



USER MANUAL

(All Models)

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1 Introduction

About RAID

RAID (Redundant Array of Inexpensive Disks) is a technology which allows the computer to see multiple drives as a single drive. Originally designed for use with mainframe computers, it is now, with Arco's patented IDE process, commonly implemented on PCs to provide varying levels of redundancy. **RAID Level 1 (RAID 1)**, which is also called **disk mirroring**, is a two-drive array in which each drive is an exact duplicate of the other.

About the DupliDisk2

The **DupliDisk2** is a driverless IDE, EIDE, U/DMA RAID 1 controller designed to provide continuous real-time data redundancy of IDE drives through hardware based mirroring.

The **DupliDisk2** uses patented technology which adds RAID Level 1 disk mirroring to any IDE enabled computer with x86 architecture.

Key DupliDisk2 Features

- Uses no system resources--no interrupts or IO addresses
- Provides intelligent monitoring of drive status
- Automatically detects new drives inserted in system
- Rebuilds drives in background on Win 9x, 2000 based systems (Shut down not required with the RAIDcase model only)
- Windows (tm) based setup, monitor/maintenance program
- Automatic drive switching in the event of drive failure
- Supports one or (in some cases) two pairs of IDE, EIDE or U/DMA drives of any size*
- Drive status indicators and audible alarm
- Driverless design permits operation under virtually any operating system--
DOS, OS/2 Windows 3.1, 9x, NT, 2000, Netware, Unix, and Linux
- Flashable ROM BIOS
- Jumperless, software configurable design
- Serial Port (remote monitoring)

Requirements

The **DupliDisk2** is an intermediate controller and attaches between the IDE controller and the hard drives. It **MUST** be installed in conjunction with the existing IDE controller on your system.

** Due to the availability of emerging hard drive technology, please consult our web site or technical support if you have any questions regarding a specific drive manufacturer or size.*

2 Contents of the Box

Check the contents of the **DupliDisk2** box. You should find:

DupliDisk2-PCI

- **DupliDisk2** controller
- **DupliDisk2** Program diskettes
- **DupliDisk2** user manual
- IDE 3 cable set (P/N 2100)

DupliDisk2-Bay Mount and NoSlot

- **DupliDisk2**-Bay Mount controller
- **DupliDisk2** Program diskettes
- **DupliDisk2** user manual
- IDE 3 cable set (P/N 2100)
- Power Cable

DupliDisk2-FlexMount

- **DupliDisk2**-FlexMount controller
- **DupliDisk2** Program diskettes
- **DupliDisk2** user manual
- IDE 3 cable set (P/N 2100)
- Power Cable

DupliDisk2-RAIDcase

- **DupliDisk2**-RAIDcase
- 2 removable drive caddies
- 18-inch Host cable
- **DupliDisk2** Program diskettes
- **DupliDisk2** user manual

This would be a good time to check the **BIOS REVISION** number and **Serial Number** on your board and enter these on your registration card.

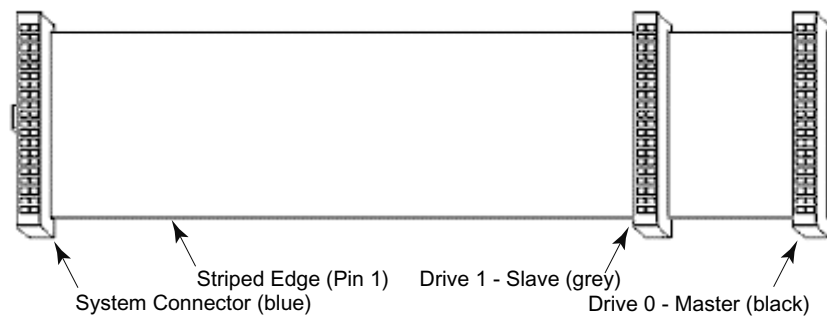
For optimal and reliable performance of your **DupliDisk2**, you must use the cables Arco has provided in your product box. If use of these cables presents a problem, call Arco to obtain an alternative.

3 Before You Begin

Before attempting to install your **DupliDisk2**

- Be sure you have a current backup on removable media, such as tape. This will not be required for the installation of your **DupliDisk2**. However, backing up before adding equipment to your system is always a wise precaution.
- Turn the system OFF and remove the cover. *Protect your computer and DupliDisk2 from static discharge by making sure you are well grounded before touching any electronic components.*
- Locate the IDE controller connector(s), also referred to in this manual as the **Host**.
- Note: The IDE cable connectors are color coded. The Blue connector for the host cable goes into the IDE connector on the motherboard. The Blue connectors for the drive channels go into the *DupliDisk2*.

Cable / Connector Layout



4 Requirements

The Essentials

● **Host, Primary** and **Mirrored** connectors are used to connect the existing IDE interface (host) and primary and mirror drives to the **DupliDisk2** via 80-wire , 40 pin connector data cables.

Warning: Cables are provided for these connections. If these lengths are not appropriate for your system, contact Arco for alternatives. Arco will not warrant operation of the product if the user substitutes a non-Arco cable for the original equipment cable.

If your System BIOS does not automatically detect the hard drive(s) on boot up, reboot your system and enter CMOS Setup to set up the drive once the DupliDisk2 is installed.

Set the drive type to AUTO. Reboot Computer.

(See the manual which was supplied by your computer manufacturer for details regarding your specific system BIOS.)

Drive Jumpers

Mirrored drive pairs must be jumpered identically. Please refer to the HDD manufacturers recommendations for the proper jumpering of your drives.

Drives Can Be Dissimilar *

Mirrored drives do not need to have the same physical geometry but, when mirroring two drives of different sizes, drive capacity will be limited to that of the smaller capacity drive. For example:

PRIMARY CHANNEL	MIRROR CHANNEL	ACTUAL SIZE
Seagate ST38421A (8.4 GB)	IBM DJNA-351010 (10.1GB)	8.4 GB

Note: *It is recommended that the smaller capacity drive be attached to the Primary Channel.*

5 Interpreting the LED's

Interpreting the External Control Panel Lights (LED's)

Each DupliDisk2 is outfitted with an external control panel which provides feedback via colored lights (LED's) as well as a reset switch for the audible alarm (Buzzer).

Understanding the control panel signals will help you to know if your DupliDisk2 is operating properly and to receive notification of a drive failure.

The following provides an interpretation of the Control Panel display and functions:

- **Primary and Mirror LED's** monitor status of the channels as follows:

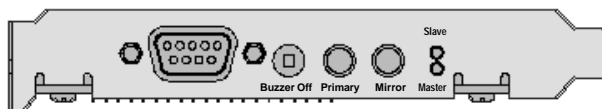
Solid Green	Drive installed on the current channel
Flashing Orange	Scanning the channel for drives
Solid Red	Drive not installed
Flashing Red	The Channel is marked as bad
Orange	Channel activity (read/write)

- **Status LED's** show the status of the **DupliDisk2** master and slave channels as follows:

Solid Green	Drives are in Mirror mode, data is identical.
Flashing Green	Drives may not be identical
Solid Red	Drives are not in Mirror mode*
Flashing Red	Copy/Compare is in progress
Orange	Copy/Compare in progress (under Windows)

- **Buzzer** provides the following indications:
 - Short beep during **power on** (system boot up) indicates successful **DupliDisk2** self test.
 - Second beep indicates the **DupliDisk2** is running in single mode.
 - Continuous or intermittent beep indicates a drive failure.
 - **Buzzer Off** switch can be depressed to stop the beeping.

** Solid Red on Slave indicated that Slave drives are not present or not in mirror mode.*



6 Installing The Hardware

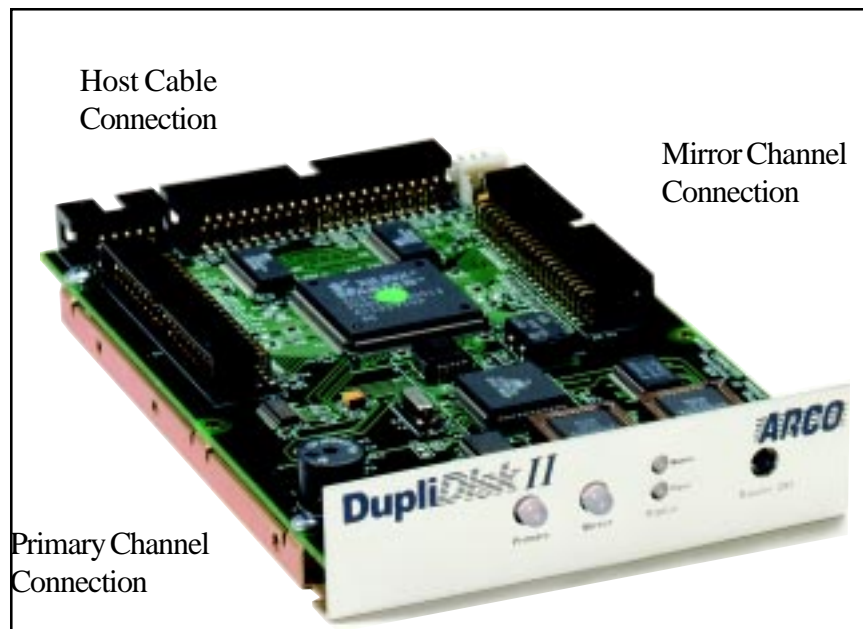
Baymount/No*Slot Models

- When installing one pair of mirrored drives, configure both drives as **Master** or **Single Mode**.

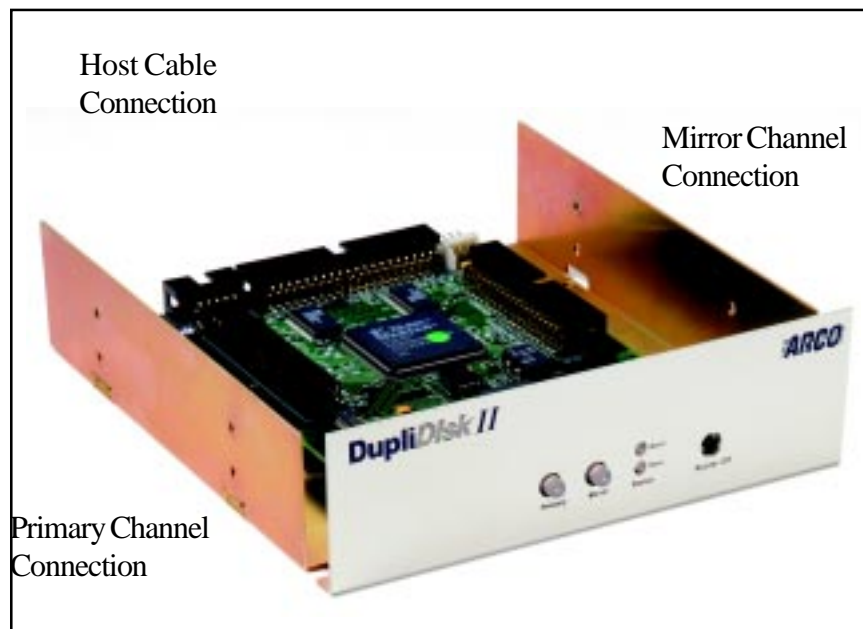
NOTE: If Cable Select is not an available choice, configure both drives as Master or Single Drive.

- Remove the **DupliDisk2** from its package.
- Attach the **IDE Host** cable provided by Arco to the **Host** connector on the **DupliDisk2**.
- Attach the **Primary** and **Mirror** cables to the **Primary** and **Mirrored** connectors on the **DupliDisk2**.
- **VERIFY** that all cables are attached to the proper location on the card and that the cables are labeled correctly to ensure proper operation! The Blue connector for the Host goes into the motherboard IDE connector. The Blue connector for the drive channels go into the DupliDisk2.
- Install the **DupliDisk2** in the appropriate empty drive bay (see diagrams), preferably as close as possible to the IDE controller.
- Connect the **Host** cable to your existing IDE controller. If your IDE interface is a dual channel controller, you may connect the **DupliDisk2 Host** connector to the **Primary Channel** or **Secondary Channel** of your existing IDE interface depending on your desired configuration.
- Attach one drive to the **Primary Channel** and the other to the **Mirror Channel** on the **DupliDisk2**. (*A power splitter may be needed to connect power to all of the drives.*)
- **VERIFY** that all cables are attached to the proper location on the card and that the cables are labeled correctly to ensure proper operation and that the cables are connected to the **proper drive!**
- Attach a power cable to the **DupliDisk2**.
- If installing a new and an existing drive (rather than two new drives), connect the existing drive to the **Primary Channel** and the new drive to the **Mirror Channel** on the **DupliDisk2**.

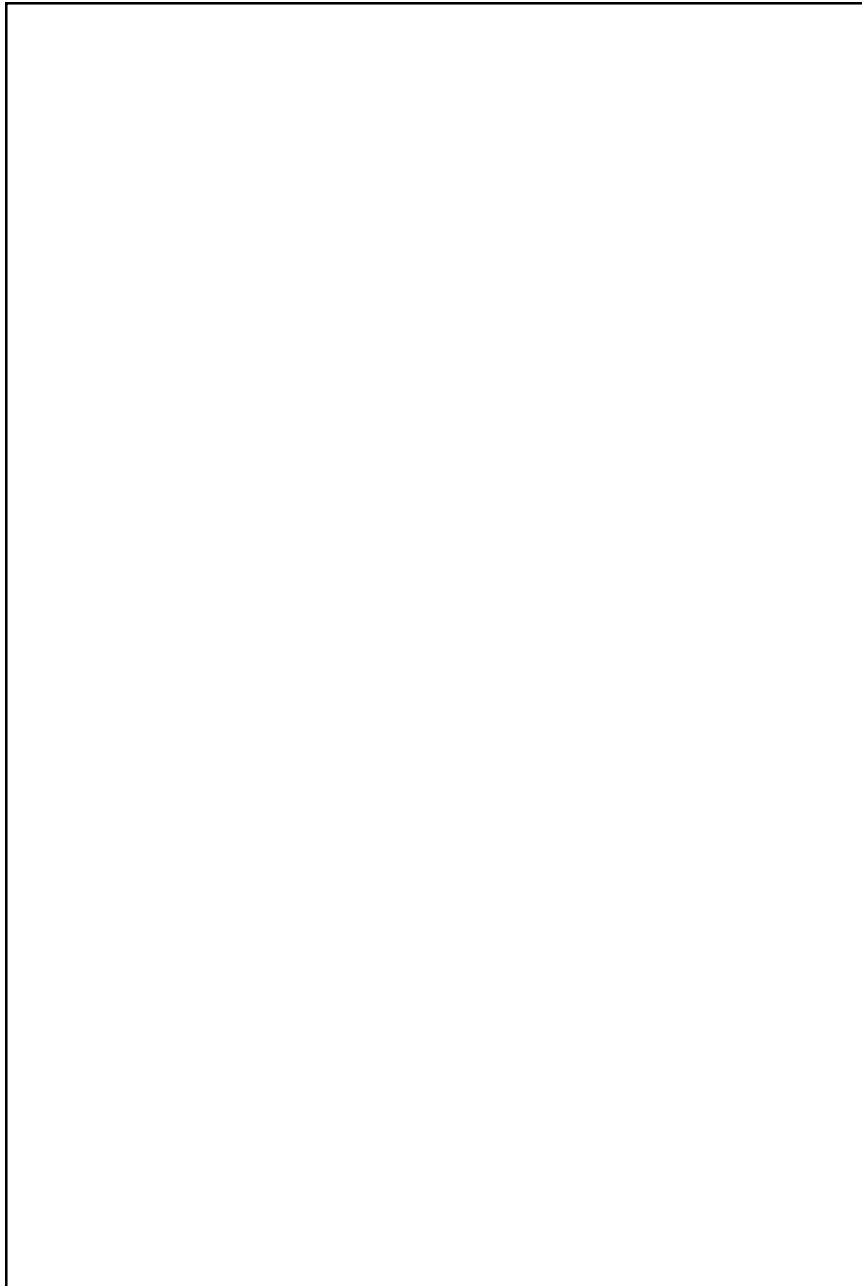
3.5" Bay Mount Controller Layout and Cabling Diagram



5.25" Bay Mount Controller Layout and Cabling Diagram



Notes:

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The PCI Model

- When installing one or two pair of mirrored drives, make sure that each of the drives is configured as **Master or Single Mode**.
- Remove the **DupliDisk2** from its package.
- Attach the **IDE Host** cable provided by Arco to the **Host** connector on the **DupliDisk2**.
- Attach the **Primary** and **Mirror** cables to the **Primary** and **Mirrored** connectors on the **DupliDisk2**.
- **VERIFY** that all cables are attached to the proper location on the card and that the cables are labeled correctly to ensure proper operation! The Blue connector for the Host goes into the motherboard IDE connector. The Blue connector for the drive channels go into the DupliDisk2.
- Install the **DupliDisk2** in the appropriate PCI bus slot (see diagrams), preferably as close as possible to the IDE controller.
- Connect the **Host** cable to your existing IDE controller. If your IDE interface is a dual channel controller, connect the **DupliDisk2 Host** connector to the **Primary Channel** of your existing IDE interface.
- Attach one drive to the **Primary Channel** and the other to the **Mirror Channel** on the **DupliDisk2**. (*A power splitter may be needed to connect power to all of the drives.*)
- **VERIFY** that all cables are attached to the proper location on the card and that the cables are labeled correctly to ensure proper operation and that the cables are connected to the **proper drive!**
- If installing a new and an existing drive (rather than two new drives), connect the existing drive to the **Primary Channel** and the new drive to the **Mirror Channel** on the **DupliDisk2**.

*Note: The **DupliDisk2** PCI model has been designed to accomodate the Hot Plug 1.0 Addendum to the PCI 2.2 specification. If power is removed by the server to the **DupliDisk2** PCI, despite our signaling system to maintain power to the **DupliDisk2** PCI, we have provided a “floppy” type power adapter to supply power to the **DupliDisk2** PCI. After installation of the “floppy” adapter, the possibility of a short involving an adjacent option card exists. Take extreme care when inserting or removing any option card to prevent accidental damage from power surge. Always remove power from the DupliDisk2 PCI BEFORE inserting or removing this card.*

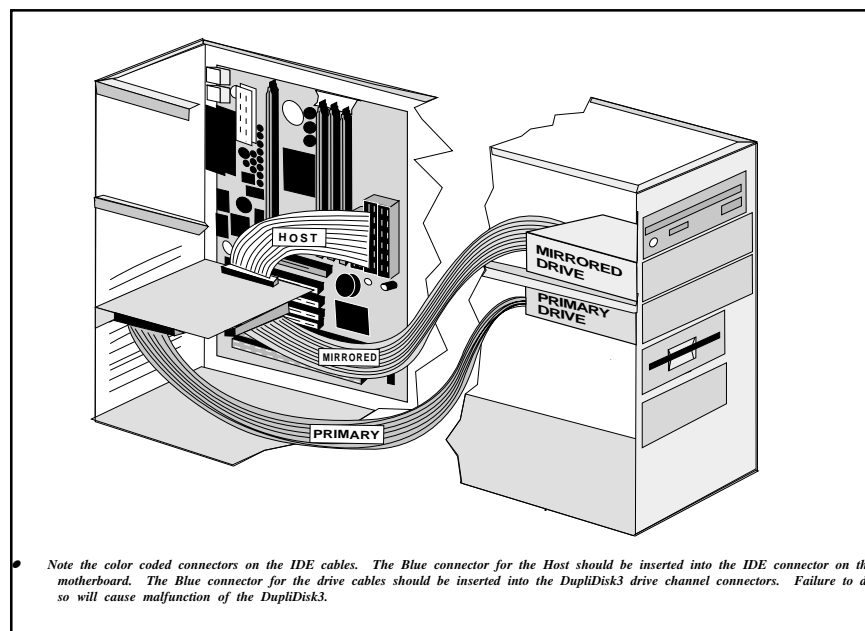
PCI Controller Layout and Cabling Diagram

Mirror Channel
Connection

Primary Channel
Connection

Host Cable Connection
(On Reverse Side)

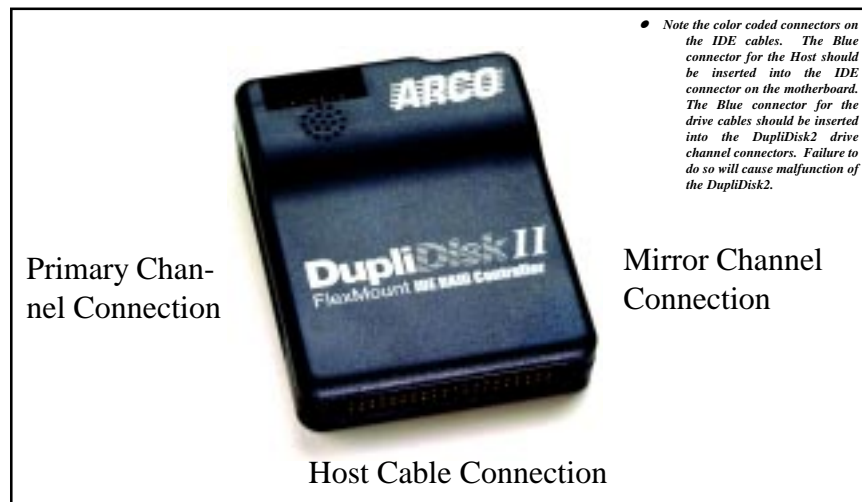
- Note the color coded connectors on the IDE cables. The Blue connector for the Host should be inserted into the IDE connector on the motherboard. The Blue connector for the drive cables should be inserted into the DupliDisk3 drive channel connectors. Failure to do so will cause malfunction of the DupliDisk3.



The FlexMount Model

- Before beginning installation, please read pages 3--5 in this manual.
- When installing one or two pair of mirrored drives, make sure that each of the drives is configured as **Master or Single Mode**.
- Remove the **DupliDisk2** from its package.
- **VERIFY** that all cables are attached to the proper location on the card and that the cables are labeled correctly to ensure proper operation! The Blue connector for the Host goes into the motherboard IDE connector. The Blue connector for the drive channels go into the DupliDisk2.
- Plug the **DupliDisk2** into the Primary or Secondary IDE controller interface on the motherboard. To utilize The Secondary IDE controller for installing a second **DupliDisk2**, you must load the DupliDisk2 Mirroring Utility using the **D** parameter: **Dupli /D**
- Attach one drive to the **Primary Channel** and the other to the **Mirror Channel** on the **DupliDisk2**. (*A power splitter may be needed to connect power to all of the drives.*) If installing a new and an existing drive (rather than two new drives), connect the existing drive to the **Primary Channel** and the new drive to the **Mirror Channel**.
- Mount the external panel either in a drive bay or a rear bracket slot. Connect the

FlexMount Controller Layout



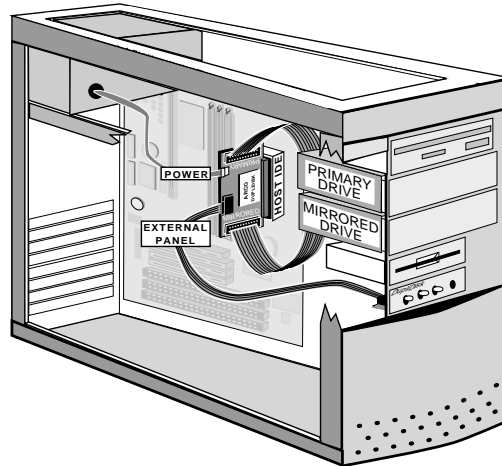
external panel cable to the external panel connectors on both the **DupliDisk2** and the external panel.

- Attach a power cable to the **DupliDisk2**.

FlexMount Controller Cabling Diagrams

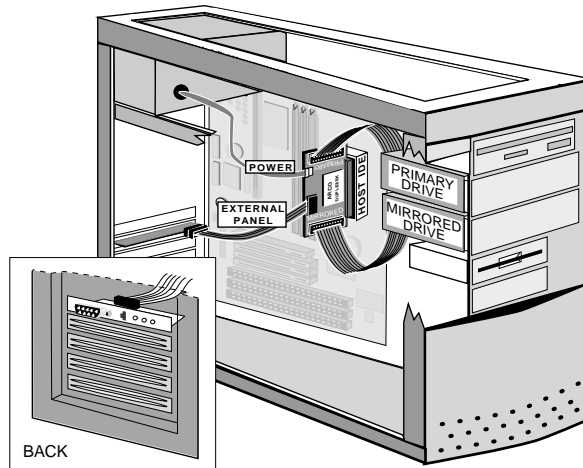
Front Panel

- *Note the color coded connectors on the IDE cables. The Blue connector for the Host should be inserted into the IDE connector on the motherboard. The Blue connector for the drive cables should be inserted into the DupliDisk2 drive channel connectors. Failure to do so will cause malfunction of the DupliDisk2.*



Rear Panel

- *Note the color coded connectors on the IDE cables. The Blue connector for the Host should be inserted into the IDE connector on the motherboard. The Blue connector for the drive cables should be inserted into the DupliDisk3 drive channel connectors. Failure to do so will cause malfunction of the DupliDisk3.*

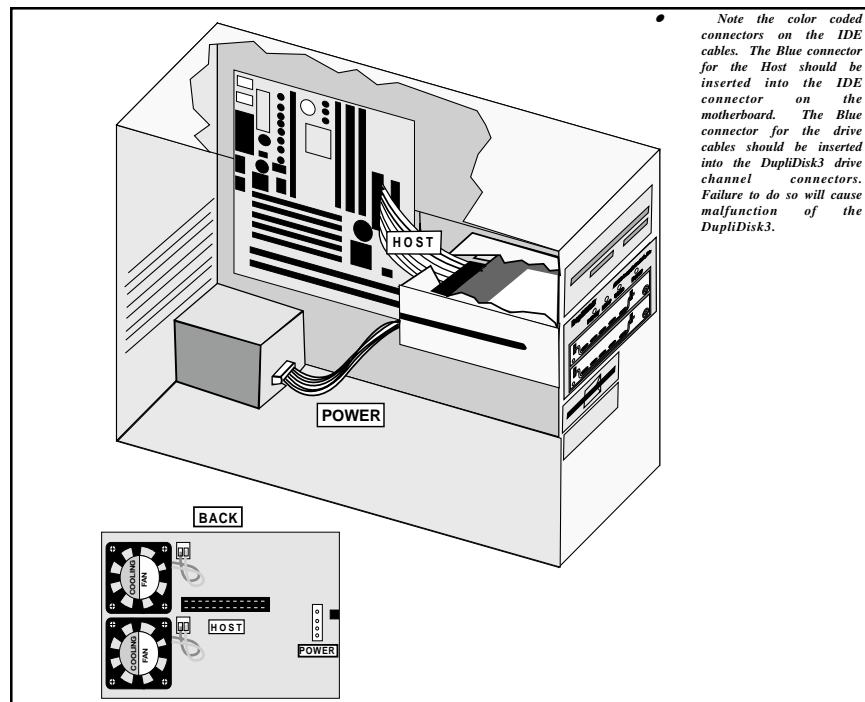


The RAIDcase Model

Installing the RAIDcase into the Computer

- Before beginning installation, please read pages 3--5 in this manual.
- Remove the RAIDcase from its protective antistatic bag.
- Firmly pull on the caddy handles to remove the two caddies from the RAIDcase.
- Close all applications and power down your computer.
- Make sure power is OFF. Open the computer case by removing the cover.
- Remove plastic front plates from two contiguous external drive bays.
- Place RAIDcase into two contiguous external drive bays and secure with screws provided.

RAIDcase Installation and Cabling Diagram



RAIDCase Drive Installation



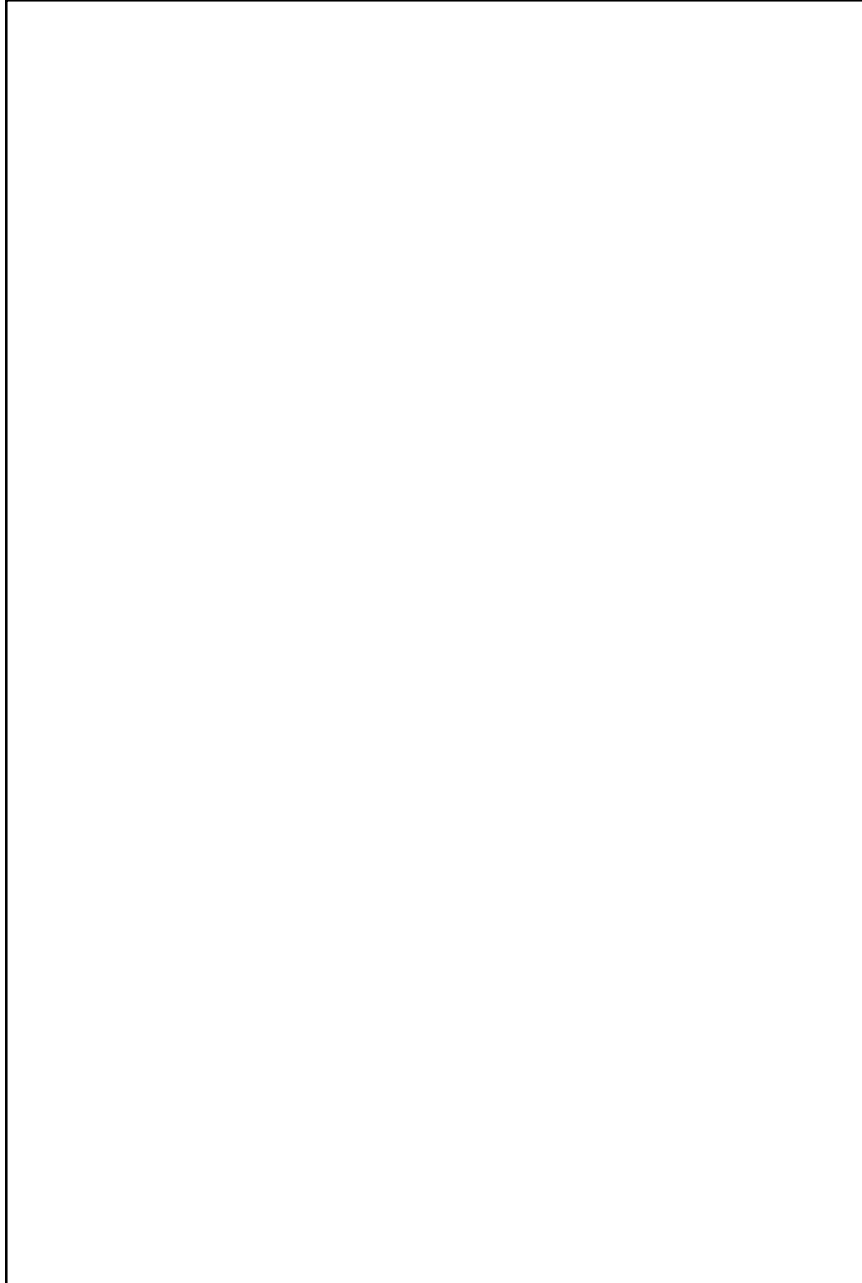
screws provided.

- Make sure both drives are configured as **Cable Select**. Check the diagram on the drive or the manufacturer's manual for proper jumper settings.

NOTE: If **Cable Select** is not an available choice, configure both drives as **Master or Single Drive**.

- Insert a drive in each caddy as shown in the RAIDcase Drive Installation diagram, using the screws provided to secure the drive. *If one drive contains existing data, make sure this drive is installed in the **Primary caddy** and the blank drive is installed in the **Mirror caddy**.*
- Connect the RAIDcase to the Primary or Secondary IDE controller on the motherboard with the provided IDE cable. Connect power to the RAIDcase.

Notes:

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7 Initial Raid 1 Mirroring

Using The DupliDisk2 Mirroring Utility Program

Before mirroring is allowed by the **DupliDisk2** controller, the hard drives will first be initialized by the **Dupli Disk2 Mirroring Utility** provided with your **DupliDisk2** product.

THIS IS NOT A DESTRUCTIVE INITIALIZATION AND WILL NOT HARM OR OVERWRITE YOUR EXISTING DATA.

Selecting From the Three Mirroring Methods

1. From the Bootable DOS Floppy

Each DupliDisk2 product is shipped with a floppy diskette which is designed to operate under DOS. (Arco licenses DR-DOS from Caldera.) The advantage to using the floppy-based (DOS) version of the DupliDisk2 Mirroring Utility is that it offers an attractive, easy-to-use graphical interface and is the *fastest* and most efficient method of mirroring your drives. Users of any operating system can mirror their drives from the floppy disk version.

There are four command line options available to you by typing the following:

A:\>dupli /s = To enable remote serial control

A:\>dupli /e = To force DupliDisk2 to interrogate enhanced IDE ports
(i.e. Abit 4 port IDE motherboards)

A:\>dupli /p = To force DupliDisk2 to interrogate enhanced IDE ports
where the I/O address is known and not found when using
the /e command from above.

A:\>dupli /d = To force DupliDisk2 to search the secondary IDE controller.
(ROM based setup utility is disabled from all ports except primary)

2. From the DupliDisk System BIOS

Users who have no floppy drive, can load the **DupliDisk2 Mirroring Utility** directly from the **DupliDisk2** BIOS.

3. As A Task Under Windows 95/98/2000/NT

Users operating in one of the Microsoft Windows environments may find it convenient to run mirroring as a task under Windows. The Windows version allows for the copying or rebuilding of drives in the background. This is slower than doing the copy as a single task but permits continued operation of other applications while drive copying or rebuilding takes place

Mirroring From the DOS Floppy Disk

The DOS version of the DupliDisk2 Mirroring Utility cannot be run as a task (in a DOS window) under any version of Windows. It must be run from the floppy disk. (Please see **As a Task Under Windows 95/98/2000/NT** on page 24.) To simplify this process, Arco provides the DupliDisk2 Mirroring Utility on a bootable 3.5-inch floppy diskette.

Insert the **DupliDisk2 Mirroring Utility** diskette in the floppy drive and boot up your computer. At the **A:** prompt type: **Dupli** and hit **<ENTER>**.

When installing two DupliDisk2's type: **Dupli /D** and hit **<ENTER>**.

The Status Screen

A status screen similar to the one below will appear.

DupliDisk2 Adapter Setup Utility (Bay)
Initialization Status

Primary Channel (Active)
Master: Seagate ST31276A hd(16) cyl(2482) spt(63) cap(1275)
Slave: Not Installed

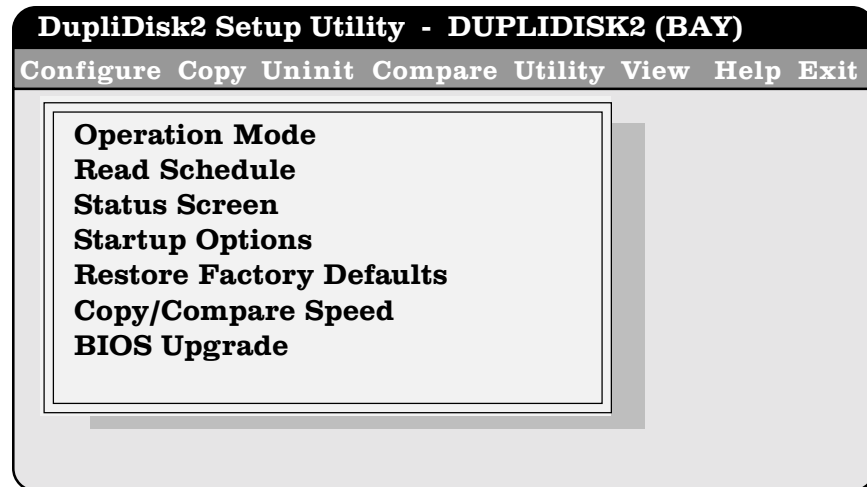
Mirror Channel (Not Active)
Master: Seagate ST51270A hd(16) cyl(2485) spt(63) cap(1282)
Slave: Not Installed

Initialization Information
Primary Master: Seagate ST31276A Not initialized
Mirror Master: Seagate ST51270A Not initialized
Master Drives are NOT in MIRROR mode

Checksum-220E Bios Rev-1.0 Serial Number 00000000000000

DOS Pull Down Menu Options

The following options are available from the DupliDisk2 Mirroring Utility pull down menu:



Configure

- **Operation Mode** allows the user to disable the mirroring function and operate from either the primary or the mirror drive only. This option is useful for isolating drive problems.
- **Read Schedule** allows the user to select either the Primary or Mirror drive as the drive to be used for read operations.
- **Status of Drives** displays drive parameters (heads, cylinders, sectors per track), capacity, model number, and initialization status. The BIOS revision of the board and Checksum may also be found on the Status screen.
- **Start-up Options**
 - Beep after cold boot if drive failure is detected
 - Beep after cold boot if running in single mode
 - Turn buzzer off after cold boot
 - Autoboot to DupliDisk utility program
 - Idle Mode Support (Default = 64)
 - Master Drive Detection
 - Slave Drive Detection
 - UDMA support
 - Serial Port BAUD Rate
 - Enable Boot Sector Protection

- **Restore Factory Defaults**

The following are the Factory Defaults settings:

- Read Schedule: **Primary Only**
- Beep on drive failure: **Continuously**
- Beep after cold boot if drive failure is detected: **Disabled**
- Beep after cold boot if running in single mode: **Disabled**
- Turn buzzer off after cold boot: **Disabled**
- Autoboot to DupliDisk ROM utility program: **Enabled**
- UDMA: **33**
- Master Drive Detection: **ON**
- Slave Drive Detection: **OFF**
- Enable Boot Sector Protection: **No**
- Serial Port BAUD rate: **9600**

When “**Beep on drive failure**” is enabled, beeping will occur if a failure is detected on one of the drives and will continue until the Buzzer Off switch is depressed or the machine is turned off. If this feature is disabled, there will be no notification if a drive fails. The other options available are for the buzzer to beep intermittently approximately every 5, 10, 30 or 60 seconds or every 2, 5, 10, or 15 minutes.

- **BIOS Upgrade** allows the user to flash the ROM. BIOS upgrades can be obtained from Arco or downloaded from our website.

In the event you need to upgrade your DupliDisk2 BIOS for enhanced features, or additional drive support, download the BIOS upgrade from our download section to the DOS bootable program disk.

Assure that your PC is connected to a power source, start the machine from the ARCO supplied Bootable DOS diskette, and run the Dupli.exe program. Select BIOS upgrade from the Configure pull down menu and follow the prompts to upgrade the DupliDisk2 BIOS..

Click on the ADD/Remove programs Icon, Select DupliDisk2 and follow the directions to remove the program files. A “WARNING” advising about removing shared files can be answered OK. You can then proceed to the Install procedure for the WinAcp program.

Copy

- **A surface to surface copy operation can be initiated:**

From Primary Master to Mirror Master
From Mirror Master to Primary Master
From Primary Slave to Mirror Slave
From Mirror Slave to Primary Slave

- **Rebuild Drive Marked As Bad** is used after the **DupliDisk2** signals a drive failure. This option allows the user to restore a mirrored drive from a defined good drive. It will automatically set up the source and destination drives for the copy process.

NOTE: The “Rebuild Drive” option will automatically initialize the replacement drive.

Uninit

Allows the user to remove the initialization information from the hard drive(s). Caution must be taken when removing the initialization buffer from a drive with existing data on it. In cases where the number of heads of the original mirrored drive pair were not identical, removing the initialization buffer from one of the drives could cause it not to boot.

Compare

Allows the user to compare the drives on the Primary and Mirror channels to determine if the data is identical. If the data is not identical the DupliDisk2 Mirroring Utility program will create a log file called dupli.log indicating the head and cylinder where the data is not identical. The dupli.log file is a text file and can be read with any text editor.

Utility

- **Set Copy/Compare Size** allows users to copy only a portion of the drive to be copied. This option is designed to reduce downtime by eliminating the need to copy the entire contents of a large drive which contains only a small amount of data. *Arco recommends that you copy the whole drive when installing for the first time. If the drive is not completely copied, any data over the initial copy amount cannot be guaranteed to be identical!*
- **Create User Default Settings** allows users to override and replace the factory default settings with user preferred default settings. Factory default settings will no longer be available. Creating your own User Default Settings places a file on the DupliDisk2 Mirroring Utility diskette called "factory.bin". If ever you wish to return to the Arco factory defaults, you must either rename or delete the "factory.bin" file.
- **Time to wait before booting OS** is used to establish the delay allowed for accessing the DupliDisk2 Mirroring ROM BIOS Utility before proceeding with normal operating system bootup.
- **Read LBA** is designed for diagnostic purposes. To access the Read LBA option, you must load the DupliDisk Mirroring Utility with the /L parameter: **Dupli /L**

View

- **DupliDisk2 Info** provides information about the DupliDisk2.
- **Drive Info** provides information about the installed drives.

Help

- Help files are not available from the Help pull down menu. For program help, hit <F1> from within any pull-down menu selection. For additional help, visit the Arco website at <http://www.arcoide.com>.
- **Company Information** for contacting Arco Computer Products is available from the Help Menu.

Exit

Exit to the DOS prompt.

Mirroring from the DupliDisk2 System BIOS

On normal bootup, the following message will appear on the screen:

Please select one of the following options

Start the DupliDisk2 Utility Program

Continue with booting your system

Use ↑ and ↓ to move the highlight to your choice
Press enter to choose

Seconds until highlighted choice will be started automatically: 25

If you do nothing, the programmed delay will expire and your system will boot normally. To run the DupliDisk2 Mirroring Utility program, use the arrow keys to select **<Start the DupliDisk2 Utility Program>** and hit **<ENTER>**. A status screen similar to the one below will appear.

DupliDisk2 Utility Program

Primary Channel

Master - Maxtor 72004AP hd(16) cyl(2482) spt(63) cap(1275)
Slave - Not Installed

Mirrored Channel

Master: WDC AC310200R hd(16) cyl(2485) spt(63) cap(1282)
Slave - Not Installed

Initialization Information

Primary Master - Maxtor 72004AP	Initialization is Not Valid
Primary Slave - Not Installed	
Mirrored Master - WDC AC310200R	Initialization is Not Valid
Mirrored Slave - Not Installed	
Master Drives are not in Mirror Mode	
Slave Drives are not in Mirror Mode	

Checksum-096Fh Firmware Rev - 1.00 Serial

Strike any key to proceed. The following screen will appear.

Configuration

Start-up Options

Copy Drives

Compare Drives

UnInitialize Drives

Factory Default

View Drive Info

Save and Exit

DupliDisk2 Utility Program

Operation Mode.....Mirrored Mode

Read Schedule.....Primary Only

Buzzer Control Setting.....Continuously

Bypass the DupliDisk Utility Program after 60 seconds

Menu Options

Use ↑ and ↓ arrow keys to move through the menu and toggle through selections. Hit <ENTER> to accept selection.

Configuration

● **Operation Mode** allows the user to disable the mirroring function and operate from either the primary or the mirror drive only. This option is useful for isolating drive problems. Selections are:

- Mirror Mode
- Primary Only
- Mirror Only

-
- **Read Schedule** allows the user to select either the Primary or Mirror drive as the drive to be used for read operations. Choices are:
 - **Primary Only**
 - **Mirror Only**
 - **Buzzer Control Setting** controls the duration of siren beep. Selections are:
 - Continuous Beep
 - Intermittent Beep every (x number) of seconds
 - **Bypass the DupliDisk2 Utility Program after** controls the time delay at system bootup before the operating system begins to load. This allows the user time to enter the DupliDisk2 Utility Program at system startup. The default setting is 30 seconds.

Start-up Options

- **Beep on cold boot after drive failure** (Enable/Disable). The Buzzer alarm signal will sound/not sound each time the system is rebooted if a drive has failed.
- **Beep on cold boot if in single mode** (Enable/Disable). The Buzzer alarm signal will sound/not sound each time the system is rebooted if the DupliDisk2 is running in Single Mode.
- **Buzzer off time after cold boot** allows the user to determine the length of time the alarm signal will beep on start up from a cold boot if a drive has failed. Selections are:
 - 1, 2, 3, 4, 5, 6, 7 and 8 minutes
 - Disable
- **Auto boot DupliDisk2 Utility Program** (Enable/Disable). The computer will automatically load the DupliDisk2 Utility Program on cold boot (rather than load the operating system).

Copy Drives

- **Copy Primary Master to Mirror Master**
- **Copy Mirror Master to Primary Master**
- **Copy Primary Slave to Mirror Slave**
- **Copy Mirror Slave to Primary Slave**

Compare Drives

Drives may be compared to insure that they are identical. Options are:

- **Compare Master Drives**
- **Compare Slave Drives**

Uninitialize Drives

The DupliDisk Mirroring Utility does a non-destructive initialization of the drives before mirroring can be established. Users may occasionally need to remove this initialization. The following choices are available:

- **Uninitialize Primary Master Drive**
- **Uninitialize Primary Slave Drive**
- **Uninitialize Mirrored Master Drive**
- **Uninitialize Mirrored Slave Drive**
- **Uninitialize all Master Drives**
- **Uninitialize all Slave Drives**
- **Uninitialize All Drives**

Factory Default

Following are factory default settings for the **DupliDisk2**:

- **Operation Mode.....Mirror Mode**
- **Read operation from.....Primary Only**
- **Buzzer Operation.....Continuously**
- **Cold boot alarm siren after drive failure.....Enabled**
- **Cold boot alarm siren after drive failure if in single mode.....Disabled**
- **Turn beeper off on cold boot after.....1 Minute**
- **Access to DupliDisk Utility on boot up.....Enabled**
- **UDMA Support.....33**
- **Enable Boot Sector Protection.....Yes**
- **BAUD Rate.....9600**

View Drive Info

For a physical description of each drive select from the following:

- **Primary Channel - Master Drive**
- **Primary Channel - Slave Drive**
- **Mirror Channel - Master Drive**
- **Mirror Channel - Master Drive**

Save and Exit

DupliDisk2 Utility Program for Windows®

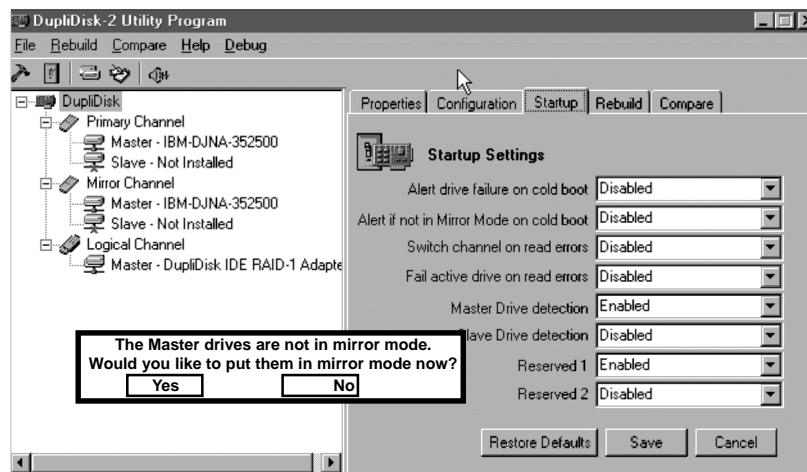
To run the DupliDisk Utility Program as a task under Windows 95/98/2000 and Windows NT, the program must be installed from the Windows DupliDisk2 Utility Program floppies provided with your DupliDisk2.

To install the DupliDisk2 Utility Program, insert Disk 1 into the floppy drive and double click the My Computer icon on the Windows desktop. When the drive icons appear, double click on the Drive: A icon. A list of files will appear. Double click on **Setup**. The installation program will prompt you to insert the additional diskettes.

A DupliDisk2 Mirroring Utility icon will appear on your desktop. A DupliDisk2 Mirroring Utility icon will also be installed in your Start Menu.

To start the DupliDisk2 Mirroring Utility, double click on the DupliDisk2 Mirroring Utility icon on the desktop or select the the DupliDisk2 Mirroring Utility icon from the Start Menu.

If you have not yet mirrored your drives, the following screen will appear.



Select "Yes" to initialize the drives. This is not a destructive initialization and will not damage your drives or overwrite existing data.

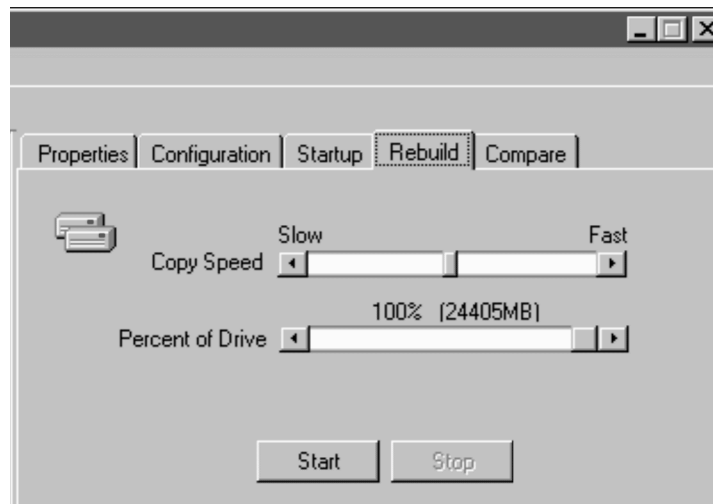
The following message will appear:

**The Master drives have been initialized.
Would you like to rebuild the drive now?**

Yes

No

If you select “Yes”, the following screen will appear.



Click **Start** to begin the copy.

Copy Speed

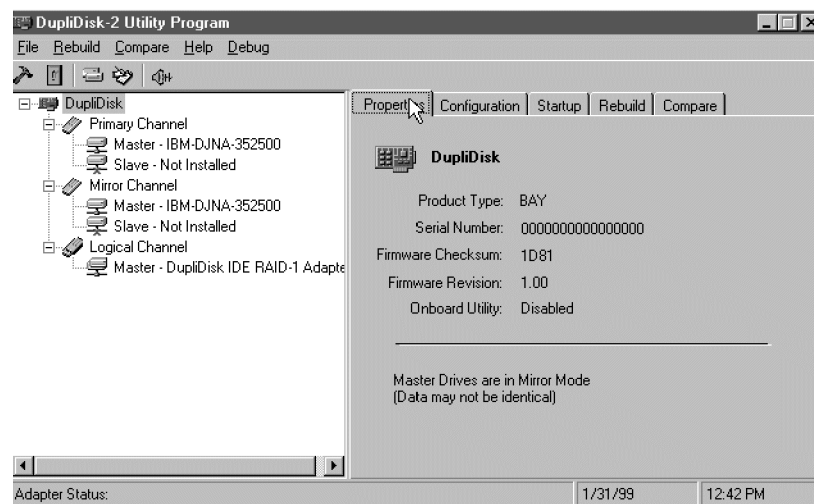
The Windows version of the DupliDisk2 Mirroring Utility offers the unique feature of background rebuild. The background rebuild feature allows users to continue to run Windows applications in foreground while the drive copy is taking place in background. A sliding selection bar allows you to determine how much of the computer's resources to allocate to the copy process. For example, if you are running no other Windows applications during the Copy, move the selection bar to **Fast**. If your foreground applications must take precedence, move the selection bar to **Slow**.

Percent of Drive to Copy

By default, the DupliDisk2 Mirroring Utility performs a bit-by-bit copy of the entire drive. The sliding selection bar in the "Rebuild" menu makes it possible for users to copy only a portion of the drive.

To save time when copying a large drive which contains only a small amount of data, users may prefer to use the Percent of Drive copy option. It is recommended that the Percent of Drive option be restricted to relatively new drives or drives which have been recently defragmented.

Windows Menu Options



Properties Tab

Click on the Properties tab to view DupliDisk2 system status information.

Configuration Tab

- **Operation Mode** allows the user to disable the mirroring function and operate from either the primary or the mirror drive only. This option is useful for isolating drive problems.
- **Read Schedule** allows the user to select either the Primary or Mirror drive as the drive to be used for read operations.
- **OS Boot Time** allows the user to determine the delay time allowed to access the BIOS-based version of DupliDisk2 Mirroring Utility. The default value for this option is "Continue" which translates to "no delay". The OS Boot Time option has no function under Windows. It is designed to allow Windows users who wish to run the BIOS version of the Mirroring Utility to be able to access the Mirroring Utility before their Windows operating system loads.
- **Beep on Drive Failure** provides options for configuring the time interval between beeps when the siren alarm (Buzzer) signal is activated by a drive failure. The default value for this option is "Continuously". If set to the default, the alarm will sound a continuous beep if a drive fails. It is also possible to set the alarm to beep at periodic intervals.

-
- **Buzzer Off After Cold Boot** controls the behavior of the siren alarm after a disk failure has been signaled and recognized. If it is not possible to replace the failed drive immediately and the user wishes to power down the computer, the alarm will beep (continuously, unless set differently) each time the computer is rebooted. “Buzzer Off After Cold Boot” is designed to eliminate the need to manually turn off the Buzzer each time the computer is rebooted after a drive failure. Use this option to establish the length of the start-up beep or to disable beep on cold boot altogether.
 - **Monitor Time Interval** sets the frequency with which the DupliDisk2 Windows Mirroring Utility checks the status of newly inserted drives. A failed drive will be reported immediately regardless of the time interval selected.
 - **Copy/Compare Percent** allows only a portion of the drive to be copied. This option is designed to reduce downtime by eliminating the need to copy the entire contents of a large drive which contains only a small amount of data.

Rebuild Tab

- Copy Speed
- Percent of Drive

For a Discussion of the Rebuild Menu, see page 25

Compare Tab

- Compare Speed
- Percent of Drive

8 Remote Monitoring

Serial Port

If you are sitting at the computer or are anywhere near it, you will hear the siren go off if a drive goes bad. However, if the computer into which you install your DupliDisk2 is in an area where the alarm siren and LED's are not likely to be noticed (such as a closed room, a remote unmanned location or a noisy factory floor) you may wish to make use of Arco's remote monitoring feature to check the status of the drives.

The serial port is currently designed for I/O and gives the computer system the DupliDisk2 is installed in the ability to READ the status of the DupliDisk2. The DupliDisk2 will send a status byte to this optional serial port after receiving a 55h at its input pin. The communications parameters are as follows:

No Parity, 8 Bits, 1 Stop Bit

Your computer's Serial port must support 9600 BPS. The DupliDisk2 Mirroring Utility Program Version 1.0 will allow the use of the higher baud rate. You will require an applet written in your own operating system which sends a 55h from any serial port in your computer to the DupliDisk2's serial port via the cable wiring diagram above.

When the **55h** is received, the DupliDisk2 will output a status byte with the following status bits to be decoded.

Cable Connections	
YOUR PORT	DupliDisk II PORT
Pin 1 (GRND)	Pin 1 (GRND)
Pin 2 (Rx)	Pin 3 (Tx)
Pin 3 (Tx)	Pin 2 (Rx)

Bits 1-0	00	Primary Channel OK
	01	Primary Channel not in use (no drives)
	10	Reserved
	11	Primary Channel marked as bad
Bits 3-2	00	Mirrored Channel is OK
	01	Mirrored Channel not in use (no drives)
	10	Reserved
	11	Mirror Channel marked as bad
Bit 4		Reserved
Bit 5	0	Beeper is OFF
	1	Beeper is ON
Bit 6	0	Controller is running in SINGLE Mode
	1	Controller is running in MIRROR mode
Bit 7	0	Current active channel for reads is the Primary
	1	Current active channel for reads is the MIRROR

Your applet should be designed so that, if the response to the **55h** query indicates that the *DupliDisk2* status has changed from the default (40h returned), this information is written to a file on your hard disk. You can then easily dial in to the remote system via a software package like PC Anywhere or Carbon Copy and read the response file from the hard disk.

Optional Status Chip Use (ISA Model Only!)

The optional STATUS chip on the *DupliDisk2*-ISA model will report status constantly to an applet without sending a "Get Status" command. To read the chip, simply perform an I/O read from port 320h, the factory default. Below is an assembly code example.

```

mov dx,320h    ; port 320
in al,dx       ; read the data from the port

```

Decoding the data received in AL is the same as the serial port option.

The DEFAULT I/O address 320h of the status chip can be changed from 320h by running: Dupli /S at the command line.

9 Replacing a Failed Drive

If one of the hard drives becomes inoperable, the buzzer will sound, indicating the drive has failed and both the drive and status LED's will turn red. The beep will continue until the system is turned off or the buzzer reset switch on the DupliDisk2 is depressed.

When a failure is detected the working drive will automatically take over and allow the user to safely save the data and shut down the system to replace the failed drive.

To replace the drive:

- Close any open application and shut down. Turn off power to the computer.
- Turn on the computer and boot from the **DupliDisk2 Mirroring Utility Program** diskette and type: **Dupli**
- The **DupliDisk2 Mirroring Utility** program will identify the failed drive. Confirm the bad drive reported by the **DupliDisk2 Mirroring Utility** with the red LED on the panel.
- Make a note of which drive was reported bad, then turn off the computer.
- Replace bad drive with a new drive. **Make sure the capacity of the new drive is equal to or greater than that of the working drive (on the working channel).**
- Reboot from the **DupliDisk2 Mirroring Utility** program diskette.
Type: **Dupli**

The **DupliDisk2 Mirroring Utility** program will then offer the following options:

CLEAR THE ERROR MESSAGE
REBUILD DRIVE ON PRIMARY CHANNEL

Select **CLEAR** if you wish to remove the error message but not duplicate the data. Select **REBUILD** if you wish to remove the error message and have the **DupliDisk2 Mirroring Utility** program automatically initialize the replacement drive and perform the correct copy procedure.

- Reboot the system from the hard drive after the data is finished copying.

10 Troubleshooting

Both drives appear on the DupliDisk2 Mirroring Utility status screen but your operating system displays only one drive.

The mirror drive can only be seen by the DupliDisk2 Mirroring Utility Program. It is invisible to your operating system. If you are mirroring a C:\ drive, for example, only the C:\ drive will appear.

Only one drive appears on the DupliDisk2 Mirroring Utility status screen.

Both the Primary and Mirror drives must be configured as Master or Single mode. Make sure one of the drives has not been configured as Slave. Check to see that the power cables to the drives are securely connected and the drives are operational.

The drives are connected to the DupliDisk2 but the system BIOS doesn't see any drives. Running the DupliDisk2 Mirroring Utility Program returns an "adapter not found" message.

Make sure the DupliDisk2 is securely mounted and that the Host and power cables are properly connected. The DupliDisk2 should emit a beep and all of the LED's should show green when the system is powered up

All you have done is to initialize the drives with the DupliDisk2 Mirroring Utility but the computer is saying you have made changes to the BIOS and asking if you want to accept them.

Do not be concerned. No changes have been made to the computer's system BIOS. Select "ACCEPT" to continue your DupliDisk2 installation.

NOTE: Make sure that the cables are connected in the proper direction. The Blue Host connector should go into the motherboard IDE connector. The Blue drive connectors must go to the DupliDisk2.

NOTE: DO NOT install DupliDisk in any system with Windows 2000 Dynamic Disks pre-configured! Call Arco Technical Support at (954) 925-7387 for installation assistance.

For the latest information and software upgrades, please visit the technical support section on our website at <http://www.arcoide.com>.

11 Specifications

Model	Bay	Flex	ISA	PCI	RAIDcase	No-Slot
Drive Interface	IDE / E-IDE / UDMA					
Data Path	IDE / E-IDE / UDMA (Defined by the host controller)					
Hard Disk Interface	Cable: 80 Wire - 40-pin Connector (P/N 62-0020003/04)					
Supplied Cable Length (inches)	18	18	18	18	n/a	18
Host Interface	Cable: 80 Wire - 40-pin Connector (P/N 62-0020002)					
Supplied Cable Length (inches)	16	16	16	16	16	16
Electrical Input	Voltage: 5V DC (+/- 5%)					
	Current: 450 MA Operating 600 MA Peak					
Length (inches)	4.75 in.	3.5	6.5	4.725	8.5	4.375
Width (inches)	4.027 in.	2.20	3.625	4.027	5.75	6.0
Height (inches)					3.25	
Operating Temp.	10 to 40 degrees Celsius					
Humidity	8 to 87 % non-condensing					
Capacity / Addressing	Utilizes 48 bit Logical Block Addressing - 128 PetaBytes (Current Application Limit is 2.0 TeraBytes)					



3100 North 29th Court • Hollywood, Florida 33020 USA • (954) 925-2688 • <http://www.duplidisk.com>



One-Year Limited Warranty

This warranty gives you specific legal rights. You may also have other rights that vary from one jurisdiction to another.

THE WARRANTIES GIVEN HEREIN, TOGETHER WITH ANY IMPLIED WARRANTIES COVERING THE HARDWARE, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF DELIVERY TO PURCHASER.

Data Protection Solutions by ARCO ("DPS") warrants to the Purchaser that DPS' hardware is free from defects in workmanship or material under normal use and service. This warranty commences on the date of delivery of the hardware to the Purchaser. Any claim under the warranty must include a dated proof of purchase or invoice. In any event, DPS' liability for defective hardware is limited to repairing or replacing the hardware.

During the warranty period, DPS agrees to repair or replace, at its sole option, without charge to Purchaser, any defective component part of the hardware. To obtain service, Purchaser must contact Technical Support to obtain a Return Merchandise Authorization (RMA) number. Return the hardware to DPS or an authorized DPS distributor in an adequate container for shipping. The postage, shipping and insurance charges incurred in shipping to DPS will be paid by Purchaser and all risk for the hardware shall remain with Purchaser until such time as DPS takes receipt of the hardware. Upon receipt, DPS will promptly repair or replace the defective unit and then return said unit to Purchaser, postage, shipping, and insurance prepaid. DPS may use reconditioned or like new parts or units, at its sole option, when repairing any hardware. Repaired products shall carry the remaining warranty period pertaining to original purchase. This warranty is contingent upon proper use of the hardware by Purchaser and does not cover: hardware or software incompatibility (covered under DPS' 30 Days Money Back Guarantee Policy), damage due to accident, unusual physical, electrical, or electromechanical stress, neglect, misuse, failure of electric power, air conditioning, humidity control, transportation, operation with media not approved by DPS, or tampering with or altering of the hardware.

DPS' 30 Days Money Back Guarantee Policy

DPS GUARANTEES MONEY BACK WITHIN THE 30 DAYS AFTER PURCHASE, FOR THE FOLLOWING REASONS: NOT SATISFIED WITH THE PRODUCT OR ANY HARDWARE AND SOFTWARE INCOMPATIBILITY.

DPS SHALL NOT BE LIABLE TO YOU FOR LOSS OF DATA, LOSS OF PROFITS, LOST SAVINGS, SPECIAL INDIRECTION, CONSEQUENTIAL, INCIDENTAL OR OTHER SIMILAR DAMAGES ARISING FROM BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, OR OTHER LEGAL ACTION EVEN IF DPS OR ITS AGENT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BROUGHT AGAINST YOU BY ANOTHER PARTY.

This warranty allocates risks of product failure between Purchaser and DPS. DPS' hardware pricing reflects this allocation of risk and limitations of liability contained in this warranty. The warranty set forth above is in lieu of all other expressed warranties, whether oral or written. The agents, employees, distributors, and dealers of DPS are not authorized to make modifications to this warranty, or additional warranties binding on DPS. Accordingly, additional statements such as dealer advertising or presentations, whether oral or written, do not constitute warranties by DPS and should not be relied upon.

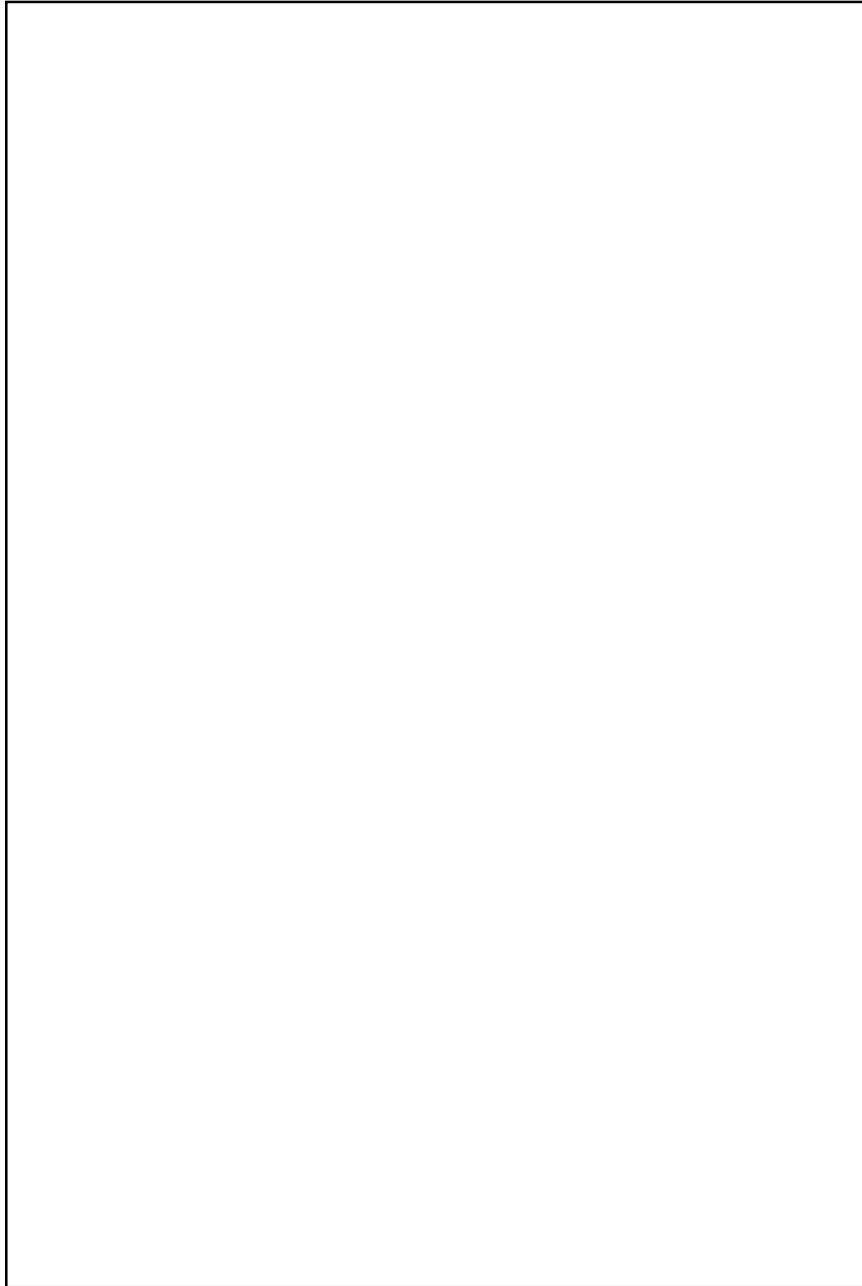
Returning the product to Data Protection Solutions by ARCO requires contacting DPS' Technical Support to obtain a Return Merchandise Authorization (RMA) number. You must have an RMA number before returning the product to us. Ship the product back in the original container with the RMA number, name, and address on the shipping label. Purchaser should address all matters concerning this warranty to:

Data Protection Solutions by Arco
3100 North 29th Court
Hollywood, Florida 33020 U.S.A.
E-mail: info@arcoide.com
Web Site: [http:// www.arcoide.com](http://www.arcoide.com)

Telephone: 954-925-2688
Facsimile: 954-925-2889
Tech Support: 954-925-7347

This product is protected under U.S. Patent No. 5740397

Notes:

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