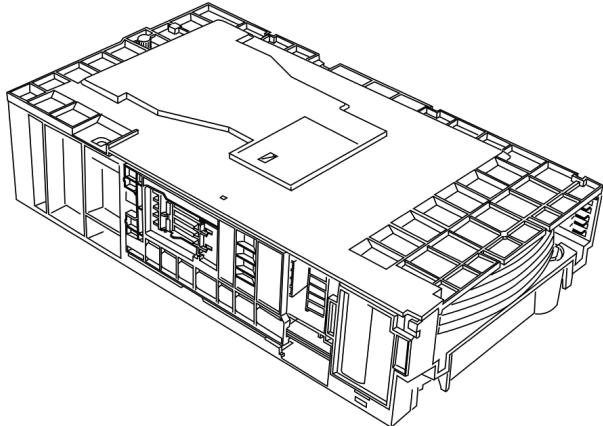


# Service Manual

## Mechanism Unit

### CRS1



#### ⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

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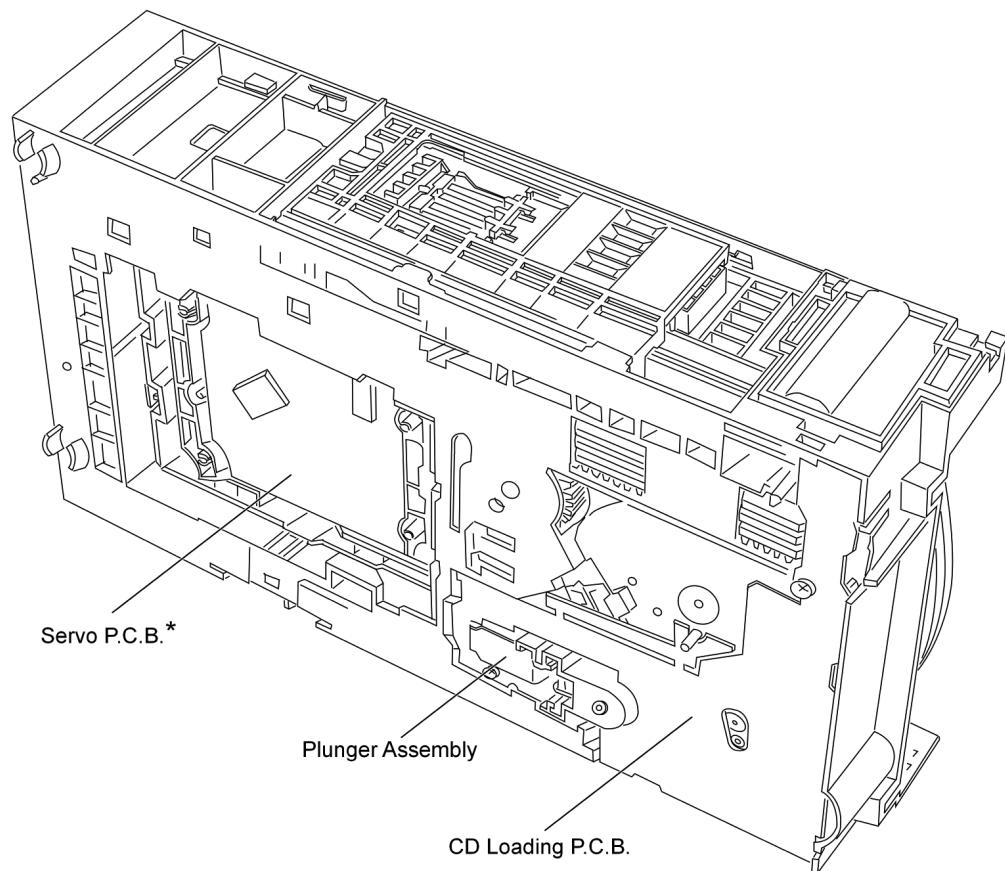
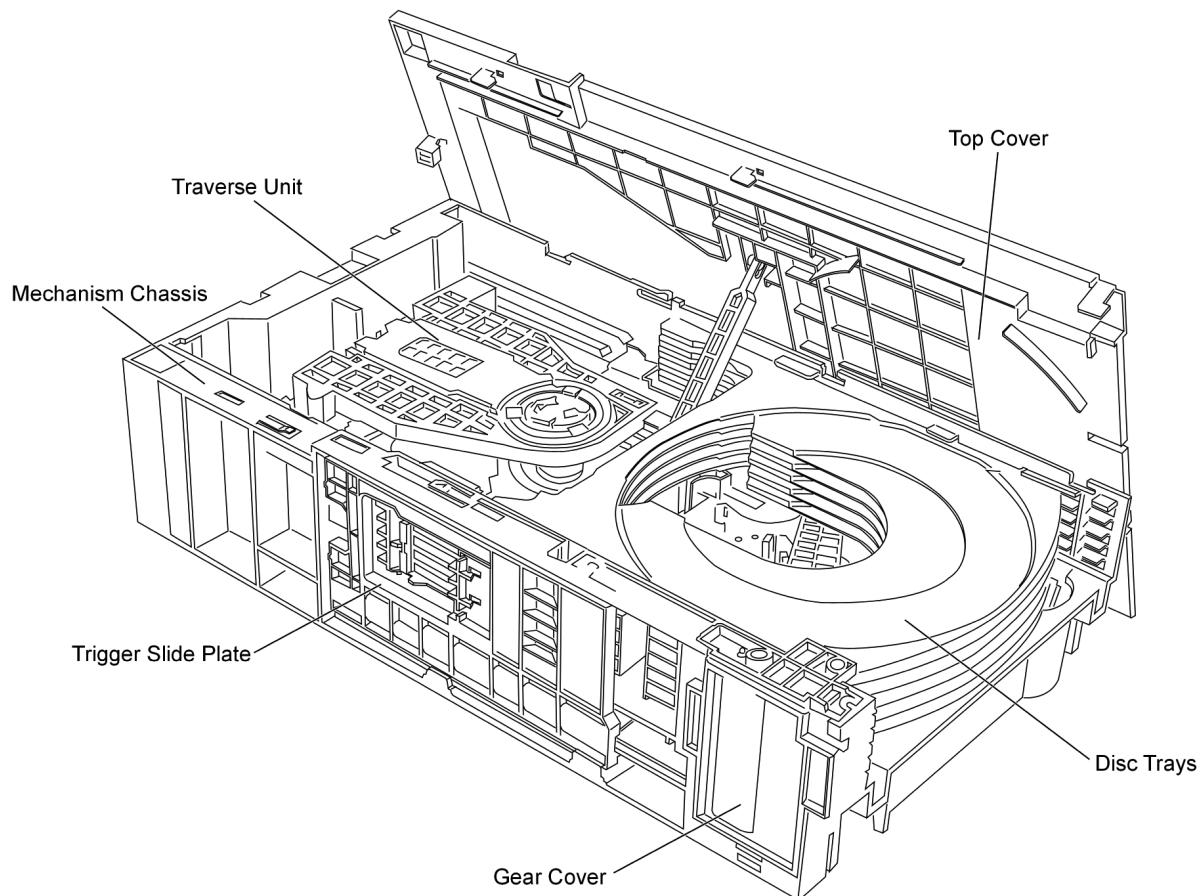
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# Panasonic

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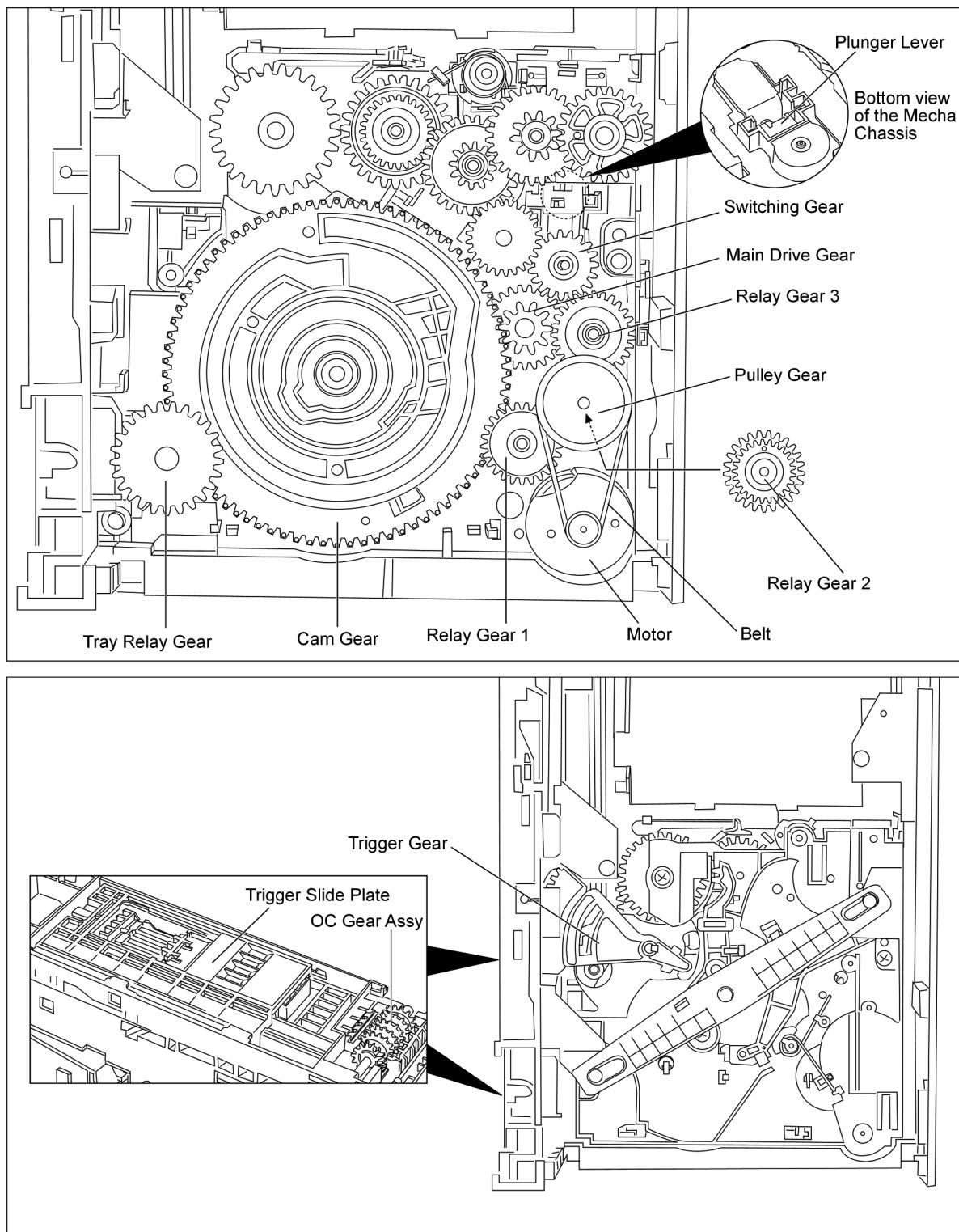
# 1 Mechanism Overview



\* Illustration for CD Servo P.C.B. (Applied models: SA-AK240/340/640 series)

## 2 Mechanism Drive Unit

### 2.1. Tray Open/Close and Multi-Discs Change operations



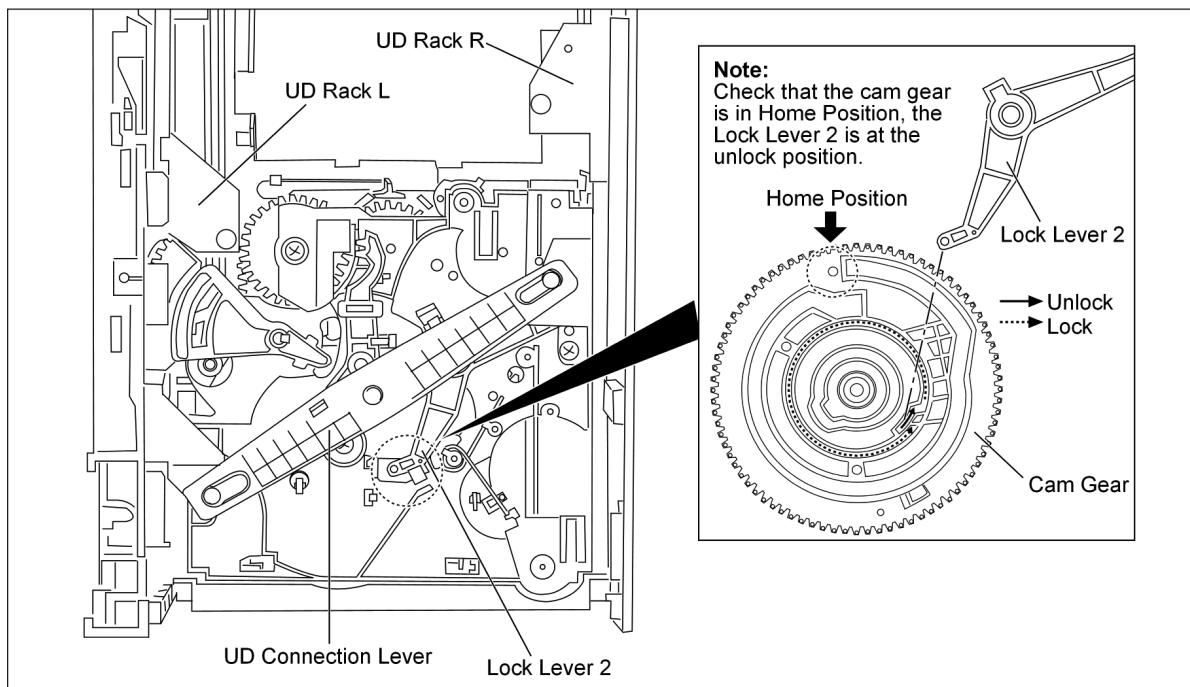
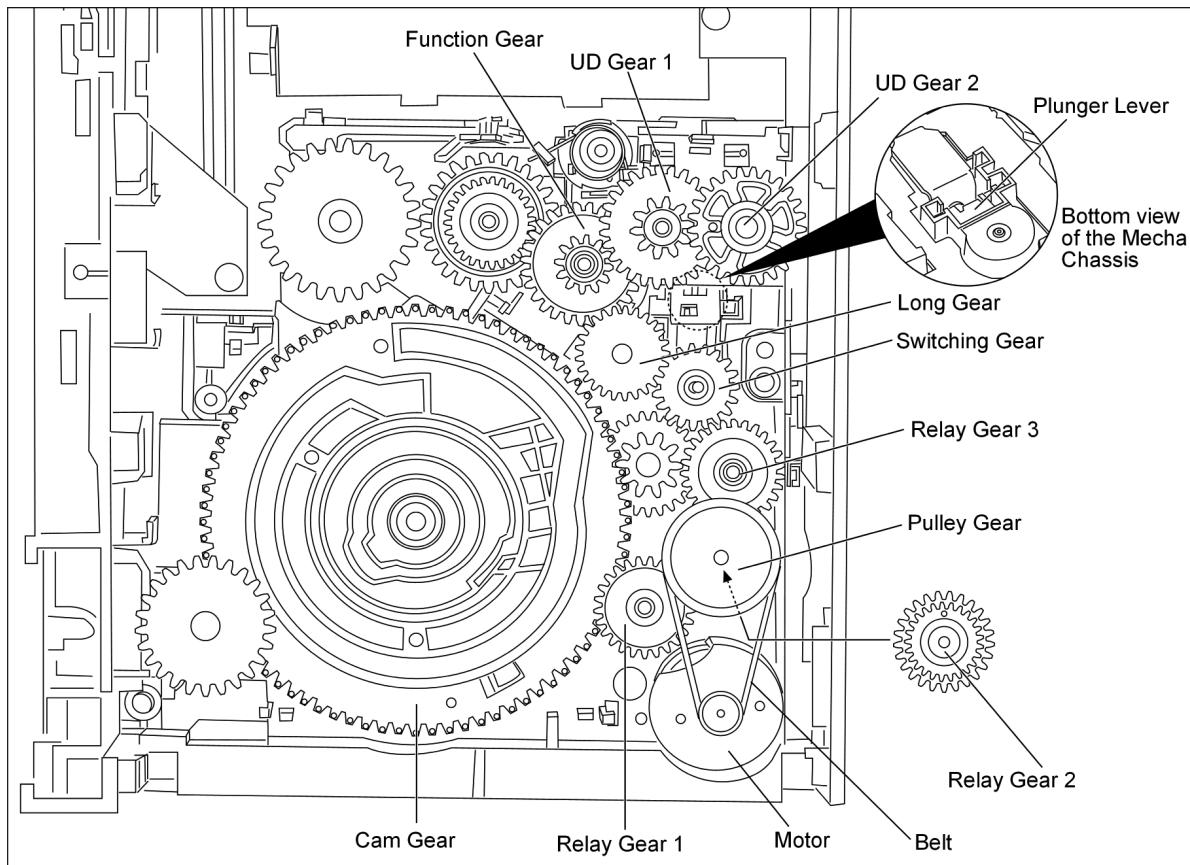
#### 2.1.1. Description of tray open/close and multi-discs change operations

1. The motor turns in the clockwise direction and the rotation is transmitted via the belt, the pulley gear also turns clockwise.
2. The relay gear 1 turns counterclockwise.
3. The relay gear 2 turns clockwise.
4. The relay gear 3 turns counterclockwise.
5. The switching gear at down position turns clockwise (up/down position functioned by the plunger lever).
6. The main drive gear turns counterclockwise.

7. The cam gear turns clockwise, which is engaged with the trigger gear and slide plate, are driven, causes the tray lock lever unlock.
8. The tray relay gear turns counterclockwise, which is engaged with the OC assy, is driven.
9. The movement of the OC assy releases the disc trays.

(The operation of the disc trays closed is the opposite of that for opening of disc trays.)

## 2.2. Disc Selection operation



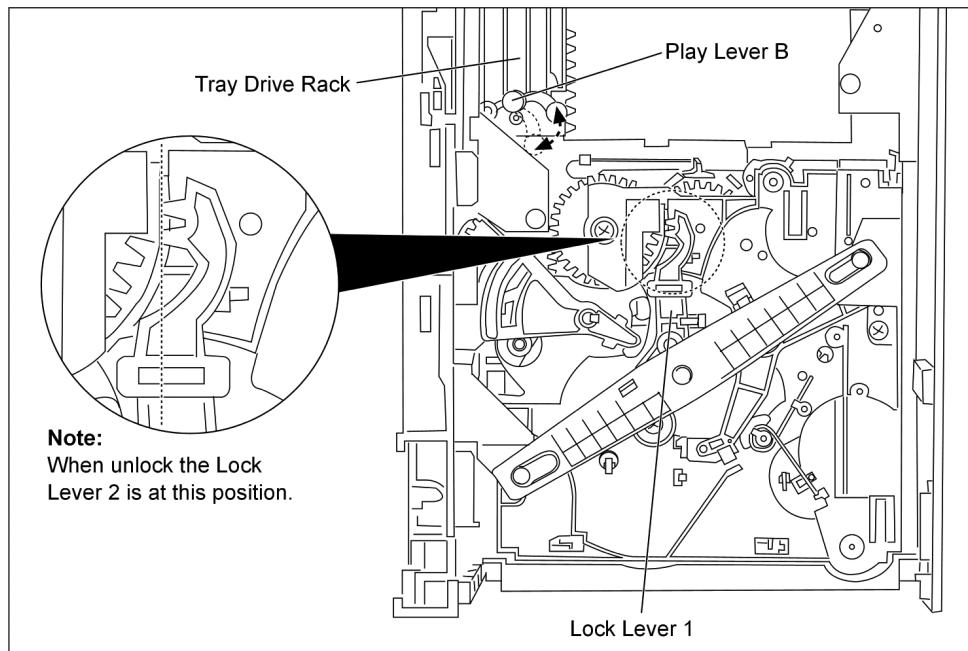
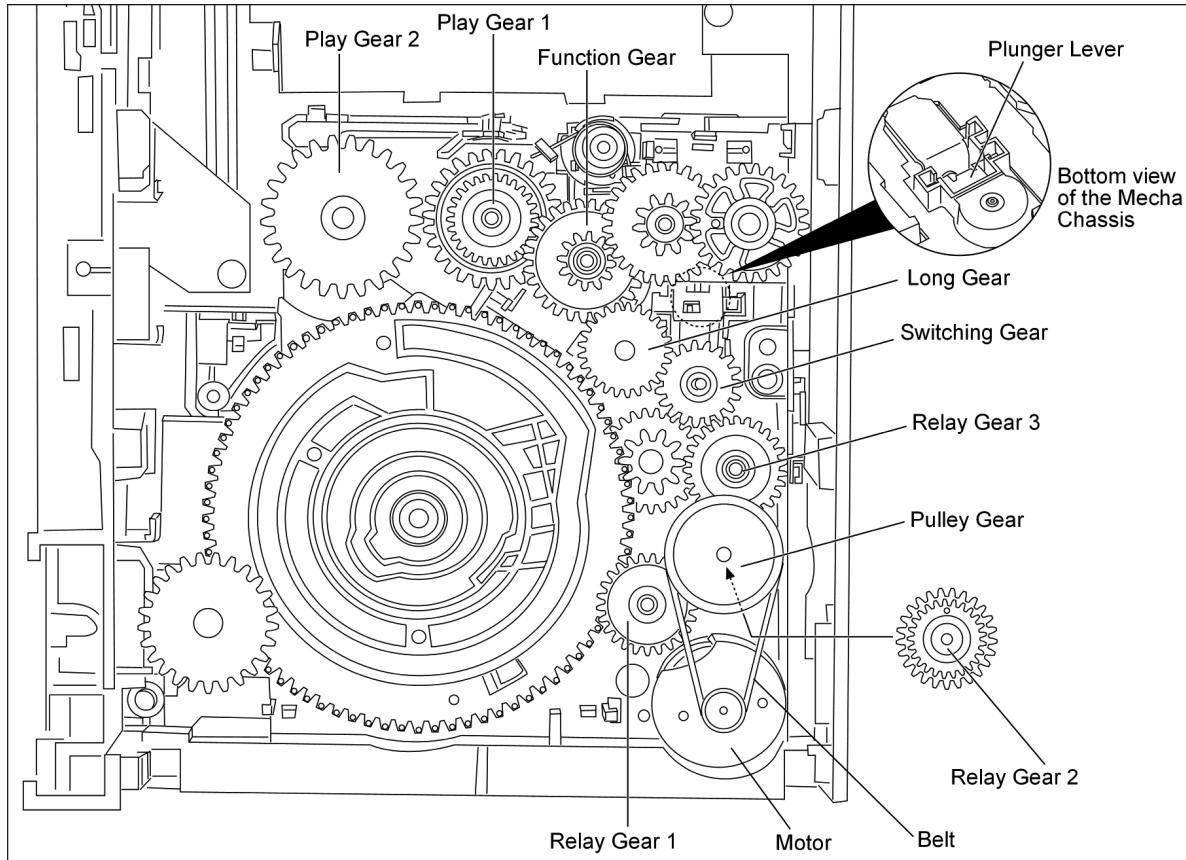
## 2.2.1. Description of disc selection operation

**Note: Check that the cam gear is in “HOME” position.**

1. The motor turns in the clockwise direction and the rotation is transmitted via the belt, the pulley gear also turns clockwise.
2. The relay gear 1 turns counterclockwise.
3. The relay gear 2 turns clockwise.
4. The relay gear 3 turns counterclockwise..
5. The switching gear move up turns clockwise (up/down position functioned by the plunger lever).
6. The long gear turns counterclockwise.
7. The function gear moved up turns clockwise.
8. The UD gear 1 turns counterclockwise.
9. The UD gear 2 turns clockwise engaged with the UD rack R drives the UD connection lever turns clockwise, UD rack L, is driven to move the traverse deck assembly up.

**(The operation of the traverse deck assembly down is the opposite of that for the traverse deck assembly up.)**

## 2.3. Play/Stop operation



### 2.3.1. Description of play/stop operation

**Note: Check that the Lock Lever 1 is unlock.**

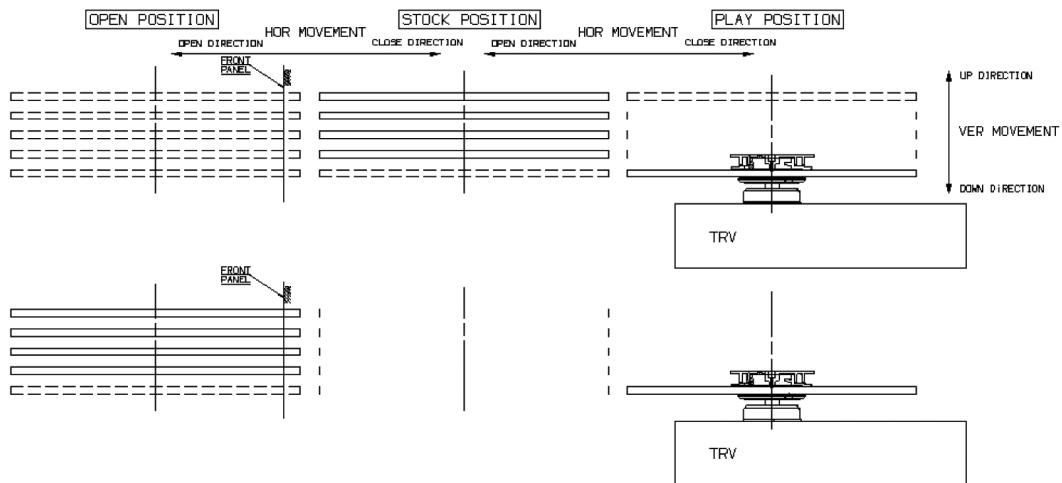
1. The motor turns in the clockwise direction and the rotation is transmitted via the belt, the pulley gear also turns clockwise.
2. The relay gear 1 turns counterclockwise.
3. The relay gear 2 turns clockwise.
4. The relay gear 3 turns counterclockwise.
5. The switching gear move up turns clockwise (up/down position functioned by the plunger lever).
6. The long gear turns counterclockwise.

7. The function gear move down turns clockwise.
8. The play gear 1 turns counterclockwise.
9. The play gear 2 turns clockwise engaged with the tray drive rack and tray catch lever to push in the disc trays.
10. Play lever B engaged with the traverse deck assembly's play lever A, causes slide plate move towards to the play position.

### 3 Mechanism Operation Description

#### 3.1. General Feature

- This is a five disc changer mechanism for CD/DVD. The outline figure is shown below.



- The mechanism has "**CHANGE WHILE PLAY**" function. It open other trays for disc exchanging while one tray is at PLAY position performing recording or reproducing.
- The mechanism can quickly change all trays with "**CHANGE ALL**" function. All trays can be move to OPEN position with one operation.
- There is no sensor to indicate presence of disc on any tray.

#### 3.2. Hardware composition

- Below is the hardware components of the mechanism

Name	Function
Open Switch (OPEN-SW)	The switch is used to detect normal tray opening
	The switch is used for detect tray being manually push/trigger when full open
Home Switch (HOME-SW)	Is used to detect cam gear home position
Close Sensor (CLOSE-SENSOR)	Used for normal single tray closing
	Used to detect cam gear rotate to Play Driving position
Play Switch (PLAY-SW)	Detect TRV clamping complete position
Stocking Switch (STOCK-SW)	Detect tray completely transfer for play position to stocking position
UD Sensor (UD-SENSOR)	Detect TRV vertical movement position
Top Switch (TOP-SW)	Detect a default position of TRV vertical movement position
Driver IC	To drive Motor
Motor	Main driving source for changer
Plunger	Switching the driving source from motor to: <ol style="list-style-type: none"> <li>1. Tray open/close</li> <li>2. Drive tray to play/stock position and TRV vertical movement</li> </ol>

#### 3.3. Mechanism Operation

- This mechanism has the following state:

1. Driving of a tray to open/close
2. Up/down operation of a traverse performs a state changes of tray.

By using the plunger to lift/release of a switching gear, and the cam gear to lift/release the function gear the motor can be link to several gear trains to perform various operations.

- The functions that can be perform in this mechanism are described as below:

Condition	Explanation
Open current playing tray	The state to change current playing disc. All tray will be open at once and current tray at PLAY position will be expose.
Open All	The state where all trays being driven to OPEN position. The disc can be taken in or out from tray to tray by close tray one by one from top to bottom.
Stock	The state where the trays are stored in STOCK position
Play	The state where one of the tray 5 trays is being driven to PLAY position and clamped by traverse unit

Condition	Explanation
Play & Open Tray-*	The state where one of the tray is in playing position performing recording or reproducing, other trays can be used (OPEN position) for disc exchanging without stopping the recording or reproducing process.
Change	The state when one of the opened tray being driven from OPEN position to STOCK position and other opened trays remain still at OPEN position.
Close All	The state where all open trays will be driven from OPEN position to STOCK position, one by one from top to bottom

Note: \* represent tray number (from 1 ~ 5)

- Logics of motor control:

Action	CW	CCW	Plunger
Tray Opening	H	L	L
Tray Closing	L	H	L
Cam move from Home Position to Play Driving Position	H	L	L
Cam move from Play Driving Position to Home Position	L	H	L
Drive tray to PLAY position	H	L	H
Drive tray to STOCK position	L	H	H
UD base moving upward	H	L	H
UD base moving downward	L	H	H

#### Notes :

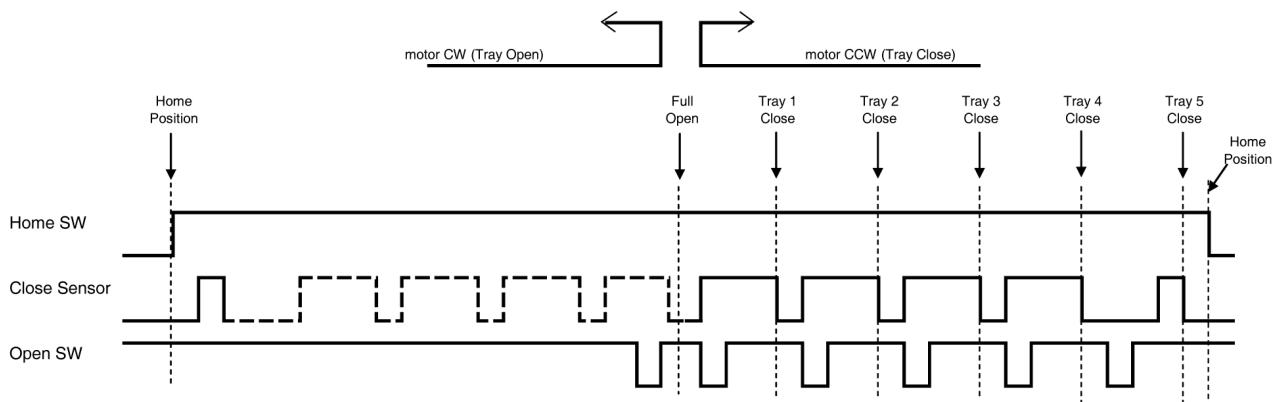
CW/CCW : Motor direction control (CW : clockwise, CCW : Anti-clockwise)

Plunger : Solenoid Control (H : ON = Activation)

- Cam gear in the mechanism use for opening/closing of trays and lifting a function gear to link to gear train that drive UD base moving up/down. When cam gear is being driven to play driving position, the function gear will be bring down to link the gear train that drive tray to and from STOCK position and PLAY position. Below are the relation between mechanism function and cam gear movement and position

Motor Direction	Plunger Unit	Cam gear movement/position	Function
CW	Release	Home SW → rotate CW	Trays Open
CCW	Release	Rotate CCW → Home SW	Trays Close
CW	Release	Home SW → close sensor 1st L-H signal	Cam gear move from Home Position to Play Driving Posi
CCW	Release	Close sensor 1st (H → L) signal → Home SW	Cam gear move from Play Driving Position to Home Position
CW	Up	Cam Stop at Home Position	UD base moving from bottom to top
CCW	Up	Cam Stop at Home Position	UD base moving from top to bottom
CW	Up	Cam Stop at Play Driving Position	Tray move from STOCK to PLAY position
CCW	Up	Cam Stop at Play Driving Position	Tray move from PLAY position to STOCK Position

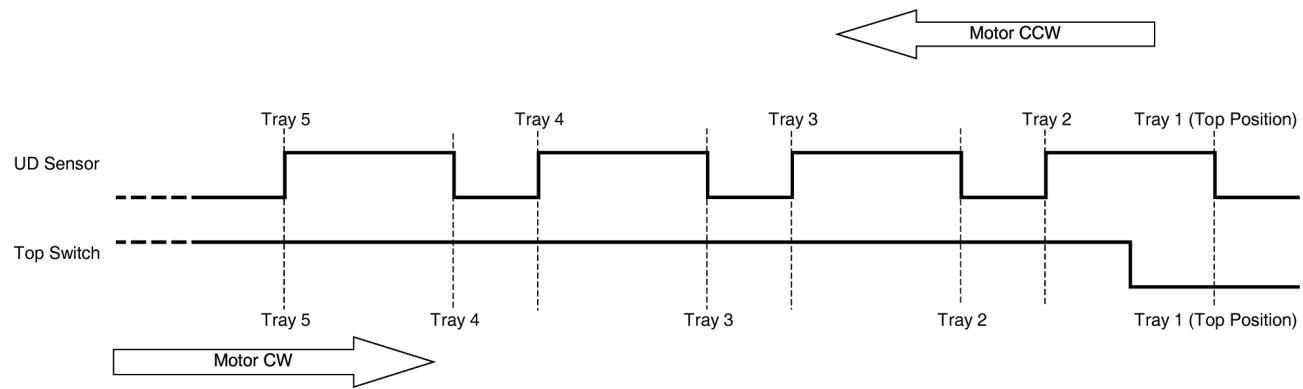
- Cam gear rotation direction, switch and state changes is show in figure below:



- The movement of UD base (vertical up/down) and driving of tray(s) between STOCK position and PLAY position is only enable when plunger ON (lift up the switching gear to link driving source to the both gear train). Only one gear train can be driven at one time, the selection of either gear train is depending on cam gear position. Below are figure showing the operation of motor driving direction and its function carry out.

Motor	Cam Gear	
	Home Position (UD Driving Position)	Play Driving Position
CW	UD base move upwards direction 5→1	Stock → Play
CCW	UD base move downwards direction 1→5	Play → Stock

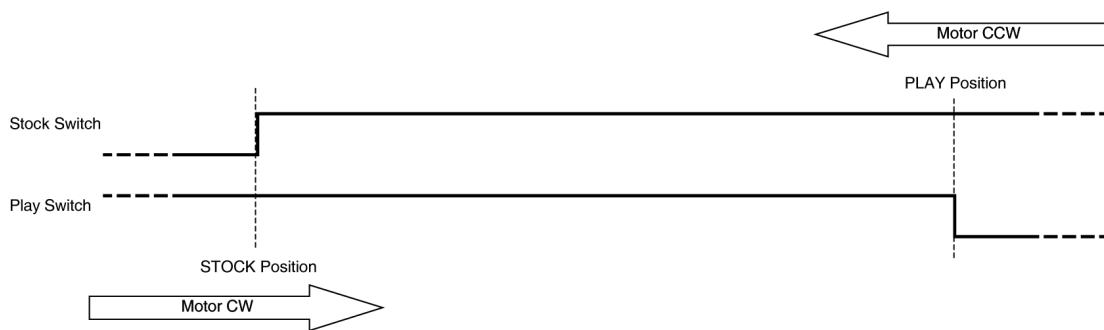
- For driving UD base up/down the cam gear must be at the home position (UD driving position) and plunger need to be activated, the switch and state change is as figure below:



**\*Condition**

- i. Cam gear at HOME position
- ii. Plunger activated (H)

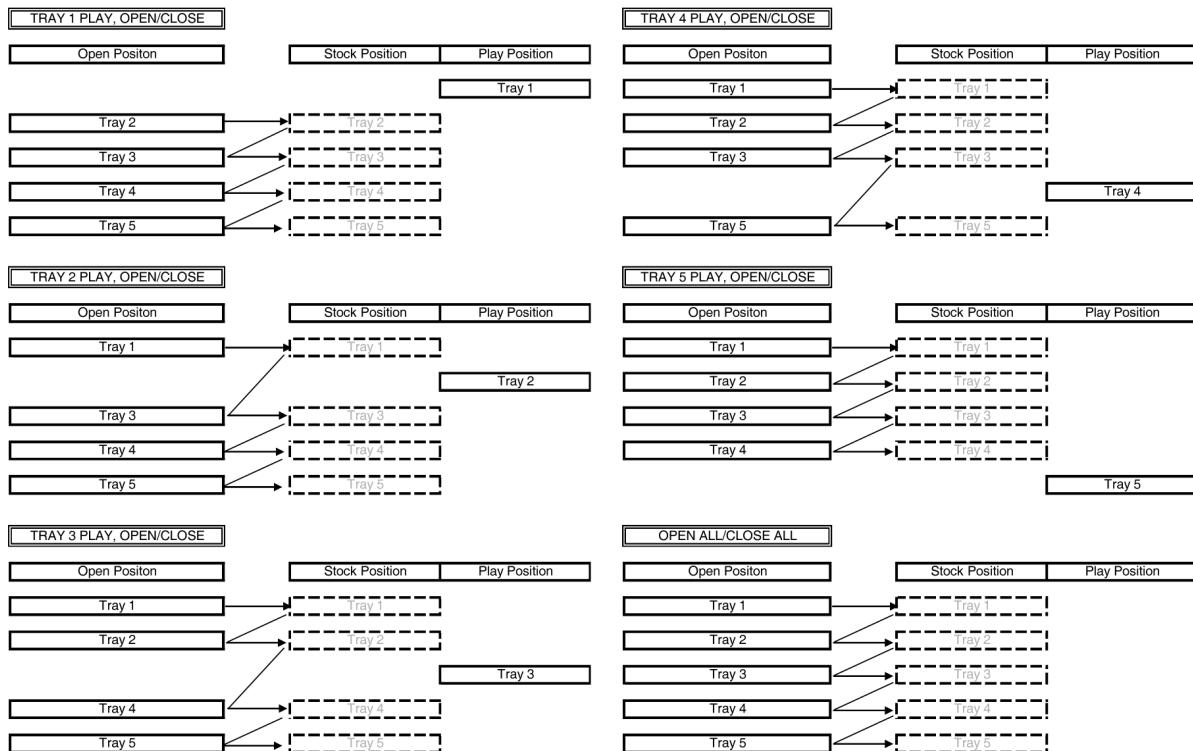
- To drive the tray(s) between STOCK/PLAY position, cam gear must be at the play driving position and plunger need to be activated, the switch and state change is as figure below:



**\*Condition**

- iii. Cam gear at Play Driving position
- iv. Plunger activated (H)

- The mechanism tray opening and closing is cycle process. It is able to open all trays in STOCK position while one of the tray is in PLAY position. The closing can be done one by one or close all at once depend on the user instruction. Below show the tray opening and closing flow.



### 3.4. Switches Chattering Check

- Each input shall perform chattering check processing.

OPEN-SW	2ms Periodic sampling. It logic-decides by continuation same 5 times.
PLAY-SW	2ms Periodic sampling. It logic-decides by continuation same 5 times.
STOCK-SW	2ms Periodic sampling. It logic-decides by continuation same 5 times.
TOP-SW	2ms Periodic sampling. It logic-decides by continuation same 5 times.
HOME-SW	2ms Periodic sampling. It logic-decides by continuation same 5 times.
UD-SENSOR	2ms Periodic sampling. It logic-decides by continuation same 5 times.
CLOSE-SENSOR	2ms Periodic sampling. It logic-decides by continuation same 5 times.

### 3.5. Motor Movement Control

Condition	Motor	
	CW	CCW
Free	L	L
Rotate CW	H	L
Rotate CCW	L	H
Short Brake	H	H

### 3.6. Plunger Timing Chart

- Plunger is use for pulling the lever that a switching gear is sit on the lever. When current supply to the plunger to pulling (kick) switching gear, it will be lift up to engage to 1<sup>st</sup> gear train. When current supply to plunger is cut off (release), switching gear will be bring done by gravity force and mechanical coil spring on top of it. Plunger use for connect the driving source from motor to 2 different gear train in the mechanism, the functions of the gear trains are as below:

1. Tray open/close
2. Drive tray to play/stock position and TRV vertical movement

- The plunger movement is define as below:

Kick = H, Release= L

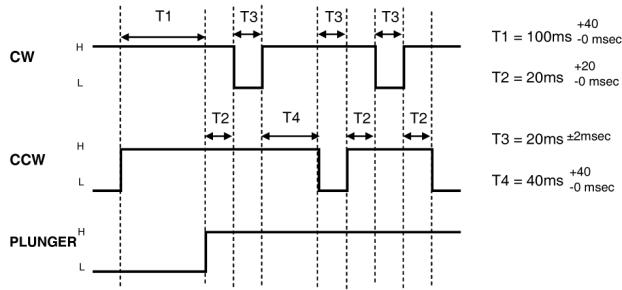
- Each time during plunger activation time (Kick/Release), the motor shall perform a short time CW and CCW rotation for release the gear side force and ensure complete gear to gear engagement.

- The basic concept of the motor rotation sequence (CW or CCW) is base on the initial and final motor rotating direction. The direction should be opposite to the initial and final motor driving direction in order to:
  1. To release the gear teeth side force
  2. To release mechanism belt tension
  3. To ensure switching gear disengage or engage into other gear's teeth

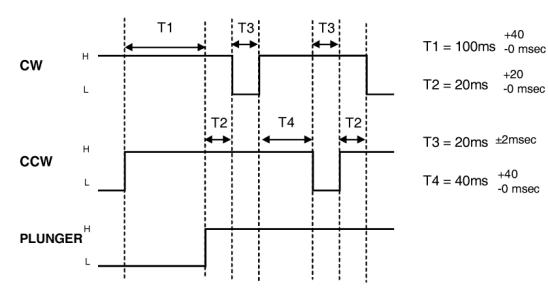
- Summary of the type of motor short rotation direction is as below:

Motor Direction	Initial	Short Rotate Direction			Final	Switching Mode
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>		
Plunger Kick	CW	CCW	CW	CCW	CW	A
		CCW	CW	-	CCW	B
	CCW	CW	CCW	-	CW	C
		CW	CCW	CW	CCW	D
Plunger Release	CW	CCW	CW	CCW	CW	E
		CCW	CW	-	CCW	F
	CCW	CW	CCW	-	CW	G
		CW	CCW	CW	CCW	H

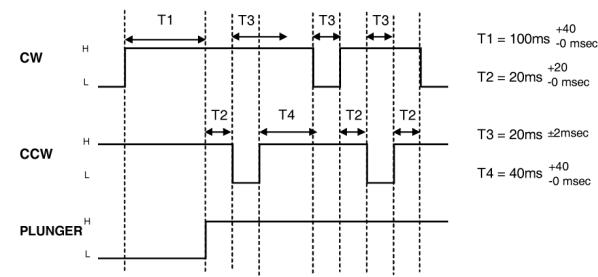
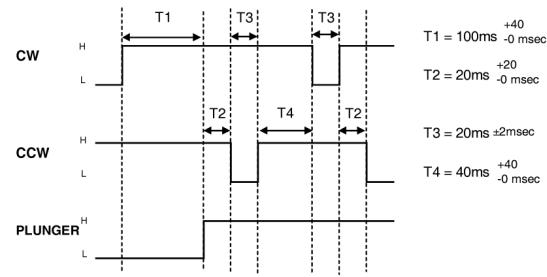
- Below are the timing charts of plunger activation time.



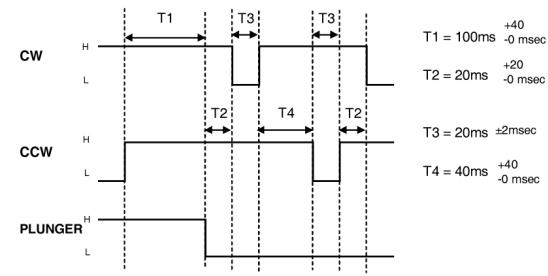
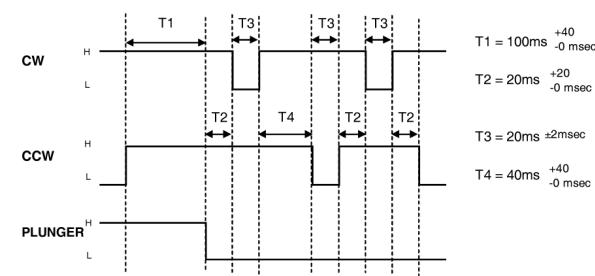
Switching Mode A



Switching Mode B

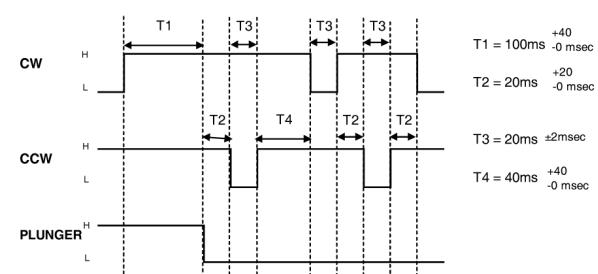
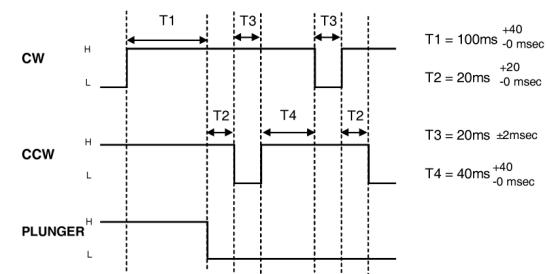


Switching Mode C



Switching Mode D

Switching Mode E



Switching Mode F

Switching Mode G

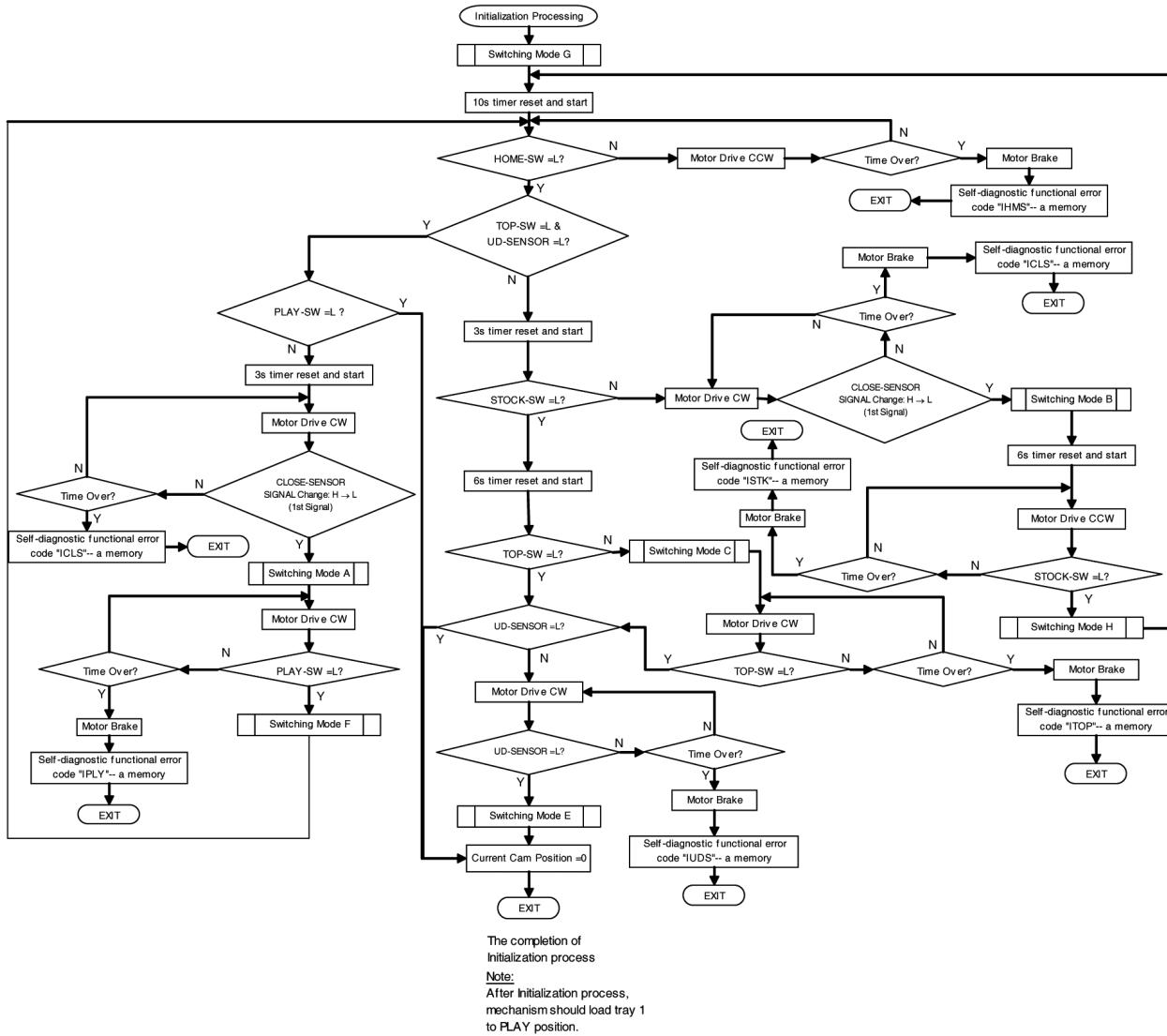
- As the plunger only activate at 2 position of cam gear. The plunger mode summary as below:

Switching Position	Initial Motor Direction	Switching Mode	Initial Motor Direction	Function
Home Position	Cam gear rotate CCW to HOME Motor : <b>CCW</b>	C	UD base move from bottom to top Motor : <b>CW</b>	Tray selection from bottom to top
	Cam gear rotate CCW to HOME Motor : <b>CCW</b>	D	UD base move from top to bottom Motor : <b>CCW</b>	Tray selection from top to bottom
	UD base move from bottom to top Motor : <b>CW</b>	E	Cam gear rotate CW from HOME to Play Driving Position. Motor : <b>CW</b>	After tray selection, cam gear rotate to Play Driving Position
	UD base move from top to bottom Motor : <b>CCW</b>	G	Cam gear rotate CW from HOME to Play Driving Position. Motor : <b>CW</b>	After tray selection, cam gear rotate to Play Driving Position
Play Driving Position	Cam gear rotate CW from HOME to Play Driving Position. Motor : <b>CW</b>	A	Drive tray from STOCK position to PLAY position. Motor : <b>CW</b>	Load tray to Play
	Cam gear rotate CW from HOME to Play Driving Position. Motor : <b>CW</b>	B	Drive tray from PLAY position to STOCK position. Motor : <b>CCW</b>	Unload tray from Play to Stock
	Drive tray from STOCK position to PLAY position. Motor : <b>CW</b>	F	Cam gear rotate CCW from Play Driving Position to HOME. Motor : <b>CCW</b>	After load tray to Play, cam gear return to HOME
	Drive tray from PLAY position to STOCK position. Motor : <b>CCW</b>	H	Cam gear rotate CCW from Play Driving Position to HOME. Motor : <b>CCW</b>	After unload tray from Play, cam gear return to HOME
	Drive tray from PLAY position to STOCK position. Motor : <b>CCW</b>	G	Cam gear rotate CW from until trays full open. Motor : <b>CW</b>	Open trays while one tray Play

- Switching mode G is used during initialization to ensure that the switching gear is at the release (down) condition before the initialization process begins.

### 3.7. Initialization of Mechanism Unit.

- Mechanism Initialization** -- This mechanism is designed to operate & set to a pre-defined position to prevent malfunction when unavoidable circumstances happen. For examples: user mis-handling during transportaion or abnormal user operations. This is comply to the product shipping reliability standards.
- Mechanism is initialized when the mechanism controller is unable to detect the present condition/state of mechanism. For example, when the microcomputer carries out a cold start. (In complete unit)
- Once the initialization process is completed, the mechanism unit is set to this condition:-
  1. Tray 1 is at PLAY position (Top tray)
  2. The traverse unit is at clamping condition (PLAY SW-L)
  3. All the remaining trays are in STOCK Position (Trays 2 ~ 5 )
  4. Plunger lever at release condition
  5. Cam gear is at Home position ( HOME SW-L)
  6. Motor is free (CW-L, CCW-L)
- Note: This is same as shipment condition. (In complete unit)
- Below is the flow chart of the initialization process:-



### 3.8. Mechanism "HOME" position

- Mechanism HOME position is a starting position for few functions, such as below:

1. Load tray from STOCK position to PLAY position
2. Unload tray from PLAY position to STOCK position
3. Open trays
4. Driving UD base up/down

- Besides this, it will always return to "HOME" position after performing below functions:

1. After tray completely clamped by Traverse unit
2. Closing All trays
3. Closing tray 5
4. After completely the UD base movement

- There are 2 type of mode to go to HOME position.

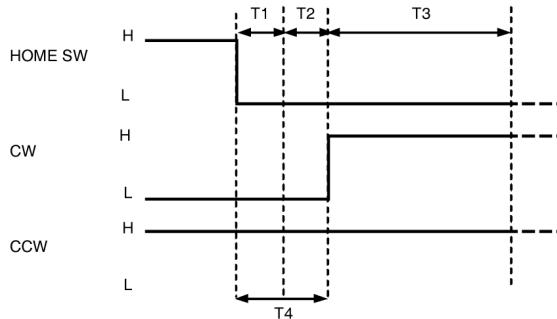
Mode 1 is to go to HOME position and motor brake and stay at HOME position, motor need longer brake time for reduce overrun of mechanical parts.

For Mode 2, after mechanism go to HOME position, motor immediately rotate reverse direction to go do loading/unloading processing, shorter brake time necessary to reduce the total mechanism operation time.

The table below is types of "GO HOME" mode and operation that use it.

GO HOME MODE 1	GO HOME MODE 2
1. After loading tray to PLAY position	1. After closing all trays (no tray at PLAY position)
2. After unloading tray to STOCK position	
3. After closing all trays (one tray at PLAY position)	

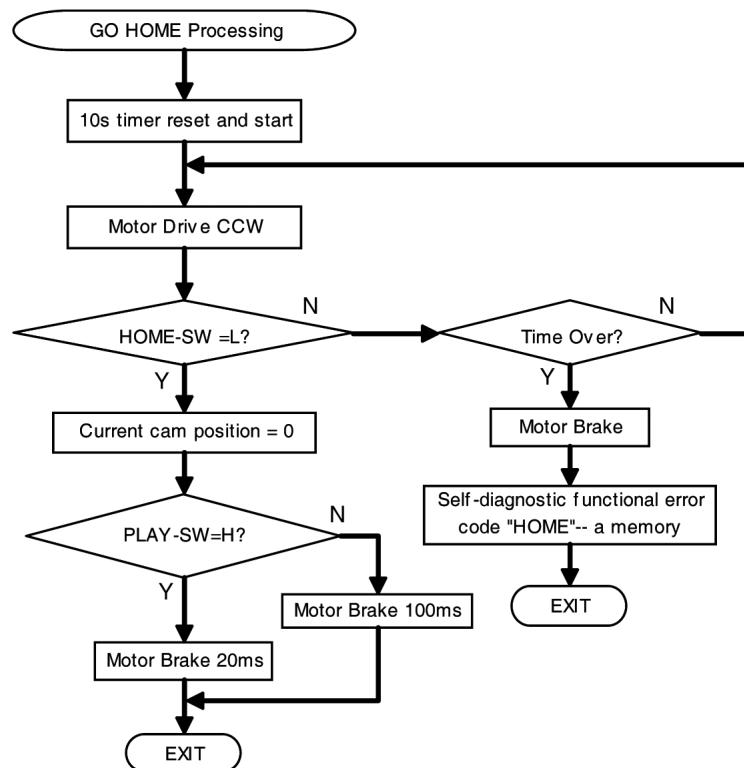
- The timing chart for the mechanism to set to "HOME" position is illustrated as below.



$T1$ : Chattering Check =  $10\text{ ms}_{-0}^{+2\text{ms}}$   
 $T2$ : Motor Wait Time =  $10\text{ ms}_{-0}^{+2\text{ms}}$   
 $T3$ : Short Brake =  $100\text{ ms} \pm 10\text{ms}$  (PLAY-SW=L)  
 $T3$ : Short Brake =  $20\text{ ms} \pm 10\text{ms}$  (PLAY-SW=H)  
 $T4$ :  $T1+T2 = 20\text{ ms}_{-0}^{+4\text{ms}}$

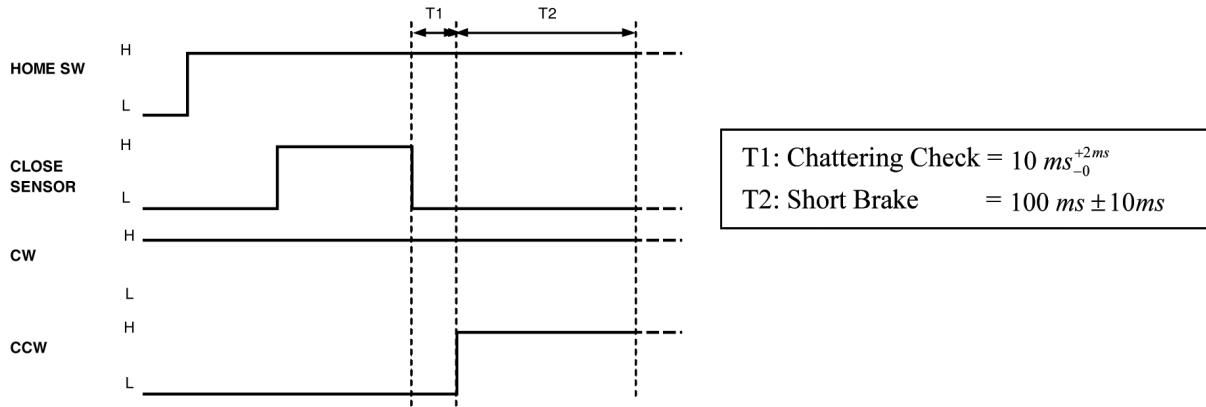
Note:  $T2$  is time for motor free run for ensure HOME switch at stable ON condition.

- Below is the flow chart for the mechanism to set to "HOME" position.

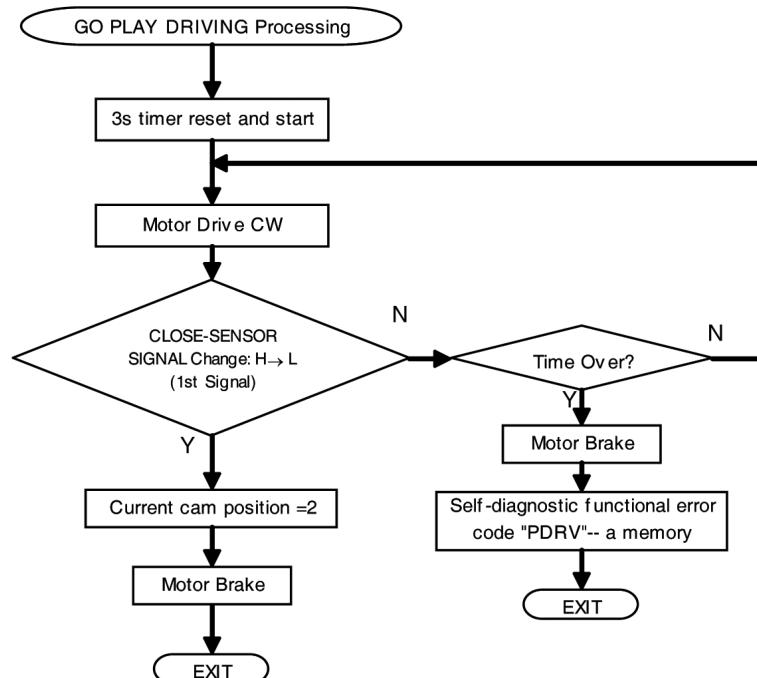


### 3.9. Mechanism "Play Driving" position

- Play driving position is a position driving source linkage to drive the tray(s) between STOCK position and PLAY position (load and unload of tray). Cam gear will rotate to this position from HOME position, and after the completion of clamping process will back to HOME position.
- For Go to Play Driving position, cam gear move from HOME position, motor brake after detect 1<sup>st</sup> time CLOSE sensor signal change from H→L



- Below is the flow chart for the mechanism to set PLAY DRIVING position.



## 3.10. Trays Operation

### 3.10.1. Tray 'Open' Operation

- Changer mechanisms are required to open trays to load a disc. This mechanism features an "All Open" or "Change all one by one" function for quick & easy disc change. There are 3 kinds of "Tray Open" conditions.

#### 1. All trays open

Occurs when OPEN/CLOSE button is pressed, playing tray will be driven to STOCK position and all trays will driven to OPEN position. All trays will remain open until "DISC CHANGE" or "OPEN/CLOSE" is pressed. When "DISC CHANGE" is pressed, the upper most tray will close while "OPEN/CLOSE" is close all trays.

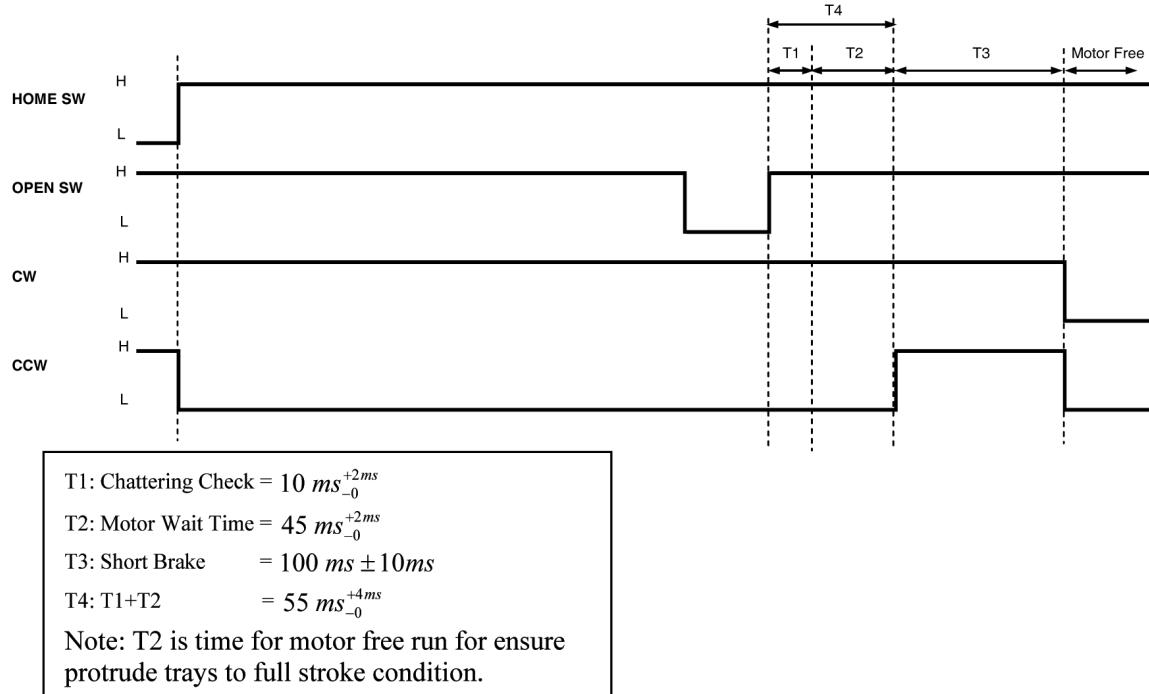
#### 2. Open selected tray while one tray at PLAY position

Occurs when specify tray is selected to be opened while one tray is at PLAY position. This operation never disturbs the playing disc operation and allow user to change desire disc on specific tray.

#### 3. Direct open playing tray

Occurs only when the user selects to open playing tray. Tray at PLAY position will stop recording/reproducing process and being driven to STOCK position. This will follow by driven all trays to OPEN position and trays closing until the previous playing tray expose for disc changing. Example: User press "DISC CHANGE" + "DISC 3". Mechanism opens all the trays, then closes trays 1 & 2 respectively exposing the tray 3.

- The timing chart for both positions is the same, motor rotate CW direction, until OPEN SW changing signal H→L→H, motor need to continue run for 45ms.
- Motor free at the end of tray open, this is for enable the tray to be manually pushing by user.
- Below is the timing chart for tray opening.



- For all type of trays opening, either 4 trays (open remaining) or 5 trays (all open) will be set to OPEN position.

### 3.10.2. Tray Closing Operation

- The following action is tray closing. For this mechanism, there are 3 types of trays closing also.

#### 1. All trays close

When user press "OPEN/CLOSE" after trays open, all trays (at any condition) will be driven to STOCK position.

#### 2. Auto Tray Close

This closing operation is an internal operation in the mechanism. This operation completes the open selected tray function. Mechanism uses this operation to drive trays that cover top surface of desire tray to STOCK position and then expose the selected tray for user to do disc exchanging.

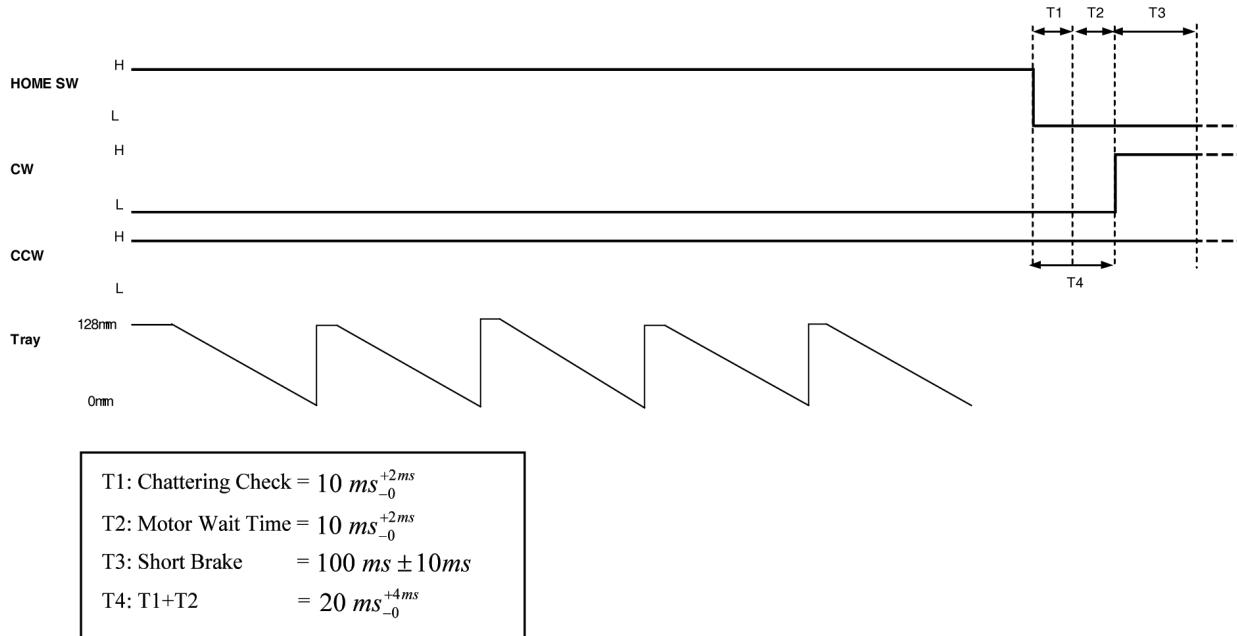
#### 3. Change

When user press "CHANGE", one tray will be driven to STOCK position. This operation is for changing disc one by one from top to bottom. The operation each time will only drive the upper most tray to STOCK position, it can be only being interrupt by "OPEN/CLOSE". If the "CHANGE" being pressed during one tray is closing, mechanism will close the second tray immediately after 1<sup>st</sup> tray. The number of tray will be closed equal to number time of "CHANGE button" being pressed.

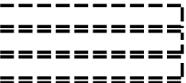
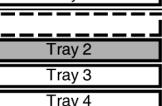
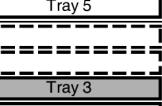
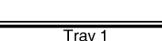
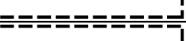
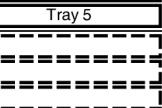
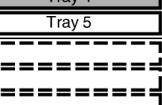
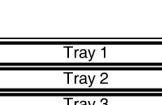
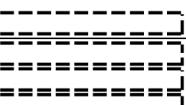
- All trays close can occurs anytime when there is tray at open condition. The all trays close processing is used when mechanism carry out the function as:

1. Close Tray 5
2. Close Tray 4 while tray 5 is in PLAY position
3. User press OPEN/CLOSE to instruct all trays close.

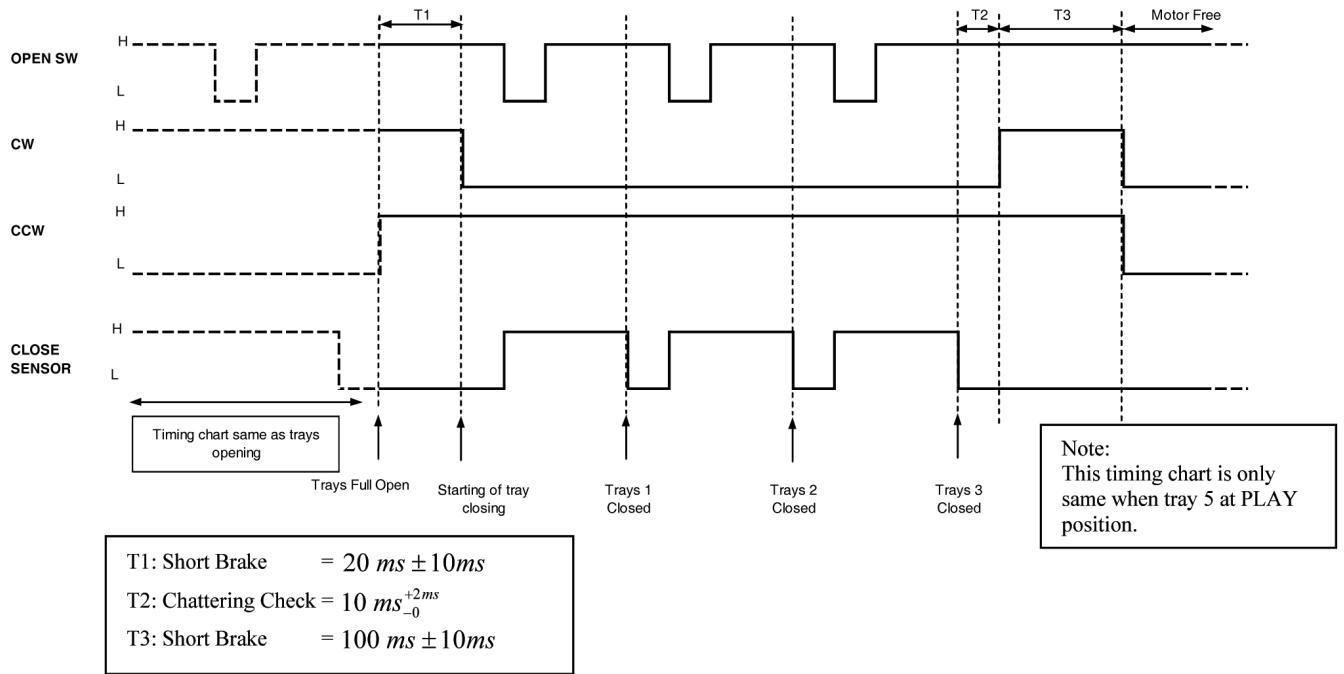
- Mechanism will close all the trays by rotating cam gear at CCW direction until detect HOME position
- Below is the timing chart for tray close (until detect HOME position).



- Table below explain the function of open selected tray while one tray at PLAY position. This table indicated the possible tray at playing trays. For opened tray, all trays will be open except the tray at PLAY position. Trays will close to expose the selected tray for user to input or change the disc.

OPEN POSITION		STOCK POSITION	PLAY POSITION	
Function	Tray Opened	Tray Closed	Possible Playing Tray	Micro-P Command
Open Tray 1				Tray Open → End
Open Tray 2	 Tray 2	 Tray 1		Tray Open → Auto Close Tray 1
Open Tray 3	 Tray 3	 Tray 1		Tray Open → Auto Close Tray 1 → Auto Close Tray 2
Open Tray 4	 Tray 4	 Tray 1		Tray Open → Auto Close Tray 1 → Auto Close Tray 2 → Auto Close Tray 3
Open Tray 5	 Tray 5	 Tray 1		Tray Open → Auto Close Tray 1 → Auto Close Tray 2 → Auto Close Tray 3 → Auto Close Tray 4

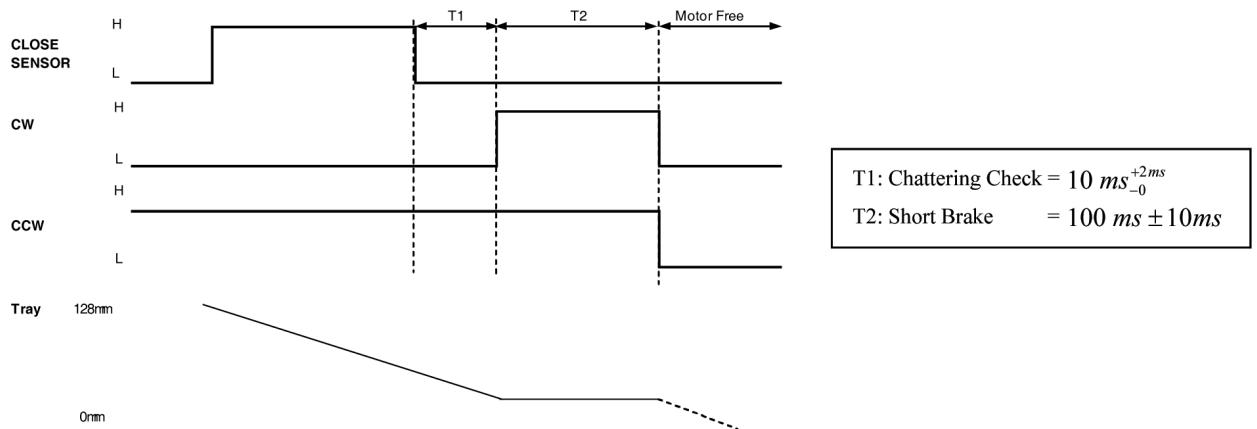
- Timing chart below, shown an example of user select to open tray 4 only.



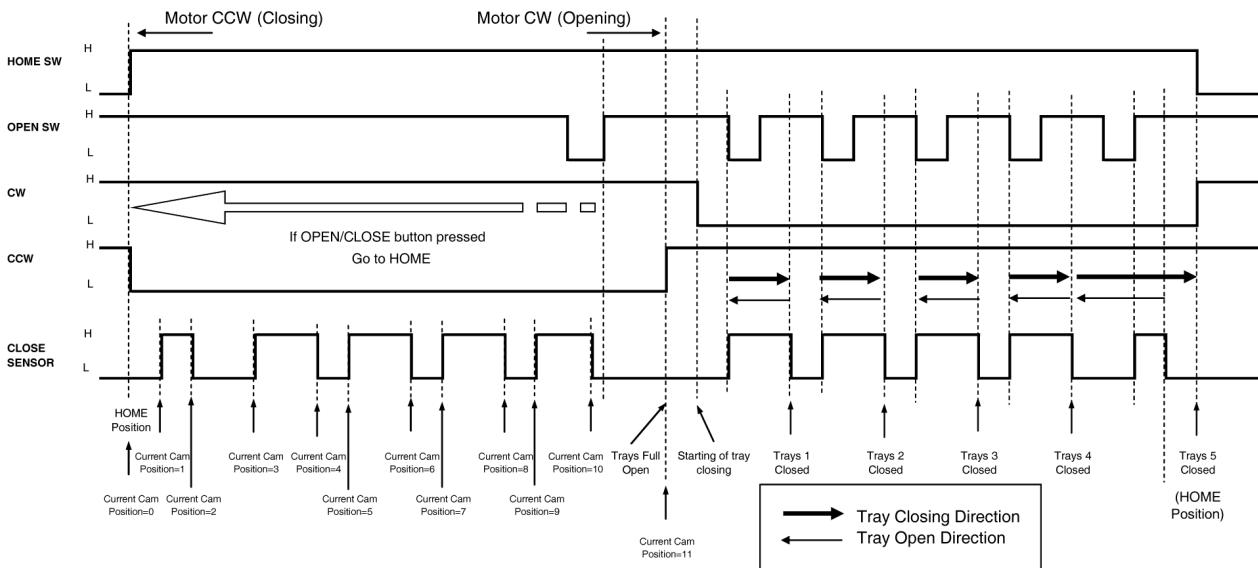
- The "Change" operation is to close one tray each time when "CHANGE" is pressed. This is the basic operation of "auto tray close". The "change" operation will stop after detect a signal change in CLOSE-SENSOR while "auto tray close" count the number of CLOSE-SENSOR signal change and stop at before selected tray start to move to STOCK position.

If there is a case where user select a upper level tray of current tray in PLAY position to be closed, (e.g. current tray at PLAY position is tray 4, user select tray 3 to be open), micro-p counting of CLOSE sensor signal must done until tray 4 position, before motor brake. The reason is to eliminate long waiting time for the next tray closing.

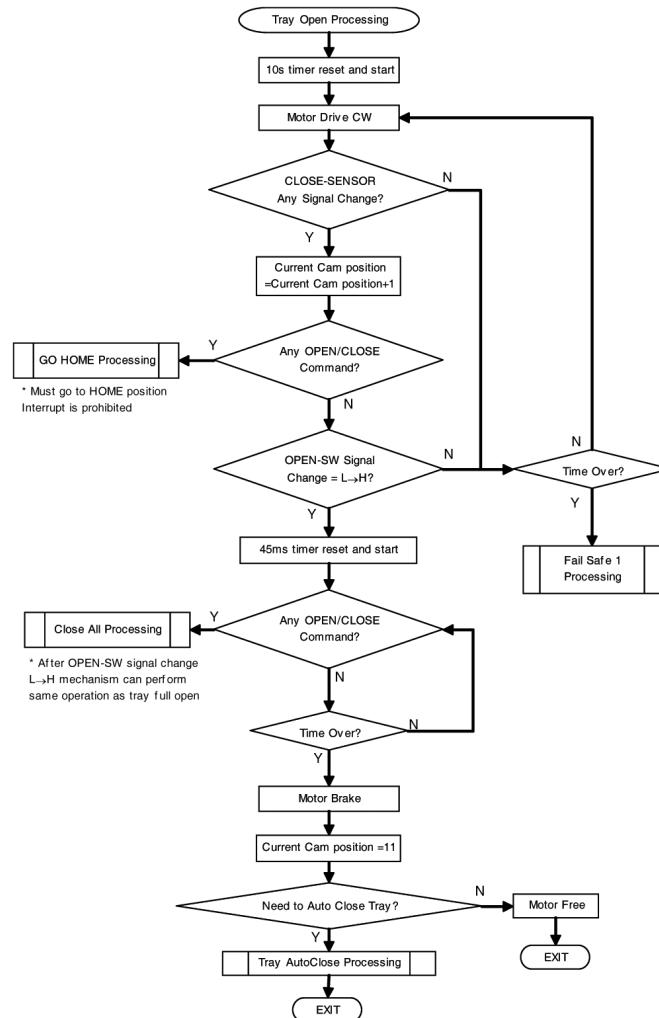
- Below is the timing chart of tray closing (Change Operation):-



- Tray opening and closing is control by cam gear and CLOSE-SENSOR signal. OPEN-SW is only use for full open operation in order to get more accurate tray stroke. Figure below show the cam gear rotation direction for tray opening and closing, and cam important position.

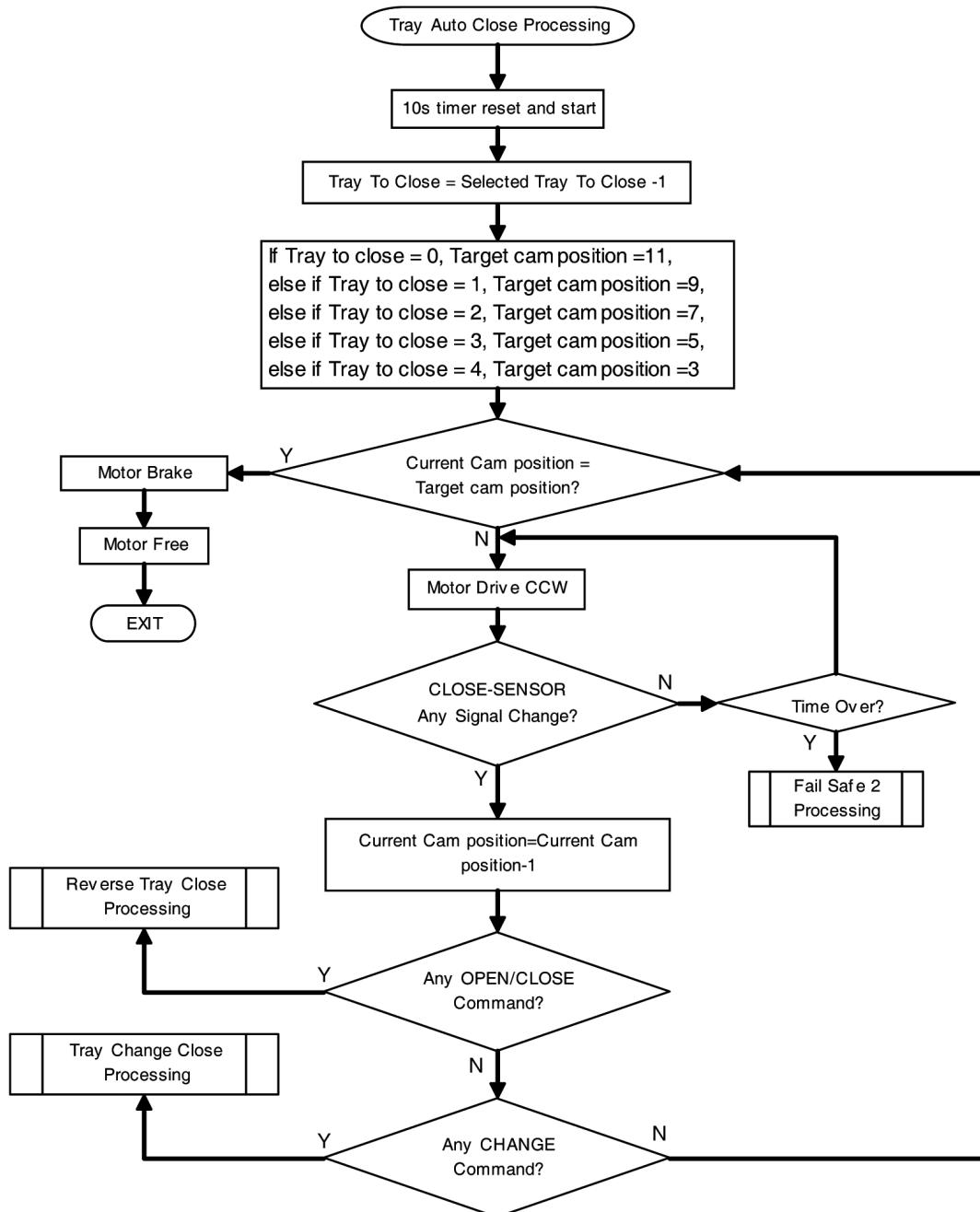


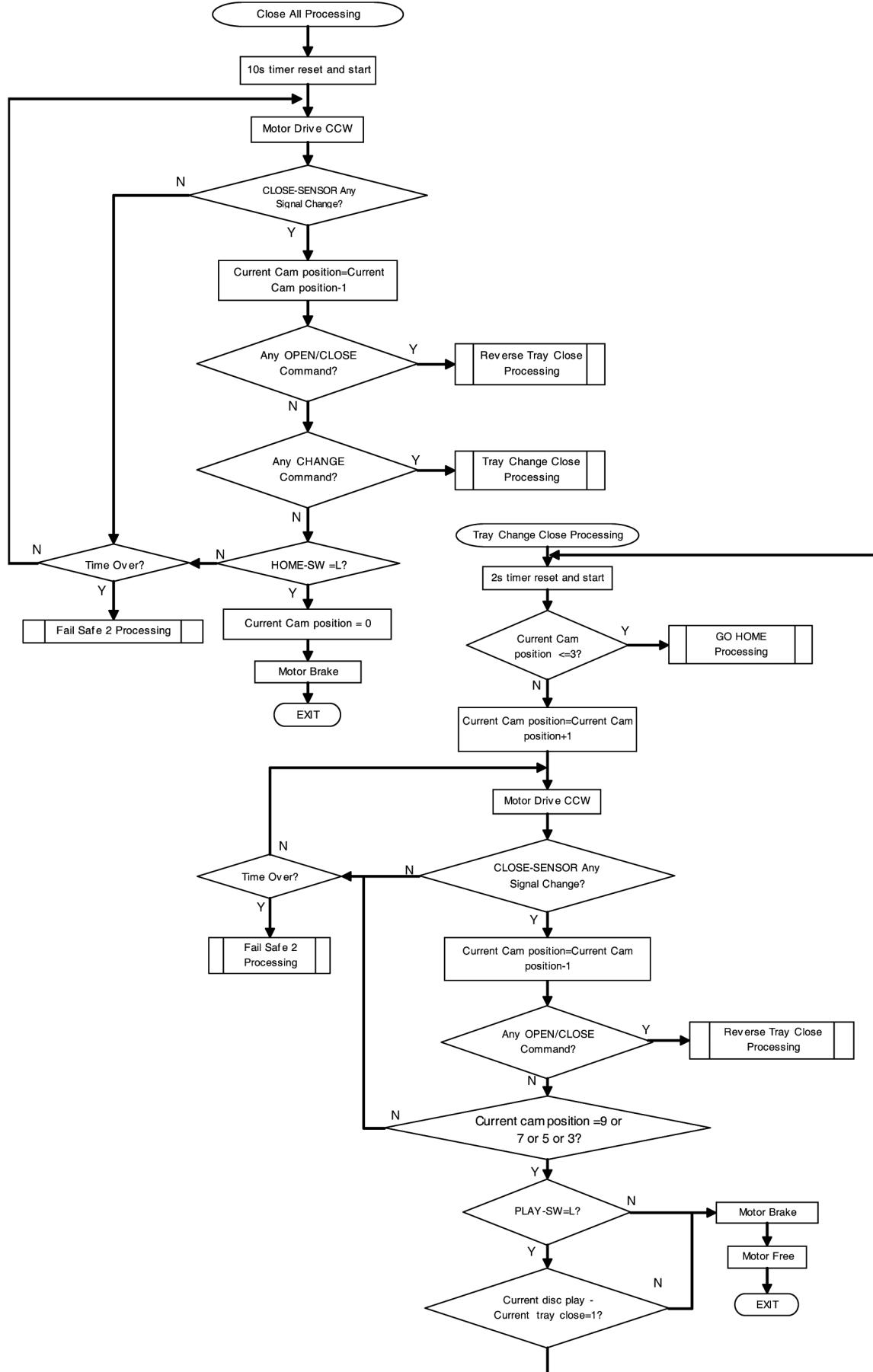
- Below is the flow chart for tray open processing.



- The flow charts below shown the types of tray close processing, for tray auto close processing is use if user select a specify tray to be close automatically after trays full open.
- Tray change close processing use if use select a function and want to change disc one by one from top tray to bottom tray.

- Close all processing is use when user wants to close all trays at once, or want to close tray no.5 or close tray no.4 while tray no. 5 is at PLAY position.

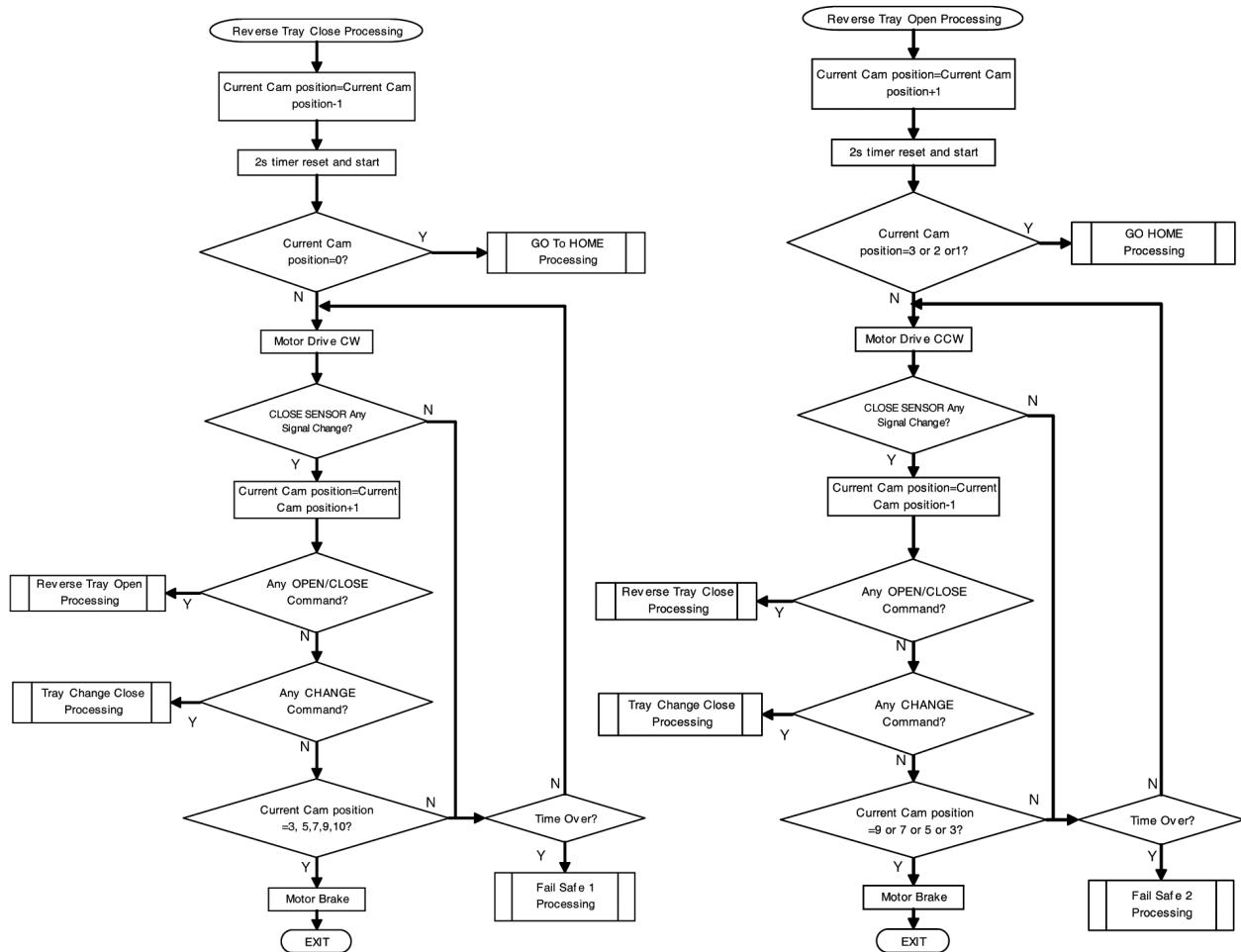




- When there is a OPEN/CLOSE button pressed during tray open or tray close operation. Motor will rotate reverse direction. There are 2 type of cases, where 1<sup>st</sup> is before full open condition (open/close gear assembly still resting) and the 2<sup>nd</sup> is after trays full open condition. For the 1<sup>st</sup> condition, motor will rotate the cam gear to move between HOME direction and tray open

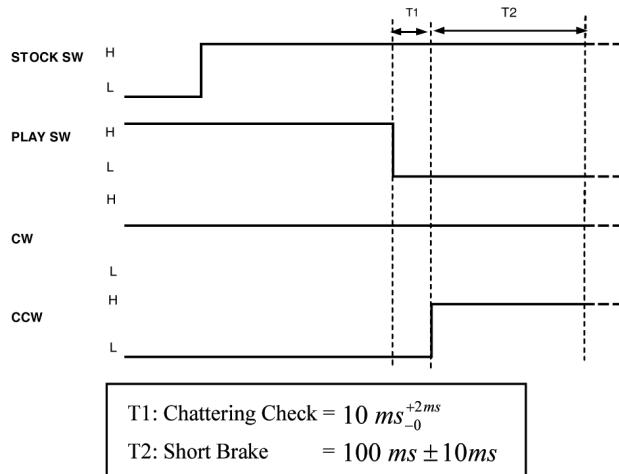
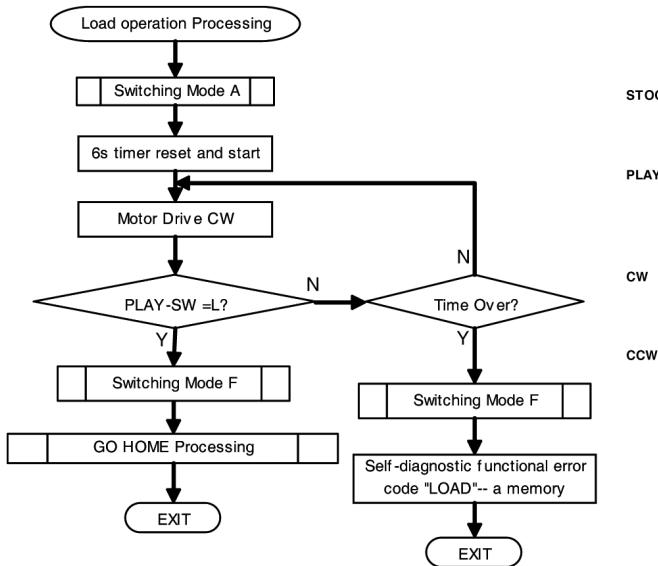
While for the 2<sup>nd</sup> case, cam gear inside mechanism will move between specific positions by checking CLOSE-SENSOR signal change.

- The flow chart for both open reverse (when tray opening motor reverse) and close reverse (when tray closing motor reverse) is as below. The operation use when user press OPEN/CLOSE button during tray is opening or closing.

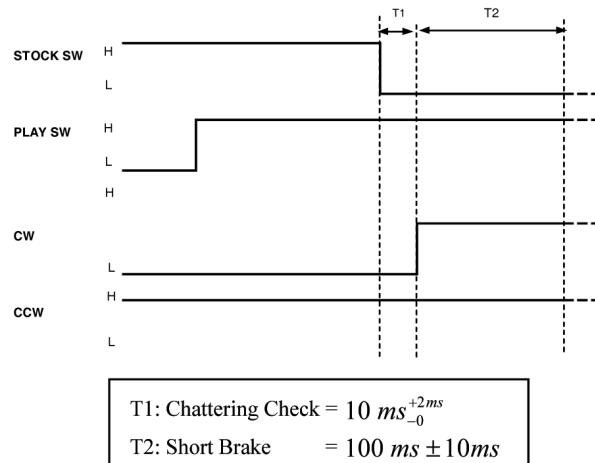
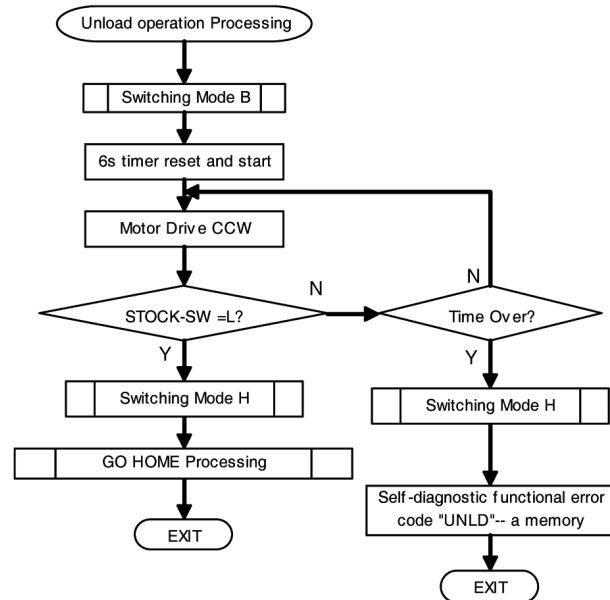


### 3.11. Drive tray between STOCK and PLAY position

- Play position is defined as the position whereas the tray is aligned to be played over the CD/ DVD unit. Only a single tray can be at this location & note that the traverse mechanism is at its clamped position. Play position can be either disc playing (actively reading disc data) or its not playing (no data reading).
- \* **Shipment** or **Initialize** positions always finish with a tray at this location.
- Loading operation is process to move tray from STOCK position to PLAY position.
- Unloading operation is process to move tray from PLAY position to STOCK position.
- If there is a certain operation key pressed at the middle of movement. The reversal operation is necessary. The reversal operation should carry out after the tray arriving the STOCK position or PLAY position.
- The flow chart and timing chart for load a disc from STOCK position to PLAY position is as below:



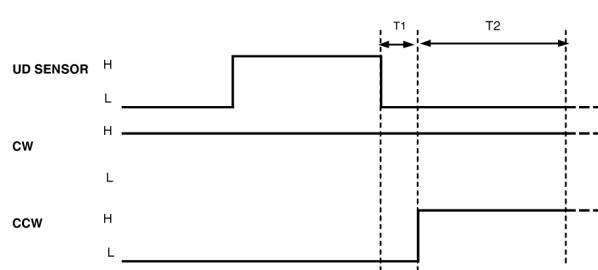
- The flow chart and timing chart for unload a disc from PLAY position to STOCK position is as below:



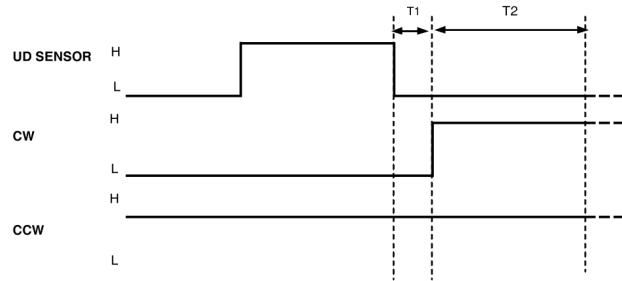
### 3.12. Selection of Tray by Moving UD base Up/down

- Tray alignment & selection is achieved by UD (up/down) movement, whereas the Mechanism vertically aligns itself to the selected tray to be driven to PLAY position or STOCK position. The upper most tray is defined as tray 1 and bottom most tray is defined as tray 5. Counting is achieved by resetting during initialization to the TOP-SW (tray 1) and counting the signal change by UD-SENSOR.

- Below are the timing chart for UD base tray selection Up/down:



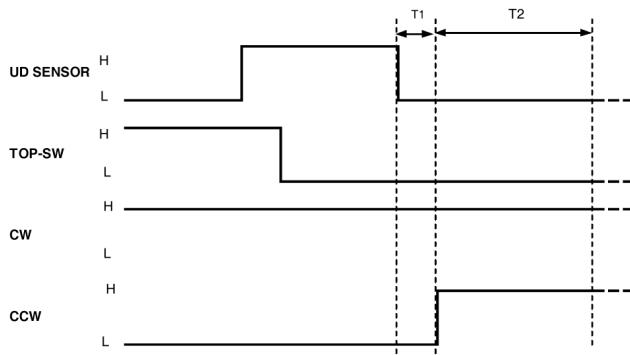
UD base move up 5 → 2



UD base move up 1 → 5

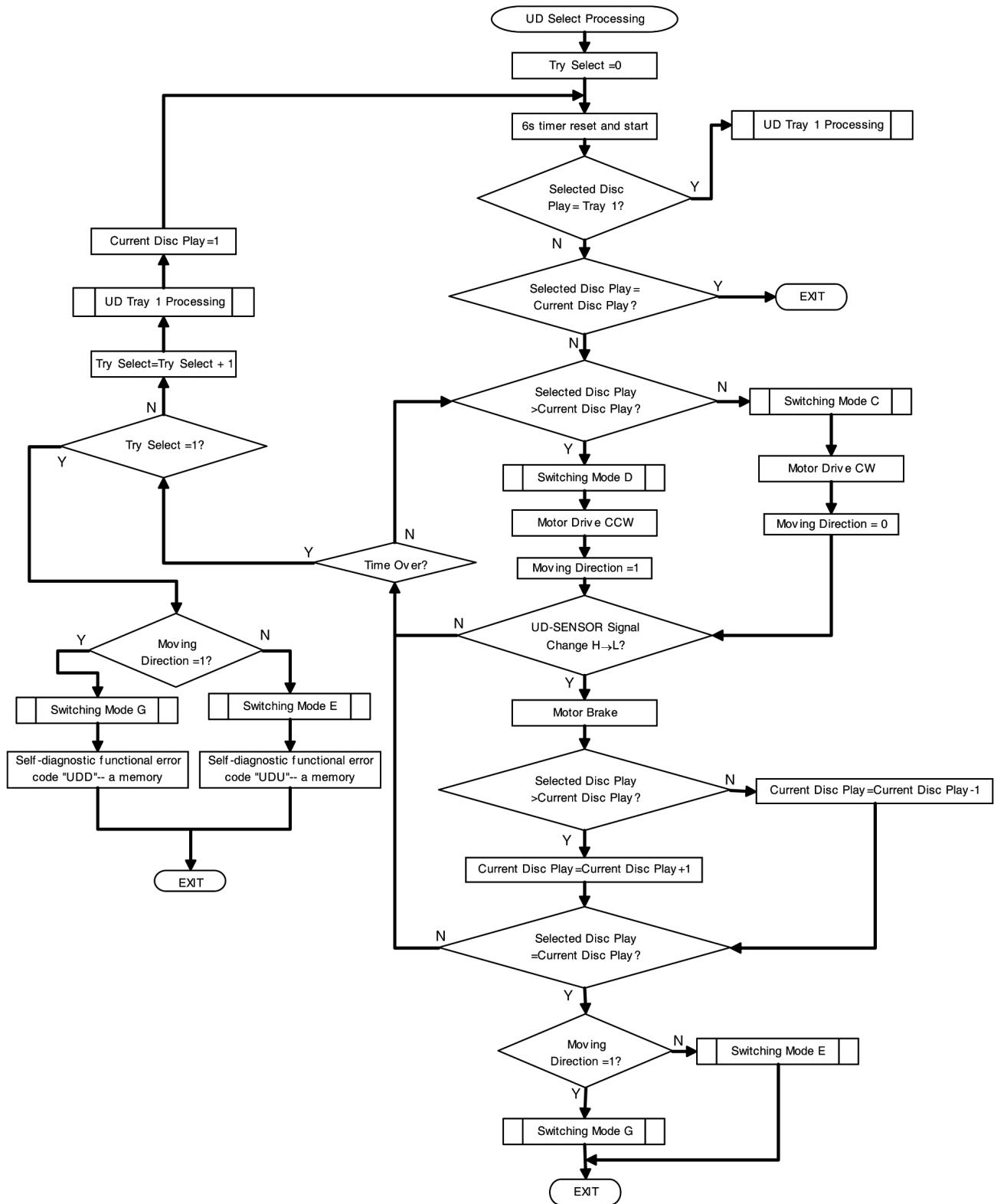
T1: Chattering Check =  $10 ms_{-0}^{+2ms}$   
 T2: Short Brake =  $100 ms \pm 10ms$

- Tray 1 is the reset position for UD base up/down processing. The position should be unique; a TOP-SW is use in this purpose.

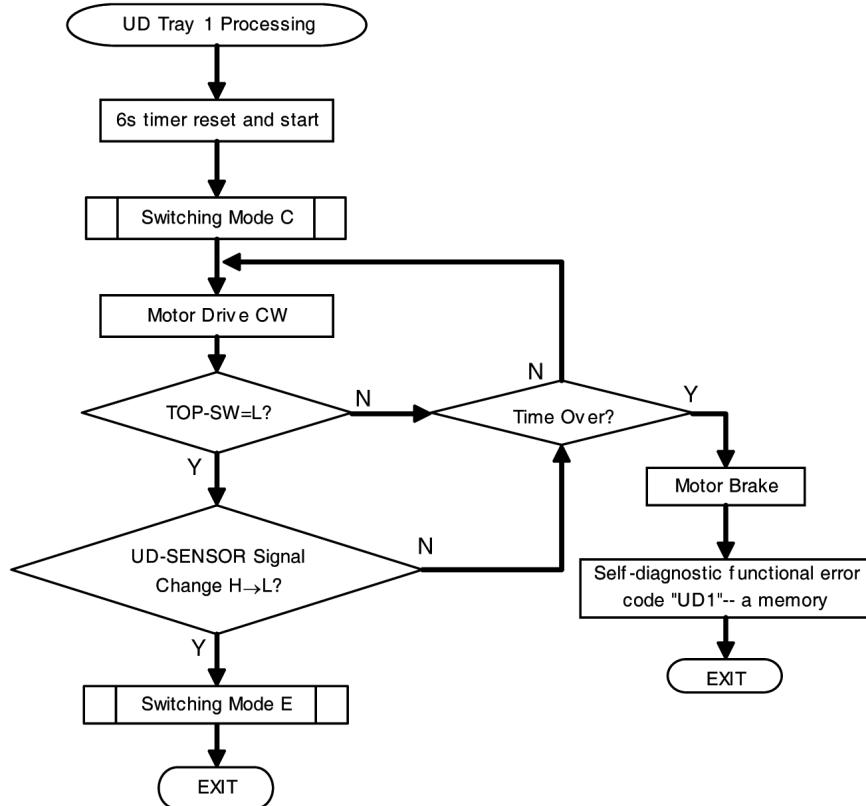


T1: Chattering Check =  $10 ms_{-0}^{+2ms}$   
 T2: Short Brake =  $100 ms \pm 10ms$

- Below is the flow chart for UD selection processing.



- For tray 1 selection, flow chart below will be used.



### 3.13. Fail Safe

- Fail safe function is for purpose of recovery of tray movement if the mechanism is not able to carry out tray open or close within a specified time.

Fail safe 1: Tray can not open: Fail safe - move all trays to home position

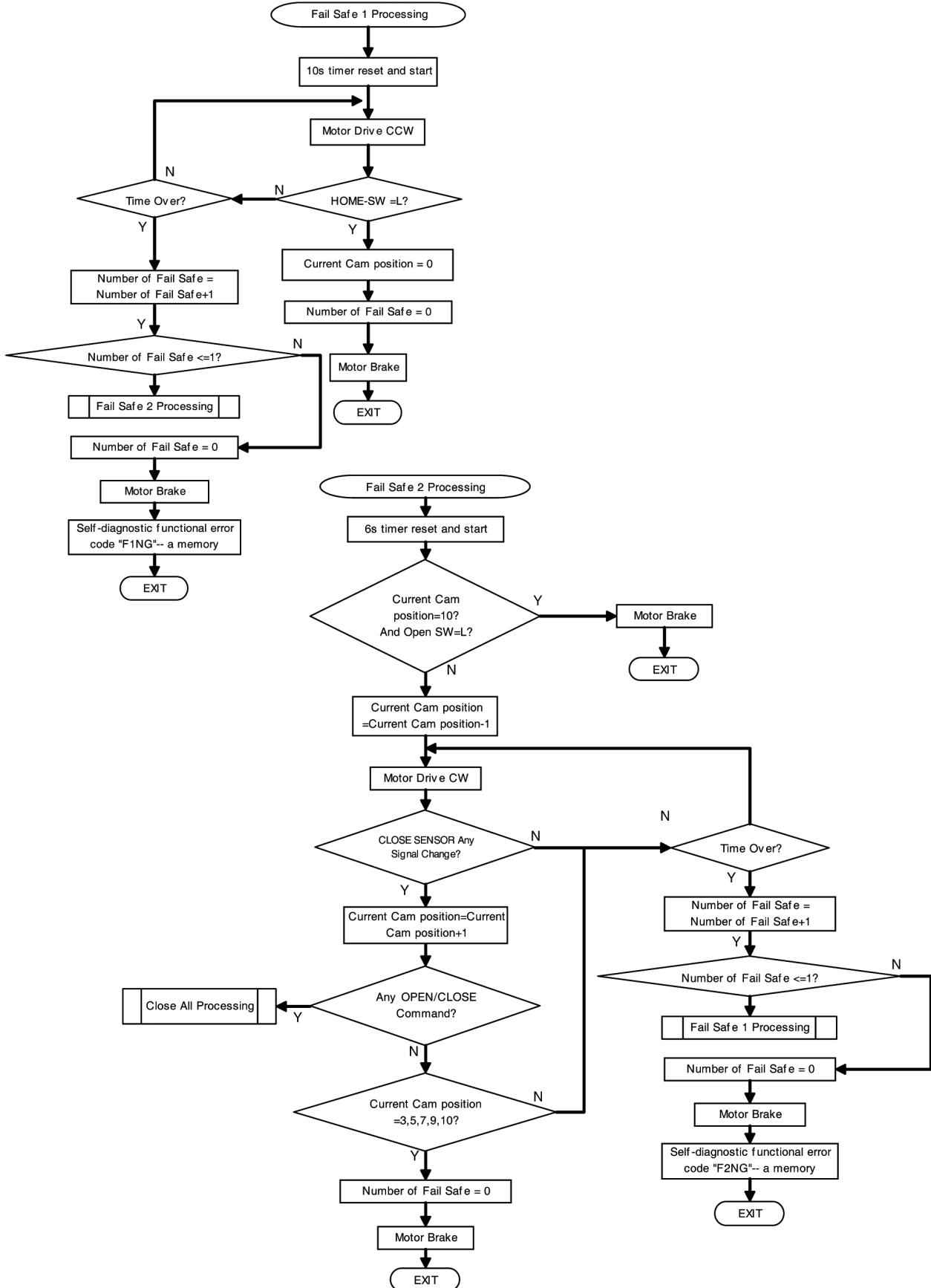
Fail safe 2: Tray can not close: Fail safe - move to next close sensor transition position

**Note :** For Fail safe 2 :

1. If done on tray 1 - will fully go to Open position because OC gears are fully engaged
2. If done on either one of the remaining trays (2, 3, 4 & 5) - will only release the gear engagement and leave the tray at free condition, tray can only open manually by user.

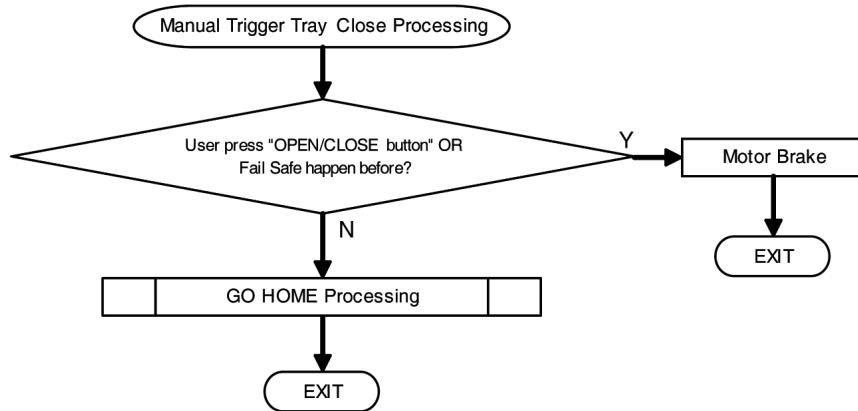
After fail safe, any subsequent button pressed on main set, the mechanism must follow "GO HOME" flowchart.

- Fail safe flow chart are shown as below:



### 3.14. Manual Trigger Tray Close

- When user push open tray at full open position, user may able to activate tray to be all close. This function will be disable if user happen to press "OPEN/CLOSE" button and fail safe happen before.



### 3.15. Changer Error Code

- The error code summary of CRS1 changer is as below:

Error Code	Operation
IHMS	Cam gear rotate to HOME position
ICLS	Cam gear rotate to Play Driving position to drive playing tray to STOCK position
ISTK	Move tray drive rack to STOCK position (drive tray to STOCK position)
IPLY	Move tray drive rack to PLAY position (drive tray to PLAY position)
ITOP	Move UD rack R to front direction (raise UD base to top position)
IUDS	After TOP-SW detect, UD rack move to tray 1 position
HOME	After load tray to PLAY position, cam gear move to HOME After unload to STOCK position, cam gear move to HOME After all tray close, cam gear go to HOME position
LOAD	Tray move from STOCK to PLAY position
UNLD	Tray move from PLAY to STOCK position
PDRV	Cam gear move from HOME to Play Driving position
UDU	UD base move at up direction (from tray 5 to tray 2)
UDD	UD base move at down direction (from tray 1 to tray 5)
UD1	UD base move to tray 1
F1NG	Fail safe 1 NG (Fail safe 1 unsuccessful then try Fail Safe 2 also unsuccessful)
F2NG	Fail safe 2 NG (Fail safe 2 unsuccessful then try Fail Safe 1 also unsuccessful)

## 4 Self diagnosis and special mode setting

This unit is equipped with functions for checking and inspecting namely: Self-Diagnostic and Test Mode.

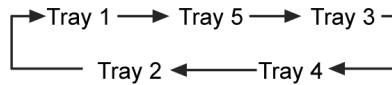
#### 4.1. Special Mode Table

Item		FL Display	Key Operation
Mode Name	Description		Front Key
Self -Diagnostic Mode	To enter into self diagnostic checking for main unit.		<p>1. Select [▶, TAPE] for TAPE mode (Ensure no tape is inserted).</p> <p>2. Press and hold [■, STOP] button for 3 seconds follow by [▶▶], ▲/FF].</p> <p>To exit, press [∅/I, POWER] button on main unit or remote control.</p>
CD Test Mode	To enter into checking the reliability of changer unit.		<p>1. Select [▶/II, CD] for CD mode.</p> <p>2. Press and hold [■, STOP] button for 3 seconds follow by [▶▶], ▲/FF].</p> <p>To exit, press [∅/I, POWER] button on main unit or remote control.</p>
CD Auto Adjustment	To check the CD auto adjustment result for FLOCK, TLOCK and CLVS.	<p>Self adjustment result CLVS (I: NG, O: OK) TLOCK (I: NG, O: OK) FLOCK (I: NG, O: OK)</p>	<p>In CD Test Mode:</p> <p>1. Press [0] button on the remote control.</p> <p>To exit, press [∅/I, POWER] button on main unit or remote control.</p>
CD Changer Reliability Test (CRS1)	To determine the reliability of CD Changer Unit. (For more information, refer to section 4.1.1)	<p>The counter will increment by one. When reach 99999 will change to 00000.</p>	<p>In Self-Diagnostic Mode:</p> <p>1. Select [▶/II, CD] for CD mode.</p> <p>2. Press [◀◀, REW/V] button.</p> <p>To exit, press [∅/I, POWER] button on main unit or remote control. (The tray will return to PLAY position and then power off)</p>
Doctor Mode	To enter into Doctor Mode for checking of various items and displaying EEPROM and firmware version.	<p>1.</p> <p>2.</p> <p>1. All segments will light up for 1 second. 2. The Check Sum of EEPROM and firmware version will be display.</p> <p>* ROM correction ** Firmware version No:</p>	<p>In any mode:</p> <p>1. Press [■, STOP] button on main unit follow by [4] and [7] on remote control.</p> <p>To exit, press [ENTER] button on remote control or [∅/I, POWER] button on main unit or remote control.</p>
Cold Start	To activate cold start upon next AC power up.		<p>In doctor mode:</p> <p>1. Press [4] button on remote control.</p> <p>To exit, press [ENTER] button on remote control or [∅/I, POWER] button on main unit or remote control.</p>
Changer Reliability Test	To check the function operation of changer unit. (For more information, refer to 4.1.1)		<p>In doctor mode:</p> <p>1. Press [DISC] on remote control.</p> <p>To exit, press [ENTER] button on remote control or [∅/I, POWER] button on main unit or remote control.</p>
FL Display Test	To check the FL segments display (All segments will light up and LED will blink at 0.5 second interval)		<p>In doctor mode:</p> <p>1. Press [PROGRAM] button on remote control.</p>

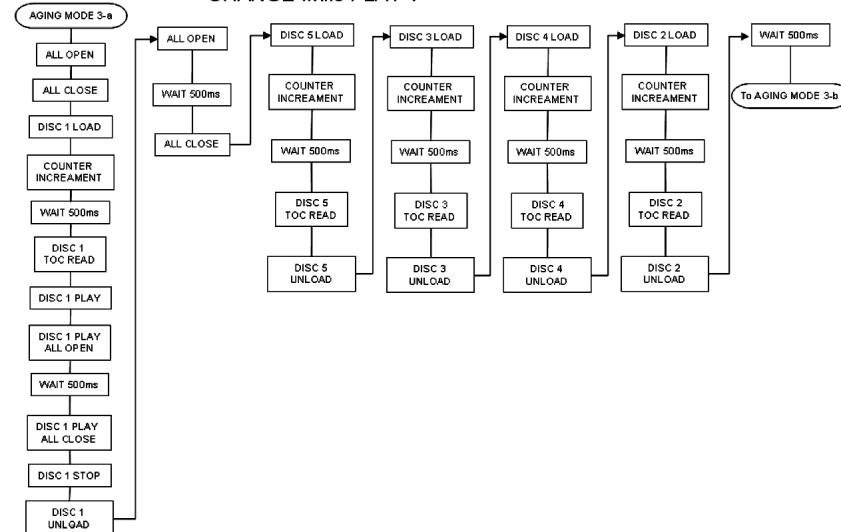
Item		FL Display	Key Operation
Mode Name	Description	Front Key	
Tape Eject Test	To check on the tape eject function (For deck 1/2)		In doctor mode: 1. Press [PROGRAM] button on remote control.

#### 4.1.1. CD changer unit ageing test mode

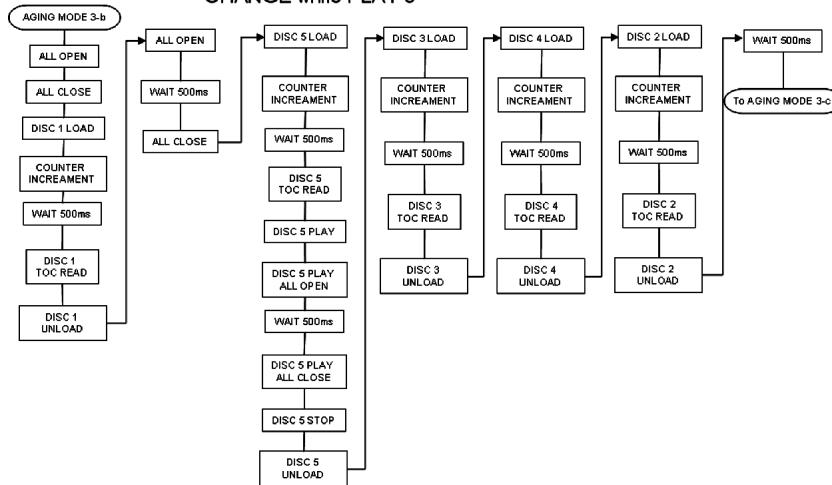
Below is the process flow chart of ageing for the CD changer unit.



**Mode 3** PLAY-CHANGE-OPEN mode aging (1 cycle)  
CHANGE while PLAY 1

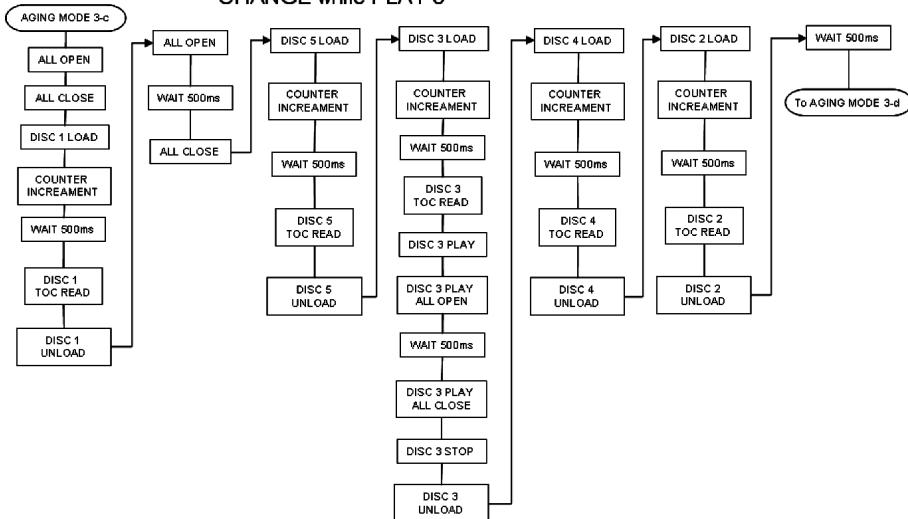


**Mode 3** PLAY-CHANGE-OPEN mode aging (1 cycle)  
CHANGE while PLAY 5



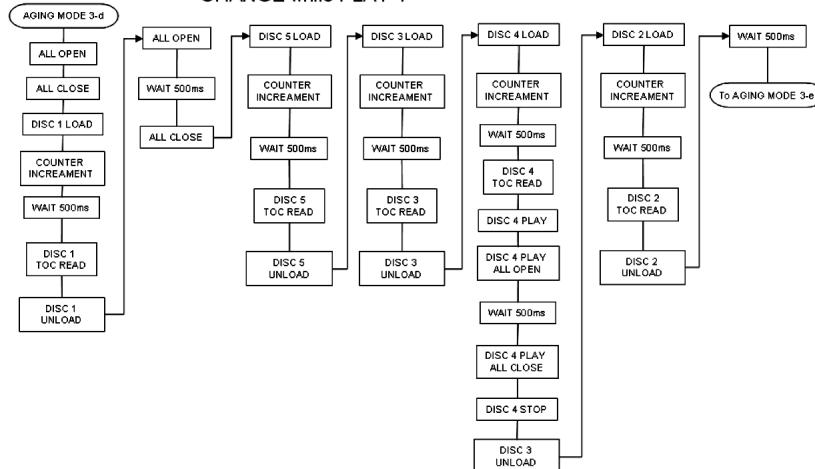
### Mode 3 PLAY-CHANGE-OPEN mode aging (1 cycle)

CHANGE while PLAY 3



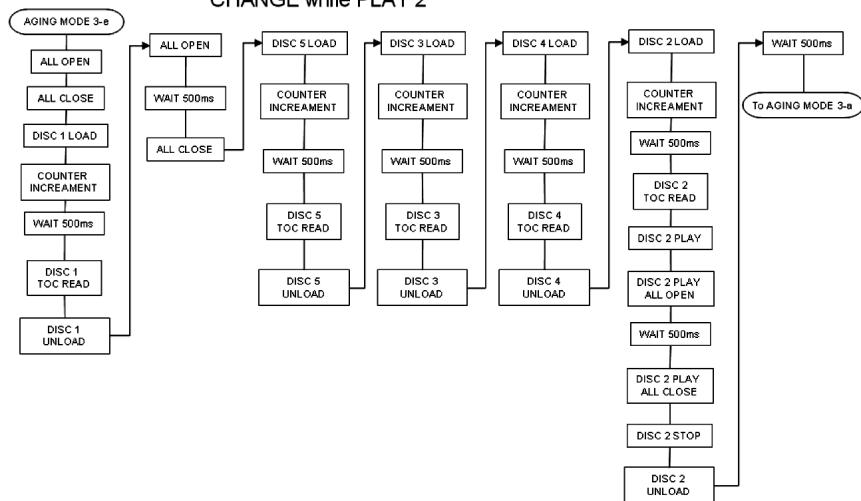
### Mode 3 PLAY-CHANGE-OPEN mode aging (1 cycle)

CHANGE while PLAY 4



### Mode 3 PLAY-CHANGE-OPEN mode aging (1 cycle)

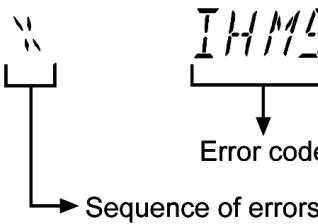
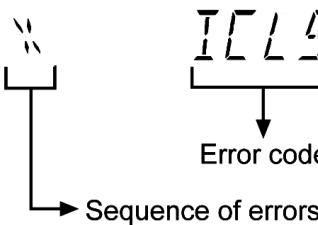
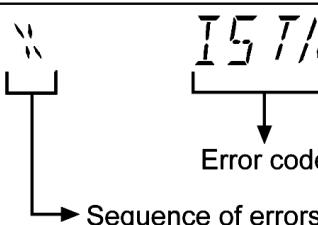
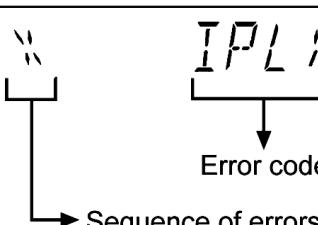
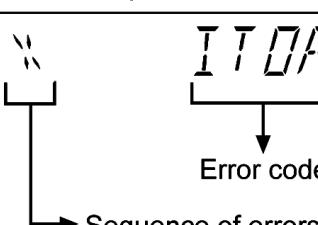
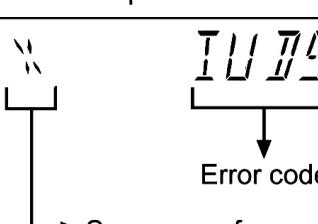
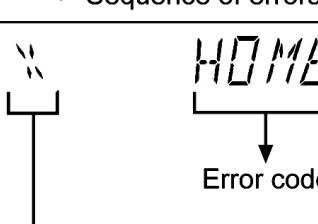
CHANGE while PLAY 2

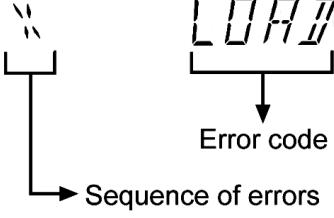
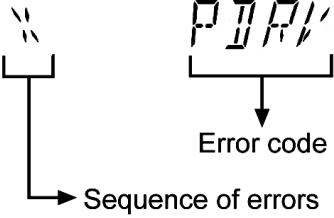
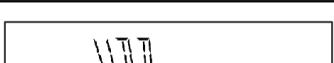
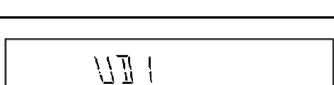
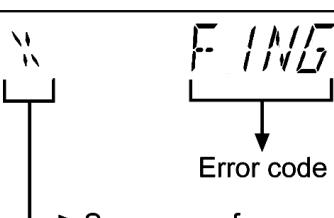
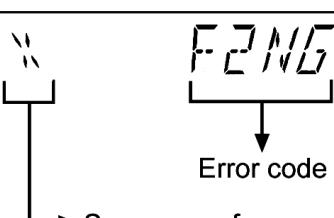
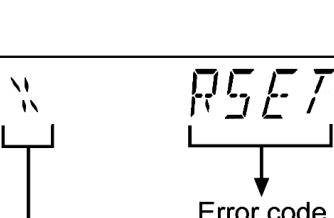


## 4.2. Error code Table

Self-Diagnosis Function (refer Section 4.1) provides information on any problems occurring for the unit and its respective components by displaying the error codes. These error code such as U\*\*, H\*\* and F\*\* are stored in memory and held unless it is cleared.

The error code is automatically display after entering into self-diagnostic mode.

Error Code	Diagnosis Contents	Description of error	Automatic FL Display	Remarks
IHMS	Cam gear abnormality	Cam gear does not rotate to "HOME" position.	 Error code	For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
ICSL	Cam gear/gear units abnormal	Cam gear does not rotate to "PLAY" driving position and hence does not drive playing tray to "STOCK" position.	 Error code	For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
ISTK	Drive rack/gear assembly abnormal	The tray drive rack does not move to "STOCK" position. (Tray does not move to "STOCK" position)	 Error code	For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
IPLY	Drive rack/gear assembly abnormal	The tray drive rack does not move to "PLAY" position. (Tray does not move to "PLAY" position)	 Error code	For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
ITOP	UD assembly	UD Rack does not move to front direction. This lead to UD base not raise to top position.	 Error code	For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
IUDS	UD assembly	After TOP SW is detected, UD rack does not move into tray 1 position.	 Error code	For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
HOME	Cam gear/gear assembly abnormal	Cam gear does not move to "HOME" position under following conditions 1. After tray is load to "PLAY" position. 2. After tray is unload to "STOCK" position.	 Error code	For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.

Error Code	Diagnosis Contents	Description of error	Automatic FL Display	Remarks
LOAD	Tray drive assembly abnormal	Tray unit does not move from "STOCK" to "PLAY" position		For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
PDRV	Cam gear/gear assembly abnormal	Cam gear does not move from "HOME" to "PLAY" drive position.		For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
UDU	UD base assembly abnormal	UD Base assembly does not move upwards from tray 5 to tray 2		For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
UDD	UD base assembly abnormal	UD Base assembly does not move downwards from tray 1 to tray 5.		For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
UD1	UD base assembly abnormal	UD Base assembly does not move to tray 1.		For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
F1NG	Fail - safe mode. (For open/close tray unit(s))	When the tray open operation is performed, it fails to open. It will automatically close all trays after the time-out by the microprocessor. During this time when it fails, the error code will appear.		For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
F2NG	Fail - safe mode. (For open/close tray unit(s))	When the tray close operation is performed, it fails to close. It will automatically open all trays after the time-out by the microprocessor. During this time when it fails, the error code will appear.		For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.
SRVC_TRV	To unlock the traverse unit for service	1. All trays set to "STOCK" position 2. Mechanism set to tray 5 3. Cam gear set to "HOME" position		For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit.
RSET	Cam gear jam/close sensor faulty	During tray re-open, the cam gear will rotate in the opposite direction to reset the cam gear position. When it fails, the error code will appear.		For CD changer unit (CRS1). Press [SINGLE CHANGE] on main unit for next error.

#### CRS1 Error Code display

1. The errors that occurred in CRS1 Mechanism can be recalled and displayed, in the order of the occurrence under self-diagnostic (Refer to Section 4.1 for procedures to enter this mode.
  - Only the first 5 errors will be memorized (in backup memory). The subsequent error shall be ignored and not memorized.
  - For system with EEPROM as memory backup, memory space in EEPROM is necessary.
2. To display all error code memorized

In CRS1 Self-Diagnostic mode, press [SINGLE CHANGE] to display subsequence error code.

It shall repeat after reaching error no. 5.

e.g.:

[1 \_\_\_\_ I H M S] → [SINGLE CHANGE]

[2 \_\_\_\_ I T O P] → [SINGLE CHANGE]

[3 \_\_\_\_ H O M E] → [SINGLE CHANGE]

[4 \_\_\_\_ L O A D] → [SINGLE CHANGE]

[5 \_\_\_\_ U D D] → [SINGLE CHANGE]

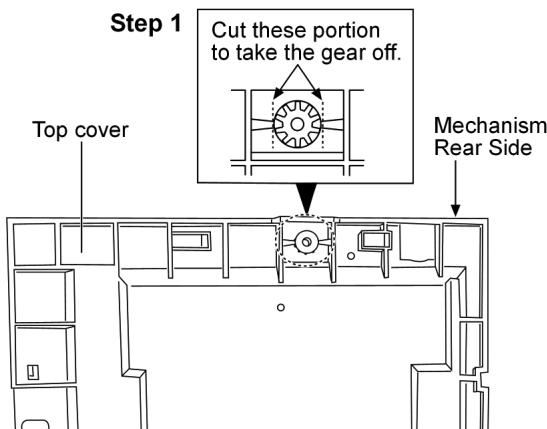
3. To clear the error code memory

In CRS1 Self-Diagnostic mode, long press [SINGLE CHANGE] key (2s or more)

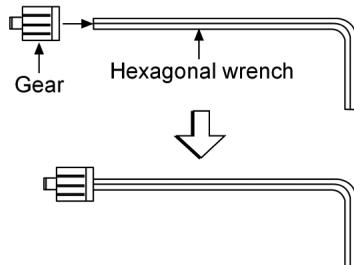
# 5 Troubleshooting Explorer

## 5.1. Preparation of service jig

- This unit has a gear which is used for checking items (open/close of disc tray, up/down operation of traverse unit by manually) when servicing. (For gear information, that is described on the items for disassembly procedures.)
- For preparation of gear (for servicing), perform the procedures as follows.
- In case of re-servicing the same set, the "gear for servicing" may be took off because it had been used. So, the "gear for servicing" must be stored.



Step 2: Insert the gear into the hexagonal wrench.



(Preparation of gear as jig is completed)

## 5.2. Checking of Changer Unit

Below is the procedures for checking the function of the changer unit.

Step 1: Enter into doctor mode.

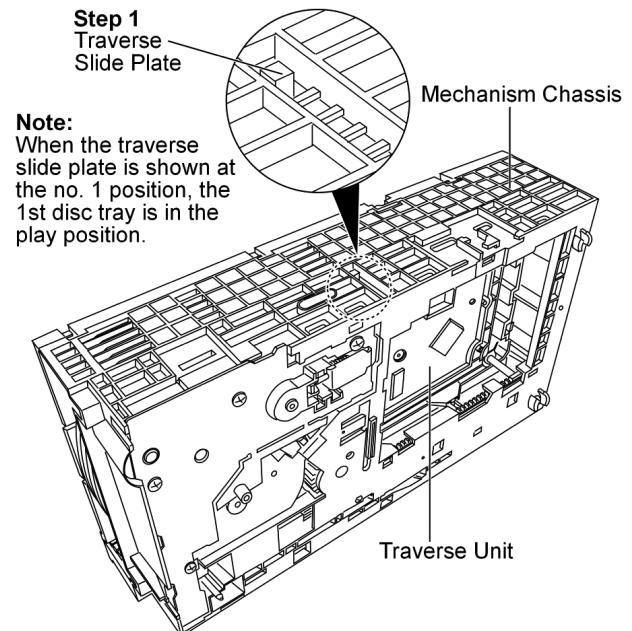
Step 2: Press [DISC] on remote control unit.

Step 3: Error code will appear if there is any function problems. (Pls refer to section 4.2 on more information of error code).

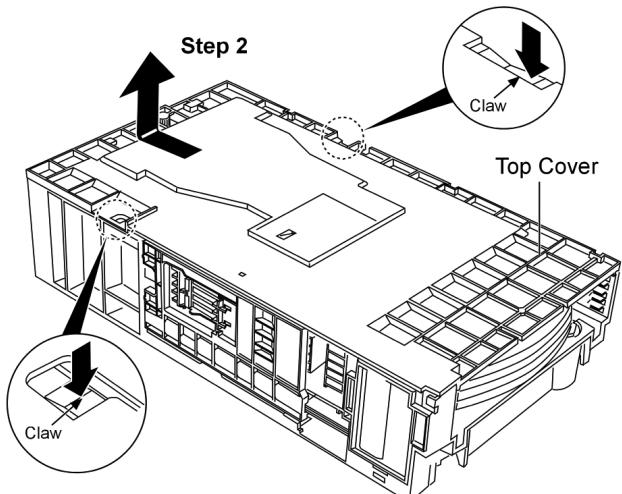
## 5.3. Setting the trays in "STOCK" position

- Below is procedures for setting the main unit into service mode:-
  - Enter into self-diagnostic (Refer to section 4.1)
  - Press [SINGLE CHANGE] on main unit.
- If fail to set the main unit into service mode, do it manually by the below procedures

### 5.3.1. No CD in the tray

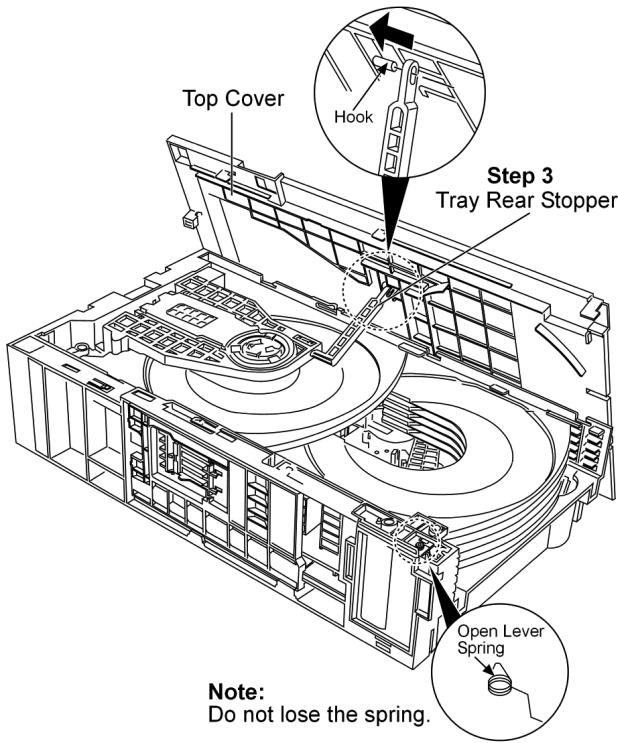


Step 1: Check any disc tray at the play position from the mechanism side.

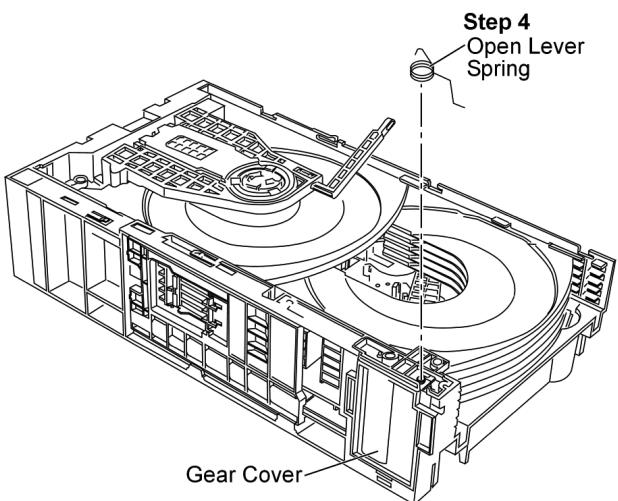


Step 2: Press the 2 claws and then lift up the top cover as arrows shown.

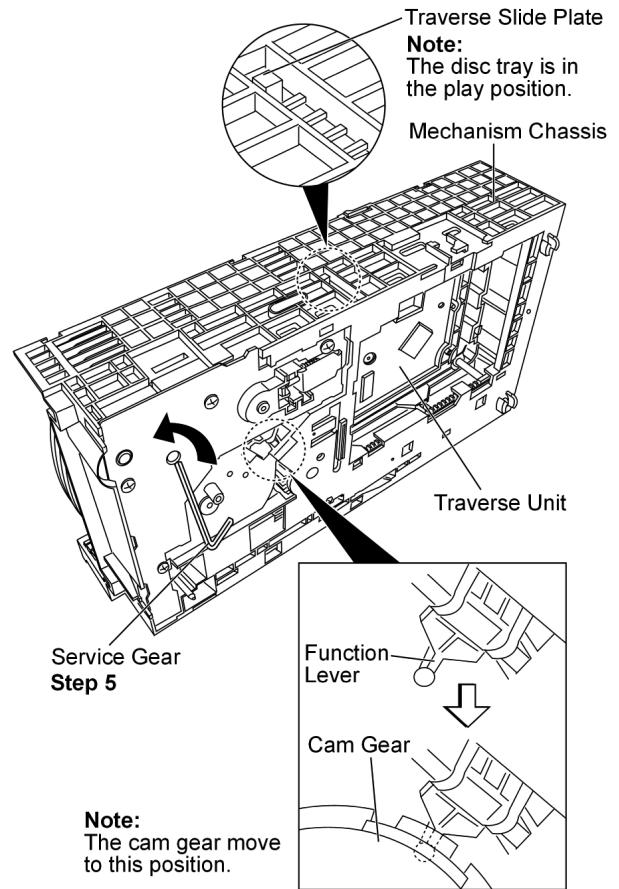
**Caution: Do not exert strong force on the claws.**



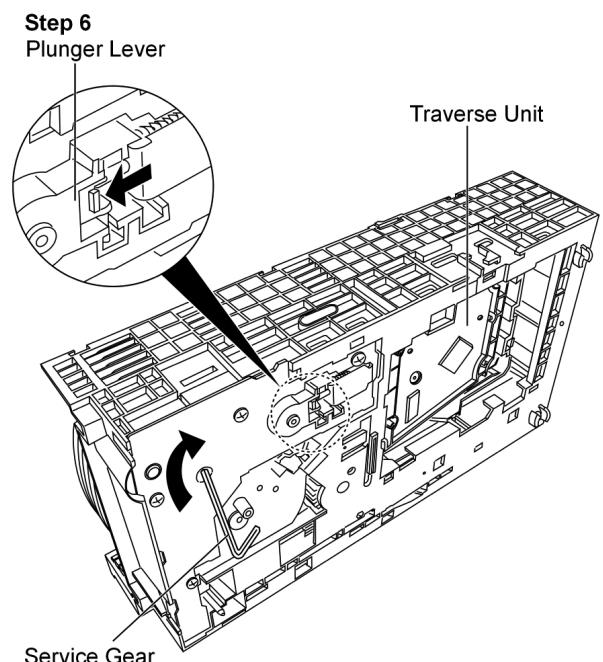
Step 3: Release the top cover from the tray rear stopper as arrow shown and remove the top cover.



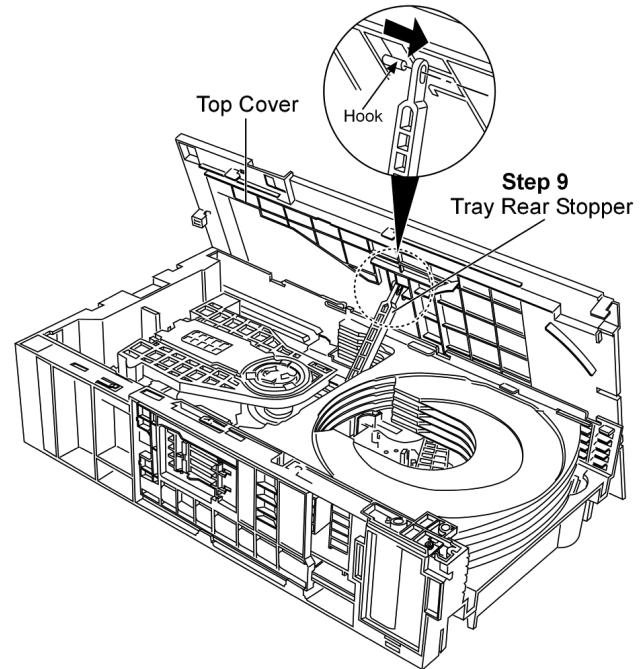
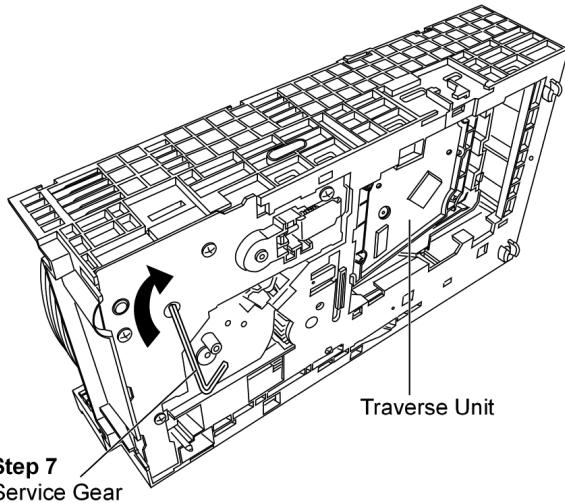
Step 4: Remove the open lever spring.



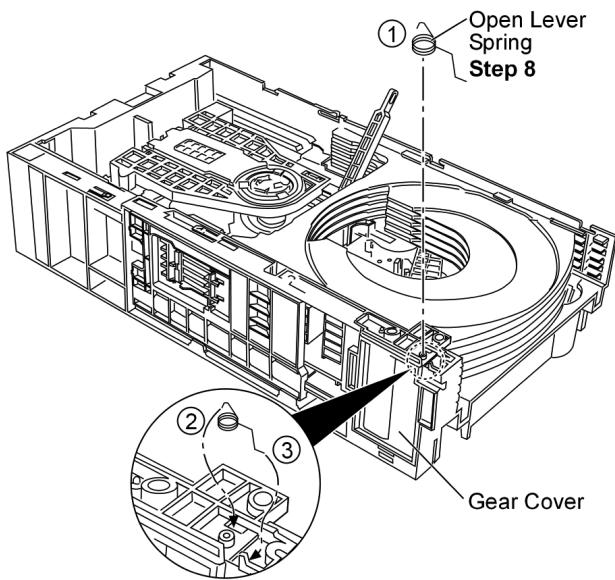
Step 5: Insert the service gear into the service hole and rotate the gear anti-clockwise.



Step 6: Press and hold the plunger lever and rotate the gear clockwise until it stop.

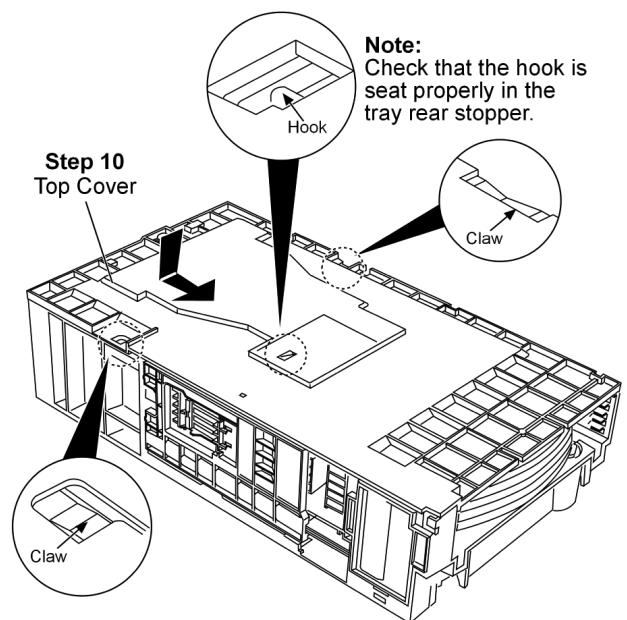


Step 7: Release the plunger lever, rotate the gear clockwise continuously until it stop at "HOME" position.



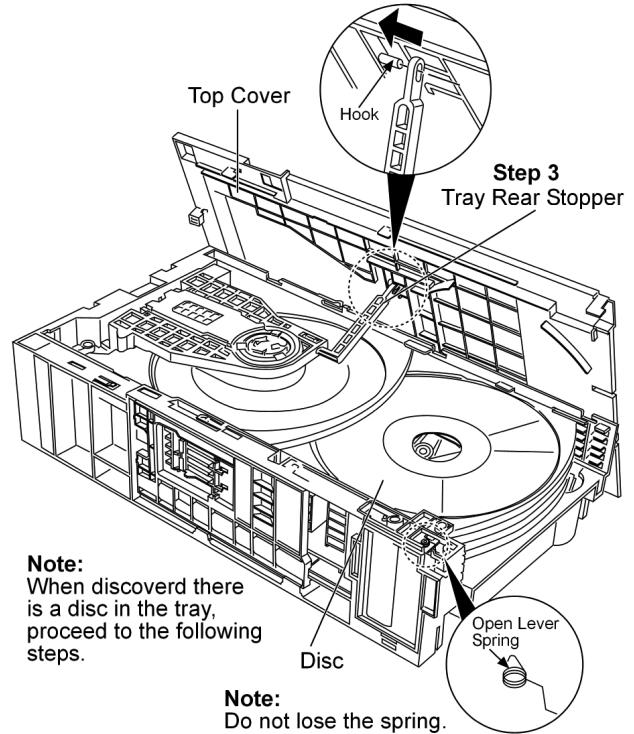
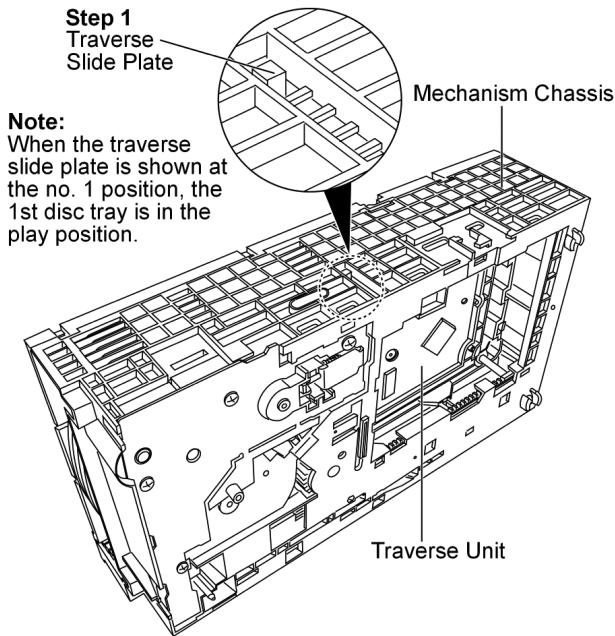
Step 8: Install the open lever spring as shown.

Step 9: Install the top cover, fix the top cover hook to the tray rear stopper as arrow shown.

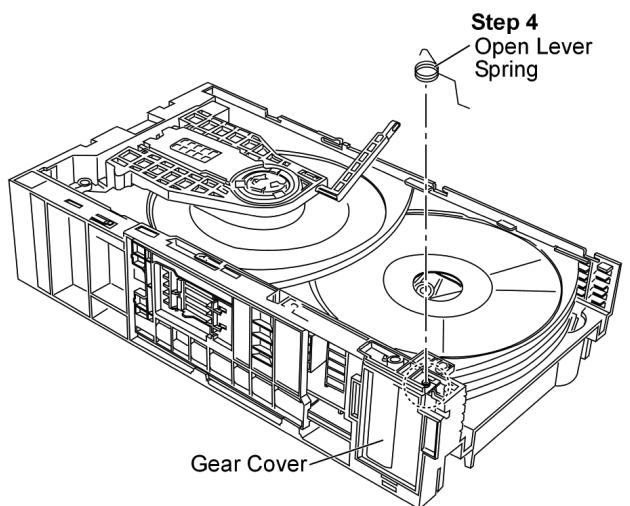
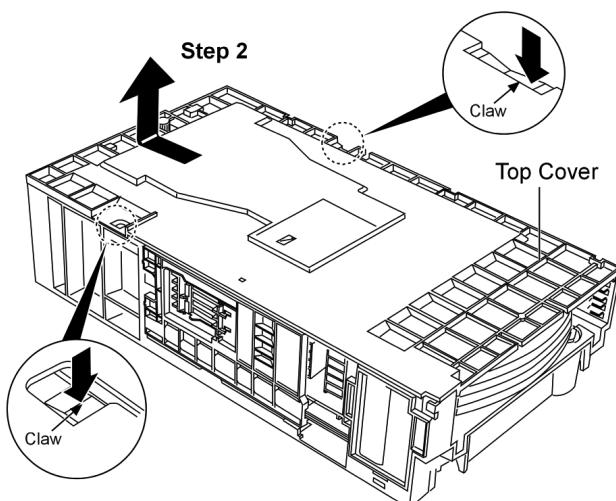


Step 10: Fix the top cover as arrow shown, the 2 claws should be latched.

### 5.3.2. When CD in the tray



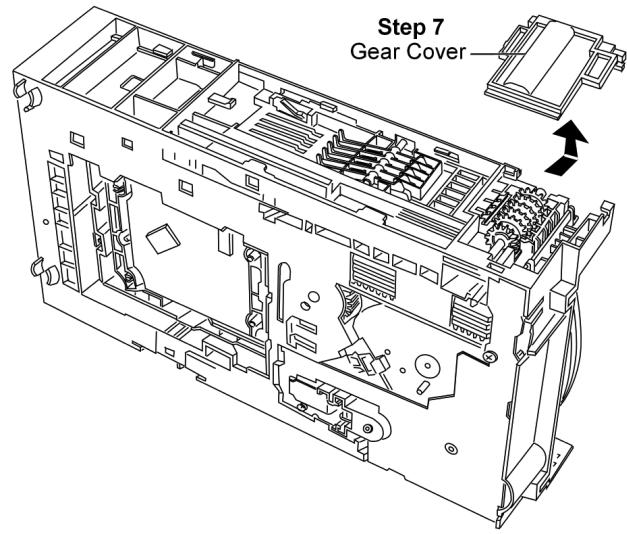
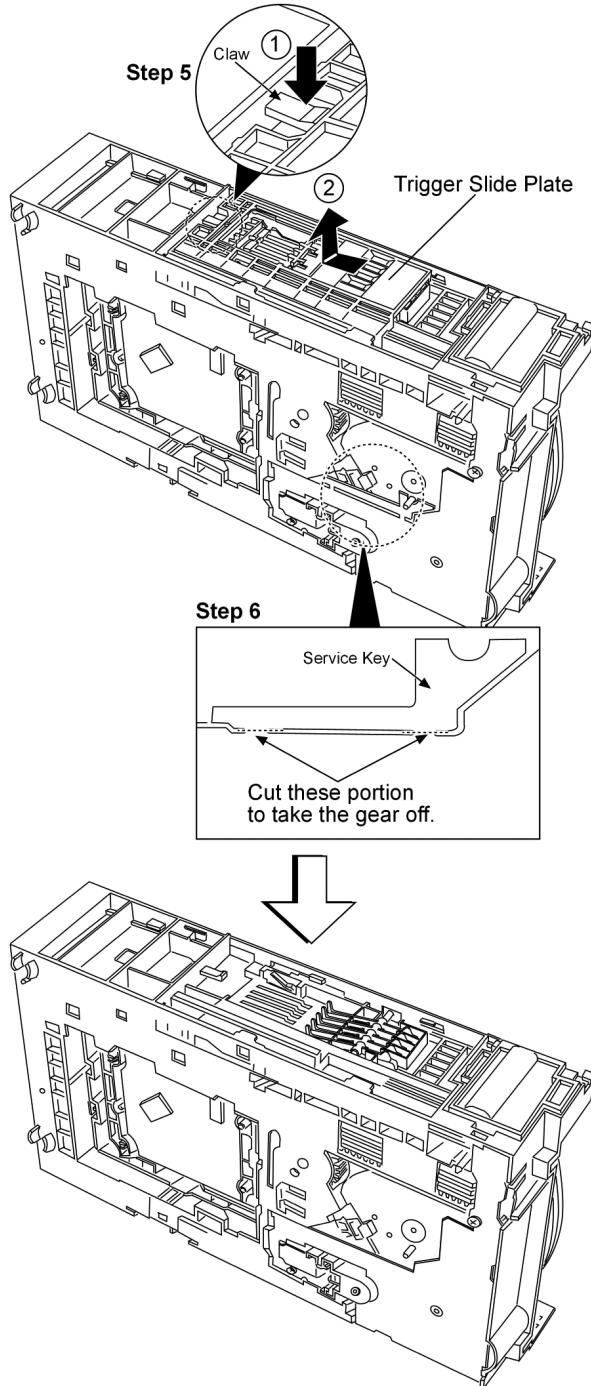
Step 1: Check any disc tray at the play position from the mechanism side.



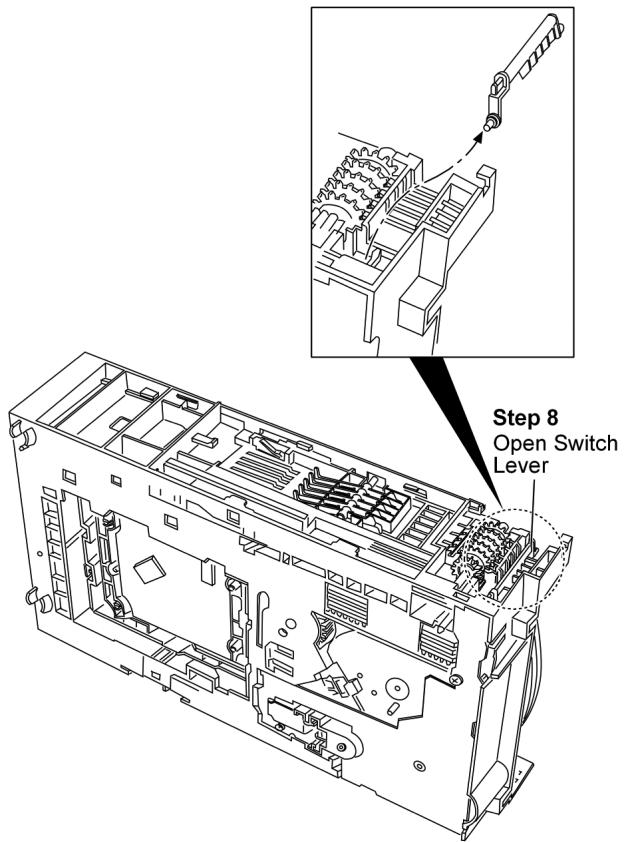
Step 2: Press the 2 claws and then lift up the top cover as arrows shown.

**Caution: Do not exert strong force on the claws.**

Step 4: Remove the open lever spring.



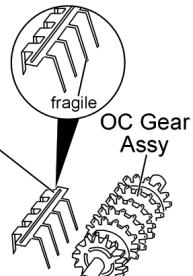
Step 7: Push forward and remove the gear cover as arrow shown.



Step 8: Remove the open switch lever.

**Note:**

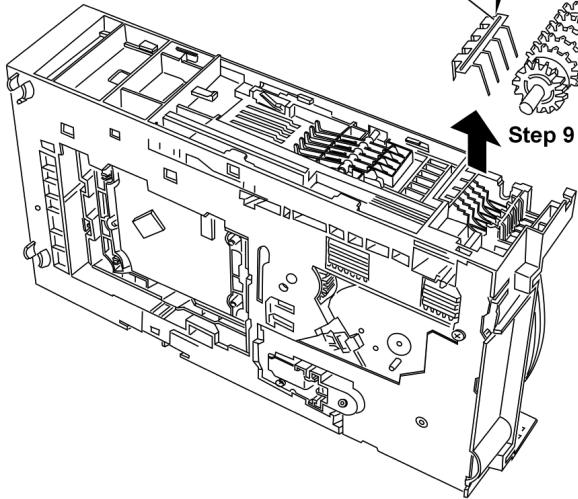
Do not exert force on the OC Gear Spring to avoid damage it.



OC Gear Spring

OC Gear Assy

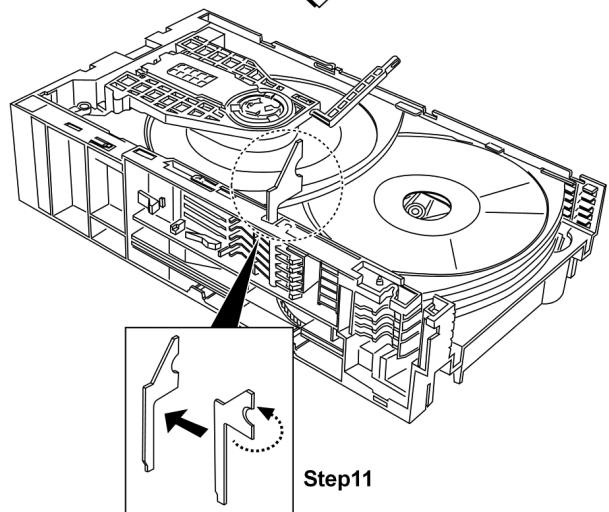
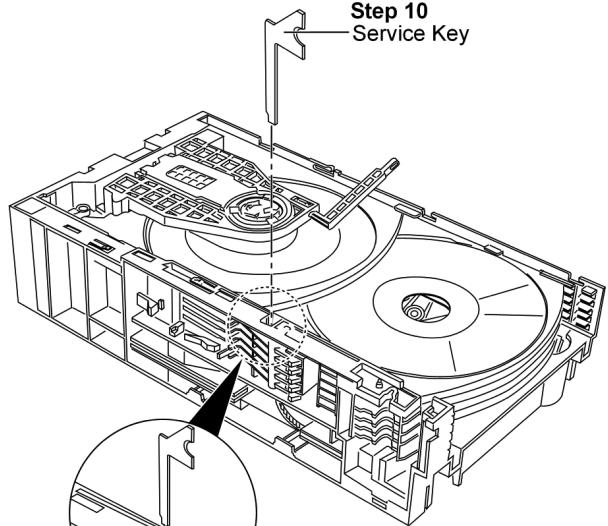
Step 9



Step 9: Remove the OC gear assy followed by the OC gear spring as arrow shown.

**Caution: Ensure the OC gear assy and OC gear spring are handle properly and keep them in a safe place.**

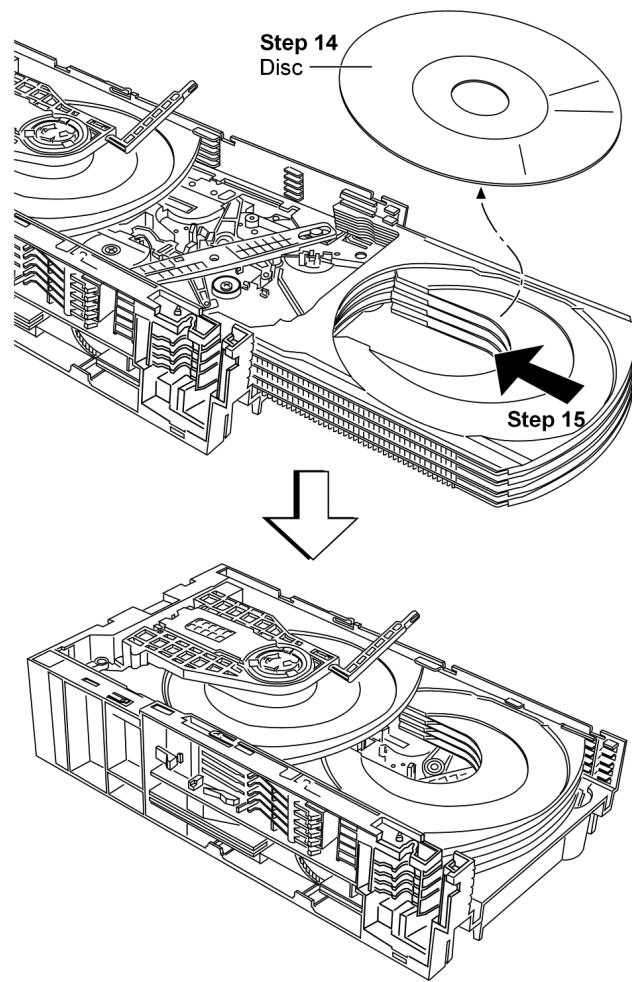
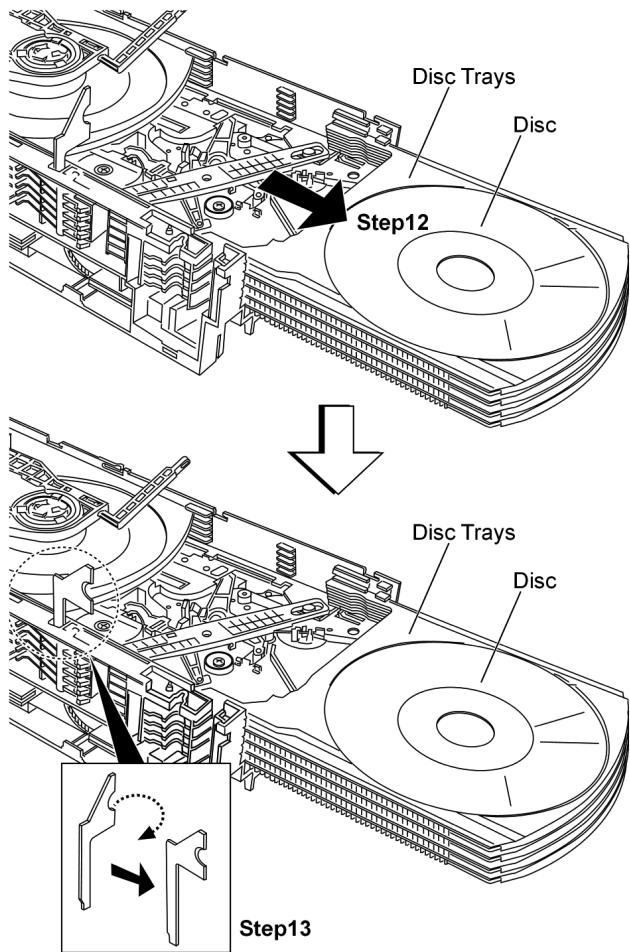
**Step 10**  
Service Key



Step11

Step 10: Insert the service key into the hole.

Step 11: Turn the service key to release the tray lock lever.

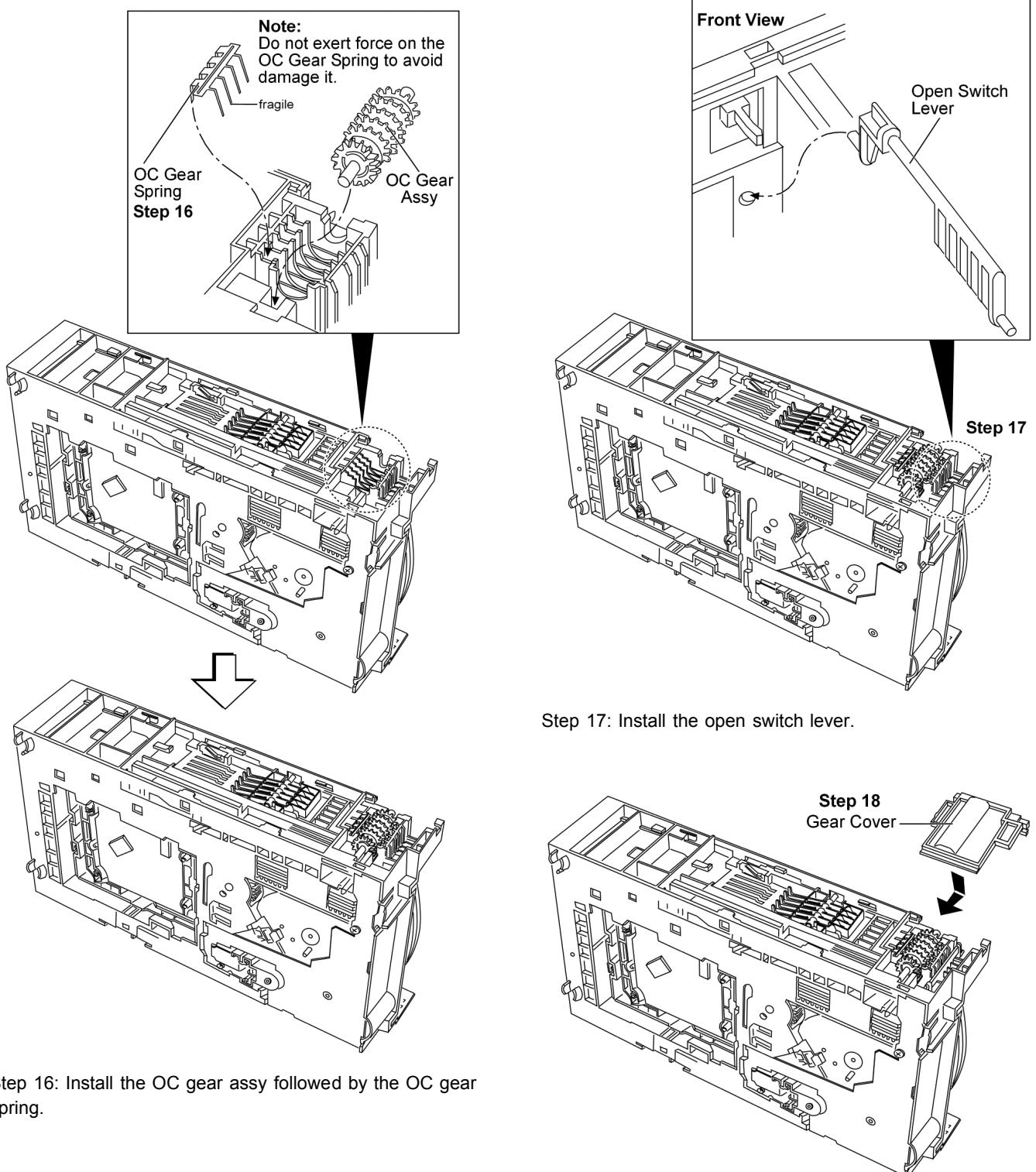


Step 12: Push the disc trays towards the front as arrow shown.

Step 13: Turn the service key back to its original position and remove it.

Step 14: Remove the disc.

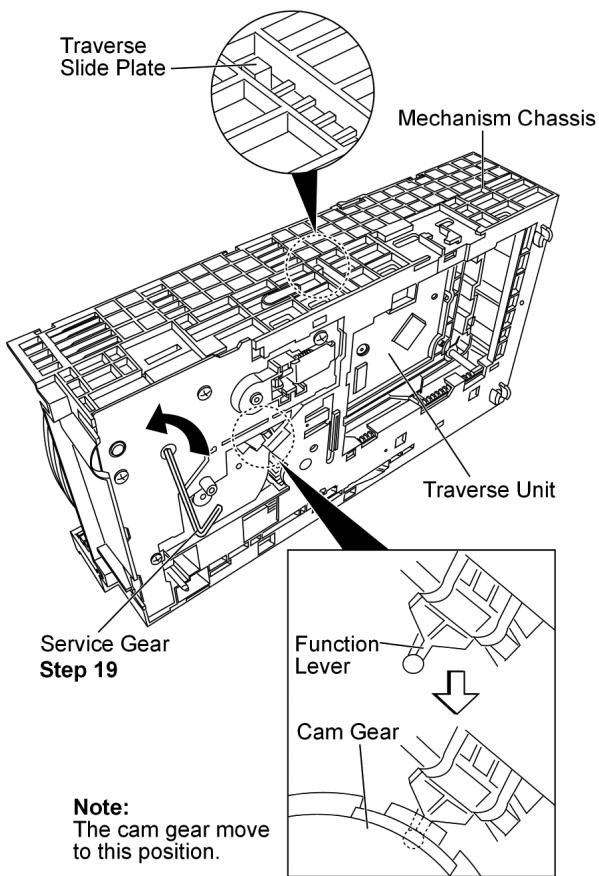
Step 15: Push the disc trays back to the unit as arrow shown.



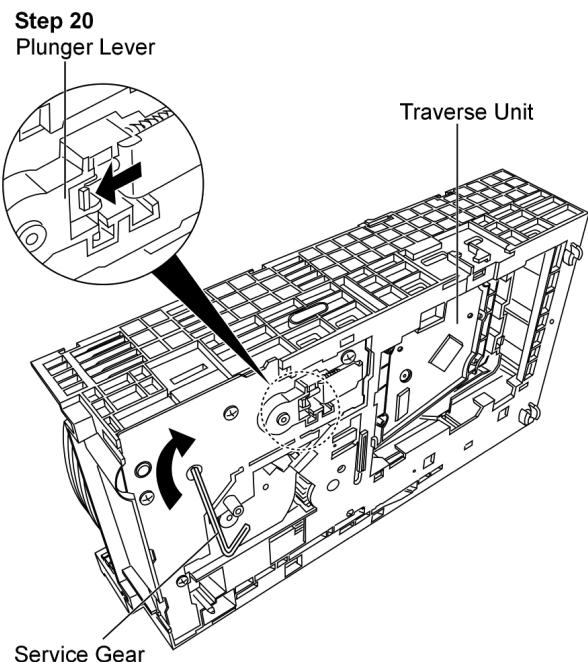
Step 16: Install the OC gear assy followed by the OC gear spring.

Step 17: Install the open switch lever.

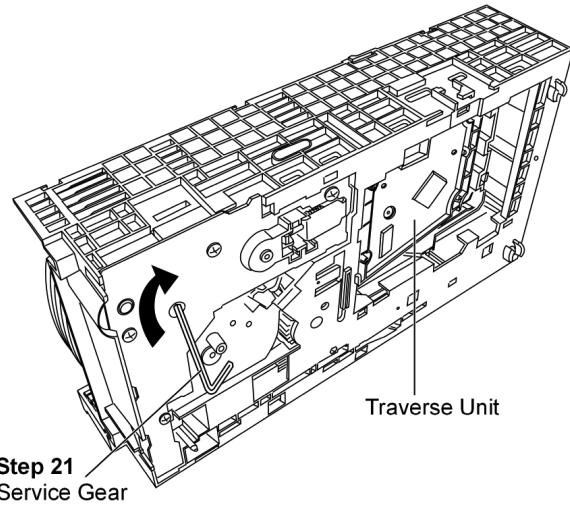
Step 18: Install the gear cover as arrow shown.



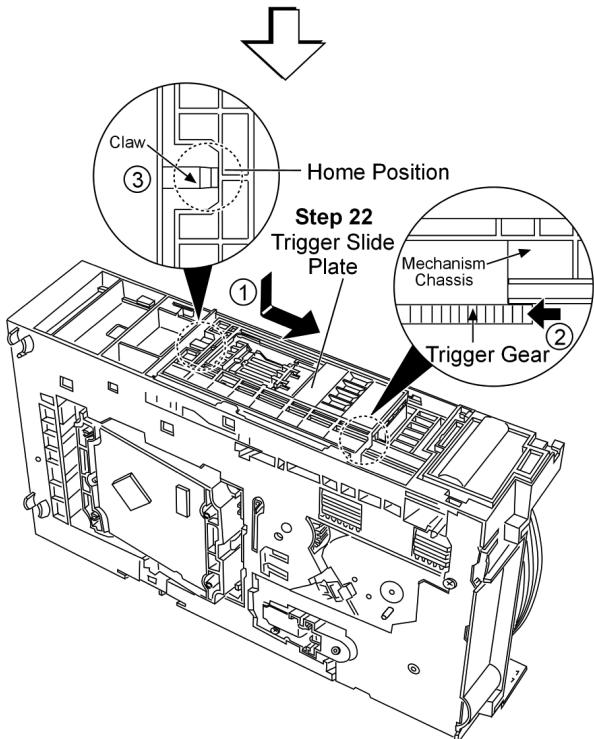
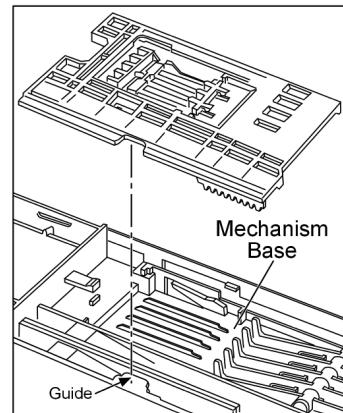
Step 19: Insert the service gear into the service hole and rotate the gear anti-clockwise.



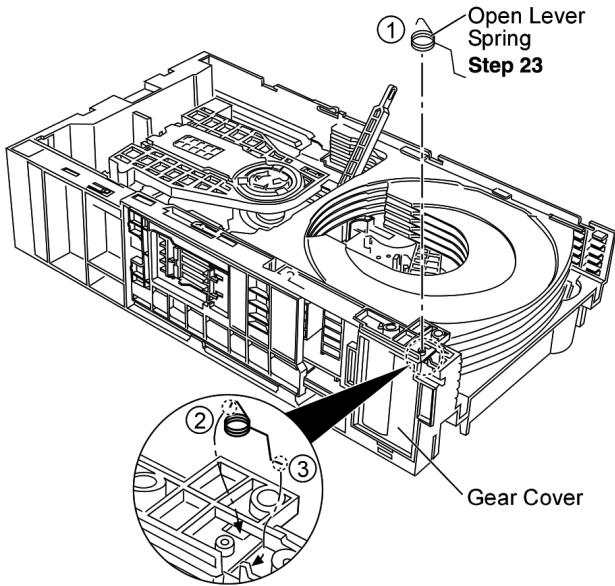
Step 20: Press and hold the plunger lever and rotate the gear clockwise until it stop.



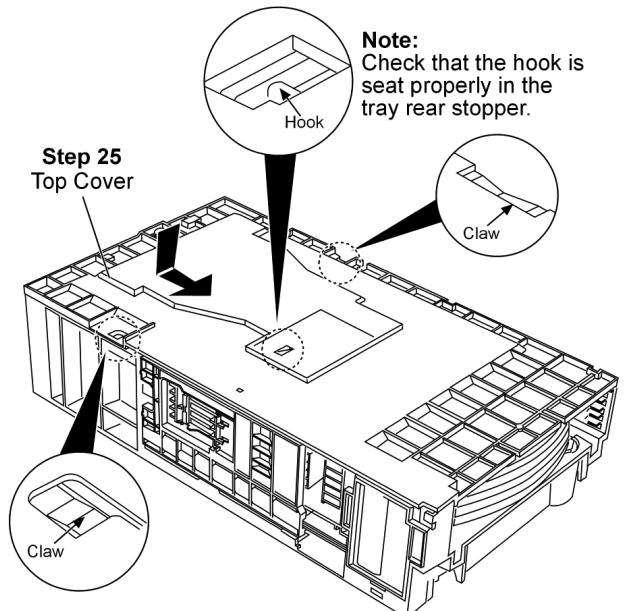
Step 21: Release the plunger lever, rotate the gear clockwise continuously until it stop at "HOME" position.



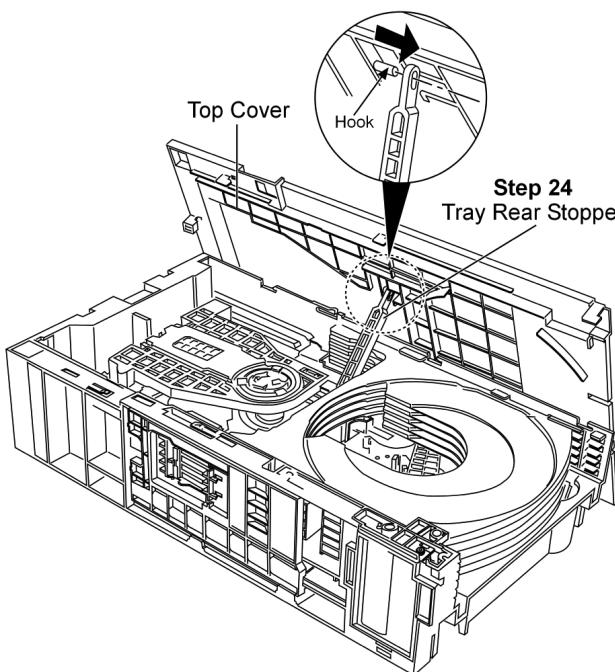
Step 22: Install the trigger slide plate as arrows shown in sequence.



Step 23: Install the open lever spring as shown.



Step 25: Fix the top cover as arrow shown, the 2 claws should be latched.



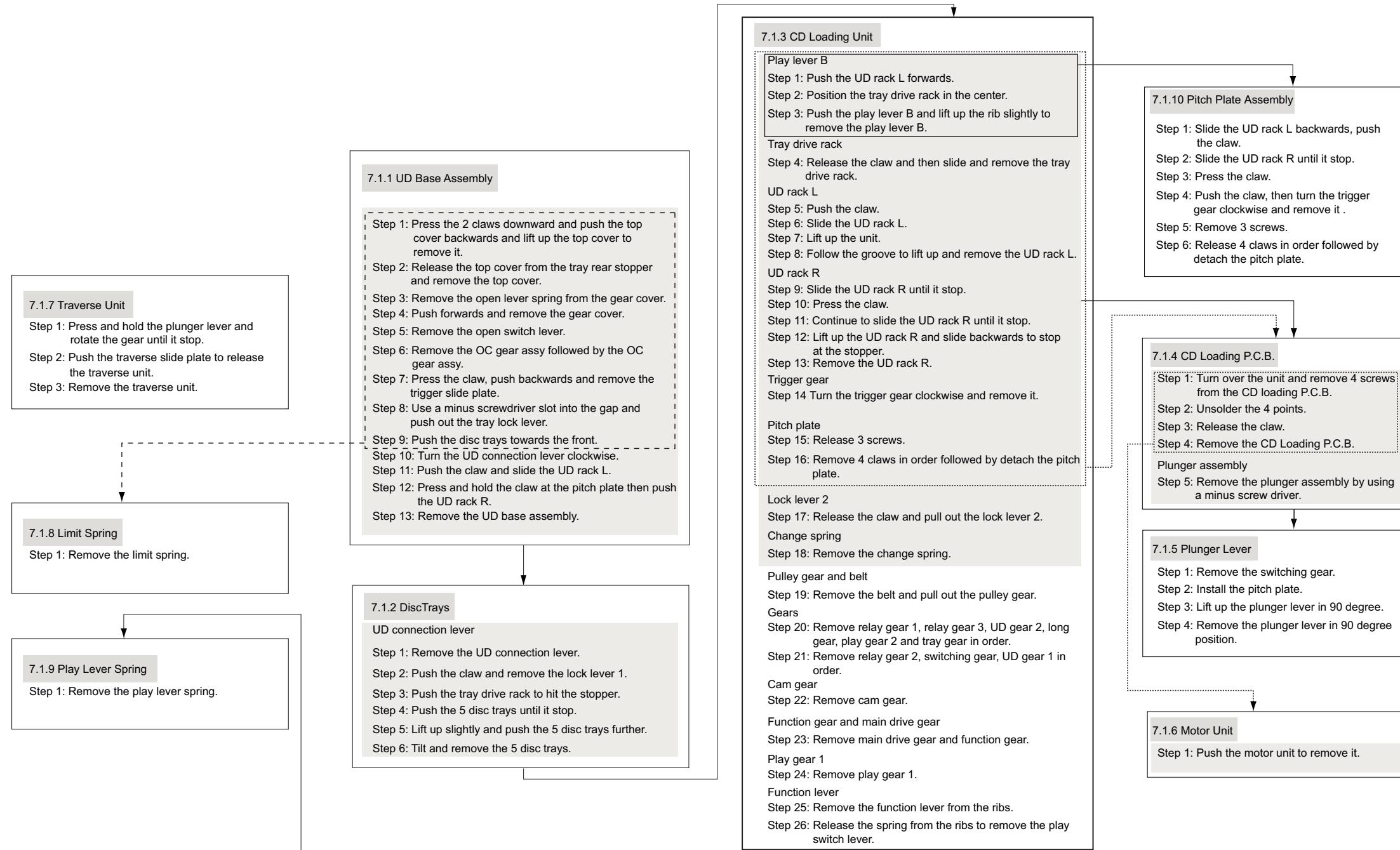
Step 24: Install the top cover, fix the top cover hook to the tray rear stopper as arrow shown.



## 6 Flow Chart

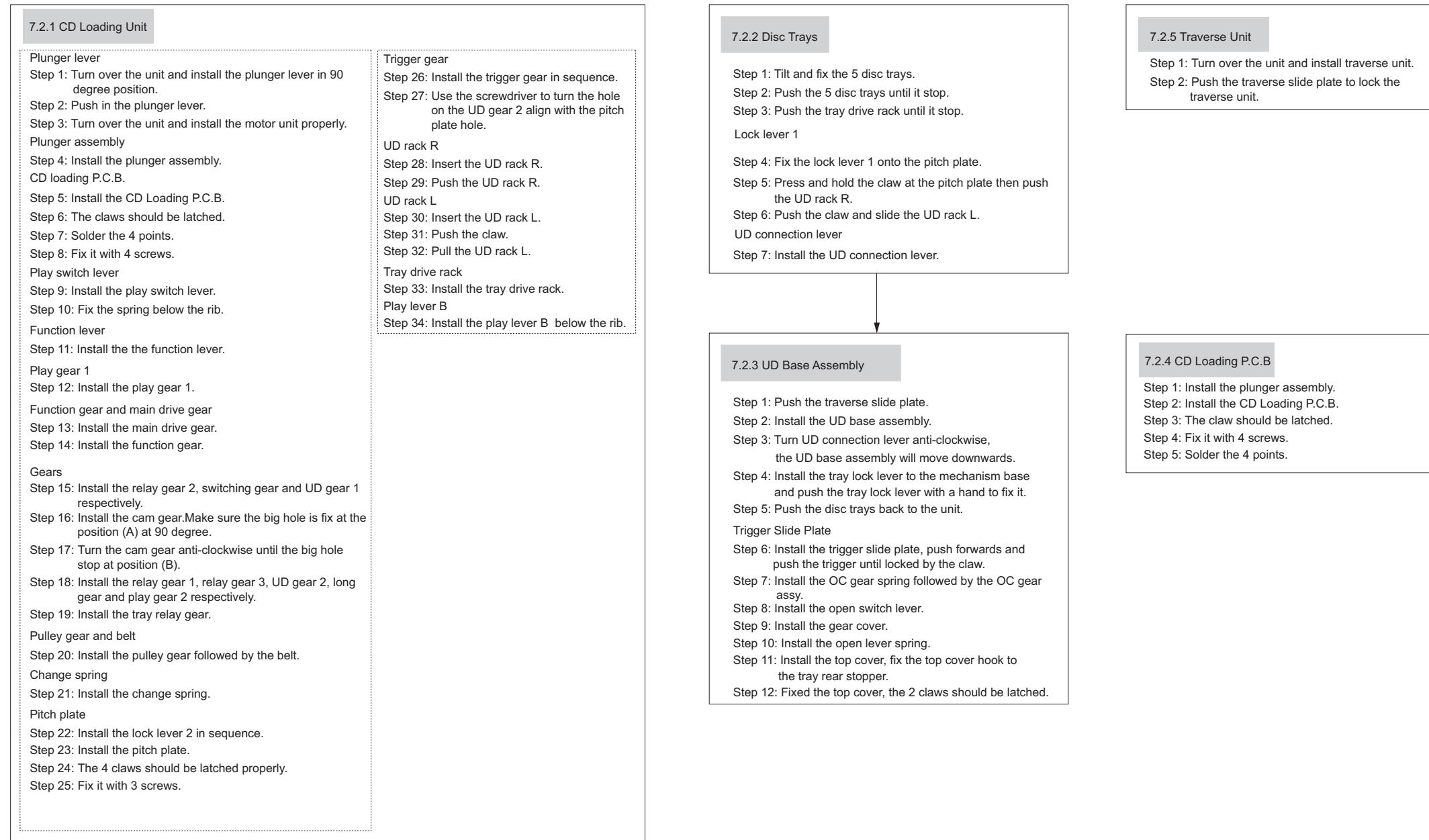
### 6.1. Disassembly Flow Chart

The following chart is the procedure for disassembling the casing and inside parts for internal inspection when carrying out the servicing.

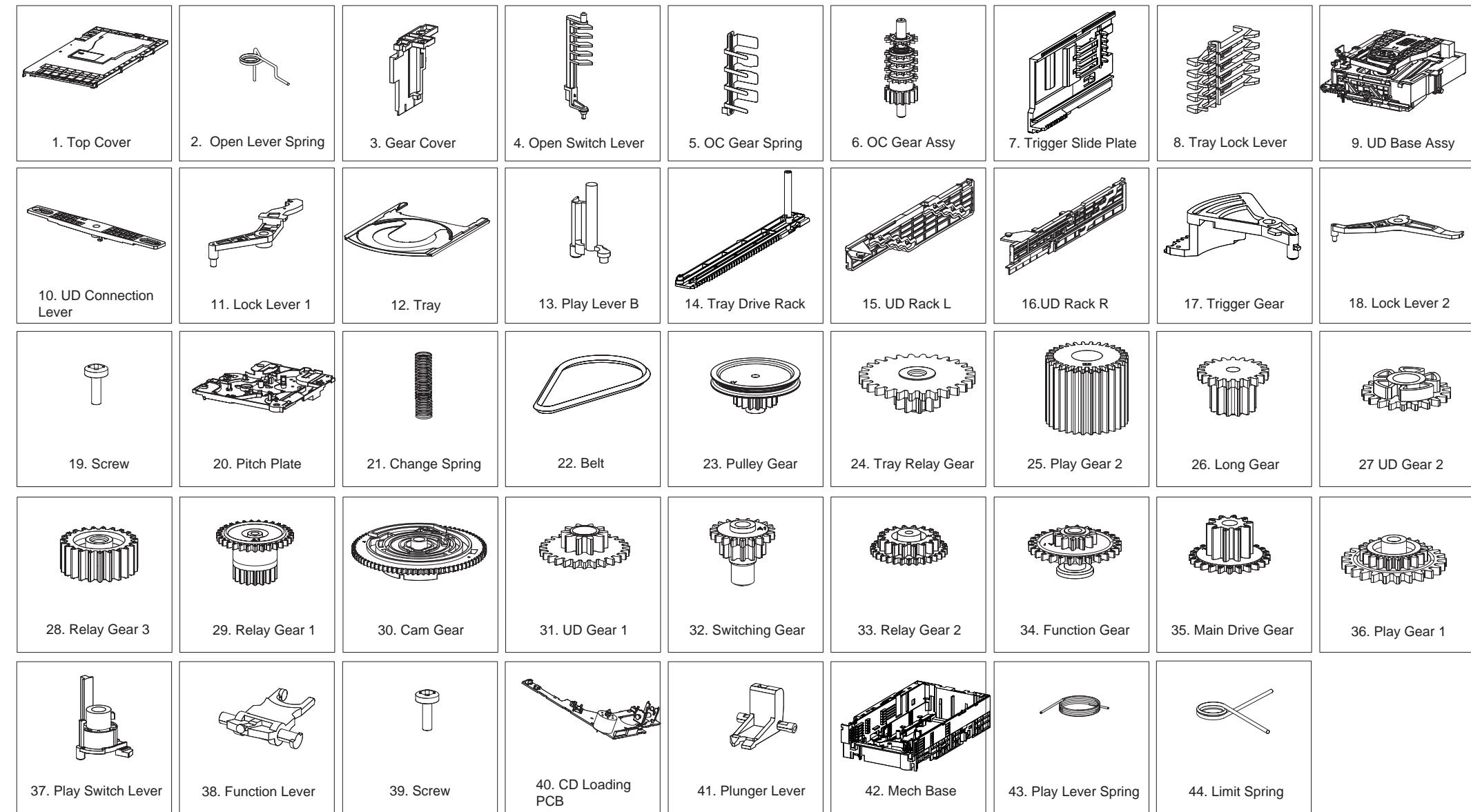


## 6.2. Assembly Flow Chart

The following chart is the procedure for assembling the casing and inside parts for internal inspection when carrying out the servicing.



### 6.3. Disassembly Flow





# 7 Assembling and Disassembling Procedure.

## 7.1. Disassembling Procedures

### Caution:

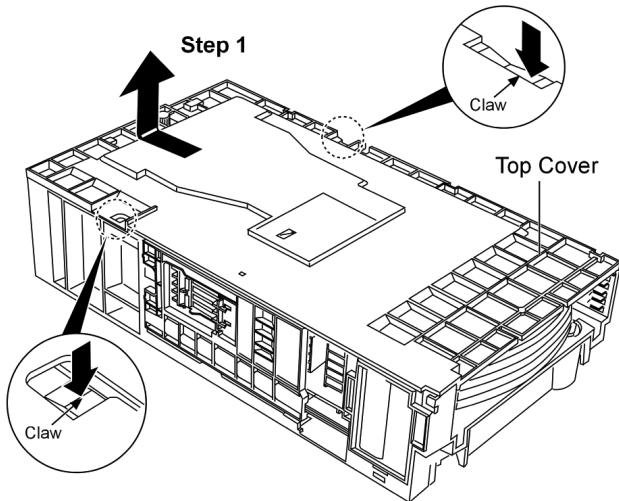
Do ensure that the main unit is set to service mode before repair.

For information on setting to service mode for changer unit, pls refer to section 5.3.

### Note:

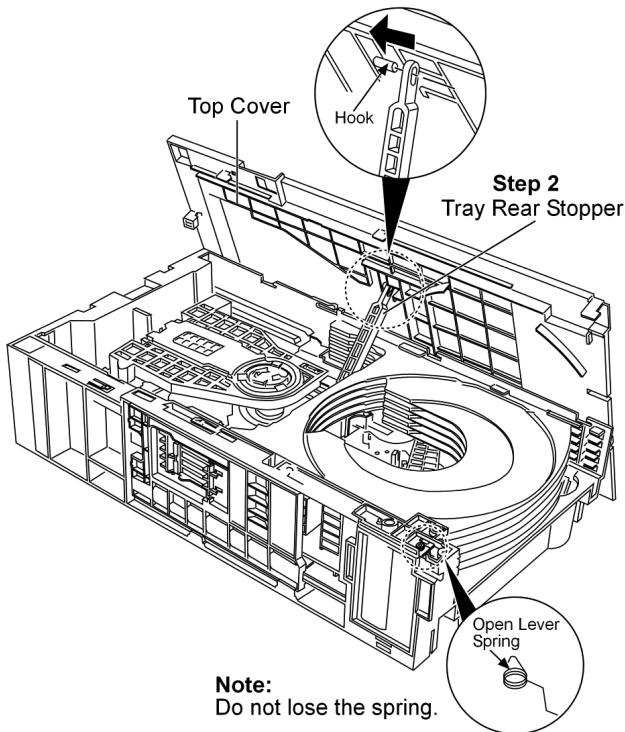
Change unit (CRS1) reliability test must be carry out in complete unit or using the Service P.C.B (Refer section 8).

### 7.1.1. Disassembly of UD Base Assembly

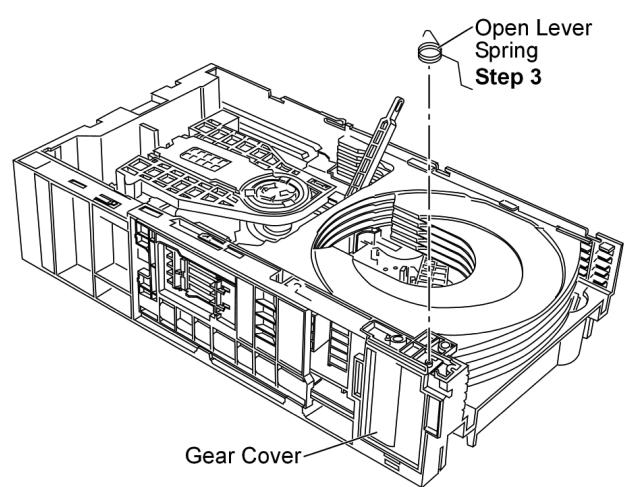


Step 1: Press the 2 claws downwards and push the top cover backwards and lift up the top cover to remove it.

**Caution: Do not exert strong force on the claws when pressing the claws.**

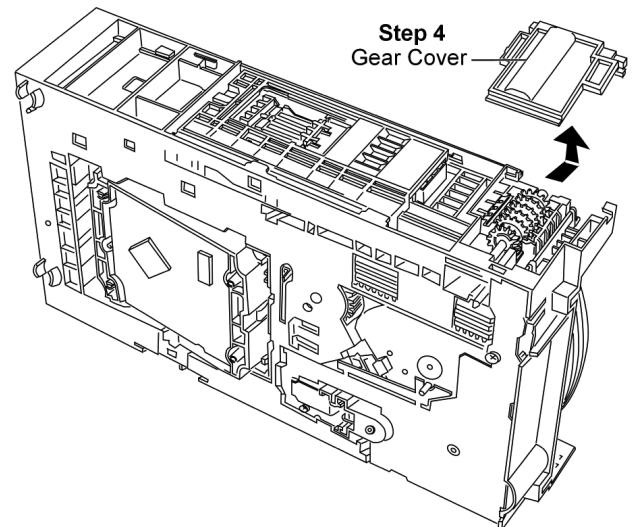


Step 2: Release the top cover from the tray rear stopper as arrow shown and remove the top cover.

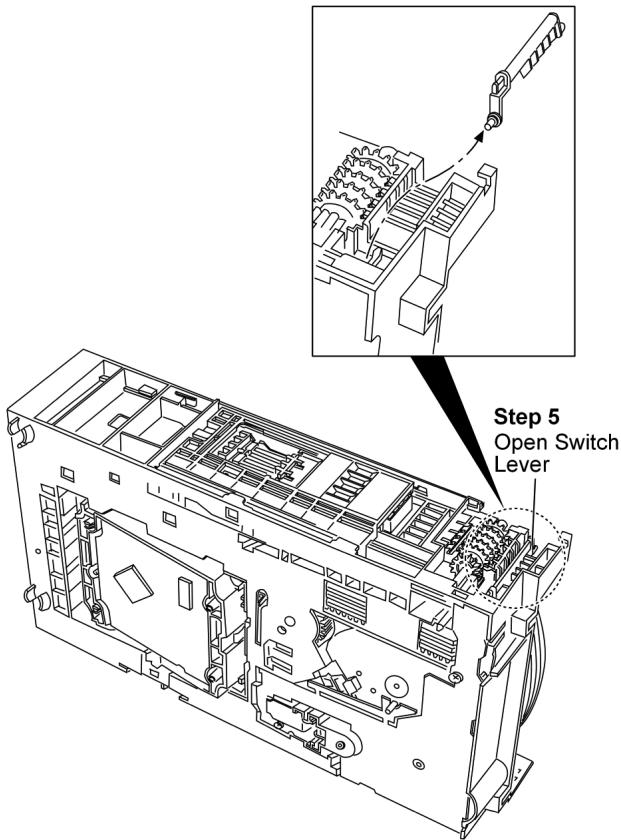


Step 3: Remove the open lever spring from the gear cover.

**Caution: Ensure the open lever spring is handle properly and keep it in a safe place.**

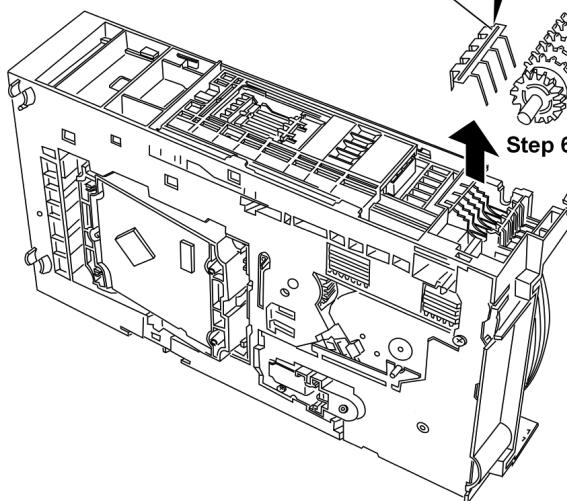


Step 4: Push forwards and remove the gear cover as arrow shown.



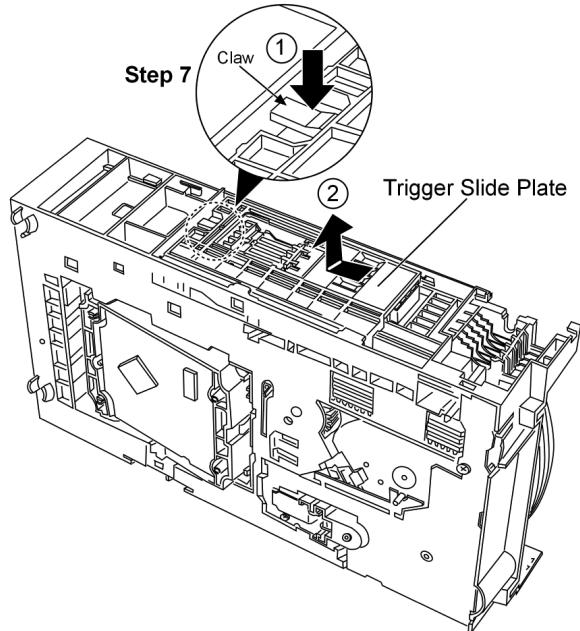
Step 5: Remove the open switch lever.

**Note:**  
Do not exert force on  
the OC Gear Spring to  
avoid damage it.

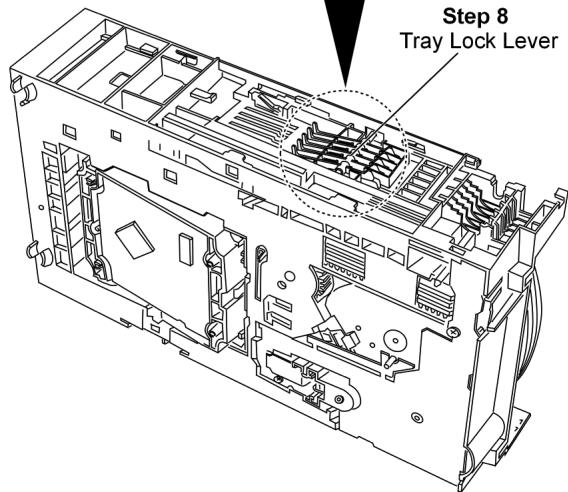
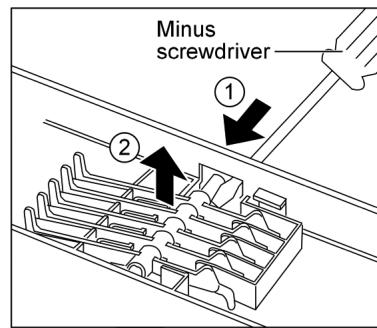


Step 6: Remove the OC gear assy followed by the OC gear spring as arrow shown.

**Caution:** Ensure the OC gear assy and OC gear spring are handle properly and keep them in a safe place.

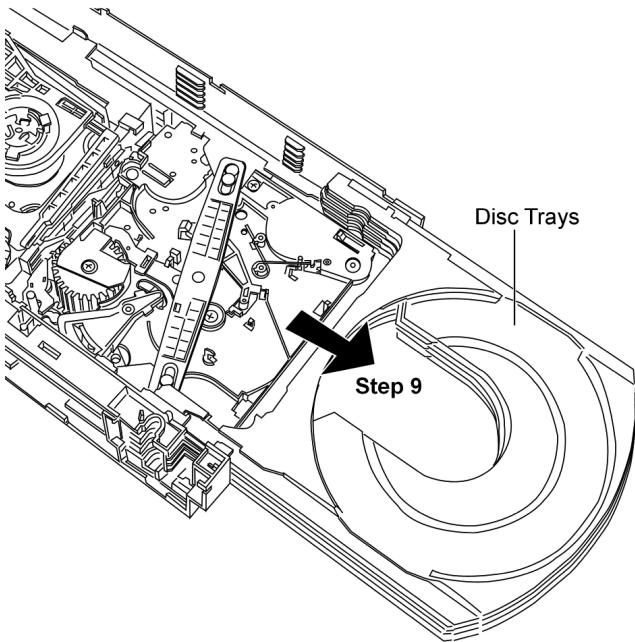


Step 7: Press the claw, push backwards and remove the trigger slide plate as arrows shown.

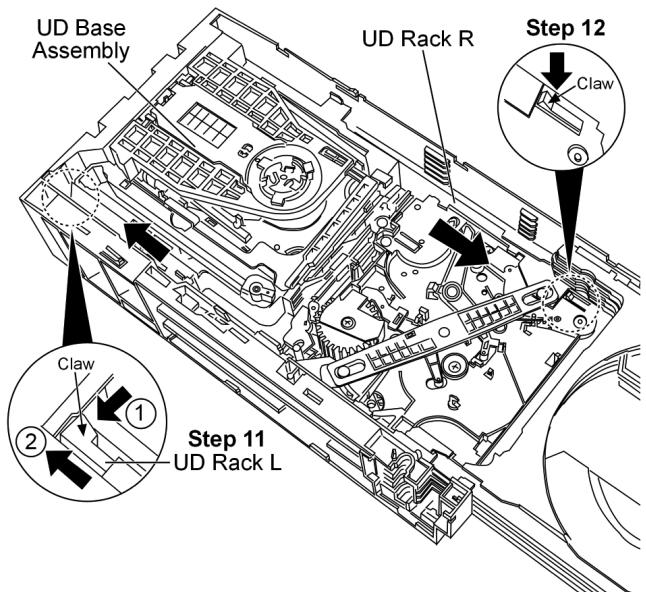


Step 8: Use a minus screwdriver slot into the gap and push out the tray lock lever as arrows shown.

**Caution:** Do not exert force as it may cause damage to the tray lock lever.

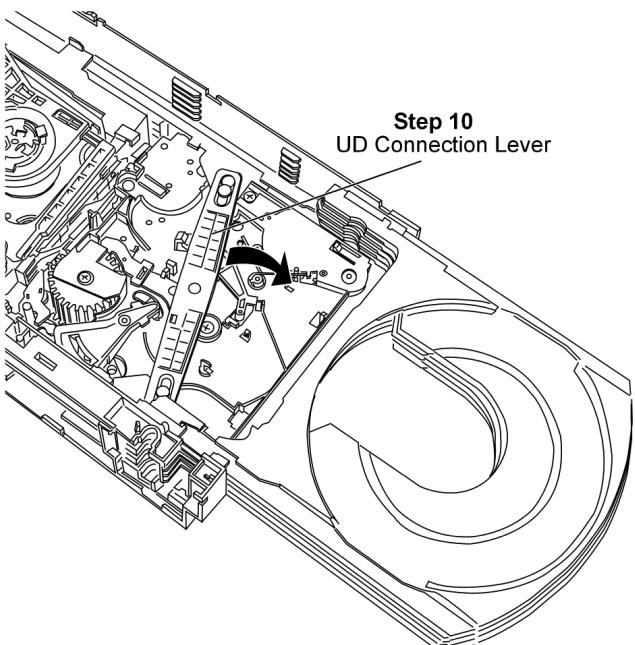


Step 9: Push the disc trays towards the front as arrow shown.

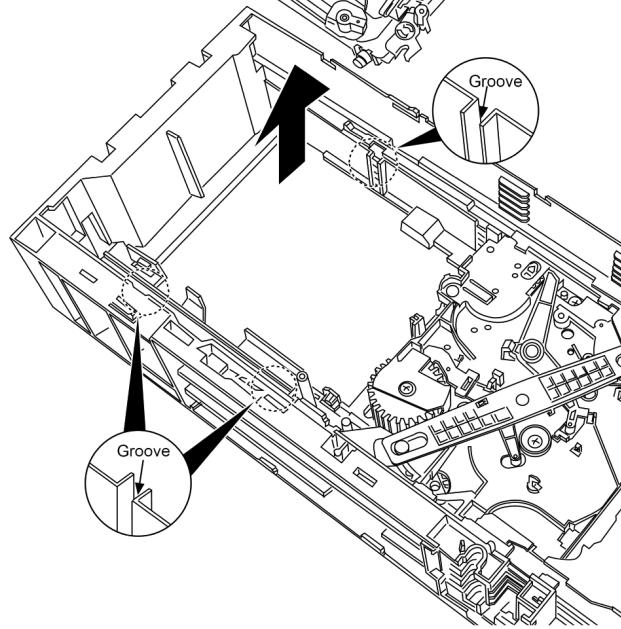
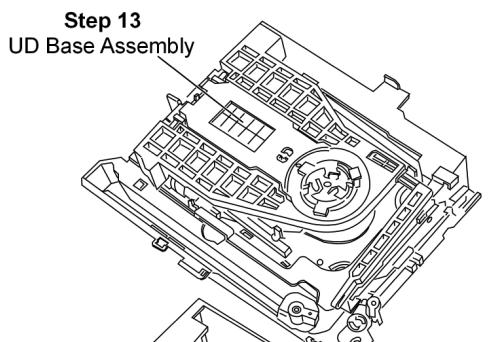
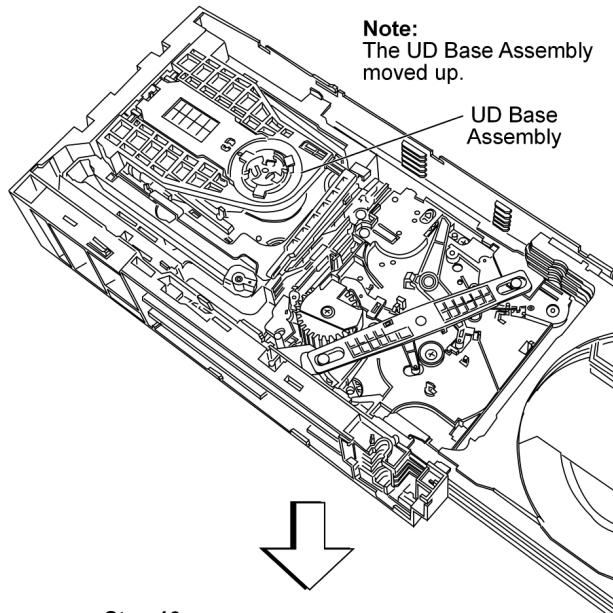


Step 11: Push the claw and slide the UD rack L as arrows shown.

Step 12: Press and hold the claw at the pitch plate then push the UD rack R as arrows shown.



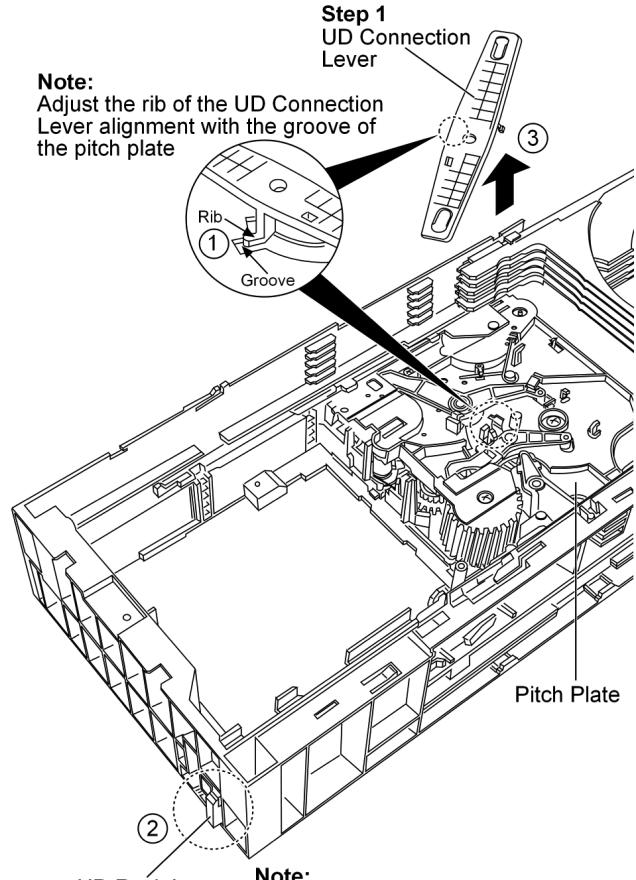
Step 10: Turn the UD connection lever clockwise.



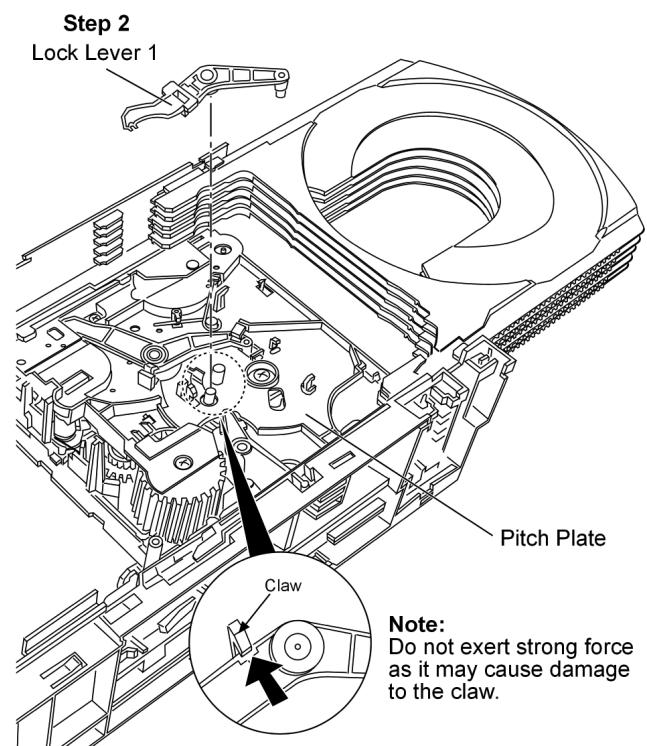
Step 13: Remove the UD base assembly as arrow shown.

### 7.1.2. Disassembly of Disc Trays

- Follow the (Step 1) to (Step 13) of item 7.1.1. (Disassembly of UD Base Assembly)
- Disassembly of UD connection lever**

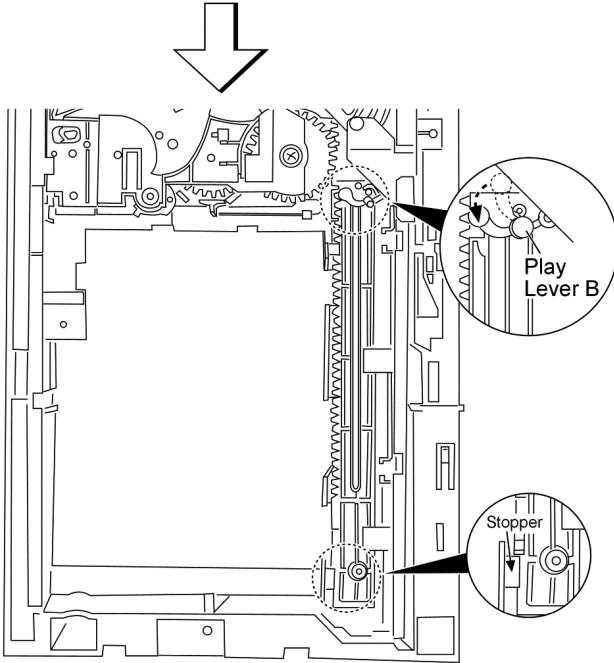
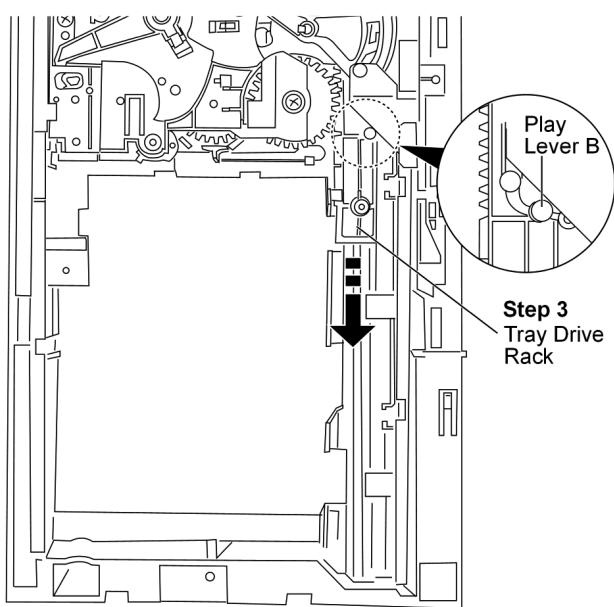


Step 1: Remove the UD connection lever.

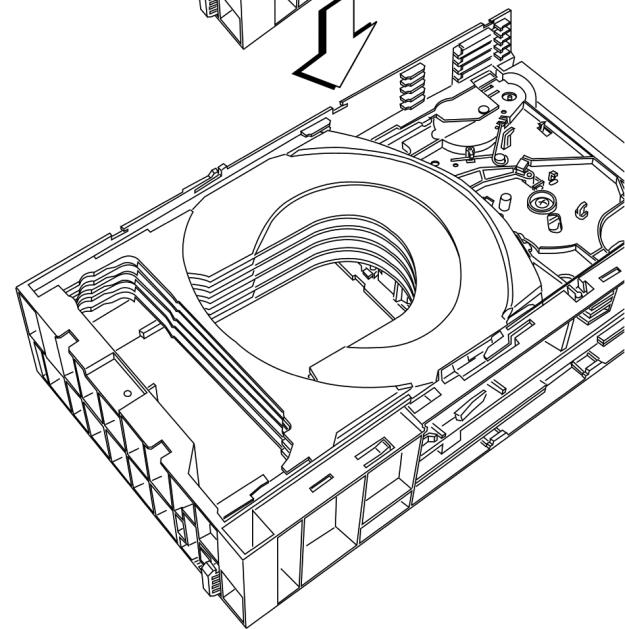
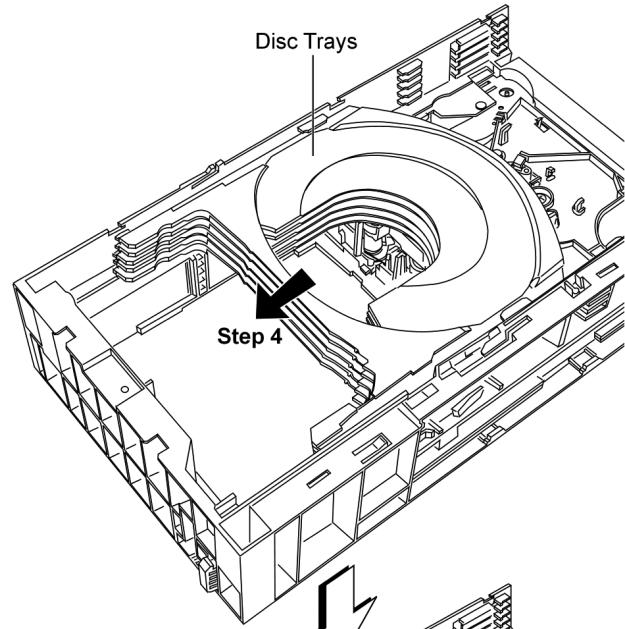


Step 2: Push the claw as arrow shown and remove the lock lever 1.

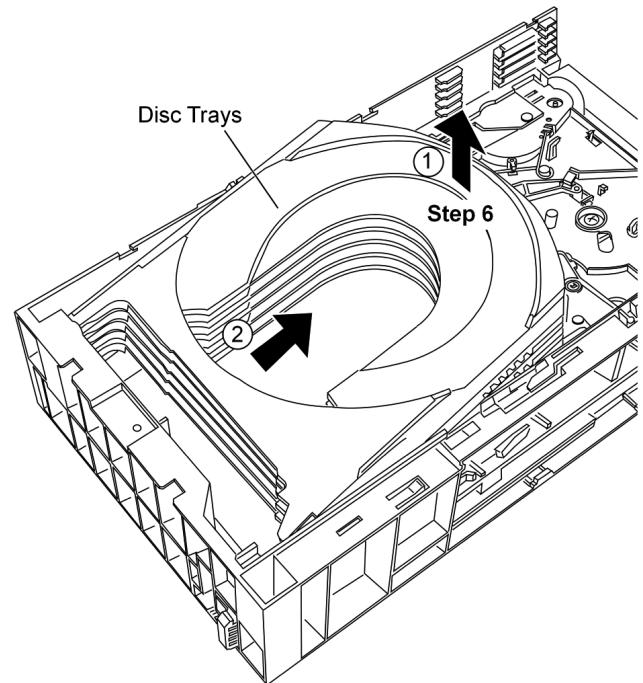
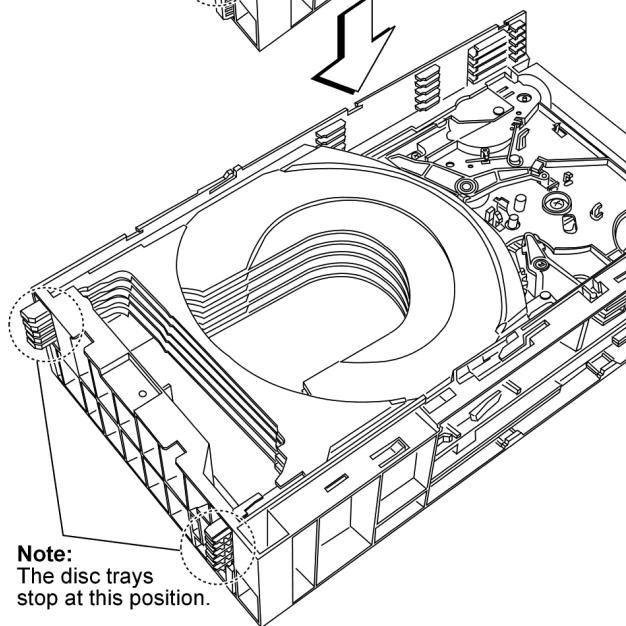
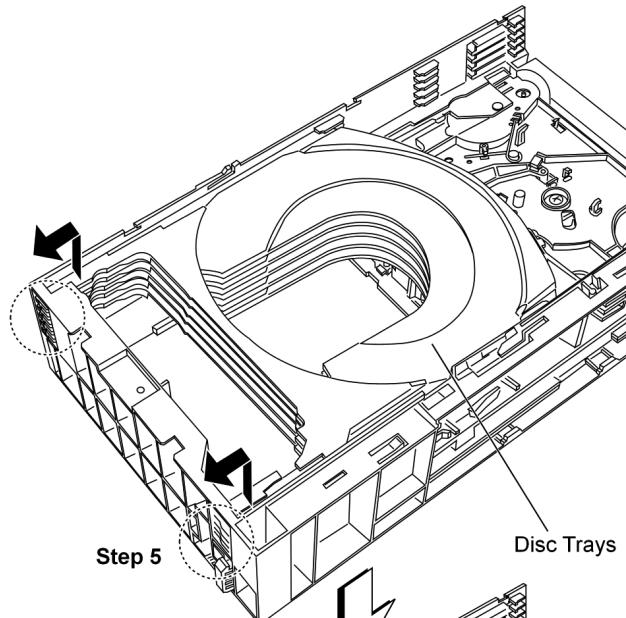
**Caution:** Do not exert force as it may cause the claw to be damage.



Step 3: Push the tray drive rack as arrow shown to hit the stopper.



Step 4: Push the 5 disc trays as arrow shown until it stop (bottom picture).



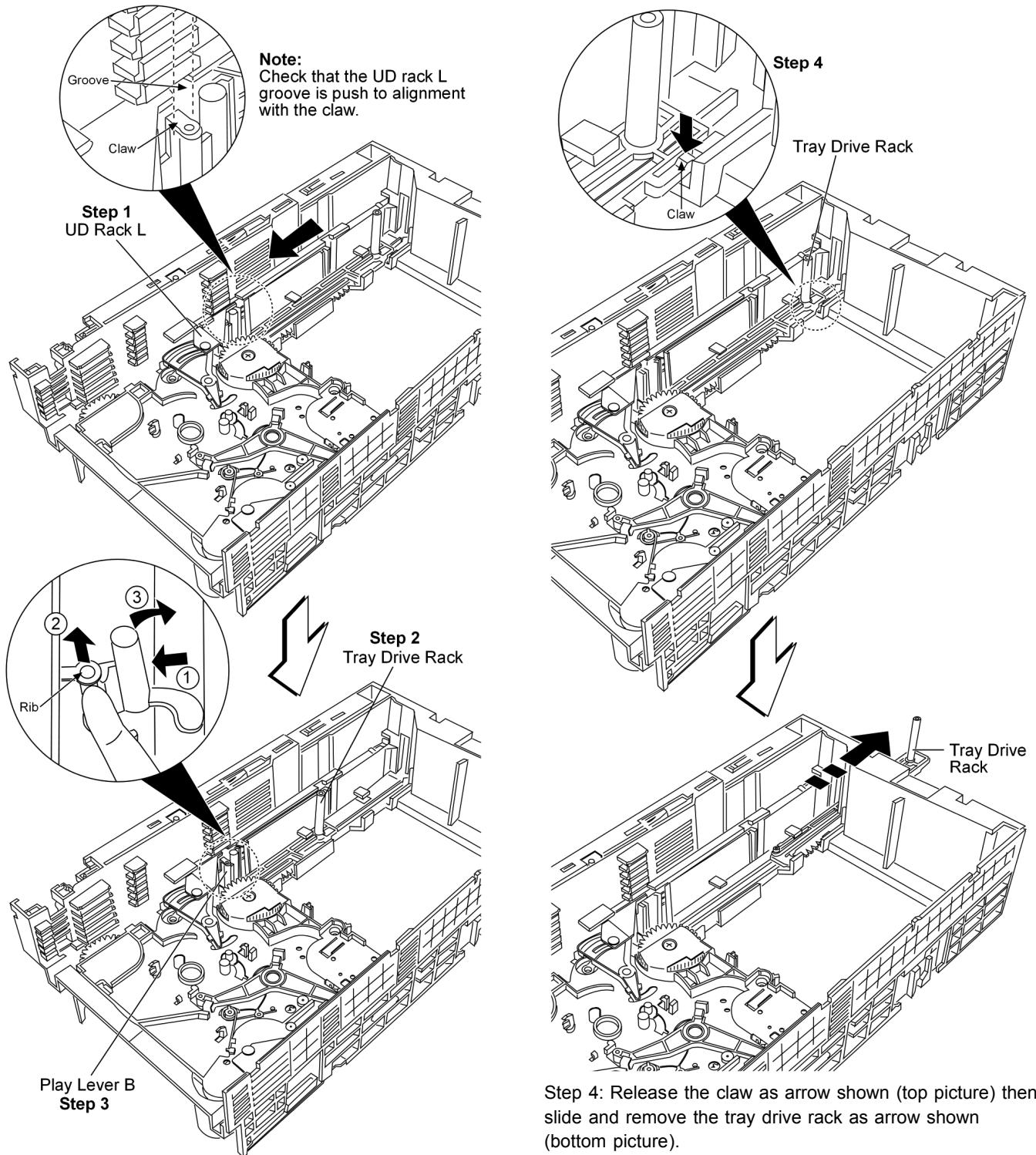
Step 6: Tilt and remove the 5 disc trays as arrows shown.

### 7.1.3. Disassembly of CD Loading Unit

- Follow the (Step 1) to (Step 13) of item 7.1.1. (Disassembly of UD Base Assembly)
- Follow the (Step 1) to (Step 6) of item 7.1.2. (Disassembly of Disc Trays)

- **Disassembly of play lever B**

Step 5: Lift up slightly and push the 5 disc trays further as arrows shown.



Step 1: Push the UD rack L forwards as arrow shown.

Step 2: Position the tray drive rack in the center.

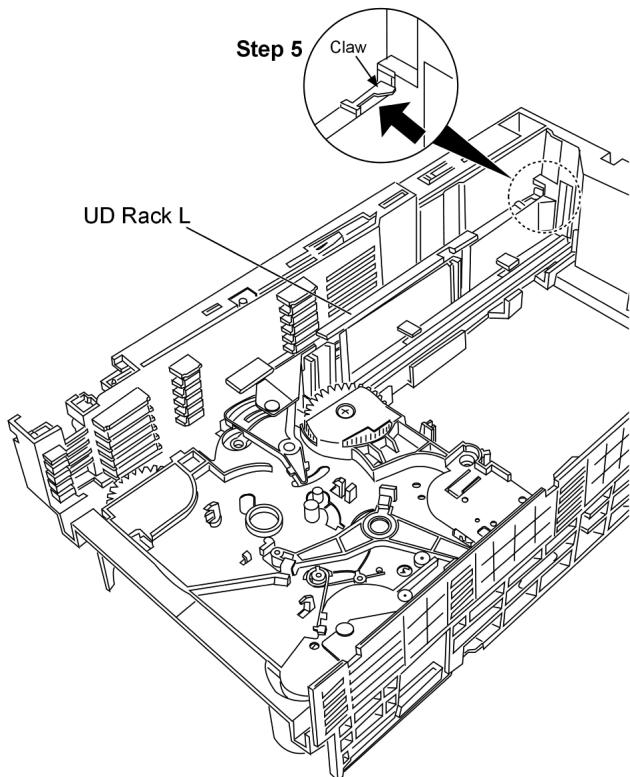
Step 3: Push the play lever B and lift up the rib slightly to remove the play lever B as arrows shown.

**Caution:** Make sure do not break the rib when removing the play lever B. The rib break easily by using the tools.

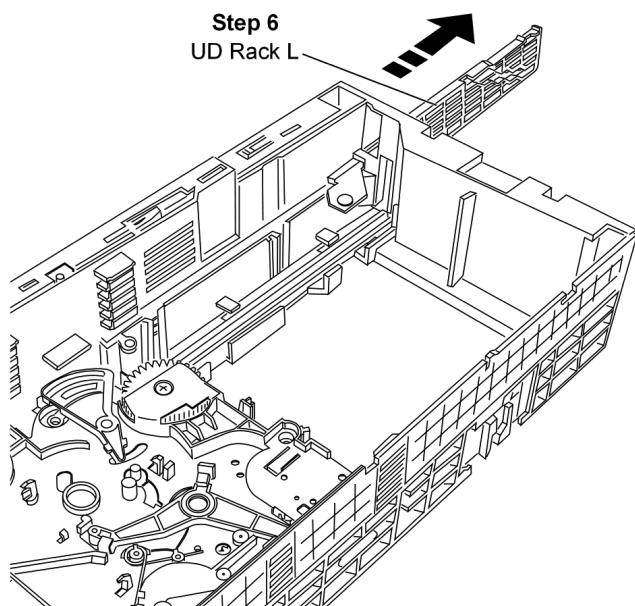
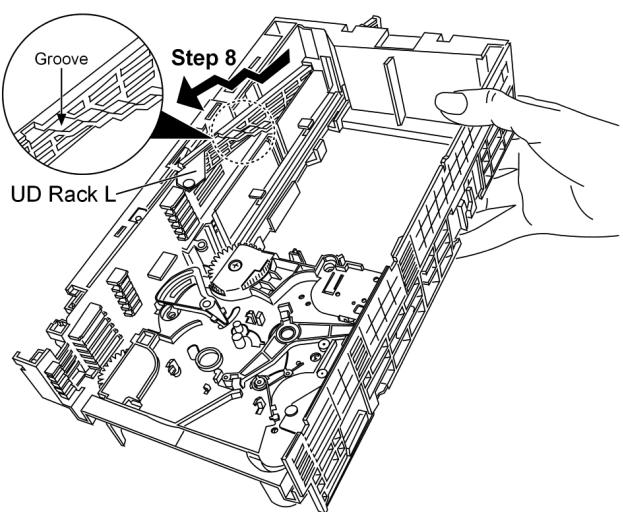
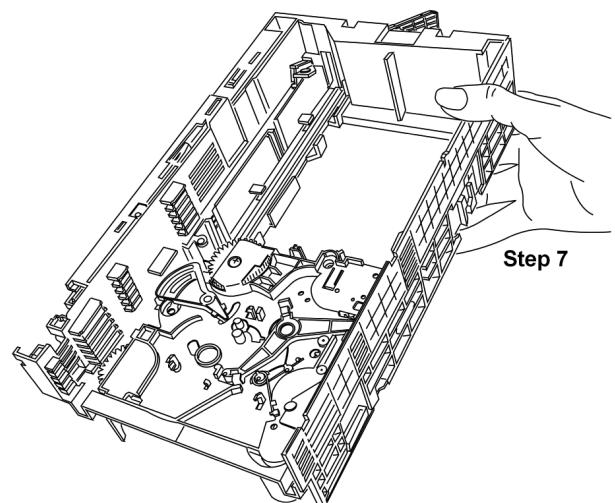
#### · Disassembly of tray drive rack

Step 4: Release the claw as arrow shown (top picture) then slide and remove the tray drive rack as arrow shown (bottom picture).

#### · Disassembly of UD rack L



Step 5: Push the claw as arrow shown.

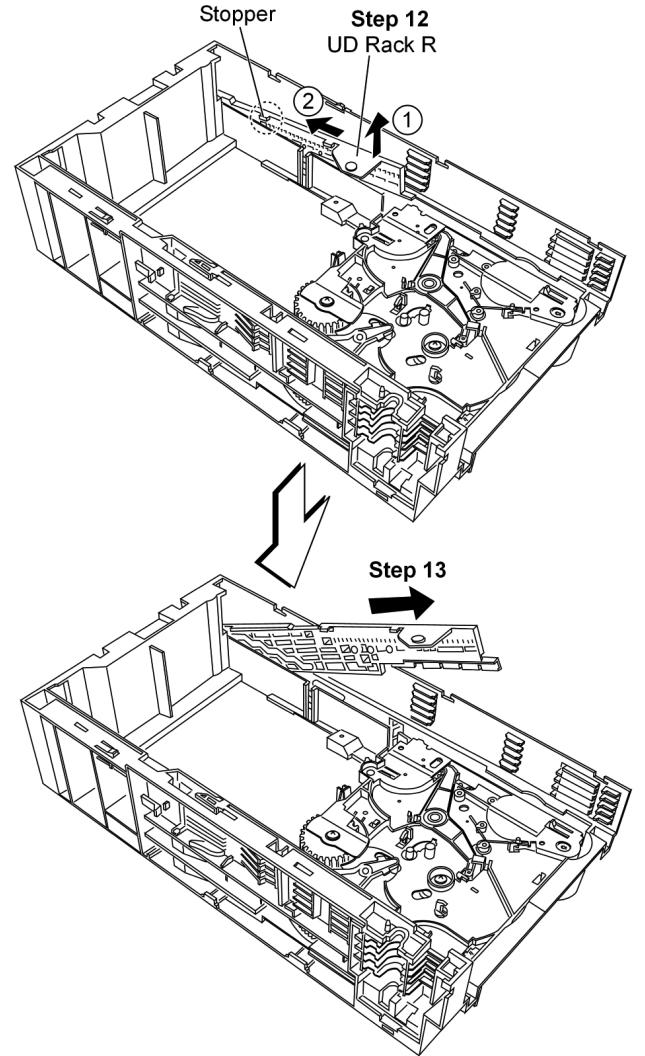
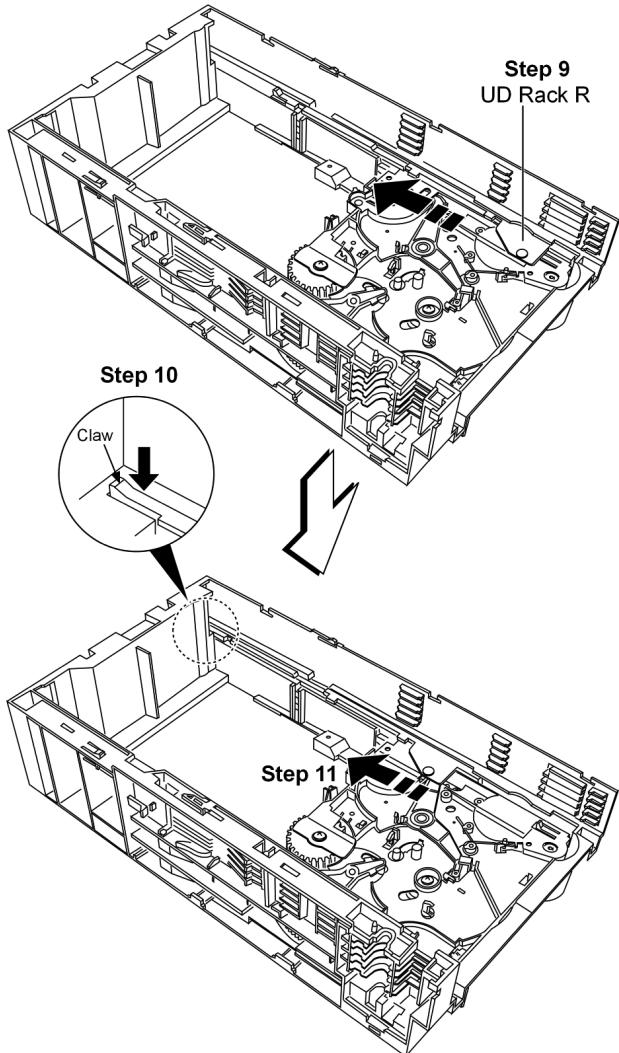


Step 6: Slide the UD rack L as arrow shown.

Step 7: Lift up the unit as shown.

Step 8: Follow the groove to lift up and remove the UD rack L as arrow shown.

#### • Disassembly of UD rack R



Step 9: Slide the UD rack R as arrow shown until it stop.

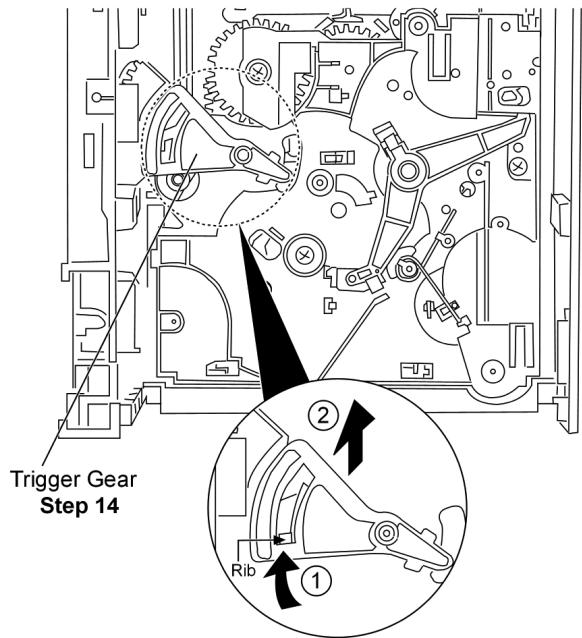
Step 10: Press the claw as arrow shown.

Step 11: Continue to slide the UD rack R as arrow shown until it stop.

Step 12: Lift up the UD rack R and slide backwards to stop at the stopper.

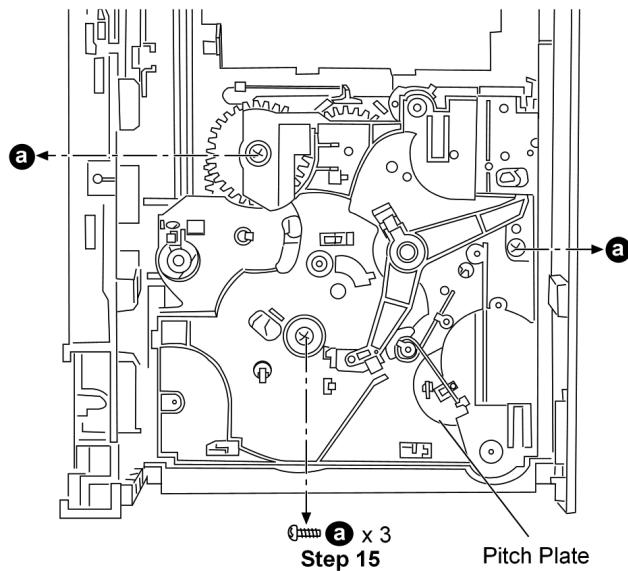
Step 13: Remove it as arrow shown.

#### · Disassembly of trigger gear

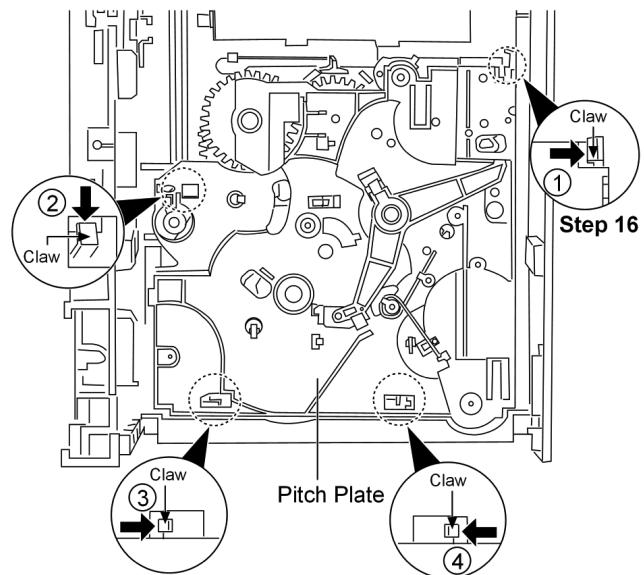


Step 14: Turn the trigger gear clockwise and remove it as arrows shown.

#### · Disassembly of pitch plate

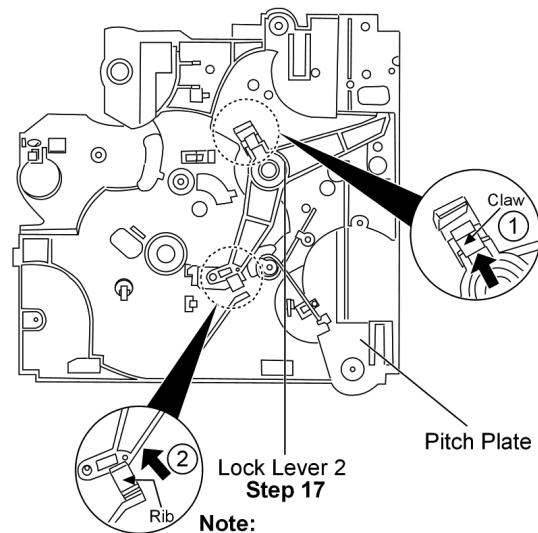


Step 15: Remove 3 screws



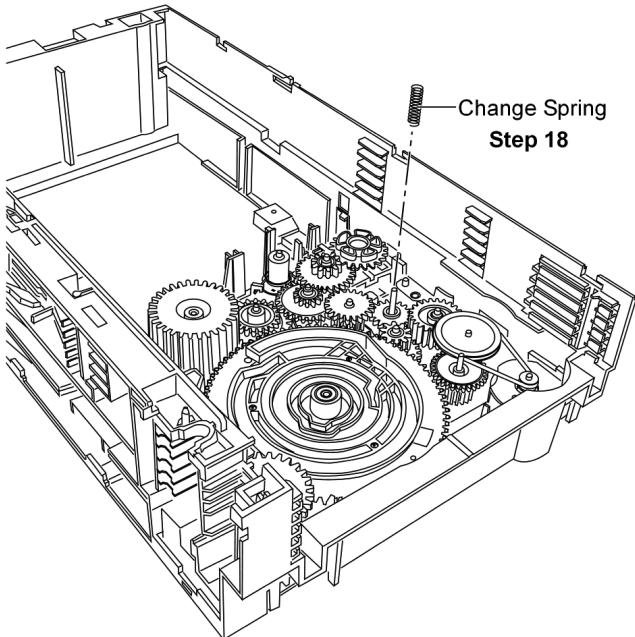
Step 16: Release 4 claws as arrows shown in order followed by detach the pitch plate.

#### · Disassembly of lock lever 2



Step 17: Release the claw and pull out the lock lever 2 as arrows shown. (The rib is fragile, do not exert force on it).

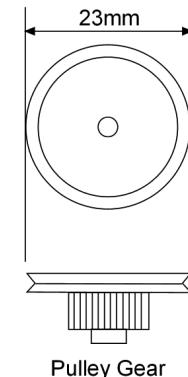
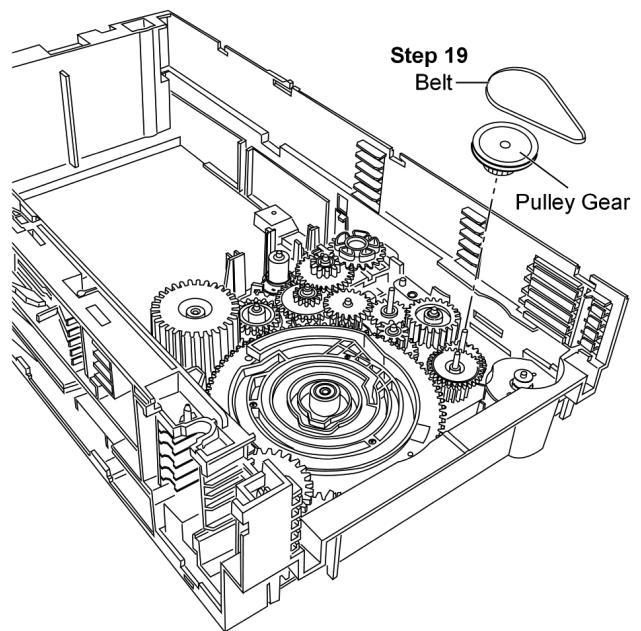
#### · Disassembly of change spring



Step 18: Remove the change spring.

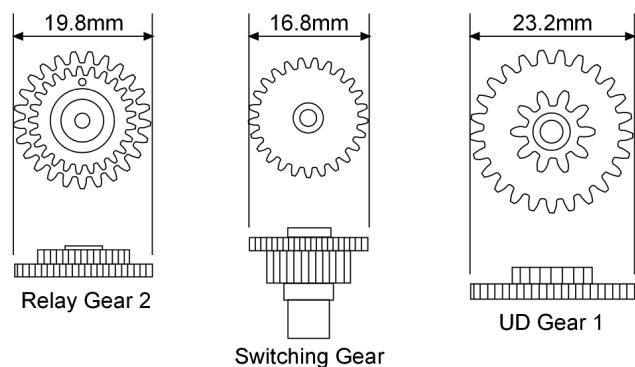
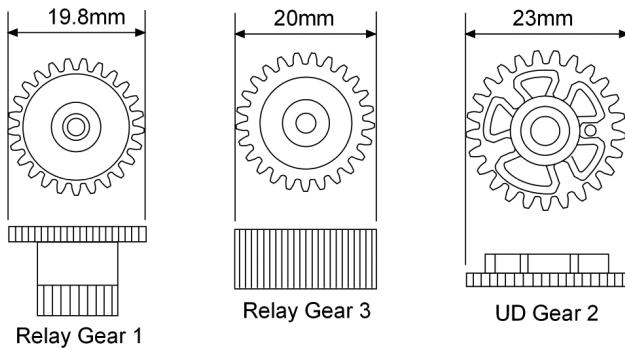
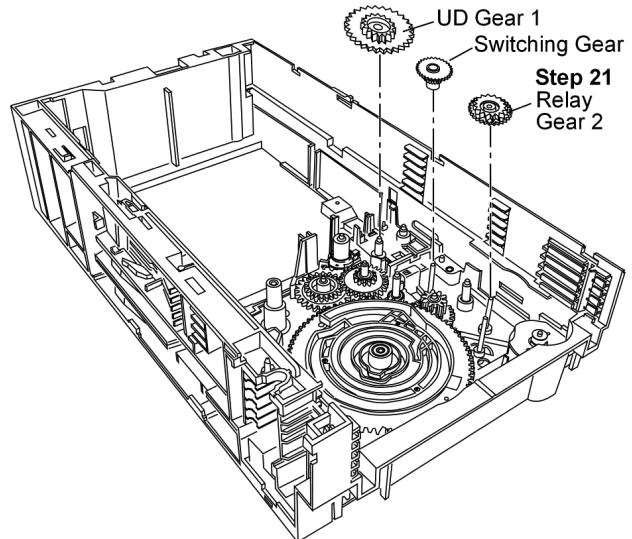
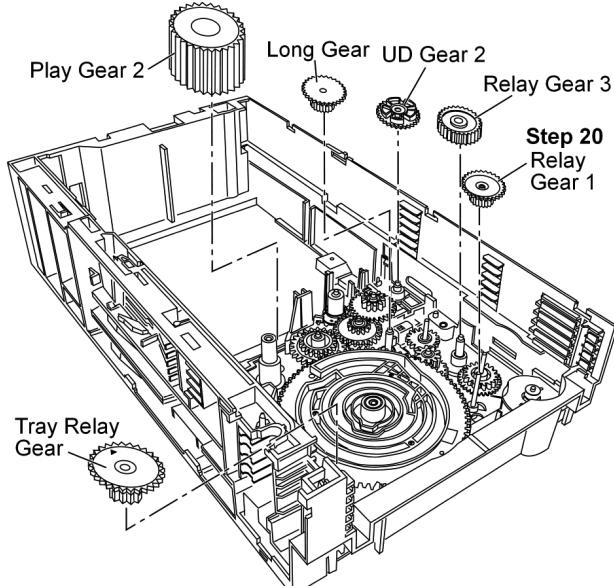
**Caution: Handle the change spring carefully, do not lose it. Put in a proper storage location.**

· **Disassembly of pulley gear and belt**

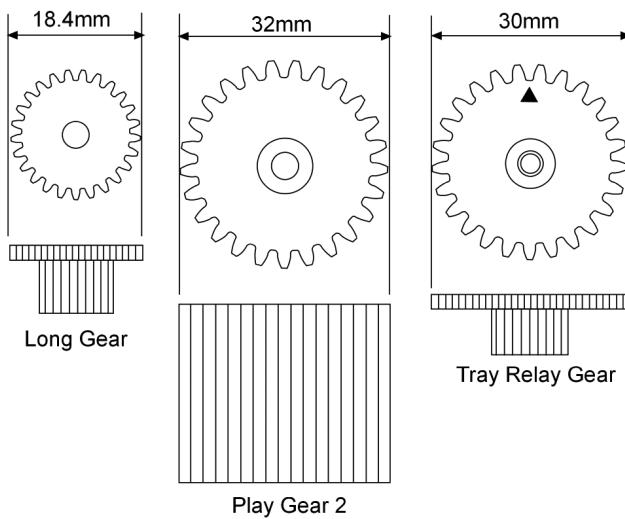


Step 19: Remove the belt and pull out the pulley gear.

· **Disassembly of gears**

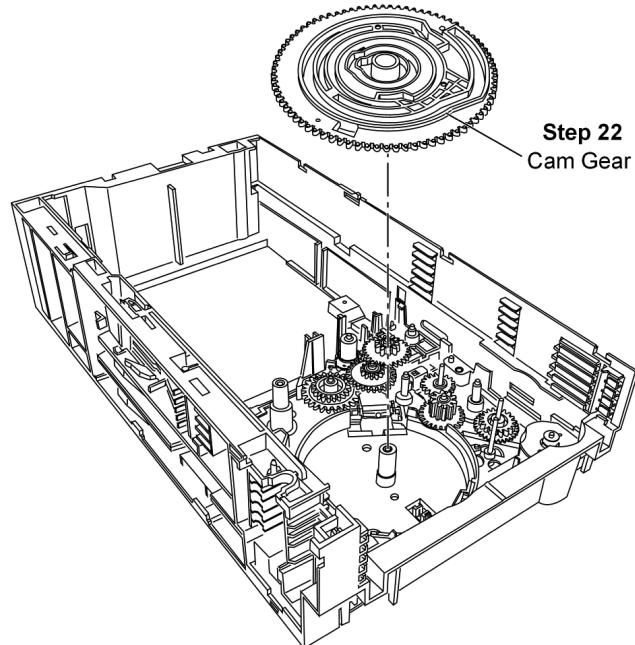


Step 21: Remove relay gear 2, switching gear, UD gear 1 in order.



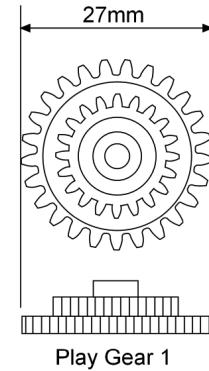
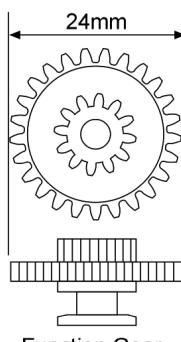
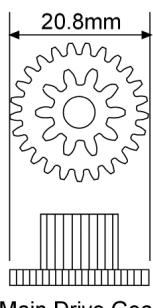
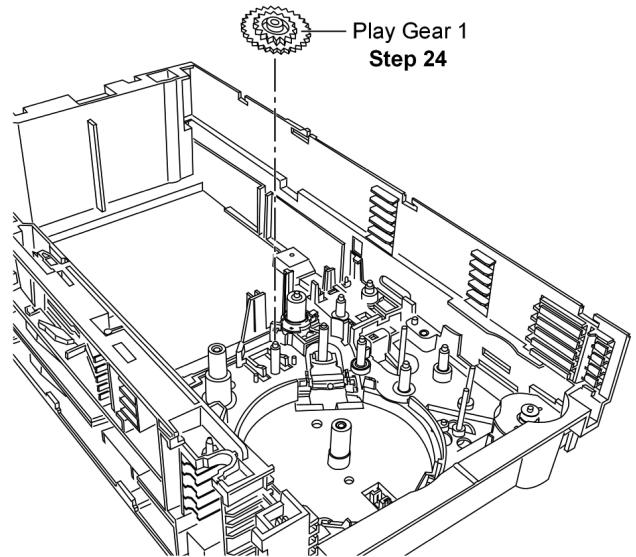
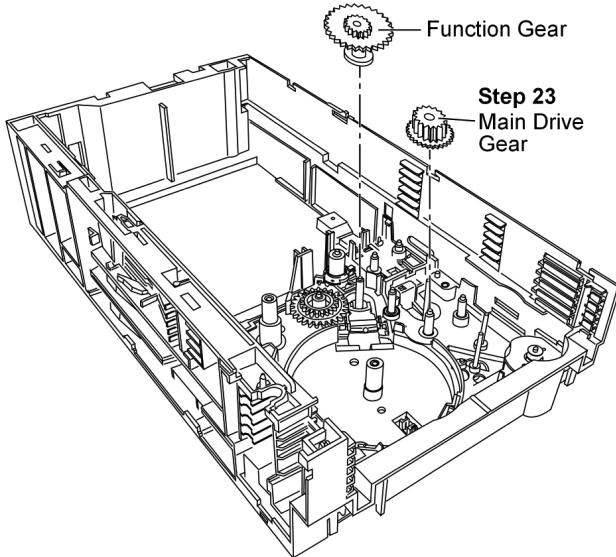
Step 20: Remove the relay gear 1, relay gear 3, UD gear 2, long gear, play gear 2 and tray relay gear in order.

#### · Disassembly of cam gear



Step 22: Remove cam gear.

#### · Disassembly of function gear and main drive gear

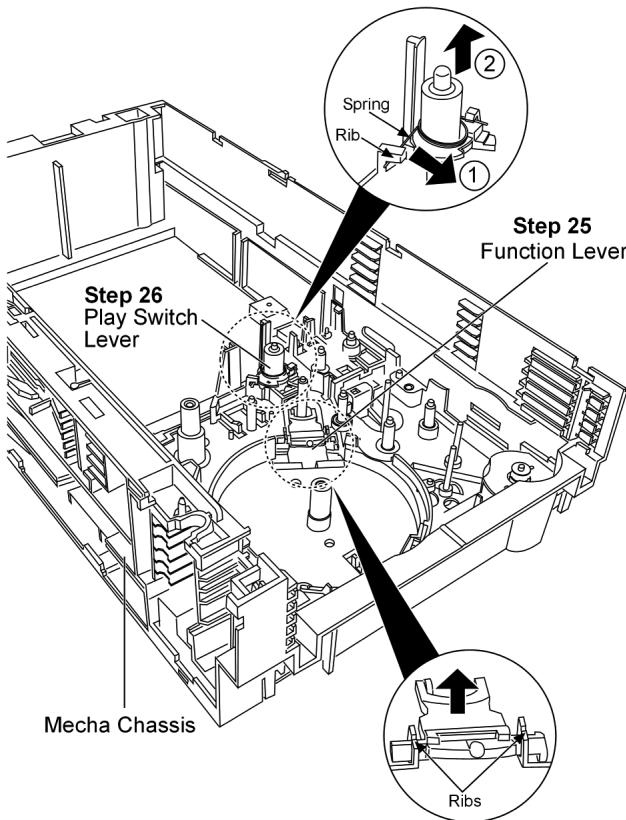


Step 23: Remove main drive gear and function gear.

· Disassembly of play gear 1

Step 24: Remove play gear 1.

· Disassembly of function lever

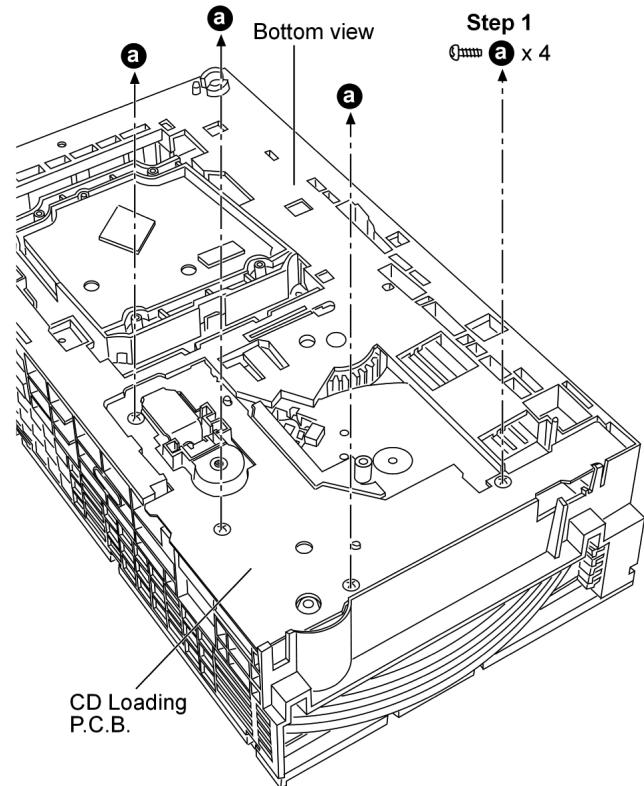


Step 25: Remove the function lever from the ribs as arrow shown.

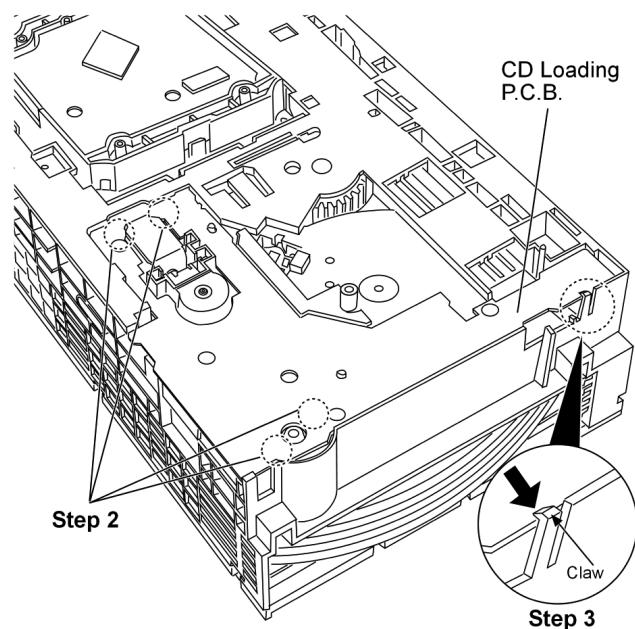
Step 26: Release the spring from the rib as arrow shown to remove the play switch lever.

**Note:** For changing of the mecha chassis, please follow Step 1 to Step 5 of item 7.1.4 (Disassembly of CD Loading P.C.B.), Step 3 to Step 4 of item 7.1.5 (Disassembly of Plunger Lever) and Step 2 of item 7.1.6 (Disassembly of Motor Unit)

#### 7.1.4. Disassembly of CD Loading P.C.B.

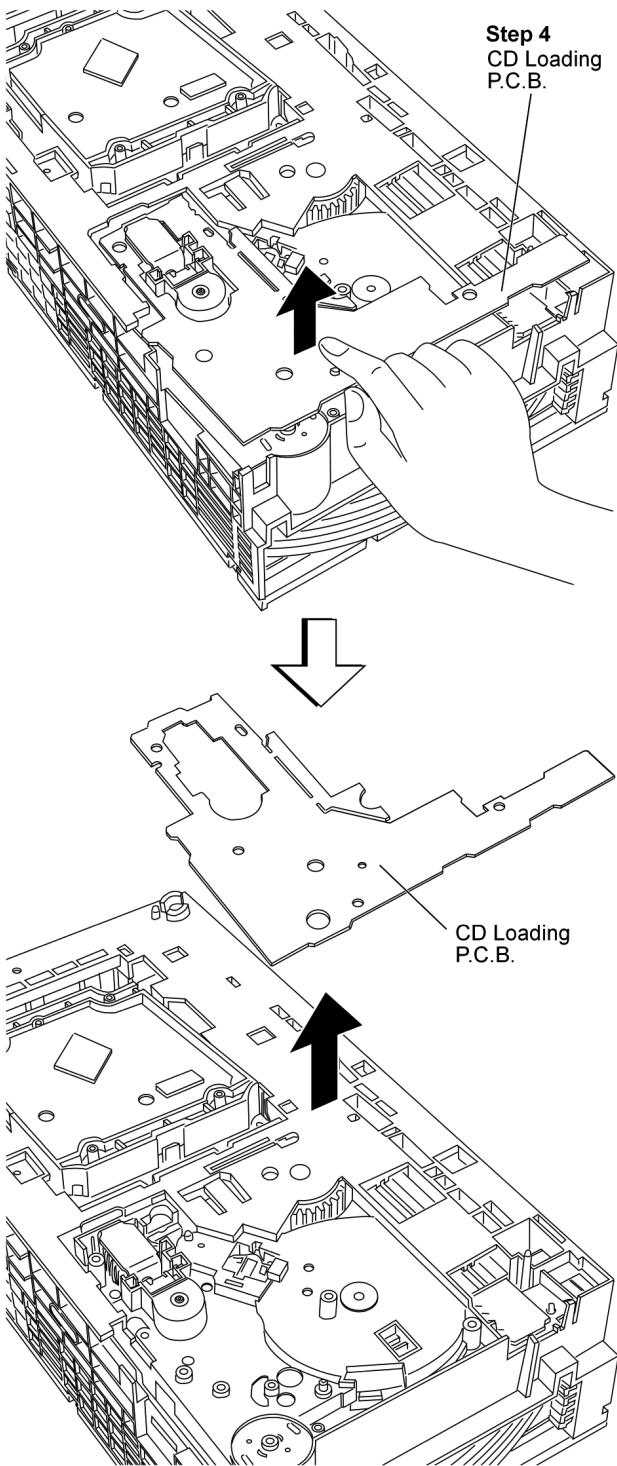


Step 1: Turn over the unit and remove 4 screws from the CD Loading P.C.B.



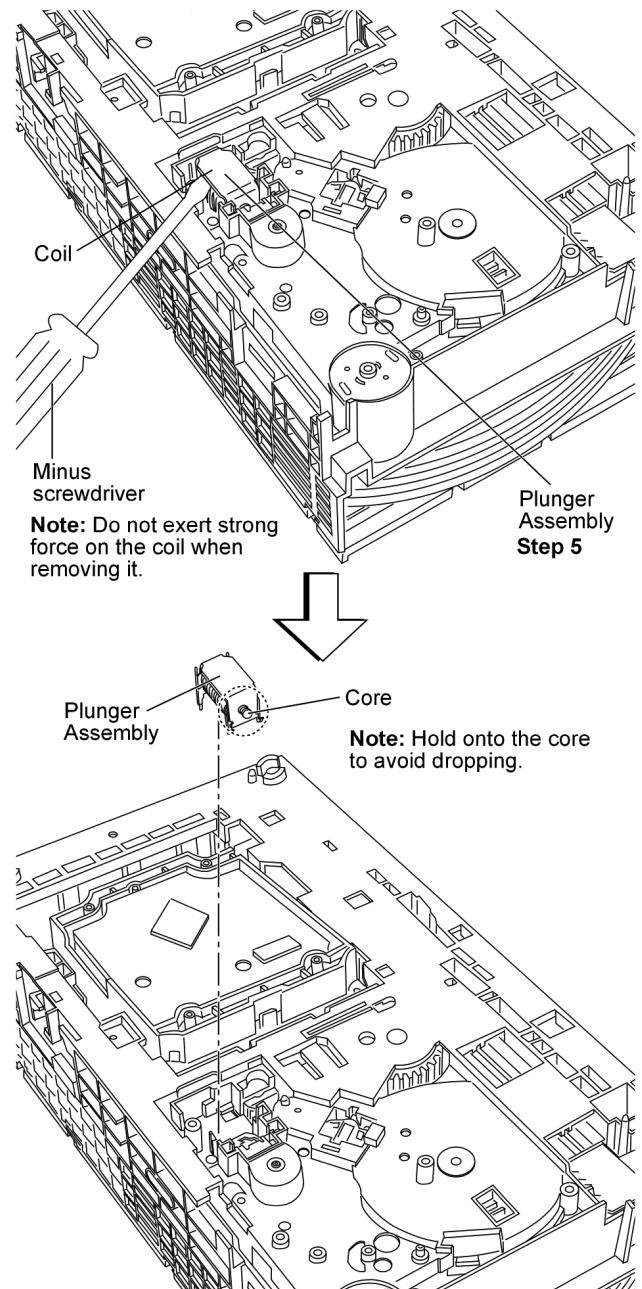
Step 2: Unsolder the 4 points.

Step 3: Release 1 claw as arrow shown.



Step 4: Remove the CD Loading P.C.B. as arrows shown.

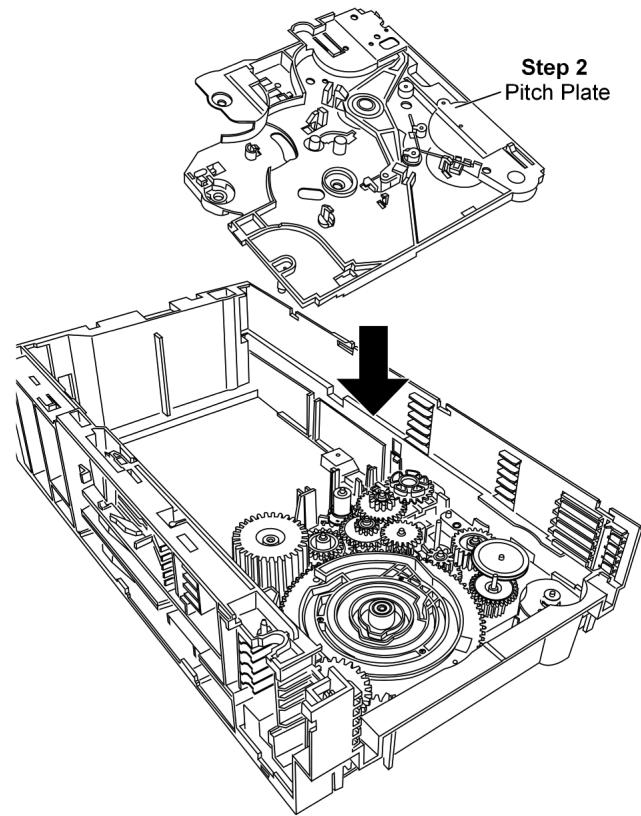
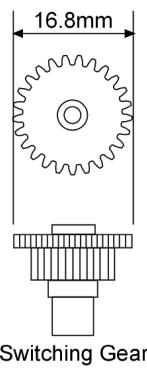
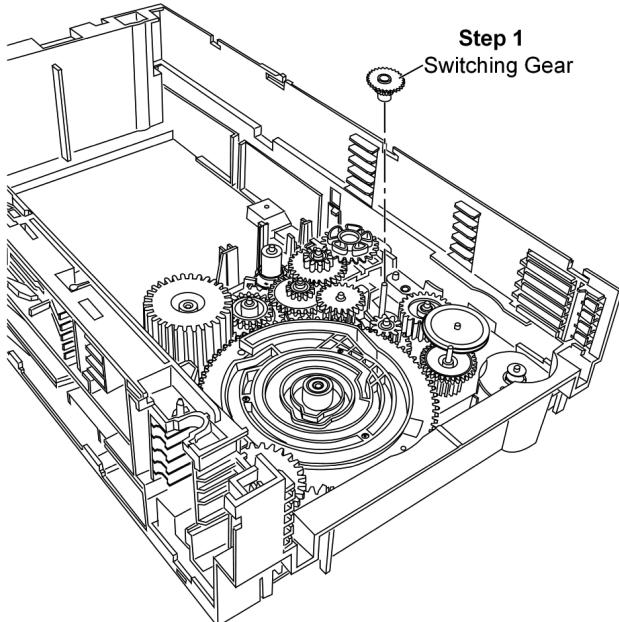
**· Disassembly of plunger assembly**



Step 5: Remove the plunger assembly by using a minus screwdriver.

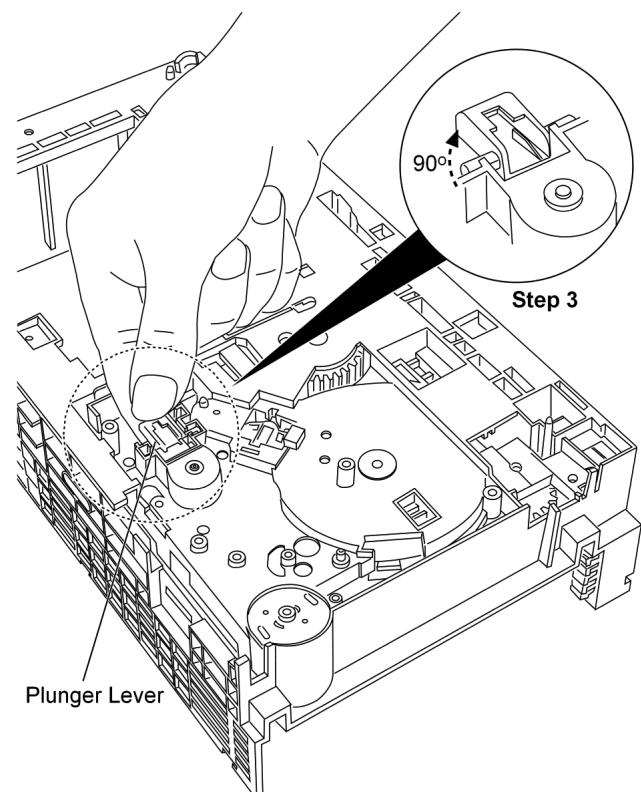
### 7.1.5. Disassembly of Plunger Lever

- Follow the (Step 1) to (Step 13) of item 7.1.1. (Disassembly of UD Base Assembly)
- Follow the (Step 1) to (Step 6) of item 7.1.2. (Disassembly of Disc Trays)
- Follow the (Step 1) to (Step 18) of item 7.1.3. (Disassembly of CD Loading Unit)
- Follow the (Step 1) to (Step 5) of item 7.1.4. (Disassembly of CD Loading P.C.B.)

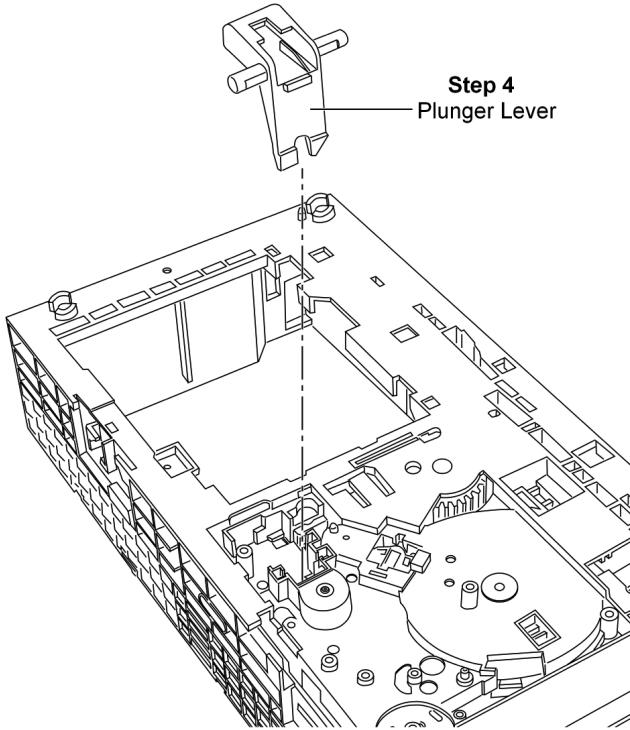


Step 2: Install the pitch plate.

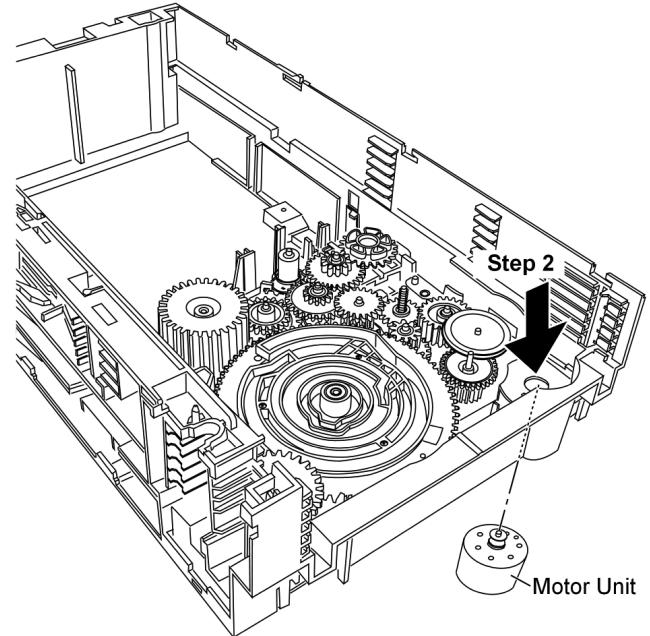
**Note: Ensure the pitch plate seats properly onto it.**



Step 3: Lift up the plunger lever in 90°



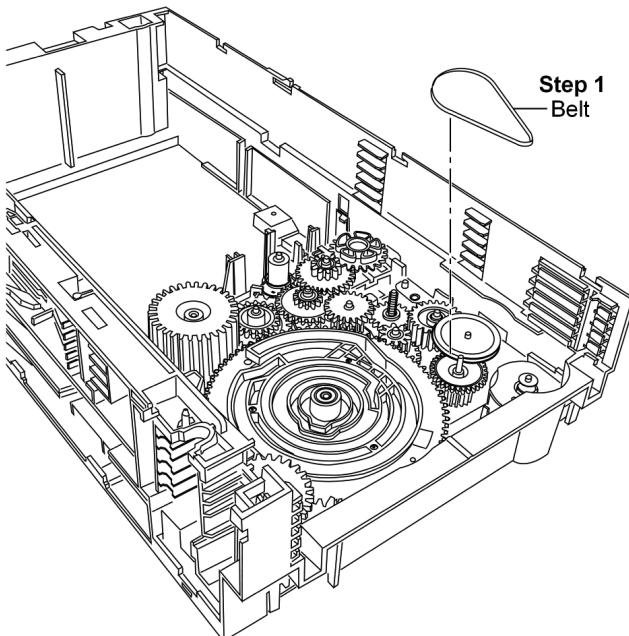
Step 4: Remove the plunger lever in 90° position.



Step 2: Push the motor unit as arrow show to remove it.

### 7.1.6. Disassembly of Motor Unit

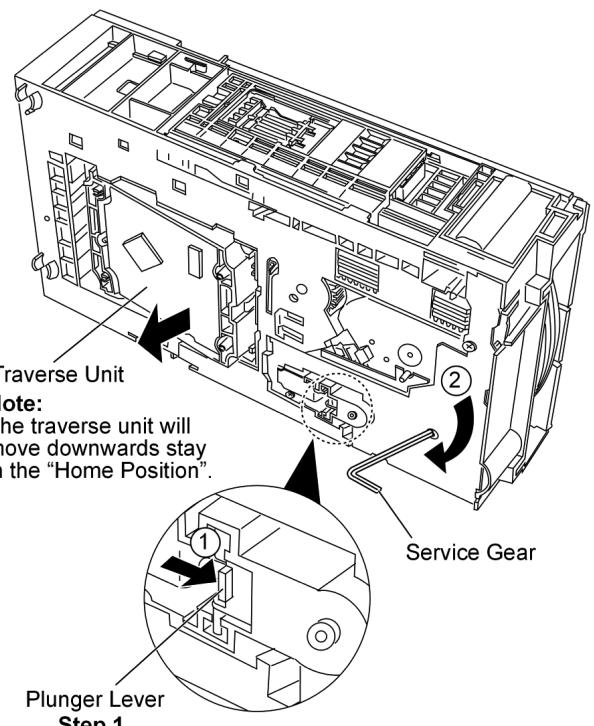
- Follow the (Step 1) to (Step 13) of item 7.1.1. (Disassembly of UD Base Assembly)
- Follow the (Step 1) to (Step 6) of item 7.1.2. (Disassembly of Disc Trays)
- Follow the (Step 1) to (Step 16) of item 7.1.3. (Disassembly of CD Loading Unit)
- Follow the (Step 1) to (Step 4) of item 7.1.4. (Disassembly of CD Loading P.C.B.)



Step 1: Remove the belt.

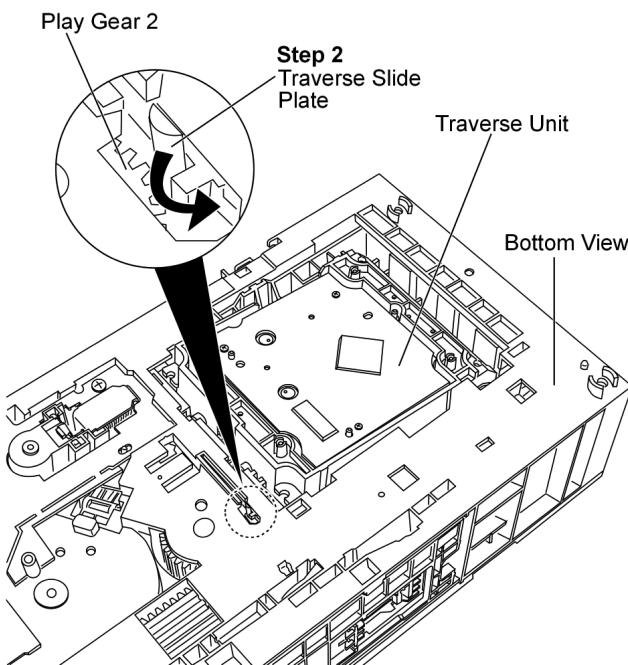
### 7.1.7. Disassembly of Traverse Unit

**Important notes:** Ensure all the trays are in the “STOCK” position before proceeding to the disassemble of traverse unit. For procedures to set the trays in “STOCK” position, please refer to (5. Troubleshooting Explorer)



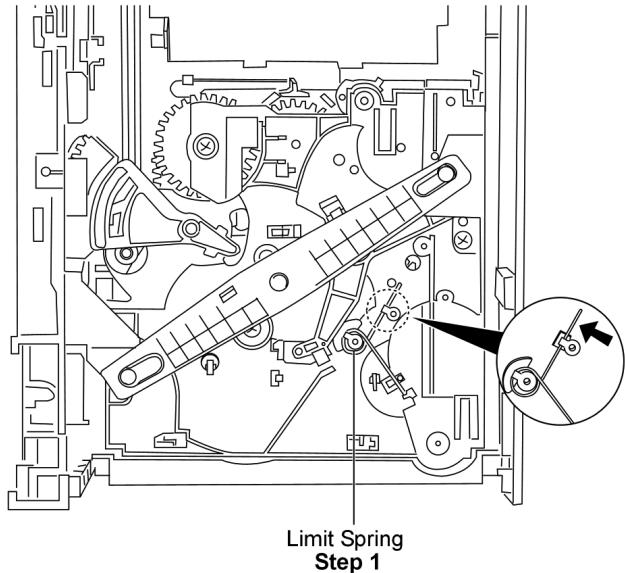
Step 1: Press and hold the plunger lever and rotate the gear as arrows shown until it stop.

**Caution:**  
Do not damage the Play Gear 2 when pushing the Traverse Slide Plate.



Step 2: Push the traverse slide plate as arrow shown to release the traverse unit.

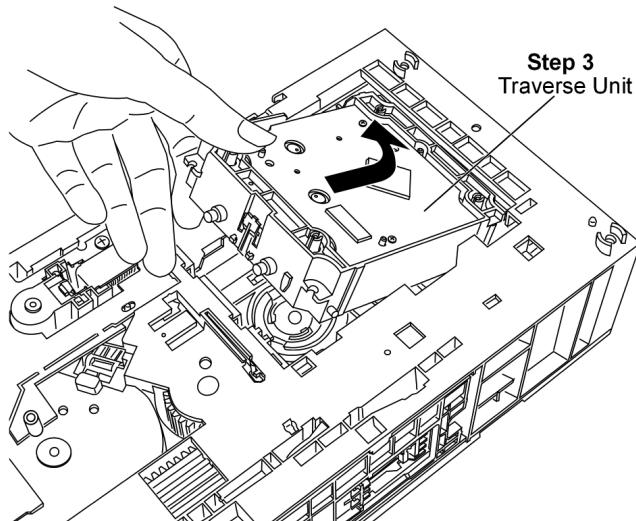
**Caution: Do not exert strong force on the traverse slide plate.**



Step 1: Remove the limit spring as arrow shown.

### 7.1.9. Disassembly of Play Lever Spring

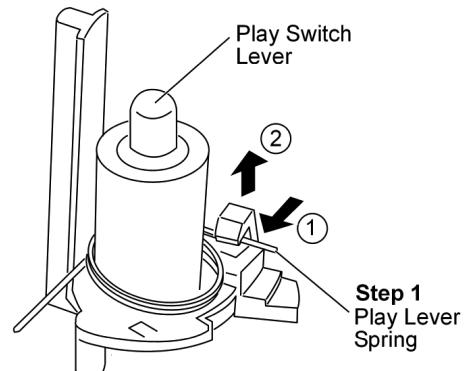
- Follow the (Step 1) to (Step 13) of item 7.1.1. (Disassembly of UD Base Assembly)
- Follow the (Step 1) to (Step 6) of item 7.1.2. (Disassembly of Disc Trays)
- Follow the (Step 1) to (Step 26) of item 7.1.3. (Disassembly of CD Loading Unit)



Step 3: Remove the traverse unit as arrow shown.

### 7.1.8. Disassembly of Limit Spring

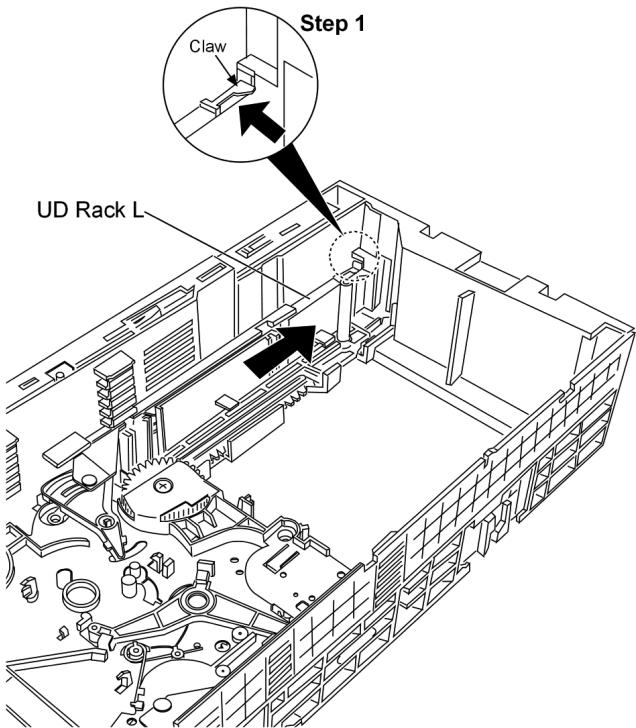
- Follow the (Step 1) to (Step 9) of item 7.1.1. (Disassembly of UD Base Assembly)



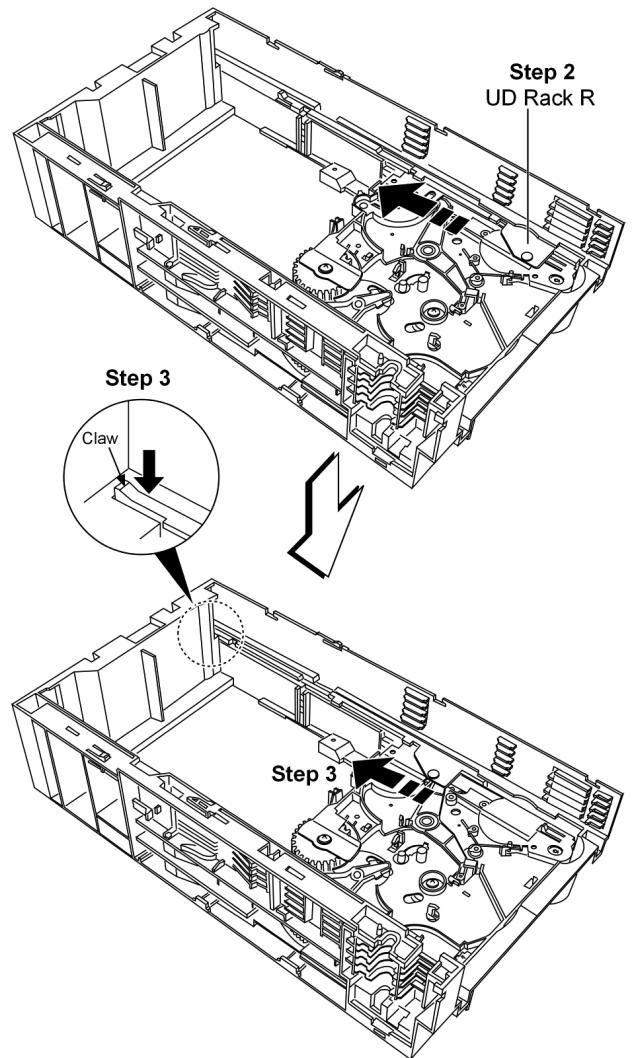
Step 1: Remove the play lever spring as arrow shown.

### 7.1.10. Disassembly of Pitch Plate Assembly

- Follow the (Step 1) to (Step 13) of item 7.1.1. (Disassembly of UD Base Assembly)
- Follow the (Step 1) to (Step 6) of item 7.1.2. (Disassembly of Disc Trays)
- Follow the (Step 1) to (Step 3) of item 7.1.3. (Disassembly of CD Loading Unit)

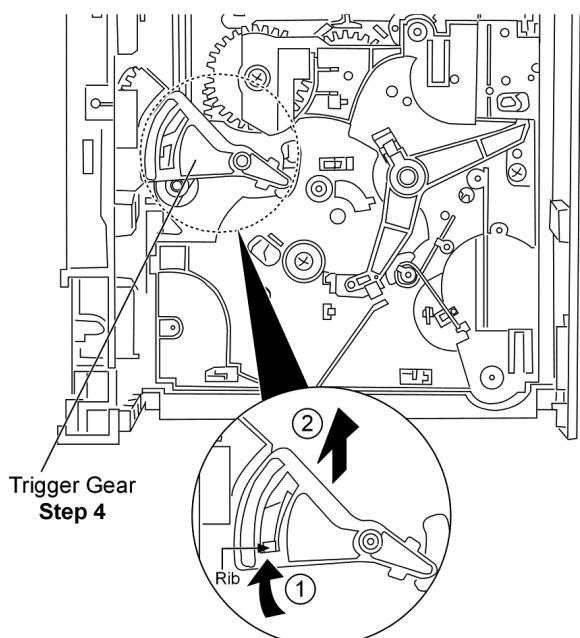


Step 1: Slide the UD rack L backwards, push the claw as arrow shown.

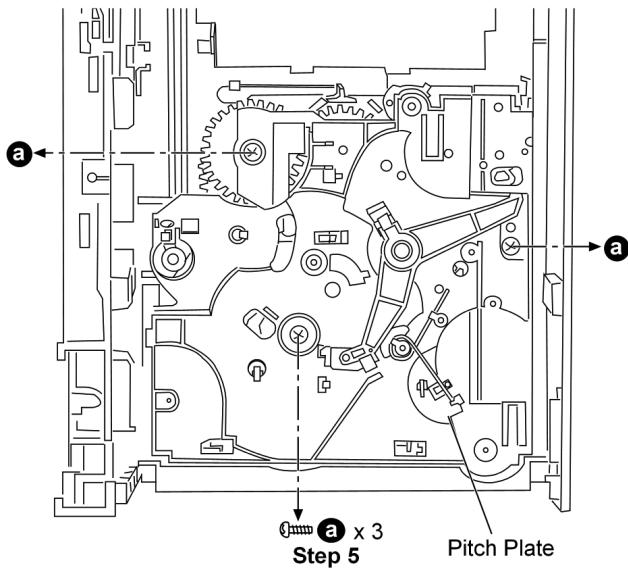


Step 2: Slide the UD rack R as arrow shown until it stop.

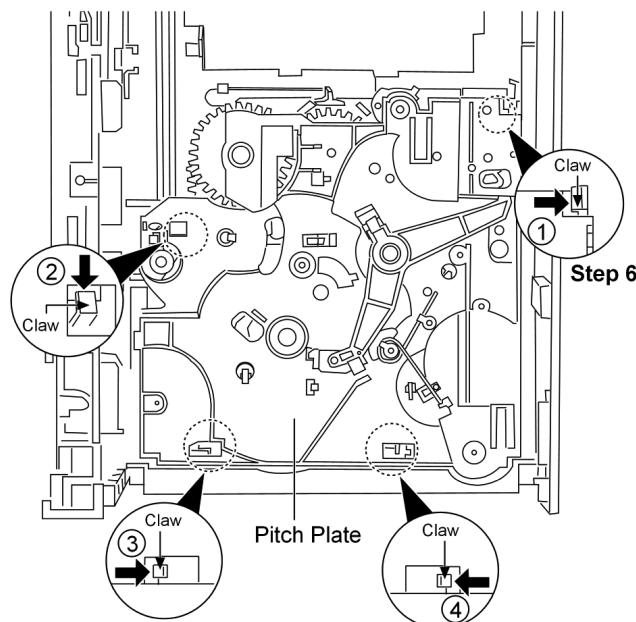
Step 3: Press the claw as arrow shown.



Step 4: Push the claw as arrow shown, then turn the trigger gear clockwise and remove it as arrows shown.



Step 5: Remove 3 screws.

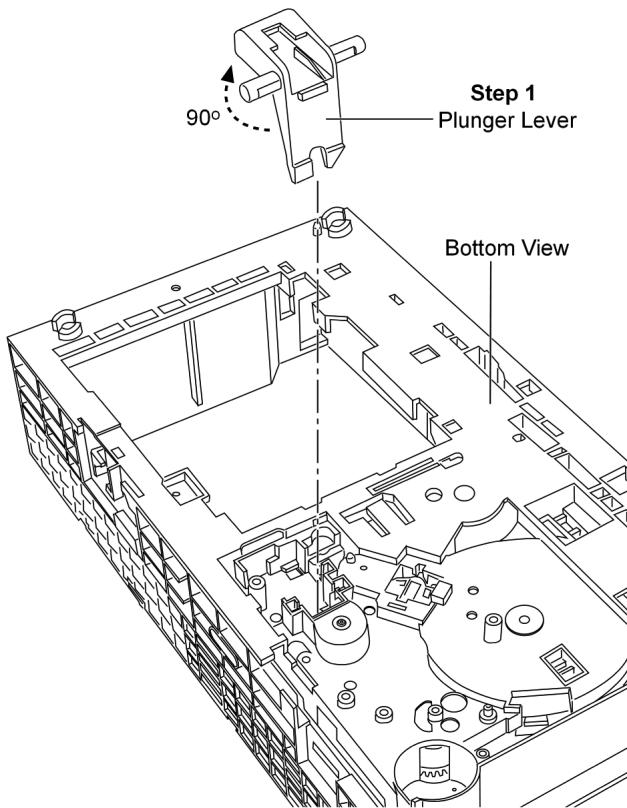


Step 6: Release 4 claws as arrows shown in order followed by detach the pitch plate.

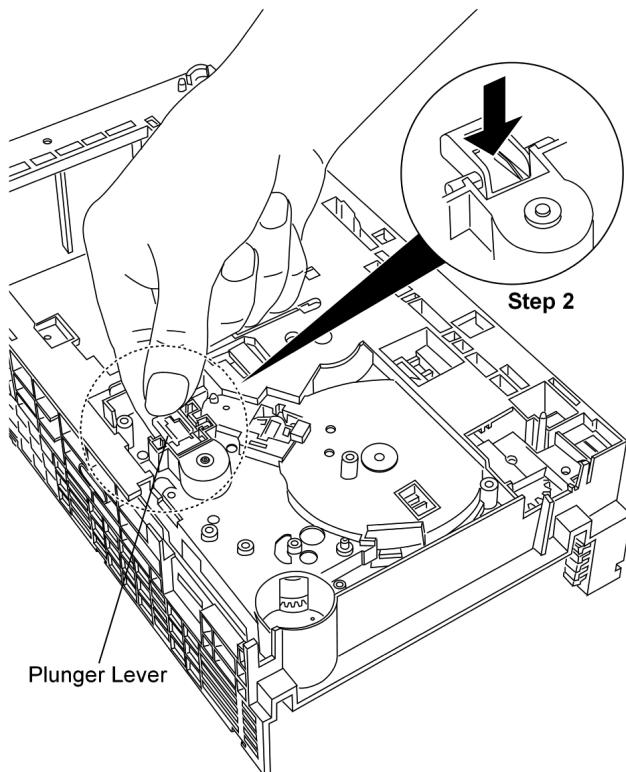
## 7.2. Assembling Procedure

### 7.2.1. Assembly of CD Loading Unit

- Assembly of Plunger Lever

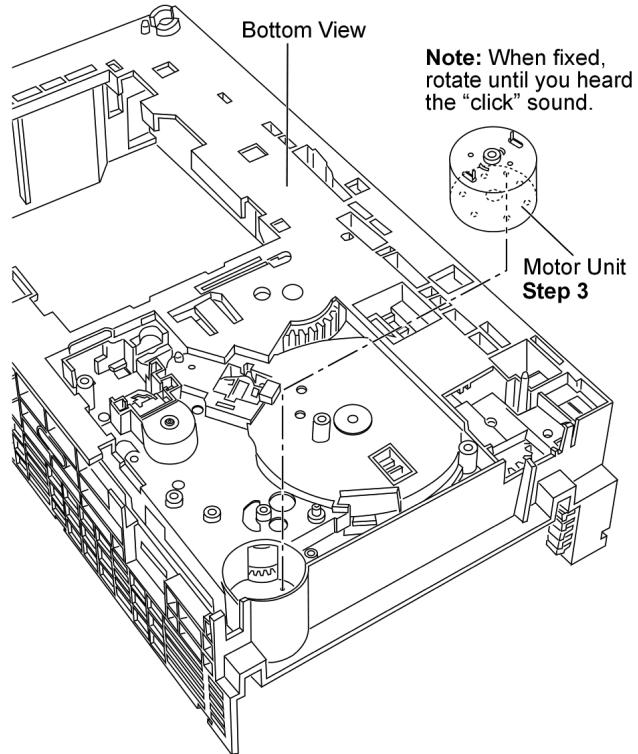


Step 1: Turn over the unit and install the plunger lever in 90° position.



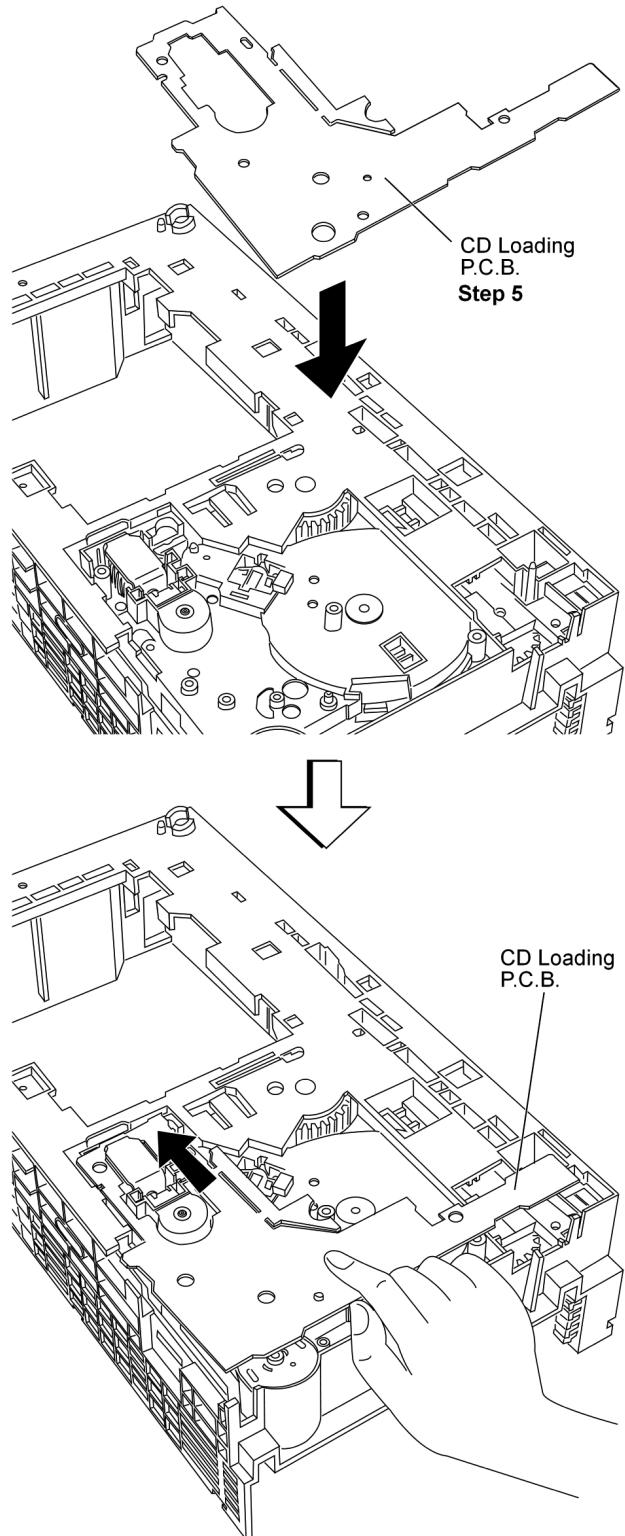
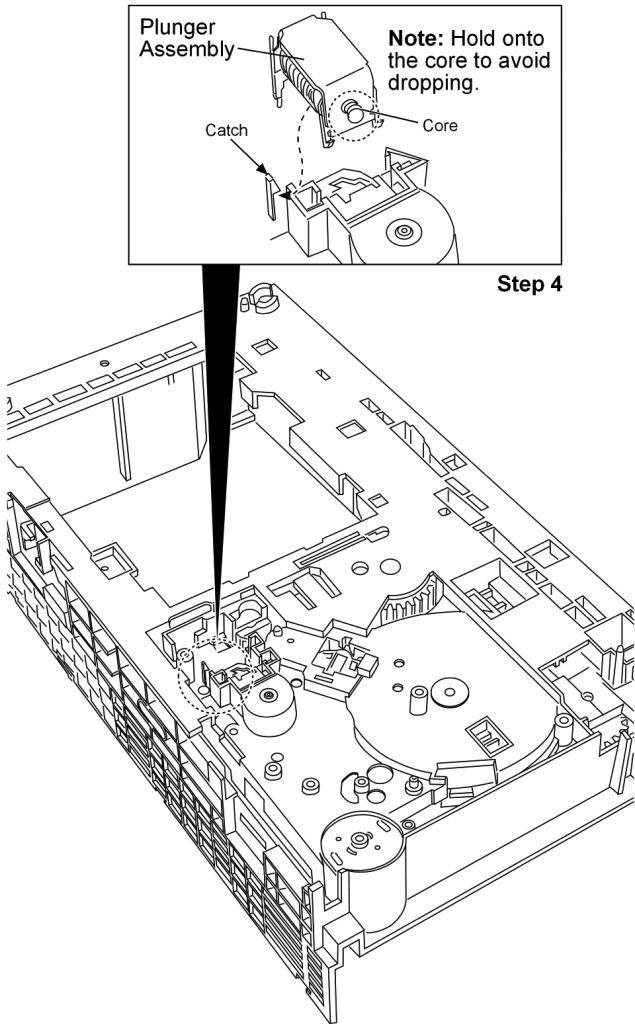
Step 2: Push in the plunger lever as arrow shown.

- Assembly of Motor Unit



Step 3: Turn over the unit and install the motor unit properly.

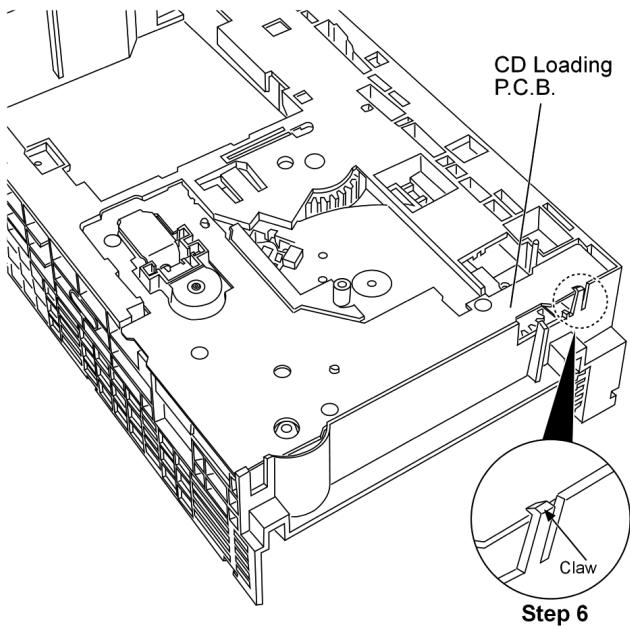
- Assembly of Plunger Assembly



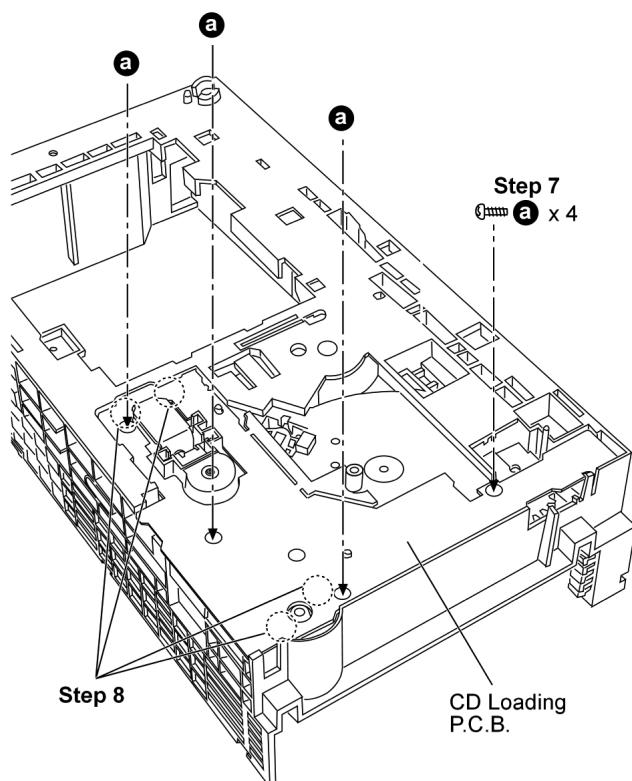
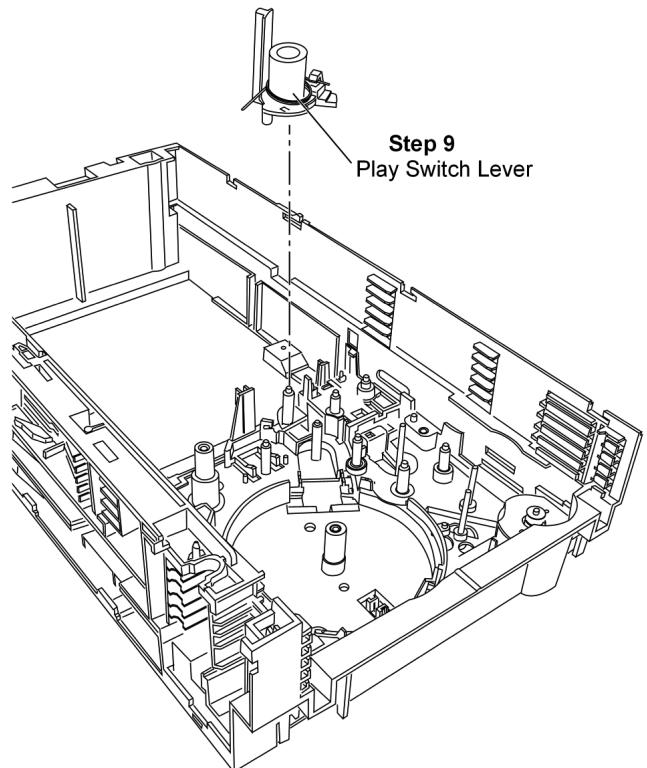
Step 4: Install the plunger assembly as arrow shown, the catch should be latched.

- Assembly of CD Loading P.C.B.

Step 5: Install the CD Loading P.C.B. as arrows shown.

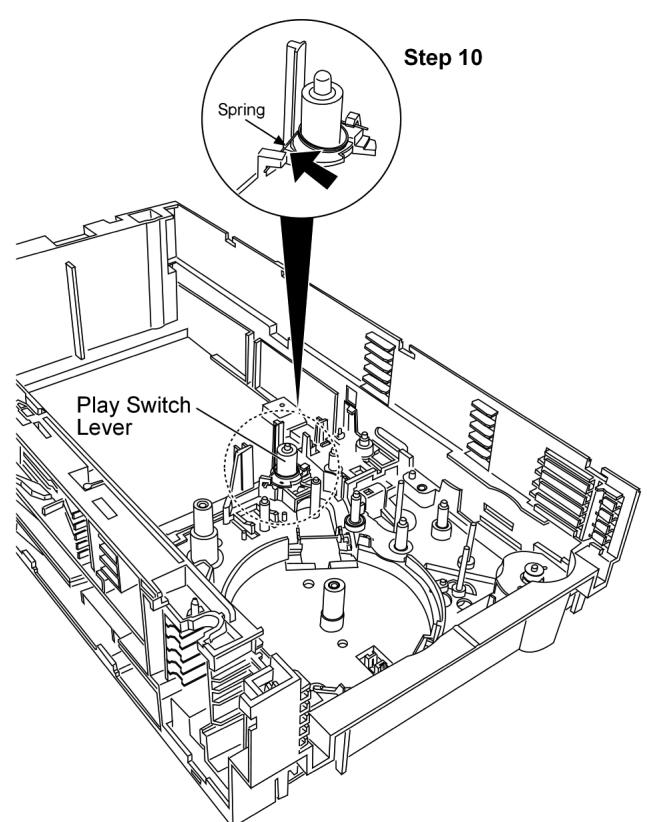


Step 6: The claw should be latched.



Step 7: Fix it with 4 screws.

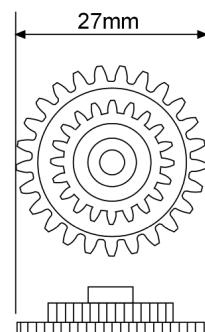
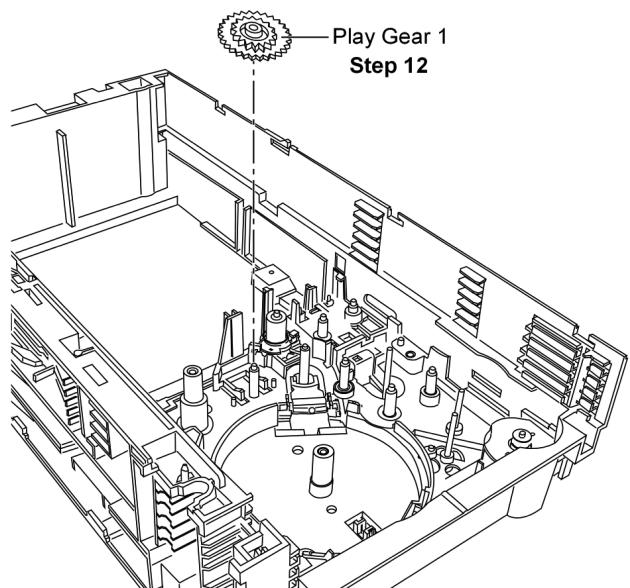
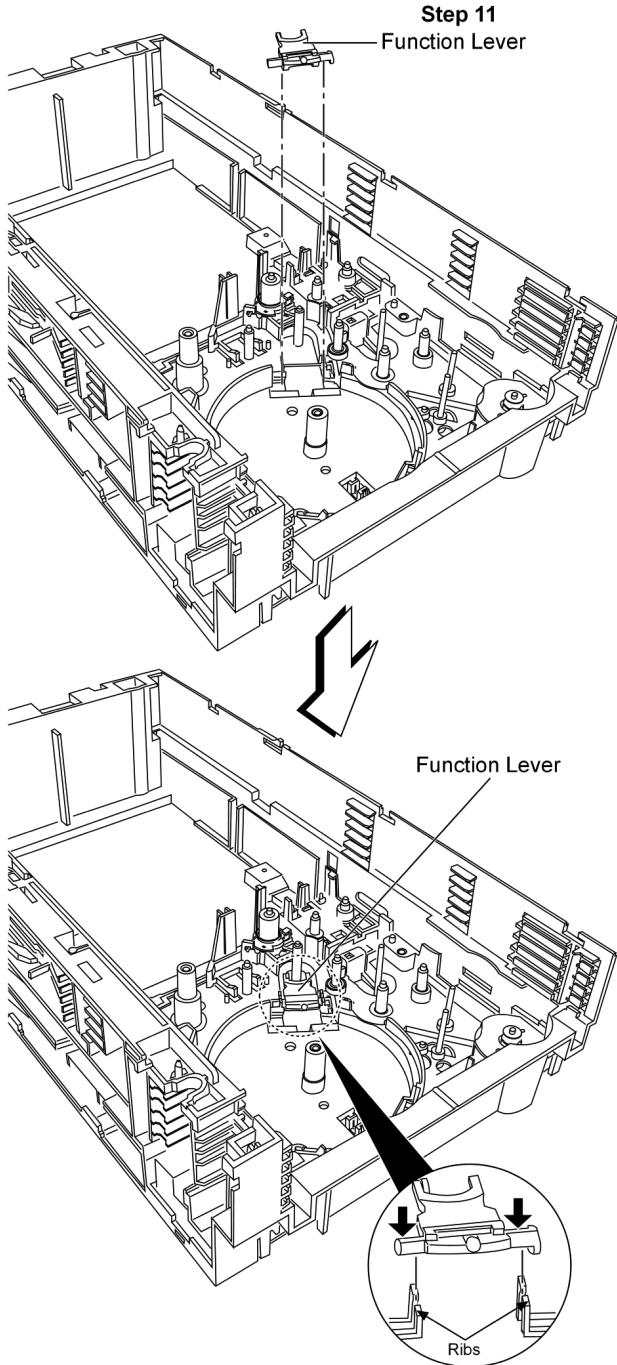
Step 8: Solder the 4 points.



Step 10: Fix the spring below the rib as arrow shown.

#### · Assembly of play switch lever

#### · Assembly of function lever



Play Gear 1

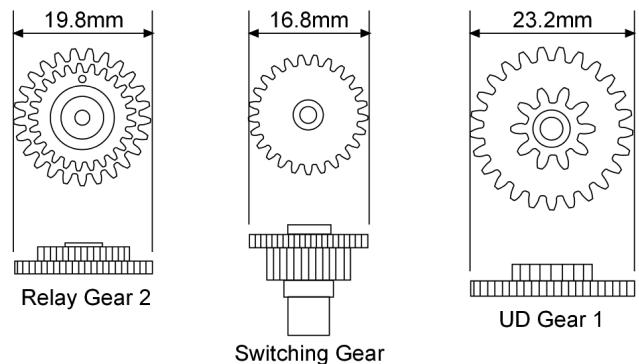
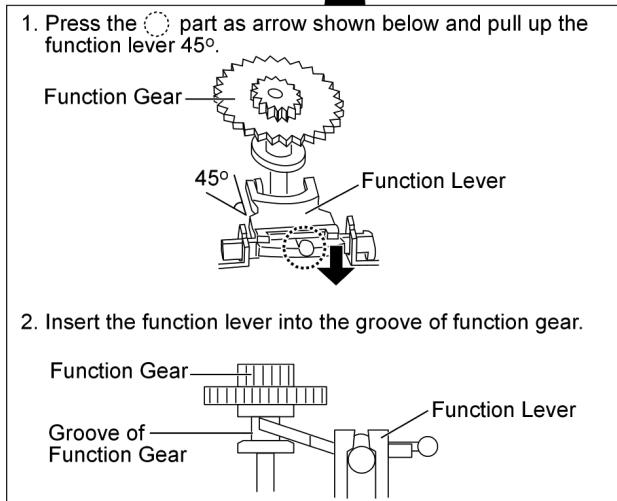
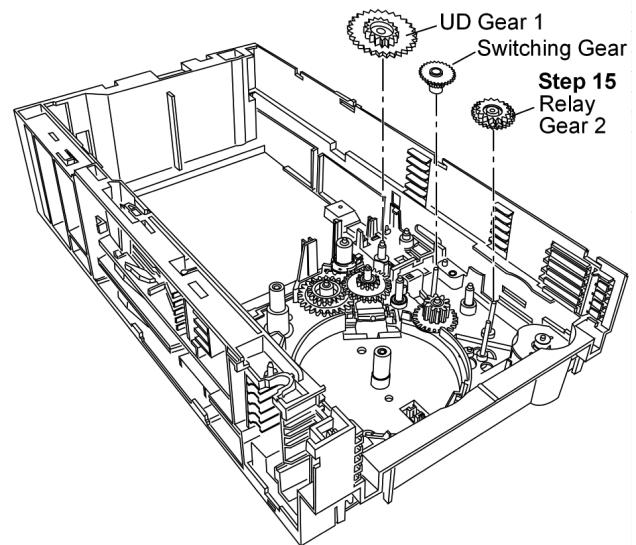
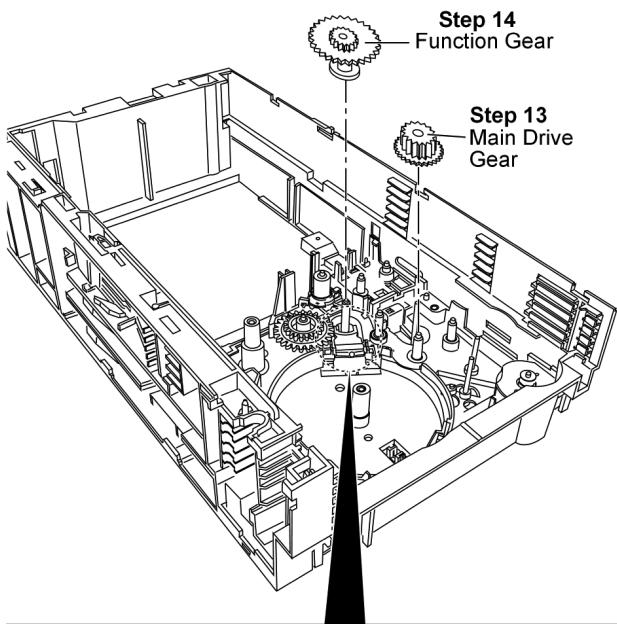
Step 12: Install the play gear 1.

· Assembly of function gear and main drive gear

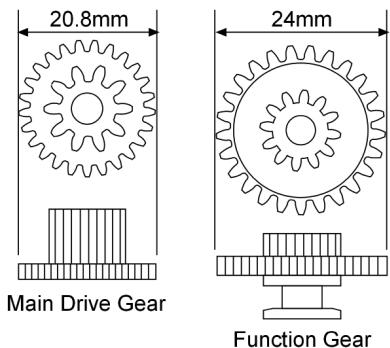
Step 11: Install the function lever.

**Note: Ensure the function lever seats properly onto the ribs. A click sound will be heard when installing.**

· Assembly of play gear 1



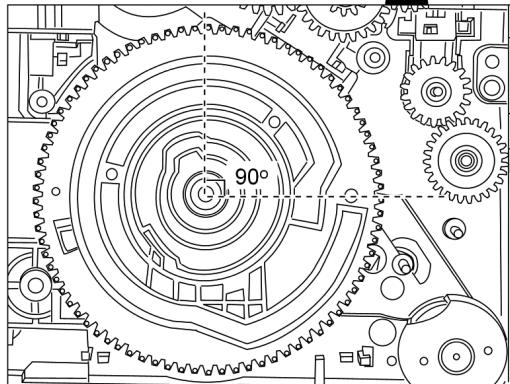
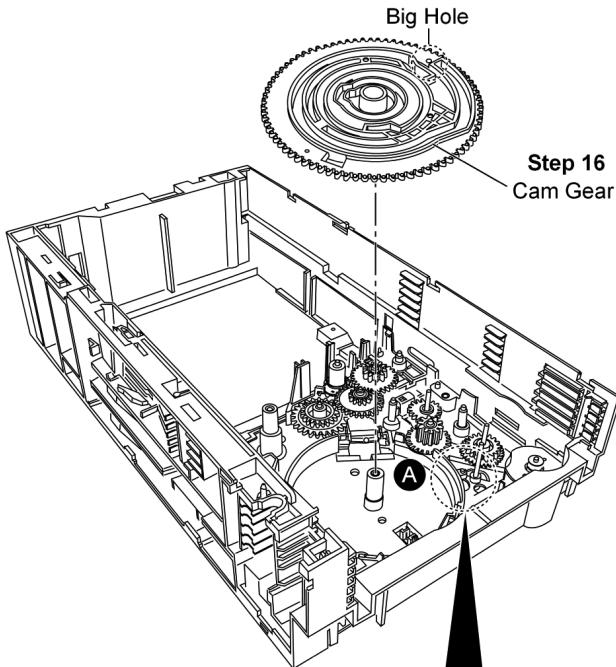
Step 15: Install the relay gear 2, switching gear and UD gear 1 respectively.



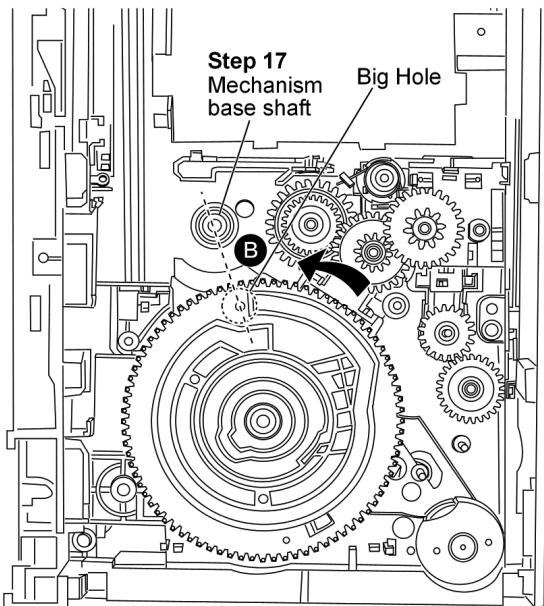
Step 13: Install the main drive gear.

Step 14: Install the function gear.

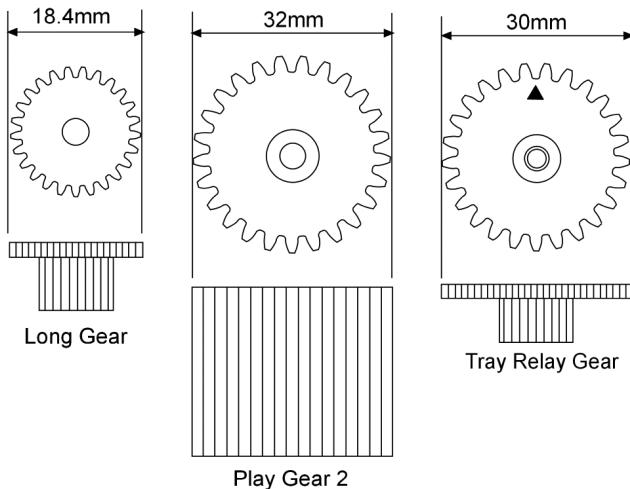
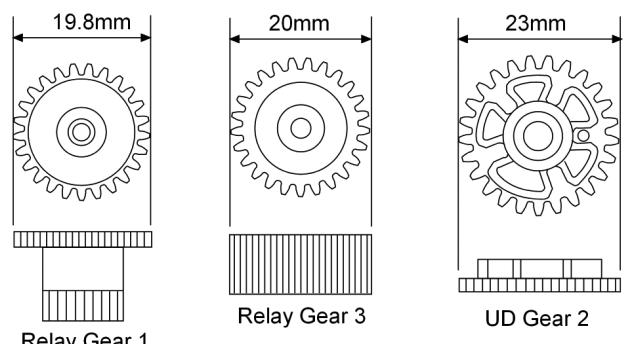
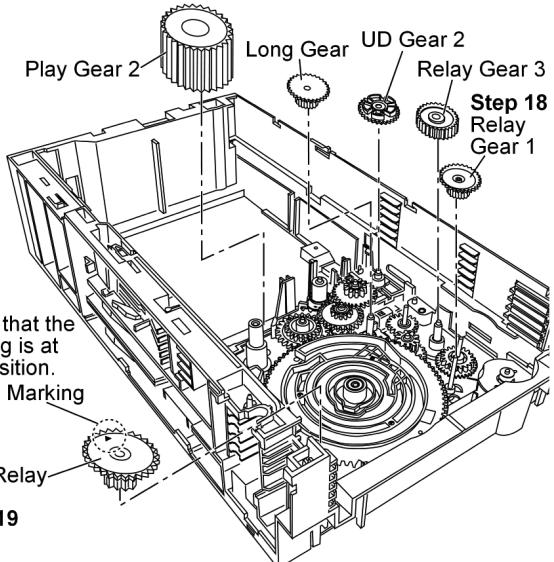
#### · Assembly of gears



Step 16: Install the cam gear. Make sure the big hole is fix at the position (A) at 90°



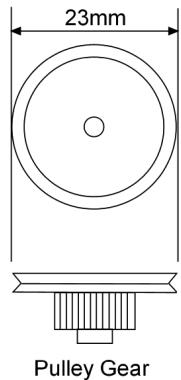
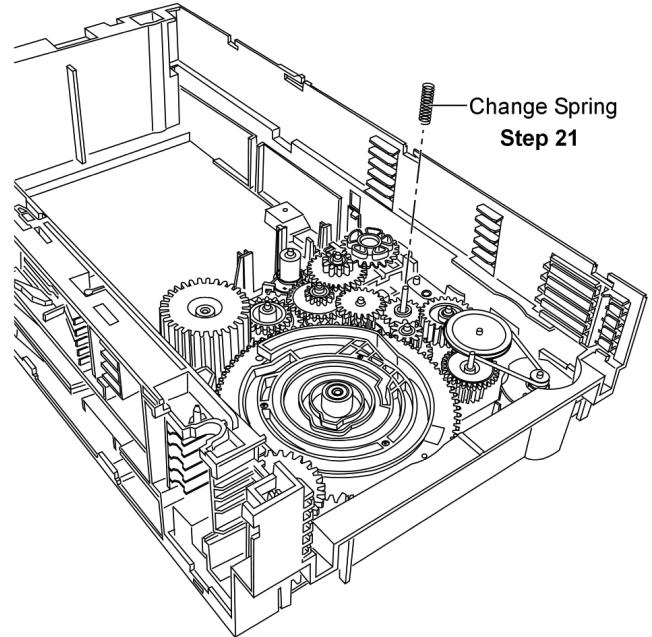
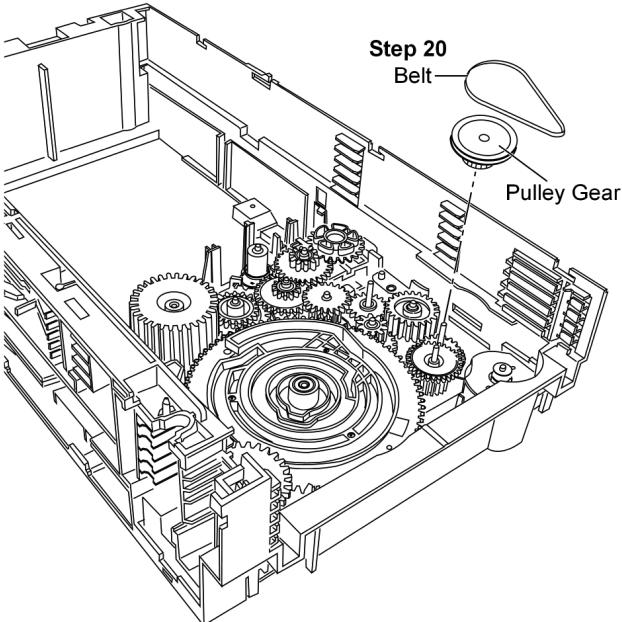
Step 17: Turn the cam gear anti-clockwise until the big hole stop at position (B).



Step 18: Install the relay gear 1, relay gear 3, UD gear 2, long gear and play gear 2 respectively.

Step 19: Install the tray relay gear.

#### • Assembly of pulley gear and belt



Step 20: Install the pulley gear followed by the belt.

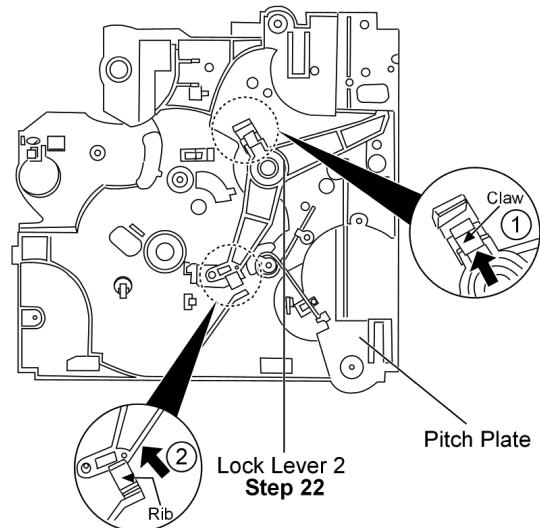
**Note: Do not apply the grease to the belt.**

#### · Assembly of change spring

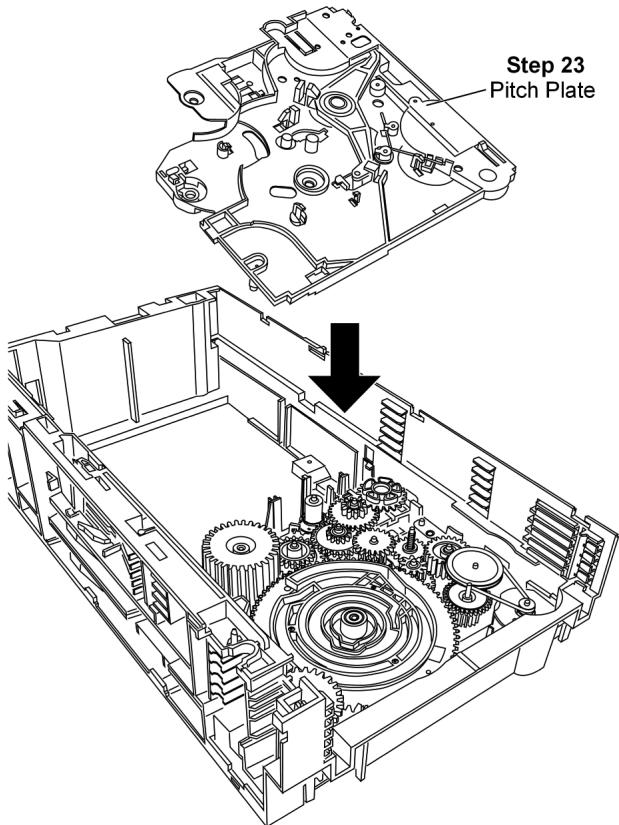
Step 21: Install the change spring.

**Caution: Handle the change spring carefully, do not lose it. Ensure the change spring seats properly on the groove of long gear.**

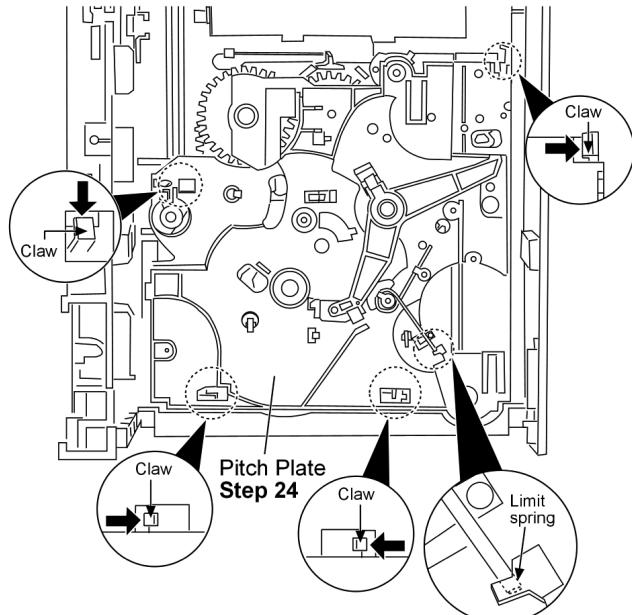
#### · Assembly of pitch plate



Step 22: Install the lock lever 2 as arrows shown in sequence.

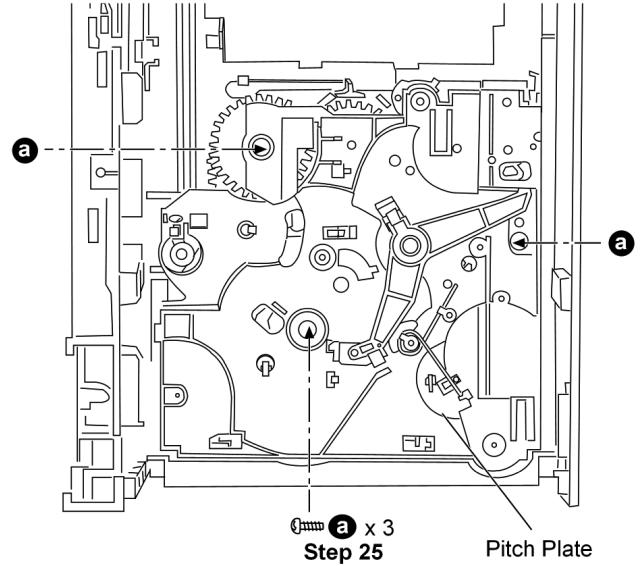


Step 23: Install the pitch plate.



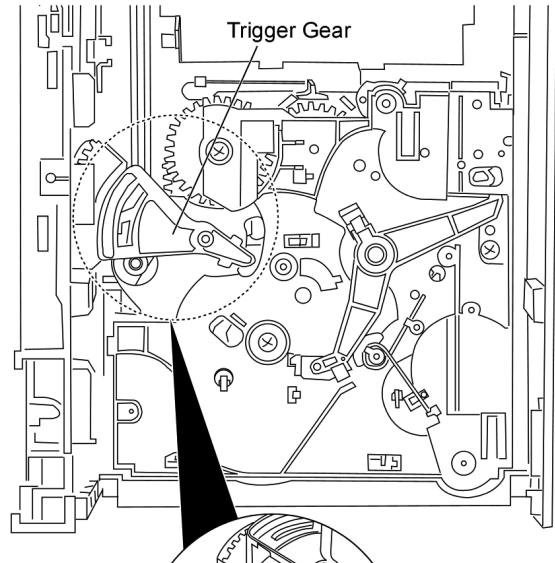
Step 24: The 4 claws should be latched properly.

**Note:**  
Check that the tip of the limit spring is hide under the pitch plate.

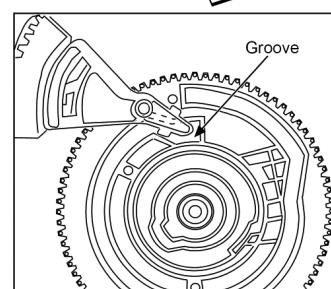
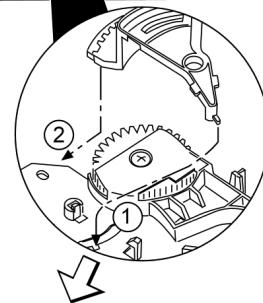


Step 25: Fix it with 3 screws

• Assembly of trigger gear



Step 26

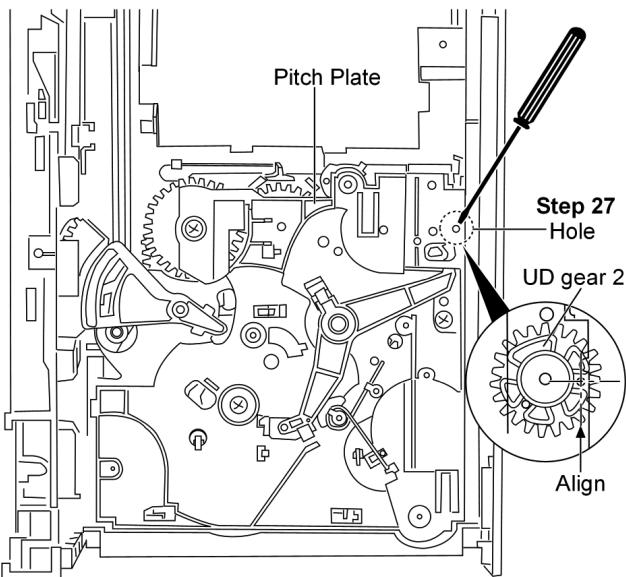


**Note:**  
Ensure the trigger seats properly onto the groove (cam gear).

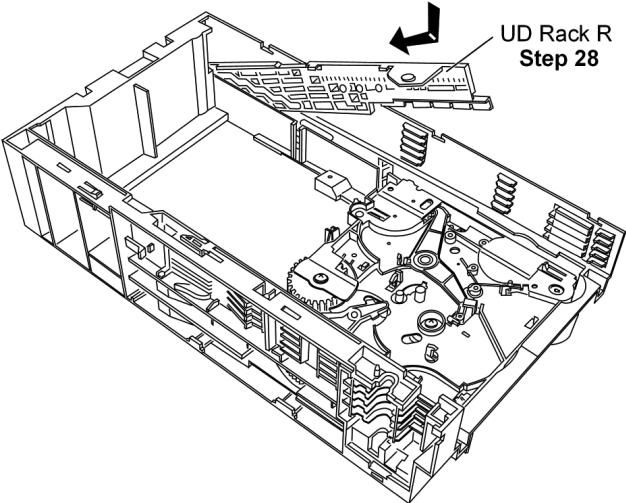
Step 26: Install the trigger gear in sequence.

**Note:** Ensure the trigger seats properly onto the groove (cam gear).

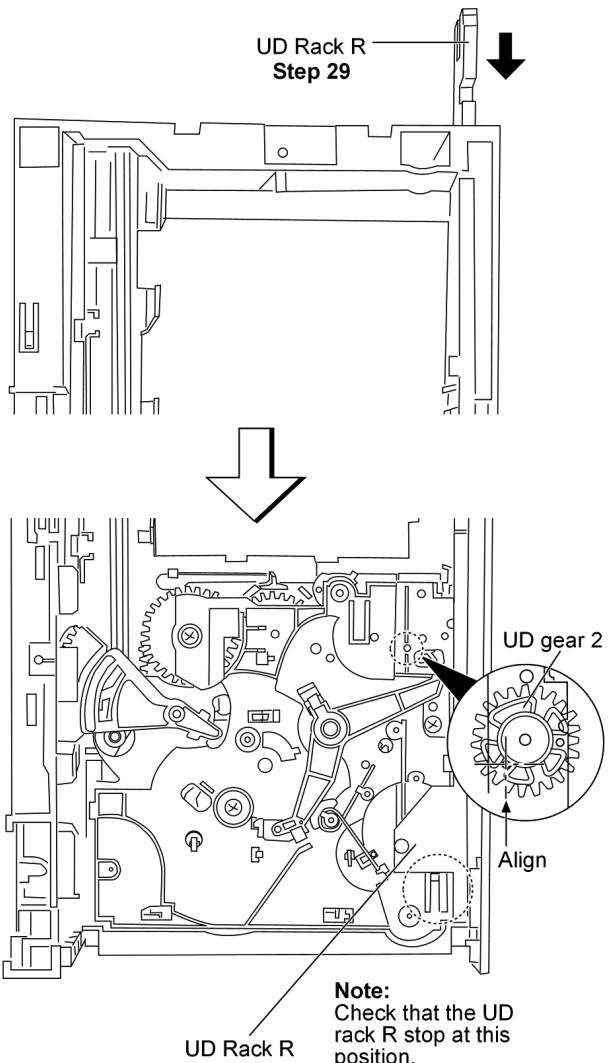
· Assembly of UD rack R



Step 27: Use the screwdriver to turn the hole on the UD gear 2 align with the pitch plate hole.

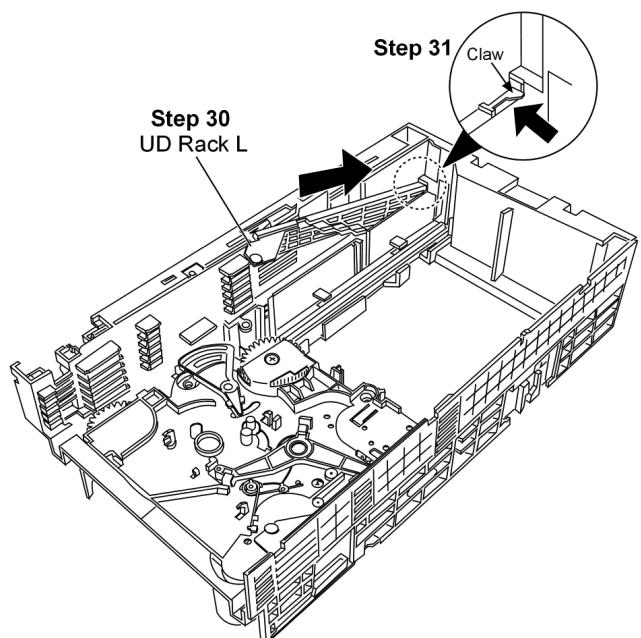


Step 28: Insert the UD rack R as arrow shown.



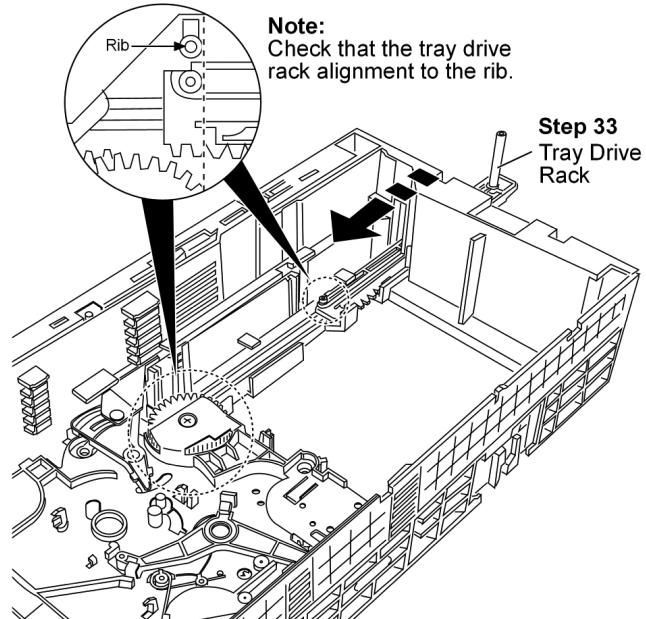
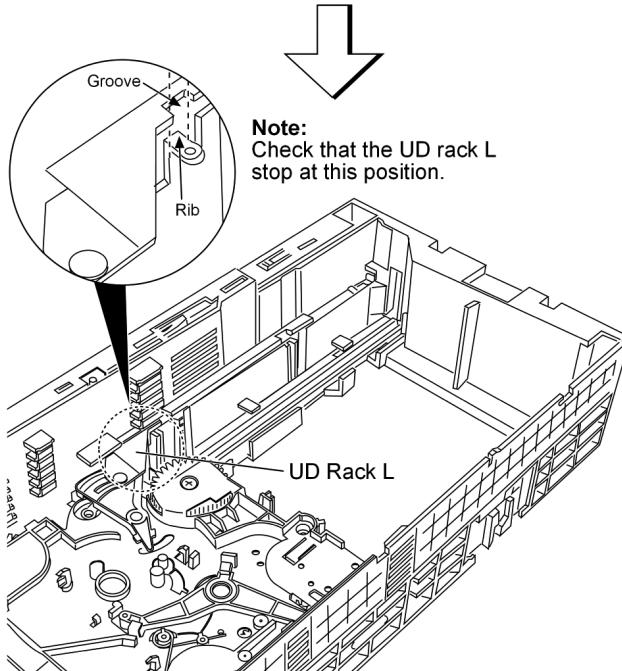
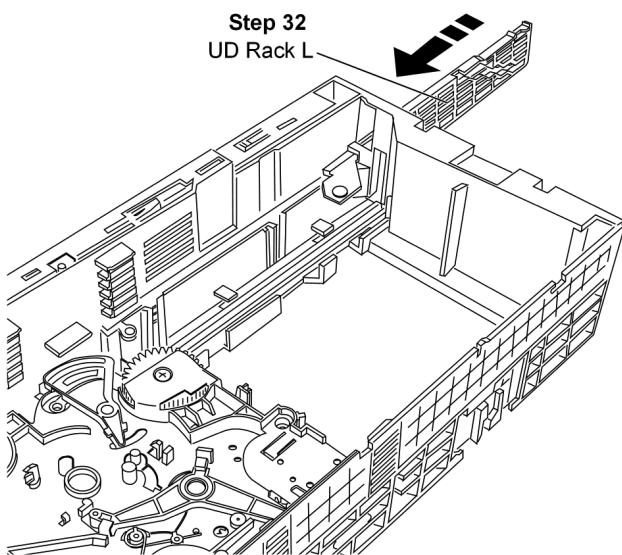
Step 29: Push the UD rack R as arrow shown.

· Assembly of UD rack L



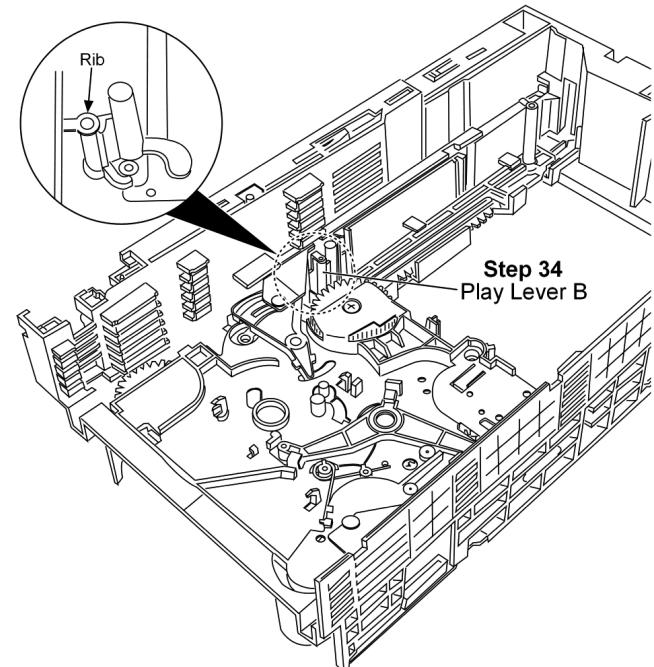
Step 30: Insert the UD rack L as arrow shown.

Step 31: Push the claw as arrow shown.



Step 33: Install the tray drive rack as arrow shown.

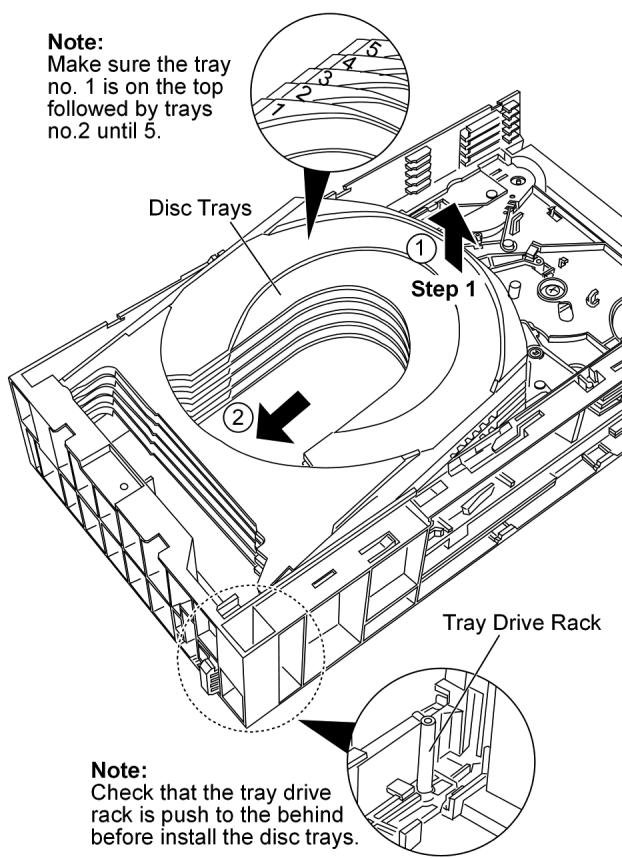
#### • Assembly of play lever B



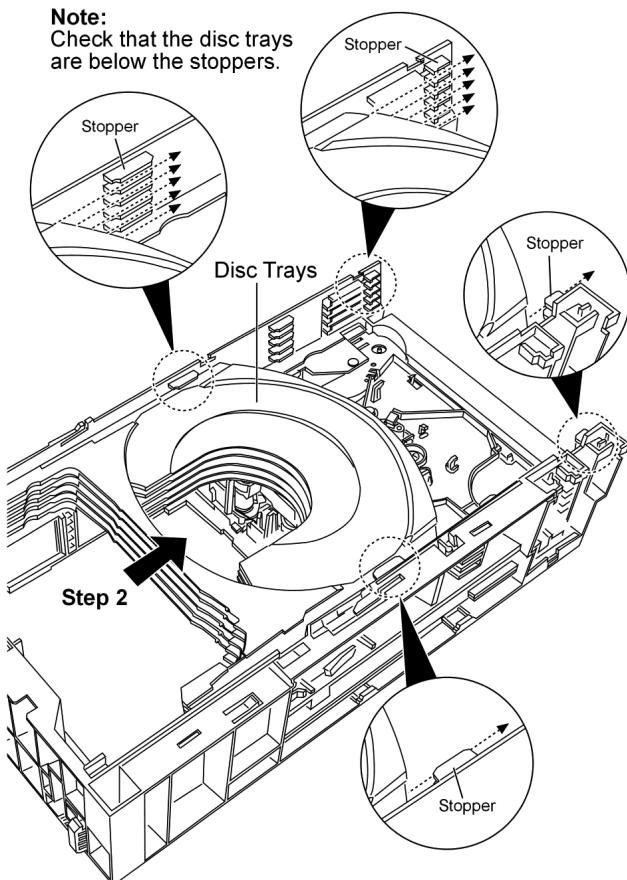
Step 34: Install the play lever B below the rib.

## 7.2.2. Assembly of Disc Trays

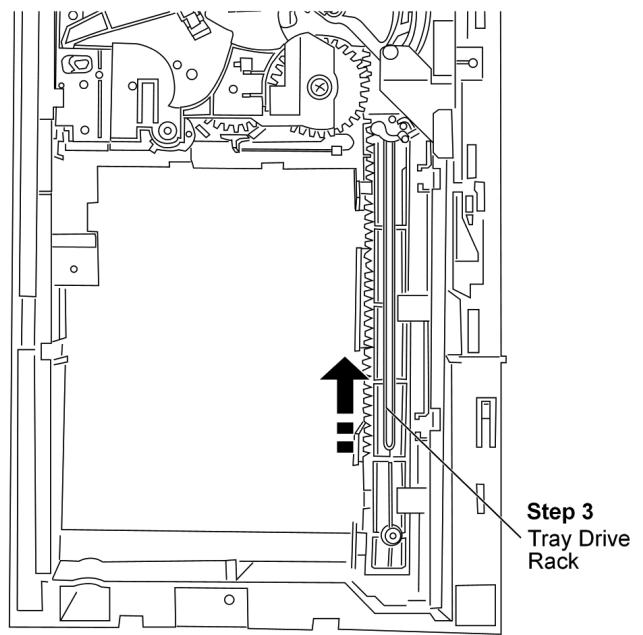
**Note:**  
Make sure the tray no. 1 is on the top followed by trays no.2 until 5.



Step 1: Tilt and fix the 5 disc trays as arrows shown.

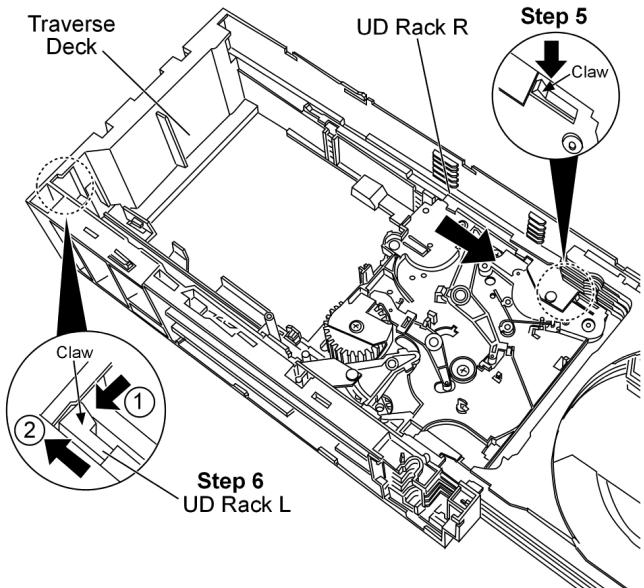
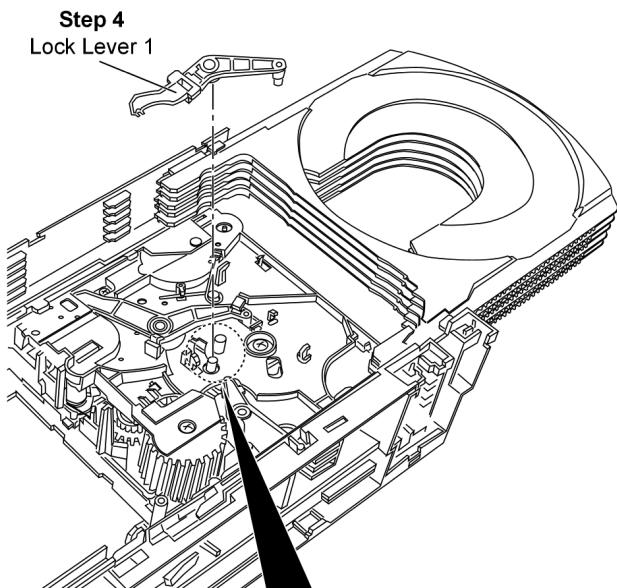


Step 2: Push the 5 disc trays as arrow shown until it stop.



Step 3: Push the tray drive rack as arrow shown until it stop.

### · Assembly of lock lever 1



Step 5: Press and hold the claw at the pitch plate then push the UD rack R as arrows shown.

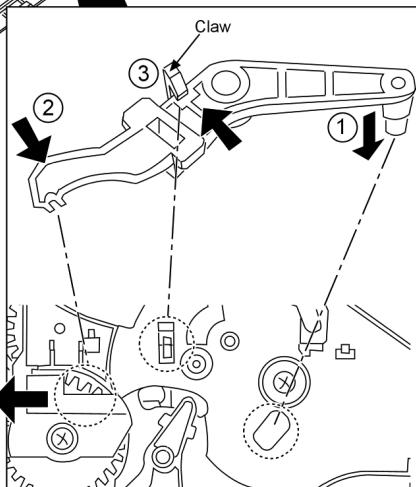
Step 6: Push the claw and slide the UD rack L as arrows shown.

#### • Assembly of UD connection lever

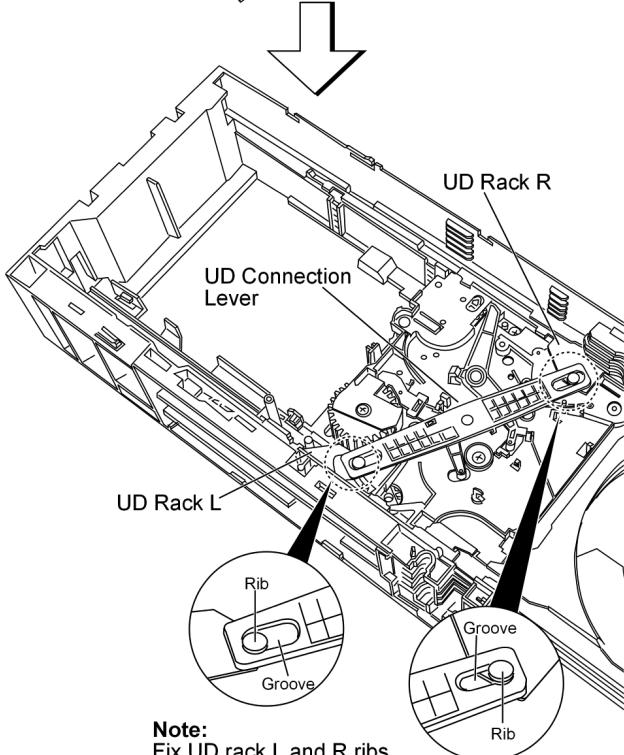
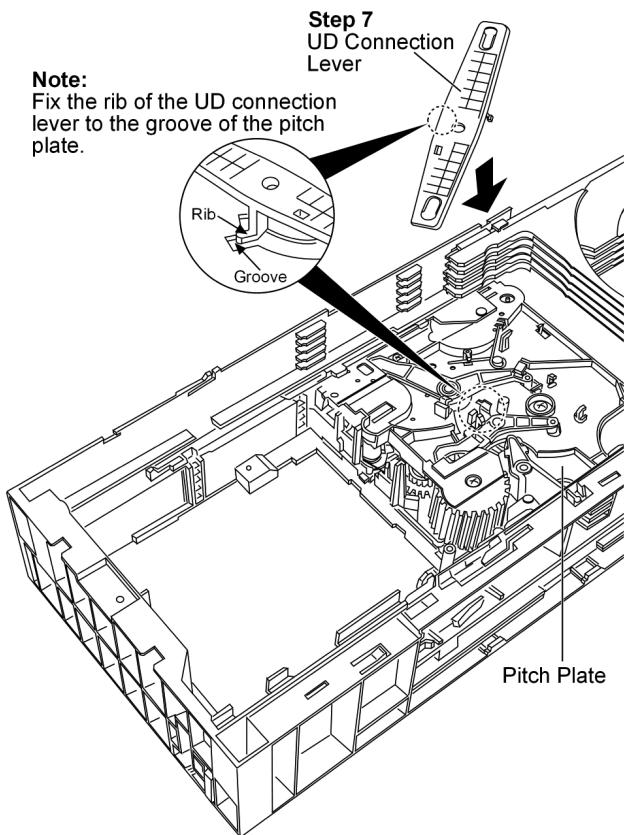


**Note:**  
Check that the lock lever 1 is alignment to the gear.

Step 4: Fix the lock lever 1 onto the pitch plate as arrow shown in sequence.

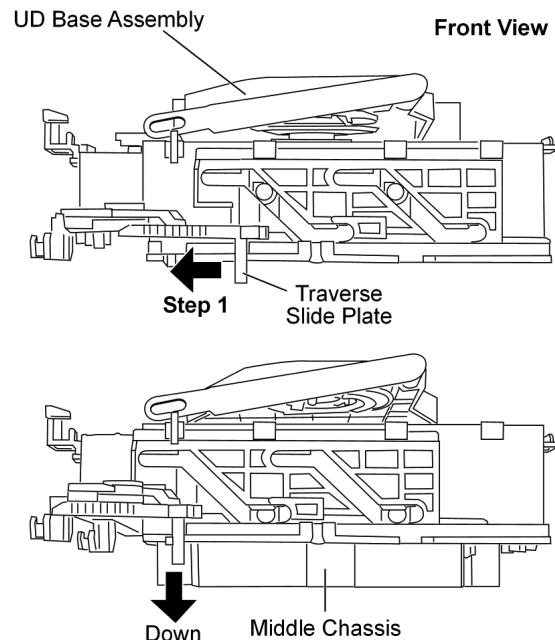


### 7.2.3. Assembly of UD Base Assembly

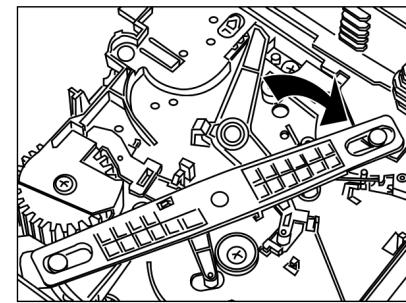


Step 7: Install the UD connection lever.

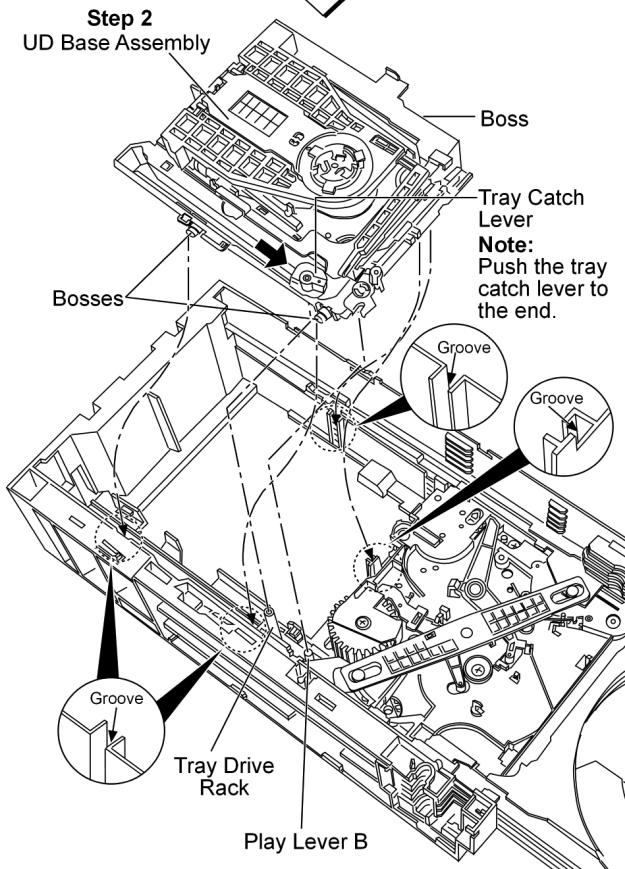
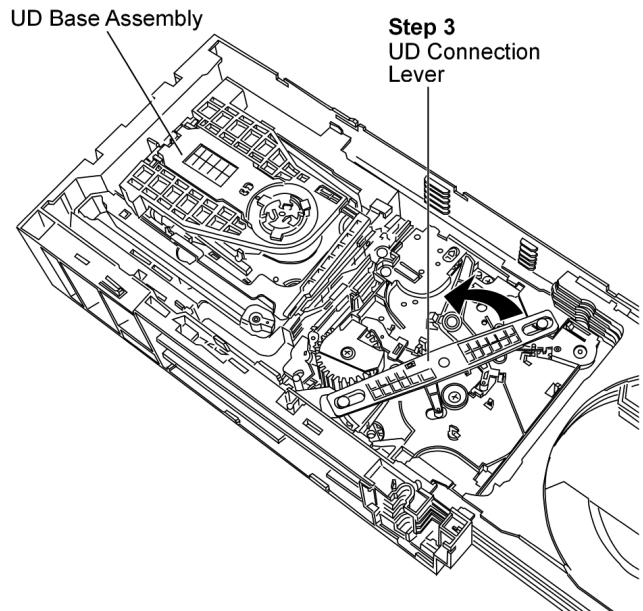
- Follow the (Step 1) to (Step 12) of item 7.2.3. (Assembly of UD Base Assembly)



Step 1: Push the traverse slide plate as arrow shown.



**Note:**  
Ensure the UD connection lever turn to this position.

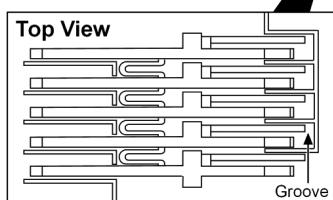
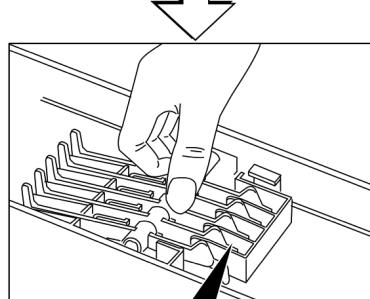
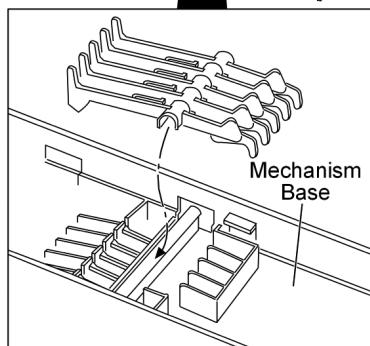
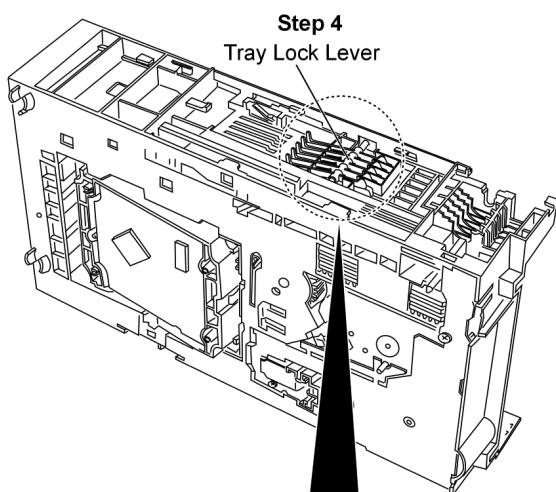


Step 3: Turn the UD connection lever anti-clockwise, the UD base assembly will move downwards.

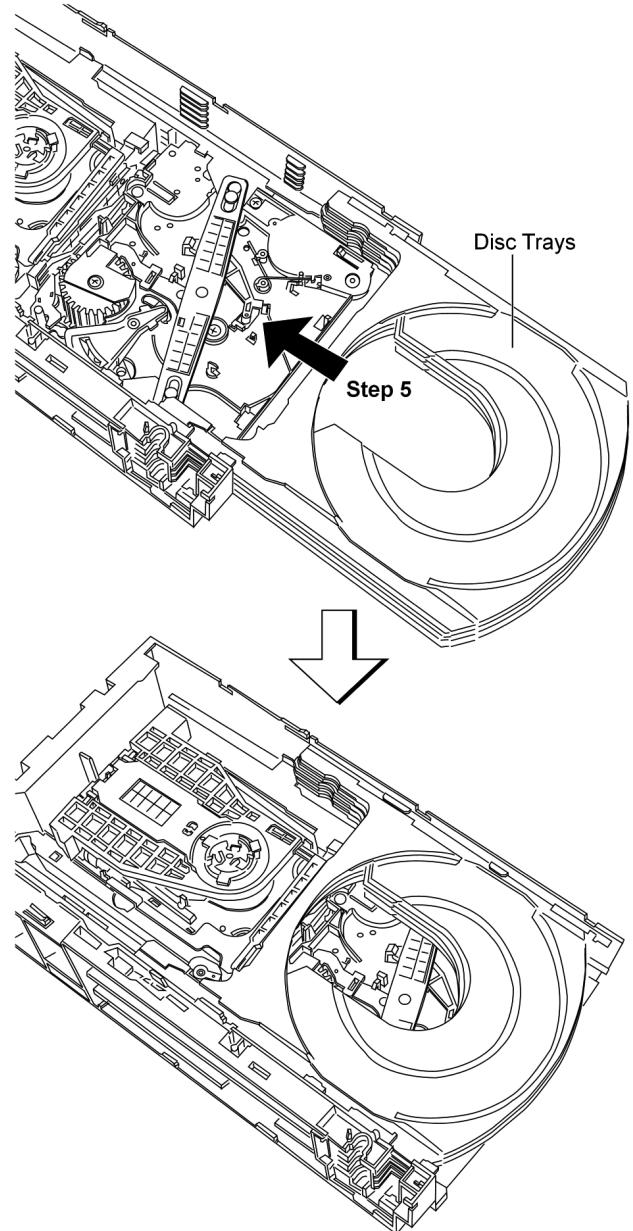
**Note:** When the UD connection lever is turn and the UD base assembly did not move downwards, check for step 1 to step 3 again.

Step 2: Install the UD base assembly.

**Note:** Ensure the UD base assembly seats properly into the grooves and engage with the play lever B and tray drive rack.



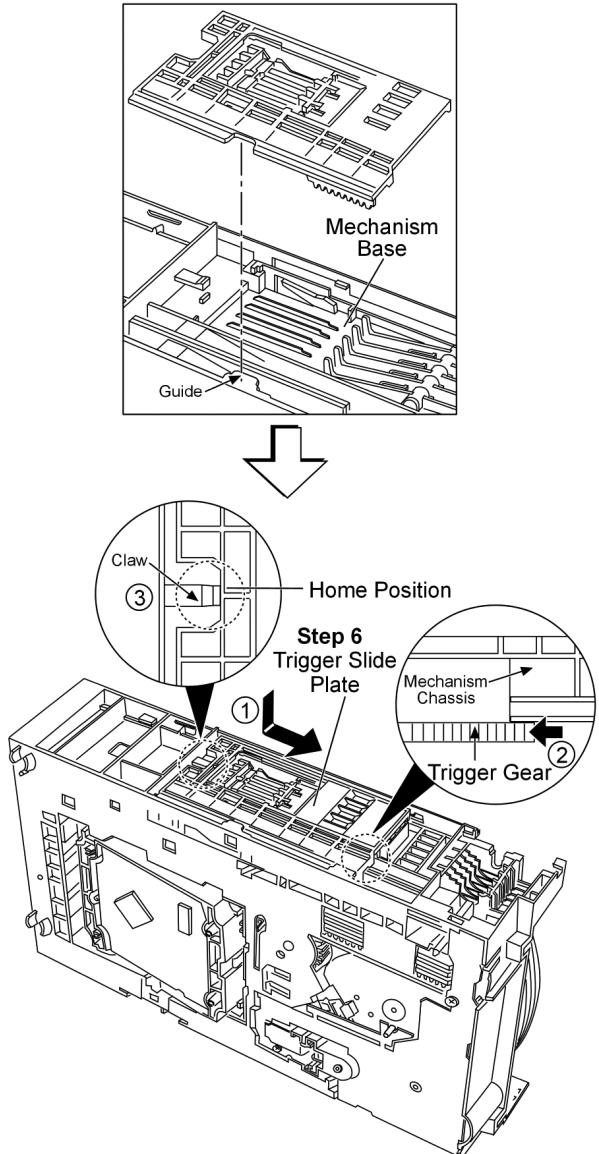
**Note:**  
Ensure that tray lock lever seats properly onto the grooves.



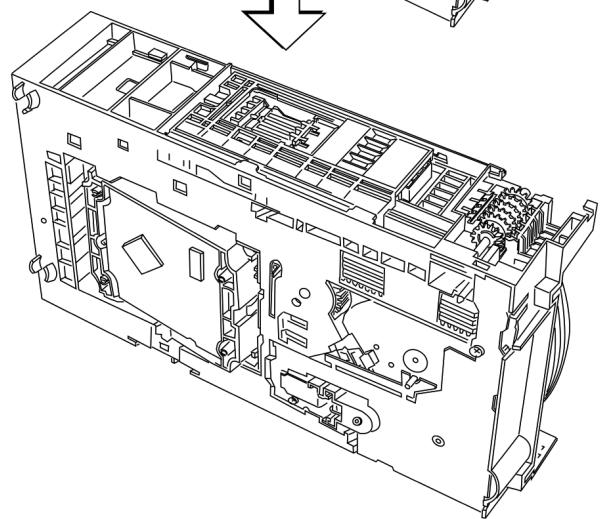
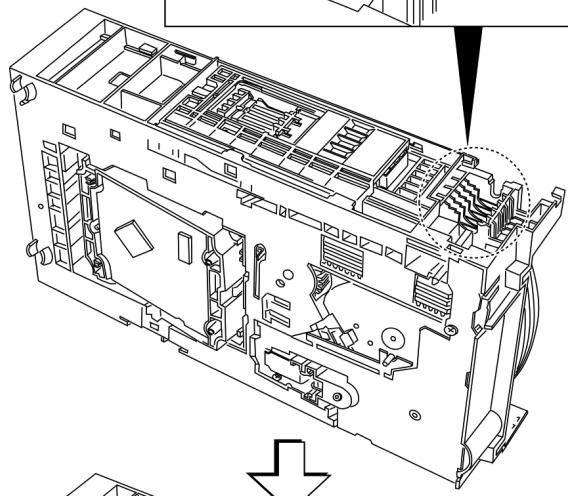
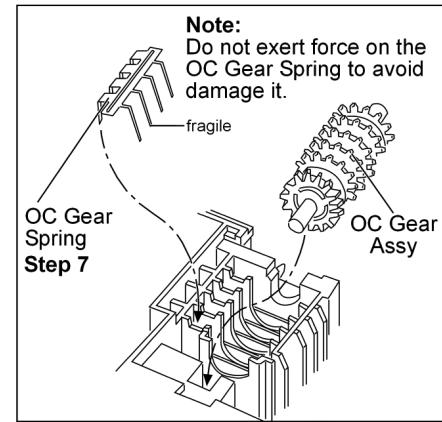
Step 5: Push the disc trays back to the unit as arrow shown.

#### · Assembly of Trigger Slide Plate

Step 4: Install the tray lock lever to the mechanism base and push the tray lock lever with a hand to fix it.

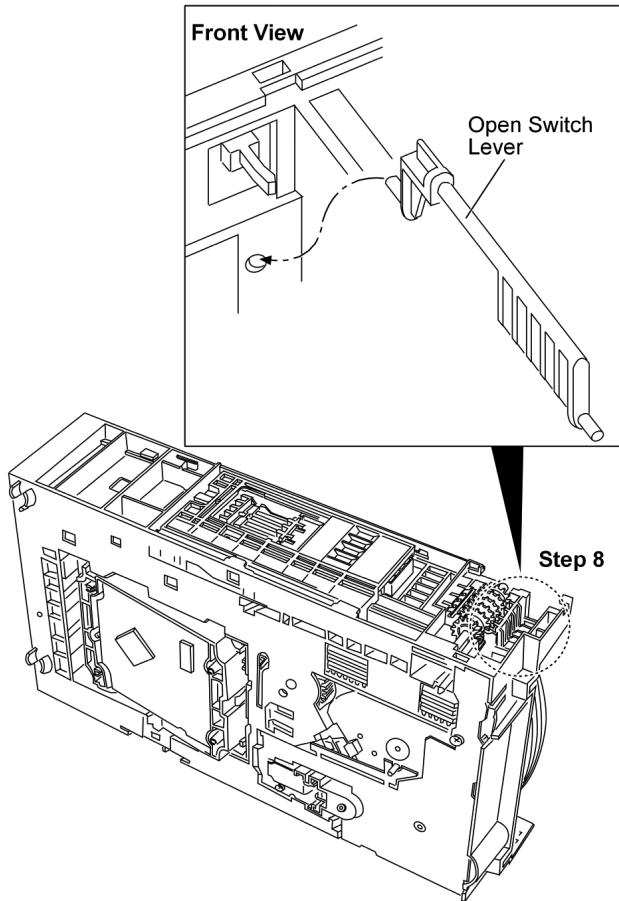


Step 6: Install the trigger slide plate, push forwards and push the trigger gear as arrows shown until locked by the claw.

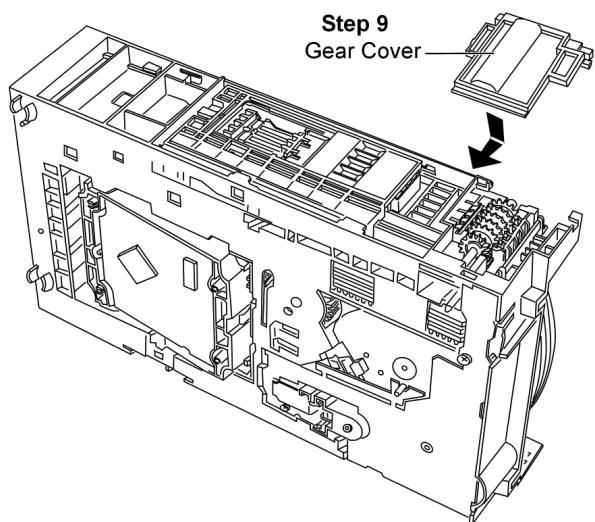


Step 7: Install the OC gear spring followed by the OC gear assy.

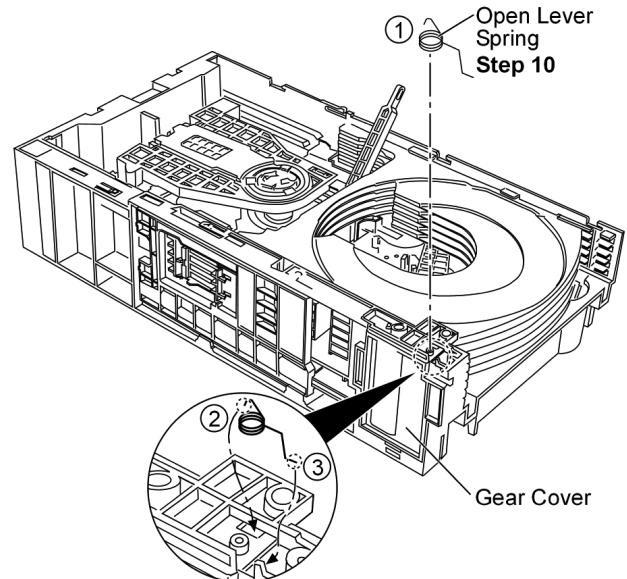
**Caution: OC gear free to rotate after assembly**



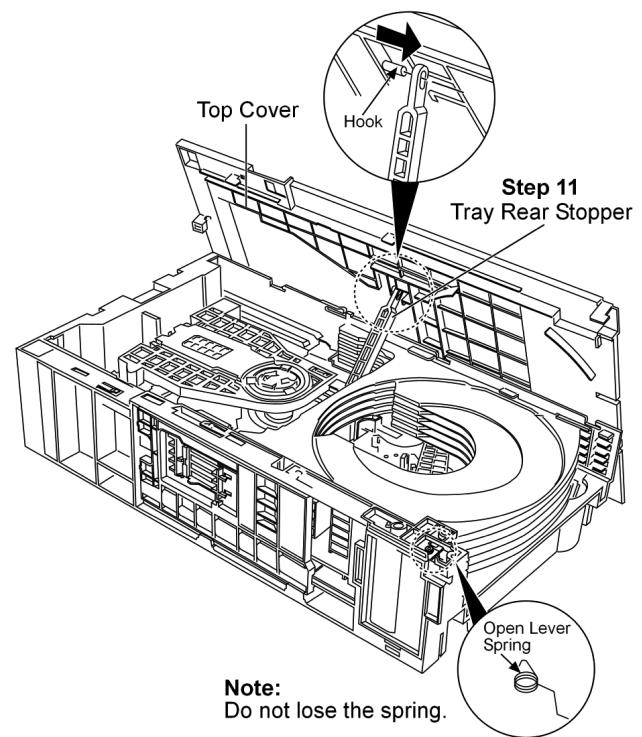
Step 8: Install the open switch lever.



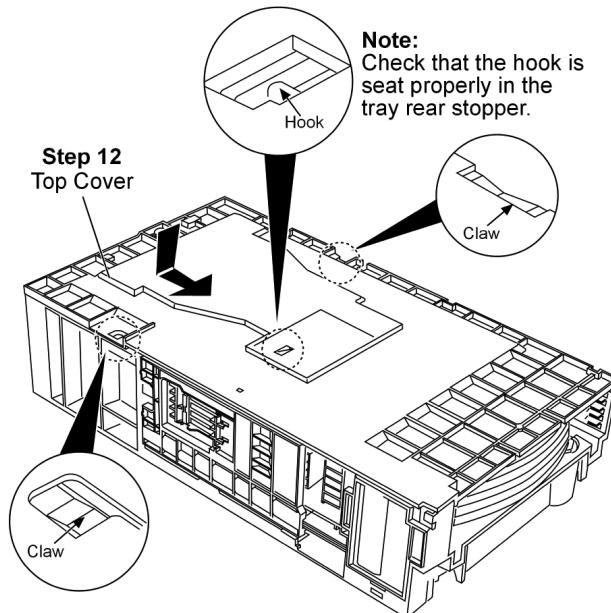
Step 9: Install the gear cover as arrow shown.



Step 10: Install the open lever spring.



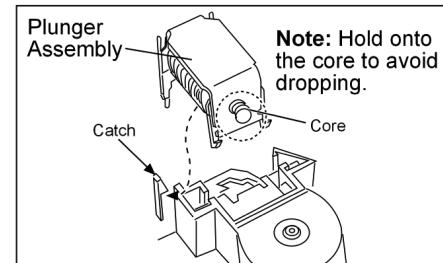
Step 11: Install the top cover, fix the top cover hook to the tray rear stopper as arrow shown.



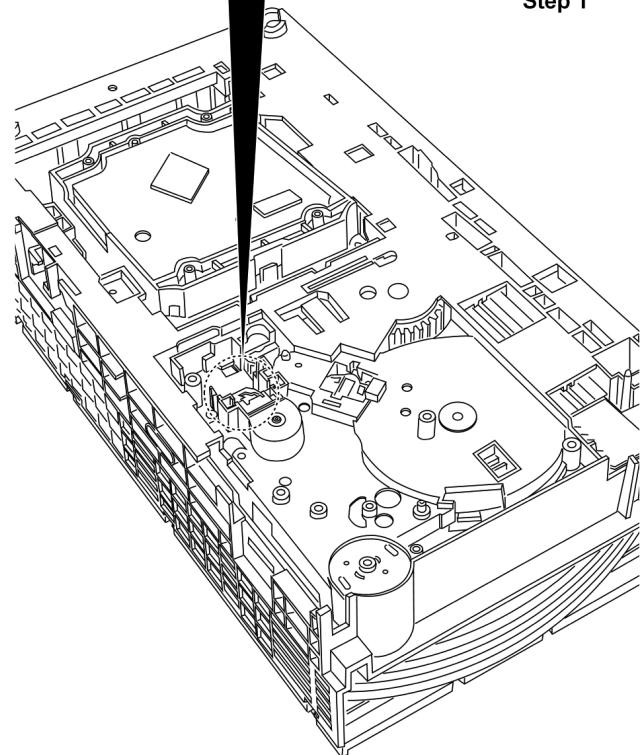
Step 12: Fix the top cover as arrow shown, the 2 claws should be latched.

The mechanism unit will be ready to be checked using service jig or be mounted to the main unit for checking.

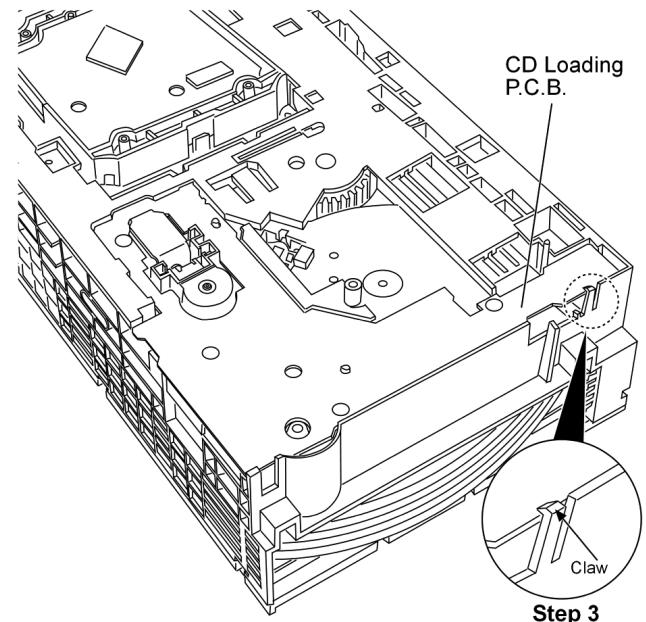
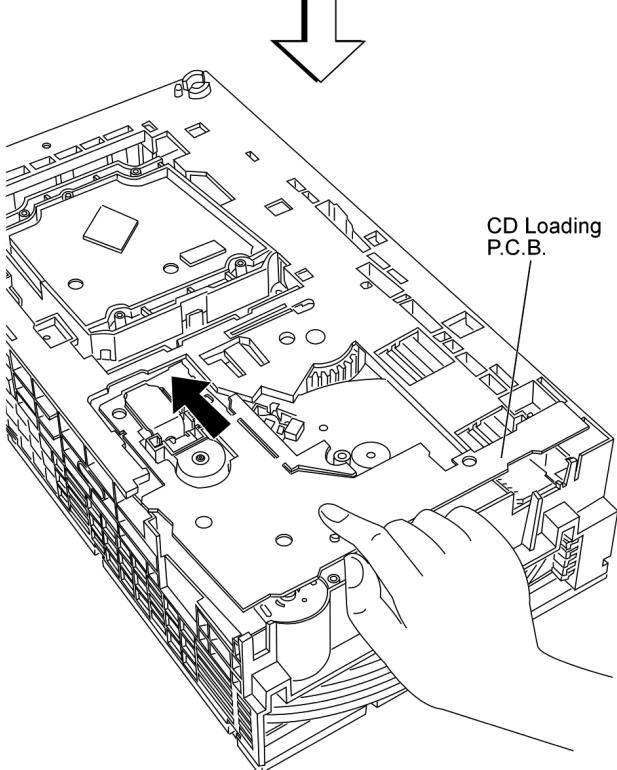
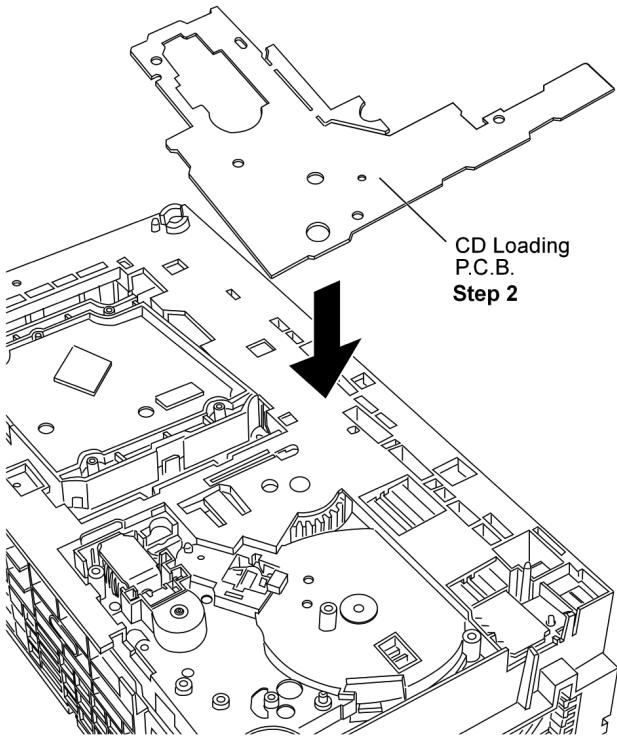
#### 7.2.4. Assembly of CD Loading P.C.B.



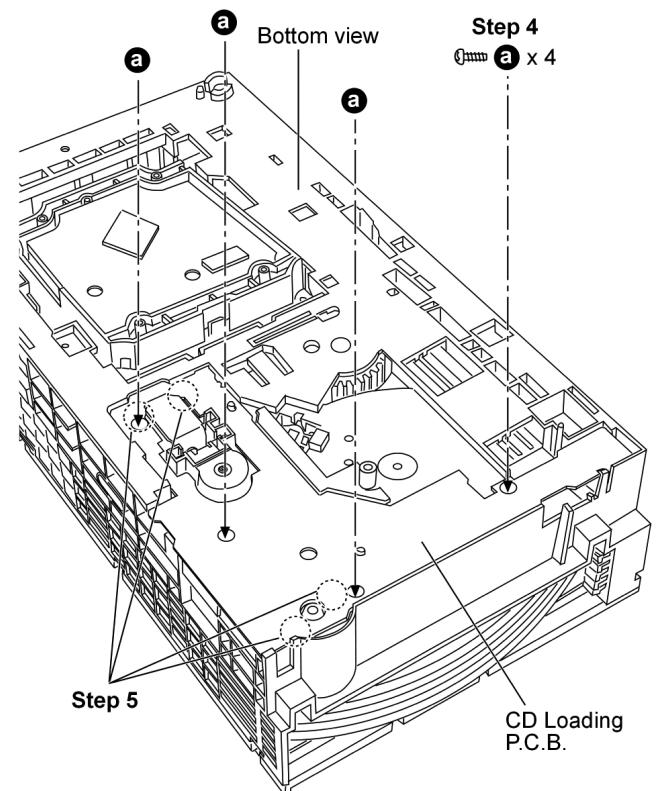
**Step 1**



Step 1: Install the plunger assembly as arrow shown, the catch should be latched.



Step 3: The claw should be latched.

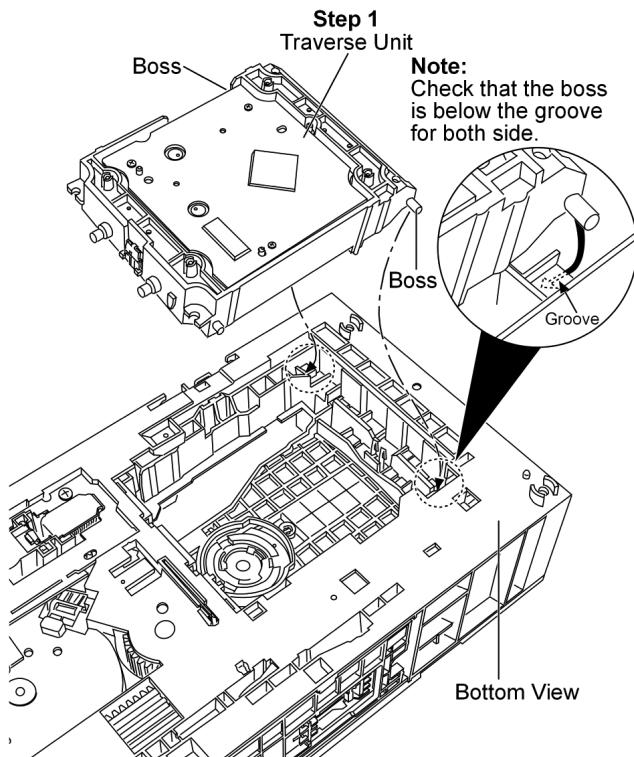


Step 4: Fix it with 4 screws.

Step 5: Solder the 4 points.

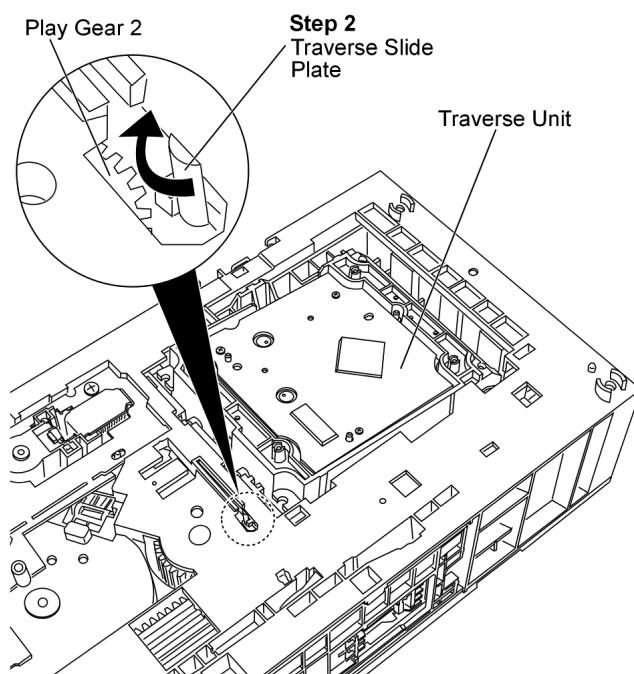
Step 2: Install the CD Loading P.C.B. as arrows shown.

## 7.2.5. Assembly of Traverse Unit



Step 1: Turn over the unit and install the traverse unit.

**Caution:**  
Do not damage the Play Gear 2 when pushing the Traverse Slide Plate.



Step 2: Push the traverse slide plate as arrow shown to lock the traverse unit.

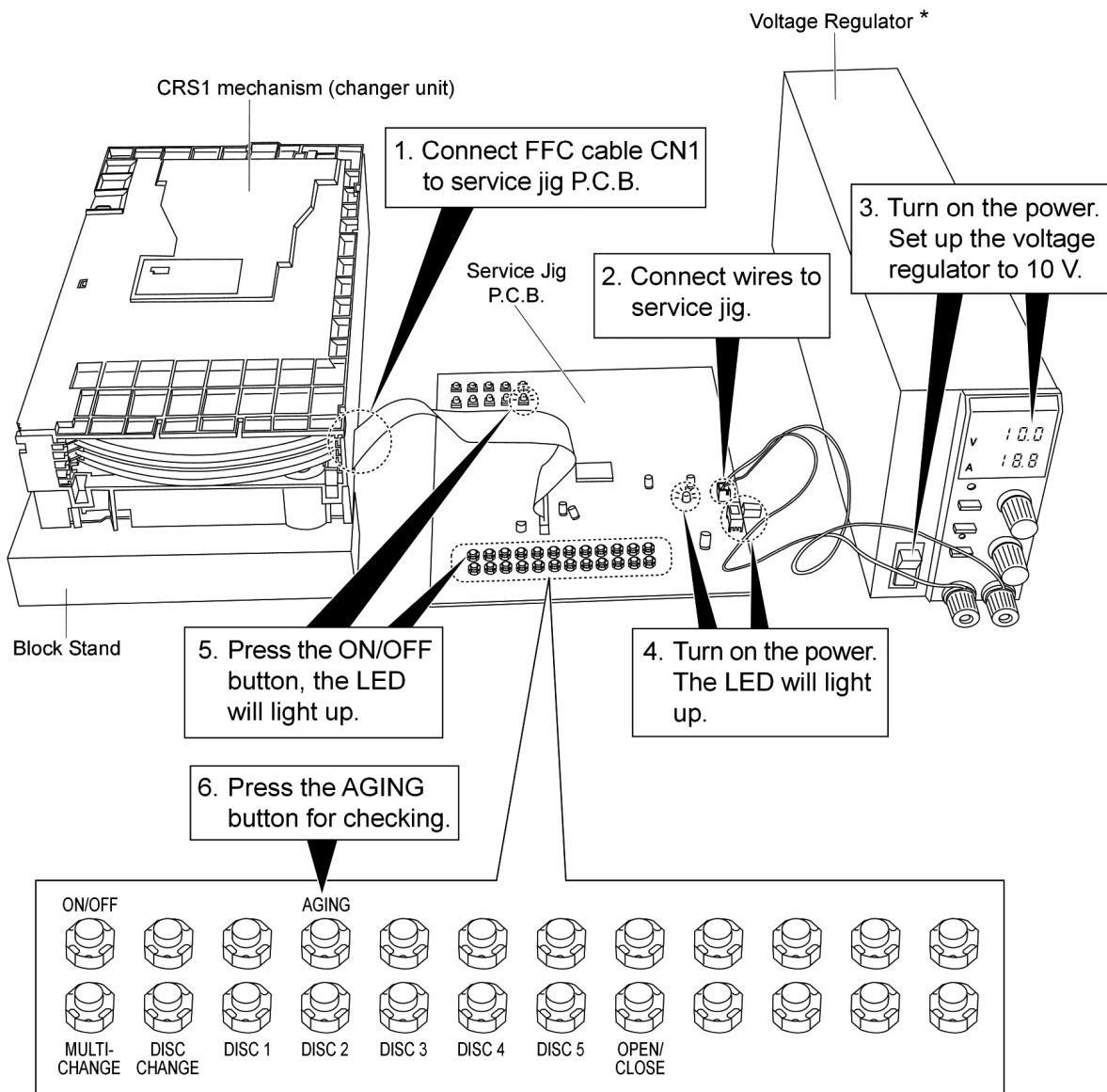
## 8 CRS1 (Changer Unit) Ageing / Reliability

Purpose: It is necessary to test the mechanism unit by using the Service Jig P.C.B., make sure it works in order before install it to the main unit.

### 8.1. Equipments

Equipments required for the set up preparation

- Voltage regulator\*
- Service jig P.C.B. (RFKZ0331) [M]



\* Non-supply

## 9 Notes of Schematic Diagram

(All schematic diagrams may be modified at any time with the development of new technology)

**Note :**

SW1	Open switch
SW2	Stock switch
SW3	Home switch
SW4	Top switch
SW5	Play switch

- The voltage value and waveforms are the reference voltage of this unit measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Accordingly, there may arise some error in voltage values and waveforms depending upon the internal impedance of the tester or the measuring unit.

**• Importance safety notice :**

Components identified by  mark have special characteristics important for safety. Furthermore, special parts which have purposes of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used. When replacing any of components, be sure to use only manufacturer's specified parts shown in the parts list.

**Caution !**

IC, LSI and VLSI are sensitive to static electricity.

Secondary trouble can be prevented by taking care during repair.

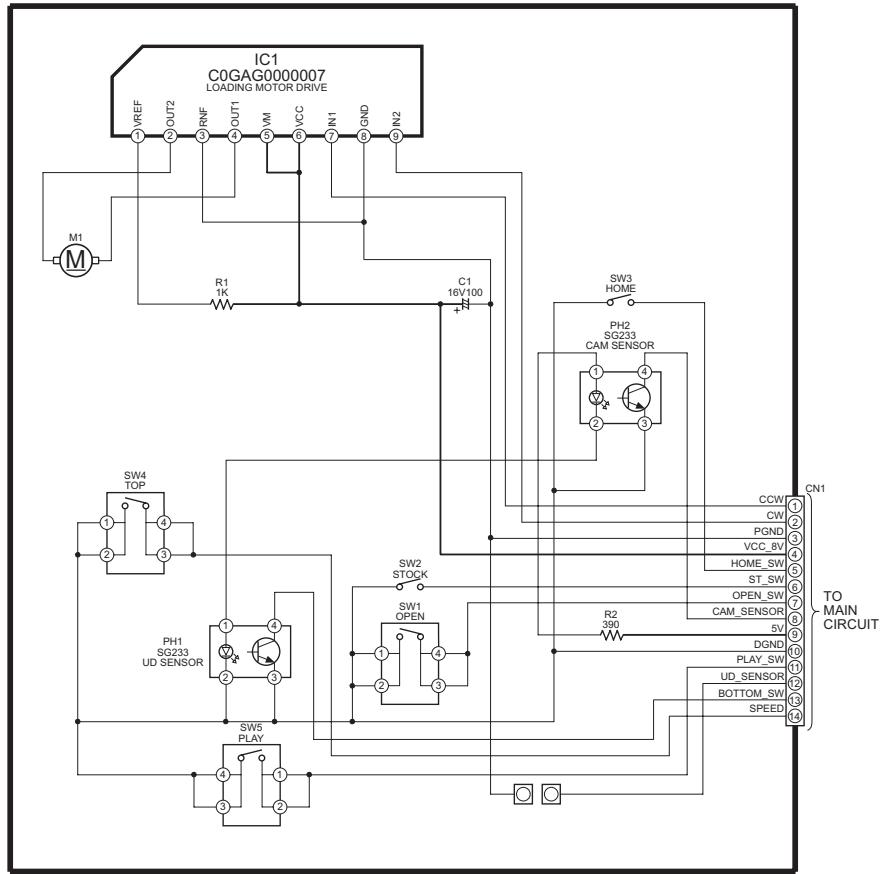
- Cover the parts boxes made of plastics with aluminium foil.
- Put a conductive mat on the work table.
- Ground the soldering iron.
- Do not touch the pins of IC, LSI or VLSI with fingers directly.

# 10 Schematic Diagram

## 10.1. CD Loading Circuit

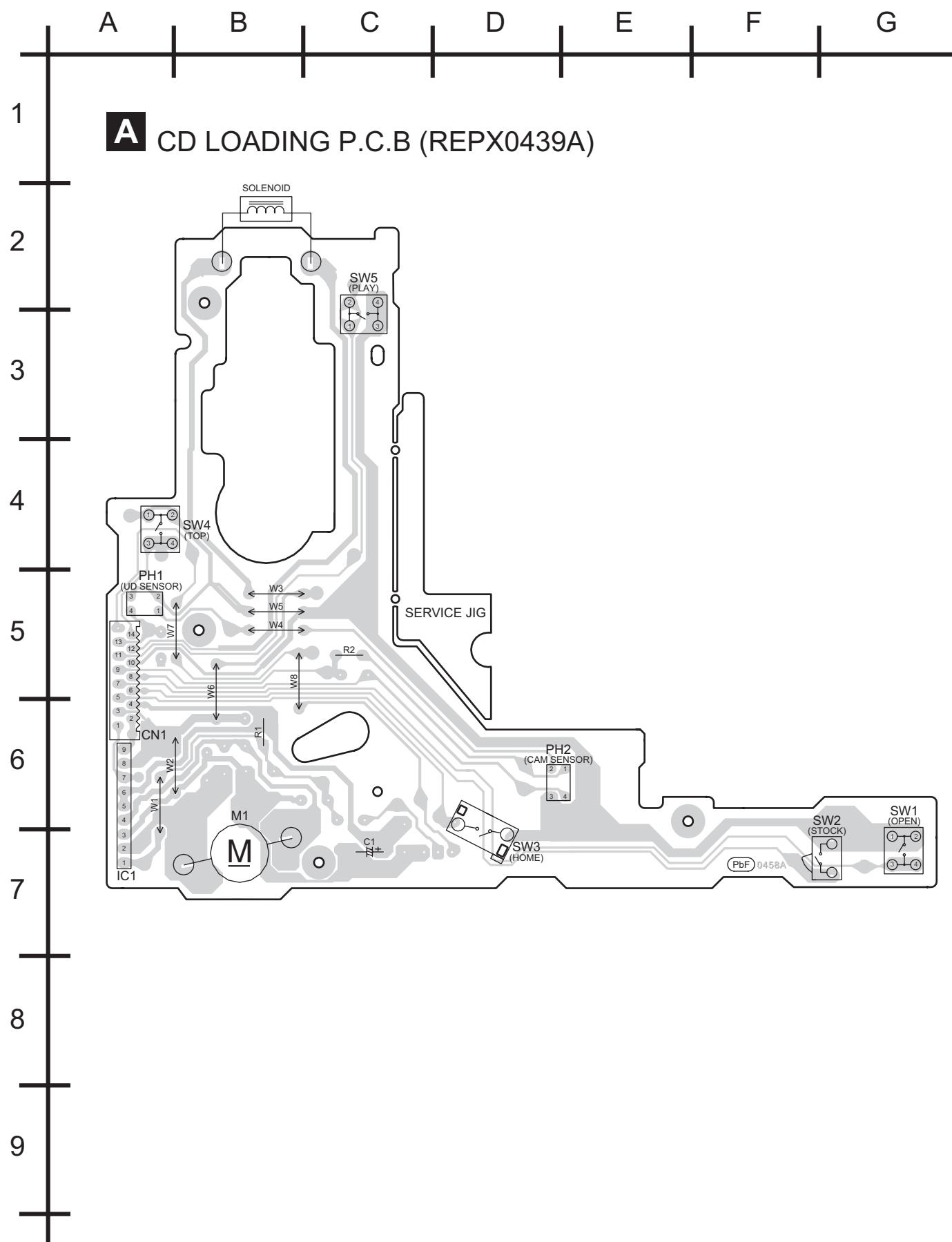
SCHEMATIC DIAGRAM - 1

CD LOADING CIRCUIT ——— : +B SIGNAL LINE



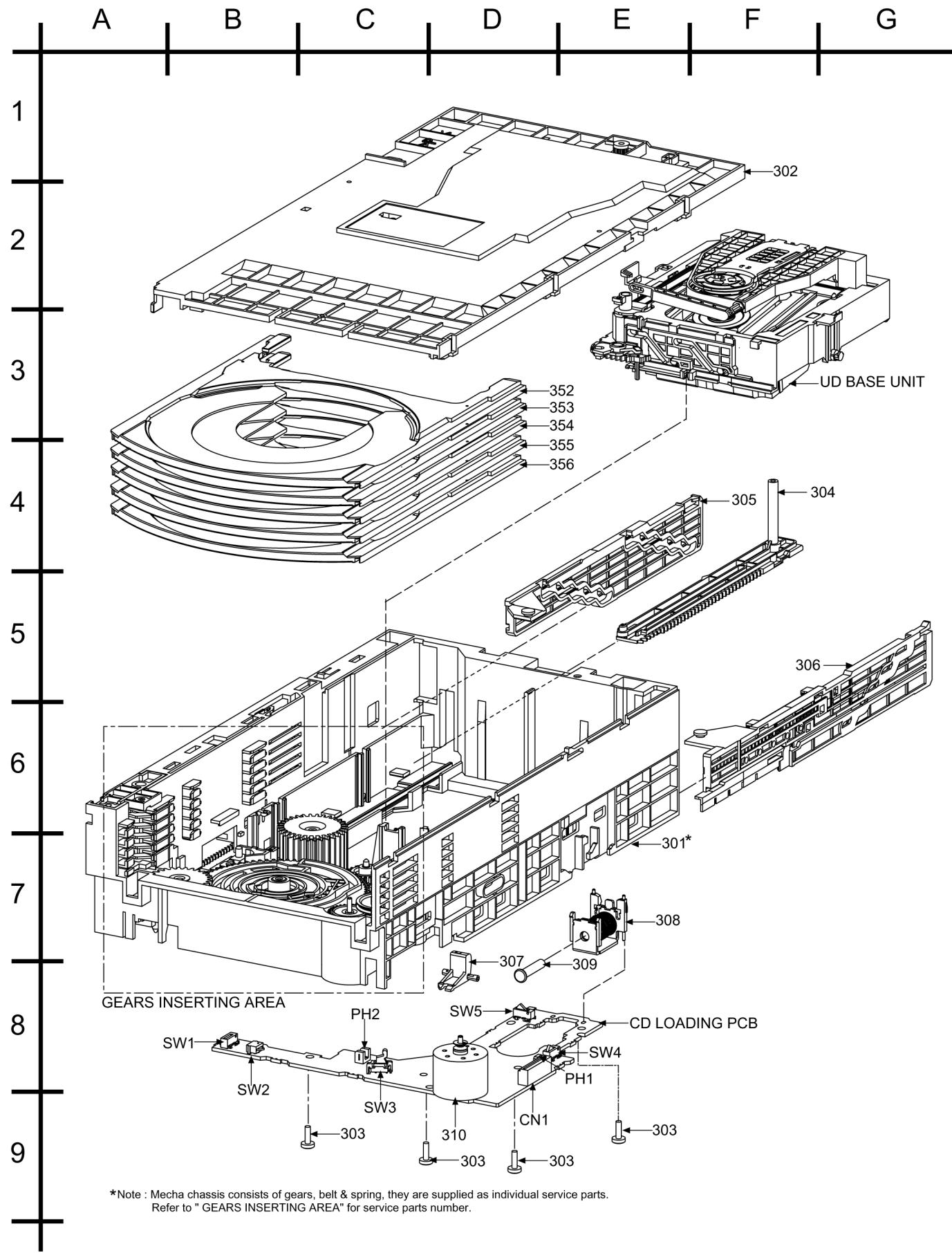
# 11 Printed Circuit Board

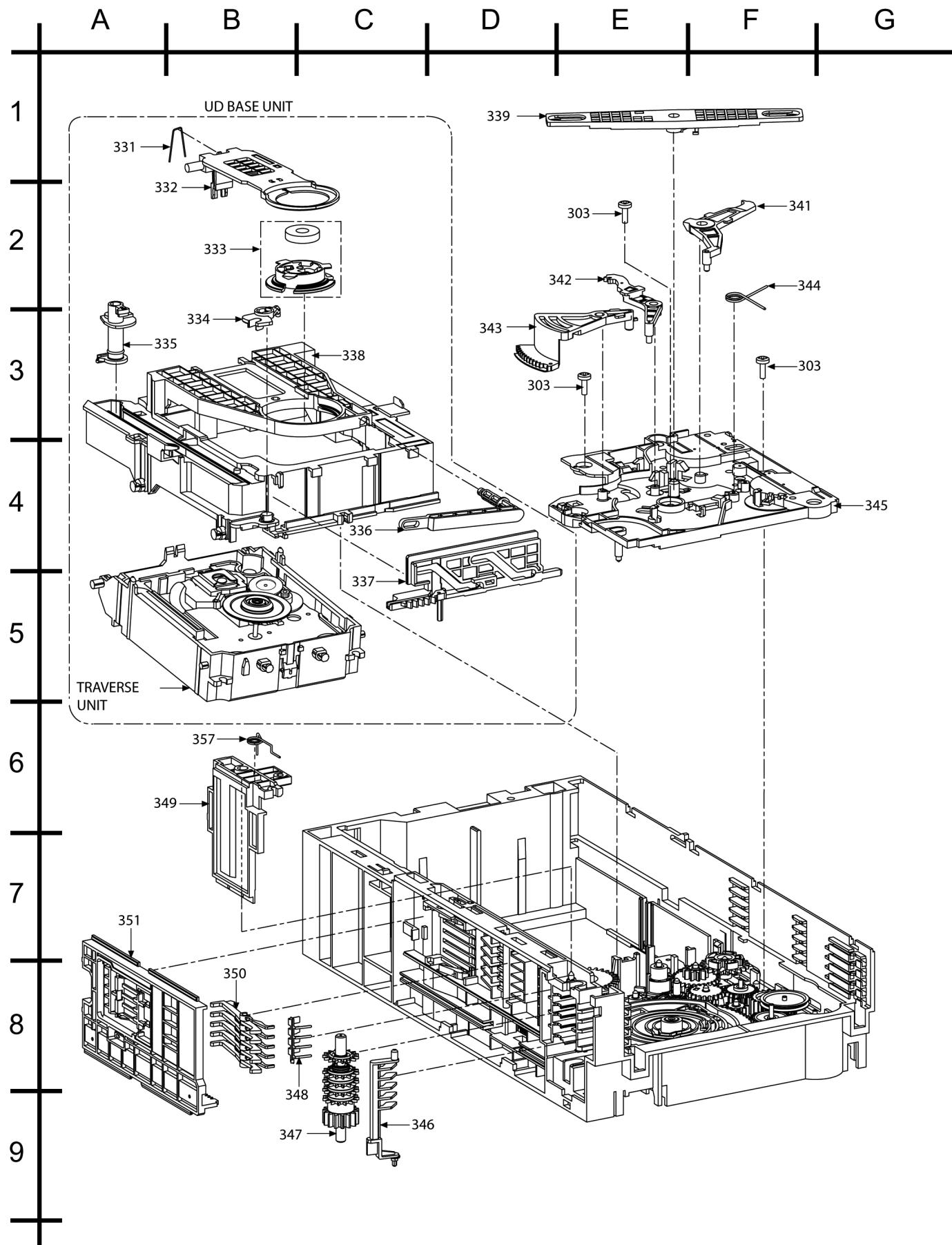
## 11.1. CD Loading P.C.B.

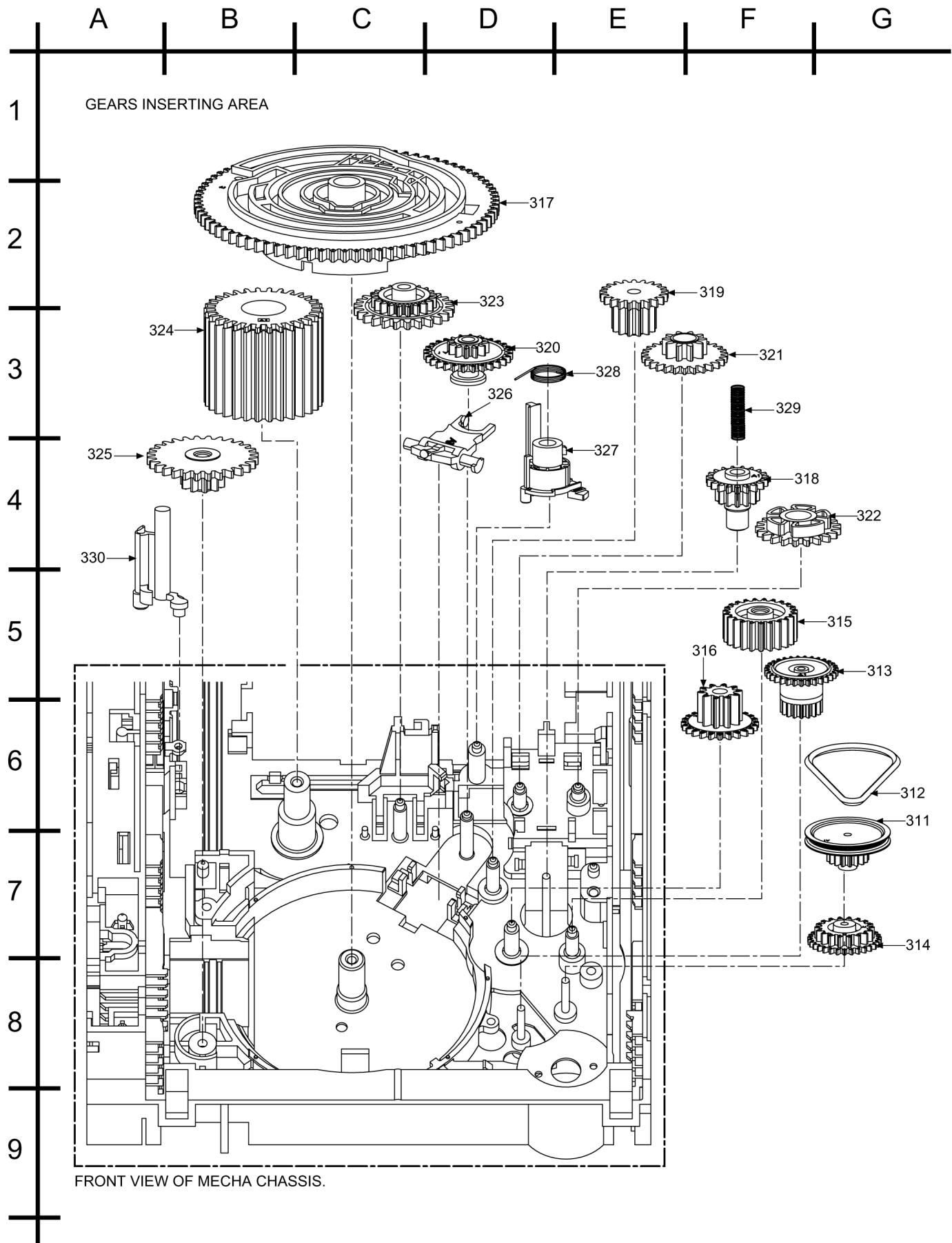


## 12 Exploded Views

### 12.1. CD Loading Mechanism







# 13 Replacement Parts List

## Notes:

- Important safety notice:

Components identified by  mark have special characteristics important for safety.

Furthermore, special parts which have purposes of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used.

When replacing any of these components, be sure to use only manufacturers's specified parts shown in the parts list.

- Capacitor values are in microfarad ( $\mu\text{F}$ ) unless specified otherwise, P=Pico-farads(pF); Farads.

- Resistance values are in ohms, unless specified otherwise, 1K=1,000(ohms).

- The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependant on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.

- [M] Indicates in the Remarks columns indicates parts that are supplied by **PAVCSG**.

### 13.1. CD Loading Mechanism Parts List

Ref. No.	Part No.	Part Name & Description	Remarks
		TRAVERSE DECK	
301	RFKJAA340PS	MECHA CHASSIS ASS'Y	[M]
302	RMLX0029	TOP COVER	[M]
303	XTB3+8JFJ	SCREW	[M]
304	RMMX0008	TRAY DRIVE RACK	[M]
305	RMMX0009	UD RACK L	[M]
306	RMMX0010-1	UD RACK R	[M]
307	RMLX0027	PLUNGER LEVER	[M]
308	RMS0398-1	MOVING CORE	[M]
309	RAQX0001-V	PLUNGER ASS'Y	[M]
310	REMX0001	MOTOR UNIT	[M]
311	RDGX0017	PULLEY GEAR	[M]
312	RDVX0001	BELT	[M]
313	RDGX0018	RELAY GEAR 1	[M]
314	RDGX0019	RELAY GEAR 2	[M]
315	RDGX0038	RELAY GEAR 3	[M]
316	RDGX0037	MAIN DRIVE GEAR	[M]
317	RDGX0022	CAM GEAR	[M]
318	RDGX0023	SWITCHING GEAR	[M]
319	RDGX0024	LONG GEAR	[M]
320	RDGX0025	FUNCTION GEAR	[M]
321	RDGX0026	UD GEAR 1	[M]
322	RDGX0027	UD GEAR 2	[M]
323	RDGX0028	PLAY GEAR 1	[M]
324	RDGX0029	PLAY GEAR 2	[M]
325	RDGX0031-1	TRAY RELAY GEAR	[M]
326	RMLX0024	FUNCTION LEVER	[M]
327	RMLX0033	PLAY SWITCH LEVER	[M]
328	RMBX0044	PLAY LEVER SPRING	[M]
329	RMBX0040	CHANGE GEAR SPRING	[M]
330	RMLX0032	PLAY LEVER B	[M]
331	RMBX0041	CLAMPER SUPPORT PLAT	[M]
332	RMMX0011	CLAMPER SUPPORT PLAT	[M]
333	RXQX0021	CLAMPER UNIT	[M]
334	RMLX0031	PLAY LEVER A	[M]
335	RMLX0025	TRAY CATCH LEVER	[M]
336	RMLX0034	TRAY REAR STOPPER	[M]
337	RMMX0007-1	TRV SLIDE PLATE	[M]
338	RMRX0057-1	UD BASE	[M]
339	RMLX0028	UD CONNECTION LEVER	[M]
341	RMLX0036	LOCK LEVER 2	[M]
342	RMLX0035	LOCK LEVER 1	[M]
343	RDGX0030	TRIGGER GEAR	[M]
344	RMBX0043	LIMIT SPRING	[M]
345	RMQX0132-1	PITCH PLATE	[M]
346	RMLX0026	OPEN SW LEVER	[M]
347	RXQX0019	OC GEAR UNIT	[M]
348	RMCX0031	OC GEAR SPRING	[M]
349	RMQX0133-1	GEAR COVER	[M]
350	RMLX0030	TRAY LOCK LEVER	[M]
351	RMMX0006	TRIGGER SLIDE PLATE	[M]
352	RMRX0056A-1	TRAY 1	[M]
353	RMRX0056B-1	TRAY 2	[M]
354	RMRX0056C-1	TRAY 3	[M]
355	RMRX0056D-1	TRAY 4	[M]
356	RMRX0056E-1	TRAY 5	[M]
357	RMEX0042	OPEN LEVER SPRING	[M]

## 13.2. Electrical Parts List

Ref. No.	Part No.	Part Name & Description	Remarks
		PRINTED CIRCUIT BOARD	
	REPX0439A	CD LOADING P.C.B.	[M] (RTL)
		INTEGRATED CIRCUITS	
IC1	C0GAG0000007	IC DRIVER	[M]
		SWITCHES	
SW1	RSH1A045-1A	SW OPEN	[M]
SW2	K0L1BA000117	SW STOCK	[M]
SW3	K0L1BA000086	SW HOME	[M]
SW4	K0L1BA000078	SW TOP	[M]
SW5	K0L1BA000078	SW PLAY	[M]
		CONNECTORS	
CN1	K1MN14A00049	14P FFC CONNECTOR	[M]
PH1	B3NAA0000004	PHOTODIODE	[M]
PH2	B3NAA0000004	PHOTODIODE	[M]
		RESISTORS	
R1	DOAE102JA048	1K 1/4W	[M]
R2	DOAE101JA048	100 1/4W	[M]
		CAPACITORS	
C1	ECEA1CKA101B	100 16V	[M]