FUJITSU

M2266S/H

Intelligent Disk Drive

Technical Handbook

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FUJITSU AMERICA, INC.

M2266S/H
Intelligent Disk Drive

Technical Handbook

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Section 1. General Description

This is the preliminary manual for the M2266 manual and is subject to change without notice.

This section describes the features and configuration of the M2266S/H intelligent disk drive. This drive is a high-performance, large-capacity, 5 1/4-inch fixed disk drive with an embedded SCSI controller.

The interface between the IDD (Intelligent Disk Drive) and host system is based on the Small Computer System Interface (SCSI) ANSI standard (X3.131, 1986.)

The flexibility and expandability of the SCSI, as well as the powerful command set of the IDD, allow the user to construct a high-performance, reliable disk subsystem with large storage capacity.

The IDD is available with two different kinds of SCSI bus, based upon electrical requirements:

*   M2266S   Single-Ended SCSI

*   M2266H   Differential SCSI

Also, the IDD is available with the following models based upon data format at factory shipment. The drives are preformatted at 512 bytes per sector, but may easily be reformatted in the field to any sector size from 180 to 4128 bytes per sector, in 2-byte increments.

Note: Some earlier revisions of the drive have a maximum bytes per sector of 3808 bytes.

•	M2266S	256 bytes (data block length)
•	M2266H	256 bytes (data block length)
•	M2266SA	512 bytes (data block length)
•	M2266HA	512 bytes (data block length)
•	M2266SB	1024 bytes (data block length)
•	M2266HB	1024 bytes (data block length)

Standard Features

Compactness

Since the SCSI controller circuit is inside the IDD PCA in the standard 5 1/4-inch fixed disk drive form factor, the IDD is extremely compact. The IDD can be connected directly to the SCSI bus of the host system.

SCSI/CCS Standard

The IDD provides not only SCSI basic functions but also the following features:

- Arbitration
- Disconnection/Reselection
- Data Bus Parity
- Command set which meets the logical specification of the SCSI CCS (Common Command Set for Direct Access Device) Requirements (Rev. 4B).

The SCSI commands can manipulate data through logical block addressing regardless of the physical characteristics of the disk drive. This allows software to accommodate future expansion of system functions.

High-Speed Data Transfer

The data transfer rate on the SCSI bus is 2.00MB/s maximum, in asynchronous mode and 4.8 MB/s maximum in synchronous mode. Such a high data transfer rate on the SCSI bus can be useful with the large capacity buffer in the IDD.

Notes:

1. The maximum data transfer rate in asynchronous mode may be limited by the response time of the initiator and by the SCSI bus length.

2. The maximum data transfer rate in synchronous mode on the single-ended SCSI bus may be limited by the cable length and transmission characteristics of the SCSI bus.

Continuous Block Processing

The addressing method of data blocks is logical block address. The initiator can access data by specifying the block number in a logically continuous data space without regard to the physical structure of the track or of cylinder boundaries.

The continuous processing of up to 64K blocks in a command can be achieved, and the IDD can perform continuous read/write operations when processing data blocks across track or cylinder boundaries.

256KB Data Buffer

Data is transferred between the SCSI bus and the disk media through the embedded 256KB data buffer in the IDD.

Since the initiator can control the disconnect/reconnect timing on the SCSI bus by specifying the condition of stored data to the data buffer or empty condition of the data buffer, the initiator can perform the effective input/output operations by utilizing the high data-transfer capability of the SCSI bus, regardless of the actual data transfer rate of the disk drive.

Read-Ahead Cache Feature

After executing the READ command, the IDD reads automatically and stores (prefetches) the subsequent data blocks into the data buffer (Read-Ahead caching.) This function may be programmed to prefetch data in amounts from one sector's worth to 256 Kbytes of data.

The high-speed sequential data access can be achieved by transferring the data from the data buffer without reaccessing the disk in case the subsequent command requests the prefetched data blocks.

Command Stack Feature

The command stack feature of the IDD corresponds to up to seven initiators. Therefore, the IDD can accept and stack the input/output command issued by another initiator even if the IDD is executing another command. The stacked command is retrieved and executed in stacked order after the present command has completed execution.

Reserve and Release Functions

The IDD can be accessed exclusively in the multi-host or multi-initiator environment by using the reserve and release functions.

Error Recovery

The IDD can try to recover from errors in the SCSI bus or the disk drive using its powerful retry processing. If a recoverable data check occurs, error-free data can be transferred to the initiator after being corrected in the data buffer. The initiator software is released from the complicated error recovery processing by these error recovery functions of the IDD.

Automatic Alternate Block Reassignment

If a defective data block is detected during read or write, the IDD can automatically reassign its alternate data block.

Programmable Data Block Length

Data can be accessed with a fixed block-length unit. Data block length is programmable, and can be set during formatting to the most suitable length, from 180 to 4,128 bytes, with a 2-byte boundary.

Defective Block Slipping

A logical data block can be reallocated in a physical sequence by slipping the defective data block during formatting. This results in high speed contiguous data-block processing without a revolution delay due to a defective data block.

High-Speed Positioning

A rotary voice coil motor achieves fast positioning.

Large Capacity

The unformatted capacity is 1266 MB. Typically, at 512 bytes per sector the formatted capacity is 1079 MB. A disk subsystem with large capacity can be constructed that uses space efficiently.

Start/Stop of Spindle Motor

Using the SCSI command, the host system can start and stop the spindle motor.

Diagnosis

The IDD has a diagnostic capability that checks internal controller functions and drive operations to facilitate testing and repair.

Low Power Consumption

By using highly-integrated LSI components, the power consumption of the IDD is very low, enabling use of the unit in a wide range of ambient temperatures between 5°C and 45°C.

Low Noise and Low Vibration

The IDD is quiet, running at approximately 45 dB (A-scale weighting) even during seek, making it ideal for office use. The IDD has rubber vibration isolators, which minimize the transfer of vibration.

Hardware Structure

Figure 1.1 shows the outer view of the IDD. The IDD consists of a disk enclosure (DE), a read/write preamplifier PCA, a controller PCA, and mounting brackets.

The DE is completely sealed and consists of disks, heads, the spindle motor, the actuator, the recirculation filter, the breather filter, the cover, and the base.
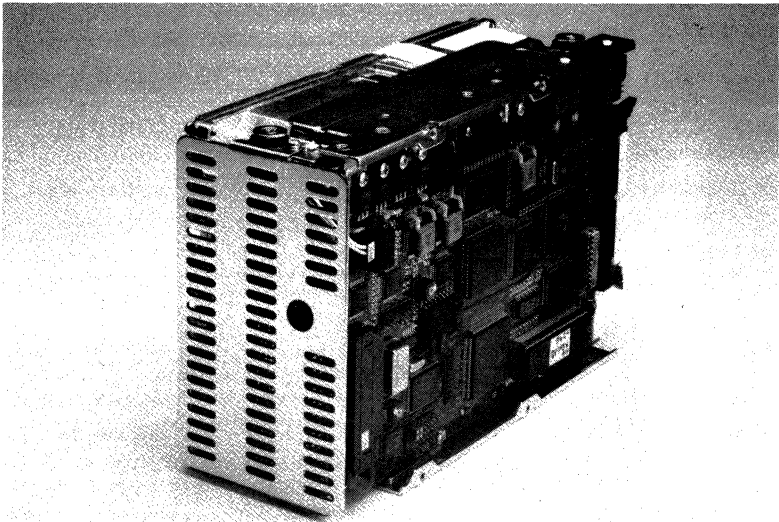
Figure 1.1 M2266S Outer View

Disks

The Winchester-type disks have an outer diameter of 130 mm (5.12 inches) and an inner diameter of 40 mm (1.57 inches). The disks are good for at least 10,000 contact starts and stops.

The IDD uses the following number of disks:

• M2266: 8 disks

Heads

The Whitney-type CSS (contact start/stop) heads are in contact with the disks when the disks are not rotating, and automatically float when the rotation reaches nominal speed.

Spindle Motor

The disks are turned by a direct-drive DC motor. The motor turns at 3600 rpm, ±0.2%. This precision is achieved through a feedback circuit which includes Hall-effect elements mounted in the motor assembly.

Actuator

The actuator, which uses a rotary voice coil motor (VCM), consumes little power and generates little heat. The head assembly on the tip of the actuator arm is controlled by electrical feedback from servo information read-out through the servo head.

Servo information is used as a control signal activating the actuator. It is used as track crossing information in positioning, and track following information during data write/read. The actuator positions heads on the innermost landing zones over the disk when the power is off or the spindle motor is stopped.

Air Circulation

The heads, disks, and actuator are sealed inside a disk enclosure (DE) to keep out dust and other pollutants.

The DE has a closed-loop air recirculation system. Using the movement of the rotating disks, air is continuously cycled through a filter. This filter will

trap any dust generated inside the enclosure and keep the air inside the DE contaminant-free. To prevent negative pressure in the vicinity of the spindle when the disks begin rotating, a breather filter is attached. The breather filter also equalizes the internal air pressure with the atmospheric pressure due to surrounding temperature changes.

Read/Write Circuit

The read/write circuit uses LSIs and head ICs to prevent errors caused by external noise, thus increasing reliability.

Controller Circuit

The controller circuit uses LSIs to increase reliability and uses a high-speed Micro-Processing Unit (MPU) to increase the performance of the SCSI controller.

System Configuration

Figure 1.2 shows the system configuration. The IDDs are connected to the SCSI bus of host systems and are always operated as target. The IDDs perform input/output operations as specified by the SCSI devices that operate as initiators.
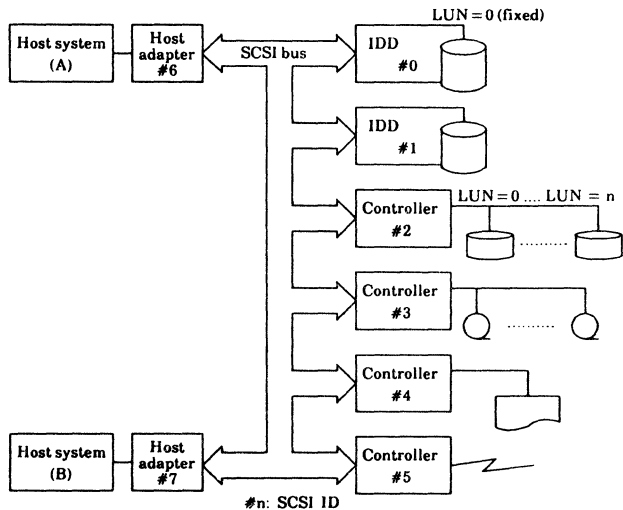
Figure 1.2 System Configuration

SCSI Bus Configuration

Up to eight SCSI devices can be connected to the SCSI bus, with any combination of the SCSI devices operating as initiators and operating as targets.

For example, the system can be configured as a multi-host system on which multiple host computers that operate as initiators are connected through the SCSI bus.

Using the disconnect/reconnect function, concurrent input/output processing is possible on multi-SCSI devices.

Peripheral Device Addressing

Each SCSI device on the bus has its own unique address (the SCSI ID number shown in Figure 1.2). For input/output operations, a peripheral device attached to the SCSI bus and operating as the target is addressed as the logical unit. A unique address or logical unit number (LUN) is assigned to each logical unit.

The initiator selects one SCSI device by specifying the SCSI ID, and then specifies the LUN to select the peripheral device for input/output operations.

When the IDD is constructed so that the whole volume of disk drives is a single logical unit, the selectable SCSI ID and LUN are as follows:

- SCSI ID: Jumper selectable from 0 to 7
- LUN: 0 (fixed)

Model/Part Number Cross References

Each model has a different data format, front panel, and mounting-screw type. Table 1.1 shows the IDD model names and part numbers. To change the data format, reinitialize the drive on your system.

Table 1.1 IDD Models and Part Numbers

Note: Metric (M4) mounting screws are not normally used in North
America.

(1) Single-Ended SCSI

Model	Block length	Storage capacity	Front panel	Mounting screws	Part number	Remarks
M2266S	256 B	953.1 MB	None	M4	B03B-4945-B803A	
			Provided	M4	B03B-4945-B803A#B	
			None	#6-32UNC	B03B-4945-B803A#N	
			Provided	#6-32UNC	B03B-4945-B803A#NB	
M2266SA	512 B	1,079.1 MB	None	M4	B03B-4945-B813A	
			Provided	M4	B03B-4945-B813A#B	
			None	#6-32UNC	B03B-4945-B813A#N	
			Provided	#6-32UNC	B03B-4945-B813A#NB	
M2266SB	1,024 B	1,140.2 MB	None	M4	B03B-4945-B823A	
			Provided	M4	B03B-4945-B823A#B	
			None	#6-32UNC	B03B-4945-B823A#N	
			Provided	#6-32UNC	B03B-4945-B823A#NB	

(2) Differential SCSI

Model	Block length	Storage capacity	Front panel	Mounting screws	Part number	Remarks
M2266H	256 B	953.1 MB	None	M4	B03B-4945-B853A	
			Provided	M4	B03B-4945-B853A#B	
			None	#6-32UNC	B03B-4945-B853A#N	
			Provided	#6-32UNC	B03B-4945-B853A#NB	
M2266HA	512 B	1,079.1 MB	None	M4	B03B-4945-B863A	
			Provided	M4	B03B-4945-B863A#B	
			None	#6-32UNC	B03B-4945-B863A#N	
			Provided	#6-32UNC	B03B-4945-B863A#NB	
M2266HB	1,024 B	1,140.2 MB	None	M4	B03B-4945-B873A	
			Provided	M4	B03B-4945-B873A#B	
			None	#6-32UNC	B03B-4945-B873A#N	
			Provided	#6-32UNC	B03B-4945-B873A#NB	

Section 2.   Installation Requirements

Introduction

Installation of the M2266S/H disk drive is a two-part process:

• Mechanical and electrical installation of the hardware

• Performance of the software procedures needed to bring the device to operational readiness.

This section contains information on the requirements for hardware installation, including the physical dimensions that assist in mounting the device, the cabling schemes, and information on how to set the jumpers.

For specific information on installing the drives, see section 3. For information on software installation of the drive in a Personal Computer environment, see section 4.

Outer Dimensions

Figures 2.1 to 2.4 show the exterior dimensions of the IDD and the positions of the holes for the IDD mounting screws.

Notes:

1.   Dimensions are in mm.

2.   The depth does not include the dimension of the hook for mounting the cable on the interface connector.
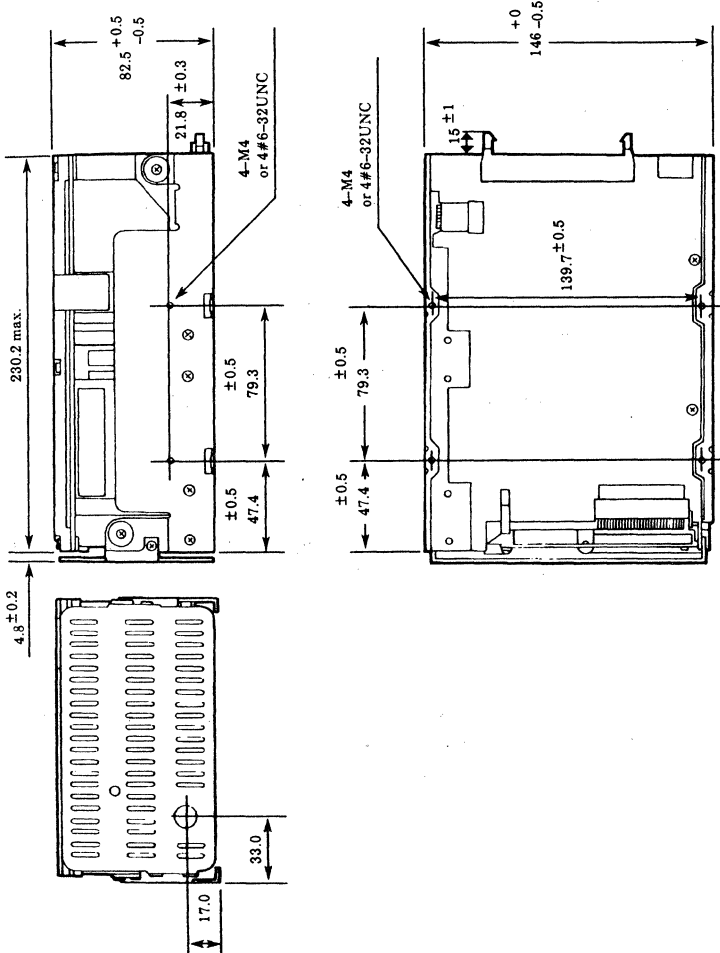
Figure 2.1   Exterior Dimensions of the M2266S without Front Panel
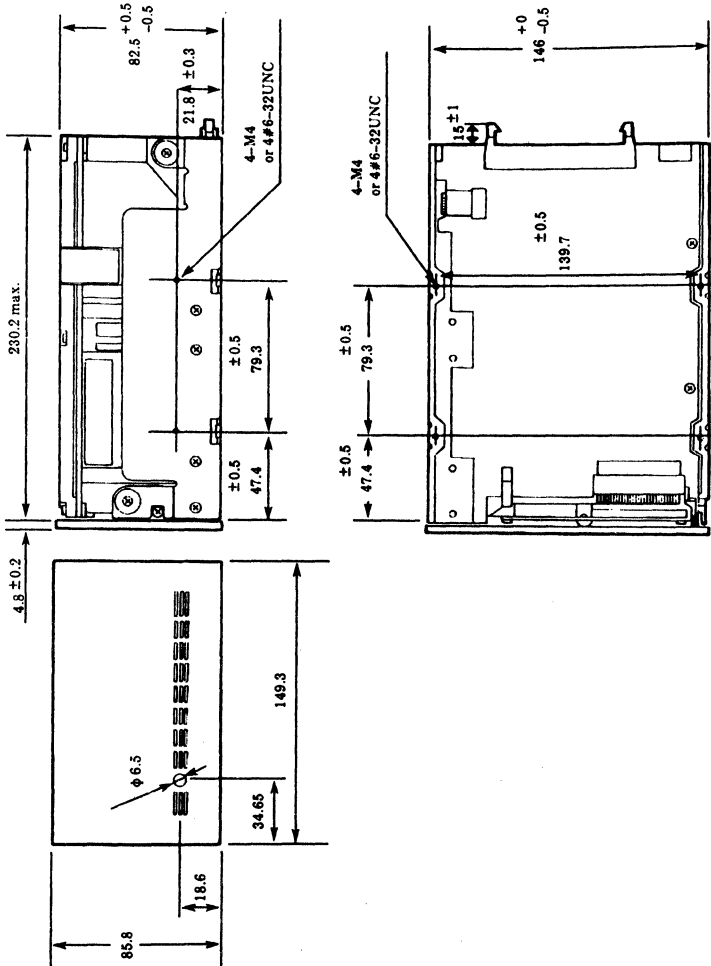
Figure 2.2   Exterior Dimensions of the M2266S with Front Panel
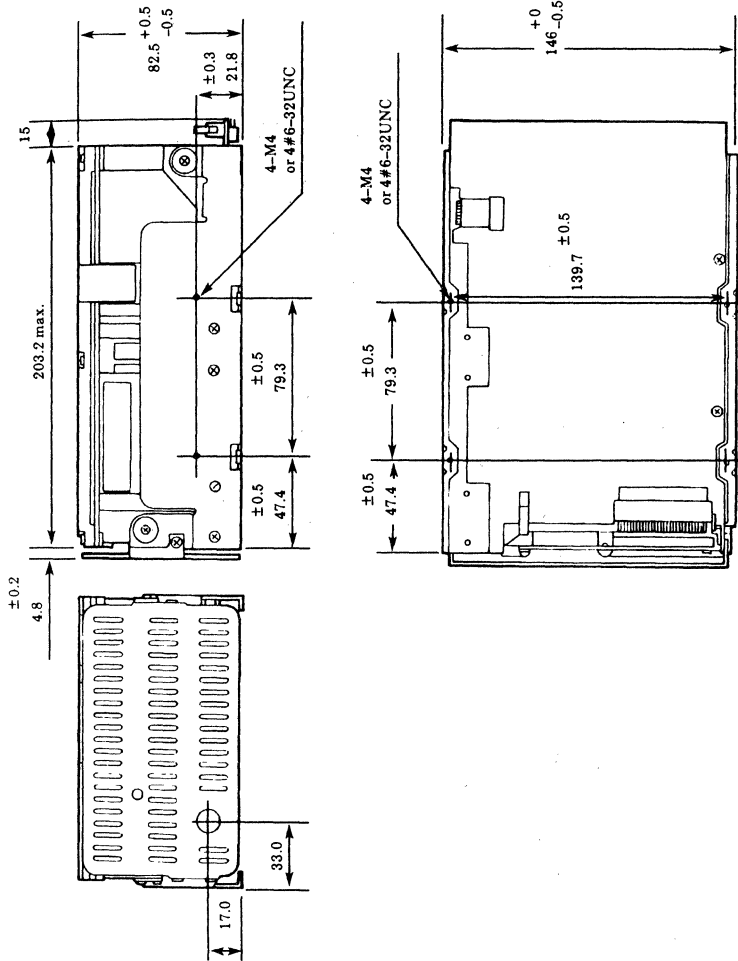
Figure 2.3   Exterior Dimensions of the M2266H without Front Panel
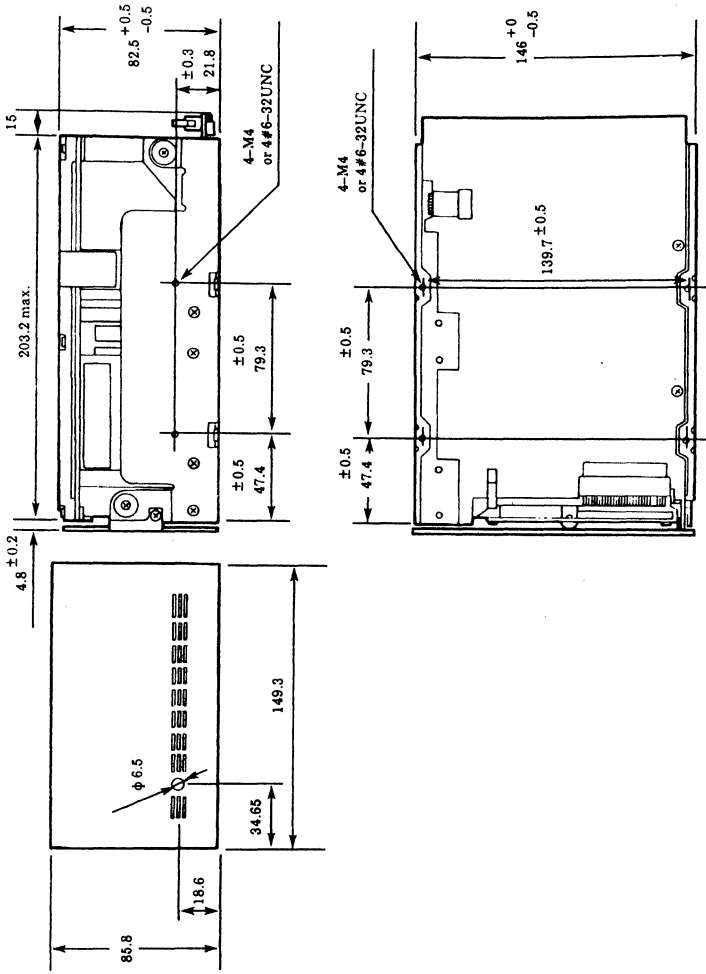
Figure 2.4   Exterior Dimensions of the M2266H with Front Panel

Mounting

Figure 2.5 shows the permissible orientations of the IDD. The tolerance of the angle is ±5° from the horizontal plane.

| (a) Horizontal | (b) Vertical | (c) Vertical |
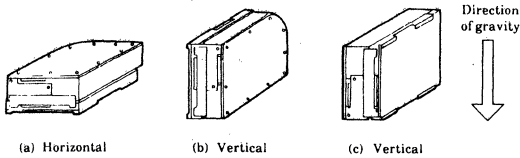
Figure 2.5 IDD Orientation

Mounting Frame Structure

The disk enclosure (DE) of the IDD serves as a signal ground (SG) and is insulated from the mounting frame. As this insulation is maintained after the IDD is mounted in the system, the following precautions must be followed:

Note:

Generally, SG and FG (frame ground) are connected at one point in the system enclosure. To maintain insulation when mounting the IDD:

(a) Use the frame with an embossed structure to avoid contact between the DE base and FG.

(b) As shown in Figure 2.6, the inward projection of the screw from the IDD frame wall at the corner must be 4 mm or less.
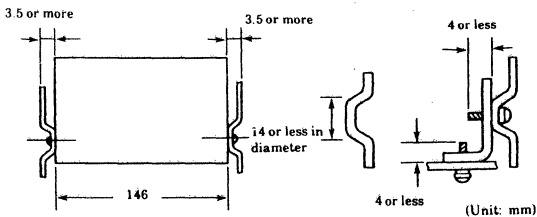
Figure 2.6 Mounting Frame Structure

Service Clearance Area

Figure 2.7 shows the service clearance area, which must be accessible during IDD installation or maintenance.

[Surface S]
● Cable connection (M2266H)
[Surface P]
● Cable connection (M2266S)
● SG pin
● Setting terminal
● External operator panel connection
[Surface R]
[Surface T]
● Hole for mounting screw
● External operator panel connection
[Surface Q]
● SCSI terminating resistor
● Setting terminal, test pin
● Hole for mounting screw
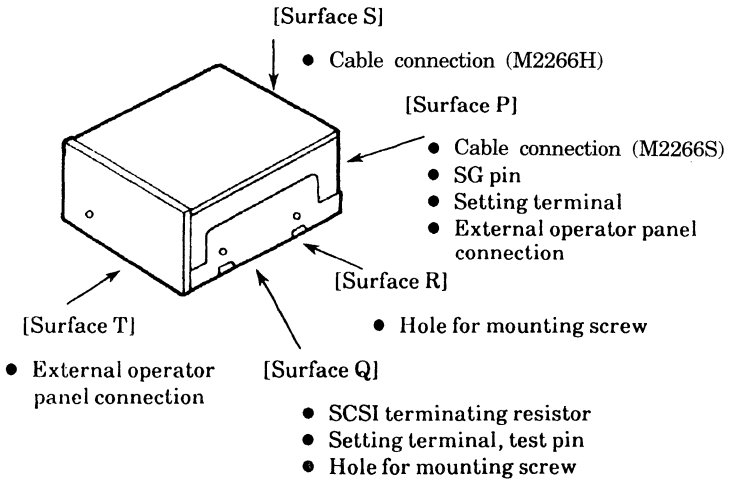
Figure 2.7 Service Clearance Area

Power Supply Requirements

Allowable Input Voltage and Current

The power supply input voltage measured at the power supply connector pin at the receiving end of the IDD must satisfy the requirement given in Table 5.3.

Current Waveform

Figure 2.8 shows the waveform of +12VDC.

(a)   At start of spindle motor   (b)   Seek, read, and seek
      rotation   (0 --> 500 CYL)
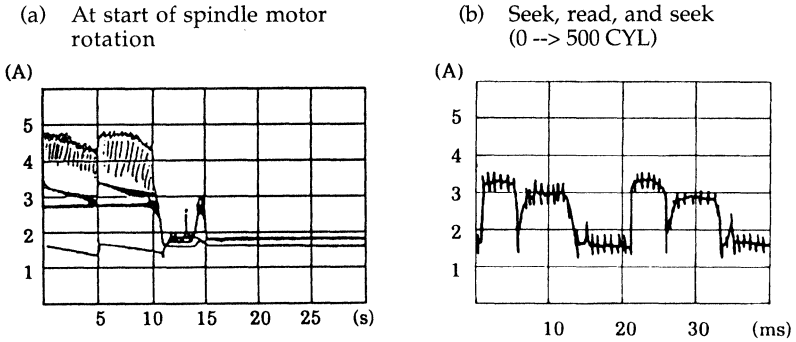
Figure 2.8 Current Waveform (+12 VDC)

Power On/Off Sequence

(a)   The order of the power on/off sequence of +5 VDC and +12 VDC,
      supplied to the IDD, does not matter.

(b)   In a system that uses the terminating resistor power supply signal
      (TERMPWR) on the SCSI bus, the requirements of +5 VDC shown in
      Figure 2.9 must be satisfied between the IDD and at least one of the SCSI
      devices supplying power to that signal.
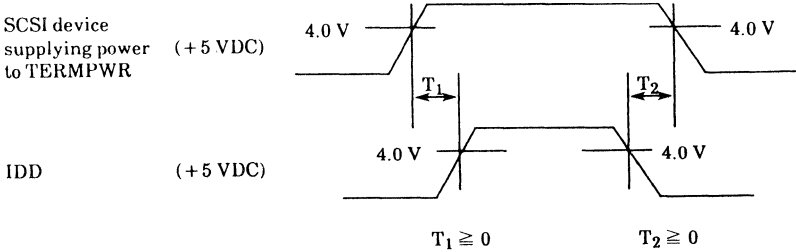
Figure 2.9 Power On/Off Sequence (1)

(c) In a system that does not use the terminating resistor power supply
signal (TERMPWR) on the SCSI bus, the requirements for +5 VDC
shown in Figure 2.10 must be satisfied between the IDD and the SCSI
device with the terminating resistor circuit.
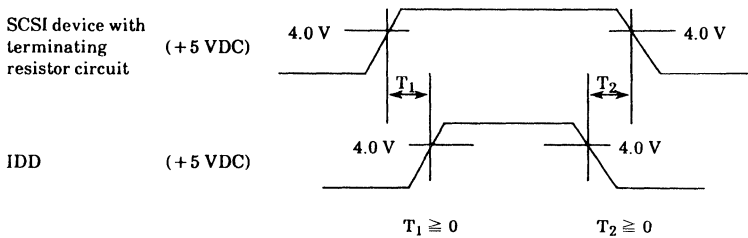
Figure 2.10 Power On/Off Sequence (2)

(d) Between the IDD and other SCSI devices on the SCSI bus, the +5 VDC
power on/off sequence is as follows:

• In a system with all its SCSI devices designed to prevent noise from
leaking to the SCSI bus when power is turned on or off, the power
sequence does not matter if the requirement in (b) or (c) is satisfied.

• In a system containing an SCSI device that is not designed to prevent
noise from leaking to the SCSI bus, the requirement given in Figure
2.11 must be satisfied between that SCSI device and the IDD.
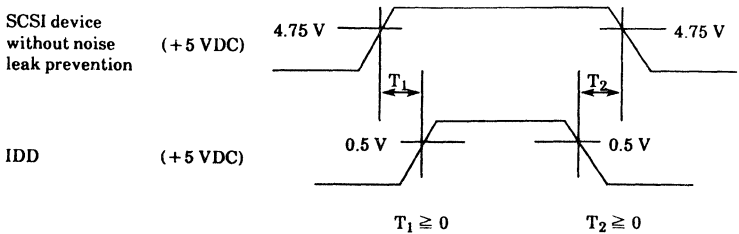
Figure 2.11 Power On/Off Sequence (3)

Sequential Starting of Spindle Motors

After power is turned on to the IDD, a large amount of current flows in the +12 VDC line as the spindle motor rotation starts. Therefore, if more than one IDD is used, the spindle motors should be started sequentially using one of the following procedures to prevent overload of the power supply unit. For information on setting spindle motor start control mode, see "Setting Terminals" in section 3.

a. Issue START commands at 20-second intervals to start the spindle motors.

b. Turn on the +12 VDC power in the power supply unit at 20-second intervals to start the spindle motors sequentially.

Power Supply to SCSI Terminating Resistor

If power for the terminating resistor is supplied from the IDD to other SCSI devices through the SCSI bus, the current-carrying capacity of the +5 VDC power supply line to the IDD must be designed with consideration given to an increase of up to 900 mA for the M2266S or up to 600 mA for the M2266H.

The method of supplying power to the terminating resistor is shown in Figure 2.12.

TERMPWR setting mode	Setting terminal (CNH4)	
Power supply to terminal resistor circuit on IDD	1 − 2	3 − 4
Power is supplied from both IDD and TERMPWR pin (*)	Strap	Strap
Power is supplied from IDD only (TERMPWR Pin is not used)	Open	Strap
Power is supplied from TERMPWR pin only (IDD power supply is not used)	Strap	Open
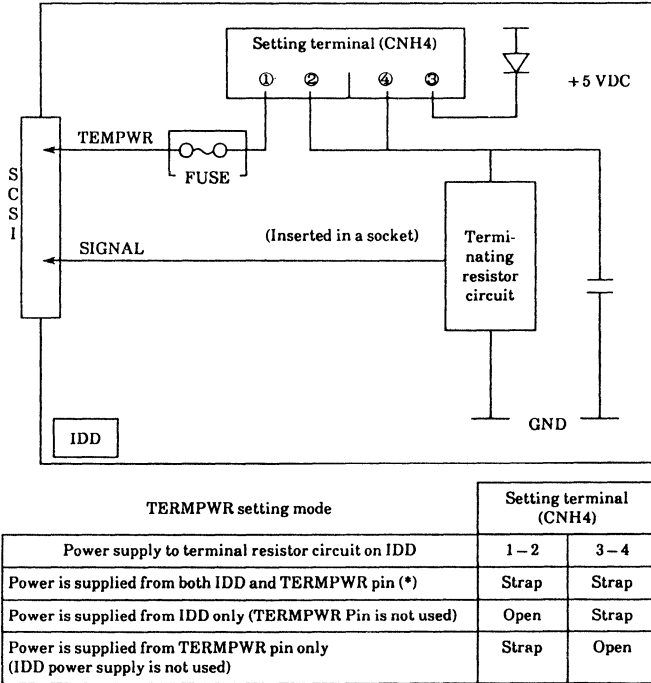
* The TERMPWR pin is also supplied with power from IDD.

Figure 2.12 Supplying Power to the Terminating Resistor

Connectors

Connectors and terminals for connection to the outside are installed on the IDD. Their positions are shown in Figures 2.13 and 2.14.

- Power supply connector
- SCSI connector
- SG (signal ground) connector
- Connector for external operator panel
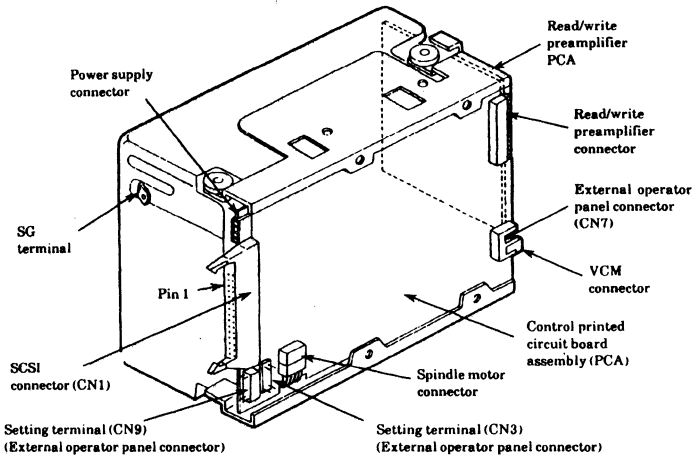
Figure 2.13 Positions of M2266S Connectors
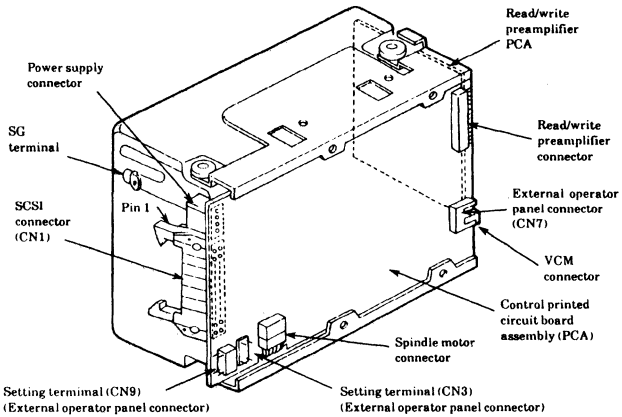
Figure 2.14 Positions of M2266H Connectors

Power Supply Connector

Figure 2.15 shows the shape and pin configuration of the DC power supply connector.

[M226xS]

①	+ 12 VDC
②	+ 12 VDC Return (GND)
③	+ 5 VDC Return (GND)
④	+ 5 VDC

[M226xII]
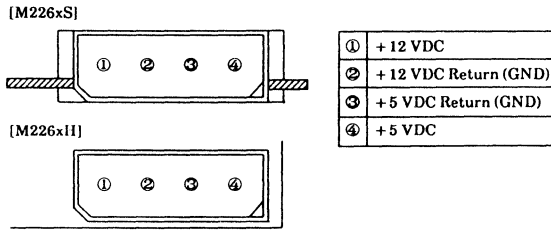
Figure 2.15 Power Supply Connector

SCSI Connector

The connector for the SCSI bus is an unshielded standard connector which has two rows of 25 pins spaced 2.54 mm (0.1 inch) apart. Figure 2.16 shows several views of the connector and gives the physical specifications. See Table 6.3 for the signal assignments on the connector for the single-ended type SCSI bus (M2266S) and the differential-type bus (M2266H).
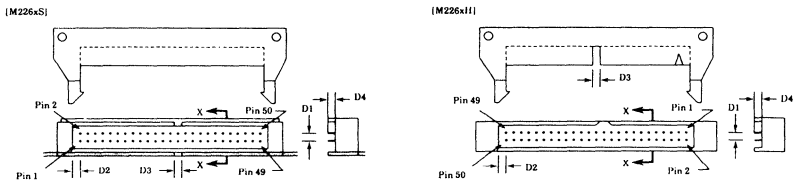
Symbol	mm	Inches	Remarks
D1	2.54	0.1	
D2	2.54	0.1	
D3	4.19 +102 -0.25	0.165 +0.04 -0.01	
D4	6.09	0.24	

Figure 2.16 SCSI Connector

SG Terminal

For DC ground, an SG terminal (Fastin-Faston tab) is mounted as shown in Figure 2.17.

Controller PCA

SCSI connector

SG terminal

DE
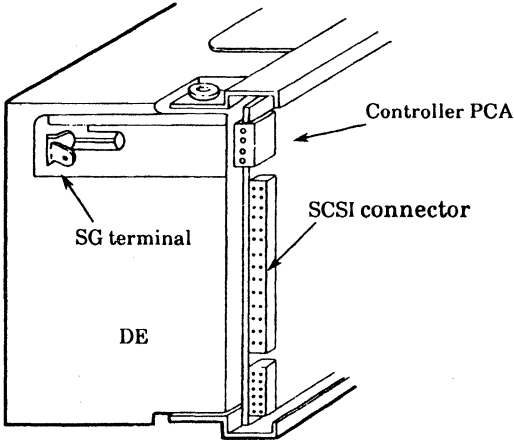
Note: This figure shows the M2266S

Figure 2.17 SG Terminal

Connectors for External Operator Panel

Two types of connectors for the external operator panel are provided on the IDD as shown in Figure 2.18. They allow connection of an external write protect switch, an LED on the front panel, and an SCSI ID setting switch. For the recommended circuit of the external operator panel, see Figure 2.21.

CN3/CN9

(CN9) (CN3)

Pin 13

Pin 13

Pin 14

2.54 mm

2.54 mm

Pin 1

Pin 2 Pin 1

2.54 mm

2.54 mm

Pin	Signal	Signal	Pin
01	+DIAG	GND	02
03	(Reserved)	GND	04
05	−RAC	GND	06
07	−STM	GND	08
09	−ID4	GND	10
11	−ID2	GND	12
13	−ID1	GND	14
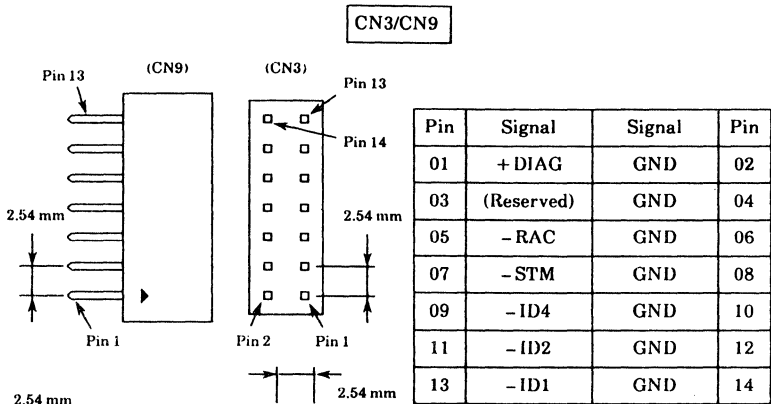
Note: This figure shows the M2266S's. In M2266H, the setting terminal (CNH4) exists between CN9 and CN3, but pin assignments of CN9 and CN3 are the same as M2266S's.

CN7

2.54 mm

Pin 3 Pin 1

2.54 mm

Pin 4 Pin 2

Pin	Signal	Signal	Pin
01	LED (V)	WPR (G)	02
03	−WPR	−LED	04
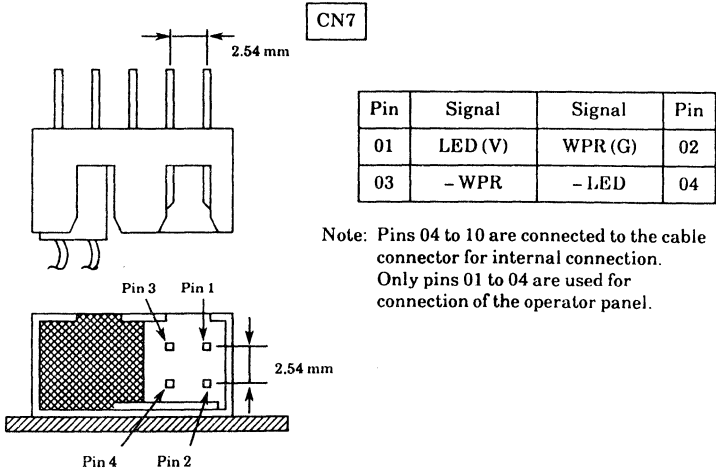
Note: Pins 04 to 10 are connected to the cable connector for internal connection. Only pins 01 to 04 are used for connection of the operator panel.

Figure 2.18 External Operator Panel Connector

Notes:

1. Some signals are assigned on both pins CN3 and CN9.

2. When no external operator panel is connected to the IDD, CN3 and CN9 are used for setting the terminal of the SCSI ID, etc. (see "Setting Terminals" in section 3) When the IDD is shipped from the factory, the short plugs are mounted between all even numbered and odd numbered pins of CN9 and no short plug is mounted on CN3.

3. When the external operator panel is connected to CN3 or CN9, pay attention to the following items.

    *   CN3 and CN9 are physically interchangeable. The external operator panel can be connected to either one.

    *   When the external operator panel is connected to CN9, all short plugs on CN9 must be removed. However, pins on CN3 corresponding to the signal set on the external operator panel must be opened. When there is a signal not set on the external operator panel, the state of that signal must be set on CN3 using the short plug. The removed short plug from CN9 can be used for setting the state.

    *   When the external operator panel is connected to CN3, the short plug on CN9 corresponding to the signal set on the external operator panel must be removed. When there is a signal not set on the external operator panel, the state of that signal must be set on CN9 using the short plug.

Connection Requirements

This section discusses the connections required when installing the drive.

SCSI Cable

All SCSI devices on one bus are daisy-chained with an SCSI cable. A terminating resistor must be mounted in the SCSI device at each end of the SCSI cable.

Since an SCSI terminating resistor module is mounted in the IDD on shipment, it must be removed when the IDD is not connected at either end of the SCSI cable. Also, a method for supplying power to the terminating resistor must be selected with the setting terminal on the IDD. For further details, see "Setting Terminals" in section 3.

The maximum number of SCSI devices that can be connected to the SCSI bus is 8, including the host adaptor, IDD, and other SCSI equipment.

The connector socket for the SCSI cable must be an unshielded 50-contact socket which has two rows of 25 contacts spaced at 2.54 mm (0.1 inch) apart. It should also have a key way to prevent insertion in the wrong direction (bump type connector). (See Figure 2.16).

Symbol	mm	Inch	Remark
C1	2.540	0.100	
C2	60.960	2.400	
C3	2.540	0.100	
C4	3.302	0.130	
C5	32.385	1.275	
C6	68.072	2.680	
C7	6.096	0.240	
C8	7.620	0.300	Max.
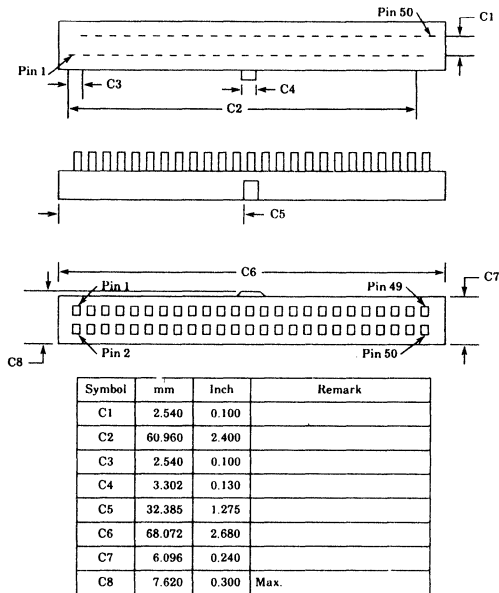
Note: The tolerance is ±0.127 mm (0.005 inch) unless otherwise specified.

Figure 2.19 SCSI Cable Connector

The maximum length of the SCSI cable is as follows. If more than one SCSI device is connected, the total cable length must not exceed the following:

- 6 m for single-ended type SCSI
- 25 m for differential type SCSI

The use of a 25-pair twisted cable satisfying the following requirements is recommended.

Single-Ended Type

Conductor Size: 28 AWG (American Wire Guage) or bigger
Characteristics impedance: 100 to 132 Ω

Differential Type

Conductor Size: 28 AWG or bigger
Characteristic impedance: 100 to 122 Ω

Each pair of wires in the 25-pair twisted cable must be connected to pins n and n+1 (where n is an odd number) on the interface connector. Cables having an identical impedance must be used on the same SCSI bus to reduce signal reflection and maintain transmission characteristics.

When an SCSI device is connected to the SCSI cable (except at either end of the cable), connection to the SCSI connector must be at a branch point of the cable. If an SCSI device is connected to one end of the SCSI bus, no cable should be connected after the last SCSI device, except when the cable has a terminating resistor. (See Figure 2.20.)

(A) Connection to a Middle Point of the Cable.

Correct connection (1)   Correct connection (2)   Incorrect connection
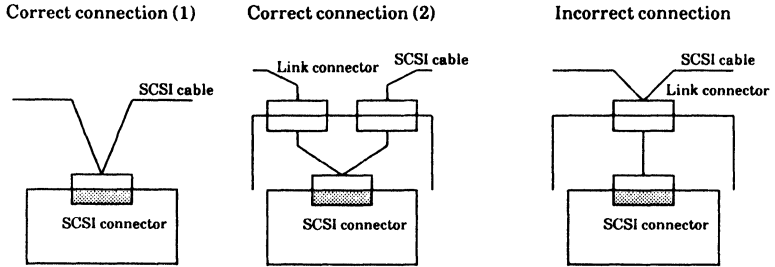
(B) SCSI Cable Termination

Correct connection (1)   Correct connection (2)   Incorrect connection
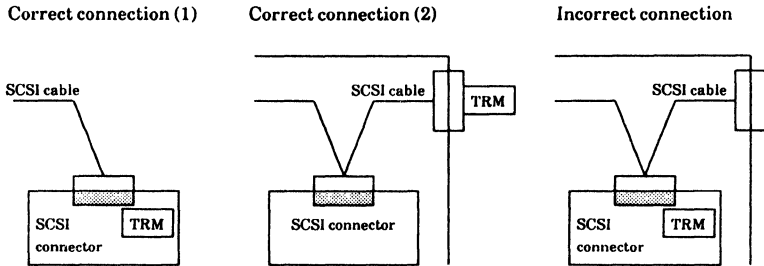
TRM: SCSI terminating resistor

Figure 2.20 Connection of SCSI Cable

Power Cable

The IDDs must be star-connected to the DC power supply in a one-to-one connection to reduce the influence of load variations.

DC Ground

A DC ground cable may or may be installed depending on the system requirements (system installation environment, cabinet structure, power supply system). This cable is generally connected to the ground of the power supply unit. Connection between more than one IDD may be in a daisy chain.

External Operator Panel

The external operator panel is installed only when required for the system. If it is unnecessary, pins 1 to 4 of CN7 connector for the external operator panel on the IDD must be opened. Also, necessary features must be set on CN3 or CN9 using the short plug. (See "Setting Terminals" in section 3.)

Figure 2.21 shows a recommended circuit for the external operator panel. Since the external operator panel is not provided as an option, the user must fabricate this panel, referring to the recommendation if necessary.

Note:

> Necessary switches and LEDs for the system can be provided on the external operator panel by referring to the recommended circuit shown in Figure 2.21.

> When there is no signal set for the external operator panel, the signal must be set on CN3 (or on CN9) using the short plug. The CN3 or CN9 pins corresponding to the signal must be opened. For details, see "Connectors" in this section and "Setting Terminals" in section 3.
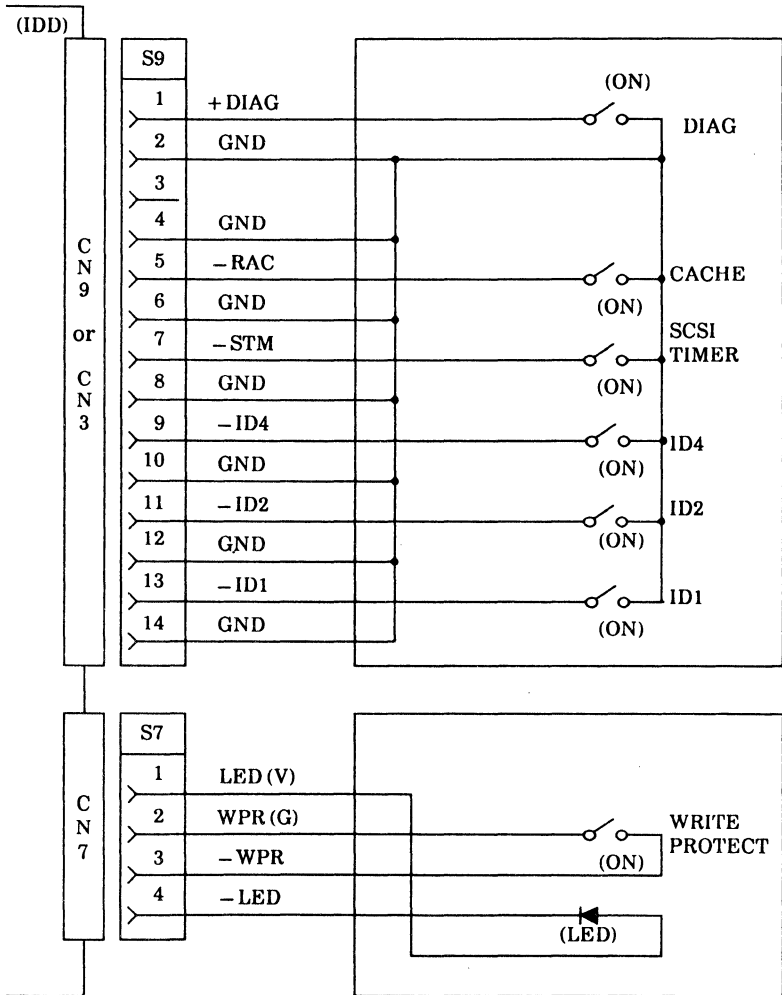
Figure. 2.21 Example of External Operator Panel Circuit

Environmental Requirements

The IDD must conform to the environmental requirements listed in section 5. When the IDD is operating, the ambient temperature measured 3 cm from the disk enclosure (DE) surface and from the PCA surface must satisfy the specified requirement. At the DE surface during operation, the contact temperature at the measurement point shown in Figure 2.22 must satisfy the specified requirement.

Measurement point
(Rear-center of DE)
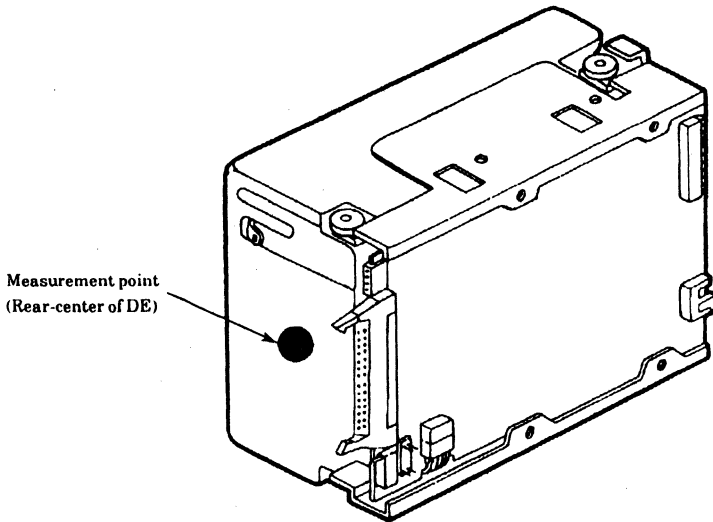
Figure 2.22 DE Surface Temperature Measurement Point

Section 3. Hardware Installation

This section describes how to handle the drives, make connections, set switches and plugs, mount drives, connect cables, confirm drive operations after installation, prepare the drives for use, and remove the drives.

Notes on Handling Drives

General Notes

- To avoid damage to the drive, do not allow vibration or shocks exceeding the values defined in the standard. Be especially careful during unpacking.

- Do not leave the drive in a dirty or contaminated environment.

- Since static discharge may destroy the CMOS semiconductors in the drive, use an antistatic mat after unpacking, and ground yourself when handling the drive.

- Hold the DE or mounting frame when handling the drive. Do not touch PCAs, except when setting switches.

Unpacking

- Use a flat work area. Be sure that the "This Side Up" sign is up. Handle the drive of soft material such as a rubber mat, not on hard material such as a desk. Handle the drive gently at all times.

- Do not remove the sealing label or cover of the DE and screws.

Installation

- While power is turned on, do not connect or disconnect connectors or change terminals except CN3 and CN9.

- Do not move the drive when power is turned on or until the drive has been completely stopped for 15 seconds after the power is turned off.

Packing

• Store the drive in an antistatic vinyl bag with a dessicant (silica gel).

• It is recommended that you use the same cushions and packages as those used at delivery. If those cannot be used, use a package with shock absorption so that the drive is free from direct shocks. In this case, fully protect the PCAs and interface connectors so that they are not damaged.

• Indicate "This Side Up' and "Handle With Care" on the outside of the package so that it is not turned over.

Storage

• Provide vapor-proof packaging for storage.

• The storage environment must satisfy the requirements specified in Table 5.3 (Environmental Specifications).

• To avoid condensation, avoid rapid changes in temperature.

Connections

Figure 3 1 shows examples of connections between the host system and the IDD. Up to eight devices, including the host adapter, IDD, and other SCSI devices can be connected to the SCSI bus in arbitrary combinations. Install a terminating resistor on the host adaptor and on either the last device in the chain or at the end of the cable.

See "Connectors" in section 2 for the cable connection requirements and power-cable connections.

(1) Connecting One IDD
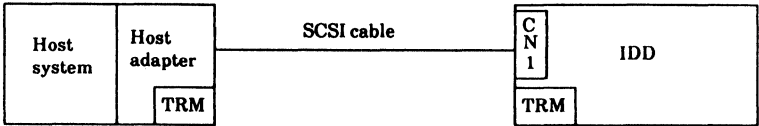
(2) Connecting More than One IDD (Single Host)
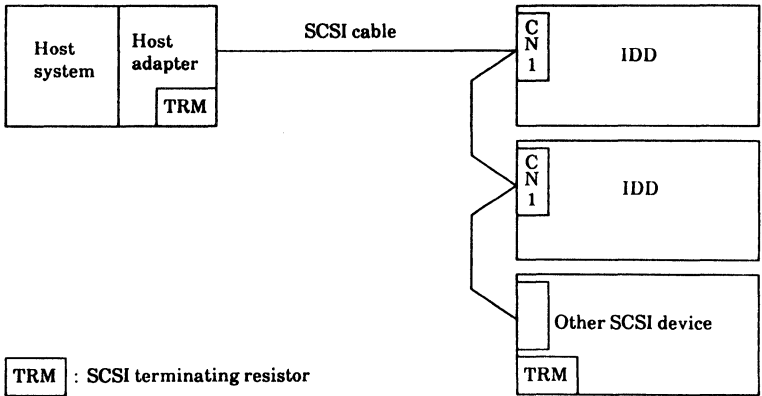
Figure 3.1 SCSI Bus Connections (1 of 2)

(3) Connecting More Than One IDD (Multi-Host)

```
┌─────────────────┐              SCSI cable    ┌────────────────────────┐
│ Host  │ Host    │                          │C│                        │
│system │adapter  ├───────────────────┐      │N│        IDD             │
│  #1   │         │                   │      │1│                        │
│       │  ┌────┐ │                   │      └────────────────────────┘
│       │  │TRM │ │                   │
└───────┴──┴────┴─┘                   │      ┌────────────────────────┐
                                      │      │C│                        │
                                      │      │N│        IDD             │
                                      │      │1│                        │
                                      │      └────────────────────────┘
┌─────────────────┐                   │
│ Host  │ Host    │                   │      ┌────────────────────────┐
│system │adapter  ├───────────────────┘      │ │                        │
│  #2   │         │                          │ │  Other SCSI device     │
│       │  ┌────┐ │                          │ │                        │
│       │  │TRM │ │                          └────────────────────────┘
└───────┴──┴────┴─┘
```
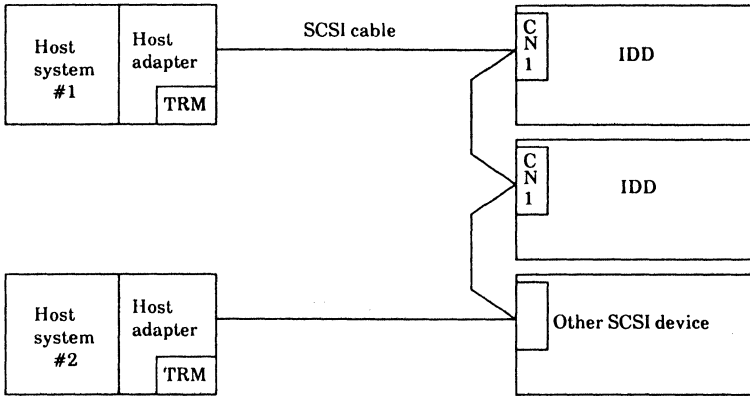
TRM: SCSI terminating resistor

Figure 3.1 SCSI Bus Connections (2 of 2)

Setting Terminals

You must set the following terminals and SCSI terminating-resistors before installing the IDD in the system.

• Setting Terminal: CN3/CN9 (These pins are commonly used with a connector for the external operator panel.) (See Figure 3.4.)

• Setting Terminal: CNH1, CNH2, CNH3, CNH4

• SCSI Terminating Resistor

Figures 3.2 and 3.3 show the terminal settings and the position of the SCSI terminating resistor module.

Notes:

1. The user must not change the setting of terminals not described in this section. Do not change factory settings for terminals not described.

2. Do not change the setting of terminals other than CN3 and CN9, and do not connect or disconnect the SCSI terminating resistor module when power is on.

3. You can change the CN3 or CN9 settings when power is on. The SCSI ID setting is valid after power is turned on again or the SCSI bus is reset.

4. To short the setting terminal, use the short plug attached when the device is shipped from the factory.
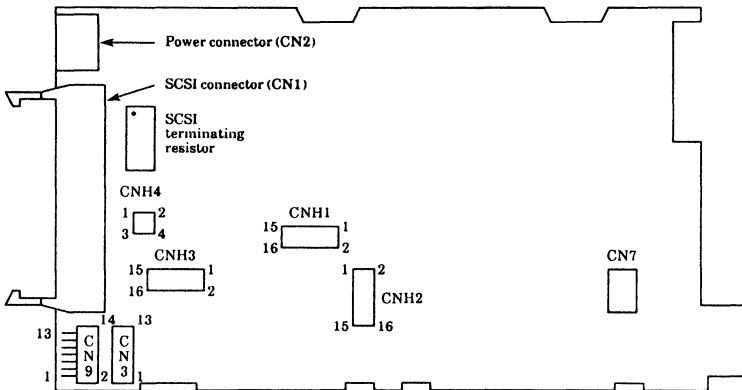
Figure 3.2 The Setting Terminals and Terminating Resistor (M2266S)
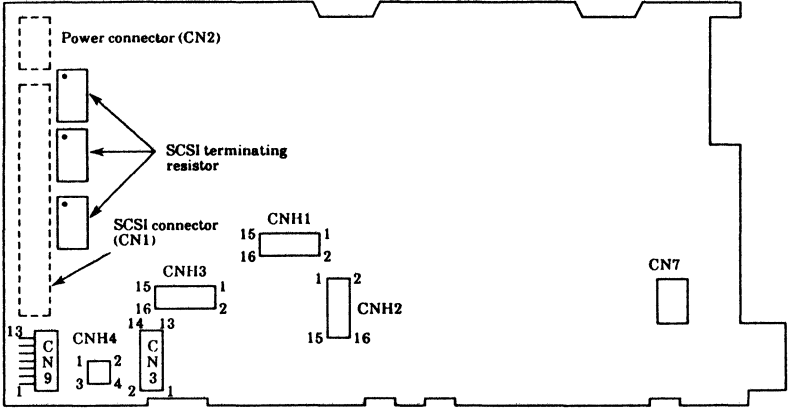
Figure 3.3   The Setting Terminals and Terminating Resistor (M2266H)

Setting Terminals CN3 and CN9

Figure 3.4 shows setting terminals CN3 and CN9. Either of these terminals can be used as a connector for the external operator panel. Following the figure are explanations of the factory default settings.

13 11 9 7 5 3 1

14 12 10 8 6 4 2

CN3

CN9
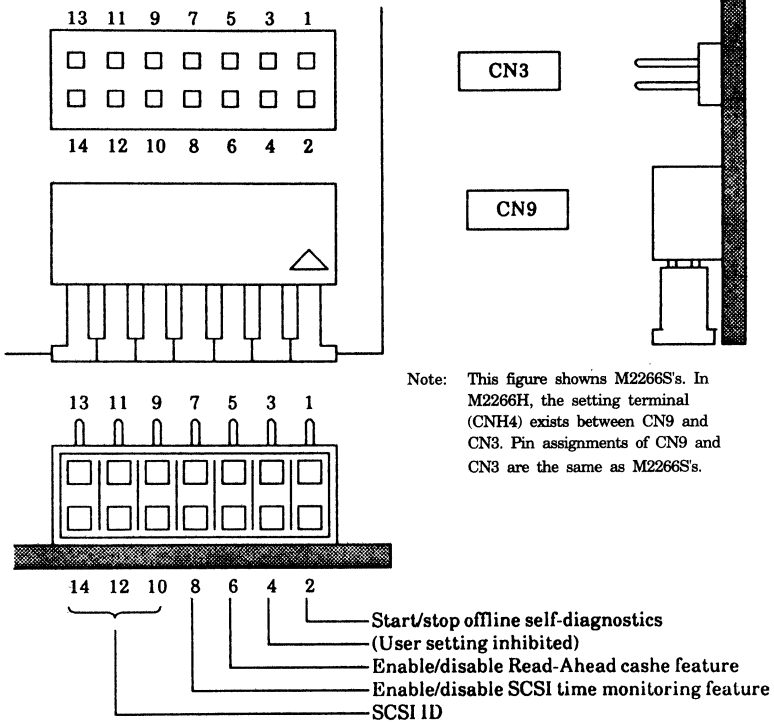
Note: This figure showns M2266S's. In
M2266H, the setting terminal
(CNH4) exists between CN9 and
CN3. Pin assignments of CN9 and
CN3 are the same as M2266S's.

13 11 9 7 5 3 1

14 12 10 8 6 4 2

Start/stop offline self-diagnostics
(User setting inhibited)
Enable/disable Read-Ahead cashe feature
Enable/disable SCSI time monitoring feature
SCSI ID

Figure 3.4 Setting Terminals CN3/CN9

Notes:

1. The same functions are assigned on the same pins of both CN3 and CN9.

2. To set features for an external operator panel, use CN3 or CN9. For details, see "Connectors for External Operator Panel" in section 2.

Factory Terminal Settings

The following paragraphs list the terminal settings at factory shipment. The terms "short" and "open" have the following meaning:

Short: The short plug is mounted between specified pins on either CN3 or CN9 as indicated.

Open: The short plug is removed from between specified pins on both CN3 and CN9.

Table 3.1 Setting Terminal: CN3/CN9

Setting item	Pin position			Setting contents	
SCSI ID	9-10	11-12	13-14	SCSI ID	
	Open	Open	Open	0	
	Open	Open	Short	1	
	Open	Short	Open	2	
	Open	Short	Short	3	
	Short	Open	Open	4	
	Short	Open	Short	5	
	Short	Short	Open	6	
	Short	Short	Short	7	(*)
SCSI time monitoring (RESELECTION, ACK response)	7-8		Open	Time monitoring is disabled.	
			Short	Time monitoring is enabled.	(*)
Read-Ahead caching	5-6		Open	Disabled	
			Short	Enabled	(*)
———————	3-4		Open	(Reserved, do not remove)	(*)
			Short		
Diagnostic switch	1-2		Open	Diagnostics are executed (diagnostic mode).	
			Short	Diagnostics stops (normal operation mode).	(*)

*: Setting at factory shipment (CN9)

Setting Terminals CNH1, CNH2, CNH3, and CNH4

Figure 3.5 shows the plug types and settings at factory shipment. Following the figure are explanations of each setting.
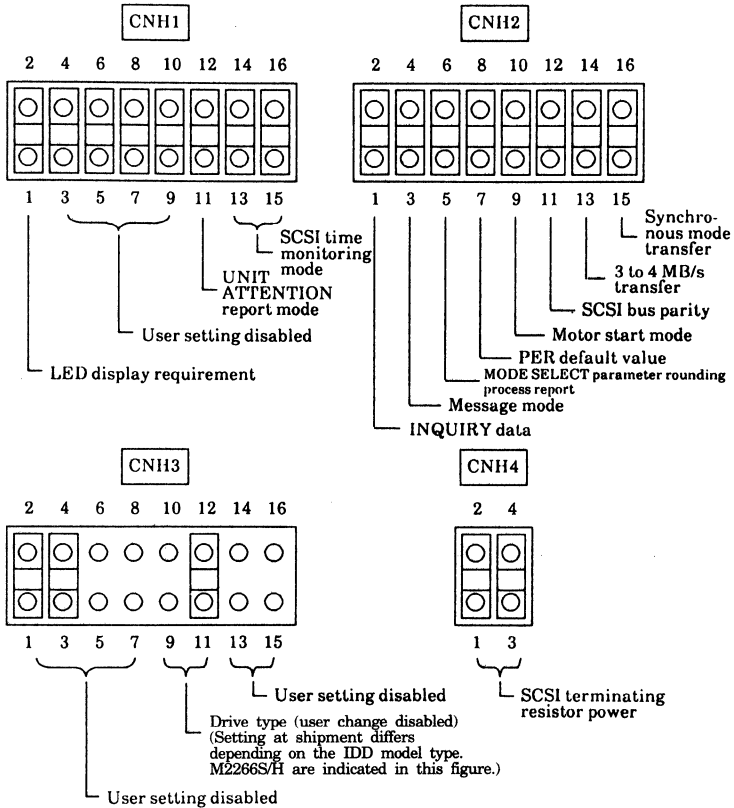
Figure 3.5 Setting Terminals CNH1, CNH2, CNH3, and CNH4

Factory Terminal Settings

The following paragraphs list the factory default settings for CNH1, CNH2, CNH3, and CNH4. "Short" means that a short plug is set between the two terminal pins; "open" means that there is no short plug.

SCSI Terminating Resistor Power Supply

Table 3.2 Setting Terminal: CNH4

	Pin position		Setting contents		
Setting item	1-2	3-4	Connecting TERMPWR pin and terminating resistor	Connecting power to TERMPWR pin	Connecting power to IDD terminating resistor
SCSI terminating resistor power	Short	Short	Yes	Yes	Yes	(*)
	Open	Short	No	No	Yes
	Short	Open	Yes	No	No

*: Setting at factory shipment

Drive Types

Table 3.3 Setting Terminal: CNH3

Setting item	Pin position		Setting contents
————	1-2 3-4 5-6 7-8		} The user must not change the setting (setting at factory shipment depends on the model).
Device type	9-10	11-12	Device type (User must not change the setting).
	Open	Open	M2266S/H
————	13-14 15-16		} The user must not change the setting (should be open).

Note: The user must not change the setting of CNH3.

Table 3.4 Setting Terminal: CNH2

Setting item	Pin position		Setting contents	
(2) SCSI level	1-2	Short	Corresponds to SCSI-2	(*)
		Open	Corresponds to SCSI-1/CCS	
Message mode	3-4	Short	SAVE DATA POINTER is issued for disconnection after data transfer.	(*)
		Open	SAVE DATA POINTER is not issued for disconnection after data transfer.	
Error report at MODE SELECT parameter rounding	5-6	Short	CHECK CONDITION status is not posted.	(*)
		Open	CHECK CONDITION status (RECOVERED ERROR) is posted.	
PER default value	7-8	Short	0	(*)
		Open	1	
Motor start mode	9-10	Short	Started when power is turned on.	(*)
		Open	Started with the START/STOP UNIT command.	
SCSI bus parity	11-12	Short	A parity check is executed.	(*)
		Open	No parity check is executed.	
Synchronous mode transfer rate	13-14	Short	0.96 to 4.8 MB/s	(*)
		Open	0.96 to 2.67 MB/s	
(1) Synchronous mode data transfer request	15-16	Short	Enabled	(*)
		Open	Disabled	

*: Setting at factory shipment

(1) Refer to synchronous mode data transfer request explanation.
(2) Refer to SCSI level explanation.

Synchronous mode data transfer request

Set whether synchronous mode data transfer request is used according to
Table 3.5. The user can set the allowable scope of the maximum transfer rate
in synchronous mode according to Table 3.5.

Table 3.5 Synchronous Mode Data Transfer Request Setting (CNH2)

Synchronous mode transfer request	15-16	
Enabled	Short	(*1)
Disabled	Open	

*1 Set at factory shipment

Table 3.6 Scope of Transfer Rate in Synchronous Mode Setting (CNH2)

3 to 4.8 MB/s synchronous mode transfer	13-14	
Enabled (max. 4.80 MB/s)	Short	(*1)
Disabled (max. 2.67 MB/s)	Open	

*1 Set at factory shipment

Notes:

1. This setting does not affect asynchronous mode transfer.

2. When synchronous mode transfer request is disabled, the IDD
    operates as follows.

    - When the SYNCHRONOUS DATA TRANSFER REQUEST
      message is sent from the INIT, the IDD replys to that message and
      the DATA IN and the DATA OUT phases of the SCSI bus can be
      executed in synchronous mode.

    - The IDD does not send the SYNCHRONOUS DATA TRANSFER
      REQUEST message to the INIT.

3. The maximum data transfer rate in synchronous mode is determined
    when the SYNCHRONOUS DATA TRANSFER REQUEST message is
    exchanged between the IDD and INIT.

The INIT must determine the parameter sent to the IDD when the message is exchanged in consideration of the signal transfer characteristics of the system SCSI bus and the data reception capacity of the INIT.

The IDD can transfer up to 4.8 MB/s in synchronous mode. However, since the configuration of the SCSI bus and its transfer characteristics differ depending on the system, the maximun transfer rate in which data can be transferred in a stable condition must be determined for each system.

4. When 3 to 4.8 MB/s synchronous mode transfer is disabled with this terminal, the IDD suppresses the data transfer rate to 2.67 MB/s or less when the SYNCHRONOUS DATA TRANSFER REQUEST message is exchanged. When 3 to 4.8 MB/s synchronous mode transfer is enabled, up to 4.8 MB/s of data can be transferred.

    At any rate, the maximum data transfer rate determined when the message is exchanged does not exceed the value in the parameter of the SYNCHRONOUS DATA TRANSFER REQUEST message declared by the initiator. Therefore, when the initiator declares the parameter within the allowable scope of the system, 3 to 4.8 MB/s synchronous mode transfer is enabled with this plug.

5. For reference, the IDD data transfer rate in synchronous mode and the restrictions on the system configuration of the SCSI bus are shown below.

    Remarks:

    The following values are rough standards. The values must be evaluated for each system.

    • Single-ended SCSI bus

Maximum transfer rate of the IDD (MB/s)	Maximum length of the SCSI cable (m)	Number of connectable SCSI devices
3.00 to 4.80	*	5*
2.67 or less	6.0	8

*   The maximum SCSI cable length and the number of connectable SCSI devices must be determined for each system.
    • Differential SCSI bus

        Generally, the restrictions on the system configuration need not be considered. When up to eight SCSI devices connect to the SCSI cable (up to 25 m), data can be transferred at 4.8 MB/s.

SCSI level

1) Set the display contents of data posted to the initiator from the IDD with the INQUIRY command according to Table 3.7. Select one of the modes depending on the system software requirements.

2) When the SCSI/CCS mode is selected, parameters transferred by the MODE SENSE command are as follows.

   a) Page code 3F (all pages equipped in the IDD are transferred.)

   ① Page 7 and page 8 are not transferred.

   ② Page 1, page 2 and page 4 are transferred with the specified length of CCS.

   b) When the page 1, page 2 or page 4 is specified individually, it is transferred with the specified length of CCS.

   c) When the page 7 or page 8 is specified individually, it is transferred with the specified length of SCSI-2.

   d) For the recovery parameter of the VERIFY, the recovery parameter in page 1 is used.

3) When the SCSI-1/CCS mode is selected and the REQUEST SENSE command is issued with specifying the transfer byte length to 0, the IDD transfers the 4-byte sense data.

Table 3.7 SCSI Level Setting (CNH2)

| Mode | INQUIRY data | | | INQUIRY VPD information | 1-2 |
	Byte 2, bits 2 to 0 (ANSI version)	Byte 3, bits 3 to 0 (Response data format)	Byte 7 (Provided function)		(*1)
SCSI-2 mode	'0,1,0' (SCSI-2)	'0,0,1,0' (SCSI-2)	Indicates the function of the IDD for each bit.	Valid	Short
SCSI-1/ CCS mode	'0,0,1' = ANSIX3.131= 1986 (SCSI-1)	'0,0,0,1' =ANSIX3T9.2/ 85-52 (CCS)	All bits '0'	Invalid	Open

*1 Set at factory shipment

Table 3.8 Setting Terminal: CNH1

Setting item	Pin position		Setting contents	
LED display requirements	1-2	Short	Operating with the SCSI bus	(*)
		Open	READY (seek completion) status	
———	3-4 5-6 7-8 9-10		} The user cannot change the setting	
(1) UNIT ATTENTION report mode	11-12	Short	Responds with CHECK CONDITION status	(*)
		Open	Does not respond with CHECK CONDITION status	
SCSI time monitoring mode	13-14	15-16	ACK signal wait monitoring time / SELECTION monitoring time and number of retries	
	Short	Short	∞ (unlimited) / 250 ms, 128 retries	(*)
	Short	Open	30 ~ 60 sec / 250 ms, 10 retries	
	Open	Short	30 ~ 60 sec / 250 ms, unlimited retries	
	Open	Open	1 ~ 2 sec / 1 ms, 10 retries	

*: Setting at factory shipment

(1) Refer to unit attention report mode explanation.

UNIT ATTENTION Report Mode

Sets the response method against the received command when the IDD keeps the UNIT ATTENTION condition (see Table 3.9). This mode is set for system requirement, however, it is recommended to use the SCSI standard setting (setting at factory shipment).

Table 3.9 UNIT ATTENTION Report Mode Setting (CNH1)

IDD response under the UNIT ATTENTION condition	11-12	
For a command other than INQUIRY, REQUEST SENSE, or PRIORITY RESERVE the IDD responsed with the CHECK CONDITION status. (SCSI standard)	Short	(*1)
All received commands are executed normally. (The CHECK CONDITION status caused by the UNIT ATTENTION condition is not reported.)	Open	

*1   Set at factory shipment

SCSI Terminating Resistor

The SCSI terminating resistor module is installed in the IDD when the IDD is shipped from the factory. See Figure 3.2 and 3.3 for installation positions. The terminating resistor module is mounted in a socket and must be processed in one of the following ways:

- When connecting the IDD to either end of the SCSI cable, do not remove the terminating resistor module.

- When connecting the IDD to a position not at the end of the SCSI cable, remove the terminating resistor modules. For the M2266S, there is one module. For the M2266H, there are three modules.

Notes:

1. When removing the terminating resistor module, be careful not to damage the resistor-module pins, mount socket, and contiguous parts.

2. When mounting the terminating resistor module, check the mounting direction and whether the module is fixed. See Figures 3.6 and 3.7.

Demounting the resistor module   Mounting the resistor module
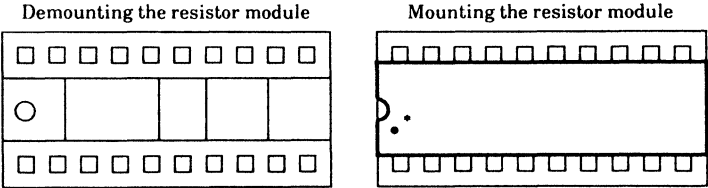
*1 ● shows pin No. 1 of the resistor module.

Figure 3.6 SCSI Terminating Resistor Module (M2266S)

Dismounting the resistor module

Mounting the resistor module
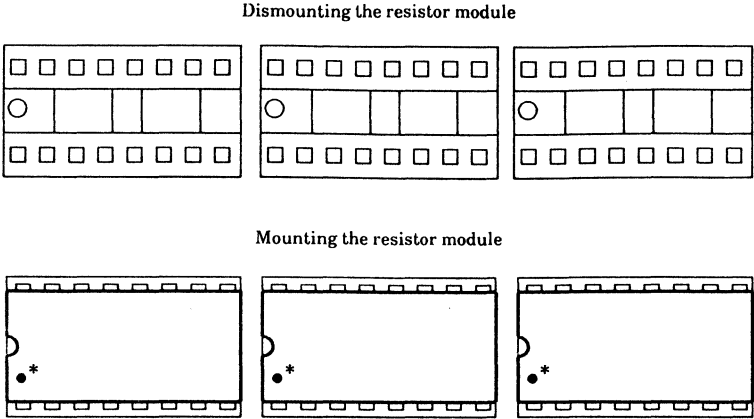
*1 ● shows pin No. 1 of the resistor module.

Figure 3.7 SCSI Terminating Resistor Module (M2266H)

Table 3.10 Setting Checklist

Setting group	Item	Setting	Location	Checkoff
Terminals (1)	1	SCSI ID	CN3/CN9 13-14 11-12 9-10	__ SCSI ID=____
	2	SCSI time monitoring	CN3/CN9 7-8	__ Short __ Open
	3	Read-ahead caching	CN3/CN9 5-6	__ Short __ Open
	4	Diagnostic switch	CN3/CN9 1-2	__ Short __ Open
Terminals (2)	5	SCSI terminating resistor power	CNH4 1-2 3-4	__ Short __ Open __ Short __ Open
	6	Synchronous mode transfer	CNH2 15-16	__ Short __ Open
	7	3 to 4 MB/sec synchronous mode transfer	CNH2 13-14	__ Short __ Open
	8	SCSI bus parity	CNH2 11-12	__ Short __ Open
	9	Motor start mode	CNH2 9-10	__ Short __ Open
	10	PER default value	CNH2 7-8	__ Short __ Open
	11	MODE SELECT parameter rounding process report mode	CNH2 5-6	__ Short __ Open
	12	SAVE DATA POINTER message mode	CNH2 3-4	__ Short __ Open
	13	INQUIRY data	CNH2 1-2	__ Short __ Open
	14	SCSI time monitoring mode	CNH1 13-14 15-16	__ Short __ Open __ Short __ Open
	15	UNIT ATTENTION report mode	CNH1 11-12	__ Short __ Open
	16	LED display requirement	CNH1 1-2	__ Short __ Open
Terminal resistor	17	Connection position of the drive on the SCSI bus	__	Drive not at one end of the chain; resistor not mounted __ Drive positioned at end of chain; resistor mounted

Mounting Drives

Before mounting a drive in the subsystem cabinet, check the setting of
terminals and of the SCSI terminating resistor.

Mounting Procedures

Since mounting procedures depend on the system cabinet structure, the
procedures may vary according to the specific requirements of each system.
The following steps describe the most common mounting method.

1. If the system has an external operator panel, it may be difficult to access
    the connector after the drive is mounted on the system cabinet.   To
    avoid a problem, connect the external operator panel cable before
    mounting the drive.

2. Fix the drive in the system cabinet with four mounting screws as
    follows:

    The drive has eight mounting holes (both sides: 2 X 2, bottom: X4). Fix
    the drive by using four mounting holes of both sides or the bottom.

    Use mounting screws whose lengths inside the drive-mounting frame
    are 4 mm or less when the screws are tightened. (See Figure 2.6.)

    When mounting the drive, be careful not to damage parts on the PCAs.

3. Check that the DE (signal ground) does not touch the system cabinet
    chassis (frame ground). There must be a 3.5 mm or greater space
    between the DE and the chassis. (See Figure 2.6.)

Connecting Cables

Connect the IDD to the system with the following cables. See section 3 for
further details of the IDD connector positions and connecting cables.

• Power cable
• SCSI cable
• DC ground cable (if required)
• External operator panel cable (if required)

The general procedures and notes on connecting cables are described below.
Especially, pay attention to the insertion direction of each cable connector.

Warning:

To avoid possible electrocution, be sure that system power is off before connecting or disconnecting cables. Do not connect or disconnect cables when power is on.

1. Connect the DC ground cable, if required to decrease ground noise.

2. Connect the power cable.

3. Connect the external operator panel, if required for the system.

4. Connect the SCSI cable.

5. Fix the cables so that they do not touch the DE and PCAs, or so that the smooth flow of the cooling air in the system cabinet is assured.

Note:

Be careful of the insertion directions of the SCSI connectors. With the system in which the terminating resistor power is supplied by means of the SCSI cable, if the power is turned on, the over-current protection fuse of the terminating resistor power supplier may be blown or the cable may be burnt if over-current protection is not provided.

Confirming Operations after Installation

This section describes expected operation after power is turned on and areas to check if you have problems during installation. These procedures apply to the default setting of motor-start mode; that is, the spindle motor starts when power is turned on. If you have set the condition to cause the motor to start with the START command, then the text that follows assumes that the START command from the interface has been issued.

Expected Operation at Power-on

• When power is turned on, the IDD executes initial self-diagnosis.

• If an error is detected in the initial self-diagnosis, the LED on the front panel blinks. The spindle motor may or may not start rotating in this stage.

- The factory default condition is to light the LED display when the IDD makes connection with the SCSI bus. The LED on the front panel remains off. When the initiator accesses the IDD by means of the SCSI bus, the LED lights. However, the disk drive enters the READY state in 20 seconds after power is turned on. Then the IDD reads system information from the system space on the disk.

  Note:

  If you have changed the factory default to cause the LED to light at READY status, the LED on the front panel lights 20 seconds after power is turned on.

Installation Checklist

If operational problems occur at installation, check the following items:

- Are cables mounted correctly?

- Are power and voltages supplied correctly? Measure them at the IDD power-connection position.

- Is each terminal setting correct? Note that the initial operation depends on the setting of the motor-start mode and of the LED display mode.

- If an error is detected in initial self-diagnosis, the LED on the front panel blinks. In this case, it is recommended that you issue the REQUEST SENSE command from the host system to obtain sense data for error analysis.

Notes:

1. When you have changed the factory default for LED display to "READY status," the LED is turned off while the drive continues the seek operations. However, since the LED is turned off for only one blink, the LED may seem to be turned on and off or not to be turned off at all.

2. When the LED display has been left at the factory default of "in connection with the SCSI bus," the LED on the front panel lights only when the IDD is connected to the SCSI bus. However, in some commands or when disconnection in is enabled, the lighting time is only an instant/ Therefore, it seems that the LED blinks or that the LED remains off.

3. Since the IDD has the automatic readjustment function of positioning(seek) control, it automatically executes the adjustment operations with seek at specific intervals from power on (first adjustment: 2 minutes after power on). When the LED display requirements are set to "READY status," the LED on the front panel blinks during the adjustment. This does not indicate a drive error.

Initializing the drive

Since the disk drive is formatted with a specific (default) data format for each model (part number) when shipped from the factory, the disk may not need to be low-level formatted (initialized) when it is installed in the system.

However, to set data attributes different from the default format, the disk must be reformatted according to the instructions below.

1. Connect the IDD to be reformatted to the system.

2. If it is necessary to change the sector size (data block length), issue a MODE SELECT command that specifies the new data block length, as shown in Figure 3.7 below.

	Parameter
Byte 0	X'15'
1	0 0 0 1 0 0 0 0
2	X'00'
3	X'00'
4	X'0C'
5	X'00'

X'000100' for 256 bytes/sector
X'000200' for 512 bytes/sector
X'000400' for 1024 bytes/sector

	Parameter
Byte 0	X'00'
1	X'00'
2	X'00'
3	X'08'
4	X'00'
5	X'00'
6	X'00'
7	X'00'
8	X'00'
9	Block length (MSB)
10	Block length
11	Block length (LSB)
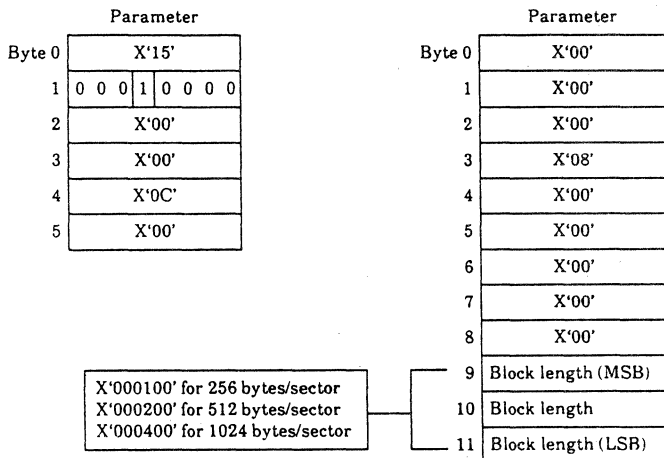
Figure 3.8 MODE SELECT Command for Reformatting

3. Issue a FORMAT UNIT command. The disk medium is reformatted with the specified block length, and the alternate block assignment for the medium defects is performed based on the primary defect list.

Section 4. Software Installation

Introduction

Due to the vast array of computer types, controllers, device configurations, and software utilities in use within small business systems, it is impossible to give specific installation instructions for each computer type in which the drive may be installed. There is no generic installation description that would apply in all cases.

Instead, this section presents basic principles for installing the M2266S/H disk drive into the most frequently used system: an IBM Personal Computer or PC-clone, using the PC DOS or MS DOS operating system.

Preparation of the Hard Disk for DOS Applications

Definition of Drive Type

First define the hard drive as "zero",or, "not installed".

Basic Steps for Software Installation

Software installation on the M2266S/H drive involves partitioning, and high-level formatting. It requires the following steps:

Step 1:   Boot DOS, and then run the DEBUG program. At the DEBUG prompt (" – "), type **g=c800:5** to access the BIOS-level formatter. (Note: The manufacturer of the controller may specify a different segment and offset location to access the low-level formatter, or may provide standalone installation software.)

Drive Partitioning

With a DOS version of 3.3 or lower, the maximum drive capacity is 32 MB. Therefore, multiple drive partitions (C:, D:, E:, . . . Z:) of 32 MB or less must be created. (See step 3 below.) Definition of larger partition size requires either DOS 4.0x or a third-party software package such as Disk Manager® from Ontrack Systems, Inc.

Step 2:   Run the software to create the partitions required by your unique configuration. (This software is either the FDISK program or one of the third-party software packages mentioned above.) Then boot the system again to save the partitions.

Step 3:   To perform high-level (or DOS-level) formatting of the partitions, use the DOS FORMAT command or follow the on-screen instructions for a third-party software package. If using the FORMAT command, enter it at the A: prompt as follows:

FORMAT d:/s

where **d** is the drive letter (typically C) assigned by DOS to the hard drive. The **/s** flag automatically copies the system files required to boot the system from the hard drive.

The flow chart on the following page summarizes the steps for partitioning the drive and preparing the drive to receive data.

Partitioning and High-Level Formatting

```
                           ( Start )
                               |
                               v
                        +-------------+
                        | Partition   |
                        | Hard disk   |
                        +-------------+
                               |
                               v
+----------------+        /---------\        +------------------+
| Use Compaq     |       /    Is     \       | Use Host         |
| DOS 3.31 or    | <---- \ Partition > / ---> | Adapter          |
| MS/PC DOS      |        \  32 MB?  /        | Mfr's Standalone |
| 4.00 or        |         \-------/          | Software or      |
| Greater        |             |              | Disk Manager     |
+----------------+             |              | 4.0 and Above.   |
        |                      v              +------------------+
        v                /---------\
  /-----------\          | Use DOS |
  \ Run Fdisk /          | 3.3 Run |
   \---------/           |  Fdisk  |
        |                 \-------/
        |                      |
        |                      v
        |               +-------------+        +-------------+
        +-------------> |   Create    |        |   Create    |
                        | Partitions  |        | Partitions  |
                        +-------------+        +-------------+
                               |                      |
                               v                      |
                        +-------------+               |
                        | Reboot the  |               |
                        | System to   |               |
                        | write the   |               |
                        | partition   |               |
                        | table on the|               |
                        |    disk     |               |
                        +-------------+               |
                               |                      v
                               v               +-------------+
                        +-------------+         |  Scan or    |
                        | Format the  |         | Verify the  |
                        | Partitions. |         | Partitions. |
                        | Use /S      |         +-------------+
                        | Option on   |                |
                        | Boot        |                |
                        | Partition.  |                |
                        +-------------+                |
                               |                       |
                               v                       |
                        +----------------+             |
                        | Transfer System|             |
                        | files on Boot  | <-----------+
                        | Drive or       |
                        | Partition      |
                        +----------------+
                               |
                               v
                        ( Hard Disk     )
                        ( Preparation   )
                        ( Complete.     )
```

Section 5. Specifications

This section describes the functional and environmental specifications of the M2266S/H disk drives.

Table 5.1 Drive Functional Specifications (1 of 2)

Items		Specifications
		M2266
Unformatted capacity of the drive (*1)		1266MB
Number of disks		8
Number of heads (read/write + servo)		15+1
Number of cylinders (user + CE + SA) (*2)		1,658 + 1 + 2
Unformatted Capacity / Track (*1)		50,910 MB
Rotational Speed		3,600 rpm 0.2%
Average Latency Time		8.3 ms
Positioning Time	Minimum	4 ms
	Average	14.5 ms
	Maximum	30 ms
Start/Stop Time (*3)	Start Time	20 seconds, maximum
	Stop Time	15 seconds, maximum
Recording Code		1/7 RLL
Recording Density		46,635 BPI
Track Density		1,634 TPI
Dimension (W x H x D) (*4)	M2266S	5.7 in (146 mm) x 3.3 in. (83 mm) x 8.0 in (203 mm) Front Protector Installed: 5.7 in x 3.3 in x 8.2 in Front Panel Installed: 5.9 in x 3.4 in x 8.2 in
	M2266H	5.7 in (146 mm) x 3.3 in. (83 mm) x 8.6 in. (218mm) Front Protector Installed: 5.7 in. x 3.3 in. x 8.8 in. Front Panel Installed: 5.9 in x 3.4 in. x 8.8 in.

Table 5.1 Drive Functional Specifications (2 of 2)

Items		Specifications
Weight		Approximately 7.7 lbs. (3.5 kg)
Power Consumption (*6)	M2266S	30W (typical)
	M2666H	31W (typical)
Interface	M2266S	Single-Ended SCSI Cable Length: 6 m maximum.
	M2266H	Differential SCSI Cable Length: 25 m maximum.
Data transfer rate	Disk drive	3.0 MB/s, nominal
	SCSI (*5) Async Mode	2.0 MB/s, nominal
	SCSI (*5) Sync Mode	4.8 MB/s, maximum
Logical Data Block Length (*1)		180 ~4,128 Bytes (Fixed block length programmable by every 2-bytes during formatting)
SCSI Command Standard		ANSI X3.131-1986 and CCS (Rev 4.B) standard
Data Buffer		Read-ahead cache

*1   The formatted capacity can be changed by changing the logical block length and using spare sector space.

*2   The number of user cylinders indicates the maximum and includes the alternate cylinder. The number of user cylinders and alternate cylinders can be specified during formatting.

*3   The start time is the time from power-on or the start command to the IDD ready state. Stop time is the time required for disks to stop completely from power off or the stop command.

*4   Depth (D) does not include length of connector locks on the interface connector.

*5   The maximum data transfer rate may be restricted to the response speed of the initiator and by the transmission characteristics.

*6   The terminator power pin on the SCSI connector that supplies power to other terminators is not used.

Table 5.2 SCSI Functional Specifications (1 of 10)

SCSI	Electrical requirements	Single-Ended type	* (M2266S model)
		Differential type	* (M2266H model)
		TERMPWR signal supply/ demand function	* (jumper selectable)
		Differential driver protection function	* (M2266H model)
	Connector	Non-shielded (100 mil pitch)	* (protect key, lock)
		Shielded	-
	Data bus parity		* (jumper selectable)
	Bus arbitration function		*
	Disconnection/Reconnection function		*
	Addressing	SCSI ID number	0-7 (jumper selectable)
		LUN (Logical unit number) (#)	0 (Fixed)
	Data transfer	Asynchronous mode	* 2.0 MB/s normal
		Synchronous mode	* (jumper selectable) 4.8 MB/s max.
		Extended data bus mode	-
	Data buffer		256 KB FIFO ring type
	Data block length (logical data length = physical data length)		180 to 4,128 bytes (Fixed by even-numbered bytes specified at format)

VU: FUJITSU unique function
* Supported, - Not supported

Table 5.2 SCSI Functional Specifications (2 of 10)

	Command Complete	(00)	*
	Save Data Pointer	(02)	*
	Restore Pointers	(03)	*
	Disconnect (TARG Æ INIT)	(04)	*
	(INIT Æ TARG)	(04)	-
	Initiator Detected Error	(05)	*
	Abort	(06)	*
	Message Reject	(07)	*
	No Operation	(08)	*
	Message Parity Error	(09)	*
1-byte	Linked Command Complete	(0A)	*
message	Linked Command Complete with Flag	(0B)	*
	Bus Device Reset	(0C)	*
	Abort Tag	(0D)	-
	Clear Queue	(0E)	-
	Initiate Recovery	(0F)	-
	Release Recovery	(10)	-
	Terminate I/O Process	(11)	-
	Identify	(80-FF)	*
	Disconnect Privilege (DiscPriv)Bit		*
	Logical Unit Target (LUNTAR) Bit		-
2-byte	Mundane Queue Tag	(20)	-
message	Head of Queue Tag	(21)	-
	Ordered Queue Tag	(22)	-
	Ignore Wide Residue	(23)	-

VU: FUJITSU unique function
* Supported, - Not supported

Table 5.2 SCSI Functional Specifications (3 of 10)

Extended message	Modify Data Pointer	(01-00)	-
	Synchronous Data Transfer Request (01-	01)	* (jumper selectable)
	Extended Identify	(01-02)	-
	Wide Data Transfer Request	(01-03)	-
	Unit Attention	[VU] (01-80)	-
	Halt I/O	[VU] (01-81)	-
	Diagnostic Control	[VU] (01-82)	-
Command (Group 0)	Test Unit Ready	(00)	*
	Rezero Unit	(01)	*
	Request Log	[VU] (02)	-
	Request Sense	(03)	*
	Format Unit	(04)	*
	FmtData (Format Data)	=0	*
	Initialization data pattern	[VU]	*
	Interleave factor		* (Non-interleaved)
	Defect list by block address	=0	
	Defect list by block address	≠0	*
	Defect list by byte length from index	=0	*
	Defect list by byte length from index	≠0	*
	Defect list by physical sector address	=0	*
	Defect list by physical sector address	≠0	*
	CmpLst (Complete List)		*
	FOV (Format Options Valid)		*
	DPRY (Disable Primary)		*
	SCRT (Disable Certification)		*
	STPF (Stop Format)		-
	IP (Initialization Pattern)		-
	DSP (Disable Saving Parameters		-
	Immed (Immediate)		-

VU: FUJITSU unique function
* Supported, - Not supported

Table 5.2 SCSI Functional Specifications (4 of 10)

	Read Defect List	[VU] (05)	-
	Reassign Blocks	(07)	*
	Read	(08)	*
	Write	(0A)	*
	Seek	(0B)	*
	No Operation	[VU] (0D)	*
	Set File Mask	[VU] (0F)	-
	Inquiry	(12)	*
	EVPD (Enable Vital Product Data)		* (jumper selectable)
	Standard INQUIRY data		* (36-byte length)
	VPD Page 0: VPD page code list		*
	VPD Page 80: Device serial No.		*
	Read Device Characteristics	[VU] (13)	-
	Priority Reserve	[VU] (14)	*
Command	Mode Select	(15)	*
(Group 0)	PF (page format)		* (set value ignored)
	Page 1: Read/Write Error Recovery		* (12B: Savable)
	AWRE (Automatic Write Reallocation Enabled)		* (Changeable)
	ARRE (Automatic Read Reallocation Enabled)		* (Changeable)
	TB (Transfer Block)		* (Changeable)
	RC (Read Continuous)		-
	EER (Enable Early Recovery)		* (Changeable)
	PER (Post Error)		* (Changeable)
	DTE (Disable Transfer on Error)		* (Changeable)
	DCR (Disable Correction)		* (Changeable)
	Retry Count for Read Recovery		* (Changeable)
	Correction Span for ECC		* (Unchangeable)
	Head Offset Count		-
	Data Strobe Offset Count		-
	Retry Count for Writing		* (Changeable)
	Recovery Time Limit		-

VU: FUJITSU unique function
* Supported, - Not supported

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Table 5.2 SCSI Functional Specifications (5 of 10)

	Mode Select (15)	*
	Page 2: Disconnect/Reconnect	* (16B:Savable)
	Buffer Full Ratio	* (Changeable)
	Buffer Empty Ratio	* (Changeable)
	Bus Inactivity Limit	* (Unchangeable)
	Disconnect Time Limit	-
	Connect Time Limit	-
	Max. Burst Length	-
	DTDC (Data Transfer Disconnect Control)	-
	Page 3: Format Parameters	* (24B:Savable)
	Tracks/Zone	* (Unchangeable)
	Alternate Sectors/Zone	* (Changeable)
	Alternate Tracks/Zone	* (Unchangeable)
	Alternate Tracks/Drive	* (Changeable)
Command	Sectors/Track	* (Unchangeable)
(Group 0)	Data bytes/Physical Sector	* (Changeable)
	Interleave Factor	* (Non-Interleaved)
	Track Skew Factor	* (Unchangeable)
	Cylinder Skew Factor	* (Unchangeable)
	SSEC/HSEC (Soft Sector/Hard Sector)	* (Unchangeable)
	RMB (Removable)	* (Unchangeable)
	SURF (Surface)	* (Unchangeable)
	Page 4: Drive Parameters	* (24B:Savable)
	Number of Cylinders	* (Changeable)
	Number of Heads	* (Unchangeable)
	"Write Precompensation" Starting Cylinder	-
	"Reduced Write Current" Starting Cylinder	-
	Drive Step rate	-
	Landing Zone Cylinder	-
	RPL (Rotational Position Locking)	-
	Rotation Synchronous Offset	-
	Media Rotational Speed	-

VU: FUJITSU unique function
* Supported, - Not supported

Table 5.3 SCSI Functional Specifications (6 of 10)

	Mode Select	(15)	*
	Page 7: Verify Error Recovery		* (24B:Savable)
	EER (Enable Early Recovery		* (Changeable)
	PER (Post Error)		* (Changeable)
	DTE (Disable Transfer on Error)		* (Changeable)
	DCR (Disable Correction)		* (Changeable)
	Retry Count on Verify		* (Changeable)
	Correctable Bit Length on ECC		* (Unchangeable)
	Time Limit on Recovery Processing		-
	Page 8: Caching Parameters		* (12B:Savable)
	MS (Multiple Select)		* (Changeable)
	WCE (Write Cache Enable)		-
	RCD (Read Cache Disable)		* (Changeable)
	Demand Read Retention Priority		-
Command	Write Retention Priority		-
(Group 0)	Disable Prefetch Block Number		* (Changeable)
	Min. Prefetch		* (Changeable)
	Max. Prefetch		* (Changeable)
	Max. Prefetch Ceiling Block Number		* (Changeable)
	Page 21: Additional Error Recovery [VU]		* (4B:Savable)
	DCED (Disable Command Execution Delay)		* (Changeable)
	PSER (Post SCSI Error)		* (Changeable)
	Retry Count on Seek Error		* (Changeable)
	EOR (Enable Overrun Report Flag)		-
	Retry Count on Overrun		-
	Page 22: Reconnect Timing [VU]		* (4B:Savable)
	Reconnect Timing on Read		-
	Reconnect Timing on Write		-
	Reserve Unit	(16)	*
	3rd Party Reserve Function		*
	Extent Reserve Function		-
	Superseding Reserve Condition Function		*

VU: FUJITSU unique function
* Supported, - Not supported

Table 5.2 SCSI Functional Specifications (7 of 10)

Command (Group 0)	Release Unit	(17)	*
	3rd Party Release Function		*
	Extent Release Function		-
	Copy	(18)	-
	Mode Sense	(1A)	*
	DBD (Disable Block Descriptor)		*
	Page 0 (Non-Parameter Transfer)		*
	Start/Stop Unit	(1B)	*
	Immed (Immediate)		*
	Receive Diagnostic Results	(1C)	*
	Send Diagnostic	(1D)	*
	PF (Page Format)		*(Set value ignored)
	SlfTest (Self Test)		*
	DevOfL (Device Offline)		-
	UnitOfL (Unit Offline)		*
	Page 0: Specifiable Page Code list		*
	Page 40: Logical/Physical Address Exchange		*
	Page 80: Condition Report in Mode Select [VU]		*
	Page 81: Device Statistic Information [VU]		*
	Prevent/Allow Medium Removal	(1E)	-
Command (Group 1)	Search Block High	[VU] (20)	-
	Search Block Equal	[VU] (21)	-
	Search Block Low	[VU] (22)	-
	Read Capacity	(25)	*
	PMI (Partial Medium Indicator)		*
	Read Extended	(28)	*
	Write Extended	(2A)	*
	Seek Extended	(2B)	*
	Write and Verify	(2E)	*
	BytChk (Byte Check)		-
	Verify	(2F)	*
	BytChk (Byte Check)		-

VU: FUJITSU unique function
* Supported, - Not supported

Table 5.2 SCSI Functional Specifications (8 of 10)

	Search Data High	(30)	-
	Search Data Equal	(31)	-
	Search Data Low	(32)	-
	Set Limits	(33)	*
	Pre-Fetch	(34)	-
	Synchronize Cache	(35)	-
	Lock/Unlock Cache	(36)	-
	Read Defect Data	(37)	*
	Block Address format		*
	Bytes Distance format from Index		*
	Physical Sector Address format		*
Command	Compare	(39)	-
(Group 1)	Copy and Verify	(3A)	-
	Write Buffer	(3B)	*
	Mode='000' (Header & data mode)		*
	Mode='001' (Header & data mode / address)		*
	Mode='010' (Data mode)		*
	Mode='100' (Download microcode)		-
	Mode='101' (Download microcode & save)		-
	Read Buffer	(3C)	*
	Mode='000' (Header & data mode)		*
	Mode='001' (Header & data mode / address)		*
	Mode='010' (Data mode)		*
	Mode='011' (Descriptor Mode)		*
	Read Long	(3E)	*
	Corrct (Corrected)		*
	Write Long	(3F)	*

VU: FUJITSU unique function
* Supported, - Not supported

Table 5.2 SCSI Functional Specifications (9 of 10)

	Change Definition (40)	-
	Write Same (41)	*
	LBdata (Logical Block Data)	*
Command	PBdata (Physical Block Data)	-
(Group 2)	Log Select (4C)	*
	Log Sense (4D)	*
	Mode Select Extended (55)	*
	Mode Sense Extended (5A)	*
	Diagnostic Write Data [VU] (C1)	-
	Diagnostic Read Data [VU] (C2)	-
	Format ID [VU] (C4)	-
Command	Space ID and Read Data [VU] (C6)	*
(Group 6)	Displaced ID [VU] (C8)	-
	Read ID [VU] (CA)	-
	Diagnostic Format ID [VU] (CD)	-
	Diagnostic Read ID [VU] (CE)	-
	Recover Data [VU] (D8)	*
	Recover ID [VU] (DA)	*
	Slipped Defect Sector Function	*
	Command Link Function	*
	Relative Block Addressing Function	-
	Command Stack Function (queuing w/o tag)	*
Command	Command with Tag Queuing feature	-
Processing	CA (Contingent Allegiance)	- (sense is kept for each INIT)
	ECA (Extended Contingent Allegiance)	-
	Async. Event Notification (AEN) feature	-
	Read-Ahead Cache feature	*
	Cache Control feature	-
	DPO (Disable Page Out)	-
	FUA (Force Unit Access)	-

VU: FUJITSU unique function
* Supported, - Not supported

Table 5.2 SCSI Functional Specifications (10 of 10)

Status	Good	*
	Check Condition	*
	Condition Met	-
	Busy	*
	Intermediate	*
	Reservation Conflict	*
	Command Terminated	-
	Queue Full	-
Sense Data	Non-Extended Type	-
	Extended Type	* (48 Bytes Length)
CCS (Common Command Set) Standard		* (Rev.4.B)

VU: FUJITSU unique function
* Supported, - Not supported

Table 5.3 Environmental Specifications

	Items	Specifications	
		M2266	
Temperature (*1)	Environment at operating	5 to 45°C (41 to 113°F)	
	Environment at non-operating	-40 to 60° (-40 to 140° F)	
	DE surface at operating	60°C or less	
	DE surface at non-operating	50°C or less (variable span)	
	Gradient	15° C /hr.(59°F/hr.) or less	
Relative Humidity	Operating	20 to 80% RH	
	Non-operating	5 to 95% RH	
	Maximum wet bulb	29°C (non-condensing)	
Vibration	Operating	Less than 0.2G (3 to 100 Hz)	
	Non-operating (*2)	Less than 0.4G (3 to 100 Hz)	
Shock	Operating	Less than 2G (10 ms max.)	
	Non-operating	Less than 20G (10 ms max.)	
Altitude (above sea level)	Operating	0 to 3,000 m	
	Non-operating	0 to 12,000 m	
Power Requirements	Input voltages (*3)	+12VDC±5%	
		1.9A (Average)	
		5.0A (Peak)	
		+5VDC ± 5%	
		M2266S	1.4 A (Average) (*5)
		M2266H	1.6 A (Average) (*5)
	Ripple (*4)	+12VDC/ +5VDC; 50 mV p-p	
Error Rate			
Soft Errors	10 or less per 10^{11} bits	A recoverable error that can be read correctly within 18 retries and ECC correction. (*6)	
Hard Errors	10 or less per 10^{15} bits	An error that cannot be recovered with 16 retries and ECC correction. (*6)	
Seek Errors	10 or less per 10^{7}	An error that cannot be recovered by one retry.	

*1   For more information, see "Environmental Requirements" in section 2.

*2   At power-off state after installation.

*3   Input voltages are specified at the connector.

*4   High frequency noise is less than 100 mV p-p.

*5   The terminator power pin (SCSI connector) that supplies power to other terminators is not used. (See "SCSI Terminating Resistor Power Supply" in section 3.)

*6   Retries-at-read errors are controlled by the error recovery procedure of the IDD, which includes retries with head offset.

Section 6. Troubleshooting

Component-level troubleshooting of M2266 series drives is not practical or cost effective. This section provides information for troubleshooting to the subassembly level only.

Begin troubleshooting by looking at the checklist below to isolate problems external to the drive. If the problem does appear to be in the drive, then run the self test program, which this section describes in some detail.

If you need to trace the problem on the SCSI bus, refer to Tables 6.3 and 6.4 at the end of this section, which show the signals for both the differential and single-ended SCSI buses.

If you cannot resolve the problem, contact the dealer or distributor who sold the product for further assistance. If you need to contact Fujitsu Customer Service, refer to the section "Maintenance Information" for telephone numbers and a description of the information you should prepare.

Troubleshooting checklist

- Are the system cables in good condition and correctly connected?

- Are the connectors turned the right way and properly seated?

- Are the bus terminations correctly installed?

- Are the drive jumpers set correctly?

- Are the power supply voltage levels and ripple voltages within tolerance as measured at the drive connector?

- Is the host adaptor correctly configured and does it pass its own diagnostic tests?

- Has the software installation procedure been performed accurately and completely?

Diagnostics

Self-Diagnostics

The IDD has the following self-diagnostic functions that check the basic operations of the IDD.

- Initial self-diagnostics
- Offline self-diagnostics (enabled through a setting terminal)
- Online self-diagnostics (enabled through the SEND DIAGNOSTIC command)

Table 7.1 lists the contents of the tests performed by the self-diagnostics. For a general check of the IDD including the operations of the host system and interface, use a test program that runs on the host system. See Test Programs in this section.

Table 6.1 Self-Diagnostic Functions

Test contents	Initial self-diagnostics	Offline self-diagnostics	SEND DIAGNOSTIC command	
			Self Test = 1 Unit Offline = 0	Self Test = 1 Unit Offline = 1
Hardware function test	◯	◯	◯	◯
Seek test		◯		◯
Write/read test (CE space)		◯		◯

Note: ◯ indicates the tests to be executed and arrows show the sequence of execution.

The items that follow briefly describe the diagnostic functions.

a. Hardware Function Test

This test checks the basic operation of the controller and contains the following tests:

- EPROM where microcode is stored
- Peripheral circuits of microprocessor (MPU)
- Memory (RAM)
- Data buffer

b. Seek Test

This test checks the positioning operation of the disk drive using several seek modes (2-points seek, 1-position sequential seek, etc.) The positioning operation is checked by confirming the physical address information . The test reads the ID field from the data block on track 0 of the target cylinder after completion of the seek operation to the target cylinder.

c. Write/Read Test

This test checks the write/read function, using the CE space of the disk drive. It runs two types of diagnostic patterns: repeating X'BBBA645A27BB', and repeating X'00'. After writing the diagnostic pattern into all logical data blocks in the CE space, the test reads the data block and then compares the data pattern to confirm that writing and reading operations are valid.

Initial Self-Diagnostics

When power is turned on, the initial self-diagnostics run on the IDD. These diagnostics check the basic operation of the hardware functions. If an error is detected, the LED on the drive front panel blinks.

Offline Self-Diagnostics (Setting Terminal)

When the diagnostic mode is set on the terminal CN3/CN9 (by setting the plug between pins 1 and 2 open), the IDD executes the hardware function test, seek (positioning) test and the data write/read test of the CE space as self diagnostics.

If commands received from the SCSI bus are being executed or stacked before the diagnostic mode is set, the self-diagnostics are stared after all command execution is terminated.

While the diagnostic mode is set, the self-diagnostics are repeated in the following sequence: hardware function test, seek test, write/read test, as long as the error is undetected. While the diagnostic mode is set, the IDD does not reply to the SCSI bus.

Online Self-Diagnostics (SEND DIAGNOSTIC Command)

The INIT can make the IDD execute self-diagnostics by issuing the SEND DIAGNOSTIC command.

The INIT specifies the execution of self diagnostics by setting 1 for the Selftest bit on the CDB in the SEND DIAGNOSTIC command and specifies the test contents with the Unitoff bit.

When the specified self-diagnostics end normally, the IDD posts GOOD status.

When an error is detected by the self-diagnostics, the IDD terminates the SEND DIAGNOSTIC command with the CHECK CONDITION status. At this time, only when an error is detected in the hardware function test, the LED on the front panel of the disk drive blinks.

Test Programs

The self-diagnostics check the basic operations of the IDD itself. However, to check general operations such as the host system and interface operations in a status similar to the normal operation status, a test program that runs on the host system must be used.

The structure and functions of the test program depend on the user system requirements. Generally, it is recommended that you provide a general input/output test program that includes SCSI devices connected to the SCSI bus and input/output devices on other I/O ports.

To test the IDD functions generally, include the following tests:

- Interface (SCSI Bus) Test
- Basic Operation Test
- Random/Sequential Read Test
- Write/Read Test

Maintenance Information

This section provides information on maintenance and on what to do if your unit needs repair.

Preventive Maintenance

No preventive maintenance is required.

Caution: Do not open the DE in the field, because this will contaminate the disks and heads, ruining the drive completely.

Service Life

No overhauls are required for the first five years when the environmental requirements and handling of the drive are satisfactory.

Field-Replaceable Parts

Two PCAs can be replaced in the field. The DE cannot be replaced in the field. (See "Spare Parts" below.)

Technical Assistance

Technical information may be obtained from the Fujitsu America Bulletin Board system, using a modem baud rate of 1200 to 9600, 8 bits, 1 stop bit and no parity. Dial 408 944-9899.

To obtain technical assistance from Fujitsu Customer Service, call the technical hotline at 1-800-826-6112 or 1-619-481-4004.

Generally, the following information must be included:

• IDD model, part number, revision number, serial number, and date of manufacture.

• Error Status

   - Date when the error occurred.
   - System configuration
   - Environmental conditions (temperature, humidity, and voltage)

• Error History

• Error Contents

- Outline of problem
- Issued commands and specified parameters
- Sense data
- Other error analysis information

Caution: Save data stored on the disk drive before requesting repair. Fujitsu America does not assume responsibility if data is destroyed during servicing or repair.

See section 3 for notes on packing and handling when returning the disk drive.

Revision Numbers

The revision number of the disk drive is represented with a letter and a number indicated on the revision label attached to the DE. Figure 6.1 shows the revision label format. Numbers marked by crossed lines indicate implemented revisions. e.g. revision B3 is shown below.

PART NO. B03B-XXXX-XXXXX

SER. NO. XXXXX   DATE 19XX-XX.

RATING   +12 V, +5 V

REV. NO. A 0 1 2 3 4 5 6 7 8 9
          B 0 1 2 3 4 5 6 7 8 9   } Revision number
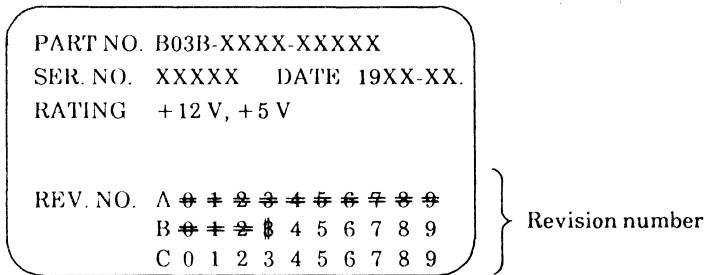   C 0 1 2 3 4 5 6 7 8 9

Figure 6.1 Revision Label

Spare Parts

Table 6.2 lists the two printed circuit boards can be replaced to assist in diagnosing and repairing the drive. Replacement boards are preadjusted at the factory and do not require further adjustments after installation.

Table 6.2 Spare Parts

Item	Part Name	Part Number	Model(s)
1	Read/Write Preamplifier PCA	B17B-0390-0150A	M2266S/H
2	Control PCA	B17B-1140-0160A	M2266Sx
3	Control PCA	B17B-1140-0170A	M2266Hx

SCSI Bus Signal Assignments

Tables 6.3 and 6.4 list the pin assignments for signals on the SCSI bus, both single-ended and differential types.

Table 6.3 SCSI Connector Signal Assignments
(Single-Ended Type: M2266S)

Pin Number	Signal	Signal	Pin Number
01	GND	–DB0	02
03	GND	–DB1	04
05	GND	–DB2	06
07	GND	–DB3	08
09	GND	–DB4	10
11	GND	–DB5	12
13	GND	–DB6	14
15	GND	–DB7	16
17	GND	–DBP	18
19	GND	GND	20
21	GND	GND	22
23	GND	GND	24
25	Open	TERMPWR (*1)	26
27	GND	GND	28
29	GND	GND	30
31	GND	–ATN	32
33	GND	GND	34
35	GND	–BSY	36
37	GND	–ACK	38
39	GND	–RST	40
41	GND	–MSG	42
43	GND	–SEL	44
45	GND	–C/D	46
47	GND	–REQ	48
49	GND	–I/O	50

*1   Terminating resistor power supply (jumper setup for input only, both input and output, or open).

**Table 6.4 SCSI Connector Signal Assignments
(Differential Type: M2266H)**

Pin Number	Signal	Signal	Pin Number
01	Open (*1)	GND	02
03	+DB0	−DB0	04
05	+DB1	−DB1	06
07	+DB2	−DB2	08
09	+DB3	−DB3	10
11	+DB4	−DB4	12
13	+DB5	−DB5	14
15	+DB6	−DB6	16
17	+DB7	−DB7	18
19	+DBP	−DBP	20
21	DIFFSENS (*2)	GND	22
23	GND	GND	24
25	TERMPWR	TERMPWR (*3)	26
27	GND	GND	28
29	+ATN	−ATN	30
31	GND	GND	32
33	+BSY	−BSY	34
35	+ACK	−ACK	36
37	+RST	−RST	38
39	+MSG	−MSG	40
41	+SEL	−SEL	42
43	+C/D	−C/D	44
45	+REQ	−REQ	46
47	+I/O	−I/O	48
49	GND	GND	50

*1 If pin 01 on the cable is used for shield ground, the shield of the connector on
the IDD is not terminated to ground.

*2 Input signal for protection of differential driver circuit.

*3 Terminating resistor power supply (jumper setup for input only, both input
and output, or open).

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