

Chapter 3 Use

3.1 Basics

The IFT-6300 is designed to be an easy-to-use RAID disk array, requiring little maintenance or attention. This section describes the essential operating factors.

Indicators and Controls

The front panel of the IFT-6300 includes buttons for various functions and LEDs to provide information about the current operating status of the array and of each individual drive, and drive bay.

Buttons include mute and LCD controls (Menu/Exit, Up, Down, Enter).

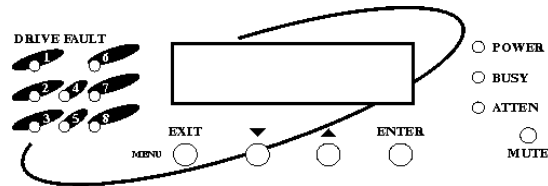


Figure 3-1 : Front Panel Buttons and LEDs

Buttons

- **Mute** – when the controller detects an error, regardless of severity, an alarm will sound. The mute button stops the alarm until the next error.
- **LCD Menu/Exit** – in most sub-menus, this button works like “back” on a web browser or backspace on a keyboard; it takes you up one level. This key is also used to enter the Main Menu from the start-up display.
- **LCD Up and Down** – navigating buttons which correspond with the arrow icon on the right hand side of the LCD.
- **LCD Enter** – from each LCD menu, pressing Enter either takes you one step deeper into the management controls or allows you to choose to confirm or deny an action. (More information is provided in *Chapter 4 : Controller*.)

LEDs

The front panel of the IFT-6300 provides LEDs to indicate various information about the status of the array and each drive/drive bay. Array LEDs consist of : Power, Busy, and Attention.

- **Power** – the power indicator is on whenever power is being supplied by either or both redundant power supplies.
- **Busy** – the busy LED lights when either the controller or a drive or drives are currently processing data and unable to respond to new requests (such as manual entries from the LCD panel).
- **Attention** – the attention LED comes on whenever the controller detects an error, particularly involving hardware such as the power supplies, fans, or hard drives.

Each drive bay also has three LEDs: Power, Activity, and Drive Fault.

- **Power** – the left-hand LED on each drive tray indicates that power is being supplied to the drive in the tray.
- **Activity** – the right-hand LED on each drive tray indicates when data is being transferred to the drive in the tray.
- **Drive Fault** – each drive bay has an indicator in an LED array at the top of the front panel to the left of the LCD which only comes on when the drive in that bay fails.

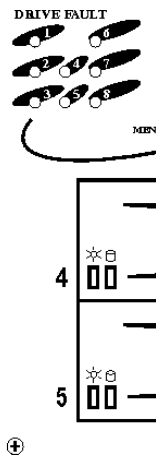


Figure 3-2 : Front Panel LEDs (only bays 4 and 5 shown)

Rear Panel

The rear panel of the unit includes data ports, a power connector, fan and power supply access and the unit power switch.

- **Power Switch** – the power button is the on/off switch for the RAID enclosure. Note that if data is still being transmitted, received, or written

to drives, there may be a delay when you press the power button to turn the unit off while data transactions are completed.

- **Power Supply Status LED** – Each power supply also has a status LED. The LEDs are in the center of the exposed end of the power supplies. When a power supply is operating normally, the LED will be green. If the power supply has experienced a failure, the LED will turn amber.

Alarm

The audible warning signal built into the IFT-6300 is a notification that there has been an error of some sort in the RAID array. Fatal errors are indicated by a single, continuous signal. During non-fatal errors and array rebuilds, the signal is a series of long tones interrupted by brief pauses.

Regardless of which type of tone, it indicates that something has occurred which needs user attention. To mute the alarm, in RAIDGuide, go to the Status window and click the Alarm button, or press the Mute button on the front of the unit.

RAID Access

Once the RAID array has been setup, it needs to be connected to a host computer. The host must have a SCSI or fibre host bus adapter (HBA), but otherwise the IFT-6300 can be used by a wide variety of hardware and OS configurations.

To connect the array (SCSI models) to a host HBA, use a shielded, round SCSI cable from either SCSI port at the back of the IFT-6300 enclosure to an external port of the SCSI HBA. (See *Section 2.1 Physical / Termination* for important SCSI-related information.)

For Fibre-to-IDE models, use an industry-standard copper cable with a DB-9 compatible connector on one end, or an optical cable with an MIA to connect to the IFT-6300 enclosure.

Once the array has been connected, you must reboot the host and then assign the RAID array a drive letter designation. Each OS has a different procedure for assigning drive letters to storage devices. Consult your particular OS's documentation and the documentation for your HBA for more information.

RAID Sharing (Network)

RAID sharing with IFT-6300 subsystems involves allowing more than just the host computer to store and retrieve data from the unit.

IMPORTANT!

The IFT-6300 can only have one host connected at a time. Sharing the array storage capacity is accomplished through the host OS and hardware, *not* through the IFT-6300.

Once a RAID array has been created and assigned a drive designation, it can be shared to a LAN or WAN using the same OS-dependent method as other host storage devices (e.g., "local" hard drives) are shared. Consult your OS documentation for information as to how to share storage devices.

Subsystem Cascading (SCSI)

The IFT-6300 includes two SCSI ports. The second SCSI port is for cascading to other SCSI devices (or must be terminated if there are no additional SCSI devices). The purpose of this is to allow multiple SCSI devices to share the same bus and thus the same host. To cascade another SCSI device, connect its SCSI cable to the available (currently terminated) SCSI port.

Operating Guidelines

Once the array is installed, running, and connected to a host computer, from a user point of view it generally functions as a large hard drive. There are only two operating factors to consider: drive failures and powering down.

Regardless of whether or not you have included a spare drive in your array, if a drive fails it should be replaced as soon as possible. Note that all drives in the array are hot-swappable, so as long as only one drive has a problem, it can be exchanged without powering down and without data loss (for RAID 3 and 5 configurations).

In general, RAID arrays are not intended to be regularly powered down. The best rule-of-thumb for powering down a RAID array is to always power the host computer down *first*. By the time the host is completely powered down, the RAID controller will have had time to finish writing and checking data and can be powered down.

3.2 RAIDGuide Manager

The IFT-6300 includes a variety of interfaces for controlling and monitoring the array. The RAIDGuide GUI management software provides the easiest, best way to monitor and manage your disk array.

NOTE:

We highly recommend using Auto RAID Setup via the LCD panel to create the array (see Section 2.3) and RAIDGuide GUI Manager to monitor and maintain it.

RAIDGuide allows you to control all of the firmware variables and see a real-time status report regarding array usage and any problems encountered. RAIDGuide uses a type of connection called In-band SCSI or In-band Fibre to connect with and control the disk array.

RAIDGuide functions include a running, real-time status display; RAID setup and expansion; controller-related items such as password setting and modification, and system maintenance; information displays for drive and controller specifications; and a system event log readout.

In-band Management

In-band SCSI and In-band Fibre are similar management data paths that allow a host computer to manage a RAID array without having any additional physical connection (aside from the data cable, either SCSI or Fibre). In-band data control paths are intended as superior replacements for RS-232 ports coupled by null modem cables. Once a SCSI or Fibre connection is made, In-band management is automatically available. No configuration is required.

Starting RAIDGuide

To start RAIDGuide and connect to your disk array, do the following:

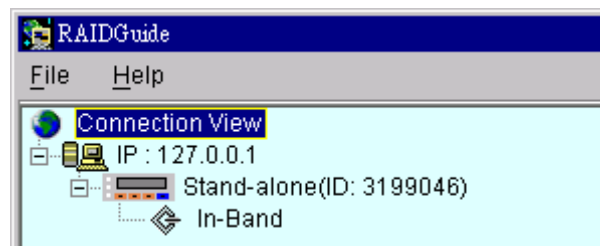
- Step 1 :** Once RAIDGuide has been installed on the host computer, a shortcut icon should have been added to the desktop. Double-click this icon to start the program.
- Step 2 :** Once the program starts, you will be prompted to enter an agent IP address. If you are working from the array host computer, click the **Local** button. Otherwise, enter the full IP address of the RAID host computer and click **OK**.



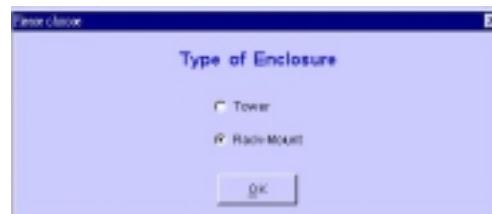
NOTE:

If you are unable to connect to a local RAID array and the host computer does not have a network (LAN) card installed, you will need to install MS Loopback Adapter if you want to use RAIDGuide on a Windows NT/2000 computer. See the end of *Section 2.4 Software* for details.

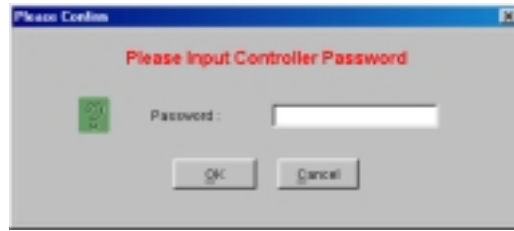
Step 3 : Click on the IP address icon of the host connected to the RAID you would like to manage. Then click on the controller icon displayed. Next double-click on the connection method icon (In-band).



Step 4 : You will now be prompted to choose the type of enclosure you are using. Choose Rackmount configuration and click **OK**.



Step 5 : You will now be prompted for a password. If a controller password has been set, enter it now and click **OK**. Otherwise, leave the entry blank and click **OK**.



Step 6 : You should now see the main RAIDGuide monitoring window.



Menu Items

RAIDGuide menus provide two choices: **File** and **Help**.

File has the following options: Connect, Disconnect, Agent and Exit.

- **Connect** – if RAIDGuide is running but not currently connected to an array, choosing this item will connect to the currently highlighted controller.
- **Disconnect** – once RAIDGuide is connected to a controller, choosing this item will disconnect without closing the program.

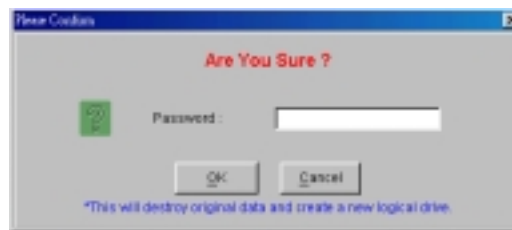
Main allows you to do an Auto RAID Setup, add a Spare drive, reconfigure the RAID level of the array, and it displays a simple representation of each RAID level (the right-hand graphic). Main also provides a simple description of the available RAID levels for the number of drives installed in the array (center pane of the window).

We recommend that you use the LCD panel on the array to do the initial RAID setup regardless of whether or not you use Auto RAID Setup or the Menu RAID Setup (manual method). If, at some later point you add drives and wish to change the RAID, you can use Auto RAID Setup from this RAIDGuide menu.

WARNING!

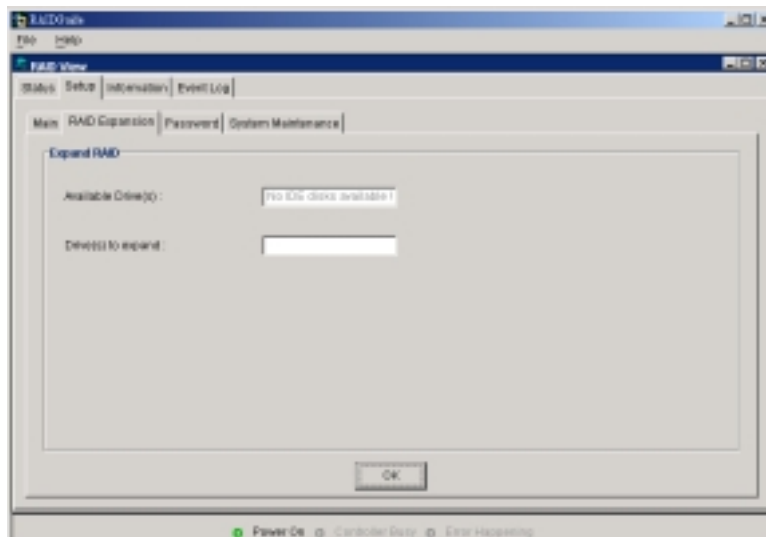
Using Auto RAID Setup will wipe out all information currently stored on the hard drives installed in the array.

To use Auto RAID Setup from **Setup / Main**, after you have physically modified the array, select **Auto RAID Setup** and click the OK button. You will be prompted to confirm using the controller password. Enter the password and click OK. The display will return to the **Status** window which will indicate the percentage of completed initialization.



If you want to expand your RAID, after installing a new drive or drives in the array, choose the **RAID Expansion** tab. Under the RAID Expansion window, the number of drives available for expansion will be displayed in the **Available Drive(s)** field. Enter the number of drives you would like to add in the **Drive(s) to expand** field and click OK.

You will be prompted to confirm using the controller password. Enter the password and click OK. The display will return to the **Status** window and indicate the percentage of initialization completed.

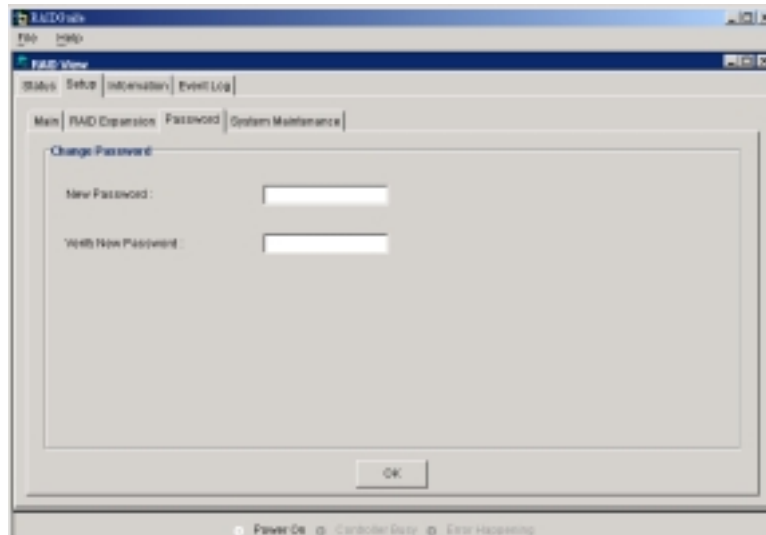


If you want to add a spare drive, or change your RAID configuration, select Spare Drive and or the new RAID level from the list on the right side of the window and click the **OK** button. You will be prompted to confirm using the controller password. Enter the password and click OK. The display will indicate the percentage of initialization completed.

NOTE:

The graphic on the right side of the **Setup** screen is a simple descriptive representation of the currently selected RAID level (not necessarily the current running RAID level). The representation is for information purposes only.

The **Password** window allows you to set and modify the controller password. To set a password or change the current password, enter the new password in the **New Password** field, press Tab and re-enter the new password in the **Verify New Password** field, then click the **OK** button.



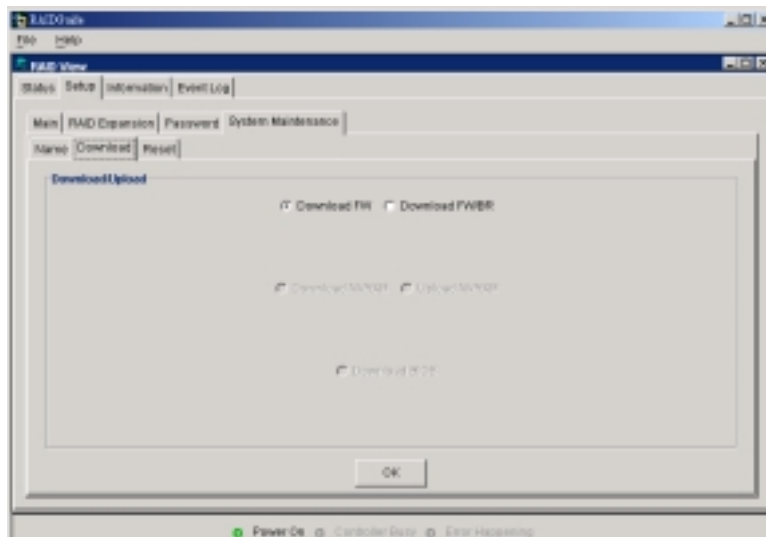
The **System Maintenance** window provides tools that relate to the RAID controller: **Name**, **Download**, and **Function**.

The **Name** sub-window lets you assign a name to the controller (and thus to the array it maintains). If the controller currently has a name, it will be listed in the **Current Name** field. To change the name or create a new one, enter the name in the **New Name** field and click the **OK** button.

The **Download** sub-window allows you to upgrade the controller firmware and bootrecord. Choose **Download Firmware** or **Download Firmware/Bootrecord**. Both functions will prompt for a file source.

WARNING!

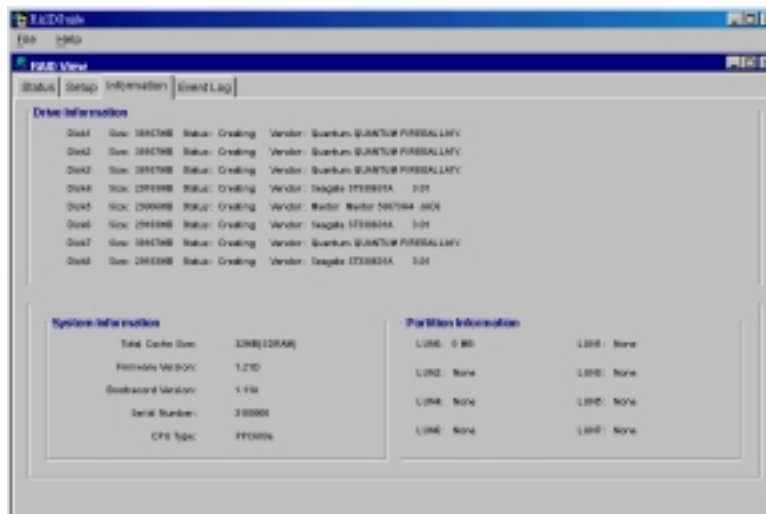
It is highly recommended that you contact your service representative before attempting any of the **Setup / Main / Download** functions, since failure to do them properly can result in serious damage to your RAID controller.



The **Function** sub-window allows you to reset the controller. To reset the controller, click the **Reset Controller** button. If you click the reset button, you will be prompted for a password to confirm.

Information

The **Information** window displays data about the installed drives and system data such as the cache size and firmware version. All items listed in this

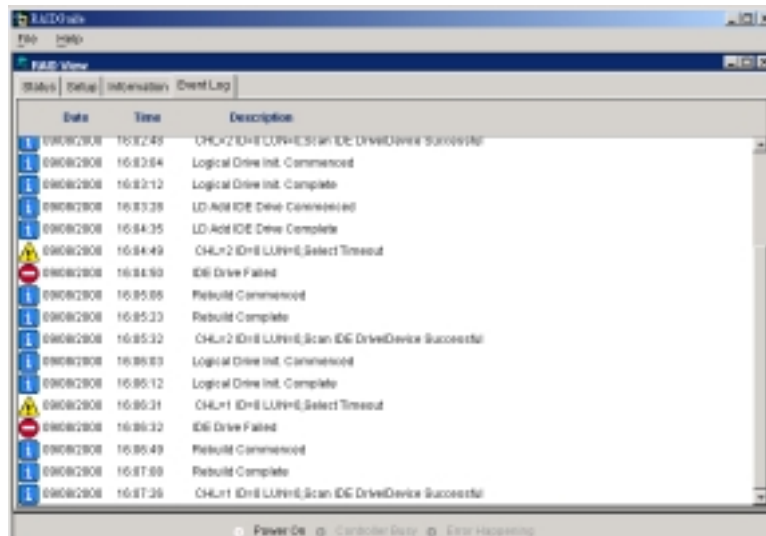


window are display only (that is, they cannot be modified). Drive information includes: size, current status in the array, and vendor data.

System information includes: cache size, firmware and bootrecord versions, controller serial number, and controller CPU.

Event Log

The **Event Log** window displays system events that have occurred while RAIDGuide was running since the last time the controller was powered on or reset.



	Date	Time	Description
1	09/08/2008	16:52:45	CHL2 ID#8 LU#H6,Scan IDE DriveDevice Successful
1	09/08/2008	16:52:54	Logical Drive Init. Commenced
1	09/08/2008	16:53:12	Logical Drive Init. Complete
1	09/08/2008	16:53:35	LD Add IDE Drive Commenced
1	09/08/2008	16:54:35	LD Add IDE Drive Complete
1	09/08/2008	16:54:49	CHL2 ID#8 LU#H6,Select Timeout
2	09/08/2008	16:54:50	IDE Drive Failed
1	09/08/2008	16:55:05	Rebuild Commenced
1	09/08/2008	16:55:23	Rebuild Complete
1	09/08/2008	16:55:32	CHL2 ID#8 LU#H6,Scan IDE DriveDevice Successful
1	09/08/2008	16:55:53	Logical Drive Init. Commenced
1	09/08/2008	16:55:12	Logical Drive Init. Complete
1	09/08/2008	16:55:31	CHL1 ID#8 LU#H6,Select Timeout
2	09/08/2008	16:55:32	IDE Drive Failed
1	09/08/2008	16:55:49	Rebuild Commenced
1	09/08/2008	16:57:00	Rebuild Complete
1	09/08/2008	16:57:26	CHL1 ID#8 LU#H6,Scan IDE DriveDevice Successful

3.3 Other Management Tools

RS-232

If your data volume is large, it may improve your throughput performance to use a null modem cable for array management. The IFT-6300 comes with a standard, 9-pin RS-232 serial port, which, using a null modem cable, can be connected to any COM port on a host computer for management purposes. The firmware-based terminal array management interface can manage the array through the RS-232 port.

The port's transmission settings have the following preset values and cannot be modified:

- Baud Rate: **38400bps**
- Parity: **No**
- Bits: **8**
- Stop Bits: **1**

In order to manage the array using the RS-232 port, use the included null modem port adapter and a serial cable (not included), connect the cable to the array RS-232 port and to the appropriate COM port on the management host, set the above values in your terminal software, and activate the software. This will give you access to the firmware-based management program.

The firmware-based management program is a standard VT-100 terminal accessible program which will automatically start if you connect your host computer to the array via the RS-232 port and start any VT-100 terminal program using the communications protocol settings listed above.

LCD Panel

The LCD panel provides both a current status readout and full access to all controller functions and settings. The entire array can be installed, monitored and maintained using only the LCD panel. For information on available options and using the LCD panel to manage the array, see Chapter 4.

3.4 Redundancy and Hot Swap

One of the hallmarks of a reliable RAID system is a high degree of built-in redundancy and the ability to swap failed elements out without powering down. The intended purpose is to create highly reliable, always-on data storage.

The IFT-6300 provides redundancy and hot-swap capabilities to all major components, including hard drives, fans, and power supplies.

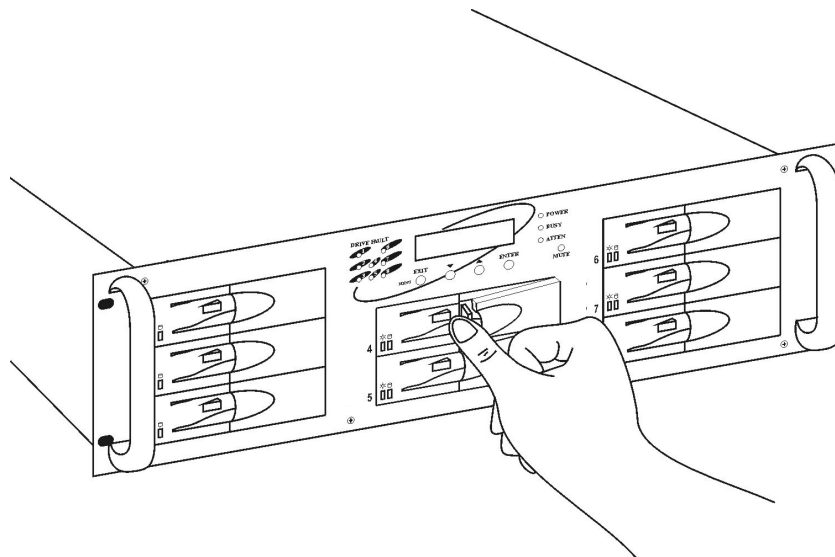
Hard Drive Hot Swap

All hard drives are hot swappable. With the exceptions of a single drive, or RAID 0 configuration, hard drive hot swapping is also a data-safe operation (i.e., no data will be lost if drives are hot swapped).

Step 1 : To remove a drive, press the tray latch button to release the catch, and pull the latch until the drive is fully released then gently slide the drive out.

Step 2 : Next, remove all four mounting screws.

Step 3 : Then flip the drive over and disconnect the power and data cables (as shown below).



Step 1

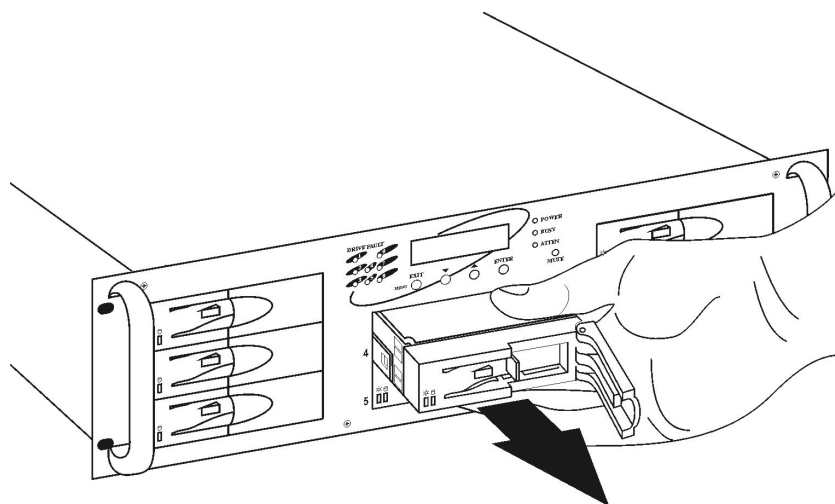


Figure 3-3 : Drive Removal – Step 1

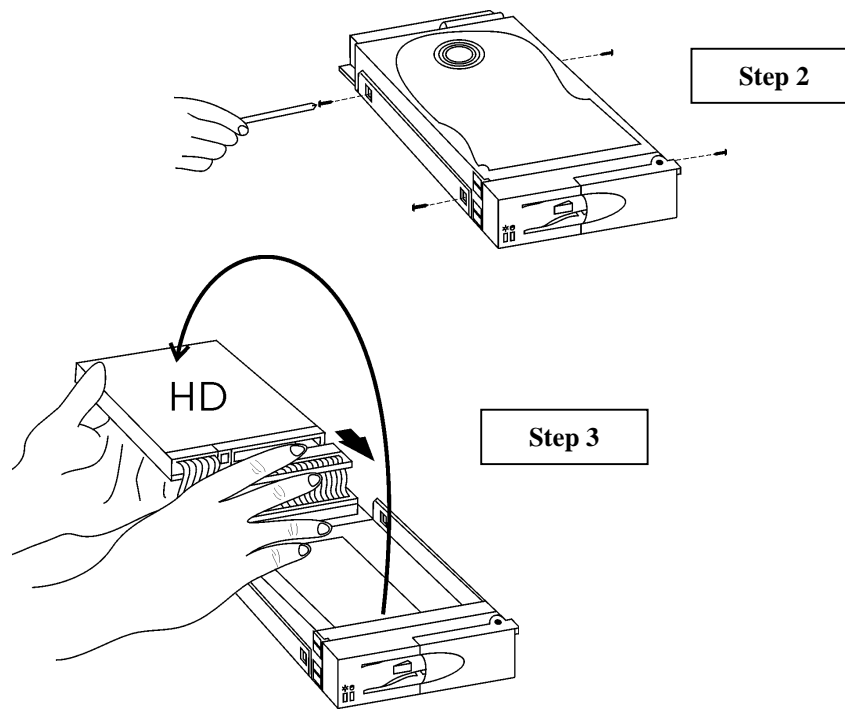


Figure 3-4 : Drive Removal – Steps 2 and 3

WARNING!

A failed drive will be indicated by a “X” mark on the LCD and by a lit red LED just to the left of the drive bay. **DO NOT** remove the wrong drive! Removing the wrong drive may result in complete data loss!

In the event of a hard drive failure in a RAID 1, 3, or 5 configuration, remove the failed drive (as shown above) and replace it with a new, similar capacity drive. After a delay, the array will automatically rebuild the configuration to include the new drive as either a replacement or as a new hot spare.

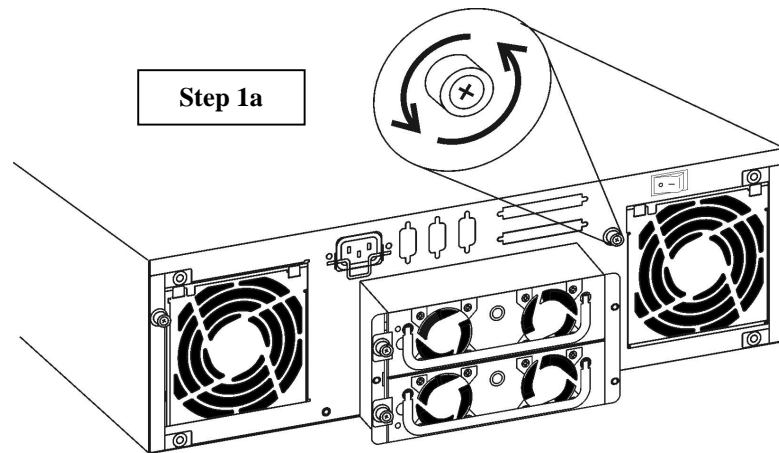
Redundant Fans

The IFT-6300 has two main enclosure cooling fans accessible from the rear panel. Both fans are necessary to maintain adequate airflow for enclosure cooling. Each fan is independently hot-swappable.

To maintain sufficient airflow through the enclosure, it is not recommended to operate the IFT-6300 for long periods of time with only one fan. A fan failure will be detected by the RAID controller, the failure will be recorded in the Event Log, the Attention LED will light, and the alarm buzzer will sound.

To remove a faulty fan and replace it, follow the procedure below (note that the entire process can be accomplished while power is still on):

- Step 1 :** Loosen the screw fastener on the correct fan housing. They are to the left of each fan. Open the housing by rotating it from left to right so that the connectors and fasteners for the fan are exposed.
- Step 2 :** Disconnect power from the faulty fan by unplugging the small power connector located rear-center of each fan.
- Step 3 :** There are plastic fasteners at each corner of the fan which must be removed before the fan can be taken out of the housing. Removing the fasteners requires first removing the central post of the fastener, followed by removing the rest of it (see figure). Repeat this for all four fasteners.
- Step 4 :** Now slide the fan out of the housing.
- Step 5 :** Put a new fan in the housing, being careful that the front (the side with a sticker) of the fan faces out and that the fan wire runs from the bottom of the left side.
- Step 6 :** Replace the fasteners (one piece at a time), reconnect power, swing the fan housing back into place, and tighten down the screw fasteners.



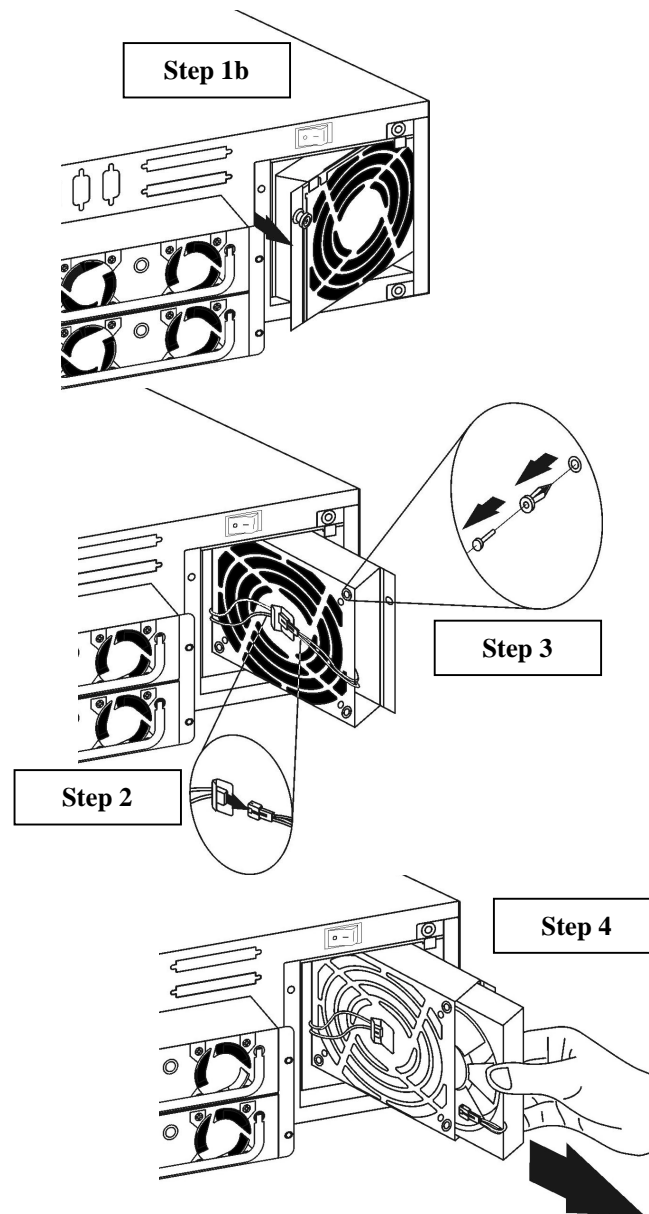


Figure 3-5 : Fan Swap

If you have a fan failure, we highly recommend that you contact your supplier and order a replacement.

Redundant Power Supplies

The IFT-6300 has two independent, redundant power supplies. Both power supplies receive current from the same power cable, and each supply is capable of providing all necessary power to the array and enclosure. Both power supplies provide power to the system when both are functioning.

If a power supply fails, the failure will be detected by the RAID controller, the failure will be recorded in the Event Log, the Attention LED will light, and the alarm will sound. Each power supply also has a status LED. The LED is green when the power supply is operating properly and turns amber if the power supply fails.

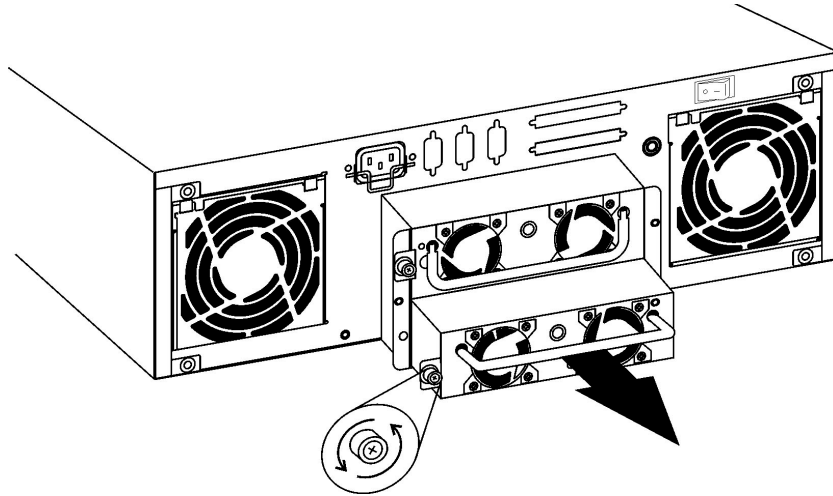


Figure 3-6 : Removing a Power Supply

To replace a failed power supply, turn the hand-screw counter-clockwise until the power supply is free, raise the handle on the failed unit, and gently pull the power supply out of the enclosure.

Before sliding a new power supply into the unoccupied bay, you must suspend data transmissions from the array host. In general, to do this requires pausing all services and software that may access the data on the array.

WARNING!

If data is still being sent and received when a new power supply is installed in the unit, it is possible you will encounter data errors.

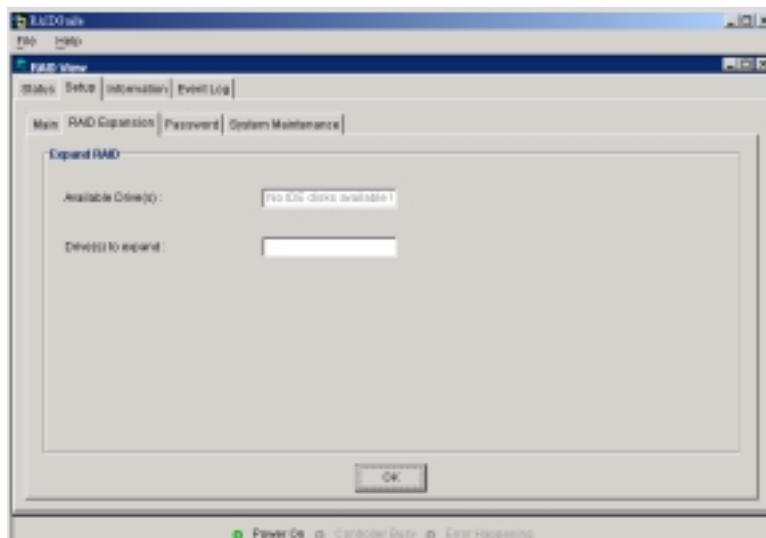
Once data I/O has been suspended by the host, a new power supply can then be gently slid into the unoccupied space. We recommend that you contact your supplier to acquire a replacement power supply to maintain the security provided by power supply redundancy.

3.5 Expansion

After a RAID has been created and operated for a time, it may be necessary to make it bigger. If you have left an open drive bay, it is possible to add a new drive to the array, and thus expand the total available storage space.

Follow the instructions in *Section 2.2 Hard Drives* to physically add drives to the array. The existing RAID configuration will be reinitialized and new drives will either be included (and listed) as spares or not yet identified.

To add the new drive to the array, start RAIDGuide and select **Setup / RAID Expansion**.



Note that RAID 1 expansion is not possible.

Note also that if the size (MB capacity) of the new drive is smaller than the already installed drives, the controller will not permit the expansion.

A new drive will be configured as a hot spare. (See *Section 3.2 RAIDGuide Manager / Setup* for more information.)

3.6 Spares and Rebuilds

Spares

The controller in the IFT-6300 permits you to include a hot-spare drive that will be used in the event of a drive failure. When a drive has been installed and configured in the array as a spare, any drive failure will cause an automatic rebuild of the array without data loss or any need for user management. (See *Section 3.2 RAIDGuide Manager / Setup* for information on adding a spare drive.)

Spare drives are indicated by a cross on the LCD display and are highlighted yellow in the RAIDGuide Status window.

Rebuilding

If your array has a drive failure without an installed spare, it will be necessary for you to remove the failed drive and install a new replacement.



Once you have replaced the failed drive, the array will automatically rebuild data onto the spare without data loss. The percentage of completion will be displayed in the RAIDGuide Status window and in the LCD display.

After the rebuild is complete, the array will return to normal functioning (and will again be capable of sustaining a drive failure without loss of function or data).