
CONTROL DATA®
WRENTM DISK DRIVE
MODEL 9415-5

GENERAL DESCRIPTION
OPERATION
INSTALLATION AND CHECKOUT

 MAGNETIC PERIPHERALS, INC.
a Control Data Company

VOLUME 1

HARDWARE INSTALLATION/OPERATION MANUAL

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PREFACE

This Manual provides the information needed to install and operate the CDC Model 9415-5 WREN™ Disk Drive BJ7D5-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, (77715771) along with the unit equipment number should be used when making reference to the WREN 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	77715772
2	Operation	77715773
3	Installation and Checkout	77715774

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.

SAFETY INSTRUCTIONS

1. The WREN is to be installed in a customer supplied cabinet where the surrounding air does not exceed 46° C.
2. Four (4) 6-32 UNC-2A screws are required for installation.
3. The power requirements are:
 - + 5 VDC $\pm 3\%$ at 1.5 A
 - +12 VDC $\pm 5\%$ at 2.5 A (4A for 30 seconds)
4. The power supply must satisfy the low voltage safety requirements.
5. Service is to be provided only by trained service personnel.
6. The incorporation of the WREN into a customer-supplied cabinet must meet the appropriate safety requirements of the country in which it is to be used.

SICHERHEITSANLEITUNG

1. Das Gerät ist ein Einbaugerät, vorgesehen für eine maximale Umgebungstemperatur von 46° C.
2. Zur Befestigung des Wren-Drives werden 4 Schrauben 6-32 UNC-2A benötigt.
3. Als Versorgungsspannungen werden benötigt:
 - + 5 VDC $\pm 3\%$ 1.5 A
 - +12 VDC $\pm 5\%$ 2.5 A (4.0 A für ca. 30 Sek.)
4. Die Versorgungsspannung muss SELV entsprechen.
5. Alle Arbeiten dürfen nur von ausgebildetem Servicepersonal durchgeführt werden.
6. Der Einbau des Drives muss den Anforderungen gemäss DIN IEC 380/VDE 0806/8.81 entsprechen.

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1.1 INTRODUCTION

The CDC 9415-5 WREN™ 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 three rigid 5-1/4 inch non-removeable fixed disk media. The WREN uses low-mass flying read/write heads attached to a precisely controlled rotary positioner. It has an unformatted data storage capacity of 21.7 or 36.2 megabytes, depending upon configuration.

1.2 GENERAL DESCRIPTION

1.2.1 STANDARD FEATURES

The following standard features of the Model 9415-5 WREN Disk Drive are:

- Seagate Interface.
- 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.
- Shock mounts.

1.2.2 OPTIONAL FEATURES

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

- 21.7 or 36.2 megabytes rigid fixed-disk data storage capacity.

1.2.3 ACCESSORIES

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

- Front panel kit, TBD
- Power supply - includes five-foot power cable, TBD

- Hardware Maintenance Manual, 77715775
- Top Mount PWA Adapter, 77715495

1.2.4 MAJOR COMPONENTS

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

CAUTION

NEVER disassemble the WREN. 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 and solenoid brake external to the sealed area can be replaced without special facilities.

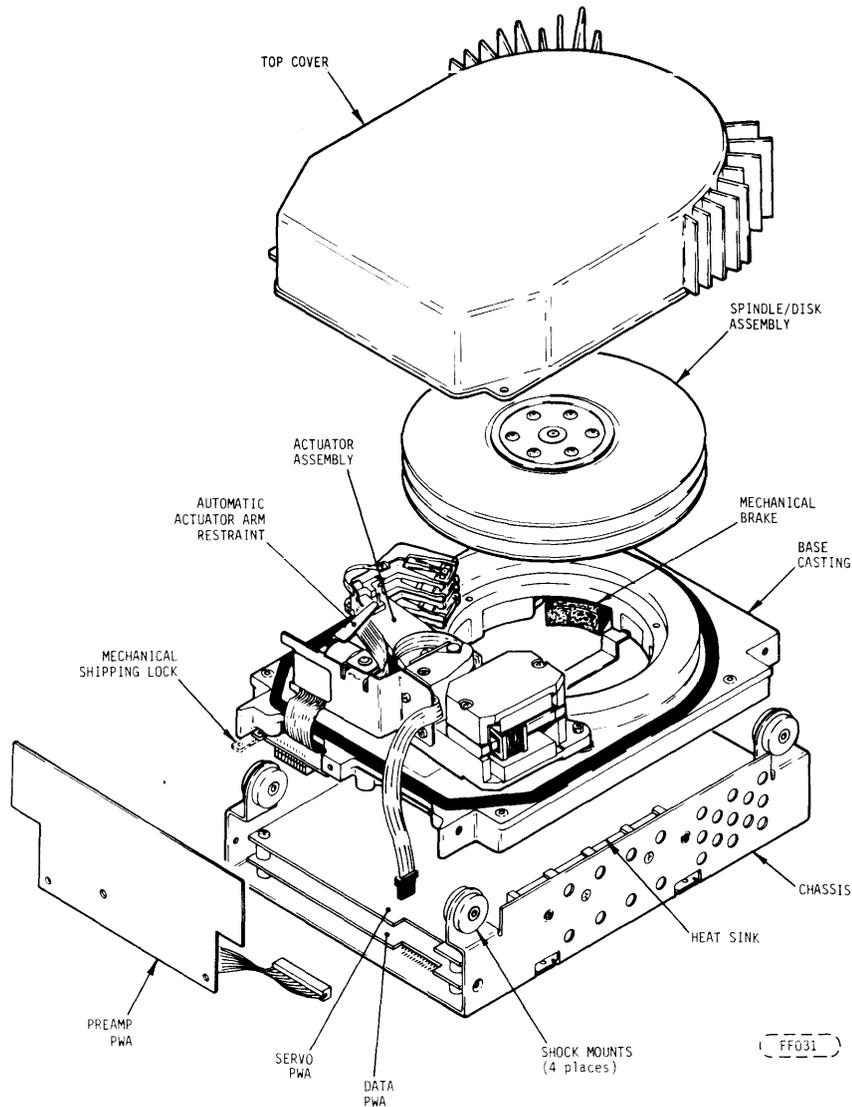


FIGURE 1-1. 9415-5 WREN

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 WREN, 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 the front panel indicator provides limited failure conditions (see para. 2.2.2) 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. Mechanical shipping lock must be in operating position.
2. The operating temperature of the drive is 50° to 115° F (10° to 46° C) with a maximum temperature change of 18° F (10° C) per hour.
3. Additional information on the drive can be found in the Hardware Maintenance Manual 77715775.
4. In case of a malfunction, the unit is to be serviced only by trained personnel.

2.2.2 FRONT PANEL INDICATOR (available only with front panel kit)

The front panel indicator under normal operation will serve as a Drive Selected indicator. It will also flash to indicate a drive failure when one of the following conditions exist.

1. Rotor is locked.
2. Spindle speed exceeds $\pm 5\%$ tolerance for more than 30 seconds.
3. The Wren cannot load heads after 6 attempts (ie mechanical shipping lock left on, PLO does not lock, automatic arm restraint fails to release, etc).

3.1 INTRODUCTION

This section provides the information and procedures necessary to install and checkout the CDC Model 9415-5 WREN Disk Drive. The WREN 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 WREN into their system.

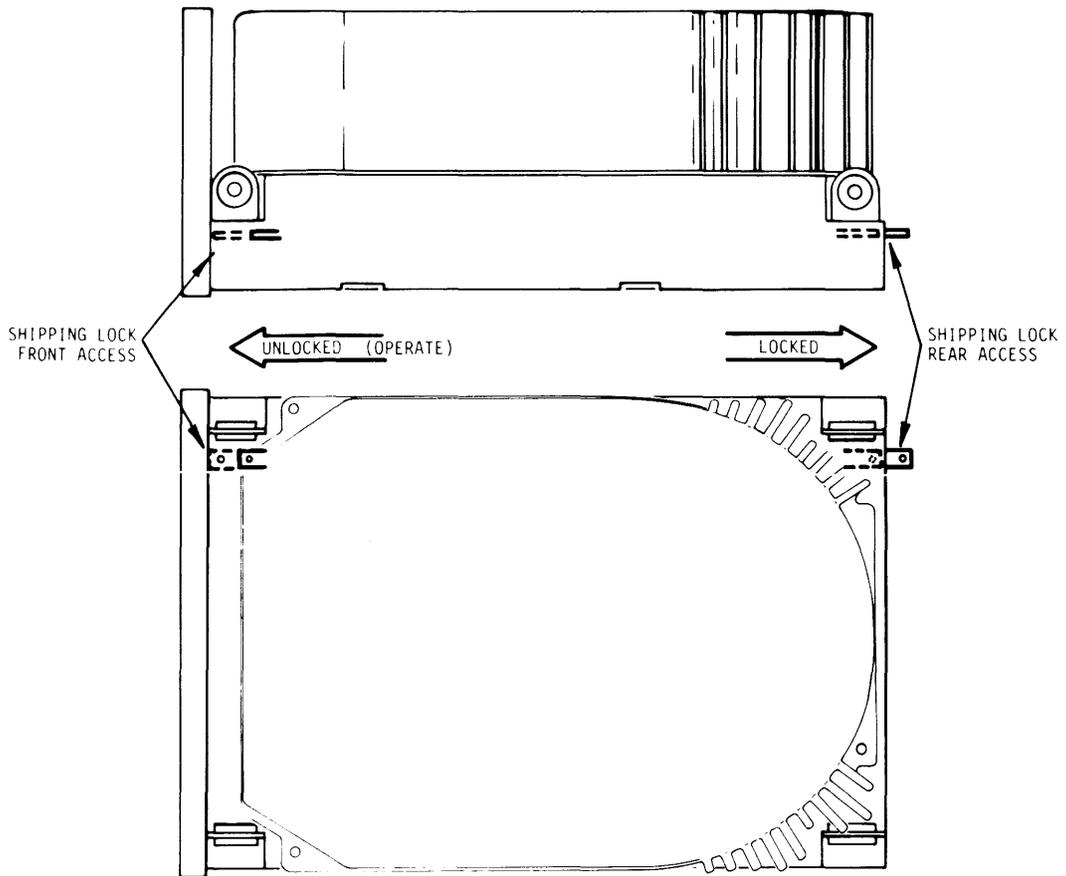
3.2 UNPACKING

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 mechanical shipping lock illustrated in Figure 1-1. Figure 3-1 shows the mechanical shipping lock which is accessible from both the front and the rear of the WREN. To prevent damage to the read/write heads or the disk itself, move the mechanical shipping lock to the operating position only after installation has been completed.

After the drive is unpacked, inspect the drive for any visual damage. 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.



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REAR ACCESS

THE SHIPPING LOCK WILL PROTRUDE OUT THE REAR IN THE LOCKED POSITION. A HOLE IN THE ARM OF THE LOCK IS PROVIDED FOR ACTIVATING THE LOCK.

FRONT ACCESS

A HOLE IN THE FRONT PANEL ALLOWS FRONT ACCESSIBILITY TO THE SHIPPING LOCK.

FIGURE 3-1. MECHANICAL SHIPPING LOCK POSITION

3.3 OPERATING ENVIRONMENT

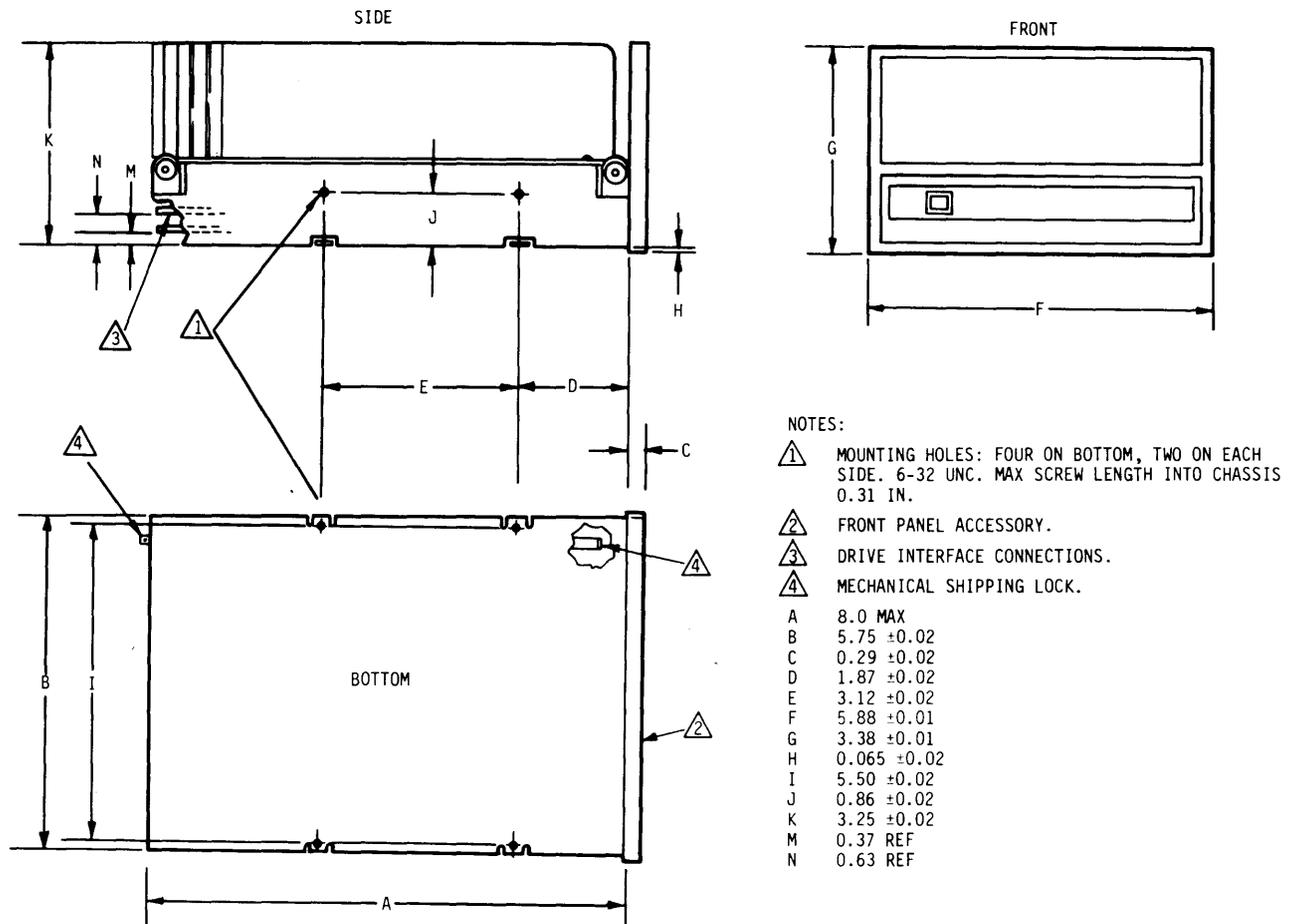
The environmental conditions required for optimum performance of the disk drive are, in general, the same as those in an office environment with minimum or no environmental control. These conditions are:

Temperature	50° to 115° F (10° to 46° 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.



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FIGURE 3-2. MOUNTING DIMENSIONS

The WREN is designed for multiple unit installation in a standard 19-inch rack. Since the WREN is a fixed drive, slides are not provided, but tapped holes are placed at various locations on the chassis for mounting in the enclosure.

The WREN has an internal blower for cooling the PWA's and mechanical components. The 9415-5 WREN design also uses the outer case to dissipate heat. Direct contact to the internal WREN heat sink can be made through the two mounting holes on the right side of the WREN (See Figure 3-3). Good metal to metal thermal contact of this surface with the customer cabinet mounting hardware is highly recommended for optimized heat transfer. Consideration should also be given to minimizing restriction of airflow through cooling holes in the drive.

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 Product Specification.

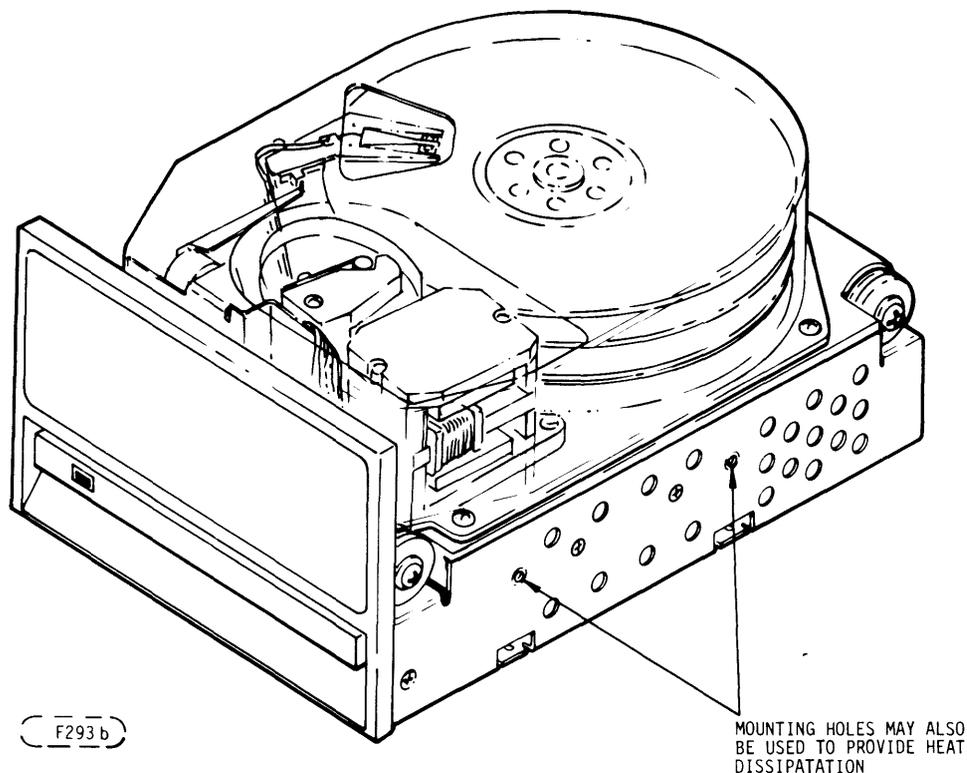


FIGURE 3-3. HEAT SINK MOUNTING HOLE LOCATION

3.5 MOUNTING ORIENTATIONS

CAUTION

The drive should never be shipped without the mechanical shipping lock in the locked position 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 mechanical shipping lock is in the up position as shown in Figure 3-1. This is to ensure that the read/write heads will return to the dedicated landing zone when power is removed.

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. Screws with 6-32 threads and sufficient length to allow several threads of engagement in the casting after passing through the cabinet mounting member should be used. Maximum screw penetration into Wren chassis should not exceed 0.31 inch.

3.5.2 HORIZONTAL ORIENTATION MOUNTING

As shown in Figure 3-2, four 6-32 tapped holes are provided in the base of the chassis to facilitate mounting in the horizontal position.

The WREN may be mounted directly to the rack using 6-32 thread screws. Place the drive in the rack or cabinet and secure it with screws with sufficient length to ensure adequate thread engagement.

3.6 DRIVE CABLING

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 cable and a data interface cable. Figure 3-4 shows the orientation of the command, DC power and data connectors.

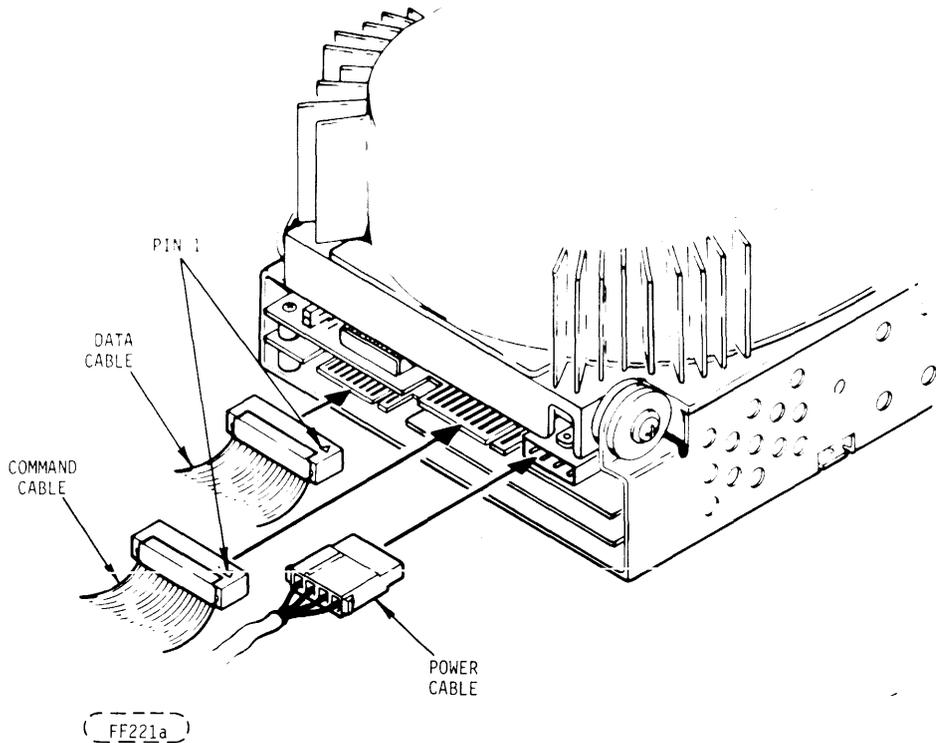


FIGURE 3-4. COMMAND, DATA, AND POWER CABLE REQUIREMENTS

Figure 3-5 shows the intercabling and terminator placement for the various drive connection arrangements. Shown are radial 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. (See Figure 3-6 for location.) An equivalent terminator must be provided in the controller on each input signal line from the WREN to the controller.

RADIAL CONFIGURATION

View A of Figure 3-5 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.

DAISY CHAINED CONFIGURATION

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

host controller for each Data cable. Only the last WREN in the daisy chain requires a terminator resistor pack (see Figure 3-6) 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).

3.7 DRIVE SELECTION AND TERMINATION

Logical unit designation and termination is accomplished at the time of installation by selecting the appropriate jumper plug located on the data board assembly.

Drive selection is performed by installing a jumper plug, onto the Drive Select header (J3). The plug can be installed in one of four possible orientations. (See Figure 3-6).

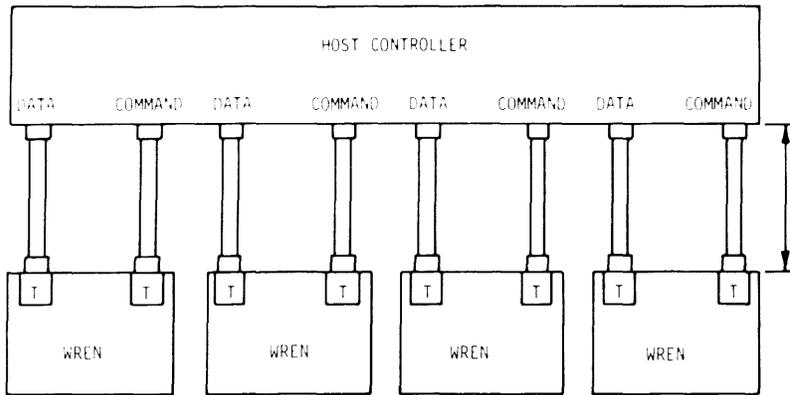
The Radial Select Jumper allows the user to keep the drive always selected for radial use. The Radial Select jumper must be installed in the location as shown in Figure 3-6.

3.8 AUTO VELOCITY ADJUST

After power has been applied and spindle speed is in tolerance, the WREN actuator will perform several seeks (approximately 15) to fine tune the actuator for optimum performance. After all seeks are complete, the heads will be loaded over cylinder 000.

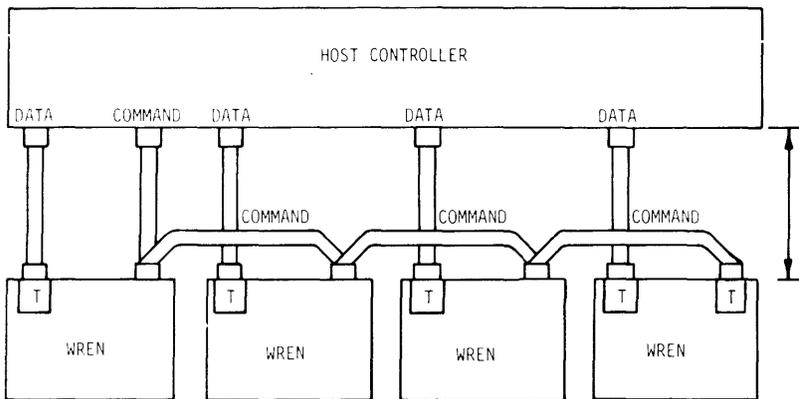
3.9 SELF SEEK TEST

The WREN has the capability to perform full stroke seeks by installing a jumper as shown in Figure 3-7. Removal of the front panel is required. The jumper must be installed prior to power-up and the full stroke seeks are performed immediately after the auto velocity adjust is performed. Full strokes will continue until the WREN is powered down or jumper is removed.



VIEW A

TOTAL COMMAND CABLE LENGTH MUST NOT EXCEED 20 FEET (6.10 m). EACH DATA CABLE LENGTH MUST NOT EXCEED 20 FEET (6.10 m).



VIEW B

TOTAL COMMAND CABLE LENGTH MUST NOT EXCEED 20 FEET (6.10 m). EACH DATA CABLE LENGTH MUST NOT EXCEED 20 FEET (6.10 m).

T INDICATES TERMINATOR RESISTOR PACK.
 WREN DATA CABLES ARE PERMANENTLY TERMINATED.

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FIGURE 3-5. INTERFACE CABLING OPTIONS

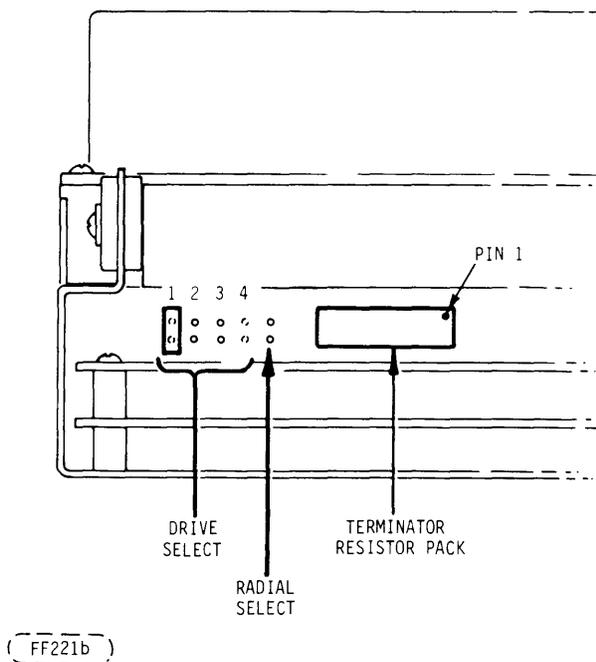


FIGURE 3-6. DRIVE SELECT AND TERMINATION JUMPER LOCATIONS

3.10 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. Configure the drive to the correct Drive Select Address using the drive select jumper.
4. Using 34-conductor flat ribbon cable, connect the Command cable from the controller to the drive.
5. Using 20-conductor flat ribbon cable, connect the data cable from the controller to data cable connector of drive.
6. Attach DC power cable from power supply to connector on the rear of the WREN.

7. Move the mechanical shipping lock to the operating position. Front Panel Indicator will flash if the shipping lock is not released.
8. 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.

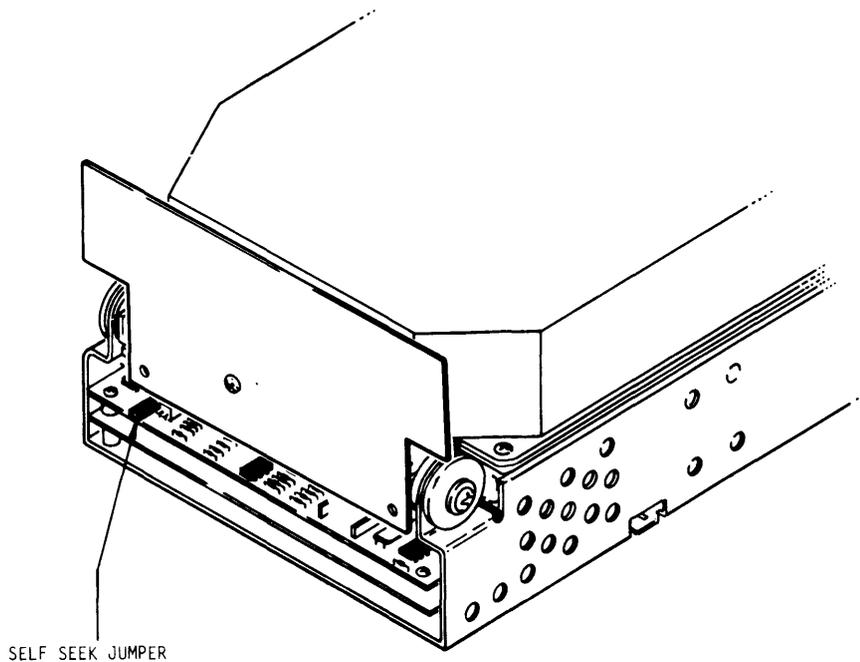


FIGURE 3-7. SELF SEEK JUMPER LOCATION

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