

Series 3000 Disk Subsystem

User's Manual

BERING[™]

Bering Industries, Inc.

SERIES 3000
MULTI-PORTED DISK SUBSYSTEM
USER'S MANUAL

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WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

WARRANTY STATEMENT

All Bering Industries (Bering) products sold in the United States carry a 90-day warranty against defects in materials and workmanship*. During the warranty period, Bering will, at its option, either repair or replace products which prove to be defective. This warranty includes labor and parts when the customer returns the product to Bering for repair. Products returned to Bering from the contiguous United States are to be shipped freight prepaid one-way. However customer shall pay all shipping charges, duties, taxes, and related expenses for product returned to Bering from another country. The aforementioned warranty shall not apply to defects as a result of misuse of the product, unauthorized modification, shipping damage, and using interface or software that is neither supplied nor approved by Bering.

Product returned to Bering for repair must be shipped freight prepaid and insured, and accompanied by a Return Material Authorization Number issued by Bering. If Bering determines that the product is not defective within the terms of this warranty, customer shall pay all costs of handling and return freight.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. BERING INDUSTRIES, INC. SHALL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES, DIRECTLY OR INDIRECTLY RELATED TO THE USE OR PERFORMANCE OF BERING PRODUCTS.

* For products sold outside the U.S.A., contact your local Bering distributor, representative, or dealer for warranty terms.

SERVICE POLICY

During the warranty period, if a product fails under normal use and proper care, Bering will repair it at no charge. We maintain a telephone hot-line where you can call for assistance in fault isolation. This consultation service is absolutely FREE. Sometimes the problem is solved without your having to return anything to Bering. But when you do, we help you confirm the correct FRU at fault and set up the most effective service arrangement. If a quick swapping of FRU is required, please consult appendix E for pricing under Quik-Swap Service for In-Warranty Product.

You save time and freight by exchanging FRU through our Quik-Swap service. We can dispatch FRU to many U.S. cities usually within 24 hours. Nonetheless, you may still return the whole system for repair if you wish.

Out of warranty products are handled similarly. Please refer to appendix E for the latest Product Service pricing.

Our objective is to reduce your system downtime and save you money. Please discuss your need with Bering sales, representative, distributor/dealer or other authorized reseller.

SAFETY

Operating and maintenance personnel must always observe sound safety practices. Do not replace components, or attempt repairs to this equipment with the power turned on. Dangerous voltage may exist even the power switch is in the power off position. To avoid injury, always remove power cord before attempting repair procedures.

Bering Industries, Inc. will accept no responsibility or liability for injury or damage sustained as result of operation or maintenance of this equipment with the covers removed and power applied.

Chapter 1 GENERAL INFORMATION

1.1 Introduction

This chapter contains general information on the Series 3000 disk subsystem. Included are introduction, and general description.

The Series 3000 is a family of random access data storage based on the latest 5.25" Winchester disk technology. It provides storage capacity of 5, 10, 15, 30, and 45 Megabytes (MB). Built-in floppy of 3.5", 5.25" or 8" is optional.

The Series 3000 fully implements the HP-300 Mass Storage Command Set, and connects to the Hewlett-Packard computers via the Hewlett Packard Interface Bus (HP-IB)*. This series emulates all versions of HP personal mass storage subsystems.

Other features like the multi-port sharing and local backup/restore are also offered. Multi-port option enables different HP computers sharing the same disk subsystem. Each HP computer communicates through its own HP-IB port, and the Bering disk subsystem assumes the multiplexing control. Local function provides a means of backing-up and restoring the Winchester disk using a number of diskettes.

In addition to this manual, users are urged to consult the related HP documentation on mass storage techniques supplied with your computer systems.

*HP-IB is Hewlett Packard's implementation of the IEEE Standard 488-1978

Table 1.1 Summary of Disk Subsystems

BERING MODEL	HP MODEL	NOTE (Storage capacities are rounded off)
3005	N/A	Winchester only: 5 MB
3010	N/A	Winchester only: 10 MB
3015	9133X	Winchester only: 15 MB
3030	N/A	Winchester only: 30 MB
3045	N/A	Winchester only: 45 MB
3305	9133V	Winc. (5 MB) & 3.5" floppy (.25 MB)
3310	9133XV	Winc. (5 MB) & 3.5" floppy (.25 MB)
	Opt. 010	Winc. (10 MB) & 3.5" floppy (.25 MB)
3315	9133XV	Winc. (15 MB) & 3.5" floppy (.25 MB)
3330	N/A	Winc. (30 MB) & 3.5" floppy (.25 MB)
3345	N/A	Winc. (45 MB) & 3.5" floppy (.25 MB)
3505	9135A	Winc. (5 MB) & 5.25" floppy (.25 MB)
3510	N/A	Winc. (10 MB) & 5.25" floppy (.25 MB)
3515	N/A	Winc. (15 MB) & 5.25" floppy (.25 MB)
3530	N/A	Winc. (30 MB) & 5.25" floppy (.25 MB)
3545	N/A	Winc. (45 MB) & 5.25" floppy (.25 MB)
3805	N/A	Winc. (5 MB) & 8" floppy (1.2 MB)
3810	N/A	Winc. (10 MB) & 8" floppy (1.2 MB)
3815	N/A	Winc. (15 MB) & 8" floppy (1.2 MB)
3830	N/A	Winc. (30 MB) & 8" floppy (1.2 MB)
3845	N/A	Winc. (45 MB) & 8" floppy (1.2 MB)

OPTIONS:

Winchester Partition

Option 201	Blocks of 1.2 MB (HP9133V OPT.004)
Option 205	Blocks of 4.8 MB (HP9133V)
Option 210	Blocks of 9.7 MB (HP9134B)
Option 215	Blocks of 14.5 MB (HP9133XV)

Enhancement

Option 301	Rackmount enclosure & slide
Option 401	Local backup & front panel control switches
Option 521	Two-port disk sharing (long haul)
Option 522	Two-port disk sharing (short haul)
Option 531	Three-port disk sharing (long haul)
Option 532	Three-port disk sharing (short haul)
Option 660	Electronic File Sharing

1.2 General Description

A fully fledged Series 3000 disk subsystem consists up to four types of functional modules (Also known as Field Replaceable Unit or FRU's) as shown in Figure 1.1. The modules are Controller, Winchester drive, Floppy drive, and Power Supply. Other components not included in the major modules consist of the cooling fan, and the power/fuseholder receptacle.

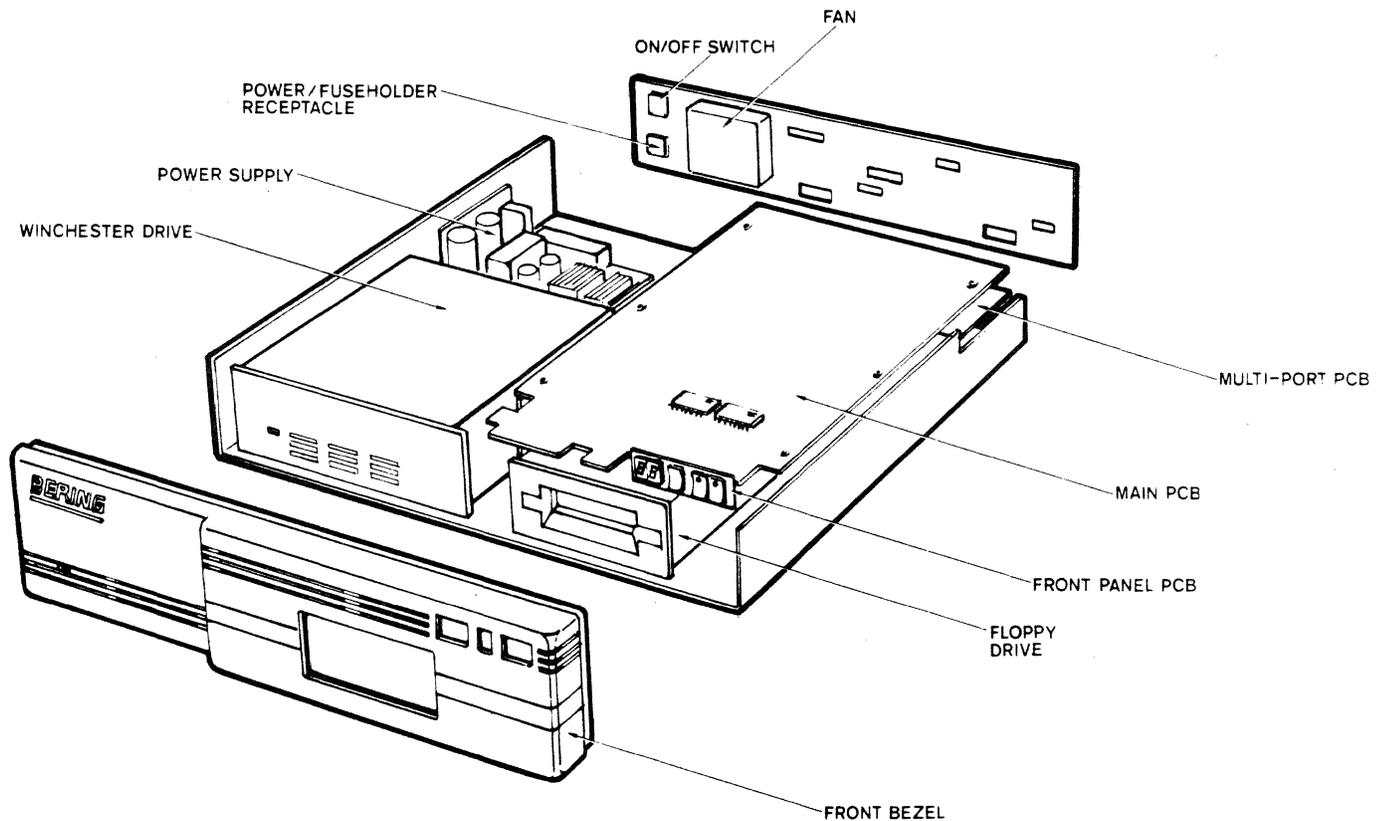


Figure 1.1 Disk Subsystem Modules

1.2.1 Controller

The controller module may consist of three printed circuit boards (PCB), namely the main PCB, the multi-port PCB, and the front panel PCB.

MAIN PCB (Standard): The main PCB is mounted above the floppy drive. It is a dual microprocessors based disk controller with built-in error correcting (ECC) hardware for the Winchester drive operations. It receives and executes command from the HP computer through the HP-IB, accesses data from the drives, and executes local commands.

MULTI-PORT PCB (Option 521/522/531/532 only): This PCB is mounted onto the solder side of the main PCB. It provides one or two HP-IB connectors (Option 5xx dependent) and configuration switches. The connectors are secured to the back panel, and the configuration switches can be accessed through the openings next to the connectors.

FRONT PANEL PCB (Option 401): This PCB is mounted onto the right-upper corner of the front bezel. It provides three switches for the execution of local functions, and two 7-segments LED display. It is connected to the main PCB by a flat-cable.

1.2.2 Winchester Drive

This module is mounted on the left-hand side of the subsystem enclosure. It includes all the mechanical parts of the Winchester drive assembly, and the associated read/write and motor control electronics. The mechanical parts consist of the spindle motor, disks, air filter, stepper motor, linear actuator, and heads. All mechanical components are enclosed in a sealed environment.

WARNING: WARRANTY IS VOID IF SEAL IS BROKEN.

1.2.3 Floppy Drive (Except Model 30xx's)

This module is mounted on the right-hand side of the subsystem enclosure, below the main PCB. It contains all the mechanical parts for physical handling of a diskette. These include the read/write and erase heads, the drive spindle and motor, the stepper motor and its associated head positioning mechanism, and the various sensors and controller electronics.

1.2.4 Power Supply

This module is located behind the Winchester drive. It is a switching power supply providing regulated +5 volts, +12 volts, or +24 volts. Integrated cable assembly connects the various supplies to the PCB's and the drive modules. It has built-in overvoltage protection and AC power line filtering.

1.2.5 Other Components

Other standard components include the cooling fan and the power/fuseholder receptacle. They are both mounted onto the back panel. The power/fuseholder receptacle has a built-in fuse compartment with a spare fuse attached.

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Chapter 2 GETTING READY

2.1 Introduction

This chapter gives instructions on initial check-out and configuring of your Bering disk subsystem.

It is very important to follow the instructions in this chapter to get the disk subsystem ready before connecting to the HP computers. Users are also urged to consult related sections of HP documentation whenever necessary.

2.2 Limitations of Multi-Port

1. For subsystem with Option 531 (three ports and long haul), ensure that Port 2 & 3 are not connected to the same HP-IB Bus. Otherwise, it may cause system failure.
2. For multiple-computers configuration, ensure that there is no voltage difference between grounds of the AC power. It is recommended to have all computers and HP-IB devices in the same AC power circuit.
3. When the computer at one of the HP-IB port is executing an INITIALIZE or FORMAT command, it may cause disk error to computer(s) in other ports. This is because some HP computers cannot tolerate the extended delay of these commands. It is recommended to stop all disk commands in other ports before executing the INITIALIZE commands.

2.3 Checklist for Getting Ready

1. Copy the model, option, and serial number of your subsystem from the rear panel to the space below for future reference.

Model No. _____

Option No. _____

Serial No. _____

2. Connect to AC power.
3. Turn the disk subsystem on, and wait for at least one minute. If the MAIN LED in front of the disk subsystem remains steadily lit, it passes the self-test successfully. If it fails, goes to Section 2.4 for detailed instruction.
4. Turn off the disk subsystem.
5. Next you will configure the disk subsystem before connecting to the HP computer.

For Model 30xx, continue to Section 2.3.1.

For Model 33xx, 35xx, 38xx with Option 52x (with/without 401), go to Section 2.3.2.

For Model 38xx with Options 53x and 401, go to Section 2.3.3.

2.3.1 Model 30xx with Option 5xx

1. Setup the address at each HP-IB port of the disk subsystem. Refer to Section 2.5.1 for detail. If both ports are connected to the same computer, ensure that there is no conflict in the address settings. WITH OPTION 531, PORT 2 AND PORT 3 SHOULD NOT BE CONNECTED TOGETHER.

2. Select and set partition type at each port.
 - 2.1. WITHOUT OPTION 660: Select the partition type to define the storage capacity for each port. Partition type can be different at each port, but ensure that the total assigned capacity does not exceed the maximum capacity of the Winchester disk. Consult Tables 2.4 and 2.5 for selection and guidance.
 - 2.2. WITH OPTION 660: Consult Appendix G before assigning storage capacity at each port. Partition type of each port and the Shared Information Space has to be the same. Also consult Tables 2.4 and 2.5 for additional guidance.

Use the following table to plan the storage capacity at each port.

	Port 1	Port 2	Port 3	Opt. 660 (SIS)
Capacity Assigned				

Available Winchester Capacity: Total Capacity Assigned:

Example: A Model 3015 with Option 521. Assume Port 1 is set to address 2, and partition type 7 (Option 210); Port 2 is set to address 4, and partition type 6 (Option 205). The settings of the configuration switches are shown in Figure 2.1.

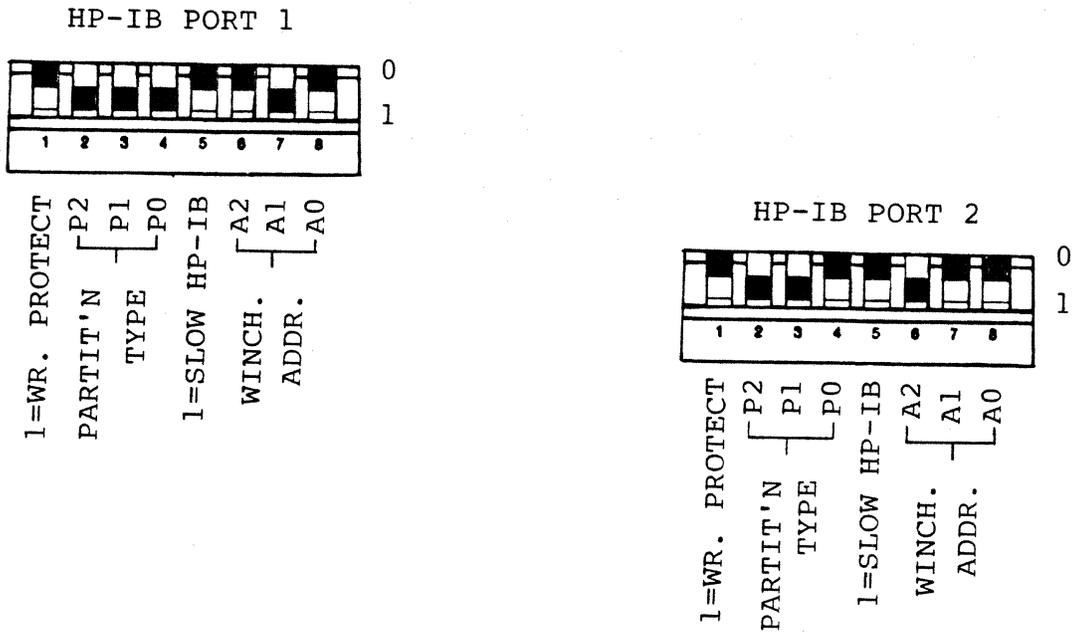


Figure 2.1

3. If your HP computer specifies slow HP-IB settling time, or if you have Option 521 (or 531) and the HP-IB cable at Port 2 or 3 exceeds 2 meters, set key #5 of the configuration switch in that port to '1', which will enable slow HP-IB settling time.
4. Install the required interface card, mass storage ROM, and device software driver for your HP computer. Consult Table 2.1. If the computer at each port is different, ensure to satisfy the requirement of each computer.
5. Plug one end of the HP-IB interface cable into the socket on the rear panel of the computer, and the other end into socket on the rear panel of the disk subsystem. If there are other peripherals already on the HP-IB bus, plug the cable into socket of the nearby HP-IB devices.
6. Turn all peripherals on.
7. Go to Chapter 3, and continue the disk installation for your computer.

2.3.2 Model 33xx, 35xx, 38xx with Option 52x (With/Without 401)

1. Setup the HP-IB address for the Winchester at Port 1 and 2. The keys on the configuration switch are labeled WINC. ADDR. (A2, A1, A0). Refer to Secion 2.5.1 for detail.
2. Set the floppy address. The location of the key switches are at the area marked "PORT 3". The floppy drive needs one HP-IB address for each port, and they are labelled as PORT 1 FLOPPY ADDR. (A2, A1, A0) and PORT 2 FLOPPY ADDR. (A2, A1, A0).

```
*****
*   If both ports are connected to the same computer, *
*   ensure that there is no conflict in the HP-IB   *
*   addresses. REMEMBER, THERE ARE A TOTAL OF FOUR *
*   ADDRESSES REQUIRED.                               *
*****
```

3. Assign storage capacity of Winchester at each port. Ensure that the total assigned capacity does not exceed the maximum capacity of the Winchester disk
 - 3.1. WITHOUT OPTION 660: Consult Table 2.5 to ensure the partition type is supported by your HP computer. Partition type could be different at each port.
 - 3.2. WITH OPTION 660: Consult Appendix G before assigning storage capacity at each port. Partition type of each port and the Shared Information Space has to be the same.

Use the following table to plan the storage capacity at each port.

	Port 1	Port 2	Port 3	Opt. 660 (SIS)
Capacity Assigned	-----	-----	-----	-----

Available Winchester Capacity: Total Capacity Assigned:

4. Specify the partition type of the Winchester disk by setting the keys P2, P1, P0 of the configuration switch at each port. Consult Table 2.4 for guidance.

Example: A Model 3315 with Option 521 and 401. Assume Winchester address is set to 2 at Port 1, and set to 4 at Port 2. Floppy address for Port 1 is set to 0, and for Port 2 is set to 7. Partition type for Port 1 is set to Option 210 (10 MB); and for Port 2 is set to Option 205 (5 MB). The settings of the configuration switches are shown in Figure 2.2.

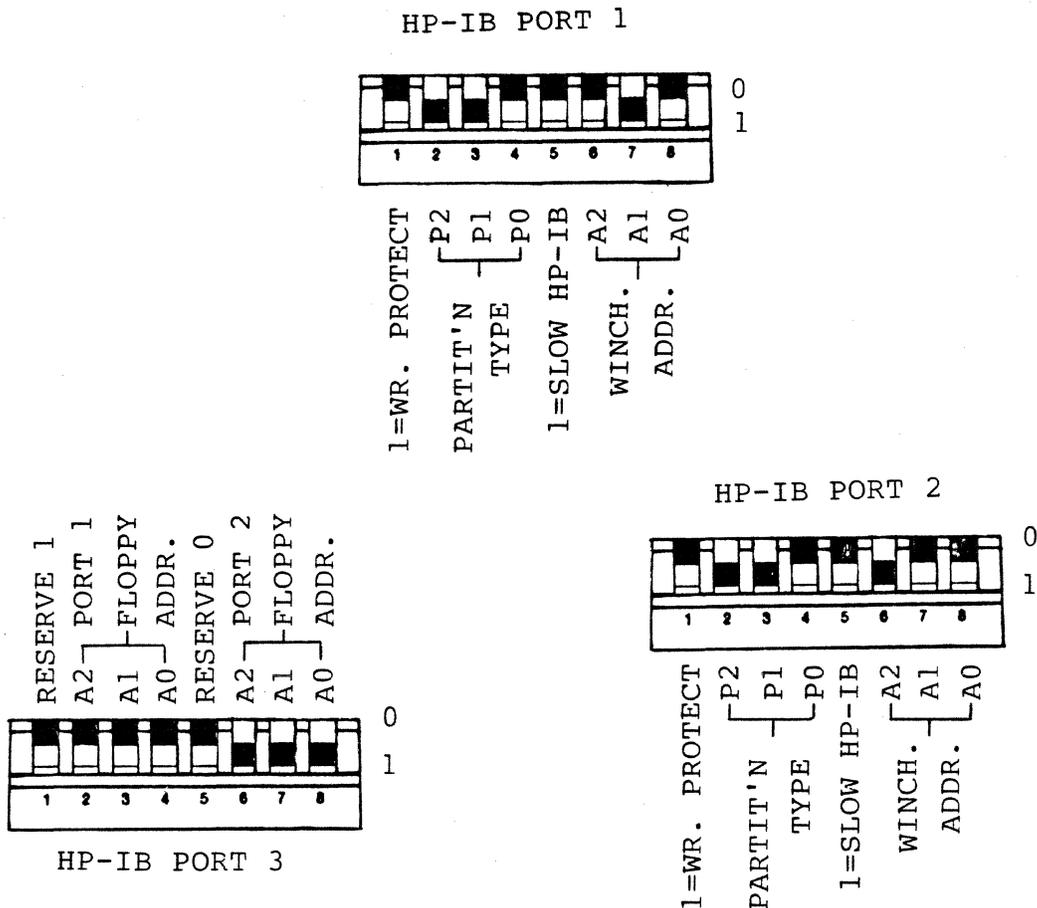


Figure 2.2

5. If you have Option 521 and the HP-IB cable at Port 2 exceeds two meters, set the key #5 of the configuration switch to "1".
6. Turn on the disk subsystem.
7. WITH OPTION 401: The display will show a number "1" indicating the floppy drive is assigned to Port 1. If you want to re-assign the port of the floppy drive, press and release the SELECT button till the desired port number appears on the display. It takes 5 seconds for the every new assignment to be effective.

WITHOUT OPTION 401: The floppy drive is configured to Port 1 by default.
8. Go to Chapter 3, and continue the disk installation for your computer.

2.3.3 Model 38xx with Option 53x and 401

1. Setup the HP-IB address at each port. The keys on the configuration switch are labeled WINC. ADDR. (A2, A1, A0). Refer to Section 2.5.1 for detail. If both ports are connected to the same computer, ensure that there is no conflict in the HP-IB addresses. **WARNING: WITH OPTION 531 , PORT 2 AND PORT 3 CANNOT BE CONNECTED TO THE SAME COMPUTER.**
2. Assign storage capacity of Winchester at each port. Ensure that the total assigned capacity does not exceed the maximum capacity of the Winchester disk.
 - 2.1. WITHOUT OPTION 660: Only 1.2 MB Partition Type is allowed, and maximum storage capacity at each port is 4.8 MB (4 units of 1.2 MB).
 - 2.2. WITH OPTION 660: Consult Appendix G before assigning storage capacity at each port. Only 1.2 MB Partition Type is allowed in this particular disk subsystem.

Use the following table to plan the storage capacity at each port.

	Port 1	Port 2	Port 3	Opt. 660 (SIS)
Capacity Assigned	-----	-----	-----	-----

Available Winchester Capacity: Total Capacity Assigned:

3. Specify the partition type by setting the keys P2, P1, P0 of the configuration switch at each port. The only partition type supported is the 1.2 MB block. Consult Table 2.4 for the setup of the partition type.

Example: A Model 3815 with Option 531 and 401. Winchester address at Port 1 is set to 2; Port 2 is set to 4; and Port 3 is set to 6. Each port is configured as 4 units of 1.2 MB partition (Option 201). The settings of the configuration switches are shown in Figure 2.3.

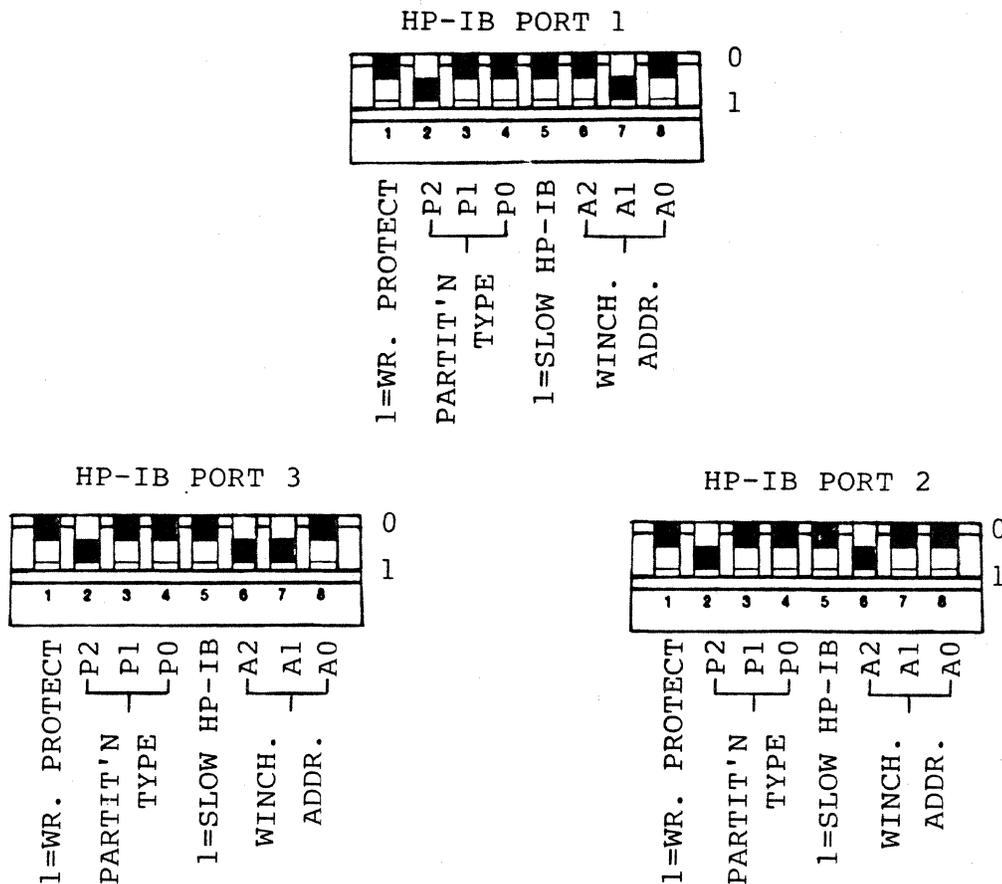


Figure 2.3

4. If your HP computer specifies slow HP-IB settling time, or if you have Option 531 and the HP-IB cable at Port 2 or Port 3 exceeds two meters, set the key #5 of the configuration switch to "1".
5. Turn on the disk subsystem.
6. Press and release the SELECT button to assign the floppy drive to the desired port. The digit on the left is the port number, and the other digit is the unit number. IT TAKES 5 SECONDS FOR THE PORT ASSIGNMENT TO BE EFFECTIVE. The HP-IB address of the floppy drive is the same as the Winchester drive of the selected port. If the display is blank, the floppy drive IS NOT assigned to any of the ports. Refer to Section 2.5.1 under FLOPPY ADDRESS for details.
7. Go to Chapter 3, and continue the disk installation for your computer.

Table 2.1 Configuration Guide

HP COMPUTER	BERING DISK SUBSYSTEM		HOST REQUIREMENTS		NOTE
			INTERFACE and/or CABLE	ROM, DRIVER	
Series 80	Model 3x05 3x10 3x15 3x30	Option 201/205 205/210 201&5xx 205 201&5xx 210&5xx 210	HP83/85/86A: 82937A HP 86B/87: HP-IB Cable*	HP85B/86B: Built-in HP83/85A/9915: 00085-150001 HP86A/87(Opt. 210 only) 00087-15012	HP86/87 do not support Opt. 205, 210 under CP/M
HP120 /125 (OP. SYS A. 01.20)	3x05 3x10 3x15	201 201&5xx 201&5xx	HP-IB Cable*	Built-in	
HP120 /125 (OP. SYS A. 02.00)	3x05 3x10 3x15 3x30	201/205 205/210 210&5xx 210&5xx	HP-IB Cable*	Built-in	
HP150	3x05 3x10 3x15 3x30 3x45	201/205 205/210 205/215 210/215 215	HP-IB Cable*	Built-in	
HP9000 Series 200	3x05 3x10 3x15 3x10 3x15 3x15 3x30 3x45	201/205 201&5xx 201&5xx 205/210 205/215 210&5xx 210/215 215	HP-IB Cable*	33xx/35xx (Opt. 201) Basic 1.0 with Enhancement Binary, HPL, Pascal 2.0. 38xx(Opt. 201) Same as above, includes Pascal 1.0 3xxx(Opt. 205,210) Basic 2.0 Extension Pascal 2.0, or later. 3xxx(Opt. 215) Basic may need additional Binary: 92238A	

Table 2.1 (Cont.) Configuration Guide

HP COMPUTER	BERING DISK SUBSYSTEM		HOST REQUIREMENTS		NOTE
			INTERFACE and/or CABLE	ROM, DRIVER	
1000's A, L	3xxx	2xx	12009A Interface	Driver ID.37 Device Driver DD.30	
1000's E, F	3805 3810 3815	201 210&5xx 210&5xx	12821A Interface	Disk Drive DVA 32 (included with RTE-IVB, 6-VM)	
9835A 9845B/C 9825T	3805 3810 3815	201 201&5xx 201&5xx	98034A revised (Rev E or later)	9835: 98331B ROM 9845: 98413B/C ROM 9825T: 98228A ROM	9835/45 requires a dedicated HPIB interface for disk subsystem.
3000 (30, 44, 64)	3x05 3810 3815	201 201&5xx 201&5xx	5060-9456 Interface	Built-in	
HP9000 Series 500	3x05 3x10 3x15 3x30 3x45	201/205 210 215 210&5xx 215&5xx	Built-in (27110A)	Driver are in RAM BASIC or HP-UX	
250	3805 3810 3815 3830 3045	201/205 210 215 210&5xx 215&5xx	Built-in	Built-in	Opt. 210 needs Op. Sys. 5.0 or later
64000	30xx	205/210 215	Built-in	Built-in	

* Bering part no. 1013-0005-00
HP part no. 45229 or 10833

x Any numerals may replace x to form a valid Model/Option number.
CP/M is a registered trademark of Digital Research Inc.

2.4 Power-On Self-Test

During the power-on process, built-in intelligence in the disk subsystem automatically tests all modules. Result of self-test is shown by means of LED's(Light Emitting Diodes). In addition, a two-digit display is available to subsystem equipped with Opt. 401. (See Appendix F for display code.)

The LED on the lower left corner of the front bezel is a indicator for power-on, self-test result, and disk access. It is referred to as the MAIN LED in this manual.

If the MAIN LED remains steadily lit beyond half a minute after power-on, the disk subsystem has successfully passed the self-test.

If the power-on self-test fails, the MAIN LED indicates a malfunction as follows:

1. If the MAIN LED remains off after power-on, the Controller PCB may have failed.
2. If the MAIN LED blinks* relatively fast (about 5 times per second), the Winchester drive may have failed. The LED continues to blink until the disk subsystem is powered down.
3. If the MAIN LED blinks* relatively slow (1 time per second), the floppy drive may have failed. The LED continues to blink until the disk subsystem is turned off.

In addition, there are three LEDs at the back panel providing more status information. These are visible through the "STATUS" opening.

Red	: ERR LED	(Lit when error encountered).
Yellow	: RUN LED	(Lit when controller is OK).
Green	: DCOK LED	(Lit when power supply is OK).

* The MAIN LED also blinks momentarily during normal access to the Winchester drive.

Table 2.2 Summary of Power-On Status*

LED's				STATUS
MAIN	ERR	RUN	DCOK	
on	on	on	on	Controller fails
on	on	off	on	Controller fails
on	off	on	on	Pass power-on test
on	off	off	on	Controller fails
off	on	on	on	Controller fails
off	on	off	on	Controller fails
off	off	on	on	Controller fails or WINC. LED burnt out
off	off	off	on	Controller fails
off/on	off/on	off/on	off	Power supply fails
blinks	blinks	on	on	Winchester fails
fast**	fast**			
blinks	blinks	on	on	Floppy fails
slow**	slow**			

If the disk subsystem fails the power-on self-test, please follow these steps:

1. Check the ERR LED to confirm the failure of the self-test. If all three LED's (ERR, RUN, DCOK) are lit, go to step 4.
2. If none of the LED's is lit, check the AC power for proper connection. Then check the fuse (consult Appendix A) before trying again.
3. If the DCOK LED is not lit, the power supply is probably malfunctioned or needs adjustment. Consult the factory immediately. (The output voltages of the power supply may be verified through the STATUS opening using a voltmeter with input impedance of 1 megohms or higher.)
4. Turn off the power, and wait for 15 seconds to ensure the Winchester drive is at a complete stop. Turning the power back on too early may potentially shorten the life of the drive, or may blow the fuse of the power supply. Turn on the power again to reinitiate the power-on self-test. If all attempts fail, go to Chapter 5, Section 5.3 for service assistance.

*Power-on status becomes stable after the power has been on for half a minute.

**Blinks fast : 5 times per second; Blinks slow : 1 time per sec.

2.5 Configuration

Every HP-IB port has its own configuration switch, located next to the HP-IB cable connector. The switch is used to select HP-IB address (Section 2.5.1), Winchester partition type (Section 2.5.2), and other configuration (Section 2.5.3). Whenever the switch has to be re-configured, follow these steps:

1. Turn off the power.
2. Use a small screw driver or similar object to setup the keys of the switch.
3. Ensure the power has been off for half a minute, before turn on the power again.

 * WARNING: Backup all files before changing partition type. *
 * Re-initialization of disk will erase all data. *

The layout of the configuration switch at Port 1, Port 2, and Port 3 are shown in Figure 2.4.

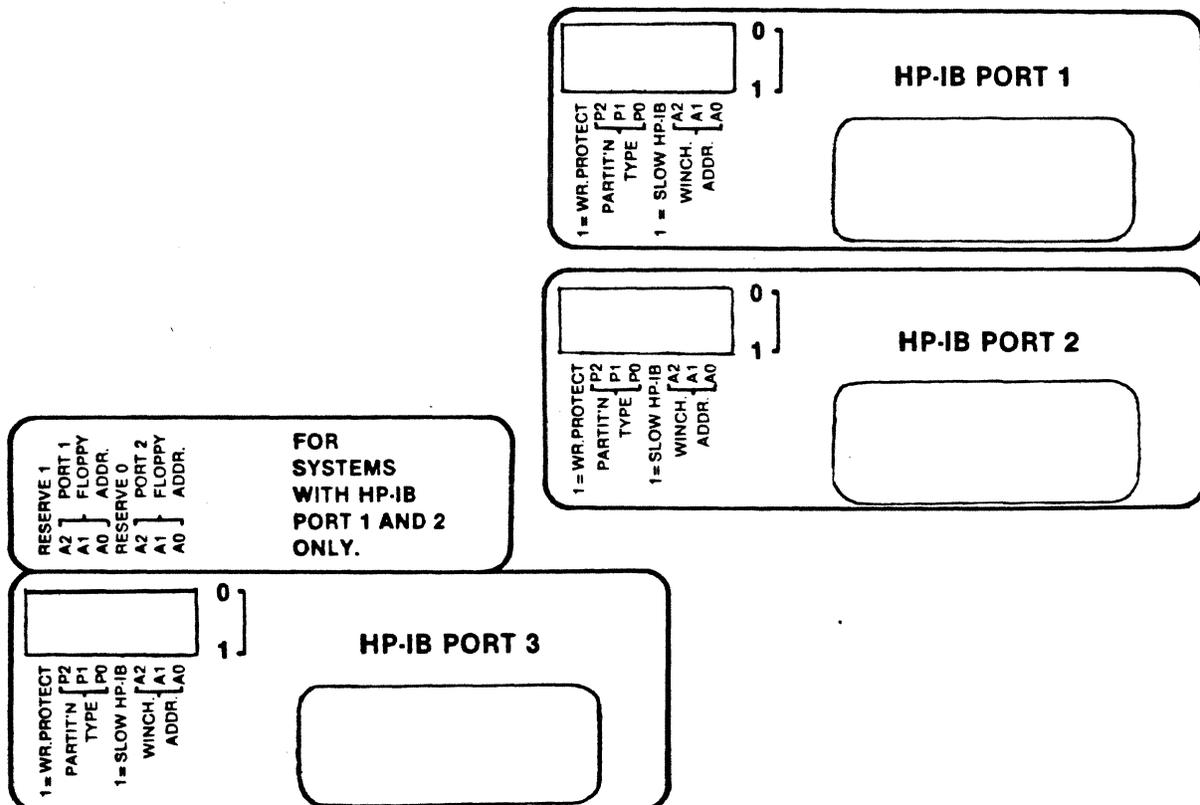


Figure 2.4

2.5.1 HP-IB Address

WINCHESTER ADDRESS:

Each port can set its own independent HP-IB address for the Winchester drive by means of the configuration switch. Keys #6 through #8 of the switch are reserved for Winchester address. Valid addresses range from decimal 0 through 7. Refer to Table 2.3 for address settings. If two or more HP-IB ports are connected together externally, ensure that the Winchester addresses do not conflict each other.

FLOPPY ADDRESS:

(a) 2-PORT WITH FRONT PANEL (Option 52x & Option 401): With these options, the floppy drive can be configured to Port 1 or Port 2 utilizing the front panel. It requires one preset HP-IB address for each port, and they can be independently specified at the configuration switch of Port 3. Floppy address for Port 1 is defined by keys #2 through #4, and for Port 2 is defined by keys #6 through #8, as shown in Figure 2.4.

(b) 3-PORT WITH FRONT PANEL (Option 53x & Option 401): Under this configuration, there is no separate address setting for the floppy drive, but it shares the HP-IB address of the Winchester drive at the port specified by the Front Panel.

(c) 2-PORT (Option 52x): Without the Option 401, the floppy drive is hardwired to Port 1 only. The address can be set at key #2 through #4 of the configuration switch at Port 3, labeled as PORT 1 FLOPPY ADDR. (This subsystem configuration is only available in the older units. All new units must have Opt. 401).

Table 2.3 HP-IB Address Settings

Address	Floppy Addr.			Winc. Addr.		
	A2	A1	A0	A2	A1	A0
0	0	0	0	0	0	0
1	0	0	1	0	0	1
2	0	1	0	0	1	0
3	0	1	1	0	1	1
4	1	0	0	1	0	0
5	1	0	1	1	0	1
6	1	1	0	1	1	0
7	1	1	1	1	1	1

WINCHESTER UNITS (VOLUMES):

Under one HP-IB address, the Winchester drive may be divided up to 4 units (volumes), numbered as 0, 1, 2, and 3. The actual number of units depends upon the size of the drive and the selected option.

Example: A Model 3x15 with Option 521, and the Winchester address at Port 1 has been set to 2, and the partition type set to 1 (2 units of 5 MB), then each unit is accessed as follows:

Address 2, Unit 0;
Address 2, Unit 1.

FLOPPY UNITS:

Floppy units only applies to Series 33xx, 35xx, and 38xx. Unit 0 of the HP-IB address set by you at the configuration switch is reserved for the built-in floppy. Unit 1 through 3 will be assigned to the invisible floppy whenever applicable. An invisible floppy here means a floppy emulation on the Winchester disk. At the end of the initialization or formatting of the Winchester disk, all the left-over storage space from the Winchester disk is automatically mapped into a number of invisible floppies. Each invisible floppy has the same storage capacity as the built-in floppy, but has the performance of the Winchester drive.

After the disk subsystem has been integrated to the computer, simply executes a "INITIALIZE" or equivalent command to find out the number of units of invisible floppies. If the unit of an invisible floppy does not exist, there will be an error of "Device time-out" or similar message from the computer.

2.5.2 Partition Type

```
*****
*
*   WARNING: BACKUP ALL FILES BEFORE CHANGING THE   *
*           PARTITION TYPE, AS RE-INITIALIZATION   *
*           OF DISK WILL DESTROY EXISTING DATA.   *
*
*****
```

The partition type of the Winchester drive specifies the way the storage space is partitioned. Each partition type is an emulation of a particular HP disk drive product. For example, 1.2 MB (Partition type of Opt. 201) emulation will look like an 8" floppy drive (HP9895A) to your HP computer. There are four major ways that a storage space can be partitioned, which are referred as Option 201, 205, 210 and 215. Option 201 means partitioning into units of 1.2 MB. Similarly, Option 205, 210 and 215 stands for 5 MB, 10 MB, and 15 MB block respectively. The partition type of each HP-IB port can be set independently by its configuration switch. Keys #2 through #4 (Labeled as P2, P1, P0) of the configuration switch are used to specify the partition type, as listed in Table 2.4.

When the disk drive powers up, the priority of disk space allocation is from Port 1 to Port 3. If the disk drive is over-partitioned, i.e. the total configured capacity is larger than the actual storage of the disk drive, some of the ports may not be configured with any storage capacity. For example, if you have Model 3030 with Option 532, and each port is configured to partition type 2 (Option 215, 15 MB), then Port 1 and 2 will each has 15 MB, but Port 3 will have no Winchester storage. If the disk drive is under-partitioned, the left-over storage space is allocated to the Shared Information Space (Option 660) and invisible floppies in that order.

Table 2.4 Switch Setting for Winchester Partition Type

PARTIT'N TYPE P2 P1 P0	EQV. OPTION	HP MODEL EMULATION	DESCRIPTION
0 0 0	N/A		Winchester capacity=0
0 0 1	205	9134A Opt.10	2 units of 5 MB
0 1 0	215	9133XV	1 units of 15 MB
0 1 1	201	9134A(9895A)	2 units of 1.2 MB
1 0 0	201	9134A(9895A)	4 units of 1.2 MB
1 0 1			Reserved
1 1 0	205	9134A Opt.10	1 unit of 5 MB
1 1 1	210	9134B	1 unit of 10 MB

Before committing to any partition type, check Table 2.5 whether the partition type is supported by your HP computer. For most Series 3000 with Opt. 5xx, you may select one of eight partition type in Table 2.4. One exception is the Series 38xx (subsystem with 8" floppy) with Option 53x, it will be limited to Option 201 only.

Table 2.5 Partition Type Supported by HP Computers

HP COMPUTER	BERING MODEL	OPT. 521/522 PARTIT'N TYPE	OPT. 531/532 PARTIT'N TYPE
Series 200 (9816/26/36)	30xx 33xx, 35xx 38xx	2xx 2xx 2xx	2xx N/A 201
HP150	30xx 33xx, 35xx 38xx	2xx 2xx 2xx	2xx N/A 201
HP120, 125 Series 80	30xx 33xx, 35xx 38xx	201, 205, 210 201, 205, 210 201, 205, 210	201, 205, 210 N/A 201
1000's A, L, XL	30xx 33xx, 35xx 38xx	2xx 2xx 2xx	2xx N/A 201
1000's E, F 9825T, 9835A, 9845B/C	38xx 38xx	201 201	201 201
9000	30xx, 38xx	201	201
250	30xx 38xx	2xx 2xx	2xx 201
64000	30xx	205, 210, 215	205, 210, 215

x: Any numerals may replace x to form a valid Model/Option number.

2.5.3 Other Hardware Options

Winchester Write Protect:

Set key no. 1 (labeled WRT. PROT.) of the configuration switch to "1", unit 0 of the Winchester drive is write-protected. Set the switch to "0", the drive is write-enabled. The disk subsystem is shipped with this key set to "0".

HP-IB Settling Time:

Set key no. 5 (Labeled SLOW HP-IB SETTling) of the configuration switch to "0", the data settling time on the HP-IB will be 370 ns. Set the switch to "1", the data settling time on the HP-IB will be 2 us. The disk subsystem is shipped with this key set to "0".

Chapter 3 GETTING STARTED

3.1 Introduction

This chapter provides instructions for integrating the Series 3000 Disk Subsystem to your HP computer. Disk initialization and other basic system operations are included to get your complete system started.

ANY BLANK DISKETTES OR A NEW WINCHESTER DISK MUST BE FORMATTED OR INITIALIZED BEFORE USING. This process checks the storage medium for defects and then creates a file directory. The directory holds the name and location of each file. When a disk is initialized, the directory is empty. So no file is listed when you catalog the disk.

Series 3000 disk subsystem implements the HP 300 command set, all the mass storage ROM or drive statements for the HP9895A and HP913x disk drive applies to this series of disk subsystem.

Table 3.1 serves as a guide to get to the related section of your computer.

Table 3.1 Reading Guide

HP COMPUTER -----	SECTION/PAGE NO. -----
HP 9000 Series 200	3.2/3-2
BASIC	3.2.1/3-2
PASCAL	3.2.2/3-6
HPL	3.2.3/3-8
HP Series 100	3.3/3-9
HP150	3.3.1/3-9
HP120/125	3.3.2/3-11
HP Series 80	3.4/3-15
HP 9845B/C	3.5/3-18
HP 9835A/B	3.5/3-18
HP 9825T	3.5/3-18
HP 1000 A, L, XL	3.6/3-20
HP 64000	3.7/3-21

3.2 HP 9000 Series 200

Series 200 computer includes HP 9816, 9826, and 9836. The following examples assume:

1. RAM based system;
2. Boot ROM 3.0.

3.2.1 Basic Language

The Series 3000 disk drive requires the system has the BASIC 2.0 or later BASIC language software package.

Boot BASIC as follows:

1. Load the System diskette into the floppy drive.
2. Turn on the computer to boot BASIC

For disk subsystem with Option 205, 210, or 215, load the BASIC extension before continue. Follow these steps:

1. Type LOAD BIN "AP 2_1"
2. Press EXECUTE

How to Initialize

To initialize a new disk, or re-initialize (erase all files) an old disk, the INITIALIZE command should be used. The format of the command is as follows:

INITIALIZE ":equipment type, HP-IB select code and device address, unit specifier"

Table 3.1 lists the equipment type specifiers for the disk subsystems under different partition options.

TABLE 3.2 EQUIPMENT TYPE

Model No.	Option	Equipment type specifier
Winchester: 3xxx 3xxx 3xxx 3xxx	201 205 210 215	:HP9895 :HP913x :HP913x :HP913x
Floppy: 33xx 35xx 38xx	All All All	:HP912x :HP912x or :HP8290x :HP9895

The following examples show how to initialize a Winchester and floppy drive under different Winchester drive configurations.

MAKE SURE YOUR SYSTEM DISKETTE IS REMOVED, AND A BLANK DISKETTE IS LOADED BEFORE PROCEEDING TO THE FOLLOWING EXAMPLES.

Example 1. Assumes a Model 3805 with Option 201, and the floppy and Winchester addresses are 0 and 2 respectively.

```

10 REM * Initialize the floppy diskette *
20 INITIALIZE ":HP9895,700,0"
30 REM * Initialize Winchester volumes *
40 INITIALIZE ":HP9895,702,0"
50 INITIALIZE ":HP9895,702,1"
60 INITIALIZE ":HP9895,702,2"
70 INITIALIZE ":HP9895,702,3"
80 END

```

Example 2. Assumes a Model 3330 with Option 210, and the floppy and Winchester addresses are 0 and 2 respectively.

```

10 REM * Initialize the floppy diskette *
20 INITIALIZE ":HP912x,700,0"
30 REM * Initialize the first unit of 10 MB Winchester *
40 INITIALIZE ":HP913x,702,0"
50 REM * Initialize the second unit of 10 MB Winchester *
60 INITIALIZE ":HP913x,702,1"
70 REM * Initialize the third unit of 10 MB Winchester *
80 INITIALIZE ":HP913x,702,2"
90 END

```

Example 3. Assume a Model 3515 with Option 205, and the floppy and Winchester addresses are 0 and 2 respectively.

```
10 REM * Initialize the floppy diskette *
20 INITIALIZE ":HP8290x,700,0"
30 REM * Initialize the 15 MB Winchester *
40 REM * Initialize unit 0 (5 MB) *
50 INITIALIZE ":HP913x,702,0"
60 REM * Initialize unit 1 (5 MB) *
70 INITIALIZE ":HP913x,702,1"
80 REM * Initialize unit 2 (5 MB) *
90 INITIALIZE ":HP913x,702,2"
100 END
```

During the INITIALIZE command, if more than five defective tracks are found in the floppy diskette, the routine will be halted and the number of tracks will be displayed.

File Copy

Using the COPY command, any files or the entire disk can be copied. When copying a file, the contents of the old file is copied into the new file, and a directory entry is created. When copying the entire disk, the complete contents of the disk is duplicated (including the directory label and size) if the destination media is as large as, or larger than, the source media.

Example 1:

With Option 201, a volume of the Winchester can be copied to the floppy disk, or vice versa:

1. Type COPY ":HP 9895, msus*" TO ":HP 9895,msus"
2. Press EXECUTE

Example 2:

With Option 205 or 210, only file copy is possible.

1. Type COPY "Filename:HP913x, msus" TO "Filename:HP9895, msus"
2. Press EXECUTE

Example 3:

To copy from one unit of Winchester to another unit of Winchester of the same partition type. Assume: HP-IB address of Winchester is 2, and copies from unit 0 to 1.

1. Type COPY ":HP913x,702,0" TO ":HP913x,702,1"
2. Press EXECUTE

*msus: Mass Storage Unit Specifier

3.2.2 Pascal

When PASCAL boots up, it determines what mass storage devices are connected to the computer, and makes them accessible to the File system. When a disk is found, it is assigned with a unit number. Some of the nominal assignment of unit number are as follows:

<u>Bering Model</u>	<u>Winc. unit #</u>	<u>Floppy unit #</u>
30xx	11 to 40	N/A
33xx	11 to 40	3
35xx	11 to 40	3
38xx	11 to 40	7

Under auto-configuration, it assumes at most one hard disk will be present, so it stops configuring the other hard disks once the first one is located. For disk subsystem with multiple volumes of 4.8 MB, 9.7 MB, or 14.5 MB, which emulates multiple units of HP equivalent disks, only volume 0 will be recognized by auto-configuration. Under those cases, CTABLE need to be changed to configure all units. Consult Appendix E for instructions.

Once a hard disk is found, it is automatically partitioned into several volumes which are assigned consecutive unit numbers beginning with #11. The size of each volume and the number of volumes depend on the type of disk.

NOTE: All units need to have a directory with a legal volume label, so that it can be listed by the VOLUME command. Thus, it is important to have the disk initialized before it can be used.

How to Boot and Initialize

The following example demonstrates how to boot from an external floppy drive and initialize a Winchester volume. It assumes you have Model 33xx, or 35xx, or 38xx, and Boot ROM 3.0. By changing the logical unit(lu) number, the same procedure could apply to the initialization of other Winchester and floppy media.

1. Turn off your computer.
2. Insert the diskette labeled "BOOT" into the floppy drive.
3. Turn on the computer.
4. When instructed to insert the diskette labeled "SYSVOL:", do so and press the "X" key to continue.

5. At the Main Command Level, insert the diskette labeled "ACCESS".
6. Press "X" to eXecute a program. You will see the following display:
Execute what file?
7. Type: ACCESS:MEDIAINIT (Enter)
The program starts running and asks:
Volume ID?
8. Type: #11 (Enter)
If the disk has been previously initialized and already has a directory on it. MEDIAINIT displays the name of the existing directory. It also gives the following warning:
WARNING: the initialization will also destroy:
#11
#12
#13
...
Are you SURE you want to proceed? (Y/N)
9. Type "Y" to continue.

Once the media is initialized, you can refer to the PASCAL USER'S MANUAL for any other disk mass storage commands.

3.2.3 HPL

Under HPL, only 1.2 MB (Option 201) Winchester partition is supported. The general format for a mass storage unit specifier(msus) is:

: [device format[select code]][,unit number]

Examples:

- :J707,2 Specifies 1 unit of 1.2 MB, LIF format,select code 707, unit #2.
- :H707,1 Specifies 1 unit of 1.2 MB, HP9825 compatible format; select code 707, unit #1.
- :M700,0 Specifies 5.25" floppy at address 0, unit 0; LIF format.

Initialize

The general format for the INIT command is as follows:

INIT msus [,interleave factor[,number of directory records]]

Example: Assumes a Model 3005 with Option 201, and initializes all units at address 707 to LIF format.

INIT ":J707,0",22,-1	[unit 0 with interleave no. 22]
INIT ":J707,1",22,-1	[unit 1 with interleave no. 22]
INIT ":J707,2",22,-1	[unit 2 with interleave no. 22]
INIT ":J707,3",22,-1	[unit 3 with interleave no. 22]

Consult the Disc Programming section of the HPL Operating Manual for other commands.

3.3 HP Series 100

HP Series 100 includes HP120, HP125, and HP150 computers.

3.3.1 HP150

In order to install the Winchester drive, a floppy drive is needed. For Model 30xx, an external floppy drive like HP 9121x is required to boot the Operating System. Make sure the HP-IB address for the floppy drive is 0 and the Winchester drive is 2.

1. Insert the diskette labeled SYS_MASTER into the floppy drive.
2. Turn on the computer to boot or touch Re-Read Disk key to show all available applications.
3. Select Format application and Execute.
4. Select Copy System key.
5. Select drive C (Winchester), and enter label.
6. Start formatting to initialize drive C and copy the system software onto the Winchester.
7. Exit Format.
8. Select Device_Config and Execute.
9. The defaulted disk configuration is:

Drive	HP-IB Addr.	Unit
A	0	0
B	0	1
C	2	0

In order to boot from the Winchester, changes have to be made in the configuration table to accommodate the Winchester drive. Depending on the number of units under the selected partition type, the Winchester drive may be configured as Drive A to D, and unit 0 to 3. The HP-IB address of the Winchester should be set to 0, and that of the floppy

drive set to 2 (referred as Drive E). For example, if you have Model 3315 with Option 205, the table should read as follows:

Drive	HP-IB Addr.	Unit
A	0	0
B	0	1
C	0	2
E	2	0

10. Save configuration.
11. Remove the diskette and turn the power OFF on both your system processor and the disk subsystem.
12. Change the Winchester address to 0 at the configuration switch of the rear panel, and the floppy address to 2.
13. Turn the power ON both the system processor and the disk subsystem. The system processor will now boot from the Winchester disk.
14. Insert the diskette labeled DISC_MASTER into the floppy drive and touch the Re_Read key.
15. Select Install Applications and Execute.
16. Insert the MASTER diskettes one at a time and install the remainder of the files on the SYS_MASTER diskette and the DISC_MASTER diskette to your Winchester disk at Drive A. DO follow the procedure for program installation in your HP 150 Manual.

Drive A has all the system and application programs on it now. But if there is any new drive (i.e. Drive B of the Winchester disk), remember to format it before using.

3.3.2 HP 125/120

NOTE
Winchesters supported only on operating system
supplied after 2/15/82

Differences Between OS 01.20 and OS 02.00

Only the differences relating to the disk drives are covered here.

1. The number of available disk-drive addresses increases from 2 to 4 as shown below.

<u>OP. SYS</u>	<u>Partition Type</u>	<u>HP-IB address</u>	<u>Logical volume</u>
01.20	201	0	A, B, C, D
		2	E, F, G, H
02.02	201	0	A, B, C, D
		2	E, F, G, H
		4	I, J, K, L
		6	M, N, O, P
02.02	205, 210	0	A
		2	E
		4	I
		6	M

2. Under OS 01.20, the only disk partition type supported is Option 201. For any disk address, there could be four different logical volumes. e.g. if the Winchester is set at address 2, the possible logical volumes would be: E, F, G, H, each of which is 1.2 MB.

Under OS 02.02, the supported partition types are Options 201 (1.2 MB), 205 (4.8 MB), and 210 (9.7 MB). Option 201 is the same as in OS 01.20. Under Option 205 and 210, multiple volumes under the same address are not supported. e.g. if a disk of Option 210 type is set at address 2, only device E is applicable (Volume F, G, H are no longer valid).

NOTE: Floppy disk drive occupies 1 or 2 logical volumes at each HP-IB address. (Very much like a 1.2 MB Winchester volume).

The following descriptions for INITIALIZING and COPYING FILES is based on OS 01.20, but a similar procedure applies to OS 02.02.

Initializing (Formatting) a Floppy Disk or Winchester Disk

1. Reminder: The floppy address should have set at 0, and that of the Winchester should be at 2.
2. Insert the system diskette into the floppy drive.
3. Load the OP SYS by turning the system on or pressing key f6.
4. Select utility 125 by pressing the f1 key.
5. Load the DISC FORMAT routine by pressing the f2 key.
6. To format a diskette in the floppy drive, remove the system diskette and insert the diskette you wish to format (Label side up and nearest to you). Make sure the diskette is write-enabled.

6.1. Ensure the disk drive(s) to be formatted is turned ON (CONFIGURATION MODE display control) and all others OFF (A through D is address 0, volumes 0 through 3, and E through H is address 2, volumes 0 though 3).

6.2. The format type is noted for each drive.

6.3. The appropriate interleave number is specified. (Interleave number is the number of sectors separating one logical sector from the next on the disk).

To make the necessary changes on the menu, use the TAB key or the cursor keys to move to the field you want to change, then press the function keys labeled NEXT CHOICE or PREVIOUS CHOICE until the value you want in the field is displayed.

7. Press the function key labeled START PROGRAM (f5) to start the the DISC FORMAT program.

If there is no disk in the drive set "ON", the following message appears on the screen:

```
INITIALIZING DISC  
DRIVE or DISC NOT AVAILABLE
```

If you start to format a disk that has already been formatted, the program will stop and display the following message:

Disc Type: HP-DOUBLE SIDED
or
Disc Type: IBM-SINGLE SIDED

Now select your function to continue. The options are as follows:

- 7.1. To continue to run the program and reformat the disk;
- 7.2. To stop formatting the current disk and proceed to the next disk;
- 7.3. To stop the entire formatting operation.

If you choose CONTINUE, the disk will be reformatted.

If you choose STOP CURRENT, the message

OPERATION ABORTED - DISC X

is displayed (where X is the current drive). The program then tries to format the next disk selected in the menu if more than one has "ON" indicated.

If you choose STOP ALL, the same message is displayed, and the following functions are available:

RESTORE MENU to return to the Disk Format Menu
START PROGRAM to continue with the formatting
EXIT to return to the Application Menu

Storing the Operating Systems on the Winchester

You may wish to store the operating systems (presently on the diskette) onto the Winchester. To do this, perform the following steps:

1. Turn off the disk subsystem.
2. Set the floppy drive device address to 0. Set the Winchester drive device address to 2.
3. Turn on the disk subsystem. After this is completed, the floppy drive specifier (in the CONFIGURATION mode) is "A" and the four Winchester volumes are "E,F,G, and H".
4. Insert the diskette and copy (use utility program DISC COPY) to the first volume of the Winchester (E). Select "SYSTEM" files only before start the COPY command.

5. Exit COPY utility and goes to CP/M. Use PIP to copy all other files:
A> PIP E:=A:*. *[r]
6. After the copy operation completes, the device addresses of the drives must be changed. To do this, perform the following:
 - 6.1. Turn off the disk subsystem.
 - 6.2. Set the Winchester drives device address to 0.
 - 6.3. Set the floppy drive device address to 2.
 - 6.4. Turn on the disk subsystem.

After the new device addresses have been set, the floppy drive specifier (in the CONFIGURATION mode) is "E", and the four volumes of the Winchester are "A,B,C, and D".

File Copy

To copy a file from the floppy diskette to a volume on the Winchester or vice versa, or from the Winchester volume to another Winchester volume, perform the following:

Load the operating system by pressing the f6 key
EXIT TO CP/M by pressing the f8 key

The prompt A> appears on the display.

Type PIP E:=A:XXXXXX.YYYYY
Press RETURN.

where, XXXXXX is the file name, and YYYYY is the name extension.
A is the source drive, and E is the destination drive.

3.4 HP Series 80

Initializing a Floppy Diskette or a Volume of the Winchester

To initialize a new diskette or re-initialize (erase all files) on an old diskette, or to initialize all the volumes of the Winchester disk:

1. Be sure the diskette is write-enabled (refer to Chapter 1, Section 1.3 for instruction). Insert the diskette into the floppy drive, and close the latch. To determine whether or not a disk has been initialized, type the CAT ":msus" command and press the END LINE key. The message "ERROR 130: DISC" indicates that the disk has not been initialized.
2. Type in the INITIALIZE command, specifying the parameters:

```
INITIALIZE ("new volume label"("msus" or ".old volume  
label"(",director y size(",interleave factor))))
```

--"new volume label" - is a six-character name assigned to the disk. The .(period), :(colon), and "(quotes" are the only characters that cannot be used.

--"msus" or ".old volume label" - is the mass storage unit specifier or the existing old volume label.

--directory size - is the number of records to be allocated.

--interleave factor - specifies the number of physical records between any two logically sequential sectors.

```
*****  
                          CAUTION  
ANY INFORMATION STORED ON THE WINCHESTER OR THE  
DISKETTE WILL BE DESTROYED BY INITIALIZING.  
*****
```

For disk subsystem, the general format for ":msus" is ":Dxyz", where
x: The interface code for the HP-IB interface card. Defaults
to 7.
y: HP-IB address ranging from 0 to 7.
z: Unit number ranging from 0 to 3.

For other devices (e.g. printer), "yz" are used to form a two digit
number for the HP-IB address. For example, a disk drive at address 2,
unit 0 would be accessed as :D720. Whereas a printer at address 2 would
be accessed as :D702.

Example 1. Assumes a Model 3805 with Option 201. The floppy and
Winchester addresses are 0 and 1 respectively.

```
10 REM * Initialize the floppy diskette *
20 INITIALIZE "DISK-0", ":D700"
30 REM * Initialize Winchester volumes *
40 INITIALIZE "DISK-1", ":D710"
50 INITIALIZE "DISK-2", ":D711"
60 INITIALIZE "DISK-3", ":D712"
70 INITIALIZE "DISK-4", ":D713"
80 END
```

Example 2. Assumes a Model 3310 with Option 205. The floppy and
Winchester addresses are 0 and 1 respectively.

```
10 REM * Initialize the floppy diskette *
20 INITIALIZE "DISK-0", ":D700"
30 REM * Initialize the first unit (5 MB) of Winchester *
40 INITIALIZE "DISK-1", ":D710"
50 REM * Initialize the second unit (5 MB) of Winchester *
60 INITIALIZE "DISK-2", ":D711"
70 END
```

Copying a File or Volume

To back up a file from a floppy drive to the Winchester drive, or vice versa (both must have been initialized on a HP Series 80 mainframe):

1. Type COPY "File Name:msus"TO"File Name:msus"
2. Press END LINE

To back up a volume from the floppy drive to the Winchester or vice versa:

1. Type COPY ":msus"TO":msus"
2. Press END LINE

3.5 HP 9835A/B, HP 9845B/C, HP 9825T

Initializing the Winchester Drive

The "INITIALIZE" statement enables a new mass storage medium to be used with the HP 9845B/9845C Systems by establishing physical records, the main, and the spare directories. A used medium can also be re-initialized; in the process, the previous contents of the medium is erased.

INITIALIZE "mass storage unit specifier"

For example, the following program initialize four/eight volumes of the Winchester disk and the diskette. The program assumes the floppy address switch is set to 0, and the Winchester address switch is set to 1 and 2 (assumes subsystem has Option 5xx).

```
10 REM * Initialize the floppy diskette *
20 INITIALIZE ":H7,0,0"
30 REM * Initialize the first four Winchester volumes *
40 INITIALIZE ":H7,1,0"
50 INITIALIZE ":H7,1,1"
60 INITIALIZE ":H7,1,2"
70 INITIALIZE ":H7,1,3"
80 REM * Initialize the second four Winchester volumes *
90 INITIALIZE ":H7,2,0"
100 INITIALIZE ":H7,2,1"
110 INITIALIZE ":H7,2,2"
120 INITIALIZE ":H7,2,3"
130 END
```

IF YOU HAVE NON-HP MASS STORAGE ROM LIKE THE BERING PART # 0021-0011, THE DEVICE SPECIFIER SHOULD BE ":A7,x,x" INSTEAD OF ":H7,x,x".

Backing Up Files on the Winchester Drive

To store an individual file from another mass storage device on the Winchester drive, or from one volume of the Winchester to another volume, or another mass storage device:

1. Type COPY "File Name:msus"TO"File Name:msus"
2. Press EXECUTE

To copy an entire Winchester drive to a number of floppy diskettes or vice versa, it would require the local backup/restore enhancement (Option 401) or custom software utility. Consult Chapter 4 for instructions.

3.6 HP 1000 Series A, L, XL

Integrating to the Computer

1. Ensure DD.30 & ID.30 driver is included in system generation.
2. Plug the HP 12009A Interface into the mainframe, then plug one end of the HP 12009-60002 cable into the interface, and the other end into the socket on the rear panel of the disk subsystem.
3. Turn the mainframe and all peripherals on. All peripherals connected to the HP-IB bus should be turned on for the system to operate properly.
4. Locate Technical Memo #105 in the supplied literature, and follow the examples to prepare the answer file for system generation.

3.7 HP 64000

The installing of disk subsystem is menu-driven operation under the HP 64000 OP SYSTEM. The following steps are rough guidelines:

1. After booting the OP SYSTEM, get to the menu of the SYSTEM DISC UTILITY.
2. Press the "fmt & test" softkey to start the disk initialization.
3. Depending on the size of the disk drive, it would take 25 minutes or more.

For detailed instructions, consult the section of Disc Installation in the HP 64000 INSTALLATION & CONFIGURATION REFERENCE MANUAL. The Bering disk subsystem is equivalent to an HP 913x type.

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GETTING STARTED

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Chapter 4 LOCAL COMMANDS

4.1 Introduction

In order to execute any Local Commands, it requires the front panel option (Option 401). The front panel consists of three push buttons, namely: SELECT, BACKUP & RESTORE, and two 7-segments LED's. Local commands include backup, restore, diskette format and floppy configuration.

The two 7-segments LED's provides two types of information:

1. Power-on self-test error: If any error occurs during the power-on test, the error code will be displayed. Consult Appendix F for error codes.
2. Local command status: Whenever in local command mode, it displays status or error messages. Consult Appendix F for error messages.
3. Floppy address assignment: Whenever the disk subsystem is not executing local commands, the current port assignment of the floppy drive is shown. The digit on the left is the HP-IB port number. The other digit is the unit number associated with the floppy address set for that port.

4.2 Local Backup

All data on the Winchester disk drive can be backed-up onto built-in floppy. The number of diskettes required depends on the storage capacity of the Winchester drive and floppy. Table 4.1 summarizes the backup and restore requirements.

Table 4.1 Backup and Restore Diskette Information

FLOPPY SIZE	WINC. PARTIT'N TYPE	# OF DISKETTES PER UNIT	TIME* REQ'D/DISKETTE (Backup/Restore)
3.5"	201	5	1/.75 min.
	205	17	"
	210	34	"
	215	51	"
5.25"	201	4	2/1.5 min.
	205	16	"
	210	32	"
	215	48	"
8.0"	201	1	3.5/2 min.
	205	5	"
	210	11	"
	215	13	"

* Time shown assumes the diskette has been formatted, otherwise it takes an additional of one minute.

BACKUP PROCEDURE:

1. Consult Table 4.1, and get the backup diskettes ready, and make sure they are write-enabled.
2. Load a diskette into the floppy drive. Refer to Appendix B for loading of diskettes.
3. Press the BACKUP button. Ensure the LED above the button is lit before releasing it.
4. Check the numbers on the display, and make sure it matches the source unit to be backed-up. The digit on the left is the HP-IB port number, and the other digit is the unit number. If the display reads "Fx", where x could be 1, 2, or 3, the source unit represents an invisible floppy (See section 2.4.1 for description). To change the source number, press and release the SELECT button till the desired source number appears on the display.
5. Press the SELECT and BACKUP buttons simultaneously for at least 1/3 of a second to start the backup process. The LED on the BACKUP button should remain lit during the whole process.
6. When "FF" appears on the display, it means the current diskette is full. When the 3.5" or 8" diskette is unloaded, the display should read "F " to acknowledge the change (Except for 5.25" diskette, the display would remain "FF").
7. Label the diskette, and store it in the box.
8. If you want to abort the process, press all three buttons (SELECT, BACKUP, RESTORE) simultaneously. Otherwise, load another diskette and press the SELECT button to continue. The display should show the source unit number again.
9. For 3.5" and 8" floppy, repeat step 6 through 8 till "Fo" appears on the display, and as for the 5.25" floppy, repeat those steps till the digit on the right of the display becomes blank. This signifies the end of the backup command. Unload the last diskette, the display will return to " 1" and go back online. Otherwise it will stay in local mode, and cannot be accessed by the computer.

4.3 Local Restore

Restoring data to the Winchester drive from the backup diskettes is a similar task to the backup process. All backup diskettes were written with a unique indentifying number during backup, so they can be restored in any order. Follow these steps:

1. Get all the backup diskettes ready.
2. Load one of the diskettes into the floppy drive. Refer to Appendix B for loading of diskettes.
3. Press the RESTORE button. Ensure the LED on the button is lit before releasing it. If you want to abort the command, press all three buttons simultaneously.
4. Check the numbers on the display, and make sure it matches the destination unit to be restored. The digit on the left is the HP-IB port number, and the other digit is the unit number. If the display reads "Fx", where x could be 1, 2, or 3, the source unit represents an invisible floppy (See Section 2.4.1 for details). To change the destination unit number, press and release the SELECT button till the desired destination unit number appears on the display.
5. Press the SELECT and RESTORE buttons simultaneously for at least 1/3 fo a second to start the restoring process. The LED of the floppy drive should be lit now, and the LED on the RESTORE button should remain lit during the whole process.
6. When "FE" appears on the display, it means the current diskette has been restored. When the 3.5" and 8" diskette is unloaded, the display should read "F " to acknowledge the change. But for 5.25" diskette, the display should remain unchanged.
7. Load the next diskette into the drive.
8. If you want to abort the process at this time, press all three buttons simultaneously. Otherwise, press the SELECT button to continue. The display should show the destination unit number again.
9. For 3.5" and 8" floppy, repeat step 6 through 8 till "Fo" appears on the display, and as for the 5.25" floppy, repeat those steps till the digit on the right of the display becomes blank. This indicates the completion of the restore process. Ensure to unload the last diskette, otherwise the disk subsystem will remain offline, and cannot be accessed by the computer. In addition, verify the port number of the floppy shown on the display.

4.4 Local Format

```
*****  
* This command WILL NOT WRITE THE DIRECTORY on the media. *  
* Most HP computers require an INITIALIZATION or          *  
* equivalent command to do it.                            *  
*****
```

Local formatting supports HP format only. It applies to both single- and double-sided diskettes. Follow these steps:

1. Load the diskette to be formatted into the drive. Make sure the diskette is write-enabled.
2. Press the BACKUP button, and the LED on the button should be lit. Release the button.
3. Press and release the SELECT button till "F0" appears on the display.
4. Press and release the SELECT and BACKUP buttons simultaneously for at least 1/3 of a second. The format process has started, and the LED in front of the floppy drive should be lit.
5. When the port number appears on the display, the command is completed, and the subsystem is on-line again.

4.5 Floppy Configuration

1. With Option 52x: The Port assignment of the floppy is accomplished by the switches and display of the front panel. When the disk subsystem is powered up, the floppy drive is configured to HP-IB port 1. Press the SELECT button on the front panel to configure the floppy drive. Every time the SELECT button is pressed, a new port number appears on the display. It takes 5 seconds for the new port assignment to be effective, and the floppy drive is always configured to the last port number shown on the display.
2. With Option 53x: When the disk subsystem powers up, the floppy drive is not configured to any of the HP-IB ports. Use the SELECT button of the front panel to specify the port and unit numbers of the floppy. Every time the SELECT button is pressed, a port and unit number will be shown on the display. The digit on the left denotes the port number, and the other digit is the unit number associated with the floppy address set for that port. Port number ranges from 1 through 3, and the unit number could be 0 or 3. The unit number is part of the HP-IB address, of which each address can have up to four units ranging from 0 through 3; but for the floppy drive, it is limited to 0 and 3 only. If it so happens the unit number of the floppy drive is the same as one of the Winchester unit, the floppy unit overlays the Winchester unit. But, once the floppy drive is re-configured to another HP-IB port or unit number, the Winchester unit becomes available again. And, for every re-configuration, it takes approximate 5 seconds for the floppy to become available again. For example, suppose the display of the front panel reads "13", and the HP-IB address of the Winchester drive at Port 1 has been set to "2". The current configuration of the floppy drive is HP-IB Port 1, Device 2, and Unit 3. If there was a Winchester Unit 3 in Port 1, it is temporarily not available.

Chapter 5 SERVICE INFORMATION

5.1 Introduction

This chapter provides basic troubleshooting procedures and instructions on how to obtain service and repair assistance.

5.2 Basic Troubleshooting

If the disk subsystem will not power up (i.e. none of the LED's is lit), and the cooling fan is not operating, make the following simple checks:

1. Make sure the power switch is at the ON position.
2. Verify that the main power outlet is functional.
3. Ensure the power cord is firmly seated in the power receptacle and the main power outlet.
4. Disconnect power cord, open the fuse holder, and check the fuse (refer to Appendix A).

If everything checks out but the disk subsystem still cannot power up, proceed to Section 5.3.

If the disk subsystem powers up but the host computer encounters mass storage errors, isolate the problem as follows:

1. Turn off all devices, including the Bering's Disk Subsystem, on the HP-IB.
2. Disconnect the Bering disk subsystem from the HP-IB Bus.
3. Turn on the Bering disk Subsystem. Refer to Chapter 2, Section 2.3 of this manual for power-on self-test.

If any of the modules fails the power-on self-test, make note of the MAIN LED at completion, and proceed to Section 5.3 for assistance.

If the disk subsystem passes the power-on self-test, one of the following events is likely. Please verify before proceeding to next section for further assistance.

-- Malfunction in the HP-IB interface hardware, either at the disk subsystem or the host computer side.

- Device address is not properly set. (See Section 2.4 & your HP Computer User's Manual)
- ROM, HP-IB Interface, etc are not properly installed. (See Table 2.1 & related HP manuals)
- Mass Storage Specifier is not properly used.

5.3 Service Assistance

U. S. customers who purchased the subsystem from dealer/distributor, or other authorized reseller, should first contact these respective sales outlet for assistance.

Customers outside of the United States should contact their sales source (Bering Authorized Dealer/Distributor) for directions on how to obtain service assistance.

When you need help from Bering directly, have the Model and Serial number ready from the rear panel of the disk subsystem, and call:

Customer Service
Bering Industries, Inc.
415-651-3300

NOTE:

- 3.1. Return Material Authorization (RMA) is required to return any equipment to Bering Industries.
- 3.2. Must use original factory shipping box and material for shipping. Ask Customer Service for further advice and shipping address.

Appendix A MISCELLANEOUS TECHNICAL INFORMATION

A.1 Product Specification

FUNCTIONAL

Interface	HP-IB.
Compatibility	Transparent to standard HP computer hardware, software, and media.
Self-Test	ROM diagnostics; automatic at power on.
Options	Multi-port sharing; Local backup and restore.

PERFORMANCE

(I) Winchester

	3x05 Opt 201	3x05 Opt 205	3x10 Opt 210	3x15 Opt 215	3x30 Opt 215	3x45 Opt 215
Transfer Rate (k Bytes/s)						
Burst:						
Read (To host)	490	490	490	490	490	490
Write (From host)	610	610	610	610	610	610
Average*	174	174	174	174	174	174
Rotational Speed (rpm)	3,600	3,600	3,600	3,600	3,600	3,600
Average Latency (ms)	8.3	8.3	8.3	8.3	8.3	8.3
One Track Seek (ms)	22	22	22	22	7	7
Average Seek** (ms)	40	69	65	42	44	37
Full-stroke Seek** (ms)	55	130	121	64	70	60
Average Access** (ms)	48.3	77.3	73.3	50.3	52.3	45.3
Maximum Access** (ms)	71.6	146.6	137.6	80.6	86.6	76.6

(II) Floppy

	3.5"	5.25"	8"
Transfer Rates (k Bytes/s)			
Burst:			
Read (To host)	490	490	490
Write (From host)	610	610	610
Average*	20.48	10.24	25.6
Rotational Speed (rpm)	600	300	360
Average Latency (ms)	50	100	83.3
One Track Seek (ms)	35	18	18
Average Track Seek (ms)	370	94	91
Full-stroke Seek (ms)	1070	219	243
Average Access Time (ms)	420	194	174
Maximum Access Time (ms)	2170	669	1410
(Seek plus Latency plus Motor on time)			
Spindle Motor on time (ms)	1000	250	1000

* Mainframe and interleave factor dependent

** Within the same logical unit of Winchester

MISCELLANEOUS TECHNICAL INFORMATION

STORAGE CAPACITIES

(I) Winchester

	3x05	3x10	3x15	3x30	3x45
Number of Platters	1	2	3	3	4
Number of Heads	2	4	6	6	8
Cylinders per Surface	306	306	306	640	640
Number of Tracks	612	1224	1836	3840	5120
Sectors per Track	34	34	34	34	34
Bytes per Sector	256	256	256	256	256
Formatted Capacity (MB)	5.2	10.5	15.7	33.2	44.3

(II) Floppy

	3.5"	5.25"	8"
Number of Heads	1	2	2
Cylinders per Surface	70	40	77
Number of Tracks	70	80	154
Sectors per Track	16	16	30
Bytes per Sector	256	256	256
Formatted Capacity (MB)	.286	.328	1.18

POWER

	110 Vac	220 Vac
Line Voltage (Vac)	90 to 132	198 to 264
Line Frequency (Hz)	47 to 63	47 to 63
Current (amp)	.7 to 1.1	.4 to .6

PHYSICAL

Height	107 mm (4.2")
Depth	446 mm (17.5")
Width	394 mm (15.5")
Weight	
Winchester only	10.58 kg (23.5 lb.)
Winc. + Floppy	14.09 kg (31.3 lb.)
Shipping Weight	
Winchester only	15.75 kg (35 lb.)
Winc. + Floppy	20.25 kg (45 lb.)

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MISCELLANEOUS TECHNICAL INFORMATION

ENVIRONMENTAL

Operating Temp.	5 °C to 40 °C (41 °F to 104 °F)	
Storage Temp.	-10 °C to 51 °C (-14 °F to 125 °F)	
Relative Humidity	20% to 80% (25.5 °C max. wet bulb temp.)	
Operating Altitude	-304.8 m to 2000 m (-1000 ft. to 6560 ft.)	
Vibration	Winchester	Floppy

Operating	1 g	.25 g (10 to 100 Hz;
Non-operating	3 g	2.00 g Rd/Wr only)

RFI EMISSION

Meets or exceeds EMI/RFI emission standard for FCC Technical Standard for Class A Computing Equipment, Docket 20780 Part 15.

A.2 Electrical Information

*** LINE VOLTAGE ***

When the disk subsystem is shipped, it should have already been set to the line voltage specified in your order. The configured line voltage should be either 110 Vac, or 220 Vac (see Table A.1). Field reconfiguration of voltage setting is not allowed. When reconfiguration is required, please consult the factory.

Table A.1 Voltage Setting

Line Voltage Range	Configured Voltage
90V to 132V	110V
198V to 264V	220V

*** FUSES ***

When the disk subsystem is shipped, there is always a spare fuse in the fuse compartment of the power/fuseholder receptacle.

The fuse compartment is located in the lower portion of the power/fuseholder receptacle. It can be opened by using a small screw driver or similar object.

Disk Model	Line-Voltage	Fuse type
38xx	110/220 Vac	3.15 A, Slow blow, 5 X 20 mm
Others	110/220 Vac	1.6 A, Slow blow, 5 X 20 mm

Users are urged to verify the fuse visually before power-up to avoid possible safety hazard and damage to the disk subsystem. DO NOT USE A FUSE WITH A HIGHER RATING THAN THE SPECIFIED TYPE.

WARNING

DISCONNECT THE DISK SUBSYSTEM UNIT FROM ANY
POWER SOURCE BEFORE CHANGING FUSES

AC Power Cord

If you do not have the right power cord for your area, please contact your nearest authorized sales/service company or Bering Industries.

To install the AC power cord:

1. Set the power switch of the disk subsystem to the OFF position.
2. Connect the female-end of the cord into the AC power socket at the rear of the disk subsystem.
3. Then plug the male-end of the cord into the proper AC power outlet on your premises.

WARNING
REPLACE THE POWER CORD ONLY WITH ANOTHER CORD THAT
HAS THE SAME ELECTRICAL POLARITY AS THE ORIGINAL.
FAILURE TO DO SO MAY CAUSE SAFETY HAZARDS.

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MISCELLANEOUS TECHNICAL INFORMATION

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Appendix B FLOPPY DISKETTE USE

This appendix provides instructions for diskette loading, handling, and write protection.

CAUTION

USE ONLY BERING OR HP APPROVED MEDIA SINCE THE USE OF NON-APPROVED MEDIA CAN RESULT IN PREMATURE DISK FAILURE OR DAMAGE TO THE FLOPPY DRIVE.

USING NON-APPROVED MEDIA FOR ONE TIME ONLY APPLICATIONS SUCH AS DATA INTERCHANGE WILL NOT DAMAGE THE DRIVE OR DESTROY THE MEDIA, BUT IF EXTENDED USAGE IS ANTICIPATED, THE DATA SHOULD BE TRANSFERRED TO APPROVED MEDIA.

B.1 Loading and Unloading

To load a 3.5" diskette:

1. For disk cartridge without auto shutter, make sure the shutter is open before inserting it into the drive. If a disk cartridge of this type is accidentally inserted without opening its shutter, it will be ejected by the fail-safe mechanism.
2. With the metal hub down and the label facing up, insert the disk cartridge into the drive until it is properly latched.

To unload a 3.5" diskette:

1. Make sure the activity LED in front of the floppy drive is off.
2. Depress the eject button to unload the disk cartridge.

To load a 5.25" or 8" diskette:

1. Open the door of the drive by pressing in on the door latch in the front.
2. Insert diskette into the drive until it is latched, with the label on the diskette facing up.
3. Press down the handle of the door until it locks in place.

To unload a 5.25" or 8" diskette:

1. Open the door of the drive by pressing in on the door latch, and the diskette should be ejected.
2. Pull the diskette straight out, and store it in the protective envelopes.

B.1.1 Handling

To ensure error-free operation, the following steps are recommended for handling of diskettes:

1. Use only Bering Industries or Hewlett Packard approved diskettes.
2. Return the diskette to its storage envelope and store it in the box whenever it is removed from the disk drive. (Does not apply to 3.5" diskette)
3. Replace storage envelopes when they become worn, cracked and distorted. (Does not apply to 3.5" diskette)
4. Do not touch or attempt to clean the recording surfaces.
5. Do not bend or fold the diskette.
6. When writing on the plastic jacket of the diskette, use a felt-tip pen and on the label part only.
7. Do not expose the diskette to extremes of temperature or humidity.
8. Keep the diskette away from magnetic fields and ferromagnetic materials.
9. Remove the diskette completely from the drive when access is not needed for an extended period of time.
10. Replace diskette periodically. Copy data to a new diskette and discard the old one every three months for heavily used diskette or at least once a year, even for lightly used diskette. If you see visible signs of abrasion on the diskette, do an immediate backup and discard the worn diskette.

OXIDE RESIDUES FROM DEFECTIVE DISKETTES MAY CONTAMINATE AND
SERIOUSLY DAMAGE THE READ/WRITE HEADS OF YOUR DRIVES.

B.1.2 Write Protection

The diskettes can be write protected. This feature prevents the accidental erasure of data on the diskette. The procedures of write protection for each type of diskette are different, and will be described separately.

3.5" diskette -----

1. Locate the write protect tab in the bottom side of the diskette. See Figure B.1.
2. Lift up the tab with a small screw driver or a similar object, and turn it in either direction until the tab is removed.
3. Insert the removed tab as illustrated in Fig. B.1. With the tab in this position, the diskette is write-protected.

TO WRITE ENABLE A DISKETTE WHOSE TAB HAS BEEN REMOVED:

1. Slide the tab as far as it will go in the direction of the arrow as shown in Fig. B.1. With the tab in this position, data can be written on the diskette again.

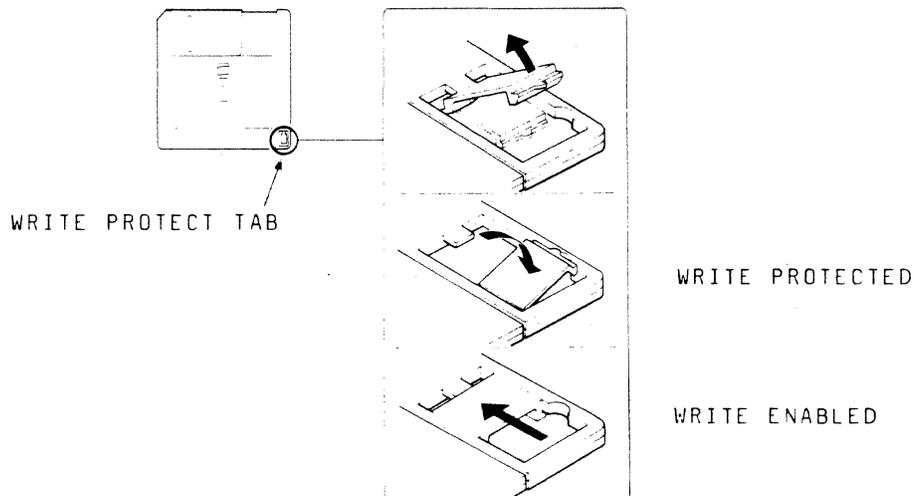


Figure B.1

5.25" diskette

1. Locate the write protect notch on the diskette. See Fig. B.2.
2. Cover the notch with a write protect tab. The diskette is then write-protected preventing the writing of any information, but can be read normally.

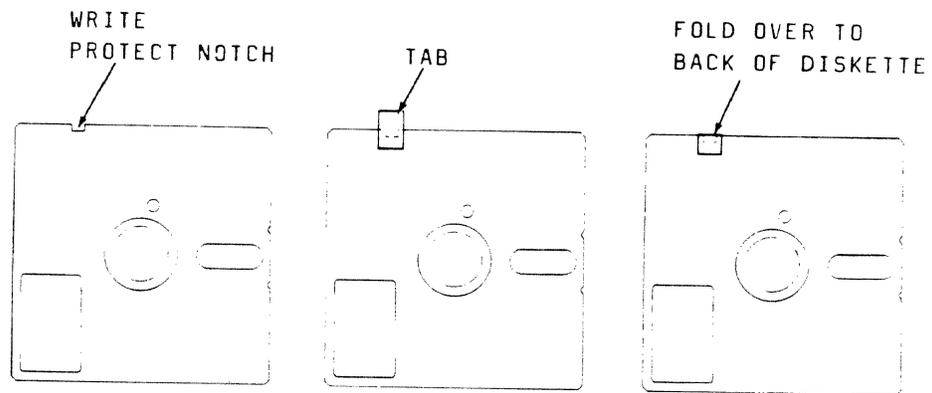


Figure B.2

8" diskette

1. Locate the write protect notch on the diskette. See Fig. B.3.
2. Remove the tab from the write protect notch. The diskette is now write-protected.

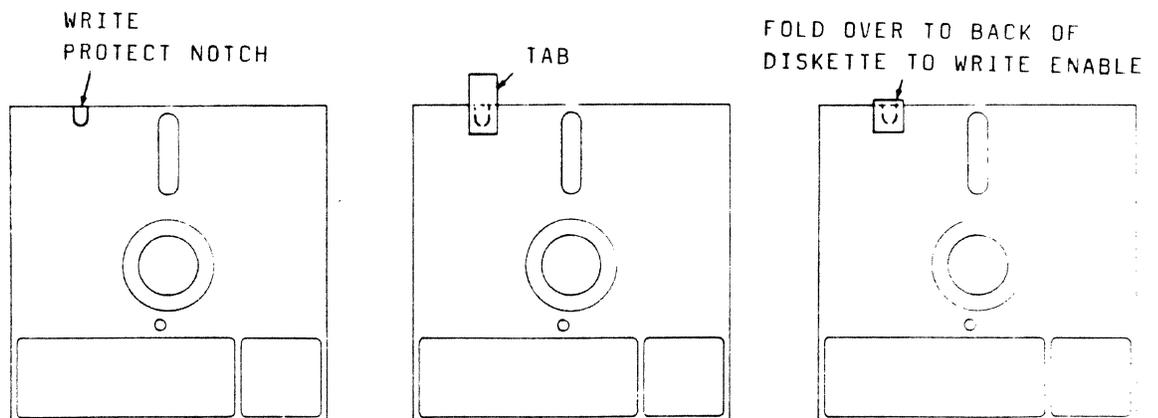


Figure B.3

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FLOPPY DISKETTE USE

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Appendix C HP-IB BUS RESTRICTIONS

1. All the AC line switches must be turned off before connecting (and disconnecting) devices to the HP-IB Bus.
2. The total length of cable permitted in one bus system must be less than or equal to two meters times the number of devices connected together (A standard HP-IB interface card is counted as one device).
3. The total length of the cable in one HP-IB system must not exceed 20 meters. For example, a system containing five devices can be connected together with cables that have a total length less than or equal to 10 meters. The individual lengths of cable can be distributed in any manner desired as long as the length does not exceed the allowed maximum.
4. The maximum number of devices that can be connected together in one bus system is 15.

There is no restriction to the way cables are connected together; however, it is recommended that no more than four piggyback connectors be stacked together on one device. The resulting structure could exert enough force on the connector mounting to damage it.

ADDITIONAL RESTRICTIONS UNDER MULTI-PORTED CONFIGURATION

With long haul Options 521 or 531, the following modification of the bus restrictions would apply.

1. The maximum length of cable between Port 2 (or Port 3), and the computer can be extended up to 20 meters. But, the total length of cables in one HP-IB Bus still limits to 20 meters. In addition, Port 1 of the disk subsystem should not be more than 2 meters from the computer.
2. At Port 2 or Port 3, the maximum number of devices that can be connected together in one HP-IB Bus is 8.
3. With Option 531, Port 2 and Port 3 cannot be connected together to the same HP-IB Bus; otherwise the bus pre-loading may cause signal degradation. With no pre-loading at Port 1, connection of this port with Port 2 or Port 3 is allowed.

Appendix D STRUCTURE/PERFORMANCE OF WINCHESTER DISK

The Winchester drive used in the Bering 3000 disk subsystems contains one, two or up to three non-removable data platters. The model 3x05 contains one data platter, while model 3x45 contains up to four data platters. Each data platter has two surfaces. There are a total of 306 cylinders, of which one cylinder is reserved for power-up self-test and is not available for data recording. In addition, two tracks (cylinder 0, head 0 and 1) is used to record the addresses of defective tracks.

Each track is further divided into 34 physical records(sectors). Each sector has 256 bytes of information. There is an important difference between a physical and a logical record. A physical record is the smallest unit of data on the disk. It is always the same size of 256 bytes. On the other hand, the size of a logical record could be variable length, and is defined by the user when the file is created.

The addresses of all the defective tracks on each data platter are stored in a bad track map. The map is 256 bytes long, and is stored in the first 2 tracks of the disk. There are 68 copies of the bad track map to reduce the chance of losing it. The map is loaded into a RAM buffer after power-on, and is used during all seek operations.

The Bering 3000 disk emulates several HP disk subsystems, which have different number of cylinders. The ranges of the logical addresses for each type of disk subsystem are as follow:

HP Disk Subsystem	Cylinder	Head	Sector
9895A	0 - 76	0-1	0-29
9134A Opt. 10	0 - 152	0-3	0-30
9134B	0 - 305	0-3	0-30
9133XV	0 - 305	0-5	0-30

Due to the addressing mapping in the emulation, the logical track boundaries are different from the physical track boundaries. Thus, it is recommended to use the cylinder mode to access data at all times, i.e. always increment the head address first before increment the cylinder number. In most cases, the software in the computer has made good use of this.

The disk drive may be formatted with different interleave number to tailor your application for maximum performance. The interleave number is specified in the Format (Initialize) command (For subsystems with option 205/210, consult the next section for details). If the Winchester drive emulates a floppy drive and the optimum interleave number is known for the floppy, use the following formula to derive the optimum interleave number for the Winchester.

$$\text{WIN} = (((\text{FIN} - 1) * \text{T}) \bmod 33) + 1$$

where, WIN = Winchester interleave number.

FIN = Floppy interleave number.

T = 11 for 8" floppy,
26 for 5.25" floppy,
13 for 3.5 " floppy.

The minimum interleave number is 3. Any specified interleave number with values less than 3 will be set to 3.

To further maximize the transfers of long disk files, unbuffered read/write operations should be utilized. The optimum block size for each read/write is 34 sectors. This will reduce system overhead and seek time.

To be fully compatible with HP9134A Opt. 10 and HP9134B disk drives, the Winchester interleave number for Bering 3000 option 205 and 210 is normally set to 10. Thus the interleave number in the Format (Initialize) command is ignored. If the interleave number need to be changed to optimize performance, follow these steps:

1. Power-up the disk drive till ready.
2. Toggle the state of the SLOW HP-IB key of the configuration switch at the rear panel (from 1 to 0 or from 0 to 1). This will temporary reconfigure the disk to option 201, so the interleave number in the Format (Initialize) command can be recognized.
3. Format (Initialize) the disk drive with the desired interleave number. Note: the drive will temporary identify as option 201.
4. Set the SLOW HP-IB key of the switch to its original state, and Format (Initialize) the disk drive again. When the Format (Initialize) command is completed, the Winchester disk is re-formatted with the interleave number specified in step 3.

Appendix E HP SERES 200 PASCAL-CTABLE

This appendix describes the modification required in the CTABLE to accommodate multiple units of Winchester drive. Here are some of Bering drives that are treated as multiple units: Model 3x10 with option 205, Model 3x15 with option 205, Model 3x30 with option 210, and Model 3x45 with option 215. Follow these steps:

1. Follow instructions in the Technical Reference of the HP PASCAL USER'S MANUAL to get to the CTABLE.
2. For drive with OPTION 205, locate the following section in the CTABLE, which reads like this:

```
$ if false$ { HP913X_A}
  mp :=HP913X_A_mp;
  nvols :=4;
  for i := 0 to nvols-1 do
    tea_amigo_sv(11+i) primary_dam, {sc} 7, {ba} 0, {du} 0,
      {offset} vol_offset(i, nvols, mp),
      {letter} HP913X_A,
      {umaxbytes} vol_bytes(i, nvols, mp));
send$
```

For drive with OPTION 210, locate the following section in the CTABLE, which read like this:

```
$ if false$ { HP913X_B}
  mp :=HP913X_B_mp;
  nvols :=9;
  for i := 0 to nvols-1 do
    tea_amigo_sv(11+i) primary_dam, {sc} 7, {ba} 0, {du} 0,
      {offset} vol_offset(i, nvols, mp),
      {letter} HP913X_B,
      {umaxbytes} vol_bytes(i, nvols, mp));
send$
```

For drive with OPTION 215, locate the following section in the CTABLE, which read like this:

```
$ if false$ { HP913X_C}
  mp :=HP913X_C_mp;
  nvols :=14;
  for i := 0 to nvols-1 do
    tea_amigo_sv(11+i) primary_dam, {sc} 7, {ba} 0, {du} 0,
      {offset} vol_offset(i, nvols, mp),
      {letter} HP913X_C,
      {umaxbytes} vol_bytes(i, nvols, mp));
send$
```

3. Set the HP-IB address by changing the "0" next to "{ba}" in the code to the desired number (0 through 7 only).

4. Duplicate this whole section of code to match the number of units of disk drive. e.g. model 3x15 with option 205, the whole section of code should be duplicated twice.
5. Edit the followings in each section of the code:
 - 5.1. Change "if false" to "if true" in all sections of code, including the duplicated sections.
 - 5.2. For all duplicated sections, edit the number next to {du}, and the number in sv{11+i...} according to the following table:

{du}	sv{11+i.....}		
Unit no.	Opt. 205	Opt. 210	Opt.215
-----	-----	-----	-----
0	11	11	11
1	15	20	25
2	19	29	39
3	23	38	N/A

- 5.3. Get out of editing. Follow instructions in the HP PASCAL USER'S MANUAL to compile and run the new CTABLE.

EXAMPLE: Assumes Model 3030 with option 215 (2 units of 15 MB drive), and set the HP-IB address at 2. The edited version of the CTABLE should read similar to the following. Only the related section of code is shown.

```

$ if true$ { HP913X_C}
  mp :=HP913X_C_mp;
  { mp := block_boundaries(mp);
  nvols :=14;
  for i := 0 to nvols-1 do
    tea_amigo_sv(11+i) primary_dam, {sc} 7, {ba} 2, {du} 0,
      {offset} vol_offset(i, nvols, mp),
      {letter} HP913X_C,
      {umaxbytes} vol_bytes(i, nvols, mp));
Sends$
$ if true$ { HP913X_C}
  mp :=HP913X_C_mp;
  nvols :=14;
  for i := 0 to nvols-1 do
    tea_amigo_sv(25+i) primary_dam, {sc} 7, {ba} 2, {du} 1,
      {offset} vol_offset(i, nvols, mp),
      {letter} HP913X_C,
      {umaxbytes} vol_bytes(i, nvols, mp));
Sends$

```

Appendix F ERROR MESSAGES

A. Power-on Self-test error code:

CODE	DESCRIPTION
C1	Channel 1 bad hardware.
C2	Channel 2 bad hardware.
C3	Channel 3 bad hardware.
C4	Channel 4 bad hardware.
C5	Channel interrupt stuck.
C6	Channel 1 not interrupting.
C7	Channel 2 not interrupting.
C8	Channel 3 not interrupting.
C9	Channel 4 not interrupting.
F0	Floppy F/W not installed.
F1	Floppy drive not ready.
F2	Rotational speed of floppy not within spec.
F3	Floppy fails to recalibrate.
F4	Floppy fails to step.
F5	Fail to format a cylinder in floppy.
F6	Fail to read all formatted sectors in floppy.
H0	Winchester not selected.
H1	Winchester not ready.
H2	Rotational speed of Winchester not within spec.
H3	Winchester fails to recalibrate.
H4	Winchester fails to seek to test cylinder.
H5	Fail to format all heads in test cylinder.
H6	Fail to read at least 1 sector on each test track.
H7	Fail in error correction.
H8	Reading the bad track map (not an error state).
H9	Bad track map check sum error.
HC	Winchester configuration state (not an error state).
HL	Moving head to landing zone (Not an error state).
HP	PLL initialization error.
L0	Read/write interrupt stuck high.
L1	Winchester PLL initialization failure.
L2	Floppy HP format PLL initialization failure.
L3	Floppy single density IBM format PLL failure.
L7	CRC/ECC circuit failure.
L8	HP format CRC circuit failure.
L9	R/W hardware fail to generate interrupt.
LA	R/W buffer addressing problem.
LH	R/W buffer high nibble failure.
LL	R/W buffer low nibble failure.
P0	8085 test failure.
P1	ROM 1 checksum error.
P2	ROM 2 checksum error.
P3	ROM 3 checksum error.
P4	ROM 4 checksum error.
P5	ROM 5 checksum error.
P6	ROM 6 checksum error.

F-2
ERROR MESSAGES

PE 2114 RAM failure.
PF 8155 RAM failure.
PH RAM high nibble failure.
PL RAM low nibble failure.
PP Stack operation failure.

U0 8155 output ports failure.
U1 Timer not running.
U2 Timer is too fast.
U3 Timer is too slow.
U4 Timer fails to generate interrupt.

B. Local command error code:

CODE	DESCRIPTION
Ab	Command abort; hit SELECT back to normal.
Er	Input error; hit SELECT back to normal.
Fb	Diskette is bad.
Fc	Data compare error.
Fd	Diskette is not double sided.
FE	End of the diskette (Not an error state).
FF	Diskette is full (Not an error state).
FH	Wrong header.
FL	Seek error.
FP	Drive is protected.
Fo	Remove the diskette (Not an error state).
Hb	Winchester fails in R/W.
HC	Winchester data compare error.
HF	Winchester unit is full.
HL	Winchester seek error.
HP	Winchester unit protected.

In general, press the SELECT button will get the disk subsystem out of the error state.

Appendix G

SHARED INFORMATION SPACE (OPTION 660)

G.1 Description

Shared Information Space (SIS) is a unit (volume, block) of Winchester disk storage shared by 2 or 3 computers connected to a multi-ported Series 3000 subsystem. The capacity of the SIS can be 1.2, 4.9, 9.8, or 14.7 Megabytes. For example, a dual-ported 15 MB system (Model 3x15 Option 52x) can be configured to provide 4.9MB of dedicated disk space at each port, and the remaining 4.9MB for the SIS.

SIS is not supported by standard HP software. A simple program involving Input/Output to HP-IB is required. Please consult Bering's Customer Support to see if a standard program exists for your particular HP computer or operating system.

The applications of SIS may be:

- transfer of files between computers;
- sharing of files, programs, libraries;
- temporary storage.

G.2 Limitations

1. The size of the SIS corresponds to the following partition-types (see Bering 3000 User's Manual for details):

Partition	HP device being emulated
1.2MB	9895A
4.9MB	913xA Opt 10
9.8MB	913xB
14.7MB	9133XV

2. Only 1 unit of disk space can be assigned to the SIS, meaning 1 unit of 1.2MB, 1 unit of 4.9MB, 1 unit of 9.8MB, or 1 unit of 14.7 MB.
3. Each port must be configured with a partition-type identical to that of the SIS.
4. Special software is required to configure the SIS (see the following sections). Bering Series 3000 Opt. 660 is also required.
5. SIS cannot be concurrently accessed by more than one computer. It is available to the next computer only after the current host computer has released it via software control. A busy SIS will generate system messages like "device not ready"; which may be fatal to some application software.

6. SIS does not provide file management. Therefore, computers connected to different ports must recognize a common file-structure in order to interpret the SIS data. Sometimes different HP computers (models and/or operating environments) can communicate with one another through a standard file-structure with HP software (e.g. LIF).
7. Under Opt. 660, assignment of disk space to the SIS will prevail over assignment of remnant disk space to invisible floppies as described in CASE D of "Application Note (0017-0022-00) on Multiport."

G.3 Configurations

In a Multi-ported Series 3000, each port is equivalent to an HP-IB device. Each port (device) can have up to 4 units (blocks) of disk space (numbered 0,1,2 and 3). The total capacity of all the units at all the ports plus the SIS cannot exceed the nominal capacity of the disk subsystem.

Switch Setting (P2P1P0)	Disk Unit(s)	Port Capacity (sectors)	SIS Unit	SIS Capacity (sectors)
001	2 x 4.9MB	38012	1 x 4.9MB	19006
010	1 x 14.7MB	56746	1 x 14.7MB	56746
011	2 x 1.2MB	9180	1 x 1.2MB	4590
100	4 x 1.2MB	18360	1 x 1.2MB	4590
110	1 x 4.9MB	19006	1 x 4.9MB	19006
111	1 x 9.8MB	37842	1 x 9.8MB	37842

The Total Capacity can be calculated using the following formulas:

For 2-port subsystem:

$$\text{Total Capacity} = \text{Port 1} + \text{Port 2} + \text{SIS}$$

For 3-port subsystem:

$$\text{Total Capacity} = \text{Port 1} + \text{Port 2} + \text{Port 3} + \text{SIS}$$

The Nominal Capacity in each model of Series 3000 subsystems are as follows:

Bering Model	Nominal Capacity (MB)	(sectors)
3x05	5	20400
3x10	10	40868
3x15	15	61336
3x30	30	129676
3x45	45	172720

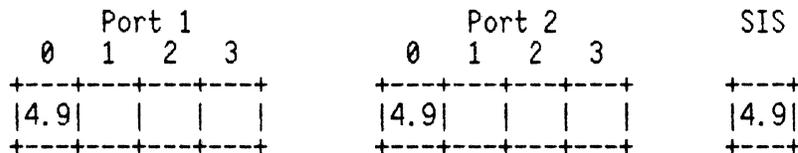
The Total Capacity must be less than or equal to the Nominal Capacity.

To use SIS,

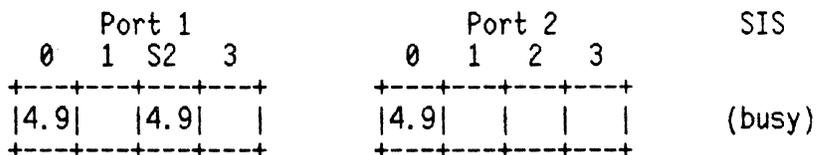
1. All the ports must set their Winchester disk partition switches (P2 P1 P0) to the same type (i.e. 1.2MB, 4.9MB or 9.8MB);
2. A program has to be written to Request and Release the SIS.
3. Request the SIS to be addressed as Unit N, where N is 0, 1, 2 or 3. The original Unit N at your port will be temporary overlaid and cannot be accessed.
4. Access SIS at Unit N (i.e. CAT ":HP9895,700,N").
5. Release the SIS; and you automatically regain the original Unit N without data loss.

Example #1 — 15MB, Partition Type 205

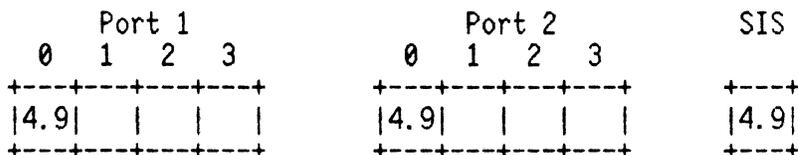
As shown in the following diagram, each port is configured with a 4.9MB partition (Opt 205) at Unit 0. The remaining 4.9MB is reserved for SIS.



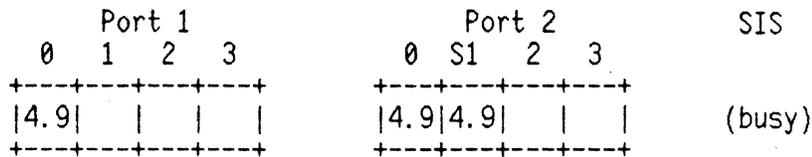
- a. Port 1 configures the SIS as one of its units using the REQUEST command (described in following sections). Assume it is configured as Unit 2.



- b. Port 1 puts the file into Unit 2. At the same time, Port 2 can be continuously requesting for the SIS.
- c. Port 1 releases the SIS using the RELEASE command.



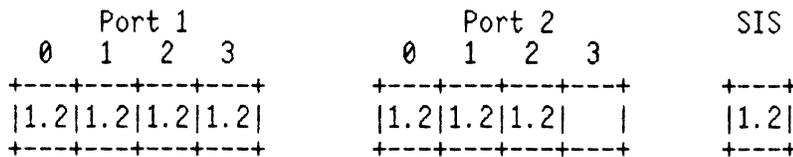
- d. Port 2 grasps the SIS and configures to one of its units.



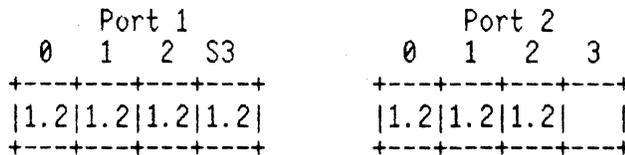
e. Port 2 reads the file created by Port 1.

Example #2 — 10MB, Partition Type 201

For a 10MB system, a total of eight 1.2MB units can be configured. Assume a dual-ported system with 4x1.2MB for Port 1, 3x1.2MB for Port 2 and a 1.2MB SIS.

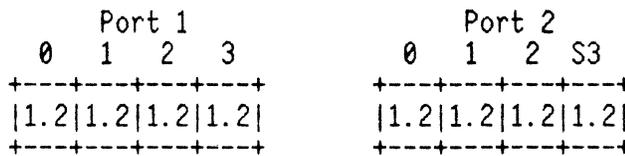


a. Port 1 request for SIS and configure it to Port 3. Note that the SIS will overlay the existing unit of 1.2MB and make it temporarily inaccessible.



b. Port 1 puts a file to be copied into Unit S3.

c. Port 1 release the SIS and Port 2 request it to Unit 3.



d. Port 2 gets the file from S3.

G.4 HP-IB Commands

Each HP-IB command is consist of three components: the header, containing address information; the text, containing device operation commands; and the trailer, containing unaddress information. The header contains the primary address and a secondary command.

Components	ATN	EOI	data	
Header	1	0	Pxxxxxxx	Primary address
	1	0	P11xxxxx	Secondary
Text	0	0	data	
	0	1	data	
Trailer	1	0	P1011111	Untalk
	1	0	P0111111	Unlisten

P = parity

The commands needed to utilize SIS are REQUEST, RELEASE, DSJ, REQUEST STATUS and SEND STATUS. They are described in the following sections. If necessary, refer to Command Set Manual (part no. 0017-0015-00) for further explanation and additional commands.

G.5 REQUEST Command

This command is used to request the SIS. The command format is as following:

ATN	EOI	data	
1	0	P0100yyy	Listen device yyy
1	0	P1101100	Secondary
0	0	00011011	Opcode
0	1	000000uu	Unit number

where yyy is the HP-IB address of the Winchester disk and uu is the unit number to which the SIS is being configured. The SIS will temporarily overlay any existing storage associated with the unit uu.

At the completion of the REQUEST, the status commands should be executed to examine the state of the SIS.

Successful and the SIS is configured to another port:

DSJ = 0
Status = 19

Successful and the SIS is configured:

```
DSJ   = 0
Status = 0
S2    = First Status.
```

Unsuccessful (not enough disk space for the SIS):

```
DSJ   = 1
Status = 1
```

G.6 RELEASE Command

This command is used to release the SIS. The overlaid storage (if any) at the port will be restored with no data loss.

ATN	EOI	data	
1	0	P0100yyy	Listen device yyy
1	0	P1101100	Secondary
0	0	00011100	Opcode
0	1	00000000	

Completion status:

```
DSJ   = 0
Status = 0
S2    = First Status or no disk
```

G.7 STATUS Commands

DSJ command returns 1 byte of pass/fail status of the previous command.

ATN	EOI	data	
1	0	P1000yyy	Talk device yyy
1	0	P1110000	Secondary
0	1	0000000s	s = 0 pass 1 fail

REQUEST STATUS command is used to examine the status of the previous command and the specified unit.

ATN	EOI	data	
1	0	P0100yyy	Listen device yyy
1	0	P1101010	Secondary
0	0	00000011	Opcode
0	1	000000uu	Unit number

SEND STATUS command returns 4 bytes of status.

ATN	EOI	data	
1	0	P1000yyy	Talk device yyy
1	0	P1101000	Secondary
0	0	Status	Status byte
0	0	Unit	Last unit number
0	0	Format	Format type
0	1	S2	Unit status

Status: 1 = Opcode error, or illegal command
 10 = I/O program error
 19 = Status 2 error, refer to S2 byte.

S2:



1 1 --- no disk
 1 0 --- no drive
 1 ----- first status

Refer to Command Set Manual (part no. 0017-0015-00) for details of other error codes.

G.8 PROGRAMMING EXAMPLES

The following Basic program segments are for reference only and they are not tested.

```

!Symbols:
! select_code - the HP-IB channel
! MTA        - my talk address
! MLA        - my listen address
! UNT        - untalk
! UNL        - unlisten
! addr       - HP-IB address of the Winchester disk
! SEC        - secondary
! END        - end of data (EOI=1)

!Get status to clear initial First Status.
SEND select_code;MTA LISTEN addr SEC 10 DATA CHR$(3)&CHR$(unit) END
UNL
SEND select_code;MLA TALK addr SEC 8
ENTER select_code USING"#,B";S1,S2,S3,S4
SEND select_code;UNT

Request_SIS:
SEND select_code;MTA LISTEN addr SEC 12 DATA CHR$(27)&CHR$(unit) END
UNL
SEND select_code;UNT

!Get DSJ and check if ok.
SEND select_code;MLA TALK addr SEC 16
ENTER select_code USING"#,B"; D
SEND select_code;UNT
If D<>0 then error

!Get status and check if configured.
SEND select_code;MTA LISTEN addr SEC 10 DATA CHR$(3)&CHR$(unit) END
UNL
SEND select_code;MLA TALK addr SEC 8
ENTER select_code USING"#,B";S1,S2,S3,S4
SEND select_code;UNT
If BIT(S4,3)=0 then Request_SIS

...

Release_SIS:
SEND select_code;MTA LISTEN addr SEC 12 DATA CHR$(28)&CHR$(0) END UNL
SEND select_code;UNT

```

```

10  !*****
20  !
30  !           Series 200 - SIS Utility           *
40  !
50  ! SIS = shared information space for Bering 3000 disk systems *
60  ! (This program isn't completely tested, and for reference only)*
70  !*****
80  !
90  COM S1,S2,S3,S4
100 !
110 ! Get Select code and HP-IB address.
120 !
130 Unit=0
140 INPUT "Enter device selector (default 700): ",X$
150 IF X$="" THEN X$="700"
160 Addr=VAL(X$[3,3])
170 Select_code=VAL(X$[1,1])
180 !
190 ! Set up softkeys for SIS configuration.
200 !
210 ON KEY 5 LABEL "5-Get SIS(0)" GOTO Request0
220 ON KEY 6 LABEL "6-Get SIS(1)" GOTO Request1
230 ON KEY 7 LABEL "7-Get SIS(2)" GOTO Request2
240 ON KEY 8 LABEL "8-Get SIS(3)" GOTO Request3
250 !
260 ! Set up SIS release softkey.
270 !
280 ON KEY 9 LABEL "9-Release SIS" GOTO Release
290 GOTO 290
300 !
310 Request0: !Configure SIS to unit 0.
320   Unit=0
330   GOTO Request
340 Request1: !Configure SIS to unit 1.
350   Unit=1
360   GOTO Request
370 Request2: !Configure SIS to unit 2.
380   Unit=2
390   GOTO Request
400 Request3: !Configure SIS to unit 3.
410   Unit=3
420 !
430 !*****
440 ! SIS configuration:
450 !
460 ! 1. Get status to clear old errors.
470 ! 2. Send SIS request command to the disk with specified unit #.
480 ! 3. Get status to check
490 !     - errors,
500 !     - SIS not available, or
510 !     - SIS is successfully configured to the specified unit.
520 !
530 Request: !Configure SIS.
540   CALL Stat(Select_code,Addr,Unit)
550   SEND Select_code,UNT UNL MTA LISTEN Addr SEC 12 DATA
   CHR$(27)&CHR$(Unit) END UNL

```

```

560 CALL Stat(Select_code,Addr,Unit)
570 IF S1=19 THEN
580     DISP "SIS IS BUSY OR IT IS NOW ONE OF YOUR UNITS!"
590     GOTO Done
600 END IF
610 IF S1<>0 THEN
620     DISP "ERROR"
630     GOTO Done
640 END IF
650 IF BINAND(S4,8)=0 THEN
660     DISP "WAIT"
670 ELSE
680     DISP "SIS CONFIGURED AT UNIT ";
690     DISP USING "D";Unit
700 END IF
710 GOTO Done
720 !
730 !*****
740 ! Release SIS:
750 !
760 !     1. Get status to clear old errors.
770 !     2. Send Release command to release Sis unit.
780 !     3. Get status to check for error.
790 !
800 Release: !
810 CALL Stat(Select_code,Addr,Unit)
820 SEND Select_code;UNT UNL MTA LISTEN Addr SEC 12 DATA
    CHR$(28)&CHR$(Unit) END UNL
830 CALL Stat(Select_code,Addr,Unit)
840 IF S1<>0 THEN
850     DISP "ERROR"
860 ELSE
870     DISP "SIS RELEASED"
880 END IF
890 GOTO Done
900 Done: BEEP
910     END
920 !
930 !*****
940 ! Get Status:
950 !
960 !     1. Get DSJ value in case of PON state.
970 !     2. Get status.
980 !
990 SUB Stat(Select_code,Addr,Unit)
1000 COM S1,S2,S3,S4
1010 SEND Select_code;UNT UNL MLA TALK Addr SEC 16 ! DSJ
1020 Enter Select_code USING "#,B";Dsj
1030 SEND Select_code;UNT UNL MTA LISTEN Addr SEC 10 DATA
    CHR$(3)&CHR$(Unit) END ! Request Status.
1040 SEND Select_code;UNT UNL MLA TALK Addr SEC 8 ! Get status
1050 ENTER Select_code USING "#,B";S1,S2,S3,S4
1060 SUBEXIT
1070 SUBEND

```

JUMPER CONFIGURATIONS :

DEFINITIONS: 1=JUMPER INSTALLED.
0=JUMPER REMOVED.

JP1 : 12V SENSE.
JP2 : 24V SENSE.
JP3 : FLOPPY VOLTAGE SENSING ENABLE.

MODEL	JP1	JP2	JP3
30XX	0	0	0
33XX	1	0	1
35XX	1	0	1
38XX	0	1	1

JP4 : R/W ENABLE. 1=NORMAL OPERATION.

JP5,6 : CHANNEL 4 DISABLE.
(NOTE: WHEN JP5,6=0,
SOCKETS 4B,3A,3B,4C AND
4D SHOULD BE STUFFED
WITH UPD7210, SN75160A,
MC3448A, PAL14H4 AND
74LS174 RESPECTIVELY.
THESE CHIPS SHOULD BE REMOVED
WHEN JP5,6=1.)

MODEL	JP5	JP6
30XX SINGLE PORT	1	1
38XX WITH OPT.53X	1	1
ALL OTHER MODELS	0	0

JP7,8 : FLOPPY TYPE SELECT.

MODEL	JP7	JP8
30XX	0	0
38XX	0	1
35XX	1	0
33XX	1	1

JP9,10,12 : WINCHESTER TYPE SELECT.
(COMBINATION OF JP9,10,12 PLUS THE FROM INSTALLED AT
LOCATION ROM-2 DETERMINES THE WINCHESTER TYPE)

JUMPERS			ROM 2 = 0020-0120-73B		ROM 2 = 0020-0120-79B		
9	10	12	MODEL	WINCHESTER DRIVE	OR	MODEL	WINCHESTER DRIVE
0	0	0	3X05	MINISCRIBE 3212		3X05	CMI 5206
0	1	0	3X10	MINISCRIBE 3212		3X10	CMI 5412
1	0	0	3X15	MINISCRIBE 4020		3X15	CMI 5619
1	1	0	3X20	MINISCRIBE 3425		3X10	RODIME 352
0	0	1	3X20	TULIN 226		3X30	RODIME 203E
0	1	1	3X30	TULIN 240		3X45	RODIME 204E
1	0	1	3X45	FUJITSU M2242AS		3X15	FUJITSU M2234A
1	1	1	3X60	FUJITSU M2243AS		3X20	FUJITSU M2235A

JP11 : PARTITION SELECT.

1 = OPTION 205 FOR 5,10,15 OR 20MB WINCHESTERS, OR
OPTION 210 FOR 30MB WINCHESTER, OR
OPTION 660 FOR MULTI-PORT SYSTEMS.

JP13 : DIAGNOSTIC MODE.

1 = NORMAL OPERATION.
0 = NO RETRY, EXTENDED STATUS.

JP14,15,16,17 : R/W PROM CONFIGURATION.
(COMBINATION OF JP14-17, ROM-4,5,6 AND LOC.13L DETERMINE
THE READ/WRITE PARAMETERS.)

MODEL	JP14	JP15	JP16	JP17	ROM-4,5,6	LOC.13L
30XX	1	0	0	1	0020-0200-XX	NOT REQUIRE
33XX (NEC FLOPPY)	0	1	0	1	0020-0250-XX	0020-0130-0
35XX	0	1	0	1	0020-0250-XX	0020-0130-0
38XX	0	1	1	0	0020-0220-XX	0020-0130-0

(NOTE: MODEL 33XX WITH SONY FLOPPY IS NOT SUPPORTED BY THE CURRENT FIRMWARE
TO SUPPORT THE SONY CONFIGURATION, THE FOLLOWING PROM FIRMWARE ARE
NEEDED : ROM 1,2,3 = 0020-0120-6X
ROM 4,5,6 = 0020-0210-XX
LOC 13L = 0020-0130-02.)

JP19,20 : R/W RAM CONFIGURATION.

JP19	JP20	MODEL	RAM SIZE AT LOC.12J,13J
1	0	ALL MODELS WITH OPTION 401	4KX4 (2168)
0	1	ALL MODELS WITHOUT OPT.401	1KX4 (2114)

JP26 : SYSTEM RESET. 0 = NORMAL OPERATION.

JP30,31 : CHANNEL RAM CONFIGURATION.

JP30	JP31	MODEL	RAM SIZE AT LOC.10B,
1	0	ALL MODELS WITH OPT.52X OR 53X OR 401	4KX4 (2168)
0	1	ALL SINGLE PORT MODELS WITHOUT OPT 401	1KX4 (2114)

JP18,21,22,23,24,25,27,28,29,32,33,34 : NOT USED.

PROM CONFIGURATION:

ROM 1	0020-0120-70 0020-0120-71	ALL MODELS WITH OPT. 660 ALL MODELS WITHOUT OPT. 660
ROM 2	0020-0120-73 0020-0120-79	SEE TABLE FOR JP9,10,12 FOR WINCHESTER SELECTION SEE TABLE FOR JP9,10,12 FOR WINCHESTER SELECTION
ROM 3	0020-0120-74 0020-0120-75	REQUIRED ONLY FOR OPT. 5XX WITHOUT OPT. 401 REQUIRED ONLY FOR OPT. 5XX WITH OPT.401

SERIES 3000 DISK ERROR MESSAGES

Alex Sy 841228

us Description

No error (This should never be seen if DSJ=1)
Illegal opcode (Invalid opcode byte)
Cylinder miscompare (ID read attempted, with wrong cyl returned)
Floppy data CRC error
Floppy or hard disk ID CRC error
IO program error (Command data bytes are invalid)
Hardware error (Unknown timeout during execution)
Status 2 error (Includes the following errors)
 Unit is between 0-3 but is not present
 No disk in drive
 Hardware problem with the drive
 Disk is unformatted or unknown format
 Disk is write protected during write
 First status bit was not cleared
 IBM format requested on double sided floppy
 ID triggered read attempted on IBM disk
Unit unavailable (unit number > 3)
Drive attention after a seek
D bit detected in floppy only
ECC uncorrectable error on hard disk only
Data address mark not found on floppy or hard disk
Bad sector table error on hard disk only
Out of bounds target address or drive too fast during format
Head miscompare (ID read with head number mismatched)
ECC corrected data on hard disk or margin error on floppy disk
ID address mark not found on floppy or hard disk
Timeout (Probably due to HPIB DMA timeout)
Seek verify error on floppy (ID read and cyl and head mismatch)
 or drive too slow during format
Sector not found
Data preamble error
Implied seek error
No command (This should never be seen)
Command ended (This should never be seen)
Command aborted (This should never be seen)

Status 2 errors

Description

Drive attention due to the followings

Seek completed normally

Seek failed due to

Drive fault

Out of bounds cylinder, head, or sector

Controller cannot find target address

After END command

Inserting a disk

Removing a disk

Disk is write protected

Drive fault due to the followings

Drive does not ready after END command

Drive does not ready during data transfer

Drive hardware failure

First status bit when a disk is newly inserted

When seek fails due to

Out of bounds target sector

Non-existent physical track

Could not find target logical track

Drive ready status as follows

00 Drive ready

01 Undefined (Should never occur)

10 No drive is connected to controller

11 No disk in drive