TJ2-G30050-D

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5.25 INCH FLEXIBLE DISK DRIVE

MODEL M4853

MAINTENANCE MANUAL

STANDARD

MITSUBISH ELECTRIC

CONTENT

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1. General

This manual explains the handling, maintenance and adjustment of M4853 Flexible disk unit.

2. References (schematics and manuals)

M4852/53 Specifications SJ2-G3375C

PCA NAMFB schematic diagram for maintenance TJ2-G30144A

Illustrated parts list TJ2-G4865A

Packing manual (10 set) TJ2-4869A

3. Names of Unit Parts

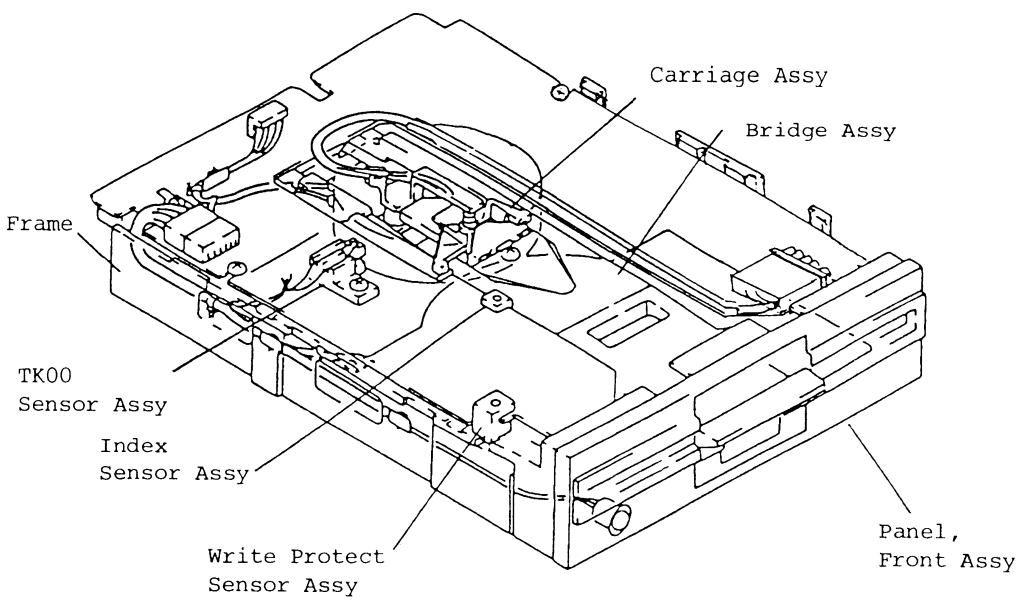

FIGURE 1

4. Operating Information

4.1 Environment

There is no problem in operating under normal office conditions but when operating out of following conditions, Drive may not work properly or Diskette may get damaged.

1 Temp./Humid. Range

	During operation	During non operation
Temperature Range	5°C - 43°C	-10°C - 50°C
Humidity Range	20% - 80% RH (DEW LESS)	20% - 80% RH (DEW LESS)

(Maximum wet bulb temp 29.4°C)

2 Impact shock Vibration

During operation : Less than 0.25G (5 - 100 HZ)

During non operation : Continuous vibration less than 3.0G (5 - 100 HZ)

3. Dust

Be extra careful of dust antering unit because it may cause damage to head or diskette media.

4.2 Diskette Handling
(Be extra careful of the following)

1 Keep diskette media away from any appliance which may generate magnetic field.
(ex, Radio, TV, Motor/Dynamo and other electrical appliances)

2 Do not bring any ferro magnetic materials near the diskette.

3 Do not bend media under any condition.

4 Return the diskette to storage envelope when transporting and storing it.

5 Do not touch or attempt to clean the disk media surface with alcohol.

6 Do not expose diskette to head, dust, or sunlight.

7 Do not write anywhere except on the media label and only use a soft felt tip pen.

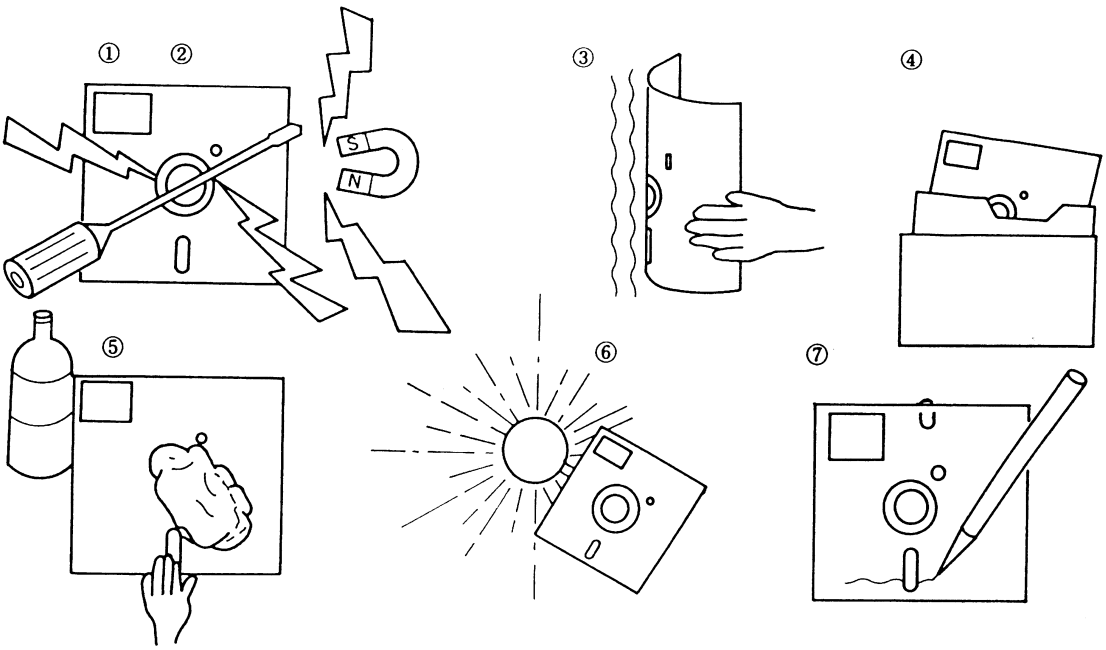

FIGURE 2

5. Regular Maintenance

"Unit life can be affected by damaged parts as a result of dusty anvironment or excessive operation." So Maintenance by such methods as visual inspection, cleaning/change of damaged parts and regular functional checks will keep the unit in good condition and enable the discovery of any problem at an early stage.

Time span between maintenance is calculated at an actual operation rate of 8 hours a day so in case of greater rate, differences modification is needed. When operating at a normal environment condition, perform maintenance once a year.

5.1 Caution

1 During maintenance, be careful of dust entering unit, and damaging head.

2 Make sure power switch is off first, when starting maintenance.

3 When put off/on Printed circuit Board (P.C.B.) Assy, make sure power switch is "off" to protect semiconductors and ICs.

4 Do not touch Disk media surface or head directly and do not bring any ferro magnetic materials near it.

5 When using this unit for Read data only (when using CE Disk), be careful of write mode mishandling to protect data.

6 Do not touch steel belt and do not adjust related mechanism.

7 Avoid static shock or excessive force to head carriage assembly because it has been carefully adjusted. To not readjust any screws except where specified in this manual.

5.2 Head Cleaning on Field Applications

Head cleaning is recommended at user's sites, especially when used in severe environments, because the heads may accumulate dust in the air and magnetic coating material of the disk, causing chance of error increase and/or scratch on the disk surface.

Recommended schedules and procedures are as follows:

1) Cleaning Schedules

(1) Periodical cleaning using wet type cleaning disk.

i. Once a month for normal usage in normal environments.

ii. Should be increased to about once a week when used in severe environments such as dusty area, high humidity, high and low extreme temparatures. Low temperature such as 5 to 10°C (41 to 50°F) under high humidity is most severe for diskettes.

iii. Higher frequency for brand new drives would be recommended, for about once a week. Better matchning between head and medium would be produced by a long time use, as experienced.

(2) When frequent errors are detected. (Wet or dry type may be used.)

(3) When scratch (es) are found on the medium surface. (Wet or dry type may be used.)

2) Recommended Head Cleaning Material

(1) Wet type

Innovative Computer Products*, Head Cleaning Kit (or equivalent).

*9174 Deering Ave., Chatsworth, CA 91311
(213) 998-2400/TWX 910-493-2188

(2) Dry type

To be supplied by Mitsubishi representatives. No substitutions would be allowable unless accepted by factory test.

5.3 Check and Adjustments

5.3.1 Diskette rotation cycle adjustments

1) Equipment

Disk Tester
Scratch Diskette
Universal Counter
VR Adjustment Driver

2) Adjustment procedure

2)-1 Connect CE Tester to Drive then turn-on power switch.

2)-2 Load diskette then turn-on motor with drive select.

2)-3 Make sure HLMG ON.

2)-4 Seek to TK00.

2)-5 Connect universal counter to INDEX (interface signal TPD14) and measure rotational cycle rate.

2)-6 Adjust counter reading until it comes within specifications using SPM VR (see Figure 4).

2)-7 After this adjustment, Lock VR with white paint.

3) Test specification

3)-1 Check: ±1.6% (196.8 - 203.2 ms)

3)-2 Adjust: ±1.0% (198.0 - 202.0 ms)

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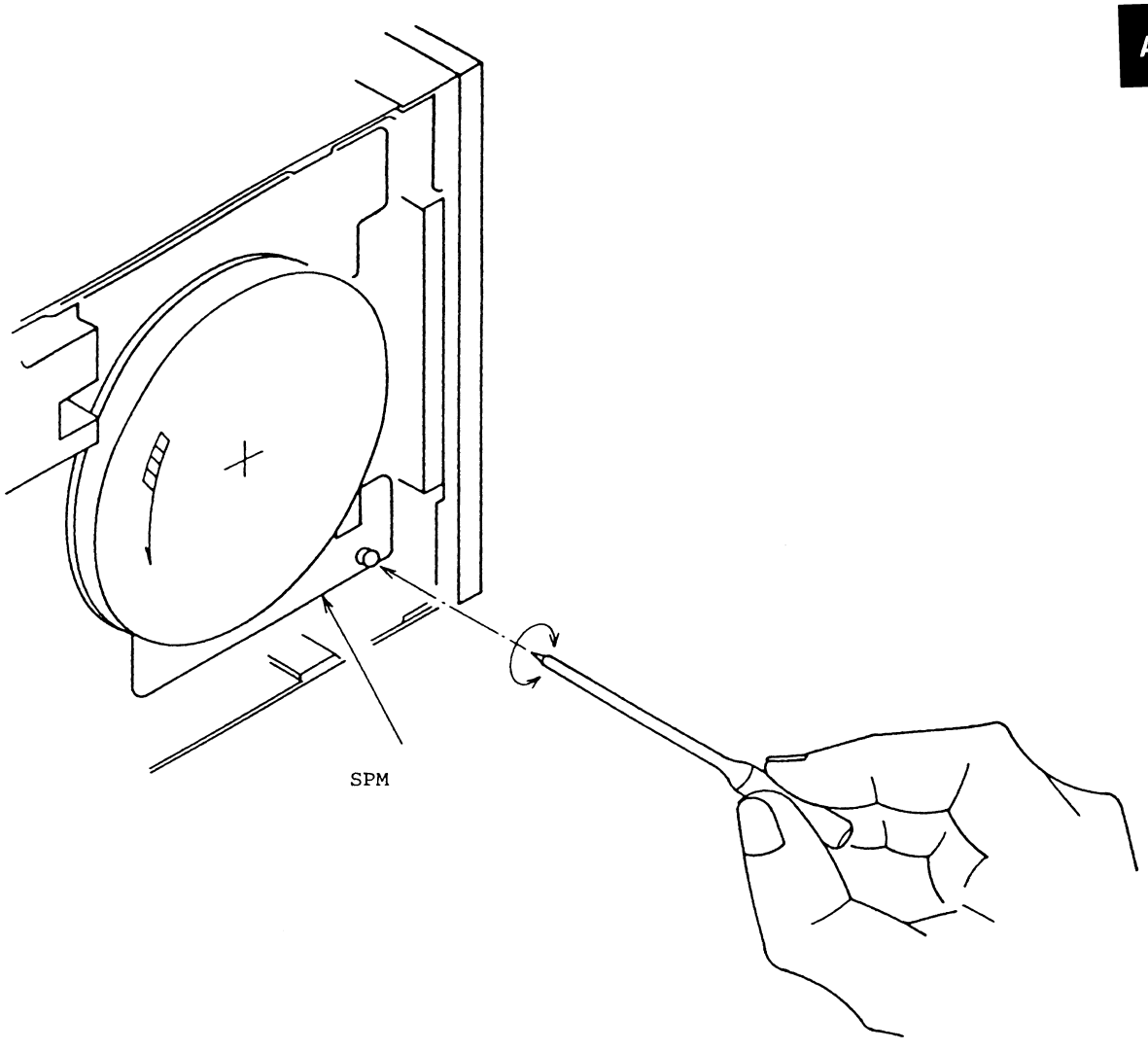
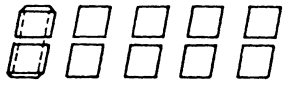
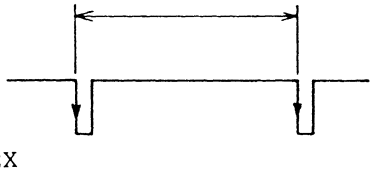




T=198.0 - 202.0 ms



INDEX
TPD14

FIGURE 4

5.3.2 TK00 sensor position adjustment

1) Equipment

Disk Tester
Scratch Diskette
No. 1 plus screw driver
Oscilloscope

2) Adjustment procedure

2)-1 Connect CE Tester to Drive then turn-on power switch and load diskette.

2)-2 Turn-on motor and select drive.

2)-3 Repeat seek between TK00 and 02 (see Figure 5).

2)-4 Observe waveform (TK00) at TPB1 using oscilloscope.

trigger	CH1--step (DC, -)	TPD15
signal	CH2--TK00 (DC)	TPE1

2)-5 Loosen screw and adjust Time T until it comes to within 3-4ms by moving TK00 in the direction of the arrow (see Figure).

3) Note:

3)-1 Set step rate at 3ms using Disk Tester

3)-2 Make sure there are 2 pulses on step signals.

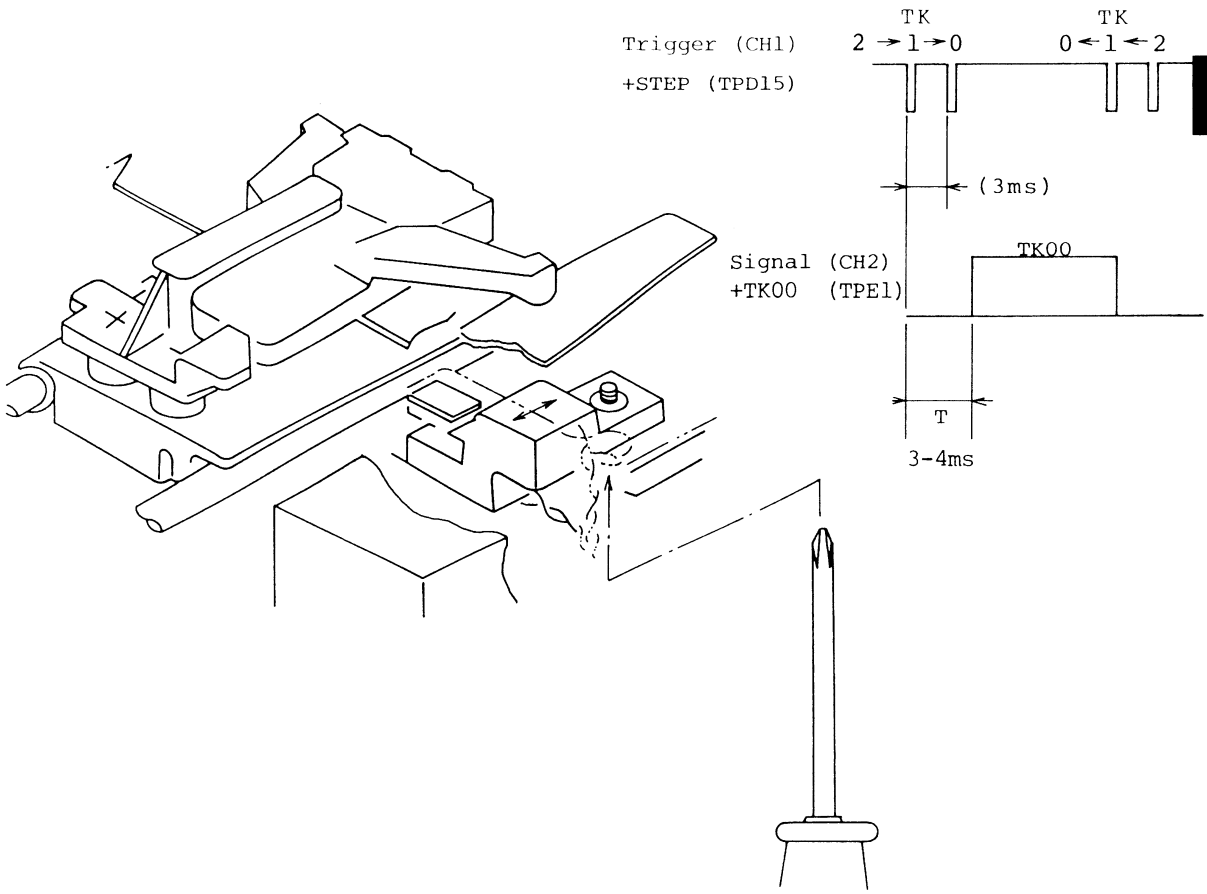

TK
2 → 1 → 0
TK
0 ← 1 ← 2
Trigger (CH1)
+STEP (TPD15)
(3ms)
Signal (CH2)
+TK00 (TPE1)
TK00
T
3-4ms

FIGURE 5

5.3.3 INDEX sensor position adjustments

1) Equipment

Disk Tester

CE diskette (DYMEK 502-1D STANDARD DISKETTE)

No. 1 plus screw driver

Oscilloscope

2) Check procedure

2)-1 Connect Disk Tester to drive (set power off)

2)-2 Load diskette

2)-3 Turn-on power switch

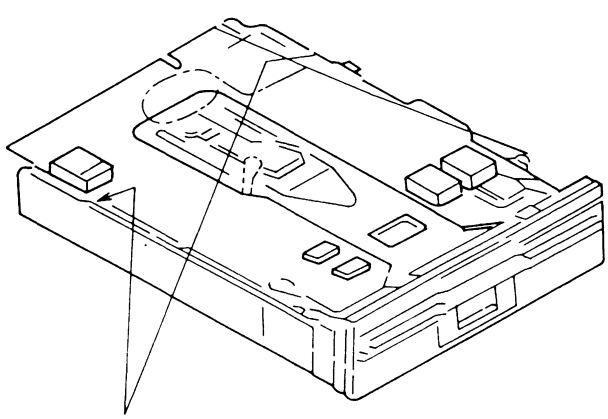
2)-4 Turn-on and select drive

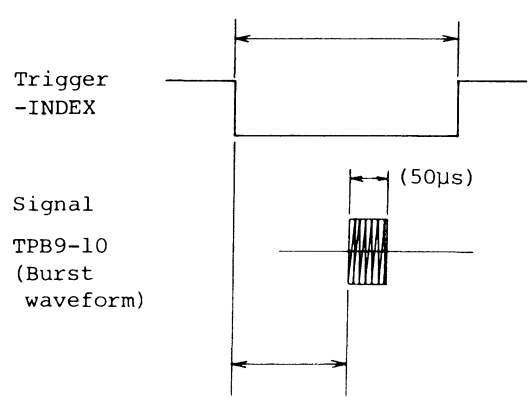
2)-5 Read timing of each waveform at TPB9.
TPB10 under read mode TK02, using oscilloscope.
(see figure)

Trigger: EXT - -INDEX (DC, +) (TPD14)
Signal : CH1 - TPB9 (AC)
CH2 - TPB10 (AC,INV) Add

Specification

Adjust.	200±100	µs at TK02 (Side 0)
	200±200	µs at TK02 (Side 1)
Check	200±200	µs at TK02 (Side 0)
	200±300	µs at TK02 (Side 1)





5.3.4 Head alignment adjustment

1) Equipment

Disk Tester

CE Diskette (DYMEK 502-1D STANDARD DISKETTE)

No. 1 screw driver

Oscilloscope

Hex wrench (1.5 mm dia.)

(Fine point diagonal cutter)

2) Adjustment procedure

2)-1 Connect Disk Test to drive (set power off)

2)-2 Turn-on power switch and motor on.

2)-3 Select drive and load CE diskette (close clamp door slowly).

2)-4 Seek TK00 to TK32 then read amplitude of each waveform (positioning waveform) at TPB9, TPB10 under read mode (see Figure 7).

Tigger:	EXT -- INDEX	(DC, +)	(TPD14)
Signal:	CH1 - TPB9 CH2 - TPB10	(AC) (AC, INV)	Add

Specification:		CHECK	ADJUST
when	A>B	B/A > 0.57	0.6
	A<B	A/B > 0.57	0.6

2)-6 In case seek direction is TK00 TK32 or TK79 TK32, loosen both set screws, then adjust STM until signal comes within spec. Tighten screw.

3) Note: Adjust under following conditions

Temperature: 23°C ±2°C exposed over 2 hours
Humidity: 50% ±5%

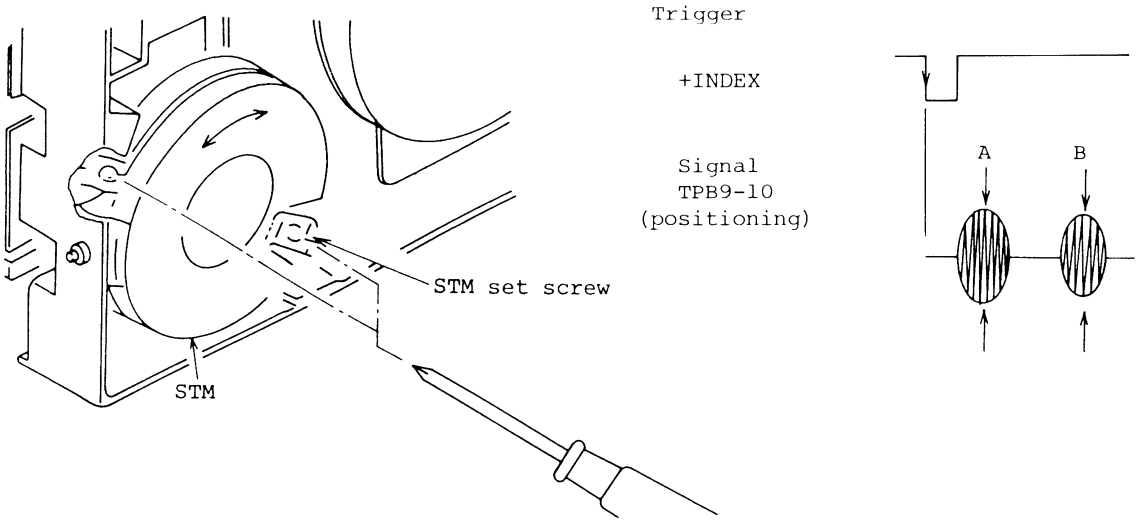

Trigger
+INDEX
Signal
TPB9-10
(positioning)
A
B
STM set screw
STM

FIGURE 7

5.3.5 Head Azimuth

1) Equipment

Disk Tester

CE Diskette (DYMEK 502-1D Standard Diskette)

Oscilloscope

2) Check procedure

2)-1 Connect CE Tester to Drive then turn-on power switch.

2)-2 Turn on motor.

2)-3 Select drive and load CE diskette.

2)-4 Seek to TK68.

2)-5 Read azimuth waveform using oscilloscope.

Trigger:	EXT - -INDEX (DC +)		(TPD14)
Signal:	CH1 - TPB9	(AC)	Add
	CH2 - TPB10	(AC,INV)	

2)-6 Acceptable when adjusted waveform within following range

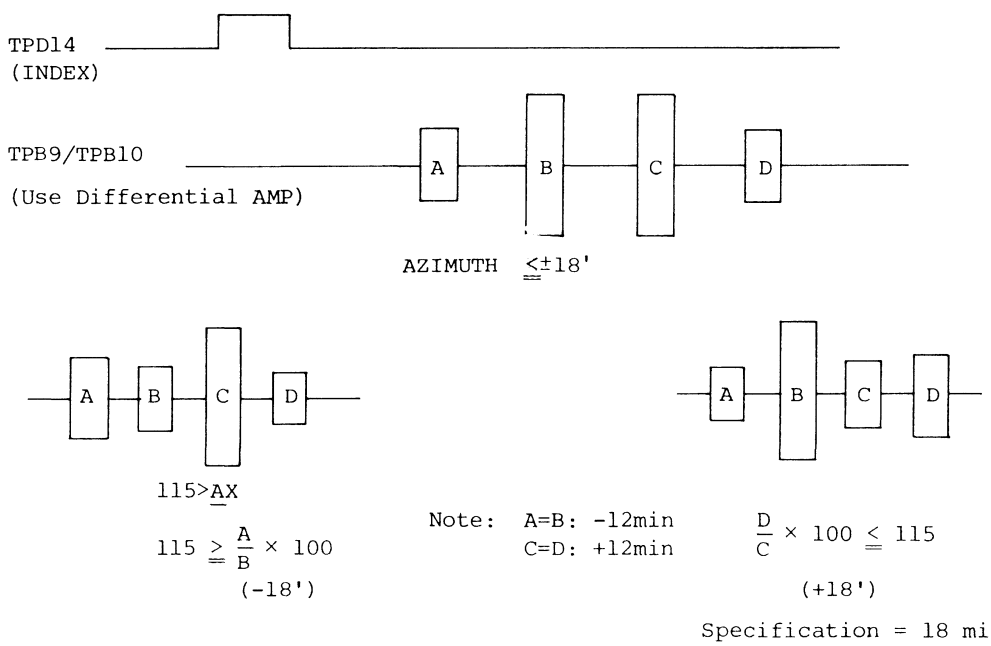


FIGURE 8

NOTE

The head's azimuth is not adjustable. It is suggested that the drive be sent to an authorized repair center or a new head assembly be installed. In the latter case, all previous adjustments should be made again.

TJ2-G30231A 10/31/83

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5.25 INCH FLEXIBLE DISK DRIVE

M4853

PCB, NAMFF PARTS LIST

This parts list is applied to the PCB,NAMFF Part No. DC447987

** It means "Custom-made for MELCO Computer Works"

*** It means the parts made by MELCO Semi-Conductor Division

Reference Designation	Part Number	Description	Q'ty Per PCB	
TPG	DC447986-G01	PWB, NAMFF	1	
	T414562E	Terminal	1	Izumi Electric (Japan)
TPB,TPC,TPD,TPE PM6,7	00-8261-0333-10-854	Connector	6	Elco Intl.
P2	172349-1	Connector	1	AMP (Japan)
P2	172296-1	Connector, Accery	1	AMP (Japan)
P3	65625-114#6	Connector	1	JAE (Japan)
PM2	00-8261-1432-10-854	Connector	2	Elco Intl.
J1,J2,J3,J4,J5,J6 J7,J8,J9,J10,J12,J13	00-8261-0282-00-878	Connector	12	Elco Intl.
P5	IL-SP-S3EN2-(N)-1	Connector	1	JAE (Japan)
P4	PS-12PA-D4LTI-A1	Connector	1	JAE (Japan)
	KEISAKI-J21101	Index Sensor Assy	1	Kodenshi Kogyo (Japan)
	KEISAKI-J21100	Write Protect Sensor Assy	1	Kodenshi Kogyo (Japan)
PM8,PM5	00-8261-0232-10-854	Connector	2	Elco Intl.
PM1	00-8261-1632-10-854	Connector	1	Elco Intl.
PM3	00-8261-0432-10-854	Connector	1	Elco Intl.
P7	IL-ZP-S3EN2-1	Connector	1	JAE (Japan)

Reference Designation	Part Number	Description	Qty. per PCB	
C13,27,63,80,92,101 102,103,104,105,106 107,108,109	RPE122-127C103K50	Capacitor, Cer. 0.01μF 50V ±10%	14	MURATA WORKS (Japan
C90, 91	RPE122-127CH102J50	Capacitor, Cer. 1000pF 50V ±5%	2	MURATA WORKS (Japan)
C4,9,15,17,18,26,11	RPE123-127F155Z25	Capacitor, Cer. 1.5μF 25V ±80%±20%	7	"
C5,6,28	RPE122-127C223K50	Capacitor, Cer. 0.022μF 50V ±10%	3	"
C7,8,70	RPE122-127CH102J50	Capacitor, Cer. 1000pF 50V ±5%	3	"
C10	RPE122-127C103K50	Capacitor, Cer. 0.01μF 50V ±10%	1	"
C3	RPE122-127CH101J50	Capacitor, Cer. 100pF 50V ±5%	1	"
C11	RPE122-127CH331J50	Capacitor, Cer. 330pF 50V ±5%	1	"
C12	RPE122-127CH151J50	Capacitor, Cer. 150pF 50V ±5%	1	"
C64,65,66,67	RPE122-127C104K50	Capacitor, Cer. 0.1μF 50V ±10%	4	"
C14,16	242M2502-475M	Capacitor, Tant. 4.7μF 25V ±20%	2	Matuo Electric (Japan)
C110	244M1602-335M	Capacitor, Tant. 3.3μF 16V ±20%	1	"

Reference Designation	Part Number	Description	Qty. per PCB	
IC G6,G2	SN7406N	IC, Digital	2	Texas Inst.
IC F1,K2,F6,L2	SN74LS74AN	IC, Digital	4	Texas Inst.
IC D5,L2,M2	M74LS14P	IC, Digital	2	***
IC E6,H1	M74LS04P	IC, Digital	2	***
IC E5, J2	MR4LS08P	IC, Digital	2	***
IC G1	M74LS86P	IC, Digital	1	***
IC H2	M74LS10P	IC, Digital	1	***
IC K1	M74LS123P	IC, Digital	1	***
IC B5, C6	M53238P	IC, Digital	2	***
IC A3-1,A3-2	M54542L	IC, Linear	2	***
IC D6	NE555P	IC, Linear	1	Texas Inst.
IC L5	AS-1412-02	IC, Hybrid	1	**
IC L6	AS-1413	IC, Linear	1	**
IC H5	MC3470P	IC, Linear	1	Motorola
IC E1	MPA2003C	IC, Linear	1	NEC (Japan)
IC H6	SN75472P	IC, Linear	1	Texas Inst.

Reference Designation	Part Number	Description	Qty. per PCB	
R33	NL¼J1200F	Resistor 120Ω ¼W ±1%	1	SEF (Japan)
R42, 51	NL¼J1002F	Resistor 10kΩ ¼W ±1%	2	SEF (Japan)
R27, 94, 95	NL¼J1202F	Resistor 12kΩ ¼W ±1%	3	"
R90	NL¼J1201F	Resistor 1.2kΩ¼W ±1%	1	"
R3, 4	NL¼J3900F	Resistor 390Ω ¼W ±1%	2	"
R5	NL¼J5601F	Resistor 5.6kΩ¼W ±1%	1	"
R6, 7	NL¼J6801F	Resistor 6.8kΩ¼W ±1%	2	"
R8, 9	NL¼J2201F	Resistor 2.2kΩ¼W ±1%	2	"
R28	NL¼J2702F	Resistor 27kΩ ¼W ±1%	1	"
R11, 12	NL¼J3300F	Resistor 330Ω ¼W ±1%	2	"
R13,14,36,38,41, 49,50,61,62,63, 64,80,82,83,85, 86,87,93	NL¼J1001F	Resistor 1kΩ ¼W ±1%	15	"
R1, 10	NL¼J3301F	Resistor 3.3kΩ¼W ±1%	2	"
R19, 21	NL¼J1002F	Resistor 10kΩ ¼W ±1%	2	"
R22	NL¼J47R0F	Resistor 47Ω ¼W ±1%	1	"
R25,31,39,53	NL¼J1500F	Resistor 150Ω ¼W ±1%	4	"
R26	NL¼J1803F	Resistor 180kΩ¼W ±1%	1	"
R37, 84	NL¼J8200F	Resistor 820Ω ¼W ±1%	2	"
R34	NL¼J1802F	Resistor 18kΩ ¼W ±1%	1	"

Reference Designation	Part Number	Description	Qty. per PCB	
R18	NL¼J8201F	Resistor 8.2kΩ¼W ±1%	1	SEF (Japan)
	NL¼J1003F	Resistor 100kΩ¼W ±1%	1	"
R43, 45, 47	NL¼J4702F	Resistor 47kΩ ¼W ±1%	3	"
R15, 16	NL¼J4700F	Resistor 470Ω ¼W ±1%	2	"
R17, 81, 91	NL¼J1501F	Resistor 1.5kΩ¼W ±1%	3	"
R92	NL¼J1502F	Resistor 15kΩ ¼W ±1%	1	"
R89	RNC½W560J	Resistor 56Ω ½W ±5%	1	Hokuriku Elec.
R2	RNC1W271J	Resistor 270Ω 1W ±5%	1	(Japan)
RM1	M16A-151J	Resistor, Module	1	Iwaki Musen
R23	PSR1.5B121J	Resistor, Module	1	(Japan)
R20, 29	3321p-1-503	Resistor, Variable 50kΩ	2	Murata Works (Japan)
L1, 2	TP0410-681J	Inductor 680μH ±5%	2	TDK (Japan)
L 4	TP0206-101K	Inductor 100μH ±10%		"
TR1, 2	2SA952	Transistor	2	NEC (Japan)
TR3	2SC2718	Transistor	1	"

Reference Designation	Part Number	Description		Qty. per PCB	
D1	NZ303	Diode, Zener	3V	1	***
D10	RD6.8FB	Diode, Zener	6.8V	1	NEC (Japan)
D5	RD5.1FB	Diode, Zener	5.1V	1	NEC (Japan)
D12	RD3.0EB2	Diode, Zener	3V	1	NEC (Japan)
D2,3,4,6,11	1S -954	Diode			National Component, Inc.
D13	NDP127	Diode		1	National Component, Inc.
D3, 4	DC447536-G01	Diode Pair		2	**

6.0 PHYSICAL SPECIFICATIONS

6.1 Installation Direction

Install the M4853 disk drive in the directions shown in Fig. 6-1.

The slant mount should be within 10 degrees.

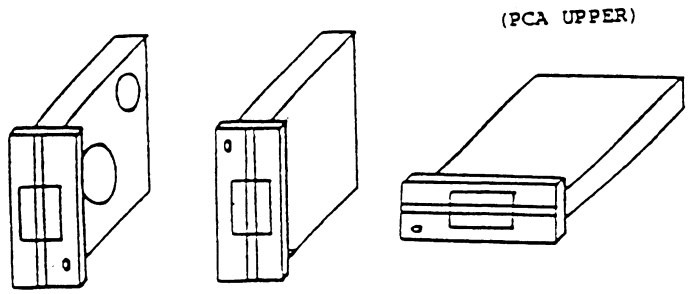


Fig. 6-1 Disk Drive Installation Directions

6.2 Dimmensions of M4853

See Fig. 6-2

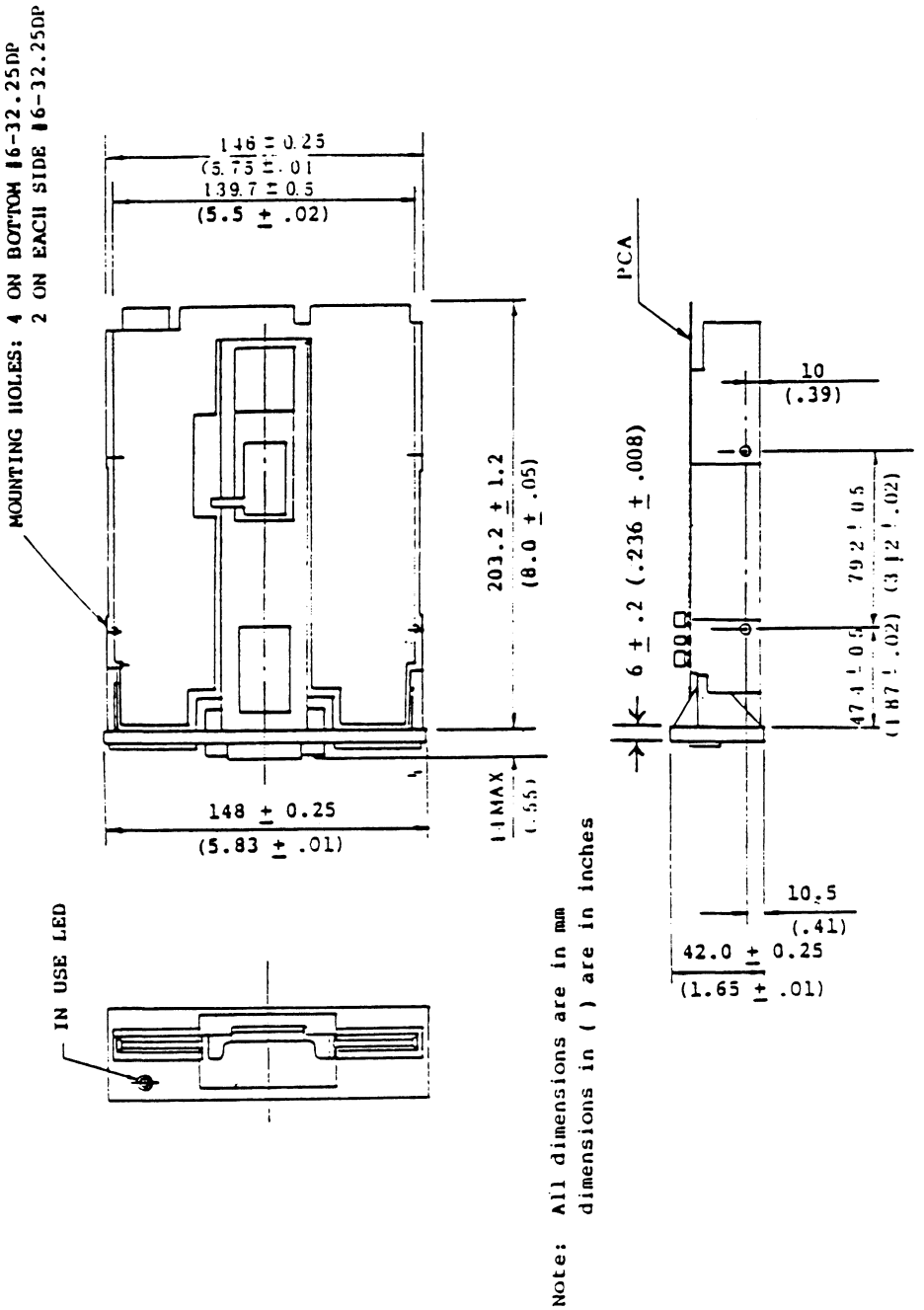


Figure 6-2 Dimensions of M4853

7.0 USER OPTIONS

Non-standard modes of operation are available to the customer by using option plugs, and some PCB cut and/or jumpers. When using a plug, installing the option plug on a pair of square pins is a "short" condition, and removing it is an "open". A trace or a soldered wire jumper between two pads is a "short", and none is a "open".

The specific options are explained below.

7.1 DS0 to DS3

When two or more FDDs are connected to the system, jumper one of the four choices to allow the drive to be enabled when the particular select line is taken to a, logical "0" condition.

Only one drive per system may be designated for each drive number. In other words, there can only be one drive "0", etc., in a system.

7.2 MX

If only one FDD is in a system, this option may be used to constantly select the drive. It causes the drive to ignore the status of the "DS" lines.

This jumper must be removed in multi-drive systems.

7.3 HS

This plug is installed to cause the heads to load when the drive is selected by DS0 through DS3. This occurs after the drive is "ready" (see section 7.8). Do not install HM or HC with this option.

7.4 HM

This plug is installed to cause the heads to load when the motor on line (P-1-16) is brought to a logical "0" level. This occurs after the drive is "ready" (see section 7.8). Do not install HS or HC with this option.

7.5 HC

This plug is installed to cause a constant head load condition which occurs after the drive is "ready" (see section 7.8) to allow for proper seating of the floppy disk. Do not install HS or HM with this option.

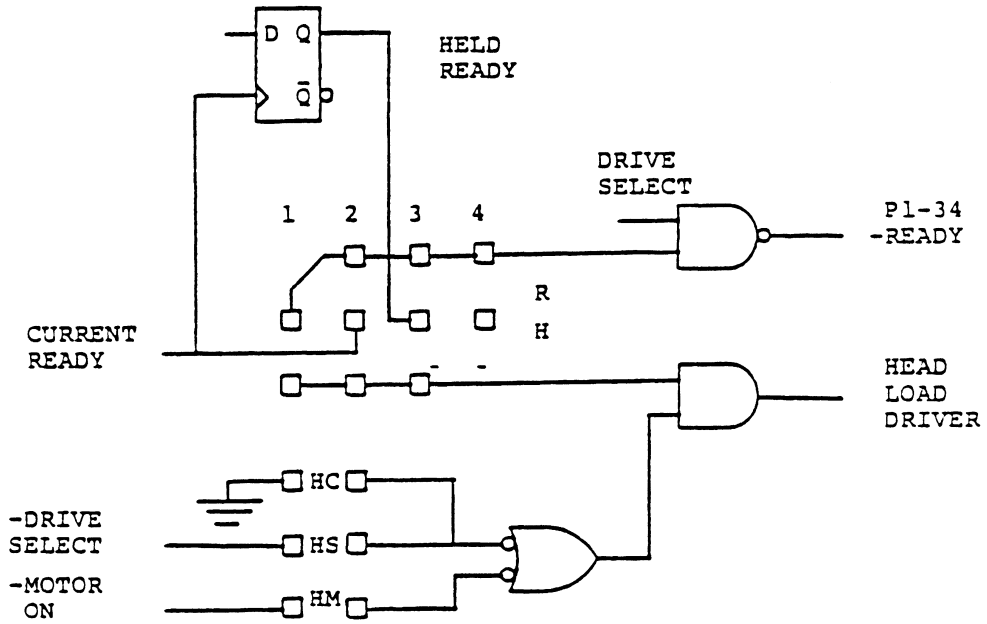


FIGURE 7-1 H and R Jumper Options

7.6 MM

This plug is installed to cause the spindle motor to turn on and rotate the disk with the input of a logical "0" on the motor on line, P1-16.

7.7 MS

This plug is installed to cause the spindle motor to turn on and rotate the disk when the drive is selected by applying a logical "0" on one of the drive select lines, DS0 through DS3.

7.8 H-1

The "H" jumper is used to select a ready qualifier for the head load control circuit. In this case the ready signals are the internal, un-multiplexed ones that are always operable, even if the drive is not selected.

Installing the "H" jumper in position 1 routes whatever type of "ready" signal is selected to be outputed from the drive to the head load circuit ready qualification input. This is done when both the H and R jumpers should be installed on the same option (H-2, R-2 or H-3, R-3), which is physically impossible. In the case of H-3, R-3, the R jumper should be installed in the R-3 position, and the H jumper should be installed in the H-1 position.

7.9 H-2

Installing the "H" jumper in position 2 routes the "current status" ready signal to the head load circuit ready qualification input. See section 7.11.

7.10 H-3

Installing the "H" jumper in position 3 routes the "held status" ready signal to the head load circuit ready qualification input. See section 7.12.

7.11 R-2

Installing the "R" jumper in position 2 selects a "current status" ready output for the drive. The output goes to a logical "0" when the floppy disk is rotating at the proper speed and the drive is selected.

7.12 R-3

Installing the "R" jumper in position 3 enables a "held status" ready output from the drive. The output will be a logical "0" when a disk is inserted and correctly clamped in the drive. (Index pulses were detected correctly.) This ready condition is held even if the drive is not selected and the motor is not on. It is an indicator that a disk is inserted in the drive and the door is closed. It is reset (to a not ready state), if the door is opened, which allows the disk to be ejected.

7.13 R-4

This option must not be used.

7.14 MC

Cutting this PCB trace causes the spindle motor to run whenever a floppy disk is inserted in the drive.

7.15 RD-RS

This option is not used at this time.

7.16 DI

Cutting this PCB trace disables the in-use input to the drive (P1-4). This means that the only time the front panel LED will be lit will be when the drive is selected. The MX option cannot be used in conjunction with this modification; the in use LED will never be illuminated if it is.

7.17 Write Protect Inversion

The option pads between IC's M1 and L1 are used to invert the logic of the write protect slot on the floppy disk. The trace from the center pad to the in-board pad must be cut, and the center pad must be jumped to the out-board pad to enable this option.

7.18 Input Terminations

All seven input lines to the drive are terminated (see section 3.1.1). The jumper plug located between IC's C5 and D5 should be removed on drives in multi-drive systems, with the exception of the drive the furthest electrical distance from the controller.

7.19 Options Summary

NAME	LOCATION	DESCRIPTION	TYPE CONNECTION	FACTORY SHIPMENT Open	FACTORY SHIPMENT Short
DS0	6B	Drive Address 0	Plug		X
DS1	6B	" " 1	"	X	
DS2	6B	" " 2	"	X	
DS3	6B	" " 3	"	X	
MX	6B	Continues Drive Select	"	X	
HS	6B	Head Load W/Drive Select	"		X
HM	6B	" " W/Motor On	"	X	
HC	6B	" " Constantly	"	X	
MM	5E	Motor On-Motor On Input	"		X
MS	5E	Motor On-Drive Select	"	X	
H1	2L	Head Load-Drive Ready	"		X
H2	2L	Head Load-Current Status	"	X	
H3	2L	Head Load-Held Status	"	X	
R2	2L	Ready Output-Current Status	"		X
R3	2L	Ready Output-Held Status	"	X	
R4	2L	Not Used-Leave Open	"	X	
MC	2E	Motor Constantly On	Trace		X
RD	2K	Not Used-Leave Open	"	X	
RS	2K	Not Used-Leave Shorted	"		X
DI	6B	Disable In Use Input	"		X
-	2M	Write Protect Inversion	"	Note 1	Note 1
	6B	Input Terminations	Plug		7

Note: See Section 7.17 for description of this unmarked option.

8.0 RECORDING FORMAT

Data to be recorded on the floppy disk is grouped in various blocks.

There are bits, bytes, sectors, tracks, and sides. The bits are encoded onto the disk by three possible means: FM, MFM, or MMFM techniques. These bits are collected together in a certain number of bytes per sector to define the actual recording format used. All of this is defined by the host system; the disk drive just records and detects flux reversals on the disk.

8.1 As stated before, there are three main methods of encoding bits on a floppy disk. All have some advantages and disadvantages, but the generally accepted standard is MFM (also called Double Density).

8.1.1 FM (Frequency Modulation) encoding is shown in Figure 8-1. It is the simplest form of encoding, and may be decoded by used of inexpensive one-shot multivibrators. It can do this because each data pulse is between two clock pulses, thereby rigidly defining the "read window" very precisely.

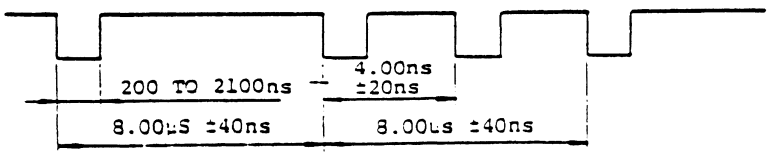
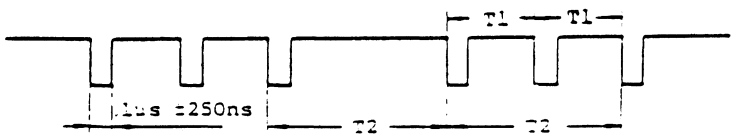


Figure 8-2 FM Write Encoding



T_1 = 4.00 µs ±800 ns (Jitter due to rotation variation excluded)

T_2 = 8.00 µs ±1.6 µs (Jitter due to rotation variation excluded)

Figure 8-2 Figure Read Encoding

8.1.2 MFM Encoding

MFM (Modified Frequency Modulation) encoding records twice the number of bits per inch (linear recording density) as FM encoding, but has the same number of flux changes per inch. It does this by removing the clock pulses, and shrinking the bit cell space by 50%. See Figure 8-2 for specific details. Clock bits are always written at the leading edge of the cell only if no data bits are written in either the present or preceeding bit cells.

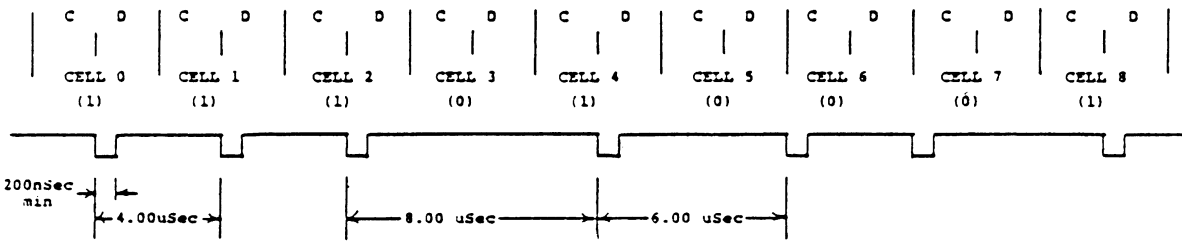
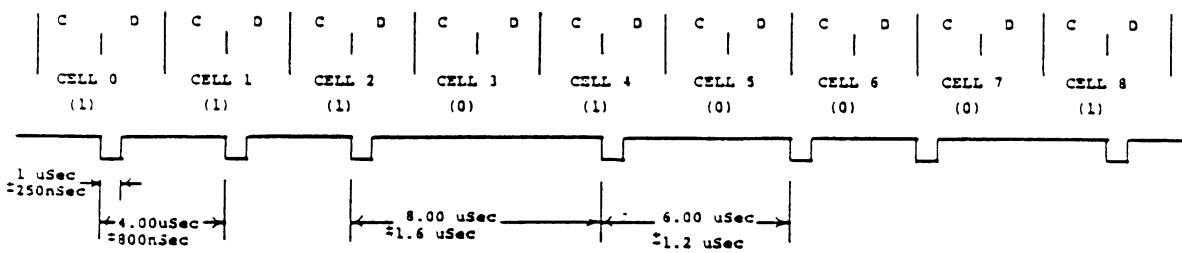


Figure 8-3 MFM Write Timing



8.1.3 MMFM Encoding

MMFM (Modified-Modified Frequency Modulation) is also a "double density" encoding method, but it further reduces the number of clock bits used to fill the empty spaces between data pulses.

It is not a standard encoding technique, and should probably be avoided for that reason. See Figure 8-3 for a description of MMFM. The data bits are written in the middle of the data cells, but a clock pulse is encoded only if no clock or data pulses were written in the previous bit cell, and no data bit is to be written in the present one.

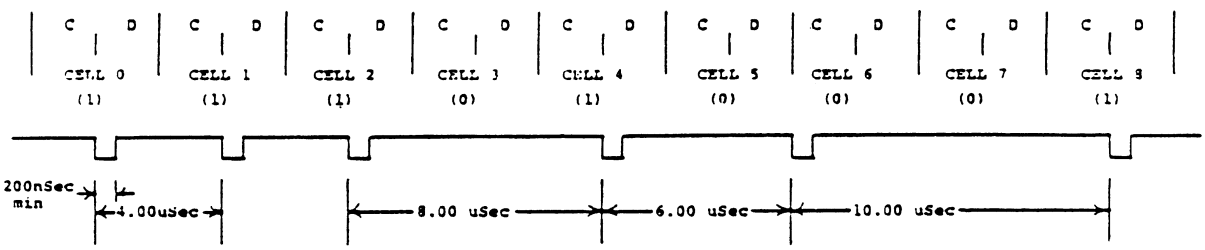


Figure 8-5 MMFM Write Timing

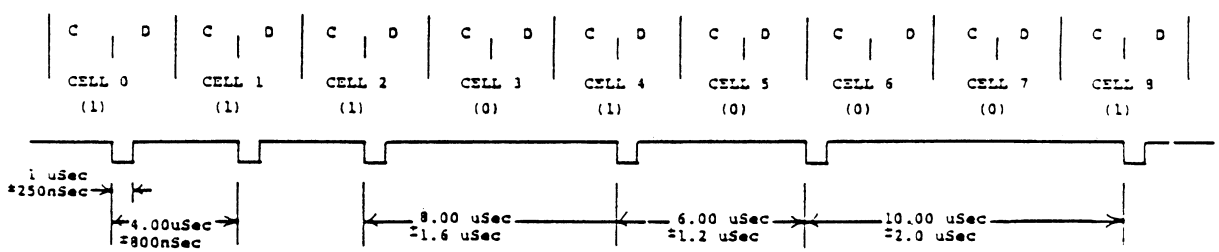


Figure 8-6 MMFM Read Timing

8.2 Track Formats

M4853 RECOMMENDED FORMATTINGS

M4853 5.25 inch (130 mm) Flexible Disk Drives use industry standard Tunnel Erase type Read/Write Heads, and high accuracy direct-drive brushless motor for spindle rotation, quaranteed ±1.6% index interval and ±2% instaneous speed.

The recommended formattings for data interchange between drives are as attached sheets, including formatting and data re-write modes.

The drives are sufficient for the following considerations for all 80 tracks.

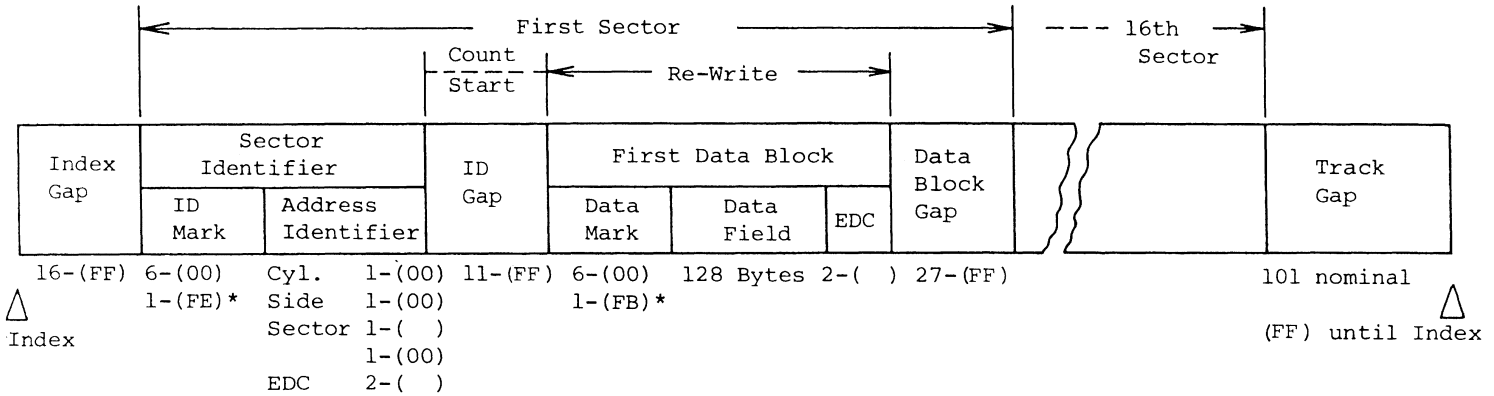
(1) The leading edge of a data block should be preceded by the erased area when re-write.

(2) The trailing edge of a data block should be covered by the erased area when re-write.

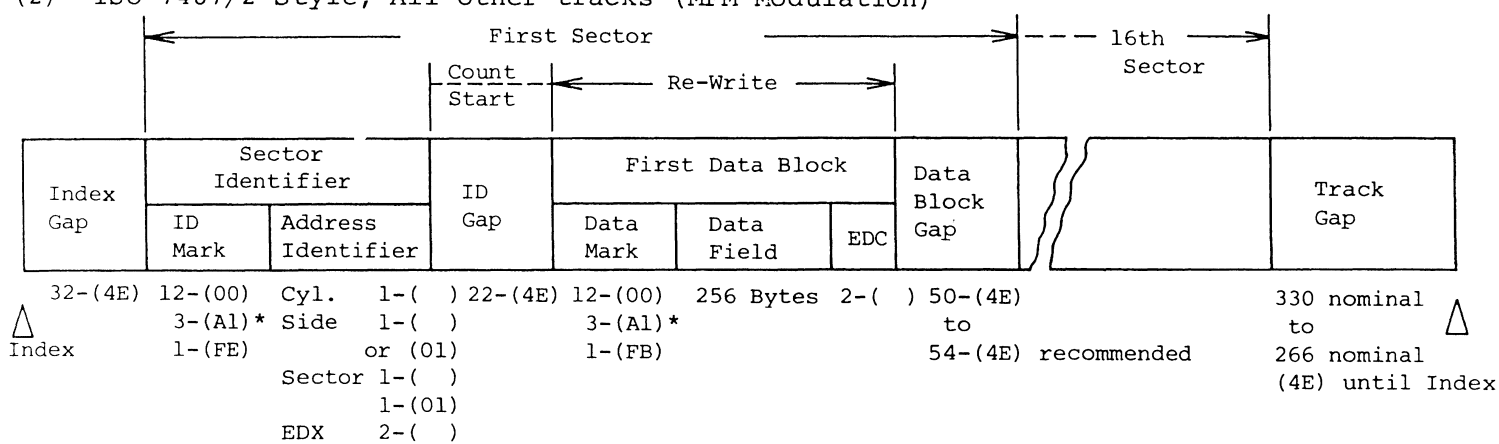
(3) The erased area should not overlap with Sector Identifiers.

(4) Read/Write gap should be before the next ID mark when the erase current is falling off when re-write with the fast rotation spindle on a slow formatted sector.

(1) ISO-7487/2° Style, Track 00 Side 0 (2F Modulation)



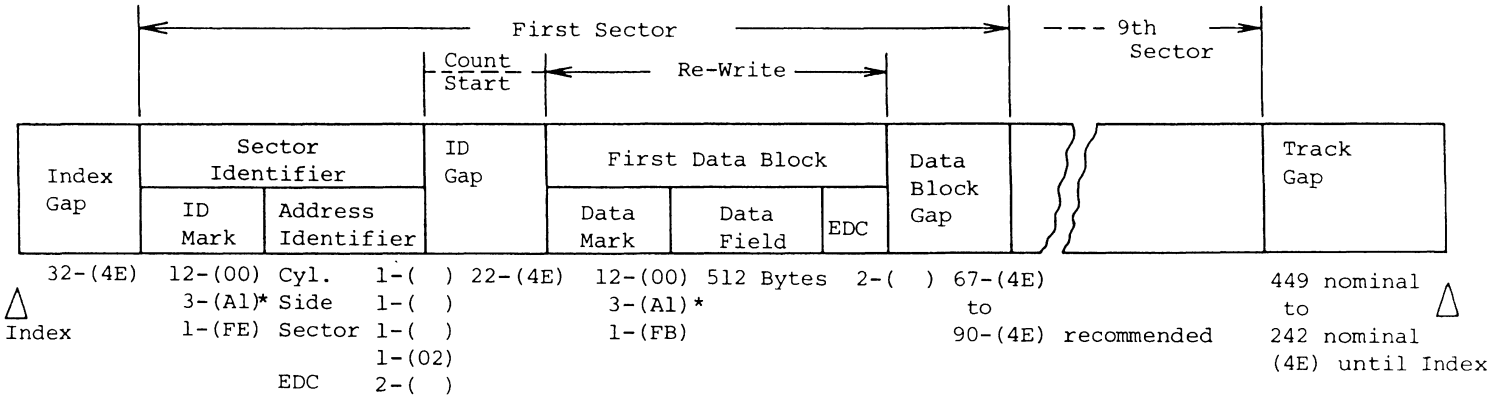
(2) ISO-7487/2° Style, All other tracks (MFM Modulation)



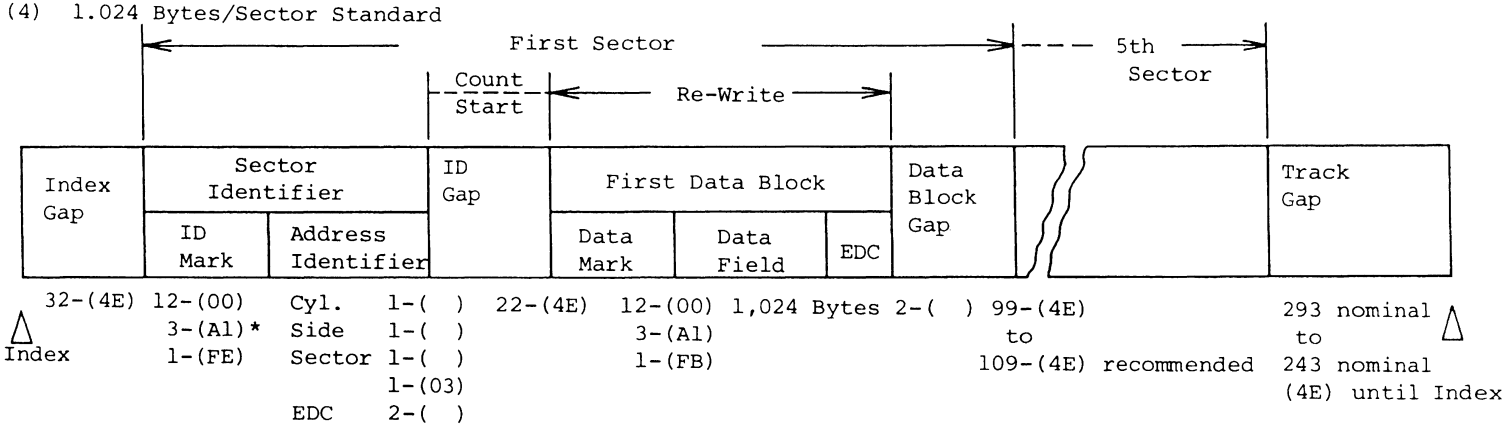
∘ Under deliberation

M4853 RECOMMENDED FORMATTING-1

(3) 512 Bytes/Sector Standard

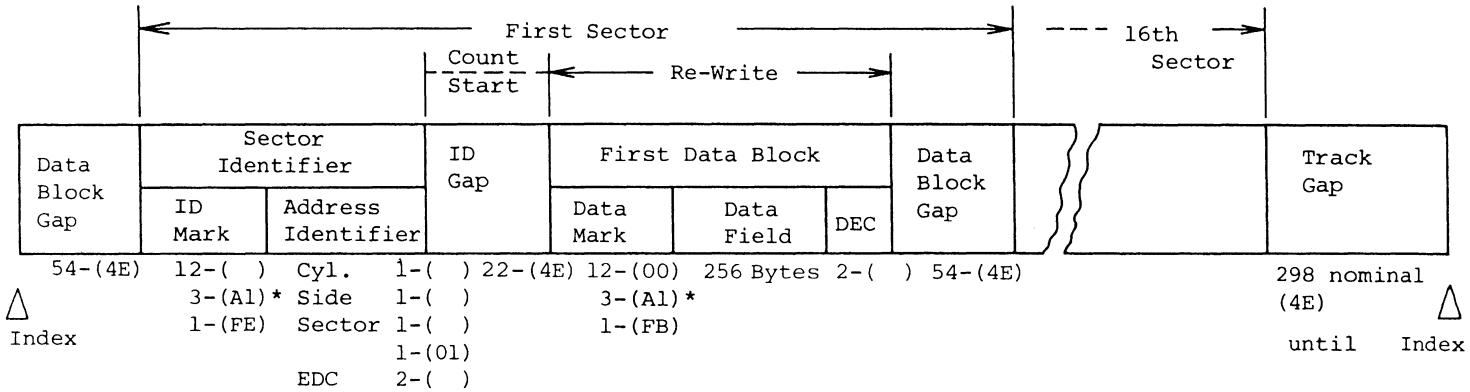


(4) 1.024 Bytes/Sector Standard

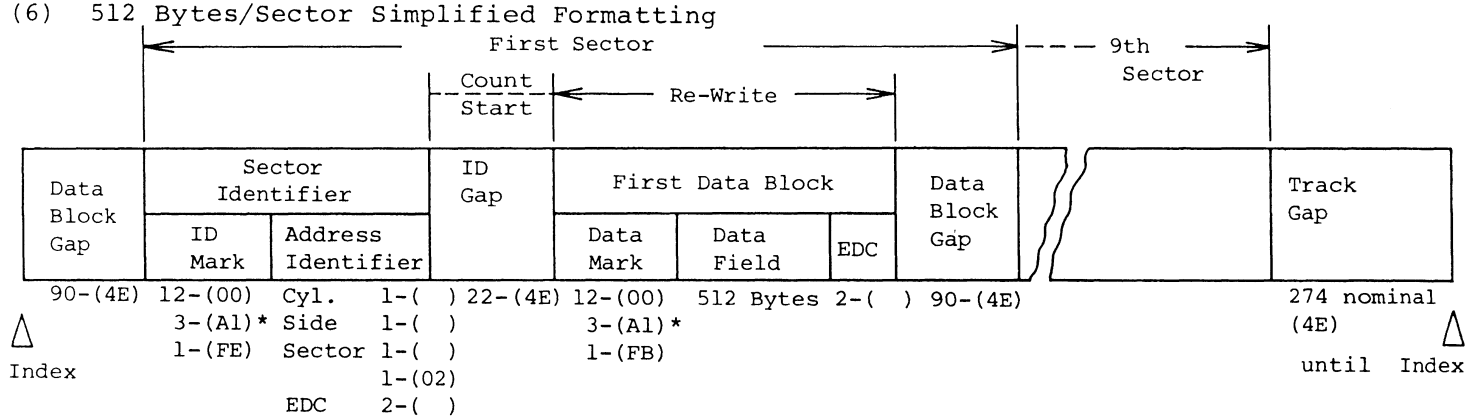


M4853 RECOMMENDED FORMATTING-2

(5) 256 Bytes/Sector Simplified Formatting



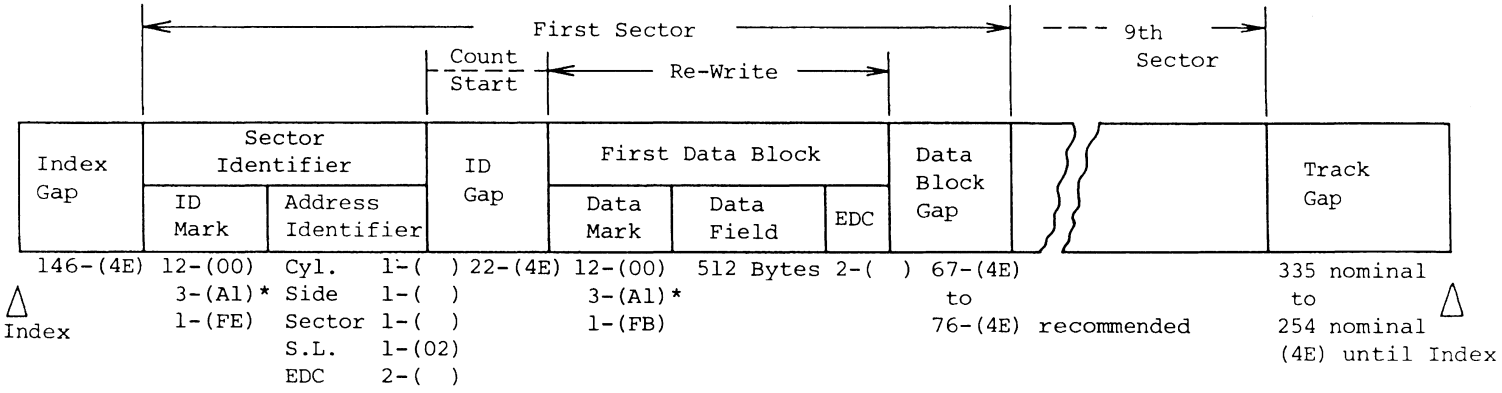
(6) 512 Bytes/Sector Simplified Formatting



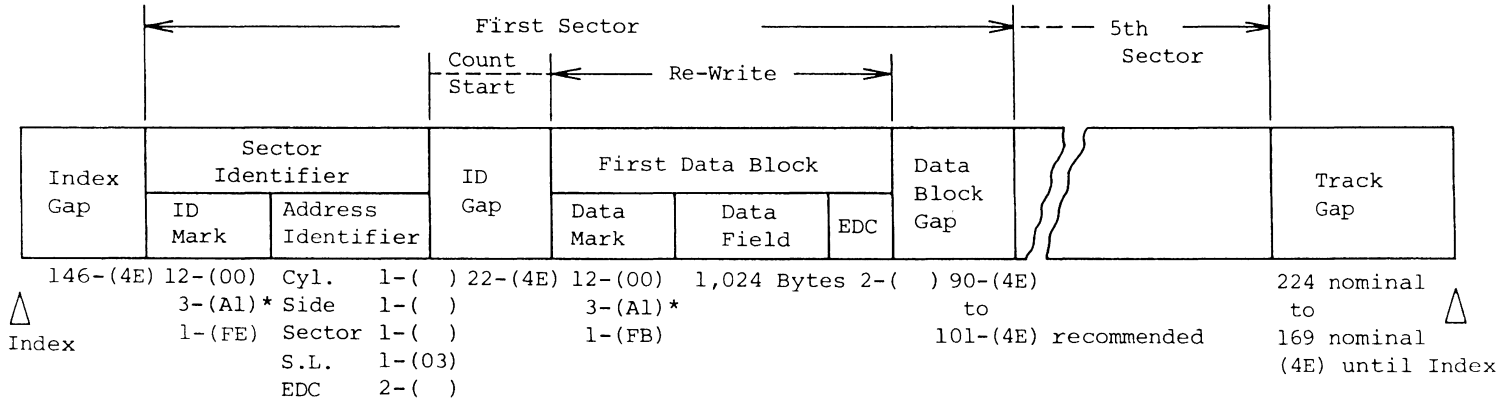
M4853 RECOMMENDED FORMATTING-3

(7) 512 Bytes/Sector, NEC 765, 765A

revised Dec. 7, '82

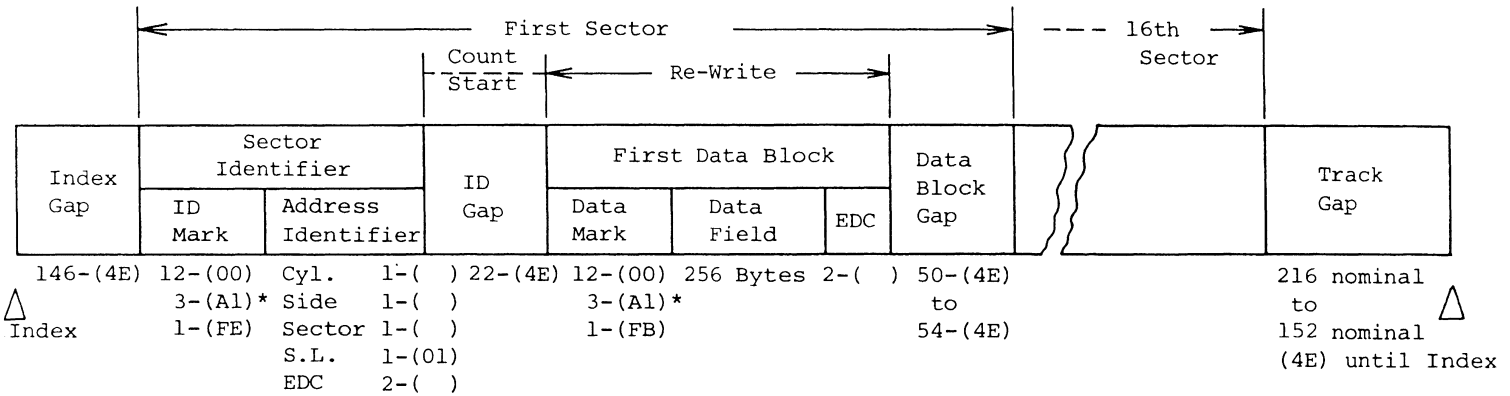


(8) 1,024 Bytes/Sector, NEC 765, 765A



M4853 RECOMMENDED FORMATTING-4 (NEC 765, 765A CONTROLLER)

(9) 256 Bytes/Sector, NEC 765, 765A



M4853 RECOMMENDED FORMATTING-5 (NEC 765, 765A CONTROLLER)

8.3 Error Detection and Correction

8.3.1 Write Errors

If an error occurs during a write operation, it can be detected by performing a read operation on the diskette immediately following the write operation. This is generally called a write check, which is an effective means of preventing write errors. It is recommended, therefore, that a write check be made without fail.

If a write error occurs, repeat the write operation and conduct a write check. If data cannot be correctly written even after the write operation is repeated about ten times, perform a read operation on another track to determine whether the data can be read correctly. If so, a specific track of the diskette is defective. If data cannot be correctly read on the other track, the drive is assumed to have some trouble. If the diskette is defective, replace it.

8.3.2 Most data errors that occur are soft errors. If a read error occurs, repeat the read operation to recover the data.

The following are possible main causes of soft errors:

- Dust is caught between the read/write head and diskette causing temporary fault in head contact. Such dust is generally removed by the self-cleaning wiper of the jacket, and the data is recovered by the next re-read operation. If read/write is continued for a long time in a very dusty environment, however, hard errors can result from a damaged diskette surface.

- Random electrical noise ranging in time from a few microseconds to a few milliseconds can also cause read errors. Spike noise generated by a switching regulator, particularly one that has short switching intervals, deteriorates the signal-to-noise ratio, and increases the number of re-read operations for data recovery. It is necessary, therefore, to make an adequate check on the noise levels of the DC power supplies to the drive and frame grounding.

- Written data or diskettes may have so small a defect as cannot be detected by a data check during write operation.

- Fingerprints or other foreign matter on a written diskette can also cause a temporary error. If foreign matter is left on a written diskette for a long time, it can adhere to the diskette, possibly

causing a hard error.

It is recommended that the following read operations be performed to correct these soft errors:

- Step 1: Repeat the read operation about ten times, or until the data is recovered.
- Step 2: If the data cannot be recovered by Step 1, move the head to another track, the opposite direction of the previous track position before the designated track, and then return the head to the original position.
- Step 3: Repeat an operation similar to Step 1.
- Step 4: If the data cannot be recovered, assume the error is a hard error.

9.0 RESHIPMENT PRECAUTIONS

When reshipping the drive, make sure the protection sheet for transportation is in place in the drive and the door is secured open.

M4853 DISK DRIVE SCHEMATICS AND LOGIC MANUAL

Usable for M4851

Sheet Title	Page	Revision
M4853 DISK DRIVE WIRING DIAGRAM	2/5	A
M4853 PCB NAMFF SCHEMATIC	3/5	A
M4853 PCB NAMFF PARTS LOCATION DIAGRAM	4/5	A
M4853 SPINDLE MOTOR ASSY SCHEMATIC	5/5	A

TJ2-G30175

SIGNAL INTERFACE CONNECTOR P1

GND	1
SPARE	2
	3
IN USE	4
	5
DRIVE SELECT–3	6
	7
INDEX	8
	9
DRIVE SELECT–0	10
	11
DRIVE SELECT–1	12
	13
DRIVE SELECT–2	14
	15
MOTOR ON	16
	17
DIRECTION SELECT	18
	19
STEP	20
	21
WRITE DATA	22
	23
WRITE GATE	24
	25
TRACK 00	26
	27
WRITE PROTECT	28
	29
READ DATA	30
	31
SIDE ONE SELECT	32
GND	33
READY	34

DC POWER SUPPLY CONNECTOR P2

+12V DC	1
0V (+12V RETURN)	2
0V (+5V RETURN)	3
+5V DC	4

FDD CONTROL CIRCUIT
PCB, NAMFF

P/J3

A1	GND–0	SHIELD	SIDE–0 HEAD
A2			
A3	CT–0 (COM)	BLUE	
A4			
A5	ER–0	RED	
A6	R/W–0.START	BLACK	
A7	R/W–0.FINISH	WHITE	
B1	GND–1	SHIELD	SIDE–1 HEAD
B2			
B3	CT–1	BLUE	
B4			
B5	ER–1 (COM)	RED	
B6	R/W–1.START	BLACK	
B7	R/W–1.FINISH	WHITE	

P/J4

1A	TK00–E	TRACK 00 DETECTOR
1B	TK00–C	
2A	+MOTOR ON	SPINDLE MOTOR ASSY (KEISAKI–J21037) DRIVE CIRCUIT → DC MOTOR (M)
2B	(KEY)	
3A	MOTOR GND	
3B	MOTOR +V (+12V)	
4A	IN USE LED–A	
4B	IN USE LED–K	ACTIVITY LED
5A	TK00 LED–K	
5B	TK00 LED–A	
6A	–HEAD LOAD	HEAD LOAD SOLENOID
6B	HEAD LOAD +V (+12V)	

P/J7

1	COM / NC / NO	DISK SENSE SW
2		

		INDEX LED (ON PCB, J21037)
		INDEX LED–K
		INDEX LED–A
IS	(INDEX–C)	INDEX DETECTOR (ON PCB, NAMF8)
IG	(INDEX–E)	
L	(WP LED–A)	WRITE PROTECT DETECTOR (ON PCB, NAMF8)
LG	(WP LED–K)	
S	(WRITE PROTECT–C)	
SG	(WRITE PROTECT–E)	

P/J5

1	ϕ4	STEPPER MOTOR
2	ϕ3	
3	FRAME GND, FASTON TAB	
4	ϕ1	
5	ϕ2	

100KΩ

0.01 μF

SIGNAL GND

M4853 DISC DRIVE
WIRING DIAGRAM
TJ2–G30175 2/5

RM1	150	C5, C6	0.022μ	C11	330P	R61 ~ R64 1K
		R13, R14	1K	C12	150P	C64 ~ C67 0.1μ
		R15, R16	470			
		C7, C8	1000P			
		R17	1.5K			

Note
Unless otherwise specified,
All Capacitors in Farads.
All Resistors in Homs, 1/4W.

Read Circuit

Write Circuit

Write-Protect

Side Select

Index Sensor

Track 00 Detection

Drive Select

Erase Circuit

Ready Circuit

Step Motor Drive Circuit

Power Save

Head Load Solenoid Drive Circuit

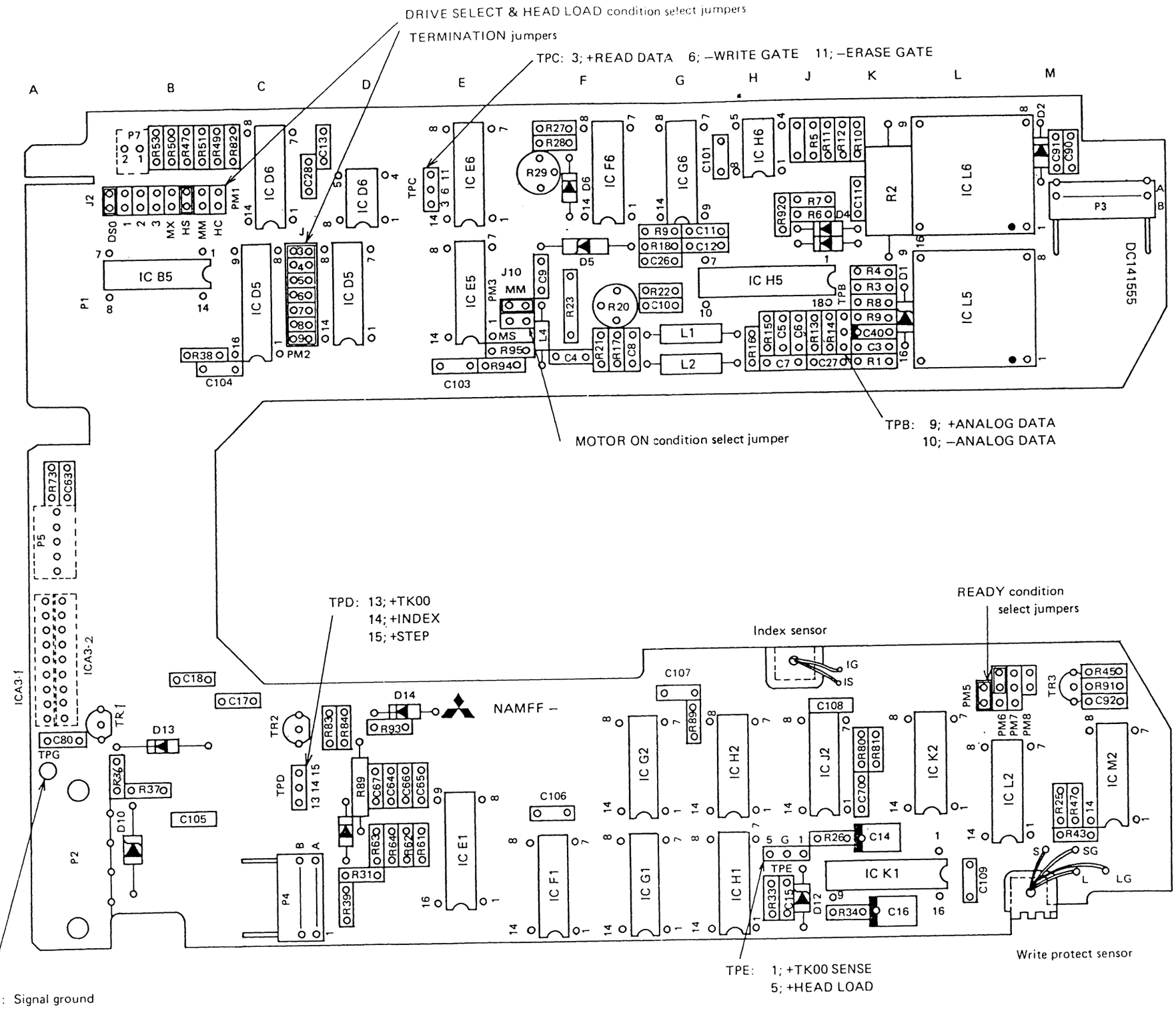
Spindle Motor Drive

Panel Indicator

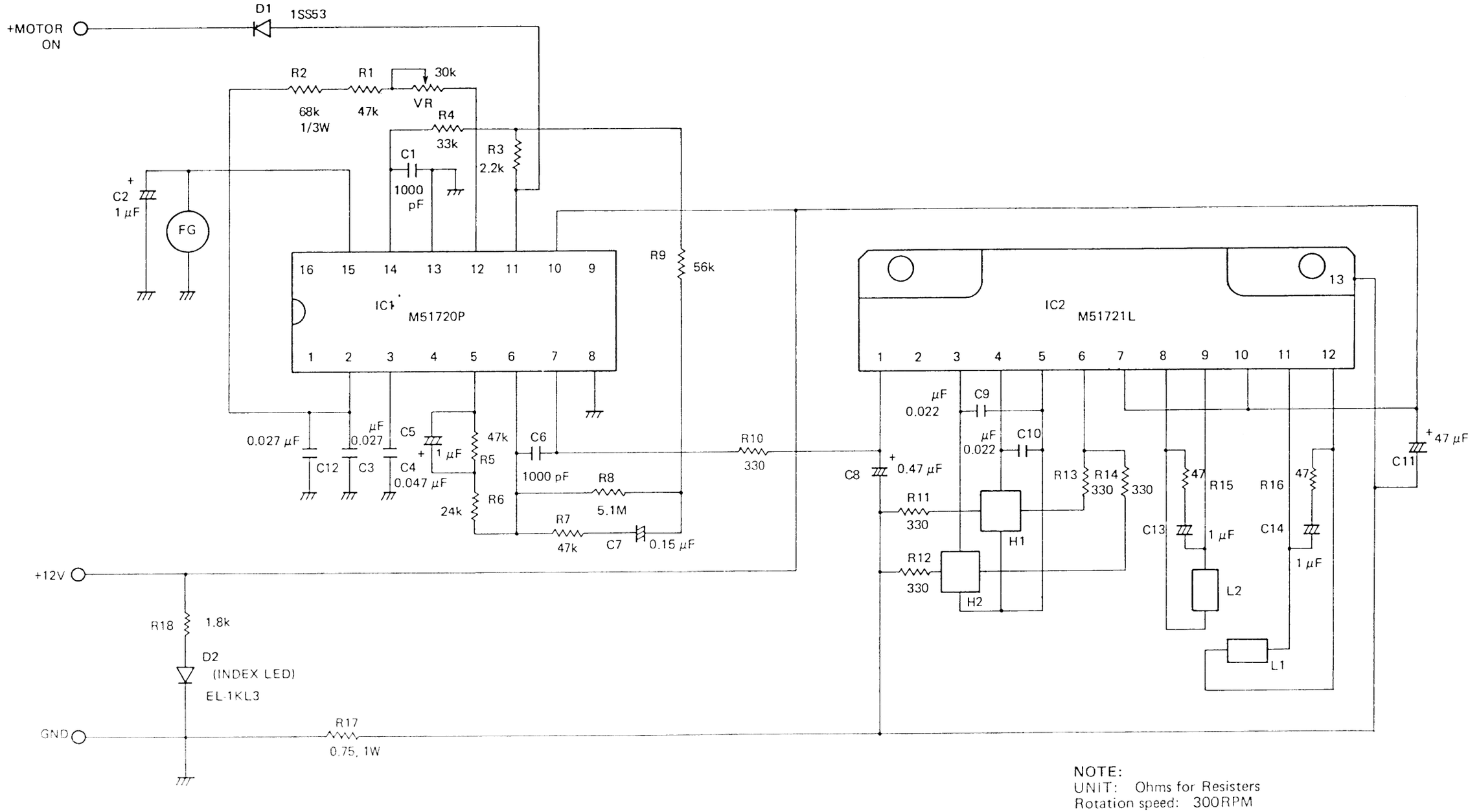
P-On Reset

M4853 PCB, NAMFF
CHEMATIC

TJ-2G30175 3/5



M4853 PCB, NAMFF
PARTS LOCATION DIAGRAM
TJ2–G30175 4/5



NOTE:
UNIT: Ohms for Resisters
Rotation speed: 300RPM

M4853 SPINDLE MOTOR
ASSY SCHEMATIC

TJ2-G30175 5/5

A

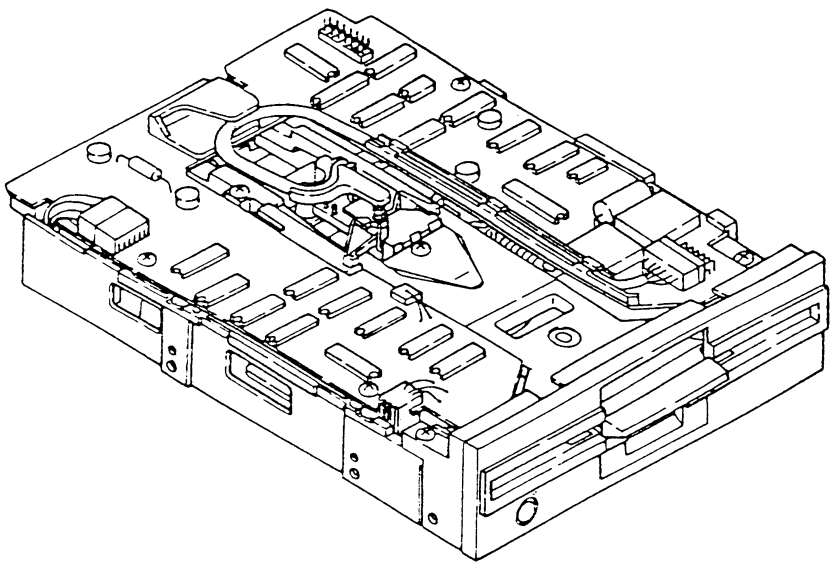
5.25 INCH FLEXIBLE DISK DRIVE

M4853

ILLUSTRATED PARTS LIST

MITSUBISHI ELECTRIC

CONTENTS



M4853 Flexible Disk Drive

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 1	DC141409-G03	Flexible Disk Drive	
-1	DC141378-G03	Mechanism Assy	1
-2	DC243295-G01	Catridge Guide Assy	1
-3	KEISAKI-J21117	Front Panel Assy	1
-4	KEISAKI-J21119	Ejector Assy	1
-5	DC447987	PCA. NAMFF	1
-6	DC343230-G01	Guide Block L	1
-7	DC343281-G01	Guide Block R	1
-8	KEISAKI-J21188-001	LED Assy	1
-9	DC447417-001	Terminal	1
-10	M3x0.5x6 FE	Screw, Flat	3
-11	M3x0.5x6 FE	Screw, Pan Hd, Washeered	5
-12	M3x0.5x10 FE	Screw, Pan Hd, Washered	1
-13	M3x0.5x8 FE	Screw, Pan Hd, Washered	1
-14	KEISAKI-J21202-001	Micro Switch	1
-15	M2x10 (No. 0 – 3)	Screw, Pan Hd	1
-16	DC448179-002	Cover	1
-17	M3x0.5x5 FE	Screw, Pan Hd	3

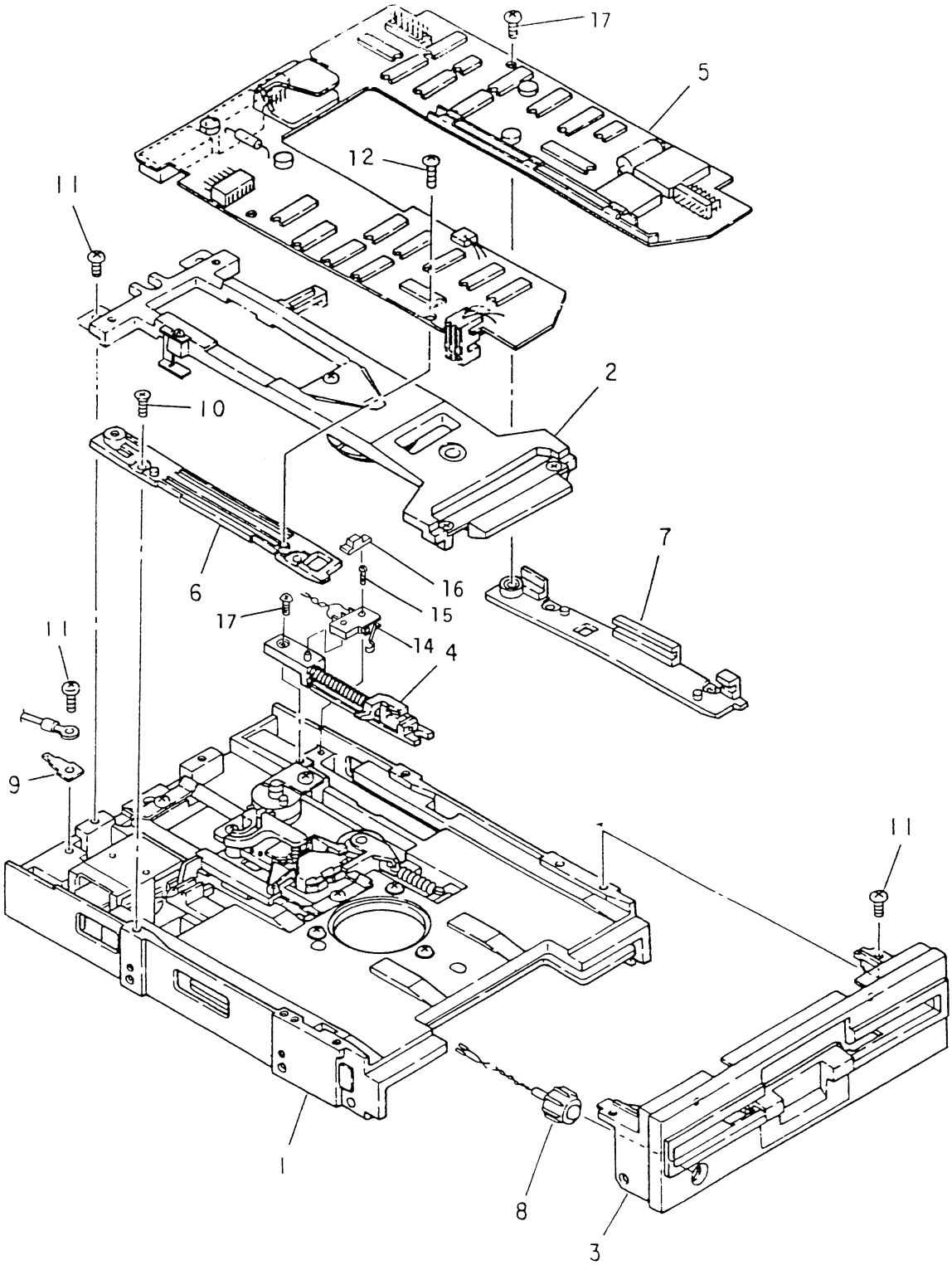


Figure 1. Flexible Disk Drive

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 2	DC141378-G03	Mechanism Assy	1
-1	DC243233-G01	Carrige Assy	1
-2	KEISAKI-J21041-001	TK00 Sensor Assy	1
-3	KEISAKI-J21039-001	HLMG Assy	1
-4	KEISAKI-J21037	Spindle Motor Assy	1
-5	KEISAKI-J21122	Idler B Assy	1
-6	KEISAKI-J21043	Stepping Motor	1
-7	DC141359-003	Frame	1
-8	DC446110-001	Guide Rod	2
-9	DC446396-003	Clamp	2
-10	DC342976-001	Band	1
-11	DC446392-001	Holder, Band A	1
-12	DC446139-001	Holder, Band B	1
-13	DC446397-001	Stopper, Capstan	1
-14	DC446148-002	Spring, Coil, C	1
-15	DC447020-001	Holder, STM, B	2
-16	DC447019-002	Spring, Plate STM	1
-17	M2.5x4 FE	Screw, Pan Hd	1
-18	M3x0.5x10 FE	Screw, Set-Socket	1
-19	M3x0.5x8 FE	Screw, Pan Hd, Washered	3
-20	M3x0.5x6 FE	Screw, Pan Hd, Washered	4
-21	M3x0.5x6 FE	Screw, Flat	3
-22	M3x0.5 FE	Nut, HEX	1
-23	M2.5x5 FE	Bolt, Socket (Micro-Size)	1

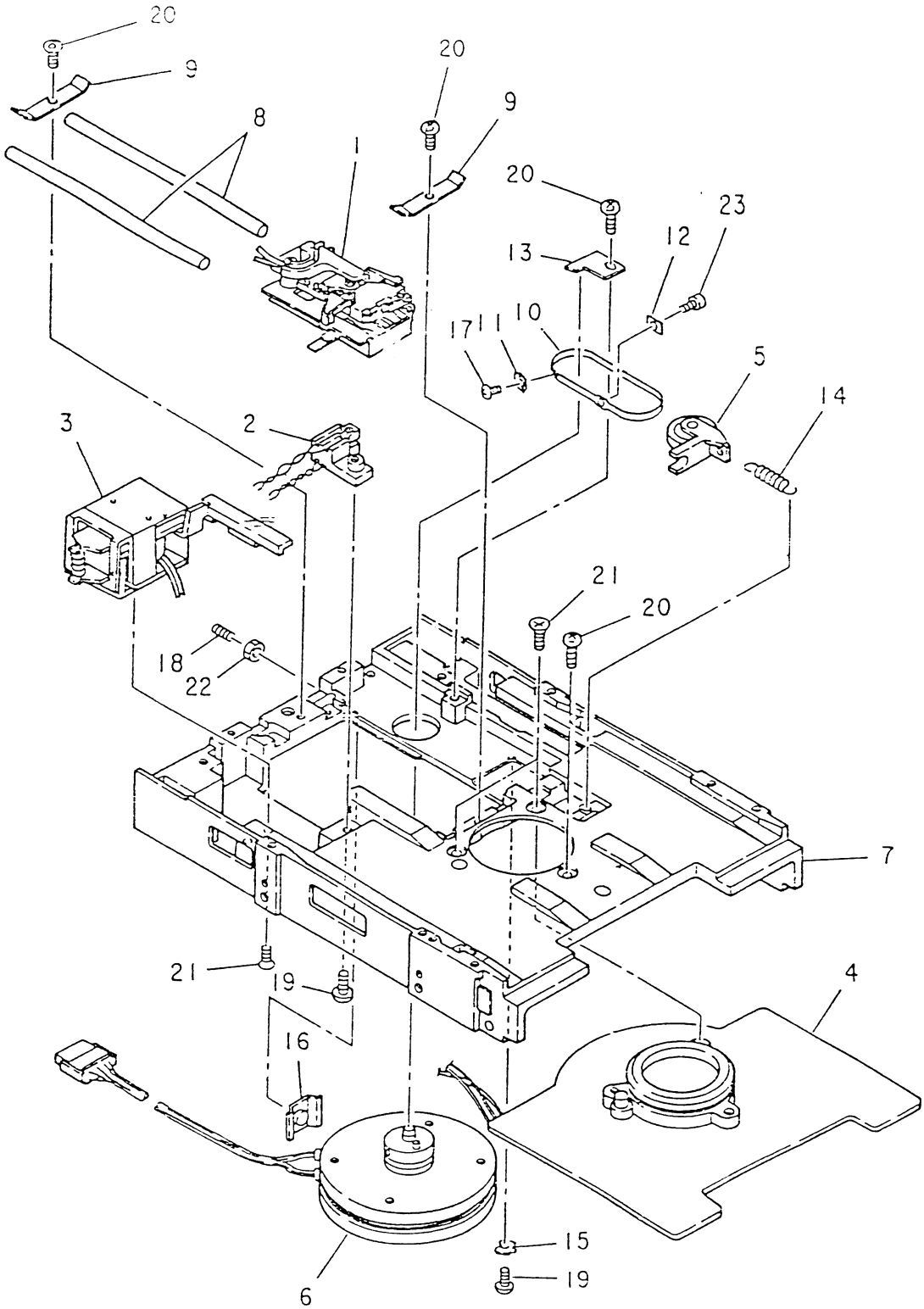


Figure 2. Mechanism Assy

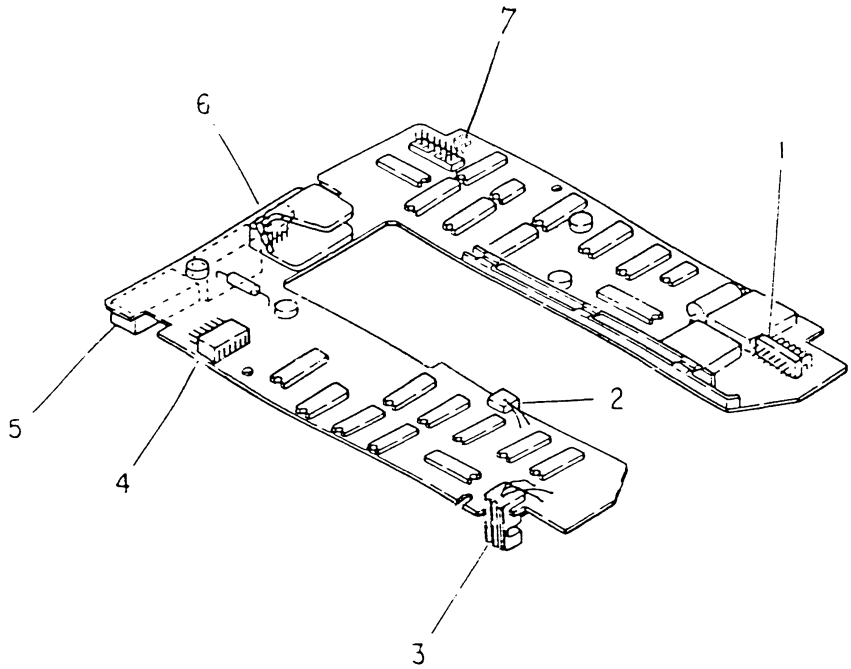


Figure 3. PCA, NAMFF

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 3	DC44 7987	PCA, NAMFF	
-1	65625-114#6	Connector, PWB	1
-2	KEISAKI-J21101	Index Sensor U Assy	1
-3	KEISAKI-J21100	Write Protector Sensor Assy	1
-4	PS-12PA-D4LT1-A1	Connector, PWB	1
-5	172349-1	Connector, PWB	1
-6	IL-5P-S3EN2-(N)-1	Connector, PWB	1
-7	IL-2P-S3EN2-1	Connector, PWB	1

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 4	DC243233-G01	Carriage Assy	
-1	DC141353-G01	Carriage	1
-2	DC243171-G01	Arm Assy	1
-3	DC343242-001	Stay, Spring	1
-4	DC447161-002	Spring, Coil Head,	1
-5	DC343009-001	Cover, Head, DN	1
-6	KEISAKI-J20996-001	Gimbals Head Assy UP	1
-7	KEISAKI-J20996-002	Gimbals Head Assy DN	1
-8	DC446597-001	Shield Plate (U)	1
-9	DC446598-001	Shield Plate (D)	1
-10	DC243442-G02	Head Cable Assy	1
-11	DC343494-G01	Spring CR Assy	1
-12	DC447130-001	Space Tube	1
-13	DC447407-001	Rubber	1
-14	DC447408-001	Rubber	1
-15	DC447791-001	Rubber	1
-16	DC447564-001	Space Rubber	2
-17	M3x0.5x8 BS	Screw, Pan Hd, Washered	2
-18	M3x0.5x10 FE	Screw, Pan Hd, Washered	1

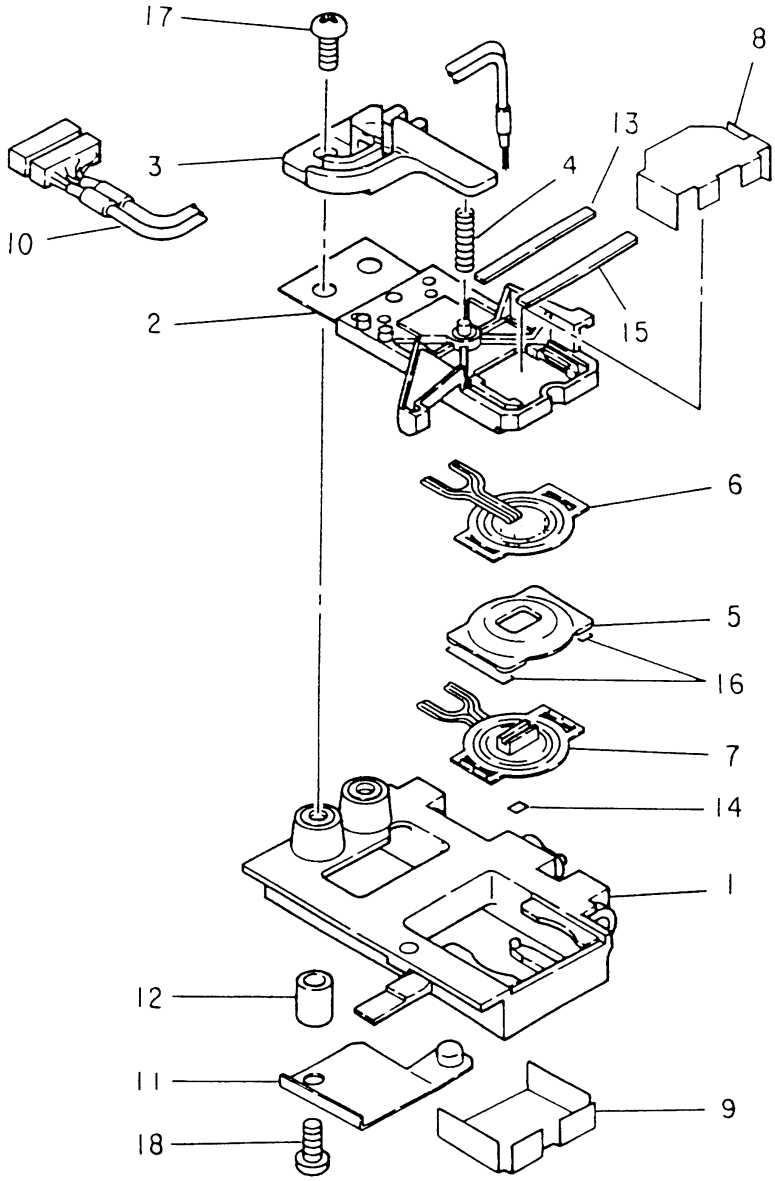


Fig. 4. Carriage Assy

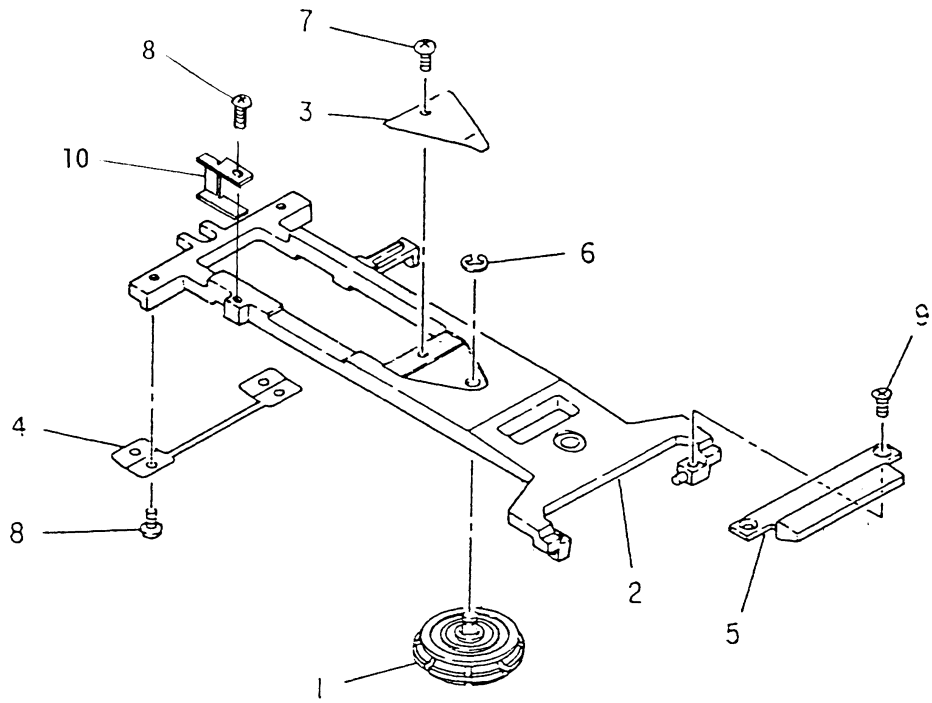


Figure 5. Cartrige Guide Assy

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 5	DC243295-G01	Cartridge Guide Assy	1
-1	DC343373-G01	Collet Assy	1
-2	DC243291-G01	Cartrige Guide	1
-3	DC446151-001	Spring Leaf B	1
-4	DC446865-003	Spring, Cartridge Guide	1
-5	KEISAKI-J21120-001	Button Assy	1
-6	Ring, E. 3ø SUS	Ring, E	1
-7	M3x0.5x5 FE	Screw, Pan Hd	1
-8	M3x0.5x6 FE	Screw, Pan Hd, Washered	3
-9	M2.5x5 FE	Screw, Flat	2
-10	DC448104-001	Fuk	1

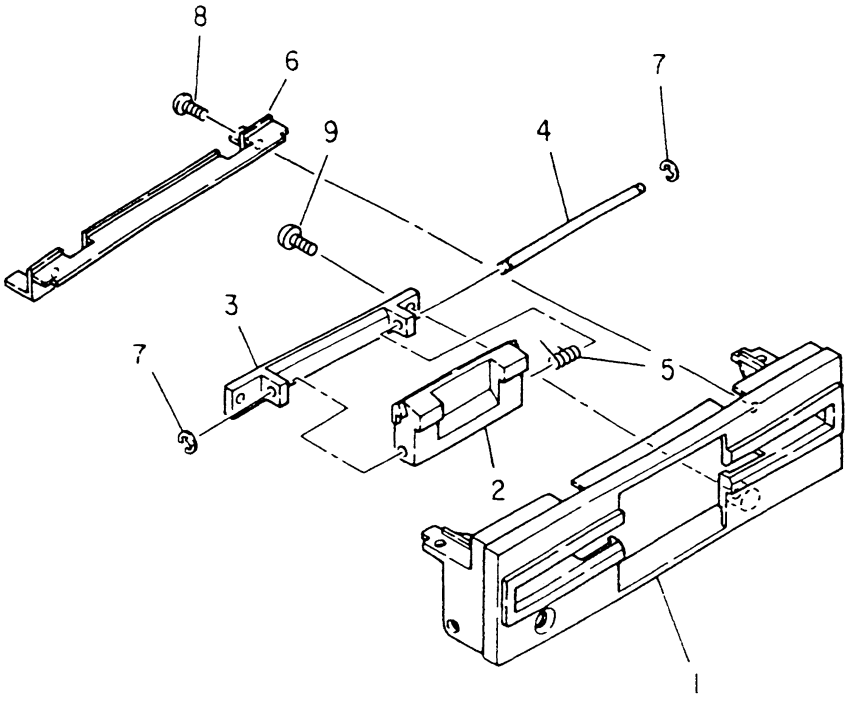


Figure 6. Front Panel Assy

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 6	KEISAKI-J21117	Front Panel Assy	
-1	DC243296-G01	Front Panel	1
-2	DC343213-001	Door, Front	1
-3	DC343214-001	Door, Support	1
-4	DC446650-001	Shaft, Front	
-5	DC446659-002	Spring, Coil	1
-6	DC343280-001	Front Cover	1
-7	Ring, E, 1.5ϕ SUS	Ring, E	2
-8	M3x0.5x6 FE	Screw, Pan Hd, Washered	2
-9	M3x0.5x8 FE	Screw, Pan Hd, Washered	2

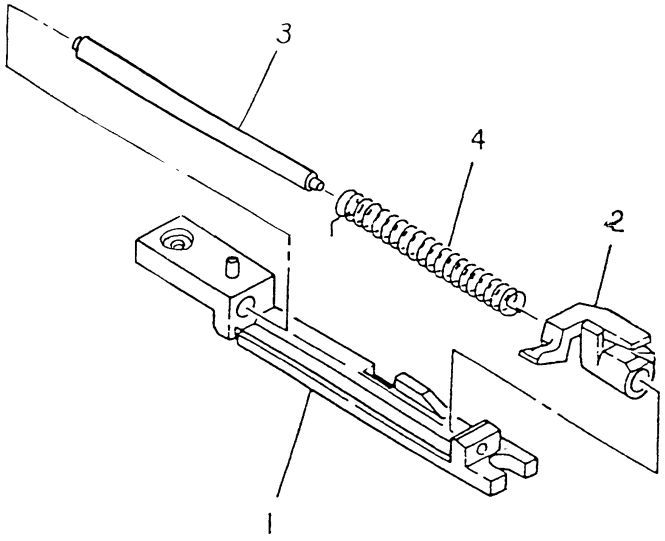


Figure 7. Ejector Assy

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 7	KEISAKI-J21119	Ejector Assy	
-1	DC345089-001	Holder. Ejector. B	1
-2	DC343182-001	Slide	1
-3	DC448175-001	Shaft. Ejector	1
-4	DC446660-001	Spring, Coil. F	1

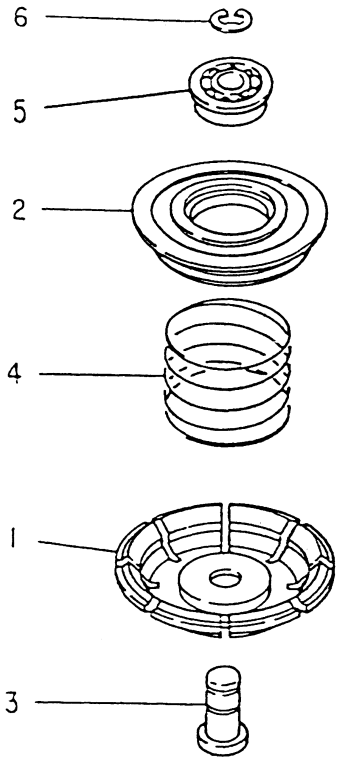


Figure 8. Collet Assy

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 8	DC343373-G01	Collet Assy	
-1	DC345069-001	Collet A	1
-2	DC345070-001	Collet B	1
-3	DC448118-001	Shaft	1
-4	DC447666-002	Spring, Cup	1
-5	RF1240ZZ OR F604 ZZ	Bearing	1
-6	Ring, E, 3ϕ SUS	Ring, E	1

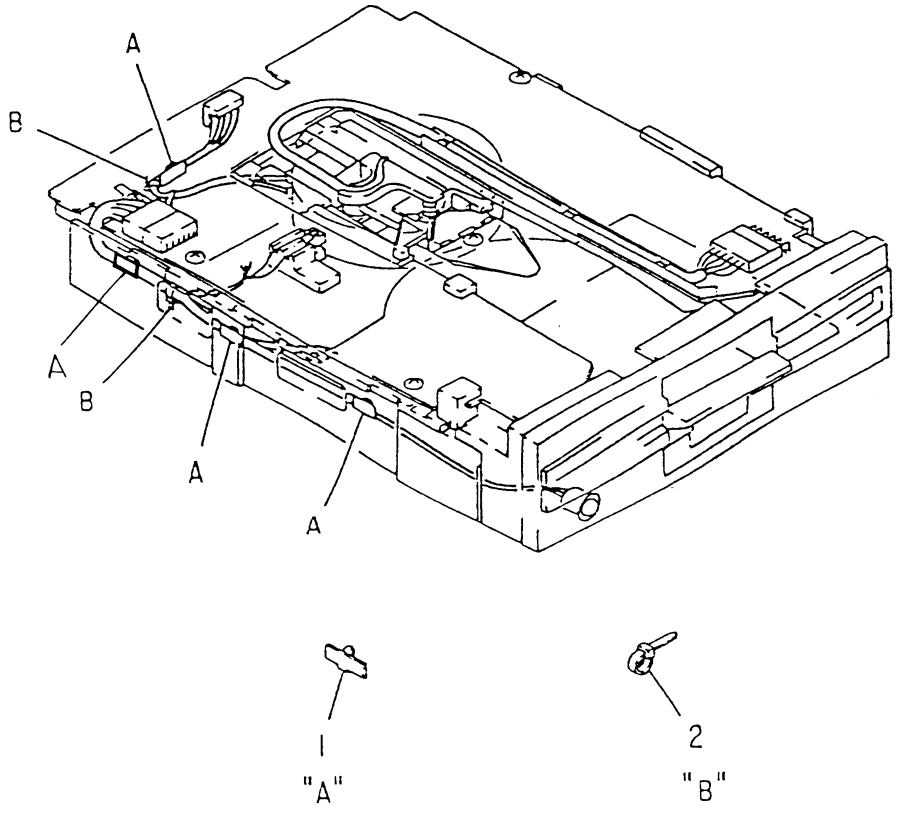


Figure 9. Flexible Disk Drive Wiring Diagram

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 9	DC141409-G03	Flexible Disk Drive Wiring Diagram	
-1	PM-105	Clamp	4
-2	SST1M	Band. Wire	2

A

5.25 INCH FLEXIBLE DISK DRIVE

Differences Between M4853 and M4853-1

MITSUBISHI ELECTRIC

DIFFERENCES BETWEEN M4853 and M4853-1

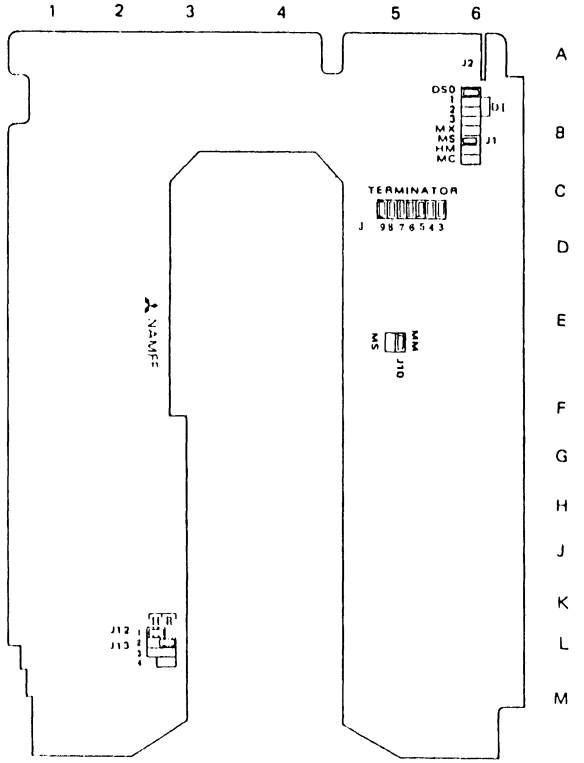
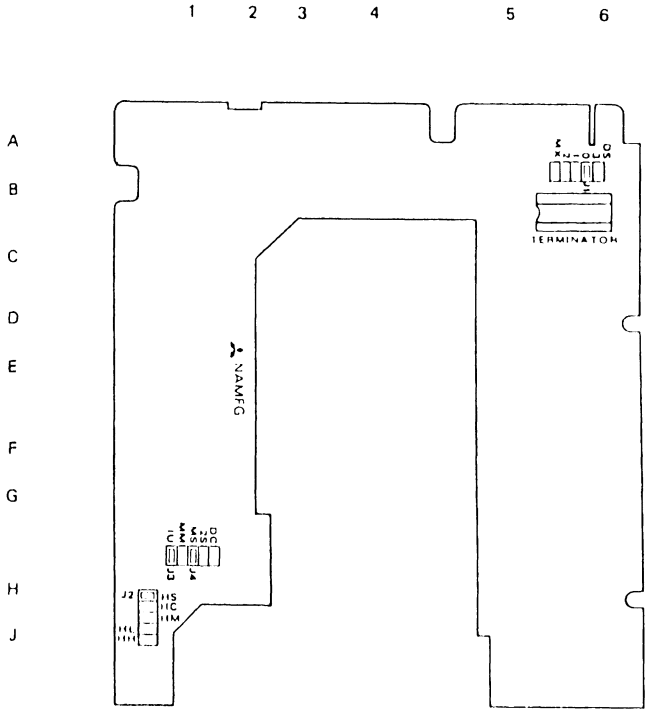
(A) PCA

Item	M4853	M4853-1	Remarks
1. Input Terminals	·Short-plug system	·IC socket system	
2. Customer adjusted short-plug (1) Choosing headload conditions	·Three kind; HS, HM and HC. ·Short-plugs can be used to choose 2 types of internal control for the headload. These types are that in conjunction with STANDARD READY and that in conjunction with HOLD READY.	·HL and HH have been added. HL performs headload in response to the IN USE signal during drive select. HH performs headload in response to the SPARE input signal (connector J1/P1 - pin 2). ·Internal control of headload is done in conjunction with HOLD READY. No other optional choice.	
(2) Choosing motor operation conditions	·During MM short the motor will start with the ON signal. During MS short, the motor will start with the Drive Select signal. When both are in short, it will start with logical add. And when both are open, the motor will not start.	·Combinations of open and short circuits between MM and MS allow the choice of one of the 4 following conditions. 1. When MM is open and MS is shorted, the motor starts with the ON signal. 2. When MM is shorted and MS is open, the motor starts with the DRIVE SELECT signal. 3. When MM is open and MS is open, motor starts with the previously mentioned logical add. 4. When MM is shorted and MS is shorted, it will result in RESERVED mode. (Motor start will result when IN USE signal is latched to DRIVE SELECT signal.)	

Item	M4853	M4853-1	Remarks
(3)Choosing READY Condition	·With STANDARD READY R-2 is shorted and R-3 is open. With HOLD READY R-2 is open and R-3 is shorted.	·With STANDARD READY DC is open and 2S is open. With HOLD READY DC is open and 2S is shorted.	
(4) Separate IN USE signal	·In the PCB pattern, DI is cut off, and short plug J3 is shorted.	·Short plug, IU is open.	
3.Interchangeability of parts	·Parts M4853 and M4853-1 are not interchangeable.		
4.Others	·The electrical interface (power supply interface) with the controller is the same for M4853 and M4853-1. ·The power supply connector and electrical interface connector are in the same position.		

A

Customer Istallation Options

M4853	M4853-1
	

(B) Structure

	Item	M4853	M4853-1	Remarks
Carriage	1. Carriage Structure		·Creating carriage subframes	
Mainframe	1. Separating designed parts form structural parts		·Can function as FDD unit without panel front.	
	2. Front panel has been strengthened		·Metal frame on inside of front panel.	
	3. Depth has been decreased	·Circuit boards protrude 8mm beyond back of frame.	·Back edge of frame and printed circuit board are even.	
Structural parts	1. Interchangeability	·No interchangeability of parts between the M4853 and the M4853-1.		
Others	1. Mounting interchangeability	·The mounting interchangeability is the same the M4853 and the M4853-1.		

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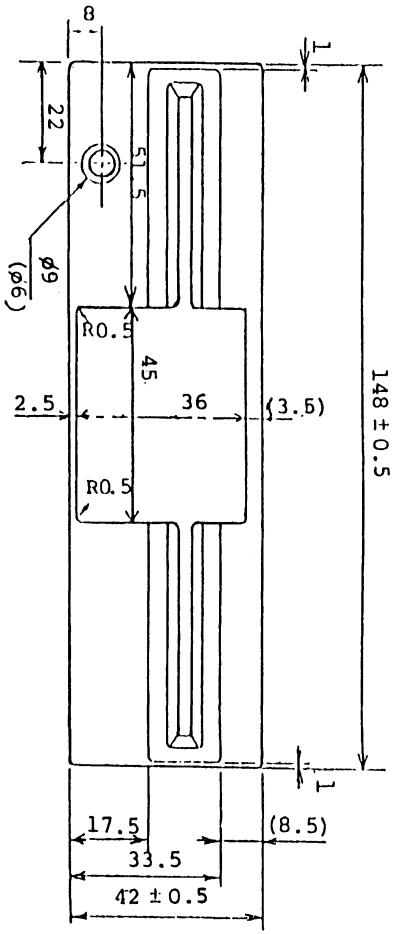
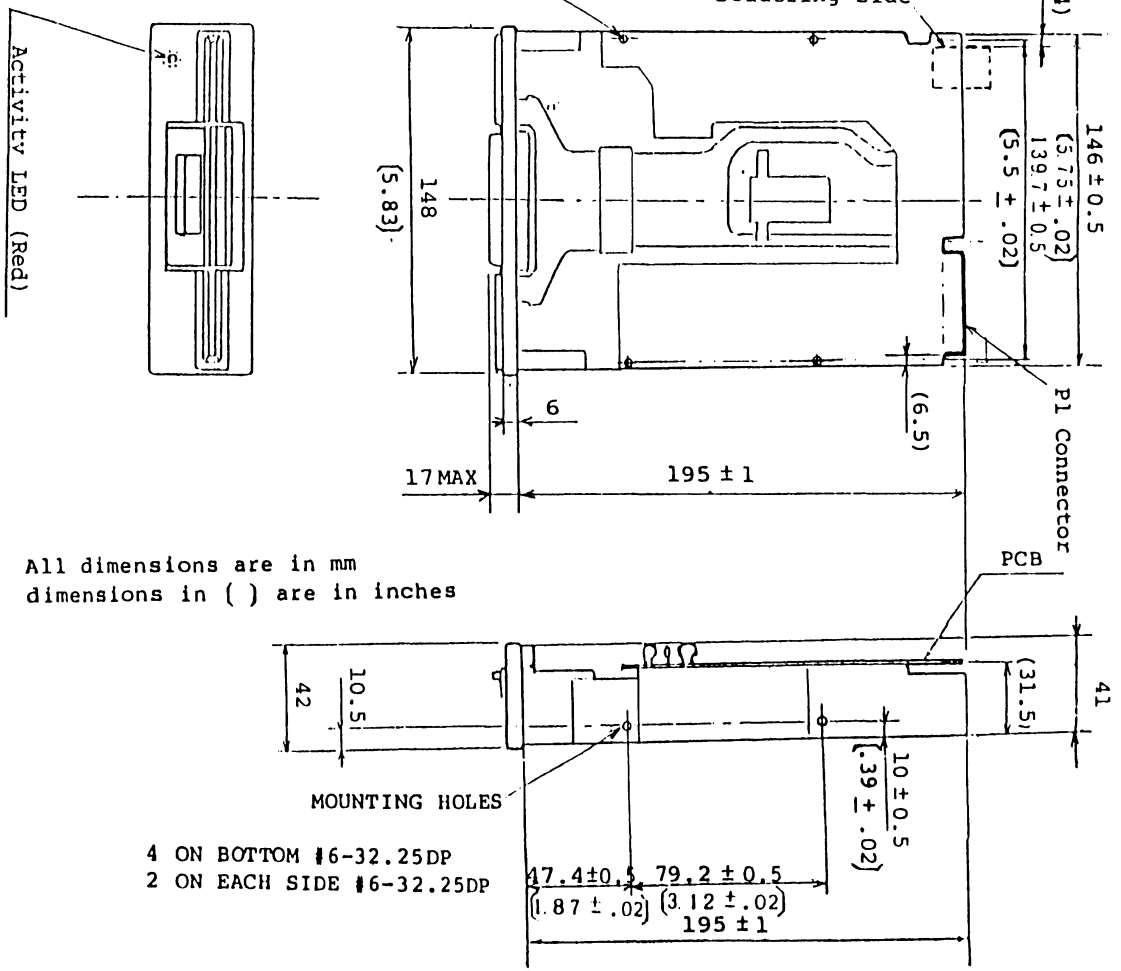
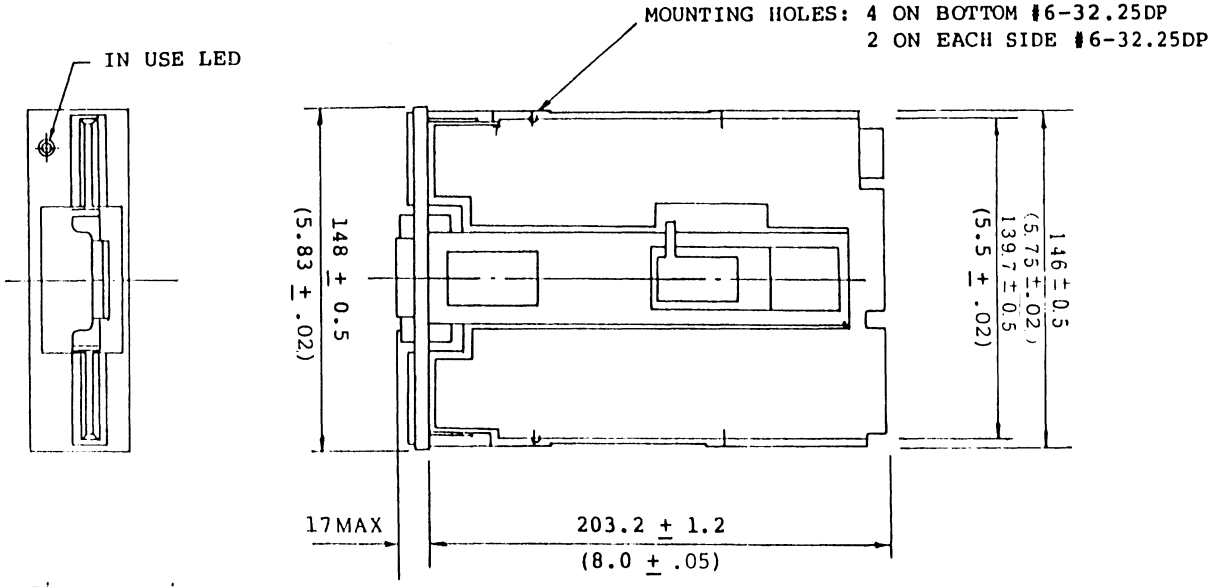


Front Panel Dimensions

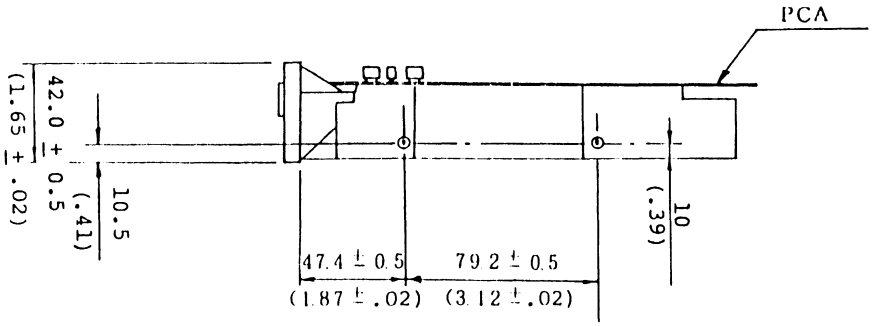


Note: All dimensions are in mm
dimensions in ( ) are in inches

M4853-1 Disk Drive Dimensions



Note: All dimensions are in mm
dimensions in ( ) are in inches



.M4853 Disk Drive Dimensions

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TJ2-G30219A

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5.25 INCH FLEXIBLE DISK DRIVE

MODEL M4853-1

MAINTENANCE MANUAL

MITSUBISHI ELECTRIC CORPORATION

1. GENERAL

This manual explains the handling, maintenance and adjustments of M4853-1 Flexible disk unit.

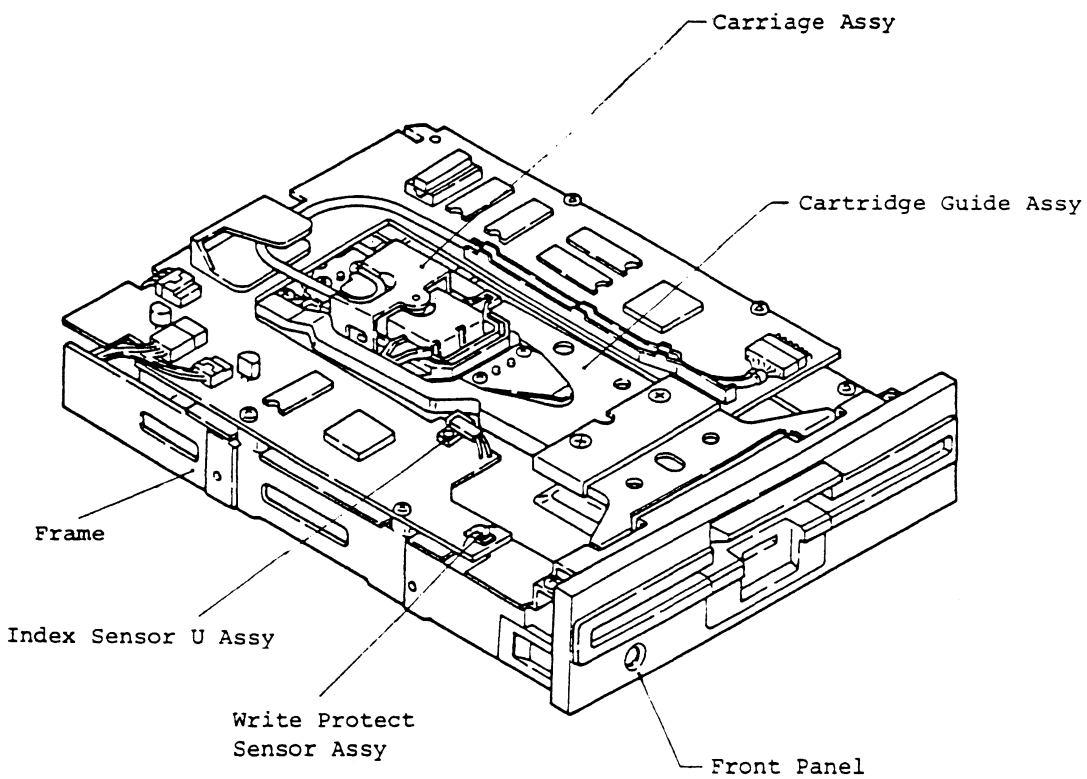
A

2. REFERENCES (SCHEMATICS AND MANUALS)

M4853-1 Specifications	SJ2-G3446A
PCA NAMFG schematic diagram for maintenance	TJ2-G30210A
Illustrated parts list	TJ2-G30199A
Packing procedure	TJ2-G30150

3. NAMES OF UNIT PARTS

Figure 1



4. OPERATING INFORMATION

4.1 Environment

There is no problem in operating under normal office conditions but when operating out of following conditions, Drive may not work properly or Diskette may get damaged.

1) Temp./Humid. Range

	During operation	During non operation
Temperature Range	5°C to 43°C (41°F to 109.4°F)	-20°C to 51°C (-4°F to 125°F)
Humidity Range	20% to 80% RH (Dew Less)	5% to 95% RH (Dew Less)

(Maximum wet bulb temp 29.4°C (85°F))

2) During transportation

Temperature range -40°C to 62°C (-40°F to 143.6°F) for a maximum period of 72 hour

Humidity limits 1 - 95% relative humidity with no condensation for a maximum period of 72 hours

3) Dust

Be extra careful of dust entering unit because it may cause damage to head or diskette media.

4.2 Diskette Handling (Be extra careful of the following)

1) Keep diskette media away from any appliance which may generate magnetic field.
(ex, Radio, TV, Motor/Dynamo and other electrical appliances)

2) Do not bring any ferro magnetic materials near the diskette.

3) Do not bend media under any condition.

4) Return the diskette to storage envelope when transporting and storing it.

5) Do not touch or attempt to clean the disk media surface with alcohol.

6) Do not expose diskette to heat, dust, or sunlight.

7) Do not write anywhere except on the media label and only use a soft felt tip pen.

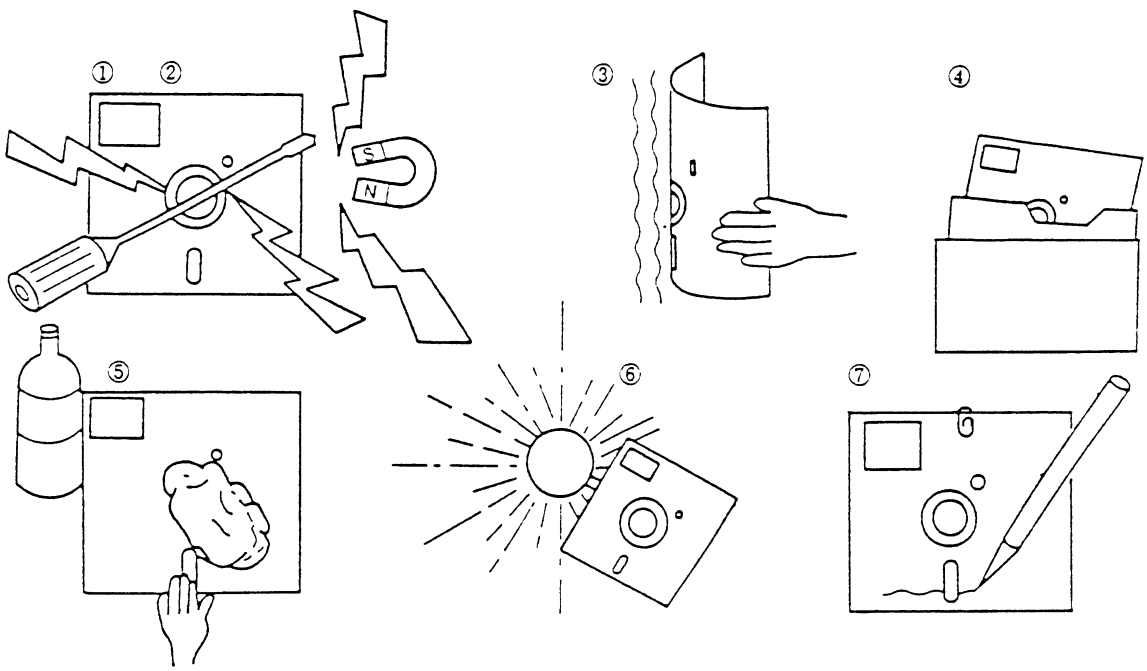


Figure 2

5. REGULAR MAINTENANCE

"Unit life can be affected by damaged parts as a result of dusty environment or excessive operation." So maintenance by such methods as visual inspection, cleaning/change of damaged parts and regular functional checks will keep the unit in good condition and enable the discovery of any problem at an early stage.

Time span between maintenance is calculated at an actual operation rate of 8 hours a day so in case of greater rate, differences modification is needed. When operating at a normal environment condition, perform maintenance once a year.

5.1 Caution

1) During maintenance, be careful of dust entering unit, and damaging head.

2) Make sure power switch is off first, when starting maintenance.

3) When put off/on Printed circuit Board (P.C.B.) Assy, make sure power switch is "off" to protect semiconductors and ICs.

4) Do not touch Disk media surface or head directly and do not bring any ferro magnetic materials near it.

5) When using this unit for Read data only (when using CE Disk), be careful of write mode mishandling to protect data.

6) Do not touch steel belt and do not adjust related mechanism.

7) Avoid static shock or excessive force to head carriage assembly because it has been carefully adjusted. Do not readjust any screws except where specified in this manual.

5.2 Head Cleaning on field applications

Head cleaning is recommended at user's sites, especially when used in severe environments, because the heads may accumulate dust in the air and magnetic coating material of the disk, causing chance of error increase and/or scratch on the disk surface.

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Recommended schedules and procedures are as follows:

1) Cleaning Schedules

a) Periodical cleaning using wet type cleaning disk.

i. Once a month for normal usage in normal environments.

ii. Should like to be encreased up to about once a week used in severe environments such as dusty area, high humidity, high and low extreme temperatures. Low temperature such as 5 to 10°C (41 to 50°F) under high humidity is most severe for diskettes.

iii. Higher frequency for brand new drives would be recommended, for about once a week. Better matching between head and medium would be produced by a long time use, as experienced.

b) When frequent errors are detected. (Wet or dry type may be used.

c) When scratch(es) are found on the medium surface. (Wet or dry type may be used.)

2) Recommended Head Cleaning Material

a) Wet type

Innovative Computer Products*, Head Cleaning Kit (or equivalent)

* 18360 Oxnard Street, Tarzana, California 91356
(213) 996-4911 TWX 910-493-5964

b) Dry type

To be supplied from Mitsubishi representatives.
No substitutions would be allowable without accepted

3) Procedures of Cleaning

a) Wet type

Dispense the cleaning solution onto the lint-free cleaning disk through the cutout in the disk jacket. Insert the cleaning disk and activate the drive. Load head and rotate disk for 2 ∿ 3 minutes. Eject cleaning disk and wait for another 2 ∿ 3 minutes to dry heads.

As the cleaning disk is high in light transmittance, cover the index hole by a semi-transparent material such as tracing paper, or color in black the index hole circular area of the disk, when the head are not loaded on the cleaning disk.

b) Dry type

Abrasive type dry cleaning disk may also be used for a hard deposit on the disk. 1/2 ∿ 1 minutes would be sufficient. Wet type finish would be recommended after dry type cleaning.

4) Other Comments

a) Please contact maintenance or service facilities if the above procedures can not recover the good performance.

b) The diskette medium is weak for abrasion in temperatures below the specified range (below 10°C or 50°F). The durability in such low temperatures are different largely for diskette brands.

c) Dry type would be usable once a month, but we don't recommend to use two times or more in a month.

d) Recommended to use dry type limitted by maintenance personnel only, or limited to use by users when frequent errors or disk scratches are found.

5.3 Check and Adjustments

5.3.1 Diskette rotational cycle adjustments

A

1) Equipment

CE Tester

Scratch Diskette

Universal Counter

VR Adjustment Driver

2) Adjustment procedure

2)-1 Connect CE Tester to Drive then turn-on power switch

2)-2 Load diskette then turn-on motor with drive select

2)-3 Make sure Head Load Magnet activated.

2)-4 Seek to Track 00

2)-5 Connect universal counter to INDEX (TPB14) signal and measure rotational cycle rate.

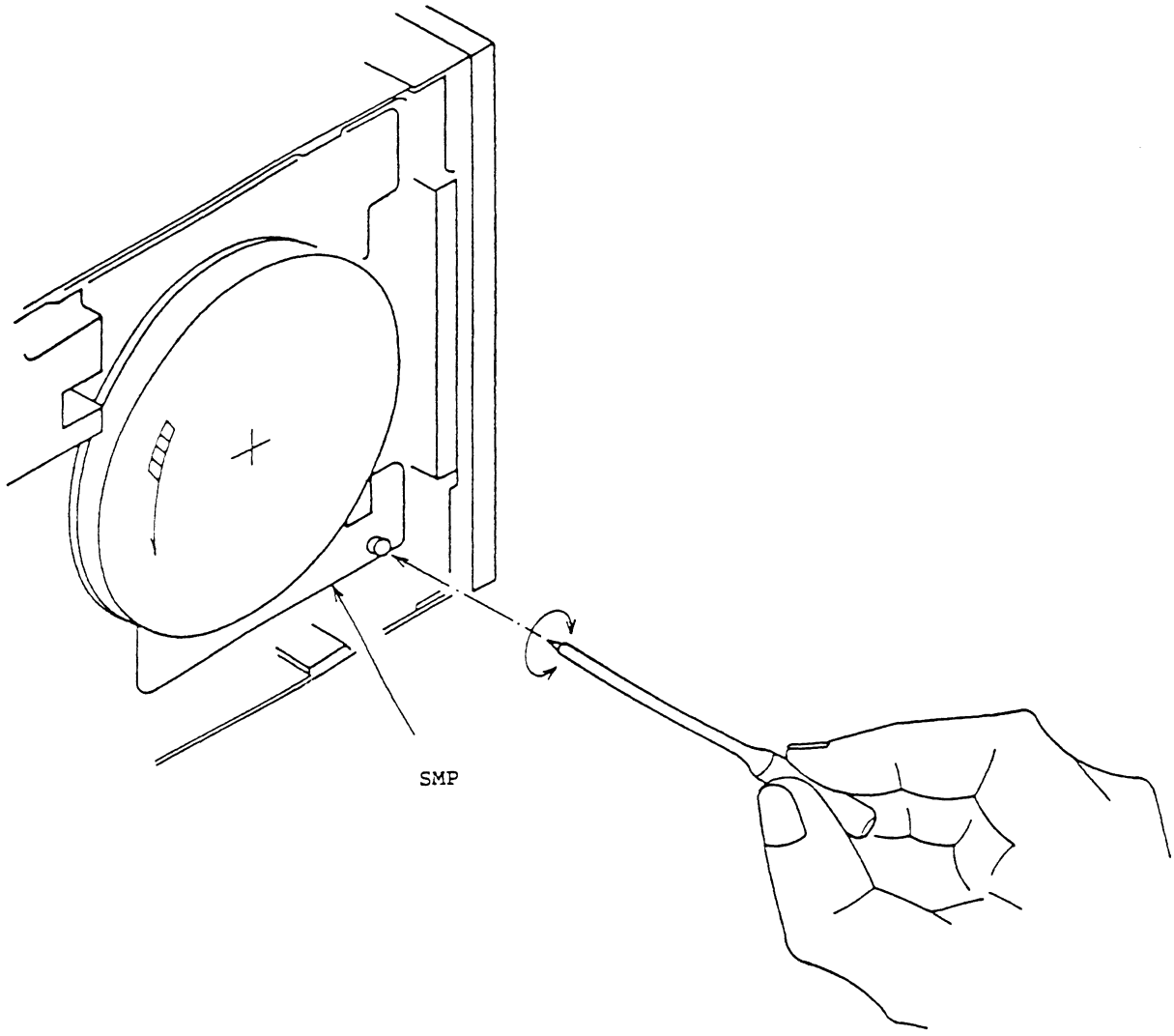
2)-6 Adjust counter reading until it comes within specifications using SPM VR (see figure 4).

2)-7 After this adjustment, lock VR with white paint.

3) Test specifications

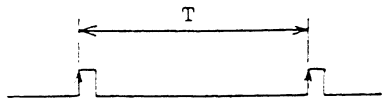
3)-1 Check: ± 1.6% (196.8 - 203.2 ms.)

3)-2 Adjust: ± 1.0% (198.6 - 201.4 ms.)



200.0

T=198.6 - 201.4 ms



+INDEX

Figure 4

5.3.2 TK00 sensor position adjustment

1) Equipments

CE Tester

Scratch diskette

No. 1 plus screw driver (Phillips #1)

Oscilloscope

2) Adjustment procedure

2)-1 Connect CE Tester to drive then turn-on power switch and load diskette.

2)-2 Turn-on motor and select drive.

2)-3 Repeat seek between TK00 and 02 (see figure 5).

2)-4 Observe waveform (TK00) at TPD1 using oscilloscope

Trigger CH1 - -step (DC, -) TPC 15
Signal CH2 - +TK00 (DC, +) TPD 1

2)-5 Loosen screw and adjust time 7 until it comes to within 2.5 - 3.5 ms by moving TK00 in the direction of the arrow. (see figure)

3) Note:

3)-1 Set step rate at 3 ms using CE tester.

3)-2 Make sure there are 2 pluses on step signals.

4) Check

4)-1 Repeat seek between TK02 and TK04

4)-2 Observe level of TK00 signal at TPC13 using oscilloscope.
trigger CH1 - -step (DC, -) TPC 15
signal CH2 - +TK00 (DC, +) TPC 13

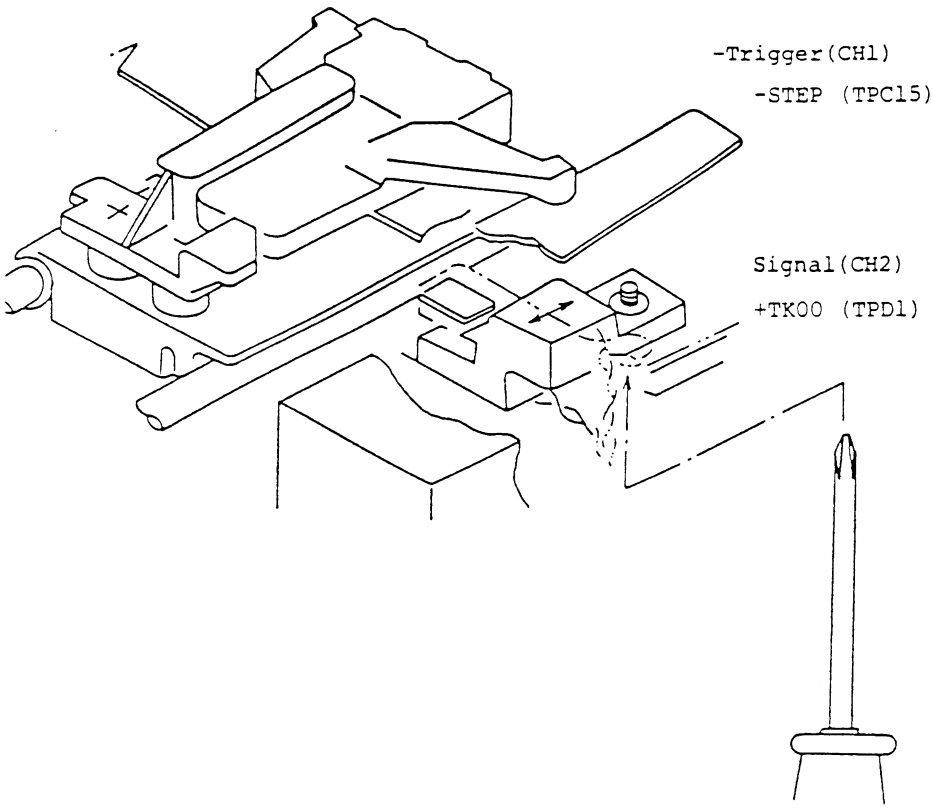
4)-3 Check level of signal is low.

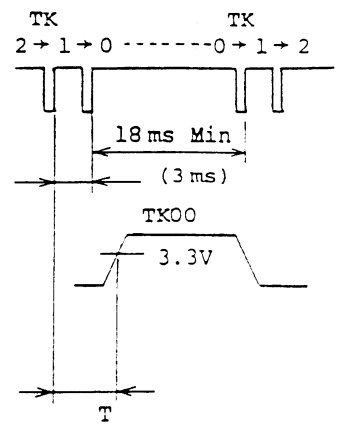
4)-4 Seek to TK00

4)-5 Observe level of signal (TK00) at TPC13 using oscilloscope.
trigger CH1 - -step (DC, -) TPC 15
signal CH2 - +TK00 (DC, +) TPC 13

4)-6 Check level of signal is high.

Figure 5





2.5 - 3.5 ms

5.3.3 INDEX sensor position adjustments

1) Equipment

CE Tester

CE diskette (DYMEK 502-1D STANDARD DISKETTE)

Hex wrench

Oscilloscope

2) Check procedure

2)-1 Connect CE tester to drive (set power off)

2)-2 Turn-on power switch and motor-on

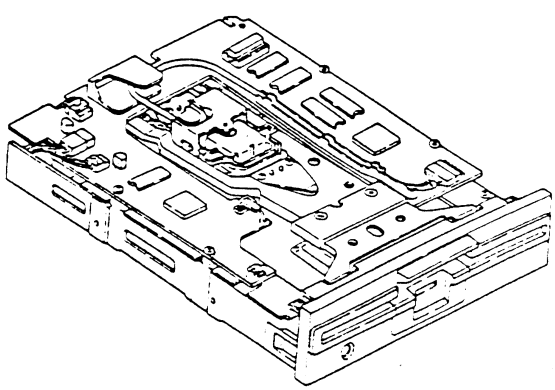
2)-3 Select drive and load CE diskette
(Close clamp door slowly)

2)-4 Read timing of each waveform at TPA9.
TPA10 under read mode TK02, using
oscilloscope. (see figure)

Trigger: EXT - +INDEX (DC, +) (TPB14)
Signal : CH1 - TPA9 (AC, Normal)
CH2 - TPA10 (AC, Inverted) Add Mode.

2)-5 Specification of timing T.

	Side-0	Side-1
Check	200 ± 200 us	200 ± 300 us
Adjust	200 ± 100 us	200 ± 200 us
	All at TK 02	



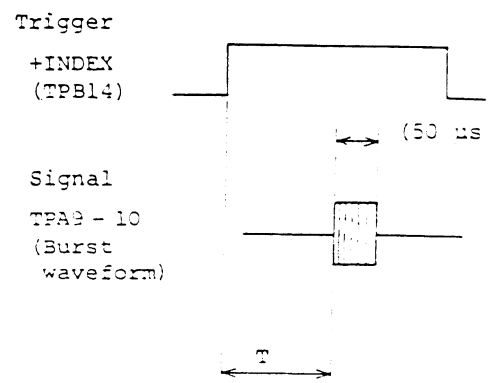


Figure 6

5.3.4 Head alignment adjustment

1) Equipment

CE Tester

CE Diskette (DYMEK 502-1D STANDARD DISKETTE)

Oscilloscope

Hex wrench (2.0 mm dia.)

(Fine point diagonal cutter)

2) Adjustment procedure

2)-1 Connect CE Tester to Drive (set power off).

2)-2 Turn-on power switch and motor on.

2)-3 Select drive and load CE diskette (close clamp door slowly).

2)-4 Seek TK00 to TK32 then read amplitude of each waveform (positioning waveform) at TPA9, TPA10 under read mode (see Figure 7).

Trigger: EXT - +INDEX (DC, +) (TPB14)

Signal : CH1 - TPA9 (AC, Normal)
CH2 - TPA10 (AC, Inverted) Add Mode.

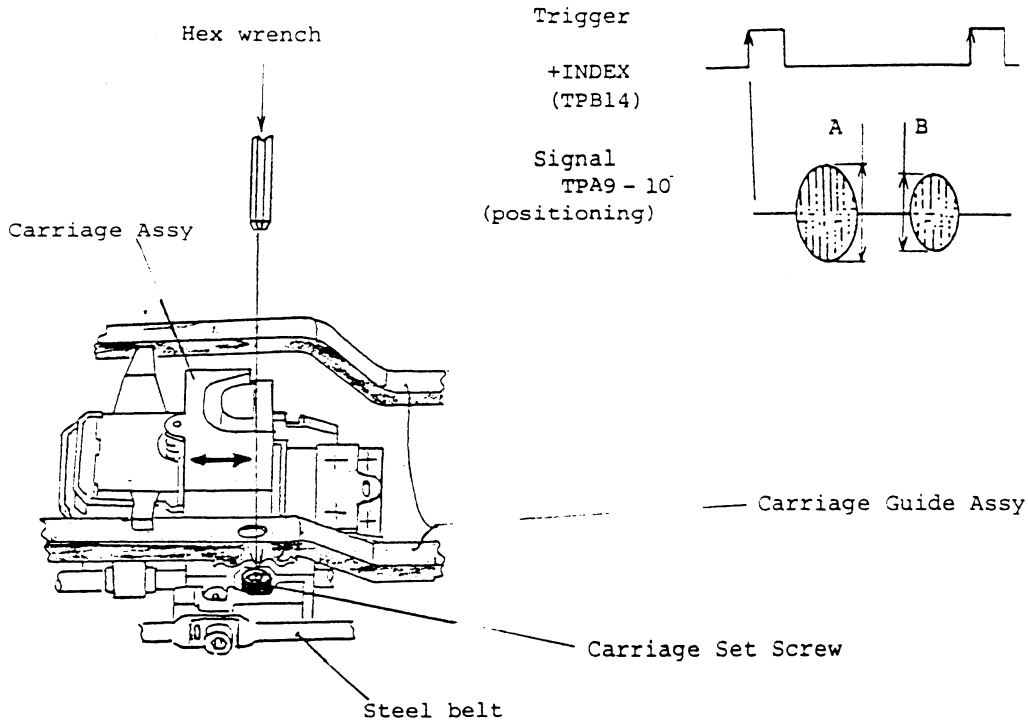
Specification:		CHECK	ADJUST
when	A > B	B/A > 0.57	0.6
	A < B	A/B > 0.57	0.6

2)-5 In each case of seek direction is TK00 to TK32 or TK79 to TK32, loosen carriage set screw, then adjust Carriage Assy until signal comes within specification. Do not forget to tighten the screw.

3) Note: Adjust under following conditions

Temperature: 23°C ±2°C exposed over 2 hours
Humidity : 50% ±5%

Figure 7


Hex wrench
Trigger
+INDEX
(TPB14)
Signal
TPA9 - 10
(positioning)
A
B
Carriage Assy
Carriage Guide Assy
Carriage Set Screw
Steel belt

A

5.3.5 Head Azimuth

1) Equipment

CE Tester
CE Diskette
Oscilloscope

2) Check procedure

2)-1 Connect CE Tester to Drive then turn-on power switch.

2)-2 Turn on motor.

2)-3 Select drive and load CE diskette.

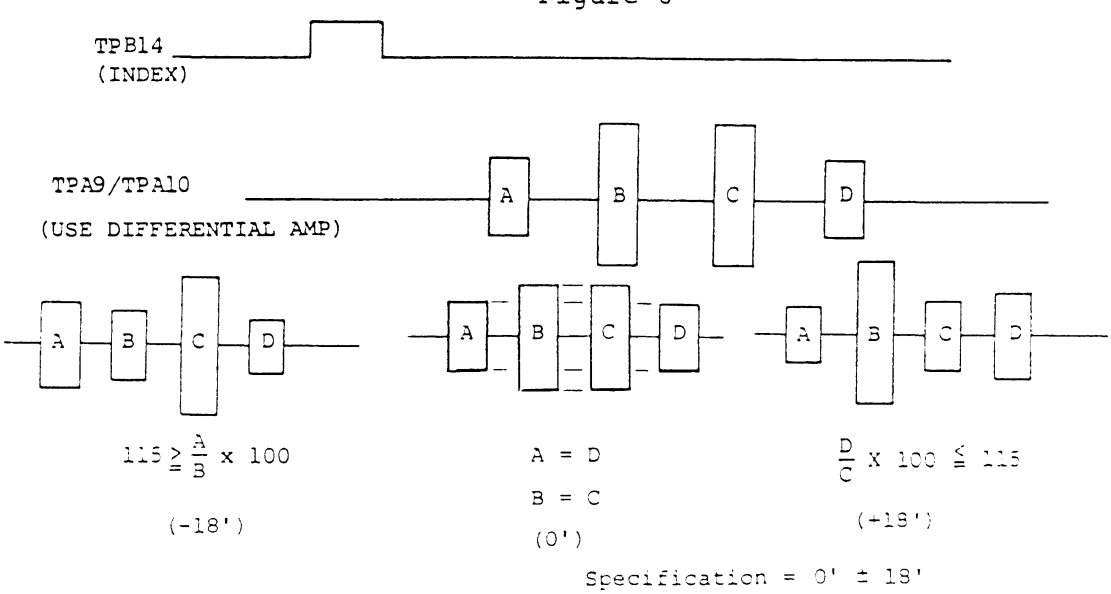
2)-4 Seek to TK68.

2)-5 Read azimuth waveform using oscilloscope.

Trigger: EXT - -INDEX (DC +) (TPB14)
Signal : CH1 - TPA9 (AC, Normal)
CH2 - TPA10 (AC, Inverted) Add Mode.

2)-6 Acceptable when adjusted waveform within following range

Figure 8



NOTE

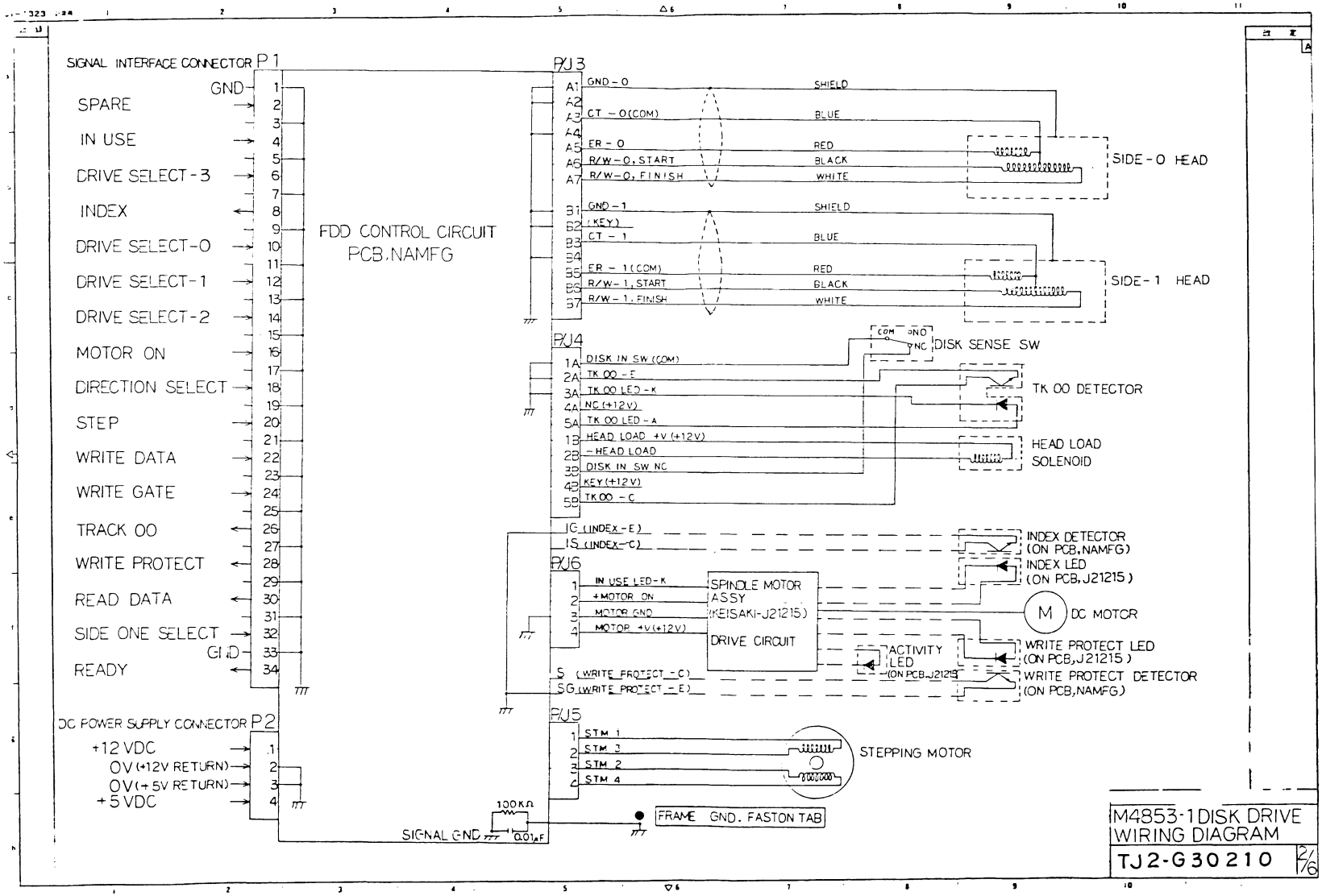
The head's azimuth is not adjustable. It is suggested that the drive be sent to an authorized repair center or a new head assembly be installed. In the latter case, all previous adjustments should be made again.

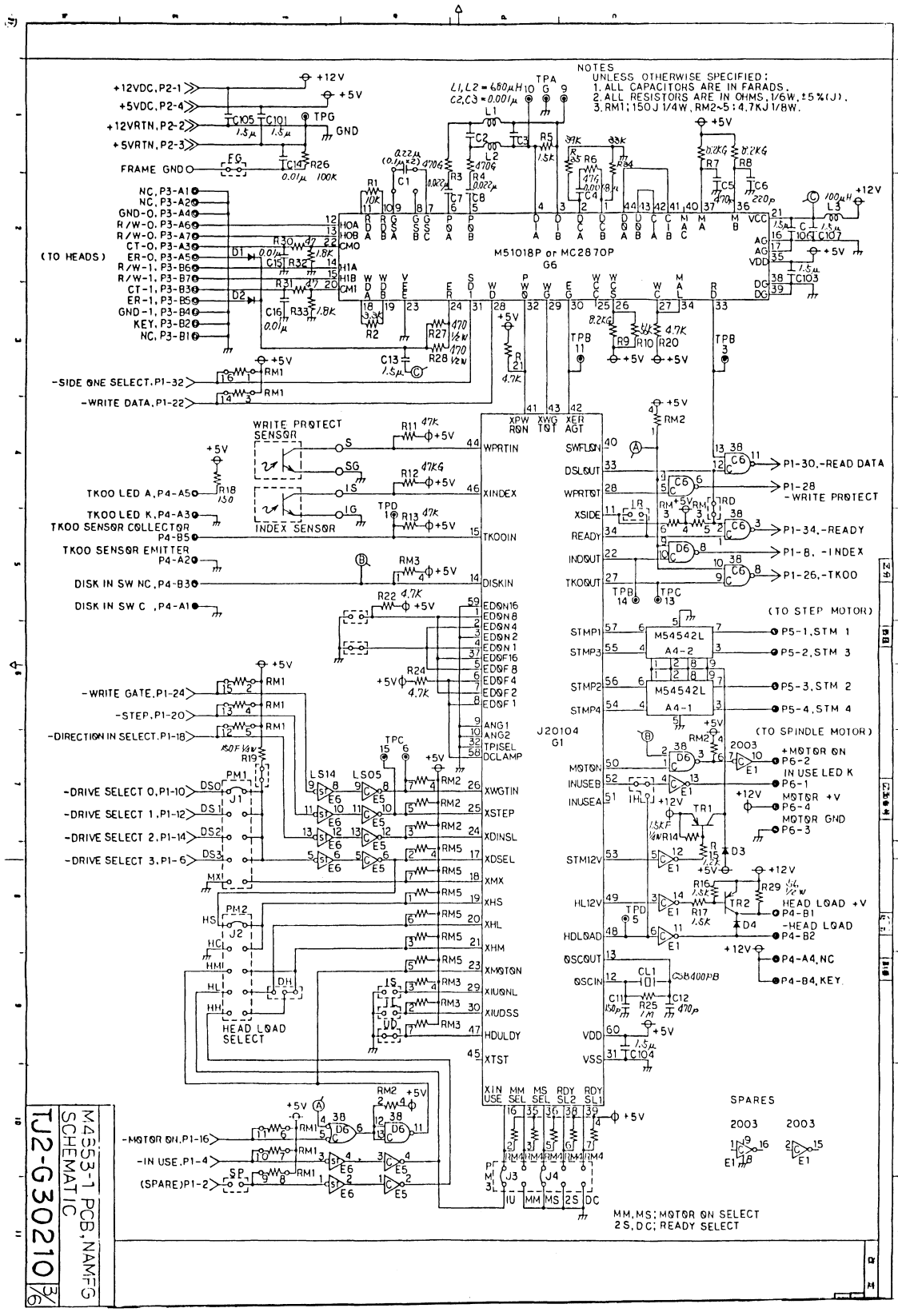
M4853-1 DISK DRIVE SCHEMATICS AND LOGIC MANUAL

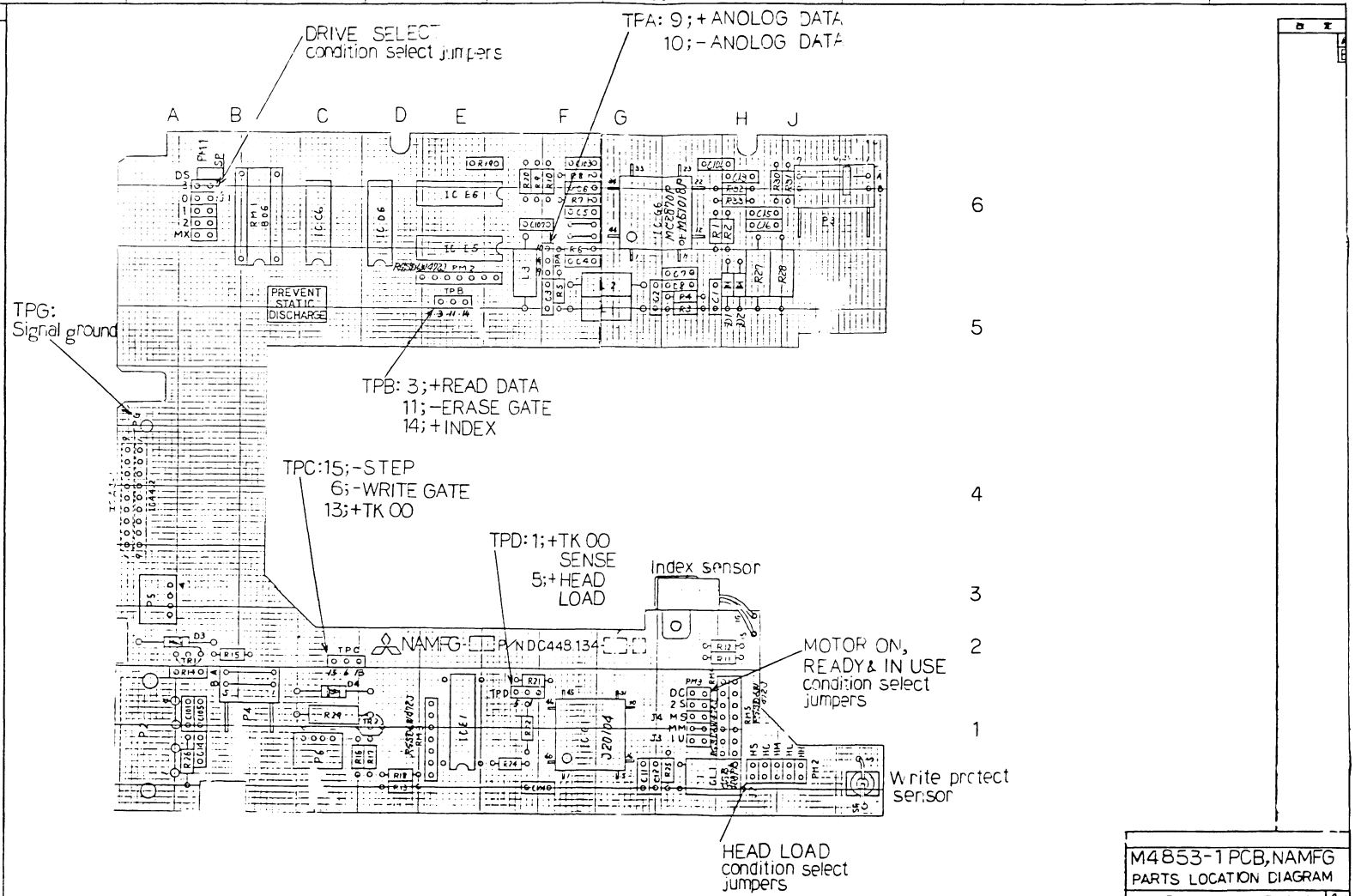
Usable for M4851-1

MITSUBISHI ELECTRIC CORPORATION

TJ2-G30210 B

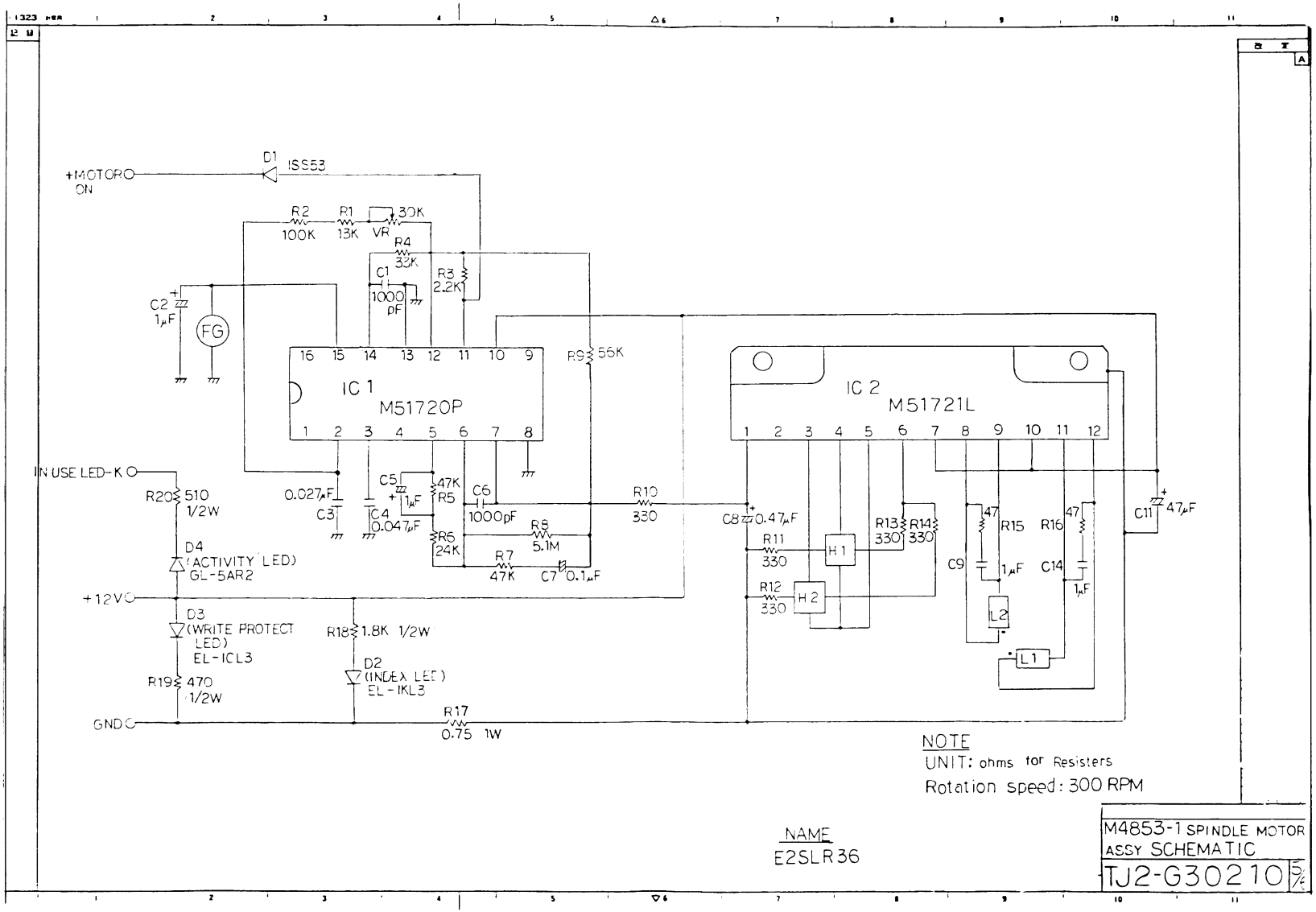

SIGNAL INTERFACE CONNECTOR P1
GND 1
SPARE 2
IN USE 4
DRIVE SELECT-3 6
INDEX 8
DRIVE SELECT-0 10
DRIVE SELECT-1 12
DRIVE SELECT-2 14
MOTOR ON 16
DIRECTION SELECT 18
STEP 20
WRITE DATA 22
WRITE GATE 24
TRACK 00 26
WRITE PROTECT 28
READ DATA 30
SIDE ONE SELECT 32
GND 33
READY 34
FDD CONTROL CIRCUIT PCB.NAMFG
DC POWER SUPPLY CONNECTOR P2
+12 VDC 1
0V (+12V RETURN) 2
0V (+5V RETURN) 3
+5 VDC 4
PJ3
A1 GND-0 SHIELD
A3 CT-0(COM) BLUE
A5 ER-0 RED
A6 R/W-0, START BLACK
A7 R/W-0, FINISH WHITE
SIDE-0 HEAD
B1 GND-1 SHIELD
B2 (KEY)
B3 CT-1 BLUE
B5 ER-1(COM) RED
B6 R/W-1, START BLACK
B7 R/W-1, FINISH WHITE
SIDE-1 HEAD
PJ4
COM NO NC DISK SENSE SW
1A DISK IN SW (COM)
2A TK 00-E
3A TK 00 LED-K
4A NC (+12V)
5A TK 00 LED-A
1B HEAD LOAD +V (+12V)
2B -HEAD LOAD
3B DISK IN SW NC
4B KEY (+12V)
5B TK 00-C
TK 00 DETECTOR
HEAD LOAD SOLENOID
IG (INDEX-E)
IS (INDEX-C)
INDEX DETECTOR (ON PCB,NAMFG)
INDEX LED (ON PCB,J21215)
PJ6
1 IN USE LED-K
2 +MOTOR ON
3 MOTOR GND
4 MOTOR +V (+12V)
SPINDLE MOTOR ASSY (KEISAKI-J21215)
DRIVE CIRCUIT
M DC MOTOR
ACTIVITY LED (ON PCB,J21215)
WRITE PROTECT LED (ON PCB,J21215)
S (WRITE PROTECT-C)
SG (WRITE PROTECT-E)
WRITE PROTECT DETECTOR (ON PCB,NAMFG)
PJ5
1 STM 1
2 STM 3
3 STM 2
4 STM 4
STEPPING MOTOR
100KΩ
SIGNAL GND 0.01μF
FRAME GND. FASTON TAB
M4853-1 DISK DRIVE WIRING DIAGRAM
TJ2-G30210 2/6
A


NOTES
UNLESS OTHERWISE SPECIFIED:
1. ALL CAPACITORS ARE IN FARADS.
2. ALL RESISTORS ARE IN OHMS, 1/6W, ±5%(J).
3. RM1; 150J 1/4W, RM2~5: 4.7KJ 1/8W.
+12VDC, P2-1
+5VDC, P2-4
+12VRTN, P2-2
+5VRTN, P2-3
FRAME GND
(TO HEADS)
M51018P or MC2870P
G6
-SIDE ONE SELECT, P1-32
-WRITE DATA, P1-22
WRITE PROTECT SENSOR
INDEX SENSOR
TK00 LED A, P4-A5
TK00 LED K, P4-A3
TK00 SENSOR COLLECTOR P4-B5
TK00 SENSOR EMITTER P4-A2
DISK IN SW NC, P4-B3
DISK IN SW C, P4-A1
-WRITE GATE, P1-24
-STEP, P1-20
-DIRECTION IN SELECT, P1-18
-DRIVE SELECT 0, P1-10
-DRIVE SELECT 1, P1-12
-DRIVE SELECT 2, P1-14
-DRIVE SELECT 3, P1-6
HEAD LOAD SELECT
-MOTOR ON, P1-16
-IN USE, P1-4
(SPARE) P1-2
J20104
G1
(TO STEP MOTOR)
M54542L
A4-2
A4-1
P1-30, -READ DATA
P1-28 -WRITE PROTECT
P1-34, -READY
P1-8, -INDEX
P1-26, -TK00
P5-1, STM 1
P5-2, STM 3
P5-3, STM 2
P5-4, STM 4
(TO SPINDLE MOTOR)
+MOTOR ON P6-2
IN USE LED K P6-1
MOTOR +V P6-4
MOTOR GND P6-3
HEAD LOAD +V P4-B1
-HEAD LOAD P4-B2
P4-A4, NC
P4-B4, KEY
SPARES
2003
MM, MS; MOTOR ON SELECT
2S, DC; READY SELECT
M4553-1 PCB, NAMES SCHEMATIC
TJ2-G30210 3/6



M4853-1 PCB, NAMFG
PARTS LOCATION DIAGRAM
TJ2-G30210 4/6

A

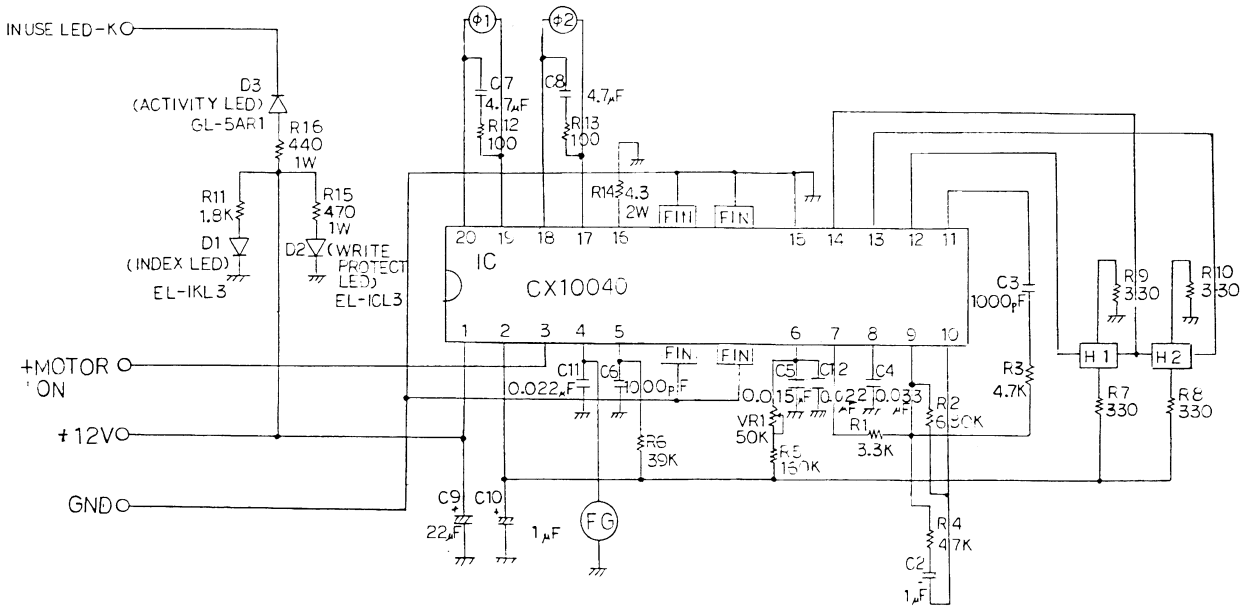


NOTE
UNIT: ohms for Resisters
Rotation speed: 300 RPM

NAME
E2SLR36

M4853-1 SPINDLE MOTOR ASSY SCHEMATIC
TJ2-G30210 5/5

A



NOTE

UNIT : ohms for Resisters

Rotation Speed : 300 RPM

NAME

TS3400N2E13

M4853-1 SPINDLE MOTOR ASSY SCHEMATIC

TJ2-G30210 5/6

A

A

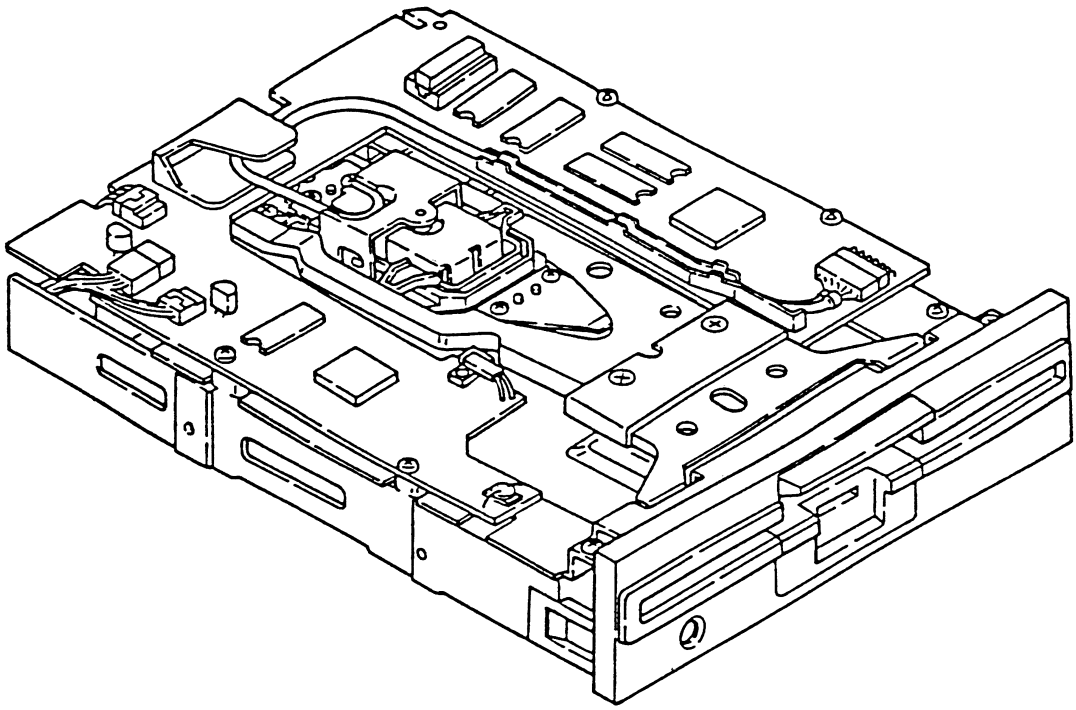
5.25 INCH FLEXIBLE DISK DRIVE

M4853-I

ILLUSTRATED PARTS LIST

MITSUBISHI ELECTRIC

CONTENTS



M4853-1 Flexible Disk Drive

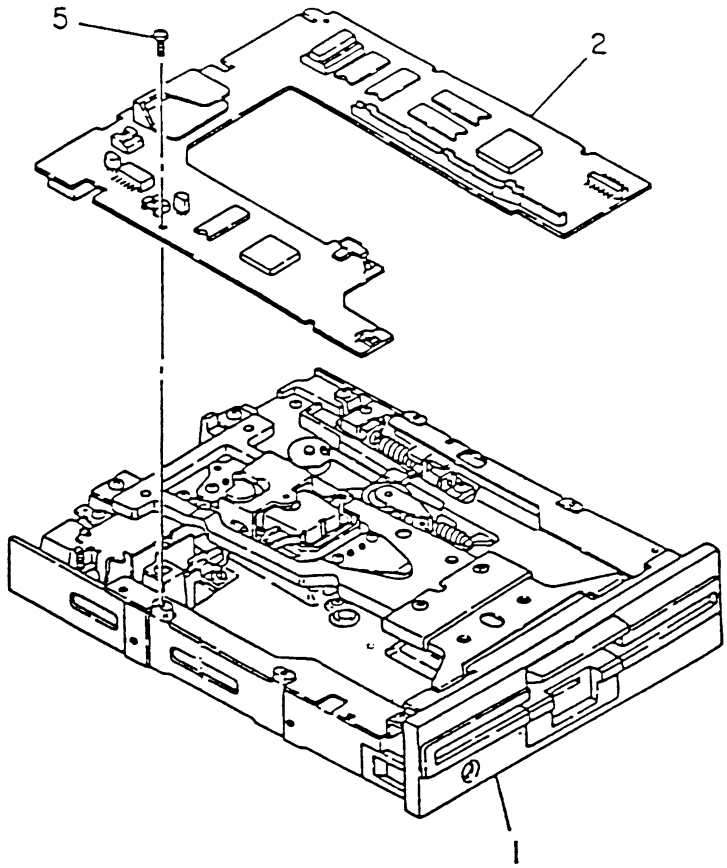


Figure 1. Flexible Disk Drive

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 1	U991K008	Flexible Disk Drive	
-1	U991K006	Mechanism Assy	1
-2	U241N014	PCA, NAMFG	1
-5	U669W201-002	Screw. Pan Hd., Washered (M3x0.5x8 FE)	4

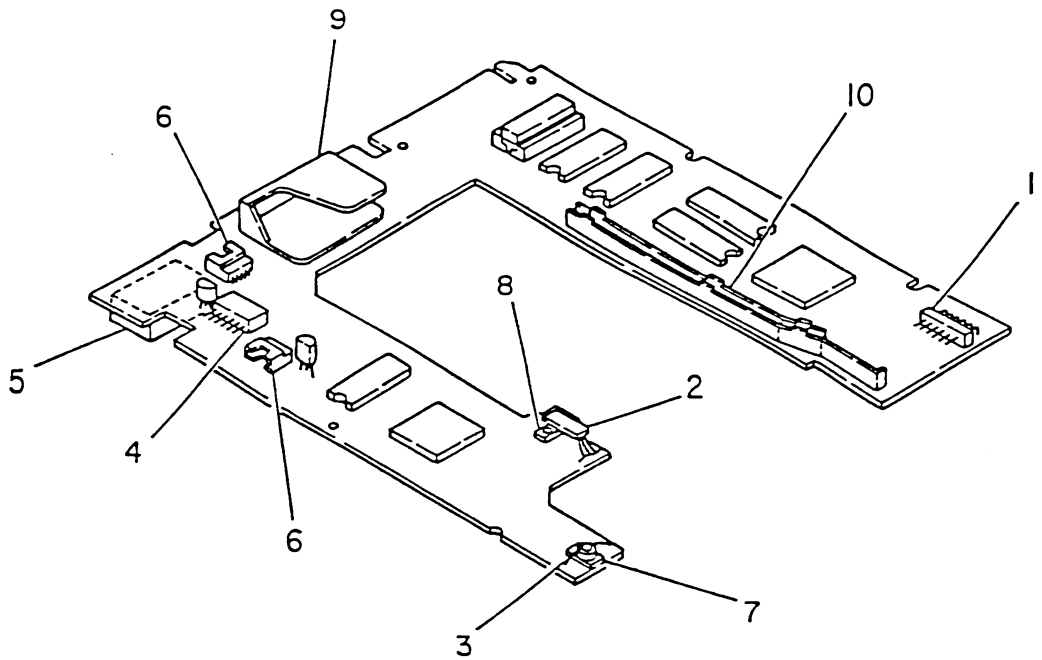


Figure 2. PCA, NAMFG

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 2	U241N014	PCA, NAMFG	
-1	U452W018-002	Connector, PWB (65625-214#6)	1
-2	U268Q005-001	Index Sensor U Assy	1
-3	U268Q006-001	Write Protector Sensor Assy	1
-4	U452W013-010	Connector, PWB (PS-10PA-D4LT1-PN1)	1
-5	U452W012-001	Connector, PWB (172349-1)	1
-6	U452W013-009	Connector, PWB (IL-S-4P-S2L2-EF)	2
-7	U541N008-001	Holder, Write Protector Sensor	1
-8	U667Q001-001	Bolt, Socket (Micro-size M2x6 FE)	1
-9	U564M001-G01	Cover, HD Cable B	1
-10	U541M009-001	Holder, HD Cable	1

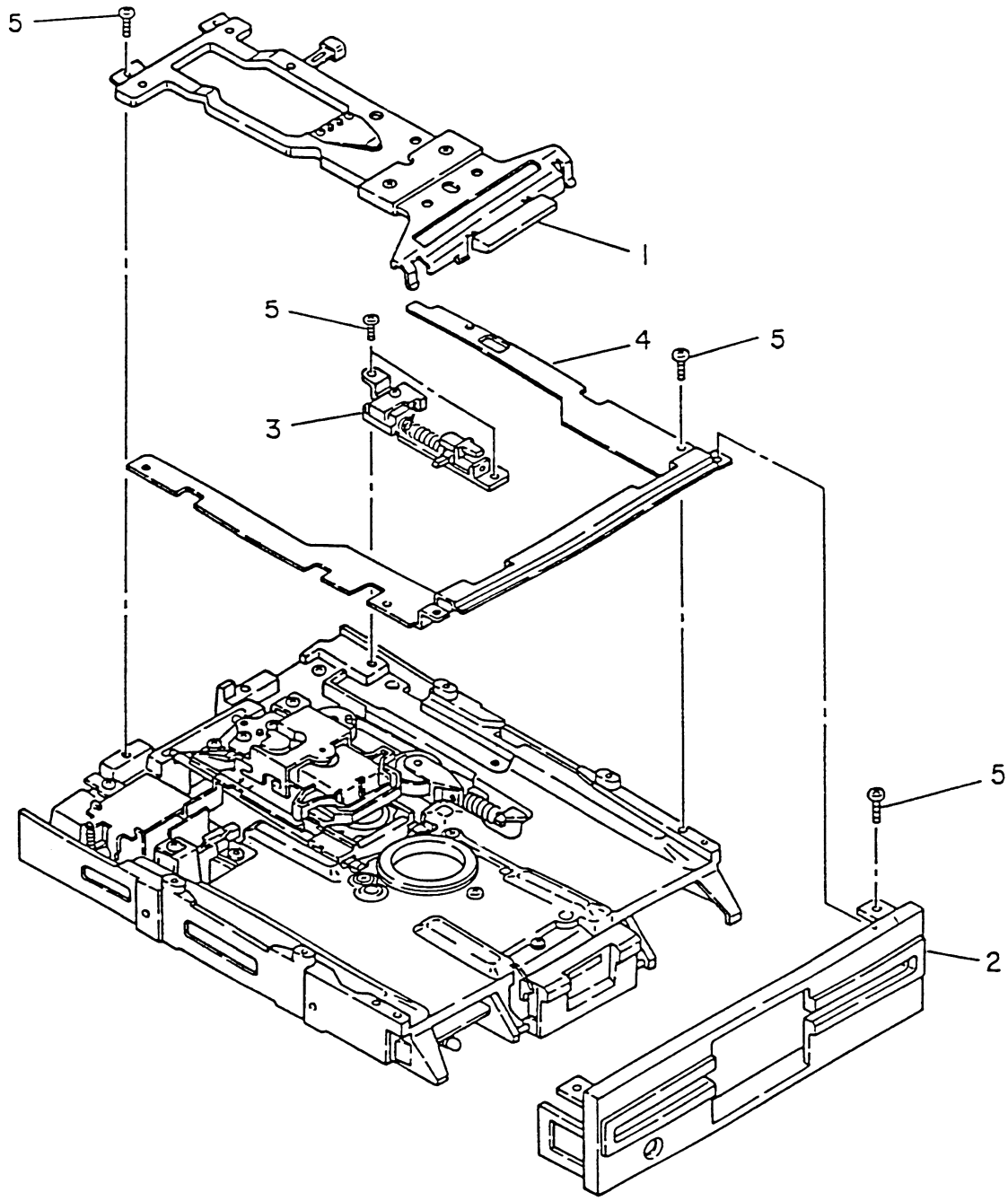


Figure 3-1. Mechanism Assy (1)

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 3-1	U991K006	Mechanism Assy (1)	
-1	U527L006	Cartridge Guide Assy	1
-2	U702L005	Front Panel	1
-3	U526Q002-001	Ejector Assy	1
-4	U560M002	Front Chassis Assy	1
-5	U669W201-002	Screw, Pan Hd., Washered (M3x0.5x8 FE)	10

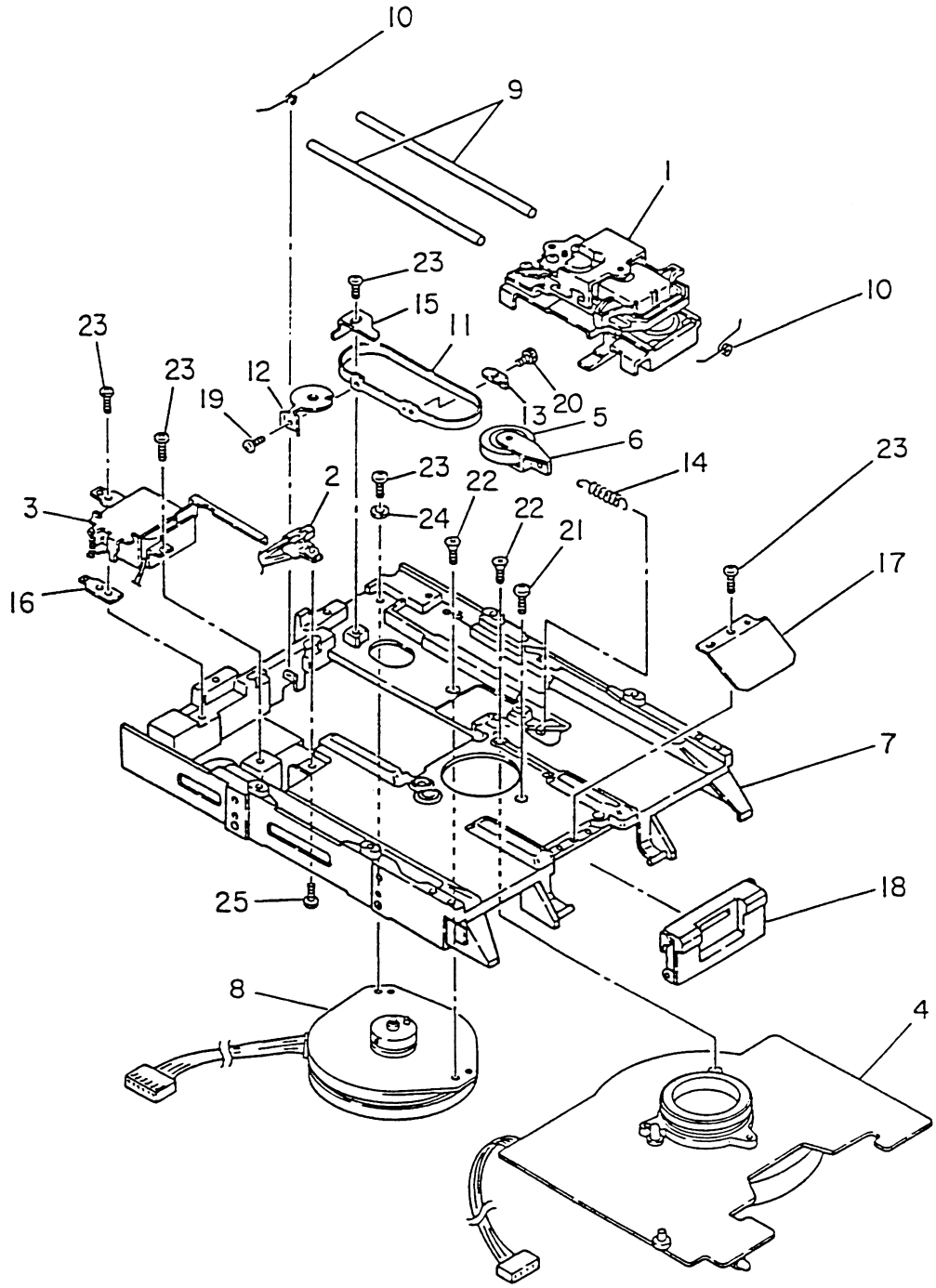


Figure 3-2. Mechanism Assy (2)

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 3-2	U991K006	Mechanism Assy (2)	
-1	U587L006-G01	Carriage Assy	1
-2	U268Q007-001	TK00 Sensor Assy	1
-3	U296Q002-001	HLMG Assy	1
-4	U288Q005-001	Spindle Motor Assy	1
-5	U522Q002-001	Idler Assy	1
-6	U541M010-001	Holder, Idler B	1
-7	U581K003	Frame	1
-8	U288Q006-001	Stepping Motor	1
-9	U531N007-001	Guide Rod	2
-10	U573N007-001	Spring Coil	2
-11	U838M007-001	Band A	1
-12	U546M001-001	Holder, Band A	1
-13	U546N005-001	Holder, Band B	1
-14	U571N001-002	Spring, Coil, C	1
-15	U838N003-001	Stopper, Capstan	1
-16	U442N002-G01	Terminal	1
-17	U572N006-002	Spring, Front Door	1
-18	U726Q001-001	Front Door Assy	1
-19	U650W021-003	Screw, Pan Hd. (M2.5x4 FE)	1
-20	U667W011-002	Bolt, Socket (Micro-size M2.5x4 FE)	1
-21	U669W201-001	Screw, Pan Hd., Washered (M3x0.5x6 FE)	1
-22	U650W031-004	Screw, Flat (M3x0.5x8 FE)	2
-23	U669W201-002	Screw, Pan Hd., Washered(M3x0.5x8 FE)	5
-24	U683Q001-002	Washer, Plain	1
-25	U669W201-003	Screw, Pan Hd., Washered (M3x0.5x10 FE)	1

A

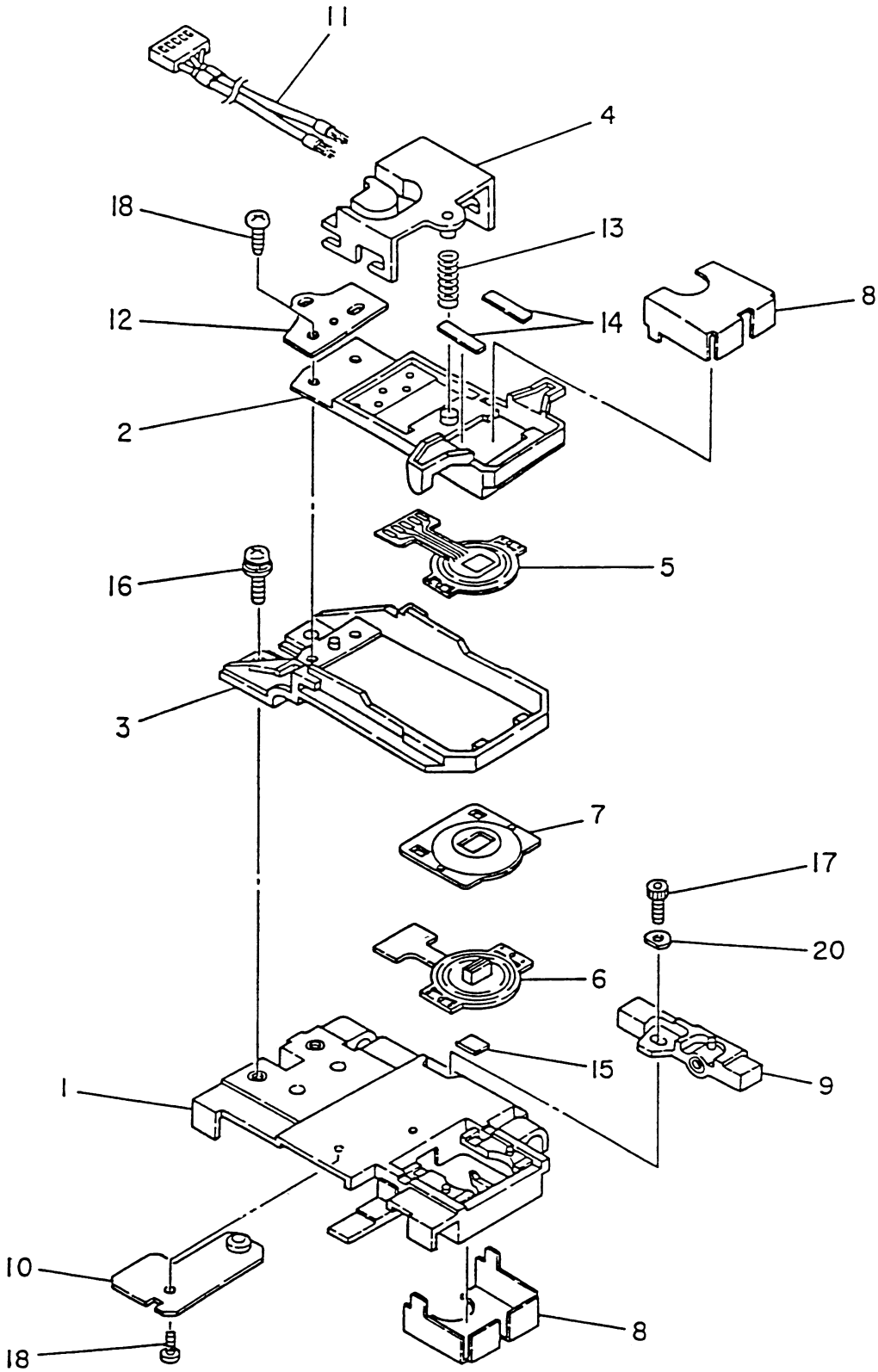


Figure 4. Carriage Assy

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 4	U587L006-G01	Carriage Assy	
-1	U587L004-G01	Carriage	1
-2	U587L005-G01	Arm Assy	1
-3	U581L001-001	Frame	1
-4	U541M008-001	Stay Spring	1
-5	U460N004-G01	Gimbals Head Assy UP	1
-6	U460N004-G02	Gimbals Head Assy DN	1
-7	U564M004-001	Cover	1
-8	U565N004-001	Shield Plate	2
-9	U541N007-G01	Holder, Band C	1
-10	U572N009-G01	Spring CR Assy	1
-11	U246L002-G01	Head Cable Assy	1
-12	U544N002-001	Holder, Arm	1
-13	U573N006-001	Spring, Coil	1
-14	U552N006-001	Rubber	2
-15	U552N004-001	Rubber	1
-16	U669W032-001	Screw, Pan Hd., Washered (M3x0.5x 8 BS)	1
-17	U667W011-002	Bolt, Socket (Micro-size, M2.5x4 FE)	1
-18	U669W077-001	Screw, Tap-Tight 2–2.6x5	3
-19	U550N007-001	Spacer	1

A

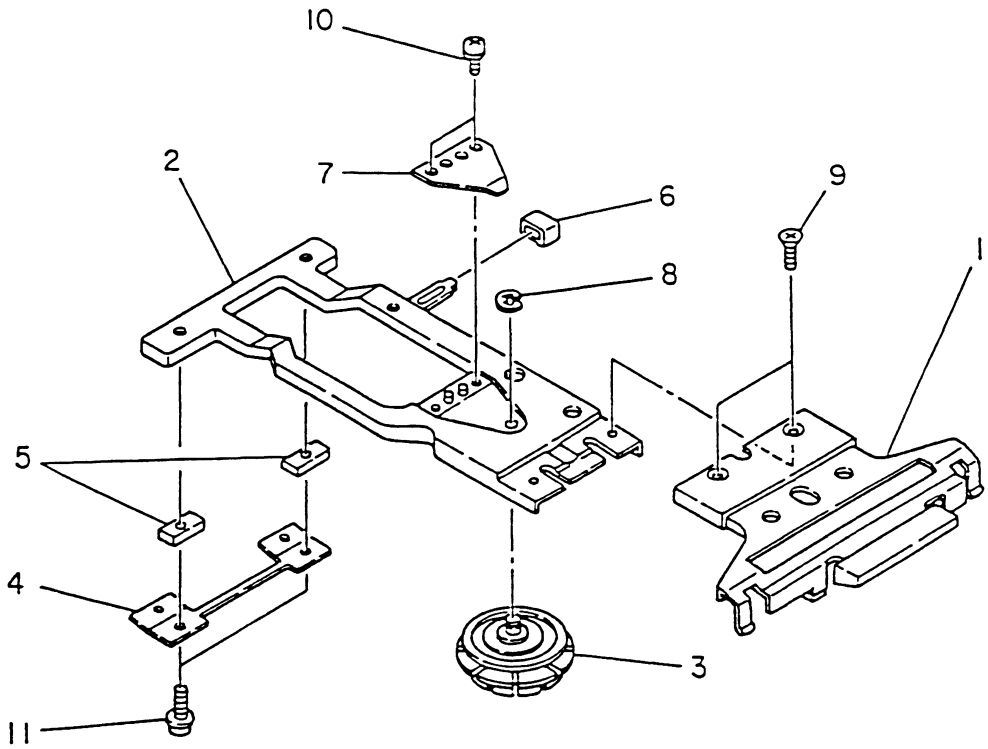


Figure 5. Cartrige Guide Assy

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 5	U527L006	Cartridge Guide Assy	
-1	U527Q001	Cartridge Guide B Assy	1
-2	U527L005-001	Cartridge Guide A	1
-3	U567M006-G01	Collet Assy	1
-4	U572N008-002	Spring, Cartridge Guide	1
-5	U550N006-001	Spacer A, Cartridge Guide	2
-6	U838M006-001	Stopper, Ejector	1
-7	U572N007-001	Spring, Leaf	1
-8	U685W111-001	Ring, E (3ϕ SUS)	1
-9	U650W031-002	Screw, Flat(M3x0.5x5 FE)	2
-10	U669W201-005	Screw, Pan Hd., Washered(M3x0.5x5 FE)	2
-11	U669W201-001	Screw, Pan Hd., Washered(M3x0.5x6 FE)	2

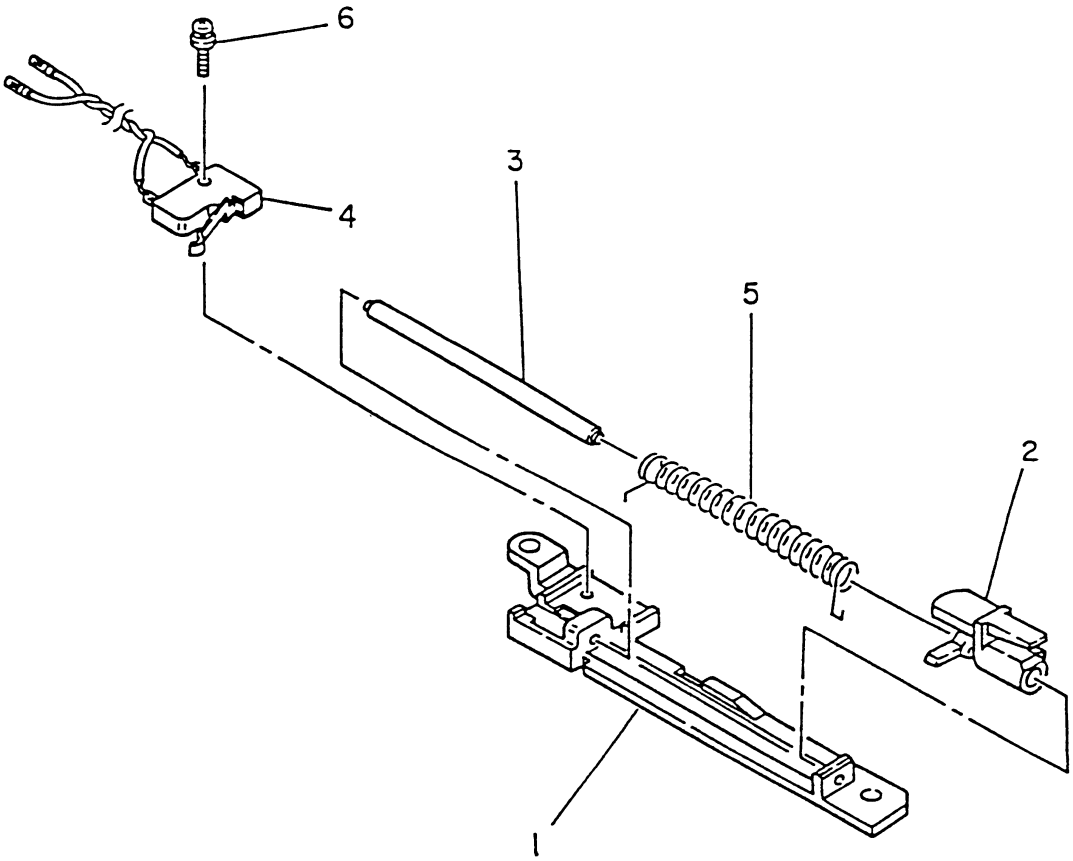


Figure 6. Ejector Assy

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 6	U526Q002-001	Ejector Assy	
-1	U526M002-001	Holder, Ejector A	1
-2	U526M003-001	Ejector	1
-3	U531N009-001	Shaft, Ejector	1
-4	U436Q002-001	Switch (Micro-size)	1
-5	U573N009-001	Spring, Coil	1
-6	U669W031-006	Screw, Pan Hd., Washered(M2x10 FE)	1

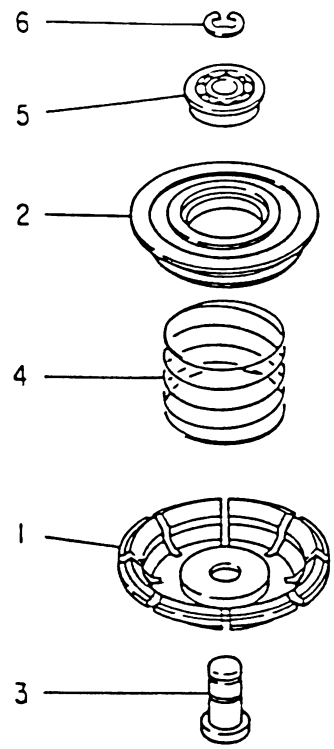


Figure 7. Collet Assy

Fig. & Index Number	Part Number	Description	Q'ty
Fig. 7	U567N006-G01	Collet Assy	
-1	U567M004-001	Collet A	1
-2	U567M005-001	Collet B	1
-3	U531N005-001	Shaft	1
-4	U573N001-002	Spring, Coil B	1
-5	U530W001-001	Bearing (F604ZZ)	1
-6	U685W111-001	Ring, E (3ϕ SUS)	1

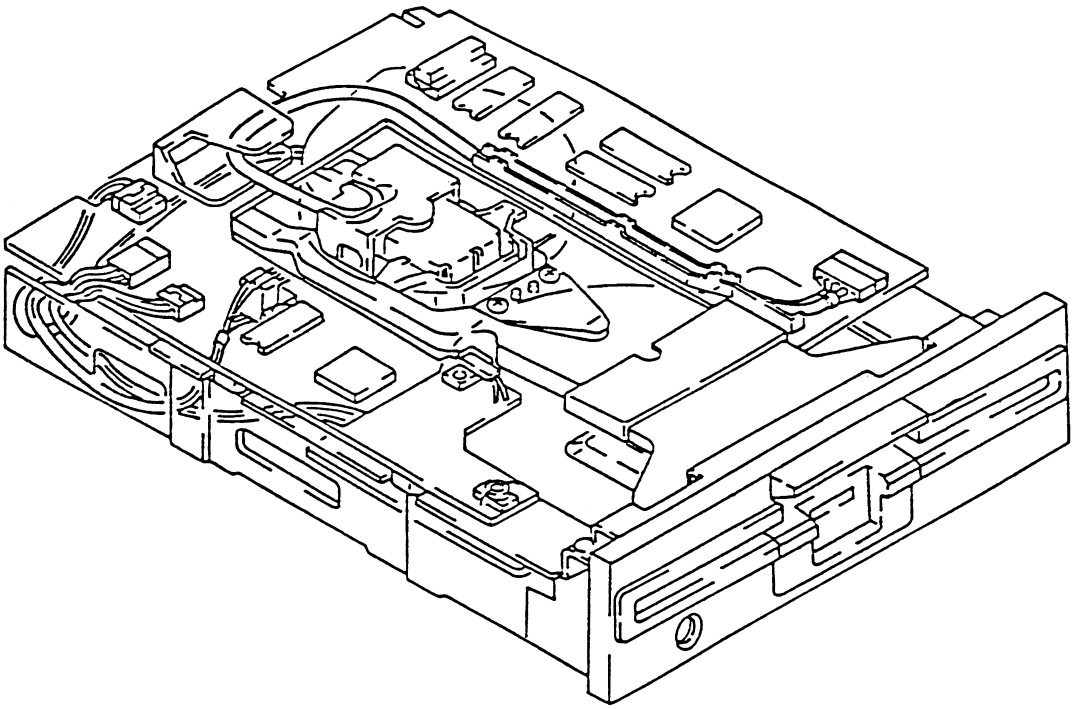


Figure 8. Flexible Disk Drive Wiring Diagram

APPENDICES

The following sections contain reprints of manufacturer's documentation of components used in the Model 2000 Computer.

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