

Technical Reference

MB-6862 9-Slot Dual Pentium® Pro
Motherboard with Natoma Chipset

Features

- Intel Pentium® Pro processor, upgradeable through 180 MHz and 200 MHz; and dual Pentium Pro processor
- Intel Natoma chipset
- System memory upgradeable to 1 GB 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
- 3 ISA slots, 4 PCI slots and 1 shared PCI/ISA slots
- Standard keyboard connector
- On-board E-IDE controller separate master/slave IDE mode support for up to 4 IDE drives and up to 2 floppy drives
- On-board I/O supporting 2 serial ports and 1 parallel port
- On board Universal Serial Bus (USB) controller with 2 USB ports
- On-board PS/2 mouse/keyboard port
- On-board auxiliary serial and 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.

NOTICE

The information within this manual is subject to change without notice.

CSS Laboratories, Incorporated shall not be held liable for technical or editorial errors or omissions contained in herein; nor for incidental or consequential damages resulting from the furnishing, performance or use of this material.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, mechanical, photocopying, recording or otherwise, without the prior written permission of CSS Laboratories, Inc.

Product names mentioned herein are for identification purposes only, and may be trademarks and/or registered trademarks of their respective companies.

© 1997 CSS Laboratories, Inc. All rights reserved.
P/N MB-P6-6862-9-DOC Revision 1 August, 1997

Table of Contents

Overview	1
The Microprocessor	2
The Motherboard	3
Cache Memory	3
Expansion Slots	3
3.3 Volt/5 Volt Power Regulators	3
Motherboard Connectors	4
Speaker J35	5
Turbo LED/Reset JP21	5
IDE Hard Drive LED J34; Extra IDE LED JP22	5
Front Panel Connector JP20	6
Voltage Regulator Module (VRM) J28, J31	6
Keyboard Connector CN1	6
PS/2 Mouse/Keyboard Connector J26	7
Power LED/Keylock LED Connector JP23	7
Primary IDE J23	7
Secondary IDE J24	7
Parallel Port J21; Auxiliary Parallel Port J30	8
Serial Port 1 J2; Auxiliary Serial Port 1 J29	8
Serial Port 2 J3; Auxiliary Serial Port 2 J27	8
Floppy Drive Connector J22	8
5 Volt Power Supply Connector J7; Auxiliary 5 Volt Power Connector J33	8
3.3 Volt Power Supply Connector J6	9
Universal Serial Bus Connectors J2, J3	9
Fan Connectors JP4, JP18	9
Infrared Connector JP7	10

Motherboard Jumpers	11
Processor Bus Clock Speed JP5, JP6	11
Processor Bus Frequency JP1, JP2	12
Processor Speed Ratio JP8, JP9, JP10, JP11	12
Flash BIOS Enable JP16, JP17	13
ISA Bus Speed JP3	13
Manual EXTSMI JP13	14
System Memory	15
Installing and Removing DIMM	15
System Memory Configuration	16
System Memory Map	19
Timers	19
System Interrupts	20
Direct Memory Access	21
The I/O Address Map	22
Configuration Utilities	23
Overview	23
CMOS Setup Utility	25
The Setup Procedure	25
BIOS Features Setup	28
Chipset Features Setup	29
Power Management Setup	30
DOS 6.2™ Advanced Power Program	34
Windows 3.1™ Advanced Power Management	34
Windows 95™ Advanced Power Management	35
PnP/PCI Configuration Setup	36
Integrated Peripherals Configuration Setup	37

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

- **The Microprocessor** - description of the features of the Pentium Pro microprocessor
- **Motherboard** - illustration and brief description of the motherboard and the dual purpose expansion slot
- **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

compatible with 8086/88, 80286, and 80386 DX and SX microprocessors. In addition, the Pentium Pro features:

- 64-bit Data Bus
- Superscalar Architecture
- Capability for executing two instructions in parallel.
- Pipelined Floating-Point Unit
- Separate 8 KB Code and 8 KB Data Caches (total 16 KB L1 cache)
- 256 KB or 512 KB internal L2 cache
- Bus Cycle Pipelining
- Writeback MESI Protocol in the Data Cache Internal Parity Checking
- IEEE 1149.1 Boundary Scan

It is available in a variety of speeds, from 180 MHz through 200 MHz.

For additional information, contact your authorized CSS Laboratories representative.

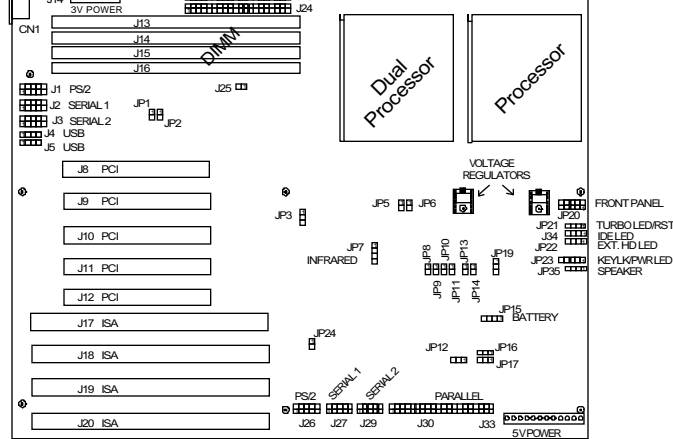


Figure 1: The Motherboard

Cache Memory

The processor comes with 16 KB of L1 cache, and is available with 256 or 512 KB of internal L2 cache.

Expansion Slots

There are a total of seven expansion slots on the motherboard. Two slots provide 16-bit wide ISA busses.

Five of the slots are PCI bus connectors. One PCI and one ISA are shared. Only one of these can be used at once.

3.3 Volt/5 Volt Power Regulators

Description	Connector
J35	Speaker connector
JP21	Turbo LED/Reset
J34	IDE hard drive LED
JP22	Extra IDE hard drive LED
JP20	CSS Front panel connector
J28, J31	Voltage regulator modules
CN1	Keyboard connector
J1, J26	PS/2 mouse/auxiliary keyboard connector and auxiliary connector
JP23	Power LED/keylock
J23	Primary IDE connector
J24	Secondary IDE connector
J21, J30	Parallel port, auxiliary parallel port
J2, J29	Serial port 1, auxiliary serial port 1
J3, J27	Serial port 2, auxiliary serial port 2
J22	Floppy drive connector
J7, J33	5 volt power supply connector, auxiliary 5 volt connector
J6	3.3 volt power supply connector
J4, J5	Universal serial bus connectors
JP15	Battery connector
JP4, JP18	Fan connector
JP7	InfraRed device connector

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

Turbo LED/Reset JP21

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	TB LED signal
2	Not used	4	TB LED power

IDE Hard Drive LED J34; Extra IDE LED JP22

J34 or JP22 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

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
5	IDE LED	10	Reset

Voltage Regulator Module (VRM) J28, J31

The VRM connector, J28, connects a voltage regulation module that adjusts the 5 volt supply. J31 connects a voltage regulation module that adjusts the 3.3 volt supply.

Keyboard Connector CN1

Keyboard plugs are keyed for proper installation.

Pin	Assignment	Pin	Assignment
1	Clock	4	Ground
2	Data	5	+5 Vdc
3	Not used		

Pin	Assignment	Pin	Assignment
1	Mouse clock	6	VCC
2	Not used	7	Not used
3	Keyboard clock	8	Mouse data
4	Not used	9	Not used
5	Not used	10	Ground

Power LED/Keylock LED Connector JP23

JP23 is a 5-pin connector used to attach the motherboard to the front panel's keylock LED and power indicator LED.

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

Primary IDE J23

J23 connects the primary on-board PCI E-IDE hard drive. Pin 1 is marked. When connecting your E-IDE, orient pin 1 of the cable ribbon with pin 1 of J23.

Secondary IDE J24

Serial Port 1 J2; Auxiliary Serial Port 1 J29

J2 or J29 provides the connection for the motherboard's serial port 1 (COM 1).

Serial Port 2 J3; Auxiliary Serial Port 2 J27

J3 or J27 provides the connection for the motherboard's serial port 2 (COM 2).

Floppy Drive Connector J22

J22 connects the floppy drive to the controller provided on the motherboard.

5 Volt Power Supply Connector J7; Auxiliary 5 Volt Power Connector J33

Pin	Assignment	Pin	Assignment
1	Power good	7	Ground
2	+5 Vdc	8	Ground
3	+12 Vdc	9	-5 Vdc
4	-12 Vdc	10	Not used
5	Ground	11	+5 Vdc
6	Ground	12	+5 Vdc

3.3 Volt Power Supply Connector J6

Pin	Assignment	Pin	Assignment
1	Ground	4	+3.3 Vdc
2	Ground	5	+3.3 Vdc
3	Ground	6	+3.3 Vdc

Universal Serial Bus Connectors J2, J3

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

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

Fan Connectors JP4, JP18

The processor fan provides extra cooling for the powerful

Pin	Assignment
1	12 volt
2	Ground

peripheral devices including mouse, printer and keyboard.

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

Read the following section carefully, before configuring your system.

The motherboard has the following jumpers:

Jumper	Description
JP5, JP6	Processor bus clock speed
JP1, JP2	Processor bus frequency
JP8, JP9 JP10, JP11	Processor speed ratio
JP16, JP17	Flash BIOS enable
JP3	ISA bus speed
JP13	Manual EXTSMI
JP14	DBX controlled EXTSMI

Processor Bus Clock Speed JP5, JP6

Pentium Pro 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 13 will help you determine the correct setting for your system.

Bus Clock Speed	JP5	JP6
60 MHz	IN	OUT
66 MHz	OUT	IN

the processor's speed. The table on page 13 will help you determine the correct setting for your system.

Bus Frequency	JP1	JP2
60 MHz	IN	OUT
66 MHz	OUT	IN

Processor Speed Ratio JP8, JP9, JP10, JP11

The Pentium Pro uses a clock multiplier to run at a speed faster than the processor bus.

These jumpers match the installed processor's speed with the motherboard's defined processor speed. When upgrading, you may need to adjust them. The table on page 13 will help you determine the correct setting for your system.

Processor Speed Ratio	JP8	JP9	JP10	JP11
2x	IN	IN	IN	IN
2.5x	IN	IN	IN	OUT
3x	IN	IN	OUT	IN
3.5x	IN	IN	OUT	OUT
4x	IN	OUT	IN	IN

Type/Speed		Bus Speed
180 MHz	3x	60 MHz
200 MHz	3x	66 MHz

Flash BIOS Enable JP16, JP17

These jumpers let you use flash BIOS, loading the latest version of BIOS. Be careful to return the settings to their default values after you have loaded the flash BIOS.

Flash BIOS Enable	JP16	JP17
Non-Flash	2-3	1-2
Flash (default)	1-2	2-3

ISA Bus Speed JP3

The ISA bus uses the processor's oscillator to set its speed. This jumper is set at the factory to the correct value.

ISA Bus Speed	JP20
Divide by 3	1-2
Divide by 4 (default)	2-3

mode. This procedure is sometimes used in specific system testing.

Manual EXTSMI	JP13
Forced Sleep	IN
Normal (default)	OUT

DBX Controlled EXTSMI JP14

The DBX controlled external system management interrupt (SMI) jumper allows a technician to bypass the BIOS' SMI control and to use the motherboard's chipset to control the SMI. This procedure is sometimes used in specific system testing.

DBX EXTSMI	JP14
DBX controlled	IN
BIOS controlled	OUT
(default)	

correcting code (ECC).

There are a total of 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

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		

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	4M x 64/72
112 MB	2M x 64/72	4M 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	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	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	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	8M x 64/72
208 MB	2M x 64/72	8M 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	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	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		

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

000000 to 9FFFFFF	640 KB motherboard	system memory
0A0000 to 0BFFFF	128 KB video display ROM	reserved for graphics
0C0000 to 0DFFFF	128 KB I/O expansion ROM	reserved for ROM on I/O
0E0000 to 0EFFFF	64 KB reserved on motherboard	duplicate code assignment at FE0000
0F0000 to 0FFFFFF	64 KB ROM on motherbord	duplicate code assignment at FF0000
100000 to FDFFFF	maximum memory is 15 MB	I/O channel memory
FE0000 to FEFFFF	64 KB reserved on motherboard	duplicate code assignment at 0E0000
FF0000 to FFFFFF	64 KB reserved on motherboard	duplicate code assignment at 0F0000

Timers

The system's three programmable timers/counters controlled by timer/counter chips are defined as channels 0 through 2 as indicated below:

Channel 0: System Timer

LEVEL		FUNCTION
Microprocessor NMI		Parity or I/O Channel Check
Interrupt Controllers		
Ctrl 1	Ctrl 2	
IRQ0		
IRQ1		
IRQ2		
Interrupts IRQ8 - IRQ15 redirected to IRQ2		
	IRQ8	Real-Time clock interrupt
	IRQ9	Software re-directed to INT + AH (IRQ2)
	IRQ10	Reserved
	IRQ11	Reserved
	IRQ12	Reserved
	IRQ13	Coprocessor
	IRQ14	Fixed disk controller
	IRQ15	Reserved
IRQ3		Serial port 2
IRQ4		Serial port 1
IRQ5		Parallel port2
IRQ6		Diskette controller
IRQ7		Parallel port 1

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.

000-01F	DMA #1
020-03F	INTR #1
040-05F	Timer
060-06F	Keyboard
070-07F	NMI mask register
080-09F	DMA page register
0A0-0BF	INTR #2
0C0-0DF	DMA #2
0F0-0F1	Clr/rst math coprocessor
0F8-0FF	Math coprocessor
1F0-1F8	Fixed disk
200-207	Joystick
278-27F	Secondary parallel port
2F8-2FF	Secondary serial port
300-31F	Prototype card
378-37F	Primary parallel port
380-38F	SDLC (secondary bisynchronous)
3A0-3AF	Primary bisynchronous
3B0-3BF	Monochrome display/printer adapter
3D0-3DF	Color/graphics monitor adapter
3F0-3F7	Diskette controller
3F8-3FF	Primary serial port

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 HDD LOW LEVEL FORMAT 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

Selection	Description
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.
HDD Low Level Format	CSS strongly recommends you do not low-level format your hard drive. This may overwrite the bad-track table.
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.

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	Sect Mode
Pri Master	Auto						
Pri Slave	Auto						
Sec Master		Auto					
Sec Slave		Auto					
Floppy Drive A		: 1.44 MB 3 1/2					
Floppy Drive B		: Not Installed					
Video:		EGA/VGA					
Halt On :		All Errors					
				Base Memory:		640K	
				Extended Memory:		48182K	
				Other Memory:		384K	
				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

Key	Action
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.

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:

Base Memory Size	The amount of base (conventional) memory, 0 to 640 KB.
Extended Memory Size	The amount of expansion memory extended beyond base memory.
Other Memory	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

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 Memory Parity Check: Disabled 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.

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 : 70 ns DRAM RAS# Precharge Time : 4 DRAM R/W Leadoff Timing : 7/6 Fast RAS# to CAS# Delay : 3 DRAM Read Burst EDO/EPP: x333/x444 DRAM Write Burst Timing : x333 Turbo Read Leadoff : Disabled DRAM Speculative Leadoff : Disabled ISA Bus Clock : PCICLK4 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 Peer Concurrency: Enabled Chipset Special Features : Enabled DRAM ECC/Parity Select : ECC	Memory Parity/ECC Check : Auto Single Bit Error Report : Enable L2 Cache Cacheable Size : 64MB Chipset NA# Asserted : Enabled Pipeline Cache Timing : Faster 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.

ROM PCI/ISA BIOS POWER MANAGEMENT SETUP AWARD SOFTWARE, INC.	
Power Management : Max Savings	IRQ3 (COM2) : OFF
PM Control by APM : Yes	IRQ4 (COM1) : ON
Video Off Method :V/H Sync&Blank	IRQ5 (LPT2) : OFF
Modem Use IRQ : 3	IRQ6 (Floppy Disk) : ON
	IRQ7 (LPT1) : OFF
Doze Mode : 1 minute	IRQ8 (RTC Alarm) : ON
Standby Mode : 1 minute	IRQ9 (IRQ8 Redir) : OFF
Suspend Mode : 1 minute	IRQ10 (Reserved) : OFF
HDD Power Down Mode: 1 minute	IRQ11 (Reserved) : OFF
	IRQ12 (PS/2 Mouse) : OFF
Wake Up Events In Doze&Standby	IRQ13 (Coprocessor) : OFF
IRQ3 Wakeup Event: OFF	IRQ14 (Hard Disk) : ON
IRQ4 Wakeup Event: ON	IRQ15 (Reserved) : OFF
IRQ8 Wakeup Event: OFF	
IRQ12 Wakeup Event: OFF	
	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.

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 Controlby 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

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

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

- 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> .

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.

- 4) Accept the change and exit the Setup program. Restart your computer by pressing <CTRL> <ALT> .

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.

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.	
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 IRQ Activated By : Level 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

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	
PCI Slot IDE 2 nd Channel : Enabled	
On-Chip Primary PCI IDE : Enabled	
On-Chip Secondary PCI IDE : Enabled	
IDE Primary Master PIO : Enabled	
IDE Primary Slave PIO : Enabled	
IDE Secondary Master PIO : Enabled	
IDE Secondary Slave PIO : Enabled	
USB Controller : Enabled	
Onboard FDC Controller : Enabled	
Onboard Serial Port 1 : COM1/3F8	
Onboard Serial Port 2 : COM2/2F8	
Onboard Parallel Port : 378/IRQ7	
Parallel Port Mode : Compatible	
ECP Mode Use DMA : 0	Esc : Quit ↑↓→ : Select Item
EPP Version : 1.7	F1 : Help PU/PD/+/- : Modify
InfraRed Duplex Type : Disabled	F5 : Old Values (Shift)F2 : Color
	F6 : Load BIOS Defaults
	F7 : Load Setup Defaults

Figure 8: Integrated Peripherals Configuration Setup