

Chapter 2 BIOS Setup

BIOS (Basic Input and Output System) records hardware parameters of the system in the CMOS on the motherboard. Its major functions include conducting the Power-On Self-Test (POST) during system startup, saving system parameters and loading operating system, etc. BIOS includes a BIOS Setup program that allows the user to modify basic system configuration settings or to activate certain system features.

When the power is turned off, the battery on the motherboard supplies the necessary power to the CMOS to keep the configuration values in the CMOS.

To access the BIOS Setup program, press the <Delete> key during the POST when the power is turned on.

To upgrade the BIOS, use either the GIGABYTE Q-Flash or @BIOS utility.

- Q-Flash allows the user to quickly and easily upgrade or back up BIOS without entering the operating system.
- @BIOS is a Windows-based utility that searches and downloads the latest version of BIOS from the Internet and updates the BIOS.

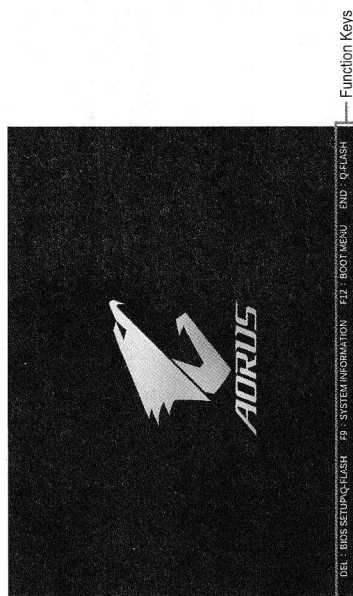


- Because BIOS flashing is potentially risky, if you do not encounter problems using the current version of BIOS, it is recommended that you not flash the BIOS. To flash the BIOS, do it with caution. Inadequate BIOS flashing may result in system malfunction.
- It is recommended that you not alter the default settings (unless you need to) to prevent system instability or other unexpected results. Inadequately altering the settings may result in system's failure to boot. If this occurs, try to clear the CMOS values and reset the board to default values. (Refer to the "Load Optimized Defaults" section in this chapter or introductions of the battery/clear CMOS jumper in Chapter 1 for how to clear the CMOS values.)

2-1 Startup Screen

The following startup Logo screen will appear when the computer boots.

(Sample BIOS Version: B450 AORUS PRO E9)

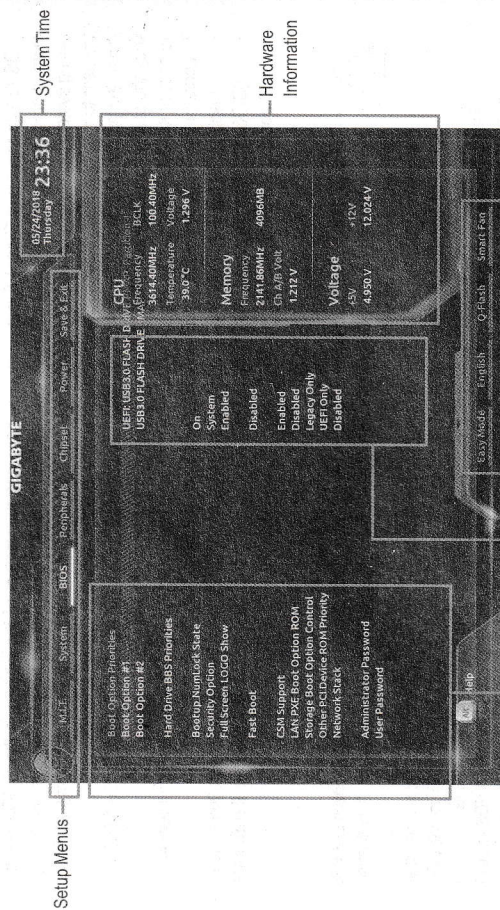


There are two different BIOS modes as follows and you can use the <F2> key to switch between the two modes. The Classic Setup mode provides detailed BIOS settings. You can press the arrow keys on your keyboard to move among the items and press <Enter> to accept or enter a sub-menu. Or you can use your mouse to select the item you want. Easy Mode allows users to quickly view their current system information or to make adjustments for optimum performance. In Easy Mode, you can use your mouse to move through configuration items.



- When the system is not stable as usual, select the **Load Optimized Defaults** item to set your system to its defaults.
- The BIOS Setup menus described in this chapter are for reference only and may differ by BIOS version.

2-2 The Main Menu

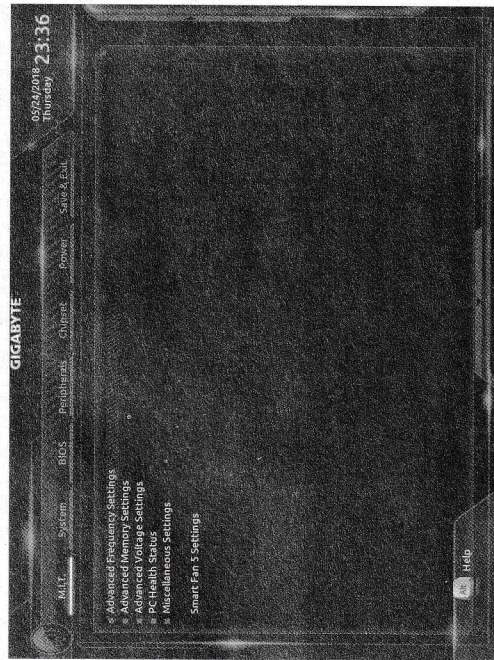


Quick Access Bar allows you to enter Easy Mode, select BIOS default language, configure fan settings, or enter Q-Flash.

Classic Setup Function Keys

<←><→>	Move the selection bar to select a setup menu
<↑><↓>	Move the selection bar to select an configuration item on a menu
<Enter>	Execute command or enter a menu
<+><-Page Up>	Increase the numeric value or make changes
<-><-Page Down>	Decrease the numeric value or make changes
<F1>	Show descriptions of the function keys
<F2>	Switch to Easy Mode
<F5>	Restore the previous BIOS settings for the current submenus
<F7>	Load the Optimized BIOS default settings for the current submenus
<F8>	Access the Q-Flash utility
<F9>	Display system information
<F10>	Save all the changes and exit the BIOS Setup program
<F12>	Capture the current screen as an image and save it to your USB drive
<Esc>	Main Menu: Exit the BIOS Setup program Submenus: Exit current submenu

2-3 M.I.T.



Whether the system will work stably with the overclock/overvoltage settings you made is dependent on your overall system configurations. Incorrectly doing overclock/overvoltage may result in damage to CPU, chipset, or memory and reduce the useful life of these components. This page is for advanced users only and we recommend you not to alter the default settings to prevent system instability or other unexpected results. Inadequately altering the settings may result in system's failure to boot. If this occurs, clear the CMOS values and reset the board to default values.)

► Advanced Frequency Settings

Host Clock Value

Displays the current operating Host Clock frequency.

GFX Clock Frequency ^(Note)

Allows you to alter the frequency for the GPU. After you alter the **GFX Clock Frequency** settings, make sure to adjust the **GFX Core Voltage** settings. (Default: Auto)

Note: The adjustable range is dependent on the CPU being installed. **Auto** lets the BIOS automatically configure this setting.

GFX Core Voltage ^(Note)

Allows you to alter the voltage for the GPU. (Default: Auto)

Note: The adjustable range is dependent on the CPU being installed. **Auto** lets the BIOS automatically configure this setting.

CPU Clock Ratio

Allows you to alter the clock ratio for the installed CPU. The adjustable range is dependent on the CPU being installed.

CPU Frequency

Displays the current operating CPU frequency.

► Advanced CPU Core Settings

CPU Clock Ratio, CPU Frequency

The settings above are synchronous to those under the same items on the **Advanced Frequency Settings** menu.

(Note) This item is present only when you install a CPU that supports this feature.

Core Performance Boost

Allows you to determine whether to enable the Core Performance Boost (CPB) technology, a CPU performance-boost technology. (Default: Auto)

AMD Cool&Quiet function

- ▶ Enabled
Lets the AMD Cool'n'Quiet driver dynamically adjust the CPU clock and VID to reduce heat output from your computer and its power consumption. (Default)
- ▶ Disabled
Disables this function.

SVM Mode

Virtualization enhanced by Virtualization Technology will allow a platform to run multiple operating systems and applications in independent partitions. With virtualization, one computer system can function as multiple virtual systems. (Default: Disabled)

Global C-state Control

Allows you to determine whether to let the CPU enter C states. When enabled, the CPU core frequency will be reduced during system halt state to decrease power consumption. (Default: Auto)

Power Supply Idle Control

Enables or disables Package C6 State.

- ▶ Typical Current Idle
Disables this function.
- ▶ Low Current Idle
Enables this function.
- ▶ Auto
Lets the BIOS automatically configure this setting. (Default)

Opacache Control ^(Note 1)

Enables or disables Opacache. Auto lets the BIOS automatically configure this setting. (Default: Auto)

Downcore Control

Allows you to select the number of CPU cores to enable (the number of CPU cores may vary by CPU). Auto lets the BIOS automatically configure this setting. (Default: Auto)

SMT Mode

Allows you to enable or disable the CPU Simultaneous Multi-Threading technology. This feature only works for operating systems that support multi-processor mode. Auto lets the BIOS automatically configure this setting. (Default: Auto)

Extreme Memory Profile (X.M.P.) ^(Note 2)

Allows the BIOS to read the SPD data on XMP memory module(s) to enhance memory performance when enabled.

- ▶ Disabled
Disables this function. (Default)
- ▶ Profile1
Uses Profile 1 settings.
- ▶ Profile2 ^(Note 2)
Uses Profile 2 settings.

System Memory Multiplier

Allows you to set the system memory multiplier. Auto sets memory multiplier according to memory SPD data. (Default: Auto)

Memory Frequency (MHz)

The first memory frequency value is the normal operating frequency of the memory being used; the second is the memory frequency that is automatically adjusted according to the **System Memory Multiplier** settings.

(Note 1) This item is present only when you install a CPU that supports this feature.

(Note 2) This item is present only when you install a CPU and a memory module that support this feature.

- ▶ **Advanced Memory Settings**
 - ☞ **Extreme Memory Profile (X.M.P.)** ^(Note), **System Memory Multiplier**, **Memory Frequency(MHz)**
The settings above are synchronous to those under the same items on the **Advanced Frequency Settings** menu.
 - ☞ **Memory Timing Mode**
Manual allows the memory timing settings below to be configurable. Options are: Auto (default), Manual.
 - ☞ **Profile DDR Voltage**
When using a non-XMP memory module or **Extreme Memory Profile (X.M.P.)** is set to **Disabled**, the value is displayed according to your memory specification. When **Extreme Memory Profile (X.M.P.)** is set to **Profile1** or **Profile2**, the value is displayed according to the SPD data on the XMP memory.
- ▶ **Standard Timing Control, Advanced Timing Control, CAD Bus Setup Timing, CAD Bus Drive Strength, Data Bus Configuration**
These sections provide memory timing settings. The respective timing setting screens are configurable only when **Memory Timing Mode** is set to **Manual**. Note: Your system may become unstable or fail to boot after you make changes on the memory timings. If this occurs, please reset the board to default values by loading optimized defaults or clearing the CMOS values.
- ▶ **Advanced Voltage Settings**
This sub-menu allows you to set CPU, chipset and memory voltages.
- ▶ **PC Health Status**
 - ☞ **Reset Case Open Status**
 - ▶▶ Disabled Keeps or clears the record of previous chassis intrusion status. (Default)
 - ▶▶ Enabled Clears the record of previous chassis intrusion status and the **Case Open** field will show "No" at next boot.
 - ☞ **Case Open**
Displays the detection status of the chassis intrusion detection device attached to the motherboard CI header. If the system chassis cover is removed, this field will show "Yes", otherwise it will show "No". To clear the chassis intrusion status record, set **Reset Case Open Status** to **Enabled**, save the settings to the CMOS, and then restart your system.
 - ☞ **CPU Vcore/CPU VDDP/DRAM Channel AIB Voltage/+3.3V/+5V/+12V/VCORE SOC**
Displays the current system voltages.
- ▶ **Miscellaneous Settings**
 - ☞ **PCIe Slot Configuration**
Allows you to set the operation mode of the PCI Express slots to Gen 1, Gen 2, or Gen 3. Actual operation mode is subject to the hardware specification of each slot. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
 - ☞ **3DMark01 Enhancement**
Allows you to determine whether to enhance some legacy benchmark performance. (Default: Disabled)

(Note) This item is present only when you install a CPU and a memory module that support this feature.

► **Smart Fan 5 Settings**

◂ **Monitor**

Allows you to select a target to monitor and to make further adjustment. (Default: CPU FAN)

◂ **Fan Speed Control**

Allows you to determine whether to enable the fan speed control function and adjust the fan speed.

- Normal Allows the fan to run at different speeds according to the temperature. You can adjust the fan speed with System Information Viewer based on your system requirements. (Default)

- Silent Allows the fan to run at slow speeds.

- Manual Allows you to control the fan speed in the curve graph.

- Full Speed Allows the fan to run at full speeds.

◂ **Fan Control Use Temperature Input**

Allows you to select the reference temperature for fan speed control.

◂ **Temperature Interval**

Allows you to select the temperature interval for fan speed change.

◂ **FAN/Pump Control Mode**

- Auto Lets the BIOS automatically detect the type of fan/pump installed and sets the optimal control mode. (Default)

- Voltage Voltage mode is recommended for a 3-pin fan/pump.

- PWM PWM mode is recommended for a 4-pin fan/pump.

◂ **FAN Stop**

Enables or disables the fan/pump stop function. You can set the temperature limit using the temperature curve. The fan or pump stops operation when the temperature is lower than the limit. (Default: Disabled)

◂ **Temperature**

Displays the current temperature of the selected target area.

◂ **Fan Speed**

Displays current fan/pump speeds.

◂ **Flow Rate**

Displays the flow rate of your water cooling system.

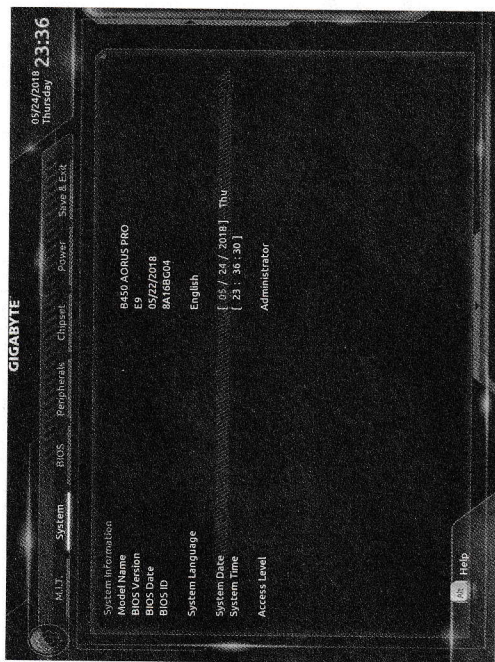
◂ **Temperature Warning Control**

Sets the warning threshold for temperature. When temperature exceeds the threshold, BIOS will emit warning sound. Options are: Disabled (default), 60°C/140°F, 70°C/158°F, 80°C/176°F, 90°C/194°F.

◂ **Fan/Pump Fail Warning**

Allows the system to emit warning sound if the fan/pump is not connected or fails. Check the fan/pump condition or fan/pump connection when this occurs. (Default: Disabled)

2-4 System



This section provides information on your motherboard model and BIOS version. You can also select the default language used by the BIOS and manually set the system time.

System Language

Selects the default language used by the BIOS.

System Date

Sets the system date. The date format is week (read-only), month, date, and year. Use <Enter> to switch between the Month, Date, and Year fields and use the <Page Up> or <Page Down> key to set the desired value.

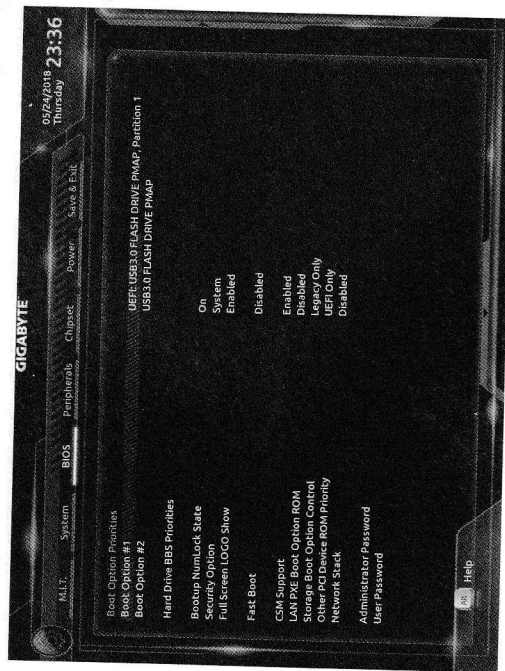
System Time

Sets the system time. The time format is hour, minute, and second. For example, 1 p.m. is 13:00:00. Use <Enter> to switch between the Hour, Minute, and Second fields and use the <Page Up> or <Page Down> key to set the desired value.

Access Level

Displays the current access level depending on the type of password protection used. (If no password is set, the default will display as **Administrator**.) The Administrator level allows you to make changes to all BIOS settings; the User level only allows you to make changes to certain BIOS settings but not all.

2-5 BIOS



Boot Option Priorities

Specifies the overall boot order from the available devices. Removable storage devices that support GPT format will be prefixed with "UEFI:" string on the boot device list. To boot from an operating system that supports GPT partitioning, select the device prefixed with "UEFI:" string.

Or if you want to install an operating system that supports GPT partitioning such as Windows 10 64-bit, select the optical drive that contains the Windows 10 64-bit installation disk and is prefixed with "UEFI:" string.

Hard Drive/CD/DVD ROM Drive/Floppy Drive/Network Device BBS Priorities

Specifies the boot order for a specific device type, such as hard drives, optical drives, floppy disk drives, and devices that support Boot from LAN function, etc. Press <Enter> on this item to enter the submenu that presents the devices of the same type that are connected. This item is present only if at least one device for this type is installed.

Bootup NumLock State

Enables or disables NumLock feature on the numeric keypad of the keyboard after the POST. (Default: On)

Security Option

Specifies whether a password is required every time the system boots, or only when you enter BIOS Setup. After configuring this item, set the password(s) under the **Administrator Password/User Password** item.

▶▶ Setup

▶▶ System

A password is only required for entering the BIOS Setup program.

A password is required for booting the system and for entering the BIOS Setup program. (Default)

Full Screen Logo Show

Allows you to determine whether to display the GIGABYTE Logo at system startup. **Disabled** skips the GIGABYTE Logo when the system starts up. (Default: Enabled)

Fast Boot

Enables or disables Fast Boot to shorten the OS boot process. **Ultra Fast** provides the fastest bootup speed. (Default: Disabled)

SATA Support

▶▶ All SATA Devices

All SATA devices are functional in the operating system and during the POST.

▶▶ Last Boot HDD Only

Except for the previous boot drive, all SATA devices are disabled before the OS boot process completes. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

VGA Support

Allows you to select which type of operating system to boot.

- ▶▶ Auto
- ▶▶ Enables legacy option ROM only.
- ▶▶ EFI Driver
- ▶▶ Enables EFI option ROM. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

USB Support

▶▶ Disabled

All USB devices are disabled before the OS boot process completes.

▶▶ Full Initial

All USB devices are functional in the operating system and during the POST. (Default)

▶▶ Partial Initial

Part of the USB devices are disabled before the OS boot process completes.

This item is configurable only when **Fast Boot** is set to **Enabled**. This function is disabled when **Fast Boot** is set to **Ultra Fast**.

PS2 Devices Support

▶▶ Disabled

All PS/2 devices are disabled before the OS boot process completes.

▶▶ Enabled

All PS/2 devices are functional in the operating system and during the POST. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled**. This function is disabled when **Fast Boot** is set to **Ultra Fast**.

Network Stack Driver Support

▶▶ Disabled

Disables booting from the network. (Default)

▶▶ Enabled

Enables booting from the network.

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

CSM Support

Enables or disables UEFI CSM (Compatibility Support Module) to support a legacy PC boot process.

▶▶ Enabled

Enables UEFI CSM. (Default)

▶▶ Disabled

Disables UEFI CSM and supports UEFI BIOS boot process only.

LAN PXE Boot Option ROM

Allows you to select whether to enable the legacy option ROM for the LAN controller. (Default: Disabled)

This item is configurable only when **CSM Support** is set to **Enabled**.

Storage Boot Option Control

Allows you to select whether to enable the UEFI or legacy option ROM for the storage device controller.

▶▶ Disabled

Disables option ROM.

▶▶ UEFI Only

Enables UEFI option ROM only.

▶▶ Legacy Only

Enables legacy option ROM only. (Default)

This item is configurable only when **CSM Support** is set to **Enabled**.

Other PCI Device ROM Priority

Allows you to select whether to enable the UEFI or Legacy option ROM for the PCI device controller other than the LAN, storage device, and graphics controllers.

▶▶ Disabled

Disables option ROM.

▶▶ UEFI Only

Enables UEFI option ROM only. (Default)

▶▶ Legacy Only

Enables legacy option ROM only.

This item is configurable only when **CSM Support** is set to **Enabled**.

Network Stack

Disables or enables booting from the network to install a GPT format OS, such as installing the OS from the Windows Deployment Services server. (Default: Disabled)

Ipv4 PXE Support

Enables or disables IPv4 PXE Support. This item is configurable only when **Network Stack** is enabled.

VGA Support

Allows you to select which type of operating system to boot.

- ▶▶ Auto
- ▶▶ EFI Driver

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

USB Support

▶▶ Disabled

▶▶ Full Initial

(Default)

▶▶ Partial Initial

Part of the USB devices are disabled before the OS boot process completes.

This item is configurable only when **Fast Boot** is set to **Enabled**. This function is disabled when **Fast Boot** is set to **Ultra Fast**.

PS2 Devices Support

▶▶ Disabled

All PS/2 devices are disabled before the OS boot process completes.

▶▶ Enabled

All PS/2 devices are functional in the operating system and during the POST. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled**. This function is disabled when **Fast Boot** is set to **Ultra Fast**.

Network Stack Driver Support

▶▶ Disabled

Disables booting from the network. (Default)

▶▶ Enabled

Enables booting from the network.

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

CSM Support

Enables or disables UEFI CSM (Compatibility Support Module) to support a legacy PC boot process.

▶▶ Enabled

Enables UEFI CSM. (Default)

▶▶ Disabled

Disables UEFI CSM and supports UEFI BIOS boot process only.

LAN PXE Boot Option ROM

Allows you to select whether to enable the legacy option ROM for the LAN controller. (Default: Disabled)

This item is configurable only when **CSM Support** is set to **Enabled**.

Storage Boot Option Control

Allows you to select whether to enable the UEFI or legacy option ROM for the storage device controller.

▶▶ Disabled

Disables option ROM.

▶▶ UEFI Only

Enables UEFI option ROM only.

▶▶ Legacy Only

Enables legacy option ROM only. (Default)

This item is configurable only when **CSM Support** is set to **Enabled**.

Other PCI Device ROM Priority

Allows you to select whether to enable the UEFI or Legacy option ROM for the PCI device controller other than the LAN, storage device, and graphics controllers.

▶▶ Disabled

Disables option ROM.

▶▶ UEFI Only

Enables UEFI option ROM only. (Default)

▶▶ Legacy Only

Enables legacy option ROM only.

This item is configurable only when **CSM Support** is set to **Enabled**.

Network Stack

Disables or enables booting from the network to install a GPT format OS, such as installing the OS from the Windows Deployment Services server. (Default: Disabled)

Ipv4 PXE Support

Enables or disables IPv4 PXE Support. This item is configurable only when **Network Stack** is enabled.

IPv4 HTTP Support

Enables or disables HTTP boot support for IPv4. This item is configurable only when **Network Stack** is enabled.

IPv6 PXE Support

Enables or disables IPv6 PXE Support. This item is configurable only when **Network Stack** is enabled.

IPv6 HTTP Support

Enables or disables HTTP boot support for IPv6. This item is configurable only when **Network Stack** is enabled.

IPSEC Certificate

Enables or disables Internet Protocol Security. This item is configurable only when **Network Stack** is enabled.

Administrator Password

Allows you to configure an administrator password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password. Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering BIOS Setup. Differing from the user password, the administrator password allows you to make changes to all BIOS settings.

User Password

Allows you to configure a user password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password. Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering BIOS Setup. However, the user password only allows you to make changes to certain BIOS settings but not all. To cancel the password, press <Enter> on the password item and when requested for the password, enter the correct one first. When prompted for a new password, press <Enter> without entering any password. Press <Enter> again when prompted to confirm.

NOTE: Before setting the User Password, be sure to set the Administrator Password first.