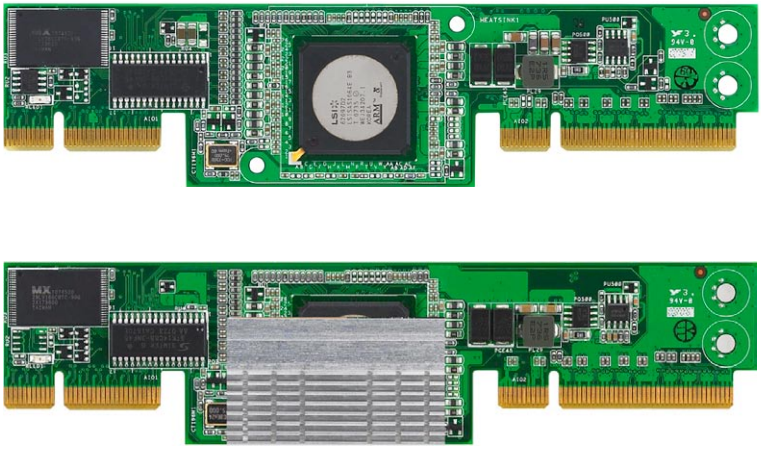
PIKE 1064E/1068E

LSISAS RAID card

User Guide



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Contents

Contents ..... **iii**
About this guide ..... **iv**
PIKE 1064E/1068E specifications summary ..... **vi**

Chapter 1: Product introduction
1.1 Welcome! **1-2**
1.2 Package contents **1-2**
1.3 Card layout **1-3**
1.4 System requirements **1-3**
1.5 Card installation **1-4**

Chapter 2: RAID configuration
2.1 Setting up RAID **2-2**
2.1.1 RAID definitions 2-2
2.1.2 Installing hard disk drives 2-2
2.2 LSI Corporation MPT Setup Utility **2-3**
2.2.1 Integrated Mirroring volume 2-4
2.2.2 Integrated Mirroring Enhanced volume 2-8
2.2.3 Integrated Striping (IS) volume 2-10
2.2.4 Managing Arrays 2-12
2.2.5 Viewing SAS topology 2-17
2.2.6 Global Properties 2-18

Chapter 3: Driver installation
3.1 RAID driver installation **3-2**
3.1.1 Creating a RAID driver disk 3-2
3.1.2 Windows® Server 2003 OS 3-4
3.1.3 Red Hat® Enterprise Linux OS 3-9
3.1.4 SUSE Linux Enterprise Server OS 3-11

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 1064E/1068E 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 1064E/1068E specifications summary

Controller	PIKE 1064E: LSISAS1064E PIKE 1068E: LSISAS1068E
Interface	ASUS PIKE interface
Ports	PIKE 1064E: 4 ports PIKE 1068E: 8 ports
Support device	SAS and SATA II devices
Data transfer rate	SATA II and SAS 3 Gb/s per PHY
RAID level	RAID0/RAID1/RAID1E
OS support*	Windows® Server 2003/2000/XP/Vista Red Hat® Enterprise Linux 3/4/5 SUSE Linux Enterprise Server 8/9/10 LSI MegaRAID Storage Manager (MSM) for Windows®/ Linux operating systems
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 1064E/1068E SAS RAID card features and the new technologies it supports.

1 Product introduction

1.1 Welcome!

Thank you for buying an ASUS® PIKE 1064E/1068E SAS RAID card!

The ASUS PIKE 1064E/1068E allows you to create RAID0, RAID1, and RAID1E set(s) from SAS 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 1064E/1068E 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: 4-port SAS signal with SGPIO interface (PIKE 1064E)
   8-port SAS signal with SGPIO interface (PIKE 1068E)*
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.
- For PIKE 1068E SAS RAID card, a heatsink is installed on the LSISAS1068E controller.

1.4 System requirements

Before you install the PIKE 1064E/1068E 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:**

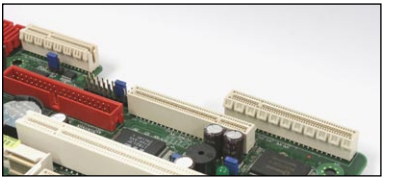
  - Appropriate thermal solution

  - Certified power supply module

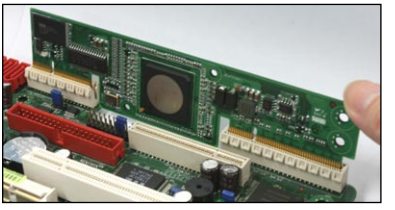
1.5 Card installation

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

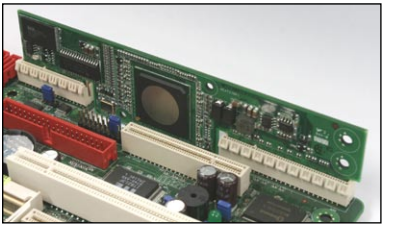
1. Locate the PIKE RAID card slot on the motherboard.



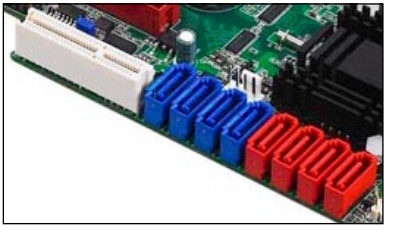
2. Align the golden fingers of the RAID card with the PIKE RAID card slot.



3. Insert the RAID card into the PIKE RAID card slot. Make sure it's completely inserted into the PIKE RAID card slot.



Connect the SAS hard disk drives to SAS connectors 1-4 (red) on the motherboard when using a 4-port PIKE RAID card. The SAS connectors 5-8 (blue) function when using a 8-port PIKE RAID card.



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 and RAID 1E set.

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.

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.

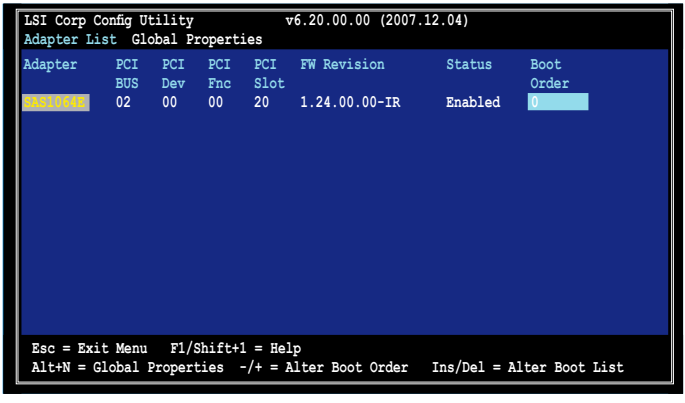
2.2 LSI Corporation MPT Setup Utility

The LSI Corporation MPT Setup Utility is an integrated RAID solution that allows you to create the following RAID set(s) from SAS hard disk drives supported by the LSI SAS 1064E/1068E controller:

- RAID 1 (Integrated Mirroring)
- RAID 1E (Integrated Mirroring Enhanced)
- RAID 0 (Integrated Striping)

- You may use disks of different sizes in IM and IME volumes; 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: 1.24.00.00-IR
  MPTBIOS version: v6.20.00.00 (2007.12.04)



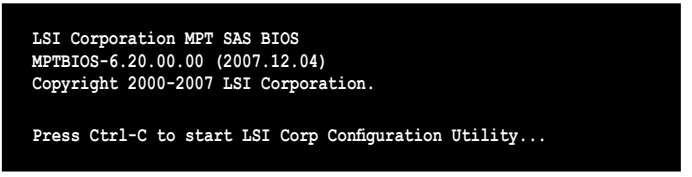
2.2.1 Integrated Mirroring volume

The Integrated Mirroring (IM) feature supports simultaneous mirrored volumes with two disks (IM).

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

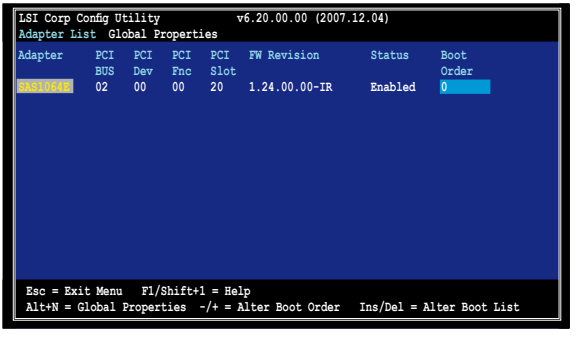
To create an IM volume:

1. Turn on the system after installing all SAS hard disk drives.
2. During POST, press <Ctrl+C> to enter the SAS configuration utility.



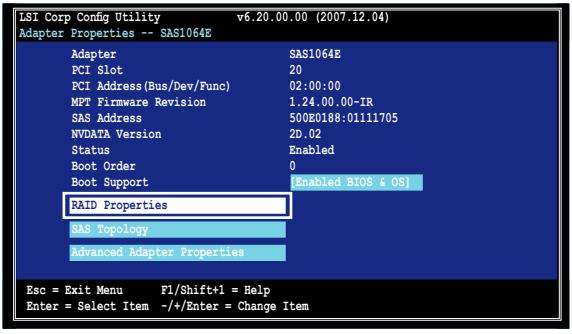
To avoid data loss, do not turn off the system when rebuilding.

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

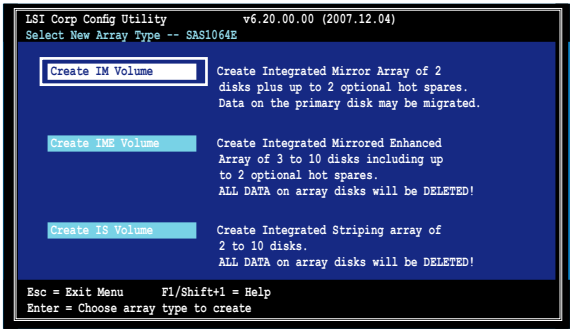


The numbers of the channel depend on the controller.

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

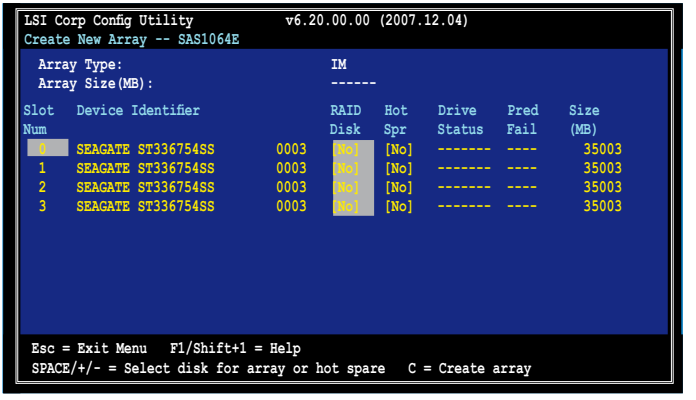


5. The **Select New Array Type** screen appears.
Use the arrow keys to select **Create IM Volume**, then press <Enter>.



6. The **Create New Array** screen shows the disks you can add to make up the IM 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>.

   You may also specify the Hot Spare disk here. Select the disk, then move the cursor to the **Hot Spr** column, then press <+>, <->, or <Space>.



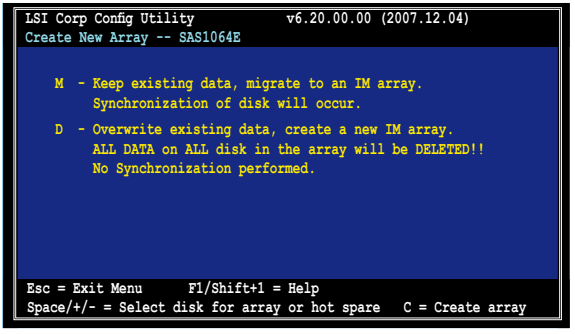
By default, the **RAID Disk** field shows **No** before array creation. This field is grayed out under the following conditions:

- The disk does not meet the minimum requirements for use in a RAID array.
- The disk is not large enough to mirror existing data on the primary drive.
- The disk has been selected as the Hot Spare for the RAID array.
- The disk is already part of another array.

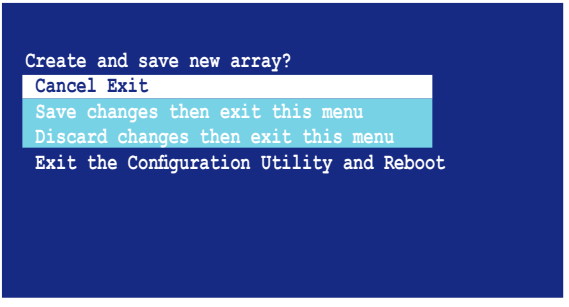
7. A confirmation screen appears.

   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. Make sure the data you want to mirror is on the first disk.

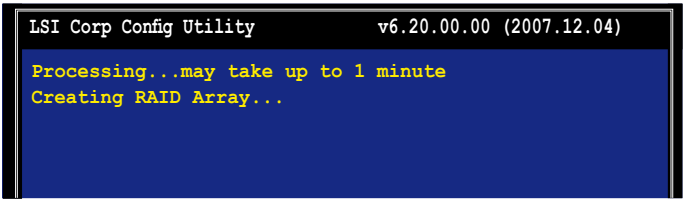
   Press <D> to overwrite any data and create the new IM array.



8. Repeat steps 5 and 6 to add the second disk to the volume.
9. When done, press <C> to create the array, then select **Save changes then exit this menu**.



10. The utility creates the array.

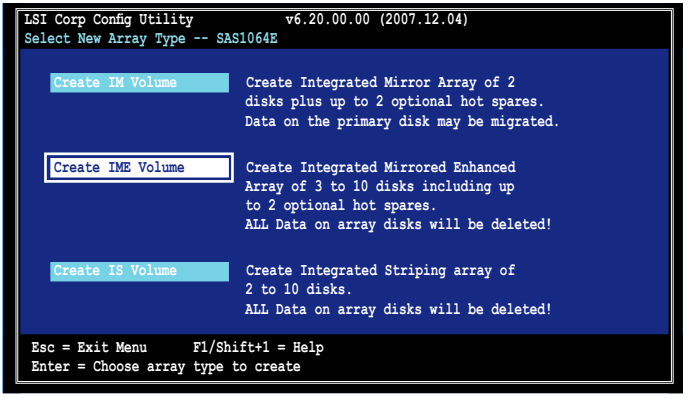


2.2.2 Integrated Mirroring Enhanced volume

The Integrated Mirroring Enhanced (IME) supports three to ten disks, or seven mirrored disks plus two hot spare disks.

To create an IME volume:

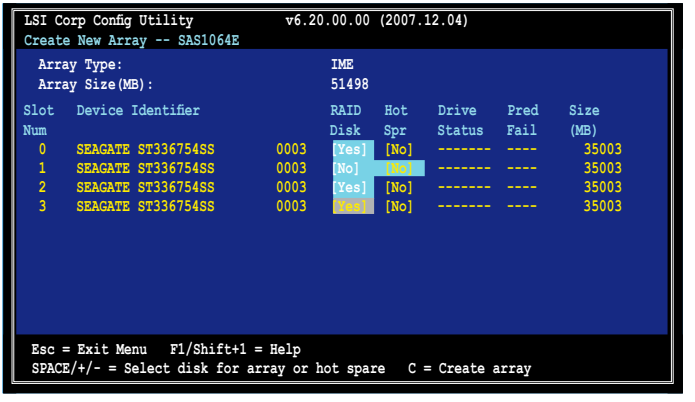
1. Follow steps 1–4 of the section **Integrated Mirroring volume**.
2. The **Select New Array Type** screen appears.
   Use the arrow keys to select **Create IME Volume**, then press <Enter>.



3. The **Create New Array** screen shows the disks you can add to make up the IME volume.

   Integrated Mirroring Enhanced (IME) 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>.

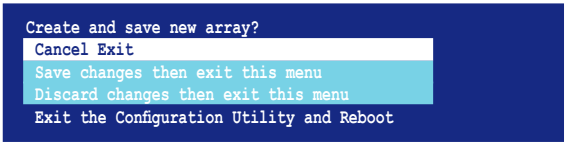
   You may also specify the Hot Spare disk here. Select the disk, then move the cursor to the **Hot Spr** column, then press <+>, <->, or <Space>.



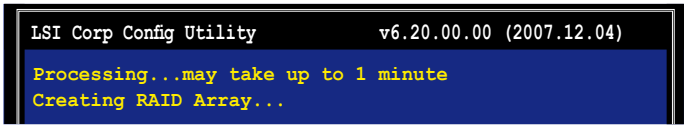
By default, the **RAID Disk** field shows **No** before array creation. This field is grayed out under the following conditions:

- The disk does not meet the minimum requirements for use in a RAID array.
- The disk is not large enough to mirror existing data on the primary drive.
- The disk has been selected as the Hot Spare for the RAID array.
- The disk is already part of another array.

4. Repeat step 3 to add the other disks to the volume.
5. When done, press <C> to create the array, then select **Save changes then exit this menu**.



6. The utility creates the array.

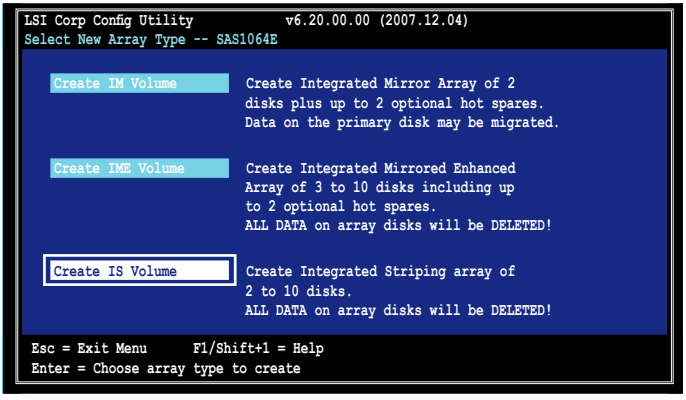


2.2.3 Integrated Striping (IS) volume

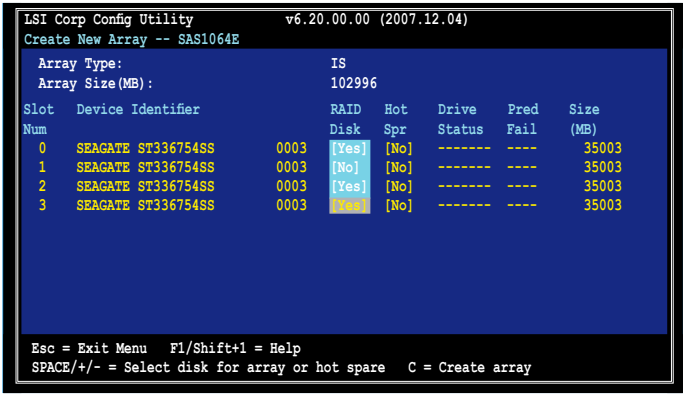
The Integrated Striping (IS) feature provides RAID 0 functionality, supporting volumes with two to ten disks. You may combine an IS volume with an IM or IME volume.

To create an IS volume:

1. Follow steps 1–4 of the section **Integrated Mirroring volume**.
2. The **Select New Array Type** screen appears.
   Use the arrow keys to select **Create IS Volume**, then press <Enter>.



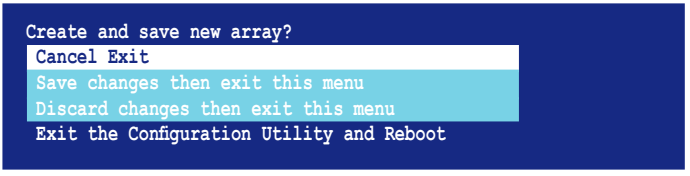
3. The **Create New Array** screen shows the disks you can add to make up the IS volume. Use the arrow key to select a disk, then move the cursor to the **RAID Disk** column. To include this disk in the array, press <+>, <->, or <Space>.



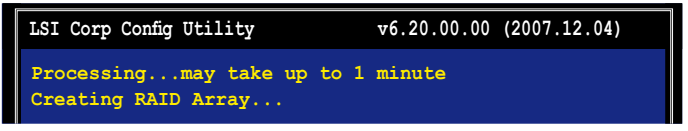
By default, the **RAID Disk** field shows **No** before array creation. This field is grayed out under the following conditions:

- The disk does not meet the minimum requirements for use in a RAID array.
- The disk is not large enough to mirror existing data on the primary drive.
- The disk has been selected as the Hot Spare for the RAID array.
- The disk is already part of another array.

4. Repeat step 3 to add the other disks to the volume.
5. When done, press <C> to create the array, then select **Save changes then exit this menu**.



6. The utility creates the array.



2.2.4 Managing Arrays

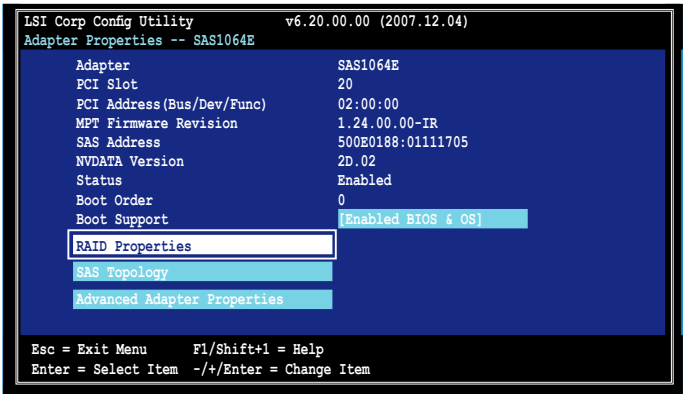
The LSI Corporation MPT Setup Utility allows you to perform other tasks related to configuring and maintaining IM and IME volumes.

Refer to this section to view volume properties, manage the hot spare disk, synchronize the array, activate the array, and delete the array.

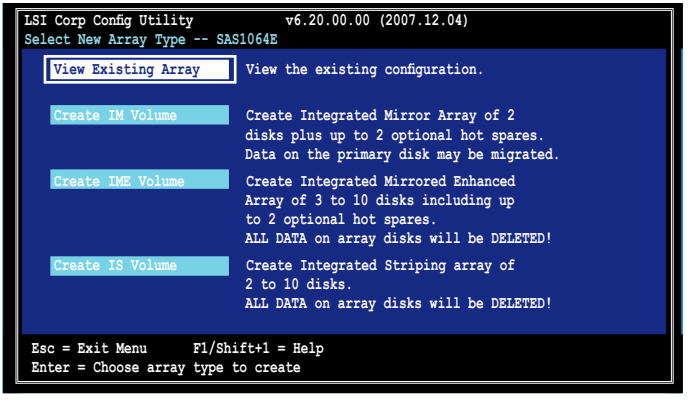
Viewing volume properties

To view volume properties:

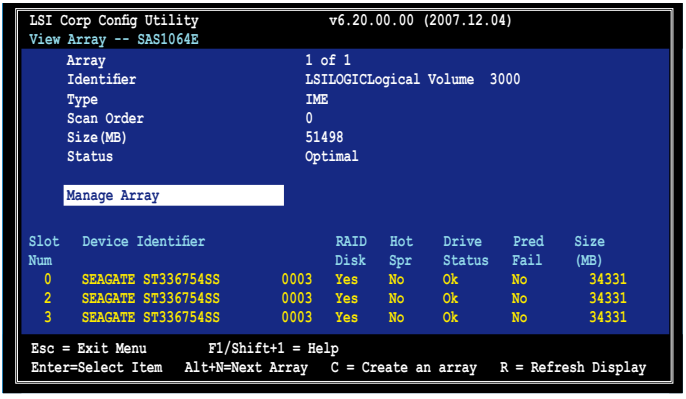
1. On the main menu, select **RAID Properties**.



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



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



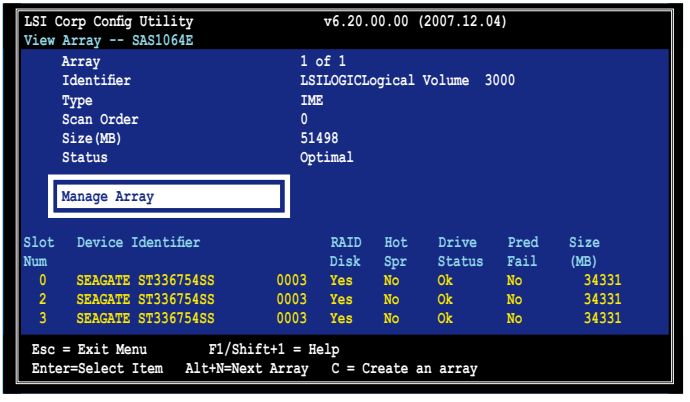
Managing hot spares

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

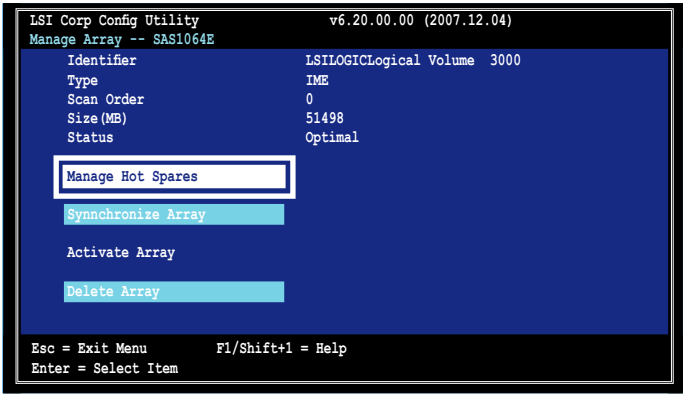
If a disk on an IM/IME volume fails, the utility automatically rebuilds the failed disk data on the hot spare. When the failed disk is replaced, the utility assigns the replacement as the new hot spare.

To create a hot spare:

1. Follow steps 1–3 of the section **Viewing volume properties**.
2. From the **View Array** screen, select **Manage Array**, then press <Enter>.

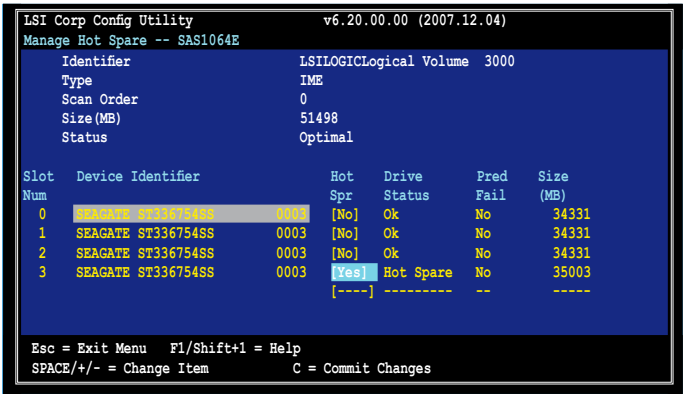


3. From the **Manage Array** screen, select **Manage Hot Spares**, then press <Enter>.



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>. The **Drive Status** column field now shows **Hot Spare**.

   Press <C> to commit the changes.

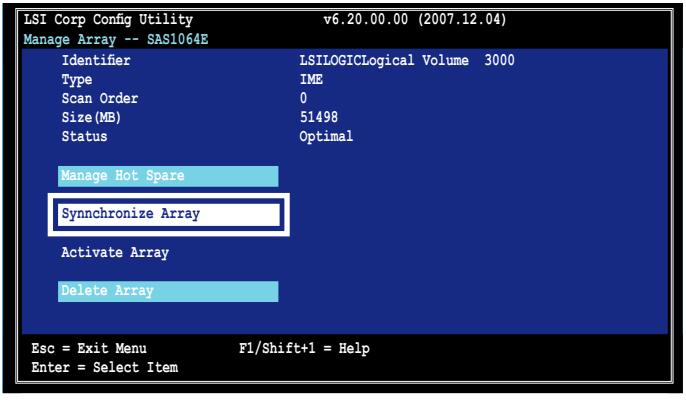


Synchronizing the array

Synchronizing the array allows the utility to resynchronize data on the mirrored disk in the array. This procedure is seldom required because data synchronization is automatically done during normal operation.

To synchronize the array:

1. Follow steps 1–3 of the section **Viewing volume properties** and step 2 of the section **Managing hot spares**.
2. From the **Manage Array** screen select **Synchronize Array**, then press <Enter>.



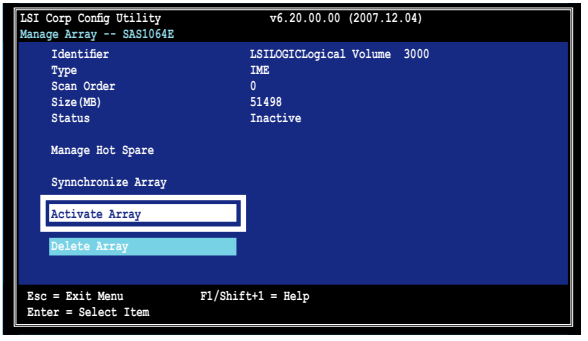
3. Press <Y> to begin the synchronization, or <N> to cancel.

Activating an array

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

To activate the array:

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



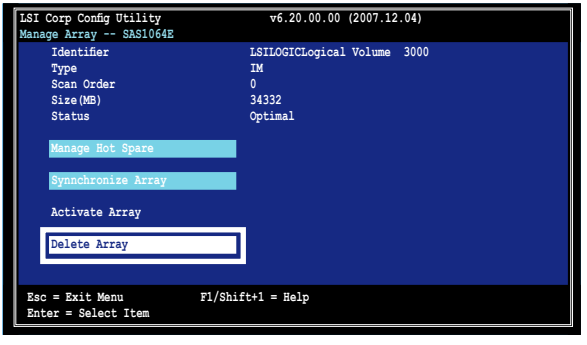
2. Press <Y> to activate, or <N> to cancel.

Deleting an array

- You cannot recover lost data if you delete an array. Make sure you back up important data before deleting an array.
- If you delete an IM (RAID 1) volume, the data is preserved on the primary disk.

To delete an array:

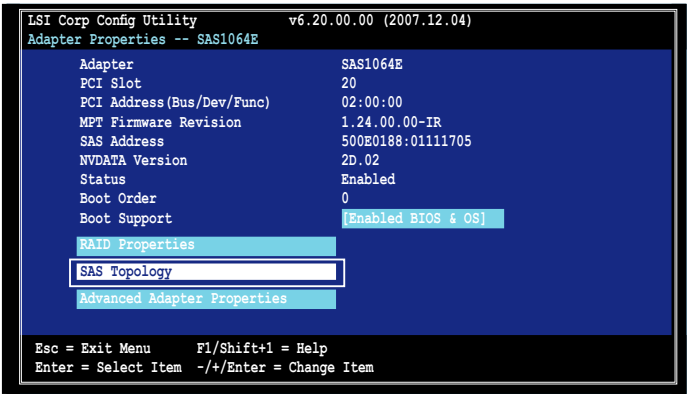
1. From the **Manage Array** screen, select **Delete Array**, then press <Enter>.



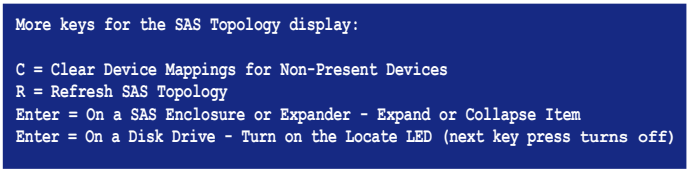
2. Press <Y> to delete, or <N> to cancel.

2.2.5 Viewing SAS topology

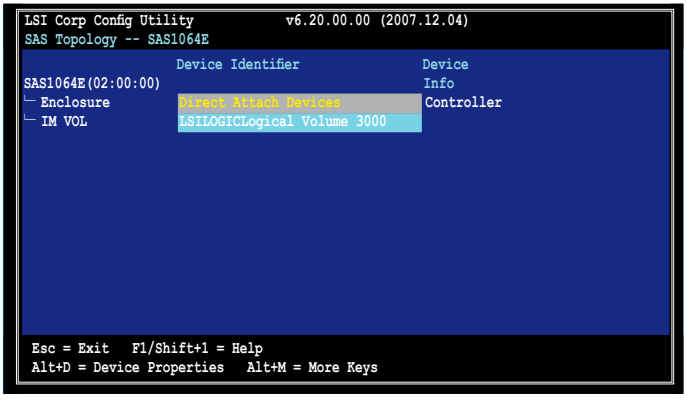
1. From the **Adapter Properties** screen, select **SAS Topology**.



Press <Alt+D> to display device properties, or <Alt+M> to display more keys.

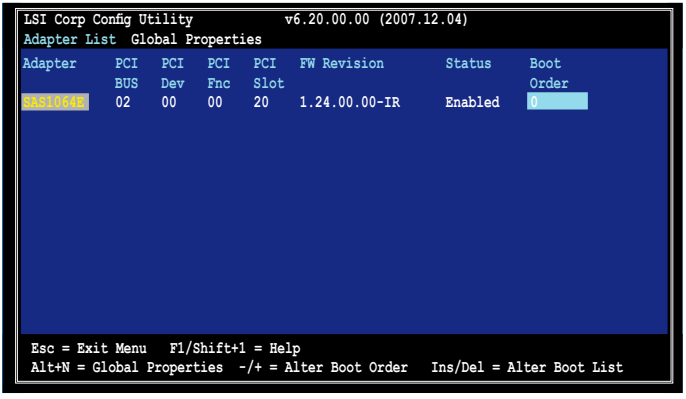


2. Information about the volume and its member-disks are then displayed.



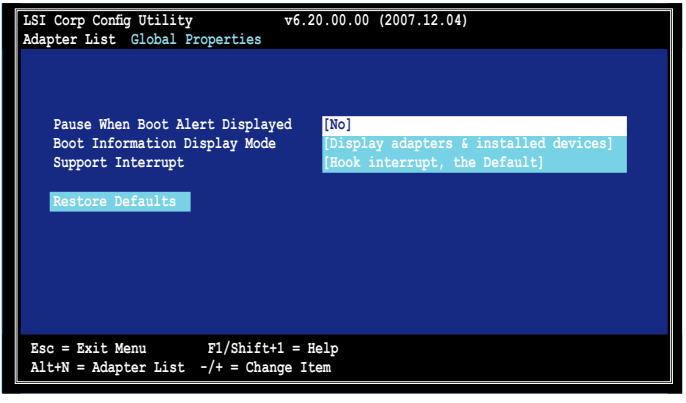
2.2.6 Global Properties

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



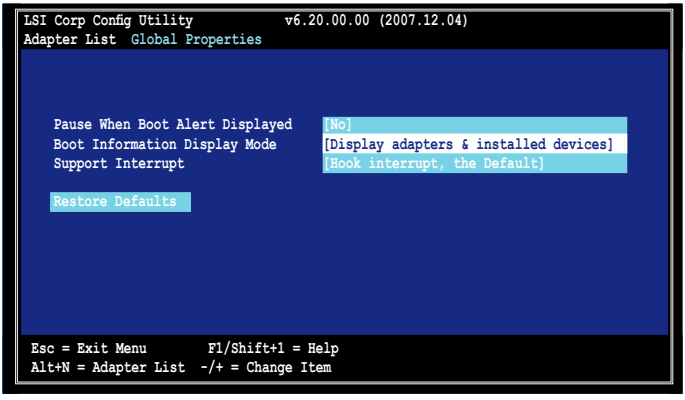
Pause When Boot Alert Displayed

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



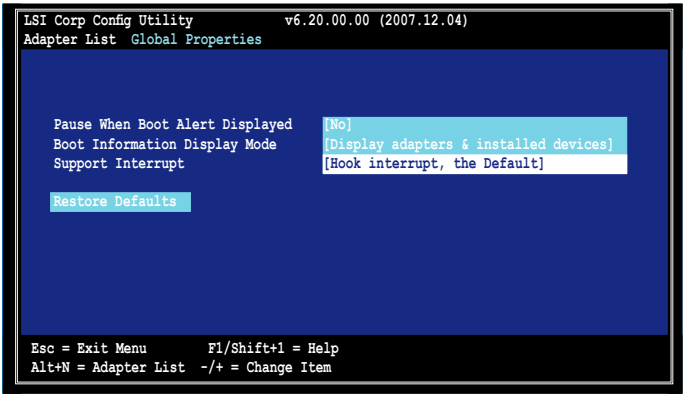
Boot Information Display Mode

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



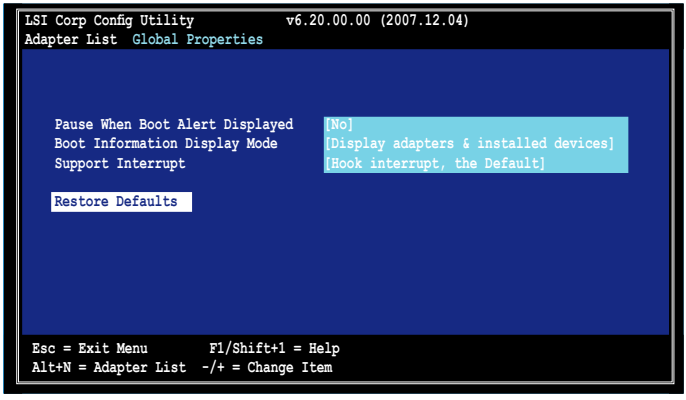
Support Interrupt

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



Restore Defaults

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



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

3 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.

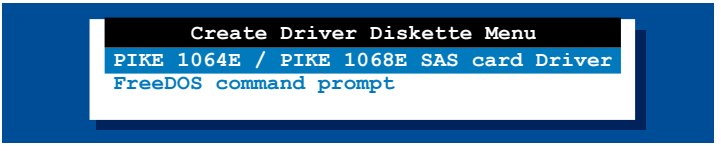
A floppy disk with the RAID driver is required when installing Windows® Server 2003 or Linux operating system on a hard disk drive that is included in a RAID set. You can create a RAID driver disk in DOS (using the Makedisk application in the support CD).

To create a RAID driver disk in DOS environment:

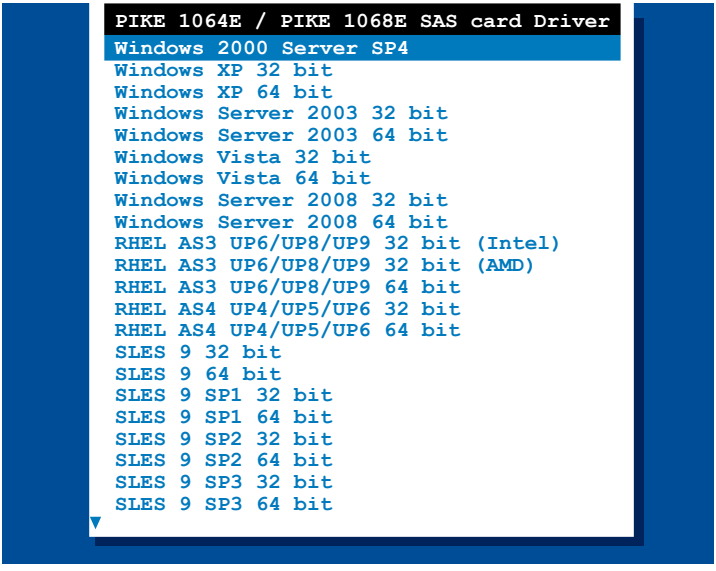
1. Place the RAID card support CD in the optical drive.
2. Restart the computer, then enter the BIOS Setup.
3. Select the optical drive as the first boot priority to boot from the support CD. Save your changes, then exit the BIOS Setup.
4. Restart the computer.
5. Press any key when prompted to boot from CD.

```
Loading FreeDOS FAT KERNEL GO!
Press any key to boot from CDROM...
```

6. The Makedisk menu appears. Select **PIKE 1064E / PIKE 1068E SAS card Driver,** and press <Enter> to enter the sub-menu.



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



8. Place a blank, high-density floppy disk to the floppy disk drive.
9. Press <Enter>.
10. Follow screen instructions to create the driver disk.

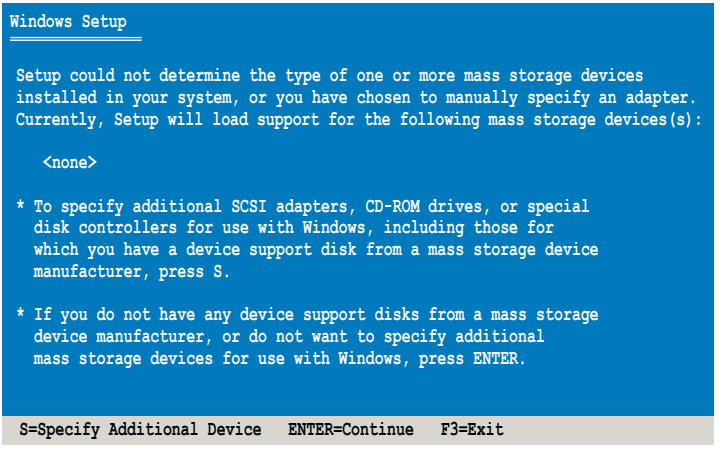
3.1.2 Windows® Server 2003 OS

During Windows® Server 2003 OS installation

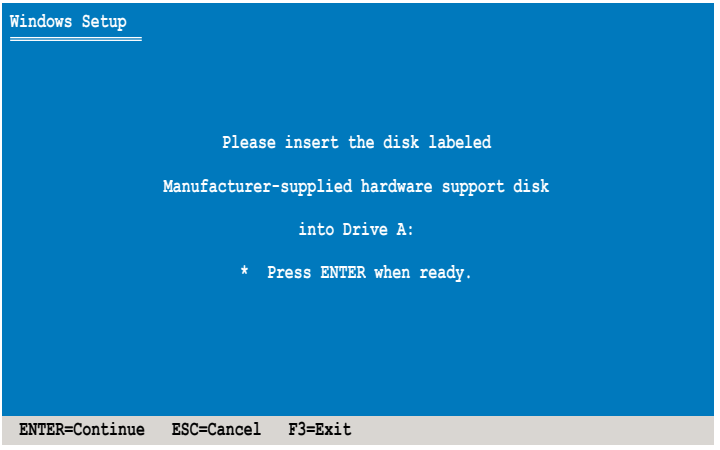
To install the RAID card driver when installing Windows® Server 2003 OS:

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.

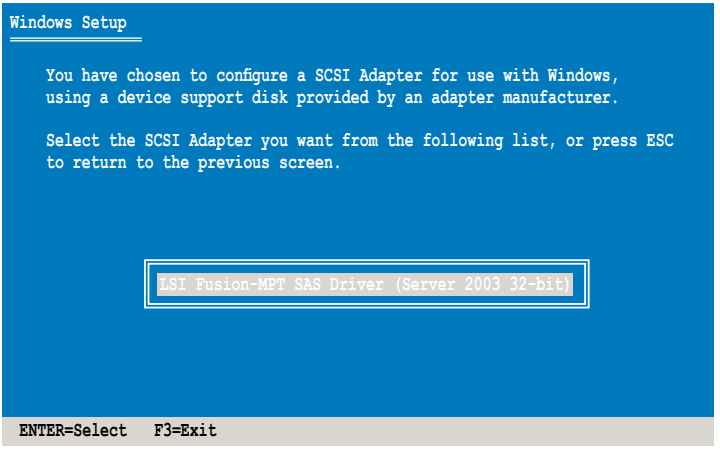
3. The next screen appears. Press <S> to specify an additional device.



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



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



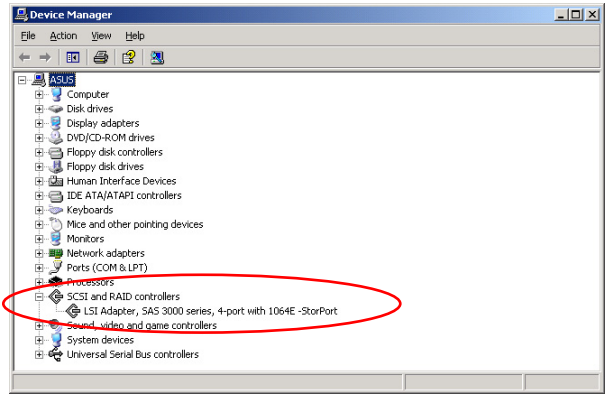
6. The Windows® Setup loads the RAID card drivers from the RAID driver disk. When next screen appears, press <Enter> to continue installation.
7. Setup then proceeds with the OS installation. Follow screen instructions to continue.

After Windows® Server 2003 OS installation

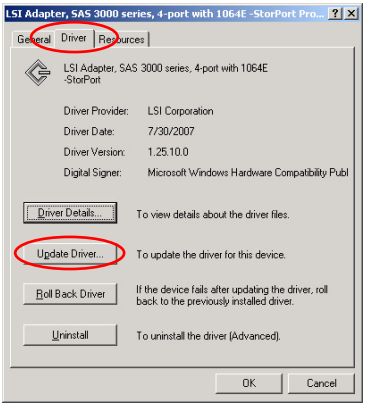
To update the RAID card driver after installing Windows® Server 2003 OS:

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, SAS 3000 series, 4-port with 1064E -StorPort** item.

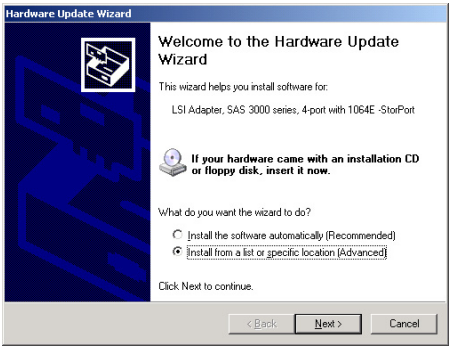
The controller name differs according to the installed SAS RAID card.



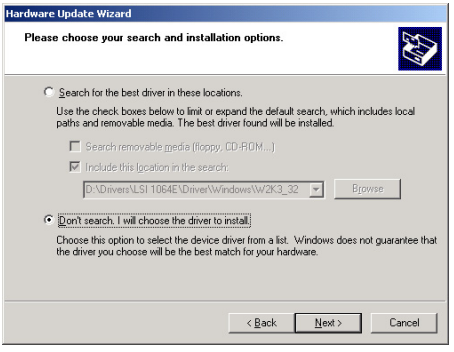
4. Click the **Driver** tab on the top, then click **Update Driver**.



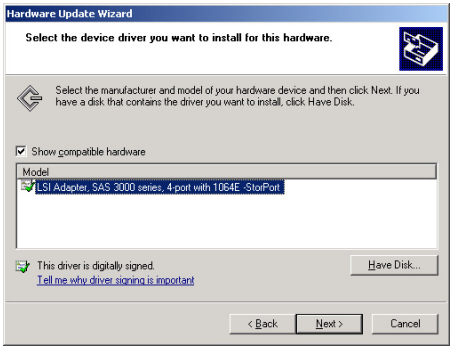
5. Toggle **Install from a list or specific location (Advanced)**, then click **Next** to continue.



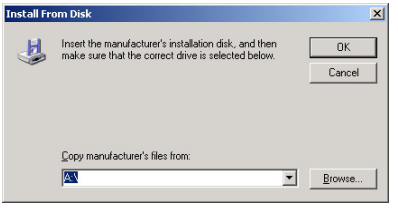
6. Toggle **Don't search. I will choose the driver to install**, then click **Next** to continue.



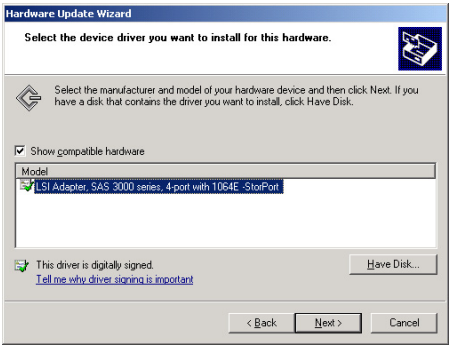
7. Insert the RAID driver disk you created earlier to the floppy disk drive.
8. Highlight **LSI Adapter, SAS 3000 series, 4-port with 1064E -StorPort**, then click **Have Disk**.



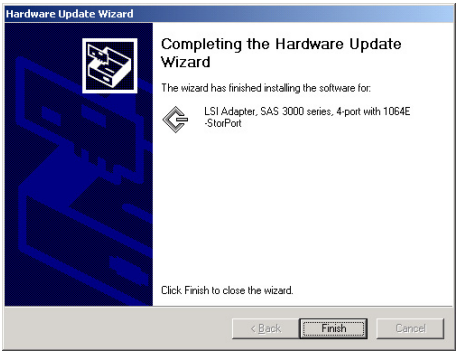
9. Select from the drop-down menu and locate the driver.



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



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



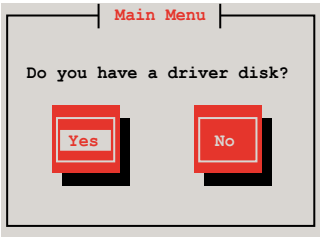
3.1.3 Red Hat® Enterprise Linux OS

To install the RAID card driver when installing Red Hat® Enterprise OS:

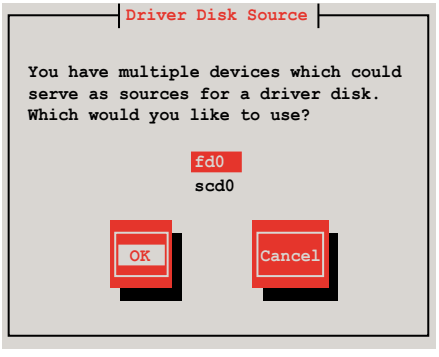
1. Boot the system from the Red Hat® OS installation CD.
2. At the **boot:**, type **linux dd**, then press <Enter>.

```
-  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
```

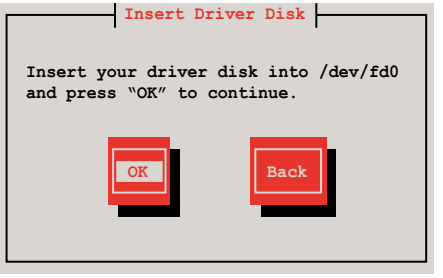
3. Select **Yes** using the <Tab> key when asked if you have the driver disk, then press <Enter>.



4. Select **fd0** using the <Tab> key when asked to select the driver disk source. Press <Tab> to move the cursor to **OK**, then press <Enter>.

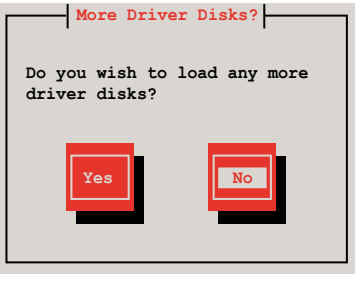


5. Insert the Red Hat® Enterprise RAID driver disk to the floppy disk drive, select **OK**, then press <Enter>.



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

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

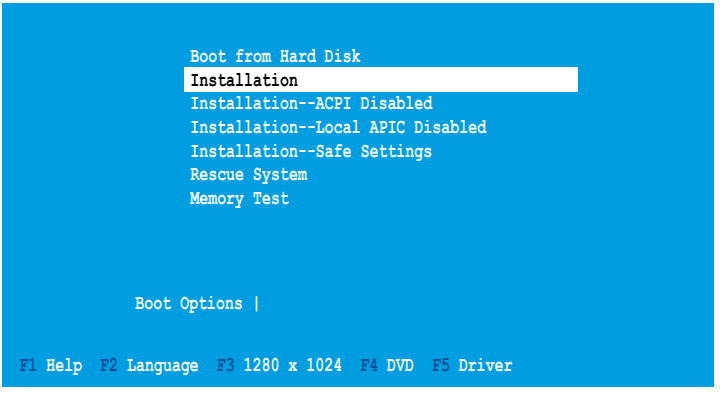


7. Follow the screen instructions to continue the OS installation.

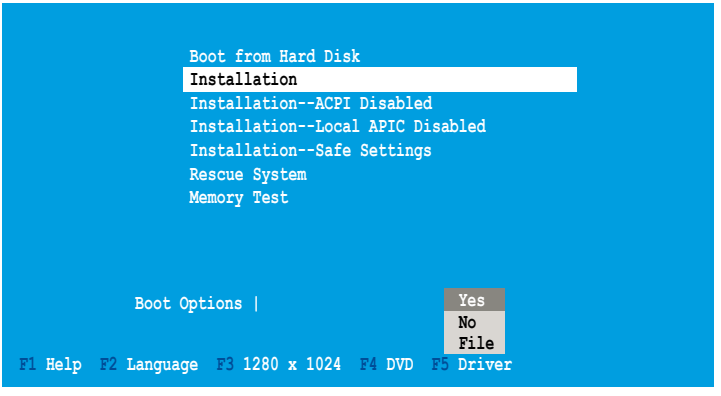
3.1.4 SUSE Linux Enterprise Server OS

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

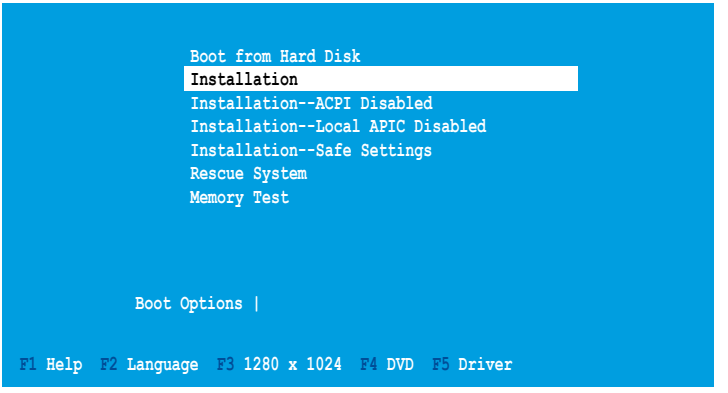
1. Boot the system from the SUSE OS installation CD.
2. Use the arrow keys to select **Installation** from the **Boot Options** menu.



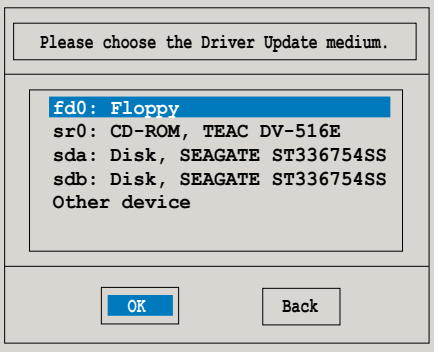
3. Press <F5>, then select **Yes** from the menu. Press <Enter>.



4. Insert the RAID driver disk to the floppy disk drive. Make sure 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.