

Highly Reliable Systems

*High-Rely Classic 5 Bay Mini-Tower and
5-10 Bay Rack Mount eSATA/USB 3.0
Disk Based Backup Systems*



Documentation V1.1

READ THIS FIRST

Important Quick Start Information for your High-Rely drive

- **YOUR MACHINE IS SET TO OPERATE AT 115 VOLTS A/C. IF THE OPERATING VOLTAGE YOU INTEND TO USE IT ON IS HIGHER SUCH AS 220/240 VOLTS A/C, BE SURE TO MOVE THE VOLTAGE SELECTOR SWITCH ON THE BACK OF THE UNIT TO YOUR OPERATING VOLTAGE RANGE. FAILURE TO DO THIS COULD RESULT IN SERIOUS DAMAGE TO YOUR UNIT!** Some units are “auto-switching” which do not require this so there is no selector switch on the back of units with this feature.
- DO NOT ATTEMPT TO REMOVE High-Rely media from their drive bays without “unlocking” the drive with the key first! Forced removal of the drive will void your warranty. The key has a mechanical interlock that blocks the drive from being removed.
- High-Rely media will not “power up” until the key lock, on the front of the drive, is turned to the locked and on position. This is by design and prevents accidental media removal.
- The latest Service Packs are important! Microsoft has continued to Debug removable drives on the Windows 2000, XP, 2003, 2008, Vista, Win 7 product lines.
- Not all eSATA ports are created equal. For maximum compatibility, we recommend that only controllers based on the Silicon Image chip sets be used. Other eSATA ports may only recognize the first drive in a multi-drive system or may not function at all. Ports should support Hot-Swap and “port multiplier” capabilities.
- If you are using multiple trays in the single bay of your High-Rely in PM/JBOD mode, you may have a drive letter problem as you change your media. Windows will assign drive letters randomly, which will cause your backup software to fail. **You can use the High-Rely Drive Manager utility HRDM2.MSI to solve this problem.** To do this, install HRDM2 on the machine that the High-Rely system will be connected to. See “Documentation SATAV2-2 (the manual for the 1 Bay Slimline, 5 Bay, 7, 8 and 10 Bay high-rely models)” available from our website, for more information.
- Particular photos in this manual may not be your exact unit.

The information in this manual primarily documents Windows 2000, 2003, 2008 or XP systems with some coverage of Vista. Although the High-Rely may work with Windows NT, Linux, Mac OS X and other operating systems, at this time, our tech support can assist with Windows platforms only.

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1 Introduction.

As a successor to the long held territory of Tape backup systems, the economy and performance of inexpensive hard drives as a backup medium can no longer be ignored. The High-Rely Classic 5 Bay Mini-Tower and 5-10 Bay Rackmount systems are the perfect tapeless solution for backup. Their ability to hot-swap coupled with multiple drive capabilities allow for a functional replacement of expensive robotic tape library systems. This is traditionally accomplished by assigning one bay for each backup session in a repeating period. For example, Monday through Friday where each day is designated a drive and thus an entire week's backup can occur without human intervention to replace media.

The High-Rely Multi-bay Classic systems and helper software were designed to make configuring your existing backup system software as easy as possible to start taking advantage of the speed, reliability and cost saving of hard disk backup.

2 Terminology.

The definition of some simple terms will help in understanding this manual:

- Hard Disk – The actual hard disk drive where data is stored.
- Tray – The removable cartridge which holds the hard disk.
- Media – The assembly of the hard disk in the tray.
- Receiver – Also referred to as the bay. The slot where the Media is inserted.

3 Front Panel controls and indicators



Power Indicator – Lit when power is on.

Power switch – Push on/push off type.

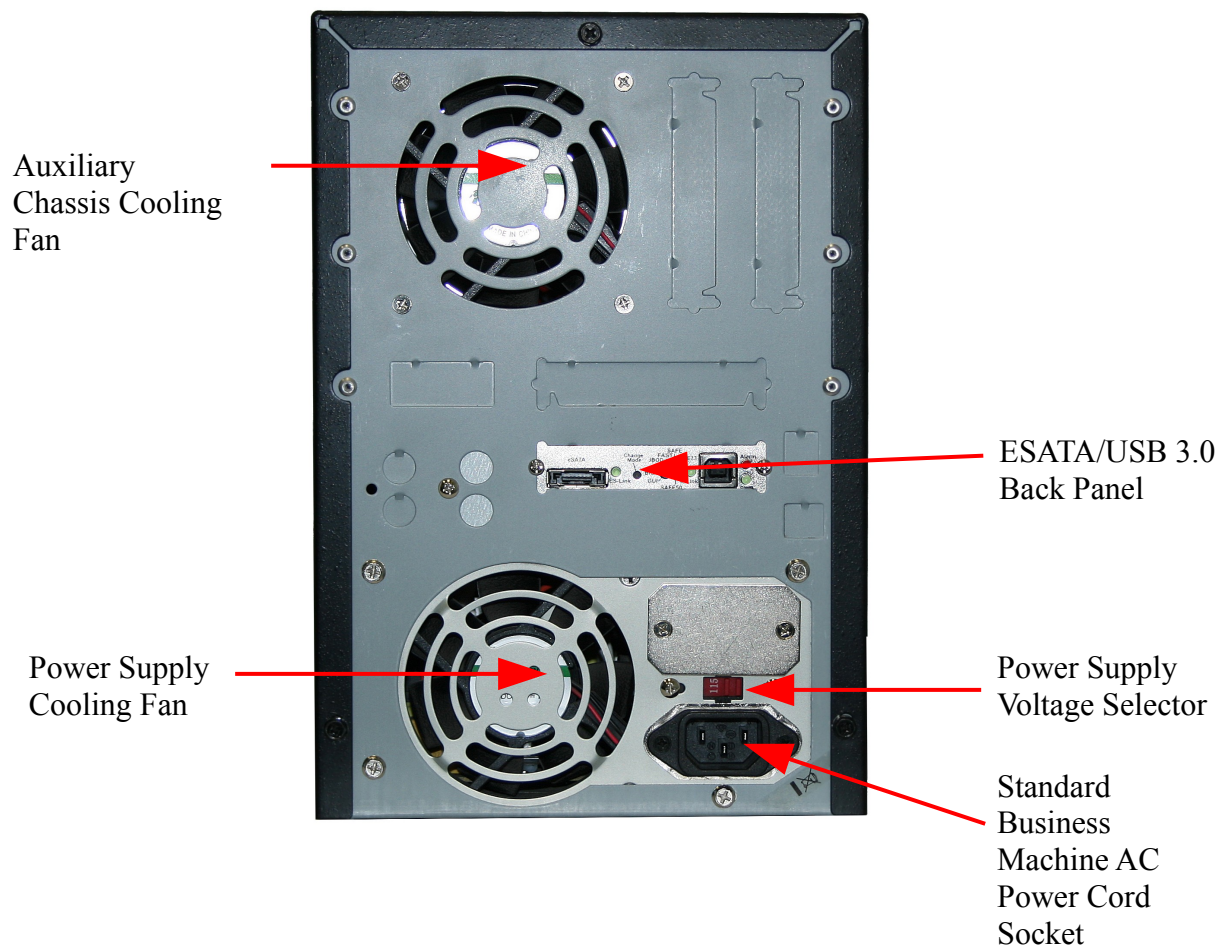


Power Indicator – Lit when power is on.
*No front power indicators on 10 bay.

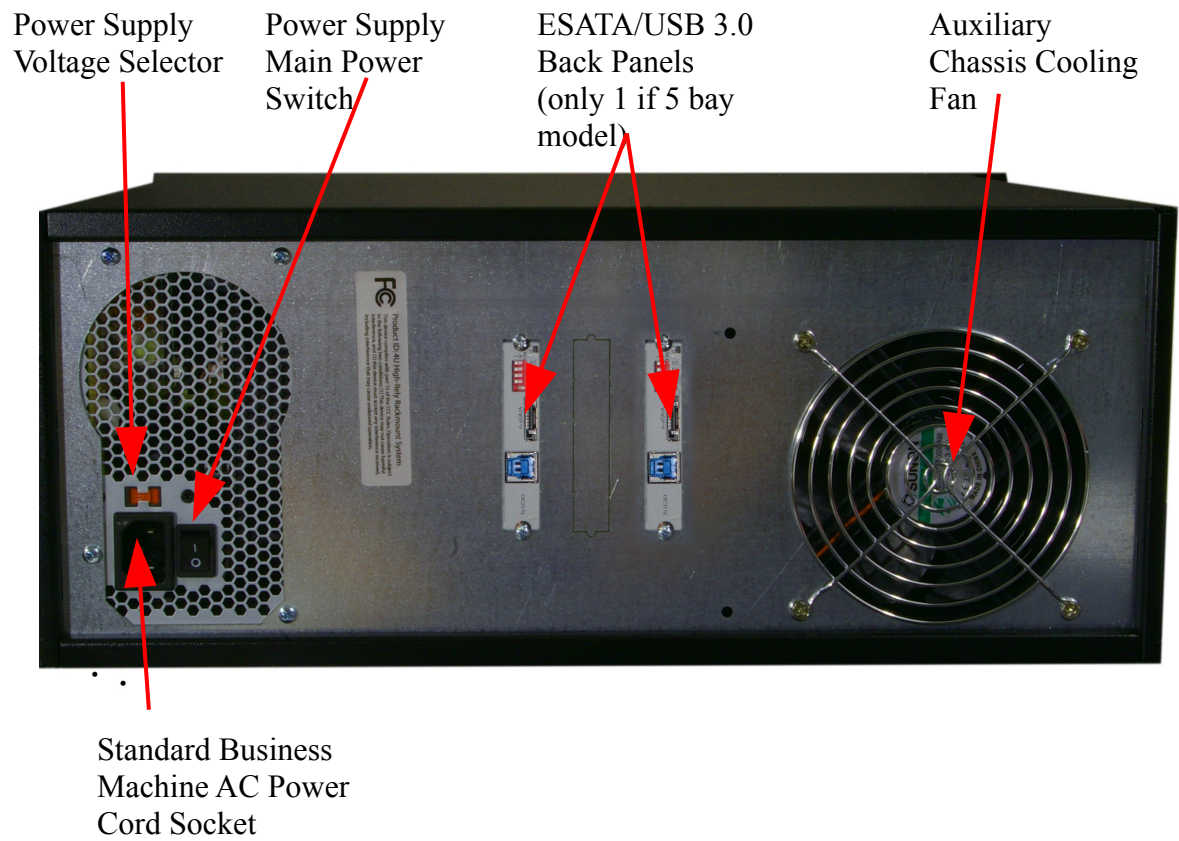
Power switch – Rocker-Type.
*No front power switch on 10 Bay.

***Figure 1 – Front side of 5 Bay MT and 5-10 Bay RM.

4 Back panel controls and indicators



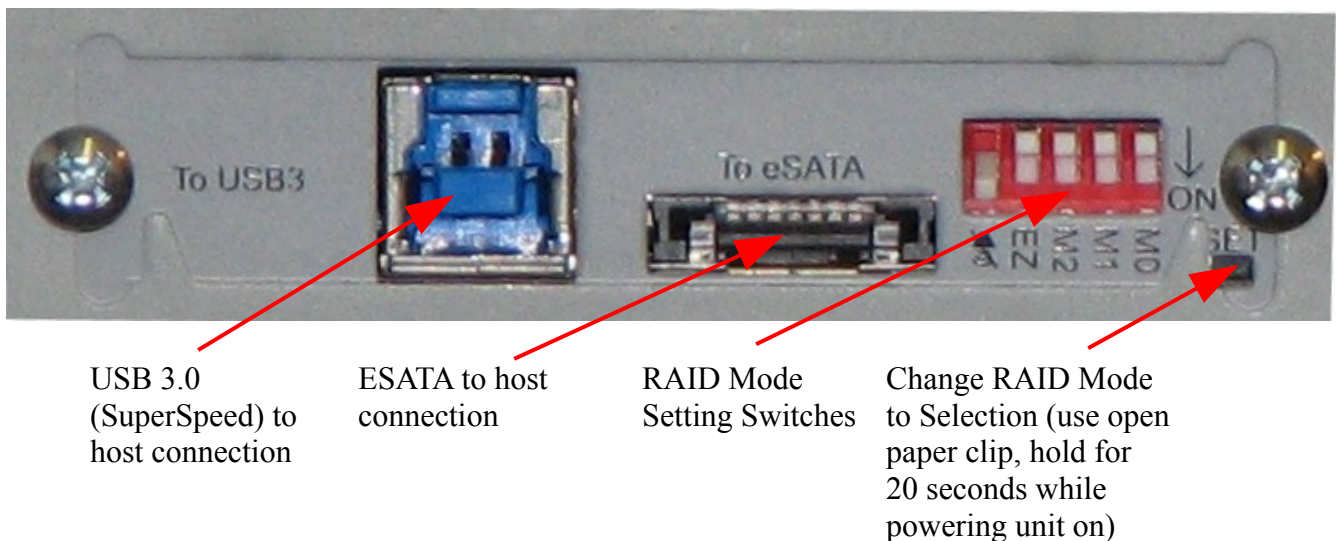
***Figure 2 – Back side of 5 Bay MT.



***Figure 3 – Back side of 5-10 Bay RM.

5 Installation - connecting to your computer.

1. If using the Mini-Tower unit, be sure to locate the unit in an area where there is plenty of ventilation. If using a Rack Mount (RM) unit, be aware that this unit is designed to mount from the rack ears, no rack slide is provided or is necessary.
2. If you need to install a controller card in your host machine to connect your unit to, follow the installation instructions for the controller card you're using. Not all USB 3.0 or eSATA cards offer the same performance or compatibility. If you're installing a controller in a PCI-E slot and can not see the device, under windows disk management (not explorer), then try every available slot for the card.
3. **NOTE:** There are some slight operational differences if your unit is connected via USB instead of eSATA. If your unit is connected via USB, it is advised to leave at least one Media installed in the unit and running when swapping Media. This keeps the USB connection to the host open. If at any point, all Media are powered down/removed such that none remain on, it may be necessary to power cycle the unit after Media is inserted in order for the host to see the drives again. This is not an issue and this process is unnecessary if your unit is connected via eSATA. Also, when connected via USB, whenever a Media is inserted or removed, it is normal for the remaining devices to go offline momentarily then return.



***Figure 4 – eSATA/USB 3.0 Back panel.

4. Install your AC power cord to an 110VAC power source. **IF YOU'RE CONNECTING TO A 220VAC POWER SOURCE, BE SURE TO CHANGE THE VOLTAGE SELECTOR ON THE BACK OF YOUR UNIT FIRST!**
5. Turn power on unit on.
6. Install media and turn the keylock to the locked/on position (see section, Inserting and removing media).
7. Connect your patch cable (USB or eSATA) from the eSATA or USB 3.0/2.0 port of your

host computer to the proper connector on the back of your unit. Note: If you have more than 5 bays in your unit (which the 5-10 bay RM unit permits), you will have two of these panels on your unit. In the RM unit, if 5 bays, there is one panel which controls the 5 bays. If 7 Bays, one panel controls 4, the other controls 3. If 8 bays, each panel controls 4 bays. If 10 bays, each panel controls 5 bays. Each panel must be connected to the host or all the bays will not show up. In Figure XXX above you will see the USB 3.0/2.0 'B' type connector and the eSATA connector. Only one maybe plugged in at a time. If you switch from USB to eSATA or vice-versa, you must wait at least 10 seconds after removing one cable before plugging in the other. If after switching cables, no devices appear, try power cycling the unit. If that fails, look back to the host controller for issues.

8. Look for new volumes to appear using Windows Drive Management. If the drive is not formatted, it will not appear to explorer but will still show in Drive Management and will need to be formatted. If you do not see the drive appear, try reseating your cables. Try power cycling both the host and the High-Rely unit. Again, if this fails, consider controller issues and compatibility.

ADVANCED USERS:

Your unit has the ability to perform various RAID operations. While the hardware will perform these functions, they are not advised in these models by High-Rely and High-Rely Technical support will not be able to assist you with these configurations. Nonetheless, if you chose to use them, we recommend you test the operation thoroughly. Use these features at your own RISK!

***WARNING!** Changing the RAID Mode can cause all data to be lost!!! Pick and set the RAID Mode prior to formatting and using the volume(s).*

**=Default settings*

Mute (Speaker)	Off – Audible Alarm during degraded or failed conditions.	On* – Audible alarm is muted.
EZ	On – Auto rebuild to spare drive.	Off* – Rebuild to fresh drive when inserted.

RAID Type	Description	M2	M1	M0
JBOD	Individual Volumes.	Off*	Off*	Off*
RAID 0	All installed volumes are Striped.	On	On	On
RAID 1 or 10	Mirror. Mirror's installed drives. (2 drives for mirror, 4 drives for RAID 10)	On	On	Off
RAID 3	RAID 3 functionality.	On	Off	Off
RAID 5	RAID 5 functionality for installed drives. Hot spares are those installed after RAID 5 is created.	Off	On	Off
BIG	Concatenates all drives.	On	Off	On
CLONE	Clones drives (all drives get the same data).	Off	On	On

****Figure 5 “Back Panel of Model B, Dip Switch Settings”*

6 Operating Scenarios.

6.1 Mon-Fri/Sun (Auto Changer)

In this scenario, the High-Rely unit is connected directly to a Windows server which is running backup software on a daily basis. The user has multiples of their weekly backup sets in media. For example, if they have a 5 bay to use for Monday through Friday, then they have (5 X) five times however many weeks they wish to go back. If they are backing up Monday through Sunday then they have (7X) 7 times. In this example we shall say the user has a 5 bay and has three weeks back of media so he has 15 pieces of media.

Each of 5 pieces of media is given a different volume letter but those letters repeat for each set. For example, there are three drives with the volume letter H:, three with I:, three with J:, three with K: and three with L:. The Hs are all Mondays, the Is are all Tuesdays, the Js are all Wednesdays and so forth. Thus, one weeks worth of media consists of 5 drives letters, H through L.

His backup software is programmed so that each night at 11:00pm it does a full backup. And on Mondays, it does a full backup to H drives, Tuesdays are I drives, Wednesdays are J drives, and so forth. Every Monday morning, he pulls the entire week's worth of drives and installs another week's set.

Additionally, because windows does not like to assign different volumes the same drive letter and will confuse them, he has installed High-Rely's free utility, HRDM2, to make sure windows assigns the proper drive letter to each drive.

Hence, this type of installation only requires that the media is touched once a week. If the user had a 10 bay device, the media would only need to be touched once every two weeks.

6.2 Mon-Fri/Sun with full backups periodically.

In this scenario, the user is using backup software with a "incremental" feature which allows it to backup only data that has changed in multiple sets. For this example, the user has a 5 bay unit and has 15 pieces of media. The user is doing a complete backup every week and incrementals during the week. He has the software set up to place the incrementals on the same drive as the full backup. Thus he need only change the media once a month and has 3 months worth of storage. His full backup is approximately 400GB and his daily incrementals are about 10GB so he can easily fit an entire week on a single 1TB drive. As in the first example above, the user is using HRDM2 to make sure that drive lettering is not confused.

6.3 Backing up Multiple Servers

In this example, the user has a 5 bay unit and is backing up 5 servers to the unit. Like the example above, he is using backup software with an incremental feature. The server the High-Rely is attached to is sharing one of the 5 drives with each of the servers. Thus, share H goes to server 1, share I goes to server 2, share J goes to server 3 and so forth. The backup software is loaded onto each of the servers and is set to do a full backup once a week and incrementals for the rest of the week. Again, HRDM2 is used as in the examples above to keep windows from confusing drive letters. Also, the feature in HRDM2 to reactivate shares once a drive has changed is also enable. Without this feature, each drive would have to be re-shared after it was changed.

The set of 5 media is changed once a week before the day of the full backups. Also, the backup start time of each server are set to start well after the backup of the previous server has ended so that

multiple servers are not trying to backup at the same time, otherwise, the network connection to the machine the High-Rely is on can become swamped and the jobs may not complete or connection problems could occur.

7 Operation.

7.1 *Working with backup software*

The high-rely multibay devices are, in their simplest configuration, a set of external hard drives. Any software which will work with external hard drives should work with the high-rely equipment. But, there is a technical issue to consider depending on how you connect the devices.

If you connect them to your host via eSATA, everything works as you would expect – when you install a media, a drive shows up on the host and disappears when you remove it. But, on USB, whenever a media is inserted or removed, all drives go off line and then return. Thus, if your software is configured to use more than one drive at a time and that drive must stay attached, there maybe issues when you swap media.

Also, if your software needs to use the multiple drives with the same drive letter, then you need to read the section below on HRDM2.

7.1.1

HRDM2





HRDM2 is free software from High-Rely which allows you configure multiple drives with the same drive letter assignment. For example, if you have 3 weeks worth of media, then you may have 3 drive H's for Monday, three drive I's for tuesday and so forth. However, windows does not guaurantee it will always assign the same letter for mutlpile drives which can make configuring your backup software for such very frustrating or impossible. This section does not completely cover the details of working with HRDM2 which are in the help files in the application. However, it does cover basic installation.

Installation

1. Run setup.exe from your installation disk or downloaded zip file.
2. Follow the installation wizard prompts.

Setup

1. The drive manager service is configured to start automatically at boot time. It will appear in your services window as shown:

	Help and Support	Enables He...	Started	Automatic	Local System
	HID Input Service	Enables ge...	Started	Automatic	Local System
	HRDM2	High-Rely ...	Started	Automatic	Local System
	HTTP SSL	This servic...		Manual	Local System

2. To assign letters to drives you must first acquire each drive's Volume Serial Number. One way to get this information is to open a Command Prompt, and use the 'dir' command, as show here:

```
C:\ C:\WINDOWS\system32\cmd.exe

G:\>dir H:\
Volume in drive H is Drive 2
Volume Serial Number is 30E0-B8FF

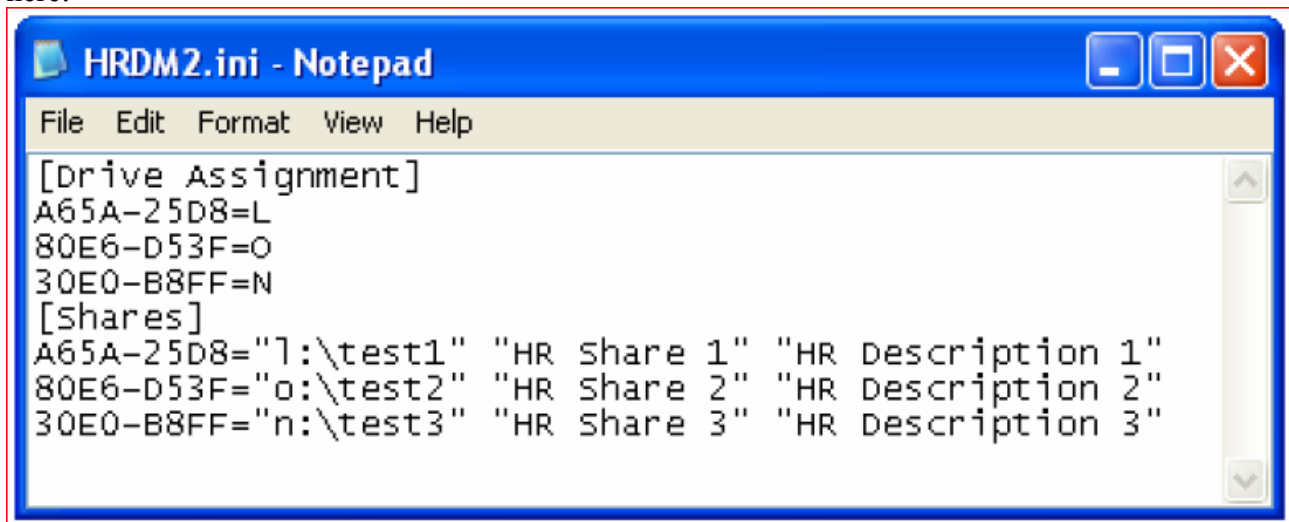
Directory of H:\

11/29/2006  02:43 PM                512 HEADER.CTF
11/29/2006  01:37 PM            65,536 S0000001.CTF
11/29/2006  01:44 PM        6,094,848 S0000002.CTF
11/29/2006  02:43 PM        327,680 S0000003.CTF
               4 File(s)          6,488,576 bytes
               0 Dir(s)  79,931,965,440 bytes free

G:\>
```

3. Once you have all of your Volume Serial Numbers, open the file called HRDM.INI, which is located in the same folder that you installed the program in using the Install Wizard.
(Default location is: C:\Program Files\Highly Reliable Systems\HRDM2\HRDM2.ini)

4. Enter each Volume Serial Number, then an equal sign, then the letter you want under the line '[Drive Assignment]'. Follow the same format under the line '[Shares]' but provide the share directory, share name and description within quotes. Enter one such entry per line as shown here:



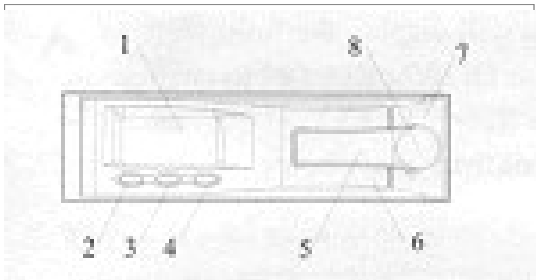
```
File Edit Format View Help
[Drive Assignment]
A65A-25D8=L
80E6-D53F=O
30E0-B8FF=N
[Shares]
A65A-25D8="l:\test1" "HR Share 1" "HR Description 1"
80E6-D53F="o:\test2" "HR Share 2" "HR Description 2"
30E0-B8FF="n:\test3" "HR Share 3" "HR Description 3"
```

5. Save the file.

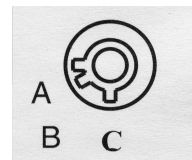
6. Any changes made to the HRDM2.ini file require newly configured media to be restarted before changes will take effect. This means if a drive's Volume Serial Number is added to the HRDM2.ini file after the drive is turned to the on position then it needs to be restarted before the new assignments will take effect.

7.2 Inserting/Removing Media.

The following diagram identifies the front of the HR removable drive and gives the names of each item. To remove the media properly you will need to understand the function of the release levers and the key lock mechanism (items 5, 6, and 8).



1. LCD Display
2. Set Button
3. Up button
4. Down button
5. Lock cover lever (Small lever)
6. Release Lever (Large lever)
7. Front Bezel of HR Receiver Frame
8. Hidden Key Lock



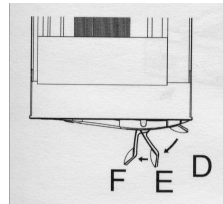
The High-Rely backup system makes use of SATA hard drives. Many SATA II drives are specifically designed to support hot swap. The High-Rely trays make it possible to also hot swap (or warm swap) SATA I drives because before a drive is removed it is powered down safely by turning the key lock on the front of the unit. This technique allows even SATA I drives to be removed and installed while computer power is on (Hot swapped).



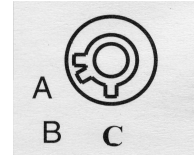
To insert the media, first make sure the lock is in the unlocked position (position C). Proper orientation of the removable drive is with the blue buttons to the left as shown in the photo. Notice that the entire large lever, called the “release lever” is in the fully open position. Do not attempt to insert the drive with the release lever closed.

Push the drive all the way in until you feel resistance. At this time move the small lever (the “lock cover” lever) to its midway (position E).

Move the larger “release lever” towards the closed position, using the lever action of the mechanism to pull the drive in the last few centimeters. Close the release lever until it snaps. If it will not snap shut check to ensure that you have the smaller lock cover lever in the partially closed position E.



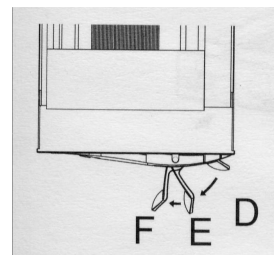
Lock Cover lever position E is used to insure the larger “release lever” will snap shut



Now insert the key and turn it clockwise to the “A” position to power up the drive as shown in the photo. The B position of the lock is considered “off” and is not used in the High-Rely system.

At this point, if master power to the unit is on, you should see the LCD front panel of the drive light up and possibly hear the hard drive spin up. If you do not, the drive is not seated properly. Remove it and try re-seating it. Once you have successfully powered up the drive you should flip the lock cover to the fully closed or D position.

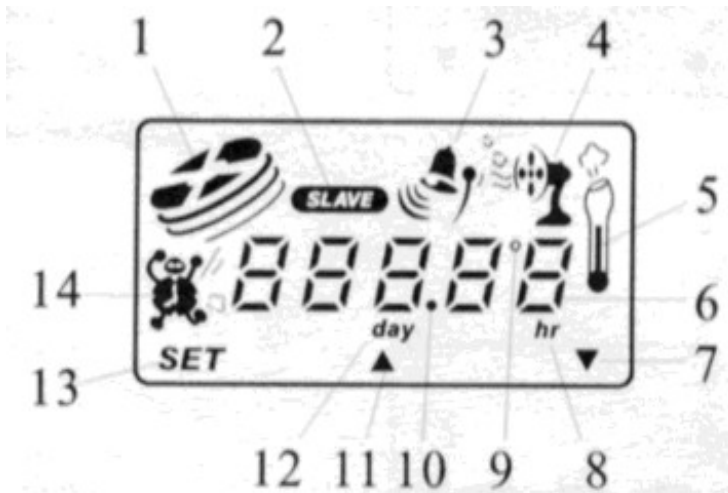
Once the drives spin up, Windows should recognize the new drive and will dynamically assign a drive letter to your new media. Removing the media is the exact same process but in reverse. However, be sure the media is not being written to by the host before removing it or the data on the drive could be incomplete or corrupted.



In the final step the “Lock Cover” should be moved to position D

7.3 *Reading/Setting Media Display*

LCD Display on Media tray



1. Hard Drive activity symbol (simulates spinning disk when drive is in use)
2. Master/Slave Status display (**Unused feature of the LCD display.** Always displays as slave)
3. Alert Symbol (Symbol is on when the unit is in alarm status)
4. Fan Status Display (Simulates a rotating fan to show that drive fan is spinning)
5. Thermometer Symbol (On when numeric display is showing temperature)
6. Digit display (Displays temperature normally)
7. Down arrow (positioned above down button)
8. Hour Indicator (On when numeric display is showing days/hours of operation)
9. Degrees Symbol (On when numeric display is showing temperature)
10. Decimal Point
11. Up arrow (positioned above up button)
12. Day Indicator (On when numeric display is showing days/hours of operation)
13. SET indicator (positioned above SET button)
14. Hard Drive Usage Time Symbol (On when display is showing days/hours of operation)

Normal Display

The normal LCD display will show the current drive temperature digits (6) in either Celsius or Fahrenheit. In addition, you should see the “slave” symbol (2), which is always on, the fan symbol simulating a spinning fan(4), the thermometer symbol (5), as well as the up and down arrow and SET symbols (7,11,13).

Hard Drive in Use

When the hard drive is being written to or read from the hard drive symbol (1) will simulate a spinning disk. The rest of the display will be normal as discussed directly above. Notice also that when hard drive is in use the Blue black lit LED will flicker, giving a quick visual indication of drive activity.

Hard Drive Usage Display

When you change the mode of the LCD to display hard drive usage time instead of the temperature display using the SET button, the digit display (6) will show the number of days and hours the drive has been in use.

Fan Malfunction Display

If the fan is disconnected or stops turning the thermometer symbol (5) will blink, the “alert” symbol (3) will come on, and an audible alarm will sound. In newer units, this features is disabled and depends on the actual temperature to be above the setting to cause an alarm.

Temperature Alert Display

If the temperature exceeds the factory setting of 130 degrees F, the screen will show the alert symbol (3). In addition, the thermometer symbol (5) will blink and an audible alarm will sound.

Programming the Temperature Alarms

From the “Normal” display you can press SET to change the temperature display from Fahrenheit to Celsius. Use the up or down arrow buttons to make this change. Press the SET key again to confirm your choice and advance to the Temperature alarm threshold screen.

In the temperature alarm threshold screen, the threshold temperature blinks. Use the up or down arrow buttons to change the threshold. **Once you’ve set the desired temperature, hold down the SET key for at least 3 seconds to make the change permanent.** You should hear two beeps to indicate the setup is complete and the LCD display will return to “Normal”.

If at any time during the SET process you do not depress any buttons for 15 seconds, the unit will exit setup mode and return to the normal display. All settings made up to that point will be cancelled if this happens.

Silencing an Alarm

If you hear a continuous alarm from your HR device, it means one of the following:

One or more drive fans have stopped turning

The temperature has exceeded the alarm threshold.

The High-Rely alarm circuitry has malfunctioned.

Hit any blue button to silence the alarm. Then determine what caused the error condition and correct it.. Replacement fans and drive trays are available from Highly-Reliable Systems.

8 Troubleshooting.

Most troubles with the high rely classic family break down into these categories:

1. Host is unable to see controller.

This usually occurs due to a resource conflict or compatibility problem in the host. Try turning off the host power and back on. If controller is still not showing in device manager as either an unknown device or the intended device, shut down machine again and try moving the controller to another slot. If still not showing, repeat this step until all slots have been tried. At the point that all slots have been tried, it possible that the controller has failed or is simply not compatible with you machine. Check our READ FIRST page on our website under technical support or check our support database also on our website before contacting our technical support department.

2. Host is unable to see drive (media).

First identify the aource of the trouble. If you have drives the host can see, try installing them in the bays which drives can not be seen in or other bays. If the problem follows the media, then the drive maybe bad. If the problem follows the receiver, then the receiver or something else in the unit maybe faulty. Check our READ FIRST page on our website under technical support or check our support database also on our website before contacting our technical support department.

3. Drives mysteriously dissappear after being present.

Many troubles can occur which cause this. There can be a device conflict, a new piece of software or virus is interfering with disk devices, a component in the unit or media is loose, cables are loose, the USB or eSATA cable connecting the device may not be defective or not working within your enviroment (very high speed signals are in this cable). Of course, there could be a problem with the hard drive itself. Attempt to solve this problem like the one above. Try different media in different bays and keep notes determining if the problem follows the media or the bay. Check our READ FIRST page on our website under technical support or check our support database also on our website before contacting our technical support department.

4. A tray alarm is sounding.

If the tray is not showing a temperature over 130 degrees, then sometimes this occurs because of the handling of the trays or static discharge. In the section above for installing media, read how to silence the alarm. If the problem persists, contact our technical support department.

5. All others. For all other issues, check our READ FIRST page on our website under technical support or check our support database also on our website before contacting our technical support department.

9 **High-Rely product line, please visit our website at www.high-rely.com or see page 2 of HR Documentation SATAV2-2 (the manual for the 1 Bay Slimline, 5 Bay, 7, 8 and 10 Bay high-rely models).**

10 **Contact**



Contact Information

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