

# Highly Reliable Systems

## *RAIDPac-II Operations Manual*



## *Documentation V1.1*

# READ THIS FIRST

## Important Quick Start Information for your High-Rely drive

- DO NOT ATTEMPT TO REMOVE RAIDPacs from their drive bays without fully depressing the drive release lever. Forced removal of the drive will void your warranty and damaged the units.
- The latest Service Packs are important! Microsoft has continued to Debug removable drives on the Windows platforms. Make sure you have the latest service packs installed.
- Not all eSATA ports are created equal. And many hosts are finicky about working with third party disk controllers. We offer eSATA controllers tested to work with our systems but can not guarantee those cards will work properly in your host computer. If you have difficulties getting your host controller card to work, see the Read First page on our website under tech support or directly at:

<https://www.high-rely.com/HR3/includes/SupportReadFirst.php>

Other eSATA ports may only recognize the first drive in a multi-drive system or may not function at all. Host controller ESATA Ports should support hot-Swap and “port multiplier” capabilities.

- For USB 3.0 connections, be sure to have the absolute LATEST drivers for your USB 3.0 host controller.
- If you are using multiple RAIDPacs in a single bay RAIDFrame, you may have a drive letter problem as you change your media. Windows will assign drive letters based on the next available letter and sometimes in a manner that appears random, which could cause your backup software to fail depending on how it is configured. **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.
- Particular photos in this manual may not be your exact unit.

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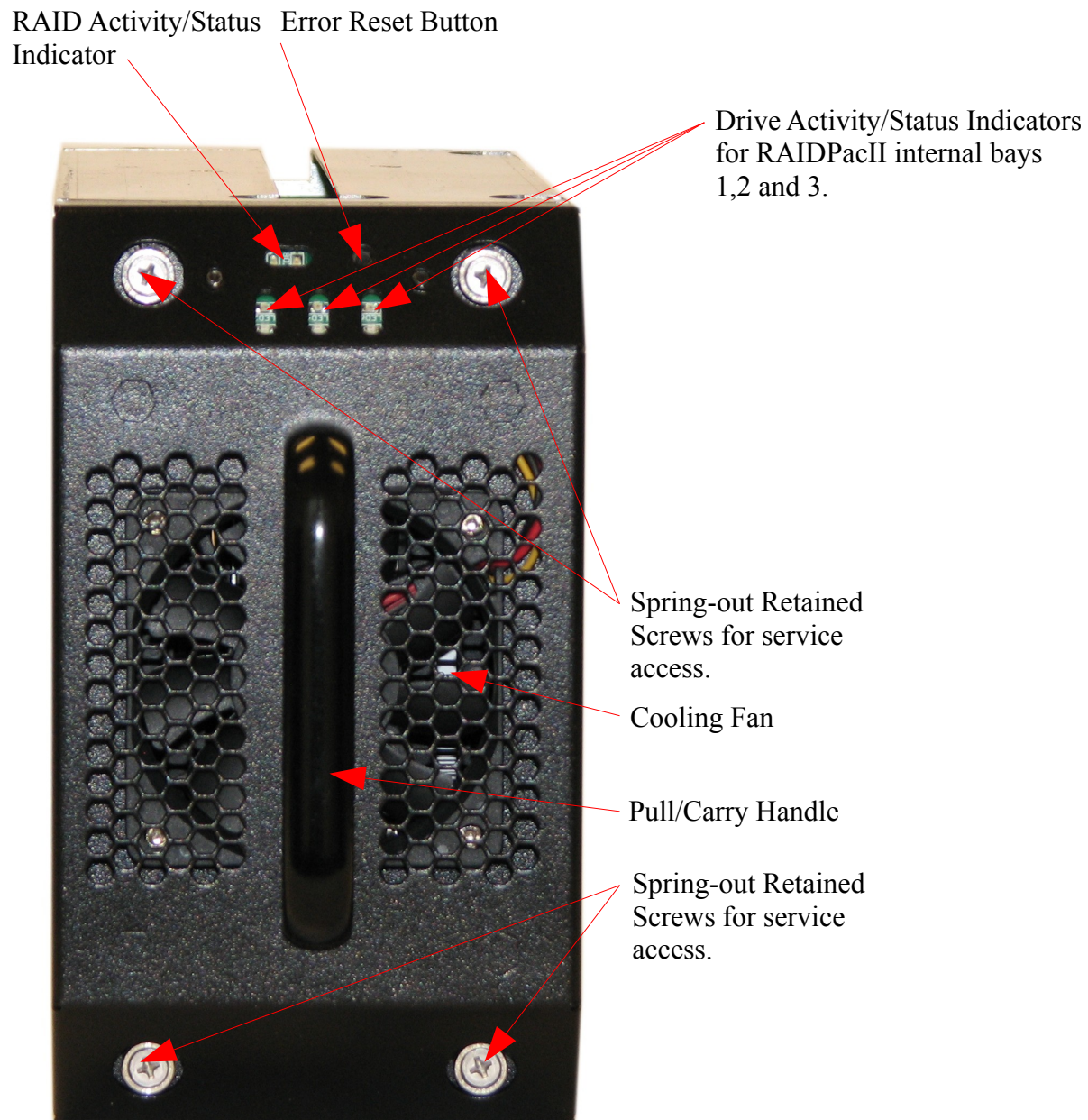
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# 1. Introduction

High-Rely's new RAIDPac-II (RP2) is a completely self-contained, hot-pluggable RAIDed drive system. It includes its own RAID controller, cooling system and up to 3) 3.5" hard drives. It is designed to be used inside RAIDFrame devices but can also be accessed stand-alone via either SATA or USB 3.0 and a standard Molex drive power connector with adequate power.

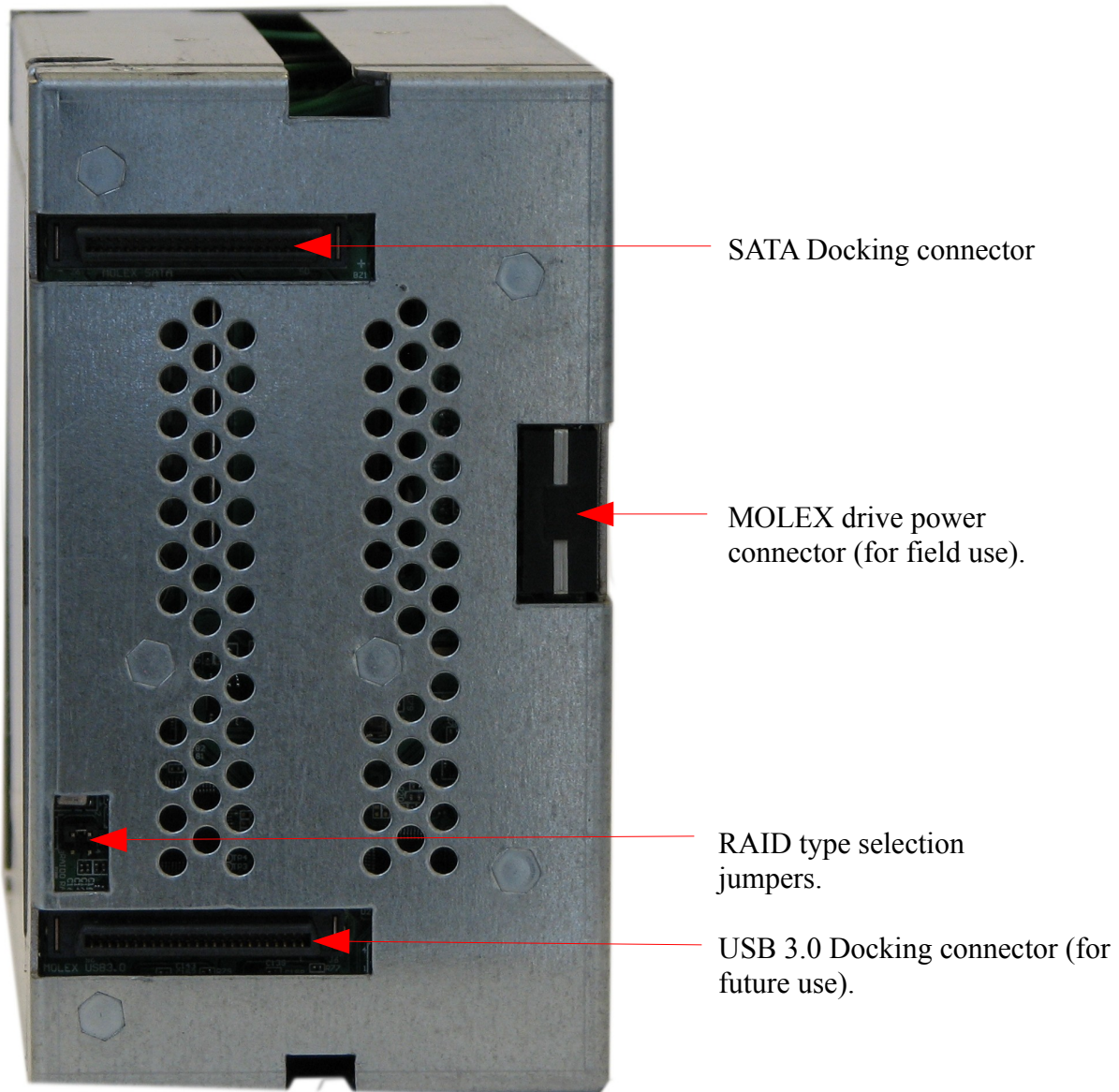
The RP2 is compatible with all existing RAIDFrame units and can co-exist with older RAIDPacs in the same unit simultaneously. This manual is dedicated to the features of the RP2 and operational notes. The previous version of RAIDPac is covered in the manual for each particular RAIDFrame unit.

## 2. Front Face features



*Figure 1 - RP2 front face features.*

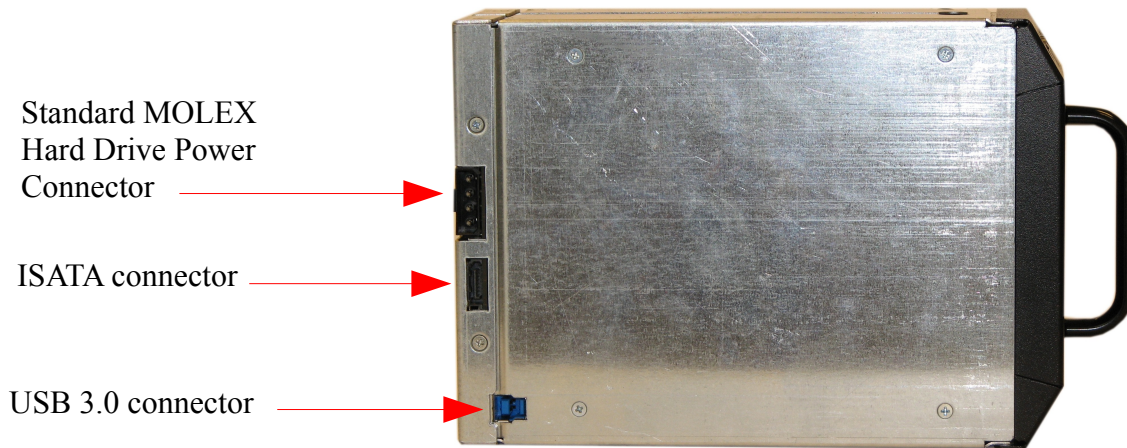
### 3. Rear Features



*Figure 2 - RP2 Rear side features.*



## 4. Side Features



*Figure 3 - RP2 Side features.*

## 5. Installation and Use

Like the previous version of RAIDPac (RP1), RP2's are already in a RAID configuration and formatted from the factory. By inserting the unit into your RAIDFrame, within 2 minutes you should see the volume appear on-line.

You may need to reformat the drive for your operating system's needs or your configuration. But no further processes or configurations should be necessary unless you need to change the configuration from the way it was ordered. Please note that most drives with useable capacities in excess of 2 TB will be partitioned as GPT. Some older operating systems may not recognize a GPT (GUID Partition Table) partition.

## 6. Status And Indicators

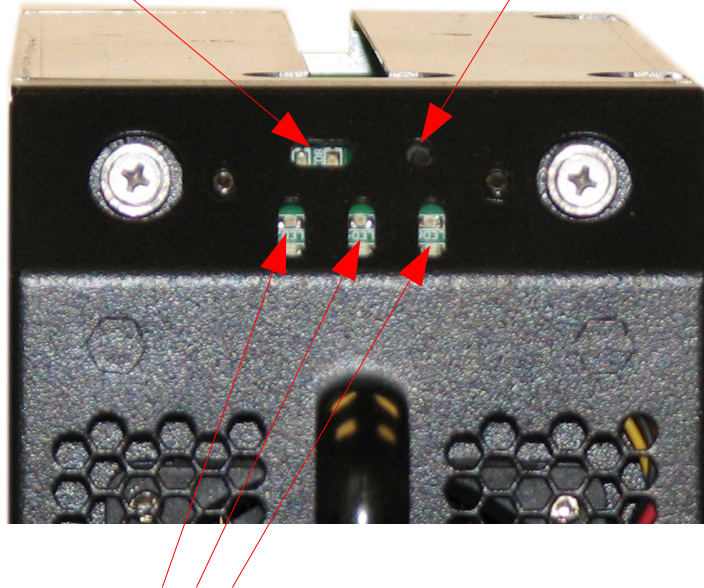
### RAID Status:

- Green: online working.
- Red: offline/error or degraded.

**Mute/Silence Alarm** – use pen.

Audible Alarm conditions:

- Drive(s) fail.
- RAID fail.
- Over temperature.



### Drive Status (Disks 1, 2, 3):

- Blue: Online
- Blue Blinking: Online with activity
- Red: Offline/Error.
- Red/Blue Blinking: Rebuilding.

*Figure 4 - Indicators Status*

The RP2's visual and audible indicators will alert you to trouble. The drive status indicators immediately indicate proper, improper or compromised operations. A properly running RP2 will be silent (no alarm tone), have a green light at the top and a blue light for each functioning drive installed in the RP2.

Should a drive fail, the audible alarm will sound, a red light will light corresponding to the drive position which failed.

Should the failure be severe enough to break the RAID, the green light at the top will be red, the unit will go off-line and there may be red lights also on the drive(s) which are not operating properly. See the section below on troubleshooting for more information.



## 7. Changing RAID configuration

The RP2 supports several RAID configurations. Those configurations are set at the factory but can easily be changed again in the field by two methods. One method is to use the jumpers on the back of the RP2 itself. The other is to use a free windows program called HW RAID Manager (available for download from our website). Using the jumper method allows quick change without running the program and maybe the only way in installations which a windows machine is not connected to the RAIDFrame.

### 7.1. Using Jumpers to change your RAID settings

On the back of the RP2 is a small cutout with two .100" standard center pin jumpers. Each time the RP2 is inserted, it checks to see if these jumpers have changed from the last time. If they have, it erases the current configuration and sets up the new configuration. **WARNING! CHANGING THESE JUMPERS WILL CAUSE COMPLETE DATA LOSS! Only move them if loosing your data is acceptable.**

Once a RAID type has been set, that type is branded onto the hard drives. Even though the jumpers may change thereafter, the RAID type will not change while a branded drive set is in the RP2. RAID type branding has priority over the jumpers. However, should the jumpers be set to the Single Drive setting, the branding is removed and the next RAID type change will become the new branding.

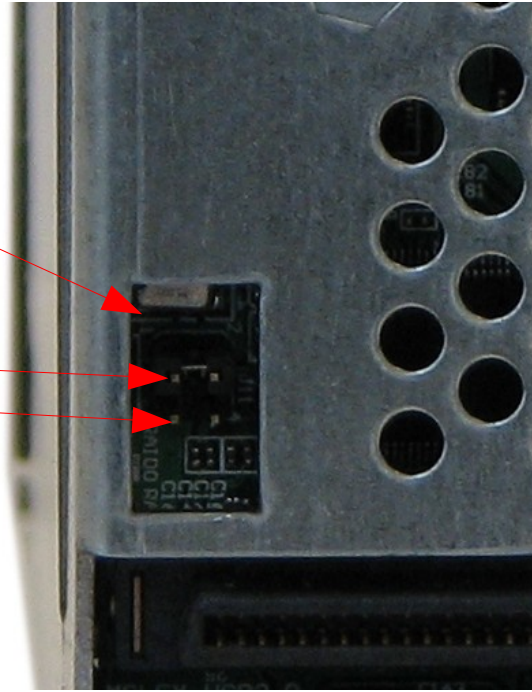
For example, if you had 3 1TB drives in a RAID 5 configuration that you wished to change to RAID 0, you would first put the jumpers in the Single Drive setting (remove them both). Then install the RP2 and let it power up. Once you hear the beep, it will have cleared the RAID branding from the drives and only a single drive's capacity will be shown to the system. Then, remove the RP2, set the jumpers to the RAID 0 setting. Insert the RP2 again. When you hear the beep again, it will have reconfigured itself to the RAID 0 setting. Any changes to the jumpers after this will have no effect on this drive set until it is placed in the Single Drive setting again.

See Figure 5 and 6 below for different RAID settings.

**RAID Type selection  
jumpers:**

Position 1

Position 2



*Figure 5 - RAID setting jumper pins.*

RAID Type	Jumper Position 1	Jumper Position 2
RAID 0	Open (Off)	Covered (On)
RAID 1	Covered (On)	Open (Off)
RAID 5	Covered (On)	Covered (On)
Single Drive (Clear Branding)	Open (Off)	Open (Off)

RAID Type (*= settable in HW Manager only, may not apply to use in RP2)	Description
0	<p>RAID 0: Striped, is the segmentation of logically sequential data, such as a single file, so that segments can be assigned to multiple hard disks in a round-robin fashion and thus written concurrently.</p> <p>The advantages of RAID 0 are that it achieves higher performance and capacity by accumulating each individual hard disks performance and capacity. <b>However, if any one hard disk becomes defective, information stored in the entire RAID0 array will be invalid!</b></p> <p>The RAID group controller will make use of the same smallest size disk space in each hard disk under RAID 0 condition. For example, if a RAID 0 consists of 5 different size hard disks, the total size of usable space of this RAID0 will be (the capacity of smallest size hard disk) X (the number of hard disks in this RAID0).</p>
1	<p>RAID 1 : Mirror, is the replication of data onto separate hard disks in real time to ensure continuous availability. In a RAID 1 system with two hard disks, data in a hard disk will be exactly the same as the data in the other hard disk.</p> <p>The RAID group controller will also make use of same smallest size disk space in each hard disk of RAID 1. That is, the RAID group controller will write data to the same disk space in each hard disk. When reading data, RAID group controller will read data from a favored hard disk. Failure in a hard disk will cause the RAID group controller to enter a degraded mode. The host controller still could read/write data normally without knowing any difference. Once the defective drive is replaced, the RAID group controller will then enter auto-rebuild mode automatically. If there is only some partial defect in a hard disk, the RAID group controller will read data from the other healthy hard drive.</p>
*10	RAID 10 (1+0 - mirrored and striped) two

	<p>mirrored sets in one striped set (minimum four disks; even number of disks) provides fault tolerance and improved performance but increases complexity. RAID 1+0 creates a striped set from a series of mirrored drives. The array can sustain multiple drive losses so long as no mirror loses all its drives. With 4 drives, this means that any one drive can fail. But if two drives fail, the whole RAID will break unless those two drives happen to be in the same mirror. RAID 10 offers better protection than RAID 5, 3 or RAID 1 because there is the added possibility of survival if two drives fail (under the right combination).</p>
*3	<p>RAID 3 (byte-level striping with dedicated parity), data is striped such that each sequential <a href="#">byte</a> is on a different disk. Parity is calculated across corresponding bytes on disks and stored on a dedicated parity disk. Higher data transfer rates are possible. A single drive failure is tolerated. RAID group controller will rebuild the failed drive upon replacement automatically.</p>
5	<p>RAID 5 (block-level striping with distributed parity) distributes parity along with the data and requires all drives but one to be present to operate; drive failure requires replacement, but the array is not destroyed by a single drive failure. Upon drive failure, any subsequent reads can be calculated from the distributed parity such that the drive failure is masked from the end user. The array will have data loss in the event of a second drive failure and is vulnerable until the data that was on the failed drive is rebuilt onto a replacement drive.</p>
*LARGE	<p>LARGE: The designated drives are concatenated into a single large volume. The difference between LARGE and RAID0 is that RAID 0 offers better performance but at the cost of flexibility. LARGE can concatenate drives of different sizes and use the complete space of all drives. <b>HOWEVER, LIKE RAID 0, LARGE CAN BECOME UNUSABLE IF JUST A SINGLE DRIVE FAILS.</b></p>
*CLONE	<p>Clone: The designated drives are mirror copies of each other.</p>

## 8. Using HW RAID Manager

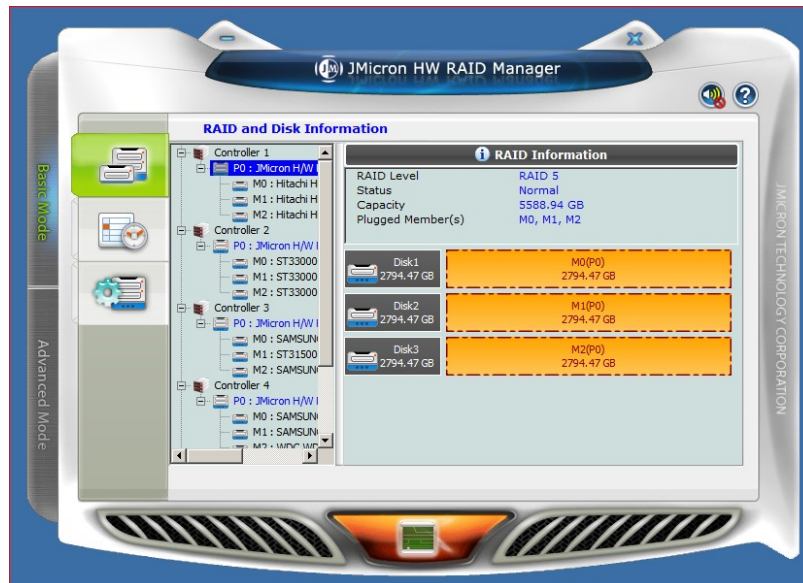


Figure 7 – HW RAID Manager Screen. RAID Information

\*This section is not intended to fully cover the features of the JMicon HW RAID Manager, as this is not High-Rely's software, but rather software from the chip set maker of the chip set used in the RP2. So, we will cover some basics. But, since this software is not under the control of High-Rely, it is subject to change without notice. As of this writing, the version of software was 0.09.69 (check by clicking the (?) in the top right corner).

The HW RAID Manager program is a Windows only program. The HW RAID manager program will allow you to see RP2's internal drives, change RAID configurations, check the event log, and set up SMTP alerts for the error conditions you select for the various RAIDPacs. If a drive RP2 is rebuilding, it can tell you the percentage of completion of the rebuild. You can also change the RAID rebuild priority.

On the left hand side of the panel are two tabs, "Basic Mode" and "Advanced Mode" Clicking in these will allow you to use the corresponding feature sets.

At this time, the HW RAID Manager runs only in the tray for Windows XP and Server 2003. For Windows Vista, 7 and Server 2008 and Server 2008 R 2, it runs as a service (JMRAID Manager). This can cause problems for XP and Server 2003 users as it will not be present to log events or email messages of events unless the user HW RAID Manager was installed for is logged in.

There are other software utilities, tools and ways to make a program run as a service. Google the phrase, "running a program as a service" for a list of methods which may work.

## 8.1. Monitoring your RAIDPacs with HW RAID manager.

HW Manager can send you SMTP messages for certain events that you flag. In the JM Manager Interface, click the Advanced Tab on the left, click the arrow/envelope icon at the top of the next tab set to get to the screen shown below.



Figure 8 – HW RAID Manager. Email Notification and Event Settings.

As you can see, you can select a wide variety of events to receive notifications for.

This is a simple SMTP email interface. Some users may have troubles with their email servers and SMTP without encryption. HW Manager does not currently support SSL or TLS encryption used in many newer emails servers. **High-rely does not support this program nor troubleshoot email problems.** If you're having difficulty, contact your service tech or try the suggestions below:

- Google for and download the program, SendEMail.exe.

- Use SendEMail.exe to perform this simple test:

- From the command prompt where you downloaded SendEMail.exe type:

```
sendEmail -f <Your Email> -t <Recipient's email> -s <Your Server's URL>:<Your Eserver's port> -xu  
<Your User Name> -xp <Your Password> -u "This is a test email" -m "Hi buddy, this is a test  
email. "
```

Here is an example using Lavabit.com:

```
sendEmail -f HRtest@lavabit.com -t bill@high-rely.com -s lavabit.com:587 -xu HRtest -xp HRtest -u  
"This is a test email" -m "Hi buddy, this is a test email. "
```



If this test works, your email server should work with HW RAID Manager. But if not, you may need to reconfigure your email server, routers or use an external server like Lavabit.

Here are some example settings in HW RAID manager using Lavabit.com:

SMTP Server Name: LAVABIT.COM

SMTP Server Port: 587

Sender Email: HRTest@lavabit.com

Sender Username: HRtest

Sender Password: HRtest

Recipient's Email: <your email address>

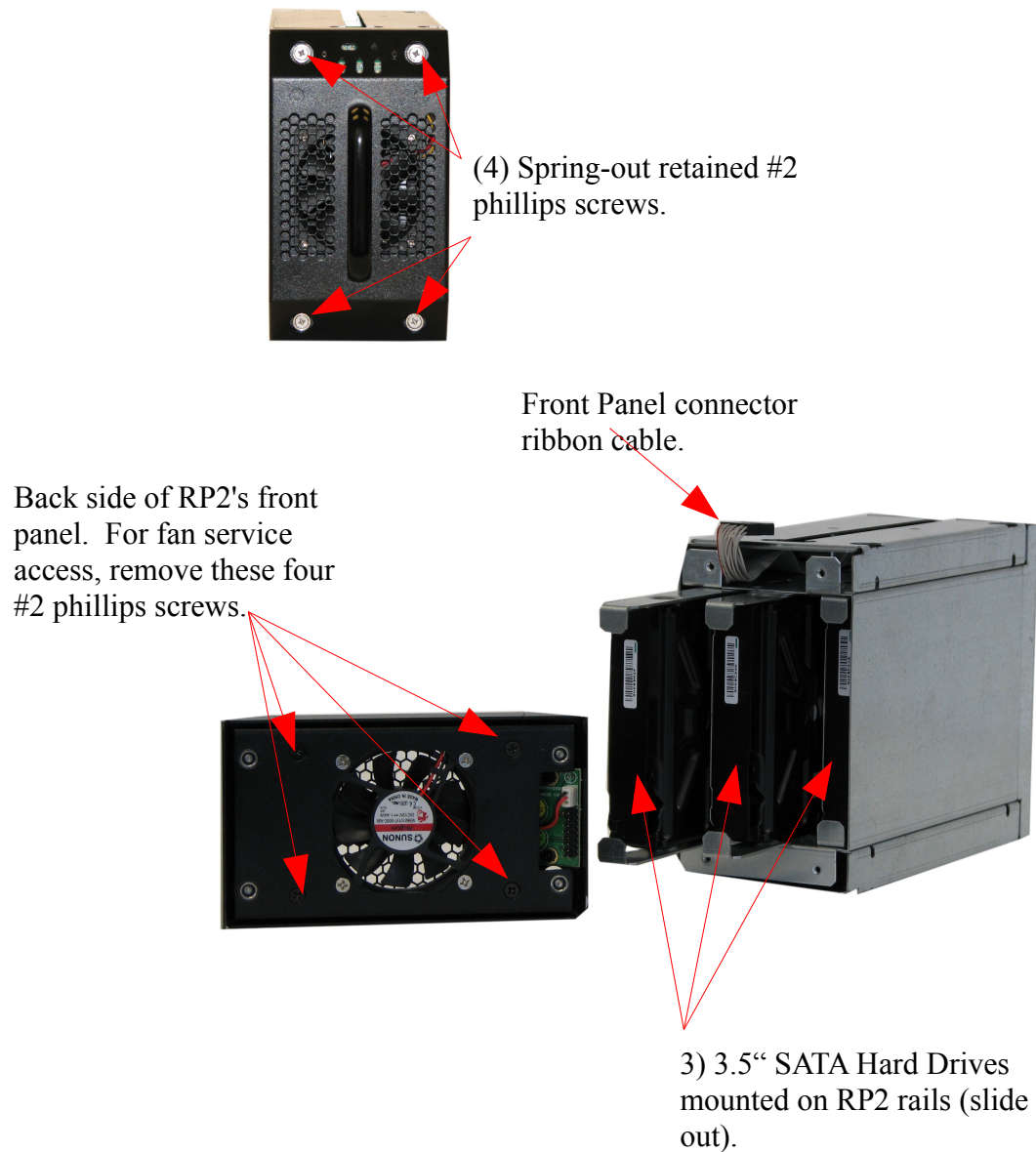
Then click Send Mail Test. And you see the test message appear in a few minutes.

Note: Port 587 is an alternate for port 25 which is often blocked in today's business routers.

We suggest you also try various target email addresses in case lavabit.com is blocked.

If this works for you but you can not configure your email server or firewalls to work, go to lavabit.com and set up your own account. Currently at the time of this writing, the accounts are free and simple to setup.

## 9. Troubleshooting and Maintenance



*Figure 9 - RP2's Service Access*

RP2's serviceable parts can all be accessed and changed from the front panel of the device, EVEN WHILE IN A RAIDFRAME BAY AND STILL RUNNING! The internal drives, fan and panel can all actually be safely "hot-plugged" within the RP2 if the pack is running a mission critical function.

## 9.1. RP2 Service Access

### WARNINGS ABOUT REMOVING PANEL:

- If pulling the front panel while the unit is a chassis and running, do not leave the panel off for an extended period of time. There is very little cooling once the fan is out of position and the unit may overheat.
- The sheet metal around the ribbon cable is sharp, be careful to not cut the cable or wedge it between any of the edges.

Be careful when reassembling to not let the ribbon cable stick out into the guide track and locking hole on the top of the chassis.

To access the fan and hard drives area for service:

1. Loosen the four spring-out retained screws until they "pop-out" with a #2 Phillips screwdriver.
2. Pull the panel off by grasping the handle and pulling gently. There is a ribbon cable attached to the top of the panel so be careful to not pull the panel out more than 2" from the rest of the chassis. If necessary, you can unplug the front panel from the cable, **EVEN WHILE THE UNIT IS POWERED ON AND RUNNING** if necessary. Note the direction of the cable, it is keyed and should only fit properly in one direction.

## 9.2. Changing failed drives.

If a drive is erroring on an RP2, before attempting to change the drive, try removing the RP2 from the chassis, wait 30 seconds, and install it again. If the error goes away and the drive starts to rebuild, things are probably fine as the drive itself just needed a power reset. However, if the error persists, then replacement of the drive in error is probably necessary. The position of the red light indicating the error, corresponds to the position of the physical drive.

To change the failed drive, first, follow the RP2 Service Access procedure above. Then:

1. To remove the defective drive from the RP2 chassis, hold the chassis firm (if not installed in a RAIDFrame bay). Pull straight out on the front edges of the slide rails for the drive you wish to change. The drive maybe firm at first but should slide out once you overcome the drive connector's holding force.
2. Unscrew the drive mounting rails from the defective drive and install them in same direction and orientation of the new drive.
3. Re-insert the new drive back into the RP2 chassis all the way.
4. Re-install the ribbon cable on the front panel if it was disconnected.
5. Re-install the front panel.
6. Once the RP2 is powered on (or if it was powered on during the whole process), it will begin to rebuild automatically if there were no further problems. It will also set the audible alarm indicating the rebuild. Press the mute button on the front to stop the tone.

## WARNINGS ABOUT REMOVING PANEL:

- If pulling the front panel while the unit is a chassis and running, do not leave the panel off for an extended period of time. There is very little cooling once the fan is out of position and the unit may overheat.
- The sheet metal around the ribbon cable is sharp, be careful to not cut the cable or wedge it between any of the edges.
- Be careful when reassembling to not let the ribbon cable stick out into the guide track and locking hole on the top of the chassis.

### **9.3. Changing failed fan.**

In the event the RP2's fan fails, the unit maybe fine and operate indefinitely provided the secondary cooling fans in the RAIDFrame chassis is able to keep the unit cool enough. Since the RP2's fan sit right up front in the RP2's front panel, checking if a fan is running is an easy audible or visual inspection.

If you received messages via HW RAID manager of temperature problems, the RP2's fan is the first suspect. If the fan is indeed stopped or sluggish, or making noises like the bearing is failing, the replacement procedure is simple and can even be done while the pack is running in a RAIDFrame chassis without interruption.

Follow the RP2's Service Access procedure above. Then:

1. Remove the four addition inner screws shown above that are located on the inside back of the RP2 front panel.
2. Note the air flow direction: it draws air from outside and blows it inward. Also note the position of the fan cable.
3. Remove the four fan screws on the fan mount plate.
4. Unplug the fan connector from the indicator board mounted on the RP2 front panel.
5. Install the replacement fan in the same airflow direction and with the fan cable orientation.
6. Plug the fan cable back in.
7. Install the fan plate.
8. Install the RP2 front panel in the reverse fashion described in the above Service Access procedure.

## 9.4. Installing new drives.

Should the desire ever come to install a complete set of newer and/or larger drives, the procedure is simple.

1. Follow the steps outline above in the section above for changing a failed drive. Except, do this for all three drives then re-assemble the RP2.
2. Install the RP2 in a RAIDFrame.
3. Follow the procedure above for changing your RAID configuration to establish the RAID.
4. Initialize and format the new volume in your operating system. If you're using HRDM2, you need to re-register the new volume with HRDM2.

## 10. Emergency (Field) Access to RP2 data from outside of a RAIDFrame.

One of the great capabilities of the RP2 is the ability for you to access your volume in the field and without a RAIDFrame bay. Original RAIDPacs supported this as well but some dis-assembly was required and only an iSATA connection was available.

The RP2 requires no dis-assembly. It provides both a SATA connection as well as USB 3.0 (works with USB 2.0 also). And, a standard hard drive MOLEX power plug allows you to plug it into almost any standard PC power supply. **WARNING! It will usually work to power the RP2 from the same computer as the computer you're plugging it into is using. However, that power supply may not be rated to power the computer and your RP2, DAMAGE to your power supply could occur.**

Because the RP2 contains its own RAID controller which presents the whole RAID to the host as a single volume, no special driver is needed. It's just a HUGE USB 3.0 thumb drive (for a giant's thumb) but it needs the external supply voltage from a computer type of power supply.

An iSATA port is also available to connect the unit with if USB 3.0 or USB 2.0 are not practical.

Because iSATA can be more tricky to connect, we suggest trying USB 3.0 first. Only one or the other maybe connected.

For the safest possible connection. Power off the computer and power supply. Make the connections you need to the RP2. Then power everything on. Hot plugging the field connections on the RP2 is not recommended.



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