



## **Hardware User Guide**

### **Galaxy Qubex**

### **Storage Enclosure**



**[www.rorke.com](http://www.rorke.com)**

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## Preface

This User Guide describes the installation, configuration and operation of the following products:

- GQUB6-U4S
- GQUB6-FCS4

### ***Audience***

This User Guide is intended for use by the person installing and/or operating the Qubex storage enclosure. For details about the host system, refer to the documentation supplied with the host system

### ***Conventions Used In This User Guide***

The following conventions are used throughout this User Guide.

**A WARNING means beware. There is a risk of electric shock or personal injury. Before working on the enclosure, be aware of the hazards that exist.**

**A CAUTION means take care. There is a risk of causing damage to the equipment or of losing data.**

**A NOTE gives general information, such as helpful tips and references to related information.**



## Chapter 1 – Introduction

Thank you for purchasing your Rorke Qubex System. Designed for speed, reliability, compatibility and performance. The Rorke Qubex System is easy to install, providing an outstanding and versatile solution to meet all your data storage requirements. This user guide covers both the SCSI (GQUB6-U4S) and the Fibre Channel (GQUB6-FCS4) products.

### Part numbers

Qubex is available in Fibre Channel or SCSI versions with dual powers supplies. Each of the top level part numbers are shown in the table below:

GQUB6-U4S/D	Six Bay U320 Host-SATA II Drive interface, dual power supply
GQUB6-FCS4/D	Six Bay dual 4 gigabit Fibre Channel Host-SATA II Drive interface, dual power supply

This User Guide presumes that you are familiar with standard computer operations including managing and organizing files and folders. If you are unfamiliar with these operations, please consult your computers User Guide.

### Features and Benefits

Rorke Qubex RAID Series offers an extremely versatile and low cost solution, perfect for any End-User environment where high performance, problem free mass storage is required, including:

- Back-up storage.
- Direct Attached Storage – High-speed local storage device for dedicated workstations.
- Server Attached Storage – High-speed storage device attached to your server.

Features include:

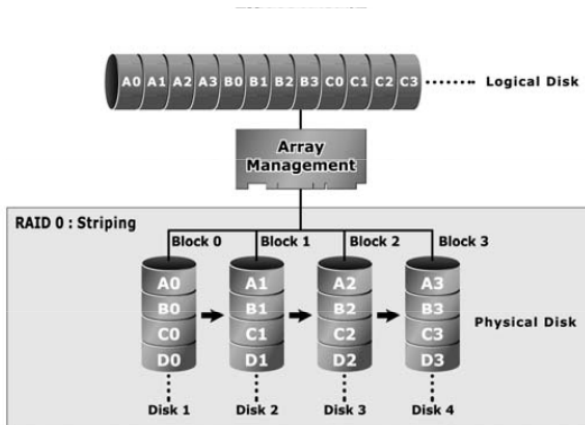
- RAID levels 0, 1, 0+1, 3, 5, 6 or JBOD
- RAID set migration
- Dual 4Gbit Fibre Channel or U320 SCSI interface
- Up to 6 SATA II hot-swap hard drives
- Push button LCD panel for easy setup and configuration
- WEB based RAID management via onboard Ethernet
- Whisper quiet fan
- O/S independent and transparent
- Optimized for high performance, content creation

### Understanding RAID

RAID is an acronym for Redundant Array of Independent Disks. A RAID system consists of an array of multiple independent hard disk drives that provide high performance and fault tolerance. The RAID controller implements several levels of the Berkeley RAID technology. An appropriate RAID level is selected when the volume sets are defined or created. This decision is based on disk capacity, data availability (fault tolerance or redundancy) and disk performance.

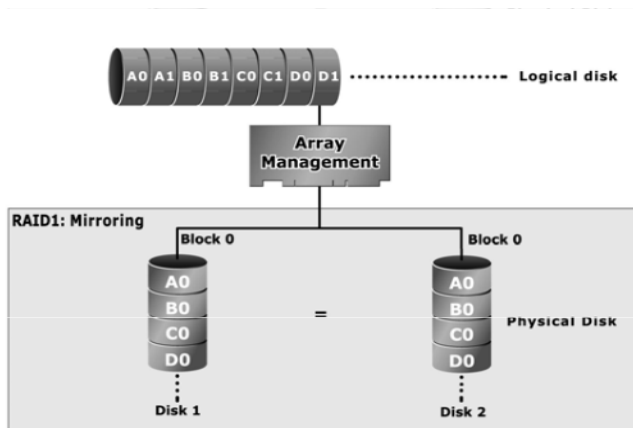
The RAID controller makes the RAID implementation and the disks physical configuration transparent to the host operating system. This means that the host operating system drivers and software utilities are not affected, regardless of the RAID level selected. Correct installation of the disk array and the controller requires a proper understanding of RAID technology and the concepts.

## RAID 0



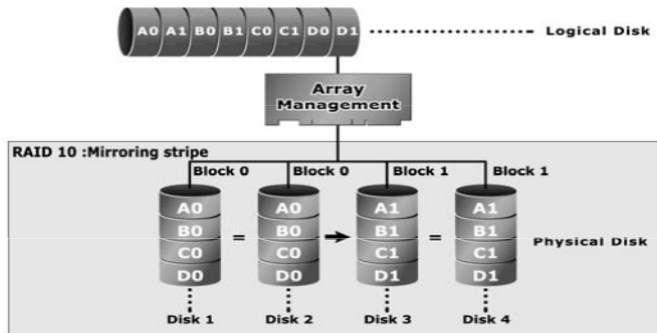
RAID 0, also referred to as striping, writes stripes of data across multiple disk drives. RAID 0 does not provide any data redundancy, but does offer the best high-speed data throughput. RAID 0 breaks up data into smaller blocks and then writes a block to each drive in the array. Disk striping enhances performance because multiple drives are accessed simultaneously; but the reliability of RAID Level 0 is less than any of its member disk drives due to its lack of redundancy.

## RAID 1



RAID 1 also known as “disk mirroring”, means that data written to one disk drive is simultaneously written to a second disk drive. Read performance may be enhanced if the array controller can simultaneously access both members of a mirrored pair. During writes, there will however, be a minor performance penalty when compared to writing to a single disk as two writes must occur (one to each disk drive). If one drive fails, all data (and software applications) is preserved on the other drive. RAID 1 offers extremely high data reliability, but at the cost of doubling the required data storage capacity.

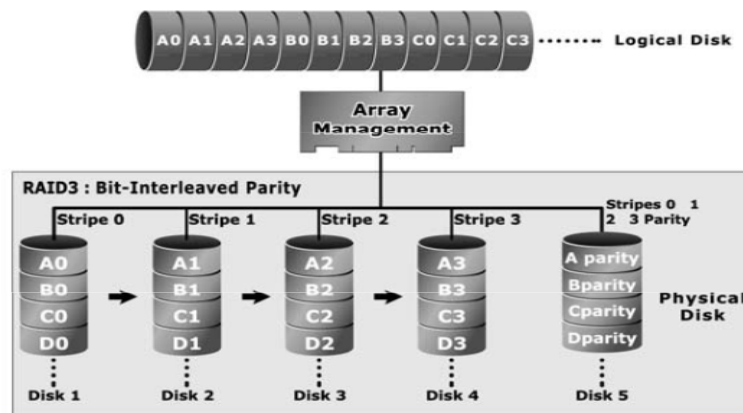
## RAID 0+1



RAID 0+1 is a combination of RAID 0 and RAID 1, combining striping with disk mirroring. RAID Level 0+1 combines the fast performance of Level 0 with the data redundancy of Level 1. In this configuration, data is distributed across several disk drives, similar to Level 0, which are then duplicated to another set of drives for data protection.

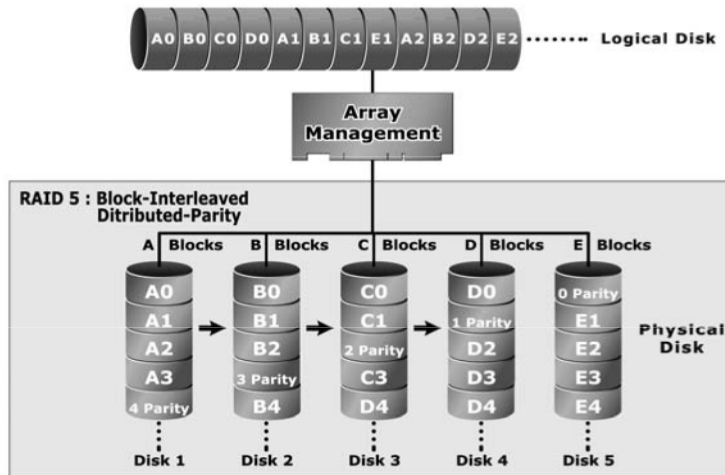
## RAID 3

RAID 3 provides disk striping and data redundancy through the use of a dedicated parity drive. RAID 3 breaks up data into smaller blocks, calculates parity by performing an exclusive-or operation on the blocks, and then writes the blocks to all but one drive in the array. The parity data created during the exclusive-or operation is then written to the remaining drive in the array. If a drive fails, data on the failed drive can be recovered using the information on the parity drive. RAID 3 is a good choice for applications that require very fast data transfer rates or large data transfers.



## RAID 5

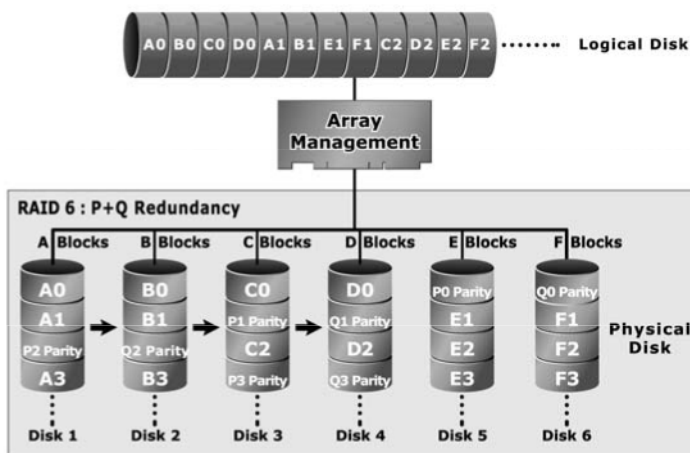
In RAID 5, the parity information is written to all of the drives in the array rather than being concentrated on a dedicated parity disk. If one drive in the array fails, the parity information can be used to reconstruct the missing data from that drive. All drives in the array can read and write data at the same time, greatly increasing the performance of the RAID system.



## RAID 6

RAID 6 extends a RAID 5 array by using dual distributed parity. Data and parity is striped at block level across all member drives, just like in RAID 5. However, two sets of parity are calculated and written across all the drives. When a disk fails, the data is recovered from the remaining disks. RAID 6 provides the ultimate level of fault tolerance and can sustain two simultaneous drive failures without downtime or data loss.

RAID 6 offers a good solution for mission-critical data.



## Chapter 2 – Initial Setup and Installation

This Chapter describes the installation and set up of the Qubex Series storage enclosure. Important safety details are described along with the environmental and electrical precautions that must be taken. The location of components within the enclosure is also shown.

**Please read this chapter carefully before attempting to install or operate the Qubex.**

### Safety Statements

The following safety requirements must be understood before you install or operate the Qubex.

**Warning: Disconnect all power supply inlets before opening the Qubex series storage enclosure for maintenance.**

**Caution: Do not place the enclosure on an uneven or unstable work surface.**

**Caution: Do not place or drop objects onto the enclosure and do not force any foreign objects into it.**

**Caution: Do not expose the Qubex series storage enclosure to extreme temperatures (below 5 °C or above 30 °C) or to direct sunlight.**

**Caution: Allow disk drives and power supplies to reach ambient room temperature before applying power to the enclosure.**

### Unpacking

When you receive the Qubex, visually inspect the exterior of the packaging for any signs of damage. If any damage is found, you should inform your distributor. Once the packaging is opened, the contents should be checked against the enclosed Packing List. If any items are missing or damaged you should contact your distributor immediately.

**CAUTION: Allow disk drives and power supplies to reach room ambient temperature before applying power to the enclosure.**

### Environmental Considerations

This section outlines the environmental factors that must be considered when choosing a suitable location to install the Qubex series storage enclosure.

#### Temperature

The operating temperature of the Qubex storage enclosure is between 5°C and 30°C. However, it is not recommended that the enclosure be continuously run at these extreme temperatures. Consideration should therefore be given to ensure that the room ambient temperature is compatible with these specifications.

### Air Flow

To ensure that internal heat build up is properly dissipated into the surrounding environment, the Qubex enclosure should be positioned such that no air vents are blocked or obstructed in any way. Failure to ensure this can lead to heat build up in the enclosure and damage to the components.

### Electrical Considerations

You must ensure that the required current does not exceed the rating of the power source. This includes cabling, power distribution units, filters and any other devices through which the main current flows. Surge currents must be catered for. Disk drives may consume twice the amount of current at start-up time as they do during steady state operation.

### Installing a Disk Drive

**Warning: Disconnect the power supply inlets before opening the Qubex series storage enclosure for maintenance.**

**Caution: Do not place or drop objects onto the enclosure and do not force any foreign objects into it.**

**Caution: Allow disk drives and power supplies to reach ambient room temperature before applying power to the enclosure.**

To install a Disk Drive in the Qubex storage enclosure, follow the procedure below:

1. Orient the Disk Drive carrier so that the LED indicator is at the bottom.
2. With the locking lever fully open, gently slide the Disk Drive carrier into the desired slot on the front of the enclosure.
3. When the Disk Drive carrier is in all the way, slowly close the locking lever until it 'clicks' into place.

### Locating Components

The Qubex family uses external 180W power supplies which plug into the rear of the unit. The following pictures show where the components are located within the enclosures.

### Front View of Qubex



The above drawing shows the front view of the Qubex with the door opened. Behind the door are the 6 hot swappable drive caddies.

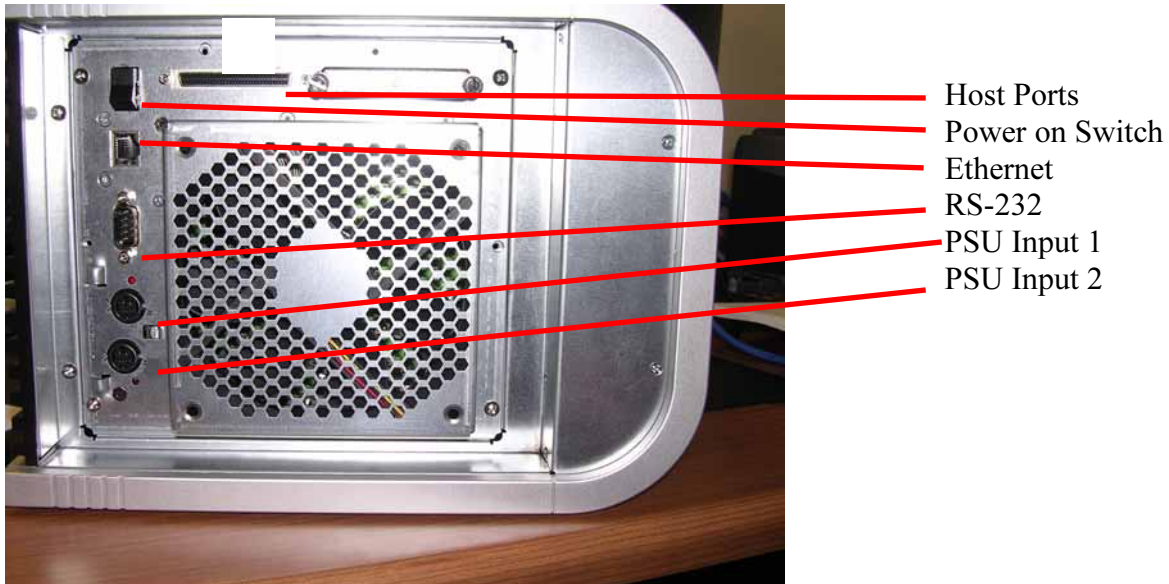
### ***RAID Controller LED Definitions***

The controller LEDs are located to the right of the LCD panel, their definitions are as follows:

- Top LED is the Power LED.
- Middle LED is the Busy LED
- Bottom LED is the Fault LED.

### **Rear View of GQUB6-U4S**

. The rear connector points of the SCSI unit are show in the following diagram.

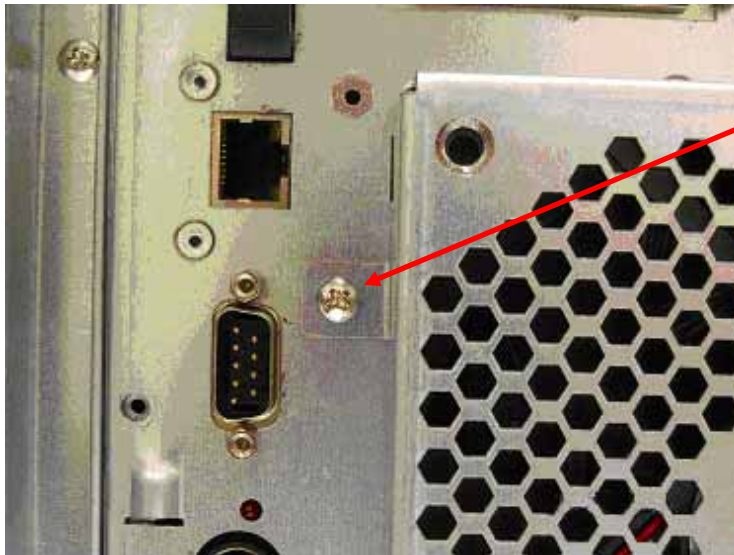


The GQUB6-FCS4 is similar except that there are Fibre Channel host ports rather than SCSI.

## **FRU replacement**

### ***Cooling Fan***

The low noise fan is easily removed by unscrewing the single retaining screw shown in the diagram below and then sliding up the fan assembly and pulling it outwards whilst detaching the fan power connector at the bottom of the backplane.

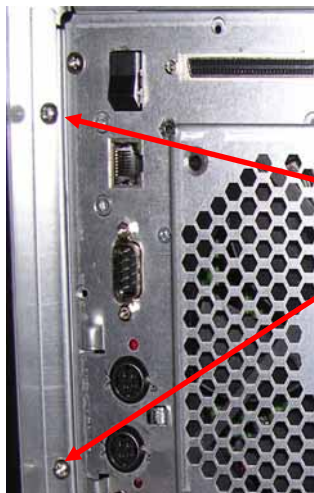


Fan Retaining Screw

### ***RAID Controller***

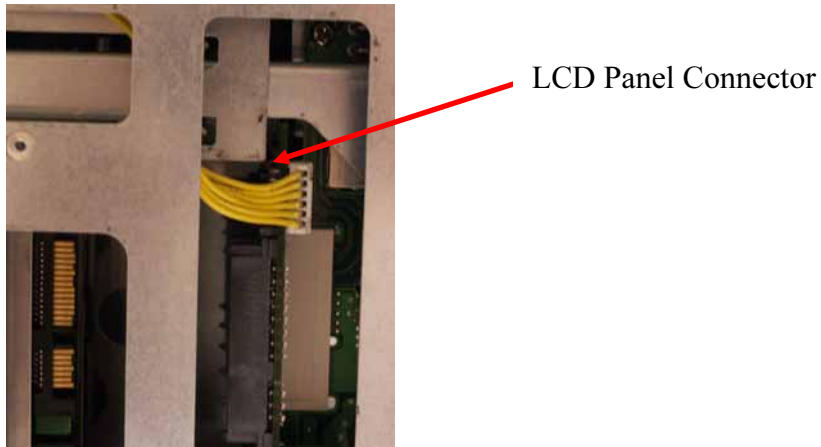
To gain access to the RAID controller it is necessary to remove the backplate assembly. The RAID controller is mounted horizontally above the drive bays and is attached to the rear panel. To remove the controller follow the steps outlined below:

1. Remove drives from backplane.
2. Remove the black plastic side panel by removing the two screws at the left (as viewed from the rear) and slide it out.

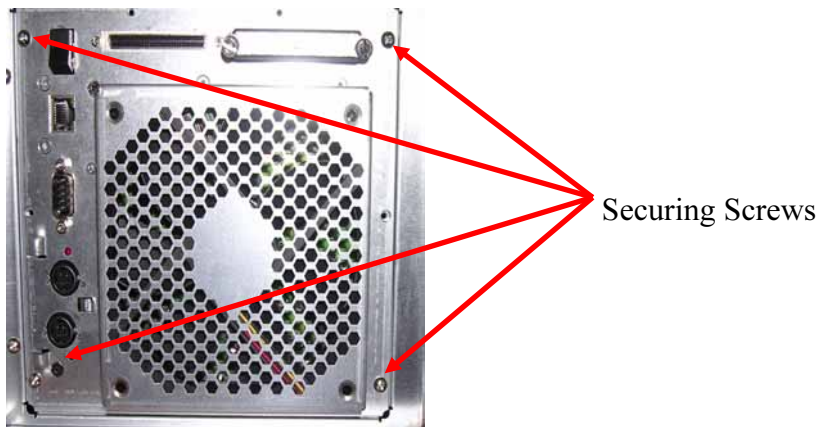


Securing Screws

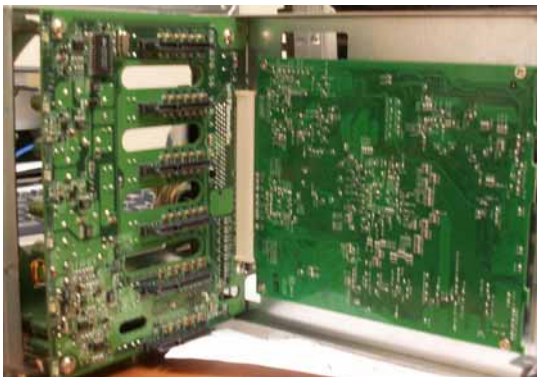
3. Unclip the LCD panel connector from the backplane



4. Remove the four securing screws and remove the assembly

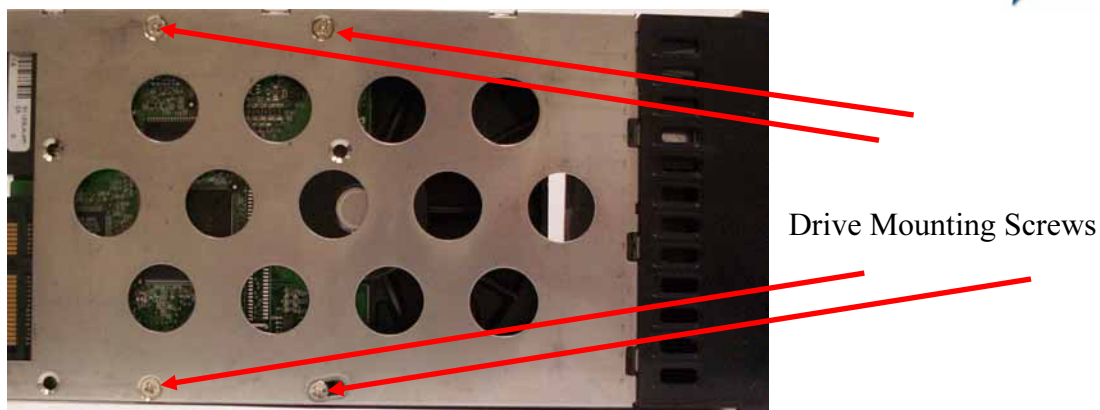


5. Detach the controller from the assembly by removing the four mounting screws.



### ***Drive Carrier***

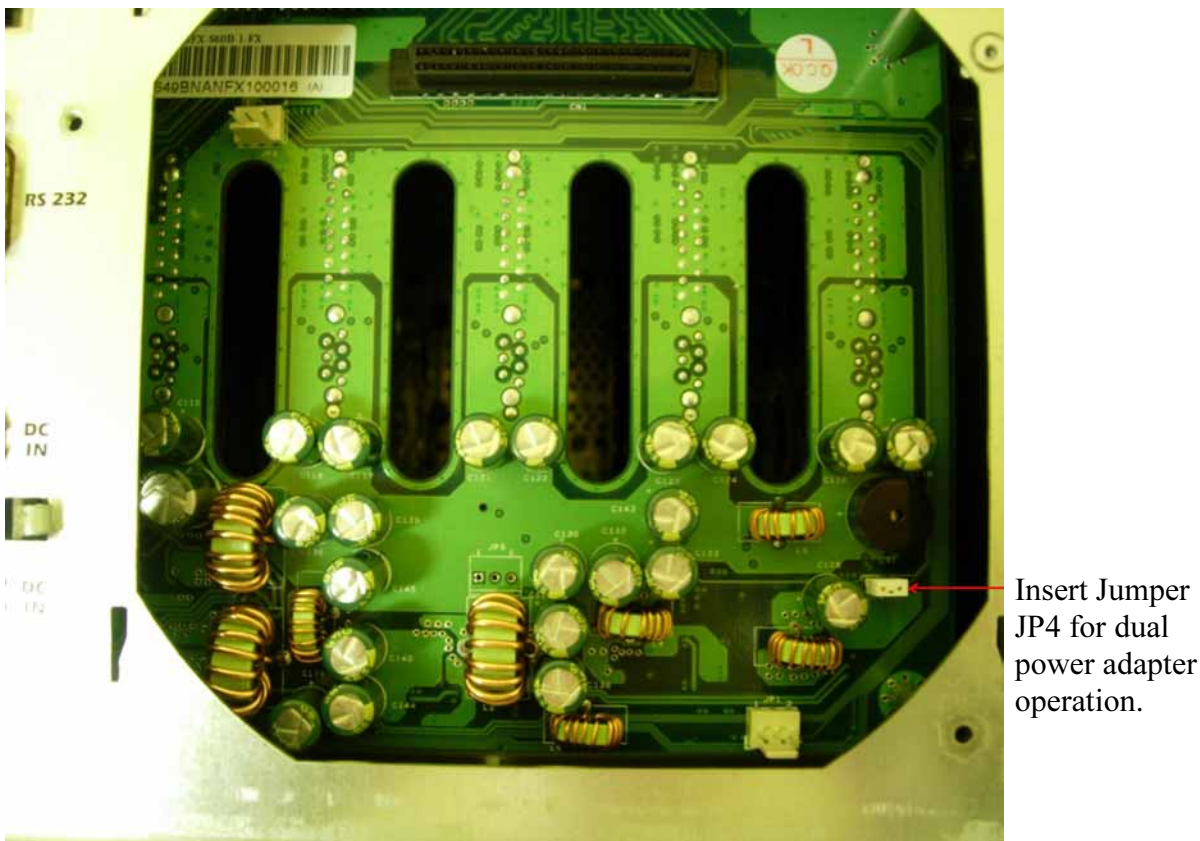
The drives are mounted in purpose designed caddies. The caddies are designed for hot swap operation with a damping handle and EMI shielding. Status information is conveyed via light pipe. Removal of the drive carrier is achieved by pressing on the upper part of the handle.



The drives are mounted from the underside of the drive caddy by the four screws shown in the diagram above.

### ***Power Supplies***

The Qubex System uses a single external power supply by default. When dual power supplies are used the system has a jumper plug to allow correct environmental monitoring. The jumper is JP4 which is located behind the cooling assembly and is shown in the diagram below:



### **Chapter 3 – Initial Configuration**

This Chapter describes how to install the hardware and how to connect to and access the RAID Controller.

#### **Attaching the SCSI Cables to GQUB6-U4S**

There are two SCSI ports on the rear of the GQUB6-U4S enclosure. Attach the SCSI cable (or 2 cables if required) to the SCSI ports.

**NOTE: If only one SCSI cable is connected to the enclosure, you must install a SCSI terminator.**

#### **Attaching the Fibre Channel Cables to GQUB6-FCS4**

There are two Fibre channel SFP Ports on the rear of the GQUB6-FCS4 enclosure at the rear of the unit. Insert the SFP adapters and then attach the FC cabling to these ports.

#### **Accessing the RAID Controller**

Following the hardware installation, the RAID subsystem disk drives must be configured and the volume sets initialized, before they are ready to use. This is carried out using one of the following methods:

- VT100 terminal connected through the RAID subsystem serial port.
- Firmware-embedded TCP/IP & web browser-based RAID manager via the 10/100 Ethernet LAN port.

The embedded RAID manager provides complete control and management of the RAID subsystem, eliminating the need for additional hardware or software.

**NOTE: The RAID subsystem must only be accessed through one method at a time.**

#### **VT100 terminal (via serial port)**

The serial port located at the rear of the unit can be used in VT100 mode. The interface cable provided connects the RS232 port to a PC. The embedded RAID management interface can access the array through the RS-232 port. You can attach a VT-100 compatible terminal or a PC running a VT-100 terminal emulation program to the serial port to access the text-based Set-up Menu.

#### **RAID subsystem RS-232C Port Configuration**

To ensure proper communications between the RAID subsystem and VT-100 Terminal Emulation program, use the following communication settings:



<b>Connection</b>	<b>Null-modem cable</b>
<b>Baud Rate</b>	<b>115,200</b>
<b>Data bits</b>	<b>8</b>
<b>Stop</b>	<b>1</b>
<b>Flow Control</b>	<b>None</b>

By connecting a VT100 terminal, or a PC operating in an equivalent terminal emulation mode, all RAID subsystem monitoring, configuration and administration functions can be carried out.

There is a wide variety of Terminal Emulation packages available, such as `Hyperterm`. Open the Terminal Emulator of your choice and configure the Settings of the Terminal port as shown in the Terminal Requirements table above.

When the VT100 Terminal set-up is complete, you can press the " X " key (on your Terminal) to link the RAID subsystem and Terminal together. The disk array Monitor Utility screen is displayed on your VT100 Terminal.

Please refer to the SmartGUI user guide to continue with the configuration of the Qubex using the VT-100 terminal software.

## Web browser-based RAID manager

Firmware-embedded web browser RAID manager is a HTTP-based application, which utilizes the browser installed on your operating system. The Ethernet LAN port (see Chapter 2 for location of components) can be used to configure the subsystem without any additional software or drivers.

You can manage the RAID subsystem remotely without adding any user specific software (platform independent) via standard web browsers connected directly to the 10/100 Ethernet RJ45 LAN port.

To configure the RAID subsystem on a local or remote machine, you need to know its IP Address. The default IP address is detailed on the Product Documentation and Quality Sheet provided with the unit.

**To launch the TCP/IP & Web Browser-based RAID manager, enter:**

`http://[IP Address]`

**NOTE: You must be logged-in as administrator with local admin rights on the workstation to remotely configure RAID subsystem. The user name and password are case sensitive. The default values are:**

User Name: "admin"  
Password: "0000"

## Web browser-based RAID manager via HTTP Proxy

The browser based RAID manager can be accessed via a HTTP Proxy. The Rorke Qubex RAID System comes with proxy software for Windows based host systems.

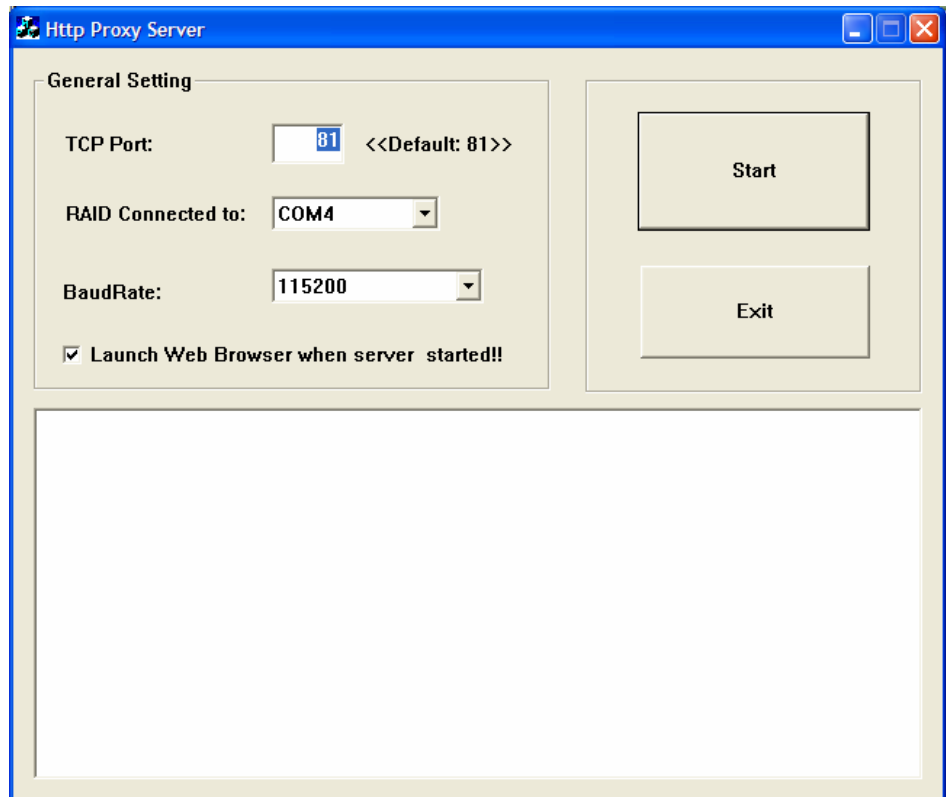
To run the proxy software, double click on the executing file **archhttp.exe**. The Archhttp dialog box appears. This allows a HTTP session to be established via the serial port. Connect the supplied serial cable to an unused com port on the server and enter the com port number in the dialog shown in the diagram below.

The Parameters for the General Setting are:

- TCP Port value = 1 ~ 65535.
- RAID Connected to value = 1 ~ 10 where 1 is for COM1, 2 for COM2 and so on...
- BaudRate value = {2400, 4800, 9600, 19200, 38400, 57600, 115200}

**NOTE: The RAID controller default baud rate is 115200.**

When the program starts running, the following window appears:

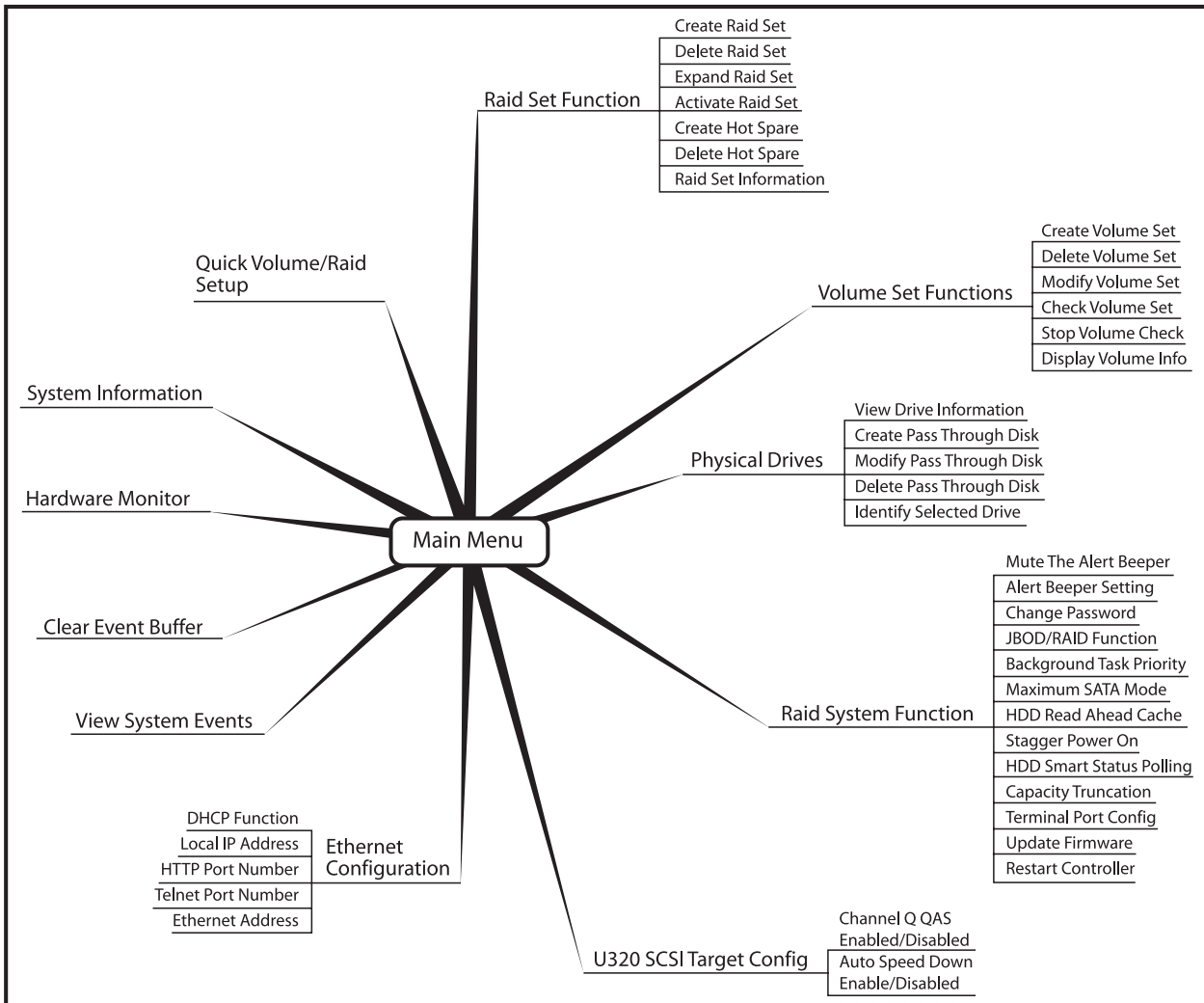


To start the ArchHttp Proxy Server web-browser management, click **Start**.

Type the User Name and Password when prompted. The RAID controller default User Name is **"admin"** and the Password is **"0000"**. After entering user name and password, press **Enter** to start-up the Http Proxy Server. The RAID Management software is now accessible.

## Configuration Menu Tree<sup>1</sup>

The following diagram details the menu structure of the RAID manager, which can be accessed via the RS-232 serial port and Ethernet LAN port.



**NOTE: Alert by Email Configuration can only be set in the web-based configuration**

## Front Panel Operation

The system can also be configured from the front panel display. It is recommended that detailed configuration is performed using normal keyboard or mouse input rather than through the front panel, however the display is useful for setting up IP addresses prior to more involved configuration and reading status information. Interaction with the keypad is achieved by using the four buttons shown in the following diagram:

<sup>1</sup> Note the firmware tree may vary slightly with different firmware releases.



The four buttons are designated as follows:

**Enter** – Selects a menu option

**Esc** – Backs up a level

↓ - Moves forward to next field

↑ - Moves backward to next field

The button correspondence is as shown in the diagram below:



The default password is “0000” which may be entered through the panel.

## **Appendix A**

### ***Troubleshooting***

Q. I have created a 2.5 TB LUN and my Operating System does not recognize the full capacity.

A. Ensure that your Operating System supports volumes sizes greater than 2 TB. This is achieved by using 16 bit SCSI Command Descriptor Blocks. If the Operating System does not support this (versions of Windows prior to WIN2K3 Service Pack 1) then you have the ability to use 4K block sizes rather than 512 bytes to overcome this limitation. Note that dynamic disk support is not available when using non standard block sizes.

These options are presented to the user when volumes greater than 2TB are initially configured.

Q. My Operating system does not recognize the newly created volume.

A. Verify that the HBA drives are correctly loaded, if the HBA supports BIOS recognition, check to see if the volume is recognized at the BIOS level. Ensure that the volume is correctly mapped to the appropriate host channel (refer to configuration guide).

Q. My Fibre Channel Qubex system is not operating correctly at 4 gigabit speeds.

A. An issue has been found during testing of the Qubex where if the Qubex is in Auto Negotiate mode it may not be able to synchronize to a 4Gb HBA that is also using Auto Negotiate. This is due to an incompatibility between various manufacturers' methods of implementing 4Gb Auto Negotiation. The solution to this issue is to hard set the Qubex for 4Gb operation and Loop Topology. Refer to the configuration guide for information on setting the FC host speed.

## **Appendix B**

### **Technical Specifications**

#### **System**

Maximum supported number of disk drives:	6 SATA II HDD's
Supported RAID levels:	JBOD, 0, 1, 0+1, 3, 5, 6
Host Bus Interface:	Dual 4GBit Fibre Channel or Ultra-320 SCSI
Current Maximum supported HDD capacity:	500 Gbyte
System setup and management:	RS-232, Web-browser and SNMP
System Alarms/Alerts:	Audible alarm, LEDs, RS-232, Web-browser, Email and SNMP traps
Power supplies:	Single or Dual redundant power adapters

#### **Physical Dimensions**

Height:	21cm (8.26 inches)
Width:	28.5cm (11.22 inches)
Depth:	30.5cm (12 Inches)
Weight:	16kg (35.3lbs) maximum including two power adapters and six disk drives

#### **Power Supply**

AC Input Voltage:	100V-240V
Input Frequency:	50-60Hz
DC output:	20VDC at 9Amps
Peak output Power:	180 Watts.

#### **Temperature**

Operating Temperature:	5°C to 30°C
Non-operating Temperature:	-40°C to +65°C
Maximum rate of Temperature change	20°C per hour

#### **Humidity**

Relative operating humidity:	10% to 80%, non-condensing
Non-operating humidity:	10% to 95%, non-condensing

#### **Altitude**

Operating Altitude:	-61m to 3,048m (-200ft. to 10,000ft)
Non-operating Altitude:	-61m to 12,000m (-200ft. to 39,370ft)