ACROSSER®

AR-B1631ET (Extended Temperature)
powered by AMD Geode LX800, EPIC SBC with
CRT, LCD, LAN, USB2.0, PCI/104

User's Guide

Edition: 1.0

Contents

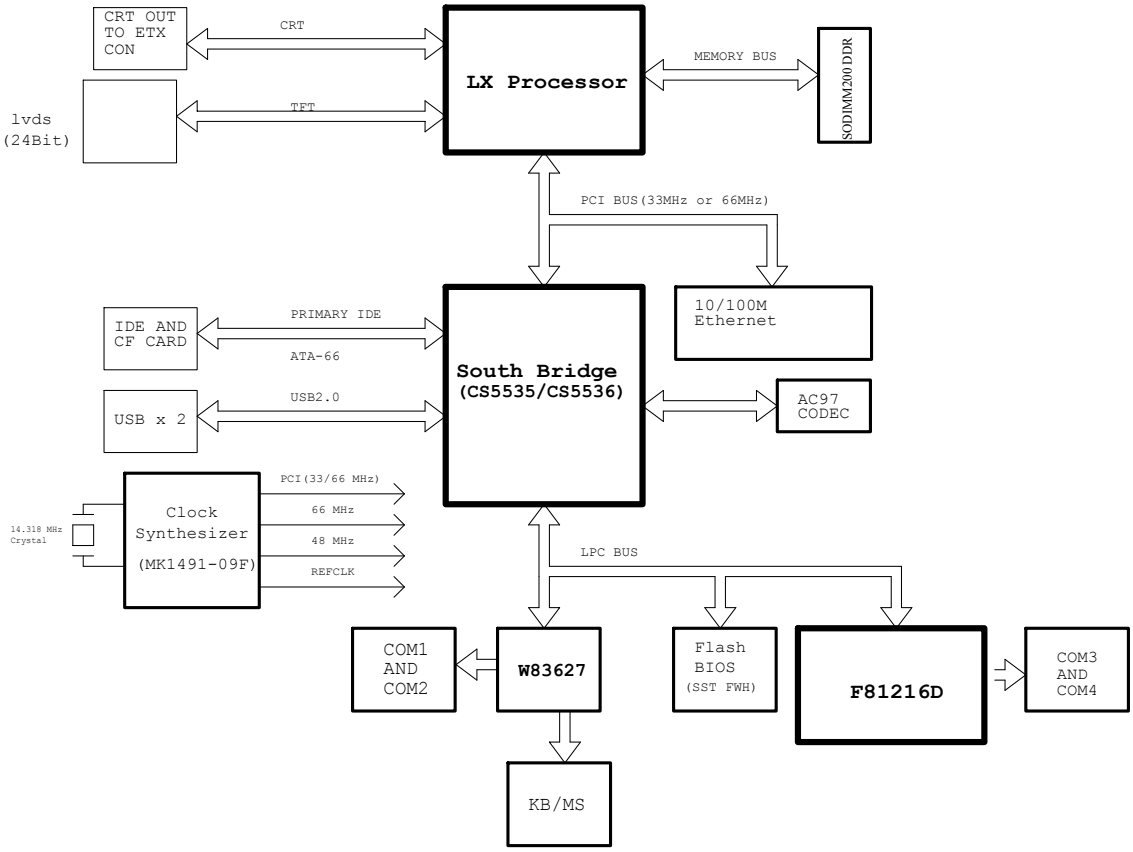
1 INTRODUCTION

Welcome to the AR-B1631ET Single Board Computer, the AR-B1631ET low power AMD Geode LX800 processor board with the advanced chipset CS5536 (CS5535). The board is designed for extreme environments, it can be operated from -40°C to +75°C which can make a lot of outdoor applications available, such as Traffic Control, Vehicle Computer, Remote Workstation, Outdoor Data Acquisition, Aviation or Military industries.

ACROSSER's Extended Temperature Products contain onboard components that have been chosen to withstand extreme operating temperatures. This platform has been fully loaded and passed robust thermal cycling tests. It is a reliable, long life time and cost effective Extended Temperature solution for your application.

In addition, the AR-B1631ET provides on chip VGA. The VGA, which provides up to 1920x1440x32bpp at 85Hz and 1600x1200x32bpp at 100HZ resolutions. The VGA memory is shared with the main memory (2M, 4M, or 8M). AR-B1631ET also has 18-bit LVDS function in the system, with a resolution up to 1600x1200x32bpp at 60Hz.

The AR-B1631ET is loaded with special on-board features that rival full-size systems. It has one network controller on board, uses Realtek RTL8100BL LAN controller, a fully integrated 10/100BASE-TX solution with high performance networking functions. Supports Compact Flash™ Type II interface. Plus optional support for AC97 sound with CD-input. The AR-B1631ET also includes one 200-pin SO-DIMM DDR sockets for up to 1GB total on-board memory. The AR-B1631ET has four on-board serial ports; COM1 with RS232C, COM2, COM3 and COM4 with RS232C, 4 USB ports, and tough industrial grade construction. All these features make the AR-B1631ET a very "system integrator friendly" solution, perfect for handling applications in the harshest unmanned environments.



AR-B1631ET System Block Diagram

SPECIFICATIONS

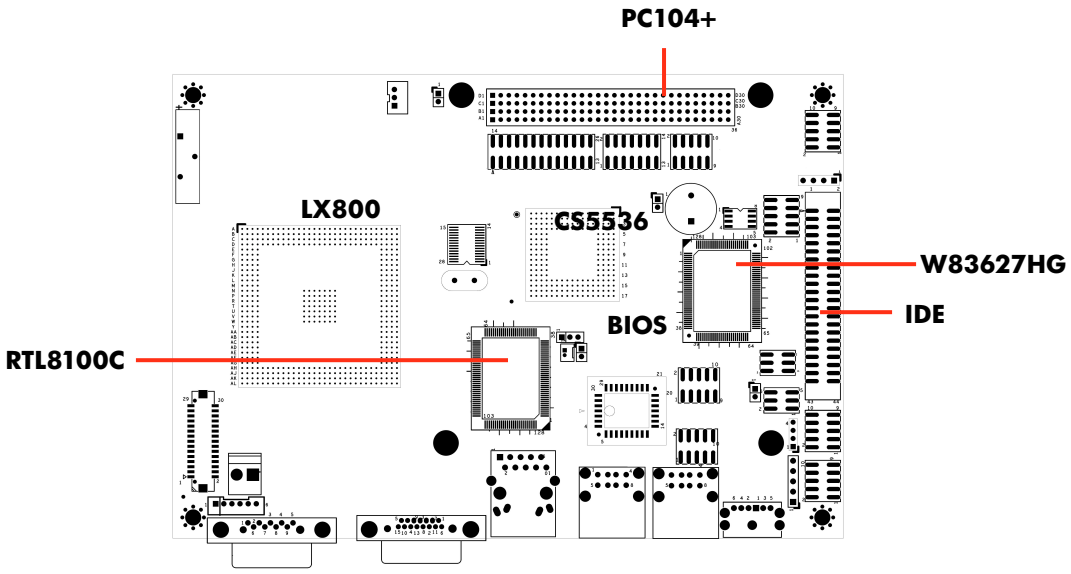
- **CPU:** AMD Geode LX800
- **Chipset:** CS5536 or CS5535
- **RAM memory:** Supports DDR400, on-board 200-pin SO-DIMM socket up to 1GB DDRAM memory module
- **Display Interface:** CRT – D-SUB 15-pin female connector
  LVDS – for 18 bit TFT LCD Panel.
- **Touch Screen Header:** shared with COM
- **Ultra ATA/33/66/100 IDE Interface:**
- **Floppy disk drive interface:** 2.88 MB, 1.44MB, 1.2MB, 720KB, or 360KB floppy disk drive.
- **Compact Flash:** Type II socket
- **Series ports:** On-board one D-SUB 9-pin male connector for COM1 with RS-232C. On-board one 2x5x2.00mm pin-header connector for COM2, COM3 and COM4 with RS-232C.
- **Parallel Port:** On-board one supports SPP/EPP/ECP modes
- **USB port:** Four USB 2.0
- **Audio: onboard AC'97 Codec,** Supports IN/OUT, and Left/Right speaker out, MIC IN, CD IN.
- **Ethernet:** On-board one RTL8100C, supports 10/100Mbps Base-T with RJ-45 connector built-in LED
- **K/B & Mouse:** On-board PS/2 Keyboard and Mouse connector

- **Power Req.:** +5V 2A and +12V 1A maximum
- **PC Board:** 6 layers, EMI considered
- **GPIO:** 8pin (4 output and 4 input) TTL compatible
- **PCB Dimensions:** 6.5" x 4.5", EPIC platform
- **Operating Temperature:** -40°C ~ 75°C
- **Operating Humidity:** 5~60% @75°C (non-condensing)

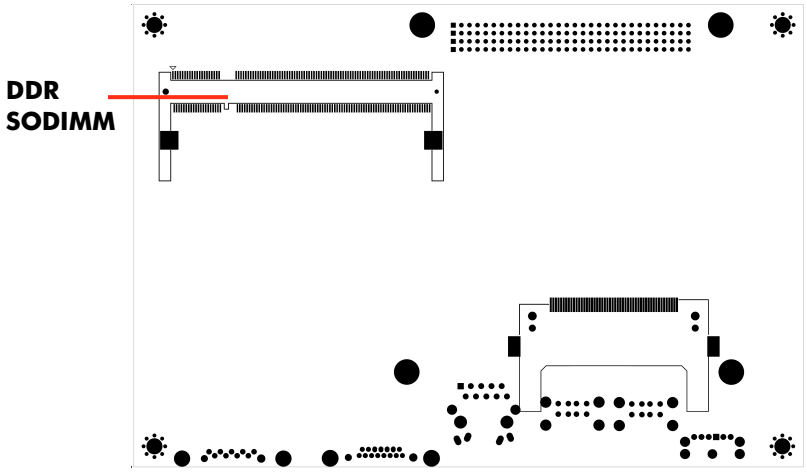
2 SYSTEM SETUP

This chapter describes how to install the AR-B1631ET. At first, the layout of the AR-B1631ET is shown, and the unpacking information is described.

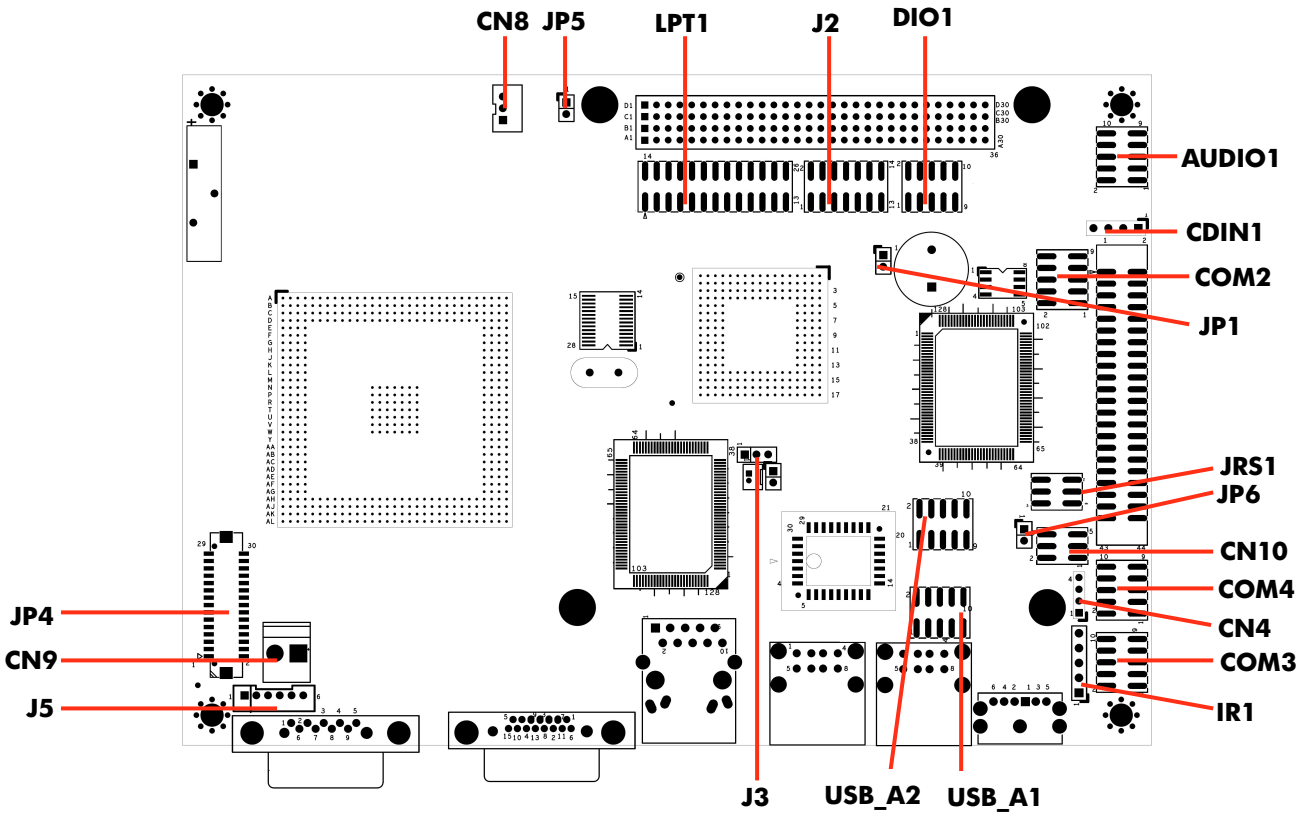
2.1 AR-B1631ET OVERVIEW



TOP VIEW



BOTTOM VIEW



2.2 SYSTEM SETTINGS

Jumper pins allow you to set specific system parameters. Set them by changing the pin location of the jumper blocks. (A jumper block is a small plastic-encased conductor that slips over the pins.) To change a jumper setting, remove the jumper from its current location with your fingers or small needle-nosed pliers. Place the jumper over the two pins designated for the desired setting. Press the jumper evenly onto the pins. Be careful not to bend the pins.

We will show the locations of the AR-B1631ET jumper pins, and the factory-default settings.

CAUTION: Do not touch any electronic components unless you are safely grounded. Wear a grounded wrist strap or touch an exposed metal part of the system unit chassis. The static discharges from your fingers can permanently damage electronic components.

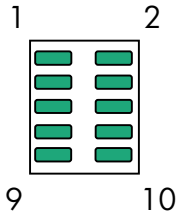
2.2.1 JP5 (SERIRQ)

CLOSE	SERIRQ

2.2.2 JP1 (POWER ON)

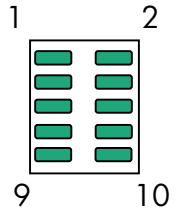
POWER BUTTON
PIN HEADER

2.2.3 DIO1 (GPIO)



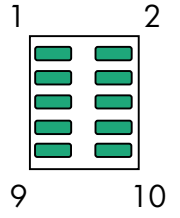
1	GND	2	+5V
3	XOUT0	4	XOUT1
5	XOUT2	6	XOUT3
7	XIN0	8	XIN1
9	XIN2	10	XIN3

2.2.4 AUDIO1 (AUDIO)



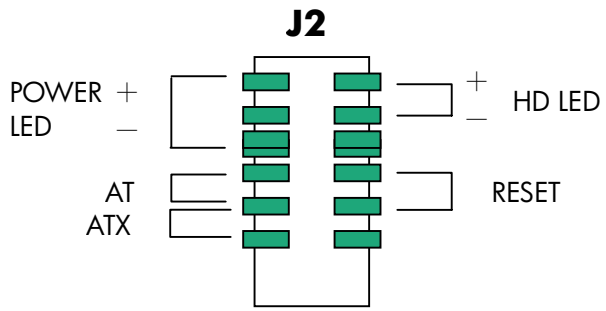
1	LINE OUT R	2	LINE OUT L
3	GND	4	GND
5	LINE IN R	6	LINE IN L
7	MIC IN	8	GND
9	GND	10	GND

2.2.5 COM2, COM3, COM4 (RS232)

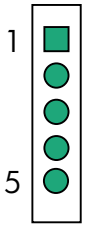


1	DCD	2	DSR
3	RX	4	RTS
5	TX	6	CTS
7	DTR	8	RI
9	GND	10	NC

2.2.6 J2 (CHASSIS CONTROL)

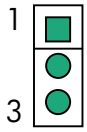


2.2.7 IR1



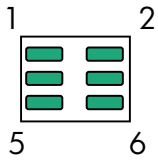
1	5V
2	NC
3	IRRX
4	GND
5	IRTX

2.2.8 J3 (CLEAR CMOS)



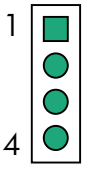
1-2	NORMAL
2-3	CLEAR CMOS

2.2.9 CN10 (LCD SETTING)



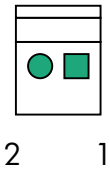
1-3	-SHFCLK
3-5	SHFCLK
2-4	3.3V LCD
4-6	5V LCD

2.2.10 CDIN1 (CDIN)



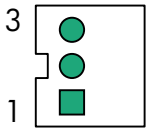
1	CD_L
2	GND
3	GND
4	CD_R

2.2.11 CN9 (POWER)



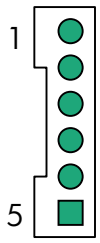
1	+12V
2	GND

2.2.12 CN8 (STAND BY POWER)



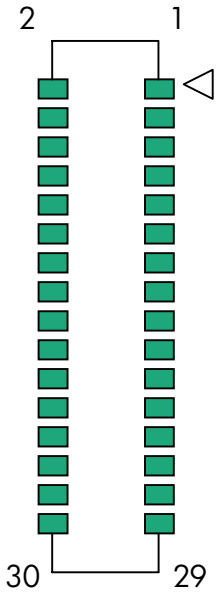
1	+5V STANDBY
2	PSON#
3	GND

2.2.13 J5 (LCD BACKLIGHT)



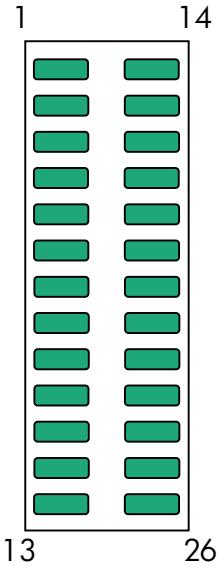
1	+12V
2	+12V
3	GND
4	BLT
5	GND
6	NC

2.2.14 JP4 (LCD LVDS)



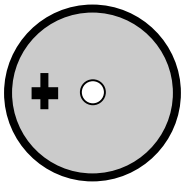
2	GND	1	POWER
4	NC	3	NC
6	NC	5	GND
8	GND	7	NC
10	NC	9	NC
12	NC	11	NC
14	NC	13	NC
16	LVDS_TXC+	15	GND
18	GND	17	LVDS_TXC-
20	LVDS_TX2-	19	LVDS_TX2+
22	LVDS_TX1+	21	NC
24	NC	23	LVDS_TX1-
26	LVDS_TX0-	25	LVDS_TX0+
28	LVDS_TX3-	27	LVDS_TX3+
30	POWER	29	POWER

2.2.15 LPT1 (PARALLEL PORT)

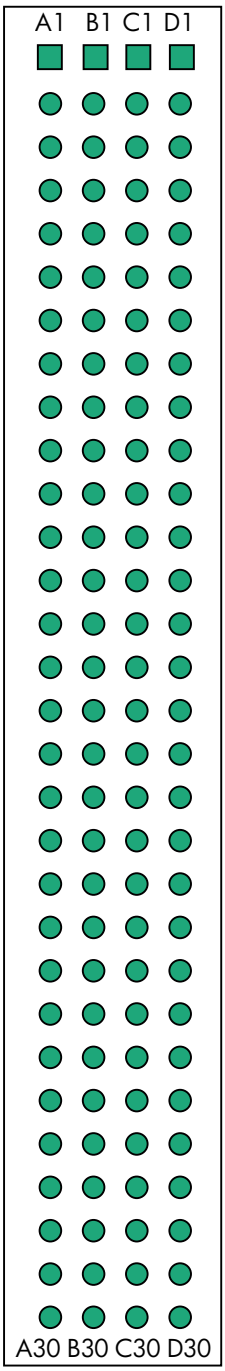


1	STB-	14	AFD-
2	D0	15	ERROR-
3	D1	16	INIT-
4	D2	17	SLIN-
5	D3	18	GND
6	D4	19	GND
7	D5	20	GND
8	D6	21	GND
9	D7	22	GND
10	ACK-	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SELECT	26	NC

2.2.16 BUZZER EXTERNAL



2.2.17 J4 (PC104+)

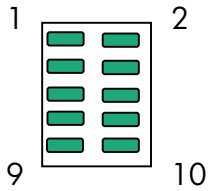


	A	B	C	D
1	NC	SERIRQ	+5V	AD0
2	NC	AD2	AD1	+5V
3	AD5	GND	AD4	AD3
4	C/BE0#	AD7	GND	AD6
5	GND	AD9	AD8	GND
6	AD11	NC	AD10	NC
7	AD14	AD13	GND	AD12
8	+3.3V	C/BE1#	AD15	+3.3V
9	SERR#	GND	PULL UP	PAR
10	GND	PERR#	+3.3V	PULL UP
11	STOP#	+3.3V	LOCK#	GND
12	+3.3V	TRDY#	GND	DEVSEL#
13	FRAME#	GND	IRDY#	+3.3V
14	GND	AD16	+3.3V	C/BE2#
15	AD18	+3.3V	AD17	GND
16	AD21	AD20	GND	AD19
17	+3.3V	AD23	AD22	+3.3V
18	IDSEL0	GND	IDSEL1	AD22
19	AD24	C/BE3#	NC	AD23
20	GND	AD26	AD25	GND
21	AD29	+5V	AD28	AD27
22	+5V	AD30	GND	AD31
23	REQ0#	GND	REQ1#	NC
24	GND	REQ2#	+5V	GNT0#
25	GNT1#	NC	GNT2#	GND
26	+5V	CLK	GND	CLK
27	CLK	+5V	NC	GND
28	GND	INTD#	+5V	PCIRST#
29	+12V	INTA#	INTB#	INTC#
30	NC	NC	NC	NC

2.2.18 JP6 (IDE Cable Select, NOTE 2)

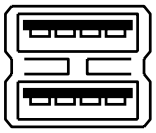
Open	ATA33
Close	ATA66 above

2.2.19 USBA_1 & USBA_2 (NOTE 2)



1	5V
2	5V
3	USB1-
4	USB2-
5	USB1+
6	USB2+
7	GND
8	GND
9	GND
10	GND

2.2.20 USB1 & USB2 (NOTE 2)

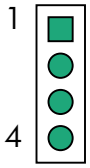


1	5V
2	USB-
3	USB+
4	GND
5	5V
6	USB-
7	USB+
8	GND

2.2.21 JRS1

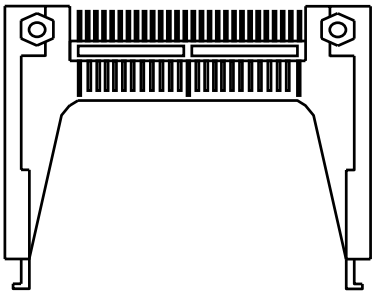
1-2	RS422
3-4	RS485
5-6	RS232

2.2.22 CN4 (RS422 & RS485)



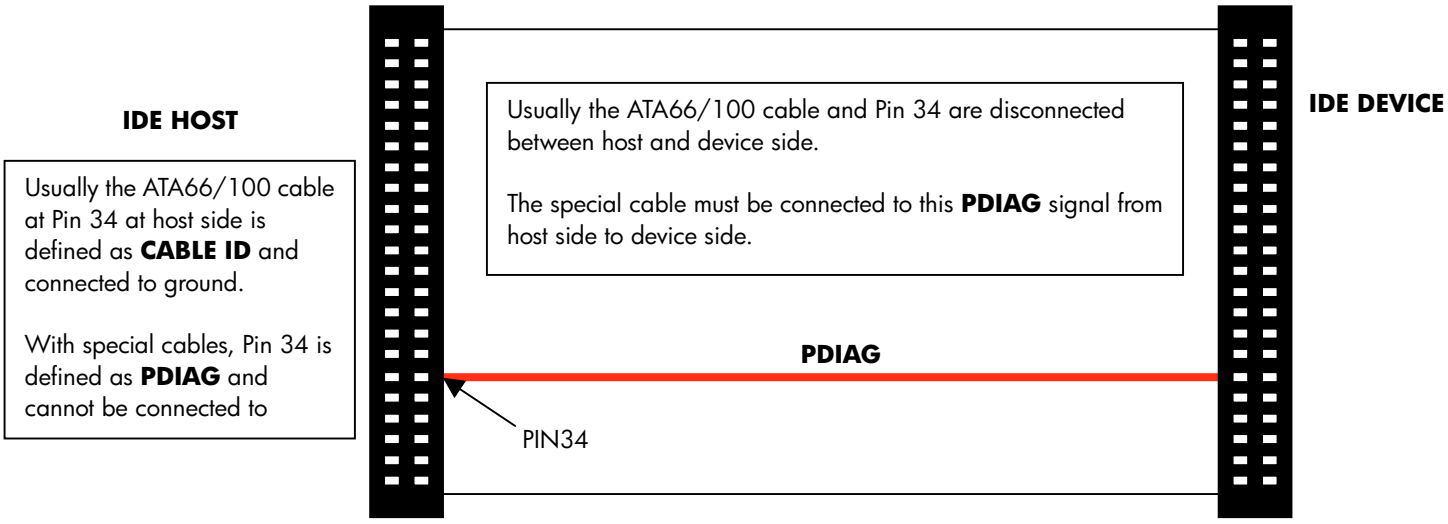
1	RS422TX+/RS485TRX+
2	RS422TX-/RS485TRX-
3	RS422RX+
4	RS422RX-

2.2.22 CF1 (NOTE 1)



NOTE 1:
For using both Hard Disk and Compact Flash, you have to use the ATA33 IDE cable. IF you want to use the ATA66/100 mode with the Hard Disk, you must put the jumper on JP6 and use the special IDE cable.

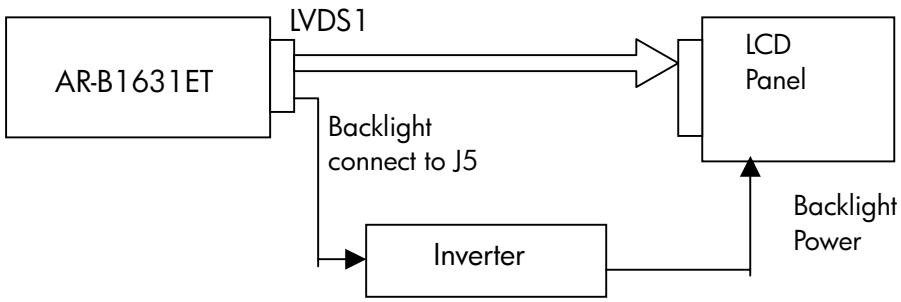
The cable is like below :



NOTE 2:
USB connectors (USB1 & USB2) and USB Pin headers cannot be used together. If you want to use USB connectors, you must take the USB cable on Pin Header.

3 LCD FLAT PANEL DISPLAY

This chapter describes the configuration and installation procedures for LCD displays.



LCD Panel Block Diagram

Please visit our web site or contact our technical support department for supports of LCD connecting.

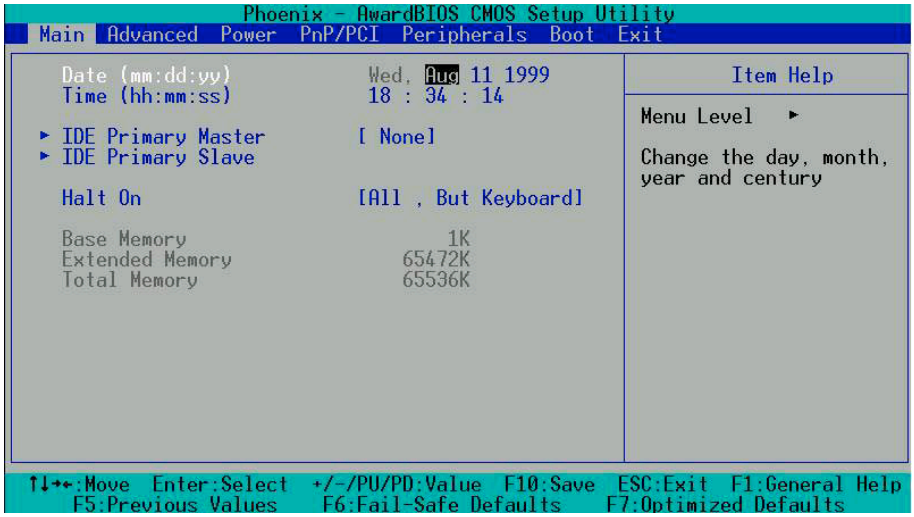
4 BIOS CONSOLE

This chapter describes the AR-B1631ET BIOS menu displays and explains how to perform common tasks needed to get up and running, and presents detailed explanations of the elements found in each of the BIOS menus. The following topics are covered:

- BIOS Setup Overview
- Advanced CMOS Setup
- Peripheral Setup
- Boot
- BIOS Exit

4.1 BIOS SETUP OVERVIEW

The BIOS is a program used to initialize and set up the I/O system of the computer, which includes the ISA bus and connected devices such as the video display, floppy drive, and the keyboard.
The BIOS provides a menu-based 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.
After the computer is turned on, the BIOS will perform diagnostics on the system and display the size of the memory that is being tested. Press the [Del] key to enter the BIOS Setup program, and the main menu will show on the screen.
The BIOS Setup main menu includes some options. Use the [Up/Down] arrow key to highlight the option that you wish to modify, and then press the [Enter] key to select the option and to configure the functions.



Setup Main Menu

The <Main> option allows you to view some basic system hardware configuration and to set the system clock as well as error handling. If the CPU board is already installed in a working system, you do not need to select this option anymore.

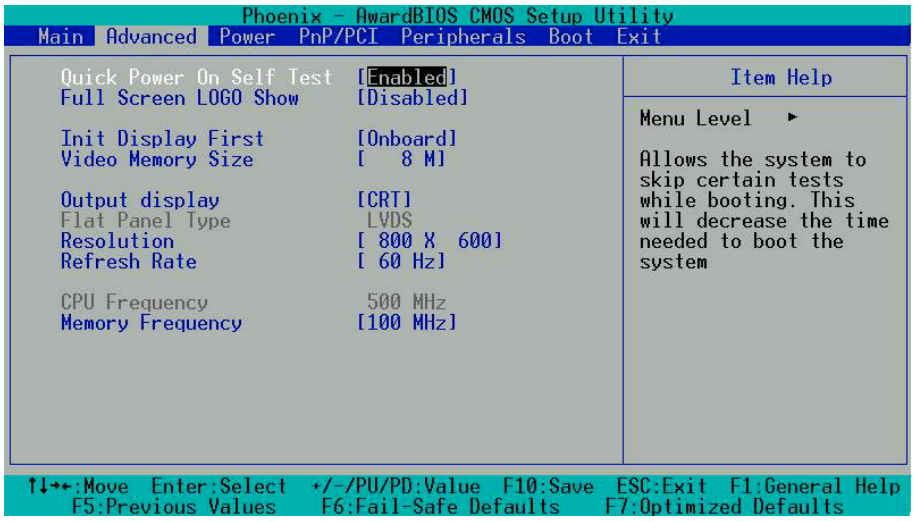
Date & Time Setup

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.

Hard Disk Setup

The BIOS supports 2 types of user settings. The BIOS supports <Pri Master> and <Pri Slave>, <Sec Master> and <Sec Slave> so the user can install up to two hard disks.

4.2 ADVANCED



Standard CMOS Setup

Quick Power On Self Test

Allows the system to skip certain tests while booting. This will decrease the time needed to boot the system.

Full Screen Logo Show [Disable]

This allows you to enable or disable the full screen logo display feature.
Configuration options: [Disabled] [Enabled]

INIT Display First [Onboard]

Initialize the onboard video display before initializing any other display device on the system. Thus the onboard display becomes the primary display.
Configuration options: [Disabled] [Enabled]

Video Memory Size [8M]

Configuration options: [None] [8M] [16M] [32M] [64M] [128M] [254M]

Output Display [CRT]

This allows you to choose the output of your system display.
Configuration options: [CRT] [Flat Panel] [Panel +CRT]

Flat Panel Type [Auto]

This allows you to choose the flat panel type
Configuration options: [Auto] [LVDS] [TFT]

Resolution [800x600]

This allows you to choose the display resolution.

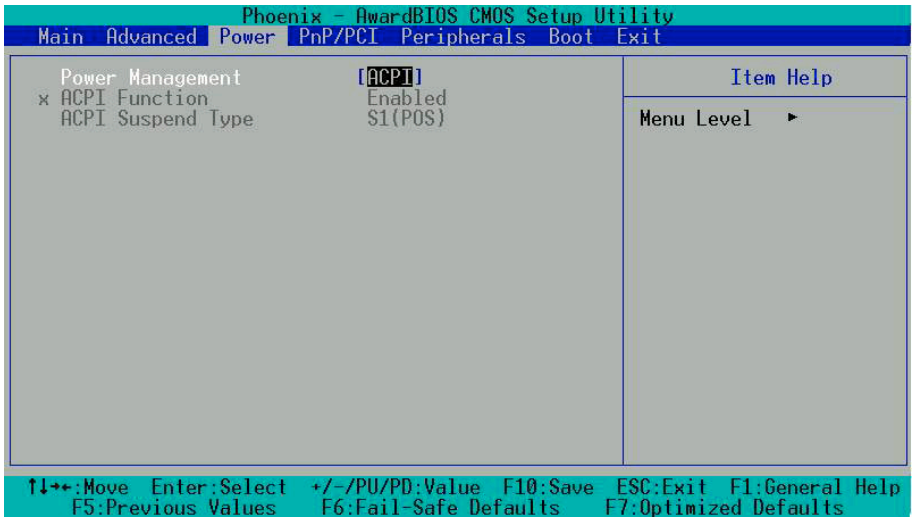
Refresh Rate [60Hz]

This allows you to choose the display Refresh Rate.

CPU / MEM / PCI Frequency [Auto]

This allows you to set the memory frequency.
Configuration options:
100/133/166/200

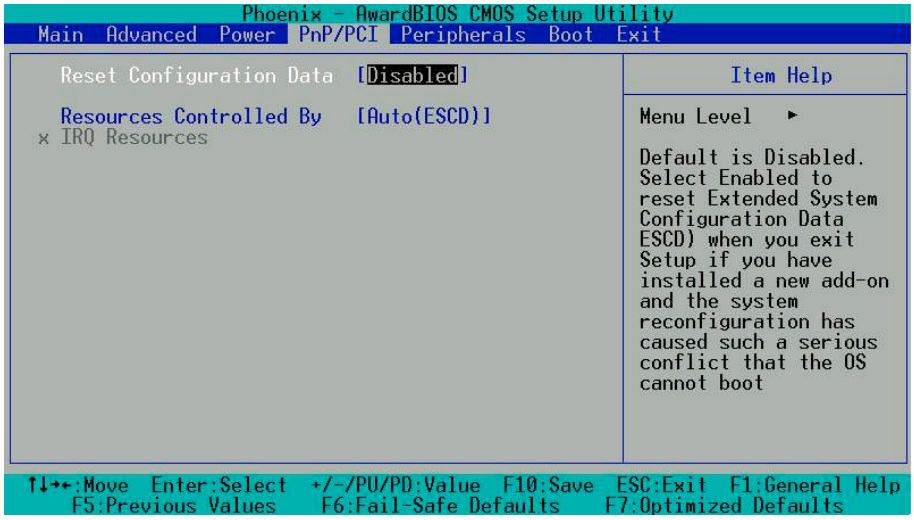
4.3 POWER



Power Management [ACPI]

This allows you to enable or disable the ACPI function Configuration options: [Disabled] [ACPI]

4.4 PnP/PCI



PnP/PCI

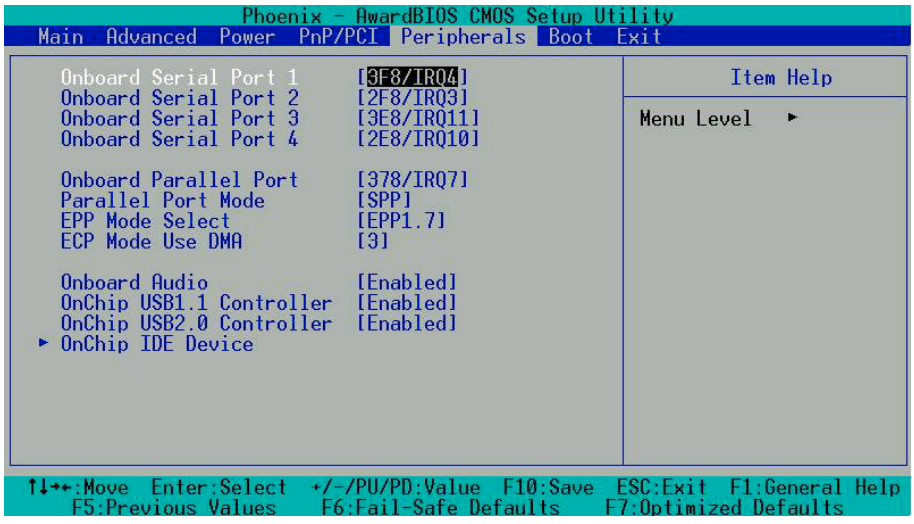
Reset Configuration Data [Disable]

Normally, you leave this field Disabled. Select Enabled to reset the Extended System Configuration Data (ESCD) when you exit the Setup if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the operating system cannot boot.

Resources Controlled By [Auto (ESCD)]

This field sets control over the IRQ resources by the automatic (ESCD) system or manual assignment of IRQ channels. The default enables the automatic (ESCD) control. Configuration options: [Auto (ESCD)] [Manual].

4.5 PERIPHERALS



Peripherals

Onboard Serial Port 1 [3F8/IRQ4]

Choose the serial port 1 I/O address. Do not set port 1, 2, 3 and 4 to the same address except for Disabled or Auto.

Onboard Serial Port 2 [2F8/IRQ3]

Choose the serial port 2 I/O address. Do not set port 1, 2, 3 and 4 to the same address except for Disabled or Auto.

Onboard Serial Port 3 [3E8/IRQ11]

Choose the serial port 3 I/O address. Do not set port 1, 2, 3 and 4 to the same address except for Disabled or Auto.

Onboard Serial Port 4 [2E8/IRQ10]

Choose the serial port 4 I/O address. Do not set port 1, 2, 3 and 4 to the same address except for Disabled or Auto.

Onboard Parallel Port [378H/IRQ7]

This field allows you to set the address of the onboard parallel port connector. If you disable this field, the Parallel Port Mode and ECP DMA Select configurations are not available. Configuration options: [Disabled] [378H/IRQ7] [278H/IRQ5]

Parallel Port Mode [SPP]

This field allows you to set the operation mode of the parallel port. [Normal] allows normal-speed operation but in one direction only; [EPP] allows bidirectional parallel port operation; [ECP] allows the parallel port to operate in bidirectional DMA mode; [ECP+EPP] allows normal speed operation in a two-way mode. Configuration options: [Normal] [EPP] [ECP] [ECP+EPP]

Parallel port EPP Type [EPP1.7]

The mode depends on your external device that connects to this port.

ECP Mode use DMA [3]

This field allows you to configure the parallel port DMA channel for the selected ECP mode. This selection is available only if you select [ECP] or [ECP+EPP] in Parallel Port Mode above. Configuration options: [1] [3]

Onboard Audio [Enabled]

Should be enabled for active AC97

USB1 Controller [Enabled]

This should be enabled if your system has a USB Controller installed on the system board and you want to use it. Even when so equipped, if you add a higher performance controller, you will need to disable this feature.

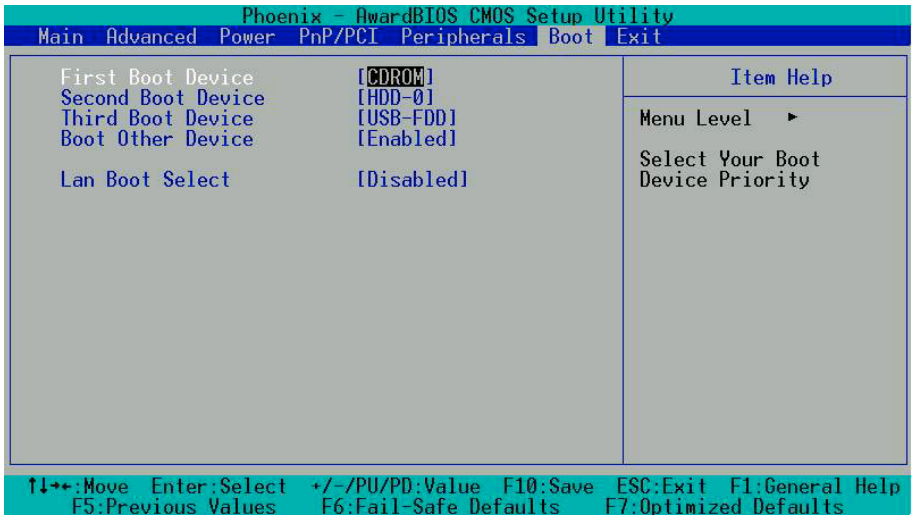
USB2 Controller [Enabled]

This should be enabled if your system has a USB Controller installed on the system board and you want to use it. Even when so equipped, if you add a higher performance controller, you will need to disable this feature.

OnChip IDE Device

With this option you can enable or disable your IDE channel and set the PIO mode or UDMA mode.

4.6 BOOT



BOOT

First/Second/Third Boot Device

HDD-0
SCSI
CDROM
HDD-1
USB-FDD
USB-ZIP
USB-CDROM
USB-HDD
LAN
Disabled

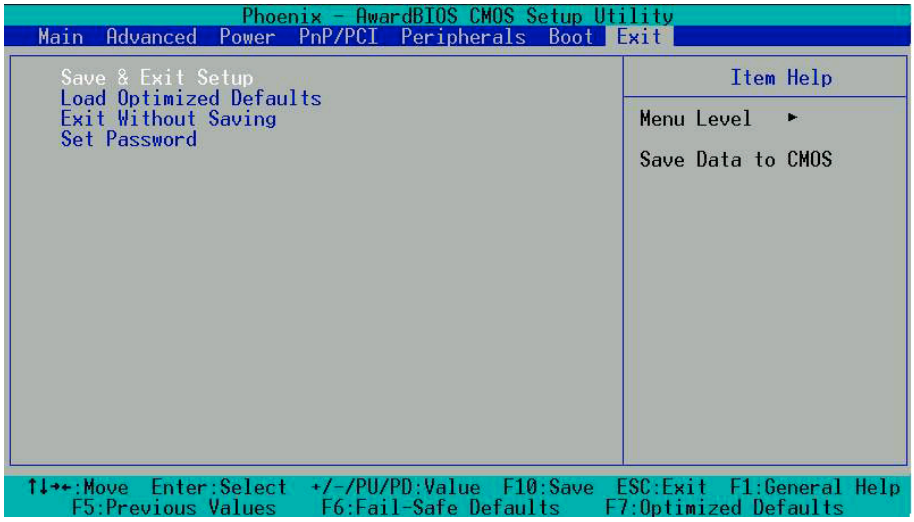
Boot Other Device [Enabled]

Configuration options: [Enabled] [Disabled].

LAN Boot Select [Disabled]

This allows you to enable or disable the LAN Boot function.

4.7 BIOS EXIT



Exit

When you have made all of your selections from the various menus in the Setup program, save your changes and exit Setup. Select Exit from the menu bar to display the following menu.

Save & Exit Setup

Typing "Y" will quit the Setup Utility and save the user setup value to RTC CMOS. Type "N" will return to Setup Utility.

Load Optimized Defaults

Selecting this field loads the factory defaults for BIOS and Chipset Features that the System automatically detects.

Exit Without Saving

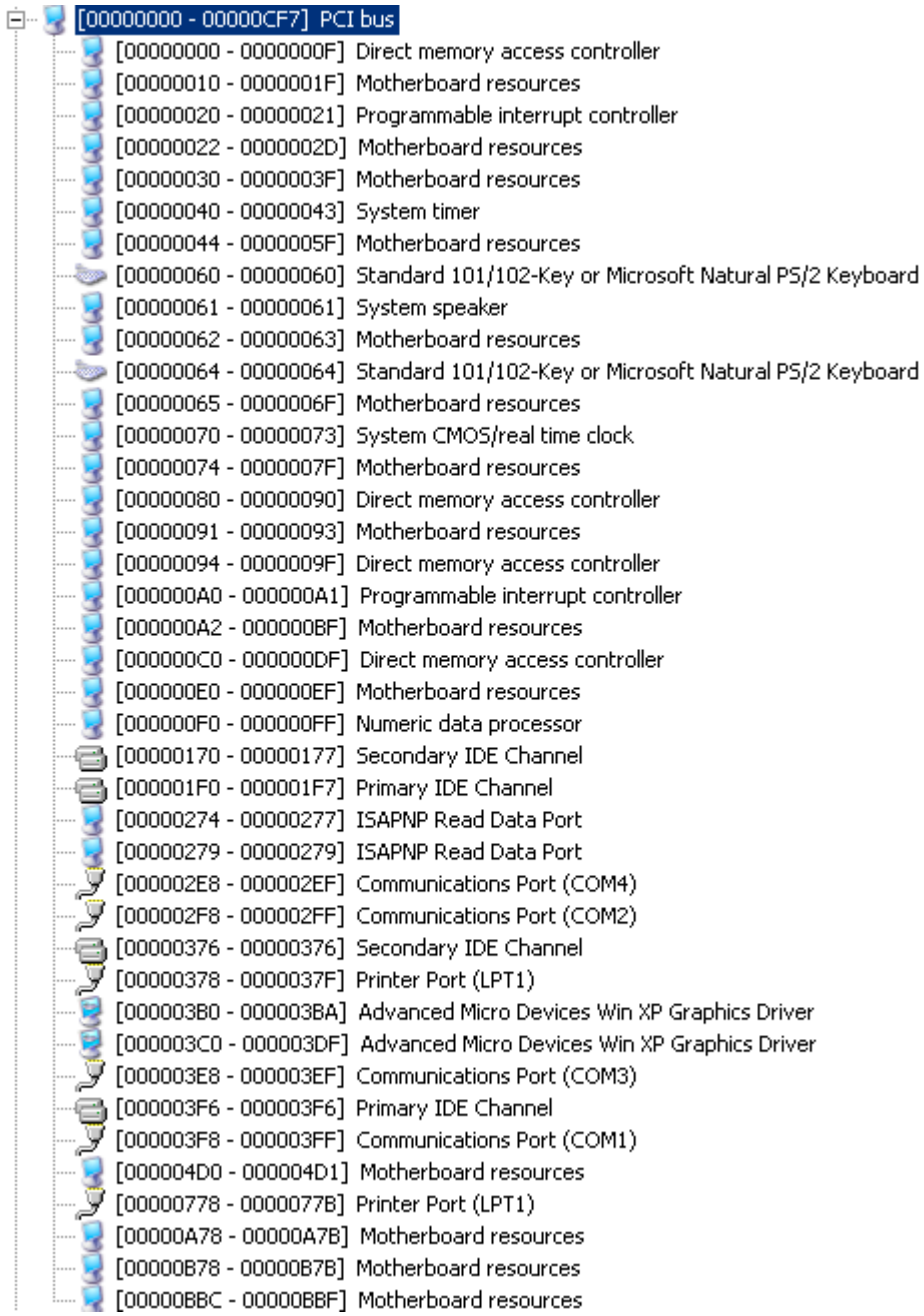
Typing "Y" will quit the Setup Utility without saving to RTC CMOS.
Typing "N" will return to the Setup Utility.

Set Password

This allows you to set a password for the BIOS menu.

5 I/O ADDRESS, IRQ AND MEMORY MAPPING

5.1 I/O ADDRESS MAPPING



- [00000D00 - 0000AC17] PCI bus
  - [00000E78 - 00000E7B] Motherboard resources
  - [00000F78 - 00000F7B] Motherboard resources
  - [00000FBC - 00000FBF] Motherboard resources
- [0000AC20 - 0000FFFF] PCI bus
  - [0000FC00 - 0000FCFF] Realtek RTL8139 Family PCI Fast Ethernet NIC
  - [0000FE00 - 0000FE7F] GeodeLX Audio Driver (WDM)
  - [0000FF00 - 0000FF0F] Standard Dual Channel PCI IDE Controller

5.2 IRQ MAPPING

- Interrupt request (IRQ)
  - (ISA) 0 System timer
  - (ISA) 1 Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
  - (ISA) 3 Communications Port (COM2)
  - (ISA) 4 Communications Port (COM1)
  - (ISA) 8 System CMOS/real time clock
  - (ISA) 9 Microsoft ACPI-Compliant System
  - (ISA) 10 Communications Port (COM4)
  - (ISA) 11 Communications Port (COM3)
  - (ISA) 12 PS/2 Compatible Mouse
  - (ISA) 13 Numeric data processor
  - (ISA) 14 Primary IDE Channel
  - (PCI) 5 Advanced Micro Devices Win XP Graphics Driver
  - (PCI) 5 Geode LX AES Crypto Driver
  - (PCI) 5 GeodeLX Audio Driver (WDM)
  - (PCI) 5 Realtek RTL8139 Family PCI Fast Ethernet NIC
  - (PCI) 5 Standard Enhanced PCI to USB Host Controller
  - (PCI) 5 Standard OpenHCD USB Host Controller

5.3 MEMORY MAPPING

- Memory
  - [00000000 - 0009FFFF] System board
  - [000A0000 - 000BFFFF] PCI bus
  - [000C8000 - 000DFFFF] PCI bus
  - [000F0000 - 000F3FFF] System board
  - [000F4000 - 000F7FFF] System board
  - [000F8000 - 000FBFFF] System board
  - [000FC000 - 000FFFFF] System board
  - [00100000 - 0F7AFFFF] System board
  - [0F7B0000 - 0F7BFFFF] System board
  - [0F7C0000 - FEBFFFFF] PCI bus
  - [FEE00000 - FEE00FFF] System board
  - [FFFF0000 - FFFFFFFF] System board

6 GPIO SAMPLE CODE

```
/*[]=====================================================================[]*/
/*|| GPIO Test utility for W83627HF.                                    ||*/
/*|| Date     : 10/18/2005                                             ||*/
/*|| Author : Willy                                                    ||*/
/*[]=====================================================================[]*/

/*[]=====================================================================[]*/
/*|| Include files                                                     ||*/
/*[]=====================================================================[]*/
#include <conio.h>
#include <stdio.h>

/*[]=====================================================================[]*/
/*|| Assember Types Define                                             ||*/
/*[]=====================================================================[]*/
typedef unsigned char           BYTE;
typedef unsigned short int WORD;
typedef unsigned long int   DWORD;

void Show_Title();
char YES_NO_Confirm();
void Enter_Config(BYTE IO_PORT_BASE);
void Exit_Config(BYTE IO_PORT_BASE);
void Init_SIO(BYTE IO_PORT_BASE);
int GPI_TEST(BYTE IO_PORT_BASE);
int GPO_TEST(BYTE IO_PORT_BASE);

/*[]=====================================================================[]*/
/*|| Function   : GPI_TEST()                                           ||*/
/*|| Input: BYTE IO_PORT_BASE                                                ||*/
/*|| Change   : -                                                      ||*/
/*|| Return      : Pass return "0", Fail return "1".                   ||*/
/*|| Description: Test GPI Pins status.                                ||*/
/*[]=====================================================================[]*/
int GPI_TEST(BYTE IO_PORT_BASE)
{
    BYTE Read_Byte,Temp_Word,Show_Byte;

    // Set W83627HF GPIO10~17 to Input
    outportb(IO_PORT_BASE,0xF0);
    outportb(IO_PORT_BASE+1,0xFF);

    printf(">>>>>   GPI Test Start   <<<<<");
```

```
/////// Input High Test ////////////////////////////////////////////////

printf("\nConnect GPI Pins to High ? [Y/N] ..... ");

if(YES_NO_Confirm() =='n')
   { printf("\n>>>>>   GPI Test Error   <<<<<\n");   return 1; }   // return fail

Show_Byte=0x00;
// Read W83627HF GPIO10~17 Status
outportb(IO_PORT_BASE,0xF1);
Read_Byte=inportb(IO_PORT_BASE+1);

if(Read_Byte&0x01)         //GPI10
   Show_Byte=Show_Byte|0x01; else   Show_Byte=Show_Byte&0xFE;
if(Read_Byte&0x02)         //GPI11
   Show_Byte=Show_Byte|0x02; else   Show_Byte=Show_Byte&0xFD;
if(Read_Byte&0x04)        //GPI12
   Show_Byte=Show_Byte|0x04; else   Show_Byte=Show_Byte&0xFB;
if(Read_Byte&0x08)        //GPI13
   Show_Byte=Show_Byte|0x08; else   Show_Byte=Show_Byte&0xF7;
if(Read_Byte&0x10)        //GPI14
   Show_Byte=Show_Byte|0x10; else   Show_Byte=Show_Byte&0xEF;
if(Read_Byte&0x20)        //GPI15
   Show_Byte=Show_Byte|0x20; else   Show_Byte=Show_Byte&0xDF;
if(Read_Byte&0x40)        //GPI16
   Show_Byte=Show_Byte|0x40; else   Show_Byte=Show_Byte&0xBF;
if(Read_Byte&0x80)        //GPI17
   Show_Byte=Show_Byte|0x80; else   Show_Byte=Show_Byte&0x7F;

if(Show_Byte==0xFF)
   printf("\nGPI Pins input value ==> 0x%002X",Show_Byte);
else
   { printf("\nGPI Pins input value ==> 0x%002X (should be 0xFF)",Show_Byte);
      printf("\n>>>>>   GPI Test Error   <<<<<\n");   return 1; }   // return fail

/////// Input Low Test /////////////////////////////////////////////////

printf("\nConnect GPI Pins to Low ? [Y/N] ..... ");

if(YES_NO_Confirm() =='n')
   { printf("\n>>>>>   GPI Test Error   <<<<<\n");   return 1; }   // return fail

Show_Byte=0x00;
// Read W83627HF GPIO10~17 Status
outportb(IO_PORT_BASE,0xF1);
Read_Byte=inportb(IO_PORT_BASE+1);

if(Read_Byte&0x01)         //GPI10
   Show_Byte=Show_Byte|0x01; else   Show_Byte=Show_Byte&0xFE;
if(Read_Byte&0x02)         //GPI11
   Show_Byte=Show_Byte|0x02; else   Show_Byte=Show_Byte&0xFD;
if(Read_Byte&0x04)        //GPI12
```

```
    Show_Byte=Show_Byte|0x04; else   Show_Byte=Show_Byte&0xFB;
  if(Read_Byte&0x08)       //GPI13
    Show_Byte=Show_Byte|0x08; else   Show_Byte=Show_Byte&0xF7;
  if(Read_Byte&0x10)       //GPI14
    Show_Byte=Show_Byte|0x10; else   Show_Byte=Show_Byte&0xEF;
  if(Read_Byte&0x20)       //GPI15
    Show_Byte=Show_Byte|0x20; else   Show_Byte=Show_Byte&0xDF;
  if(Read_Byte&0x40)       //GPI16
    Show_Byte=Show_Byte|0x40; else   Show_Byte=Show_Byte&0xBF;
  if(Read_Byte&0x80)       //GPI17
    Show_Byte=Show_Byte|0x80; else   Show_Byte=Show_Byte&0x7F;

  if(Show_Byte==0x00)
    printf("\nGPI Pins input value ==> 0x%002X",Show_Byte);
  else
    { printf("\nGPI Pins input value ==> 0x%002X (should be 0x00)",Show_Byte);
      printf("\n>>>>>   GPI Test Error   <<<<<\n");   return 1; }   // return fail

  printf("\n>>>>>    GPI Test End    <<<<<\n");
  return 0;      // return pass
}

/*[]=================================================================[]*/
/*|| Function   : GPO_TEST()                                       ||*/
/*|| Input: BYTE IO_PORT_BASE                                       ||*/
/*|| Change   : -                                          ||*/
/*|| Return      : Pass return "0", Fail return "1".              ||*/
/*|| Description: Test GPO Pins status.                           ||*/
/*[]=================================================================[]*/
int GPO_TEST(BYTE IO_PORT_BASE)
{
  // Set W83627HF GPIO10~17 to Output
  outportb(IO_PORT_BASE,0xF0);
  outportb(IO_PORT_BASE+1,0x00);

  printf(">>>>>   GPO Test Start   <<<<<");

  /////// Output High Test ////////////////////////////////////////////////

  printf("\nSet GPO Pins to High ..............");

  // Set W83627HF GPIO10~17 to High
  outportb(IO_PORT_BASE,0xF1);
  outportb(IO_PORT_BASE+1,0xFF);

  printf("\nGPO Pins is High ? [Y/N] ..... ");

  if(YES_NO_Confirm() =='n')
    { printf("\n>>>>>   GPO Test Error   <<<<<\n");   return 1; }   // return fail

  /////// Output Low Test /////////////////////////////////////////////////

  printf("\nSet GPO Pins to Low ..............");
```

```
    // Set W83627HF GPIO10~17 to Low
    outportb(IO_PORT_BASE,0xF1);
    outportb(IO_PORT_BASE+1,0x00);

    printf("\nGPO Pins is Low ? [Y/N] ..... ");
    if(YES_NO_Confirm() =='n')
      { printf("\n>>>>>   GPO Test Error   <<<<<\n");   return 1; }   // return fail

    printf("\n>>>>>    GPI Test End    <<<<<\n");
    return 0;      // return pass
}

/*[]============================================================================[]*/
/*||  Main procedure                                                            ||*/
/*[]============================================================================[]*/
int main(int argc, char *argv[])
{
  BYTE    IO_PORT_BASE=0x2E;   // DATA_PORT = IO_PORT_BASE + 1;
  int result;

  if ( argc != 2 )
    {   Show_Title();    return 1;   }

  clrscr();

  // Enter W83627HF Config
  Enter_Config(IO_PORT_BASE);

  Init_SIO(IO_PORT_BASE);

  switch(argv[1][0])
   {
     case 'i':
     case 'I':      //I Key
          result=GPI_TEST(IO_PORT_BASE);
          if(result==0)
            printf("Test Result is Pass.");
          else
            printf("Test Result is Fail.");
          break;
     case 'o':
     case 'O':      //O Key
          result=GPO_TEST(IO_PORT_BASE);
          if(result==0)
            printf("Test Result is Pass.");
          else
            printf("Test Result is Fail.");
          break;
   } //switch end

  // Exit W83627HF Config
  Exit_Config(IO_PORT_BASE);
```

```
   return(0);
}

/*[]=====================================================================[]*/
/*|| Function   : Show_Title()                                          ||*/
/*|| Input: -                                                ||*/
/*|| Change   : -                                                ||*/
/*|| Return     : -                                                  ||*/
/*|| Description: Show Title string.                                 ||*/
/*[]=====================================================================[]*/
void Show_Title()
{
    clrscr();
    printf("GPIO Control test for W83627HF\n");
    printf("1. GPIO.EXE I ==-> Test GPI.\n");
    printf("2. GPIO.EXE O ==-> Test GPO.\n");
}

/*[]=====================================================================[]*/
/*|| Function   : YES_NO_Confirm()                                      ||*/
/*|| Input: -                                                ||*/
/*|| Change   : -                                                ||*/
/*|| Return     : character 'y' or 'n'                               ||*/
/*|| Description: Confirm get 'Y' or 'N' key.                        ||*/
/*[]=====================================================================[]*/
char YES_NO_Confirm()
{
   int X_Axis,Y_Axis;
   char y_n;

   X_Axis=wherex();   /* Get Cursor X Axis */
   Y_Axis=wherey();   /* Get Cursor Y Axis */

   while(1) {
    y_n=getche();
    if(y_n=='y' || y_n=='Y')
       return('y');
    else if(y_n=='n' || y_n=='N')
          return('n');
       else
          gotoxy(X_Axis,Y_Axis);
   }
}

/*[]=====================================================================[]*/
/*|| Function   : Enter_Config()                                ||*/
/*|| Input: BYTE IO_PORT_BASE                                        ||*/
/*|| Change   : -                                                ||*/
/*|| Return     : -                                          ||*/
/*|| Description: Enter chip configuration key.                      ||*/
/*[]=====================================================================[]*/
```

```
void Enter_Config(BYTE IO_PORT_BASE)
{
  outportb(IO_PORT_BASE,0x87);
  outportb(IO_PORT_BASE,0x87);
}

/*[]=================================================================[]*/
/*|| Function   : Exit_Config()                                    ||*/
/*|| Input: BYTE IO_PORT_BASE                                       ||*/
/*|| Change   : -                                              ||*/
/*|| Return     : -                                          ||*/
/*|| Description: Exit chip configuration key.                      ||*/
/*[]=================================================================[]*/
void Exit_Config(BYTE IO_PORT_BASE)
{
  outportb(IO_PORT_BASE,0xAA);
}

/*[]=================================================================[]*/
/*|| Function   : Init_SIO()                                        ||*/
/*|| Input: -                                                 ||*/
/*|| Change   : -                                              ||*/
/*|| Return     : character 'y' or 'n'                         ||*/
/*|| Description: Confirm get 'Y' or 'N' key.                       ||*/
/*[]=================================================================[]*/
void Init_SIO(BYTE IO_PORT_BASE)
{
  /* Set Multi-function Pins to GPIO */
  outportb(IO_PORT_BASE,0x2A);
  outportb(IO_PORT_BASE+1,(inportb(IO_PORT_BASE+1) | 0xFC));

  // Select GPIO Port device
  outportb(IO_PORT_BASE,0x07);
  outportb(IO_PORT_BASE+1,0x07);

  // Set GPIO Port Active
  outportb(IO_PORT_BASE,0x30);
  outportb(IO_PORT_BASE+1,0x01);
}
```