



Everdisk[™]
internal/external
hard disk subsystem
(XT compatible)

**OWNER'S MANUAL AND REFERENCE GUIDE
(VERSION 2.0)**

EVER for EXcellence



EverdiskTM
internal/external
hard disk subsystem
(XT compatible)

OWNER'S MANUAL AND REFERENCE GUIDE

EV-390
EV-391
EV-392
(VERSION 2.0)

EVEREX SYSTEMS, INC.
48431 MILMONT DRIVE
FREMONT, CA 94538

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Warning

Class B: Computing Device

WARNING: This equipment generates and uses radio frequency energy and if not installed and used in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception. The product has been certified and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.
2. Reorient the computer with respect to the receiver.
3. Move the computer away from the receiver.
4. Plug the computer into a different outlet so that computer and receiver are on different branch circuits.
5. Reorient the receiving antenna.

This product requires the use of shielded interconnect cables and connectors for proper installation and connection to peripheral devices and to insure compliance with FCC Class B limits for radio frequency emissions. Shielded cables are available from authorized dealers. The manufacturer is not responsible for any radio or television interference caused by using other than the recommended cables or by unauthorized modifications to this equipment.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4 (FCC, Part 15.838 b).

Table of Contents

CHECKLIST	1
USER PRECAUTIONS.....	4
SECTION 1: INTRODUCTION.....	5
1.1 Before You Begin	5
1.2 System Requirements.....	6
SECTION 2: GETTING STARTED.....	8
2.1 Quick Installation (Internal Drive).....	8
2.2 Quick Installation (External Drive).....	9
SECTION 3: DRIVE CONFIGURATION.....	10
3.1 Drive Select Switch.....	10
3.2 Terminating Resistor.....	16
SECTION 4: CONTROLLER CONFIGURATION.....	19
4.1 Controller Description	20
4.2 Controller Configuration.....	21
SECTION 5: PHYSICAL INSTALLATION	27
5.1 Controller Installation.....	27
5.2 Internal Drive Installation.....	30
5.2.1 One Internal Drive.....	30
5.2.2 Two Internal Drives.....	34
5.3 External Drive Installation.....	37
5.3.1 One External Drive.....	37
5.3.2 Two External Drives.....	40

SECTION 6: FORMATTING THE HARD DISK.....	41
6.1 For Older IBM PC Models.....	42
6.2 Physical Formatting.....	43
6.3 Disk Partitioning.....	44
6.3.1 Creating Primary DOS Partition.....	45
6.3.2 Creating Extended DOS Partition.....	46
6.3.3 Creating Super DOS Partition.....	48
6.3.4 Deleting Partitions.....	50
6.4 Logical Formatting.....	50
6.5 Utilities.....	53
6.5.1 The Diagnostics Menu.....	53
6.5.2 SHIPDISK.EXE.....	57
APPENDIX 1: REMOVING SYSTEM COVER.....	58
APPENDIX 2: INSTALLING ONE EXTERNAL AND ONE INTERNAL DRIVE.....	59
APPENDIX 3: EV-390 CONTROLLER INSTALLATION.....	61
APPENDIX 4: CONTROLLER SPECIFICATIONS.....	63
APPENDIX 5: HARD DISK SPECIFICATIONS.....	65
APPENDIX 6: QUESTIONS AND ANSWERS.....	68

Check List

Your EVERDISK hard disk subsystem should contain the following items:

Internal Subsystem:

- Hard disk controller board in an anti-static bag
- Hard disk drive in an anti-static bag
- 34-pin ribbon cable
- 20-pin ribbon cable
- Half-height bezel (full-height bezel optional)
- Metal mounting brackets
- Set of screws
- EVERDISK utility diskette (Version 3.0 or later)
- EVERDISK Owner's Manual and Reference Guide
- Owner Registration and Warranty Card
- Foam padding and other packaging materials

External Subsystem

- Hard disk controller with external connector on mounting bracket in an anti-static bag
- Hard disk drive in an external subchassis
- 37-pin shielded connecting cable
- AC power cord (power external subchassis ONLY)
- EVERDISK utility diskette (Version 3.0 or later)
- EVERDISK Owner's Manual and Reference Guide
- Owner Registration and Warranty Card
- Foam padding and other packaging materials

Optional Items

- 34-pin floppy disk ribbon cable with three connectors (for EV-390 controller ONLY)
- 34-pin hard disk daisy-chain ribbon cable with three connectors (for two-drive installations)
- Extra 20-pin hard disk ribbon cable (for two-drive installations)

If any of the items previously listed are missing or are damaged, please consult your Everex dealer *immediately*.

NOTE: Please save all Everex packaging materials that came with your EVERDISK subsystem; if you ever need to return your EVERDISK subsystem to Everex Systems for any reason without proper packaging, your warranty may be affected. As with any major purchase, please save your sales invoice.

Also, it is very important you read the enclosed warranty information; the warranty will not take effect until the warranty card is filled out and returned to Everex Systems.

User Precautions

To avoid possible hazardous situations and to prevent damaging your EVERDISK subsystem, please read the following precautions *carefully*.

1. Turn OFF your system and disconnect the power cable before you begin the installation. **Make sure NO power goes to your system!**
2. Clear an area around your computer to make working on your computer easier.
3. The hard disk drive and drive controller are easily damaged by static electricity; to avoid such damage, touch the system chassis before handling the drive and controller, and try not to touch the circuitry on the drive and controller. Also, limit your movements as much as possible as you work on your system.
4. The hard disk drive contains fragile parts that are easily damaged; please handle the drive as gently as possible.
5. Do not remove any stickers attached to the metal side of the drive, as this will void the warranty.
6. Do not open the cover of the external drive subchassis; this will void the warranty, and some internal parts may produce electrical shock.

Section 1: Introduction

1.1 Before You Begin

Before installing your EVERDISK hard disk subsystem, please read through this manual carefully. This manual gives you all the information needed to install the EVERDISK hard disk subsystem in your computer. If you have any questions not answered by this manual, please see your local Everex dealer.

REMEMBER: "If all else fails, read the instructions."

Introducing the EVERDISK Subsystem

The EVERDISK hard disk subsystem offers superior performance, reliability, and rugged construction in hard disk technology. The EVERDISK subsystem:

- Comes complete with controller, drive, and software for easy installation.
- Provides complete compatibility with Version 2.1 or later of PC-DOS or MS-DOS.
- Allows you to boot directly off the hard disk.
- Allows you to connect two hard disk drives of different capacities to the controller board.

1.2 System Requirements

- IBM PC, XT or compatible
- Minimum 128KB of RAM memory
- DOS 2.1 or later DOS version
- Higher-capacity power supply (only for PC and PC compatibles with a system power supply of less than 135 watts output).

Please refer to the appropriate section below for special requirements if you have the following computers:

IBM PC Portable

- IBM Portable front bezel for hard disk (optional)
- Special short mounting screw (DO NOT use mounting screws from your floppy disk drive)

Compaq Portable

- Compaq DOS 2.11 or IBM PC-DOS (Version 2.1 or later)
- Full-height bezel or half-height bezel with Compaq mounting cage.
- Mounting retainers (optional)

Compaq Deskpro

- Compaq DOS 2.11 or IBM PC-DOS (Version 2.1 or later)
- Compaq Deskpro mounting rails
- Deskpro power cable
- "Y" power cable (optional)

Other PC Compatibles

- MS-DOS Version 2.1 or later (older MS-DOS versions will not work with a hard disk)

Section 2: Getting Started

The following Quick Installation subsections are for experienced PC/XT users. First-time users should follow the more comprehensive instructions in Sections 3 through 5 of this manual.

2.1 Quick Installation (Internal Drive)

1. Configure the drive as drive 1 or drive 2, and check if you need to disable the drive's terminating resistor.
2. Configure the SW1 jumper block for the type of drive you will connect to the controller.
3. Attach the 20-pin and 34-pin ribbon cables to the controller.
4. Install the controller in your system.
5. Install the drive in your system.
6. Attach the other end of the 20-pin and 34-pin cables to the drive; attach an available 4-wire power cable from the power supply to the drive.
7. Reinstall all cables and turn ON the computer.
8. Format the hard disk drive following the instructions in Section 6.

2.2 Quick Installation (External Drive)

1. Configure the SW1 jumper on the controller board for the type of drive you have.
2. Install the controller board in your system.
3. If applicable, connect a 4-wire cable from the power supply to the controller.
4. Connect the 37-pin cable to the 37-pin connectors on the controller board's mounting bracket and the external hard disk subchassis.
5. If applicable, connect the AC power cord to the hard disk subchassis FIRST, then connect the other end to the AC wall outlet.
6. Turn on the subchassis FIRST; then turn on the computer.
7. Format the hard disk drive with the instructions in Section 6.

Section 3: Drive Configuration

Before you can install the hard disk drive into your PC or XT, you must properly configure the following two areas of the hard disk:

1. Configure the drive select switch as drive #1 if it is your first drive, or drive #2 if it is your second drive.
2. Make sure your drive's terminating resistor is selected properly.

3.1 The Drive Select Switch

Before you install the hard disk drive, make sure the drive select switch is configured properly. The drive select switch enables the controller to select and address the drive. You need to configure the drive select switch to insure that the drive(s) will be set properly for your system. To change or confirm the drive's drive select switch, refer to the following instructions.

SEAGATE 21.4MB ST225, 31.5MB ST238, 42.8MB ST251, 42.5MB ST4051 and 80MB ST4096 Drives: The drive select switch (DS) is the 16-pin jumper block located between the cable connectors. Put a jumper on DS1 (Drive Select 1) if the drive is the first drive in your system or DS2 if the drive is the second drive in your system. Refer to the following figure. Please note the location of the terminating resistor in this figure also.

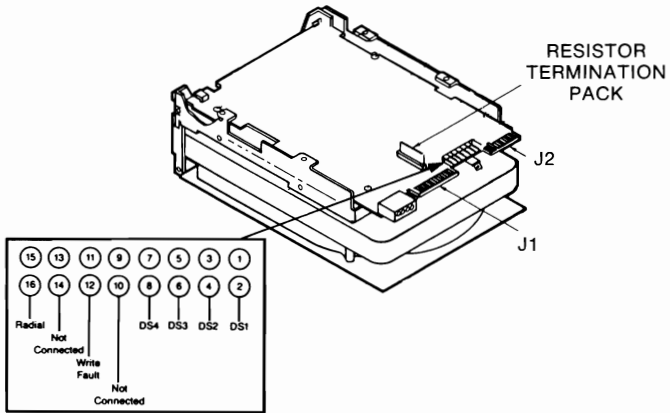


Figure 1A: Seagate 16-pin Drive Select Jumper

SEAGATE 21.4MB ST4026 and 31.9MB ST4038 Drives:

The drive select switch is the 8-pin jumper J9 (refer to Figure 1B). For physical drive 1, put the jumper on DS1; for physical drive 2, put the jumper on DS2. Please note the location of the terminating resistor also.

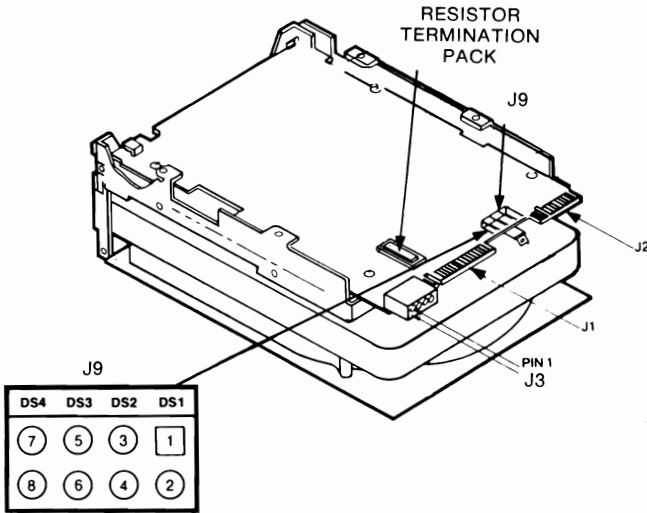
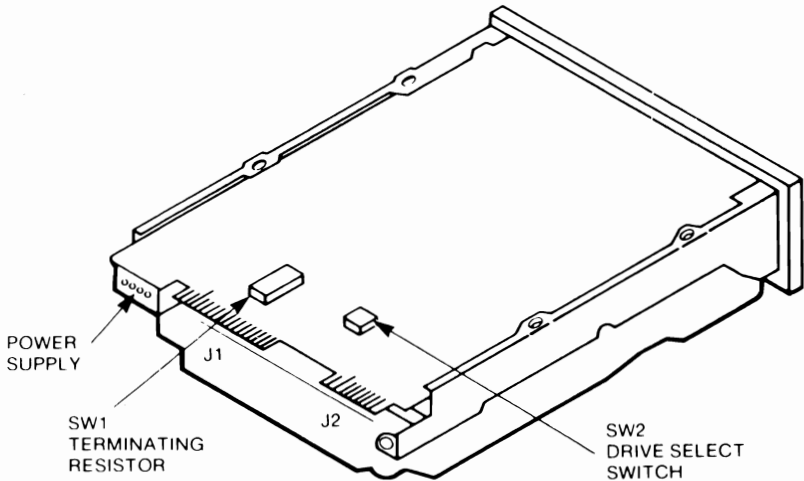


Figure 1B: Seagate 8-pin Drive Select Jumper

NEC 42MB 5146. The drive select switch is a 4-position dipswitch called SW2 located on the circuit side of the drive. Select drive address 1 if the 5146 is the first drive in your computer; select drive address 2 if the 5146 is the second drive in your computer. Refer to the following figure. In this figure, note the location of the SW1 terminating resistor dipswitch.



Drive Address	SW2 Position			
	1	2	3	4
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	OFF	OFF	ON	OFF
4	OFF	OFF	OFF	ON

Figure 1C: NEC Drive Select Switch (SW2)

MICROPOLIS 44.5MB 1333A and 71.3MB 1335: The drive select jumper (DS) is the 12-pin jumper block located between the cable connectors. Do not remove the jumpers from W1 and W2 positions. For physical drive 1, put jumper on position DS1; for physical drive 2, put jumper on position DS2. Please note the position of the terminating resistor also.

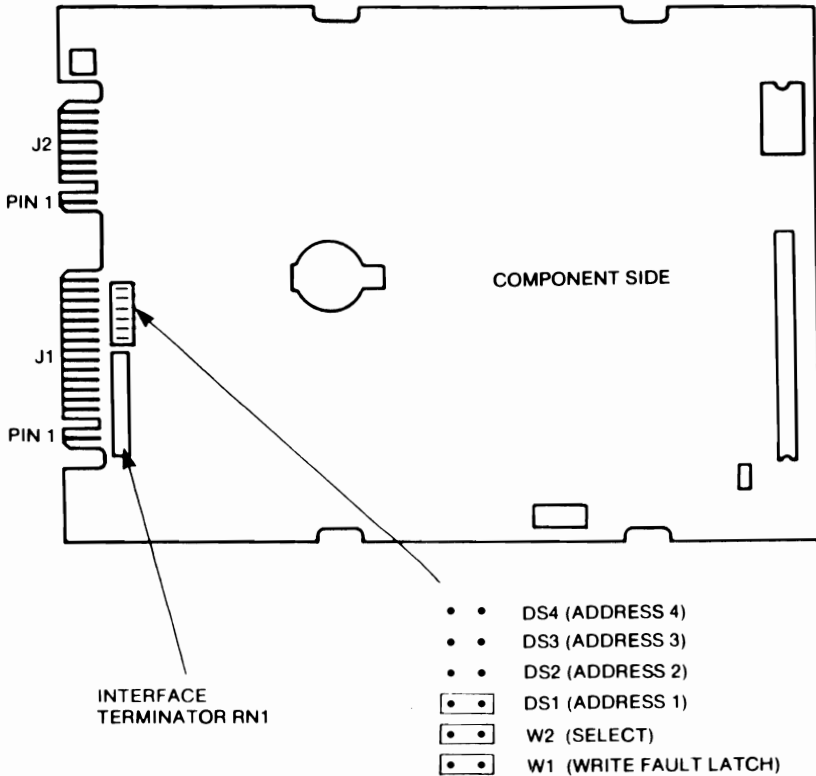


Figure 1D: Micropolis 12-pin Drive Select Jumper

MINISCRIBE 42.2MB 3650: The drive select jumper is a 14-pin jumper block located on the left rear of the drive as you face the rear of the drive. For physical drive 1, place the jumper on DS0, for physical drive 2, place the jumper on DS1. Please note the position of the terminating resistor also.

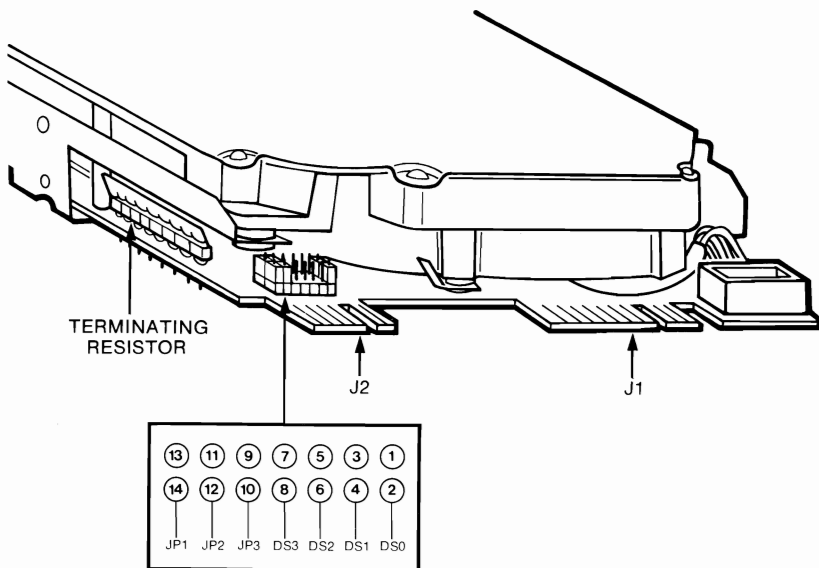


Figure 1E: Miniscribe 14-pin Drive Select Jumper

3.2 The Terminating Resistor

Since hard disks can be connected to the controller in a daisy-chain fashion, the drives have a resistor called a *terminating resistor*. The resistor can either be removed (Seagate, Micropolis and Miniscribe drives) or disabled (NEC 5146) so you can turn the terminator on and off, depending on the configuration of your computer. To locate the terminating resistor of your drive, refer to Figures 1A through 1E. The *last* drive connected to the daisy-chain cable *must* have its terminating resistor installed. If the controller has two drives connected to it, the drive attached to the middle of the daisy-chain cable *must* have its terminating resistor removed.

Removing the Terminating Resistor (Seagate, Micropolis and Miniscribe drives):

Removing the resistor from the drive attached to the middle connector of the daisy-chain cable is a very easy process. Use a small screwdriver, and gently pry the resistor off the hard disk drive. *Do not throw the terminating resistor away*, if you ever move the drive, you may need to reinstall the terminating resistor. For this reason, put the terminating resistor in a safe place.

Note the following figures to see whether to install or remove the terminating resistor.

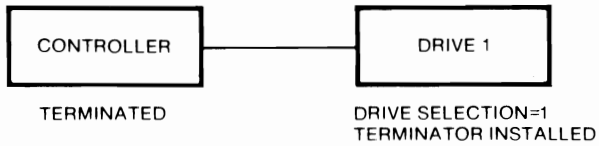


Figure 2A: One Drive Configuration

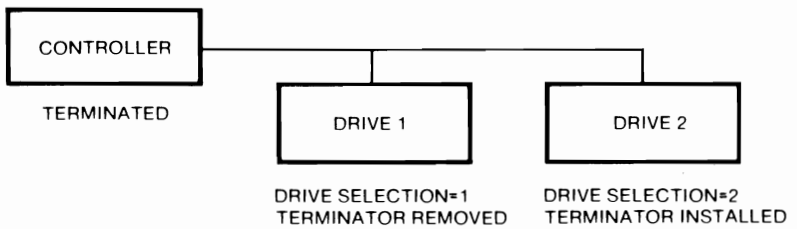


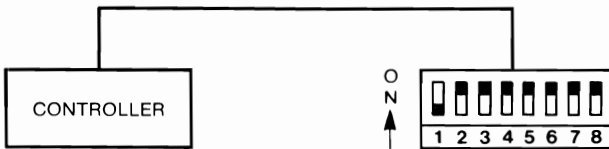
Figure 2B: Two Drive Configuration

Disabling the Terminating Resistor (NEC 5146):

The 8-pin dipswitch SW1 pointed out in Figure 1C determines if the terminating resistor is on or off. Whether the terminating resistor is on or off depends on how it is cabled to the controller. Refer to the following examples:

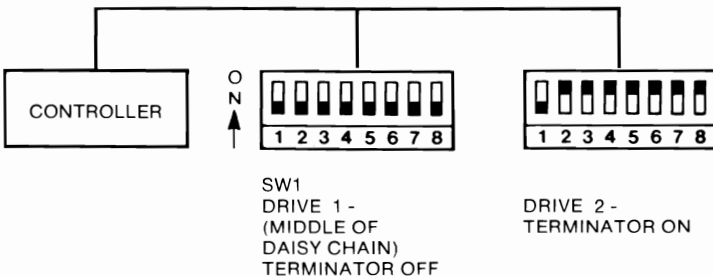
Example 1: 5146 is the only drive connected to daisy-chain cable

Switch positions 2 to 8 ON; position 1 should be OFF.



Example 2: 5146 is connected to middle of daisy-chain cable

Switch positions 1 to 8 OFF on the drive connected to middle connector of daisy-chain cable; switch positions 2 to 8 ON on the drive connected to the end connector of daisy-chain cable.



Section 4: Controller Configuration

The position of the jumper shunts at location SW1 of the hard disk controller (model number EV-390 or EV-391) determines the physical characteristics of the drive(s) attached to the controller. These physical characteristics include very important drive specifications, such as the capacity (in megabytes), and how many heads and cylinders the drives have. You need to place the jumper shunt on the pins at SW1 according to the type of drive(s) you are installing.

WARNING: Circuit boards are sensitive to static electricity, which could damage their delicate electronics. You can pick up a static charge in dry weather or walking on carpeted floors. To rid yourself of the static charge, touch the system chassis before you handle your board, and handle the board by the edges only.

4.1 Controller Description

The EVERDISK subsystem comes mostly with the EV-391 controller board. The board is two-third sized, and is NOT AT-compatible. The EV-391 controller uses MFM encoding, which records 17 sectors per track on a hard disk compatible with the ST506 specification. The EV-391 can operate two drives, even if the drives have a different number of heads and cylinders. The EV-391 has an optional 37-pin connector on the board's mounting bracket, which allows the installation of an external hard disk drive subchassis compatible with the ST506 standard.

Some EVERDISK subsystems are delivered with the EV-392 controller board. The EV-392 is similar in size to the EV-391 controller, but the EV-392 uses RLL (2,7) encoding, which records 26 sectors per track on a hard disk compatible with the ST412 specification. Drives connected to the EV-392 MUST be RLL (2,7)-qualified.

EVERDISK subsystems can also be delivered with the EV-390 controller. The function of the EV-390 is similar to the EV-391, but the EV-390 is a full-sized controller board that can also control up to four 360KB-capacity floppy disk drives in addition to controlling two hard disk drives. The floppy disk section can be disabled by removing the jumper shunt from the jumper block marked W10 (see Figure 4 for the location of the W10 jumper block on the EV-390 board).

4.2 Controller Configuration

To set the EV-390/391/392 controller card for each drive, you must move jumper positions 1-4 on SW1. Jumper positions 1 and 2 control Drive 2 (your second drive) and Jumper positions 3 and 4 control Drive 1 (your first drive).

The EPROM chip on the EV-390/391 controller (see Figure 3 and 4 for the location of the EPROM chip on the controllers) comes in several versions (labeled 3.92A, 3.93, 3.94, 3.95, 3.96 and 3.97) that support specific drive types. *Table 1A: ROM BIOS Disk Type Selection (EV390/391)* shows the proper configuration of SW1 (see Figures 3 and 4 for SW1 configuration options) and the type of EPROM needed for the drives.

There is only one EPROM version available on the EV-392. *Table 1B: ROM BIOS Disk Type Selection (EV-392)* shows the proper configuration of SW1 (see Figure 5 for SW1 configuration options) pertaining to each drive type.

EXAMPLE: For the Seagate ST4096 80MB drive connected to the EV-390/391 controller, make sure the EPROM is labeled "3.95," and make sure no jumpers are installed (option A from Figures 3 and 4).

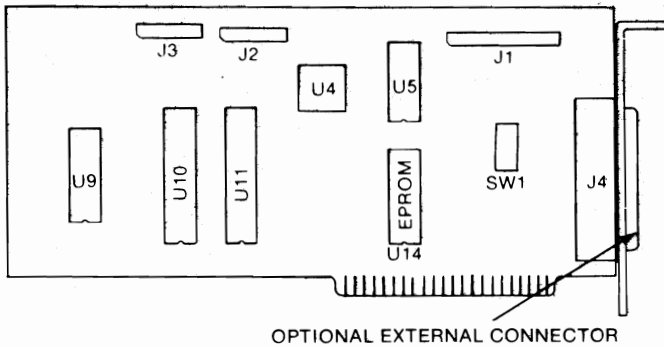


Figure 3: The EV-391 Hard Disk Controller

	A Option	B Option	C Option	D Option	
Drive 1	5 ■ ■	5 ■ ■	5 ■ ■	5 ■ ■	
	6 ■ ■	6 ■ ■	6 ■ ■	6 ■ ■	
	7 ■ ■	7 ■ ■	7 ■ ■	7 ■ ■	
	8 ■ ■	8 ■ ■	8 ■ ■	8 ■ ■	
	4 ■ ■	4 ■ ■	4 ■ ■	4 ■ ■	
	3 ■ ■	3 ■ ■	3 ■ ■	3 ■ ■	
	2 ■ ■	2 ■ ■	2 ■ ■	2 ■ ■	
	1 ■ ■	1 ■ ■	1 ■ ■	1 ■ ■	
		SW1	SW1	SW1	SW1
	Drive 2	5 ■ ■	5 ■ ■	5 ■ ■	5 ■ ■
6 ■ ■		6 ■ ■	6 ■ ■	6 ■ ■	
7 ■ ■		7 ■ ■	7 ■ ■	7 ■ ■	
8 ■ ■		8 ■ ■	8 ■ ■	8 ■ ■	
4 ■ ■		4 ■ ■	4 ■ ■	4 ■ ■	
3 ■ ■		3 ■ ■	3 ■ ■	3 ■ ■	
2 ■ ■		2 ■ ■	2 ■ ■	2 ■ ■	
1 ■ ■		1 ■ ■	1 ■ ■	1 ■ ■	
		SW1	SW1	SW1	SW1

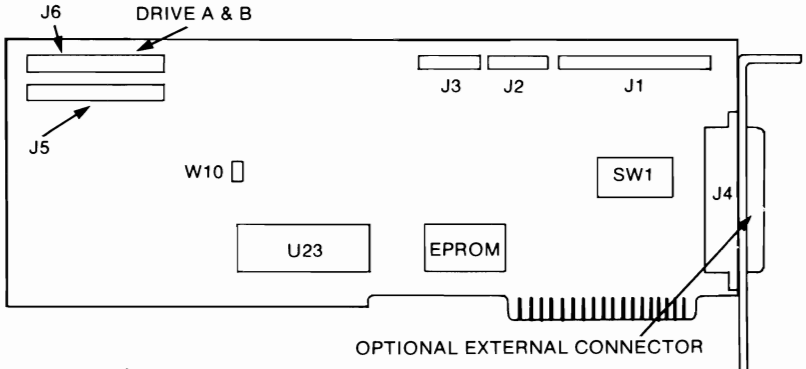


Figure 4: The EV-390 Hard Disk/Floppy Disk Controller

	A	B	C	D
	Option	Option	Option	Option
Drive 1	5 ■ ■	5 ■ ■	5 ■ ■	5 ■ ■
	6 ■ ■	6 ■ ■	6 ■ ■	6 ■ ■
	7 ■ ■	7 ■ ■	7 ■ ■	7 ■ ■
	8 ■ ■	8 ■ ■	8 ■ ■	8 ■ ■
	4 ■ ■	4 ■ ■	4 ■ ■	4 ■ ■
	3 ■ ■	3 ■ ■	3 ■ ■	3 ■ ■
	2 ■ ■	2 ■ ■	2 ■ ■	2 ■ ■
	1 ■ ■	1 ■ ■	1 ■ ■	1 ■ ■
	SW1	SW1	SW1	SW1
Drive 2	5 ■ ■	5 ■ ■	5 ■ ■	5 ■ ■
	6 ■ ■	6 ■ ■	6 ■ ■	6 ■ ■
	7 ■ ■	7 ■ ■	7 ■ ■	7 ■ ■
	8 ■ ■	8 ■ ■	8 ■ ■	8 ■ ■
	4 ■ ■	4 ■ ■	4 ■ ■	4 ■ ■
	3 ■ ■	3 ■ ■	3 ■ ■	3 ■ ■
	2 ■ ■	2 ■ ■	2 ■ ■	2 ■ ■
	1 ■ ■	1 ■ ■	1 ■ ■	1 ■ ■
	SW1	SW1	SW1	SW1

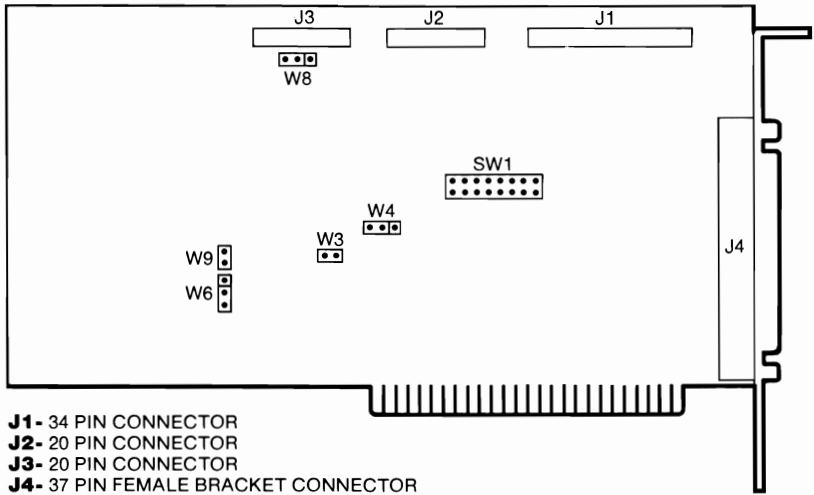


Figure 5: The EV-392 Hard Disk Controller

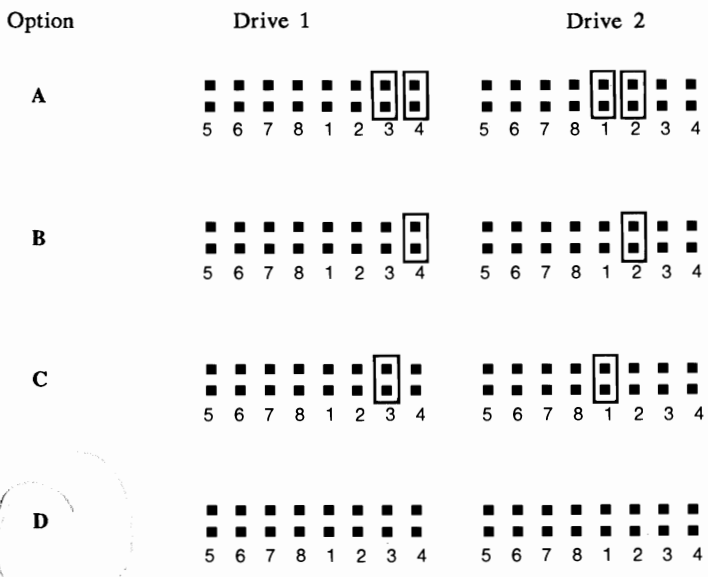


TABLE 1A
ROM BIOS Disk Type Selections (EV-390/391)

Manufacturer	Model	MB	Heads	Cyl	3.92A	EPROM						
						3.93	3.94	3.95	3.96	3.97		
Micropolis	133A	44.5	5	1024	NS	NS	NS	NS	NS	A	NS	
Micropolis	1335	71.3	8	1024	NS	NS	NS	NS	NS	B	NS	
Microscience	612	10	4	306	A	A	A	NS	NS	NS	NS	
Miniscribe	3650	42.2	6	809	NS	NS	NS	NS	NS	NS	A	
NEC	5146	42	8	615	NS	NS	B	B	NS	NS	NS	
Seagate	ST213	10.7	2	615	B	B	NS	NS	NS	NS	B	
Seagate	ST225	21.4	4	615	C	C	C	C	C	C	C	
Seagate	ST251	42.8	6	820	NS	NS	D	D	NS	NS	NS	
Seagate	ST4026	21.4	4	615	C	C	C	C	C	C	C	
Seagate	ST4038	31.9	5	733	D	NS	NS	NS	NS	D	D*	
Seagate	ST4051	42.5	5	977	D*	D	NS	NS	NS	NS	D	
Seagate	ST4096	80.2	9	1024	NS	NS	NS	A	NS	NS	NS	

* NS: The EPROM chip will not support this drive.

The ST4051 will have a formatted capacity of 31.9 megabytes when using the D option with the the 392A EPROM.

TABLE 1B
ROM BIOS Disk Type Selections
(EV-392)

Manufacturer	Model	MB	Cyl	Heads	Option
Tandon	TM755	65	981	5	A
Vertex	V150	65	981	5	A
Priam	V170	92	987	7	B
Miniscribe	3425	31	612	4	C
Microscience	HH725	31	612	4	C
Seagate	ST238	32	615	4	D

NOTE: The drives listed in Table 1B are all qualified for RLL (2,7) encoding; all hard disk drives attached to the EV-392 controller MUST be RLL (2,7) qualified.

Section 5: Physical Installation

Because of the large number of procedures needed to install a hard disk drive in your system, we strongly urge you to read through this section thoroughly before you install the drive. This section contains information on how to install internal and external drives.

NOTE: Since the EVERDISK subsystem requires extensive amounts of work inside the system unit during the physical installation process, we suggest having a reputable dealer do the installation for you. Also, IBM PC owners should consider upgrading the power supply for the hard disk subsystem to work properly.

5.1 Installing the Controller

1. Remove the hard disk drive, controller board, cables, mounting hardware and the EVERDISK software diskette from the carton. *Save the packaging materials, boxes and payment receipts.*

NOTE: If you ever return your EVERDISK hard disk subsystem to Everex Systems for any reason without proper packaging, your warranty may be affected. Please read the warranty card included in the packaging; the warranty will not be in effect until the warranty card is filled out and returned to Everex Systems.

2. Turn OFF the system and remove all power cables from the system. Clear an area around your computer to leave plenty of room to work.

-
3. Remove the system cover (see Appendix 1 on how to remove the system cover).
 4. Remove the hard disk controller from the anti-static bag; then make sure the controller is configured for the drive you have (see Section 4.2 for instructions on configuring the controller).
 5. Locate an available expansion slot cover nearest the floppy disk controller and remove the screw that holds the expansion slot cover in place; lift the slot cover off. Be sure to save the screw, as you will use it to secure the controller later.

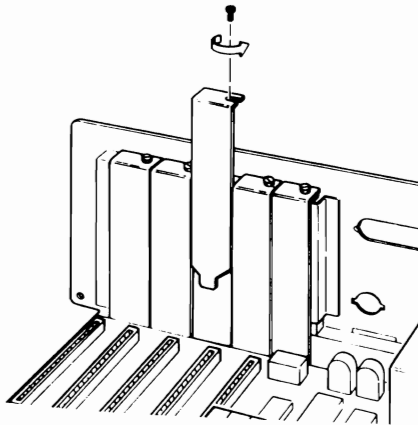


Figure 6: Removing the Expansion Slot Cover

-
6. Attach the 34-pin cable to the J1 connector and the 20-pin cable to the J2 connector. Make sure you align the colored stripe on the cables to the silkscreened "1" on the controller.

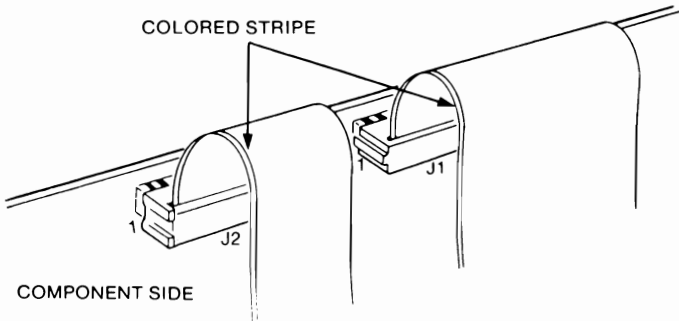


Figure 7: Attaching the Cables to the Controller

7. Insert the controller into the available expansion slot, making sure the gold edge connectors are fully seated into the expansion slot.

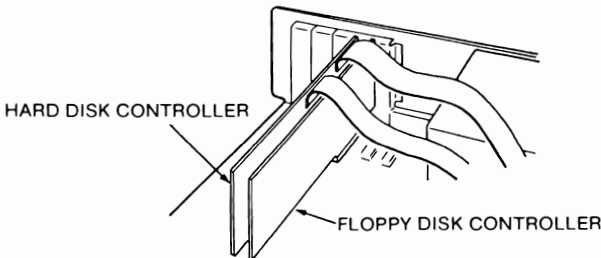


Figure 8: Installing the Controller Board

5.2 Internal Drive Installation

5.2.1 One Internal Drive

1. Remove the hard disk controller from the anti-static bag and confirm the controller is configured for the drive you have. See Section 4.2 for controller configuration instructions.
2. Turn OFF the system and remove all power cables from the system. Clear an area around your computer to leave plenty of room to work.
3. Install the controller according to the instructions in Section 5.1.
4. Make sure the drive select switch and terminating resistor on the drive have been adjusted according to the instructions in Sections 3.1 and 3.2.
5. Install the mounting bars onto the disk drive using the flat head "A" screws as shown in Figure 9.

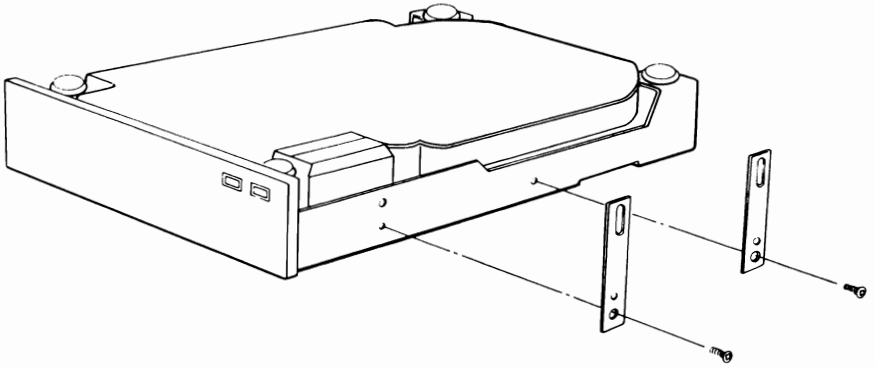


Figure 9: Attaching the Mounting Bars

6. Insert the drive partially into the drive space with the metal cover face up. Connect the cables from the controller to the drive according to Figure 10. The colored stripe on the cables should be on the left side as you face the front of the drive.

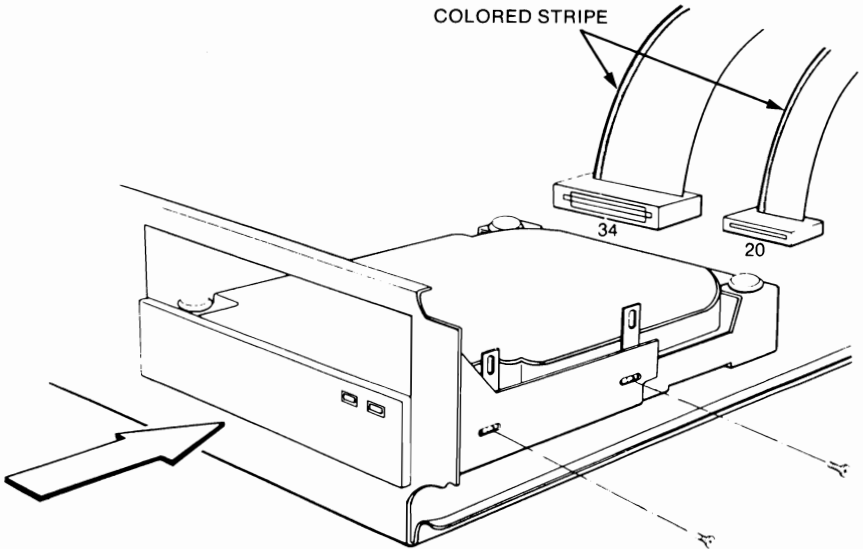


Figure 10: Installing the Hard Disk

-
7. Connect the 4-pin power cable from a power source (either the computer's power supply or an additional power supply) to the drive.
 8. Slide the drive completely into the drive space, and connect the provided pan head screws to secure the disk drive mounting bar to the system chassis (see Figure 10). DO NOT over-tighten the screws or use long screws; doing so may damage the drive.
 9. DO NOT change the switch settings on your system motherboard unless you removed the floppy disk drive and replaced it with the hard disk drive; in this case, refer to your system's manual on how to reset your motherboard dipswitches for one floppy drive.
 10. Reinstall disconnected cables and turn ON your system with the DOS diskette in drive A.

WARNING: Don't touch the components inside the system when the computer is ON with the system cover removed; you may damage the components, and some parts can cause electrical shock.

11. Format the hard disk using the instructions in Section 6 of this manual.

-
12. When the drive is formatted and working properly, turn OFF the system and reinstall the system cover.

5.2.2 Two Internal Drives

If you plan to have two internal drives attached the controller, use the following additional instructions:

1. Make sure the controller is configured for the installation of two drives. Refer to Section 4.2 for instructions on how to configure the controller.
2. Make sure the drive select switch and terminating resistor on each internal drive are adjusted according to instructions in Section 3.1 and 3.2.
3. Connect the 20-pin data cable from drive 1 to the J2 connector and the 20-pin data cable from drive 2 to the J3 connector. Then connect the 34-pin daisy-chain cable to the J1 connector (see Figure 11).
4. If possible, place the drives side by side on top of the floppy drive or a tape drive. **DO NOT try to stack two hard disk drives on top of one another, as this may cause the system to overheat!**

-
5. Connect the 20-pin and 34-pin cables to the hard disk drives. The cable attached to J2 connects to drive 1, and the cable attached to J3 connects to drive 2. Make sure the colored stripe on the cables connect is on the left side as you face the front of the system. The end connector of the daisy-chain cable should be connected to drive 2; the middle connector should be connected to drive 1. Refer to the following figure.

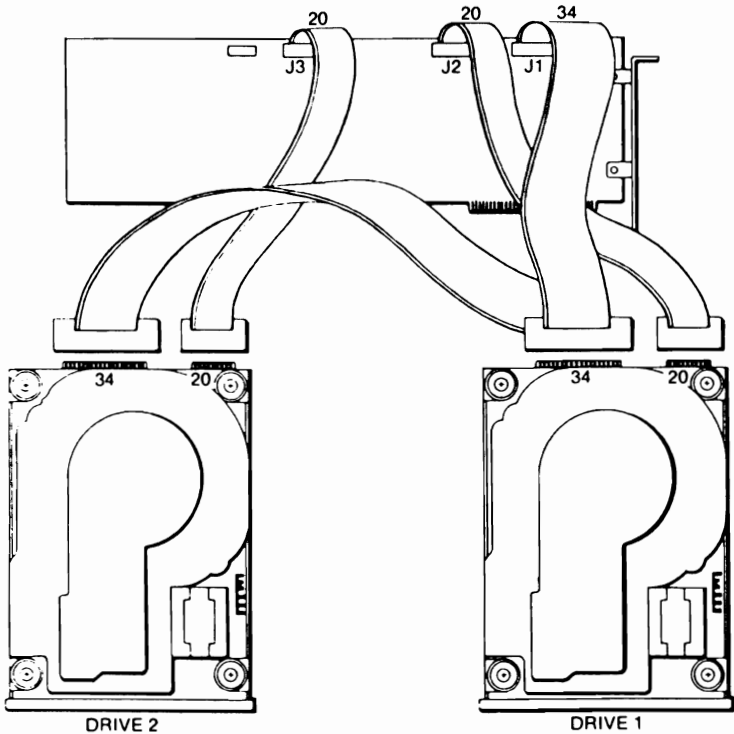


Figure 11: Installing Two Hard Disk Drives

-
6. Connect the power cables to the drives; use a "Y" power cable if necessary.
 7. Reinstall all cables and turn the computer ON.
 8. Follow the instructions in Section 6 to format the two hard disk drives. Note that your second drive is normally addressed as the "D" drive.
 9. When the drives are tested and working, turn OFF the system and reinstall the system cover.

5.3 External Drive Installation

5.3.1 Installing One External Drive

1. Follow the instructions for installing the controller board in Section 5.1.
2. Plug one end of the shielded round cable to the external connector on the controller, and the other end to the external connector on the hard disk subchassis.

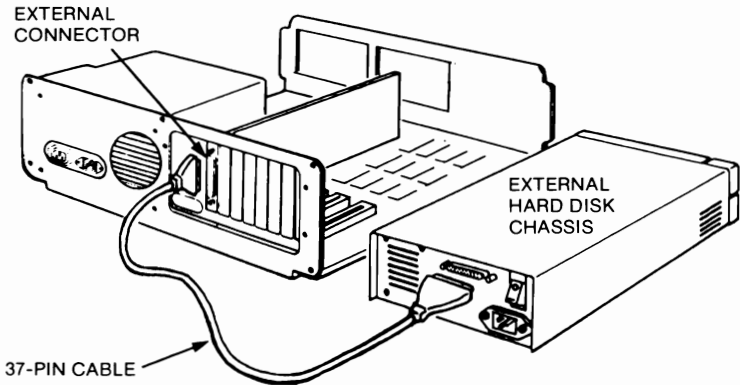


Figure 12: Connecting the Controller to Subchassis

3. Plug the power cable to the subchassis **FIRST**, then plug in the power cable to the wall outlet.

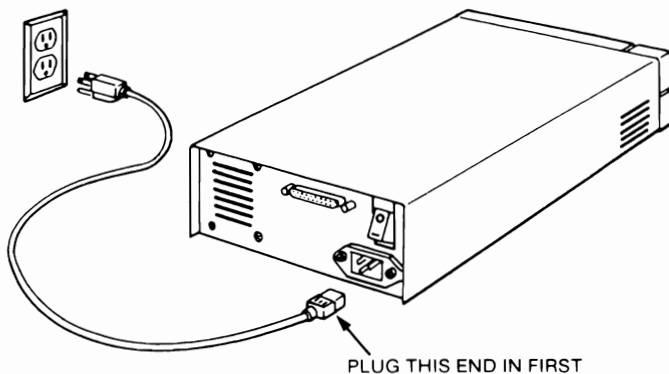


Figure 13: Connecting the Power Cord to Subchassis

4. Turn the chassis ON first; then turn the computer ON with the DOS system diskette in drive A.
5. Format the drive by following the instructions in Section 6 of this manual.
6. Once the drive is formatted and working properly, turn OFF the system and replace the system cover.

A Note About Unpowered External Subchassis:

There are some external hard disk subchassis that do not have a built-in power supply. In this case, the power comes from the system through the hard disk controller. For such subchassis, plug in a 4-wire power cable from the power supply to the J5 connector on the controller board; if there are no spare power cables available, disconnect a 4-wire cable from your currently installed floppy drive and connect a "Y" power cable. Connect one of the 4-wire connectors to the floppy drive, and the other one to the J5 connector on the controller.

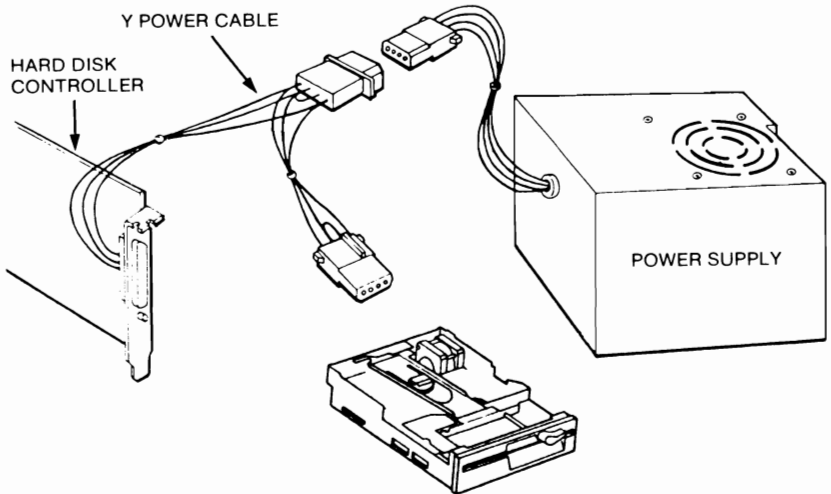


Figure 14: Connecting the "Y" Power Cable

5.3.2 Installing Two External Drives

The procedures for installing two external drives are similar to installing one external drive; however, the two external drives are two half-height drives encased in a full-height subchassis with its own power supply.

Before you install the two-drive subchassis, make sure you configure the hard disk controller board so two drives are usable by the controller (see Section 4). Then use the instructions in Section 5.3.1 to connect your two-drive subchassis to your system.

WARNING: DO NOT open the two-drive external hard disk subchassis; the drives have already been properly configured as drive 1 and drive 2. Also, many internal parts of the subchassis can produce electrical shock.

NOTE: The second drive will be recognized as drive "D".

Section 6: Formatting the Hard Disk

Unlike floppy diskettes, formatting a hard disk drive is a three-step process: *physical formatting*, *drive partitioning*, and *logical formatting*. Physical formatting arranges the information on the disk media and marks the bad sectors on the hard disk. Disk partitioning defines a disk space where information can be stored. Logical formatting prepares the partition with information so that DOS can read and write data to and from that partition.

Everex Systems has included with your EVERDISK hard disk subsystem the EVERDISK utility diskette (Version 3.0 or later), which contains programs that will perform the three steps needed to format your hard disk drive. You will also need a DOS system diskette in order to format your hard disk.

NOTE: Before you begin to format your hard disk, please note the list provided by the drive manufacturer which lists the bad tracks on the drive. This list is usually a computer print-out taped to the drive itself; often it is a sticker on the metal side of the drive. **KEEP THIS LIST**, as you will need it to format the drive.

6.1 For Older IBM PC Models

Some early models of the IBM PC (the PC 1) do not contain the ROM BIOS codes which allow you to boot DOS directly from the hard disk. For these systems, a software patch is necessary for the PC to recognize the hard disk drive. Everex Systems provides you with such a software patch. This patch is called **EVEREX1.EXE** and is located on the EVERDISK software diskette that accompanies your hard disk subsystem.

On the left hand side of your IBM PC motherboard (near the speaker) is a white label which indicates the model number of the PC. If it is labeled **16K – 64K CPU**, you have a PC 1, if it is labeled **64K – 256K CPU**, you have a PC 2.

To Install the EVEREX1.EXE Patch:

1. Copy the file **EVEREX1.EXE** from your EVERDISK utility diskette to your DOS system diskette.
2. Type in the following lines (DO NOT do this step if you already have an **AUTOEXEC.BAT** file on your DOS system diskette; instead use a text editor to enter the line *everex1* in the **AUTOEXEC.BAT** file):

```
copy con: autoexec.bat      [Enter]
everex1                     [Enter]
[F6]                        [Enter]
```

-
3. Press [Ctrl]-[Alt]-[Del] to reboot the system; this will run the EVEREX1.EXE file.

NOTE: The DOS system diskette with this AUTOEXEC.BAT file must be run each time the system is booted for the computer to access the hard disk drive.

6.2 Physical Formatting

1. Boot up the system with the DOS system diskette in drive A. Then replace it with the EVERDISK utility diskette and type:

DISK [Enter]

2. From the DISK Main Menu, press the [F2] key, *Physical Format*, to begin the physical formatting process.
3. You will see the following menu fields: *Enter physical disk number*, *Enter number of cylinders in disk*, *Enter number of heads in disk*, *Enter disk interleave factor (1 to 9)*, and *Do disk media test after format (Y/N)*. Use the up and down cursor keys to move between the fields.

As the physical description of the hard disk drive is determined by the SW1 settings on the EV-390/391/392 controller, you cannot adjust the total number of cylinders and heads in the drive.

For the disk interleave factor, we suggest entering the

number 5 (default factor for PCs and XT's); enter "Y" in the *Do disk media test after format (Y/N)* field if you need to test the drive to find any bad tracks not listed by the drive manufacturer.

4. Press [F2] to enter the *Bad Track* window field; using the list provided by the drive manufacturer, enter the entire bad track list in this field. Enter one value at a time followed by the [Enter] key; for example, if the drive has a bad track listed at cylinder 400, head 2, you would type:

400[Enter]2[Enter]

If you want to insert any bad tracks, press the [F5] key; if you want to delete any bad tracks, press the [F6] key after placing the cursor on the bad track entry you want deleted.

5. After entering all the bad tracks, press the [F8] key to begin the physical format. Formatting will take several minutes so please be patient. When the physical format is completed, press the [F10] key to return to the DISK Main Menu.

6.3 Disk Partitioning

Partitioning your hard disk drive defines the space on the disk that DOS will use. The software lets you select the number of cylinders allocated to each partition; each physical drive supports up to 4 partitions.

6.3.1 Creating Primary DOS Partition:

1. From the DISK Main Menu, press the [F3] key, *Partition Disk*.
2. Press the [F3] key, *Create DOS Partition*.
3. This initial partition on the disk must contain the DOS system files so it can self-boot; press the [F3] key, *Create Primary DOS Partition*.
4. You will see these window fields:

<i>Maximum number of available cylinders</i>	<i>aaa</i>
<i>Maximum cylinders allowed in partition</i>	<i>bbb</i>
<i>Enter number of cylinders in partition</i>	<i>ccc</i>
<i>Enter starting cylinder of partition</i>	<i>ddd</i>

Where:

- aaa* represents the largest free space on the drive.
- bbb* represents the maximum size of a partition. If the drive is less than 32 megabytes in capacity, *bbb* will equal the *aaa* value; if the drive is larger than 32 megabytes, *bbb* will represent the drive space equivalent to the 32 megabyte limit imposed by DOS.
- ccc* represents the number of cylinders you want in the partition; to make sure the drive can self-boot, do not exceed the suggested *ccc* value.
- ddd* represents the starting cylinder of the partition; since you are partitioning the first partition where your DOS system files will be stored, the *ddd* value should be 0.

-
5. Use the up and down cursor keys to move between the *Enter number of cylinders in partition* and *Enter starting cylinder of partition* fields. Enter the values you want, and press the [F8] key to create the partition.
 6. The new partition will appear in the *Partitions* menu. Now that a DOS partition exists on your drive, press [F9] to return to the Partitioning Main Menu, then press [F4], *Activate partition*, to make the partition bootable from DOS. You can proceed to logically format your drive by pressing the [F10] key to return to the DISK Main Menu.

NOTE: You must activate your Primary DOS partition for the drive to be bootable from DOS!

If your drive has a capacity greater than 32 megabytes, you have two options available to make the rest of the drive usable by DOS: create an *Extended DOS* partition, or create a *Super DOS* partition.

6.3.2 Creating Extended DOS Partition

An Extended DOS partition contains one or more "sub-partitions" called Logical drives, with each Logical drive up to 32 megabytes in size. For DOS 2.0 to 3.2, you will need the **EVDISK.SYS** device driver to access these logical drives; for PC-DOS 3.3, DOS will automatically recognize the extra logical drives without the **EVDISK.SYS** device driver.

1. From the Partitioning Main Menu, press [F3], *Create DOS Partition*, then press [F4], *Create Extended DOS Partition*.

2. You will then see these window fields:

<i>Maximum number of available cylinders</i>	<i>aaa</i>
<i>Maximum cylinders allowed in partition</i>	<i>bbb</i>
<i>Enter number of cylinders in partition</i>	<i>ccc</i>
<i>Enter starting cylinder of partition</i>	<i>ddd</i>

3. Use the up and down cursor keys to move between the *Enter number of cylinders in partition* and *Enter starting cylinder of partition* fields. Enter the values you want, and press the [F8] key to create the partition.

4. The *Partition Menu* window will then be replaced by a new *Create Logical DOS Drive* window with the following fields:

<i>Maximum available Extended partition space</i>	<i>eee</i>
<i>Maximum cylinders allowed in Logical drive</i>	<i>fff</i>
<i>Enter number of cylinders in Logical drive</i>	<i>ggg</i>
<i>Enter starting cylinder of Logical drive</i>	<i>hhh</i>

Where:

eee represents the space available in the Extended DOS partition.

fff represents the maximum number of cylinders allowed for the Logical drive within the Extended DOS partition. If the Extended DOS partition is less than 32 megabytes in size, the *fff*

value will equal the *eee* value; if the Extended DOS partition is larger than 32 megabytes in size, the *fff* value will be equivalent to a Logical drive that is 32 megabytes in capacity.

ggg represents the number of cylinders you want in the Logical drive.

hhh represents the starting cylinder of the Logical drive in the Extended DOS partition.

5. Enter the *ggg* and *hhh* values, and press the [F8] key to create the logical drive.
6. If there is room left in the Extended DOS partition for another Logical drive, you will be prompted to continue creating Logical drives until you have no more space to create a Logical drive in the Extended DOS partition.
7. You will notice in the *Partitions* menu two new partition types: *Ext-DOS*, which is the Extended DOS partition you created, and *Log-DOS*, which are the logical drives inside the Extended DOS partition.
8. Press the [F10] key to return to the DISK Main Menu and proceed to Section 6.4 to logically format the partitions in your drive.

6.3.3 Creating Super DOS Partition

A Super DOS partition, like the Extended DOS partition, allows DOS to access a high-capacity drive; but unlike an Extended DOS partition, Super DOS partitions define logical drives that are larger than the normal 32 megabyte

DOS limit, with a maximum limit of 285 megabytes per Super DOS partition. The software allows the definition of three Super DOS partitions in addition to the Primary DOS partition; this means you format a physical drive with a formatted capacity of 887 megabytes! Use the following instructions to create a Super DOS partition.

1. From the Partitioning program Main Menu, press [F3], *Create DOS Partition*, then press [F5], *Create Super DOS Partition*.
2. The *Partition Menu* field displayed is similar to the one for creating a Primary DOS partition (see Section 6.3.1), except this time the maximum number of cylinders allowed in a partition (*bbb*) will equal the maximum number of available cylinders (*aaa*). If you want only one Super DOS partition, press the [F8] key to create the partition. You can also create smaller Super DOS partitions, but there is a limit of 3 Super DOS partitions per physical drive. You can have 4 Super DOS partitions, but then the drive will not be bootable from DOS.
3. You will notice in the *Partitions* menu the new Super DOS partition, named *Sup-DOS*.
4. Press the [F10] key to return to the DISK Main Menu; go on to the next subsection to logically format your drive.

6.3.4 Deleting Partitions

If you need to delete a partition, use the following instructions:

1. Choose the physical drive that contains the partition you want to delete. The software defaults to physical drive 1; press the [F6] key to select physical drive 2.
2. To select the partition you want to delete, press the [F2] key to move the cursor to the *Partitions* menu field, use the up and down cursor keys to select the partitions you want deleted, and press the [F2] key again to confirm your selection. **WARNING: If you delete the Primary DOS Partition, the hard disk drive will not be bootable from DOS!**
3. Press the [F8] key to delete the chosen partition; *heed the warnings about losing data if you delete the partition.* Make sure the partition you delete does not contain valuable data.

6.4 Logical Formatting

The logical formatting process organizes the data blocks, or clusters, on the hard disk drive and transfers the DOS system files to the drive. You will need a DOS system diskette to complete the logical formatting process.

-
1. From the DISK Main Menu, press the [F4] key, Logical Format.
 2. The program will ask for which physical disk to format, whether to copy the DOS system files to the disk, and an optional disk label.

The software automatically defaults to physical drive 1; select 2 to logically format the partitions in physical drive 2. If you are formatting the Primary DOS partition, enter Y to copy the DOS system files; otherwise enter N. If you want a volume label for your drive, enter a volume label name up to 11 characters long.

3. Press the [F8] key to begin the logical format. This process takes a few minutes to complete so please be patient.
 4. When the logical format is completed, a message will prompt you to replace the EVERDISK utility diskette with the DOS system diskette.
 5. After you insert the DOS system diskette, press the [Enter] key to transfer your DOS system files to the hard disk. Press [Enter] again; you will be prompted to replace the DOS system diskette with the EVERDISK utility diskette.
-

-
6. If your drive has additional partitions, you must format each partition separately; to choose a partition to format, press the [F2] key to move the cursor into the *Partitions* menu field, use the cursor keys to select the partition, and press the [F2] key again to confirm your selection.

 7. Once you finish logically formatting each partition, press the [F10] key to leave the program; a message will prompt you to press a key to reboot the system. Make sure the floppy drive door is open, then proceed to reboot the system. When your system comes up with a "C>" prompt, your hard disk is ready for use.

 8. If your disk contains more than one DOS-usable partition (eg. Extended DOS or Super DOS partitions), you must create a **CONFIG.SYS** file in order to use these extra partitions. To create this file:
 - a. Boot up your system from your hard disk.

 - b. Use the DOS COPY command to copy the file **EVDISK.SYS** from the EVERDISK utility diskette to the hard disk.

 - c. Type in the following lines (DO NOT do this step if you already have a **CONFIG.SYS** file on your hard disk; instead use a text editor to enter the line *device=evdisk.sys* in the **CONFIG.SYS** file):

copy con: config.sys [Enter]
device=evdisk.sys [Enter]
[F6] [Enter]

- d. Reboot your system; the computer should now recognize the extra logical drives on your physical disk.

NOTE: If the additional DOS-usable partitions are all Extended DOS partitions and you are using PC-DOS 3.3, you can skip step #7 since the partitions are directly supported by this version of DOS.

6.5 Utilities

6.5.1 The Diagnostics Menu

The EVERDISK utility diskette also includes a series of diagnostic tests intended to ensure that your hard disk and hard disk controller are working properly. Use the following instructions to enter the Utility Menu.

1. From the DISK Main Menu, press the [F5] key, Utilities.
2. From the Utility Menu, press the [F4] key to enter the Diagnostics menu.
3. In the Diagnostics Menu, you will see three groups of window fields: the group on the left listing the various tests; the group on the upper right selects the physical

drive to test, whether to do a continuous drive test, and the duty cycle percentage value (100 percent means testing the drive at maximum performance capabilities); and the group on the lower right displays the test status.

4. Move the cursor with the cursor keys to the upper right group; select the physical drive you want to test, select whether or not to do a continuous test, and select the duty cycle.

NOTE: For the duty cycle, we do not recommend entering 100 percent if you choose to do a continuous test, as this may damage the drive if the continuous test is done over a long period of time.

5. Move the cursor to the left menu field, and use the up and down cursor keys to select the test you want to run. Table 2 below is a description of each test.

TABLE 2
DISK Diagnostic Test Descriptions

Test Name	Description
Sequential Write	Checks to make sure the drive can write data to disk in sequential order from cylinder 0, head 0 to end of drive.
Sequential Read	Checks to make sure the drive can read data from disk in sequential order from cylinder 0, head 0 to end of drive.
Sequential Write-Read	Checks to make sure the drive can write and read in sequential order from cylinder 0, head 0 to end of drive.
Random Write	Checks to make sure the drive can write to a random track on the drive.
Random Read	Checks to make sure the drive can read from a random track on the drive.
Random Write-Read	Checks to make sure the drive can write and read data to and from a random track on the drive.

Controller	Checks to make sure basic operation of drive and controller are working properly.
Seek	Checks to make sure the read/write head assembly works properly.
Drive Ready	Checks to make sure the drive is ready to accept and execute commands.
All Tests	Runs all the tests listed above.

WARNING: The *Sequential Write*, *Sequential Write-Read*, *Random Write*, *Random Write-Read*, and *All Tests* diagnostics selections will destroy data already on the disk! For these tests, we urge that you back up any data on the drive **FIRST** or run them **BEFORE** you partition and logically format the drive, or all data will be lost.

6. Once you finish testing the drive, press the [F9] key, then the [F10] key to leave the utility programs.

6.5.2 SHIPDISK.EXE

Whenever you need to move your system and/or hard disk, you should move ("park") the read/write head on the hard disk at an area always void of data (the so-called *landing zone*). This is analogous to securing the tone arm of a stereo turntable. To park the read/write head, use the SHIPDISK.EXE program on the EVERDISK utility diskette.

To Park the Read/Write Heads:

1. Insert the EVERDISK utility diskette in drive A.

2. Type:

```
SHIPDISK           [Enter]
```

3. The program will ask you for a drive number (1-8). Enter 1 for physical drive 1, enter 2 for physical drive 2. If two drives are connected to your system, you must run this program twice to park the heads on both drives; park the read/write heads on physical drive 2 first, then park the heads on physical drive 1.

4. When the head is parked, a *disk is ready to ship* message will appear. The drive(s) are now ready to be moved.

NOTE: Some drives do not need to run SHIPDISK.EXE as the drive will automatically park the read/write head mechanism upon turning off the system.

Appendix 1: Removing System Cover

It is a straightforward process to remove the system cover. First, remove the holding screws from the edges of the back panel of the system unit (save the screws). With the front of the unit facing you, carefully pull the cover towards you until it stops. Tilt the cover up slightly, and lift it off gently.

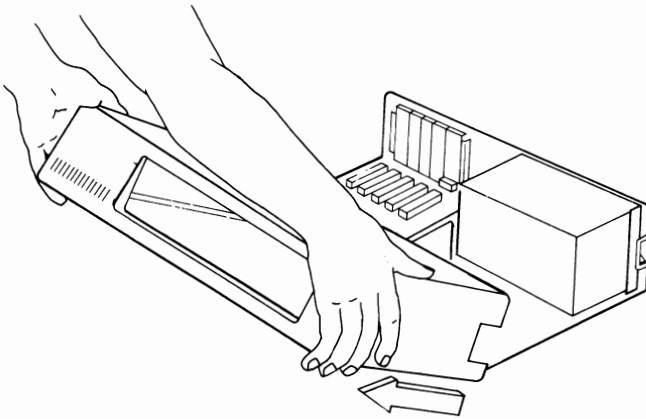


Figure 15: Removing the System Cover

Appendix 2: Installing One External & One Internal Drive

If you have one internal and one external drive, you must configure the external drive as drive 1 and the internal drive as drive 2.

Installation Instructions

1. Turn the system OFF.
2. Change the drive select switch so your internal drive is configured as drive 2 (the external drive is already configured as drive 1). **NOTE: You do not need to remove the terminating resistor from your internal drive.**
3. Change the 20-pin data cable from J2 to J3; the external drive is connected to the controller via the J4 bracket connector.
4. Format the external drive as drive "C" and the internal drive as drive "D". You will boot from the external drive.

WARNING: Whenever you install a new hard disk controller, you must reformat the hard disk drive. Therefore, back up the data on the original internal hard disk drive.

5. From now on, you will boot from the external drive (known as Drive 1) and the internal drive will be known as Drive 2. If your external drive has its own power supply, turn ON your external drive first before you turn on your system.

WARNING: DO NOT remove the cover of the external hard disk drive subchassis; some of the components inside can produce electrical shock.

Appendix 3: EV-390 Controller Installation

Use the instructions in Section 5 to install the EV-390 Hard Disk/Floppy controller board. The only change required for this controller is the installation of a floppy disk ribbon cable.

To install the hard disk/floppy disk controller:

1. Remove the floppy disk controller card already in your system.
2. Attach one end of the 34-pin daisy-cable to the J6 connector on the upper left side of the EV-390 board.

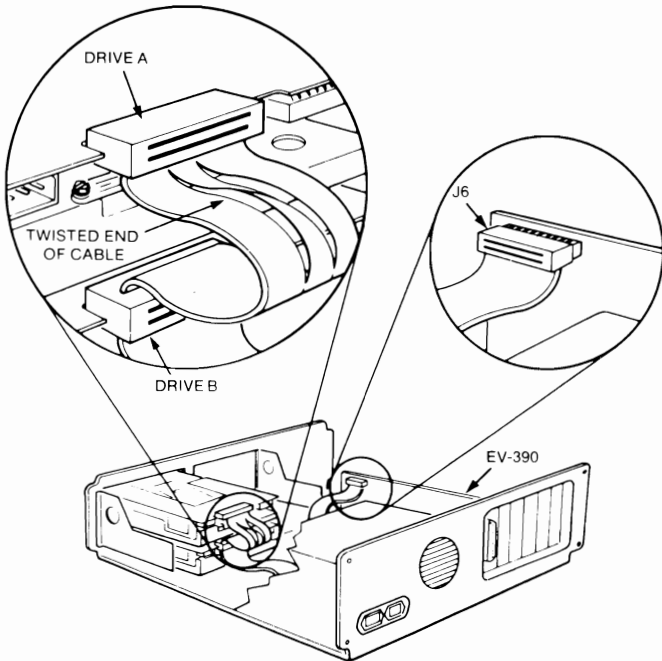


Figure 16: Installing the Floppy Disk Cable

The daisy-chain cable is keyed to prevent installing the cable backwards. The untwisted end of the cable should be attached to the J6 connector. Make sure to align the cable with pin 1 on the controller; the color stripe on the cable should be on the right side as you see the component side of the controller. (See Figure 16.)

3. Connect the cable's middle connector to drive "B", and connect the end connector to drive "A". (See Figure 16.)
4. Make sure all connectors are fully inserted; do not use excessive force to install the connectors.
5. Follow the instructions in Section 5.2 and/or 5.3 to install your hard disk drive(s).

Appendix 4: Controller Specifications

Encoding Method	MFM (EV-390/391) RLL (2,7) (EV-392)
Cylinders Per Drive	Up to 1024
Bytes Per Sector	512
Sectors Per Track	17 (EV-390/391) 26 (EV-392)
Head Selects	16
Drive Selects	2
Data Transfer Rate	5 Mbits/sec. (EV-390/391) 7.5 Mbits/sec. (EV-392)
Write Precomp Time	12 nanoseconds
Max Cable Length:	
Daisy Chain Control	20 feet
Data	20 feet

Host Interface

Type	IBM PC/XT
Connection	Uses any expansion slot (it will not fit half-length slots)

Power

Voltage	+5VDC +/- 5% and +12VDC +/- 10%
Maximum Current	depends of drive type

Environmental Limits

Ambient Temperature	0-55 ⁰ C (32-131 ⁰ Fahrenheit)
Relative Humidity	10-95% non-condensing
Altitude	0-3000 meters (0-9840 feet)
Air Flow	0.25" from component surface

Interleave factor

The recommended interleave factor is 5.

Appendix 5: Hard Disk Specifications

TABLE 3
Hard Disk Specifications (I)

	Seagate ST225	Seagate ST251	Seagate ST4026	Seagate ST4038
Formatted Capacity	21.4MB	42.8MB	21.4MB	31.9MB
Heads	4	6	4	5
Cylinders	615	820	615	733
Tracks	2460	4920	2460	3665
Encoding Type	MFM	MFM	MFM	MFM
Transfer Rate Mbits/second	5	5	5	5
Average Access (msec)	65	40	40	40

TABLE 4
Hard Disk Specifications (II)

	Seagate ST4051	Seagate ST4096	NEC 5146	Miniscribe 3650
Formatted Capacity	42.5MB	80.2MB	42MB	42.2MB
Heads	5	9	8	6
Cylinders	977	1024	615	809
Tracks	4885	9216	4920	4854
Encoding Type	MFM	MFM	MFM	MFM
Transfer Rate Mbits/second	5	5	5	5
Average Access (msec)	40	28	40	65

TABLE 5
Hard Disk Specifications (III)

	Micropolis 1333A	Micropolis 1335	Seagate ST238
Formatted Capacity	44.5MB	71.3MB	31.5MB
Heads	5	8	4
Cylinders	1024	1024	615
Tracks	5120	8192	2460
Encoding Type	MFM	MFM	RLL (2,7)
Transfer Rate Mbits/second	5	5	7.5
Average Access (msec)	30	30	.65

Appendix 6: Questions & Answers

Q. Do I need to change the dipswitch settings on the system motherboard?

A. *Normally, you do not need to change the dipswitch settings when you install a hard disk subsystem. However, if you removed one of your floppy disk drives so you can install an internal hard disk drive, check your computer owner's manual to see how to set the motherboard for one floppy drive installed.*

Q. When I boot up, the message *1701 hard disk not recognized* comes up. What should I do?

A. *The most likely problem is that your hard disk subsystem is not securely installed in your computer. Check to make sure all cables are properly aligned and securely connected; also, make sure your controller board is securely installed into the expansion slot.*

Q. After the computer boots up, why does the hard disk drive motor not spin?

A. *The power cables connected to the hard disk drive are probably not connected properly. Make sure the power cables are securely installed to the drive.*

Q. When I boot up, the message *invalid drive specification* appears. What should I do?

A. *Make sure you followed the hard disk formatting instructions in Section 6 of this manual properly. If you have a IBM PC 1, you should run the EVEREX1.EXE program each time you boot up from DOS.*

Q. After I format the disk, the drive shows a lot of bad tracks. What should I do?

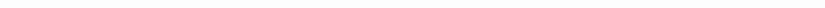
A. *Make sure you followed the formatting instructions in Section 6 properly; we suggest doing the entire formatting process again. If you still have a lot of bad tracks, try removing some of your expansion boards to determine if an inadequate power supply is the problem.*

Q. Why does the message *drive not ready* appear periodically?

A. *Your power supply may not be adequate enough to power your hard disk subsystem and expansion boards simultaneously. Try removing any unused expansion boards and/or consider upgrading your power supply.*

Q. Why is it that after exchanging controllers, the drive does not work?

A. *A unique physical format is required for each type of controller. This means if you formatted your hard disk drive with one type of controller and then replaced the controller with another type, you must reformat the drive for the newer controller to work with your drive. Please refer to Section 6 of this manual for instructions on how to reformat your drive. Note that reformatting your drive will erase all data on the drive, so back up all data on the drive before you reformat it.*



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