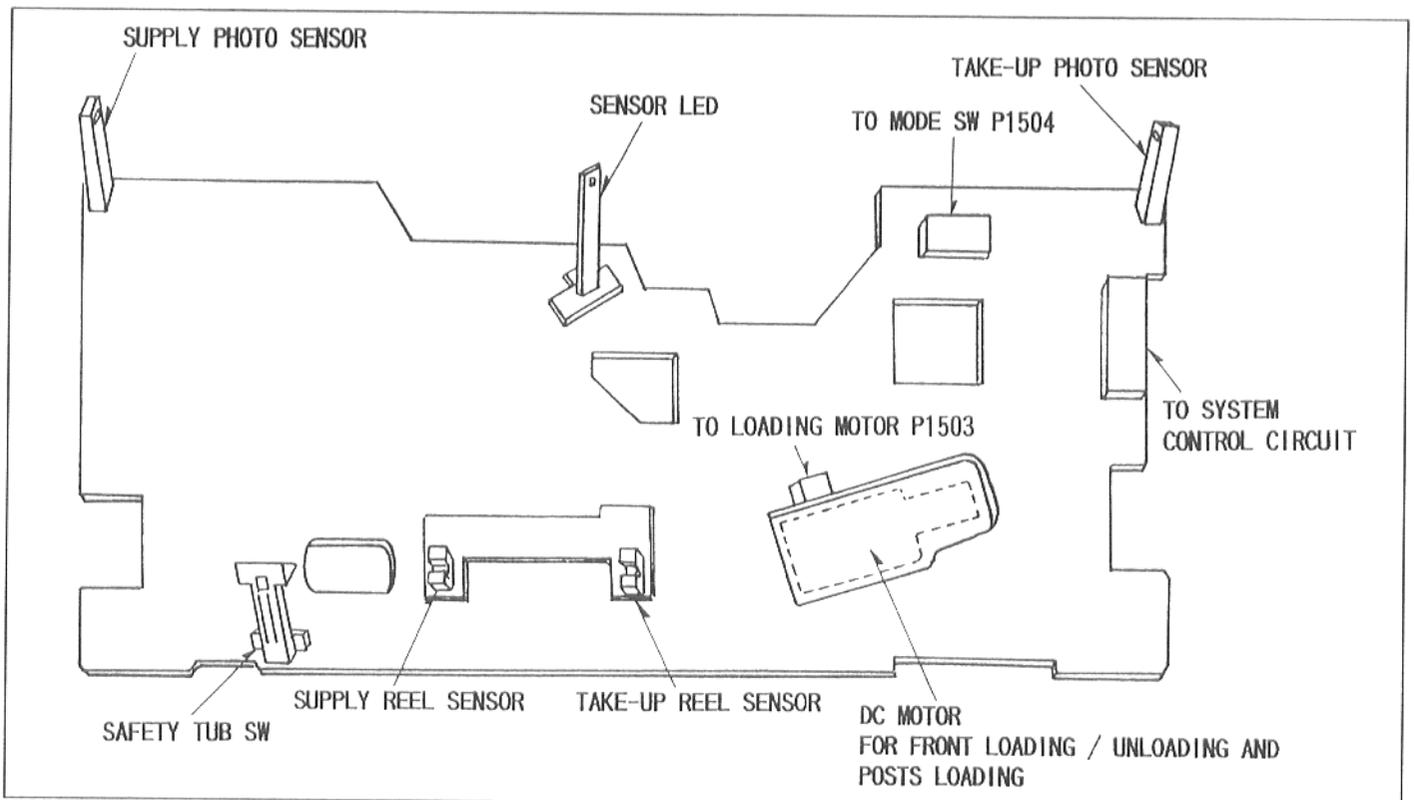


Fig. M1 Bottom C.B.A.

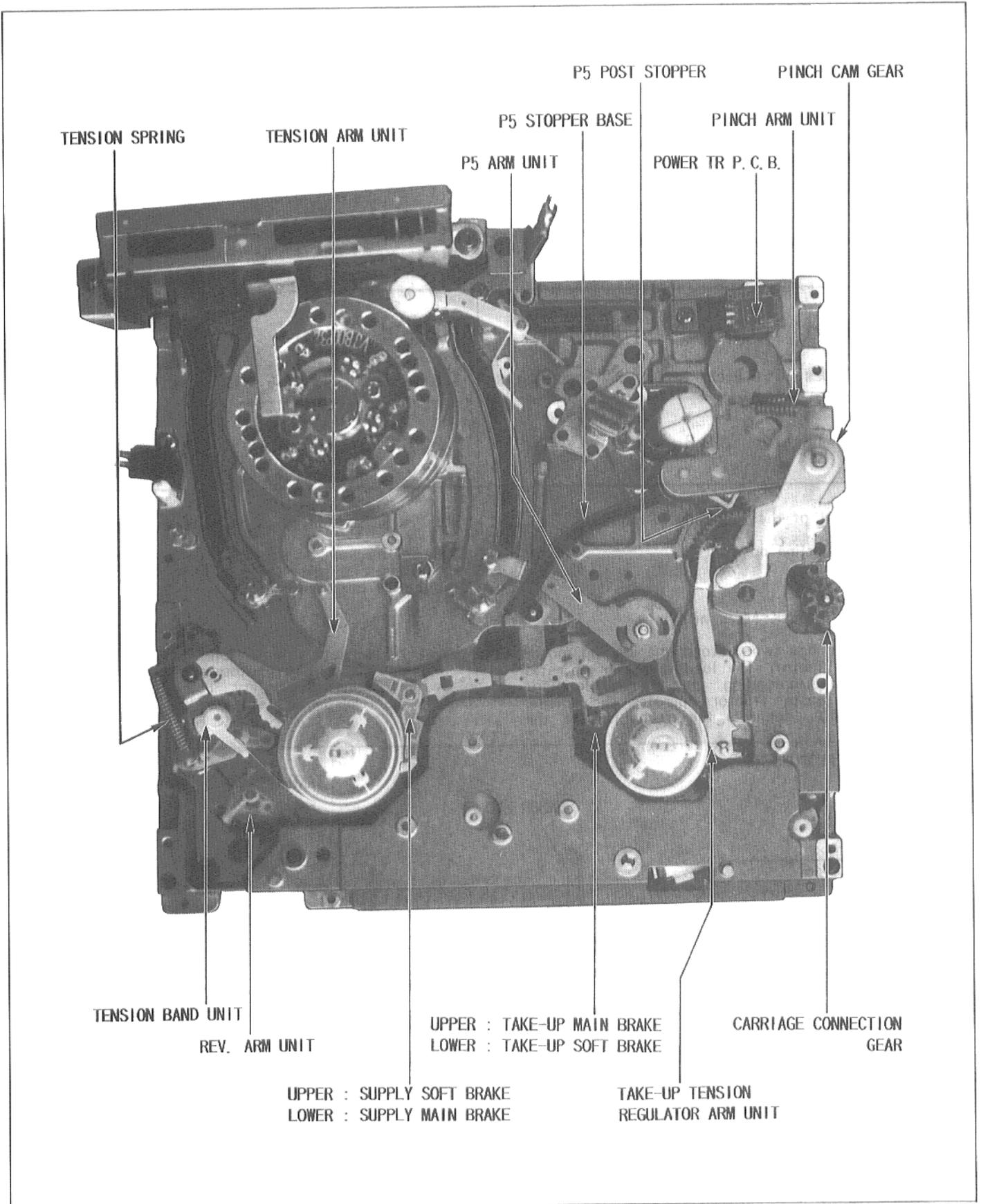


Fig. M2 Top View of K Mechanism

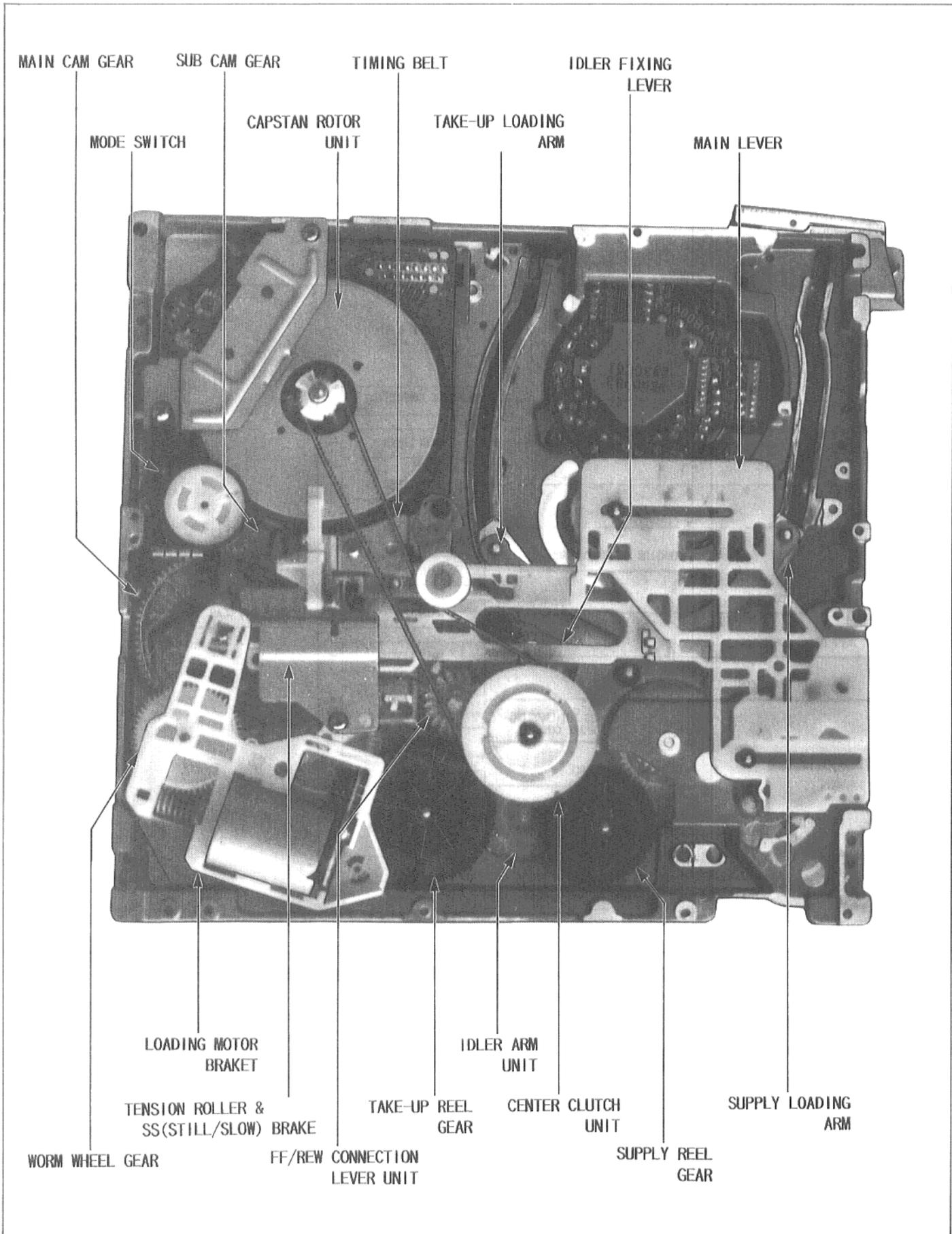


Fig. M3 Bottom View of K Mechanism

1-1-2. Loading Motor Mechanism Movement

(1) Mechanism Control for each mode.

<Example>

When a cassette is inserted into the cassette carriage, the loading motor performs the Cassette Down, Tension Arm, Soft Brake, Main Brake controls. At this time, the drive power of each control is applied as follows,

- (1) Cassette Down operation ← Carriage Connection Gear ← Main Cam Gear
- (2) Tension Arm operation ← Main Lever ← Main Cam Gear
- (3) Soft Brake applied ← Main Lever ← Main Cam Gear
- (4) Main Brake applied ← Main Lever ← Main Cam Gear

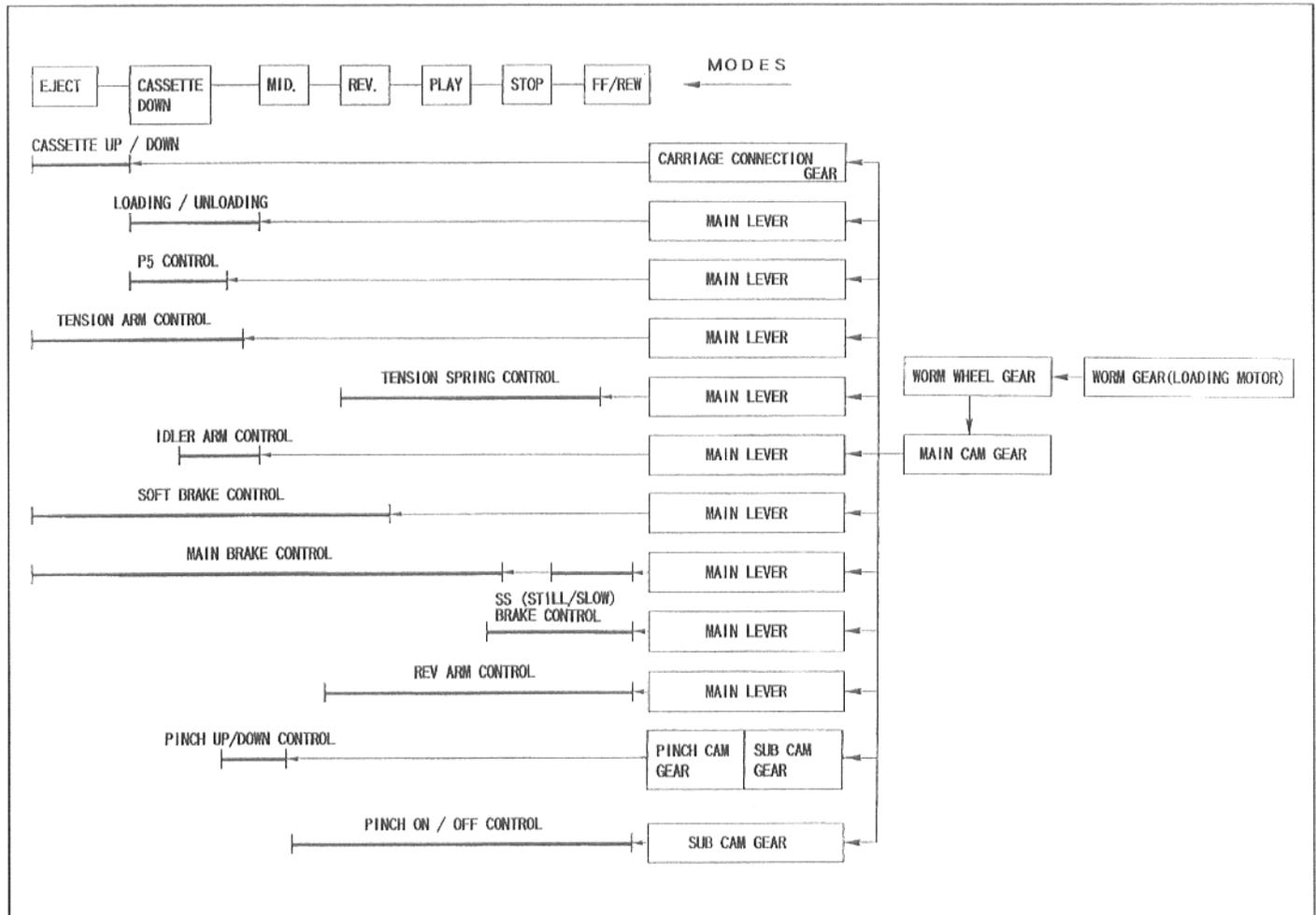


Fig. M4 Transmission Rout of Gears in each Mode

<Detail Mode Operation>

- a) MID Loading/Unloading operation
- b) REV 1) REV 2) REV SLOW
- c) PLAY 1) PLAY 2) CUE 3) STILL
4) FWD SLOW 5) STOP 3
6) REC 7) PAUSE

NOTE:

STOP3 is the position where the Pinch Roller is on the capstan motor shaft.

- d) STOP The Pinch Roller is off the capstan motor shaft.

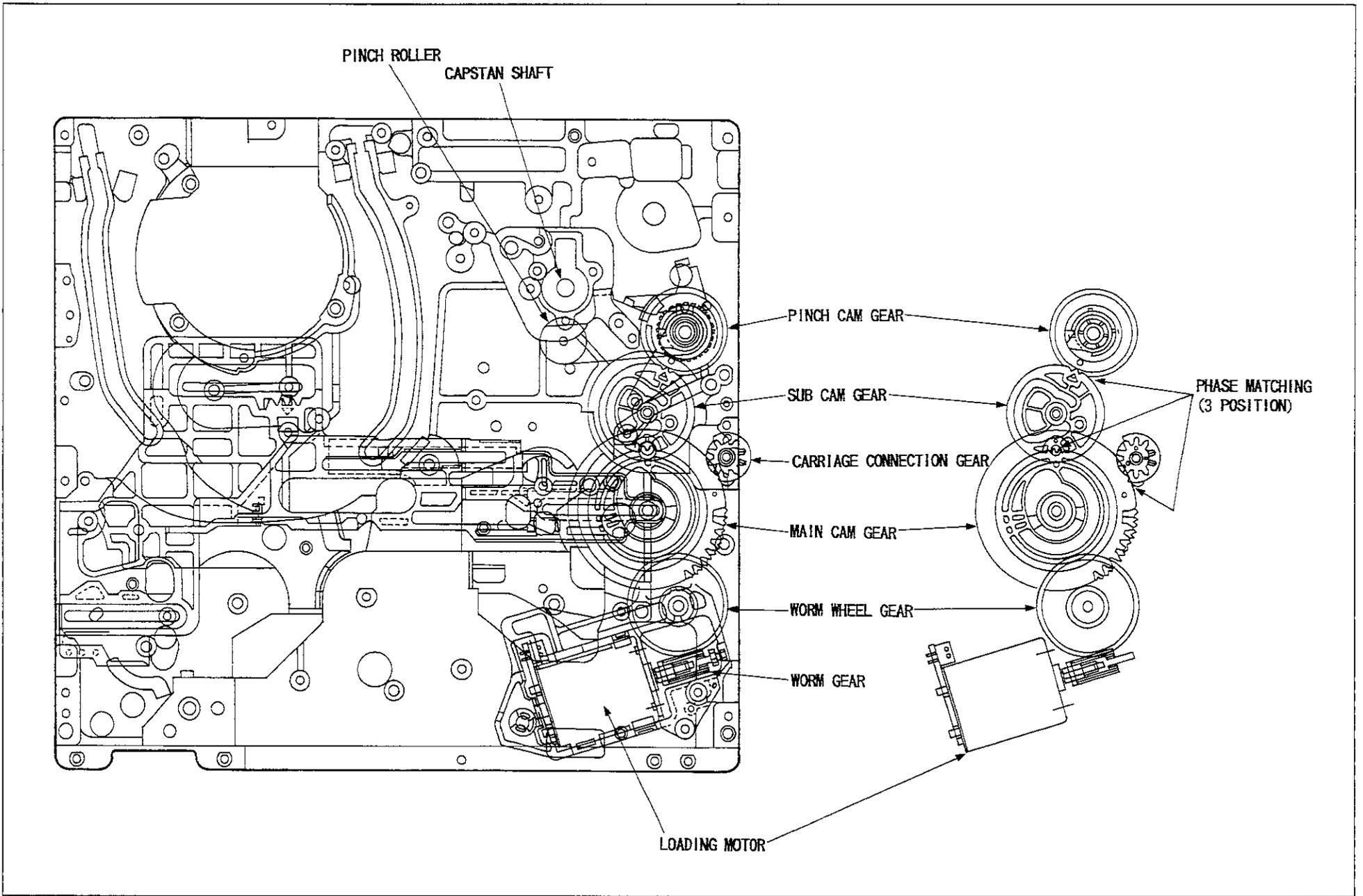


Fig. M5 Top View of Components Location

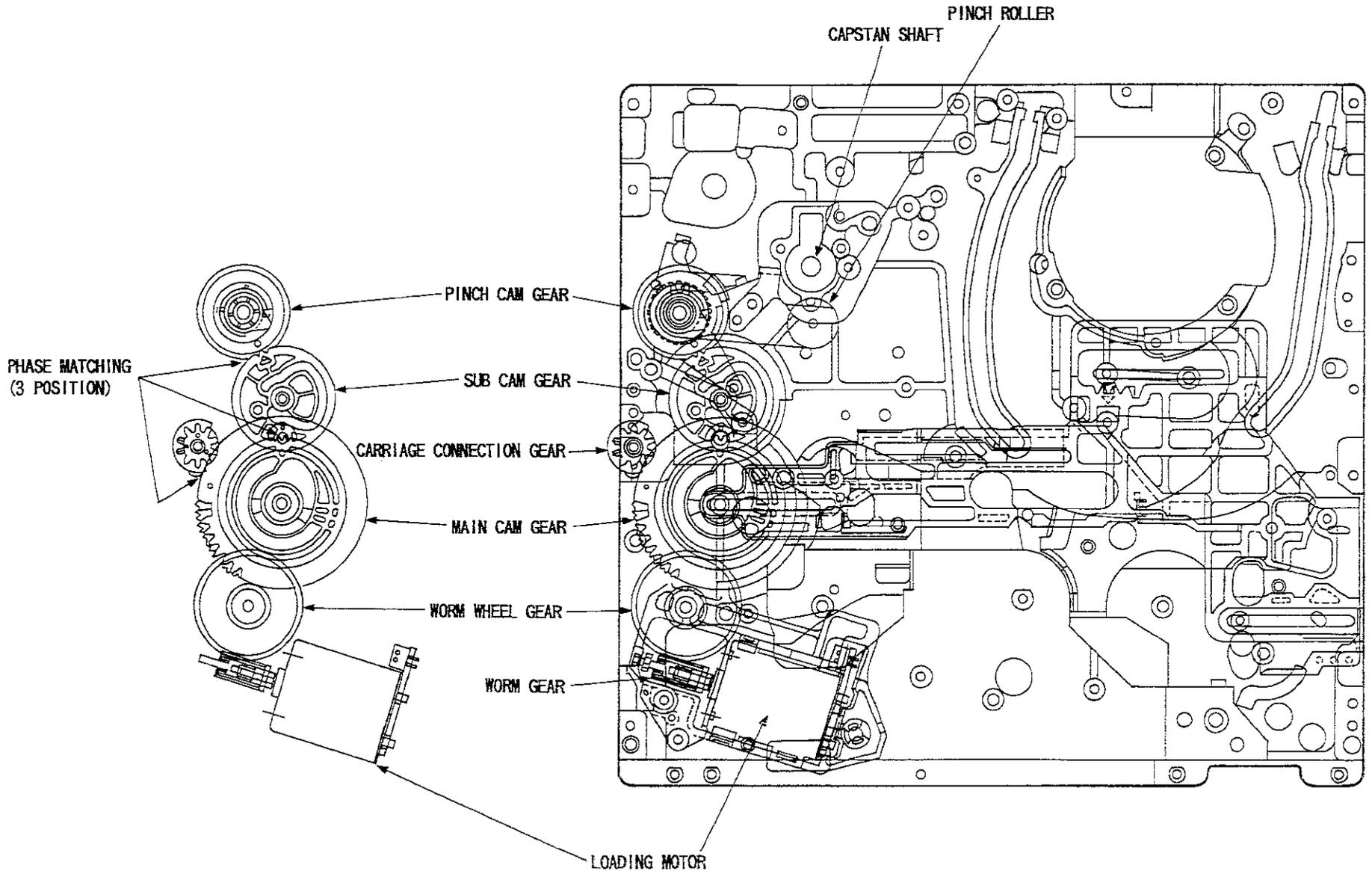


Fig. M6 Bottom View of Components Location

(2) Posts and Main Lever Positions.

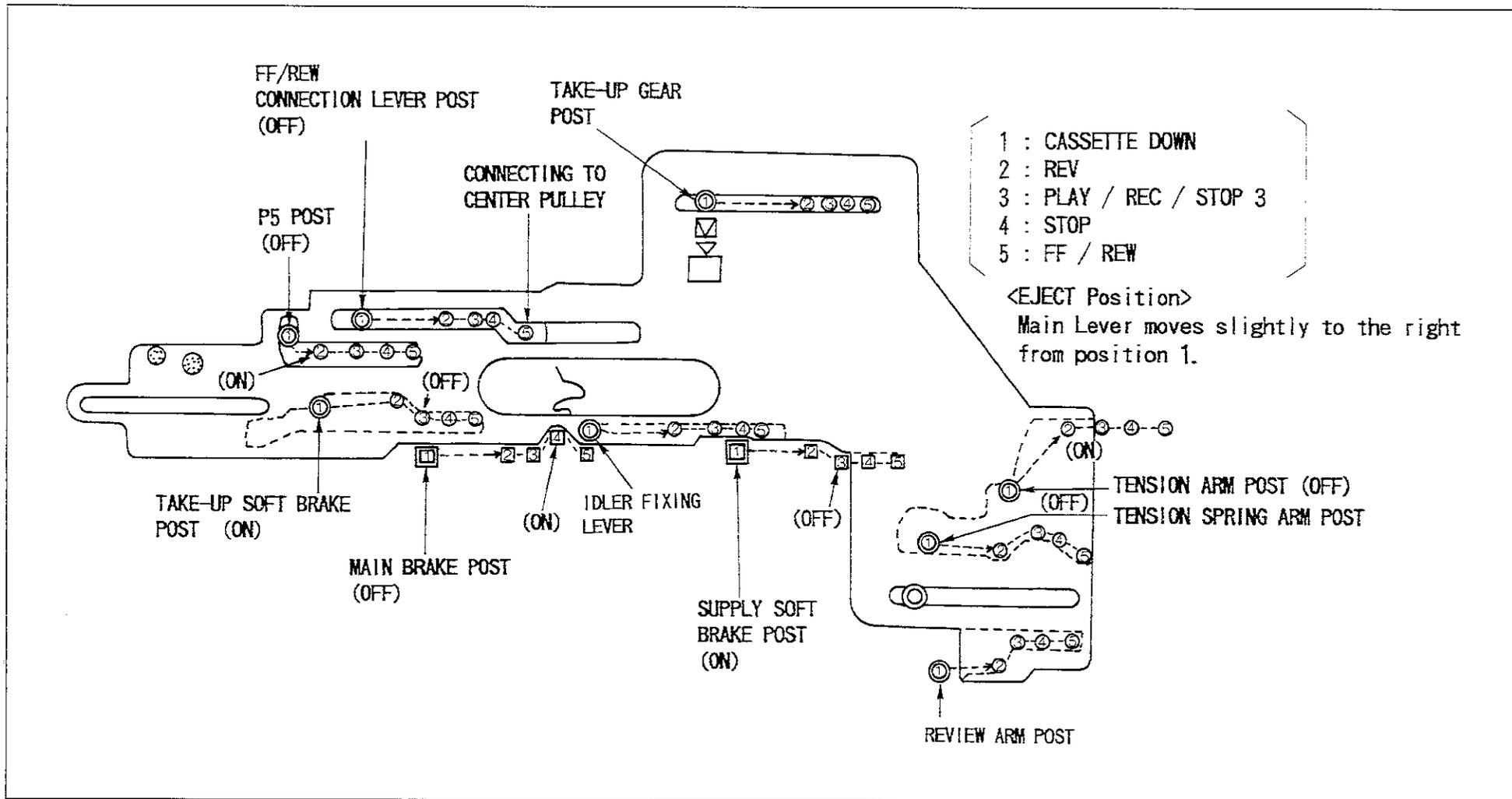


Fig. M7 Post and Main Lever Position in each Mode

1-1-3. Capstan Motor Mechanism Movement

There are 4 routes which drive power is transmitted from the capstan motor to the gears to perform mode operations as shown below.

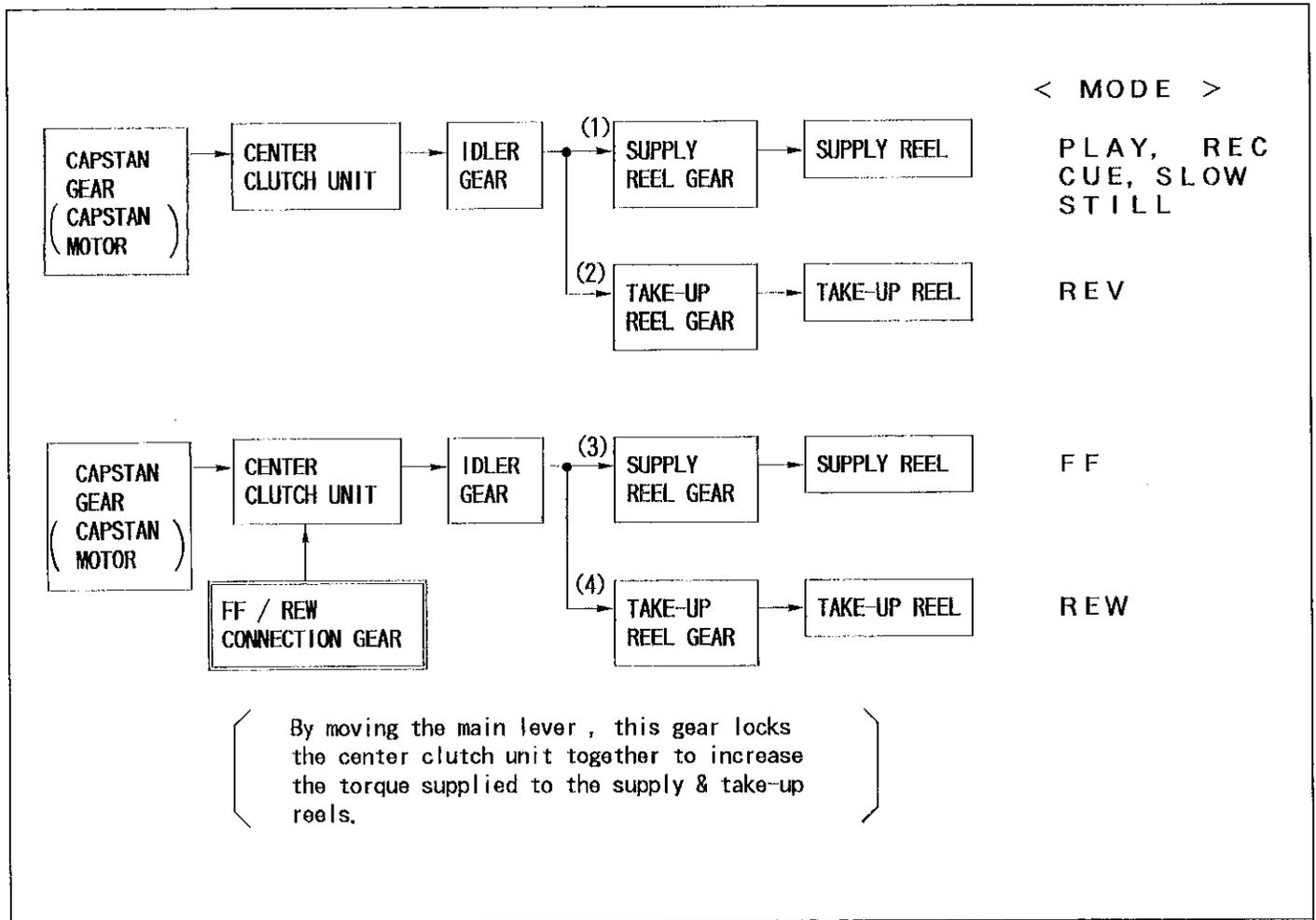


Fig. M8 Transmission Route of Gears in each Mode

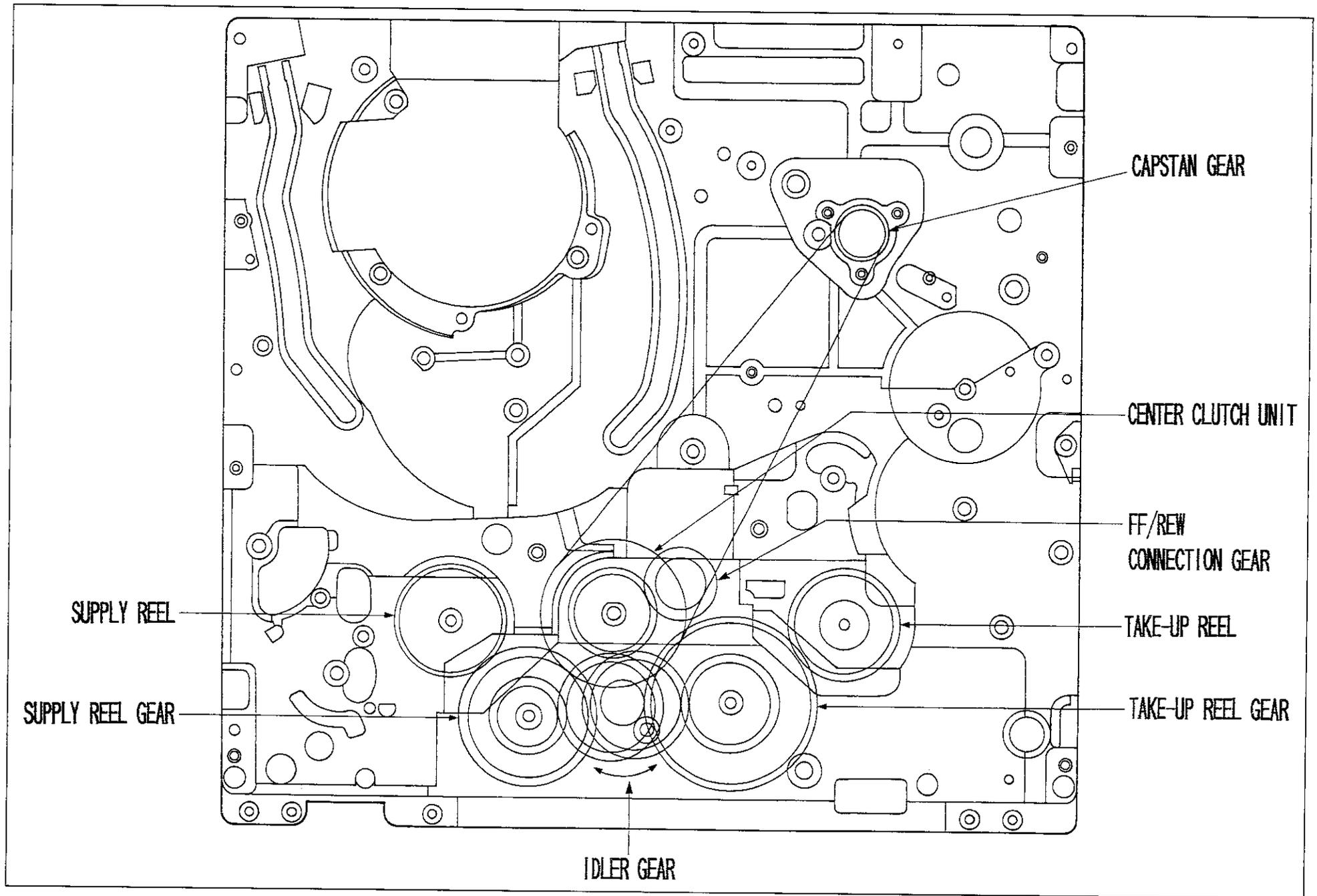


Fig. M9 Top View of Components Location

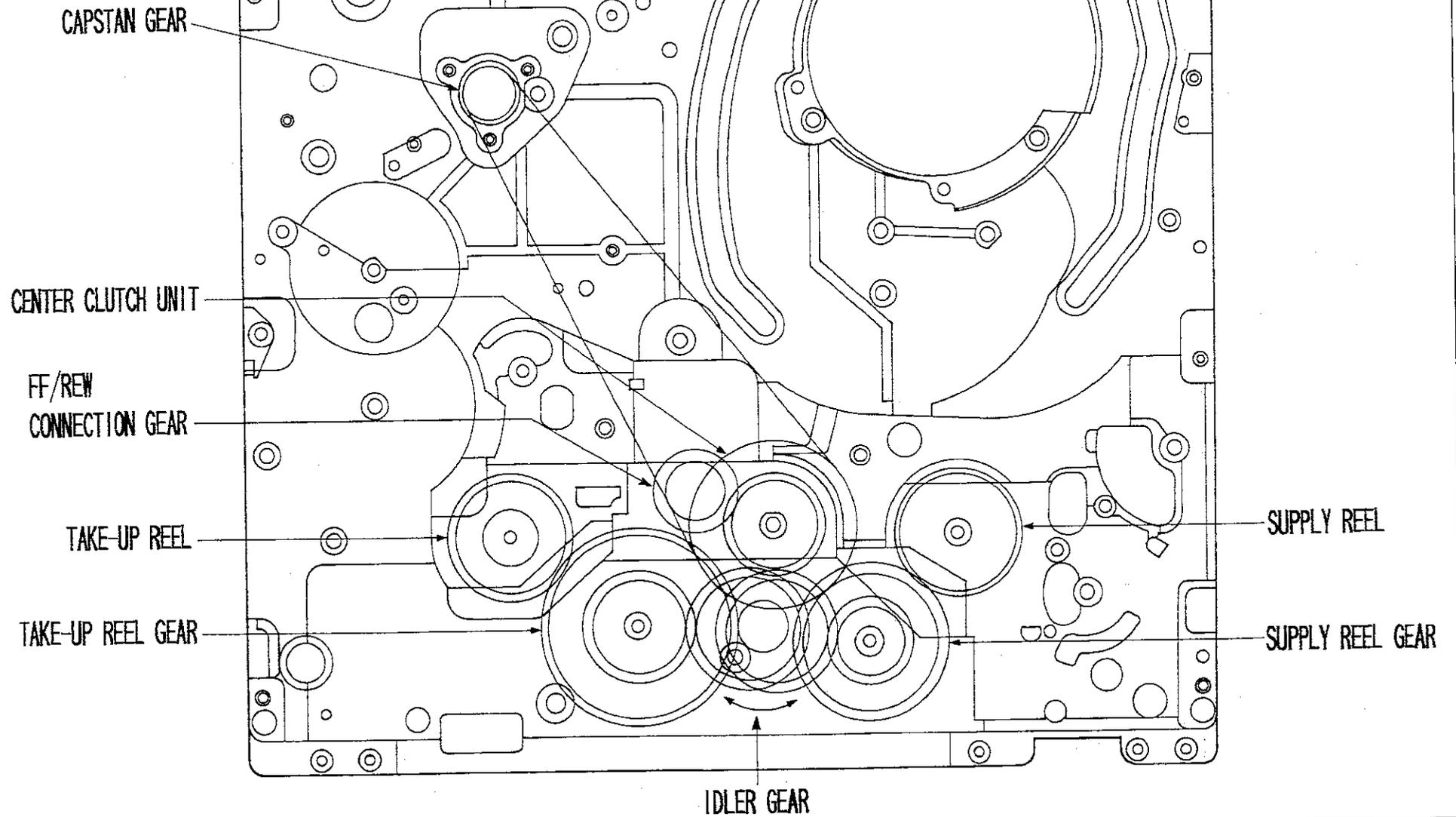


Fig. M10 Bottom View of Components Location

1-2. View of Phase Alignment

The gear phase alignment is performed in the cassette down position and is crucial for the K Mechanism to operate correctly.

- (1) Top View of Gear Phase Alignment Marks.
There are alignment marks on the Pinch Cam Gear and Sub Cam Gear. There is one alignment mark on the carriage connection gear.
- (2) Bottom View of Gear Phase Alignment Marks.
There are alignment marks on Take-up Loading Gear and Supply Loading Gear. There is an additional mark on the Take-up Loading Gear that aligns with the mark on the main lever. There are alignment marks on the Main Cam Gear and the Sub Cam Gear. The mode switch gear mark aligns with a notch in the mode switch frame.

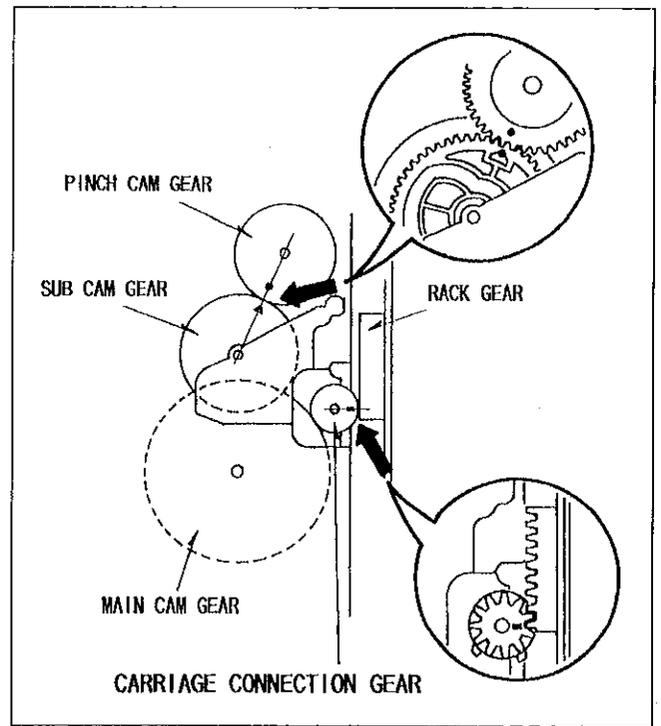


Fig. M11 Top View of Gear Phase Alignment

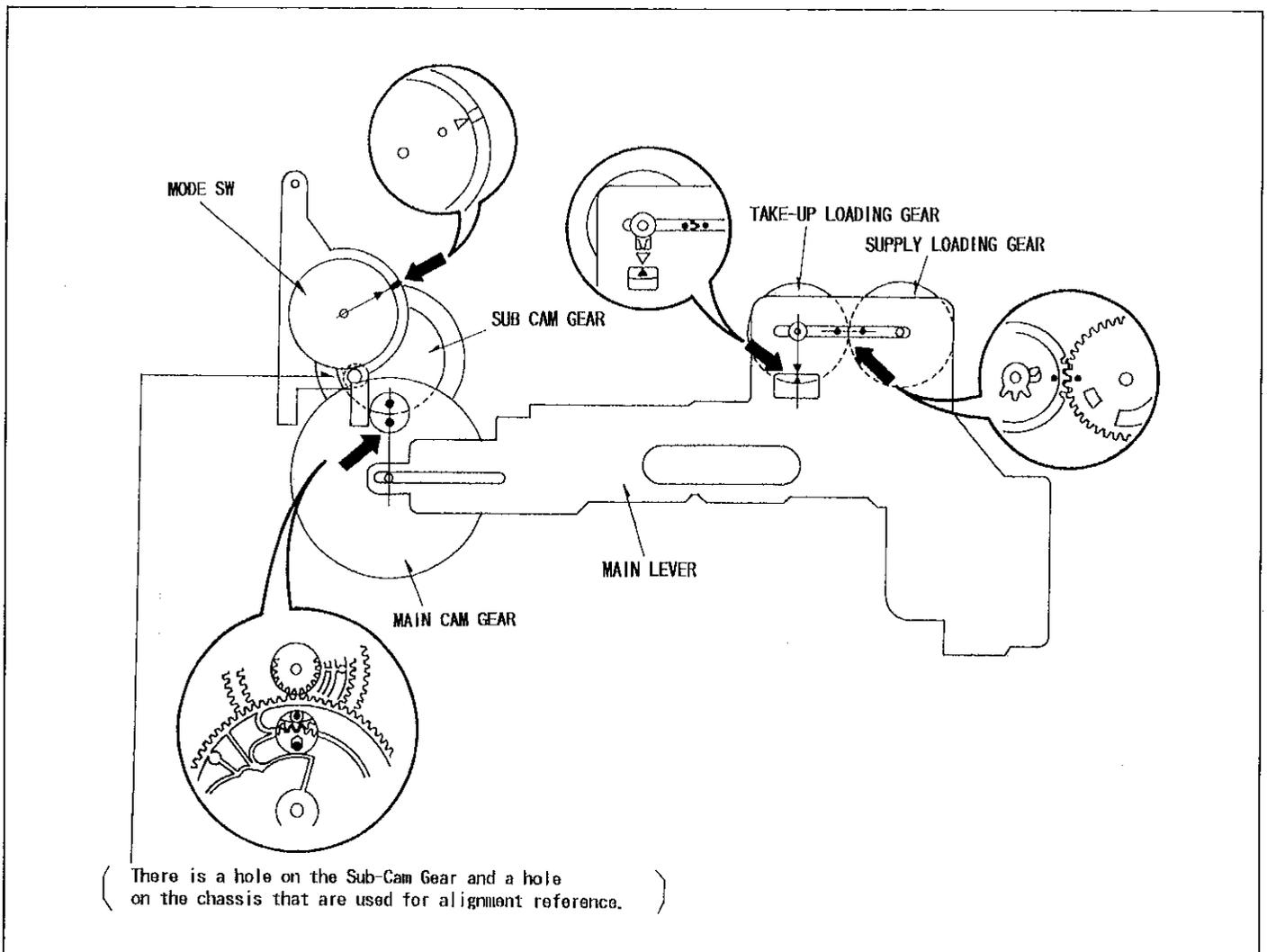


Fig. M12 Bottom View of Gear Phase Alignment

1-2-1. Phase Alignment in the Eject Position

When assembling a cassette carriage in an unit, align the phase as shown in Fig.M13.

(1) Phase alignment of Carriage Connection Gear

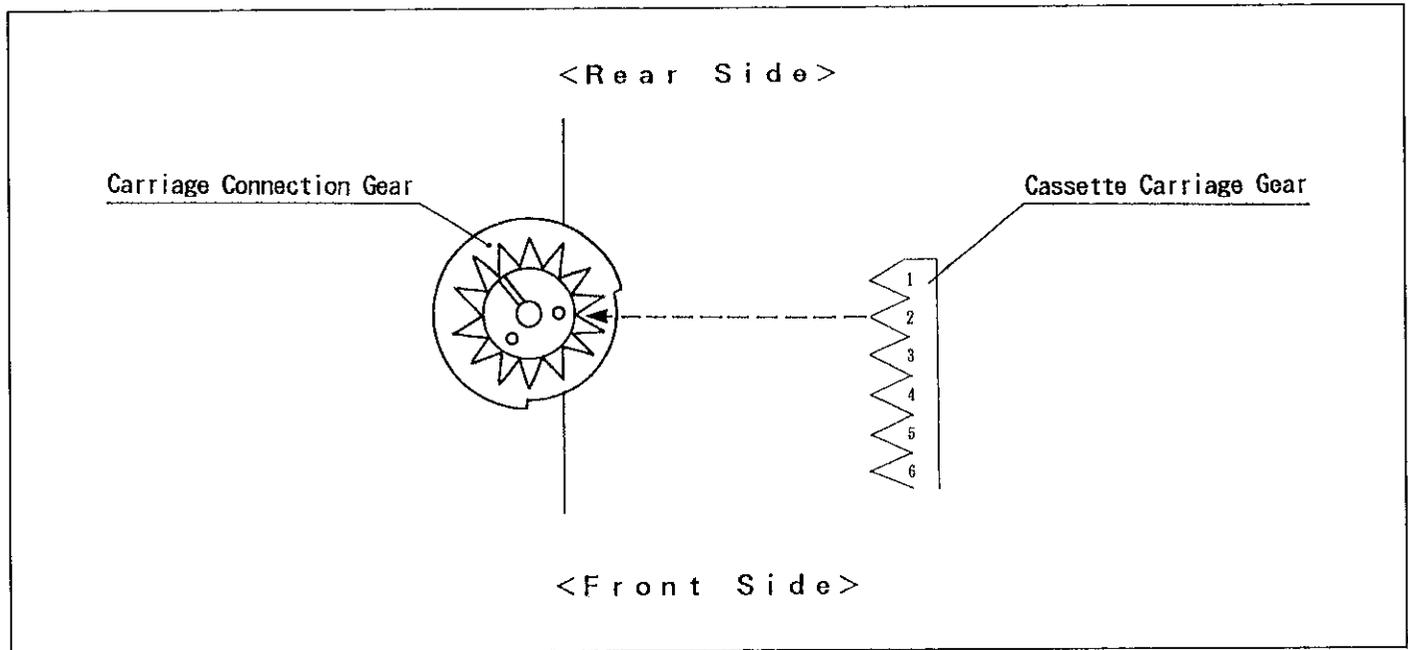


Fig. M13 Phase Alignment of Carriage Connection Gear

(2) Position of Mode Switch Arrow

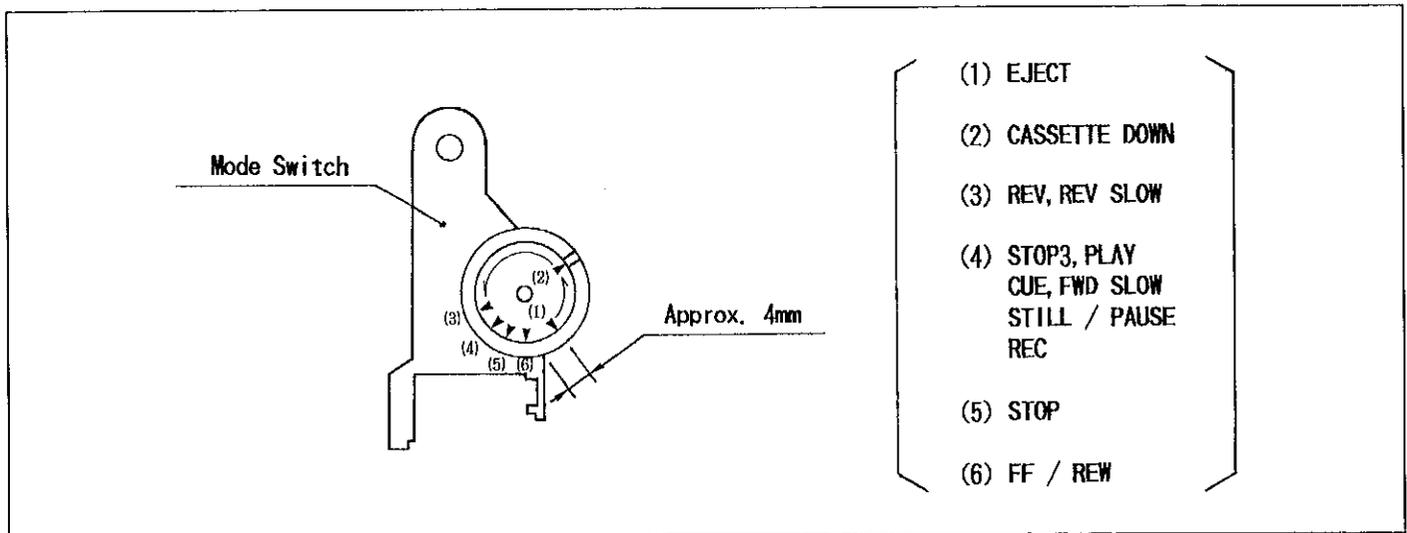


Fig. M14 Position of Mode Switch Arrow

1-3. Service Note

(1) Eject Operation

The mechanical Eject Operation works as shown in Fig.M15.

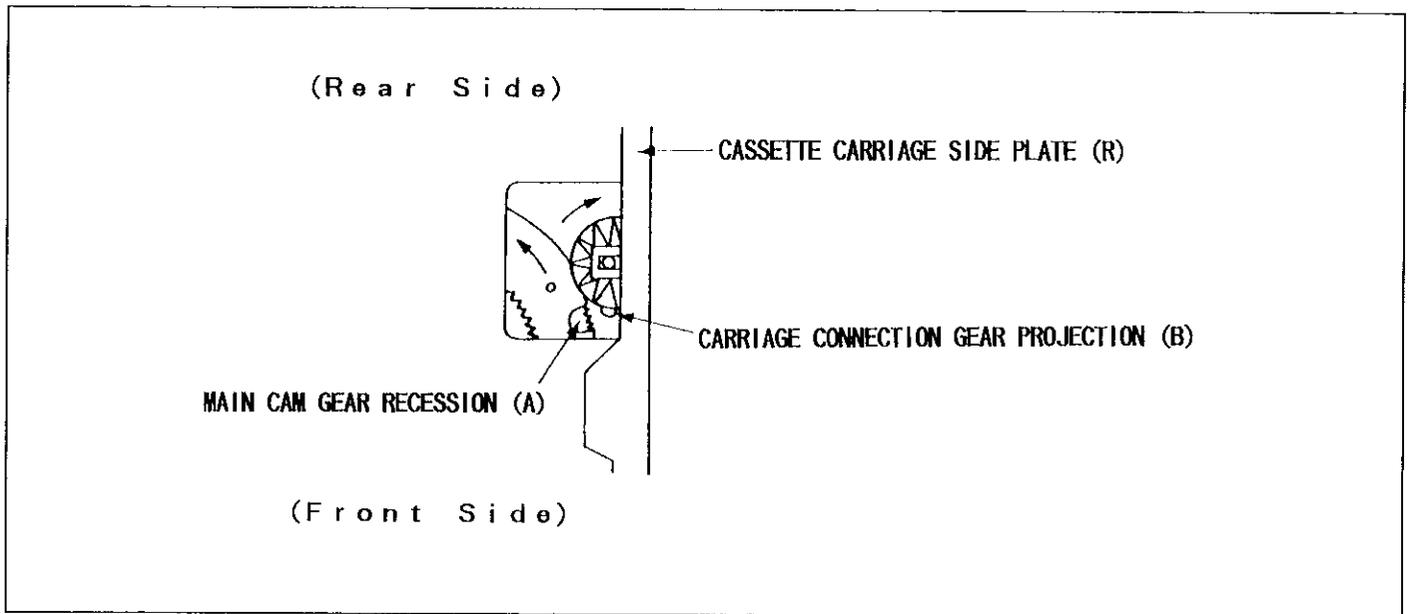


Fig. M15 Top View of Eject Operation

The main cam gear rotates in the direction of the arrow. The projection (B) of the carriage connection gear engages with the recession (A) of the main cam gear. The carriage connection gear rotates in the direction of the arrow to perform the Eject operation.

<NOTE>

If the Eject operation is performed without the cassette carriage installed while repairing or making the mechanical phase alignment, the main cam gear will not engage with the carriage connection gear and the carriage connection gear will not rotate.

For performing the Eject operation with the cassette carriage not installed, it is necessary to rotate the carriage connection gear by hand in the direction of the arrow.

2. System Control

The new products such as NV-SD series employing K-Mechanism use a new microprocessor (Ref. No. IC6001 : MN67434VRRV / MN67434VRSA). The system control consists of 4 sections as follows.

- (1) Serial Data Transmission
- (2) Mechanism Control
- (3) Safety
- (4) Special Features and Controls

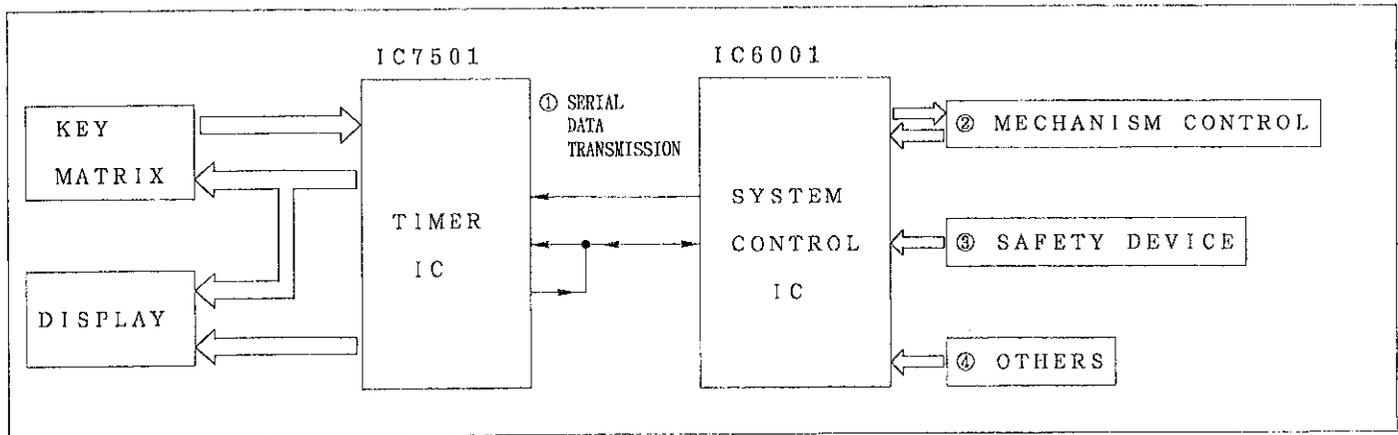


Fig. S1 Overall Block Diagram of System Control Circuit

2-1. SERIAL DATA TRANSMISSION CHART

The system control command data is transmitted as serial data to reduce the amount of transmission circuitry required. The format of serial data is shown in Fig.S2. A Serial clock is transmitted with the data for read timing reference.

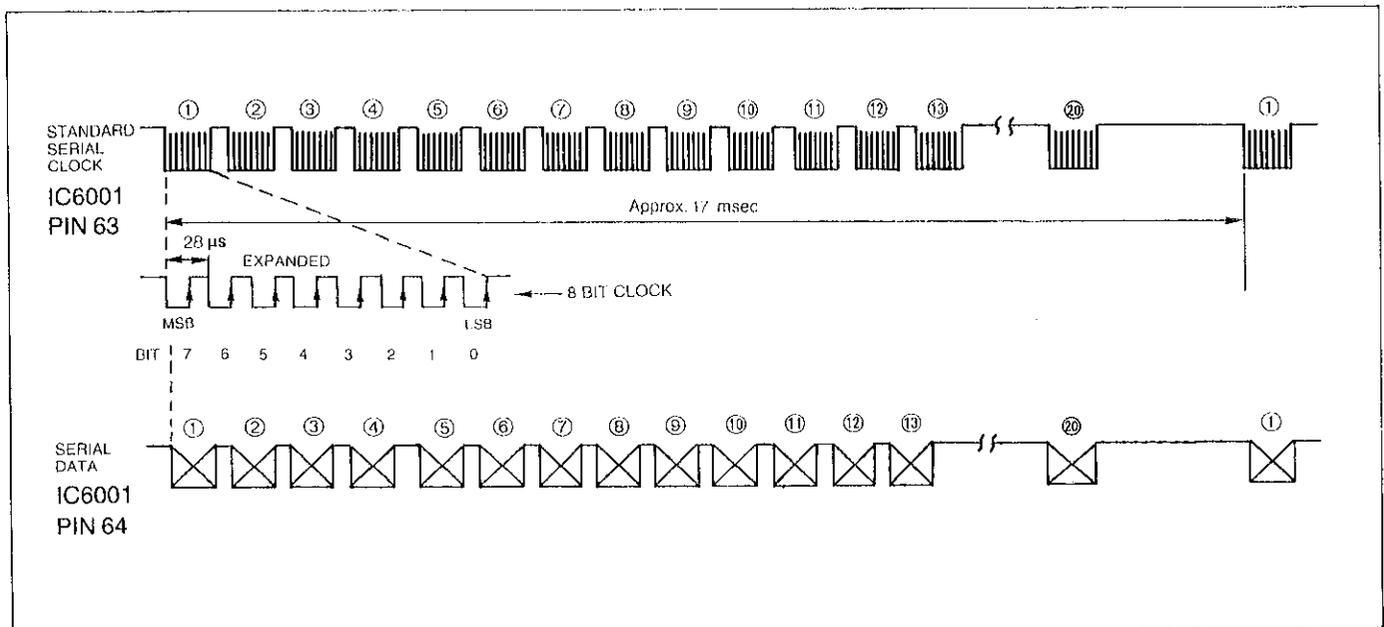


Fig. S2 Format of Serial Data and Clock

DATA NO.	DATA TRANSMISSION	CONTENTS OF DATA	DATA NO.	DATA TRANSMISSION	CONTENTS OF DATA
1	SYSTEM CONTROL → IC6001 TIMER IC7501	Tape Speed, Memory/Repeat/Search etc	11	SYSTEM CONTROL → IC6001 TIMER IC7501	Jog/VISS Code etc
2	TIMER IC7501 → SYSTEM CONTROL IC6001	Wireless Remoto & Key Control Code	12	SYSTEM CONTROL → IC6001 TIMER IC7501	Service Information Display etc
3	TIMER IC7501 → SYSTEM CONTROL IC6001	Timer Instructions code	13	SYSTEM CONTROL → IC6001 TIMER IC7501	OSD Code
4	Not Used		14	TIMER IC7501 → SYSTEM CONTROL IC6001	Jog/Shuttle Code
5	SYSTEM CONTROL → IC6001 TIMER IC7501	Deck Mode etc	15	Not Used	
6	SYSTEM CONTROL → IC6001 TIMER IC7501	Power ON/OFF, Cassette IN/OUT Code etc	16	Not Used	
7	SYSTEM CONTROL → IC6001 TIMER IC7501	Counter/Tape Remaining Code	17	Not Used	
8	SYSTEM CONTROL → IC6001 TIMER IC7501	Counter/Tape Remaining Code	18	Not Used	
9	SYSTEM CONTROL → IC6001 TIMER IC7501	Counter/Tape Remaining Code	19	Not Used	
10	TIMER IC7501 → SYSTEM CONTROL IC6001	Counter ON/OFF Tape Select Code etc	20	Not Used	

Fig. S3 Data Transmission Flow and Contents of Data

The contents of serial data transmission are shown in Fig.S4-1~13.

NO. 1 TRANSMISSION	INFORMATION	CONTENTS																	
BIT 7 & BIT 6	TAPE SPEED DISPLAY	<table border="1"> <thead> <tr> <th>BIT 7</th> <th>BIT 6</th> <th>DISPLAY</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>'SP' MARK DISPLAY</td> </tr> <tr> <td>0</td> <td>1</td> <td>'LP' MARK DISPLAY</td> </tr> <tr> <td>1</td> <td>0</td> <td>'SLP' MARK DISPLAY</td> </tr> <tr> <td>1</td> <td>1</td> <td>NO INDICATION</td> </tr> </tbody> </table>	BIT 7	BIT 6	DISPLAY	0	0	'SP' MARK DISPLAY	0	1	'LP' MARK DISPLAY	1	0	'SLP' MARK DISPLAY	1	1	NO INDICATION		
BIT 7	BIT 6	DISPLAY																	
0	0	'SP' MARK DISPLAY																	
0	1	'LP' MARK DISPLAY																	
1	0	'SLP' MARK DISPLAY																	
1	1	NO INDICATION																	
BIT 5 & BIT 4	COUNTER DISPLAY	<table border="1"> <thead> <tr> <th>BIT 5</th> <th>BIT 4</th> <th>DISPLAY</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>TAPE REMAIN TIME DISPLAY</td> </tr> <tr> <td>0</td> <td>1</td> <td>DEW MODE DISPLAY</td> </tr> <tr> <td>1</td> <td>0</td> <td>PROGRAM MODE DISPLAY</td> </tr> <tr> <td>1</td> <td>1</td> <td>LINEAR COUNTER MODE DISPLAY</td> </tr> </tbody> </table>	BIT 5	BIT 4	DISPLAY	0	0	TAPE REMAIN TIME DISPLAY	0	1	DEW MODE DISPLAY	1	0	PROGRAM MODE DISPLAY	1	1	LINEAR COUNTER MODE DISPLAY		
BIT 5	BIT 4	DISPLAY																	
0	0	TAPE REMAIN TIME DISPLAY																	
0	1	DEW MODE DISPLAY																	
1	0	PROGRAM MODE DISPLAY																	
1	1	LINEAR COUNTER MODE DISPLAY																	
BIT 3 & BIT 2	(MEMORY/RESET/ SEARCH DISPLAY)	<table border="1"> <thead> <tr> <th>BIT 3</th> <th>BIT 2</th> <th>DISPLAY</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>NO INDICATION</td> </tr> <tr> <td>0</td> <td>1</td> <td>NO INDICATION</td> </tr> <tr> <td>1</td> <td>0</td> <td>'R' MARK DISPLAY</td> </tr> <tr> <td>1</td> <td>1</td> <td>'S' MARK DISPLAY</td> </tr> </tbody> </table>	BIT 3	BIT 2	DISPLAY	0	0	NO INDICATION	0	1	NO INDICATION	1	0	'R' MARK DISPLAY	1	1	'S' MARK DISPLAY		
BIT 3	BIT 2	DISPLAY																	
0	0	NO INDICATION																	
0	1	NO INDICATION																	
1	0	'R' MARK DISPLAY																	
1	1	'S' MARK DISPLAY																	
BIT 1 & BIT 0	COUNTER TRANSMISSION DATA	<table border="1"> <thead> <tr> <th>BIT 1</th> <th>BIT 0</th> <th>DISPLAY</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>TAPE REMAIN TIME</td> </tr> <tr> <td>0</td> <td>1</td> <td>DEW DATA</td> </tr> <tr> <td>1</td> <td>0</td> <td>PROG. NUMBER DATA</td> </tr> <tr> <td>1</td> <td>1</td> <td>LINEAR COUNTER DATA</td> </tr> </tbody> </table>	BIT 1	BIT 0	DISPLAY	0	0	TAPE REMAIN TIME	0	1	DEW DATA	1	0	PROG. NUMBER DATA	1	1	LINEAR COUNTER DATA		
BIT 1	BIT 0	DISPLAY																	
0	0	TAPE REMAIN TIME																	
0	1	DEW DATA																	
1	0	PROG. NUMBER DATA																	
1	1	LINEAR COUNTER DATA																	

Fig. S4-1 Serial Data No.1 (IC6001->IC7501)

TRANSMISSION NO. 2					
NO	FUNCTION	CODE	NO	FUNCTION	CODE
		BIT 7~BIT 0			BIT 7~BIT 0
1	STOP	00000000	12	TAPE REMAINING	01010101
2	EJECT	00000001	13	AUTO TRACKING ON	10110000
3	REW(REVIEW)	00000010	14	TRACKING UP	10110001
4	FF(CUE)	00000011	15	TRACKING DOWN	10110010
5	STILL/PAUSE	00000110	16	RVS. PLAY	00001011
6	RECORD	00001000	17	INSERT	10110011
7	AUDIO DUBBING	00001001	18	AUDIO SELECT	00110011
8	PLAY	00001010	19	JOG ON	10000000
9	POWER ON/OFF	00111101	20	SERVICE MODE	11111100
10	ZERO STOP	11110101	21	MEMORY	01010011
11	COUNTER RESET	01010100			

Fig. S4-2 Serial Data No.2 (IC7501→IC6001)

NO. 3 TRANSMISSION	INFORMATION	CONTENTS		
BIT 7	ANT OUT	BIT 7	INFORMATION	
		0	TV	
		1	VYR	
BIT 6	REMOTE CONTROLLER SELECTION	BIT 6	INFORMATION	
		0	TIMER MODE	
		1	SYSTEM CONTROL MODE	
BIT 5 & BIT 4	TAPE SPEED DATA FROM SP/LP SELECT SW	BIT 5	BIT 4	TAPE SPEED DATA
		0	0	SP
		0	1	LP
		1	0	SLP(EP)
		1	1	NOT USED
BIT 3 } BIT 0	TIMER COMMAND CODE	BIT 3~BIT 0	COMMAND	
		0001	TIMER STAND-BY	
		0011	TIMER REC PAUSE	
		0101	TIMER REC	
		0111	OTR REC	

Fig. S4-3 Serial Data No.3 (IC7501→IC6001)

NO. 5 TRANSMISSION	INFORMATION	CONTENTS																																							
BIT 7	SAFETY TAB IS ATTACHED OR NOT	<table border="1"> <thead> <tr> <th data-bbox="676 197 804 259">BIT 7</th> <th colspan="3" data-bbox="804 197 1476 259">INFORMATION</th> </tr> </thead> <tbody> <tr> <td data-bbox="676 259 804 322">0</td> <td colspan="3" data-bbox="804 259 1476 322">YES</td> </tr> <tr> <td data-bbox="676 322 804 385">1</td> <td colspan="3" data-bbox="804 322 1476 385">NO</td> </tr> </tbody> </table>				BIT 7	INFORMATION			0	YES			1	NO																										
BIT 7	INFORMATION																																								
0	YES																																								
1	NO																																								
BIT 6	CHANNEL LOCK (DELAYED REC)	<table border="1"> <thead> <tr> <th data-bbox="676 454 804 517">BIT 6</th> <th colspan="3" data-bbox="804 454 1476 517">INFORMATION</th> </tr> </thead> <tbody> <tr> <td data-bbox="676 517 804 580">0</td> <td colspan="3" data-bbox="804 517 1476 580">NO CHANNEL LOCK</td> </tr> <tr> <td data-bbox="676 580 804 642">1</td> <td colspan="3" data-bbox="804 580 1476 642">CHANNEL LOCK</td> </tr> </tbody> </table>				BIT 6	INFORMATION			0	NO CHANNEL LOCK			1	CHANNEL LOCK																										
BIT 6	INFORMATION																																								
0	NO CHANNEL LOCK																																								
1	CHANNEL LOCK																																								
BIT 5	EE / VV DATA	<table border="1"> <thead> <tr> <th data-bbox="676 712 804 775">BIT 5</th> <th colspan="3" data-bbox="804 712 1476 775">INFORMATION</th> </tr> </thead> <tbody> <tr> <td data-bbox="676 775 804 837">0</td> <td colspan="3" data-bbox="804 775 1476 837">EE</td> </tr> <tr> <td data-bbox="676 837 804 900">1</td> <td colspan="3" data-bbox="804 837 1476 900">VV</td> </tr> </tbody> </table>				BIT 5	INFORMATION			0	EE			1	VV																										
BIT 5	INFORMATION																																								
0	EE																																								
1	VV																																								
BIT 4	PROCESS FLAG	<table border="1"> <thead> <tr> <th data-bbox="676 969 804 1032">BIT 4</th> <th colspan="3" data-bbox="804 969 1476 1032">INFORMATION</th> </tr> </thead> <tbody> <tr> <td data-bbox="676 1032 804 1095">0</td> <td colspan="3" data-bbox="804 1032 1476 1095">NOT USED</td> </tr> <tr> <td data-bbox="676 1095 804 1158">1</td> <td colspan="3" data-bbox="804 1095 1476 1158">DURING MODE TRANSIT</td> </tr> </tbody> </table>				BIT 4	INFORMATION			0	NOT USED			1	DURING MODE TRANSIT																										
BIT 4	INFORMATION																																								
0	NOT USED																																								
1	DURING MODE TRANSIT																																								
BIT 3 ? BIT 0	DECK MODE	<table border="1"> <thead> <tr> <th data-bbox="676 1227 868 1290">MODE</th> <th data-bbox="868 1227 1043 1290">CODE</th> <th data-bbox="1043 1227 1251 1290">MODE</th> <th data-bbox="1251 1227 1458 1290">CODE</th> </tr> </thead> <tbody> <tr> <td data-bbox="676 1290 868 1352">STOP</td> <td data-bbox="868 1290 1043 1352">0000</td> <td data-bbox="1043 1290 1251 1352">PLAY</td> <td data-bbox="1251 1290 1458 1352">1000</td> </tr> <tr> <td data-bbox="676 1352 868 1415">EJECT</td> <td data-bbox="868 1352 1043 1415">0001</td> <td data-bbox="1043 1352 1251 1415">STILL</td> <td data-bbox="1251 1352 1458 1415">1001</td> </tr> <tr> <td data-bbox="676 1415 868 1478">REW</td> <td data-bbox="868 1415 1043 1478">0010</td> <td data-bbox="1043 1415 1251 1478">REC</td> <td data-bbox="1251 1415 1458 1478">1010</td> </tr> <tr> <td data-bbox="676 1478 868 1541">FF</td> <td data-bbox="868 1478 1043 1541">0011</td> <td data-bbox="1043 1478 1251 1541">REC PAUSE</td> <td data-bbox="1251 1478 1458 1541">1011</td> </tr> <tr> <td data-bbox="676 1541 868 1603">REV</td> <td data-bbox="868 1541 1043 1603">0100</td> <td data-bbox="1043 1541 1251 1603">AUDIO DUBBING</td> <td data-bbox="1251 1541 1458 1603">1100</td> </tr> <tr> <td data-bbox="676 1603 868 1666">CUE</td> <td data-bbox="868 1603 1043 1666">0101</td> <td data-bbox="1043 1603 1251 1666">A. DUB PAUSE</td> <td data-bbox="1251 1603 1458 1666">1101</td> </tr> <tr> <td data-bbox="676 1666 868 1729">SLOW</td> <td data-bbox="868 1666 1043 1729">0110</td> <td data-bbox="1043 1666 1251 1729">INSERT</td> <td data-bbox="1251 1666 1458 1729">1110</td> </tr> <tr> <td data-bbox="676 1729 868 1792">POWER OFF</td> <td data-bbox="868 1729 1043 1792">0111</td> <td data-bbox="1043 1729 1251 1792">INSERT PAUSE</td> <td data-bbox="1251 1729 1458 1792">1111</td> </tr> </tbody> </table>				MODE	CODE	MODE	CODE	STOP	0000	PLAY	1000	EJECT	0001	STILL	1001	REW	0010	REC	1010	FF	0011	REC PAUSE	1011	REV	0100	AUDIO DUBBING	1100	CUE	0101	A. DUB PAUSE	1101	SLOW	0110	INSERT	1110	POWER OFF	0111	INSERT PAUSE	1111
MODE	CODE	MODE	CODE																																						
STOP	0000	PLAY	1000																																						
EJECT	0001	STILL	1001																																						
REW	0010	REC	1010																																						
FF	0011	REC PAUSE	1011																																						
REV	0100	AUDIO DUBBING	1100																																						
CUE	0101	A. DUB PAUSE	1101																																						
SLOW	0110	INSERT	1110																																						
POWER OFF	0111	INSERT PAUSE	1111																																						

Fig. S4-4 Serial Data No.5 (IC6001→IC7501)

NO. 6 TRANSMISSION	INFORMATION	CONTENTS	
		0	1
BIT 7	FLAG	NORMAL SPEED FLAG	DOUBLE SPEED FLAG
BIT 6	POWER FLAG	POWER OFF	POWER ON
BIT 5	CASSETTE IN/OUT	CASSETTE OUT	CASSETTE IN
BIT 4	NOT USED		
BIT 3	BUZZER	SOUND	NO SOUND
BIT 2	REVERSE PB FLAG	NORMAL PB	REVERSE PB
BIT 1	COMPULSIVE COUNTER DISPLAY	NORMAL DISPLAY	COMPULSIVE COUNTER DISPLAY
BIT 0	SLOW FLAG	DURING MODE TRANSIT TO SLOW MODE	NORMAL PB

Fig. S4-5 Serial Data No.6 (IC6001→IC7501)

NO. 7 TRANSMISSION	INFORMATION
BIT 7~BIT 0	HOUR DISPLAY

Fig. S4-6 Serial Data No.7 (IC6001→IC7501)

NO. 8 TRANSMISSION	INFORMATION
BIT 7~BIT 0	MINUTE DISPLAY

Fig. S4-7 Serial Data No.8 (IC6001→IC7501)

NO. 9 TRANSMISSION	INFORMATION
BIT 7~BIT 0	SECOND DISPLAY

Fig. S4-8 Serial Data No.9 (IC6001→IC7501)

NO. 10 TRANSMISSION	INFORMATION	CONTENTS			
		0	1		
BIT 7	COUNTER DISPLAY	EXCEPT COUNTER DISPLAY	DURING COUNTER DISPLAY		
BIT 6	NOT USED				
BIT 5 & BIT 4	TAPE SELECTION	BIT 5	BIT 4	MODE	
				NTSC	PAL
		0	0	~T120	E195
		0	1	T140~T180	E240
		1	0	NOT USED	E260
		1	1	NOT USED	
BIT 3 & BIT 0	NOT USED				

Fig. S4-9 Serial Data No.10 (IC7501->IC6001)

NO. 11 TRANSMISSION	INFORMATION	CONTENTS	
		0	1
BIT 7	TIME SEARCH	ON	OFF
BIT 6	VISS MODE	INDICATION	NO INDICATION
BIT 5	BLANK SEARCH	ON	OFF
BIT 4	INTRO SEARCH	ON	OFF
BIT 3	VISS WRITE	INDICATION	NO INDICATION
BIT 2	VISS ERASE	INDICATION	NO INDICATION
BIT 1	LAP TIME	INDICATION	NO INDICATION
BIT 0	JOG	INDICATION	NO INDICATION

Fig. S4-10 Serial Data No.11 (IC6001->IC7501)

NO. 12 TRANSMISSION	INFORMATION	CONTENTS	
		0	1
BIT 7	SERVICE INFORMATION DISPLAY	INDICATION	NO INDICATION
BIT 6	INSERT AND DUB. DISPLAY	"INSERT" and "DUB" MARK DISPLAY	NO INDICATION
BIT 5 & BIT 4	FRAME NUMBER DISPLAY	LEFT DIGIT OF FRAME NUMBER	
BIT 3 } BIT 0	FRAME NUMBER DISPLAY	RIGHT DIGIT OF FRAME NUMBER	

Fig. S4-11 Serial Data No.12 (IC6001->IC7501)

No. 13 TRANSMISSION	INFORMATION	CONTENTS			
		BIT 7	BIT 6	BIT 5	COMMAND
BIT 7 } BIT 5	OSD DISPLAY COMMAND	1	1	1	NO INDICATION
		1	0	--	TRACKING DISPLAY
		0	1	1	REC/PAUSE, TIME DISPLAY
		0	0	1	TAPE REMAINING DISPLAY
		0	0	0	NO INDICATION
		1	1	0	OSD DISPLAY INHIBITION
BIT 4 } BIT 0	DISPLAY MODE DATA	DISPLAY DATA FROM MODE			

Fig. S4-12 Serial Data No.13 (IC6001->IC7501)

TRANSMISSION No. 14

No	FUNCTION	CODE	No	FUNCTION	CODE
		BIT 7 → BIT 0			BIT 7 → BIT 0
1	JOG ON	10000000	11	x - 1	10000100
2	NO OPERATION	11111111	12	x 1	10000101
3	FORWARD SLOW	00001100	13	REV 1	10000110
4	REVERSE SLOW	00001101	14	CUE 1	10000111
5	x - 1/30	10010110	15	REV 2	10001000
6	x 1/30	10010111	16	CUE 2	10001001
7	x - 1/10	10011000	17	REV 3	10001100
8	x 1/10	10011001	18	CUE 3	10001101
9	x - 1/5(SHUTTLE)	10000001	19	x - 1/5(JOG)	10001010
10	x 1/5(SHUTTLE)	10000011	20	x 1/5(JOG)	10001011

Fig. S4-13 Serial Data No.14 (IC7501->IC6001)

2-2. Mechanism Control Circuit

All mechanism movement except the reel rotation is driven by the loading motor. The microprocessor IC6001 controls the mechanism by controlling the loading motor. The Mode SW sends mechanism position information to the IC6001.

< Example of Mechanism Control in FF Mode >

- (1) When pressing FF mode button, the command data is transmitted from IC7501 (TIMER IC) to IC6001 to drive the loading motor.
 - (2) The loading motor drives the mechanism components to the FF mode position.
 - (3) The Mode SW sends the mechanism position information.
- (POSITION SW 1 : POSITION SW 2 : POSITION SW 3 : = L : H : H) to IC6001.

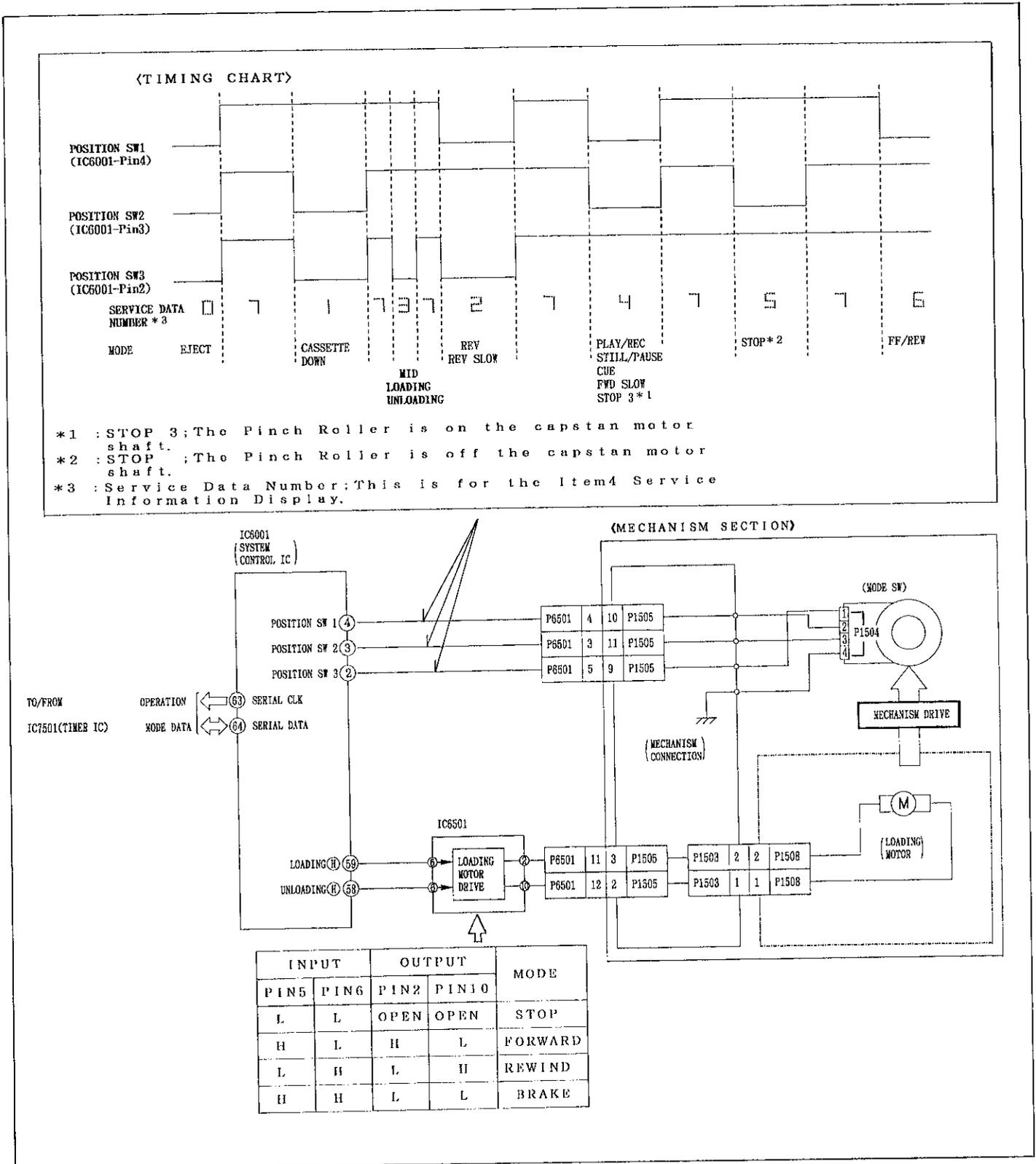


Fig. S5 Mechanism Control Circuit

2-2-1. Cassette-Insert Detection

The cassette up/down position is detected by the take-up photo transistor Q1501. When the cassette tape is inserted into the cassette carriage, the light from Sensor LED D1501 to Q1501 is cut by the right side of cassette. Then, the cassette tape goes to the cassette down position.

2-3. Safety Circuit

The microprocessor IC6001 detects conditions that might cause damage to the tape or mechanism. When such a condition is detected, the IC6001 will prevent further operation.

2-3-1. Cylinder Lock

The IC6001 uses the head switching signal produced from FG/PG signals (IC6001-Pin43 Input) to sense cylinder lock. If the head switching signal is not received due to cylinder lock during the recording or playback, the microprocessor IC6001 places the VCR in the Stop mode. During the timer recording, it turns the VCR power Off.

2-3-2. Loading & Unloading Mechanism Lock

The mechanism lock is determined by the IC6001 not receiving the correct mechanism position information from the mode switch. If the mechanism locks during the loading operation, the tape is unloaded and the cassette is ejected. If the mechanism locks during the unloading operation, the power is turned Off.

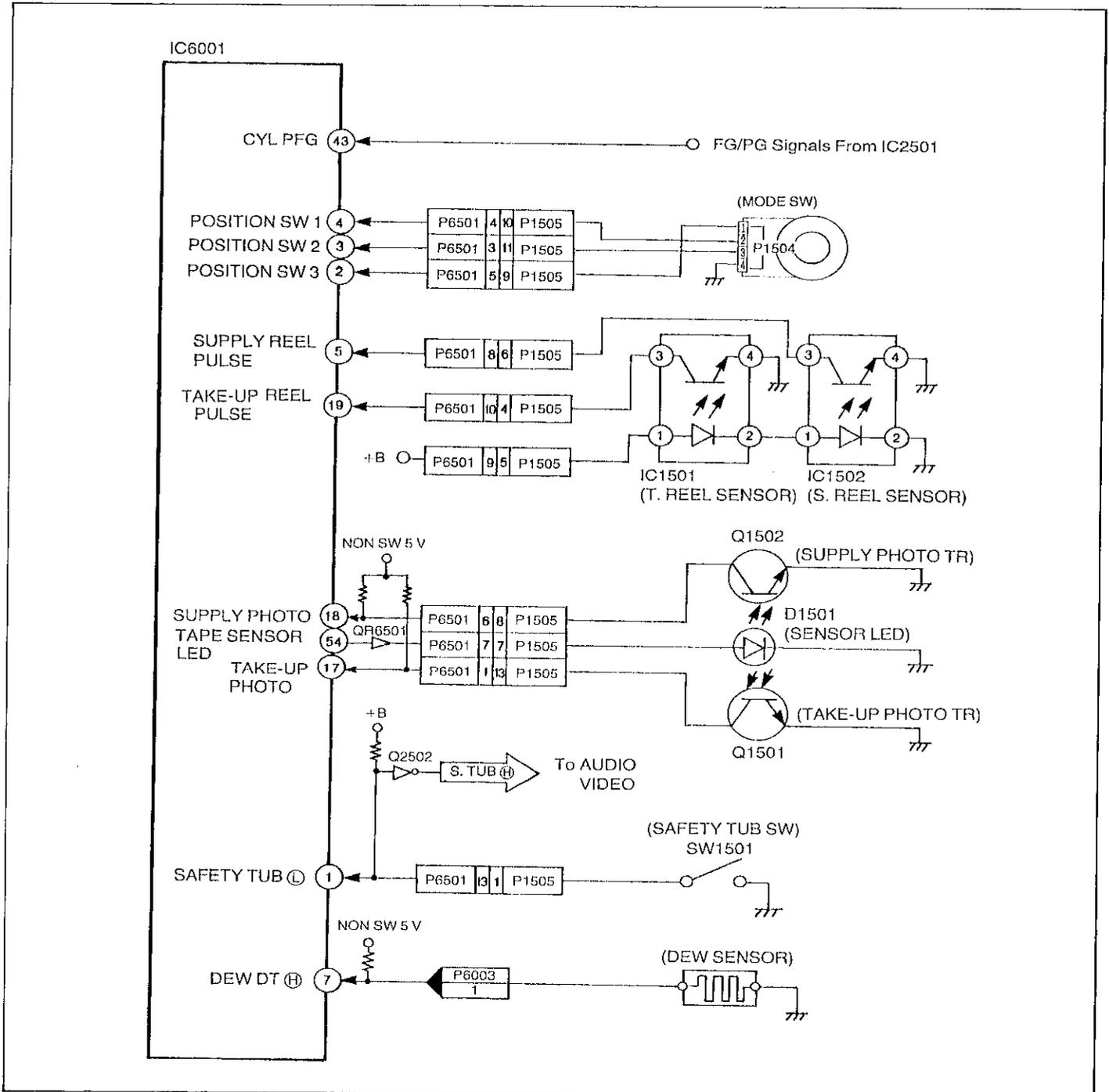


Fig. S6 Safety Circuit

2-3-3. Cassette Loading & Unloading Lock

- (1) If the mechanism locks during the cassette-in operation, the cassette is ejected.
- (2) If the mechanism locks during the cassette eject operation the mechanism performs the cassette-in operation and retries the cassette eject operation. If the mechanism locks again the power is turned Off.

2-3-4. Reel Sensor

The reel sensor (IC6001-Pin(5),(19)) detects a pulse generated by the Supply and Take-up reels to determine if reels are rotating. If the reel rotation is not smooth, the microprocessor places the VCR in the Stop mode to prevent tape damage.

2-3-5. Supply and Take-up Sensors

Supply and take-up photo transistors are used to sense the beginning and end of a tape. The tape has transparent leaders at the beginning and end. When these transparent leaders enter the tape transport path, they allow infrared light from the sensor LED to reach either one of the tape end sensors (photo-transistor). If the take-up end sensor detects the light, the microprocessor IC6001 places the VCR in the Stop mode and then performs a short cue. If the supply end sensor is triggered, the microprocessor activates the Stop mode and the Rewind mode. The Rewind mode continues until the take-up end sensor detects the end of the tape. The tape beginning is detected by a low signal at IC6001 pin(17). The tape end is detected by a low signal at IC6001 pin(18). If light is received at both sensors at same time the cassette is ejected.

2-3-6. Safety Tab Switch

A recorded video cassette can be protected against accidental erasure by breaking off the tab on the cassette. The cassette can now only be used for playback. To be able to record on the cassette, cover the hole with adhesive tape. If the safety tab on the cassette has been removed, the Safety Tab Switch is off(open) and a high signal is supplied to pin 1 of IC6001. The IC6001 will not go into the Recording mode and automatically places the VCR in the Playback mode.

2-3-7. Dew Sensor

If excessive moisture or condensation is present inside the machine (an internal humidity of more than 98%) the unit will stop if running. Until the moisture level decreases only the Eject mode will operate. To sense the humidity, a dew sensor is used. The sensor is a special variable resistor which changes resistance with ambient humidity. The sensor ranges in resistance from about 5k ohm at 90% humidity to about 50k ohm at 98% humidity. Normally, the voltage across the sensor is low because of its low resistance. But if moisture condenses inside the unit, the voltage of pin7 of IC6001 increases to indicate a Dew condition.

2-4. Special Features and Controls

2-4-1. STOP 3 Specifications

- a) The STOP 3 is the playback standby mode.
- b) The unit is put into the STOP 3 position after tape loading if the cassette tape does not have a clear leader tape.
- c) If the unit is in the STOP 3 position when the power is switched off (including the timer a standby mode), the unit goes to the STOP position.
- d) If a cassette is in the unit when the power is turned on, the unit goes to the STOP 3 position.

2-4-2. Standby in the STOP 3 Position

- a) The unit goes to the STOP 3 position if the STOP mode is selected during the PLAY or REC operations. The unit then loosens the tape tension by performing the Reverse Still Advance. The Reverse Still Advance corresponds to the FG 40 pulses of the capstan (irrespective of SP/EP modes). The cylinder continues to rotate.
- b) After about 10 minutes in the STOP 3 mode, the unit shifts to the STOP position and the cylinder continues rotating.
- c) After another 10 minutes, the unit stops the cylinder rotation.

2-4-3. Remaining Tape Time Calculation in FF/REW mode

- a) If the calculation of the remaining tape time is not completed before the FF or REW operation starts, the unit runs the tape by the CUE or REV operation to calculate the remain tape time.

2-4-4. CUE/REV Search

Operation on the unit control panel.

- a) If the SHUTTLE Ring is rotated and released in less than 0.7sec during the playback mode (while playback picture appears), the unit is put into the CUE/REV lock mode. If the SHUTTLE Ring is kept rotated longer than 0.7sec., the unit will return to the PLAY mode when the SHUTTLE Ring is released.

2-4-5. FR (Forward/Reverse) Search

Operation on the unit control panel.

- a) If the SHUTTLE Ring is kept rotated during FF or REW, the unit is put into the CUE or REV mode.
- b) When the SHUTTLE Ring is released, the unit returns to the FF or REW mode.

(Operation with the Remote Controller)

- a) If the FF or REW Key is kept depressed during FF or REW, the unit is put into the CUE or REV mode.
- b) When the FF or REW Key is released, the unit turns to the FF or REW mode.

2-4-6. Input/Output Chart for IC6001
(Part No.: MN67434VRRV / MN67434VRSB)

Pin Number	Input/Output	Port Name	Function																																				
1	I	SAFETY-TAB	When inserting the cassette tape with safety tab, this port is low. When there is no safety tab, this port is high to prevent recording.																																				
2	I	POSITION SW 3	<table border="1"> <thead> <tr> <th>P. SW 3</th> <th>P. SW 2</th> <th>P. SW 1</th> <th>Position (Mode) Name</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>EJECT</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>CASSETTE DOWN</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>REV, REV SLOW</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>MID(LOADING / UNLOADING)</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>PLAY/REC, STILL/PAUSE, CUE, FWD SLOW STOP^{3*1}</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>STOP</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>FF / REW</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>INTERMEDIATE</td> </tr> </tbody> </table> <p>(*1) The Pinch Roller is on the capstan motor shaft.</p>	P. SW 3	P. SW 2	P. SW 1	Position (Mode) Name	0	0	0	EJECT	0	0	1	CASSETTE DOWN	0	1	0	REV, REV SLOW	0	1	1	MID(LOADING / UNLOADING)	1	0	0	PLAY/REC, STILL/PAUSE, CUE, FWD SLOW STOP ^{3*1}	1	0	1	STOP	1	1	0	FF / REW	1	1	1	INTERMEDIATE
P. SW 3	P. SW 2	P. SW 1		Position (Mode) Name																																			
0	0	0		EJECT																																			
0	0	1		CASSETTE DOWN																																			
0	1	0		REV, REV SLOW																																			
0	1	1		MID(LOADING / UNLOADING)																																			
1	0	0		PLAY/REC, STILL/PAUSE, CUE, FWD SLOW STOP ^{3*1}																																			
1	0	1		STOP																																			
1	1	0		FF / REW																																			
1	1	1		INTERMEDIATE																																			
3	I	POSITION SW 2																																					
4	I	POSITION SW 1																																					
5	I	SUPPLY REEL PULSE	Supply Reel Pulse Input (For detecting tape remaining)																																				
6	I	NORMAL/SERVICE /TEST	Service Mode Setting Normal Mode : High Service Mode : Middle Test Mode : Low																																				
7	I	DEW	When Dew is detected, this port is middle. Normally, this port is low.																																				
8	I	TEST	Not used (Low setting)																																				
9	I	ENVELOPE SELECT	The playback envelope video signal level is detected at this input to select the video head in the special special playback modes.																																				
10	O	ROTARY SW	This signal is supplied to the chrominance circuit to perform the phase rotation.																																				
12	O	HEAD AMP SWITCH	This signal is supplied to the head amp circuit to switch the video head, SP or LP.																																				
14	O	ARTIFICIAL V / H / N	Artificial Vertical Sync Signal is supplied to video circuit to stabilize the picture in the special playback modes.																																				
17	I	TAKE-UP PHOTO	Take-up Side Photo Sensor Input (For detecting tape beginning)																																				
18	I	SUPPLY PHOTO	Supply Side Photo Sensor Input (For detecting tape end.)																																				

Pin Number	Input/Output	Port Name	Function
19	I	TAKE-UP REEL	Take-up Reel Pulse Input (For detecting tape remaining and reel (Cap.)lock.)
20	0	SP / LP	Tape Speed Output SP : Low LP : High
47	0	VTR(II)	VTR / TV Switch Output VTR : High TV : Low
48	0	SP(II)	Tape Mode Output SP : High LP : Low
54	0	SENSOR LED ON (L)	When turning on the Sensor LED, this port is low. 1) STOP Mode : No lit. 2) FF, REW, CUE, REV Modes : DC is lit. 3) EJECT Mode : Pulse blinking. (Cycle:320[msec])
55	0	VOLTAGE CHANGE (II)	When increasing the drive torque of loading motor to perform the FF/REW mode, this port is low.
58	0	UNLOADING (II)	When unloading, this port is high.
59	0	LOADING (II)	When loading, this port is high.
63	0	SERIAL CLOCK	Serial Clock Output
64	I/O	SERIAL DATA	Serial Data In/Out
66	0	DELAYED REC(II)	When the video goes to the recording mode after a delay from the video recording command, this port is high.
67	0	DELAYED AUDIO REC (II)	When the audio goes to the recording mode after a delay from the audio recording command, this port is high.
68	0	FULL ERASE (II)	When the video goes to the recording mode, this port is high.
69	0	REC (H)	When the video goes to the recording mode, this port is high.
70	0	NTSC (L)	System Output NTSC : Low PAL : High
71	0	AUDIO MUTE (II)	When the audio goes to the mute mode, this is high.
72	0	CAPSTAN REVERSE (II)	When the capstan motor rotates in reverse, this is high.
73	0	AUDIO EE (H)	When the audio goes to the EE mode, this is high.

Pin Number	Input/Output	Port Name	Function
75	0	CURRENT EMPHASIS (H)	When the servo goes to the edit mode, this is high.
76	0	FF/REW (L)	When the servo goes to the FF/REW mode, this is low.
78	0	VIDEO EE (L)	When the video goes to the EE mode, this is low.
79	0	TRICK (L)	When the video goes to the special playback (CUE, REV, SLOW, STILL) mode, this is low.
80	0	POWER OFF (H)	Power ON/OFF Control is low when the power switch is turned on.
84	I	RESET (L)	When resetting the IC6001, this port is low.

2-5. Mechanical Mode Operation

Refer to Item 2-2. Mechanism control circuit.

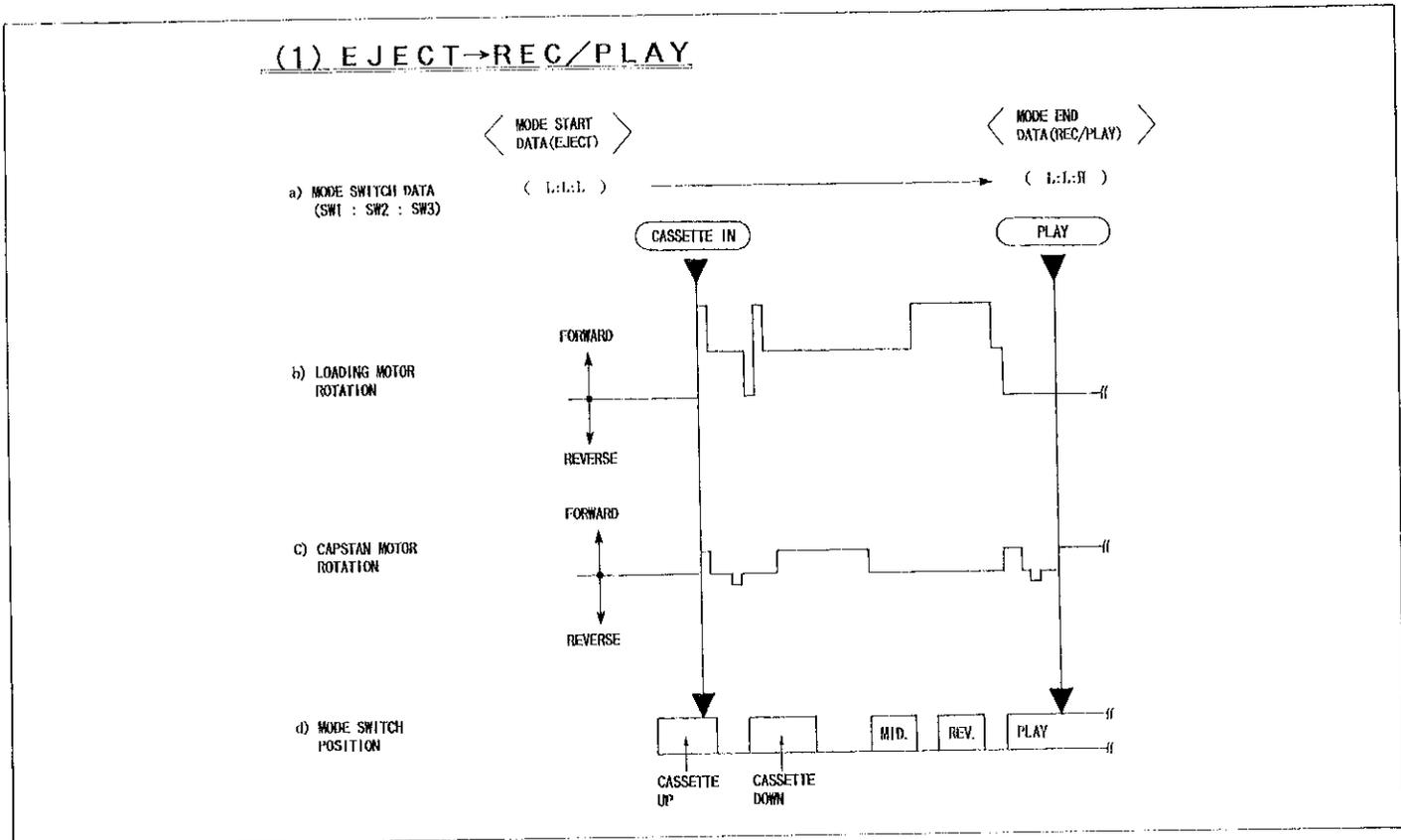


Fig. S7 Mechanical Mode Operation From Eject TO REC/PLAY

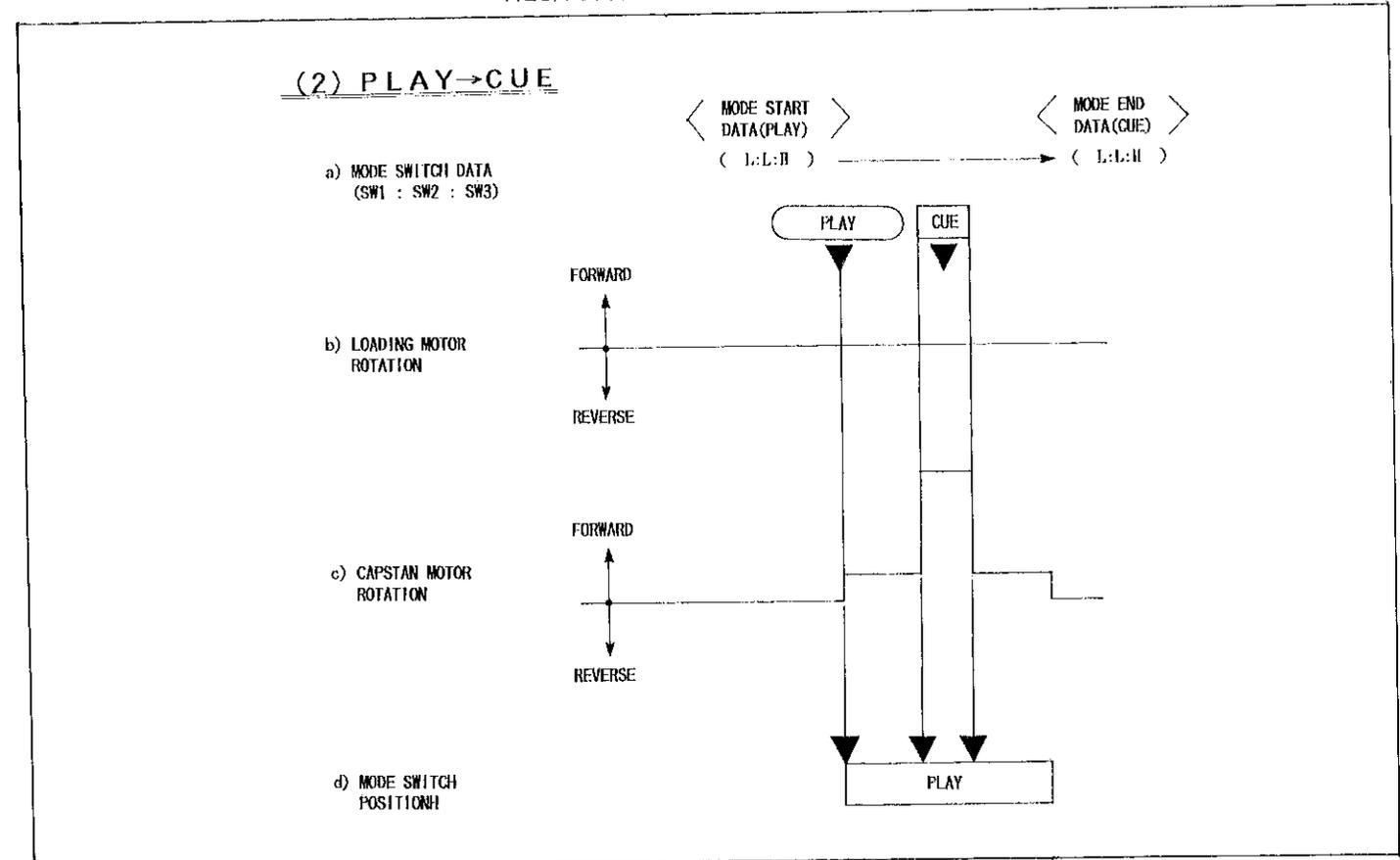


Fig. S8 Mechanical Mode Operation From PLAY TO CUE

(3) PLAY→REVIEW

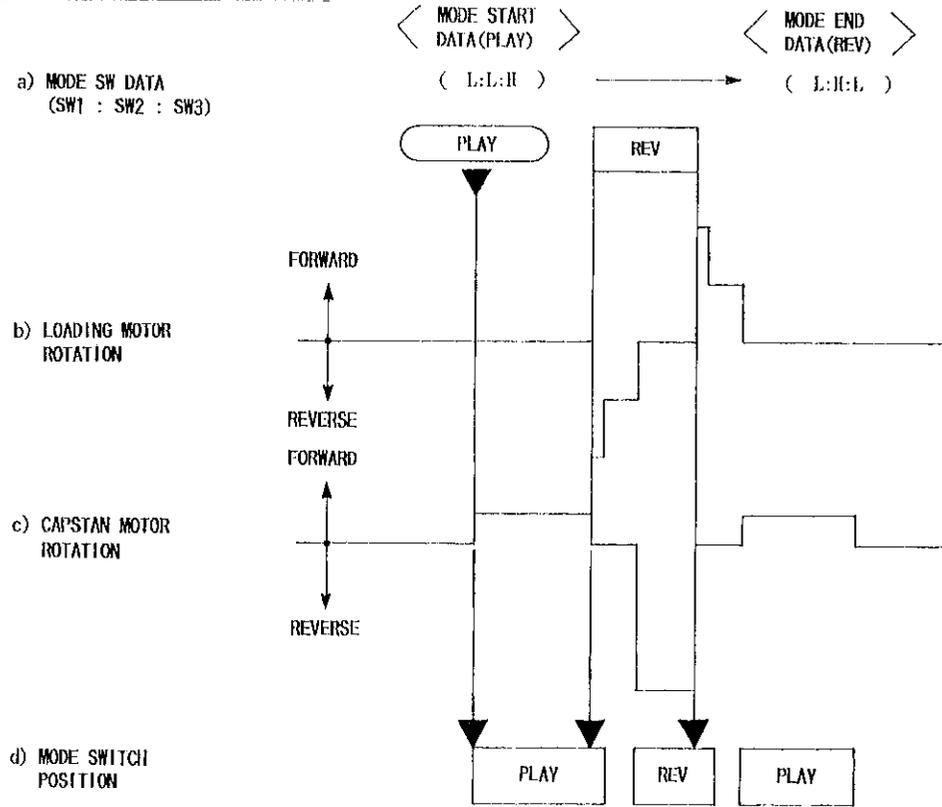


Fig. S9 Mechanical Mode Operation From PLAY TO REVIEW

(4) PLAY (REC) → STILL (PAUSE) → SLOW

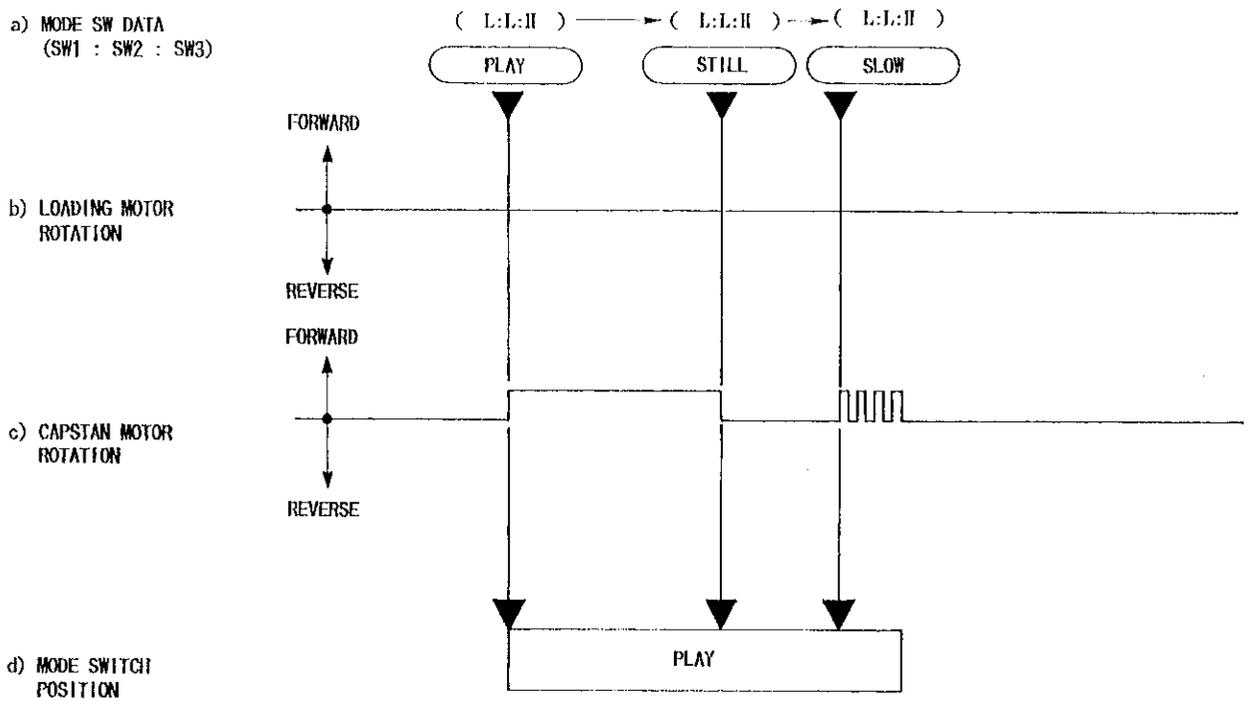


Fig. S10 Mechanical Mode Operation From PLAY TO SLOW

(5) PLAY → STOP 3 → STOP

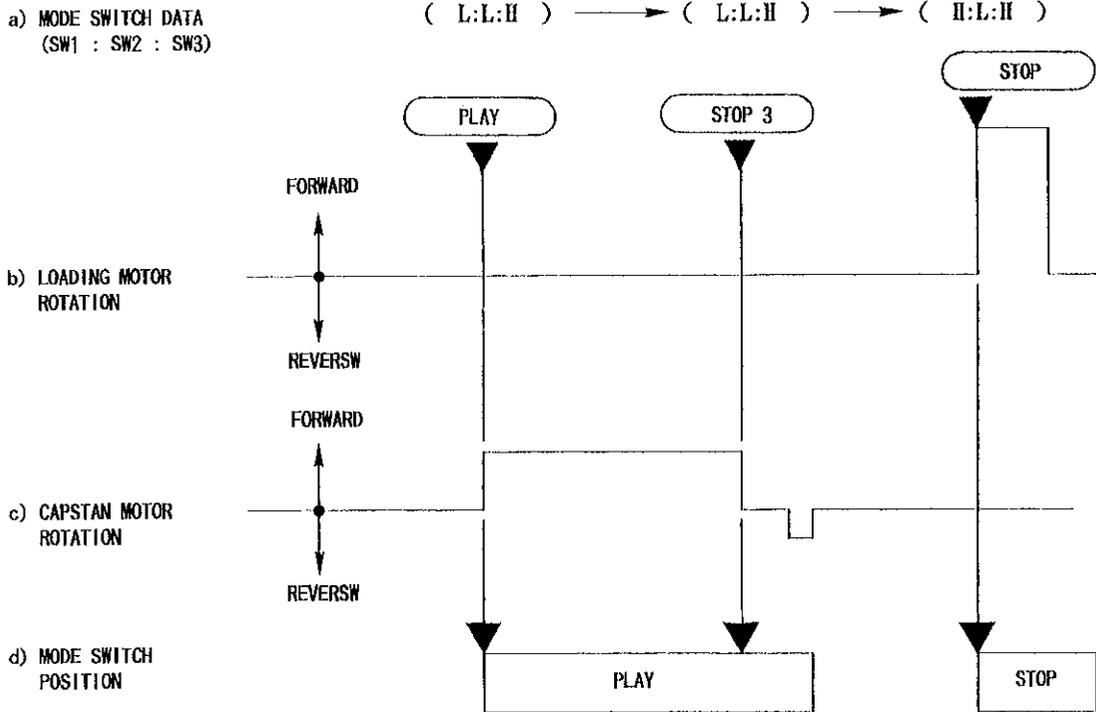


Fig. S11 Mechanical Mode Operation From PLAY TO STOP

(6) PLAY → STOP 3 → FF

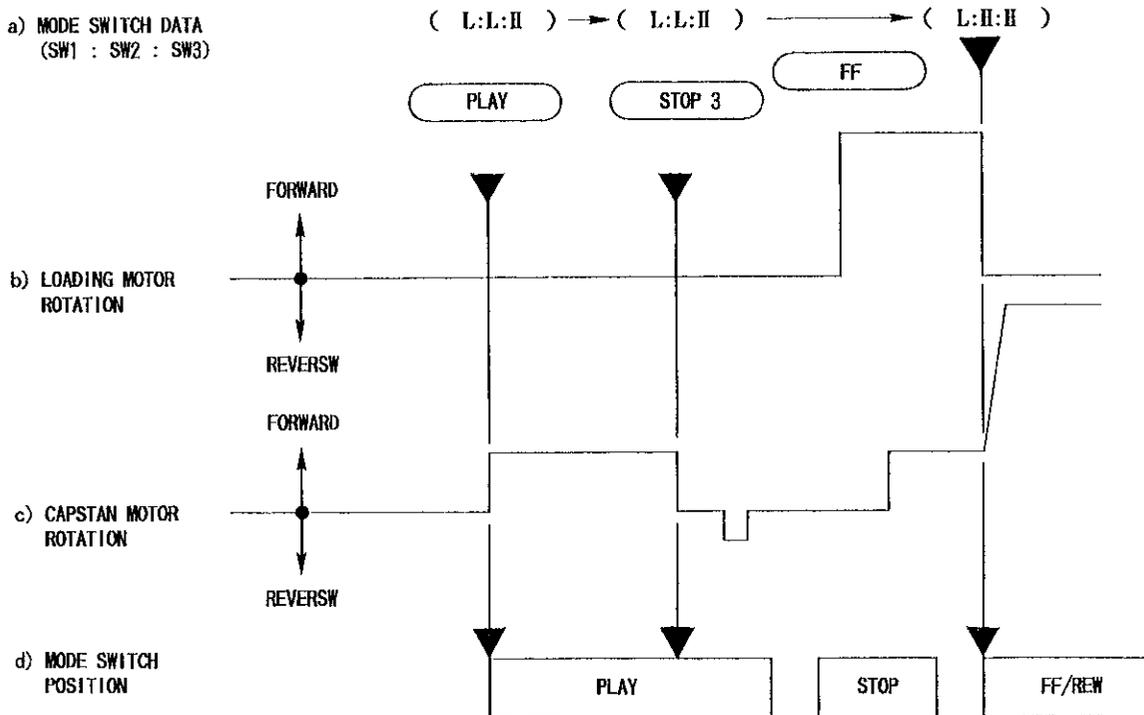


Fig. S12 Mechanical Mode Operation From PLAY TO FF

3. Serial Data/Clock Transmission Error Display

If the Serial Data/Clock is not transmitted from IC6001 to IC7501, "E9" is displayed as shown in Fig.T1. This indication will be displayed either during the Service Information Display mode or in normal mode.

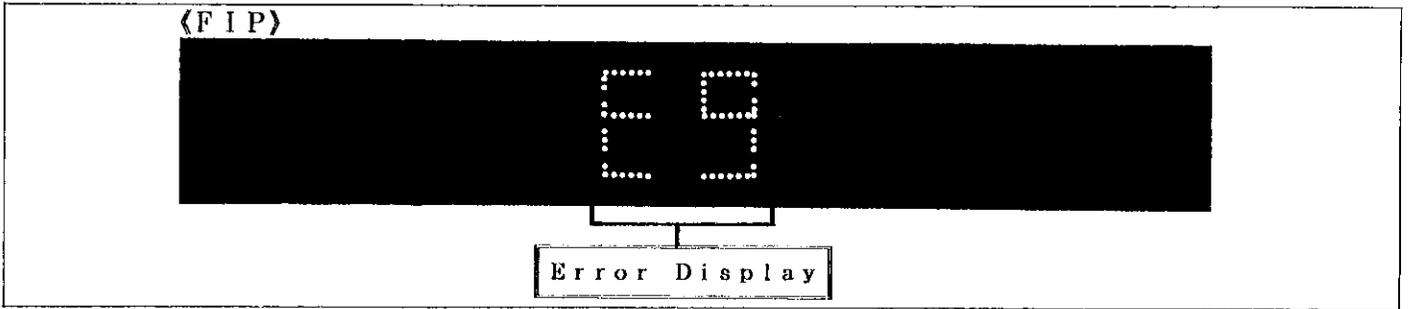


Fig. T1 Serial Data/Clock Transmission Error Display

4. Service Information Display

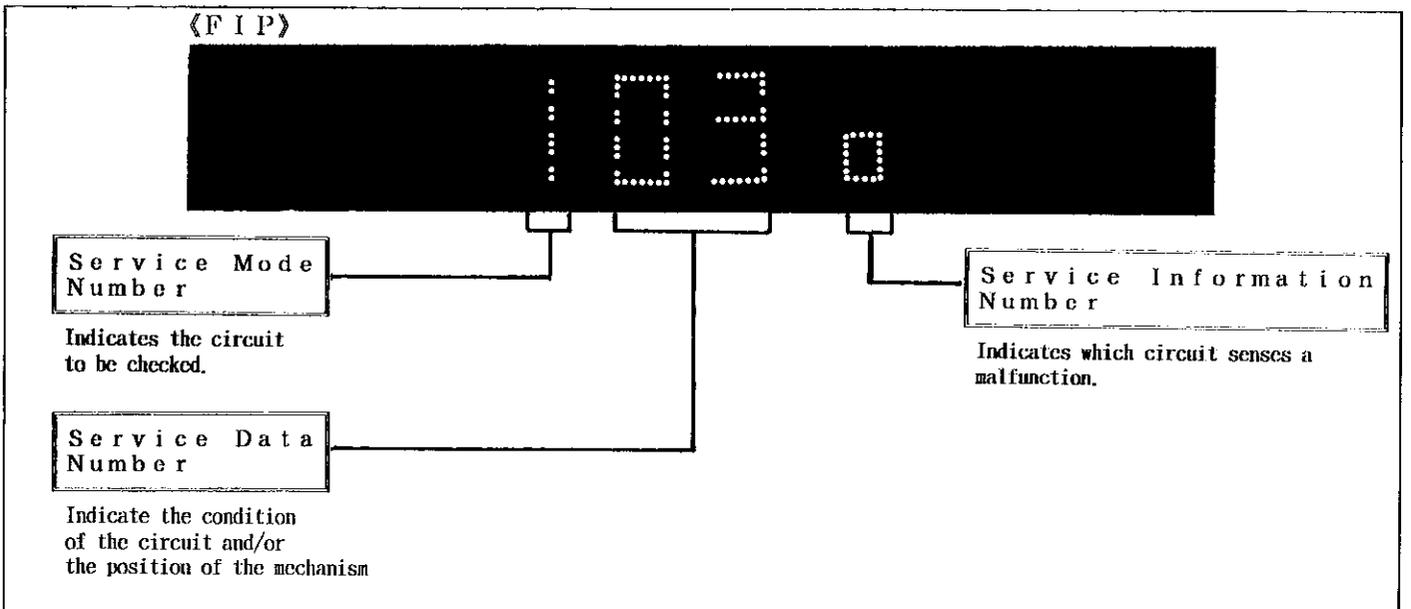


Fig. D1 Service Information Display

4-1. Purpose of Service Information Display

This information aids trouble shooting by indicating the source of the malfunction. The service mode number & service data number are used by the technician during repair while the service information can be used by the consumer to diagnose malfunctions allowing the technician to provide a more accurate repair cost estimate and reduce repair time.

In the Service Information Display, there are four digits divided into 3 functions. The first digit indicates which other 6 service modes that the unit is Currently in.

- MODE 1 : Check tape protection circuit
- MODE 2 : Check tape transport mechanism
- MODE 3 : Check mode switching operation
- MODE 4 : Check control buttons
- MODE 5 : Check capstan motor
- MODE 6 : Check cylinder motor

4-2. Turning on Service Information Display

There are two ways to turn on the Service Information Display.

- (1) Turn the Shuttle Ring to FF then push the Eject button. The Service Information will be displayed for 1 minute.
- (2) Connecting a jumper wire between TPSEV and TPGND will display the service information indefinitely.

The second and third digits are service data which indicate the condition of the circuit or mechanism being checked.

The fourth digit is the service Information display. It is to be used by the consumer to help determine the source of a malfunction. The service information display operates independently of the service modes and stores the fault indication in memory for as long as AC power is supplied.

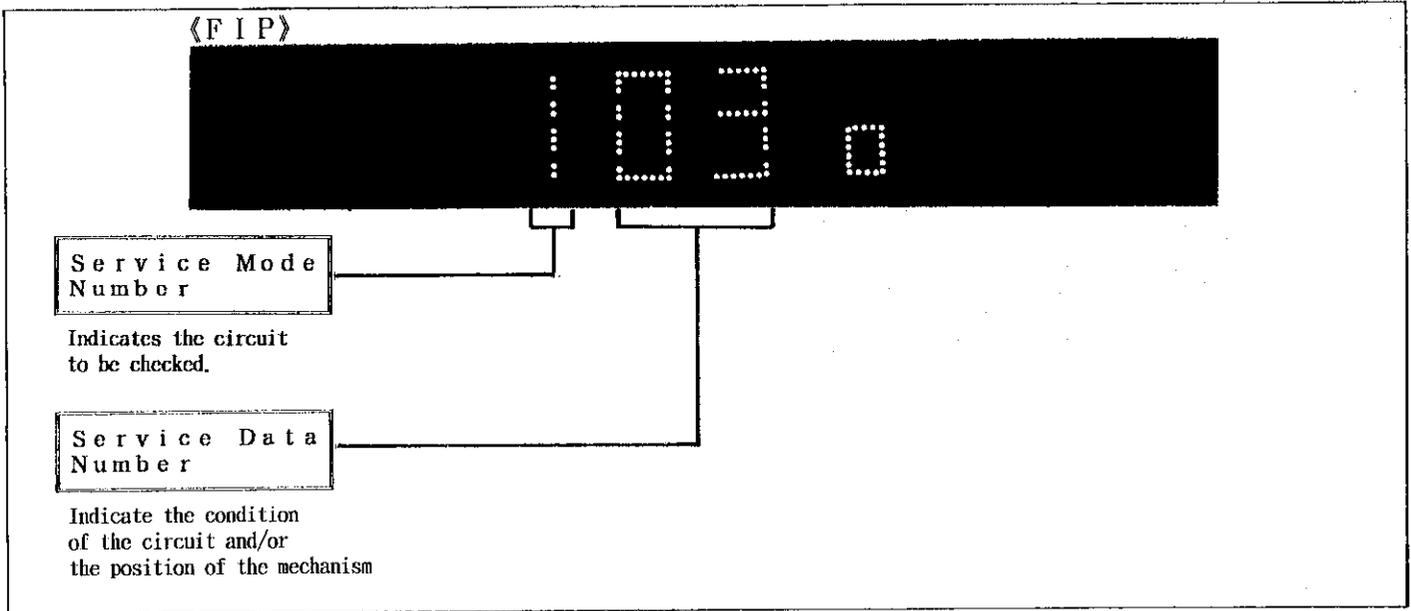


Fig. D2 Service Mode Number and Service Data Number on S.I.D.

- (1) Turn on Service Information Display.
- (2) To change Service Modes turn the shuttle ring to FF then push the Eject button.

(3) Mode 1 : Checks that the Sensor LED, Supply & Take-up Sensor circuits check the circuits by blocking the light from the Sensor LED to either or both Supply & Take-up Sensors.
 When the light is blocked to both sensors, "00" should be indicated on the service data number.
 When the light is blocked to the supply sensor, "01" should be indicated.



(4) Mode 2 : Checks the mode switch circuit while indicating mechanism position. Service Data Numbers indicate the position of the mode switch and there by the mechanism position.



(5) Mode 3 : Checks that mode switch circuit operations have been completed. Service Data Number should indicate "00" after each mechanism operation is completed.



(6) Mode 4 : Checks the operation circuit. Indicates if IC6001 receives the operating commands from the mode buttons and/or remote controller.



(7) Mode 5 : Checks the capstan motor circuit. Indicates if the IC6001 has received the command to rotate the capstan motor.



(8) Mode 6 : Checks the cylinder motor circuit. IC6001 has received the command to rotate the cylinder motor.



<NOTE>
 Refer to Fig.D5 for details of Service Data Number.

4-4. Service Information Number

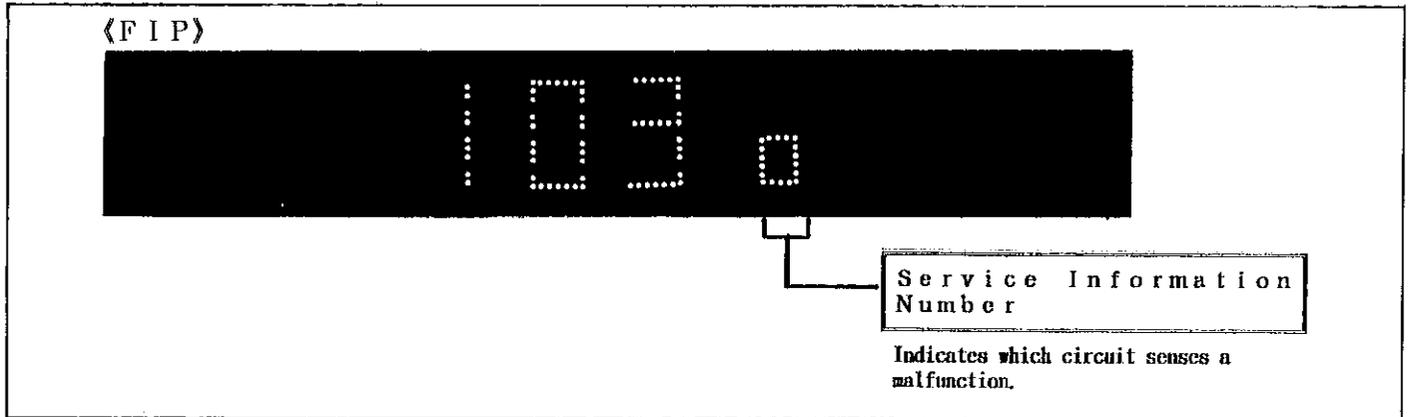


Fig. D3 Service Information Number on S.I.D.

Refer to Fig.D4 for details of Service Information Number.

Note:

The Service Information Number display is independent of the service mode display. The Service Information Number will be stored as long as AC power is supplied. If a second error occurs, the most current error will be displayed.

Service Information Number	Malfunction
0	Normal (No problem)
1	Cylinder stop
2	Tape reel stop
3	Stop at position other than 4 or 6
4	Stop during unloading
5	Falty capstan rotation
6	Stop during Cassette-In/Eject operation

Fig. D4 Service Information

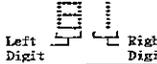
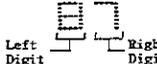
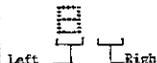
Service mode Number	Note for checking Service Data Numbers	Service Data Numbers	Indication	Remarks
1	_____	00	No light detected at either sensor	Tape not required
		01	Tape Begining. Light to Supply Photo Sensor is blocked.	
		02	Tape End. Light to Take-up Photo Sensor is blocked.	
		03	Light detected at both sensors.	
2	_____	00	EJECT	Tape Reuired *1 : STOP3 ; The Pinch Roller is on the capstan motor shaft. *2 : STOP ; The Pinch Roller is off the capstan motor shaft. Refer to Fig.D7 to Check mechanism Position and timing.
		01	Cassette-down	
		02	REV, REV SLOW	
		03	Loading/Unloading	
		04	PLAY/REC, STILL/PAUSE, CUE, FWD SLOW, STOP3 *1	
		05	STOP*2	
		06	FF/REW	
07	Intermediate position			
3	Disregard service data displayed until mechanism operation is completed. Then the display should indicate "00".	00	Any display other than "00" indicates a fault in the mode switch circuit or system.	Tape Required.
4	Display only when the operating button is pressed.	Refer to Fig.D6		Tape not required.
5	Left digit only, disregard Right digit display.		8, 9, u, A, -, n, L, and no display indicate that the Capstan motor "PLAY" command received by IC6001.	Tape required. If a symbol other than those listed is displayed, a malfunction in that circuit is indicated.
	Right digit only, disregard left digit display.		1, 2, 3, 4, 5, 6, 7, indicate that the Capstan motor CUE, FF, Forward slow" commands received by IC6001.	
	Right digit only, disregard left digit display.		8, 9, u, A, -, n, L, and no display indicate that the Capstan motor Reverse, Rew, Reverse Slow commands received by IC6001.	
6	Left digit only, disregard Right digit display.		1, 3, 5, 7, 9, A, n and no display indicate that the cylinder motor "ON" command received by IC6001.	Tape required. If a symbol other than those listed is displayed, a malfunction in that circuit is indicated.

Fig. D5 Service Data Display and Indication

SERVICE DATA NUMBERS	MODE BUTTONS	SERVICE DATA NUMBERS	MODE BUTTONS
37	OPERATE	54	RESET
01	EJECT	5	ZERO STOP
09	AUDIO DUB	-0	INPUT SELECT
A3	INSERT	49.40	INDEX
-9	PAL/MESECAM	A 1.92	TRACKING(+,-)/V-LOCK
---	CHECK/PROG.	9	REPEAT
34 or 35	^ V, +-	8	SKIP
---	NEXT/SP/LP	---	TAPE SELECT
---	SLEEP/SHIFT	---	PROG.
A4	TIMER REC	---	NEXT
08	REC	---	RECORDING SP/LP
---	CLOCK SET	---	CANCEL
---	TUNER PRESET	10	SU(1)
80	PAUSE/STILL	11	MO(2)
00	PLAY	12	TU(3)
00	STOP	13	WE(4)
0-, 07	JOG DIAL (FRAME ADV, REVERSE ADV)	14	TH(5)
03, 02	SHUTTLE RING (FF, REW)	15	FR(6)
---	TV/VTR	16	SA(7)
---	SCANNER ON/OFF	17	SU-SA(8)
---	TRANSMIT	18	MO-SA(9)
0	SEARCH	19	MO-FR(0)
EL	+ (REMOTE CONTROLLER)	3A	-/--
8	-- (REMOTE CONTROLLER)		
---	DISPLAY		

Fig. D6 Service Data Display for Service mode 4

4-5. Timing Chart from Mode SW to
System control IC6001

System control IC6001 senses the mechanism position through the Mode SW.
Fig.D7 shows the timing for Service Mode Number 2.

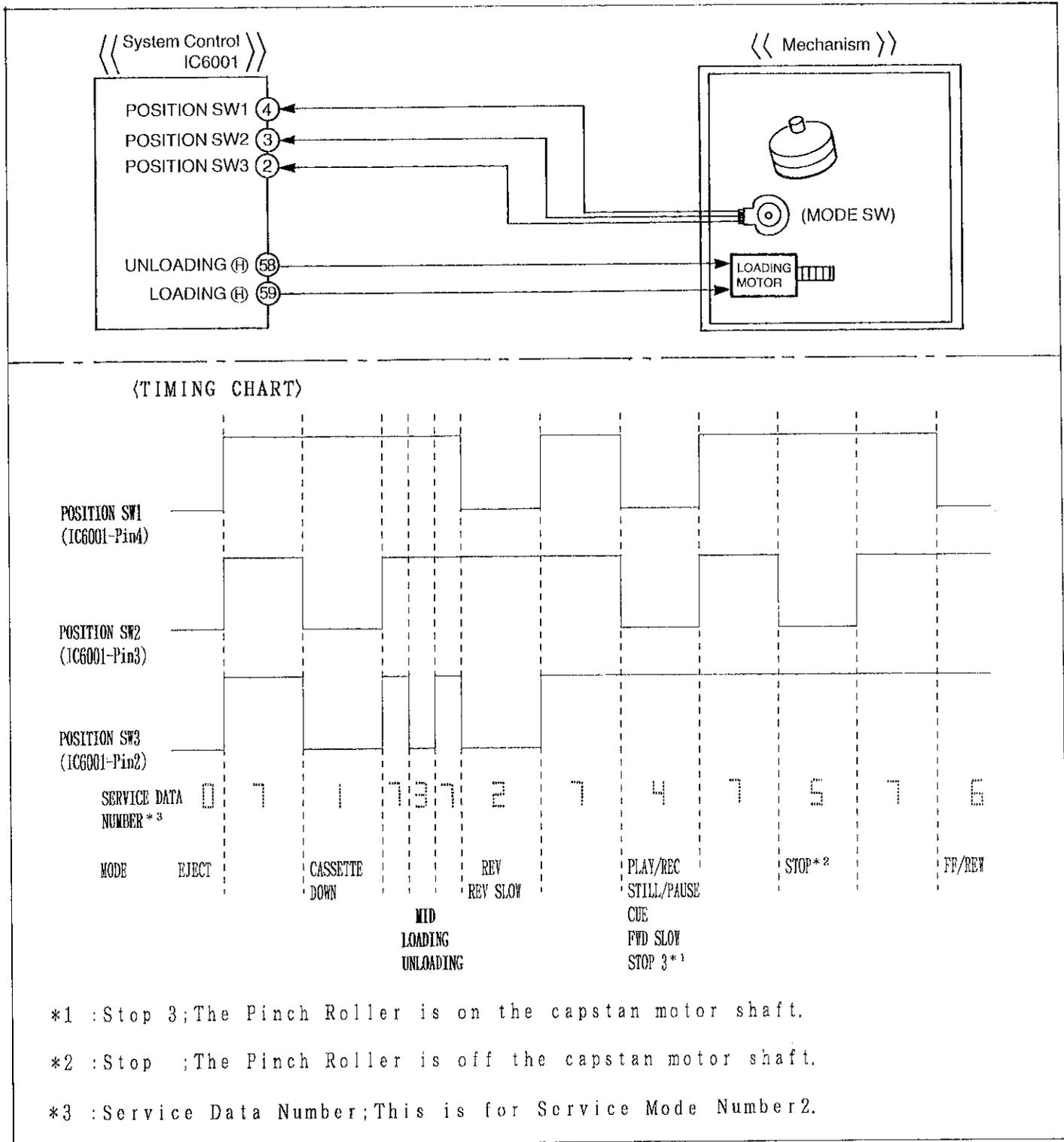


Fig. D7 Timing Chart of Mode SW

5. Parts Access Flow chart.
This chart shows the parts necessary to gain access to other parts.

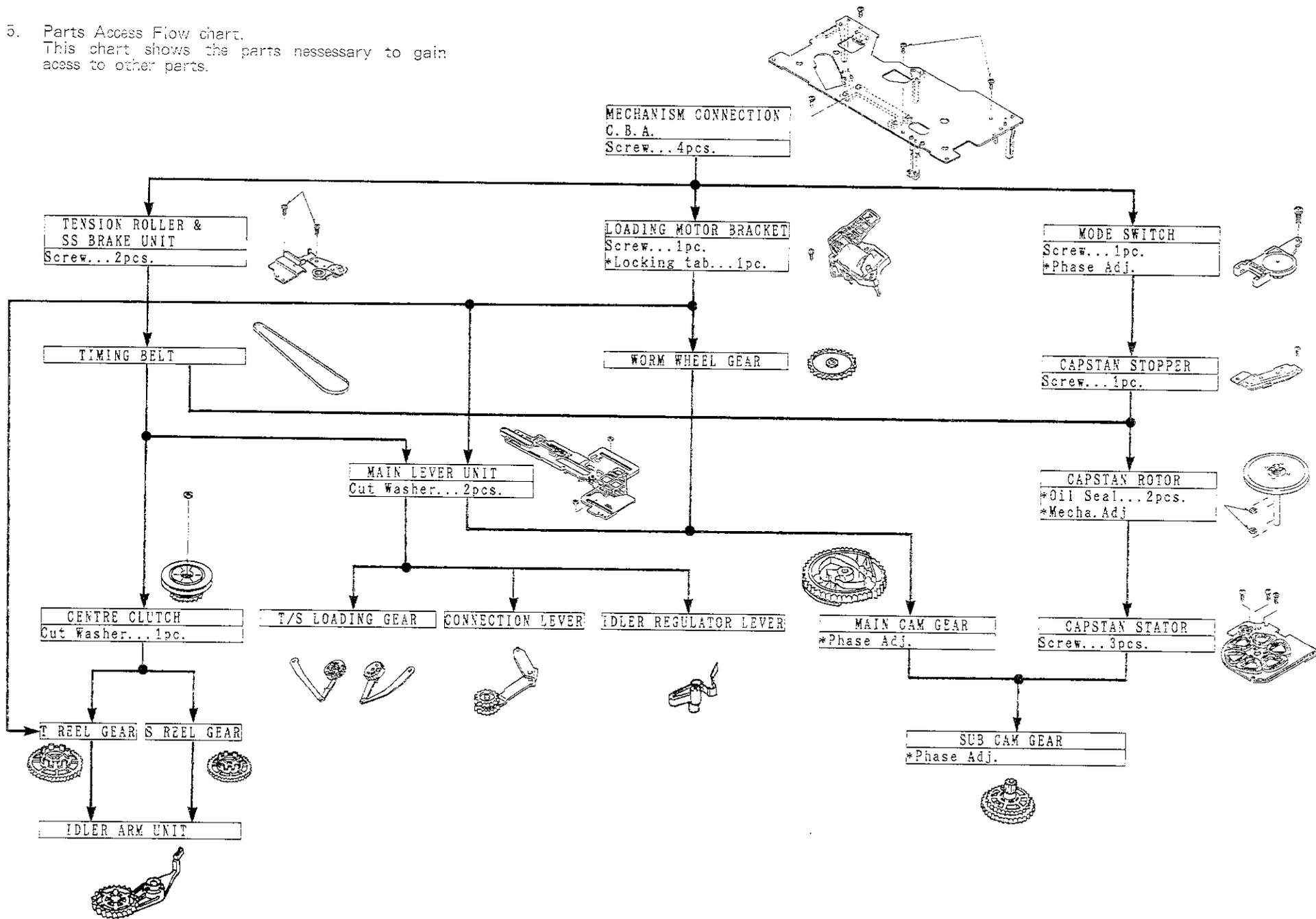
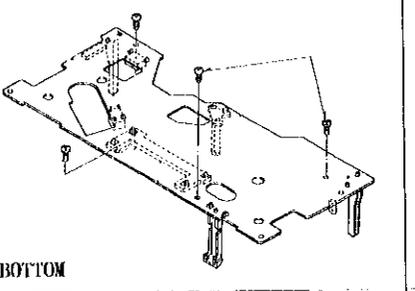
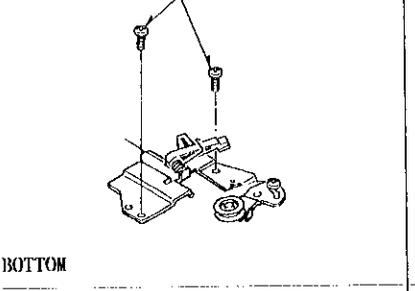
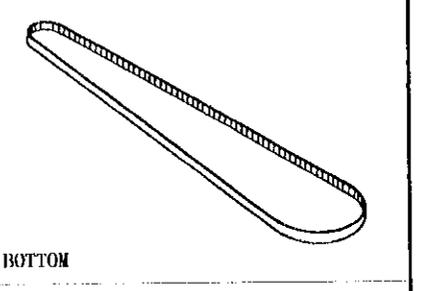
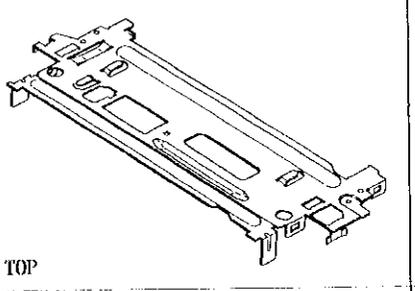
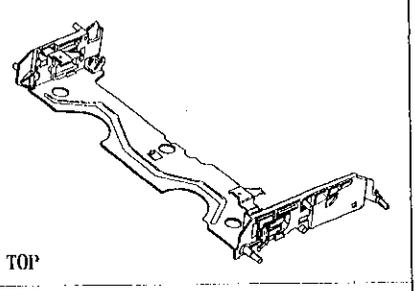
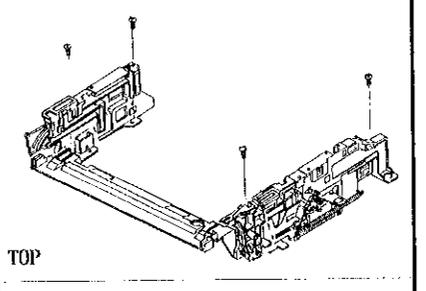
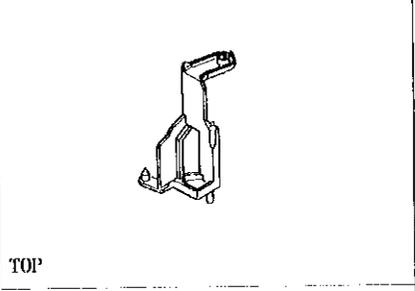
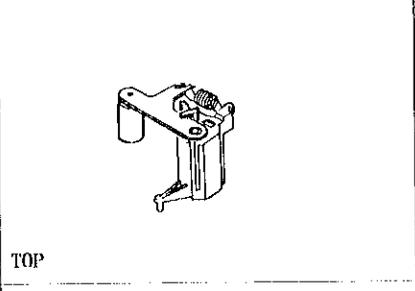
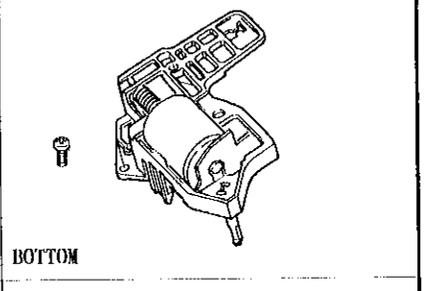
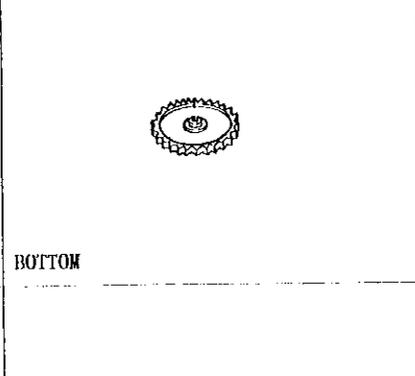
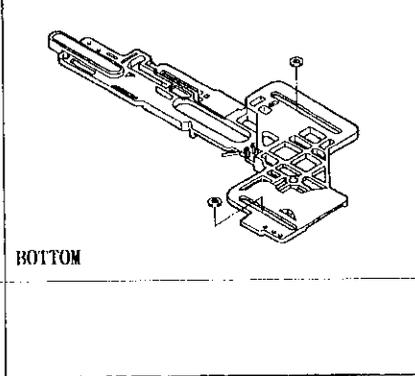
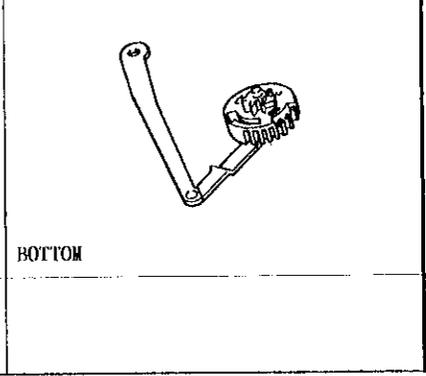
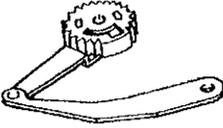
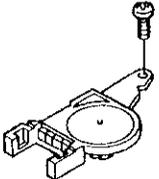
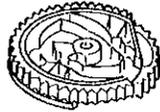
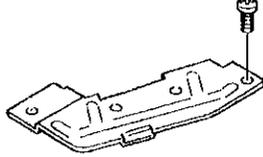
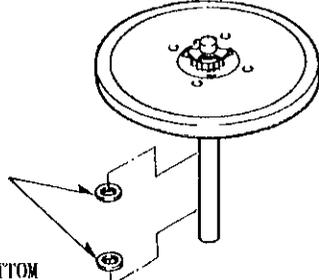
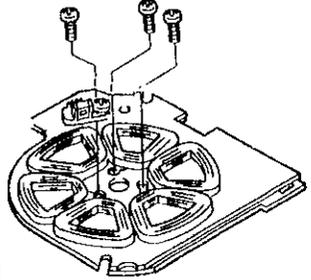
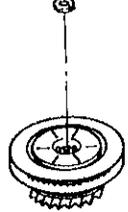
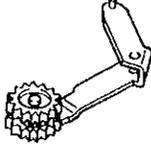
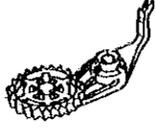
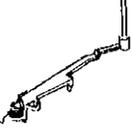
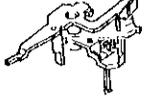


Fig. D8 Parts Access Flow Chart for Replacing.

6. Assembly/Disassembly Chart.
 When disassembling this mechanism, put the parts on this table. The number indicated on each part shown the order of disassembly.

<p>PARTS NAME</p> <p>PARTS & FIGURES</p> <p>REMARKS</p>	<p>1. MACHANISM CONNECTION C. B. A.</p>  <p>BOTTOM</p>	<p>2. TENSION ROLLER & SS BRAKE UNIT</p>  <p>BOTTOM</p>	<p>3. TIMING BELT</p>  <p>BOTTOM</p>
<p>PARTS NAME</p> <p>PARTS & FIGURES</p> <p>REMARKS</p>	<p>4. TOP PLATE</p>  <p>TOP</p>	<p>5. HOLDER PLATE</p>  <p>TOP</p>	<p>6. CASSETTE HOLDER</p>  <p>TOP</p>
<p>PARTS NAME</p> <p>PARTS & FIGURES</p> <p>REMARKS</p>	<p>7. OPENER PIECE</p>  <p>TOP</p>	<p>8. PINCH ARM UNIT</p>  <p>TOP</p>	<p>9. LOADING MOTOR BRACKET</p>  <p>BOTTOM</p>
<p>PARTS NAME</p> <p>PARTS & FIGURES</p> <p>REMARKS</p>	<p>10. WORM WHEEL GEAR</p>  <p>BOTTOM</p>	<p>11. MAIN LEVER UNIT</p>  <p>BOTTOM</p>	<p>12. TAKE-UP LOADING ARM</p>  <p>BOTTOM</p>

PARTS NAME	13. SUPPLY LOADING ARM	14. MODE SWITCH	15. MAIN CAM GEAR
PARTS & FIGURES			
	BOTTOM	BOTTOM	BOTTOM
REMARKS			
PARTS NAME	16. CAPSTAN STOPPER	17. CAPSTAN ROTOR	18. CAPSTAN STATOR
PARTS & FIGURES			
	BOTTOM	BOTTOM	BOTTOM
REMARKS			
PARTS NAME	19. SUB CAM GEAR	20. CENTER CLUTCH	21. IDLER REGULATOR LEVER
PARTS & FIGURES			
	BOTTOM	BOTTOM	BOTTOM
REMARKS			
PARTS NAME	22. CONNECTION LEVER UNIT	23. TAKE-UP REEL GEAR	24. SUPPLY REEL GEAR
PARTS & FIGURES			
	BOTTOM	BOTTOM	BOTTOM
REMARKS			

PARTS NAME	25. IDLER ARM UNIT	26. P5 POST STOPPER	27. P5 STOPPER BASE
PARTS & FIGURES			
	BOTTOM	TOP	TOP
REMARKS			
PARTS NAME	28. PINCH CAM GEAR	29. P5 ARM UNIT	30. TAKE-UP REEL
PARTS & FIGURES			
	TOP	TOP	TOP
REMARKS			
PARTS NAME	31. TAKE-UP TENSION REGULATOR ARM UNIT	32. TAKE UP BRAKE ARM UNIT	33. CARRIAGE CONNECTION GEAR
PARTS & FIGURES			
	TOP	TOP	TOP
REMARKS			

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