Service Instructions

JVC CD Changer Audio System

1. THE C-3 MECHANISM OUTLINE

Today's worldwide trend of expansive growth in CD changer systems is estimated to come to further maturity from now on. At JVC, we have added a triple-tray CD changer system, which applies a C-3 mechanism, into our CD radio cassette recorder, portable audio system and mini-components lines for 1995.

We would like to describe the operation principles of the C-3 mechanism in detail. We hope that you will take full advantage of these instructions in order to understand the characteristics and operation procedures of this mechanism and perform efficient and applicable inspections and services of the mechanism.

2. THE C-3 MECHANISM CHARACTERISTICS

(1) Three separate disc trays allow the operator to open and close two trays while playing a disc in the third tray. (There are Disc 1, Disc 2, Disc 3, Eject 1, Eject 2 and Eject 3 operation buttons.)
(2) The mechanism does not have a function to detect whether or not there is a disc in the tray. It is detected by a focus search for the current disc.
(3) Two motors drive functions such as loading, eject, disc-switching and chucking.

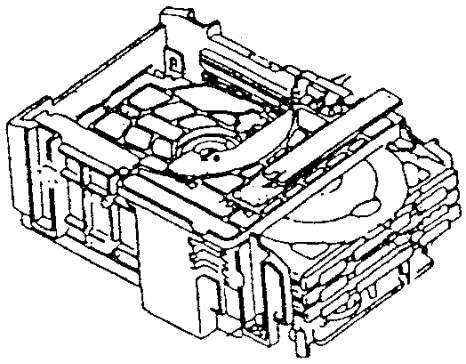


fig-1

3. LOCATION OF MAIN OF PARTS OF C-3 MECHANISM

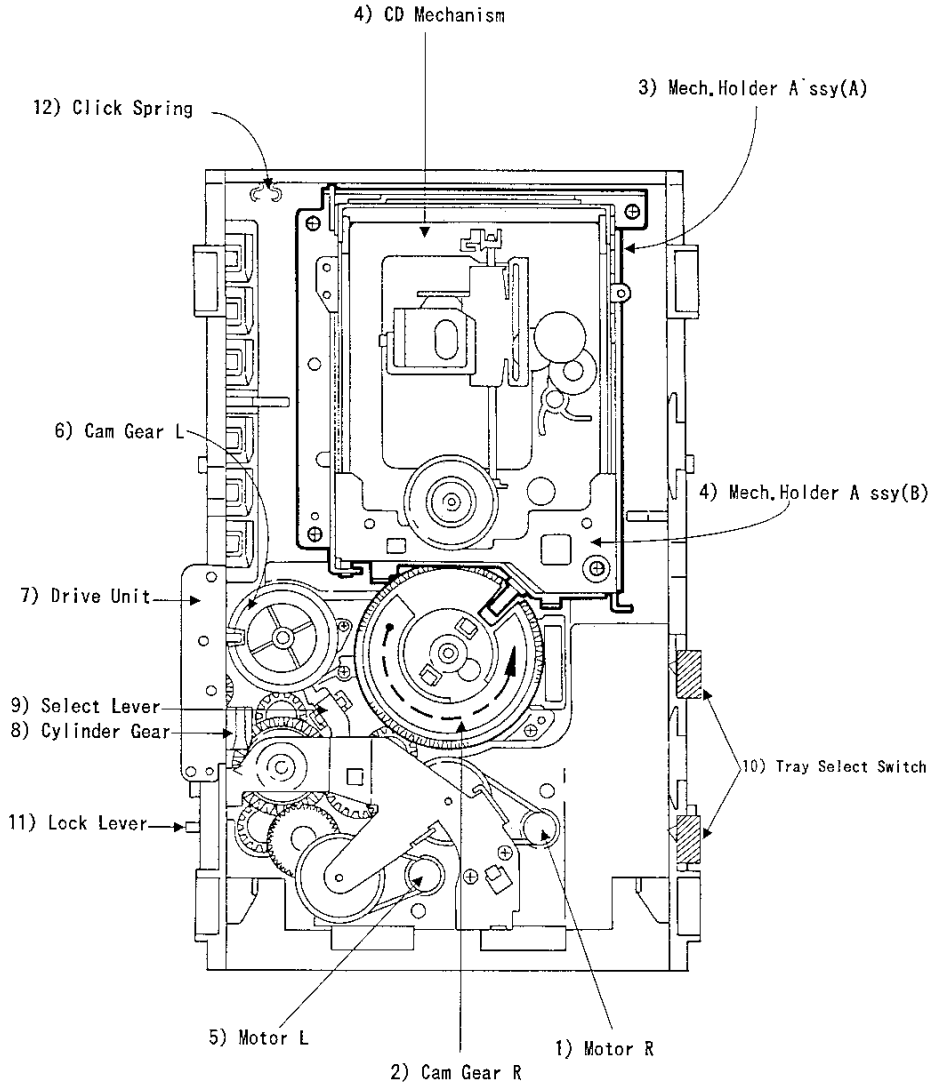


fig-2

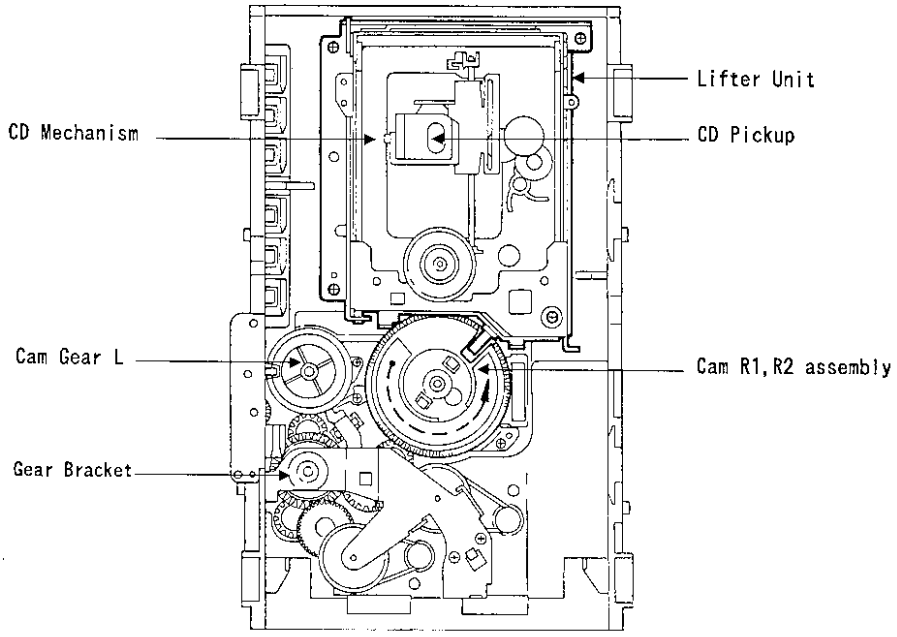

Lifter Unit
CD Mechanism
CD Pickup
Cam Gear L
Cam R1, R2 assembly
Gear Bracket

fig-3

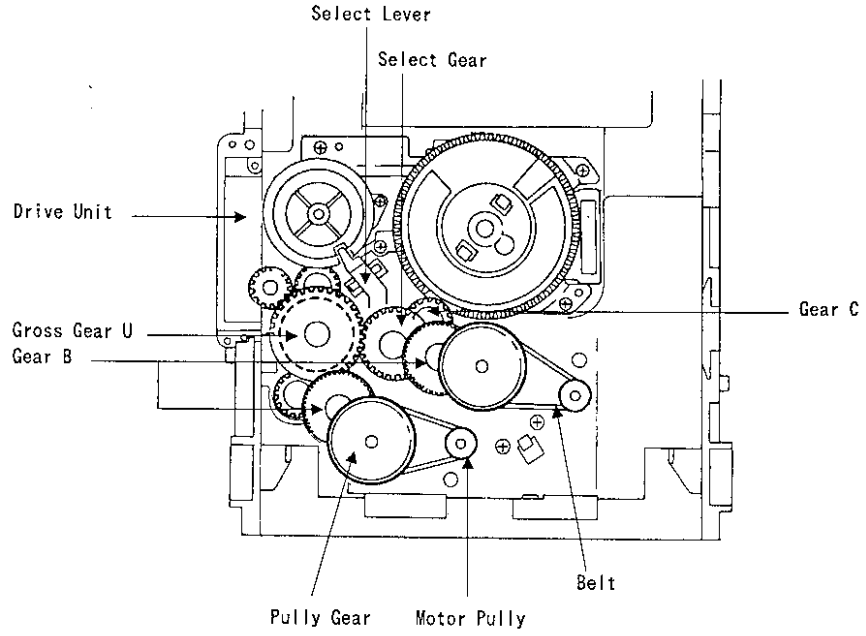

Select Lever
Select Gear
Drive Unit
Gear C
Gross Gear U
Gear B
Belt
Pully Gear
Motor Pully

fig-4

3. THE C-3 MECHANISM MAJOR PARTS AND THEIR FUNCTIONS

3-1) Motor R

This motor drives the C-3 mechanism. Activation and deactivation of the motor are controlled by an output from the mechanism controller.
Its functions are largely divided into two categories depending on the position of cam gear L:

(1) The motor drives cam gear R, chucks and unchucks the traverse mechanism, and selects a disc.
(2) It also drives the opening and closing operations of the main and sub trays.

3-2) Cam R

The mechanism holder assembly moves up and down according to the rotating position of this cam R. This allows the cam R to determine the height of the traverse mechanism (select a disc).

The cam R also controls chucking or unchucking operations of each disc depending on the relative position of levers A and B of the mechanism holder. (See Cam R Rotation Diagram: Fig. 22.)

3-3) Mechanism holder assembly

This holder moves the traverse mechanism up and down according to the position of cam gear R.

3-4) CD mechanism

This is a traverse mechanism for the CD. An Optima-6S pickup is mounted.

3-5) Motor L

This motor drives the cam gear L.

3-6) Cam L

Depending on the position of this gear, it plays the role of a clutch for switching the driving force of motor R.

(1) Cam L switches each tray-drive gear in the drive unit in order to open and close the main and sub trays that the operator wants to use.
(See Cam L Rotation Diagram: Fig. 10.)
(2) It also switches the driving force of motor R to the tray side and to the cam-gear R side (disc select, chucking or unchucking).

3-7) Cylinder gear

This gear conveys the motor R drive to the drive unit in order to open and close each set of main and sub trays.
The elevator gear moves up and down depending on the rotating position of cam gear L, there by driving the cylinder gear of each tray. The cylinder gear has a certain vertical length so that this gear always engages with the elevator gear no matter which position the elevator gear is in.

3-8) Drive unit

This gear box allows three sets of the main and sub trays to open and close. Depending on which position cam gear L is in, the elevator gear moves up and down, and engages the drive gear of a tray that the operator has chosen, thereby conveying the driving force of motor R via the cylinder gear and making trays open and close.

3-9) Select lever

This lever supplies or releases the conveyance of the driving force from motor R to cam gear R.

Depending on which position cam gear L is in, the select lever lifts up the select gear and cancels the conveyance between cam gear R and motor R.

3-10) Tray select switches

These three sets of the main/sub-tray switches allow the mechanism control IC to monitor the condition of the three trays.

POSITIONING DETECTION OF MAIN TRAY AND SUB TRAY

TRAY MAIN SW	TRAY SUB SW	MAIN TRAY POSITION	SUB TRAY POSITION
ON	ON	CLOSE	WAIT or PLAY
ON	OFF	OPEN	OPEN
		CLOSE	MOVING
OFF	OFF	MOVING	MOVING WITH MAIN TRAY

3-11) Lock lever

This lever locks the main tray so that the tray does not pop out. When the main tray is open, the lock is released by the elevator gear.

3-12) Click spring

The click spring prevents the main tray from loosening. The spring also retains the main tray so that the tray does not pop out when the lock lever is released while the elevator gear is moving.

4. CAM L

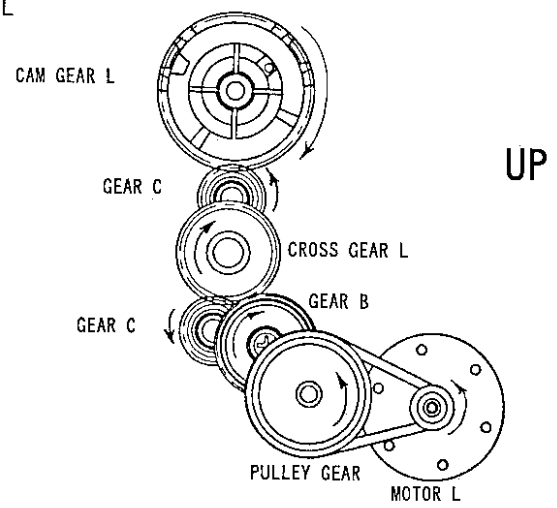


fig-5

The rotation of motor L drives the pulley gear via the belt. This rotative power is conveyed from the pulley gear through gear B, gear C, gear D and gear C to cam L.

As shown in Fig. 5 above, when the motor L rotates counterclockwise, cam L rotates in the upward direction.

Cam L has step-shaped grooves. These grooves make the drive unit move up and down with the rotation of cam L, and, as a result, the elevator gear moves up and down. There is a shaft on the upper gear section as shown in Fig. 8.

Depending on which position the shaft is in, the rotation of the elevator gear will be conveyed to one of the six tray-drive gears.

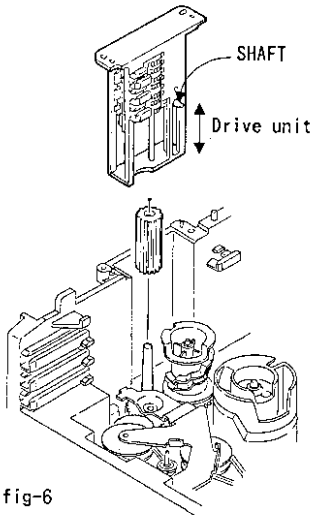


fig-6

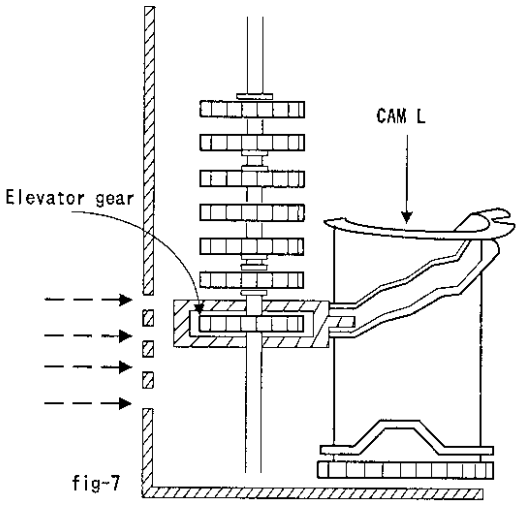
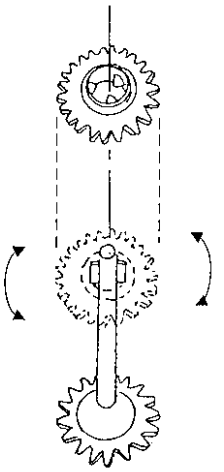


fig-7

5. DRIVE UNIT



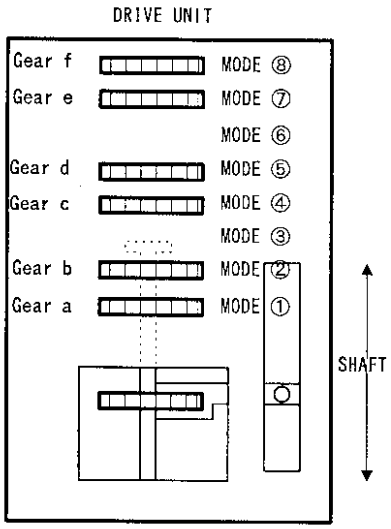


fig 8

As the shaft on the drive unit moves up and down, the rotation of gear A is conveyed to one of the upper six gears, which makes the tray gear rotate and the tray execute a loading or unloading operation.

There are eight modes, dependent on the position of cam L.
The current positioning status can be confirmed through the seven windows (indicators) on the left side of the chassis.
As this gear moves up and down, one can confirm which mode (mode position) cam L is located in through the hole (indicator) on the left side of the C-3 mechanism.

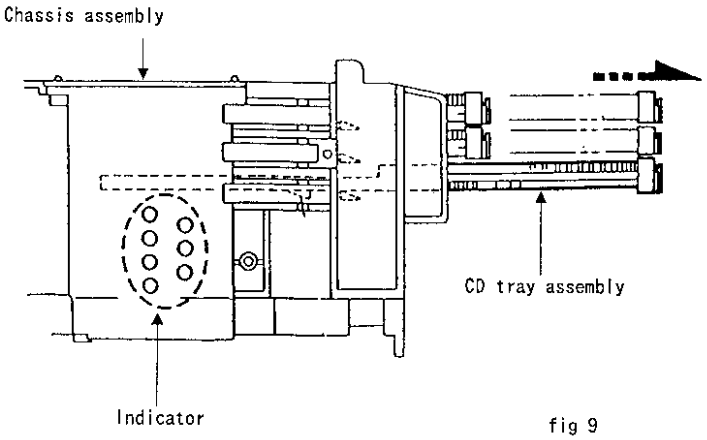
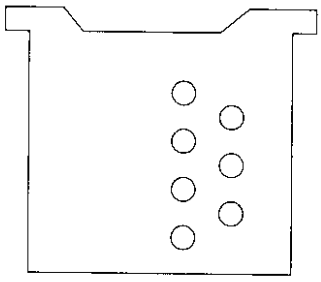
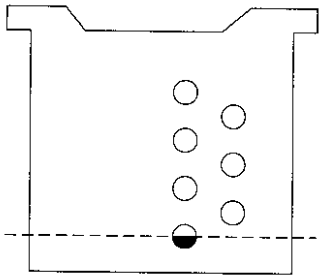


fig 9

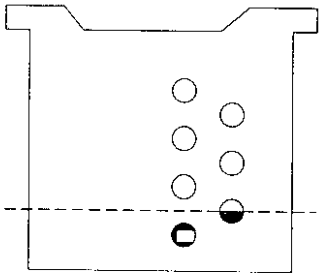
CAM L POSITION



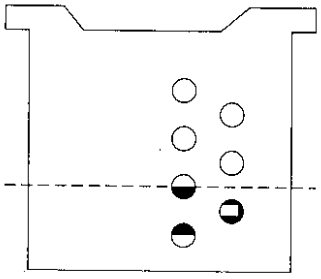
1: MAIN TRAY 1



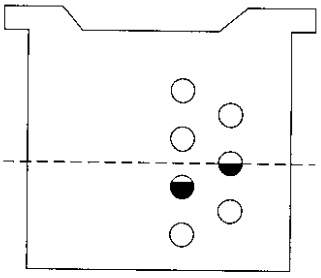
2: SUB TRAY 1



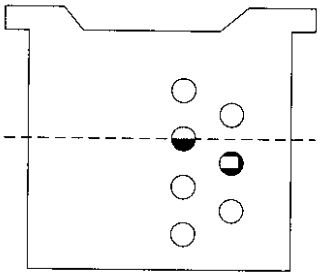
3: CAM R2



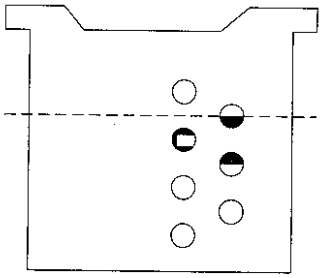
4: MAIN TRAY 2



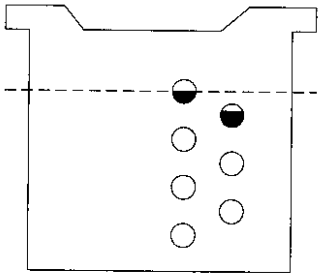
5:SUB TRAY 2



6: CAM R1



7: MAIN TRAY 3

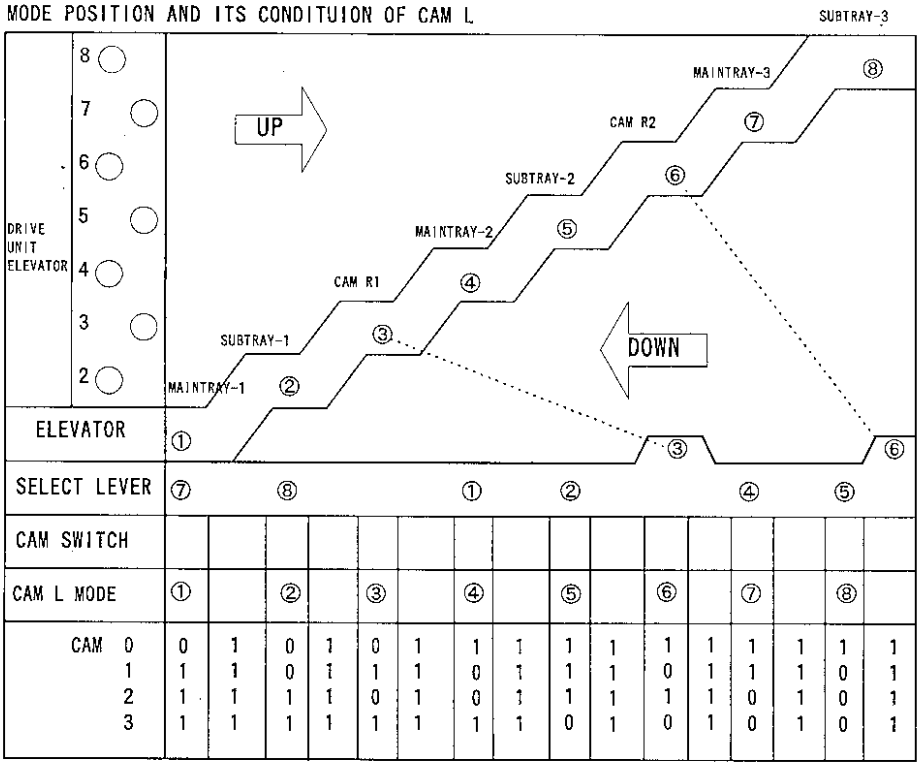


8:SUB TRAY 3

SWICTHINGL BY MOTOR L		ROTATIVE POWER OF MOTOR R		
CAM L		DRIVE UNIT	CAM R	
	⑧ SUB 3	GEAR f		OPEN / CLOSE OF SUB TRAY 3
	⑦ MAIN 3	GEAR e		OPEN / CLOSE OF MAIN TRAY 3
	⑥CAM R2		○	DISC SELECT CHUCKING / UNCHUKING
	⑤ SUB 2	GEAR d		OPEN / CLOSE OF SUB TRAY 2
	④ MAIN 2	GEAR c		OPEN / CLOSE OF MAIN TRAY 2
	③ CAM R1		○	DISC SELECT CHUCKING / UNCHUKING
	② SUB 1	GEAR b		OPEN / CLOSE OF SUB TRAY 1
	① MAIN 1	GEAR a		OPEN / CLOSE OF MAIN TRAY 1

CAM L ROTATING DIAGRAM

MODE POSITION AND ITS CONDITUION OF CAM L



	①		②		③		④		⑤		⑥		⑦		⑧	
⑦		⑧				①		②				④		⑤		
CAM 0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1
1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	0	1
2	1	1	1	1	0	1	0	1	1	1	1	1	0	1	0	1
3	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1

fig-10

6. LOADING / EJECT OPERATION OF THE TRAY

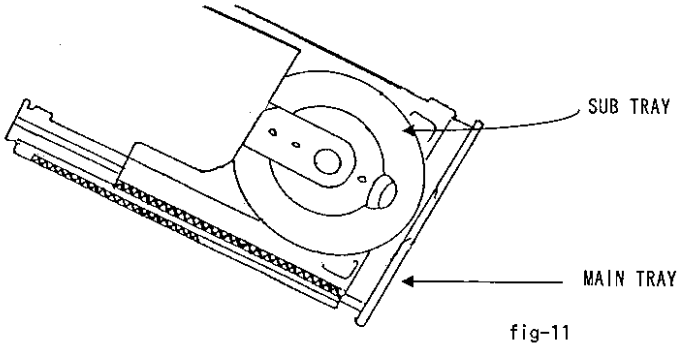


fig-11

There are two kinds of trays for the discs: (1) the main tray and (2) the sub tray. In order to load a disc, place a disc on the sub tray and press the eject button or push the tray itself inside. Then the main tray slides back and loads the disc. The three tray sets are the same shape.
As shown in Fig. 12, when the left side gear engages each tray-drive gear in the drive unit, an opening or closing operation is executed.
This determines the height of the elevator gear depending on the position of cam L, and engages the drive gear of a tray that the operator has chosen.
Regarding the rotative power for opening and closing a tray, the driving force of motor R is conveyed from the cylinder gear through the elevator gear to the tray-drive gear.

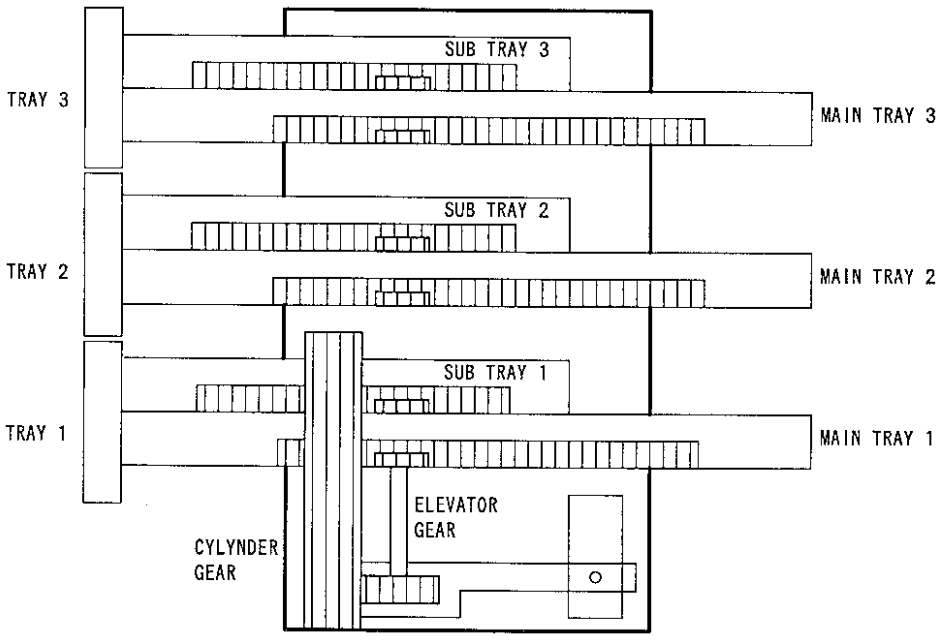


fig-12

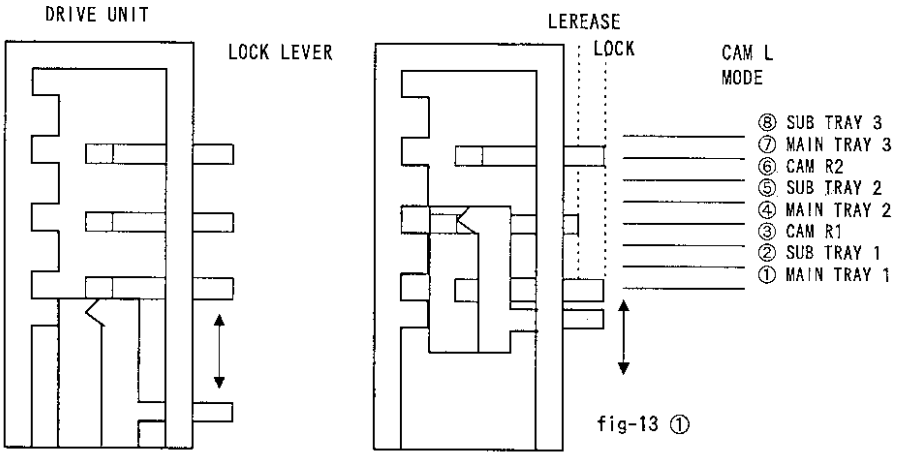


fig-13 ①

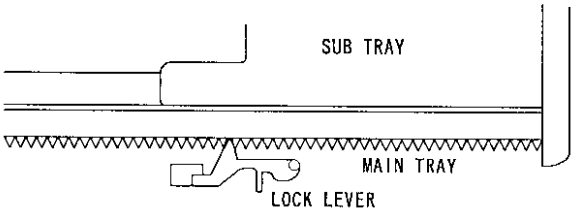


fig-13 ②

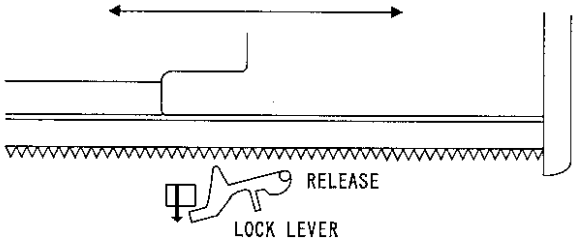


fig-13 ③

Fig14 and 15 show that the lock of lock lever is released.

Normally each tray is engaged with the lock lever at the gear of main tray.

When CAM L selects the one of main tray (MODE①, ④, ⑦)the elevator gear goes up and down and the lock lever is pressed for releasing the main tray to activate the OPEN/CLOSE operation.

Another function of cam L also switches the driving destination of the rotative power of motor R to either cam R (for selecting, chucking or unchucking a disc) or the tray-drive gear in the drive unit (for opening or closing the tray).

Depending on which position cam L is located, after the select lever is pressed, the select gear moves up and down. This controls whether or not the driving force of motor R is conveyed to cam R.

To describe more concretely, when cam L is in mode (3) or (6), the select lever is freed and cam R rotates according to the rotation of motor R. Therefore, the condition of disc select, chucking or unchucking is determined by the position of cam R.

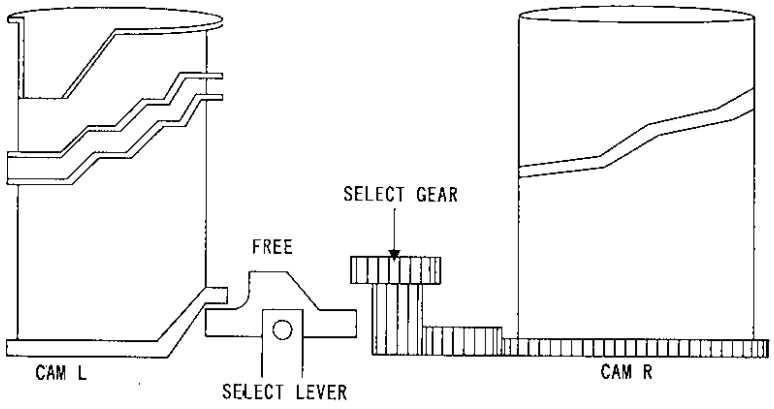


fig-14

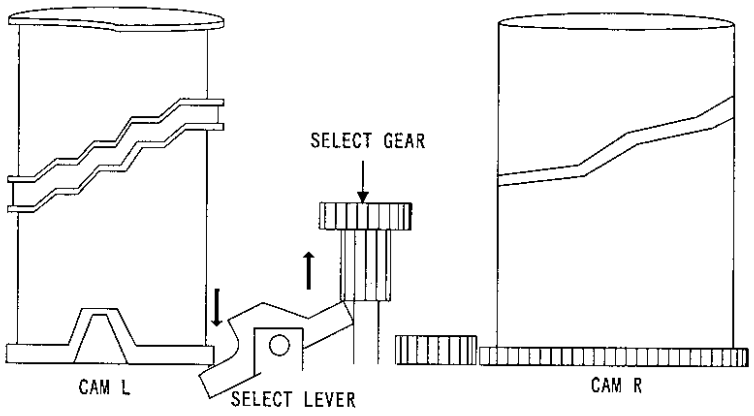


fig-15

7. CAM R

The motor R drives the pulley gear via the belt. This rotative power is conveyed from gear B through the select, gross, cylinder and drive gears of each tray to the sub and main trays.

The rotative power of the select gear is also conveyed from gear C to cam R depending on the position of the select lever.

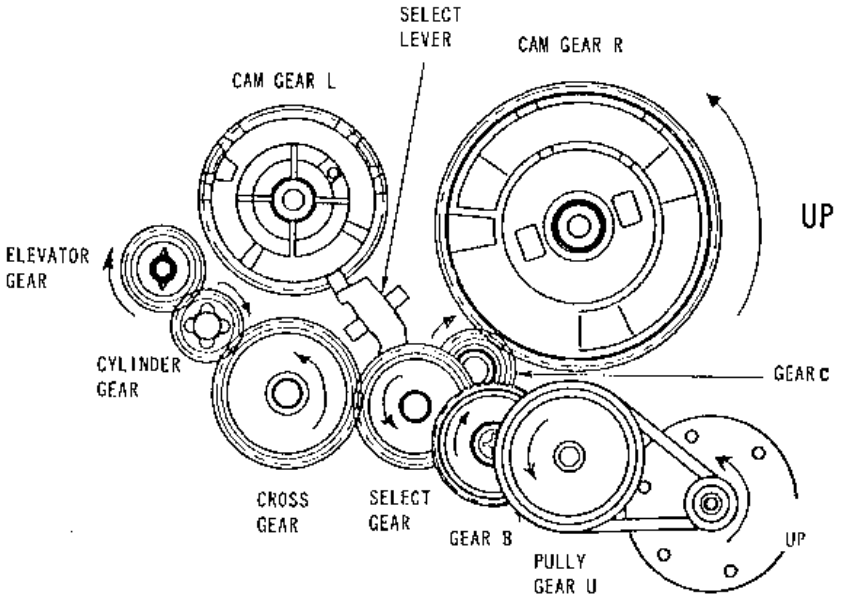
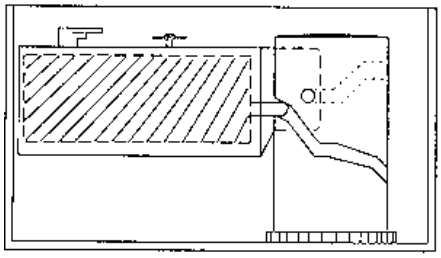
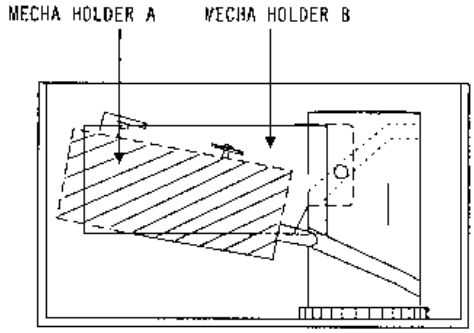


fig-16



CHUKING

fig-17



UNCHUKING

fig-18

8. CHUCKING AND UNCHUCKING A DISC

There are two kinds of mechanism holder as shown on the left: (1) mechanism holder A and (2) mechanism holder B. Each holder is mounted at approximately a 38 incline against cam gear R. (See Fig. 21)

Mechanism holder A:
Holder for determining the incline of the mechanism assembly (traverse mechanism)
Mechanism holder B:
Holder for determining the height position of the mechanism assembly

Cam gear R has grooves as shown on the left. The height of the mechanism holders A and B are determined by the rotation of cam gear R. As a result, the CD mechanism is engaged during Disc 1, Disc 2, Disc 3, chucking or unchucking. (SeeFig-20)

Now we will concretely describe the operations of chucking and unchucking a disc.

According to the rotating position of cam gear R, the mechanism holder moves to the height of each tray. At this time, if the shafts of mechanism holders A and B are located at the same height, the CD mechanism assembly is horizontal, and is engaged in chucking the disc. With shaft A located at a lower height than shaft B, the drive unit leans, in a condition so that the disc can be taken out (unchucked).

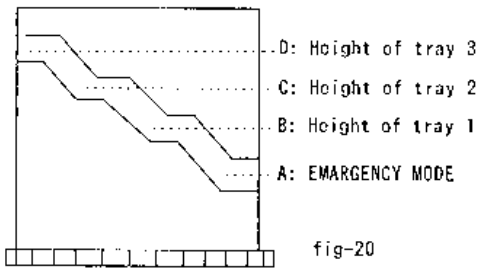


fig-20

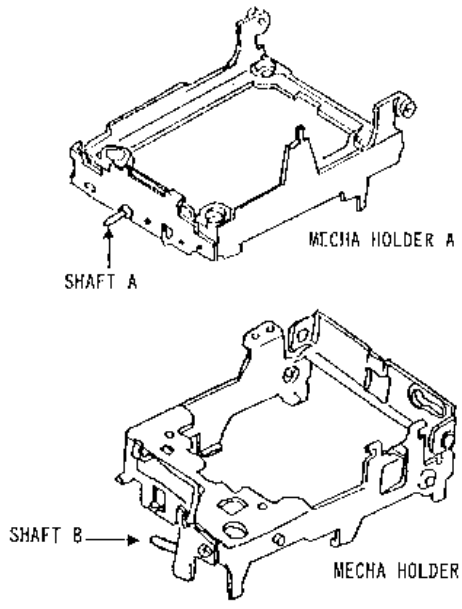


fig-19

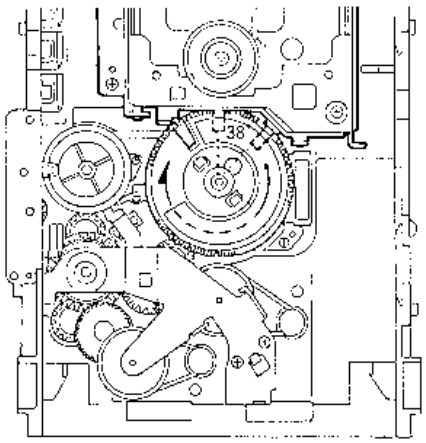


fig-21

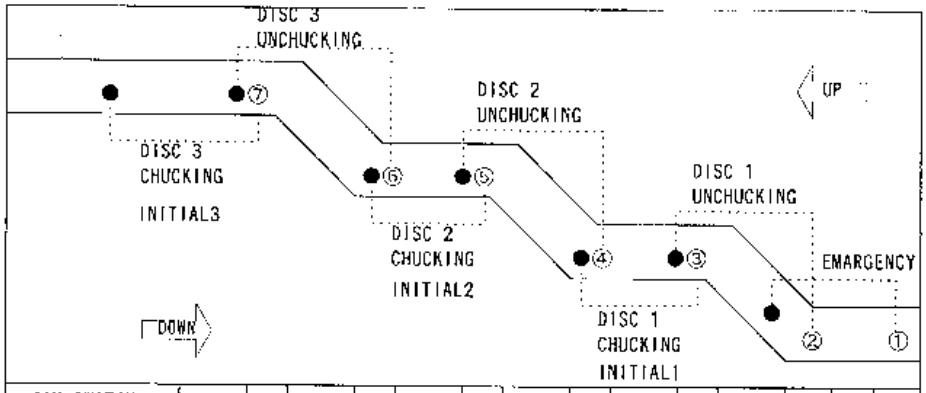
There are seven cam gear R modes. The CD mechanism assembly moves up and down by the counterclockwise rotation of cam gear R.

CAM R MODE	Hight of MECH. HOLDER B	Hight of MECH. HOLDER A	CONDITION	DOSC SELECT
⑦	D	D	CHUCKING DISC 3	DISC 3
⑥	D	C	UN-CHUKING DISC 3	
⑤	C	C	CHUKING DISC 2	DISC 2
④	C	B	UN-CHUKING DISC 2	
③	B	B	CHUKING DISC 1	DISC 1
②	B	A	UN-CHUKING DISC 1	
①	A	A	EMARGENCY MODE	

Fig. 22 shows the grooves of cam R on the plane diagram. ① to ⑦ shows the positions of mechanism holder B, and "●" shows the positions of mechanism holder A.

CAM R ROTATING DIAGRAM

MODE POSITION AND ITS CONDITION OF CAM R



CAM SWITCH														
CAM R MODE	OFF	⑦	OFF	⑥	OFF	⑤	OFF	④	OFF	③	OFF	②	OFF	①
CAM 4	1	0	1	0	1	0	1	1	1	1	1	1	1	1
5	1	0	1	1	1	1	1	0	1	0	1	1	1	1
6	1	1	1	0	1	1	1	0	1	1	1	0	1	1
7	1	1	1	1	1	1	1	1	1	0	1	0	1	0

fig-22

9. EJECTING

We will make a brief description of the ejection operation.

(1) Initial stage
In the initial stage, the CD tray is closed, and the CD mechanism is engaged in chucking.

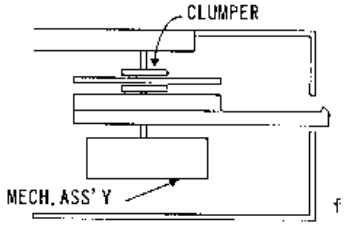


fig-23

(2) Unchucking
By pressing the eject button, the CD mechanism goes from the chucking condition to the unchucking condition.

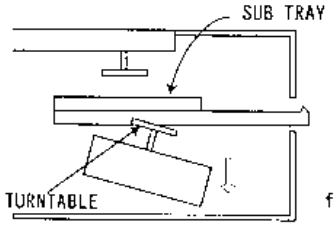


fig-24

(3) Sub tray
Then the sub tray is ejected.

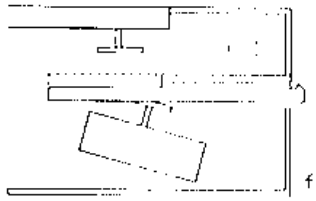


fig-25

(4) Main tray
The main tray is ejected.

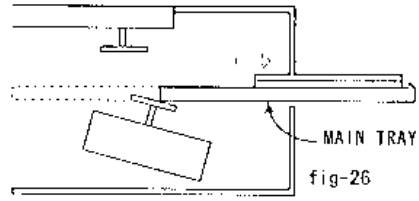


fig-26

(5) Loading the main tray
With the CD tray open, pressing the eject button again closes the tray.

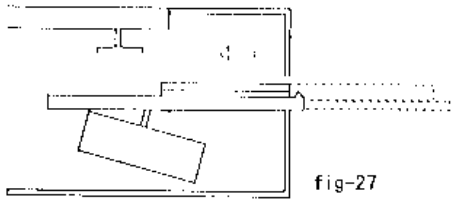


fig-27

(6) Loading the sub tray
The sub tray withdraws.

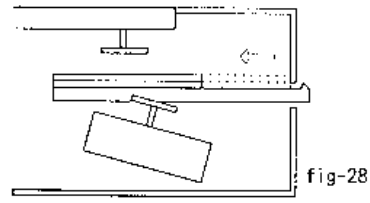


fig-28

(7) Chucking
The CD mechanism is engaged in chucking.

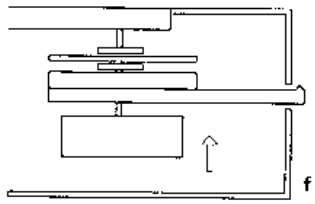


fig-29

10. DETECTING THE POSITIONS OF CAM L AND CAM R

The cam switch board interlocks for detecting both positions of cam L and cam R in each mode, thereby electrically detecting the condition of each cam.

The cam switch board has a configuration as shown in Fig. 31, and controls each as 4-bit data using a control IC.

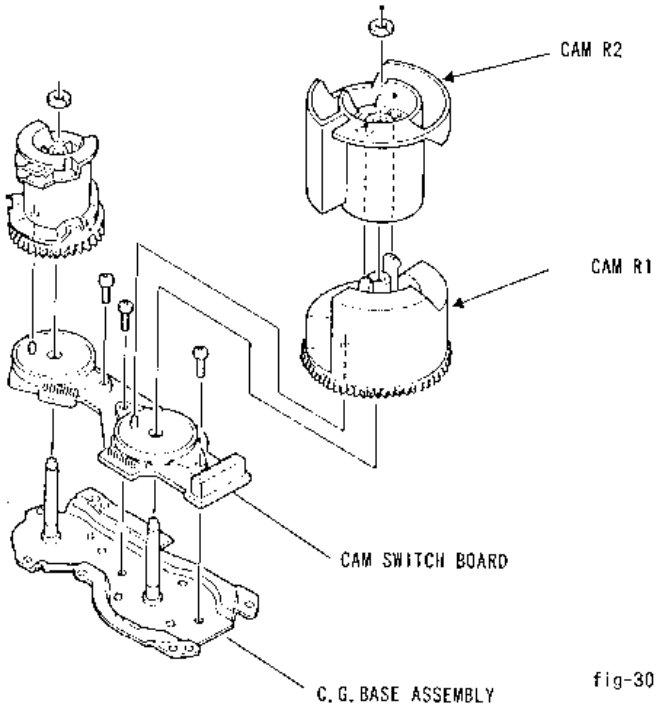


fig-30

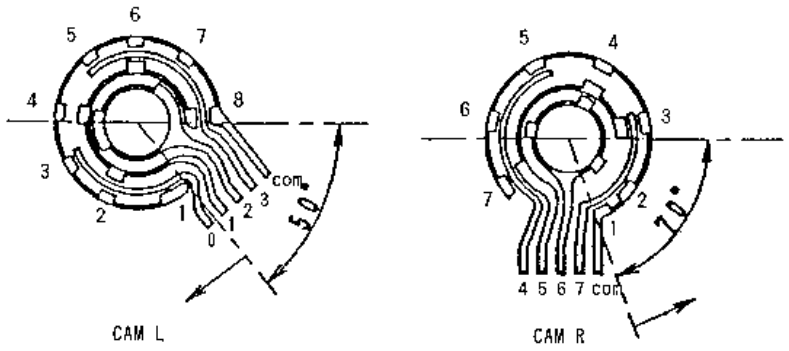
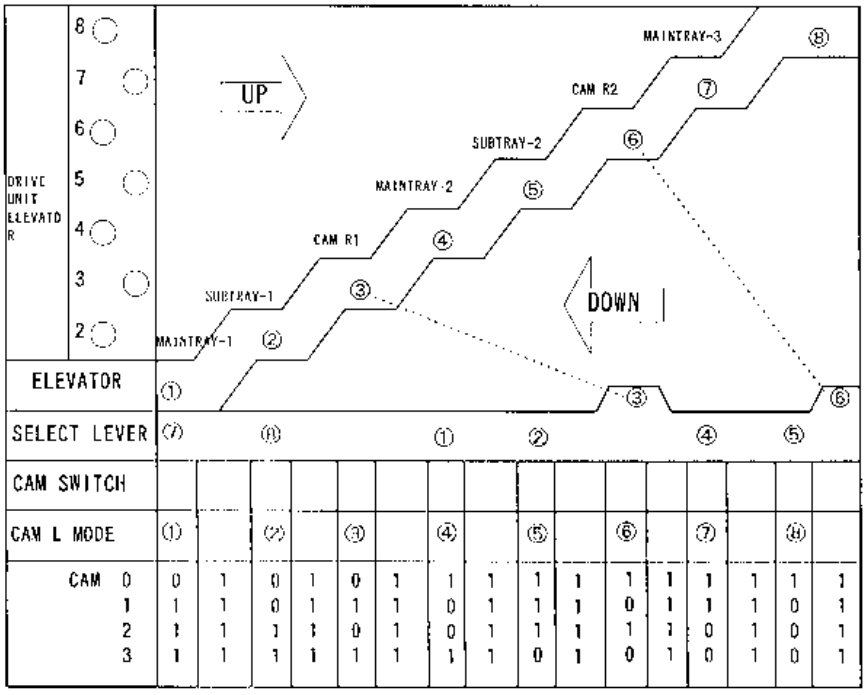


fig-31

CAM L ROTATING DIAGRAM

fig-32

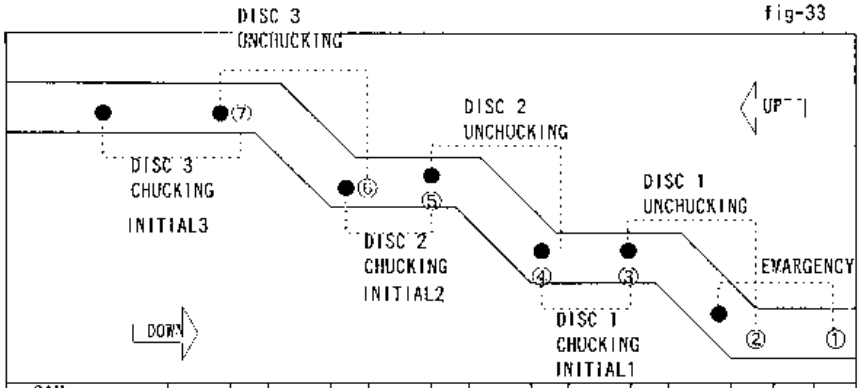
MODE POSITION AND ITS CONDITUION OF CAM L



CAM SWITCH																
CAM L MODE	①		②		③		④		⑤		⑥		⑦		⑧	
CAM 0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1
1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	0	1
2	1	1	1	1	0	1	0	1	1	1	1	1	0	1	0	1
3	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1

CAM R ROTATING DIAGRAM

fig-33



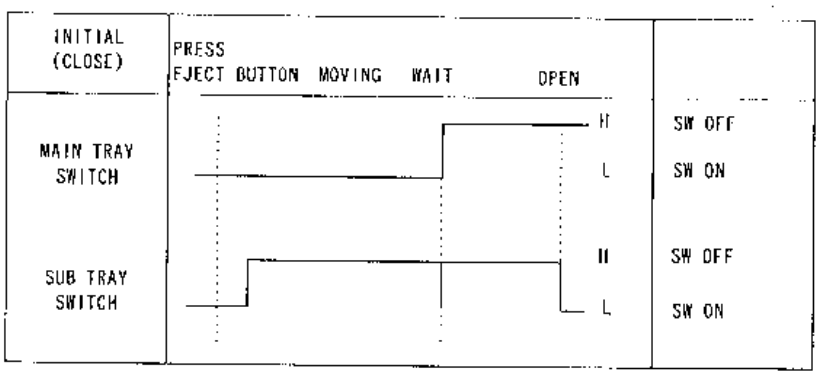
CAM SWITCH																
CAM R MODE	OFF	⑦	OFF	⑥	OFF	⑤	OFF	④	OFF	③	OFF	②	OFF	①		
CAM 4	1	0	1	0	1	0	1	1	1	1	1	1	1	1	1	
5	1	0	1	1	1	1	1	0	1	0	1	1	1	1	1	
6	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	
7	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	

11. TRAY SELECT SWITCH

The tray select switch is pressed by the protruding portions on the side of the tray, and the state of the tray is detected.

DETECTION		POSITION	
MAIN TRAY SW	SUB TRAY SW	MAIN TRAY SW	SUB TRAY SW
ON (L)	ON (L)	CLOSE	WAIT or PLAY
ON (L)	OFF (H)	OPEN	OPEN
		CLOSE	MOVING
OFF (H)	OFF (H)	MOVING	MOVING WITH MAIN TRAY

EXAMPLE



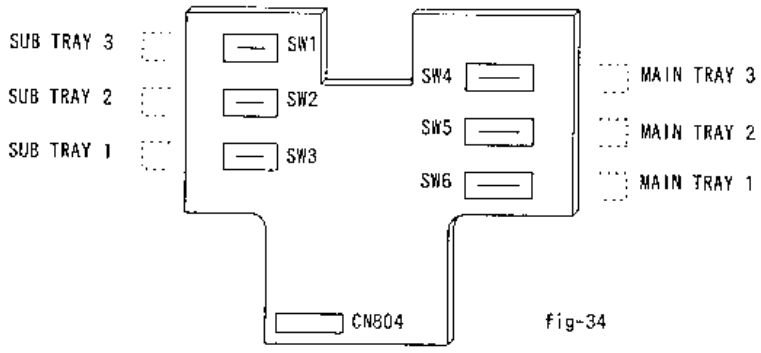
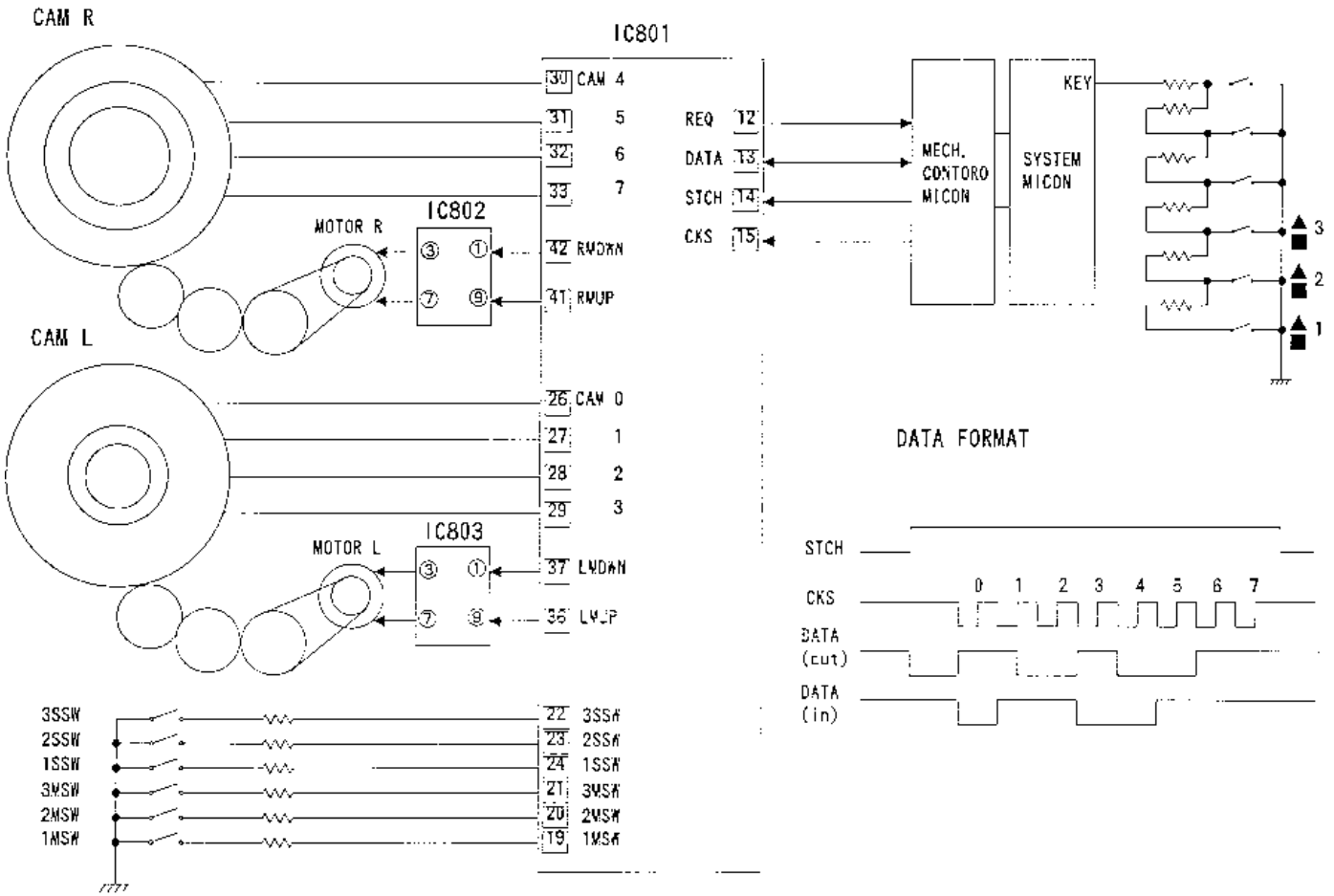


fig-34

TRAY SELECT SWITCH

C-3MCH. BLOCK DIAGRAM



DATA FORMAT

12. THE C-3 MECHANISM: EACH MODE AND ITS BASIC OPERATION

Normally, the mechanism is engaged in the initial state after turning the power on, and then goes into standby, waiting for input from an operation button.

There are three initial states. The conditions of each gear and cam in each initial state are as shown in the table below.

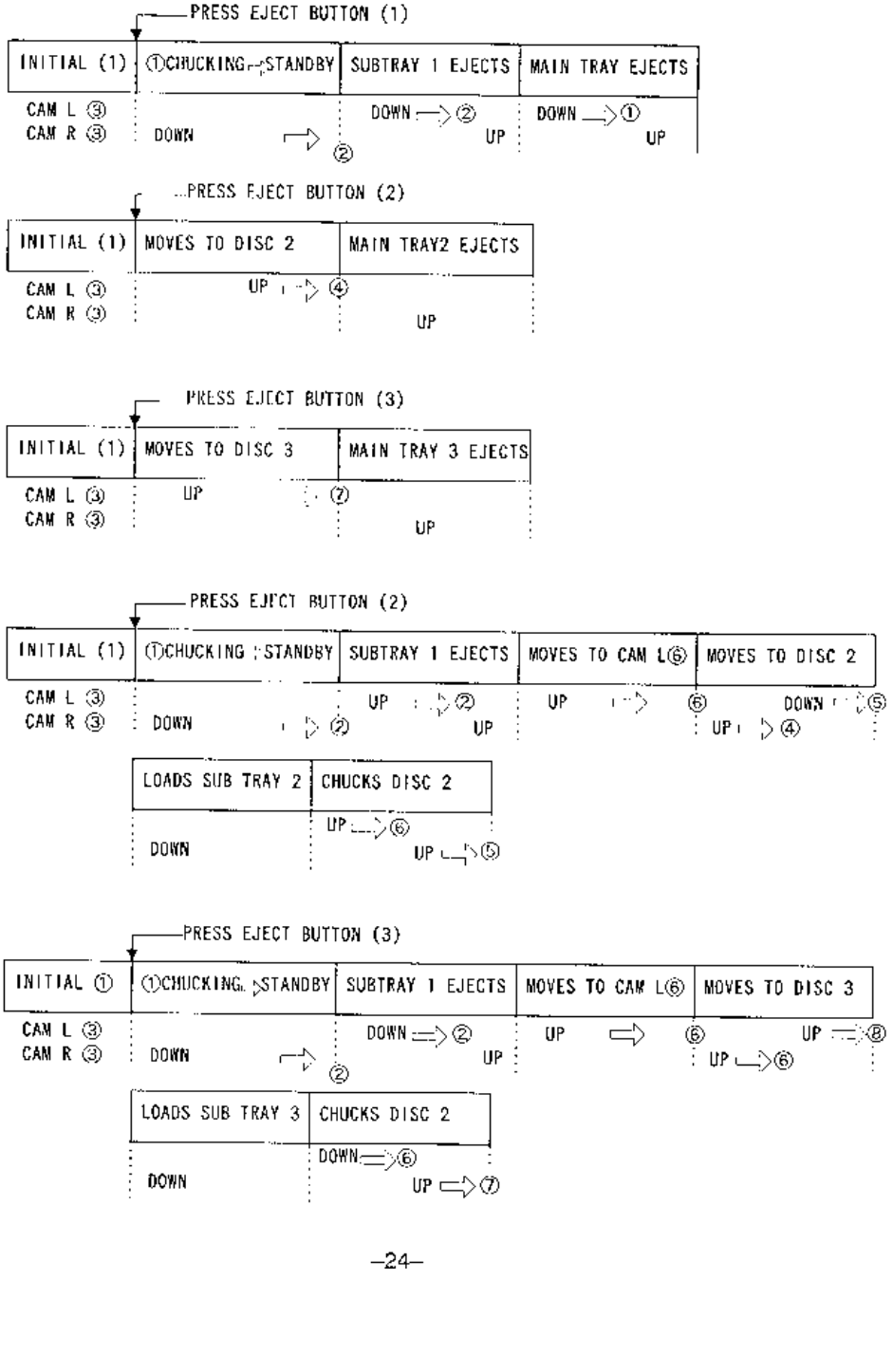
KINDS OF INITIAL STATES	SUB TRAY	MAIN TRAY	CAM L	CAM R
(1) CHUKING STATE OF DISC 1	ONLY THE TRAY 1 IS IN	ALL TRAYS ARE IN	3(CAM R1)	3(1 CHUCK)
(1) CHUKING STATE OF DISC 2	ONLY THE TRAY 2 IS IN	ALL TRAYS ARE IN	6(CAM R2)	5(2 CHUCK)
(1) CHUKING STATE OF DISC 3	ONLY THE TRAY 3 IS IN	ALL TRAYS ARE IN	6(CAM R2)	7(3 CHUCK)

CAM PATTERE LIST

CAM NO. / POSITION	CAM L 0	1	2	3	COM	CAM R 4	5	6	7	CAM NO. / POSITION
① MAIN TRRAY 1	0	1	1	1	0	1	1	1	0	① EMERGENCY
② SUB TRAY 1	0	0	1	1	0	1	1	0	0	② TRAY 1 STAND-BY
③ CAM R1	0	1	0	1	0	1	0	1	0	③ TRAY 1 CHUCKING
④ MAIN TRAY 2	1	0	0	1	0	1	0	0	1	④ TRAY 2 STAND-BY
⑤ SUB TRAY 2	1	1	1	0	0	0	1	1	1	⑤ TRAY 2 CHUCKING
⑥ CAM 2	1	0	1	0	0	0	1	0	1	⑥ TRAY 3 CHUCKING
⑦ MAIN TRAY 3	1	1	0	0	0	0	0	1	1	⑦ TRAY 3 STAND-BY
⑧ SUB TRAY 3	1	0	0	0	0	—	—	—	—	————
OFF	1	1	1	1	0	1	1	1	1	OFF

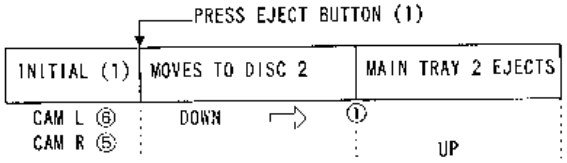
12-(a) OPERATION FROM INITIAL STATE 1

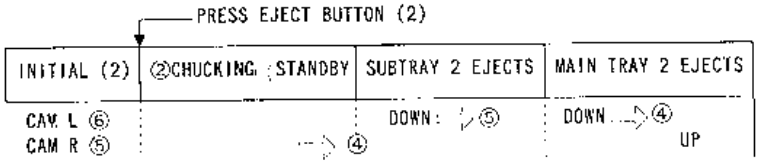
PRECONDITION:CHUKING DISC 1
CAM L ③ (CAM R1)
CAM R ② (TRAY 1 CHUKS)

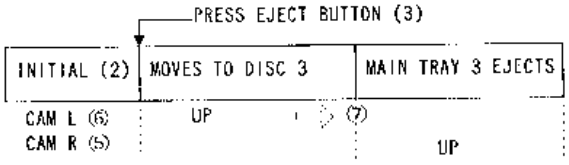


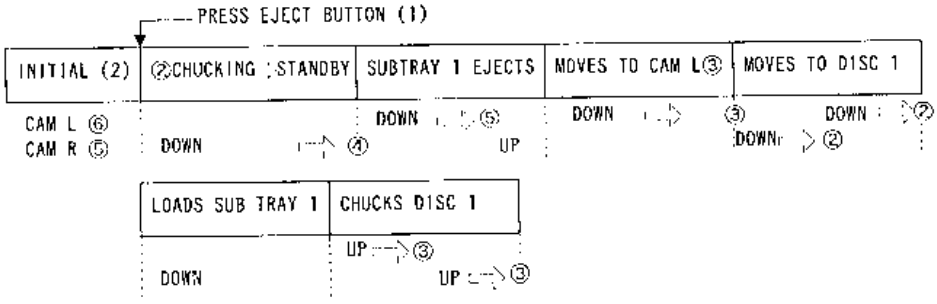
12-(b) OPERATION FROM INITIAL STATE 2

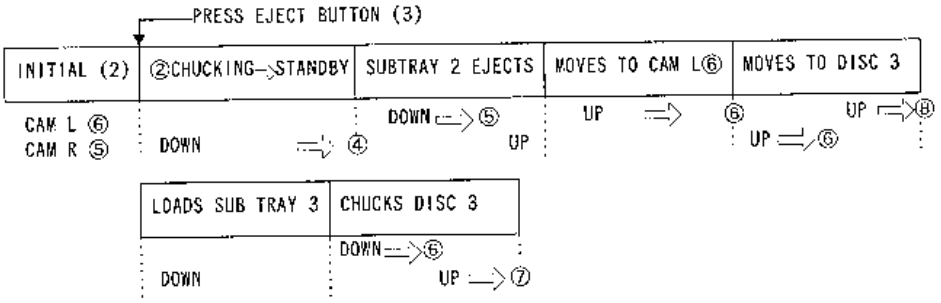
PRECONDITION:CHUKING DISC 2
CAM L ⑥ (CAM R2)
CAM R ⑤ (TRAY 2 CHUKS)





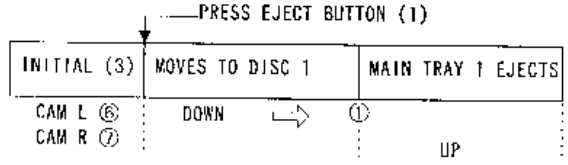


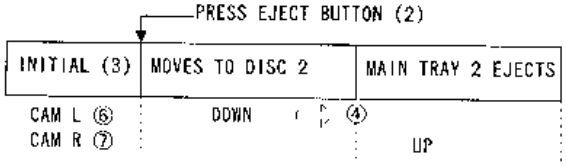


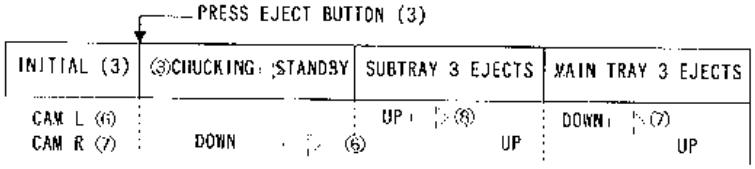


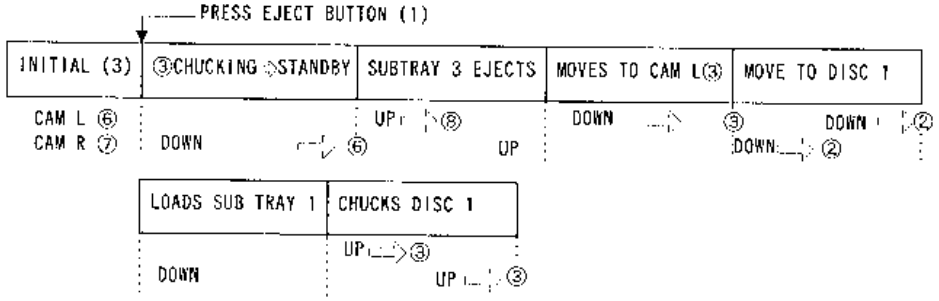
12-(c) OPERATION FROM INITIAL STATE 3

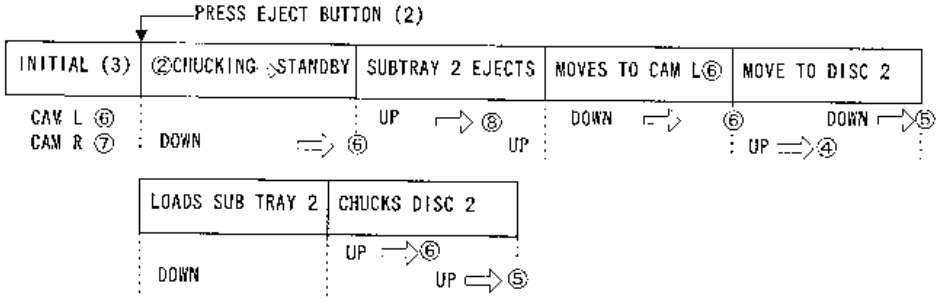
PRECONDITION:CHUKING DISC 2
CAM L ⑥ (CAM R2)
CAM R ⑦ (TRAY 3 CHUKS)





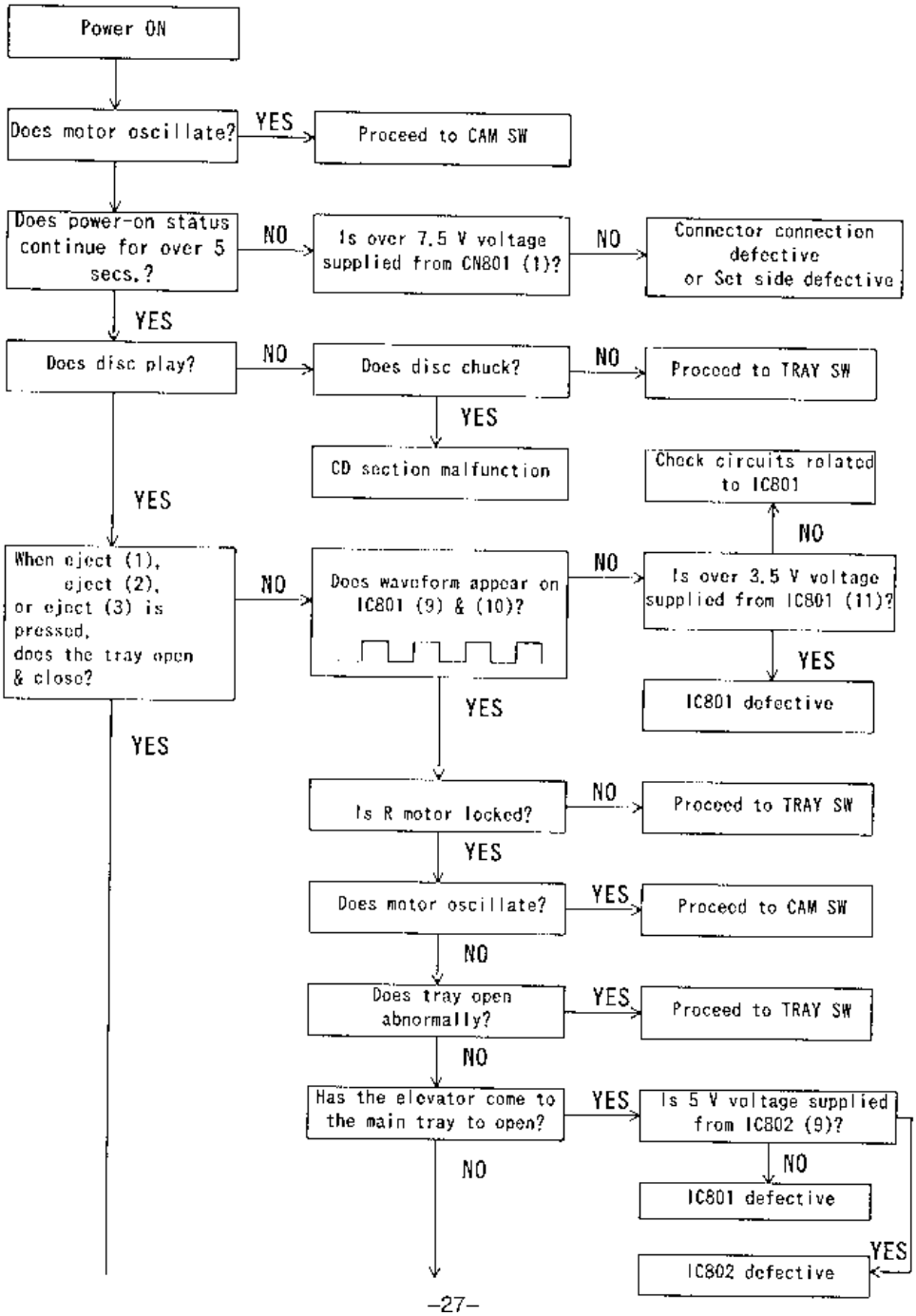


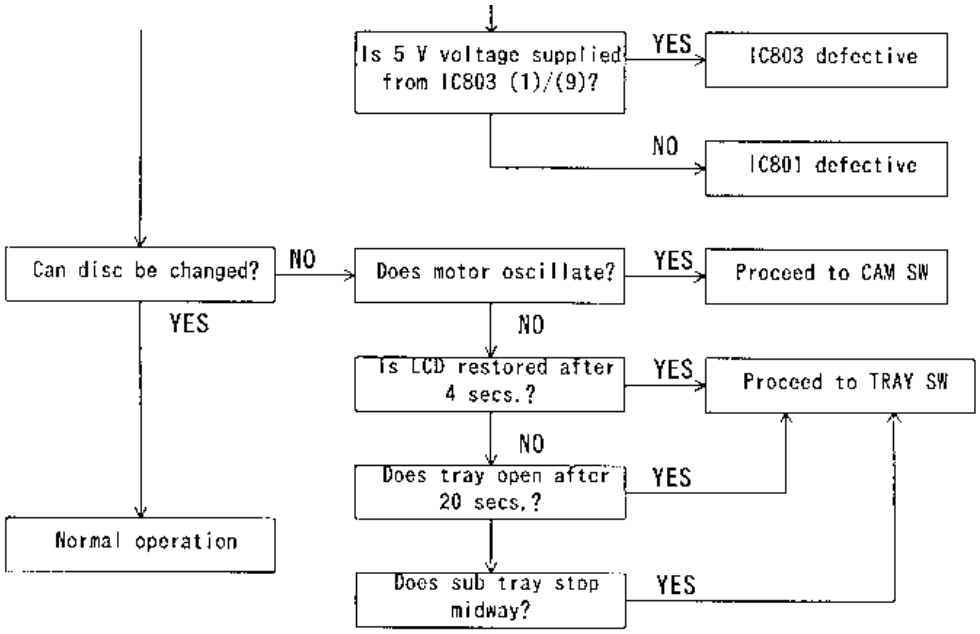




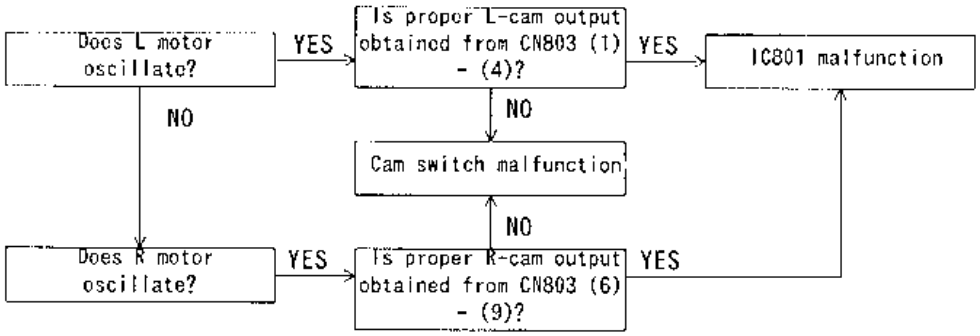
TROUBLESHOOTING OF CD CHANGER MECHANISM PART

■ GENARAL SECTION





■ CAM SWITCH SECTION



■ TRAY SWITCH SECTION