Appendix B: Intel ICH5R Serial ATA RAID Introduction

The southbridge ICH5R provides a hybrid solution that combines two independent SATA ports for support of up to two Serial ATA (Serial ATA RAID) drives.

Serial ATA (SATA) is the latest generation of the ATA interface. SATA hard drives deliver blistering transfer speeds of up to 150MB/sec. Serial ATA uses long, thin cables, making it easier to connect your drive and improving the airflow inside your PC.

1. Supports 150 MB/s transfers with CRC error checking
2. Data handling optimizations including tagged command queuing, elevator seek and packet chain command

MSI Reminds You...
All the information/volumes listed in your system might differ from the illustrations in this appendix.

Introduction

Following are the Parallel ATA (P-ATA) and Serial ATA (S-ATA) device configurations supported by Intel ICH5R.

ATA Operate Mode

There are two modes to select: Legacy mode and Native mode.

Legacy Mode:

--- In this mode, system BIOS just assign the traditional 14 and 15 IRQs to use for HDD.

--- Older OSs that do not support switch to Native Mode (DOS, Win2K, Win98/ME...) should set SATA and PATA to Legacy Mode.

--- Maximum 4 ATA devices to connect.

--- Combine mode and Non-Combine mode.

- Non-Combined Mode: P-ATA devices only .
  Maximum of 4 devices.
- Non-Combined Mode: S-ATA devices only.
  Maximum of 2 devices.
- Combined Mode: S-ATA devices
  P-ATA devices
  Maximum of 2 devices each, thus total 4 devices at maximum.

Native Mode:

--- In this mode, system BIOS will search all available IRQs to use for HDD.

--- New OS that support switch to Native Mode (WinXP, Windows .NET Server) can set SATA and PATA to Native Mode.

--- Comprehend both Legacy and/or Native Modes.

--- Maximum 6 ATA devices to connect (4 for P-ATA & 2 for S-ATA).

MSI Reminds You...

Proper support: BIOS provides a BIOS setup option for Native Mode or Legacy Mode user selection.

What is RAID 0 (striping)?

RAID 0 leverages the read/write capabilities of two or more hard drives working in unison to maximize the storage performance of a computer system. Data in a RAID 0 volume is arranged into blocks that are interleaved among the disks so that reads and writes can be performed in parallel (see below diagram). This technique, known as "striping", is the fastest of all of the RAID levels, especially for reading and writing large sequential files. Real world usage models where RAID 0 can be of particular benefit include loading large files into an image editing application such as Adobe* Photoshop*, saving large movie files in a video editing application such as Adobe* Premiere*, or creating CD or DVD images with a CD/DVD authoring package such as Roxio* Easy CD Creator*.

The hard drives in a RAID 0 volume are combined to form one volume which appears as a single virtual drive to the operating system. For example, two 40 GB hard drives in a RAID 0 array will appear as a single 80 GB hard drive to the operating system.

No redundancy information is stored in a RAID 0 volume. This means that if one hard drive fails, all data on both drives is lost. This lack of redundancy is also reflected by the RAID level 0, which indicates no redundancy. RAID 0 is not recommended for use in servers or other environments where data redundancy is a primary goal.

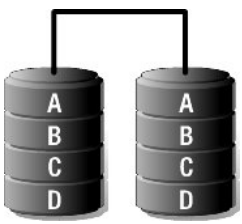
Minimum Disks:	2
Advantage:	Highest transfer rates
Redundancy:	None - if one disk fails all data will be lost
Application:	Typically used in desktops and workstations for maximum performance for temporary data and high I/O rate

What is RAID 1 (mirroring)?

A RAID 1 array contains two hard drives where the data between the two is mirrored in real time. Since all of the data is duplicated, the operating system treats the usable space of a RAID 1 array as the maximum size of one hard drive in the array. For example, two 40 GB hard drives in a RAID 1 array will appear as a single 40 GB hard drive to the operating system.

The primary benefit of RAID 1 mirroring is that it provides good data reliability in the case of a single disk failure. When one disk drive fails, all data is immediately available on the other without any impact to the data integrity. In the case of a disk failure, the computer system will remain fully operational to ensure maximum productivity.

The performance of a RAID 1 array is greater than that of a single drive since data can be read from multiple disks simultaneously, although disk writes do not realize the same benefit as is the case with RAID 0.



Minimum Disks:	2
Advantage:	100% redundancy of data. One disk may fail, but data will continue to be accessible. A rebuild to a new disk is recommended to maintain data redundancy.
Redundancy:	Excellent - disk mirroring means that all data on one disk is duplicated on another disk.
Application:	Typically used for smaller systems where capacity of one disk is sufficient and for any application(s) requiring very high availability.

BIOS Configuration

The Intel RAID Option ROM should be integrated with the system BIOS on all motherboards with a supported Intel chipset. The Intel RAID Option ROM is the Intel RAID implementation and provides BIOS and DOS disk services. Please use <Ctrl> + <I> keys to enter the "Intel(R) RAID for Serial ATA" status screen, which should appear early in system boot-up, during the POST (Power-On Self Test).

Using the Intel RAID Option ROM

1. Creating, Deleting and Resetting RAID Volumes:

The Serial ATA RAID volume may be configured using the RAID Configuration utility stored within the Intel RAID Option ROM. During the Power-On Self Test (POST), the following message will appear for a few seconds:

MSI Reminds You...

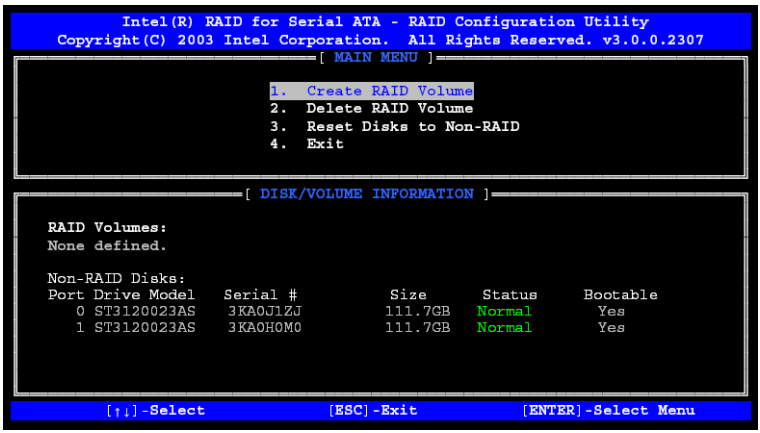
The "Driver Model", "Serial #" and "Size" in the following example might be different from your system.

```
Intel(R) RAID for Serial ATA - RAID BIOS v3.0.0.2307
Copyright(C) 2003 Intel Corporation.  All Rights Reserved.

RAID Volumes:
None defined.

Non-RAID Disks:
Port Drive Model      Serial #          Size      Status     Bootable
  0  ST3120023AS      3KA0J1ZJ          111.7GB   Normal       Yes
  1  ST3120023AS      3KA0H0M0          111.7GB   Normal       Yes
Press <CTRL-I> to enter Configuration Utility...
```

After the above message shows, press <Ctrl> and <I> keys simultaneously to enter the RAID Configuration Utility.

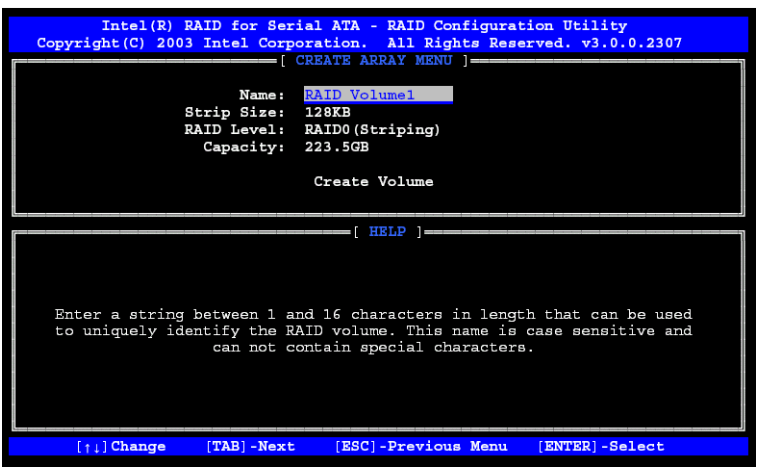
2. Creating, Deleting and Resetting RAID Volumes:

After pressing the <Ctrl> and <I> keys simultaneously, the following window will appear:



(1) Create RAID 0 or RAID 1 Volume

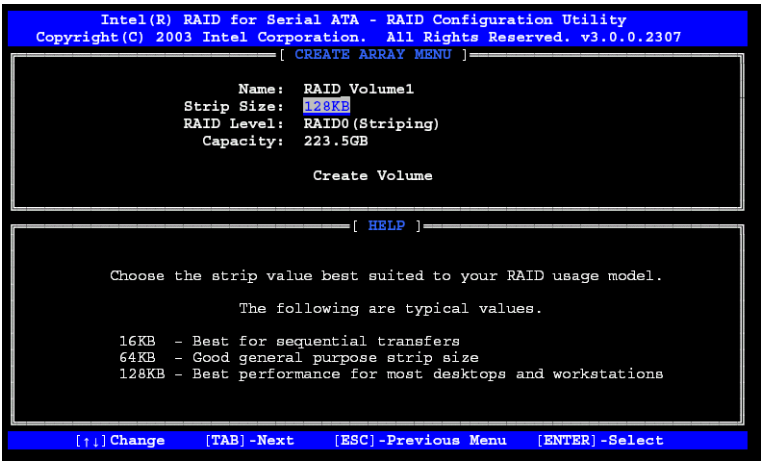
1. Select this option and press <Enter>. The following screen appears:



MSI Reminds You...

The following procedure is only available with a newly-built system or if you are reinstalling your OS. It should not be used to migrate an existing system to RAID 0.

2. Specify a RAID Volume name and then press the <TAB> or <Enter> key to go to the next field.

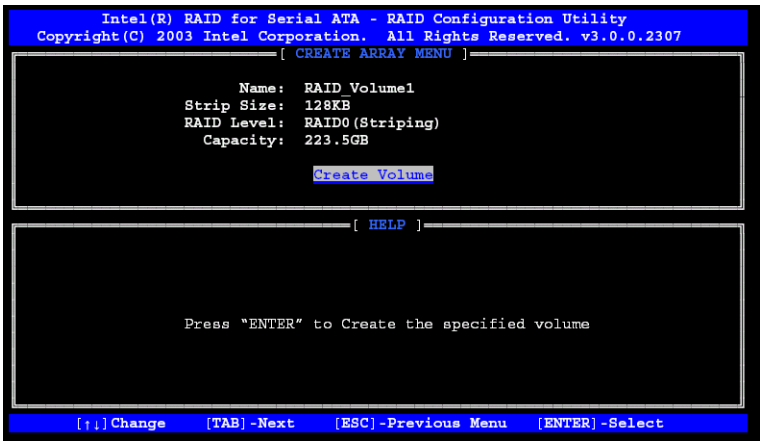


3. Select the strip value for the RAID 0 or RAID 1 array by scrolling through the available values by using the “upper arrow” or “down arrow” keys and pressing the <Enter> key to select and advance to the next field. The available values range from 4KB to 128 KB in power of 2 increments. The strip value should be chosen based on the planned drive usage. Here are some suggested selections:

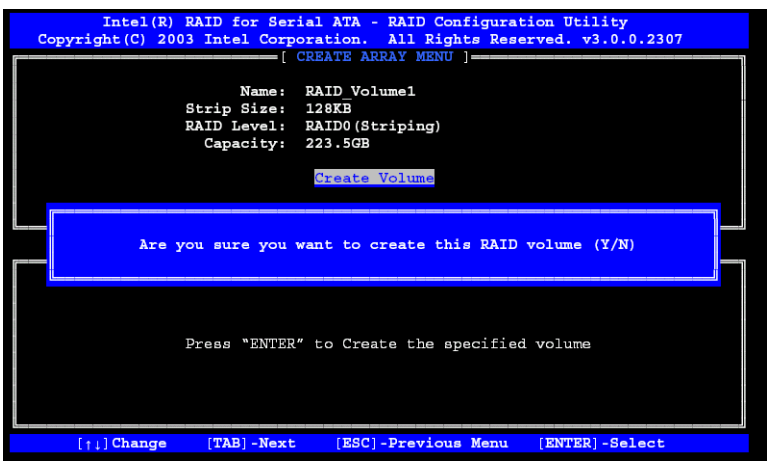
   16 KB – Best for sequential transfers
   64 KB – Good general purpose strip size
   128 KB – Best performance for most desktops and workstations. The default value.

   Select the RAID level (**Striping** for RAID0 and **Mirror** for RAID1) by scrolling through the available values by using the “upper arrow” or “down arrow”, and press the <Enter> key to select and advance to the next field.

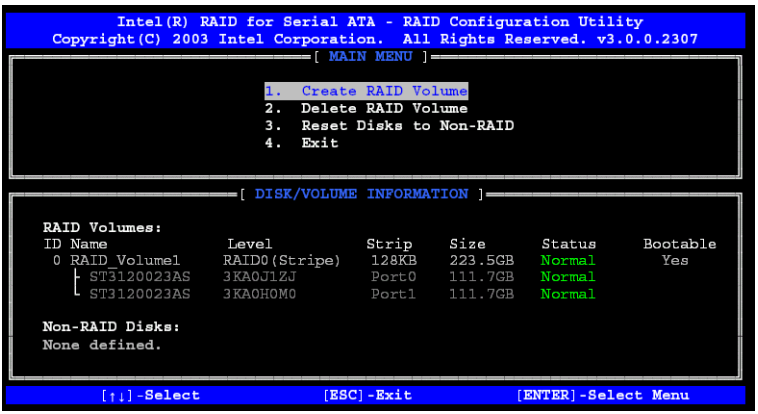
4. From the Strip size, press the <Tab> or <ENTER> key to advance to the **Create Volume** prompt. The window will appear as follows:



5. Then press <Enter> to create the specified volume and the following prompt will show:



6. Press <Y> to confirm the selection or press <N> to create the RAID volume again. Then you will return to the main menu with an updated status as follows:



7. Scroll to option 4 **Exit** and press <Enter> to exit the RAID Configuration utility. The following prompt appears:

8. Click <Y> to confirm the exit.

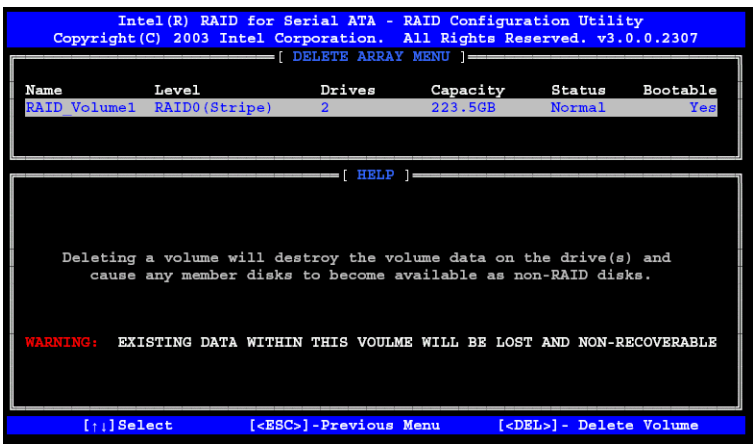
(2) Delete RAID Volume

Here you can delete the RAID volume, but please be noted that all data on RAID drives will be lost.

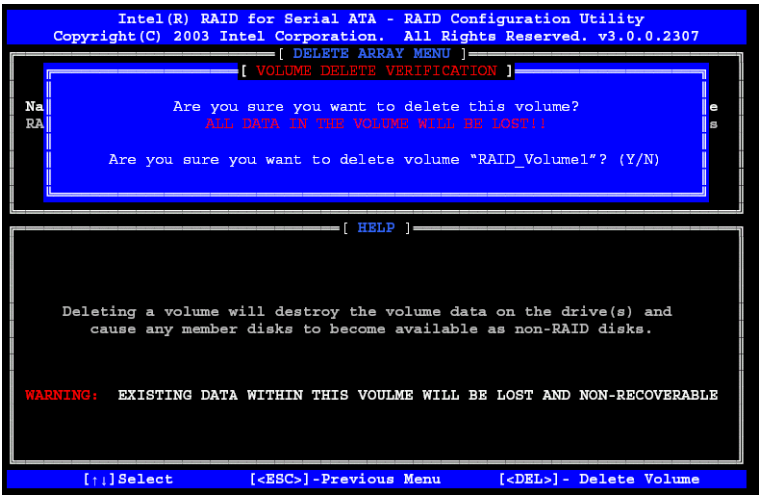
MSI Reminds You...

If your system currently boots to RAID and you delete the RAID volume in the Intel RAID Option ROM, your system will become unbootable.

Select option 2 **Delete RAID Volume** from the main menu window and press <Enter> key to select a RAID volume for deletion. The following window will appear:



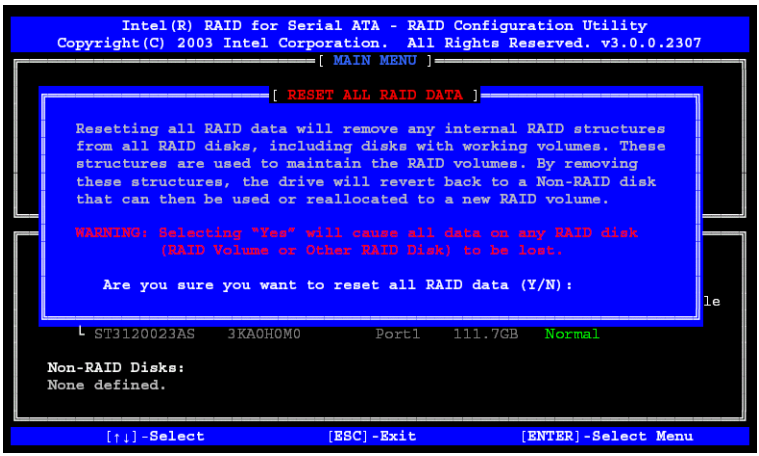
Select the volume and press <Delete> key to delete the RAID volume. The following prompt appears:



Press <Y> key to accept the volume deletion.

(3) Reset Disks to Non-RAID

Select option 3 **Reset Disks to Non-RAID** and press <Enter> to delete the RAID volume and remove any RAID structures from the drives. The following screen appears:



Press <Y> key to accept the selection.

MSI Reminds You...

1. *You will lost all data on the RAID drives and any internal RAID structures when you perform this operation.*
2. *Possible reasons to 'Reset Disks to Non-RAID' could include issues such as incompatible RAID configurations or a failed volume or failed disk.*

Installing Software

Install Driver in Windows XP

➤ **New Windows 2000/XP Installation**

The following details the installation of the drivers while installing Windows XP.

1. Start the installation:
   Boot from the CD-ROM. Press F6 when the message "Press F6 if you need to install third party SCSI or RAID driver" appears.
2. When the Windows XP Setup window is generated, press S to specify an Additional Device(s).
3. Insert the driver diskette ***Intel IAA RAID XP Driver For ICH5R (FW82801ER)*** into drive A: and press <Enter>.
4. Choose ***Intel(R) 82801ER SATA RAID Controller*** from the list that appears on Windows XP Setup screen, press the <Enter> key.
5. Press <Enter> to continue with installation or if you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, press <Enter> to continue with installation.
6. From the Windows XP Setup screen, press the <Enter> key. Setup will now load all device files and then continue the Windows XP installation.

➤ **Existing Windows 2000/XP Driver Installation**

1. Insert the MSI CD into the CD-ROM drive.
2. The CD will auto-run and the setup screen will appear.
3. Under the Driver tab, click on ***Intel IAA RAID Edition***.
4. The drivers will be automatically installed.

➤ **Confirming Windows 2000/XP Driver Installation**

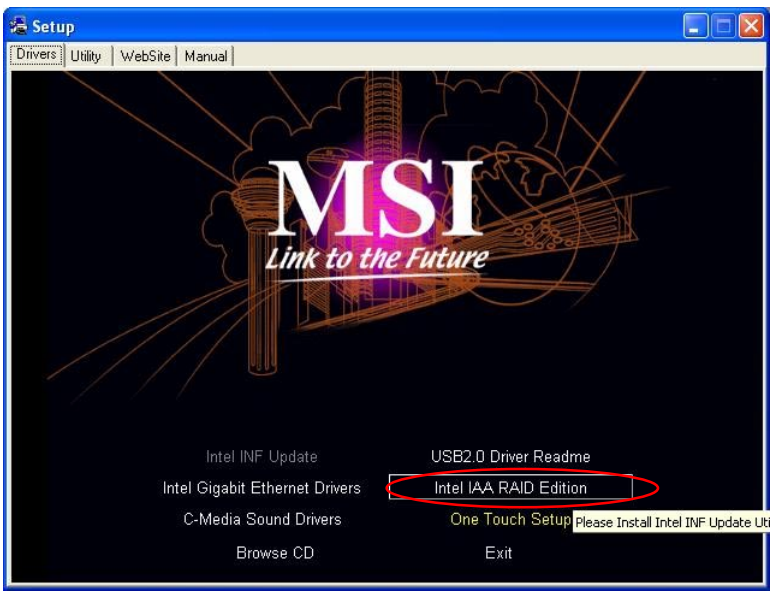
1. From Windows 2000/XP, open the **Control Panel** from **My Computer** followed by the System icon.
2. Choose the **Hardware** tab, then click the **Device Manager** tab.
3. Click the "+" in front of the **SCSI and RAID Controllers** hardware type. The driver ***Intel(R) 82801ER SATA RAID Controller*** should appear.

Installation of Intel Application Accelerator RAID Utility

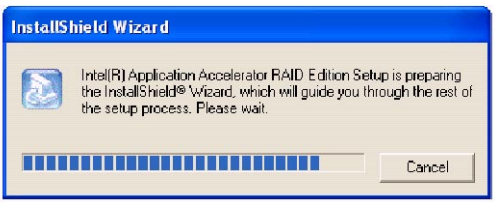
The Intel Application Accelerator RAID Edition is the software package that enables high-performance RAID 0 arrays in the Windows* XP operating system. This version of Intel Application Accelerator contains the following key features:

- ➤ Serial ATA RAID driver for Windows XP
- ➤ Intel Application Accelerator RAID Edition utility
- ➤ Migration Feature

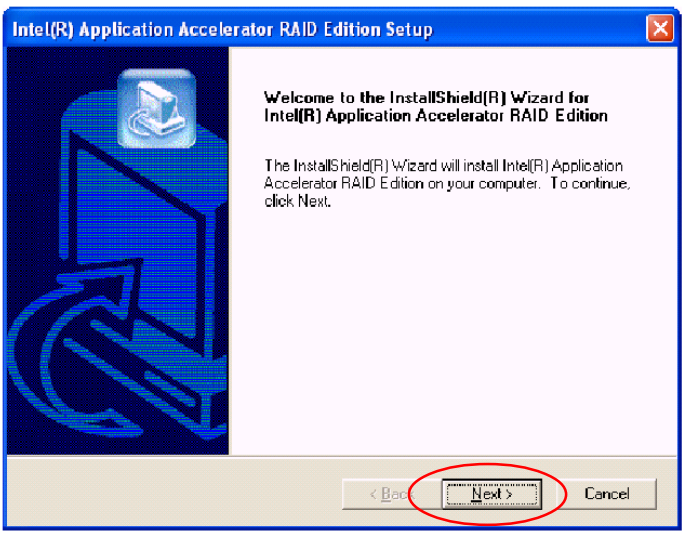
Insert the MSI CD and click on the **Intel IAA RAID Edition** to install the software.



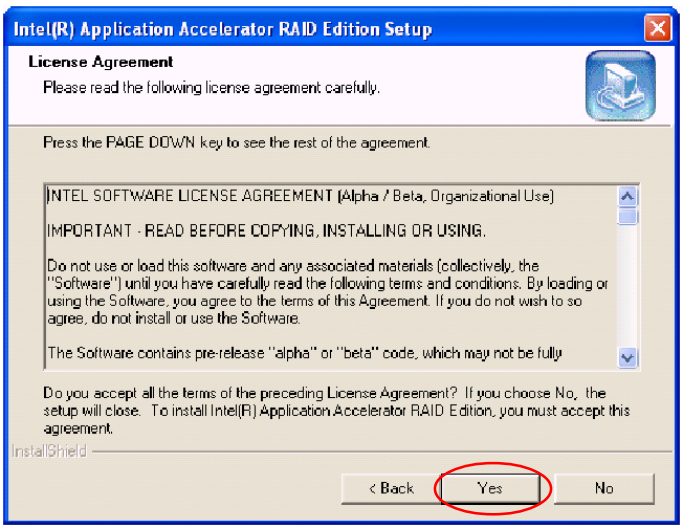
The **InstallShield Wizard** will begin automatically for installation showed as following:



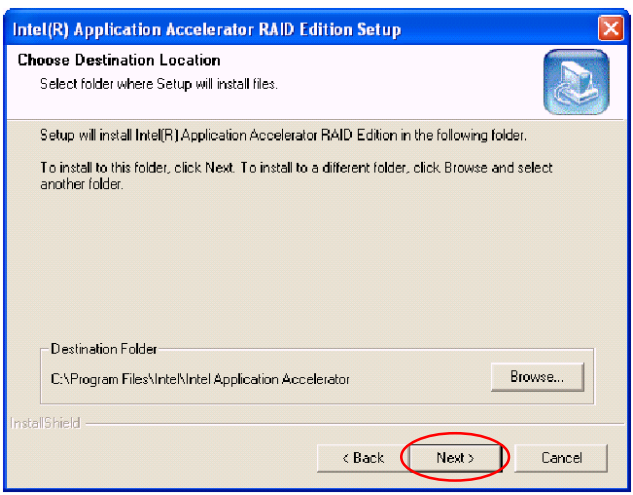
Click on the **Next** button to proceed the installation in the welcoming window.



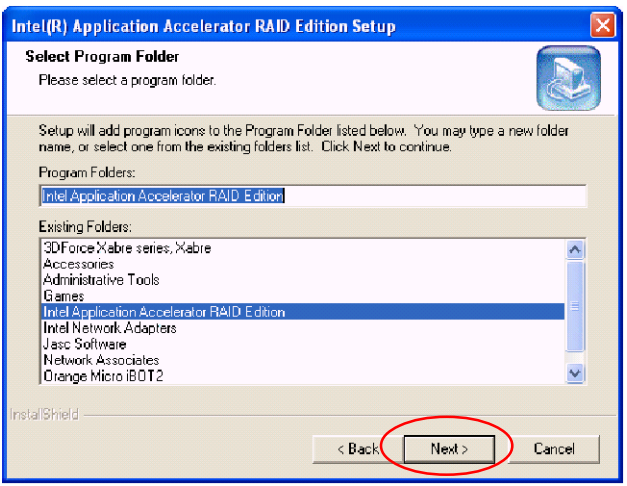
After reading the license agreement in the following window, click **Yes** button to continue.



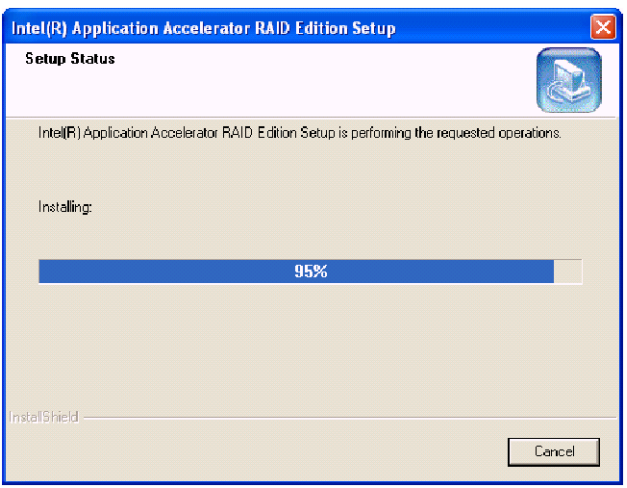
Select the folder in which you want the program to be installed in the following window, and click **Next** button to start installation.



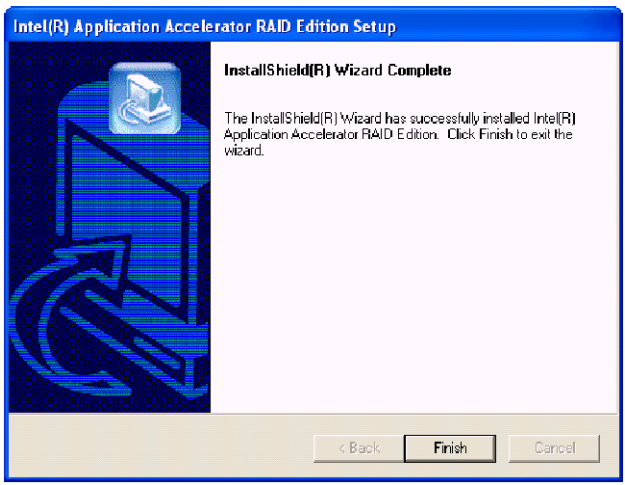
Select a program folder in the following window where you want Setup to add the program icon.



The following window appears to show the Intel Application Accelerator RAID Edition Setup installation status.



Once the installation is complete, the following window appears.



RAID Migration Instructions

The Intel Application Accelerator RAID Edition offers the flexibility to upgrade from a single Serial ATA (SATA) hard drive to a two drive RAID 0 or RAID 1 configuration when an additional SATA hard drive is added to the system. This process will create a new RAID volume from an existing disk. However, several important steps must be followed at the time the system is first configured in order to take advantage of RAID when upgrading to a second SATA hard drive:

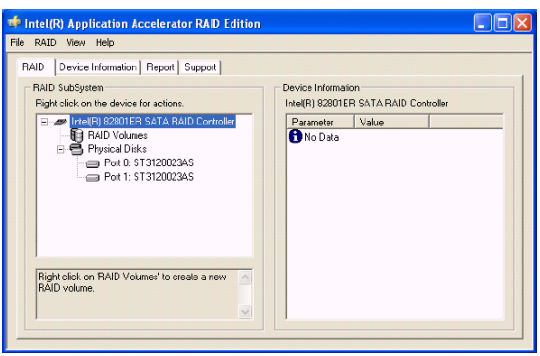
1. BIOS must be configured for RAID before installing Windows* XP on the single SATA hard drive. Refer to Page 3 “BIOS Configuration” for properly setting of the BIOS.
2. Install the Intel Application Accelerator RAID Edition during Windows Setup. Refer to Page 11 “Installing Software” for instructions on installing the driver during Windows Setup.
3. Install the Intel Application Accelerator RAID Edition after the operating system is installed.

To create a volume from an existing disk, complete the following steps:

MSI Reminds You...

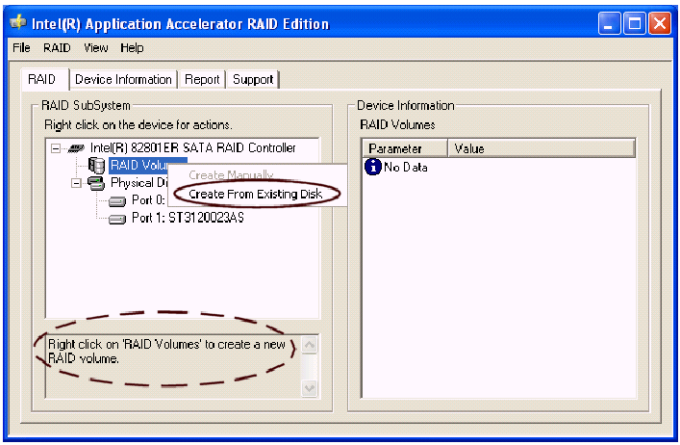
*A **Create from Existing Disk** operation will delete all existing data from the added disk and the data cannot be recovered. It is critical to backup all important data on the added disk before proceeding. However, during the migration process, the data on the source disk is preserved.*

After the Intel Application Accelerator RAID Edition has been successfully installed and the system has rebooted, click on the Intel Application Accelerator shortcut link and the following window will appear:



Create RAID Volume from Existing Disk

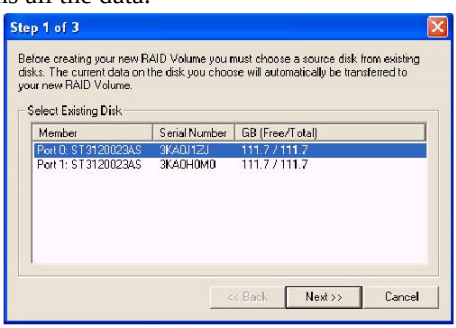
To create a RAID volume from an existing disk, right-click on **RAID Volume** and select **Create From Existing Disk** to create a new RAID volume as the screen below. You may also use the **RAID** drop-down menu and click on **Create Volume from Existing Disk**.



(1) Step 1 of 3: Select the source disk

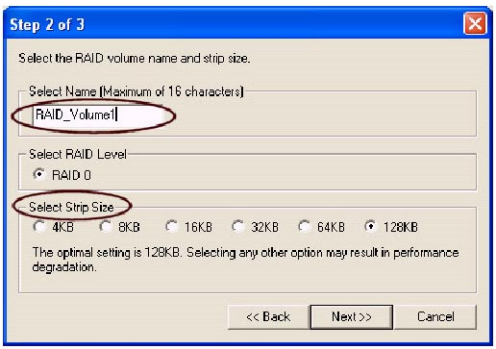
For Step 1, select the source disk that you wish to use and then click **Next**. It is very important to note which disk is the source disk (the one containing all of the information to be migrated) and which one is the target disk. On a RAID Ready system, this can be determined by making a note during POST of which port (e.g. Port 0 or Port 1) the single disk is attached to.

You can also use the Intel Application Accelerator RAID Edition utility before the second disk is installed to verify the Port and serial number of the drive that contains all the data.



(2) Step 2 of 3: Select the RAID Volume Name and Strip Size

In Step 2, select the RAID volume name and strip size, and click **Next**:



➤ **RAID Volume Name:**

A desired RAID volume name needs to be typed in where the 'RAID_Volume1' text currently appears above. The RAID volume name has a maximum limit of 16 characters. The RAID volume name must also be in English alphanumeric ASCII characters.

➤ **RAID Level:**

Select the desired RAID level:

RAID 0 (Performance) – A volume optimized for performance will allow you to access your data more quickly.

RAID 1 (Redundancy) – A volume optimized for data redundancy will provide you with a realtime duplicate copy of your data. Note: Only half of the available volume space will be available for data storage.

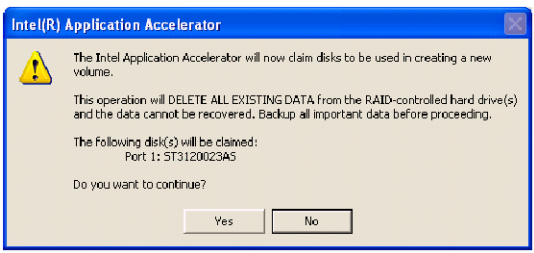
➤ **Strip Sizes:**

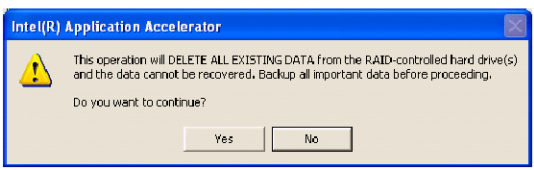
Select the desired strip size setting. As indicated, the optimal setting is 128KB. Selecting any other option may result in performance degradation. Even though 128KB is the recommended setting for most users, you should choose the strip size value which is best suited to your specific RAID usage model. The most typical strip size settings are:

4KB: For specialized usage models requiring 4KB strips
8KB: For specialized usage models requiring 8KB strips
16KB: Best for sequential transfers
32KB: Good for sequential transfers

64KB: Good general purpose strip size
128KB: Best performance for most desktops and workstations

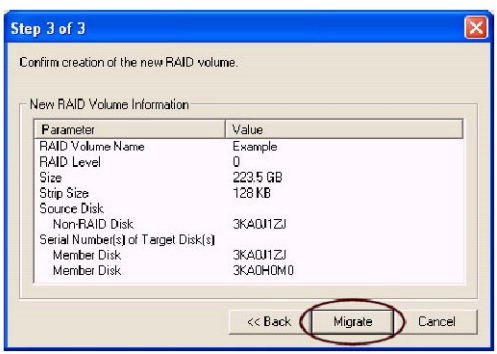
Before you continue to Step 3 of 3 by clicking **Next** in Step 2 of 3, read the next 2 dialogue boxes carefully. Please note that once you have selected **Migrate** on Step 3 of 3, the Intel Application Accelerator RAID Edition will have claimed the disks to be used in creating a new volume and this operation cannot be undone. It is critical that you backup all important data before selecting **Yes** to these dialogue boxes:





(2) Step 3 of 3: Confirm the creation of new RAID volume

In Step 3, confirm the creation of the new RAID volume and then click **Migrate**:



Migration Process

The migration process may take up to two hours to complete depending on the size of the disks being used and the strip size selected. A dialog window will appear stating that the migration process may take considerable time to complete and you must click **Yes** in order to start the migration. While you can still continue using your computer during the migration process, once the migration process starts, it cannot be stopped. If the migration process gets interrupted and your system is rebooted for any reason, it will pick up the migration process where it left off. You will be provided with an estimated completion time (the remaining time will depend on your system) once the migration process starts as illustrated in the following example:

The following screen appears if the migration process is completed successfully. Then you have to reboot your system to use the full capacity of the new volume.