adaptec

ACB-2370/ACB-2372

User's Manual

2.1 INTRODUCTION

This section describes the steps necessary to install the ACB-237X board into the computer. First, the operating environment, unpacking procedure and board layout are described. This section also describes the integration of the drive and controller into the computer.

2.2 ENVIRONMENTAL REQUIREMENTS

The ACB-237X will perform properly over the following range of conditions:

	Operating	Storage
Temperature:	0° to 55°C (32° to 131°F)	-40° to 75°C (-8° to 167°F)
Humidity (Noncondensing):	0% to 95%	10% to 95%
Altitude (Feet):	Sea level to 10,000	Sea level to 20,000
MTBF (Hours):	20,000 at 55°C	

2.3 UNPACKING PROCEDURE

The carrier is responsible for damage incurred during shipment. In case of damage, have the carrier note the damage on both the delivery receipt and the freight bill, then notify your freight company representative so that the necessary insurance claims can be initiated.

After opening the shipping container, use the packing slip to verify receipt of the individual items listed on the slip. Retain the shipping container and packing material for possible later reuse should return of the equipment to the factory or distributor be necessary.

CAUTION: THE ACB-237X LIKE ALL ELECTRONIC EQUIPMENT, IS STATIC SENSITIVE. PLEASE TAKE THE PROPER PRECAUTIONS WHEN HANDLING THE BOARD. KEEP THE BOARD IN ITS CONDUCTIVE WRAPPING UNTIL IT IS READY TO BE CONFIGURED AND INSTALLED IN YOUR SYSTEM.

2.4 ACB-2372 BOARD LAYOUT

The ACB-2372 is shown in Figure 2-1. This figure shows the location of the controller microcode, ACB-BIOS, jumpers and connectors. Note that Pin 1 of the connectors is identified by a square solder pad on the solder side of the board. The dimensions of the board are:

Width: 3.9 Inches
Length: 13.0 Inches
Height: 0.75 Inches

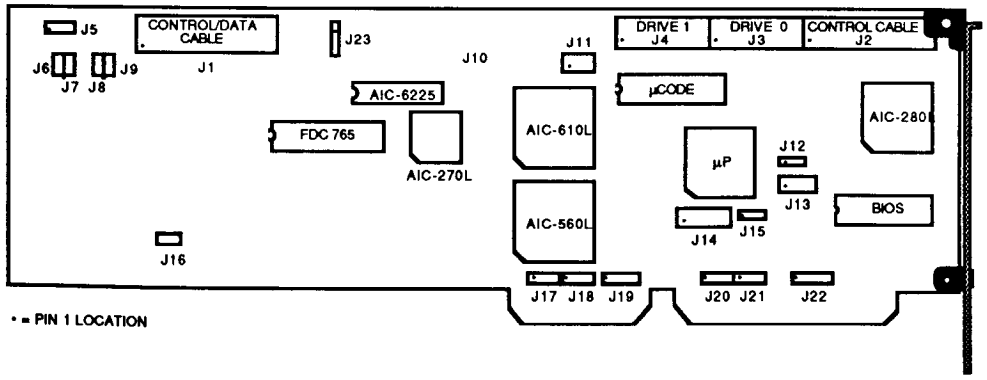

FIGURE 2-1. BOARD LAYOUT

2.5 ACB-2370 BOARD LAYOUT

The ACB-2370 is shown in Figure 2-2. This figure shows the location of the controller microcode, ACB-BIOS, jumpers and connectors. Note that Pin 1 of the connectors is identified by a square solder pad on the solder side of the board. The dimensions of the board are:

Width: 3.9 Inches
Length: 8.0 Inches
Height: 0.75 Inches

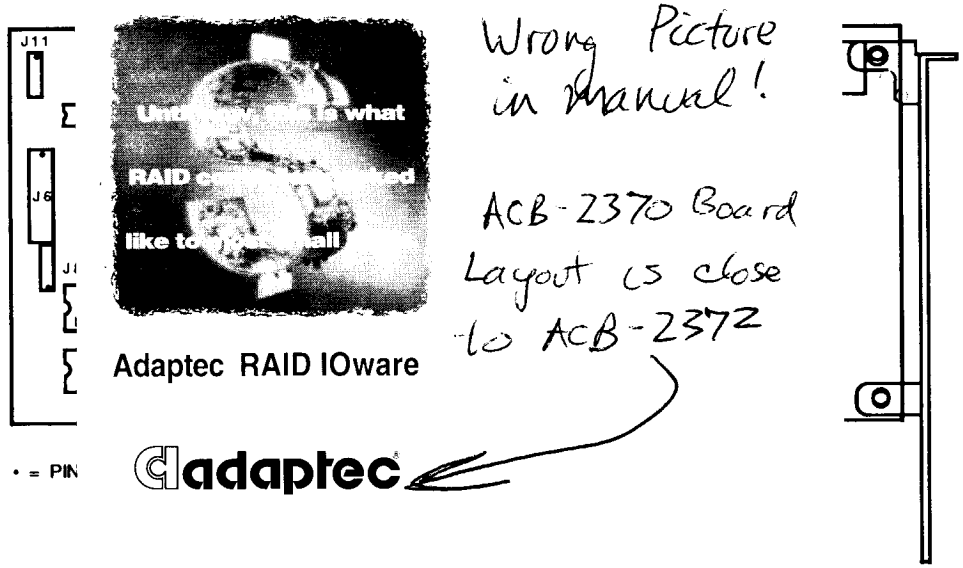

FIGURE 2-2. BOARD LAYOUT

2.6 SYSTEM REQUIREMENTS

The ACB-237X was designed to be installed in an IBM PC AT-compatible personal computer; thus, it requires the same system resources as the IBM AT hard disk controller.

TABLE 2-1. ACB-237X SYSTEM MEMORY MAP

I/O Ports	
Hard Disk - Primary	1F0,1F1,1F2,1F3,1F4,1F5,1F6,1F7,3F6,3F7
- Secondary	170,171,172,173,174,175,176,177,376,377
*Floppy Disk - Primary	3F0,3F1,3F2,3F3,3F4,3F5
- Secondary	370,371,372,373,374,375
If the BIOS is enabled:	
BIOS Address - Primary	16 Kbytes from C8000H through CBFFFH
- Secondary	16 Kbytes CC000H through CFFFFH
Temporary Drive Parameters Table	Interrupt locations 60H through 67H

* *ACB-2372 only*

Drive Power

The IBM PC AT internal power supply does have sufficient current to power most hard disk drives in addition to its present load. Check with your drive vendor for an accurate estimate of its specific power requirements.

TABLE 2-2. ACB-2372 POWER REQUIREMENTS
(Typical)

+5V Power ——————>	1.5 Amp
–5V Power ——————>	Not Used
+12V Power ——————>	130mA
–12V Power ——————>	50mA

TABLE 2-3. ACB-2370 POWER REQUIREMENTS
(Typical)

+5V Power ——————>	1.5 Amp
–5V Power ——————>	Not Used
+12V Power ——————>	Not Used
–12V Power ——————>	Not Used

CAUTION: THE VALUES FOR THE POWER REQUIREMENTS WERE DETERMINED BY ACTUAL MEASUREMENTS IN AN IBM PC AT WHILE THE CONTROLLER WAS READING A HARD DISK. IF THESE VALUES ARE TO BE USED TO DESIGN THE CONTROLLER INTO A SPECIFIC APPLICATION, AT LEAST 20% SHOULD BE ADDED TO THESE LISTED VALUES AS A SAFETY MARGIN.

2.7 INTEGRATION INTO THE SYSTEM

To install the Adaptec ACB-237X board into your system you must first configure the drive(s), set the controller jumpers and connect the drive cables properly. This section describes all of the necessary steps to successfully install this hardware.

Step 1 Controller Jumper Setup and Definition

Check that the jumpers are set correctly for your application. Table 2-4 and 2-5 defines, in detail, connectors and jumper blocks.

TABLE 2-4. ACB-2372 CONTROLLER JUMPER DEFINITIONS

Note: Jumper positions and pin numbers are defined from left to right, or top to bottom, where applicable per Figure 2-1. An asterisk (*) denotes jumpers that are installed for a standard configuration.

J1	Floppy Disk control and data cable (34-pin), Both drives
J2	Hard disk control cable (34-pin), Both drives
J3	Hard disk data cable (20-pin), First drive (Drive 1)
J4	Hard disk data cable (20-pin), Second drive (Drive 2)
J5	Drive activity LED - Pins 1,4 are +5 Volts, Pins 2,3 are Signal Ground
J6	Manufacturing Test Points
J7	Manufacturing Test Points
J8	Manufacturing Test Points
J9	Manufacturing Test Points
J10	Manufacturing Test Points
J11	Manufacturing Test Points
J12	Adaptec ACB-BIOS address selection
	*Position 1 and 2 Jumpered for BIOS address C8000 - CBFFF
	Position 2 and 3 Jumpered for BIOS address CC000 - CFFFF
	No jumper ACB-BIOS disabled

Note: Install only one jumper on J12. No jumper should be installed if ACB-BIOS Disabled.

TABLE 2-4. ACB-2372 CONTROLLER JUMPER DEFINITIONS (Continued)

Note: Jumper positions and pin numbers are defined from left to right, or top to bottom, where applicable per Figure 2-1. An asterisk (*) denotes jumpers that are installed for a standard configuration.

J13	Manufacturing Test Points
J14	BOARD CONFIGURATION JUMPERS
	Position 1 Hard Disk Port Addresses
	Not installed: primary address 1F0 - 1F7
	Installed: secondary address 170 - 177
	Position 2 Floppy Disk Port Address
	Not installed: primary address 3F0 - 3F7
	Installed: secondary address 370 - 377
	Position 3 Bus Wait State
	Not installed: Enabled
	Installed: Disabled
	Position 4 Drive Recal goes to track 0 minus 1
	Not installed: Enabled (ST238)
	Installed: Disabled (ST4144R)
	Position 5 Not Used
	Position 6 Serial Monitor Mode
	Not installed: Disabled
	Installed: Enabled (2400 baud)
	Position 7 Manufacturing Test Point
J15	Serial Monitor Output
J16	Manufacturing Test Points
J17	Not Used
J18	Not Used
J19	Controller's system interrupt selection
	*Pins 1 and 2 jumpered for IRQ14
	Pins 2 and 3 jumpered for IRQ15
	Pins 3 and 4 DO NOT USE
J20	Floppy Disk DMA Acknowledge signal selection
	*Pins 1 and 2 jumpered for DACK2
	Pins 2 and 3 jumpered for DACK3
J21	Floppy Disk Interrupt Request signal selection
	Pins 1 and 2 jumpered for IRQ10
	*Pins 2 and 3 jumpered for IRQ6
J22	Floppy Disk DMA Request signal selection
	Pins 1 and 2 jumpered for DREQ3
	*Pins 2 and 3 jumpered for DREQ2

TABLE 2-5. ACB-2370 CONTROLLER JUMPER DEFINITIONS

Note: Jumper positions and pin numbers are defined from left to right, or top to bottom, where applicable per Figure 2--2. An asterisk (*) denotes jumpers that are installed for a standard configuration.

J1	Hard disk data cable (20-pin), second drive (Drive 2)
J2	Hard disk data cable (20-pin), first drive (Drive 1)
J3	Hard disk control cable (34-pin), both drives
J4	Manufacturing test points
J5	Drive activity LED - Pins 1,4 are +5 Volts, Pins 2,3 are signal ground
J6	Board configuration jumpers
	Position 1 Hard disk port addresses
	Not installed: primary address 1F0 - 1F7
	Installed: secondary address 170 - 177
	Position 2 Not used
	Position 3 Wait state (C & T)
	Not installed: enabled
	Installed: disabled
	Position 4 Drive recal goes to track 0 minus 1
	Not installed: enabled (ST238)
	Installed: disabled (ST4144R)
	Position 5 Not used
	Position 6 Serial monitor mode
	Not installed: disabled
	Installed: enabled (2400 baud)
	Position 7 Manufacturing test point
J7	Manufacturing test points
J8	Manufacturing test points
J9	Manufacturing test points
J10	Serial monitor output
J11	Manufacturing test points
J12	Manufacturing test points
J13	Controller's system interrupt selection
	*Pins 1 and 2 jumpered for IRQ14
	Pins 2 and 3 jumpered for IRQ15
	Pins 3 and 4 DO NOT USE
J14	Adaptec ACB-BIOS address selection
	*Position 1 and 2 Jumpered for BIOS address C8000 -CBFFF
	Position 2 and 3 Jumpered for BIOS address CC000-CFFFF
	No jumper ACB-BIOS disabled

Note: Install only one jumper on J14. No jumper should be installed if ACB-BIOS is disabled

J15	Manufacturing test points

Step 2 Hard Disk Cabling, Drive Selection and Termination

The drive changeable parameters that must be set are the drive selection switches (or jumpers) and the drive termination. The drive selection switches and cabling select the address (drive address 1-4) to which the drive will respond. This is accomplished either by setting both drives to be the second lowest address and using a twisted 34-pin cable, or by setting the drive address to the lowest two addresses and using a flat cable.

A. Twisted 34-Pin Cable

The typical AT 34-pin cable has three connectors. Between the first (middle) drive connector (for drive D) and the second drive connector (for drive C), wires 25 through 29 are twisted, thus inverting the drive selection wires. This type of twisted cable allows both drives to have their drive selection switches (or jumpers) to be the same. Both drives must be set to the SECOND lowest drive address. The controller will see the two drives to be drive 1 and drive 2, depending on the position of the connector that is used.

B. Flat 34-Pin Cable

In some cases a 34-pin flat (non-twisted) cable is used. This cable does not invert the drive selection wires but relies on the drive addresses to be unique for each drive. Now drive 1 must have its drive selection switches (or jumpers) set to be the lowest drive address (typically 1). Drive 2 must have its selection switches (or jumpers) set to be the second lowest drive address (typically 2). The controller will see the two drives to be drive 1 and drive 2, independent of the position on the connector that is used.

Before the drives can be cabled to the controller, the drive cable terminator must be properly set. The terminator is used to reduce signal "ringing" in the cables. The terminator, as its name implies, must be at the end of each cable in order to have the controller and drive communicate properly. The controller has a permanent terminator built into it. The disk drives, since they can be connected in a daisy-chain configuration (see Figure 2-4), have a removable terminator. This is usually a 16-pin DIP resistor package located on the drive PCB. The last

physical drive in the chain must always have its terminator installed. When two drives are connected to the same controller, only the last one in the daisy chain is terminated (see Figures 2-3 and 2-4 for the ACB-2372. See Figures 2-5 and 2-6 for the ACB-2370). The other drive must have the terminator resistor removed.

Step 3 Floppy Disk Cabling, Drive Selection and Termination (ACB-2372 only)

The typical AT 34-pin floppy disk cable has three connectors. Between the first (middle) drive connector (for drive B) and the second drive connector (for drive A), wires 10 through 16 are twisted, thus inverting the drive selection wires. This type of twisted cable allows both drives to have their drive selection switches (or jumpers) to be the same. Both drives must be set to the SECOND lowest drive address (typically 1 since floppy drives are addressed as 0-3). The controller will see the two drives to be drive 0 and drive 1, depending on the position of the connector that is used.

Termination of the floppy disk drives is the same as the hard disk drives in step 2.

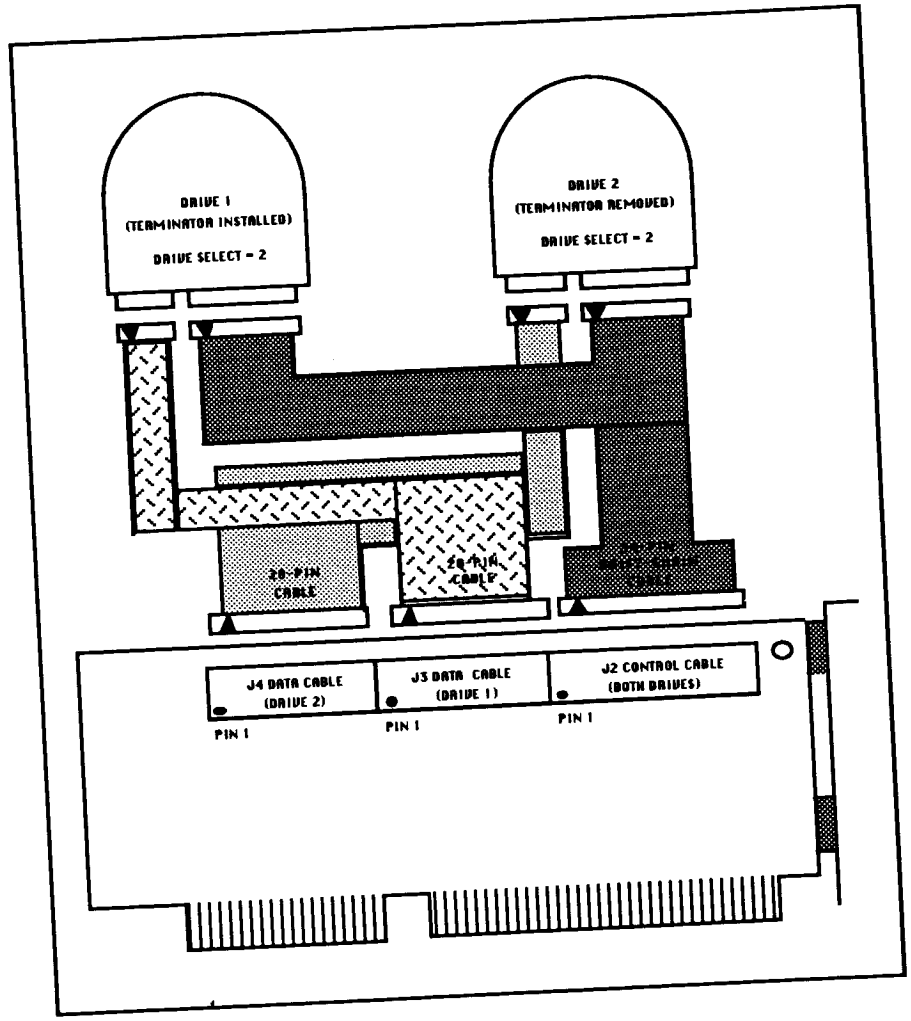

FIGURE 2-3. ACB-2372 CONTROLLER AND DRIVE CABLING-TWISTED CABLE
(HARD DISK CABLES)

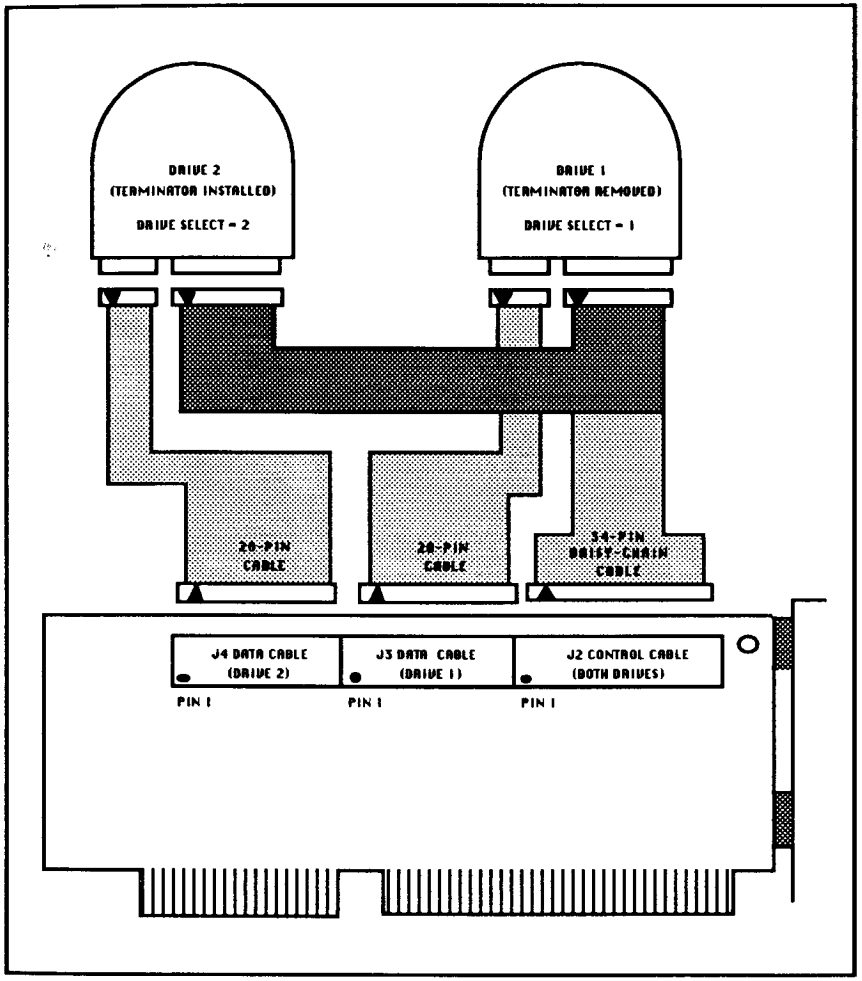

FIGURE 2-4. ACB-2372 CONTROLLER AND DRIVE CABLING-FLAT CABLE
(HARD DISK CABLES)

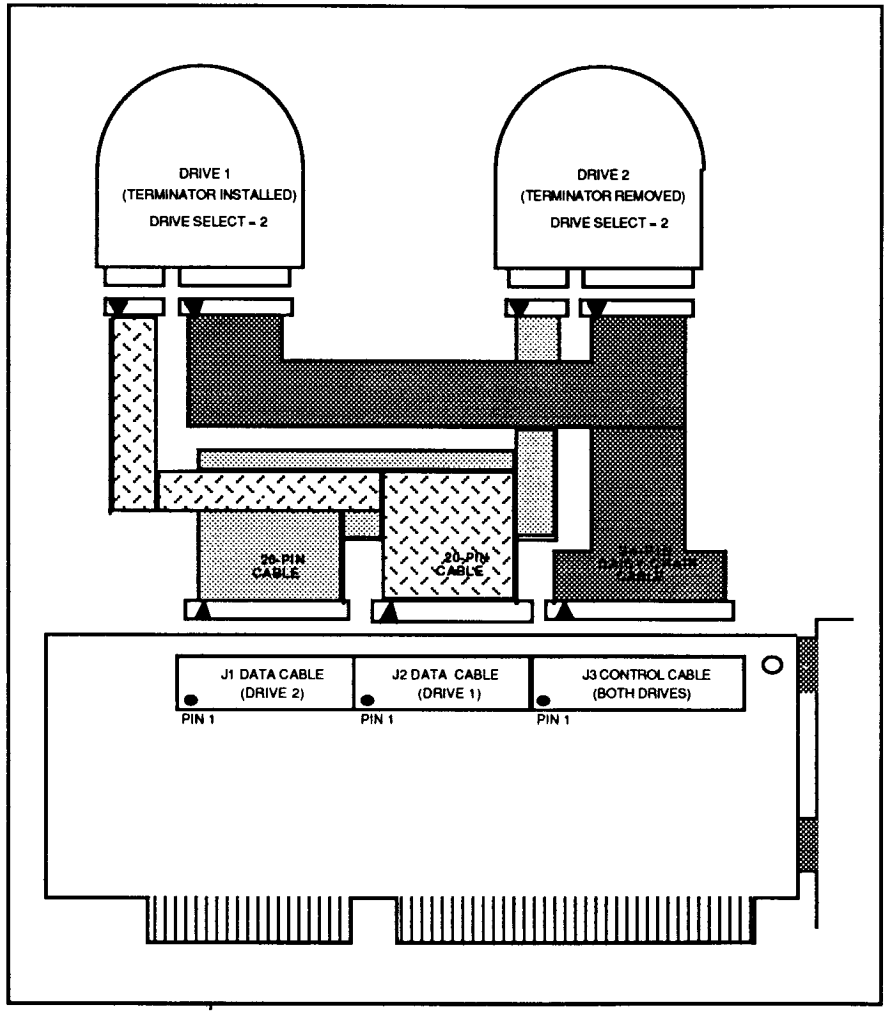

FIGURE 2-5. ACB-2370 CONTROLLER AND DRIVE CABLING-TWISTED CABLE
(HARD DISK CABLES)

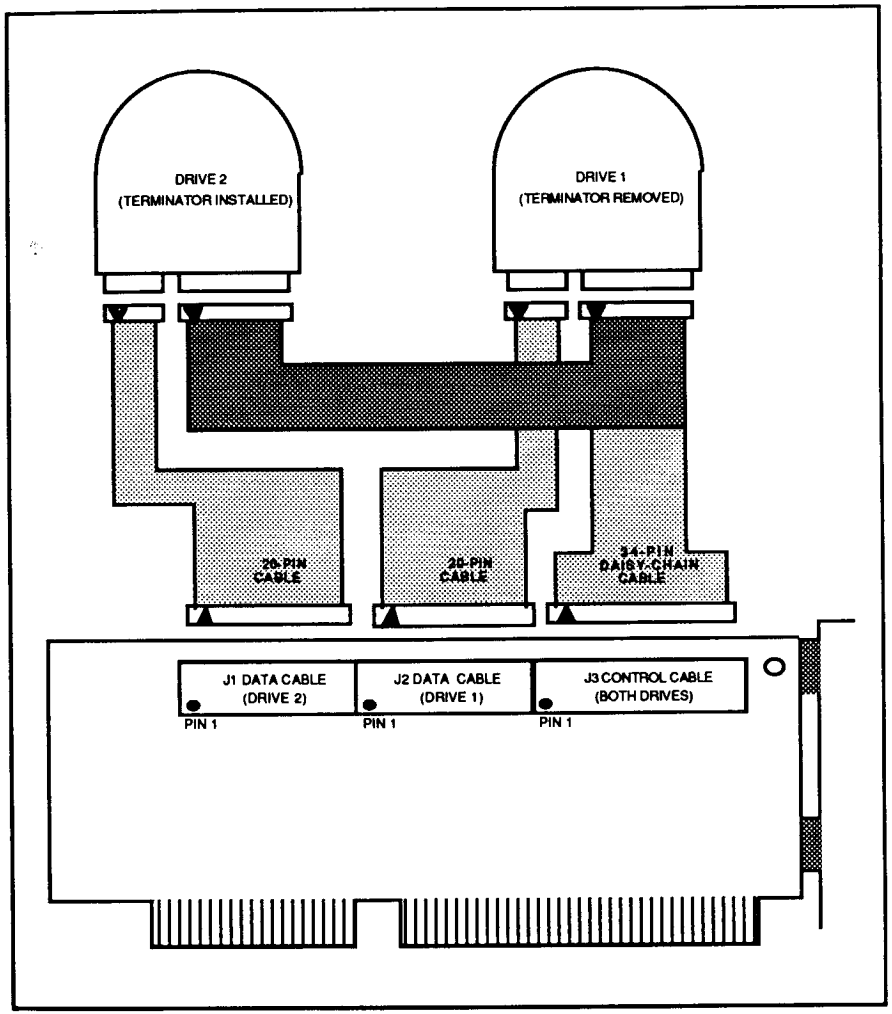

FIGURE 2-6. ACB-2370 CONTROLLER AND DRIVE CABLING-FLAT CABLE
(HARD DISK CABLES)

Step 4 Mounting the Drives and Controller in the PC AT

Now that the drives and controller are configured, they can be connected and installed in the system.

The controller has three (ACB-2370) or four (ACB-2372) cable connectors: J1, J2, J3, and J4. Their function, suggested connector plugs and maximum cable length are described in Table 2-6 and 2-7.

TABLE 2-6. ACB-2372 CONTROLLER CONNECTOR DEFINITIONS

Connector	*Signals*	*Cable*
J1	Control/Data	34-pin flat ribbon cable. Connected to both floppy drives 0 and 1.
J2	Control	34-pin flat ribbon cable. Connected to both RLL drives 1 and 2.
J3	Data	20-pin flat ribbon cable. Connected to 2,7 RLL drive 1.
J4	Data	20-pin flat ribbon cable. Connected to 2,7 RLL drive 2.

Connector	*Recommended Plug*	*Maximum Length*
J1	3M Part #3414	20 feet (6 meters)
J2	3M Part #3414	20 feet (6 meters)
J3	3M Part #3421	20 feet (6 meters)
J4	3M Part #3421	20 feet (6 meters)

TABLE 2-7. ACB-2370 CONTROLLER CONNECTOR DEFINITIONS

Connector	*Signals*	*Cable*
J1	Data	20-pin flat ribbon cable. Connected to 2,7 RLL drive 2.
J2	Data	20-pin flat ribbon cable. Connected to 2,7 RLL drive 1.
J3	Control	34-pin flat ribbon cable. Connected to both RLL drives 1 and 2.

Connector	*Recommended Plug*	*Maximum Length*
J1	3M Part #3421	20 feet (6 meters)
J2	3M Part #3421	20 feet (6 meters)
J3	3M Part #3414	20 feet (6 meters)

Attach the cables to the controller, making sure that the pin 1 indicator on the cable goes to pin 1 on the controller. The connector locations and pin orientation for ACB-2372 connectors are shown in Figure 2-3 and 2-4, for ACB-2370, see Figure 2-5 and 2-6.

Now the controller must be installed into a 16-bit slot on the PC AT motherboard. Next, mount the drive(s) in any available drive bay in the AT. Consult your PC AT owner's manual for details of performing the installation of options into the motherboard expansion slots and for instructions on mounting a hard disk and floppy disk in the system. Once both the drive(s) and controller are installed in the system, complete the installation by connecting the data cable to drive 1, connect data to drive 2 and connect the daisy-chain control cable to both drives (see Figures 2-3 through 2-6). For the ACB-2372, connect the control/data cable from J1 to both floppy drives. Finally, connect the drive power connectors from the PC AT power supply to all drives.

At this point, the floppy disk, hard disk and controller hardware is completely installed in the PC AT system.

CAUTION: TAKE TIME NOW TO VERIFY THAT ALL OF THE DRIVE AND CONTROLLER CABLE CONNECTORS ARE CORRECTLY CONNECTED, AND THAT POWER CABLES ARE CONNECTED TO ALL DRIVES.

3.1 INTRODUCTION

The following procedure will guide you through the preparation of a single hard disk using DOS. At the end of this procedure, a 32 MB RLL drive and a Seagate ST-277R 65 MB drive with two 32 megabyte volumes will be formatted.

This software installation process allows an entire RLL drive to be used under DOS 3.0, 3.1, 3.2 and 3.3. These all have a 32 MB limitation for one logical drive. Under DOS 3.3, DOS FDISK permits using drives greater than 32 MB by creating an Extended Partition that is divided into logical drives. Under DOS 3.0, 3.1 and 3.2, the Adaptec Volume Partitioning Program plus the Adaptec Device Driver allows using drives greater than 32 MB by dividing the drive into volumes of capacities up to 32 MB. The drive can also be formatted by the controller to be used by non-DOS operating systems and device drivers.

CAUTION: IF YOU ENCOUNTER ANY PROBLEMS WHILE ATTEMPTING TO PERFORM THIS INSTALLATION, REFER TO CHAPTER 4, TROUBLESHOOTING.

Note: There is no software installation required for the floppy drive(s) other than formatting floppies under DOS.

3.2 ADAPTEC ACB-237X SOFTWARE INSTALLATION FLOWCHART

The software installation process is best described by the following flowchart.

Note that four possible paths may be taken. All paths follow the same first 7 steps.

Path 1 through 7 and 8 through 12 is used for drives that format to be less than 32 MB. This applies to any version of DOS 3.x.