

77653532



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**CONTROL DATA®**  
**FINCH<sup>TM</sup> DISK DRIVE**  
**MODEL 9410**

**GENERAL DESCRIPTION**  
**OPERATION**  
**INSTALLATION AND CHECKOUT**

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**MAGNETIC PERIPHERALS INC.**  
 a subsidiary of  
CONTROL DATA CORPORATION

**VOLUME 1**

**HARDWARE INSTALLATION/OPERATION MANUAL**



REVISION RECORD															
R E V	DATE	SHEETS AFFECTED	MANUAL/SECTION REVISION STATUS												CHANGE AUTHORITY
			1	2	3	4	5	6	7	8	9	10	11	12	
A	81 JUN 10 ISSUE <i>S.W.D.</i>		A	A	A										Magdeburger
B	81 AUG 26 <i>S.W.D.</i>	ii	B	A	B										PL 32103
C	81 SEP DEC 15	ii, iii, iv	C	B	C										PL 32147



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## PREFACE

This Manual provides the information needed to install and operate the CDC Model 9410 FINCH™ Disk Drive (BJ9A1-A) and is intended to serve customer engineers and operators.

The total content of the Manual is comprised of three sections, each having a unique publication number, and is contained in one volume. The manual's publication number, (77653532) along with the unit series code number, should be used when making reference to the FINCH Disk Drive Installation/Operation Manual.

The following table identifies the content of this manual:

<u>SECTION NUMBER</u>	<u>TITLE</u>	<u>PUBLICATION NO.</u>
1	General Description	77653596
2	Operation	77653597
3	Installation and Checkout	77653598

### EMI NOTICE

NOTICE: This equipment has been designed as a component to high standards of design and construction. The product, however, must depend on receiving adequate power and environment from its host equipment in order to obtain optimum operation and to comply with applicable industry and governmental regulations. Special attention must be given by the host manufacturers in the areas of safety, power distribution, grounding, shielding, audible noise control, and temperature regulation of the device to insure specified performance and compliance with all applicable regulations. This equipment is a component supplied without its final enclosure and therefore is not subject to standards imposed by FCC Rules for Electro-Magnetic Interference (EMI). Federal Docket 20780/FCC 80-148 Part 15.

## 1.2.4 MAJOR COMPONENTS

The major components of the FINCH are shown in Figure 1-1.

### CAUTION

NEVER disassemble the FINCH. This exploded view is for information only. Servicing items in the upper sealed environmental enclosure (heads, media, actuator, etc.) requires special facilities. Only the printed-circuit boards, brake and motor external to the sealed area can be replaced without special facilities.

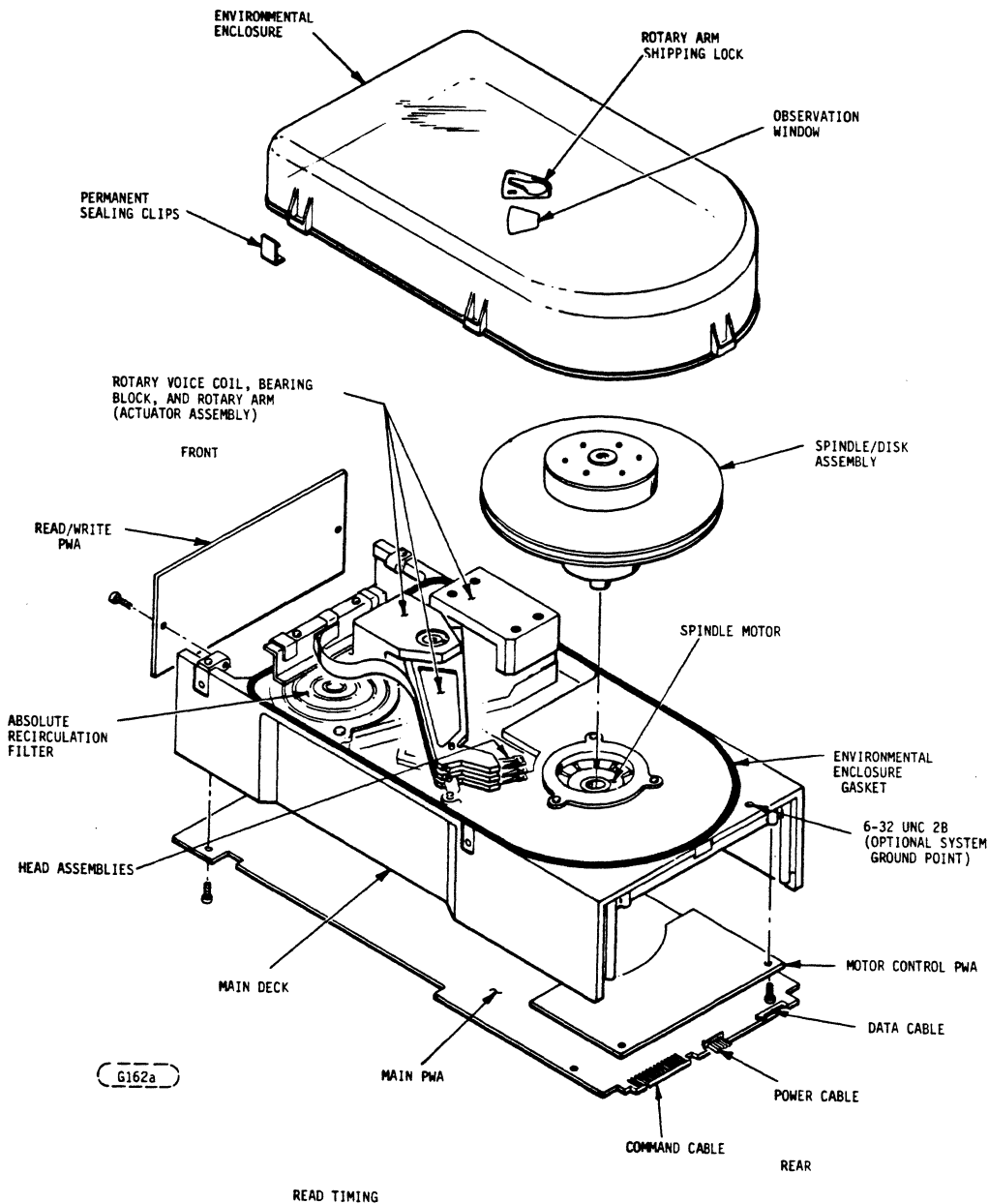


FIGURE 1-1. FINCH MAJOR COMPONENTS

## 1.1 INTRODUCTION

The CDC 9410 FINCH™ Disk Drive is a small, low-cost, medium-performance, random-access rotating-disk, mass-memory device designed to record and recover data on up to two rigid eight-inch non-removeable fixed disk media. The FINCH uses low-mass flying read/write heads attached to a precisely controlled rotary positioner. It has an unformatted data storage capacity of 8,24 or 32 megabytes, depending upon configuration.

## 1.2 GENERAL DESCRIPTION

### 1.2.1 STANDARD FEATURES

The following are standard features of the Model 9410 FINCH Disk Drive:

- Full data recovery circuitry
- Sealed disk, head, and actuator chamber
- No preventive maintenance required
- LSI circuitry for high reliability
- Low audible noise for office environments
- Vertical (side) or horizontal (bottom) mounting
- Low power consumption
- Rotary voice-coil actuator
- Terminators

### 1.2.2 OPTIONAL FEATURES

The following optional features (factory-installed only) are available for the FINCH:

- 8,24 or 32 megabytes rigid fixed-disk data storage capacity

### 1.2.3 ACCESSORIES

The following accessories are available for the FINCH and must be ordered and shipped separately:

- Shock mounts, horizontal and vertical.
- Front panel
- Power supply - includes five-foot power cable
- Hardware Maintenance Manual, 77711000.
- Application Note, Diagnostics for Model 9410 FINCH Disk Drive, 77653374
- Application Note, Interfacing a 9406 Flexible Disk Drive with a 9410 FINCH Disk Drive, 77653461



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## 2.1 INTRODUCTION

There is only one mechanical function required of the operator: to ensure that power is applied. During routine computer operations, the operator should, of course, note any malfunctions or problems and report them.

## 2.2 OPERATING AND PRELIMINARY DIAGNOSIS PROCEDURE

Due to the sophisticated design and special equipment required to repair the FINCH, most repairs may only be effected at a properly equipped and staffed depot service and repair facility. These repair facilities will be capable of performing all warranty and routine repair activities.

Because there are no lamps for error or fault indication and no operator/drive interaction is required, operating systems must contain sufficient error reporting information to allow the operator to make preliminary diagnosis of problems. In other words, software must adequately inform the operator if any technical difficulties arise. In multi-unit installations, logical and physical identification are necessary for the operator to identify a defective unit.

### 2.2.1 OPERATING INSTRUCTIONS

1. The following conditions must be met to initiate operation of the disk drive.
  - a. The DC power cable from the power supply must be connected.
  - b. Rotary-arm shipping lock must be in operating position.
2. The operating temperature of the drive is 50° to 104° F (10° to 40°C) with a maximum temperature change of 18° F (10° C) per hours.
3. Additional information on the drive can be found in the Hardware Installation/Operation Manual 77653532.
4. In case of a malfunction the unit is to be serviced only by trained personnel.



### 3.3 OPERATING ENVIRONMENT

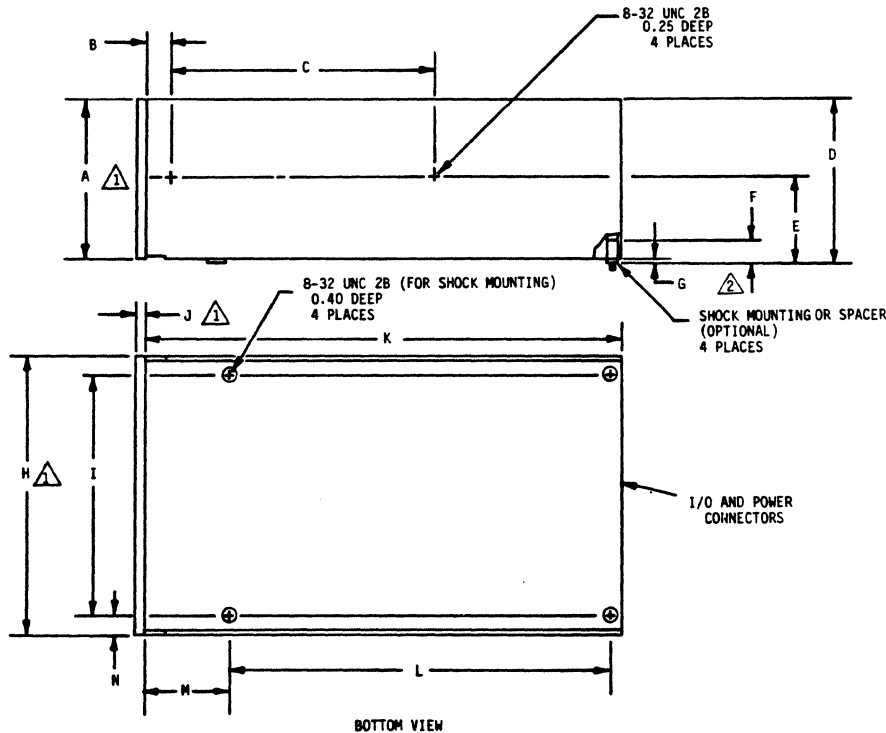
The environmental conditions required for optimum performance of the disk drive are, in general, the same as those in an office environment with minimum or no environmental control. These conditions are:

Temperature	50° to 104° F (10° to 40° C)
Humidity	20% to 80%
Altitude	-983 to +6,562 feet (-300 to +2,000 meters)

The room temperature should not change more than 18° F (10° C) per hour. Relative humidity should be kept between 20% and 80%. Avoid high relative humidity as much as possible since it can cause condensation in the drive. Very low relative humidity should also be avoided because it can lead to particle attraction and accumulation by static electricity.

### 3.4 SPACE ALLOCATION AND MOUNTING REQUIREMENTS

Figure 3-2 shows overall dimensions of the drive for determining space allocation and mounting requirements.



DIMENSION	INCHES	MILLIMETERS
A	4.62 ±0.02	117.35 ±0.51
B	0.80 ±0.02	20.32 ±0.51
C	8.00 ±0.04	203.2 ±1.02
D	4.62 ±0.03	117.35 ±0.76
E	2.49 ±0.02	63.25 ±0.51
F	0.50 NOMINAL	12.70 NOMINAL
G	0.06 NOMINAL	1.52 NOMINAL
H	8.56 ±0.02	217.42 ±0.51
I	7.30 ±0.06	125.42 ±1.52
J	0.25 ±0.02	6.35 ±0.51
K	14.00 ±0.06	355.6 ±1.52
L	11.65 ±0.04	295.91 ±1.02
M	2.05 ±0.03	52.07 ±0.76
N	0.63 ±0.02	16.00 ±0.51

△ OPTIONAL FRONT PANEL  
 △ NOMINAL SHOCKS OR SPACER PROTRUSION

FIGURE 3-2. MOUNTING DIMENSIONS

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3.1 INTRODUCTION

This section provides the information and procedures necessary to install and check out the CDC Model 9410 FINCH Disk Drive. The FINCH is designed, manufactured, and tested with a "Plug-in and Play" installation philosophy. Basically, this philosophy minimizes the requirements for a highly trained person to integrate a FINCH into their system.

3.2 UNPACKING

Visually inspect the shipping container for any obvious damage. During unpacking, exercise care so that any tools being used do not cause damage to the unit. As the drive is unpacked, inspect it for possible shipping damage. All claims of this type should be filed promptly with the transporter involved. If a claim is filed for damages, save the original packing materials.

CAUTION

Do not disengage the rotary-arm shipping lock illustrated in Figure 1-1. Figure 3-1 shows the rotary arm shipping lock in the locked and operating positions. To prevent damage to the read/write heads or the disk itself, move the rotary-arm shipping lock to the operating position only after installation has been completed.

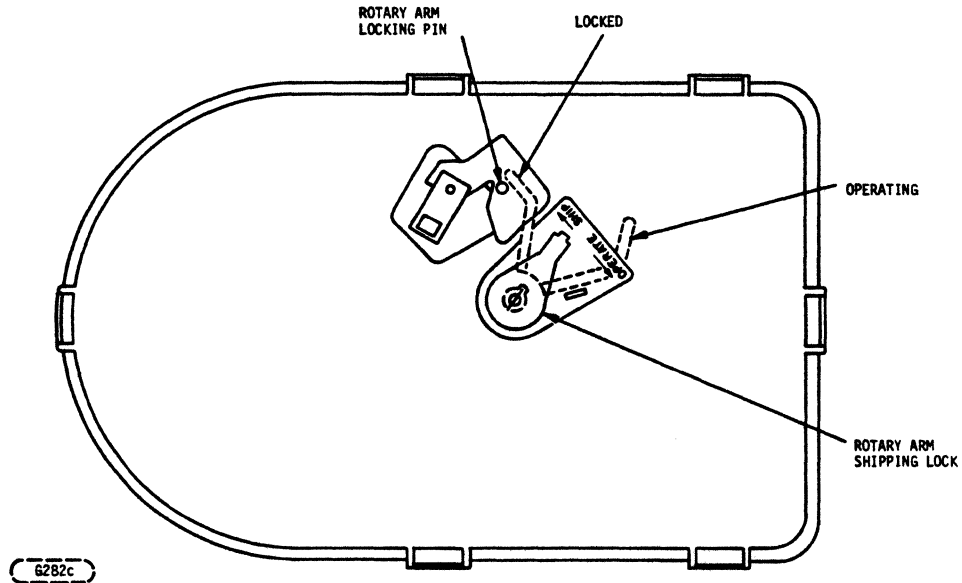


FIGURE 3-1. ROTARY ARM SHIPPING LOCK POSITION

After the drive is unpacked, inspect the drive for any visual internal damage (circuit boards, actuator assembly, and read/write heads). Compare all parts listed on the shipping bill with the received equipment. Discrepancies or damage should be reported to the Sales Representative. Save the packing materials; they can be used for reshipment.

## 3.5 MOUNTING ORIENTATIONS

### CAUTION

The drive should never be shipped or moved without the rotary-arm shipping lock locked to prevent damage to the disk and/or heads.

There are only two mounting orientations: disks in a horizontal plane and disks in a vertical plane. In either the horizontal or vertical mounting, the uppermost casting surface should be in a level position or drive performance may be affected.

### 3.5.1 VERTICAL ORIENTATION MOUNTING

In the vertical orientation, the drive must be mounted so that the heads are above the spindle as shown in Figure 3-4 and 3-5. This is to ensure that the read/write heads will return to the head landing area when power is removed.

Shock mounting in a vertical orientation is accomplished through the use of an optional plate and shock mounts. This plate is mounted to the side of the drive and the shock mounts are attached to the plate and to the cabinet. This configuration and mounting dimensions are shown in Figure 3-5.

Two tapped holes are provided on each side of the drive for securing the drive to the enclosure (cabinet). The drive may be bolted to an overhead member in a suspended mount and/or bolted from below in a supportive mount (Figure 3-3). Screws with 8-32 threads and sufficient length to allow several threads of engagement in the casting after passing through the cabinet mounting member should be used.

Two mounting configurations are possible: either side-by-side in the upright horizontal position or in the vertical position with the nameplate to the top. Figure 3-3 shows these two mounting configurations. Detailed drive orientation information is contained in the Subsection 3.6, Drive Cabling.

The FINCH is designed for multiple unit installation in a standard 19-inch rack. Since the FINCH is a fixed drive, slides are not provided, but tapped holes are placed at various locations on the base casting for mounting in the enclosure. A maximum of two units can be mounted adjacent to each other horizontally, or three units if using the vertical mounting configuration.

THE FINCH has an internal blower for cooling the Main PWA, Motor Control PWA, and mechanical components. This blower pulls air in through the hole in the Main PWA. For this reason, air flow to this blower shall not be restricted. If the drive is mounted to a solid mounting plate on the PWA side of the drive (horizontal mounting), the gap G (Figure 3-2) is the minimal allowable space for air flow. It is preferred that this gap be larger and/or the mounting plate have openings for air flow to the blower.

A sometimes overlooked consideration when mounting several drives in the same enclosure is heat dissipation. Because power supplies, for example, are typically heavy and produce large amounts of heat, they are usually mounted in the bottom of an enclosure. This heat rises to the top of the cabinet or enclosure and the temperature can increase drastically. Cabinet ventilation, either by natural convection or forced cooling, must be provided to keep the internal air temperature around the disk drive within the limits specified by the manufacturer.

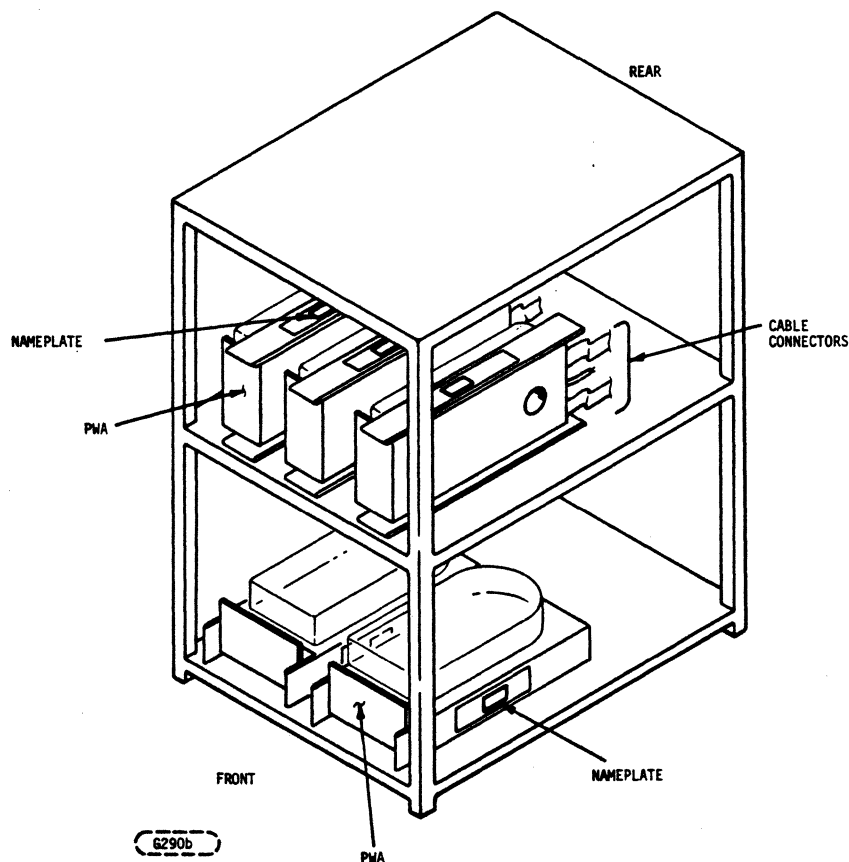
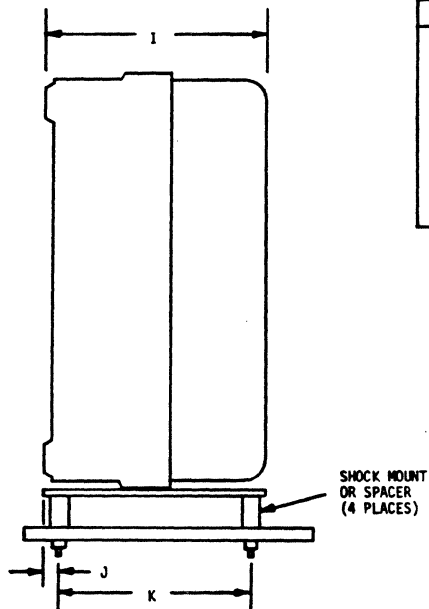
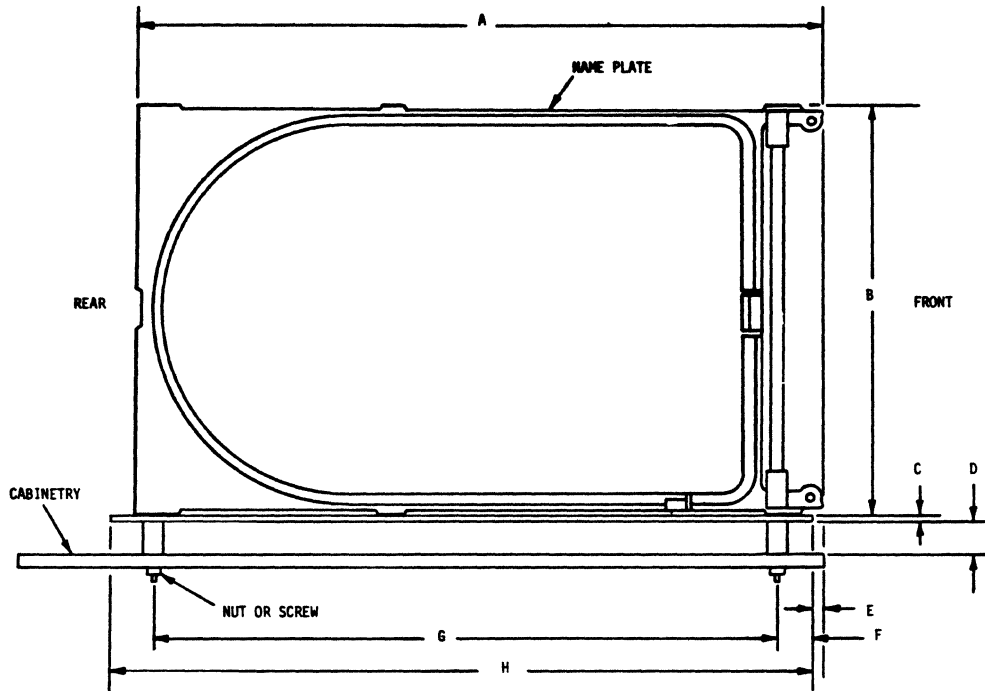


FIGURE 3-3. MOUNTING CONFIGURATIONS



DIMENSION	INCHES	MILLIMETERS
A	14.00 REF	355.60 REF
B	8.56 REF	217.42 REF
C	0.12	3.05
D	0.50	12.70
E	0.50	12.70
F	0.50	12.70
G	12.70	322.58
H	14.30	363.22
I	4.62 REF	117.35 REF
J	0.25	6.35
K	4.00	101.60

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FIGURE 3-5. VERTICAL SHOCK MOUNTING

### 3.5.2 HORIZONTAL ORIENTATION MOUNTING

As shown in Figure 3-2, four 8-32 tapped holes are provided in the base of the main deck casting to facilitate mounting in the horizontal position.

The FINCH may be mounted with optional shock mounts or spacers directly to the rack using 8-32 thread screws. If shock mounts or spacers are used, screw the four mounts into their respective threaded holes as shown in Figure 3-6. Place the drive in the rack or cabinet and secure it with screws with sufficient length to ensure adequate thread engagement.

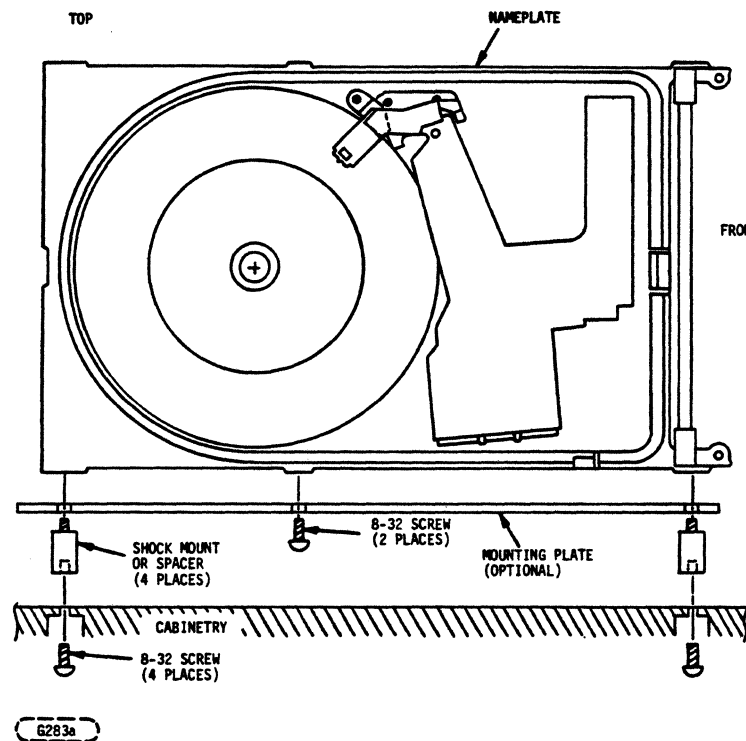


FIGURE 3-4. VERTICAL MOUNTING



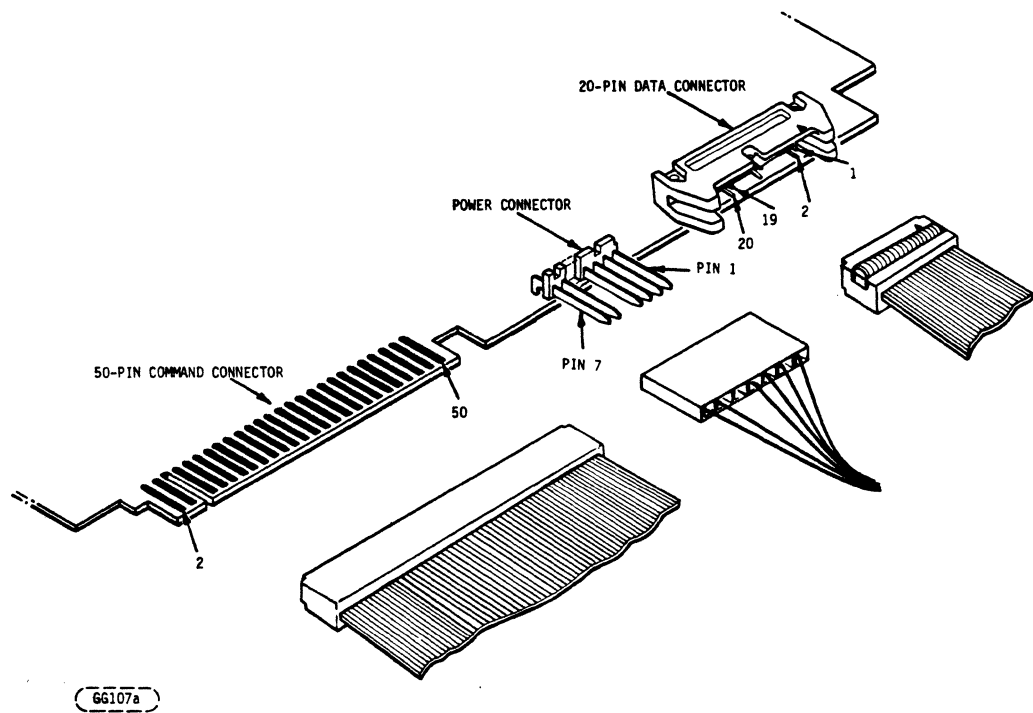


FIGURE 3-7. POWER AND SIGNAL CABLE ORIENTATION

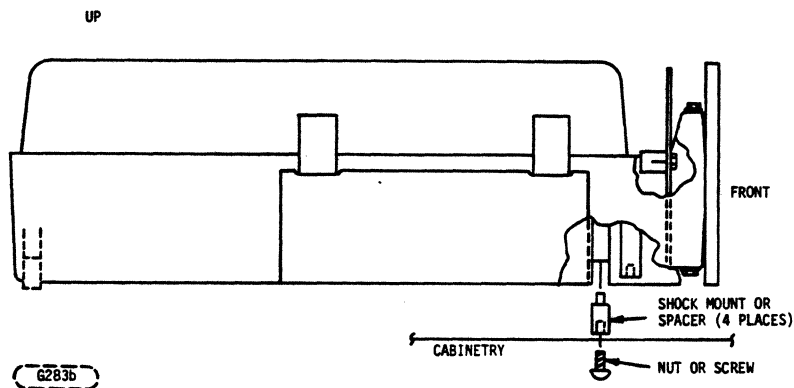
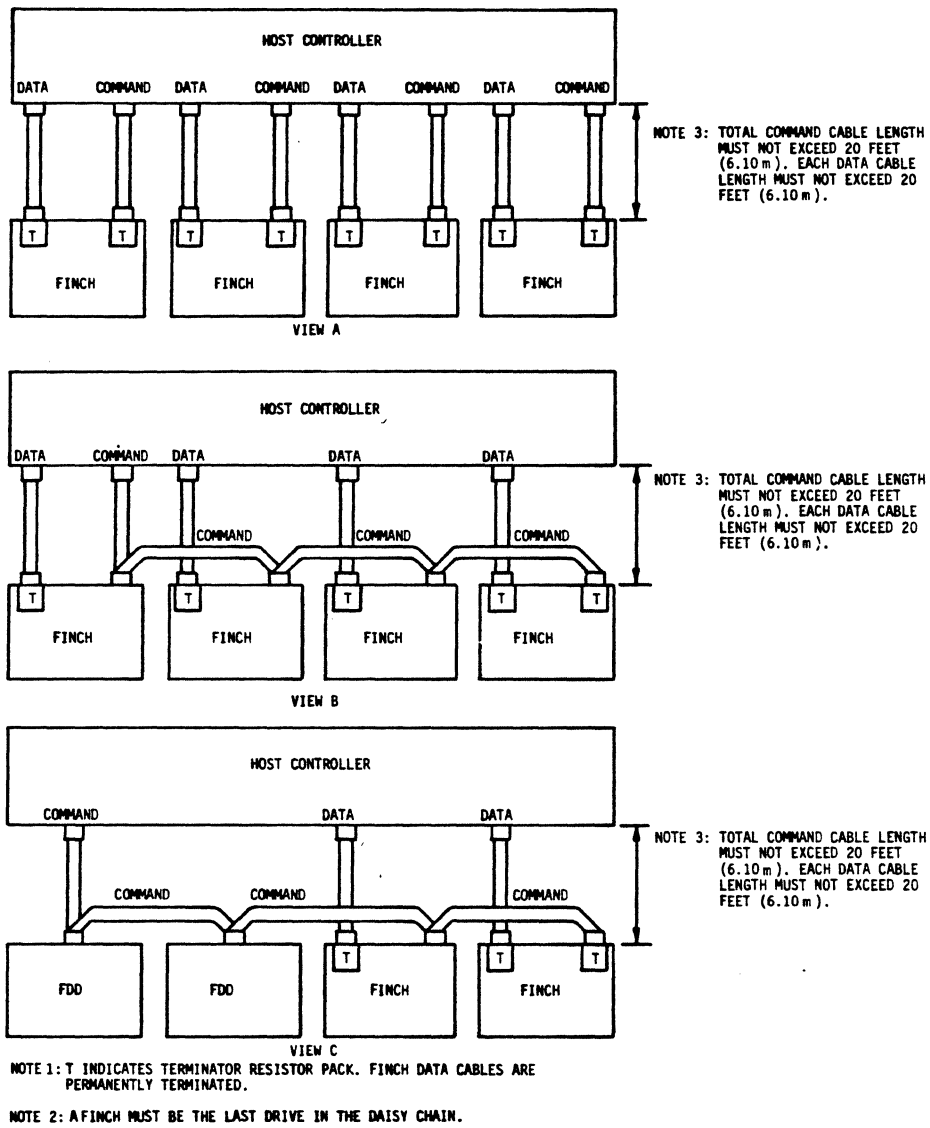


FIGURE 3-6. HORIZONTAL MOUNTING

### 3.6 DRIVE CABLING

The FINCH's digital interface is intended to utilize a single controller design capable of controlling both a FINCH and a flexible disk drive (FDD).

The required connections to the drive are power and signal cables. All input/output cables exit at the rear of the disk drive. The signal cables consist of a command interface and a data interface. Figure 3-7 shows the orientation of the command, DC power and data connectors.



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FIGURE 3.8 . INTERFACE CABLING OPTIONS

Figure 3-8 shows the intercabling and terminator placement for the various drive connection arrangements. Shown are radial-cabled and daisy-chained system configurations. A single drive would be connected as shown for the radial configuration.

Terminator resistor packs are included in each drive. The terminators consist of a DIP resistor module which is plugged into a DIP socket in each drive. An equivalent terminator must be provided in the controller on each input signal line from the FINCH to the controller.

View A of Figure 3-8 shows each drive interfaced to its own Command cable, which, in turn, allows interfacing of more than four drives and a variety of system operational techniques. Each drive has its Data cable and Command cable radially connected to the host controller. The length of each individual cable must not exceed 20 feet (6.1 meters). Terminator resistors must be installed in the host controller for each Data cable and for each Command cable. If instead of all FINCH's there are FDD's plus FINCH's, then a terminator resistor pack also would be installed in each FDD for its Data/Command cable.

A daisy-chain configuration incorporates parallel interfacing of the disk drives on a common Command cable. A maximum of four drives may be daisy-chained on the Command cable. Only the drive which is selected by the host system has its control and data signals enabled through this common interface. View B of Figure 3-8 consists only of FINCH's. Terminator resistors are required in the host controller for each Data cable. Only the last FINCH in the daisy chain requires a terminator resistor pack for the Command cable; the others must be removed. The total combined Command cable length (from the controller to the first drive, to the second and subsequent drives) must not be more than 20 feet (6.1 meters).

View C of Figure 3-8 consists of a common controller for both FINCH's and FDD's. A maximum of four drives (any combination of FDD's plus FINCH's) may be daisy-chained on the Command cable. Terminator resistors are required in the controller and in the last drive in the daisy chain for the Command cable. Terminator resistor packs for the Command cable of other drives would be removed. A terminator resistor is required in the controller for each Data cable. The total combined Command cable length (from the controller to the first drive, to the second and subsequent drives) must not be more than 20 feet (6.1 meters). A FINCH must be the last drive in the daisy chain to ensure FINCH-unique lines are terminated.

### 3.7 UNIT SELECTION

Logical unit designation is accomplished at the time of installation by selecting the appropriate jumper plug located on the baseboard assembly.

Unit selection is performed by installing a keyed jumper plug, onto the Unit Select header (J3). The plug can be installed in one of four possible orientations and will display the unit selected number to the rear of the drive (see Figure 3-9).

### 3.8 INSTALLATION PROCEDURE/INITIAL CHECKOUT AND STARTUP PROCEDURE

This procedure assumes the preceding procedures and requirements of this section have been performed and satisfied.

1. Decide how the drive(s) will be mounted (horizontally or vertically) and mount into enclosure using standard hardware.
2. Decide whether the drive(s) will be daisy-chained or radially connected. Terminate as required.
3. Using 50-conductor flat ribbon cable, connect J1 located on the component side of the PWA to the command cable connector of the controller.
4. Using 20-conductor flat ribbon cable, connect J2 of FINCH to data cable connector of controller.
5. Attach DC power cable from power supply to connector J2 on the rear of the FINCH.
6. An optional ground point is provided on the drive for system grounding (see Figure 1-1).
7. Place the rotary-arm shipping lock to the operating position.
  - Apply power to the drive and observe that the spindle spins. Observe that the actuator mechanism performs a calibration operation in less than one minute, that is, the heads move from the landing area and automatically perform a series of test seeks.
9. Run system diagnostics to ensure the operability of the disk subsystem.

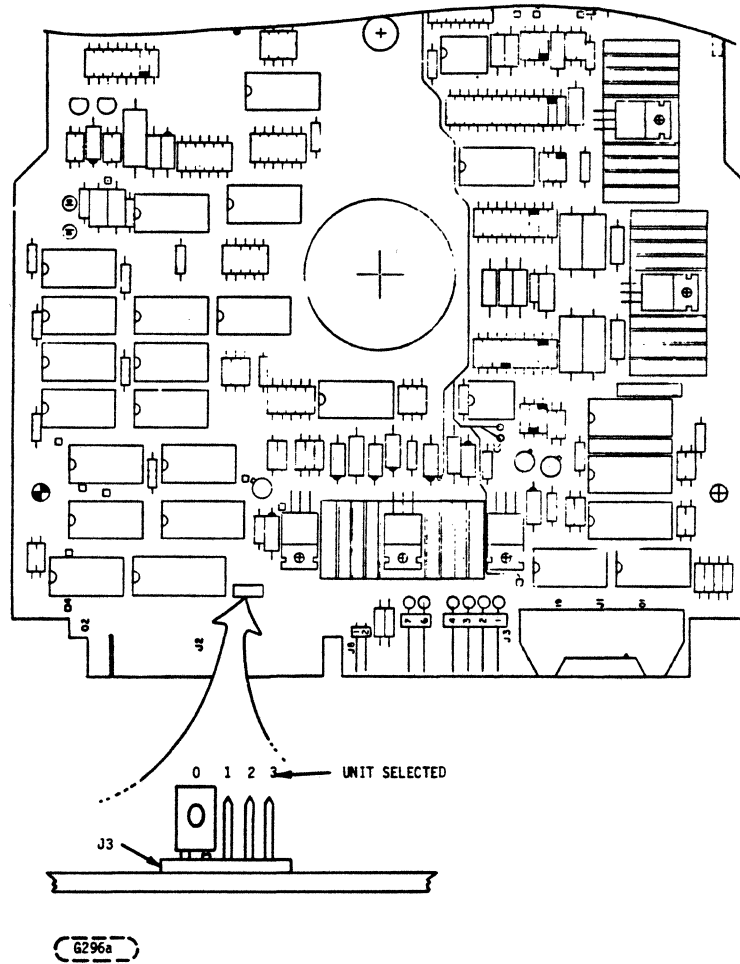


FIGURE 3-9. UNIT SELECTION

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