

NAR-5530 Series Communication Appliance

User's Manual

Revision: 1.2

CE

This certificate of conformity of NAR-5530 series with actual required safety standards in accordance with 89/366 ECC-EMC Directive and LVD 73/23 ECC

UL

This product meets all safety requirements per UL60950 standard.



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Chapter 1 Introduction

1.1 About This Manual

This manual contains all required information for setting up and using the NAR-5530 series.

NAR-5530 provides the essential platform for delivering optimal performance and functionality in the value communications appliance market segment. This manual should familiarize you with NAR-5530 operations and functions. NAR-5530 series provide up to nine on-board Ethernet ports to serve communication applications like Firewall, requiring nine Ethernet ports to connect external network (internet), demilitarized zone and internal network.

NAR-5530 series overview:

- ◆ Supports LGA 775 Dual-Core* CPU and Prescott, Cedar Mill
- ◆ Up to 4GB DDR2 533/667/800 DIMM
- ◆ Two USB ports and two COM ports
- ◆ Two SATA connectors for SATA Hard disk
- ◆ User-friendly LCD control panel
- ◆ PCI-E architecture with totally six x1 PCI-E interfaces
- ◆ Provides absolute high flexibility of customized I/O configuration

1.2 Manual Organization

This manual describes how to configure your NAR-5530 system to meet various operating requirements. It is divided into three chapters, with each chapter addressing the basic concept and operation of this system.

- Chapter 1: Introduction. This section describes how this document is organized. It includes brief guidelines and overview to help find necessary information.
- Chapter 2: Hardware Configuration Setting and Installation. This chapter demonstrated the hardware assembly procedure, including detailed information. It shows the definitions and locations of Jumpers and Connectors that can be used to configure the system.
- Chapter 3: Operation Information. This section provides illustrations and information on the system architecture and how to optimize its performance.
- Chapter 4: This section describes how to programming EZIO software.

Any updates to this manual, would be posted on the web site: <http://isc.portwell.com.tw>

1.3 Technical Support Information

Users may find helpful tips or related information on Portwell's web site: <http://www.portwell.com.tw>
A direct contact to Portwell's technical person is also available. For further support, users may also contact Portwell's headquarter in Taipei or local distributors.

Taipei Office Phone Number: +886-2-27992020

1.4 Board Layout

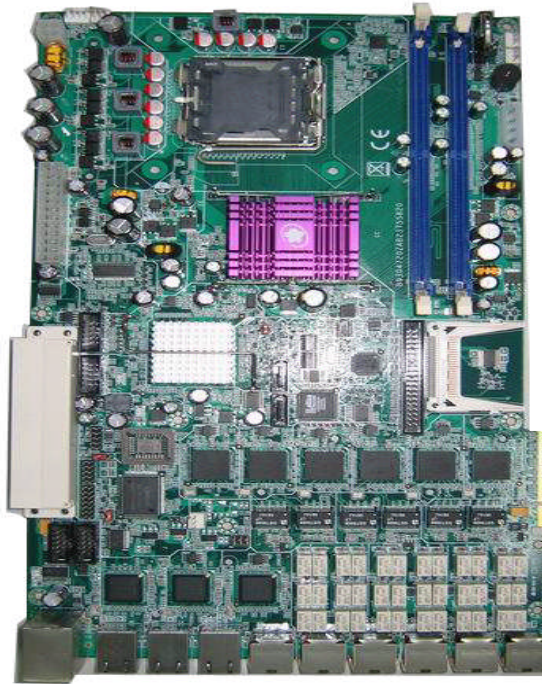


Figure 1-1 Board Layout of NAR-5530 M/B

1.5 System Block Diagram

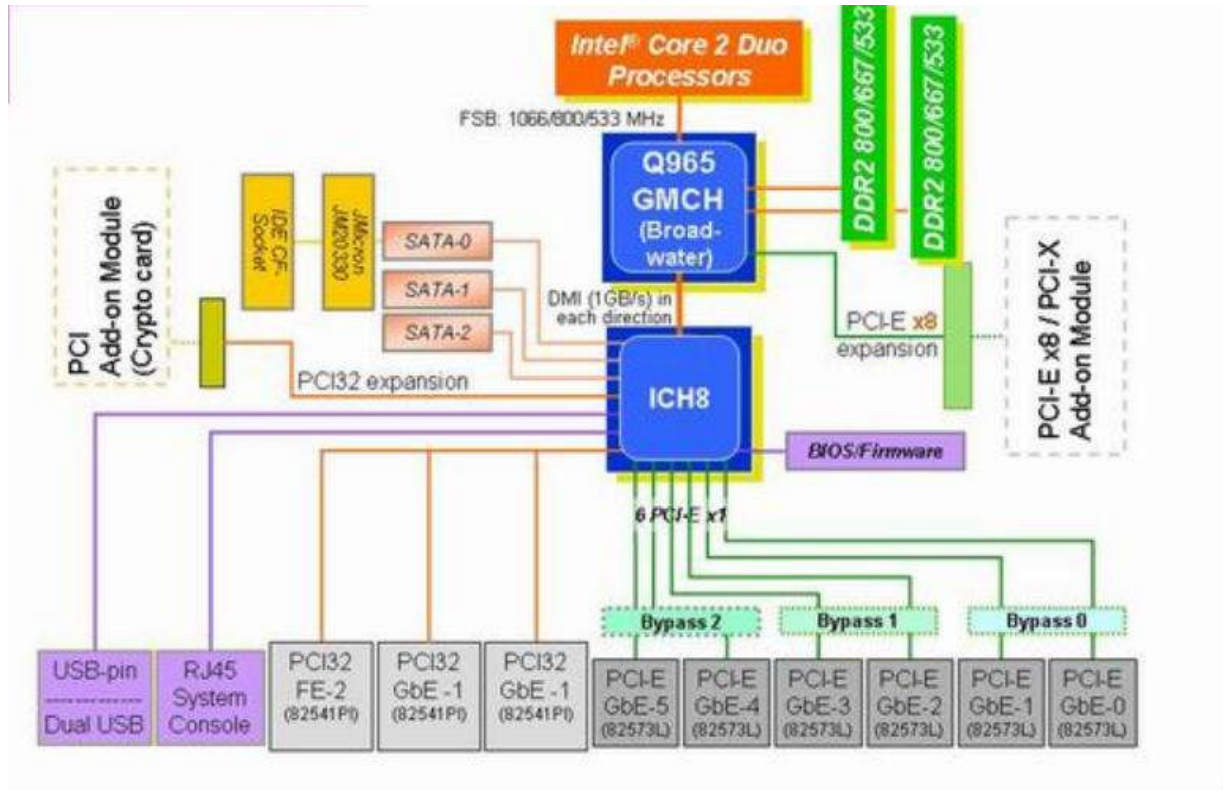


Figure 1-2 NAR-5530 Basic Block Diagram

#	Feature	Detailed Description
1	CPU	Supports LGA 775 Conroe, Conroe-L, Cedar Mill and current Prescott CPUs.
2	System Memory	<ul style="list-style-type: none"> ◆ 2 DIMM slots. ◆ Supports un-buffered DDR2 800/667/533 ◆ Up to 4 GB
3	Power Supply	◆ AT with power switch. ATX with power button.
4	PCI-E Architecture	◆ Six PCI-E x1 from S/B (ICH8) to connect with PCI-E Ethernet controllers (Intel [®] 82573L)
5	Ethernet	Max three PCI32 GbE ports on-board for system management. Max. six PCI-E x1 GbE ports based on Intel 82573L
6	Expansion slots	One golden finger of PCI-E x8 connector for installation of proprietary PCI-E module. Horizontal (right-angled) connector for internal PCI card installation..
7	SATA & IDE Interfaces	<ul style="list-style-type: none"> ◆ Two SATA Interfaces on board ◆ The IDE channel support one Compact Flash Socket and one 40-pin pin-header.
8	Dimension	◆ 1U W: 431.8mm /17.00" x D:406.4mm /16" x H: 44.5mm /1.75" (1U)

Note 1: To use a DDRII 667 memory module on the motherboard, you must install an 800/1066MHz FSB processor

Note 2: For system stability and performance, please install INTEL E1000 driver version E1000-7.4.35 or later

Note 3: If boot from Linux kernel 2.6.18 or earlier version, please add Linux kernel option on boot loader

For example: kernel /boot/vmlinuz-2.6.9-42.0.3.ELsmp ro root=LABEL=/ rhgb quiet [all-generic-ide](#)

==> "**all-generic-ide**", this option will let kernel identify the device on IDE bus, and enable DMA.

Because you can't use specific ide support as it is unknown to the current kernel.

Note 4: Before install Fedora core 4 or earlier OS please change BIOS SATA mode from "Enhance" to "Compatible" mode

Chapter 2 Getting Started

This section describes how the hardware installation and system settings should be done.

2.1 Included Hardware

The following hardware is included in package:

- ◆ NAR-5530 Communication Appliance System Board
- ◆ One null serial port cable

2.2 Before You Begin

To prevent damage to any system board, it is important to handle it with care. The following measures are generally sufficient to protect your equipment from static electricity discharge:

When handling the board, use a grounded wrist strap designed for static discharge elimination and touch a grounded metal object before removing the board from the antistatic bag. Handle the board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

When handling processor chips or memory modules, avoid touching their pins or gold edge fingers. Restore the communications appliance system board and peripherals back into the antistatic bag when they are not in use or not installed in the chassis.

Some circuitry on the system board can continue operating even though the power is switched off. Under no circumstances should the Lithium battery cell used to power the real-time clock be allowed to be shorted. The battery cell may heat up under these conditions and present a burn hazard.

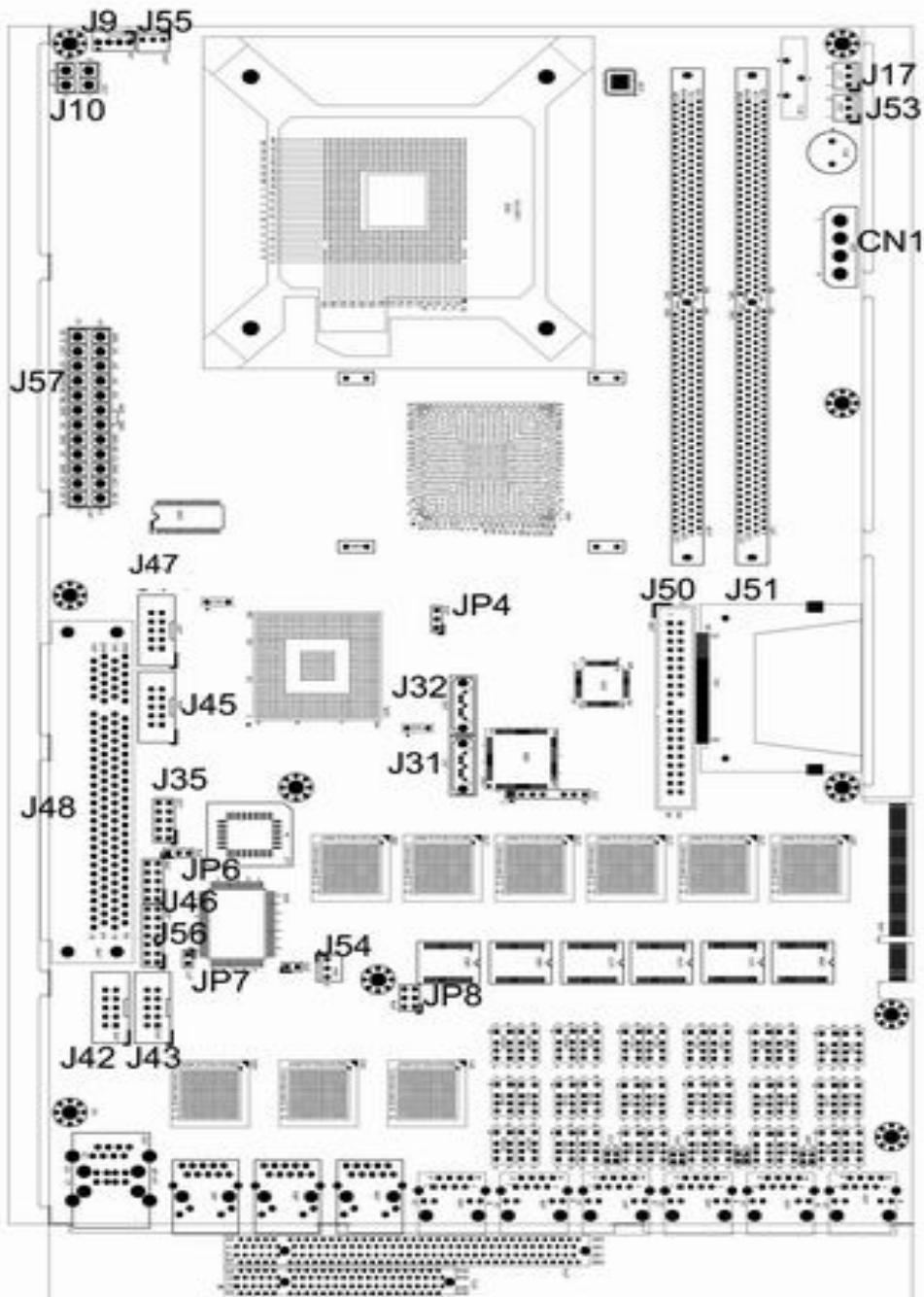
WARNING!

1. **"CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS"**
2. **This guide is for technically qualified personnel who have experience installing and configuring system boards. Disconnect the system board power supply from its power source before you connect/disconnect cables or install/remove any system board components. Failure to do this can result in personnel injury or equipment damage.**
3. **Avoid short-circuiting the lithium battery; this can cause it to superheat and cause burns if touched.**
4. **Do not operate the processor without a thermal solution. Damage to the processor can occur in seconds.**
5. **Do not block air vents. Minimum 1/2-inch clearance required.**

2.3.1 NAR-5530 System Board Jumper

In general, jumpers on NAR-5530 system board are used to select options for certain features. Some of the jumpers are configurable for system enhancement. The others are for testing purpose only and should not be altered. To select any option, cover the jumper cap over (Short) or remove (NC) it from the jumper pins according to the following instructions. Here NC stands for “Not Connected”.

- **Location of Jumpers**



JP4: CMOS Clear

JP4	Function
1-2 Short	Normal Operation ★
2-3 Short	Clear CMOS Contents

JP6:GPIO Voltage Select

JP6	Function
1-2 Short	+5v ★
2-3 Short	+3.3v

JP7:Watch Dog Timer(WDT) Select

JP6	Function
1-2 Short	Enable WDT Function ★
1-2 Open	Disable WDT Function

JP8: Bypass LED connector define

(For PPAP-3755-0926)

Pin	Signal Name	Pin	Signal Name
1	BP_A_LEDP	2	BP_A_LEDN
3	BP_B_LEDP	4	BP_B_LEDN
5	BP_C_LEDP	6	BP_C_LEDN

(For PPAP-3755-0624)

Pin	Signal Name	Pin	Signal Name
1	BP_A_LEDP	2	BP_A_LEDN
3	BP_B_LEDP	4	BP_B_LEDN

Connector	Function	Remark
J9	CPU FAN connector	
J17、 J53、 J54、 J55	SYS FAN connector	
J31、 J32	SATA connector	
J35	USB connector	
J42、 J43	COM1、 COM2 connector	
J45	K/B、 M/S connector	
J46	8-bit GPIO connector	
J47	VGA connector	
J48	PICMG 1.0 connector	
J50	IDE connector	
J51	CF connector	
J56	Front Panel connector	
CN1	+5V & +12V power connector(only output)	

J15: HDD LED +Power LED connector define

Pin	Signal Name	Pin	Signal Name
1	+5V	2	-HD
3	+5V	4	-PWR

J46: 8-bit GPIO connector define

Pin	Signal Name	Pin	Signal Name
1	GPIO	2	GPIO
3	GPIO	4	GPIO
5	GPIO	6	GPIO
7	GPIO	8	GPIO
9	Ground	10	+5V or +3.3V

J47: VGA connector define

Pin	Signal Name	Pin	Signal Name
1	RED	2	DDCCLK
3	GREEN	4	Ground
5	BLUE	6	DDCDATA
7	HSYNC	8	Ground
9	VSYNC	10	N/C

J56: PIN define

Pin	Signal Name	Pin	Signal Name
1	HD+(+5V)	2	GP+(+5V)
3	HD-	4	YP+
5	GND	6	ON-(+3.3SB)
7	RSET	8	PWR SW
9	DEFAULT-	10	GND
11	ACT+(+5V)	12	LNK+(+5V)
13	ACT-	14	LNK-

2.4 The Chassis

The system is integrated in a customized 1U chassis (**Fig. 2-1, Fig. 2-2**). On the front panel you will find a 4-push-button LCD module (EZIO), right LAN ports, two USB ports and a COM port.



Fig. 2-1 Front view of the chassis



Fig. 2-2 Rear view of the chassis

2.5 Open the Chassis

1. Loosen the 8 screws of the chassis, three on each side and the rest two on the back, to remove the top lead (**Fig. 2-3**).



Fig. 2-3 Take off screws

2. The top lead (**Fig. 2-4**) can be removed from the base stand (**Fig. 2-5**).

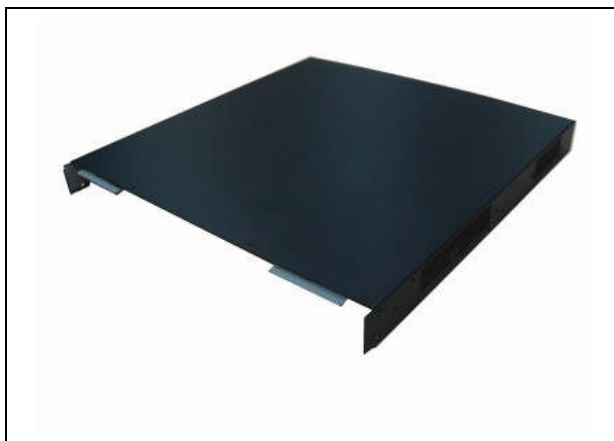


Fig. 2-4 The top lead



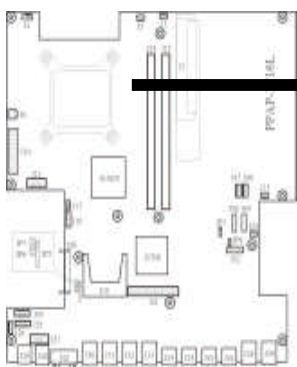
Fig. 2-5 The base stand

2.6 Install a Different Processor

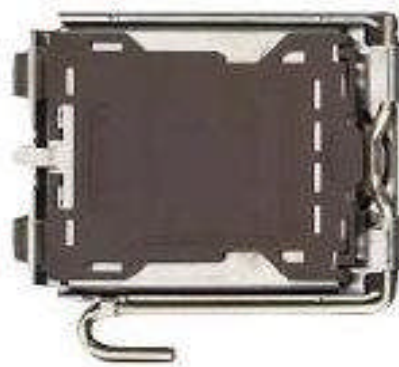


To install a CPU

1. Local the CPU socket on the motherboard

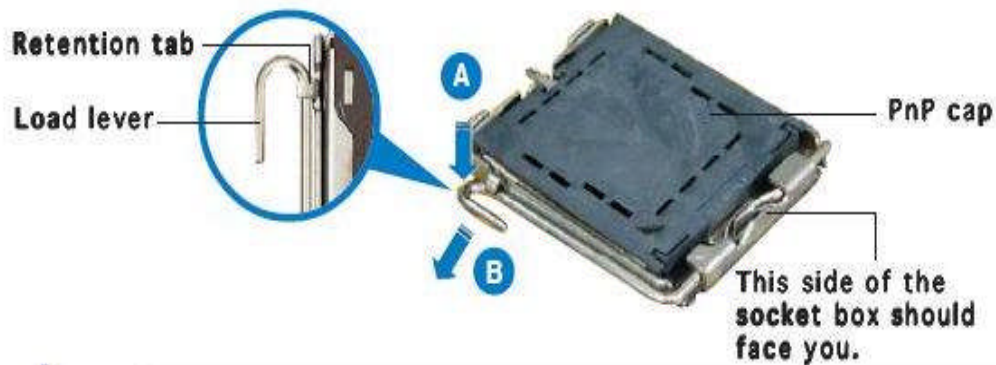


NAR-5530 CPU socket 775



Before installing the CPU, make sure that the socket box is facing towards you and the load lever is on your left.

2. Press the load lever with your thumb (A), then move it to left (B) until it is released from the retention tab

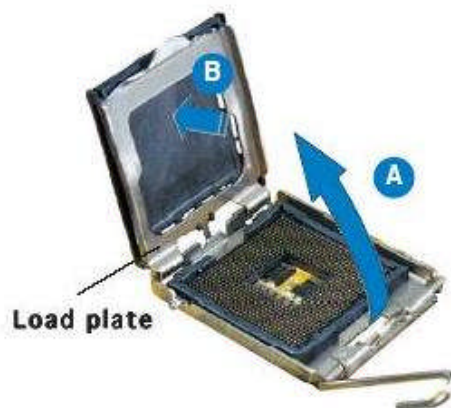


To prevent damage to the socket pins, do not remove the PnP cap unless you are installing a CPU.

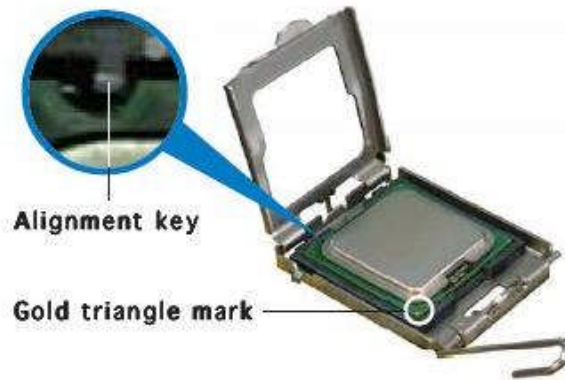
3. Lift the load lever in the direction of the arrow to a 135° angle



4. Lift the load plate with your thumb and forefinger to a 100° angle (A), then push the PnP cap from the load plate window to remove (B)



5. Position the CPU over the socket, making sure that the gold triangle is on the bottom-left corner of the socket. The socket alignment key should fit into the CPU notch



6. Close the load plate (A), then push the load lever (B) until it snaps into the retention tab



The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!



Configure Processor Speed

The system was designed to self-detect its CPU speed. So it does not require any system adjustment.

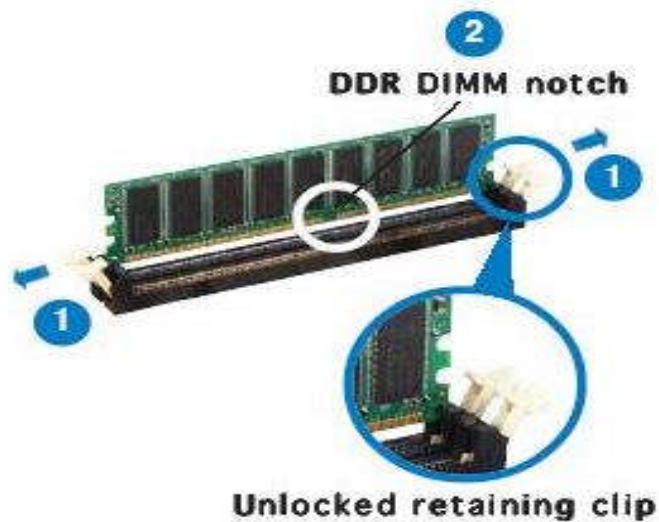
2.7 Remove and Install DIMM

Follow these steps to upgrade RAM module:



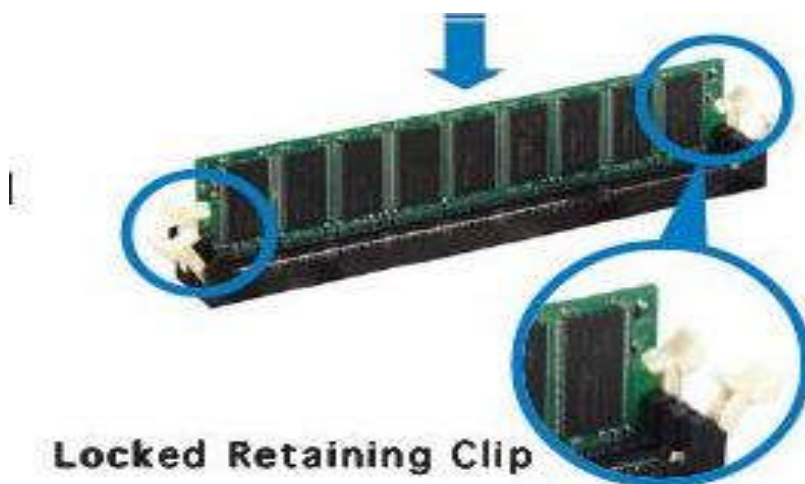
Make sure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1. Unlock a DIMM socket by pressing the retaining clips outward
2. Align a DIMM on the socket such that the notch on the DIMM matches the break on the socket



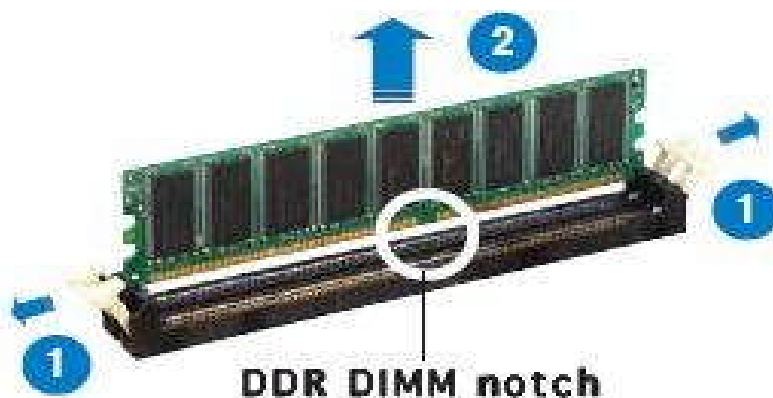
A DDR DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket to avoid damaging the DIMM.

3. Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated



Follow these steps to remove a DIMM:

1. Simultaneously press the retaining clips outward to unlock the DIMM



2. Remove the DIMM from the socket

2.8 Remove and Install Compact Flash Card

1. Insert the Compact Flash Card (**Fig. 2-7**) into the CF interface (**Fig. 2-8**).



Fig. 2-6 Compact Flash Card

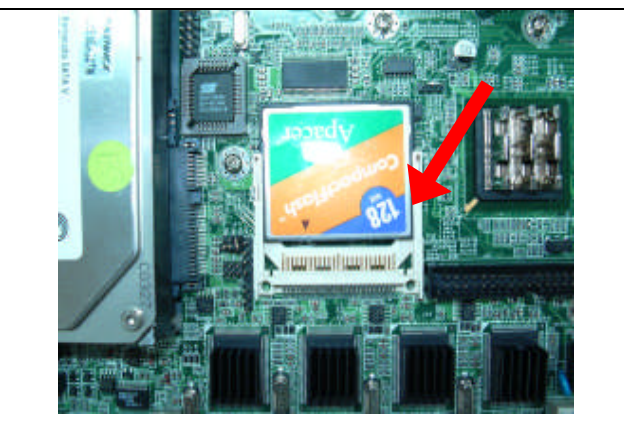


Fig. 2-7 Insert Compact Flash Card into the CF interface

2. The completed installation of Compact Flash Card is shown as **Fig. 2-8**

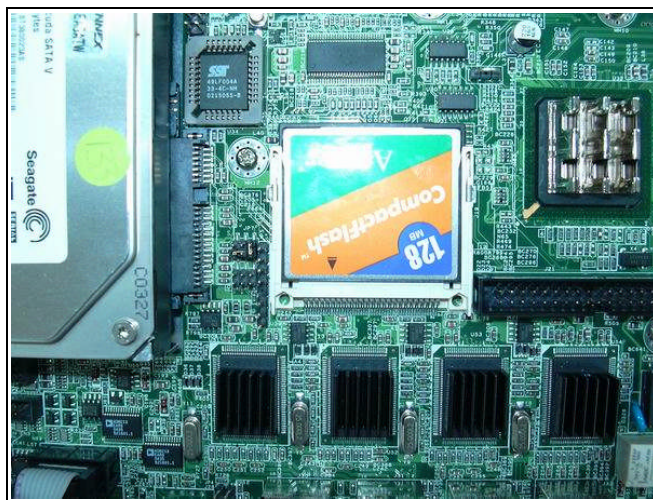


Fig. 2-8 Completion of Compact Flash Card connection

2.9 Remove and Install Battery

1. Press the metal clip back to eject the button battery (**Fig. 2-9**).
2. Replace it with a new one by pressing the battery with fingertip to restore the battery (**Fig. 2-10**).

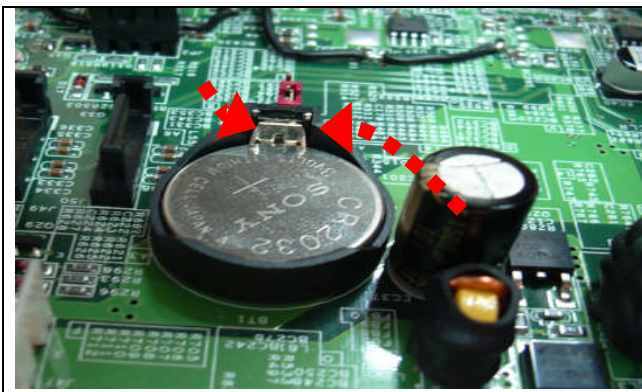


Fig. 2-9 Eject the battery

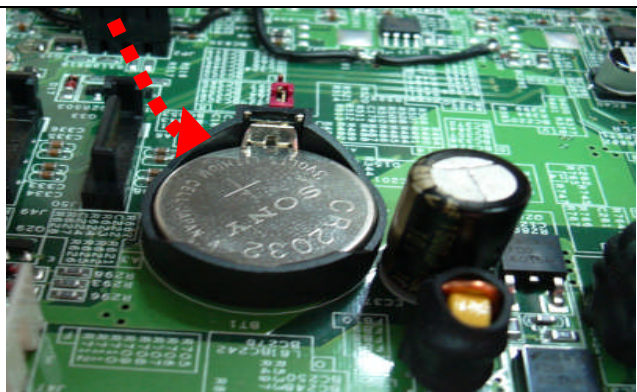


Fig. 2-10 Restore the battery

2.10 Install HDD

The system has an internal drive bay for one 3.5" SATA hard disk drive. If the HDD is not pre-installed, you can install it by yourself. Follow the steps below to install the HDD:

1. Fasten the two screws to lock HDD and bracket together (**Fig. 2-11a, 2-11b**).

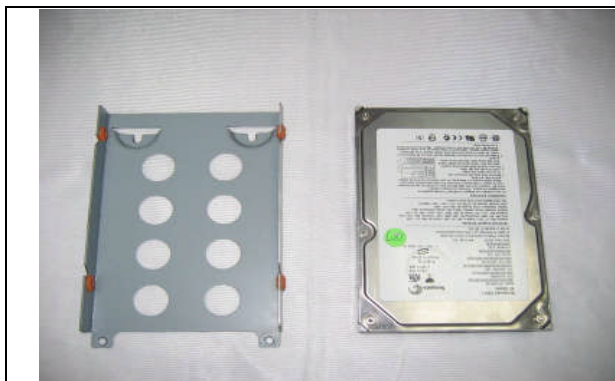


Fig. 2-11a A 3.5" SATA HDD and the HDD bracket



Fig. 2-11b Fix HDD to the bracket

2. Connect Power cable and HDD cable to NAR-5530RB system board (**Fig. 2-12**).



Fig. 2-12 Connect HDD to NAR-5530 system board and drive two screws back

2.11 Ear Mount Kit Installation

The NAR-5530 series shipped with 2 ear mount kits. The following is the installation instruction of these ear mounts:

1. Take out the L shape ear mount kits. One ear mount fits on one side of the chassis,

2. Placing the side with four holes against the chassis and the side with two holes face outward. (**Fig. 2-13**)
3. Fasten five screws on each side (**Fig. 2-13**)

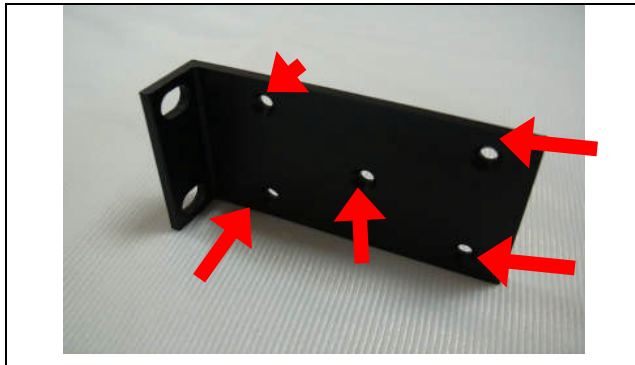


Fig.2-13 Fasten the screws to the side

2.12 Use a Client Computer



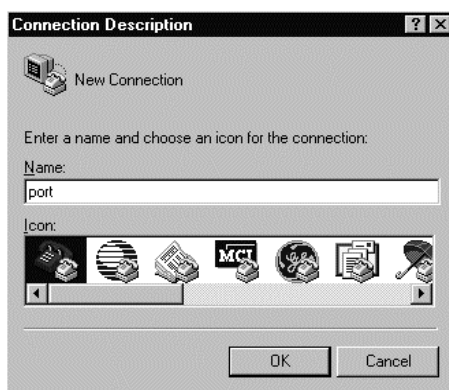
Connection Using Hyper Terminal

If users use a headless NAR-5530 system, which has no mouse/keyboard and VGA output connected to it, the console may be used to communicate with NAR-5530.

To access NAR-5530 via the console, Hyper Terminal is one of many choices. Follow the steps below for the setup:

Note: Terminal software may need to update for correct console output.

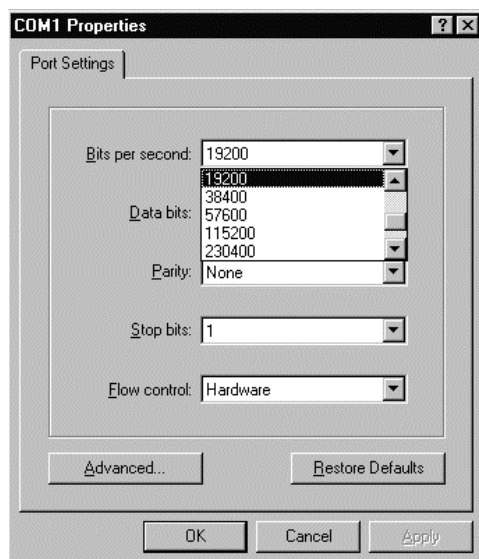
1. Execute HyperTerminal under C:\Program Files\Accessories\HyperTerminal
2. Enter a name to create new dial



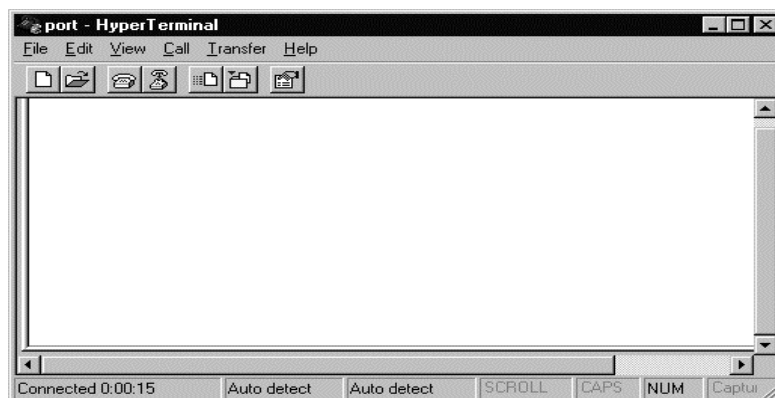
3. For the connection settings, make it Direct to Com1.



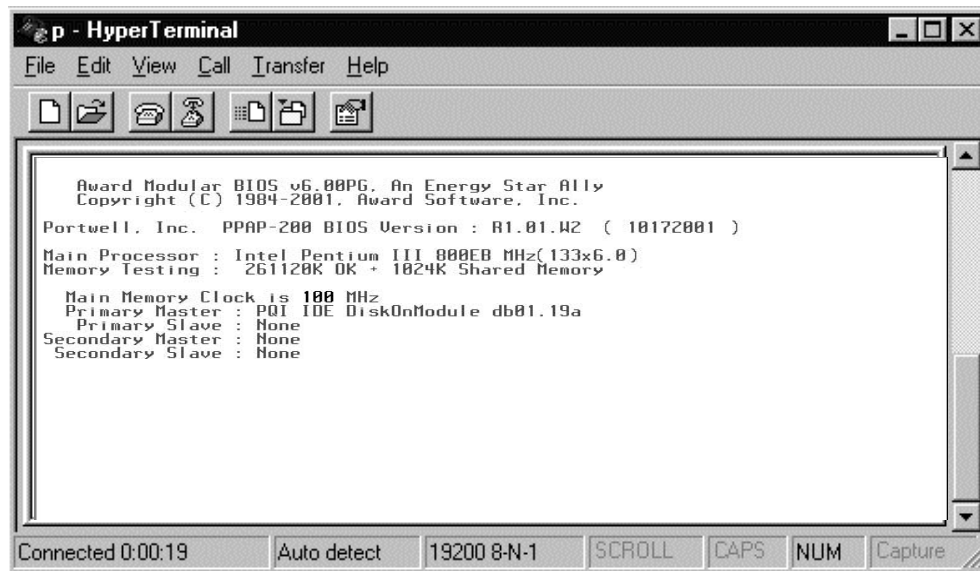
4. Please make the port settings to Baud rate 19200, Parity None, Data bits 8, Stop bits 1



5. Turn on the power of NAR-5530 system, after following screen was shown:



6. You can then see the boot up information of NAR-5530.



7. When message "Hit if you want to run Setup" appear during POST, after turning on or rebooting the computer, press **<Tab>** key **immediately** to enter BIOS setup program.

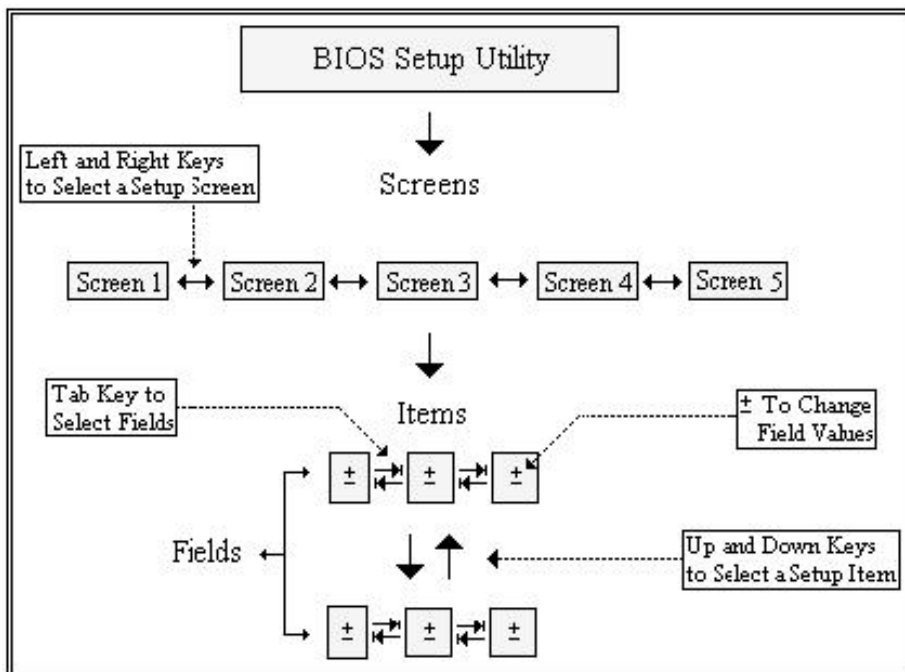
This is the end of this section. If the terminal did not port correctly, please check the previous steps.

Chapter 3 BIOS Setting

BIOS Setup Information

Power on the system, press the to run BIOS setup. After you press the <Delete> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Chipset and Power menus.

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, <Arrow> keys, and so on.



Control Keys

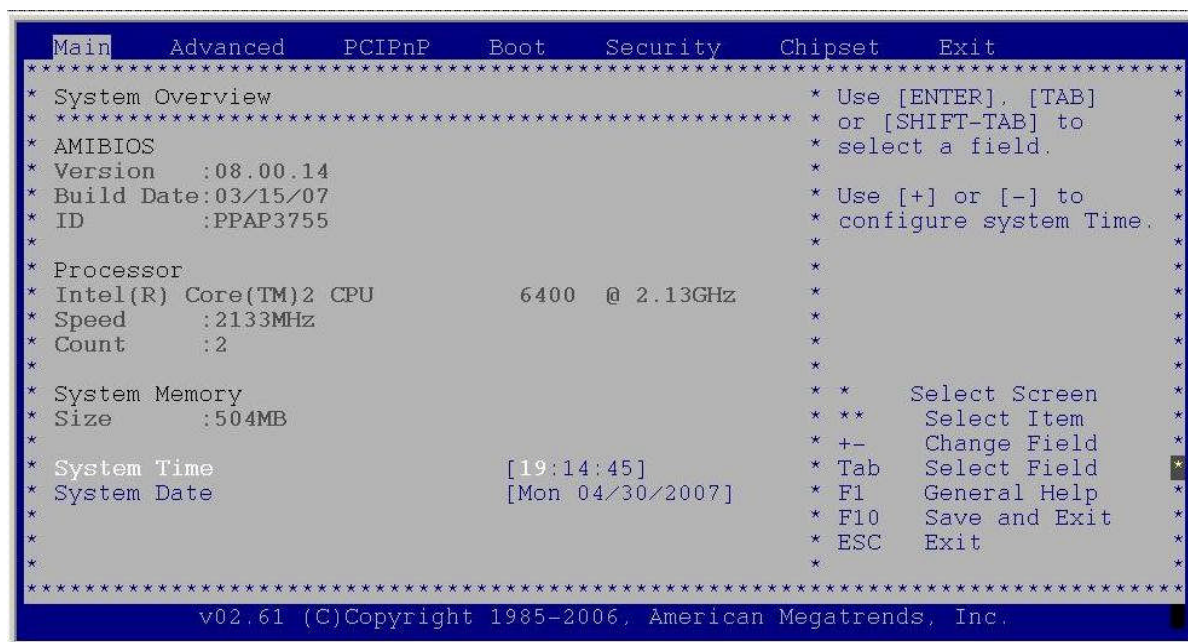
Key	Function
↑↓ Up /Down	The <i>Up and Down</i> <Arrow> keys allow you to select a setup item or sub-screen.
→ ← Left/Right	The <i>Left and Right</i> <Arrow> keys allow you to select a setup screen. For example: Main screen, Advanced screen, Chipset screen, and so on.
+ - Plus/ Minus	The <i>Plus and Minus</i> <Arrow> keys allow you to change the field value of a particular setup item. For example: Date and Time.
Tab	The <Tab> key allows you to select setup fields.

Hot Key	Description																												
F1	<p>The <F1> key allows you to display the <i>General Help</i> screen.</p> <p>Press the <F1> key to open the <i>General Help</i> screen.</p> <div><div><div>General Help</div><table><tr><td>↔</td><td>Select Screen</td><td>↓↑</td><td>Select Item</td></tr><tr><td>+ -</td><td>Change Screen</td><td>Enter</td><td>Go to Sub Screen</td></tr><tr><td>PGDN</td><td>Next Page</td><td>PGUP</td><td>Previous Page</td></tr><tr><td>Home</td><td>Go to Top of the Screen</td><td>End</td><td>Go to Bottom of Screen</td></tr><tr><td>F2/F3</td><td>Change Colors</td><td>F7</td><td>Discard Changes</td></tr><tr><td>F8</td><td>Load Failsafe Defaults</td><td>F9</td><td>Load Optimal Defaults</td></tr><tr><td>F10</td><td>Save and Exit</td><td>ESC</td><td>Exit</td></tr></table><div>[Ok]</div></div></div>	↔	Select Screen	↓↑	Select Item	+ -	Change Screen	Enter	Go to Sub Screen	PGDN	Next Page	PGUP	Previous Page	Home	Go to Top of the Screen	End	Go to Bottom of Screen	F2/F3	Change Colors	F7	Discard Changes	F8	Load Failsafe Defaults	F9	Load Optimal Defaults	F10	Save and Exit	ESC	Exit
↔	Select Screen	↓↑	Select Item																										
+ -	Change Screen	Enter	Go to Sub Screen																										
PGDN	Next Page	PGUP	Previous Page																										
Home	Go to Top of the Screen	End	Go to Bottom of Screen																										
F2/F3	Change Colors	F7	Discard Changes																										
F8	Load Failsafe Defaults	F9	Load Optimal Defaults																										
F10	Save and Exit	ESC	Exit																										
F10	<p>The <F10> key allows you to save any changes you have made and exit Setup. Press the <F10> key to save your changes. The following screen will appear:</p> <div><div><div>Save configuration changes and exit now?</div><div><div>[Ok]</div><div>[Cancel]</div></div></div></div> <p>Press the <Enter> key to save the configuration and exit. You can also use the <Arrow> key to select <i>Cancel</i> and then press the <Enter> key to abort this function and return to the previous screen.</p>																												
ESC	<p>The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes. The following screen will appear:</p> <div><div><div>Discard changes and exit setup now?</div><div><div>[Ok]</div><div>[Cancel]</div></div></div></div> <p>Press the <Enter> key to discard changes and exit. You can also use the <Arrow> key to select <i>Cancel</i> and then press the <Enter> key to abort this function and return to the previous screen.</p>																												
Enter	<p>The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.</p>																												



Main Menu

When you first enter the Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the *Main* tab. There are two Main Setup options. They are described in this section.



System Date / Time

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

➤ Advanced BIOS 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.



➤ IDE Configuration Setup

From the IDE Configuration screen, press <Enter> to access the sub menu. Use the up and down <Arrow> keys to select an item. The settings are described on the following pages.



➤ SUPER IO CONFIGURATION

SuperIO Configuration

You can use this screen to select options for the Super I/O 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. The settings are described on the following pages. The screen is shown below.



➤ REMOTE ACCESS CONFIGURATION

Remote Access Configuration

You can use this screen to select options for the Remote Access 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. The settings are described on the following pages. The screen is shown below.

```

Advanced
*****
* Configure Remote Access type and parameters                               *
* *****                                                                    *
* Remote Access                    [Enabled]                                *
* *                                                                           *
* Serial port number                [COM1]                                  *
*   Base Address, IRQ              [3F8h, 4]                               *
* Serial Port Mode                  [19200 8,n,1]                          *
* Flow Control                      [None]                                  *
* Redirection After BIOS POST       [Always]                                *
* Terminal Type                    [ANSI]                                   *
* VT-UTF8 Combo Key Support         [Enabled]                              *
* Sredir Memory Display Delay       [No Delay]                             *
* *                                                                           *
* *                               * *   Select Screen                       *
* **                              **   Select Item                       *
* +-                              +-   Change Option                     *
* F1                              F1   General Help                      *
* F10                             F10  Save and Exit                     *
* ESC                              ESC  Exit                             *
* *                                                                           *
*****
v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.

```

Remote Access

You can disable or enable the BIOS remote access feature here.

Serial Port Number

Select the serial port you want to use for console redirection. You can set the value for this option to either *COM1* or *COM2*.

Serial Port Mode

Select the baud rate you want the serial port to use for console redirection.

➤ USB Configuration

You can use this screen to select options for the USB 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. The settings are described on the following pages. The screen is shown below.

```

Advanced
*****
* USB Configuration                                                         *
* *****                                                                    *
* Module Version - 2.24.0-12.4                                             *
* *                                                                           *
* USB Devices Enabled :                                                    *
*   1 Keyboard, 1 Mouse                                                    *
* *                                                                           *
* Legacy USB Support                [Enabled]                              *
* Port 64/60 Emulation              [Disabled]                            *
* USB 2.0 Controller Mode           [HiSpeed]                             *
* BIOS EHCI Hand-Off               [Enabled]                              *
* *                                                                           *
* *                               * *   Select Screen                       *
* **                              **   Select Item                       *
* +-                              +-   Change Option                     *
* F1                              F1   General Help                      *
* F10                             F10  Save and Exit                     *
* ESC                              ESC  Exit                             *
* *                                                                           *
*****
v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.

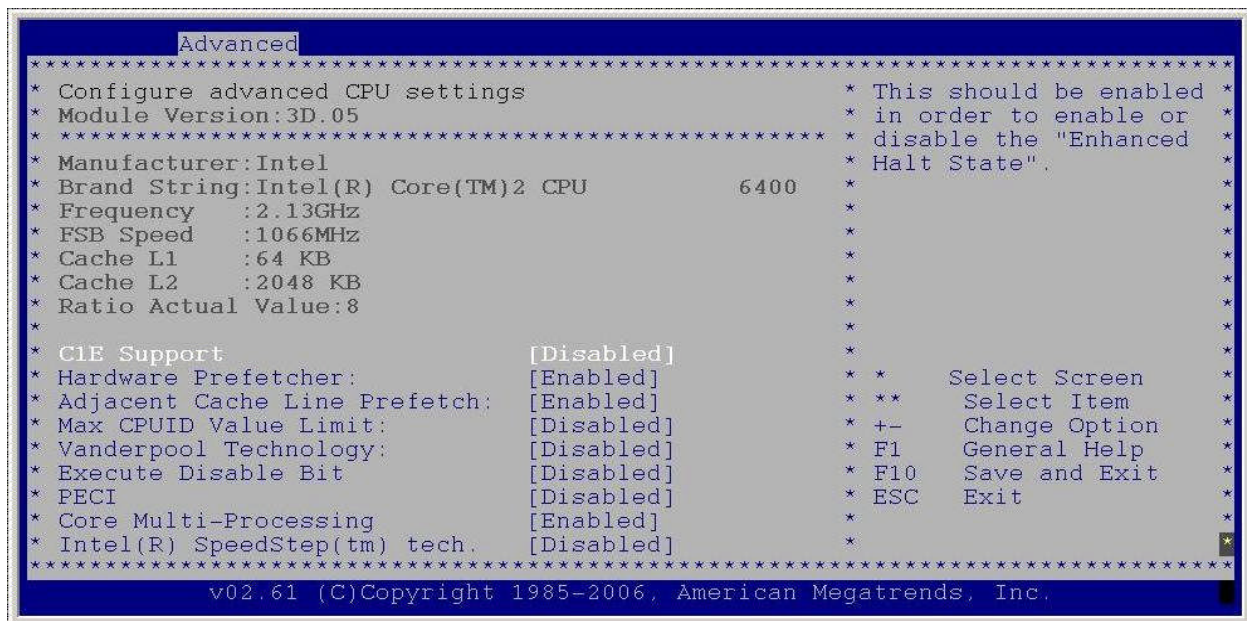
```

Legacy USB Support

Legacy USB Support refers to the USB mouse and USB keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard will not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB drivers loaded on the system. Set this value to enable or disable the Legacy USB Support. The Optimal and Fail-Safe default setting is *Disabled*.

➤ CPU Configuration

You can use this screen to select options for the CPU 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.



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

➤ Boot Settings

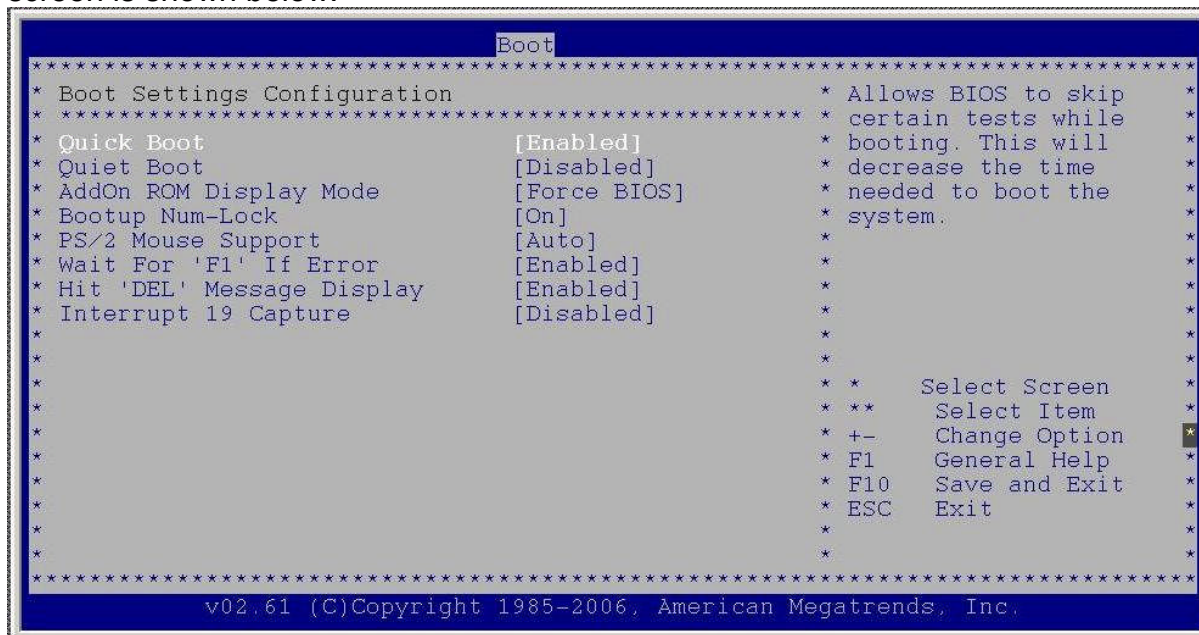
Select the *Boot* tab from the setup screen to enter the Boot BIOS Setup screen.



➤ BOOT SETTINGS CONFIGURATION SCREEN

Boot Settings Configuration

Use this screen to select options for the Boot Settings 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. The settings are described on the following pages. The screen is shown below.



Quick Boot

The Optimal and Fail-Safe default setting is *Disabled*.

Quiet Boot

Set this value to allow the boot up screen options to be modified between POST messages or OEM logo. The Optimal and Fail-Safe default setting is *Enabled*.

Add-On ROM Display Mode

Set this option to display add-on ROM (read-only memory) messages. The Optimal and Fail-Safe default setting is *Force BIOS*. An example of this is a SCSI BIOS or VGA BIOS.

Boot up Num-Lock

Set this value to allow the Number Lock setting to be modified during boot up. The Optimal and Fail-Safe default setting is *On*.

PS/2 Mouse Support

Set this value to allow the PS/2 mouse support to be adjusted. The Optimal and Fail-Safe default setting is *Enabled*.

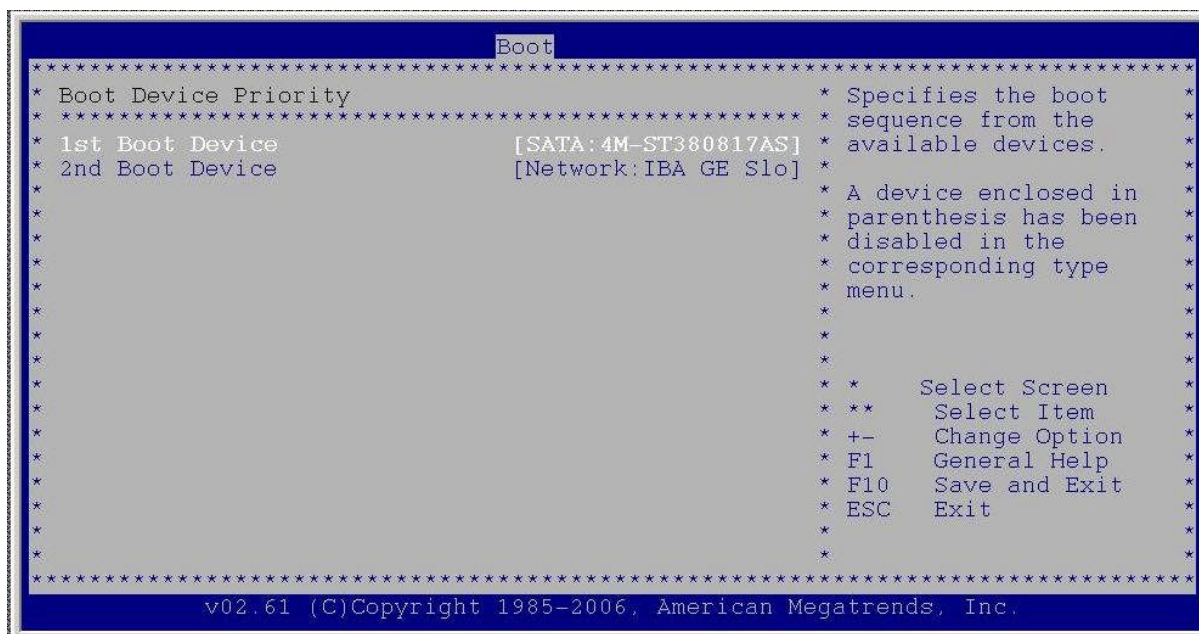
Interrupt 19 Capture

Set this value to allow option ROMs such as network controllers to trap BIOS interrupt 19.

➤ BOOT DEVICE PRIORITY

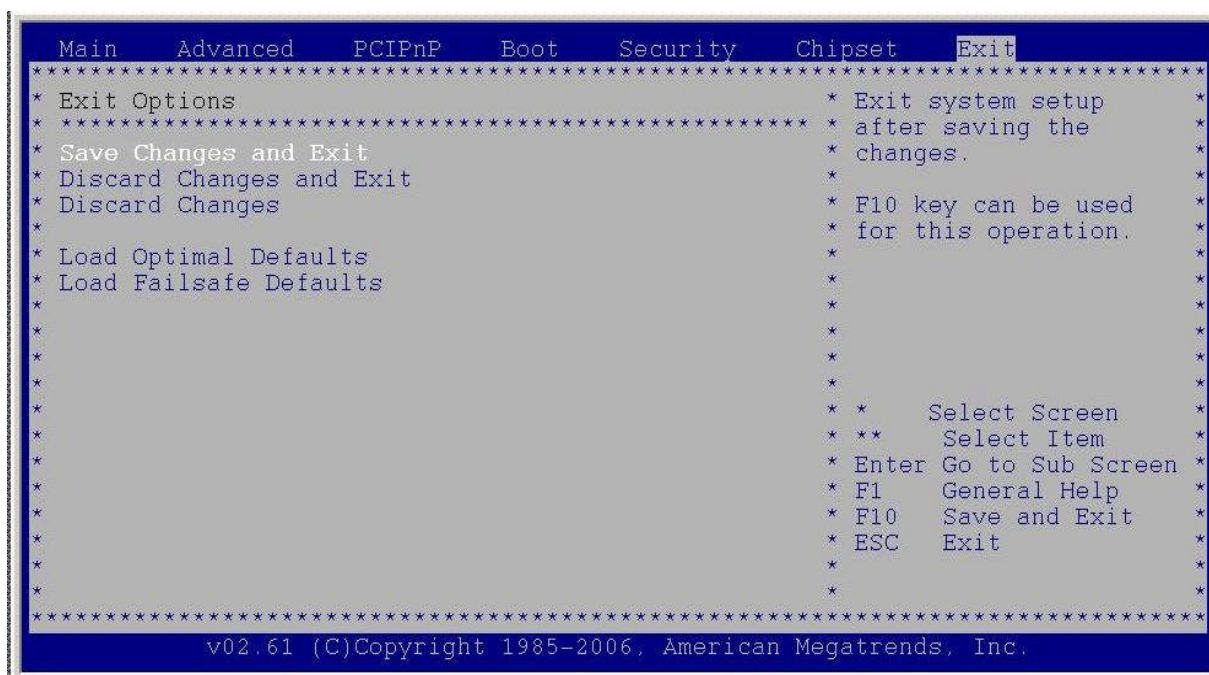
Boot Device Priority

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>. The following screen displays:



➤ Exit Menu

Select the *Exit* tab from the setup screen to enter the Exit BIOS Setup screen. You can display an Exit BIOS Setup option by highlighting it using the <Arrow> keys. All Exit BIOS Setup options are described in this section. The Exit BIOS Setup screen is shown below.



Saving Changes and Exit

When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Exit Saving Changes from the Exit menu and press <Enter>.

Discarding Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration. Select Exit Discarding Changes from the Exit menu and press <Enter>.

Discard Changes

Select Discard Changes from the Exit menu and press <Enter>.

Load Optimal Defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. Select Load Optimal Defaults from the Exit menu and press <Enter>.

Load Fail-Safe Defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. The Fail-Safe settings are designed for maximum system stability, but not maximum performance. Select the Fail-Safe Setup options if your computer is experiencing system configuration problems.

Select Load Fail-Safe Defaults from the Exit menu and press <Enter>.

Chapter 4 EZIO Programming Guide

4.1 About EZIO3

Proprietary keypad and LCD display interfaces are implemented in traditional computing system design, but they are usually different from system to system. The main purpose to roll this module out is to provide an easier human-machine interface for those computing systems regarding application friendly operation as a “must.”

The design goals of this interface are:

- ◆ A single interface for those applications where both LCD display and keypad are required.
- ◆ This interface should be available in every computing system.
- ◆ The communication implementation should be OS independent.

Our solution is to use “Serial port” as the interface for both LCD display and keypad. A simple protocol is further defined so that applications can directly communicate with this module no matter what the Operating System is.

WARNING!

THE LCD DRIVER ICS ARE MADE OF CMOS PROCESS, DAMAGED BY STATIC CHARGE VERY EASILY. MAKE SURE THE USER IS GROUNDED WHEN HANDLING THE LCD.

4.2 Features

- Ideal user interface for communication appliance
- No driver required; OS independent
- Alphanumeric characters display support
- Four key pads can be customized for different applications
- Easy system installation and operation
- Clearly display system status
- Single interface to SBC or M/B

4.3 Technical Support Information

For further support, users may also contact Portwell’s headquarter in Taipei or your local distributors.

Taipei Office Phone Number: +886-2-27992020

4.4 Mechanical Specification

Module Size (mm):	• 101.6(W) x 26.0(H) x 30.6(D) (max.)
Display Format:	• 16 characters x 2 lines
Character Size:	• 3.0 x 5.23 mm

4.5 General Specification

General Specification

Display Resolution:	• 16 characters x 2 lines
Dimensional Outline (mm):	• 101.6(W) x 26.0(H) x 30.6(D) (max.)
Function Key:	• Four operation keys (up, down, enter and ESC)
Display Icon:	• Eight self-defined icons
Interface:	• RS-232

Absolute Maximum Rating

Item	Normal Temperature			
	Operating		Storage	
	Max.	Min.	Max.	Min.
Ambient Temperature	0°C	+50°C	-20°C	+70°C
Humidity (w/o condensation)	Note 2, 4		Note 3, 5	

4.6 Product Outlook



4.7 Interface Pin Assignment

There are only two connectors in this module, as shown in **Figure C.2-1**: power connector and Serial Port connector. The power source into this module is 5 volt only. There are only three pins used in the Serial Port interface (**Figure C.2-2**).

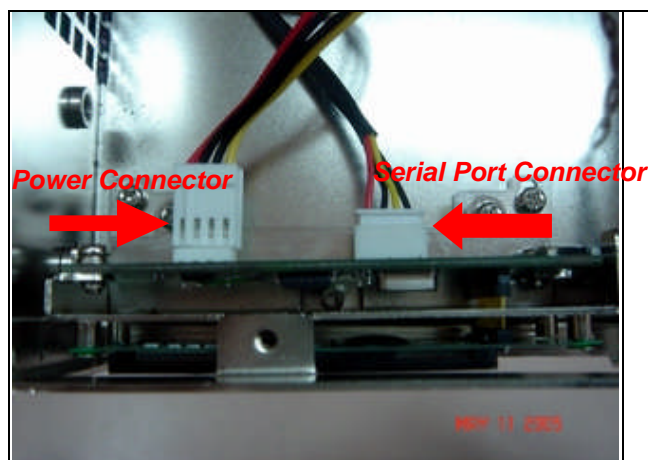


Fig. C.2-1 Power connector and serial port connector of EZIO-100

5	4	3	2	1
10	9	8	7	6

Pin 2: TxD Pin 3 : RxD Pin 5 : Ground

Fig. C.2-2 Pin assignment

In other words, the Serial Port is defined as DCE. Therefore, we can use a straight-through cable to connect it to the Serial Port of most of the computers, defined as DTE.

(1) Interface Pin Assignment

PIN NO.	PIN OUT	Description
1	NC	No connector
2	RXD	RS232 Data
3	TXD	RS232 Data
4	NC	No connector
5	V _{ss}	Ground
6	NC	No connector
7	NC	No connector
8	NC	No connector
9	NC	No connector
9	NC	No connector

(2) Power

PIN NO.	PIN OUT	Description
1	NC	No connector
2	GND	Power GND
3	GND	Power GND
4	+5V	Power VCC (+5V)

4.8 Hardware installation

The installation steps are:

- ◆ Connect the power connector to the power connector of this module.
Connect the straight-through cable between Serial Port of this module and computer

4.9 EZIO3 Function Command

First, all versions (00A, 01A, 02A) of EZIO can use those commands. Only the 02A version of EZIO firmware that adds “FE 28” & “FE 37” command can control start of HEX & End of HEX.

EZIO is an intelligent device, which will display those data received from RS-232 port and reply key pressing status to polling command from RS-232 port. Both commands and data go thru RS-232 ports. To distinguish between data and commands, the LCD/key-pad module recognizes a command prefix, 254 (Hex 0FE). The byte following “254” will be processed as a command. For example, to clear the screen, send the command prefix (254) followed by the LCD clear-screen code (1). The valid data range is shown as the following table:

<i>Valid data range</i>	<i>Displayed characters</i>
0-7	Customized icon 0-7
48-57 (30-39 Hex)	0-9
65-90 (41-5A Hex)	A-Z
97-122 (61-7A Hex)	a-z

To get the key pressing status, a “read key” command can be issued to this module, which will check the key-pressing status and reply accordingly. The following are the commands and corresponding Decimal/Hex values:

	<i>Functions/commands</i>	<i>Decimal/Hex</i>	<i>Comment</i>
1.	Start Of HEX	40/28	Only for 02A
2.	End Of HEX	55/37	Only for 02A
3.	Clear screen	1/01	
4.	Home cursor	2/02	
5.	Read key	6/06	See note 1
6.	Blank display (retaining data)	8/08	
7.	Hide cursor & display blanked characters	12/0C	
8.	Turn on (blinking block cursor)	13/0D	
9.	Show underline cursor	14/0E	
10.	Move cursor 1 character left	16/10	
11.	Move cursor 1 character right	20/14	
12.	Scroll 1 character left	24/18	
13.	Scroll 1 character right	28/1C	
14.	Set display address (position the cursor) location	128 (Hex080)+ Location	See note 2
15.	Set character-generator address	64 (Hex 040)+ address	See note 3

Note 1: Upon receiving the “read key” command from host computer, the LCD/keypad module will check the status of every key and reply with status command accordingly. The replied message from LCD/key-pad module consists of a header and a status byte. The header byte is 253 (Hex0FD). The high nibble (with the most significant bit) of the status byte is always “4” and the low nibble (with the least significant bit) of the status byte is used to indicate key pressing status of the keypad module. This nibble will be “F” (of four 1s), if no key pressed while the “read key” received. “0” will be used to indicate key pressing status of corresponding key. There are four keys in this module – upper arrow, down arrow, enter (ENT), and escape (ESC). The relationship between the function key, corresponding status bit and status byte is shown as the table below.

Function key	Corresponding status bit	Status byte
Escape	The fourth bit of lower nibble (the least significant bit) (1110)	B7 (H)
Up arrow	The third bit of lower nibble (1101)	BE (H)
Enter	The second bit of lower nibble (1011)	BB (H)
Down arrow	The first bit of lower nibble (0111)	BD (H)

More than one key can be pressed at the same time so that there may be more than one “0”s in the low nibble of status byte. For example, if Up and Down arrow keys are pressed at the same time while “read key” command received, the replied status will be “Hex045”.

Note 2: This command can be used to place the cursor at any location. The corresponding address for each character on the screen is as follows:

For 16x2 Display Address

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Location	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
(Address)	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

The addresses of characters at the same row are continuous, so moving cursor commands can be applied to shift the cursor position back and forth. However, the addresses of characters between upper and lower row are discontinuous. To change cursor position between upper row and lower row, this command will be applied.

Note 3: This command can be used to create customized icon. The starting address is 64 and every character will take 8 bytes to create a 5(W) x 7(H) resolution picture, as shown below:

CG RAM MAPPING

CG RAM Address							Character Patterns (CG RAM data)								
5	4	3	2	1	0		7	6	5	4	3	2	1	0	
High			Low				High			Low					
0	0	0	0 0 0							0	1	1	0	0	Character Pattern
			0 0 1							1	0	0	1	0	
			0 1 0							0	0	1	0	0	
			0 1 1							0	1	0	0	0	
			1 0 0				*	*	*	1	1	1	1	0	
			1 0 1							0	0	0	0	0	
			1 1 0							0	0	0	0	0	
0	0	1	1 1 1							0	0	0	0	0	Cursor
0	0	1	0 0 0							1	1	1	1	1	Character Pattern
			0 0 1							1	0	0	0	1	
			0 1 0							1	0	0	1	0	
			0 1 1							1	0	1	1	1	
			1 0 0				*	*	*	1	0	1	0	1	
			1 0 1							1	0	0	0	1	
			1 1 0							1	1	1	1	1	
			1 1 1							0	0	0	0	0	Cursor

1	1	1				
	0	0	0			
	0	0	1			
	0	1	0			
	0	1	1			
	1	0	0			
	1	0	1			
	1	1	0			
	1	1	1			

To show the customized icon, simply send the data between “0” to “7” to this module.

For example, this module will display the customized icon at location 64 to 71 upon receiving data “0”, while it will display the customized icon at location 72 to 79 upon receiving data “1”.

Watchdog timer is also built in the module. This module will reset itself and send out “reset packet” (0FDH, 0EH) thereafter.

The input must be a standard RS-232 or inverted TTL signal. The RS-232 setting should be:

- ◆ Baud rate: 2400 bps
- ◆ Parity: None
- ◆ Data bits: 8
- ◆ Stop bit: 1

What follows is the default setup after LCD module initiated:

- ◆ 2-line display mode; every character is 5 x 8 dots.
- ◆ Display on; cursor off; cursor blink off.
- ◆ Display will be cleared.
- ◆ Shift right for entry mode.
- ◆ Set address counter to “00”(cursor position to 0)
- ◆ In entry mode.

4.10 Character Generator ROM (CGROM)

Upper bits Lower bits		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0000	CG RAM (1)			0	a	P	\	F				—	タ	E	o	P	
0001	CG RAM (2)		!	1	A	O	a	a				「	ア	チ	△	△	g
0010	CG RAM (3)		"	2	B	R	b	r				「	イ	ウ	×	p	e
0011	CG RAM (4)		*	3	C	S	c	s				」	ウ	チ	チ	E	△
0100	CG RAM (5)		*	4	D	T	d	t				」	エ	ト	ト	h	o
0101	CG RAM (6)		%	5	E	U	e	u				「	オ	ナ	1	o	o
0110	CG RAM (7)		0	6	F	V	f	v				「	カ	ニ	ヨ	p	△
0111	CG RAM (8)		'	7	G	W	g	w				「	キ	ズ	ラ	g	π
1000	CG RAM (1)		(8	H	X	h	x				「	ク	ホ	リ	「	△
1001	CG RAM (2))	9	I	Y	i	y				「	ケ	ル	「	「	△
1010	CG RAM (3)		*	#	J	Z	j	z				「	コ	ノ	「	j	△
1011	CG RAM (4)		+	#	K	L	k	l				「	サ	ヒ	ロ	「	△
1100	CG RAM (5)		,	<	L	*	l	l				「	セ	フ	「	△	π
1101	CG RAM (6)		—	=	M	J	m	j				「	ズ	「	「	△	÷
1110	CG RAM (7)		#	>	N	^	n	+				「	セ	ホ	「	△	
1111	CG RAM (8)		/	?	O	_	o	+				「	ウ	「	△	△	△

```

/* *****
* EZIO RS232 LCD Control Sample Program
* *****
* *****
* Company:      Portwell Inc.
* Date:         4/16/2003
* Program:      02A.c
* Version:      1.02
* Compile:      Linux GNU C
* Purpose:      Direct access to EZIO LCD, the program will display
*               messages according to the control button. The current
*               version only has the following function:
*
*               1: display welcome message
*               2: display UP message if "scroll up" button is pressed
*               3: display ENTER message if "ENTER" button is pressed
*               4: display ESC message if "ESC" button is pressed
*               5: display DOWN message if "scroll down" button is pressed
*
* Program Overview:
*
*   - Parameters:
*       fd          : a file name for open() method, here represents the com port
*       Cmd         : command prefix
*       cls         : clear command
*       init        : initialize command
*       blank       : display blank screen
*       stopsend    : stop input/output
*       home        : move cursor to initial position
*       readkey     : set to read from EZIO
*       hide        : hide cursor & display blanked characters
*       movel       : move cursor one character left
*       mover       : move cursor one character right
*       turn        : turn on blinking-block cursor
*       show        : turn on underline cursor
*       scl         : scroll cursor one character left
*       scr         : scroll cursor one character right
*       setdis      : set character-generator address
*
*   - Procedure:
*       1. The program sets up the environment, i.e. com port settings.
*       2. The main function MUST call init() twice to initialize EZIO
*          before any communication.
*       3. For executing any command, the command prefix, Cmd, MUST be
*          called be command. So all command contains two parts, eg.
*          to initialize the sequence of HEX number is 0xFE, 0x25.
*       4. After clear screen and display welcome message, ReadKey()
*          method must be call to advise EZIO for reading data.
*       5. A pooling method is implemented to get input from EZIO while
*          any button is pressed.
*
*   - NOTE: This program is a sample program provided " AS IS" with NO
*           warranty.
*
* Copyright (c) Portwell, Inc. All Rights Reserved.
* *****/
#include <sys/stat.h>
#include <fcntl.h>
#include <unistd.h>

```

```

#include <stdlib.h>

static int fd;

void SetEnvironment () {
    system("stty ispeed 2400 < /dev/ttyS1");
    system("stty raw < /dev/ttyS1");
}

int Cmd = 254; /* EZIO Command */
int cls = 1; /* Clear screen */
void Cls () {
    write(fd,&Cmd,1);
    write(fd,&cls,1);
}

int init = 0x28;
void Init () {
    write(fd,&Cmd,1);
    write(fd,&init,1);
}

int stopsend = 0x37;
void StopSend () {
    write(fd,&Cmd,1);
    write(fd,&init,1);
}

int home = 2 ; /* Home cursor */
void Home () {
    write(fd,&Cmd,1);
    write(fd,&home,1);
}

int readkey = 6 ; /* Read key */
void ReadKey () {
    write(fd,&Cmd,1);
    write(fd,&readkey,1);
}

int blank = 8 ; /* Blank display */
void Blank () {
    write(fd,&Cmd,1);
    write(fd,&blank,1);
}

int hide = 12 ; /* Hide cursor & display blanked characters */
void Hide () {
    write(fd,&Cmd,1);
    write(fd,&hide,1);
}

int turn = 13 ; /* Turn On (blinking block cursor) */
void TurnOn () {
    write(fd,&Cmd,1);
    write(fd,&turn,1);
}

int show = 14; /* Show underline cursor */
void Show () {
    write(fd,&Cmd,1);
    write(fd,&show,1);
}

int movel = 16 ; /* Move cursor 1 character left */

```

```

void MoveL () {
    write(fd,&Cmd,1);
    write(fd,&movel,1);
}

int mover = 20      ; /* Move cursor 1 character right */
void MoveR () {
    write(fd,&Cmd,1);
    write(fd,&mover,1);
}

int scl = 24;      /* Scroll cursor 1 character left */
void ScrollL(){
    write(fd,&Cmd,1);
    write(fd,&scl,1);
}

int scr = 28;      /* Scroll cursor 1 character right */
void ScrollR(){
    write(fd,&Cmd,1);
    write(fd,&scr,1);
}

int setdis = 64; /* Command */
void SetDis(){
    write(fd,&Cmd,1);
    write(fd,&setdis,1);
}

/* Add or Change Show Message here */
char mes1[] = "Portwell EZIO";
char mes2[] = "*****";
char mes3[] = "Up is selected";
char mes4[] = "Down is selected";
char mes5[] = "Enter is selected";
char mes6[] = "ESC is selected";
char nul[] = "          ";

int a,b;
void ShowMessage (char *str1 , char *str2) {
    a = strlen(str1);
    b = 40 - a;
    write(fd,str1,a);
    write(fd,nul,b);
    write(fd,str2,strlen(str2));
}

int main () {

    SetEnvironment(); /* Set RAW mode */

    fd = open("/dev/ttyS1" ,O_RDWR);/** Open Serial port (COM2) */

    Init(); /* Initialize EZIO twice */
    Init();

    Cls(); /* Clear screen */
    ShowMessage(mes1,mes2);

    while (1) {
        int res;
        char buff[255];

```

```

SetDis();
ReadKey(); /* sub-routine to send "read key" command */
res = read(fd,buf,255); /* read response from EZIO */

switch(buf[1]) {      /* Switch the Read command */

    case 0x4D : /* Up Botton was received */
        Cls();
        ShowMessage(mes1,mes3); /* display "Portwell EZIO" */
        break;          /* display "Up is selected" */

    case 0x47 : /* Down Botton was received */
        Cls();
        ShowMessage(mes1,mes4); /* display "Portwell EZIO" */
        break;          /* display "Down is selected" */

    case 0x4B : /* Enter Botton was received */
        Cls();
        ShowMessage(mes1,mes5); /* display "Portwell EZIO" */
        break;          /* display "Enter is selected" */

    case 0x4E : /* Escape Botton was received */
        Cls();
        ShowMessage(mes1,mes6); /* display "Portwell EZIO" */
        break;          /* display "Escape is selected" */

}

}
}

```