MAT-A791

Socket 478 Embedded Single Board Computer
With Five Ethernet

User's Manual

Version 1.0

Manual edition 1.0, May.2002

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Chapter 1. General Information

1.1 Introduction

The MAT-A791 is fully function of socket 478 Pentium® 4 CPU Card, which is PCI/ISA bus and PICMG compliant. The MAT-A791 with Intel® 845G and ICH4 chipset supports Intel® Pentium® 4 processors with 533/400MHz system bus, with one 184-pin DDR DIMM sockets for DDR SDRAM to 1Gbytes. The MAT-A791 supports three Gigabit and two100/10Mbps Ethernet Interface, two USB 2.0 compliant ports.

1.2 Specification

General Functions

CPU	Socket 478 Pentium® 4 processor with 400/533MHz system bus
BIOS	Award® 512KB Flash BIOS
Chipset	Intel 845G + ICH4
I/O Chipset	Winbond® 83627HF-AW
Memory	Onboard one 184-pin DDR DIMM sockets supports up to 1Gbytes
Enhanced IDE	Support up to four IDE devices. Ultra DMA 33/ 66/100
Parallel port	One bi-directional parallel port. Supports SPP/ECP/EPP
Serial port	Two RS-232 serial ports
KB/Mouse connector	6-pin Mini-DIN connector for PC/AT keyboard & PS/2 mouse
USB connectors	Two USB 2.0 compliant ports
Battery	Lithium battery for data retention up to 10years(in normal condition)
Watchdog Timer	Can generate a system reset, support 1-256 second selectable timeout interval
System Monitoring	Built in W83627HF-AW; supports temperatures, Fan speed, and voltages monitoring
PCI Slot	One 32-bit expansion slot
GPO LED	Supports eight application definable LEDs

SMBus	6-pin header supports SMBus LCD interface
VGA Interface	Optional via VGA kit
Ethernet Interface	
Chipset	Three Intel® 82540EM Gigabit and two 82551QM 100Base-Tx Fast Ethernet controller
Ethernet interface	PCI 1000/100/10 Mbps Ethernet controller IEEE 802.3U protocol compatible
SSD Interface	One 50-pin CompactFlash Socket
Mechanical and Environmental	
Power supply voltage	+12V(11.4V to 12.6V)
Max. power requirements	13.5A @ +12 V
Operating temperature	32 to 140°F (0 to 60°C)
Weight	8.3"(L)x8.27"(W) (211mm x 210mm)

1.3 MAT-A791 Package

Please make sure that the following items have been included in the package before installation.

1. MAT-A791 Socket 478 Single Board
2. Quick Installation Guide
3. Cable: Please refer to Appendix D Optional Cables
4. CD-ROM which contains the following folders:
   (1) Manual
   (2) LAN Driver
   (3) VGA Driver
   (4) USB 2.0 Driver
   (5) BIOS Utility

If any of these items are missing or damaged, please contact your dealer from whom you purchased the board at once. Save the shipping materials and carton in the event that you want to ship or store the board in the future. After you unpack the board, inspect it to assure an intact shipment. Do not apply power to the board if it appears to have been damaged.

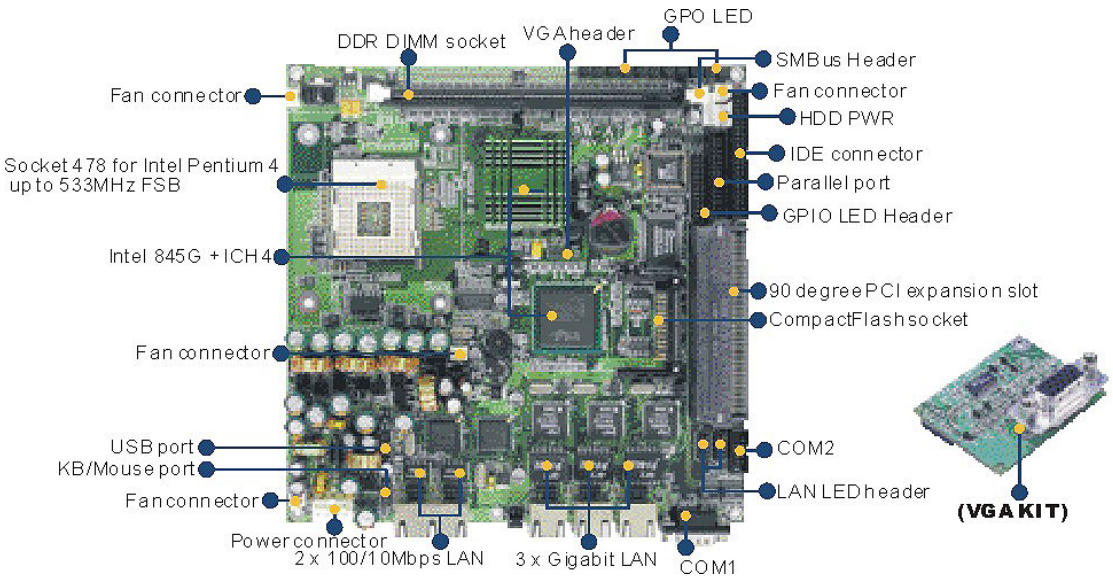
Leave the board in its original packing until you are ready to install

Precautions

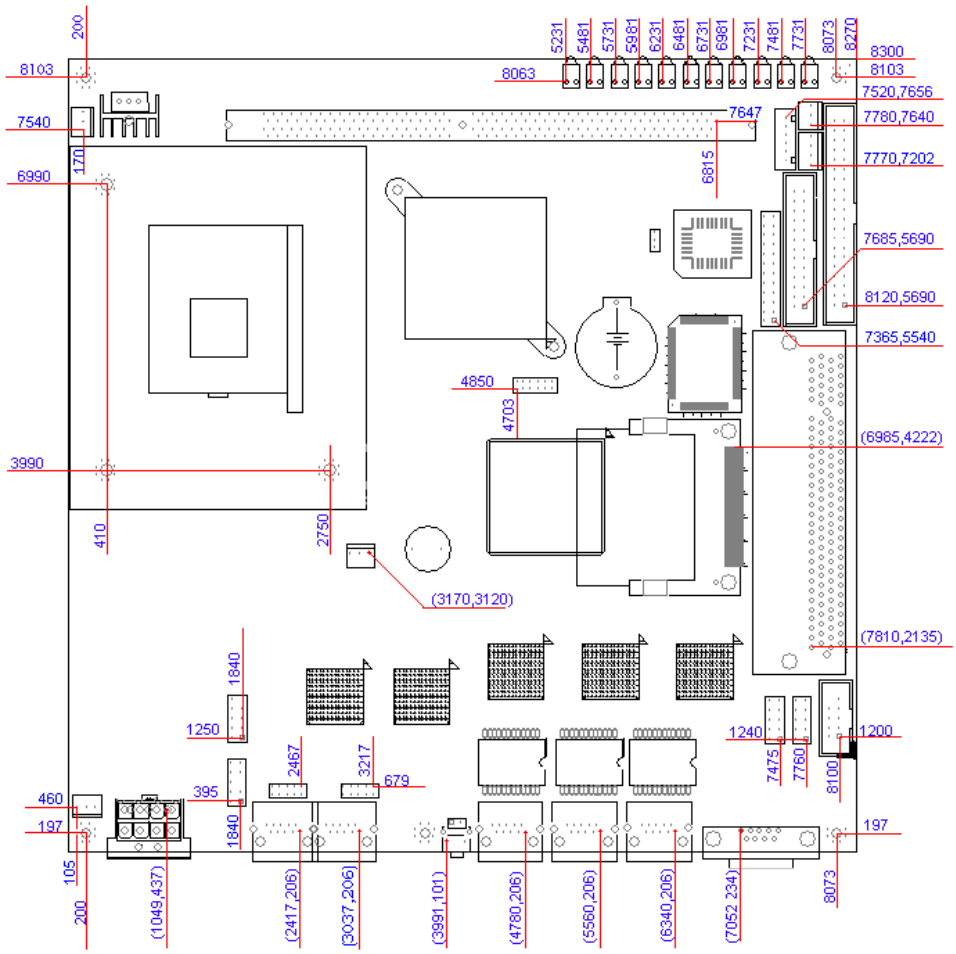
Please make sure you properly ground yourself before handling the MAT-A791 board or other system components. Electrostatic discharge can be easily damage the MAT-A791 board.

1. Do not remove the anti-static packing until you are ready to install the MAT-A791 board.
2. Ground yourself before removing any system component from it protective anti-static packaging. To ground yourself, grasp the expansion slot covers or other unpainted parts of the computer chassis.
3. Handle the MAT-A791 board by its edges and avoid touching its component.

1.4Board Layout

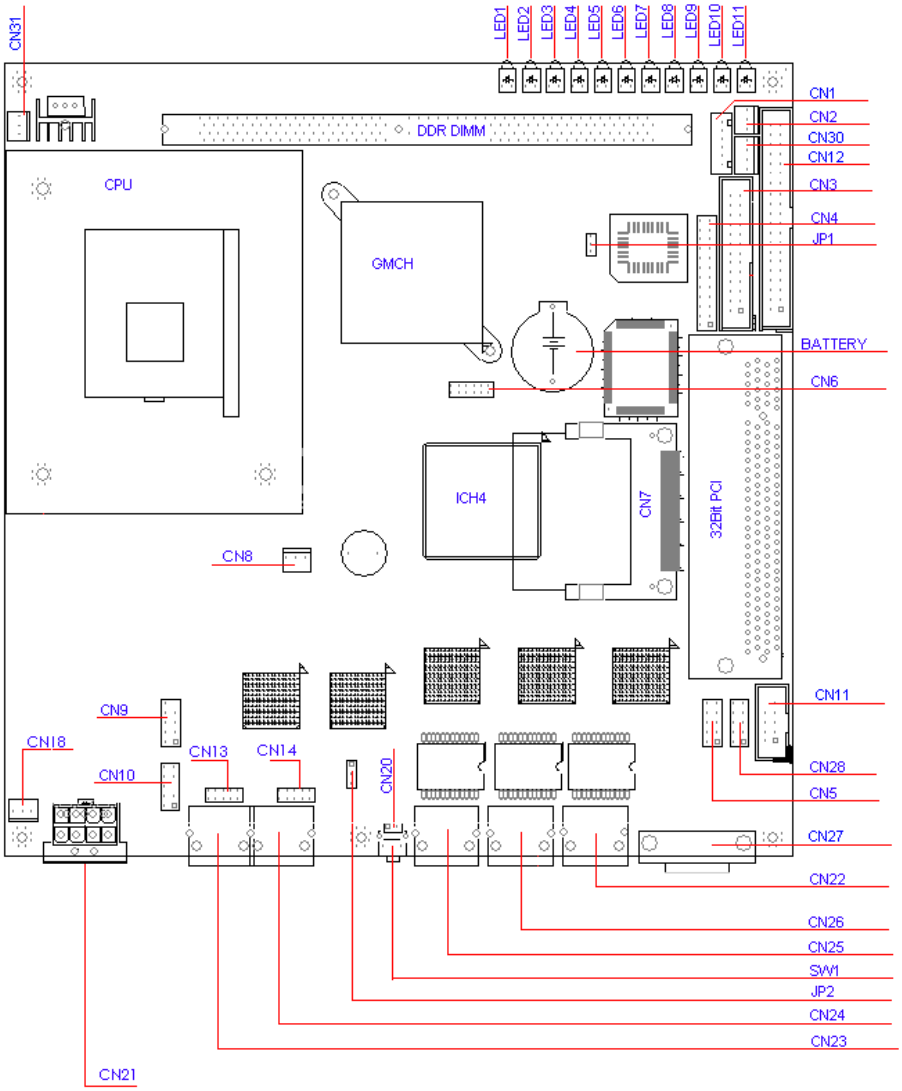


1.5 Board Dimension



Chapter 2. Connectors Location and Configuration

2.1 Connectors/Jumpers Location and Define



Connector	Define	Connectors	Define
CN1	SMBUS Connector 2.54mm	CN18	FAN Connector 2.54mm
CN2	FAN Connector 2.54mm	CN19	Power Connector – Jack Type
CN3	LPT Connector 2.54mm	CN20	Reset Connector
CN4	GPO LED Header	CN21	Power Connector – Header Type
CN5	LAN LED Header	CN22	LAN 1 (RJ45)
CN6	VGA Header	CN23	LAN 5 (RJ45)
CN7	CompactFlash Socket	CN24	LAN 4 (RJ45)
CN8	FAN Connector 2.54mm	CN25	LAN 3 (RJ45)
CN9	USB Header 2.54mm	CN26	LAN 2 (RJ45)
CN10	KB/Mouse Header 2.54mm	CN27	COM1 (D-Sub)
CN11	COM2 Header 2.54mm	CN28	LAN LED Header
CN12	IDE Connector 2.54mm	CN30	HDD Power Connector
CN13	LAN 5 (Pin-Header) 2.0mm	CN31	FAN Connector
CN14	LAN 4 (Pin-Header) 2.0mm	D8	GPO 3 LED
D1	HDD LED	D9	GPO 2 LED
D2	Power LED	D10	GPO 1 LED
D3	Alert LED	D11	GPO 0 LED
D4	GPO 7 LED	SW1	Reset Switch
D5	GPO 6 LED	JP1	Clear CMOS
D6	GPO 5 LED	JP2	GPO Register Select
D7	GPO 4 LED		

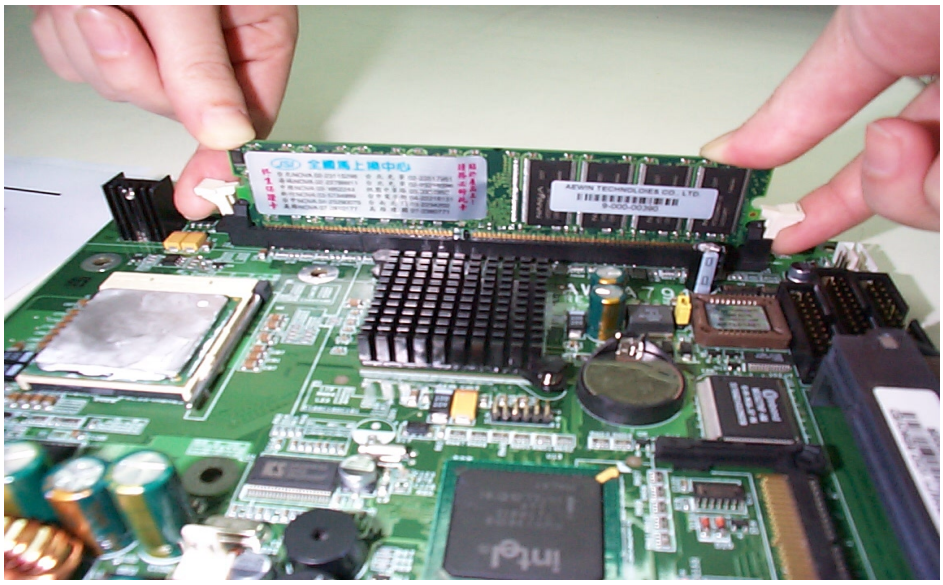
2.2 Installing CPU

The MAT-A791 with 478 socket supports Intel® Pentium® 4 processors, up to 533MHz system bus.

2.3 Installing System Memory

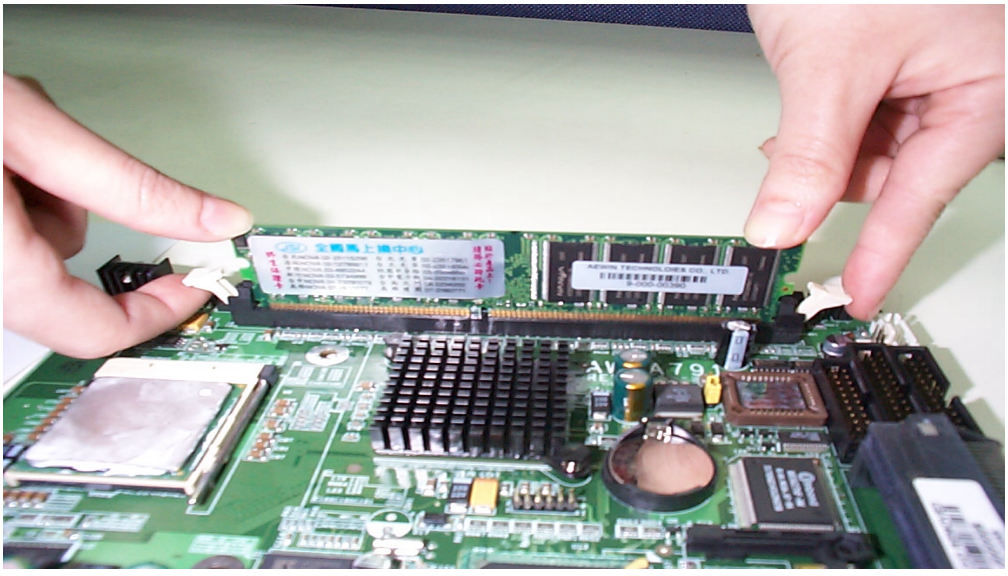
The MAT-A791 supports one 184-pin DDR DIMM sockets, memory up to 1Gbytes.

To insert a DDR DIMM Memory: Please align the module with the socket key and press down until the levers at each end of the socket snap close up.



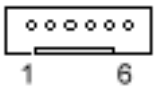
Note: There is only one direction for installing a module in the socket. Do not attempt to force the module into the socket incorrectly.

To remove a DDR DIMM Memory: Press down on the levers at both end of module until the module pops out.



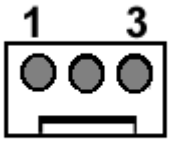
2.4 Connector and Jumper Settings

CN1: SMBus Connector



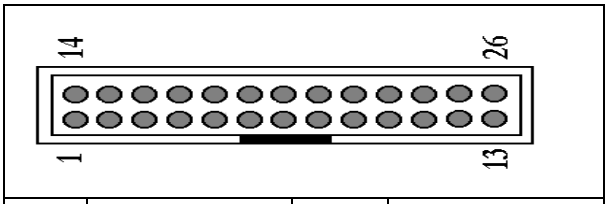
Pin	Define
1	GND
2	+5V
3	SMBCLK
4	SMBDATA
5	+12V
6	PWR-BTTN

CN2, CN8, CN18: FAN Connectors



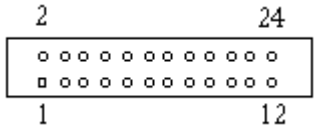
Pin	Define
1	GND
2	+12V
3	SPEED DETECT

CN3: LPT Connector



Pin	Define	Pin	Define
1	STROBE	14	AUTOFD*
2	PD0	15	ERROR*
3	PD1	16	INIT*
4	PD2	17	SLCTIN*
5	PD3	18	GND
6	PD4	19	GND
7	PD5	20	GND
8	PD6	21	GND
9	PD7	22	GND
10	ACK*	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SLCT	26	GND

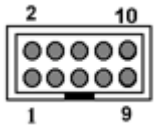
CN4: GPO LED Connector



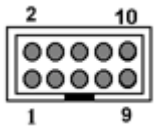
Pin	Define	Pin	Define
1	Power LED-	2	Power LED+
3	IDE LED-	4	IDE LED+
5	GPO LED7-	6	GPO LED7+
7	GPO LED6-	8	GPO LED6+
9	GPO LED5-	10	GPO LED5+
11	GPO LED4-	12	GPO LED4+
13	GPO LED3-	14	GPO LED3+
15	GPO LED2-	16	GPO LED2+
17	GPO LED1-	18	GPO LED1+
19	GPO LED0-	20	GPO LED0+
21	ALARM LED-	22	ALARM LED+
23	+5V	24	GND

CN5, CN28: LAN LED Connector

The MAT-A791 reserved two LAN LED connectors

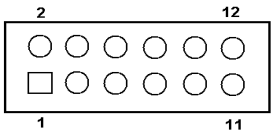


Pin	Define	Pin	Define
1	LAN1 SPEED1000 LED- LAN1 SPEED 100 LED+	2	LAN1 SPEED 1000 LED+ LAN1 SPEED 100 LED-
3	LAN1 LINK/ACTIVE LED+	4	LAN1 LINK/ACTIVE LED-
5	LAN2 SPEED 1000 LED- LAN2 SPEED 100 LED+	6	LAN2 SPEED 1000 LED+ LAN2 SPEED 100 LED-
7	LAN2 LINK/ACTIVE LED+	8	LAN2 LINK/ACTIVE LED-
9	LAN3 SPEED 1000 LED- LAN3 SPEED 100 LED+	10	LAN3 SPEED 1000 LED+ LAN3 SPEED 100 LED-



1	LAN3 LINK/ACTIVE LED+	2	LAN3 LINK/ACTIVE LED-
3	LAN4 SPEED 100 LED+	4	LAN4 SPEED 100 LED+
5	LAN4 LINK/ACTIVE LED+	6	LAN4 LINK/ACTIVE LED-
7	LAN5 SPEED 100 LED+	8	LAN5 SPEED 100 LED-
9	LAN5 LINK/ACTIVE LED+	10	LAN5 LINK/ACTIVE LED-

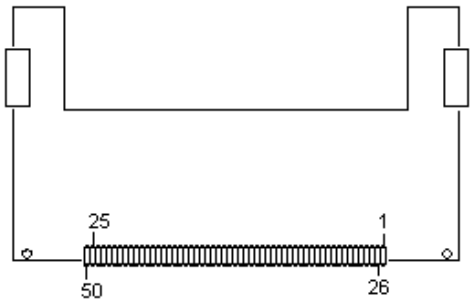
CN6: VGA Connector (2.0mm header)



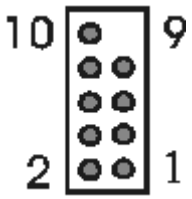
Pin	Define
1	RED
2	GND
3	GREEN
4	+3.3V
5	BLUE
6	GND
7	GND
8	DDC DATA
9	DDC CLK
10	HSYNC
11	VSYNC
12	+5V

CN7: CompactFlash Connector

Pin	Define	Pin	Define	Pin	Define	Pin	Define	Pin	Define
1	GND	11	GND	21	DATA0	31	DATA15	41	RESET*
2	DATA3	12	GND	22	DATA1	32	SELECT 1*	42	IOCHRDY
3	DATA4	13	+5V	23	DATA2	33	NC	43	NC
4	DATA5	14	GND	24	IOCS16*	34	IOR*	44	-REG
5	DATA6	15	GND	25	NC	35	IOW*	45	ACTIVE*
6	DATA7	16	GND	26	NC	36	WE*	46	-PDIAG
7	SELECT0*	17	GND	27	DATA11	37	INTRQ	47	DATA8
8	GND	18	A2	28	DATA12	38	+5V	48	DATA9
9	GND	19	A1	29	DATA13	39	CSEL*	49	DATA10
10	GND	20	A0	30	DATA14	40	NC	50	GND

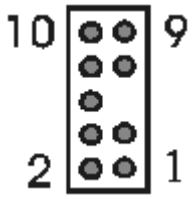


CN9: USB Connector



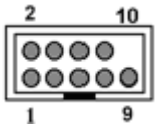
Pin	Define	Pin	Define
1	+5V	2	+5V
3	DATA 0-	4	DATA 1-
5	DATA 0+	6	DATA 1+
7	GND	8	GND
9	NC	10	GND

CN10: KB/Mouse Header



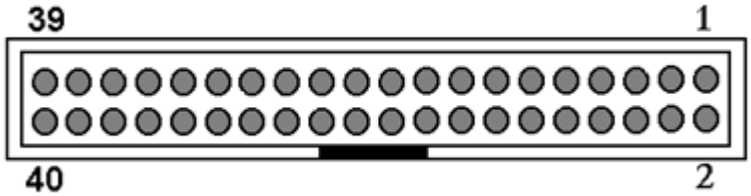
Pin	Define	Pin	Define
1	KB-CLK	2	MS-CLK
3	KB-DAT	4	MS-DAT
5	KEY PIN	6	NC
7	GND	8	GND
9	+5V	10	+5V

CN11: COM2 Pin Header



Pin	Define	Pin	Define
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	KEY PIN

CN12: IDE Connector



Pin	Define	Pin	Define
1	RESET*	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15
19	GND	20	NC
21	DREQ	22	GND
23	DIOW*	24	GND
25	DIOR*	26	GND
27	IOCHRDY	28	CSEL
29	DACK*	30	GND
31	IRQ14	32	NC
33	A1	34	DETECT
35	A0	36	A2
37	HD SELECT 0*	38	HD SELECT1*
39	ACTIVE*	40	GND

CN13, CN14: LAN5~LAN4 Pin Header

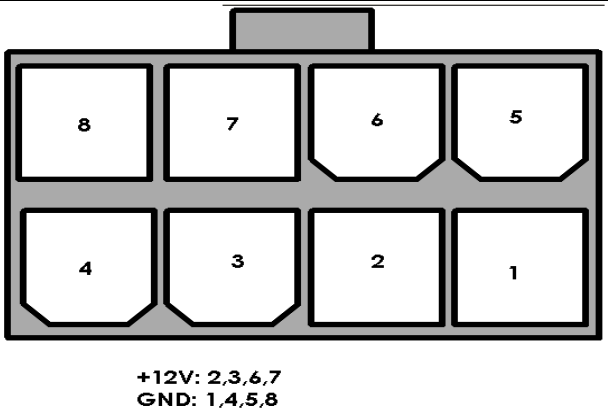
CN13, CN14: LAN5, LAN4 (10/100BaseT)			
Pin	**Define**	**Pin**	**Define**
1	TX+	2	TX-
3	RX+	4	NC
5	NC	6	RX-
7	NC	8	NC
9	CHS GND	10	CHS GND

CN19, CN21: Internal/External Power Connector

The MAT-A791 supports two different power connectors, CN19 with header type power connector and CN21 with jack type power connector

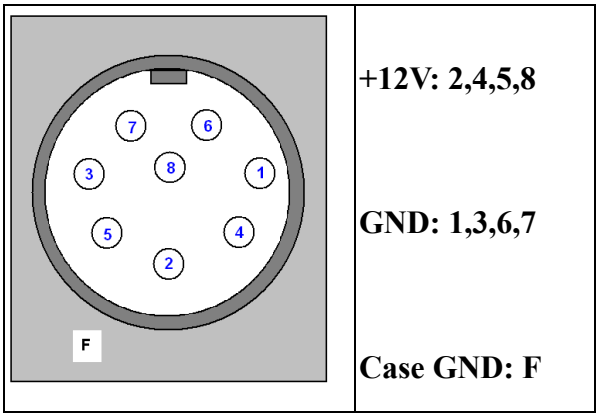
1. CN19

Pin	Define
1	GND
2	+12V
3	+12V
4	GND
5	GND
6	+12V
7	+12V
8	GND



2. CN21 (Jack Type Connector Optional)

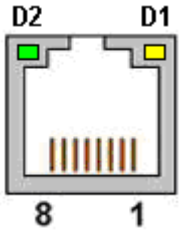
Pin	Define	Pin Define on Board Side
1	GND	
2	+12V	
3	GND	
4	+12V	
5	+12V	
6	GND	
7	GND	
8	+12	
9	CHS GND	
10	CHS GND	



CN20: Reset

There is a 2-pin header for connecting to external system reset button.

CN22, CN25, CN26: LAN1, LAN3, LAN2 GIGABIT LAN RJ45 Jack

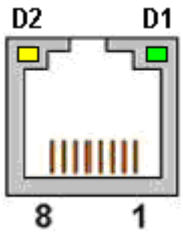


Pin	Define
1	TX0+
2	TX0-
3	RX0+
4	TX1+
5	TX1-
6	RX0-
7	RX1+
8	RX1-

LED:

D1 :Bi-Color Speed LED	
10 Mbps	Off
100 Mbps	Green
1000 Mbps	Yellow
D2 :Link/Activity LED	
Link	Green
Activity	Blinking

CN23, CN24 :LAN5, LAN4 100M LAN RJ45 JACK

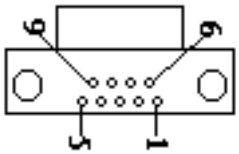


Pin	Define
1	TX0+
2	TX0-
3	RX0+
4	N/C
5	N/C
6	RX0-
7	N/C
8	N/C

LED:

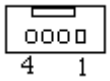
D1 :Speed LED	
10 Mbps	DIM
100 Mbps	Green
D2 :Link/Activity LED	
Link	Yellow
Activity	Blinking

CN27: COM1 Serial Port



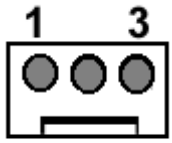
Pin	Define
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

CN30: HDD Power Connector



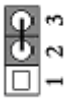
Pin	Define
1	+12V
2	Ground
3	Ground
4	+5V

CN31: FAN Connector



Pin	Define
1	GND
2	+12V
3	NC

JP1:Clear CMOS

Setting		Define
	1-2	Normal
	2-3	Clear CMOS

JP2: GPIO Register Select

Setting		Define
	1-2	Define SW1 to power off button. Dedicate to a GPIO register. Not a hardware power button.
	2-3	Define SW1 to reset button

Chapter 3. BIOS Setup

The ROM chip of your MAT-A791 board is configured with a customized Basic Input/Output System (BIOS) from Phoenix-Award BIOS. The BIOS is a set of permanently recorded program routines that give the system its fundamental operational characteristics. It also tests the computer and determines how the computer reacts to instructions that are part of programs.

The BIOS is made up of code and programs that provide the device-level control for the major I/O devices in the system. It contains a set of routines (called POST, for Power-On Self Test) that check out the system when you turn it on. The BIOS also includes CMOS Setup program, so no disk-based setup program is required CMOS RAM stores information for:

- Date and time
- Memory capacity of the main board
- Type of display adapter installed
- Number and type of disk drives

The CMOS memory is maintained by battery installed on the MAT-A791 board. By using the battery, all memory in CMOS can be retained when the system power switch is turned off. The system BIOS also supports easy way to reload the CMOS data when you replace the battery of the battery power lose.

3.1 Quick Setup

In most cases, you can quickly configure the system by choosing the following main menu options:

1. Choose "Load Optimized Defaults" from the main menu. This loads the setup default values from the BIOS Features Setup and Chipset Features Setup screens.
2. Choose "Standard COS Features" from the main menu. This option lets you configure the date and time, hard disk type, floppy disk drive type, primary display and more.
3. In the main menu, press F10 ("Save & Exit Setup") to save your changes and reboot the system.

3.2 Entering the CMOS Setup Program

Use the CMOS Setup program to modify the system parameters to reflect the options installed in your system and to customized your system. For example, you should run the Setup program after you:

- Received an error code at startup
- Install another disk drive
- Use your system after not having used it for a long time
- Find the original setup missing
- Replace the battery
- Change to a different type of CPU
- Run the Phoenix-Award Flash program to update the system BIOS

Run the CMOS Setup program after you turn on the system. On-screen instructions explain how to use the program.

⇩Enter the CMOS Setup program's main menu as follows:

1. Turn on or reboot the system. After the BIOS performs a series of diagnostic checks, the following message appears:
   "Press DEL to enter SETUP"
2. Preess the <DEL> key to enter CMOS Setup program. The main menu appears:

Phoenix - AwardBIOS CMOS Setup Utility

▸ Standard CMOS Features	Load Fail-Safe Defaults
▸ Advanced BIOS Features	Load Optimized Defaults
▸ Advanced Chipset Features	Set Supervisor Password
▸ Integrated Peripherals	Save User Password
▸ Power Management Setup	Save & Exit Setup
▸ PnP/PCI Configuration	Exit Without Saving
▸ PC Health Status	
↑↓→← : Select Item F10: Save & Exit Setup	
Time, Date, Hard Disk Type....	

3. Choose a setup option with the arrow keys and press <Enter>. See the following sections for a brief description of each setup option.

In the main menu, press F10 ("Save & Exit Setup) to save your changes and reboot the system. Choosing "EXIT WITHOUT SAVING" ignores your changes and exits the program. Pressing <ESC> anywhere in the program returns you to the main menu.

3.3 Menu Options

The main menu options of the CMOS Setup program are described in the following and the following sections of this chapter.

STANDARD CMOS FEATURES:
Configure the date & time, hard disk drive type, floppy disk drive type, primary display type and more

ADVANCED BIOS FEATURES:
Configure advanced system options such as enabling/disabling cache memory and shadow RAM

ADVANCED CHIPSET FEATURES:
Configure advanced chipset register options such DRAM timing

INTEGRATED PERIPHERALS:
Configure onboard I/O functions

POWER MANAGEMENT SETUP:
Configure power management features such as timer selects

PNP/PCI CONFIGURATION:
Configure Plug & Play IRQ assignments and PCI slots

PC HEALTH STATUS:
Configure the CPU speed and, if the optional Winbond W83627HF system monitor IC is installed, view system information

LOAD FAIL-SAFE DEFAULT:
Loads BIOS default values. Use this option as diagnostic aid if your system behaves erratically

LOAD OPTIMIZED DEFAULTS:
Loads optimized BIOS settings

SET SUPERVISORS & USER PASSWORD:

Configure the system so that a password is required when the system boots or you attempt to enter the CMOS setup program. When you log in with this password, you will be able to enter the COS Setup main menu, but you can not enter other menus in the CMOS Setup program.

SAVE & EXIT SETUP:

Save changes of values to CMOS and exit the CMOS setup program

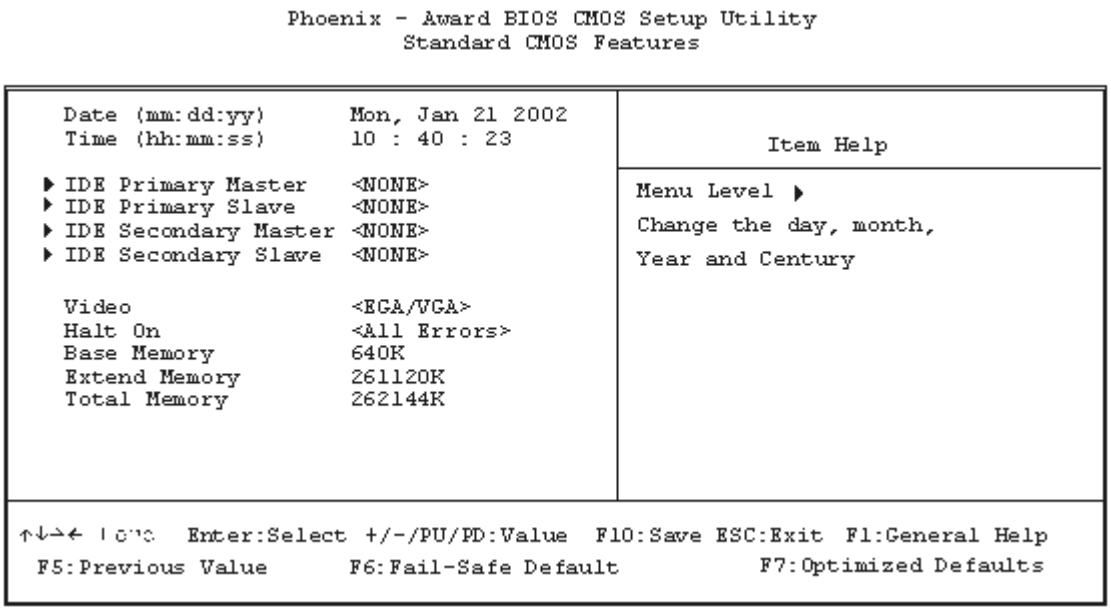
EXIT WITHOUT SAVING:

Abandon all CMOS changes and exit the CMOS setup program

Standard CMOS Features Setup

⇩ **Use the Standard CMOS Setup option as follows:**

1. Choose "Standard CMOS Features" from the main menu. The following screen appears:



2. Use the arrow keys to move between fields. Modify the selected field using the PgUP/PgDN/+/- keys. Some fields let you enter numeric values directly.

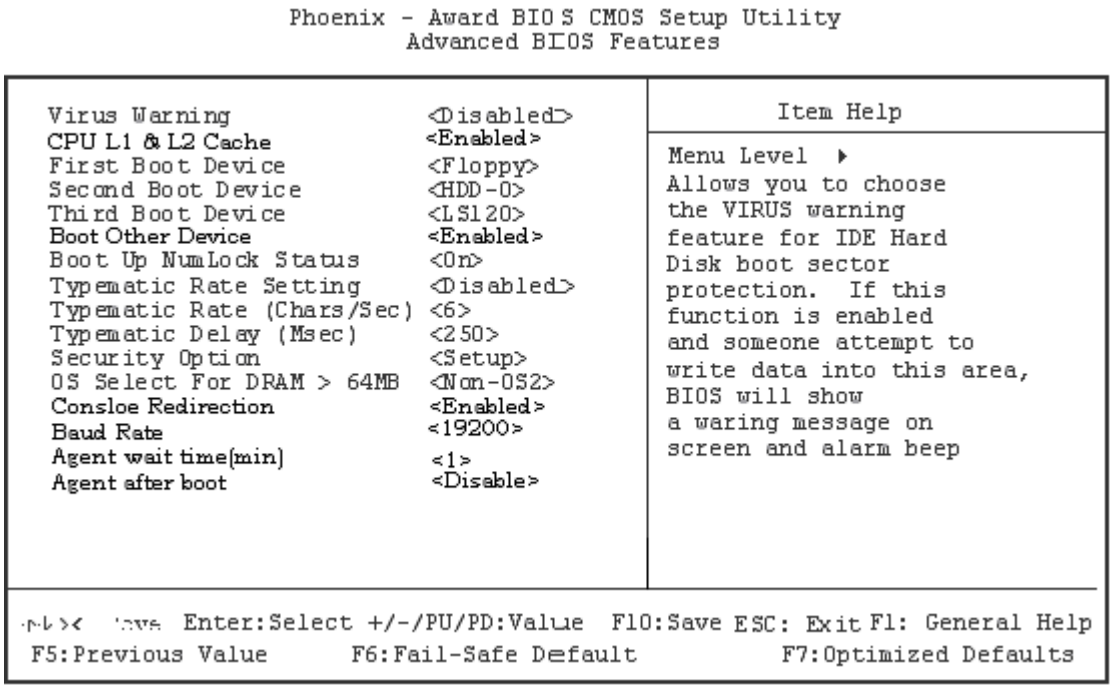
Option	Description
Date (mm:dd:yy)	Type the current date
Time (hour:min:sec)	Type the current time (24-hour clock)
Hard Disks	Choose from "Auto", "User", or "None" If your drive is not one of the predefined types, choose "User" and enter the following drive specifications: Cylinders, heads, Wpcom, L-Zone, sectors, and mode Consult the documentation received with the drive for the values that will give you optimum performance.
Video	Choose: EGA/VGA CGA 40 CGA 80 Mono
Halt On	Controls whether the system stops in case of an error detected during power up. Choose: All Errors No Errors All, But Keyboard (Default) All, But Diskette All, But Disk/Key

3. After you have finished with the Standard CMOS Features program, press the <ESC> key to return to the main menu.

Advanced BIOS Features Setup

⇩ **Use the Advanced BIOS Features Setup option as follows:**

1. Choose "Advanced BIOS Features Setup" from the main menu. The following screen appears:



2. Use the arrow keys to move between items and to select values. Modify the selected fields using the PgUP/PgDN keys. Press the <F1> "Help" key for information on the available options:

Option	Description
Virus Warning	When enabled, any attempt to write to the boot sector and partition table will halt the system and cause a warning message to appear. If this happens, you can use an anti-virus utility on a virus-free, bootable floppy disk to reboot and clean your system. The default setting is **Disabled**.
CPU L1 & L2 Cache	Choose Enable/Disable of the CPU internal Cache.
First/Second/Third Boot Device	The BIOS attempts to load the operating system from the devices in the sequence selected in these items. Choose: Floppy, HDD-0, LS-120, USB FDD…..

Boot Other Device	Enable other device bootable not selected above.
Boot Up NumLock Status	Choose On or Off. On puts the numeric keypad in Num Lock mode at boot-up. Off puts the numeric keypad in arrow key mode at boo-up
Typematic Rate Setting	Choose Enabled or Disabled. Enable his option to adjust the keystroke repeat rate. Adjust the rate via Typematic Rate Delay and Typematic Rate
Typematic Rate (Chars/Sec)	Choose the rate at which character keeps repeating
Typematic Delay (Msec)	Choose the delay between holding down a key and when the character begins repeating
Security Option	Choose Setup or System. This lets you specify whether a password is required every time the system boots or only when an attempt is made to enter the CMOS Setup program. "Setup" – The password prompt only appears if you attempt to enter the CMOS setup program. "System" – The password prompt appears each time the system is booted. ***Note: The password function is disabled by default. For a description of enabling the password function, refer to the section: Supervisor Password & User Password later in this chapter.***
OS Select for DRAM > 64MB	Set to OS/2 if your system is using OS/2 and has a memory size of more than 64MB
Console Redirection	Choose enabled to allowing agent which connect to this board to administrate this computer
Baud Rate	The data transfer rate (bit per second) to agent. Choose 9600/19200/38400/57600/115200 item.
Agent wait time(min)	Agent negotiate time, choose 1/2/4/8 min.
Agent after boot	Choose enabled to enable agent administrate this board after boot.

Advanced Chipset Features Setup

⇩ **Use the Advanced Chipset Features Setup option as follows:**

1. Choose "Advanced Chipset Features Setup" from the main menu. The following screen appears:

```
                Phoenix - Award BIOS CMOS Setup Utility
                      Advanced Chipset Features

  DRAM Timing Selectable        <By SPD>          |
X CAS Latency Time               2.5              |        Item Help
X Active to Precharge Delay      7                |
X DRAM RAS# to CAS# Delay        3                | Menu Level ▸
X DRAM RAS# Precharge            3                |
  Memory Frequency For          <Auto>            |
  System BIOS Cacheable         <Enabled>         |
  Video BIOS Cacheable          <Enabled>         |
  Memory Hole At 15M-16M        <Disabled>        |
  AGP Aperture Size (MB)        <64>              |
                                                  |
  ** On-Chip VGA Setting **                       |
  On-Chip VGA                   <Enabled>         |
  On-Chip Frame Buffer Size     <8MB>             |

↑↓→← Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC: Exit  F1: General Help
 F5:Previous Value      F6:Fail-Safe Default          F7:Optimized Defaults
```

2. Move between items and select values by using the arrow keys. Modify the selected fields using the PnUP/PgDN keys. For information on the various options, press <F1> key.

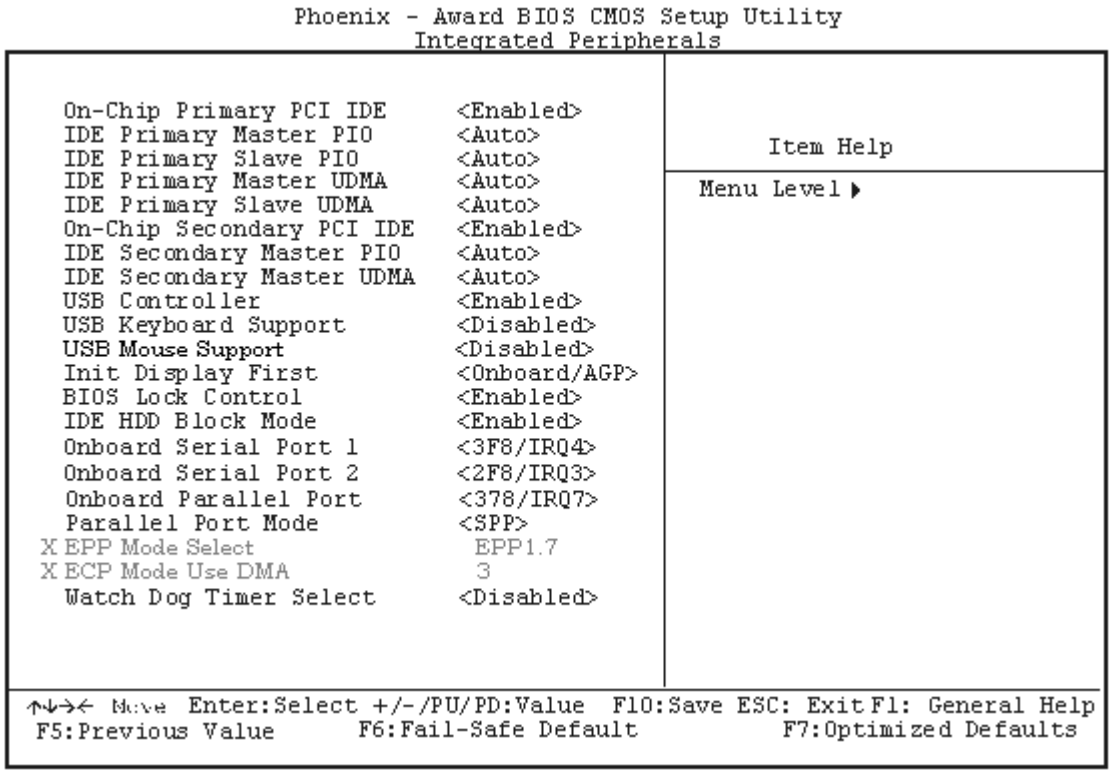
Option	Description
DRAM Timing Selectable	Choose 'SPD' to set the DRAM access timing by EPROM on the DRAM module. Choose 'Manual' to set "CAS latency time", "Active to precharge delay", "DRAM RAS# to CAS# delay", and " DRAM RAS# precharge time" by manual.
Memory Frequency For	Auto: by hardware PC100/133: 100MHz/133MHz
System BIOS Cacheable	Choose Enabled or Disabled. When enabled, caching of the system BIOS at F0000h-FFFFFh, enhancing system performance. However, if any program writes to this memory area, a system error

	may result.
Video BIOS Cacheable	Choose Enabled or Disabled. When Enable this option to allow caching of the Video BIOS.
Memory Hole At 15M-16M	Choose Enabled or Disabled. You can reserve this area of system memory for ISA adapter ROM. When this area is reserved, it can not be cached. The user information of peripherals that need to use this area of system memory usually discusses their memory requirement.
AGP Aperture Size (MB)	Select the size of AGP aperture. The aperture is a portion of the PCI memory address range dedicated for graphics memory address space. Host cycle that hit the aperture range are forwarded to the AGP without any translation. 64MB
On-Chip VGA Setting	On-Chip VGA: Enabled On-Chip Frame Buffer Size: 8MB

Integrated Peripherals

⇩**Use the Integrated Peripherals Setup option as follows:**

1. Choose "Integrated Peripherals Setup" from the main menu. The following screen appears:



2. Move between items and select values by using the arrow keys. Modify the selected fields using the PgUP/PgDN keys. Please press the <F1> key for information on the various options.

Option	Description
On-Chip Primary/Secondary PCI IDE	Enables/Disables. Select Enabled to activate the primary IDE interface. Select Disabled to deactivate this interface
IDE Primary/Secondary Master/Slave PIO	Auto/Mode0/Mode1/Mode2/Mode3/Mode4 The four IDE PIO (Programmed Input/Output) fields let you set a PIO mode (0-4) for each of the four IDE devices that the onboard IDE interface supports. Modes 0 through 4 provide successively increased performance. In Auto mode, the system automatically

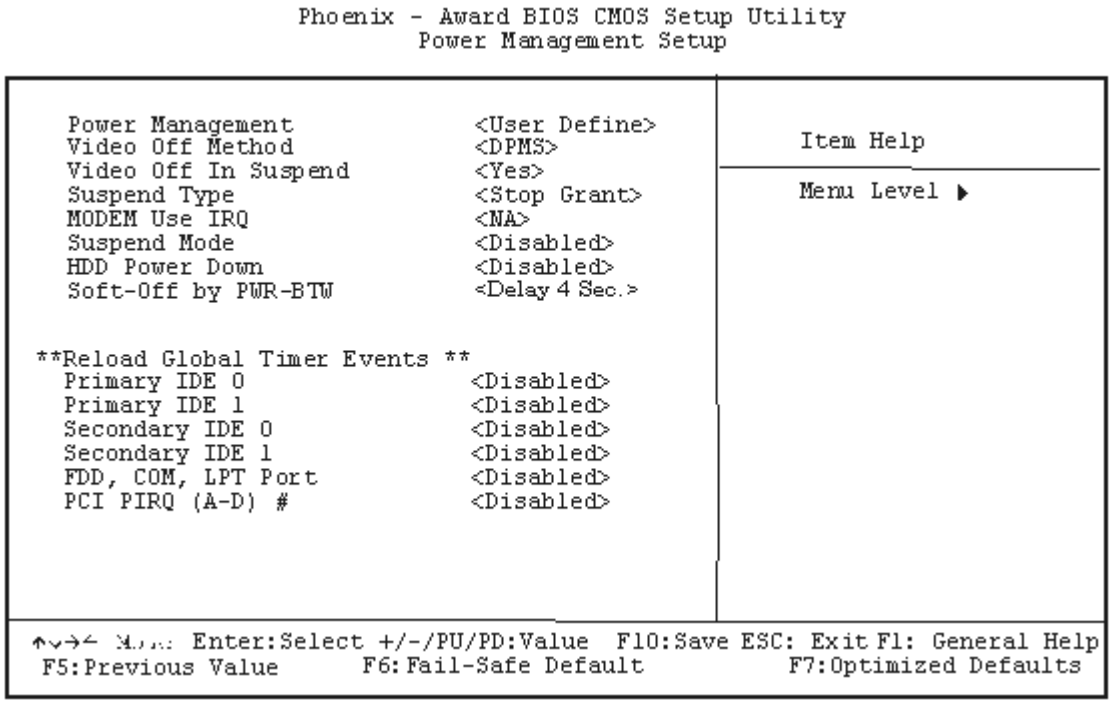
	determines the best mode for each device.
IDE Primary/Secondary Master/Slave UDMA	Auto, Mode0, Mode1, Mode2, Mode3, Mode4 UltraDMA33/66/100 implementation is possible only if your IDE hard drive supports it and the operating environment includes a DMA driver. If your hard drive and your system software both support UltraDMA33/66/100, select Auto to enable BIOS support.
USB Controller	Enabled/Disable. This option should be enabled if your system has a USB installed on the system board and you want to use it.
USB Keyboard/Mouse Support	Enabled/Disabled USB keyboard support
Init Display First	Default: Onboard/AGP This option lets you choose the priority of AGP & PCI VGA card
BIOS Lock Control	Choose Enable to enable BIOS write, Disable to allowing the BIOS writing to update new BIOS code.
IDE HDD Block Mode	Enabled/Disabled the IDE HDD Block Mode function. *Note: Not all drives support this function*
Onboard Serial Port1/2	Choose: 3F8/IRQ4, 2F8/IRQ3 Select an address and corresponding interrupt for the first and second serial ports.
Onboard Parallel Port	Choose: 378/IRQ7 This option lets you to determine onboard parallel port controller I/O address setting.
Parallel Port Mode	Default Setting: SPP/EPP/ECP/EPP+ECP/Normal EPP Mode Select: EPP1.7 or 1.9 ECP Mode use DMA: DMA1 or DMA3 Select an operating mode for the onboard parallel port.
Watchdog Timer Select	Choose disabled/10/20/30/40 second or 1/2/4n minutes to set the watch dog timer.

Power Management Setup

The Power Management Setup controls the board's "green" features. To save energy these features shut down the video display and hard disk drive.

⇩ **Use the Power Management Setup option as follows:**

1. Choose "Power Management Setup" from the main menu. The following screen appears.



2. Move between items and select values by using the arrow keys. Modify the selected field the PgUP/PgDN keys. For information on the various options, press <F1> key.

Option	Description
Power Management	Choose Disable, User Define, Min Saving or Max. Saving. "User Define" – Lets you specify when the HDD and system will shut down "Min Saving" - Predefine timer value of 4-12 min. "Max Saving" – Predefine timer value of 1 minute
Video Off Method	Choose V/H SYNC+Blank, DPMS, Blank Screen

	When power management blanks the screen and turns off vertical and horizontal scanning. The DPMS (Display Power Management System) setting allows the BIOS to control the video card if it has the DPMS features. If you don't have a Green monitor, use the Blank Screen option
Video Off In Suspend	Choose the video off condition: NA/Suspend/Doze
Suspend Type	Choose "Stop Grant" or "Power on Suspend"
MODEM Use IRQ	Choose the IRQ used by the modem. Default: Disabled
Suspend Mode	Sets the time for Suspend mode or disables it
HDD Power Down	Sets the time for the HDD power down mode or disables it
Soft-Off by PWR-BTW	Default: Delay 4 sec
Reload Global Timer Events	Choose Enable or Disable Primary IDE 0 <Disabled> Primary IDE 1 <Disabled> Secondary IDE 0 <Disabled> Secondary IDE 1 <Disabled> FDD, COM, LPT Port <Disabled> PCI PIRQ <A-D> <Disabled>

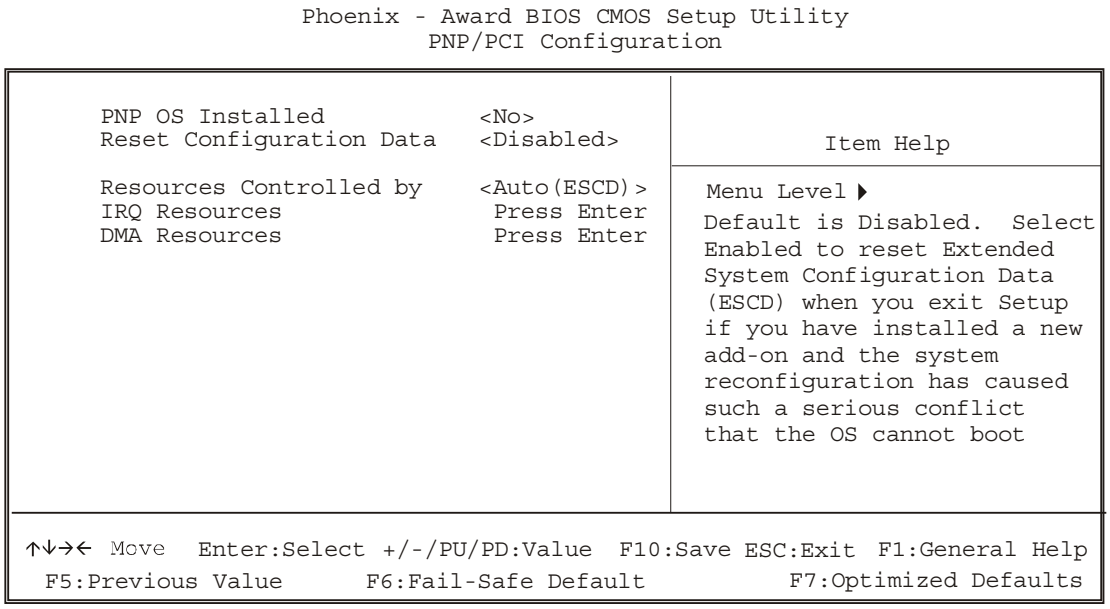
3. After you have finished with the Power Management Setup, press the <ESC> key to return to the main menu.

PNP/PCI Configuration

This option is used to configure Plug and Play assignments and route PCI interrupts to designated ISA interrupts.

⇩ **Use the PNP/PCI Configuration Setup option as follows:**

1. Choose "PNP/PCI Configuration Setup" from the main menu, the following screen appears.



2. Move between items and select values by using the arrow keys. Modify the selected fields using the PgUP/PgDN keys. For information on the various options, please press <F1> key.

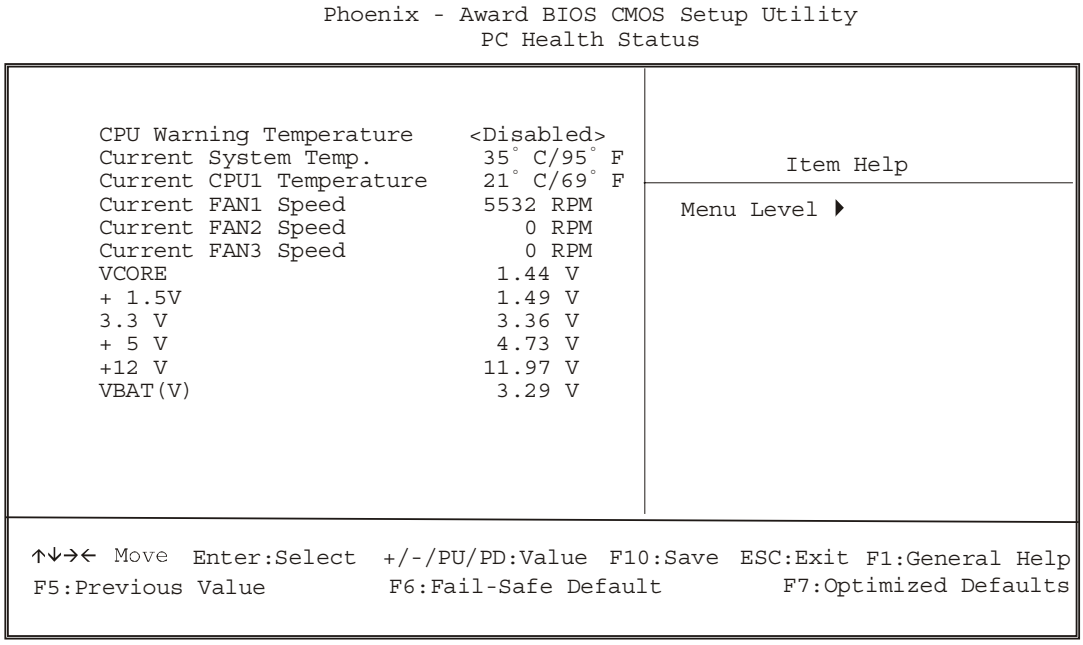
Option	Description
PNP OS Installed	Choose <No> for default If choose <Yes) and install plug and play operating system, the OS will reassign the interrupt
Reset Configuration Data	Choose Enable or Disable "Enable" – PNP configuration data is reset in BIOS "Disable" – PNP configuration date is retained in BIOS
Resources Controlled By	Choose Auto or Manual. This option specifies whether resources are controlled by automatic or manual configuration
IRQ Resources	IRQ-3 Assigned to <PCI Device>

	IRQ-4 Assigned to	<PCI Device>
	IRQ-5 Assigned to	<PCI Device>
	IRQ-7 Assigned to	<PCI Device>
	IRQ-9 Assigned to	<PCI Device>
	IRQ-10 Assigned to	<PCI Device>
	IRQ-11 Assigned to	<PCI Device>
	IRQ-12 Assigned to	<PCI Device>
	IRQ-14 Assigned to	<PCI Device>
	IRQ-15 Assigned to	<PCI Device>
DMA Resources	Assign DMA channel 0/1/3/5/6/7 to legacy ISA or auto by default "PCI/ISA"	

3. Please press the <ESC> key to return the main menu after finishing with the PNP/PCI Configuration Setup.

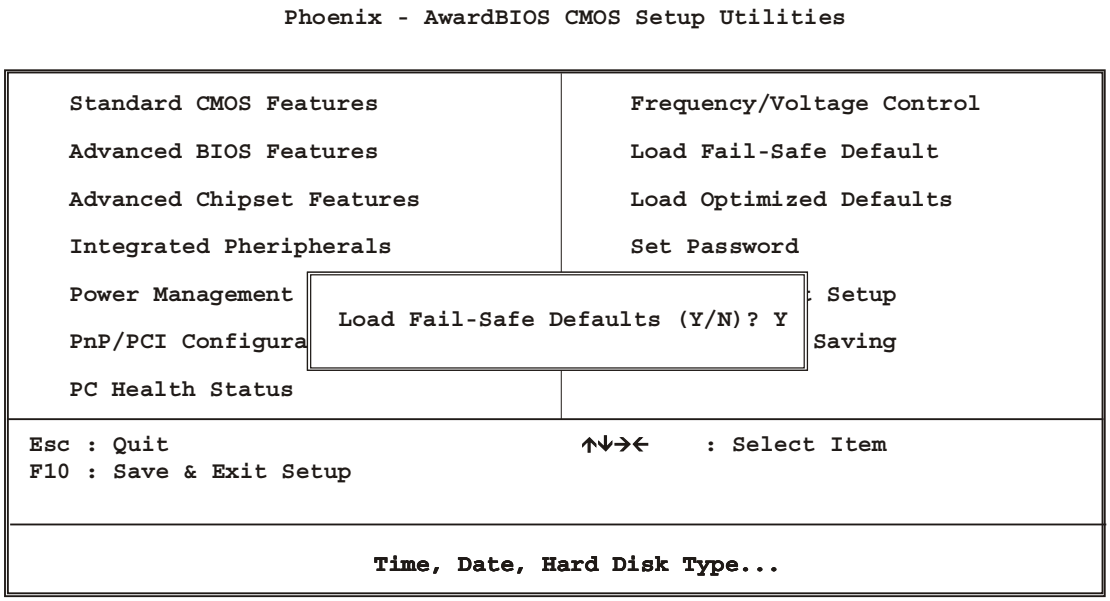
PC Health Status Configuration Setup

Choose "PC Health Status Configuration Setup" from the main menu, the following screen appears:



Load Fail-Safe Defaults

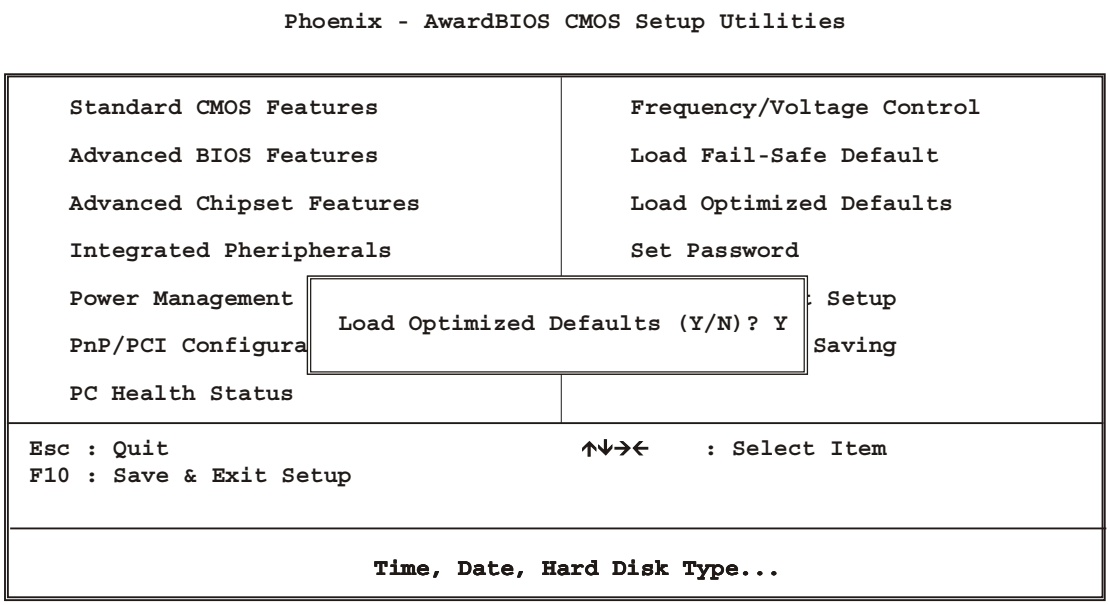
This option loads the troubleshooting default values permanently stored in the BIOS ROM. This is useful if you are having problems with the main board and need to debug or troubleshoot the system. The loaded default settings do not affect the Standard CMOS Setup screen.



To use this feature, highlight it on the main screen and press <Enter>. A line will appear on the screen asking if you want to load the BIOS default values. Pres the <Y> key and then press <Enter> if you want to load the BIOS default.

Load Optimized Defaults

This option loads optimized settings stored in the BIOS ROM. The auto-configured settings do not affect the Standard CMOS Setup screen.



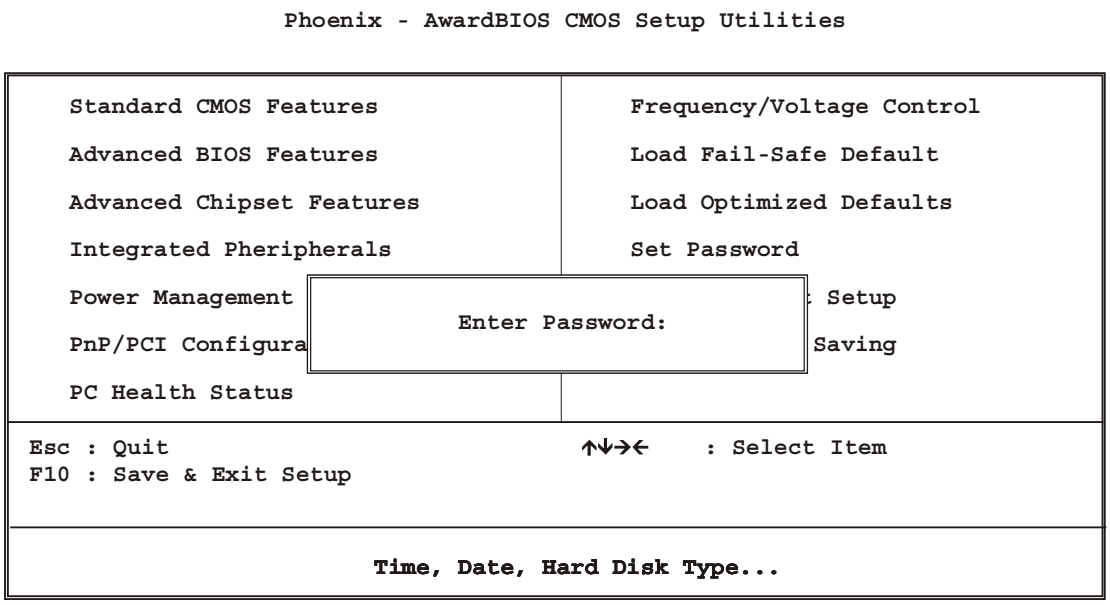
To use this feature, highlight it on the main screen and press <Enter>. A line will appear on the screen asking if you want to load the Optimized Default Values. Press the <Y> key and then press <Enter> if you want to load the SETUP default.

Supervisor/User Password

The password options let you prevent unauthorized system boot-up or unauthorized use of CMOS setup. The Supervisor Password allows both system and CMOS Setup program access; the User Password allows access to the system and the CMOS Setup Utility main menu.

The password functions are disabled by default. You can use these options to enable a password function or, if a password function is already enabled, change the password.

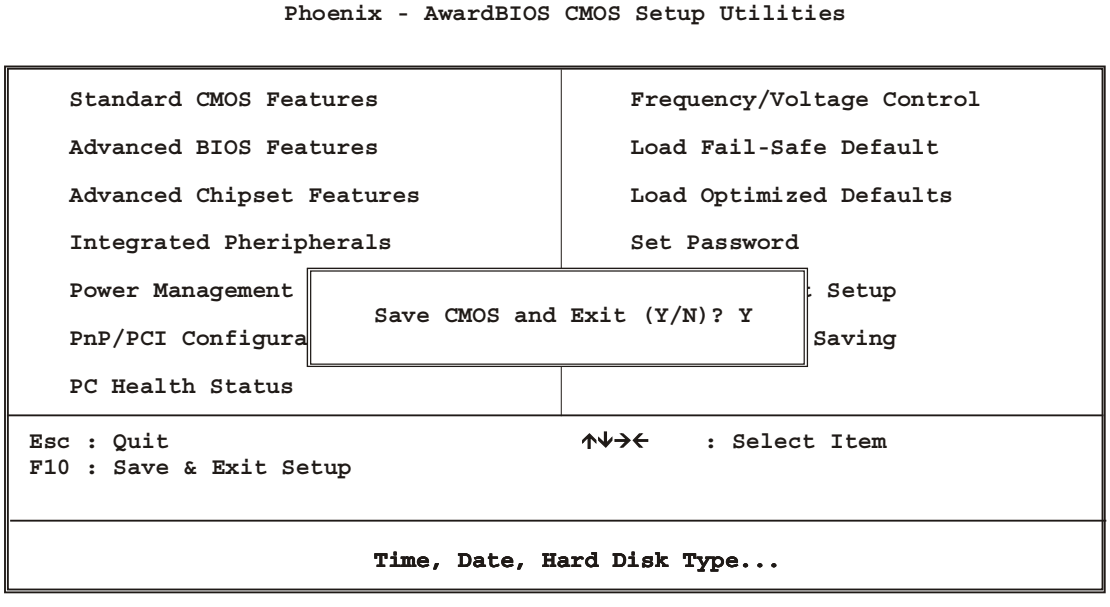
To change a password, first choose a password option from the main menu and enter the current password. Then type your new password at the prompt. The password is case sensitive and you can use up to 8 alphanumeric characters. Press <Enter> after entering the password. At the Next Prompt, confirm the new password by typing it and pressing <Enter> again.



After you use this option to enable a password function, use the "Security Option" in "BIOS Feature Setup" to specify whether a password is required every time the system boots or only when an attempt is made to enter the CMOS Setup program.

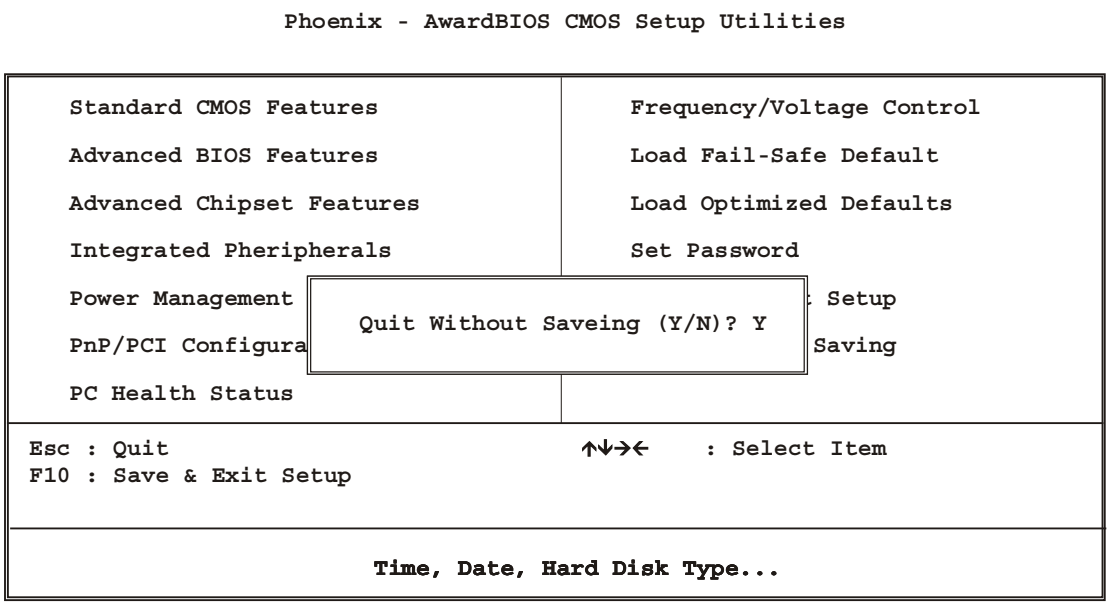
Save and Exit Setup

This function automatically saves all CMOS values before exiting Setup.



Exit Without Saving

Use this function to exit Setup without saving the CMOS value.



Chapter 4. Driver Utility

The MAT-A791 drivers and utilities CD-ROM contains the following folders.

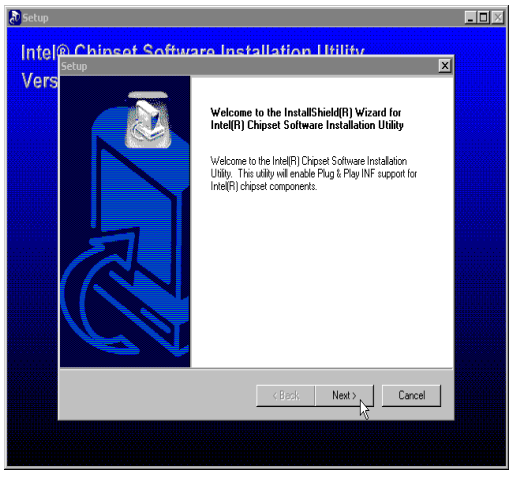
- VGA: VGA drivers
- LAN: Ethernet drivers
- USB 2.0 driver

The Intel® Chipset Software Installation Utility installs to the target system the Windows* INF files that outline to the operating system how the chipset components will be configured. This is needed for the proper functioning of the following features:

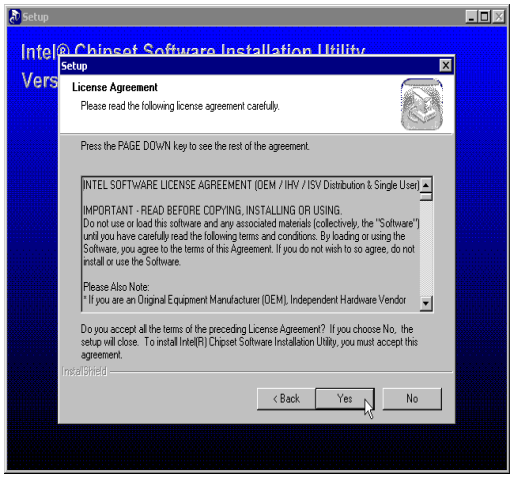
- Core PCI and ISAPNP Services
- AGP Support
- IDE/ATA33/ATA66 Storage Support
- USB Support
- Identification of Intel® Chipset Components in the Device Manager

Installing the Intel INF Driver for Windows98SE/ME/2000/XP

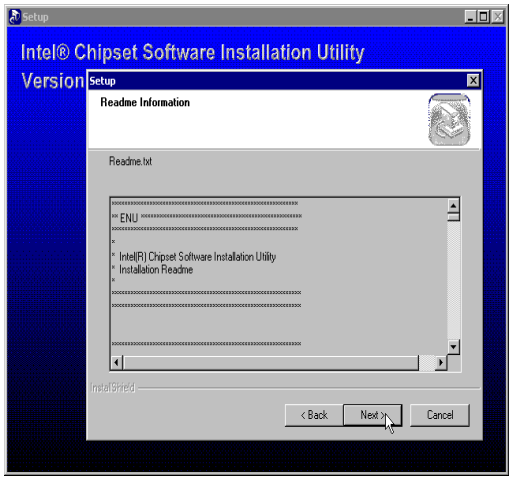
1. Insert the Drivers and Utilities CD into the CD ROM drive (example E:)
2. Double click the "845G\Chipset Software Installation Utility" folder in drive E: to open it and run "Setup" program by double click it.



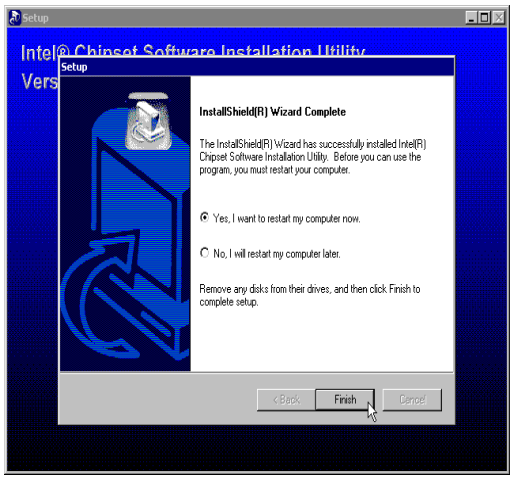
(1)Click "Next"



(2)Click "yes"



(3)Click "Next"

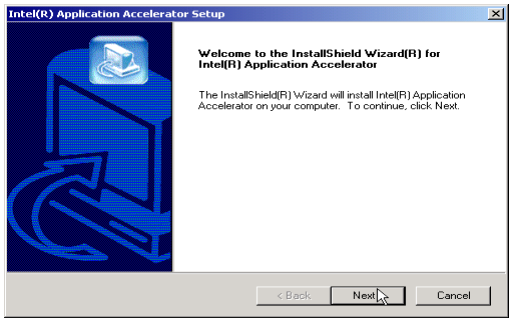


(4)Click "Finish" to restart your system

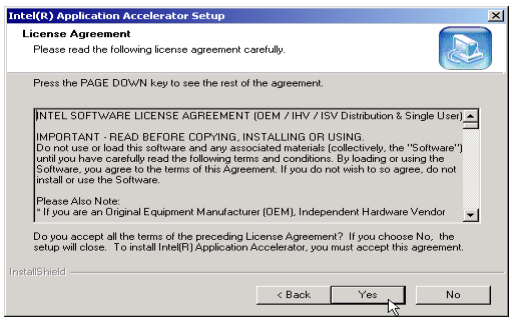
Intel Application Accelerator

The Intel® Application Accelerator is designed to improve performance of the storage sub-system and overall system performance. This software delivers improved performance through several ingredient technologies (components).
Certain components will be available only on Pentium(R) 4 processor-based systems running Microsoft Windows 2000 and Windows XP. Software installation is flexible and fully automated for Microsoft Windows 98, Windows 98 Second Edition(SE), Windows Millennium Edition(Me), Windows NT 4.0, Windows 2000, and Windows XP operating systems.

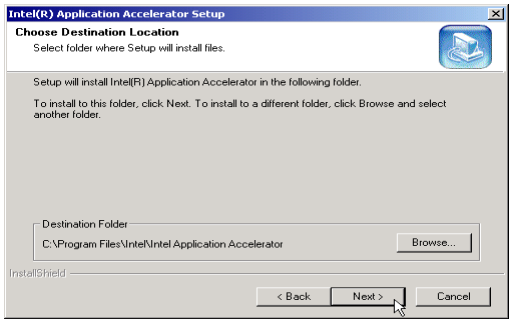
1. Insert the Drivers and Utilities CD into the CD ROM drive (example E:)
2. Double click the "845G\Iaa" folder in drive E: to open it run "iaa**.exe"



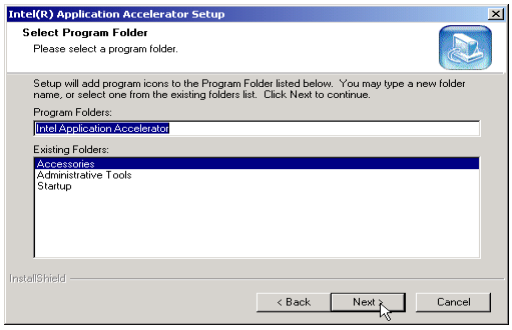
(1) Click "Next"



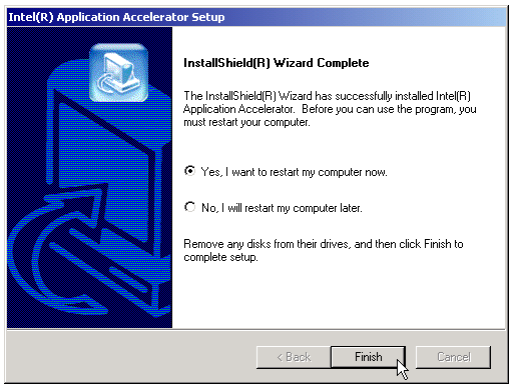
(2) Click "Yes"



(3) Click "Next"



(4) Click "Next"



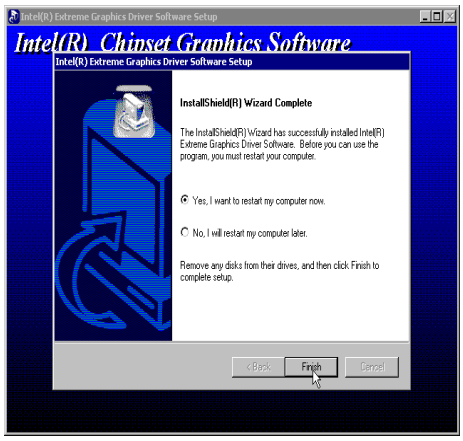
(5)Click "Finish" to restart your system

Intel 845G Chipset VGA Graphics Driver

1. Insert the Drivers and Utilities CD into the CD ROM drive (example E:)
2. The installation is same as Windows 2000
3. Double click the "845G\Graphics\WinXP_2K" folder in drive E: to open it and run "Setup" program by double click it.

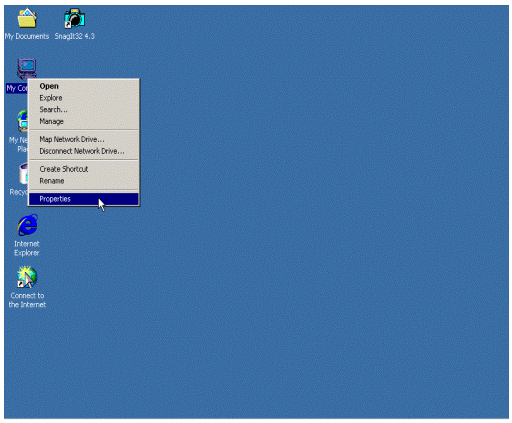
(1)Click "Next"

(2)Click "Yes"

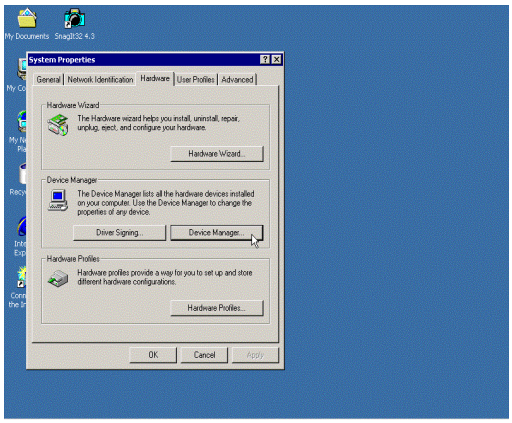


(3)Click "Finish" to restart your system

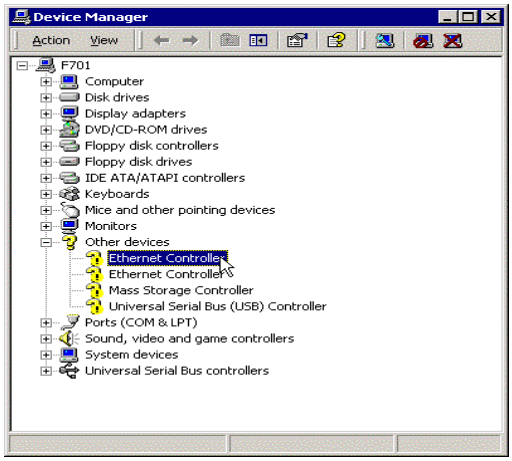
Intel Network Driver



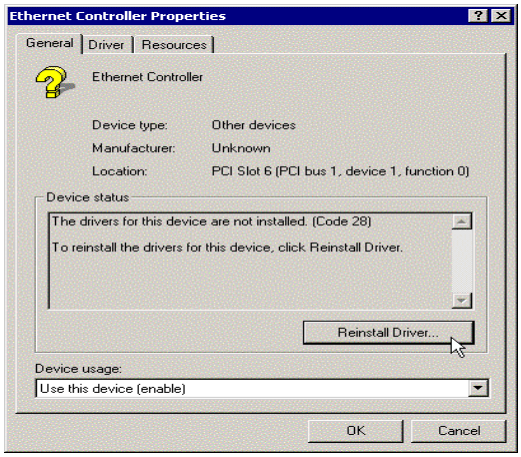
(1)Click "My Computer"→ Properties



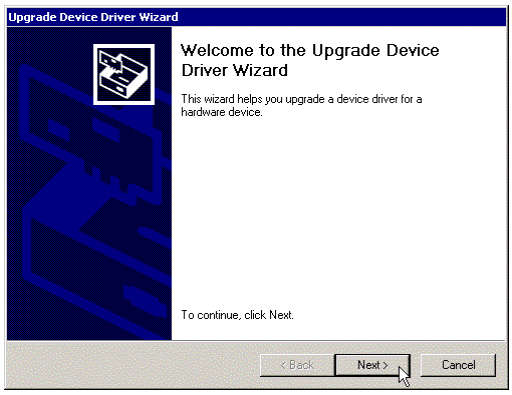
(2)Click "Hardware"→ "Device Manager"



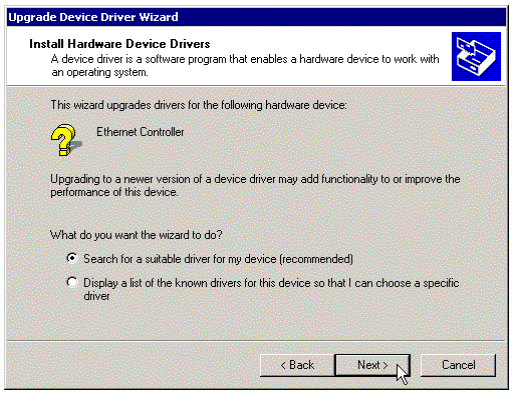
(3)Click "Other devices" →"Ethernet Controller"



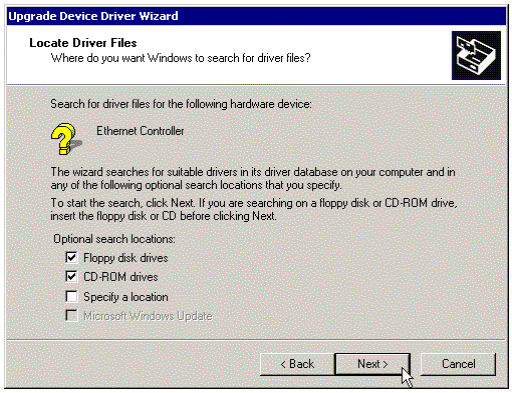
(4)Click "Reinstall Driver"



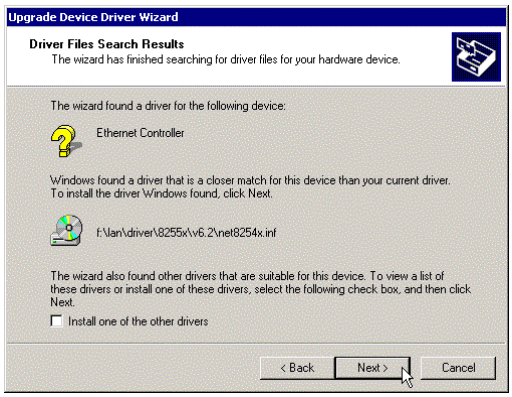
(5) Click "Next"



(6) Click "Next"



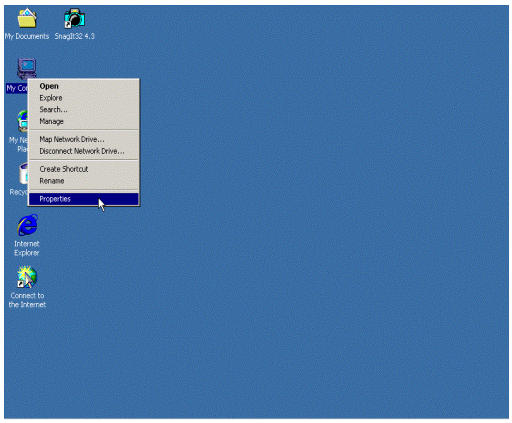
(7) Click "Next"



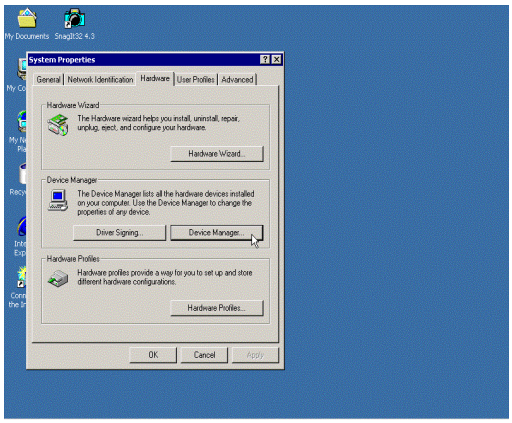
(8) Click "Next"

(9) Click "Finish" to restart computer

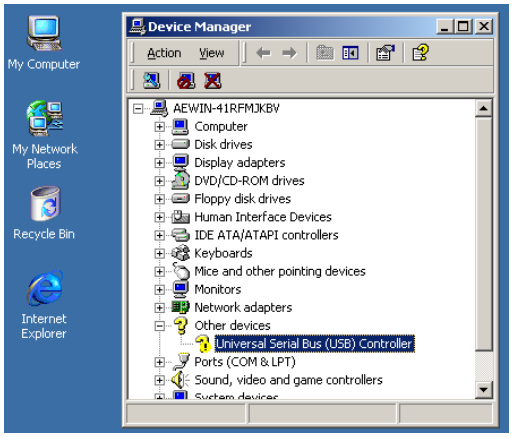
USB 2.0 DRIVER



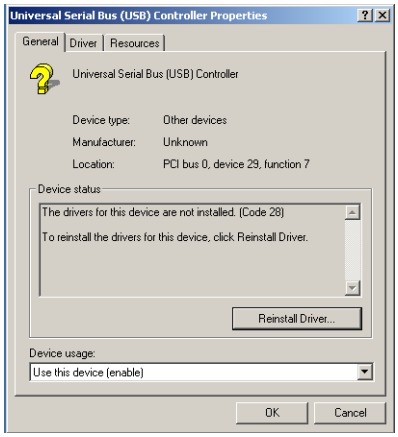
(1)Click "My Computer"→ Properties



(2)Click "Hardware"→ "Device Manager"

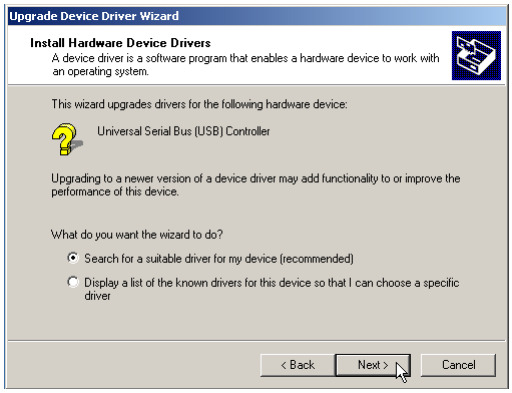


(3)Click "Other devices" →"Ethernet Controller"

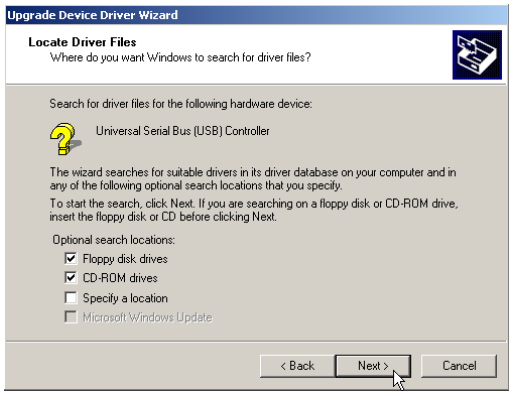


(4)Click "Reinstall Driver"

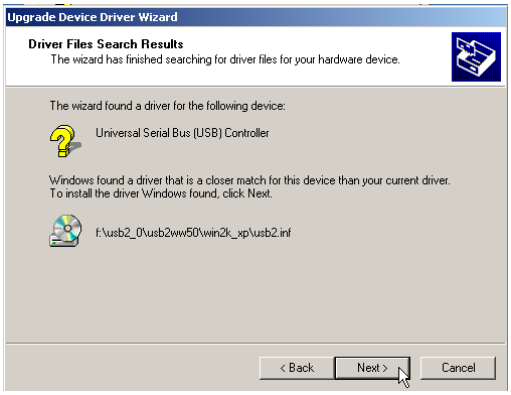
(5) Click "Next"



(6) Click "Next"



(7) Click "Next"



(8) Click "Next"

(9) click "Finish" to complete installation.

Appendix A: Programming the Watchdog Timer

The MAT-A791 provides a watchdog timer that resets the CPU or generates an interrupt if processing comes to a stop. This function ensures greater system reliability in industrial stand-alone and unmanned environments.

In order to enable the watchdog timer, you have to output the value of the watchdog timer interval to the controller. The value range is from 01H to FFH, and the related time watchdog timer interval is 1 sec to 255 sec.

Data	Timer interval
00	Disabled
01	1 sec
02	2 sec
*	*
*	*
FF	255 sec

If you want to disable the watchdog timer, just set the timer interval value to 00H.

After setting the timer interval value, the watchdog timer begins to count down. You have to refresh the watchdog timer, so that the watchdog timer will return to its initial value; otherwise, your system will reset after a time-out. The following program shows how to set the watchdog timer:

ASSEMBLY LANGUAGE	DOS DEBUG
MOV DX,2EH	O 2E 87
MOV AL,87H	O 2E 87
OUT DX,AL	
OUT DX,AL	
MOV AL,07H	O 2E 07
OUT DX,AL	O 2F 08
MOV DX,2FH	
MOV AL,08H	
OUT DX,AL	

Program 1: Initializing the watchdog controller

Program 2: Writing a watchdog timer interval

value

```
MOV DX,2EH                                  O 2E F6
MOV AL,F6H                                  O 2F XX
OUT DX,AL                                   O 2E AA
MOV DX,2FH
MOV AL,XXH      ; Timer interval *** see note
***
OUT DX,AL
MOV DX,2EH
MOV AL,AAH
OUT DX,AL
```

Note: This XX value range is from 01H to FFH, and the related watchdog timer interval is 1 sec. to 255 sec. (as in the previous description).

Using the Demo Program

Update the System BIOS as follows:

1. Run Program 1
2. Run Program 2 (load the timer interval of 1EH, 30 seconds)
3. Run your Application Program #1 (**Be sure your Application Program will finish within 30 seconds)**
4. Run Program 1
5. Run Program 2 (change the timer interval value to 3CH, 60 seconds)
6. Run your Application Program#2 (**Be sure your Application Program will be finished within 60 seconds)**
7. Run Program 1
8. Run Program 2 (reload the timer interval value of 3CH, 60 seconds)
9. Run Program 1

Run Program 3 (**Load the timer interval of 00H, and disable the watchdog timer function)**

Appendix B: Programming the GPO

HEX,HEX	LED4	LED5	LED6	LED7	LED8	LED9	LED10	LED11
00	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
11	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
22	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
33	OFF	OFF	ON	ON	OFF	OFF	ON	ON
44	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
55	OFF	ON	OFF	ON	OFF	ON	OFF	ON
66	OFF	ON	ON	OFF	OFF	ON	ON	OFF
77	ON	ON	ON	ON	OFF	ON	ON	ON
88	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
99	ON	OFF	OFF	ON	ON	OFF	OFF	ON
AA	ON	OFF	ON	OFF	ON	OFF	ON	OFF
BB	ON	OFF	ON	ON	ON	OFF	ON	ON
CC	ON	ON	OFF	OFF	ON	ON	OFF	OFF
DD	ON	ON	OFF	ON	ON	ON	OFF	ON
EE	ON	ON	ON	OFF	ON	ON	ON	OFF
FF	ON	ON	ON	ON	ON	ON	ON	ON

Debug –

-O 2E 87

-O 2E 87

-O 2E 2A ; select multi-function pin to GPO

-O 2F FC ; select multi-function pin to GPO

-O 2E 07

-O 2F 07 ; select logical device 7

-O 2E F0 ; select CRF0

-O 2F 00 ; set 8 GPO pin to output

-O 2E F1

-O 2F HEX,HEX

ALARM BUZZER

-DEBUG

-O 4B0 xxxx,xxx1 ; set bit 0 to "1" to enable GPO32

-O 4B4 xxxx,xxx0 ; set bit 0 to "0" to assign to output

-O 4B8 xxxx,xxx0 ; set bit 0 to "0", active alarm buzzer; set bit 0 to "1" inactive alarm buzzer

-ALARM LED-D3

-O 4B0 xxxx,xx1x ; set bit 1 to "1" to enable GPO33

-O 4B4 xxxx,xx0x : set bit 1 to "0" assign to output

-O 4B8 xxxx,xx0x ; set bit 1 to "0" to turn off, set "1" to turn on D3 alarm LED

POWER OFF CONTROL: GPO27

-DEBUG

-O 487, xxx 0xxx ; define to output

-O 48F, xxx 0xxx ; GPO27 output low

-O 48F, xxx 1xxx : GPO27 output high

Appendix C: System Resources

Interrupt Controller

The MAT-A791 is a fully PC compatible embedded single board computer, it consists of 16 ISA interrupt request lines and most of them already in used by other part of the board. If you would like to use extra add-on cards, please make sure that the IRQs do not conflict.

System IRQs are available to cards installed in the ISA expansion Bus first. Any remaining IRQs then may be assigned to this PCI Bus. You are able to use Microsoft's Diagnostic (MDS.EXE) utility included in Windows directory to see their map.

IRQ	Assignment
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt rerouting from IRQ8 through IRQ15
IRQ3	Serial Port 2
IRQ4	Serial Port 1
IRQ5	USB Controller
IRQ6	Floppy Disk Controller
IRQ7	Parallel Port 1
IRQ8	Real Time Clock
IRQ9	Ethernet Controller
IRQ10	Reserved
IRQ11	VGA Controller
IRQ12	USB Controller
IRQ13	Math Coprocessor
IRQ14	Primary IDE Controller
IRQ15	Secondary IDE Controller

DMA Channel Assignment

Channel 4 is by default used to cascade to two controllers

Channel	Assignment
DMA0	Available for PCI and ISA Slot
DMA1	Available for PCI and ISA Slot
DMA2	Floppy Disk Controller
DMA3	Available for PCI and ISA Slot
DMA4	Cascade
DMA5	Available for PCI and ISA Slot
DMA6	Available for PCI and ISA Slot
DMA7	Available for PCI and ISA Slot

Memory Map

The following table indicates memory of MAT-A791. The address ranges specify the runtime code length.

Memory below 1MB (1MB ~ 640KB)

Address Range	Type	Owner
A0000 ~ AFFFF	ISA	VGA Adapter
B0000 ~ BFFFF	ISA	VGA Adapter
C0000 ~ CADFF	ISA	Adapter ROM
F0000 ~ FFFFF	ISA	System BIOS

Memory above 1MB (1MB ~ 251840KB)

Address Range	Type	Owner
E000000~E7FFFFF7	PCI	VGA Adapter
E8000000~EBFFFFF7	PCI	Host Bridge
EC000000~EC0FFFFF	PCI	PCI Bridge
EC100000~EC17FFFF	PCI	VGA Adapter

System Memory Map

Start High	Start Low	Size High	Size	Type
00000000	00000000	00000000	000A0000	Available
00000000	000F0000	00000000	00010000	Reserved
00000000	FEC00000	00000000	00001000	Reserved
00000000	FFF00000	00000000	00001000	Reserved
00000000	FFB00000	00000000	00500000	Reserved
00000000	00100000	00000000	0F6F0000	Available
00000000	0F7F3000	00000000	0000D000	ACPI Space
00000000	0F7F0000	00000000	00003000	NVS Space

I/O Map

The addresses shown in the table are typical locations

I/O Port	Assignment
0 ~ F	AT DMA Controller
20 ~ 21	AT Interrupt Controller
40 ~ 43	82C54 Compatible Programmable Timer
60	8042 Compatible Keyboard Controller
61	AT Style Speaker
64	8042 Compatible Keyboard Controller
70 ~ 71	Real Time Clock
81 ~ 83	AT DMA Controller
87	AT DMA Controller
89 ~ 8B	AT DMA Controller
8F ~ 91	AT DMA Controller
A0 ~ A1	AT Interrupt Controller
C0 ~ DF	ATA DAM Controller
F0 ~ FF	Math Coprocessor
170 ~ 177	IDE Controller
1F0 ~ 1F7	IDE Controller
294 ~ 297	PCI Bus
2F8 ~ 2FF	Communication Port (COM2)
376	IDE Controller
378 ~ 37A	LPT1
3B0 ~ 3BB	VGA Adapter
3C0 ~ 3DF	VGA Adapter
3F6	IDE Controller
3F8 ~ 3FF	Communication Port (COM1)
4D0 ~ 4D1	PCI Bus
CF8 ~ CFF	PCI Bus
9000 ~ AFFF	PCI – PCI Bridge
B000 ~ B01E	USB Controller
B400 ~ B41E	USB Controller
B800 ~ B81E	USB Controller
F000 ~ F00E	IDE Controller

Appendix D: Optional Cable List

Part Number	Cable Description	MAT-791 Connector	Terminating Connector
46-ATA660-00	IDE Cable	CN12	ATA66/100 IDE Cable, 46cm
46-IPS200-00	KB/Mouse Cable	CN10	KB/Mouse Cable, block pin5, 2.54mm, 15cm
46-ICOM00-00	COM2 Cable	CN11	COM2 Cable
46-IUSB1B-00	USB Cable	CN9	2-Channel USB Cable w/Bracket
46-IPW4X8-00	Power Cable	CN21	12V Power Cable
46-IPRINT-00	LPT Cable	CN3	Printer Port Cable
46-I002X6-00	VGA Cable	CN6	VGA Cable w/VGA Kit