

Canon

MDD 221/211

SPECIFICATION

MINI FLOPPY DISK DRIVE



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July, 1983

*Specifications are subject to change without notice.

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1. Product Outline

1-1 Feature

This MDD employs a high performance direct-drive spindle motor, resulting in stability of media rotation and also freedom from maintenance due to the elimination of a driving belt. It also employs a high-speed stepping motor and steel belt drive system, permitting speedier seek-access by the head, and making for improved track positioning accuracy.

1-2 Specifications

1-2-1 Performance

	MDD221	MDD211
Capacity		
Unformatted	1M bytes	500Kbytes
per disk		
per track	6.25Kbytes	6.25Kbytes
Formatted (16 sectors)		
per disk ^{*Note 1}	655.36Kbytes	327.68Kbytes
Data transfer rate	250Kbits/sec	250Kbits/sec
Access time		
Track-to-track	3msec	6msec
Seek settling time ^{*Note 2}	20msec	20msec
Average access time ^{*Note 3}	100msec	100msec
Head load time	25msec	25msec
Media rotating speed	300rpm	300rpm
Average rotation waiting time	100msec	100msec
Spindle motor starting time	800msec	800msec
Recording density (inner track)	5922 BPI	5876 BPI
Number of tracks	160	80
Recording mode ^{*Note 4}	MFM	MFM
Recommended media	MAXELL MD2-DD	MAXELL MD2-D

Notes

*Note 1: Conformance to IBM

*Note 2: The waiting time during seek is the track-to-track shift time + seek settling time.

*Note 3: The average access time is the average track-to-track shift time + seek settling time.

*Note 4: FM mode is available.

Capacity, data transfer rate and recording density are 1/2, when it is employed.

1-2-2 Environmental Conditions

Operating ambient temperature	5 ~ 45°C
Temperature during transport	-40 ~ 62°C
Storage temperature	-22 ~ 55°C
Relative humidity	20% to 80% (max, wet bulb temperature 29°C, free of dew formation)

1-2-3 Power Source

+5V • ±5% ripple 50 mVp-p max.	TYP 0.8A MAX 1.0A
+12V • ±5% ripple 100 mVp-p max.	TYP 0.8A MAX 1.7A

1-2-4 Machine Dimensions

Width	146 mm
Height	33.5 mm
Depth	221 mm
Weight	1.2 kg

* For details, refer to dimension specifications (4.2)

1-2-5 Vibration and Shock

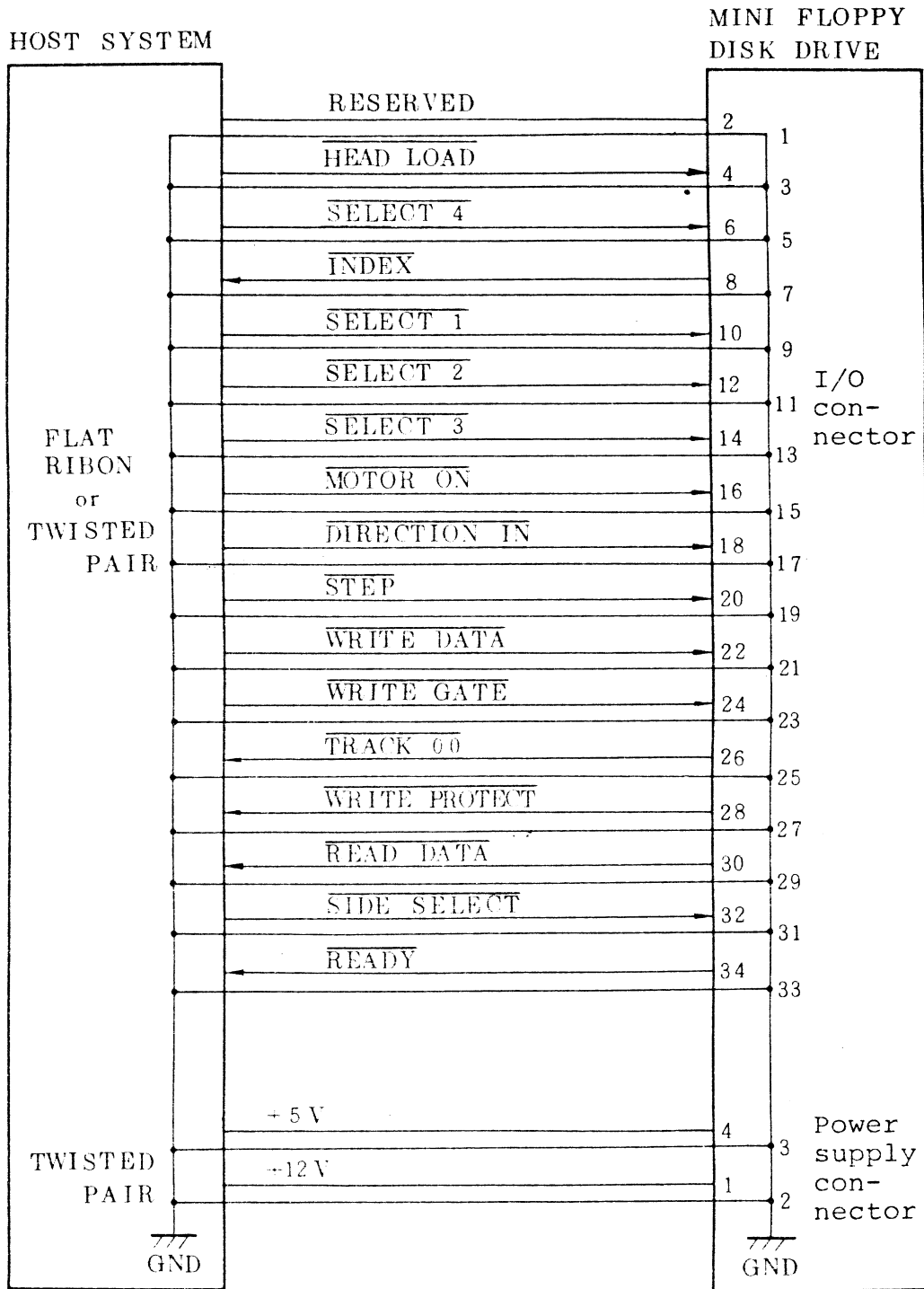
Vibration during operation	1G (5 - 100Hz) X, Y, and Z directions
Vibration during transportation	3G (5 - 100Hz) X, Y, and Z directions (in packed condition)
Shock during transportation	Shall satisfy all specifications when dropped from a height of 100cm in packed condition (in all directions, one corner, three ridgelines, and six planes)

1-2-6 Reliability

MTBF	10,000 POH
MTTR	30 minutes
Unit life	5 years
Soft read error	10^{-9} bits
Hard read error	10^{-12} bits
Seek error	10^{-6} seek operations

2. Interface

2-1 Signal Interface



2-2 Table of Connector Used

Fig. 2-1 and 2-2 are simplified drawings of the interface connector on the MDD. Suitable matching connectors are shown in the table below.

Signal connector	Scotchflex ribbon connector	3463-0000 3463-0001
	Yamaichi connector	FDS-34-12 #1 FDS-34-12 #2
	DDK connector	225F-A34-1
Power supply connector	AMP (housing)	1-480424-0
	AMP (pin)	170148-2 (AWG18 - 24)
	AMP (pin)	170121-4 (AWG14 - 20)

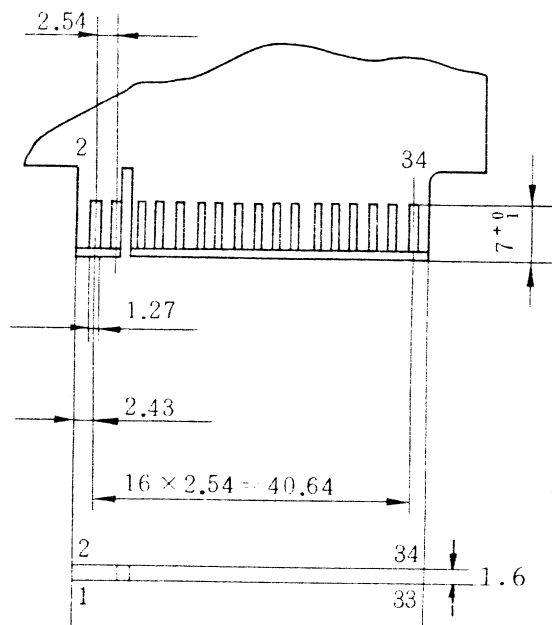
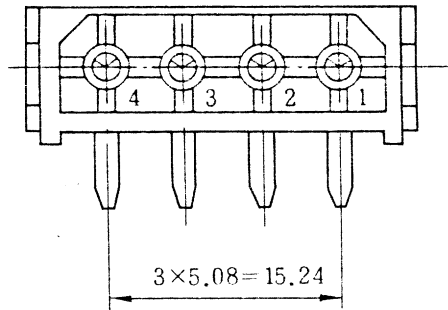


Fig. 2-1 Signal connector



Connector No.

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

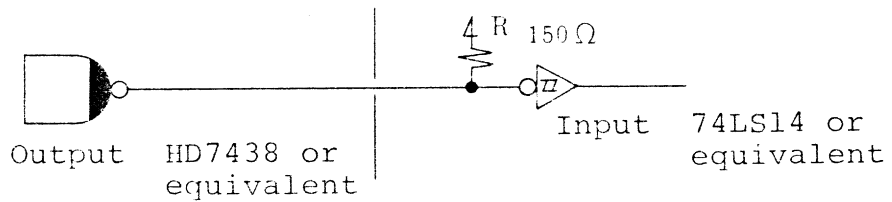
Fig. 2-2 Power supply connector

2-3 Input/Output Interface

2-3-1 Recommended Input/Output Interface

Negative logic

Logic 0	0.0 - 0.4V (active)
Logic 1	2.5 - 5.25V (inactive)



2-3-2 Input Signal Name

Signal name	Content
<p>Select 1 to 4</p>	<p>It is possible to connect up a maximum of four MDD units in a daisy chain.</p> <p>Set the drive select condition by means of the drive jumper pin. (All units are set to drive select 1 before they leave the factory.)</p> <p>When the select signal of the set drive becomes low level, the drive will go into an active condition.</p>
<p>Motor ON</p>	<p>When this signal becomes low level, the drive motor will rotate. The motor signal alone is not gated by the select signal.</p>
<p>Direction in</p>	<p>When this signal is high level, the head will shift to the outer periphery under the step signal. When it is low level, it will shift to the inner periphery.</p>
<p>Step</p>	<p>This signal is a pulse signal. The head will shift in the direction of the 'direction in' signal under the leading edge (fall) of this pulse.</p> <p>During the write mode, this signal is being an inhibit condition internally.</p>
<p>Write gate</p>	<p>When this signal is low level, information is registered in the media in accordance with the signal of the write data. Also, the write gate signal functions to cause tunnel erase to take place inside the drive, hence neither side select, step nor head unload will take place until 1.2 ms after the write gate has closed.</p>

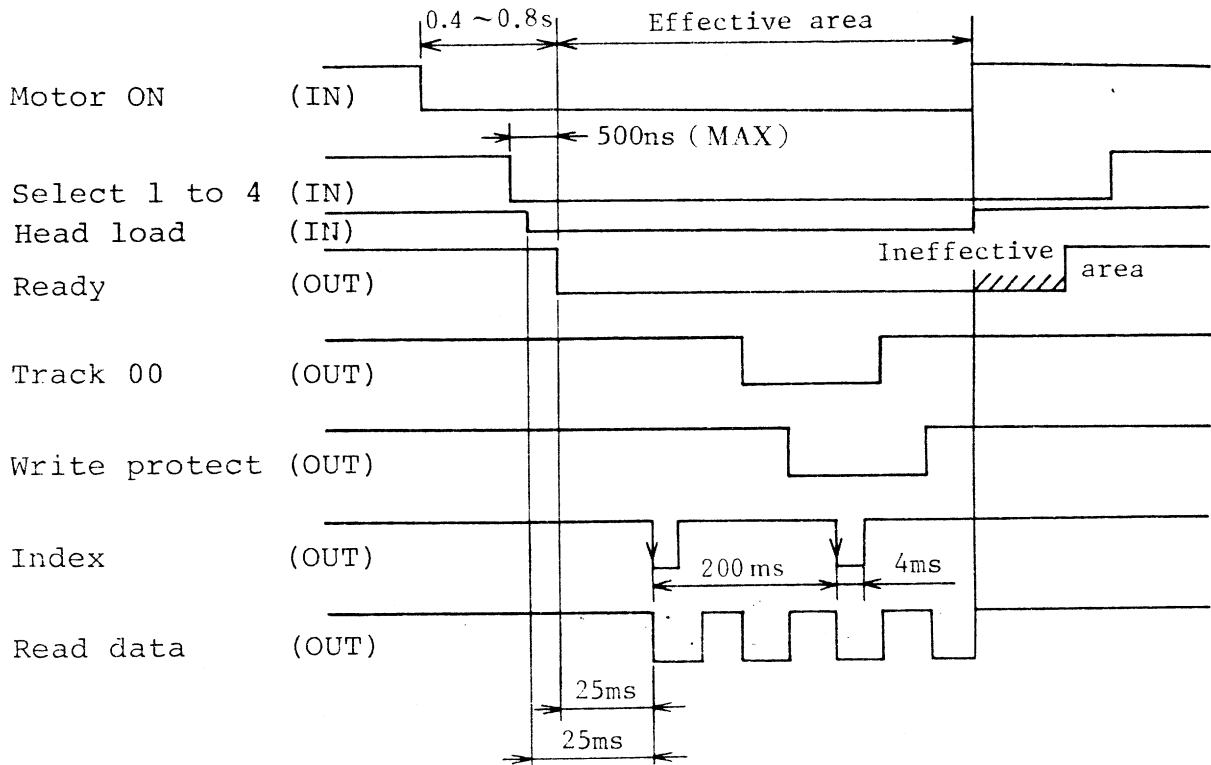
Signal name	Content
Write data	<p>This signal is a pulse signal. Under the leading edge of the pulse (fall), the data will be inverted and information will be registered in the media.</p> <p>Transfer data only when the write gate is low level.</p>
Head load	<p>When this signal becomes low, the head will be loaded. It is also possible to perform head loading by means of the drive selector signal, irrespective of the head load signal. During head load, the indicator LED becomes red and the button is interlocked. For details, see the jumper specifications.</p>
Side selector	<p>This signal is used to select a particular head on a drive employing a double sided head. When it is high level, head 0 is selected, and when it is low level, head 1 is selected.</p>
Ready	<p>After the motor goes on and the media reaches a constant speed of rotation, this signal will go on (low level).</p> <p>After a lapse of 0.8 second from when the motor goes on, the ready signal is confirmed and R/W operation commences. Then, the indication LED becomes green.</p>
Track 00	<p>This signal is on (low level) when the head is at track 00.</p>

Signal name	Content
Index	<p>This signal goes on (low level) when the index hole of the media is detected.</p> <p>This signal is a 3 to 5 ms pulse signal.</p> <p>The leading edge (fall) of the pulse indicates the commencement of the track/sector.</p> <p>When the media is not inserted, this signal will remain low level.</p>
Read data	<p>This is a readout signal for magnetic inversion on the media. It is a pulse signal, the leading edge (fall) of which is effective.</p>
Write protect	<p>This signal becomes low level when a write-protected media is inserted. Simultaneously, write will be inhibited inside the drive.</p> <p>Write protect takes place by covering the notch in the disk jacket by an opaque label.</p>

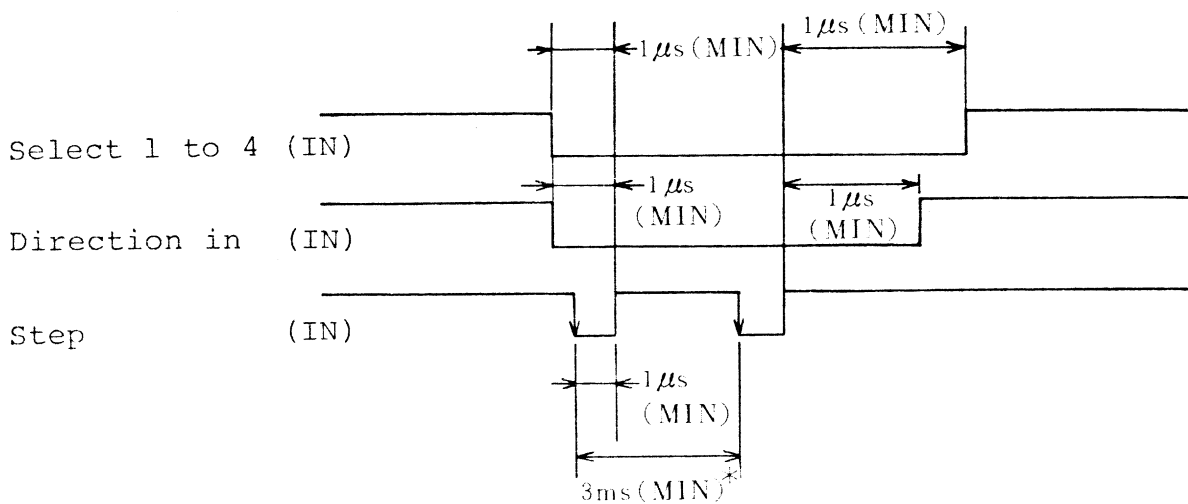
* All output signals are gated by the drive select signal.

2-4 Timing Chart

2-4-1 Ready Signal Timing

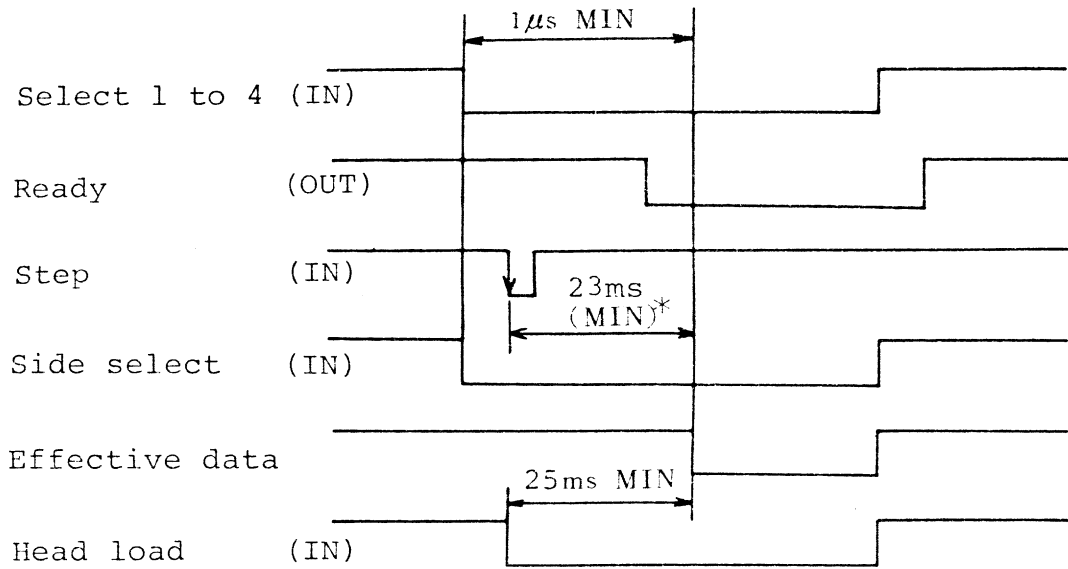


2-4-2 Step Signal Timing



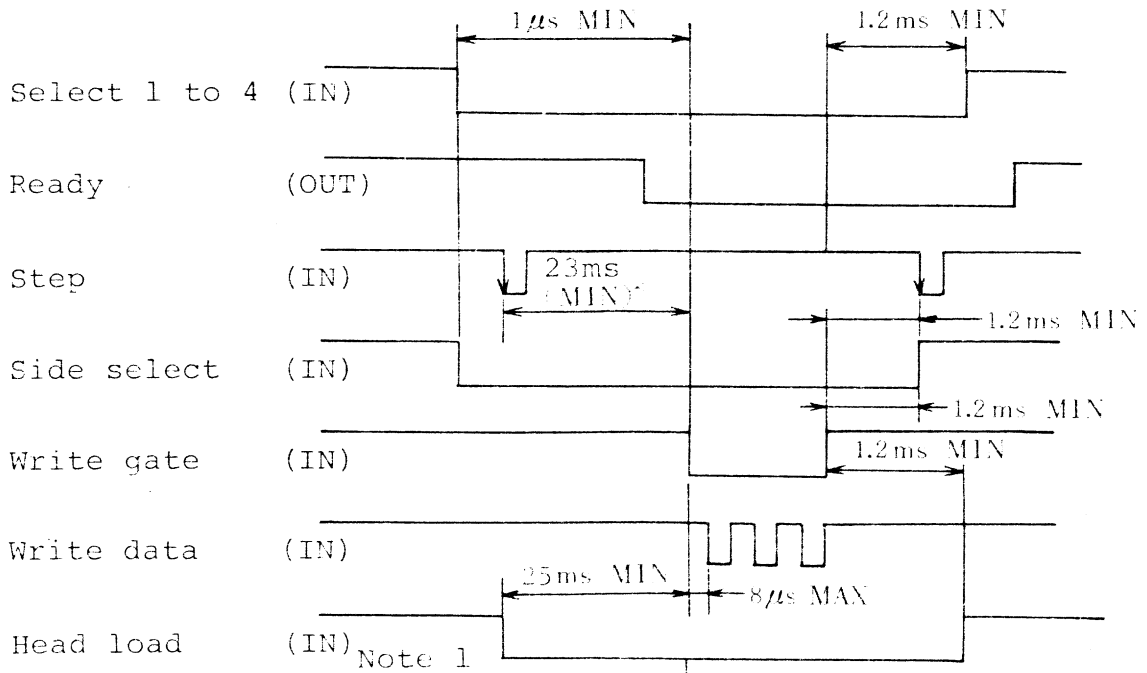
*6ms for MDD211

2-4-3 Readout Timing



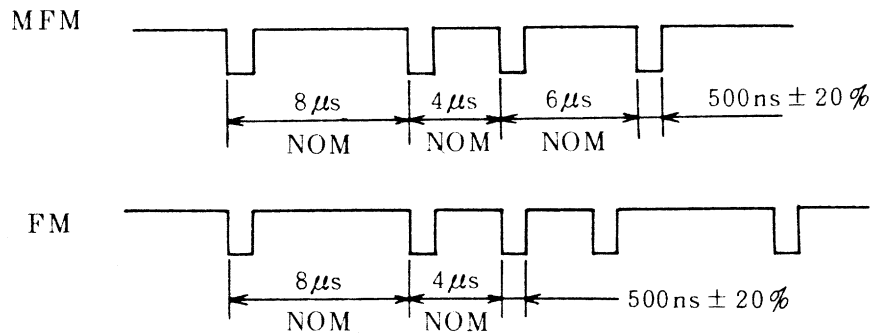
*26ms for MDD211

2-4-4 Write Timing

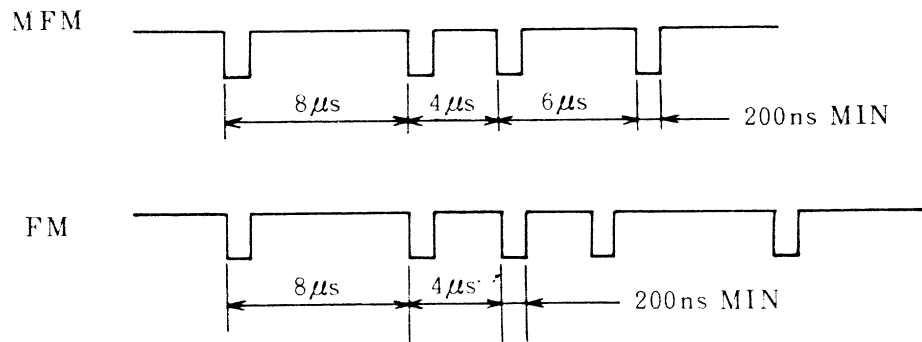


*26ms for MDD211

2-4-5 Read Data (OUT)



2-4-6 Write Data (IN)



Use a write clock accuracy of $\pm 0.5\%$ ($4\ \mu\text{s} \pm 20\ \text{ns}$).

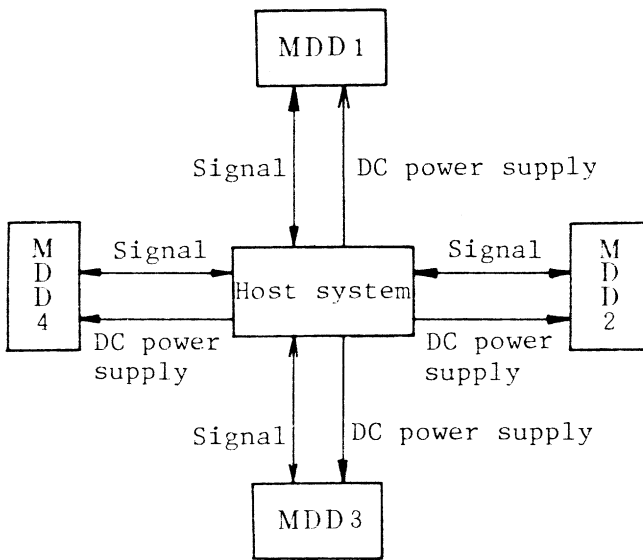
Normally, write pre-compensation is not necessary.

If it is required by the system, use it only from the center track towards the inner track.

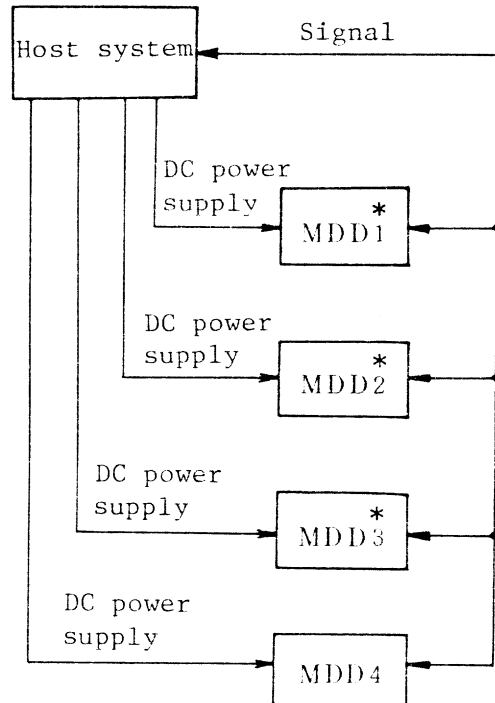
2-5 Multiple Drive Connection System

When connecting several MDD units to a host system, either a radial connecting or a daisy chain connecting is used.

When using the daisy chain connecting method, it is necessary to remove all pull-up resistors (resistor arrays) except that on the last MDD unit.



Radial connection



* Remove resistor arrays.

Daisy chain connection

3. Description of Functions

3-1 Overall Block Diagram

The main components of the MDD are a spindle motor (DD motor), stepping motor, head assembly, main PCB, and other drive components. Refer to Fig. 3-1.

3-2 Circuit Block Diagram

Apart from the control circuit of the spindle motor, the entire MDD circuit is on the main PCB.

Refer to Fig. 3-2.

3-3 Jumper Functions

Table 3-1 shows the jumper selections for the MDD as well as the manufactured factory settings.

There are two function types for setting.

- o Drive Select Function: Set the drive select jumper according to the drive number which the MDD will be performing (1, 2, 3, or 4).
- o Head Load Function: Set the jumper for either selected head load signal (SH) or automatic head load when head is loaded by ready and select signal (AH).

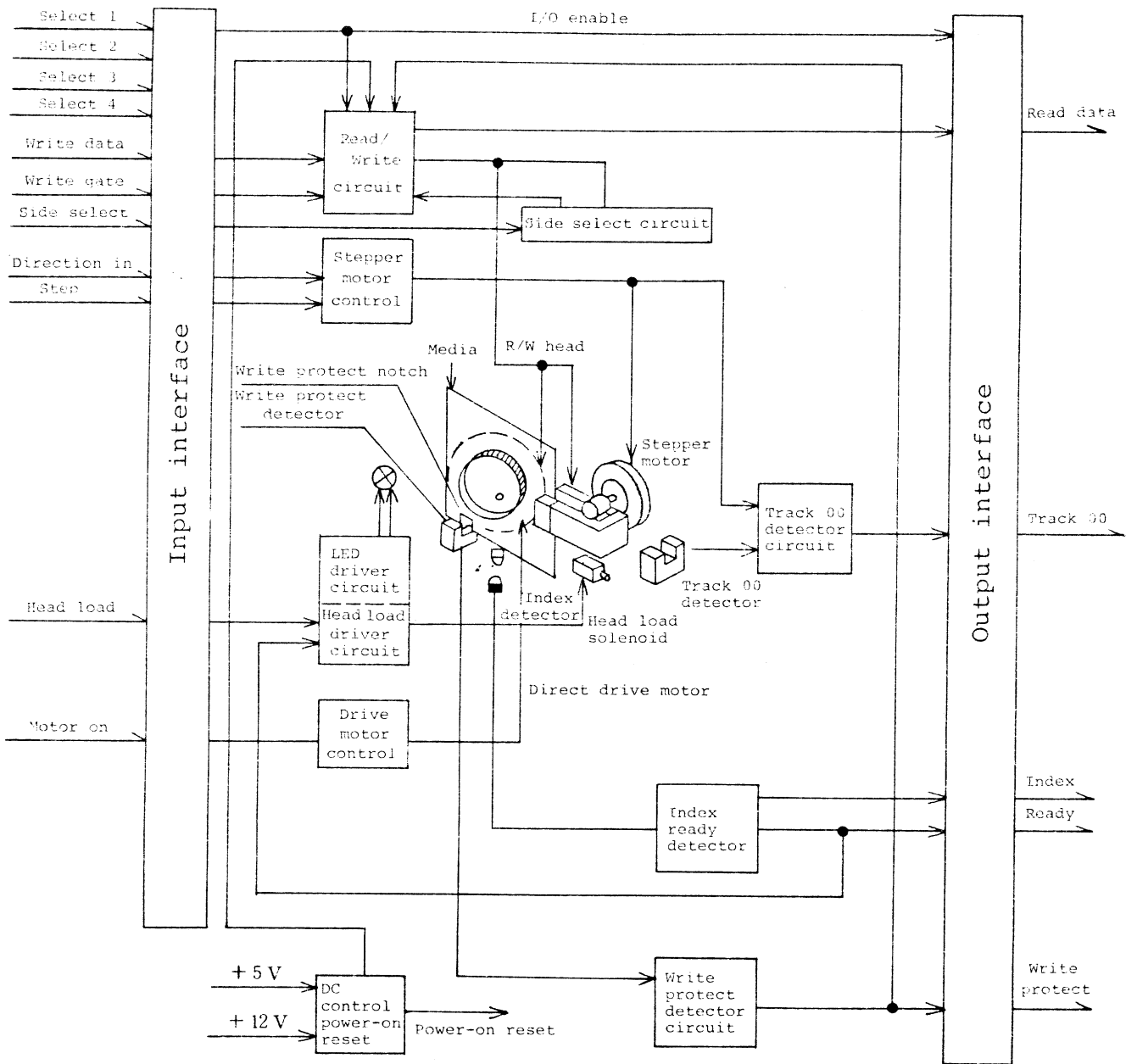


Fig. 3-1 Function block diagram

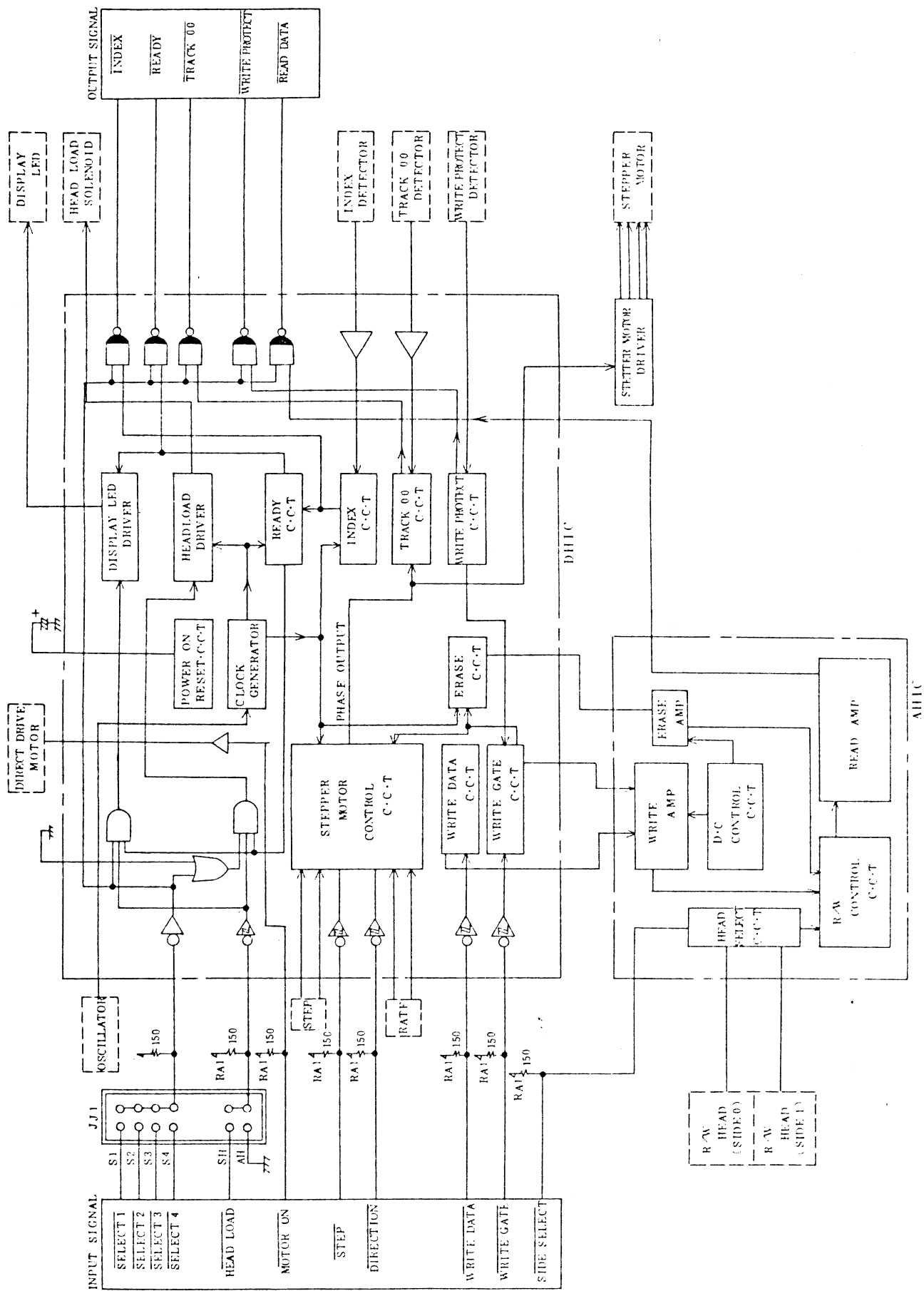
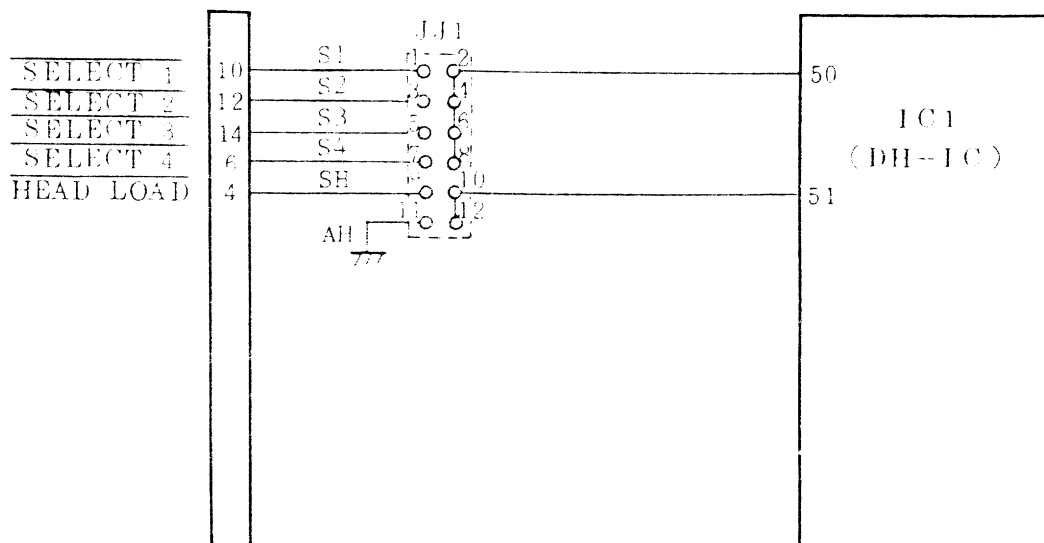


Fig. 3-2 Circuit block diagram

Function	Content	JJ1					
		S1	S2	S3	S4	SH	AH
	Jumper mode at factory before shipment.	o	x	x	x	o	x
Drive select	Drive select 1	o	x	x	x		
	" 2	x	o	x	x		
	" 3	x	x	o	x		
	" 4	x	x	x	o		
Head load selection	Head loading takes place under head loading signal.					o	x
	Head loading takes place by ready mode automatically.					x	o

Table 3-1 Jumper selection table

3-4 Arrangement of Jumper



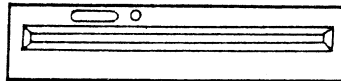
4. Dimension Specifications

4-1 Installation Method

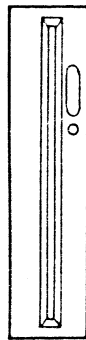
Install the MDD according to the method shown below.

- (1) Installation with PCB at top
- (2) Installation with PCB at right
- (3) Installation with PCB at left

1



2

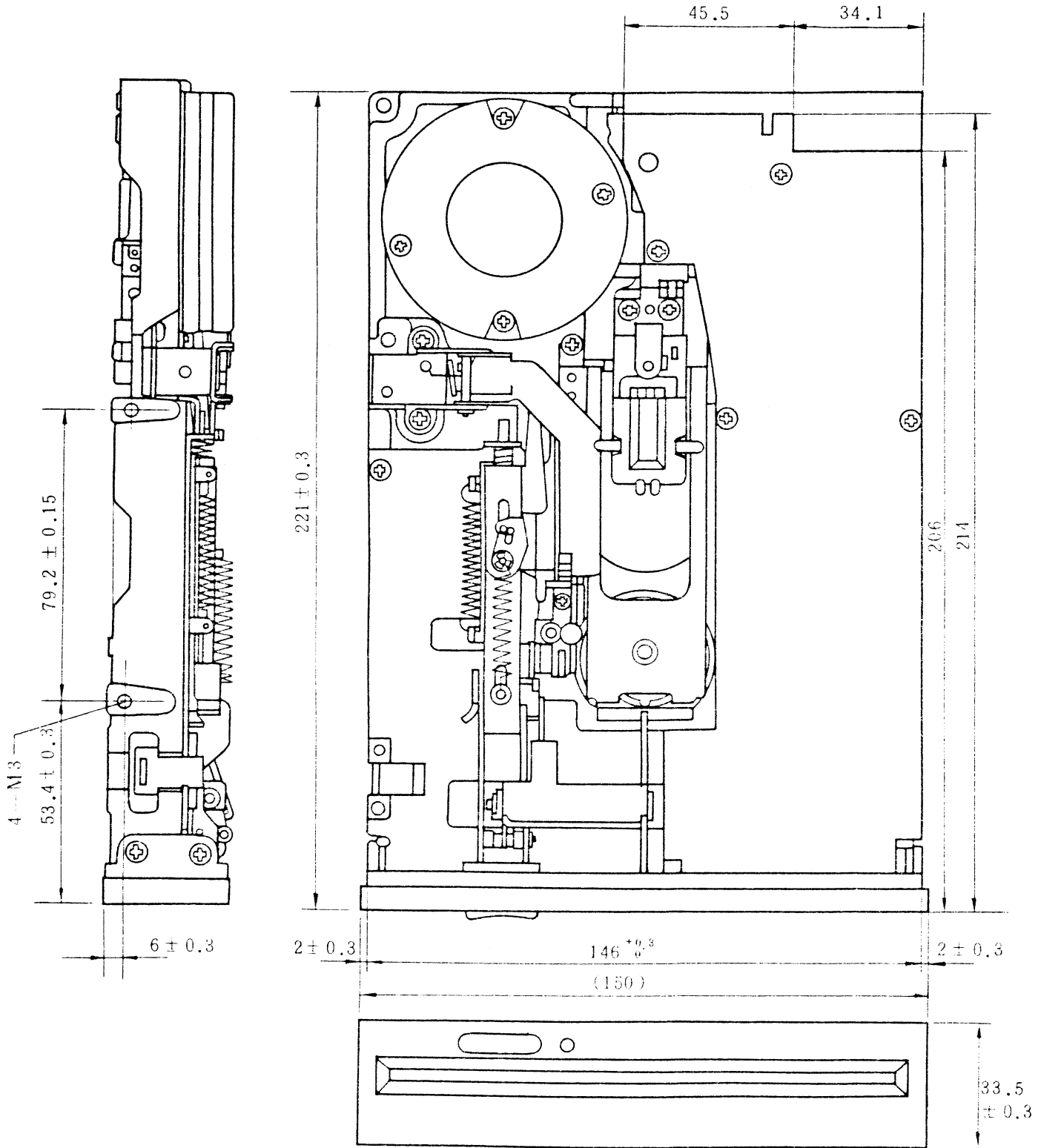


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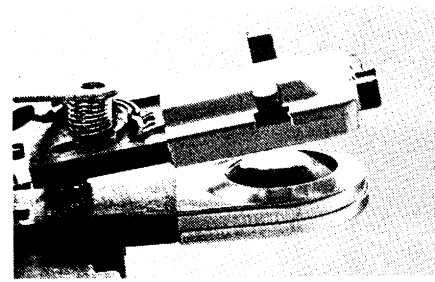


* When using the unit near a CRT, printer, or other source of noise, it is recommended that a shield be used.

4-2 Exterior of Unit



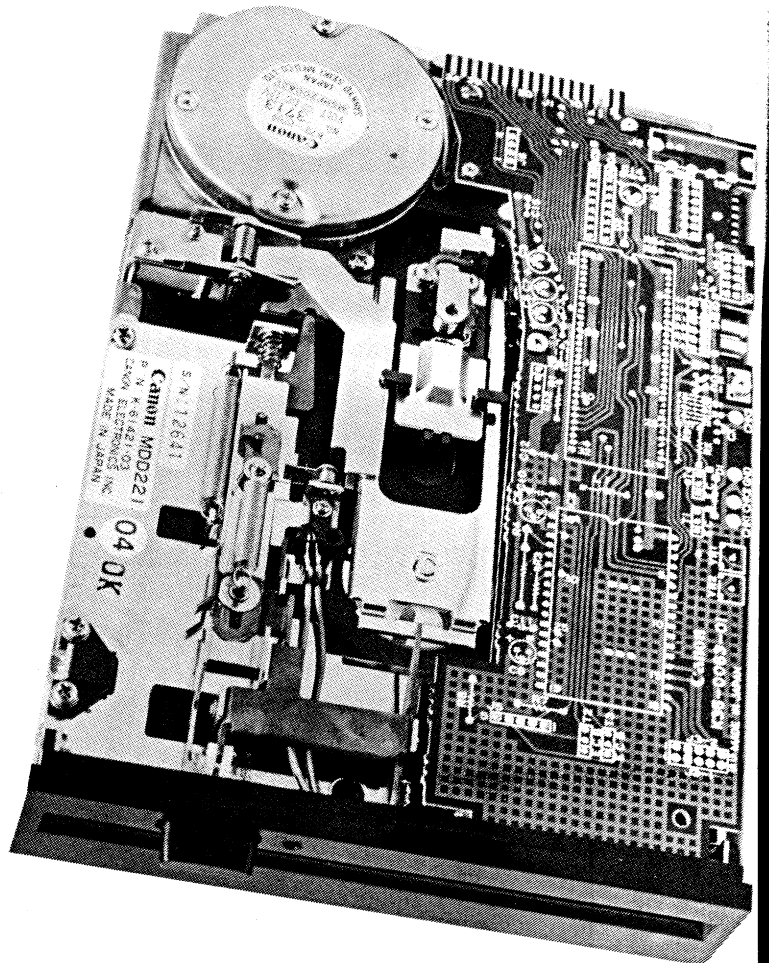
MINI FLOPPY DISK DRIVES



UNIQUE READ/RECORD HEAD

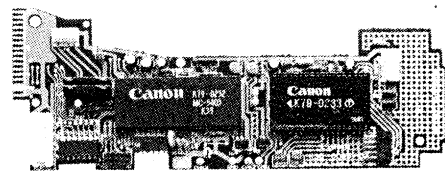
This mini FD is manufactured by Canon, a company that has demonstrated expertise in the production of magnetic heads, including those for audio equipment and VTR's. Canon also designed the read/record head for the MDD221/211 and the seek tap, which has a considerable longer service life than that of the competition.

And with Canon's improvements in shielding, protection against electrical noise is also superior.



SPECIFICATIONS

MODELS	MDD221 Series	
	221	211
Capacity	1M	500k
· Unformatted per disk bytes	6.25k	6.25k
· Formatted (16sectors) per disk *1 bytes	655.36k	327.68k
DATA transfer rate	250k	250k
	bits/sec	
Access time	3	6
track to track ms	20	20
seek settling time ms	100	100
Average access time ms	25	25
Head load time ms	300	300
Media rotational speed r.p.m	100	100
Average rotation waiting time ms	0.8	0.8
Spindle motor starting time sec	5922	5876
Recording density (inner track) B.P.I.	160	80
Number of tacks	96	48
Recording density T.P.I.	MFM	MFM
Encoding method		
Environmental limits	*2	
	ambient temperature C	
	relative humidity %	
	vibration	
Power source	TYP. 0.8A	MAX. 1.7A
· 12V · 5% ripple 100mVp-p max.	TYP. 0.8A	MAX. 1.0A
· 5V · 5% ripple 50mVp-p max.		
Dimensions (width · depth · height) mm	146 · 221 · 33.5	
Weight kg	1.2	
MTBF P.O.H.	10,000	
MTTR minutes	30	
Soft read error bit	10 ⁻⁹	
Hard read error bit	10 ⁻¹²	
Seek error seek operation	10 ⁻⁶	



HIGH-RELIABILITY IC's

Costs were slashed by simplifying the IC section, combining digital and analog circuits into two hybrid ICs.

The combination also increased reliability remarkably.

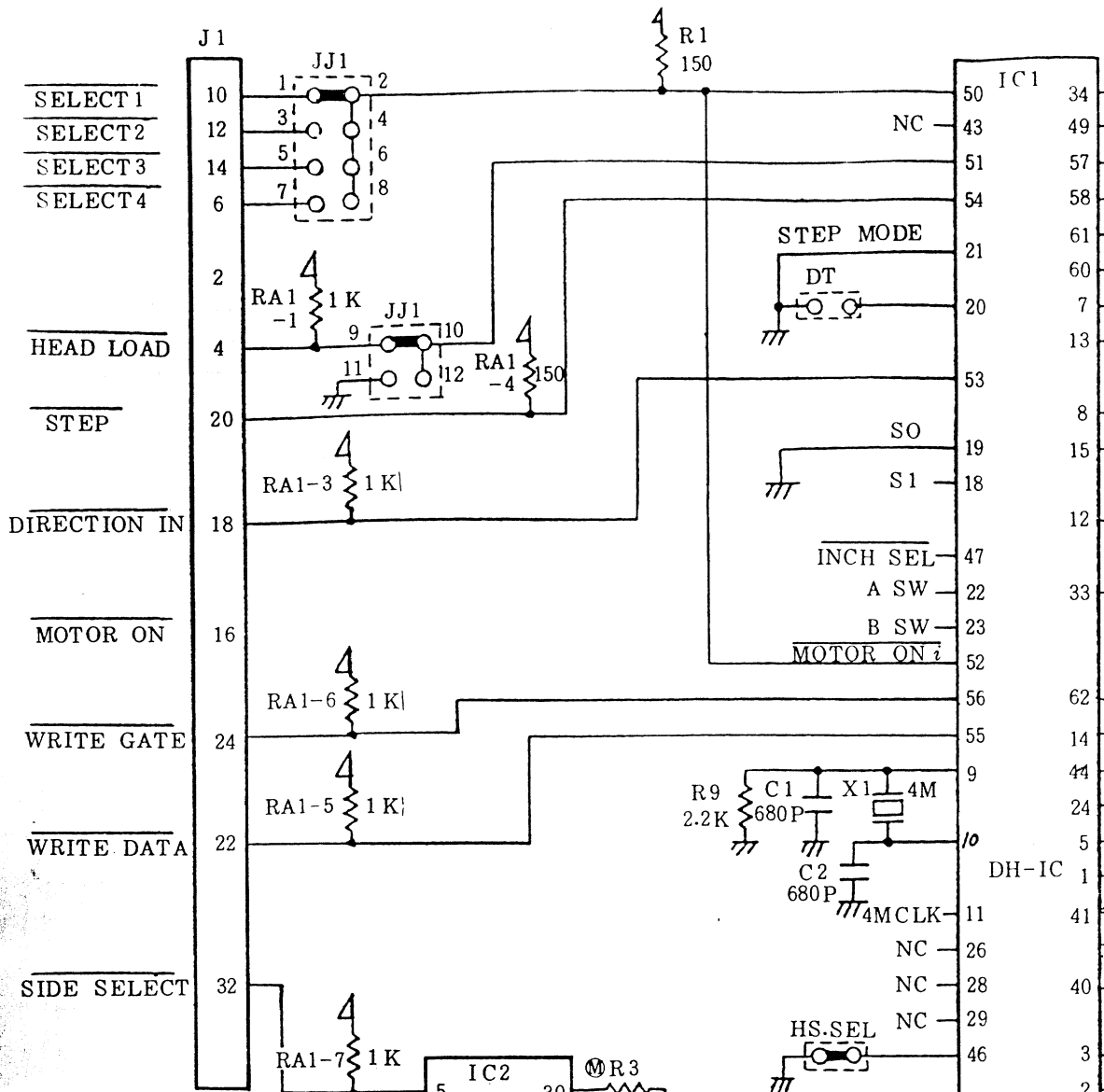
*1 Conform IBM

5 45

*2 20 to 80% (max. wet bulb temperature 29°C, free of dew formation)
1G (5 - 100Hz) X, Y and Z directions

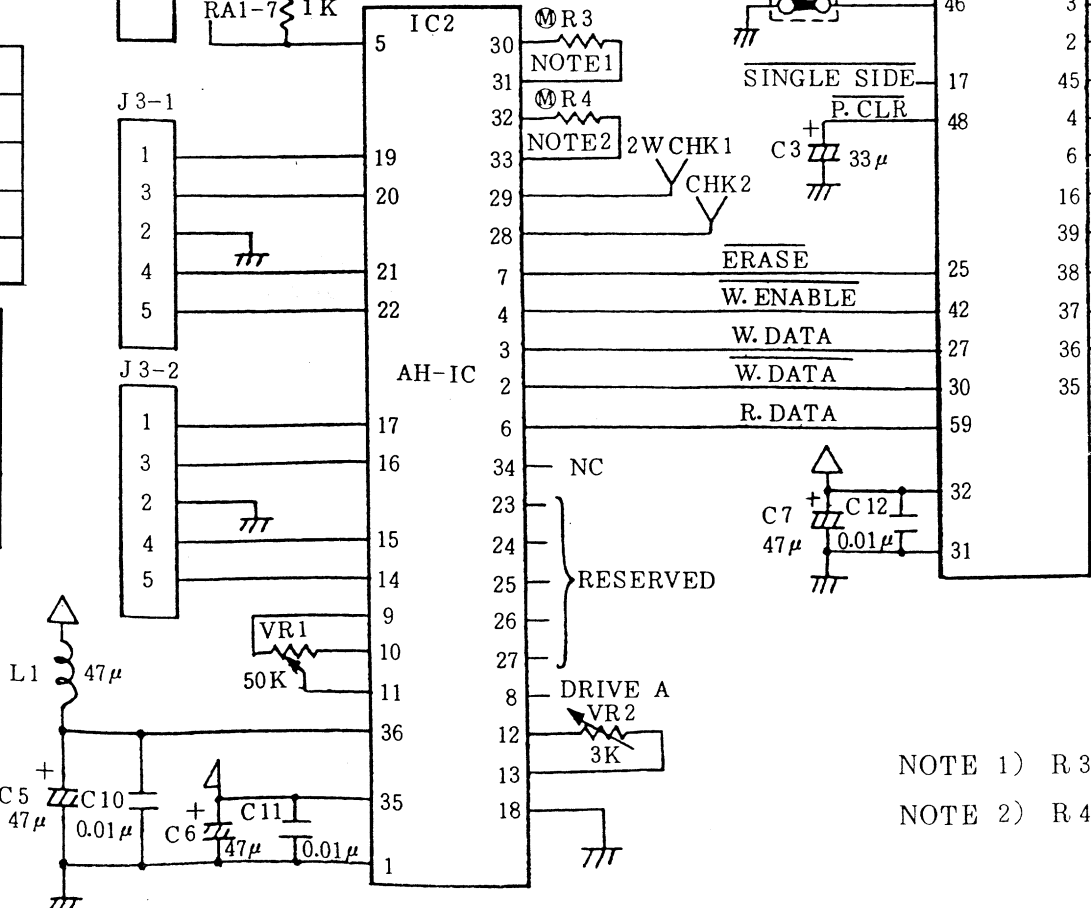
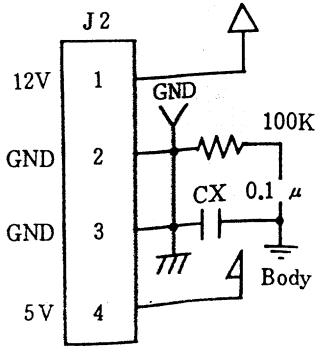


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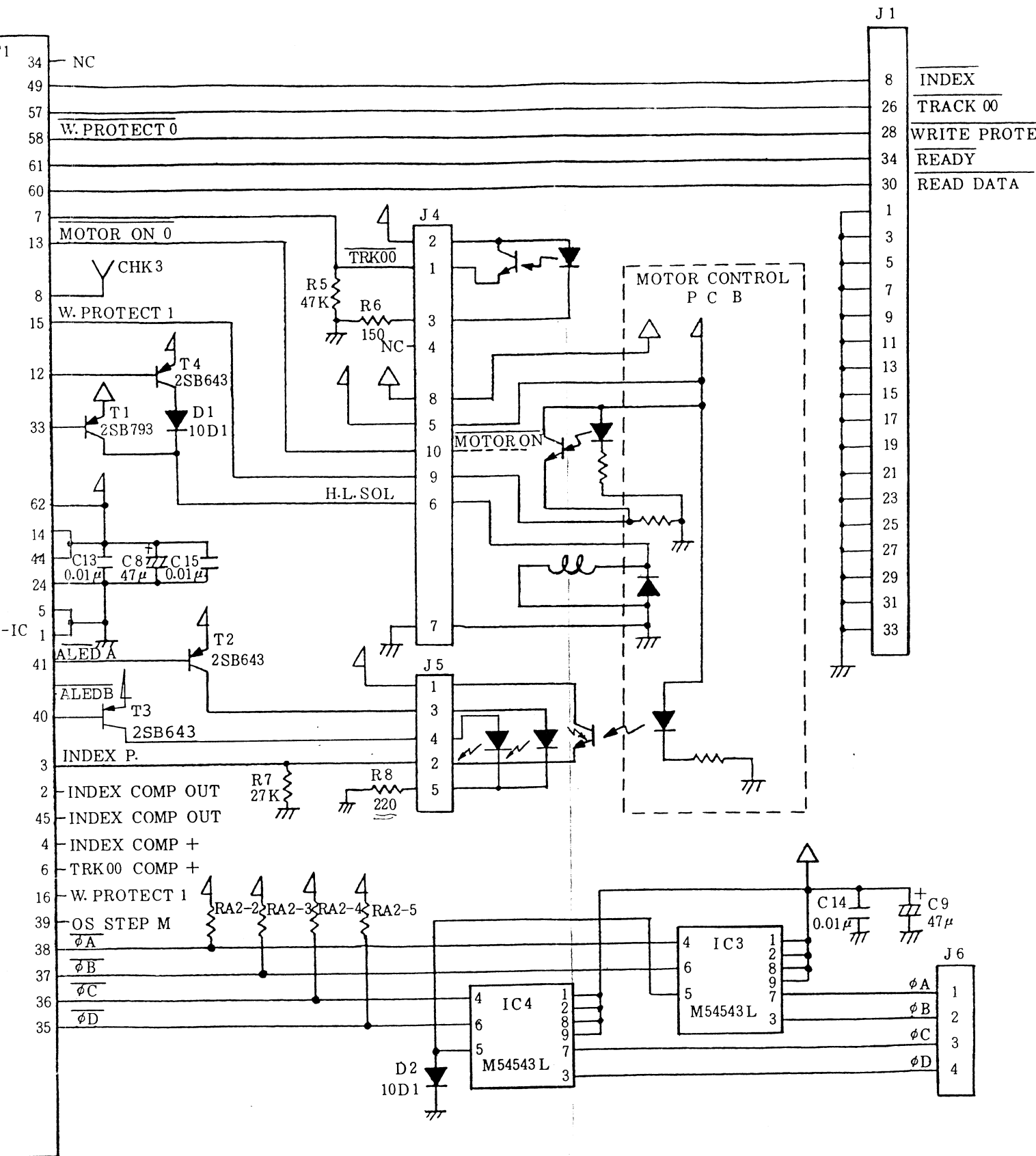


SM	D.T	STEP.P
L	L	1
L	H	2
H	L	4
H	H	8

SO	SI	S.CLOCK
L	L	2 (ms)
L	H	3 (")
H	L	5 (")
H	H	7 (")



NOTE 1) R 3
 NOTE 2) R 4



LOGIC

- 1) R 3 (MDD211 2.05K Ω , MDD221 2.37K Ω)
- 2) R 4 (MDD211 150 Ω , MDD221 390 Ω)