HAWK
486

The material in this manual is for information only and is subject to change without notice.

REVISION: 1.0

RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference with radio and television reception.

If this equipment does cause interference to radio or TV 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 the receiving antenna.*
* *Relocate the computer away from the receiver.*
* *Move the computer away from the receiver.*
* *Plug the power cord of computer into a different outlet so that computer and receiver are on different branch circuits.*
* *Ensure that card slot covers are in place when no card is installed.*
* *Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.*
* *If peripherals are used with this system, it is suggested to use shielded, grounded cables, with in-line filters if necessary.*

If necessary, the user should consult the dealer service representative for additional suggestions.

The manufacturer is not responsible for any radio or TV interferences caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interferences.

Note

1. Electronic components are sensitive to dust and dirt. Do inspect and clean the computer system regularly.

2. Turn off the power whenever you install or remove any connector, memory module and add-on card. Before turning on the power, make sure that all the connectors, memory modules and add-on cards are secured.

3. After power is on, please wait for a minute. The system BIOS are going through a self-test during this period and nothing is shown on the screen. After the self-test, the system BIOS will initialize the display adaptor and show messages.

4. The SIMM sockets are fragile device. Do not force the SIMM modules into the sockets. It may break the locking latches.

Preface

The manual provides information about the installation and maintenance of OCTEK HAWK-486 motherboard. In-depth explanations of the functions of this motherboard are provided. In the appendix, the system BIOS setup is explained.

The content in this manual is only for reference and is intended to provide basic information for the general users. There are also some technical information for hardware and software engineers.

In this manual, there are 4 chapters. Chapter 1 contains a brief introduction and specification of OCTEK HAWK-486 motherboard. In the Chapter 2, the functions of OCTEK HAWK-486 are explained. It also outlines many advanced features of the CPU and the system architecture. Chapter 3 explains the installation of DRAM modules and jumpers. Some technical information are provided in the Chapter 4.

System BIOS and the system setup are described in the Appendix A. All the setup procedures are explained.

Additional information are given in Appendix B, C and D for the maintenance purpose.

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Chapter 1
Introduction

OCTEK HAWK-486 consists of 32-bit 80486 microprocessor, a large cache memory and highly integrated chipsets to provide high performance, reliability and compatibility. OCTEK HAWK-486 is a perfect choice for CAD/CAM workstation and file server and supports sophisticated 32-bit computing applications and multi-user operating systems.

The total memory is 32MB memory is installed on board and flexible memory configuration for 256K 1M and 4M.

Compatibility and reliability are important issues. I/O channel is compatible to standard AT bus. Therefore any AT compatible peripherals may be used on OCTEK HAWK-486. On board POWERGOOD generator is essential to ensure the reliability of the system and is well-designed to work with all power supplies.

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Chapter 2
General Features

SPECIFICATION

Processor :

Intel 80486DX, 80486SX and 80487SX CPU

Speed :

Turbo/normal speed
Software/hardware selectable

I/O Slot :

Compatible to standard AT bus
Two 8-bit and six 16-bit slots
Programmable wait state for AT cycle
Programmable AT Bus speed

Memory :

Shadow RAM for System BIOS and Video BIOS
Fast page mode DRAM controller with burst mode support
SIMM sockets for 256K , 1M or 4M modules
32M bytes on board
CAS# before RAS# refresh to reduce power consumption
Combination of DRAM type support

System Support Functions :

8-Channel DMA (Direct Memory Access)
16-level interrupt
3 programmable timers
CMOS RAM for system configuration
Real time clock with battery backup

Other Features :

On board POWERGOOD generation
On board battery backup CMOS data
External battery connector
Hardware / Software turbo switch

PROCESSOR

The power of HAWK comes from 80486. 80486 is the state-of-art microprocessor which merges many innovative features on a single chip for advanced applications and operation systems. Fabricating with the 1um process, this CPU consists of more than one million transistors. With such high density, this CPU incorporates as many as new features to make itself the most powerful microprocessor.

80486 is a 32-bit microprocessor with 32-bit external data bus and 32-bit external address bus. It not only contain a central processing unit, but also integrates a numeric processor and a four-way set associate cache memory. It is fully binary compatible with 80386 and 80387. All existing software for PC XT/AT can be used on OCTEK HAWK-486. However, due to the new internal architecture, the performance of 80486 is two to four times of 80386.

Cache memory can improve the overall performance of a computer system. Nevertheless, if the cache memory is separated from CPU, CPU still needs to fetch code and data through external bus. That means the data transfer rate should not be too fast so that the external devices are able to keep pace with the CPU. In 80486, the cache controller and cache memory are integrated into the chip. Most of the operations can be carried out inside the CPU, which reduces the bus operations on external data and address bus and thus speeds up the internal execution.

The cache memory is a 8K bytes, 16 bytes line size, four-way set associative configuration. The hit rate of this configuration is much better than 32K bytes two-way set associative external cache because a four-way set associative architecture provides better performance in a multitasking and multi-processor environment.

Bus snooping feature keeps the cache memory consistent with the main memory. When an external processor overwrites the content in the main memory, the corresponding data in the internal cache memory will be invalidated and will be fetched from main memory when CPU reads this data.

If a read miss occurs, the CPU will initiate a burst mode read operation. In burst mode read operation, CPU performs four successive read operations each of which takes only one cycle. Total 128 bits data are fetched into the CPU's internal cache. Since burst mode read operation is very fast, the traffic of the CPU bus is greatly reduced and the bus is available to other bus masters, such as DMA controller.

Reading 128 bits data into CPU will take some times. In order to reduce the delay, the internal cache controller works parallel with CPU. It fetches the data needed by CPU for the present operation and the CPU read cycle is terminated. Then the other data are read into the internal cache memory while CPU is doing something else. This arrangement permits the CPU to run at zero wait state.

By eliminating the access to external bus, operations with the internal cache can be completed in a single cycle. 80386 at least needs two cycles for an operation. To further increase the rate of data transfer inside the CPU, the internal bus of the cache memory is increased to 128 bits, which is four times of the external bus. Since, in most of the time, the CPU is using the internal cache, the large bus size substantially improves the overall performance.

When the CPU writes data to the main memory, the data is first stored in a write buffer. There are four write buffers. When the external bus is idle, data will be sent to the main memory. If all buffers are filled, it can start write operation in burst mode. Since the internal cache is updated immediately, the CPU need not suspend its operation and there is no need to wait for the external device to update the main memory.

Many often-used instructions are executed in a clock cycle and some instructions are modified to take fewer cycles than in 80386. On the contrary, 80386 may take two to three more cycles for the same instruction. The CPU contains an advanced instruction pipeline structure and a 32-byte code queue to speed up the execution.

80486 includes all the functions of 80386 and is able to support sophisticated software and operation systems which are widely employed now. It is able to operate in real mode, protected mode and virtual 8086 mode.

Internal memory management unit provides a flexible addressing scheme for the next generation operation system. Multitasking, concurrent operation and manipulating huge data base can be accomplished with excellent performance. Paging mechanism is employed to allow powerful operating system to implement virtual memory. Each segment is divided into several pages which are 4K bytes per page. Page mechanism is transparent to software and allows software to address 64 terabytes. Furthermore, the 64KB segment boundary which is an barrier of 8088 and 80286 is removed and the segment length can be increased up to 4GB.

The demand for sophisticated, number-crunching scientific and business applications has rapidly increased in recent years. In the past, microprocessor features an integer Arithmetic Logic Unit which only handles simple integer operations such as addition and multiplication. Floating-point operations which are actually utilized by applications must be accomplished through software routines.

To meet the demand of floating-point calculation, a numeric coprocessor is necessary. However, an external coprocessor has been found to be the bottleneck of data transfer. 80486 integrates the coprocessor on chip and thus the data transfer to external bus is eliminated. The on-chip coprocessor is compatible with 80387. It works parallel with other units in the CPU, which results in a better performance of numeric process.

MEMORY SYSTEM

Two banks of DRAMs can be installed on motherboard and 256K, 1MB and 4MB DRAM SIMM modules are support. One bank of DRAM refers to four pieces of SIMM modules. The maximum memory size is 32MB when using 4MB DRAM for all banks. The DRAM should be fast-page mode DRAM with CAS# before RAS# refresh capability.

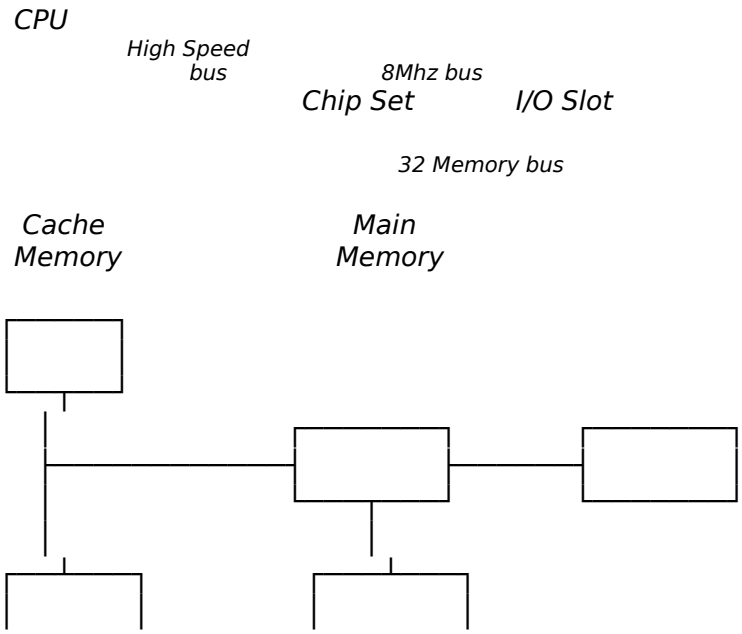
The memory system supports Burst mode. Successive memory accesses in 3, 2, 2, 2 DRAM burst cycles. It does not require wait state and thus CPU can run at full speed.

To enhance the system performance, shadow RAM mode is supported. In shadow RAM mode, system BIOS and video BIOS contained in low speed memory such as EPROM and ROM are copied into DRAM. Improvement is significant because access to DRAM is much faster than ROM.

DUAL BUS DESIGN

It is very important that a high speed system should be compatible with existing peripherals without lowering the performance. To be compatible, the I/O slot should run at 8MHz or slower. On the other hand, the rest of the system are running at full speed.

A dual bus design is employed. A high speed bus links the CPU, coprocessor, cache memory and main memory. This bus is synchronous with the clock of the CPU and the data transfer is 32 bits. Whenever there is a request for transferring to or from I/O slot, the chipset is responsible for handling the conversion between the buses. The clock rate of the high speed bus will not be reduced, which eliminates many compatibility problem.



SYSTEM FUNCTIONS

System functions include :

- *Interrupt*
- *DMA*
- *Timer*
- *Real time clock*
- *Clock and ready generation*
- *I/O channel control*

All system functions are 100% compatible to AT standard. I/O channel of OCTEK HAWK-486 is designed to be compatible with standard AT bus. All the expansion cards conformed to the standard AT bus can be used in OCTEK HAWK-486 without problem.

Chapter 3
Installing Components

Important Note : Turn off the power before installing or replacing any component.

INSTALLING RAM MODULES

OCTEK HAWK-486 has eight sockets for SIMM modules. Whenever adding memory modules to the motherboard, install four modules at the same time. Also make sure that the chips on the modules face toward the memory expansion slot as shown in the next page.

To install a module, the module edge is angled into the socket's contact and then the module is pivoted into position, where the locking latches will secure it. If the module edge is not completely inserted into the socket, it cannot be pivoted to be in vertical position and should be dragged out and inserted again. Do not force the module into the SIMM socket. It will damage the locking latches.

The modules should be locked by the locking latches of the sockets firmly. Please check carefully before turning on the power. Otherwise, the system will not work properly.

If the BIOS reports an memory error or parity error, drag out the modules and insert them again. If the locking latches are damaged, contact your dealer to replace the socket.

INSTALLING EXTERNAL BATTERY

To back up the information stored in CMOS RAM, an external battery is needed to provide power after the system is turned off. The connector (P8) for the battery is located beside the keyboard connector on the rear of the board. A 3.6V battery is used. Turn off the power before install the battery. The location of the connector P8 is shown below.

CONFIGURATION OF MEMORY

The configuration of the memory is very flexible. It can install 256KB , 1MB or 4MB SIMM modules are acceptable. There are several combinations of DRAM types you may consider. So, a basic system can be equipped with fewer memory and the system can be upgraded by installing the extended memory. The different configurations of memory is illustrated at the next page.

There are totally two banks of DRAM. The memory size is detected automatically by system BIOS. This detection is performed during memory test and the size is indicated after reset. No jumper is needed to be set for the memory size and DRAM type.

To determine what DRAM speed rating to be used is depended on the system speed and wait state. The highest performance is accomplished by using zero wait state, but high speed DRAM has to be used.

The wait state setting is applied to two banks of memory. Therefore make sure to install DRAM modules with the same speed rating, or accommodate the wait state setting to the new DRAM type.

The number of wait state is assigned in the BIOS setup. Improper setting may cause the system malfunction. In this case, reset the CMOS setup using JP3. Then reset the system and go through the system setup again.

DRAM CONFIGURATION

	Bank 0 SIMM (1-4)	*Bank 1 SIMM (5-8)*	*Total Memory*
1	*256K*	*X*	*1M*
2	*256K*	*256K*	*2M*
3	*1M*	*X*	*4M*
4	*256K*	*1M*	*5M*
5	*1M*	*1M*	*8M*
6	*4M*	*X*	*16M*
7	*4M*	*4M*	*32M*

CONTROL OF SYSTEM SPEED

System speed can be controlled by hardware switch and keyboard. Connector P4 is connected to the turbo switch of the case. When the system speed is fast, the turbo LED of the case should be turned on.

To change the speed by keyboard, use '-' and '+' of the numeric keypad. Press 'Ctrl', 'Alt' and '-' for slow speed and Press 'Ctrl', 'Alt' and '+' for fast speed.

Whenever the system speed is set to slow by turbo switch, it cannot be changed by keyboard, and vice versa.

RESET CMOS SETUP INFORMATION

Sometimes, the improper setting of system setup may make the system malfunction. In this case, turn off the power and disconnect the external battery. Then place a jumper on JP3 (2-3) for a while. The internal CMOS status register will be cleared. Then remove the jumper and turn on the power. The BIOS finds the CMOS status register is reset and regards the setup information as invalid. So it will prompt you to correct the information. In normal operation, JP3 place in (1-2).

SYSTEM BOARD JUMPER SETTING

There are several options which allow user to select by hardware switches.

Security Selection

JP2	
1-2	Enable
OPEN	Disable *

CPU Type

	486DX	486SX	487SX
JP4	* 1-2	OPEN	2-3
JP5	* 1-2	OPEN	1-2
JP6	* 1-2	2-3	1-2

*Note : * factory setting*

SYSTEM BOARD CONNECTORS

Under typical conditions, these connectors should be connected to the indicators and switches of the system unit.

Connector	*Function*
P2	*Hardware reset connector*
P5	*Speaker connector*
P4	*Turbo switch connector*
P3	*Turbo LED connector*
P1	*Power LED & Ext-Lock connector*
P6, P7	*Power supply connector*
P8	*External battery connector*
KB1	*Keyboard connector*

Pin assignments of the connectors are illustrated as follows:

P 2 - Hardware Reset Connector

Pin	*Assignment*
1	*Selection Pin*
2	*Ground*

P 5 - Speaker Connector

Pin	*Assignment*
1	*Data out*
2	*+5 Vdc*
3	*Ground*
4	*+5 Vdc*

P 4 - Turbo Switch Connector

Pin	*Assignment*
1	*Selection Pin*
2	*Ground*

P 3 - Turbo LED Connector

Pin	*Assignment*
1	*+5 Vdc*
2	*LED signal*

P 1 - Power LED & Ext-Lock Connector

Pin	Assignment
1	+5 Vdc
2	Key
3	Ground
4	Keyboard inhibit
5	Ground

P6, P7 - Power Supply Connector

Pin	Assignment
1	POWERGOOD
2	+5 Vdc
3	+12 Vdc
4	-12 Vdc
5	Ground
6	Ground

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

P 8 - External Battery Connector

Pin	*Assignment*
1	*+ Vdc*
2	*not used*
3	*Ground*
4	*Ground*

KB 1 - Keyboard Connector

Pin	*Assignment*
1	*Keyboard clock*
2	*Keyboard data*
3	*Spare*
4	*Ground*
5	*+5 Vdc*

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Chapter 4
Technical Information

This section provides technical information about OCTEK HAWK-486 and is intended for advanced users interested in the basic design and operation of OCTEK HAWK-486.

MEMORY MAPPING

Address	*Range*	*Function*
000000-7FFFFF	*000K-512K*	*System Board Memory (512K)*
080000-09FFFF	*512K-640K*	*System Board Memory (128K)*
0A0000-0BFFFF	*640K-768K*	*Display Buffer (128K)*
0C0000-0DFFFF	*768K-896K*	*Adaptor ROM / Shadow RAM (128K)*
0E0000-0EFFFF	*896K-960K*	*System ROM / Shadow RAM (64K)*
0F0000-0FFFFF	*960K-1024K*	*System BIOS ROM / Shadow RAM (64K)*
100000-7FFFFF	*1024K-8192K*	*System Memory*
800000-FFFFFF	*8192K-16318K*	*System Memory*

I/O ADDRESS MAP

I/O Address Map on System Board

I/O address hex 000 to 0FF are reserved for the system board I/O.

ADDRESS (HEX)	DEVICE
000-01F	DMA Controller 1, 8237
020-03F	Interrupt Controller 1, 8259, Master
040-05F	Timer, 8254
060-06F	Keyboard Controller
070-07F	Real Time Clock, NMI (non-maskable interrupt) mask
080-09F	DMA Page Register, 74LS612
0A0-0BF	Interrupt Controller 2, 8259
0C0-0DF	DMA Controller 2, 8237
0F0	Clear Math Coprocessor Busy
0F1	Reset Math Coprocessor
0F8-0FF	Math Coprocessor Port

I/O address hex 100 to 3FF are available on the I/O channel.

ADDRESS (HEX)	DEVICE
1F0-1F8	Fixed Disk
200-207	Game I/O
278-27F	Parallel Printer Port 2
2F8-2FF	Serial Port 2
300-31F	Prototype Card
360-36F	Reserved
378-37F	Parallel Printer Port 1
380-38F	SDLC, bisynchronous 2
3A0-3AF	Bisynchronous 1
3B0-3BF	Monochrome Display and Printer Adapter
3C0-3CF	Reserved
3D0-3DF	Color Graphics Monitor Adapter
3F0-3F7	Diskette Controller
3F8-3FF	Serial Port 1

SYSTEM TIMERS

OCTEK HAWK-486 has three programmable timer/ counters controlled by 82C206 and they are defined as channels 0 through 2 :

Channel 0	*System Timer*
Gate 0	*Tied on*
Clk in 0	*1.190 Mhz OSC*
Clk out 0	*8259 IRQ 0*

Channel 1	*Refresh Request Generator*
Gate 1	*Tied on*
Clk in 1	*1.190 Mhz OSC*
Clk out 1	*Request Refresh Cycle*

Channel 2	*Tone Generation of Speaker*
Gate 2	*Controlled by bit 0 of port hex 61 PPI bit*
Clk in 2	*1.190 Mhz OSC*
Clk out 2	*Used to drive the speaker*

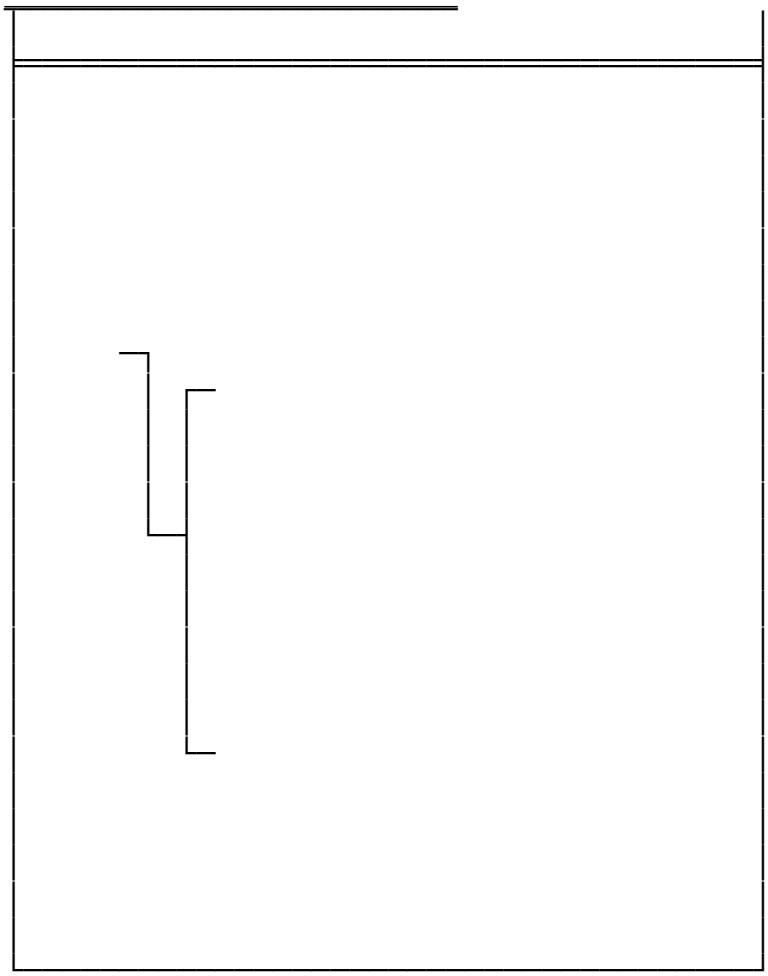
Note : Channel 1 is programmed to generate a 15-micro-second period signal.

The 8254 Timer/Counters are treated by system programs as an arrangement of four programmable external I/O ports. Three are treated as counters and the fourth is a control register for mode programming.

SYSTEM INTERRUPTS

Sixteen levels of system interrupts are provided on OCTEK HAWK-486. The following shows the interrupt-level assignments in decreasing priority.

Level		Function
Microprocessor NMI		*Parity or I/O Channel Check*
Interrupt Controllers		
CTLR 1	*CTLR 2*	
IRQ0		*Timer Output 0*
IRQ1		*Keyboard (Output Buffer Full)*
IRQ2		*Interrupt from CTLR 2*
	IRQ8	*Real-time Clock Interrupt*
	IRQ9	*Software Redirected to INT 0AH (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 Port 2*
IRQ6		*Diskette Controller*
IRQ7		*Parallel Port 1*



DIRECT MEMORY ACCESS (DMA)

OCTEK HAWK-486 supports seven DMA channels.

Channel	*Function*
0	*Spare (8 bit transfer)*
1	*SDLC (8 bit transfer)*
2	*Floppy Disk (8 bit transfer)*
3	*Spare (8 bit transfer)*
4	*Cascade for DMA Controller 1*
5	*Spare (16 bit transfer)*
6	*Spare (16 bit transfer)*
7	*Spare (16 bit transfer)*

The following shows the addresses for the page register.

Page Register	*I/O Address (HEX)*
DMA Channel 0	*0087*
DMA Channel 1	*0083*
DMA Channel 2	*0081*
DMA Channel 3	*0082*
DMA Channel 5	*008B*
DMA Channel 6	*0089*
DMA Channel 7	*008A*
Refresh	*008F*

REAL TIME CLOCK AND CMOS RAM

Real time clock and CMOS RAM are contained on board. Real time clock provides the system date and time. CMOS RAM stores system information. Both are backed up by battery and will not lose information after power off. The following page shows the CMOS RAM Address Map.

CMOS RAM ADDRESS MAP

Addresses	Description
00-0D	* Real-time clock information
0E	* Diagnostic status byte
0F	* Shutdown status byte
10	Diskette drive type byte - drives A and B
11	Reserved
12	Fixed disk type byte - drives C and D
13	Reserved
14	Equipment byte
15	Low base memory byte
16	High base memory byte
17	Low expansion memory byte
18	High expansion memory byte
19-2D	Reserved
2E-2F	2-byte CMOS checksum
30	* Low expansion memory byte
31	* High expansion memory byte
32	* Date century byte
33	* Information flags (set during power on)
34-3F	Reserved

REAL TIME CLOCK INFORMATION

The following table describes real-time clock bytes and specifies their addresses.

Byte	*Function*	*Address*
0	*Seconds*	*00*
1	*Second alarm*	*01*
2	*Minutes*	*02*
3	*Minute alarm*	*03*
4	*Hours*	*04*
5	*Hour alarm*	*05*
6	*Day of week*	*06*
7	*Date of month*	*07*
8	*Month*	*08*
9	*Year*	*09*
10	*Status Register A*	*0A*
11	*Status Register B*	*0B*
12	*Status Register C*	*0C*
13	*Status Register D*	*0D*

SYSTEM EXPANSION BUS

OCTEK HAWK-486 provides seven 16-bit slots.

The I/O channel supports:

* *I/O address space from hex 100 to hex 3FF*
* *Selection of data access (either 8 or 16 bit)*
* *24 bit memory addresses (16MB)*
* *Interrupts*
* *DMA channels*
* *Memory refresh signal*

The following figure shows the pin numbering for I/O channel connectors JA1 to JA7.

The following figure shows the pin numbering for I/O channel connectors JB1-JB7.

The following tables summarize pin assignments for the I/O channel connectors.

I/O Channel (A-Side)

I/O Pin	*Signal Name*	*I/O*
A1	*-I/O CH CK*	*I*
A2	*SD7*	*I/O*
A3	*SD6*	*I/O*
A4	*SD5*	*I/O*
A5	*SD4*	*I/O*
A6	*SD3*	*I/O*
A7	*SD2*	*I/O*
A8	*SD1*	*I/O*
A9	*SD0*	*I/O*
A10	*-I/O CH RDY*	*I*
A11	*AEN*	*O*
A12	*SA19*	*I/O*
A13	*SA18*	*I/O*
A14	*SA17*	*I/O*
A15	*SA16*	*I/O*
A16	*SA15*	*I/O*
A17	*SA14*	*I/O*
A18	*SA13*	*I/O*
A19	*SA12*	*I/O*
A20	*SA11*	*I/O*
A21	*SA10*	*I/O*
A22	*SA9*	*I/O*
A23	*SA8*	*I/O*
A24	*SA7*	*I/O*
A25	*SA6*	*I/O*
A26	*SA5*	*I/O*

A27	SA4	I/O
A28	SA3	I/O
A29	SA2	I/O
A30	SA1	I/O
A31	SA0	I/O

I/O Channel (B-Side)

I/O Pin	Signal Name	I/O
B1	GND	Ground
B2	RESET DRV	I
B3	+5 Vdc	Power
B4	IRQ9	I
B5	-5 Vdc	Power
B6	DRQ2	I
B7	-12 Vdc	Power
B8	0WS	I
B9	+12 Vdc	Power
B10	GND	Ground
B11	-SMEMW	O
B12	-SMEMR	O
B13	-IOW	I/O
B14	-IOR	I/O
B15	-DACK3	I
B16	DRQ3	O
B17	-DACK1	I
B18	DRQ1	O
B19	-Refresh	I/O
B20	CLK	O
B21	IRQ7	I
B22	IRQ6	I
B23	IRQ5	I
B24	IRQ4	I
B25	IRQ3	I
B26	-DACK2	O
B27	T/C	O
B28	BALE	O
B29	+5 Vdc	Power

B30	OSC	O
B31	GND	Ground

I/O Channel (C-Side)

I/O Pin	Signal Name	I/O
C1	SBHE	I/O
C2	LA23	I/O
C3	LA22	I/O
C4	LA21	I/O
C5	LA20	I/O
C6	LA19	I/O
C7	LA18	I/O
C8	LA17	I/O
C9	-MEMR	I/O
C10	-MEMW	I/O
C11	SD8	I/O
C12	SD9	I/O
C13	SD10	I/O
C14	SD11	I/O
C15	SD12	I/O
C16	SD13	I/O
C17	SD14	I/O
C18	SD15	I/O

I/O Channel (D-Side)

I/O Pin	*Signal Name*	*I/O*
D1	*-MEM CS16*	*I*
D2	*-I/O CS16*	*I*
D3	*IRQ10*	*I*
D4	*IRQ11*	*I*
D5	*IRQ12*	*I*
D6	*IRQ15*	*I*
D7	*IRQ14*	*I*
D8	*-DACK0*	*O*
D9	*DRQ0*	*I*
D10	*-DACK5*	*O*
D11	*DRQ5*	*I*
D12	*-DACK6*	*O*
D13	*DRQ6*	*I*
D14	*-DACK7*	*O*
D15	*DRQ7*	*I*
D16	*+5 Vdc*	*Power*
D17	*-MASTER*	*I*
D18	*GND*	*Ground*

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Appendix A
System BIOS

The system BIOS provides an interface for the software to control the hardware and is recorded in a ROM (Read Only Memory) chip. Upon power-up, it will also carry out a thorough diagnostic test to make sure the system is functional. It will initialize the chipset with setting stored in the CMOS RAM.

Then it proceeds to load the disk operating system and you can start to work with your applications.

In this supplementary, it mainly explains the BIOS Setup Utility, in which you can set up your system to suit your configuration and applications. In case you have any doubt, consult your dealer. Improper setting may cause reliability problem or system failure.

SETUP UTILITY DESCRIPTION

A Setup Utility is incorporated into the BIOS which allows the user to change the system configuration, and to select a variety of options.

You may enter the Setup Utility in three ways:

(1) A configuration change detected, or
(2) ESC is pressed during cold-boot, or
(3) CTRL+ALT+ESC is pressed to warm-boot into Setup.

The Setup Utility is an interactive program for the system setup. You can enter the system configuration, such as clock, hard disk type and floppy disk type. There are many advanced options available to you to improve the system performance. The settings for these options are preset to a proper value, such that the overall performance is optimal. In most case, you only need to setup the clock, hard disk type and floppy disk type.

The main screen format of setup utility consists of these four fields:

(1) Copyright/Version

On the top two lines on the screen, the BIOS version number is shown.

(2) Menu Line

A list of setup section names appears on this line, from which a specific section may be selected. Use 'Left' and 'Right' arrow key to change from one setup section to another and the corresponding Edit-Page (see below) is shown. Press ENTER key to enter the setup section.

(3) Edit Page

In the Edit page, setup options are listed. You can move the cursor to a particular field and change the setting. Press PgUp key to exit.

(4) Prompt Line

The Setup-Utility is designed to be usable without the aid of this manual. In the prompt line, acceptable key-strokes and corresponding explanation are listed.

SYSTEM BIOS

The main Setup Menu is shown as below when the Setup Utility is invoked.

MR BIOS (tm) Copyright (c) 1991, Microid Research Ver 1.26 Port OPTI435

CPU Type 80486DX	*Floppy 0 ..... 1.2M [5¼]*
CPU MHz 33.0	*Floppy 1 ..... None*
Boot Speed ..... High	*Floppy 2 ..... None*
Math Unit ..... n/a	*Floppy 3 ..... None*
	Fixed 80 (C:) ..... Type 17
RAM Cache ..... Enable	*Fixed 81 (D:) ..... Type 17*
Shadow RAM ..... Enable	*Boot Sequence ..... C: 1st*
Memory-Base 640K	*Anti-Virus ..... n/a*
Memory-Extended 3328K	*Security ..... Disable*
Memory-System 128K	
Memory-Total 4096K	*Keyboard ..... AT*
	NumLock ..... On
COM1 ..... 3F8 | LPT1 378	*Typematic 30.0*
COM2 ..... n/a | LPT2 ..... n/a	
COM3 ..... n/a | LPT3 ..... n/a	*Video-Primary ..... V/EGA-Color*

COM4 ..... n/a | LPT4 ..... n/a	Video-Secondary ..... n/a

Summary Clock Video Floppy Fixed Boot-Seq Keyboard More-->

F10 to Record and Exit Home End Moves Cursor

PROMPT-LINE TEXT

The purpose of this section is to further explain the meanings of the keystroke prompts. They are somewhat abbreviated due to screen space limitations.

F10 TO RECORD AND EXIT

Press F10 to record the new configuration to CMOS, and terminate the Setup session. The system will proceed to boot-up.

HOME END (LEFT/RIGHT ARROWS) MOVES CURSOR

The Menu-cursor can be moved respectively to the first entry, last entry, or next leftward/rightward entry.

(ENTER) TO SELECT

When the cursor is in Menu Line, you need to press enter key to enter the Edit Page for a particular setup section. The cursor will move from the Menu Line into the Edit Page, on the first field.

ESC FOR MENU

When the cursor is currently in the Edit-Page, press ESC (or PgUp) to return to Menu-Line.

(UP/DOWN/LEFT/RIGHT ARROWS) MOVES CURSOR

The cursor is currently illuminating a field within an Edit-Page. It may be moved to another field via these cursor keys.

(ENTER) TO EDIT

The cursor is currently illuminating a field within Edit-Page. This particular field can be entered with numbers or letters. Press ENTER to enter the editing mode. The field remains illuminated, and a small blinking underline cursor will appear under the leftmost editable character in that field. In general, Left-Arrow, Right-Arrow, Space, Backspace, and AlphaNumerics are accepted in edit mode. ESC will restore the field to its initial state and the blinking underline will disappear. ENTER will finalize the editing mode and the blinking underline will disappear. All "edit-mode" keystrokes are prompted.

+-SCROLLS CHOICES
SPACEBAR +- TO CHANGE
SPACEBAR +- SCROLLS CHOICES

The cursor is currently illuminating a field within the Edit-Page which may be changed. Press SpaceBar or "+" to change to other available options. The options are rolled through a list in the forward direction. BackSpace and "-" roll the options in reverse order.

ESOTERIC PROMPTS

A few special-case prompts also exist. Generally, they specify a range of numbers or a particular set of AlphaNumeric characters that will be accepted in the field. For example, the CLOCK Time-Of-Day subfield accepts Alphabetic "a" and "p" to indicate am and pm.

The SECURITY utility requires pressing ENTER after selecting a new configuration. This additional step is not consistent with behaviour of the other utilities, but is necessary so that a new password can be prompted when appropriate, and so the current password is not dismissed if the user simply scroll through available options.

The LOW-LEVEL-FORMAT field column within the FIXED disk configuration utility cannot be accessed until CTRL-F is pressed. Pressing ESC while the cursor is in that column will move it to a non-Format column on the screen. While the format is in progress, ESC will immediately terminate the process.

SETUP SECTION

There are currently 13 sections contained in BIOS Setup. As the cursor is moved across the Menu Line, Page for the respective Setup Section appears in the Edit. A quick summary of the utilities is given below.

(1) SUMMARY UTILITY PAGE

In the Summary Section, the basic configurations and characteristic of your system can be viewed here. Each of the fields are explained below with an example of how they might appear:

CPU

The type and revision number of the CPU is shown.

CPU 80486DX	*indicates a 486DX processor chip*

MATH UNIT

Numeric-Coprocessor-Extension type found in the system.

NPX	Description
Built-in	internal cache

RAM CACHE

It indicates status of internal cache.

RAM CACHE	
Disable	disable internal cache
Enable	enable internal cache

SHADOW RAM

Indicates if any part of the (384K) ROM space is mapped to shadow RAM.

For example, Shadow RAM ..... n/a
Shadow RAM ..... Enable
Shadow RAM ..... Disable

MEMORY-BASE

Indicates the amount of base memory (below 1 Megabyte boundary). Possible range is 64K to 640K.

MEMORY-EXTENDED

Indicates the amount of extended memory (above 1 Megabyte boundary). Possible range is 0K to 15360K.

For example, Memory-Extended 1024K

MEMORY-SYSTEM

Indicates the amount of special OEM memory found to be in working order. Typically, this field will be un-implemented (0K), or will represent the 384K available for shadow RAM or relocation to the Extended Memory pool.

For example, Memory-System 384K

MEMORY-TOTAL

This is simply a sum of the three preceding quantities.

For example, Memory-Total 2048K

COM1, COM2, COM3, COM4

Indicates if RS232 serial port COM1 is present, and its I/O address.

For example, COM1 ..... n/a
COM1 ..... 3F8
COM1 ..... 2F8

LPT1, LPT2, LPT3 and LPT4

Indicates if parallel (printer) port LPT1 is present, and its I/O address.

For example, LPT1 ..... n/a
LPT1 ..... 3BC
LPT1 378
LPT1 278

FLOPPY 0, FLOPPY 1, FLOPPY 2 AND FLOPPY 3

Indicates floppy drive type and step rate. The "type" can be 5¼ 360K, 5¼ 1.2M, 3½ 720K, 3½ 1.4M AND 3¼ 2.8M. The "step rate" is given as two options : fast or slow required for the read/write head to be moved to an adjacent cylinder.

Floppy 0	*Description*
None	*Card present but no drive*
5¼ 1.2M	*5¼ inch*

FIXED 80 (C:), FIXED 81 (D:)

Indicates fixed disk type, step rate encoding and if "Translation Mode" is in effect. If the "Translation Mode" is enabled for this disk a letter "T" will be shown. the step rate will be shown if set to non-zero.

Fixed 80 (C:)	*Description*
N/A	*Fixed controller card not present*
None	*Drive type "0", no drive present*
2	*Drive type "2", no special features*
47T	*Drive type "47T", Translation Mode*
8 {F}	*Drive type "8", special Step rate*
46T {E}	*Drive type "46", Translate+Step rate*

BOOT SEQUENCE

Specifies the selected order in which the disk will be booted.

Boot-Sequence	*Description*
A: 1st	*Try A:first, if failure, try C:*
C: 1st	*Try C:first, if failure, try A:*
Prompt	*Screen prompt for drive A: - D:*

ANTI-VIRUS

The Anti-Virus is provided in two options:

enable
disable

SECURITY

The state of password-Security is shown in this field.

For example, Security ..... Enable
Security ..... Disable

KEYBOARD

The keyboard type is shown in this field.

Eg, Keyboard ... AT PC/AT type keyboard
Keyboard ... XT PC/XT type keyboard

NUMLOCK

The programmable powerup NumLock state is shown in this field.

Note: This is only meaningful for AT-type keyboards.

For example, NumLock ..... Off
NumLock ..... On

TYPEMATIC

The programmable powerup "typematic" repeat rate is shown here.

Note: This is only meaningful for AT-type keyboards.

Typematic	*Description*
Default	*No rate programmed, speed approx 10 cps*
30.0	*30 cps rate is programmed*

VIDEO-PRIMARY

Indicates the video adaptor which will be in use when the system boots.

Video-Primary	*Description*
None	*Special Support, see VIDEO menu*
Monochrome	*B/W card*
CGA - Snow	*CGA, slow access due to "snow"*
CGA - Fast	*CGA, "snow" isn't problem*
V/EGA-Mono	*Advanced Graphics, B/W monitor*
V/EGA-Color	*Advanced Graphics, Color monitor*

VIDEO-SECONDARY

Indicates if a second video card is present in the system. This will be displayed:

Video-Secondary ..... n/a

Otherwise, refer to VIDEO-PRIMARY above.

(2) CLOCK CONFIGURATION

The battery backed Real-Time-Clock (RTC) time, date, and daylight savings feature are programmed through this utility.

TIME

The time field is shown in 12 hour format, followed by a time-of-day indicator "a" or "p" (am/pm). Enter the time directly. After entering the second, the cursor moves the right most of the field, press `a' for am or`p' for pm.

Time hh/mm/ss t	*Military*
12:00:00 a	*00:00:00*
09:10:11 p	*21:10:11*

DATE

The date field is shown in mm/dd/yyyy format.

Date (mm/dd/yyyy)	
01/23/1990	*January 23, 1990*

DAYLIGHT SAVINGS

The RTC has a built-in capability to automatically adjust the time on the two daylight savings days of the year. If enable, on the last Sunday in April, the time increments from 1:59:59 am to 3:00:00 am. On the last Sunday in October, when the time reaches 1:59:59 am, it is rolled-back to 1:00:00 am. This feature is only useful in those countries using this scheme, such as United States. Otherwise, set the field to "Disable".

For example, Daylight Savings ..... Enable
Daylight Savings ..... Disable

(3) VIDEO CONFIGURATION

The primary video adaptor is declared through this utility.

A "primary" adaptor is defined to be the video card which will be recognized by the operation system. If there are two video cards present, the other one becomes the "secondary" video adaptor. The secondary adaptor is placed into a standby state and can only be activated by specialized software.

No jumper setting is required and the BIOS will determine the type of display found in the computer. In systems with a single video card, the choices are limited to that present card, or "none". Setting to "none" is useful in certain specialized monitoring/control applications.

When two video cards are present in the system, one must be color, and the other monochrome. The BIOS will identify these cards, and make both choices available for primary selection. If one of the cards is V/EGA, the BIOS will automatically detect whether the display card is in color or monochrome mode. Although V/EGA cards generally require setting dipswitches, the BIOS will override those settings according to the primary adaptor selected via this utility. Note that some valid dipswitch state must still be set on the V/EGA card so that it may correctly initialize itself.

If a CGA card is found, a second field will appear on the screen. Its purpose is to allow selection of video access speed. Some CGA cards will produce screen "snow" when accessed too quickly in 80-column text mode. Such cards require synchronization with video signals to prevent this undesirable effect. Most CGA cards do not require this synchronization, and the video access speed will be improved. Try selecting the fast mode. If there is no "snow" problem, select fast mode permanently.

(4) FLOPPY DISK CONFIGURATION

This utility setups the floppy drive subsystem, drives A:, B:, C: and D:.

The BIOS supports the following types of floppy disk drives:

a. 5.25 inch, 360K bytes drive;
b. 5.25 inch, 1.2M bytes drive;
c. 3.5 inch, 720k bytes drive;
d. 3.5 inch, 1.4M bytes drive;
e. 3.5 inch, 2.8M bytes drive;

The "step-rate" parameter controls the speed which the drive head moves from track to track. Usually the fast rate is selected. In case that your disk drive cannot work with fast rate or your application depends on the timing of the drive, select the slower speed.

(5) FIXED DISK CONFIGURATION / LOW LEVEL FORMAT

This utility configures the fixed disk subsystem, drives C: and D:

The type of fixed disks may be selected from standard fixed disk table or defined as user-defined type 46 and 47. The drive parameter tables are comprised of these entries:

(1) Number of Cylinders
(2) Number of Heads
(3) Starting Precompensation Cylinder
(4) Landing Zone Cylinder
(5) Number of Sectors per Track

Make sure you choose the correct type. Otherwise, the system will have problem with the fixed disk. If the type of your fixed disk is not included in the standard table, define it in type 46 and 47. Move the cursor to the "Type" field and select 46 or 47. Then move the cursor down to the next field, "Cylinders", and press ENTER. Enter the number of cylinders, and press ENTER when done. Continue in this fashion, editing the "Heads", "Precomp", "Landing", and "Sector" fields.

Larger capacity fixed disk drives with higher track density may have more than 1024 cylinders, but the standard BIOS only supports upto 1024 tracks. There is a translation mode to surpass the 1024 cylinders limitation. up to 16384 (16K) cylinders can be addressed via the translation mode. The Translation Mode implementation is designed to be compatible both with programs which exclusively use the BIOS interface, and programs which interpret the fixed disk tables and run the drives directly. If Translate Mode is not selected, only the first 1024 cylinders will be accessible through the BIOS interface.

To support the translate mode, a Low-level-Format utility is supported by the BIOS. Press CTRL-F to enter Low-level Format utility. Enter the range of cylinders to be formatted. The sequence may be increasing or decreasing order. If the final cylinder is greater than the start cylinder, it is in increasing order. Otherwise, it is in deceasing order. Also, the "interleave" is programable. The default setting is "3". But most of the fixed disks and controllers nowadays, such as IDE hard disk, support interleave factor of "1". Consult the manual of hard disk and hard disk controller for detail.

Many advanced fixed disks are already formatted in the factory and low level format should not be done. Consult your dealer for detail.

Anti-Virus is provided as a user selectable option. It offers a measure of protection against malicious programs by trapping writes to the main boot sector. It also traps attempts to low-level-format any region of the fixed disk.

(6) BOOT SEQUENCE CONFIGURATION

BOOT SEQUENCE

In a typical BIOS implementation, whenever CTRL ALT DEL is pressed or cold-boot, an attempt to boot from drive A: always occurs first. If the drive is found to be empty, drive C: is booted. However, hard disk is always used as the boot device in the computer system, and drive A: is only used to transfer files. So booting directly from drive C: is more convenient and takes less time.

The boot sequence is now selectable. In addition to the usual "A: first, then C:" sequence, the order may be reversed so that drive C: is accessed first.

To override the boot sequence established in this utility, a special "hot-key" warm-boot sequence CTRL ALT ENTER is available. The effect is identical to CTRL ALT DEL, except a prompt appears on the screen asking which drive should be booted. For cold-boot, press ENTER during the memory test. A prompt will be shown to ask which drive is the boot device.

When "Screen-Prompt" is selected, the BIOS will always ask you to choose which drive to boot.

MEMORY PRIMING

Memory test will be carried out after cold-boot. When there is a lot of memory installed, the test will take some time. To speed up the test, you may change from "Full test" to "Quick scan". The BIOS will only perform a simple memory test which will just need a few seconds.

COLD-BOOT DELAY

Since power-up diagnostics only take a few second, some hard disks may not even complete their setup process and can not be accessed by the BIOS. In this case, the BIOS has to wait before the hard disk is ready. Otherwise, hard disk error will be reported. Maximum cold-boot delay is 30 seconds. Select a proper time delay to suit your hard disk. Set to "none" for no delay. `None' or a short delay is appropriate for most IDE hard disks.

(7) KEYBOARD CONFIGURATION

NUMLOCK

In 84-key AT-style keyboards, it lacks a dedicated cursor-control keypad. The NumLock control key is used on these keyboards to toggle the Numeric Keypad from numeric operation to cursor functions. In the original AT system, Numlock is always on after booting and thus the keypad is in numeric mode. You need to press the Numlock key once so as to use the cursor keys. 101/2 key keyboards have a dedicated Cursor Keypad in addition to the Numeric Keypad. The NumLock key is not necessary.

Through this utility, the boot-time default state of NumLock can be set. Select "Disable" or "Enable" accordingly.

TYPEMATIC RATE

When a key is pressed on the keyboard for a period of time, the keystroke will begin repeating at a predefined rate. The delay is by default 0.5 seconds and the repeat rate is 10 characters per second. This typematic repeat rate feature is a function of the keyboard and is not produced by the system BIOS. However, most of AT-style keyboards permit overriding the initial delay and subsequent repeat rate.

The BIOS can be configured to issue override typematic parameters to the keyboard at boot-time. Both the "Delay before repeat" and "typematic Repeat Rate" parameters can be selected. To accomplish this, "Enable" the "Typematic Override" field, and select the Delay and Rate in the other fields. We suggest a Delay of 0.5 seconds, and a Repeat Rate of 30.0 cps.

If the keyboard fails to function properly when overriding the default typematic state, disable the "Typematic Override" field. The Delay and Rate fields will display "Default" in response to this selection. In this way, no typematic parameters will be issued to the keyboard.

(8) FIRST AID

The setup utility "First Aid" provides some measures to solve many problems in AT design.

The first one is the keyboard problem with Novell environment in high speed system. keyboard may not be respond very well because Novell program is running at very fast speed but the keyboard is a slow speed device. The BIOS allows you to adjust a parameter to make the keyboard work properly. You need to test your selection. Set to the lowest value that can solve the problem.

The A20-GATE option is aimed at solving the problem with some applications using protected mode. The A20-GATE signal is generated from slow speed device. Sometimes the application crashes when toggling this signal. Setting this signal to "ON" can eliminate the problem.

(9) CACHE CONFIGURATION

You can enable the internal cache of CPU and no external secondary cache supported in this system. The internal cache is by default enabled.

(10) SHADOW RAM CONFIGURATION

In this section, the BIOS allows you to select "shadow RAM" function for the address in 640K to 1M region. The BIOS will detect which address is occupied by adapter ROM and video ROM. The address range of C0000H to CFFFFH, which is usually used by VGA and EGA BIOS, is divided into four 16K blocks. The memory space from D0000H to DEEEEH is also divided into four 16K blocks. The last memory block is E0000H to EFFFFH. The BIOS ROM is resident at F0000H and is always shadowed.

When no memory block is selected to be shadowed in the range from D0000H to DFFFFH and E0000H to EFFFFH, these memory blocks may be mapped to the top of memory and served as extended memory. In this case, the memory block originally locates at A0000H to BFFFFH where is already occupied by display memory will also be remapped to the top of memory. There is additional 256KB available in the extended memory.

Each adapter ROM and video ROM will be assigned a number. If a ROM occupies more than one block, the BIOS will show the same ROM number for each block.

To set a ROM to be shadowed, move the cursor to a particular block and change to the "WP-Shadow". If the ROM occupies more than one block, just set one block to be shadowed and then other blocks will be set accordingly. It avoids the mistake that you just enable the shadow RAM function for part of a ROM.

The address range that is not used may be available to software by setting to "RW-Shadow". This feature is useful to many memory management utilities and advanced operation systems. These utilities can move the memory resident files and device drivers to these address ranges and hence there are more spaces

available in the 640KB range. If a particular memory block in D0000H to DFFFFH and E0000H to EFFFFH are set to "RW-Shadow", 256KB remapped function is not enabled.

(11) DMA PARAMETER

DMA timings may be adjusted to adapt to your EtherNet, SCSI and other Bus-Master peripherals, to achieve optimal performance. However care should be taken when setting these parameters so that it won't violate the specification. The default values are recommended for reliable operation. If you have any doubt, ask your dealer.

DMA CLOCK

It is initially set to ATCLK/2. If set to ATCLK/1, the DMA operation is running at 8MHz.

8-BIT WAITS / 16-BIT WAITS

This option controls the CPU access to the peripherals controller which handles DMA operations and hardware interrupts. The default setting is 1WS.

COMMAND WIDTH

When "Compress" is selected, all DMA operations will take less cycles and hence the data transfer rate is better. Only few peripherals can work with compressed command width. Make sure the system is reliable with this option. "Normal" is appropriate for normal range.

MEMR# SIGNAL / MEMW# SIGNAL

Setting to the option "Normal" is compatible to standard AT design. The option "Early" allows the faster

generation of control signal MEMR# and MEMW#. Since it is reliable to use the option "Normal", it is rarely necessary to choose the other one.

(12) CHIPSET

This section provides a means to define some parameters for the system, such as memory wait state and the AT-bus speed. The default settings are proper for normal usage. Changing the setting may lead to better performance, but make sure your system is still reliable and compatible with the peripherals.

DRAM TIMING - READ/WRITE STATE

The number of wait state for read and write operation depends on the clock speed of CPU and the speed rating of the DRAM. Improper setting can make the system unstable. Since the specification of DRAM for different manufacturers may vary, you would better consult your local dealer for the detailed information. In general, select 0 wait state Write and 1 wait state Read with 80ns DRAM for 33MHz system. For 25MHz system, select 0 wait Read for using 80ns DRAM.

EXTRA WAIT STATE

The standard AT Bus, it requires 1ws for 16 bit and 8 bit bus operation to 8 bit device, take 4 wait state, so cycle turn is achieved. For the slower I/O device, it will require one more wait state to complete cycle.

AT BUS CLOCK

Bus clock is used by pripherals on the motherboard and slot, such display and DMA Bus clock is generated from CPU clock-in and the speed of Bus clock is shown below.

CPU Speed (MHz)				
AT CLK	33	25	20	16
CLKIN/4	* 8.4	6.3	5.0	4.0
CLKIN/3	11.1	* 8.3	6.6	5.3
CLKIN/2.5	12.5	10.0	* 8	6.4
CLKIN/2	16.7	12.5	10	* 8

The system performance can be improved by selecting a higher Bus clock speed. To be compatible with general add-on cards, the bus clock must be 8.4MHz or less. There are many old version add-on cards that can only run at the slow speed. So, be careful when you want to set to higher speed.

(13) SECURITY CONFIGURATION

This utility is used to enable or disable Password Security. In order to use this feature, place a jumper on JP2.

This Security feature offers a measure of protection against unauthorized use of the computer, by requiring a password when the computer is first being powered up. Three opportunities are given to enter the correct password. If three unsuccessful attempts are made, the system will be halted and an alarm will be sounded. The alarm will persist until the power is turned off. After the correct password is entered, the computer will proceed to boot-up. Security feature is not applied to warm-boot, pressing CTRL-ALT-DEL.

The Setup-Utility is also password protected when Security feature is enabled. When entering the BIOS setup via CTRL ALT ESC, the SUMMARY page will be displayed as usual, but the user will be prompted to press "F10 to Exit", or "ENTER for Security Clearance".

When you select to enable the Security feature, a second field will appear on the screen for you to enter a password. A password consisting of zero to ten characters must be typed in. Asterisks are echoed to the screen, instead of the character typed, and the only keystroke available for editing is BackSpace. The password cannot be viewed. Press ENTER when you have entered the password. Then a prompt will appear requiring the same password to be entered again. The BIOS will compare the entries and the process will repeat if the latter entry does not match the initial one.

All keystrokes recognized by BIOS can be used in the password. So, function keys such as F1 and combinations of keys, such as ALT F1 and SHIFT F1, are valid and considered different. Also Alphabetic characters are case-sensitive, which means "a" and "A" are different.

Once the password has been defined, it may subsequently be changed using this utility. To accomplish this, toggle the "Security" field entry from "Enable" to "Change Code", and press ENTER. The procedure is identical to initially installing the password.

The password entry feature may also be set to "Disable" and the Security feature is disabled. When disabled, anyone can invoke the BIOS Setup and enable the Security feature with their own password. Afterward, the system can only boot up with his password. JP2 is served as a Master-Override Password Security Jumper. When there is no jumper on JP2, the security function is disabled and no one can enable it in the Setup. When you need the security function, place a jumper on JP2 and enter your password.

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Appendix B
Operation and Maintenance

STATIC ELECTRICITY

When installing or removing any add-on card, DRAM module or coprocessor, you should discharge the static electricity on your body. Static electricity is dangerous to electronic device and can build-up on your body. When you touch the add-on card or motherboard, it is likely to damage the device. To discharge the static electricity, touch the metal of your computer. When handling the add-on card, don't contact the components on the cards or their "golden finger". Hold the cards by their edges.

KEEPING THE SYSTEM COOL

The motherboard contains many high-speed components and they will generate heat during operation. Other add-on cards and hard disk drive can also produce a lot of heat. The temperature inside the computer system may be very high. In order to keep the system running stably, the temperature must be kept at a low level. A easy way to do this is to keep the cool air circulating inside the case. The power supply contains a fan to blow air out of the case. If you find that the temperature is still very high, it would be better to install another fan inside the case. Using a larger case is recommended if there are a number of add-on cards and disk drives in the system.

CLEANING THE "GOLDEN FINGER"

Whenever inserting an add-on card to the motherboard, make sure that there is no dirt on the "golden finger" of the add-on card. If not, the contact between the "golden finger" and the slot may be poor and thus the add-on card may not work properly. Use a pencil eraser to clean the "golden finger" if dirt is found.

CLEANING THE MOTHERBOARD

The computer system should be kept clean. Dust and dirt is harmful to electronic devices. To prevent dust from accumulating on the mother-board, installing all mounting plates on the rear of the case. Regularly examine your system, and if necessary, vacuum the interior of the system with a miniature vacuum.

Appendix C
Troubleshooting

MAIN MEMORY ERROR

After power up, the monitor remains blank, and there are beep sounds indicating a main memory failure. In this case, turn off the power and remove all SIMM modules. Carefully place the modules back to the sockets and make sure that all the modules are locked by the locking latches firmly.

In some other cases, the total memory found by the BIOS is different from the actual amount of memory on board. (Note that 128K bytes memory is reserved for the shadow RAM function and will not be counted by the BIOS). It is also a memory failure and you can follow the instruction above.

IMPROPER SETTING OF WAIT STATE

If the system hangs after memory test, another possible cause is the improper setting of the wait state for memory operation. The number of wait state must match the speed of the DRAM. Reset the CMOS RAM and set up the wait state. Try to increase the number of wait state.

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Appendix D
System Board Layout