ASUS

PIKE 2308

LSISAS RAID card

User Guide

Contents

About this guide

This user guide contains the information you need when installing and configuring the server management board.

How this guide is organized

This guide contains the following parts:

- **Chapter 1: Product introduction**

    This chapter offers the PIKE 2308 SAS RAID card features and the new technologies it supports.

- **Chapter 2: RAID configuration**

    This chapter provides instructions on setting up, creating, and configuring RAID sets using the available utilities.

- **Chapter 3: Driver installation**

    This chapter provides instructions for installing the RAID drivers on different operating systems.

Where to find more information

Refer to the following sources for additional information and for product and software updates.

1. **ASUS websites**

    The ASUS website provides updated information on ASUS hardware and software products. Refer to the ASUS contact information.

2. **Optional documentation**

    Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.

Conventions used in this guide

To make sure that you perform certain tasks properly, take note of the following symbols used throughout this manual.

DANGER/WARNING: Information to prevent injury to yourself when trying to complete a task.

CAUTION: Information to prevent damage to the components when trying to complete a task.

IMPORTANT: Instructions that you MUST follow to complete a task.

NOTE: Tips and additional information to help you complete a task.

Typography

Bold text	Indicates a menu or an item to select.
Italics	Used to emphasize a word or a phrase.
<Key>	Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key.
	Example: <Enter> means that you must press the Enter or Return key.
<Key1+Key2+Key3>	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).
	Example: <Ctrl+Alt+D>
`Command`	Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.
	Example: At the DOS prompt, type the command line: `format a:`

PIKE 2308 specifications summary

Controller	LSISAS2308
Interface	ASUS PIKE interface
Ports	8 ports
Support device	SAS/SAS II devices
	SATA/SATA II/SATA III devices
Data transfer rate	SATA III and SAS II 6Gb/s per PHY
RAID level	RAID 0/RAID 1/RAID 1E/RAID 10
OS support*	Windows® Server 2012
	Windows® Server 2008 Enterprise R2
	Windows® Server 2003 Enterprise R2
	Windows® 8
	Windows® 7 Ultimate
	Red Hat Enterprise Linux AS 5.8
	Red Hat Enterprise Linux AS 6.3
	SuSE Linux Enterprise Server 10.4
	SuSE Linux Enterprise Server 11.2
	CentOS 6.2
	Fedora 17
Form factor	6.44 in x 1.57 in (1U compatible)

* The exact OS support would base on the OS support list of the motherboard.

** Specifications are subject to change without notice.

This chapter offers the PIKE 2308 SAS RAID card features and the new technologies it supports.

Product introduction

1

1.1   Welcome!

Thank you for buying an ASUS® PIKE 2308 SAS RAID card!

The ASUS PIKE 2308 allows you to create RAID 0, RAID 1, RAID 1E, and RAID 10 sets from SATA/SATA II/SATA III/SAS/SAS II hard disk drives connected to the SAS connectors on the motherboard.

Before you start installing the RAID card, check the items in your package with the list below.

1.2   Package contents

Check your package for the following items.

- ASUS PIKE 2308 SAS RAID card
- Support CD
- User guide

If any of the above items is damaged or missing, contact your retailer.

1.3   Card layout

The illustration below shows the major components of the RAID card.
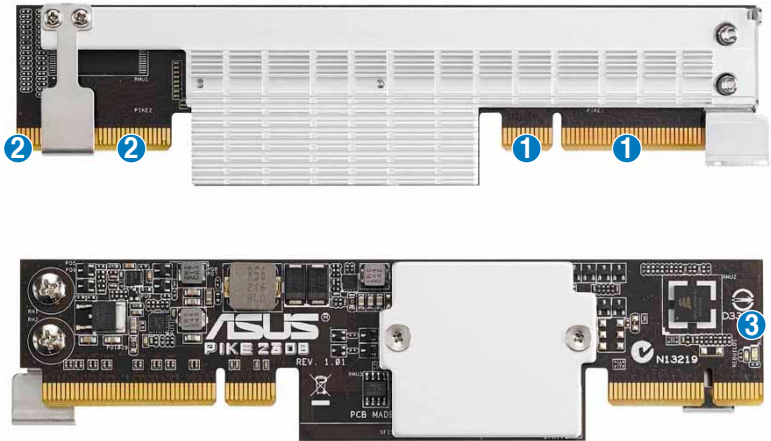
1.   ASUS PIKE interface-1: PCI-E x8

2.   ASUS PIKE interface-2: 8-port SAS signal with SGPIO interface*

3.   SAS RAID card status LED (lights up and blinks to indicate that the card is working normally)

> *The SGPIO interface is used for visibility into drive activity, failure and rebuild status, so that users could build high-performatnce and reliable storage systems. Refer to the motherboard manual for detailed information about using the SGPIO connectors on the motherboard.

1.4   System requirements

Before you install the PIKE 2308 SAS RAID card, check if the system meets the following requirements:

•   **Workstation or server motherboard with a PIKE RAID card slot**

•   **SAS or SATA hard disk drives**

•   **Supporting operating system:**

      Windows® and Linux operating systems (refer to website for details)

•   **Other requirement:**

      - Appropriate thermal solution
      - Certified power supply module

1.5   Card installation

Follow the below instructions to install the RAID card on your motherboard.

For 2U, 5U, or pedestal server

To install ASUS PIKE 2308 SAS RAID card on a 2U, 5U, or pedestal server

1.   Locate the PIKE RAID card slot on the motherboard.
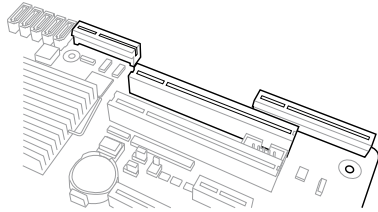
2.   Align the golden fingers of the RAID card with the PIKE RAID card slot.
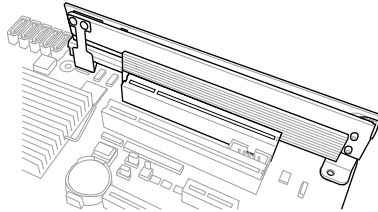
3.   Insert the RAID card into the PIKE RAID card slot. Ensure the card is completely inserted into the card slot, and the heatsink latch is completely hooked to the edge of the card slot.
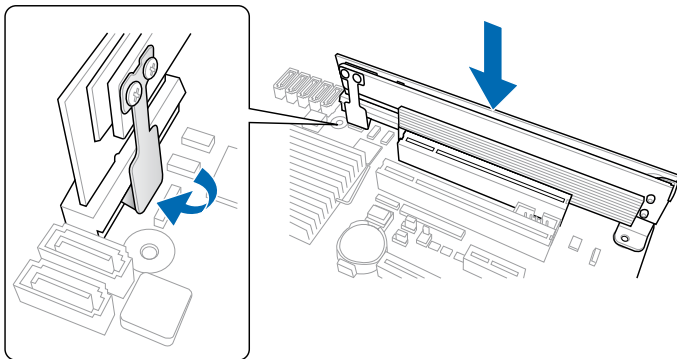
4. Secure the heatsink to the nearest screw hole on the motherboard.

> ⚠ DO NOT overtighten the screw, or the motherboard component can be damaged.
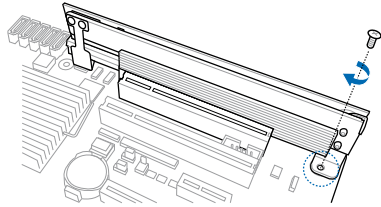
5. Connect the hard disk drives to the SAS connectors on the motherboard.
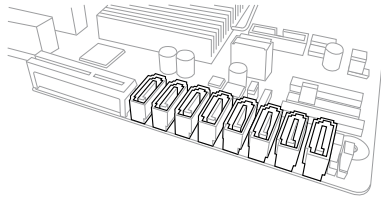
To uninstall ASUS PIKE 2308 SAS RAID card from a 2U, 5U, or pedestal server

1. Disconnect all SAS hard disk drives from the motherboard.

2. Remove the screw that secures the RAID card to the motherboard.
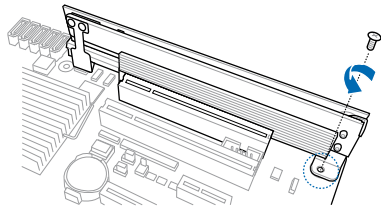
3. Release the heatsink latch from the card slot with a finger, and then remove the RAID card from the slot.
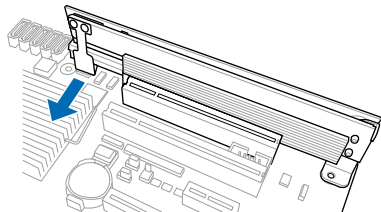
This chapter provides instructions on setting up, creating, and configuring RAID sets using the available utilities.

2

RAID configuration

2.1 Setting up RAID

The RAID card supports RAID 0, RAID 1, RAID 1E, and RAID 10.

2.1.1 RAID definitions

RAID 0 *(Data striping)* optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of at least two new identical hard disk drives is required for this setup.

RAID 1 *(Data mirroring)* copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

RAID 1E *(Enhanced RAID 1)* has a striped layout with each stripe unit having a secondary (or alternate) copy stored on a different disk. You can use three or more hard disk drives for this configuration.

RAID 10 is a striped configuration with RAID 1 segments whose segments are RAID 1 arrays. This configuration has the same fault tolerance as RAID 1, and has has the same overhead for fault-tolerance as mirroring alone. RAID 10 achieves high input/output rates by striping RAID 1 segments. In some instances, a RAID 10 configuration can sustain multiple simultaneous drive failure. A minimum of four hard disk drives is required for this setup.

> If you want to boot the system from a hard disk drive included in a created RAID set, copy first the RAID driver from the support CD to a floppy disk before you install an operating system to the selected hard disk drive.

2.1.2 Installing hard disk drives

The RAID card supports SAS for RAID set configuration. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

To install the SAS hard disks for RAID configuration:

1. Install the SAS hard disks into the drive bays following the instructions in the system user guide.

2. Connect a SAS signal cable to the signal connector at the back of each drive and to the SAS connector on the motherboard.

3. Connect a power cable to the power connector on each drive.

2.2 LSI Corporation MPT Setup Utility

The LSI Corporation MPT Setup Utility is an integrated RAID solution that allows you to create the following RAID sets from SAS hard disk drives supported by the LSI SAS 2308 Series controller: RAID 0, RAID 1, RAID 1E, and RAID 10.

- You may use disks of different sizes in one volume; however, the size of the smallest disk determines the "logical" size of each member disk.

- DO NOT combine Serial ATA and SAS disk drives in one volume.

- **The RAID setup screens shown in this section are for reference only and** may not exactly match the items on your screen due to the controller version difference.

- **The adapter name shown on the setup screens differs according to the** installed SAS RAID card.

- **Before requesting support from the ASUS Technical Support team, you** have to take note of the MPTFW and MPTBIOS version for the SAS RAID card. After entering the SAS configuration utility, you can see below screen and identify the MPTFW and MPTBIOS version:
  MPTFW version: 5.00.00.00-IR
  MPTBIOS version: v7.05.01.00 (2010.02.09)

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Adapter List  Global Properties

Adapter          PCI   PCI   PCI   PCI   FW Revision      Status      Boot
                 BUS   Dev   Fnc   Slot                               Order
Asus SAS2308     04    00    00    07    5.00.00.00-IR    Enabled     0




          Esc = Exit Menu        F1/Shift+1 = Help
          Alt+N = Global Properties   -/+ = Alter Boot Order   Ins/Del = Alter Boot List
```

2.2.1 RAID 1 volume

The RAID 1 feature supports simultaneous mirrored volumes with two disks.

The RAID 1 feature supports hot swap capability, so when a disk in an RAID 1 volume fails, you can easily restore the volume, and the swapped disk is automatically re-mirrored.

To create a RAID 1 volume:

1.   Turn on the system after installing all SAS hard disk drives.

2.   During POST, press <Ctrl+C> to enter the SAS configuration utility.

```
LSI Corporation MPT SAS2 BIOS
MPT2BIOS-7.05.01.00 (2010.02.09)
Copyright 2000-2010 LSI Corporation.

Press Ctrl-C to start LSI Corp Configuration Utility...
```

To avoid data loss, do not turn off the system when rebuilding.

3.   The following screen appears. Select a channel and press <Enter> to enter the setup.

```
LSI Corp Config Utility                v7.05.01.00 (2010.02.09)
Adapter List  Global Properties

Adapter          PCI   PCI   PCI   PCI   FW Revision     Status      Boot
                 BUS   Dev   Fnc   Slot                              Order
Asus SAS2308     04    00    00    07    5.00.00.00-IR   Enabled     0



Esc = Exit Menu      F1/Shift+1 = Help
Alt+N = Global Properties   -/+ = Alter Boot Order   Ins/Del = Alter Boot List
```

The numbers of the channel depend on the controller.

4. The **Adapter Properties** screen appears.
    Use the arrow keys to select **RAID Properties**, then press <Enter>.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Adapter Properties -- SAS2308

         Adapter                      Asus SAS2308
         PCI Slot                     07
         PCI Address(Bus/Dev)         04:00
         MPT Firmware Revision        5.00.00.00-IR
         SAS Address                  500E0180:1280E000
         NVDATA Version               05.02
         Status                       Enabled
         Boot Order                   0
         Boot Support                 [Enabled BIOS & OS]

         RAID Properties
         SAS Topology
         Advanced Adapter Properties




Esc = Exit Menu        F1/Shift+1 = Help
Enter = Select Item    -/+/Enter = Change Item
```

5. The **Select New Volume Type** screen appears.
    Use the arrow keys to select **Create RAID 1 Volume**, then press <Enter>.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Select New Volume Type -- SAS2308

     Create RAID 1 Volume        Create a RAID 1 volume
                                 consisting of 2 disks plus up to 2
                                 optional hot spares. ALL DATA on
                                 volume disks will be DELETED!

     Create RAID 1E/10 Volume    Create a RAID 1E or RAID 10 volume
                                 consisting of 3 to 10 disks including up
                                 to 2 optional hot spares. ALL DATA on
                                 volume disks will be DELETED!

     Create RAID 0 Volume        Create a RAID 0 volume consisting of
                                 2 to 10 disks. ALL DATA on
                                 volume disks will be DELETED!




Esc = Exit Menu        F1/Shift+1 = Help
Enter = Choose volume type to create
```

6.   The **Create New Volume** screen shows the disks you can add to make up the RAID 1 volume. Use the arrow key to select a disk, then move the cursor to the **RAID Disk** column. To include this disk in the array, press <+>, <->, or <Space>.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Create New Volume -- SAS2308

  Volume Type:                     RAID 1
  Volume Size(GB):                 -------
Slot  Device Identifier            RAID   Drive        Pred   Size
Num                                Disk   Status       Fail   (GB)
  0   ATA      WDC WD800JD-22LS1D06 [No]   ----------   No       74
  1   ATA      WDC WD800JD-22LS1D06 [No]   ----------   No       74
  2   ATA      WDC WD800JD-22LS1D06 [No]   ----------   No       74
  3   ATA      WDC WD800JD-22LS1D06 [No]   ----------   No       74




Esc = Exit Menu       F1/Shift+1 = Help
SPACE/+/- = Select disk for volume        C = Create volume
```

By default, the **RAID Disk** field shows **No** before volume creation. This field is grayed out under the following conditions:

•   The disk does not meet the minimum requirements for use in a RAID volume.

•   The disk is not large enough to mirror existing data on the primary drive.

•   The disk is already part of another volume.

7. A warning screen appears. Press any key to continue.

   Press <M> to keep existing data on the first disk. If you choose this option, data on the first disk will be mirrored on the second disk that you will add to the volume later. Ensure the data you want to mirror is on the first disk.

   Press <D> to overwrite any data and create the new IM array.

```
LSI Corp Config Utility            v7.05.01.00 (2010.02.09)
Create New Volume -- SAS2308

WARNING! Data was found on the selected disk, this data will be lost
when the volume is created!
Choose Discard configuration or Cancel Exit on the next screen to abort.








Esc = Exit Menu          F1/Shift+1 = Help
SPACE/+/- = Select disk for volume          C = Create array
```
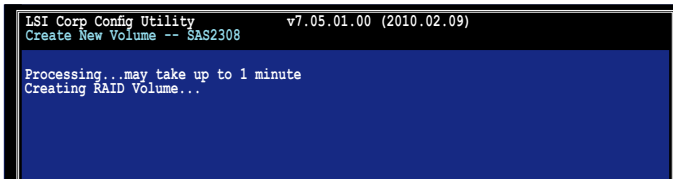
8. Repeat step 6 to add the second disk to the volume.

9. When done, press <C> to create the volume, then select **Save changes then exit this menu**.

```
Create and save new volume?
 Cancel Exit
 Save changes then exit this menu
 Discard changes then exit this menu
 Exit the Configuration Utility and Reboot
```

10. The utility creates the volume.

```
LSI Corp Config Utility            v7.05.01.00 (2010.02.09)
Create New Volume -- SAS2308

Processing...may take up to 1 minute
Creating RAID Volume...
```

2.2.2   RAID 1E/10 volume

The RAID 1E/10 supports three to ten disks, or seven mirrored disks plus two hot spare disks.

> Use odd numbers of hard disk drives to create a RAID 1E volume; use even numbers of hard disk drives to create a RAID 10 volume.

To create a RAID 1E/10 volume:

1.   Follow steps 1–4 of the section **RAID 1E/10 volume**.

2.   The **Select New Volume Type** screen appears.
      Use the arrow keys to select **Create RAID 1E/10 Volume**, then press <Enter>.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Select New Volume Type -- SAS2308


      Create RAID 1 Volume        Create a RAID 1 volume
                                  consisting of 2 disks plus up to 2
                                  optional hot spares. ALL DATA on
                                  volume disks will be DELETED!

      Create RAID 1E/10 Volume    Create a RAID 1E or RAID 10 volume
                                  consisting of 3 to 10 disks including up
                                  to 2 optional hot spares. ALL DATA on
                                  volume disks will be DELETED!

      Create RAID 0 Volume        Create a RAID 0 volume consisting of
                                  2 to 10 disks. ALL DATA on
                                  volume disks will be DELETED!




Esc = Exit Menu        F1/Shift+1 = Help
Enter = Choose volume type to create
```
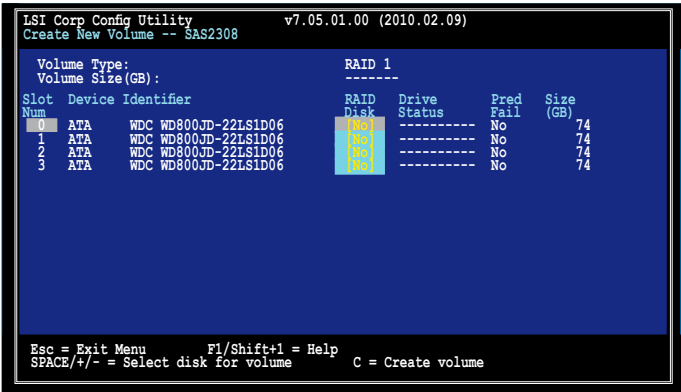
3.   The **Create New Volume** screen shows the disks you can add to make up the RAID 1E/10 volume.

      RAID 1E/10 supports three to ten disks, or seven mirrored disks plus two hot spare disks. Use the arrow key to select a disk, then move the cursor to the **RAID Disk** column. To include this disk in the array, press <+>, <->, or <Space>.
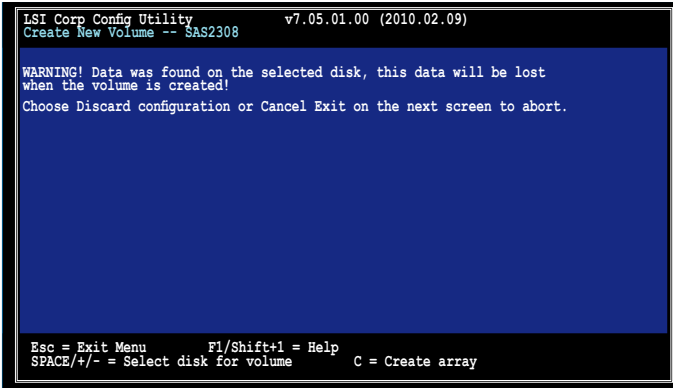
```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Create New Volume -- SAS2308

   Volume Type:                     RAID 1E
   Volume Size(GB):                 -------
 Slot  Device Identifier            RAID    Drive      Pred   Size
 Num                                Disk    Status     Fail   (GB)
   0    ATA      WDC WD800JD-22LS1D06   [No]   ----------   No      74
   1    ATA      WDC WD800JD-22LS1D06   [No]   ----------   No      74
   2    ATA      WDC WD800JD-22LS1D06   [No]   ----------   No      74
   3    ATA      WDC WD800JD-22LS1D06   [No]   ----------   No      74




 Esc = Exit Menu       F1/Shift+1 = Help
 SPACE/+/- = Select disk for volume       C = Create volume
```

By default, the **RAID Disk** field shows **No** before volume creation. This field is grayed out under the following conditions:

- The disk does not meet the minimum requirements for use in a RAID volume.
- The disk is not large enough to mirror existing data on the primary drive.
- The disk is already part of another volume.

4.   Repeat step 3 to add the other disks to the volume.

5.   When done, press <C> to create the volume, then select **Save changes then exit this menu**.

```
Create and save new volume?
 Cancel Exit
 Save changes then exit this menu
 Discard changes then exit this menu
 Exit the Configuration Utility and Reboot
```

6.   The utility creates the volume.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Create New Volume -- SAS2308

 Processing...may take up to 1 minute
 Creating RAID Volume...
```

2.2.3 RAID 0 volume

The RAID 0 feature supports volumes with two to ten disks. You may combine an RAID 0 volume with an RAID 1 or RAID 1E/10 volume.

To create a RAID 0 volume:

1. Follow steps 1–4 of the section **RAID 1 volume**.

2. The **Select New Volume Type** screen appears.
    Use the arrow keys to select **Create RAID 0 Volume**, then press <Enter>.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Select New Volume Type -- SAS2308


        Create RAID 1 Volume          Create a RAID 1 volume
                                      consisting of 2 disks plus up to 2
                                      optional hot spares. ALL DATA on
                                      volume disks will be DELETED!

        Create RAID 1E/10 Volume      Create a RAID 1E or RAID 10 volume
                                      consisting of 3 to 10 disks including up
                                      to 2 optional hot spares. ALL DATA on
                                      volume disks will be DELETED!

        Create RAID 0 Volume          Create a RAID 0 volume consisting of
                                      2 to 10 disks. ALL DATA on
                                      volume disks will be DELETED!




Esc = Exit Menu          F1/Shift+1 = Help
Enter = Choose volume type to create
```

3. The **Create New Volume** screen shows the disks you can add to make up the RAID 0 volume. Use the arrow key to select a disk, then move the cursor to the **RAID Disk** column. To include this disk in the array, press <+>, <->, or <Space>.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Create New Volume -- SAS2308

   Volume Type:                 RAID 0
   Volume Size(GB):             -------
Slot  Device Identifier         RAID   Drive        Pred   Size
Num                             Disk   Status       Fail   (GB)
   0   ATA      WDC WD800JD-22LS1D06   [No]  ----------   No      74
   1   ATA      WDC WD800JD-22LS1D06   [No]  ----------   No      74
   2   ATA      WDC WD800JD-22LS1D06   [No]  ----------   No      74
   3   ATA      WDC WD800JD-22LS1D06   [No]  ----------   No      74








Esc = Exit Menu          F1/Shift+1 = Help
SPACE/+/- = Select disk for volume          C = Create volume
```

By default, the **RAID Disk** field shows **No** before volume creation. This field is grayed out under the following conditions:

- The disk does not meet the minimum requirements for use in a RAID volume.
- The disk is not large enough to mirror existing data on the primary drive.
- The disk is already part of another volume.

4. Repeat step 3 to add the other disks to the volume.

5. When done, press <C> to create the volume, then select **Save changes then exit this menu**.

```
Create and save new volume?
 Cancel Exit
 Save changes then exit this menu
 Discard changes then exit this menu
 Exit the Configuration Utility and Reboot
```

6. The utility creates the volume.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Create New Volume -- SAS2308

Processing...may take up to 1 minute
Creating RAID Volume...
```
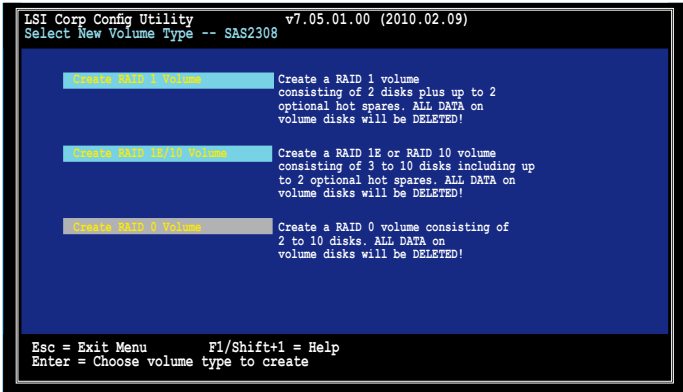
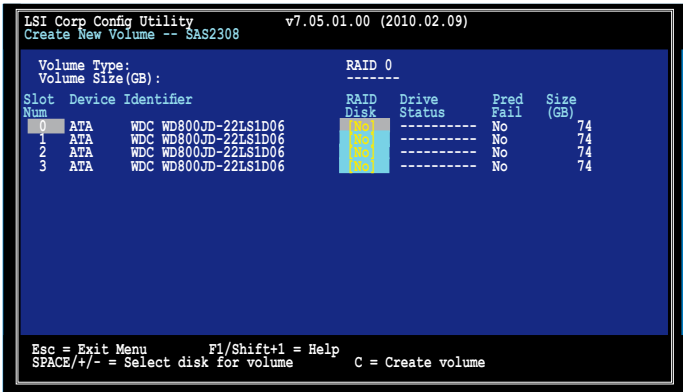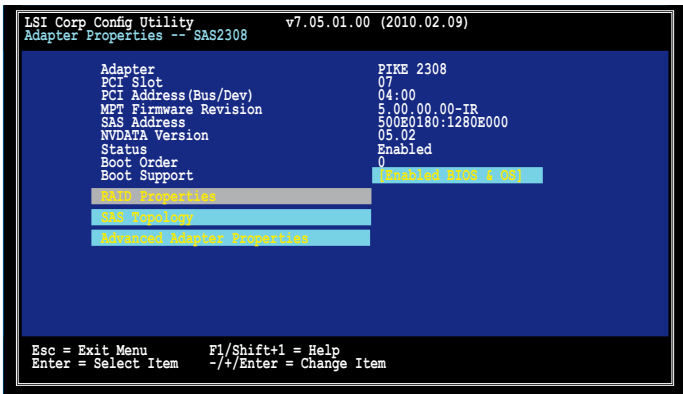## 2.2.4   Managing Arrays

The LSI Corporation MPT Setup Utility allows you to perform other tasks related to configuring and maintaining RAID volumes.

Refer to this section to view volume properties, manage the hot spare disk, proceed with the volume consistency check, activate the volume, delete the volume, and expand the volume capacity.

Viewing volume properties

To view volume properties:

1.   On the main menu, select **RAID Properties**.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Adapter Properties -- SAS2308

         Adapter                        PIKE 2308
         PCI Slot                       07
         PCI Address(Bus/Dev)           04:00
         MPT Firmware Revision          5.00.00.00-IR
         SAS Address                    500E0180:1280E000
         NVDATA Version                 05.02
         Status                         Enabled
         Boot Order                     0
         Boot Support                   [Enabled BIOS & OS]

         RAID Properties

         SAS Topology

         Advanced Adapter Properties




Esc = Exit Menu        F1/Shift+1 = Help
Enter = Select Item    -/+/Enter = Change Item
```

2.   On the next screen that appears, select **View Existing Volume**.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Select New Volume Type -- SAS2308

      View Existing Volume        View the existing configuration.

      Create RAID 1 Volume        Create a RAID 1 volume
                                  consisting of 2 disks plus up to 2
                                  optional hot spares. ALL DATA on
                                  volume disks will be DELETED!

      Create RAID 1E/10 Volume    Create a RAID 1E or RAID 10 volume
                                  consisting of 3 to 10 disks including up
                                  to 2 optional hot spares. ALL DATA on
                                  volume disks will be DELETED!

      Create RAID 0 Volume        Create a RAID 0 volume consisting of
                                  2 to 10 disks. ALL DATA on
                                  volume disks will be DELETED!



Esc = Exit Menu        F1/Shift+1 = Help
Enter = Choose volume type to create
```

3. The **View Volume** screen appears. Here you can view properties of the RAID volume(s) created. If you have configured a hot spare, it will also be listed. If you created more than one volume, you may view the next volume by pressing <Alt+N>.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
View Volume -- SAS2308

        Volume                   1 of 1
        Identifier               LSI      Logical Volume   3000
        Type                     RAID 1
        Size(GB)                 73
        Status                   Optimal
        Task                     None

        Manage Volume

Slot    Device Identifier            RAID  Hot   Drive      Pred   Size
Num                                  Disk  Spr   Status     Fail   (GB)
  0     ATA     WDC WD800JD-22LS1D06  Yes   No    Primary    No       73
  1     ATA     WDC WD800JD-22LS1D06  Yes   No    Secondary  No       73




Esc = Exit Menu        F1/Shift+1 = Help
Enter=Select Item    Alt+N=Next Volume
```

Managing hot spares

You may configure one disk as a global hot spare to protect critical data on the RAID 1/1E/10 volume(s). You may create the hot spare disk at the same time you create the RAID 1/1E/10 volume. Refer to this section when adding a hot spare disk on an existing volume.

> If a disk on an RAID 1/1E/10 volume fails, the utility automatically rebuilds the failed disk data on the hot spare. When the failed disk is replaced, the utility assigns the replacement as the new hot spare.

To create a hot spare:

1. Follow steps 1–3 of the section **Viewing volume properties**.

2. From the **View Volume** screen, select **Manage Volume**, then press <Enter>.

3. From the **Manage Volume** screen, select **Manage Hot Spares**, then press <Enter>.

4.   Use the arrow key to select the disk you would like to configure as hot spare, then move the cursor to the **Hot Spr** column. Press <+>, <->, or <Space>.

Press <C> to commit the changes. The **Drive Status** column field now shows **Hot Spare**.

```
 LSI Corp Config Utility        v7.05.01.00 (2010.02.09)
 Manage Hot Spare -- SAS2308

        Identifier               LSI    Logical Volume  3000
        Type                     RAID 1
        Size(GB)                 73
        Status                   Optimal
        Task                     None

 Slot   Device Identifier             Hot    Drive      Pred    Size
 Num                                  Spr    Status     Fail    (GB)
   0    ATA     WDC WD800JD-22LS1D06   [No]   RAID       No        74
   1    ATA     WDC WD800JD-22LS1D06   [No]   RAID       No        74
   2    ATA     WDC WD800JD-22LS1D06   [No]   ----------  No       74
   3    ATA     WDC WD800JD-22LS1D06   [No]   ----------  No       74




 Esc = Exit Menu        F1/Shift+1 = Help
 SPACE/+/- = Change Item             C = Commit Changes
```

Running a consistency check

To run a consistency check on the RAID volume:

1.   Follow steps 1–3 of the section **Viewing volume properties** and step 2 of the section **Managing hot spares**.

2.   From the **Manage Volume** screen select **Consistency Check**, then press <Enter>.

3.   The below screen appears. Press <Enter> to start the consistency check on the RAID volume.

```
 LSI Corp Config Utility        v7.05.01.00 (2010.02.09)
 Manage Volume -- SAS2308

 Press Enter to run a consistency check on the RAID volume.

 This field is grayed out under the following conditions:
 - The adapter's MPT FW does not support the feature
 - The volume is a RAID 0
 - The volume is not optimal
 - The volume is already running a consistency check
 - The volume has a consistency check pending







 Esc = Exit Menu        F1/Shift+1 = Help
 Enter = Select Item
```

Activating a volume

If a volume is removed from one controller/computer or moved to another, the volume is considered inactive. When you add the volume back to the system, you may reactivate the volume.

To activate the volume:

1. From the **Manage Volume** screen, select **Activate Volume**, then press <Enter>.

```
LSI Corp Config Utility              v7.05.01.00 (2010.02.09)
Manage Volume -- SAS2308

     Identifier                    LSI      Logical Volume  3000
     Type                          RAID 1
     Size(GB)                      73
     Status                        Optimal
     Task                          None

     Manage Hot Spares

     Consistency Check

     Activate Volume

     Delete Volume

     Online Capacity Expansion




  Esc = Exit Menu        F1/Shift+1 = Help
  Enter = Select Item
```
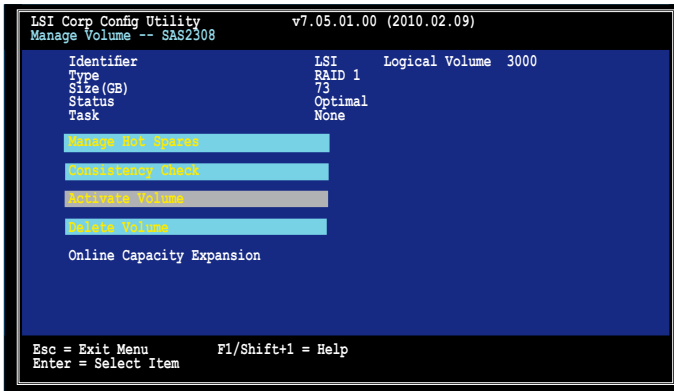
2. The below screen appears. Press <Enter> to activate a RAID volume.

```
LSI Corp Config Utility              v7.05.01.00 (2010.02.09)
Manage Volume -- SAS2308

This field is used to activate a RAID volume.

This field is grayed out under the following conditions:
- The volume is currently active.
- Activating the volume would exceed the maximum number of
  active volumes allowed.
- Activating the volume would exceed the maximum number of
  RAID disks allowed.
- The volume has incompatible metadata on it.







  Esc = Exit Menu        F1/Shift+1 = Help
  Enter = Select Item
```

Deleting a volume

> ⚠ • You cannot recover lost data if you delete a volume. Ensure you back up important data before deleting a volume.
>
> • If you delete a RAID 1 volume, the data is preserved on the primary disk.

To delete a volume:

1. From the **Manage Volume** screen, select **Delete Volume**, then press <Enter>.

```
LSI Corp Config Utility            v7.05.01.00 (2010.02.09)
Manage Volume -- SAS2308

     Identifier                 LSI      Logical Volume  3000
     Type                       RAID 1
     Size(GB)                   73
     Status                     Optimal
     Task                       None

     Manage Hot Spares

     Consistency Check

     Activate Volume

     Delete Volume

     Online Capacity Expansion




Esc = Exit Menu          F1/Shift+1 = Help
Enter = Select Item
```

2. The below screen appears. Press <Y> to delete, or <N> to cancel.

```
LSI Corp Config Utility            v7.05.01.00 (2010.02.09)
Manage Volume -- SAS2308


WARNING! All data will be lost when the volume is deleted!


         Y       Delete volume and exit to Adapter Properties
         N       Abandon volume deletion and exit this menu








Esc = Exit Menu          F1/Shift+1 = Help
Enter = Select Item
```

Expanding the volume capacity

You may use two new hard disk drives to replace the existing one, and expand the capacity of the RAID volume.

• The capactiy of th new hard disk drives should be 50GB larger than the existing one.

• This function is available only when the RAID 1 volume is optimal.

To expand the capacity of the currently displayed RAID volume:

1. From the **Manage Volume** screen, select **Online Capacity Expansion**, then press <Enter>.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Manage Volume -- SAS2308

      Identifier              LSI     Logical Volume  3000
      Type                    RAID 1
      Size(GB)                73
      Status                  Optimal
      Task                    None

      Manage Hot Spares

      Consistency Check

      Activate Volume

      Delete Volume

      Online Capacity Expansion




Esc = Exit Menu          F1/Shift+1 = Help
Enter = Select Item
```

2. The below screen appears. Press <Enter> to proceed with the capacity expansion.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Manage Volume -- SAS2308

This field is used to expand the capacity of the currently displayed
RAID volume.

This field is disabled under the following conditions:
- The volume is not a RAID 1 volume.
- Firmware is configured to diable this feature.








Esc = Exit Menu          F1/Shift+1 = Help
Enter = Select Item
```

2.2.5 Viewing SAS topology

1. From the **Adapter Properties** screen, select **SAS Topology**, then press <Enter>.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Adapter Properties -- SAS2308

          Adapter                    PIKE 2308
          PCI Slot                   07
          PCI Address(Bus/Dev)       04:00
          MPT Firmware Revision      5.00.00.00-IR
          SAS Address                500E0180:1280E000
          NVDATA Version             05.02
          Status                     Enabled
          Boot Order                 0
          Boot Support               [Enabled BIOS & OS]

          RAID Properties
          SAS Topology
          Advanced Adapter Properties


Esc = Exit Menu      F1/Shift+1 = Help
Enter = Select Item    -/+/Enter = Change Item
```

2. Information about the volume and its member-disks are then displayed.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
SAS Topology -- SAS2308

                    Device Identifier          Device
                                               Info
PIKE 2308(04:00)
├─ Controller        Direct Attach Devices     Controller
└─ RAID1 VOL         LSI    Logical Volume  3000







Esc = Exit   F1/Shift+1 = Help
Alt+D = Device Properties   Alt+M = More Keys
```

You may press <Alt+D> to display device properties, or <Alt+M> to display more keys.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
SAS Topology -- SAS2308

More keys for the SAS Topology display:

Alt+B = Select or deselect a device as the preferred boot device
Alt+A = Select or deselect a device as the alternate boot device

Enter = On a SAS Enclosure or Expander - Expand or Collapse Item
Enter = On a Disk Drive - Turn on the Locate LED (next key press turns off)
```

2.2.6   Global Properties

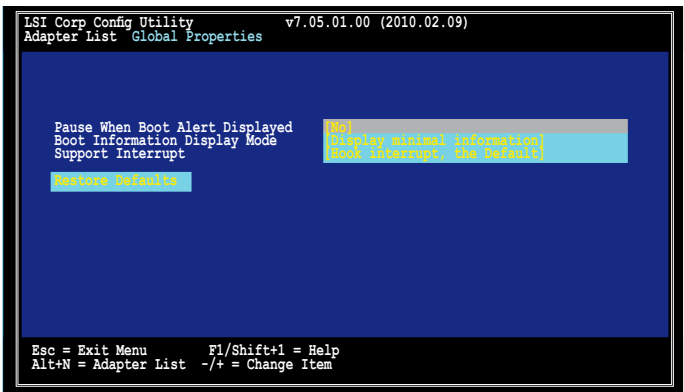From the **Adapter List** screen, press <Alt+N> to enter **Global Properties** menu. From the menu you may change related settings.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Adapter List  Global Properties

Adapter            PCI   PCI   PCI   PCI   FW Revision      Status      Boot
                   BUS   Dev   Fnc   Slot                              Order
PIKE 2308          04    00    00    07    5.00.00.00-IR    Enabled     0




Esc = Exit Menu        F1/Shift+1 = Help
Alt+N = Global Properties   -/+ = Alter Boot Order   Ins/Del = Alter Boot List
```
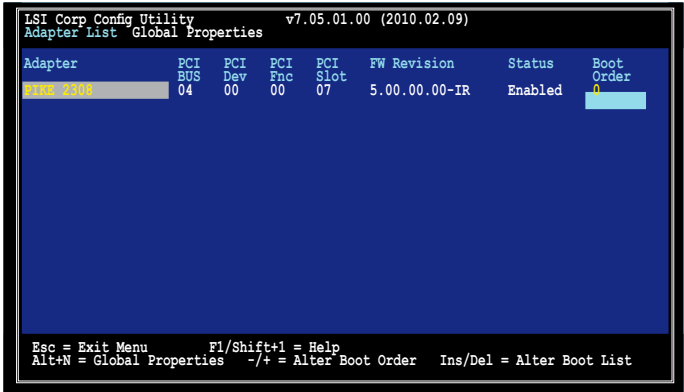
Pause When Boot Alert Displayed

Sets whether to pause or not when the boot alert displays.
Configuration options: [Yes] [No]

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Adapter List  Global Properties


    Pause When Boot Alert Displayed   [No]
    Boot Information Display Mode     [Display minimal information]
    Support Interrupt                 [Hook interrupt, the Default]

    Restore Defaults




Esc = Exit Menu        F1/Shift+1 = Help
Alt+N = Adapter List   -/+ = Change Item
```
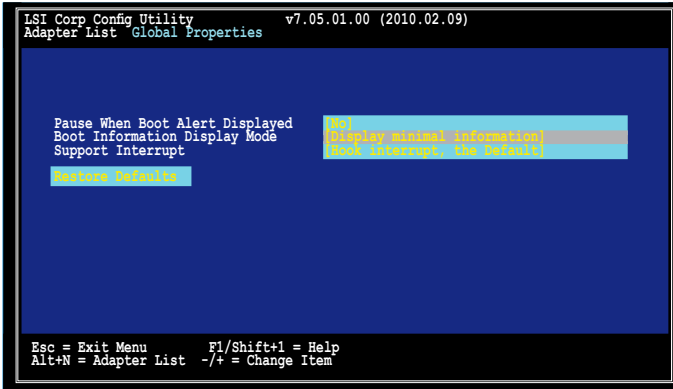
Boot Information Display Mode

Sets the disk information display mode.
Configuration options: [Display adapters & installed devices]
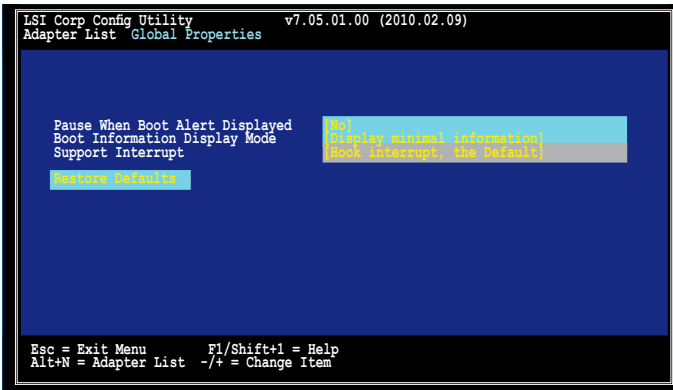[Display adapters only] [Display adapters and all devices]
[Display minimal information]

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Adapter List  Global Properties



        Pause When Boot Alert Displayed    [No]
        Boot Information Display Mode      [Display minimal information]
        Support Interrupt                 [Hook interrupt, the Default]

        Restore Defaults




    Esc = Exit Menu       F1/Shift+1 = Help
    Alt+N = Adapter List  -/+ = Change Item
```

Support Interrupt

Configuration options: [Hook interrupt, the Default] [Bypass interrupt hook]

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Adapter List  Global Properties



        Pause When Boot Alert Displayed    [No]
        Boot Information Display Mode      [Display minimal information]
        Support Interrupt                 [Hook interrupt, the Default]

        Restore Defaults




    Esc = Exit Menu       F1/Shift+1 = Help
    Alt+N = Adapter List  -/+ = Change Item
```

Restore Defaults

This option allows you to discard the selections you made and restore the system defaults.

```
LSI Corp Config Utility          v7.05.01.00 (2010.02.09)
Adapter List  Global Properties




       Pause When Boot Alert Displayed    [No]
       Boot Information Display Mode       [Display minimal information]
       Support Interrupt                  [Hook interrupt, the Default]

       Restore Defaults




 Esc = Exit Menu         F1/Shift+1 = Help
 Alt+N = Adapter List  -/+ = Change Item
```

2.3 MegaRAID Storage Manager

MegaRAID Storage Manager software enables you to configure, monitor, and maintain storage configurations on LSI SAS controllers. The MegaRAID Storage Manager graphical user interface (GUI) makes it easy for you to create and manage storage configurations.

2.3.1 Hardware and Software Requirements

The hardware requirements for MegaRAID Storage Manager software are as follows:

- PC-compatible computer with an IA-32 (32-bit) Intel Architecture processor or an EM64T (64-bit) processor and at least 128 Mbytes of system memory (256 Mbytes recommended)
- Disk drive with at least 50 Mbytes available free space

Refer to your server documentation and to the operating system documentation for more information on hardware and operating system requirements.

2.3.2 Installing MegaRAID Storage Manager Sofware on Microsoft Windows OS

Follow these steps if you need to install MegaRAID Storage Manager software on a system running Microsoft Windows OS:

1.   Insert the MegaRAID Storage Manager software installation CD in the CD-ROM drive.

     If necessary, find and double-click the setup.exe file to start the installation program.

2.   When the Welcome screen appears, click **Next**.

     If MegaRAID Storage Manager software is already installed on this system, the Program Maintenance screen appears. Read the screen text and select **Modify**, **Repair**, or **Remove**.

3.   When the next screen appears, read and accept the user license, and click **Next**.

     The Customer Information screen appears, as shown in the following figure.
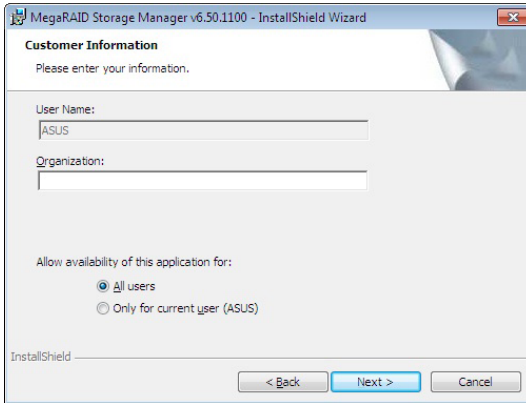
4. Enter your user name and organization name. In the bottom part of the screen, select an installation option:

    – If you select **All users**, any user with administrative privileges can use this version of MegaRAID Storage Manager software to view or change storage configurations.

    – If you select **Only for current user**, the MegaRAID Storage Manager shortcuts and associated icons will be available only to the user with this user name.

5. Click **Next** to continue.

6. On the next screen, accept the default Destination Folder, or click **Change** to select a different destination folder. Click **Next** to continue.

    The Setup Type screen appears, as shown in the following figure.
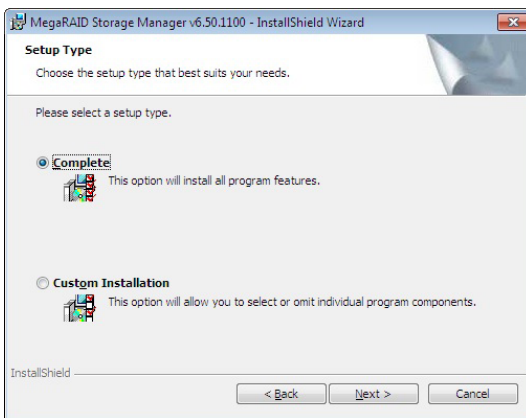
7. Select one of the Setup options. The options are fully explained in the screen text.

   – Normally, you would select **Complete** if you are installing MegaRAID Storage Manager software on a server.

   – Select **Custom Installation** if you want to select individual program components.

8. Click **Next** to continue.

   If you selected **Custom Installation** as your setup option, the second Setup Type screen appears, as shown in the following figure.

   If you select **Complete** as your setup option, the Installation Wizard is ready to install MSM. To begin installation, click on Install on the next screen that appears.
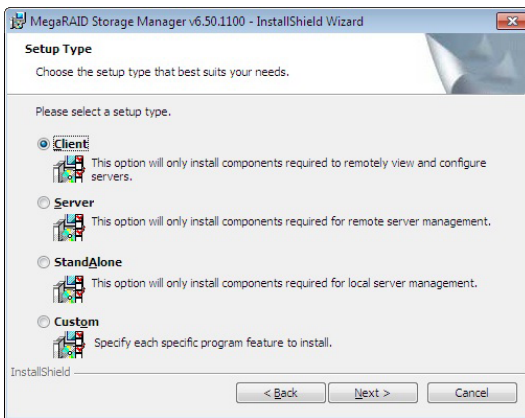

9. Select one of the custom setup options. The options are fully explained in the screen text.

   – Select **Client** if you are installing MegaRAID Storage Manager software on a PC that will be used to view and configure servers over a network. To begin installation, click on **Install** on the next screen that appears.

   – Select **Server** to install only those components required for remote server management. To begin installation, click on **Install** on the next screen that appears.

   – Select **StandAlone** if you will use MegaRAID Storage Manager software to create and manage storage configurations on a standalone workstation. To begin installation, click on **Install** on the next screen that appears.

   – Select **Custom** if you want to specify individual program features to install.

If you select **Custom**, a window listing the installation features appears, as shown in the following figure. Select the features you want on this screen.
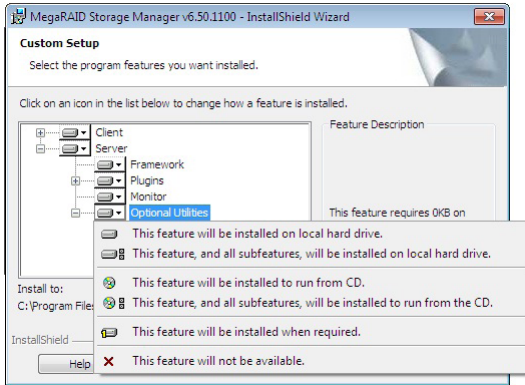
10. Click **Next** to proceed.

11. Click **Install** to install the program.

12. When the final Configuration Wizard screen appears, click **Finish**.

If you select **Client** installation for a PC used to monitor servers, and if there are no available servers with a registered framework on the local subnet (that is, servers with a complete installation of MegaRAID Storage Manager software), the server screen will appear, as shown in the following figure. The server screen will not list any servers. You can use this screen to manage systems remotely.
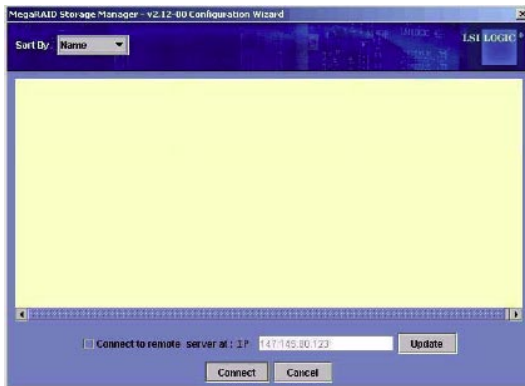
2.3.3   Installing MegaRAID Storage Manager Sofware for Linux

Follow these steps if you need to install MegaRAID Storage Manager software on a system running Red Hat Linux or SUSE Linux:

1.   Copy the **MSM_linux_installer...tar.gz** file to a temporary folder.

2.   Untar the **MSM_linux_installer...tar.gz** file using the following command:

      tar -zxvf MSM_linux_installer...tar.gz

      A new **disk** directory is created.

3.   Go to the new **disk** directory.

4.   In the **disk** directory, find and read the **readme.txt** file.

5.   To start the installation, enter the following command:

      csh install.sh -a

If you select **Client** installation for a PC used to monitor servers, and if there are no available servers with a registered framework on the local subnet (that is, servers with a complete installation of MegaRAID Storage Manager software), the server screen appears. The server screen does not list any servers. You can use this screen to manage systems remotely.

2.3.4   Linux Error Messages

The following messages may appear while you are installing MegaRAID Storage Manager software on a Linux system:

- **More than one copy of MegaRAID Storage Manager software has been installed.**

  This message indicates that the user has installed more than one copy of MegaRAID Storage Manager software. (This can be done by using the rpm-force command to install the rpm file directly, which is not recommended, instead of using the install.sh file.) In such cases, the user must uninstall all the rpm files manually before installing MegaRAID Storage Manager software with the procedure listed previously.

- **The version is already installed.**

  This message indicates that the version of MegaRAID Storage Manager software you are trying to install is already installed on the system.

- **The installed version is newer.**

  This message indicates that a version of MegaRAID Storage Manager software is already installed on the system, and it is a newer version than the version you are trying to install.

- **Exiting installation.**

  This is the message that appears when the installation is complete.

- **RPM installation failed.**

  This message indicates that the installation failed for some reason. Additional message text explains the cause of the failure.

## 2.3.5   Starting MegaRAID Storage Manager Software

Follow these steps to start MegaRAID Storage Manager software and view the main window:

1.   Start the program using the method required for your operating system environment:

    –   To start MegaRAID Storage Manager software on a Microsoft Windows system, select **Start > Programs > MegaRAID Storage Manager > StartupUI**, or double-click the MegaRAID Storage Manager shortcut on the desktop.

    If a warning appears stating that Windows Firewall has blocked some features of the program, click **Unblock** to allow MegaRAID Storage Manager software to start. (The Windows Firewall sometimes blocks the operation of programs that use Java.)

    –   To start MegaRAID Storage Manager software on a Red Hat Linux system, select **Applications > System Tools > MegaRAID Storage Manager StartupUI**.

    –   To start MegaRAID Storage Manager software on a SUSE SLES system, select **Start > System > More Programs > MegaRAID Storage Manager**.

2.   When the program starts, the Select Server window appears, as shown in the following figure.
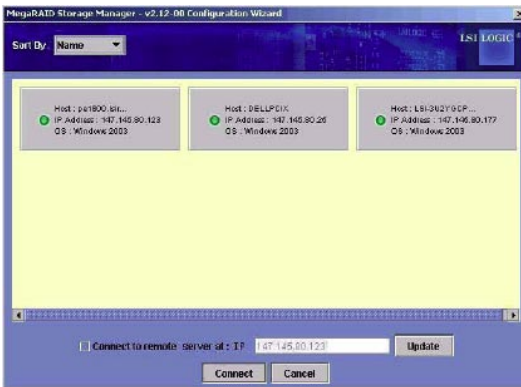
    If the circle in the server icon is yellow instead of green, it means that the server is running in a degraded state—for example, because a disk drive used in a virtual disk has failed. If the circle is red, the storage configuration in the server has failed.

To access servers on a different subnet, type in the box at the bottom of the screen the IP address of a server in the desired subnet where the MegaRAID Storage Manager software is running, and click **Update**. If you check the **Connect to remote server at: IP** address box, you can also access a standalone (remote) installation of MegaRAID Storage Manager software, if it has a network connection.

3.   Double-click the icon of the server that you want to access. The Server Login window appears, as shown in the following figure.

4.   Select an access mode from the drop-down menu.

–   Select **Full Access** if you need to both view the current configuration and change the configuration.

–   Select **View Only** if you need to only view and monitor the configuration.

5.   Enter your user name and password, and click **Login**.

If the computer is networked, this is the login to the computer itself, not the network login.

You must enter the root/administrator user name and password to use Full Access mode. If your user name and password are correct for the Login mode you have chosen, the main MegaRAID Storage Manager window appears.

2.3.6   MegaRAID Storage Manager Window

This section describes the MegaRAID Storage Manager window, which is shown in the following figure.
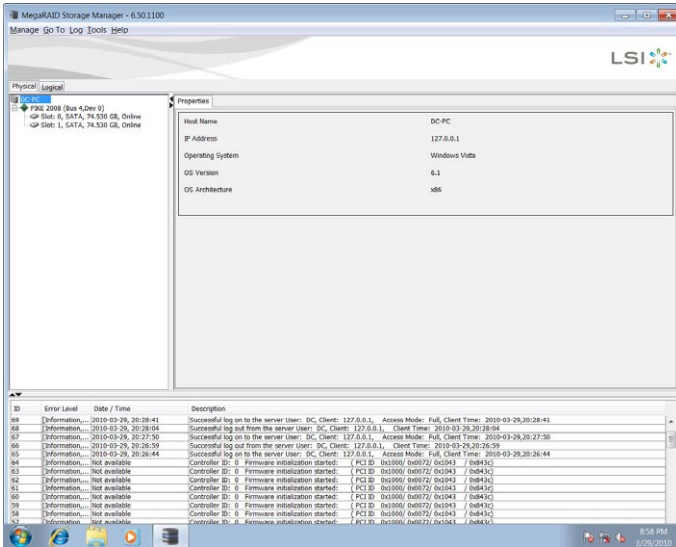
Physical/Logical View Panel

The left panel of the MegaRAID Storage Manager window displays either the Physical view or the Logical view of the system and the devices in it, depending on which tab is selected.

*   The Physical view shows the hierarchy of physical devices in the system. At the top of the hierarchy is the system itself. One or more controllers are installed in the system. The controller label identifies the MegaRAID controller, such as the ASUS PIKE 2308 controller, so that you can easily differentiate between multiple controllers. Each controller has one or more ports. Disk drives and other devices are attached to the ports.

*   The Logical view shows the hierarchy of controllers, virtual disks, and disk groups that are defined on the system. (Physical drives also appear in the Logical view, so you can see which physical drives are used by each virtual disk.)

The following icons in the left panel represent the controllers, disk drives, and other devices:

*   System

*   Controller

*   Port   Slot

*   Volume

*   Virtual disk

- Physical drive

A red circle to the right of an icon indicates that the device has failed. For example, this icon indicates that a physical drive has failed: .

A yellow circle to the right of an icon indicates that a device is running in a degraded state. For example, this icon indicates that a virtual disk is running in a degraded state because a disk drive has failed: .

Properties View Panel

The right panel of the MegaRAID Storage Manager window has the **Properties** tab that displays information about the selected device. For example, if a controller icon is selected in the left panel, the Properties tab lists information such as the controller name, NVRAM size, and device port count.

Event Log Panel

The lower part of the MegaRAID Storage Manager window displays the system event log entries. New event log entries appear during the session. Each entry has an ID, a timestamp and date, an error level indicating the severity of the event, and a brief description of the event.

Menu Bar

Here are brief descriptions of the main selections on the MegaRAID Storage Manager menu bar.

Manage Menu
The **Manager** menu has an **Exit** option for exiting from the MegaRAID Storage Manager software. It also has a **Refresh** option for updating the display in the MegaRAID Storage Manager window. (Refresh is seldom required; the display normally updates automatically.) The Manage menu options also include **Check Consistency**, **Initialize**, and **Show Progress**.

Go To Menu
The **Go To** menu is available when a controller, physical drive, or virtual disk is selected in the MegaRAID Storage Manager window. The **Go To** menu options vary depending on what type of device is selected in the left panel of the MegaRAID Storage Manager window. For example, the **Scan Foreign Configuration** option is available only when a controller is selected. The options also vary depending on the current state of the selected device. For example, if you select an offline physical drive, the **Make Drive Online** option will be available in the **Go To** menu.

Log Menu

The Log menu includes options for saving and clearing the message log.

Tools Menu

On the Tools menu you can select **Configure Alerts** to access the Event Configuration Notification screen, which you can use to set the alert delivery rules, event severity levels, exceptions, and email settings.

Help Menu

On the Help menu you can select **Help > Contents** to view the MegaRAID Storage Manager online help file. You can select **Help > About MegaRAID Storage Manager** to view version information for the MegaRAID Storage Manager software.

- When you use the MegaRAID Storage Manager online help, you may see a warning message that Internet Explorer has restricted the file from showing active content. If this warning appears, click on the active content warning bar and enable the active content.

- If you are using the Linux operating system, you must install Firefox® or Mozilla® for the MegaRAID Storage Manager online help to display.

This chapter provides instructions for installing the RAID drivers on different operating systems.

Driver installation

3.1 RAID driver installation

After creating the RAID sets for your server system, you are now ready to install an operating system to the independent hard disk drive or bootable array. This part provides instructions on how to install or update the RAID card drivers.

The RAID card driver might be included in the Linux OS installation CD, and could be loaded automatically during OS installation. However, we recommend using the RAID driver packaged in the RAID card support CD for better reliability.

3.1.1 Creating a RAID driver disk

You may have to use another system to create the RAID driver disk from the RAID card support CD or from the Internet.

A floppy disk with the RAID driver is required when installing Windows® Server 2003 or Linux operating system on a hard disk drive that is included in a RAID set. You can create a RAID driver disk in DOS (using the Makedisk application in the support CD).

To create a RAID driver disk in DOS environment:

1. Place the RAID card support CD in the optical drive.

2. Restart the computer, then enter the BIOS Setup.

3. Select the optical drive as the first boot priority to boot from the support CD. Save your changes, then exit the BIOS Setup.

4. Restart the computer.

5. The Makedisk menu appears. Select **PIKE 2308 SASs card Driver,** and press <Enter> to enter the sub-menu.

```
Create Driver Diskette Menu
PIKE 2308 SAS2 card Driver
FreeDOS command prompt
```

6. Use the arrow keys to select the type of RAID driver disk you want to create.

```
PIKE 2308 SAS2 card Driver
Windows XP x86
Windows XP x64
Windows Server 2003 x86
Windows Server 2003 x64
Windows Vista x86
Windows Vista x64
Windows Server 2008 x86
Windows Server 2008 x64
Windows 7 x86
Windows 7 x64
Windows Server 2008 R2 x64
RHEL 4 UP6 i686
RHEL 4 UP6 x86_64
RHEL 4 UP7 i686
RHEL 4 UP7 x86_64
RHEL 4 UP8 i686
RHEL 4 UP8 x86_64
RHEL 5 i686
RHEL 5 x86_64
RHEL 5 UP1 i686
RHEL 5 UP1 x86_64
RHEL 5 UP2 i686
▼
```

7. Place a blank, high-density floppy disk to the floppy disk drive.

8. Press <Enter>.

9. Follow screen instructions to create the driver disk.
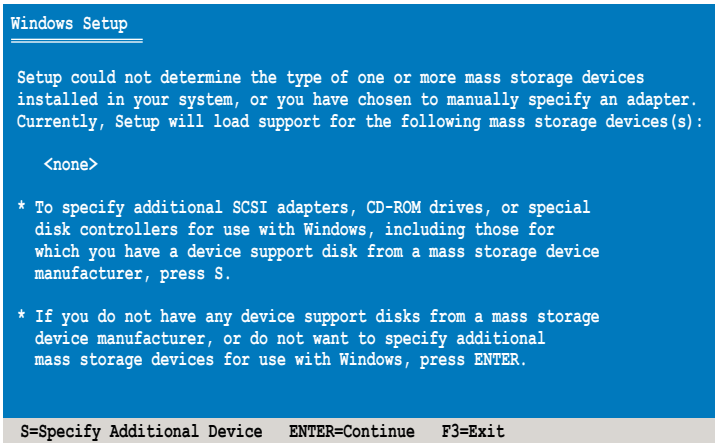
3.1.2 Windows® Server 2003 OS

During Windows® Server 2003 OS installation

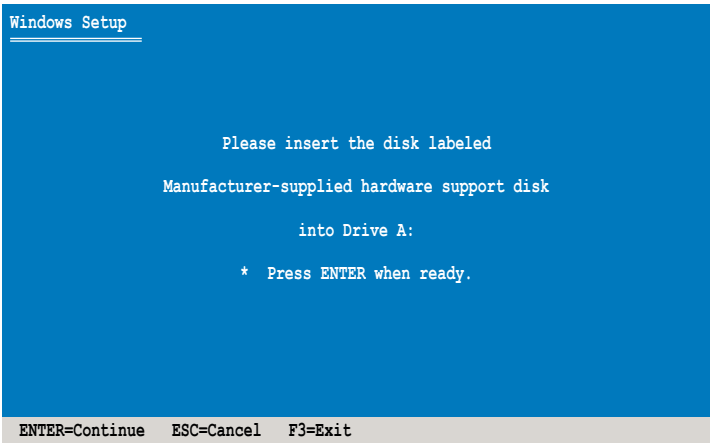To install the RAID card driver when installing Windows® Server 2003 OS:

1. Boot the computer using the Windows® Server 2003 OS installation CD. The **Window® Setup** starts.

2. Press <F6> when the message "Press F6 if you need to install a third party SCSI or RAID driver..." appears at the bottom of the screen.
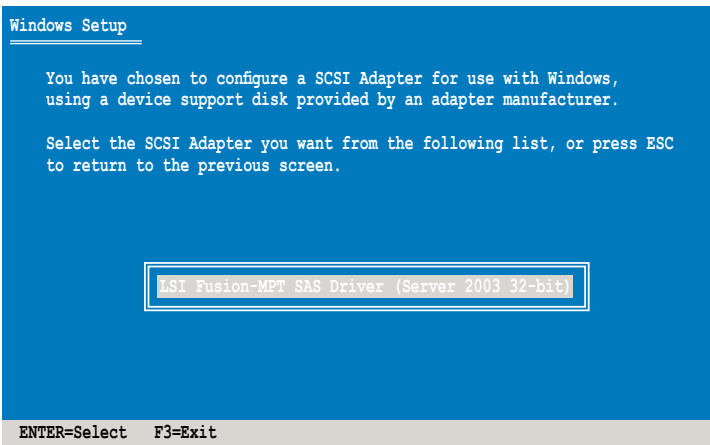
```
Windows Setup
─────────────




















  Press F6 if you need to install a third party SCSI or RAID driver...
```

3. The next screen appears. Press <S> to specify an additional device.

```
Windows Setup
─────────────

 Setup could not determine the type of one or more mass storage devices
 installed in your system, or you have chosen to manually specify an adapter.
 Currently, Setup will load support for the following mass storage devices(s):

    <none>

 * To specify additional SCSI adapters, CD-ROM drives, or special
   disk controllers for use with Windows, including those for
   which you have a device support disk from a mass storage device
   manufacturer, press S.

 * If you do not have any device support disks from a mass storage
   device manufacturer, or do not want to specify additional
   mass storage devices for use with Windows, press ENTER.


 S=Specify Additional Device    ENTER=Continue    F3=Exit
```

4. Insert the RAID driver disk you created earlier to the floppy disk drive, then press
    <Enter>.

```
Windows Setup
_____



                     Please insert the disk labeled

              Manufacturer-supplied hardware support disk

                            into Drive A:

                     *  Press ENTER when ready.




 ENTER=Continue    ESC=Cancel    F3=Exit
```

5. Select **LSI Fusion-MPT SAS Driver (Server 2003 32-bit)**, then press <Enter>.

```
Windows Setup
_____
    You have chosen to configure a SCSI Adapter for use with Windows,
    using a device support disk provided by an adapter manufacturer.

    Select the SCSI Adapter you want from the following list, or press ESC
    to return to the previous screen.




       [LSI Fusion-MPT SAS Driver (Server 2003 32-bit)]




 ENTER=Select    F3=Exit
```

6. The Windows® Setup loads the RAID card drivers from the RAID driver disk. When
    next screen appears, press <Enter> to continue installation.

7. Setup then proceeds with the OS installation. Follow screen instructions to continue.

After Windows® Server 2003 OS installation

To update the RAID card driver after installing Windows® Server 2003 OS:

1. Right-click the **My Computer** icon on the desktop and select **Properties** from the menu.

2. Click the **Hardware** tab on the top, then click the **Device Manager** button.

3. Double-click the **LSI Adapter, SAS2 2308 Falcon -StorPort** item.

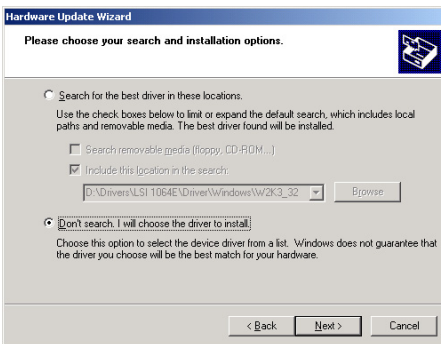> The controller name differs according to the installed SAS RAID card.
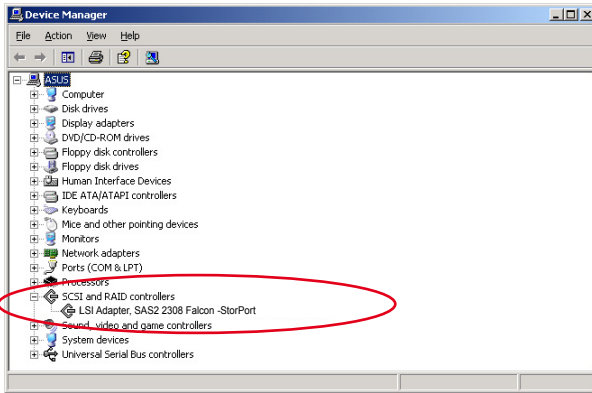
4. Click the **Driver** tab on the top, then click **Update Driver**.
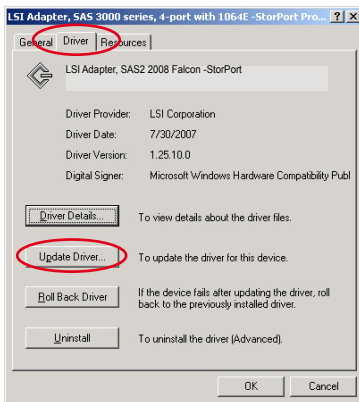
5. Toggle **Install from a list or specific location (Advanced)**, then click **Next** to continue.
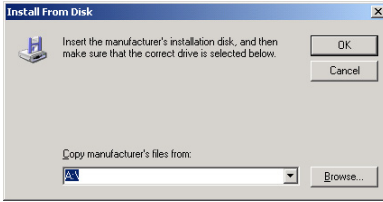

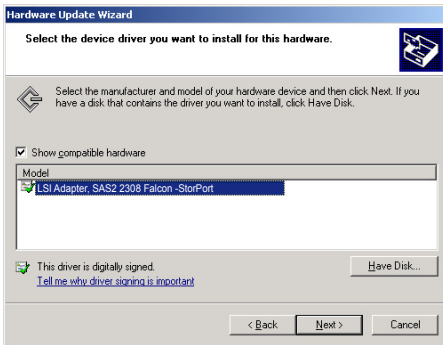6. Toggle **Don't search. I will choose the driver to install**, then click **Next** to continue.

7. Insert the RAID driver disk you created earlier to the floppy disk drive.

8. Highlight **LSI Adapter, SAS2 2308 Falcon -StorPort**, then click **Have Disk**.
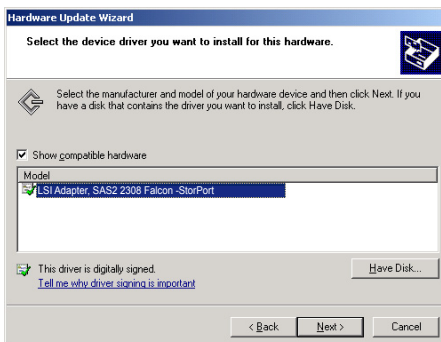
9. Select from the drop-down menu and locate the driver.

10. Click **Next** to start updating the driver.

11. After completing driver update, click **Finish** to close the wizard.

3.1.3 Red Hat® Enterprise Linux OS 5

To install the RAID card driver when installing **Red Hat**® Enterprise OS:
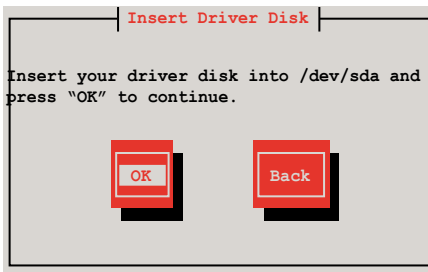
1.   Boot the system from the Red Hat® OS installation CD.

2.   At the **boot:**, type **linux dd**, then press <Enter>.

```
-  To install or upgrade in graphical mode, press the <ENTER> key.

-  To install or upgrade in text mode, type: linux text <ENTER>.

-  Use the function keys listed below for more information.
[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]
boot: linux dd
```

3.   Select **Yes** using the <Tab> key when asked if you have the driver disk, then press <Enter>.

```
                    ┤ Main Menu ├

Do you have a driver disk?

         Yes              No
```
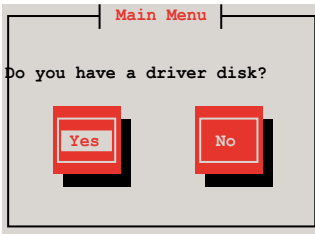
4.   Insert the Red Hat® Enterprise RAID driver disk to the floppy disk drive, select **OK**, then press <Enter>.

```
              ┤ Insert Driver Disk ├

Insert your driver disk into /dev/sda and
press "OK" to continue.

           OK              Back
```

The drivers for the RAID card are installed to the system.

5. When asked if you will load additional RAID controller drivers, select **No**, then press
   <Enter>.

```
┌──────────────┤ More Driver Disks? ├──────────────┐
│                                                  │
│ Do you wish to load any more                     │
│ driver disks?                                    │
│                                                  │
│                                                  │
│         ┌───────┐          ┌───────┐             │
│         │  Yes  │          │  No   │             │
│         └───────┘          └───────┘             │
│                                                  │
│                                                  │
└──────────────────────────────────────────────────┘
```
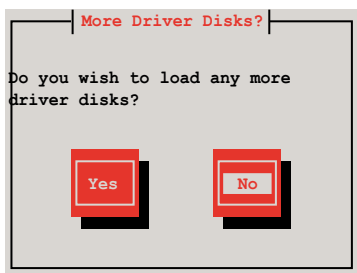
6. Follow the screen instructions to continue the OS installation.

3.1.4 SUSE Linux OS 11

To install the RAID card driver when installing **SUSE Linux Enterprise Server OS**:

1. Boot the system from the SUSE OS installation CD.

2. Use the arrow keys to select **Installation** from the **Boot Options** menu.

3. Press <F6>, then select **Yes** from the menu. Press <Enter>.

4. Insert the RAID driver disk to the floppy disk drive. Enure that **Installation** from the **Boot Options** menu is selected, then press <Enter>.

5. When below screen appears, select the floppy disk drive (fd0) as the driver update medium. Select **OK**, then press <Enter>.
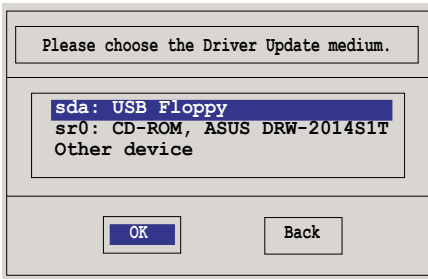
The drivers for the RAID controller are installed to the system.

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Telephone   (495) 640-32-75
Web site   http://ru.asus.com

Technical Support
Telephone   008-800-100-ASUS (008-800-100-2787)
Online Support   http://vip.asus.com/eservice/techserv.aspx?SLanguage=ru

DECLARATION OF CONFORMITY

Per FCC Part 2 Section 2. 1077(a)

Responsible Party Name: **Asus Computer International**

Address: **800 Corporate Way, Fremont, CA 94539.**

Phone/Fax No: **(510)739-3777/(510)608-4555**

hereby declares that the product

Product Name : RAID CARD

Model Number : PIKE 2308

Conforms to the following specifications:

☒   FCC Part 15, Subpart B, Unintentional Radiators

Supplementary Information:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Representative Person's Name : ___**Steve Chang / President**___

Signature :

Date : _____**Apr. 08, 2013**_____

Ver. 120601

EC Declaration of Conformity

We, the undersigned,

Manufacturer:	ASUSTeK COMPUTER INC.
Address, City:	4F, No. 150, LI-TE Rd., PEITOU, TAIPEI 112, TAIWAN
Country:	TAIWAN
Authorized representative in Europe:	ASUS COMPUTER GmbH
Address, City:	HARKORT STR. 21-23, 40880 RATINGEN
Country:	GERMANY

declare the following apparatus:

Product name :	RAID CARD
Model name :	PIKE 2308

conform with the essential requirements of the following directives:

☒**2004/108/EC-EMC Directive**

☒ EN 55022:2010	☒ EN 55024:2010
☒ EN 61000-3-2:2006+A2:2009	☒ EN 61000-3-3:2008
☐ EN 55013:2001+A1:2003+A2:2006	☐ EN 55020:2007+A11:2011

☐**1999/5/EC-R &TTE Directive**

☐ EN 300 328 V1.7.1(2006-10)	☐ EN 301 489-1 V1.9.2(2011-09)
☐ EN 300 440-1 V1.6.1(2010-08)	☐ EN 301 489-3 V1.4.1(2002-08)
☐ EN 300 440-2 V1.4.1(2010-08)	☐ EN 301 489-4 V1.4.1(2009-05)
☐ EN 301 511 V9.0.2(2003-03)	☐ EN 301 489-7 V1.3.1(2005-11)
☐ EN 301 908-1 V5.2.1(2011-05)	☐ EN 301 489-9 V1.4.1(2007-11)
☐ EN 301 908-2 V5.2.1(2011-07)	☐ EN 301 489-17 V2.1.1(2009-05)
☐ EN 301 893 V1.6.1(2011-11)	☐ EN 301 489-24 V1.5.1(2010-09)
☐ EN 302 544-2 V1.1.1(2009-01)	☐ EN 302 326-2 V1.2.2(2007-06)
☐ EN 302 623 V1.1.1(2009-01)	☐ EN 302 326-3 V1.3.1(2007-09)
☐ EN 50360:2001	☐ EN 301 357-2 V1.4.1(2008-11)
☐ EN 62479:2010	☐ EN 302 291-1 V1.1.1(2005-07)
☐ EN 50385:2002	☐ EN 302 291-2 V1.1.1(2005-07)
☐ EN 62311:2008	

☐**2006/95/EC-LVD Directive**

☐ EN 60950-1 / A12:2011	☐ EN 60065:2002 / A12:2011

☐**2009/125/EC-ErP Directive**

☐ Regulation (EC) No. 1275/2008	☐ Regulation (EC) No. 278/2009
☐ Regulation (EC) No. 642/2009	

☒**2011/65/EU-RoHS Directive**   Ver. 130208

☒**CE marking**

$C\epsilon$

(EC conformity marking)

Position :   **CEO**

Name :   **Jerry   Shen**

Declaration Date: 08/04/2013

Year to begin affixing CE marking:2013

Signature : **_____**