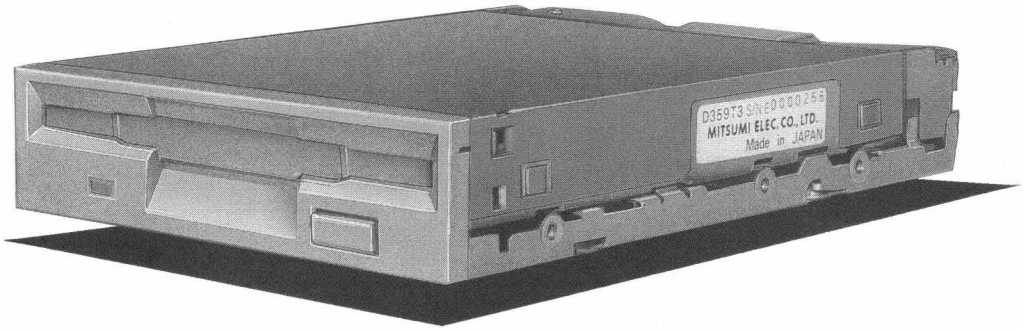
D357T3,D358T3,D359T3

3½ -Inch Micro Floppy Disk Drive

■ SERVICE MANUAL



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CONTENTS

Chapter 1 Foreword

This manual is for maintenance of D357T3, D358T3 and D359T3. Chapter 2 explains disks, jigs and tools necessary for the maintenance. Chapter 3 describes failure diagnosis procedures from which you can understand replacement parts and adjustment items. Chapter 4 and 5 explain parts replacing and adjusting methods and Chapters 6 and 7 explain circuit diagram, development, and parts list respectively.

D357T3 : 135TPI double - sided flexible disk drive .....1M byte
D358T3 : 135TPI double - sided flexible disk drive .....1M/1.6M byte
D359T3 : 135TPI double - sided flexible disk drive .....1M/2M byte

Chapter 2 Explanation of Jigs and Tools

2 - 1 List of Ordinary and Special Jigs and Tools

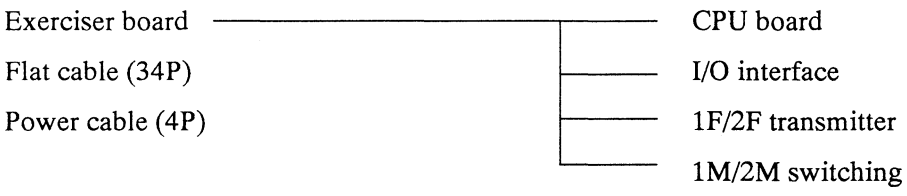
The following shows the jigs/tools and measuring instruments to be used for maintenance of D347T3, D358T3 and D359T3.

a. Ordinary jigs/tools	b. Special jigs/tools
+ screw driver (M2.6) + screw driver (M12) Tweezers Pliers Nippers Soldering iron Tester DC power supply	Exerciser Power cable (4P) Flat cable (34P) Oscilloscope Probe
c. Disk	**d. Consumables**
Alignment disk D357T3 DK302 – 12 (DYMEK) D358T3 DK302 – 12 (DYMEK) D359T3 DK302 – 12 (DYMEK) Work disk D357T3(1M) OM – D4440 (Sony) D358T3(1M) OM – D4440 (Sony) D358T3(1.0M) MFD – 2HD (Sony) D359T3(1M) OM – D4440 (Sony) D359T3(2M) MFD – 2HD (Sony)	Lock agent Alcohol Grease (Floil MGA1) (Floil G – 329B) Solder Screws

2 - 2 Explanation of Special Jigs/Tools

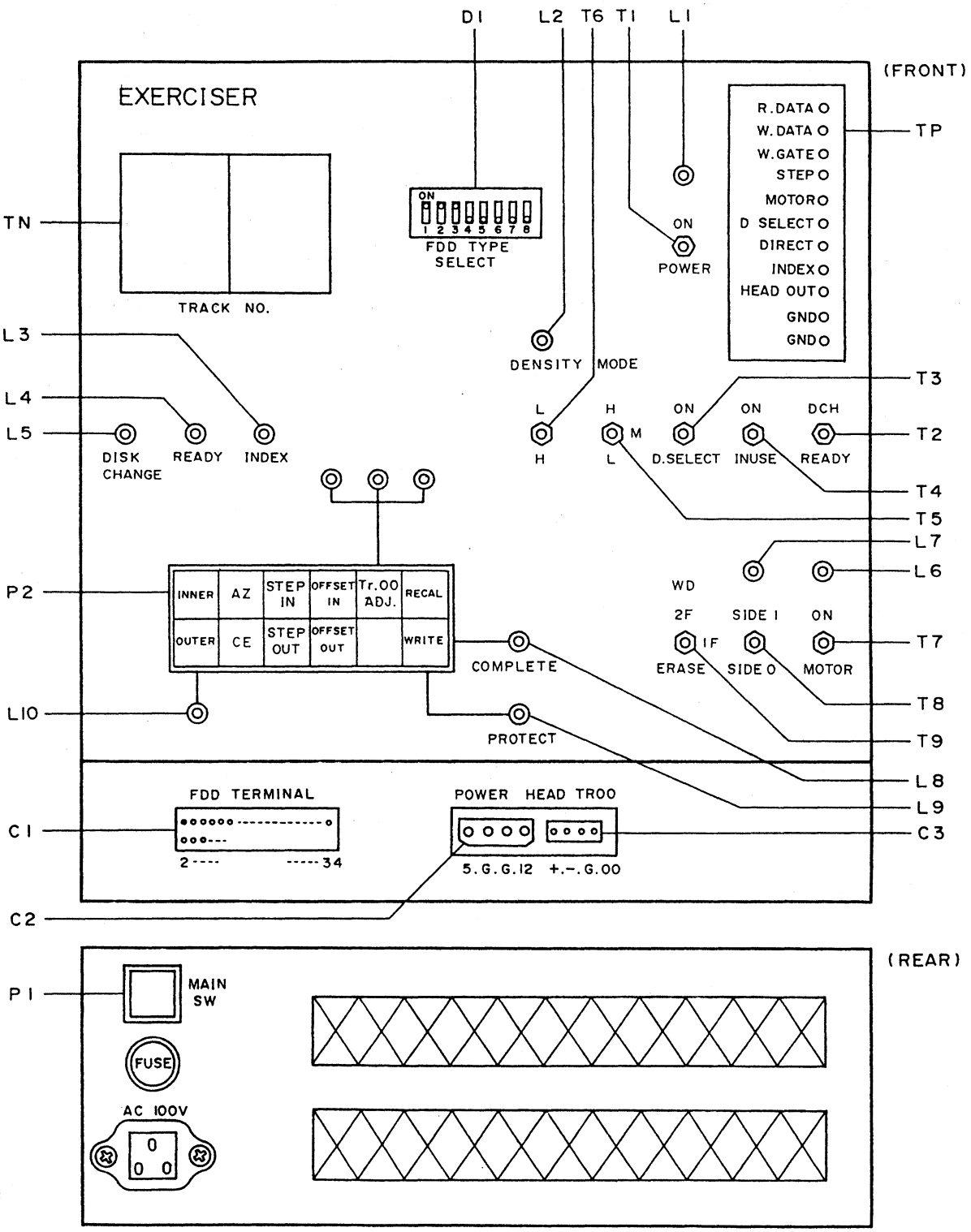
2 - 2 - 1 Exerciser

a. Exerciser configuration



b. Connection with FDD (See Fig. 2 - 1)

c. Function switches of exerciser



Roles of Switches, LEDs

Symbol	Type	Description
P1	Pushbutton switch	[OUTER] Head access to Tr.00
		[INNER] Head access to Tr.79
		[AZ] Head access to azimuth track (Tr.68)
		[CE] Head accesws to cat eye track (Tr.40)
		[STEP IN] To advance head inward one track at a time
P2		[STEP OUT] To advance head outward one track at a time
		[OFFSET IN] To advance head inward 2 tracks with track No. remaining as it is
		[OFFSET OUT] To advance head outward 2 tracks with track No. remaining as it is
		[RECAL] To reset FDD
		[WRITE] To write data 1 track
		[Tr.00 ADJ.] } Not used
		[ ]
T1	Select switch	Power switch
T2		READY/DCH selection (Pin 34 of CN1)
T3		Drive select ON/OFF
T4		INUSE ON/OFF
T5		Data transfer rate selection
T6		Mode selection (Pin 2 of CN1,High Density / Low Density in)
T7		Motor ON/OFF selection
T8		Side 1, 0 selection
T9		Write data (1F, 2F) and erase selection

Symbol	Type	Description
L1	LED	It lights when T1 is ON.
L2		It lights when T6 is L.
L3		It lights when index is detected.
L4		It lights when T2 is READY.
L5		It lights when T2 is DCH.
L6		It lights when T7 is ON.
L7		It lights when T8 is side l.
L8		It lights when writing is ended.
L9		It lights when writing is prohibited.
L10		It lights when head is in track 00.
D1	Dip switch	FDD type selector switch
TN	Monitor	It indicates present track position.
TP	Test pin	To read signal from FDD
C1	Connector	To connect 34pin flat cable (2 of I/O : left)
C2		To connect power cable
C3		To connect output signal cable

2 - 2 - 2 Disk

a. Alignment disk
D357T3 DK302 - 12 (DYMEK)
D358T3 DK302 - 12 (DYMEK)
D359T3 DK302 - 12 (DYMEK)

These disks are used for measurement and adjustment of the cat eye (CE), azimuth, and index burst.

b. Work disk
D357T3 (1M) OM - D4440 (Sony)
D359T3(1M) OM - D4440 (Sony)
D359T3 (2M) MFD - 2HD (Sony)
D358T3(1M) OM - D4440 (Sony)
D358T3 (1.6M) MFD - 2HD (Sony)

These disks are used for measurement of head output, modulation, and resolution.

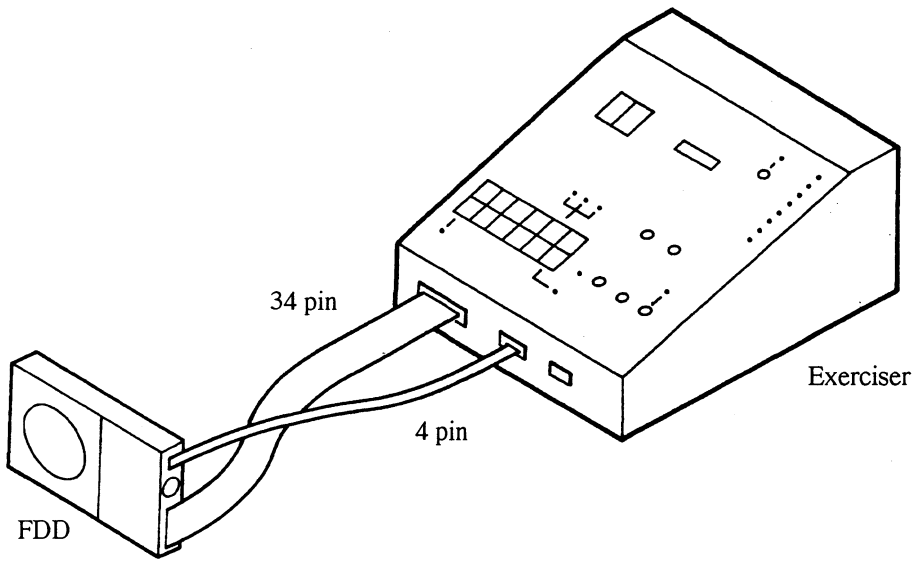


Fig. 2 - 1 FDD and Exerciser Connection

Chapter 3 Troubleshooting

This chapter shows method of troubleshooting.
3 - 1 describes checking before troubleshooting and 3 - 2 describes special error types.
3 - 3 shows check points during normal operation and abnormal operation, and they are helpful for clarifying defective places.

3 - 1 Checking before Troubleshooting

Before you decide that the drive is abnormal, check the following points.

1) Is the operation correct?
2) Isn't there any program error?
3) Is the connection made correctly?
4) Isn't the disk itself broken? Does the same symptom appear with other disk?
5) How about the environmental conditions? (Strong magnetic field, electrical noise, etc.)
6) Isn't it contaminated with dust or foreign matter?
7) Is the drive selection correct?

3 - 2 Special Error Types

3 - 2 - 1 Write Error

To find out which is responsible for the error, disk or drive, replace the disk with other disk and check. If the write error does not occur after the disk is replaced, it means that the disk is defective and should be replaced with new one.
If the write error occurs even when a normal disk is used, the drive is abnormal.

3 - 2 - 2 Compatibility Error

If data written with other drive cannot be read or the data can be read with a certain drive but not with other drive, it means compatibility error exists. The compatibility error is caused due to improper adjustment of CE or index position, drive motor speed, or disk installation.

3 - 2 - 3 Software Error

Read the error place about 10 times. If it cannot be read, move the head to the track adjacent to the present track in the same moving direction and return it to the original track and read. If it can be now read, adjust the track position. (See 5 - 2) If it cannot still be read, the error cannot be remedied.

3 - 3 Failure Diagnosis with Exerciser, Oscilloscaope

3 - 3 - 1 shows normal operations. Check the normal operations in accordance with the procedures.

3 - 3 - 2 shows check points when abnormal operations occur in the procedures in 3 - 3 - 1.

3 - 3 - 1 Normal Operation

Preparation

1) Check that all the switches of the exerciser are "OFF".

2) Connect the measuring probes as shown in Fig. 3 - 1.

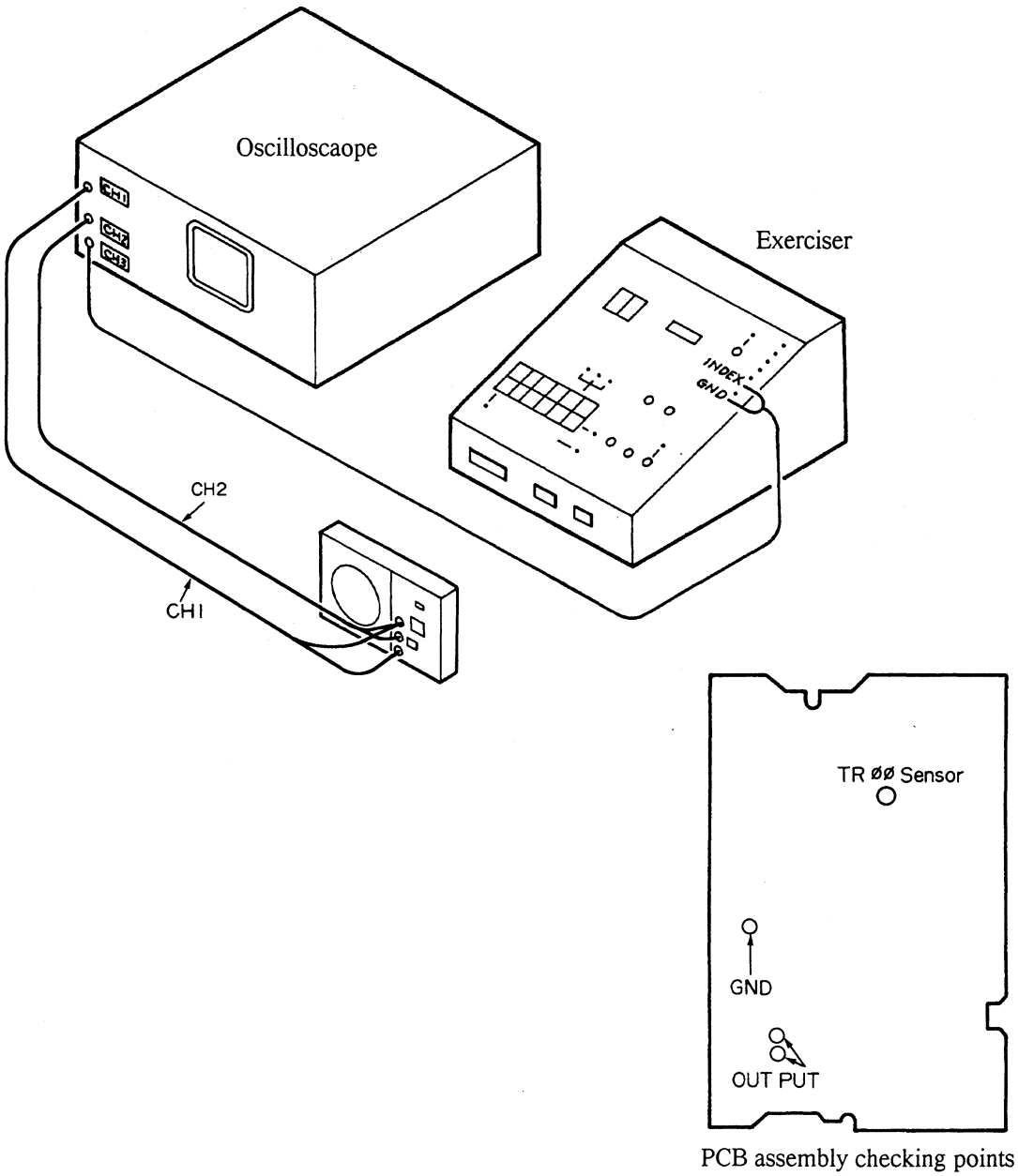


Fig. 3 - 1 Measuring Instrument Connection

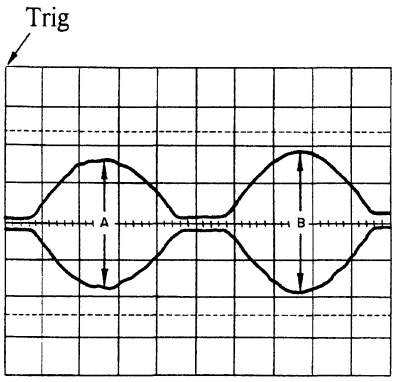
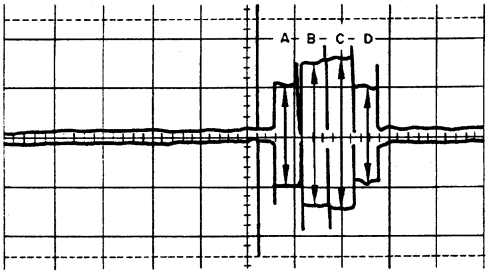
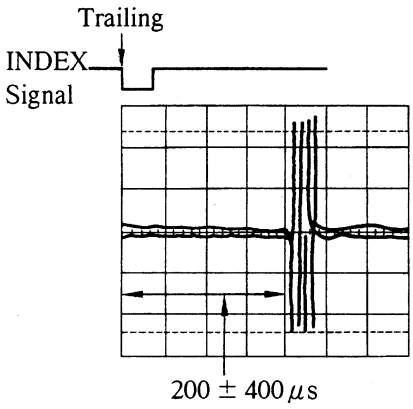
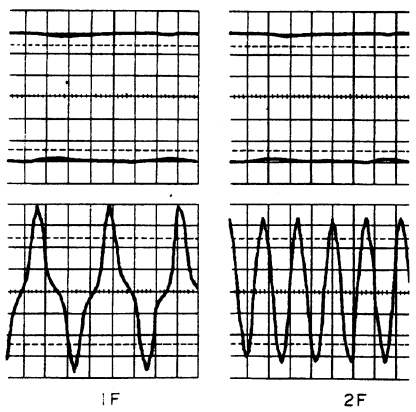
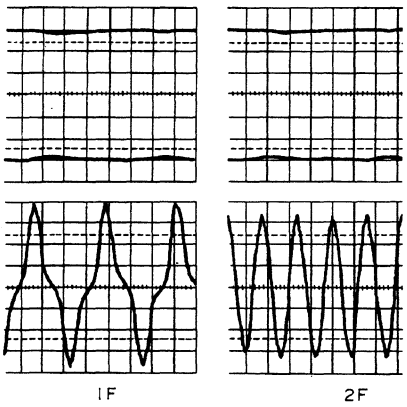
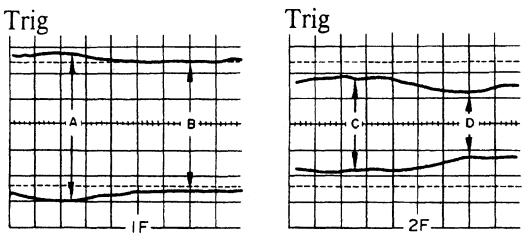
Procedure	Item	Operation
1	DC power switch ON	1. W.PROTECT INDEX lamp lights. (When head is in Tr00, Tr00 indicator lamp lights.) 2. Drive motor remains stopped.
2	Motor switch ON	1. Motor ON lamp lights.
3	Disk inserting (Insert alignment disk.)	1. Drive motor starts. 2. INDEX lamp changes from lighting to flickering. (Note: For putting in/out the disk, avoid Tr40.)
4	RECAL I switch ON	1. Head is set to Tr00 and Tr00 lamp lights. 2. Tr No. indication becomes 00.
5	Step operation OUTER CE INNER Switch operation	1. Press OUTER CE or INNER switch and move the head to a desired track.
6	Track position	1. At Tr40, the CE signal shown in Fig. 3 − 2 is obtained.  SWEEP/DIV 20ms/DIV CH1. VOLT/DIV 0.1V/DIV CH2. VOLT/DIV 0.1V/DIV Probe × 1 A ≧ B B/A × 100 ≧ 60% A < B − (A/B × 100) ≦ (− 60%)

Fig. 3 - 2 CE Signal

Procedure	Item	Operation
7	Azimuth	1. At Tr40, the azimuth wafeform shown in Fig. 3 − 3 is obtained.  B and C > A and D SWEEP/DIV 1ms/DIV CH1. VOLT/DIV 0.1V/DIV CH2. VOLT/DIV 0.1V/DIV Probe × 1 **Fig. 3 - 3 Azimuth Waveform** Azimuth angle 0 ± 21 〔'〕
8	Index position	1. At Tr40, the index burst signal shown in Fig. 3 − 4 is obtained.  **Fig. 3 - 4 Index Burst Signal** SWEEP/DIV 0.1ms/DIV CH1. VOLT/DIV 0.1 V/DIV CH2. VOLT/DIV 0.1V/DIV Probe × 1 If the index position become negative, however, the indication is not made, because the Trig-point is at the left end. In such a case, move the Trig-point rightward.
9	Disk out operation (Take out alignment)	1. INDEX lamp changes from flickering to lighting. (Note : For putting in/out the alignment disk, avoid Tr40.)
10	Write operation (Inserting work disk)	1. If "1F" or "2F" is written, the output waveform shown in Fig. 3 − 5 or 3 − 6 is obtained.  **Fig. 3 - 5 Output Waveform, 1M Mode** SWEEP/DIV 20ms/DIV CH1. VOLT/DIV 0.1V/DIV CH2. VOLT/DIV 0.1V/DIV Probe × 1 (Note : Sweeping is done.) SWEEP/DIV 5 μs/DIV CH1. VOLT/DIV 0.1V/DIV CH2. VOLT/DIV 0.1V/DIV Probe × 1

Procedure	Item	Operation
10	Write operation (Inserting work disk)	 SWEEP/DIV 20ms/DIV CH1. VOLT/DIV 0.1V/DIV CH2. VOLT/DIV 0.1V/DIV Probe × 1 (Note : Sweeping is done.) SWEEP/DIV 2 μ /DIV CH1. VOLT/DIV 0.1V/DIV CH2. VOLT/DIV 0.1V/DIV Probe × 1 **Fig. 3 - 6** **Output Waveform, 2M Mode**
11	Head output Modulation Resolution	1. Move the head to Tr00. 2. DC ERASE and "1F" writing. (See Fig. 3 − 7) 3. From maximum amplitude A and minimum amplitude B, head output and modulation are obtained. Head output = (A + B)/2 Modulation = $\frac{A-B}{A+B} \times 100 \leqq 10\%$ 4. DC ERASE and "2F" writing. (See Fig. 3 − 7) 5. From maximum amplitude C and minimum amplitude D, head output and modulation are obtained, and from A, B, C, and D, resolution is obtained. Resolution = $\frac{C+D}{A+B} \times 100 \leqq 100\%$ 6. At Tr79 of Side 1, too, the values are seeked in the same way. (The standard of resolution at Tr79 is 55% or higher)  SWEEP/DIV 20ms/DIV VOLT/DIV 0.1V/DIV VOLT/DIV 0.1V/DIV CH1, 2 (Note : Sweeping is done.) **Fig. 3 - 7 Output Waveform**

3 - 3 - 2 Check Points When Abnormal Operations Occur

<table>
<tr><th>Operation</th><th>Abnormal operation</th><th>Check point (defective place)</th><th>Remarks</th></tr>
<tr><td>DC power switch ON</td><td>1. INUSE LED does not light.</td><td>1. Power supply
2. LED
3. DRIVE SELECT
4. PCB
a) DRIVE SELECT</td><td>Check point 4 lighting condition
a) When DRIVE SELECT is L</td></tr>
<tr><td>Motor switch ON</td><td>1. Drive motor does not start.</td><td>1. Drive motor circuit system
2. Drive motor drive system
3. Power supply
4. Disk abnormality</td><td>CN1 – 16 is at H level or drive motor is faulty.</td></tr>
<tr><td>RECAL I switch ON</td><td>1. Head does not move.
2. Head moves inward.
3. Head is moving outward but does not stop at Tr00.</td><td>1. 00 sensor
2. 00 sensor circuit system
3. READY
4. Stepping motor
5. Stepping motor circuit system</td><td>CN1 – 20 is at H level.
CN1 – 18 is at L level.
CN1 – 26 is at H level.</td></tr>
<tr><td>Step operation</td><td>1. Step operation does not occur or no smooth movement.
See IC – 3 Parts Arrangement
<table>
<tr><th>TRACK</th><th>IC3 - 3</th><th>IC3 - 4</th><th>IC3 - 10</th><th>IC3 - 12</th></tr>
<tr><td>0、4、8...72、76</td><td>L</td><td>H</td><td>H</td><td>L</td></tr>
<tr><td>1、5、9...73、77</td><td>H</td><td>L</td><td>L</td><td>H</td></tr>
<tr><td>2、6、10...74、78</td><td>L</td><td>H</td><td>H</td><td>L</td></tr>
<tr><td>3、7、11...75、79</td><td>H</td><td>L</td><td>L</td><td>H</td></tr>
</table></td><td></td><td>1. Stepping motor or drive system
2. Stepping motor circuit system</td></tr>
</table>

Operation	Abnormal operation	Check point (defective place)	Remarks
Track position	1. CE does not meet the standard. 2. No signal at all 3. Seek error	Maladjustment of track position Read amplifier system circuit	See 5 − 2 See 3 − 3 − 2 Step Operation
Azimuth	1. Azimuth does not meet the standard.	Check azimuth.	See 5 − 3 − 5 (Due care should be taken because azimuth is changed due to impact, etc.)
Index position	1. If disk inserting is repeated, index position is deviated from the standard. 2. Index position does not meet the standard.	Faulty installation of disk to disk table. Maladjustment of index	 See 5 − 2
00 sensor	1. Indicator lamp lights at other than Tr00.	1. Dislocation of 00 sensor 2. 00sensor failure	Check : Tr00 : L level Tr01 : 1.0 to 3.8V Tr02 : H level
Write operation	1. Waveform cannot be rewritten	1. Write circuit 2. Index failure 3. Write protect 4. Disk write protect	Check if signal is input to CN1 − 22 when rewriting. During normal operation, CN1 − 24rises to L level when writing. CN1-28 is at H level.

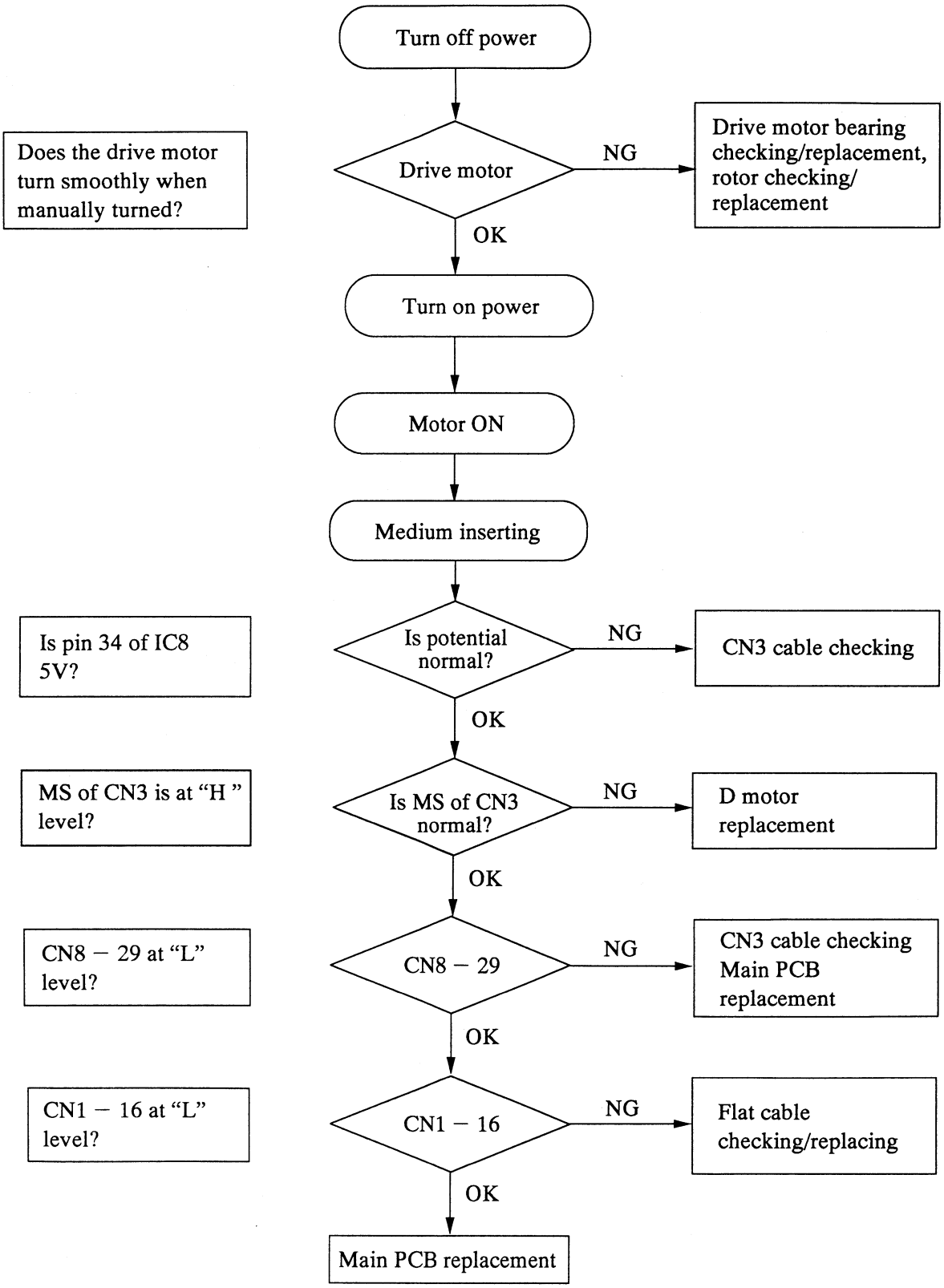
Operation	Abnormal operation	Check point (defective	Remarks
Head output	1. Head output is abnormally small or large.	1. Head	See 5 − 1 Standard or 3 − 3 − 1 (11)
	2. Modulation does not meet the standard.	1. Pad pressure 2. Media	
	3. Resolution does not meet the standard.	1. Head disk abnormality	
Index	1. Index indicator lamp does not flicker.	1. Media detection switch 2. Hall IC failure 3. Drive motor does not start 4. Disk is not inserted	Pulse is output to CN1 − 8 at intervals of 200mS.
1M/2M switching	In case of 359T3, read/write operation cannot be done in 1M or 2M.	Press the switch SW2(a) (6 − 4 − 2, SW2(a))	Check relationship between input signal and density mode select jumper pin. (See 3 − 6 Optional Specification)

3 - 4 List of Exerciser Errors

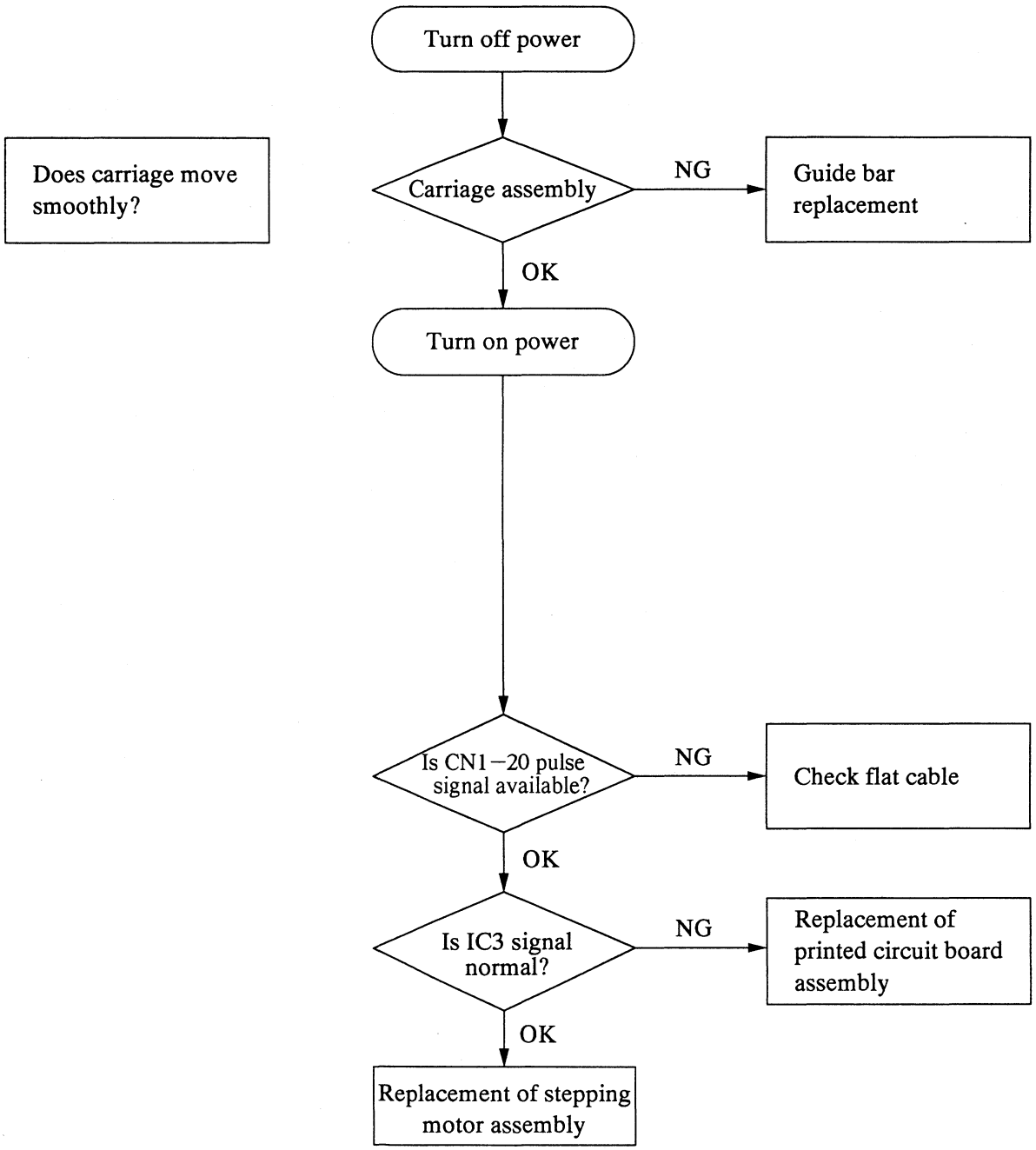
Error type	Error message	Possible cause	Remedy (checking,
Write protect error	W.PROTECT lamp lights.	1. Write protect state is set. 2. Disk is not inserted.	Check write protect and write protect circuit of medium.
Index error	INDEX lamp does not flicker.	1. Drive motor is not running. 2. Medium is not inserted. 3. Index mechanism failure	Check for existence of medium and index circuit.
Ready error	READY lamp does not light.	1. Drive motor is not running. 2. Index error 3. READY circuit failure	Check index and drive motor.

3 - 5 Failure Diagnosis Flow Chart

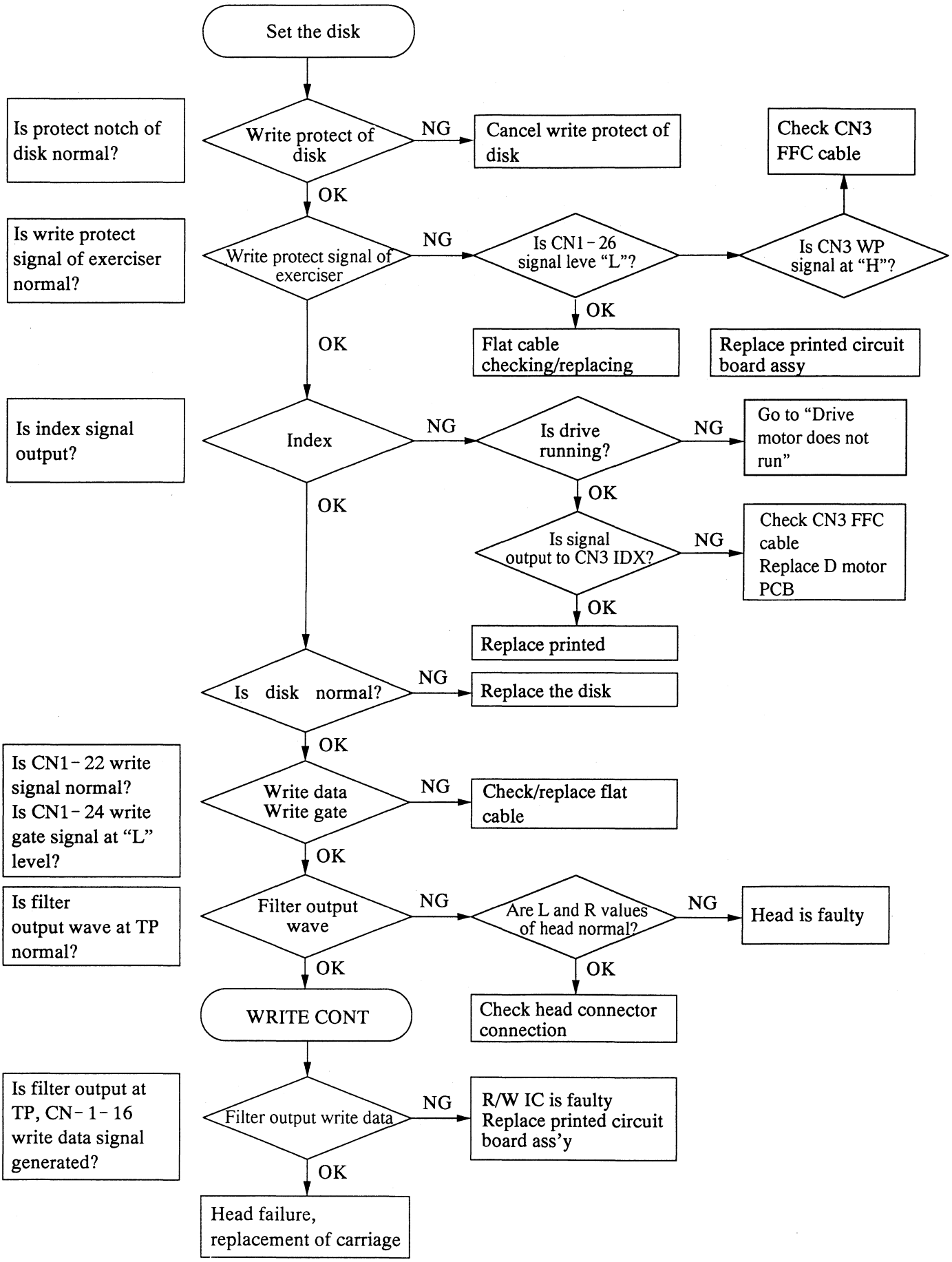
3 - 5 - 1 Drive motor does not start



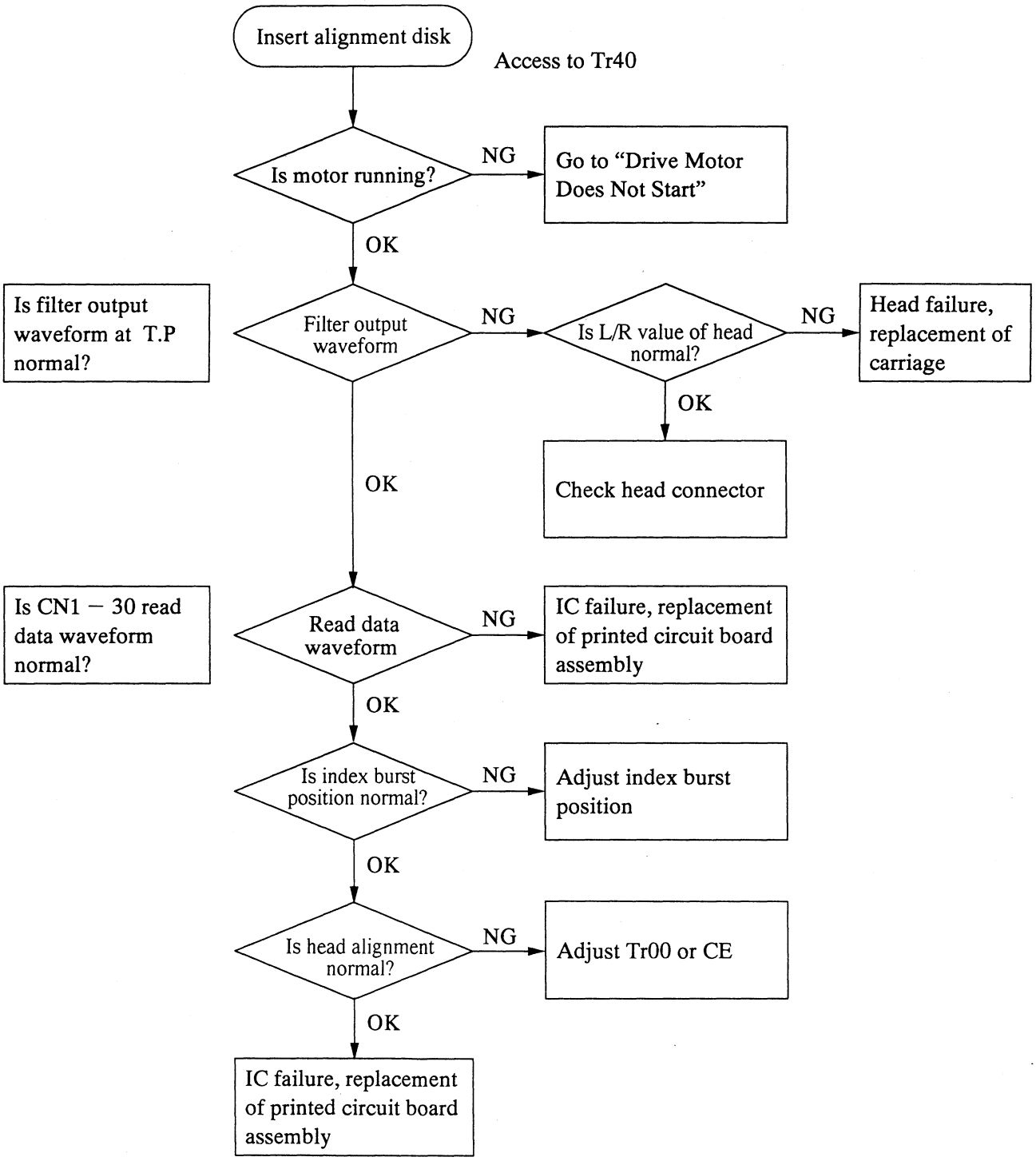
3 - 5 - 2 Step operation does not occur



3 - 5 - 3 No writing can be done (1M Mode / 2M Mode)



3 - 5 - 4 No reading can be done (1M Mode / 2M Mode)

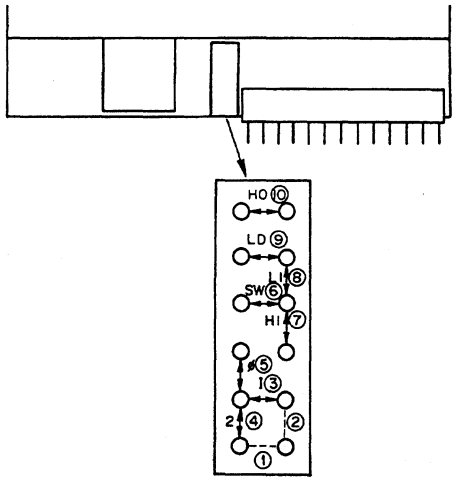


3 - 6 Optional Specification

Short plug function and inserting position

Name	Select plug Inserting position	Function
NC	①	———————
NC	②	———————
DS 1	③	DRIVE SELECT 1 ON (Terminal No.12)
DS 2	④	DRIVE SELECT 2 ON (Terminal No.14)
DS 0	⑤	DRIVE SELECT 0 ON (Terminal No.10)
SW	⑥	Normal density/high density switching
HDI	⑦	HIGH DENSITY IN
LDI	⑧	LOW DENSITY IN
LDO	⑨	LOW DENSITY OUT
HDO	⑩	HIGH DENSITY OUT

* Short plug not used should be put in NC.
* At shipment, short plugs are inserted in (3) and (6) and 1M/2M switching is to be done with disk.



Chapter 4 Parts Replacement

4 - 1 Replacement of FDD Cover

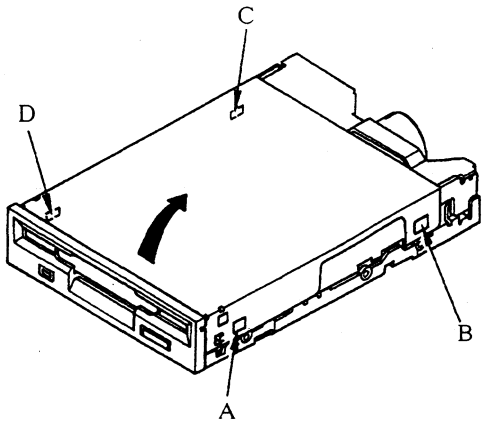
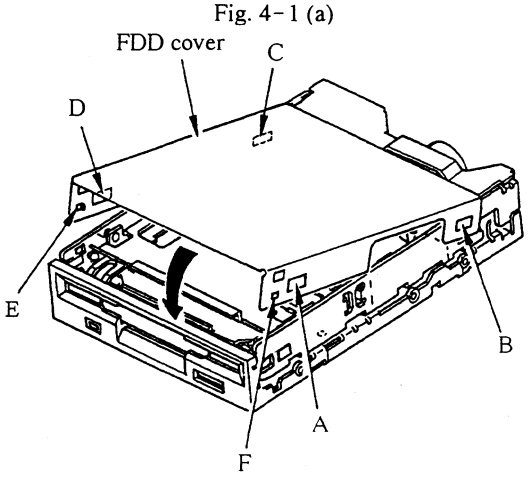


Fig. 4-1 (a)



4 - 2 - 1 Removal

a) As shown in Fig. 4 - 1 (a), remove the frame catches of both sides (A, B, C, D) with tweezers, etc. and remove the FDD cover by raising the front bezel side in the arrow direction.

4 - 2 - 2 Installation

a) Install in such a way that the pawls of both sides (A, B, C, D) and front (E, F) catch the frame, as shown in Fig. 4 - 1 (b). Pay attention to the direction of the FDD cover. Do not deform the front bezel and FDD cover.

4 - 2 Replacement of Front Bezel

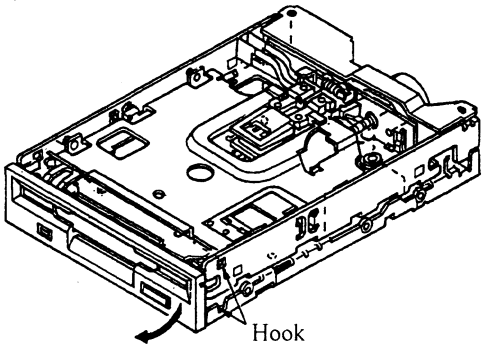
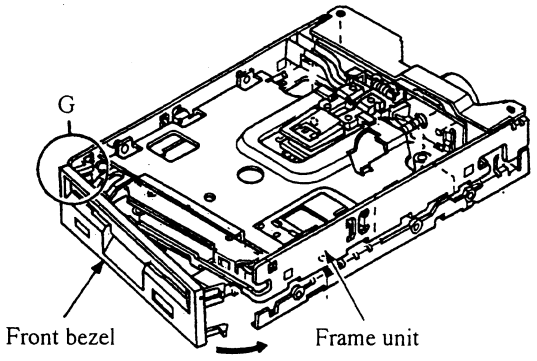


Fig. 4-2 (a)



4 - 2 - 1 Removal

a) Remove the hooks (two places) on one side of the front bezel with tweezers, etc. and bend and remove it as shown in Fig. 4 - 2 (a).

4 - 2 - 2 Installation

a) Hook portion G of the front bezel to the frame unit and bend and install it as shown in Fig. 4 - 2 (b).

4 - 3 Replacement of Eject Button

4 - 3 - 1 Removal

a) Remove the FDD cover. (See 4 - 1)

b) Remove the front bezel.

c) Remove the eject button while pushing down (arrow direction) the portion of the eject plate ASS'Y to which the pawl of the eject button is hooked,with tweezers, etc. as shown in Fig. 4 - 3 (a).

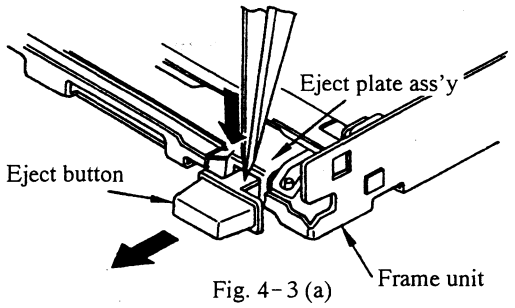


Fig. 4 - 3 (a)

4 - 3 - 2 Installation

a) Insert and install the eject button to the eject plate ass'y as shown in Fig. 4 - 3 (b).

Note : Pay attention to the direction of the eject button. Check that the pawl of the eject button is completely inserted in the eject plate ass'y.

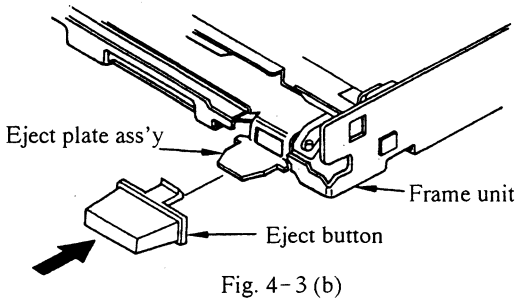


Fig. 4 - 3 (b)

b) Install the front bezel. (See 4 - 2)

c) Install the FDD cover. (See 4 - 1)

4 - 4 Replacement of Disk Holder Unit

4 - 4 - 1 Removal

a) Remove the FDD cover. (See 4 - 1)

b) Remove the front bezel. (See 4 - 2)

c) Remove the eject stopper screw (W Semus round head screw) as shown in Fig. 4 - 4 (a).

d) Remove and hook the two eject springs hooked to the disk holder unit to the catch (H of the eject plate ass'y.

e) If you push the top portion of the eject button, the disk holder unit will be raised.
Remove it by pulling it in the arrow direction.

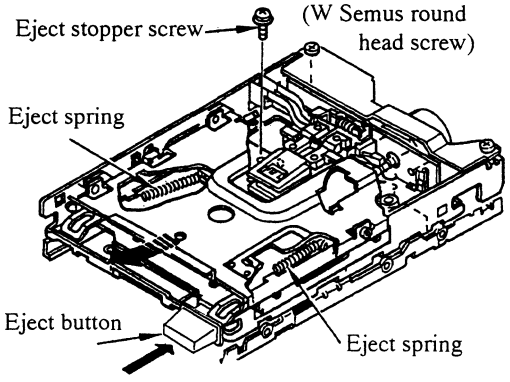


Fig. 4 - 4 (a)

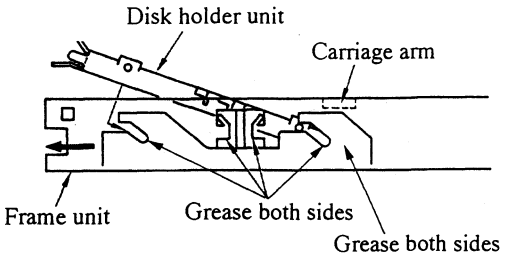


Fig. 4-4 (b)

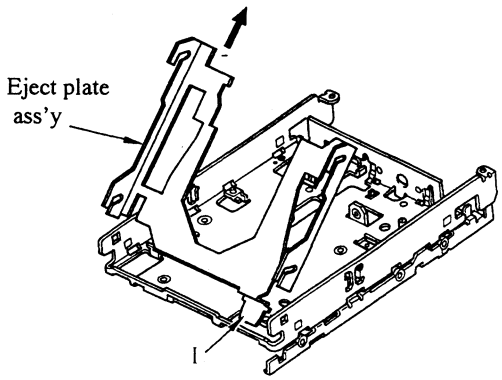


Fig. 4-5 (a)

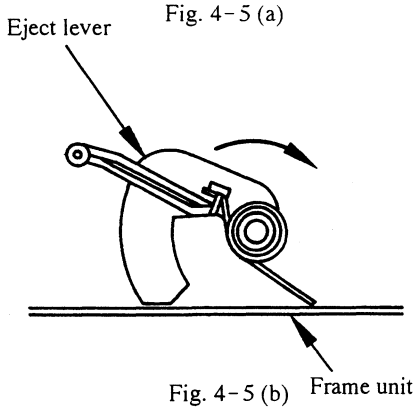


Fig. 4-5 (b)

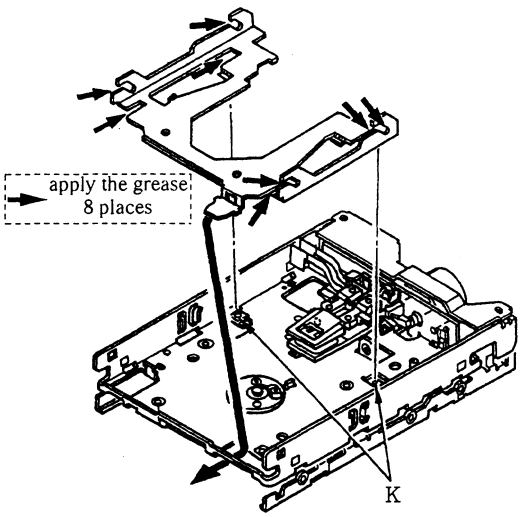


Fig. 4-5 (c)

4-4-2 Installation

a) Insert the disk holder under portion J of arms of carriage ass'y as shown in Fig. 4-4 (b).
b) Install the disk holder unit by setting it in the groove of the eject plate ass'y and guide of the frame unit.
c) Pull the eject plate ass'y in the arrow direction.
d) Remove the two eject springs from the eject plate unit and install them to the disk holder.
e) Install the eject stopper screw (W Semus round head screw).
f) Install the front bezel. (See 4-2)
g) Install the FDD cover. (See 4-1)

Note : When replacing, apply grease (Floil MGA1) to the frame unit (4 places) and eject plate guide groove portion (4 places).

4-5 Replacement of Eject Plate Ass'y

4-5-1 Removal

a) Remove the FDD cover. (See 4-1)
b) Remove the front bezel. (See 4-2)
c) Remove the eject button. (See 4-3)
d) Remove the disk holder unit. (See 4-4)
e) Remove it by pushing portion I of the eject plate ass'y and raising it in the arrow direction from the back side of the eject plate ass'y, as shown in Fig. 4-5 (a). (At that time, the eject lever should be pulled in the arrow direction to install, as shown in Fig. 4-5 (b))

4-5-2 Installation

a) Set the holes of the eject plate ass'y to the bent portions (K) of the frame unit and push it in the arrow direction to install, as shown in Fig. 4-5 (c). (The eject button installation should be passed through the frame hole as shown by the arrow.)
b) Install the disk holder unit. (See 4-4)
c) Install the eject button. (See 4-3)
d) Install the front bezel. (See 4-2)
e) Install the FDD cover. (See 4-1)

Note : When replacing, apply the grease (Floil MGA1) to the eject plate ass'y (8 places).

4 - 6 Replacement of Eject Lever

4 - 6 - 1 Removal

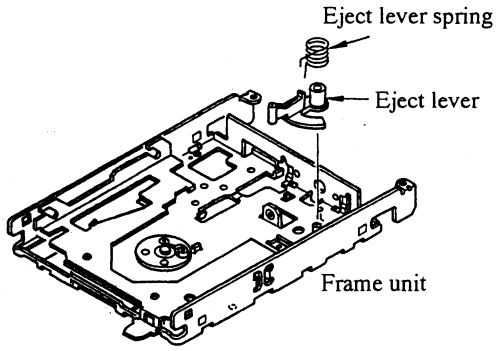


Fig. 4 - 6 (a)

a) Remove the FDD cover. (See 4 - 1)
b) Remove the front bezel. (See 4 - 2)
c) Remove the eject button. (See 4 - 3)
d) Remove the disk holder unit. (See 4 - 4)
e) Remove the eject plate ass'y. (See 4 - 5)
f) Remove the eject lever spring from the hook (L) of the eject lever and remove the eject lever spring, as shown in Fig. 4 - 6 (a) (b).
g) Remove the eject lever.

4 - 6 - 2 Installation

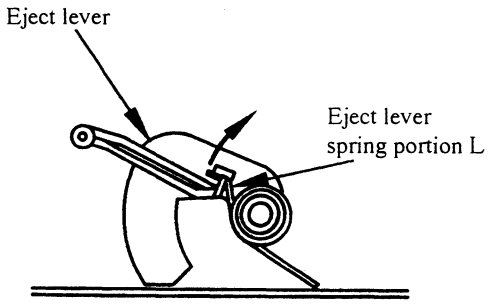


Fig. 4 - 6 (b) View from top

a) Insert the eject lever onto the pin of the frame unit as shown in Fig. 4 - 6 (a), (b).
b) Hook the eject lever spring to the top of the eject lever. The spring end (frame side) should be pushed in to the bent base of the frame.
c) Install the eject plate ass'y. (See 4 - 5)
d) Install the disk holder unit. (See 4 - 4)
e) Install the eject button. (See 4 - 3)
f) Install the front bezel. (See 4 - 2)
g) Install the FDD cover. (See 4 - 1)

4 - 7 Replacement of Carriage Ass'y

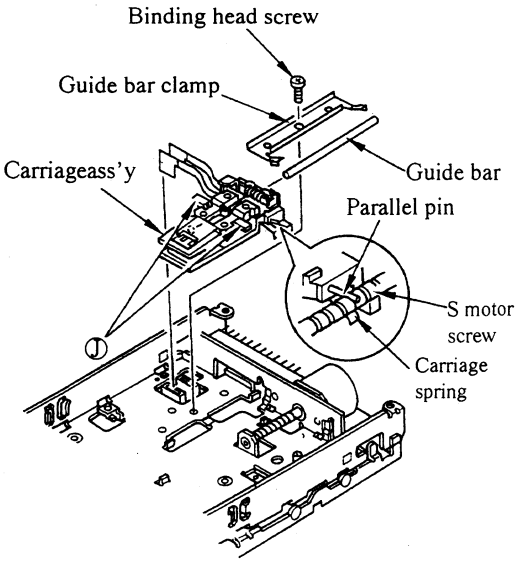


Fig. 4-7 (a)

4 - 7 - 1 Removal

a) Remove the FDD cover. (See 4 - 1)
b) Remove the front bezel. (See 4 - 2)
c) Remove the eject button. (See 4 - 3)
d) Remove the disk holder unit. (See 4 - 4)
e) Pull out the FPC of the carriage ass'y from the connector.
f) Remove the guide bar mounting screw (binding head screw) and remove the guide bar clamp as shown in Fig. 4 - 7 (a).
g) Hold the portion J of upper arm of the carriage ass'y with hand and pull it up obliquely toward the connector side. (Do not apply unnecessary force to the carriage ass'y.)
h) Remove the guide bar from the carriage ass'y.

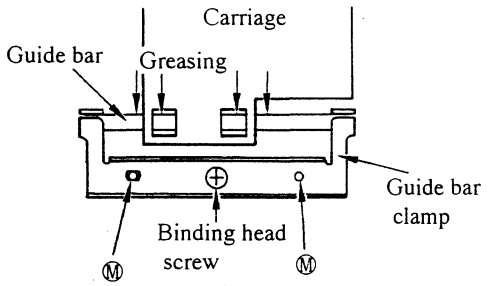


Fig.4-7(b)

4 - 7 - 2 Installation

a) Pass the guide bar through the carriage ass'y.
b) Apply the grease (Floil MGA1) to the guide bar (4 places) as shown in Fig. 4 - 7 (b). (Turn the guide bara to distribute the grease. Hold the guide bar and install the guide bar for dropping of the carriage under its own weight.)
c) Insert the screw spring of the carriage ass'y and parallel pin in the screw of the stepping motor as shown in Fig. 4 - 7 (a).

Note : Do not deform the ϕ sensor shutter portion of the carriage ass'y in Fig. 4 - 7 (c).

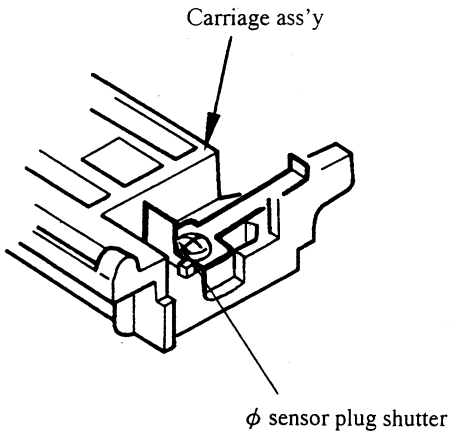


Fig. 4-7 (c)

d) Adjust the hole of the guide bar clamp to the frame unit positioning place (M) and install it with the guide bar mounting screw (binding head screw).
e) AInsert the FPC of the carriage ass'y in the connector.
f) AInstall the disk holder unit. (See 4 - 4)
g) AInstall the eject button. (See 4 - 3)
h) AInstall the front bezel. (See 4 - 2)
i) AInstall the FDD cover. (See 4 - 1)

4 - 8 Replacement of Rear Plate

4 - 8 - 1 Removal

a) Remove the two rear plate mounting screws (binding head screws) and removethe rear plate as shown in Fig. 4 - 8 (a).

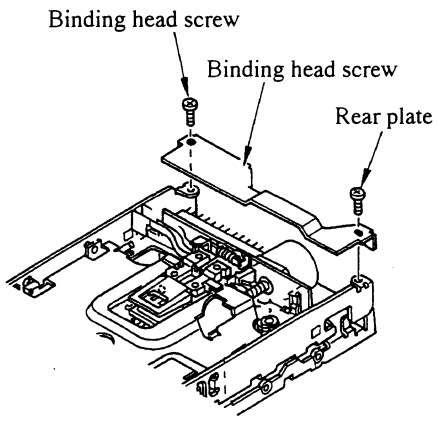


Fig. 4-8 (a)

4 - 8 - 2 Installation

a) Install the rear plate with the rear plate mounting screws as shown in

4 - 9 Replacement of Stepping Motor

4 - 9 - 1 Removal

a) Remove the FDD cover. (See 4 - 1)
b) Remove the front bezel. (See 4 - 2)
c) Remove the eject button. (See 4 - 3)
d) Remove the disk holder unit. (See 4 - 4)
e) Remove the carriage ass'y. (See 4 - 7)
f) Remove the rear plate. (See 4 - 8)
g) Turn over the main body and remove the FPC of the stepping motor from the PCB with the soldering iron.
h) Remove the two stepping motor mounting screws (W Semus cross-recessed round head screws) and remove the stepping motor as shown in Fig. 4 - 9 (a).
i) Remove the steel ball from the end of the stepping motor.

Note : Do not lose the steel ball.

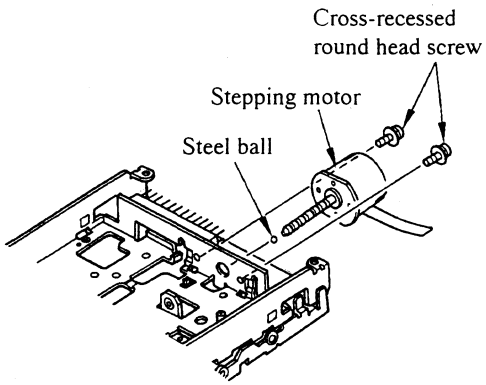


Fig. 4-9 (a)

4 - 9 - 2 Installation

a) Install the steel ball to the end of the stepping motor as shown in Fig. 4 - 9 (a).
b) Install the stepping motor with the two stepping motor mounting screws (W Semus cross-recessed round head screws) as shown in Fig. 4 - 9 (b).
(After CE adjustment, apply the lock agent to specified two places.)
c) Install the FPC of the stepping motor to the main PCB with the soldering iron.
d) Install the rear plate. (See 4 - 8)
e) Install the carriage ass'y. (See 4 - 7)
f) Install the disk holder unit. (See 4 - 4)
g) Install the eject button. (See 4 - 3)
h) Install the front bezel. (See 4 - 2)
i) Install the FDD cover. (See 4 - 1)

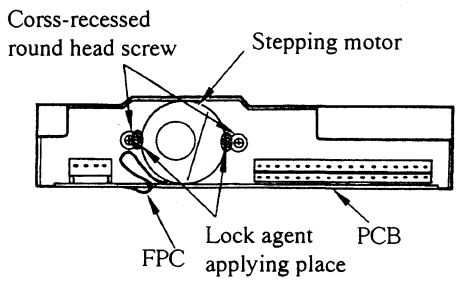


Fig. 4-9 (b)

4 - 10 Replacement of Rotor Ass'y and Disk Table Ass'y

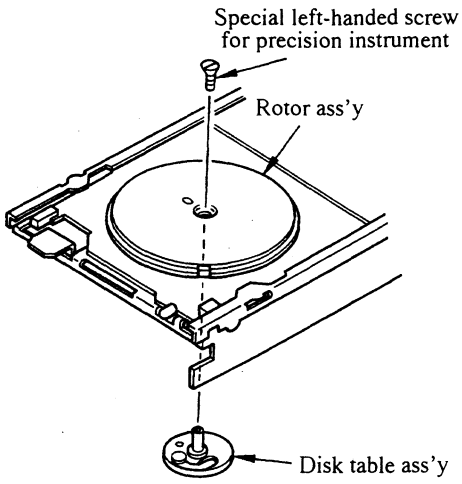


Fig. 4 - 10 (a)

4 - 10 - 1 Removal

a) Remove the FDD cover. (See 4 - 1)
b) Remove the front bezel. (See 4 - 2)
c) Remove eject button. (See 4 - 3)
d) Remove the disk holder unit. (See 4 - 4)
e) Turn over the main body, remove the rotor ass'y mounting screw (special left-handed screw for precision instrument), and remove the rotor ass'y and disk table ass'y.

Note : Since the rotor ass'y mounting screw is left-hand thread, attention should be paid to the direction of the screw.

4 - 10 - 2 Installation

a) Check that there is the bearing and install the rotor ass'y and disk table ass'y with the rotor ass'y mounting screw (special left-handed screw for precision instrument) as shown in Fig. 4 - 10 (b).

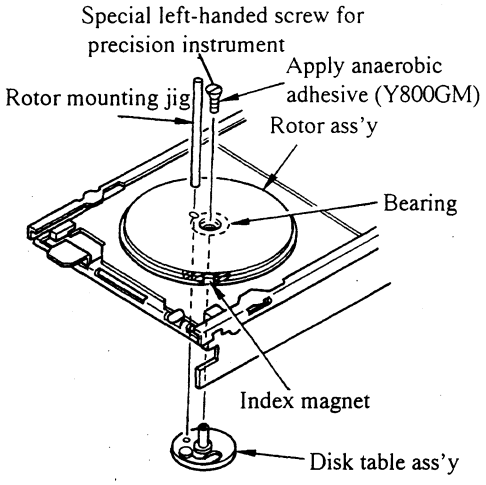


Fig. 4 - 10 (b)

Adhesive (UV) application place

Note : Apply the anaerobic adhesive (Y800GM) to the end of the rotor ass'y mounting screw. In order to position the disk table ass'y, pass the the rotor mounting jig through the holes of the rotor ass'y, frame unit, and disk table ass'y, and install it with the rotor ass'y mountingscrew. After adjusting the burst wave, attach the index magnet to the rotor ass'y with the adhesive (3062 UV).

b) Install the disk holder unit. (See 4 - 4)
c) Install the eject button. (See 4 - 3)
d) Install the front bezel. (See 4 - 2)
e) Install the FDD cover. (See 4 - 1)

4 - 11 Replacement of Main PCB

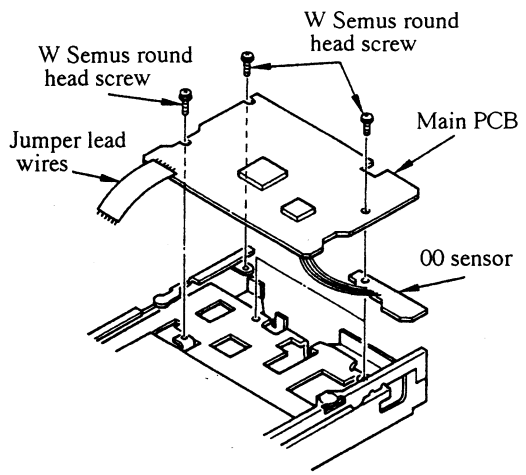


Fig. 4-11 (a)

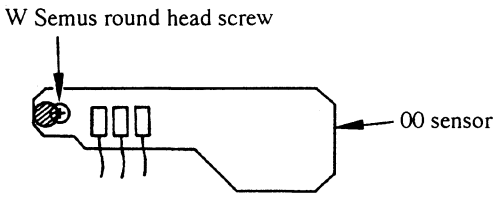


Fig. 4-11 (b)

Lock agent application place

4 - 11 - 1 Removal

a) Remove the FDD cover. (See 4 - 1)

b) Remove the FPC (2 places) of the carriage from the connectors.

c) Remove the FPC of the stepping motor from the main PCB with the soldering iron.

d) Remove the jumper lead wires to which the main PCB and D motor PCB are connected, with the soldering iron as shown in Fig. 4 - 11 (a). (At that time, D motor PCB should be removed.) Remove the three main PCB mounting screws (W Semus round head screws) and one 00 sensor mounting screw (W Semus round head screw) and remove the main PCB and 00 sensor.

4 - 11 - 2 Installation

a) Install the main PCB and 00 sensor with the three main PCB mounting screws (W Semus round head screws) and one 00 sensor mounting screw (W Semus round head screw) as shown in Fig. 4 - 11 (a). (The lead wires of the 00 sensor should be prevented from entering the hole of theframe unit. After adjusting the 00 sensor, apply the lock agent to the specified place.)

b) Solder the FPC of the stepping motor to the main PCB.

c) Solder the jumper lead wires to the D motor PCB.

d) Insert the FPC (2 places) of the carriage in the connectors.

e) Install the FDD cover. (See 4 - 1)

f) (Adjust the 00 sensor.)

Note : If the stepping motor FPC or jumper lead wires are damaged when soldering, they should be replaced.

4 - 12 Replacement of D Motor PCB

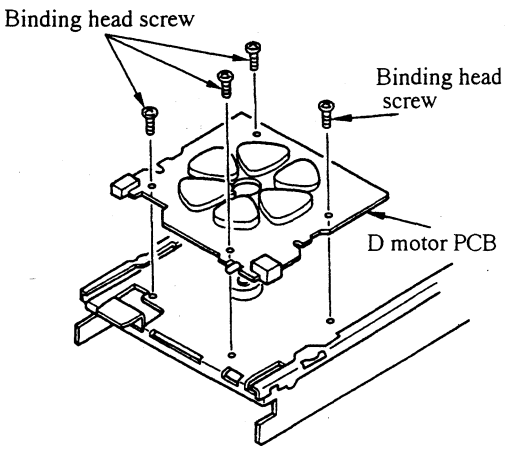


Fig. 4 - 12

4 - 12 - 1 Removal

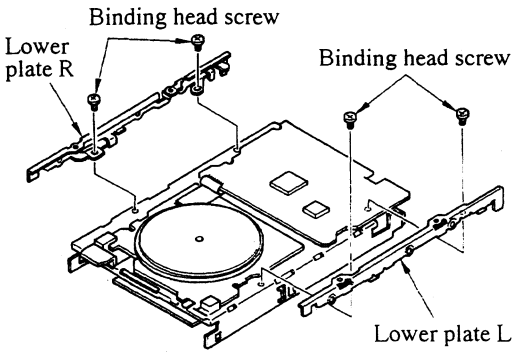
a) Remove the FDD cover. (See 4 - 1)
b) Remove the front bezel. (See 4 - 2)
c) Remove the eject button. (See 4 - 3)
d) Remove the disk holder unit. (See 4 - 4)
e) Remove the rotor ass'y and disk table ass'y. (See 4 - 10)
f) Remove the jumper lead wires on the D motor PCB side with the soldering iron.
g) Remove the four D motor PCB mounting screws (binding head screws) and remove the D motor PCB as shown in Fig. 4 - 12 (a).

4 - 12 - 2 Installation

a) Install the D motor PCB with the four D motor PCB mounting screws (binding head screws) as shown in Fig. 14 - 1 (a).
b) Install the jumper lead wires to the D motor PCB with the soldering iron.
c) Install the rotor ass'y and disk table ass'y. (See 4 - 10)
d) Install the disk holder unit. (See 4 - 4)
e) Install the eject button. (See 4 - 3)
f) Install the front bezel. (See 4 - 2)
g) Install the FDD cover. (see 4 - 1)

Note : If the jumper wires are damaged, they should be replaced.

4 - 13 Replacement of Lower Plates R, L



4 - 13 - 1 Removal

a) Remove the FDD cover. (See 4 - 1)
b) Remove the front bezel. (See 4 - 2)
c) Remove the main PCB. (See 4 - 11)
d) Remove the four lower plate mounting screws (binding head screws) and remove the lower plates R and L.

4 - 13 - 2 Installation

a) Install the lower plates R and L with the four lower plate mounting screws (binding head screws).

Note : Pay attention to the difference between lower plates R and L.

b) Install the main PCB. (See 4 - 11)
c) Install the front bezel. (See 4 - 2)
d) Install the FDD cover. (See 4 - 1)

4 - 14 Replacement of LED

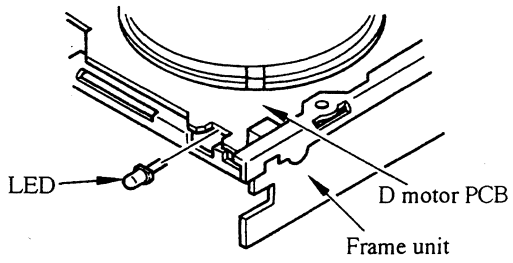


Fig. 4-14 (a)

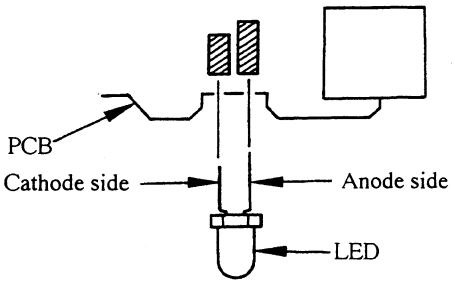


Fig. 4-14 (b)

4 - 14 - 1 Removal

a) Remove the front bezel. (See 4 - 2)
Turn over the main body and remove the LED with the soldering iron as shown in Fig. 4 - 14 (a).

4 - 12 - 2 Installation

a) Install the LED with the soldering iron as shown in Fig. 4 - 14 (a), (b).
b) Install the front bezel. (See 4 - 2)

Note : Pay attention to the polarity (anode, cathode) of the LED.

Note : The tightening torque with the screwdriver is 3.5 [kgf-cm] for rotor ass'y mounting screw and 2.5 [kgf-cm] for all the other works.

Chapter 5 Checking and Adjustment

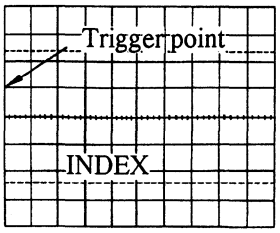
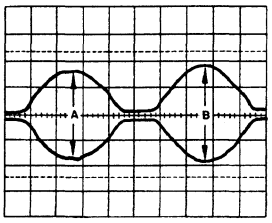
5 - 1 Standards

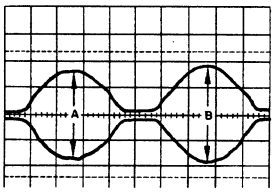
		Standard
1. Environmental conditions	Ambient temperature	a) When operating 5 ℃ to 50 ℃ b) When stored − 40 ℃ to 65 ℃
2. Standard of parts	Design life of parts Drive motor	5 years Revolutions 300rpm ± 2%...D357T3 D358T3(1M) D359T3 Revolutions 360rpm ± 2%...D358T3(1.6M)
3. Electrical characteristics	○ Input signal	LOW level 0 to 0.7V HIGH level 2.5 to 5.5V
	○ Output signal	LOW level 0 to 0.4V HIGH level 5.5V max
4. Checking/ adjustment	a) Track position (CE)	Tr00 → Tr40 60% or higher Tr79 → Tr40 60% or higher
	b) Azimuth angle	0 ± 21 [']
	c) Index burst	From leading edge of index pulse 200 ± 400 [μs]
	d) Modulation	10% or less
	e) Resolution	Tr00 100% or less Tr79 55% or more
	f) Frequency • 1M mode 1f signal 2f signal • 1.6M mode 1f signal 2f signal • 2M mode 1f signal 2f signal	 62.5 [KHz] 125 [KHz] 125 [KHz] 250 [KHz] 125 [KHz] 250 [KHz]

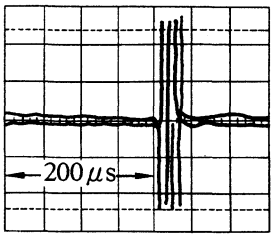
5 - 2 Adjustment

Exerciser → E　　Oscilloscope → O　　FDD → D

Operating procedure	Command	Keying	Display
1. Preparation for adjustment			
1) Connect as shown in Fig. 3 – 1, P. 8			
2) Turn on the power supply to the oscilloscope.			
① Connect the probe of CH3 to the index of the exerciser.	O	Probe × 1	
② Connect the probe of CH1, CH2 to the output TESTPIN (TP1) of FDD.	E	Probe × 1	
3) Exerciser	D		
DC POWER SWITCH ON MOTOR SWITCH ON			INUSE LED lighting MOTOR ON lamp lighting
4) Insert the alignment disk.	E		
		DC POWER MOTOR	
Note : For putting in/out the alignment disk, avoid Tr40.	D		
5) RECAL SWITCH ON			Tr00 lamp lighting
		RECAL	
	E		

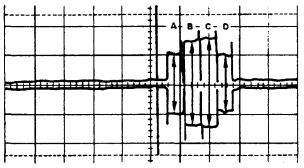
Operating procedure	Command	Keying	Display
6) Oscilloscope	O		
① Trigger with CH3 and hold so that the trailing edge of the index will be at the left end of the display.		Pull HOLD OFF.	
CH2 is DC		DC	
INDEX SWEEP MODE			
NORMAL	O	NORM	SWEEP/DIV 20ms/DIV
DISPLAY			VOLT/DIV 0.5V/DIV
A		A	
INT TRIG			
CH3		CH3	
② CH2 INVERSE and ADD of CH1 and CH2		INT	CE signal
CH1 AC	O	CN2 INV	
CH2 AC		ADD	
		AC	
		AC	
2. CE adjustment			SWEEP/DIV 20ms/DIV
1) Carriage access to Tr40.		CE	CH1 VOLT/DIV 0.1V/DIV
	E		CH2 VOLT/DIV 0.1V/DIV
2) Loosen the stepping motor mounting screw, slide the stepping motor, and adjust so that the A : B (B : A) in the right figure will be 10 : 6 or more.			

Operating procedure	Command	Keying	Display
3) Carriage access from Tr00 to Tr40. Check that A : B (B : A) of the CE signal is 10 : 6 or more.	E	OUTER CE	
① Carriage access from Tr79 to Tr40. Check in the same way.		INNER CE	SWEEP/DIV 20ms/DIV CH1 VOLT/DIV 0.1V/DIV CH2 VOLT/DIV 0.1V/DIV
* If A : B (B : A) is less than 10 : 6, adjust again in the procedures in 1) and 2).			* A < B Head is at outer periphery. * A > B Head is at inner periphery.
Switch the SIDE SELECT SWITCH and adjust through operations in 1) through 3) to obtain 10 : 6 or more for both Side 0 and Side 1.	E	0	
After the adjustment/checking is completed, apply the lock agent.		1	
3. INDEX BURST adjustment			
1) Make connection in the same way as for CE adjustment. Oscilloscope SWEEP/DIV 0.1mF/DIV			
2) Turn the index burst adjusting volume and set it at a point 200ms from the trigger.			

Operating procedure	Command	Keying	Display
	O D		Index Trig  SWEEP/DIV 0.1ms/DIV CH1 VOLT/DIV 0.1V/DIV CH2 VOLT/DIV 0.1V/DIV
4. 00 sensor check			
1) Connect the probe of CH1 to 00 sensor TESTPIN (TP1). VOLT/DIV 2V/DIV SWEEP MODE AUTO DC ① Step in from Tr00 to Tr0l and Tr02. Tr00 → L Tr01 → 1.0~3.8V Tr02 → H Move the 00 sensor assembly and adjust as follows. ② Step out from Tr02 to Tr0l and Tr00. Check if the setting is same as in 1) and apply the lock agent.	D O E	AUTO DC IN OUT	

5 – 3 Measurement

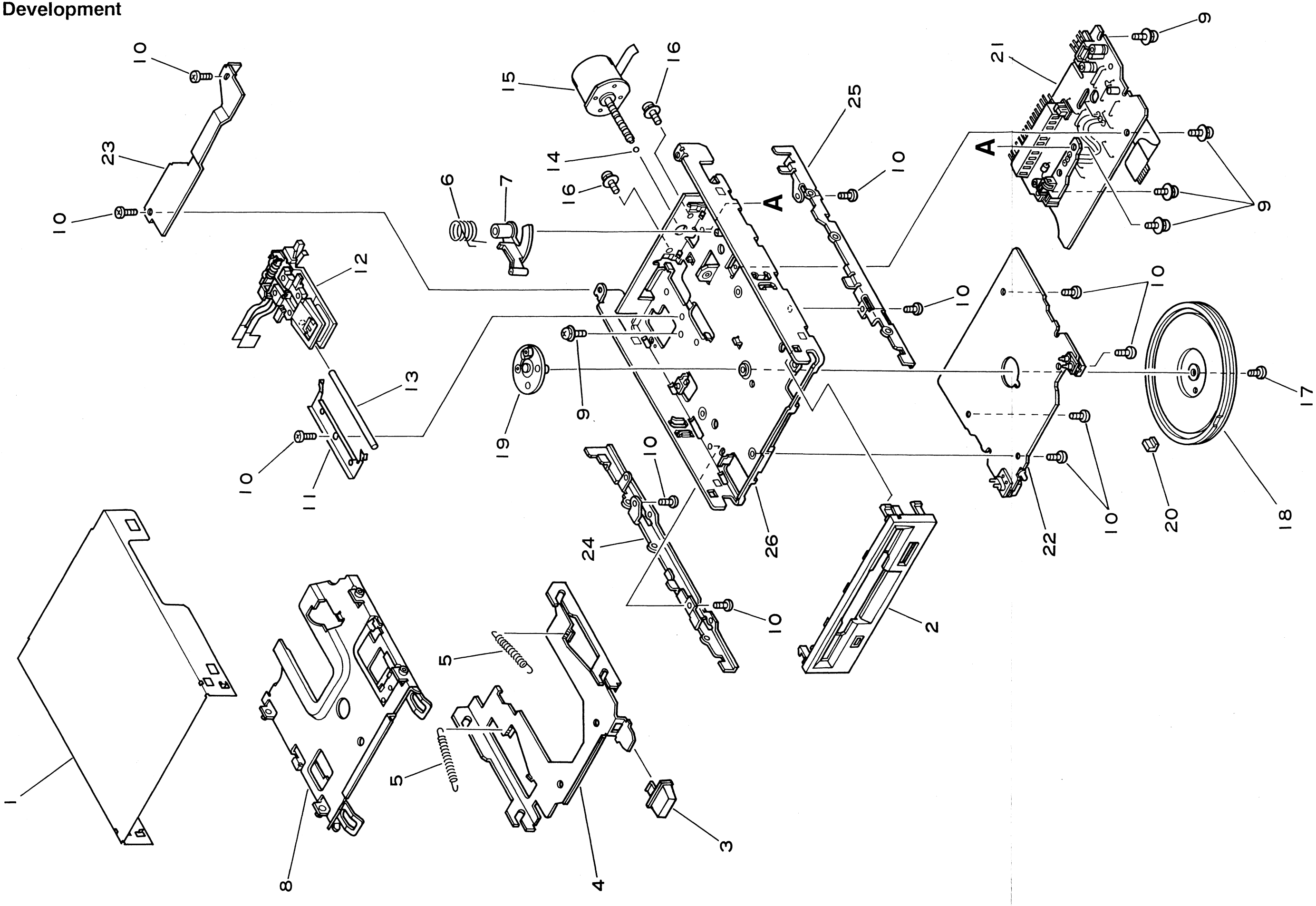
Commands E ... Exerciser O ... Oscilloscope D ... FDD

Operating procedure Command	Command	Keying	Display
1) DC POWER SWITCH ON	E	DC POWER	
MOTOR SWITCH ON	E	MOTOR	
2) Insert alignment disk.	D		
3) RECAL I SWITCH ON	E	RECAL	
4) Conduct CE measurement in accordance with the operating procedures in 5 – 2 adjustment.			
5) Azimuth			
SWEEP/DIV 0.5ms/DIV			
CH1. VOLT/DIV 0.1V/DIV	O	CH1, 2 probe × 1	
CH2. VOLT/DIV 0.1V/DIV	O	CH3 probe × 1	
CH3. VOLT/DIV 1V/DIV			
Tr40			
① Read the voltage A, B, C, and D values from the azimuth waveform with the oscilloscope through the exerciser.	E	CE	
② Calculation			
A > D Azimuth = 21 × (C – B)/(B – D)			
A < D Azimuth = 21 × (C – B)/(B – D)			
Note : Azimuth 0 ± 21 (')			
6) Take out the alignment disk.			
Note : For putting in/taking out the alignment disk, avoid Tr40.	D		

Operating procedure command	Command	Keying	Display
7) OUTPUT SWEEP/DIV 20ms/DIV CH1. VOLT/DIV 0.1V/DIV CH2. VOLT/DIV 0.1V/DIV CH3. VOLT/DIV 1V/DIV	 O O O O	 CH1, 2 probe × 1 CH3 probe × 1	
① Return the head to Tr00.	E		
② Insert the work disk.			
③ Seek values of head output, modulation and resolution in accordance with the operating procedure of 11 in 3 − 3 − 1.		OUTER	
* For Side 1, too, conduct the measurement on the same items in 4) − 7) as for Side 0. Conduct the same measurement in 2M mode, too.	E	1	

Chapter 6 Development and List of Parts

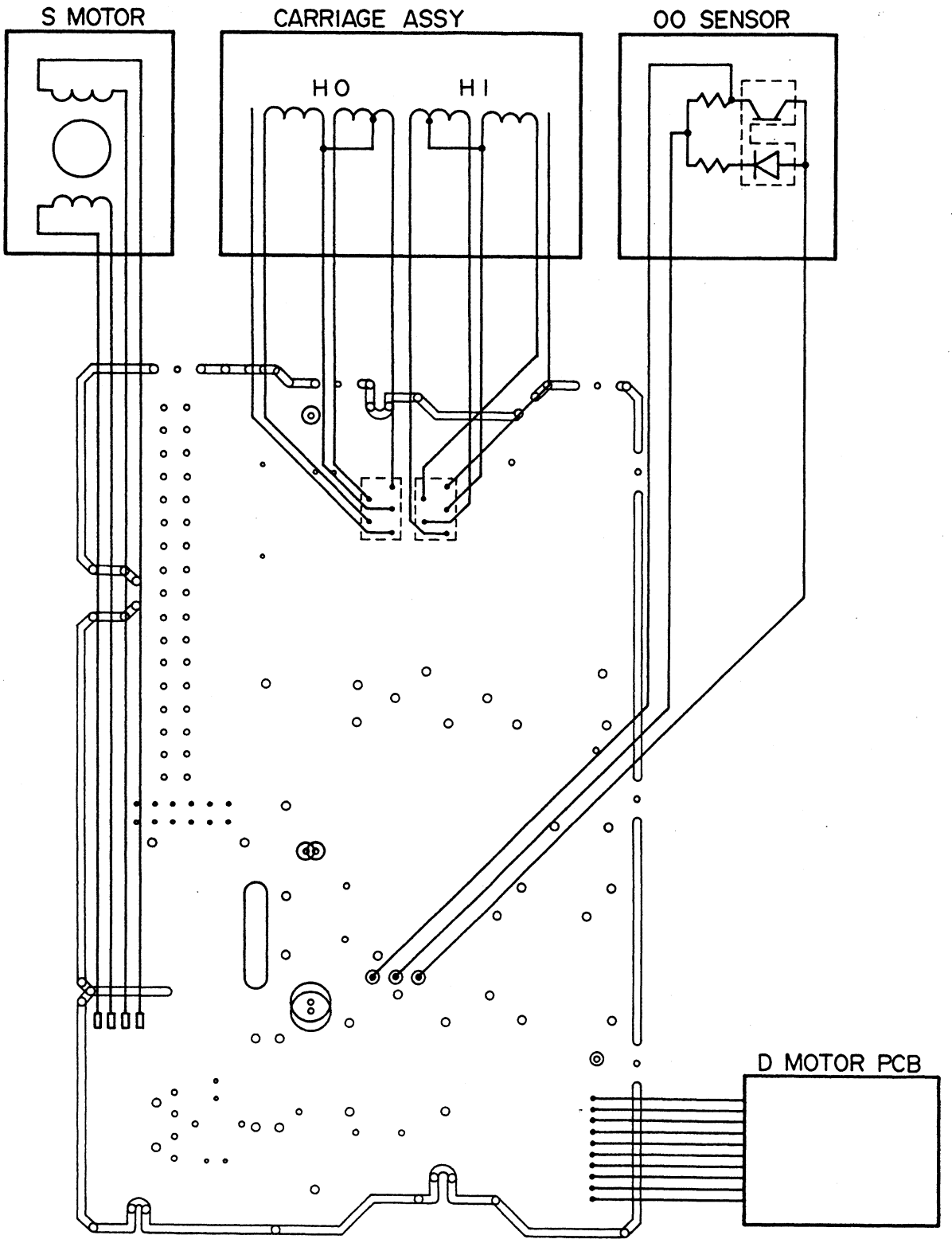
6 - 1 Development



6-2 D357T3, D358T3, D359T3 Mechanical Parts List

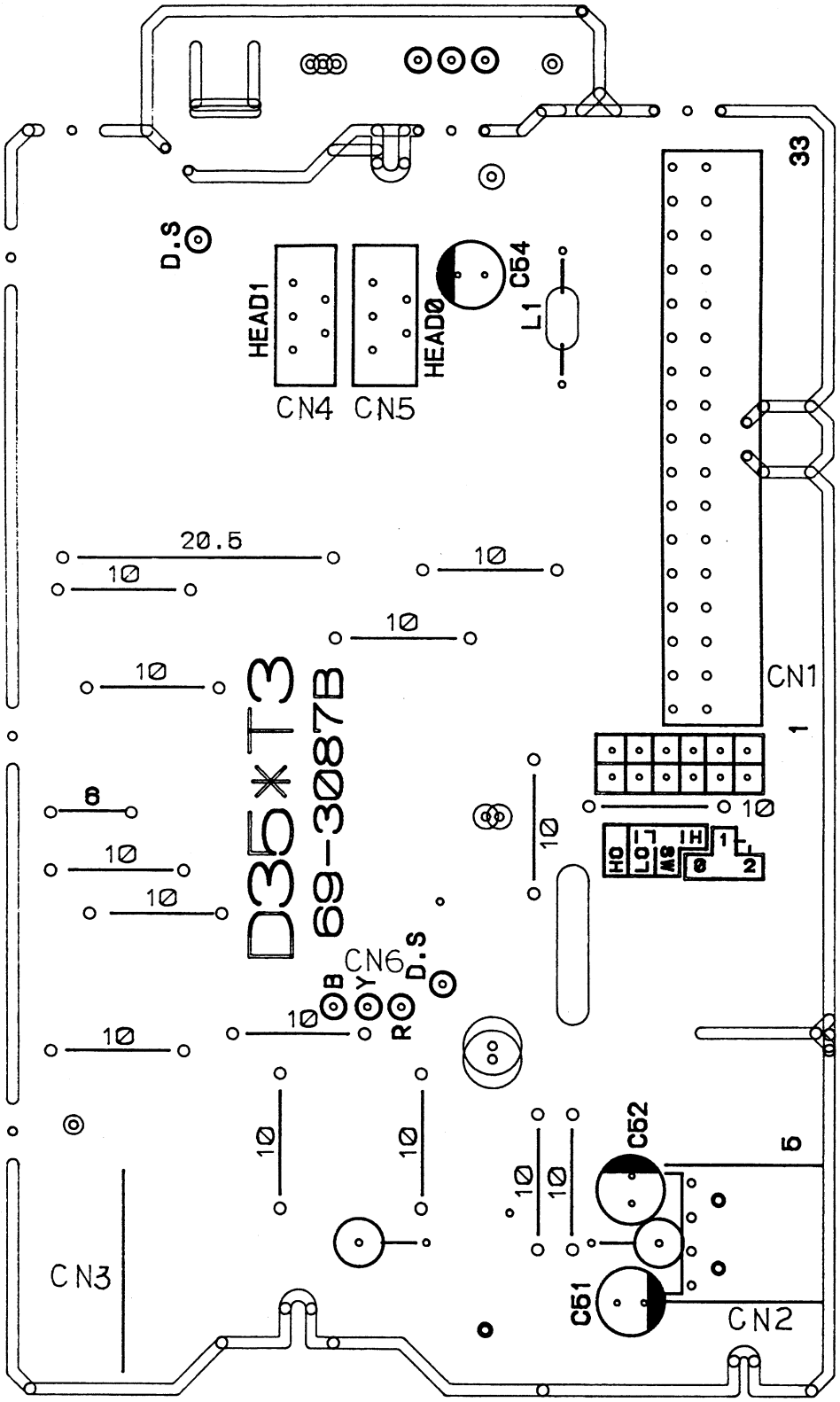
No.	Drawing No.	Product Name
	69 – 2933 – 1A	FDD cover
	69 – 2930 – 1C	Front bezel
	69 – 2095 – 1H	Eject button
	69 – 2901 – 1A	Eject plate ass'y
	69 – 2903 – 1A	Eject spring
	69 – 2935 – 1A	Eject lever spring
	69 – 2934 – 1A	Eject lever
	69 – 2898 – 1A	Disk holder unit
	0144691	W Semus round head screw
	0117804	Binding head screw
	69 – 2932 – 1A	Guide bar clamp
	69 – 2910 – 1A	Carriage ass'y
	69 – 1813 – 1B ~ G	Guide bar
	69 – 0337 – 1B	Steel ball
	69 – 2938 – 1A, B	Stepping motor
	69 – 0708 – 2U	Cross-recessed round head screw
	69 – 2909 – 1A	Round head screw for precision instrument
	69 – 2906 – 1A	Rotor ass'y
	69 – 2926 – 1A	Disk table ass'y
	69 – 2929 – 1A	Index magnet
	69 – 3092 – 1A	Main PCB
	69 – 2967 – 1A	D motor PCB
	69 – 2936 – 1A	Rear plate
	69 – 2905 – 1A	Lower plate L
	69 – 2904 – 1A	Lower plate R
	69 – 2895 – 1A	Frame unit

6-3 D357T3, D358T3, D359T3 Connector Connection Diagram

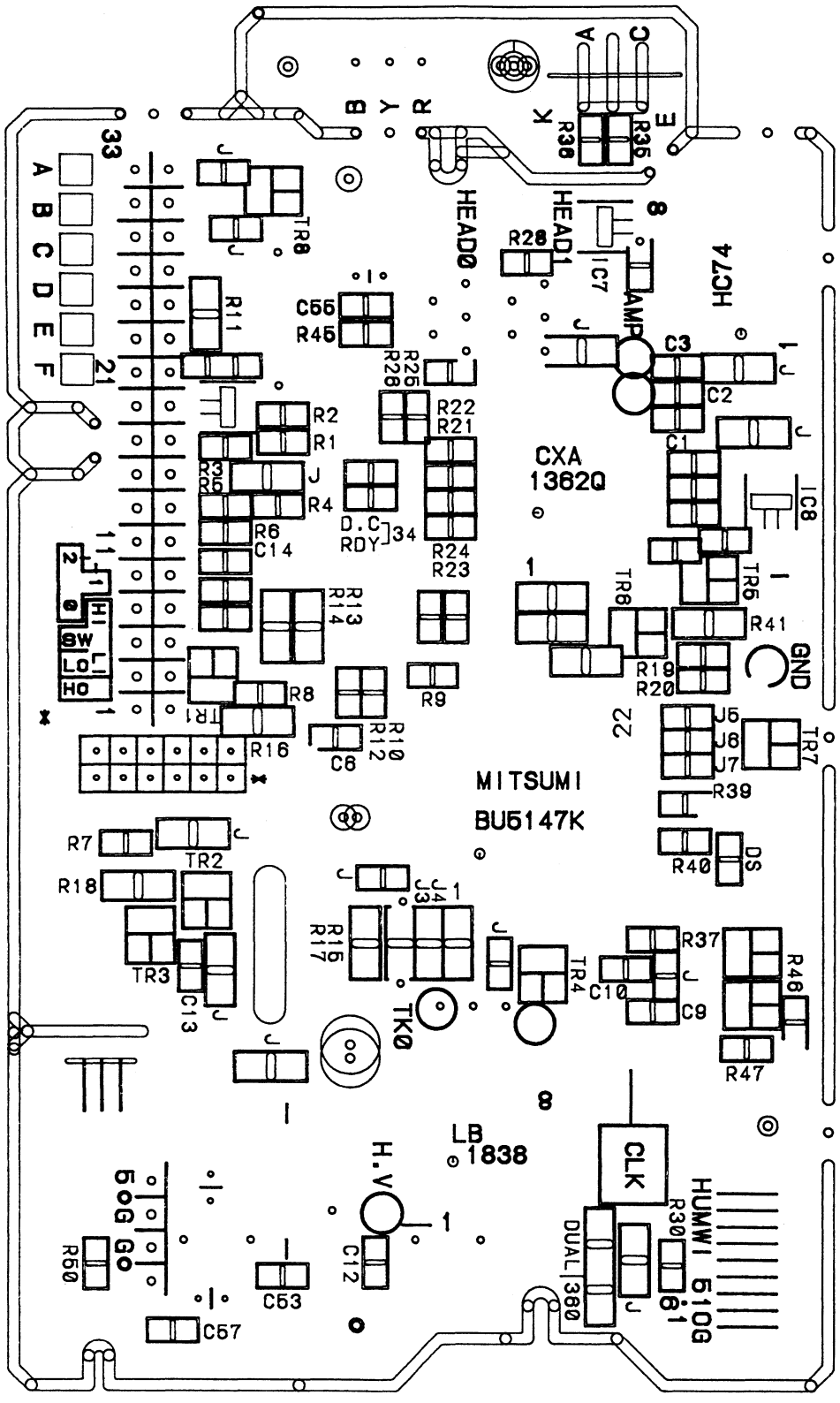


6-4 D357T2, D358T2, D359T3 Parts Arrangement

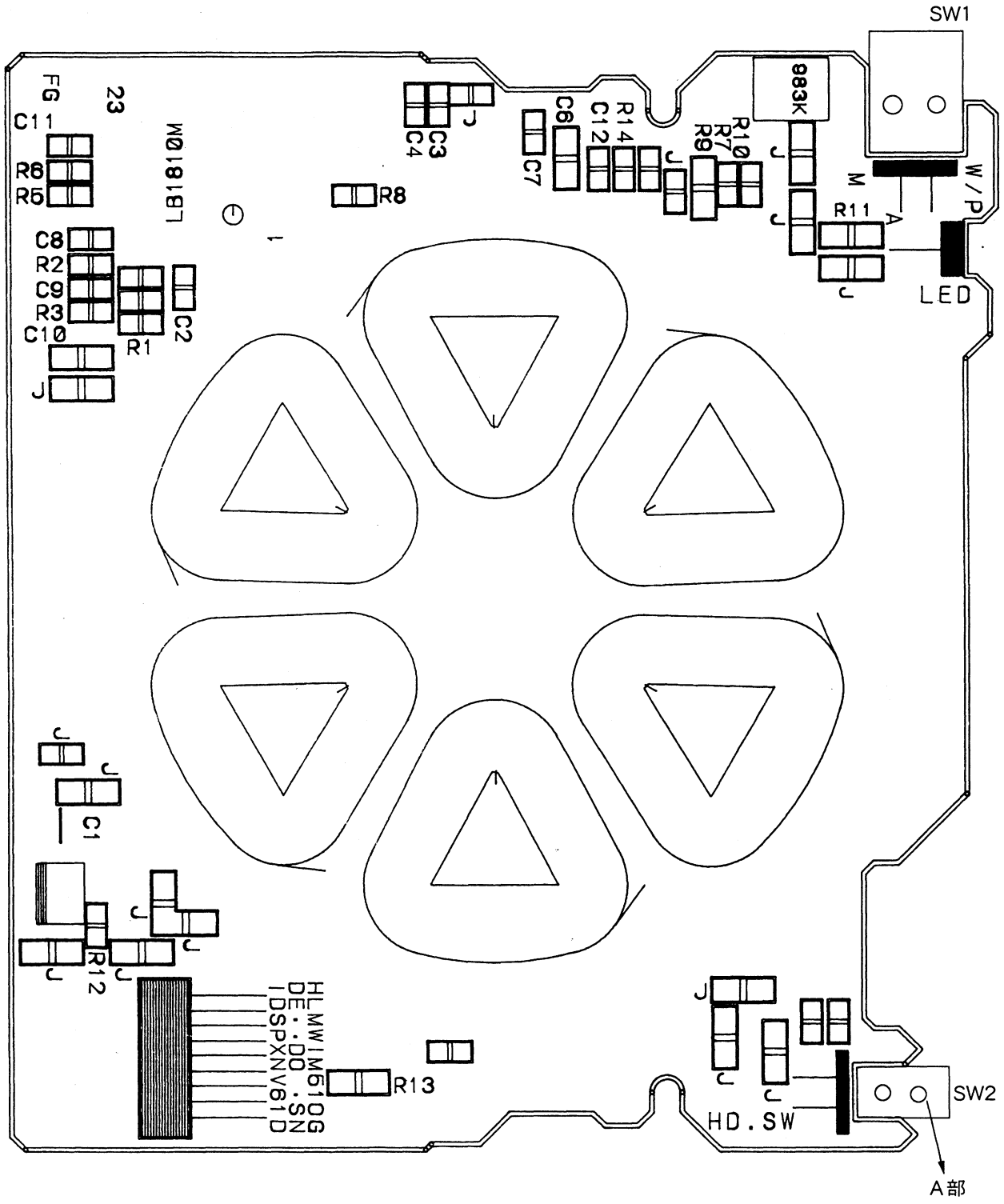
6-4-1 Main PCB (parts side) parts arrangement



6-4-2 Main PCB (chip side) parts arrangement



6-4-3 D motor PCB parts arrangement



6 - 5 PCB Assembly Parts List

6 - 5 - 1 D357T3 MAIN PCB Assembly Parts List

Resistance

R1~7,9,10,12	0054460	RKC-102JW10T200
R11,13~15	0053439	RKC-102JW08T300
R41,45	0053611	RKC-562JW08T300
R19,20,35	0054692	RKC-103JW10T200
R21,24	0054627	RKC-512JW10T200
R22	0101196	RKC-162JW10T200
R23	0054718	RKC-123JW10T200
R25,26	0059162	RKC-621JW10T200
R28	0054734	RKC-153JW10T200
R29	0054791	RKC-273JW10T200
R30	0054635	RKC-562JW10T200
R36	0101188	RKC-241JW10T200
R37	0055103	RKC-105JW10T200
R39,40	0054460	RKC-102JW10T200
R43	0054569	RKC-302JW10T200
R44	0054783	RKC-243JW10T200
R50	0054932	RKC-104JW10T200
J	0053975	RKC0000-020T303
J	0055194	RKC0000-020T202

CN

C1,2,3,57	0120261	CKC103K50WBT201
C6,12,53,55	0120378	CKC104Z25WBT200
C9,10	0036202	CCC101J50SLT201
C13,14	0140798	CCC651J50SLT200
C51,52	0029643	CER470M16-C-302
C54	0029264	CER100M19-C-201

Inductor

L1	0116608	LP330KN002

TR

TR1,6,7	04690107012	DTP0024TC223A1C
TR4,8	04690107016	DTP0024TC472B1A
TR5	04690109008	DTP0024TA103B1A

IC

IC1	00590206006	BU5147K
IC2	0123067	HCXA1362Q - - - - SO
IC3	0143560	HLB1838M-TP-T1-SY
IC4	05690317074	74HC74
IC7	05690315004	LIP0037T01ANOR
IC8	05690315003	LIP0037T01AAND

Ceramic OSC

	09690103019	CSB1000JT

Jumper

	0139832	J2861571T0480606
	0139816	J2841571T0480606
	0139857	J2821571T0480606
	0139592	J2851571T0630606
	69-1207-12A	Jumper
	69-1207-1H	Jumper
	69-1940-1U	Jumper
	69-2979-1A	FFC cable

00 Senser

	69-2793-1A	SG211

Ferrite beads

	08690201004	FRW0029-011R62

Connector

CN1	69-1544-1C	connector G
CN2	69-1067-1A	connector F
CN4,5	69-2534-2B	FFC connector

Pin header

	69-3974-1C	9210B

Short pin

	69-1610-2B	Short-circuit plug

6 - 5 - 2 D358T3 MAIN PCB Assembly Parts List

Resistance

R1~10,12	0054460	RKC-102JW10T200
R11,13~15,17	0053439	RKC-102JW08T300
R16,18,41,45	0053611	RKC-562JW08T300
R19,20,35	0054692	RKC-103JW10T200
R21,24	0054627	RKC-512JW10T200
R22	0101196	RKC-162JW10T200
R23	0054718	RKC-123JW10T200
R25,26	0059162	RKC-621JW10T200
R28	0054734	RKC-153JW10T200
R29	0054791	RKC-273JW10T200
R30	0054635	RKC-562JW10T200
R36	0101188	RKC-241JW10T200
R37	0055103	RKC-105JW10T200
R39,40	0054460	RKC-102JW10T200
R43	0054557	RKC-332JW10T200
R44	0054783	RKC-243JW10T200
R50	0054932	RKC-104JW10T200
J	0053975	RKC0000-020T303
J	0055194	RKC0000-020T202

CN

C1,2,3,57	0120261	CKC103K50WBT201
C6,12,53,55	0120378	CKC104Z25WBT200
C9,10	0036202	CCC101J50SLT201
C13,14	0140798	CCC651J50SLT200
C51,52	0029643	CER470M16-C-302
C54	0029264	CER100M19-C-201

Inductor

L1	0116608	LP330KN002

TR

TR1,6,7	04690107012	DTP0024TC223A1C
TR2,3,4,8	04690107016	DTP0024TC472B1A
TR5	04690109008	DTP0024TA103B1A

IC

IC1	00590206006	BU5147K
IC2	0123067	HCXA1362Q - - - - SO
IC3	0143560	HLB1838M-TP-T1-SY
IC4	05690317074	74HC74
IC7	05690315004	LIP0037T01ANOR
IC8	05690315003	LIP0037T01AAND

Ceramic OSC

	09690103019	CSB1000JT

Jumper

	0139832	J2861571T0480606
	0139816	J2841571T0480606
	0139857	J2821571T0480606
	0139592	J2851571T0630606
	69-1207-12A	Jumper
	69-1207-1H	Jumper
	69-1940-1U	Jumper
	69-2979-1A	FFC cable

00 Senser

	69-2793-1A	SG211

Ferrite beads

	08690201004	FRW0029-011R62

Connector

CN1	69-1544-1C	connector G
CN2	69-1067-1A	connector F
CN4,5	69-2534-2B	FFC connector

Pin header

	69-3974-1C	9210B

Short pin

	69-1610-2B	Short-circuit plug

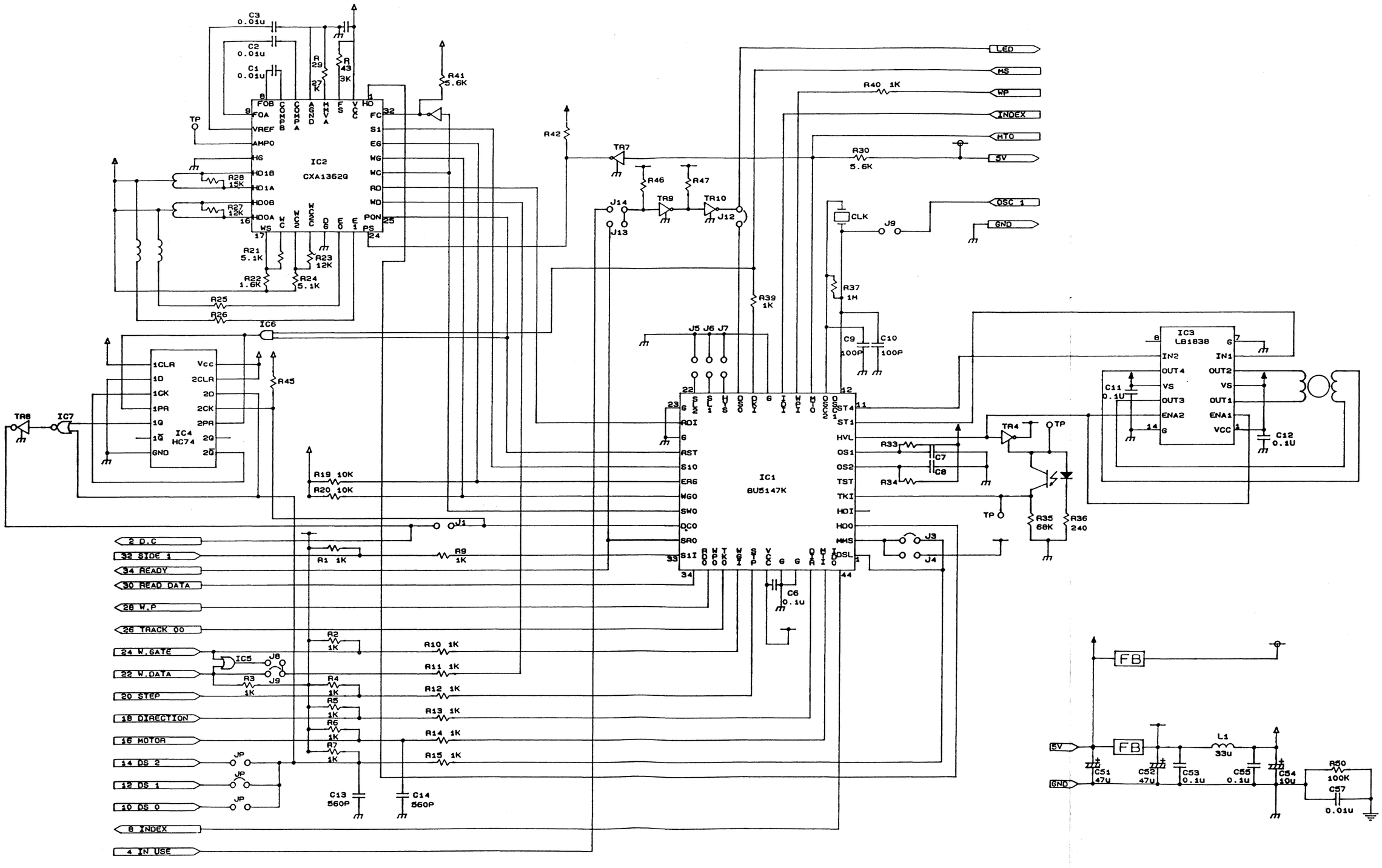
6 - 5 - 3 D359T3 PCB Assembly Parts List

Resistance		
R1~10,12	0054460	RKC-102JW10T200
R11,13~15,17	0053439	RKC-102JW08T300
R16,18,41,45	0053611	RKC-562JW08T300
R19,20,35,44	0054692	RKC-103JW10T200
R21,24	0054627	RKC-512JW10T200
R22	0101196	RKC-162JW10T200
R23	0054718	RKC-123JW10T200
R25,26	0059162	RKC-621JW10T200
R28	0054734	RKC-153JW10T200
R29	0054791	RKC-273JW10T200
R30	0054635	RKC-562JW10T200
R36	0101188	RKC-241JW10T200
R37	0055103	RKC-105JW10T200
R39,40	0054460	RKC-102JW10T200
R43	0054569	RKC-302JW10T200
R50	0054932	RKC-104JW10T200
J	0053975	RKC0000-020T303
J	0055194	RKC0000-020T202
CN		
C1,2,3,57	0120261	CKC103K50WBT201
C6,12,53,55	0120378	CKC104Z25WBT200
C9,10	0036202	CCC101J50SLT201
C13,14	0140798	CCC651J50SLT200
C51,52	0029643	CER470M16-C-302
C54	0029264	CER100M19-C-201
Inductor		
L1	0116608	LP330KN002
TR		
TR1,6,7	04690107012	DTP0024TC223A1C
TR2,3,4,8	04690107016	DTP0024TC472B1A
TR5	04690109008	DTP0024TA103B1A
IC		
IC1	00590206006	BU5147K
IC2	0123067	HCXA1362Q - - - - SO
IC3	0143560	HLB1838M-TP-T1-SY
IC4	05690317074	74HC74
IC7	05690315004	LIP0037T01ANOR
IC8	05690315003	LIP0037T01AAND
Ceramic OSC		
	09690103019	CSB1000JT

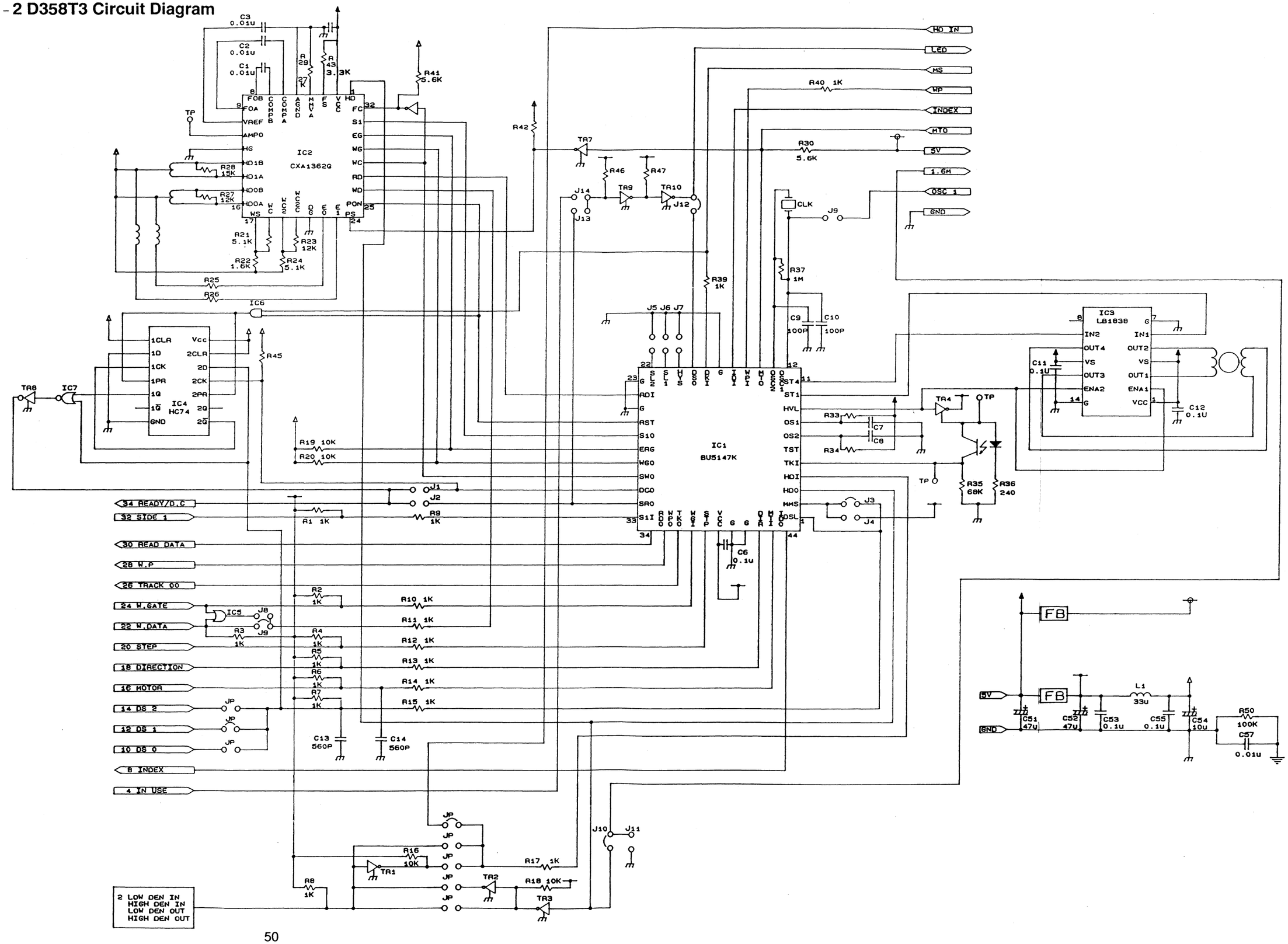
Jumper		
	0139832	J2861571T0480606
	0139816	J2841571T0480606
	0139857	J2821571T0480606
	0139592	J2851571T0630606
	69-1207-12A	Jumper
	69-1207-1H	Jumper
	69-1940-1U	Jumper
	69-2979-1A	FFC cable
00 Senser		
	69-2793-1A	SG211
Ferrite beads		
	08690201004	FRW0029-011R62
Conector		
CN1	69-1544-1C	conector G
CN2	69-1067-1A	conector F
CN4,5	69-2534-2B	FFCconector
Pin header		
	69-3974-1C	9210B
Short pin		
	69-1610-2B	Short-circuit plug

6 - 6 Circuit Diagram

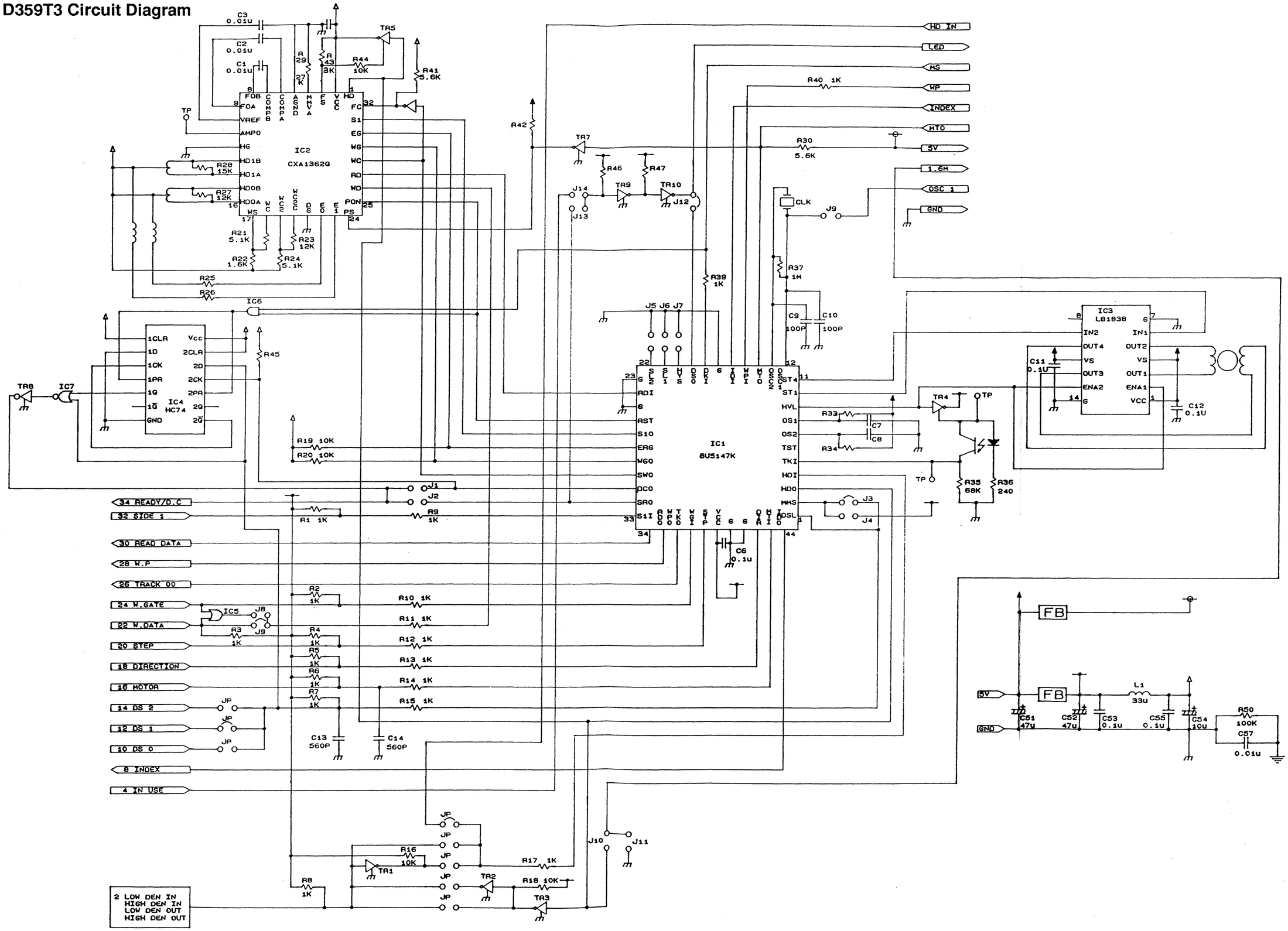
6 - 6 - 1 D357T3 Circuit Diagram



6 - 6 - 2 D358T3 Circuit Diagram



6 - 6 - 3 D359T3 Circuit Diagram



6-6-4 D Motor PCB Circuit Diagram