83326010

CONTROL DATA

CDC® EMD/SABRE EIGHT-INCH MODULE DRIVE

PA8M2

PA8R2

ABOUT THE DISK DRIVE

INSTALLING THE DISK DRIVE

OPERATING THE DISK DRIVE

TESTING THE DRIVE

USER'S MANUAL

REVISION RECORD

REVISION	DESCRIPTION
A (11-01-87)	Manual Released.
B (05-31-88)	Manual revised. This revision includes information about the sweep cycle feature, incorporates a new control board, and includes miscellaneous technical changes.

REVISION LETTERS I, O, Q AND X ARE NOT USED.

Address comments concerning this manual to:
Control Data Corporation
Technical Publications Dept.
5950 Clearwater Drive
Minnetonka, Mn 55343
or use Comment Sheet in the back of this manual.

83326010 B

IMPORTANT SAFETY INFORMATION AND PRECAUTIONS

Use of proper safety and repair techniques is important for safe, reliable operation of this unit. Service should be done only by qualified persons. We recommend the procedures in this manual as effective ways of servicing the unit. Some procedures require the use of special tools. For proper maintenance and safety, you must use these tools as recommended.

The procedures in this manual and labels on the unit contain warnings and cautions that must be carefully read and followed to minimize or eliminate the risk of personal injury. The warnings point out conditions or practices that may endanger you or others. The cautions point out conditions or practices that may damage the unit, possibly making it unsafe for use.

You must also understand that these warnings and cautions are not exhaustive. We cannot possibly know, evaluate, and advise you of all the ways in which maintenance might be performed or the possible risk of each technique. Consequently, we have not completed any such broad evaluation. If you use a non-approved procedure or tool, first ensure that the method you choose will not risk either your safety or unit performance.

For the safety of yourself and others, observe the following warnings and precautions.

- Perform all maintenance by following the procedures in this manual.
- Follow all cautions and warnings in the procedures and on unit labels.
- Use the special tools called out in the procedures.
- Use sound safety practices when operating or repairing the unit.
- Use caution when troubleshooting a unit that has voltages present. Remove power from unit before servicing or replacing parts.
- Wear safety glasses when servicing units.
- Wear safety shoes when removing or replacing heavy parts.

(continued on next page)

- Use only designated CDC/MPI replacement parts. Non-CDC/MPI replacement parts can adversely affect safety in addition to degrading reliability, increasing maintenance downtime, and voiding warranty coverage.

- Use care while working with the power supply because line voltages are always present when the ac power cord is connected to a power source. Setting the power supply switch to position "0" disables dc power to the drive but has no effect on ac power within the supply. For complete safety, remove the ac power plug from the site power outlet.

- In case of fire or other emergency, isolate the drive from main power by removing the drive power plug from the ac outlet. In situations where pulling the plug is not possible or practical, use the system main power disconnect to isolate the drives from main power.

- When the drive is mounted in an equipment rack or cabinet, ensure that the internal temperature of the rack or cabinet will not exceed the limits defined for the drive. Where units are stacked vertically, pay special attention to the top where temperatures are usually highest.

- This drive is designed to be installed and operated in accordance with IEC380, IEC435, VDE0805, and VDE0806.

- Follow the precautions listed under Protecting The Drive From Electrostatic Discharge.

- If the power supply is placed on a bench for testing, position the supply so all ventilation holes are open, to allow proper air flow to internal components.

- Do not attempt to disassemble the module. It is not field repairable. Replace the entire module assembly if it is defective.

- Do not operate the drive over an extended period of time without the top cover installed.

- If the power supply is connected to an IT network, ensure that the input voltage is limited to 230 volts.

- Do not attempt to disassemble the power supply. It is not field repairable. Replace the entire supply if it is defective.

- If you do not use a recommended CDC power supply, ensure the supply meets the specifications in this manual and is designed to be used in accordance with IEC380, IEC435, VDE0805, and VDE0806.

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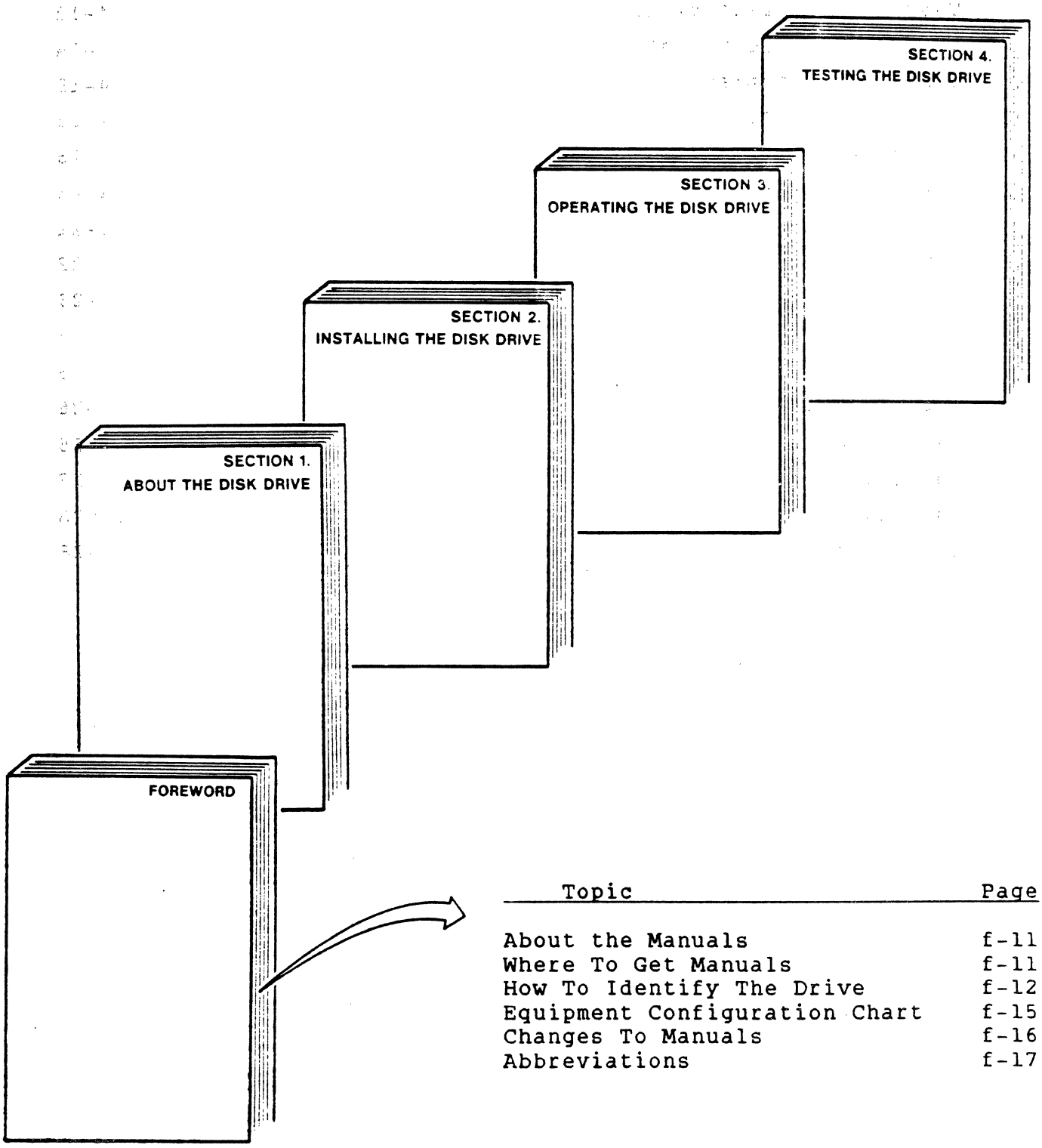
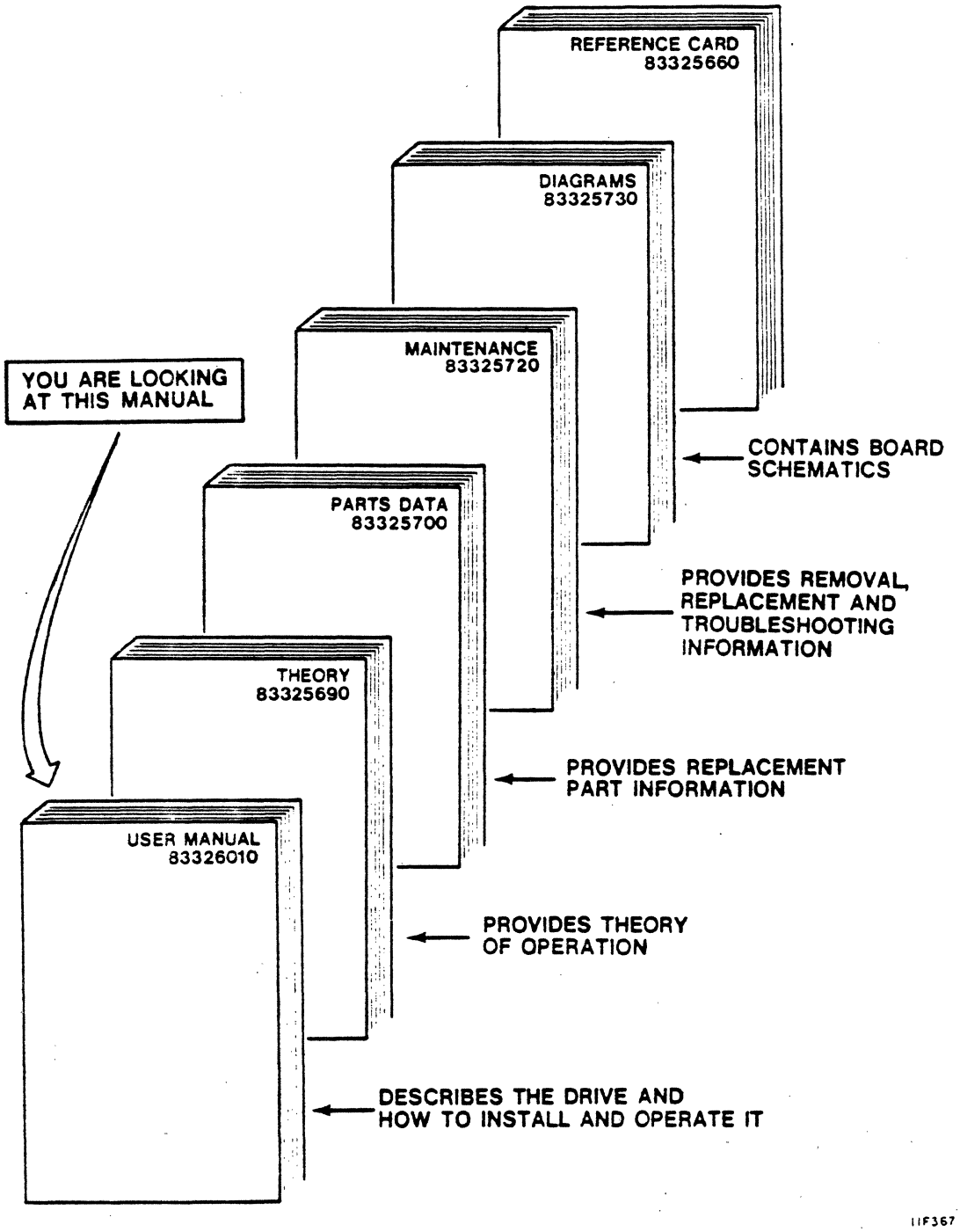
FOREWORD




REFERENCE CARD
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YOU ARE LOOKING AT THIS MANUAL
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83325700
PROVIDES REMOVAL, REPLACEMENT AND TROUBLESHOOTING INFORMATION
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PROVIDES REPLACEMENT PART INFORMATION
USER MANUAL
83326010
PROVIDES THEORY OF OPERATION
DESCRIBES THE DRIVE AND HOW TO INSTALL AND OPERATE IT
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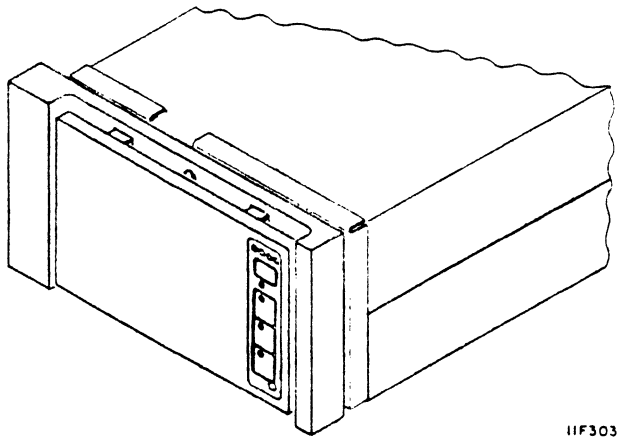
ABOUT THIS MANUAL

This manual is for you, the user of the CONTROL DATA® PA8M2/PA8R2 Eight-inch Module Drive (EMD). This manual describes the disk drive and how to install and operate it. Diagnostic testing and status information is also provided.



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ABOUT THE OTHER EMD MANUALS

The other manuals in the set of manuals for the EMD provide theory of operation, diagrams (board schematics), parts data, and repair information. Some of these manuals pertain to more than one EMD model.

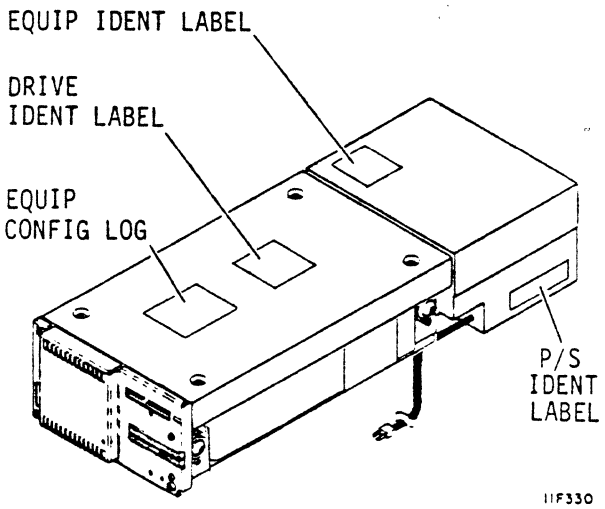
WHERE TO GET MANUALS

Additional copies of this manual or any of the other EMD manuals can be obtained at the address shown.

Control Data Corporation
Literature Distribution Services
308 North Dale Street
St. Paul, MN 55103

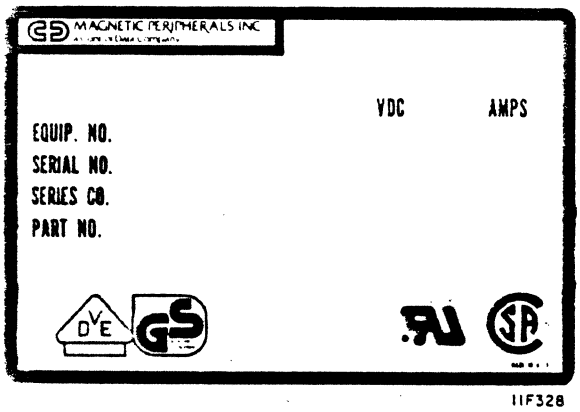
HOW TO IDENTIFY YOUR DRIVE

You may need to identify the exact characteristics of your drive at some time in the future. The various equipment identification labels and the equipment configuration log help you and service persons identify your drive and its exact characteristics.



DRIVE IDENTIFICATION LABEL

The equipment identification label on the top cover of the drive identifies the physical and logical characteristics of the drive at the time it was manufactured.



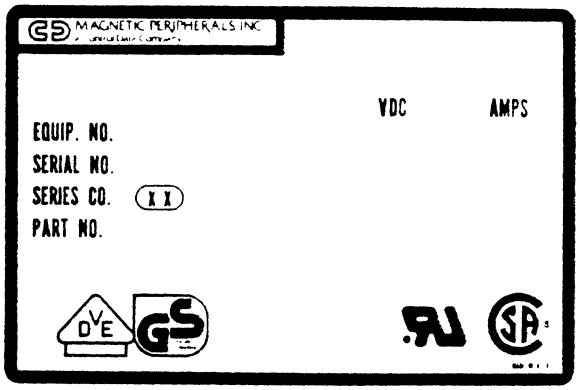
EQUIPMENT NUMBER

The equipment number has two parts. The equipment identifier specifies the drive family and basic functional characteristics. The type identifier shows the features of your drive such as 50 Hz or 60 Hz, capacity, etc.

PA8	M2A
↑	↑
|	|
Equipment Identifier	Type Identifier

SERIES CODE

All drives interchange at the system level regardless of series code. Part differences exist in drives with different series codes. The series code helps identify your drive for parts ordering purposes.



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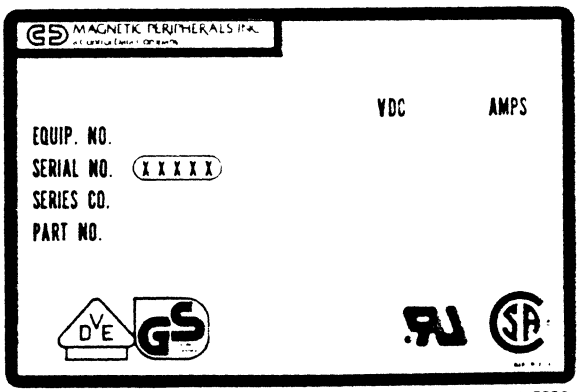
SERIAL NUMBER

Each drive is assigned a serial number. Serial numbers are assigned sequentially within a family of drives. No two drives have the same serial number.



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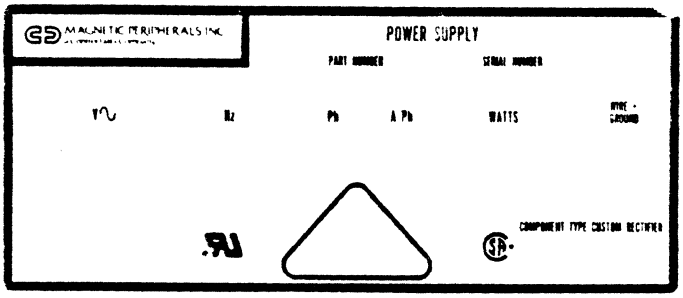
POWER SUPPLY IDENTIFICATION LABEL

The label on the power supply identifies the parts that make up the drive installation. It also shows power information for the power supply.



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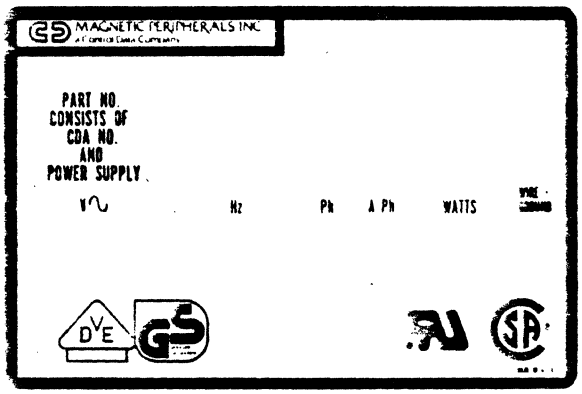
PART NUMBERS

An equipment package part number is assigned to the entire unit -- including the drive, power supply and, if applicable, any painted panels, installation hardware etc.

The complete drive assembly (CDA) is the number assigned to the drive only.

The power supply assembly number is the number assigned to the power supply only.



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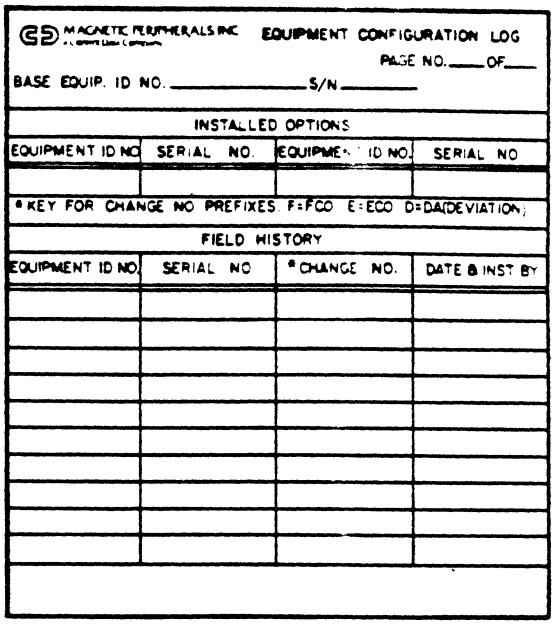
DOES YOUR MANUAL MATCH THE DRIVE?

Changes made to the drive, whether made at the factory or by a service person after it is installed, cause changes in the manuals.

Your manual matches the drive if the field change orders (FCOs) and engineering change orders (ECOs) listed on the equipment configuration log are shown either on the revision record at the front of this manual or on the first sheet of a revision packet(s) supplied with it.

EQUIPMENT CONFIGURATION LOG

This log shows the changes that were made to the drive during its life cycle. The entries on this log may have been made in manufacturing or by service persons. They help track the history of the drive for service purposes. It is important that this log be kept current by persons who install any changes.



MAGNETIC PERIPHERALS INC EQUIPMENT CONFIGURATION LOG

PAGE NO.____OF____

BASE EQUIP. ID NO._____S/N_____

INSTALLED OPTIONS			
EQUIPMENT ID NO.	SERIAL NO.	EQUIPMENT ID NO.	SERIAL NO.

* KEY FOR CHANGE NO PREFIXES F=FCO E=ECO D=DA(DEVIATION)

FIELD HISTORY			
EQUIPMENT ID NO.	SERIAL NO.	* CHANGE NO.	DATE & INST BY

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EQUIPMENT CONFIGURATION CHART

The equipment configuration chart below identifies each version of the equipment covered by this manual.

Equipment Number	Interface Type	Other Characteristics
PA8M2A	IPI	850 MB, Std Format
PA8M2B	IPI	850 MB, 512 Byte Format
PA8M2C	IPI	850 MB, 1024 Byte Format
PA8R2A	IPI	1230 MB, Standard Format
PA8R2B	IPI	1230 MB, 512 Byte Format
PA8R2C	IPI	1230 MB, 1024 Byte Format

CHANGES TO THIS MANUAL

A List Of Effective Pages is provided at the back of this manual. It lists each page in the manual and its revision level. If you receive a manual and one or more packets of revised pages, each of the packets also contains a new List Of Effective Pages.

Instructions for inserting the revised pages into the manual are provided with each packet. If you have more than one packet to insert, always start with the least current and work toward the latest revision.

HOW CHANGES ARE INDICATED

New features, technical changes, additions, and deletions in this manual are indicated in three ways:

- A vertical bar in the outer margin of a page marks a changed area.
- A dot by the page number indicates the entire page contains new or changed information.
- A vertical bar by the page number indicates the information was moved from another page, but there were no technical or editorial changes.

ABBREVIATIONS

A	Ampere
ABV	Above
ac	Alternating Current
ACK	Acknowledge
ADD	Address
ADDR	Address
ADJ	Adjust
ADRS	Address
AGC	Automatic Gain Control
ALT	Alternate
AM	Address Mark
AME	Address Mark Enable
AMP	Amplifier, Ampere
ASSY	Assembly
ATN	Attention
BLW	Below
BSY	Busy
C	Celsius
CB	Circuit Breaker
C/D	Control/Data
CDA	Complete Drive Assembly
CDC	Control Data Corporation
CH	Channel
CHK	Check
CLK	Clock
CLR	Clear
cm	Centimetre
CNTR	Counter
COMP	Comparator
CONT	Control
CONTD	Continued
CT	Center Tap
CYL	Cylinder
D/A	Digital to Analog
dc	Direct Current
DB	Data Bit
DET	Detect
DIV	Division
DLY	Delay

ABBREVIATIONS (Contd)

DRVR	Driver
ECL	Emitter Coupled Logic
ECO	Engineering Change Order
EMC	Electromagnetic Compatibility
EMD	Eight-Inch Module Drive
EN	Enable
ENBL	Enable
EPROM	Erasable Programmable Read Only Memory
ESD	Electrostatic Discharge
EXT	External
F	Fahrenheit, Fuse
FCO	Field Change Order
FDBK	Feedback
FIG	Figure
FLT	Fault
FRU	Field Replaceable Unit
ft	Foot
FTU	Field Test Unit
FWD	Forward
GND	Ground
HD	Head
HEX	Hexagon
Hg	Mercury
HR	High Resolution
HYST	Hysteresis
Hz	Hertz
IC	Integrated Circuit
ID	Identification
IDENT	Identification
in	Inch
IND	Index
INTRPT	Interrupt
I/O	Input/Output
IPB	Illustrated Parts Breakdown
IPS	Inches per Second

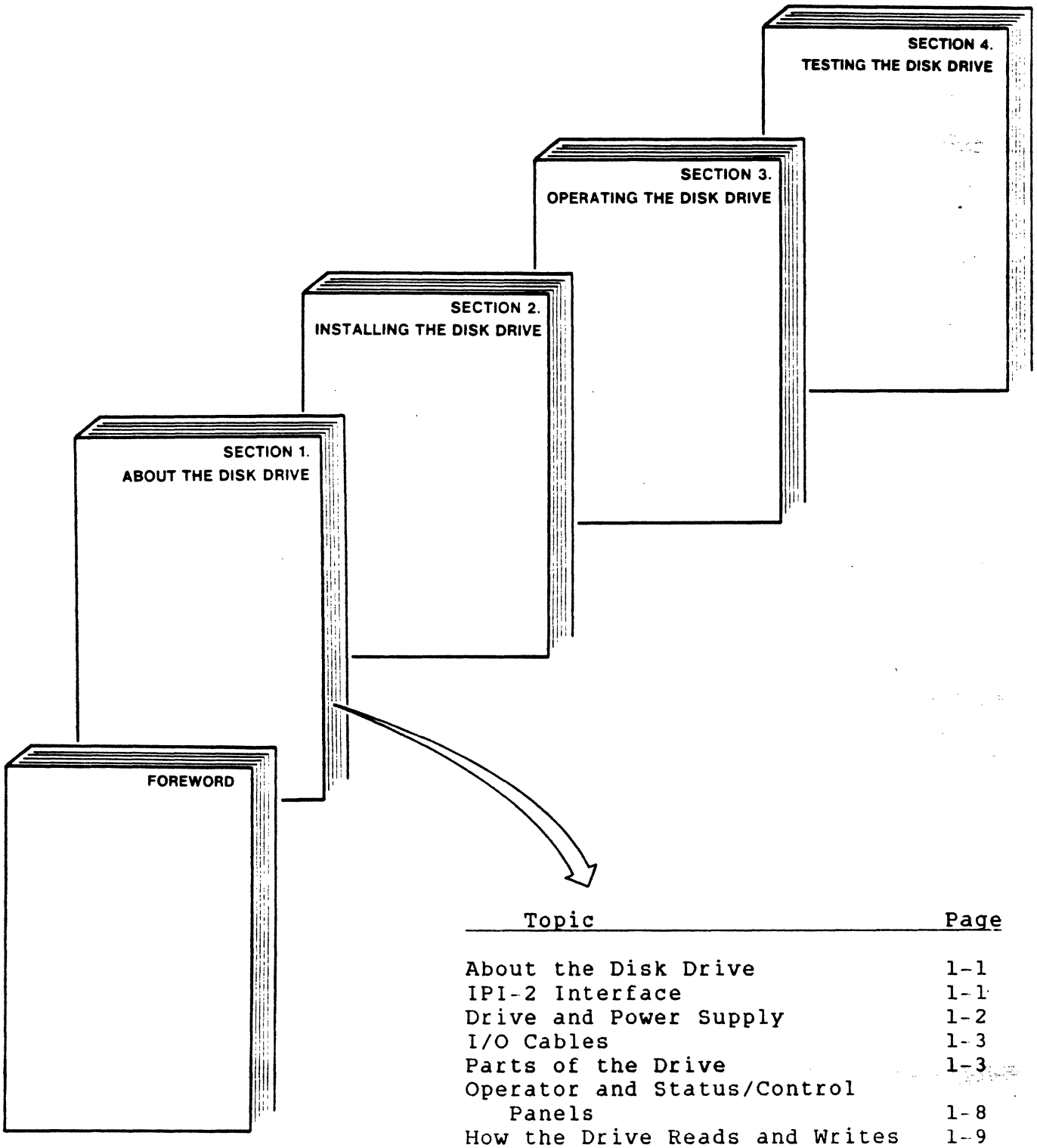
ABBREVIATIONS (Contd)

kg	Kilogram
kPa	Kilopascal
kW	Kilowatt
lb	Pound
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LSI	Large Scale Integration
LTD	Lock to Data
m	Metre
MAX	Maximum
MB	Megabyte
MEM	Memory
MHz	Megahertz
mm	Millimetre
MPI	Magnetic Peripherals, Inc.
MPU	Microprocessor Unit
MRK	Mark
ms	Millisecond
MSG	Message
MTR	Motor
mV	Millivolt
NC	No Connection
NORM	Normal
NRZ	Non Return to Zero
ns	Nanosecond
OC	On Cylinder
OS	One-Shot
OSC	Oscillator
P	Plug
PD	Peak Detect
pF	Picofarad
PG	Page
PHH	Phillips Head
PLO	Phase Lock Oscillator
PROC	Procedure
PROG	Programmable
PS	Power Supply
PWR	Power
RCVR	Receiver
RD	Read
RDY	Ready

ABBREVIATIONS (Contd)

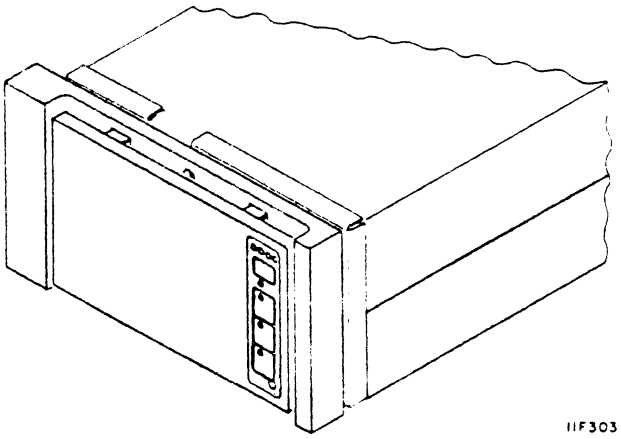
REF	Reference
REQ	Request
RES	Resolution
REV	Reverse, Revision
RGTR	Register
r/min	Revolutions Per Minute
RST	Reset
RTZ	Return to Zero
R/W	Read/Write
s	Second
S/C	Series Code
SEC	Second
SEL	Select
SEQ	Sequence
SPD	Speed
SS	Sector Switch
T	Tracks to go
TF	Thread Forming
TIM	Timer
TP	Test Point
TSP	Troubleshooting Procedure
TTL	Transistor-Transistor Logic
V	Volts, Voltage
Vbb	Bias Voltage
VCC	Bias Voltage
VCO	Voltage Controlled Oscillator
W	Watts
W/	With
W/O	Without
W PROT	Write Protect
W+R	Write or Read
W·R	Write and Read
WRT	Write
XFR	Transfer
Ω	Ohms
$	Hexadecimal Address
uF	Microfarad
us	Microsecond

SECTION
ABOUT THE DISK DRIV



ABOUT THE DISK DRIVE

The Eight-Inch Module Drive (EMD/SABRE) is a high-speed, random access disk drive. The front panel shown is used when the drive is mounted beside another drive in the optional 2X (two drives side-by-side) drawer. The 2X drawer can be mounted in a standard 19-inch rack, or the drive can be mounted in a custom cabinet or enclosure.



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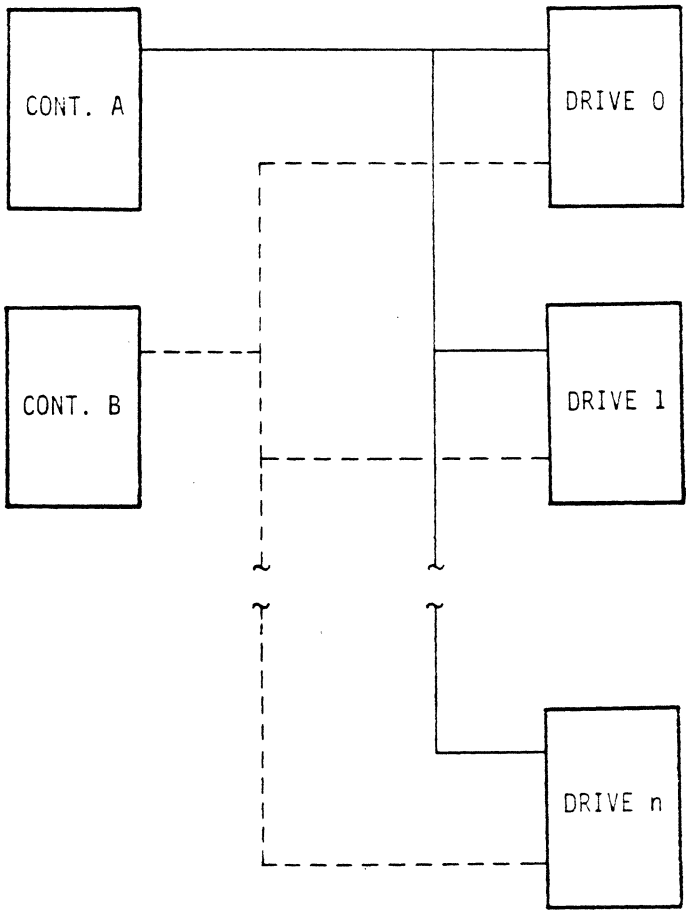
ABOUT THE INTELLIGENT PERIPHERAL INTERFACE (IPI)

The drive communicates with the host using the Intelligent Peripheral Interface (IPI) and protocol. The signals on the interface cables are listed in Section 2 of this manual. The IPI signals and protocol are described in detail in the Theory manual.



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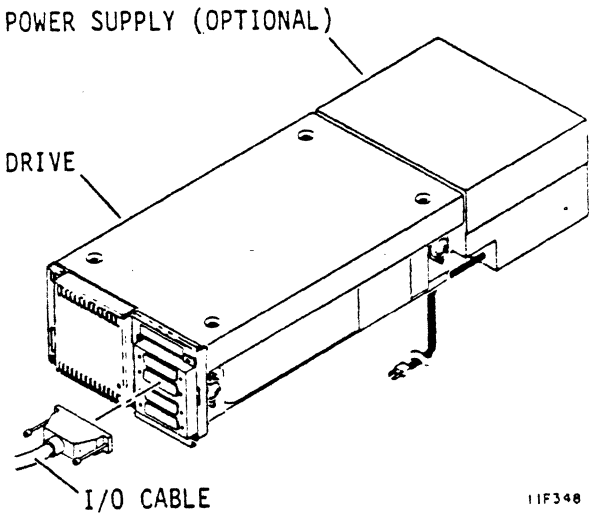
A COMPLETE DRIVE

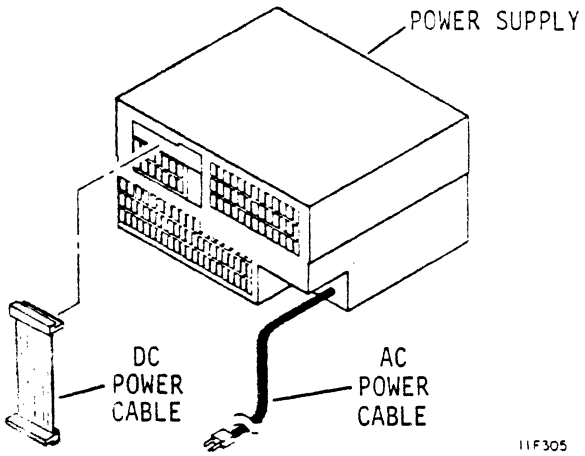
As a minimum, a functional drive installation requires the following:

- the drive,
- a power supply, and
- interconnecting (I/O) cables



THE POWER SUPPLY

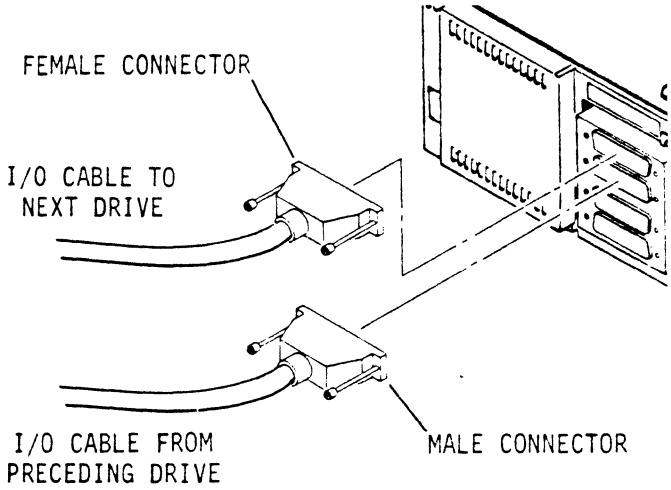
Site power enters the optional power supply through the ac power cable. The power supply provides the dc voltages needed to operate the drive. These voltages reach the drive through the dc power cable.



I/O CABLES

One shielded, 50-conductor (25 twisted-pair), I/O cable is needed for each port. Using shielded I/O cables permits meeting FCC/VDE requirements. Shielded cables also help to minimizes signal cross-talk and inductive coupling.

The I/O cables have a male connector on one end and a female connector on the other. This enables cables to be joined if a drive must be removed from a daisy chain. The controller must provide a female connector for each port.



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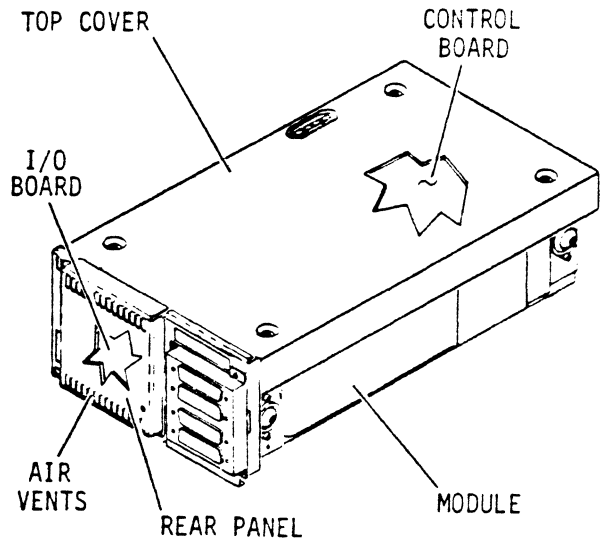
PARTS OF THE DRIVE

The drive has the following main parts:

- a top cover,
- rear panel,
- module,
- two circuit boards, and
- cooling provisions



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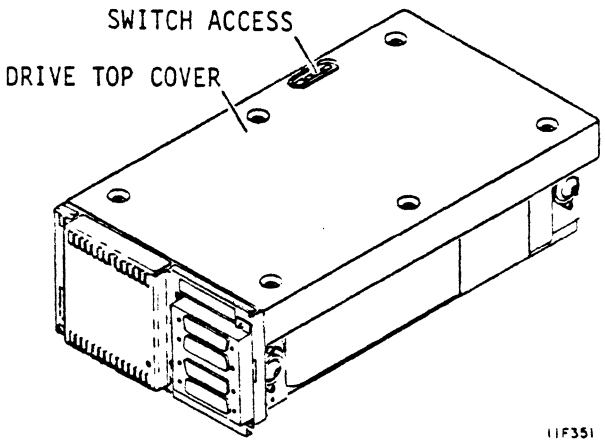
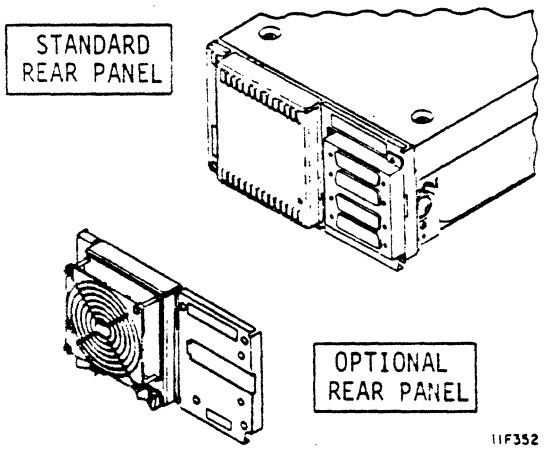
THE TOP COVER

The top cover ensures proper air flow and protects the internal components of the drive. An access hole in the top cover allows setting the switches on the circuit board without removing the cover.



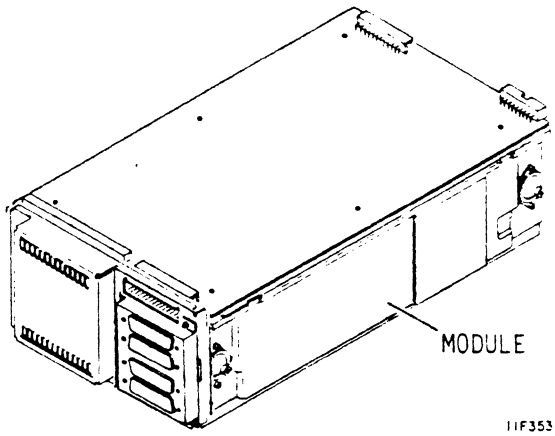
THE REAR PANEL

The rear panel protects the I/O board and connectors at the rear of the drive, and ensures proper air flow. The optional fan and rear panel assembly must be used if the optional power supply is not used or is not mounted in-line with the drive.



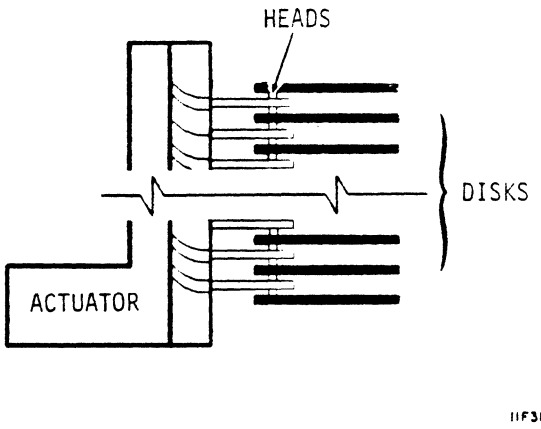
THE MODULE

The module is a sealed unit containing the actuator, disks, heads, motor, spindle, and the other electrical and mechanical parts needed for drive operation.



The disks inside the module are mounted on a spindle that is coupled directly to the drive motor. The drive motor spins the disks at 3600 r/min. Disk rotation creates air currents inside the sealed module that allow the heads to fly over the disk surface.

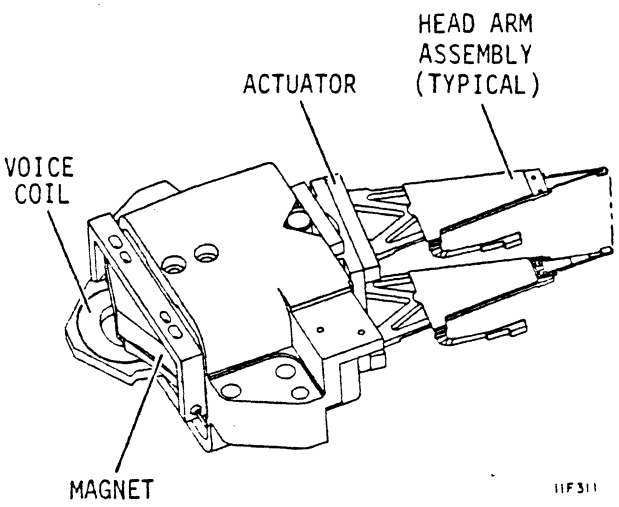
The actuator assembly holds the heads and moves them over the spinning disks. There are 15 data heads used for data transfers to and from the disk. One servo head senses actuator position by reading prerecorded servo information from the servo surface. The information read by the servo head is used to control movement of the actuator and the heads attached to it.



THE MODULE (CONTD)

The actuator has a voice coil that moves within a permanent magnetic field in response to signals from the servo control circuits. Movement of the voice coil moves the heads in an arc, across the rotating disks, to any one of the available data tracks.

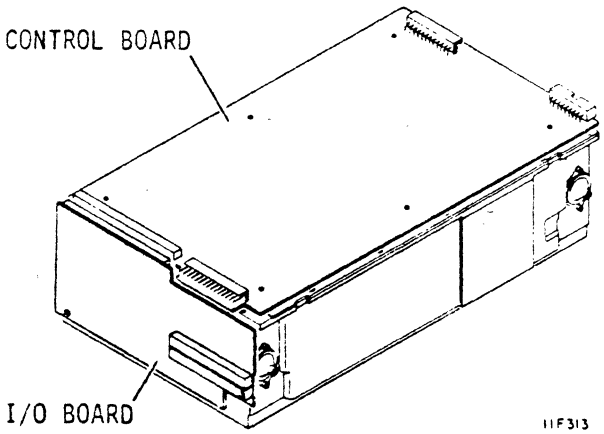
The heads rest in a landing zone on the disk surface when the drive is not in use. This landing zone is beyond the data zone. The actuator locks in this position when the drive is stopped.



CIRCUIT BOARDS

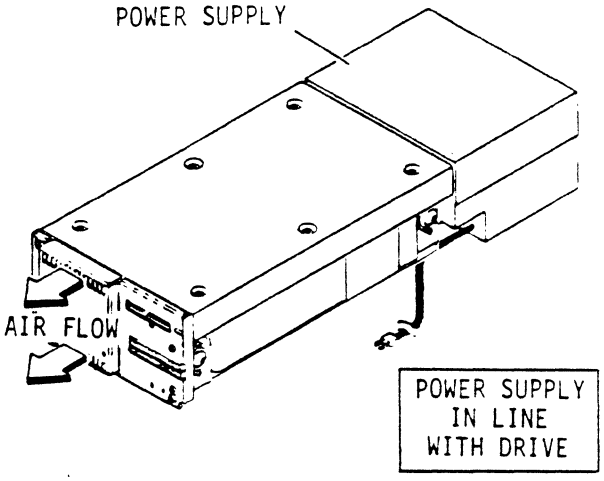
The drive has two circuit boards. A control board is mounted on the module under the top cover. This board controls read, write, seek, and the other drive control functions.

The I/O board at the back of the drive controls data formatting and transfer (I/O) operations. It also has the connectors to which the I/O cables are connected.

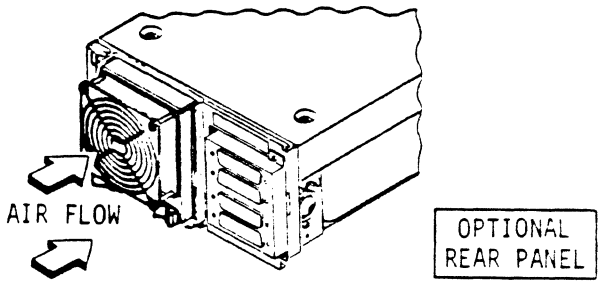


COOLING PROVISIONS

When the optional power supply is mounted in-line with the drive, air flows out of the power supply, through the drive, and out the rear panel.



The optional rear panel is needed when the power supply is not mounted in-line with the drive. The fan forces air across the interior of the drive.



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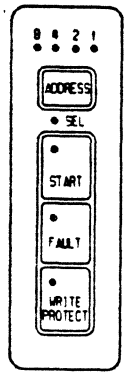
OPERATOR PANEL

This optional operator panel provides external control of the drive. It contains the switches and indicators you use to control the drive. These controls and indicators are described in section 3 of this manual.



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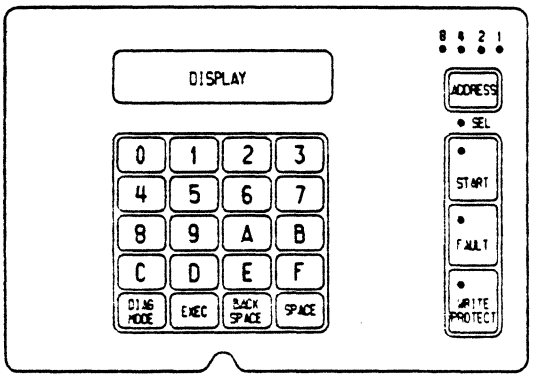
STATUS/CONTROL PANEL

The optional status/control panel is another type of control panel. It has the same controls and indicators as the operator panel, but it also has a maintenance panel that allows running of offline diagnostic tests and reading of various status conditions. Controls and indicators used by the operator are described in section 3.

The controls and indicators on the maintenance panel are described in the maintenance manual.



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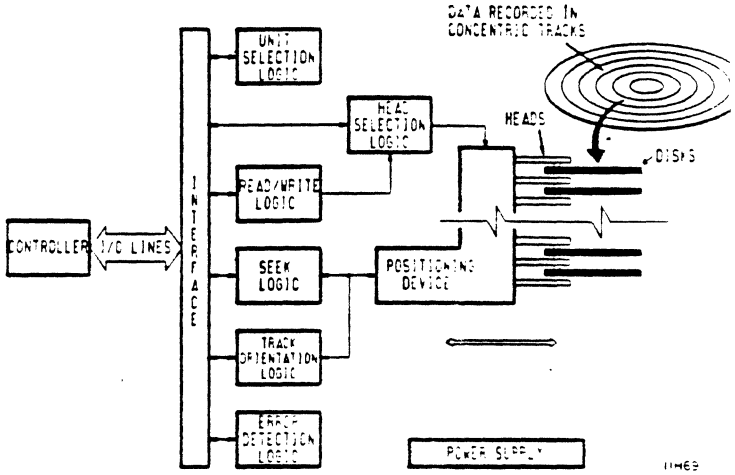
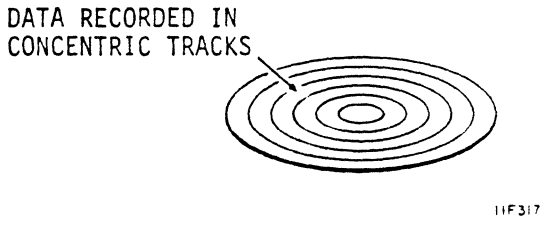
HOW THE DRIVE WRITES AND READS

The drive has all the circuits and mechanical devices needed to record data on and recover it from the disks.

During a write operation, the drive receives commands and data from the controller. The drive interprets the commands and then records (writes) the data. In read operations, the drive receives commands from the controller, interprets them, recovers the data (reads it) from the disks, and then transfers it back to the controller. Power needs are met by the power supply.



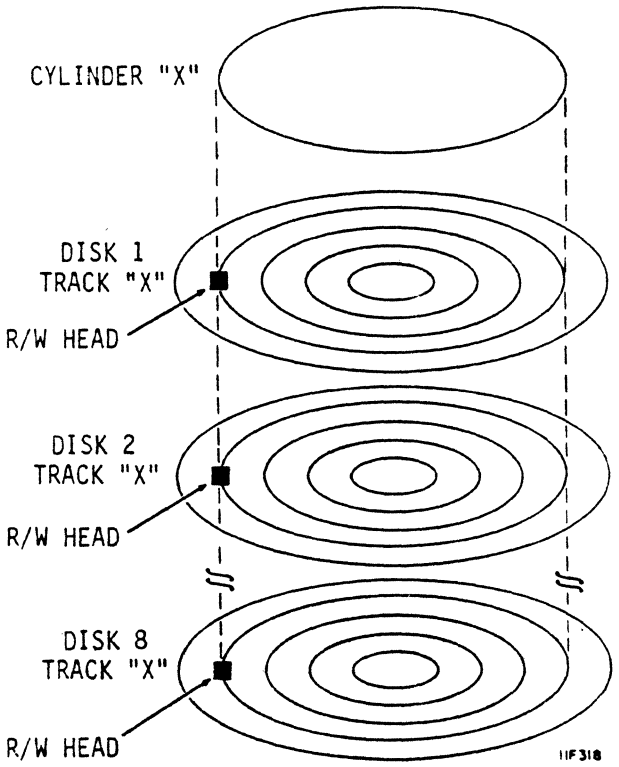
The drive circuits control the data storage (writing) and retrieval (reading) process. The read and write processes use electromagnetic devices called heads that can be moved to various tracks (positions) on the recording surfaces of the rotating disks. One head is provided for each disk surface. The heads are positioned such that data is written in concentric tracks around the disk surfaces.



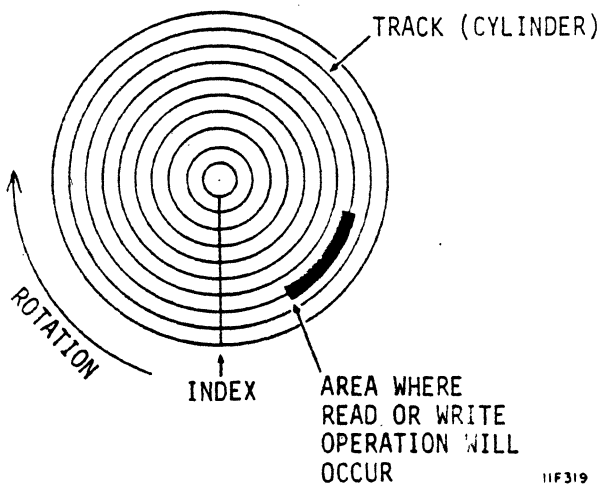
HOW THE DRIVE WRITES AND READS (CONTD)

The controller instructs the drive to seek (move the heads) to a given cylinder. Cylinders are formed by imaginary lines that connect the same track on each recording surface.

Having reached the specified cylinder, the controller directs the drive to select the head located over the track where the read or write operation will occur.



The drive locates the part of the track where the data is to be written or read. This is called track orientation. The controller uses signals from the drive to determine the position of the head on the track.

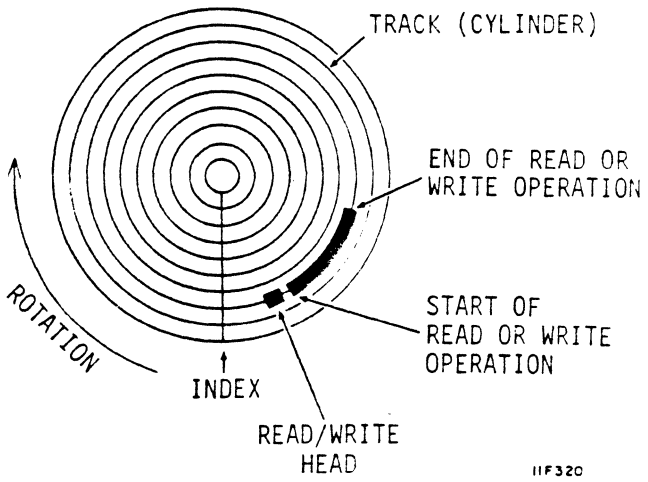


HOW THE DRIVE WRITES AND READS (CONTD)

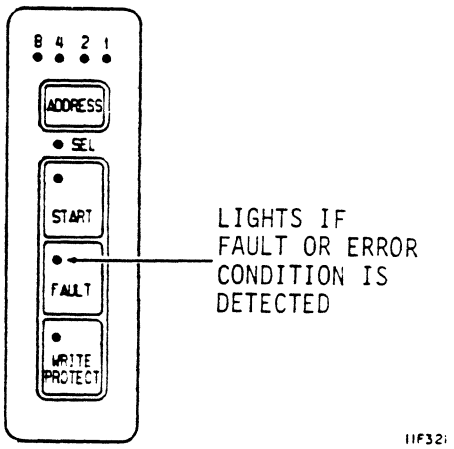
The controller commands the drive to read or write the data when the desired location on the track is reached.

During a read operation, the drive recovers (reads) data from the disks and sends it to the controller.

During a write operation the drive receives data from the controller, processes it, and records (writes) it on the disks.



The drive recognizes certain errors that may occur during its operation. If an error occurs, an indicator on the drive may light or a signal may be sent to the controller.



DRIVE SPECIFICATIONS

Characteristics	Conditions	Specifications
Size	Dimensions	See Section 2
	Weight (Drive only)	14.9 kg (32.8 lb)
	Weight (Power Supply only)	3.6 kg (8.0 lb)
Capacity	Total Capacity (Unformatted)	
	850 MB Drives	851.14 MB
	1230 MB Drives	1236.06 MB
	Bytes per track (Unformatted)	
	850 MB Drives	41 088 bytes
	1230 MB Drives	50 400 bytes
Physical	Number of disks	9
	Movable data heads	15
	Servo Heads	1
	Heads/Surface	1
	Logical cylinders	
	850 MB Drives	1381 (0-1380)
	1230 MB Drives	1635 (0-1634)
Recording	Modulation	2-7 Code
Transfer rate	3600 r/min	
	850 MB Drives	19.72 MHz (2.46 MB/s)
	1230 MB Drives	24.19 MHz (3.024 MB/s)

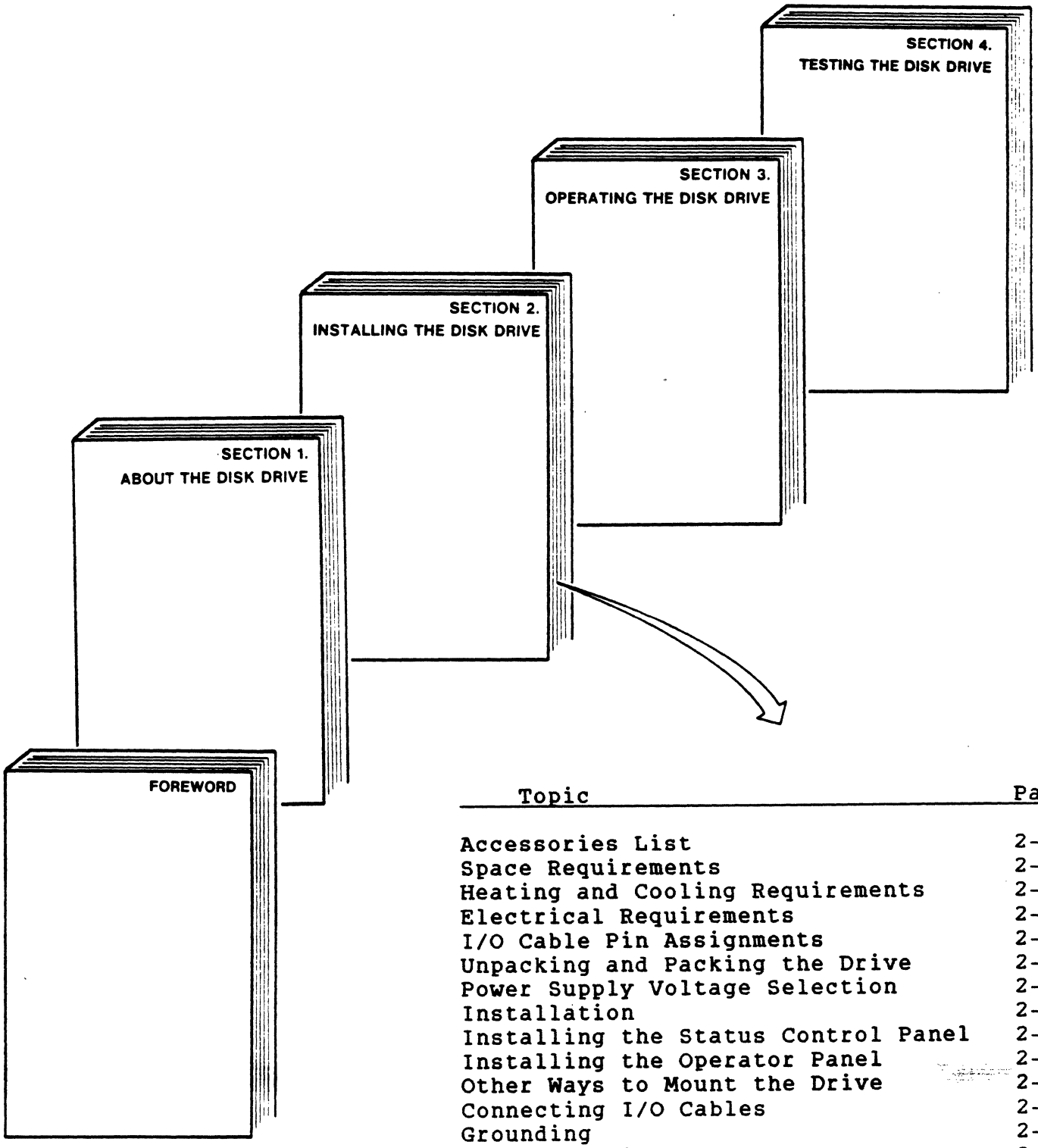
Continued

DRIVE SPECIFICATIONS (CONTD)

Characteristics	Conditions	Specifications
Latency		Latency is time to reach a particular track address after positioning is complete.
	Average	8.33 milliseconds (disk rotation speed at 3600 r/min)
	Maximum	16.83 milliseconds (disk rotation speed at 3564 r/min)
Seek Time	0 to max. cyl.	35 milliseconds maximum
	Average	16 milliseconds
	Single Track	5 milliseconds maximum
Start Time		90 seconds maximum
Stop Time		60 seconds maximum

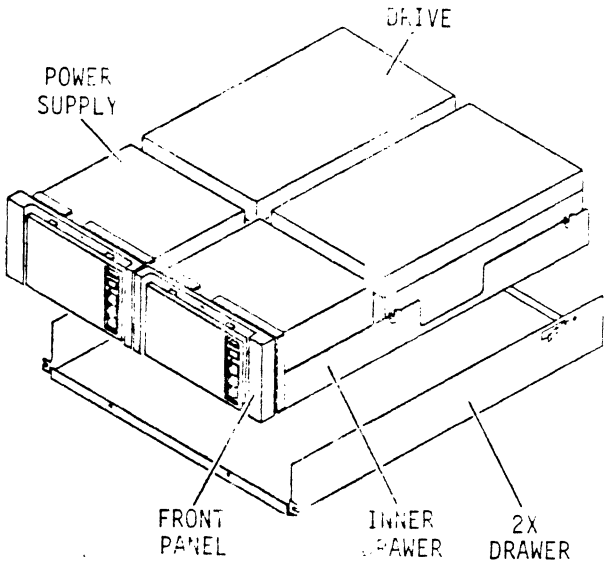
SECTION 2

INSTALLING THE DISK DRIV



THINGS TO CONSIDER BEFORE YOU BEGIN INSTALLING THE DRIVE

The installation procedures in this manual apply to a drive and power supply that mount side-by-side with another drive and power supply in a 2X drawer. The 2X drawer mounts on slides into a 483 mm (19 in) standard rack. The slides allow outward extension of the drawer for ease of maintenance.



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Successful installation of the drive starts with a plan that considers the following:

- Protecting the Drive From Electrostatic Discharge
- Accessories Needed
- Space Requirements
- Heating and Cooling Requirements
- Electrical Requirements
- Grounding Requirements
- Interface Requirements

THE INSTALLATION PROCESS

The installation process can vary depending on how the drive and power supply are mounted, how dc power is supplied to the drive, if the fan kit is required, and whether an optional operator or status/control panel is used. Each procedure in this section is presented in the sequence it must be performed. In some cases you may find it more convenient to make switch settings on the power supply and the drive before they are mounted. If a procedure does not apply, skip it and go to the next procedure.

The topic Other Ways To Install the Drive provides information for those installations where a 2X drawer is not used. Details for alternate mounting are beyond the scope of this manual.

PROTECTING THE DRIVE FROM ELECTROSTATIC DISCHARGE

All drive electronic assemblies are sensitive to static electricity, due to the electrostatically sensitive devices used within the drive circuitry. Although some of these devices such as metal-oxide semiconductors are extremely sensitive, all semiconductors as well as some resistors and capacitors may be damaged or degraded by exposure to static electricity.

Electrostatic damage to electronic devices may be caused by a direct discharge of a charged conductor, or by exposure to the static fields which surround charged objects. To avoid damage to drive electronic assemblies, you must observe the following precautions when servicing the drive:

- Ground yourself to the drive whenever the drive electronics are or will be exposed. Connect yourself to ground with a wrist strap (refer to Accessories in this section for part numbers). Connection may be made to any metal assembly. As a general rule, remember that you, the drive, and the circuit boards must all be at ground potential to avoid potentially damaging static discharges.

- Keep boards in conductive bags. When circuit boards are not installed in the drive, keep them in conductive static shielding bags (refer to Accessories in this section for part numbers). These bags provide absolute protection from direct static discharge and from static fields surrounding charged objects. Remember that these bags are conductive and should not be placed where they might cause an electrical short circuit.

- Remove boards from bags only when you are grounded. All boards received from the factory are in static shielding bags, and should not be removed unless you are grounded.

- Turn off power to the drive before removing or installing circuit boards.

- Do not touch pins on power supply connector J15. The power supply circuitry is sensitive to electrostatic discharge.

- Never use an ohmmeter on any circuit boards.

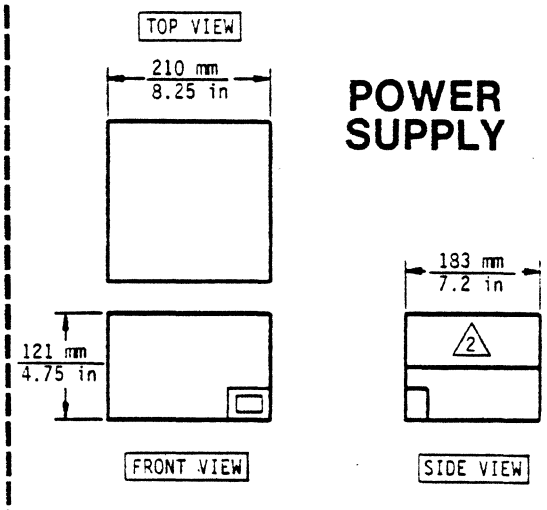
ACCESSORIES

PART NUMBER	DESCRIPTION
12263496	Static Ground Wrist Strap, 6 1/2 to 8 inch wrist
12263623	Static Ground Wrist Strap, up to 6 1/2 inch wrist
12263624	Static Shielding Bag, 5 x 8 inch
12263625	Static Shielding Bag, 8 x 12 inch
12263626	Static Shielding Bag, 10 x 12 inch
12263499	Static Shielding Bag, 14 x 18 inch
12263627	Static Shielding Bag, 16 x 24 inch
47188871	AC Short Power Cord Set (60 Hz)
47188872	AC Short Power Cord Set (50 Hz)
75168331	AC Power Cable, 5-15P (60 Hz)
75168346	AC Power Cable, 6-15P (60 Hz)
15165427	AC Power Cable (50 Hz).
92588100	DC Power Cable, 63.5 mm (2.5 inch)
92588101	DC Power Cable, 152 cm (60 inch)
92588102	DC Power Cable, 244 cm (96 inch)
47191101	I/O Cable, 10 foot (3.05 metre) long
47191108	I/O Cable, 15 foot (4.57 metre) long
47191102	I/O Cable, 25 foot (7.62 metre) long
47191103	I/O Cable, 50 foot (15.25 metre) long
47191104	I/O Cable, 75 foot (22.9 metre) long
47191105	I/O Cable, 100 foot (30.5 metre) long
47191106	I/O Cable, 150 foot (45.7 metre) long
15458851	I/O Terminator, Shielded
24534808	Ground Strap (Specify length)
40125601	Ground Lug
10126403	Lockwasher, #10 (For grounding)
All I/O cables are shielded	

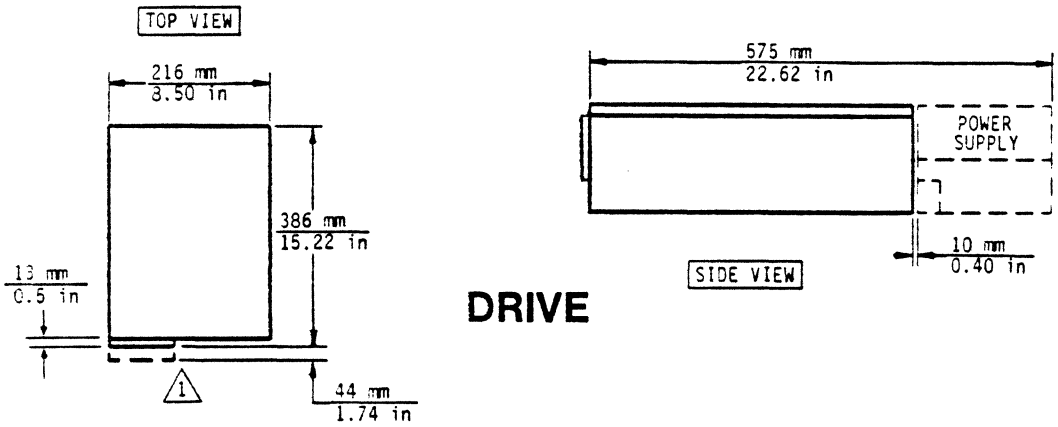
SPACE REQUIREMENTS

Dimensions for the drive and optional power supply are shown on this page.

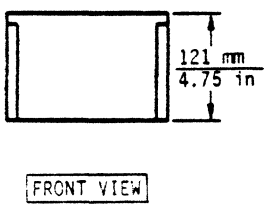
Be sure to refer to Other Ways to Install the Drive later in this section if the drive and power supply will be mounted in a custom enclosure or cabinet.



POWER SUPPLY



DRIVE



NOTES:

1. COOLING FAN MOUNTS ON REAR PANEL WHEN POWER SUPPLY IS NOT MOUNTED IN LINE WITH DRIVE.
2. COOLING FAN IS INSIDE POWER SUPPLY.
3. DIMENSIONS ARE NOMINAL.

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HEATING AND COOLING REQUIREMENTS

The environmental requirements listed below must not be exceeded regardless how the drive is mounted.

Conditions	Characteristics	Specifications
TEMPERATURE		
Storage (Packed)	Range	-10°C to 50°C (14°F to 122°F)
	Maximum change per hr	15°C (27°F)
Transit (Packed)	Range	-40°C to 60°C (-40°F to 140°F)
	Maximum change per hr	20°C (36°F)
Operating	Range	10°C to 45°C (50°F to 113°F)
	Maximum change per hr	15°C (27°F)
RELATIVE HUMIDITY		
Storage (Packed)	Range	5% to 95%
Transit (Packed)	Range	5% to 95%
Operating	Range	20% to 80% (No condensation allowed)

Continued

HEATING AND COOLING REQUIREMENTS

Conditions	Characteristics	Specifications
BAROMETRIC PRESSURE (STANDARD DAY)		
Storage (Packed)	Range	-305 m to 3000 m (-1000 to 10 000 ft) 104 kPa to 69 kPa (30 in Hg to 20 in Hg)
Transit (Packed)	Range	-305 m to 12 192 m (-1000 to 40 000 ft) 104 kPa to 19 kPa (30 in Hg to 6 in Hg)
Operating	Range	-305 m to 3000 m (-1000 to 10 000 ft) 104 kPa to 69 kPa (30 in Hg to 20 in Hg)

ELECTRICAL REQUIREMENTS

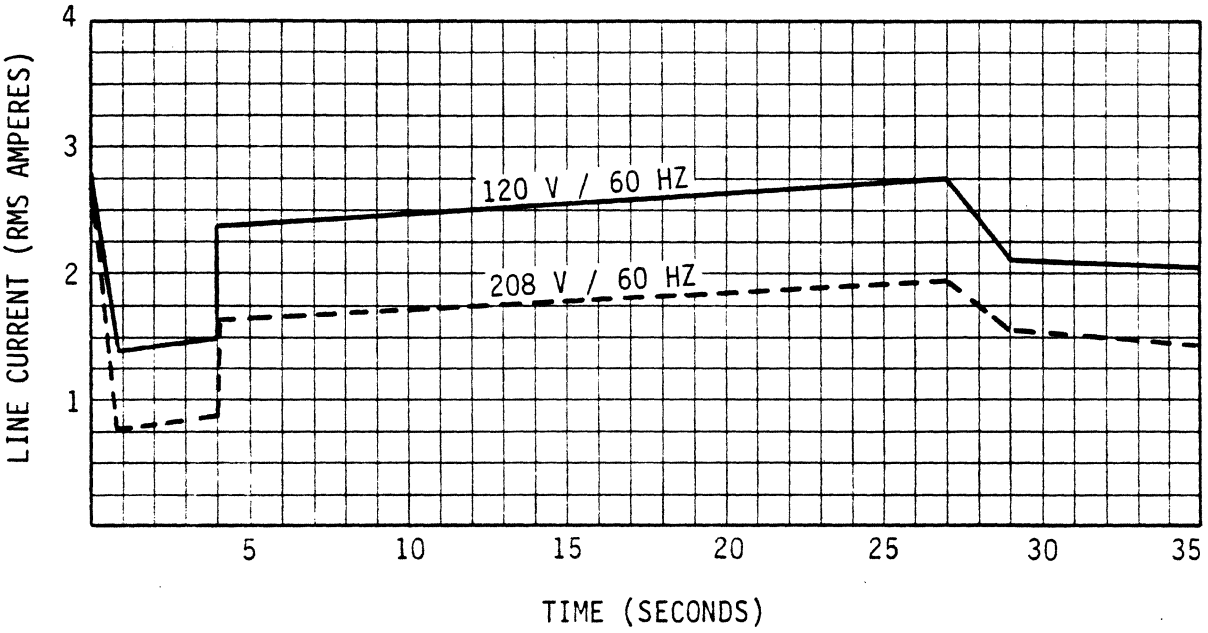
WARNING

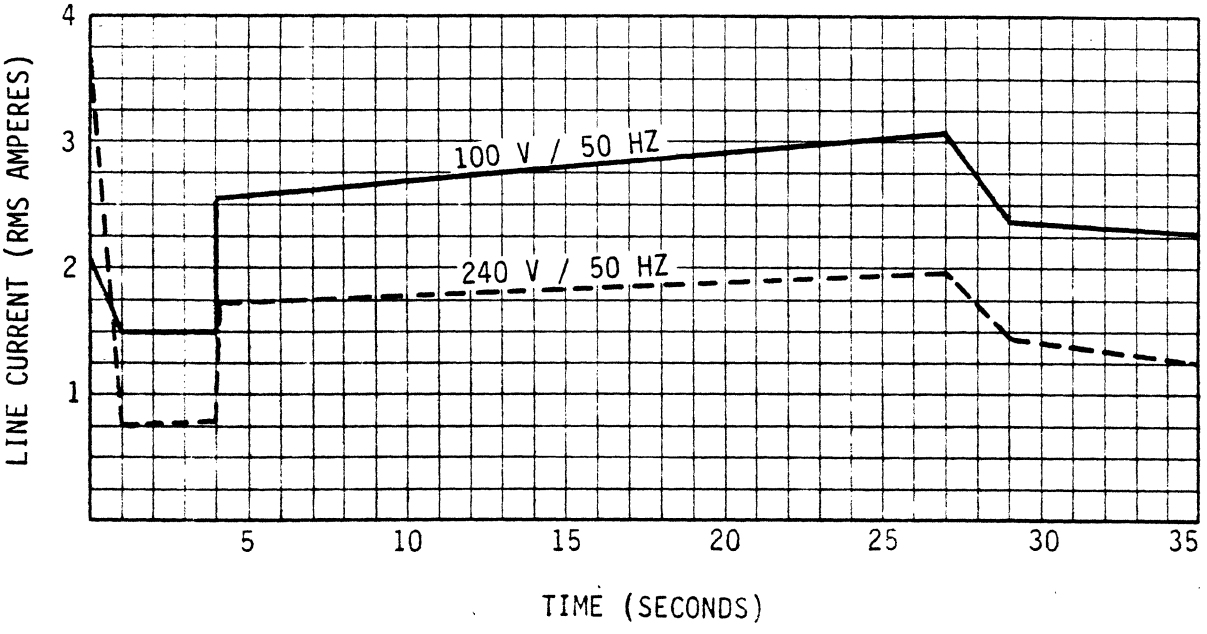
This unit has a single phase power supply with a capacitor input filter (sometimes called a switching type supply). If power comes from a 3-phase, 4-wire, wye branch or feeder circuit, ensure the circuit meets the latest requirements of the United States National Electrical Code. Failure to meet these requirements may cause hazardous conditions due to high currents and heating in the neutral conductors and transformers supplying the unit.

Specifications	Nominal Values	
	100 - 120 V ac	208 - 240 V ac
Voltage Range	85 to 132 V	177 to 264 V
Nominal Line Frequency	50/60 Hz	50/60 Hz
Frequency Range	48.0 to 62.0 Hz	48.0 to 62.0 Hz
Phase	Single Phase	Single Phase
Power Consumed*	0.140 - 0.145 kW	0.143 - 0.147 kW
Line Current*	2.5 - 2.2 A	1.5 - 1.4 A
Power Factor*	0.57 - 0.55	0.46 - 0.44
*Nominal values with disks rotating and carriage moving.		

ELECTRICAL REQUIREMENTS (CONTD)

Start current waveforms are shown below.





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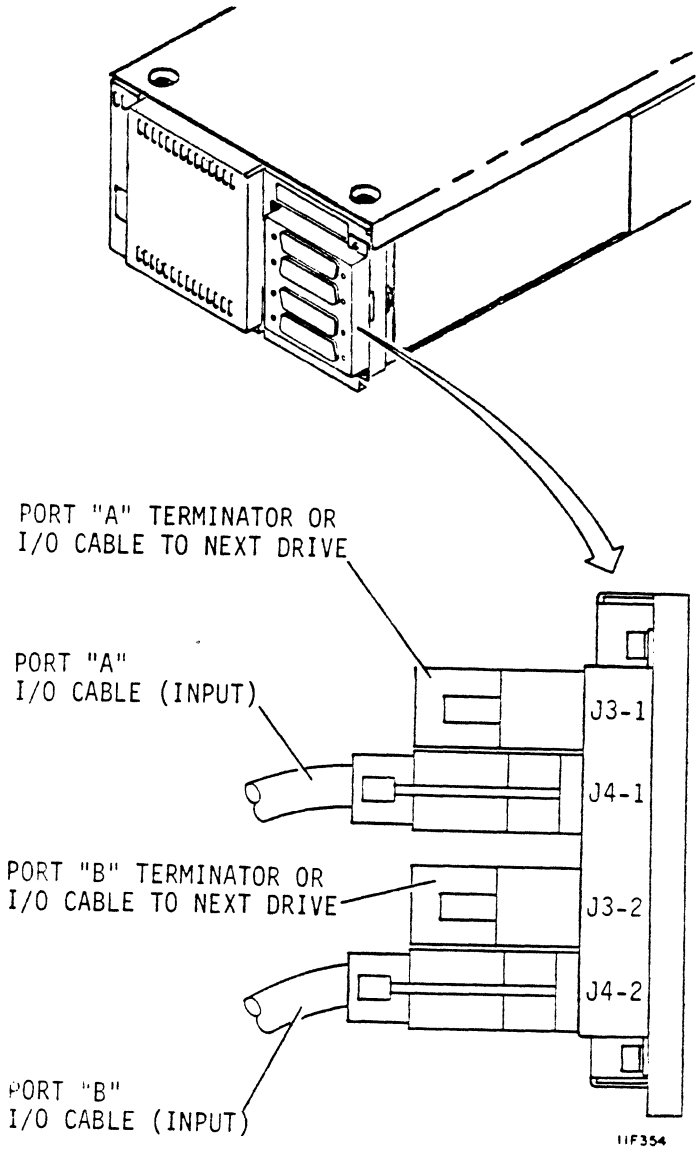
INTERFACE REQUIREMENTS

This drive is a two channel device, so it can be shared by two controllers if necessary. It can be connected in either a star or daisy chain I/O configuration.

The four I/O connectors at the back of the drive accept the I/O cables that connect it to the system. J3-1 and J3-2 are the connectors for port A and B to which a terminator or the I/O cable to the next drive in a string are attached. J4-1 and J4-2 are the I/O inputs for port A and B respectively.

A terminator must be installed on J3-1 and J3-2 only if they are not used, AND an I/O cable is connected to J4-1 (port A) or J4-2 (port B). Unused ports (i.e., no I/O input) must be disabled as described in Setting the I/O Board Switches.

Refer to the Accessories list in this section for I/O cable and terminator part numbers. When selecting I/O cables, ensure they are long enough to permit full extension of the drive from the cabinet (if applicable).

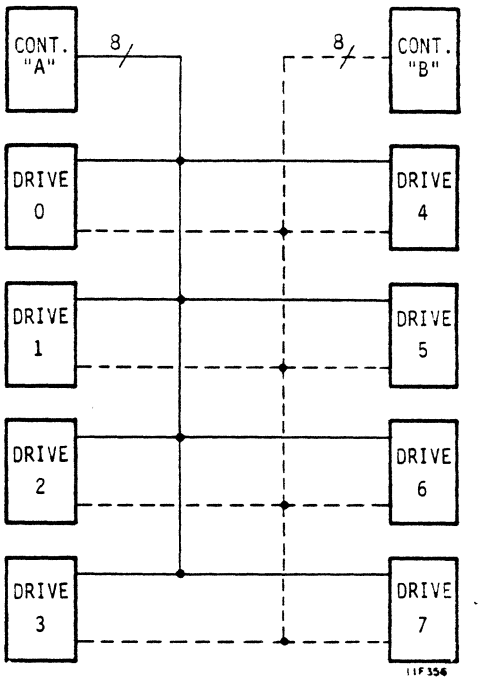


STAR I/O CABLING

A star I/O cabling scheme can be used if the controller has an I/O connector available for each drive in the system. In dual port systems, both controllers must have an I/O connector available for each drive in the system if both controllers are to have access to all drives.

I/O cable length cannot exceed 45.7 m (150 ft). Unused ports are disabled or terminated as described in Setting the I/O Board Switches.

The number of I/O cables and terminators required in this cabling scheme is doubled if the dual port feature is used.

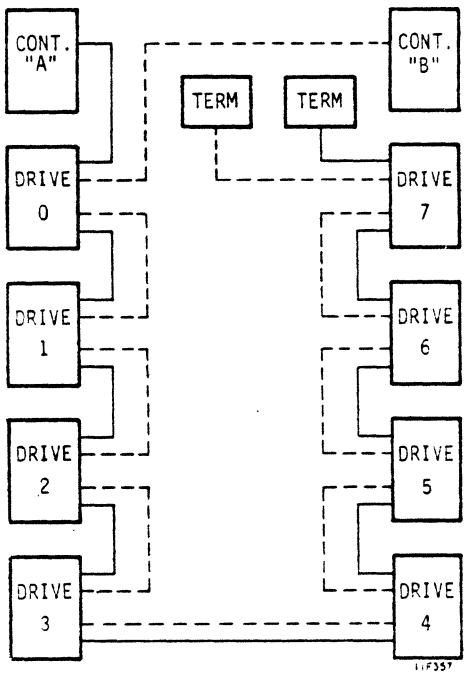


DAISY CHAIN I/O CABLING

Daisy chain I/O cabling must be used if the controller has only one drive I/O connector. In this scheme, an I/O cable connects the first drive to the controller. Additional I/O cables connect the first drive to the second, second to the third, etc.

A maximum of eight drives can be connected in a daisy chain. Unused ports must be disabled or terminated as described in Setting the I/O Board Switches.

The maximum cumulative I/O cable length in a daisy chain system is 45.7 m (150 ft). The number of I/O cables and terminators required in this cabling scheme is doubled if the dual port feature is used.



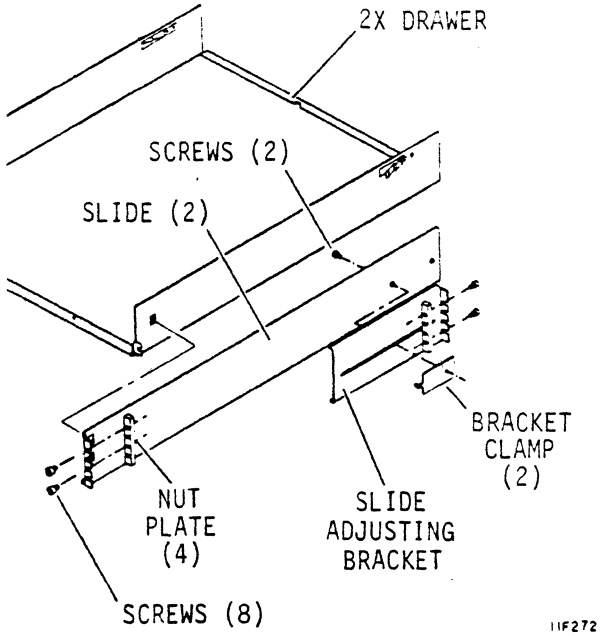
I/O CABLE PIN ASSIGNMENTS

Signal Name	(+) Pin Number	(-) Pin Number
DC Ground	1	34
Select Out	43	27
Master Out	45	29
Sync Out	41	25
Sync In	15	48
Slave In	39	23
Attention In	20	4
Bus A - Bit 0	13	46
Bus A - Bit 1	30	14
Bus A - Bit 2	22	6
Bus A - Bit 3	26	10
Bus A - Bit 4	11	44
Bus A - Bit 5	28	12
Bus A - Bit 6	37	21
Bus A - Bit 7	5	38
Bus A - Parity	47	31
Bus B - Bit 0	32	16
Bus B - Bit 1	49	33
Bus B - Bit 2	3	36
Bus B - Bit 3	7	40
Bus B - Bit 4	24	8
Bus B - Bit 5	9	42
Bus B - Bit 6	18	2
Bus B - Bit 7	35	19
Bus B - Parity	17	50

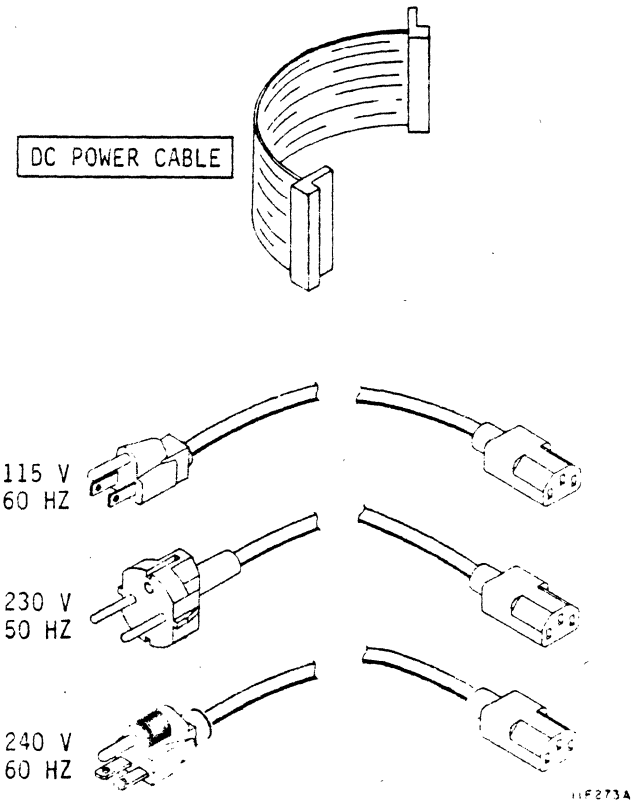
UNPACKING THE DRIVE

Unpack the drive using the unpacking instructions supplied with it. Save all packing materials for use if the drive must be shipped in the future.

Unpack the 2X drawer, two slide mounts, and slide mount hardware kit if applicable.



Unpack the ac and dc power cables. The length and style of the ac and dc power cables can vary. These cables are accessories, ordered for your specific application. AC power cords are either one or two pieces and can have one of several plug styles. The dc power cable is available in various lengths to accommodate remote mounting of the power supply.



UNPACKING THE DRIVE (CONTD)

Open the sealed vapor barrier bag and remove the drive and power supply.

Check all items against the shipping bill. Report discrepancies, missing items, damaged equipment, etc., to the CDC account representative for the equipment.

INSPECTING THE DRIVE

Inspect the drive, power supply, and accessory items for possible shipping damage. Claims for shipping damage must be filed with the carrier involved.

PACKING THE DRIVE

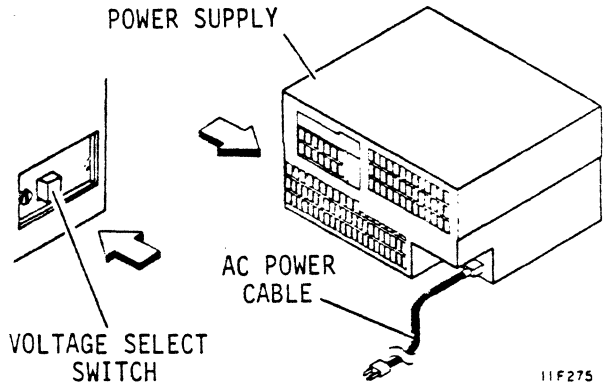
If it is necessary to ship the drive at some time in the future, pack it using the original packing materials. Packing instructions can be obtained at the address shown. Follow the packing instructions carefully to ensure the drive is undamaged in shipment.

Specify the exact equipment number and series code shown on the drive equipment identification label.

Magnetic Peripherals, Inc.
Packaging Engineer
Material Services Dept.
7801 Computer Avenue
Minneapolis, Mn 55435

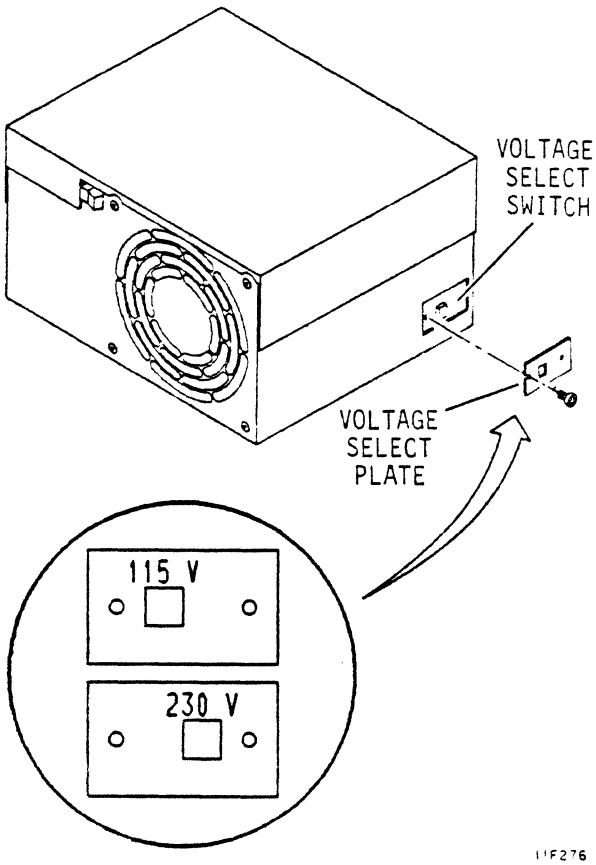
HOW TO CHECK THE POWER SUPPLY VOLTAGE SELECTION

The power supply is set at the factory to operate from either a 115 V or 230 V ac input power source. A matching power cord is provided. Check the voltage select plate at the side of the power supply to find the selected voltage. If it matches the site ac power source, skip the following procedure. Perform the following procedure if the voltage setting must be changed.



HOW TO CHANGE THE POWER SUPPLY VOLTAGE SELECTION

1. Disconnect ac power cord from power supply.
2. Remove screw securing voltage select plate to power supply. Remove plate. Save plate and screw.
3. Set voltage select switch to desired range.
4. Reverse voltage select plate and install it on power supply to lock switch in desired range. Plate must show new voltage setting.
5. Install ac power cord for selected voltage.

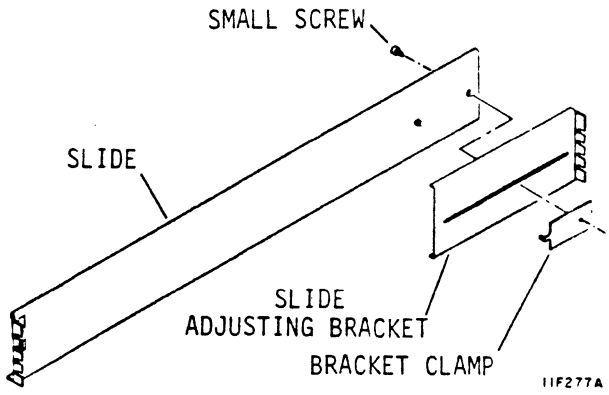


INSTALLING THE 2X DRAWER IN A RACK

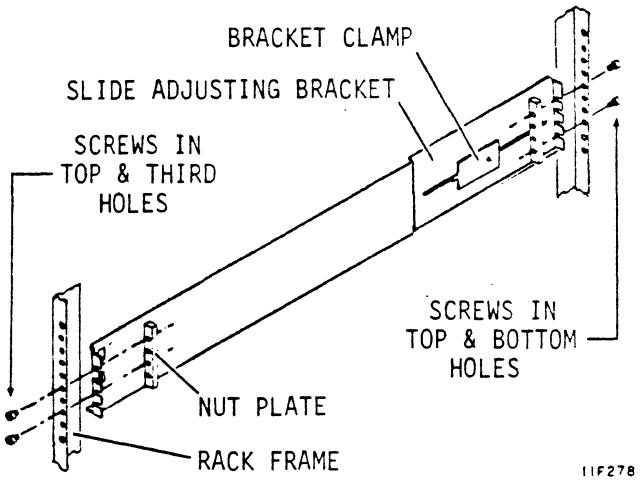
Use this procedure to install the optional 2X drawer into a standard rack.

1. Remove screws from rack mounting kit. The four smaller screws attach the slide adjusting brackets to slides and inner drawers to the 2X drawer.

2. Loosely attach slide adjusting bracket to each slide with bracket clamp and screw.



3. Loosely attach screws and nut plates for each slide to rack. The screws go into top and third holes at front of rack and in top and bottom holes at rear of rack.

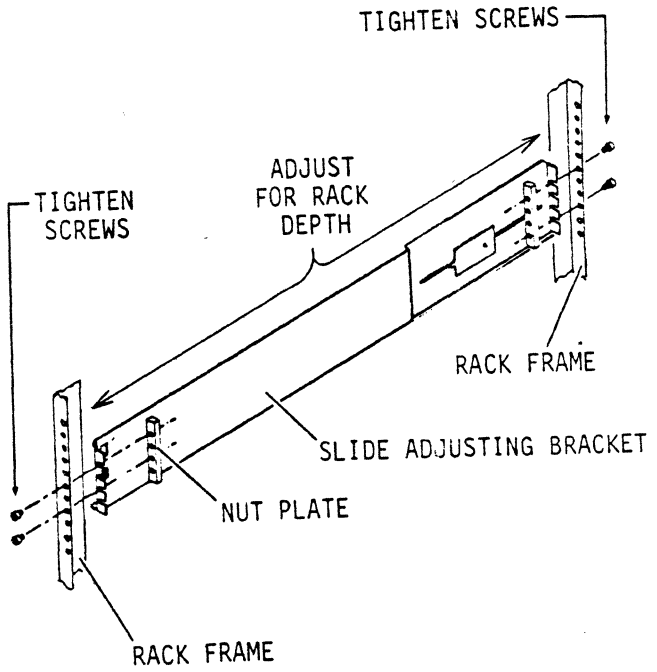


INSTALLING THE 2X DRAWER IN A RACK (CONTD)

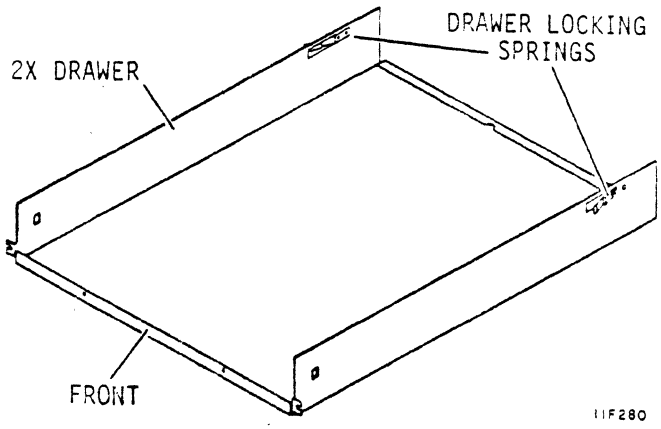
4. Position slide adjusting brackets as needed for rack depth. Mount right and left slides in rack. Position slides so 2X drawer rests on flat edge of slides.

5. Tighten screws holding adjusting brackets to slides and slides to rack.

6. Lift drawer and guide it into slide assemblies. Continue pushing inward until drawer is fully in rack. Drawer should not bind when sliding it in and out of rack.



If it is necessary to remove the drawer from the rack, slide it out to full extension. Press the drawer locking springs and remove the drawer from the rack.



INSTALLING THE OPERATOR PANEL OR STATUS/CONTROL PANEL JUMPER CABLE

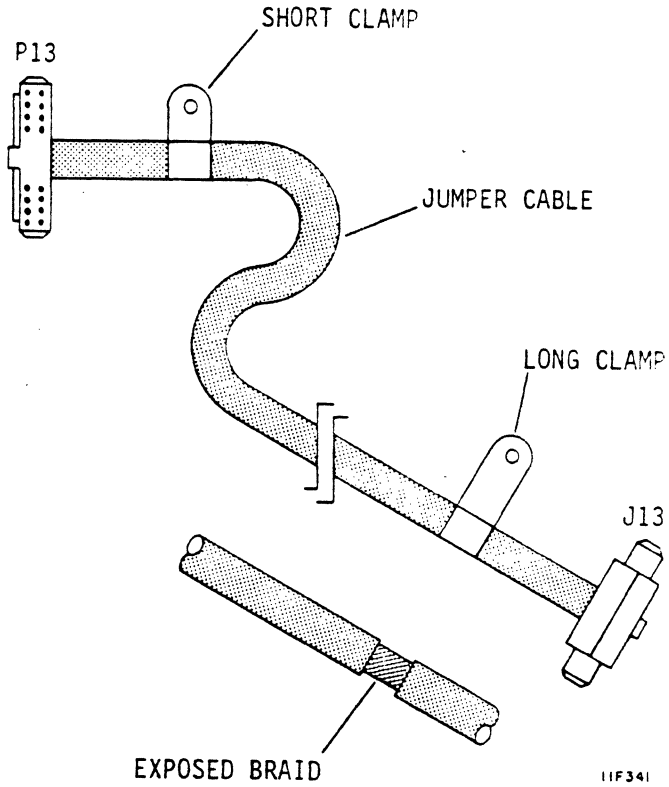
This procedure describes how to install an operator or status/control panel jumper cable as part of a new drive installation. Skip this procedure if your installation does not include an operator panel or status/control panel.

If you must add one to an existing installation, refer to Adding an Operator or Status/Control Panel at the end of this section.

1. Unpack operator panel or status/control panel kit.

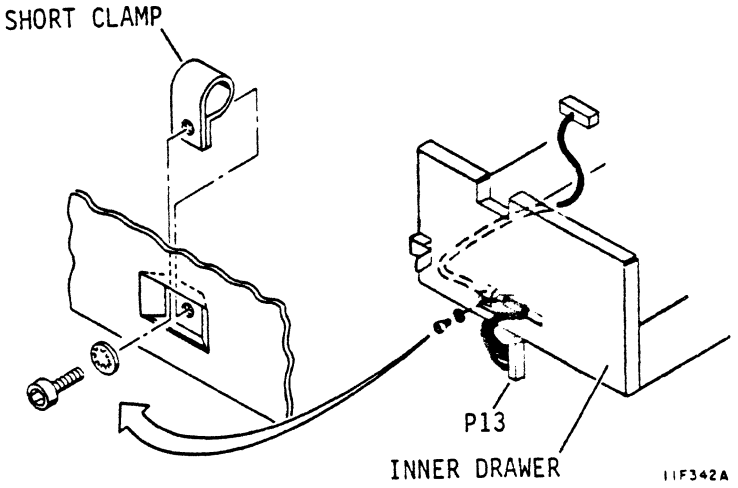
2. Install longer of two metal cable clamps over exposed shielding on J13 end of jumper cable.

3. Install shorter of two metal cable clamps over exposed shielding on P13 end of jumper cable.



INSTALLING THE OPERATOR PANEL OR STATUS/CONTROL PANEL JUMPER CABLE (CONTD)

4. Attach cable clamp at P13 end of jumper cable to inner drawer and route cable around left side.



INSTALLING THE POWER SUPPLY IN THE INNER DRAWER

1. Remove heat shrink from 60 Hz power cord only, to expose shield in area shown.

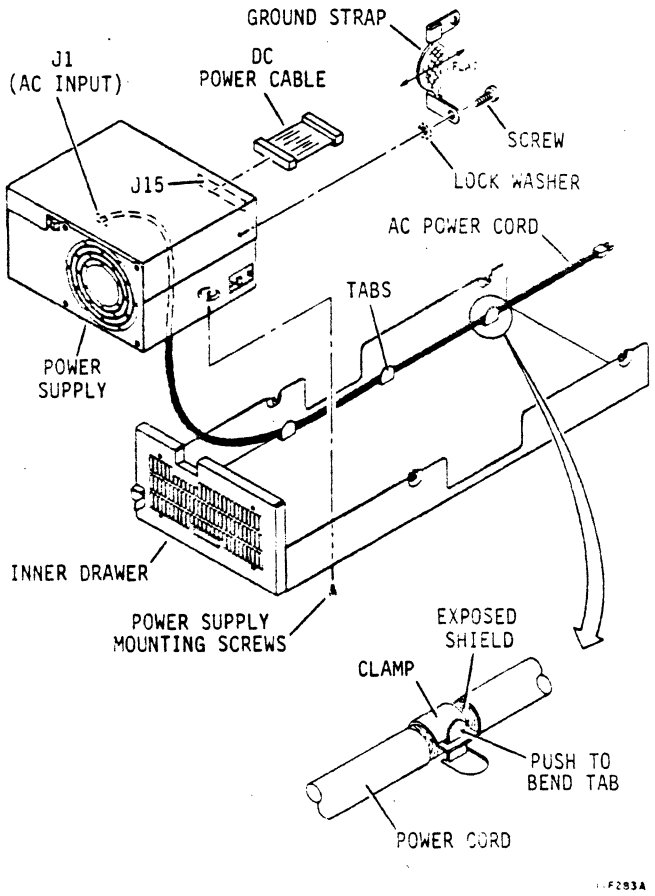
2. Connect power cord to J1 on power supply, place power supply into inner drawer and secure with screws. Ensure cables are not pinched.

3. Place power cord behind tabs. Exposed shield on 60 Hz power cord must be behind tab as shown.

4. For 60 Hz power cords, place clamp over tab and shield. Bend tab to firmly secure clamp.

5. Connect dc power cable to J15 on power supply.

6. Secure ground strap to power supply. Ensure lockwasher is between strap and power supply.



INSTALLING THE DRIVE IN THE INNER DRAWER

1. Loosely insert shock mount screws into shock mounts on drive.

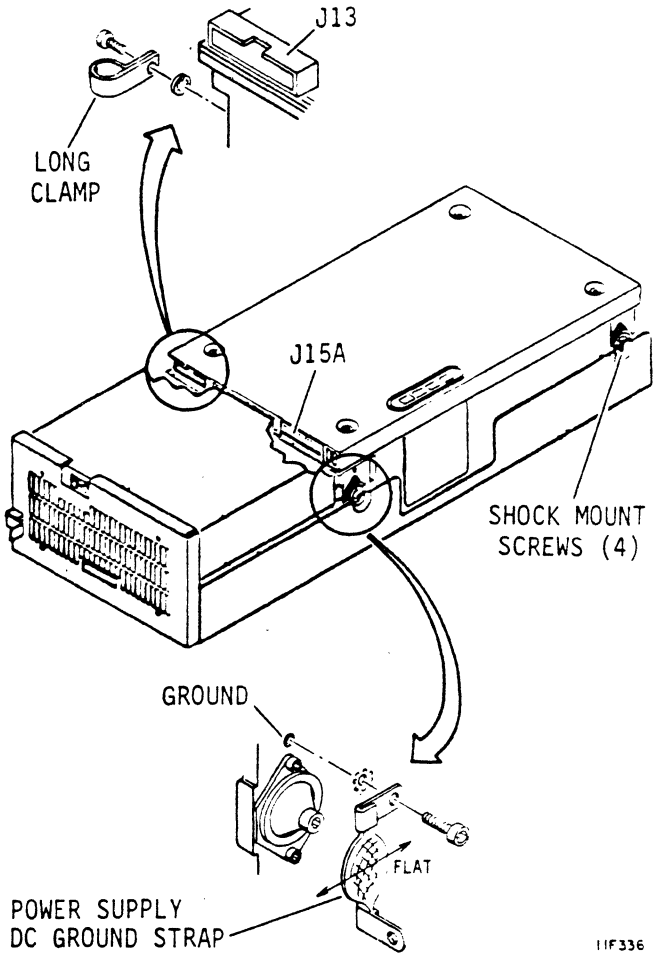
2. With I/O connectors facing away from power supply, place drive into inner drawer so it rests on shock mount screws.

3. Lift power supply end of drive and connect dc power cable to J15A on drive. Connect operator panel or status/control panel jumper cable (if used) to J13 on control board.

4. Lower drive onto shock mount screws and tighten them.

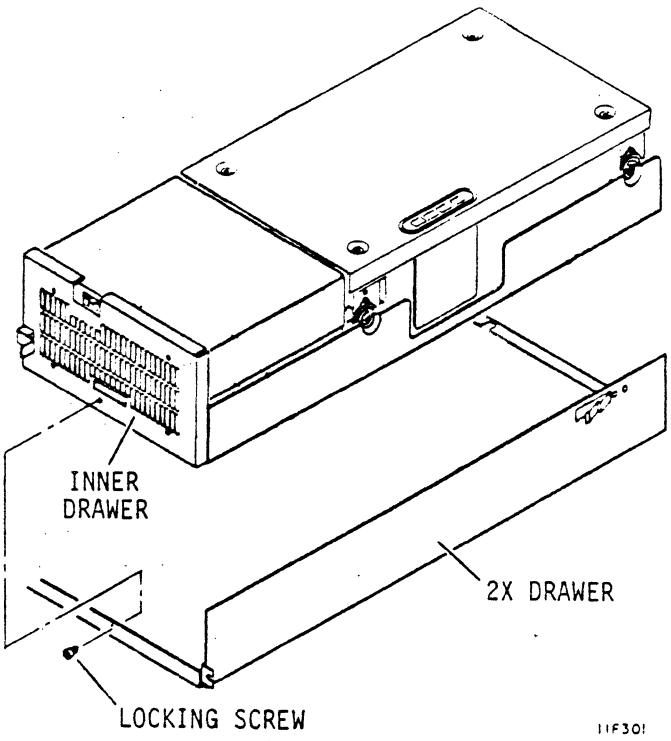
5. Connect ground strap from power supply to ground screw just above shock mount on drive. Ensure lockwasher is between drive and strap.

6. If used, attach operator panel or status/control panel jumper cable clamp (long clamp) to hole just above shock mount. Ensure lockwasher is between clamp and drive.



INSTALLING THE INNER DRAWER INTO THE 2X DRAWER

1. Fully extend 2X drawer from rack.
2. Slide inner drawer into 2X drawer so rear edge of inner drawer is under lip on 2X drawer.
3. Secure inner drawer into 2X drawer with locking screw.
4. Repeat steps 2 and 3 for other drive.
5. Push 2X drawer to closed position in rack.



INSTALLING THE FRONT PANEL

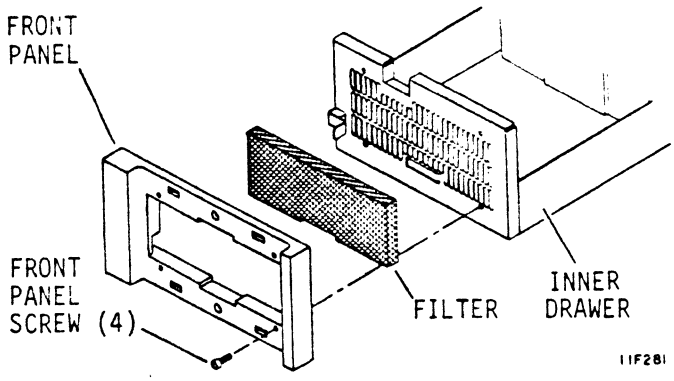
Perform this procedure only if an optional operator panel or status/control panel is NOT being installed.

1. Position front panel on drive. Turn front panel 180° if drive is placed at the right side of 2X drawer.

2. Align top edge of front panel with top edge of inner drawer.

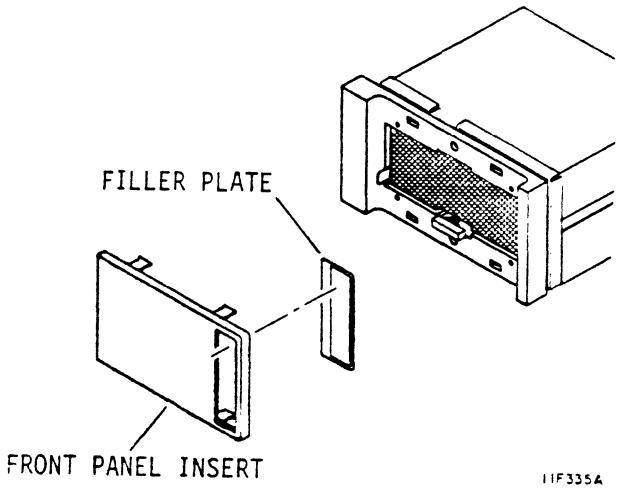
3. Ensure front panel is positioned for best alignment and appearance and secure it with four screws.

4. Install air filter.



5. Remove adhesive backing from filler plate and attach it to front panel insert.

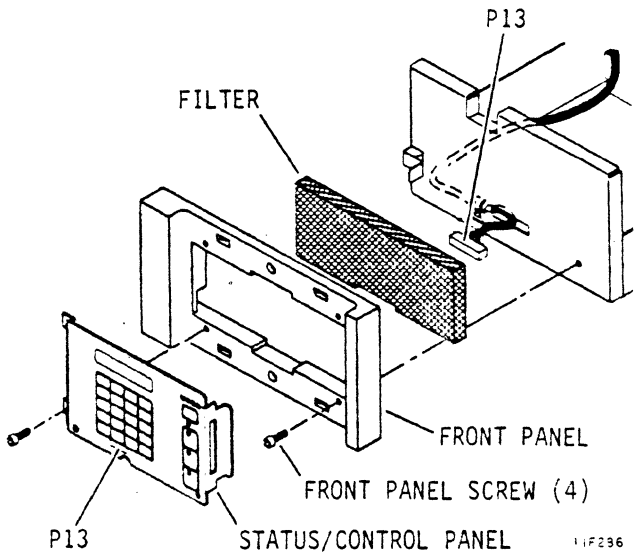
6. Install front panel insert.



INSTALLING THE STATUS/CONTROL PANEL

Use this procedure to complete the mounting of the optional status/control panel. The jumper cable that connects the status/control panel to the control board should already be installed.

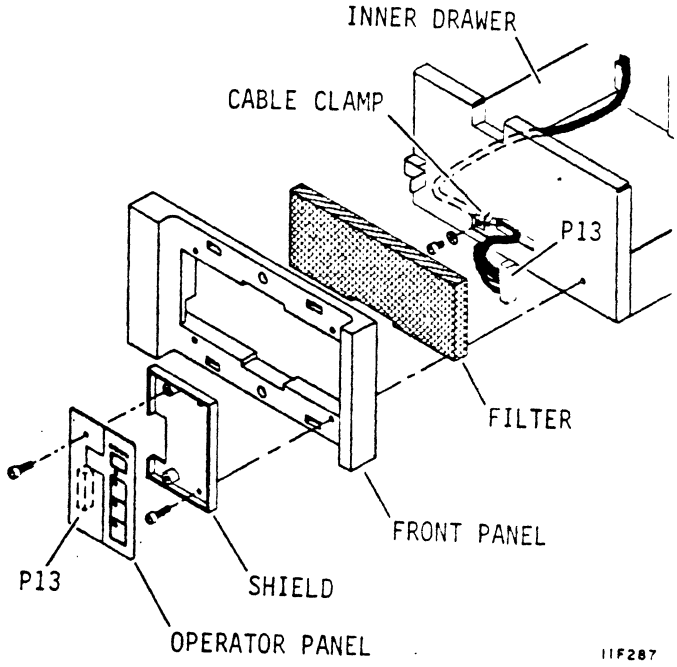
1. Orient front panel so wide edge faces left on left drive and right on right drive.
2. Center screw holes in front panel on screw holes in inner drawer.
3. Insert two screws on right side of front panel.
4. Install air filter.
5. Connect P13 on jumper cable to P13 on status/control panel.
6. Align status/control panel to front panel and secure with screws.
7. Remove protective film from status/control panel.
8. Install front panel insert.



INSTALLING THE OPERATOR PANEL

Use this procedure to complete the mounting of an optional operator panel. The jumper cable that connects the operator panel to the control board should already be installed.

1. Orient front panel so wide edge faces left on left drive and right on right drive.
2. Center screw holes in front panel on screw holes in inner drawer.
3. Insert two screws on left side of front panel.
4. Install air filter.
5. Remove screws holding operator panel to shield.
6. Align shield and front panel and secure both to inner drawer with screws.
7. Connect P13 on jumper cable to P13 on operator panel.
8. Position operator panel on shield and secure with screws.
9. Install front panel insert.



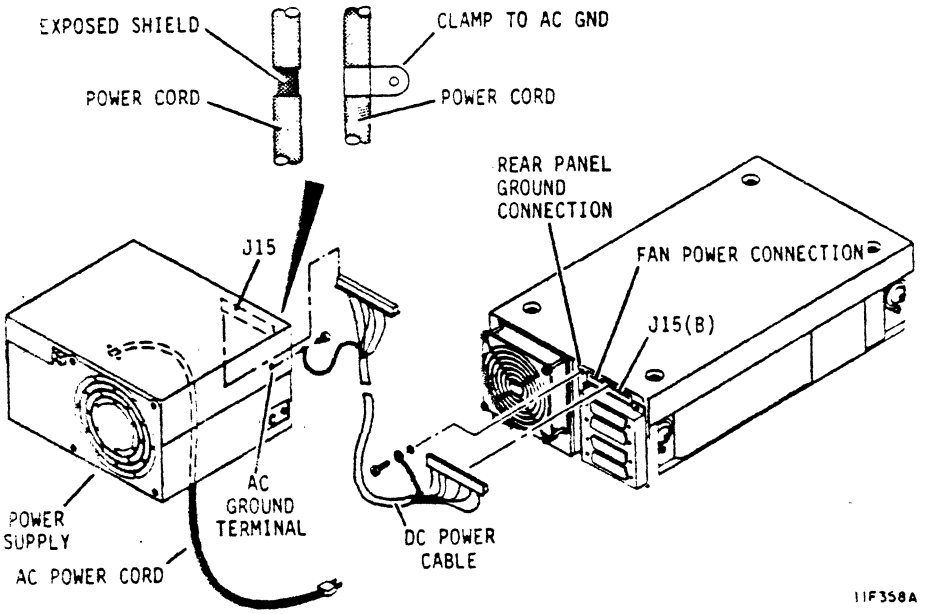
OTHER WAYS TO MOUNT THE DRIVE

The following requirements must be met if the drive is mounted in other than a 2X drawer:

- Support the drive by its shock mounts, either horizontally or vertically.
- Allow adequate clearance between the drive and any surfaces near it.
- Ensure the mounting design allows adequate ventilation of the drive and power supply.
- Install the optional fan kit if the power supply is mounted remotely from the drive.

When the power supply mounting is remote from the drive, a shielded dc power cable is recommended. One end of the cable connects to J15 on the power supply, and the trailing ground lead on that end connects to the ac ground terminal. The other end of the cable (end with ferrite bead) connects to J15(B) on the drive. The trailing ground lead on that end connects to the dc ground screw at the back of the drive.

When a 60 Hz power supply is mounted remotely from the drive, the heat shrink must be removed from the J1 end of the power cord to expose the shield. The cable clamp is installed on the shield and attached to the ac ground screw on the power supply.



CONNECTING STAR SYSTEM I/O CABLES

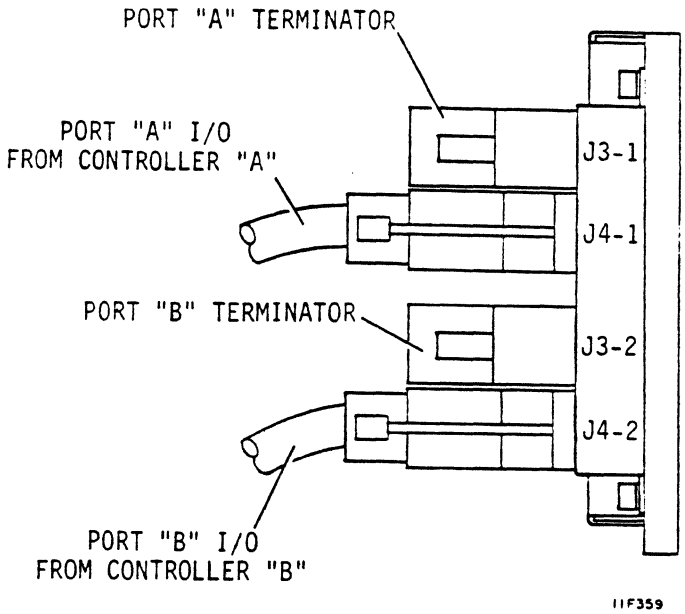
NOTE

You can use the star cabling scheme only if the controller has one unused I/O connector for each drive in the system.

1. Route an I/O cable from controller to each drive in system.

2. Connect controller end (port A) of each I/O cable to appropriate I/O connector for each drive.

3. Connect drive end of each I/O cable to J4-1 on each drive.



NOTE

Do not install a terminator on J3-1 if an I/O cable is not connected to J4-1. Use the enable/disable switch on I/O board to disable unused ports.

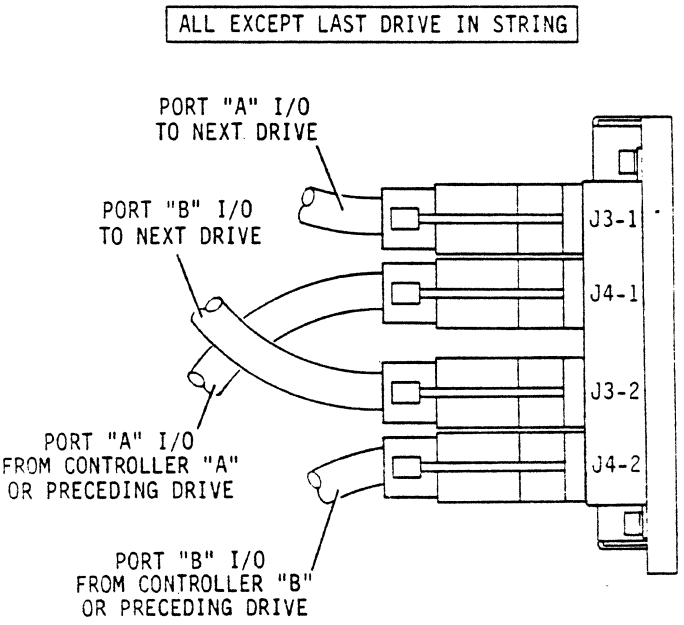
4. Install terminator on I/O connector J3-1 on each drive.

5. If this is a dual port system, repeat steps 1 through 4 for second controller (port B). I/O cables connect to J4-2 on each drive and terminator is installed on J3-2.

CONNECTING DAISY CHAIN SYSTEM I/O CABLES

A daisy chain I/O scheme needs only one I/O connector on the controller.

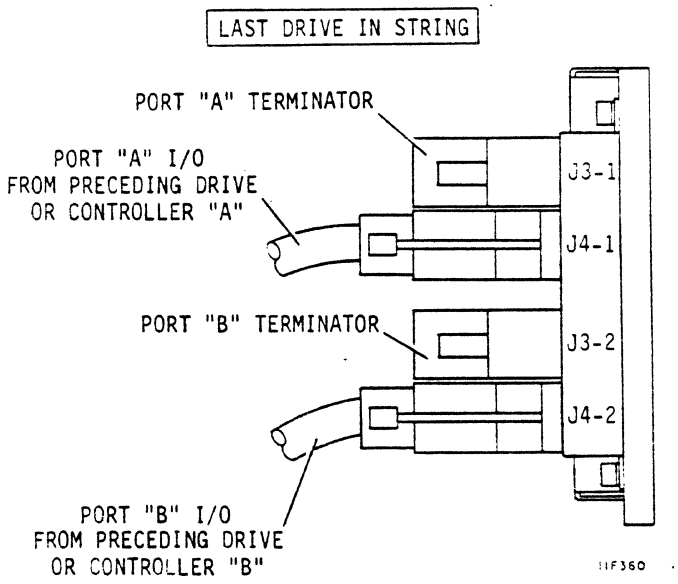
1. Route one I/O cable from controller to first drive in the string.
2. Connect controller end of I/O cable to port A drive I/O connector on controller.
3. Connect drive end of I/O cable from controller to J04-1 on first drive.
4. Continue connecting drives by routing I/O cable between J03-1 on drive and J04-1 on next drive in string.



NOTE

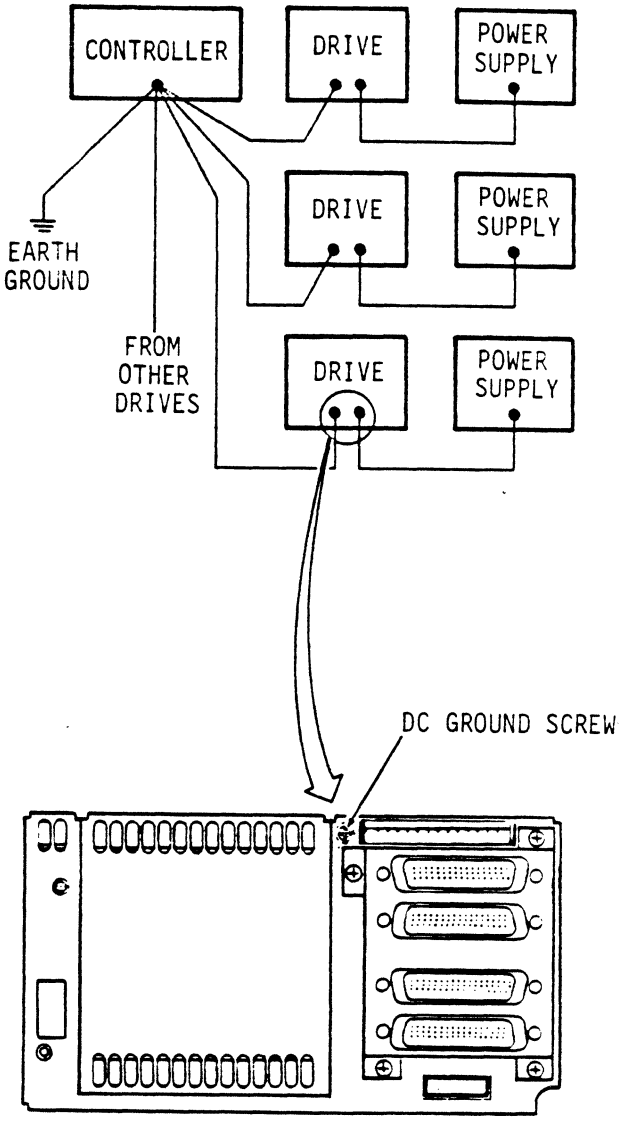
Do not install a terminator on an unused port (i.e., if an I/O cable is not connected to J04-1 or J04-2). Disable an unused port with the port enable/disable switch on I/O board.

5. Install a terminator on J03-1 on the last drive in the string.
6. If this is a dual port system, repeat steps 1 through 5 for second controller (port B). I/O cables connect to J04-2 on each drive and terminator installs on J03-2 on last drive in string.



CONNECTING A STAR SYSTEM GROUND

In this system, the earth ground connection on the controller is connected to an earth ground and to each drive in the system. Refer to the Accessories List in this section for ground strap and terminal lug part numbers.



1. Allowing for extension of drives, cut ground straps to length needed to connect each drive to system ground point on controller. Cut One more strap to connect ground on controller to earth ground.

2. Crimp and solder terminal lugs to both ends of each ground strap.

3. Remove screw and lockwasher from ground point (DC GND) on each drive.

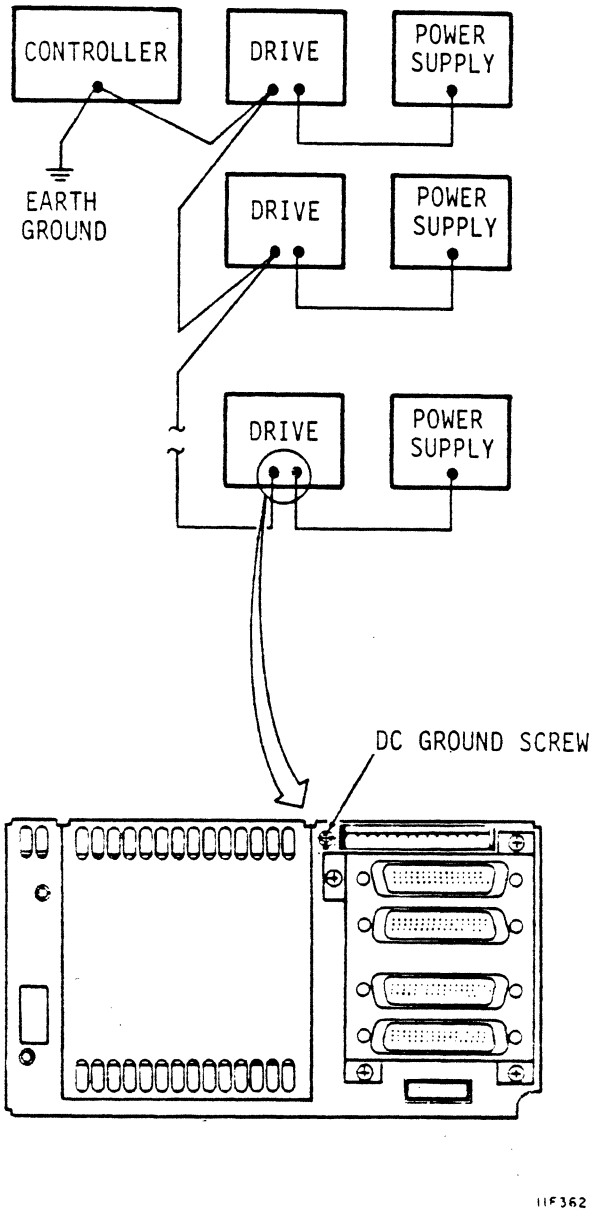
4. With lockwasher under ground strap, attach a ground strap to DC GND point on each drive.

5. Attach controller and all drive ground straps to system ground point on controller.

6. Connect other end of controller ground strap to earth ground.

CONNECTING A DAISY CHAIN SYSTEM GROUND

In this system, the earth ground connection on the controller is connected to an earth ground and to the DC GND point on the first drive in the string. Other ground straps connect between the DC GND point on the first and second drive, second and third, etc. Refer to the Accessories List in this section for ground strap and terminal lug part numbers.

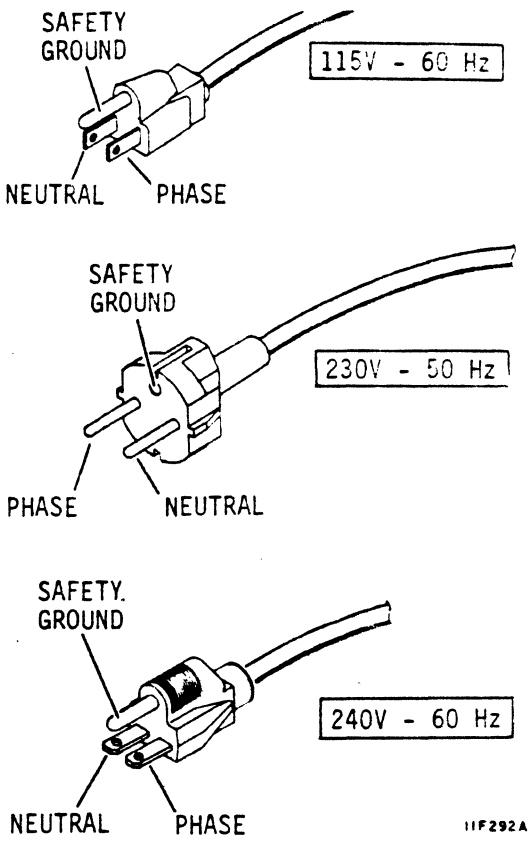


1. Allowing sufficient length for drive extension, cut ground straps to length for use:
   - between each drive
   - between the first drive and controller
   - between controller and earth ground
2. Crimp and solder terminal lugs to both ends of each ground strap.
3. Remove screw and lockwasher from DC GND point on each drive.
4. With lockwasher under ground straps, attach them to DC GND point on each drive.
5. Attach earth ground strap and ground strap from first drive, to system ground point on controller.
6. Connect other end of controller ground strap to earth ground.

PROVIDING A SAFETY GROUND

A safety ground must be provided by the site ac power system. The green wire (or green wire with yellow stripe) in the drive power cord provides the safety ground connection between the power supply and the site ac power system. The site ac power system must provide the safety ground to earth ground connection.

All site ac power connection points, including convenience outlets for test equipment, must be maintained at the same safety ground potential.

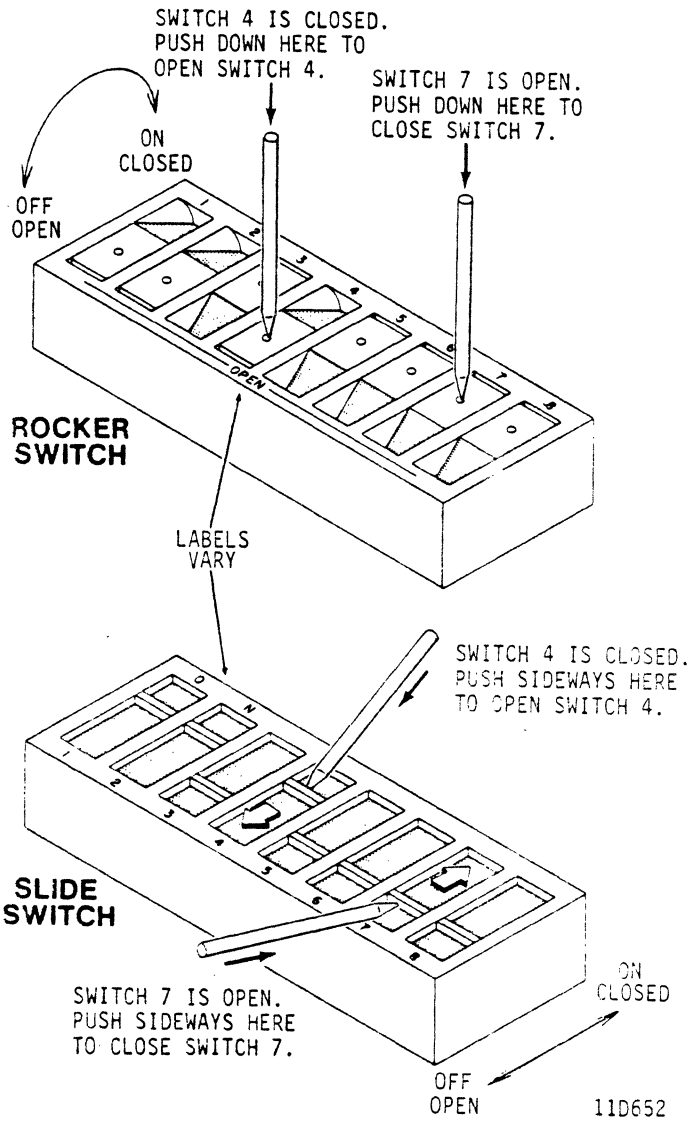


HOW TO OPERATE DIP SWITCHES

Two groups of small switches (called DIP switches) allow tailoring the drive to your exact needs. One set of DIP switches is found on the I/O board. You reach them through a hole at the left side of the rear panel. The other set is found on the control board. They are reached through holes in the drive top cover.

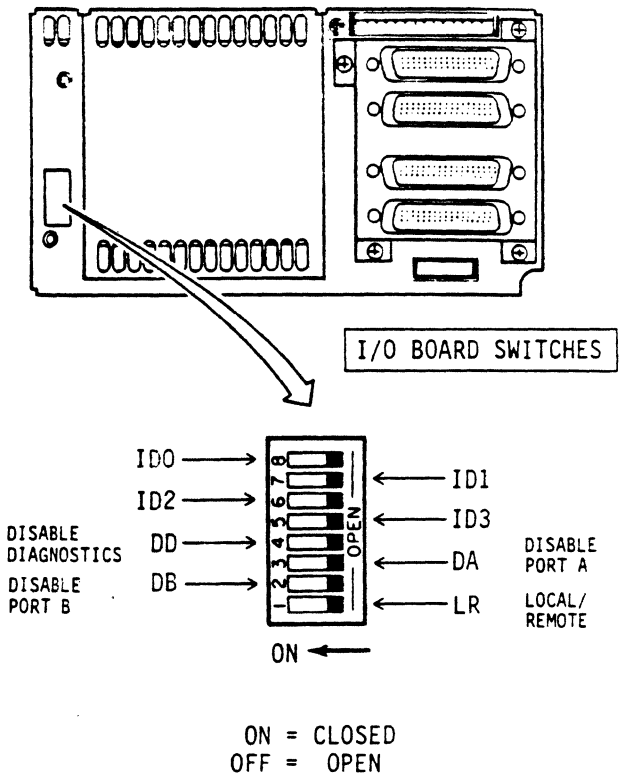
You may encounter two types of switches. Rocker switches are actuated by pressing one end of the actuator or the other (rocking it) to turn the switch on (closed) or off (open). Slide switches are turned on or off by sliding the actuator one way or the other. Use a slender ball point pen, a straightened paper clip, or any similar object to change the switch settings. DO NOT use a lead pencil point as it may break off and lodge in the switch, or cause the switch to malfunction.

The switches are mounted in a plastic case and are usually numbered. Other labels may appear next to the switches on the circuit board, or a label may appear at the sides of the access hole in the drive. The position of the labels may not always coincide with the switch setting that enables the function. Always use the table of switch settings to properly set the switches for your needs. A switch is considered closed in the on position and open in the off position.



SETTING THE I/O BOARD SWITCHES

The switches on the I/O board are accessible through a hole in the lower left side of the rear panel. Use the table on the next page to determine if the switch settings must be changed.



SETTING THE I/O BOARD SWITCHES

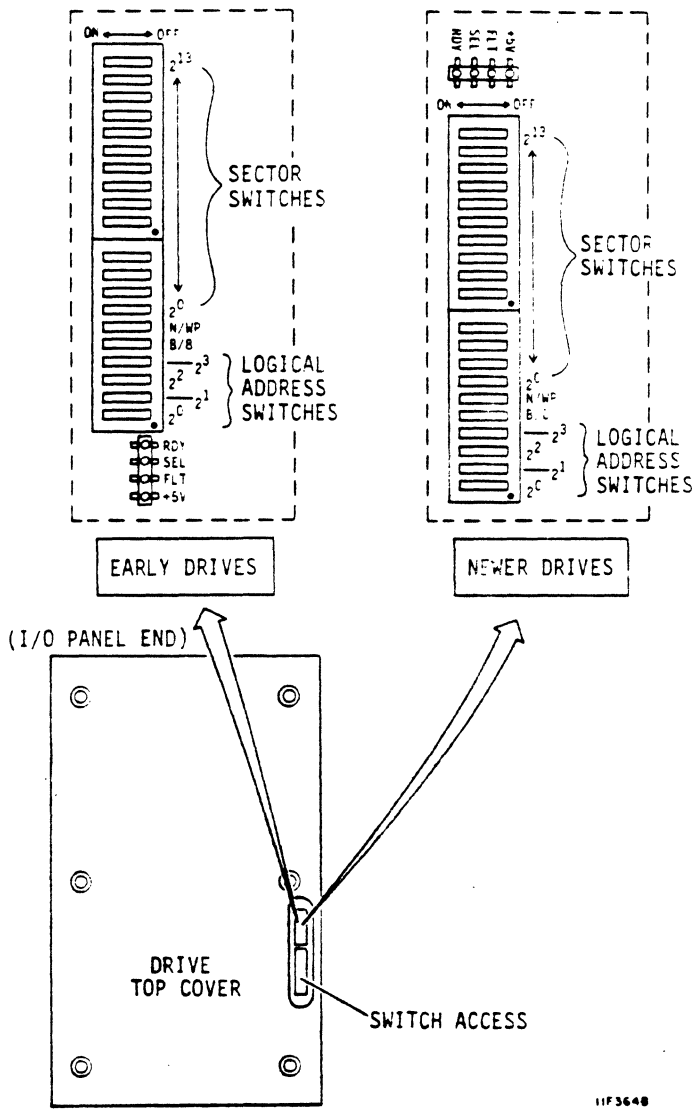
Switch	Setting	Description
L/R (Local/Remote)	Local (off/open)	Disk spin-up starts when dc power is applied, or when the START switch is pressed if the drive has an optional operator or status/control panel.
	Remote (on/closed)	Factory set to this position. Spin-up command from interface is required to start drive.
DA - DB Port Disable (A or B)	Enable (off/open)	Enables the port for normal operation. Factory set to this position.
	Disable (on/closed)	Disables use of the port.
DD Disable R/W Diagnostics	Enable (off/open)	Enables internal diagnostic program to perform read and write operations. Factory set to this position.
	Disable (on/closed)	Prevents internal diagnostic program from doing read and write operations.
ID0 - ID3 (ID Microcode)		These switches assign a unique device configuration code. Do not change the factory setting shown below. 850 MB Drives: ID0, ID2, and ID3 are set to off (open) and ID1 is set to on (closed). 1230 MB Drives: ID0 and ID1 are set to on (closed). ID2 and ID3 are set to off (open).

SETTING THE CONTROL BOARD SWITCHES

Your drive can have either of two types of control boards installed. The location of the four LEDs and the jumpers used to enable or disable various features are the main visual differences.

The switches on the Control board are reached by removing the plastic cover from the the hole in the drive top cover. Switch settings are described in the table on the next page.

The jumpers that control how certain features operate can be changed on newer boards through the same access hole used to reach the switches. You must remove the top cover to reach the jumpers on early drives.



SETTING THE CONTROL BOARD SWITCHES

<table>
<tr><th>Switch</th><th>Setting</th><th>Description</th></tr>
<tr><td>Sector Switches</td><td></td><td>These switches are not used. Changing the settings has no effect on drive operation.</td></tr>
<tr><td>Logical Address</td><td></td><td>Select the logical address from the table below and then set switches 2^0 - 2^3 as shown. The switches are factory set for address 0 (all off/open).
<table>
<tr><th rowspan="2">Logical Address</th><th colspan="4">Switch Settings</th></tr>
<tr><th>2^3</th><th>2^2</th><th>2^1</th><th>2^0</th></tr>
<tr><td>0</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>1</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>2</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td></tr>
<tr><td>3</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>4</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td></tr>
<tr><td>5</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>6</td><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td></tr>
<tr><td>7</td><td>OFF</td><td>ON</td><td>ON</td><td>ON</td></tr>
</table></td></tr>
<tr><td>B/8 (Early Drives)
B/C (Early Drives)</td><td></td><td>This switch is not used. Changing the setting has no effect on drive operation.</td></tr>
<tr><td>WP/N</td><td>WP (off)

N (on)</td><td>Write Protect (prevents writing)

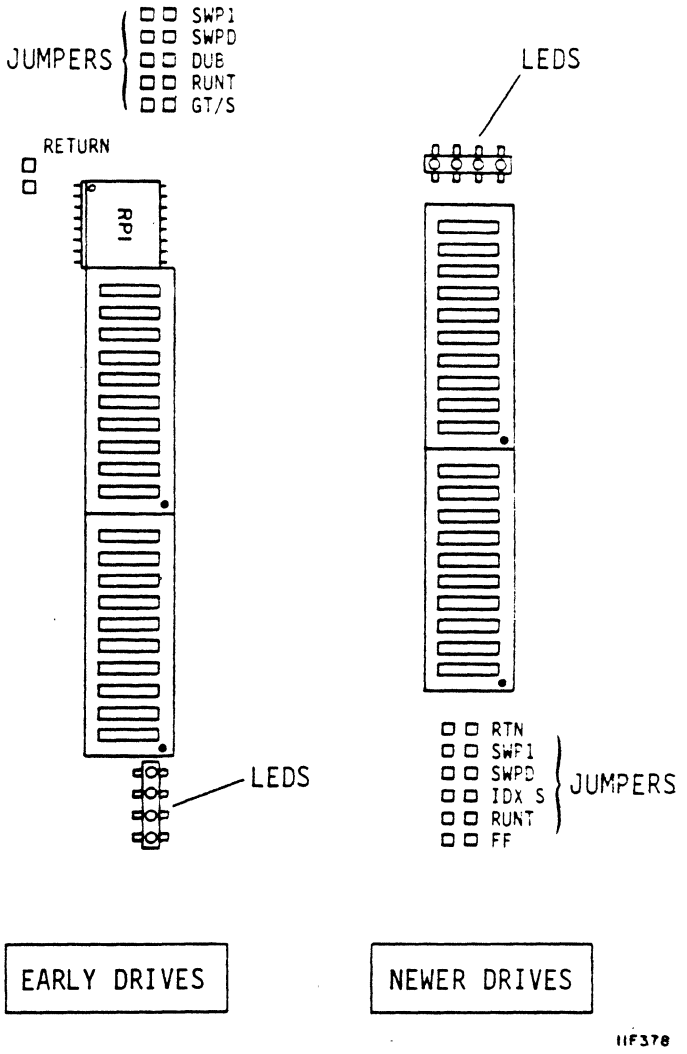
Normal (allows writing)</td></tr>
<tr><td colspan="3">Switch On = Closed, Switch Off = Open</td></tr>
</table>

SETTING THE CONTROL BOARD JUMPERS

Both types of Control boards have jumpers that control operation of some special features. Setting of these jumpers is described in the table on the next page, and in the Sweep Cycle Information that follows it. Review this information carefully to determine if jumper settings must be changed.

If you need to make jumper position changes on an early drive where the jumpers are not accessible through the access hole in the top cover, you must remove the six screws and lift the cover off the drive. The jumpers on newer drives are accessible through the access hole in the top cover.

A jumper is connected when it connects the two pins, and is disconnected when it is removed or left connected to only one of the two pins. Install the top cover (early drives) or the plastic hole cover (newer drives) when finished setting jumpers.



SETTING THE CONTROL BOARD JUMPERS (CONTD)

Jumper	Position	Description
RUNT	Connected	Suppresses runt sector pulses.
	Disconnected	Allows runt sector pulses. The drive is shipped with this jumper disconnected.
DUB*	Connected	The drive is shipped with this jumper connected. Do not change this factory setting.
GT/S*	Disconnected	The drive is shipped with this jumper disconnected. Do not change this factory setting.
SWP1**	Connected	Disables the option for sweep cycle only on seeks.
	Disconnected	Enables the option for sweep cycle only on seeks.
SWPD**	Connected	Disables sweep cycle operation.
	Disconnected	Enables sweep cycle operation.
Return** (No Label on early drives)	Disconnected	Disables the option to return heads to their original position following a sweep segment.
RTN *** (Newer drives)	Connected	Enables the option to return heads to their original position following a sweep segment only if drive was selected during last 12 minutes. If drive was not selected during last 12 minutes, the heads stay on the last track the sweep segment moved them to.

Continued

SETTING THE CONTROL BOARD JUMPERS (CONTD)

Jumper	Position	Description
IDX S***	Disconnected	The drive is shipped with this jumper disconnected. Do not change this factory setting.
	Connected	This setting must not be used.
FF***	N/A	Reserved for future use.

* Found only on early drives.
** See Sweep Cycle Information below.
*** Found only on newer drives.

SWEEP CYCLE INFORMATION

The sweep cycle feature was not fully implemented at the time this manual was printed. The sweep cycle descriptions that follow are for future reference.

The sweep cycle is a feature that periodically moves the heads to different locations on the disks during periods when the drive is idle. Some advantages of using a sweep cycle are:

- It enhances drive reliability. You are encouraged to use the drive sweep cycle or a sweep cycle that is controlled by the system or subsystem. Consult with a systems analyst before making this choice.
- The sweep cycle routine only takes about 11 seconds in a 13 hour period. This means the drive is still available to the system more than 99% of the time.
- You may disable the sweep cycle without affecting the specified Mean Time Between Failures (MTBF) or warranty agreements.

WHICH DRIVES HAVE THE SWEEP CYCLE FEATURE

- At the time this manual was printed, drives were shipped with the sweep cycle feature disabled (SWPD jumper is connected) because of I/O constraints. Do not disconnect the SWPD jumper in an attempt to enable the sweep cycle feature on these drives. You can use a sweep cycle that is controlled by the system or subsystem.

WHICH DRIVES HAVE THE SWEEP CYCLE FEATURE (CONTD)

- Drives that have the sweep cycle feature fully implemented will ship from the factory with the feature enabled (SWPD jumper disconnected). You may disable the sweep cycle feature on these drives, or continue to use a sweep cycle controlled by the system or subsystem if desired.

HOW TO ENABLE THE SWEEP CYCLE FEATURE

To enable the sweep cycle feature, the jumpers must be set as follows:

1. Disconnect the SWPD jumper.

2. Select one of the SWP1 jumper settings below:

   - Disconnect the SWP1 jumper to allow sweep cycle movements only when a seek is issued by the system or subsystem. The drive logic will start a sweep cycle if there is no Tag 1 (seek) activity during a 12 minute interval.

   - Connect the SWP1 jumper to allow sweep cycle movements only if a seek is issued by the system or subsystem. Sweep cycle activity does not occur unless there is Tag 1 (seek) activity.

3. Select one of the RTN (or Return) jumper settings below:

   - Connect the RTN (or Return) jumper to cause the drive to monitor Unit Selected status. If the drive is not selected during a 12 minute period prior to completion of a sweep segment, the heads are positioned at one of the cylinders accessed during the sweep segment. If the drive is selected during this 12 minute period, the heads are positioned at the original cylinder at the end of the sweep segment.

   - Disconnect the RTN (or Return) jumper to cause the heads to be positioned at one of the cylinders accessed during the sweep segment regardless of Unit Selected Status.

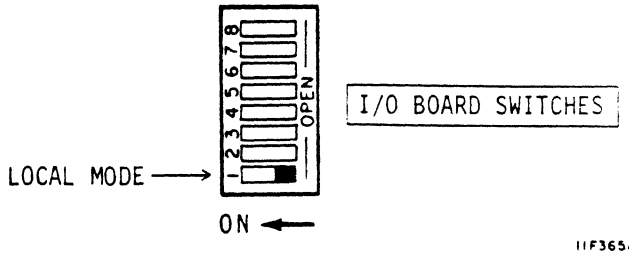
HOW TO DISABLE THE SWEEP CYCLE FEATURE

Connect the SWPD jumper to disable the sweep cycle feature. The setting of the SWP1 and RTN (or Return) jumpers need not be changed since their setting is irrelevant when the SWPD jumper is connected.

CHECKING LOCAL MODE OPERATION

This procedure verifies that the drive power on sequence works properly in the Local mode.

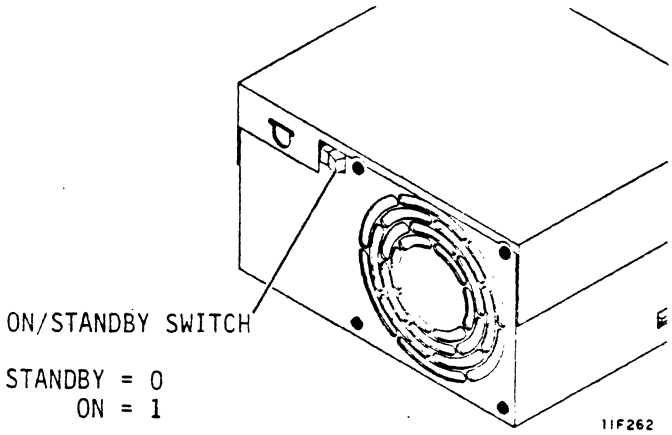
1. Place the Remote/Local switch on the I/O board in the Local position.



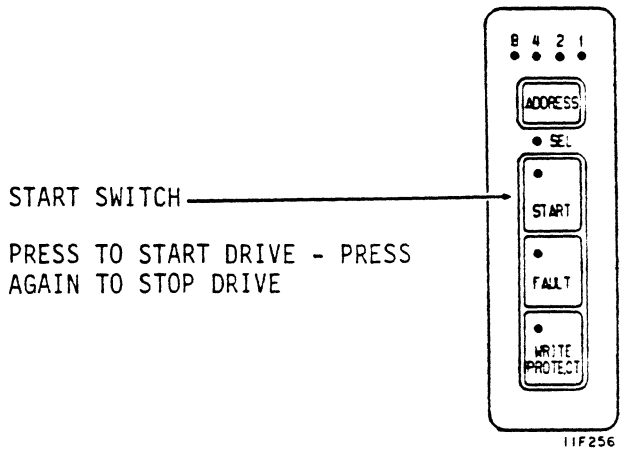
NOTE

If operator or status/control panel is not used, drive power on sequence starts when power supply On/Standby switch is placed in On position.

2. Set On/Standby switch on power supply to On (1) and observe that power supply cooling fan is operating.



3. Press START switch if drive has an operator or status/control panel. Otherwise, skip this step.



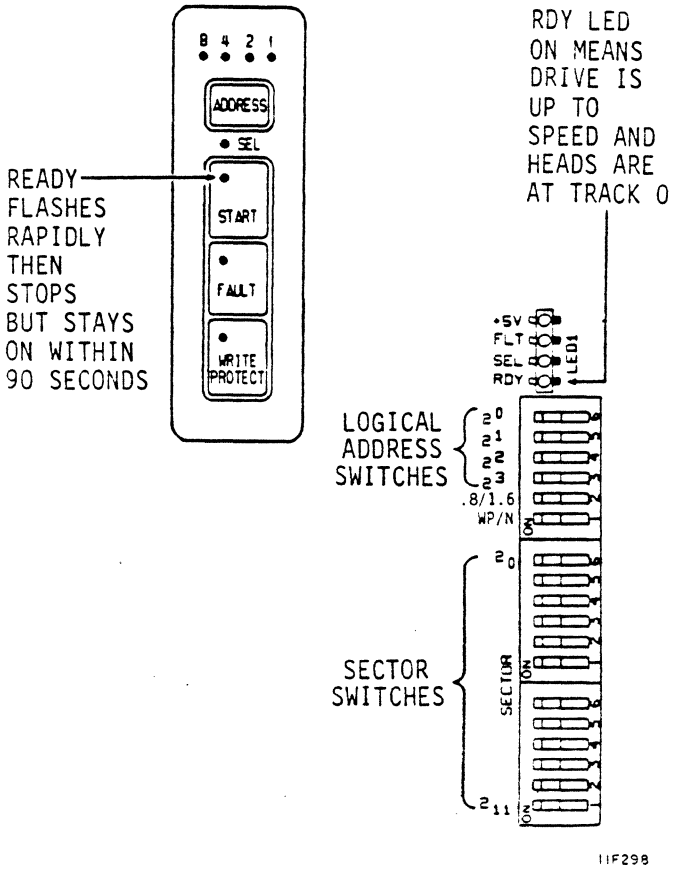
CHECKING LOCAL MODE OPERATION (CONTD)

4. Note Ready indicator in START switch flashes rapidly. This means power up sequence has started.

5. Ready indicator stops flashing but stays on within 90 seconds. This means the drive motor is up to speed and the heads are at track 0.

   RDY LED on control board lights to indicate the drive is ready.

Refer to section 4 of this manual or to the maintenance manual if a problem exists in the drive.



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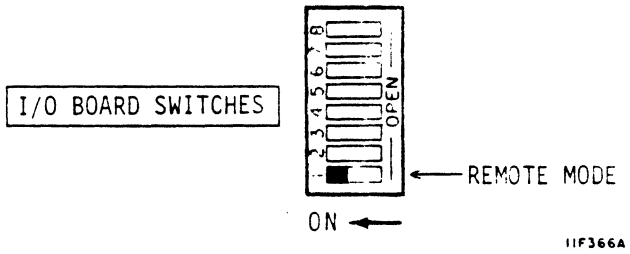
CHECKING REMOTE MODE OPERATION

This procedure verifies that the drive power on sequence works properly in the Remote mode.

1. Place the Remote/Local switch on the I/O board in the Remote position.



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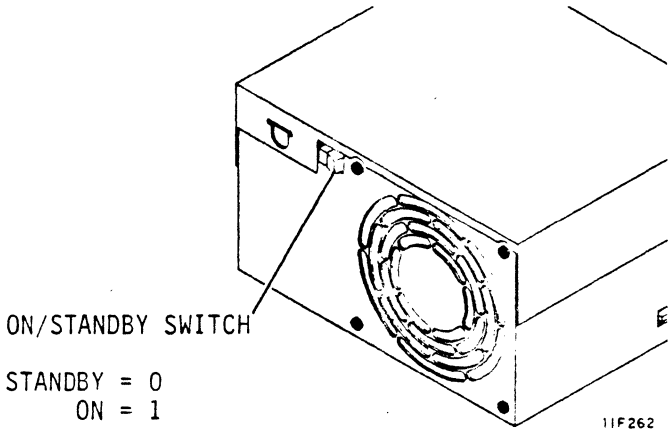
NOTE

If operator or status/control panel is not used, drive power on sequence starts when power supply On/Standby switch is placed in On position.

2. Set On/Standby switch on power supply to On (1) and observe that power supply cooling fan is operating.



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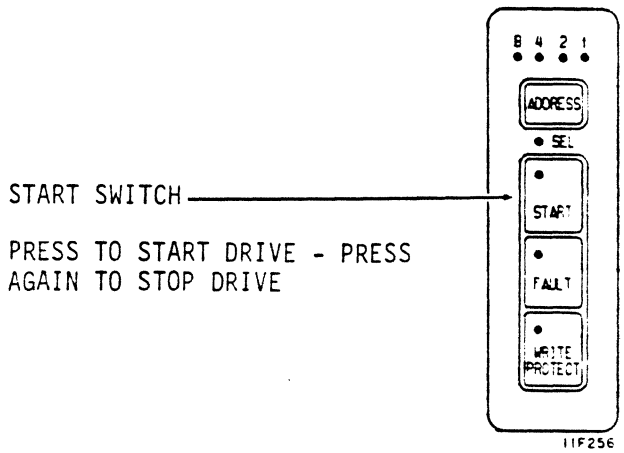
3. Press START switch if drive has an operator or status/control panel. Otherwise, skip this step.



11F256

CHECKING REMOTE MODE OPERATION (CONTD)

4. Issue Spin Up command to start the drive.

NOTE

Each drive power on sequence is delayed for a time equal to five seconds times its logical address. If logical address is 3, drive starts after 15 second delay.

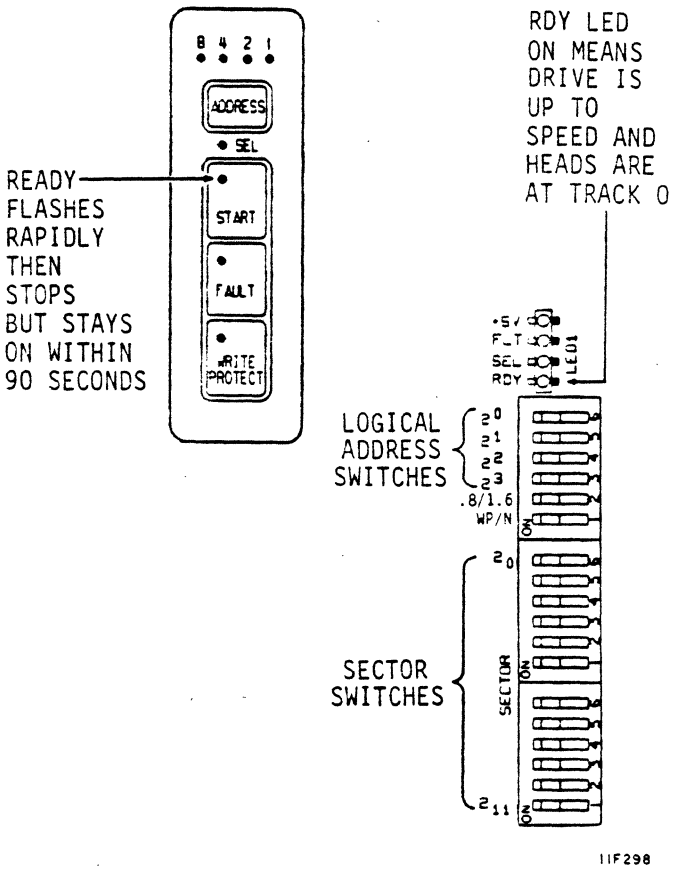
Address 0 = 0 second delay
Address 1 = 5 second delay
Address 2 = 10 second delay
Address 3 = 15 second delay
Address 4 = 20 second delay
Address 5 = 25 second delay
Address 6 = 30 second delay
Address 7 = 35 second delay

5. Note Ready indicator in START switch flashes rapidly. This means power up sequence has started.

6. Note Ready indicator stops flashing but stays on within 90 seconds. This means drive motor is up to speed and heads are at track 0.

   RDY LED on control board lights to indicate drive is ready.

Refer to section 4 of this manual or to the maintenance manual if a problem exists in the drive.



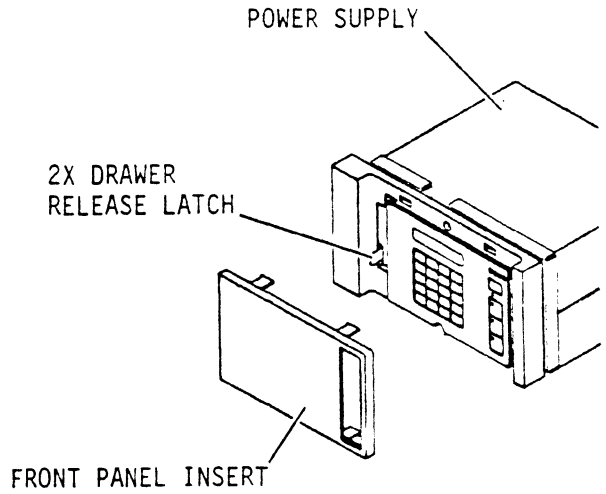
11F298

ADDING AN OPERATOR PANEL OR STATUS/CONTROL PANEL

Use this procedure to add an optional operator panel or status/control panel to an existing 2X installation.

1. Remove the front panel insert from each drive.

2. Push the left 2X drawer latch to the right and fully extend 2X drawer. The release latch for the right drive is not used.

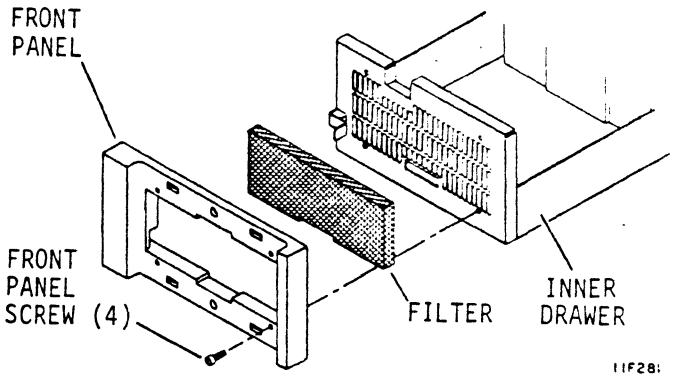


3. Set On/Standby switch on power supply to Standby (0) position.

4. Remove screws securing front panel to inner drawer. Remove front panel and filter from drawer.

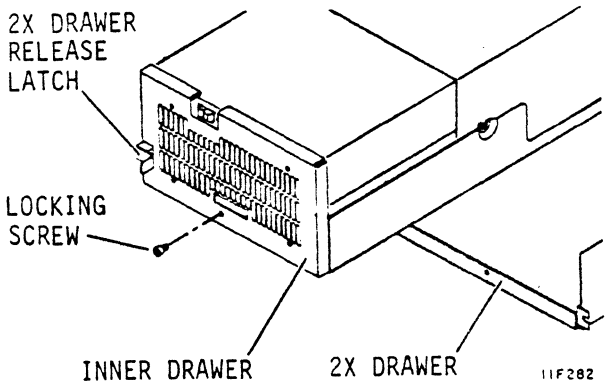
5. Disconnect the ac power cord from the power source.

6. Disconnect the I/O cables at the rear of the drive.



ADDING AN OPERATOR PANEL OR STATUS/CONTROL PANEL (CONTD)

7. Remove inner drawer locking screw. Push 2X drawer latch to right, lift inner drawer up and slide it forward and out of 2X drawer. Place inner drawer on a work table.

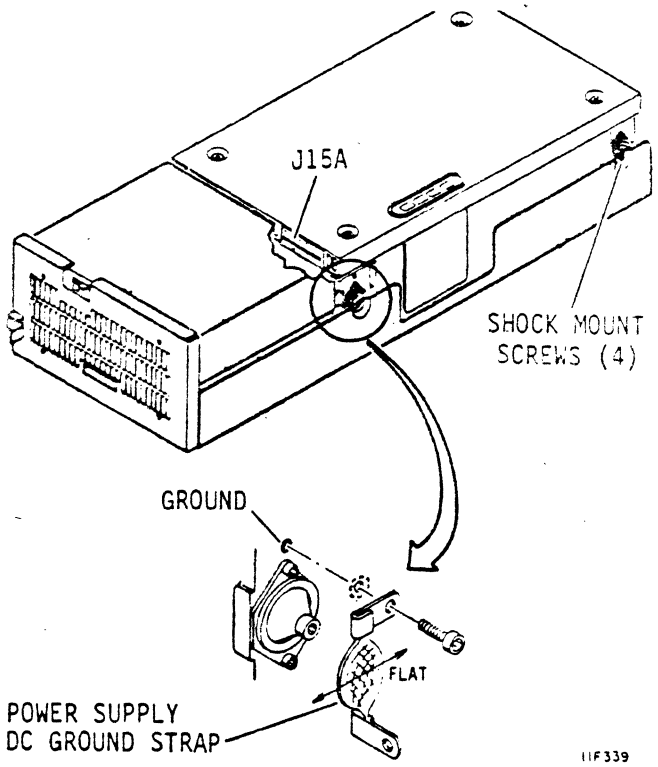


8. Loosen shock mount screws securing drive to inner drawer.

9. Disconnect ground strap above shock mount on left side of drive.

10. Lift up front of drive and disconnect dc power cable from J15A on control board.

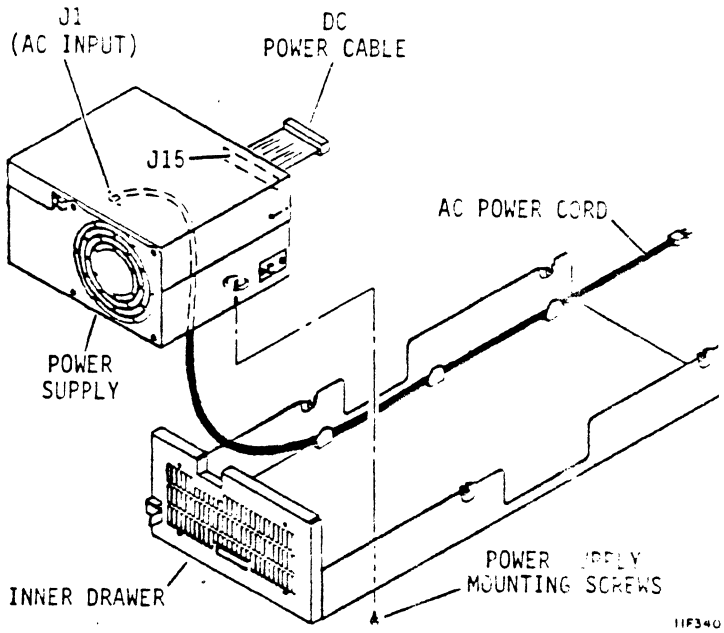
11. Lift drive from inner drawer and set on table.



ADDING AN OPERATOR PANEL OR STATUS/CONTROL PANEL (CONTD)

12. Remove screws holding power supply to inner drawer.

13. Lift power supply from inner drawer and disconnect ac power cord from J1.



14. Perform the following procedures in the order listed. All procedures are in the listed sequence earlier in this section.

    - Installing the Operator Panel or Status/Control Panel Jumper Cable
    - Installing the Power Supply in the Inner Drawer
    - Installing the Drive in the Inner Drawer
    - How to Mount the Status/Control Panel, or How to Mount the Operator Panel

15. Connect I/O and system ground cables.

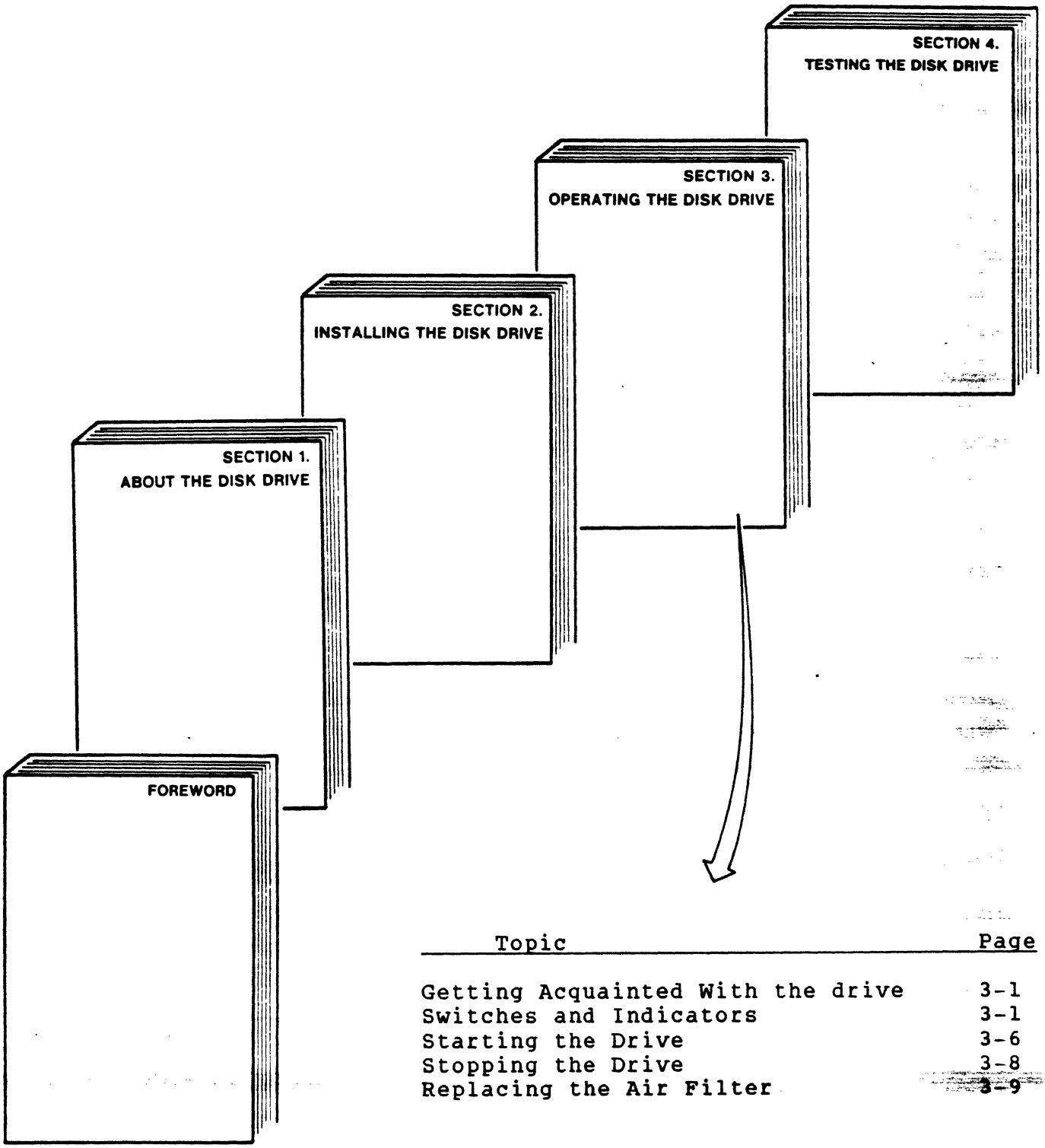
16. Connect ac power cord to power source.

17. Place On/Standby switch on power supply to On (1)

18. Place 2X drawer in its closed position in rack.

SECTION 3

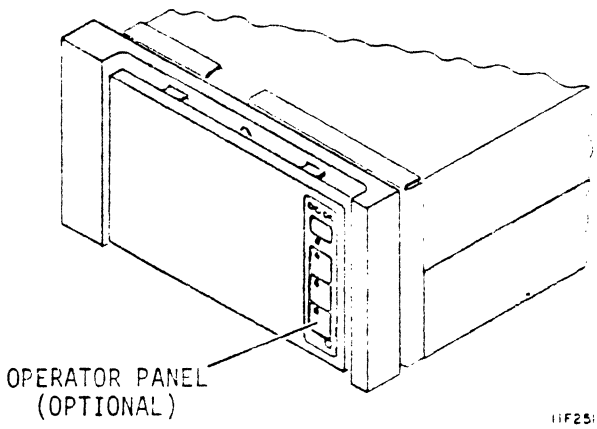
OPERATING THE DISK DRIVE



GETTING ACQUAINTED WITH THE DRIVE

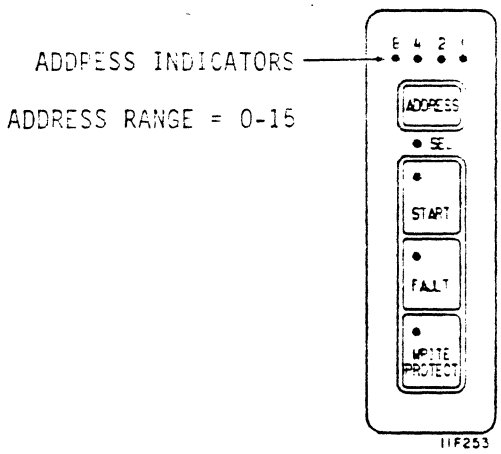
This section explains the controls you use to operate the drive, how to start and stop the drive, how to interpret lighted indicators, and how to change the air filter.

The operator panel shown is optional. A blank panel is provided if the drive does not have an operator panel. If the drive does not have an operator panel, its operation depends on how various switches were set when the drive was installed.



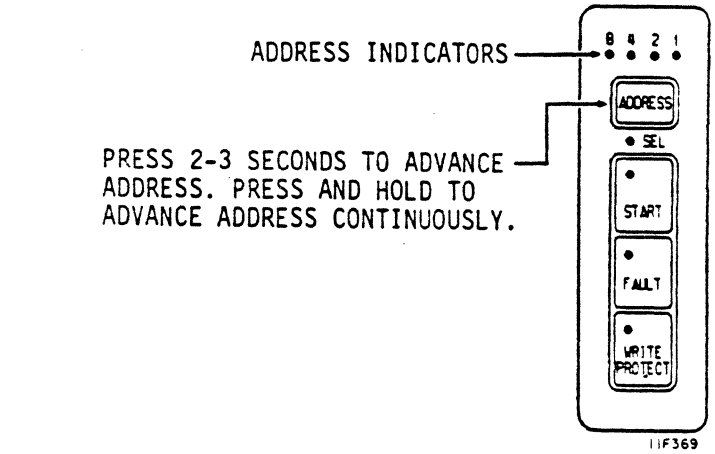
THE ADDRESS INDICATORS

The address indicators show the binary logical address of the drive. This address is determined and set when the drive is installed. It is stored in memory when dc power is off. The address can be any number from 0 to 7, but no two drives in the same string can have the same address. The address can be changed with the ADDRESS switch.



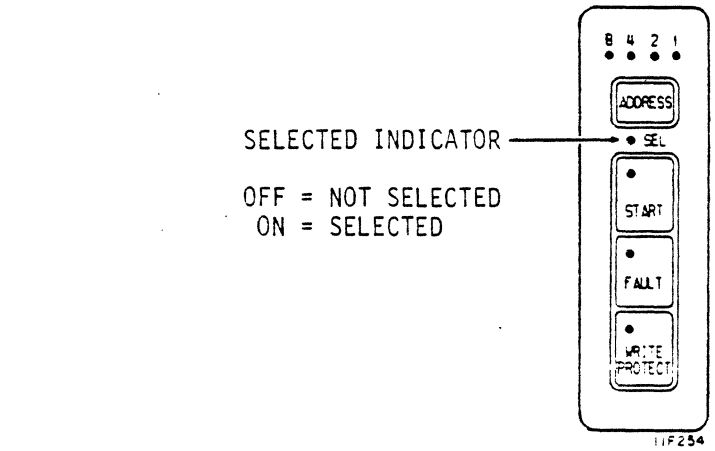
THE ADDRESS SWITCH

This switch is used to set the logical address of the drive. Pressing it for 2 to 3 seconds advances the logical address as displayed by the address indicators. Pressing and holding the switch longer than 3 seconds advances the logical address continuously.



THE SEL (SELECTED) INDICATOR

When on, this indicator tells you the drive is selected by a controller. When off, it tells you the drive is not selected.

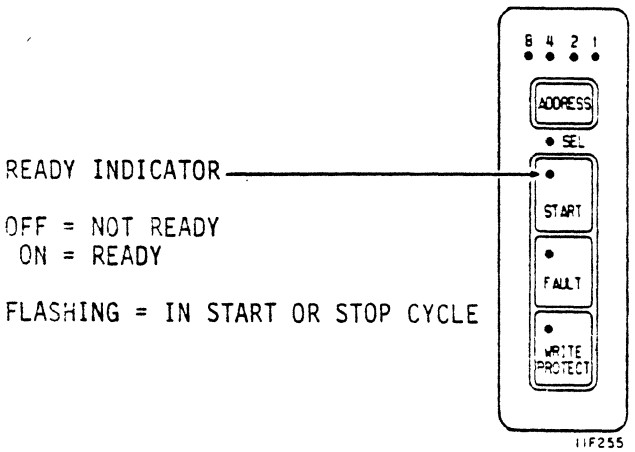


THE READY INDICATOR

The Ready indicator is in the upper left corner of the START switch.

This indicator flashes rapidly during the start cycle. It stops flashing but remains on when the start cycle ends.

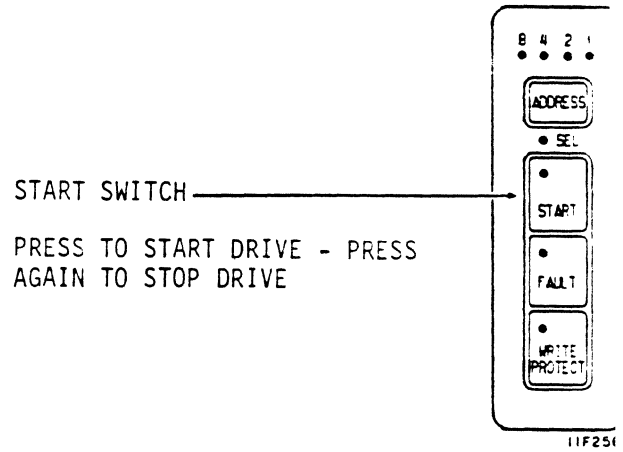
The indicator flashes slowly during the stop cycle. It stops flashing and remains off when the stop cycle ends.



THE START SWITCH

Pressing and releasing this switch starts the drive. The Ready indicator in the upper left corner of the switch flashes rapidly during this cycle. It stops flashing but remains on when the start cycle ends.

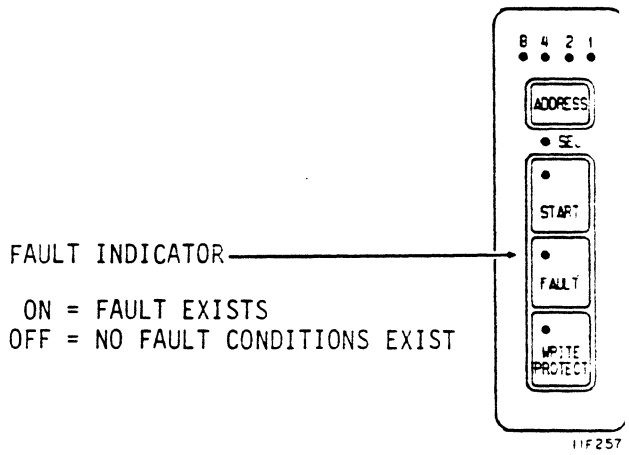
Pressing and releasing the switch again causes the drive to begin its stop cycle. The Ready indicator flashes slowly during this cycle. It stops flashing and remains off when the stop cycle ends. The current condition of the START switch is stored in memory when dc power is removed.



THE FAULT INDICATOR

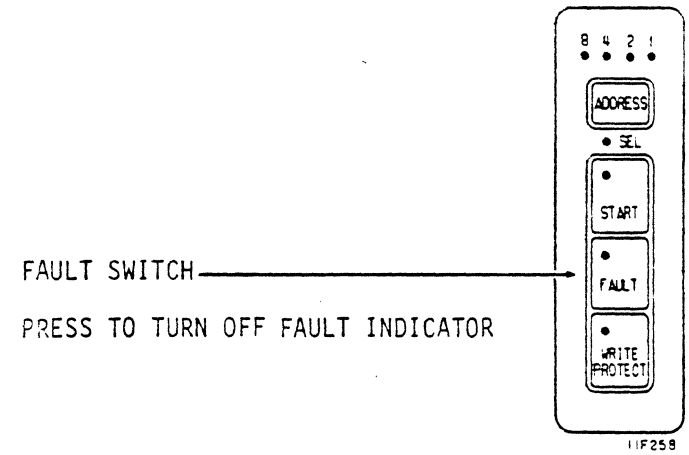
This indicator is in the upper left corner of the FAULT (clear) switch. It lights if a fault condition exists within the drive. The indicator is turned off by any of the following, provided the fault condition is no longer present.

- Pressing the FAULT switch
- A drive start cycle
- A Fault Clear command from the controller.



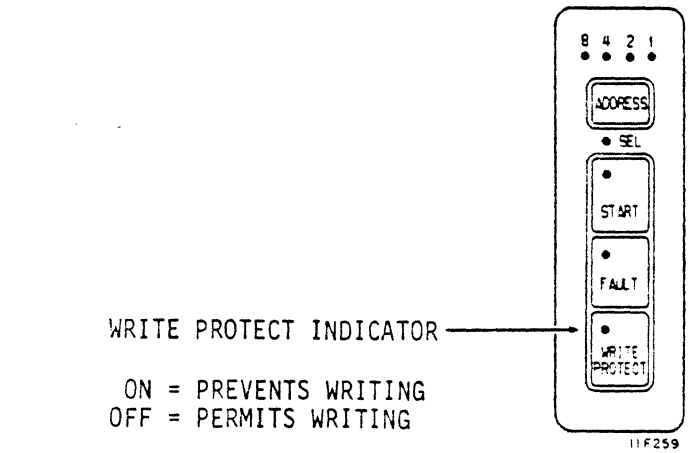
THE FAULT (CLEAR) SWITCH

Pressing and releasing this momentary action switch turns off the FAULT indicator, provided the fault condition that caused the indicator to light is no longer present.



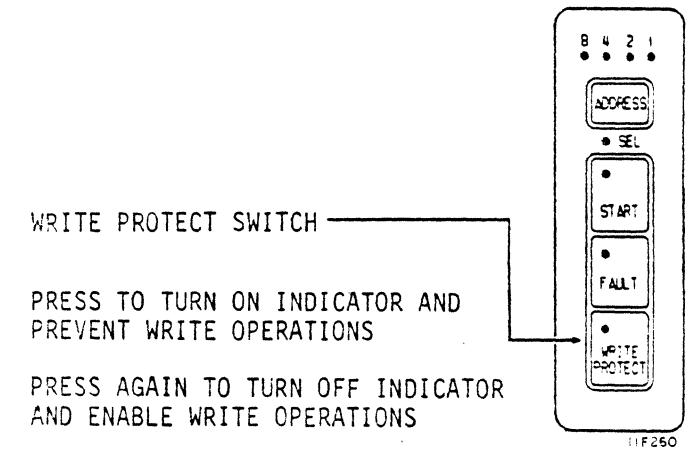
THE WRITE PROTECT INDICATOR

The WRITE PROTECT indicator is in the upper left corner of the WRITE PROTECT switch. When this indicator is on, the write protect mode is selected and the drive is prevented from writing. The drive can read or write when this indicator is off.



THE WRITE PROTECT SWITCH

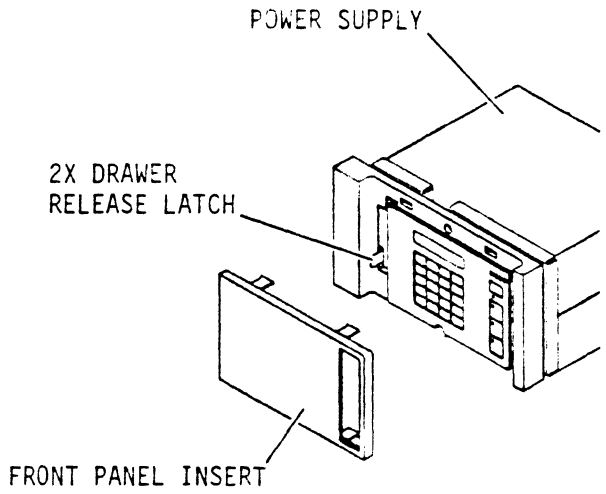
Pressing this switch turns on the WRITE PROTECT indicator and prevents write operations. Pressing the switch again turns off the indicator and allows read or write operations. The current mode is stored in memory when dc power is removed. The WRITE PROTECT switch does not change the selection if the WP/N switch on the control board is set to WP (write protect).



THE POWER SUPPLY ON/STANDBY SWITCH

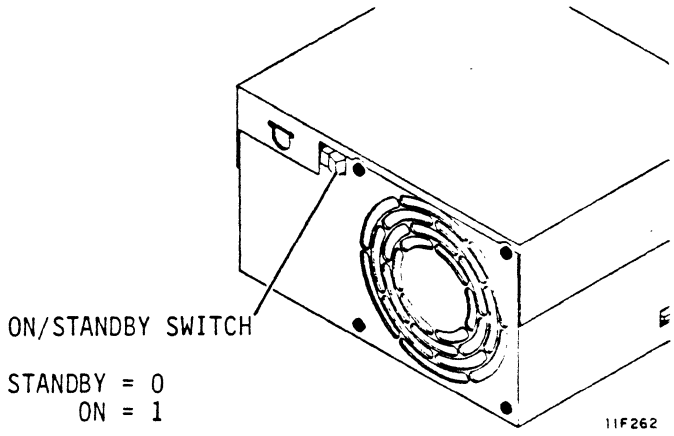
The On/Standby switch is on the power supply. This switch controls dc power to the drive and is not routinely used. To reach the switch --

1. Remove the front panel insert.
2. Push the release latch to the right.
3. Extend the 2X drawer from the rack to expose the power supply.



Placing the switch in the On (1) position applies dc power to the drive and starts the cooling fan.

Placing the switch in the Standby (0) position removes dc power from the drive and stops the fan.



HOW TO START A DRIVE WITH NO OPERATOR PANEL

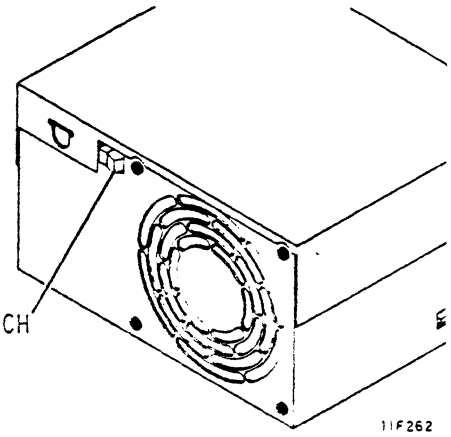
Drives with no operator panel are not routinely turned on and off. Power is normally left on and the drive motor is started and stopped using the Spin Up and Spin Down function codes. Use the following procedure to start the drive:

1. Set the On/Standby switch on the power supply to On (1).

NOTE

In Local mode, the drive starts immediately when the On/Standby switch is set to On (1). In Remote mode, starting of each drive can be delayed from 0 to 35 seconds depending on its logical address. The delay period is 5 seconds times the logical address. A drive with a logical address of 5, starts after a 25 second delay expires.

2. Repeat step 1 for all drives in the string. After 90 seconds all drives should be started and ready to respond to controller commands.



HOW TO START A DRIVE WITH THE OPTIONAL OPERATOR PANEL

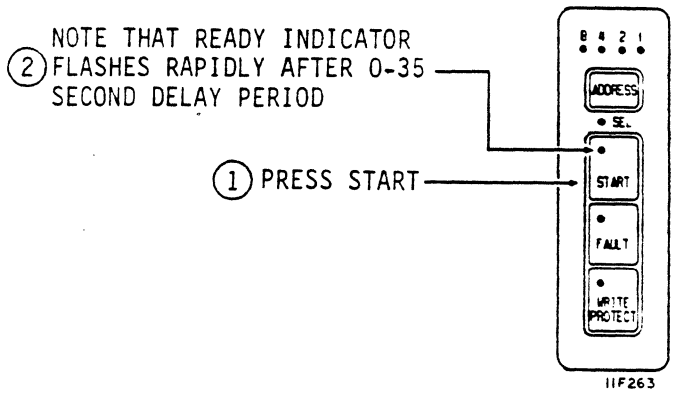
1. Set the power supply On/Standby switch to On (1).

NOTE

In Local mode, the drive starts immediately when the On/Standby switch is set to On (1). In Remote mode, start up of each drive can be delayed from 0 to 35 seconds depending on its logical address. The delay period is 5 seconds times the logical address. A drive with a logical address of 5, starts after a 25 second delay expires.

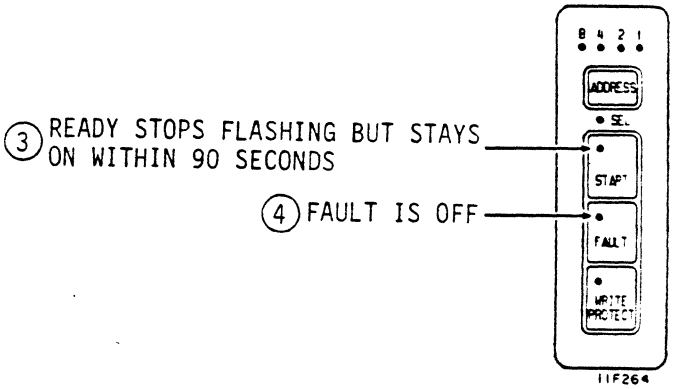
2. Press the START switch.

3. After the delay period (if applicable) observe that the Ready indicator flashes rapidly.



4. Observe that the Ready indicator stops flashing within 90 seconds, but remains on.

5. Observe that the FAULT indicator is off. The drive is now ready to respond to commands from the controller.



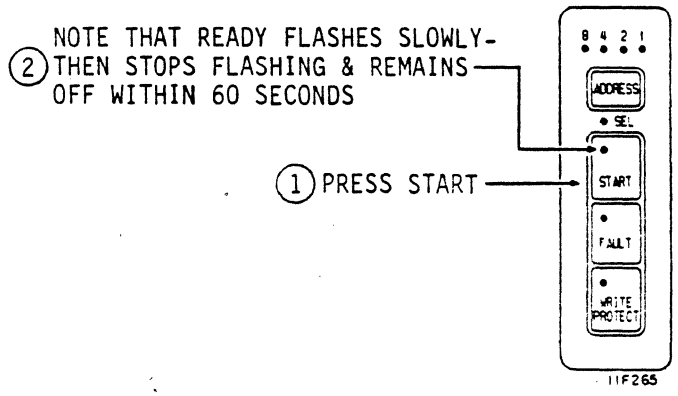
HOW TO STOP THE DRIVE

A drive can be stopped in any one of three ways:

- Using the operator panel
- Using the power supply On/Standby switch
- Using the Spin Down function.

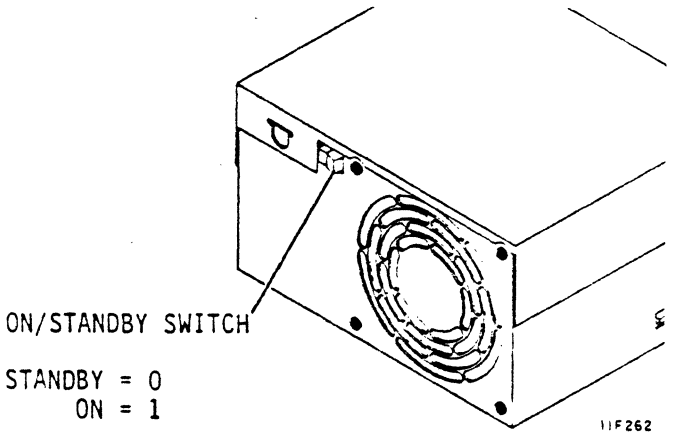
STOPPING THE DRIVE USING THE OPTIONAL OPERATOR PANEL

1. Press the START switch.
2. Observe that the Ready indicator flashes slowly.
3. Observe that the Ready indicator stops flashing and remains off within 60 seconds.



STOPPING THE DRIVE USING THE POWER SUPPLY ON/STANDBY SWITCH

1. Set the On/Standby switch on the power supply to the Standby (0) position.
2. The power supply fan stops and the drive stops within 60 seconds.



USING THE SPIN UP/SPIN DOWN FUNCTION

The Spin Down function can be used to stop the drive after it has once been started. The Spin Up function can be used to start the drive only after dc power is applied. The sequence of events when the drive receives this command is the same as pressing the START switch on the optional operator panel.

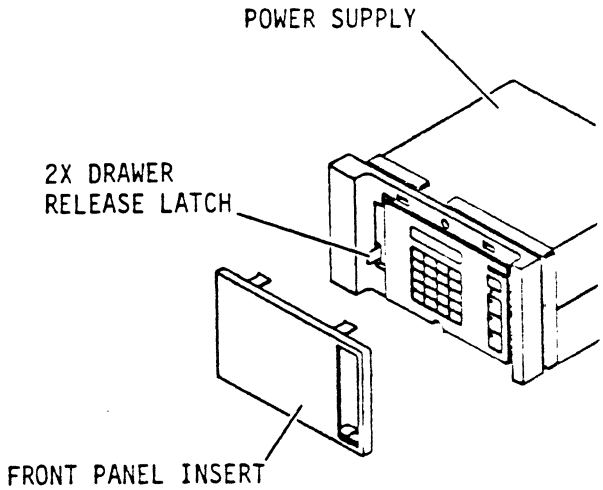
HOW TO REPLACE THE AIR FILTER

The air filter is located behind the front panel insert. It must be checked frequently and replaced when it is dirty. Clean the air filter only if a replacement is not available.

1. Remove the front panel insert from the drive.

2. Push the release latch to the right and extend the 2X drawer to gain access to the power supply

3. Stop the drive. Place the On/Standby switch on the power supply in the Standby (0) position.



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HOW TO REPLACE THE AIR FILTER (CONTD)

NOTE

Skip steps 4 and 7 if the drive does not have the optional status/control panel.

4. Remove the two screws that secure the status/control panel to the front panel. Move it away from the front panel to gain access to the air filter.

5. Remove the dirty filter. If a clean, replacement filter is not available, clean the dirty filter in a solution of water and mild detergent. Rinse the filter and allow it to dry thoroughly.

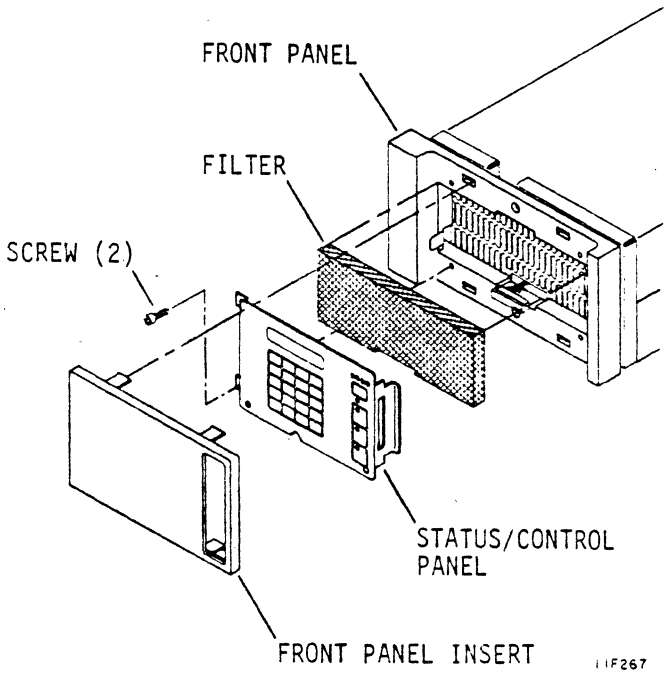
6. Install the clean filter.

7. Place the status/control panel on the front panel and secure it with the two screws.

8. Set the On/Standby switch on the power supply to the On (1) position.

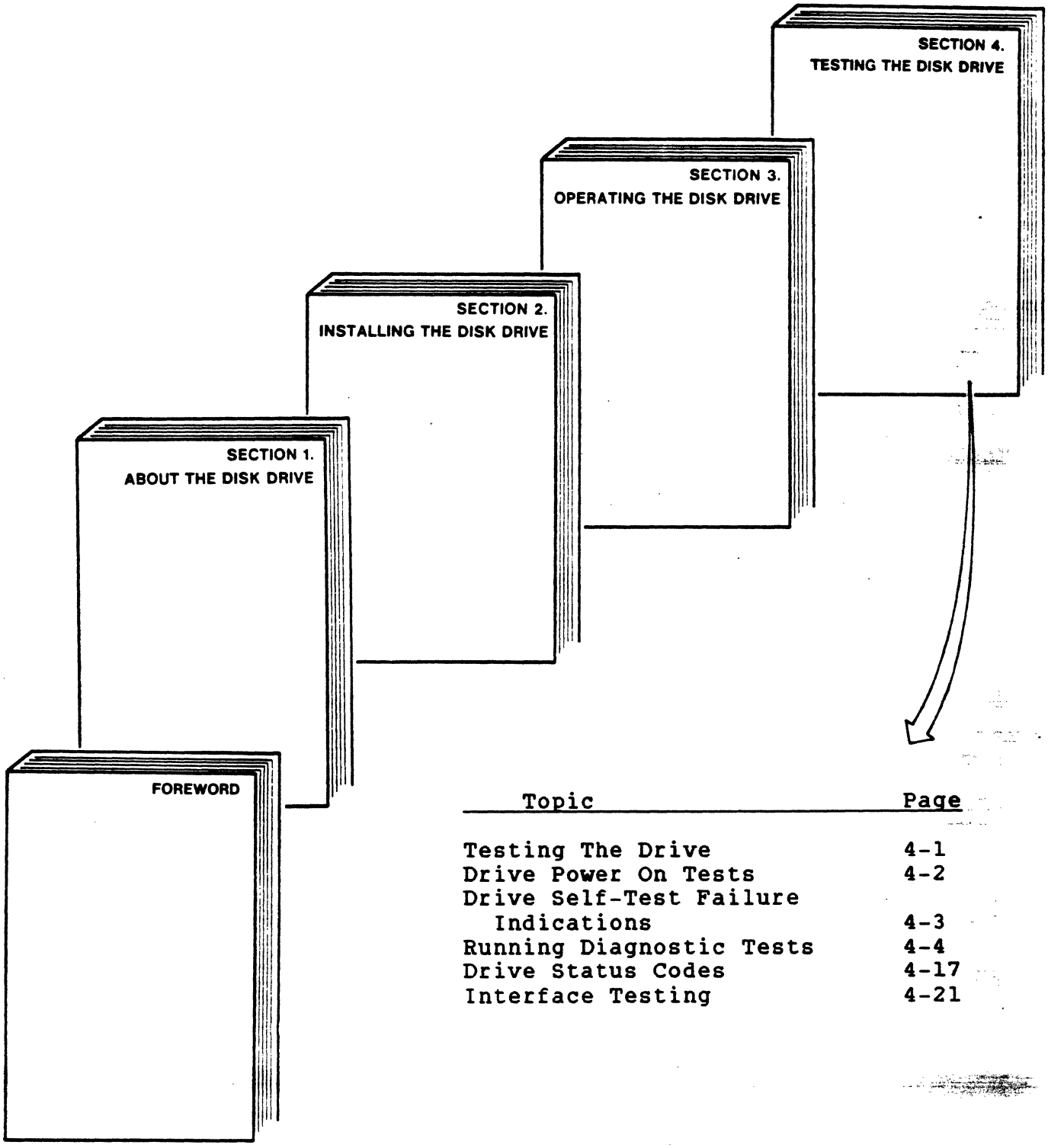
9. Push the 2X drawer fully into the rack until it latches.

10. Install the front panel insert.



SECTION

TESTING THE DISK DRIV



ABOUT TESTING THE DRIVE

CAUTION

When servicing the drive, observe all of the precautions listed under Electrostatic Discharge Protection in section 2 of this manual. Failure to observe these precautions can result in serious damage to electronic assemblies.

This section briefly explains the various diagnostic tests, how to run them, and how to interpret the information displayed on the optional status/control panel. Refer to the maintenance manual for detailed troubleshooting information.

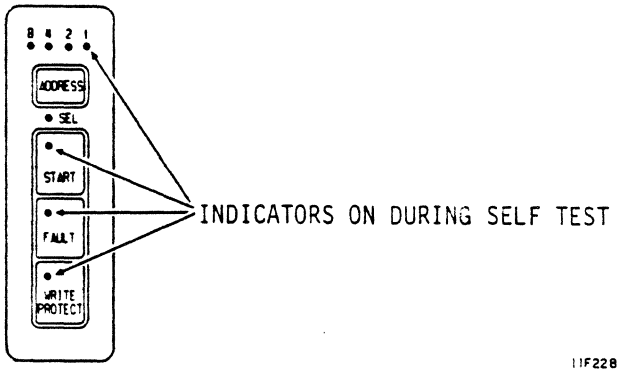
A status/control panel is needed for trouble analysis. If the drive installation does not include a status/control panel, you should connect one to the drive for troubleshooting. Part numbers for the status/control panel and its interconnecting cable can be found in the parts data manual. Instructions for installing the status/control panel are provided in section 2 of this manual. When using the status/control panel for trouble analysis, disable the I/O using the port disable switches (DA - DB) on the I/O board as described in section 2. Failure to disable the I/O may prevent status/control panel initiated diagnostics from completing and the LCD may go blank due to controller selection of the drive.

The following types of troubleshooting information are provided in this section:

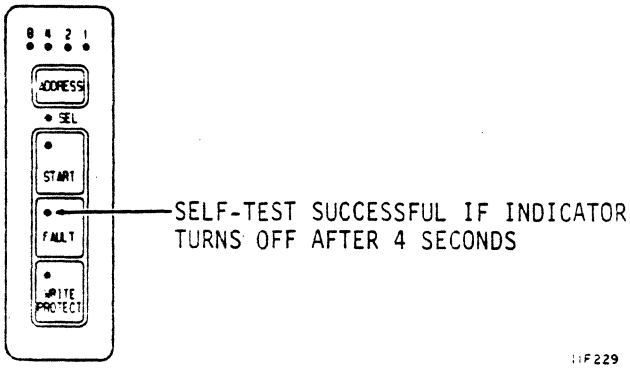
- Drive Power On Tests -- describes the self-tests that occur when dc power is applied to the drive, and lists the corrective actions to take if a test failure occurs.
- Diagnostic Testing -- describes how to use offline diagnostic testing to isolate drive malfunctions.
- Drive Status Codes -- provides information on correcting problems associated with drive power-up/down and with servo operations.
- Interface Testing -- describes the I/O MPU self-tests and online diagnostics.

DRIVE POWER ON TESTS

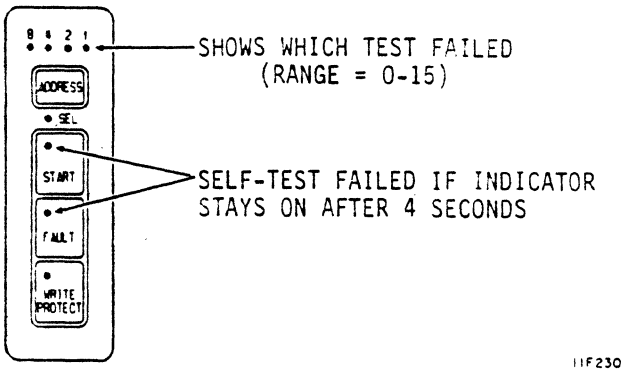
The Control MPU starts a series of tests on the drive circuits when dc power is applied. The Ready, FAULT, and WRITE PROTECT lights on the operator or status/control panel are on during these tests. The Address indicators display the test number being run.



The FAULT light turns off in about four seconds. This means the self-test ran error-free.



The drive failed the self-test if the Ready and FAULT lights stay on constantly. The The Address indicators show which self-test routine the drive failed to complete. Refer to the Drive Self-Test Failure table on the next page to determine which test failed and what action to take. If the Control MPU is unable to communicate with the optional status/control panel, PANEL FAILURE is displayed on the status/control panel LCD.



DRIVE SELF-TEST FAILURE INDICATIONS

Address Lights* 8 4 2 1	Hex Code	Test Failed** & Actions
● ● ● ●	F	RAM Test Action: Replace control board.
● ● ● o	E	ROM Test Action: Replace control board.
● ● o ●	D	I/O Chip Test Actions: 1. Replace I/O board. 2. Replace control board.
● ● o o	C	Peripheral Chip (Test 1) Action: Replace control board.
● o ● ●	B	Peripheral Chip (Test 2) Action: Replace control board.
● o ● o	A	Motor MPU Test Action: Replace control board.

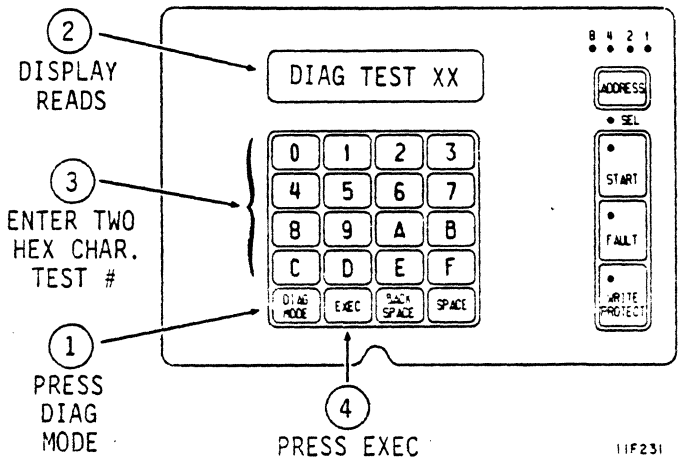
* Darkened circles means light is On.

** Ready and FAULT lights stay on, indicating drive failed four second power-on self-test.

HOW TO SELECT AND RUN DIAGNOSTIC TESTS

Use the procedure below to select and run the diagnostic tests. Run tests 06 and 07 before any other test if you connected a status/control panel only temporarily. Its internal status and fault logs may reflect operation with another drive. Entering test numbers other than those described in this section will produce invalid test results. SPEED NOT OK or ACT PARKED is displayed on the LCD if the drive is not up to speed or the heads are not loaded when running a test that does seeks (05, 08, 09, and 0E).

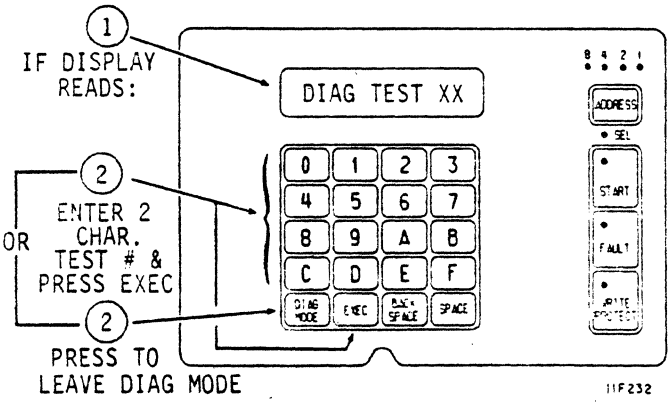
1. Press DIAG MODE switch to enter diagnostic mode.
2. Observe that LCD reads DIAG TEST XX.
3. Enter a two hexadecimal character test number on keyboard and press EXEC switch to select first test.



Pressing the EXEC switch one more time ends the test. The LCD again reads DIAG TEST XX.

You now have two choices:

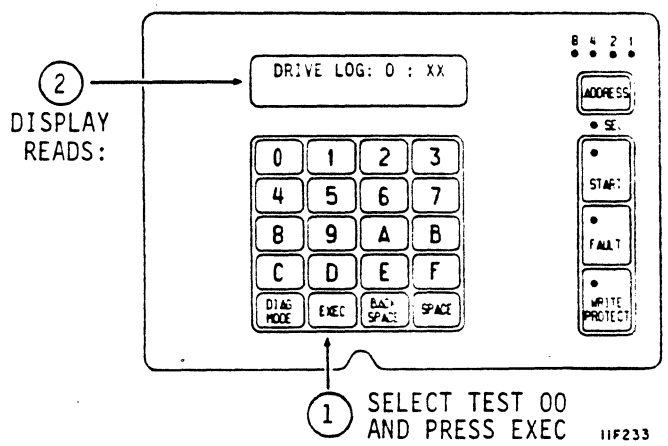
- Enter two hexadecimal characters on keyboard and press EXEC switch to select another test, or
- Press DIAG MODE switch to leave diagnostic mode. The LCD displays drive operating status.



TEST 00 -- DISPLAY DRIVE OPERATING STATUS LOG

This test displays the eight most recently generated drive status codes. After test selection, the display provides a hexadecimal status code from the internal log. This code is preceded by a character (0-7) and a colon, indicating the position of the status code in the status log. To execute test 00, perform the following steps:

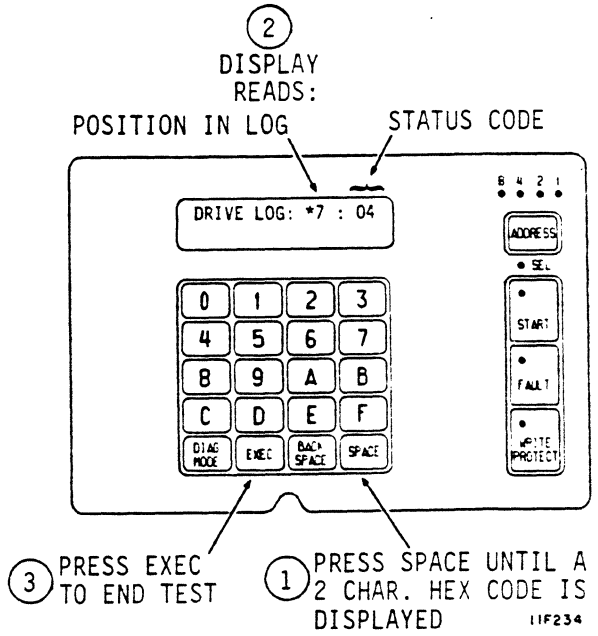
1. Enter Test 00 and press EXEC switch. The LCD reads DRIVE LOG: 0:XX where 0 is the position in log and XX is status code in that position.



2. Press SPACE switch until a code appears, preceded by an asterisk. This is most recent code stored in status log.

3. Use SPACE switch to step through 8th most recent to most recent status.

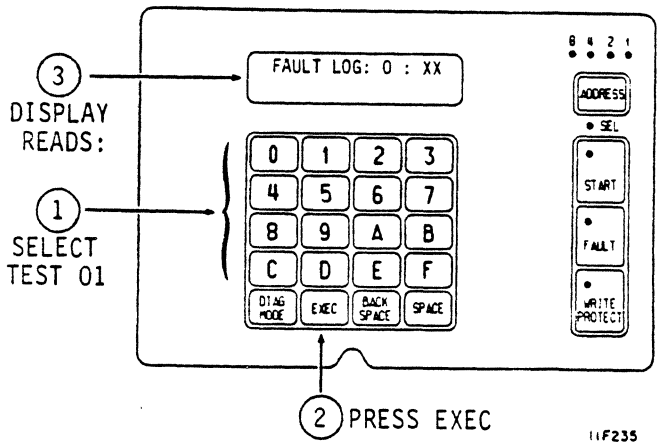
4. Press EXEC switch to end test and return to test selection.



TEST 01 -- DISPLAY FAULT LOG

This test displays the eight most recently stored fault codes. After test selection, a hexadecimal fault code will be displayed. This code is preceded by a character (0-7) and a colon, indicating the position of the fault code in the fault log. Perform the following steps to execute test 01:

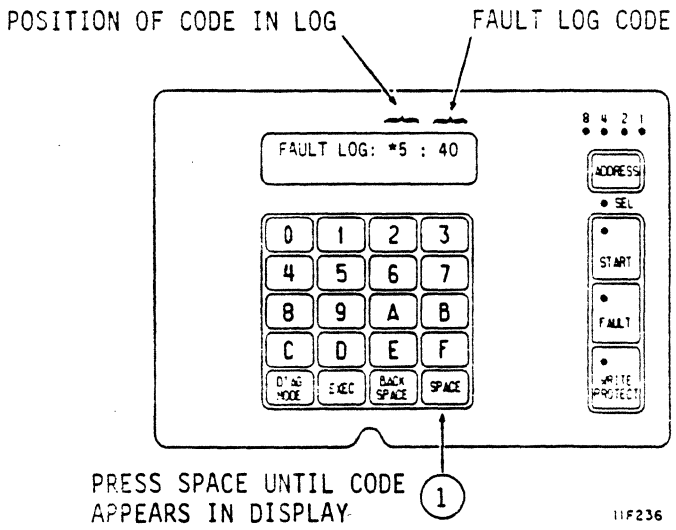
1. Enter Test 01 and press EXEC switch. LCD reads FAULT LOG: 0:XX where 0 is position in log and XX is fault code in that position.



2. Press SPACE switch until a code appears, preceded by an asterisk. This indicates most recent code stored in fault log.

3. Use SPACE switch to step through from 8th most recent to most recent fault.

4. If more than one fault occurs simultaneously (multiple faults), more than one bit in fault code is set. Check bit-mapped locations of each fault in list on next page.



TEST 01 -- DISPLAY FAULT LOG (CONTD)

The first code shown in parenthesis in the following table is the code displayed on the status/control panel. The second code is the code reported to the interface.

Bit		Definition
0	(LSB)	Read•Write Fault (01/81)
1		(Read+Write)•Off Cylinder Fault (02/82)
2		First Seek Fault (04/84)
3		Write Fault (08/88)
4		Write•Write Protected Fault (10/90)
5		Head Select Fault (20/A0)
6		Voltage Fault (40/C0)
7	(MSB)	Not Used

5. Press EXEC switch to end test and return to test selection.

TEST 04 -- CALCULATE THREE MOST LIKELY FIELD REPLACEABLE UNITS

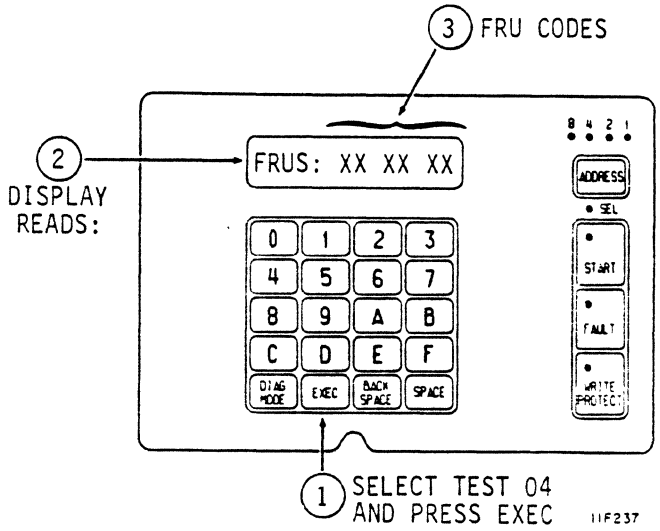
NOTE

Do not execute Tests 05, 06, or 07 prior to running Test 04.

This test uses the fault status and the drive operating status history (Tests 00 and 01) to predict the most likely cause of drive failure. To execute Test 04, perform the following steps:

1. Enter Test 04 and press EXEC switch. LCD reads FRUS: XX XX XX.

   Three FRUs are displayed at end of test. First code is most probable cause of failure.



The FRU codes reported to the controller and displayed on the status/control panel are:

Controller	Displayed	FRU
80	00	No FRU Information
81	01	Replace Control Board
82	02	Replace Module
83	03	Replace Power Supply
84	04	Replace I/O Board
85	05	Replace Control Board
86	06	Replace Module

2. Press EXEC switch to end test and return to test selection.

TEST 05 -- SERVO TEST

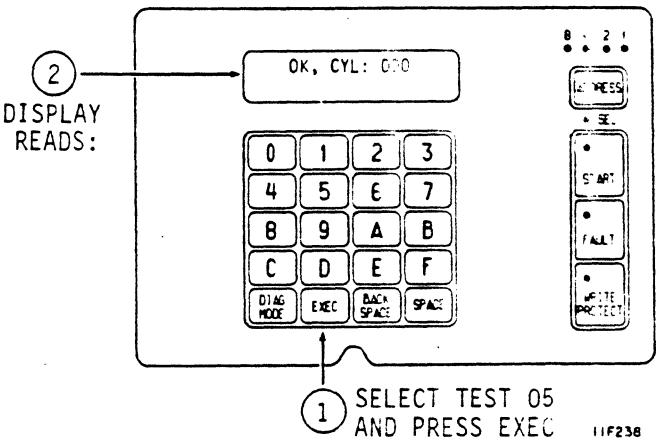
This test clears the drive status log and fault log. Test 04 relies on status history that would be cleared by Test 05 so you may want to run Test 04 before running Test 05. Test 05 performs the seek operations listed below:

- RTZ (one time)
- One track seek (16 times)
- RTZ (one time)
- Partial servo recalibrate (one time)
- RTZ (one time)
- Maximum length seek (16 times)
- RTZ (one time)

The test stops if an error is detected or at the end of the test. Perform the following steps to run test 05:

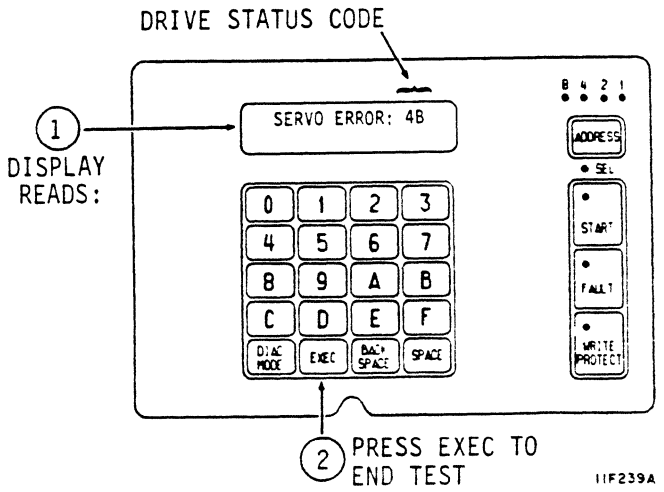
1. Enter Test 05, then press the EXEC switch.

   If test is successful LCD reads OK, CYL: 000.



If error occurs, LCD displays SERVO ERROR:XX. Drive status codes (SERVO ERROR) are defined in table at end of this section.

2. Press EXEC switch to end test and return to test selection.



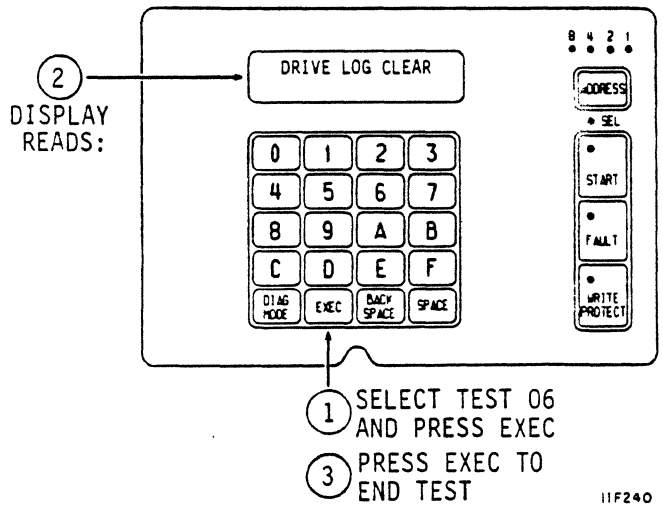
TEST 06 -- CLEAR DRIVE OPERATING STATUS LOG

This test clears the drive status log in the program RAM. Since Test 04 relies on status history that is cleared by Test 06 so you might want to run Test 04 before running Test 06. Perform the following steps to run Test 06:

1. Enter Test 06 and press EXEC switch.

   LCD displays
   DRIVE LOG CLEAR

2. Press EXEC switch to end test and return to test selection.



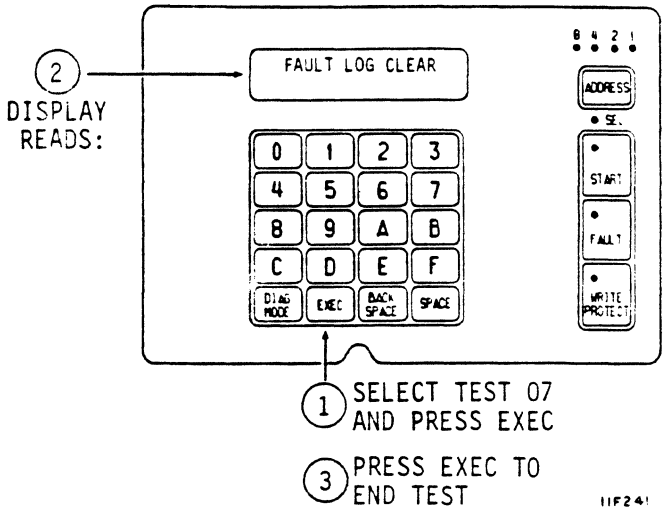
TEST 07 -- CLEAR FAULT LOG

This test clears the fault log. Test 04 relies on status history that is cleared by Test 07 so you might want to run Test 04 before running Test 07. Perform the following steps to run Test 07:

1. Enter Test 07 and press EXEC switch.

   LCD reads
   FAULT LOG CLEAR

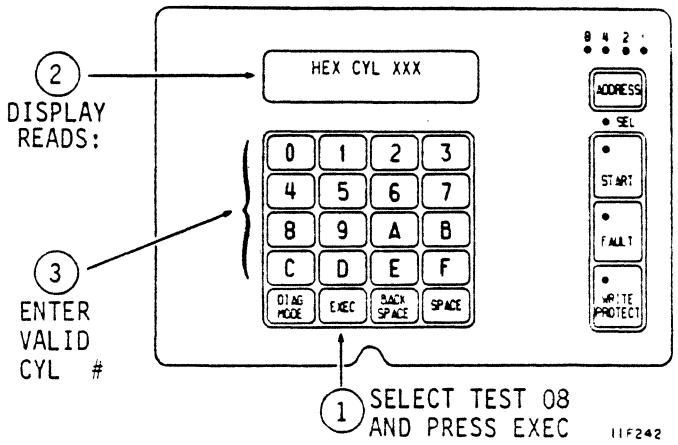
2. Press EXEC switch to end test and return to test selection.



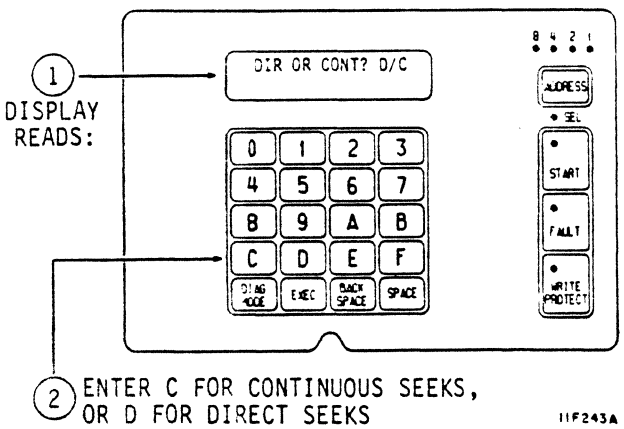
TEST 08 -- DIRECT OR CONTINUOUS SEEKS

This test performs direct or continuous seeks between cylinder 0 and the desired cylinder address. The test ends if an error occurs or if the EXEC switch is pressed. Perform the following steps to run Test 08:

1. Enter Test 08 and press EXEC switch.
2. HEX CYL XXX tells you to enter valid hex cylinder address (between 0 and 564 for 850 MB drives or 0 and 663 for 1230 MB drives). Enter three characters and press SPACE switch.

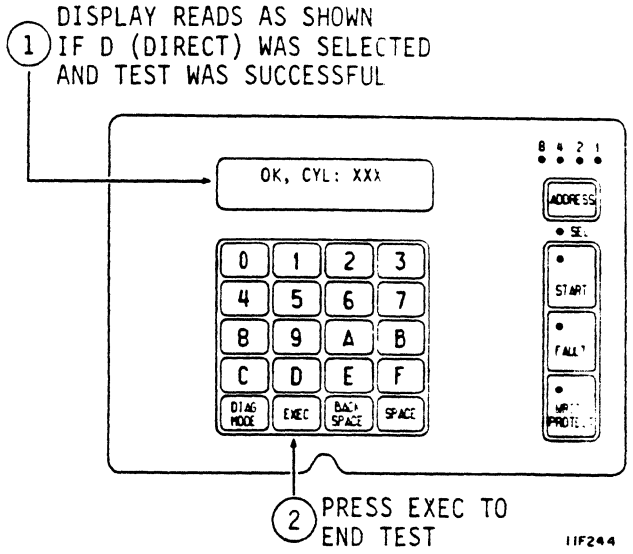


3. DIR OR CONT? D/C asks you to select either direct (D) or continuous (C) seeks. Enter either C or D to start test.



4. If D was entered and direct seek is successful LCD displays OK, CYL: XXX where XXX is address previously entered.

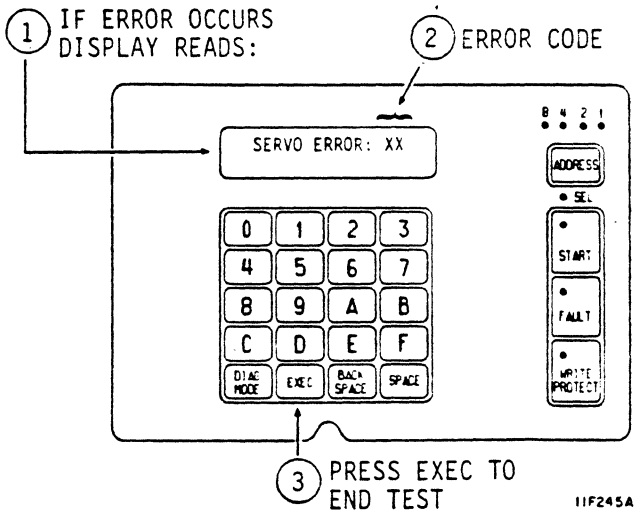
5. Press the EXEC switch to end test and return to test selection.



6. If either D or C was entered and an error occurs, LCD displays SERVO ERROR: XX.

   Drive status codes (SERVO ERROR) are defined in a table at the end of this section. Clear seek errors by running Test 05 or Test 0E.

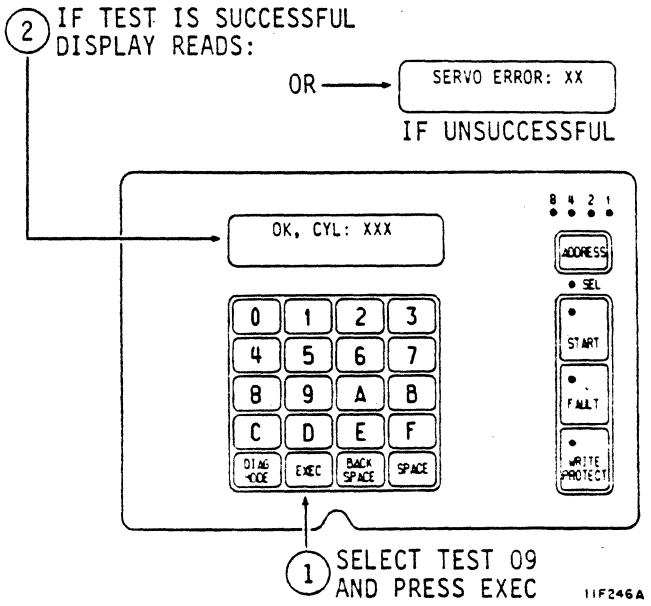
   If C was entered, press EXEC switch to end test and return to test selection.



TEST 09 -- RANDOM SEEK

This test performs random seeks between cylinders 0 and the maximum cylinder address (1380 for 850 MB drives or 1634 for 1230 MB drives). The test ends if an error is detected or by pressing the EXEC switch. Perform the following tests to run Test 09:

1. Enter Test 09 and press EXEC switch.
2. LCD reads OK, CYL: XXX if test is successful.
3. If an error occurs, LCD reads SERVO ERROR: XX. Drive status codes (SERVO ERROR) are defined in a table at end of this section.
4. Press EXEC switch to end test and return to test selection.



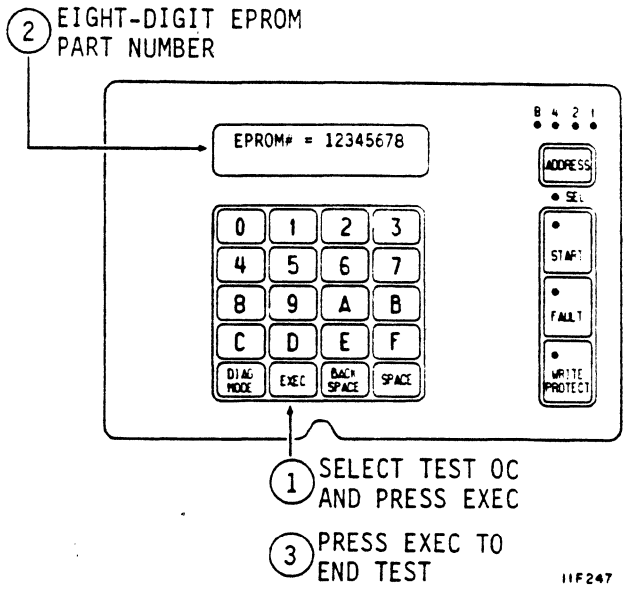
TEST 0C -- DISPLAY EPROM PART NUMBER

This test displays the eight-digit part number of the control microprocessor EPROM. Perform the following steps to run Test 0C:

1. Enter Test 0C and press EXEC switch.

   LCD displays eight-digit EPROM part number (for example EPROM# = 12345678).

2. Press EXEC switch to end test and return to test selection.



TEST 0E -- RETURN TO ZERO

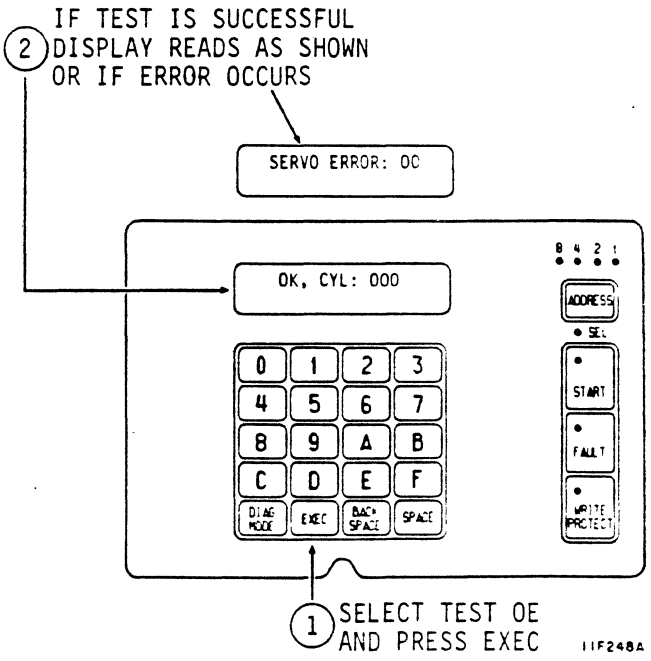
This test starts a return to zero command. Perform the following steps to run Test 0E:

1. Enter Test 0E and press EXEC switch.

   LCD reads OK, CYL: 000.

2. If error occurs during test, LCD displays SERVO ERROR: XX. Drive status codes (SERVO ERROR) are defined in table at end of this section.

3. Press EXEC switch to end test and return to test selection.

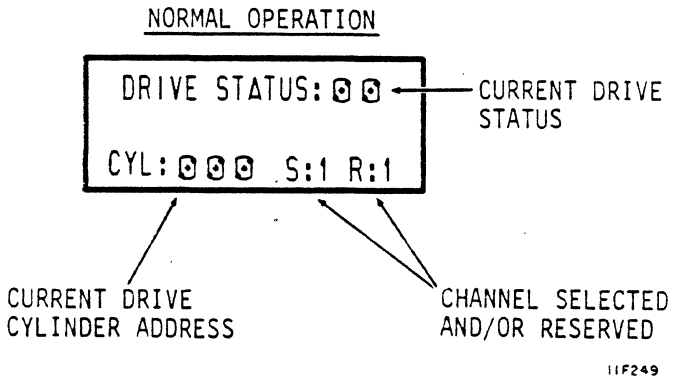


DRIVE STATUS CODES

The Control MPU periodically checks operation of the drive and generates appropriate operating status codes when the drive has dc power applied.

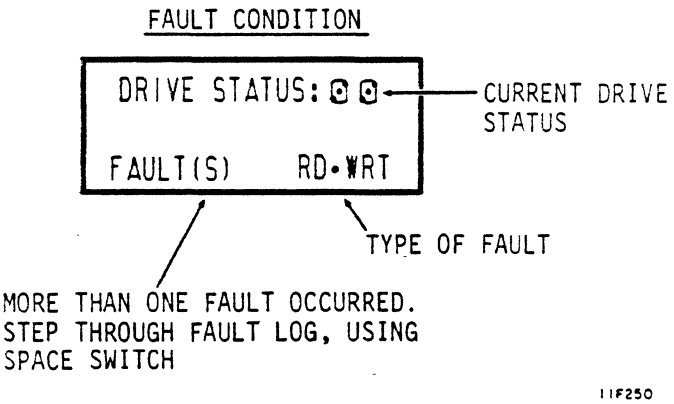
The table on the next page lists the status codes and provides a definition of each. If a drive malfunction occurs, observe the error code and perform Diagnostic Test 04 to calculate the action to be taken.

Shown at the right is an example of the LCD (Liquid Crystal Display) during normal operation. It displays current drive status, current cylinder address, and which drive channel is selected and/or reserved if applicable.



If a fault occurs, the LCD displays the type of fault(s) that occurred along with the current drive status. If more than one fault occurred, use the SPACE switch to step through the fault log to determine what faults are present.

Pressing the Fault Clear switch clears the LCD fault display and the FAULT indicator provided the fault is no longer exists. A Fault Clear signal from the controller clears only the Fault indicator.



DRIVE STATUS CODES (CONTD)

Two status codes are shown for each entry in the following table. The first is the code reported to the interface and the second is the code displayed on the status/control panel.

Code	Title	Description
NORMAL START/STOP STATUS		
80/00	Ready & On Cylinder	Indicates the drive is on cylinder and ready for normal operation.
82/02	Motor Stopping	Indicates the motor is slowing or that motor braking is in progress.
83/03	Motor Stopped	Indicates the motor is stopped.
84/04	First Load/Calibrate	Indicates the heads are moving from the landing zone to track 0 and servo calibration is being performed.
85/05	Sequence Delay	This code appears in remote mode during power on sequence delay. Delay is determined by logical address assigned to drive. (delay = address X 5 seconds). Status changes to 87/07 after delay.
86/06	START pressed and waiting for power sequence signals	In remote mode, indicates START switch was pressed and drive is waiting for power sequencing control signals from interface. Code precedes delay.
87/07	Starting Motor	Indicates that start conditions (codes 85/05 and 86/06) were satisfied. Code remains 87/07 until motor reaches full speed.
88/08	Motor Up To Speed	Indicates the spindle motor has reached full speed.

Continued

DRIVE STATUS CODES (CONTD)

Code	Title	Description
	I/O BOARD NORMAL STATUS	
89/09	I/O Self-Test Passed	I/O MPU successfully ran its power on self-test.
	SWEEP CYCLE STATUS	
8A/0A	Drive in Sweep Cycle	Drive is seeking as part of sweep cycle. On cylinder is inactive at this time.
8B/0B	Heads Left on Last Cylinder of Sweep	Current head position determined by last sweep cycle -- not by controller-requested seek. On cylinder is inactive.
	SEEK ERROR STATUS	
C6/46	Seek Timeout	Indicates the drive took longer than 100 milliseconds to reach on cylinder during a normal seek.
CB/4B	Off Track Seek Error	Indicates either the drive failed to stay on cylinder or cylinder pulses were detected during track-following.
CD/4D	Illegal Cylinder Address	Indicates controller issued too high a cylinder address (1380 for 850 MB or 1634 for 1230 MB drives) during a normal seek.
CF/4F	Seek Error On Settle In	Indicates the drive could not settle on destination cylinder.

Continued

DRIVE STATUS CODES (CONTD)

Code	Title	Description
	FIRST SEEK FAULT STATUS	
D4/54	First Seek Fault On Retract	Indicates the drive failed to complete the retract portion of the first seek.
D5/55	First Seek Fault On Load	Indicates the drive failed to load the heads.
D6/56	First Seek Fault On RTZ	Indicates the drive failed to complete the return to zero (RTZ) portion of the first seek.
D7/57	First Seek Fault On Calibrate	Indicates the drive did not complete the velocity calibration operation.
	ERROR CONDITION STATUS	
D8/58	Speed Loss	Indicates spindle speed fell below 3564 r/min. The motor MPU inactivates the Speed OK code to the control MPU. The control MPU activates the Write Protect line, drops the Ready signal, and performs a retract operation.
D9/59	Motor Can't Start Due to Error	Indicates a problem in the motor control circuits.
DA/5A	Emergency Retract	Indicates the heads retracted to the landing zone due to a power loss (-Low Vcc active), or that a servo-controlled retract failed.

Continued

DRIVE STATUS CODES (CONTD)

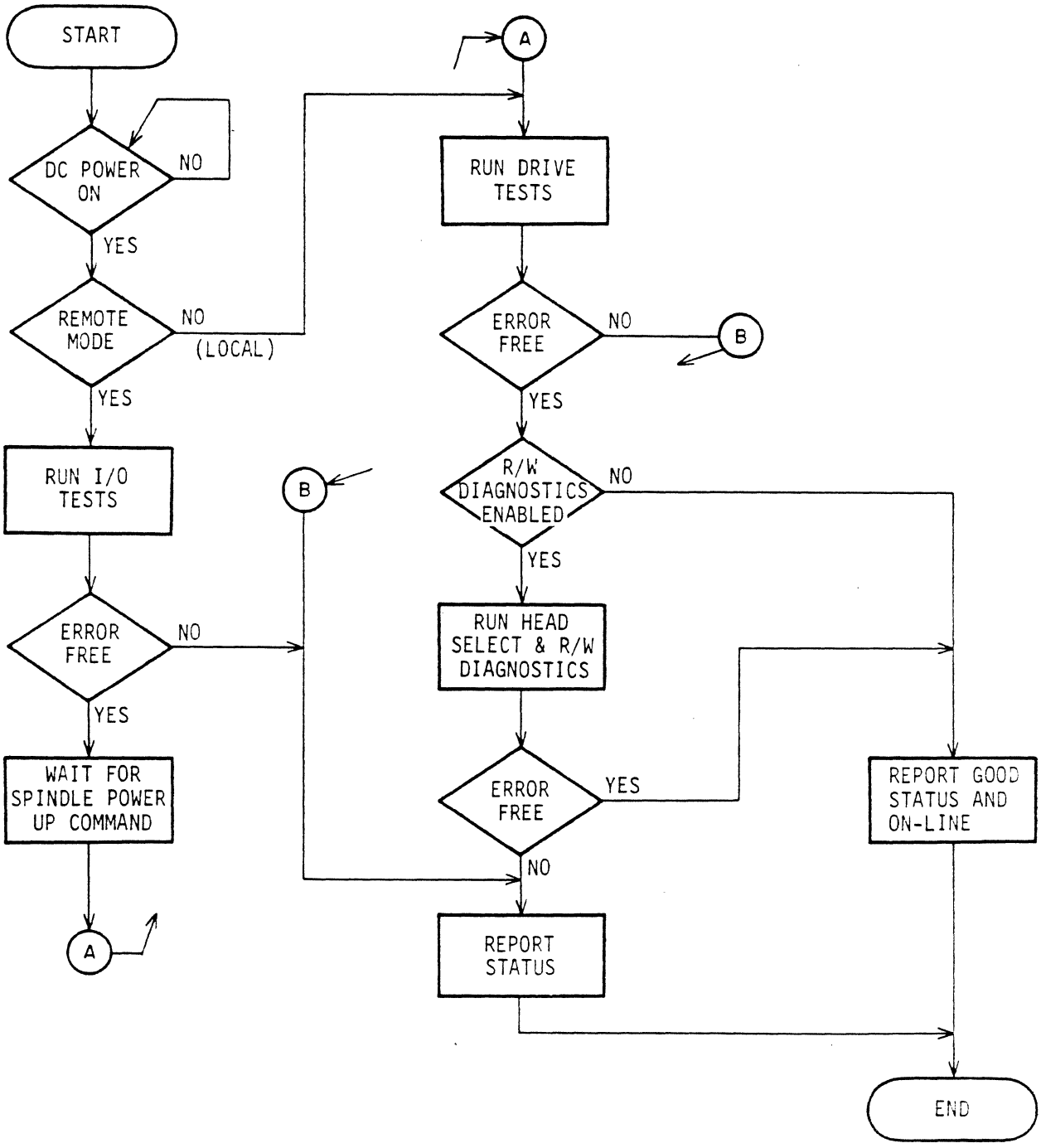
Code	Title	Description
	MOTOR AND SERVO MPU ERRORS	
E0/60	Motor MPU Failure	Indicates the Control MPU was unable to communicate with the Motor MPU.
E1/61	Servo MPU Failure	Indicates the Control MPU was unable to communicate with the Servo MPU.
	I/O BOARD ERROR STATUS	
E2/62	I/O Board Status Failed	I/O MPU failed to transfer status successfully to the control MPU during a diagnostic test.
EE/6E	I/O Self-Test Failed	Failed I/O Read/Write Diagnostic self-test.

INTERFACE TESTING

This topic describes the unique self-tests and online diagnostic tests available with the IPI interface.

THE SELF-TEST AND INITIALIZATION SEQUENCE

The drive self-test and initialization sequence is shown on the flow chart below.



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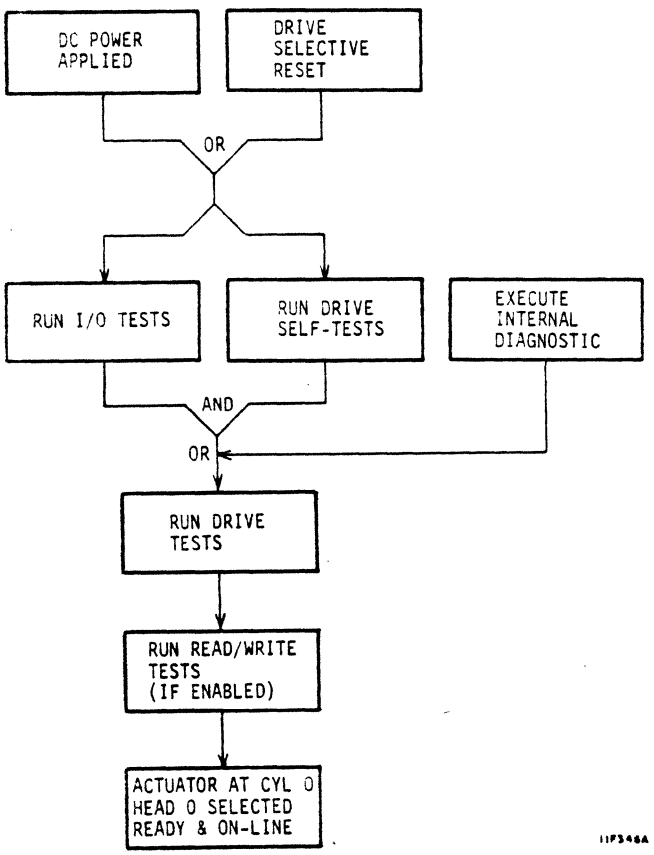
STARTING THE TESTS

The I/O MPU and drive control MPU self-test sequences start when dc power is applied or a Drive Selective Reset is received (see the flowchart below).

The I/O and drive circuits are tested first. The I/O tests include checks of the serializer/deserializer (SERDES) and I/O circuits, and an I/O MPU self-test. The drive self-test checks the control MPU. Testing stops and status is reported if an error is found.

The drive begins its start sequence if the I/O and drive self-tests run error-free. If these tests run error-free, the drive MPU runs a series of servo tests. The drive is capable of normal operation if these tests run error-free.

The controller can direct the running of write and read tests. The drive must be ready, not write protected, and there may be no faults present.



If an error is detected in any test, testing stops and the appropriate error and status codes are reported. If all tests run error-free, the drive will be ready and the actuator will be at cylinder zero with head zero selected.

EXECUTE INTERNAL DIAGNOSTICS FUNCTION

Receipt of this function runs an access test, a head select test, and a read/write test.

The access test performs the following operations:

- Return to zero seek operation
- Single track seek
- Servo recalibrate
- Maximum seek
- Random seek

Successful completion of this test allows starting of the Head Select test provided the Disable Write/Read Diagnostic bit is not set. The Head Select and Write/Read tests can be disabled by issuing the Disable Read/Write Diagnostics Function Code.

The Head Select test performs a seek to the diagnostic cylinder, waits for on-cylinder, and then sequentially selects all heads on the cylinder. Successful completion of this test allows starting of the Write/Read test.

The write and read tests run if the drive is Ready, is not write protected, and no fault conditions exist. The header is read and verified on the diagnostic cylinder. If no errors are found, data patterns are written on the diagnostic cylinder, after which they are read back and verified.

READ DRIVE SPECIFIC INFORMATION (BUS CONTROL 43)

The Read Drive Specific Information bus control transfers status information to the controller. This status information fits into two general categories:

- Native-controlled status -- generated by the drive MPU. Although the codes are numerically different, they report the information available via the maintenance panel.

- Interface-controlled status -- generated by the I/O MPU.

The response to the bus control has the parameters listed below and in the tables that follow.

- Native-Controlled Diagnostic Status Codes are presented in octets 02 - 11 and listed in the table on the next page. Each status code has an equivalent offline status code. The drive status codes (offline and online) were listed and defined earlier in this section.
- Native-Controlled Diagnostic FRU Codes are presented in octets 12 - 15.
- Native-Controlled Diagnostic Fault Codes are presented in octets 16 - 1D.
- Interface-Controlled Diagnostic Status Codes are presented in octets 1E - 1F
- Interface-Controlled Diagnostic FRU Codes are presented in octets 20 - 21.
- Interface-Controlled Diagnostic Fault Codes are presented in octets 22 - 23.

Native-Controlled Diagnostic Status Codes

Status Code	Status Description
80	Ready & On Cylinder
82	Motor Stopping
83	Motor Stopped
84	First Load/Calibrate
85	Sequence Delay
86	START Switch Pressed & Waiting for Power Sequence Signals
87	Starting Motor
88	Motor Up to Speed
89	I/O Self-Test Passed
8A	Drive in Sweep Segment
8B	Heads Left on Last Cylinder of Sweep
C6	Seek Timeout
CB	Off Track Seek Error
CD	Illegal Cylinder Address
CF	Seek Error on Settle In
D4	First Seek Fault on Retract
D5	First Seek Fault on Load
D6	First Seek Fault on RTZ
D7	First Seek Fault on Calibrate
D8	Speed Loss
D9	Motor Can't Start Due to Error
DA	Emergency Retract
E0	Motor MPU Failure
E1	Servo MPU Failure
E2	I/O Status Transfer Failed
EE	I/O Self-Test Failed

Native-Controlled Diagnostic FRU Codes

FRU Code	FRU Description
81	Control Board
82	Module
83	Power Supply
84	I/O Board
85	Control Board
86	Module

Native-Controlled Diagnostic Fault Codes

Fault Code	Fault Description
80	Good Status
82	Voltage Fault
84	Write Fault
88	Read • Write Fault
90	(Read + Write) • Off Cylinder Fault
A0	Head Select Fault
C0	First Seek Fault

Interface-Controlled Diagnostic Status Codes

Status Code	Status Description
Read/Write Tests	
00	Good Status
01	Failed during seek to diagnostic cylinder
02	Failed during RTZ seek from diagnostic cylinder
03	Not defined
04	Not defined
05	Failed during head select test
06	Failed during read header test
07	Failed during write data test
08	Failed during read data test
09	Sync byte error during read header test
0A	Data error during read header test
0B	Sync byte error during read data test
0C	Data error during read data test
Access Tests	
10	Failed during status/error log test
11	Failed during clear fault/cylinder log test
12	Failed during disable cylinder log test
13	Failed during servo test
14	Failed during random seek test
15	Failed during access RTZ test
Read Drive Specific Tests	
20	Failed during read up of diagnostic status/error code log test
21	Failed during read up of FRU log test
22	Failed during read up of display fault log test

Interface-Controlled Diagnostic FRU Codes

FRU Code	FRU Description
01	Control Board
02	Module
03	Power Supply
04	I/O Board
05	Control Board
06	Module

Interface-Controlled Diagnostic Fault Codes

Fault Code	Fault Description
00	Good Status
01	Read • Not On Cylinder Fault
02	Write • Not On Cylinder Fault
04	First Seek Fault
08	Write Fault
10	Fan Fault
20	Head Select Fault
40	Voltage Fault
80	Seek Error

ANHANG

INSTALLATIONS- UND BETRIEBSERFORDERNISS

INSTALLATIONS- UND BETRIEBSERFORDERNISSE A

EINLEITUNG

Dieser Anhang enthält Informationen für gefahrlose(n) Anschluß, Betrieb und Wartung des Laufwerks.

SICHERHEITSHINWEISE

- Um die Zuverlässigkeit der im Laufwerk eingebauten Sicherheitseinrichtungen zu gewährleisten, darf die Installation und Wartung des Gerätes nur von qualifiziertem Wartungspersonal unter Verwendung von Original-CDC/MPI-Ersatzteilen durchgeführt werden.

- Beim Ausbrechen von Feuer oder in anderen Notfällen ist die Verbindung zum Hauptstromnetz durch das Ziehen des Netzsteckers aus der Steckdose zu unterbrechen. Sollte dies nicht möglich oder unpraktisch sein, so ist der Hauptstromunterbrecher des Systems zu bedienen, um die Laufwerke vom Hauptstromnetz zu trennen.

- Wenn das Laufwerk in einem Geräteeinschub oder Gehäuse montiert ist, versichern Sie sich, daß die Temperatur im Einschub oder Gehäuse die in diesem Handbuch festgelegten Werte nicht überschreitet. Sind Geräte übereinander angeordnet, achten Sie besonders auf das obere Gerät, da dort die Temperatur gewöhnlich am höchsten ist.

- Das Gerät ist konstruiert zum Anschluß und Betrieb in Übereinstimmung mit IEC380, IEC435, VDE805 und VDE806.

- Geräteschalter schaltet nur die Sekundärseite des Netzgerätes. Schalterstellung 1: Normal- und Ersatzgerät ist eingeschaltet. Schalterstellung 0: Normal- und Ersatzgerät ist ausgeschaltet. Vorsicht: in beiden schalterstellungen liegt die Netzspannung an den Geräten an.

- Falls das Netzteil an ein IT-Netzwerk angeschlossen wird, ist die Eingangsspannung auf 230 V zu begrenzen.

- Das Netzteil ist nicht im feld reparierbar. Versuchen Sie deshalb nicht, es zu zerlegen. Im Falle eines Defekts ist es komplett auszutauschen.

- Falls kein empfohlenes CDC Netzgerät verwendet wird, stellen Sie bitte sicher, daß das Netzgerät den Spezifikationen in diesem Manual entspricht und konstruiert ist für den Betrieb entsprechend IEC380, IEC435, VDE805 und VDE806.

ANSCHLUSS-ERFORDERNISSE

Der Installationsort muß dem in den folgenden Tabellen und Skizzen dargelegten Vorschriften entsprechen:

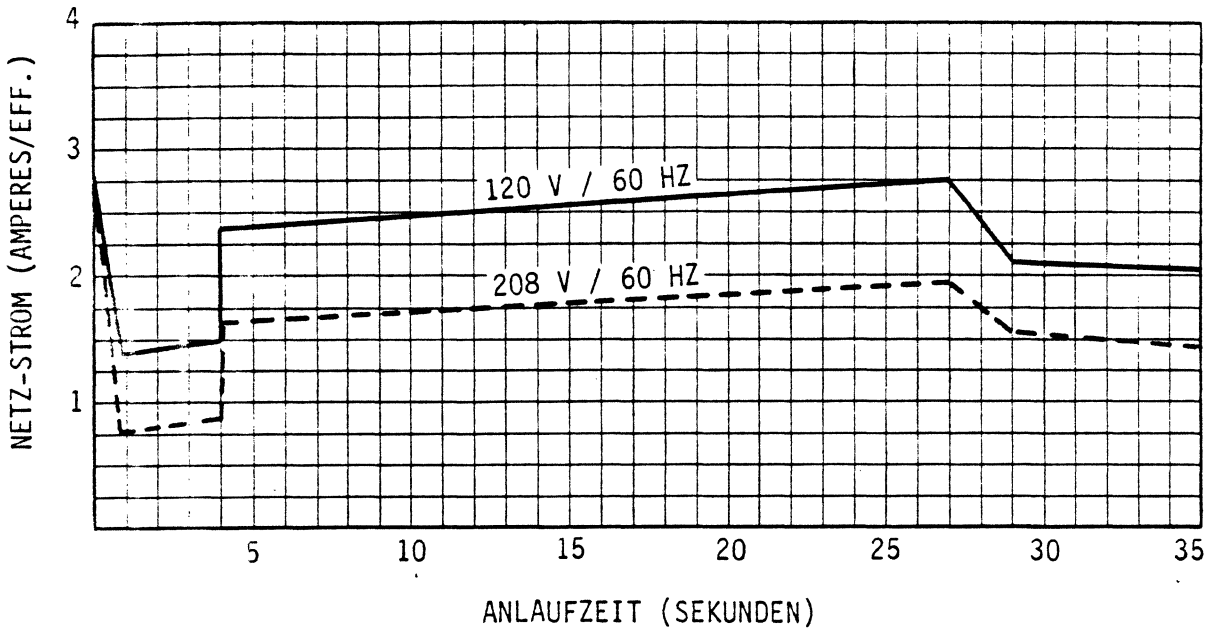
TABELLE A-1. UMGEBUNGSBEDINGUNGEN

TEMPERATUR	BEREICH	MAX. ÄNDERUNGSWERT
Lagerung (verpackt)	-10 bis 50°C	15°C / h
Transit (verpackt)	-40 bis 60°C	20°C / h
in Betrieb	10 bis 45°C	15°C / h
RELATIVE FEUCHTE		
Lagerung (verpackt)	5% bis 95% (keine Kondensation erlaubt)	
Transit (verpackt)	5% bis 95% (keine Kondensation erlaubt)	
in Betrieb	20% bis 80% (keine Kondensation erlaubt)	
ATMOSPHÄRENDRUCK		
Lagerung (verpackt)	-305 m bis 3000 m oder 104 kPa bis 69 kPa	
Transit (verpackt)	-305 m bis 12 192 m oder 104 kPa bis 19 kPa	
in Betrieb	-305 m bis 3000 m oder 104 kPa bis 69 kPa	

TABELLE A-2. ERFORDERNISSE FÜR EL. ANSCHLUSS

SPEZIFIKATION	WERTE	
	100 - 120 V ac	208 - 240 V ac
Spannungsbereich	85 bis 132 V	177 bis 264 V
Nominale Netz-Frequenz	50/60 Hz	50/60 Hz
Frequenzbereich	48,0 bis 62,0 Hz	48,0 bis 62,0 Hz
Phase	einphasig	einphasig
Leistungsbedarf*	0,140 - 0,145 kW	0,143 - 0,147 kW
Stromaufnahme*	2,5 - 2,2 A	1,5 - 1,4 A
Phasenwinkel *Cos phi	0,57 - 0,55	0,46 - 0,44
Anlaufstrom	siehe Abbildung A-1.	siehe Abbildung A-1.

* gemessen bei rotierendem Plattenstapel und Kopfschlitten in Bewegung.



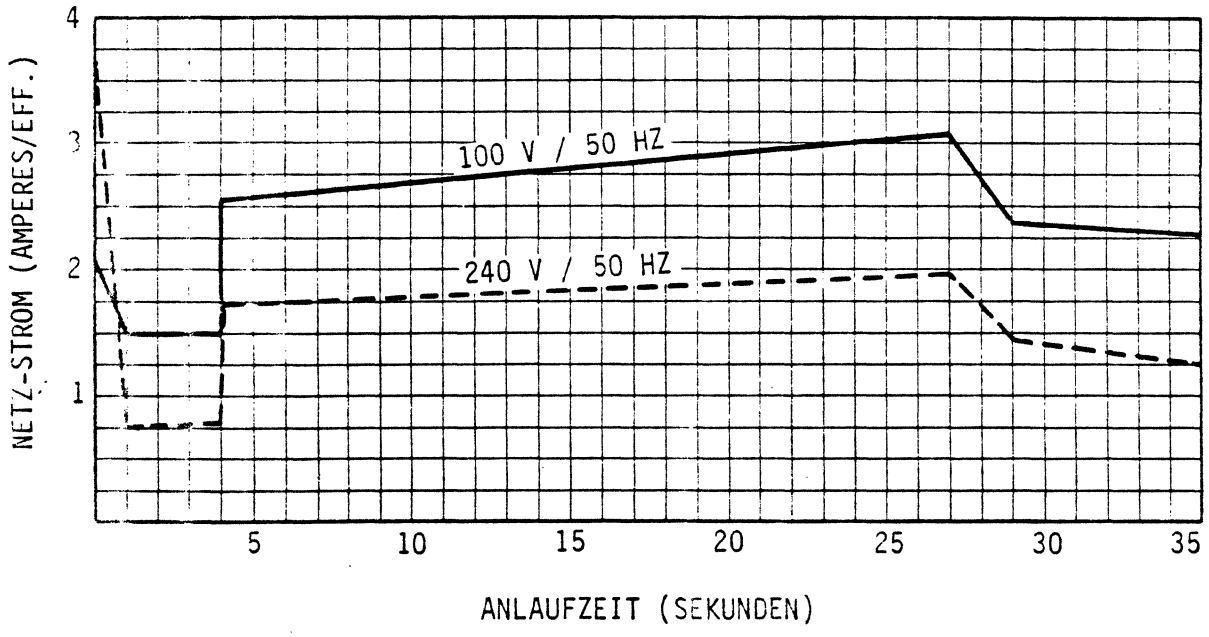


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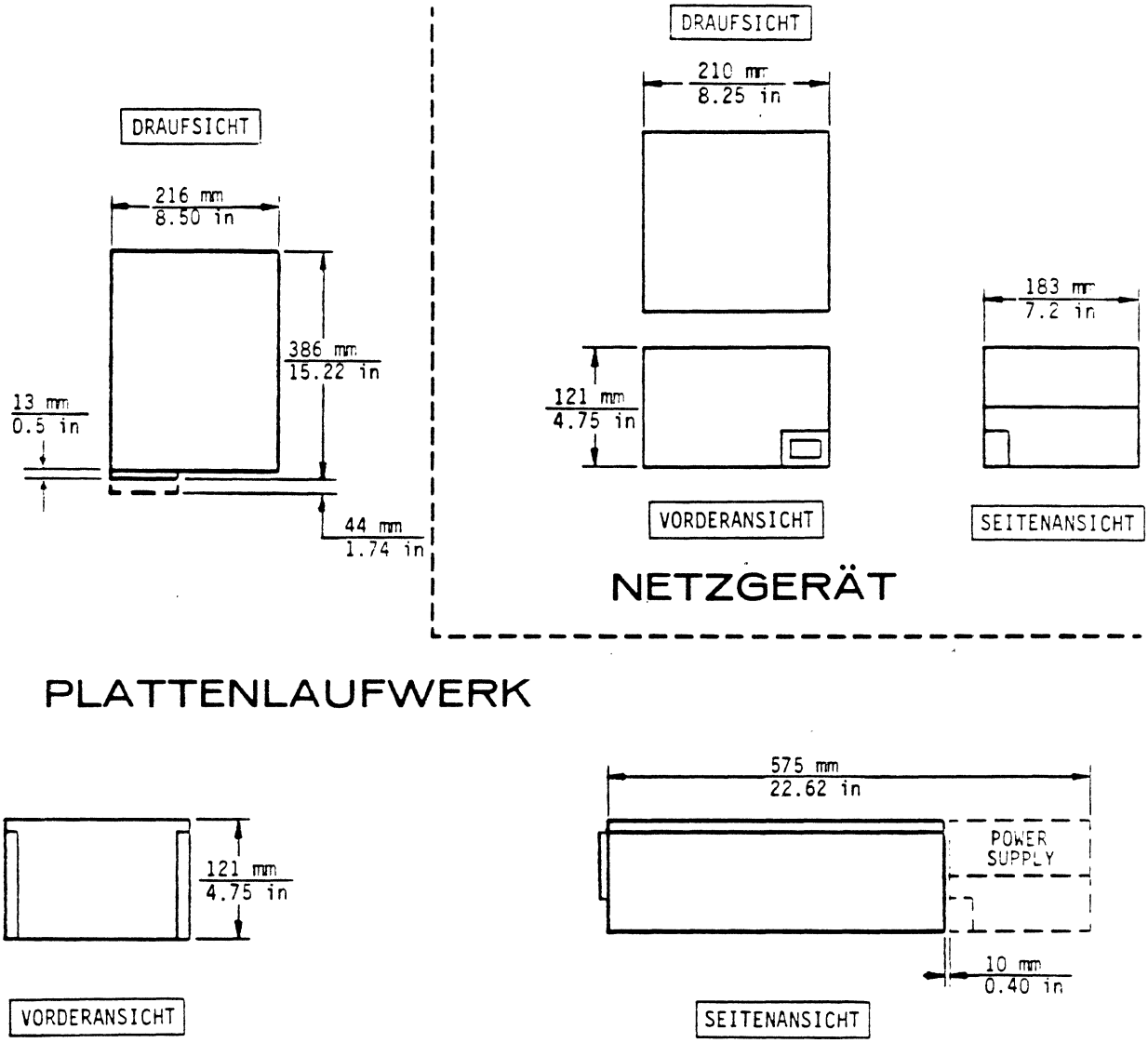
Abbildung A-1. Typischer Anlaufstrom im Verhältnis zur Zeit



HINWEISE:

1. GEWICHT
   GERÄT ALLEINE = 14.5 kg (32 lb)
   NETZGERÄT ALLEINE = 3.2 kg (7 lb)

2. DIE ANGEGEBENEN ABMESSUNGEN SIND NOMINAL-WERTE.

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Abbildung A-2. Abmessungen und Gewicht des Laufwerks

BETRIEBSANLEITUNG (mit Status/Control Panel oder Operator Panel)

EINSCHALTSEQUENZ

1. Am Netzgerät Schalter ON/STANDBY auf 1 (EIN) stellen.

2. START-Schalter drücken.

   - Wurde der R/L (Remote/Local)-Schalter an der I/O-Karte während des Installationsvorganges auf "L" (Local) gestellt, beginnt die Einschaltsequenz unmittelbar.

   - Wurde der R/L-Schalter während des Installationsvorganges auf "R" (Remote) gestellt, ist die Einschaltsequenz verzögert, bis das Laufwerk das entsprechende Signal vom Kontroller erhält.

3. Die Bereitschaftsanzeige (kleine Lampe im START-Schalter) blinkt in rascher Folge, solange die Startsequenz abläuft.

4. Beobachten Sie, daß die Bereitschaftsanzeige innerhalb von 90 sec auf Dauerlicht wechselt, nachdem das Laufwerk Nenndrehzahl erreicht hat und die Magnetköpfe eingefahren sind.

5. Die FAULT-Anzeige muß unbeleuchtet sein, zum Zeichen, daß kein Fehler auftrat und das Gerät zum Lesen oder Schreiben von Daten bereit ist.

AUSSCHALTSEQUENZ

1. START-Schalter drücken. Wurde während des Installationsvorgangs der R/L-Schalter an der I/O-Karte auf "R" gestellt, so kann der Kontroller das Laufwerk veranlassen, die Ausschaltsequenz zu starten (Drücken des START-Schalters nicht erforderlich).

2. Die Bereitschaftslampe (kleine Lampe in START-Schalter) blinkt langsam, solange die Ausschaltsequenz abläuft.

3. Beobachten Sie, daß die Bereitschaftsanzeige nach etwa 60 sec verlöscht, zum Zeichen, daß die Ausschaltsequenz abgeschlossen ist. Die Magnetköpfe sind jetzt in der Landezone positioniert und der Plattenstapel rotiert nicht mehr.

4. Zur Unterbrechung der Gleichstromverbindung zum Laufwerk wird am Netzgerät der Schalter ON/STANDBY auf O (OFF) gestellt.

BETRIEBSANLEITUNG (ohne Status/Control Panel oder Operator Panel)

EINSCHALTSEQUENZ

Am Netzgerät ON/STANDBY-Schalter auf ON (1) stellen.

- Wurde während des Installationsvorganges der Schalter R/L (Remote/Local) an der I/O-Karte auf "L" (Local) gestellt, beginnt die Einschaltsequenz unmittelbar und ist innerhalb 90 sec abgeschlossen.

- Wurde der R/L (Remote/Local)-Schalter an der I/O-Karte während des Installationsvorganges auf "R" (Remote) gestellt, dann startet die Einschaltsequenz, wenn das Laufwerk das entsprechende Signal vom Kontroller erhält.

AUSSCHALTSEQUENZ

Der Ausschaltvorgang läuft unterschiedlich ab, abhängig von der Position, in welcher der R/L (Remote/Local)-Schalter steht.

Steht der R/L-Schalter an der I/O Karte auf L (Local):

- ON/STANDBY-Schalter auf O (AUS) stellen, um Gleichstromverbindung zu unterbrechen und die Ausschaltsequenz zu starten.

- Die Ausschaltsequenz ist etwa 60 sec nach ihrem Start abgeschlossen. Dabei kommt die Rotation des Plattenstapels zum Stillstand und die Magnetköpfe werden in der Landezone positioniert.

Steht der R/L-Schalter auf R (Remote), bestehen zwei Möglichkeiten zur Einleitung der Ausschaltsequenz:

- Fernbedienung: Hierbei veranlaßt der Kontroller das Laufwerk, die Ausschaltsequenz zu starten. Nach deren Abschluß besteht aber der Gleichspannungsanschluß zum Netzteil fort, wenn nicht der ON/STANDBY- Schalter auf O (OFF = AUS) gestellt wird.

- Lokale Bedienung: Der ON/STANDBY-Schalter wird auf O (AUS) gestellt. Dadurch wird der Gleichspannungsanschluß zum Laufwerk unterbrochen und die Ausschaltsequenz eingeleitet.

- Bei beiden Methoden ist die Ausschaltsequenz innerhalb von 60 sec nach deren Start abgeschlossen. Der Plattenstapel rotiert nicht mehr und die Magnetköpfe befinden sich in der Landezone.

APPENDICE B

INSTRUCTIONS D'INSTALLATION ET DE FUNCTIONNEMENT

NSTRUCTIONS D'INSTALLATION ET DE FONCTIONNEMENT B

INTRODUCTION

Cet appendice contient les informations sécuritaires indispensables pour l'installation, le fonctionnement et la maintenance de l'appareil.

INFORMATION DE SECURITE

- Afin d'assurer l'intégralité des conditions sécuritaires installées dans l'appareil, l'installation et la maintenance doivent être accomplies exclusivement par un personnel qualifié utilisant des pièces recommandées CDC/MPI.

- En cas d'incendie ou autres états d'urgence, isolez l'appareil de la source de courant en retirant la fiche secteur de la prise de courant. Pour les situations où il n'est pas possible ou praticable de retirer la fiche, utilisez la déconnection générale du système pour isoler les appareils de la source de courant.

- Si l'appareil est monté en rack ou en armoire, assurez-vous que la température interne du rack ou de l'armoire ne dépasse pas les limites définies pour l'appareil. Lorsque les appareils sont empilés verticalment, portez votre attention sur la partie supérieure du rack ou de l'armoire où les températures sont généralement plus élevées.

- Cet appareil est concu pour être installé et de fonctionner en accordance avec IEC380, IEC435, VDE805 et VDE806.

- L'interrupteur de l'alimentation ne coupe pas la tension secteur. L'interrupteur placé sur On (1) permet la distribution des tensions continues, sur la position Standby (0) elles sont bloquées. Mais dans les deux cas la tension secteur est présente à l'intérieur de l'alimentation.

- Si l'alimentation est branchées à un réseau IT, faites le nécessaire afin que la tension d'entrée ne dépasse pas 230 volts.

- Abstenez vous de décortiquer l'alimentation. Elle n'est pas reparable sur place. Remplacez l'alimentation complète en cas depanne.

- Si vous n'utilisez pas une alimentation recommandée CDC, assurez vous que l'alimentation soit conforme aux spécifications de ce manuel et qu'elle soit concue pour être utilisée en accordance avec IEC380, IEC435, VDE805, et VDE806.

CONDITIONS D'INSTALLATION

Le lieu d'installation doit être conforme aux spécifications données dans les tableaux et figures suivants.

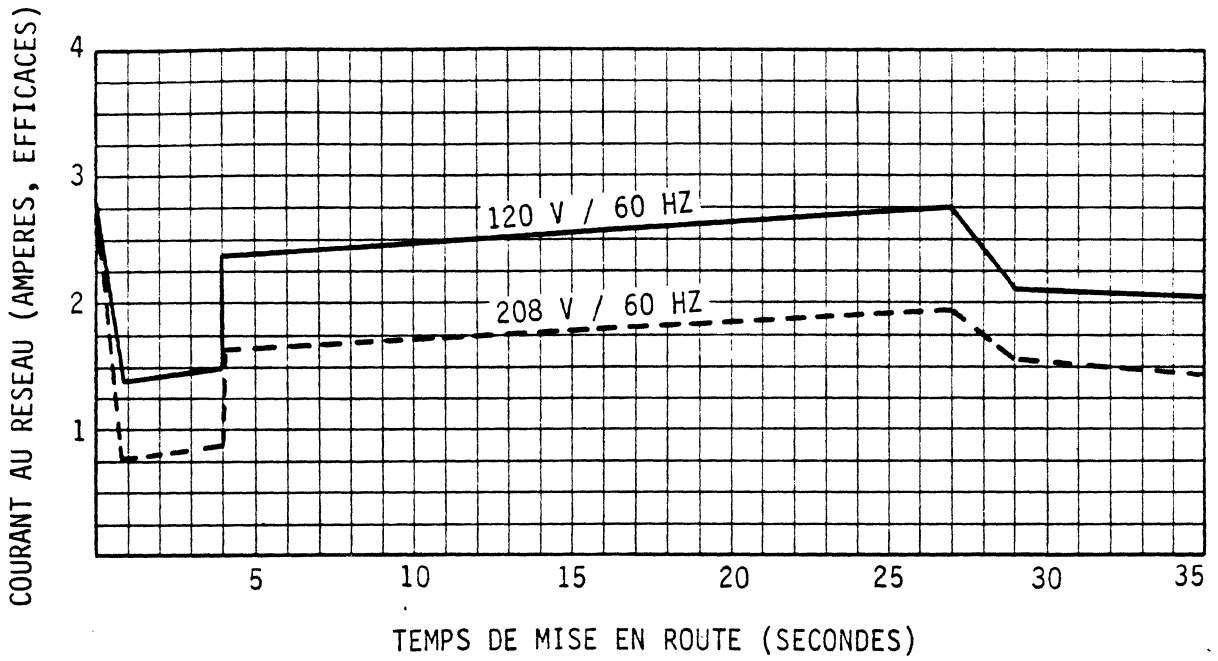
TABLEAU B-1. CONDITIONS DE L'ENVIRONNEMENT

TEMPERATURE	MARGE	FLUCTUATION MAXIMALE
Stockage (Emballée)	-10 à 50°C	15°C par heure
Transport (Emballée)	-40 à 60°C	20°C par heure
En service	+10 à 45°C	15°C par heure
HUMIDITE RELATIVE		
Stockage (Emballée)	5% à 95% (pas de condensation autorisée)	
Transport (Emballée)	5% à 95% (pas de condensation autorisée)	
En service	20% à 80% (pas de condensation autorisée)	
PRESSION BAROMETRIQUE		
Stockage (Emballée)	-305 m à 3000 m ou 104 kPa à 69 kPa	
Transport (Emballée)	-305 m à 12 192 m ou 104 kPa à 19 kPa	
En service	-305 m à 3000 m ou 104 kPa à 69 kPa	

TABLEAU B-2. EXIGENCES POUR L'ALIMENTATION

SPECIFICATIONS	VALEURS 100 - 120 V ac	208 - 240 V ac
Marge de tension	85 à 132 V	177 à 264 V
Fréquence nominale du réseau	50/60 Hz	50/60 Hz
Marge de fréquence	48.0 à 62.0 Hz	48.0 à 62.0 Hz
Phase éxigée	Monophasé	Monophasé
Puissance consomée*	0.140 - 0.145 kW	0.143 - 0.147 kW
Courant au réseau*	2.5 - 2.2 A	1.5 - 1.4 A
Cosinus Phi*	0.57 - 0.55	0.46 - 0.44
Courant de mise en route	Voir figure B-1.	Voir figure B-1.

* Mesuré lorsque les disques sont en rotation et que le chariot soit en mouvement.



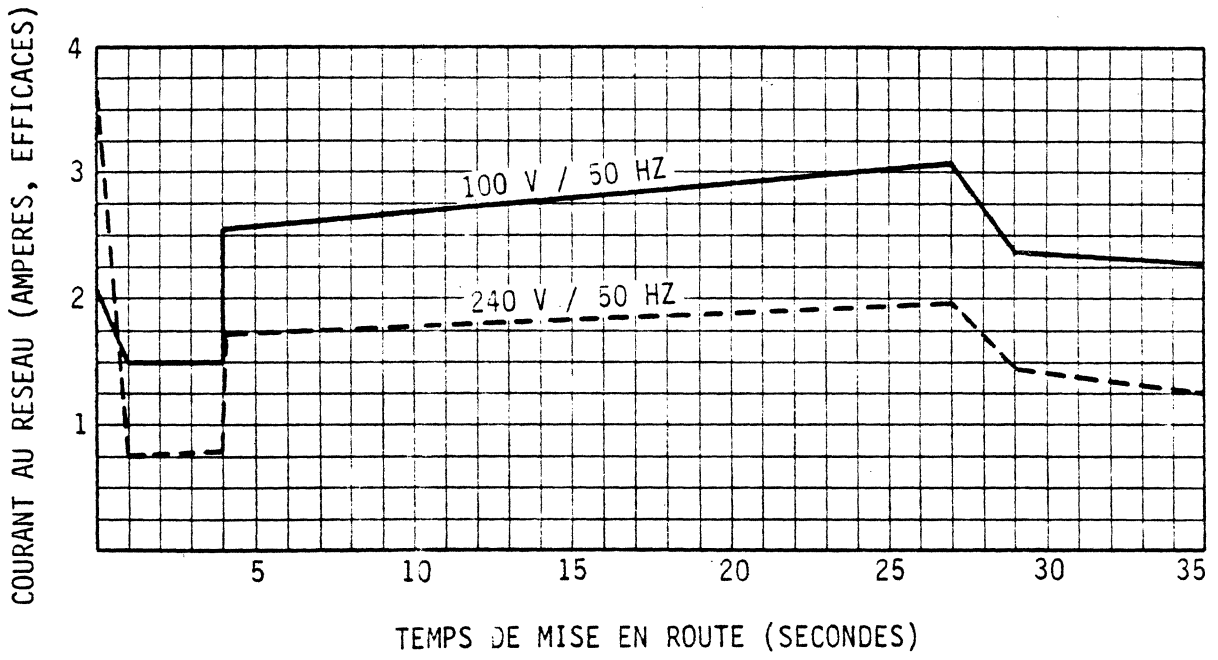


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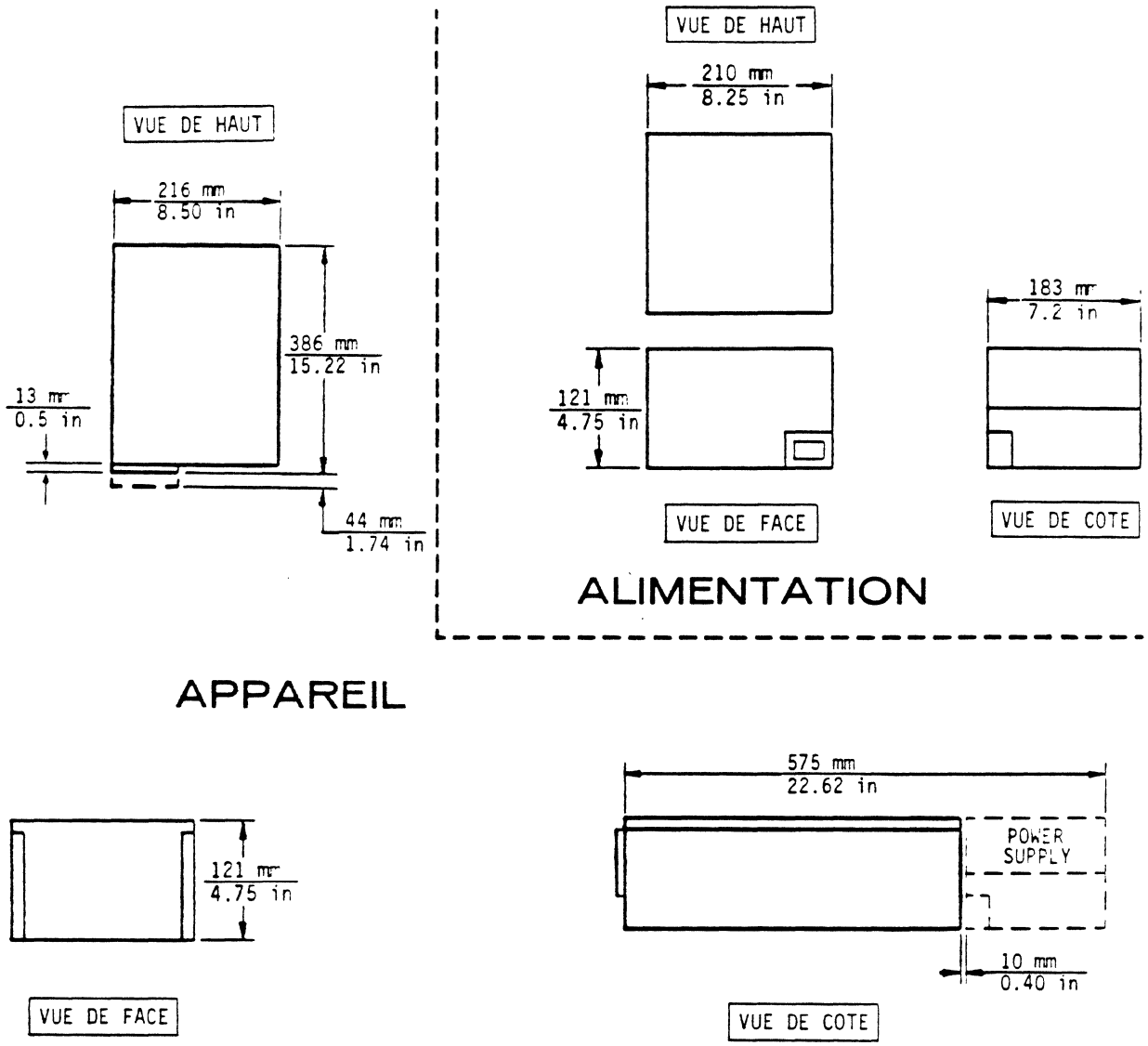
Figure B-1. Courant typique par rapport au temps de mise en route



NOTES:

1. MASSE
   APPAREIL SEUL = 14.5 kg (32 lb)
   ALIMENTAIRE SEULE = 3.2 kg (7 lb)

2. LES DIMENSIONS DONNEES SONT NOMINALES.

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Figure B-2. Dimensions et poids des appareils

INSTRUCTIONS DE FONCTIONNEMENT (avec panneau status/control ou operator)

PROCEDURE DE MISE EN ROUTE

1. Placez l'interrupteur On/Standby de l'alimentation sur 1 (On).

2. Pressez l'interrupteur START.

   - Si le commutateur R/L (Remote/Local) situé sur la carte I/O à été placé sur L (Local) à l'installation, la séquence de mise en route démarre aussitôt.

   - Si le commutateur R/L est place sur R (Remote) à l'installation, la séquence est retardée jusqu'a ce que l'appareil recoive le signal approprié du contrôleur.

3. Observez que l'indicateur Ready (placé dans l'interrupteur START) clignote rapidement pour signaler que la séquence de mise en route est en progression.

4. Observez que l'indicateur Ready luise continuellement dans un délai de 90 secondes pour signaler que les disques ont atteints leur vitesse nominale et que les têtes sont chargées.

5. Observez que l'indicateur FAULT soit éteint pour signaler l'absence d'erreurs et que l'appareil est prêt à lire ou écrire des données.

PROCEDURE D'ARRET

1. Pressez l'interrupteur START. Si le commutateur R/L placé sur la carte I/O à été placé sur R à l'installation, le contrôleur peut signaler à l'appareil de démarrer la séquence d'arrêt (il n'est pas nécessaire de presser l'interrupteur START).

2. Observez que l'indicateur Ready (placé dans l'interrupteur START) clignote lentement pour signaler que le séquence d'arrêt est en progression.

3. Observez que l'indicateur Ready s'éteigne après environ 60 secondes pour signaler que l'arrêt est complet. Les têtes sont maintenant positionnées dans la zone d'atterissage et les disques ne sont pas en rotation.

4. Retirez la tension continue de l'appareil en placant l'interrupteur On/Standby de l'alimentation sur O (Off).

INSTRUCTIONS DE FONCTIONNEMENT (sans panneau status/control ou operator)

PROCEDURE DE MISE EN ROUTE

Placez l'interrupteur On/Standby de l'alimentation sur On (1).

- Si le commutateur R/L (Remote/Local) situé sur la carte I/O à été placé sur L (Local) à l'installation, la séquence de mise en route démarre aussitôt et est terminée dans un délai aux environs de 90 secondes.

- Si le commutateur R/L à été placé sur R (Remote) à l'installation, la séquence de mise en route démarre lorsque l'appareil recoit le signal approprié du contrôleur. La séquence est complète environ 90 secondes après que l'appareil ait recu ce signal.

PROCEDURE D'ARRET

La procédure d'arrêt varie selon la position sur laquelle le commutateur R/L (Remote/Local) est placé.

Si le commutateur R/L sur la carte I/O est sur L (Local):

- Placez l'interrupteur On/Standby sur O (Off) afin de retirer la tension continue et démarrer la séquence d'arrêt.

- La séquence d'arrêt est complète environ 60 secondes après son départ. Après celà les disques sont arrêtés et les têtes sont dans la zone d'atterrissage.

Si le commutateur R/L est sur R (Remote) il y à deux moyens pour démarrer une séquence d'arrêt:

- Méthode Remote: Ici, le contrôleur signale à l'appareil de démarrer la séquence d'arrêt. Lorsque la séquence est complète, l'alimentation continue de fournir les tensions continues à l'appareil tant que l'interrupteur On/Standby n'est pas placé sur O (Off).

- Méthode Local: Vous placez l'interrupteur On/Standby sur O (Off). Ceci retire les tensions continues de l'appareil pour démarrer la séquence.

- Avec les deux méthodes la séquence d'arrêt est complète environ 60 secondes après son départ. Après celà les disques sont arrêtés et les têtes sont dans la zone d'atterissage.

APENDICE

REQUISTOS DE INSTALACION Y OPERACIO

REQUISITOS DE INSTALACION Y OPERACION C

INTRODUCCION

Este apéndice contiene información pertinente a la instalación, operación y mantenimiento seguro del disco.

INFORMACION DE SEGURIDAD

- Para asegurar la integridad de las caracteristicas de seguridad integradas en el disco, la instalación y el mantenimiento deben ser realizadas solamente por personal de servicio cualificado utilizando solamente piezas originales de CDC/MPI.

- En caso de fuego u otra emergencia, aislar el disco de la fuente principal de energia, desenchufando el cable de corriente del disco de la salida de corriente alterna. En situaciones donde quitar el enchufe no es posible ni práctico, utilize el sistema de desconexión principal para aislar los discos de las fuentes de energia.

- Cuando el disco está montado en un estante de equipos o en un armario, asegúrese de que la temperatura interna del armario no sobrepase los limites definidos para el disco. Cuando las unidades están almacenadas verticalmente, preste particular atención a la parte superior donde las temperaturas son normalmente más altas.

- Este disco está diseñado para ser instalado y operado de acuerdo a las normas IEC380, IEC435, VDE805 y VDE806.

- El interruptor de la fuente de alimentación no controla la entrada de corriente alterna. Poniendo el interruptor a "On" (1) abilita las salidas de corriente continua, y poniendolo en "Standby" (0) las desabilita. Pero en ambos casos la corriente alterna está presente dentro de la alimentación.

- Si la fuente de alimentación está conectada a un circuito IT, asegúrese que la tensión de entrada está limitada a 230 voltios.

- No intente desensamblar la fuente de alimentación. Ha de ser reparada en fábrica. Reemplaze la fuente de alimentación en su totalidad en caso de ser defectuosa.

- Si no utiliza una fuente de alimentación recomendada por CDC asegúrese que la fuente de alimentación cumple las especificaciones de este manual y está diseñada para ser usada de acuerdo con las normas IEC380, IEC435, VDE805 y VDE806.

REQUISITOS DE INSTALACION

El local de la instalación debe cumplir las especificaciones dadas en las siguientes tablas y cifras.

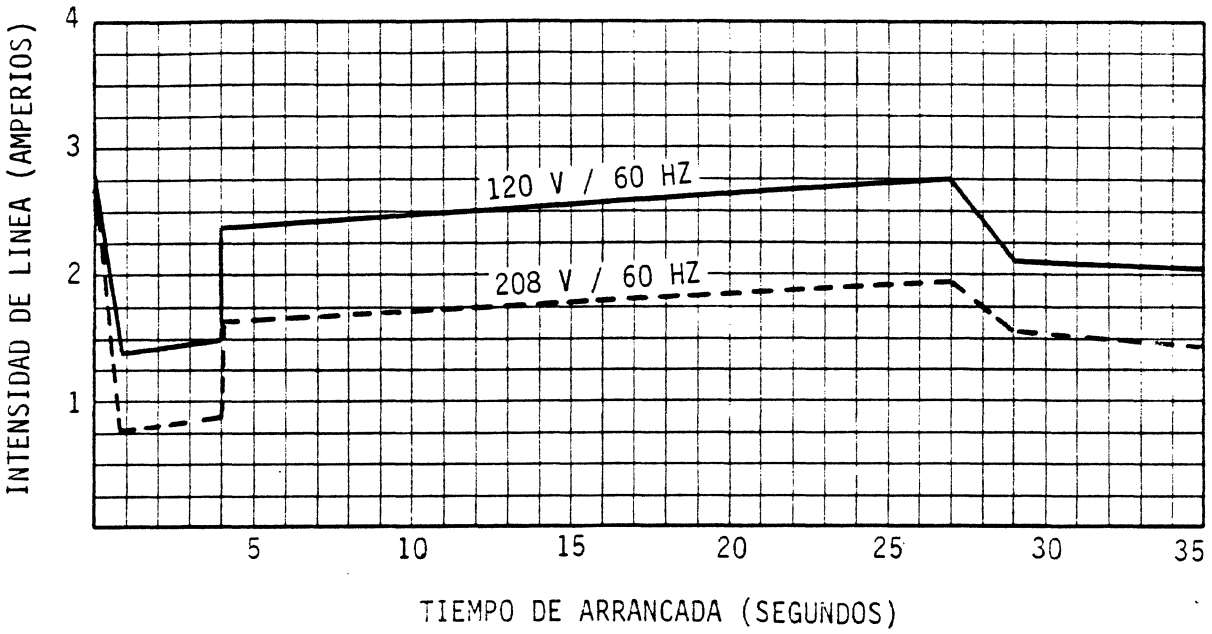
TABLA C-1. REQUISITOS AMBIENTALES

TEMPERATURA	RANGO	VARIACION MAXIMO
Sin operar (desempaquetada)	-10 a 50º C	15º C por hora
Almacenada (embalada)	-40 a 60º C	20º C por hora
Operando	10 a 45º C	15º C por hora
HUMEDAD RELATIVA		
Sin operar (desempaquetada)	5% a 95% (sin condensación)	
Almacenada (embalada)	5% a 95% (sin condensación)	
Operando	20% a 80% (sin condensación)	
PRESION BAROMETRICA		
Sin operar (desempaquetada)	-305 m a 3000 m ó 104 kPa a 69 kPa	
Almacenada (embalada)	-305 m a 12 192 m ó 104 kPa a 19 kPa	
Operando	-305 m a 3000 m ó 104 kPa a 69 kPa	

TABLA C-1. REQUISITOS DE ENERGIA

ESPECIFICACIONES	VALORES	
	Unidad de 100/120	Unidad de 208/240
Margen de tensión	85 a 132 V	177 a 264 V
Frecuencia nominal	50/60 Hz	50/60 Hz
Margen de Frecuencia	48 a 62 Hz	48 a 62 Hz
Fases	Monofásico	Monofásico
Consumo de Potencia*	0,140 - 0,145 kW	0,143 - 0,147 kW
Consumo de corriente*	2,5 - 2,5 A	1,5 - 1,4 A
Factor de potencia	0,57 - 0,55	0,46 - 0,44
Corriente de arranque	Vea la figura C-1	Vea la figura C-1

* Medidas cuando ls discos están girando y el actuador moviendose.



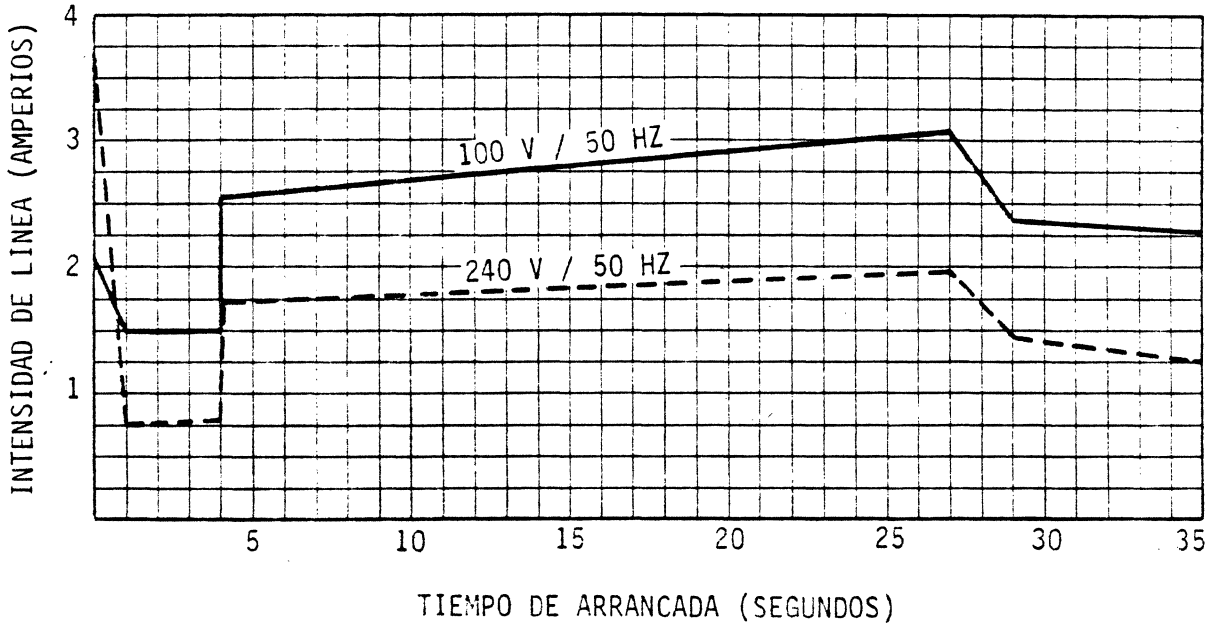
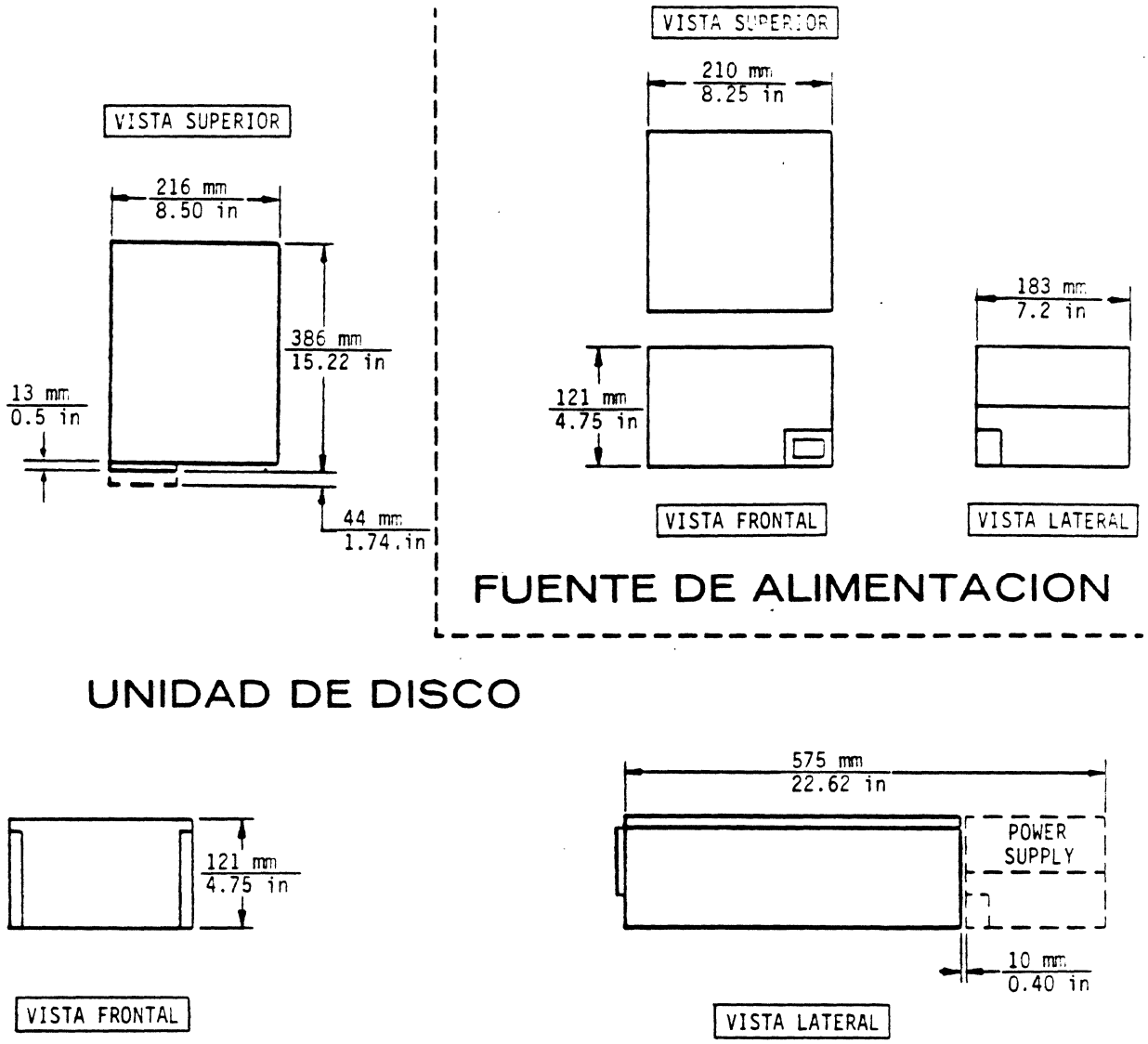


Figura C-1. Intensidad de linea y tiempos de arrancada



NOTAS:

1. MASA
   UNIDAD DE DISCO SOLAMENTE = 14,5 kg (32 LIBRAS)
   FUENTE DE ALIMENTACION SOLAMENTE = 3,2 kg (7 LIBRAS)

2. LAS DIMENSIONES SON NOMINALES.

12J21

Figura C-2. Dimensiones y peso de la unidad de disco

INSTRUCCIONES DE OPERACION (Con Panel Status/Control ó Operator)

PROCEDIMIENTO DE ENCENDIDO

1. Fijar el interruptor "On/Standby" de la fuente de alimentación a la posición 1 (ON).

2. Pulse el interruptor "START".

   - Si el interruptor "R/L" (remoto/local) de la tarjeta de I/O ha sido puesto en L (local) durante la instalación, la secuencia de encendido comienza inmediatamente.

   - Si el interruptor "R/L" ha sido puesto en R (remoto) durante la instalación. La secuencia se retrasa hasta que el disco recibe la señal apropiada desde el controlador.

3. Observe que el indicador de "READY" (localizado en el interuptor "START") parpadea rapidamente indicando que la secuencia de encendido está en marcha.

4. Observe que 90 segundos más tarde el indicador de "READY" queda luciendo fijo, indicando que los discos están a su velocidad de régimen y las cabezas están cargadas.

5. Observe que el indicador de "FAULT" permanece apagado indicando que no han ocurrido errores y la unidad está disponible para leer o escribir datos.

PROCEDIMIENTO DE APAGADO

1. Pulse el interuptor de "START". Si el interruptor R/L en la tarjeta de I/O de la unidad ha sido puesto a R durante la instalación, el controlador puede ordenar al disco que inicie la secuencia de apagado (en ese caso no es necesario pulsar el interruptor "START").

2. Observe que el indicador de "READY" (localizado en el interruptor de "START") parpadea lentamente indicando que que la secuencia de apagado está en marcha.

3. Observe que aproximadamente 60 segundos despues el indicador de "READY" se apaga indicando que la secuencia de apagado ha finalizado. Las cabezas están ahora posicionadas en la zona de aterrizaje y los discos no están girando.

4. Retire la corriente continua de la unidad de discos fijando el interruptor "On/Standby" de la fuente de alimentación a la posición 0 (apagado).

INSTRUCCIONES DE OPERACION (Sin Panel Status/Control ó Operator)

PROCEDIMIENTO DE ENCENDIDO

Fije el interruptor "On/Standby" de la fuente de alimentación a la posición 1 (encendido).

- Si el interruptor R/L (remoto/local) de la tarjeta de I/O fue fijado a L (local) durante la instalación, la secuencia de encendido comienza inmediatamente y tarda aproximadamente 90 segundos en finalizar.

- Si el interruptor R/L fue fijado a R (remoto) durante la instalación, la secuencia de encendido empieza cuando el disco recibe la señal apropiada desde el controlador y finaliza 90 segundos aproximadamente despues de recibida tal señal.

PROCEDIMIENTO DE APAGADO

El procedimiento de apagado varia dependiendo de como ha sido fijado el interruptor R/L (remoto/local).

Si el interruptor R/L (remoto/local) de la tarjeta de I/O está en L (Local).

- Fije el interruptor "On/Standby" a 0 (apagado) para retirar la corriente continua de la unidad y comenzar la secuencia de apagado.

- La secuencia de apagado se completa 60 segundos despues de iniciada. Deja a los discos parados con las cabezas en la zona de aterrizaje.

Si el interruptor R/L está en R (remoto), hay dos maneras de iniciar la secuencia de apagado.

- Método remoto: Aqui, la señal del controlador ordena al disco que inicie la secuencia de apagado. Cuando la secuencia finaliza, la fuente de alimentación continua suministrando corriente continua al disco a menos que el interruptor "On/Standby" se fije a la posición 0 (apagado).

- Método local: Fijando el interruptor de "On/Standby" a la posición 0 (apagado). Retira la corriente continua de la unidad para iniciar la secuencia.

- Con cualquier método, la secuencia de apagado finaliza 60 segundos despues de iniciada. Y deja a los discos parados con las cabezas en la zona de aterrizaje.

LIST OF EFFECTIVE PAGES

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1-9	A

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2-5	A
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2-7	A
2-8	B
2-9	B
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2-21	B
2-22	B
2-23	B
2-24	B
2-25	B
2-26	B

PAGE/REV	
2-27	B
2-28	B
2-29	B
2-30	B
2-31	B
2-32	B
2-33	B
2-34	B
2-35	B
2-36	B
2-37	B
2-38	B
2-39	B
2-40	B
2-41	B
2-42	B
2-43	B
2-44	B
2-45	B
Blank	-
S-3 Div	-
Blank	-
3-1	A
3-2	A
3-3	A
3-4	A
3-5	A
3-6	B
3-7	B
3-8	A
3-9	A
3-10	A
S-4 Div	-

PAGE/REV	
Blank	-
4-1	B
4-2	B
4-3	B
4-4	B
4-5	B
4-6	B
4-7	B
4-8	B
4-9	B
4-10	B
4-11	B
4-12	B
4-13	B
4-14	B
4-15	B
4-16	B
4-17	B
4-18	B
4-19	B
4-20	B
4-21	B
4-22	B
4-23	B
4-24	B
4-25	B
4-26	B
4-27	B
4-28	B
App A Div	-
Blank	-
A-1	B
A-2	B

PAGE/REV	
A-3	A
A-4	B
A-5	A
A-6	A
A-7	A
Blank	-
App B Div	-
Blank	-
B-1	B
B-2	B
B-3	B
B-4	B
B-5	A
B-6	A
B-7	A
Blank	-
App C Div	-
Blank	-
C-1	B
C-2	B
C-3	B
C-4	B
C-5	B
C-6	B
C-7	B
Blank	-
LEP	B
Blank	-
Cmt Sht	-
Rtn Env	-
Blank	-
Cover	-

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PUBLICATIONS SUPPLEMENTAL CHANGE PACKET

NUMBER: 8805

MANUALS AFFECTED:	This packet applies to the following manuals for the SABRE 736, 850 MB, and 1230 MB drives that have the IPI interface. 83326010 User's Manual 83325720 Maintenance Manual
REASON FOR CHANGE:	Provide information about the PA8Y2, two-head parallel drive.

DESCRIPTION OF CHANGE:

This supplemental packet describes a new version (PA8Y2) of the SABRE disk drive. This new drive reads and writes using two heads simultaneously, has spindle synchronization capability, a higher data transfer rate (48 MHz), and its data capacity is 1153.65 MB.

INSTRUCTIONS:

The publication number of the manual each page of this supplement pertains to is indicated at the bottom of each page. This supplement can be kept with the other manuals, or the various pages can be separated and inserted at the front of the appropriate manual. DO NOT remove any pages from the manuals. Future revisions of the manuals will include the information in this supplement.

REVISION STATUS:

Revision	Date
01	09/16/88
02	12/21/88

EQUIPMENT CONFIGURATION

The equipment number for the two-head parallel, 1153 MB SABRE disk drive is listed below along with the individual characteristics.

Equipment	Interface Type	Other Characteristics
PA8Y2A	IPI	1153 MB, 2-Channel, 2-Head Par

ABOUT THE DISK DRIVE

The two-head parallel version of the drive contains a control board with two read/write channels and the associated control circuitry required for two-head parallel operation. The I/O board is also redesigned to enable operation with the two-head parallel control board. This version can be distinguished by the nine-pin connector located just below the row of DIP switches on the I/O board at the back of the drive. This connector provides spindle synchronization between all drives.

When writing or reading, one-half of the data is written or read by one head, while the other half is written or read by the second head. This increases (doubles) the transfer rate to 48.4 MHz.

DRIVE SPECIFICATIONS

The drive specifications listed in section 1 of the User's Manual apply to two-head parallel drives with the following exceptions:

1. The total data capacity (unformatted) is 1153.65 MB.
2. The data transfer rate is 48.4 MHz (6.0 MB/s).
3. The total Number of heads used is 14.

INSTALLATION

To install a two-head parallel drive, use the information below in addition to that in the User's manual.

INSTALLATION (Contd)

A daisy chain connection can be made to the spindle sync connector at the back of each drive to provide synchronization between all drives. This connection is not necessary if spindle synchronization is not required. A spindle sync terminator must be installed on this connector if this feature is not used. Spindle sync cable and terminator part numbers are listed below.

Part Number	Description
70567141	Spindle Sync Cable, 6 foot (1.83 metre) long
70567142	Spindle Sync Cable, 10 foot (3.05 metre) long
70567143	Spindle Sync Cable, 25 foot (7.62 metre) long
70567144	Spindle Sync Cable, 50 foot (15.24 metre) long
70567151	Terminator, Spindle Sync

This drive also has an air duct fastened to the top of the drive. This duct closes the gap between the drive and power supply to provide proper air flow. The duct is secured to the top cover with the two cover screws.

SWITCH SETTINGS

The switch setting information provided in section 2 of the User's Manual (83326010) applies to two-head parallel drives with one exception. The Microcode ID switches (ID0 - ID3) on all two-head parallel drives must be set differently than indicated in the manual. Switches ID0 and ID2 must be set to the On (closed) position. Switches ID1 and ID3 must be set to the Off (open) position.

OPERATION and DIAGNOSTICS

The operation and diagnostic information presented in the User's Manual (section 3 and 4) can be used for two-head parallel drives.

INTRODUCTION

The maintenance manual (publication number 83325720) applies to a number of drives with various interfaces. The information in the maintenance manual also applies to the two-head parallel drives. The two-head parallel drives appear nearly identical to the other drives with the IPI interface, but they have different control and I/O boards. The control board has two read/write channels and control circuits that permits reading and writing with two heads simultaneously. The I/O board is also redesigned to enable operation with the two-head parallel control board. This version can be distinguished by the nine-pin connector located just below the row of DIP switches on the I/O board at the back of the drive. This connector provides spindle synchronization between all drives.

NEW EQUIPMENT NUMBERS

The equipment numbers listed below identify the two-head parallel drives and their major features.

Equipment Number	Interface Type	Data Capacity	Sector Length
PA8Y2A	IPI, 2-Channel, 2-Head Parallel	1153.65 MB	Unspecified

ACCESSING ASSEMBLIES FOR MAINTENANCE

This topic in the maintenance manual shows the location of the major components of the drive and indicates the control and I/O board types for the various drives. For the two-head parallel drive (1153.65 MB), the I/O board type is LYBX and the control board is GYBX. Figure 1-2 in the maintenance manual shows the various control board connectors. The configuration of the connectors on the control board for two-head parallel drives is the same as the other control boards, but the appearance and location of the other components on the board is significantly different. The I/O board has a nine-pin spindle sync connector located just below the row of DIP switches.

TROUBLESHOOTING and MAINTENANCE PROCEDURES

All of the troubleshooting and maintenance procedures in the maintenance manual also pertain to the two-head parallel drives.