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IPC Solution

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Small Cube System  
**Fanless Series**  
**FX5420 User' Manual**

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- ❑ A list of your name, address, telephone, facsimile number, or email address where you may be reached during the day
- ❑ Description of you peripheral attachments
- ❑ Description of your software (operating system, version, application software, etc.) and BIOS configuration
- ❑ Description of the symptoms (Extract wording any message)

For updated BIOS, drivers, manuals, or product information, please visit us at [www.fabiotech.com](http://www.fabiotech.com)

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## Chapter 1 Introducing the FX5420 System

### Overview

The FX5420 is a compact size embedded system with AMD Geode™ low power LX-800 processor board inside. This user's manual provides information on the physical features, installation, and BIOS setup of the FX5420.

Built to unleash the total potential of the AMD Geode™ Processor, support 500 MHz CPU, this system supports four 10/100M interface network port, 1 DIMM socket with 256MB DDR RAM, Two USB2.0 ports, and a VGA controller.

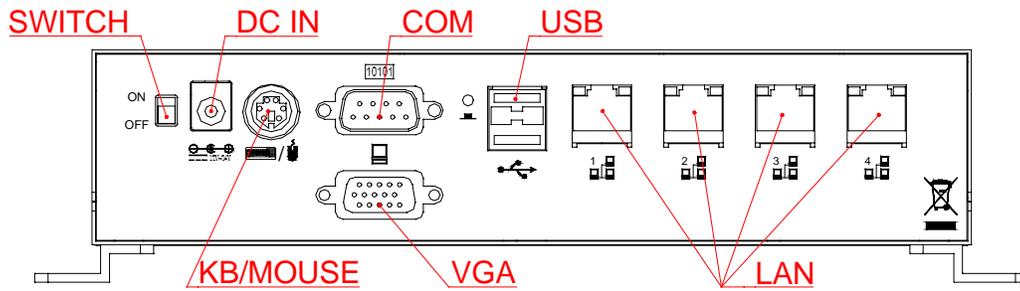
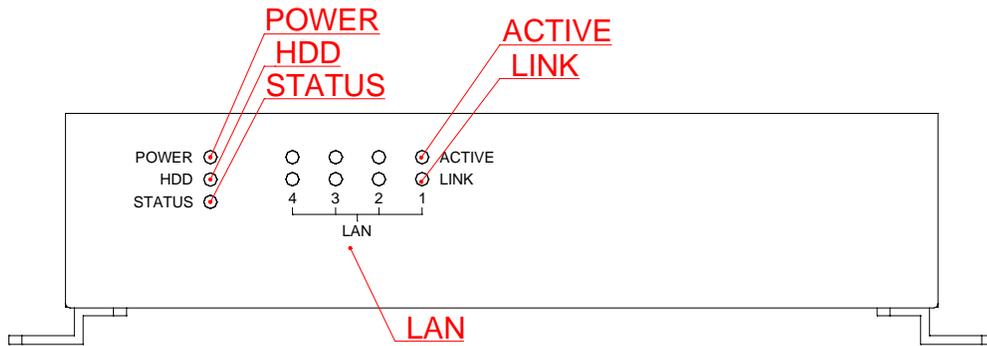
Each FX5420 has one RS-232C port are available.

The FX5420 is perfect for Internet Router, VPN Gateway, firewall, Mail Server, WBT, and small Embedded Control. The unit is only 130.0mm(D) x 200.0mm(W) x 44.2mm(H), offering unparalleled performance in a very small footprint.

## Series Comparison Table

Model	FX5420
Processor	AMD Geode™ LX800 (500MHz)
Chipset	AMD Geode™ CS5536
1-DIMM Socket (Max.)	256MB/1GB
CRT VGA	Yes
Watchdog Timer	Yes
Multi I/O	One RS232C
Enhanced IDE	One
CF (Compact Flash Socket)	One
USB2.0	Two
RJ45 Ethernet (10/100M Base-TX)	Four
Dimensions (Unit: mm)	130.0 (D) x 200.0 (W) x 44.2 (H)

## Layout



## Specifications

❑ ***Processor Board –***

AMD Low Power Geode™ LX800 (500MHz) CPU with 256MB DDR RAM.

❑ ***I/O Outlets –***

Four 10 / 100M Ethernet with RJ-45 ports.

One Serials RS-232 with DB9 ports and two USB ports (V2.0).

One CRT and one PS/2 compatible keyboard and mouse interfaces.

One DC-In plug connector and one power switch.

One power LED and hard disk/ Compact Flash access LED, one user defined state LED and eight LAN LEDs

One Push Button reset switch.

❑ ***Storage Bay-***

One Compact Flash slot for Compare Flash Module or Micro Drivers

One 2.5" hard disk space.

❑ ***Power requirement –***

+12 ~ +24V DC with 15% tolerance, 10VA maximum with 2.5" HDD and 19V input voltage..

❑ ***Dimensions (1U height)-***

130.0mm(D) x 200.0mm(W) x 44.2mm(H)

## Packing List

Upon receiving the package, verify the following things. Should any of the mentioned happens, contact us for immediate service.

- Unpack and inspect the FX5420 package for possible damage that may occur during the delivery process.
- Verify the accessories in the package according to the packing list and see if there is anything missing or incorrect package is included.
- If the cable(s) you use to install the FX5420 is not supplied from us, please make sure the specification of the cable(s) is compatible with the FX5420 system.

**Note:** after you install the FX5420, it is recommended that you keep the diskette or CD that contains drivers and document files, and keep the document copies, or unused cables in the carton for future use.

The following lists the accessories that may be included in your FX5420 package. Some accessories are optional items that are only shipped upon order.

- One FX5420 embedded system.
- One AC to DC power adapter and one AC power code cable.
- One 44-pin flat cable and 4 screws for fixing and connecting a 2.5" HDD driver.
- One Y-type (3-end) PS/2 keyboard plus mouse port adapter cable.
- Two L-type universal fixers and 6 screws.
- One compact disc includes software utility.



## Chapter 2 Hardware Installation

This chapter introduces the system connectors & jumper settings, and guides you to apply them for field application.

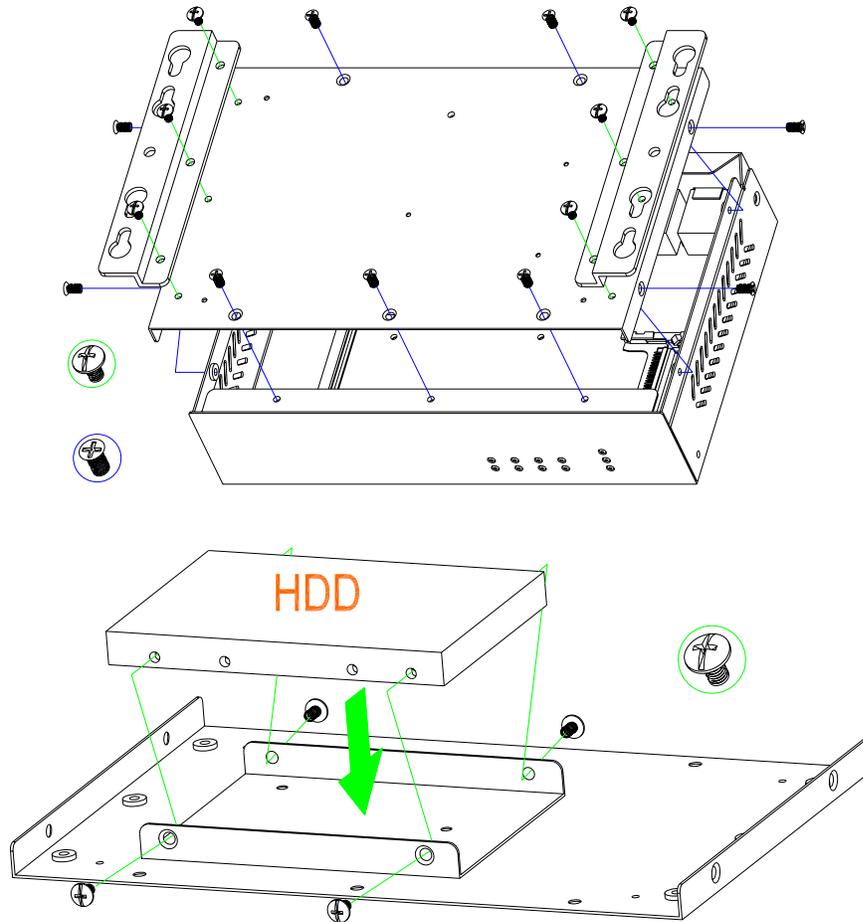
### Before Installation

Before you install the system, make sure you follow the following descriptions.

1. Before removing the cover, shut down the operation System and disconnect power switch to off and unplug AC-to DC Adapter cable.
2. Install or unplug any connector, Compact Flash, and hard disk be sure that the power is disconnected or power switch to off from the system. If not, this may damage the system.
3. The ESD (Electricity Static Discharge) may be created from human body that touches the board. It may do damage to the board circuit.

➤ **Removing Covers -Installing HDD or Compact Flash**

If you are installing hardware option, you can remove the bottom cover. The following figure will guide you how to install 2.5" HDD inside the FX5420 and how to install the FX5420 fixers.

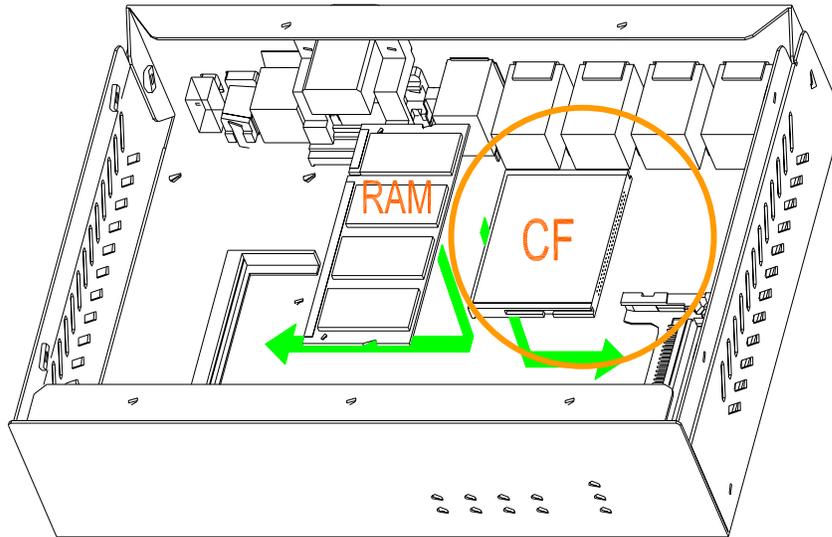


**Note:** Use caution when handling the hard disk to prevent damage to IDE connector as you insert hard disk.

Be careful with the pin orientation when installing connectors and the cables. A wrong connection can easily destroy your hard disk. CN3 is used to connect a 2.5" HDD with included 44-pin flat-cable or 44-pin DiskOnModule directly.

❑ **Installing Compact Flash**

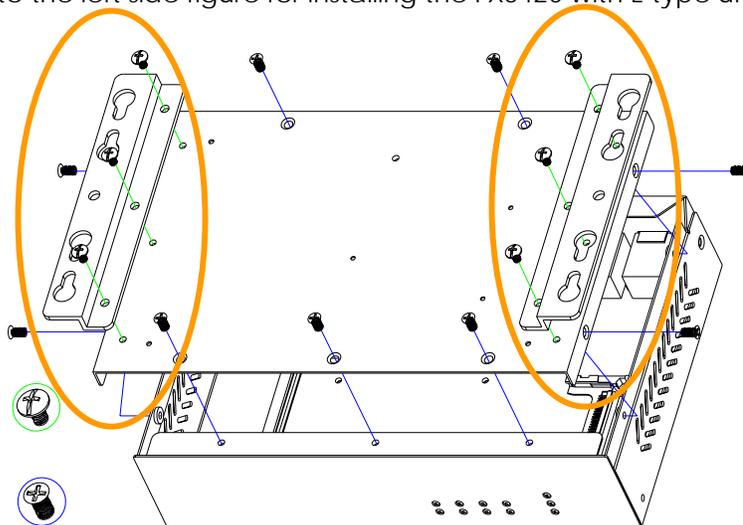
If you are installing Compact Flash modules you need to remove a bottom cover. (Please see the spots circled.)



**Note:** The CN2 Compact Flash socket supports 3.3V Compact Flash and Micro Drives. The JP2 is used to select master/slave device of this socket and default is slave (close). Be sure to avoid the same master/slave setting with which connects to IDE connector, if you use CF and IDE hard disk simultaneous.

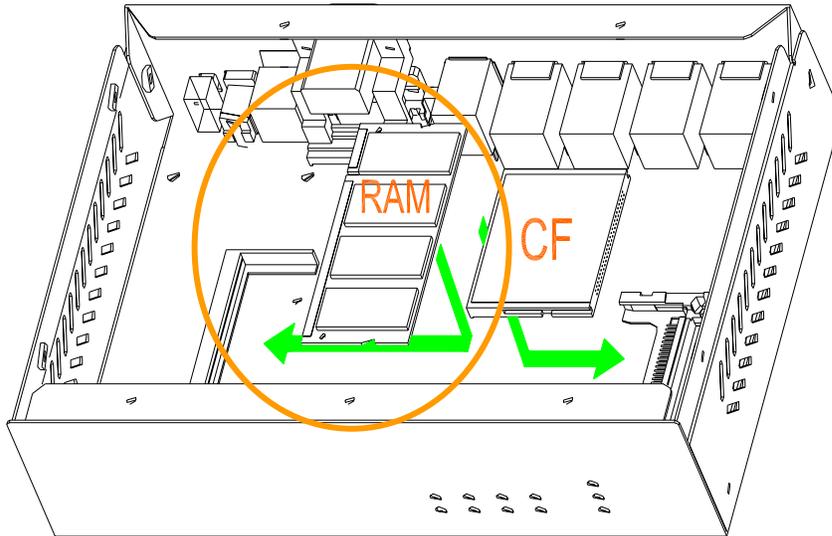
➤ **Installing the L-type universal fixers on FX5420**

Please refer to the left side figure for installing the FX5420 with L-type universal fixers.



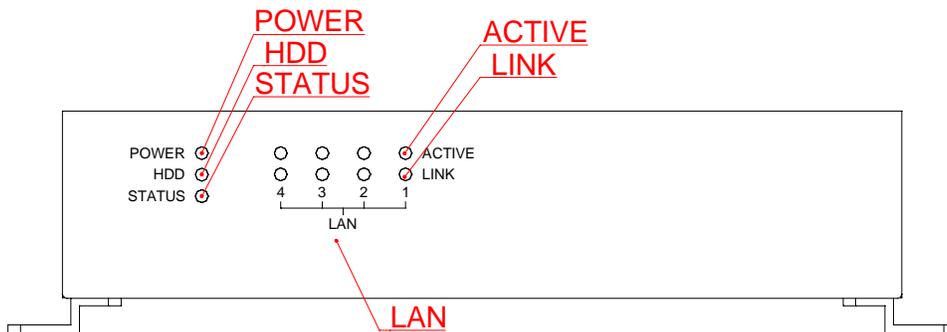
➤ **Installing Memory: DIMM Socket for DDR Modules**

You may extend additional memory to FX5420 by removing the bottom cover, See as following figure and rear pictures. The DIMM socket supports 128MB to 1GB of DDR RAM modules.



➤ **LED Indicators (On the Front Panel)**

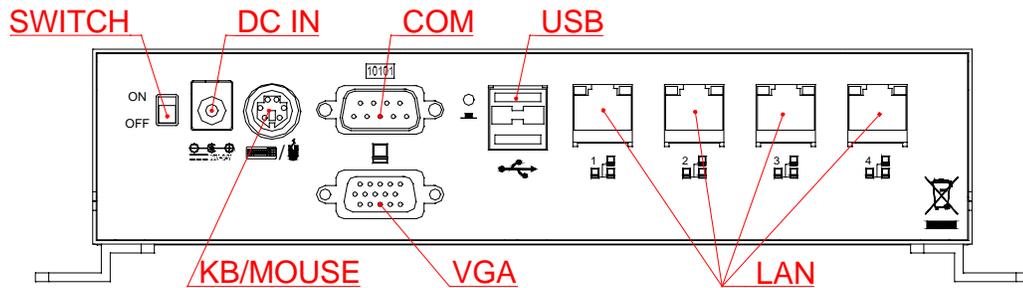
The Power LED, HDD LED and Status LED's have two distinctive statuses: Off for inactive operation and blinking light for activity. And the 8 LED's for LAN ports. The down side LED (Yellow) indicates data is being accessed and the up side LED's (Green) indicates on-line status. (On indicates on-line and off indicates off-line)



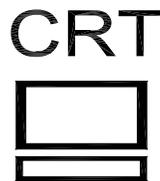
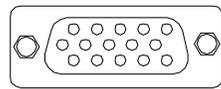
**Note:** Status LED – The I/O port A22h bit 1 can define the status LED to Light/Blinking Status. When I/O Port A22h Bit 1 is set to 1, the status LED is inactive. When I/O port A22h Bit 1 is set to 0, the status LED is active.

➤ **Connecting the Monitor, Keyboard and Mouse**

To connector the peripheral control devices and monitor to the FX5420, refer to the following procedure.



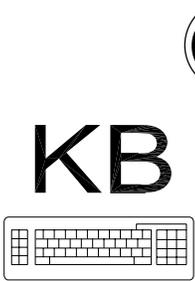
- ◆ A VGA connector is provided for CRT display



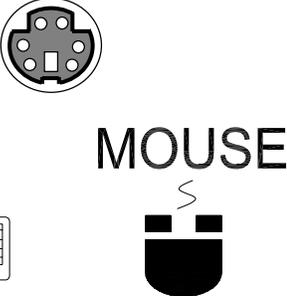
DB15	Signal
1	Red
2	Green
3	Blue
13	Hsync
14	Vsync
12	DDC Data
15	DDC Clock
5 & 10	Digital Ground
6,7,8	Analog Ground
Others	Not Used

**Note:** The JP3 can define to select CRT (V-Sync & H-Sync) to ON or OFF mode. When remove the JP3-1,2 jumper the CRT is inactive. When set to JP3-1, 2 closes (default), the CRT is active. Or set to JP3-2,3 closes by software program control CRT on or off mode, The I/O port A22h bit 0 can define to select CRT (V-Sync & H-Sync) to On OR off mode. When I/O Port A22h Bit 0 is set to1, the CRT is active. When I/O port A22h Bit 0 is set to 0, the CRT is not active.

- ◆ The connector uses the included adapter cable you can attach standard PS/2 type keyboard and mouse. Standard PS/2 keyboard can be plugged into this connector without any adapter cable. If PS/2 keyboard and mouse will be used simultaneously, a Y-type (3-terminal) adapter cable is needed.



**KB**

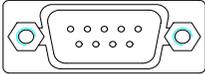


**MOUSE**

Pin	Description
1	Mouse Data
2	Keyboard Data
3	Ground
4	VCC
5	Mouse Clock
6	Keyboard Clock

➤ **Connecting the COM ports**

The DB9 (COM1) is standard serial port connector. The following tables show the signal connections of these connectors.



**COM**

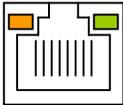
10101

DB-9	RS-232 Signal
1	-DCD2
6	-DSR2
2	RXD2
7	-RTS2
3	-TXD2
8	-CTS2
4	-DTR2
9	-RI2
5	Ground
Case	Case Ground

➤ **Connecting the LAN ports and USB Ports**

The RJ45 connector with 2 LED's for LAN. The right side LED (orange) indicates data is being accessed and the left side LED (green) indicates on-line status. (On indicates on-line and off indicates off-line)

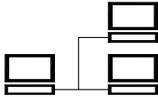
RJ45 connector



8 1

(Front View)

**LAN**

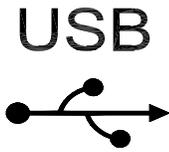
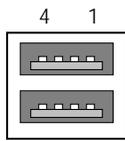


The following lists the pin assignment of RJ45

LAN1~LAN4	Signal	LAN1~LAN4	Signal
1	TPTX+	5	FBG1
2	TPTX -	6	TPRX -
3	TPRX+	7	FBG2
4	FBG1	8	FBG2

- ◆ The FX5420 supports a two port USB connector. Any USB device can be attached to USB ports with plug-and-play supported.

The following lists the pin assignment of USB port

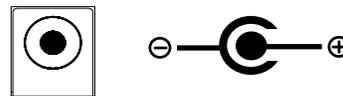
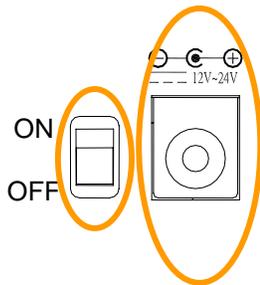


USB#1/2	Signal
1	USBV
2	USB D-
3	USB D+
4	USBG

➤ **Connecting the DC Power and Power Switch**

Power is supplied through an external AC/DC power adapter or power DC In. Check the technical specification section for information about AC/DC power input voltage. See following figure and a side pictures.

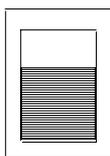
- DC-Power Jack: Use External AC/DC power adapter



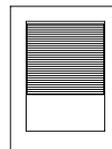
DC +12~+24V, 15% tolerance

20VA minimum

Since the switch does include a power switch, plugging its power adapter into a power outlet then switch power to on, when you final installed system hardware device.



Off: Power Off



On: Power On



## Chapter 3 BIOS Setup

This chapter describes the BIOS setup.

### Overview

BIOS are a program located on a Flash memory chip on a circuit board. It is used to initialize and set up the I/O peripherals and interface cards of the system, which includes time, date, hard disk drive, the ISA bus and connected devices such as the video display, diskette drive, and the keyboard. This program will not be lost when you turn off the system.

The BIOS provides a menu-driven interface to the console subsystem. The console subsystem contains special software, called firmware that interacts directly with the hardware components and facilitates interaction between the system hardware and the operating system.

The BIOS default values ensure that the system will function at its normal capability. In the worst situation the user may have corrupted the original settings set by the manufacturer.

All the changes you make will be saved in the system RAM and will not be lost after power-off.

When you start the system, the BIOS will perform a self-diagnostics test called Power On Self Test (POST) for all the attached devices, accessories, and the system. Press the [Del] key to enter the BIOS Setup program, and then the main menu will show on the screen.

**Note:** Change the parameters when you fully understand their functions and subsequence.



➤ **BIOS Functions**

On the menu, you can perform the following functions

1. Main
2. Advanced
  - CPU Configuration
  - IDE Configuration
  - SuperIO Configuration
  - Hardware Health Configuration
3. PCIPnP
4. Boot
  - Boot Settings Configuration
  - Boot Device Priority
5. Security
  - Change Supervisor
  - Change User Password
  - Clear User Password
6. Chipset
  - NorthBridge Configuration
  - SouthBridge Configuration
7. Power
8. Exit

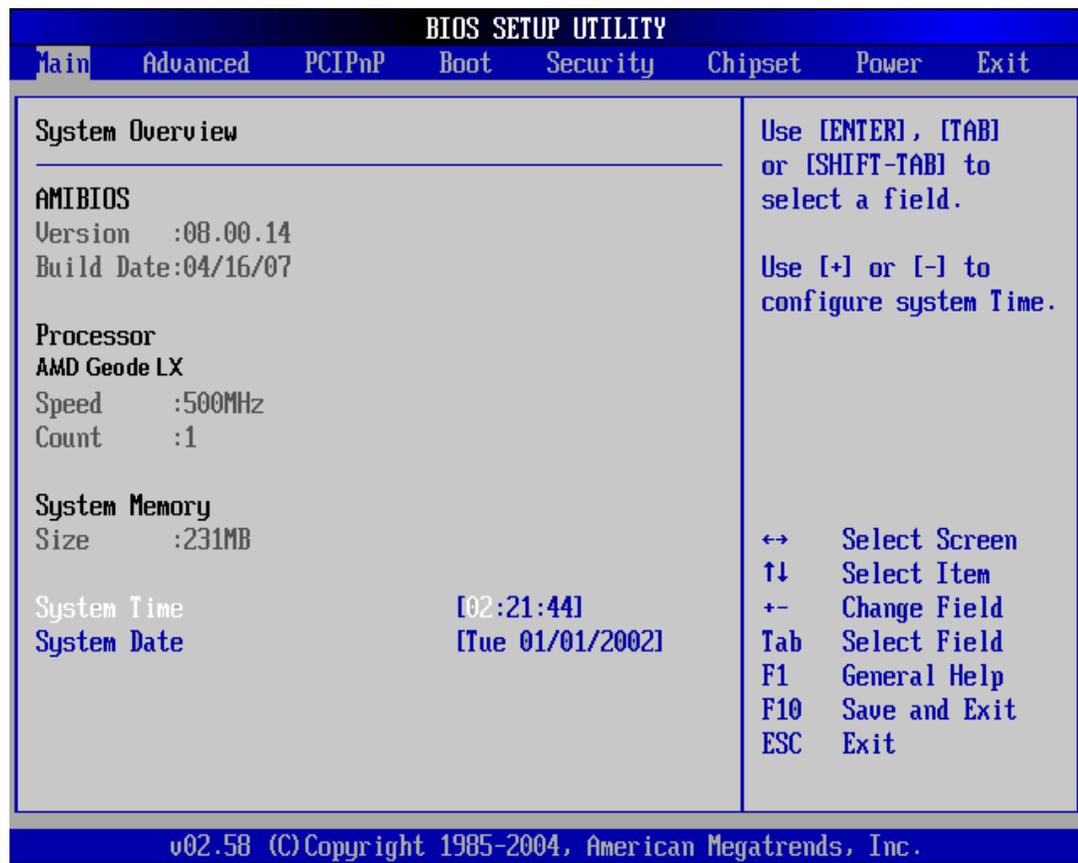
- Save Changes and Exit: Exit system setup after saving the changes. F10 key can be used for this operation.
  - Discard Changes and Exit: Exit system setup without saving any changes. ESC key can be used for this operation.
  - Discard Changes: Discard changes down so far any of the set questions. F7 key can be used this operation.
  - Load Optimized Default: to auto configure the system according to optimal setting with pre-defined values. This is also the factory default setting of the system when you receive the board.
  - Load Fail-Safe Default: to configure the system in fail-safe mode with predefined values.
- **Keyboard Convention**

On the BIOS, the following keys can be used to operate and manage the menu:

Item	Function
ESC	To exit the current menu or message
Page Up/Page Down	To select a parameter
F1	To display the help menu if you do not know the purpose or function of the item you are going to configure
F6	Fail-Safe Default
F7	Optimized Default
F10	Save and exit
UP/Down Arrow Keys	To go upward or downward to the desired item

## Main Setup

This section describes basic system hardware configuration, system clock setup and BIOS version information. If the CPU board is already installed in a working system, you will not need to select this option anymore.



**System Memory**

This option is display-only which is determined by POST (Power On Self Test) of the BIOS.

**System Date & Time Setup**

Highlight the <Date> field and then press the [Page Up] / [Page Down] or [+]/ [-] keys to set the current date. Follow the month, day and year format.

Highlight the <Time> field and then press the [Page Up] / [Page Down] or [+]/ [-] keys to set the current date. Follow the hour, minute and second format.

The user can bypass the date and time prompts by creating an AUTOEXEC.BAT file. For information on how to create this file, please refer to the MS-DOS manual.

## Advanced Setup

Select the *Advanced* tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as SuperIO Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screen is shown below. The sub menus are described on the following pages



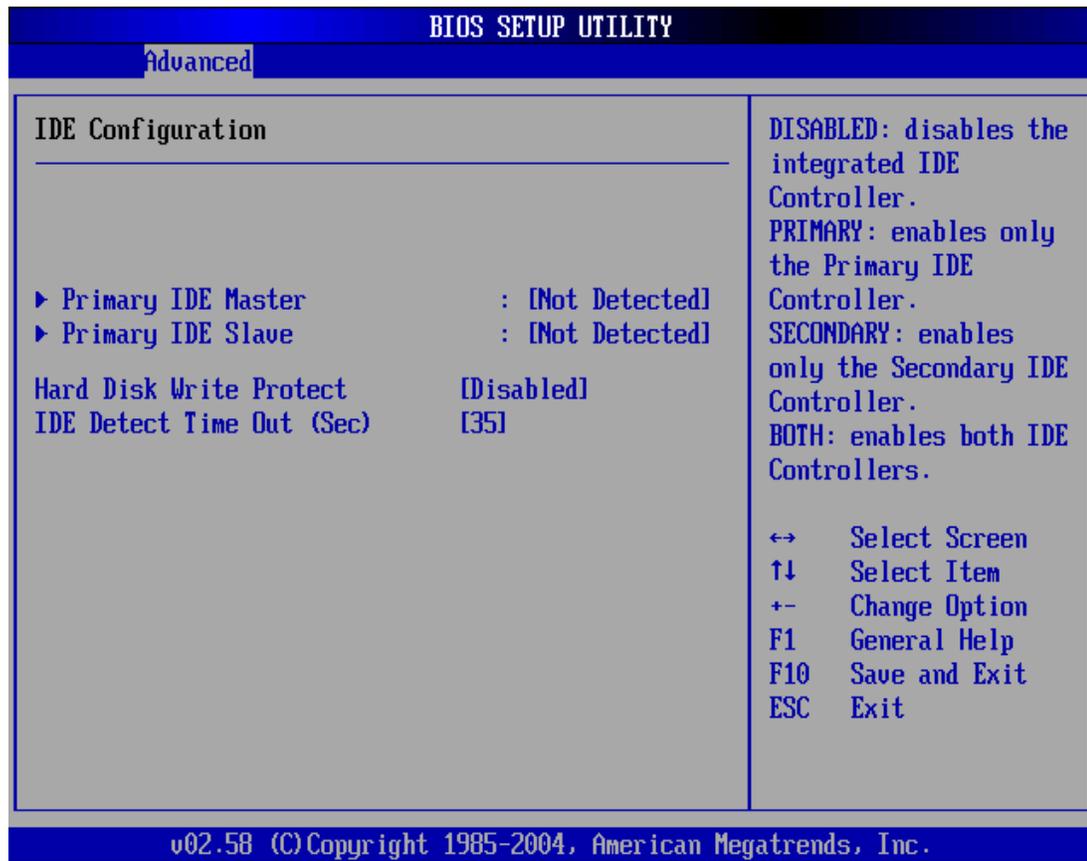
### ➤ CPU Configuration

You can use this screen to select options for the CPU information. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option.

**Note:** The CPU Configuration setup screen varies depending on the installed processor.

### ➤ IDE Configuration

You can use this screen to select options for the IDE Configuration Settings. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The settings are described on the following pages. An example of the *IDE Configuration* screen is shown below.



**☐ IDE Primary Master/Slave**

IDE hard drive controllers can support compact flash and hard drives. These drives have a master/slave relationship, which is determined by the cabling configuration used to attach them to the controller.

**Hard Disk Type**

The BIOS supports various types for user settings, The BIOS supports <Pri Master>, <Pri Slave>, so the user can install up to two hard disks. For the master and slave jumpers, please refer to the hard disk's installation descriptions and the hard disk jumper settings.

You can select <AUTO> under the <TYPE> and <MODE> fields. This will enable auto detection of your IDE drives during boot up. This will allow you to change your hard drives (with the power off) and then power on without having to reconfigure your hard drive type. If you use older hard disk drives, which do not support this feature, then you must configure the hard disk drive in the standard method as described above by the <USER> option.

**PIO MODE**

PIO means Programmed Input/Output. Rather than have the BIOS issue a series of commands to affect a transfer to or from the disk drive, PIO allows the BIOS to tell the controller what it wants and then let the controller and the CPU perform the

complete task by them. This is simpler and more efficient (and faster). Your system supports five modes, numbered from 0 to 4, which primarily differ in timing. When Auto is selected, the BIOS will select the best available mode.

#### **BLOCK Mode**

This option allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive (HDD).

#### **S.M.A.R.T**

This field is used to activate the S.M.A.R.T (System Management and Reporting Technologies) function for S.M.A.R.T HDD drives. This function requires an application that can give S.M.A.R.T message.

##### **Hard Disk Write Protect**

Set this option to protect the hard disk drive from being overwritten. The Optimal and Fail-Safe default setting is *Disabled*.

**Available Options:** Disabled, Enabled

**Default setting:** Disable

##### **IDE Detect Time Out (Sec.)**

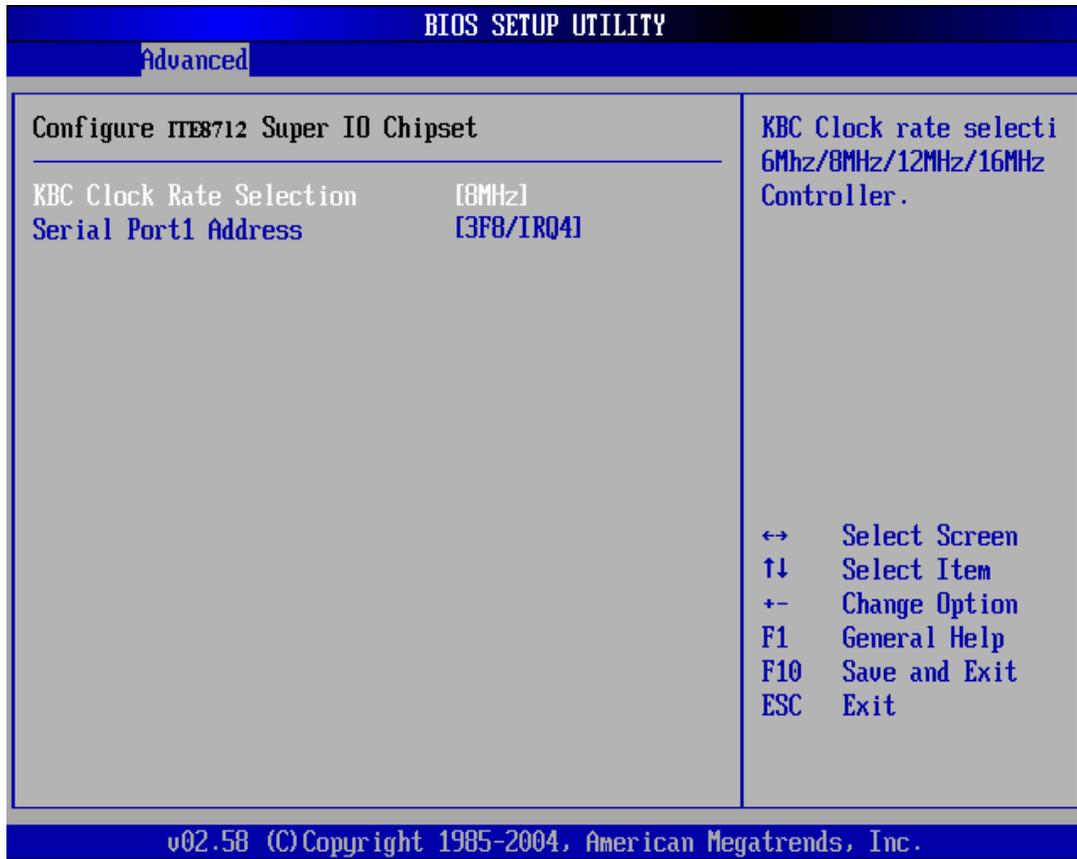
Set this option to stop the AMIBIOS from searching for IDE devices within the specified number of seconds. Basically, this allows you to fine-tune the settings to allow for faster boot times. Adjust this setting until a suitable timing that can detect all IDE disk drives attached is found.

**Available Options:** 0, 5,10, 15, 20, 25, 30, and 35

**Default setting:** 35

➤ **SuperIO Configuration**

This section describes the function of Super I/O settings.



☐ **Serial Port 1 Address**

These fields select the I/O port address for each Serial port.

**Available Options:** Disabled, 3F8H/COM1, 3E8H/COM3, and 2E8H/COM4.

**Default setting:** 3F8H/COM1

➤ **Hardware Health Configuration**

On the Hardware Monitor Setup screen, you can monitor the system temperature, CPU voltage, and CPU fan speed...



**PCI/PnP Setup**

Select the *PCI/PnP* tab from the setup screen to enter the Plug and Play BIOS Setup



**PCI IDE BusMaster**

This option is to specify that the IDE controller on the PCI local bus have bus-mastering capability.

**Available Options:** Enable, Disable

**Default setting:** Disable

**IRQ 3 -15**

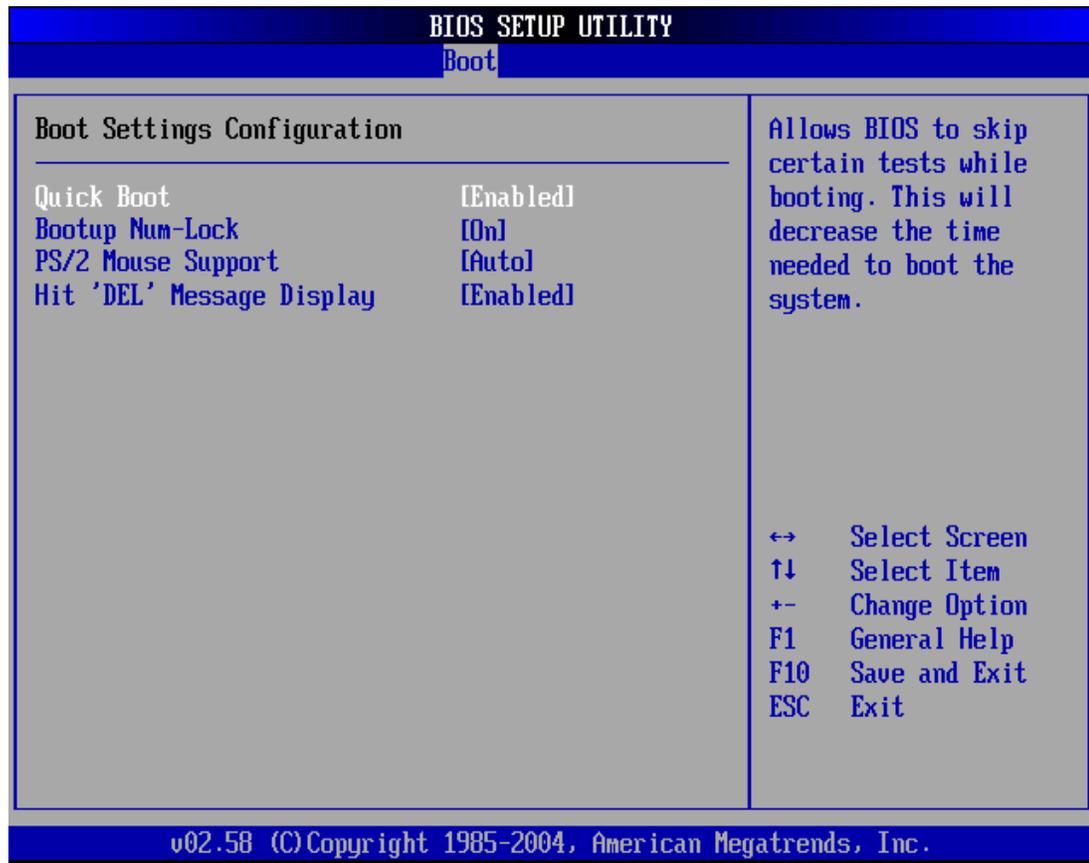
When I/O resources are controlled manually, you can assign each system interrupt as one of the following types, based on the type of device using the interrupt:

Reserved: devices comply with the original PC AT bus specification, requiring a specific interrupt (Such as IRQ4 for COM1).

Available: devices comply with the Plug and Play standard, whether designed for PCI or ISA bus architecture.



➤ **Boot Setting Configuration**



**Quick Boot**

This field is used to activate the quick boot function of the system. When set to Enabled,

1. BIOS will not wait for up to 40 seconds if a Ready signal is not received from the IDE drive, and will not configure its drive.
2. BIOS will not wait for 0.5 seconds after sending a RESET signal to the IDE drive.
3. You cannot run BIOS Setup at system boot since there is no delay for the Hit, Del. To run Setup message.

**Available Options:** Disabled, Enabled

**Default setting:** Enabled

**Boot Up Num-Lock**

This field is used to activate the Num Lock function upon system boot. If the setting is on, after a boot, the Num Lock light is lit, and user can use the number key.

**Available options:** On, Off

**Default setting:** On

**PS/2 Mouse Support**

The PS/2 mouse function is optional. Before you configure this field, make sure your FB2602 supports this feature. The setting of **Enabled** allows the system to detect a PS/2 mouse on boot up. If detected, IRQ12 will be used for the PS/2 mouse. IRQ 12 will be reserved for expansion cards if a PS/2 mouse is not detected. **Disabled** will reserve IRQ12 for expansion cards and therefore the PS/2 mouse will not function.

**Available options:** Disabled, Enabled

**Default setting:** Enable

**Hit 'DEL' Message Display**

Set this field to **Disabled** to prevent the message as follows:

Hi t 'DEL' i f you want to run setup

It will prevent the message from appearing on the first BIOS screen when the computer boots.

**Available options:** Disabled, Enabled

**Default setting:** Enabled

➤ **Boot Device**

Use this screen to specify the order in which the system checks for the device to boot from. To access this screen, select Boot Device Priority on the Boot Setup screen and press <Enter>.



❑ **First Boot Device**

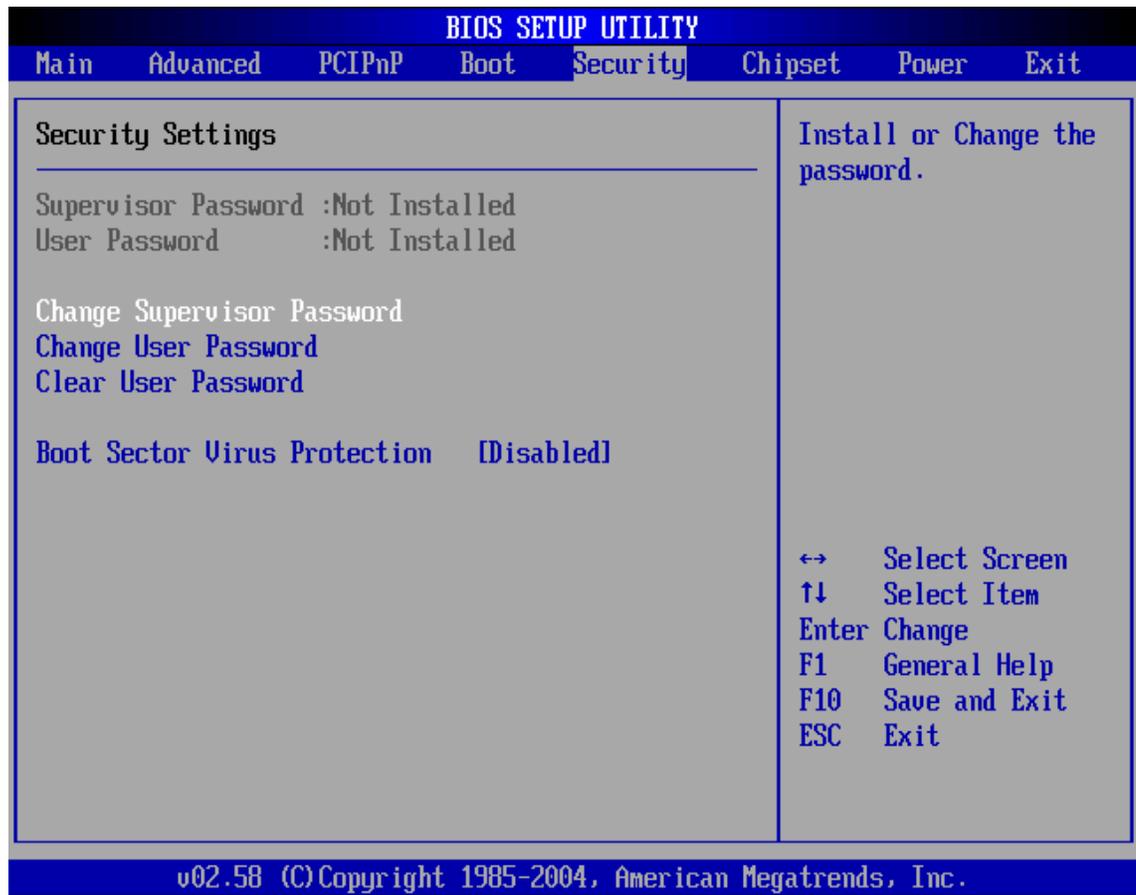
Set the boot device options to determine the sequence in which the computer checks which device to boot from. The settings are *Removable Dev.*, *Hard Drive*, or *ATAPI CDROM*.

**Note:** When you select a boot category from the boot menu, a list of devices in that category appears. For example, if the system has three hard disk drives connected, then the list will show all three hard disk drives attached

## Security setup

There are two security passwords: Supervisor and User. Supervisor is a privileged person that can change the User password from the BIOS. According to the default setting, both access passwords are not set up and are only valid after you set the password from the BIOS.

- Change Supervisor Password
- Change User Password
- Clear User Password



To set the password, please complete the following steps.

1. Select **Change Supervisor Password**.
2. Type the desired password (up to 6 character length) when you see the message, "Enter New Supervisor Password."
3. Then you can go on to set a user password (up to 6 character length) if required. Note that you cannot configure the User password until the Supervisor password is set up.
4. Enter Advanced BIOS Features screen and point to the Security Option field.

5. Select System or Setup.
  - ✧ **Always:** a visitor who attempts to enter BIOS or operating system will be prompted for password.
  - ✧ **Setup:** a visitor who attempts to the operating system will be prompted for user password. You can enter either User password or Supervisor password.
6. Point to **Save Settings and Exit** and press Enter.
7. Press Y when you see the message, "Save Current Settings and Exit (Y/N)?"

Note: it is suggested that you write down the password in a safe place to avoid that password may be forgotten or missing.

**Clean User Password**

Select Clear User Password from the Security Setup menu and press <Enter>. Clear New Password > [Ok] [Cancel] appears. Type the password and press <Enter>. The screen does not display the characters entered. Retype the password as prompted and press <Enter>.

**Password Check**

This field enables password checking every time the computer is powered on or every time the BIOS Setup is executed. If **Always** is chosen, a user password prompt appears every time and the BIOS Setup Program executes and the computer is turned on. If **Setup** is chosen, the password prompt appears if the BIOS executed.

**Available options:** Setup, Always

**Default setting:** Setup

## Chipset Setup

This section describes the configuration of the board's chipset features.

- NorthBridge Configuration
- SouthBridge Configuration



### ➤ Northbridge Configuration

You can use this screen to select options for the North Bridge Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option.

#### ☐ System Clock/PLL Configuration

This specifies the system Clock/PLL frequency.

#### ■ Clock Determined By

Select the mode to determine of the CPU core and GeodeLink Clock.

**Available Options:** H/W Strapping, Manual Setting

**Default setting:** H/W Strapping

**Manual Setting:**

*CPU Multiplier: CPU multiplier active value. CPU Speed= 33.3MHz \* CPU Multiplier (Range:1-32)*

*GeodeLink Multiplier: GeodeLink multiplier active value. GeodeLink Speed=33.3MHz Multiplier (Range:1-32) For Example: 6=200MHz*

**Note:** If the wrong setting of CPU core or GeodeLink Multiplier on the FX5420 system (over speed), you can clean CMOS setup by the JP1.

**SDRAM Configuration**

This field specifies the DDR SDRAM configuration setting.

■ **Configure SDRAM Timing by SPD**

SPD represents Serial Presence Detect. It is an 8-bit, 2048 bits EEPROM, built on the SDRAM for 100 MHz frequencies. If the installed SDRAM supports SPD function, select SPD. If not, you can select based on other access time of the SDRAM.

**Available Options:** Disabled, Enabled

**Default setting:** Disabled

**Video Configuration**

This field specifies the Graphics configuration setting.

■ **Internal Graphics Mode Select**

This field is share memory architecture (SMA) for frame buffer memory. SMA allows system memory to be efficiently share by the host CPU and allocated depending on user preference, application requirements, and total size of system memory.

**Available Options:** 1MB, 4MB, 8MB, 16MB and up to 254MB

**Default setting:** 24MB

➤ **Southbridge Configuration**

You can use this screen to select options for the South Bridge Configuration. South Bridge is a chipset on the motherboard that controls the basic I/O functions, LAN port, and audio function.

■ **LAN Boot ROM Controller**

This field specifies the PXE boot ROM of the onboard LAN chip.

**Available Options:** Disabled, Enable

**Default setting:** Disable

■ **USB 1.1/2.0 Controller**

Select Enable, if a USB device is installed to the system. If Disabled are selected, the system will not be able to use a USB device.

**Available Options:** Disabled, Enabled

**Default setting:** Enabled

## Power Management



### ➤ Power Management/APM

Select Enabled to activate the chipset Power Management and APM (Advanced Power Management) features.

**Available Options:** Disable, and Enable

**Default setting:** Disable

### ❑ Standby Time Out (Minute)

This field specifies the length of a period of system inactivity (like hard disk or video) while in full power on state. When this length of time expires, the system enters Standby power state.

**Available Options:** Disabled, 1 Minute, 5 Minute, 10 Minute, and 15 Minute, up to 60 Minute.

**Default setting:** Disabled



## Chapter 4 Software Installation

The enclosed diskette includes FX5420 VGA, AUDIO driver and LAN driver. To install and configure you FX5420 system, you need to perform the following steps.

### VGA Drivers

➤ **WINDOWS XP Driver**

- 1 To install the VGA driver, insert the CD ROM into the CD ROM device, and enter DRIVER>VGA> Geode\_LX >WINXP. If your system is not equipped with a CD ROM device, copy the VGA driver from the CD ROM to a CF.
- 2 Open Control Panel. [Start->Settings->Control Panel].
- 3 Click on System button> Select Hardware >click on Device Manager.
- 4 Click on Video Controller (VGA Compatible) >Update Driver> Select Specify a location > **Browse** > Select "IX\_win " file from CF .
- 5 Click on OK >Next >Yes >Finish
- 6 In the WINDOWS-XP, you can find the <DISPLAYL> icon located in the {CONTROL PANEL} group.
- 7 Adjust the <Resolution> and <Color>.

### LAN Utility & Driver

- 1 To install the LAN utility OR driver, insert the CD ROM into the CD ROM device, and enter DRIVER>LAN>RTL8139C>DIAG. If your system is not equipped with a CD ROM device, copy the LAN driver from the CD ROM to CF.
- 2 Execute install2KXP.exe or install98se.exe file.

**Note:** In the RTL8139C directory, a README.TXT is included to provide installation information.

## AES Drivers

### ➤ WINDOWS XP Driver

- 1 To install the SysChip driver, insert the CD ROM into the CD ROM device, and enter DRIVER>SysChip>GeodeLX\_XP\_AES. If your system is not equipped with a CD ROM device, copy the AES driver from the CD ROM to a CF.
- 2 On the target LX processor computer running Windows XP, open the device manager
- 3 Find the question mark on "Entertainment Encryption/Decryption Device" in Other Devices.
- 4 Pick "Install from a list or specific location" and click next.  
Pick "Don't search. I will choose the driver to install." and click next.  
Pick "Show All Devices", wait, and pick "Have Disk".
- 5 It will come back with "Geode LX AES Crypto Driver", click Next.  
Click yes to the warning box that comes up.

## BIOS Flash Utility

In the <UTILITY> directory, there is the AFU409.EXE file.

Step 1: Use the AFU409.EXE program to update the BIOS setting.

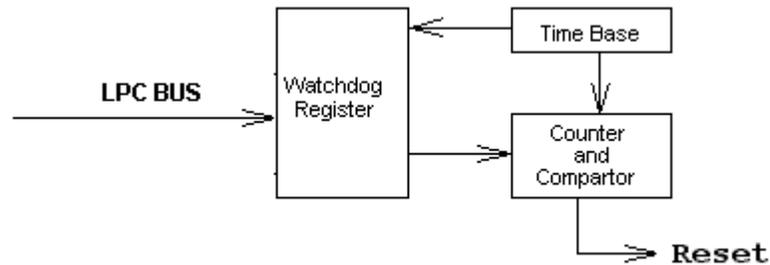
Step 2: And then refer to the chapter "BIOS Setup", as the steps to modify BIOS.

Step 3: Now the CPU board's BIOS loaded with are the newest program; user can use it to modify BIOS function in the future, when the BIOS add some functions.

## Watchdog Timer

This section describes how to use the Watchdog Timer, including disabled, enabled, and trigger functions.

The FX5420 is equipped with a programmable time-out period watchdog timer. You can use your own program to enable the watchdog timer. Once you have enabled the watchdog timer, the program should trigger the I/O every time before the timer times out. If your program fails to trigger or disable this timer before it times out, e.g. because of a system hang-up, it will generate a reset signal to reset the system. The time-out period can be programmed to be set from 1 to 255 seconds or minutes.



The CD-ROM includes a Watch Dog demo file. In the file, there are 3 execution programs written in different forms. The sub-directories of the file are:

1. WATCHDOG/ASSEMBLE: Library and Test Program written in Assembly Language
2. WATCHDOG/TURBOC: Library and Test Program written in Turbo C++

The WATCHDOG includes a demonstration program established for users who would like to configure the Watchdog timer by themselves.

**Note:** In the WATCHDOG/ITE8712 directory, README.TXT file is included to provide demo program information.

➤ **Watchdog Timer Setting**

The watchdog timer is a circuit that may be used from your program software to detect system crashes or hang-ups. LED on the Front side is the watchdog timer indicator. Whenever the watchdog timer is enabled, the LED will blink to indicate that the timer is counting. The watchdog timer is automatically disabled after reset.

Once you have enabled the watchdog timer, your program must trigger the watchdog timer every time before it times out. After you trigger the watchdog timer, it will be set to non-zero value to watchdog counter and start to count down again. If your program fails to trigger the watchdog timer before time-out, it will generate a reset pulse to reset the system.

The factor of the watchdog timer time-out constant is approximately 1 second. The period for the watchdog timer time-out is between 1 to FF timer factors.

If you want to reset your system when watchdog times out, the following table listed the relation of timer factors between time-out periods.

Time Factor	Time-Out Period (Seconds)	Time-Out Period (Minutes)
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
"	"	"
"	"	"
"	"	"
FF	FF	FF

➤ **Watchdog Timer Enabled**

To enable the watchdog timer, you have to output a byte of timer factor to the watchdog. The following is a Turbo C++ program, which demonstrates how to enable the watchdog timer and set the time-out period at 6 seconds.

```
#include "stdio.H"
#include "WDLIB.H"

main()
{
char WD_TIME=0x6;

InitWD(equWdUnitS);
printf ("Enable watchdog");
//Trigger watchdog Timer Output is 6 seconds
EnWD(WD_TIME);
}
```

➤ **Watchdog Timer Trigger**

After you enable the watchdog timer, your program must write the same factor as enabling to the watchdog register at least once every time-out period to its previous setting. You can change the time-out period by writing another timer factor to the watchdog register at any time, and you must trigger the watchdog before the new time-out period in the next trigger. Below is a Turbo C++ program, which demonstrates how to trigger the watchdog timer:

```
#include "stdio.H"
#include "WDLIB.H"

main()
{
char WD_TIME=0x6;

InitWD(equWdUnitS);
printf ("Enable watchdog");
//Trigger watchdog Timer Output is 6 seconds
EnWD(WD_TIME);
}
```

➤ **Watchdog Timer Disabled**

To disable the watchdog timer, simply write a 00H to the watchdog register.

```
#include "stdio.H"
#include "WDLIB.H"

main()
{
    InitWD(equWdUnitS);
    printf ("Disable Watch Dog");
    //Disable watch dog
    DisWD(WD_TIME);
}
```

## Chapter 5 Technical Reference

This section outlines the errors that may occur when you operate the system, and also gives you the suggestions on solving the problems.

Topic include:

- Trouble Shooting for Post Beep & Error Messages
- Technical Reference
- RS485 and RS422 Hardware Setup

### Trouble Shooting for Post Beep and Error Messages

The following information informs the Post Beep & error messages. Please adjust your systems according to the messages below. Make sure all the components and connectors are in proper position and firmly attached. If the errors still exist, please contact with your distributor for maintenance.

#### ➤ POST BEEP

Currently there are two kinds of beep codes in BIOS setup.

- One indicates that a video error has occurred and the BIOS cannot initialize the video screen to display any additional information. This beep code consists of a single long beep followed by three short beeps.
- The other indicates that an error has occurred in your DRAM. This beep code consists of a constant single long beep.

#### ➤ Error Message

##### ❑ CMOS BATTERY FAILURE

When the CMOS battery is out of work or has run out, the user has to replace it with a new battery.

**CMOS CHECKSUM ERROR**

This error informs that the CMOS has corrupted. When the battery runs weak, this situation might happen. Please check the battery and change a new one when necessary.

**DISK BOOT FAILURE**

When you can't find the boot device, insert a system disk into Drive A and press < Enter >. Make sure both the controller and cables are all in proper positions, and also make sure the disk is formatted. Then reboot the system.

**DISKETTE DRIVES OR TYPES MISMATCH ERROR**

When the diskette drive type is different from CMOS, please run setup or configure the drive again.

**ERROR ENCOUNTERED INITIALIZING HARD DRIVE**

When you can't initialize the hard drive, ensure the following things:

1. The adapter is installed correctly
2. All cables are correctly and firmly attached
3. The correct hard drive type is selected in BIOS Setup

**ERROR INITIALIZING HARD DISK CONTROLLER**

When this error occurs, ensure the following things:

1. The cord is exactly installed in the bus.
2. The correct hard drive type is selected in BIOS Setup
3. Whether all of the jumpers are set correctly in the hard drive

**KEYBOARD ERROR OR NO KEYBOARD PRESENT**

When this situation happens, please check keyboard attachment and no keys being pressed during the boot. If you are purposely configuring the system without a keyboard, set the error halt condition in BIOS Setup to HALT ON ALL, BUT KEYBOARD. This will cause the BIOS to ignore the missing keyboard and continue the boot procedure.

**MEMORY ADDRESS ERROR**

When the memory address indicates error, you can use this location along with the memory map for your system to find and replace the bad memory chips.

❑ **MEMORY SIZE HAS CHANGED**

Memory has been added or removed since last boot. In EISA mode, use Configuration Utility to re-configure the memory configuration. In ISA mode enter BIOS Setup and enter the new memory size in the memory fields.

❑ **MEMORY VERIFYING ERROR**

It indicates an error verifying a value is already written to memory. Use the location along with your system's memory map to locate the bad chip.

❑ **OFFENDING ADDRESS MISSING**

This message is used in connection with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem cannot be isolated.

❑ **REBOOT ERROR**

When this error occurs that requires you to reboot. Press any key and the system will reboot.

❑ **SYSTEM HALTED**

Indicates the present boot attempt has been aborted and the system must be rebooted. Press and hold down the CTRL and ALT keys and press DEL.

## Technical Reference

### ➤ Physical and Environmental

Temperature: Operating 0°C ~ 50°C

Relative humidity 5 % to 95 % non-condensing

DC-AC adapter

Input AC Voltage Range: 100V~240V/1A, 50Hz ~60Hz

Output DC Voltage: 19V/3.42A Maximal

Surface Temperature of Chassis :

5°C to 45°C (W/HDD)/0°C to 50°C (W/CF card only)

### ➤ Real-Time Clock and Non-Volatile RAM

The FX5420 contains a real-time clock compartment that maintains the date and time in addition to storing configuration information about the computer system. It contains 14 bytes of clock and control registers and 114 bytes of general purpose RAM. Because of the use of CMOS technology, it consumes very little power and can be maintained for long periods of time using an internal Lithium battery. The contents of each byte in the CMOS RAM are listed below:

Address	Description
00	Seconds
01	Second alarm
02	Minutes
03	Minute alarm
04	Hours
05	Hour alarm
06	Day of week
07	Date of month
08	Month
09	Year
0A	Status register A
0B	Status register B

Address	Description
0C	Status register C
0D	Status register D
0E	Diagnostic status byte
0F	Shutdown status byte
10	Diskette drive type byte, drive A and B
11	Fixed disk type byte, drive C
12	Fixed disk type byte, drive D
13	Reserved
14	Equipment byte
15	Low base memory byte
16	High base memory byte
17	Low expansion memory byte
18	High expansion memory byte
19-2D	Reserved
2E-2F	2-byte CMOS checksum
30	Low actual expansion memory byte
31	High actual expansion memory byte
32	Date century byte
33	Information flags (set during power on)
34-7F	Reserved for system BIOS

➤ **CMOS RAM Map**

Register	Description
00h -10h	Standard AT-compatible RTC and Status and Status Register data definitions
11h – 13h	Varies
14h	<p>Equipment</p> <p>Bits 7-6 Number of Floppy Drives            00 1 Drive            01 2 Drives</p> <p>Bits 5-4 Monitor Type            00 Not CGA or MDA 01 40x25 CGA            01 2 Drives 80x25 CGA</p> <p>Bits 3 Display Enabled            0 Disabled            1 Enabled</p> <p>Bit 2 Keyboard Enabled            00 Not CGA or MDA 01 40x25 CGA            01 2 Drives 80x25 CGA</p> <p>Bit 1 Math Coprocessor Installed            0 Absent            1 Present</p> <p>Bit 0 Floppy Drive Installed            0 Disabled            1 Enabled</p>
15h	Base Memory (in 1KB increments), Low Byte
16h	Base Memory (in 1KB increments), High Byte
17h	IBM-compatible memory (in 1KB increments), Low Byte
18h	IBM-compatible memory (in 1KB increments), High Byte (max 15 MB)
19h-2Dh	Varies
2Eh	Standard CMOS RAM checksum, high byte
2Fh	Standard CMOS RAM checksum, low byte
30h	IBM-compatible Extended Memory, Low Byte (POST) in KB
31h	IBM-compatible Extended Memory, High Byte (POST) in KB
32h	Century Byte
33h	Reserved. Do not use
34h	Reserved. Do not use
35h	Low byte of extended memory (POST) in 64 KB
36h	High byte of extended memory (POST) in 64 KB
37h-3Dh	Varies
3Eh	Extended CMOS Checksum, Low Byte (including 34h-3Dh)
3Fh	Extended CMOS Checksum, High Byte (including 34h-3Dh)

**➤ I/O Port Address Map**

Each peripheral device in the system is assigned a set of I/O port addresses, which also becomes the identity of the device. There is a total of 1K-port address space available. The following table lists the I/O port addresses used on the Industrial CPU Card.

Address	Device Description
000h - 01Fh	DMA Controller #1
020h - 03Fh	Interrupt Controller #1
040h - 05Fh	Timer
060h - 06Fh	Keyboard Controller
070h - 071h	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0BFh	Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
2B0 - 2DF	Graphics adapter Controller
378h - 3FFh	Parallel Port #1(LPT1)
360 - 36F	Network Ports
3B0 - 3BF	Monochrome & Printer adapter
3C0 - 3CF	EGA adapter
3D0 - 3DF	CGA adapter
3F0h - 3F7h	Floppy Disk Controller
3F8h - 3FFh	Serial Port #1(COM1)

**➤ Interrupt Request Lines (IRQ)**

There are a total of 15 IRQ lines available on the Industrial CPU Card. Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on the Industrial CPU Card.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt Cascade
IRQ3	Reserved
IRQ4	Serial Port #1
IRQ5	Reserved
IRQ6	Floppy Disk Controller
IRQ7	
IRQ8	Real Time Clock
IRQ9	Reserved
IRQ10	LAN #1
IRQ11	LAN #2
IRQ12	PS2 Mouse
IRQ13	FPU
IRQ14	Primary IDE
IRQ15	USB

➤ **DMA Channel Map**

The equivalent of two 8237A DMA controllers is implemented in the FX5420 board. Each controller is a four-channel DMA device that will generate the memory addresses and control signals necessary to transfer information directly between a peripheral device and memory. This allows high speed information transfer with less CPU intervention. The two DMA controllers are internally cascaded to provide four DMA channels for transfers to 8-bit peripherals (DMA1) and three channels for transfers to 16-bit peripherals (DMA2). DMA2 channel 0 provides the cascade interconnection between the two DMA devices, thereby maintaining IBM PC/AT compatibility.

The following is the system information of DMA channels:

<b>DMA Controller 1</b>	<b>DMA Controller 2</b>
Channel 0: Spare	Channel 4: Cascade for controller 1
Channel 1: Reserved for IBM SDLC	Channel 5: Spare
Channel 2: Diskette adapter	Channel 6: Spare
Channel 3: Spare	Channel 7: Spare

➤ **Serial Ports**

The ACEs (Asynchronous Communication Elements ACE1 to ACE2) are used to convert parallel data to a serial format on the transmit side and convert serial data to parallel on the receiver side. The serial format, in order of transmission and reception, is a start bit, followed by five to eight data bits, a parity bit (if programmed) and one, one and half (five-bit format only) or two stop bits. The ACEs are capable of handling divisors of 1 to 65535, and produce a 16x clock for driving the internal transmitter logic.

Provisions are also included to use this 16x clock to drive the receiver logic. Also included in the ACE a completed MODEM control capability, and a processor interrupt system that may be software tailored to the computing time required to handle the communications link.

The following table is a summary of each ACE accessible register

DLAB	Port Address	Register
0	Base + 0	Receiver buffer (read)
		Transmitter holding register (write)
0	Base + 1	Interrupt enable
X	Base + 2	Interrupt identification (read only)
X	Base + 3	Line control
X	Base + 4	MODEM control
X	Base + 5	Line status
X	Base + 6	MODEM status
X	Base + 7	Scratched register
1	Base + 0	Divisor latch (least significant byte)
1	Base + 1	Divisor latch (most significant byte)

**Receiver Buffer Register (RBR)**

Bit 0-7: Received data byte (Read Only)

**Transmitter Holding Register (THR)**

Bit 0-7: Transmitter holding data byte (Write Only)

**Interrupt Enable Register (IER)**

Bit 0: Enable Received Data Available Interrupt (ERBFI)

Bit 1: Enable Transmitter Holding Empty Interrupt (ETBEI)

Bit 2: Enable Receiver Line Status Interrupt (ELSI)

Bit 3: Enable MODEM Status Interrupt (EDSSI)

Bit 4: Must be 0

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

**Interrupt Identification Register (IIR)**

Bit 0: "0" if Interrupt Pending

Bit 1: Interrupt ID Bit 0

Bit 2: Interrupt ID Bit 1

Bit 3: Must be 0

Bit 4: Must be 0

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

**Line Control Register (LCR)**

Bit 0: Word Length Select Bit 0 (WLS0)

Bit 1: Word Length Select Bit 1 (WLS1)

WLS1	WLS0	Word Length
0	0	5 Bits
0	1	6 Bits
1	0	7 Bits
1	1	8 Bits

Bit 2: Number of Stop Bit (STB)

Bit 3: Parity Enable (PEN)

Bit 4: Even Parity Select (EPS)

Bit 5: Stick Parity

Bit 6: Set Break

Bit 7: Divisor Latch Access Bit (DLAB)

**MODEM Control Register (MCR)**

Bit 0: Data Terminal Ready (DTR)

Bit 1: Request to Send (RTS)

Bit 2: Out 1 (OUT 1)

Bit 3: Out 2 (OUT 2)

Bit 4: Loop

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

**Line Status Register (LSR)**

Bit 0: Data Ready (DR)

Bit 1: Overrun Error (OR)

Bit 2: Parity Error (PE)

Bit 3: Framing Error (FE)

Bit 4: Break Interrupt (BI)

Bit 5: Transmitter Holding Register Empty (THRE)

Bit 6: Transmitter Shift Register Empty (TSRE)

Bit 7: Must be 0

**MODEM Status Register (MSR)**

Bit 0: Delta Clear to Send (DCTS)

Bit 1: Delta Data Set Ready (DDSR)

Bit 2: Training Edge Ring Indicator (TERI)

Bit 3: Delta Receive Line Signal Detect (DSLSD)

Bit 4: Clear to Send (CTS)

Bit 5: Data Set Ready (DSR)

Bit 6: Ring Indicator (RI)

Bit 7: Received Line Signal Detect (RSLD)

**Divisor Latch (LS, MS)**

	LS	MS
Bit 0:	Bit 0	Bit 8
Bit 1:	Bit 1	Bit 9
Bit 2:	Bit 2	Bit 10
Bit 3:	Bit 3	Bit 11
Bit 4:	Bit 4	Bit 12
Bit 5:	Bit 5	Bit 13
Bit 6:	Bit 6	Bit 14
Bit 7:	Bit 7	Bit 15

Desired Baud Rate	Divisor Used to Generate 16x Clock
300	384
600	192
1200	96
1800	64
2400	48
3600	32
4800	24
9600	12
14400	8
19200	6
28800	4
38400	3
57600	2
115200	1

# Appendix

## Dimension

