Guide to SATA Hard Disks Installation and RAID Configuration

1. Guide to SATA Hard Disks Installation

1.1 Serial ATA (SATA) Hard Disks Installation

ULi M1697 chipset supports Serial ATA (SATA) hard disks with RAID functions, including RAID 0, RAID 1, RAID 0+1, JBOD, and RAID 5. You may install SATA hard disks on this motherboard for internal storage devices. For SATA installation guide, please refer to Serial ATA (SATA) Hard Disks Installation of "User Manual" in the support CD. This section will guide you how to create RAID on SATA ports.

2. Guide to RAID Configurations

2.1 Introduction of RAID

RAID

The term "RAID" stands for "Redundant Array of Independent Disks", which is a method combining two or more hard disk drives into one logical unit. For optimal performance, please install identical drives of the same model and capacity when creating a RAID set.

RAID 0 (Data Striping)

RAID 0 is called data striping that optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. It will improve data access and storage since it will double the data transfer rate of a single disk alone while the two hard disks perform the same work as a single drive but at a sustained data transfer rate.

> **WARNING!!**
> Although RAID 0 function can improve the access performance, it does not provide any fault tolerance. Hot-Plug any HDDs of the RAID 0 Disk will cause data damage or data loss.

RAID 1 (Data Mirroring)

RAID 1 is called data mirroring that copies and maintains an identical image of data from one drive to a second drive. It provides data protection and increases fault tolerance to the entire system since the disk array management software will direct all applications to the surviving drive as it contains a complete copy of the data in the other drive if one drive fails.

RAID 0+1

RAID 0+1 is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 0+1 configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.

JBOD

JBOD (Just a Bunch of Drives) is also called data spanning. It will expands the capacity of your drive and results in a useable total capacity since it will make several hard disk types configured as a single hard disk, and the hard drives are simply hooked up in series. However, JBOD will not increase any performance or data security.

RAID 5

RAID 5 stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

2.2 RAID Configurations Precautions

1. Please use two new drives if you are creating a RAID 0 (striping) array for performance. It is recommended to use two SATA drives of the same size. If you use two drives of different sizes, the smaller capacity hard disk will be the base storage size for each drive. For example, if one hard disk has an 80GB storage capacity and the other hard disk has 60GB, the maximum storage capacity for the 80GB-drive becomes 60GB, and the total storage capacity for this RAID 0 set is 120GB.

2. You may use two new drives, or use an existing drive and a new drive to create a RAID 1 (mirroring) array for data protection (the new drive must be of the same size or larger than the existing drive). If you use two drives of different sizes, the smaller capacity hard disk will be the base storage size. For example, if one hard disk has an 80GB storage capacity and the other hard disk has 60GB, the maximum storage capacity for the RAID 1 set is 60GB.

3. Please verify the status of your hard disks before you set up your new RAID array.

WARNING!!
Please backup your data first before you create RAID functions.

2.3 Setting the BIOS RAID Items

After installing the hard disk drives, please set the necessary RAID items in the BIOS before setting your RAID configuration. Boot your system, and press <F2> key to enter BIOS setup utility. Highlight **Advanced** and press <Enter>, then the main interface of BIOS setup utility will appear. Please set the option **SATA Operation Mode** to [RAID]. Save your change before you exit BIOS setup.

2.4 Configuring ULi RAID BIOS

Reboot your computer. After the system BIOS detects ULi RAID BIOS, the RAID BIOS version and drive information shows up on the screen. When RAID BIOS is waiting after identifying drives, press <Ctrl+A> to enter the setup menu. Then, the below screen appears. There are three major areas in the RAID BIOS setup screen: **Main Menu**, **Drive Select Menu** and **RAID Array List**:
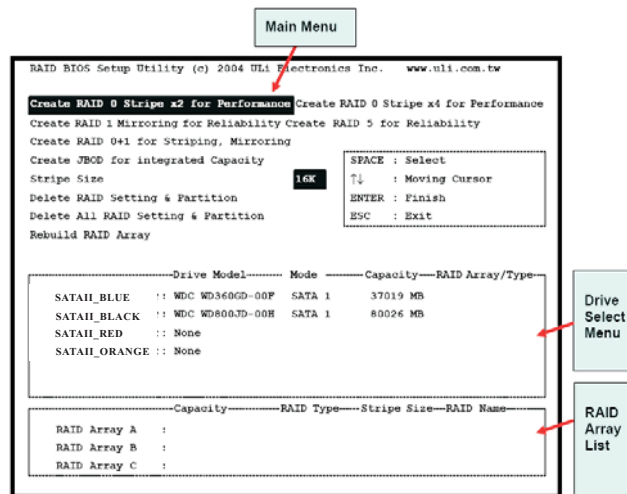
2.4.1 Main Menu

In Main Menu, you have the following options to operate RAID:

Create RAID 0 Stripe x2 for Performance

1. Press 'Enter' key to activate this item. An 'S' flashing cursor appears at the Drive Select Menu for the user to choose the first drive for RAID 0.
2. Use 'Space' key to choose the desired drive for RAID 0. Then the flash cursor changes to an 's' flashing cursor for the user to choose the second drive for RAID 0.
3. The prompt 'Data on RAID Drives will be deleted (Y/N)' appears after two drives are properly assigned.
4. Press 'Y', and then the necessary information will be written to the drives, which will destroy the original data in the drives.
5. Next, the Array Name input line appears for the user to key in a name for the newly created array. The effective characters for an array name is '0'-'9', 'A'-'Z', 'a'-'z', space and underscore.
6. After the RAID array has been created successfully, its information shows up at RAID Array List.

Create RAID 0 Stripe x4 for Performance

1. Press 'Enter' key to activate this item.
2. The prompt 'Data on first 4 drives will be deleted (Y/N)' appears.
3. Press 'Y', and then the necessary information will be written to the drives, which will destroy the original data in the drives.
4. Next, the Array Name input line appears for the user to key in a name for the newly created array. The effective characters for an array name is '0'-'9', 'A'-'Z', 'a'-'z', space and underscore.
5. After the RAID array has been created successfully, its information shows up at RAID Array List.

Create RAID 1 Mirroring for Reliability

1. Press 'Enter' key to activate this item. An 'M' flash cursor appears at the 'Drive Select Menu' for the user to choose the first (source) drive for RAID 1.
2. Use 'Space' key to choose the desired drive for RAID 1. Then flash cursor changes to an 'm' flash cursor for the user to choose the second (target) drive for RAID 1.
3. The prompt 'Create RAID 1(Y/N)' appears after two drives are properly assigned.

4. Press 'Y', and then the necessary information will be written to drives, which may destroy the original data in the drives.
5. Next, the Array Name input line appears for the user to key in a name for the newly created array. The effective characters for an array name is '0'-'9', 'A'-'Z', 'a'-'z', space and underscore.
6. Lastly a prompt message 'Duplicate Data from M to m (Y/N)?' asks whether to do drive copy. The source and target drives are indicated by 'M' and 'm' in 'Drive Select Menu' respectively. Pressing 'Y' will duplicate the data in source drive to the target drive. Make sure the source drive is the correct one. If you press 'N', the data will be inconsistent in the two drives.
7. After the RAID array has been created successfully, its information shows up at RAID Array List.
8. The process status bar shows up during the duplication process.

Create RAID 0+1 for Striping, Mirroring
1. Press 'Enter' key to activate this item. An '+' flash cursor appears at the 'Drive Select Menu' for the user to choose the first drive for RAID 0+1.
2. Use 'Space' key to choose the desired drive for RAID 0+1. Then flash cursor changes to an '+' flash cursor for the user to choose the second, third and fourth drives for RAID 0+1.
3. The prompt 'Create RAID 1(Y/N)' appears after two drives are properly assigned.
4. Press 'Y', and then the necessary information will be written to drives, which may destroy the original data in the drives.
5. Next, the Array Name input line appears for the user to key in a name for the newly created array. The effective characters for an array name is '0'-'9', 'A'-'Z', 'a'-'z', space and underscore.
6. After the RAID array has been created successfully, its information shows up at RAID Array List.
7. The process status bar shows up during the duplication process.

Create JBOD for Integrated Capacity
1. Press 'Enter' key to activate this item. A 'J' flash cursor appears at the 'Drive Select Menu' for the user to choose the first drive for JBOD.
2. Use 'Space' key to choose the desired drive for JBOD array. Use 'Enter' key to finish JBOD drive selection. The maximum number of drives for JBOD array is four and the minimum is two.
3. The prompt 'Create JBOD (Y/N)' appears.
4. Press 'Y' key and then the necessary information will be written to drives, which may destroy the original data in the drives.

5. Next the Array Name input line appears for the user to key in a name for the newly created array. The effective characters for an array name is '0'-'9', 'A'-'Z', 'a'-'z', space and underscore.

Create RAID 5 for Reliability

1. Press 'Enter' key to activate this item. A '5' flashing cursor appears at the 'Drive Select Menu' for the user to choose the first drive for RAID 5.
2. Use 'Space' key to choose the desired drives for RAID 5 array. Use 'Enter' key to finish RAID 5 drive selection. The maximum number of drives for RAID 5 array is four and the minimum is three. Using four drives for RAID 5 will have better READ performance.
3. The prompt 'Data on RAID drives will be deleted (Y/N) ?' appears.
4. Press 'Y' key and then the necessary information will be written to drives, which may destroy the original data in the drives.
5. Next the Array Name input line appears for the user to key in a name for the newly created array. The effective characters for an array name is '0'-'9', 'A'-'Z', 'a'-'z', space and underscore.

Stripe Size

This option is effective for RAID 0/5/0+1. The user can choose a stripe size from 64KByte, 32KByte, 16KByte (default), 8KByte and 4KByte. If the user uses RAID 0 for most A/V editing applications and files, 64KByte is recommended.

1. Press 'Enter' key to activate this item. Then 64K, 32K, 16K, 8K, 4K items appears at the bottom of Main Menu.
2. Use the up or down arrow keys to choose the stripe size.

Rebuild RAID Array

When a drive is replaced or BIOS detects a broken RAID, the user can use Rebuild RAID Array to keep data coherency for RAID 1, 5 or 0+1.

1. Press 'Enter' key to activate this item. An 'R' flashing cursor appears at the 'Drive Select Menu' for the user to choose the valid drive (the original RAID drive except the broken or the replaced drive) of previ ously defined RAID 1, 5 or 0+1 to perform rebuild.
2. BIOS shows the source (marked with 'M') and target (marked with 'm') drives.
3. Lastly a prompt message 'Duplicate Data from M to m (Y/N)?' asks whether to do drive copy. The source and target drives are indicated by 'M' and 'm' in 'Drive Select Menu' respectively. Press 'Y' to start the rebuild process and data duplication.
4. The process status bar shows up during the duplication process.

Delete RAID Setting & Partition

When RAID BIOS detects a broken RAID, the user can use Delete RAID
Setting & Partition to delete the broken RAID.

1. Press 'Enter' key to activate this item. An 'E' flash cursor appears at the
   'Drive Select Menu' for the user to choose defined array drives to be
   deleted.

2. 'Data on RAID drives will be deleted (Y/N)?' prompt message shows up
   to confirm the user's selection.

3. Press 'Y' key, and then the data in selected drives is destroyed.

4. "RAID Array List" automatically updates itself.

Delete All RAID Setting & Partition

1. Press 'Enter' key to activate this item.

2. 'Data on RAID drives will be deleted (Y/N)?' prompt message shows up
   to confirm the user's selection.

3. Press 'Y' key, and then the data in drives is destroyed.

4. 'RAID array List" automatically updates itself.

2.4.2   Drive Select Menu

This menu lists the available drives and their information. There
are three indicator bars in this menu: two RAID Drive Selection
Bar and one Boot Drive Selection Bar.
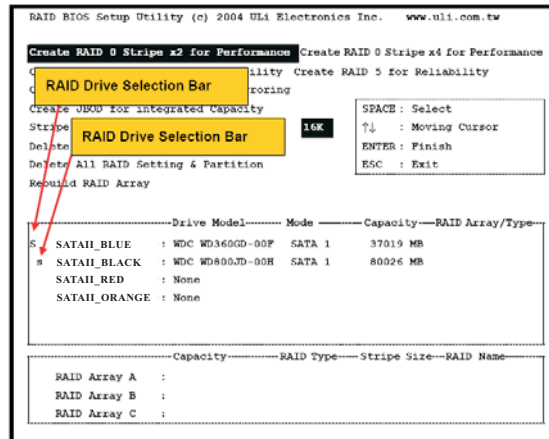
2.4.3   RAID Array List

This list showa the existing and newly created RAID arrays.

3. Using ULi Windows RAID Utility

## 3.1 How to Create RAID under Windows

You can create RAID arrays in either the RAID BIOS setup menu as previously described or under Windows Utility. After the driver and utility are installed correctly, you can find ULi RAID utility from Windows **Programs** as shown below, or find ULi RAID Utility at task bar. Run ULi RAID utility from Windows Program or click on 'Configuration' at task bar. The Configuration dialog box appears.
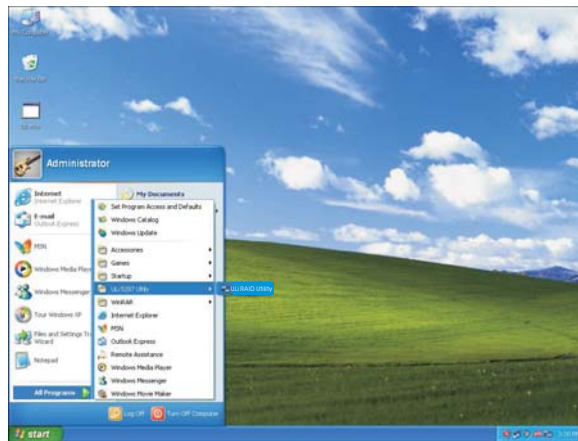

The information of the connected drives is displayed. (RAID 0x2 indicates RAID 0 with two drives, RAID 0x4 indicates RAID 0 with four drives.)
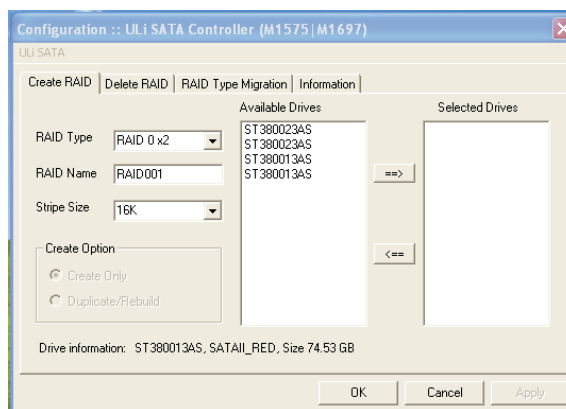
Click the desired drive from the 'Available Drives' list, use the right arrow key to move the drives that you plan to use to the 'Selected Drives' list. You can select array type from the 'RAID Type' pull-down menu and select stripe size for RAID 0 from the 'Stripe Size' pull-down menu.
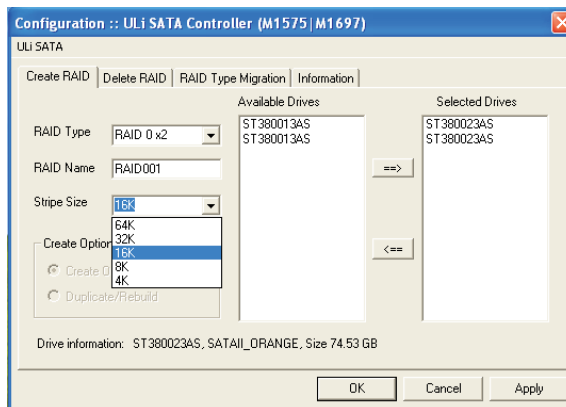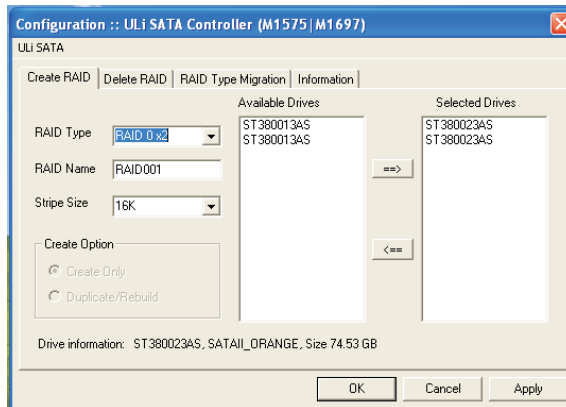
Key in array name in 'RAID Name'.
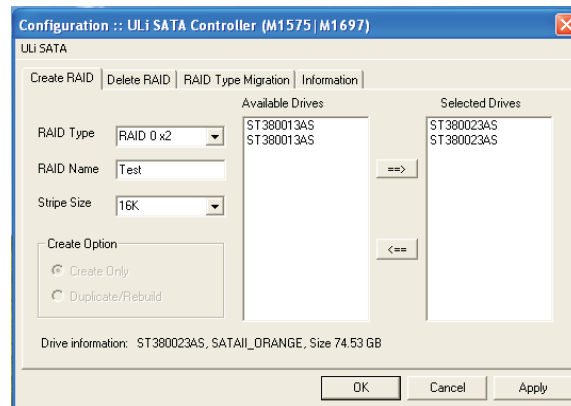
* The Create Option is active for RAID 1, 5 and RAID 0+1 only. The 'Create Only' option will destroy data in both of the selected drives. The 'Duplicate/Rebuild' option will keep the source drive data and copy source drive data into the target drive.

After the drives and type are configured, a dialog box appears to warn you that the next action will destroy information in the drives. Make sure the information in selected drivers is no longer in use before clicking on 'Yes'. Then, click 'Yes' to restart your system when a dialog box appears to confirm that you have changed the RAID settings.

3.2 How to Delete RAID under Windows

If you wants to delete existing or newly created RAID, click on 'Delete RAID' tab on the main Configuration menu. Click on the RAID from 'Available RAID' list, then move the selected RAID to 'Selected RAID' list by clicking the right arrow key.
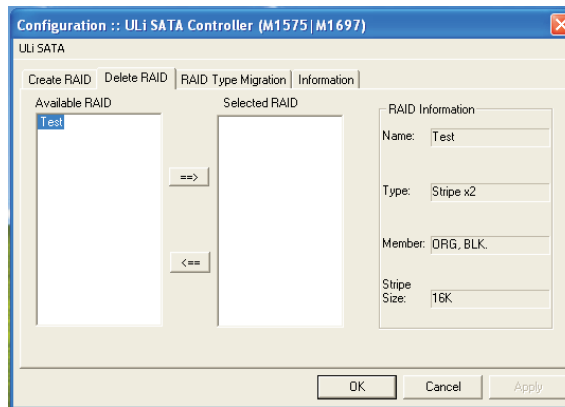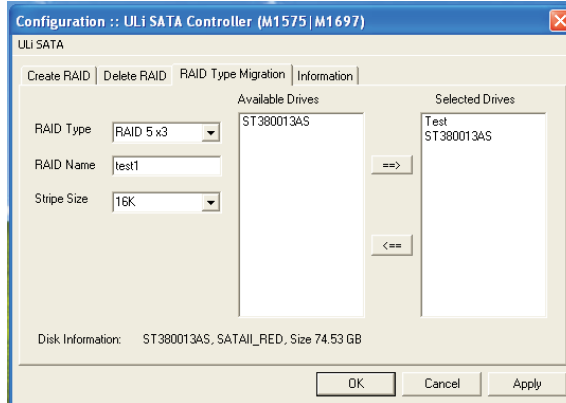

Click 'OK' after the array is selected. A dialog box appears to warn you that the next action will destroy information in the drives. Make sure the information in selected drivers is no longer in use before clicking on 'Yes'. Then, click 'Yes' to restart your system when a dialog box appears to confirm that you have changed the RAID settings.

3.3 How to Migrate RAID under Windows

Select new array type from the 'RAID Type' pull-down menu and select new stripe size for RAID from 'Stripe Size' pull-down menu. Input array name in 'RAID Name'. The following is an example of migration from RAID 0x2 to RAID 5x3.
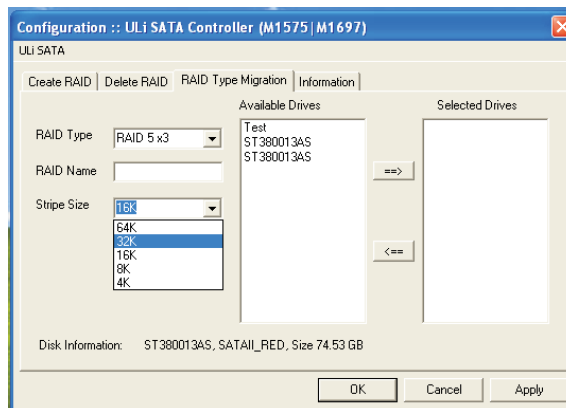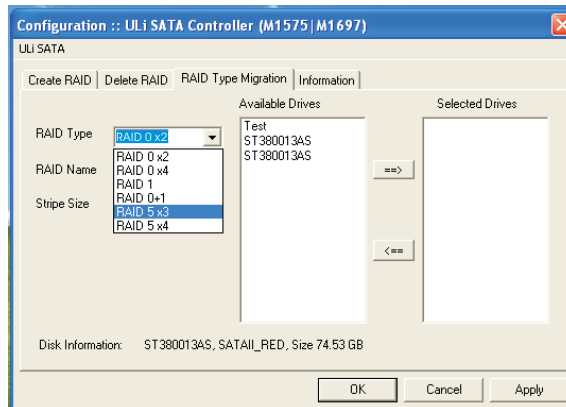
Click the desired drive or RAID from the 'Available Drives' list. The selected drive or RAID will be moved to 'Selected Drives' list by clicking the right arrow key.

Click on 'OK' or 'Apply' to start RAID type migration. After the drives and type are configured, a dialog box appears to warn you that the next action will destroy information in the drives. Make sure the information in selected drivers is no longer in use before clicking on 'Yes'. Then, click 'Yes' to restart your system when a dialog box appears to confirm that you have changed the RAID settings.