

WANG

5103

OFFICE INFORMATION SYSTEMS

Models:

OIS 140 (Model 6540)

OIS 145 (Model 6545)

**Customer Engineering
Product Maintenance Manual**

741-0664

PREFACE

The purpose of this manual is to provide the Wang-trained Customer Engineer (CE) with instructions to operate, troubleshoot and repair Wang Office Information Systems 140 (Model 6540) and 145 (Model 6545).

Third Edition (July 1984)

This reprint of Document 729-0664-A is identified by a new converted document number (741-0664) and incorporates the following: Document 729-0664, Addendums 729-0664-1 through 729-0664-6, Product Service Notices (PSN's) 729-0986 and 729-1111, and Publication Update Bulletin (PUB) 729-0664-A1. The material in this document may be used only for the purpose stated in the Preface. Updates and/or changes to this document will be published as PUB's or subsequent editions.

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PUBLICATION UPDATE BULLETIN

TITLE: OIS 140/145

DATE: 11/12/87

This PUB affects: 741-0664
742-0664

Color: Green

Previous Notice(s): None

REASON FOR CHANGE:

This PUB describes the unbundling of the OIS 140 system from its disk devices.

INSTRUCTIONS:

Remove and insert attached pages and/or microfiche as follows:

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1.		PUB cover/proprietary
2.	iii/iv	iii/iv
3.	1-1 through 1-4	1-1 through 1-4
4.	2-1 through 2-4	2-1 through 2-4
5.	2-9 through 2-14	2-9 through 2-14
6.	3-1/3-2	3-1/3-2
7.	3-29/3-30	3-29/3-30
8.		3-34a through 3-34c
9.	3-37/3-38	3-37/3-38
10.	5-1/5-2	5-1/5-2

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CHAPTER

1

**INTRO-
DUCTION**

CHAPTER 1

INTRODUCTION

1.1 SCOPE AND PURPOSE

This publication concerns the Office Information Systems 140 and 145* (OIS 140/145) and provides field personnel with the information necessary to:

- A. Understand the functions of the principal parts of the system and all the relationships and interactions among these parts
- B. Unpack and install the system
- C. Perform preventive maintenance procedures
- D. Perform diagnostic tests
- E. Analyze failure indications
- F. Replace failed assemblies

A block-level description of the printed circuit boards internal to the master unit is presented in Chapter 8, "Theory of Operation." This document also serves as a reference to those publications necessary for the installation and maintenance of optional peripherals and accessories.

This manual is written for Customer Engineering personnel with a background in Wang word processing. Familiarity with OIS 140 and 145 systems and the Hawk, Phoenix, and 300 Meg SMD disk drives is essential for effective use of this manual.

*Product discontinued after October, 1985.

1.2 ORGANIZATION

This manual describes the 140 and 145 Office Information Systems. Throughout the manual all statements pertaining to both the OIS 140 and 145 systems will be identified as such by references to the collective OIS 140/145 System. In cases where the two systems differ, the references will be qualified to indicate explicitly one system apart from the other. That is, whenever the phrase OIS 140 or OIS 145 stands alone, the ensuing statement applies to that system only.

The OIS 145, although currently unavailable, is essentially the same as the OIS 140 System, with the exception of the system disk. The 145 is equipped with a 300 megabyte Storage Module Drive (300 Meg SMD) as its system disk, while the 140 System contains a 96 Meg Phoenix Cartridge Module Drive (96 Meg CMD) sold in three different storage capacities.

In accordance with the stated scope and purpose, this manual is arranged into 8 chapters:

CHAPTER 1	INTRODUCTION
CHAPTER 2	SYSTEM DESCRIPTION
CHAPTER 3	INSTALLATION
CHAPTER 4	CONTROLS AND INDICATORS
CHAPTER 5	MAINTENANCE
CHAPTER 6	TROUBLESHOOTING
CHAPTER 7	REPAIR
CHAPTER 8	THEORY OF OPERATION

This manual is further organized and arranged so that all information pertaining to a task or subject is complete on a single page. Obviously, more than one page is required for complicated and difficult subjects. In these instances, all the information written at "page level" is presented on that page; references are given for further details. The referenced material is also organized in the same fashion. That is to say, when the CE has completed a page, he/she has completed the task described on that page; there is no more to be done. If the CE is not familiar with or needs detailed information about some item on that page he/she is referred to a page that details that item (the details also being complete on one page). This arrangement allows the experienced CE to run quickly through all the steps in a task without being slowed by details with which he/she is already familiar. At the same time, all the details needed by a CE less familiar with the product also are available.

To reduce endless paging back-and-forth, the manual is arranged so that once the CE has gone to the detailed portion of the manual, he/she can remain there and proceed from one detailed page to another. Of course, if the CE only needs additional information on one item, he/she is better advised to return to the "higher level" procedures and continue from there.

1.3 RELATED DOCUMENTATION

MISCELLANEOUS

Systems Installation Guide for VS, 2200, WP/OIS Systems
Site Preparation Guide
OIS Supervisor Procedures Manual

CRT WORKSTATION (Models 5536-2,-3,-4)

Models 5536-1/-2/-3/-4 Workstations WPNL No. 81.
Model 5536 Series Workstation PMM

PHOENIX CMD DISK DRIVE (Model 6580)

CDC CMD Hardware Maintenance Manual
Wang Cartridge Module Disk Drive Manual
Cartridge Module Drive (Block Point 4) Manual
Wang CMD Addendum 2

CDC SMD DISK DRIVES (67 MB, 80 MB, 300 MB)

CDC OEM Service Manual
CDC SMD Hardware Maintenance Manual
CDC SMD Hardware Reference Manual
CDC Disk Drive Theory of Operation Manual
CDC Disk Drive Installation Manual

HAWK CDC DISK DRIVE (Model 6560)

CDC Hawk Field Maintenance Manual
Wang/CDC Hawk Disk Drive Manual

NEC 67 MB, 134 MB DISK DRIVES (Models 6568-1, 6568-2)

Winchester Disk Drive Product Maintenance Manual

SHUGART FLOPPY DISKETTE DRIVE (Model SA901)

Shugart Disk System, Service Bulletin No. 46.2
PSN-2 Shugart SA901

OPTIONAL PERIPHERALS

Product Maintenance Manual: Wang Daisy Printers
Archiving Workstation - Service Information, WPNL #77
Mag-Card Reader for WPS, WPNL #78
Model 61/62 Matrix Printer Maintenance Manual
Model 44, 48 Phototypesetter
Image Printer Maintenance Manual
Model 5538 Twin Sheet Feeder (TSF) Installation & Adjustment Manual
Envelope Feeder (EF) Product Maintenance Manual
WISE Model 6550-1 PMM
TCB-1 TC Controller Self Study Workbook

1.4 TOOLS AND EQUIPMENT

1.4.1 RECOMMENDED TEST EQUIPMENT/TOOL LIST

OIS installation, repair, and maintenance procedures can be performed using the following tools and test equipment.

- A. Customer Engineering standard tool kit
- B. Digital volt meter
- C. Oscilloscope with two 1X probes and/or two 10X probes
- D. Alcohol pads
- E. Hypot/dc ESD tester
- F. AC outlet impedance tester
- G. Dry air
- H. Media solution

1.4.2 SPECIAL TOOLS AND EQUIPMENT

Special tools and equipment for the Phoenix, Hawk, 300 Meg SMD, and Shugart drives are presented in the associated manuals outlined in section 1.3.

1.4.3 SOFTWARE TOOLS

Software diskettes and documents referenced in this manual are listed below.

<u>TITLE</u>	<u>DISKETTE/DOCUMENT</u>
OIS 140-Class Power Up (PROM)	(702-0042D)
OIS 140 Extended Memory Power Up (PROM)	(702-0123B)
SYSEX40	(702-0117)
SYSEX40X	(702-0135)
OIS 140-Class Master Monitor	(702-0057D)
OIS Online Device Monitor	(702-0174)
OIS Online Printer Part I	(702-0176A, Rev 2422)
OIS Online Printer Part II	(702-0149, Rev 21A0)

CHAPTER
2
SYSTEM
DESCRIP-
TION

CHAPTER 2

SYSTEM DESCRIPTION

2.1 GENERAL DESCRIPTION OF OIS 140/145*/145A*

The OIS 140 and 145A (formerly OIS 145) are the largest text processors in the Wang OIS family. Master processing and data storage equipment form the core of these systems; user devices are clustered around this core. Extensive options provide system configurations that are versatile and expandable.

These CRT/disk-based processors are designed for users with large volumes of data input, output, or storage requirements. The OIS 140 is currently offered with a basic configuration of one master processor unit with a single diskette drive for off-line storage. The OIS is capable of supporting up to four drives on-line (one designated as system disk). The customer has eight different choices for his disk storage. These choices are listed below.

Standalone Disks

Disk Cabinets

<u>Model</u>	<u>Type</u>	<u>Model</u>	<u>Contents</u>
6565	275 MB Fixed	6593-C1	67 MB Removable Disk (6567-1)
6565-1	67 MB Removable	6593-C2	67 MB Removable Disk (6567-1)
6580-3	80.4 MB Fixed/Removable	6593-C3	67 MB Fixed Disk (6568-1)
			67 MB Removable Disk (6567-1)
			134 MB Fixed Disk (6568-2)
		6595-C6	344 MB Fixed Disk (6568-3)
			67 MB Removable Disk (6567-1)
		6595-C7	(2) 344 MB Fixed Disk (6568-3)

Both the 6568-1 and the 6568-2 drives can be added on to the 6593-C1 cabinet for customer upgrades.

The OIS 145/145A is essentially the same as the current OIS 140 System, except for the system disk. The basic 145/145A is equipped with a 300 Meg SMD as its system disk (formatted capacity = 275 Meg). Up to three 300 Meg SMD units may be attached to the OIS 145A, making the total system capable of storing over 334,000 pages of text. Older equipment (OIS 145s) may have 10 Meg Hawk drives attached for information backup.

Both the 140 and 145/145A systems use standard OIS architecture and software. Both may be expanded to include up to 32 peripherals (maximum of 24 workstations) in many combinations. The diagrams on the next four pages outline the basic configurations and list some of the available peripherals for each system.

-----NOTE-----

Throughout the rest of the manual, statements applying to both the OIS 140 and 145/145A will be identified as the OIS 140/145 System. In cases where the systems differ, the references will be qualified to indicate one system apart from the other.

*Products discontinued after October 1985.

OFFICE INFORMATION SYSTEM 140

Models 140-1*, 140-2*, 140-3*

140-1

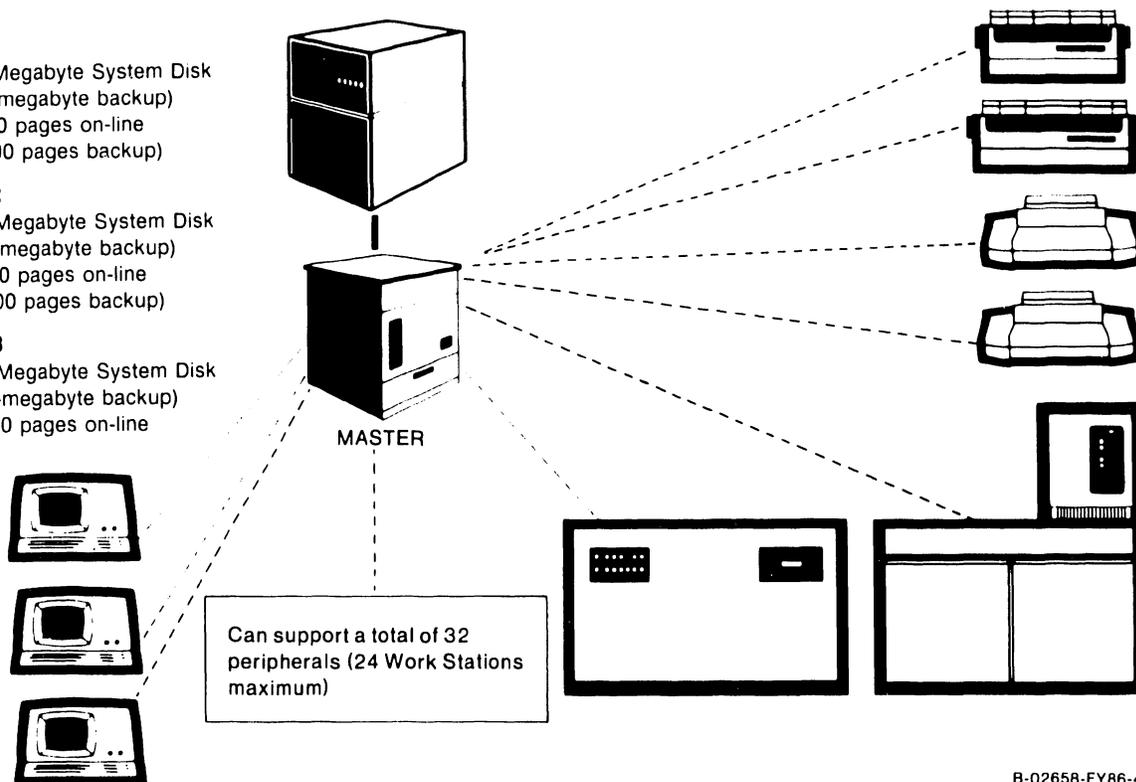
13.4-Megabyte System Disk
(13.4-megabyte backup)
10,700 pages on-line
(10,700 pages backup)

140-2

53.6-Megabyte System Disk
(13.4-megabyte backup)
21,400 pages on-line
(21,400 pages backup)

140-3

80.4-Megabyte System Disk
(13.4-megabyte backup)
31,100 pages on-line



B-02658-FY86-4

BASIC CONFIGURATION

(1) System Master and
Archive Diskette
(1) System Disk (26.8,
53.6, or 84.4 Megabytes)
13.4 Megabyte
Removable cartridge

OPTIONAL PERIPHERALS

Archiving Workstation (48 or 64K)
Mag Card Reader
Numeric Keypad
Phototypesetter
Phototypesetter Input Option
Papertape Punch for Telex
Telecommunications
26.8, 53.6, or 80.4 Meg Disk
(2) 10 Megabyte Disks
(5 Megabyte removable cartridge)
Workstation (32K, 48K, or 64K)
WISE (Wang Inter-System Exchange)
OCR Interface

PRINTERS

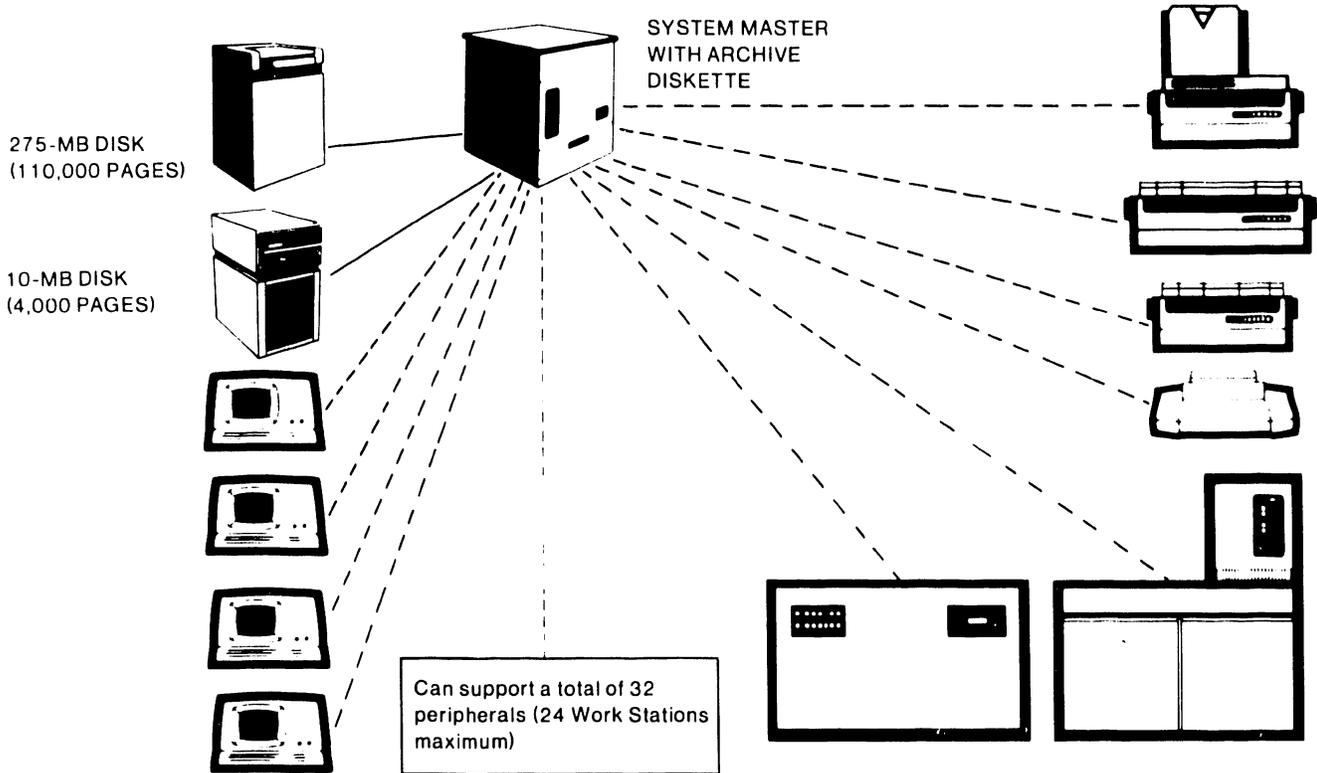
35 CPS Daisy
35 CPS Wide Carriage
120 CPS Matrix
200 CPS Matrix
425 LPM Line
Intelligent Image
Twin-Head Daisy

ACCESSORIES

Twin Sheet Feeder
Workstation Table
General Work Table
Line Printer Stand
Additional Cable
Lengths (2000' Max)
Bidirectional Forms
Tractor
Envelope Feeder

*Product discontinued after October, 1985.

OFFICE INFORMATION SYSTEM 145*



B-02658-FY86-2

BASIC CONFIGURATION

(1) 275 Megabyte Disk
(1) 10 Megabyte Disk
(1) System Master
with Archive Diskette

OPTIONAL PERIPHERALS

Archiving Workstation
(1) or (2) 275 Megabyte Disks
Mag Card Reader
Numeric Keypad
OCR Interface
Phototypesetter Input Option
WISE (Wang Inter-System Exchange)
Workstation with Communications
(1) 10 Megabyte Disk
Phototypesetter 5548Z

PRINTERS

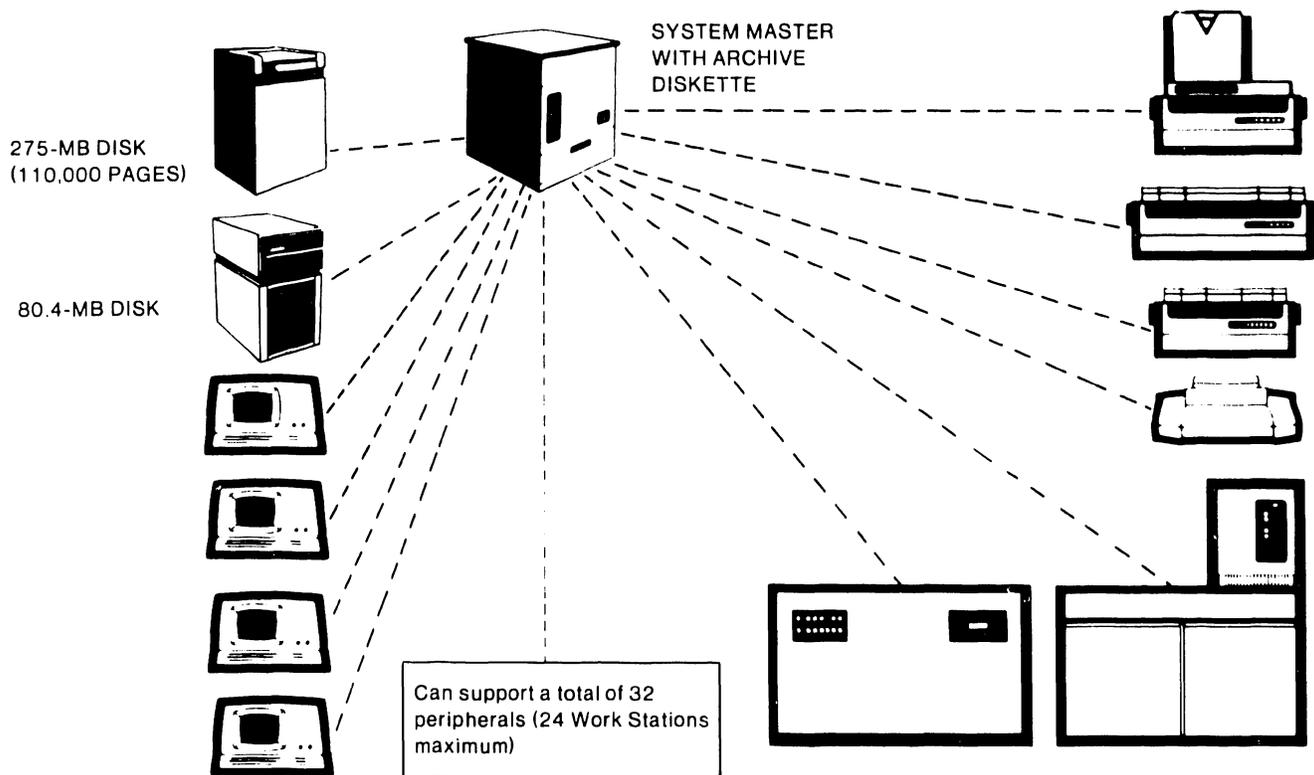
35 CPS Daisy
35 CPS Wide Carriage
Twin-head Daisy
120 CPS Matrix
200 CPS Matrix
425 LPM Line
Intelligent Image

ACCESSORIES

Workstation Table
General Work Table
Line Printer Stand
Twin Sheet Feeder
Additional Cable
Lengths (2000' Max)

*Product discontinued after October, 1985.

OFFICE INFORMATION SYSTEM 140 (Unbundled)



BASIC CONFIGURATION

(1) 275 Megabyte Disk
(1) 10 Megabyte Disk
(1) System Master
with Archive Diskette

OPTIONAL PERIPHERALS

Archiving Workstation
(1) or (2) 275 Megabyte Disks
Mag Card Reader
Numeric Keypad
OCR Interface
Phototypesetter Input Option
WISE (Wang Inter-System Exchange)
Workstation with Communications
(1) 10 Megabyte Disk
Phototypesetter 5548Z

PRINTERS

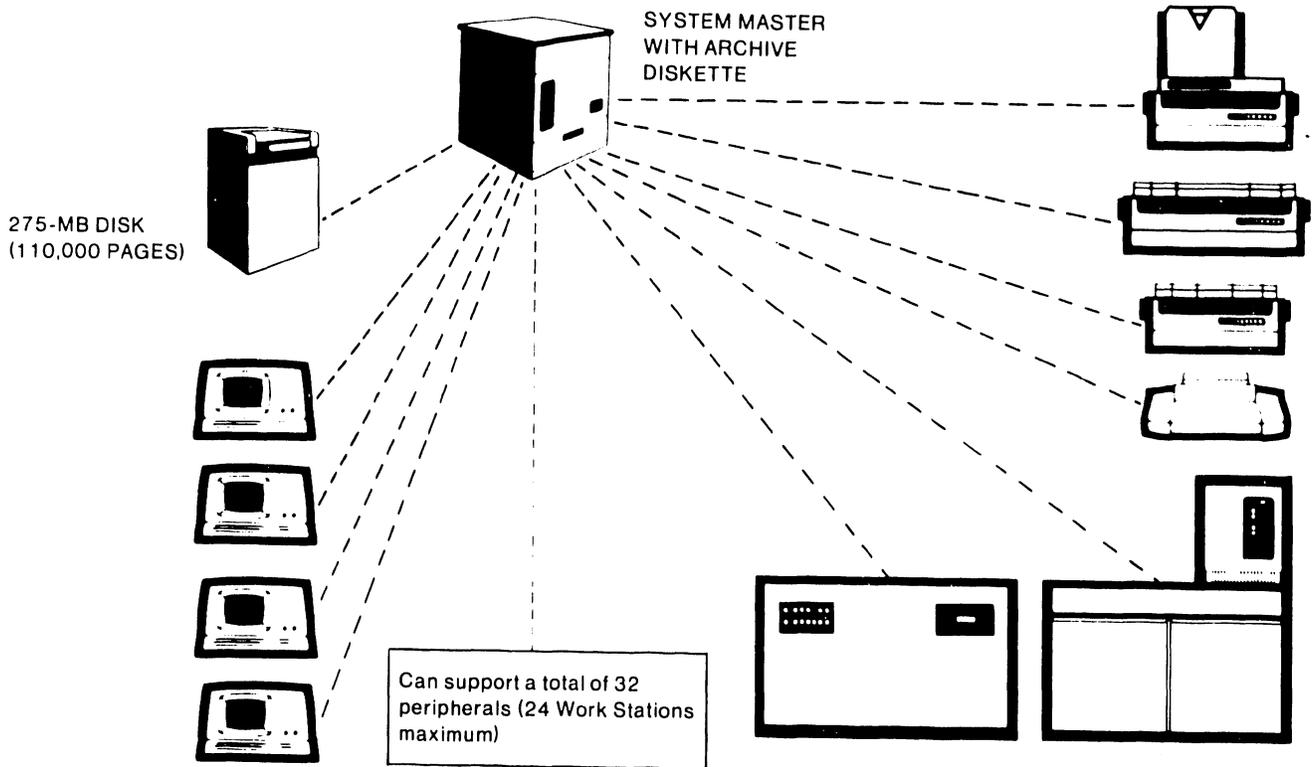
35 CPS Daisy
35 CPS Wide Carriage
Twin-head Daisy
120 CPS Matrix
200 CPS Matrix
425 LPM Line
Intelligent Image

ACCESSORIES

Workstation Table
General Work Table
Line Printer Stand
Additional Cable
Lengths (2000' Max)
Twin Sheet Feeder

*Product discontinued after October, 1985.

OFFICE INFORMATION SYSTEM 145A*



B-02658-FY86-1

BASIC CONFIGURATION

- (1) 275 Megabyte Disk
- (1) Archive Diskette

OPTIONAL PERIPHERALS

- Archiving Workstation
- 80.4 Megabyte Phoenix
- (1) or (2) 275 Megabyte Disks
- 67 Megabyte Disk
- Mag Card Reader
- Numeric Keypad
- OCR Interface
- Phototypesetter Input Option
- WISE (Wang Inter-System Exchange)
- Workstation with Communications
- Phototypesetter 5548Z

PRINTERS

- 35 CPS Daisy
- 35 CPS Wide Carriage Daisy
- Twin-Head Daisy
- 120 CPS Matrix
- 200 CPS Matrix
- 425 LPM Line
- Intelligent Image

ACCESSORIES

- Twin Sheet Feeder
- Workstation Table
- Line Printer Stand
- Additional Cable Lengths (2000' Max)
- Bidirectional Forms Tractor
- Envelope Feeder

*Product discontinued after October, 1985.

2.2 MASTER UNIT SPECIFICATIONS

A Z-80 based Master CPU is a standard hardware feature of the OIS 140/145. Operating at 4 MHz, it provides this system with a faster transfer rate than previous processing systems. Included on the same circuit board as the Master CPU is a programmable Counter Timer Circuit (CTC), 3K of PROM, 1K of address space devoted to Memory Mapped I/O, and 60K of RAM. If the Extended Memory option is purchased, an additional 3K of PROM and 60K of RAM is available to the customer.

Other features of the Master Unit include thirty-two slave channels and I/O ports, nine Printed Circuit Assemblies (PCAs), a Power Supply Assembly, Front Panel Assembly, and Shugart Floppy Diskette Drive. Refer to Chapter 8, "Theory of Operation", for a block diagram discussion of the PCAs in the Master CPU.

Following is a list of printed circuit boards and chassis assemblies used in the OIS 140/145 Master Unit:

<u>BOARD/CHASSIS #</u>	<u>NAME</u>
210-7501-A	64K CPU/Memory Board
210-7502	Floppy/10 Meg Controller Board
210-7503	Data Link Controller Board
210-7504-A	Data Buffer Board
210-7505	SMD Disk Controller Board #1 (A)
210-7506	SMD Disk Controller Board #2 (B)
210-7507	Motherboard
210-7508	Regulator Board
210-7518	Front Panel PCB
270-0599	Motherboard Chassis
270-0601	Power Supply Chassis (60 Hz)
270-0601-1	Power Supply Chassis (50 Hz)

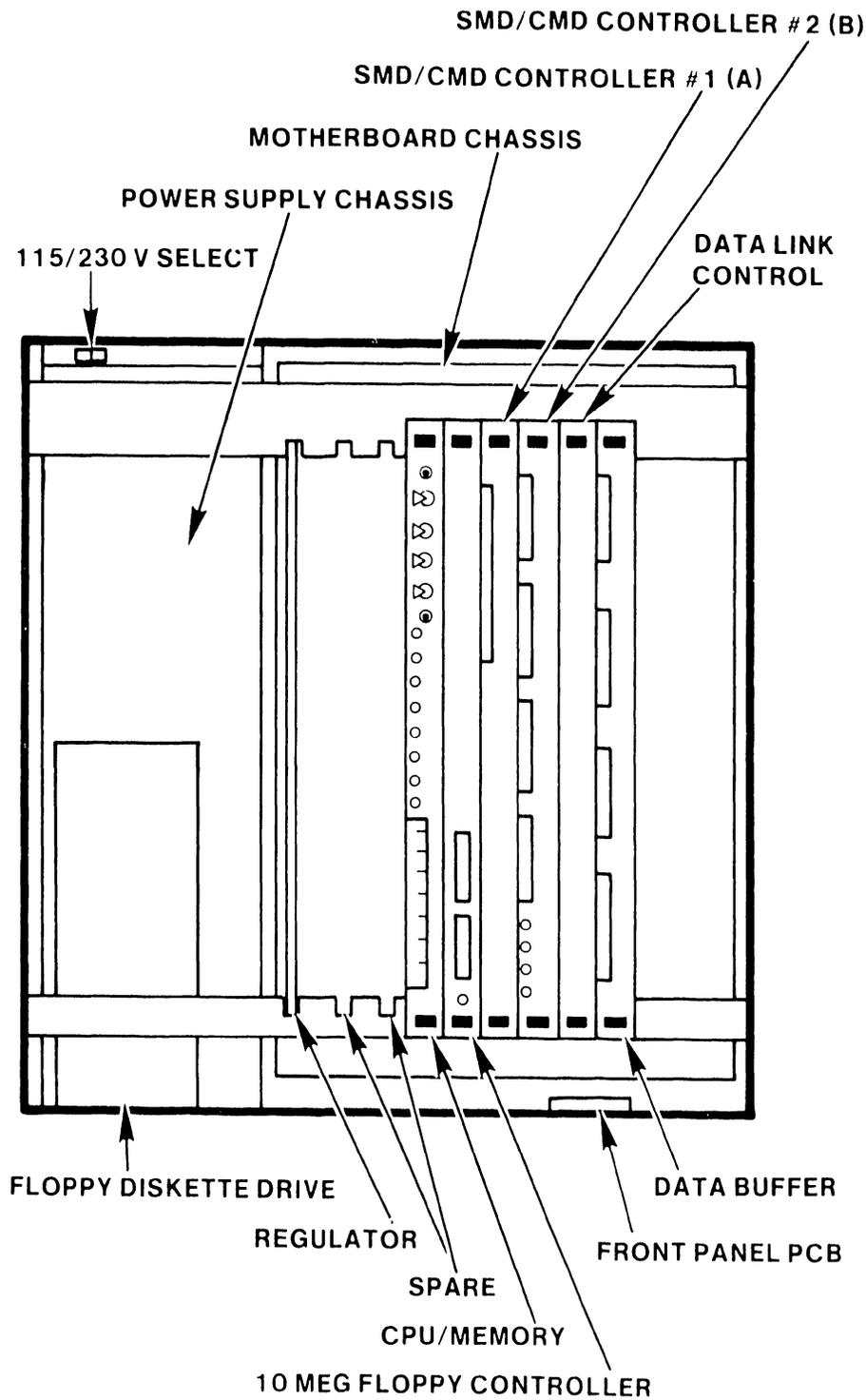


FIGURE 2-1 MASTER UNIT MAJOR COMPONENT LOCATIONS

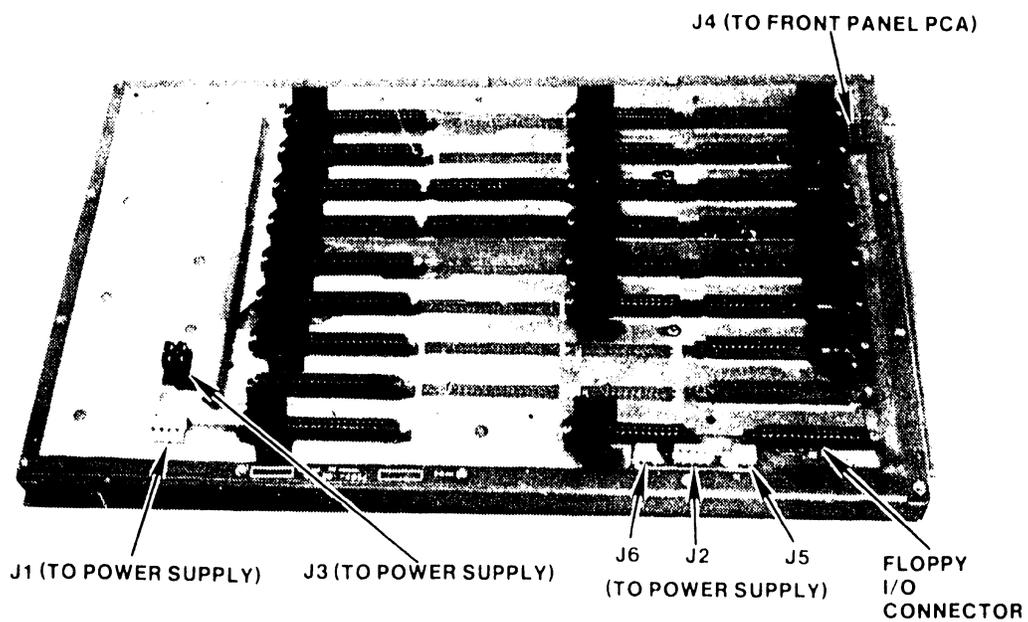


FIGURE 2-2 210-7507 MOTHERBOARD PCB AND CONNECTOR LOCATIONS

Following are the electrical and physical specifications for the Master Unit and Diskette Drive:

Master Unit:	<u>Domestic</u>	<u>International</u>
Height	30 Inches	(76.2 cm)
Width	24 Inches	(60.9 cm)
Depth	30 Inches	(76.2 cm)
Power Requirements	115VAC \pm 10%	(230VAC \pm 10%)
	60 Hz \pm 1 Hz	(50 Hz \pm 1 Hz)
	4A @ 115VAC	3A @ 230 VAC
Power Consumed	500 Watts	
Heat Dissipated	1700BTU/Hr	

Diskette Drive: (See fig. 2-3)

Height	12.75 Inches	(32.4 cm)
Width	6.0 Inches	(15.3 cm)
Depth	16.5 inches	(42 cm)

Diskette Drive characteristics:

Diskette Capacity	315,392 Characters
Rotational Speed	360 RPM
Rotational Period	166.72 msec
Average Access Time	424 msec
Average Latency	83 msec
Data Transfer Rate	31,250 Bytes/sec.
Bit Cell Time	4 usec
Track to Track	
Access Time	10 msec
Head Settling Time	10 msec
Sectors per Track	16
No. of Tracks	77
Total Sectors	1232
Sector Mark Duration	400 usec \pm 200 usec
Index Mark Duration	400 usec \pm 200 usec
Direction Select Pulse	
Duration	1 usec minimum
Time Between Head Load	
and Valid Data	50 msec
Time Between Head Load	
and step	30 msec

Refer to Service Bulletins 46.2 (729-0115), 46.3 (729-0116), and 46.3A (729-0117) for additional information on the Floppy Diskette.

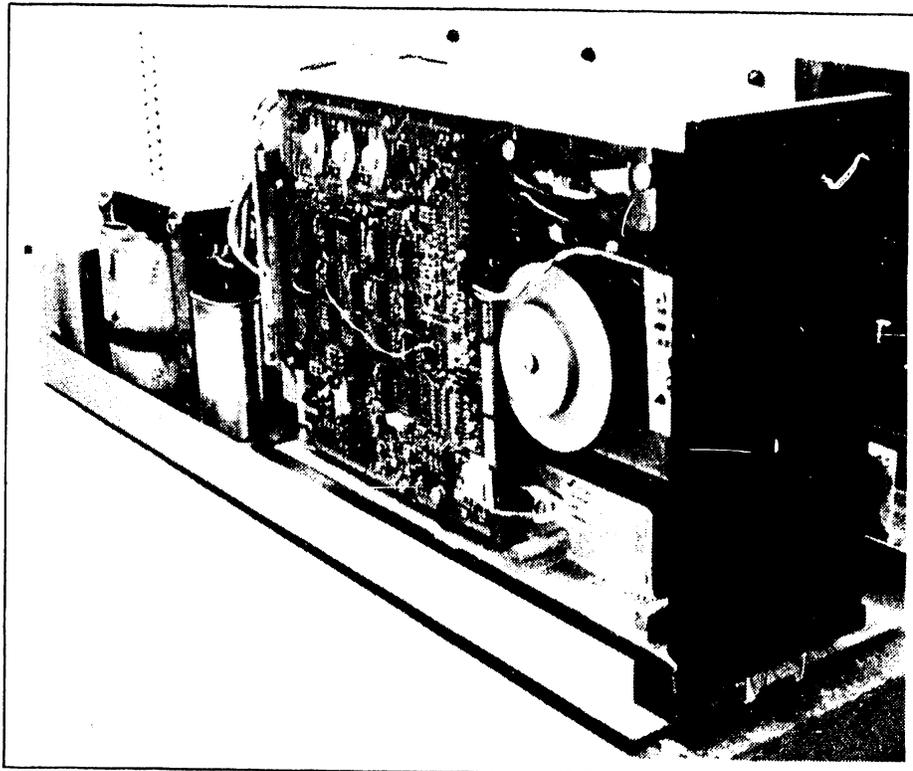


FIGURE 2-3 SHUGART DRIVE MOUNTED ON POWER CHASSIS

2.3 DISK DRIVES

Seven types of disk drives are available with the OIS 140. The Phoenix 6580-3, and the CDC 6565 and 6565-1 provide standalone disk storage, while the NEC 6568-1, 6568-2, and 6568-3, and the CDC 6567-1 provide storage in a small disk cabinet. Although no longer offered, a Hawk (6560) 10 Mbyte drive is fully compatible and may be found on older equipment. The number of drives on line depends upon the needs of the end user. The OIS 140 is capable of supporting any combination of these to a maximum of four drive units on line, providing the user with up to 1.1 Gbytes of formatted storage.

2.3.1 PHOENIX CMD DISK DRIVE (6580)

The Phoenix CMD is a high performance, random access, mass storage device. The Model 3 (6580-3) stores a maximum of 80.4 Mbytes. Previously available were the 6580-1, which stored a maximum of 26.8 Mbytes, and the 6580-2, which stored a maximum of 53.6 Mbytes.

A linear positioner, a density of 384 tracks per inch (tpi), and a 30 msec average access time give the Phoenix CMD a 9.67 MHz transfer rate.

Following are the electrical/physical characteristics of the Phoenix CMD:

Phoenix Specifications:	<u>Domestic</u>	<u>International</u>
Height	10.5 Inches	(264 mm)
Width	19.0 Inches	(483 mm)
Depth	31.75 Inches	(806 mm)
Weight	170 lbs	(77.1 Kg)
Power Requirements	115 VAC \pm 10% 60Hz \pm 1 Hz	(230VAC \pm 10% (50Hz \pm 1 Hz)
	8.2A @ 120 VAC	(4A @ 230 VAC)
	.950 KWH	

NOTE: A separate, 20A (10A Int'l) dedicated line should be provided for the Phoenix.

Phoenix Data Capacity (formatted):

Model 1 (6580-1)*	26,836,992 bytes
Model 2 (6580-2)*	53,675,984 bytes
Model 3 (6580-3)	80,510,976 bytes

* Products discontinued.

Phoenix Specifications - continued

Track Density	384 tpi
Maximum Positioning Time	55 ms
Track-to-track	
Positioning Time	6 ms
Average Access Time	30 ms
Spindle Speed	3600 rpm (+2.5%,-3.5%)
Avg. Latency Time	8.33 ms @ 3600 rpm

-----NOTE-----

Refer to the Wang Cartridge Module Disk Drive Manual and the Control Data Cartridge Module Hardware Maintenance Manual for a detailed description of the Phoenix CMD.

2.3.2 300 SMD DISK DRIVE (6565)

The 300 Meg SMD is a high speed, random access, mass storage device with a formatted capacity of 275 megabytes. Like the Phoenix, the 300 Meg SMD has a density of 384 tracks per inch (tpi), a 30 msec average access time, and a 9.67 MHz transfer rate.

Following are the electrical and physical characteristics of the 300 megabyte Storage Module Drive:

300 Meg SMD Specifications:	<u>Domestic</u>	<u>International</u>
Height	36 Inches	(920 mm)
Width	36 Inches	(914 mm)
Depth	23 Inches	(584 mm)
Weight	550 lbs	(252 Kg)
Power Requirements	208 VAC \pm 10%, 230 VAC \pm 10% 60Hz \pm 1Hz 8.0A @ 208 VAC 1300 Watts	(220 VAC \pm 10%), (240 VAC \pm 10%) (50Hz \pm 1 Hz) (9.5A @ 220 VAC)

NOTE: A separate, 20A dedicated line should be provided for the 300 Meg SMD.

300 Meg SMD Characteristics:

Track Density	384 tpi
Maximum Positioning Time	55 ms
Track-to-track	
Positioning Time	6 ms
Average Access Time	30 ms
Spindle Speed	3600 rpm (+2.5%,-3.5%)
Avg. Latency Time	8.33 ms @ 3600 rpm

Data Capacity: 300 Mbytes (unformatted)
275 Mbytes (formatted)

-----NOTE-----

Refer to the CDC SMD Hardware Reference Manual and the CDC Hardware Maintenance Manual for a detailed description of the 300 Meg SMD.

2.3.3 HAWK DISK DRIVE (6560)

Previously available with the OIS 140 and 145 is the Hawk (6560) 10 Mbyte Cartridge Disk Drive (see Fig. 2-5).

Following are the electrical and physical characteristics of the Hawk Cartridge Disk Drive:

Hawk Specifications:	<u>Domestic</u>	<u>International</u>
Height	10.3 Inches	(262 mm)
Width	18.9 Inches	(480 mm)
Depth	30.6 Inches	(778 mm)
Weight	150 lbs.	(68.2 kg)
Power Requirements	115VAC \pm 10%	(230VAC \pm 10%)
	60Hz \pm 1Hz	(50Hz \pm 1 Hz)
	4.6A @ 120 VAC	(2.5A @ 230 VAC)
	310 Watts	

Hawk Characteristics:

Track Density	200 tpi
Access Time	60 msec
Average Access Time	35 msec \pm 1 msec
Spindle Speed	2400 RPM (\pm 48 RPM) at + 0.5 -1.0 Hz of input freq. and + 10%, -15% of input voltage.
Avg. Latency Time	12.5 msec (@ 2400 RPM)
Nominal Recording Bit Rate	2.5 MHz
Data Capacity (unformatted)	10 Mbytes

Refer to the Wang/CDC Hawk Disk Drive Manual for additional details.

2.3.4 67 MB NEC DRIVE (6568-1)

For a detailed description of the 67 MB NEC Drive, refer to the Winchester Disk Drive Product Maintenance Manual.

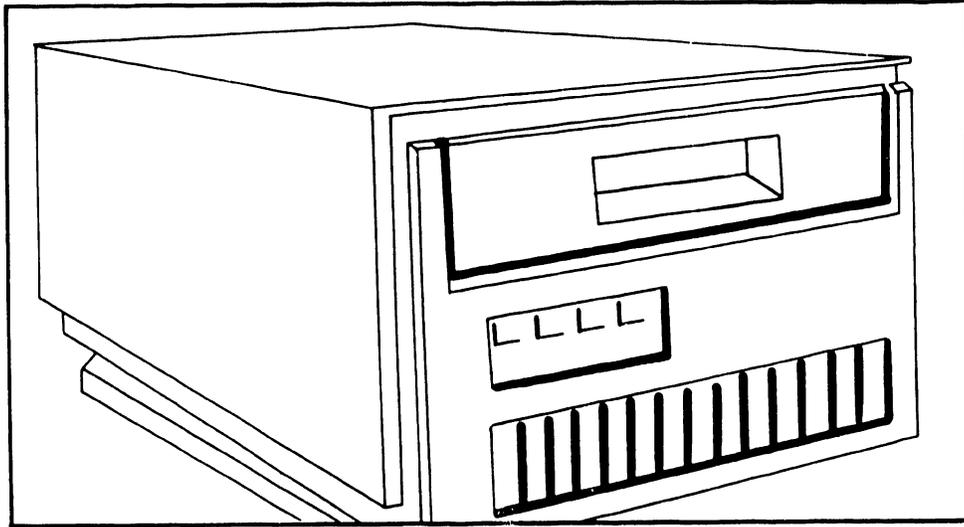


FIGURE 2-4 PHOENIX CMD

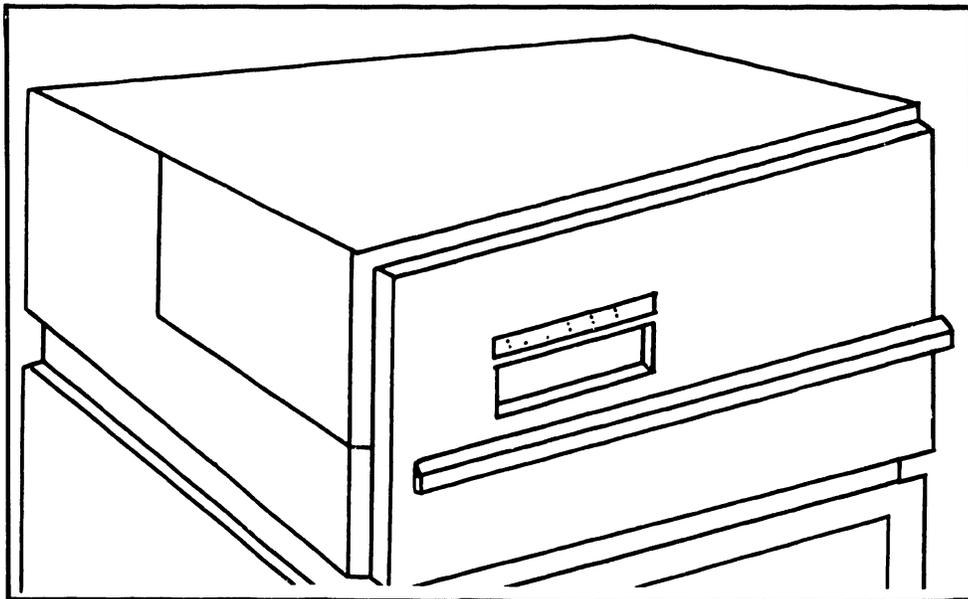


FIGURE 2-5 HAWK DISK DRIVE

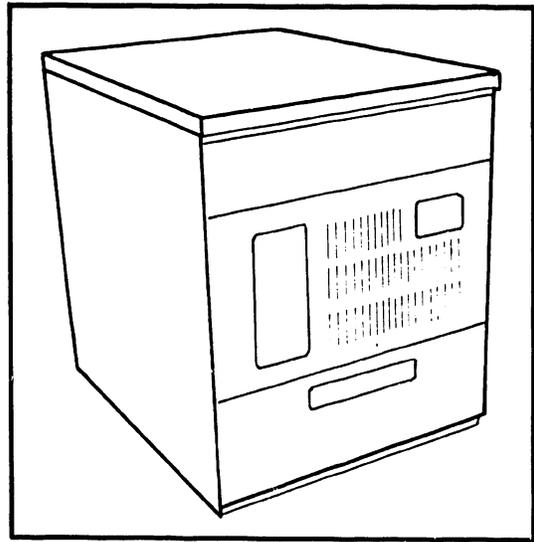
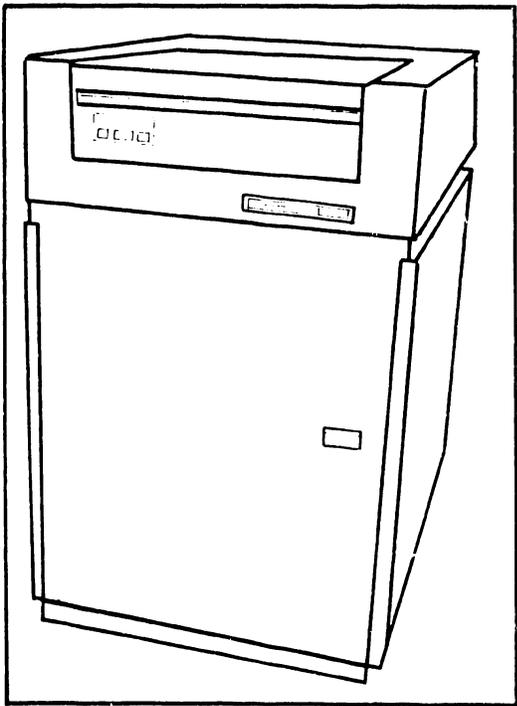
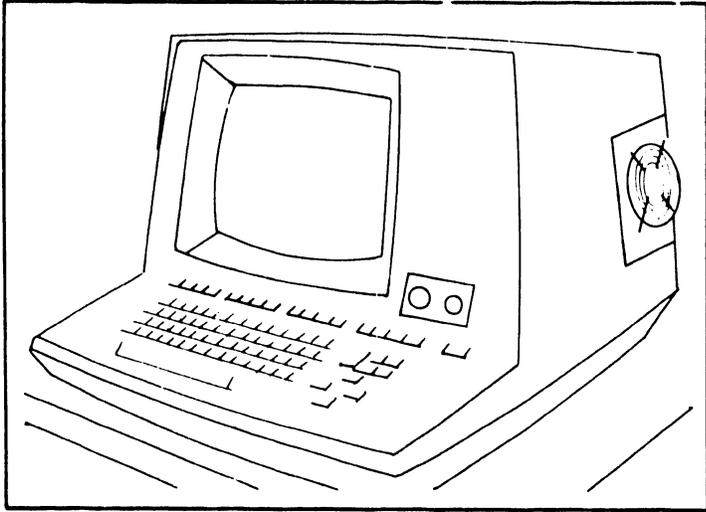


FIGURE 2-6 300 MEG SMD DISK DRIVE, MASTER PROCESSOR AND CRT WORKSTATION

2.3.5 67 MB CDC Drive (6567-1)

For a detailed description of the 67 MB CDC Drive, refer to the Theory of Operation Manual and the Installation Manual.

2.3.6 134 MB NEC Drive (6568-2)

For a detailed description of the 134 MB NEC Drive, refer to the Winchester Disk Drive Product Maintenance Manual.

2.3.7 67 MB CDC (6565-1)

For a detailed description of the 67 MB CDC Drive, refer to the CDC SMD Hardware Reference Manual and the CDC Hardware Maintenance Manual.

2.3.8 344 MB CDC (6568-3)

For a detailed description of the 344 MC CDC Drive, refer to the CDC FSD Installation Manual.

2.4 OPTIONAL PERIPHERALS

To communicate with the OIS 140 and 145, peripheral devices such as CRT/Workstations and printers are necessary additions.

Most peripherals available to the system are standard Wang products. These include the Model 5536-2, -3, and -4 CRT/Workstations with 32K, 48K, and 64K of memory respectively, the 6521 Line Printer with 16K memory, and the 6581W Daisy Printer with 16K memory. A more complete list is provided on pages 2-2, 2-3, 2-4, and 2-5.

2.5 ENVIRONMENTAL CHARACTERISTICS

The operating environment is an important consideration when installing a processing system. Although the OIS 140/145 is designed to operate efficiently under less than ideal conditions, a dust-free, temperature-controlled environment is recommended.

Adhering to the following system environmental specifications will ensure that maximum operating efficiency is maintained:

1. Relative Humidity	40% to 60% (non-condensing)
2. Ambient Temperature	60°F (15°C) to 80°F (28°C)
3. Temperature Gradient	12°F/Hr (6.7°C/Hr)
4. Max. Wet Bulb Temp.	75°F (24.5°C)
5. Maximum Altitude **	10,000 ft (3048m)

**Tape drives above 4000 ft (1200m) and disk drives (removable disks) above 6500 ft (1960m) require high altitude options.

CHAPTER

3

INSTAL-

LATION

CHAPTER 3

INSTALLATION

3.1 INTRODUCTION

The configuration addressed in this manual, prior to October 1985, was a minimum system configuration comprised of a master processor with single diskette drive, CRT workstation, and a system disk. A Model 6580 Phoenix CMD served as system disk for the OIS 140 System; a Model 6565 300 Meg SMD, for the OIS 145 System. Current OIS systems have a minimum configuration of a master processor with a single diskette drive only. Additional drives are optional. System control is accomplished at the CRT workstation, while off-line data storage is provided by the diskette drive. Since the Model 6560 Hawk Disk Drive was a standard component in OIS 145 Systems, it is addressed in this chapter.

This chapter sets forth a checklist for site preparation and the information necessary to unpack, inspect, make initial adjustments, and power-up the basic system. Specifically, this chapter provides:

<u>ITEM</u>	<u>SECTION</u>
Checklist for site preparation	3.2
Unpacking & initial inspection	3.3
System interconnections	3.4
Initial setup, checks, and adjustments	3.5
Power-up procedure	3.6
Master unit power-up diagnostic	3.7
Power-down procedure	3.8
Software installation	3.9
System checkout	3.10
Final word processing check	3.11
Detailed procedures	3.12

NOTE: For information regarding optional disk drives not listed in this publication, please refer to the applicable Product Maintenance Manual. (Ref. Section 1.3 of this document)

3.2 CHECKLIST FOR SITE PREPARATION

Proper location and site preparation are important for overall operating efficiency. Ideally, the area should be easily accessible, relatively dust free, and temperature and humidity controlled. An adequate number of dedicated, regulated, noise-free ac power outlets should be provided to minimize electromagnetic interference. Additional information is provided in the Systems Installation Guide and the Site Preparation Guide.

Selection and preparation of the site should be completed already. The purpose of this checklist in Table 3-1 is to highlight key items and thereby promote the best operating environment.

TABLE 3-1. SITE PREPARATION CHECKLIST

ITEM	NOTES
Location	Master processor near the primary user; device may be as much as 2000 feet from the master processor, if necessary.
Space	Easy access by user and service personnel.
Storage	For manuals, materials (ribbon, paper, spare disks), etc.
Environment	An air-conditioned and humidity-controlled environment is recommended (see Table 3-2).
Power Circuits	(1) Separate, noise-free, 3-wire, 20 amp dedicated lines (properly installed in rigid metal conduits that are correctly joined to junction boxes). (2) Branch circuits protected by circuit breakers suitable for motor load application (see Table 3-2).
Grounding	Extremely important that the CPU and all disks be connected to a grounding conductor that is securely attached to the ground bus in the service panel. The grounding conductor is green, green with yellow stripe, or bare. In addition, all outlets used by the system peripherals must be properly grounded.
Dust Free	No noticeable accumulation of dust in a 24-hour period.
Static Electricity	Preferably non-static floor materials.
Access	All doorways and corridors wide enough to allow passage of the system, and sufficient elevator weight-capacity (if used).

TABLE 3-2 ELECTRICAL AND ENVIRONMENTAL REQUIREMENTS *

DEVICE	VOLTAGE REQUIREMENTS	AMPS	BTU/HR (max.)
MASTER UNIT			
Domestic	115 VAC \pm 10% (60 Hz \pm 1 Hz)	4A	1700
International	230 VAC \pm 10% (50 Hz \pm 1 Hz)	3A	
96 MEG CMD			
Domestic	115 VAC \pm 10% (60 Hz \pm 1 Hz)	8.2A	3000
International	230 VAC \pm 10% (50 Hz \pm 1 Hz)	4A	
300 Meg SMD			
Domestic	208 VAC (+14.6, -29)	8.0A	4200
	230 VAC (+16.0, -13) (60 Hz \pm 1 Hz)	7.2A	
International	220 VAC (+15.0, -25)	9.5A	
	240 VAC (+17.0, -27) (50 Hz \pm 1 Hz)	8.7A	
5536-2/-3/-4 CRT/WS			
Domestic	115 VAC \pm 10% (60 Hz \pm 1 Hz)	2.5A	480
International	230 VAC \pm 10% (50 Hz \pm 1 Hz)	1.5A	

SYSTEM ENVIRONMENTAL SPECIFICATIONS

- | | |
|-------------------------|-----------------------------|
| 1. Relative Humidity | 40% to 60% (non-condensing) |
| 2. Ambient Temperature | 60°F (15°C) to 80°F (28°C) |
| 3. Temperature Gradient | 12°F/Hr (6.7°C/Hr) |
| 4. Max. Wet Bulb Temp. | 75°F (24.5°C) |
| 5. Maximum Altitude ** | 10,000 ft (3048m) |

- * All AC outlets used by the system and peripherals must be checked with the AC Outlet Impedance Tester (WL #727-0143) for proper polarity and grounding quality.

-----CAUTION-----

The AC Outlet Impedance Tester, when used on circuits employing a GFI, will cause the GFI to trip. In environments containing extremely important equipment, such as life support equipment, tripping a GFI could spell disaster.

- ** Tape drives above 4000 ft (1200m) and disk drives (removable disks) above 6500 ft (1960m) require high altitude options.

3.3 UNPACKING & INITIAL INSPECTION

3.3.1 UNPACKING THE MASTER PROCESSOR

----- CAUTION -----
Inspect the shipping cartons and report any damage to the carrier. Do not proceed with unpacking until certain that this will not void any claims to the carrier.

Unpacking procedures for the Master Processor comprise 6 steps:

- A. Using diagonal cutters (or other suitable tool), cut the two plastic straps securing the shipping carton.
- B. Remove the the carton's top cover and the cushion assembly that protects the top of the Master Unit
- C. Slide the square cardboard tube off of the unit. (tube should not be stapled to pallet.)
- D. Remove the plastic bag surrounding the unit.
- E. Remove the four shipping brackets that secure the CPU to its pallet, using the appropriate size nut driver.
- F. The Master Unit is now ready to be lifted from the pallet and placed in its assigned location.

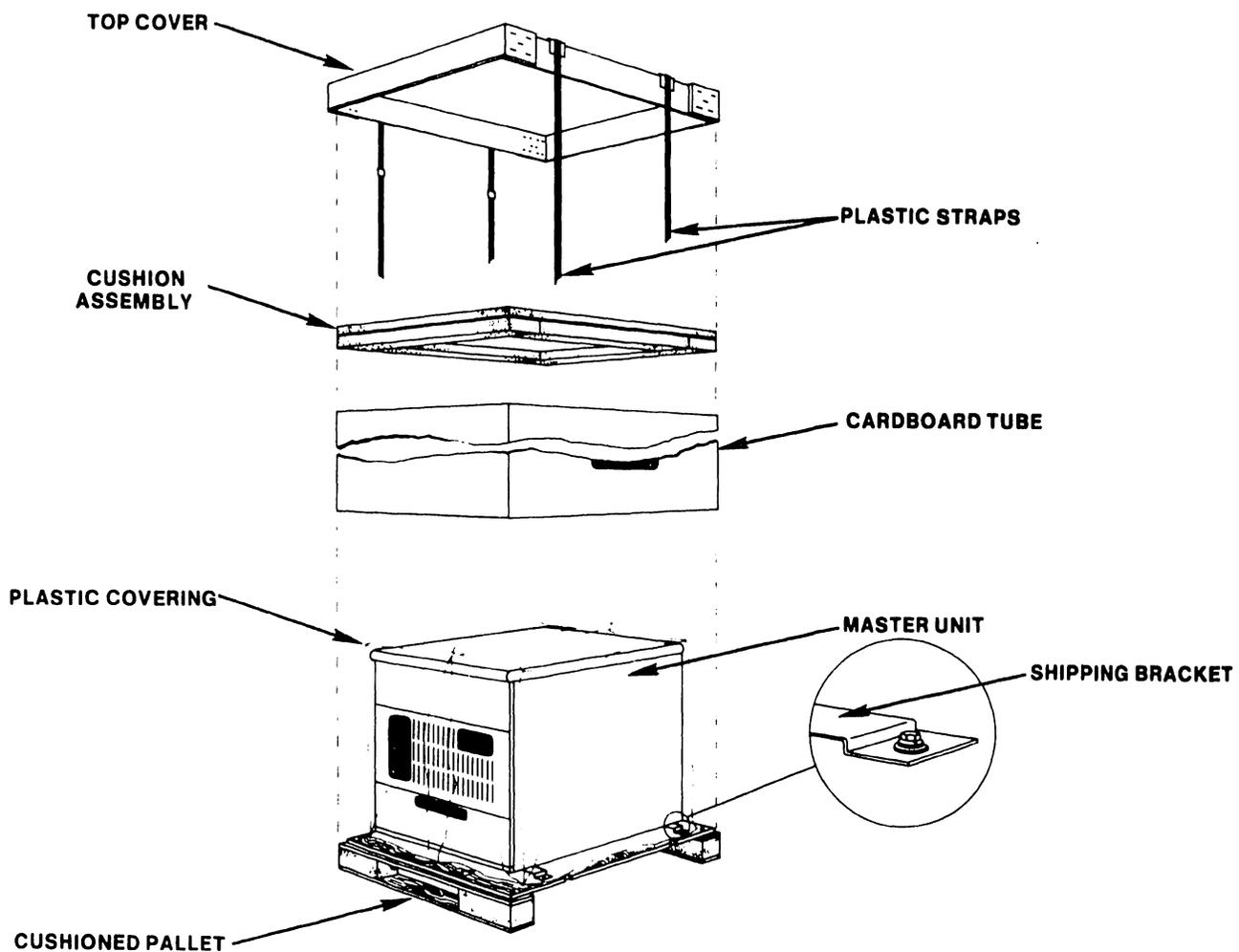


FIGURE 3-1 PACKAGING FOR THE MASTER PROCESSOR

3.3.2 UNPACKING THE CRT WORKSTATION

----- CAUTION -----
Inspect the shipping cartons and report any damage to the carrier. Do not proceed with unpacking until certain that this will not void any claims to the carrier.

Unpacking the CRT workstation follows standard procedures for "foam in place" packaging:

- A. Cut the sealing tape and open the top of the shipping carton
- B. Remove the foam padding at the top and sides of the CRT workstation
- C. Carefully, lift the CRT workstation clear of the shipping carton and place it in its designated location.

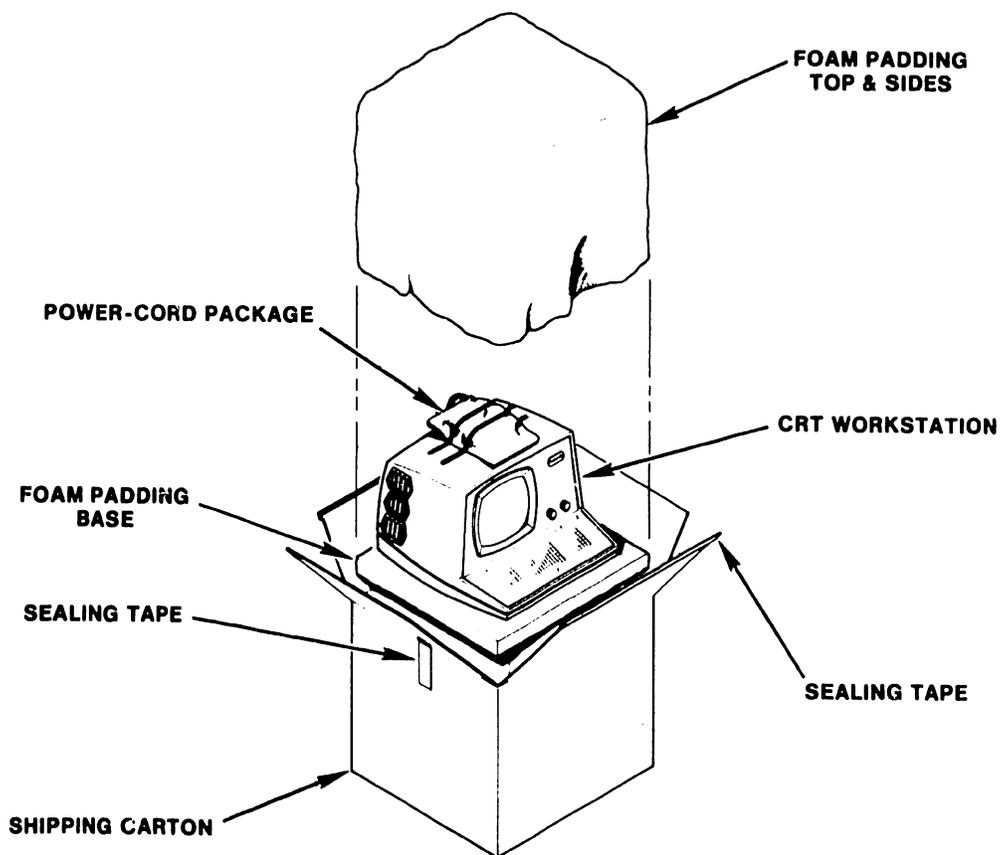


FIGURE 3-2 PACKAGING FOR THE CRT WORKSTATION

3.3.3 UNPACKING THE PHOENIX DISK DRIVE

----- CAUTION -----
Inspect the shipping cartons and report any damage to the carrier. Do not proceed with unpacking until certain that this will not void any claims to the carrier.

Unpacking procedures for the Phoenix disk unit comprise 5 steps:

- A. Using diagonal cutters (or other suitable tool), cut the two steel straps securing the shipping carton.
- B. Open the top of the cardboard carton and remove Instapak that surrounds the drive. Take care not to lose or dispose of the hardware package shipped internally on top of the unit.
- C. Remove the staples that secure the cardboard carton to the wooden pallet, then lift off the carton.
- D. With the disk drive exposed, remove the four short metal hold-down brackets that secure the disk to the wooden support base.
- E. Prior to removing the Phoenix from the wooden pallet, raise one end of the drive at a time just enough to install the round white rubber mounts supplied with the associated hardware. The disk is now ready to mount on its stand.

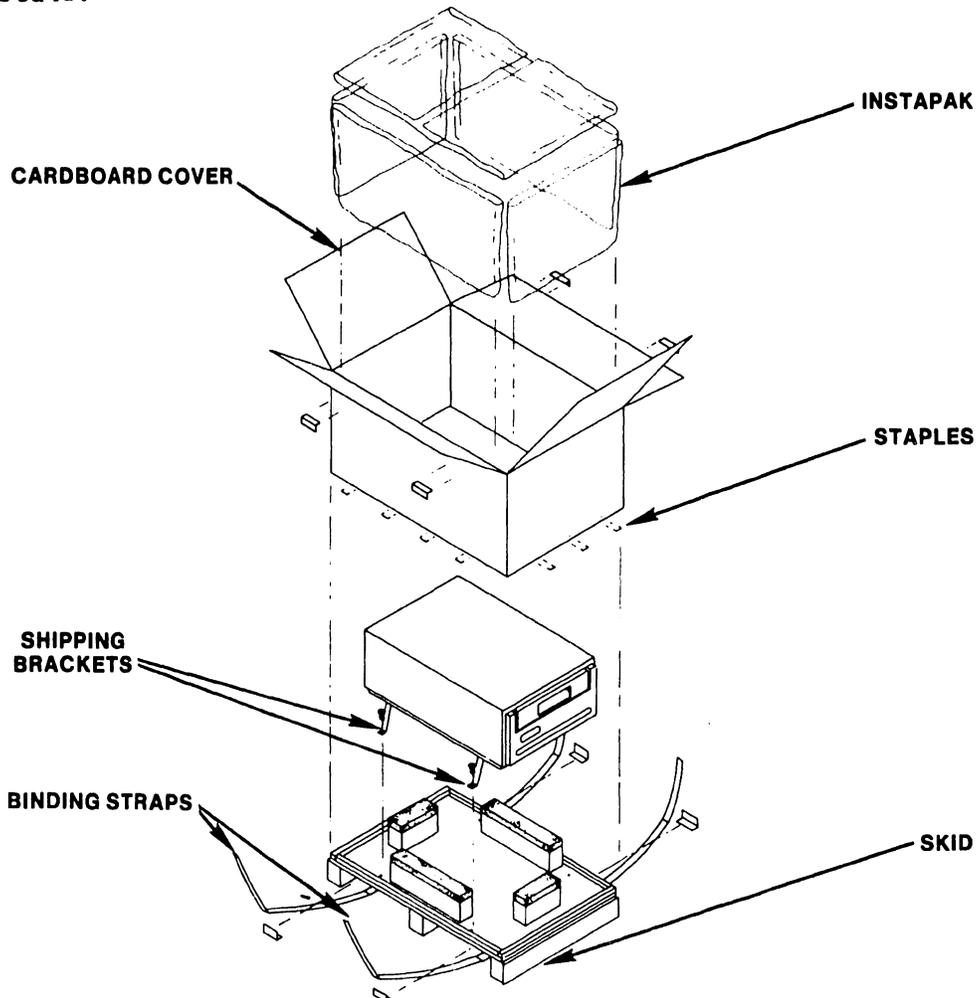


FIGURE 3-3 PACKAGING FOR THE PHOENIX DISK DRIVE

3.3.4 UNPACKING THE 300 MEG SMD DISK DRIVE

----- CAUTION -----
 Inspect the shipping cartons and report any damage to the carrier. Do not proceed with unpacking until certain that this will not void any claims to the carrier.

Unpacking procedures for the 300 Meg SMD disk unit comprise 5 steps:

- A. Using diagonal cutters (or other suitable tool), cut the two straps securing the shipping carton.
- B. Remove the the carton's top cover and the cushion assembly that protects the top of the Master Unit.
- C. Cut the inner straps that secure the unit to its pallet, then remove the protective plastic covering.
- D. Unbolt the shipping brackets and remove the middle and end cushion assemblies from the wooden pallet as shown in the figure below.
- E. Raise the four leveling legs as high as possible and slowly roll the unit down off the pallet. The disk is now ready to be placed in its assigned location.

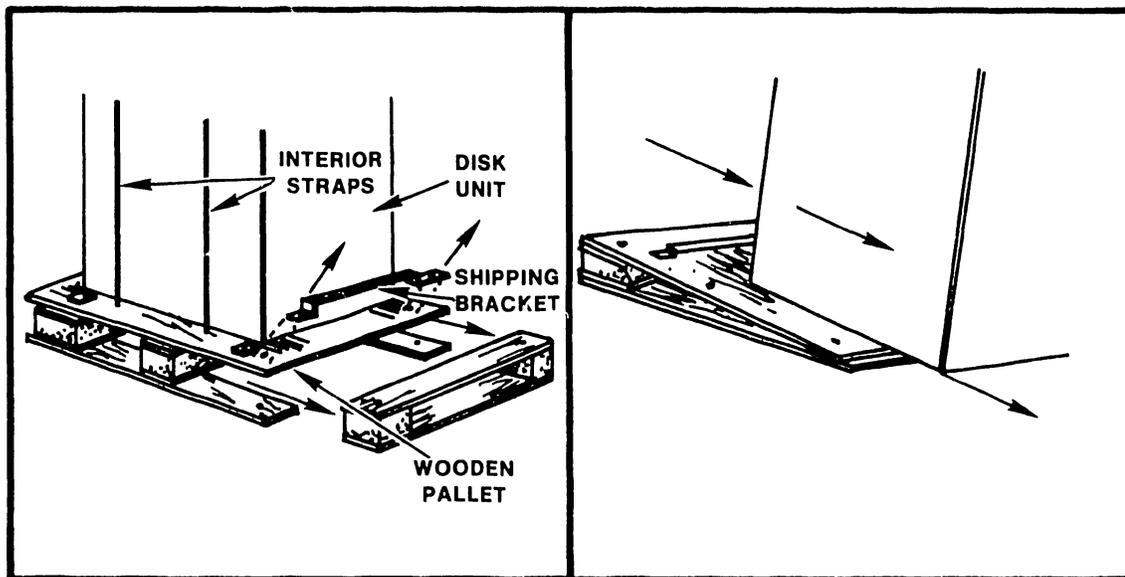


FIGURE 3-4 PACKAGING FOR THE 300 MEG SMD DISK DRIVE

3.3.5 UNPACKING THE HAWK DISK DRIVE

-----CAUTION-----
Inspect the shipping cartons and report any damage to the carrier. Do not proceed with unpacking until certain that this will not void any claims to the carrier.

The HAWK disk unit is strapped to a cushioned pallet for shipping. A corrugated shipping carton covers the unit and is also strapped down.

Unpacking procedures comprise 6 steps:

- A. Using diagonal cutters (or other suitable tool), cut the steel straps securing the shipping carton.
- B. Using a slotted screwdriver, remove the staples which attach the carton to the pallet and lift off the carton.
- C. Remove any packing material.
- D. Cut the steel straps securing the HAWK disk unit.
- E. Carefully, lift the HAWK disk unit clear of the pallet and place it on the mounting cabinet.
- F. Thoroughly clean the unit of all particles of shipping dust.

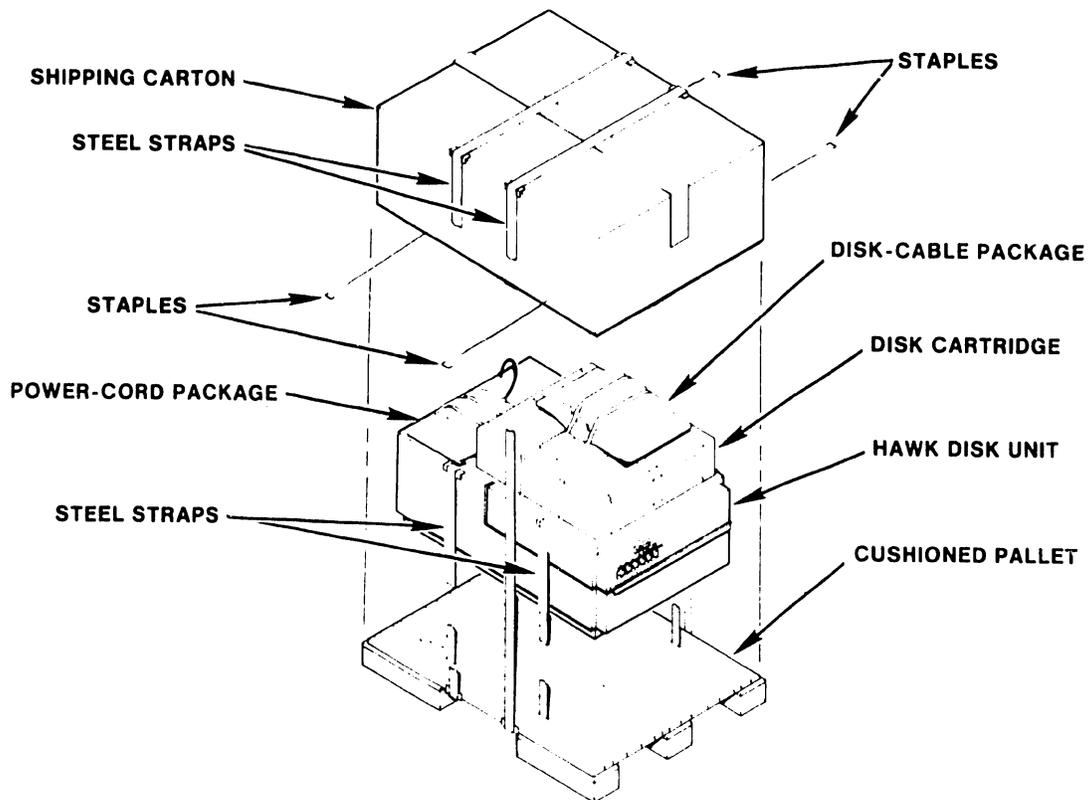


FIGURE 3-5 PACKAGING FOR THE HAWK DISK UNIT

3.3.6 INSPECTING THE MASTER PROCESSOR

- A. Ensure that the power-on switch is in the OFF position.
- B. Remove the top cover and front panels per Sections 7.3.1 and 7.3.2.
- C. Ensure that all connections from the motherboard to the power supply chassis, front panel, and diskette drive are secure and properly oriented per sections 7.3.2 and 7.3.4 (see Figure 3-6).
- D. Inspect the inside of the Master Unit, the motherboard, and the power supply chassis for wire clippings, metal shavings, etc.
- E. Clean as necessary.
- F. Ensure that the two screws located on top of the large capacitor on the power supply chassis are sufficiently tight (see Figure 3-7).
- G. Set the voltage selector switch to the correct position (see Figure 3-7). Check fuse to ensure value is correct for line voltage selected. (115 VAC - 4A SLO-BLO, WL# 360-1040-SB; 230 VAC - 3A SLO-BLO, WL# 360-1031-SB.)
- H. Check and properly seat all PCAs and connectors per section 7.3.3.
- I. Complete, sign, and mail the shipping card enclosed with the unit.
- J. The top cover and front panels need not be replaced until the system installation and checkout is complete.

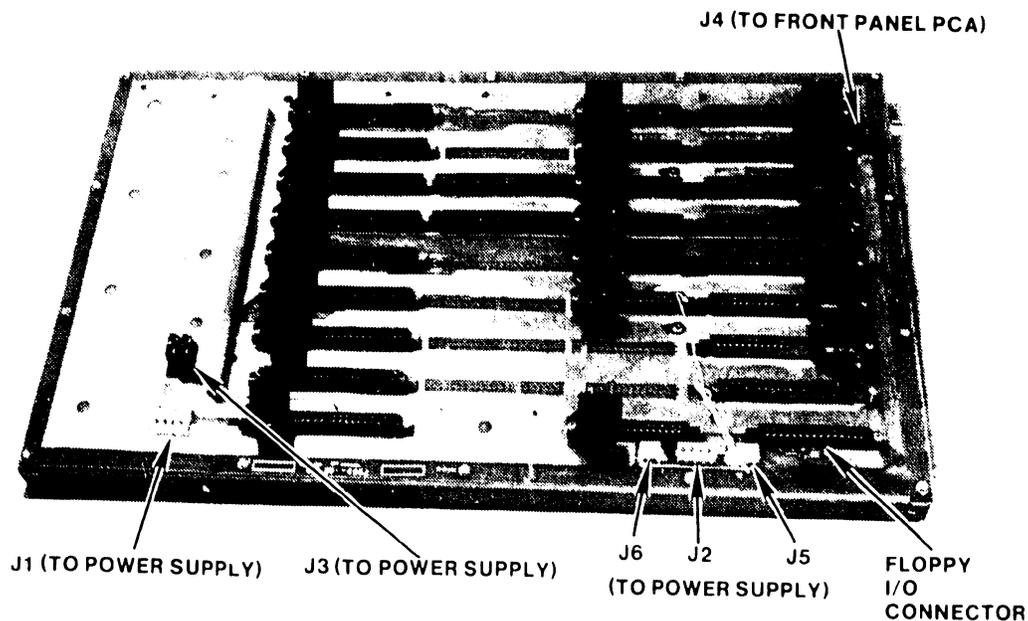


FIGURE 3-6 MOTHERBOARD CONNECTIONS

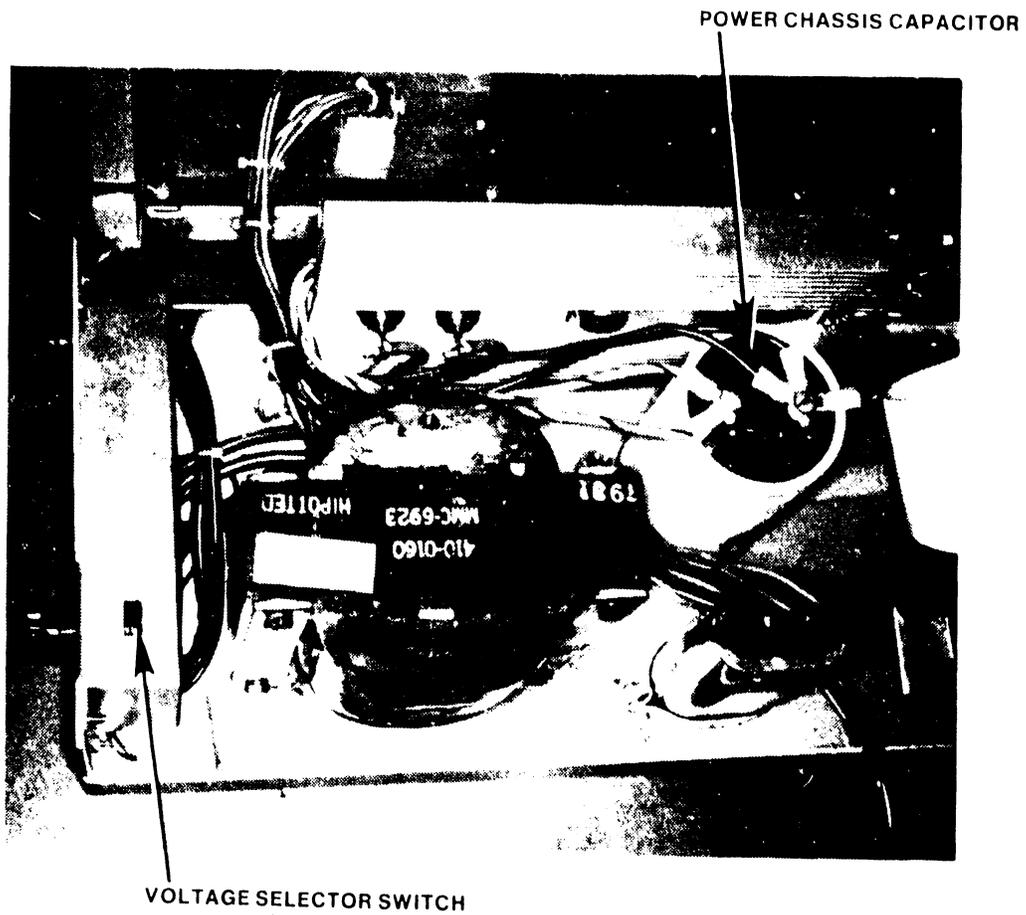


FIGURE 3-7 POWER CHASSIS CAPACITOR CONNECTIONS AND
115/230 VOLTAGE-SELECT SWITCH

3.3.7 INSPECTING THE CRT WORKSTATION

These procedures are detailed in Models 5536-1/-2/-3/-4 Workstations, WPNL No.81 (729-0522) and Model 5536 Series Workstation PMM (729-0522A).

Inspection requires:

- A. Removing the keyboard and main covers.
- B. Inspecting for wire clippings, metal shavings, etc.
- C. Setting the switches
- D. Completion and mailing of the shipping card

The covers need not be replaced until the Initial Checks and Adjustments have been completed.

3.3.8 INSPECTING THE PHOENIX DISK DRIVE

The following procedures are detailed in the Wang Cartridge Module Disk Drive Manual (729-0199), and CMD Block Point Four Manual (729-1063):

- A. Remove the top dust cover and inspect various items such as circuit boards, carriage assembly, and read/write heads for shipping damage.
- B. Remove the Electronic Module Securing Screws.
- C. Move the Head Carriage Locking Tool from the 'shipping' position to the 'operating' position.
- D. Loosen the Deck Hold Down Bolts and ensure that the Rear Shipping Bolt and spacer are in position before attempting to raise the deck assembly.
- E. Check that the unit is clean inside. Raise the base deck assembly to inspect inside the base pan. Note that the Electronic Module must be in maintenance position to open the deck (not applicable to Block Four units).
- F. Check/perform the inspection of the following items:
 - 1. Power supply is securely tightened.
 - 2. Check the unit for any shipping or packing material that may be in the cartridge receiver area.
 - 3. Inspect top of unit for loose wires or damaged components.
 - 4. Check the connectors on the bottom of the Electronics Module while the Deck Base is raised.
 - 5. Check the Deck Lowered Switch Interlock located under the Electronic Module.
- G. Lower the base deck assembly and restore the Electronics Module to its normal position per Section 2.6 of the Wang CMD Disk Drive Manual. Take care not to pinch any cables while lowering the assembly.
- H. Tighten the Deck Hold Down Bolts, remove the Rear Shipping Bolt and spacer.
- I. When the procedure outlined in Section 2.6 has been completed, restore the top dust cover and complete, sign, and mail the shipping card.

3.3.9 INSPECTING THE 300 MEG SMD DISK DRIVE

The following inspection procedures are detailed in the CDC SMD Hardware Maintenance Manual (729-0221):

1. Inspect drive for possible shipping damage. Any claim for this type of damage should be filed promptly with the transporter involved. If a claim is to be filed, save the original shipping materials.
2. Ensure that all shipping hardware, e.g. shipping bolts, head clamp, etc., have been removed per chapter 1 of the manual cited above.
3. Verify that all logic cards are firmly seated in logic chassis and power supply.
4. Verify that all connectors are firmly seated.
5. Verify that the control panel is firmly seated in its shroud.
6. Verify that all cabling is intact and that there are no broken or damaged wires.
7. Check entire drive for presence of foreign material which could cause an electrical short.
8. Check actuator and pack area for presence of material which could obstruct movement of carriage and heads.
9. Complete, sign, and mail the shipping card.

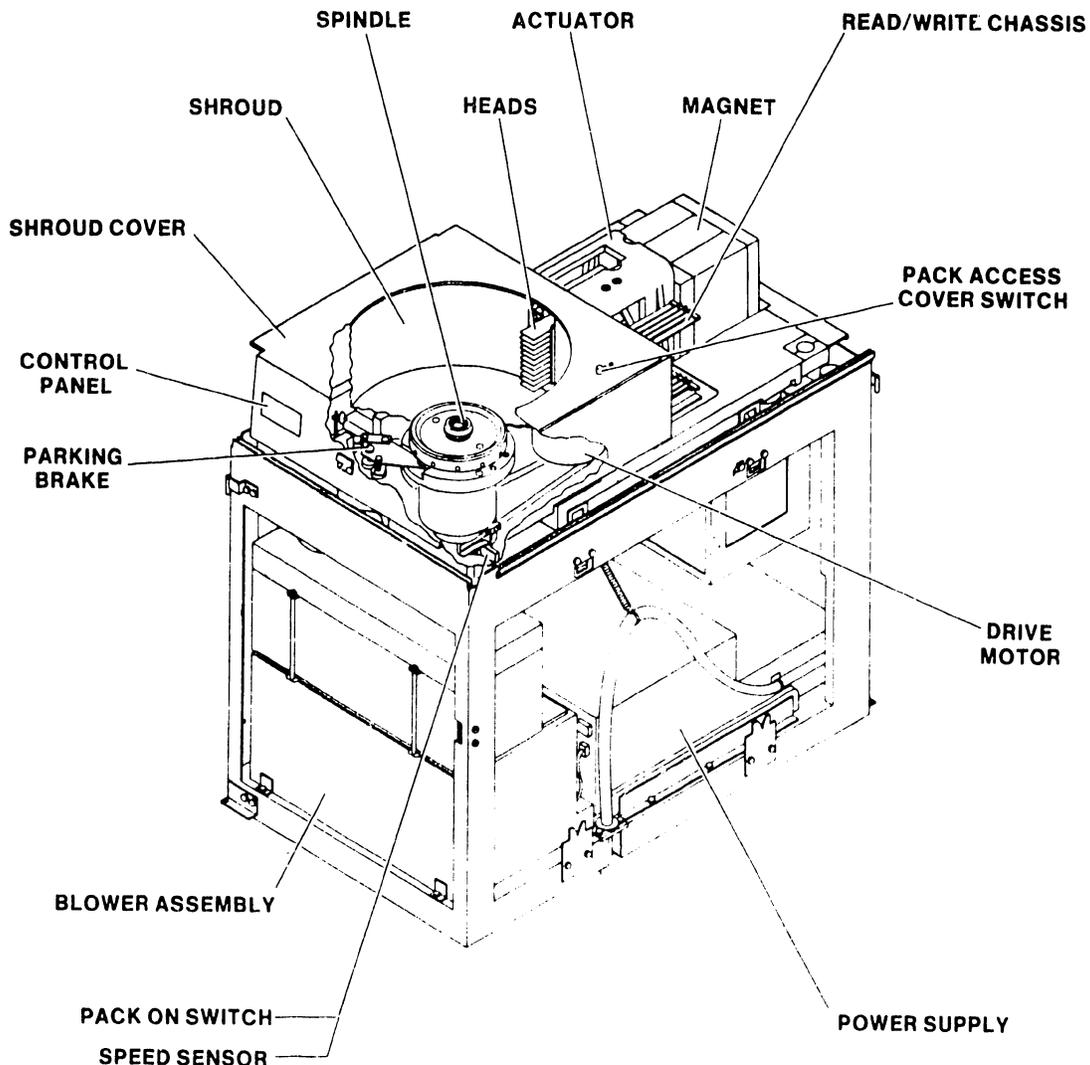


FIGURE 3-8 300 MEG SMD DETAILED LOCATIONS

3.3.10 INSPECTING THE HAWK DISK DRIVE

The following procedures are detailed in the Wang/CDC HAWK Disk Drive Manual (729-0181); refer to this document for further information unless directed otherwise.

- A. Remove the electronics cover.
- B. Remove the carriage lock pin.
- C. Remove the card-cage cover.
- D. Verify that all logic cards are firmly seated.
- E. Set the option switches per Section 3.12.4.
- F. Ensure that the ground straps are properly installed.
- G. Complete and mail the shipping card.
- H. The electronics covers need not be replaced until the Initial Checks and Adjustments have been completed.

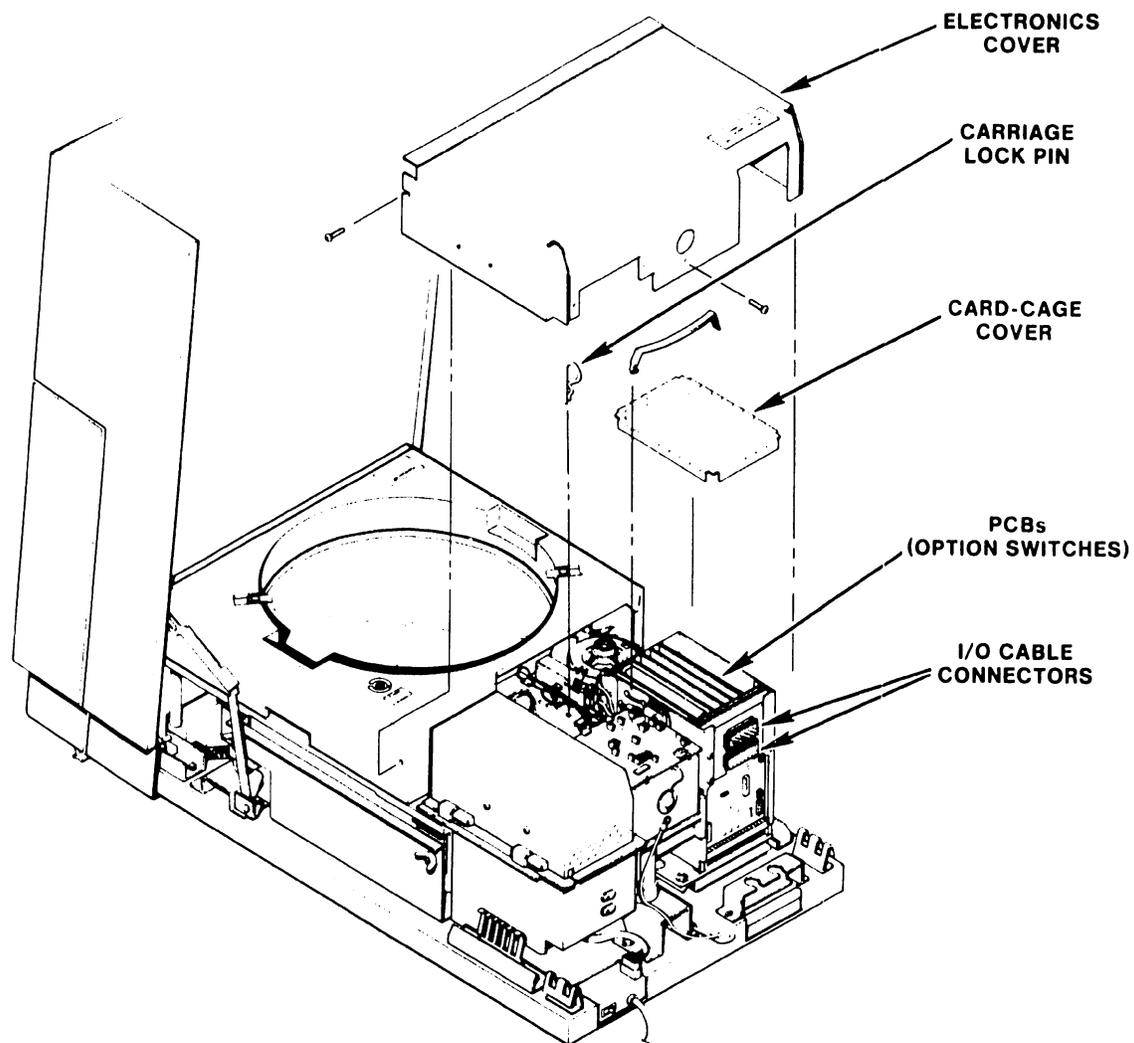


FIGURE 3-9 INSPECTING THE HAWK DISK UNIT

3.4 SYSTEM INTERCONNECTIONS

3.4.1 CABLING

The Master Unit is connected to its various peripherals as follows:

- A. Connect all slave devices to the serial connector plates (279-0358) at the rear of the Master Unit. A CRT/Workstation should be close to the master processor to serve as a 'system console' for running Master Monitor Diagnostics and the like.

Be sure to number the coaxial cables at both ends, master and slave.
Slave devices can be located up to 2000 feet from the Master Unit.

- B. Connect the four ribbon cables from the serial connector plates to the top of the 7504 DATA BUFFER board (See Fig. 3-10). The ribbon cable from adapter plate number one plugs into the J₁ connector, from plate number two, into the J₂ connector, and so on.
- C. The cables from the #1 HAWK drive, Phoenix CMDs, (or 300 Meg SMDs) are inserted through clamps at the rear of the main chassis. The J₁ and J₂ plugs of the HAWK cable are inserted into the J₁ and J₂ connectors, respectively, of the 210-7502 PCB. The CMD/SMD "A" cable is plugged into the 7505 board and the CMD/SMD "B" cables are plugged into Ports 0 through 3 (Connectors J1 through J4) of the 7506 board.

-----NOTE-----

Ports 0 through 3 are interchangeable, i.e. any Phoenix (or 300 Meg SMD) drive may be connected to any of the four ports, as long as each drive-type definition switch is set to the appropriate state. For OIS 140/145 Systems employing more than one Phoenix (or 300 Meg SMD), it is recommended that all the drive-type definition switches be set identically. In this way, all four ports may be interchanged at will during troubleshooting without having to modify the drive-type definition switches. See Section 3.12.1 for instructions on how to set the drive-type definition switches.

The CMD/SMD "A" and "B" cables, and the HAWK cables are copper clad for shielding purposes. To ensure proper contact with the main chassis, all drive cables must be mounted as follows:

1. Slide plastic sleeve over ground clips ensuring that the copper shield is in contact with the clips. (See Fig. 3-11.)
2. Push cable into clamp until plastic sleeve of cable touches the cable clamp ground clips.
3. Tighten clamps to ensure good contact, do not overtighten as this could damage drive cable.

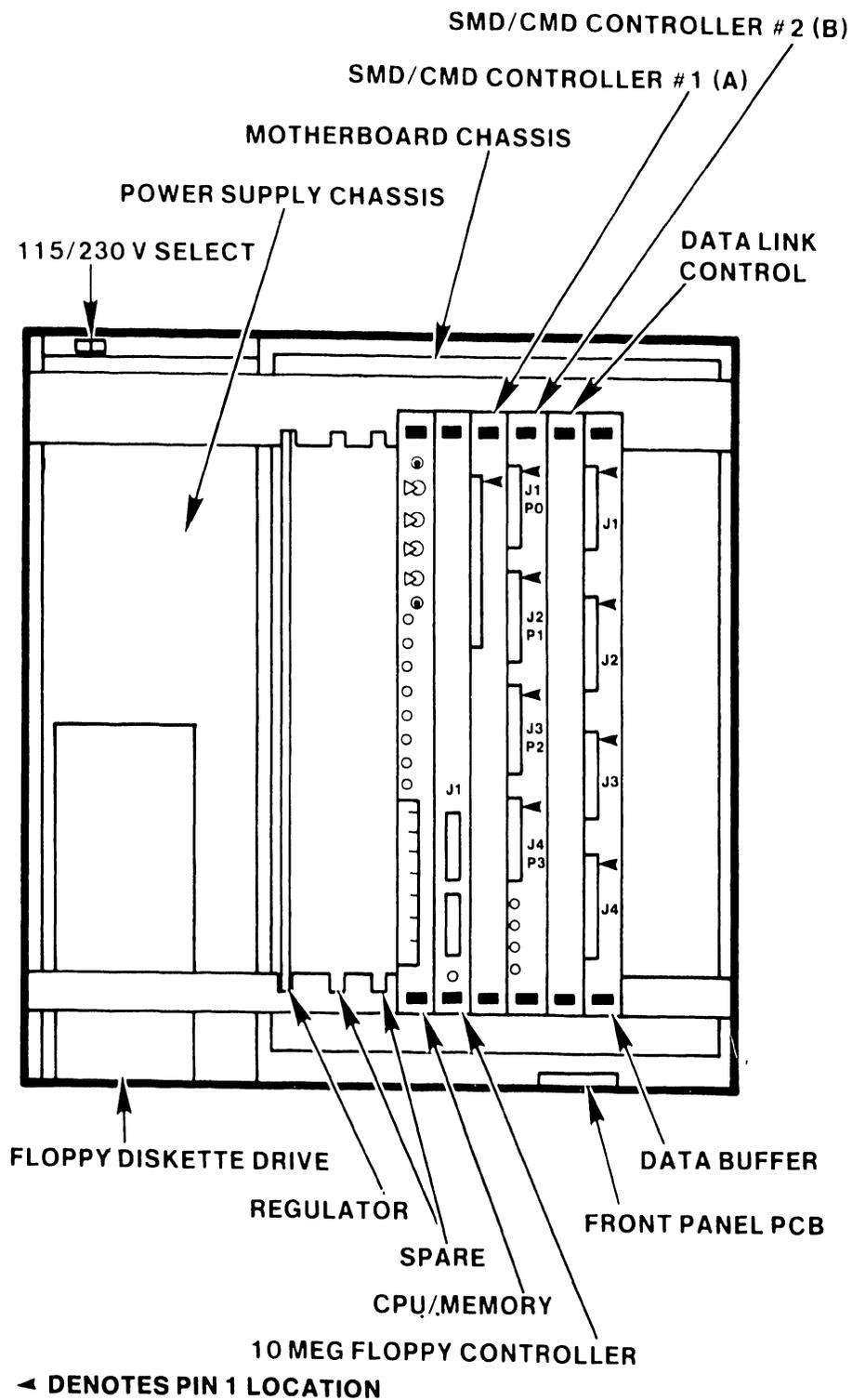


FIGURE 3-10 MASTER UNIT DETAILED LOCATIONS

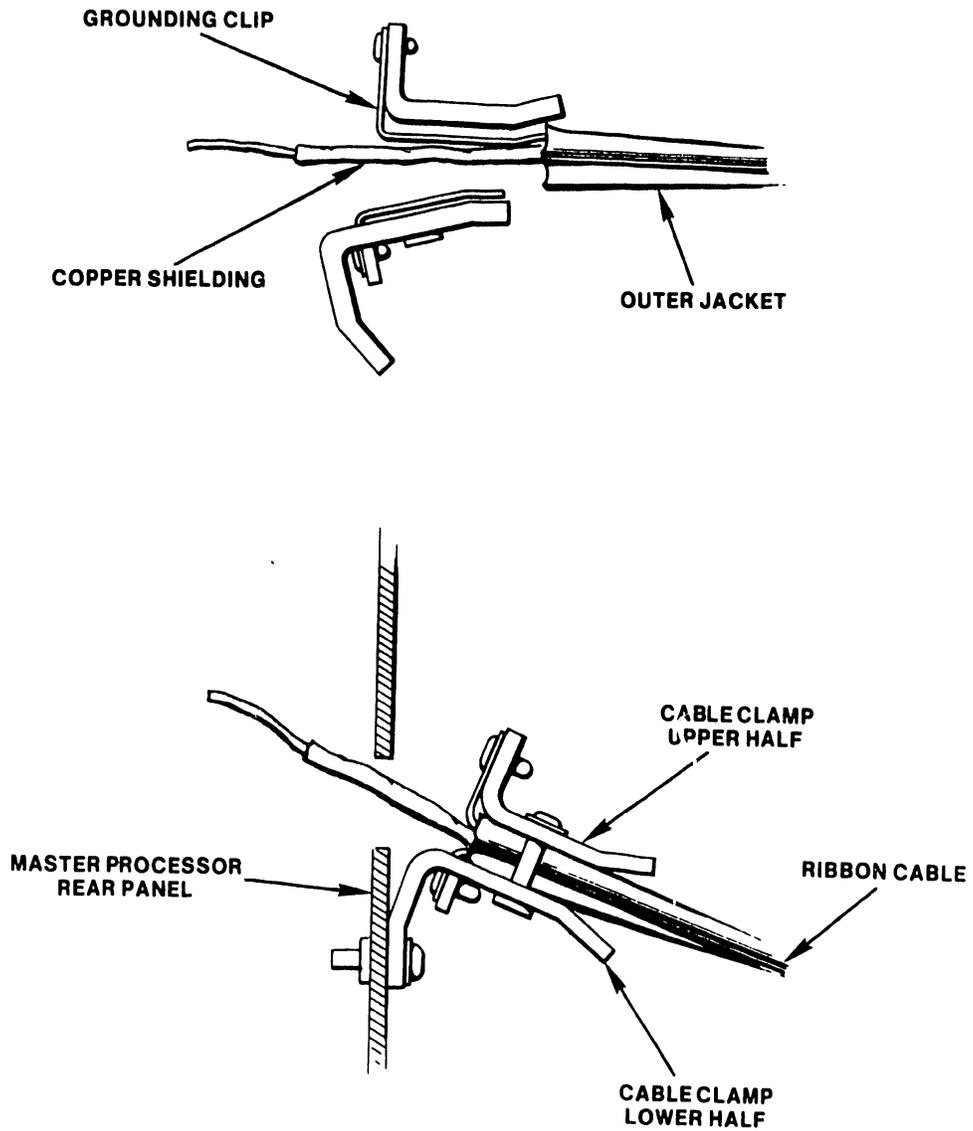


FIGURE 3-11 MASTER UNIT DISK CABLE CLAMP

3.4.2 ELECTRICAL POWER

-----WARNING-----

It is extremely important that all system equipment and all outlets are properly grounded: The Master Unit and all disks must be connected to a Grounding Conductor which is securely attached to the ground bus in the service panel. "The Grounding Conductor shall be...green...or green with yellow stripes, unless it is bare." -- National Electrical Code, Article 210, National Fire Protection Association.

All AC outlets used by the system and peripherals must first be checked with the AC Outlet Impedance Tester (WL #727-0143) for proper polarity and grounding quality.

-
- A. Ensure that all equipment power switches are positioned "OFF" and the Master Processor Voltage Selector switch is positioned correctly (see Figure 3-7).
 - B. Plug the Master Processor power cable into the outlet provided.
 - C. Plug all disk drive power cables into the outlets provided.
 - D. Plug the CRT Workstation power cable into the outlet provided.

3.5 INITIAL SETUP, CHECKS, AND ADJUSTMENTS

3.5.1 INITIAL CHECKS AND ADJUSTMENTS FOR THE MASTER PROCESSOR

-----WARNING-----

Do not touch the heat sink: serious injury could result.
The heat sink reaches very high temperatures when the unit
is running and the top cover is removed.

-
- A. If applicable, remove the top cover. (See Section 7.3.1.)
 - B. Check the PC board E-revision level. (See Section 3.12.7)
 - C. Properly set all switches. (See Section 3.12.1)
 - D. Position the power switch to "ON".

-----CAUTION-----

Avoid touching bare leads and causing a short circuit:
very little clearance is provided for these adjustments.

-
- E. Adjust the voltages on the CPU/MEM board. (See Section 3.12.5)
 - F. Test the diagnostic LEDs. (See Section 3.12.5)
 - G. Replace the top cover. (See Section 7.3.1.)

3.5.2 INITIAL CHECKS AND ADJUSTMENTS FOR THE CRT WORKSTATION

These procedures are detailed in Models 5536-1/-2/-3/-4 Workstations, WPNL No.81 (729-0522).

Initial checks and adjustments comprise the following steps.

- A. Turn power ON and adjust voltages
- B. Turn power OFF and connect video cable
- C. Connect fan
- D. Connect brightness/contrast cable
- E. Replace covers
- F. Ensure free rotation of the fan blades
- G. Tighten all screws

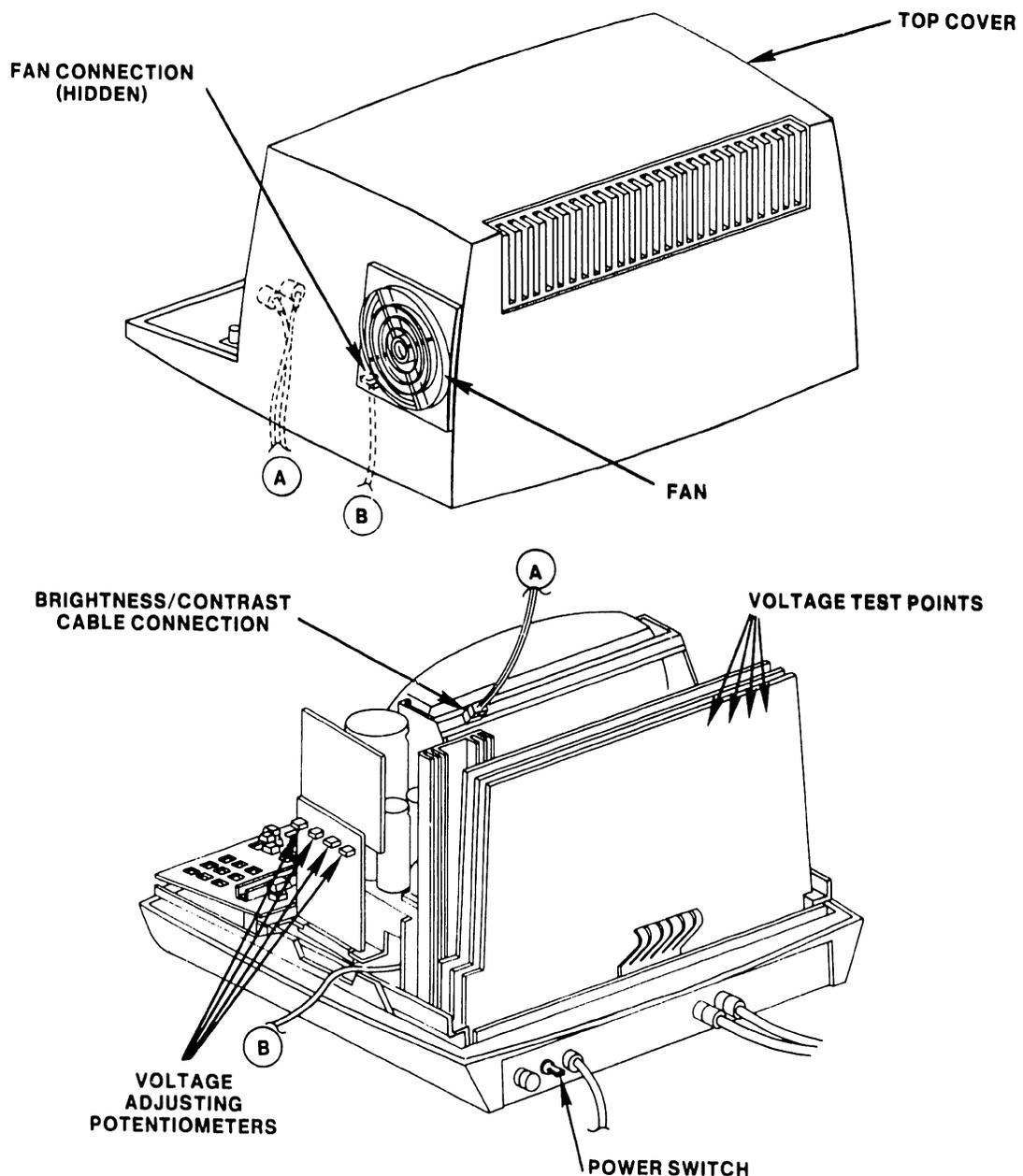


FIGURE 3-12 CRT WORKSTATION CHECKS AND ADJUSTMENTS

3.5.3 INITIAL CHECKS AND ADJUSTMENTS FOR THE PHOENIX DISK DRIVE

The following procedures are detailed in the Wang Cartridge Module Disk Drive Manual (729-0199):

- A. Ensure that the Carriage Locking Pin is in the 'operating' position.
- B. Verify the following cable connections:
 - 1. "A" Cable to the J1 connector of the I/O board.
 - 2. "B" Cable to the J3 connector of the Control MUX PCB.
 - 3. Terminator to the J2 connector of the I/O board of last drive in chain.
 - 4. If daisy chained, "A" Cable from J1 connector of the I/O board, to J2 connector of the I/O board on "upstream"* drive.

-----NOTE-----
As viewed from the component side, positioned in the electronics module, the I/O board shows two large connectors. Connector J1 is to the left of J2. On both connectors, pin 1 is located in the upper-left corner.

The J3 connector of the Control MUX PCB, when viewed in the same manner locates pin 1 in the upper-left corner.

- C. Make proper switch settings on Servo Coarse PCB. (See Section 3.12.2.)
- D. Make proper switch settings on Control MUX PCB. (See Section 3.12.2.)
- E. Check/perform Logical Address Plug Installation. (See Section 3.12.6.)
- F. Power up and perform voltage checks.
- G. Verify/perform correct head alignment.
- H. Perform the Heads Loaded Switch Adjustment.
- I. Perform the Spin Speed Sensor Test.
- J. Perform the Velocity Gain Adjustment.

* In daisy chain, upstream drive is next drive closer to Master Processor.

3.5.4 INITIAL CHECKS AND ADJUSTMENTS FOR THE SMD-300 DISK DRIVE

The following procedures are detailed in the CDC SMD Hardware Maintenance Manual (729-0221):

- A. Ensure that the SMD unit is properly grounded according to the Daisy Chain Grounding scheme outlined on page 1-11 of the manual cited above.
- B. Verify the following cable connections on the SMD I/O connector panel (see Figures 3-13, 3-14):
 1. "B" Cable to connector IJ2.
 2. "A" Cable to connector IJ3.
 3. Terminator to connector IJ4 of last drive in chain.
 4. If daisy chained, "A" Cable from connector IJ3 to connector IJ4 on "upstream"* drive.
- C. Make the proper sector switch settings on the LTV card, in logic chassis position A06. (See Section 3.12.3.)
- D. Check/perform Logical Address Plug installation. (See Section 3.12.6.)
- E. Power up and perform voltage check.
- F. Perform Servo System Test and Adjustment and Head Alignment procedures.

* In daisy chain, upstream drive is next drive closer to Master Processor.

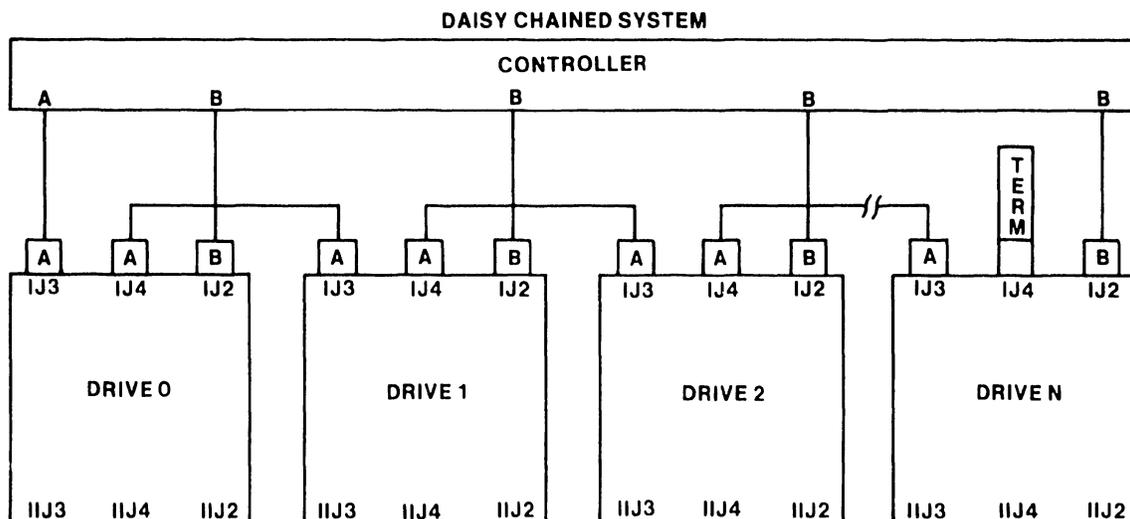
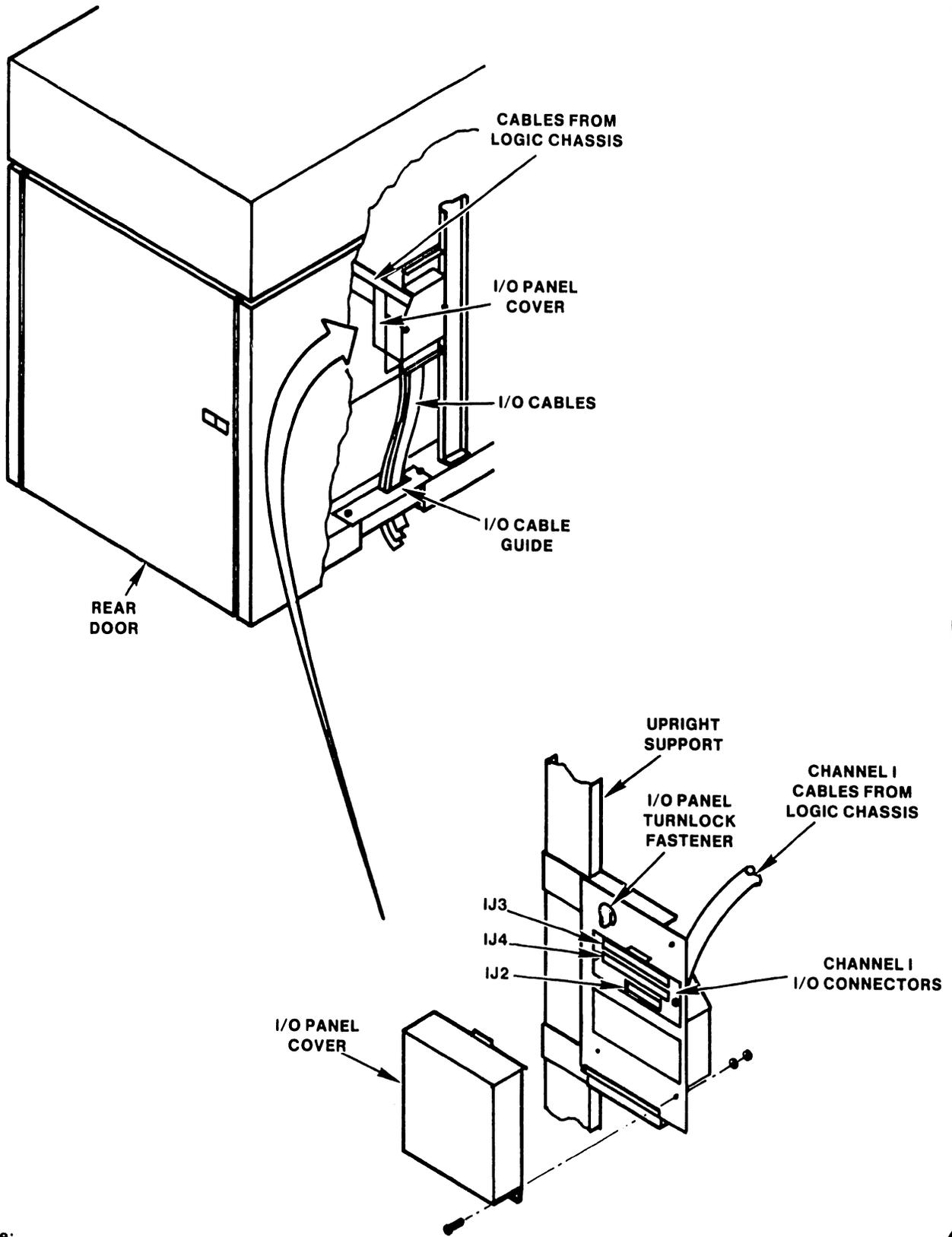


FIGURE 3-13 300 MEG SMD CABLE CONFIGURATIONS



Note: CONNECTOR PINS ARE LABELED. PIN #1 IS LOCATED AT THE BOTTOM LEFT OF EACH CONNECTOR, AS VIEWED FROM THIS ANGLE

FIGURE 3-14 300 MEG SMD I/O CONNECTOR PANEL

3.5.4.1 INITIAL CHECKS AND ADJUSTMENTS FOR THE 80 MEG SMD DRIVE

The following procedures are detailed in the CDC OEM Service Manual (729-0210):

- A. Verify the following cable connections on the SMD I/O connector panel (see Figures 3-14a, 3-14b):
 1. "B" Cable to connector IJ2.
 2. "A" Cable to connector IJ3.
 3. Terminator to connector IJ4 of last drive in chain.
 4. If daisy chained, "A" Cable from connector IJ4 to connector IJ4 on "upstream"* drive.
- B. Make the proper sector switch settings on the LTV card, in logic chassis position B08. (See Section 3.12.3.)
- C. Check/perform Logical Address Plug installation. (See Section 3.12.6.)
- D. Power up and perform voltage check.
- E. Perform Servo System Test and Adjustment and Head Alignment procedures.

* In daisy chain, upstream drive is next drive closer to Master Processor.

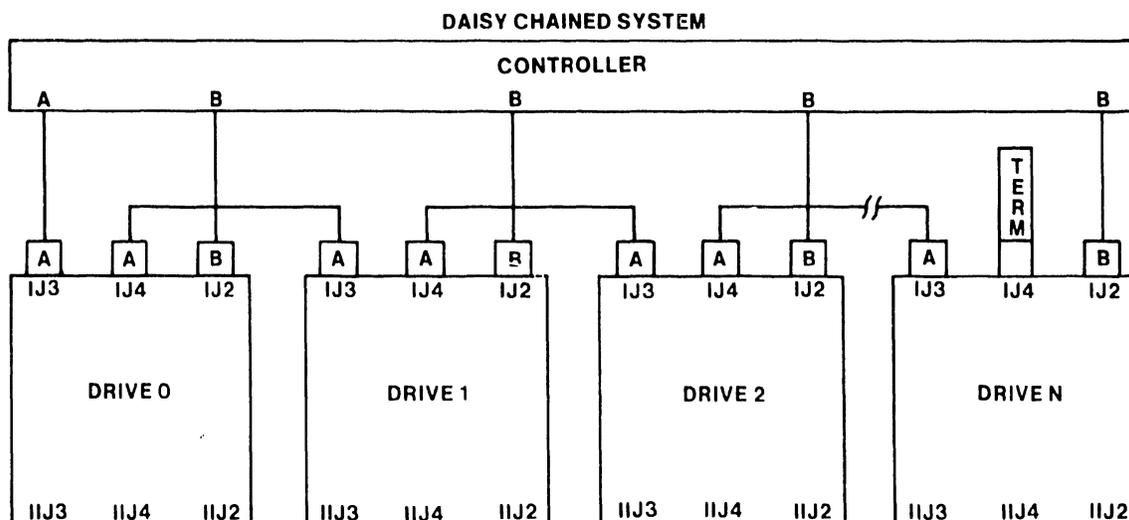


FIGURE 3-14a 80 MEG SMD CABLE CONFIGURATIONS

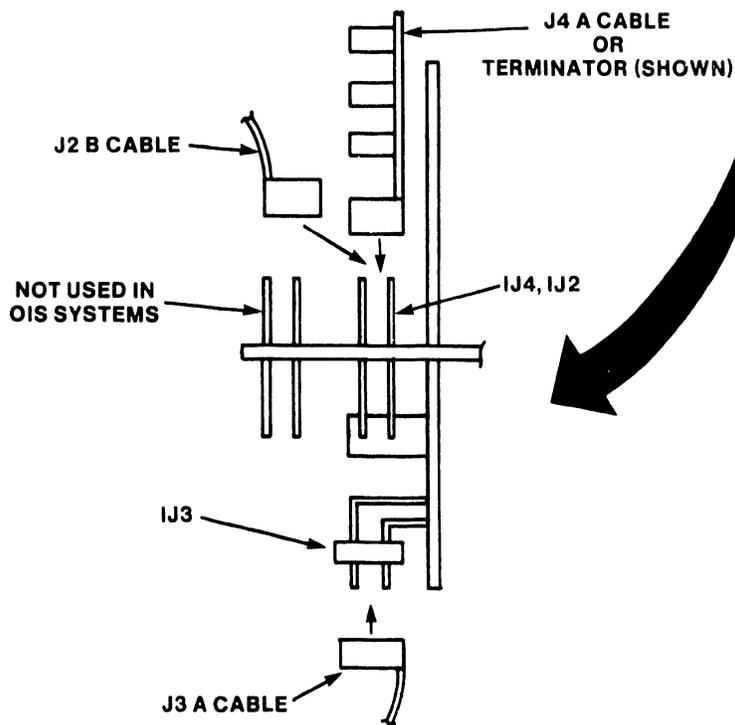
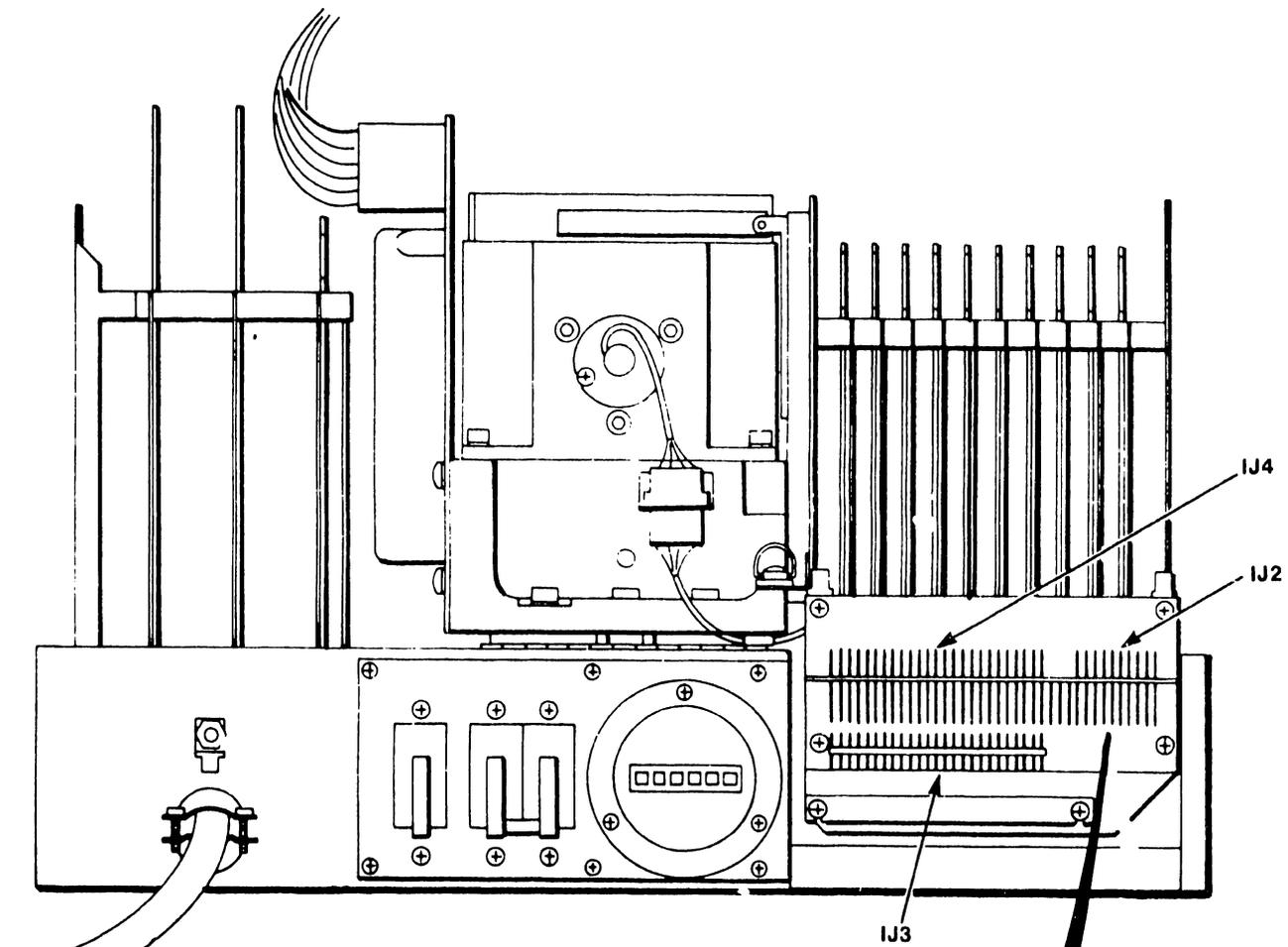


FIGURE 3-14b 80 MEG SMD I/O CONNECTOR PANEL

3.5.5 INITIAL CHECKS AND ADJUSTMENTS FOR THE HAWK DISK DRIVE

The following procedures are detailed in the Wang/CDC HAWK Disk Drive Manual (729-0181); refer to this document for further information unless directed otherwise.

-----CAUTION-----
 Stop the unit immediately if a pinging or scratching sound (caused by head-to-disk contact) is heard and persists. Also, keep the access door closed to prevent unnecessary entry of atmospheric dust in order to obtain maximum performance and reliability.

- A. Ground the I/O ribbon cable at the rear of the HAWK unit (see Fig. 3-14).
 1. Tilt the top cover forward to access the I/O board at the rear of the unit.
 2. Feed the cable under the cable clamp, located just below the I/O board.
 3. Ensure that the bare shield is in contact with the clamp.
 4. Tighten the screws evenly, ensuring good electrical contact between the clamp and copper shield.

- B. Connect the ribbon cable to the Winchester I/O board at the rear of the unit (see Fig. 3-15).
 1. Plug the ribbon cable from the Master Processor into the upper (male) connector on the Winchester I/O board. If there is only one HAWK in the system configuration, this ribbon cable should include a terminator at its connector, as shown in Figure 3-14.
 2. If a second HAWK is to be included in the system, plug the 'daisy chain' ribbon cable into the lower (female) connector on the Winchester I/O board as shown in Figure 3-15. The other end of the 'daisy chain' cable should include a terminator and be connected to the upper (male) connector of the 'downstream'* HAWK.
 3. Evenly tighten the securing screws on all connectors.

- C. Ensure that the HAWK option switches have been set correctly. (See Section 3.12.4.)

- D. Power up the HAWK unit(s).

- E. Install the Cartridge Module(s).

- F. Perform compatibility alignments as outlined in Section 3 of the manual cited above.

- G. Replace all covers.

* Downstream HAWK is unit furthest from Master Processor in daisy chain.

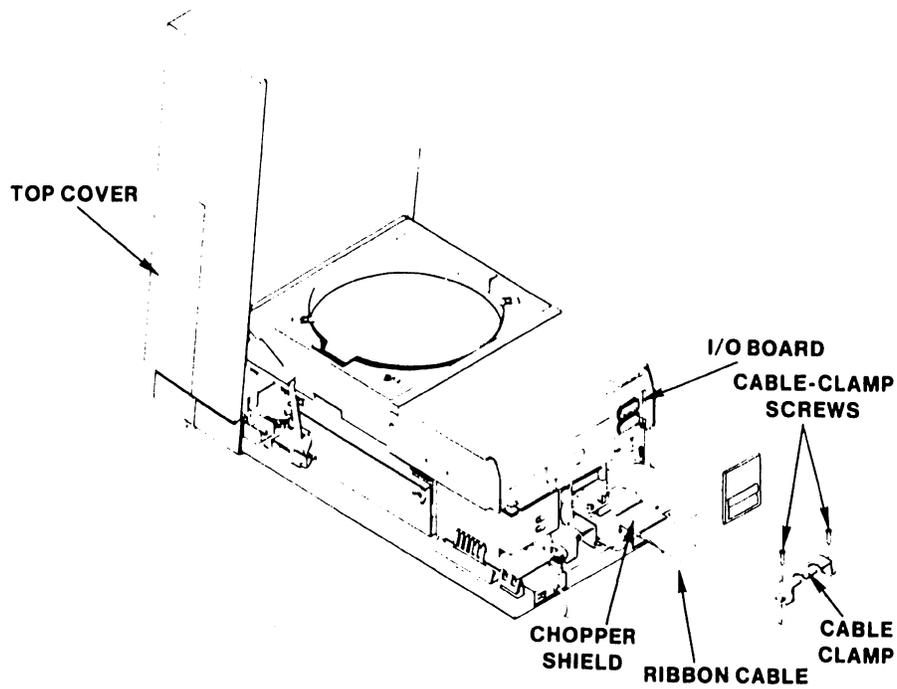


FIGURE 3-15 GROUNDING THE HAWK I/O RIBBON CABLE(S)

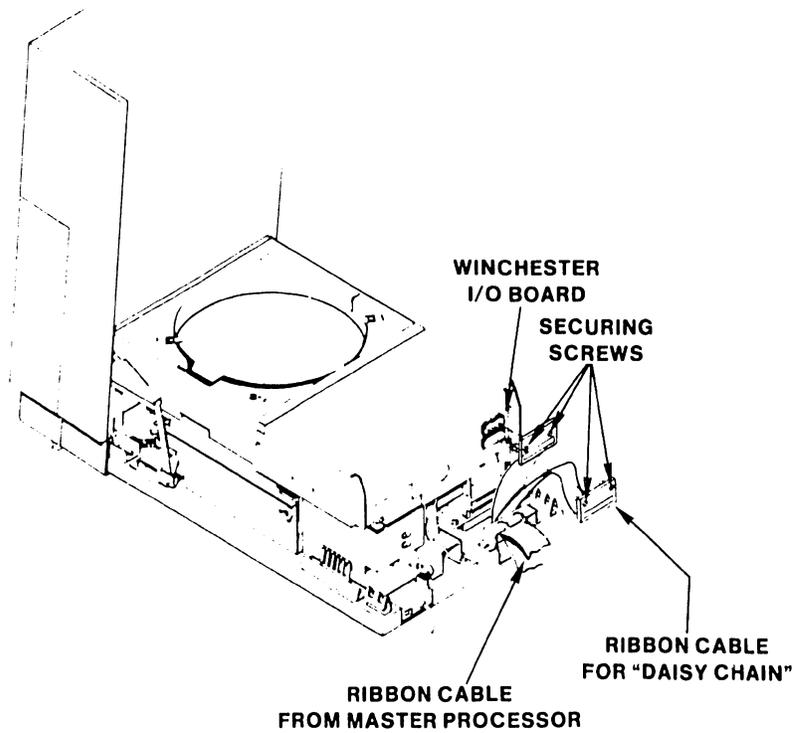


FIGURE 3-16 CONNECTING THE HAWK I/O RIBBON CABLE(S)

3.6 POWER-UP PROCEDURE

Power is applied to the system upon completion of all installation checks and adjustments. The power switches for the HAWK, Phoenix, and 300 Meg SMD drives are located at the rear of each unit. The START/STOP switches for these drives are located on the front panel of each unit. To minimize risk of damage to the system, follow the power-up procedure outlined below:

- A. Position the Disk Select Switch on the Master Processor to indicate the location of the System Disk.
- B. Position the power switch on the Master Processor to ON.
- C. Position the power switches on all the disk units to "ON" and ensure that the blower motors start. (This is the "standby mode".)

-----CAUTION-----

Do not power-up (or down) any optional drive unit if the system has been IPLed and is operating. Do not activate any drive units simultaneously: allow an interval of at least one minute to avoid overloading circuits. Wait a minimum of 5 minutes (30 minutes if room temperature was below 40°F during shutdown) for the equipment to stabilize before proceeding to activate the disk units.

- D. If the optional disk unit is required, activate the unit by pressing the START/STOP pushbutton. (Note that the optional drive may be left in the standby mode if not required for daily operation; when required, activate and mount volume(s) using Disk Control.)
- E. Activate the System Disk unit by pressing its START/STOP pushbutton.
- F. Power-up all workstations and devices to be used.
- G. Press RESET on the Master Processor.
- H. Enter correct date and time when the IPL menu is displayed.

3.7 MASTER UNIT POWER-UP DIAGNOSTIC

The Power-Up Diagnostic begins whenever the Master Unit is powered up, IPL'ed, or Reset and the system disk reaches operating speed. The diagnostics take approximately 15 seconds to complete.

Once the Power-Up diagnostic begins, the Power LED starts to flash. If all tests pass, the Power LED ceases flashing and goes to a steady-on state and the DATE/TIME screen is displayed on the CRT. If an error occurs, an error code is displayed on the Front Panel Error LEDs of the Master Unit and the Power LED continues flashing (See Fig. 3-17). For detailed information concerning the OIS 140/145 Power-Up Diagnostic and its associated error codes, refer to Appendix D for the standard 64K CPU, and Appendix E for the 128K CPU.

3.8 POWER-DOWN PROCEDURE

- A. Power down all system devices (excluding the Master Processor and disk units).
- B. Press RESET on the Master Processor.
- C. Press START/STOP pushbutton on the optional disk unit (if used).
- D. Press START/STOP pushbutton on the System Disk unit.

-----NOTE-----
It is recommended that the drive units be left in standby mode (AC power only, and the blower motors running). This will keep the drive units stabilized and reduce contaminants.

- F. Position the power switches on all disk units to OFF.
- G. Position the power switches on the Master Processor to OFF.

3.9 SOFTWARE INSTALLATION

Refer to Appendix C, SOFTWARE INSTALLATION PROCEDURES, for detailed information concerning software installation and updates procedures.

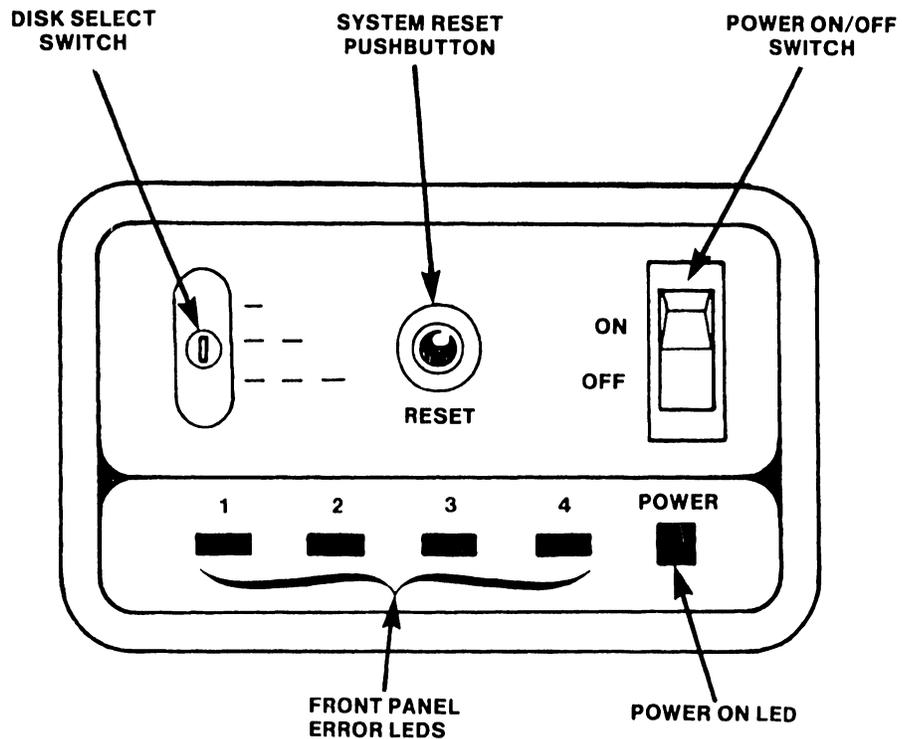


FIGURE 3-17 MASTER UNIT FRONT CONTROL PANEL

3.10 SYSTEM CHECKOUT

System checkout is complete when the items on the following checklist have been accomplished:

- A. Verify correct switch settings for all devices. (See Section 3.12)
- B. Verify correct head alignment for all disk drives.
- C. Set switches on the CMD/SMD "B" CONTROLLER board for the maximum storage capacity. (See Section 3.12.1)
- D. Configure the U33 jumper-pack on the Phoenix CONTROL MUX PCB for the maximum storage capacity. (See Section 3.12.2)
- E. Exercise the system for a minimum of four hours, using SYSEX40, if available.
- F. Exercise the Master Diagnostics Monitor for at least ten passes of each diagnostic program. (See Appendix A.)
- G. Reset the switches in the Master Processor and Phoenix to the purchased configurations. (See Section 3.12)
- H. Format and initialize the System Disk. (See Appendix C.)
- I. Load software packages. (See Appendix C.)
- J. Format and initialize all remaining volumes.
- K. Run the Single Channel Diagnostic Monitor for all devices (or on-line diagnostic, if available).
- L. Verify static immunity for all system components by Hypot testing to 2500 V. (Refer to Chapter 5 of the Systems Installation Guide, WL# 729-0907.)
- M. Adjust printers for best print quality.
- N. Perform final Word Processing Check. (See Section 3.11)
- O. Reinitialize the System Disk. (See Appendix C.)

3.11 FINAL WORD PROCESSING CHECK

Assign a library to each workstation. The libraries should be equally divided among the volumes available to the system. Each workstation should run the glossary listed in Appendix F. This glossary will:

- A. Create a New Document
- B. Edit a Document by:
 - 1. supercopying text from another document
 - 2. super global replace words contained within the text
 - 3. deleting words within the text
- C. File document to archive diskette
- D. Retrieve document from archive diskette
- E. Delete document from archive diskette
- F. Delete document from library
- G. Start process all over again

Only archiving workstations and one standard workstation using the central archive drive, can perform steps C, D, and E simultaneously. This checkout should be run over night. Upon completion of this test, documents should be queued to every printer and printed out. At least 2 documents should be printed per printer.

Upon completion of this Final Check-Out, all volumes should be reinitialized and software reloaded. Because loading of the software at this time should be suited to the customer and with purchased software options, the proper loading of the software is the responsibility of the Marketing Support Representative.

3.12 DETAILED PROCEDURES

3.12.1 MASTER PROCESSOR SWITCH SETTINGS

Internal switches of the Master Processor comprise:

SWITCH	LOCATION
Diagnostic switches	CPU/MEM board
Voltage Selector switch	Rear of power supply
Drive Type Definition switch	SMD/CMD Controller "B"
Options switch	CPU/MEM board

- A. Verify that the Voltage Selector switch has been set to the correct position (see Figure 3-7).
- B. Position all the Diagnostic switches on the CPU/MEM board to OFF (toward the component side of the board). The function of this group of switches is discussed in Appendices D and E.
- C. Position the switchpacks SW1 and SW2 on the CPU/MEM board as follows:

SWITCHPACK	SWITCH	POSITION
SW1	ALL	OFF
SW2	1,2,4,5,6,7,8	OFF
SW2	3	ON if BASIC purchased OFF if BASIC not purchased

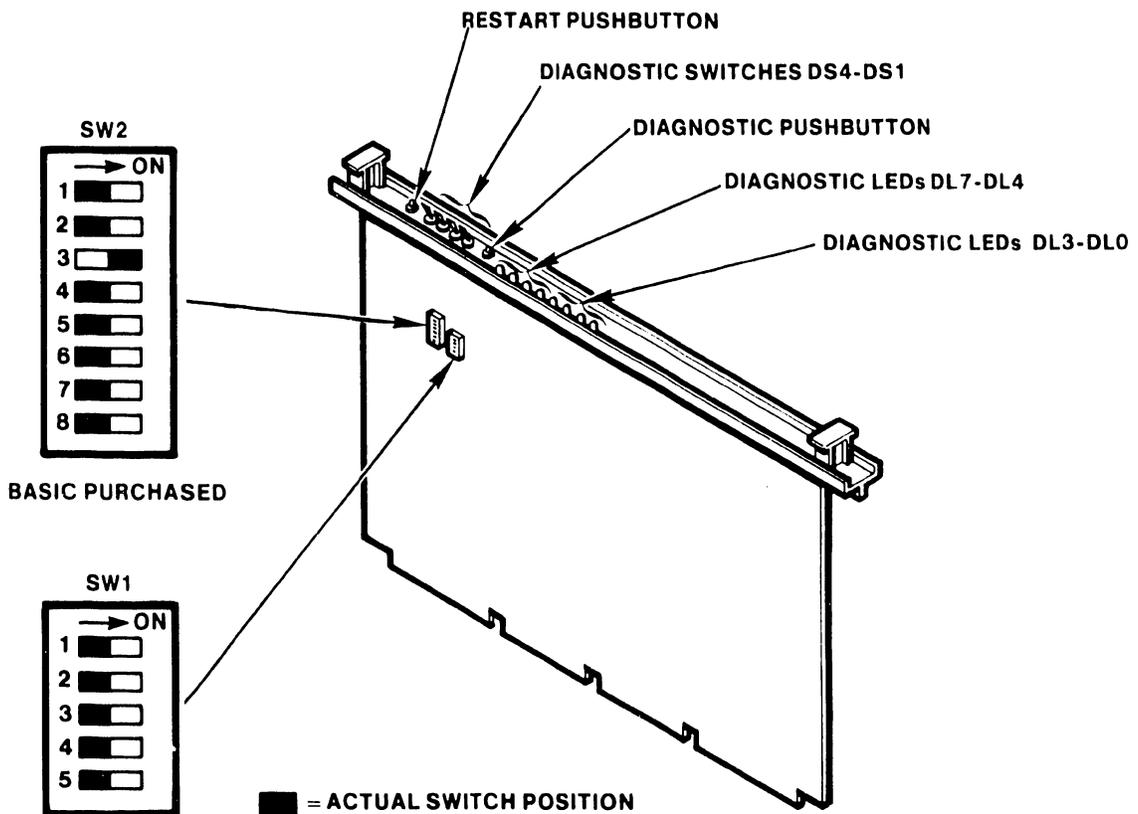


FIGURE 3-18 CPU/MEM DIAGNOSTIC AND OPTION SWITCHES

D. Position the Drive Type Definition switches on the 7506 SMD/CMD "B" CONTROLLER board as shown below:

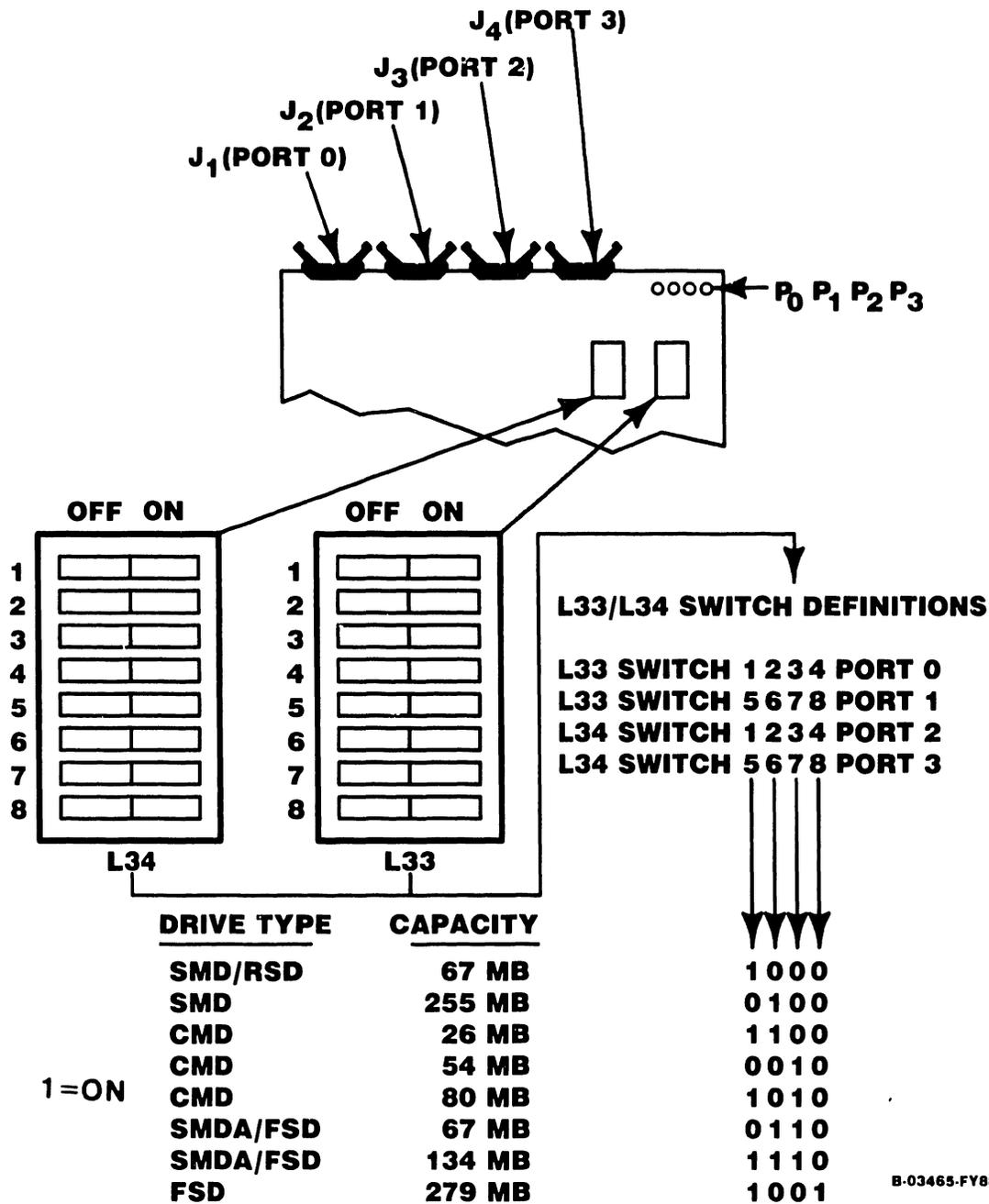


FIGURE 3-19 SWITCH SETTINGS FOR THE SMD/CMD "B" CONTROLLER

3.12.2 SWITCH SETTINGS FOR THE PHOENIX DRIVE

This section discusses only the internal Phoenix Drive switch settings unique to OIS 140 Systems. Additional switch settings are necessary for successful operation of the Phoenix Drive and may be obtained from the Wang CMD Disk Drive Manual (729-0199). Phoenix switch settings unique to OIS 140 Systems comprise:

1. Switchpack S1 on the SERVO-COARSE PCB (726-5780)
 2. Switchpack S2 and jumper-pack U33 on the CONTROL MUX PCB (726-5779)
- A. Set the Sector Pulse switches (Switchpack S1) on the SERVO-COARSE PCB as shown in Figure 3-20.
 - B. Set the Switch pack S2 and jumper-pack U33 on the CONTROL MUX PCB as shown in Figure 3-21. (One need not cut the jumper to create an open jumper; simply bend the associated pin out of its socket. In the event a pin breaks, the jumper-pack may be rotated 180 degrees, replaced in its socket, and will still function correctly. For reorder purposes, this jumper-pack has WLI No. 726-5889.

SERVO-COARSE PCB WLI NO. 726-5780

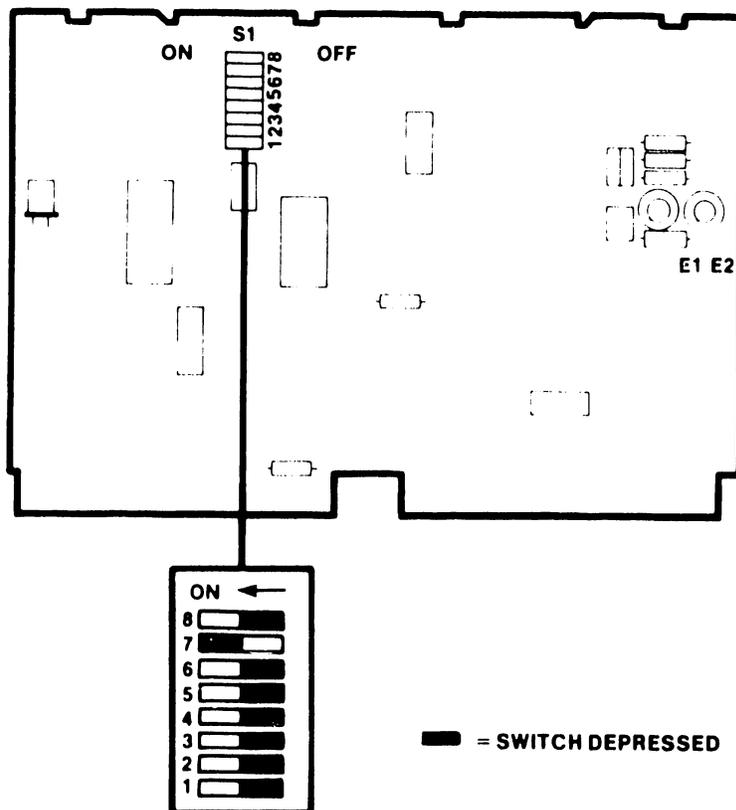


FIGURE 3-20 PHOENIX SWITCH SETTINGS FOR SERVO-COARSE PCB

CONTROL MUX PCB WLI No 726-5779

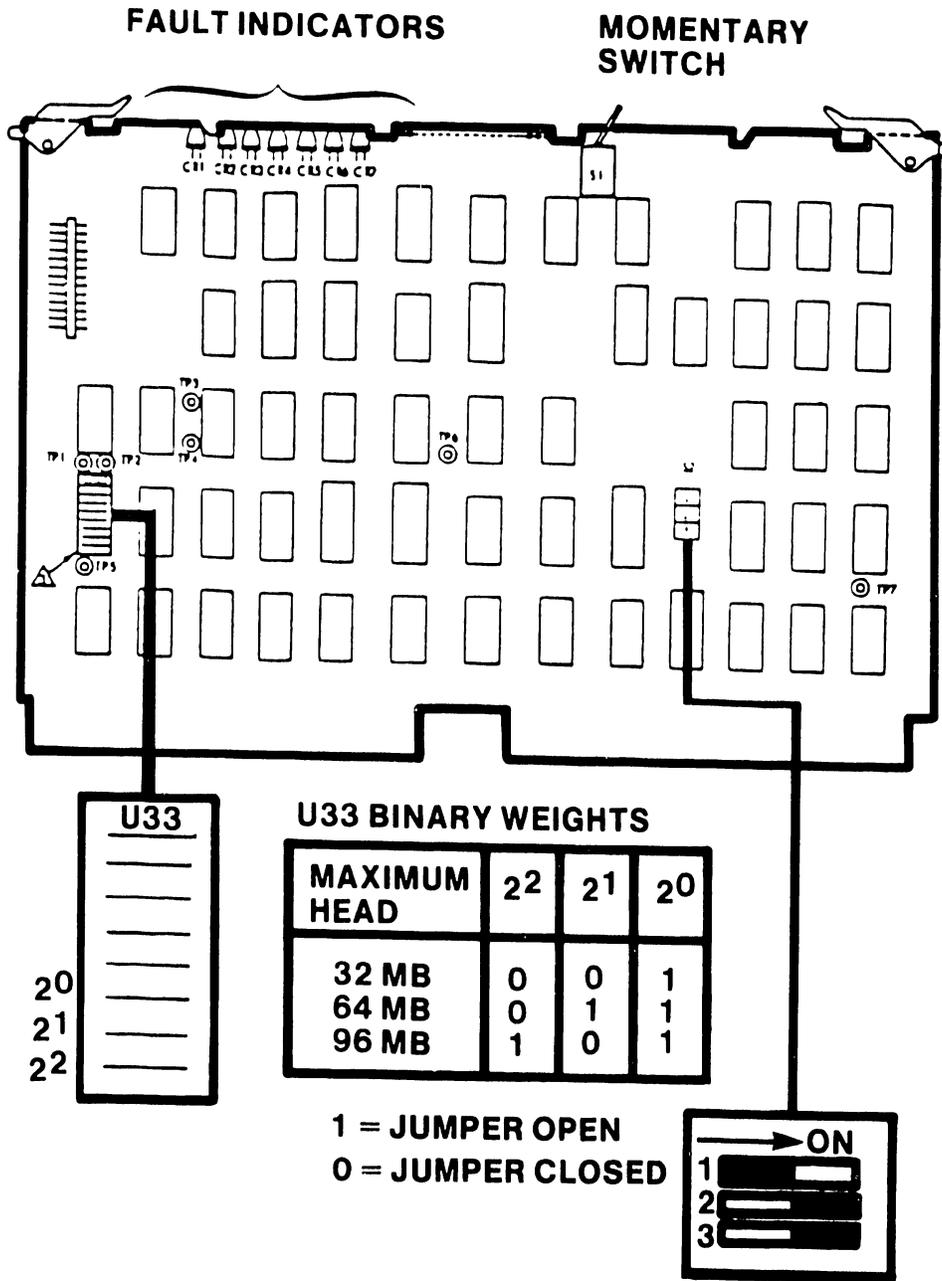


FIGURE 3-21 PHOENIX SWITCH SETTINGS FOR CONTROL MUX PCB

3.12.3 SWITCH SETTINGS FOR THE SMD-300 DRIVE

This section discusses only the internal 300 Meg SMD Drive switch settings unique to OIS 145 Systems. Additional switch settings are necessary for successful operation of the 300 Meg SMD Drive and may be obtained from the CDC SMD Hardware Maintenance Manual (729-0221). 300 Meg SMD switch settings unique to OIS 145 Systems affect the LTV printed circuit card located in chassis location A06. Figure 3-22 below depicts these settings:

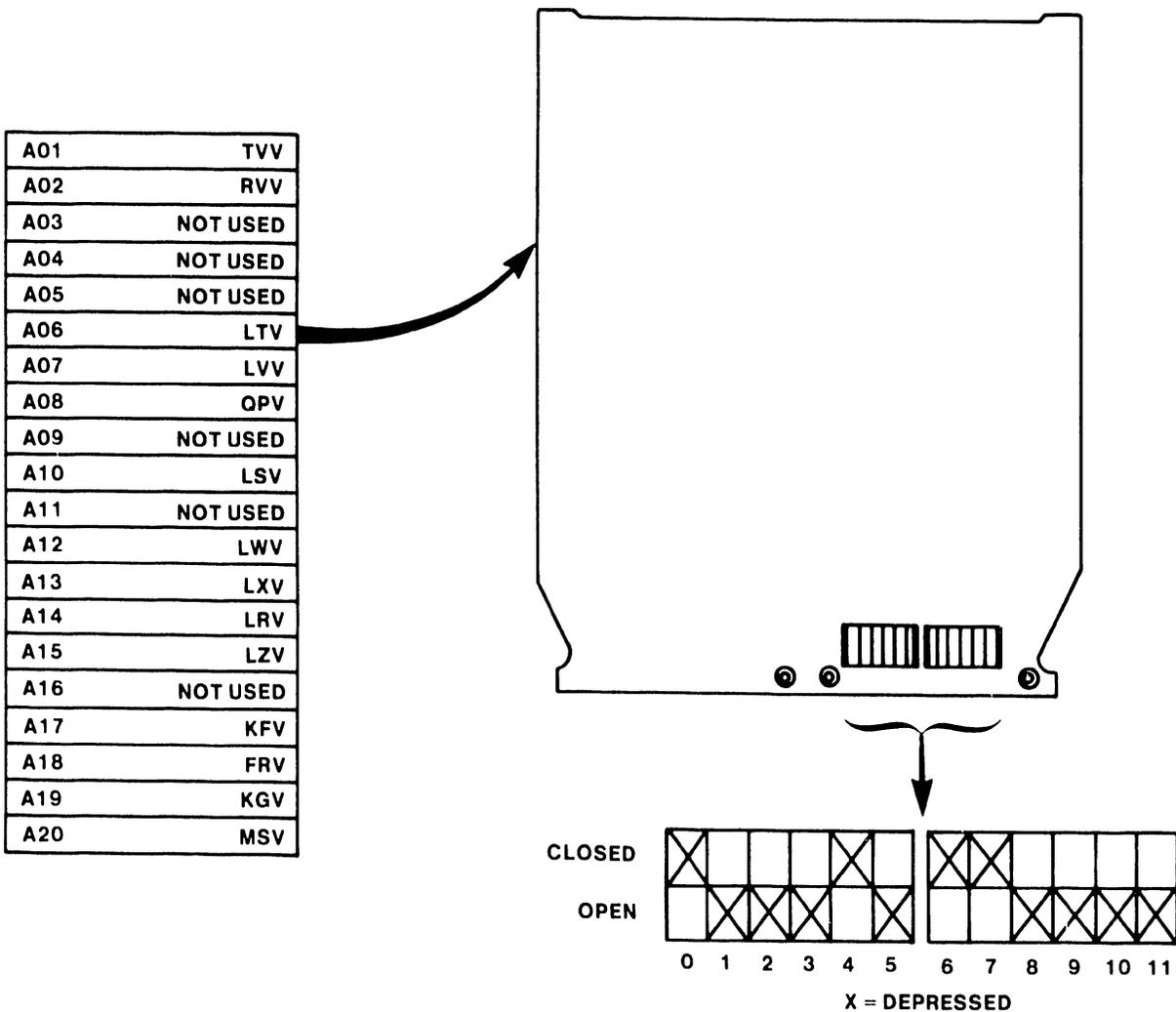


FIGURE 3-22 300 MEG SMD SECTOR SWITCH SETTINGS

3.12.4 SWITCH SETTINGS FOR THE HAWK DRIVE

This section discusses the internal switch settings for the HAWK Disk Drive, which are unique to OIS 140/145 Systems. Additional switch settings are necessary for successful operation of the HAWK Disk Drive and may be obtained from the Wang/CDC HAWK Disk Drive Manual (729-0181). The HAWK switch settings unique to OIS 140/145 Systems affect the Winchester I/O board located in the rear of the HAWK unit. Figure 3-23 below depicts these settings. Banks 1 through 4 on switch-packs S1 and S2 identify the drive unit number. For HAWK Unit 1, Bank 1 on both switch-packs should be 'ON', Banks 2, 3, and 4 should be 'OFF'. For HAWK Unit 2 (if present), Bank 2 should be 'ON', 1, 3, and 4, 'OFF'. Set switch-packs S3, S4, and S5 according to the diagram below.

NOTE: SWITCH SETTINGS SHOWN WOULD SELECT UNIT AS NUMBER 1

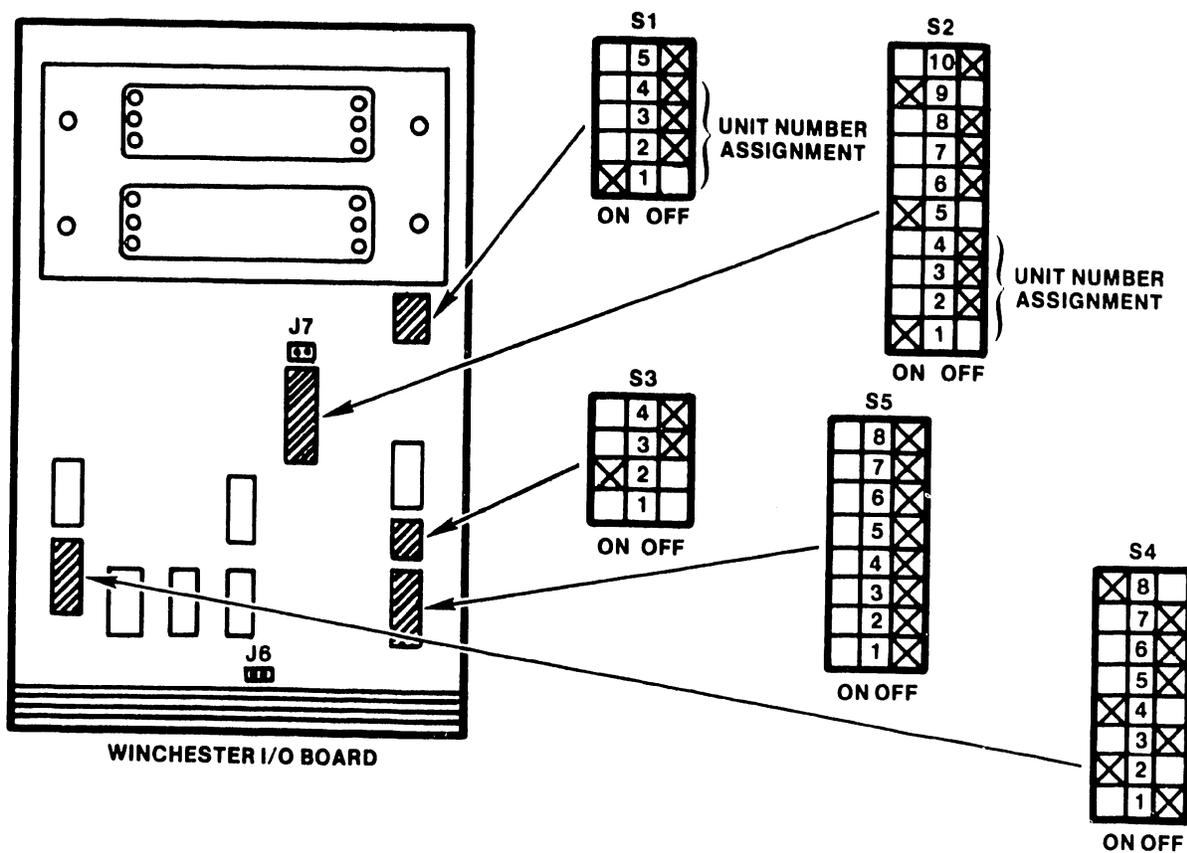
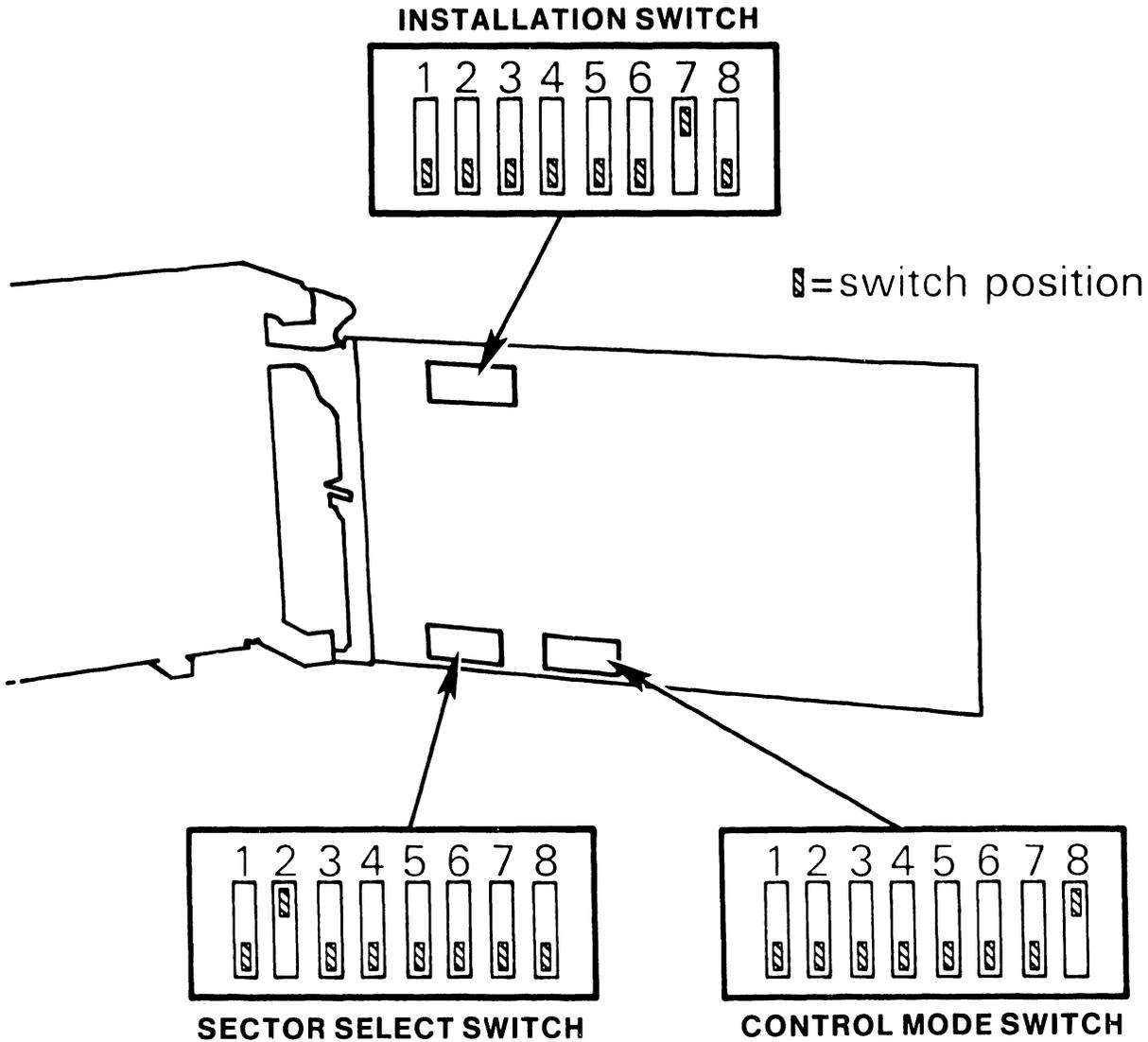


FIGURE 3-23 HAWK SWITCH SETTINGS

3.12.4a SWITCH SETTINGS FOR THE NEC 134 MEG DISK DRIVE

This section discusses the internal switch settings for the NEC 134 MEG Disk Drive that are unique to OIS 140 Systems. Additional switch settings are necessary for the successful operation of the NEC Disk Drive and may be obtained from the Wang/NEC Winchester Disk Drive manual. The switch settings unique to OIS 140 systems are located on the right side of the NEC unit. Figure 3-23a below depicts these settings. Set the control Mode, Sector, and Installation Mode switches as shown below.



6568-2

B 02874 FY86-1

FIGURE 3-23a NEC 134 MEG SWITCH SETTINGS

3.12.4b SWITCH SETTINGS FOR THE NEC 67 MEG FIXED DISK DRIVE

This section discusses the internal switch settings for the NEC 67 Meg Disk Drive that are unique to OIS 140 Systems. Additional switch settings are necessary for successful operation of the NEC Disk Drive and may be obtained from the Wang/NEC Winchester Disk Drive Manual. The NEC switch settings unique to OIS 140 Systems are located on the right side of the NEC unit. Figure 3-24b below depicts these settings. Set the Installation mode, Sector Select, and Control Mode switches as shown below.

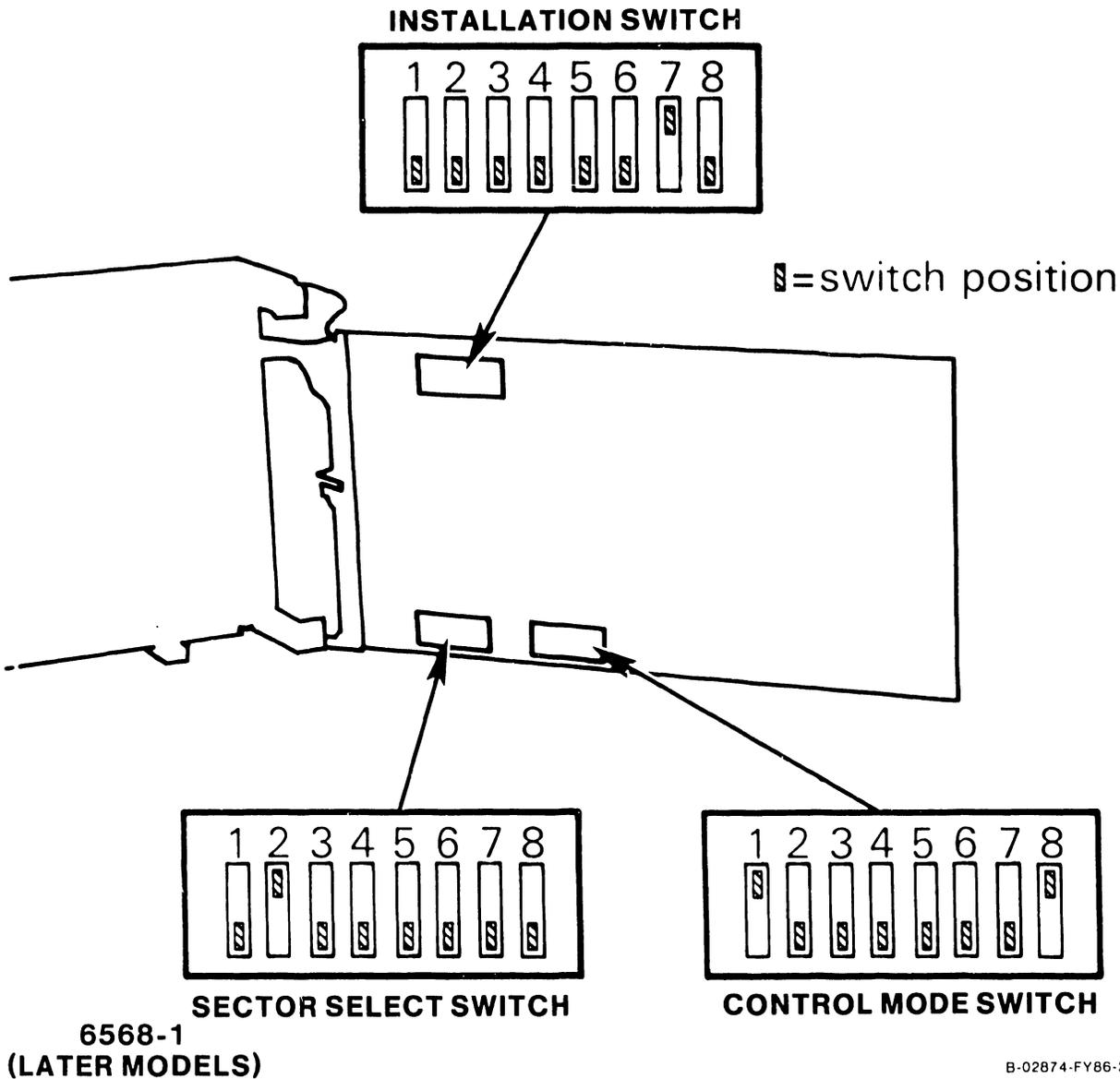


Figure 3-23b NEC 67 MEG SWITCH SETTINGS

3.12.5 VOLTAGE ADJUSTMENTS FOR THE MASTER PROCESSOR

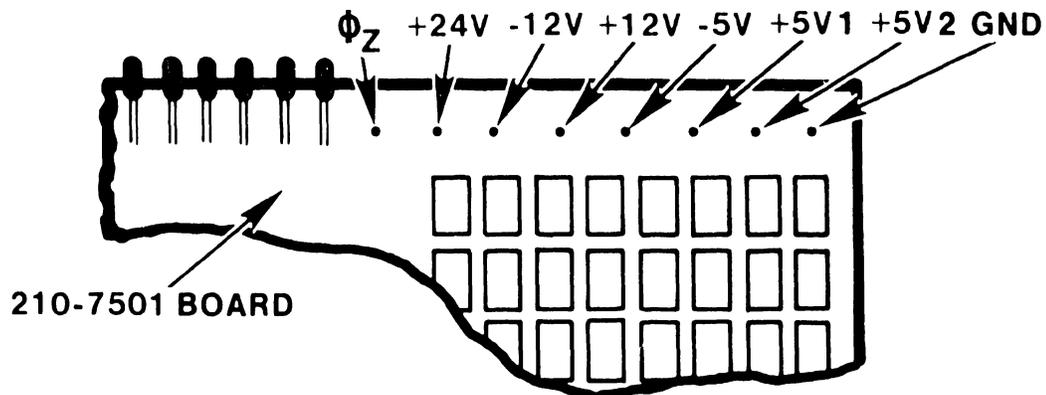
It is important that the following voltage-check procedures be performed to eliminate component failures due to improperly adjusted supply voltages.

- A. Ensure that all PCBs are properly seated.
- B. Plug in the main power cable from the Master Unit and turn the Master Unit Power switch ON.
- C. Using a DVM, measure the DC voltages at the test points on the CPU/MEM board using the GND point as a reference. These test points are located on the CPU/MEM board and are labeled +5V₁, +5V₂, -5V, +12V, -12V, +24V, respectively. (See Fig. 3-24.)
- D. Adjust specific voltages as necessary by trimming the related potentiometers located on the Power Regulator Board (210-7508), a +2% variation is allowed. There is no adjustment for The -12V supply. This voltage should not be lower than -11.7 VDC. Replace regulator board if voltage is not within limits. (See Fig. 3-24.)
- E. Check the system clock, Oz, on the CPU/MEM board with an oscilloscope or DVM. To check with an oscilloscope, set the Volts/Div. to 2V and the SEC/DIV to .1 usec. The resulting display should have a pulse width of 0.25 usec. A reading of approximately +1.9 VDC should be obtained when using a DVM. (See Figure 3-24.)
- F. Engage the Diagnostic Pushbutton (DPB) on the CPU/MEM board. While keeping the DPB engaged, push the Reset (IPL) button on the front panel on the Master Unit. Engaging both pushbuttons in the above sequence causes all diagnostic LEDs on the CPU/MEM board and front panel to light, replace any board having an unlit LED. (See Fig. 3-17, 3-18.)
- G. Turn the Master Unit Power switch OFF.

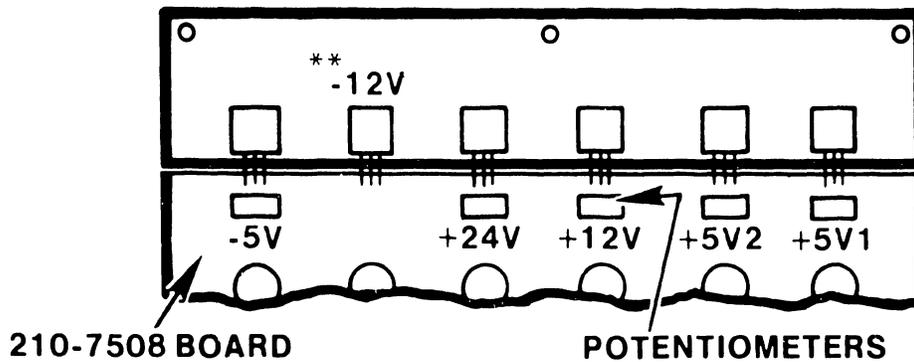
Test Point	Limits (Vdc)		Adjustment
------------	--------------	--	------------

+ 24	+ 23.5	+ 24.5	+ pot.
- 5	- 4.9	- 5.1	- pot.
- 12	- 11.7	- 12.3	none
+ 12	+ 11.75	+ 12.25	+ pot.
+ 5V1	+ 4.9	+ 5.1	+ 5V1 pot.
+ 5V2	+ 4.9	+ 5.1	+ 5V2 pot.

USING DVM, MEASURE DC VOLTAGES AT TEST POINTS ON CPU/MEM BOARD USING GND POINT AS A REFERENCE. THESE TEST POINTS ARE LOCATED ON THE 210-7501 BOARD AND ARE LABELED +5V1, +5V2, -5V, +12V, -12V, +24V



ADJUST VOLTAGES AS NECESSARY BY TRIMMING RELATED POTENTIOMETERS LOCATED ON POWER REGULATOR BOARD 210-7508. A $\pm 2\%$ VARIATION IS ALLOWED



** -12V IS NOT ADJUSTABLE

FIGURE 3-24 VOLTAGE TEST AND ADJUSTMENT LOCATIONS

3.12.6 INSTALLATION OF THE LOGICAL ADDRESS PLUGS

If the drives connected to the OIS 140 system are in a daisy-chained configuration, it becomes necessary to assign each drive a logical address for the Master Processor to identify the individual drives. This is accomplished through the use of binary-coded Logical Address Plugs inserted into the front control panel of each disk unit. Plug 0 should be installed on the disk unit which serves as the System Disk. Extra plugs for the Phoenix may be ordered using WLI #726-6550 (contains plugs 1-7), and WLI #726-6848 (plug 0 only). Extra plugs for the 300 Meg SMD may be ordered using WLI #726-6849. Note that only plugs with numbers 0 through 3 are valid addresses on the OIS System.

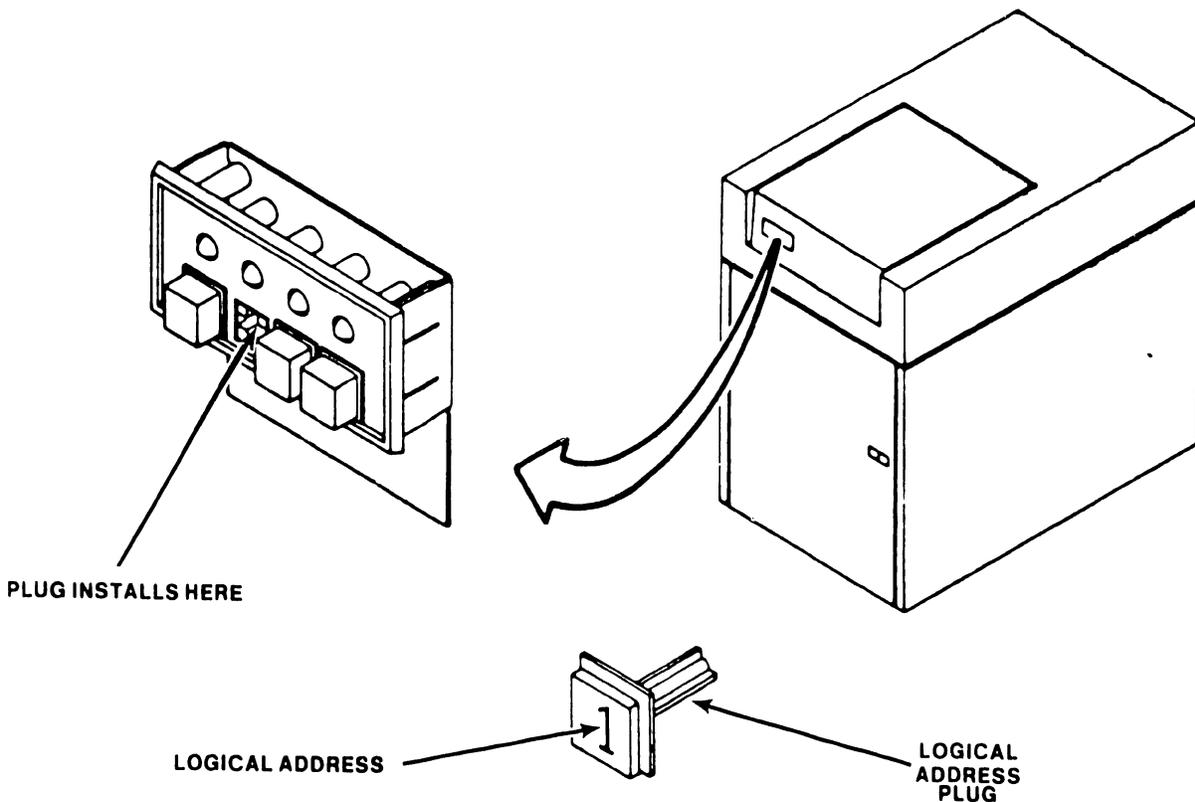


FIGURE 3-25 LOGICAL ADDRESS PLUG FOR THE 300 MEG SMD

3.12.7 CHECKING THE BOARD E-REV LEVELS

The E-Rev level is noted on a sticker affixed to the non-component side of each PC board. Note that occasionally the E-Rev level is only scratched into the board in the spot where the sticker should be affixed.

- A. Remove the PCB retainers.
- B. Remove the PCB by pulling up on the board handles.
- C. Verify that the board E-Rev levels are at or above those listed in Figure 3-26 below.

Board	Revision
7501 CPU & MEMORY	8
7502 10 MEG FLOPPY CNTRL	4
7503 DATA LINK CONTROL	9
7504 DATA BUFFER	1
7505 SMD CONTROLLER A (140/145)	6
7506 SMD CONTROLLER B (140/145)	7
7507 MOTHERBOARD (140/145)	2
7508 REGULATOR (140/145)	3
7650 DISK I/O A (105/115)	6
7653 DISK I/O B (105/115)	5
7887 REGULATOR	3
7649 MOTHERBOARD	0
3025 CPU & MEMORY 128K ASSY	
7684 MOTHER 128K	7
7685 DAUGHTER 128K	2
3014 TCB-1 ASSY	
7762 MOTHER TC	2
7763 DAUGHTER TC	4

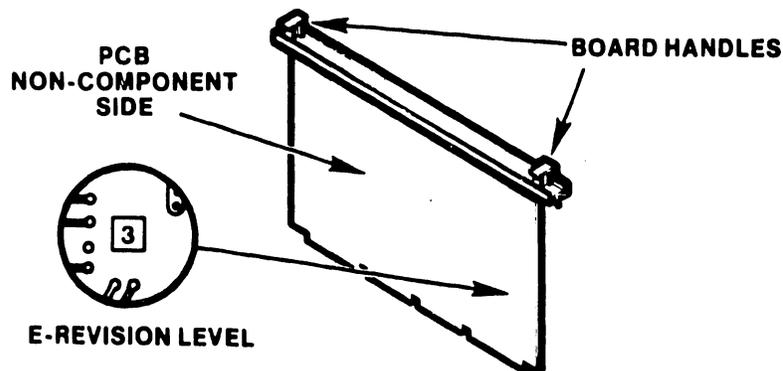


FIGURE 3-26 E-REV LEVELS

CHAPTER

4

CONTROLS

AND

INDICA-

TORS

CHAPTER 4CONTROLS AND INDICATORS4.1 INTRODUCTION

This chapter describes the main switches, controls, and indicators for the OIS-140/145 Master Processor. Controls and indicators for the CRT workstation, Phoenix, and 300 Meg SMD disk units are referenced.

TABLE 4-1 OIS 140/145 CONTROLS AND INDICATORS

NAME	SECTION
Power Switch	4.2.1
Front (Operator) Panel	4.2.1
Option Switches	4.2.2.1
Diagnostic Switches	4.2.2.1
Diagnostic LEDs	4.2.2.1
10 Meg/Floppy Disk Activity LED	4.2.2.2
CMD/SMD Drive Type Definition switches	4.2.2.3
CMD/SMD Disk Activity LEDs	4.2.2.3
Voltage Selector Switch	4.2.2.4
Phoenix CMD controls and indicators	4.3
300 Meg SMD controls and indicators	4.4
CRT workstation controls and indicators	4.5

4.2 MASTER-PROCESSOR CONTROLS AND INDICATORS

Controls and indicators for the Master Processor are located on the front panel, the PCBs, and at the rear of the power supply chassis.

4.2.1 MASTER-PROCESSOR FRONT PANEL

The locations of front-panel controls and indicators are called out in Figure 4-1. Their functions and settings are described in the associated Table 4-2.

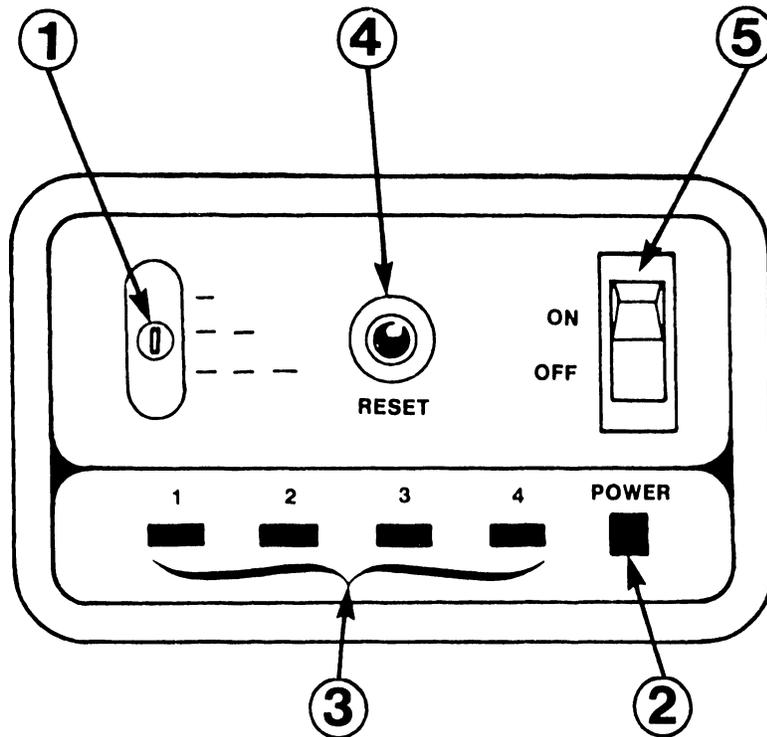


FIGURE 4-1 MASTER PROCESSOR FRONT-PANEL CONTROLS AND INDICATORS

TABLE 4-2 MASTER PROCESSOR FRONT-PANEL CONTROLS AND INDICATORS

ITEM	NAME	TYPE AND FUNCTION
1	DISK-SELECT	<p>Three-position toggle switch. Set to System Disk where IPL program is located. IPL program is normally located on the CMD/SMD with Logical Address Plug '0'.</p> <p>UP (-) = Floppy diskette MIDDLE (--) = Hawk disk unit DOWN (---) = Phoenix CMD or 300 Meg SMD</p>
2	POWER LED	<p>Indicates AC power applied to Master processor. Flashes during power-up diagnostics and when an error condition is detected. Steadily illuminated while the system is operational.</p>
3	ERROR LEDs 1, 2, 3, 4	<p>Error lights; indicate type of error detected during power-up diagnostics. LED 1 indicates a fatal error. LEDs 2, 3, and 4 indicate errors which are correctable by the operator. Refer to Appendices D and E for error descriptions.</p>
4	RESET	<p>Red pushbutton; IPL's system by forcing system to address 0000H.</p>
5	POWER-ON SWITCH	<p>Rocker-type switch; Energizes Master Unit and forces system into Power-up diagnostics.</p>

4.2.2 MASTER PROCESSOR INTERNAL CONTROLS AND INDICATORS

4.2.2.1 7501 CPU/MEMORY BOARD

Internal controls and indicators located on the 7501-board comprise those used for diagnostics and those used for options. The locations of the controls and indicators are called out in Figure 4-2, their function and use, in Table 4-3.

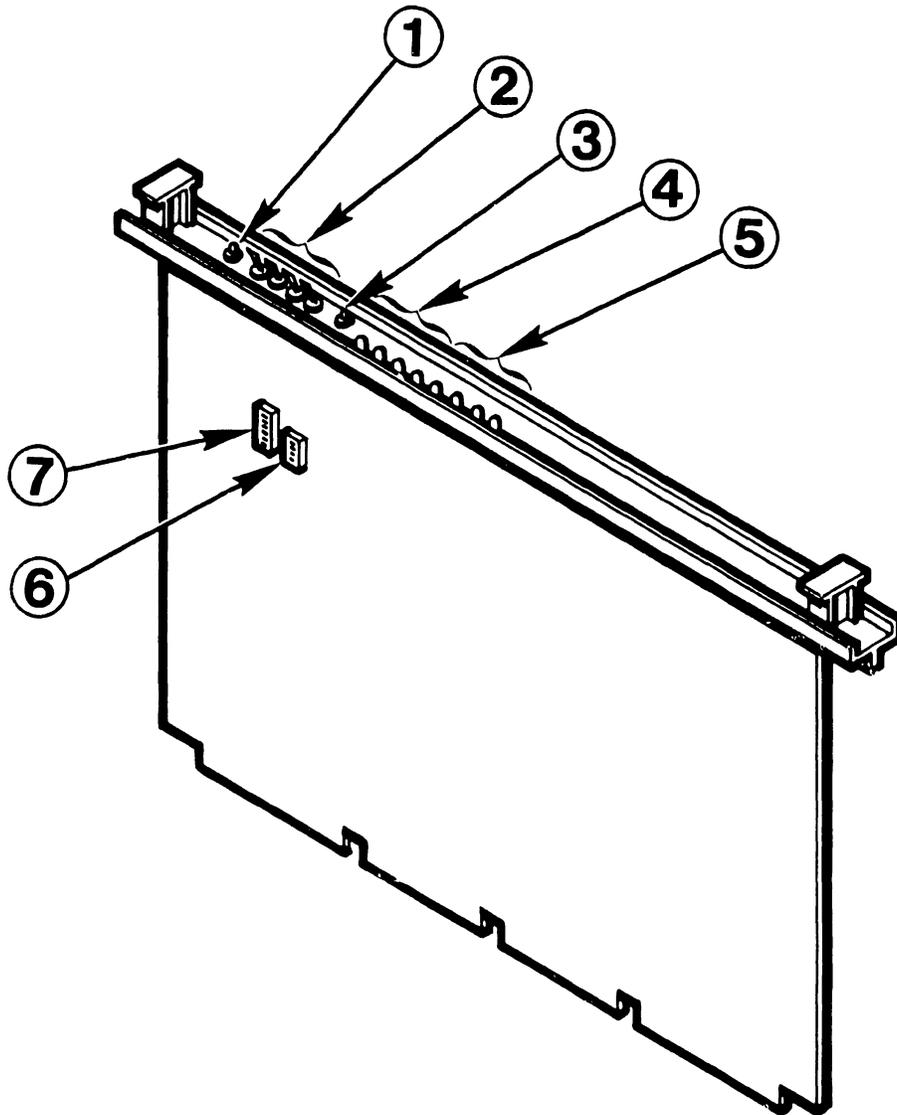


FIGURE 4-2 MASTER PROCESSOR INTERNAL CONTROLS AND INDICATORS
7501 CPU/MEMORY BOARD

TABLE 4-3 MASTER PROCESSOR INTERNAL CONTROLS AND INDICATORS
7501 CPU/MEMORY BOARD

ITEM	NAME	TYPE AND FUNCTION
1	RST	Restart pushbutton; forces system to trap at address 0066H; same effect as non-maskable interrupt.
2	DS4, DS3, DS2, DS1	Diagnostic switches; used to start diagnostic programs at particular locations. All switches should be positioned OFF for normal operation. Appendices D and E contain information concerning their use.
3	DPB	Diagnostic pushbutton; initializes requested diagnostic programs.
4	DL7-DL4	Diagnostic LEDs; display fatal "detailed error code" during power-up diagnostics. The detailed error codes do not apply if the error is not fatal. (See Appendices D and E.)
5	DL3-DL0	Diagnostic LEDs; display the test number being executed during power-up diagnostics. Also used to display Extended Error information. (See Appendices D and E.)
6	SW1	Option switches; 5-bank DIP switch. For future use. Position all switches to OFF.
7	SW2	Option switches; 8-bank DIP switch. BASIC purchased, position switch 3 ON BASIC not purchased, position switch 3 OFF Position switches 1, 2, 4, 5, 6, 7, and 8 OFF.

4.2.2.2 7502 - 10 MEG/FLOPPY CONTROLLER BOARD

The activity LED indicates activity on either a Hawk disk drive or on the Shugart floppy diskette drive.

ITEM 1 10 Meg/Floppy Disk Activity LED

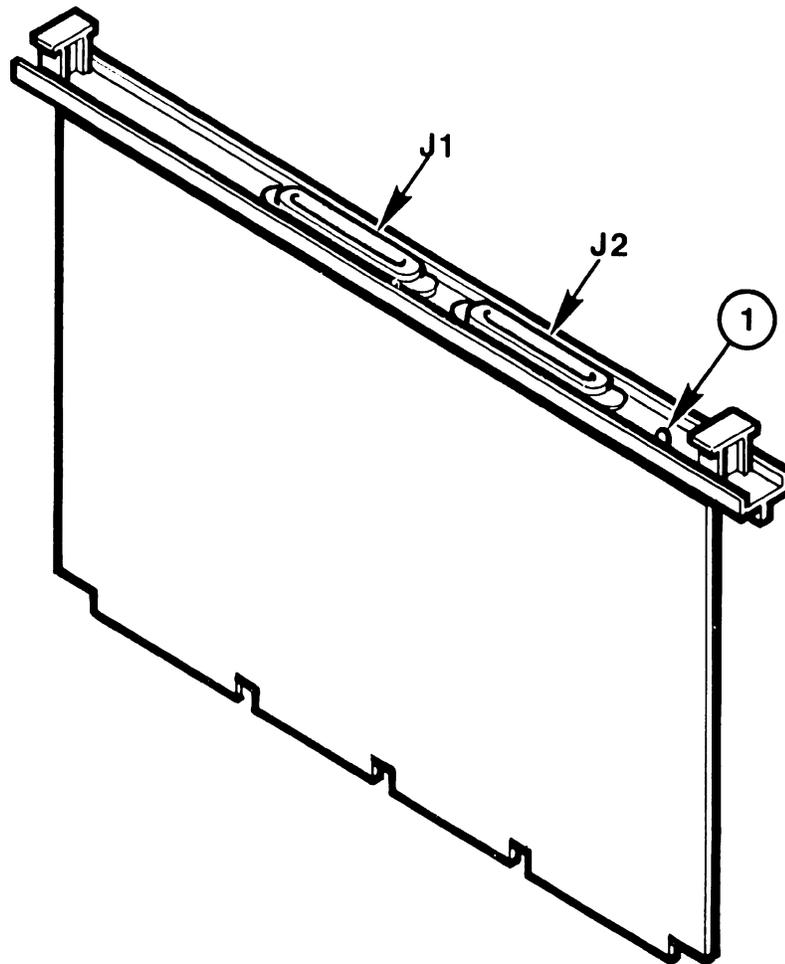


FIGURE 4-3 MASTER PROCESSOR INTERNAL CONTROLS AND INDICATORS
7502 - 10 MEG/FLOPPY CONTROLLER BOARD

4.2.2.3 7506 CMD/SMD "B" CONTROLLER BOARD

Internal switches and indicators located on the 7506 board comprise two 8-bank DIP switches used to define drive storage capacity and four LEDs to indicate drive activity. The locations of the switches and indicators are called out in Figure 4-4, their function and use, in Table 4-4.

TABLE 4-4 MASTER PROCESSOR INTERNAL CONTROLS AND INDICATORS
7506 CMD/SMD "B" CONTROLLER BOARD

ITEM	NAME	TYPE AND FUNCTION
1	SW1	Drive-type Definition switch (L33); 8-bank DIP switch. Used to define the type and storage capacity of CMD/SMD connected to each port of the 7506 board. Switches 1 - 4 reference Port 0, switches 5 - 8 reference Port 1. Refer to Figure 4-4 for details.
2	SW2	Drive-type Definition switch (L34); 8-bank DIP switch. Used to define the type and storage capacity of CMD/SMD connected to each port of the 7506 board. Switches 1 - 4 reference Port 2, switches 5 - 8 reference Port 3. Refer to Figure 4-4 for details.
3	P0 - P3	These LEDs indicate read, write, or seek activity on the associated disk unit (P0 corresponds to the disk connected to Port 0, P1 to Port 1, etc.).

-----NOTE-----
Ports 0 through 3 are interchangeable, i.e. any Phoenix (or 300 Meg SMD) drive may be connected to any of the four ports, as long as the associated drive-type definition switch is set to the appropriate state. For OIS 140/145 Systems employing multiple CMD or SMD drives, it is recommended that all the drive-type definition switches be set identically. In this way, all four ports may be interchanged at will during troubleshooting without having to modify the drive-type definition switches. (This recommendation assumes that all the CMD/SMD units in the particular system have identical storage capacity.)

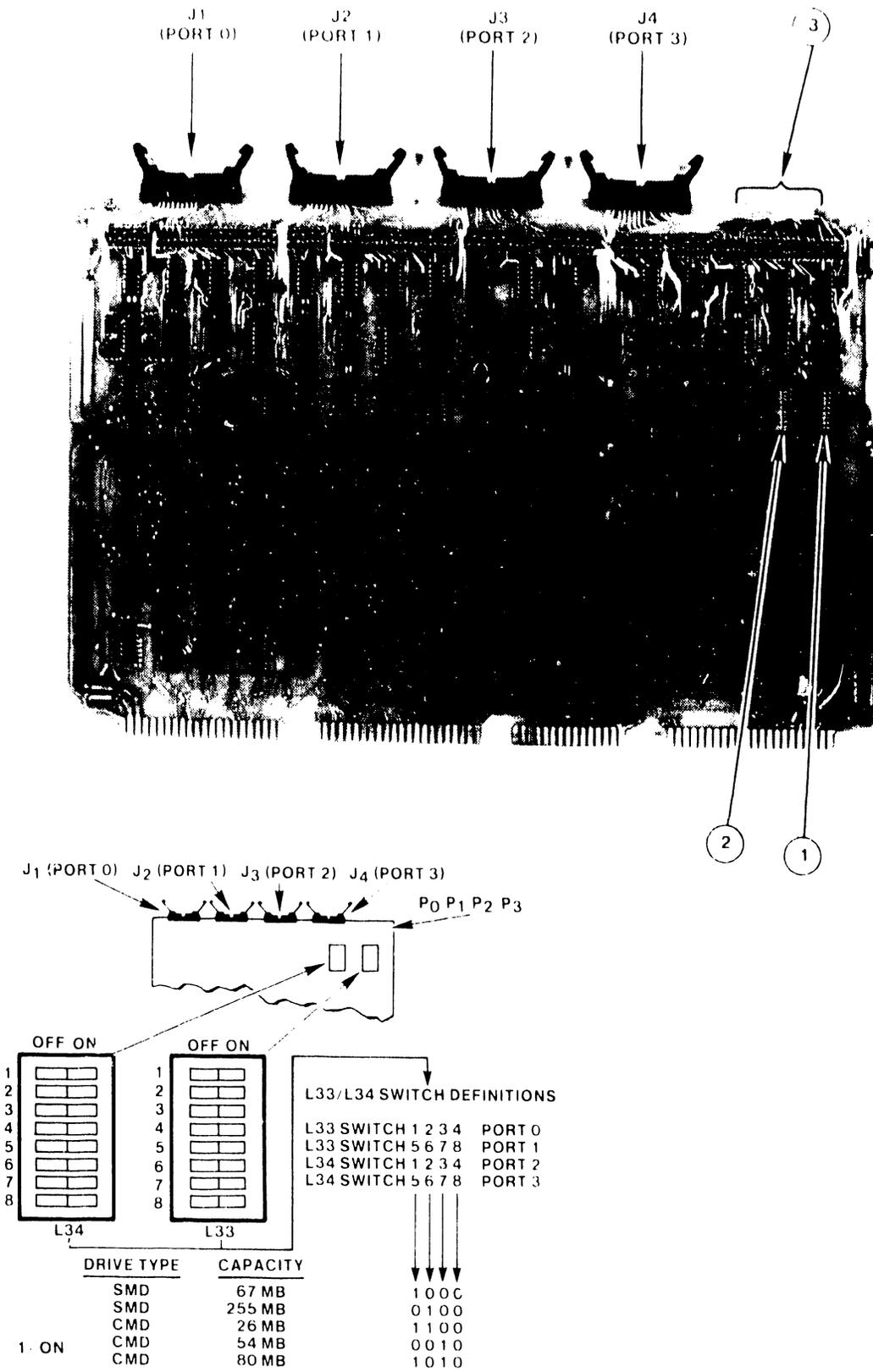
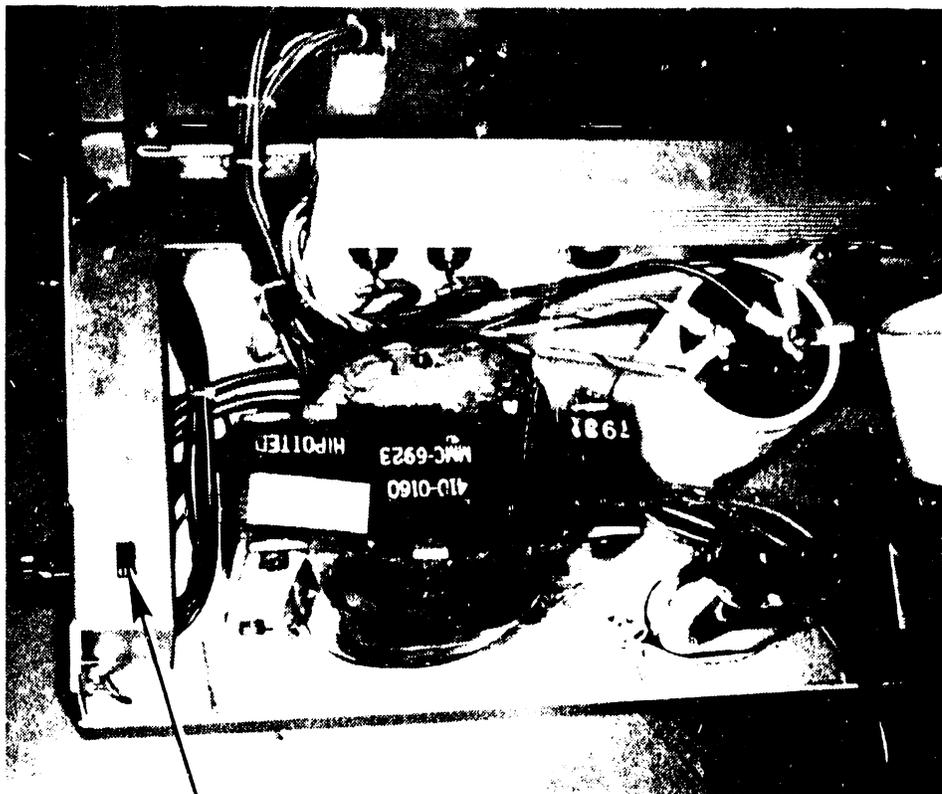


FIGURE 4-4 MASTER PROCESSOR INTERNAL CONTROLS AND INDICATORS
7506 CMD/SMD "B" CONTROLLER BOARD

4.2.2.4 VOLTAGE-SELECTOR SWITCH

The voltage-selector switch, located at the rear of the power-supply chassis, is used to select 115 Vac or 230 Vac according to the line voltage available. Changes in operating frequency (50/60 H.) require a complete change of power supply and floppy diskette. The part numbers necessary to make such a change may be found in the IPB of Appendix G.



VOLTAGE SELECTOR SWITCH

FIGURE 4-5 MASTER PROCESSOR INTERNAL CONTROLS AND INDICATORS
POWER SUPPLY CHASSIS

4.3 PHOENIX DISK UNIT

Operator controls and indicators for the Phoenix disk unit are described in the Wang Cartridge Module Disk Drive Manual (729-0199); refer to this document for further information. The locations of the controls and indicators are called out in Figure 4-6, their function and use, in Table 4-5.

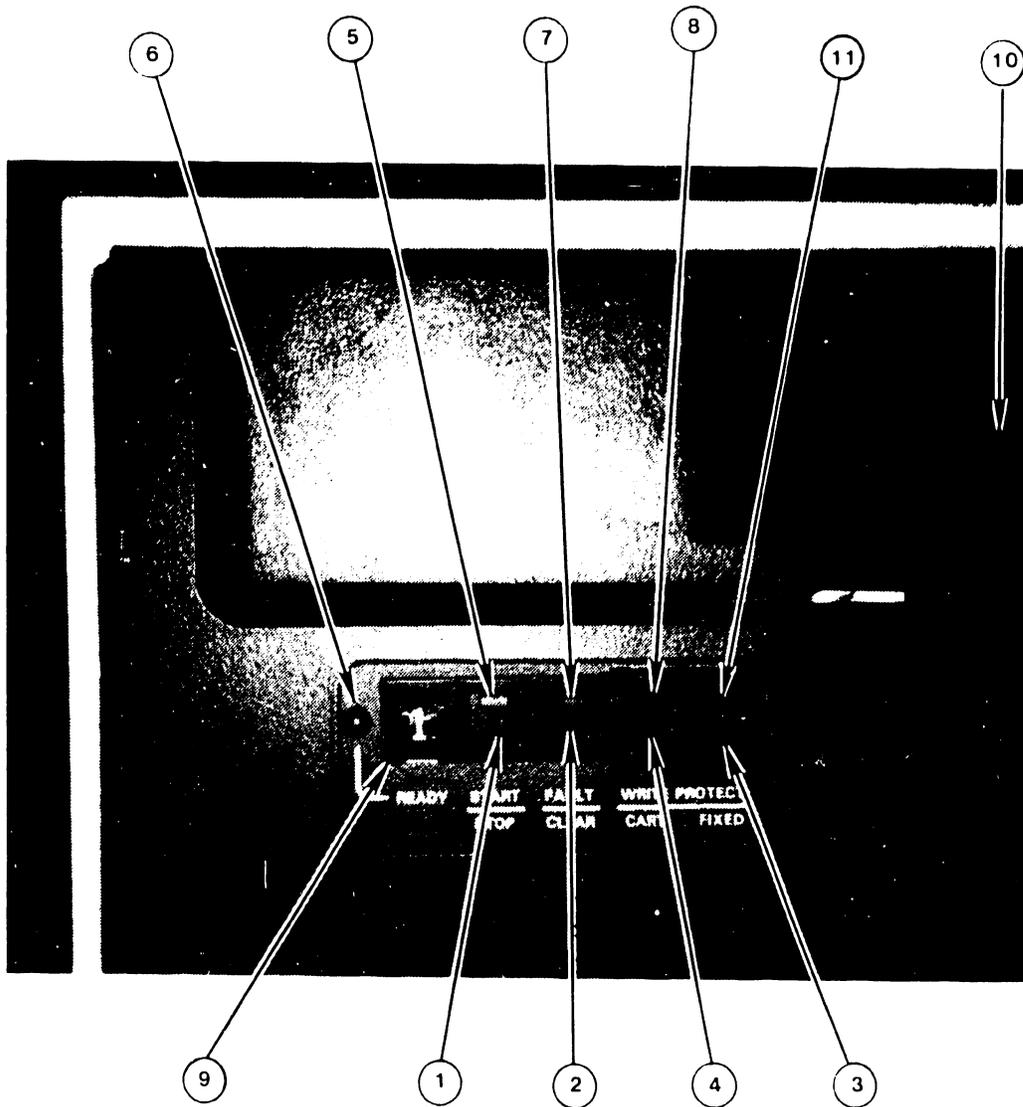


FIGURE 4-6 PHOENIX CMD CONTROLS AND INDICATORS

TABLE 4-5 PHOENIX CMD CONTROLS AND INDICATORS

ITEM	NAME	FUNCTION
1	START/STOP SWITCH	<p>Energizes spindle motor and initiates the first seek mode, provided the following conditions are met:</p> <ol style="list-style-type: none"> 1) The AC circuit breaker is ON. 2) The disk cartridge loading door is closed and latched with cartridge in place. (Deck in lowered position) 3) FAULT indicator LED is OFF. 4) Ground on HOLD line for LOCAL start mode. <p>Releasing the switch when the drive is in powered-up state (disk pack spinning) initiates power-down sequence.</p>
2	FAULT SWITCH	<p>Clears certain fault conditions when operated. Start/Stop switch may have to be released to clear some fault indicators.</p>
3	PROTECT FIXED SWITCH	<p>Disables write driver for fixed media; disabled in Wang Systems.</p>
4	PROTECT CARTRIDGE SWITCH	<p>Disables write driver for removable cartridge; disabled in Wang Systems.</p>
5	START/STOP INDICATOR LED	<p>Located within the START/STOP switch, lights when the START/STOP switch is activated, turns off when switch is released. Not all units have a START indicator.</p>
6	READY INDICATOR LED	<p>When lit this LED indicates unit ready status. The READY indicator is lit whenever unit is up to speed, heads are loaded, and no fault requiring manual intervention exists within the unit. The READY light will blink throughout the spindle start and stop procedure.</p>

TABLE 4-5 (continued)

ITEM	NAME	FUNCTION
7	FAULT INDICATOR LED	Located on the FAULT switch*. Indicates a fault condition when lit. Turns OFF when the fault condition is cleared by operating the FAULT switch.
8	PROTECT CARTRIDGE INDICATOR LED	Indicates that the removable volume cartridge of the drive is write protected.
9	LOGICAL ADDRESS PLUG	Plastic plug; generates the logical unit address when inserted into the socket. This is done by closing the coded switch contacts in the Logical Address socket. The plug is marked (0, 1, 2, 3 ...) to represent the unit number selected.
10	DISK PACK ACCESS DOOR LATCH	The Disk Pack Access Door is opened by lifting the latch located under the lip of the access door. The latch will not open the door until after the spindle motor has stopped rotating and the START/STOP switch is in the OFF position. This causes the interlock solenoid to release the catch. In the event of an AC power loss, the interlock solenoid will not release the catch. This is done to prevent damage to the cartridge.
11	PROTECT FIXED INDICATOR LED	Indicates that the fixed volume media of the drive is write protected.

* Does not indicate Seek error.

4.4 300 MEG SMD UNIT

Operator controls and indicators for the 300 Meg SMD are described in the CDC SMD Hardware Maintenance Manual (729-0221); refer to this document for further information. The locations of the controls and indicators are called out in Figure 4-7, their function and use, in Table 4-6.

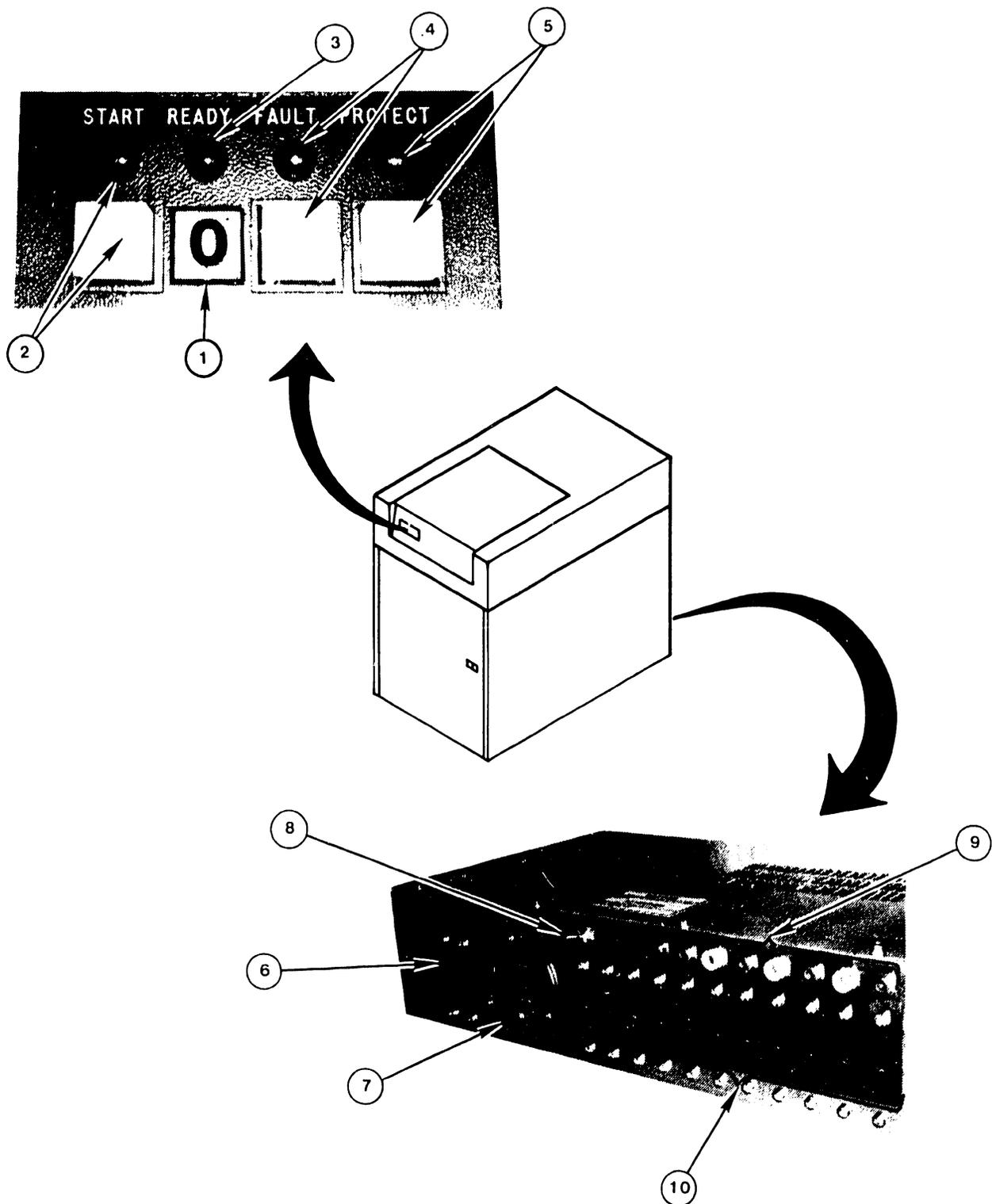


FIGURE 4-7 300 MEG SMD CONTROLS AND INDICATORS

TABLE 4-6 300 MEG SMD CONTROLS AND INDICATORS

ITEM	NAME	FUNCTION
1	LOGICAL ADDRESS PLUG	Determines logical address of drive. In OIS 145 Systems, this address may be 0, 1, or 2 (a maximum of 3 SMDs are allowed). 'Zero' plug must reside on System Disk.
2	START SWITCH/ INDICATOR	Pressing button when drive is in power-off condition (disk pack not spinning) lights indicator and starts power-on sequence, provided the following conditions are met: <ol style="list-style-type: none"> 1. Disk pack is installed 2. Pack access cover is closed 3. All power supply circuit breakers are on Pressing the indicator when drive is in power-on condition (disk pack spinning), extinguishes indicator and starts power-off sequence.
3	READY INDICATOR	Lights when unit is up to speed, the heads are loaded, and no fault conditions exist.
4	FAULT SWITCH/ INDICATOR	Lights if a fault condition exists within the drive. It is extinguished by either of the following: <ol style="list-style-type: none"> 1. Pressing fault switch on indicator control panel 2. Maintenance Fault Clear switch on fault card in logic chassis location A17
5	WRITE PROTECT SWITCH/INDICATOR	Pressing switch lights indicator and disables the driver write circuits, preventing data from being written on the pack. Pressing the switch to extinguish the indicator removes the disable from the write circuits.
6	MAIN AC CIRCUIT BREAKER	Controls application of site AC power to drive. Closing this breaker applies power to blower and elapsed time meter.

TABLE 4-6 (continued)

NAME	FUNCTION
7 HOURS ELAPSED TIME METER	Records accumulated AC power-on time. Meter starts when Main AC Circuit Breaker is closed.
8 LOCAL/REMOTE SWITCH	Controls whether drive can be powered-up from drive, (LOCAL) or controller (REMOTE). The OIS System uses the LOCAL position, and drive power-on sequence starts when START switch is pressed.
9 GRD, +46, -46, +9.7, -9.7, +20 -20, +28 TEST POINTS	Provide means of checking the associated DC voltages.
10 +20V, MOTOR, +46, -46, +9.7, -9.7, +20, -20, +28 SWITCHES	Control application of associated voltages to drive and also provide overload protection.

4.5 CRT WORKSTATION

The CRT workstation is described in Models 5536-1/-2/-3/-4 Workstations, WPNL No.81 (729-0522). For more information on these controls and indicators, and the internal controls, refer to this WPNL.

TABLE 4-7 WORKSTATION CONTROLS AND INDICATORS

ITEM	NAME	TYPE AND FUNCTION
①	DISPLAY	CRT screen; displays input and output data.
②	CONTRAST	Potentiometer; adjusts contrast of "highlights".
③	BRIGHTNESS	Potentiometer; adjusts brightness of display.
④	KEYBOARD	"Typewriter" keys; input data.
⑤	CONNECTORS	BNC & TNC connectors; connects Master Processor.
⑥	POWER SWITCH	Toggle switch; energizes the workstation.
⑦	FUSE	2.5A Slow-Blow fuse; protection for all circuits.
⑧	TONE	Potentiometer; adjusts volume of "beep".
⑨	CLICKER	Potentiometer; adjusts volume of "clicker".

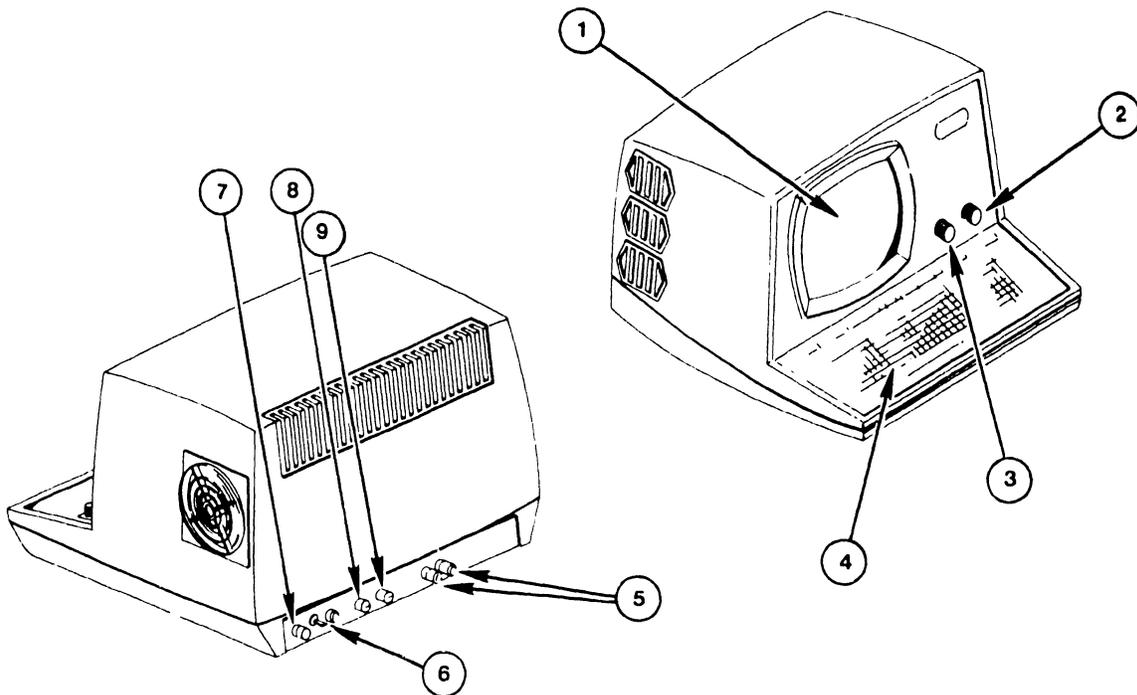


FIGURE 4-8 CRT WORKSTATION CONTROLS AND INDICATORS

CHAPTER

5

**MAINT-
ENANCE**

CHAPTER 5
MAINTENANCE

5.1 GENERAL

This chapter contains a preventive maintenance schedule, required materials and detailed maintenance procedures for the OIS 140/145 Master Unit. Proper and timely implementation of the information contained in this chapter is necessary to ensure maximum operating efficiency of the OIS 140/145 System.

Preventive maintenance procedures for the system's disk drives and CRT workstations do not fall within the scope of this manual. PM schedules and procedures for these peripheral devices may be found in the following documents.

- A. PHOENIX CMD:
PM schedules and procedures for the Phoenix drive can be found in Chapter 6 of the CDC CMD Hardware Maintenance Manual.
- B. 300 MEG SMD DRIVE:
PM schedules and procedures for the 300 Meg SMD drive are found in chapter 2 of the CDC SMD Hardware Maintenance Manual.
- C. HAWK DRIVE:
PM schedules and procedures for the Hawk drive are found in section 4 of the Wang/CDC Hawk Disk Drive Manual.
- D. 134 and 67 MEG NEC DRIVES:
PM schedules and procedures for the 134 Meg and the 67 Meg NEC drives are found in sections 3 and 4 of the Winchester Disk Drive Manual.
- E. 67 MEG CDC DRIVE:
PM schedules and procedures for the 67 Meg CDC drive can be found in Section 2 of the CDC Disk Drive Manual.
- F. 80 MEG NEC DRIVE:
PM schedules and procedures for the 80 Meg NEC drive can be found in Chapter 3 of the NEC Disk Drive Manual.
- G. 344 MEG CDC DRIVE:
PM schedules and procedures for the 344 MEG CDC drive can be found in Chapter 2 of the CDC FSD Installation Manual.
- H. CRT/WORKSTATION: (5536-2,-3,-4)
For information on maintenance procedures for the CRT workstation consult section 4 of Word Processing Newsletter No. 81.

5.2 MATERIALS REQUIRED

Materials required to perform a thorough and efficient job of preventive maintenance on OIS 140/145 Systems include the following.

- 1. Cleaning agents for use on the system cabinets and special cleaning agents for use on heads, contacts, etc.

2. Dusting tools and aids such as assorted brushes, swabs, a vacuum, an aerosol can of compressed air, materials for cleaning electrical contacts, and touch up paints.
3. CE tool kit and oscilloscope.
4. Diagnostics--

OIS 140-Class Power Up (PROM) (702-0042D)	OIS 140 Extended Mem. Pwr. Up (PROM) (702-0123B)
SYSEX40 (702-0117)	
SYSEX40X (702-0135)	OIS 140-Class Master Monitor (702-0057D)
OIS Online Device Monitor (702-0174)	OIS Online Printer Part II (702-0149, Rev 21A0)
OIS Online Printer Part I (702-0176A, Rev 2422)	

5. Manuals --
 - OIS 140/145 Product Maintenance Manual
 - CDC CMD Hardware Maintenance Manual
 - CDC SMD Hardware Maintenance Manual
 - Cartridge Module Drive (Block Point 4)
 - Wang/CDC Hawk Disk Drive Manual
 - CDC Hawk Field Maintenance Manual
 - Word Processing Newsletter No. 81

5.3 PM SCHEDULES FOR THE MASTER PROCESSOR

<u>ACTION / FREQUENCY</u>	<u>WEEKLY</u>	<u>6 MONTHS</u>	<u>12 MONTHS</u>	<u>SECTION</u>
Equipment operational check (IPL)	X			5.4.1
Clean exterior		X		5.4.2
Clean interior		X		5.4.2
Inspect		X		5.4.3
Align/Adjust		X		5.4.4
Diagnostic check		X		
Clean contacts and connectors			X	5.4.2
Apply ECOs			X	
Replace parts			X	
Repair scratches and blemishes			X	

5.4 DETAILED PROCEDURES

5.4.1 EQUIPMENT OPERATIONAL CHECK

It is recommended that the customer perform an equipment operational test at least once weekly. Run the power-up diagnostic and check the front panel diagnostic LEDs for possible error codes. The test takes approximately 15 seconds to complete and is activated when the customer re-IPLs the system.

5.4.2 CLEANING

- A. Exterior:
 1. Remove excess dust and debris from exterior with cloth and vacuum.
 2. Apply general cleaning agent to soft cloth and wipe case clean.

- B. Interior:
 - 1. Remove top cover, dust, then vacuum dust and debris from interior.
 - 2. Clean fan blades with cloth and cleaning agent.
- C. Contacts and Connectors:
 - 1. Remove all PCB assemblies and clean contacts if necessary, also brush and vacuum dust accumulated on PCBs.
 - 2. Clean PCB and I/O cable connector.
- D. Shugart Floppy:
 - 1. Using brush and vacuum cleaner, remove dust and debris from drive.
 - 2. Inspect the head load pad and head for dirt and/or damage. The head should be cleaned if it has an oxide build-up that is visible to the naked eye. Cleaning methods and materials other than those listed can permanently damage the head and should be avoided.
 - a. Lightly dampen a piece of clean, lintless tissue with isopropyl alcohol (use sparingly).
 - b. Lift the load arm off the head, being careful not to touch the load button (see Fig. 5-1). Note: Do not bend back the head load arm more than 90°.
 - c. Gently wipe the head with the moistened portion of the tissue.
 - d. After the alcohol has evaporated, gently polish the head with a clean, dry piece of lintless tissue.
 - e. Carefully lower the load arm onto the head. DO NOT let it snap back.

5.4.3 INSPECTION

- A. Inspect for loose, missing, or damaged parts.
 - 1. Replace, if part on hand.
 - 2. Order for next PM, or call.
- B. Check PCB E-Rev, and PROM Rev levels.
 - 1. Update, if parts available.
 - 2. Order parts for update on next PM, or call.
- C. Check PCB and I/O cable security.
- D. Clean and check fan operation.
- E. Inspect covers for scratches or blemishes.
- F. Check controller address switch setting for correctness.

- G. Inspect the Shugart floppy disk drive as follows:
 - 1. Check for and correct any loose connections.
 - 2. Check for excessive noise from spindle or head movement motors.
 - 3. Inspect drive belt for worn, frayed, or weak spots.

NOTE: Hands and fingers should be clean, free of oil and grease when handling drive.

- 4. Check spindle lock nut for tightness. Do not take apart spindle and lubricate it.

5.4.4 ALIGNMENTS/ADJUSTMENTS

A. Mechanical: None required.

B. Voltage:

Adjust voltages per section 3.12.5 and Figure 3-24, using test points located on CPU/MEM board and adjusting potentiometers located on the Power Supply Regulator board.

-----CAUTION-----

Avoid touching bare leads and causing a short circuit: very little clearance is provided for these adjustments. If possible, insulate the shank of the adjusting screwdriver or use an insulated alignment tool. All PCBs must be inserted and the system drive connected for these adjustments.

C. Shugart Floppy:

Check and/or replace worn read/write head load pad buttons to prevent excessive wear on the diskette (see Fig. 5-1).

- 1. To remove the button, hold the load arm out away from the head (not more than 90°), squeeze the locking tabs together with a pair of needle-nosed pliers and press forward.
- 2. To install the button, press the button into the head load arm and it will snap into place.
- 3. Check integrity of floppy door and door locking mechanism. Adjust as necessary.

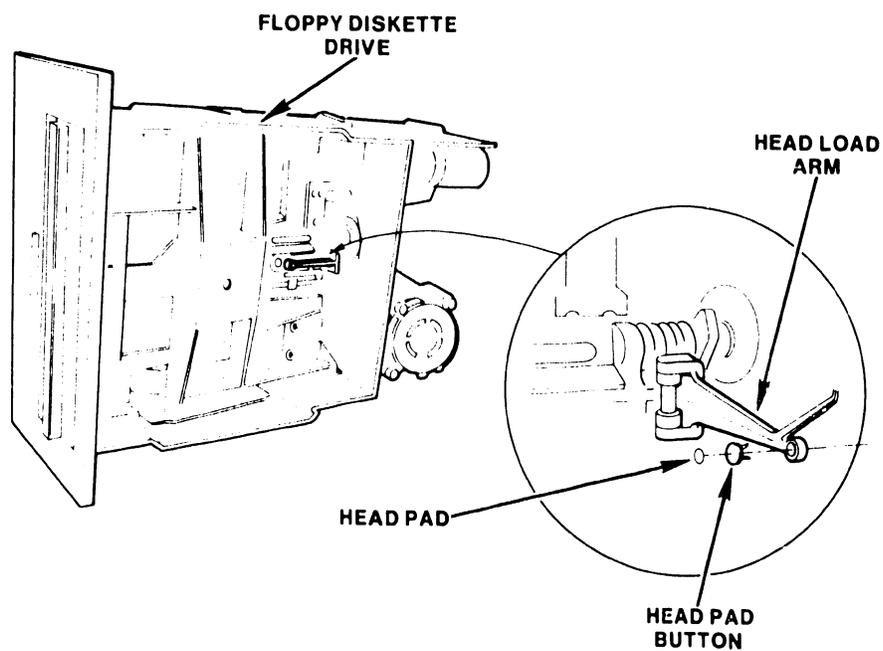


FIGURE 5-1 CHECKING/REPLACING THE DISKETTE DRIVE HEAD PAD