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IPC Solution

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**PCI CPU Card**

**Fanless Series**

**FB2646 User's Manual**

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- ❑ Description of you peripheral attachments
- ❑ Description of you software (operating system, version, application software, etc.) and BIOS configuration
- ❑ Description of the symptoms (Extract wording any message)

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## Chapter 1 Introducing theFB2646 System Board

### Overview

The FB2646 is a low power Pentium-M all-in-one CPU card. This user's manual provides information on the physical features, installation, and BIOS setup of the FB2646.

Built to unleash the total potential of the Pentium-M or Celeron-M Processor, Able to support .1Ghz ~ 1.4Ghz CPUs, this system supports 10/100/1000M Base -TX LAN port, DDRAM up to 1GB and a onboard VGA port up to 32MB share memory that can support CRT/LVDS LCD, AC'97 Audio function, TTL I/O, Compact Flash socket and four USB2.0 ports.

Each FB2646 has two ports for I/O communications. One RS-232C and one RS-232C /422/485 ports are available. There is also a watchdog timer that can be configured from software to automatically reset the system.

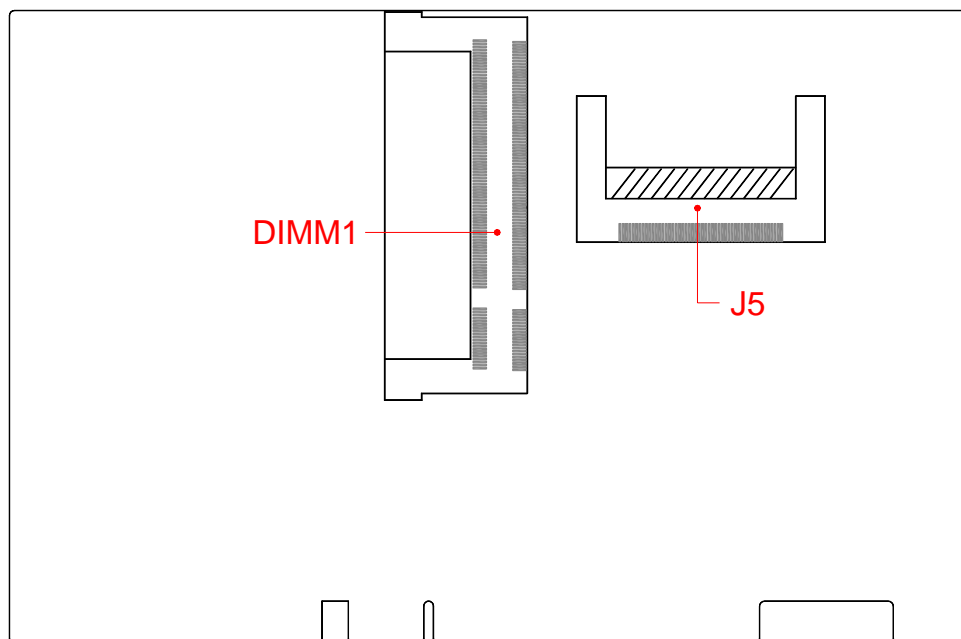
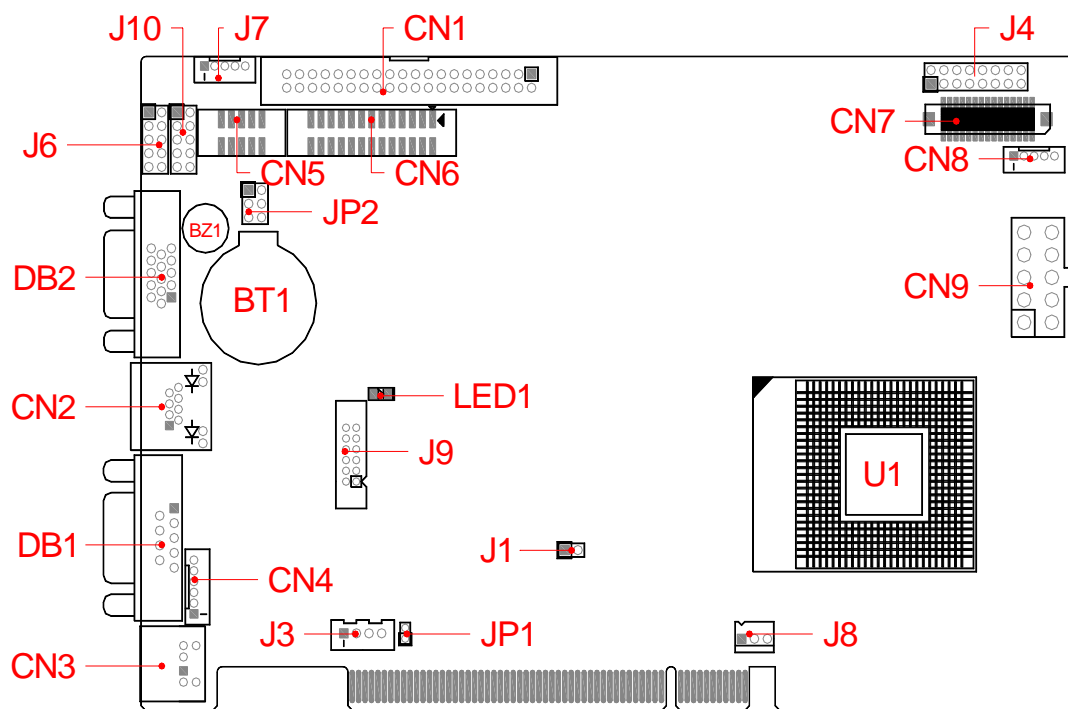
Power management is also featured to lower the rate of consumption. The unit supports doze mode, <Suspend Mode> and <Standby mode> as well as it adheres to the "Green Function" standard.

The FB2646 is perfect for POS and POI applications, network systems, panel / MMI's, order entry kiosks and test equipment. The Compact size is only 185X122 (mm).

## Series Comparison Table

Model	FB2646	FB2646A
Processor	Intel Celeron-M/Pentium-M 1.1GHz~1.8GHz	Intel Pentium-M 1.4GHz
Package	478 uFC-PGA	479 uFC-BGA
Chipset	855GME+ICH4	
1 200 Pin So-DIMM (Max.)	1GB	
CRT VGA/LVDS LCD	Yes	
Watchdog Timer	Yes	
Multi I/O	Two Serial and One Parallel	
Digital IO	2-In/2-Out	
Enhanced IDE	One	
Compact Flash Socket	One	
USB 2.0	Four	
Audio	Line -Out And MIC-In	
RJ45 WAN port (100/1000Mbps)	One	
Dimensions (Unit: mm)	185(D) x 122(W)	

## Layout





## Specifications

- Supports Celeron-M or Pentium-M 1.1 GHz ~1.8GHz CPU. (FB2646)
- Support CPU Pentium-M 1.4GHz CPU. (FB2646A)
- Intel 855GME+ICH4 and Internal Cache 512k/1MB (C-M) or 1MB/2MB(P-M) inside CPUs
- One 200-pin So-DIMM Socket for up to 1GB DDR333
- Supports two IDE interface, Primary Channel supports ATA-100 mode and Secondary Channel supports ATA-33/PIO mode for Compact Flash.
- Supports CRT/VLDS LCD with 1MB to 32MB share memory.
- One RS-232 and one RS-232/RS-422/RS-485 ports and one parallel port.
- PS/2 compatible keyboard and mouse interface and four USB 2.0 ports.
- Provides AC'97 audio function.
- E2KEY functions for safe CMOS data keeping. (Optional)
- 4-line TTL I/O, On-board buzzer, and LED indicator.
- Build-In Realtek RTL8110S 10/100/1000 base-TX with RJ45 connectors.
- Provides CPU cooling fan connector for monitoring.
- On-board buzzer and LED indicator
- Software programmable watchdog timer.
- EMI Considered on every output signals.
- Power requires +5V/5.2A Max. (Base On 1.6GHz CPU), +12V/0.25A(For FAN).
- Compact size, 185 mm x 122 mm.

## 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 FB2646 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 FB2646 is not supplied from us, please make sure the specification of the cable(s) is compatible with the FB2646 system board.

**Note:** after you install the FB2646, it is recommended that you keep the diskette or CD that contains drivers and document files, document copies, and unused cables in the carton for future use.

The following lists the accessories that may be included in your FB2646 package. Some accessories are optional items that are only shipped upon order.

- One FB2646 system board
- One 40-pin hard disk drive interface cable
- One serial port and parallel port interface cable with bracket
- One Y-type keyboard and mouse port adapter cables
- One USB and Audio adapter board with cables
- CPU heat sink with cooling fan. (FB2646 only)
- One compact disc containing manual file in PDF format and necessary drivers and utilities
- One hard copies of this quick setup manual



## Chapter 2 Hardware Installation

To set up a FB2646 system board, complete the description Chapter 2 and Chapter 3.

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

### Before Installation

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

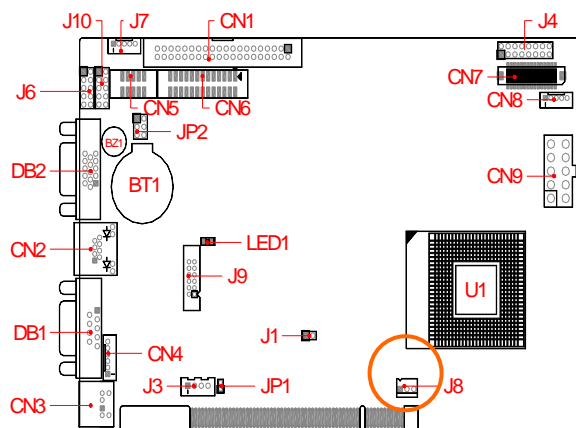
1. Before removing the board from its anti-static bag, wear an anti-static strap to prevent the generation of Electricity Static Discharge (ESD). The ESD may be created from human body that touches the board. It may do damage to the board circuit.
2. Install or unplug any connector, module, or add-on card, be sure that the power is disconnected from the system board. If not, this may damage the system board components, module, or the add-on-card.
3. Installing a heat sink and cooling fan is necessary for heat dissipation from your CPU. If heat sink or cooling fan is not mounted, this may cause the CPU fail due to over-heating problem.
4. When you connect the connectors and memory modules, be careful with the pin orientations.

## Hardware Features

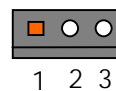
The following lists the connectors and jumpers to install the FB2646.

Item	Description
CN1	40-pin 2.54mm IDE 1 hard disk connector (IDC)
CN2	RJ45-LAN connector
CN3	Keyboard and Mouse connector
CN4	6 – pin 2.0mm JST connector for Keyboard and Mouse
CN5	10-pin RS-232/422/485 port (IDC)
CN6	26-pin 2.0mm parallel port connector (IDC)
CN7	30-pin LVDS LCD Connector (DF13)
CN8	5-pin Power Connector for LVDS LCD inverter board
CN9	10-pin 2.54mm Mini-ATX power connector
J1	Clear CMOS data header
J3, JP1	Soft start connector for AXT power supply only
J4	Power/HDD/LAN Indicator LED's header, IrDA/Reset /Temp/PWR-SW header.
J5	Compact Flash Socket
J6, J10	10-pin USB ports #0/1, #2/3 connector header
J7	5-pin for TTL I/O
J8	3-pin for case/CPU cooling fan
J9	Connector to daughter board FB4641, provides AC'97 signals for Audio
JP2	RS232/RS-422/RS-485 Select Header
LED1	Power and watchdog of LED indicator
BUS1	PCI Connector
DIMM1	DDR So-DIMM Socket 200-pin
DB1	RS232 9-pin D – type male connector
DB2	CRT Connector with D-SUB 15
Bz1	On board Buzzer

## □ J8: CPU or System Fan Connector



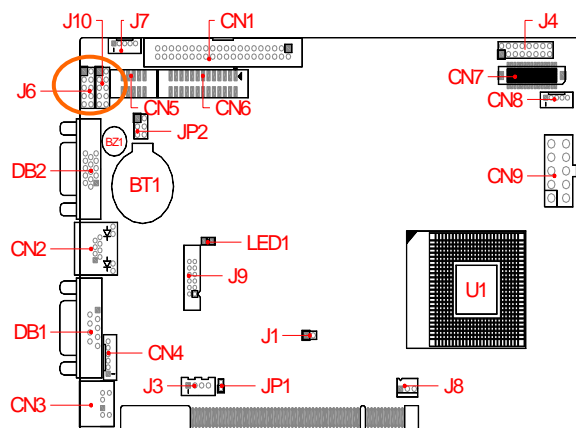
J8



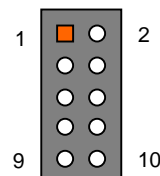
J8	Description
1	Ground
2	+12V
3	Speed-In

## □ J6 & J10: USB#1/0 & #2/3 Connectors

J6 and J10 are 10-pin connectors. Use the USB adapter cable and FB4641 board and USB adapter cable, you can attach up to 4 USB devices.



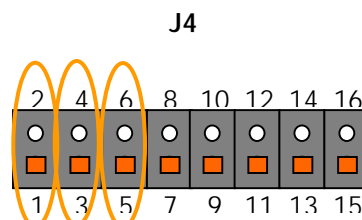
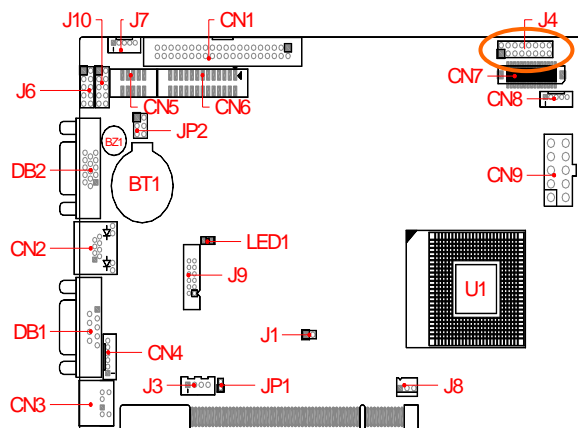
J6 & J10



J6&J10	Signal	J6&J10	Signal
1	USBV0 (2)	2	Case Ground
3	USBD0 (2)-	4	USBG1 (3)
5	USBD0 (2)+	6	USBD1 (3)+
7	USBG0 (2)	8	USBD1 (3)-
9	Case Ground	10	USBV1 (3)

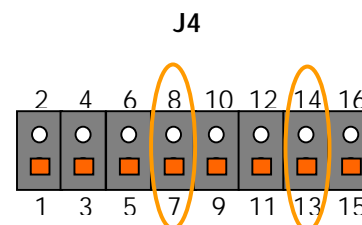
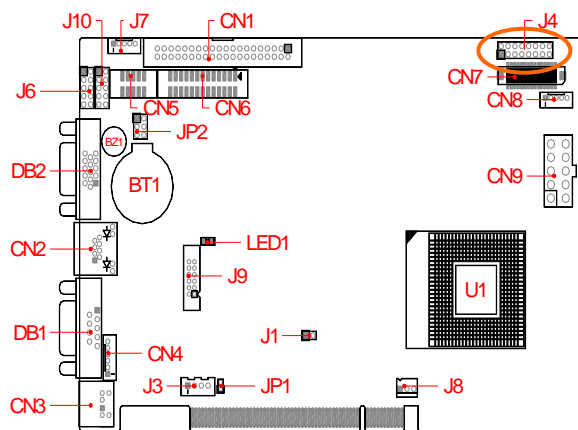
#### □ J4: External Power/LAN LED's Indicators & IrDA/Temp/Reset/PWR-SW Header

The Power and HDD LED's has two distinctive status: Off for inactive operation and blinking light for activity. And the J4 (5,6 pin (LED1+/LED1-) for LAN port. The LAN LED's indicate on-line/access status of LAN respectively.

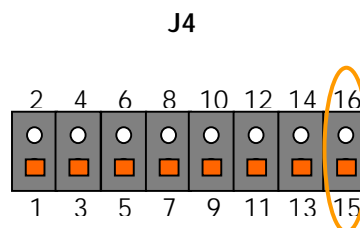
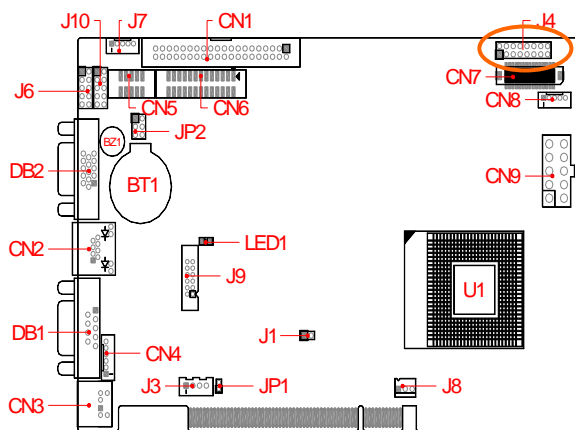


J4	Signal	J4	Signal
1	P/W LED+	2	P/W LED -
3	HDD LED+	4	HDD LED -
5	LAN1 LED+	6	LAN1LED-
7	Ext-Temp.	8	GNDA
9	IRTX+	10	IRRX-
11	GND	12	GND
13	Reset	14	GND
15	PWR-SW+	16	PWR-SW-

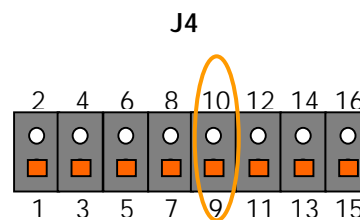
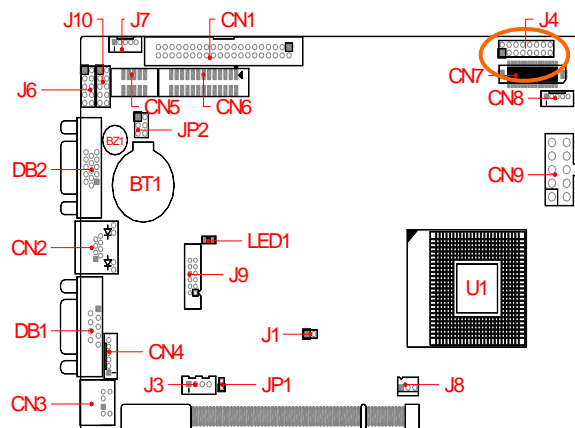
1. The J4 pin 7,8 is a 2-pin for connecting Resistive Temperature Sensor input header and pin 13,14 is a 2-pin for connecting to system reset bottom. It is cause hardware reset of FB2646 and restart system booting.



2. The J4 pin 15,16 is a 2 pin connecting to PWR-SW (Power Button Switch); It's Pushing the PWR-SW button once will switch the FB2646 on and off. It's depending on system BIOS (Power Management Setup) or OS setting. Pushing the power button while in the on mode for more than 4 seconds will turn the system off.

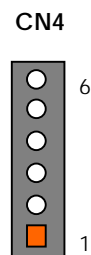
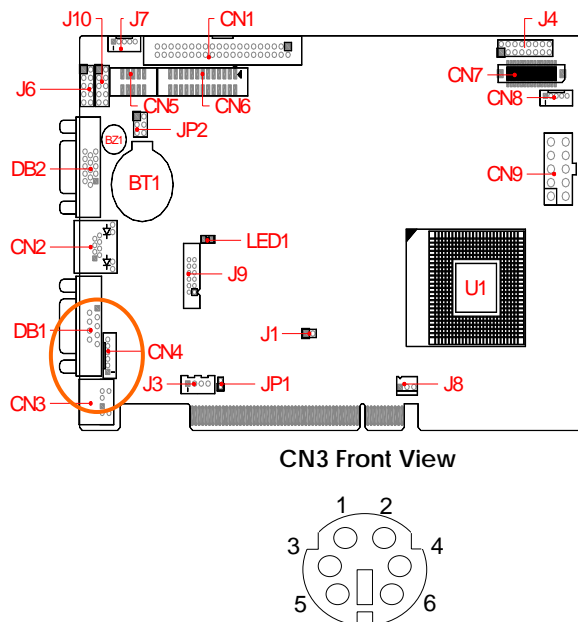


3. The J4 pin 9,10 is a 2 pin provide basic RS-232C signals of serial port 2 respectively. The basic RS-232C signal is used to interface with IrDA (Infrared) controller internally.



## □ CN3, CN4: Keyboard/Mouse Connector

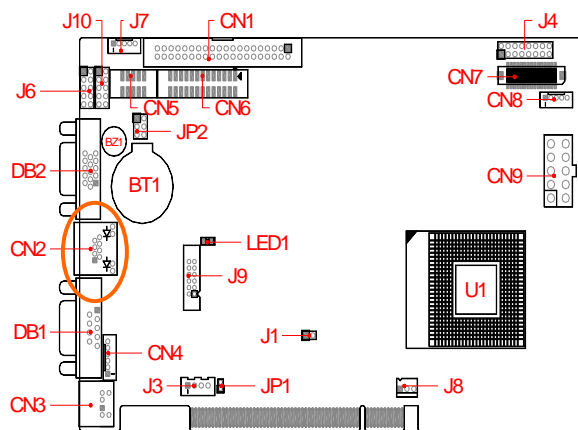
CN3 is a standard PS/2 type keyboard connector, so any PS/2 type keyboard can plug into CN4 directly without extra adapter cable. CN4 provides PS/2 mouse interface, use the included mouse adapter cable to connect between CN4 and standard PS/2 mouse.



CN4	CN3	Signal
1	2	Mouse Data
2	1	Keyboard Data
3	3	Ground
4	4	VCC
5	6	Mouse Clock
6	5	Keyboard Clock

## □ CN2: RJ45 LAN Connector

The CN2 contain LAN twist pair signals and LAN accesses indicator signal is RJ45 type connector with 2 LED indicators. The up side LED (orange) indicates data is accessing and the down side LED (green) indicates on-line status. (When lighted indicates on-line and off indicates off-line). The following lists the pin assignment of CN2:

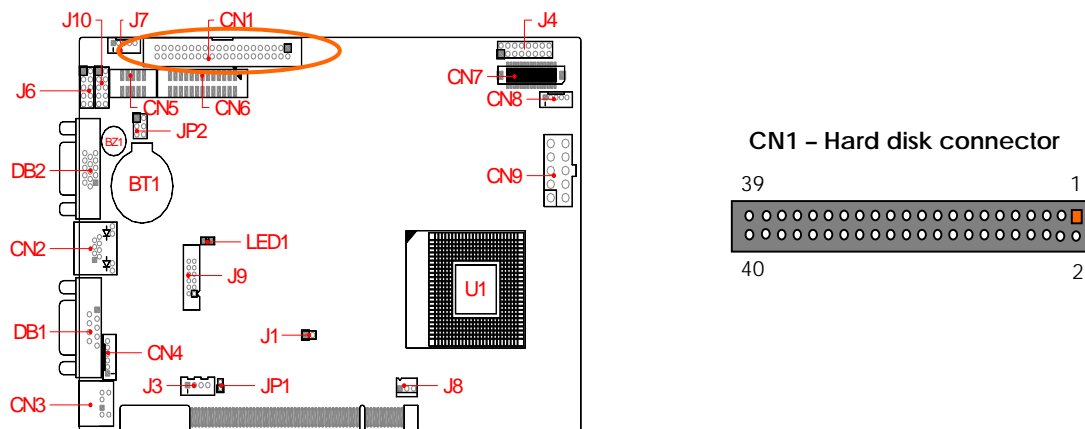


The following lists the pin assignment of RJ45.

RJ45	10/100	Giga	RJ45	10/100	Giga
1	TPTX+	MDI0+	5	FBG1	MDI2+
2	TPTX-	MDI0-	6	TPRX-	MDI2-
3	TPRX+	MDI1+	7	FBG2	MDI3+
4	FBG1	MDI1-	8	FBG2	MDI3-

## □ CN1: IDE hard Disk Connector

CN 1 is 40-pin 2.54mm IDE hard disk connector. The included hard disk is able to attach up to two hard disk drives.

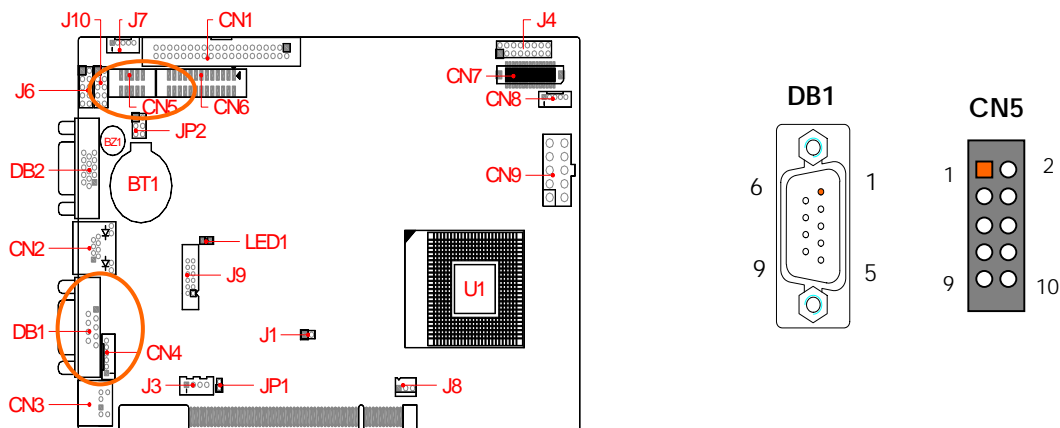


The following table lists the pin description of CN1.

Pin	Signal	Pin	Signal
1	-RESET	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	Not Used
21	IDEDREQ	22	GROUND
23	-IOW	24	GROUND
25	-IOR	26	GROUND
27	IDEIORDYA	28	GROUND
29	-DACKA	30	GROUND
31	AINTE	32	GROUND
33	SA 1	34	Not Used
35	SA 0	36	SA 2
37	CS 0	38	CS 1
39	HD LED A	40	GROUND

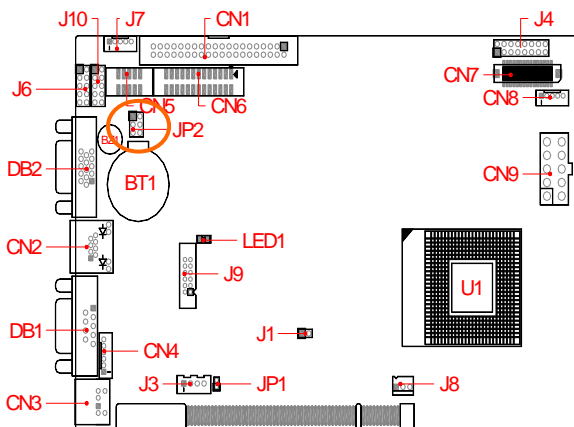
## □ DB1 & CN5: RS232 Serial Ports 1,2 Connectors and Jumpers

The DB1 connector on bracket is 9-pin D-type male connector. The serial port 2 adapter cables are used to transfer 10-pin IDC connector into standard DB9 connectors.

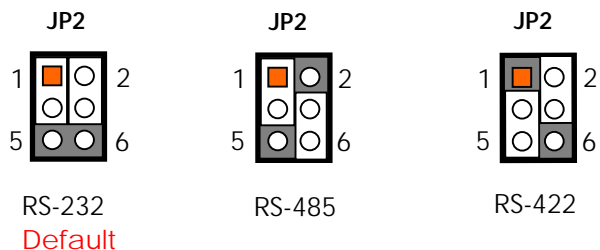


## □ Serial Port 2 (CN5, JP2)

The CN5 DB9 (COM2) is standard serial port connector. The following tables show the signal connections of these connectors. Serial port 2 is designed for multiple proposes. Use JP2 selects the RS-232, RS-422 or RS-485.

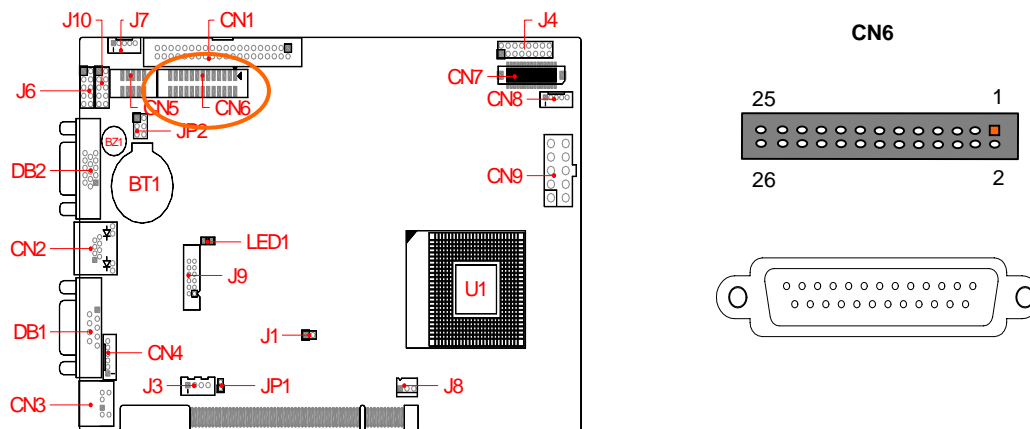


DB-9	CN5	RS-232	RS-422	RS-485
1	1	-DCD		
6	2	-DSR		
2	3	RXD	RX-	485-
7	4	-RTS	TX-	
3	5	-TXD	RX+	485+
8	6	-CTS	TX+	
4	7	-DTR		
9	8	-RI		
5	9	Ground		
Metal	10	Case Ground		



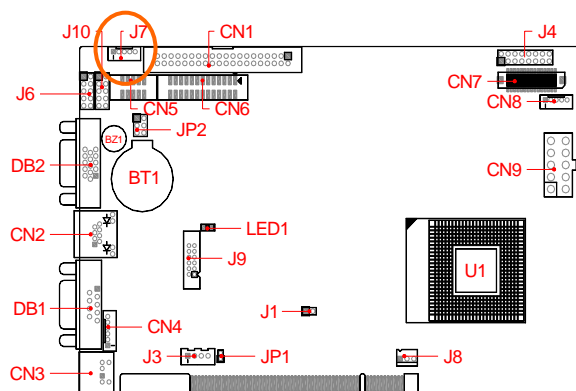
# □ **CN6: 26-pin Parallel Port Connector**

The included printer interface cable is used to transfer 26-pin connector into standard DB25 connector.

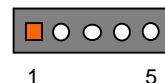


CN6	DB-25	Signal	CN6	DB-25	Signal
1	1	-STROBE	2	14	-AUTO FORM FEED
3	2	DATA 0	4	15	-ERROR
5	3	DATA 1	6	16	-INITIALIZE
7	4	DATA 2	8	17	-PRINTER SELECT IN
9	5	DATA 3	10	18	Ground
11	6	DATA 4	12	19	Ground
13	7	DATA 5	14	20	Ground
15	8	DATA 6	16	21	Ground
17	9	DATA 7	18	22	Ground
19	10	-ACKNOWLEDGE	20	23	Ground
21	11	BUSY	22	24	Ground
23	12	PAPER	24	25	Ground
25	13	PRINTER SELECT	26	--	No Used

## □ J7: TTL I/O Connector



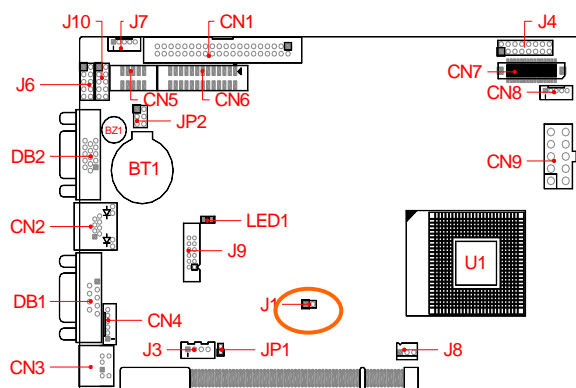
J7



J7	TTL Lines	Bit Location
1	Output Line 0	Please refer to Chapter4- J7 TTL I/O - Software programming example
2	Output Line 1	
3	Input Line 0	
4	Input Line 1	
5	Ground	

## □ J1: CMOS Data Clear Jumper

You can use J1 to clear CMOS data. The CMOS store information like system date, time, boot up device, password, IRQ... that are set up with the BIOS. To clear the CMOS, set J1 jumper 1-2 close and then remove jumper 1-2.



J1



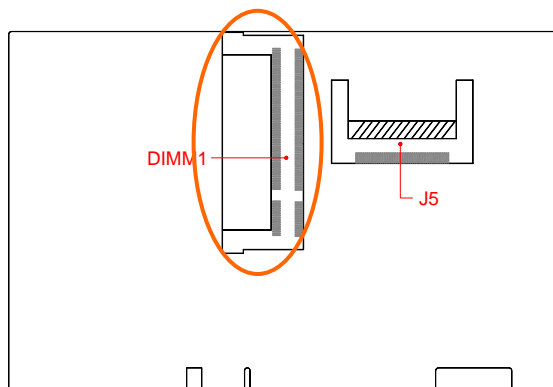
Normal Operation  
Default



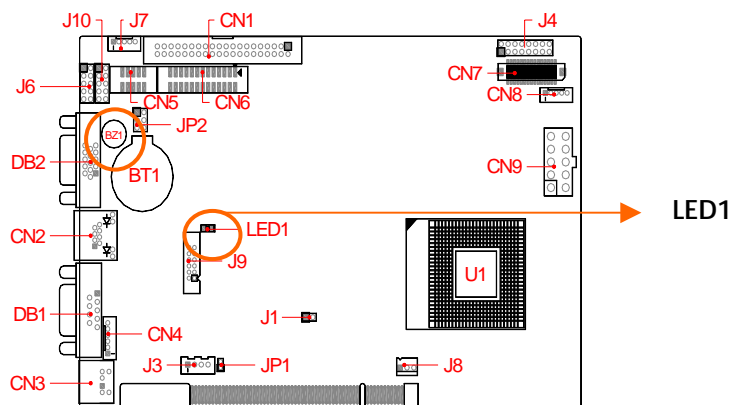
Clear CMOS Data

## □ DIMM1: DIMM Socket for DDR Modules

You may extend additional memory to FB2646 See as following figure and rear pictures. The DIMM socket supports 128/256/512 MB and 1GB of DDR RAM modules.

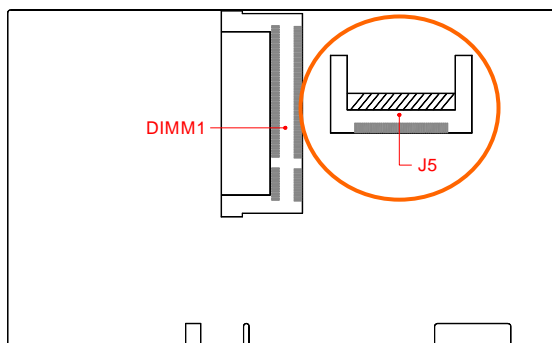


## □ BZ1 & LED1: On-Board Buzzer & On-Board Power LED



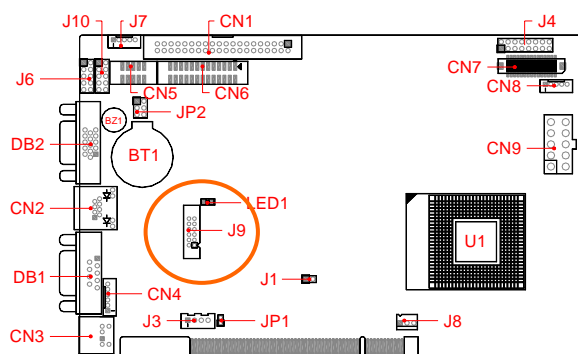
## □ J5: Compact Flash Socket

The Compact Flash socket J5 (on the solder side) is optional and supports 3.3V Compact Flash and Micro Drives. The Compact

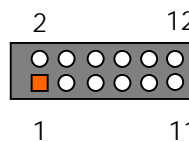


## □ J9: External Bus Connector for Audio

J9 provides AC'97 signals for Audio functions. FB4641 (Audio Adapter Board, Optional) is recommended for your best Audio solutions.



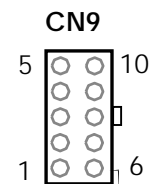
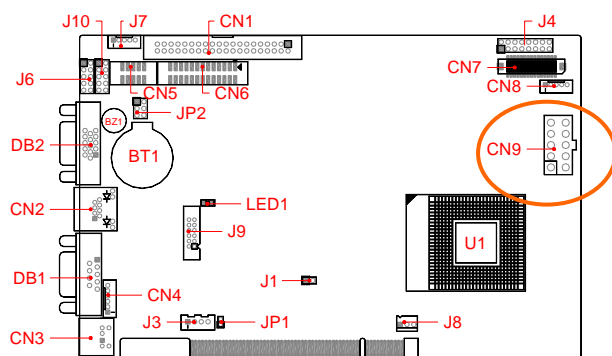
J9



J9	Description	J9	Description
1	BITCLK	2	+12v
3	+5V	4	SYNC
5	Ground	6	Ground
7	N.C.	8	ACRST#
9	SDOUT	10	SDIN2
11	SDIN	12	SDIN1

# □ **CN9: ATX Power Connector (10-pin 2.54mm ATX Connector)**

CN9 is the power connector for FB2646 is used with stand-alone applications.

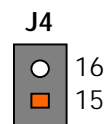
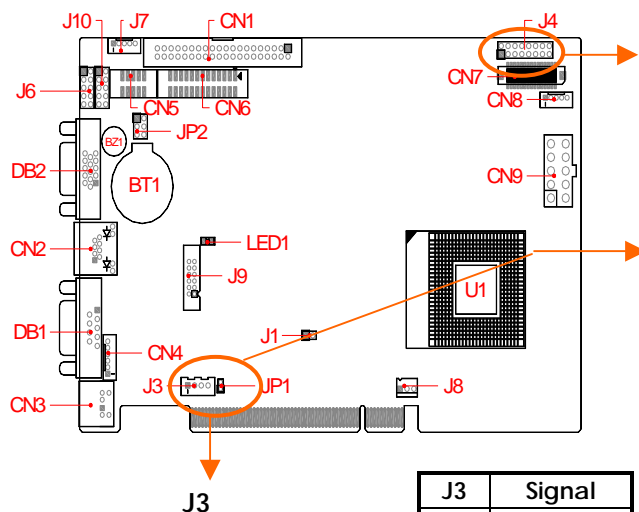


**Note:** This power connector is ideal for standalone applications.

CN9	Signal	CN9	Signal
1	+5V	6	5V Standby
2	+5V	7	+5V
3	Ground	8	Ground
4	Ground	9	PS_ON
5	+12V	10	-12v

# □ **J3, J4 & JP1: Soft Start Connector (*for ATX Power Supply Only*)**

When ATX power supply is used, you can connect J3 to ATX control signals from the back plane, and connect J4 to a push bottom switch as soft power switch. If non-ATX power supply is used, please short JP1 with jumper and you don't need to connect J3 and J4.

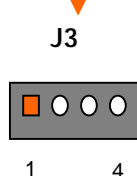


**JP1**



Close: Non - ATX Power  
Default

Open: ATX Power



J3	Signal
1	Ground
2	PSON#
3	Power OK
4	VCCSB

## Chapter 3 Installing CRT & LVDS LCD

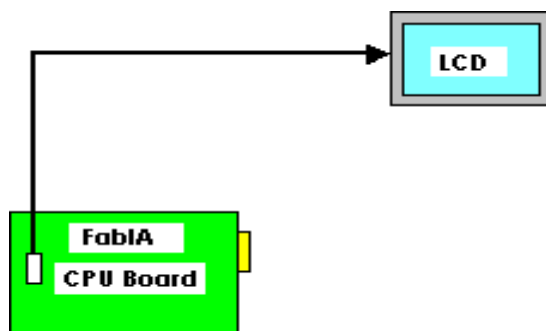
This chapter describes the configuration and installation procedure of LVDS LCD's and CRT displays. Both CRT and LVDS LCD displays may be used at the same time. However, each type of LVDS LCD requires different BIOS setting. This section describes the configuration and installation procedure using LVDS LCD display. Skip this section if you are using CRT monitor only.

- LVDS LCD Flat Panel Display
- CRT & LVDS LCD Display

### LCD FLAT PANEL DISPLAY

Using the BIOS setting for different types of LVDS LCD panel. Then set your system properly and configure BIOS setting for the right type of LVDS LCD panel you are using.

The following shows the block diagram of using FB2646 for LVDS LCD display.



LCD Panel Block Diagram

The block diagram shows that FB2646 still needs components to be used with a LVDS LCD panel.

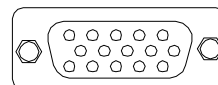
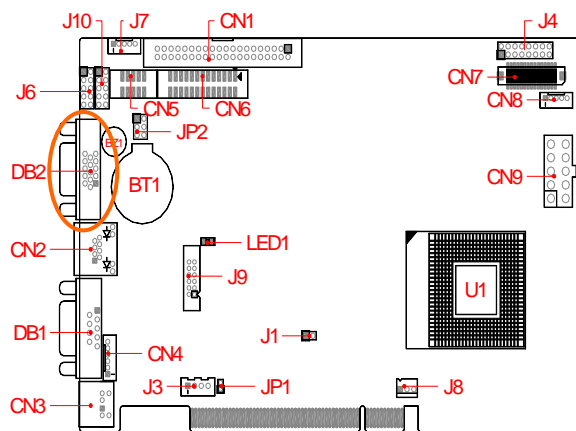
**NOTE:** Be careful with the pin orientation when installing connectors and the cables. A wrong connection can easily destroy your LCD panel. The pin 1 of the cable connectors is indicated with a sticker and the pin1 of the ribbon cable usually has a different color.

## CRT & LVDS LCD DISPLAY

The FB2646 supports a CRT colored monitor and a LVDS LCD. It can be connected to create a compact video solution for the industrial environment. 32MB simulated VRAM allows a maximum CRT resolution of 1600X1200 with 64K colors.

### DB2: CRT connector

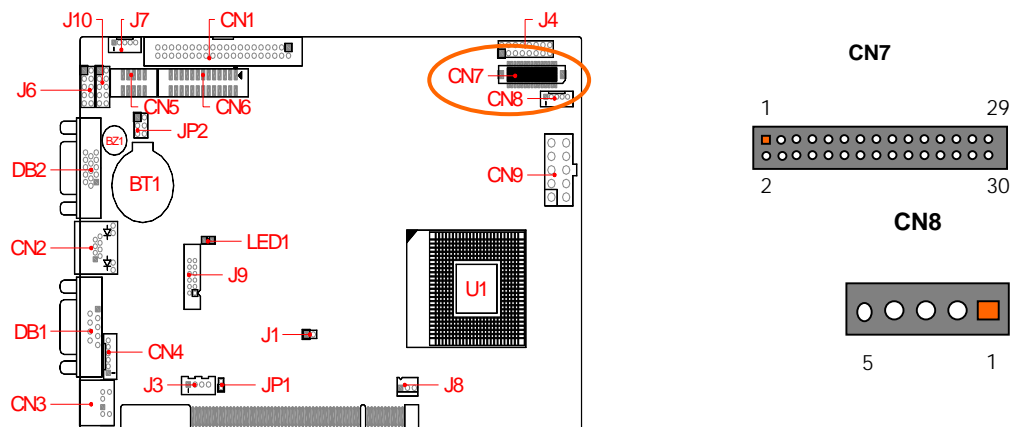
The CRT is use to a standard CRT connector (DB2).



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

## □ CN2 & CN3: LVDS LCD Connector and Power Connector

CN7 supports LVDS LCD signals, and CN8 is the power connector for inverter board.



CN7	Signal	CN7	Signal
1	Ground	2	Y0+
3	Y0-	4	Ground
5	Y1+	6	Y1-
7	Ground	8	Y2+
9	Y2-	10	Ground
11	YCK+	12	YCK-
13	Ground	14	Z0+
15	Z0-	16	Ground
17	Z1+	18	Z1-
19	Ground	20	Z2+
21	Z2-	22	Ground
23	ZCK+	24	ZCK-
25	Ground	26	Ground
27	+3.3V	28	+3.3V
29	+5V	30	+5V

CN8	Signal
1	+12V
2	Ground
3	ENVDD
4	N.C.
5	VCC

**Note:** If any trouble when connecting FB2646 with LVDS LCD panels, you could contact technical support division of FabiaTech Corporation.



## Chapter 4 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.

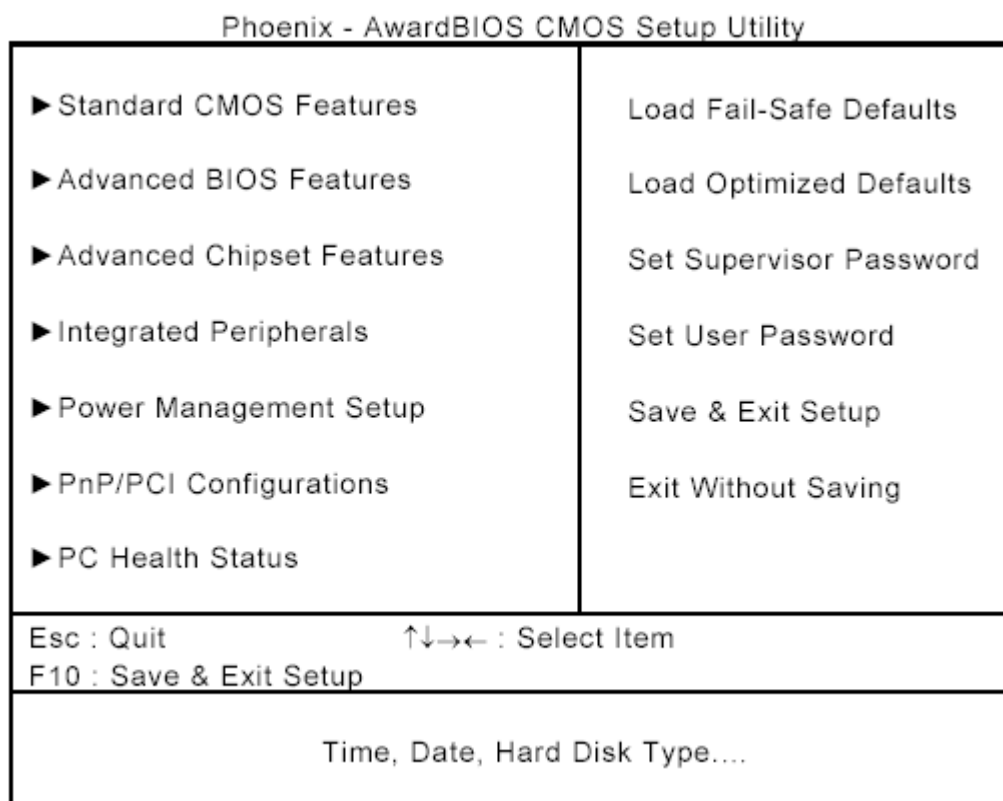
The BIOS provides a menu-driven interface to the console subsystem. The console subsystem contains special software, called firmware that interacts directly with the hardware components and facilitates interaction between the system hardware and the operating system.

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. Standard CMOS Features
2. Advanced BIOS Features
3. Advanced Chipset Features
4. Integrated Peripherals
5. Power Management Setup
6. PNP/PCI Configuration
7. PC Health States
8. Set Supervisor Password
9. Set User Password
10. 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.
11. Load Fail-Safe Default: to configure the system in fail-safe mode with predefined values.
12. Save Settings and Exit: perform this function when you change the setting and exit the BIOS Setup program.
13. Exit without saving: perform this function when you want to exit the program and do not save the change.

**a. 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

## STANDARD CMOS SETUP

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

Phoenix - AwardBIOS CMOS Setup Utility		
Standard CMOS Features		
Date (mm:dd:yy)	Wed, May 26 2004	Item Help
Time (hh:mm:ss)	13 : 42 : 30	
▶ IDE Primary Master [ST320014A] ▶ IDE Primary Slave [None] ▶ IDE Secondary Master [None] ▶ IDE Secondary Slave [None]		Menu Level ▶
Drive A	[None]	Change the internal clock.
Drive B	[None]	
Video	[EGA/VGA]	
Halt On	[All, But Keyboard]	
Base Memory	640K	
Extended Memory	228352K	
Total Memory	229376K	
↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults		

### □ 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.

### □ Hard Disk Setup

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.

#### ☐ **Video**

This option selects the type of adapter used for the primary system monitor that must match your video display card and monitor. Although secondary monitors are supported, you do not have to select the type in Setup.

You have two ways to boot up the system:

When VGA set as primary and monochrome set as secondary, the selection of the video type is "VGA Mode".

When monochrome set as primary and VGA set as secondary, the selection of the video type is "Monochrome Mode".

#### ☐ **Error Halt**

This option determines whether the computer will stop if an error is detected during power up.

No errors	The system boot will not be stopped for any error that may be detected.
All errors	Whenever the BIOS detect a non-fatal error the system will be stopped and you will be prompted.
All, But Keyboard	The system boot will not stop for a keyboard error; it will stop for all other errors.
All, But Diskette	The system boot will not stop for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not stop for a keyboard or disk error; it will stop for all other errors.

#### ☐ **Memory**

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

##### ☐ **Base Memory**

The POST of the BIOS will determine the amount of base (or conventional) memory installed in the system. The value of the base memory is typically 512K for systems with 512K memories installed on the motherboard, or 640K for systems with 640K or more memory installed on the motherboard.

##### ☐ **Extended Memory**

The BIOS determines how much extended memory is present during the POST. This is the amount of memory located above 1MB in the CPU's memory address map.

❑ **Total Memory**

System total memory is the sum of basic memory, extended memory, and other memory.

## BIOS Features Setup

This section describes the configuration entries that allow you to improve your system performance, or let you set up some system features according to your preference. Some entries here are required by the CPU board's design to remain in their default settings.

Phoenix - AwardBIOS CMOS Setup Utility		
Advanced BIOS Features		
Virus Warning	[Disabled]	<i>Item Help</i>
CPU L1 & L2 Cache	[Enabled]	
Quick Power On Self Test	[Enabled]	<i>Menu Level ►</i>
First Boot Device	[Floppy]	<i>Allows you to</i>
Second Boot Device	[HDD-01]	<i>choose the</i>
Boot Up NumLock Status	[On]	<i>VIRUS</i>
Typematic Rate Setting	[Disabled]	<i>warning</i>
x Typematic Rate (Chars/Sec)	6	<i>feature for IDE</i>
x Typematic Delay (Msec)	250	<i>Hard Disk boot</i>
Security Option	[Setup]	<i>sector</i>
<b>Report No FDD For WIN 95</b>	<b>[NO]</b>	<i>protection. If</i>
<i>this function is</i>		
↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults		

### ☐ Virus Warning

This option may flash on the screen. During and after the system boots up, any attempt to write to the boot sector or partition table of the hard disk drive will halt the system and the following error message will appear, in the mean time, you can run an anti-virus program to locate the problem.

**Available Options:** Disabled, Enabled

**Default setting:** Disable

### ☐ CPU L1& L2 Cache

This functions speeds up System access. The CPU has an internal cache.

**Available options:** Disabled, Enabled

**Default setting:** Enabled

☐ **Quick Power On Self Test**

This option speeds up Power On Self Test (POST) after you power on the computer. If it is set to Enable, BIOS will shorten or skip some items' checks during POST.

**Available options:** Disabled, Enabled

**Default setting:** Enable

☐ **First /Second /Third/Boot Other Device/ Boot Device**

This field specifies which device the system looks first upon power on.

**Available options:** Floppy, LS120, HDD-0, SCSI, CDROM, HDD-1, HDD-2, HDD-3, ZIP100, USB-FDD, USB-ZIP, USB-CDROM, USB-HDD, LAN and Disable

**Default setting:** HDD-0, CDROM, LAN

☐ **Boot Up Numlock status**

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

☐ **Typematic rate Setting**

This function specifies the keystroke repeat rate when a key is pressed and held down.

**Available options:** Disable, Enable

**Default setting:** Disable

☐ **Typematic Rate (Chars/Sec)**

Typematic Rate sets the rate at which characters on the screen repeat when a key is pressed and held down.

**Available options:** 6, 8, 10, 12, 15, 20, 24, or 30 characters per second

**Default setting:** 6

☐ **Typematic Delay (Msec)**

The number selected indicates the time period between two identical characters appearing on screen.

**Available options:** 250,500 750 and 1000

**Default setting:** 250

☐ **Security Option**

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

☐ **Report No FDD for Win95**

This option allows Windows 95 to share IRQ6 (assigned to a floppy disk drive) with other peripherals in case the driver does not exist.

**Available options:** Enable, Disable

**Default setting:** Enable

## Chipset Features Setup

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

Phoenix - AwardBIOS CMOS Setup Utility Advanced Chipset Features		
<b>DRAM Timing Selectable</b>	<b>[By SPD]</b>	<i>Item Help</i>
<b>X CAS Latency Time</b>	<b>2.5</b>	<i>Menu Level ►</i>
<b>X Active to Precharge Delay</b>	<b>7</b>	
<b>X DRAM RAS# to CAS# Delay</b>	<b>3</b>	
<b>X DRAM RAS# Precharge</b>	<b>3</b>	
DRAM Data Integrity Mode	Non-ECC	
System BIOS Cacheable	[Enabled]	
Video BIOS Cacheable	[Disabled]	
Memory Hole At 15M-16M	[Disabled]	
Delayed Transaction	[Enabled]	
AGP Aperture Size (MB)	[64]	
<b>** On-Chip VGA Setting **</b>		
On-Chip VGA	[Enabled]	
On-Chip Frame Buffer Size	[32MB]	
Boot Display	[CRT+LFP]	
Panel Type	[ 2 ]	
↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults		

### □ DRAM Timing Selectable

SPD represents Serial Presence Detect. It is an 8-bit, 2048 bits EEPROM, built on the SDRAM for different 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:** By SPD, Manual

Default setting: By SPD

### □ CAS Latency Time

This field specifies the latency for the Synchronous DRAM system memory signals.

**Available Options:** 2.5, 2

**Default setting:** 2.5

### □ Active to Precharge Delay

This field specifies control the number of DRAM for an access cycles.

**Available Options:** 7,6,5

**Default setting:** 7

☐ **DRAM RAS# to CAS# delay**

This field specifies the length of the delay inserted between RAS and CAS signals of the Synchronous DRAM system access cycle when SDRAM is installed.

**Available Options:** 3, 2

**Default setting:** 3

☐ **DRAM RAS# Precharge**

This field specifies the length of the RAS pre-charge part of the Synchronous DRAM access cycle when SDRAM is installed.

**Available Options:** 3, 2

**Default setting:** 3

☐ **DRAM Date Integrity Mode**

Select parity ECC (Error –Correcting Code), according to the type of installed DRAM

☐ **MGM Core Frequency**

This Select equates are used for determining the FSB/MEM/GFX, Low/GFX High core frequency DRAM Date integrity mode

**Available Options:** AUTO Max 266Mhz, 400/266/133/200Mhz, 400/200/100/200Mhz, 400/200/100/133Mhz, 400/266/133/267Mhz, 400/333/166/250Mhz, Auto Max 400/300Mhz

**Default setting:** Auto Max 266

☐ **System BIOS Cacheable**

This field specifies selecting enabled allows caching of the system BIOS ROM at F0000H ~ FFFFFH, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

**Available Options:** Disabled, Enabled

**Default setting:** Enabled

☐ **Video BIOS Cacheable**

This field specifies selecting enabled allows caching of the video BIOS ROM, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

**Available Options:** Disabled, Enabled

**Default setting:** Disabled

☐ **Delayed Transaction**

This field specifies the chipset has an embedded 32-bit posted write buffer to support delay transactions cycles. Select Enabled to support compliance with PCI specification version 2.1.

**Available Options:** Disabled, Enabled

**Default setting:** Enabled

☐ **AGP Aperture Size (MB)**

This field specifies the system memory size that can be used by the Accelerated Graphics Port (AGP).

**Available Options:** 4MB, 8MB, 16MB, 32MB, 64MB, 128MB and 256MB

**Default setting:** 64 MB

☐ **On-Chip Frame Buffer Size**

This field specifies which VGA display memory. You can select either Video memory on the VGA. There are setting share onboard memory.

**Available Options:** 1MB, 4MB, 8MB, 16MB and 32MB

**Default setting:** 32MB

☐ **Boot Display**

This field specifies which VGA display will be used when the system is boot. You can select either the LFP (LVDS LCD's) or the CRT booting on the VGA.

**Available Options:** CRT+LFP, LFP, and CRT

**Default setting:** CRT

☐ **Panel Type**

When use the LCD the field specifies which select display resolution for different TFT LVDS LCD's display type.

**Available Options:** 0,1,2,3,4,5,6,7,8,9,10,11,12,13,14 and 15

**Default setting:** 2

**LCD Panel Type Table**

<b>Panel ID</b>	<b>Function</b>
0	640x480
1	800x600
2	1024x768
3	1280x1024
4	1400x1050
5	1400x1050
6	1600x1200
7	1280x768
8	1600x1050
9	1920x1200
10	1024x768
11	1024x768
12	1024x768
13	1280x800
14	1280x600
15	1024x768

## Integrated Peripherals

This section describes the function of peripheral features.

Phoenix - AwardBIOS CMOS Setup Utility		
Integrated Peripherals		
▶ OnChip IDE Device	[Press Enter]	Item Help
▶ Onboard Device	[Press Enter]	Menu Level ▶
▶ SuperIO Device	[Press Enter]	
↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults		

### ❑ OnChip IDE Device

Phoenix – Award CMOS Setup Utility		
OnChip IDE Device		
OnChip Primary PCI IDE	[Enabled]	Item Help
IDE Primary Master PIO	[Auto]	Menu Level ►
IDE Primary Slave PIO	[Auto]	
IDE Primary Master UDMA	[Auto]	
IDE Primary Slave UDMA	[Auto]	
OnChip Secondary PCI IDE	[Enabled]	
IDE Secondary Master PIO	[Auto]	
IDE Secondary Slave PIO	[Auto]	
IDE Secondary Master UDMA	[Auto]	
IDE Secondary Slave UDMA	[Auto]	
IDE HDD Block Mode	[Enabled]	
↑↓→←:Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults		

### ❑ OnChip Primary/Secondary PCI IDE

This field specifies the IDE channel that can be applied when using IDE hard disk connector.

**Available Options:** Disabled, Enable

**Default setting:** Enable

#### ❑ DE Primary/Secondary Master/Slave PIO

IDE hard drive controllers can support up to two separate hard drives. These drives have a master/slave relationship, which is determined by the cabling configuration used to attach them to the controller. Your system supports one IDE controller – a primary and a secondary – so you have the ability to install up to four separate hard disks.

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.

#### ❑ IDE Primary/Secondary Master/Slave UDMA

Ultra DMA/33 implementation is possible only if your IDE hard drive supports it and the operating environment includes a DMA driver (Windows 95 OSR2 or a third-party IDE bus master driver). If your hard drive and your system software both support Ultra DMA/33, select Auto to enable. This option allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive (HDD).

#### ❑ IDE HDD 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).

#### ❑ OnBoard Device

Phoenix – Award CMOS Setup Utility		
Onboard Device		
USB Controller	[Enabled]	Item Help
USB 2.0 Support	[Enabled]	
USB Keyboard Support	[Disabled]	Menu Level ►
AC97 Audio	[Auto]	
Init Display First	[Onboard]	
Onboard LAN Boot ROM	[Disabled]	
↑↓→←:Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults		

#### ❑ USB Controller

Select Enabled 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

☐ **USB Device KB Support**

Select All Device 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, Mice and All Devices

**Default setting:** All Devices

☐ **AC'97 Audio**

This field specifies the internal Audio Control.

**Available Options:** Disable, Enable

**Default setting:** Enable

☐ **Init Display First**

This field specifies which VGA display will be used when the system is boot. You can select either the onboard AGP or the VGA card installed on the PCI bus.

**Available Options:** Onboard/AGP, PCI Slot

**Default setting:** Onboard/AGP

☐ **Onboard LAN Boot ROM**

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

**Available Options:** Disabled, Enable

**Default setting:** Disable

❑ **SuperIO Device**

Phoenix – Award CMOS Setup Utility		
SuperIO Device		
Onboard FDC Controller	[Enabled]	<i>Item Help</i>
Onboard Serial Port 1	[3F8/IRQ4]	<i>Menu Level ►</i>
Onboard Serial Port 2	[2F8/IRQ3]	
Onboard Parallel Port	[378/IRQ7]	
Parallel Port Mode	[SPP]	
X EPP Mode Select	EPP1.7	
X ECP Mode Use DMA	3	
↑↓→←:Move Enter: Select +/-PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults		

❑ **OnBoard FDC**

This field enables the floppy drive controller on the FB2642.

**Available Options:** Disabled, Enabled and Auto

**Default setting:** Auto

❑ **OnBoard Serial Port 1**

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

**Available Options:** Disabled, 3F8H/IRQ4, 2F8H/IRQ3, and 3E8H/IRQ4, 2E8H/IRQ3.

**Default setting:** 3F8/IRQ4

❑ **OnBoard Serial Port 2**

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

**Available Options:** Disabled, 3F8H/IRQ4, 2F8H/IRQ3, and 3E8H/IRQ4, 2E8H/IRQ3.

**Default setting:** 2F8/COM2

☐ **OnBoard Parallel Port**

This field selects the I/O port address for parallel port.

**Available Options:** Disabled, 378/IRQ7, 278/IRQ5, and 3BC/IRQ7

**Default setting:** 378/IRQ7

☐ **Parallel Port Mode**

This field specifies the parallel port mode. ECP and EPP are both bi-directional data transfer schemes that adhere to the IEEE P1284 specifications.

**Available Options:** Normal, SPP, EPP, ECP and ECP+EPP

**Default setting:** SPP

☐ **EPP Mode Select**

This field specifies the EPP version for the Parallel Port Mode specification used in the system and is not configurable. IF Normal or ECP is selected, this field displays N/A, meaning not available.

**Available Options:** EPP1.7 and EPP1.9

**Default setting:** EPP1.9

☐ **ECP Mode Use DMA**

This option is only available if the setting for the parallel Port Mode option is ECP.

**Available Options:** 1,3

**Default setting:** 3

## POWER MANAGEMENT

Phoenix - AwardBIOS CMOS Setup Utility		
Power Management Setup		
ACPI Function	[Enabled]	Item Help
Power Management	[User Define]	
Video Off Method	[DPMS]	
Video Off In Suspend	[Yes]	
Suspend <b>Type</b>	<b>[Stop Grant]</b>	
Suspend Mode	[Disabled]	Menu Level ►
Soft-Off by PWR-BTTN	Instant-Off	
Power <b>After PWR-Fail</b>	<b>[OFF]</b>	
Resume by Alarm	[Disabled]	
x Date (of Month) Alarm	0	
x Time (hh:mm:ss) Alarm	0 : 0 : 0	
↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults		

### ❑ ACPI Function

This filed specifies allow you enable Advanced Configuration and Power Management. When you use Windows/OS standby mode can set to enable.

**Available Options:** Disabled, Enabled

**Default setting:** Enable

### ❑ Power Management

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

**Available Options:** User Define, Min Saving, Max Saving

**Default setting:** User Define

### ❑ Video Of Method

When enabled, this feature allows the VGA adapter to operate in a power saving mode.

V/H SYNC + Blank - This selection will cause the system to turn off the vertical and horizontal synchronization ports and write blanks to the video buffer.

Blank Screen - This option only writes blanks to the video buffer.

DPMS - Select this option if your monitor supports the Display Power Management

Signal (DPMS) standard of the Video Electronics Standards to select video power management values.

**Available Options:** V/H SYNC + Blank, Blank Screen and DPMS

**Default setting:** DPMS

☐ **Suspend Type**

This field defines the continuous idle time before the system enters PwrOn Suspend.

**Available Options:** Stop Grant and PwrOn Suspend

**Default setting:** Stop Grant

☐ **Suspend Mode**

This field specifies the When enabled and after the set time of system inactivity, all devices except the CPU will be shut off.

**Available Options:** Disabled, 1 Minute, 2 Minute, 4 Minute, 12 Minute, 20 Minute, 30 Minute, 40 Minute and 1 Hour

**Default setting:** Disabled

☐ **Soft-Off By PWR-BTIN**

Pressing the power button for more than 4 seconds forces the system to enter the Soft-Off state when the system has "hung". The choices are Delay 4 Sec and Instant-Off.

**Available Options:** Instant-Off and Delay 4 sec.

**Default setting:** Instant-Off

☐ **Resume By Alarm**

This field specifies the RTC alarm to be turned off by extra software.

**Available Options:** Disabled, Enabled

**Default setting:** Disabled

☐ **Date (Of Month) Alarm**

This field specifies the date of the RTC alarm.

**Available Options:** 1, 31

**Default setting:** 15

☐ **Time (hh:mm:ss) Alarm**

This field specifies the hour/ minute/second of the RTC alarm.

**Available Options:** 1-24/0-60/0-60

**Default setting:** 00

## PnP/PCI Configurations

Phoenix - AwardBIOS CMOS Setup Utility  
PnP/PCI Configurations

Reset Configuration Data	[Disabled]	<i>Item Help</i>
Resources Controlled By	[Auto (ESCD)]	<i>Menu Level ►</i>
X IRQ Resources	Press Enter	
PCI/VGA Palette Snoop	[Disabled]	
		<i>Select Yes if you are using a Plug and Play capable operating system Select No if you need the BIOS to configure non-boot devices</i>
↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults		

- ❑ **Reset Configuration Data:** Enable, Disable

If you select Enable to reset Extended System Configuration Data (ESCD) when you exit setup is you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the operation operating system cannot boot.

**Available Options:** Enable, Disable

Default setting: Disable

- ❑ **Resources Controlled By:** Auto [ESCD], Manual

If you select Auto, all the interrupt request (IRQ), DMA assignment, and Used DMA fields disappear, as the BIOS automatically assigns them. The default value is "Manual".

**Available Options:** Auto, Manual

**Default setting:** Manual

❑ **X IRQ Resources**

Phoenix – Award CMOS Setup Utility		
IRQ Resources		
IRQ-3 assigned to	[PCI Device]	<i>Item Help</i>
IRQ-4 assigned to	[PCI Device]	
IRQ-5 assigned to	[PCI Device]	
IRQ-7 assigned to	[PCI Device]	<i>Menu Level ►</i>
IRQ-9 assigned to	[PCI Device]	<i>Legacy ISA for devices</i>
IRQ-10 assigned to	[PCI Device]	<i>compliant with the</i>
IRQ-11 assigned to	[PCI Device]	<i>original PC AT bus</i>
IRQ-12 assigned to	[PCI Device]	<i>specification, PCI/ISA</i>
IRQ-14 assigned to	[PCI Device]	<i>PnP for devices</i>
IRQ-15 assigned to	[PCI Device]	<i>compliant with the Plug</i>
		<i>and Play standard</i>
		<i>whether designed for</i>
		<i>PCI or ISA bus</i>
		<i>architecture</i>
↑↓→←:Move Enter: Select +/-PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults		

❑ **IRQ-n Assigned: PCI Device and Reserved**

You may assign each system interrupt a type, depending on the type of device using the interrupt.

❑ **PCI/VGA Palette Snoop**

When Enabled is selected, multiple VGA devices operating on different buses can handle data from the CPU on each set of palette registers on every video device. Bit 5 of the command register in the PCI device configuration space is the VGA Palette Snoop bit. (0 is disabled).

**Available Options:**

Disabled: Data read and written by the CPU is only directed to the PCI VGA devices palette registers.

Enabled: Data read and written by the CPU is directed to both the PCI VGA devices palette registers.

## PC Health Status

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

Phoenix - AwardBIOS CMOS Setup Utility		
PC Health Status		
Current SYS Temp	47°C/116°F	<i>Item Help</i>
Current CPU Temp	47°C/116°F	<i>Menu Level ▶</i>
Current CPU Fan 1 Speed	0 RPM	
Current CPU Fan 2 Speed	5152 RPM	
Vcore <b>A</b>	1.44V	
Vcore <b>B</b>	1.00V	
3.3 V	3.23V	
+ 5 V	4.94V	
+12 V	11.97	
<b>+1.5 V</b>	<b>1.56V</b>	
<b>+1.35V</b>	<b>1.40V</b>	
VBAT (V)	3.13V	
5VSB (V)	5.11V	
↑↓→←: Move Enter: Select +/-PU/PD:Value F10:Save ESC:Exit F1:General Help F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults		

### ❑ System Hardware Monitor

In this field, you can monitor or detect the followings items. These items are view-only and cannot be changed.

- Current CPU Temp.
- Current System Temp.
- Current Ext. Tempe.
- CPU Fan1 Speed
- CPU Fan2 Speed
- VCORE A
- VCORE B
- +3.300V
- +5.0000V
- +12.00V
- +1.500V
- +1.350V
- VBAT (V)
- 5VSB (V)

VBAT (On board Battery)

## Password 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.

To set the password, please complete the following steps.

1. Select **Change Supervisor Password**.
2. Type the desired password (up to 8 character length) when you see the message, "Enter New Supervisor Password."
3. Then you can go on to set a user password (up to 8 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.
  - ✧ **System:** 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.

To set the password, please complete the following steps.

1. Select **Change Supervisor Password**.
2. Press Enter instead of entering any character when you see the message, "Enter New Supervisor Password."
3. Thus you can disable the password.



## Chapter 5 Software Installation

The enclosed diskette includes FB2646 VGA, Audio, USB, System and LAN driver. To install and configure you FB2646 system, you need to perform the following steps.

### System Driver

#### **WIN 98/2000/XP Driver**

Installs 855GME Chipset, IRQ Routing, USB, AGP Driver and PCI IDE Bus Master Driver.

- Step 1: To install the 855GME driver, insert the CD ROM into the CD ROM device, and enter DRIVER>SysChip>855GME.
- Step 2: Execute Setup.exe file.
- Step 3: The screen shows the SETUP type. Press any key to enter the main menu.
- Step 4: As the setup is completed, the system will generate the message as follows.

Yes, I want to restart my computer now. Installation is done!

No, I will restart my computer later.

System must be restart then complete the installation.

**Note:** In the Syschip>855GME directory, a Readme.txt file is included to provide installation information.

## VGA Driver for WIN98SE/ME/2000/XP/NT4.0

Step 1: To install the VGA driver, insert the CD ROM into the CD ROM device, and enter DRIVER>VGA>855GME>WIN2K\_XP, WIN98\_ME or WINNT4.

Step 2: Execute SETUP.EXE file.

Step 3: The screen shows the SETUP type. Press any key to enter the main menu.

Step 4: As the setup is completed, the system will generate the message as follows.

Yes, I want to restart my computer now. Installation is done!

No, I will restart my computer later.

System must be restart then complete the installation.

Step 5: In the WINDOWS2000/XP/98SE/ME, you can find the <DISPLAYL> icon located in the {CONTROL PANEL} group.

Step 6: Adjust the <Refresh Rate>, <Font size> and <Resolution>.

## Audio Drivers

### WIN 98/2000/XP Driver

Step 1: To install the AUDIO driver, insert the CD ROM into the CD ROM device, and enter DRIVER>AUDIO>I815E>WIN98&ME&2K&XP.

Step 2: Execute SETUP.exe file.

Step 3: The screen shows the SETUP type. Press any key to enter the main menu.

Step 4: As the setup is completed, the system will generate the message as follows.

Yes, I want to restart my computer now. Installation is done!

No, I will restart my computer later.

System must be restart then complete the installation.

<p><b>Note:</b> In the DRIVER&gt;AUDIO&gt;I815E&gt; WIN98&amp;ME&amp;2K&amp;XP or WINNT40 directory, a Readme.txt file is included to provide installation information.</p>
---

## USB 2.0 Driver

### WIN 98/2000/XP Driver

- Step 1: To install the USB driver, insert the CD ROM into the CD ROM device, and enter DRIVER>USB>855GME>WIN2K, WINXP, WIN98\_ME.
- Step 2: Start the "Add New Hardware" wizard in control panel  
(Click Start/Settings/Control Panel).
- Step 3: Select "Hardware" and click "Device Manager " button.
- Step 4: Double Click "USB Root Hub".
- Step 5: Select "Driver".
- Step 6: Click "Install" to install the driver.
- Step 7: Follow the instructions on the screen to complete the installation.
- Step 8: Click "Finish" after the driver installation is complete.

## LAN Utility & Driver

- 1 To install the LAN utility OR driver, insert the CD ROM into the CD ROM device, and enter DRIVER>LAN>RTL8110S>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.

<p><b>Note:</b> In the RTL8110S directory, a README.TXT is included to provide installation information.</p>
--

## BIOS Flash Utility

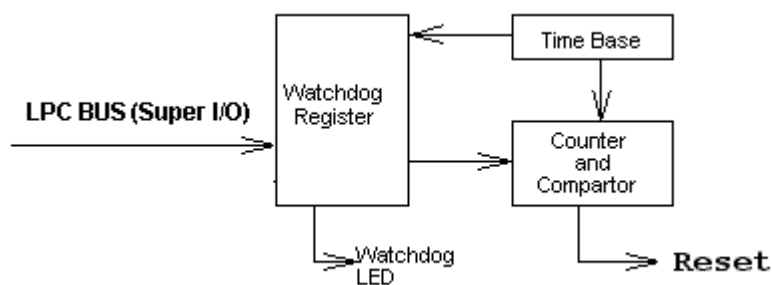
In the <UTILITY> directory, there is the FLASH845.EXE file.

- Step 1: Use the AWDFLASH.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 is 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 FB2646 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.



### Watchdog Timer Setting

The watchdog timer is a circuit that may be used from your program software to detect system crashes or hang-ups. LED1 on this CPU board is the watchdog timer indicator, which is located at the upper-left corner above the USB connector. 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 seconds. 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 register whose address is 2Eh and data port is 2Fh. The following is an Assemble program, which demonstrates how to enable the watchdog timer and set the time-out period at 28 seconds.

```
;-----  
; Enter the extended function mode, interruptible double-write  
;-----  
Mov     dx, 2eh           ; Enter to extended function mode  
Mov     al, 87h  
Out     dx, al  
Out     dx, al  
Mov     al, 07h  
Out     dx, al  
;-----  
; Logical device 8, configuration register CRF5 Bit 3, CRF6 Bit 0~7  
;-----  
Mov     dx, 2fh  
Mov     al, 08h           ; Select Logical Device 8 of watchdog timer  
Out     dx, al  
Mov     dx, 2eh  
Mov     al, 0f5h         ; Set second as counting unit  
Out     dx, al  
Mov     dx, 2fh  
In      al, dx  
Or      al, c0           ; Trigger P/W LED.  
And     al, not c8h       ; Set Second.  
; And    al, c8h         ; Set Minute.  
Out     dx, al  
Mov     dx, 2eh  
Mov     al, 0f6h  
Out     dx, al  
Mov     dx, 2fh  
Mov     al, 28h           ; Set timeout interval as 28seconds and start counting  
Out     dx, al  
;-----  
; Exit extended function mode  
;-----  
Mov     dx, 2eh  
Mov     al, 0aah  
Out     dx, al
```

### 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 next trigger.

**Watchdog Timer Disabled**

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

```
-----  
; Enter the extended function mode, interruptible double-write  
-----  
Mov     dx,2eh           ; Enter to extended function mode  
Mov     al,87h  
Out     dx,al  
Out     dx,al  
-----  
; Logical device 8, configuration register CRF5 Bit 3(Sec./Min.), CRF6 Bit 0~7 (Count.)  
-----  
Mov     al,07h  
Out     dx,al  
Mov     dx,2fh  
Mov     al,08h           ; Select Logical Device 8 of watchdog timer  
Out     dx,al  
Mov     dx,2eh  
Mov     al,0f5h          ;Set second as counting unit  
Out     dx,al  
Mov     dx,2fh  
In      al,dx  
And     al,not c8h       ;Set Second or Minute.  
Out     dx,al  
Mov     dx,2eh  
Mov     al,0f6h  
Out     dx,al  
Mov     dx,2fh  
Mov     al,00h           ; Set Watchdog Timer Disabled  
Out     dx,al  
-----  
; Exit extended function mode  
-----  
Mov     dx,2eh           ;Exit the extended function mode  
Mov     al,0aah  
Out     dx,al
```

## J7 TTL I/O -Software programming example

The following example is written in Intel 8086 assembly language. It assumes that the IO port address is located at 2Eh and data port is located at 2Fh. The following is an Assemble program, which demonstrates how to read/write the TTL IO port

```
-----  
; Enter the extended function mode, interruptible double-write  
-----  
Mov     dx,2eh  
Mov     al,87h  
Out     dx,al  
Out     dx,al  
-----  
; Logical device 7, configuration register CRF1 Bit 0,1(J5-Pin1, 2/GPO1, 2)  
-----  
Mov     dx,2eh  
Mov     al,07h  
Out     dx,al           ;point to Logical Device Number Reg.  
Mov     dx,2fh  
Mov     al,07h  
Out     dx,al           ; select logical device 7  
Mov     dx,2eh  
Mov     al,0f1H  
Out     dx,al           ; select CRF1  
Mov     dx,2fh  
Mov     al,cfh           ; Bit o,1 with value 1. (Write GPO1, GPO2 is active to high.)  
; Mov    al,0cch          ; Bit o, 1 with value 0. (Write GPO1, GPO2 is active to low.)  
Out     dx,al           ; update CRF1 with value CFH  
-----  
; Logical device 8, configuration register CRF1 Bit 0,1(J5-Pin3, 4/GPI 1,2)  
-----  
Mov     dx,2eh  
Mov     al,07h  
Out     dx,al           ; point to Logical Device Number Reg.  
Mov     dx,2fh  
Mov     al,08h  
Out     dx,al           ; select logical device 8  
Mov     dx,2eh  
Mov     al,0f1h  
Out     dx,al           ; select CRF1  
Mov     dx,2fh  
In      al,dx           ; Bit o, 1 with state value. (Read GPI1, GPI2 state.)  
; Read CRF1 with value 0XH  
-----  
; Exit extended function mode  
-----  
Mov     dx,2eh  
Mov     al,0aah  
Out     dx,al
```

## Chapter 6 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

### 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.

#### ❑ **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

❑ **FLOPPY DISK CONTROLLER ERROR OR NO CONTROLLER PRESENT**

When you cannot find or initialize the floppy drive controller, please ensure the controller is in proper BIOS Setup. If there is no floppy drive installed, ensure the Diskette Drive selection in Setup is set to NONE.

❑ **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**

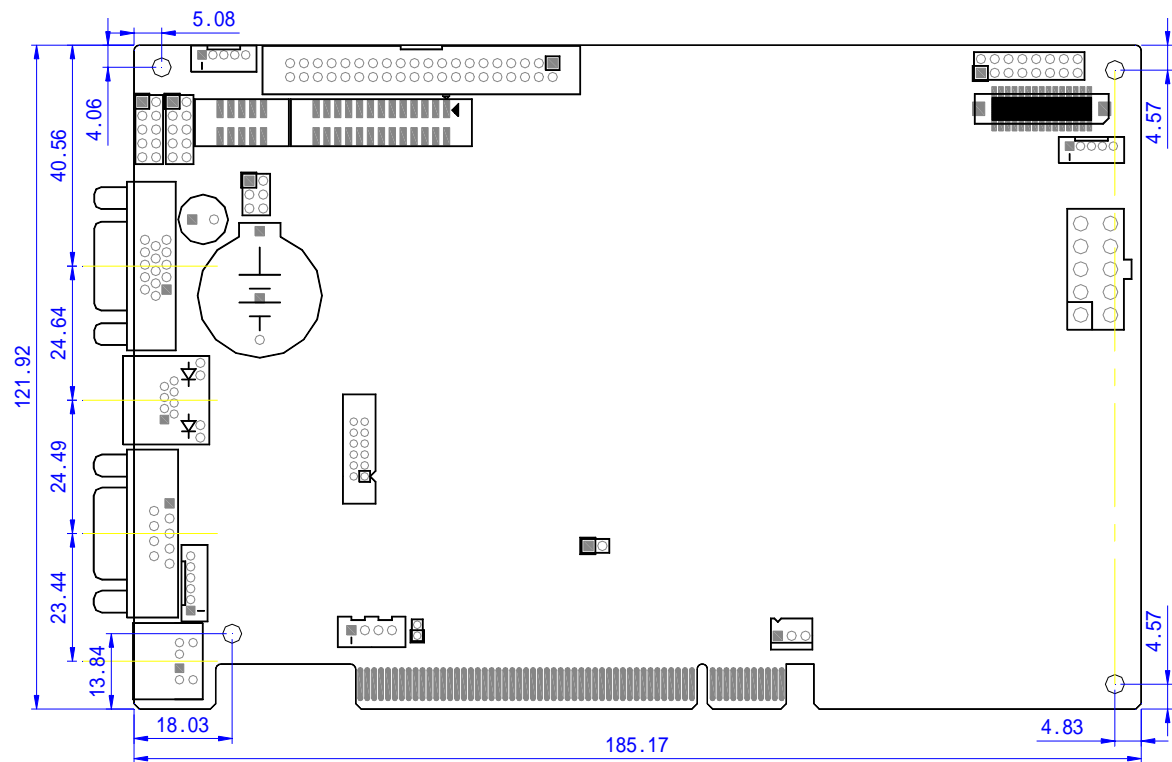
When this error occurs that requires you to reboot. Press any key and the system will reboot.

❑ **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.

## Appendix

### Dimension



## Technical Reference

### Physical and Environmental

Power Supply Voltage: +5V/+5%,+12V/+5%

Temperature: Operating 0°C ~ 60°C (32~140 °F)

Relative humidity 0 % to 90 % non-condensing

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

The FB2646 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
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

Address	Description
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	Equipment Bits 7-6 Number of Floppy Drives 00 1 Drive 01 2 Drives Bits 5-4 Monitor Type 00 Not CGA or MDA 01 40x25 CGA 01 2 Drives 80x25 CGA Bits 3 Display Enabled 0 Disabled 1 Enabled Bit 2 Keyboard Enabled 00 Not CGA or MDA 01 40x25 CGA 01 2 Drives 80x25 CGA Bit 1 Math Coprocessor Installed 0 Absent 1 Present Bit 0 Floppy Drive Installed 0 Disabled 1 Enabled
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
078h - 07Bh	TTL I/O
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
170h - 177h	IDE Interface
1F0h - 1F7h	IDE Interface
2E8h - 2EFh	Serial Port #4(COM4)
2F8h - 2FFh	Serial Port #2(COM2)
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
3E8h - 3EFh	Serial Port #3(COM3)
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	Serial Port #2
IRQ4	Serial Port #1
IRQ5	USB#0
IRQ6	Floppy Disk Controller
IRQ7	Parallel Port #1
IRQ8	Real Time Clock
IRQ9	SM-BUS
IRQ10	USB#1
IRQ11	USB#2/LAN /VGA
IRQ12	USB#3/PS2 Mouse
IRQ13	FPU
IRQ14	Primary IDE
IRQ15	Secondary IDE (CF)

### DMA Channel Map

The equivalent of two 8237A DMA controllers are implemented in the FB2646 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 speeding 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:

DMA Controller 1	DMA Controller 2
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 is 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

## Parallel Ports

### ❑ Register Address

Port Address	Read/Write	Register
Base + 0	Write	Output data
Base + 0	Read	Input data
Base + 1	Read	Printer status buffer
Base + 2	Write	Printer control latch

### ❑ Printer Interface Logic

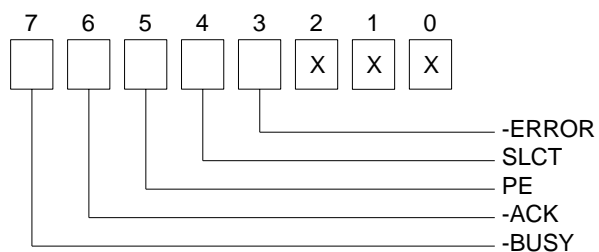
The parallel portion of the SMC37C669 makes the attachment of various devices that accept eight bits of parallel data at standard TTL level.

### ❑ Data Swapper

The system microprocessor can read the contents of the printer's Data Latch through the Data Swapper by reading the Data Swapper address

### ❑ Printer Status Buffer

The system microprocessor can read the printer status by reading the address of the Printer Status Buffer. The bit definitions are described below:

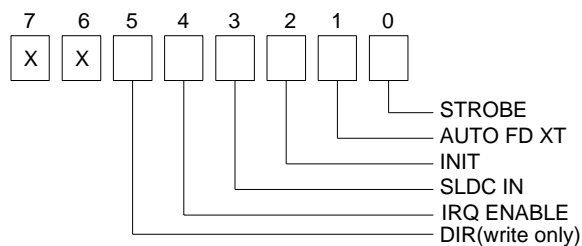


NOTE: X represents not used.

- Bit 7: This signal may become active during data entry, when the printer is off-line during printing, or when the print head is changing position or in an error state. When Bit 7 is active, the printer is busy and cannot accept data.
- Bit 6: This bit represents the current state of the printer's ACK signal. A 0 means the printer has received the character and is ready to accept another. Normally, this signal will be active for approximately 5 microseconds before receiving a BUSY message stops.
- Bit 5: A 1 means the printer has detected the end of the paper.
- Bit 4: A 1 means the printer is selected.
- Bit 3: A 0 means the printer has encountered an error condition.

#### □ Printer Control Latch & Printer Control Swapper

The system microprocessor can read the contents of the printer control latch by reading the address of printer control swapper. Bit definitions are as follows:



NOTE: X represents not used.

- Bit 5: Direction control bit. When logic 1, the output buffers in the parallel port are disabled allowing data driven from external sources to be read; when logic 0 they work as a printer port. This bit is write-only.
- Bit 4: A 1 in this position allows an interrupt to occur when ACK changes from low state to high state.
- Bit 3: A 1 in this bit position selects the printer.
- Bit 2: A 0 starts the printer (50 microseconds pulse, minimum).
- Bit 1: A 1 causes the printer to line-feed after a line is printed.
- Bit 0: A 0.5 microsecond minimum highly active pulse clocks data into the printer. Valid data must be present for a minimum of 0.5 microseconds before and after the strobe pulse.

