

**WAFER-4821  
DX4-100 MHz with  
Ethernet SBC  
Version 2.0**

**User Manual Version 2.0  
August 22, 2003**



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# Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>5</b>
1.1	Specifications .....	6
1.2	Package Contents .....	7
<b>2</b>	<b>Installation.....</b>	<b>8</b>
2.1	WAFER-4821 Layout .....	8
2.2	Unpacking Precautions.....	9
2.3	CPU Setting for WAFER-4821 .....	9
2.4	Watchdog Timer .....	10
2.5	DiskOnChip™ Flash Disk .....	10
2.6	Serial port2 RI Pin Setting.....	11
2.7	Serial port2 RS-232, RS-422 or RS-485 Setting.....	11
2.8	Free IRQ3 and IRQ4 Setting .....	12
2.9	Clear CMOS Setup .....	12
2.10	Realtek8019AS Setting .....	12
<b>3</b>	<b>Connection .....</b>	<b>13</b>
3.1	Floppy Disk Drive Connector.....	13
3.2	IDE Disk Drive Connector.....	14
3.3	Parallel Port .....	15
3.4	Serial Ports .....	16
3.5	Keyboard/Mouse Connector .....	17
3.6	External Switches and Indicators.....	18
3.7	External Power Connector .....	18
3.8	External Speaker .....	19
3.9	PC/104 Connection Bus .....	20
3.9	IrDA Infrared Interface Port.....	22
3.10	LAN RJ45 Connector .....	22
3.11	Digital I/O.....	23
<b>4</b>	<b>AMI BIOS Setup.....</b>	<b>24</b>
4.1	Getting Started.....	24
4.2	Standard CMOS Setup .....	25
4.3	Advanced CMOS Setup .....	26
4.4	Advanced Chipset Setup .....	28
4.5	Peripheral Setup .....	28
4.6	Auto-Detect Hard Disk.....	30

4.7	Change Supervisor Password .....	30
4.8	Auto Configuration with Optimal Settings .....	31
4.9	Auto Configuration with Fail Safe Settings .....	31
4.10	Save Settings and Exit .....	32
4.11	Exit Without Saving .....	32
	<b>Appendix A Watchdog Timer .....</b>	<b>33</b>
	<b>Appendix B I/O Information .....</b>	<b>35</b>
	<b>Appendix C Digital Input and Output .....</b>	<b>37</b>

## Chapter 1 Introduction

Thank you for choosing WAFER-4821 DX4-100 with Ethernet Single Board Computer. WAFER-4821 is a stand alone board with PC/104 connector, equipped with four COM Ports and advanced high-performance multi-mode I/O and Ethernet function, designed for the system manufacturers, integrators, or VARs to provide all the performance, reliability, and quality.

An advanced high performance super I/O function is supported by the Maple chipset. The on-chip UARTs are compatible with the NS16C550. The parallel port and IDE interface are compatible with IBM PC/AT and XT architecture's, as well as EPP and ECP.

The most outstanding feature in the WAFER-4821 is the built-in PC/104 expansion bus. Based on the PC/104 bus, you can easily install over thousands of PC/104 modules from hundreds vendors in the world. WAFER-4821 has external power connector that can let it connects to power supply directly. It is suitable for your standalone applications. Also, it provides four COM Ports: three RS232C, one RS-232C or RS-422/485 Port, for industrial field site application.

## 1.1 Specifications

WAFER-4821 DX4-100 with Ethernet Single Board Computer provides the following specification:

- **System on Chip (SOC):**  
System core logic, I/O, CPU (DX4-100) in one chip.  
Real-time clock/calendar and battery backup: by DS12887 or equivalent.
- **Memory:**  
DRAM memory: up to 32MB, 1 pcs 72-pin SIMM on board 4 MB designed for customer requirement.  
Disk on Chip socket: support one Disk on Chip socket.
- **Ethernet Interface:**  
Chipset: Realtek RTL-8019AS chipset (on board).  
Type: 16-bit Ethernet, Novell NE2000 compatible, 10Base-T 10 MBps.  
Connection: on-board RJ-45 connector.
- **Integrated Multi I/O:**  
IDE hard disk drive interface: Supports up to two IDE hard disk drives. Can be disabled by BIOS Setup.  
Floppy disk drive interface: Supports two 2.88 MB, 1.44MB, 1.2MB, 720KB, or 360KB floppy disk drives. Can be disabled by BIOS Setup.  
Four high speed Series ports: Three RS-232C, one RS-232C or RS-422/485 Port.  
PS/2 Mouse/Keyboard Connector: 6-pin Mini DIN Keyboard Connector.
- **Digital I/O:** 4 TTL inputs and 4 TTL outputs
- **Industrial features:**  
Watchdog timer: Software programmable time period can be set from 1 to 255 seconds. Reset is generated when CPU does not periodically trigger the timer.  
PC/104 expansion bus: A 64-pin and 40-pin, industrial embedded-PC bus standard.  
External power connector: 5-pin male connector (model: 2571-08TS)

Keyboard connector: 6-pin mini-DIN keyboard connector.

- **General information:**

Power Consumption: +5V @ 1.85A (DX4-100MHz, 32MB RAM)

Operating Temperature: 0°C ~ 60°C

Humidity: 5% ~ 95%, non-condensed

Dimension: 102.01mm(W) x 146.48mm(L)

## **1.2 Package Contents**

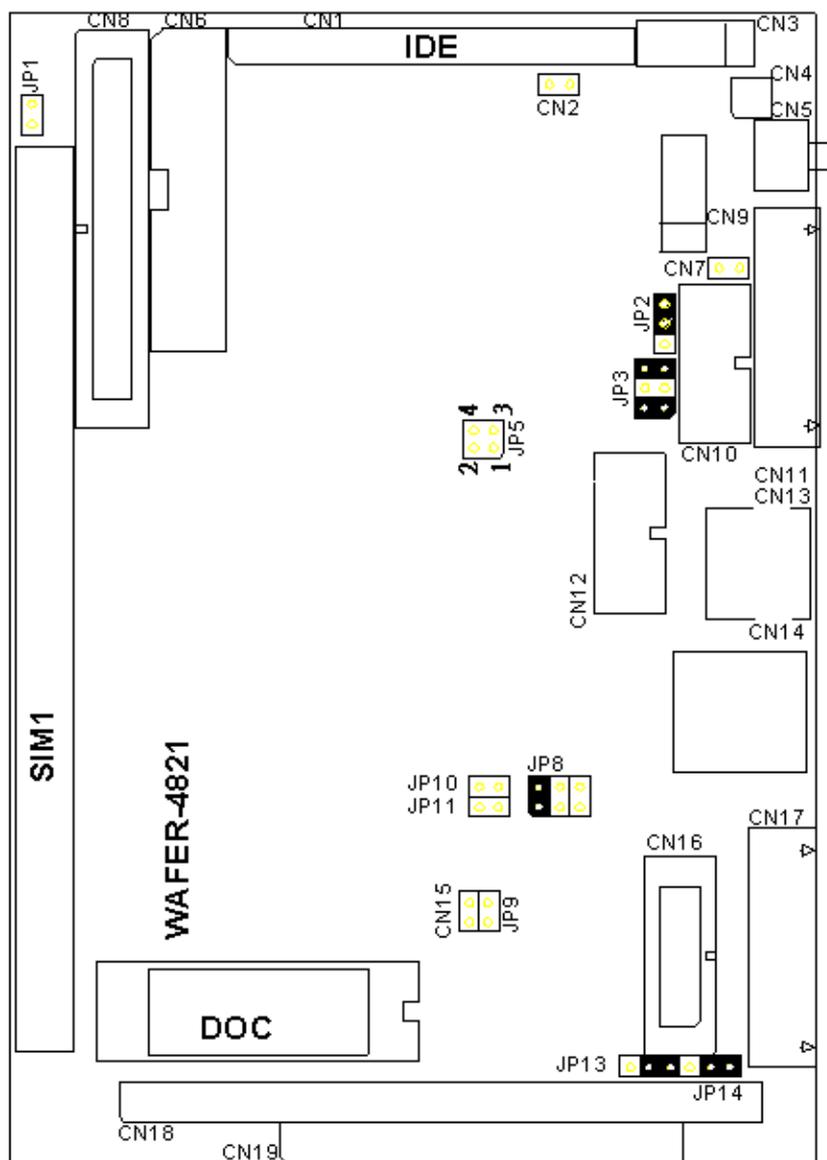
In addition to this User Manual, WAFER-4821 package includes the following items:

- WAFER-4821 DX4-100 with Ethernet Single Board Computer x 1
- RS-232/Printer Cable x 1
- FDD/HDD Cable x 1
- 6-pin Mini-Din Keyboard/Mouse Adapter Cable x 1
- Power/wire Cable x 1
- RS-232/422/485 Cable x 1

## Chapter 2 Installation

This chapter describes how to install the WAFER-4821. The layout of WAFER-4821 is shown on the next page and the Unpacking Precautions that you should be careful with is described on the following page. Jumpers and switches setting is also included for this board's configuration, such as: system clock setting and Watchdog timer.

### 1.1 WAFER-4821 Layout



## 1.2 Unpacking Precautions

Some components on WAFER-4821 SBC are very sensitive to static electric charges and can be damaged by a sudden rush of power. To protect it from unintended damage, follow the precautions below:

- i. Ground yourself to remove any static charge before touching your WAFER-4821 SBC. You can do it by using a grounded wrist strap at all times or by frequently touching any conducting materials that is connected to the ground.
- ii. Handle your WAFER-4821 SBC by its edges. Do not touch IC chips, leads or circuitry if not necessary.
- iii. Do not plug any connector or jumper while the power is on.

## 1.3 CPU Setting for WAFER-4821

- JP5: CPU CLOCK SETTING:

The system clock is generated by the ICS650R-01, and the different CPU clock frequency can be selected by JP5 and shown as following table:

CPU CLK	1-2	3-4
75MHz	ON	ON
100MHz	OFF	OFF

## 1.4 Watchdog Timer

Watchdog Timer is enabled by reading port 443H. It should be triggered before the time-out period ends, otherwise it will assume the program operation is abnormal and will issue a reset signal to start again. The Watchdog Timer is disabled by reading port 043H, or 843H.

- JP2: Watch-Dog Timer Type Selector

1-2	RESERVED
2-3	RESET

## 1.5 DiskOnChip™ Flash Disk

The DiskOnChip™ does not need any extra software utility because the DOC is 100% software compatible to hard disk. It is just “plug and play”, easy and reliable.

- JP3: DiskOnChip™ Memory Address Setting

ADDRESS	1-2	3-4	5-6
CE00H	OPEN	CLOSE	CLOSE
D600H	CLOSE	OPEN	CLOSE
DE00H	OPEN	OPEN	CLOSE

## 1.6 Serial port2 RI Pin Setting

The serial port2 (CN16) can supply +5V or +12V power to the serial devices via RI pin (Pin 9) of the serial port connector. The maximum current is 1A with fuse protection. If the output is set to 12V, make sure that you have 12V to supply to the board.

- JP13, JP14: for CN16, Pin 8 Selector

CN16 Pin9	JP14	JP13
RI Signal	2-3	Any is applicable when JP 14 uses 2-3
+5V	1-2	2-3
+12V	1-2	1-2

\* +5V or +12V output is fuse protected.

## 1.7 Serial port2 RS-232, RS-422 or RS-485 Setting

The serial port2 (CN16) can be set to RS-232 or RS-422/485 for industrial field site application.

- JP8: COM2 (CN16) RS-232/422/485 setting

	RS-232	RS-422	RS-485
1-2	CLOSE	OPEN	OPEN
3-4	OPEN	CLOSE	CLOSE
5-6	OPEN	OPEN	CLOSE

## 1.8 Free IRQ3 and IRQ4 Setting

If you want to free IRQ3 and IRQ4 for other application then the serial port2 and serial port1 have to be disabled by BIOS setting and the jumper JP9 and JP10 have to be closed to free IRQ3 and IRQ4, respectively.

- **JP 9: Free IRQ3 Setting**

OFF	Enable serial port2
ON	Disable serial port2

- **JP 10: Free IRQ4 Setting**

OFF	Enable serial port1
ON	Disable serial port1

## 1.9 Clear CMOS Setup

If you forget the CMOS password, you can clear or reset it by closing the JP11. After JP11 is closed, turn on the power for about 3 seconds then turn it off and open the JP11. Now, the password and CMOS contents have been cleared from your CMOS.

- **JP11: Clear CMOS**

OFF	NORMAL
ON	CLEAR

## 1.10 Realtek8019AS Setting

Realtek8019AS can be set to PNP MODE or JUMPERLESS MODE.

- **JP1: Realtek8019AS Setting**

OFF	PNP mode
ON	JUMPERLESS mode

## Chapter 3 Connection

This chapter describes how to connect peripherals, switches and indicators to the WAFER-4821 board. You can access most of the connectors from the top of the board while it is installed in the chassis.

### 1.1 Floppy Disk Drive Connector

WAFER-4821 board comes equipped with a 34-pin daisy-chain driver connector cable. The detailed pin assignment of the connector is specified as following table:

- **CN8: Floppy Disk Drive Connector**

<b>PIN</b>	<b>Description</b>	<b>PIN</b>	<b>Description</b>
1	GROUND	2	REDUCE WRITE
3	GROUND	4	N/C
5	GROUND	6	N/C
7	GROUND	8	INDEX#
9	GROUND	10	MOTOR ENABLE 0#
11	GROUND	12	DRIVE SELECT 1#
13	GROUND	14	DRIVE SELECT 0#
15	GROUND	16	MOTOR ENABLE 1#
17	GROUND	18	DIRECTION#
19	GROUND	20	STEP#
21	GROUND	22	WRITE DATA#
23	GROUND	24	FDCWE#
25	GROUND	26	TRACK 0#
27	GROUND	28	WRITE PROTECT#
29	GROUND	30	READ DATA#
31	GROUND	32	HEAD#
33	GROUND	34	DISK CHANGE#

## 1.2 IDE Disk Drive Connector

You can attach two IDE (Integrated Device Electronics) hard disk drives to the WAFER-4821 internal controller. The board comes equipped with a 44-pin flat-cable connector. The detailed pin assignment of the connector is specified as following table:

- **CN1: IDE Interface Connector**

<b>PIN</b>	<b>Description</b>	<b>PIN</b>	<b>Description</b>
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	GND	20	N/C
21	N/C	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	IDE CHRDY	28	BALE
29	N/C	30	GROUND
31	IRQ14	32	IOCS16
33	SA 1	34	N/C
35	SA 0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND
41	VCC	42	VCC
43	GND	44	VCC

### 1.3 Parallel Port

This port is usually connected to a printer. WAFER-4821 includes an on-board parallel port, accessed through a 26-pin flat-cable connector CN6. The detailed pin assignment of the connector is specified as following table:

- **CN6: Parallel Port Connector**

<b>PIN</b>	<b>Description</b>	<b>PIN</b>	<b>Description</b>
1	STROBE#	2	DATA 0
3	DATA 1	4	DATA 2
5	DATA 3	6	DATA 4
7	DATA 5	8	DATA 6
9	DATA 7	10	ACKNOWLEDGE
11	BUSY	12	PAPER EMPTY
13	PRINTER SELECT	14	AUTO FORM FEED #
15	ERROR#	16	INITIALIZE
17	LPT SELECT LN#	18	GND
19	GND	20	GND
21	GND	22	GND
23	GND	24	GND
25	GND	26	N/C

## 1.4 Serial Ports

WAFER-4821 offers four high speed NS16C550 compatible UARTs with Read/Receive 16 byte FIFO serial ports. These ports enable you connect to serial devices or a communication network. Two 9-pin DSUB connectors, one 10-pin header and one 14-pin header are provided by WAFER-4821. The detailed pin assignment of the connectors are specified as following tables:

- **CN17: Serial Port1 Connector (9-pin DSUB)**

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

- **CN16: Serial Port2 Connector (14-pin Header/W Housing)**

PIN	Description	PIN	Description
1	DCD	2	DSR
3	RX	4	RTS
5	TX	6	CTS
7	DTR	8	RI
9	GND	10	NC
11	TX2+	12	TX2-
13	RX2+	14	RX2-

- **CN11: Serial Port3 Connector (9-pin DSUB)**

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

- **CN10: Serial Port4 Connector (10-pin Header/W Housing)**

<b>PIN</b>	<b>Description</b>	<b>PIN</b>	<b>Description</b>
1	DCD	6	DSR
2	RX	7	RTS
3	TX	8	CTS
4	DTR	9	RI
5	GND	10	GND

## 1.5 Keyboard/Mouse Connector

WAFER-4821 provides a 6-pin Mini-DIN connector CN13 on the board-mounting bracket for single board computer applications.

- **CN13: PS/2Mouse, Keyboard Connector (Mini Din)**

<b>PIN</b>	<b>Description</b>
1	KBDAT
2	MDAT
3	GND
4	+5V
5	KBCLK
6	MCLK

## 1.6 External Switches and Indicators

There are many external switches and indicators for monitoring and controlling your CPU board. These features are optional. The detailed pin assignment of the connectors is specified as following table:

- **CN5: Reset button**

PIN	Description
1	RESET
2	GND

- **CN2: IDE LED connector**

PIN	Description
1	HDD ACTIVE#
2	+5V

## 1.7 External Power Connector

WAFER-4821 has an on-board external power connector CN3 and a 2-pin power connector CN7. You can connect power directly to the CPU board without passive backplane application.

- **CN3: External Power Connector**

PIN	Description
1	VCC
2	VCC
3	GND
4	GND
5	+12V

- **CN7: External Power LED Connector**

PIN	Description
1	+5V
2	GND

## 1.8 External Speaker

WAFER-4821 has its own buzzer, which can be connected to external speaker through the connector CN15:

- **CN15: External Speaker Connector**

PIN	Description
1	+5V
2	Speaker

### 3.9 PC/104 Connection Bus

WAFER-4821 PC/104 expansion bus enables you to attach any kind of PC/104 modules. The PC/104 bus has already become the industrial embedded PC bus standard, so you can easily install over thousands of PC/104 modules from hundreds of vendors in the world. There are two PC/104 connectors on this board: PC/104-64 and PC/104-40.

- **CN19: PC/104-40 Connector**

<b>PIN</b>	<b>Description</b>	<b>PIN</b>	<b>Description</b>
1	GND	21	GND
2	MCS16#	22	SBHE#
3	IOCS16#	23	LA23
4	IRQ10	24	LA22
5	IRQ11	25	LA21
6	IRQ12	26	LA20
7	IRQ15	27	LA19
8	IRQ14	28	LA18
9	DACK0#	29	AL17
10	DRQ0	30	MEMR#
11	DACK5#	31	MEMW#
12	DRQ5	32	SD8
13	DACK6#	33	SD9
14	DRQ6	34	SD10
15	DACK7#	35	SD11
16	DRQ7	36	SD12
17	VCC	37	SD13
18	MASTER#	38	SD14
19	GND	39	SD15
20	GND	40	GND

- **CN18: PC/104-64 Connector**

<b>PIN</b>	<b>Description</b>	<b>PIN</b>	<b>Description</b>
1	IOCHCK#	33	GND
2	SD7	34	IRSTDRV
3	SD6	35	VCC
4	SD5	36	IRQ9
5	SD4	37	-5V
6	SD3	38	DRQ2
7	SD2	39	-12V
8	SD1	40	ZWS
9	SD0	41	+12V
10	IOCHRDY	42	GND
11	AEN	43	SMEMW#
12	LA19	44	SMEMR#
13	LA18	45	IOW#
14	LA17	46	IOR#
15	SA16	47	DACK3#
16	SA15	48	DRQ3
17	SA14	49	DACK1#
18	SA13	50	DRQ1
19	SA12	51	REFRESH#
20	SA11	52	SYSCLK
21	SA10	53	IRQ7
22	SA9	54	N/C
23	SA8	55	IRQ5
24	SA7	56	IRQ4
25	SA6	57	IRQ3
26	SA5	58	DACK2
27	SA4	59	TC
28	SA3	60	BALE
29	SA2	61	VCC
30	SA1	62	OSC
31	SA0	63	GND
32	GND	64	GND

## 1.9 IrDA Infrared Interface Port

WAFER-4821 has a built-in IrDA port supports Serial Infrared (SIR) or Amplitude Shift Keyed IR (ASKIR) interface. If you want to use the IrDA port, you have to configure the SIR or ASKIR model in BIOS>Peripheral Setup>COM4. Then the normal RS-232 COM4 will be disabled.

- **CN9: IR Connector**

PIN	Description
1	VCC
2	N/C
3	IR-RX
4	GND
5	IR-TX

## 1.10 LAN RJ45 Connector

WAFER-4821 built-in RJ45 LAN connector is for 10Mbps Ethernet (NE-2000 compatible) operation.

- **CN14: LAN RJ45 Connector**

PIN	Description	PIN	Description
1	TX+	5	NC
2	TX-	6	RX-
3	RX+	7	NC
4	NC	8	NC

- **CN4: LAN LED**

Green LED for LINK and Yellow LED for RX.

## 1.11 Digital I/O

One of the characteristics of digital circuit is its fast response to high or low signal. This kind of respond is badly needed for harsh and critical industrial operating environment. That is why we design 4-bit digital inputs and 4-bit digital outputs on the WAFER-4821.

Digital Input and Output, generally, are control signals. You can use these signals to control external devices that needs On/Off circuit or TTL devices. The register address is 340H (or 240H, 260H) (configured with BIOS setting).

- **CN12: Digital I/O**

<b>PIN</b>	<b>Signal Name</b>	<b>PIN</b>	<b>Signal Name</b>
1	GND	6	VCC
2	DO3	7	DO2
3	DO1	8	DO0
4	DIN3	9	DIN2
5	DIN1	10	DIN0

## Chapter 4 AMI BIOS Setup

WAFER-4821 uses AMI BIOS for system configuration. AMI BIOS setup program is designed to provide maximum flexibility in configuring the system by offering various options which may be selected for end-user requirements. This chapter is written to assist you in the proper usage of these features.

### 1.1 Getting Started

When you turn on the power button, the BIOS will enter the Power-On-Self-Test routines. These routines will be executed for system test and initialization and system configuration verification.

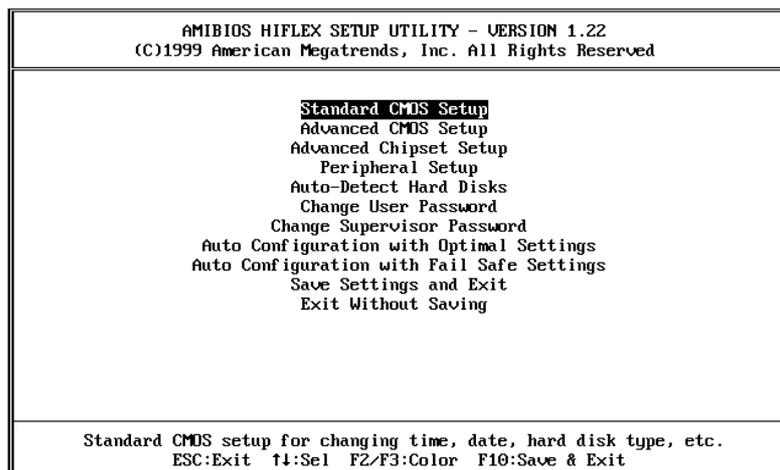
Note: for your convenience, a diskette containing files for updating the BIOS is included with the following content:

FLASH634.COM: Flash utility to update BIOS.

After the POST routines are completed, the following message appears:

"Hit DEL if you want to run SETUP"

To access AMI BIOS SETUP UTILITY, press <Del> key. The following screen will be displayed at this time:



## 1.2 Standard CMOS Setup

The standard CMOS Setup is used for basic hardware system configuration. The main function is for Date/Time setting and Floppy/Hard Disk setting. Please refer to the following screen for this setup.

AMIBIOS SETUP - STANDARD CMOS SETUP										
(C)1999 American Megatrends, Inc. All Rights Reserved										
Date (mm/dd/yyyy): Thu <b>Oct</b> 14, 1999					Base Memory: 0 KB					
Time (hh/mm/ss) : 12:03:16					Ext'd Memory: 0 MB					
Floppy Drive A:		1.44 MB 3½								
Floppy Drive B:		Not Installed								
	Type	Size	Cyl'n	Head	WPcom	Sec	LBA Mode	Blk Mode	PIO 32Bit Mode	
Pri Master :	Auto								Off	
Pri Slave :	Auto								Off	
Sec Master :	Not Installed									
Sec Slave :	Not Installed									
Boot Sector Virus Protection		Disabled								
Month:	Jan - Dec						ESC:Exit ↑:Sel			
Day:	01 - 31						PgUp/PgDn:Modify			
Year:	1901 - 9999						F1:Help F2/F3:Color			

To set the Date, for example, press either the arrow or <Enter> button on your keyboard to select one of the fields (Months, Date or Year) then press either <PgUp> or <PgDn> to set it to the current Months, Date and Year. Do the same steps for Time setting.

**For IDE hard disk drive setup**, please check the following possible setup procedure:

1. Use the Auto-Detect Hard Disk option in the main menu; the computer will automatically detect the HDD specifications.
2. Manually enter the specifications by yourself by selecting the Type of your HDD.

## 1.3 Advanced CMOS Setup

The following screen will be displayed if you select Advanced CMOS Setup:

AMIBIOS SETUP - ADVANCED CMOS SETUP (C)1999 American Megatrends, Inc. All Rights Reserved		
<b>Quick Boot</b>	<b>Enabled</b>	Available Options: Disabled ▶ Enabled
1st Boot Device	Floppy	
2nd Boot Device	IDE-0	
3rd Boot Device	CDROM	
Try Other Boot Devices	Yes	
Floppy Access Control	Read-Write	
Hard Disk Access Control	Read-Write	
S.M.A.R.T. for Hard Disks	Disabled	
BootUp Num-Lock	On	
PS/2 Mouse Support	Enabled	
System Keyboard	Absent	
Password Check	Setup	
Boot To OS/2	No	
Wait For 'F1' If Error	Enabled	
Hit 'DEL' Message Display	Enabled	
System BIOS Cacheable	Enabled	
C000,32k Shadow	Enabled	
C800,32k Shadow	Disabled	
D000,64k Shadow	Disabled	
D800,32k Shadow	Disabled	
		ESC:Exit ↑↓:Sel PgUp/PgDn:Modify F1:Help F2/F3:Color

You can change the value of each option by using <PgUp> and <PgDn> key. The available values are shown on the right screen.

### Quick Boot

*Enabled:* To enable the BIOS to boot quickly when you turn on your computer. The BIOS will only check the first 1MB of the system memory.

### Quick Boot

*Disabled:* BIOS will test all system memory when it boots up. It will spend about 40 seconds until it receives a Ready signal from the HDD. It will also wait for you to press the <Del> key or not.

### 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> Boot Device

To define the device type for booting after the routines check up completes. If the 1<sup>st</sup> Boot Device fails, BIOS will attempt to boot from the 2<sup>nd</sup> or the 3<sup>rd</sup> device.

### Try Other Boot Devices

BIOS will try to boot from any other available device in the system if the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> device fails to boot.

### Floppy Access Control

To define the read/write access which is set when booting from a floppy drive.

**Hard Disk Access Control**

To define the read/write access which is set when booting from a HDD.

**S.M.A.R.T. for Hard Disks**

To allow BIOS to use the **S**ystem **M**anagement and **R**eporting **T**echnologies protocol for reporting server system information on a network.

**BootUp Num-Lock**

To turn on/off the Num-Lock option on an enhanced keyboard when you boot. If you turn it off, the arrow keys on the numeric keypad can be used just as the other set of arrow keys on the keyboard and vice versa.

**PS/2 Mouse Support**

To testify whether or not a PS/2 mouse is supported.

**System Keyboard**

To testify whether or not a keyboard is attached to the computer.

**Primary Display**

To define the type of display monitor of the system. The Absent option is for network file servers.

**Password Check**

To define if a password is necessary or not for accessing to the system.

**Boot to OS/2**

If you run the OS/2 operating system, this option must be set to yes.

**System BIOS Cacheable**

To define whether or not the memory segments F000H can be read from or written to cache memory. Setting it as Enabled will give faster execution in your system.

**XXXX, 16k Shadow**

ROM Shadow is a technique in which BIOS code is copied from slower ROM to faster RAM. If you enable it then the BIOS will be executed from the RAM. Each option allows 16KB segment to be shadowed to the RAM.

## 4.4 Advanced Chipset Setup

AMIBIOS SETUP - ADVANCED CHIPSET SETUP (C)1999 American Megatrends, Inc. All Rights Reserved		
<b>AT Bus Clock</b>	<b>Automatic</b>	Available Options: ▶ Automatic
RAS Precharge Time	2T	14.318MHz
RAS to CAS Read Cycle Delay	2T	CLKSRC/5
RAS to CAS Write Cycle Delay	2T	CLKSRC/3
CAS Precharge Read Time	1T	CLKSRC/2.5
CAS Precharge Write Time	1T	CLKSRC/1.5
CAS Width in Read Cycle	1T	CLKSRC/1(00)
CAS Width in Write Cycle	1T	CLKSRC/4
		CLKSRC/2
		24MHz
ESC:Exit F4:Sel PgUp/PgDn:Modify F1:Help F2/F3:Color		

Note: Do not change any value on this page unless necessary.

## 4.5 Peripheral Setup

When you enter the Peripheral Setup, the following items are available for setting:

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<b>OnBoard IDE</b>	<b>Primary</b>	Available Options: Disabled
OnBoard Serial Port1	3F8h/COM1	▶ Primary
OnBoard Serial Port2	2F8h/COM2	Secondary
OnBoard Parallel Port	378h	
Parallel Port Mode	SPP/BPP	
Parallel Port IRQ	5	
Parallel Port DMA Channel	0	
OnBoard FDC	Enabled	
OnBoard Serial Port3	3E8h/COM3	
Serial Port3 IRQ	11	
OnBoard Serial Port4	2E8h/COM4	
Serial Port4 Mode	Normal	
IrDA Protocol	1.6 uS	
Serial Port4 IRQ	10	
OnBoard GPIO Port	340h	
ESC:Exit F4:Sel PgUp/PgDn:Modify F1:Help F2/F3:Color		

- **OnBoard IDE:** to define the on-board Integrated Drive Electronics controller channel(s) to be used. Available options are: Primary, Secondary and Disabled.
- **OnBoard FDC:** The floppy disk drive controller can be Enabled or Disabled by this item. When you do not need floppy disk, the FDD controller can be disabled. If you set it Auto, the BIOS will try to enable any floppy drive controller on the ISA Bus.

- **Serial Port 1:** The options are Disable, 3F8, 2F8, 3E8, 2E8 and Auto. You can set the I/O address of the serial port 1 or disable it.
- **Serial Port 2:** The options are Disable, 3F8, 2F8, 3E8, 2E8 and Auto. You can set the I/O address of the serial port 2 or disable it.
- **Serial Port 3:** The options are Disable, 3F8, 2F8, 3E8, 2E8 and Auto. You can set the I/O address of the serial port 3 or disable it.
- **Serial Port 4:** The options are Disable, 3F8, 2F8, 3E8, 2E8 and Auto. You can set the I/O address of the serial port 4 or disable it.
- **OnBoard Parallel Port:** The options are Auto, Disable, 3BC, 378 or 278. You can set the I/O address of the parallel port or disable it.
- **IrDA Protocol:** To specify the function mode if an IrDA mode is selected.
- **Parallel Port Mode:** WAFER-4821 provides EPP, ECP, ECP/EPP, and SPP/BPP Mode. EPP passes the parallel port to be used with devices which stick to the EPP specification. The existing parallel port signals will be used by EPP to provide asymmetric bi-directional data transfer driven by the host devices. ECP passes the parallel port to be used with devices which stick to the ECP specification.
- **Parallel Port IRQ:** To define the Interrupt Request (IRQ), which is used by the parallel port.
- **Parallel Port DMA Channel:** To set the DMA Channel used by the parallel port.

## **4.6 Auto-Detect Hard Disk**

This option detects the parameters of an IDE hard disk drive (HDD sector, cylinder, head, etc) automatically and will put the parameters into the Standard CMOS Setup screen. Up to 4 IDE drives can be detected and the parameters will be listed in the box. Press <Y> if you accept these parameters. Press <N> to skip the next IDE drives.

Note: If your IDE HDD was formatted in previous older system, incorrect parameters may be detected. In this case, you need to enter the correct parameters manually or low-level format the disk.

## **4.7 Change Supervisor Password**

This option sets a password that is used to protect your system and Setup Utility. Supervisor Password has higher priority than User Password. Once you setup the password, the system will always ask you to key-in password every time you enter the BIOS SETUP. If you enter the BIOS SETUP with Supervisor Password, you can choose every setup/option on the main menu but with User Password, you can only choose three setup/options (USER PASSWORD, SAVE SETTING AND EXIT and EXIT WITHOUT SAVING). To disable these passwords, enter the BIOS SETUP room with Supervisor Password and then just press the <Enter> key instead of entering a new password when the prompt 'Enter Password' pops up.

Note: If you forget the password, do the Clear/Reset CMOS procedure (see Part 2.3 the CPU Setting for WAFER-4821 >> Clear CMOS SETUP)

## 4.8 Auto Configuration with Optimal Settings

This option lets you load the *optimal* default settings. These settings are *best-case values* which will provide the best performance. Whenever your CMOS RAM is damaged, this optimal setting will be loaded automatically.



## 4.9 Auto Configuration with Fail Safe Settings

This option lets you load the Fail Safe default settings when something happens to your computer so that it cannot boot normally. These settings are not the most optimal settings but are the most stable settings.



## 4.10 Save Settings and Exit

Select this option when you finish setting all the parameters and want to save them into the CMOS. Just simply press <Enter> key and all the configuration changes will be saved.



## 4.11 Exit Without Saving

Select this option if you want to exit the Setup without saving the changes that you made. Press <Enter> key and you will exit the BIOS SETUP without saving the changes.



## Appendix A Watchdog Timer

Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, hardware on the board will perform a hardware reset (cold boot) to bring the system back to a known state.

The Watch-Dog Timer is controlled by three I/O ports.

443	Write	Set Watchdog Time period
443 (hex)	Read	Enable the refresh the Watchdog Timer.
843/043 (hex)	Read	Disable the Watchdog Timer.

To enable the Watchdog Timer, user has to define Timer before enable the Watchdog Timer function. The output data is a value of time interval and the range of the value is from 01(hex) to FF (hex) and time interval 1 sec to 255 sec.

Data	Time Interval
01	1 sec
02	2 sec
03	3 sec
04	4 sec
.	.
.	.
.	.
FF	255 sec

This will enable and activate the countdown timer which will eventually time out and reset the CPU to ensure that this reset condition does not occur, the Watch-Dog Timer must be periodically refreshed by reading the same I/O port 043H and 443H. This must be done within the time out period that is selected by software, please refer to the example program.

A tolerance of at least 5% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time consuming. Therefore if the time out period has been set to 10 seconds, the I/O port 443H must be read within 7 seconds.

Note: when exiting a program it is necessary to disable the Watch-Dog Timer, otherwise the system will reset.

Example program:

```
TIMER_PORT    = 443H
TIMER_START   = 443H
TIMER_STOP    = 843H
;
; INITIAL TIME PERIOD COUNTER
;
        MOV    DX, TIME_PORT
        OUT   AL, 8 ; 8 SECONDS
;
; ADD YOUR APPLICATION HERE
;
        MOV    DX, TIMER_START
        IN    AL, DX.      ; START COUNTER
;
; ADD YOUR APPLICATION HERE
;
W_LOOP:
        MOV    DX, TIMER_STOP
        IN    AL, DX
        MOV    DX, TIMER_START
        IN    AL, DX.      ; RESTART COUNTER
;
; ADD YOUR APPLICATION HERE
;
        CMP    EXIT_AP, 0
        JNE    W_LOOP
        MOV    DX, TIMER_STOP
        IN    AL, DX
;
; EXIT AP
;
```

## Appendix B I/O Information

### IO Address Map

I/O address Range	Description
000-01F	DMA Controller #1
020-021	Interrupt Controller #1, Master
040-05F	8254 timer
060-06F	8042 (Keyboard Controller)
070-07F	Real time Clock, NMI Mask
080-09F	DMA Page Register
0A0-0BF	Interrupt Controller #2
0C0-0DF	DMA Controller #2
0F0	Clear Math Coprocessor Busy
0F1	Reset Math Coprocessor
0F8-0FF	Math Coprocessor
1F0-1F8	Fixed Disk
200-207	Game I/O
278-27F	Parallel Printer Port 2 (LPT3)
2E8-2EF	Serial Port 4
2F8-2FF	Serial Port 2
300-31F	Prototype Card
360-36F	Reserved
378-37F	Parallel Printer Port 1 (LPT2)
3B0-3BF	Monochrome Display and Printer Adapter (LPT1)
3C0-3CF	Reserved
3D0-3DF	Color/Graphics Monitor Adapter
3E8-3EF	Serial Port 3
3F0-3F7	Diskette Controller
3F8-3FF	Serial Port 1
443	Watchdog timer enable
843 or 043	Watchdog timer disable

### 1st MB Memory Address Map

Memory address	Description
00000-9FFFF	System memory
A0000-BFFFF	VGA buffer
C0000-C7FFF	VGA BIOS
C8000-EFFFF	Free for customer application
F0000-FFFFF	System BIOS
1000000-	Extend BIOS

### IRQ Mapping Chart

IRQ0	System Timer	IRQ8	RTC Clock
IRQ1	Keyboard	IRQ9	Unused
IRQ2	Cascade to IRQ Controller	IRQ10	COM4
IRQ3	COM2	IRQ11	COM3
IRQ4	COM1	IRQ12	PS/2 mouse
IRQ5	Unused	IRQ13	FPU
IRQ6	FDC	IRQ14	Primary IDE
IRQ7	Printer	IRQ15	Unused

### DMA Channel Assignments

DMA Channel	Function
0	Available
1	Available
2	Floppy Disk (8-bit transfer)
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

## Appendix C Digital Input and Output

Digital Input and Output, generally, are control signals. You can use these signals to control external devices that needs On/Off circuit or TTL devices. The register address is 340H. This register is designed to latch the output data.

- **CN16: Digital I/O**

PIN	Signal Name	PIN	Signal Name
1	GND	6	VCC
2	DO3	7	DO2
3	DO1	8	DO0
4	DIN3	9	DIN2
5	DIN1	10	DIN0

Below is the specifications of WAFER-4821 Digital I/O:

- Digital Input/Output channels : 4 bits
- TTL Devices compatible
- Digital Logic level 0: +0.5V max
- Digital Logic level 1: 3.5V to 5V
- Register Address: 340H

Example program:

```
PORT_ADRESS = 340H
```

```
G_LOOP: MOV    DX, PORT_ADRESS
          IN     AL, DX
          CMP   AL, P_STATUS
          JNE   W_LOOP
          CMP   X_STATUS, 0
          JE    G_LOOP
          OUT   DX, AL
          MOV   X_STATUS, 0
          JMP   G_LOOP
W_LOOP: MOV   P_STATUS, AL
          MOV   X_STATUS, 1
          ;
          ; WAIT HERE
          ;
          JMP   G_LOOP
X_STATUS DB 0
P_STATUS DB
```