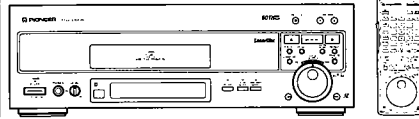


1793

**PIONEER**  
The Art of Entertainment

# Service Manual



**SERVICE GUIDE**

ORDER NO.  
RRV1066

CD CDV LD PLAYER

# CLD-D703

## CLD-D503

## CLD-D770

## CLD-D570

## CLD-S360

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# 1. OVERALL BLOCK DIAGRAM

## 1.1 OVERALL BLOCK DIAGRAM FOR CLD-D503, CLD-D570 AND CLD-S360

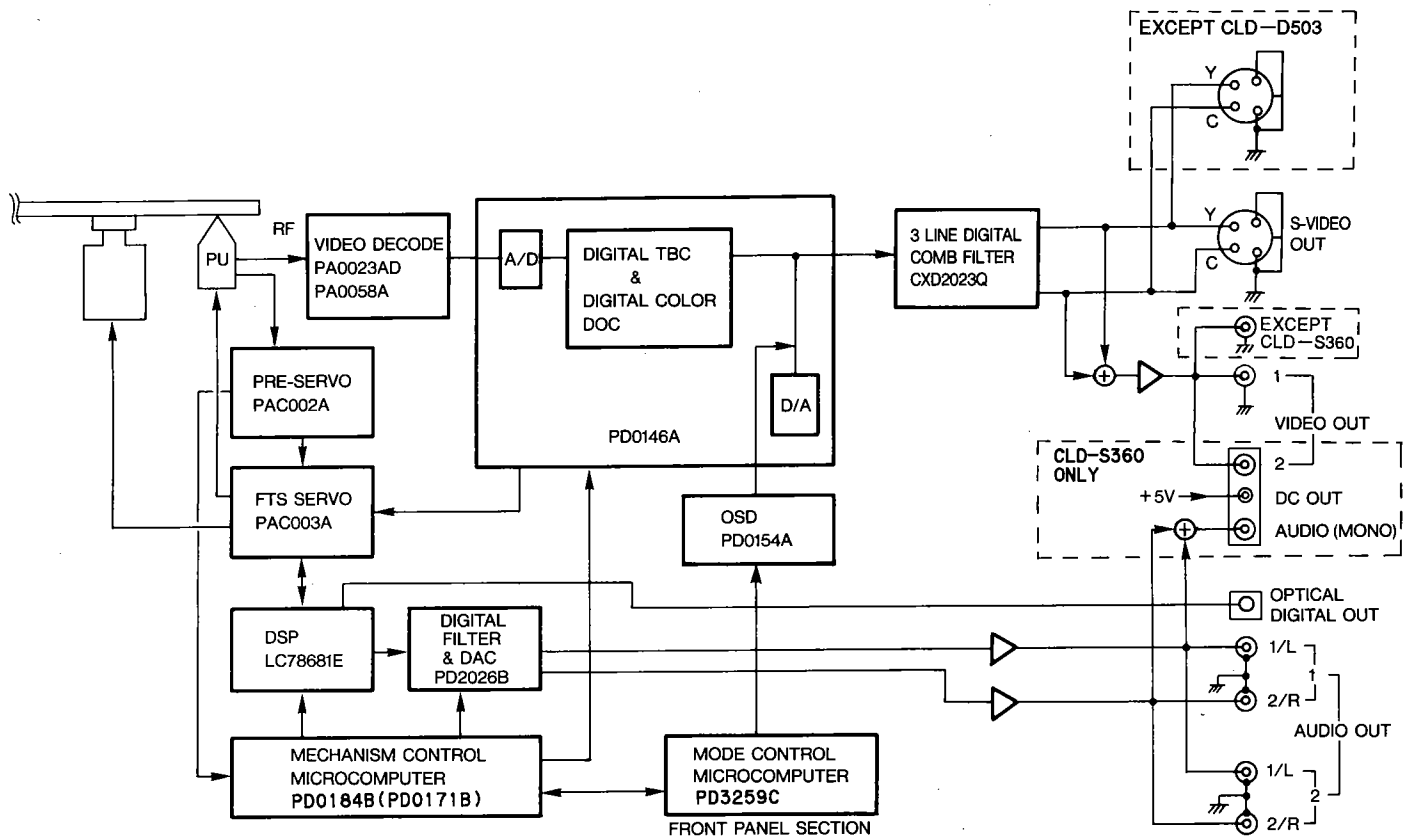


Fig. 1-1 OVERALL BLOCK DIAGRAM FOR CLD-D503, CLD-D570 AND CLD-S360



## 2. SYSTEM CONTROL DESCRIPTION

### 2.1 SYSTEM CONTROL AND MODE CONTROL BLOCK DIAGRAM FOR CLD-D703 AND CLD-D770

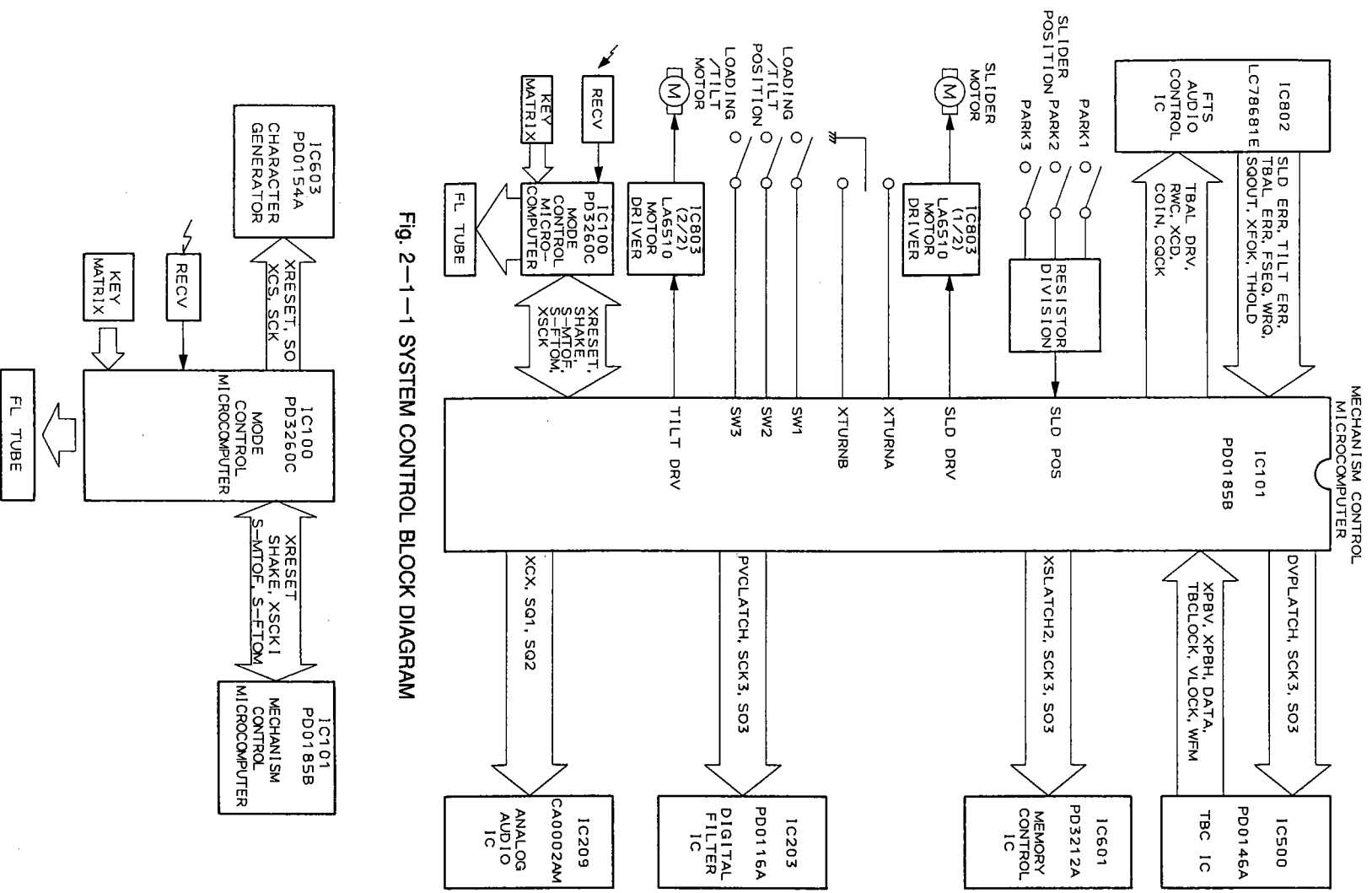


Fig. 2-1-1 SYSTEM CONTROL BLOCK DIAGRAM

Fig. 2-1-2 MODE CONTROL BLOCK DIAGRAM

### 2.2 SYSTEM CONTROL BLOCK DIAGRAM FOR CLD-D503 AND CLD-D570

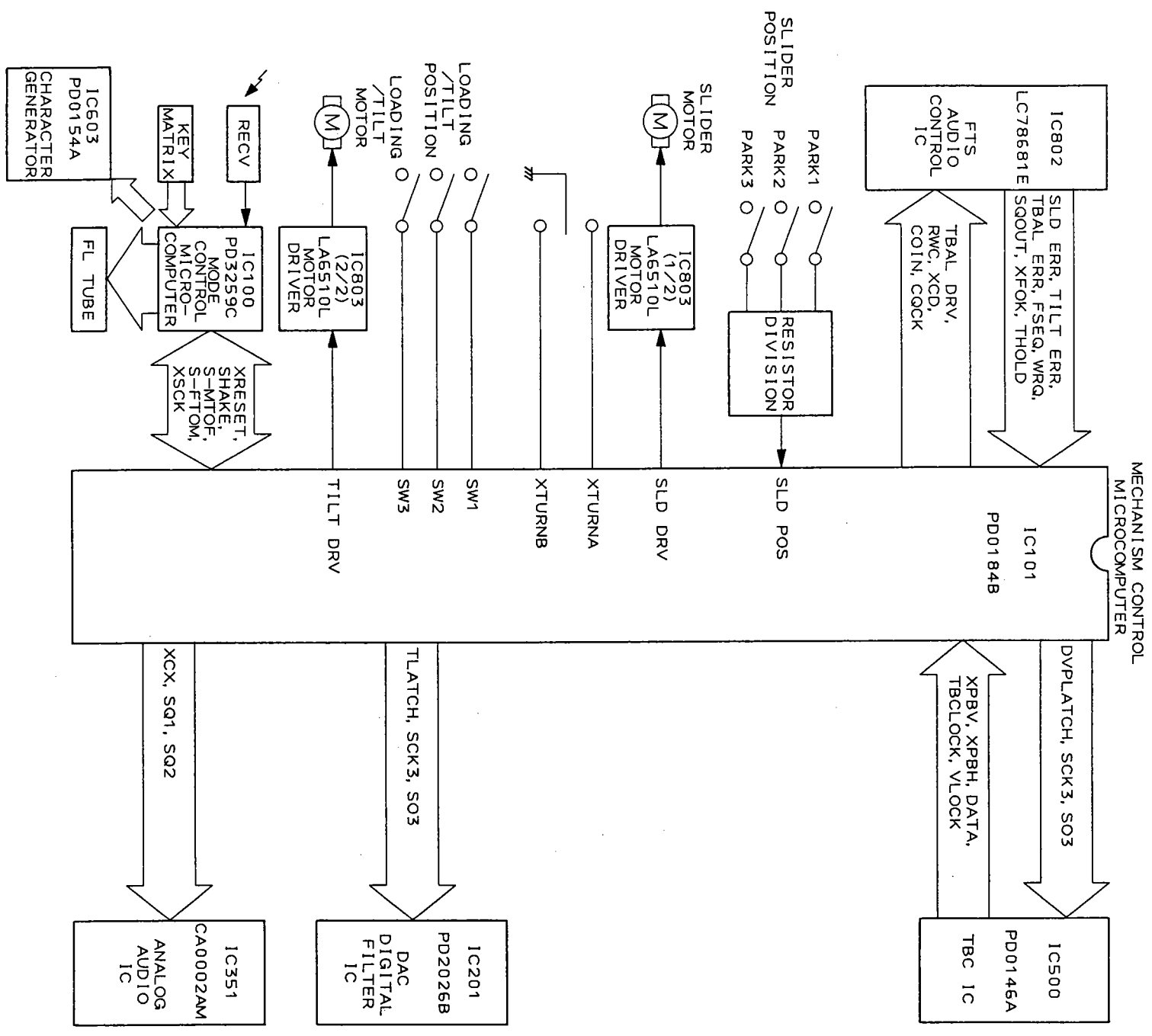


Fig. 2-2 SYSTEM CONTROL BLOCK DIAGRAM

2.3 SYSTEM CONTROL BLOCK DIAGRAM FOR CLD-S360

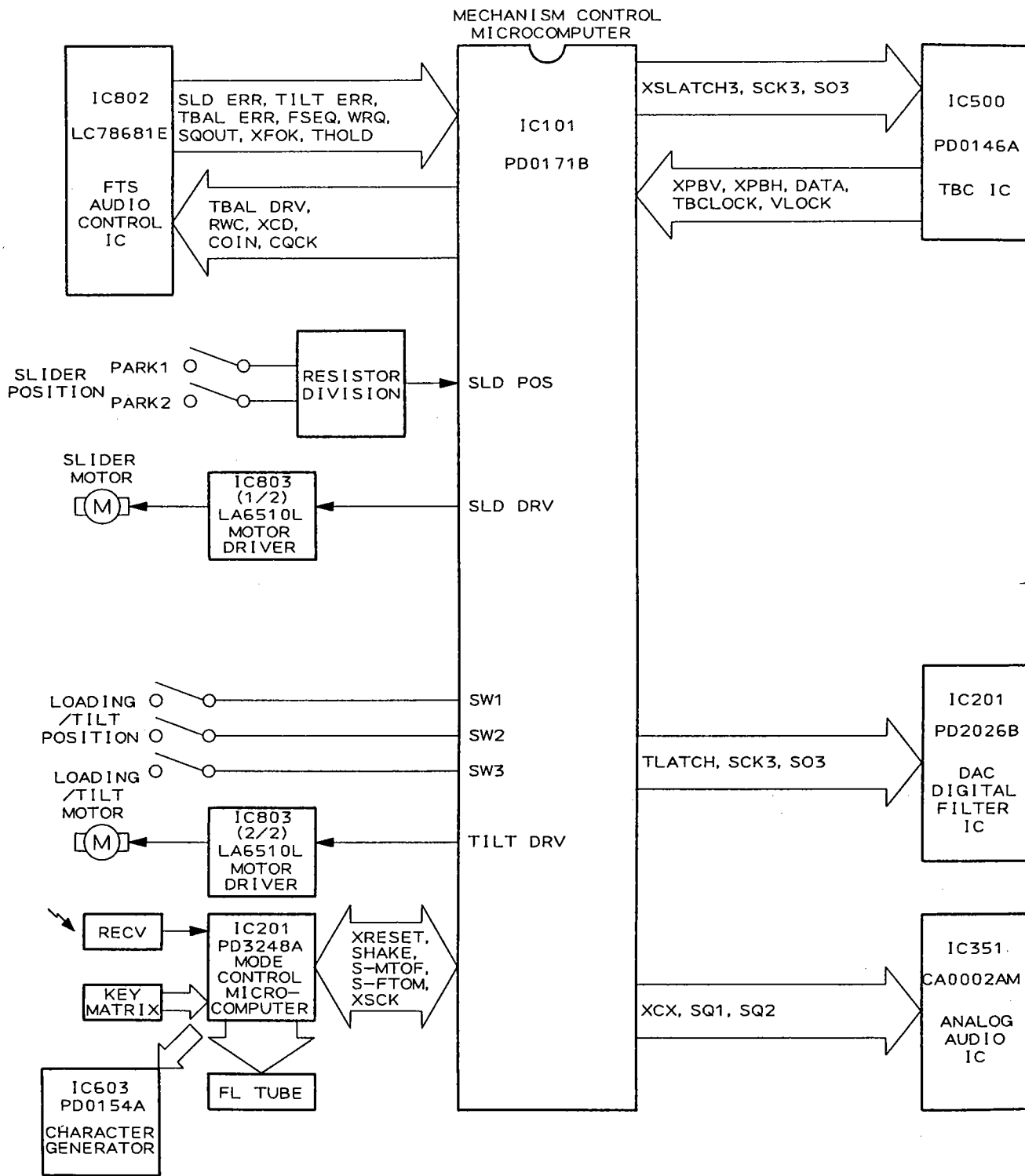


Fig. 2-3 SYSTEM CONTROL BLOCK DIAGRAM

### 2.4 INTERFACE BETWEEN MICROCOMPUTERS

This unit has an 8-bit microcomputer (IC101: refer to table 1) that controls the mechanism and an 8-bit microcomputer (IC100: refer to table 1) that controls operation/display. These two

microcomputers are connected by serial interface. This communication line also uses a character generator IC (IC603: PD0154A).

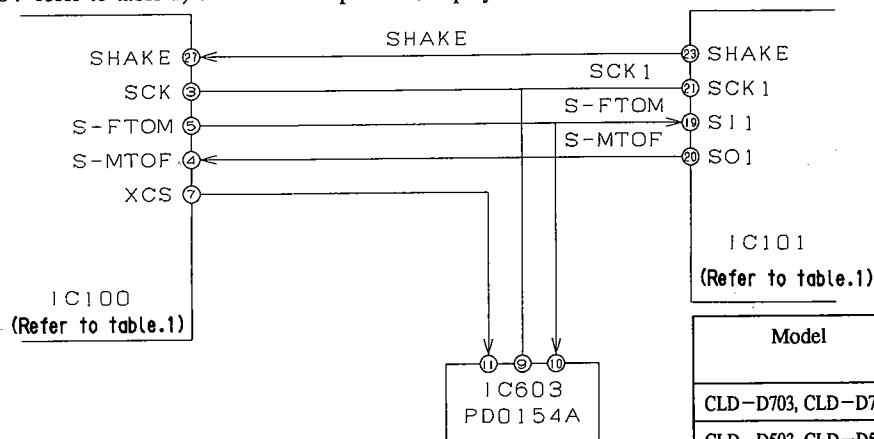


Fig. 2-4 Serial interface connection

Model	Mechanism control microcomputer	Mode control microcomputer
CLD-D703, CLD-D770	IC101 : PD0185B	IC100 : PD3260C
CLD-D503, CLD-D570	IC101 : PD0184B	IC100 : PD3259C
CLD-S360	IC101 : PD0171C	IC201 : PD3248A

Table 1: Mechanism Control Microcomputers and Mode Control Microcomputers

### 2.5 COMMUNICATION PROCEDURE BETWEEN MICROCOMPUTERS

For this explanation of the communications procedure between microcomputers, CLD-D703 is used as an example.

1. PD0185B sets SHAKE pin (23 pin) to several  $\mu$ s "L" and requests PD3260C for commencement of communications.
2. Upon receiving request for commencement of communications, PD3260C sets SHAKE pin (27 pin) to "L" and informs PD0185B that communications is possible.
3. PD0185B switches SCK1 (21 pin), which it had been using as an input port, into output mode. PD3260C puts SCK (3 pin) into input mode and establishes communications line connection between microcomputers.
4. PD0185B sends out transmission clock (562.5kHz) at 8-bits and transmits each datum in synchronization with that clock.
5. When PD3260C receives 8-bit data, it sets SHAKE pin (27 pin) to "H" and signals that one communication has ended.

6. PD0185B puts SCK1 (21 pin) into input mode and PD3260C puts SCK (3 pin) into output mode and cuts off communications line to complete one communication.
- Communications is in 10-30ms cycles and 12-byte data can be transmitted at one time.
  - Handshake is done on one line and PD0185B and PD3260C use ports that are for both input and output. Output mode is in effect only when output is "L". At other times, input mode (high impedance) is in effect. Also, before output of "L", each confirms that SHAKE is "H" before carrying out operation. This prevents crosstalk of outputs.
  - To prevent transmission error when communicating data, a check code has been added. When transmission error has been detected 16 times continuously, PD3260C outputs a reset signal to PD0185B in order to return to the initial condition. Similar resetting is also done when communication of 300ms or more cannot be carried out.

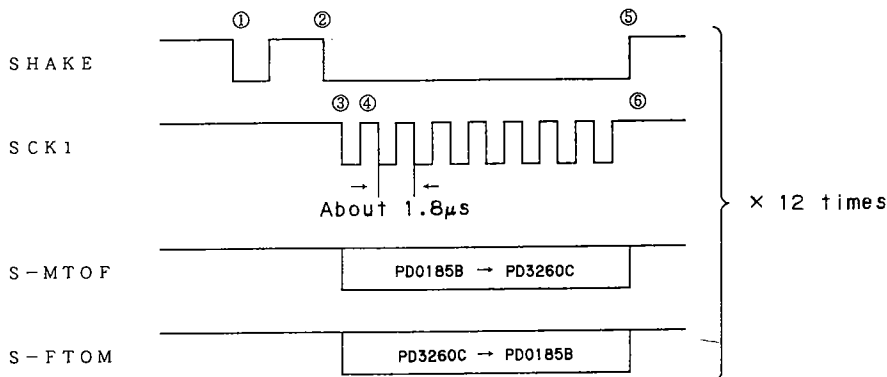


Fig. 2-5 Microcomputer-to-Microcomputer Timing Chart

## 2.6 OUTLINE OF MECHANISM CONTROL SYSTEM

### 1) Processing after power ON

After the power is turned on, reset is canceled (28 pin : L → H) and the mechanism control microcomputer (refer to table 1) carries out initialization in the following order.

1. Inside RAM and ports are initialized
2. Memory IC (IC601 : PD3212A) is initialized (CLD-D703, CLD-D770 only)
3. FTS-audio IC (IC802 : LC78681E) is initialized
4. Tray position is detected
5. Communications with mode control microcomputer (refer to table 1) is confirmed (If there is any abnormalities in communications, the following initialization steps are not carried out.)
6. TBC IC (IC500 : PD0146A) is initialized
7. Pickup position is initialized
8. Disc revolution is stopped
9. Loading mode is initialized

Normal operations are commenced after the above initialization procedures are completed.

### 2) Loading/tilt motor control

Loading/tilt motor drive is controlled by PWM signal output from the TILT DRV (refer to table 2) of the CONT section mechanism control IC(IC101) which goes through the OP amp (IC803). The voltage impressed on the loading/tilt motor is switched by the PWM signal duty as shown below. The PWM cycle is 30msec.

Model	TILT DRV pin
CLD-D703, CLD-D770	62
CLD-D503, CLD-D570	14
CLD-S360	14

Table 2: Mechanism Control IC TILT DRV Signal Output Pins

Motor operation		Duty (%)	PWM Signal waveform
Focus OFF	Stop	0	5.0V 2.5V 0V
	Loading Unloading	100  Is changed to prevent feeling/overrun. refer to Fig. 2-6-2, 2-6-3.	
Focus ON	Large error	Tilt UP servo	40
		Tilt DOWN servo	40
	Small error	Tilt UP servo	13 (CLD-S360 is 20)
		Tilt DOWN servo	20

Fig. 2-6-1

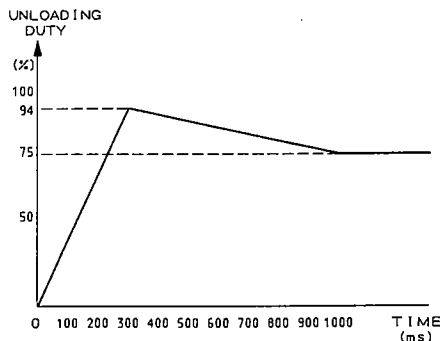


Fig. 2-6-2 Duty Changes at CLD-D503, CLD-D570, CLD-D703 and CLD-D770 Unloading

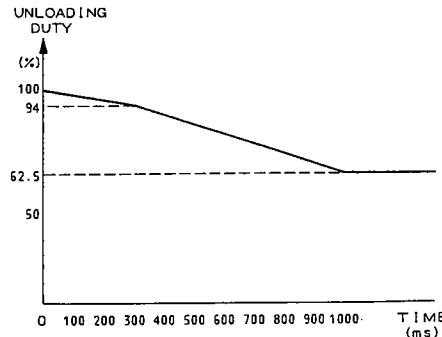


Fig. 2-6-3 Duty Changes at CLD-S360 Unloading

●Loading/clamping operation

When the tray is opened or closed and the disc is clamped or stopped, the motor operates while detecting the position of the cam gear with the loading/tilt position detection switch which is connected to SW1 - 3 of IC101 (refer to table 3).

●Tilt servo operation

Each time disc movement starts, the loading/tilt motor can be used for playing LD discs and CDV discs (video part) because of the tilt servo.

When the tilt servo is operating, the drive of the loading/tilt motor is PWM drive.

The tilt servo drives the loading/tilt motor so that the input voltage of TILT ERR of IC101 (refer to table 4) is 2.5V.

The ON/OFF conditions for the tilt servo are as shown below.

Model	SW1 - 3 pin
CLD - D703, CLD - D770	59 - 61
CLD - D503, CLD - D570	33 - 35
CLD - S360	33 - 35

Table 3 : Mechanism Control IC SW1 - 3 Output Pins

Model	TILT ERR pin
CLD - D703, CLD - D770	8
CLD - D503, CLD - D570	9
CLD - S360	9

Table 4 : Mechanism Control IC TILT ERR Input Pins

Disc part	Disc movement started	At normal play
LD	ON	All regions
CD,CDV audio part	ON	OFF
CDV video part	ON	0 : 00 - outer track 1 : 23 (disc with 3 : 00 or more recording) ON

Table 5 : Tilt Servo ON/OFF Conditions

When there is an abnormality in the disc or the tilt sensor circuit and input voltage of the TILT ERR pin does not enter the set range even if the pick up incline is more than +1.7 or -2.2 degrees, the mecha switch condition is detected and the loading motor's operation is stopped. The tilt servo switches the PWM duty between two steps according to the error value. When the error value is small (refer to table 6), the duty is small and when the error value is large (refer to table 6), the duty is large for PWM output. refer to Fig. 2 - 6 - 4.

Model	Error value is small	Error value is large
CLD - D703, CLD - D770	1.25V - 3.75V	0V - 1.25V, 3.75V - 5V
CLD - D503, CLD - D570	1.25V - 3.75V	0V - 1.25V, 3.75V - 5V
CLD - S360	0.625V - 4.375V	0V - 0.625V, 4.375V - 5V

Table 6 : Error Level Divisions

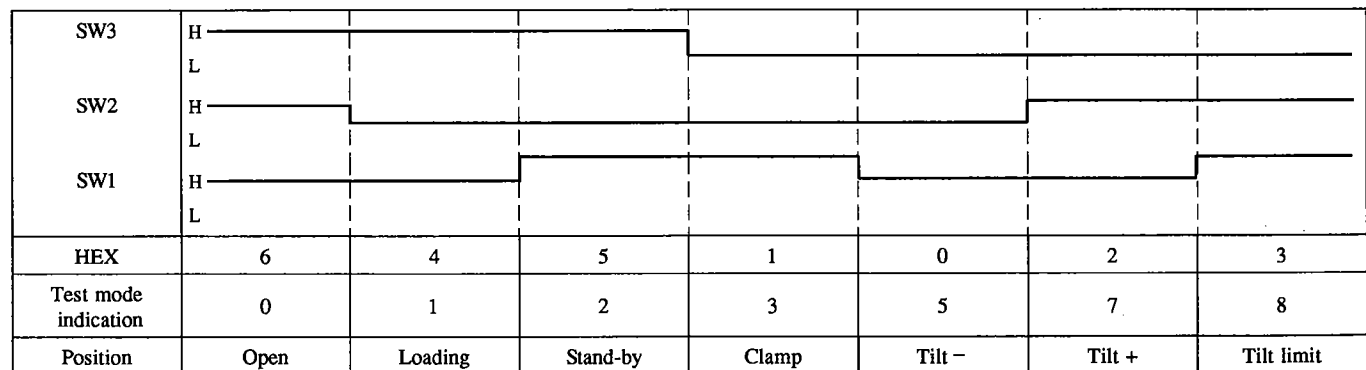


Fig. 2 - 6 - 4 Loading/Tilt Position



3) Slider Motor Control

Slider motor drive is controlled by PWM signal output from the SLD DRV pin 18 of the VSOP ASS'Y CONT section mechanism control IC (IC101) which goes through the OP amp (IC803). The voltage impressed on the slide tilt motor is switched by the PWM signal duty as shown below. The PWM cycle is approximately 910µsec.

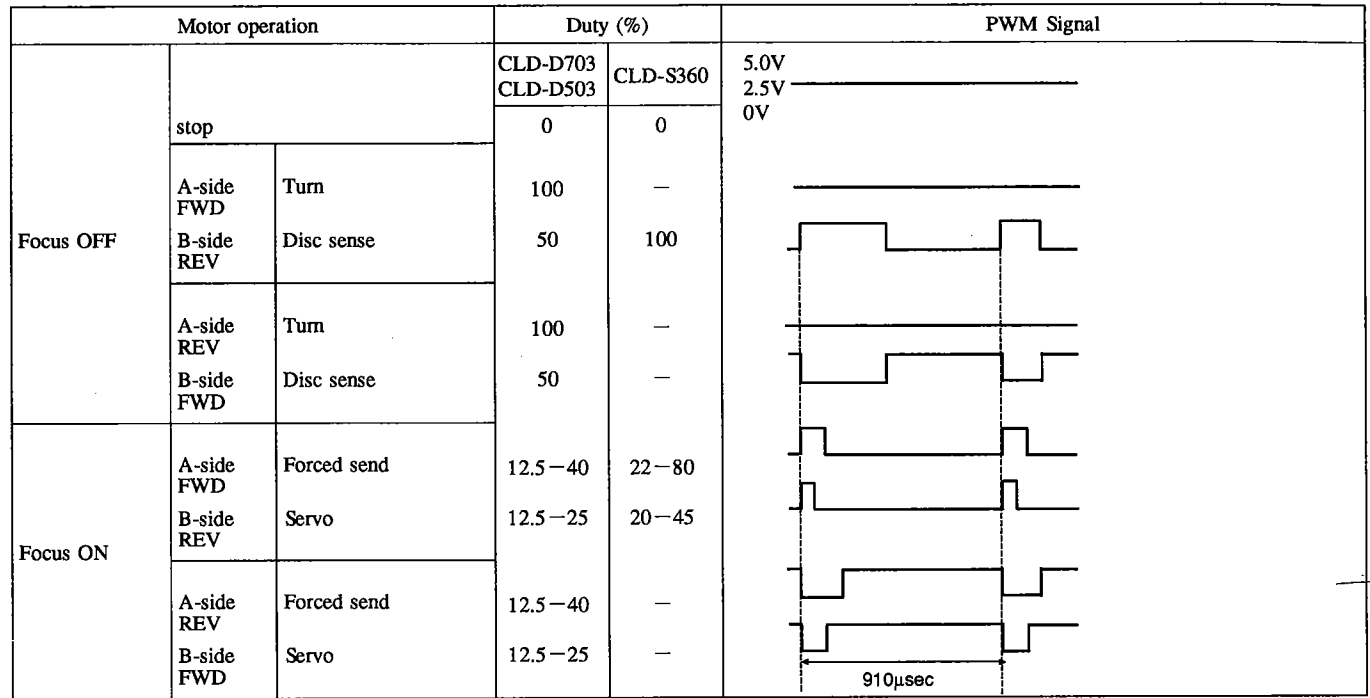


Fig. 2-6-5 Switching of Voltage Impressed on Slider Motor

The slider servo controls the slider motor so that the input voltage of the SLD ERR pin (refer to table 7) of the mechanism control IC is the same as the voltage at STOP.

Model	SLDR ERR pin
CLD-D703, CLD-D770	7
CLD-D503, CLD-D570	6
CLD-S360	6

Table 7: SLDR ERR Pins

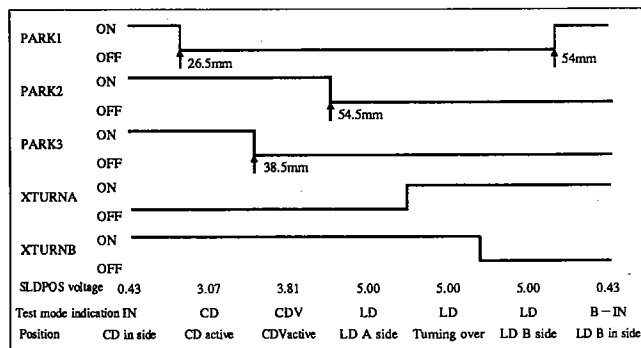


Fig. 2-6-6 Slider Position (CLD-D703, CLD-D770, CLD-D503 and CLD-D570)

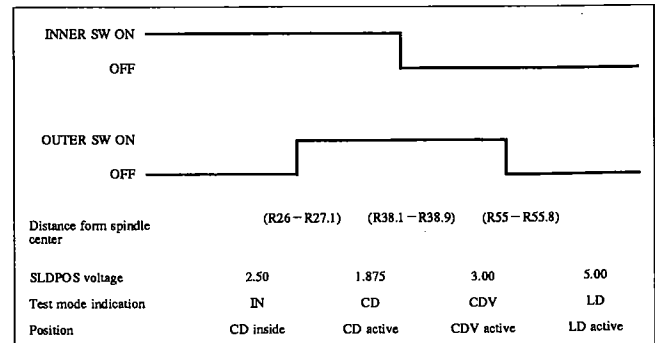


Fig. 2-6-7 Slider Position (CLD-S360)

4) Audio Control

XANA	SQ1	SQ2	Lch Line Out	Rch Line Out
L	L	L	Analog L channel	Analog R channel
	H	H	Mute	Mute
H	Following commands from microcomputer, LC78681E carries out switching between 3 conditions.		Digital L channel Digital L channel Digital R channel	Digital R channel Digital L channel Digital R channel

Fig. 2-6-8

At time of CD scan and LD clear scan (in case of digital sound selection), -12dB attenuated sound is output.

5) Clear Scan (CLD-D503, CLD-D570 and CLD-S360)

Through shuttling (main body: remote control), clear scanning without screen distortion can be carried out.

Depending on the angle that the shuttling is turned, it is possible to switch between color lock scan and clear scan. At time of clear scan, scan is carried out while outputting digital sound at -12dB (same as CD scan). (sound cannot be output when analog sound is selected.) The operation principles are given below.

1. In the clear scan mode, a prescribed number of tracks can be skipped with multi-track jumping.
2. In order to match phases of REF system and SG system, the mechanism control IC (refer to table 1) sends a shift enable command to the DVP IC (PD0146) and waits until the phases match (VLOCK="H").
3. Upon receiving the shift enable command, the DVP IC first eliminates phase difference between REF-H and SG-H by either decreasing or increasing SG-H by 6 clock increments. When there is no difference between H phases, the DVP IC eliminates phase difference between REF-V and SG-V by decreasing or increasing SG-V by 7H increments. When there is no phase difference, VLOCK is set to "H".
4. When VLOCK of the mechanism control IC becomes "H", squelch is canceled and the disc picture is shown for a fixed time. Step 1 is again returned to and steps 1 to 4 are repeated.

- \* For sections where disc picture is not output, a black background is displayed.
- \* During clear scan, the played digital sound is output in section where disc picture is output and in section that has VLOCK.
- \* REF-H, V ... H-SYNC, V-SYNC of standard video signal
- \* SG-H, V ... H-SYNC, V-SYNC generated by sync generator in DVP interior
- \* VLOCK ... Signal that is emitted when H, V phases of REF system and SG system match.

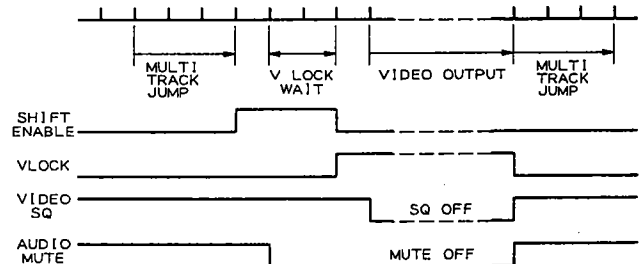


Fig. 2-6-9

● Clear Scan Timing Chart

CAV

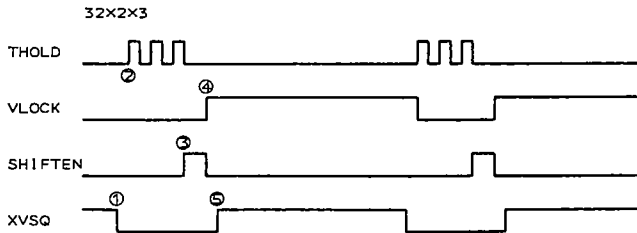


Fig. 2-6-10

- \* SHIFTEN.XVSQ is serial command sent to DVP
- \* The audio mute signal is put on at the same time as video squelch, but its cancellation is earlier than video squelch.

- ① : Video squelch is put on.
- ② : Multi-track jump  $32 \times 2 \times 3$  is carried out.
- ③ : CLOCK, H decrease of increase is carried out to match phases of REF system and SG system. Shift enable (SHIFT EN) is ON.
- ④ : Since phases match (VLOCK="H")
- ⑤ : Video squelch is canceled and play is carried out for fixed time.

CLV : Compared with CAV, the time until phases are matched after jumping is long.

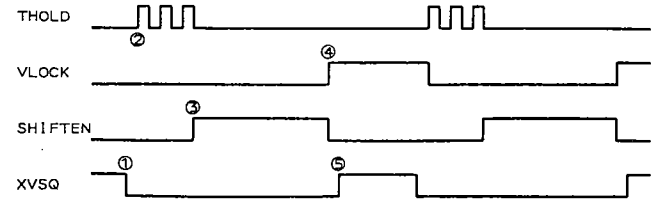


Fig. 2-6-11

● V-DNR (video digital noise reduction)

V-DNR is ON in at the following times :

- Normal play
- Strobe  $\times 1$  FWD
- CAV/CLV multi-speed  $\times 1$  FWD
- CAV still

However, V-DNR is OFF even at the following times :

- Test mode
- Video squelch ON

V-DNR can be changed with OFF, VARIABLE, and STANDARD buttons. In VARIABLE MODE, through shuttling, the NR amounts of Y (brightness) side and C (color) can be adjusted over ten steps. In variable mode, OFF and STANDARD are equivalent to no display (0) and middle value (5) respectively.

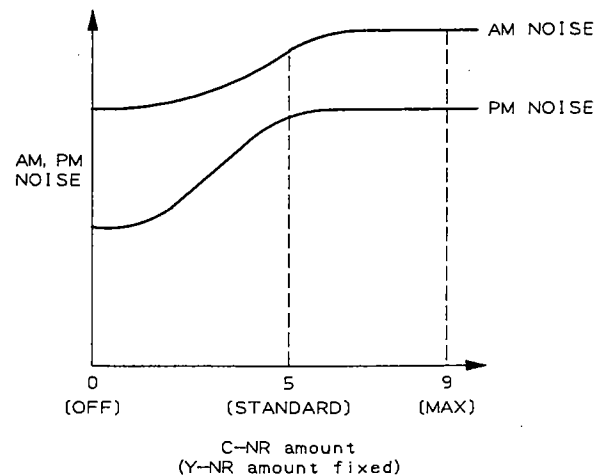
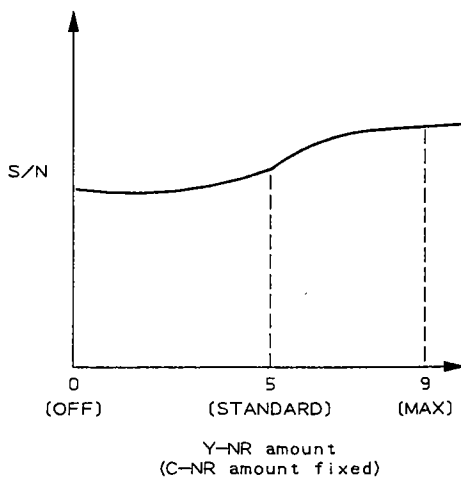


Fig. 2-6-12

6) Normal State Scan Timing Chart

●CLD -D703 and CLD -D770

With units that have video memory, four kinds of scan (×2, ×5, L SCAN, AND H SCAN) are possible by controlling the angle that the shuttle ring is turned.

CAV×2: Synchronization with play back V SYNC and multi-track jumping is carried out.

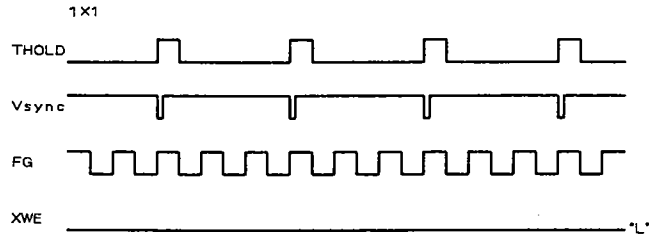


Fig. 2-6-13

\* With XWE (X write enable), when the serial command to the memory control IC (PD0146) is "L", writing to memory is carried out, if it is "H", writing is stopped (freeze).

CAV×more than 2: FG is counted and multi-jumping is carried out for each revolution.

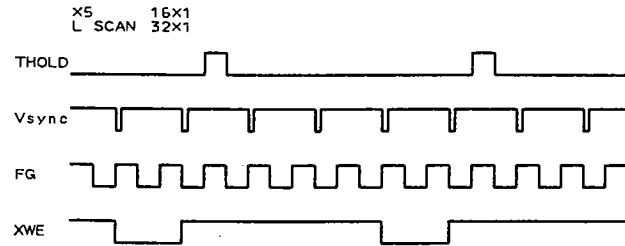


Fig. 2-6-14

CAV

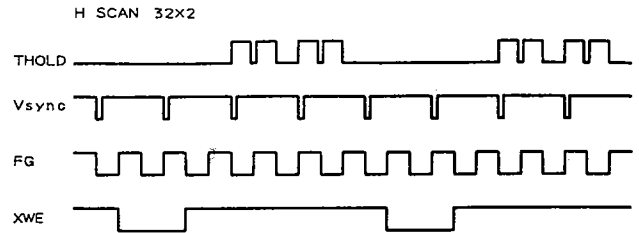


Fig. 2-6-15

CLV: FG is counted and multi-track jumping is carried out every four revolutions of inner track, three revolutions of middle track, and two revolutions of outer track.

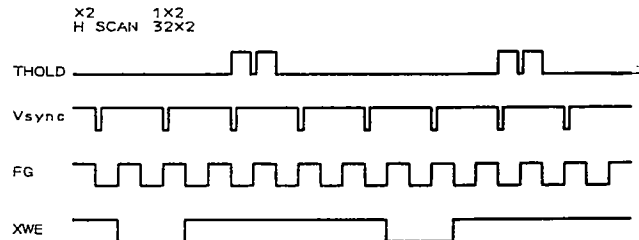


Fig. 2-6-16

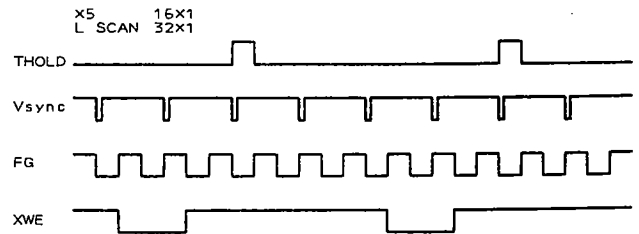


Fig. 2-6-17

●CLD -D503,CLD-D570 and CLD-S360

CAV: Synchronization with play back V SYNC and multi-track jumping is carried out.

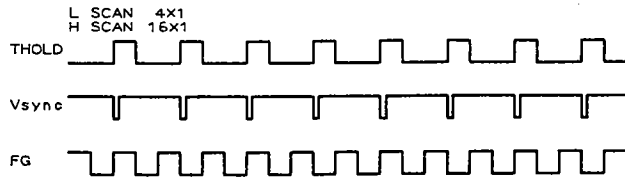


Fig. 2-6-18

CLV: FG is counted and multi-track jumping is carried out every four revolutions of inner track, three revolutions of middle track, and two revolutions of outer track.

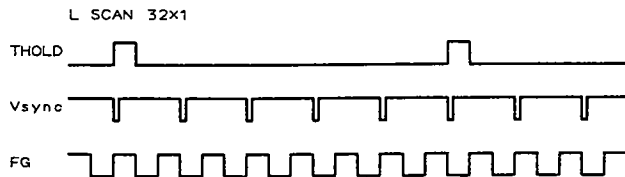


Fig. 2-6-19

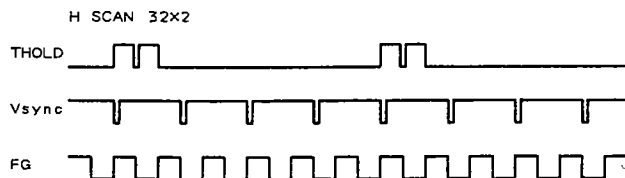


Fig. 2-6-20

7) Direct CD

At CD play, if the direct CD switch is turned on, the following operations are carried out. (Control by microcomputer)

- ①Self-lighting switch lights up and direct CD mode is entered.
- ②Power to video system portion that is unnecessary for CD play is turned OFF. (no indication)
- ③The slider park position is put into CD start position.
- ④When the tray is opened from its closed position, the small tray for CDs comes out.

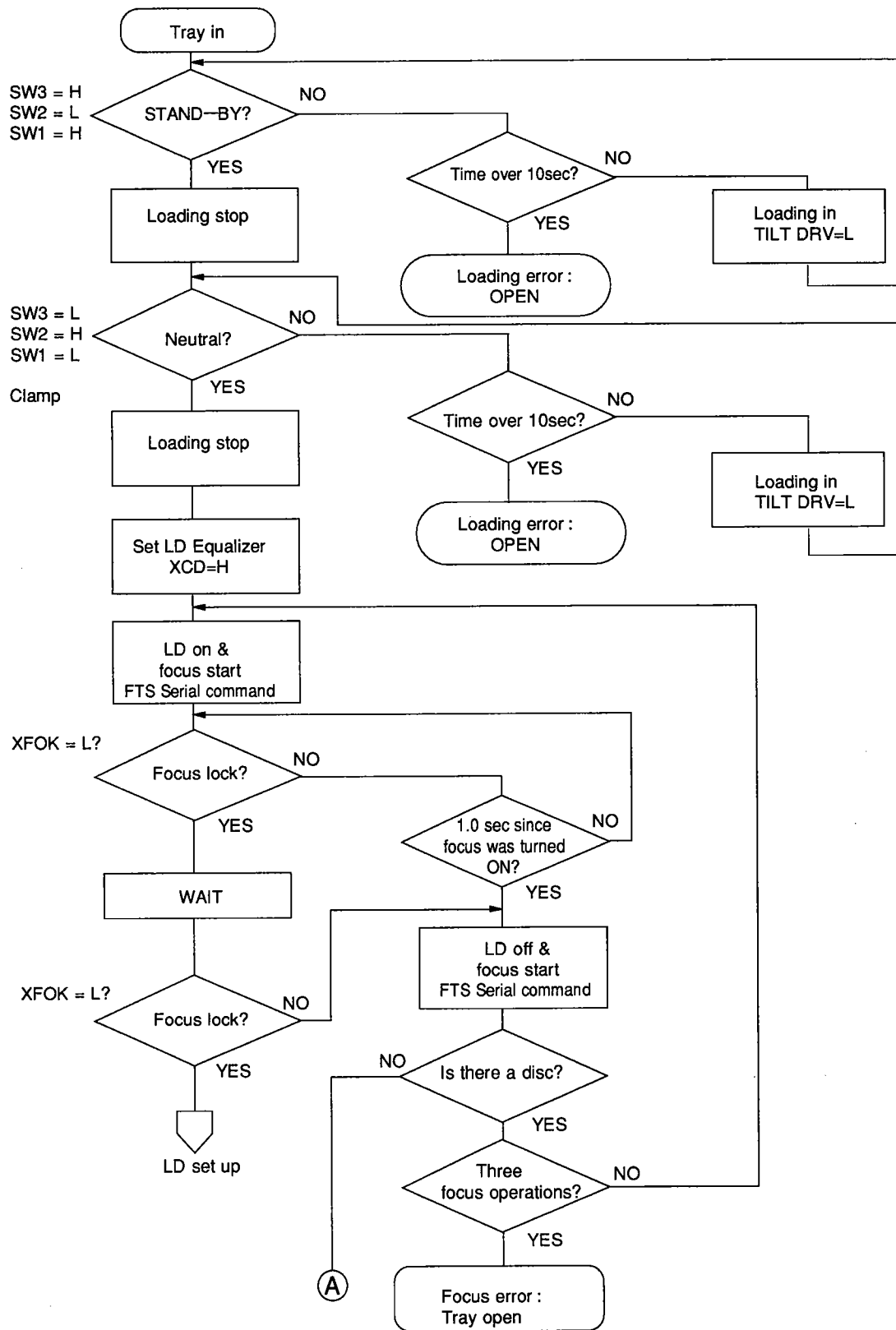
With these operations, the time its takes after play button is pushed until the CD is plays is 2/3. Also, because unnecessary power is cut off, more pure audio playing is possible.

If the direct CD switch is turned ON when the tray is open, the self-lighting switch will flash from the time the tray is closed until disc determination is finished. At the time that disc determination is finished, if there is a CD or CDV disc present or if there is no disc, the self-lighting switch is lit (flashing stops). If there is an LD, then it goes off and the CD mode is automatically canceled. Also, the direct CD switch cannot be turned ON during LD play.

If a CDV disc is played, when the video part is played, the video system's power will go on temporarily, but the direct CD mode is not canceled. When video part play is finished, the normal direct CD mode is returned to.

2.7 FLOW CHART OF EACH OPERATION

1) From Tray Open to Tray-In Flow Chart

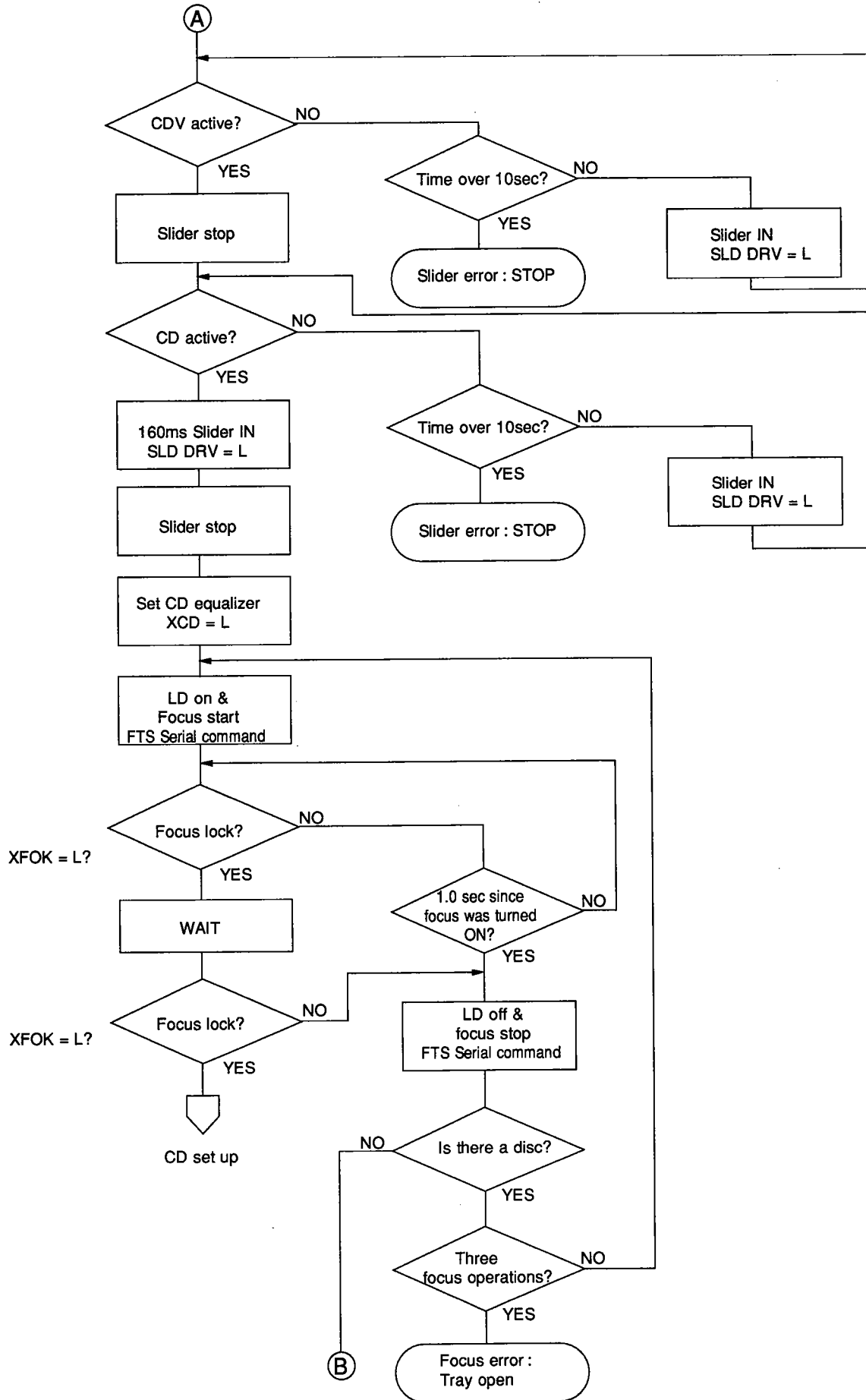


• From tray open state to completion of tray-in.

• If loading operation is not finished within 10 seconds, the situation is judged as abnormal and the tray is opened.

• When there is a disc and focus does not lock even after three focus sweeps, the situation is judged as abnormal and the tray is opened.

Fig. 2-7-1



Slider operation is stopped if it is not completed within a fixed time. After that, only OPEN key will evoke response.

Fig. 2-7-2

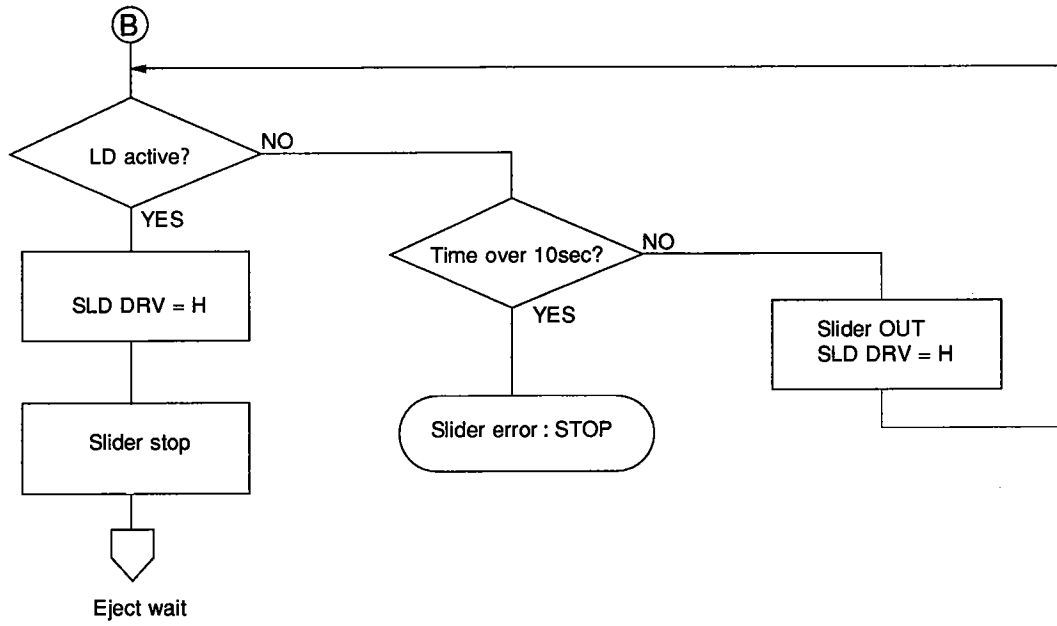
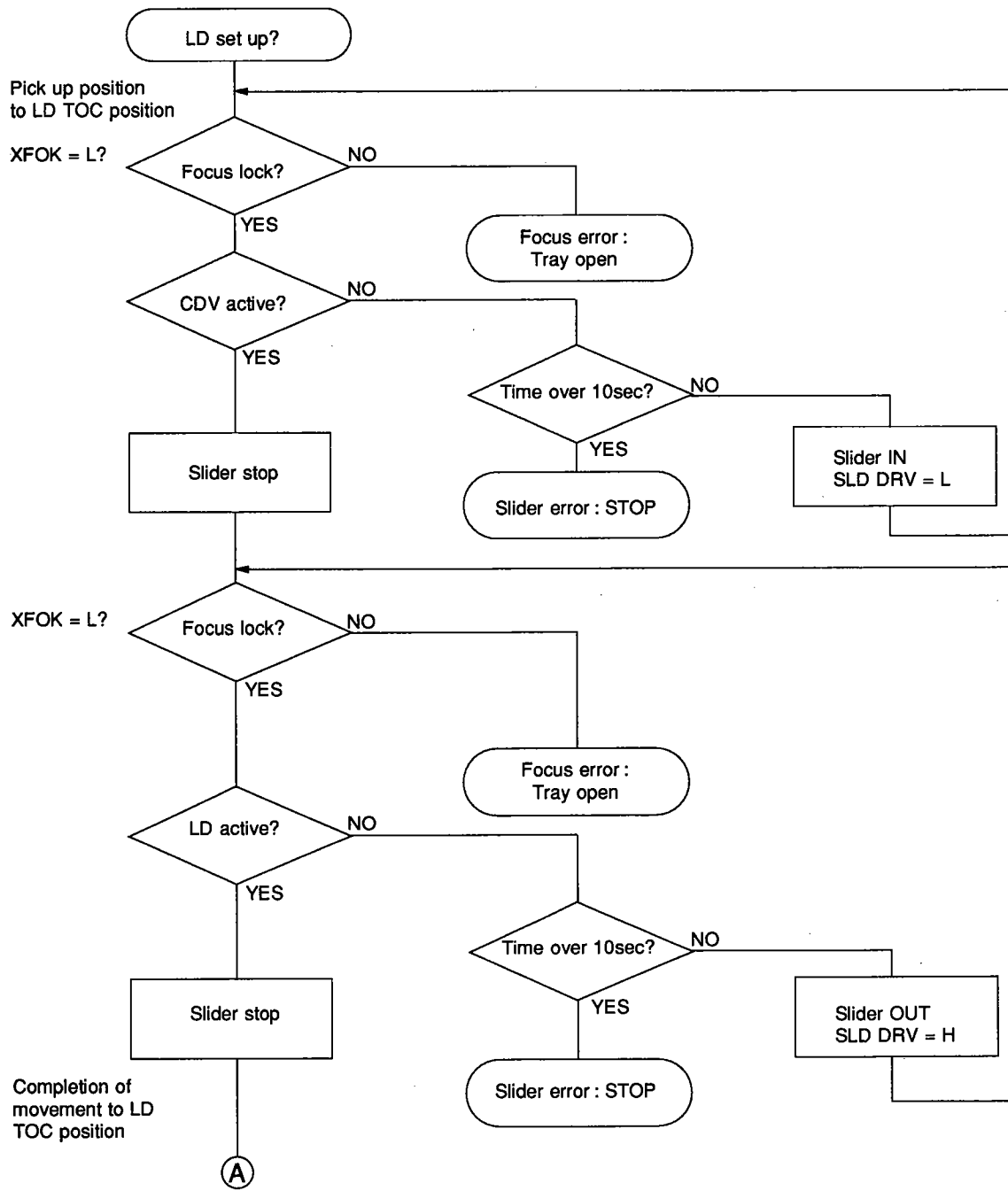


Fig. 2-7-3



2) LD Set-up Flow Chart



• During movement to spindle start position, if the focus is cannot be achieved, it is determined that there are overlapping LD, CD and the tray is opened.

Fig. 2-7-4

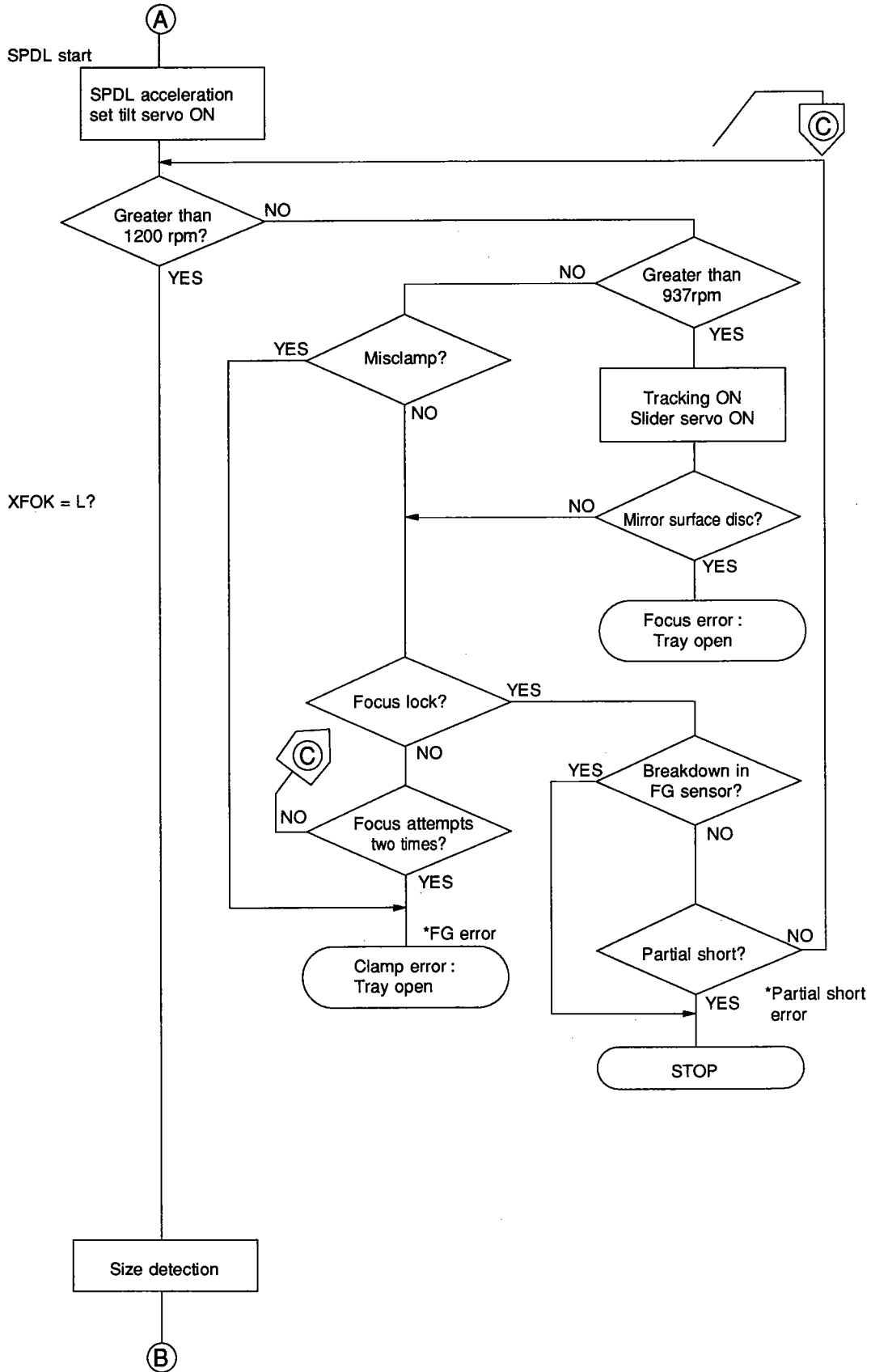


Fig. 2-7-5

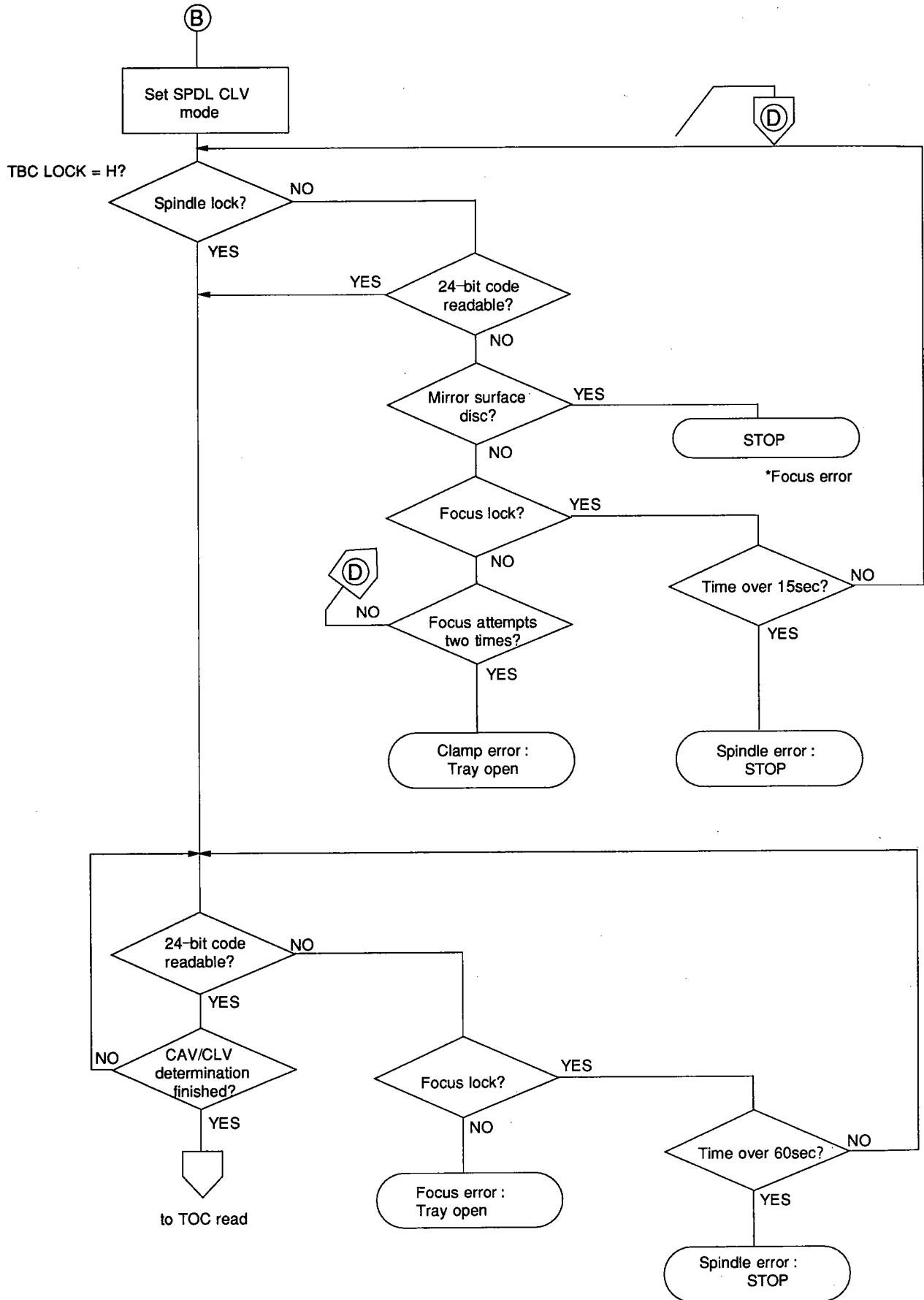


Fig. 2-7-6

3) CD Set Up Flow Chart

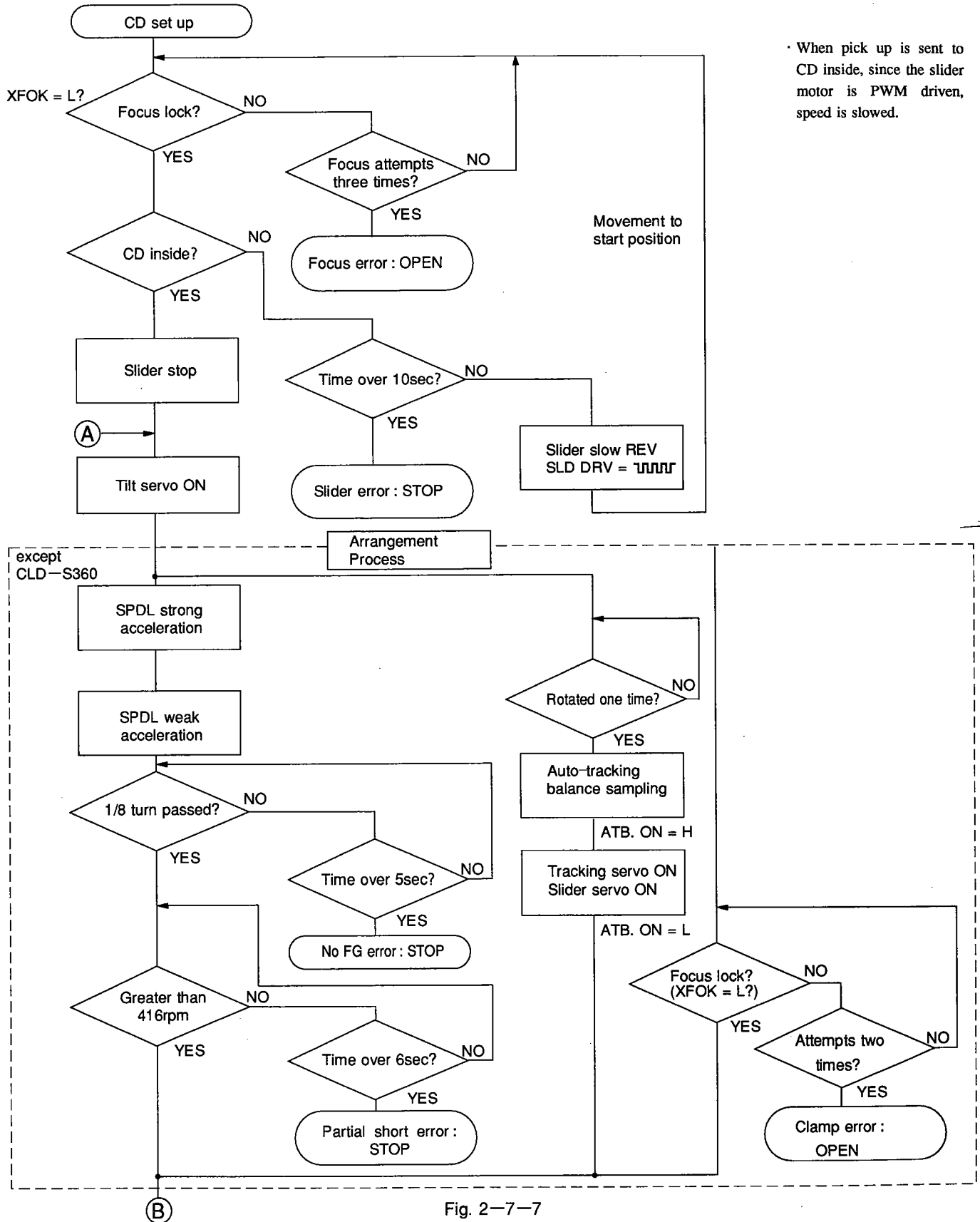
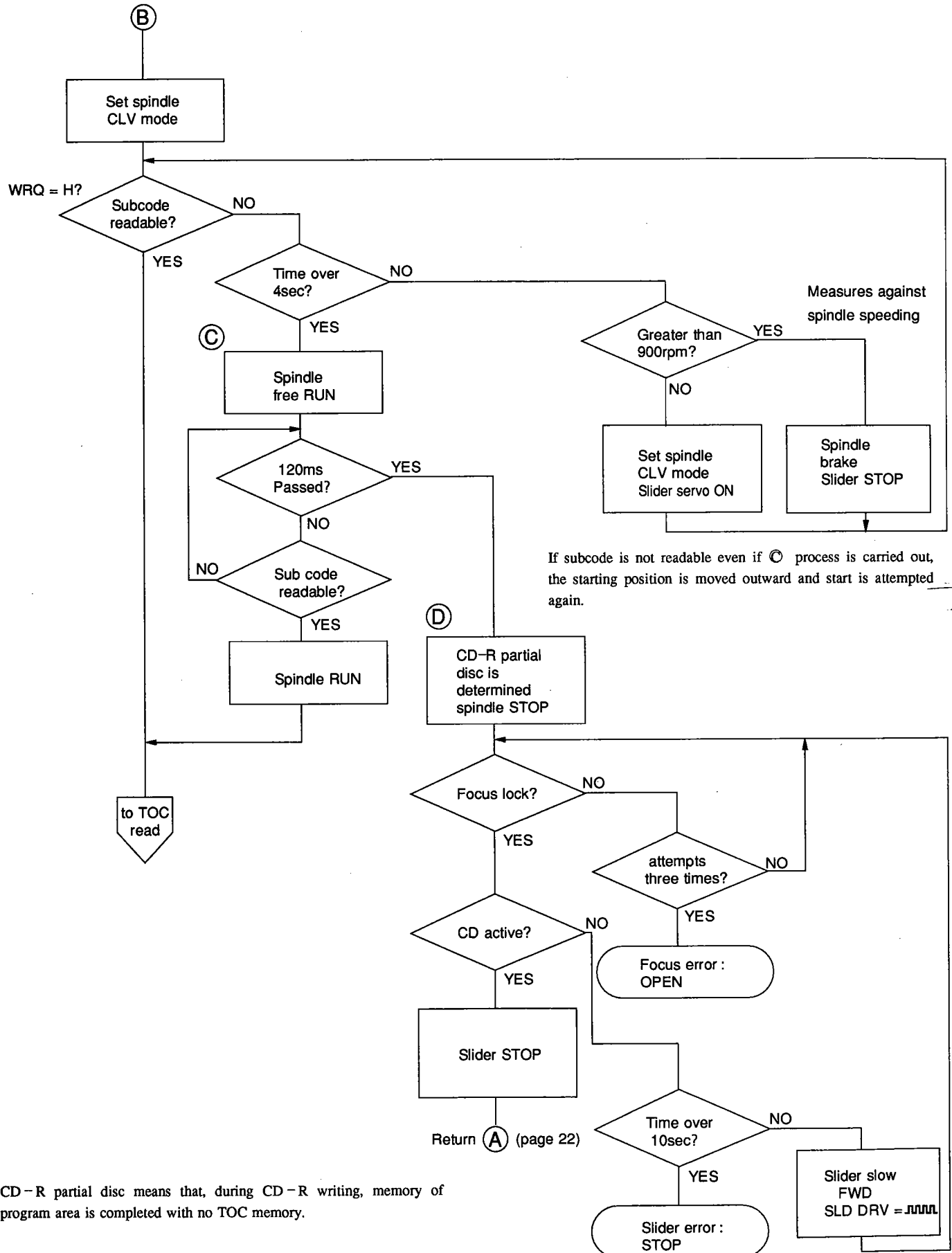


Fig. 2-7-7



CD-R partial disc means that, during CD-R writing, memory of program area is completed with no TOC memory.

Fig. 2-7-8

4) Disc Search for CLV, CAV Discs Without TOC Flow Chart

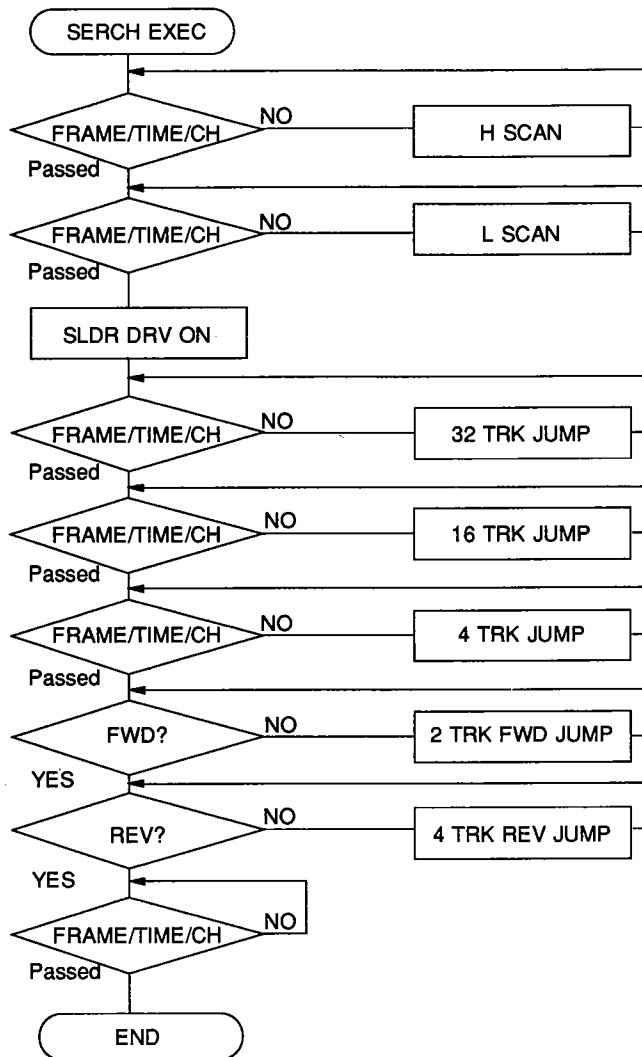


Fig. 2-7-9

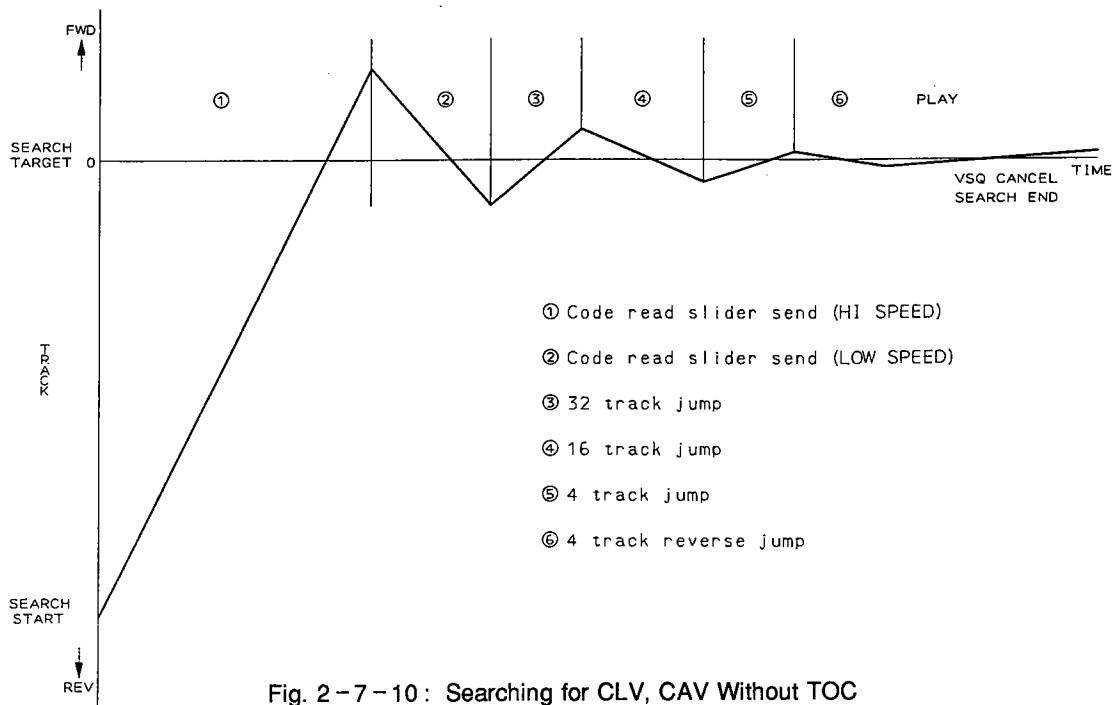


Fig. 2-7-10: Searching for CLV, CAV Without TOC

5) Disc Search for CLV With TOC Flow Cart

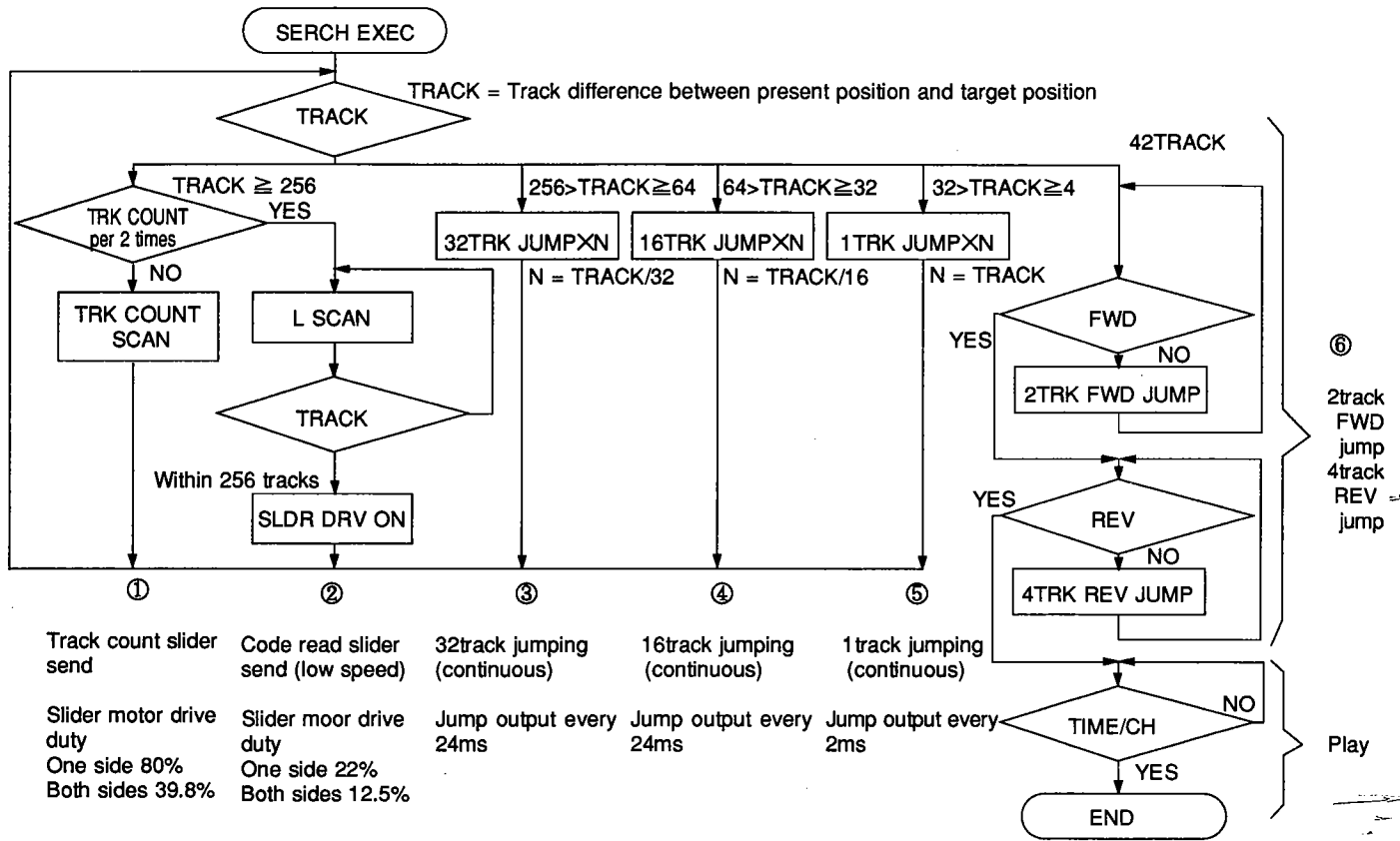


Fig. 2-7-11

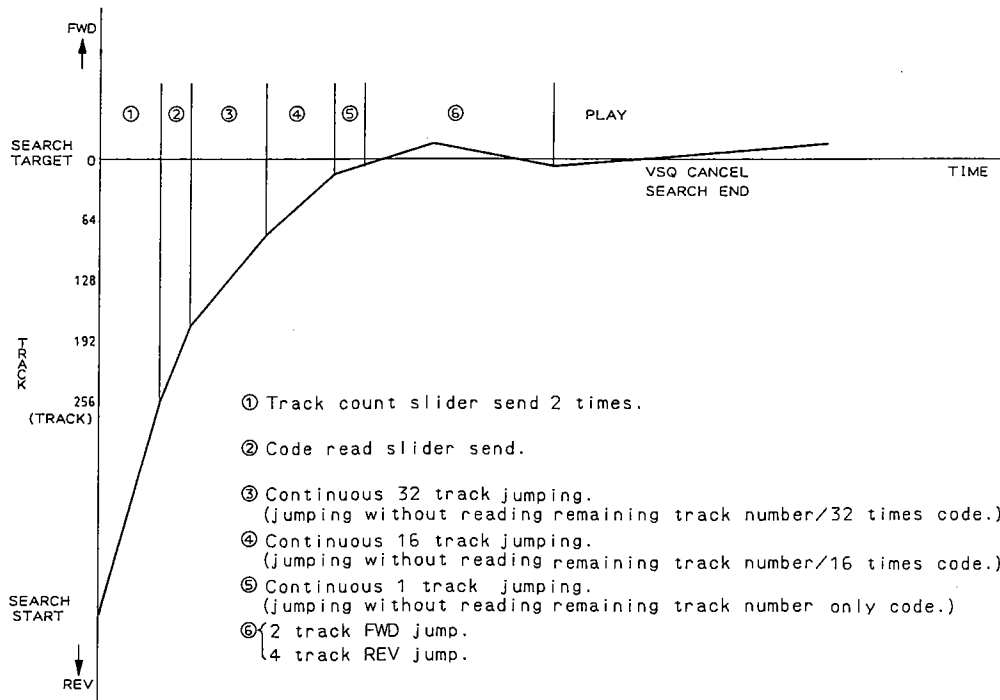


Fig. 2-7-12 Search for CLV with TOC

6) Turning from Side A to Side B (except CLD—S360)

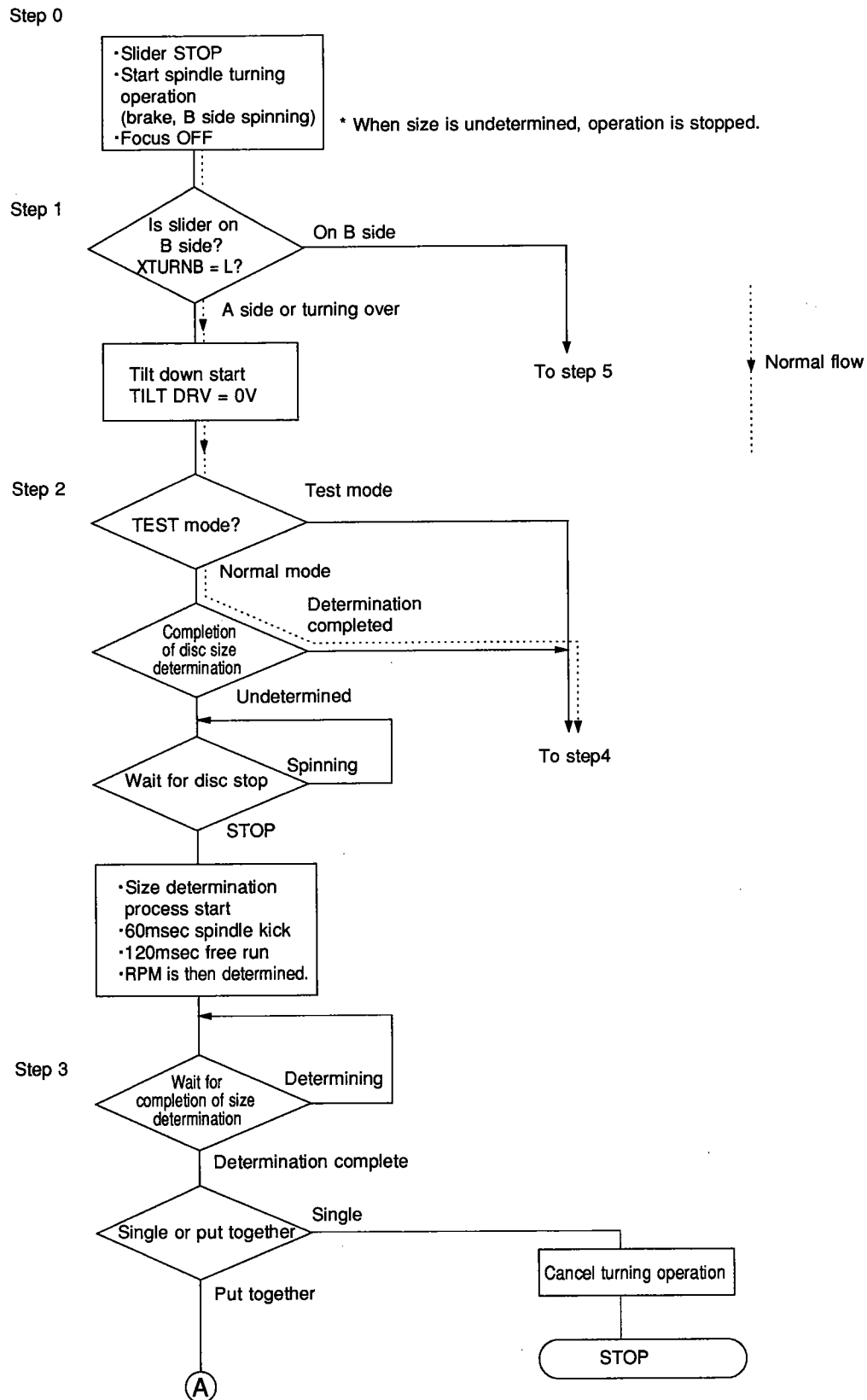
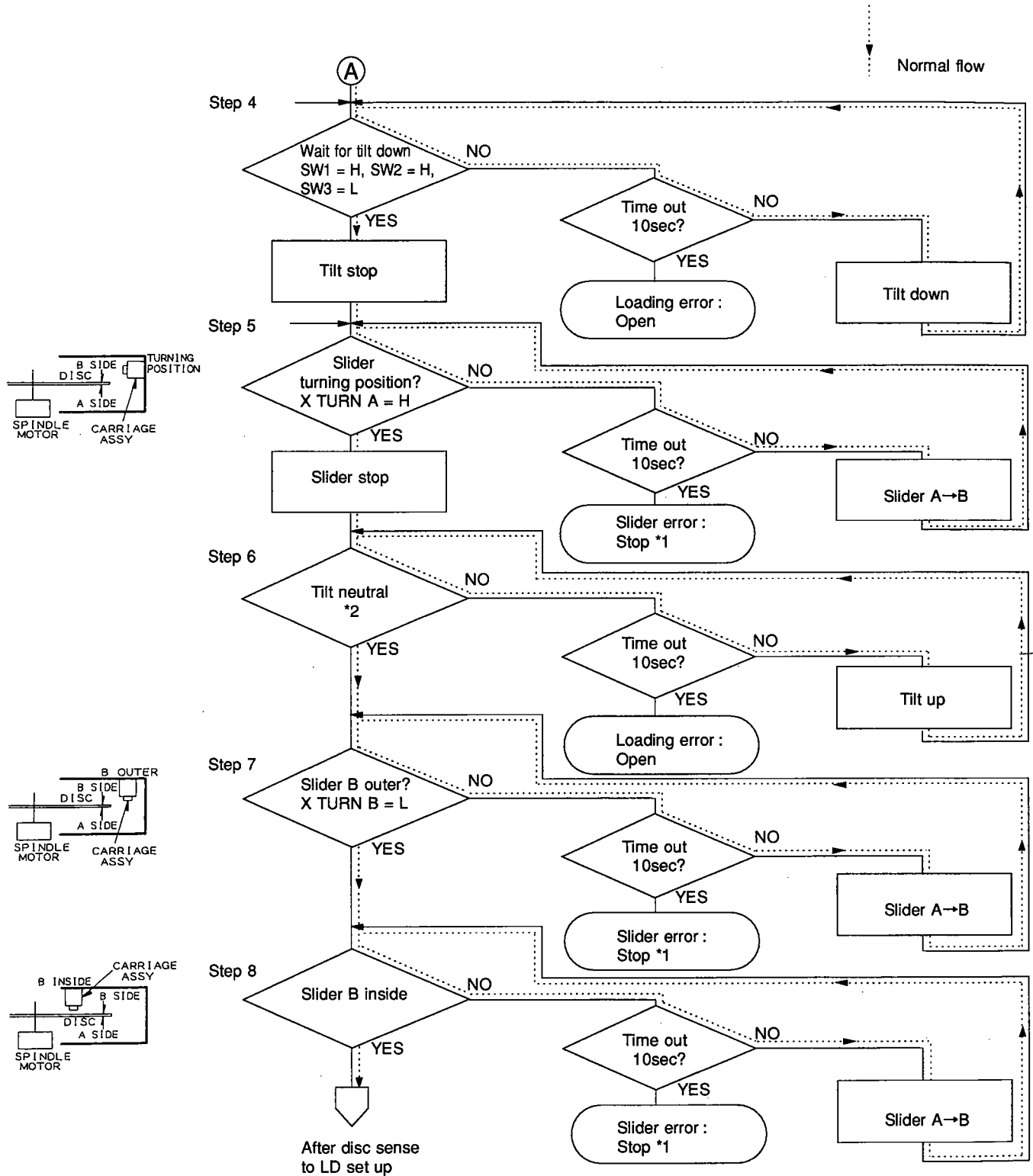


Fig. 2-7-13





\* 1 : If there is slider error, only open and power keys will evoke response. In this condition, if the power key is pressed, the power will immediately go off.

\* 2 : Tilt neutral is the position of the slider when it is shifted in the down direction until tilt plus (SW1 = L, SW2 = H, SW3 = L) is reached after having been moved in up direction until tilt minus (SW1 = L, SW2 = L, SW3 = L) is reached.

7) Turning from Side B to Side A (except CLD-S360)

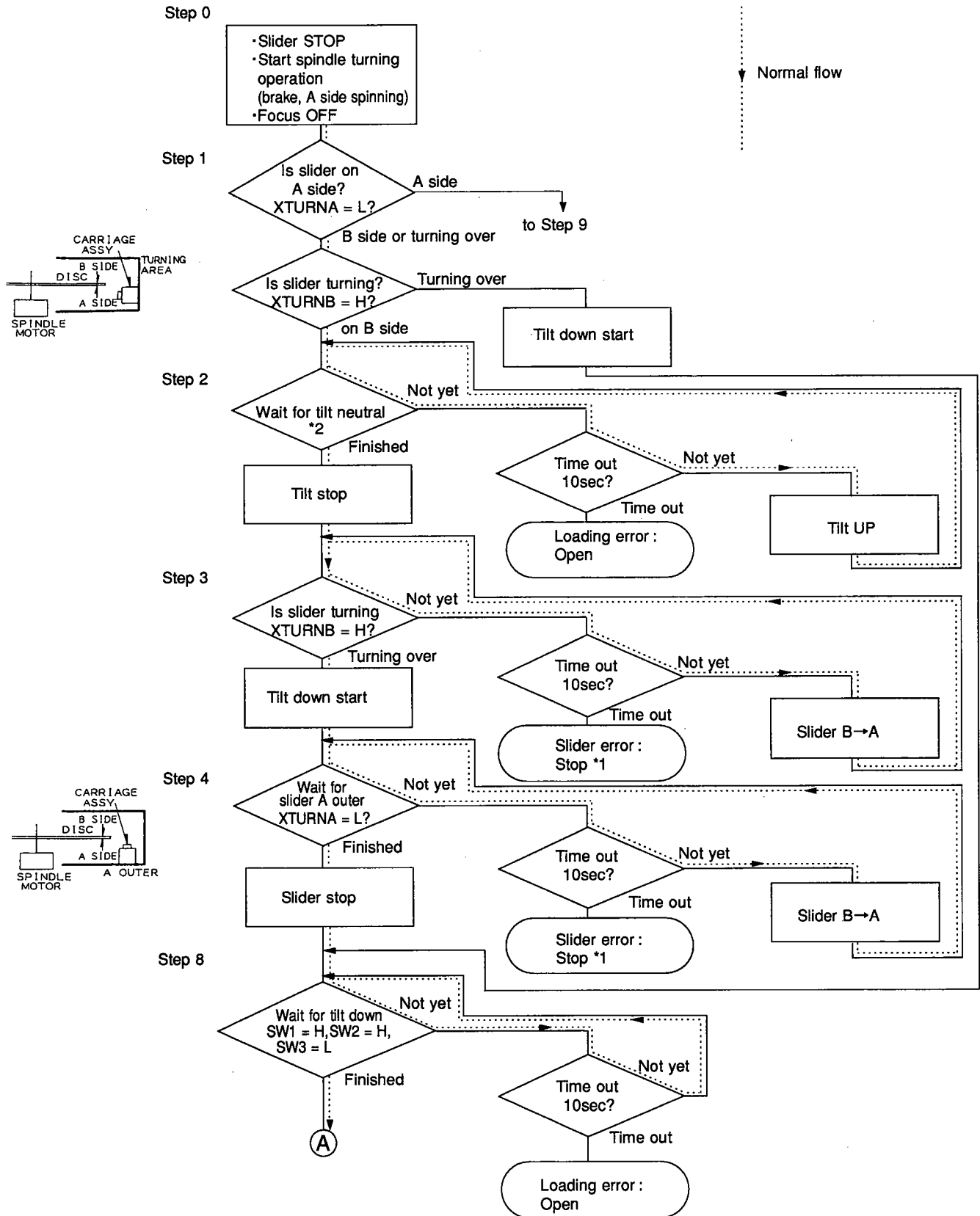
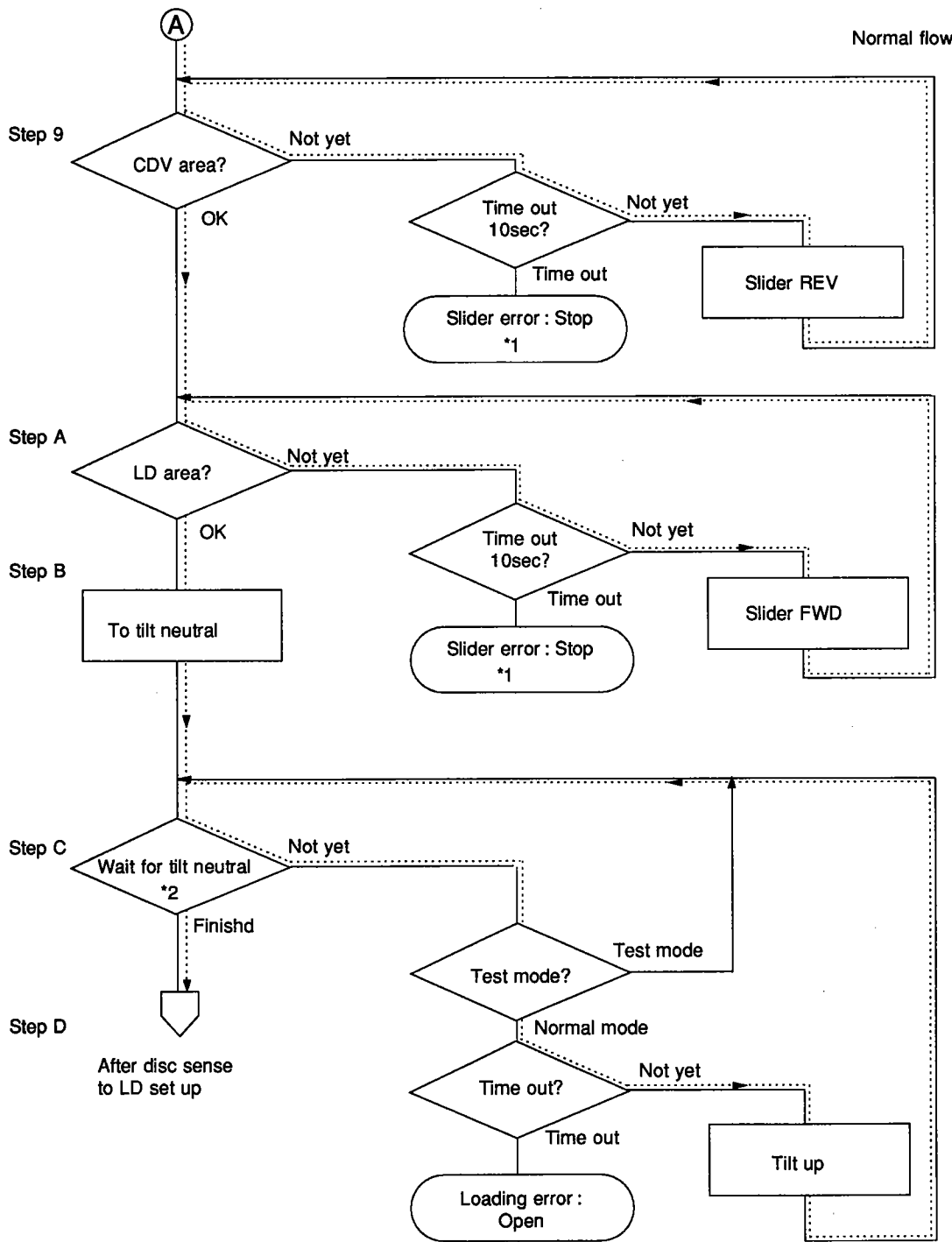


Fig. 2-7-15



\* 1 : If there is slider error, only open and power keys will evoke response. In this condition, if the power key is pressed, the power will immediately go off.

\* 2 : Tilt neutral is the position of the slider when it is shifted in the down direction until tilt plus (SW1 = L, SW2 = H, SW3 = L) is reached after having been moved in up direction until one degree tilt minus (SW1 = L, SW2 = L, SW3 = L) is reached.

Fig. 2-7-16

**2.8 TABLE OF OPERATION MODES**

●except CLD—S360

(1) Mecha mode = 1 open mode

Mecha step	Description
0	open entry
1	side change check, disc status clear
2	wait for tilt neutral, set slider to A-side outer track
3	tilt down set
4	wait for slider movement
5	dummy
6	dummy
7	dummy
8	wait for loading motor operation finish
9	move slider to home position
A	wait for slider movement
B	spindle check
C	loading to unload
D	wait for loading motor operation finish
E	100ms timer set
F	wait for timer
10	loading to open
11	mecha mode all end

(2) Mecha mode = 2 standby mode

Mecha step	Description
0	stop entry
1	side change check, disc status clear
2	wait for tilt neutral, set slider to A-side outer track
3	tilt down set
4	wait for slider movement
5	dummy
6	dummy
7	dummy
8	wait for loading motor operation finish
9	move slider to home position
A	wait for slider movement
B	spindle check
C	set loading mode to standby or vertical movement
D	wait for loading motor operation finish
E	mecha mode all end

(3) Mecha mode = 3 stop mode

Mecha step	Description
0	stop entry
1	side change check, disc status clear
2	wait for tilt neutral, set slider to A-side outer track
3	tilt down set
4	wait for slider movement
5	dummy
6	dummy
7	dummy
8	wait for loading motor operation finish
9	move slider to home position
A	wait for slider movement
B	spindle check
C	tilt neutral set
D	wait for loading motor clamp finish
E	mecha mode all end

(4) Mecha mode = 4 disc sense mode

Mecha Step	Description
0	if B-side, to step F if CD or CDV, to step 4
1	LD EQ setting, CAV setting, slider target setting
2	wait for slider movement (LD sense position)
3	wait for focus lock, when locked, confirm LD and go to mecha mode all end
4	wait for focus OFF
5	LD fix or if B-side go to step B, CD EQ setting, slider target setting
6	wait for slider movement (CD sense position)
7	wait for focus lock, when locked, confirm CD and go to mecha mode all end
8	wait for focus OFF
9	LD EQ setting, CAV setting, slider target setting
A	wait for slider movement (LD sense position)
B	if there is no CD direct, go to step E
C	wait for focus lock, when locked, confirm LD and go to mecha mode all end
D	wait for focus OFF
E	set to no disc and go to mecha mode all end
F	slider target setting, if single is confirmed, go to step 13
10	wait for slider movement (B side inside position)
11	wait for focus lock, when locked, confirm LD and go to mecha mode all end
12	wait for focus OFF
13	set to no disc and go to mecha mode all end

