

Chapter 3 INSTALLATION

This chapter explains how to unpack, configure, mount, and connect the Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drive prior to operation. It also explains how to start up and operate the drive.

3.1 SPACE REQUIREMENTS

The Quantum Fireball TM series of hard disk drives are shipped without a faceplate. Figure 3-1 shows the external dimensions of the Quantum Fireball TM one disk drive, and Figure 3-2 for the Quantum Fireball TM two and three disk drives.

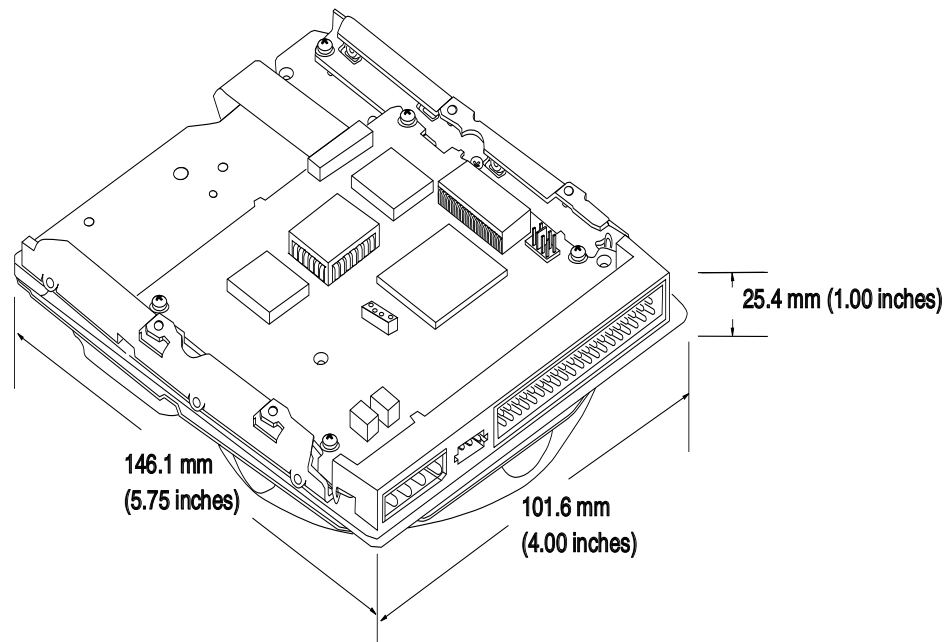


Figure 3-1 *Mechanical Dimensions for Quantum Fireball TM (One-Disk) Drive*

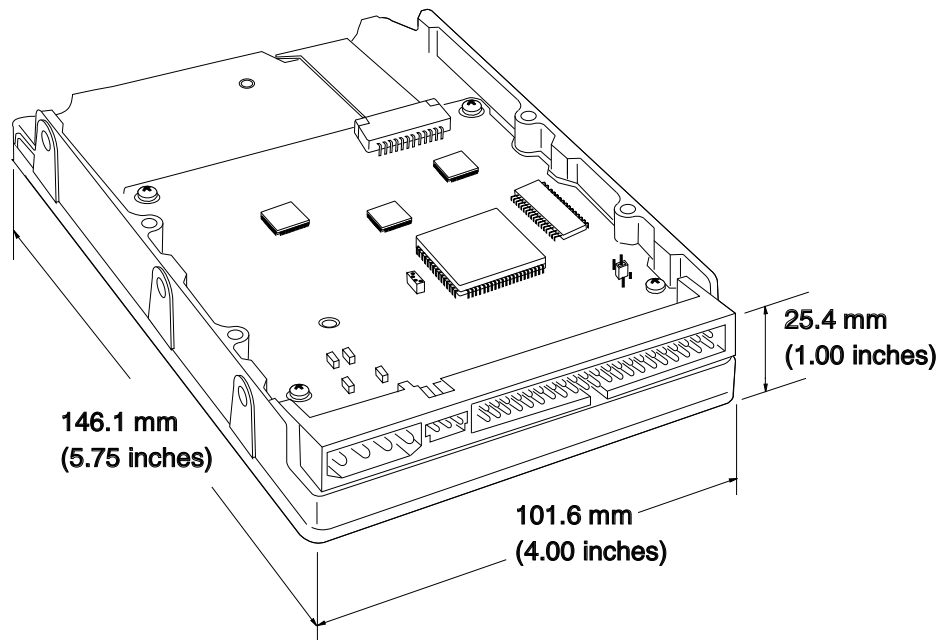


Figure 3-2 *Mechanical Dimensions for Quantum Fireball TM (Two- and Three-Disk) Drives*

3.2 UNPACKING INSTRUCTIONS

CAUTION: The maximum limits for physical shock can be exceeded if the drive is not handled properly. Special care should be taken not to bump or drop the drive.

1. Open the shipping container and remove the packing assembly that contains the drive.
2. Remove the drive from the packing assembly.

CAUTION: During shipment and handling, the antistatic electrostatic discharge (ESD) bag prevents electronic component damage due to electrostatic discharge. To avoid accidental damage to the drive, do not use a sharp instrument to open the ESD bag. Save the packing materials for possible future use.

3. When you are ready to install the drive, remove it from the ESD bag.

Figure 3-3 shows the packing assembly for a single Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drive. A 12-pack shipping container is available for multiple drive shipments.

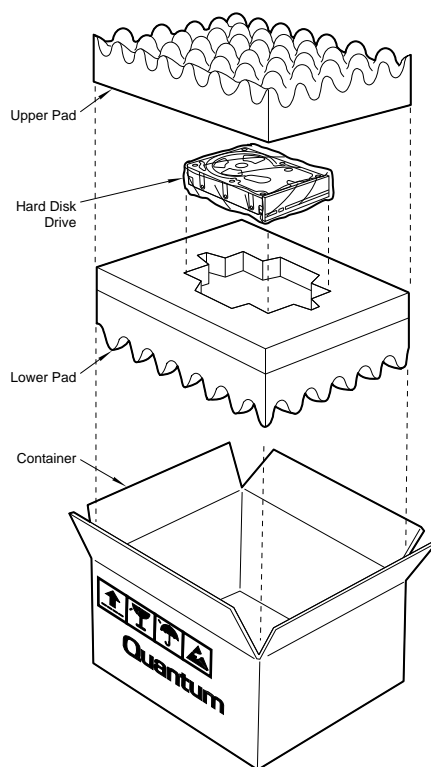


Figure 3-3 *Drive Packing Assembly*

3.3 HARDWARE OPTIONS

The configuration of a Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drive depends on the host system in which it is to be installed. This section describes the hardware options that you must take into account prior to installation. Figure 3-4 shows the printed circuit board (PCB) assembly, indicating the jumpers that control some of these options.

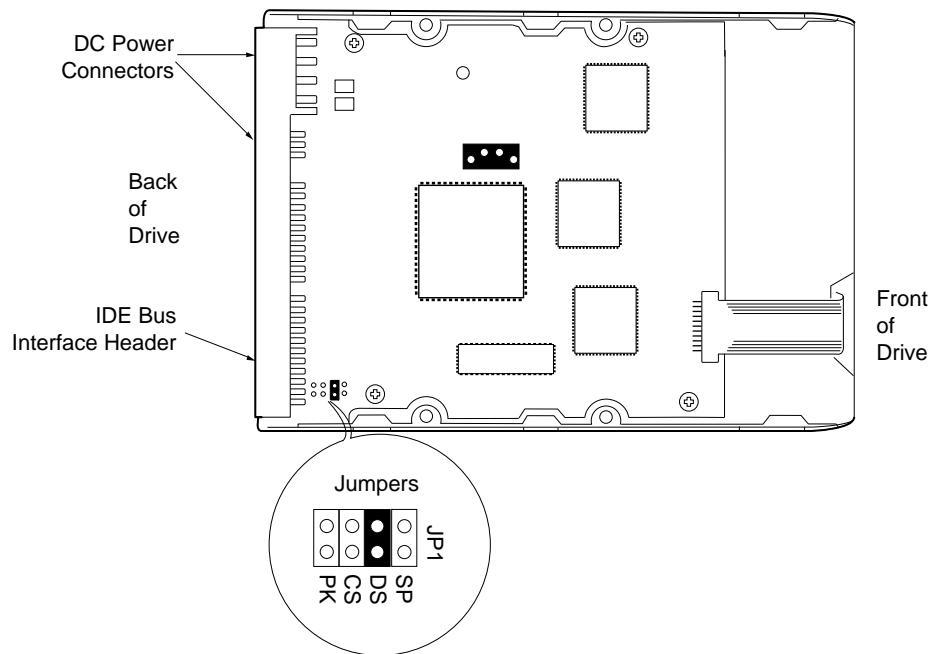


Figure 3-4 Jumper Locations on the Drive PCB

The configuration of the following four jumpers controls the drive's mode of operation:

- CS – Cable Select
- DS – Drive Select
- SP– Slave Present
- PK– Jumper Parking Position

The AT PCB has two jumper locations provided for configuration options in a system. These jumpers are used to configure the drive for master/slave operation in a system. The default configuration for the drive as shipped from the factory is with a jumper across the DS location and open positions in the CS and PK positions.

Table 3-1 defines the operation of the jumpers and their function relative to pin 28 on the interface. *1* indicates that the specified jumper is installed; *0* indicates that the jumper is not installed.

Table 3-1 AT Jumper Options

CS	DS	PK	Pin 28	DESCRIPTION
0	0	X	X	Drive configured as a slave.
0	1	X	X	Drive configured as a Master.
1	X	X	Open	Drive configured as a slave.
1	X	X	Gnd	Drive configured as a Master.

Note: In Table 3-1, a *0* indicates that the jumper is removed, a *1* indicates that the jumper is installed, and an *X* indicates that the jumper setting does not matter.

3.3.1 Cable Select (CS) Jumper

When two Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drives are daisy-chained together, they can be configured as Master or Slave either by the CS or DS jumpers. To configure the drive as a Master or Slave with the CS feature, the CS jumper is installed (1).

Once you install the CS jumper, the drive is configured as a Master or Slave by the state of the Cable Select signal: pin 28 of the IDE bus connector. Please note that pin 28 is a vendor-specific pin that Quantum is using for a specific purpose. More than one function is allocated to CS, according to the ATA CAM specification (see reference to this specification in Chapter 1). If pin 28 is a *0* (grounded), the drive is configured as a Master. If it is a *1* (high), the drive is configured as a Slave. In order to configure two drives in a Master/Slave relationship using the CS jumper, you need to use a cable that provides the proper signal level at pin 28 of the IDE bus connector. This allows two drives to operate in a Master/Slave relationship according to the drive cable placement.

3.3.2 Drive Select (DS) Jumper

You can also daisy-chain two drives on the IDE bus interface by using their Drive Select (DS) jumpers. To use the DS feature, the CS jumper must be removed.

To configure a drive as the Master (Drive 0), a jumper must be installed on the DS pins.

The Quantum Fireball TM series of hard disk drives are shipped from the factory as a Master (Drive 0 - DS jumper installed). To configure a drive as a Slave (Drive 1), the DS jumper must be removed. In this configuration, the spare jumper removed from the DS position may be stored on the SP jumper pins.

Note: The order in which drives are connected in a daisy chain has no significance.

3.3.3 Jumper Parking (PK) Position

The PK position is used as a holding place for the jumper for a slave drive in systems that do not support Cable Select.

3.3.4 Slave Present (SP) Jumper

In combination with the current DS or CS jumper settings, the Slave Present (SP) jumper implements one of two possible configurations:

- When the drive is configured as a Master (DS jumper installed or CS jumper installed, and the Cable Select signal is set to 0), the SP jumper indicates to the drive that a Slave drive is present. The SP jumper should be installed on the Master drive only if the Slave drive does *not* use the Drive Active/Slave Present (DASP-) signal to indicate its presence.
- When the drive is configured as a Slave (DS jumper not installed), the SP jumper position is used to store the DS jumper and will have no effect.

If an error is encountered during the self-seek test, the test terminates.

3.4 IDE BUS ADAPTER

There are two ways you can configure a system to allow the Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drive to communicate over the IDE bus of an IBM or IBM-compatible PC:

1. Connect the drive to a 40-pin IDE bus connector (if available) on the motherboard of the PC.
2. Install an IDE-compatible adapter board in the PC, and connect the drive to the adapter board.

3.4.1 40-Pin IDE Bus Connector

Many of the newer design PC motherboards have a built-in 40-pin IDE bus connector that is compatible with the 40-pin IDE interface of the Quantum Fireball TM series of hard disk drives. If the motherboard has an IDE connector, simply connect a 40-pin ribbon cable between the drive and the motherboard.

You should also refer to the motherboard instruction manual, and refer to Chapter 6 of this manual to ensure signal compatibility.

3.4.2 Adapter Board

If your PC motherboard does not contain a built-in 40-pin IDE bus interface connector, you must install an IDE bus adapter board and connecting cable to allow the drive to interface with the motherboard. Quantum does not supply such an adapter board, but they are available from several third-party vendors.

Please carefully read the instruction manual that comes with your adapter board, as well as Chapter 6 of this manual to ensure signal compatibility between the adapter board and the drive. Also, make sure that the adapter board jumper settings are appropriate.

3.5 MOUNTING

Drive mounting orientation, clearance, and ventilation requirements are described in the following subsections.

3.5.1 Orientation

The mounting holes on the Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drives allow the drive to be mounted in any orientation. Figures 3-4 and 3-5 show the location of the three mounting holes on each side of the drive. The drive can also be mounted using the four mounting hole locations on the PCB side of the drive.

Note: It is highly recommended that the drive is hard mounted on to the chassis of the system being used for general operation, as well as for test purposes. If, for Bench-test purposes or any other reason, it is not possible to mount the drive in the system chassis, Quantum recommends that the drive be placed on a high-density anti-static foam pad. Failure to use a flat and stable surface can result in erroneous errors during testing.

All dimensions are in millimeters. Number 6-32 UNC screws are recommended for mounting.

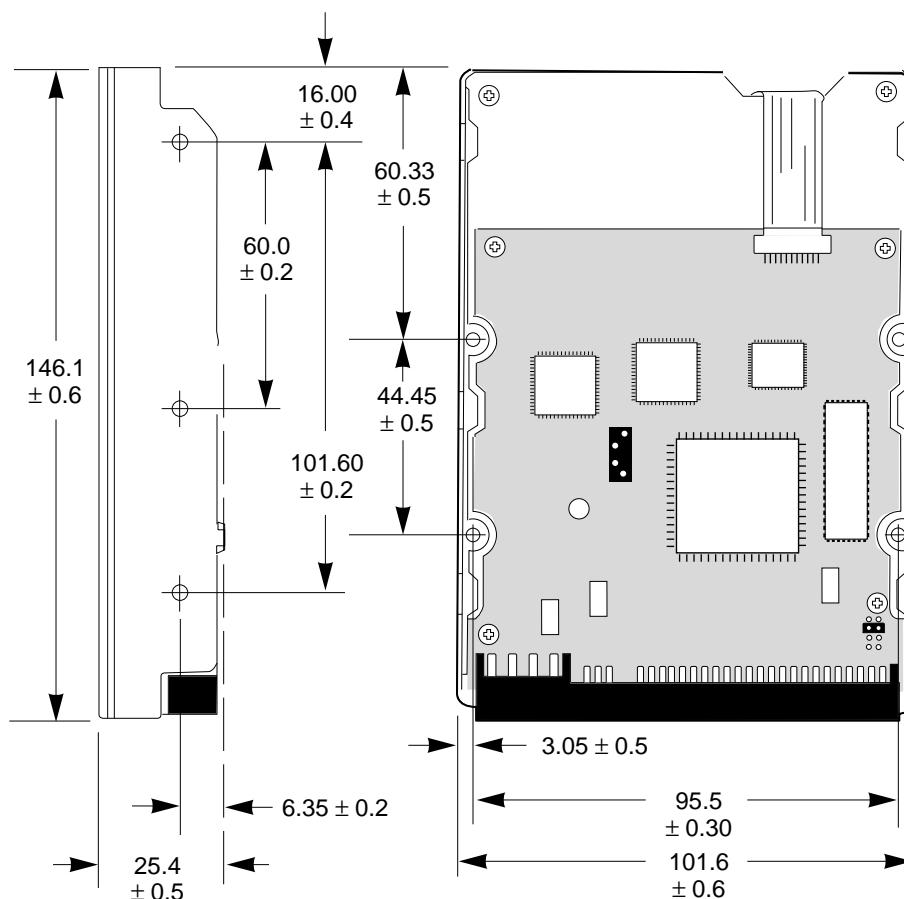


Figure 3-5 Mounting Dimensions for Quantum Fireball TM (One-Disk) Drive

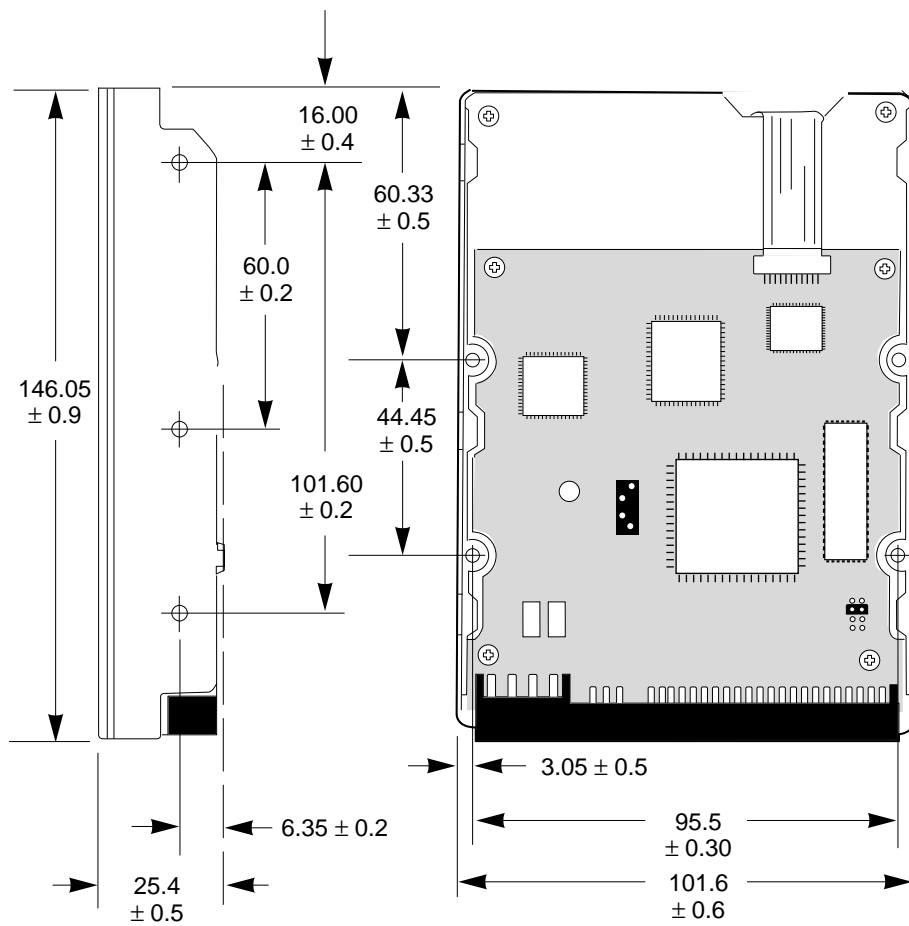


Figure 3-6 Mounting Dimensions for Quantum Fireball (Two- and Three-Disk) Drives

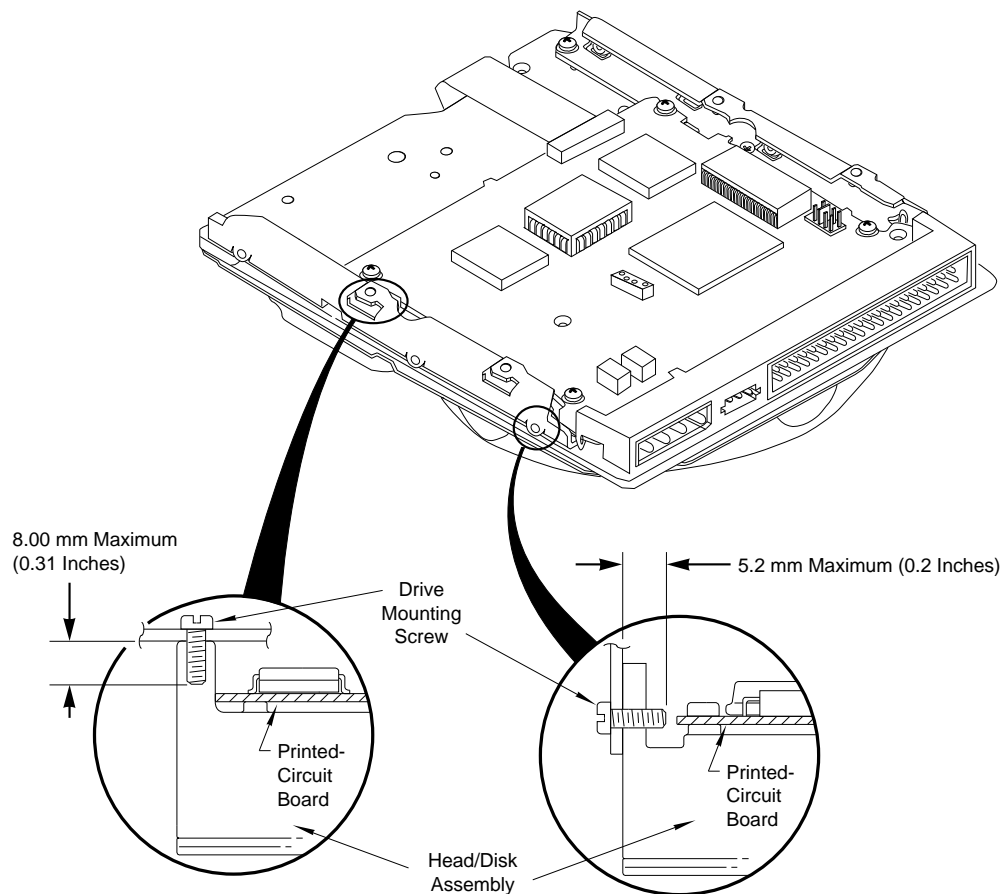


Figure 3-7 *Mounting Screw Clearance for Quantum Fireball™ (One-Disk) Drive*

CAUTION: The PCB is very close to the mounting holes. Do not exceed the specified length for the mounting screws. The specified screw length allows full use of the mounting hole threads, while avoiding damaging or placing unwanted stress on the PCB. Figure 3-7 specifies the minimum clearance between the PCB and the screws in the mounting holes. To avoid stripping the mounting hole threads, the maximum torque applied to the screws must not exceed 8 inch-pounds. A maximum screw length of 0.25 inches may be used on the side mounting locations when a bracket of 0.040 inches minimum thickness is included.

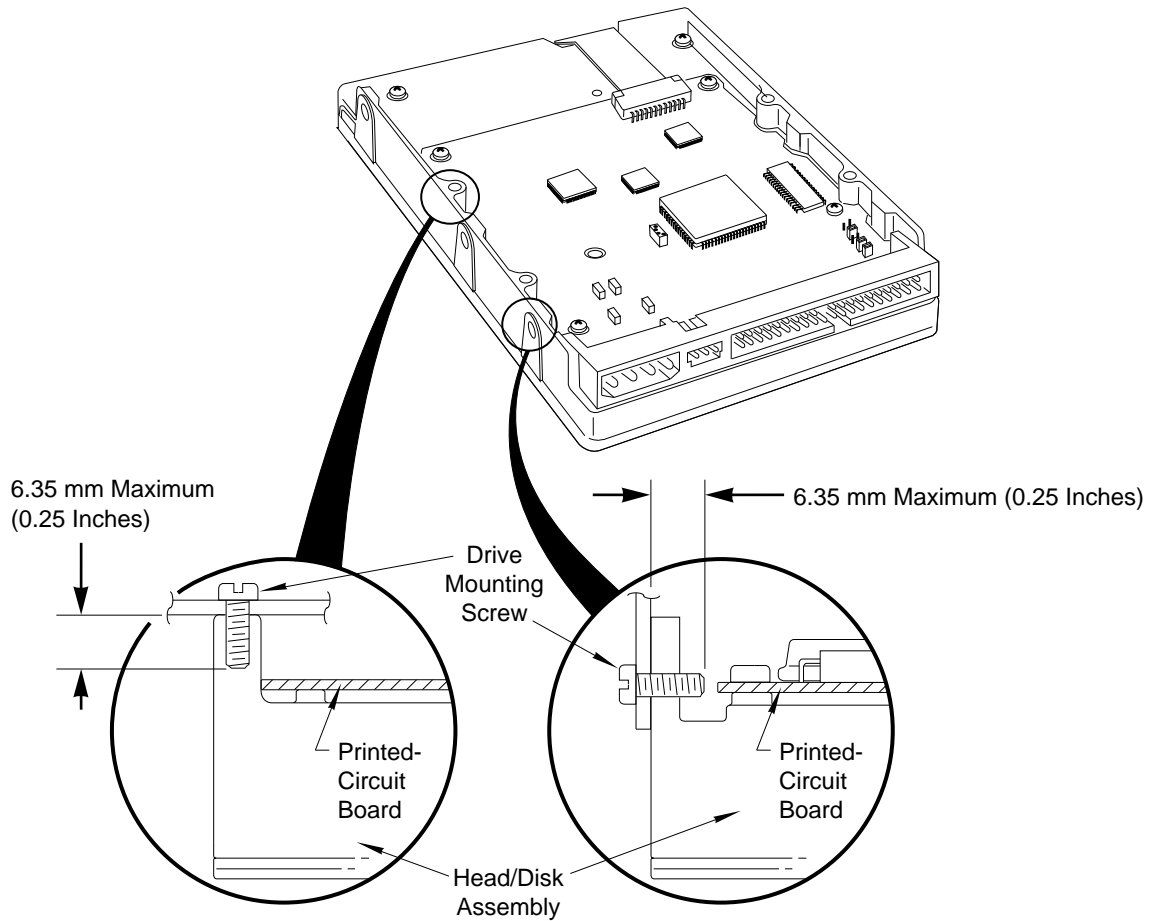


Figure 3-8 *Mounting Screw Clearance for Quantum Fireball TM (Two- and Three-Disk) Drives*

CAUTION: The PCB is very close to the mounting holes. Do not exceed the specified length for the mounting screws. The specified screw length allows full use of the mounting hole threads, while avoiding damaging or placing unwanted stress on the PCB. Figure 3-8 specifies the minimum clearance between the PCB and the screws in the mounting holes. To avoid stripping the mounting hole threads, the maximum torque applied to the screws must not exceed 8 inch-pounds. A maximum screw length of 0.25 inches may be used on the side mounting locations when a bracket of 0.040 inches minimum thickness is included.

3.5.2 Clearance

Clearance from the drive to any other surface (except mounting surfaces) must be a minimum of 1.25 mm (0.05 inches).

3.5.3 Ventilation

The Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drives operate without a cooling fan, provided the ambient air temperature does not exceed 131°F (55°C).

3.6 COMBINATION CONNECTOR (J1)

J1 is a three section combination connector. The drive's DC power can be applied to either section A or B. The IDE bus interface (40-pin) uses section C. The connector is mounted on the back edge of the printed-circuit board (PCB), as shown in Figure 3-9.

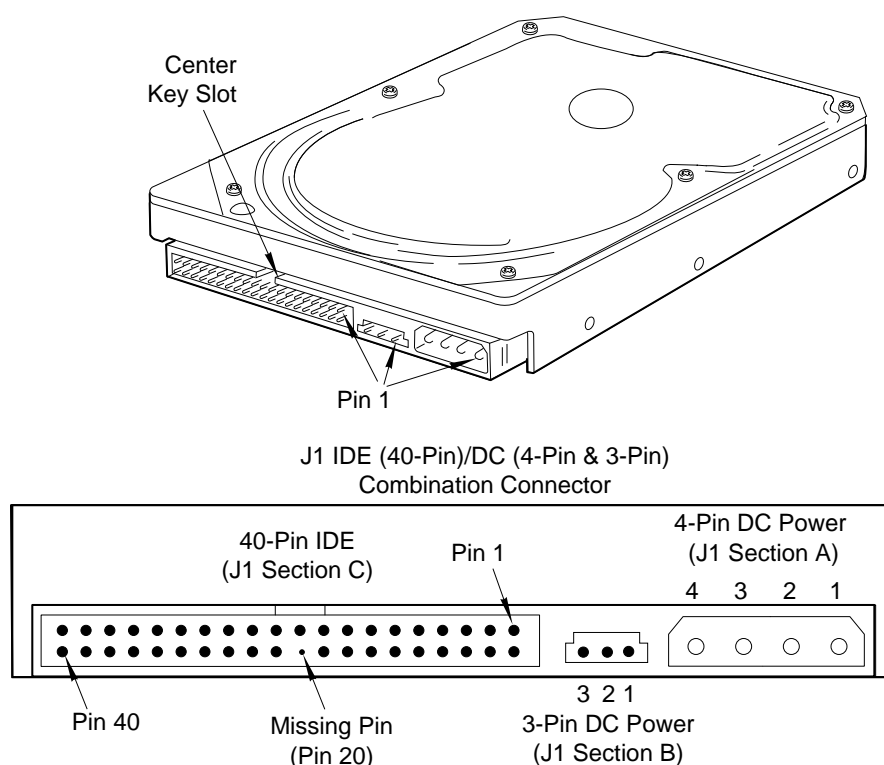


Figure 3-9 J1 DC Power and IDE Bus Combination Connector

3.6.1 DC Power (J1, Sections A and B)

The recommended mating connectors for the +5 Vdc and +12 Vdc input power are listed in Table 3-2.

Table 3-2 J1 Power Connector, Sections A and B

PIN NUMBER	VOLTAGE LEVEL	MATING CONNECTOR TYPE AND PART NUMBER (OR EQUIVALENT)
J1 Section A (4-Pin):		
1	+12 VDC	4-Pin Connector: AMP P/N 1-480424-0 Loose piece contacts: AMP P/N VS 60619-4 Strip contacts: AMP P/N VS 61117-4
2	Ground Return for +12 VDC	
3	Ground Return for +5 VDC	
4	+5 VDC	
J1 Section B (3-Pin):		
1	+5 Vdc	3-Pin Connector: Molex P/N 5484 39-01-0033 (for connector housing) 00-0031 (for pins)
2	+12 Vdc	
3	Ground	

Note: Power can be applied to either J1, sections A or B. Labels indicate the pin numbers on the connector. Pins 2 and 3 of section A are the +5 and +12 volt returns and are connected together on the drive.

3.6.2 External Drive Activity LED

An external drive activity LED may be connected to the DASP-I/O pin 39 on J1. For more details, see the pin description in Table 6-1.

3.6.3 IDE Bus Interface Connector (J1, Section C)

On the Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drive, the IDE bus interface cable connector (J1, section C) is a 40-pin Universal Header, as shown in Figure 3-9.

To prevent the possibility of incorrect installation, the connector has been keyed by removing Pin 20. This ensures that a connector cannot be installed upside down.

See Chapter 6, "IDE Bus Interface and ATA Commands," for more detailed information about the required signals. Refer to for the pin assignments of the IDE bus connector (J1, section C).

3.7 FOR SYSTEMS WITH A MOTHERBOARD IDE ADAPTER

You can install the Quantum Fireball TM series of hard disk drives in an AT-compatible system that contains a 40-pin IDE bus connector on the motherboard.

To connect the drive to the motherboard, use a 40-pin ribbon cable 18 inches in length or shorter. Ensure that pin 1 of the drive is connected to pin 1 of the motherboard connector.

3.8 FOR SYSTEMS WITH AN IDE ADAPTER BOARD

To install a Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drive in an AT-compatible system without a 40-pin IDE bus connector on its motherboard, you need a third-party IDE-compatible adapter board.

3.8.1 Adapter Board Installation

Carefully read the manual that accompanies your adapter board before installing it. Make sure that all the jumpers are set properly and that there are no address or signal conflicts. You must also investigate to see if your AT-compatible system contains a combination floppy and hard disk controller board. If it does, you must disable the hard disk drive controller functions on that controller board before proceeding.

Once you have disabled the hard disk drive controller functions on the floppy/hard drive controller, install the adapter board. Again, make sure that you have set all jumper straps on the adapter board to avoid addressing and signal conflicts.

Note: For Sections 3.7 and 3.8, power should be turned off on the computer before installing drive.

3.8.1.1 Connecting the Adapter Board and the Drive

Use a 40-pin ribbon cable to connect the drive to the board. See Figure 3-10. To connect the drive to the board:

1. Insert the 40-pin cable connector into the mating connector of the adapter board. Make sure that pin 1 of the connector matches with pin 1 on the cable.
2. Insert the other end of the cable into the header on the drive. When inserting this end of the cable, make sure that pin 1 of the cable connects to pin 1 of the drive connector.
3. Secure the drive to the system chassis by using the mounting screws, as shown in Figure 3-11.

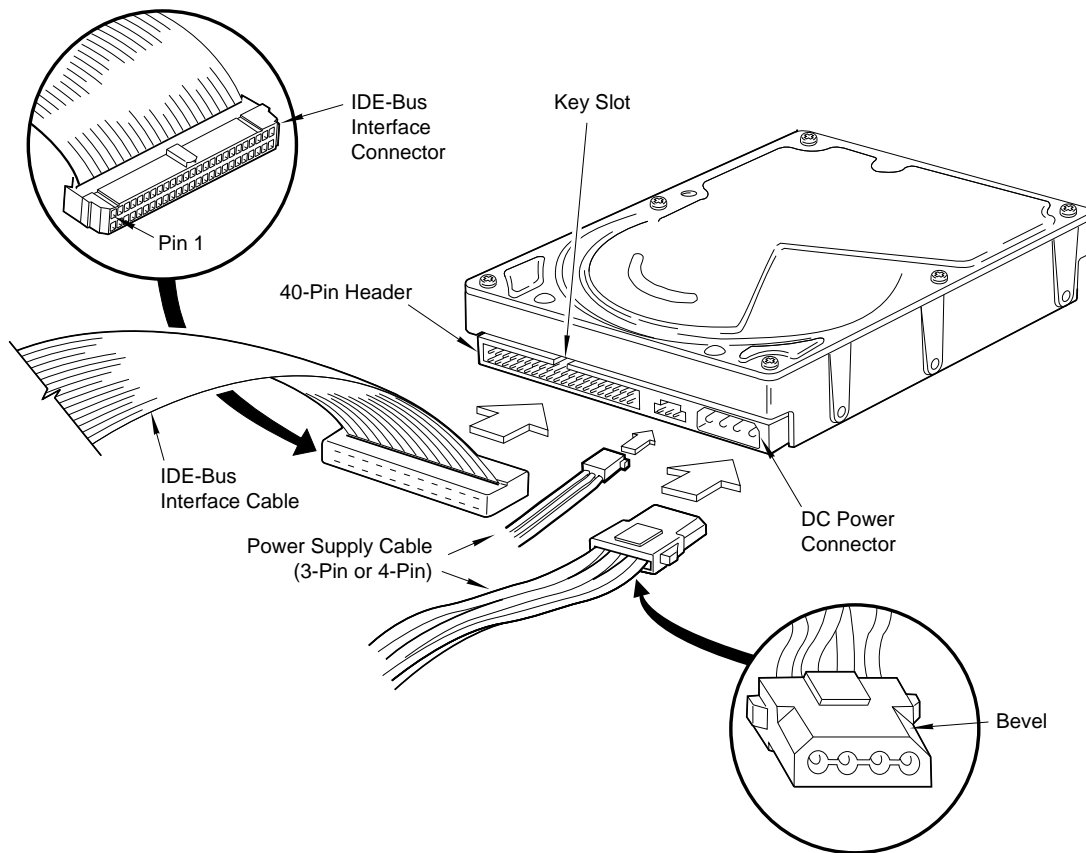


Figure 3-10 Drive Power Supply and IDE Bus Interface Cables

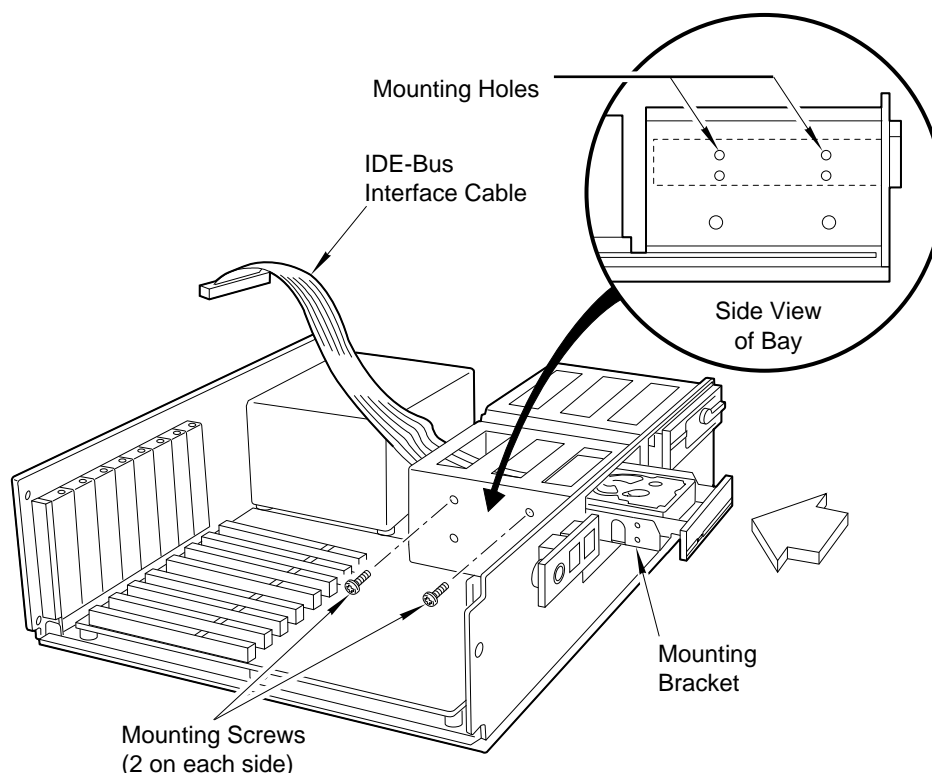


Figure 3-11 *Completing the Drive Installation*

3.9 TECHNIQUES IN DRIVE CONFIGURATION

3.9.1 Manual Partition Size in MS-DOS 4.0 and Above

When using MS-DOS 4.0 and above, FDISK allows the user to partition a hard drive with a total capacity of 4 GB (4,294,967, 296 bytes). However, the file allocation table (FAT) only supports partition size of 2 GB (2, 147, 483, 648 bytes). Therefore, a hard drive between the sizes of 2 and 4 GB must be divided into multiple partitions, each not exceeding 2 GB.

3.9.2 1024 Cylinder Limitation on Older Computer Systems

Because the MS-DOS operating system uses the computer's ROM BIOS to access the hard drive, it is limited to viewing 1,024 cylinders by the AT ROM BIOS. The CMOS System Setup is able to scan the total number of cylinders, but the BIOS is still limited to using only 1024 cylinders. Listed below are some techniques to resolve this difficulty.

- Use a third party software program that translates the hard drive parameters to an acceptable configuration for MS-DOS.
- Use a hard disk controller that translates the hard drive parameters to an appropriate setup for both MS-DOS, and the computer system's ROM BIOS.

3.9.3 Newer Computer Systems with Extended BIOS Translation

Some newer computer systems allow the user to configure disk drives that go beyond the 528 MB (528,482,304 bytes) barrier. Here are formulas to translate drives with a maximum capacity of 8.4 GB (8,422,686,720):

$xcyl = cyl * nx$ cyl is defined as a new cylinder translation
 $xhead = head * nx$ $head$ is defined as a new head translation
 $xsec = sec = 63x$ sec is defined as a new sector translation
where $n = 2, 4, 8, \dots$, a power of 2

n is chosen to reduce the number of cylinders to be less than or equal to 1024. However, sectors must equal 63 and the number of heads cannot exceed 255.

Note: Be advised that the previous information is dependent upon the capabilities of the computer system, hard disk controller, and/or software programs. Some configurations may not provide the user with proper operation of the disk drive. All other documentation should be examined prior to installing the hard drive.

3.10 SYSTEM STARTUP AND OPERATION

Once you have installed the Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drive, and adapter board (if required) in the host system, you are ready to partition and format the drive for operation. To set up the drive correctly, follow these steps:

1. Power on the system.
2. Run the SETUP program. This is generally on a Diagnostics or Utilities disk, or within the system's BIOS.
3. Enter the appropriate parameters.

The SETUP program allows you to enter the types of optional hardware installed—such as the hard disk drive type, the floppy disk drive capacity, and the display adapter type. The system's BIOS uses this information to initialize the system when the power is switched on. For instructions on how to use the SETUP program, refer to the system manual for your PC.

During the AT system CMOS setup, you must enter the drive type for the Quantum Fireball TM series of hard disk drives. The drive supports the translation of its physical drive geometry parameters such as cylinders, heads, and sectors per track to a logical addressing mode. The drive can work with different BIOS drive-type tables of the various host systems.

You can choose any drive type that does not exceed the capacity of the drive. Table 3-3 gives the logical parameters that provide the maximum capacity on the Quantum Fireball TM 1.0/1.2/1.7/2.1/2.5/3.2/3.8AT hard disk drives.

Table 3-3 Logical Addressing Format

	QUANTUM FIREBALL TM HARD DISK DRIVES						
	1080AT	1280AT	1700AT	2110AT*	2550AT	3200AT	3840AT
CHS or LBA Capacity	1.089 GB	1.281 GB	1.707 GB	2.111 GB	2.564 GB	3.216 GB	3.860 GB
Logical Cylinders	2,112	2,484	3,309	4,092	4,969	6,232	7,480
Logical Heads	16	16	16	16	16	16	16
Logical Sectors/Track	63	63	63	63	63	63	63
Total Number Logical Sectors	2,128,896	2,503,872	3,335,472	4,124,736	5,008,752	6,281,856	7,539,840

Note: * The AT capacity is artificially limited to a 2.1 GB partition boundary.

To match the logical specifications of the drive to the drive type of a particular BIOS, consult the system's drive-type table. This table specifies the number of cylinders, heads, and sectors for a particular drive type.

Note: The BIOS of some systems may not support a logical cylinder value greater than 1,024, as is needed for taking advantage of the maximum capacity of a Quantum Fireball TM 1080 or 2110AT hard disk drive. For such systems, use a device driver, or run in LBA mode if the system BIOS supports it.

You must choose a drive type that meets the following requirements:

For the 1080AT:
 $\text{Logical Cylinders} \times \text{Logical Heads} \times \text{Logical Sectors/Track} \times 512 \leq 1,089,994,752$

For the 1280AT:
 $\text{Logical Cylinders} \times \text{Logical Heads} \times \text{Logical Sectors/Track} \times 512 \leq 1,281,982,464$

For the 1700AT:
 $\text{Logical Cylinders} \times \text{Logical Heads} \times \text{Logical Sectors/Track} \times 512 \leq 1,707,761,664$

For the 2110AT:
 $\text{Logical Cylinders} \times \text{Logical Heads} \times \text{Logical Sectors/Track} \times 512 \leq 2,111,864,832$

For the 2550AT:
 $\text{Logical Cylinders} \times \text{Logical Heads} \times \text{Logical Sectors/Track} \times 512 \leq 2,564,481,024$

For the 3200AT:
 $\text{Logical Cylinders} \times \text{Logical Heads} \times \text{Logical Sectors/Track} \times 512 \leq 3,216,310,272$

For the 3840AT:
 $\text{Logical Cylinders} \times \text{Logical Heads} \times \text{Logical Sectors/Track} \times 512 \leq 3,860,398,080$

4. Boot the system using the operating system installation disk—for example, *MS-DOS*—then follow the installation instructions in the operating system manual.

If you are using a version of MS-DOS below 4.01:

1. Run FDISK or a third-party partitioning program.

Note: If you use DOS version 3.2 or an earlier version, the DOS partition will employ only 32 MB (33,554,432 bytes) of the drive's capacity. With DOS 3.3, you can partition the drive in multiples of 32 MB. If you use DOS 4.01 or later, or if you use a third-party partitioning program, you can create partitions that exceed 32 MB.

2. To format the drive with a high-level format, and to transfer the operating system to the drive, type `FORMAT C: /S`. Once this command executes, you can boot the system from the hard drive.

Note: The drive is shipped from the factory with a low-level format; therefore, a low-level format is not required.