Synergy Global Technology Inc

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RAU 141

4 Disk FireWire / USB 2.0 / eSATA RAID System

User Manual

Version 1.0 (March 2007)

Important Safeguards

Please read all of these instructions carefully before you use the device. Save this manual for future reference.

What the warranty does not cover

■ Any product, on which the serial number has been defaced, modified or removed.

■ Damage, deterioration or malfunction resulting from:

    ☐ Accident, misuse, neglect, fire, water, lightning, or other acts of nature, unauthorized product modification, or failure to follow instructions supplied with the product.

    ☐ Repair or attempted repair by anyone not authorized by us.

    ☐ Any damage of the product due to shipment.

    ☐ Removal or installation of the product.

    ☐ Causes external to the product, such as electric power fluctuation or failure.

    ☐ Use of supplies or parts not meeting our specifications.

    ☐ Normal wear and tear.

    ☐ Any other causes which does not relate to a product defect.

■ Removal, installation, and set-up service charges.

Regulatory Notice

Legal Information

First English printing, October 2002
Information in this document has been carefully checked for accuracy; however, no guarantee is given to the correctness of the contents. The information in this document is subject to change without notice. We are not liable for any injury or loss that results from the use of this equipment.

Safety Instructions

■ Unplug equipment before cleaning. Don't use liquid or spray detergent; use a moist cloth.

■ Keep equipment away from excessive humidity and heat. Preferably, keep it in an air-conditioned environment with temperatures not exceeding 40º Celsius (104º Fahrenheit).

■ When installing, place the equipment on a sturdy, level surface to prevent it from accidentally falling and causing damage to other equipment or injury to persons nearby.

■ When the drawer is in an open position, do not cover, block or in any way obstruct the gap between it and the power supply. Proper air convection is necessary to keep it from overheating.

■ Arrange the equipment's power cord in such a way that others won't trip or fall over it.

■ If you are using a power cord that didn't ship with the equipment, ensure that it is rated for the voltage and current labeled on the equipment's electrical ratings label. The voltage rating on the cord should be higher than the one listed on the equipment's ratings label.

■ Observe all precautions and warnings attached to the equipment.

■ If you don't intend on using the equipment for a long time, disconnect it from the power outlet to prevent being damaged by transient over-voltage.

■ Keep all liquids away from the equipment to minimize the risk of accidental spillage. Liquid spilled on to the power supply or on other hardware may cause damage, fire or electrical shock.

■ Only qualified service personnel should open the chassis. Opening it yourself could damage the equipment and invalidate its warranty.

■ If any part of the equipment becomes damaged or stops functioning, have it checked by qualified service personnel.

Regulatory Notices Federal Communications Commission (FCC)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
Any changes or modifications made to this equipment may void the user's authority to operate this equipment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

■ Re-position or relocate the receiving antenna.

■ Increase the separation between the equipment and receiver.

■ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Preface

About this Manual

Thank you for using **Synergy Global Technology Inc.**products; if you have any question, please e-mail to **"sales@rackmountmart.com"**. We will answer your question as soon as possible.

This manual is designed and written for users of the **RAU 141**. Users should ideally be familiar and have some experience with RAID planning and data storage operations. However, this manual will provide instructions and education for those who have little or no experience in RAID to install and setup the **RAU 141**.

Notice

Product features and specifications described in this manual are subject to change without notice.

The manufacturer shall not be liable for any damage, or for the loss of information resulting from the performance or use of the information contained herein.

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Table of Contents

Chapter 1 Product Overview

1.1 Overview

The **RAU 141** is a 4 disk RAID System provides RAID 0 (striping), RAID 10 (Striping and mirroring) and RAID 5 (striping with parity) for you to construct a disk array optimized for performance and/or reliability. There are four types of interfaces provided for Host connection.

- FireWire 400
- FireWire 800
- USB 2.0
- eSATA

Front view

Power LED   Access LED

Tray Release

Rear view

FW400   FW800   Mini USB   eSATA

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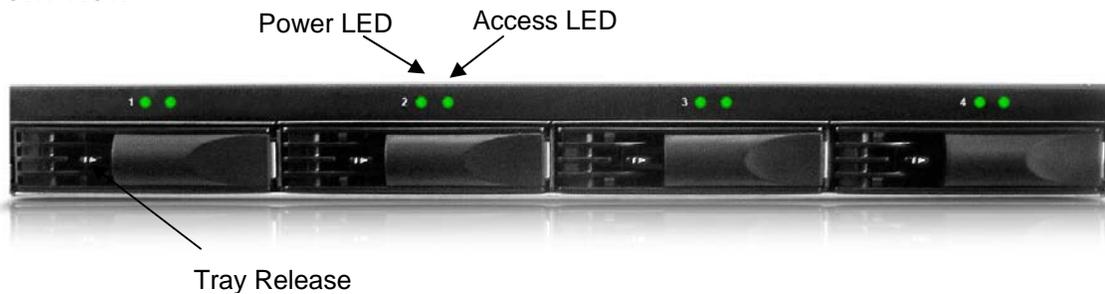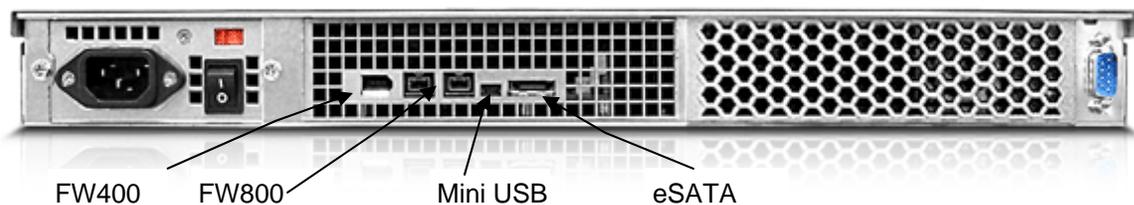
1.2 System Structure

RAU 141 composes of a RAID controller, a selector for RAID level configuration, power supply, fan, I/O interface board and all internal cables.

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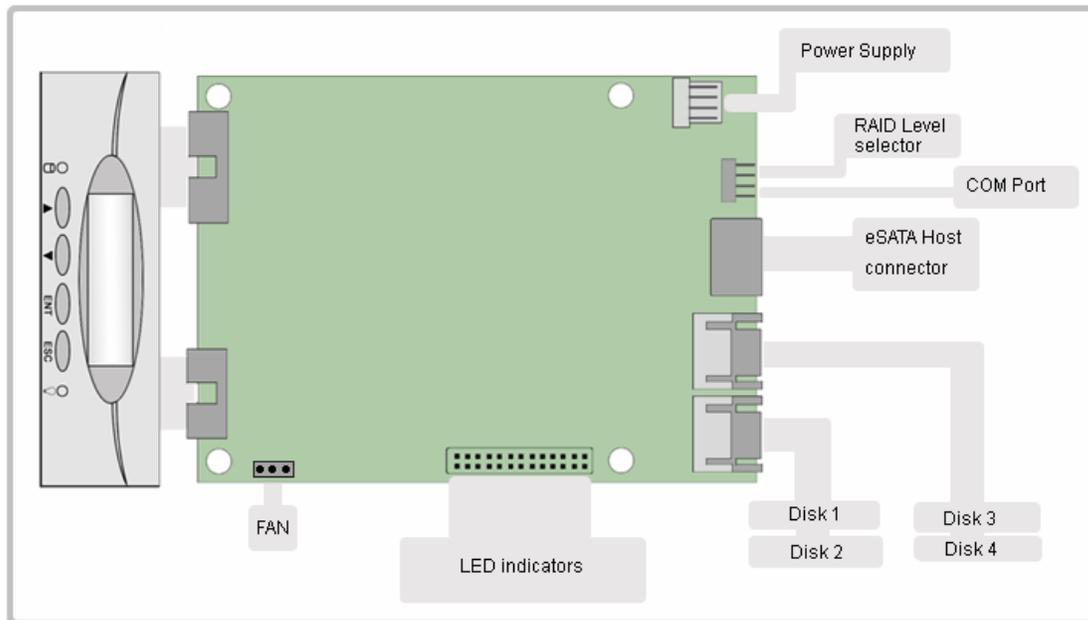
Chapter 2 Environment Setup

2.1 Package Includes

- 1 pcs 4x3.5" SATA-II HDDs Rackmount RAID Storage Enclosure
- 4 pcs Hot-Swap Removable HDD Tsray (Installed)
- 4 pcs Cooling Fan Module (Installed)
- One 150 Watt Power Supply (Installed)
- One 1M External SATA (eSATA) Cable
- One USB 2.0 & One FireWire 800 Cable
- Heavy Duty Foam Protection
- Accessory Box:
    - Screws for Mounting Hard Drives
    - One Standard Power Cord

<table>
<tr>
<td rowspan="5">C a u t i o n</td>
<td>

- Before starting any type of hardware installation, please ensure that all power switches have been turned off and all power cords have been disconnected to prevent personal injury and damage to the hardware.

- To avoid overheating, **RAU 141** should be operated in a well-ventilated area and in such a way that sufficient airflow is maintained across the controller chips.

- Static electricity can damage electronic components. To guard against such damage:
    1. Work in a static-free environment
    2. Wear a grounded anti-static wrist strap
    3. Store uninstalled components in anti-static bags
    4. Handle PCBs by their edges and avoid touching chips and connectors.

- Environmental requirements:
    Temperature: 0°C to 40°C (32°F to 104°F)
    Humidity: 5% to 95%, non-condensing

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</tr>
</table>

2.2 Install SATA disks

If the hard drives do not come with the RAID system, please follow the instructions for installation below.

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- Press the release button and pull the handle to remove the disk tray. The trays may have to be unlocked first using the key provided. **(Figure 2.2.1, Figure 2.2.2)**
- Insert the disk into the disk tray with the connectors directed toward the open rear of the tray.

Figure 2.2.1

Figure 2.2.2

- Align the mounting holes of the disk with the tray.
- Mount the disk to the disk tray with the screws provided in the accessory pack. **(Figure 2.2.3)**
- Slide the disk tray back into the empty slot of the chassis and make sure the handle clicks into place. **(Figure 2.2.4)**
- Lock the tray with key provided to ensure disk security.
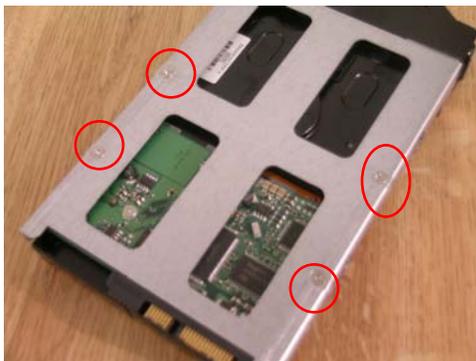
Figure 2.2.3

Figure 2.2.4

2.2 LCD Panel Operations

The LCD messages are displayed on the screen of LCD panel for system status.

Access LED → ○ ⬭ ⬭ ⬭ ⬭ ○ ← Power LED
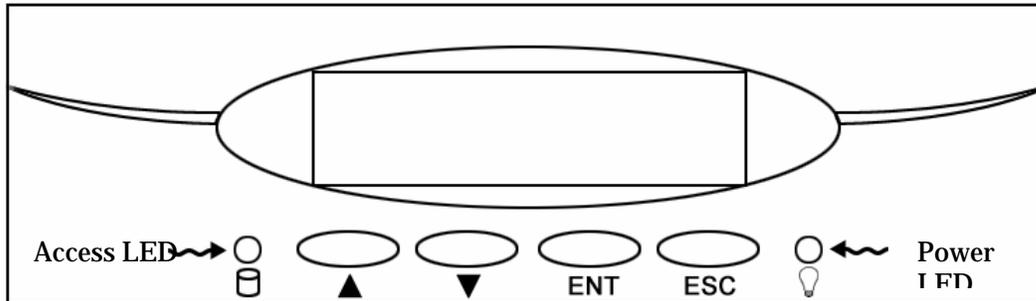
▲: Scroll up button ▼: Scroll down button **ENT**: Enter button **ESC**: ESC button

Scroll up button: to scroll up message data.
Scroll down button: to scroll down message data.
Enter button: to confirm or enter your selection.
ESC button: back to the top layer of message data.

Chapter 3 RAID Setup

The customers can configure the **RAU 141** through the following steps:

Step 1	3.1. Setting the RAID level – The RAU141is per-configured at RAID level 5, but you have the option of customizing your RAID level in this step
Step 2	3.2. Creating an Array – The disks in RAU 141 will be used to create an array, by which you can partition and use the storage.
Step 3	3.3. Setting the Date and Time – Configure your RAU 141 for your local use.
Step 4	3.4. Connecting to a Host computer – Connecting RAU 141 to your host computer through USB/FireWire or eSATA Interface
Step 5	3.5. Formatting and Partitioning – This section details the process for formatting and partitioning the RAU 141on Windows operating system.

3.1 RAID Level Setup

The **RAU 141** RAID level is set using jumper heads on the RAID Configuration Interface (Pin1, 3, 5, 7 of the CN8). The four possible combinations of the jumper position correspond to the four available RAID settings: 0, 0+1, 5 and 5+spare.

Caution
If there is data on the array, changing the RAID level will cause loss of all the data on the array.

Caution
The R4 CR1000 must be powered off to change the RAID level.

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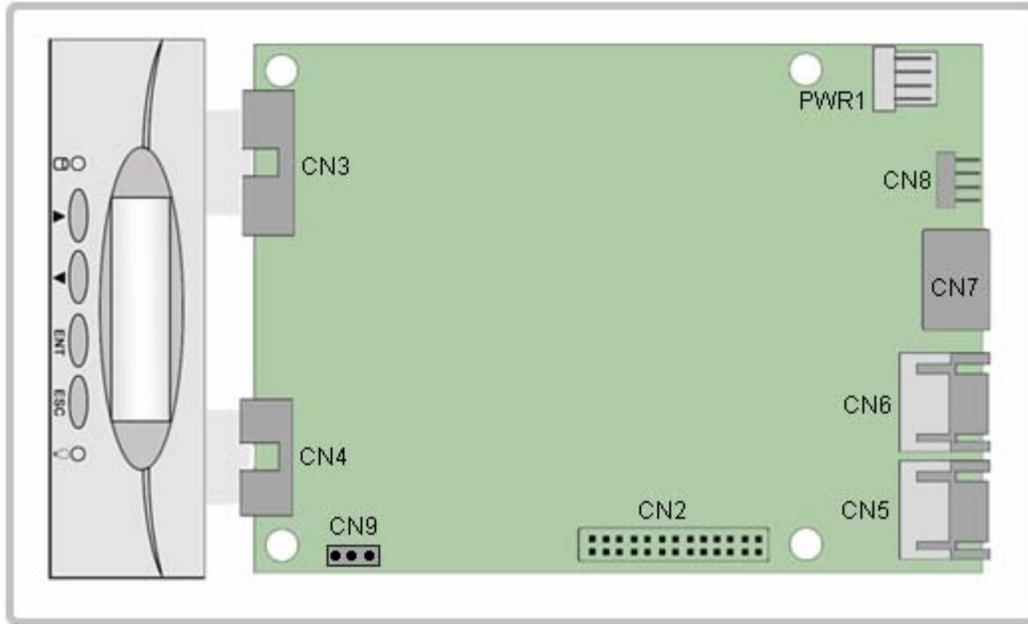
PWR1	Power connector	CN4	Button connector	CN7	Host I/F
CN2	BP I/F (LED, I2C)	CN5	Disk I/F	CN8	COM and RAID configuration I/F
CN3	LCD connector	CN6	Dick I/F	CN9	FAN connector

3.1.1 RAID Level configurations

RAID Level 5	RAID Level 0
Pin1-3 is **open**. Pin5-7 is **open**. 	Pin1-3 is **short**. Pin5-7 is **short**.
RAID Level 10	**RAID Level 5 + spare**
Pin1-3 is **short**. Pin5-7 is **open**. 	Pin1-3 is **open**. Pin5-7 is **short**.

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Note

If the RAID level is not matched between the disk setting and the RAID level
selector setting, the LCD will display the following two messages alternatively:
(1) "RAID level"
    "Unmatched"
(2) "Current: R(X)" (i.e. the current RAID level setting of RAID level selector.)
    "Original: R(Y)" (i.e. the original RAID level setting of the installed disks.)

Solution:
At this situation, RAID cannot work, users should choose one of the following
options :
(1) Shut down and tune the RAID level selectors to R(Y).
(2) Re-plug the four disks and re-create the Array to R(X). (But data in the RAID
    will be lost due to the destructive initialization)

RAU 141 supports over 2TB capacity. The steps below will guide you to enable/disable
over 2TB capacity.

1. Select scroll button to find the capacity setting item on LCD panel. (**4.1.2. Set over 2TB
   capacity Messages**)
2. Press the **ENT** button, and select (YES) or (NO) by the scroll buttons.
3. Press the **ENT** button to confirm the setting.

Note

If you want to create the array with over 2TB capacity, the
setting must be finished before to create an array.

3.2.2 Creating an Array

The steps below will guide you to create an array on the RAU 141
1. Configure RAID level.
2. Power on the RAU 141 without disks installed.
3. Install 4 disks on RAU 141
4. After RAU 141 recognized all disks. A message 「**Create New RAID?**」will be
   displayed on the LCD panel.
5. Select 「**YES**」by the scroll buttons and press the **ENT** button to create array.

Note

During the RAID-creating procedure, the percentage of
RAID initialization progress will be displayed on the LCD
panel.

Note
The initialization process is a time-intensive process and is dependent upon the size of the disks. For example, four 400GB disks in a RAID 5 array could take over about two hours.

Note
The device over 2TB capacity should be supported by Operation System (e.g. Windows Vista). Please refer to section **3.5. Formatting and Partitioning** to partition the device.

3.3. Setting the Time and Date by LCD

To change the time and date on the LCD, press and hold the **ENT** button for five seconds. Release the button to display the date and time setting screen.
To adjust the time and date values, use the **Scroll** buttons to change the values. (Figure 3.3.A)
Press the **ENT** button to confirm your selection and move to next value.
Start by adjusting the year (YY), then move to the month (MM), the day (DD), and finally the hour (HH) and minute (MM).
Pressing the **ENT** button on the final selection will set the time and date. The Time and Date will be displayed on the LCD during R4 CR1000 stand-by mode. (Figure 3.3.B)
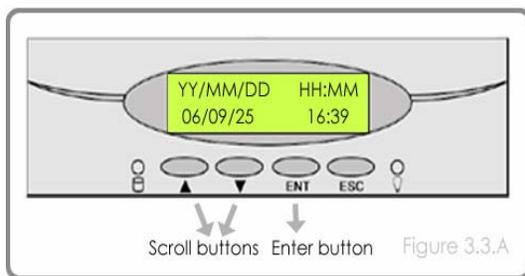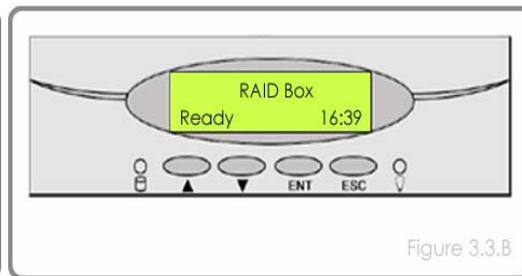
Note
The time is measured in the 24-hour clock format.

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3.4. Connecting to the Host computer

1. Follow the steps on **3.1. Setting the RAID Level** and **3.2. Create an Array** to establish a RAID.
2. Pending on the chosen I/O interface, connect one end of the eSATA / USB / FireWire cable into the eSATA / USB / FireWire port on the RAU 141 RAID system.
3. Connect the other end of the eSATA / USB / FireWire cable into the eSATA / USB / FirewWire port on the host computer.

It will take a few seconds for the host computer to recognize the drive for it to appear in **My Computer** or on the desktop.

The RAU 141 RAID subsystem will now   need to be formatted. Go to next step **3.5. Formatting and Partitioning** for more information.

3.5. Formatting and Partitioning

Before the **RAU 141**   array can be fully utilized, it needs to be formatted. During this process, the array can also be customized with partition. As you format the drive, you will have the opportunity to divide the hard drive into sections, called partitions. A partition is a section of the hard drive's capacity that is created to contain file and data.

3.5.1. Windows Users

> **Caution**
> Before beginning the format and partition, make sure there are no any warning or error message being displayed on the R4 CR1000 LCD displayed.

After having followed the steps to set the RAID level, create an array and connect the interface cable to the host computer, the RAU 141 must now be formatted and partitioned before it can be used.

1. Right click **My Computer** and click **Manage**.
2. From the **Computer Management** window, select **Disk Management**. (Figure 3.5.1.A)
3. If the **Initialize and Convert Disk Wizard** window appears, click **Cancel**.

4. Windows operation system will list all the hard drives that are installed on the system. Locate the RAU 141 drive   that is represented by the🚫 icon. Right click the icon and select **Initialize.**
5. In the drive box to the right shows **Unallocated**, right click and select **New Partition**. (Figure 3.5.1.B)

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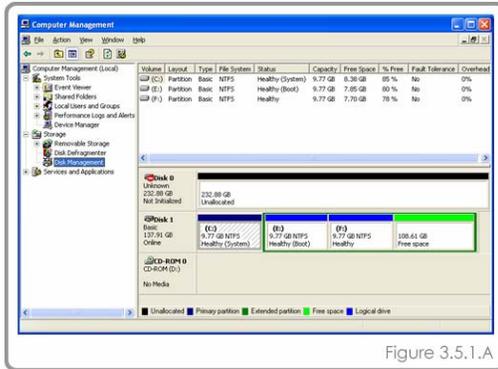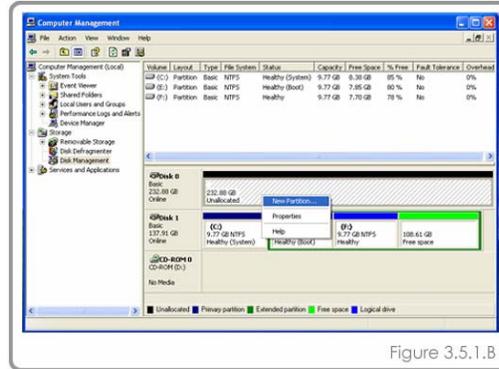
Figure 3.5.1.A

Figure 3.5.1.B

6. The **New Partition Wizard** dialog box will appear, click **Next** to continue. (Figure 3.5.1.C)
7. After selecting partition type, specifying partition size and assigning drive letter, the **Format Partition** dialog box (Figure 3.5.1.D) will appear, you have the option of selecting the **Quick Format** option. This allow mach fast formatting, however, this disallow Disk Management to check the drive sector for errors. Click Next to start the format process.
8. Your drive should now appear in your **My Computer** and ready for use.
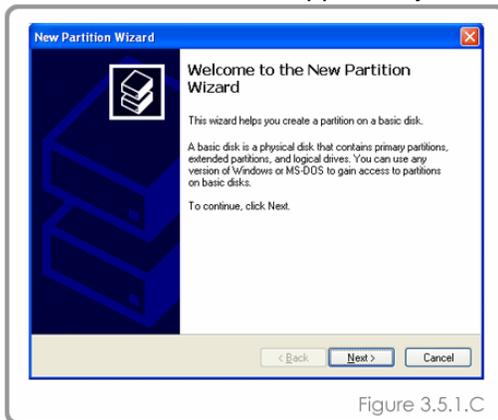
Figure 3.5.1.C
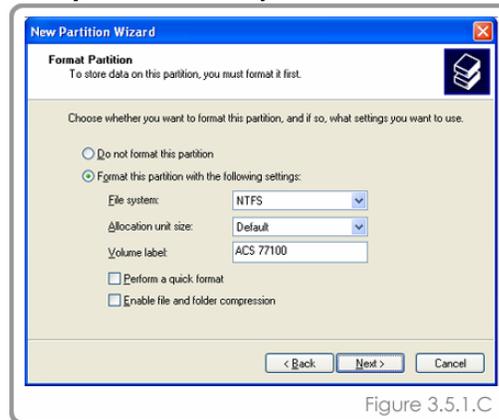
Figure 3.5.1.C

Caution
Formatting drive will crash all data in the drive.

3.5.2. Formatting drive over 2TB capacity on Windows Vista

The steps below will guide you to format a drive over 2TB capacity on Window Vista.

1. Right click **Computer** and click **Manage**.
2. From the **Computer Management** window, select **Disk Management**.
3. Windows operation system will list all the hard drives that are installed on the system. Locate the RAU 141 drive that is represented by the ⛔ icon. Right click the icon and select **Initialize Disk**.

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4. The **Initialize Disk** dialog box will appear, select the disk number and select the **GPT (GUID Partition Table)** partition style. (Figure 3.5.2.A)
5. In the drive box to the right shows **Unallocated**, right click and select **New Simple Volume**. (Figure 3.5.2.B)
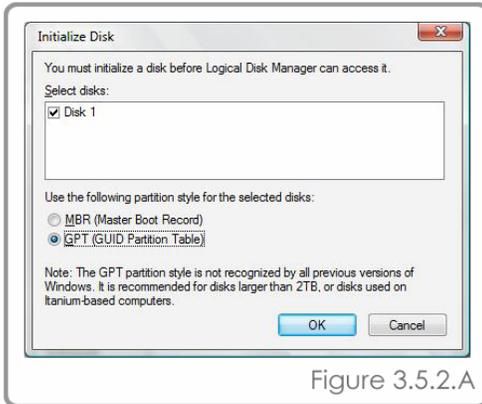
Figure 3.5.2.A
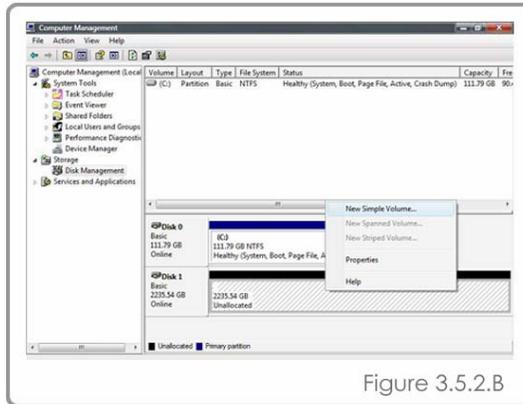
Figure 3.5.2.B

6. The **New Simple Volume Wizard** dialog box will appear, click **Next** to continue.
7. After selecting partition type, specifying partition size and assigning drive letter, the **Format Partition** dialog box will appear, you have the option of selecting the **Quick Format** option. This allow mach fast formatting, however, this disallow Disk Management to check the drive sector for errors. Click Next to start the format process.
8. Your drive should now appear in your **Computer** and ready for use.

Chapter 4 Management

4.1 LCD Displayed Messages

The status of the **RAU 141** can be viewed through the LCD display. By using the scroll buttons to scroll through the messages, the following information is available.

RAID level and capacity	Disk drive model	Disk capacity
Controller firmware version	Controller serial number	Fan and temperature status

4.1.1. Booting Messages

LCD Display	Message

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LCD Display	Message
RAID Box Boot	RAU 141 is booting
RAID Box Initialize Disks	RAU 141 is initializing the installed disks

4.1.2. Set over 2TB Capacity Messages

LCD Display	Message
Enable over 2T Press ENT select	Press ENT button to set enable/disable over 2TB
Enable over 2T (YES)	Enable over 2TB capacity
Enable over 2T (NO)	Disable over 2TB capacity

4.1.3. Initialization Messages

LCD Display	Message
Create New RAID? No (Yes)	Create a new RAID.
RAID INIT XX.X % Total: XXXX GB	New array being created.
RAID Init 100 % XXXX GB INIT OK!	RAID Initialization completed successfully.

LCD Display	Message

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LCD Display	Message
RAID INIT Failed DX offline	Disk X failed during the initialization. The initialization cannot proceed.
RAID INIT Failed DX Bad sectors	Too many bad sectors in Disk X, initialization cannot proceed.

4.1.4. System Ready Messages

LCD Display	Message
RAID Box Ready hh:mm	RAU 141 is ready for use.

4.1.5. Rebuild Messages

LCD Display	Message
DX Rebuild XX.X% Total: XXX GB	Rebuilding data to a new disk (Disk X) since Disk X failure.
DX Rebuild 100% XXX GB OK!	Disk rebuild completed successfully.
DX Rebuild Fail XX GB < YYY GB	The capacity of the new disk (Disk X) is too small. XXX GB is the capacity of the new disk. YYY GB is the minimum disk capacity of the RAID.
DX Rebuild Fail DX offline	Disk rebuilding fail since Disk X failed.
DX Rebuild Fail DX Bad sectors	Disk rebuilding fail since too many bad sectors in Disk X

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4.1.6. Error Messages

RAID Failure Messages

LCD Display	Message
RAID Fail code: 0	The RAID failed since there are not enough disk members.
RAID Fail code: 1 <xxxx>	The RAID failed since the sequence of the disks is incorrect. The current sequence is displayed within the < > space.
RAID Fail code: 2	The RAID has been failed, but all disks exist.

Disk Failure Message

LCD Display	Message
Disk X fail	Disk X failed.

Fan Failure Message

LCD Display	Message
Fan Fail XXXX rpm	Fan failure. The xxxx rpm is the current rpm for the fan.

Overheating Error Message

LCD Display	Message
Temperature!! XX°C > 50°C	System overheating. The XX is the current temperature

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Chapter 5 Update Firmware

        RAU 141   allows the customers to update firmware via RS-232 interface. The firmware can be updated from a host PC with third party communication software, such as HyperTerminal, that supports ANSI terminal emulation. The setup process for HyperTerminal will be guided in this chapter.

> **Note**
>
> The data and configurations on the array are not affected by firmware updating.

> **Note**
>
> The HyperTerminal is bundled as standard with Microsoft Windows operating system. It will be found in the Communications folder. The program can also be download from Higraeve Software at http://www.higraeve.com/htpr/

5.1. Firmware updating steps

1. Ensure the RAU 141 is turned off.
2. Connect one end of the supplied RS-232 cable to the RS-232 3pin port from the Pin2, 4, 6 of the CN8 on the R4 CR1000 controller, and connect the other end to one of the host computer's COM port.

| Pin2 to A | Pin4 to B | Pin6 to C |
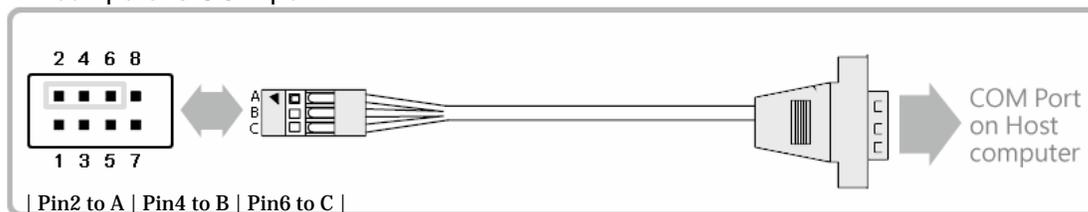
3. Launch HyperTerminal from the host computer: Start > Programs > Accessories > Communications > HyperTerminal.

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4. Select COM1 or COM2 from the Connect using: dropdown menu, depending on which port is connecter toRAU 141.
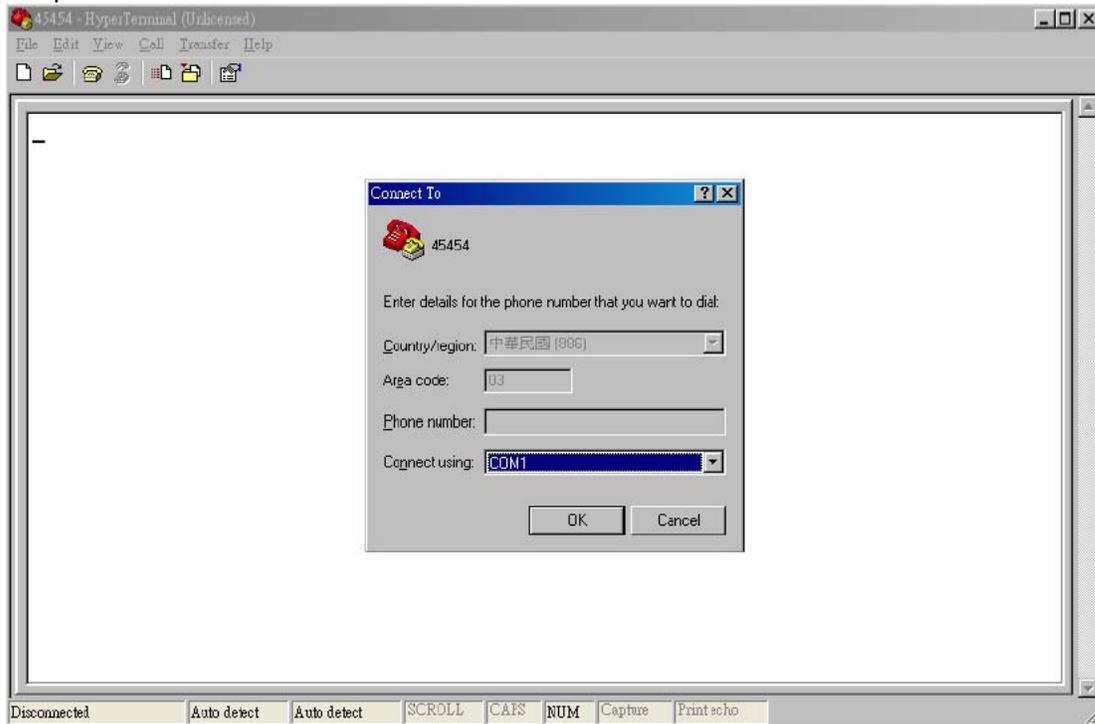
5. The COM properties dialog box will appear. Set the following values:
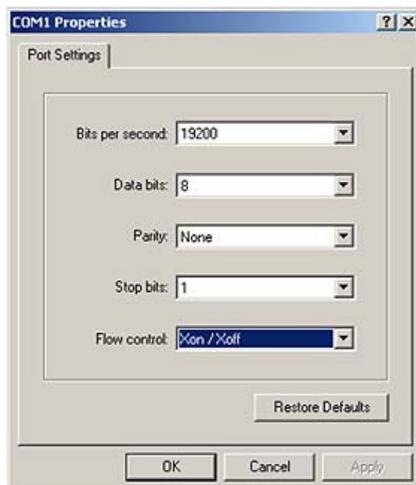
Bit per second: 19200
Data bits: 8
Parity: None
Stop bits: 1
Flow Control: Xon/Xoff

6. Turn on the RAU 141 and press the **ESC** button on the host computer keyboard. The "**>>>**" prompt will appear.

7. Type in the command "download" to go to the firmware download mode, then type "1" to download code (Firmware or Bootcode).

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```
>>> download
restart … 01 GPIO 01 AAA 01 01
========= 76 Download Mode =========
Enter  '1'   to Download Code (Firmware, Bootcode)
     'ESC'  exit
     'r'    reset
-------------------------- version: Boot ---- 13 (a) ---- 03 Downloading Code!
Flash type:  SST39VF040
```

8. Locate the updates firmware file to send. For HyperTerminal, go to the **Transfer** menu and select **Send Text File**.
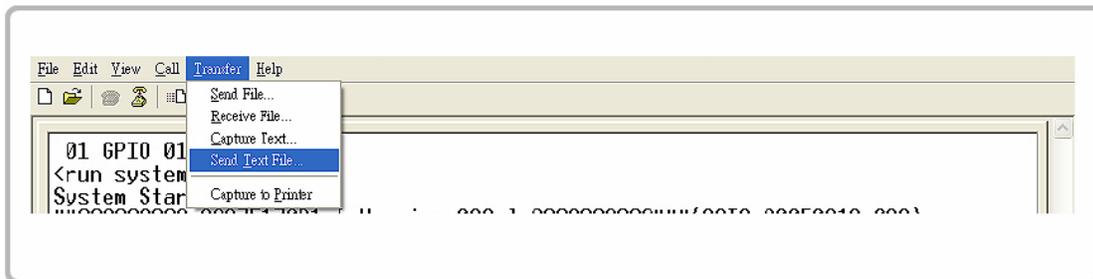
9. Send the firmware file as a text file. The file will start to download.

Caution
Do not turn off the system or interrupt program during firmware-updating procedure.

10. When the file has been downloaded, after RAU 141 restarted, the firmware-updating procedure is finished.

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Chapter 6 Trouble Shooting

Problem	Possible solution
The RAU 141 does not appear in the BIOS.	Ensure that the array has completed the initialization process.
How should I react to disk failure?	For a RAID 5/RAID 10 array, you should replace the failed disk. Data rebuilding will then begin. For a RAID 5+hot spare array, data will be rebuilt automatically to the hot-spare disk. There is no need to immediately replace the failed drive. The capacity of new disk you installed must equal or larger than the disks installed in RAU 141. Otherwise, it will be rejected by RAU 141, though it has no any damage.
LCD display RAID Fail Code 0.	The status for RAID fail Code 0 is: Not enough number of function disks for a RAID to operate Please create a new array.
LCD display RAID Fail Code 1 <x x x x>	Represents disk sequence is wrong, and the current sequence displayed within < >. Example: <2134>: disk 2 and disk 1 sequence is reversed. Please power off theRAU 141 and replace the disks on the right slot.
LCD display RAID Fail Code 2	The status for RAID Fail Code 2 is: The RAID has been failed, but all disks exist. Please create a new array.

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