

INIC-1623 User Manual

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1 Product Introduction

1.1 Overview

The INIC-1623 provides advanced Host Adapter features in a single 128 pin TQFP package with 2 Serial ATA, 32-bit/66 MHz PCI 2.3 compliant, and Cardbus compliant interfaces. The third memory interface allows access to FLASH and Serial EEPROM devices. The Flash interface provides Read/Write access to the attached BIOS. The Serial EEPROM interface provides Read/Write access to the attached Serial EEPROM for bus configuration information.

Serial ATA is the next -generation internal storage inter-connect, designed to replace parallel ATA technology. Serial ATA is the proactive evolution of the ATA interface from a parallel bus to serial bus architecture. This architecture overcomes the electrical constraints that are increasing the difficulty of continued speed enhancements for the classic parallel ATA bus. Though Serial ATA will not be able to directly interface with legacy Ultra ATA hardware, it is fully compliant with the ATA protocol and thus is software compatible.

1.2 Features

1.2.1 PCI 32 bit/66MHz interface

- ◆ PCI 2.3 compliant interface.
- ◆ Burst transfer rate of 264 Mb/s.
- ◆ Built in hardware bus master engine.
- ◆ Supports both 3.3V and 5V.

1.2.2 Cardbus Interface

- ◆ Cardbus compliant interface.

1.2.3 ATA Interface

- ◆ Serial ATA Revision 1.0a, Serial ATA II Revision 1.0 (Extensions to Serial ATA 1.0a)
- ◆ Serial ATA transfer rate of 1.5 GB/s.
- ◆ Two SATA channels support.
- ◆ SATA TCQ and NCQ commands support.

1.2.4 Memory Interface

- ◆ Support for 256K FLASH and Serial EEPROM.

1.2.5 Data FIFO

- ◆ 256 Byte data FIFO for each channel.

1.2.6 On Board PCI Bus Master Engine

- ◆ On board Bus Master Engine relieve the system processor from book keeping and enhance performance.

1.2.7 Uses Initio's Proprietary Host Adapter Mode of Operation

- ◆ Initio Proprietary Auto DMA mode (IDMA).
- ◆ Queued/ Overlapping ATA Commands support.

1.2.8 Other Features

- ◆ Disk RAID 0/1/JBOD support.
- ◆ SATA hot plug/unplug hardware support.
- ◆ Implements Power Management.
- ◆ Full driver support for all Major Operating Systems.
- ◆ Supports Plug and Play allowing users to change configurations without the use of jumpers.
- ◆ Integrated Serial ATA Transport, link logic and PHY layer.
- ◆ Supports 48-bit LBA (Logical Block Addressing) for hard drives larger than 137GB.
- ◆ Supports ATAPI devices.
- ◆ LED support for each channel.
- ◆ External Flash BIOS.

1.3 Supported Operating Systems

Windows Operating System

Windows 98SE

Windows ME

Windows 2000

Windows XP

Windows Server 2003

Mac Operating System

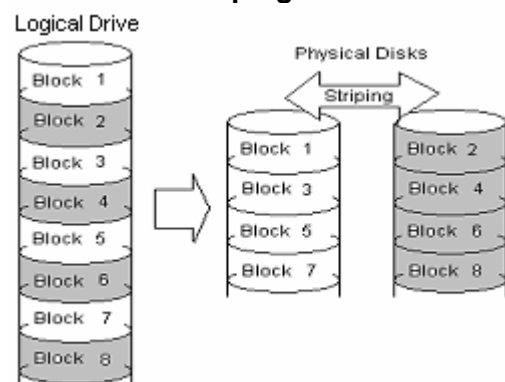
Mac 10.2.8 above

Mac 10.3.x

Mac 10.4.x

1.4 RAID Introduction

RAID 0 Disk Striping

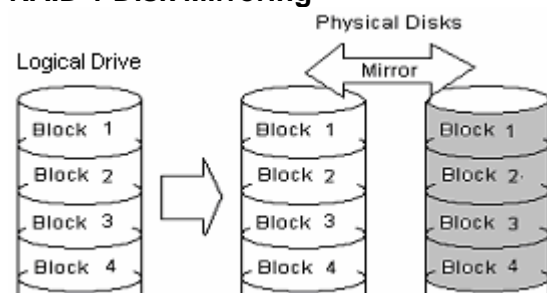


RAID 0	
Minimum Number of Physical Drives	Two
Logical Capacity	$N1+N2$ or Minimum $N \times 2$ disk
Fault Tolerant	No

RAID 0 provides disk striping across all configured drives in the RAID subsystem.

RAID 0 doesn't provide any data redundancy, but does offer the best performance of any RAID level. RAID 0 breaks up data into smaller segments, and then stripes the data segments across each drive in the array as shown in the figures above. The size of each data segment is determined by the stripe size parameter, which is set during the creation of the RAID set.

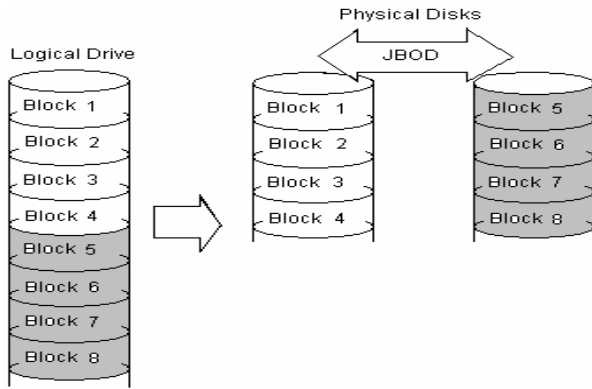
RAID 1 Disk Mirroring



RAID 1	
Minimum Number of Physical Drives	Two
Logical Capacity	Minimum $N / 2$ disk
Fault Tolerant	Yes

RAID 1 duplicates all data from one drive to a second drive. RAID 1 provides complete data redundancy, but at the cost of doubling the required data storage capacity.

RAID JBOD (Just a Bunch of Disks)


RAID JBOD

Minimum Number of Physical Drives	Two
Logical Capacity	N1+N2 disk
Fault Tolerant	No

JBOD combines drives into larger logical volumes, it provides no fault tolerance, nor does it provide any improvements in performance compared to the independent use of its constituent drives.

2 BIOS Configuration Utility

This chapter explains how to configure the Initio Serial ATA Host Controller, assign RAID levels, plan the array configuration, optimize storage and use the Initio BIOS RAID utility.

2.1 Configuring Arrays

Configure the physical disk drives in arrays. An array can consist of two or more physical disk drives, depending on the RAID level. A RAID 0 array can consist of two physical drives, A RAID 1 array can consist of two physical drives and a RAID JBOD array can consist of two physical drives.

2.2 RAID Mode Define

The following table displays the drives required per RAID level.

RAID Mode	Description	Minimum Number of Physical Drives	Logical Capacity	Fault Tolerant
RAID 0	Disk Striping	Two	N1+N2 or Minimum Nx2 disk	No
RAID 1	Disk Mirroring	Two	Minimum N/2 disk	Yes
RAID JBOD	Just a Bunch of Disks	Two	N1+N2 disk	No

2.3 BIOS Configuration Utility

1. Perform the following steps to configure arrays and logical drives using the Configuration Utility,
2. Boot the system.
3. Start the Configuration Utility by pressing <Ctrl>+<R>.
4. Select any method in the Configuration Utility.
5. Create arrays that you want for using the available physical drives.
6. Define the logical drive by using the Configuration Utility.
7. Initialize the logical drive.

2.4 Starting the Guide of BIOS Configuration

During boot up the system, the following BIOS banner displays as the below,

1. Press Ctrl and R key to run the INIC162x SATA RAID BIOS utility.

```

Initio INIC162x SATA RAID BIOS Version 1.xx
Copyright (C) Initio Corp. 2005

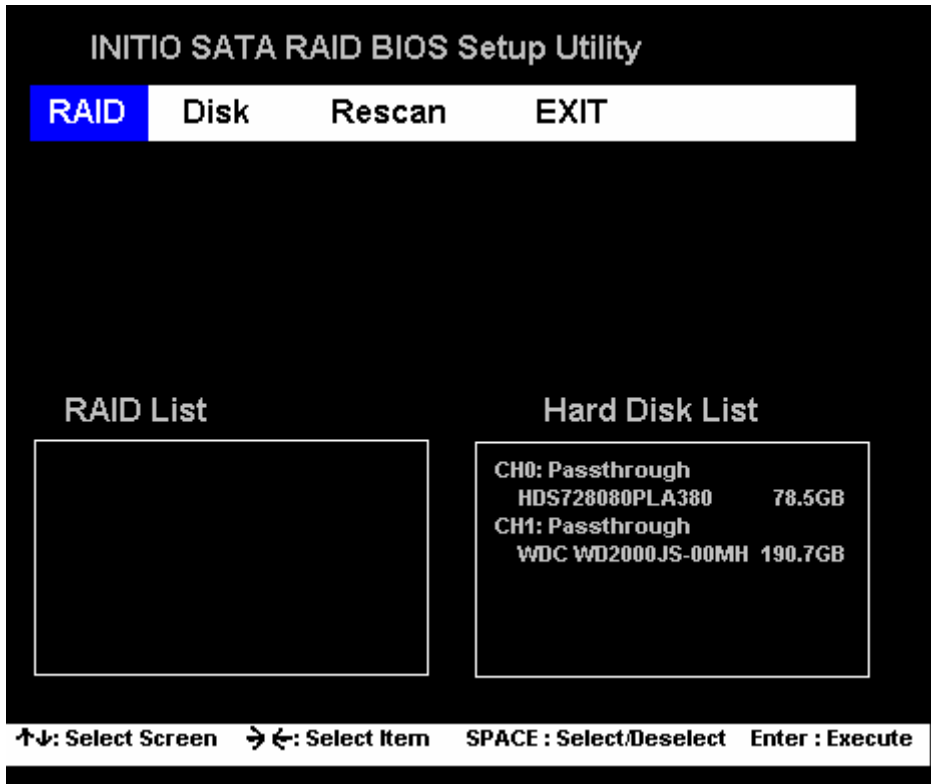
Controller at Bus 0, slot 9

Scan Drives...
  Channel 0 : HDS728080PLA380    78.5(GB)
  Channel 1 : WDC WD2000JS-00MHB0 190.7(GB)

=====
Scan RAID...

---- Press <Ctrl+R> to enter RAID utility ----
---- Press <ESC> to continue ----
  
```

2. In the BIOS Setup Utility, the configuration utility associates each hard drive with a single logical drive. If logical drives have already been configured, the BIOS utility doesn't change their configuration.

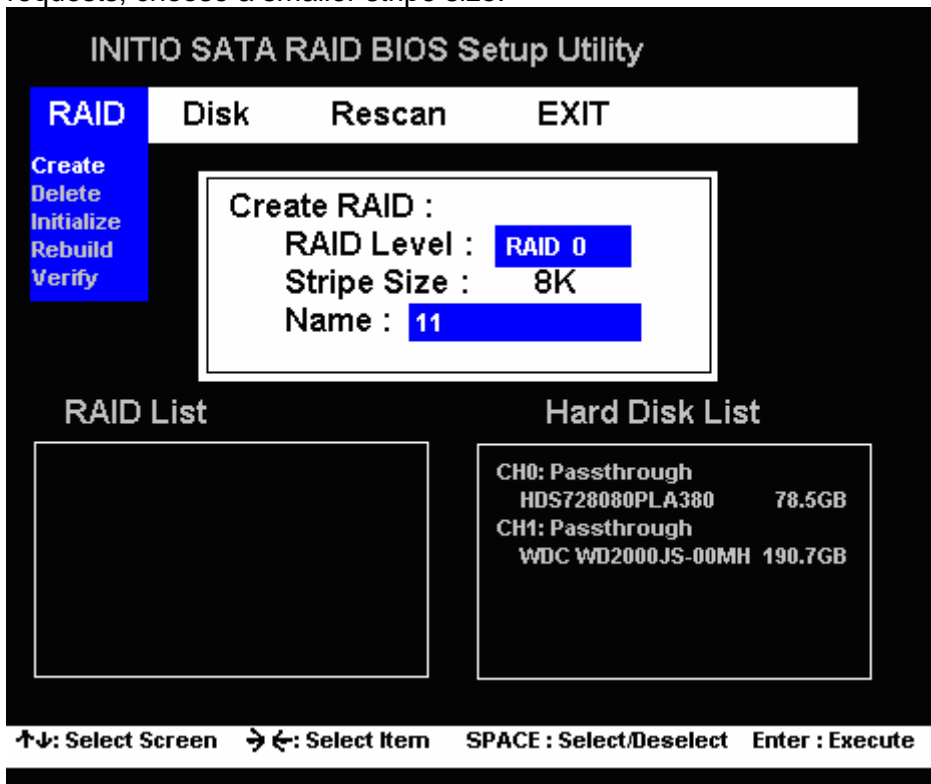


2.4.1 Create RAID

RAID 0

1. The stripe size parameter specifies the size of the segment written to each disk in a RAID configuration. You can set the stripe size to 8, 16, 32, 64, 128, or 256 Kbytes. The default is 8 Kbytes.

A larger stripe size produces higher read performance. If your computer regularly performs random read requests, choose a smaller stripe size.



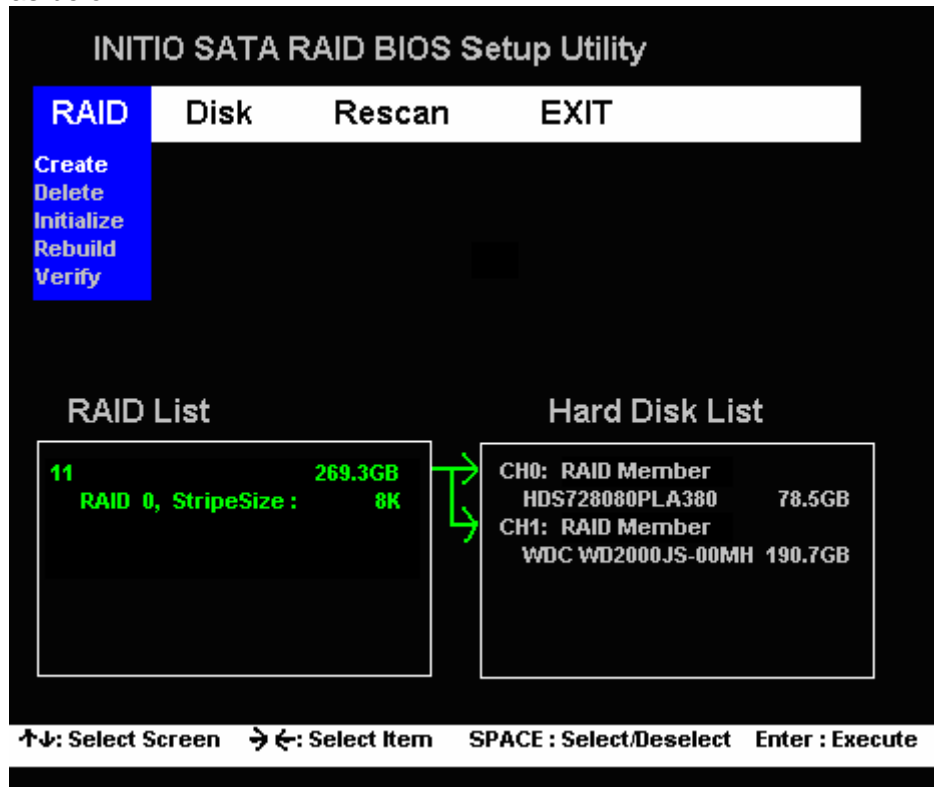
2. You can decide to expand RAID 0 to maximum capacity or not, as below.

Expand RAID 0 to maximum capacity?

Yes

No

3. The RAID list will display the RAID 0's information includes the RAID Level, Stripe Size, Name and Capacity as below.



RAID 1

1. RAID 1 requires exactly two physical drives, data duplicated on another disk by mirroring, more disk space required. RAID 1 will reduce usable disk space to the size of the smallest drive and reduced performance during rebuilds.

INITIO SATA RAID BIOS Setup Utility

RAID Disk Rescan EXIT

Create
Delete
Initialize
Rebuild
Verify

Create RAID :
RAID Level : **RAID 1**
Stripe Size : Invalid
Name : **11**

RAID List

Hard Disk List

CH0: Passthrough
HDS728080PLA380 78.5GB
CH1: Passthrough
WDC WD2000JS-00MH 190.7GB

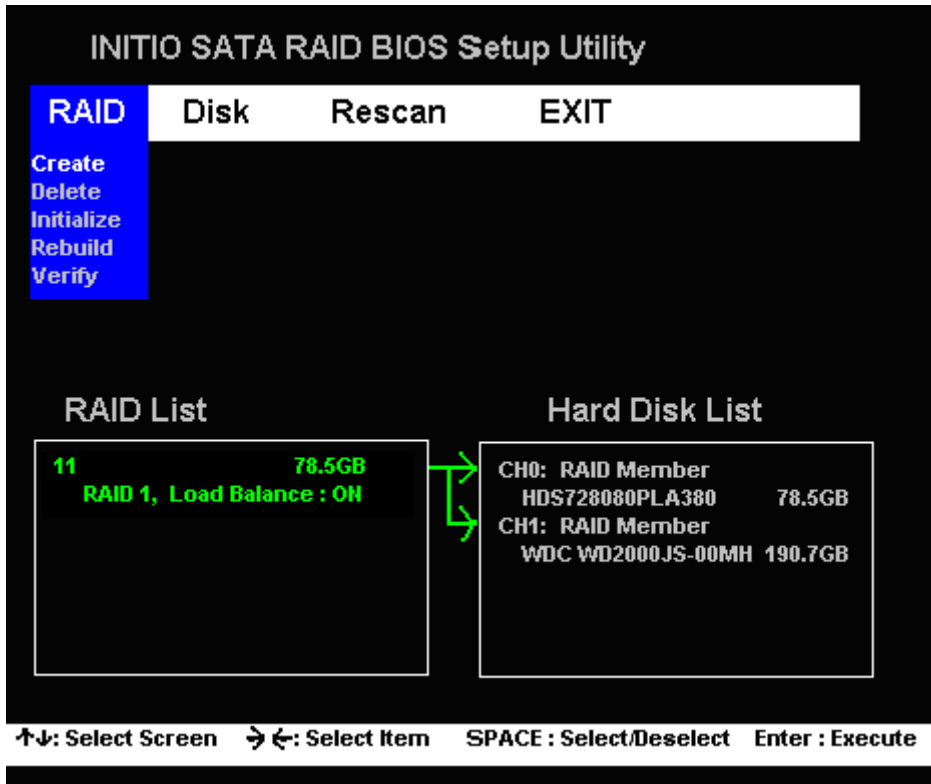
↑↓: Select Screen →←: Select Item SPACE : Select/Deselect Enter : Execute

2. You can activate the function of load balance for RAID 1, it can let the each drive averages the loading.

Activate load balance for RAID 1 ?

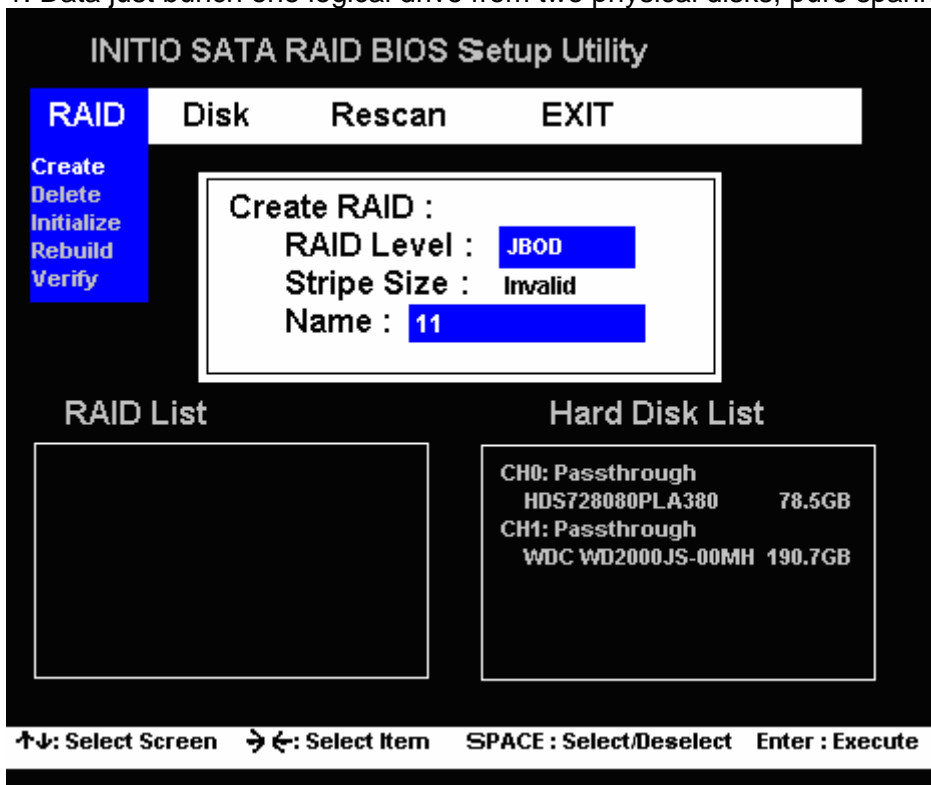
Yes **No**

3. The RAID list will display the RAID 1's information includes the RAID Level, Load Balance, Name and Capacity as below.

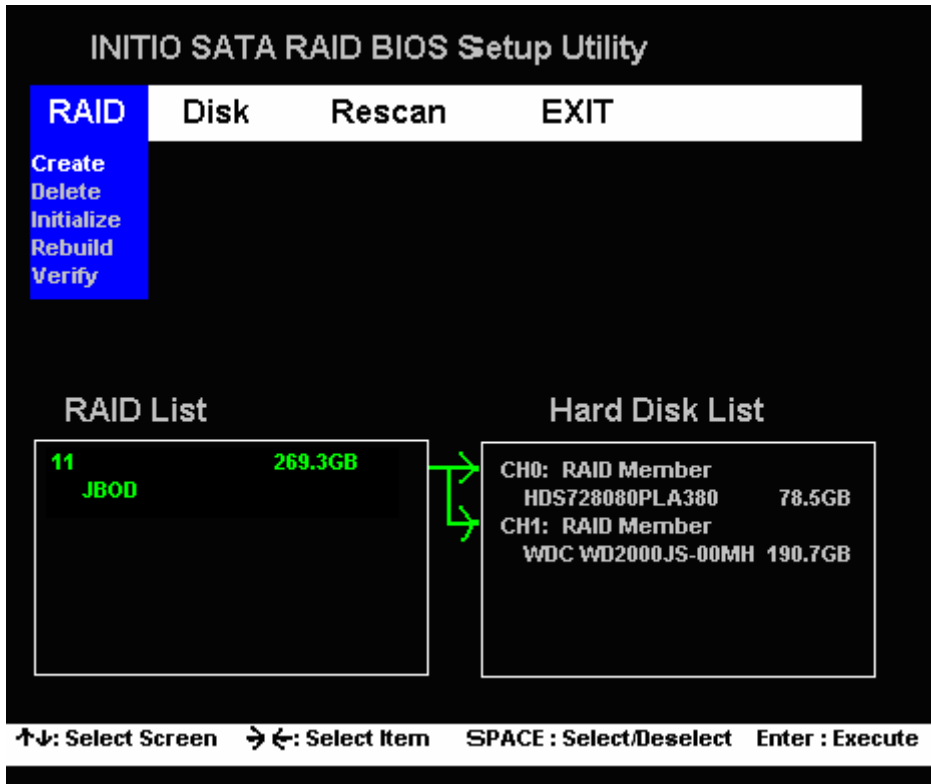


JBOD

1. Data just bunch one logical drive from two physical disks, pure spanning.

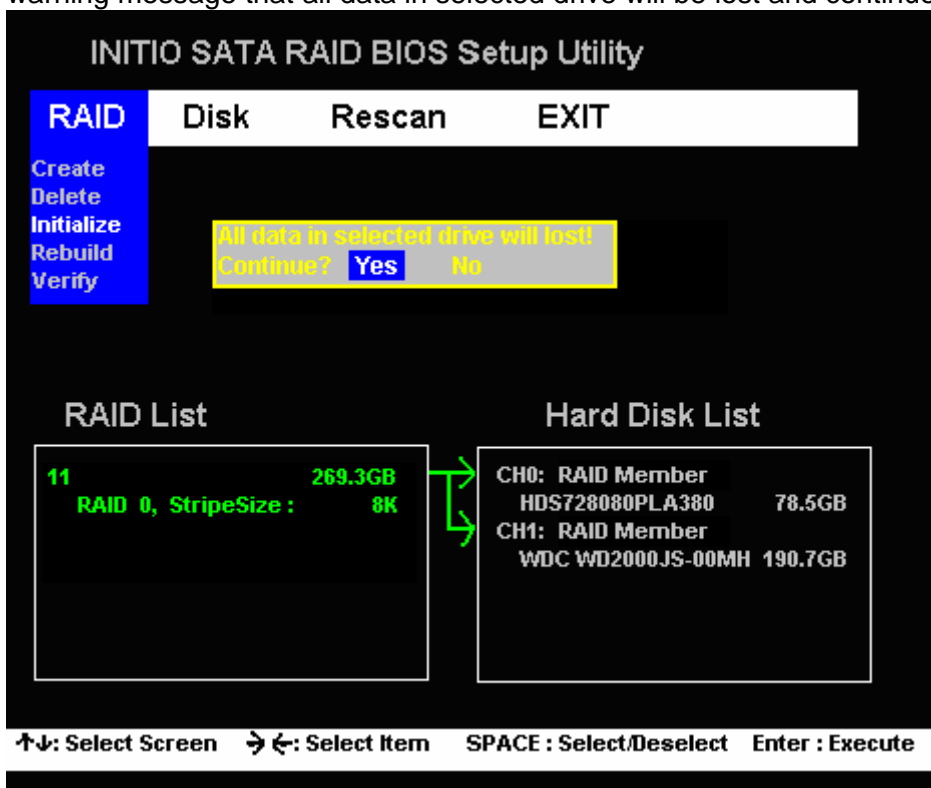


2. The RAID list will display the RAID JBOD's information includes the RAID Level, Name and Capacity as below.

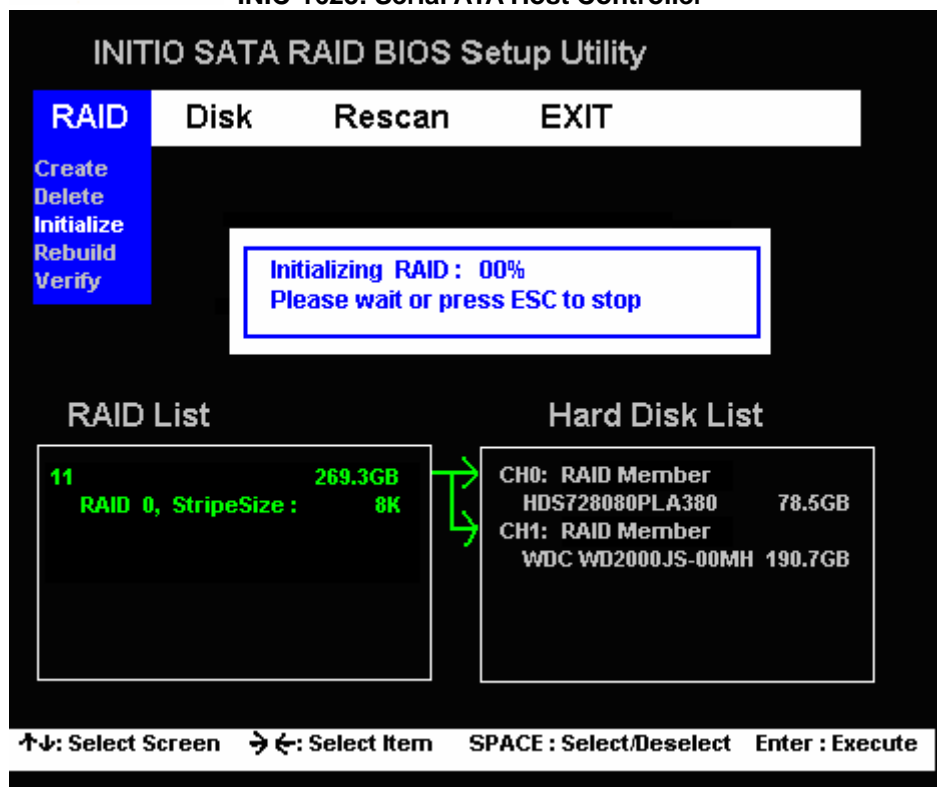


2.4.2 Initialize RAID

1. Perform the below steps to initialize a logical drive by using the initialize selection, pay attention about the warning message that all data in selected drive will be lost and continue the choices.

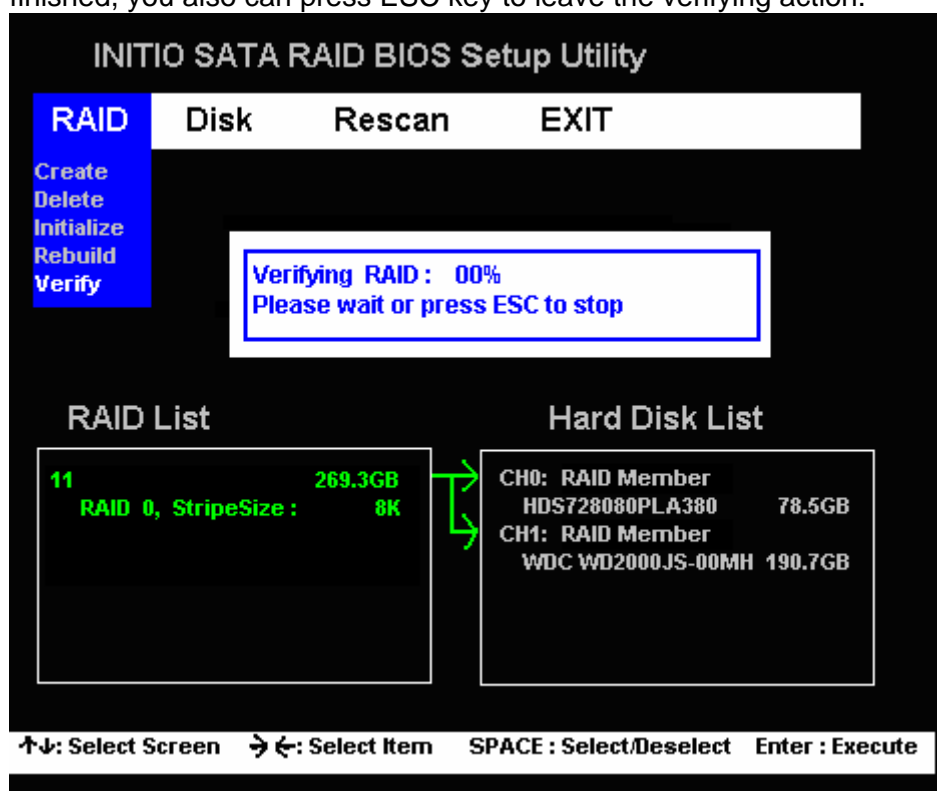


2. The initializing action will spend much time and the process of initializing action will display how much percent is finished, you also can press ESC key to leave the initializing action.



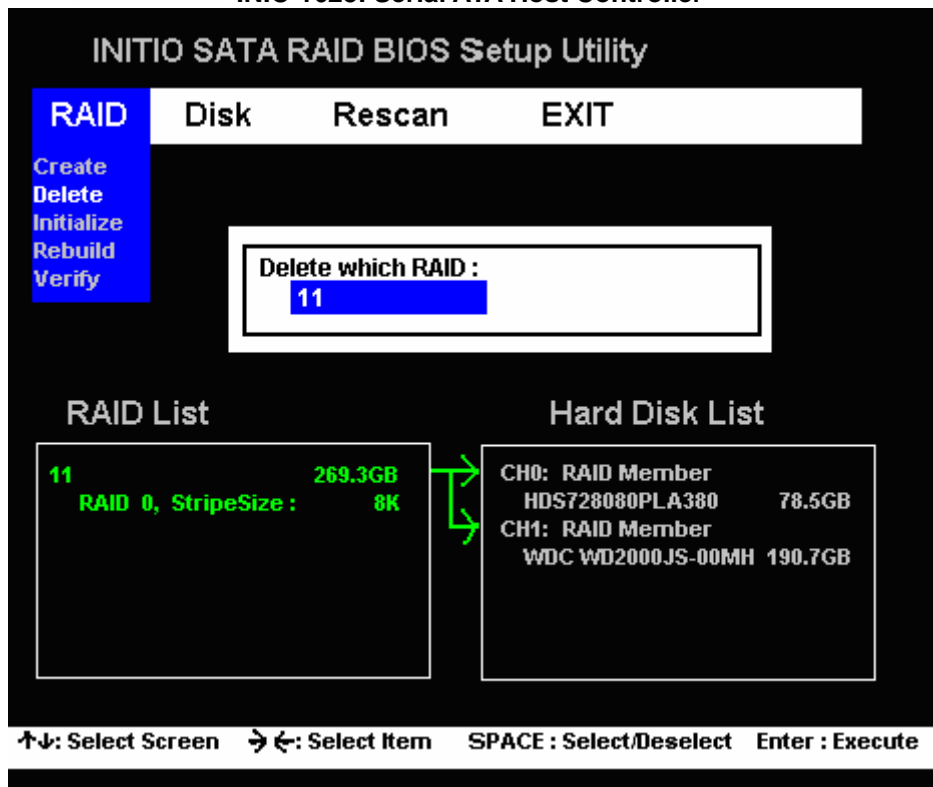
2.4.3 Verify RAID

The verifying action will spend much time and the process of verifying action will display how much percent is finished, you also can press ESC key to leave the verifying action.



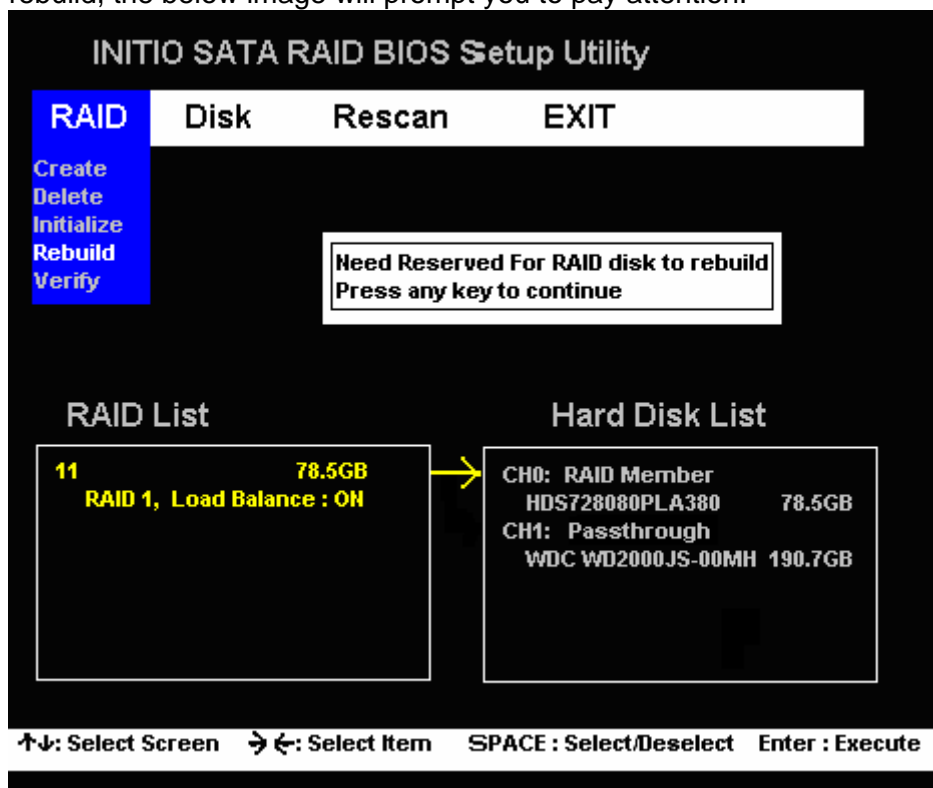
2.4.4 Delete RAID

Select the delete item from the RAID menu, and choose the name of RAID which wants to delete as below.

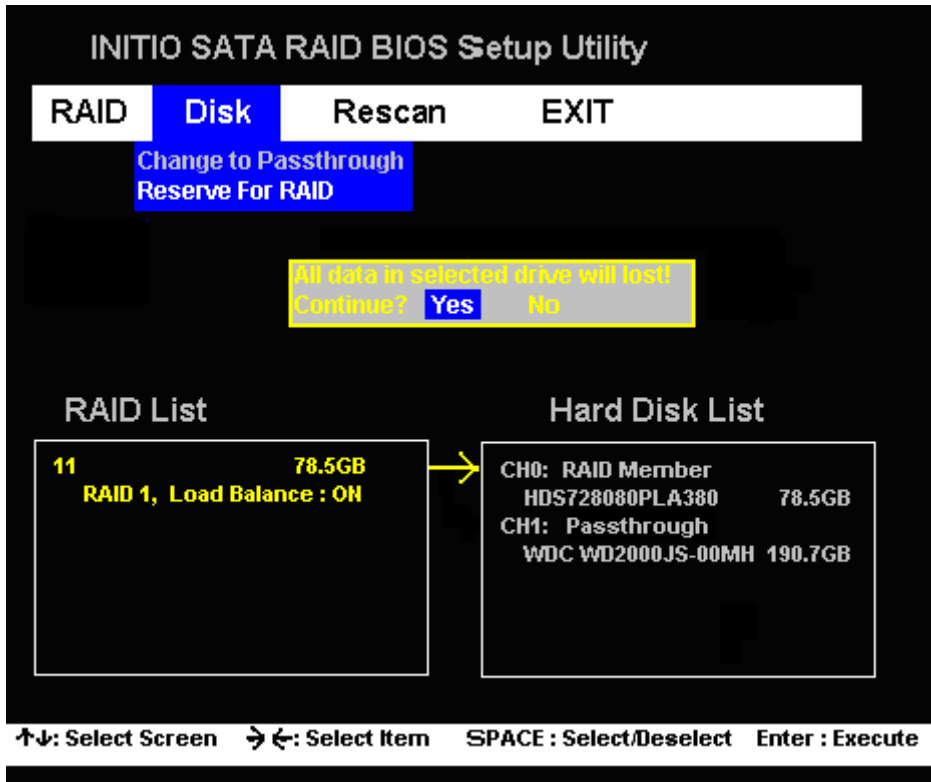


2.4.5 Rebuild

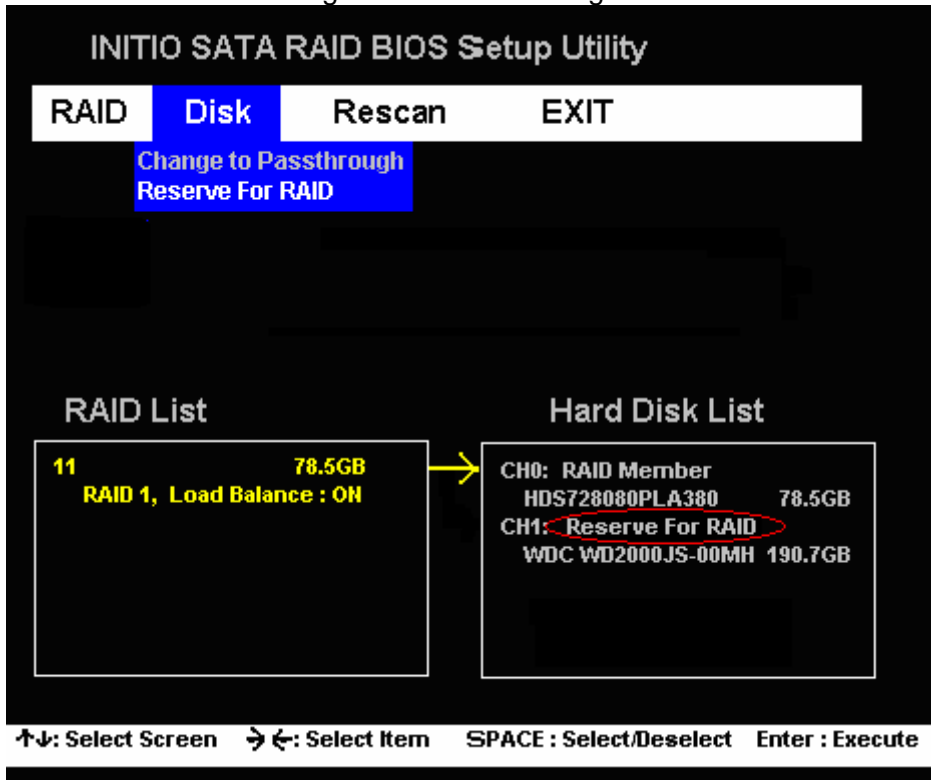
1. When the RAID 1 is broken, you can do the Rebuild function, but you need the "Reserved For RAID" disk to rebuild, the below image will prompt you to pay attention.



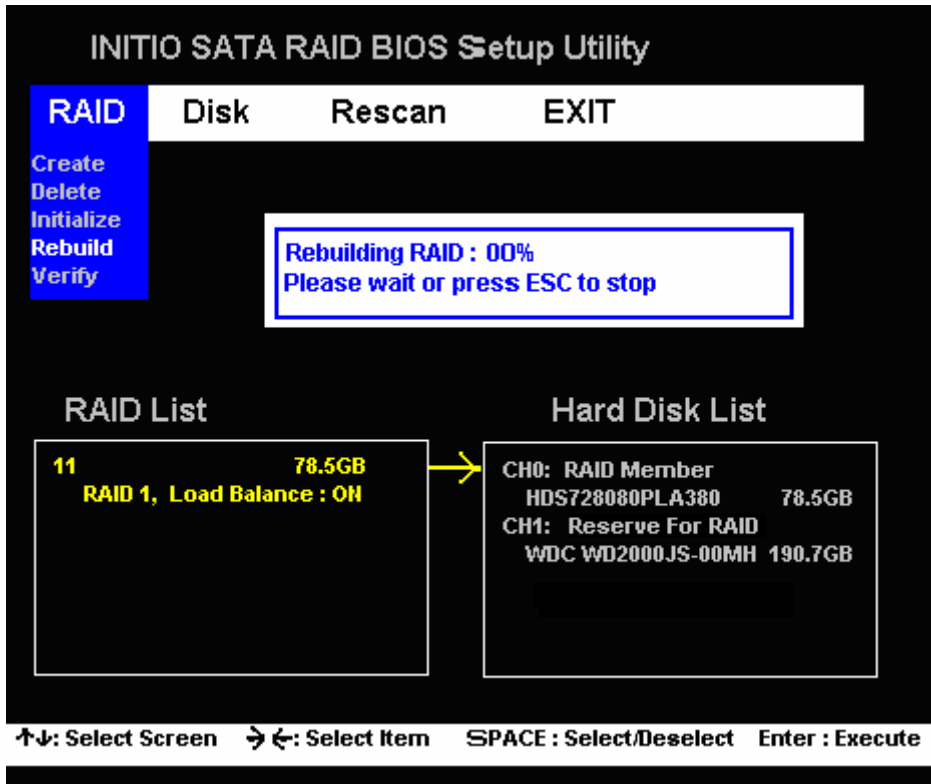
2. To pay attention about the warning message that all data will lost.



3. The state will be changed from "Passthrough" to "Reserve For RAID".

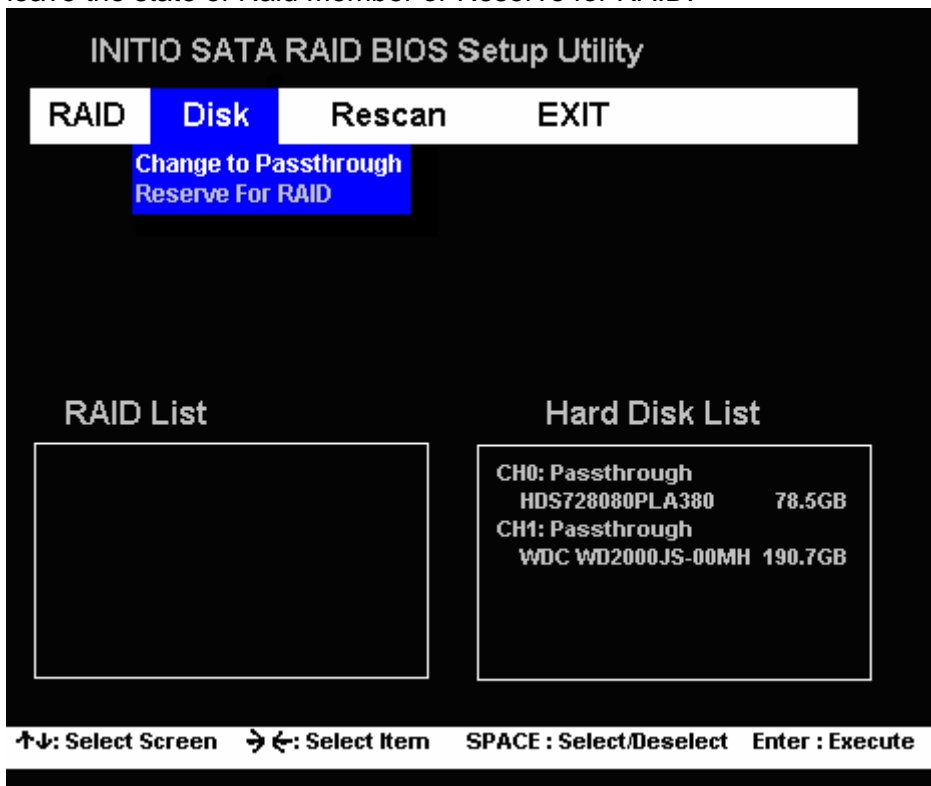


4. Rebuilding action will take a long time, so you can wait or press ESC key to stop it.



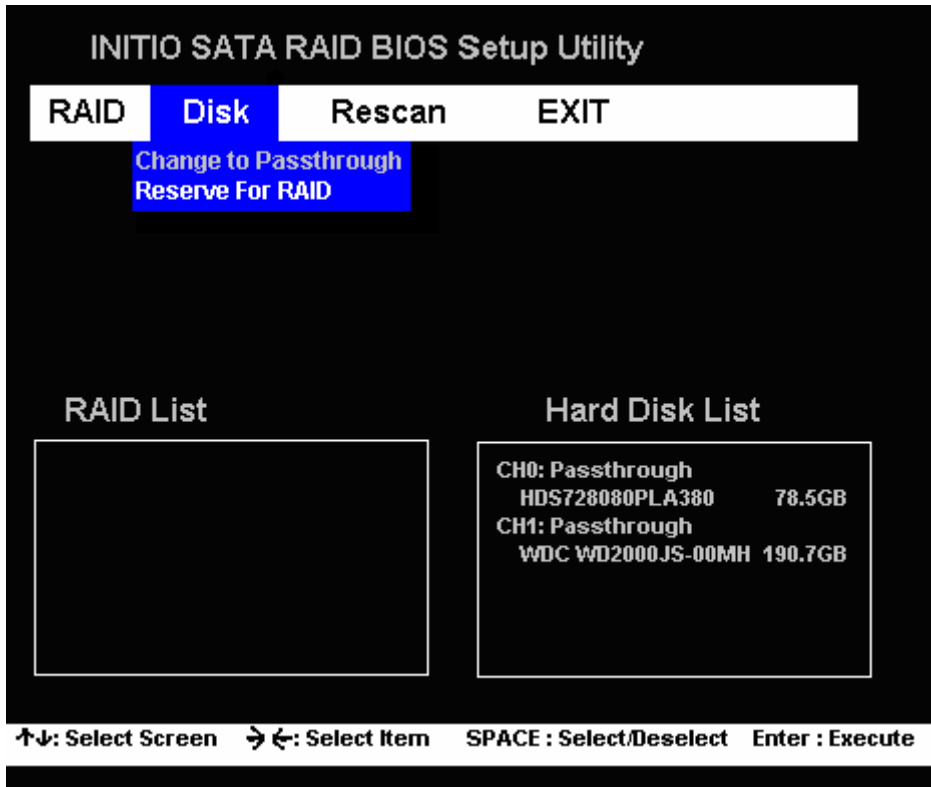
2.4.6 Change to Pass-through

Select the item of "Change to Passthrough" on the Disk menu for change the hard disk to pass-through mode to leave the state of Raid Member or Reserve for RAID.



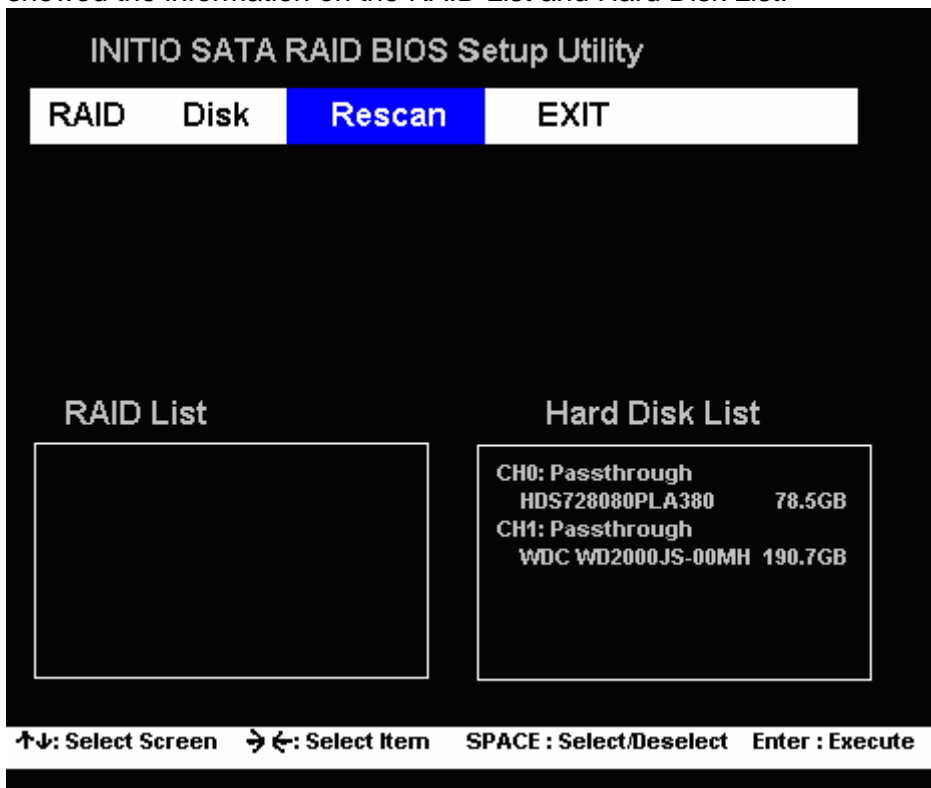
2.4.7 Reserve for RAID

Select the item of "Reserve For RAID" on the Disk menu, and change the hard disk from "Passthrough" to "Reserve For RAID" for rebuilding function.



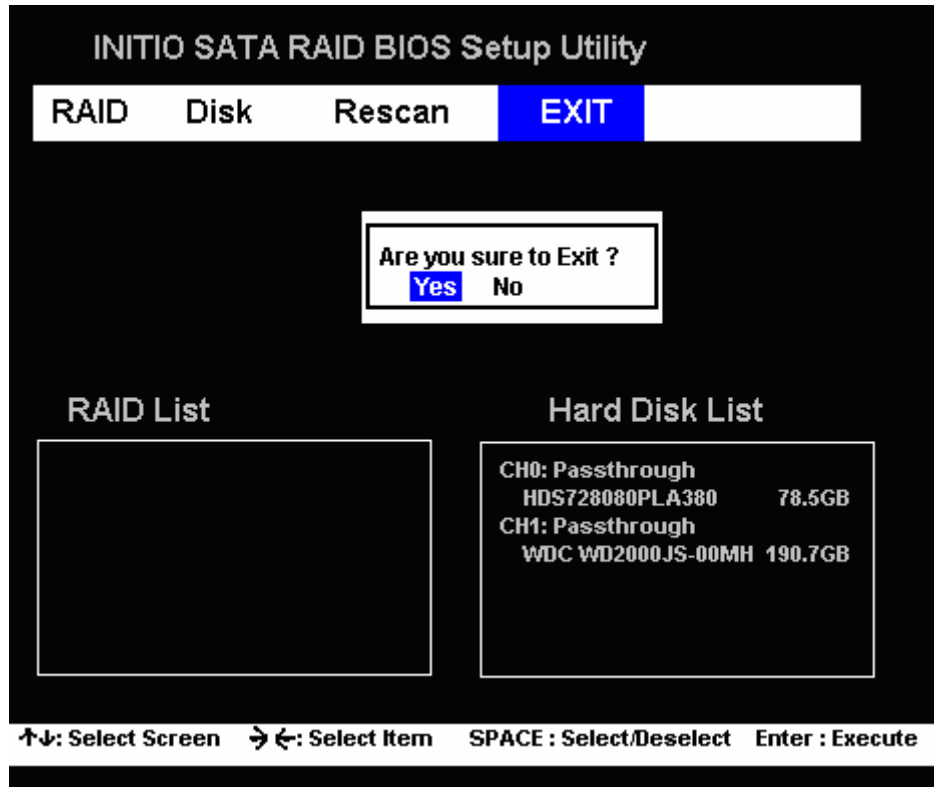
2.4.8 Rescan

The Rescan function updates the status of RAID drive that will refresh all of the attached devices and be showed the information on the RAID List and Hard Disk List.



2.4.9 Exit BIOS Utility

You can select the Exit selection to leave the RAID BIOS Setup utility.



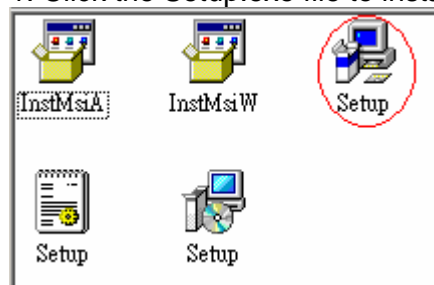
3 Operating System Installation

The chapter contains the procedures for installing the Windows* 98, ME, 2000, XP, and 2003, and Mac* OS 10.2.8 above, 10.3.x, 10.4.x operating systems.

3.1 Windows* 98/ME/2000/XP/2003 Application and Driver Installation

Perform the following steps to install the application and driver onto the Windows* 98, ME, 2000, XP and 2003.

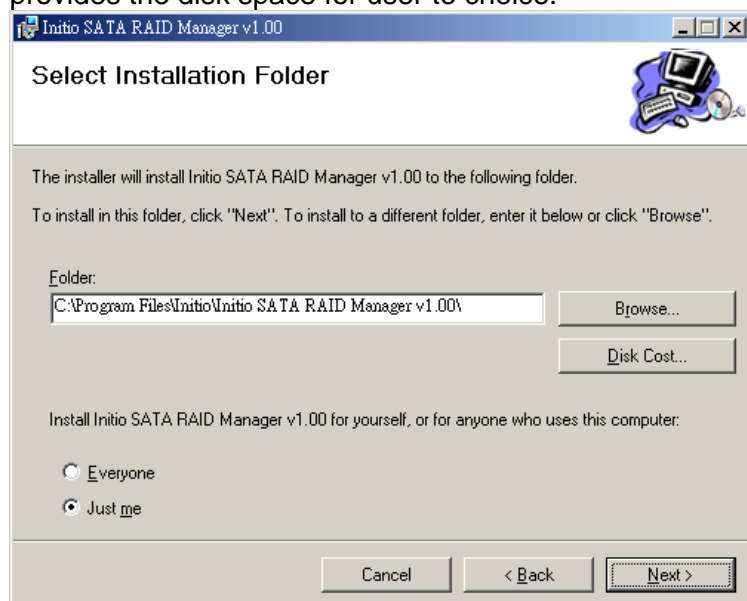
1. Click the Setup.exe file to install the application of RAID Manager and driver.



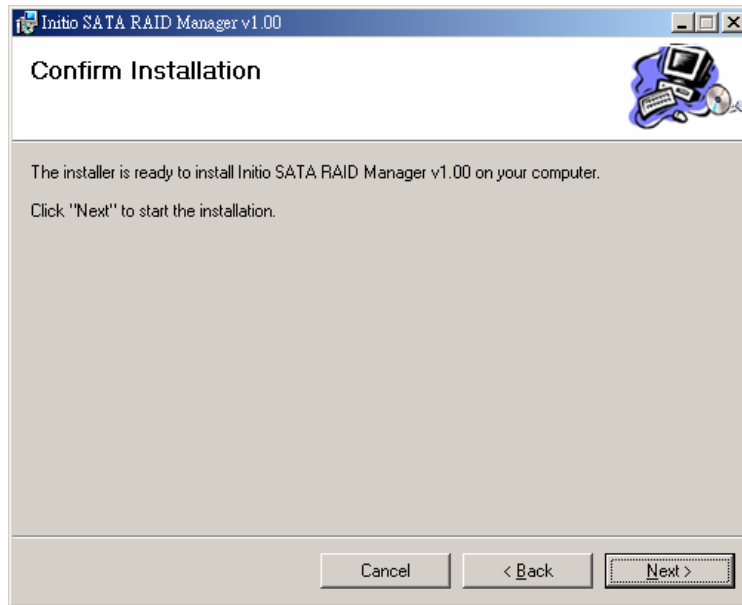
2. Click the Next button.



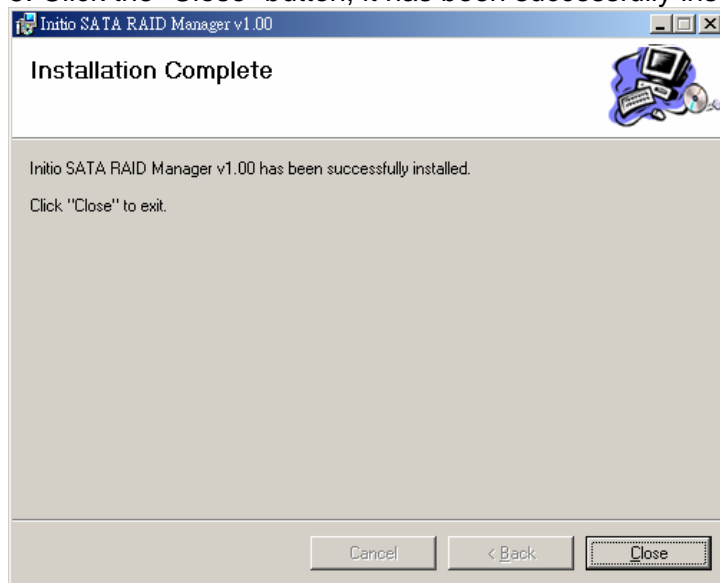
3. Click the "Next" button to install a different folder by press the "Browse" button, the button of "Disk Cost" provides the disk space for user to choice.



4. Click the Next button to confirm the installation.



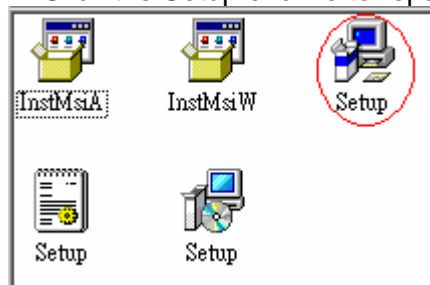
5. Click the “Close” button, it has been successfully installed.



6. Restart the system.

3.1.1 Repair the Windows* 98/ME/2000/XP/2003 Application and Driver Installation

1. Click the Setup.exe file to repair the application of RAID Manager and driver.



Or you also can execute the repair function with “Change” button via the “add and remove programs” on control panel.

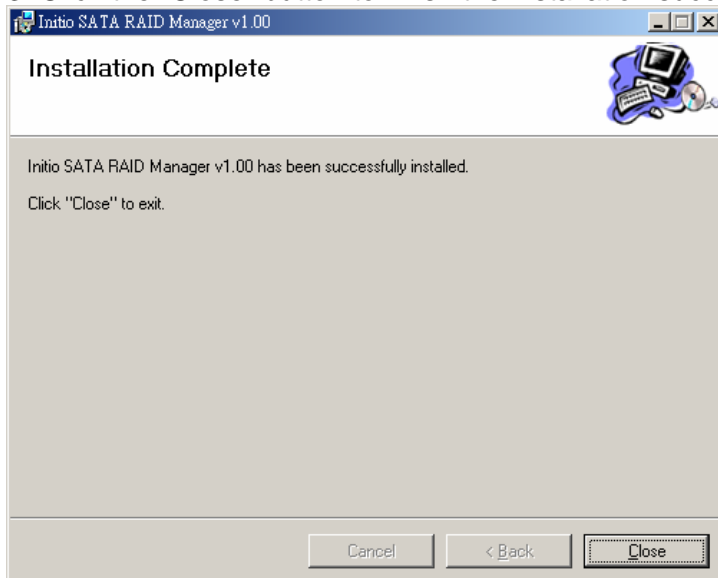


Add/ Remove Programs

2. Select the item of Repair Initio SATA RAID Manager and press the “Finish” button.



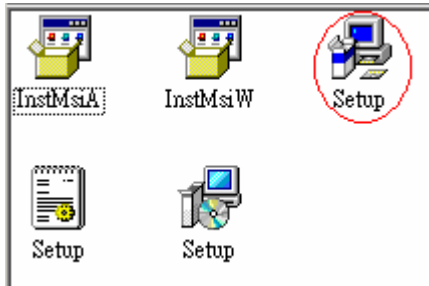
3. Click the “Close” button to finish the installation successfully.



4. Restart the system.

3.1.2 Remove the Windows* 98/ME/2000/XP/2003 Application and Driver Installation

1. Click the Setup.exe file to remove the application of RAID Manager and driver.



Or you also can execute the remove function with “Remove” button via the “add and remove programs” on control panel.

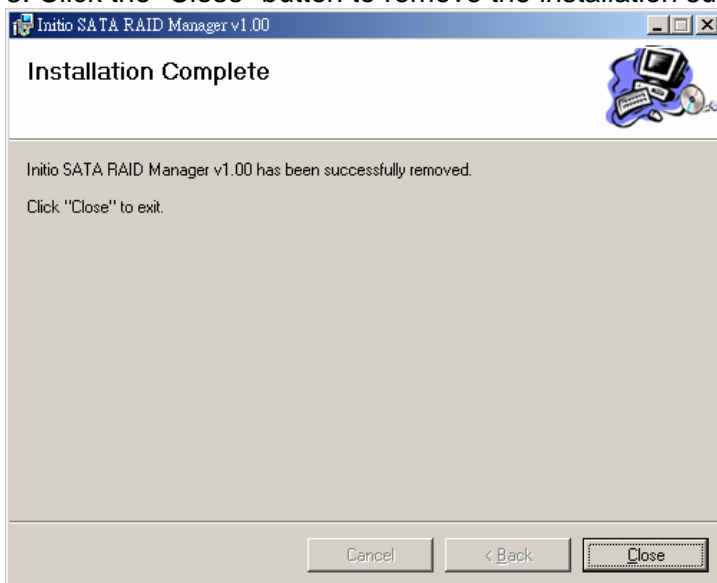


Add/ Remove Programs

2. Select the item of Remove Initio SATA RAID Manager and press the “Finish” button.



3. Click the “Close” button to remove the installation successfully.



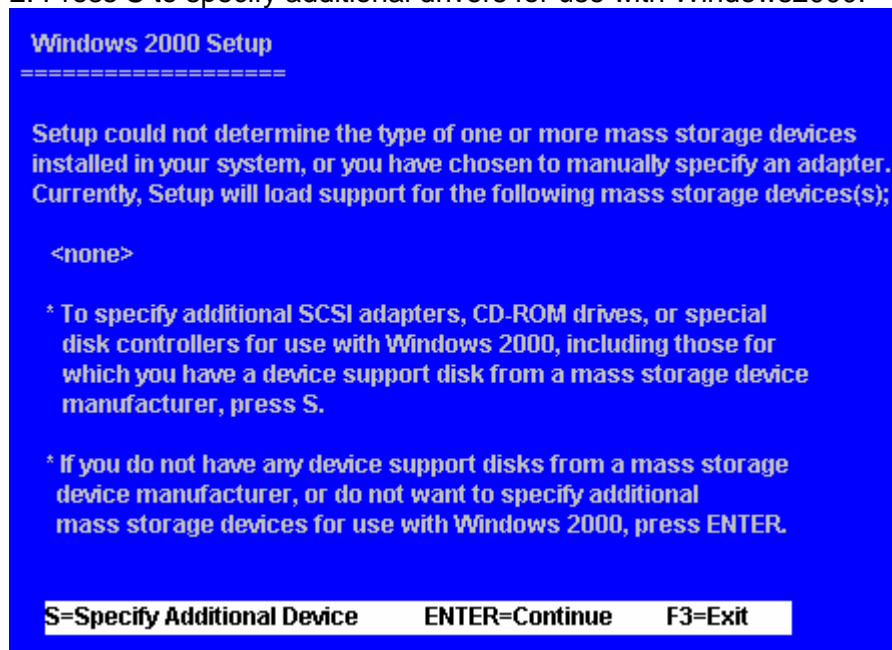
4. Restart the system.

3.2 During Install the Windows* 2000/XP/2003 Operating System to SATA Hard Drive

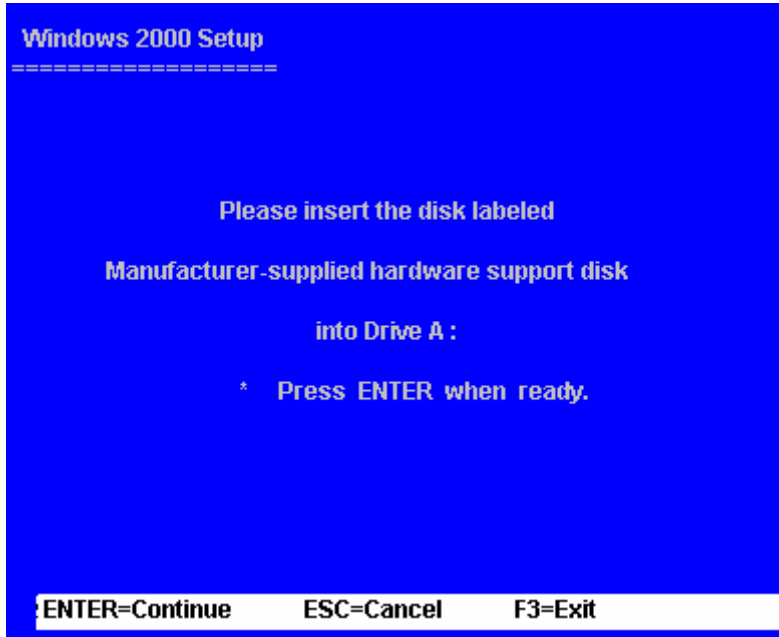
1. Press F6 to install the driver of SATA Host Controller.



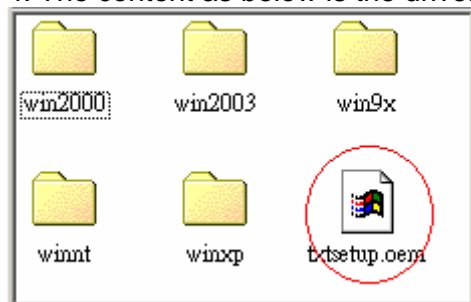
2. Press S to specify additional drivers for use with Windows2000.



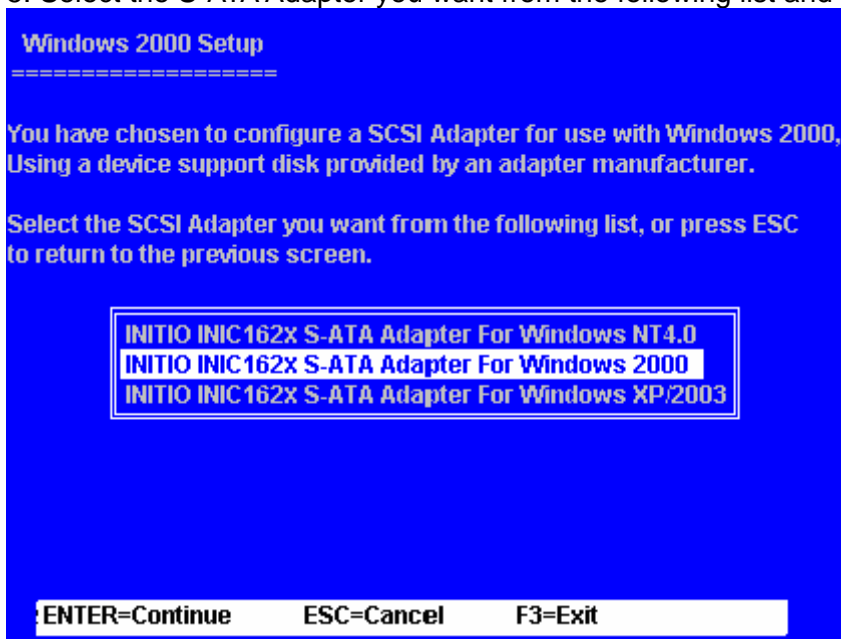
3. Please insert the disk labeled and press ENTER key when ready.



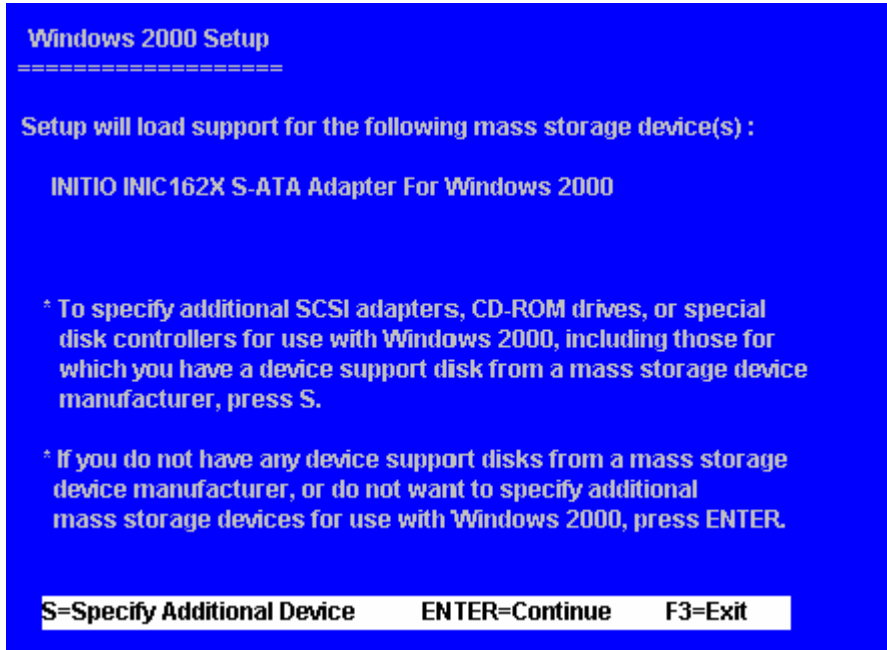
4. The content as below is the driver and index file for installation.



5. Select the S-ATA Adapter you want from the following list and press ENTER key to continue.



6. Press the ENTER to continue the Windows setup process.



3.3 Windows* 98/ME Driver PnP method for Installation

1. Select the selection of “specify the location of the driver” and click the NEXT button.



2. Choose the “specify a location” and assign the 162x driver’s location.



3. Press the "NEXT" button for installs the driver.



4. Press "Finish" button for finish the installing.



5. You can verify the driver is installed normally or not on Device Manager.



3.4 Windows* 2000/XP/2003 Driver PnP method for Installation

1. Choose the selection of "No, not this time" for don't connect to Windows Update and press "NEXT" button.



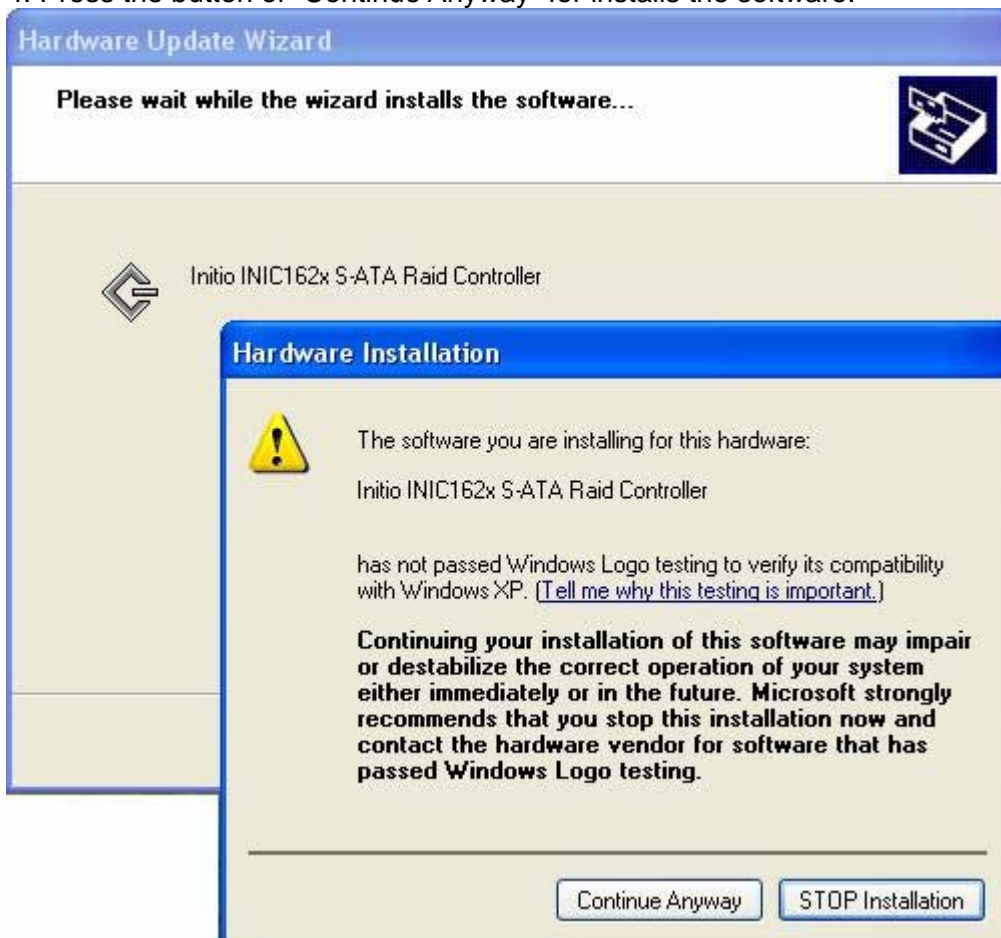
2. Choose the item of "Install from a list or specific location" and click "NEXT" button to continue.



3. Select the "Include this location in the search" and assign the 162x driver's location for which system by "Browse" key.



4. Press the button of "Continue Anyway" for installs the software.



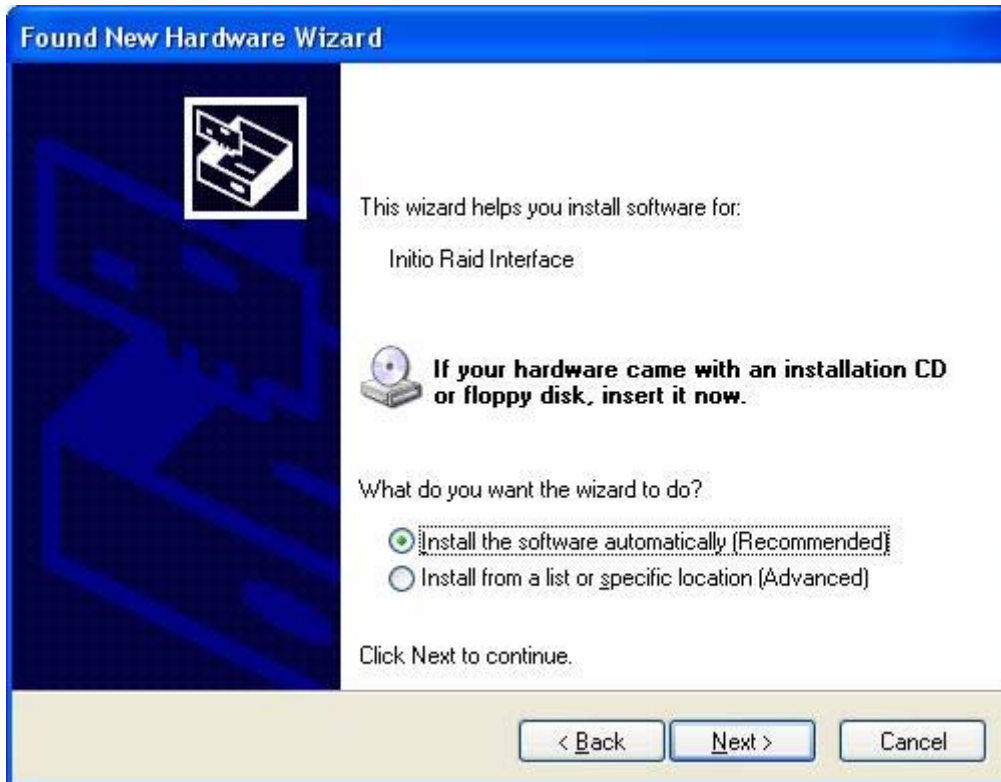
5. Click "Finish" button to finish the installing.



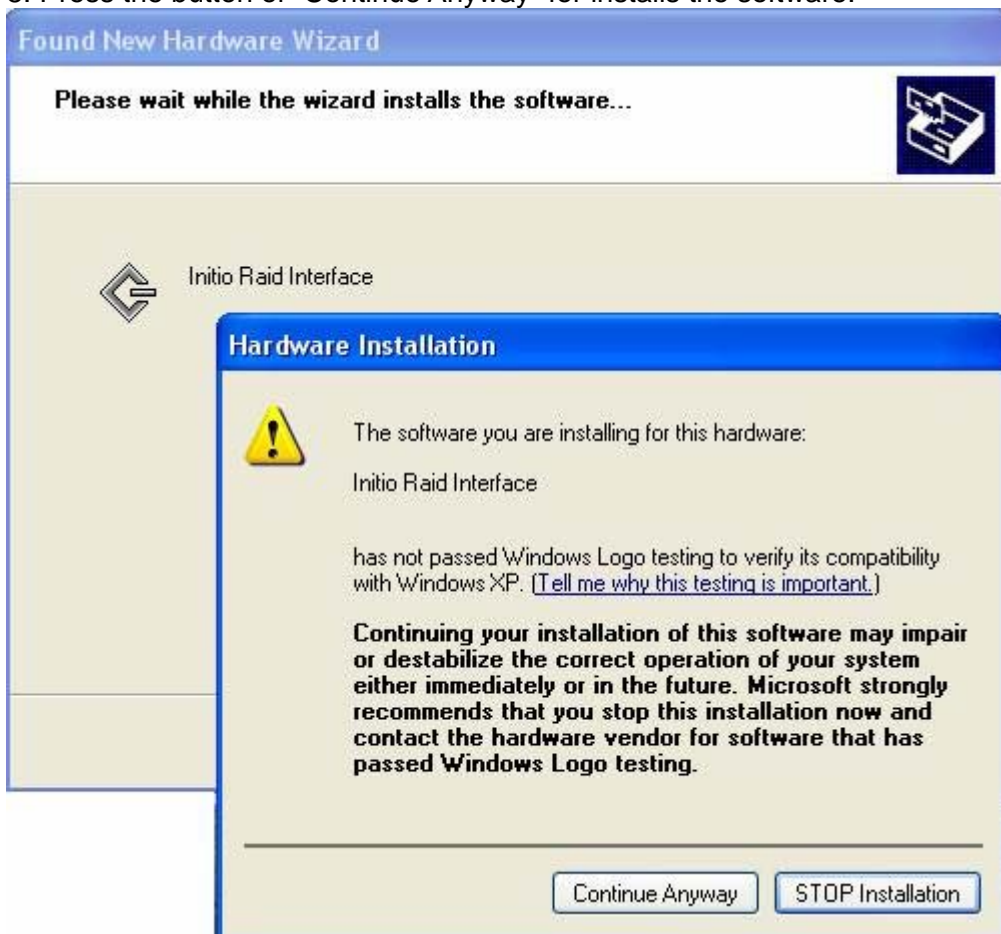
6. And then the Initio Raid Interface will be found by hardware wizard.



7. Choose the item of "install the software automatically" and click "NEXT" button to continue.



8. Press the button of "Continue Anyway" for installs the software.



9. Click "Finish" button to finish the installing of Initio Raid Interface.



10. You can see “Initio INIC162x S-ATA Raid Controller” and “Initio Raid Interface” list in “SCSI and RAID Controllers” on Device Manager that means installation successfully.



4. Initio SATA RAID Manager Configuration Utility

Supported operation system: Windows 2000/2003, XP, the Initio SATA RAID Manager mainly consists of a System Menu, a Task Menu, an Array View Window and a Device View Window. The task menu consists of all operation entry points while the array and device view windows graphically display the result of operations and the current configuration of RAID and related devices.

The Initio SATA RAID Manager is a Windows application for Initio inic1623 Serial ATA RAID adapter to provide the following functions,

Configuration of RAID

This category provides functions to create and delete an array.

Maintenance of RAID

This category provides functions to inquiry adapter, array and device information; initialize a mirrored set; verify the integrity of a mirrored set; and rebuild a degraded mirrored set.

Modification of RAID and device states

This category provides functions to modify array properties and change device state.

Event viewing and notification

This category includes an event viewer and notification mechanism to enable monitoring the operations of RAID and devices.

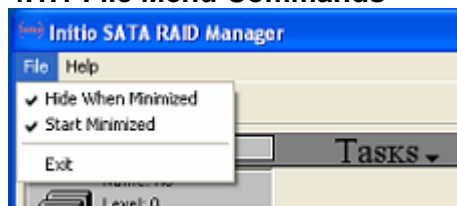
4.1 System Menu

The system menu provides commands for Initio SATA RAID Manager itself.

- ◆ **File menu**
- ◆ **Help menu**



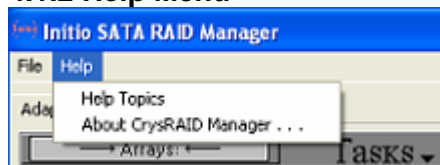
4.1.1 File Menu Commands



File menu offers the following functions, which configure the behavior of the Initio SATA RAID Manager.

- 1. Hide when minimized:** The Initio SATA RAID Manager will hide and display an icon on task bar when minimized.
- 2. Start minimized:** The Initio SATA RAID Manager will be minimized when it starts up next time.
- 3. Exit:** Exit Initio SATA RAID Manager.

4.1.2 Help Menu

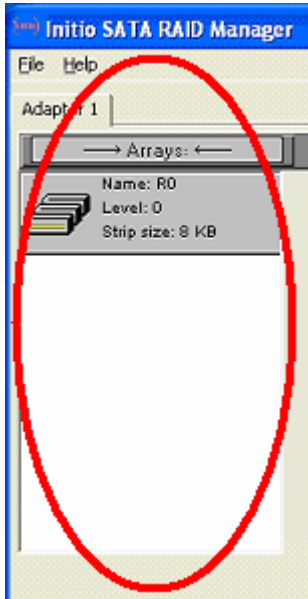


The Help menu offers the following commands, which provide you assistance with this application,

- 1. Help Topics:** Offers you an index to topics on which you can get help.
- 2. About:** Displays the version number of this application.

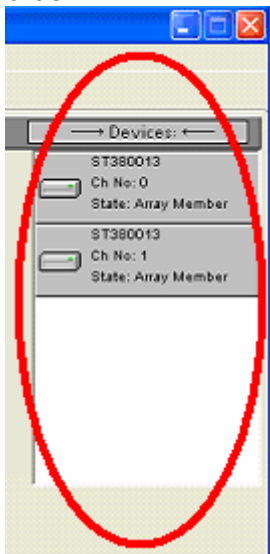
4.2 Array View Window

The Array View Window displays the configured array and its major properties, including RAID level, array name and status.



4.3 Device View Window

The Device View Window displays all the devices connected to inic1623 adapter. The device status and properties are displayed as well, so users will know what devices are array members and if any device is out of order.



4.4 Task Menu

The Task Menu contains the following operations, Information, Operations, Create Array, Delete Arrays, Rebuild Arrays, Rescan, and Event Viewer.



4.4.1 Information

Three types of information are provided, adapter information, array information and device information.

1. Adapter information: If neither an array nor a device is selected, the information page shows information of current selected adapter.

2. Array information: If an array is selected in Array View Window, the information page shows the detail information of the selected array.

3. Device information: If a device is selected in Device View Window, the information page shows the detail information of selected device.

4.4.2 Operations

Two types of operations can be performed via Operations button.

1. Array Operations: If an array is selected in Array View Window, the operations are array related. Array operations include common operation for all array levels and RAID 1 specific operations.

Array Level

Array level is used as a key to specify how data is organized on the set of disks which form the array.

Level	Data organized	Specific properties
0 (RAID 0)	Data is striped into blocks and stored cross disks	Stripe Size Stripe Only
1 (RAID 1)	Data is mirrored on two disks	Load Balance
Span (RAID SPAN)	Data is stored disk after disk	

A. Common operation:

Change Name in Change Properties category is used to change the selected array name.

B. RAID 1 specific operation:

a. Initialize Array: Clear both mirrored disks to make sure they are in sync. It is highly recommended to initialize a RAID 1 array right after array creation. **Warning:** All data will be lost after this operation.

b. Verify Array: Compare both mirrored disks to find out if the disks are in sync.

c. Load Balance: Load balance check box in change property category can be used to turn on/off the load balance feature of RAID.

2. Device Operations: If a device is selected in Device View Window, the operations are device related.

Device operation only supports Change State of selected disk. However, based on current configuration of array, only applicable new disk states can be changed to. The applicable new disk states are summarized as below,

Array Configuration	Current State	Applicable New States
No Array, Array (RAID 0/SPAN)	Pass through	Reserved for RAID
	Reserved for RAID	Pass through
Array (RAID 1)	Pass through	Reserved for RAID Dedicated spare
	Reserved for RAID	Pass through Dedicated spare
	Dedicated spare	Pass through Reserved for RAID

Disk States

Four device states are defined in Initio SATA RAID Manager. Disk states can be changed via Device Operations operation.

Pass through	A physical device has not been configured by Initio SATA RAID Manager.
Reserved for RAID	A disk is configured to participate an array later and is hidden from operating system.
Array Member	A disk belongs to an array
Dedicated Spare	A disk is configured to participate in a selected array as a spare disk for later use. (Reserved for later use)

4.4.3 Create Array

Construct a set of selected disks into a logical disk according to the properties you specified. The common array properties are array name and array level. There are extra array properties for different array level. Please refer to array level for more information. Warning: All data on disks will be lost when you create an array.

4.4.4 Delete Array

Delete a selected array. The original array member disks will be changed to Reserved for RAID state. Warning: All data stored on the array will be lost after you delete the array.

4.4.5 Rebuild Array

Rebuild Array is used to copy the whole disk image from one disk to another in a RAID 1 array (mirrored set). Usually, there are only a few circumstances that the array rebuilding is necessary: The mirrored set is broken that two mirroring disks are not in sync. Such circumstance happens when unrecoverable I/O errors occur or one of the disks is removed from the array. To recover the array from broken condition, a user needs to replace the bad disk (or missing disk) with a good disk whose capacity must not be smaller than the remaining disk in the array.

4.4.6 Rescan

Refresh all status to new initial.

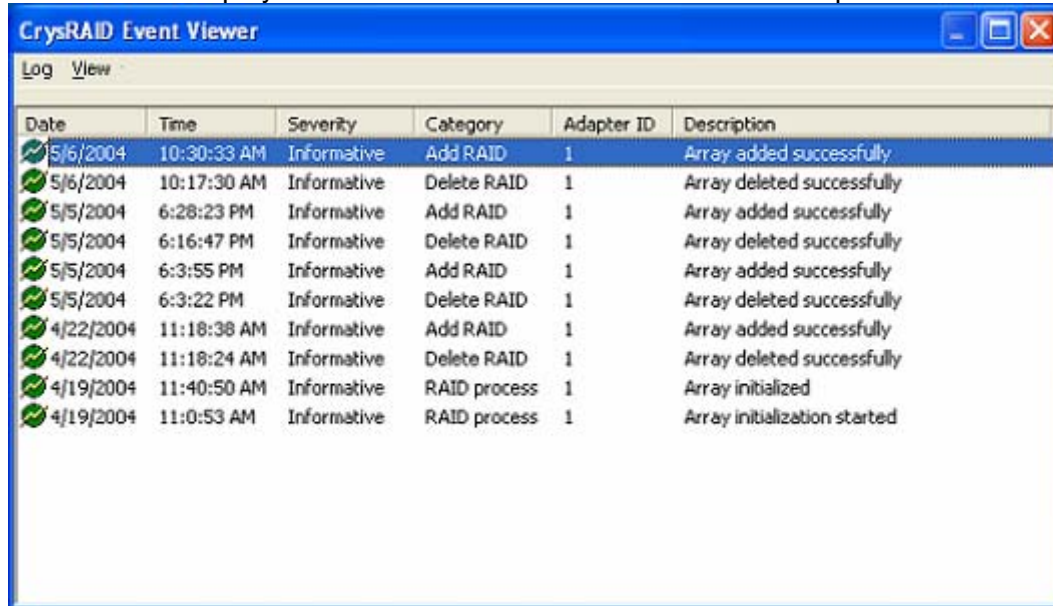
4.4.7 Event Viewer

Event viewer displays accumulated events have occurred and operations have been done on the computer.

5 Event Viewer Tool

Supported operation system: Windows 98SE/ME

Event viewer displays accumulated events have occurred and operations have been done on the computer.



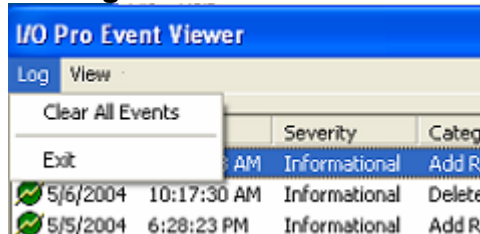
Date	Time	Severity	Category	Adapter ID	Description
5/6/2004	10:30:33 AM	Informative	Add RAID	1	Array added successfully
5/6/2004	10:17:30 AM	Informative	Delete RAID	1	Array deleted successfully
5/5/2004	6:28:23 PM	Informative	Add RAID	1	Array added successfully
5/5/2004	6:16:47 PM	Informative	Delete RAID	1	Array deleted successfully
5/5/2004	6:3:55 PM	Informative	Add RAID	1	Array added successfully
5/5/2004	6:3:22 PM	Informative	Delete RAID	1	Array deleted successfully
4/22/2004	11:18:38 AM	Informative	Add RAID	1	Array added successfully
4/22/2004	11:18:24 AM	Informative	Delete RAID	1	Array deleted successfully
4/19/2004	11:40:50 AM	Informative	RAID process	1	Array initialized
4/19/2004	11:0:53 AM	Informative	RAID process	1	Array initialization started

The event viewer contains several columns to describe events.

1. Date/Time columns show when the event or operation is taken place.
2. Severity column shows the severity level of the event or notification.
3. Category column shows what kind of event or notification it is.
4. Adapter ID column shows which adapter the event or notification is generated.
5. Description column shows a brief description of the event or notification.

The event viewer contains Log Menu and View Menu to further configure the event viewer.

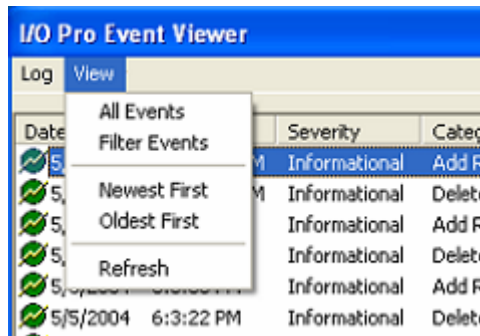
5.1 Log Menu



I/O Pro Event Viewer				
Log View				
Clear All Events				
Exit				
Date	Time	Severity	Category	
5/6/2004	10:17:30 AM	Informational	Delete	
5/5/2004	6:28:23 PM	Informational	Add R	

1. Selecting Clear All Events will clear the log file and all logged message will be lost.
2. Selecting Exit will close the event viewer window and return to the Initio SATA RAID Manager.

5.2 View Menu



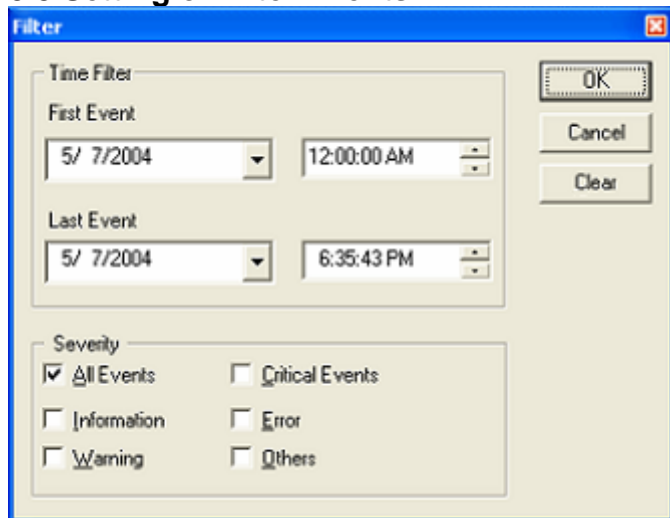
I/O Pro Event Viewer				
Log View				
All Events				
Filter Events				
Newest First				
Oldest First				
Refresh				
Date	Time	Severity	Category	
5/6/2004	10:17:30 AM	Informational	Add R	
5/5/2004	6:28:23 PM	Informational	Delete	
5/5/2004	6:3:55 PM	Informational	Add F	
5/5/2004	6:3:22 PM	Informational	Delete	

By selecting

1. All Events, the event viewer will display all events in the log file despite event filter setting.
2. Filter Events, the user can select the filtering criteria in popped up Event Filter window.
3. Newest First, the event viewer will display the events from the newest event to the oldest event.

4. Oldest First, the event viewer will display the events from the oldest event to the newest event.
5. Refresh, the event viewer will reload the events from the log file.

5.3 Setting of Filter Events



In Filter dialog, a user can set criteria to pick up those events relevant to the user. Users can set the filter based on time and/or severity.

6. Troubleshooting

The following table describes problems you might encounter, along with suggested solutions.

Problem	Recommend solution
Drives aren't detected.	Change cables or change the drives if everything fails.
BIOS system will hang during booting.	Disable the SATA Host controller of embedded motherboard on main board's BIOS setup.
It can't finish the installation of Raid manager application on windows 2000 when you updating the application of Raid manager.	Remember to unplug the SATA host card when you update the application or driver of windows 2000.
Bootting function fail with SATA optical drive from SATA host controller.	Update the motherboard's BIOS.
There is not existing RAID configuration on any of the drives connected to the system and the message with RAID utility displays reserve for Raid.	Press <Ctrl + R> key to enter the BIOS configuration Utility, then select a rebuild method to configure the drives.
Update the windows service patch file that will show warning message during the upgrading action.	Remember to unplug the SATA host card when you update the service patch file of windows 2000.