

## **Technical Reference**

**MB-P201  
7-Slot Pentium® II  
Motherboard with Intel 440 LX Chipset**



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Irvine, California 92614



# Features

- 7 bus slots: 1 ISA, 4 PCI slots, 1 ISA & 1 PCI slot shared
- 1 Accelerated Graphics Port (AGP). 1 Pentium® II processor slot
- Intel Pentium® II processor upgradeable through 233, 266 MHz, 300 MHz and 333 MHz
- Intel 440LX chipset
- System memory upgradeable from 32 MB to 1 GB EDO or up to 512 MB SDRAM using ‘x 64’ or ‘x 72’ DIMM. Processor-facilitated ECC memory with ‘x 72’ DIMM
- Processor available with either 256 KB or 512 KB cache
- PCI 2.1 compliant PCI/ISA bus architectures
- Supports Desktop Management Interface (DMI) at BIOS level, via a DMI configuration utility
- BIOS-facilitated timers for *Doze*, *Standby* & *Suspend Modes*
- 2 Standard PS/2 keyboard and mouse connectors
- On-board PCI bus master EIDE controller (up to 4 EIDE drives & 2 floppy drives). Two channels support PIO modes 3 & 4. 14 MB/sec bus master IDE. Also supports “Ultra33” synchronous DMA mode transfer (33 MB/sec)
- On-board I/O: 2 serial ports & 1 parallel port; 2 on-board Universal Serial Bus (USB) ports
- On-board PS/2 mouse & keyboard ports

# FCC Standards

The FCC (Federal Communications Commission) restricts the amount of radiation and radio frequency emissions coming from computing equipment.

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CSS Labs is not responsible for any radio or television interference caused by unauthorized modifications to this equipment. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

To ensure compliance to FCC non-interference regulations, peripherals attached to this device require shielded I/O cables.

**NOTICE:** The use of a non-shielded I/O cable with this device is in violation of U.S. Federal law and will not allow the device to meet the maximum emission limits.

**CAUTION:** Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

**Note:** If you have purchased the miniature tower system, please note the following...

**WARNING:** The system is to be installed on desk or table tops only. The unit will become unstable if operated as a floor standing unit and unintentional force is applied to the top of the unit.

Turn the unit off and unplug the power cord before you open the cover to install any cards or peripheral devices.

## WARNING

CAUTION: THERE IS A DANGER OF EXPLOSION IF THE BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

ATTENTION: IL Y A DANGER D'EXPLOSION S'IL Y A REMPLACEMENT INCORRECT DE LA BATTERIE. REMPLACER UNIQUEMENT AVEC UNE BATTERIE DU MEME TYPE OU D'UN TYPE RECOMMENDE PAR LE CONSTRUCTEUR. ETTERAU REBUT LES BATTERIES USAGEES CONFORMEMANT AUX INSTRUCTIONS DU FABRICATANT.

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# Overview

This document describes the technical features of the motherboard. The topics include:

- **The Microprocessor** - description of the features of the Pentium II microprocessor
- **Motherboard** - illustration and brief description of the motherboard
- **Connectors** - description of connector locations and functions on the motherboard
- **Jumpers** - detailed description of the jumpers used to configure the motherboard
- **System Memory** - detailed description of system memory and how to add memory
- **System Memory Map** - listing of traditional address assignments for system memory
- **Configuration Utilities** - description and instructions for using the utility to configure the board's BIOS

# The Microprocessor

The Pentium II microprocessor contains all the features of the Pentium, Pentium Pro and 80486 processors, and is 100% compatible with 8086/88, 80286, and 80386 DX and SX microprocessors. In addition, the Pentium II features:

- Dual Independent Bus Architecture allowing access to data from either bus simultaneously or in parallel
- Dynamic Execution with Multiple Branch Prediction, Data Flow Analysis and Speculative Execution
- Intel MMX multimedia technology

It is available in a variety of speeds, from 233 MHz through 333 MHz. For additional information, contact your authorized CSS Laboratories representative; or visit Intel's web site.

# The Motherboard

## Cache Memory

The processor comes with 32 KB of L1 cache, and 512 KB of internal L2 cache.

## Expansion Slots

There are a total of seven slots on the motherboard: one ISA slot, four PCI slots; 1 ISA and 1 PCI are shared, and one Accelerated Graphics Port (AGP).

## Accelerated Graphics Port Slot

The motherboard provides one accelerated graphics port (AGP), which is a special bus platform that enables high performance graphics capabilities. The AGP provides dedicated pipelined access to main memory and faster transfer rates. The AGP also enables the use of main memory.

## Voltage Regulators

The board comes with a voltage regulator, making the board compatible with the full line of processors.

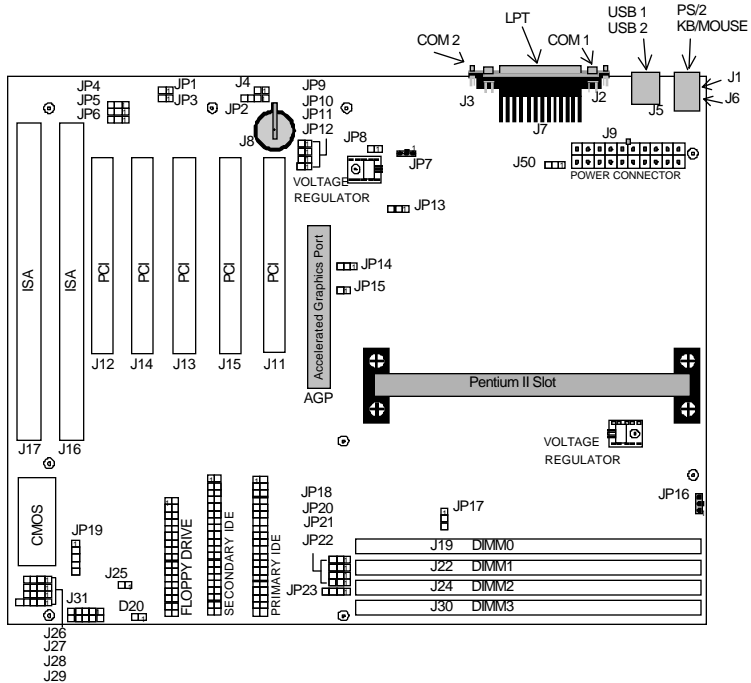


Figure 1: The Motherboard

# Motherboard Connectors

<b>Description</b>	<b>Connector</b>
J28	Speaker connector
J26	Reset switch connector
J27	IDE hard drive LED
JP23	Extra IDE hard drive LED
JP31	CSS Front panel connector
J1	PS/2 keyboard connector
J6	PS/2 mouse connector
J5	Universal serial bus 1 & 2 connectors
J29	Keylock
J20	Primary IDE connector
J21	Secondary IDE connector
J7	Parallel port
J2, J3	Serial ports 1 & 2
J23	Floppy drive connector
J9	Power supply connector
JP7, JP16	Processor fan connectors
JP4	Chassis fan connector
J8	On-board CMOS battery slot
JP2	External CMOS battery connector
JP19	Infrared device connector
J25	ON/OFF switch
J50	Wake On LAN Connector

## Speaker J28

J28 connects the computer's speaker to the motherboard.

Pin	Assignment	Pin	Assignment
1	Speaker	3	Gnd
2	Not used	4	VCC

## Reset Switch J26

The reset button on the front panel lets you perform a “cold boot”, without turning the system off.

Pin	Assignment	Pin	Assignment
1	Reset	3	Not used
2	Ground	4	Not used

## IDE Hard Drive LED J27

J27 connects a hard drive access LED to the front panel. It lights when the drive is accessed.

Pin	Assignment
1	VCC
2	HDD Act (-)
3	HDD Act (-)
4	VCC

## Front Panel Connector JP31

This 10-pin connector interfaces between the system board and the control panel on the front of the system case.

Pin	Assignment	Pin	Assignment
1	Ground	6	Ground
2	Power LED	7	Green LED
3	IDE Power LED	8	Keylock
4	Not used	9	Power LED
5	IDE LED	10	Reset

## PS/2 Keyboard Connector J1; PS/2 Mouse Connector J6

These 10-pin connectors are in a stacked configuration. The keyboard connector is on the bottom.

## Universal Serial Bus Connectors J5

The motherboard provides two 4-pin universal serial bus connectors (USB).

Pin	Assignment	Pin	Assignment
1	VCC	3	Data +
2	Data -	4	Ground

## Keylock LED Connector J29

J29 attaches to the chassis' keylock and power LEDs.

Pin	Assignment	Pin	Assignment
1	Power LED	4	Keylock
2	Not used	5	Ground
3	Ground		



## Primary EIDE J20; Secondary EIDE J21

J20 connects the primary on-board PCI EIDE controller to the primary hard drive. J21 connects the secondary on-board PCI EIDE controller to the secondary hard drive. Pin 1 is marked.

<b>Pin</b>	<b>Assignment</b>	<b>Pin</b>	<b>Assignment</b>
1	Reset IDE	2	Ground
3	Host Data 7	4	Host Data 8
5	Host Data 6	6	Host Data 9
7	Host Data 5	8	Host Data 10
9	Host Data 4	10	Host Data 11
11	Host Data 3	12	Host Data 12
13	Host Data 2	14	Host Data 13
15	Host Data 1	16	Host Data 14
17	Host Data 0	18	Host Data 15
19	Ground	20	Key
21	DDRQ (DDRQ1)	22	Ground
23	I/O Write #	24	Ground
25	I/O Read#	26	Ground
27	IOCHRD	28	+5V pull-up
29	DDACK0(DDACK1)#	30	Ground
31	IRQ14 (IRQ15)	32	Reserved
33	Addr 1	34	Reserved
35	Addr0	36	Addr2
37	Chip Select 1P (1S)#	38	Chip select (3P 3S)
39	Activity #	40	Ground

## Parallel Port J7

J7 provides the connection for the parallel port.

Pin	Assignment	Pin	Assignment
1	STROBE#	14	AUTOFD#
2	DATA BIT 0	15	FAULT#
3	DATA BIT 1	16	PINIT#
4	DATA BIT 2	17	SLCT IN#
5	DATA BIT 3	18	Ground
6	DATA BIT 4	19	Ground
7	DATA BIT 5	20	Ground
8	DATA BIT 6	21	Ground
9	DATA BIT 7	22	Ground
10	ACK#	23	Ground
11	BUSY	24	Ground
12	PEERROR	25	Ground
13	SLCT	26	Ground

## Serial Port 1 (COM1) J2; Serial Port 2 (COM2) J3

J2 provides the connection for serial port 1 (COM 1). J3 provides the connection for serial port 2 (COM2).

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

## Floppy Drive Connector J23

J23 connects the floppy drive to the controller provided on the motherboard.

Pin	Assignment	Pin	Assignment
1	Ground	2	DENSEL
3	Ground	4	TP
5	Key	6	FDENIN#
7	Ground	8	FDINDX#
9	Ground	10	FDM00#
11	Ground	12	FDSD1#
13	Ground	14	FDSD01#
15	Ground	16	FDM01#
17	MSEN1	18	FDDIR#
19	Ground	20	FDSTEP#
21	Ground	22	FDWD#
23	Ground	24	FDWE#
25	Ground	26	FDTRK0#
27	MSEN0	28	FDWPD#
29	Ground	30	FDRDATA#
31	Ground	32	FDRHEAD#
33	Ground	34	DSKCHG#

## Fan Connectors JP7, JP16

The processor fan provides extra cooling for the powerful new Pentium II processors.

Pin	Assignment
1	12 volt
2	Ground

## Chassis Fan Connector JP4

Pin	Assignment
1	12 volt
2	Ground

## ATX Power Supply Connector J9

The power connector attaches the motherboard to the main power supply.

Pin	Assignment	Pin	Assignment
1	3.3 Vdc	11	3.3 Vdc
2	3.3 Vdc	12	-12 Vdc
3	Ground	13	Ground
4	+5 Vdc	14	PS On
5	Ground	15	Ground
6	+5 Vdc	16	Ground
7	Ground	17	Ground
8	PWRGD	18	-5 Vdc
9	5 VSB	19	+5 Vdc
10	+12 Vdc	20	+5 Vdc

## On-board CMOS Battery Slot J8

The motherboard can be configured with an on-board battery cell. J8 provides the socket.

## External CMOS Battery Connector JP2

The motherboard can be configured with an external CMOS battery.

Pin	Assignment
1	Ground
2	Not used
3	Key
4	+6V

### **Infrared Connector JP7**

JP7 connects to an optional infrared add-in controller. Infrared controllers can act as ports for a number of peripheral devices including mouse, printer and keyboard.

Pin	Assignment
1	Transmitting
2	Receive 1
3	Receive 2
4	Ground

### **ON/OFF Switch Connector J25**

The chassis' power ON/OFF switch connects to the motherboard through J25. The ON/OFF switch can be configured, through the BIOS, to provide either instant ON/OFF or Delayed ON/OFF capabilities.

Delayed ON/OFF lets you use the ON/OFF switch to place the system in Suspend Mode. Simply press the switch quickly and release. To power down the system with, press and hold the switch for four seconds. Refer to the **Configuration Utilities** section, **Chipset Features** subsection.

## Wake On LAN Connector J50

J50 connects to an installed LAN card that provides “Wake On LAN” output. LAN activity causes the system to wake the low power Sleep Mode

Pin	Assignment
1	+5 volt standby
2	Ground
3	Not used

# Motherboard Jumpers

The motherboard's jumpers are pre-configured at the factory. Read the following section carefully, before configuring your system. The motherboard has the following jumpers:

<b>Jumper</b>	<b>Description</b>
JP18, JP20 JP21, JP22	Processor bus clock speed
JP10, JP9 JP11, JP12	Processor speed ratio
JP5	Super I/O Address Selector
JP5	SMI source chip select
JP14	Test jumper (default 2-3)
JP3, D20	Test jumper (default OUT)
JP1	Test jumper (default OUT)

## Processor Bus Clock Speed JP18, JP20, JP21, JP22

Pentium II processors are designed with one of two bus clock speeds. The bus clock speed is always a fraction of the processor's internal speed. The table on page 14 will help you determine the correct setting for your system.

<b>Processor Bus Clock</b>	<b>JP18</b>	<b>JP20</b>	<b>JP21</b>	<b>JP22</b>
66 MHz	1-2	1-2	1-2	1-2
60 MHz	1-2	1-2	2-3	1-2

## Processor Speed Ratio JP10, JP9, JP11, JP12

The Pentium II uses a clock multiplier to run faster than the processor bus. The jumpers match the installed processor's speed with the motherboard's processor speed.

Processor Speed Ratio	JP10	JP9	JP11	JP12
3x	IN	IN	OUT	IN
3.5x	IN	IN	OUT	OUT
4x	IN	OUT	IN	IN
4.5x	IN	OUT	IN	OUT
5x	IN	OUT	IN	OUT

The following table matches processor speed, processor clock and the motherboard's processor bus speed.

Processor Type/Speed	Clock Ratio	Processor Bus Speed
266 MHz	4x	66 MHz
300 MHz	4.5x	66 MHz
333 MHz	5x	66 MHz

## Super I/O Address Selector JP8

JP8 lets a technician select a different address within the BIOS for the on-board Super I/O in order to perform certain tests. The default setting is jumper installed.

## CMOS Battery Selector J4

J4 indicates which type of CMOS battery is used. The motherboard can be configured with an on-board cell-type battery, or an external lithium battery.



<b>Battery Type</b>	<b>JP4</b>
On-board cell	IN
External battery	OUT

### **Manual EXTSMI JP15**

The manual external system management interrupt (SMI) jumper allows a technician to force the system into sleep mode. This procedure is sometimes used in specific system testing.

<b>Manual EXTSMI</b>	<b>JP15</b>
Forced Sleep	IN
Normal (default)	OUT

### **SMI Source Chip Select JP5**

JP5 selects the chip within the motherboard's chipset to provide the SMI signal.

<b>Source Chip</b>	<b>JP5</b>
I/O APIC	1-2
PIIX4 (default)	2-3

# System Memory

The motherboard uses DIMM memory. DIMM is available in 64-pin or 72-pin, where the 72-pin DIMM provides error correcting code (ECC).

Up to 1 GB Extended Data Out (EDO) or up to 512 MB Synchronous DRAM (SDRAM) are supported.

Memory uses symmetrical and asymmetrical addressing. Single and double density DIMMS are supported

There are four banks available for memory upgrades. The board supports DIMM in the following combinations:

1M x 64/72 = 8 MB/bank	8M x 64/72 = 64 MB/bank
2M x 64/72 = 16 MB/bank	16M x 64/72 = 128 MB/bank
4M x 64/72 = 32 MB/bank	32M x 64/72 = 256 MB/bank

## Installing and Removing DIMM

Read these instructions completely before installing or removing DIMMs. The DIMM is held by plastic press-clips on both sides of the slot.

### Installing DIMM

- 1) Hold the DIMM so that the gold tab is pointing toward the slot. The DIMM is keyed so that it will only snap into the slot when positioned correctly.
- 2) Press one end of the DIMM until it inserts and its press-clip snaps into place.
- 3) Press the other end of the DIMM until it inserts and its press-clip snaps into place.

## **Removing DIMM**

- 1) Pull both press-clips simultaneously, until the DIMM pops up from its slot.

The following pages provide a table with all the possible memory configurations for the MB-P201.

## System Memory Configuration

RAM	Bank 0	Bank 1	Bank 2	Bank 3
8 MB	1M x 64/72			
16 MB	1M x 64/72	1M x 64/72		
16 MB	2M x 64/72			
24 MB	1M x 64/72	1M x 64/72	1M x 64/72	
24 MB	1M x 64/72	2M x 64/72		
32 MB	1M x 64/72	1M x 64/72	1M x 64/72	1M x 64/72
32 MB	2M x 64/72	2M x 64/72		
32 MB	4M x 64/72			
32 MB	2M x 64/72	1M x 64/72	1M x 64/72	
32 MB	2M x 64/72	2M x 64/72		
40 MB	1M x 64/72	2M x 64/72	2M x 64/72	
40 MB	1M x 64/72	4M x 64/72		
40 MB	2M x 64/72	1M x 64/72	1M x 64/72	1M x 64/72
48 MB	4M x 64/72	1M x 64/72	1M x 64/72	
48 MB	2M x 64/72	2M x 64/72	2M x 64/72	
48 MB	2M x 64/72	4M x 64/72		
48 MB	4M x 64/72	1M x 64/72	1M x 64/72	
48 MB	4M x 64/72	2M x 64/72		
56 MB	1M x 64/72	2M x 64/72	2M x 64/72	2M x 64/72
56 MB	4M x 64/72	1M x 64/72	1M x 64/72	1M x 64/72
64 MB	2M x 64/72	2M x 64/72	2M x 64/72	2M x 64/72
64 MB	8M x 64/72			
64 MB	4M x 64/72	4M x 64/72		
64 MB	4M x 64/72	2M x 64/72	2M x 64/72	
64 MB	4M x 64/72	4M x 64/72		
72 MB	8M x 64/72	1M x 64/72		
72 MB	1M x 64/72	4M x 64/72	4M x 64/72	
80 MB	2M x 64/72	8M x 64/72		
80 MB	2M x 64/72	4M x 64/72	4M x 64/72	
80 MB	4M x 64/72	2M x 64/72	2M x 64/72	2M x 64/72
80 MB	8M x 64/72	1M x 64/72	1M x 64/72	

RAM	Bank 0	Bank 1	Bank 2	Bank 3
88 MB	8M x 64/72	1M x 64/72	1M x 64/72	1M x 64/72
96 MB	4M x 64/72	4M x 64/72	4M x 64/72	
96 MB	4M x 64/72	8M x 64/72		
104 MB	1M x 64/72	4M x 64/72	4M x 64/72	4M x 64/72
112 MB	2M x 64/72	4M x 64/72	4M x 64/72	4M x 64/72
128 MB	4M x 64/72	4M x 64/72	4M x 64/72	4M x 64/72
128 MB	8M x 64/72	8M x 64/72		
128 MB	16M x 64/72			
136 MB	16M x 64/72	1M x 64/72		
136 MB	1M x 64/72	8M x 64/72	8M x 64/72	
144 MB	2M x 64/72	16M x 64/72		
144 MB	2M x 64/72	8M x 64/72	8M x 64/72	
144 MB	16M x 64/72	1M x 64/72	1M x 64/72	
152 MB	16M x 64/72	1M x 64/72	1M x 64/72	1M x 64/72
160 MB	16M x 64/72	2M x 64/72	2M x 64/72	
160 MB	16M x 64/72	4M x 64/72		
160 MB	4M x 64/72	8M x 64/72	8M x 64/72	
176 MB	16M x 64/72	2M x 64/72	2M x 64/72	2M x 64/72
192 MB	8M x 64/72	8M x 64/72	8M x 64/72	
192 MB	16M x 64/72	4M x 64/72	4M x 64/72	
192 MB	16M x 64/72	8M x 64/72		
200 MB	1M x 64/72	8M x 64/72	8M x 64/72	8M x 64/72
208 MB	2M x 64/72	8M x 64/72	8M x 64/72	8M x 64/72
224 MB	4M x 64/72	8M x 64/72	8M x 64/72	8M x 64/72
224 MB	16M x 64/7	24M x 64/7	24M x 64/72	4M x 64/72
256 MB	8M x 64/72	8M x 64/72	8M x 64/72	8M x 64/72
256 MB	16M x 64/72	16M x 64/72		
256 MB	32M x 64/72			
256 MB	16M x 64/72	8M x 64/72	8M x 64/72	
256 MB	16M x 64/72	16M x 64/72		
264 MB	32M x 64/72	1M x 64/72		
264 MB	1M x 64/72	16M x 64/72	16M x 64/72	

RAM	Bank 0	Bank 1	Bank 2	Bank 3
272 MB	32M x 64/72	1M x 64/72	1M x 64/72	
272 MB	32M x 64/72	2M x 64/72		
272 MB	2M x 64/72	16M x 64/72	16M x 64/72	
280 MB	32M x 64/72	1M x 64/72	1M x 64/72	1M x 64/72
288 MB	32M x 64/72	4M x 64/72		
288 MB	32M x 64/72	2M x 64/72	2M x 64/72	
288 MB	4M x 64/72	16M x 64/72	16M x 64/72	
304 MB	32M x 64/72	2M x 64/72	2M x 64/72	2M x 64/72
320 MB	32M x 64/72	4M x 64/72	4M x 64/72	
320 MB	16M x 64/72	8M x 64/72	8M x 64/72	8M x 64/72
320 MB	32M x 64/72	8M x 64/72		
352 MB	32M x 64/72	4M x 64/72	4M x 64/72	4M x 64/72
384 MB	16M x 64/72	16M x 64/72	16M x 64/72	
384 MB	16M x 64/72	32M x 64/72		
384 MB	32M x 64/72	8M x 64/72	8M x 64/72	
392 MB	1M x 64/72	16M x 64/72	16M x 64/72	16M x 64/72
400 MB	2M x 64/72	16M x 64/72	16M x 64/72	16M x 64/72
416 MB	4M x 64/72	16M x 64/72	16M x 64/72	16M x 64/72
448 MB	32M x 64/72	8M x 64/72	8M x 64/72	8M x 64/72
512 MB	16M x 64/72	16M x 64/72	16M x 64/72	16M x 64/72
512 MB	32M x 64/72	32M x 64/72		
512 MB	32M x 64/72	16M x 64/72	16M x 64/72	
520 MB	1M x 64/72	32M x 64/72	32M x 64/72	
528 MB	2M x 64/72	32M x 64/72	32M x 64/72	
544 MB	4M x 64/72	32M x 64/72	32M x 64/72	
640 MB	16M x 64/72	32M x 64/72	32M x 64/72	
640 MB	32M x 64/72	16M x 64/72	16M x 64/72	16M x 64/72
768 MB	32M x 64/72	32M x 64/72	32M x 64/72	
776 MB	1M x 64/72	32M x 64/72	32M x 64/72	32M x 64/72
784 MB	2M x 64/72	32M x 64/72	32M x 64/72	32M x 64/72
800 MB	4M x 64/72	32M x 64/72	32M x 64/72	32M x 64/72
896 MB	16M x 64/72	32M x 64/72	32M x 64/72	32M x 64/72
1 GB	32M x 64/72	32M x 64/72	32M x 64/72	32M x 64/72

# System Interrupts

The processor has two controllers, supplying 16 IRQs. Below are assignments in decreasing priority.

IRQ	Function
NMI	Parity error
IRQ0	Reserved, interval timer
IRQ1	Reserved, keyboard buffer full
IRQ2	Reserve, cascade interrupt from slave PIC
IRQ3	Onboard serial port 2
IRQ4	Onboard sreial port 1
IRQ5	User available
IRQ6	Onboard floppy controller
IRQ7	Onboard parallel port
IRQ8	Real-time clock (RTC)
IRQ9	User available
IRQ10	User available
IRQ11	User available
IRQ12	Onboard mouse port if enabled, else user available
IRQ13	Reserved, math coprocessor
IRQ14	Onboard primary IDE disk controller
IRQ15	Onboard secondary IDE disk controller

**Note:** IRQ9, IRQ10, IRQ11, IRQ12, IRQ15, IRQ3, IRQ4, IRQ5 and IRQ7 can be redirected to PCI add-in boards.

The PCI standard has a 4-IRQ limitation. Some PCI add-in boards do not require IRQs. Some can share an IRQ with another board of the same model and manufacture. Check the add-in board's documentation for IRQ information.

## Direct Memory Access

The system supports seven DMA channels:

Controller 1	Controller 2
Channel 0 - Spare	Channel 4 - Cascade for Controller 1
Channel 1 - SDLC	Channel 5 - Spare
Channel 2 - Diskette	Channel 6 - Spare
Channel 3 - Spare	Channel 7 - Spare

The first DMA controller holds channels 0 through 3. These channels support 8-bit data transfers between 8-bit I/O adapters and 8- or 16-bit system memory. Each channel can transfer data in 4 KB blocks.

The second DMA controller holds channels 4 through 7. Channel 4 cascades channels 0 through 3 to the microprocessor. Channel 5, 6 and 7 support 16-bit data transfers between 16-bit I/O adapters and 16-bit system memory. These DMA channels can transfer data throughout the 16 MB system-address space in 128 KB blocks.

Channel 5, 6 and 7 cannot transfer data on odd byte boundaries.



## The I/O Address Map

Address (hex)	Function
0EC	Index for VLSI chipsets 82C480 and 82C113
0ED	Data for VLSI chipset 82C480 and 82C113
061	AT-compatible configuration port
078	System configuration port
079	BIOS independent timer (BIT)
1F0-1F7	IDE (SMC37C651)
278-27F	Parallel port 2
2F8-2FF	Serial port 2
378-37F	Parallel port 1
3B0-3DF	Video controller
3F0-3F7	Floppy disk controller
3F8-3FF	Serial port 1

# Configuration Utilities

## Overview

BIOS Setup is a utility that defines and stores the configuration of the machine. When the system “boots”, the machine’s configuration loads into memory. Drives, video adapter, memory and keyboard are described to the system.

The program is built into the CMOS chip on the motherboard. To start the program, press the <Delete> key while the system is booting. The Utilities menu displays:

ROM PCI/ISA BIOS CMOS SETUP UTILITY AWARD SOFTWARE, INC.	
STANDARD CMOS SETUP BIOS FEATURES SETUP CHIPSET FEATURES POWER MANAGEMENT SETUP PnP PCI CONFIGURATION SETUP LOAD BIOS DEFAULTS LOAD SETUP DEFAULTS	INTEGRATED PERIPHERALS SUPERVISOR PASSWORD USER PASSWORD IDE HDD AUTO DETECTION SAVE & EXIT SETUP EXIT WITHOUT SAVING
Esc: Quit F10 : Save & Exit Setup	↑↓→ : Select Item (Shift)F2 : Change Color
Time, Date, Hard Disk Type...	

Figure 2: The Main Menu

If you discover after making and saving system changes that you have made a mistake, the BIOS lets you override the settings. Simply press <Insert> when you restart the computer.

The following table gives a brief description of the Main Menu options.

<b>Selection</b>	<b>Description</b>
Standard CMOS	SetupStandard options for the computer.
BIOS Features Setup	Enhanced BIOS options.
Chipset FeaturesSetup	Options for the motherboard's chipset.
Power Management Setup	Advanced Power Management (APM) options.
PnP/PCIconfiguration	Plug and Play standard and PCI Local Bus configuration options.
Integrated Peripherals	I/O subsystems that depend on integrated peripherals controller on the motherboard.
Supervisor/User Password	Change, set or disable a password. Only the supervisor password accesses Setup.
IDE HDD Auto Detection	Automatically detect and configure IDE hard disk parameters.
Load BIOS Defaults	BIOS defaults are factory settings for the most stable, minimal-performance.
Load Setup Defaults	Setup defaults are factory settings for optimal-performance operations.
Save & Exit Setup	Save settings in CMOS and exit the program.
Exit Without Save	Abandon all changes and exit the program.

## CMOS Setup Utility

This utility allows you to record your system setup.

ROM PCI/ISA BIOS CMOS SETUP UTILITY AWARD SOFTWARE, Inc.								
Date (mm/dd/yy)	: Friday, March 3, 1997							
Time (hh/mm/ss)	: 11:11:00							
	Type	Size	Cyls	Head	Precomp	LandZ	Sept	Mode
Pri Master	Auto							
Pri Slave	Auto							
Sec Master	Auto							
Sec Slave	Auto							
Floppy Drive A	: 1.44 MB 3 1/2							Base Memory: 640K
Floppy Drive B	: Not Installed							Extended Memory: 48182K
Video: EGA/VGA								Other Memory: 384K
Halt On : All Errors								Total Memory: 49152K
Esc: Quit			↑↓→ : Select Item		PgUp/PgDn : Modify			
F10 : Save & Exit Setup			<Shift> F2 : Change Color					

Figure 3: The Standard Setup Menu

The values represented in this table are used as an example, and may not match your BIOS settings.

### The Setup Procedure

To start Setup, highlight STANDARD CMOS SETUP on the Main Menu, and press <ENTER>. The current system configuration stored in CMOS is displayed. The screen image displayed in figure X is an example, and may differ slightly from your display.

The current cursor position is highlighted. The following list shows how to move the cursor around the screen and make selections:

<b>Key</b>	<b>Action</b>
Left and right arrows	Moves the cursor left to right and right to left.
Up and down arrows	Moves cursor up and down, and from field to field.
<Enter>	Selects the setting and moves cursor to next field.
<F10>	Saves the settings and exits Setup.
<Esc>	Exit to main screen from submenu.
<F1>	Help.

In order to use the <PgUp> and <PgDn> keys on the numeric key pad, you must turn the <NumLock> off.

Alter only the items that need to be changed or reset. If a highlighted option is correct, skip the corresponding step.

- 1) Start by entering the current date in the following format: mm/dd/yy. March 3, 1991 would be entered as 03/03/91. Press <Enter> to continue.
- 2) Enter the current time using the military style: hh:mm:ss. 4:11 p.m. is entered as 16:11:00. Press <Enter> to continue.

- 3) Use the <PgUp> and <PgDn> keys to toggle between the floppy drive types. The supported drive types are:
- |       |          |      |           |
|-------|----------|------|-----------|
| 5.25" | - 360 KB | 3.5" | - 720 KB  |
|       | - 1.2 MB |      | - 1.44 MB |
|       |          |      | - 2.88 MB |

After you find your floppy drive type, press the <Enter> key. Repeat this procedure for Floppy drive B:, or press <Enter> again to skip to the next step.

- 4) Use the <PgUp> and <PgDn> keys to toggle between the different hard drive types.

The lower right hand side of the Setup menu displays information about your system board:

<b>Base Memory Size</b>	The amount of base (conventional) memory, 0 to 640 KB.
<b>Extended Memory Size</b>	The amount of expansion memory extended beyond base memory.
<b>Other Memory</b>	Any other type of memory, usually the memory above base and below 1 MB.

When you have made all the necessary changes, verify that the settings are correct. Press the <Esc> key. The screen displays the following:

### **Write data into CMOS and exit (Y/N)? Y**

Type "Y" or "N", and press <Enter>. Entering "N" will send you back to the Setup menu, where you can make additional changes. Entering "Y" causes the system to accept the changes. The screen clears and the system reboots.

## BIOS Features Setup

The BIOS Features Setup allows you to fine tune some of the BIOS's special features. It is configured for your system at the factory.

ROM PCI/ISA BIOS BIOS FEATURES SETUP AWARD SOFTWARE, INC.	
Virus Warning: Disabled CPU Internal Cache: Enabled External Cache: Enabled Quick POST: Disabled Boot Sequence: A, C Swap Floppy Drive: Disabled Boot Up Floppy Seek : Enabled Boot Up NumLock Status : On Boot Up System Speed : High Gate A20 Option: Fast Typematic Rate Setting: Disabled Typematic Rate (Chars/Sec): 6 Typematic Delay: 250 Security Option: Setup	Video BIOS Shadow: Enabled C8000-CBFFF Shadow: Disabled CC000-CFFFF Shadow: Disabled D0000-D3FFF Shadow: Disabled D4000-D7FFF Shadow: Disabled D8000-DBFFF Shadow: Disabled DC000-DFFFF Shadow: Disabled
PCI/VGA Palette Snoop: Disabled OS Select-DRAM>64MB: Non-OS/2	Esc : Quit    ↑↓→ : Select Item F1 : Help    PU/PD/+/- : Modify F5 : Old Values (Shift)F2 : Color F6 : Load BIOS Defaults F7 : Load Setup Defaults

Figure 4: BIOS Features Setup

The values represented in this table are used as an example, and may not match your BIOS settings.

## Chipset Features Setup

This option allows you to alter some of the technical features associated with the chipset. These values are optimized and set at the factory. The settings need only be changed if you are reconfiguring the system.

ROM PCI/ISA BIOS CHIPSET FEATURES SETUP AWARD SOFTWARE, INC.	
Auto Configuration : Enabled DRAM Speed Selection : 60 ns MA Additional Wait State: Disabled EDO RAS# To CAS# Relay: 3 EDO RAS# Precharge Time: 3 EDO DRAM Read Burst: x222 EDO DRAM Write Burst: x222 DRAM Integrity Mode: Non-ECC CPU-To-PCI Posting: Enabled System BIOS Cacheable: Enabled Video BIOS Cacheable: Enabled 8 Bit I/O Recovery Time: 1 16 Bit I/O Recovery Time: 1 Memory Hole at 15M-16M: Disabled Passive Release: Enabled Delayed Transaction: Disabled AGP Aperture Size (MB): 64 SDRAM RAS To CAS Delay: Slow SDRAM RAS To CAS Time: Slow	SDRAM CAS Latency Time: 3 Current System Temp: 26°C/78°F Current CPUFAN1 Speed: 5487 RPM Current CPUFAN2 Speed: 5487 RPM IN0(V) 2.83V      IN1(V) 2.83V IN2(V) 2.83V      IN3(V) 5.41V IN4(V) 11.00V     IN5(V) -11.21 IN6(V) -4.64
	Esc : Quit                      ↑↓ : Select Item F1 : Help                        PU/PD/+/- : Modify F5 : Old Values                (Shift)F2 : Color F6 : Load BIOS Defaults F7 : Load Setup Defaults

Figure 5: BIOS Features Setup

The values represented in this table are used as an example, and may not match your BIOS settings.



## Power Management Setup

This program lets you set the values for the components of your “Green PC”. The default values are set at the factory.

ROM PCI/ISA BIOS POWER MANAGEMENT SETUP AWARD SOFTWARE, INC.	
Power Management : Max Savings PM Control by APM : Yes Video Off Method :DPMS Video Off After: Suspend Modem Use IRQ : 3 Doze Mode : 1 minute Standby Mode : 1 minute Suspend Mode : 1 minute HDD Power Down Mode: 1 minute Throttle Duty Cycle: 12.5% ZZ Active in Suspend: Disabled VGA Active Monitor: Enabled Soft-Off By PWR-BTTN: Delay 4 sec CPUFan Off In Suspend Mode: Enab. Resume by Ring: Enabled IRQ8 Break Suspend: Disabled	**Reload Global Timer Events** IRQ [3-7, 9-15], NMI: Enabled Primary IDE 0: Disabled Primary IDE 1: Disabled Secondary IDE 0: Disabled Secondary IDE 1: Disabled Floppy Disk: Disabled Serial Port: Enabled Parallel Port: Enabled  Esc : Quit    ↑↓→ : Select Item F1 : Help    PU/PD/+/- : Modify F5 : Old Values (Shift)F2 : Color F6 : Load BIOS Defaults F7 : Load Setup Defaults

Figure 6: Power Management Setup

The following pages provide descriptive overviews of each option in the Power Management Setup.

## **Power Management**

This option lets you select the type or degree of power saving for Doze, Standby and Suspend modes. See PM Timers for a brief description of both.

*Max Saving:* Maximum power savings (SL processors only).

*User Defined:* Set each mode individually. Select time-out periods in PM Timers section.

*Min Savings:* Minimum savings. Inactivity period is 1 hour. In each mode, except hard drive.

## **PM Control By APM**

If Advanced Power Management (APM) is installed, selecting Yes gives better power savings.

**Video Off Method** Determines the manner in which the monitor is blanked.

*V/H SYNC+Blank:* System turns off vertical and horizontal synchronization ports and writes blanks to the video buffer.

*DPMS Support:* Select this option if your monitor supports the Display Power Management Signaling (DPMS) standard. Use the software supplied with the video subsystem to select video power management values.

*Blank Screen:* System only writes blanks to the video buffer.

## **MODEM Use IRQs**

Names the interrupt request (IRQ) line assigned to the modem, if any, on your system. Activity on the selected IRQ always awakens the system.

## **PM Timers**

The following are Green PC power saving functions. They are user-configurable only during User Defined Power Management mode.

*Doze Mode:* After the selected period of inactivity, 1 minute to 1 hour, the processor clock runs at slower speed while all other devices continue to operate at full speed.

*Standby Mode:* After the selected period of inactivity, 1 minute to 1 hour, the fixed disk and video shut off while all other devices continue to operate at full speed.

*Suspend Mode:* After the selected period of system inactivity, 1 minute to 1 hour, all devices except the processor shut off.

*HDD Power Down:* After the selected period of drive inactivity, 1 to 15 minutes, the hard disk drive powers down while all other devices remain active.

## **Wake Up Events**

You can turn on or off monitoring of four commonly used interrupt requests so they do not awaken the system from, or reset activity timers for Doze and Standby modes.

For example, if you have a modem on IRQ3, you can turn on IRQ3 as a wake-up event, so that an interrupt from the modem can wake up the system.

Or you may want to turn off IRQ12, the PS/2 mouse, as a wake-up event, so accidentally brushing the mouse does not awaken the system. The default wake-up event is keyboard activity.

## Power Down and Resume Events

You can disable monitoring of common IRQs so they do not awaken the system from, or reset activity timers for Suspend mode.

IRQ3 - COM2	IRQ10 - Reserved
IRQ4 - COM1	IRQ11 - Reserved
IRQ5 - LPT2	IRQ12 - PS2/Mouse
IRQ6 - Floppy	IRQ13 - Coprocessor
IRQ7 - LPT1	IRQ14 - Hard disk
IRQ8 - RTC	IRQ15 - Reserved
IRQ9 - IRQ2 redir.	

Power Management Setup allows you to take advantage of Microsoft's DOS 6.2™ Advanced Power Management (APM) program.

The values represented in this table are used as an example, and may not match your BIOS settings. To take advantage of this feature,

- Make sure DOS 6.2 is installed on your system
- Select YES for PM Control by APM in the menu above
- Enable the DOS Power program
- Enable the Power program in Windows 3.1™, if installed

## **DOS 6.2™ Advanced Power Program**

To use the program, follow these simple steps.

- 1) Open your CONFIG.SYS file by using a text editor, such as MS-DOS Editor. To open your CONFIG.SYS file using MS-DOS Editor, type the following at the command prompt: `edit c:\config.sys`
- 2) At the end of the CONFIG.SYS file, add a device command specifying the location of the POWER.EXE file. This example specifies the POWER.EXE file is located in the C: drive DOS directory, and that the default setting should be used: `device=c:\dos\power.exe`
- 3) Save the changes to your CONFIG.SYS file, and quit the text editor.
- 4) Restart the computer. Press <CTRL> <ALT> <DEL>.

MS-DOS 6.2 User's Guide also provides instructions. For more information, type "help power", at the DOS prompt.

## **Windows 3.1™ Advanced Power Management**

Use the Windows Setup program to select the MS-DOS with APM option.

- 1) Start the Windows Setup program by changing to the Windows root directory and typing `Setup: cd windows setup`.
- 2) At the Windows Setup menu, edit the Computer field. Use the arrow key to highlight the field, and press <Enter>.

- 3) From the Computer screen, select MS-DOS with APM and press <Enter>. Use the arrow key to scroll through the selection menu.
- 4) Accept the change and exit the Setup program. Restart your computer by pressing <CTRL> <ALT> <DEL>.

### **Windows 95™ Advanced Power Management**

- 1) Enable the APM option in BIOS Setup before installing Windows 95.
- 2) The APM is automatically installed during Windows 95 setup.
- 3) An APM icon appears in the Control Panel window, indicating a successful installation.

## PnP/PCI Configuration Setup

These settings are pre-set at the factory and should be altered with care.

The values represented in this table are used as an example, and may not match your BIOS settings.

ROM PCI/ISA BIOS PnP/PCI CONFIGURATION SETUP AWARD SOFTWARE, INC.	
PnP OS Installed: Yes Resources Controlled By: Manual Reset Configuration Data: Disabled IRQ-3 Assigned to : Legacy ISA IRQ-4 Assigned to : Legacy ISA IRQ-5 Assigned to : PCI/ISA PnP IRQ-7 Assigned to : PCI/ISA PnP IRQ-9 Assigned to : PCI/ISA PnP IRQ-10 Assigned to : PCI/ISA PnP IRQ-12 Assigned to : PCI/ISA PnP IRQ-14 Assigned to : PCI/ISA PnP IRQ-15 Assigned to : PCI/ISA PnP DMA-0 Assigned to : PCI/ISA PnP DMA-1 Assigned to : PCI/ISA PnP DMA-3 Assigned to : PCI/ISA PnP DMA-5 Assigned to : PCI/ISA PnP DMA-6 Assigned to : PCI/ISA PnP DMA-7 Assigned to : PCI/ISA PnP	PCI IDE IRQ Map To : PCI-AUTO Primary IDE INT# : A Secondary IDE INT# : B  Esc : Quit    ↑↓→ : Select Item F1 : Help    PU/PD/+/- : Modify F5 : Old Values (Shift)F2 : Color F6 : Load BIOS Defaults F7 : Load Setup Defaults

Figure 7: Plug and Play/PCI Setup

## Integrated Peripherals Configuration Setup

This program lets you setup the components that are integrated onto the motherboard. These features include the E-IDE controller and drives, universal serial bus (USB) controller, floppy controller, serial ports and parallel port.

ROM PCI/ISA BIOS INTEGRATED PERIPHERALS SETUP AWARD SOFTWARE, INC.	
IDE HDD Block Mode	: Enabled
IDE Primary Master PIO	: Enabled
IDE Primary Slave PIO	: Enabled
IDE Secondary Master PIO	: Enabled
IDE Secondary Slave PIO	: Enabled
IDE Primary Master UDMA	: Auto
IDE Primary Slave UDMA	: Auto
IDE Secondary Master UDMA	: Auto
IDE Secondary Slave UDMA	: Auto
On-Chip Primary PCI IDE	: Enabled
On-Chip Secondary PCI IDE	: Enabled
USB Keyboard Support	: Enabled
KBC Input Clock	: 8 MHz
Onboard FDC Controller	: Enabled
Onboard Serial Port 1	: COM1/3F8
Onboard Serial Port 2	: COM2/2F8
UR2 Mode	: Standard
Onboard Parallel Port	: 378/IRQ7
Parallel Port Mode	: Compatible
Parallel Port Mode	: SPP
Esc : Quit    ↑↓→ : Select Item F1 : Help    PU/PD/+/- : Modify F5 : Old Values (Shift)F2 : Color F6 : Load BIOS Defaults F7 : Load Setup Defaults	

Figure 8: Integrated Peripherals Configuration Setup

The settings are preset at the factory and should be altered with care. The values represented in this table are used as an example, and may not match your BIOS settings.



