



## **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 DupliDisk3

The **DupliDisk3** 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 **DupliDisk3** uses patented technology which adds RAID Level 1 disk mirroring to any IDE enabled computer.

### Key DupliDisk3 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 all Windows 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, Macintosh, Windows 3.1, 9x, Me, XP, NT, 2000, Netware, Unix, and Linux**
- Flashable ROM BIOS
- Jumperless, software configurable design
- Serial Port (remote monitoring)
- Remote Notification (Email)
- Extended LBA Addressing supports drive capacities up to 128,000 Terrabytes.
- ATA100 Support

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## 2 Contents of the Box

Check the contents of the **DupliDisk3** box. You should find:

### **DupliDisk3-PCI**

- **DupliDisk3** controller
- **DupliDisk Raid Management** Program diskette and CD
- **DupliDisk3** Quick Start Guide
- IDE 3 cable set (P/N 62-2010001)

### **DupliDisk3-Bay Mount and NoSlot:**

- **DupliDisk3**-Bay Mount controller
- **DupliDisk Raid Management** Program diskette and CD
- **DupliDisk3** Quick Start Guide
- IDE 3 cable set (P/N 62-2010001)
- Power Cable

### **DupliDisk3-FlexMount:**

- **DupliDisk3**-FlexMount controller
- **DupliDisk Raid Management** Program diskette and CD
- **DupliDisk3** Quick Start Guide
- IDE 3 cable set (P/N 62-2010001)
- Power Cable

### **DupliDisk3-RAIDcase:**

- **DupliDisk3**-RAIDcase
- 2 removable drive caddies with keys
- 18-inch Host cable
- **DupliDisk** Raid Management Program diskette and CD
- **DupliDisk3** Quick Start Guide

### **DupliDisk3-MicroRaid:**

- **DupliDisk3** controller
- **DupliDisk Raid Management** Program diskette and CD
- **DupliDisk3** Quick Start Guide
- IDE 3 cable set (P/N 62-2010001)

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

For optimal and reliable performance of your **DupliDisk3**, 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.

### **Note:**

*ATA Specifications (T13 Document) limit maximum length of host cable to 18". This is the length of the supplied cable. Use of any length greater than 18" may result in data corruption or loss. Arco does not support the use of cables not supplied by Arco.*

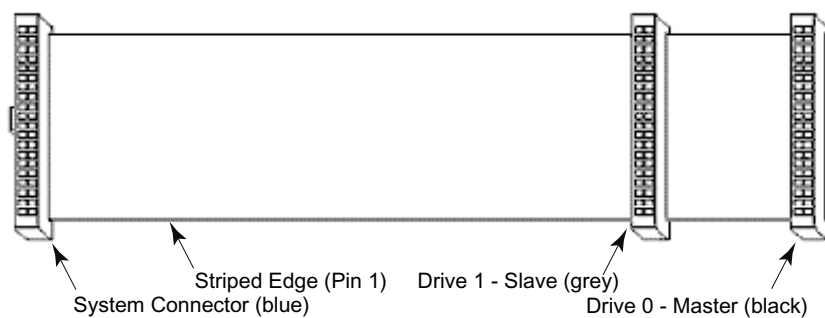
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## 3 Before You Begin

Before installing your **DupliDisk3**

- Be sure you have a current backup on removable media, such as tape. This will not be required for the installation of your **DupliDisk3**. 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 DupliDisk3 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 **DupliDisk3**.

### Cable / Connector Layout



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## 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 **DupliDisk3** 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 DupliDisk3 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 ST340016A (40GB)	MAXTOR 6L060L3 (60GB)	40GB

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

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## 5 Interpreting the LED's

### Interpreting the External Control Panel Lights (LED's)

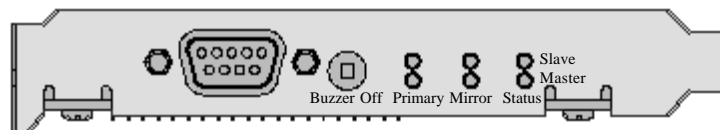
Each DupliDisk3 is outfitted with an external control panel which provides feedback via colored lights (LED's) as well as a reset switch for the audible alarm (Buzzer).

Understanding the control panel signals will help you to know if your DupliDisk3 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 Drive is marked as bad
  - Orange** Channel activity (read/write)
  
- **Status LED's** show the status of the **DupliDisk3** 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 **DupliDisk3** self test.
  - Second beep indicates the **DupliDisk3** 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.  
NOTE: Slave Channel scanning can be disabled in configuration.*



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## 6 Installing The Hardware

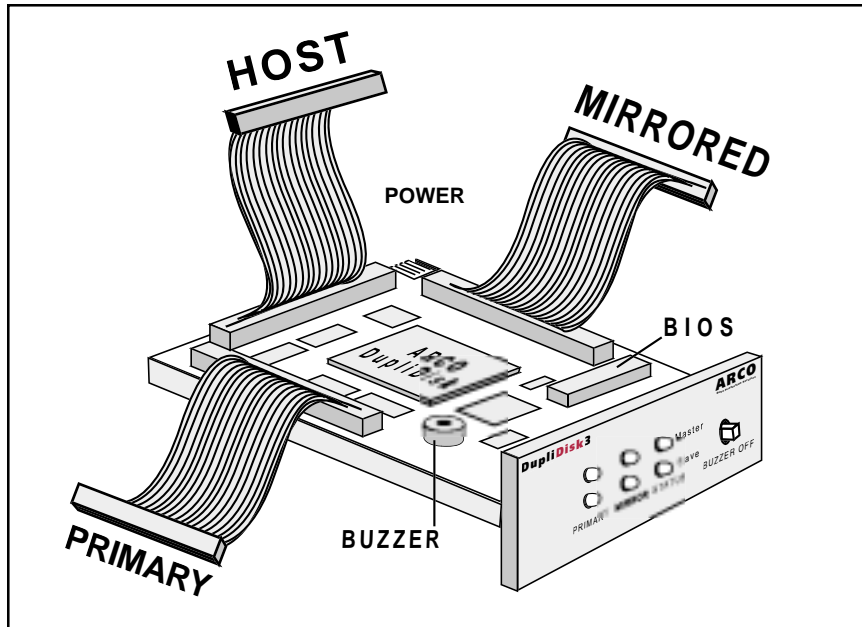
### Baymount/No\*Slot Models

- When installing one pair of mirrored drives, configure both drives as **Cable Select**. (see manufacturers instructions)

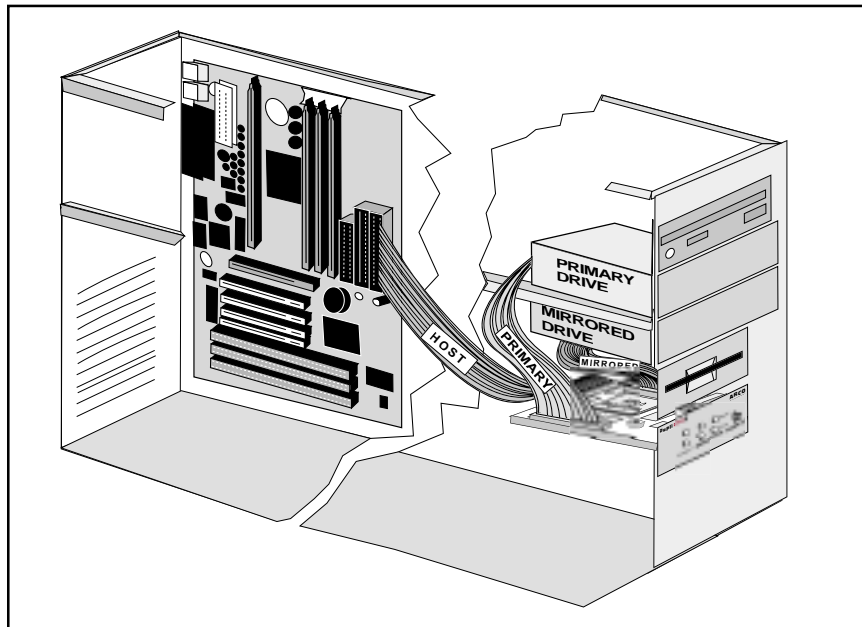
*NOTE: If Cable Select is not an available choice, configure both drives as Master or Single Drive.*

- Remove the **DupliDisk3** from its package.
- Attach the **IDE Host** cable provided by Arco to the **Host** connector on the **DupliDisk3**.
- Attach the **Primary** and **Mirror** cables to the **Primary** and **Mirrored** connectors on the **DupliDisk3**.
- **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 DupliDisk3.
- Install the **DupliDisk3** 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 **DupliDisk3 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 **DupliDisk3**. (*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 **DupliDisk3**.
- 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 **DupliDisk3**.

### 3.5" Bay Mount Controller Layout and Cabling Diagram

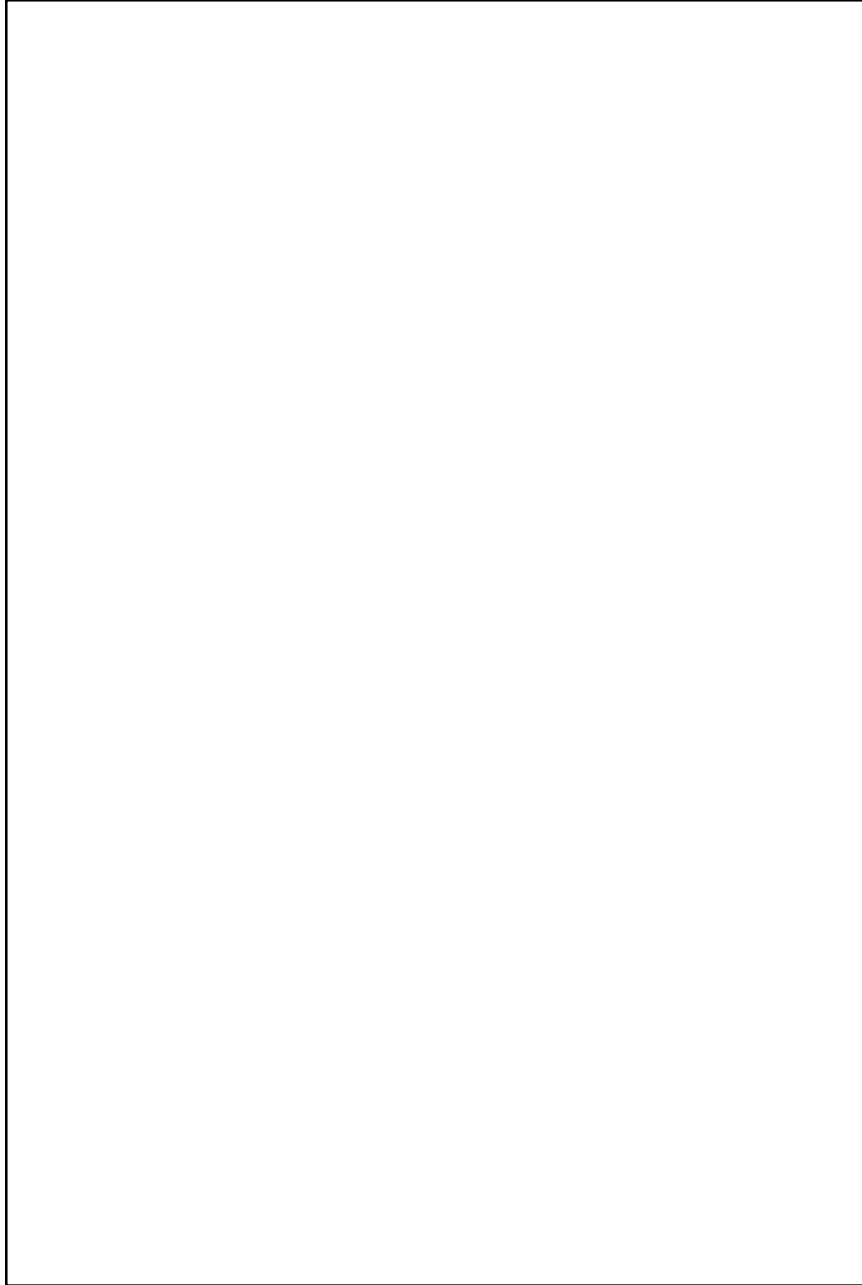


### 5.25" Bay Mount Controller Cabling Diagram



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**Notes:**

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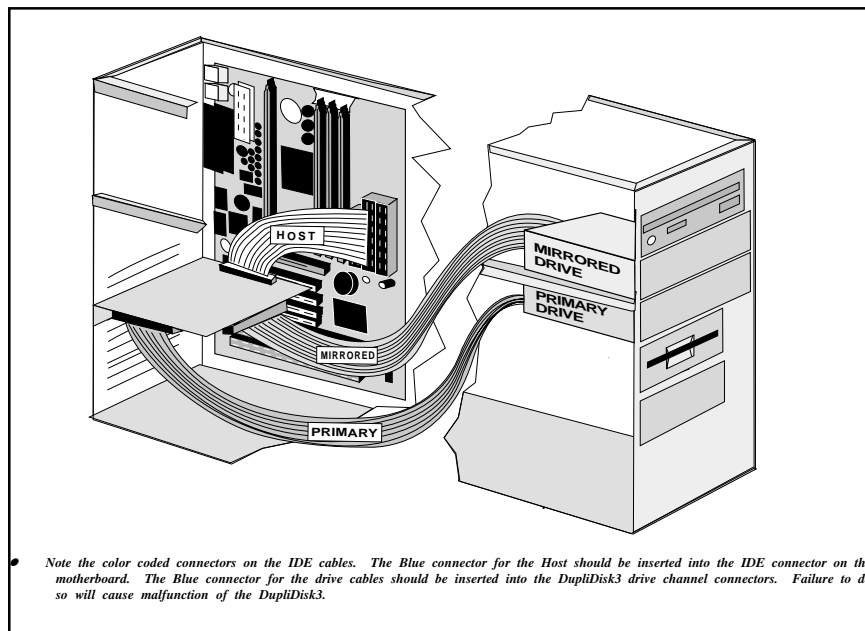
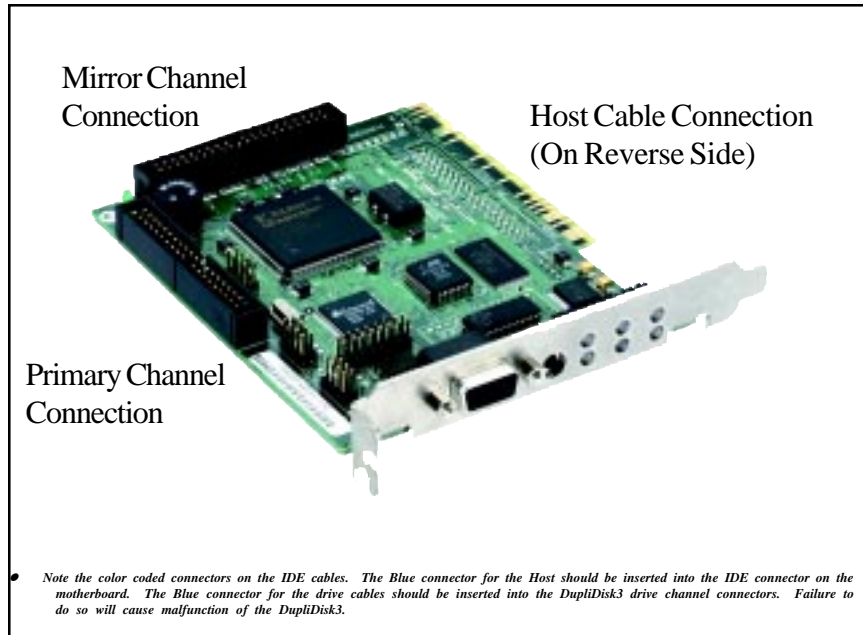
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## The PCI Model

- 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 **Cable Select**.  
  
*NOTE: If Cable Select is not an available choice, configure both drives as Master or Single Mode.*
- Remove the **DupliDisk3** from its package.
- Attach the **IDE Host** cable provided by Arco to the **Host** connector on the **DupliDisk3**.
- Attach the **Primary** and **Mirror** cables to the **Primary** and **Mirrored** connectors on the **DupliDisk3**.
- **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 DupliDisk3.
- Install the **DupliDisk3** 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 **DupliDisk3 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 **DupliDisk3**. (*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 **DupliDisk3**.

*Note: The DupliDisk3 PCI model has been designed to accommodate the Hot Plug 1.0 Addendum to the PCI 2.2 specification. If power is removed by the server to the DupliDisk3 PCI, despite our signaling system to maintain power to the DupliDisk3 PCI, we have provided a "floppy" type power adapter to supply power to the DupliDisk3 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 DupliDisk3 PCI **BEFORE** inserting or removing this card.*

## PCI Controller Layout and Cabling Diagram



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## The FlexMount Model

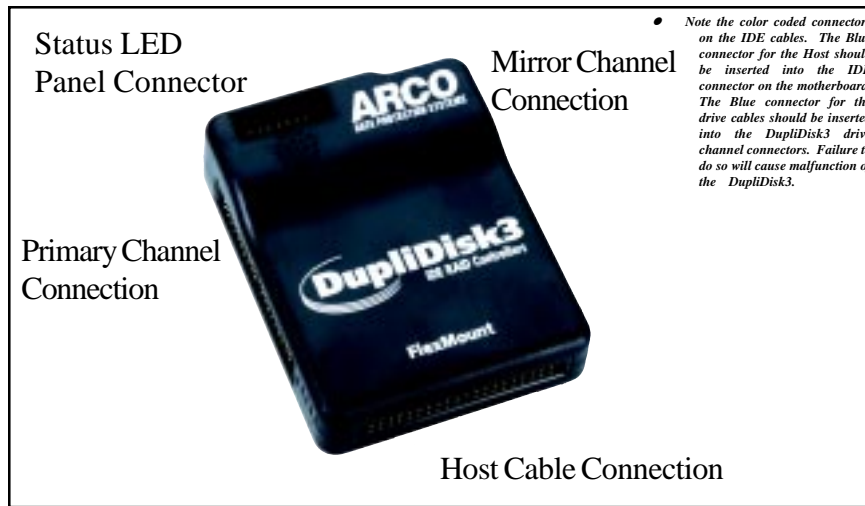
- Before beginning installation, please read pages 3--5 in this manual.
- When installing one or two pair of mirrored drives, make sure that each of the drives is configured as **Cable Select**.

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

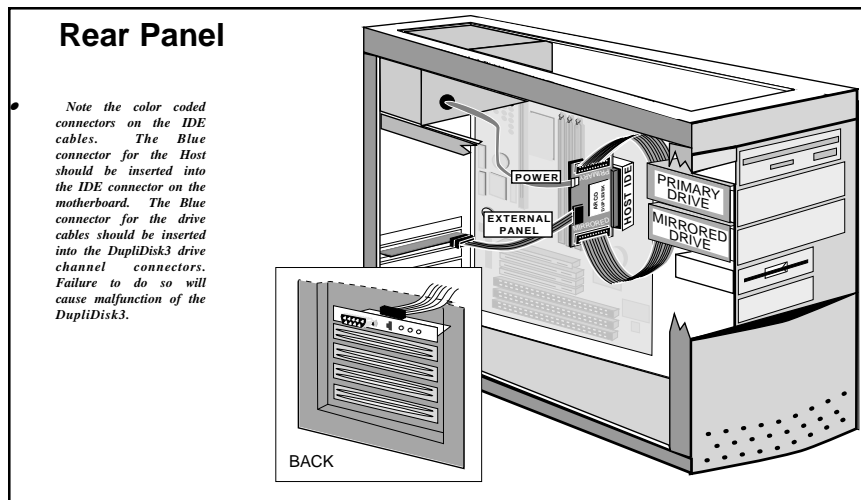
- Remove the **DupliDisk3** from its package.
- Attach the **IDE Host** cable provided by Arco to the **Host** connector on the **DupliDisk3**.
- Attach the **Primary** and **Mirror** cables to the **Primary** and **Mirrored** connectors on the **DupliDisk3**.
- **VERIFY** that all cables are attached 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 DupliDisk3.
- Plug the **DupliDisk3** into the Primary or Secondary IDE controller interface on the motherboard. To utilize The Secondary IDE controller for installing a second **DupliDisk3**, you must load the Dupli Raid Management Utility using the **D** parameter: **Dupli /D** (See Dos Software pg. 16)
- Attach one drive to the **Primary Channel** and the other to the **Mirror Channel** on the **DupliDisk3**. (*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 in a rear bracket slot. Connect the external panel cable to the external panel connectors on both the **DupliDisk3** and the external panel.
- Attach a power cable to the **DupliDisk3**.

## FlexMount Controller Layout



## FlexMount Controller Cabling Diagrams

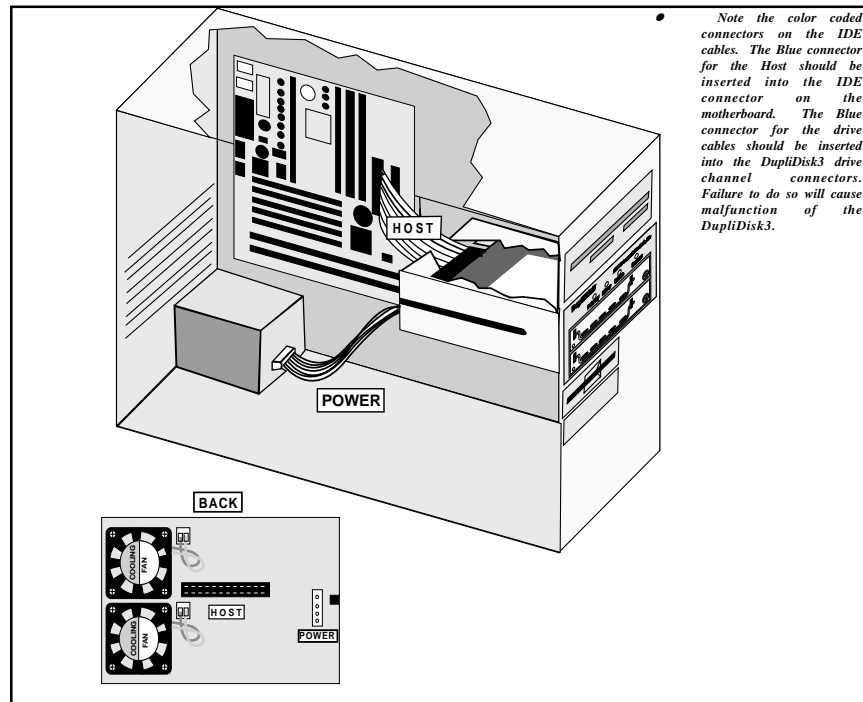


## The RAIDcase Model

### 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.
- Using the keys provided, unlock the drive caddies and firmly pull on the caddy handles to remove the two drawers from the RAIDcase.
- Close all applications and power down your computer.
- Make sure power is OFF. Open the computer case by removing the cover.

### RAIDcase Installation and Cabling Diagram



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## RAIDCase Drive Installation



screws provided.

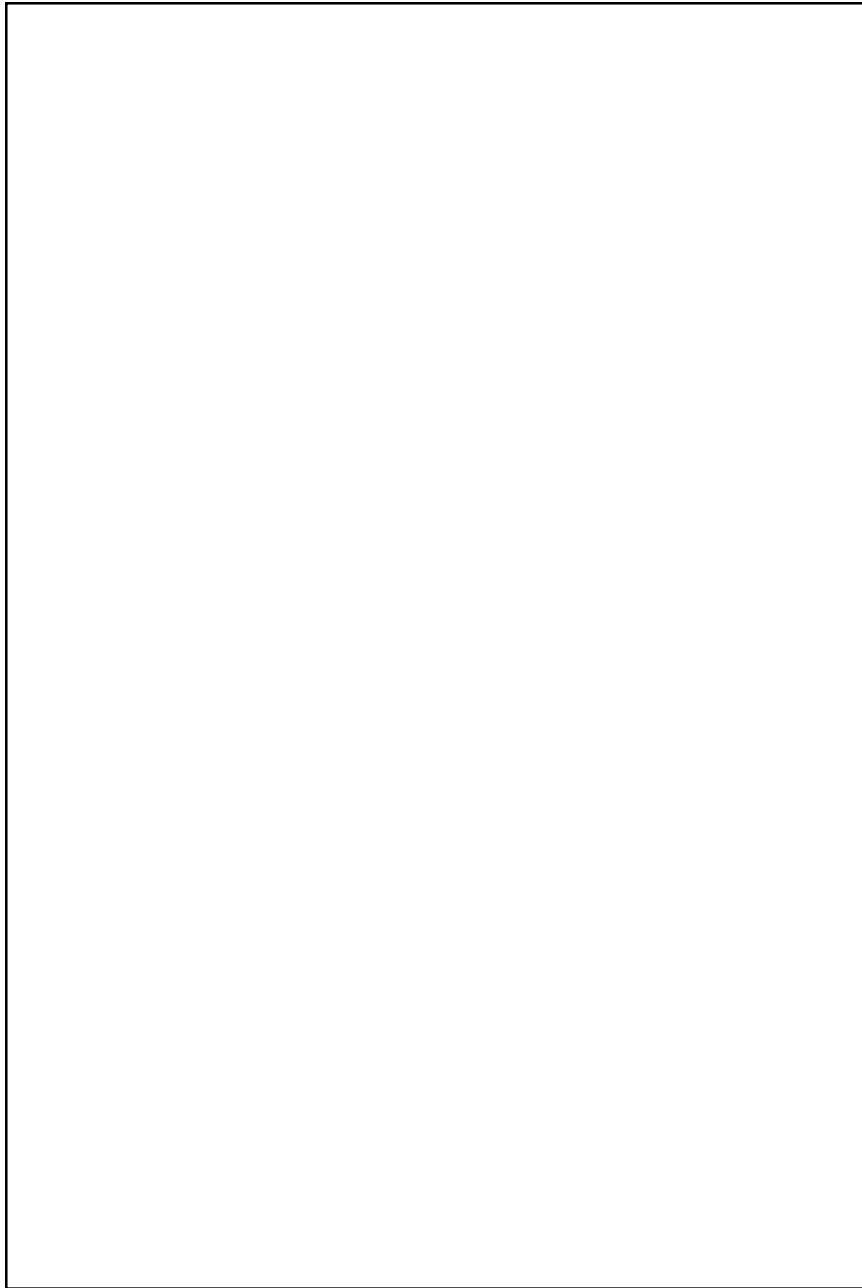
- Make sure both drives are configured as **Cable Select**. Check the diagram on the drive or the manufacturer's manual for proper jumper settings.

**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.

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**Notes:**

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## 7 Initial Raid 1 Mirroring

The DupliDisk3 does not need any resident software or software drivers to maintain a mirrored pair, or to constantly monitor the drive quality, and to isolate defective drives when needed. However, upon installation, you must perform an initial setup and mirroring using one of the available Raid Management Utility programs. These programs are supplied free of charge with this product, or may be downloaded from our web site.

Each Utility is described in detail further along in this manual. For example, you can configure certain startup options, such as monitor interval, and alarm (beep) conditions. The utility will also determine if the drives are compatible (mirror drive cannot be smaller than primary drive), perform an initialization process (here we register drive characteristics, and create a “logical” drive that is seen by the operating system), and finally copy 100% of the data from the primary drive to the mirror drive. **No data on the primary drive is changed during this process.** After the initial mirroring is completed, you may never need to use the Utility again. However, some utilities offer additional services, such as drive monitoring, logging, remote notification and even automatic rebuild. These may continue to be utilized throughout the life of the product.

### Selecting From the Three Mirroring Methods

#### 1. From the Bootable DOS Floppy

Each DupliDisk3 product is shipped with a floppy diskette which contains a bootable DOS Operating System and the Dupli Raid Management Utility. (Arco licenses DR-DOS from Caldera.) The advantage to using the floppy-based version of the Raid Management 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, as long as their hardware is compatible with DOS.

#### 2. As A Task Under Windows 95/98/Me/XP/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. See Windows Software for additional details.

#### 3. As A Task Under Linux v2.2.18 and above

Users operating in one of the Linux operating environments may find it convenient to run mirroring as a task under Linux. The Linux version allows for the copying and rebuilding of drives in the background. See Linux Software for additional details.

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## 8 DOS Software

### Using The Dupli Raid Management Utility Program

#### Mirroring From the DOS Floppy Disk

*The Dupli Raid Management Utility cannot be run as a task (in a DOS window) under any version of Windows. It must be run from the DOS floppy disk.* (Please see **As a Task Under Windows 95/98/Me/XP/2000/NT** on page 16.) To simplify this process, Arco provides the Dupli Raid Management Utility in a bootable disk image on the master CD.

To create the bootable version for your operating system, Insert a blank diskette in drive A:. Open the DupliDisk application CD from within your operating system and select the appropriate build routine (Windows/Linux) for the diskette image. This will create the **Dupli Raid Management Utility** diskette.

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

When installing two DupliDisk3's type: **Dupli /D** and hit <ENTER>.

#### The Status Screen

A status screen similar to the one below will appear.

```
Dupli Raid Management Utility - DupliDisk3 (Bay)
Initialization Status
Primary Channel (Active For Reads)
  Master: Maxtor 6L020J1  hd(16) cyl(39813) spt(63) cap(19.1GB)
  Slave: Not Installed

Mirror Channel (Not Active For Reads)
  Master: Maxtor 6L020J1  hd(16) cyl(39813) spt(63) cap(19.1GB)
  Slave: Not Installed

Initialization Information
  Primary Master: Maxtor 6L020J1           Initialized
  Mirror Master: Maxtor 6L020J1           Initialized
  Master Drives are NOT in MIRROR mode

Checksum-C6E8  Firmware Rev-1.27.107  Serial Number 20020110003348
```

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## Command Line Options

Normally you can perform all tasks by running the “**dupli**” command, in special cases you may need to use one of the four command line options available to you by typing the following:

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

A:\>dupli /e = To force DupliDisk3 to interrogate enhanced IDE ports (i.e. Abit 4 port IDE motherboards)

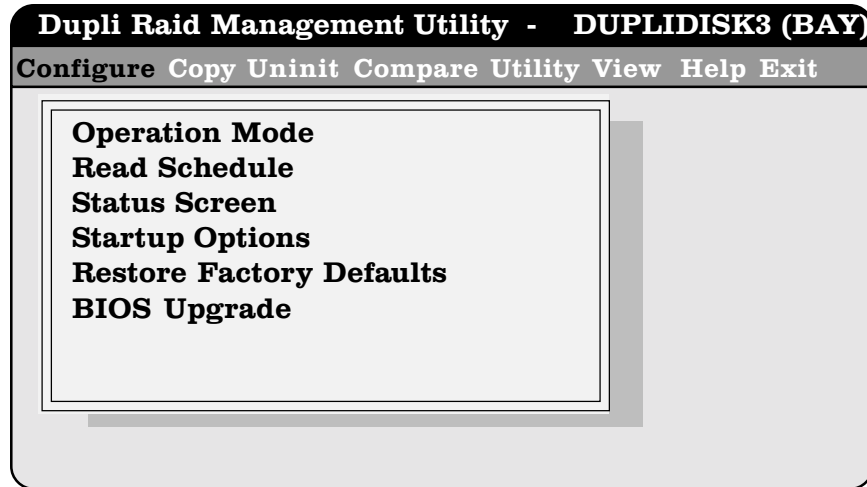
A:\>dupli /p = To force DupliDisk3 to interrogate enhanced IDE ports where the I/O address is known and not found when using the /e command from above.

A:\>dupli /d = To force DupliDisk3 to permit the use of two DupliDisk3 adapters in one system.

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## DOS Pull Down Menu Options

The following options are available from the Dupli Raid Management 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 Screen** 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 on Drive Failure
  - Beep after cold boot if drive failure is detected
  - Beep after cold boot if running in single mode
  - Time to turn buzzer off after cold boot
  - Master Drive Detection
  - Slave Drive Detection
  - Set Baud Rates
  - Ultra UDMA support
  - Multimode DMA support
  - UDMA Extended Cache

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- **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**
- UDMA: **66**
- Multimode: **2**
- Master Drive Detection: **ON**
- Slave Drive Detection: **ON**
- 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 DupliDisk3 BIOS for enhanced features, or additional drive support, download the BIOS upgrade from our download section to the DOS bootable programdisk.*

*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 DupliDisk3 BIOS.*

## 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 DupliDisk3 signals a drive failure. This option allows the user to restore a mirrored drive from

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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 DupliDisk3. Caution must be taken when removing the initialization buffer from a DupliDisk3 with existing data on it.

**NOTE:** *In cases where the drive geometry is different from the current standard (16hds / 63sec) and 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 Dupli Raid Management 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 Dupli Raid Management 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.
- **Read LBA** is designed for diagnostic purposes. To access the Read LBA option, you must load the Dupli Raid Management Utility with the /L parameter: **Dupli /L**

**System Information:** The contents of several internal files are written to the “dupli.inf” file on the floppy diskette. These are used for diagnostic purposes.

## View

- **DupliDisk Info** provides information about the DupliDisk3.
- **Drive Info** provides information about the installed drives.

---

## Help

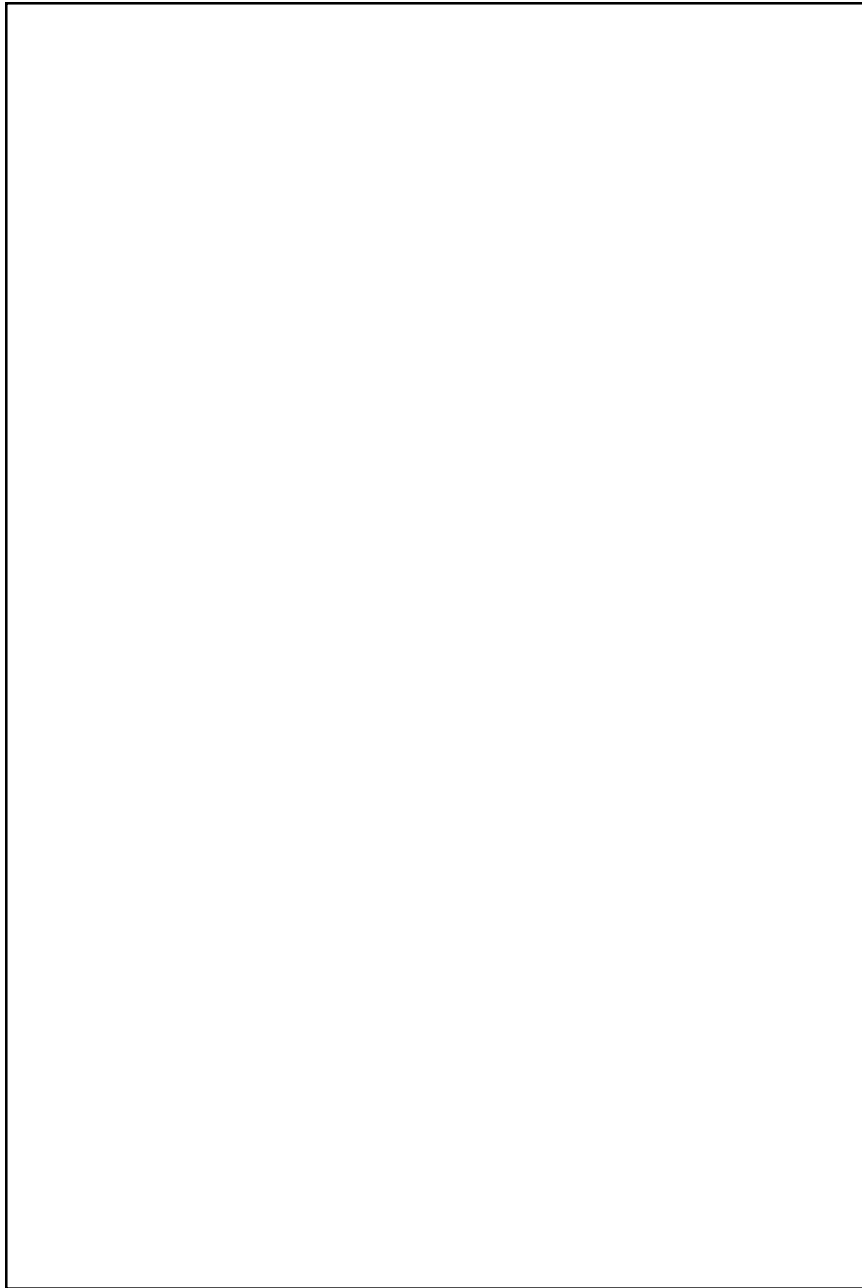
- Help files are not available from the Help pull down menu. For program help, hit <F1> from within any pull-down menu selection. For additional help, visit the Arco website at <http://www.arcoide.com>.
- **Company Information** for contacting Arco Computer Products is available from the Help Menu.

## Exit

Exit to the DOS prompt.

---

**Notes:**

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## 9 Windows Software

### The DupliDisk Raid Management Utility Program for Windows®

To run the **DupliDisk** Utility Program as a task under Windows 98/Me/XP/2000 and Windows NT, the DupliDisk Raid Management Utility Program must be installed from the Windows CD provided with your DupliDisk3.

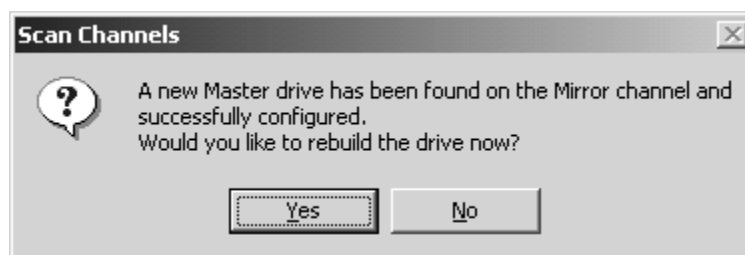
#### Software Installation and Setup

To install the **DupliDisk** Utility Program, insert the CD into CD-Rom drive and double click the My Computer icon on the Windows desktop. When the drive icons appear, double click on the appropriate drive icon. A list of files will appear. Double click on **Setup**.

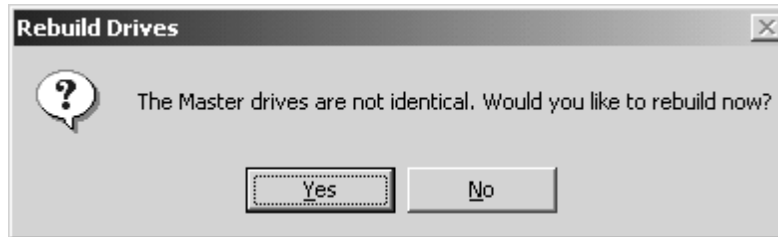
During the standard setup you may choose in which folder to install the **DupliDisk** program. If you choose the Start Menu, the **DupliDisk** Raid Management Utility will automatically run every time you start your system. This is useful if you are using one of the monitor functions. Otherwise, the **DupliDisk** icon will appear on your desktop, and the utility can be started by double clicking this icon.

Before running your **DupliDisk** Raid Management Utility, make sure your drive pair (Primary/Mirror) is properly installed, and that your drive with valid data is connected to the Primary channel. **This is important because the Utility will copy data from the Primary to the Mirror drive by default, thus destroying all previous data on the Mirror drive.**

If you have both drives installed, and have never mirrored the drives, the utility will automatically scan the channels and the following screen will appear:

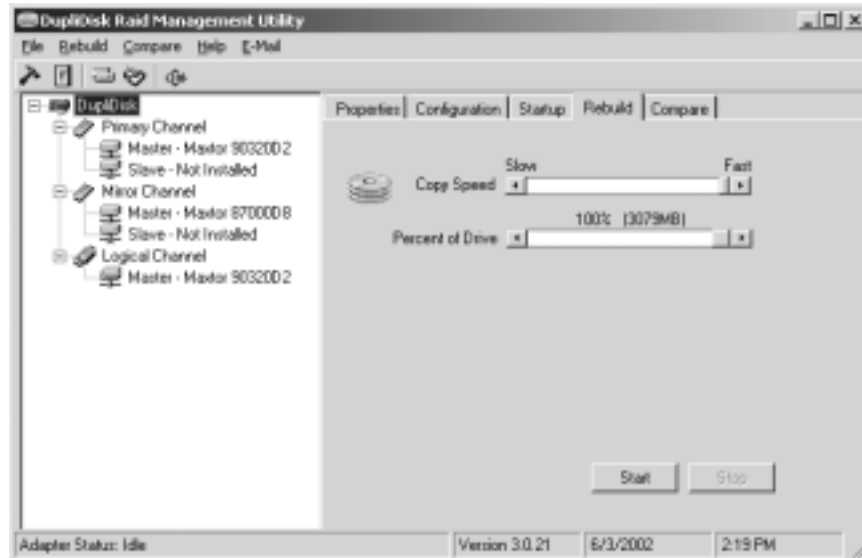


If you have already run the Utility, but performed a “Rebuild”, the following message will appear:



In either of the above cases, select “Yes” to start the rebuild (copy) process. Again, during this process, all data on the Primary Drive will be copied to the Mirrored drive. If you want to keep any data on the Mirrored drive, select “No” and proceed to back up the data.

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

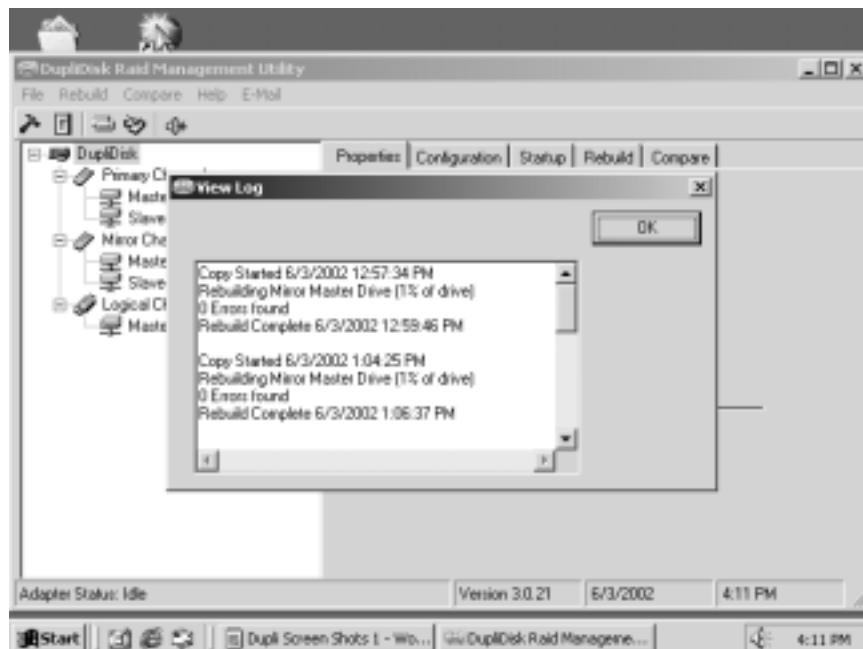


Click **Start** to begin the copy.

If the copy was successful, the following message will appear:



If rebuild was not completed successfully, you should check the log file, using the "View Log" tool, as follows:



## Windows Menu Options



### Properties Tab

Click on the Properties tab to view DupliDisk3 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.
- **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.

## Configuration Tab(cont.)

- **Monitor Time Interval** sets the frequency with which the **DupliDisk** Windows Raid Management Utility checks the status of newly inserted drives. A failed drive will be detected 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.

**Warning:** It is recommended that the Percent of Drive option be set to 100% to insure complete initial rebuild.

## Configuration Settings Screen



---

## Rebuild Tab

- Copy Speed
- Percent of Drive

## Compare Tab

- Compare Speed
- Percent of Drive

## Copy Speed

The Windows version of the **DupliDisk** Raid Management 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 **DupliDisk** Raid Management 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.

---

# 10 Linux Software

## The Duplinux Utility Program for Linux

This distribution CD contains all of the applications necessary for the DupliDisk3 when operating in a Linux environment.

### Duplinux

This is an interactive utility program that should be used for system configuration and initialization after first installing the DupliDisk3 hardware pair of drives. Run duplinux from the command line in terminal mode and follow the menu instructions. For users familiar with the DOS “Dupli” utility program, operation of the dupli will be very familiar, with the same functionality. Normally all you will need to start Raid 1 operation is run duplinux, choose “Copy” and wait for the initial mirroring operation to finish.

### Duplimon

This is a monitor program that checks DupliDisk status, and automatically forms a mirrored pair, if necessary. There is no visual user interface for this program, but it will write a log entry into the /root/arco.log file when significant events occur. These include looking for new drive, when starting to copy a drive, at intervals during drive copy, and when re-build is complete. Older log entries are eliminated so that total log size does not exceed about 1000 lines. The duplimon program should be used together with the duplshell program as described below.

### Duplshell

This is a script program that is called by the crontab (see below for crontab programming). It calls duplimon at every programmed click of the crontab interrupt. If duplimon is already running, it just indicates this event in the /root/arco.log and exits.

## Software Installation and Setup

- Copy The Files - Insert the CD into CD-Rom drive and copy all the applications you plan to use from the CD directory Linux/Applications/ to the /usr/bin/ directory on your system.
- Run the Duplinux Utility – From a command line in the terminal mode, just type “duplinux” and the screen will indicate your initial menu choices. To navigate through the menus, just key in your numerical choice and (enter). Choosing “0” will return to the previous menu, and exit the program from the top menu.
- If you will run the duplimon/duplshell, program The Crontab. Run “crontab -e” and edit the file. You must type i (insert) and program the minute, hour, day, month, day of the week, and file fields. For example, to run duplshell once every hour on the hour, just type:  
00 \* \* \* \* duplshell  
Hit “(esc):x” to save the file and crontab will automatically start running.

---

## Software Installation and Setup (cont.)

To program every minute, type: “00-59 \* \* \* \* duplshell”

To run every 5 minutes type: “\*/5 \* \* \* \* duplshell”

See man crontab for more details.

## Duplimon Options

Duplimon can be called with three command line options: *duplimon -option*

- (-1) - This reads the current status and the “status screen” to the /root/arco.log file.
- (-2) - This starts the rebuild mode. If drives are identical, the program writes to the log and exits. If drives are in mirror mode but not identical, the active drive is copied to the non-active drive. The rate is about 10-20 gBytes per hour. If not in mirror mode, the program scans for a compatible drive. If it does not find one, the program exits and waits for the next crontab call.
- (-9) - Terminates the program.

The duplshell program calls duplimon with the default (-2) and (-9) options.

## Operating System Requirements

In order to run the above programs the Linux operating system kernel must be configured for Task File Access via the IOCTL. This is available on patched versions of kernel 2.2.18 and above. Kernel patches are available from <http://www.kernel.org/pub/linux/kernel/people/hedrick/>. If you have any difficulty in obtaining this configuration, please contact ARCO Computer Products.

## Duplinux Operation

A simulation of duplinux operation can be seen by running the “duplinux.htm” file (found on your distribution CD) with your internet browser. This will show you the menu options and explains each function. For your reference, these are repeated below.

### Configure: Operation Modes

- **SINGLE MODE PRIMARY ONLY**  
Single PRIMARY mode will break the mirror and ALL system READ/Writes will be directed to ONLY the PRIMARY (The factory default) drive unless the operator changes the read schedule to the mirror drive.
- **SINGLE MODE MIRROR ONLY**  
Single MIRROR mode will break the mirror and ALL system READ/Writes will be directed to ONLY the drive set in the read schedule.
- **OPERATE IN MIRROR MODE**  
MIRROR mode will reset the mirror and ALL system READ will be directed to

---

- **OPERATE IN MIRROR MODE (CONT.)**

ONLY the PRIMARY, drive and ALL WRITES will be directed to BOTH drives.

## **Configure: Read Schedule**

- **PRIMARY DRIVE**

Setting the PRIMARY drive on the READ SCHEDULE will force ALL system READS to be directed to ONLY the PRIMARY drive. This is the factory DEFAULT setting for the DupliDisk.

The DupliDisk WRITES to both drives whenever the system goes to save or update data on the drives, however when the system, or O/S requires data FROM the drives, the DupliDisk will READ from the drive selected in the read schedule.

- **MIRROR DRIVE**

Setting the MIRROR drive on the READ SCHEDULE will force ALL system READS to be directed to ONLY the MIRROR drive.

NOTE: The DupliDisk reads data from only ONE of the drives in the mirrored pair, but all writes are directed to BOTH drives. See Read Schedule above for additional details.

## **Configure: Status Screen**

Displays the status summary of the DupliDisk:

- **GENERAL STATUS**

- Serial
- DupliDisk Type
- BIOSVersion
- Installed Port

- **MASTER DRIVES**

- Primary Master Details
- Mirror Master Details
- Primary Operational Mode
- Primary Operational Status
- Primary Slave Details
- Mirror Slave Details
- Slave Operational Mode
- Slave Operational Status

---

## Configure: Startup Options

- **BEEP CYCLE SETUP**
  - Disable
  - **Continuously** (5 sec - 4 min)
- **BEEP AFTER COLD BOOT IF DRIVE FAILURE DETECTED**
  - Enable
  - **Disable**
- **BEEP AFTER COLD BOOT IF RUNNING IN SINGLE MODE**
  - Enable
  - **Disable**
- **TURN BUZZER OFF AFTER COLD START**
  - Enable
  - **Disable**
- **IDLE MODE SUPPORT**
  - Enable
  - **Disable**
- **MASTER DRIVE DETECT**
  - Enable
  - **Disable**
- **SLAVE DRIVE DETECT**
  - Enable
  - **Disable**
- **BOOT SECTOR PROTECTION**
  - Enable
  - **Disable**
- **SET BAUD RATE**
  - **9600**
  - 19,200

*NOTE: Default selections are in bold.*

## Configure: Restore Factory Defaults

- **ALL SETTINGS**

All settings that were changed after the defaults were set at the factory will be restored.
- **CONFIGURATION SETTINGS**

Only settings that were set by the user will be restored to factory defaults.
- **STARTUP OPTIONS**

Only Startup settings that were set by the user will be restored to factory defaults.
- **RESTORE USER DEFAULT SETTINGS**

Restores a previously saved set of settings.

---

## Configure: Upgrade DupliDisk3 ROM BIOS

This option will “flash” upgrade the ROM BIOS on the DupliDisk3. ARCO supplies two to four files with each code revision. There will ALWAYS be a duplixxx.txt file, along with one to three additional code segments that are going to be upgraded.

To perform the upgrade you will need to have either a floppy, cdrom, or a directory on the hard drive with the appropriate files. We distribute the upgrades on floppy in their native .hex, and .txt format, but on the web they will be a .tar file.

After copying or downloading and uncompressing the files, simply run duplinux, and select the bios upgrade option. You will be prompted for a path to the files. We assume that basic device mounting procedures are understood by the user, but a short synopsis of the operation for cdrom follows.

```
mount /dev/cdrom /mnt/cdrom
```

```
cp /mnt/cdrom/bios/*.tar /usr/anyplace (anyplace = )
```

When duplinux asks for the path to the upgrade files you can either use the /mnt/cdrom/bios directory or the directory you copied the files to.

## Copy Drives

- **ACTIVE MASTER TO INACTIVE MASTER**  
This option copies the ACTIVE MASTER to the INACTIVE MASTER. The Active Master is the drive setup in the configuration settings that is active for system READS. See Read schedule above for more details on Read schedule.
- **ACTIVE SLAVE TO INACTIVE SLAVE**  
The DupliDisk supports two pairs of drives in mirror mode. If you have two pairs of drives in mirror mode, the ACTIVE drive (the PRIMARY channel by default) will copy its data to the inactive or mirror drive.
- **REBUILD DRIVE MARKED AS BAD**  
In the event of a drive failure, the DupliDisk will stop that drive from participating in read and write activity. When the drive is replaced, this option will allow you to rebuild the drive while the system is in operation.

---

## Compare Drives

- **COMPARE MASTER DRIVES**

This option compares the ACTIVE MASTER to the INACTIVE MASTER. The Active Master is the drive setup in the configuration settings that is active for system READS. See Read schedule above for more details on Read schedule.

Note: This option will ONLY compare the percentage of the drive set in the DupliDisk utilities.

- **COMPARE SLAVE DRIVES**

The DupliDisk supports two pairs of drives in mirror mode. If you have two pairs of drives in mirror mode, the ACTIVE drive (the PRIMARY channel by default) will copy its data to the inactive or mirror drive.

Note: This option will ONLY compare the percentage of the drive set in the DupliDisk utilities.

## DupliDisk Utilities

- **SET COPY / COMPARE SIZE**

This option sets the size that the DupliDisk will copy or compare. This option is useful if the user has a small partition on a large drive with data on it. In this event it is not necessary to copy the entire drive. The user is advised to ALWAYS copy 100% of the drive because some file allocation systems may fragment data, or drives with multiple operating systems cannot be copied fully with a small percentage of the drive copied.

- **CREATE USER DEFAULT SETTINGS**

The DupliDisk is setup with factory defaults for the large majority of systems where the user does not need an in depth understanding of the DupliDisk. There are however some situations where users will change options on the DupliDisk and need their customized version to be saved to rapidly restore the DupliDisk to their unique settings.

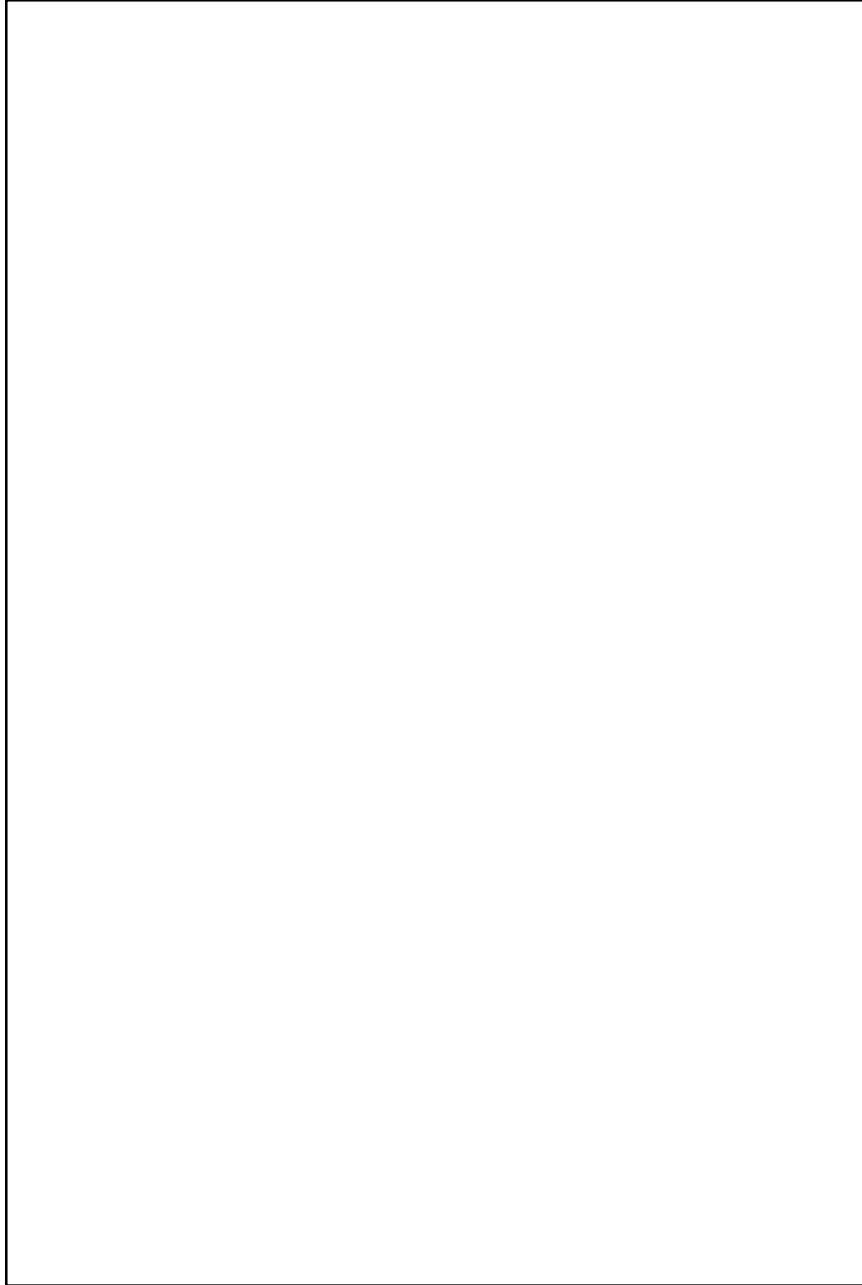
This option allows the user to save their setting to a file named factory.bin in the /root directory.

- **GET SYSTEM INFORMATION**

This option should only be used for diagnostic purposes. When selected a file named dupli.inf will be written to the /root directory. Dupli.inf records information about the DupliDisk, the drives, and other items unique to the system it is installed into. If users have a problem which is difficult to diagnose, technical support will ask that you Email this file to them for the Arco Engineering team to evaluate.

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**Notes:**

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# 10 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 DupliDisk3 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 DupliDisk3 is installed in the ability to READ the status of the DupliDisk3. The DupliDisk3 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. Other baud rates may be available on special order. You will require an applet written in your own operating system which sends a 55h from any serial port in your computer to the DupliDisk3's serial port via the cable wiring diagram below.

When the 55h is received, the DupliDisk3 will output a status byte with the following status bits to be decoded.

Cable Connections	
YOUR PORT	DupliDisk3 PORT
Pin 1 (GRND)	Pin 1 (GRND)
Pin 2 (Rx)	Pin 3 (Tx)
Pin 3 (Tx)	Pin 2 (Rx)

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

Your applet should be designed so that, if the response to the **55h** query indicates that the Dupli**Disk3** 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 Dupli**Disk3**-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.

---

## 12 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 DupliDisk3 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 applications and shut down. Turn off power to the computer.
- Turn on the computer and boot from the **Dupli Raid Management Utility Program** diskette and type: **Dupli**
- The **Dupli Raid Management Utility** program will identify the failed drive. Confirm the bad drive reported by the **Dupli Raid Management 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 **Dupli Raid Management Utility** program diskette.  
Type: **Dupli**

The **Dupli Raid Management Utility** program will then offer the following options:

### **REBUILD DRIVE ON PRIMARY CHANNEL**

Select **REBUILD** if you wish to remove the error message and have the **Dupli Raid Management Utility** program automatically initialize the replacement drive and perform the correct copy procedure.

---

## 13 Remote Notification

Under Windows the DupliDisk3 system provides the option of Remote Notification via email. When properly configured, this feature will provide email notification of the DupliDisk3 system status. Configuration can be setup to provide routine status checks at periodic intervals or to provide Only On Drive Failure alerts.

### Configuration and Setup

- 1 Choose E-Mail from the main application screen.
- 2 Enter the email addresses for the sender and receiver.
- 3 Enter the SMTP Host. (i.e. smtp.yourhost.com)
- 4 Choose the intervals that notification will take place.  
Options include:
  - Only On Drive Failure** - Email will be generated only if a drive failure occurs.
  - At Monitor Intervals** - Email will be generated at periodic

### E-Mail Setup Screen

Configure E-Mail

ARCO COMPUTER PRODUCTS LLC

E-Mail Configuration Setup

E-Mail Address To:

E-Mail Address From:

SMTP Host:

E-Mail Interval

Only After Drive Failure

At Monitor Intervals:

E-Mail Subject:

---

## 14 Troubleshooting

**Both drives appear on the DupliDisk Raid Management Utility status screen but your operating system displays only one drive.**

The mirror drive can only be seen by the DupliDisk Raid Management 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 DupliDisk Raid Management 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 DupliDisk3 but the system BIOS doesn't see any drives. Running the DupliDisk Raid Management Utility Program returns an "adapter not found" message.**

Make sure the DupliDisk3 is securely mounted and that the Host and power cables are properly connected. The DupliDisk3 should emit a beep and all of the LED's should indicate green when the system is powered up

**All you have done is to initialize the drives with the DupliDisk Raid Management 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 DupliDisk3 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 DupliDisk3.***

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

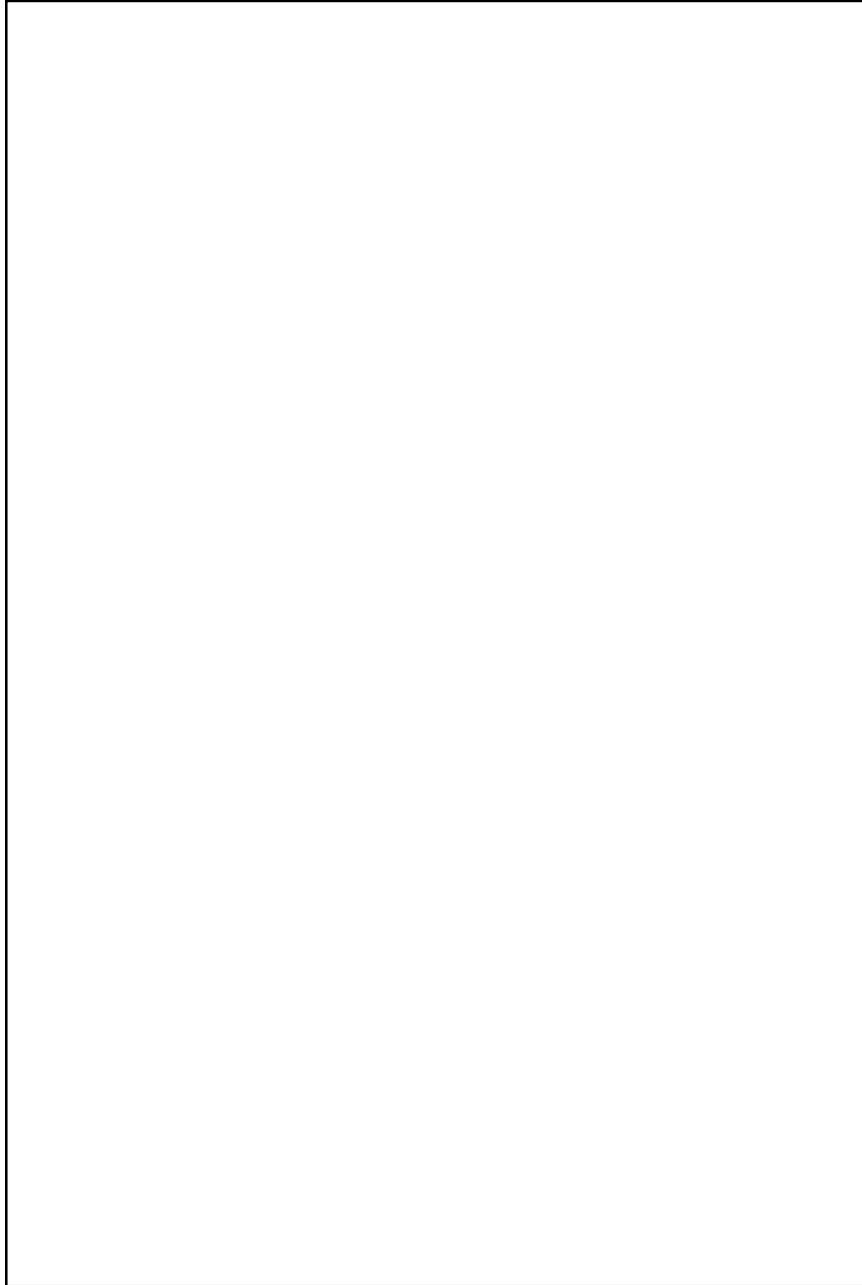
# 15 Specifications

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.	Internal Raid Solutions 10 to 50 degrees Celsius External Raid Solutions 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)					



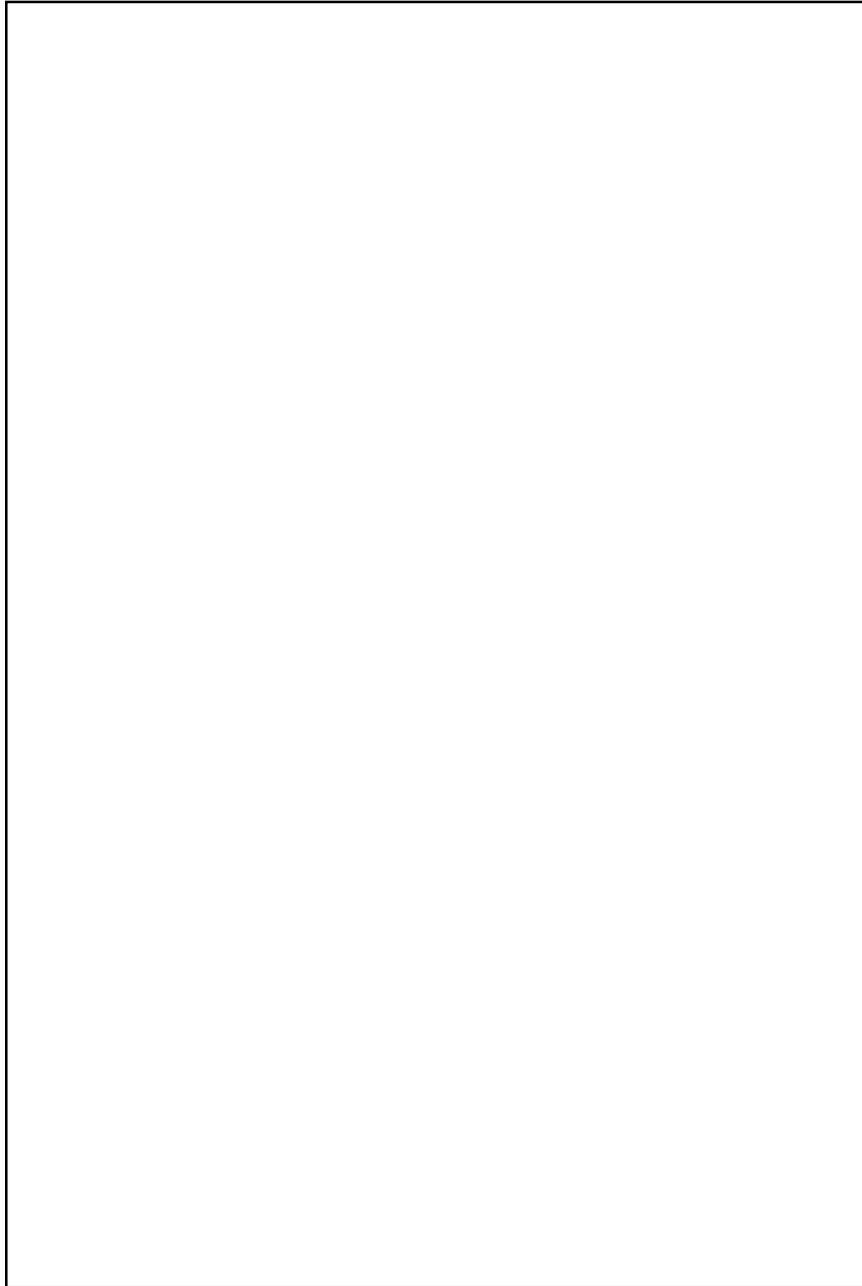
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**Notes:**

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**Notes:**





## 5 Year Limited Hardware 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 FIVE YEARS FROM THE DATE OF DELIVERY TO PURCHASER, WITH THE EXCEPTION OF HARD DISK DRIVES (HDD). ARCO WILL HONOR THE FIRST YEAR OF THE HDD WARRANTY PERIOD, AFTER WHICH TIME THE PURCHASER MUST CONTACT THE MANUFACTURER FOR ANY ADDITIONAL COVERAGE. THE HDD WARRANTY PERIOD BEGINS FROM THE DATE OF DELIVERY AND ARE SUBJECT TO THE SAME TERMS AND CONDITIONS AS FOLLOWS:

Arco Computer Products, LLC. ("ACP") warrants to the Purchaser that ACP's 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, ACP's liability for defective hardware is limited to repairing or replacing the hardware.**

During the warranty period, ACP 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 return the hardware to ACP or an authorized ACP distributor in an adequate container for shipping. The postage, shipping and insurance charges incurred in shipping to ACP will be paid by Purchaser and all risk for the hardware shall remain with Purchaser until such time as ACP takes receipt of the hardware. Upon receipt, ACP will promptly repair or replace the defective unit, and then return said unit to Purchaser, postage, shipping and insurance prepaid. ACP 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, or one (1) year whichever is greater.

This warranty is contingent upon proper use of the hardware by Purchaser and does not cover: 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 ACP, or tampering with or altering of the hardware.

ACP SHALL NOT BE LIABLE TO YOU FOR LOSS OF DATA, LOSS OF PROFITS, LOST SAVINGS, SPECIAL INCIDENTAL, CONSEQUENTIAL, INDIRECT OR OTHER SIMILAR DAMAGES ARISING FROM BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, OR OTHER LEGAL ACTION EVEN IF ACP 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 ACP. ACP's 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 express warranties, whether oral or written. The agents, employees, distributors, and dealers of ACP are not authorized to make modifications to this warranty, or additional warranties binding on ACP. Accordingly, additional statements such as dealer advertising or presentations, whether oral or written, do not constitute warranties by ACP and should not be relied upon.

**Returning the adapter to Arco Computer Products, LLC.:** Contact 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:

<b>Arco Computer Products, LLC.</b>	<b>Telephone:</b>	<b>954-925-2688</b>
<b>3100 North 29th Court, Second Floor</b>	<b>Facsimile:</b>	<b>954-925-2889</b>
<b>Hollywood, Florida 33020 U.S.A.</b>	<b>Tech Support:</b>	<b>954-925-7347</b>

**e-mail: [info@arcoide.com](mailto:info@arcoide.com)**

**<http://www.arcoide.com>**

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

**Document: ARC-02-60003-00**

**Part No.: 04-0103002-A**