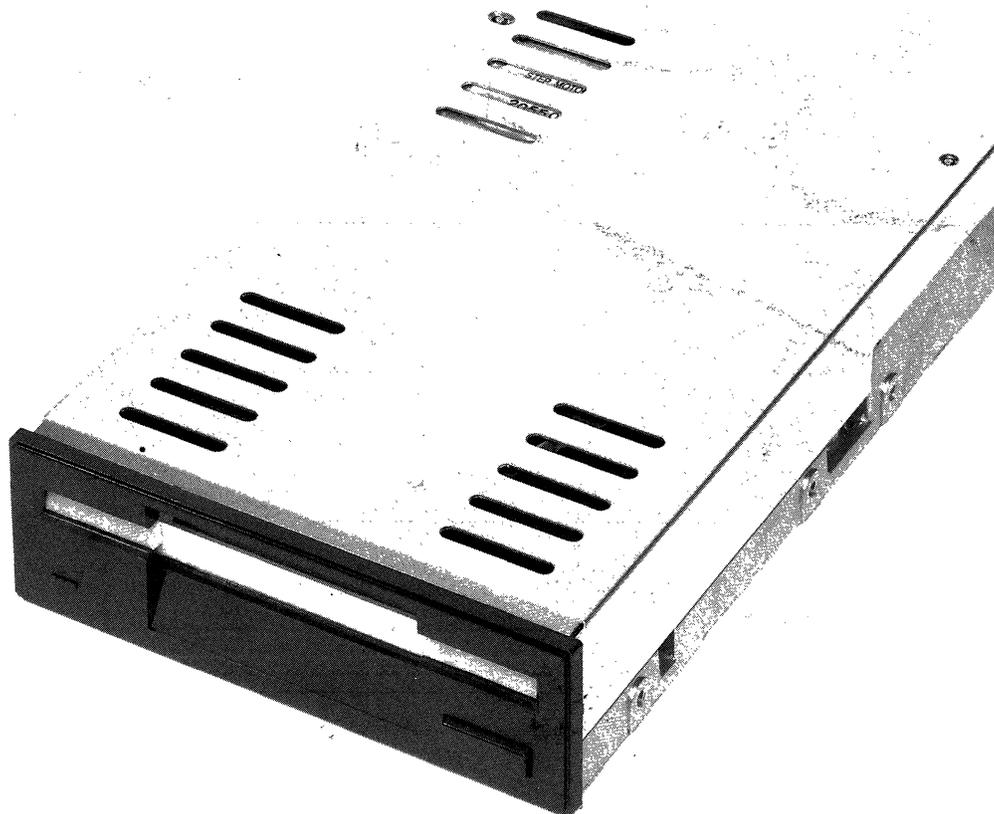


CHINON

3-1/2" MICRO FLOPPY DISK DRIVES

SPECIFICATIONS

MODEL: F-354CAE/F-354C (135 TPI, DOUBLE SIDES)



CHINON INDUSTRIES, INC.

CONTENTS

1. SCOPE.....	1
2. FEATURES.....	1
3. SPECIFICATIONS.....	2
3-1. Specification (1)	2
3-2. Specificaiton (2)	3
3-3. Installation Conditions	4
3-4. Reliability	5
4. DIMENSIONS	6
5. INTERFACE SIGNALS	7
5-1. Signal Voltage Levels.....	7
5-2. Input Signals.....	7
5-3. Output Signals.....	8
5-4. Input signal Line Terminator.....	9
5-5. Interface Circuit.....	9
5-6. Signal Timing.....	12
6. POWER CONSUMPTION	17
6-1. Power Consumption (1)	17
6-2. Power Consumption (2)	18
7. POWER-ON SEQUENCE.....	19
8. POWER SUPPLY INTERFACE.....	20
8-1. Power Supply Specifications.....	20
8-2. Frame Ground.....	20
8-3. Power Supply Sequence	20
9. INTERFACE CONNECTOR AND PIN ARRANGEMENT.....	20
9-1. Interface Connector	20
9-2. Pin Arrangement	20
10. SHORT PLUG AND FRONT LED	24
10-1. Short Plug.....	24
10-2. Front LED	25

1. SCOPE

These Specifications apply to 3-1/2" double-sided 135-TPI micro floppy disk drive (hereafter abbreviated as FDD) CHINON F-354CAE/F-354C.

2. FEATURES

The features of the F-354CAE/F-354C are as follows:

(1) Compact, Lightweight and Slim

The base section, the foundation supporting all components of the unit, uses aluminum die-cast to ensure superb heat radiation, thermal expansion characteristic and ruggedness against external force. With its light weight of 600 g (1.33 lb) and compact size of 101.6 (W) × 32 (H) × 155 (D) mm (4" × 1-1/4" × 6-1/8"), the F-354CAE/F-354C are ideal for desk-top type small computer systems or other portable systems.

(2) Low Power Consumption

Power consumption has been minimized by application of C-MOS circuitry, low power read/write IC and low power type DD motor, enabling a low power consumption of 2.2 W (typ.) in operation and 0.02 W (typ.) in standby. The peak value of power consumption during operation is also restricted by new technology.

(3) Auto-Eject Mechanism (Only F-354CAE)

Our original technology has produced an auto-ejection mechanism with no additional motor for ejection. The disk can be auto-ejected by just sending a control pulse from the system and selection of drive is also possible in case two or more FDDs are used.

(4) Head Soft-Landing Mechanism

The soft-landing mechanism protects head and disk against disk-loading impact to prolong the service lives of the head and disk.

This mechanism does not operate in disk ejection, making the eject operation lighter.

(5) Single-Touch Disk Positioning

Based on the cassette insertion mechanism in our famous car stereo system, the FDD allows the disk to be accurately positioned with a single touch. This sophisticated feature is very durable. When the disk is to be ejected, simple press the button and the disk pops out ready to file.

(6) High Reliability

The FDD has a flat, 3-phase DC brushless direct drive motor with an accurate chucking mechanism and a reliable spindle knob, so the rotation accuracy is improved and service life is prolonged.

(7) High-Speed, High-Accuracy Head Positioning Mechanism

The small, compact, flat hybrid-type stepping motor and steel belt drive mechanism assures high accuracy in head positioning and fast access time of 3 ms for 1 track.

(8) Higher Track Density, Larger Capacity

The high 135 TPI density allows a high 1 MB capacity with double-density (MFM) unformatted disk.

(9) Easy Interfacing

The FDD is compatible with 5-1/4" FDDs and data replacement is easy.

3. SPECIFICATIONS

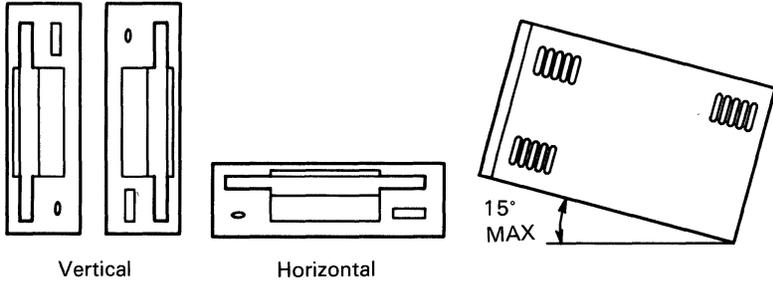
3-1. Specification (1)

Item		Characteristic	
		Double density	Single density
Unformatted	Per disk	1 M bytes	500 K bytes
	Per track	6.25 K bytes	3.125 K bytes
Formatted (Equivalent to IBM format)	Per disk	655.36 K bytes	327.68 K bytes
	Per track	4096 bytes	2048 bytes
Recording density		8717 BPI	4359 BPI
Rate of data transfer		250 K bits per second	125 K bits per second
	Power on to ready time	0.5 sec.	
	Single track seek time	3 ms per track	
	Average access time	95 ms	
	Settling time	15 ms	
	Average latency time	100 ms	
Rotation speed		300 rpm	
Long term speed variation		Less than +1.5%	
Instantaneous speed variation		Less than +1.5%	
Number of tracks		160	
Number of heads		2	
Track radius	Outside track	Side 0: 39.5 mm	Side 1: 38.0 mm
	Inside track	24.6875 mm	23.1875 mm
Number of indexes		1	
Recording method		MFM	FM
Track density		135 TPI	

3-2. Specification (2)

Item	Specification			
Physical dimensions	101.6 (W) × 32 (H) × 155 (D) mm			
Weight	600 grams			
Power supply	DC +12 V ± 5%			
	DC +5 V ± 5%			
Power consumption		5 V	12 V	POWER
	Stand by	4 mA TYP	10 μA MAX	0.02 W TYP.
	Read	200 mA TYP	100 mA TYP	2.2 W TYP.
	Write	210 mA TYP	120 mA TYP	2.5 W TYP.
	Seek	100 mA TYP	340 mA TYP	4.6 W TYP.
	Starting current	10 mA TYP	250 mA MAX	3.1 W MAX
	During auto ejection	4 mA TYP	300 mA MAX	3.6 W MAX
Ripple voltage allowance	DC +12 V	Less than 150 mVp-p (including spike noise)		
	DC +5 V	Less than 100 mVp-p (including spike noise)		
Noise	Less than 55 phons (class A) (separated from the drive by 1 m)			
Cabinet specifications	Front panel	Material: ABS	Color: Black	
	Front door	Material: ABS	Color: Ivory	

3-3. Installation Conditions

Item	Specification			
Mounting position	 <p style="text-align: center;">Vertical Horizontal</p>			
	 <p style="text-align: center;">Declination upward Declination lowward</p>			
Media eject	10 mm or more in the above mounting positions			
Environment conditions	Temperature	During operation	5 ~ 45°C	
		During non-operation	0 ~ 50°C	
		During storage	-20 ~ 60°C	
	Humidity	During operation	20 ~ 80% RH Maximum wet bulb temperature 29°C	
		During non-operation	5 ~ 90% RH No dew condensation	
During storage		8 ~ 90% RH No dew condensation		
Temperature change	15°C/H			
Vibration	During operation	Continuous vibration	Amplitude Less than 0.5 mm 5 ~ 25 Hz 0.25G 25 ~ 100 Hz	
		Single vibration	Less than 10G (10 ms)	
	During non-operation and storage (W/Protect sheet)	Continuous vibration	Amplitude Less than 7 mm 5 ~ 9 Hz 0.5G 9 ~ 100 Hz	
		Single vibration	Less than 30G (10 ms)	
Drop shock	Fall height in packing State: 70 cm (corner: one time, sides: three times, flat surfaces: six times)			

3-4. Reliability

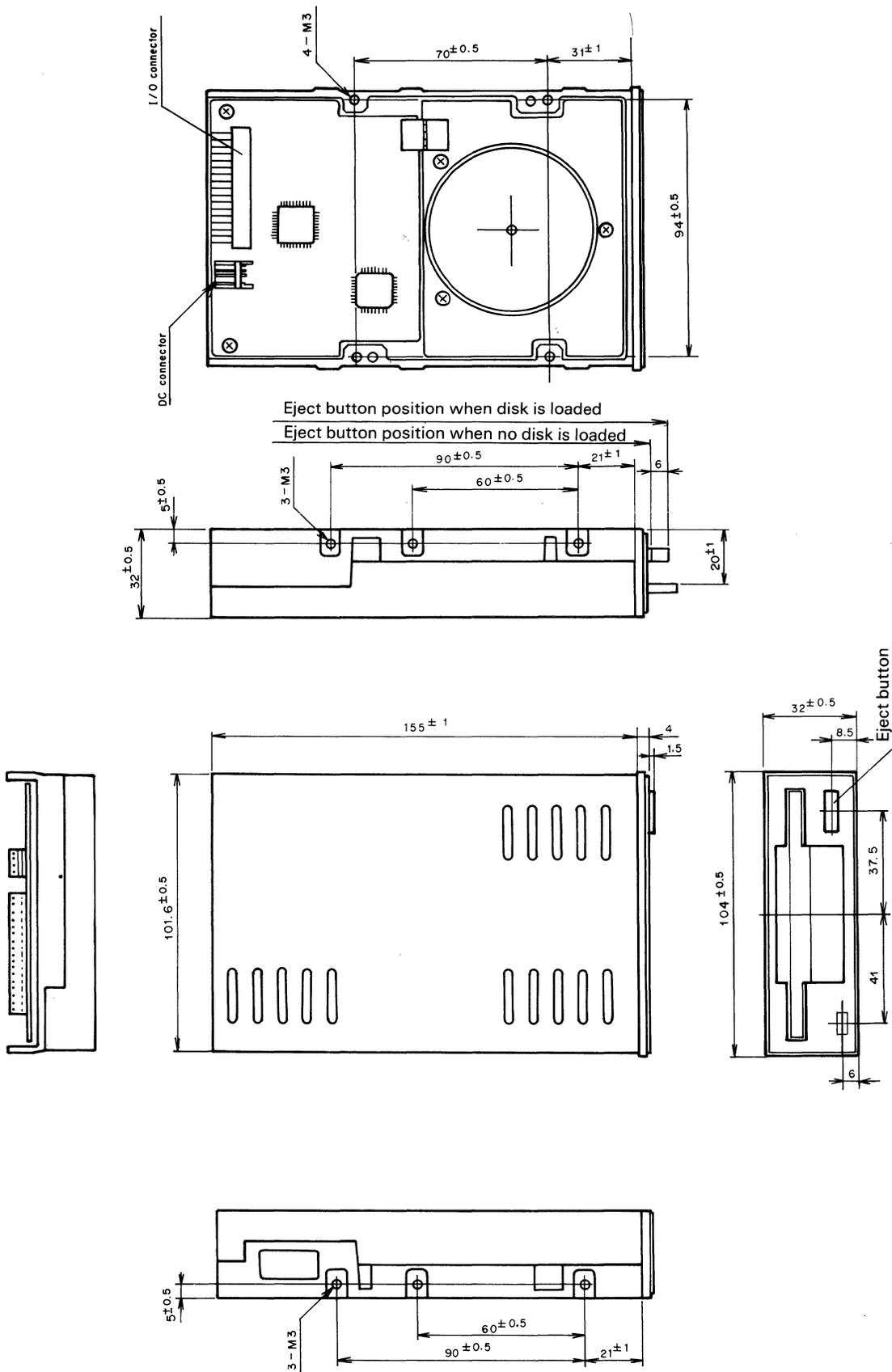
Item		Specification	
Drive	MTBF	10,000 POH	
	MTTR	0.5 H	
	Drive life	Five years	
Error rate	Software errors	10^{-9} times/bit	
	Hardware errors	10^{-12} times/bit	
	Seek errors	10^{-6} times/seek	
Life	Drive	Number of mountings of the media	30,000 times or more
		Seek	10,000,000 seeks or more
		Head	10,000 H or more
	*1 Media	Number of identical track passes	3,000,000 passes or more
		Number of mountings	10,000 times or more

* Media to be used SONY OM-D4440

* Maintenance is not required under normal use conditions.

*1 Reference value

4. DIMENSIONS



5. INTERFACE SIGNALS

The interface signal has 12 input signal lines and 6 output signal lines. See Fig. 5-1

5-1. Signal Voltage Levels

The interface signal interfaces with the controller at the TTL level. For all signals, low is true. The I/O signal level into the drives have the following specifications.

(1) Input signal

Low level 0.00V to +0.40V

High level +2.40V to +5.25V

Input impedance 1K Ω (center)

(For daisy chain connection of N units 1 k Ω /N: N is up to four units)

(2) Output signal

Low level 0.00V to +0.40V

High level +5.25V max. (by receiving the end terminator)

Output current (for low level) 48 mA (max.)

Output current (for high level) 250 μ A (max.)

5-2. Input Signals

(1) DRIVE SELECT 0 to 3 signal lines

When one of these signal lines goes into low level, the drive corresponding to the signal line is selected and the I/O gate is opened. Up to four drives can be controlled using these four signal lines. The drive corresponding to one of the DRIVE SELECT 0 to 3 signal lines is determined by the position of the short plug in the drive.

At that time, set the short plug to MD to control the DD motor ON/OFF operation. When the short plug is set to M0 – M3, the signal line functions as the MOTOR ON signal line. (See 10-1 "Short Plug".)

(2) MOTOR ON signal line

This line controls the ON/OFF of the spindle motor. When this signal line is set to low level, the spindle motor revolves. When it is set to high level, it stops. 0.5 seconds is the required start up time of the spindle motor. The motor start operation is not executed when no disk is loaded.

This signal operates independently of the DRIVE SELECT signals.

(3) DIRECTION SELECT signal line

This signal determines the direction of movement of the head when a pulse is sent via the STEP signal line. When this signal line is set to low level and the STEP signal pulse is sent, the head moves toward the center of the disk. When it is set to high level and the STEP signal pulse is sent, the head moves away from the center.

The logic level of this signal should be held for at least 1 microsecond after the trailing edge of the STEP pulse.

(4) STEP signal line

This signal line moves the head. With the rise of a single low level pulse, this signal line changes from LOW level to HIGH level and the head moves one track in the direction determined by the DIRECTION SELECT signal.

However, this signal is not accepted when the FDD is in WRITE mode. The head is stabilized 15 ms after the trailing edge of the last STEP pulse, and the FDD is ready for data read/write operation.

(5) WRITE GATE signal line

This signal line specifies drive write and read status. When this signal line is set to low level, write enable status occurs and the data is stored on the disk surface by the WRITE DATA signal. When this signal line is set to high level, read status occurs.

After the writing operation, a period of 1.2 ms is necessary before a valid READ DATA signal appears on the interface.

(6) WRITE DATE signal line

Data written on the disk surface is transferred on this signal line. With the decline of the pulse sent to this signal line (when the signal line changes from the high level to the low level), data is written on the disk surface.

(7) SIDE SELECT signal line

This signal line selects the head.

When this signal line is set to high level, the side 0 head is selected; when it is set to low level, the side 1 head is selected. Side 0 stands for the one-sided medium recording surface.

The selection is completed 100 microseconds after the change of the SIDE SELECT signal line, and read/write becomes possible.

(8) IN USE signal line

When this signal line is set to low level, the LED on the front panel lights. This signal line operates regardless of the DRIVE SELECT signals. (The LED also lights when the DRIVE SELECT signal line selected by the short plug is set to low level.)

(9) EJECT signal line

When the DRIVE SELECT signal line selected by the short plug is set to low level, the EJECT request is latched by the positive-going edge (the moment of change from low level to high level) of the pulse applied to the EJECT signal line and the disk auto-eject operation starts.

(Do not turn the power off during auto eject operation.)

When the auto-eject mechanism is not in use, open the signal line with the host system or pull-up to 5V line.

5-3. Output Signals

(1) INDEX signal line

Whenever the disk rotates once, this signal line outputs a low level pulse indicating the start of the track. A decline of the pulse signal (when this signal line changes from high level to low level) indicates the start of the track. However, the pulse is only output when the disk is inserted.

(2) TRACK 00 signal line

When this signal line is set to low level, the head is located at the track 00 position and the specific phase of the stepping motor is excited.

(3) WRITE PROTECT signal line

When this signal line is set to low level, the inserted disk cannot be written on. This signal line may also be set to low level even when no disk is inserted in the drive. The write function of the drive becomes inoperative when write-inhibited disk is inserted.

(4) READ DATA signal line

This signal line is used for the transfer of the pulse series read from the disk, in which clock pulses and data pulses are mixed. The negative-going edge (the moment of change from high level to low level) of the pulse output at this signal line indicates the readout data (clock and data pulses). (See Page 14.)

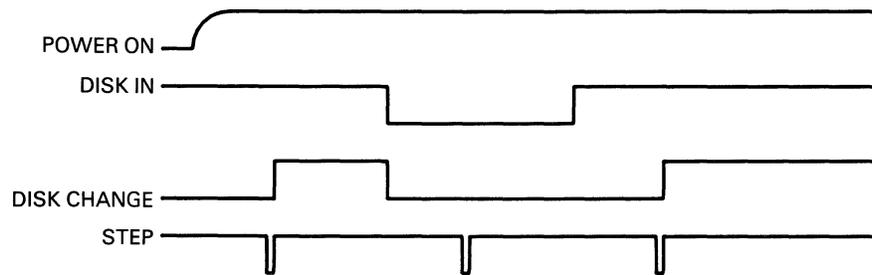
(5) READY signal line

When this output signal line is set to low level, the disk is inserted and the number of disk rotations is fixed.

When the READY signal is ON, read and write operations can be performed on the disk. Immediately after the MOTOR ON signal is turned ON, power is supplied. After the disk is inserted, check that the READY signal is ON before performing write and read operations.

(6) DISK CHANGE signal

This signal line is set to low level by power on or when a disk is ejected, and set to high level by STEP signal input when a disk is loaded.



5-4. Input Signal Line Terminator

The F-354CAE/F-354C are operable with either daisy chain or star chain systems. There is no need to disconnect the terminal resistor even with the daisy chain system.

Each of the input signal lines has a 1 k Ω terminal resistor.

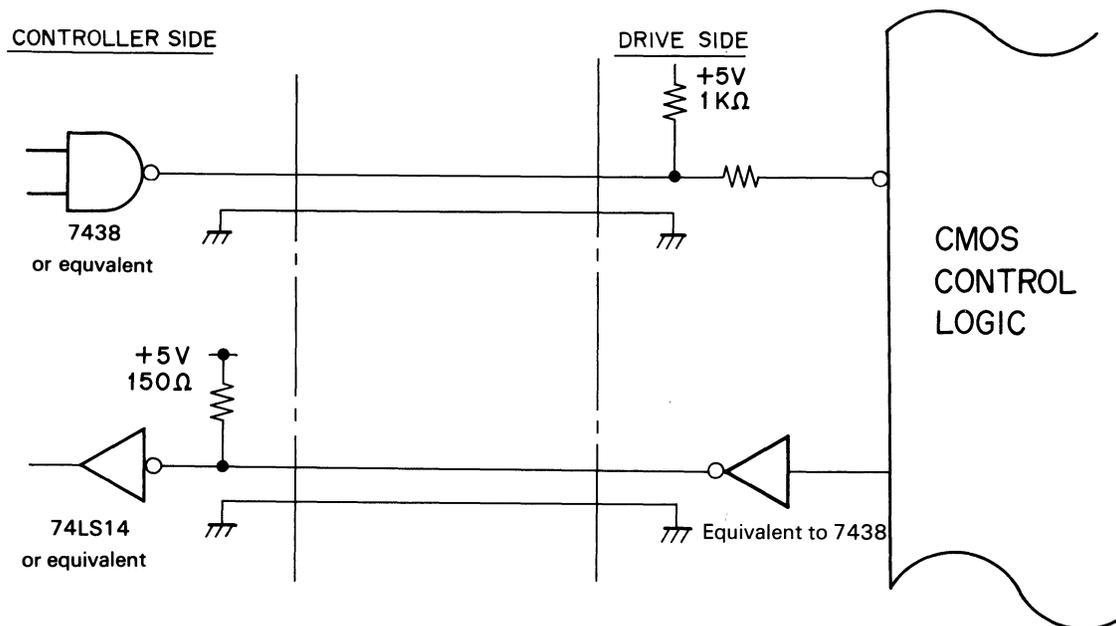
When a number of input signal line terminators are connected by the daisy chain system, resistance will differ, depending upon the number of drives. When two drivers are connected resistance will 500 Ω .

When four drives are connected, resistance will be 250 Ω .

5-5. Interface circuit

(1) Drives-receivers

When recommend the following drivers-receivers.

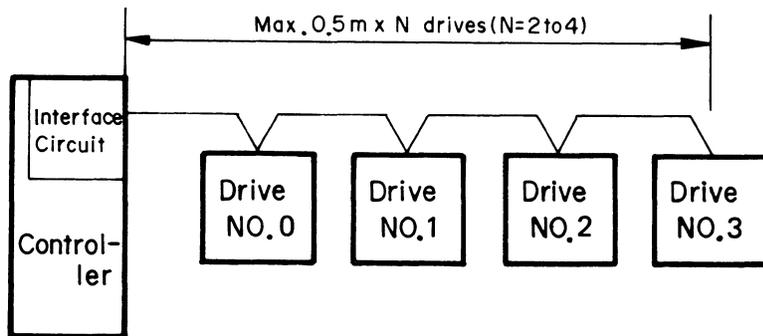


(2) Wire material

Flat cables or twisted pair wires

(3) Wire length

1) Daisy chain system (4 drives max.)



Note: 1. When only one drive is connected, the cable length is 1m max.

2. To connect a number of the drives in the daisy chain connection method, keep the power supplied to all drives.

2) Star chain system

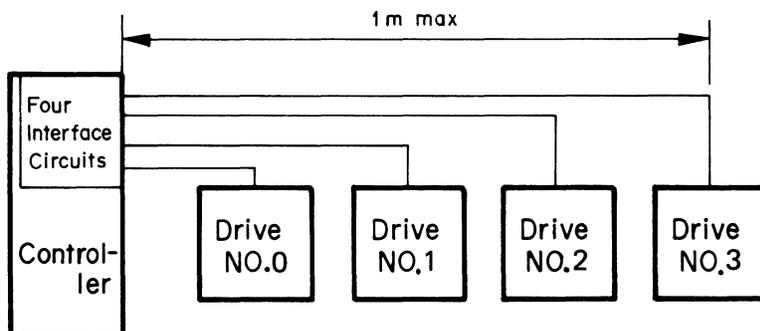
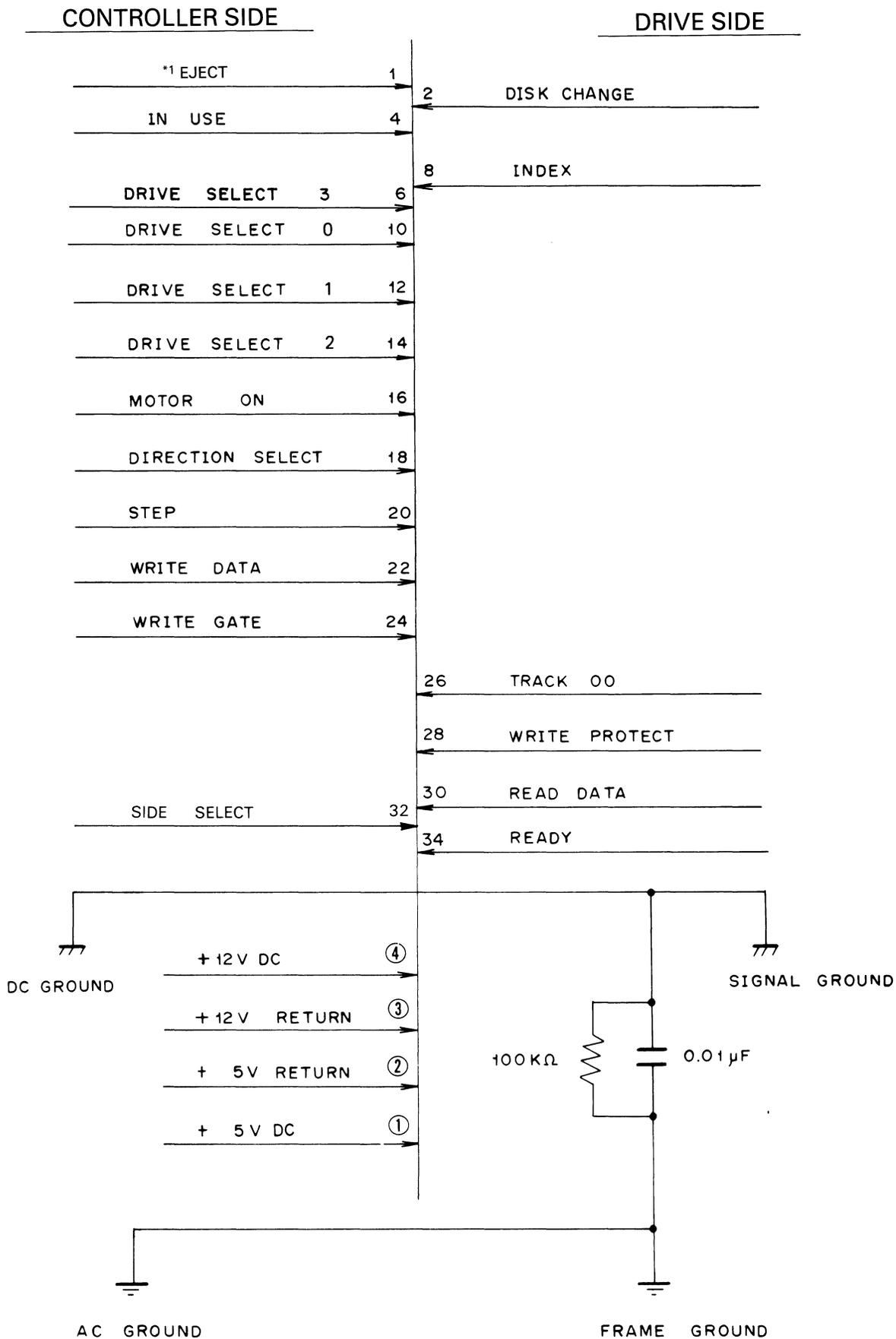


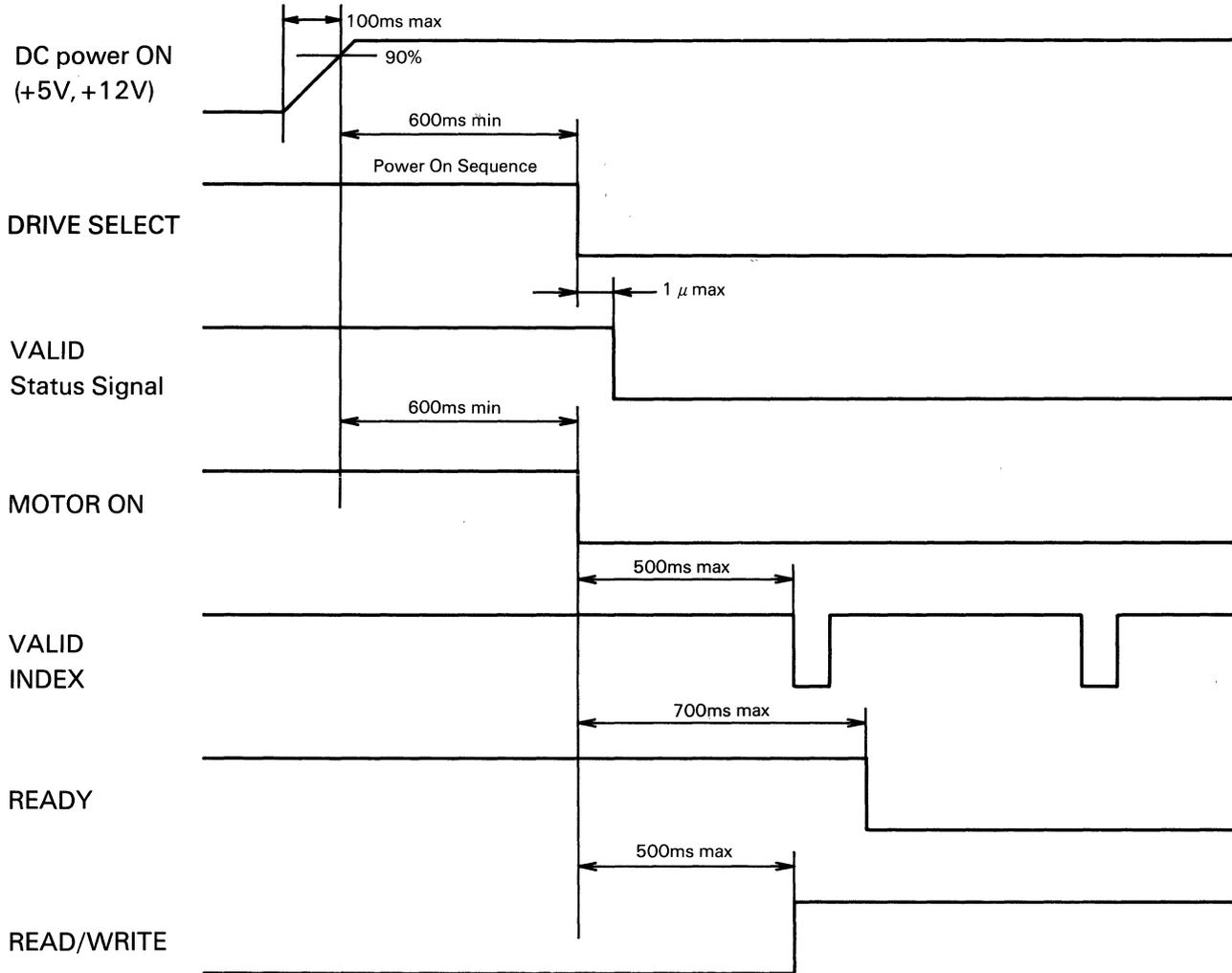
Fig. 5-1 Interface with the controller and host system



*1: Only F-354CAE

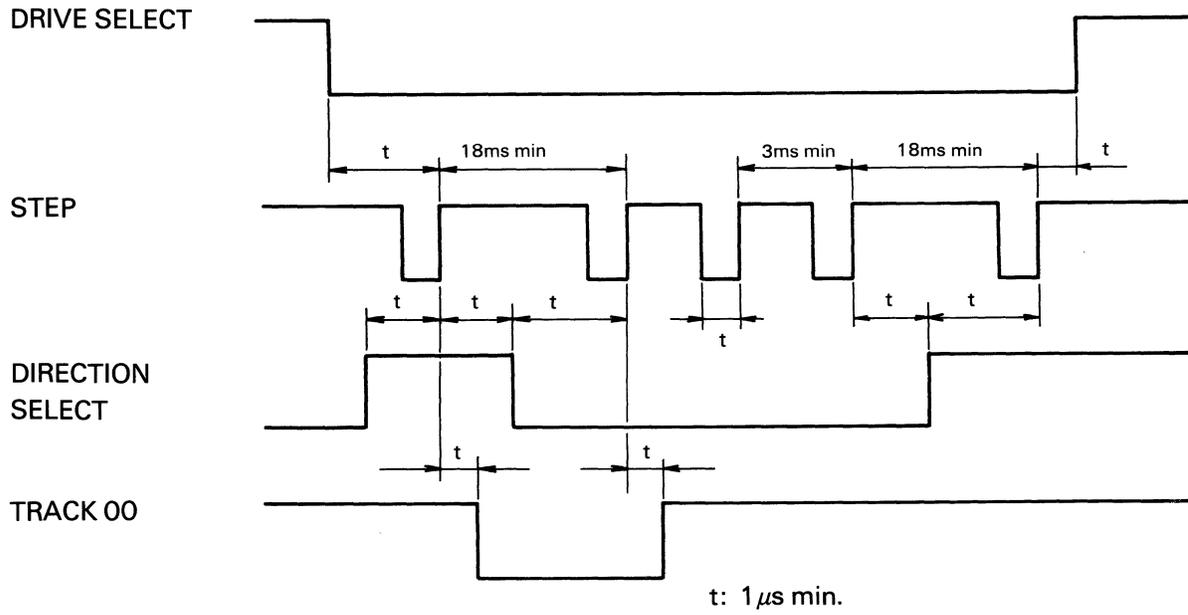
5-6. Signal Timing

(1) Initialize sequence

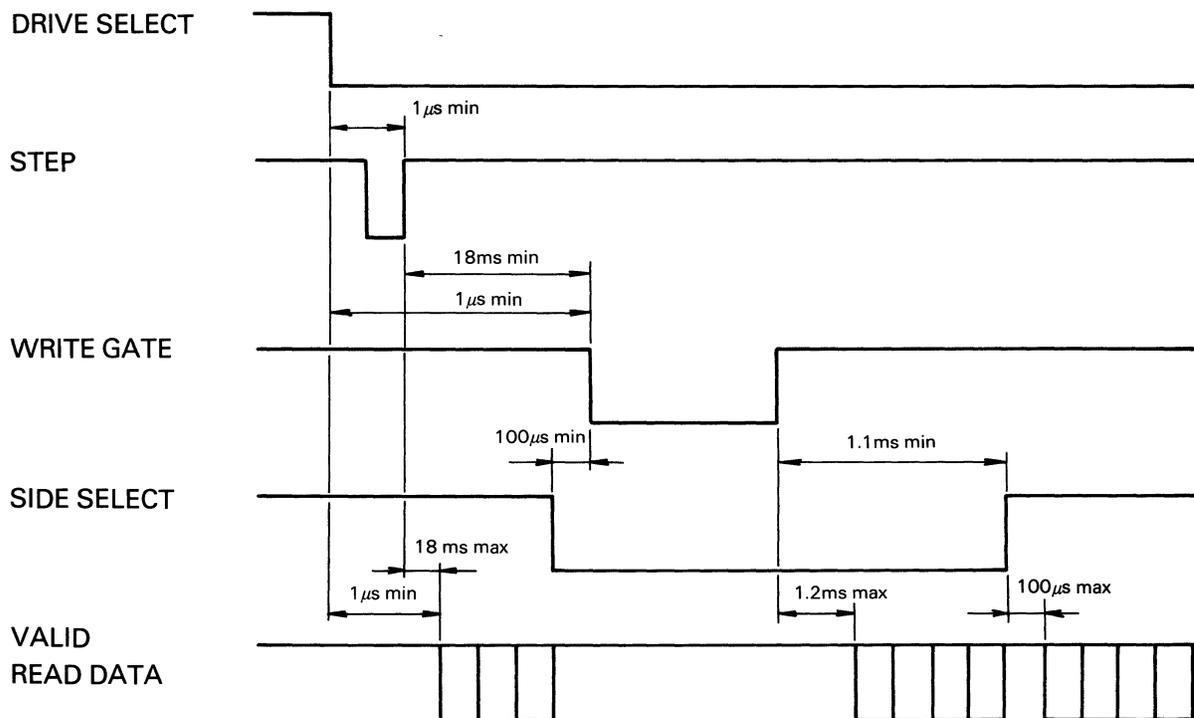


The drive requires a power-on sequence delay of 600 ms. DRIVE SELECT is ignored during this delay time.

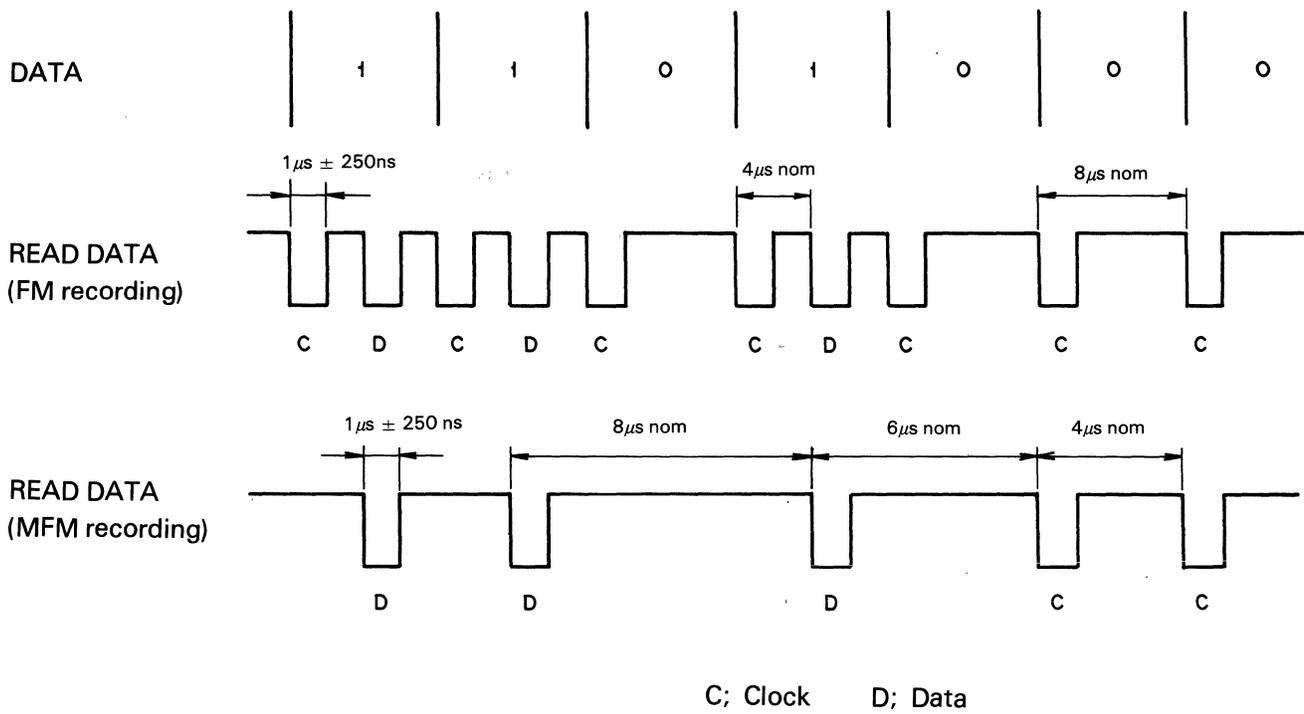
(2) Access timing



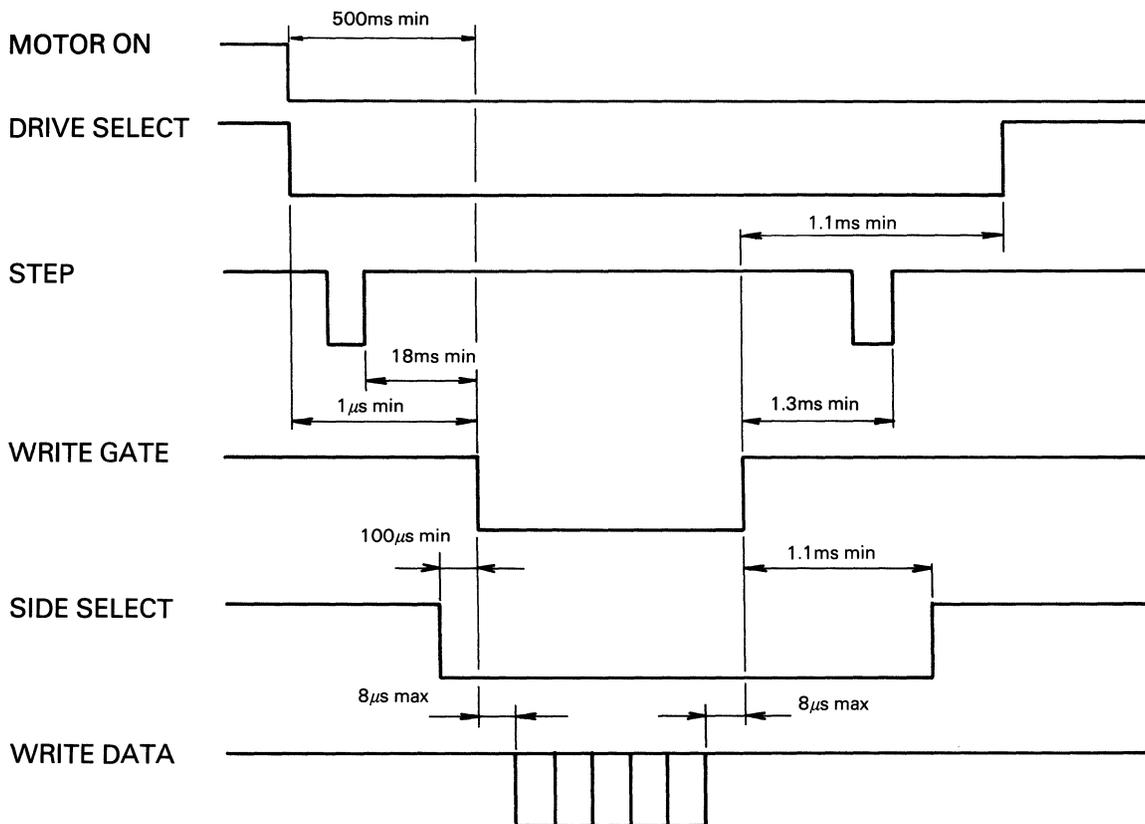
(3) Read timing



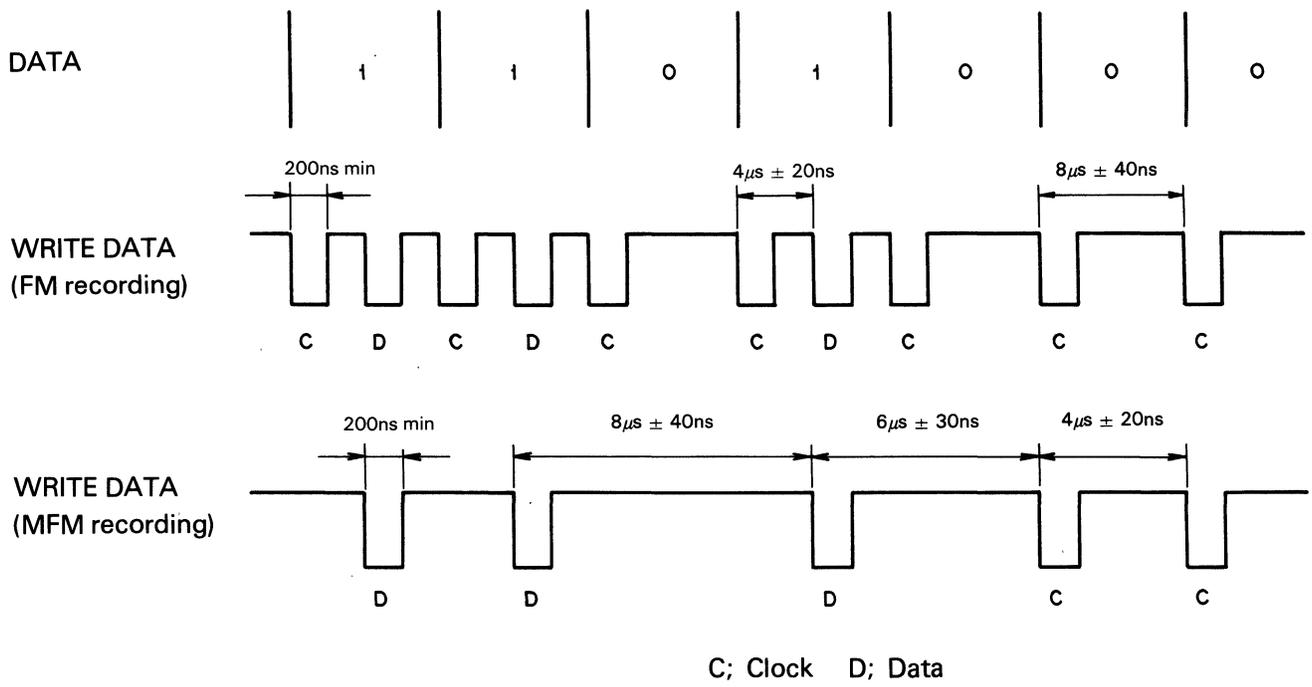
(4) READ DATA timing



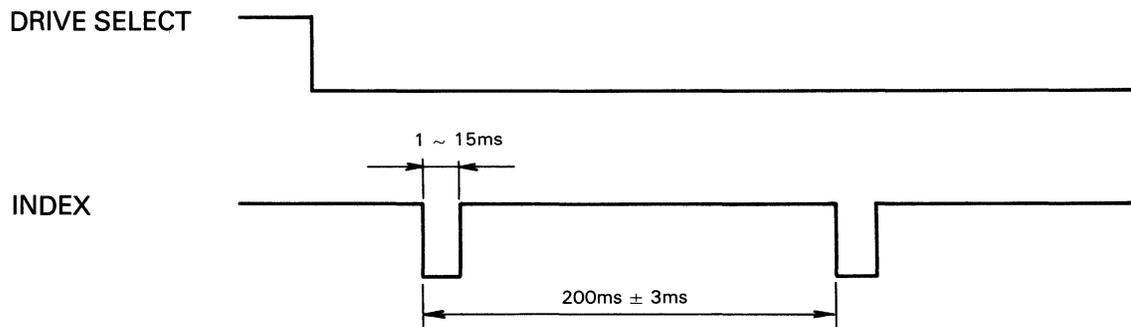
(5) Write timing



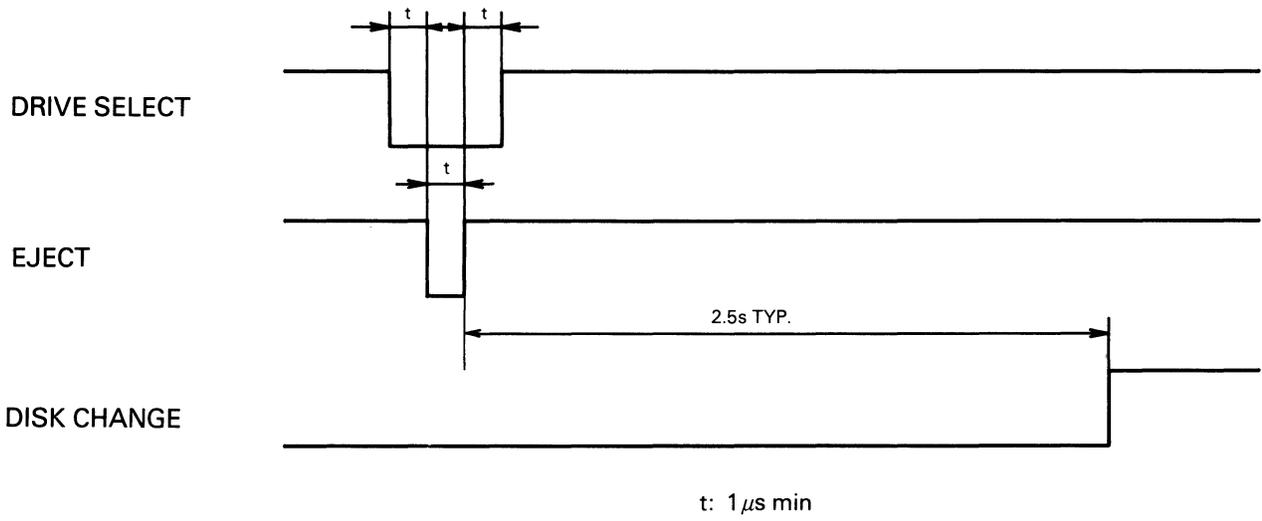
(6) WRITE DATA timing



(7) INDEX timing



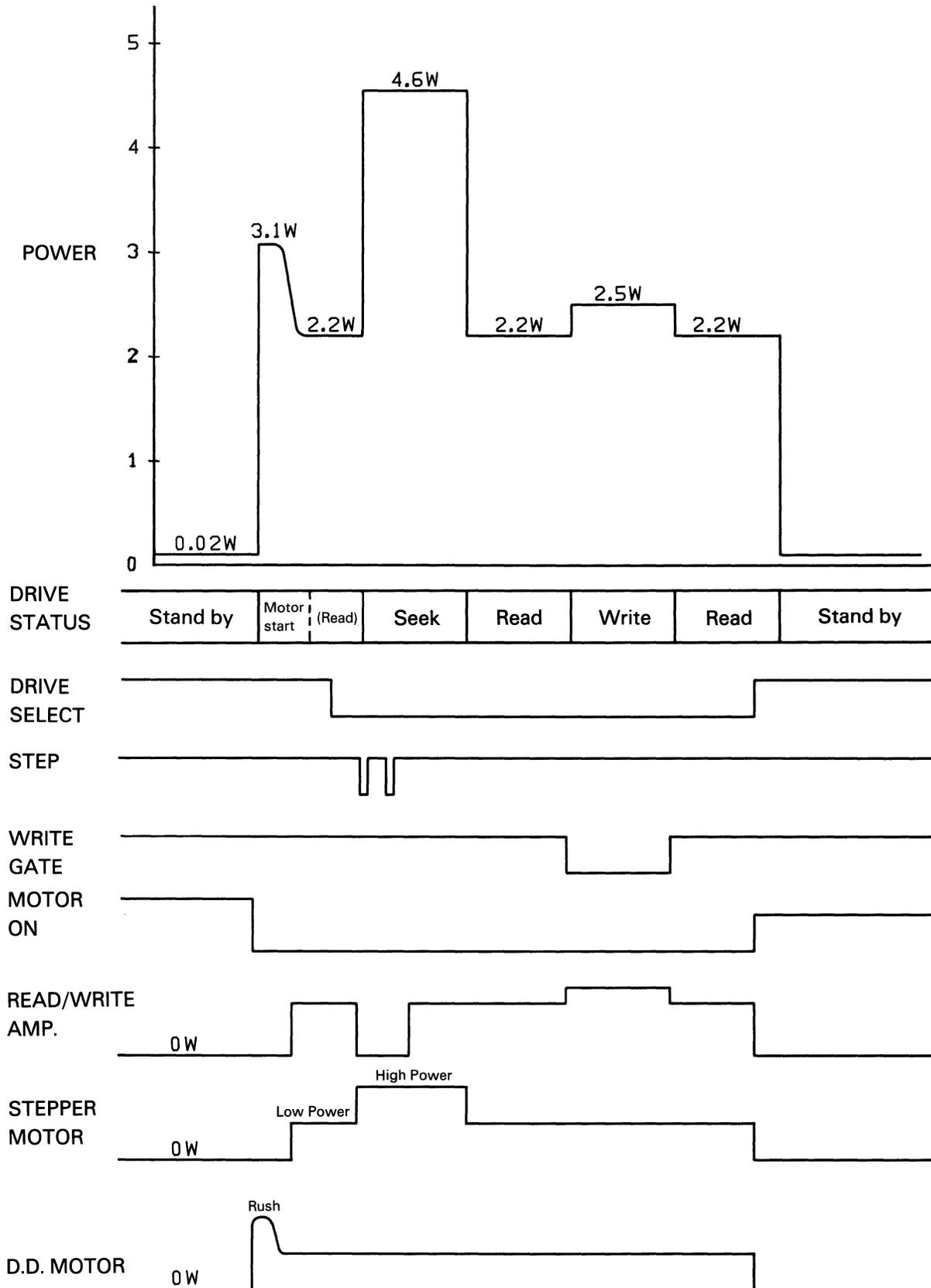
(8) EJECT timing (Only F-354CAE)



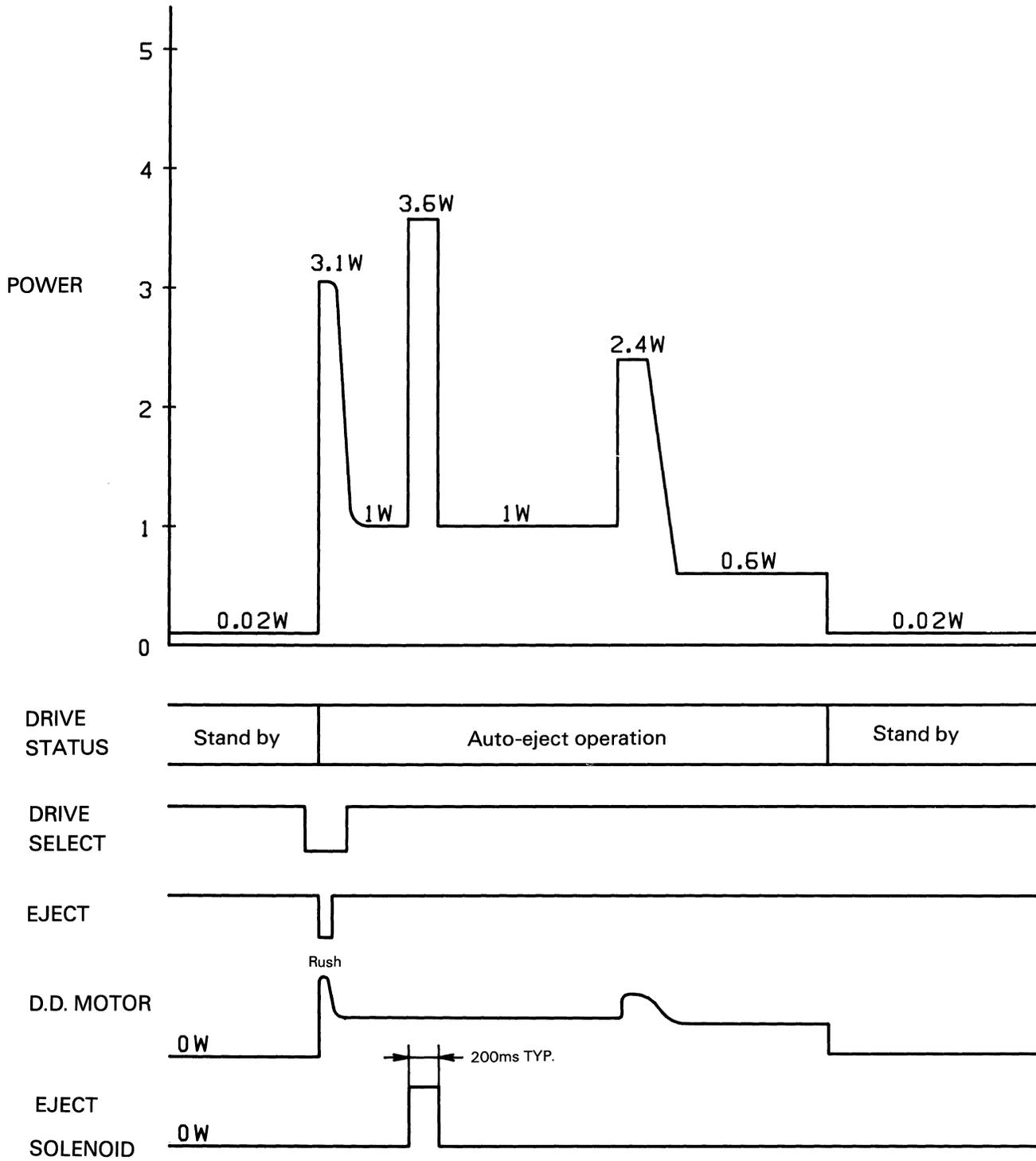
INDEX and READY are not output during EJECT operation.

6. POWER CONSUMPTION

6-1. Power Consumption (1)



**6-2. Power Consumption (2)
During Auto Eject Operation**



7. POWER-ON SEQUENCE

Recalibration of the head position is performed during the power-on sequence of the FDD.

Fig. 7-1 shows the power-on sequence.

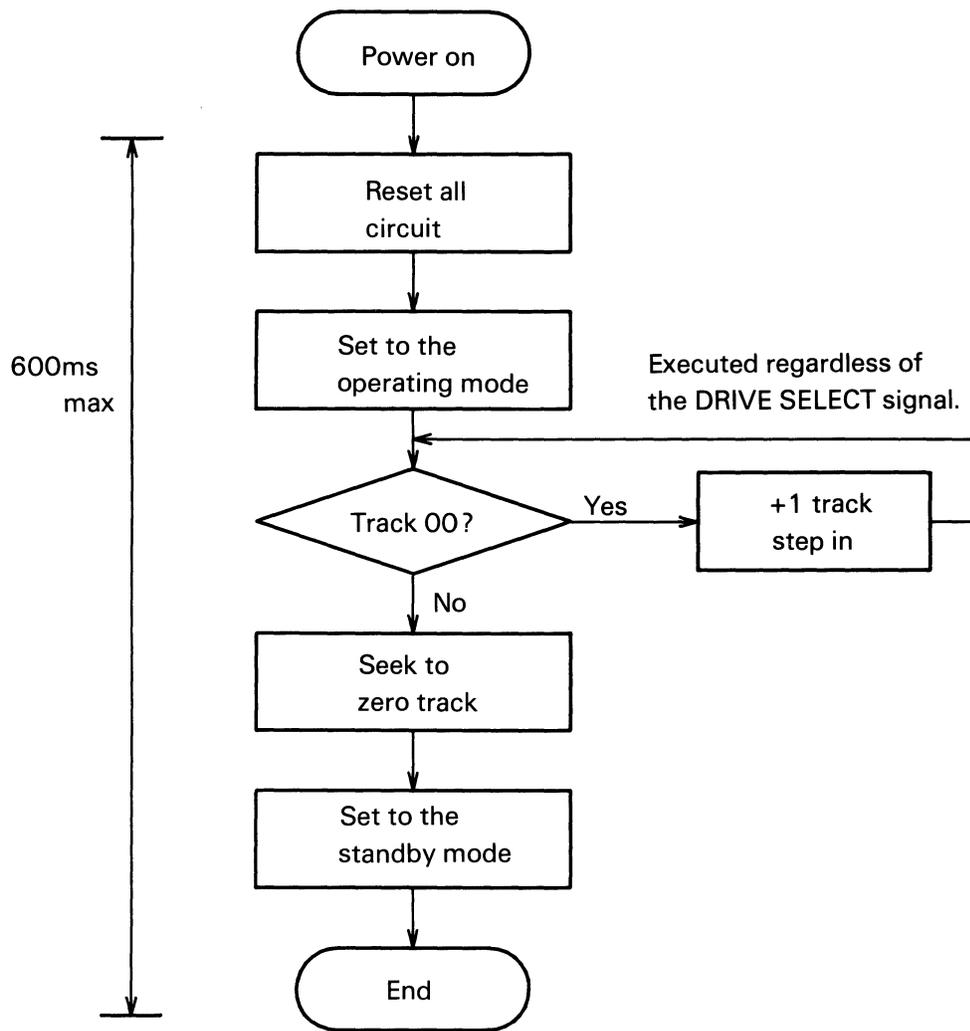


Fig. 7-1 Power-On Sequence

Note: At power on, the DD motor is rotated by about 12 turns for warm-up.

8. POWER SUPPLY INTERFACE

8-1. Power Supply Specifications

The DC power (+12V, +5V) shown in Specification (2) of Section 3-2 is required by the power supply. There are four power lines (+12V, +5V, and the two return lines).

8-2. Frame Ground

The frame ground and signal ground are connected through a capacitor and a resistor. The values are as follows:

$$R = 100 \text{ k}\Omega \quad C = 0.01 \text{ }\mu\text{F}$$

Connect the frame ground where the AC ground and DC ground are one point connected in the host system.

8-3. Power Supply Sequence

- (1) The power ON sequence is not specified. However, the time in which the supplied power voltage rises up to 90% of the specified value, should be set to 100 ms or less.
- (2) If the drive is in a status other than write operation, and the DC power is disconnected, the disk and the data stored on the disk are not destroyed. However, its contents will be destroyed if the WRITE GATE is not set to high level.

9. INTERFACE CONNECTOR AND PIN ARRANGEMENT

9-1. Interface Connector

- (1) DC power connector

	Drive side	Host side
Connector/housing	AMP 171826-4 or equivalent	AMP 171822-4 or equivalent
Pin	—	AMP 170204-2 or equivalent

The diagram of the drive side power connector dimensions is shown in Fig. 9-1.

- (2) Interface signal connector

	Drive side	Host side
Connector	JAE PS-34PE-D4LT1-P/N 1 or equivalent	JAE PS-34SEN-D4P1-1C or equivalent

The diagram of the drive side signal connector dimensions is shown in Fig. 9-2.

“▼” marking on the connector indicates pin #34. Key protrusion on some connector plugs should be placed in the slot of P.C. Board.

9-2. Pin Arrangement

The arrangement of each pin is shown below. This diagram shows the back of the drive.

(1) DC Power connector

Pin number	Signal
1	+5V DC
2	+5V RETURN
3	+12V RETURN
4	+12V DC

(2) Interface signal connector

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

GND: SIGNAL GROUND

*1: Only F-354CAE

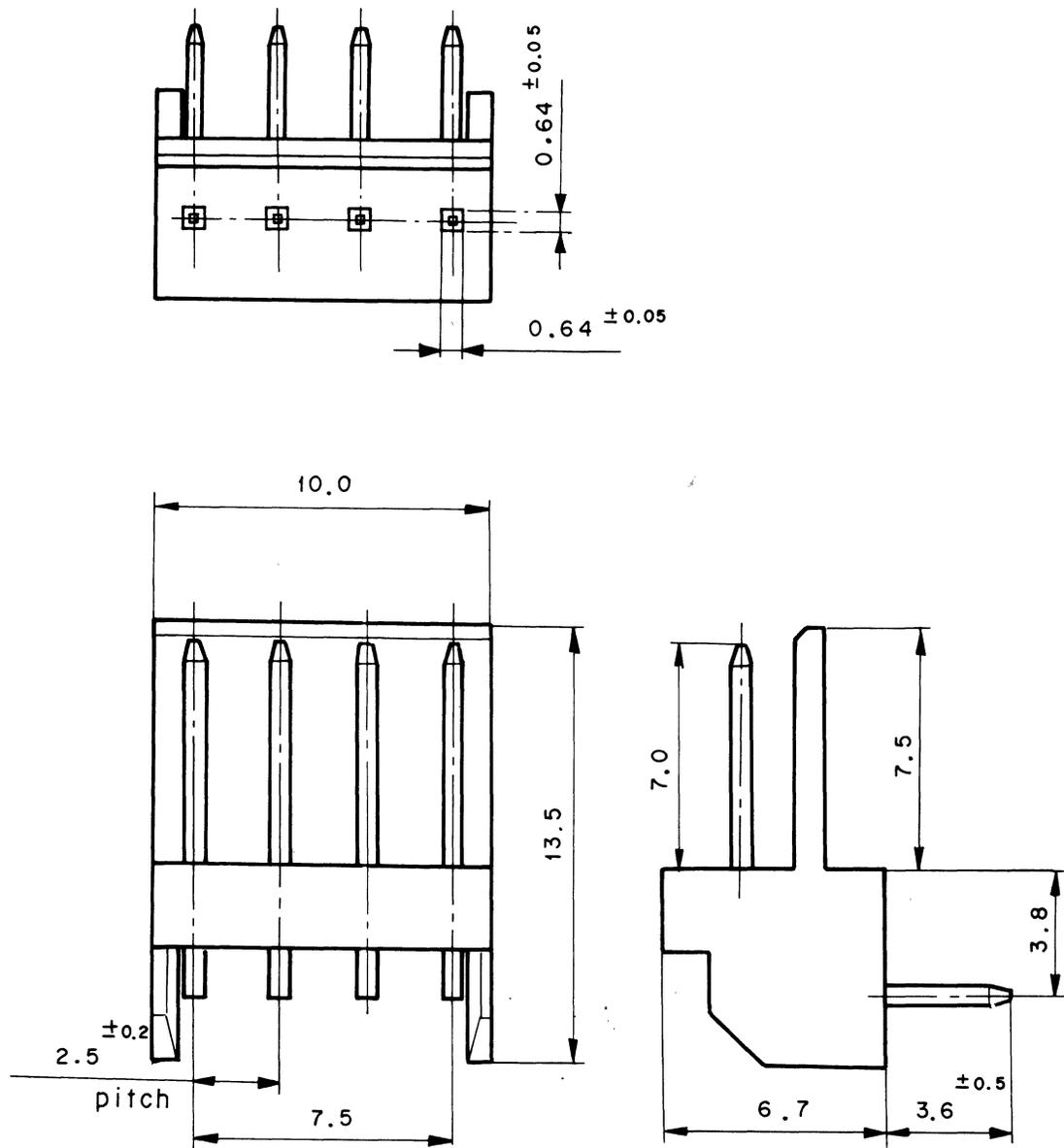


Fig. 9-1 Power connector dimensions

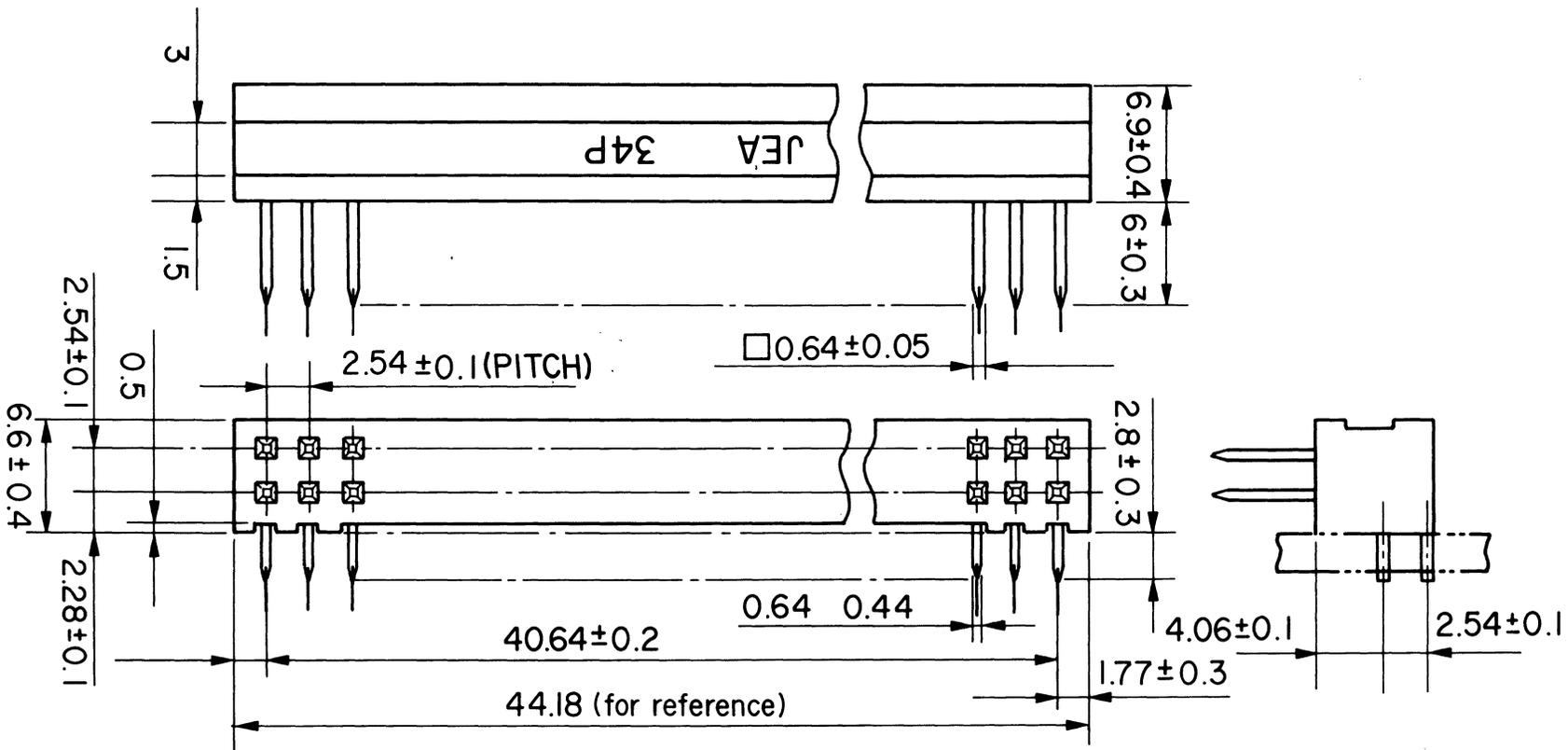


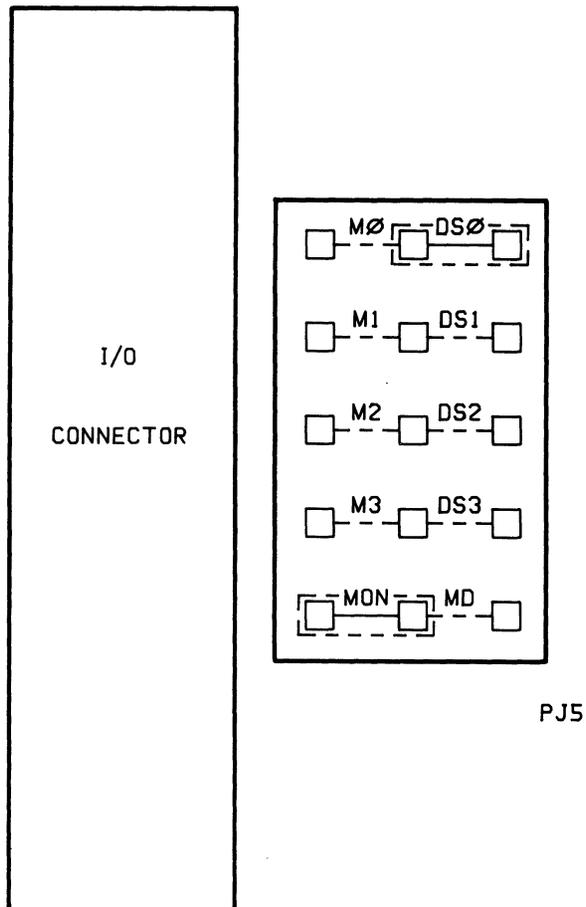
Fig. 9-2 Signal connector dimensions

10. SHORT PLUG AND FRONT LED

10-1. Short Plug

The MOTOR ON signal functions as same as that of the former 5-1/4" FDD.

However, when the short plug is set to MD, instead of MON, the DD motor ON/OFF operation can be controlled by DRIVE SELECT signal together with drive select operation. When the short plug is set to M0 – M3 instead of MON, the DD motor ON/OFF operation can be controlled by the DRIVE SELECT line. (For example, when short plugs are placed at DS0 and M2, the drive will be selected by the drive select 0 signal and its motor will be controlled by the drive select 2 signal.) With this function, the motor ON/OFF operation of the 2 drives can be independently controlled.



10-2. Front LED

The front LED lights when the DRIVE SELECT signal selected by the short plug or the IN USE signal is set to low level.

CHINON INDUSTRIES, INC.

INFORMATION EQUIPMENT DIV.

23-1-1, Nakagohshio, Chino City, Nagano Pref., 391-02 Japan

PHONE: 0266-72-5800 FAX: 0266-72-1010 TELEX: 3362-429

CHINON AMERICA INC.

INFORMATION EQUIPMENT DIVISION

6374 Arizona Circle, Los Angeles, CA. 90045 U.S.A.

PHONE: (213) 216-7611 FAX: (213) 216-7646

Printed in Japan

065F1JC-(2)G/05860500