IDE RAID Host Controller User Manual

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Revision History

Document Release	Date	Revision	Initials
0.1	11/4/02	Initial internal release	JC
0.2	11/11/02	Added VIA cover page, revision history, header and footer Corrected typos and grammatical errors	AT

Table of Contents

INTRODUCTION

This section gives a brief introduction on the RAID-related background knowledge and a brief introduction on the VIA IDE RAID Host Controller. For users wishing to install their VIA IDE RAID driver and RAID software, please proceed to the **Driver and RAID Software Installation** section.

RAID Basics

RAID (Redundant Array of Independent Disks) is a method of combining two or more hard disk drives into one logical unit. The advantage of an Array is to provide better performance or data fault tolerance. Fault tolerance is achieved through data redundant operation, where if one drives fails, a mirrored copy of the data can be found on another drive. This can prevent data loss if the operating system fails or hangs. The individual disk drives in an array are called "members". The configuration information of each member is recorded in the "reserved sector" that identifies the drive as a member. All disk members in a formed disk array are recognized as a single physical drive to the operating system.

Hard disk drives can be combined together through a few different methods. The different methods are referred to as different RAID levels. Different RAID levels represent different performance levels, security levels and implementation costs. The RAID levels which the VIA VT6410 IDE RAID Host Controller supports are RAID 0, 1, 0+1, and JBOD. The table below briefly introduced these RAID levels.

RAID Level	No. of Drives	Capacity	Benefits
RAID 0 (Striping)	2 to 4	Number drives * Smallest size	Highest performance without data protection
RAID 1 (Mirroring)	2	Smallest size	Data protection
RAID 0+1 (Striping/Mirroring)	4	2 * Smallest size	Highest performance with data protection
JBOD (Spanning)	2 to 4	Sum of All drives	No data protection and performance improving, but disk capacity fully used.

RAID 0 (Striping)

RAID 0 reads and writes sectors of data interleaved between multiple drives. If any disk member fails, it affects the entire array. The disk array data capacity is equal to the number of drive members times the capacity of the smallest member. The striping block size can be set from 4KB to 64KB. RAID 0 does not support fault tolerance.

RAID 1 (Mirroring)

RAID 1 writes duplicate data onto a pair of drives and reads both sets of data in parallel. If one of the mirrored drives suffers a mechanical failure or does not respond, the remaining drive will continue to function. Due to redundancy, the drive capacity of the array is the capacity of the smallest drive. Under a RAID 1 setup, an extra drive called the "spare drive" can be attached. Such a drive will be activated to replace a failed drive that is part of a mirrored array. Due to the fault tolerance, if any RAID 1 drive fails, data access will not be affected as long as there are other working drives in the array.

RAID 0+1 (Striping/Mirroring)

RAID 0+1 is a combination of RAID 0 and RAID 1 array types. A minimum of four drives needs to be installed. With a four-drive array, there must be two pairs of RAID 0 drives. Each pair mirrors the data on the other pair of striping drives. The data capacity is two times the smallest drive.

In a four-drive array, a single drive failure will cause the whole array to become, in essence, a RAID Level 0 array. However, this does not impact the data access. Another unique feature of RAID 0+1 is dual fault tolerance. In some cases, two drives can fail simultaneously and still maintain the integrity of the data. The data can still be accessed and worked like a RAID 0 array.

Assume the drives are configured as follows (M = Master, S = Slave, A/B indicates which striping pair the drive belongs to, number indicates which part of stripe data):

	IDE 1	IDE 2
M	Drive A1	Drive A2
S	Drive B1	Drive B2

In a RAID 0+1 array, the data integrity will remain if any 1, 2 combination survives. The following table indicates the possible combination of dual drive failure and the respective results of each case.

Failed Drives	Array Status	Note
A1, A2	Working	B1, B2 retains array integrity
B1, B2	Working	A1, A2 retains array integrity
A1, B2	Working	B1, A2 retains array integrity
B1, A2	Working	A1, B2 retains array integrity
A1, B1	Failure	A2, B2 contains only half of array data
A2, B2	Failure	A1, B1 contains only half of array data

JBOD (Spanning)

A spanning disk array is equal to the sum of the all drives in the array. Spanning stores data on to a drive until it is full then proceeds to store files onto the next drive in the array. When any disk member fails, the failure affects the entire array. JBOD is not really a RAID and does not support fault tolerance.

Key Features

The VIA IDE RAID solution uses the VT6410 chip (a two-channel ATA 133 solution) as a RAID controller. The RAID software is a Windows-based software utility. Its graphical user interface provides an easy way to configure and manage disk drives or disk arrays connected to the VT6410 controller. Listed below are the main features and benefits of VIA IDE RAID:

1. Supports ATA 133 high performance hard disk drive.
2. Supports hard disk drive larger than 137 GB (48-bits LBA).
3. Dual independent ATA channels and maximum connection of four hard disk drives allowed.
4. Supports Ultra DMA mode 6/5/4/3/2/1/0, DMA mode 2/1/0, and PIO mode 4/3/2/1/0.
5. Supports PCI Plug and Play. PCI interrupt sharing and coexists with mainboard IDE controller.
6. Supports IDE bus master operation.
7. Supports RAID 0, 1, 0+1, and JBOD.
8. 4 KB to 64 KB striping block size support.
9. Bootable disk or disk array support.
10. Windows-based RAID configure and management software tool. (Compatible with BIOS)
11. Real-time monitoring of device status and error alarm with popup message box and beeping.
12. Supports hot-swap failed disk drive in RAID 1 and 0+1 array.
13. Mirroring automatic background rebuilds support.
14. ATA SMART function support.
15. Microsoft Windows 98, Me, NT4.0, 2000, XP operating systems support.
16. Event log for easy troubleshooting.
17. On-line help for easy operation for RAID software.

INSTALLING THE HARD DRIVES

Hard disk drives must be Ultra ATA/133, Ultra ATA/100, Ultra ATA/66, Ultra ATA/33, or ATA-3 compatible to operate with the VT6410 IDE RAID controller. For optimal performance, it is recommended to install all identical drives of the same model and capacity.

1. Striping (RAID 0) and JBOD require at least two drives and has a limit of four drives. Mirroring (RAID 1) requires two drives. Striping and mirroring (RAID 0 +1) requires four drives. Set the jumpers of each hard drive to "Master" ("Device 0") or "Slave" ("Device 1") according to the following table.

Number of Drives	IDE Channel 1	IDE Channel 2
1	Master	------
2	Master	Master
3	Master & Slave	Master
4	Master & Slave	Master & Slave

2. Connect the IDE cables and the power cables to the hard drives. When connecting hard drives, pay attention to its Master – Slave jumper setting. If two hard drives are connected to one IDE cable, then one drive must be set as master while the other as slave.

3. Attach the IDE cables into the connectors on the VT6410 IDE RAID controller.

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BIOS CONFIGURATION UTILITY

Enter BIOS Configuration Utility

When the system powers on, the following information will appear on screen. Press the 'Tab' key to enter BIOS configuration utility.

```
VIA Technologies, Inc. VIA VT6410 RAID BIOS Setting Utility vX.XX
Copyright (C) VIA Technologies, Inc. All Right reserved.

Press <Tab> key into User Window!
Scan Device, Please wait...
Primary Master:    Maxtor 34098H4
Primary Slave:     Maxtor 34098H4
Secondary Master:  Maxtor 34098H4
Secondary Slave:   Maxtor 34098H4
```

The main interface of BIOS configuration utility is as below:

```
             VIA Tech. RAID BIOS Ver 0.94

  ▶ Create Array                  Create a RAID array with
  ▶ Delete Array                  the hard disks attached to
  ▶ Create/Delete Spare           VIA IDE controller
  ▶ Select Boot Array
  ▶ Serial Number View            F1  : View Array/disk Status
                                  ↑,↓ : Move to next item
                                  Enter: Confirm the selection
                                  ESC  : Exit

     Channel        Drive Name     Array Name   Mode    Size(GB)  Status

  Channel0 Master   Maxtor 34098H4              ATA 133 37.27     Hdd
  Channel0 Slave    Maxtor 34098H4              ATA 133 37.27     Hdd
  Channel1 Master   Maxtor 34098H4              ATA 133 37.27     Hdd
  Channel1 Slave    Maxtor 34098H4              ATA 133 37.27     Hdd
```

Create Disk Array

1. Use the arrow keys to navigate the menu. Select **Create Array** and press <Enter> to call out the list of creation steps.

```
             VIA Tech. RAID BIOS Ver 0.94

  ► Auto Setup For Data Security        Create a RAID array with
  ► Array Mode RAID 1 (Mirroring)       the hard disks attached to
  ► Select Disk Drives                  VIA IDE controller
  ► Start Create Process
                                        F1   : View Array/disk Status
                                        ↑,↓  : Move to next item
                                        Enter: Confirm the selection
                                        ESC  : Exit

    Channel         Drive Name       Array Name   Mode    Size(GB)  Status

  Channel0 Master   Maxtor 34098H4                ATA 133  37.27    Hdd
  Channel0 Slave    Maxtor 34098H4                ATA 133  37.27    Hdd
  Channel1 Master   Maxtor 34098H4                ATA 133  37.27    Hdd
  Channel1 Slave    Maxtor 34098H4                ATA 133  37.27    Hdd
```

2. Select **Array Mode** and press <Enter>. A list of array modes will appear. Highlight the target array mode that you want to create, and press <Enter> to confirm the selection. If RAID 1 or RAID 0/1 is selected, an option list will popup and enable the users to select **Create only** or **Create and duplicate**. **Create only** will allow BIOS to only create an array. The data on the mirroring drive may be different from the source drive. **Create and duplicate** allows BIOS to copy the data from the source to the mirroring drive.

```
              VIA Tech. RAID BIOS Ver 0.94

 ►  RAID 0 for performance              Create a RAID array with
 ◄  RAID 1 for data protection          the hard disks attached to
 ►  RAID 0/1                            VIA IDE controller
 ►  RAID SPAN for capacity
                                        F1  : View Array/disk Status
                                        ↑,↓ : Move to next item
                                        Enter: Confirm the selection
                                        ESC : Exit

     Channel        Drive Name    Array Name   Mode    Size(GB)  Status

   Channel0 Master  Maxtor 34098H4            ATA 133  37.27    Hdd
   Channel0 Slave   Maxtor 34098H4            ATA 133  37.27    Hdd
   Channel1 Master  Maxtor 34098H4            ATA 133  37.27    Hdd
   Channel1 Slave   Maxtor 34098H4            ATA 133  37.27    Hdd
```

3. After array mode is selected, there are two methods to create a disk array. One method is "**Auto Setup**" and the other one is "**Select Disk Drives**". **Auto Setup** allows BIOS to select the disk drives and create arrays automatically but it does not duplicate the mirroring drives even if the user selected **Create and duplicate** for RAID 1 or 0+1. It is recommended all disk drives are new ones when wanting to create an array. **Select Disk Drives** lets the user select the array drives by their requirements. When using **Select Disk Drives**, the channel column will be activated. Highlight the drives that you want to use and press <Enter> to select them. After all drives have been selected, press <Esc> to go back to the creation steps menu.

```
              VIA Tech. RAID BIOS Ver 0.94

 ► Auto Setup For Performance           Create a RAID array with
 ► Array Mode RAID 0 (Striping)         the hard disks attached to
 ► Select Disk Drives                   VIA IDE controller
 ► Block Size 64K
 ► Start Create Process                 F1  : View Array/disk Status
                                        ↑,↓ : Move to next item
                                        Enter: Confirm the selection
                                        ESC : Exit

     Channel         Drive Name    Array Name   Mode    Size(GB)  Status

[▪]Channel0 Master   Maxtor 34098H4           ATA 133  37.27    Stripe0
[▪]Channel0 Slave    Maxtor 34098H4           ATA 133  37.27    Stripe2
[▪]Channel1 Master   Maxtor 34098H4           ATA 133  37.27    Stripe1
[ ]Channel1 Slave    Maxtor 34098H4           ATA 133  37.27    Hdd
```

4. If RAID 0 or RAID 0+1 was selected in step 2, the block size of the array can also be selected. Use the arrow key to highlight **Block Size** and press <Enter>. Then select a block size from the popup menu. The block size can be 4KB to 64KB.
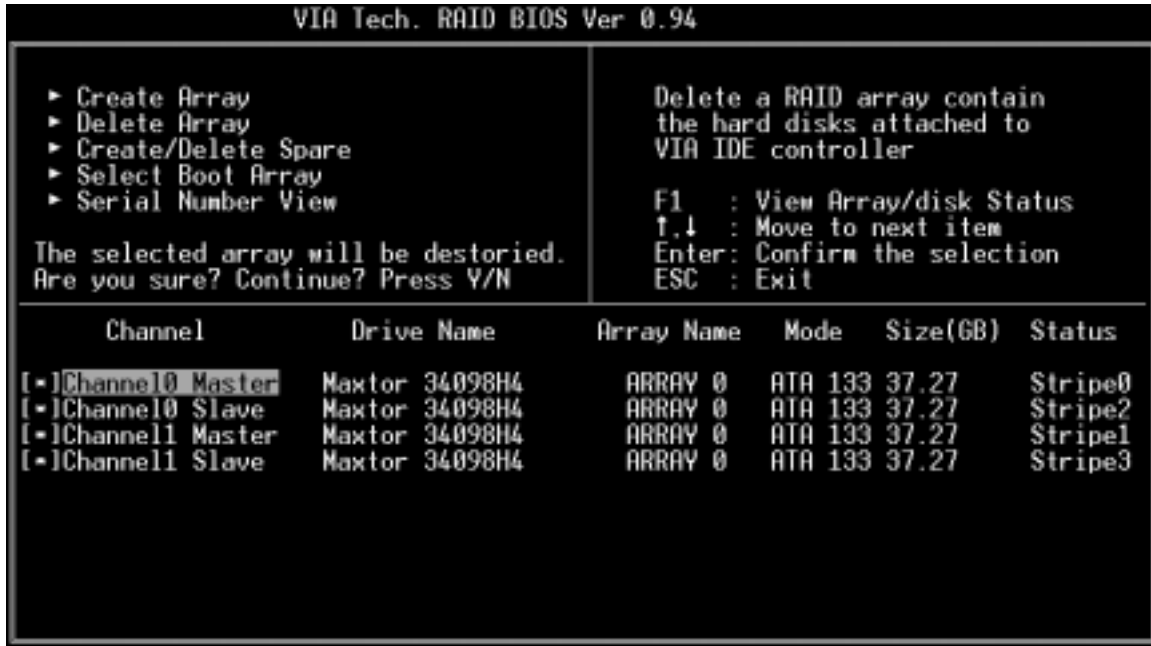
```
            VIA Tech. RAID BIOS Ver 0.94

  ► Auto Setup For    4K          Create a RAID array with
  ► Array Mode RAID   8K          the hard disks attached to
  ► Select Disk Dri   16K         VIA IDE controller
  ► Block Size 64K    32K
  ► Start Create Pr   64K         F1  : View Array/disk Status
                                  ↑,↓ : Move to next item
                                  Enter: Confirm the selection
                                  ESC : Exit

     Channel          Drive Name    Array Name   Mode    Size(GB)   Status

  [*]Channel0 Master  Maxtor 34098H4            ATA 133  37.27     Stripe0
  [*]Channel0 Slave   Maxtor 34098H4            ATA 133  37.27     Stripe2
  [*]Channel1 Master  Maxtor 34098H4            ATA 133  37.27     Stripe1
  [*]Channel1 Slave   Maxtor 34098H4            ATA 133  37.27     Stripe3
```

5. Use the arrow key to highlight **Start Create Process** and press <Enter>. A confirmation message will appear. Press **Y** to finish the creation, or press **N** to cancel the creation.
6. Important note: All existing content in the hard drive will be destroyed during array creation.

Delete Disk Array

A RAID can be deleted after it has been created. To delete a RAID, use the following steps:

1. Select **Delete Array** and press <Enter>. The channel column will be activated.
2. Select the member of an array that is to be deleted and press <Enter>. A warning message will display. Press Y to delete or press N to cancel.

```
                  VIA Tech. RAID BIOS Ver 0.94

    ► Create Array                 Delete a RAID array contain
    ► Delete Array                 the hard disks attached to
    ► Create/Delete Spare          VIA IDE controller
    ► Select Boot Array
    ► Serial Number View           F1   : View Array/disk Status
                                   ↑,↓  : Move to next item
    The selected array will be destoried.   Enter: Confirm the selection
    Are you sure? Continue? Press Y/N       ESC  : Exit

       Channel        Drive Name     Array Name   Mode    Size(GB)   Status

    [■]Channel0 Master  Maxtor 34098H4   ARRAY 0   ATA 133 37.27   Stripe0
    [■]Channel0 Slave   Maxtor 34098H4   ARRAY 0   ATA 133 37.27   Stripe2
    [■]Channel1 Master  Maxtor 34098H4   ARRAY 0   ATA 133 37.27   Stripe1
    [■]Channel1 Slave   Maxtor 34098H4   ARRAY 0   ATA 133 37.27   Stripe3
```

Deleting a disk array will destroy all the data on the disk array except RAID 1 arrays. When a RAID is deleted, the data on these two hard disk drives will be reserved and become two normal disk drives.

Create and Delete Spare Hard Drive

If a RAID 1 array is created and there are drives that do not belong to other arrays, the one that has a capacity which is equal to or greater than the array capacity cab be selected as a spare drive for the RAID 1 array. Select **Create/Delete Spare** and press <Enter> and he channel column will be activated. Select the drive that you want to use as a spare drive and press <Enter>. The selected drive will be marked as **Spare**. The spare drive cannot be accessed in an OS.

To delete a spare drive, highlight **Create/Delete Spare** and press <Enter>. The spare drive will be highlighted. Press <Enter> to delete the spare drive.

```
          VIA Tech. RAID BIOS Ver 0.94

  ► Create Array                 Create/Delete a spare disk
  ► Delete Array                 in a mirror array
  ► Create/Delete Spare
  ► Select Boot Array
  ► Serial Number View           F1  : View Array/disk Status
                                 ↑,↓ : Move to next item
                                 Enter: Confirm the selection
                                 ESC : Exit

      Channel        Drive Name      Array Name   Mode    Size(GB)  Status

  Channel0 Master  Maxtor 34098H4    ARRAY 0    ATA 133 37.27     Source
  Channel0 Slave   Maxtor 34098H4    ARRAY 0    ATA 133 37.27     Spare
  Channel1 Master  Maxtor 34098H4    ARRAY 0    ATA 133 37.27     Mirror
  Channel1 Slave   Maxtor 34098H4               ATA 133 37.27     Hdd
```

Select Boot Array

User can select a disk array as boot device if user wants to boot operating system from an array. Boot disk array cannot be selected if the operating system does not boot from the disk array. Highlight the **Select Boot Array** item, then press <Enter> and the channel column will be activated. Then highlight the target disk array and press <Enter>. If user selects a disk array that has a boot mark and press <Enter>, its boot setting will be canceled.

```
                 VIA Tech. RAID BIOS Ver 0.94

      ► Create Array                     Set/Clear bootable array
      ► Delete Array
      ► Create/Delete Spare
      ► Select Boot Array
      ► Serial Number View              F1   : View Array/disk Status
                                        ↑,↓  : Move to next item
                                        Enter: Confirm the selection
                                        ESC  : Exit

         Channel          Drive Name    Array Name  Mode   Size(GB)  Status

      [■]Channel0 Master   Maxtor 34098H4   ARRAY 0   ATA 133 37.27   Boot
      [ ]Channel0 Slave    Maxtor 34098H4   ARRAY 1   ATA 133 37.27   Source
      [■]Channel1 Master   Maxtor 34098H4   ARRAY 0   ATA 133 37.27   Boot
      [ ]Channel1 Slave    Maxtor 34098H4   ARRAY 1   ATA 133 37.27   Mirror
```

View Serial Number of Hard Drive

Highlight **Serial Number View** and press <Enter>. Use arrow key to select a drive, the selected drive's serial number can be viewed in the last column. The serial number is assigned by the disk drive manufacturer.

View Array Status

Press the **F1** key to show the array status on the screen. If there are no disk arrays then nothing will be displayed on the screen.

```
            VIA Tech. RAID BIOS Ver 0.94

  ► Create Array                    Create a RAID array with
  ► Delete Array                    the hard disks attached to
  ► Create/Delete Spare             VIA IDE controller
  ► Select Boot Array
  ► Serial Number View              F1   : View Array/disk Status
                                    ↑,↓  : Move to next item
                                    Enter: Confirm the selection
                                    ESC  : Exit

     Array Name    Array Mode    Block Size(GB)    Size(GB)

     ARRAY 0       Mirror        N/A               37.27

     ARRAY 1       Mirror        N/A               37.27
```
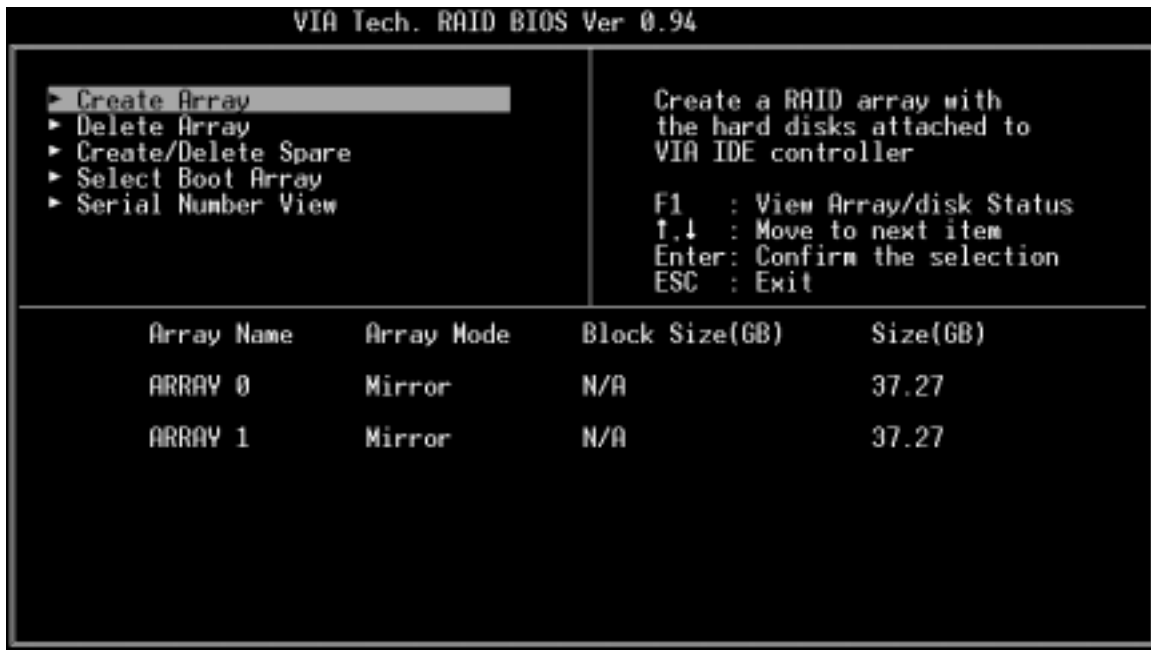
Duplicate Critical RAID 1/0+1 Array

When booting up the system, BIOS will detect if the RAID 1 or RAID 0+1 array has any inconsistencies between user data and backup data. If BIOS detects any inconsistencies, then the status of the disk array will be marked as critical and BIOS will prompt the user to duplicate the RAID 1 or 0+1 to make the backup data consistent with the user data.

```
┌── Critical RAID 1 ─────────────┐  ┌── Critical Status ──┐
│ Duplicate now                  │  │ The RAID 1  array needs to │
│ Continue to boot               │  │ be duplicated to ensure    │
│                                │  │ data consistancy.          │
│                                │  │                            │
│                                │  │ Fault Hdd Found:           │
│                                │  │ Channel 1 Device 0 Fault   │
└────────────────────────────────┘  └────────────────────────────┘
┌── Remaining members of the failed array ──────────────────────┐
│                                                                │
│   Channel        Drive Name      Array Name  Mode   Size(GB) Status │
│ Channel1 Device0  IC35L040AVVA07-0  Array0   ATA 100 38.34  Mirror │
│ Channel0 Device0  IC35L040AVVA07-0  Array0   ATA 100 38.34  Source │
│                                                                │
│                                                                │
│ Note:                                                          │
│ 1)Press <ESC> to Exit.                                         │
│ 2)After Execute,Press <TAB> immediately can into Utility Window! │
└────────────────────────────────────────────────────────────────┘
```

Continue to boot will enable duplicating the array after booting into OS.

Rebuild Broken RAID 0/0+1 array

When booting up the system, BIOS will detect if any member disk drives of RAID has failed or is absent. If BIOS detects any disk drive failures or missing disk drives, the status of the array will be marked as broken.

If BIOS detects a broken RAID 1 array but there is a spare hard drive available for rebuilding the broken array, the spare hard drive will automatically become the mirroring drive. BIOS will show a main interface just like a duplicated RAID 1 main interface. **Continue to boot** will enable duplicating the array after booting into operating system.

If BIOS detects a broken RAID 1 or 0+1 array but there is no spare hard drive available for rebuilding the array, BIOS will provide several operations to solve such problem.

```
┌─ Broken RAID 1 ──────────────────────┐  ┌─ Critical Status ──────┐
│ Power off and check the failed drive │  │ A disk member of a mirroring   │
│ Destroy the Mirroring Relationship   │  │ array has failed or is not     │
│ Choose replacement drive and rebuild │  │ responding. The array is       │
│ Continue to boot                     │  │ stilling functional,but fault  │
│                                      │  │ tolerance is disabled.         │
│                                      │  │                                │
│                                      │  └────────────────────────┘
│                                      │
├─ Remaining members of the failed array ──────────────────────────┤
│                                                                   │
│    Channel       Drive Name       Array Name  Mode   Size(GB) Status │
│ Channel0 Device0 IC35L040AVVA07-0  Array0   ATA 100 38.34   Broken │
│                                                                   │
│                                                                   │
│ Note:                                                             │
│ 1)Press <ESC> to Exit.                                           │
│ 2)After Execute,Press <TAB> immediately can into Utility Window! │
└───────────────────────────────────────────────────────────────────┘
```

1. **Power off and check the failed drive**
    This item turns off the computer and replaces the failed hard drive with a good one. If your computer does not support APM, you must turn off your computer manually. After replacing the hard drive, boot into BIOS and select **Choose replacement drive and rebuild** to rebuild the broken array.

2. **Destroy the Mirroring Relationship**
   This item cancels the data mirroring relationship of the broken array. For broken RAID 1 arrays, the data on the surviving disk will remain after the destroy operation. For broken RAID 0+1 arrays, all data on the array will be lost after destroy operation. However, **Destroy the Mirroring Relationship** is not recommend because the data on the remaining disk will be lost when you use the hard drive to create another RAID 1 array.

3. **Choose replacement drive and rebuild**
   This item enables the user to select an already-connected hard drive to rebuild the broken array. After choosing a hard drive, the channel column will be activated.

```
┌─ Broken RAID 1 ────────────────────┬──── Critical Status ───────┐
│                                    │                            │
│ Power off and check the failed drive │ The contents on the disk │
│ Destroy the Mirroring Relationship   │ you have selected will be │
│ Choose replacement drive and rebuild │ deleted.                  │
│ Continue to boot                     │                           │
│                                      │                           │
│                                      │                           │
│                                      │                           │
├─ Remaining members of the failed array ─────────────────────────┤
│                                                                  │
│     Channel         Drive Name     Array Name  Mode   Size(GB) Status │
│ ( )Channel0 Device1  IC35L040AVVA07-0  Array0  ATA 100 38.34  Hdd │
│ ( )Channel1 Device1  IC35L040AVVA07-0  Array0  ATA 100 38.34  Hdd │
│                                                                  │
│                                                                  │
│  Note:                                                           │
│  1)Press <ESC> to Exit.                                          │
│  2)After Execute,Press <TAB> immediately can into Utility Window! │
└──────────────────────────────────────────────────────────────────┘
```

Highlight the target hard drive and press <Enter>, a warning message will appear. Press **Y** to use that hard drive to rebuild, or press **N** to cancel. Please note that rebuilding the array will destroy all the data on the replacement hard drive.

4. **Continue to boot**
   This item skips the problem and allows the system to continue booting into OS.

DRIVER AND RAID SOFTWARE INSTALLATION

Microsoft Windows driver Installation

1. After Windows has finished booting up, the system will automatically find the newly installed adapter and prompt the **Found New Hardware Wizard** window. Click **Cancel** to skip it.

2. Insert the RAID driver and software installation CD or diskettes. Browse the CD or diskettes and double click on **setup.exe** to begin the driver and software installation.

3.   Confirm the follow-up dialogue windows to finish the installation.
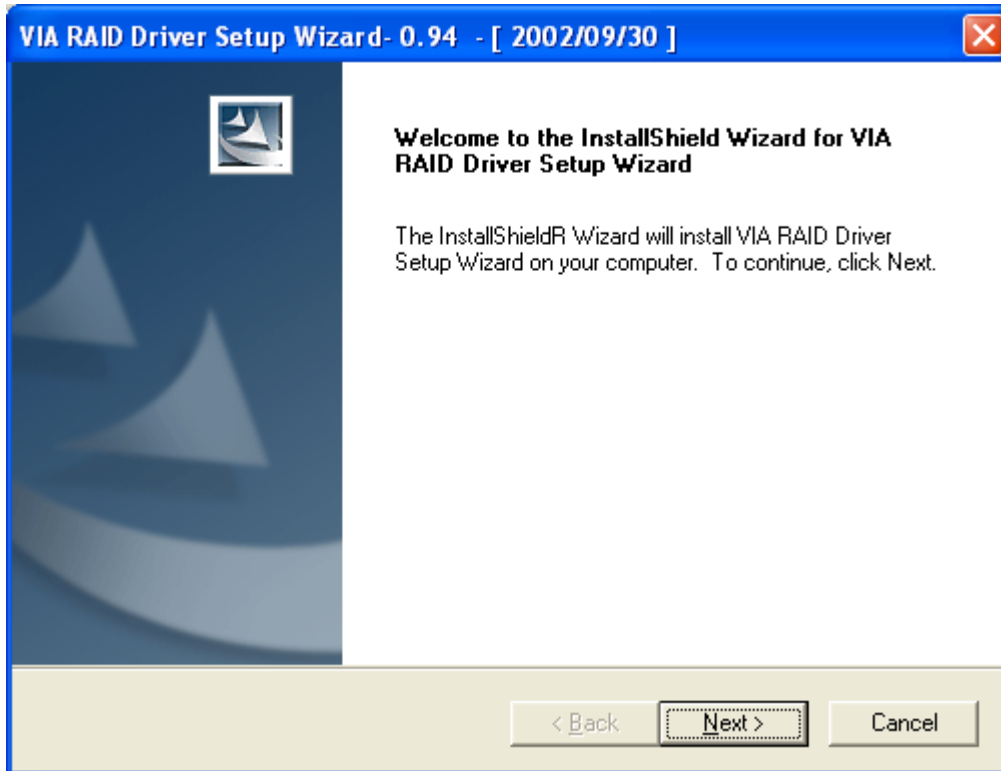
4.   When the installation is completed, click **Finish** to restart the system.
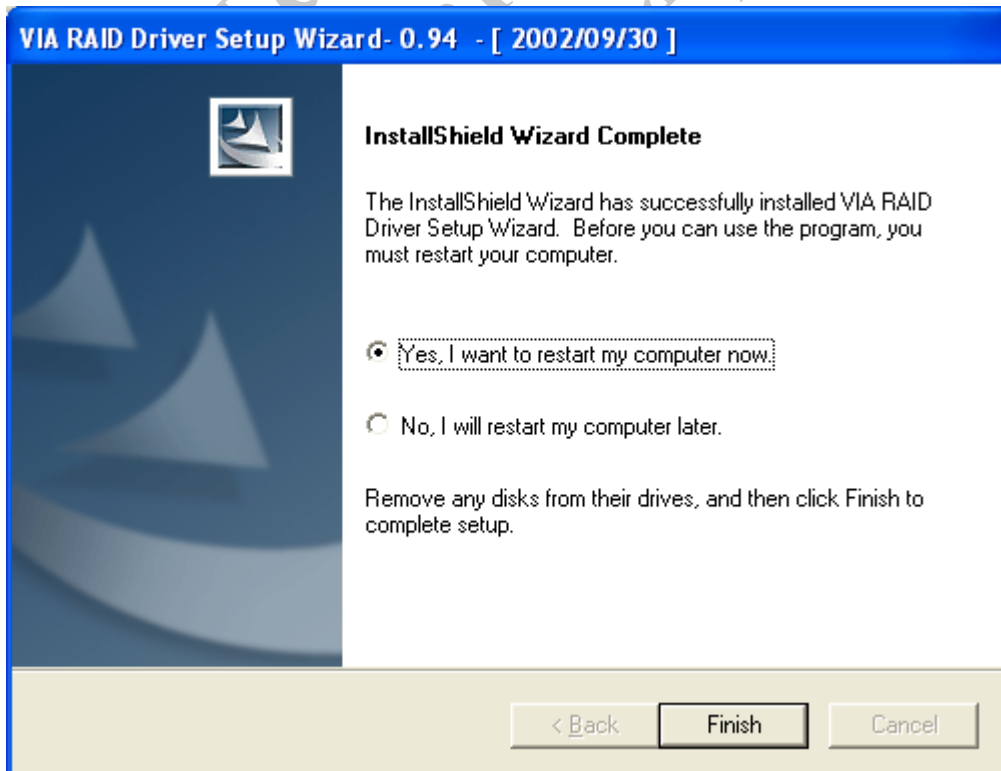
Verify Installation

1. Right-click on **My Computer** and the select **Properties** from the popup menu.
2. From the popup window, click on **Hardware**, then click on **Device Manager**.
3. Expand the **SCSI and RAID controllers** tree as shown below. If the VIA IDE RAID Host Controller does not exist or there is a "?" or "!" marking on the device icon, then the driver has not been installed correctly and needs to be reinstalled.
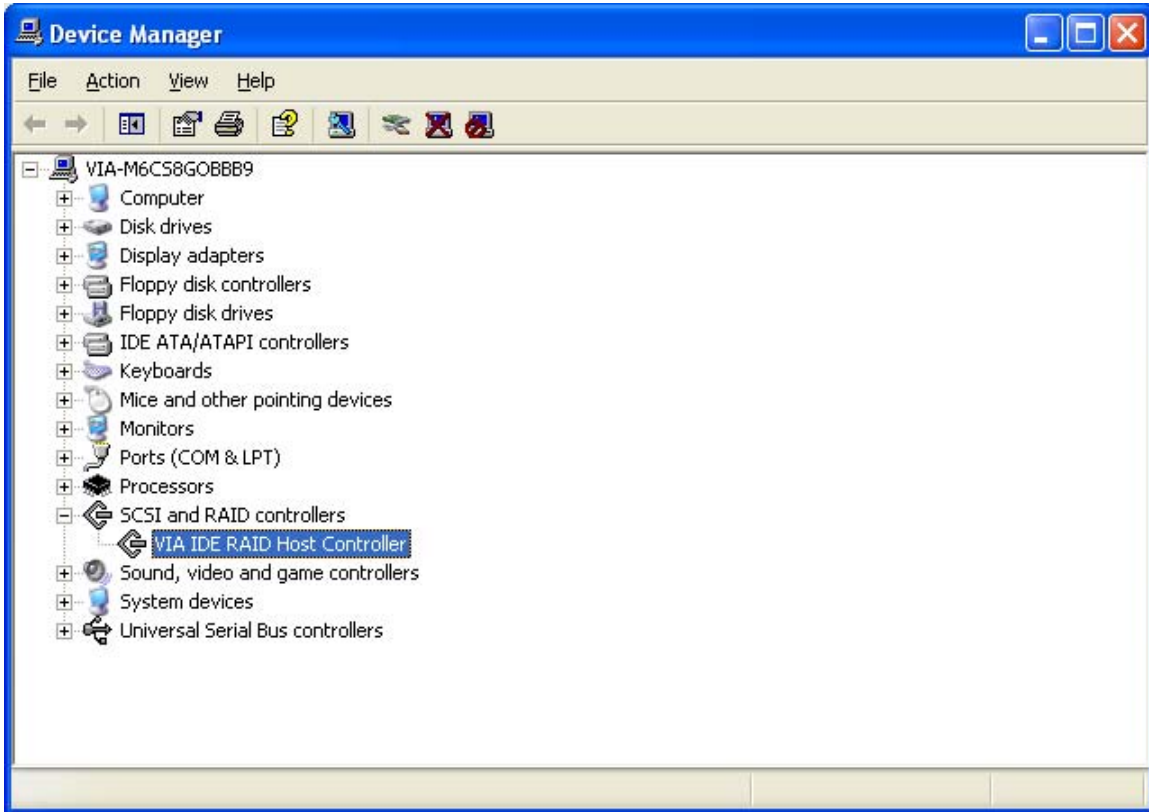
RAID SOFTWARE

Installation

The RAID software is installed simultaneously with driver installation.
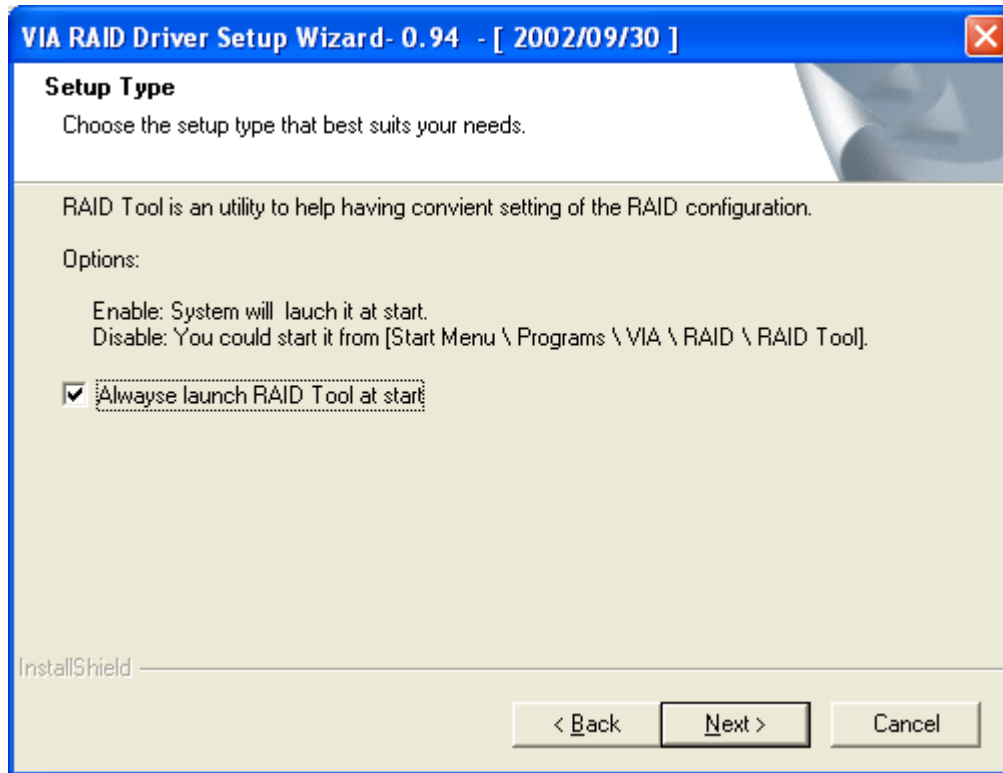
Getting Start

After installing the GUI software, it will be automatically started every time Windows is started. An icon will appear in the system tray of the tool bar to indicate that GUI software is currently running.

Double click on the system tray icon to launch the main interface of the utility.
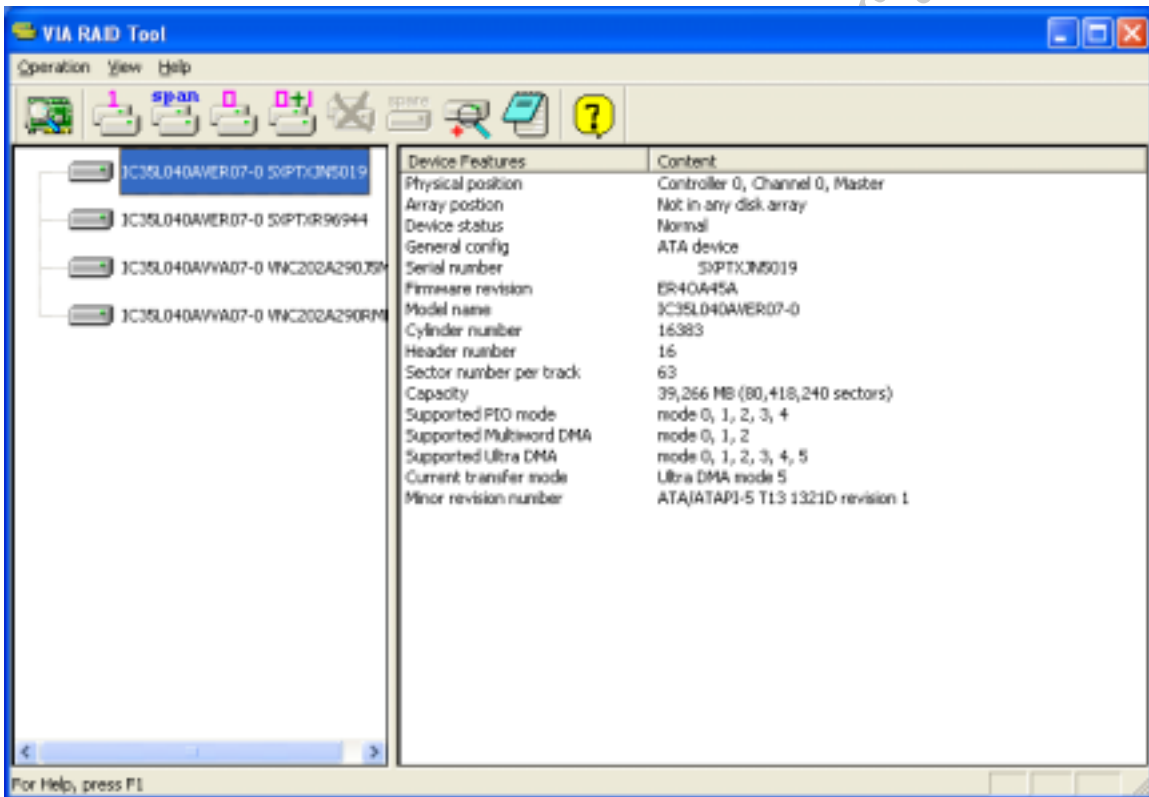
The main interface is divided into two windows and the toolbar above contain the main functions. Click on these toolbar buttons to execute specific functions. The left windowpane displays the controller and disk drives and the right windowpane displays the details of the controller or disk drives.

View by Controller

Create Span Array (JBOD)

Create RAID 0+1

Add/Remove Spare disk

View Event log

View by Devices

Create Mirror Array (RAID 1)

Create Stripe Array (RAID 0)

Remove Array

Check All Disks

Help Topics

View Online Help

Click on to launch the Help Topics. It is recommended that you read through the help articles before using RAID utility.
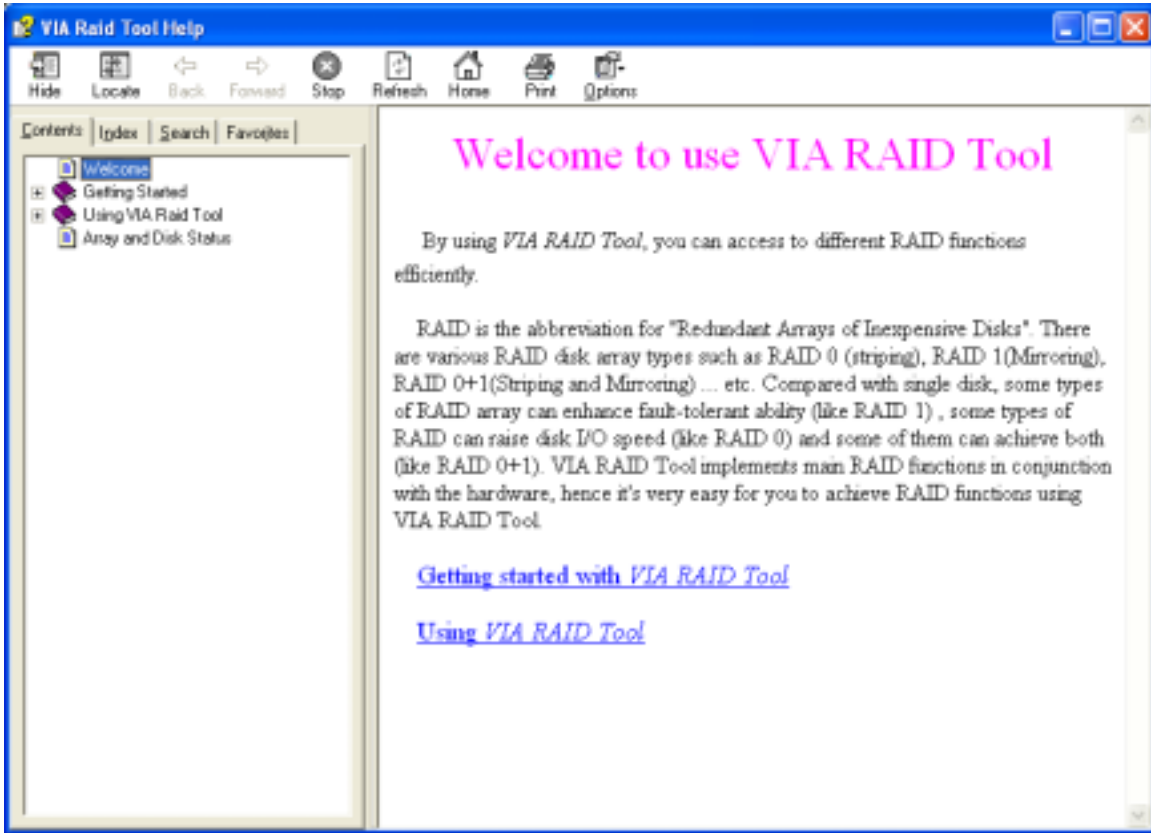
View Controller and Device Status

Click on [icon] or [icon] button to determine the viewing type of left windowpane. There are two viewing types: By controllers and by device. Click on the object in the left windowpane to display the status of the object in the right windowpane.
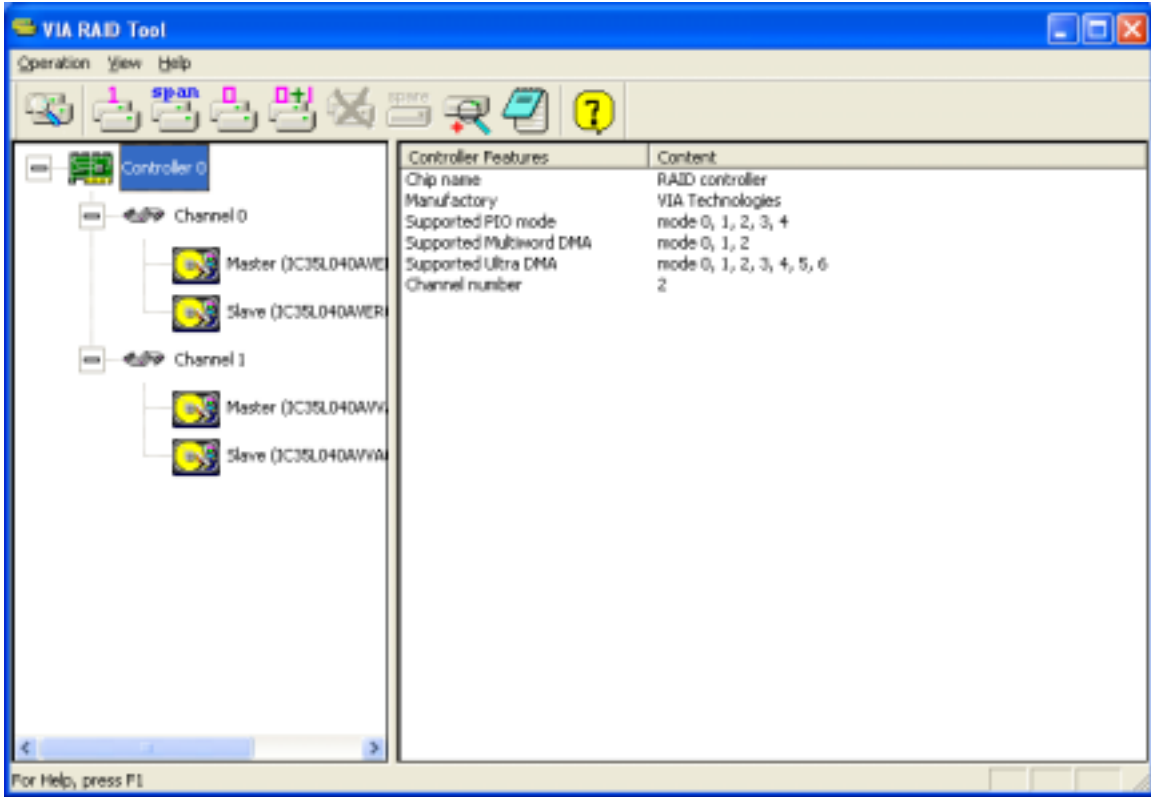
Create Disk Array

1. The following four buttons are used to create a disk array depending on users' preference: ![RAID 1 icon] RAID 1, ![Span icon] Span, ![RAID 0 icon] RAID 0, and ![RAID 0+1 icon] RAID 0+1. Click on the RAID button you want to create, the **Select Array Creating Method** will be displayed.
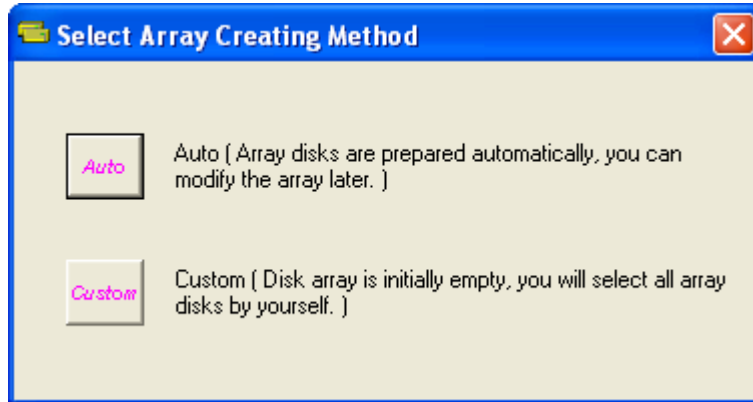
Auto: The utility will arrange the available hard disk drives to be the disk arrays. The hard disk drives can still be modified later. This method is strongly recommended.

Custom: The utility will provide an interface to manually arrange the array.

2. Click on "**Auto**" to launch the creating array window. If you select **Custom**, the available disks window lists the available disk drives that can be used to create the array. Select a disk drive and click on the right arrow button to add the specified disk drive to the array. Disk drives can be removed from the array by selecting an array disk and clicking on the left arrow button to remove the drive from the array.
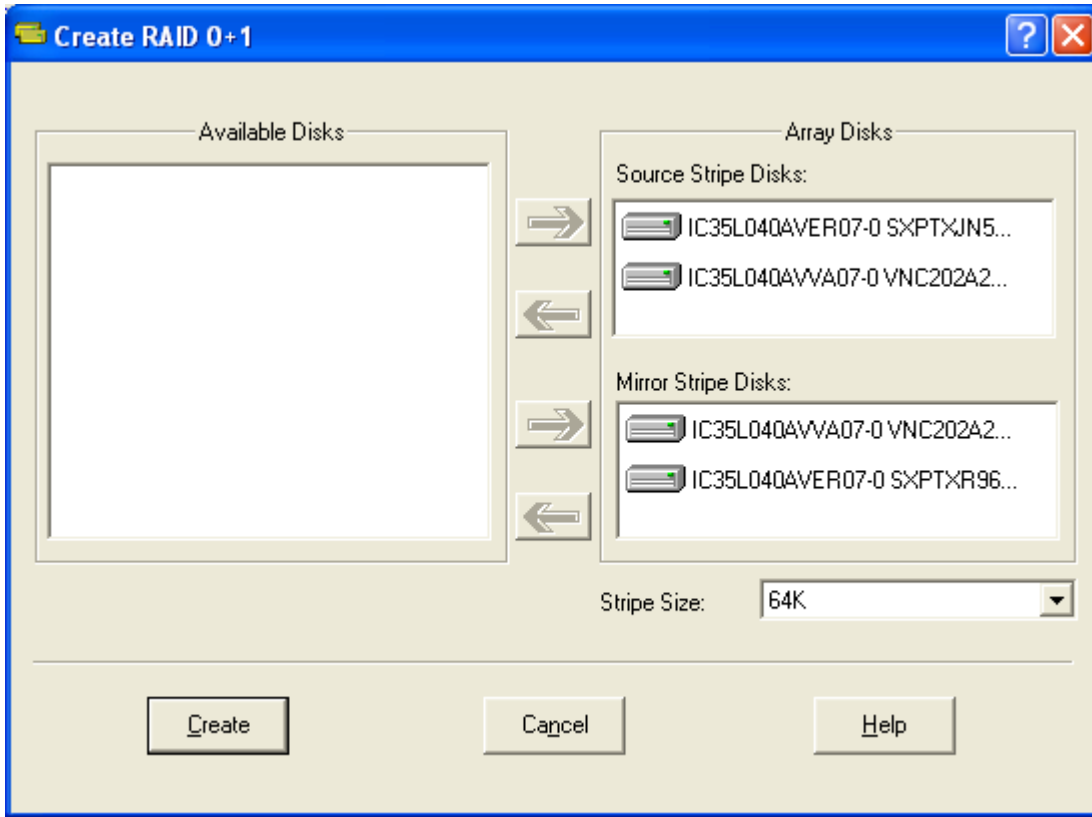
Click on "**Create**" to continue or "**Cancel**" to exit. Click on "**Help**" to launch the Help Topics window.

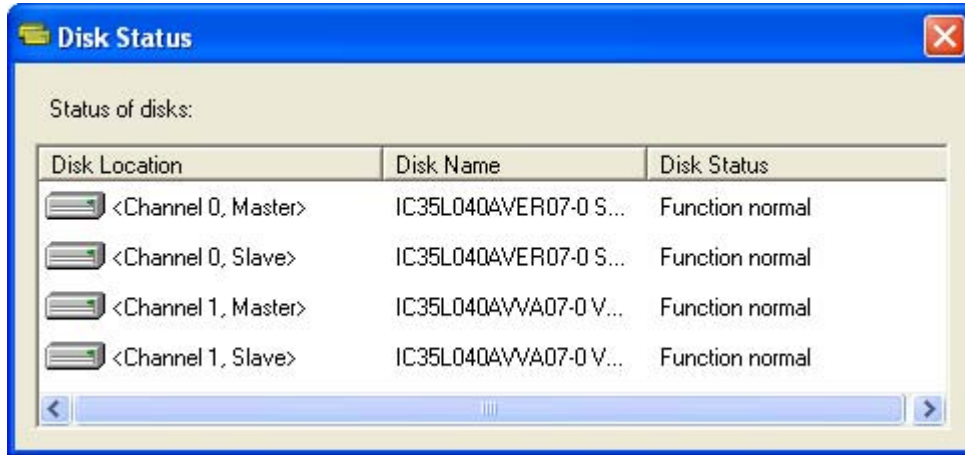3. A warning message will pop up after clicking on **Create**. Click **Yes** to finish the creation of disk array, or **No** to cancel.

4. A message box will popup to prompt the user to restart the computer. Click **Yes** to restart the computer or click **No** to skip restarting. The new disk array setting will take effect only after restarting.
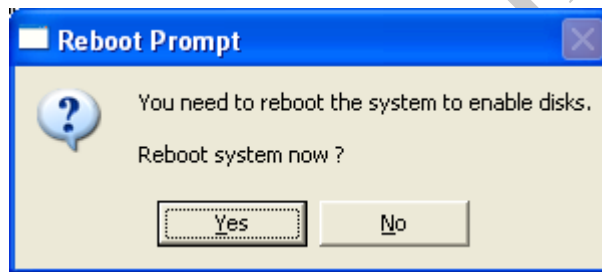
Delete Disk Array

1. Select the disk array that you want to delete from the left windowpane. Click on **Remove Array** [icon]. A warning message will popup.
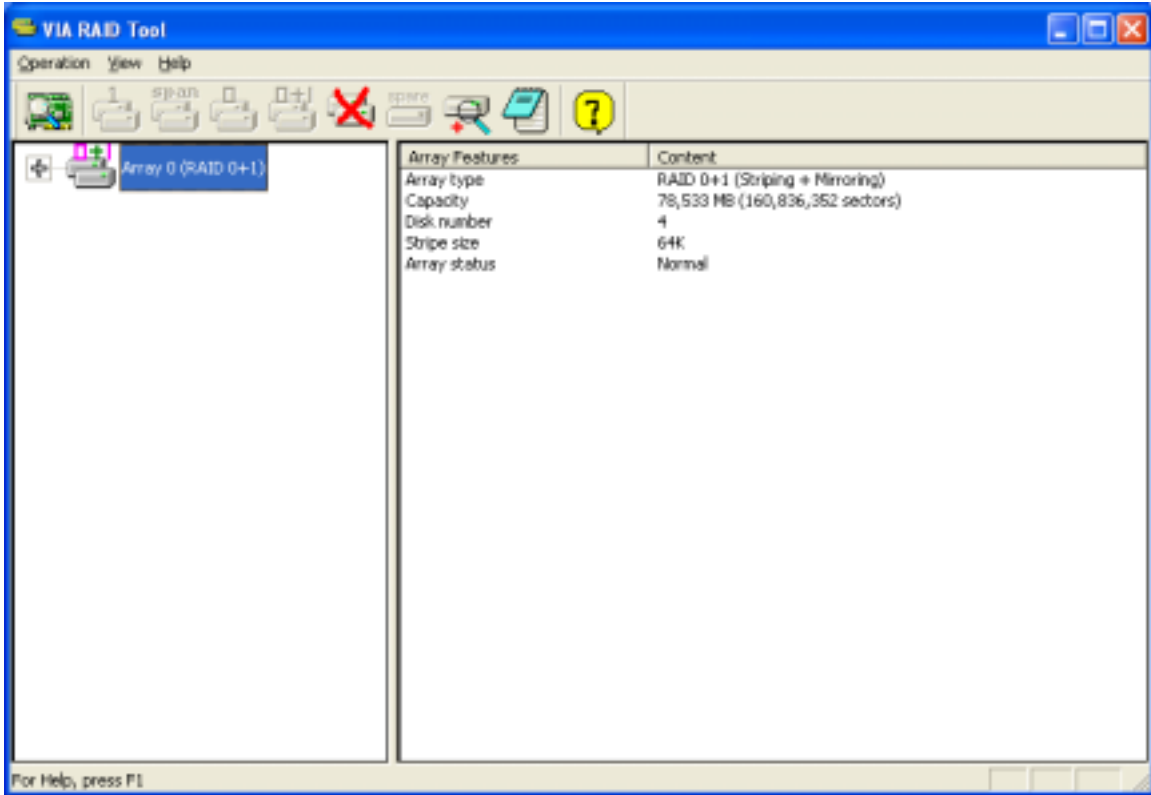
2. Click **Yes** to delete the specified disk array or click **No** to cancel.
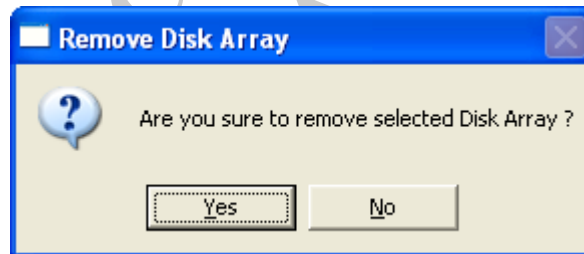
3. A message box will popup to prompt the user to restart the computer. Click **Yes** to restart the computer or click **No** to skip restarting. The new setting will take effect only after restarting.
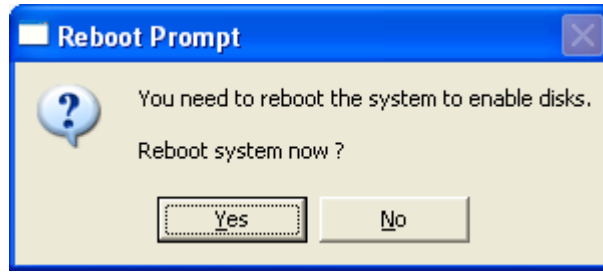
Warning: Deleting a disk array will destroy all the data on the disk array except RAID 1 arrays. When a RAID array is deleted, the data on these two hard disk drives will still remain and become two normal disk drives.

Add and Remove Spare Disk Drive

Add Spare Disk Drive

A spare disk drive can be added when a RAID 1 array is created. The capacity of the spare disk drive must be greater than or equal to the capacity of the RAID 1 array. If there is no spare disk drive in a RAID 1 array, user can add a spare disk drive after RAID 1 array is created by clicking on [spare].

1. Select the RAID 1 array in the left windowpane and click on [spare]. Then the available disk drives will be listed in a popup window.
2. Select a disk drive and click on **OK** to add a spare disk drive to RAID 1.
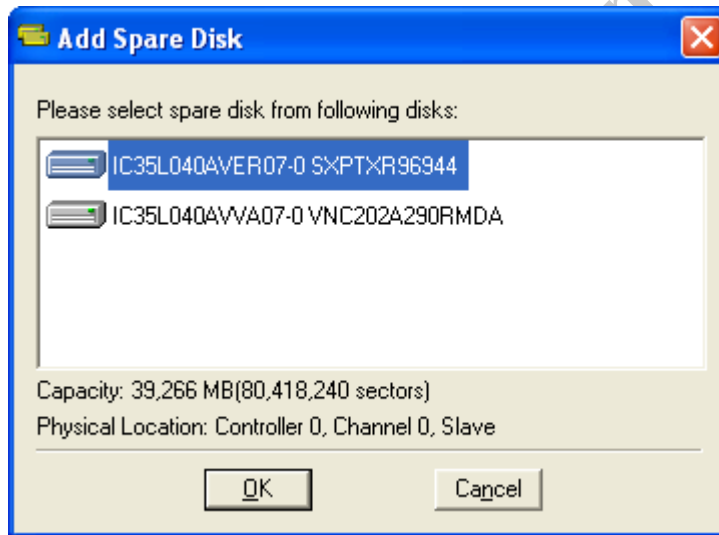
3. A warning message will popup. Click **Yes** to finish adding the spare disk, or **No** to cancel.
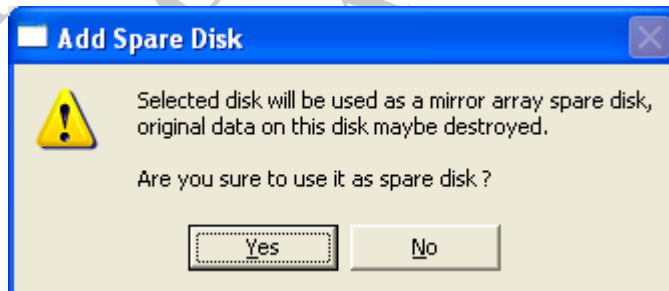
4. A message box will popup to prompt the user to restart the computer. Click **Yes** to restart the computer or click **No** to skip restarting. The new setting will take effect only after restarting.
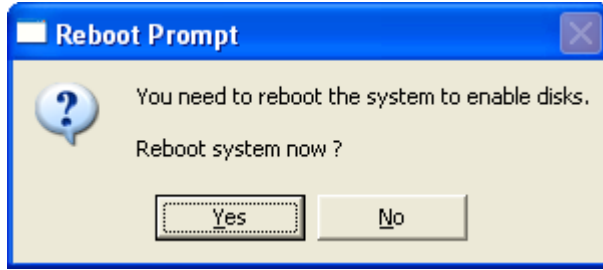
Note: The spare disk drive in the RAID 1 array can be accessed by the operating system.

Remove Spare Disk Drive

Spare disk drives can be removed from a specified RAID 1 and changed into normal hard disk drives.

1. Select the RAID 1 array that you want to remove spare disk drive in the left windowpane and click on [spare]. A warning message will popup.
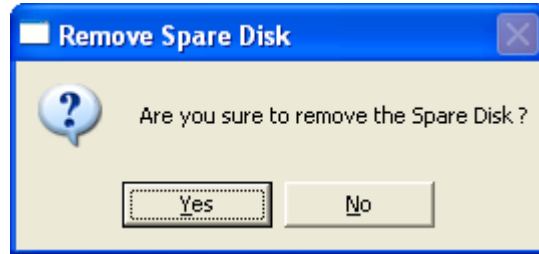
2. Click **Yes** to finish removing spare disk, or **No** to cancel.
3. A message box will popup to prompt the user to restart the computer. Click **Yes** to restart the computer or click **No** to skip restarting. The new setting will take effect only after restarting

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Check All Disks

You can check whether the disk drives are working normally at any time by clicking on [icon]. After the disk check is completed, a dialog window will pop up to show the status of each disk. See picture below.

Disk Location	Disk Name	Disk Status
<Channel 0, Master>	IC35L040AVER07-0 S...	Function normal
<Channel 0, Slave>	IC35L040AVER07-0 S...	Function normal
<Channel 1, Master>	IC35L040AVVA07-0 V...	Function normal
<Channel 1, Slave>	IC35L040AVVA07-0 V...	Function normal

Disk Status

Status of disks:

Your hard disk drive must be compatible with the ATA/ATAPI-5 specification and support SMART commands or the disk checking will fail.

View Event Log

The RAID software records important events into a log file, such as disk array creation, disk array removal, disk failure, synchronization…etc.

1. Click on ⬜ to display the event log. There are three types of log items: Information ⓘ , Warning ⚠ , and Error ⊗ .
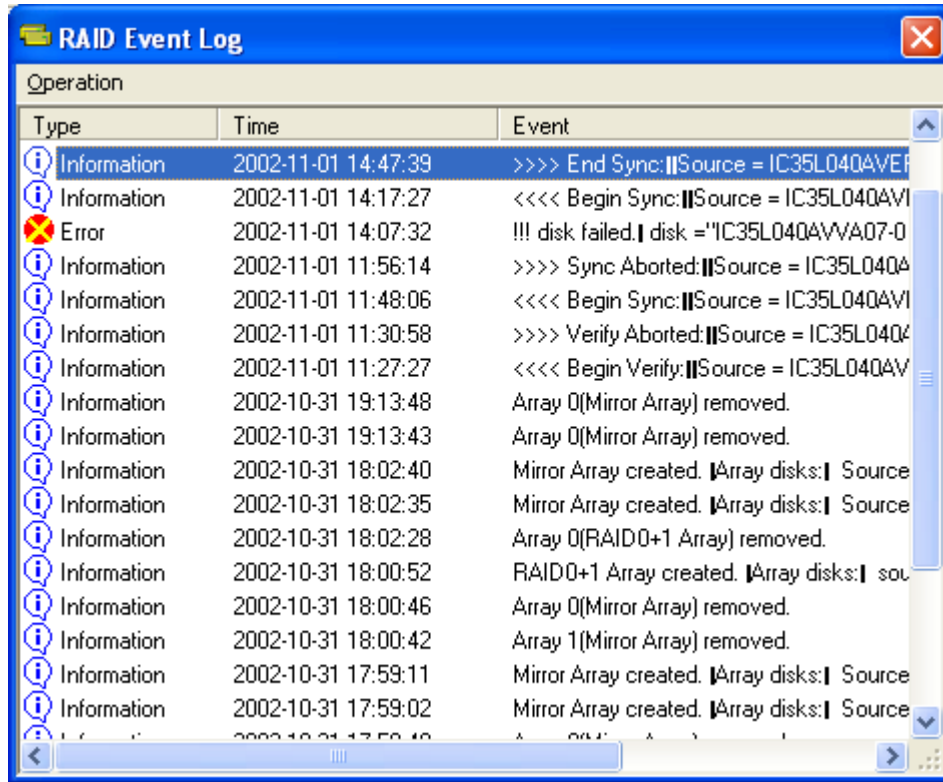
2. To view the details of a log item, you can double click on the log item, select the log item and press <Enter>, or select the log item and click on **Operation->View Detail** in the menu bar. The following dialog will appear.
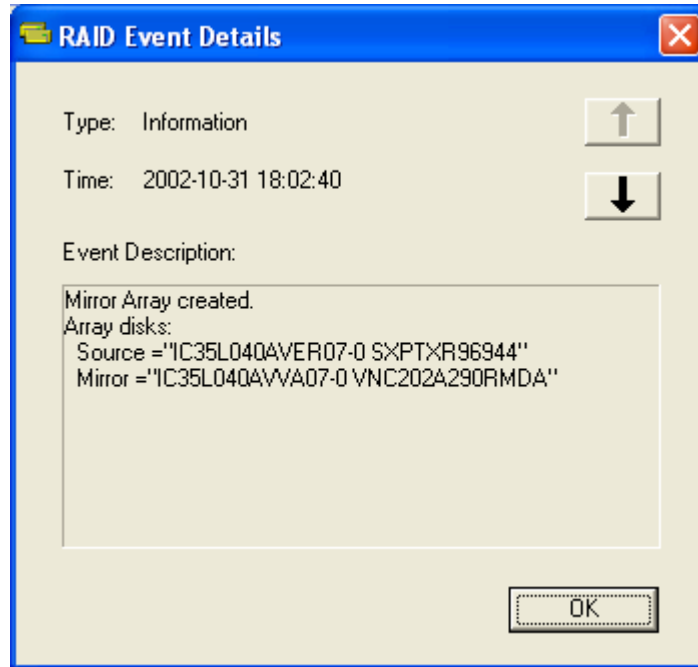
Click on ↓ or ↑ to browse the next or previous log item.

3. To clear all log items, click on **Operation->Clear All** in the menu bar.

Note: Only the operations in the RAID software can be recorded into the log file. The operations in BIOS will not be recorded.

Verify Mirror Disk

The data on the mirror disk must be the same with its corresponding source disk to provide fault tolerance for RAID 1 or RAID 0+1.

1. Select a RAID 1 or RAID 0+1 array. Right-click the selected RAID, then a shortcut menu will be shown. Click on **Verify Mirror** to verify whether the source and mirror are identical.
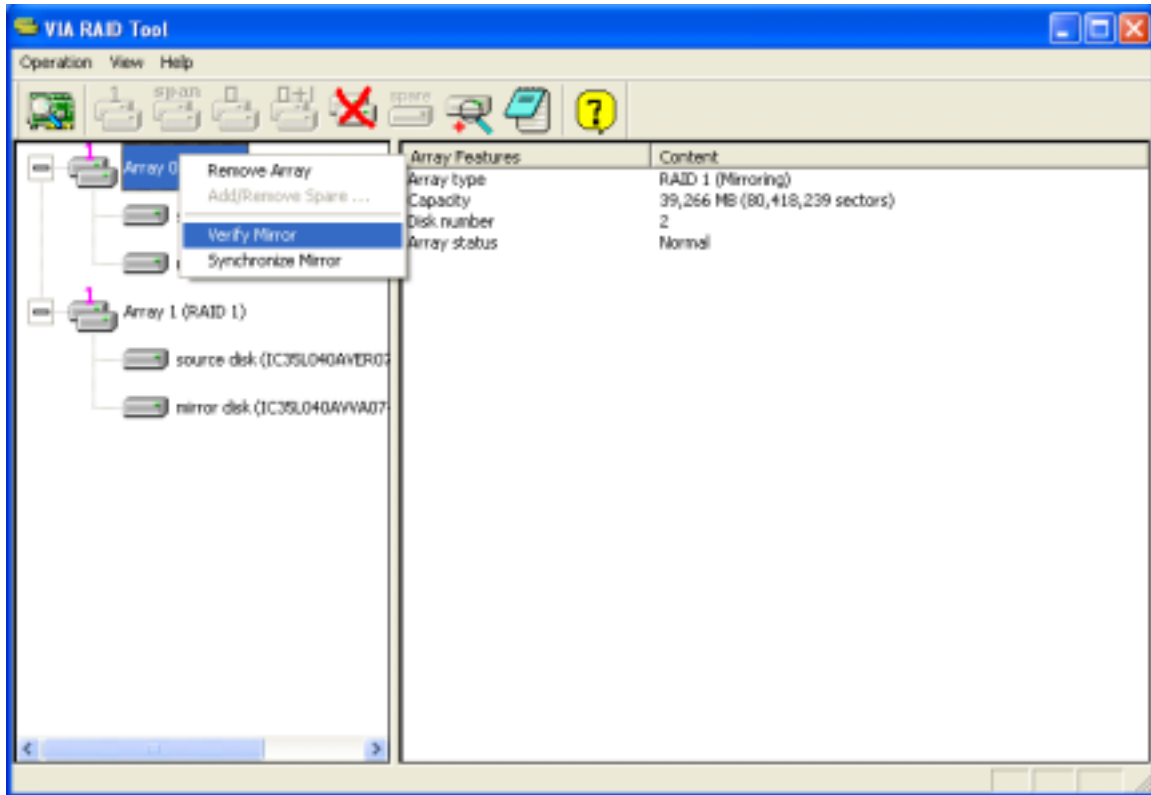
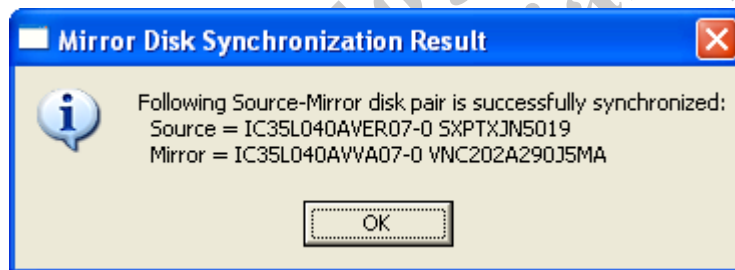2. After executing the "verify mirror" command, a dialog box will show the verifying process. You can pause or cancel this process at any time. It may take a long time to verify the source and mirror disk if the capacity of the RAID is large.

Verify Mirror Disk

Source disk location: Controller 0, Channel 0, Master

Mirror disk location: Controller 0, Channel 1, Master

Real capacity: 39,266 MB (80,418,239 sectors)

4% verified, 34 minutes left

Pause   Cancel
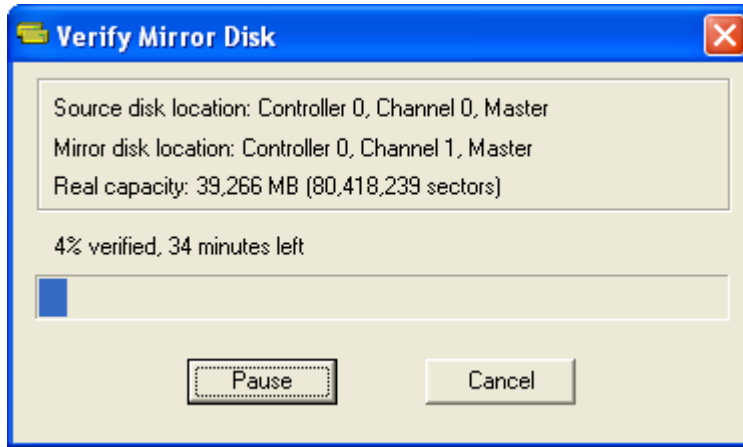
3. When the mirror disk is not identical with the corresponding source disk, the mirror disk will be marked with a "need-sync" flag. The icon used to indicate this status is ▣. A "need-sync" mirror disk should be synchronized as soon as possible.

Synchronize Mirror Disk

RAID 1 or RAID 0+1 arrays must be synchronized when the data on the mirror disk is not identical with its corresponding source disk. Sometimes the data on the mirror disk may be newer than the data on the source disk. For example, the source disk is absent and the mirror disk runs in the tolerance mode. So the exact meaning of "Synchronize Mirror" is to make a pair of source and

mirror disks have identical data. The RAID software always marks the mirror disk with a "need-sync" icon ![icon] although the mirror disk may have the correct data.

1. Select a RAID 1 or RAID 0+1 array. Right-click the selected RAID, then a shortcut menu will be shown. Click on **Synchronize Mirror** to synchronize the source and mirror disks.
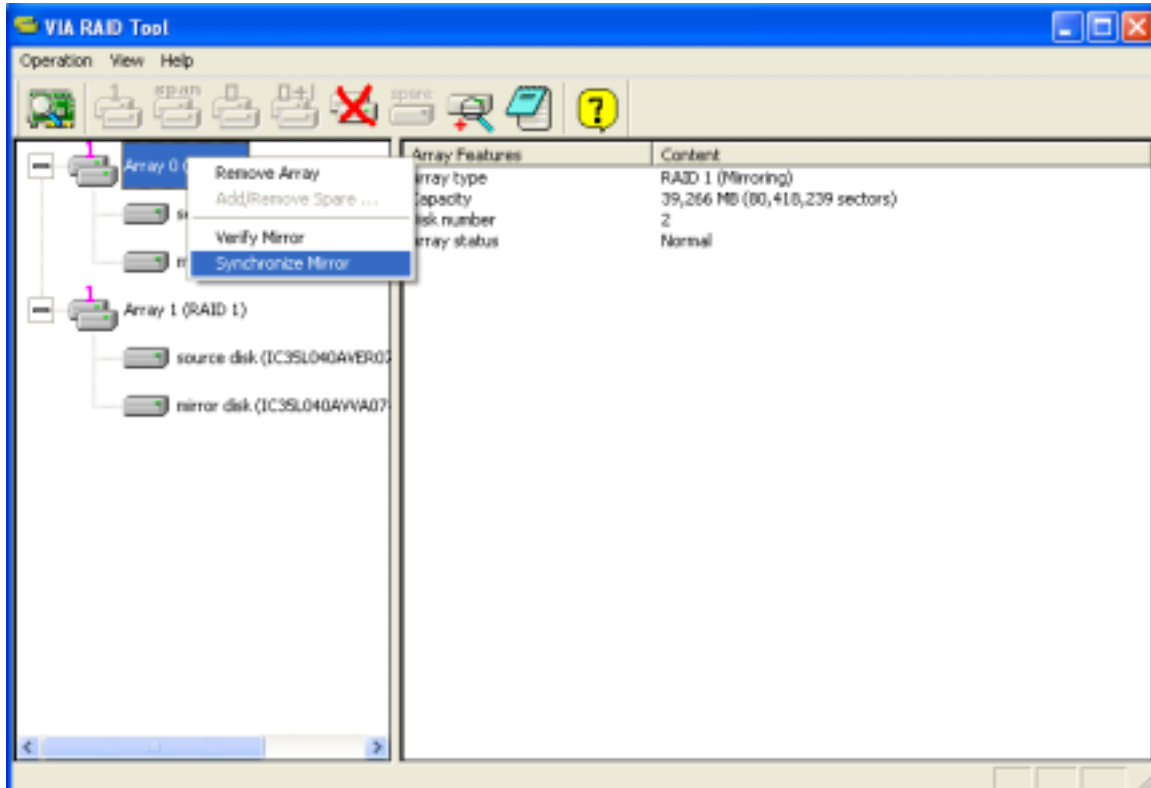
2. After synchronization has started, a dialog box will show the process. You can pause or cancel this process at any time.

Synchronize Mirror Disk

Source disk location: Controller 0, Channel 0, Master

Mirror disk location: Controller 0, Channel 1, Master

Real capacity: 39,266 MB (80,418,239 sectors)

Data copy direction: Source to Mirror

24% synchronized, 24 minutes left

[Pause]   [Cancel]

A message will pop up when the synchronization is finished.

Mirror Disk Synchronization Result

Following Source-Mirror disk pair is successfully synchronized:
Source = IC35L040AVER07-0 SXPTXJN5019
Mirror = IC35L040AVVA07-0 VNC202A290J5MA

[OK]

Disk Error Detection

The RAID software will pop up an error message if a disk drive fails or is missing.
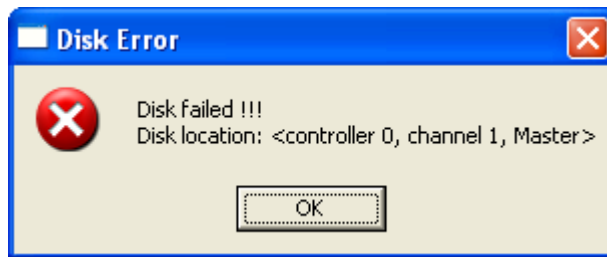
Duplicate Critical RAID 1/0+1 Array

When booting up the system, the RAID utility will detect if there are any inconsistencies between the source and mirror disk drives of the RAID 1 or RAID 0+1 arrays. If the software detects that a RAID 1 or 0+1 array has any inconsistencies, then the status of the disk array will be marked as critical and the software will prompt the user to duplicate the RAID 1 or 0+1 to make the mirror disk consistent with the corresponding source disk.
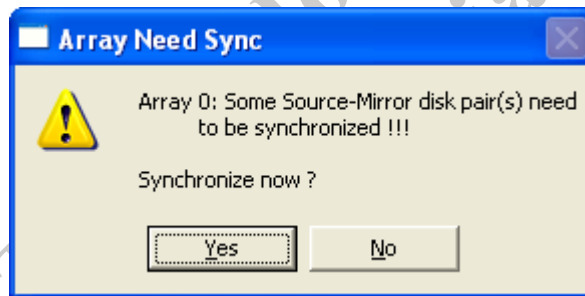
You can click **Yes** to synchronize now or click **No** to synchronize later.

After synchronization has started, a dialog box will show the process. You can pause or cancel this process at any time. If you cancel the synchronization process, the RAID will be on the "need-sync" condition. You should synchronize again to guarantee that the data between source and mirror disk drives is identical.

A message will pop up when the synchronization is finished.
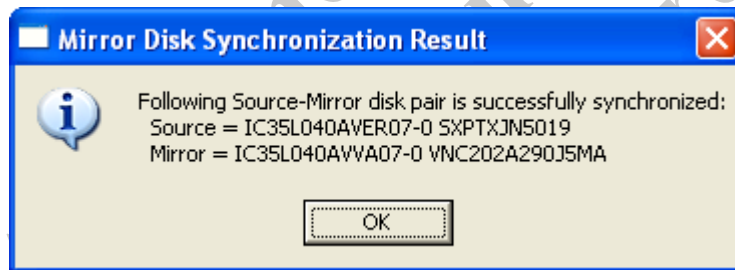
Rebuild Broken RAID 0/0+1 array

After booting up the system, the RAID utility will detect if any member disk drives of the RAID 0 or 0+1 array has failed or is absent. If the RAID utility detects any disk drive failures or missing disk drives, the status of the array will be marked as broken.

If the RAID software detects a RAID 1 array being broken, and there is a spare hard drive that could be used to rebuild the broken array, the spare hard drive will automatically become the mirroring drive. Software will remind the user to synchronize this RAID like the duplicating RAID 1.

If the RAID software detects a RAID 1 or 0+1 array being broken but there is no spare hard drive, the RAID software will indicate a series of steps to repair such problem.

1. Pop up a dialog box to indicate that the RAID is broken. Click **Yes** to repair the array.

2. Another dialog box will pop up. If the source or mirror disk drive is only unplugged, click **Cancel** to stop rebuilding. Shut down system. Plug in the absent disk drive and then reboot system. If the original disk drive is broken, plug in a new disk drive and then reboot system. Click **Next** to proceed to the next step.
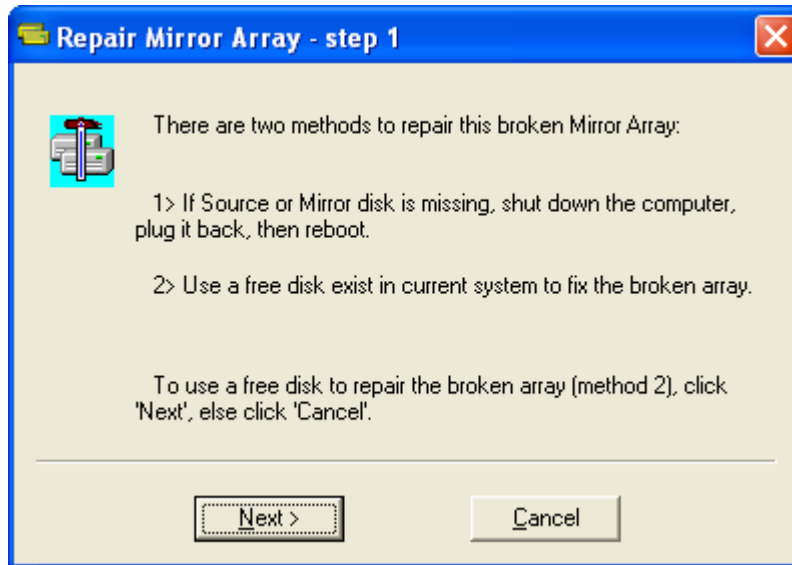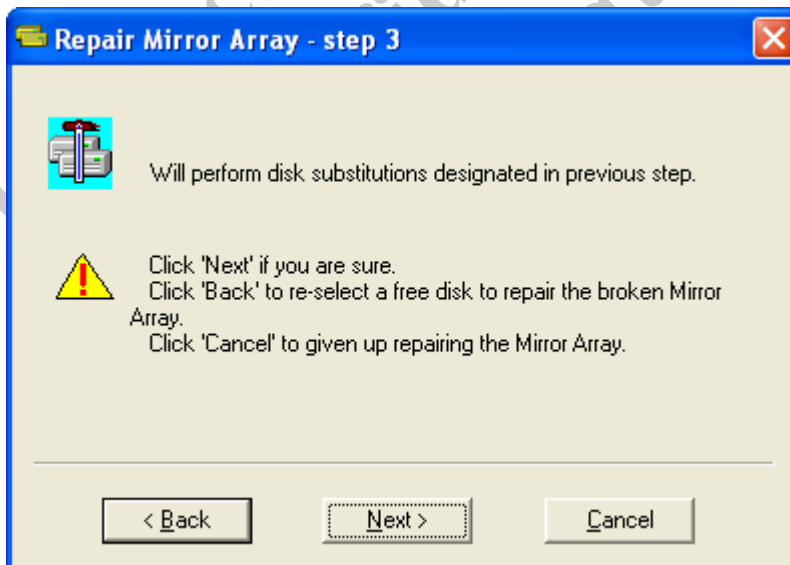

3. Select a disk drive from **Available Disks** and click on [arrow icon] to replace the broken drive and then click **Next**.
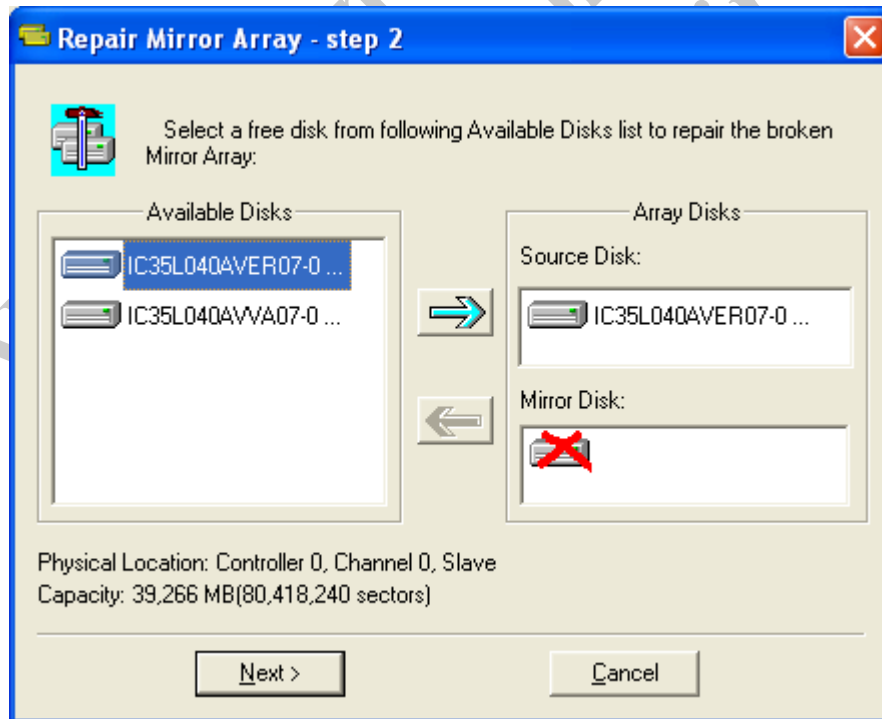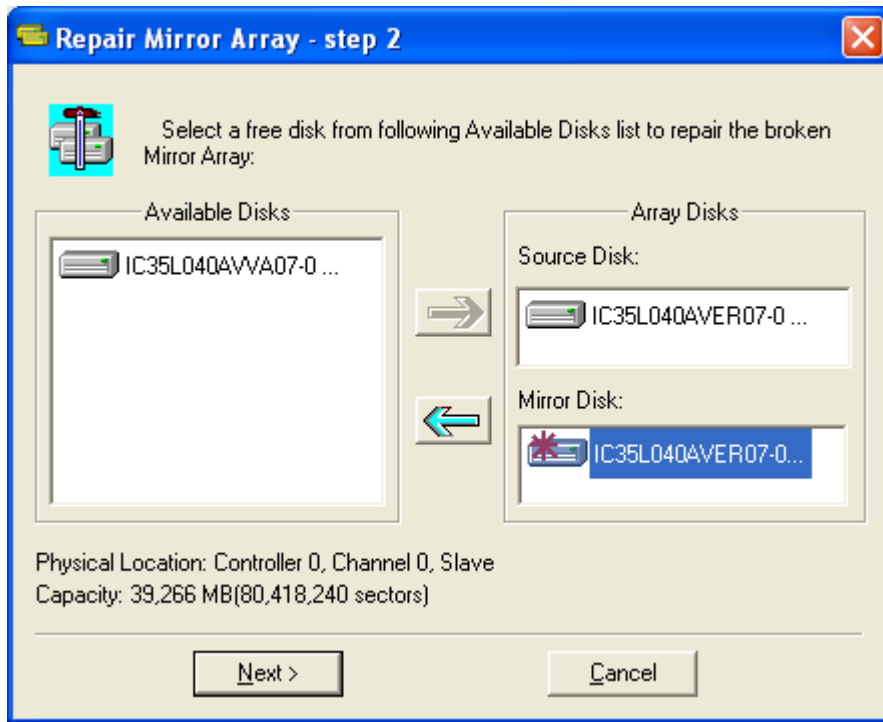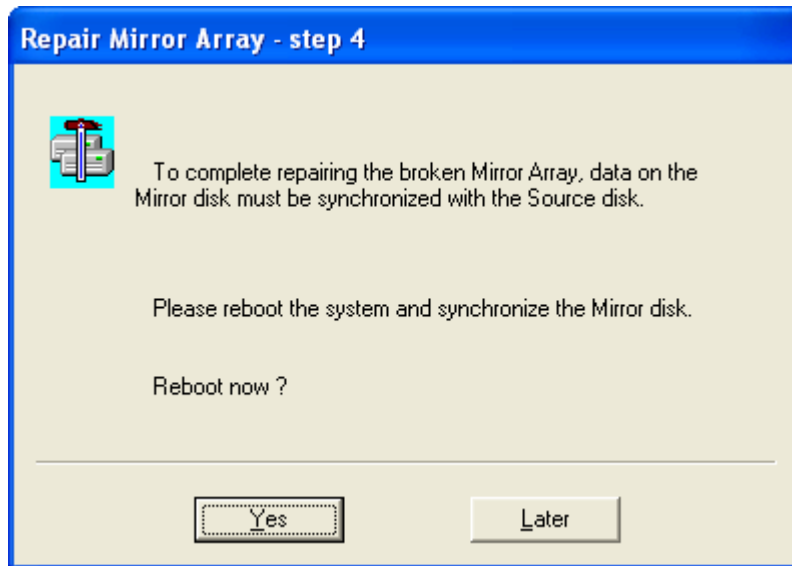
4. A warning message will pop up. If you want to rebuild the RAID using the disk driver that you selected in the previous step, click **Next**.

Warning: All of the data on the selected disk drive will be lost.

5. Reboot the system

6. This RAID is marked as a critical RAID. The RAID software will duplicate this critical RAID 1/0+1 process.

Icon View

All icon types and their meanings are listed below. You can check the meaning of a specific icon here. The real status of an array or a disk drive is described on "Array status" or "Device status" in the right windowpane.

Normal Disk Array

Disk Array with Warning status

Broken Disk Array

Disk Drive with Normal status

Absent Disk Drive in a Array

Disk Drive with Error

Disk Drive with Warning status

The pair of Source and Mirror Disks should be synchronized

Disk Drive which needs system rebooting to enable its function.