

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 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 interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

NOTE

1. *When you see an error message appear on the screen after turning the power on, leave the system switched on for one or two hours to recharge the battery. You can then enter the system configuration.*
2. *Leave your system switched on for 10 to 15 hours to completely recharge the battery.*
3. *If you had left the system switched off for more than one month, follow step 2, above.*

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

VERSION: 1.0

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Chapter 1 INTRODUCTION

OCTEK Hippo-486 contains the most powerful microprocessor 80486 which combines CPU, numeric coprocessor and internal cache on one chip. Incorporated with a highly integrated chipset, OCTEK Hippo-486 fully takes advantage of the power of 80486 and provides high performance, reliability and compatibility. OCTEK Hippo-486 is a perfect choice for CAD/CAM workstation and file server and can support sophisticated 32-bit applications and multi-user operating systems.

The 80486 burst mode is supported and thus the data is transferred to CPU at full speed. In addition to the internal cache memory of 80486, the chipset supports an optional secondary cache memory up to 512K bytes.

If you want more speed in numeric operation, WEITEK 4167 can be installed. 8MB memory can be installed on board and additional 8MB is on memory expansion board which is installed on a fast speed 32-bit memory expansion slot.

Fast A20 gate and fast reset generation are incorporated to improve the performance of advanced operation system and expanded memory managers.

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

Chapter 2 GENERAL FEATURES

Specification

Processor: Intel 80486 CPU
with optional WEITEK 4167 Coprocessor

Speed: Turbo/normal speed

I/O Slot: Compatible to standard AT bus
Eight 16-bit slots

Optional Secondary Cache Memory:
128KB or 512KB cache memory
Direct mapped/Write through

Memory: Shadow RAM and Page/Interleaved mode
SIMM sockets for 256K or 1M modules
8MB on board
Up to 16MB with option expansion
memory board

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 back-up
- Fast A20 gate and fast reset

Other Features:

- On board POWERGOOD generation
- External battery connector

PROCESSOR

80486 is a 32-bit microprocessor with 32-bit external data bus and 32-bit external address bus. It is fully binary compatible with 80386 and 80387. All existing software for PC XT/AT can be used on OCTEK Hippo-486. Due to the new internal architecture, the performance of 80486 is two to three times of 80386.

Integrating cache controller and cache memory into the chip reduces the bus operation on external data and address bus. The cache is a 8K bytes, 16 bytes line size, four-way set associative configuration. The hit rate of this configuration is better than 32K bytes external cache.

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 to 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 DMA controller.

80486 is designed with RISC concept. Many often-used instructions are executed in a clock cycle. In comparison, 80386 may take two to three more cycles for the same instruction. Advance instruction pipeline structure further improves the overall performance.

A wide internal bus also leads to a better performance. The data bus of internal cache is 128 bits wide. Data transfer between internal units is 64 bits. Since, in most of the time, CPU is using the internal cache, the large bus size substantially improves the performance.

MEMORY SYSTEM

Four banks of DRAMs can be installed. Two banks are available on motherboard and others are on optional memory expansion board. The maximum memory size is 16MB when using 1MB DRAM for all banks.

The memory system provides a flexible memory configuration. 256KB and 1MB DRAM can be used together. Several combinations of DRAM types are allowed. So, a basic system is equipped with 1MB using 256KB DRAM and then memory size is increased to 5MB by putting another bank of 1MB DRAM.

The memory system supports page-interleaved mode. The memory is divided into pages. Successive memory accesses within the same page need not require wait state. When more than one bank of memory are installed, the page size is effectively increased because several banks of memory can be kept active. If four banks are filled, the page size is increased by a factor of four.

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.

Another useful feature is memory remapping. 640KB is allocated as base memory. System BIOS and video BIOS occupy some locations between 640K and 1M. When 1M bytes or more are installed, there are some parts of DRAM overlapping with the BIOS and cannot be accessed. Memory remapping allows these parts of memory to be accessed at other locations and thus is available to software.

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 standard AT machine. I/O channel of OCTEK Hippo-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 Hippo-486 without problem.

Chapter 3 CONFIGURING THE SYSTEM

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

Installing Math Coprocessor

Math coprocessor WEITEK 4167 is a PGA devices. Beside the CPU, there is a 144-pin PGA socket. To install Math coprocessor, be sure to line up pin 1 of the Math coprocessor with pin 1 of the socket as shown below.

Installing RAM Modules

OCTEK Hippo-486 has eight sockets for SIMM modules. Whenever you add memory to the motherboard, install four modules at the same time. Also make sure that the chips on the modules face towards the slot for optional memory expansion board as shown below. The modules should be locked by the sockets. Please check carefully before turning on the power. Otherwise, the system will not work properly.

Configuration of Memory

The configuration of the memory is very flexible. There are several combinations of DRAM types you may consider. Either 256KB or 1MB SIMM are acceptable. So, a basic system can be equipped with fewer memory and later more memory can be installed when upgrading the system. The configuration of memory is illustrated on next page.

Interleaved mode is only enabled for those with similar pairs or quartet of DRAMs. Page mode is always active. The memory size is automatically detected by BIOS and indicated during memory test after reset. No jumper is needed to be set.

The speed of DRAM depends on the speed of the system and wait state. The highest performance is accomplished by using zero wait state, but fast page mode DRAM has to be used. Consult your dealer for details.

DRAM Configuration

	Bank	Bank	Bank	Bank	Total	Inter-
	0	1	2	3	Memory	leaved
1	0	0	0	0	0	
2	256K	0	0	0	1M	2W
3	256K	256K	0	0	2M	2W
4	256K	256K	256K	0	3M	4W
5	256K	256K	256K	256K	4M	
6	1M	0	0	0	4M	
7	256K	1M	0	0	5M	
8	1M	256K	0	0	5M	
9	256K	256K	1M	0	6M	2W
10	256K	1M	256K	0	6M	
11	1M	256K	256K	0	6M	
12	256K	256K	1M	256K	7M	2W
13	256K	1M	256K	256K	7M	2W
14	1M	256K	256K	256K	7M	2W
15	1M	1M	0	0	8M	2W
16	256K	1M	1M	0	9M	
17	1M	1M	256K	0	9M	2W
18	1M	256K	1M	0	9M	
19	256K	256K	1M	1M	10M	2W
20	256K	1M	1M	256K	10M	
21	1M	1M	256K	256K	10M	2W
22	1M	256K	1M	256K	10M	
23	1M	1M	1M	0	12M	2W
24	256K	1M	1M	1M	13M	2W
25	1M	1M	1M	256K	13M	2W
26	1M	256K	1M	1M	13M	2W

27	1M	1M	1M	1M	16M	4W
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Control of System Speed

System Speed can be controlled by keyboard. 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.

System Board Jumper Setting

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

Display Selection

JP10	
ON	CGA, EGA, VGA
OFF	Monochrome display *

Secondary Cache installation

	Secondary	Cache
JP3 & JP4	Installed	Not installed
	OFF	ON *

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
SW1	Hardware reset connector
J25	Speaker connector
J26	Power LED & Ext-lock connector
J11, J12	Power supply connector
J1	External battery connector
J2	Keyboard connector

Pin assignment of the connector are illustrated as follows:

SW 1 - Hardware Reset Connector

Pin	Assignment
1	Selection Pin
2	Ground

J 25 - Speaker Connector

Pin	Assignment
1	Data out
2	+5 Vdc

3	Ground
4	+5 Vdc

J 26 - Power LED & Ext-Lock Connector

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

J 11, J 12 - 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

J 1 - External Battery Connector

Pin	Assignment
1	+6 Vdc
2	not used
3	Ground
4	Ground

J 2 - Keyboard Connector

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

Chapter 4 TECHNICAL INFORMATION

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

Memory Mapping

Address	Range	Function
000000-7FFFFFFF	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)
0F0000-0FFFFFFF	960K-1024K	System BIOS ROM / Shadow RAM (64K)
100000-7FFFFFFF	1024K-8192K	System Memory
800000-FFFFFFF	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 Hippo-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

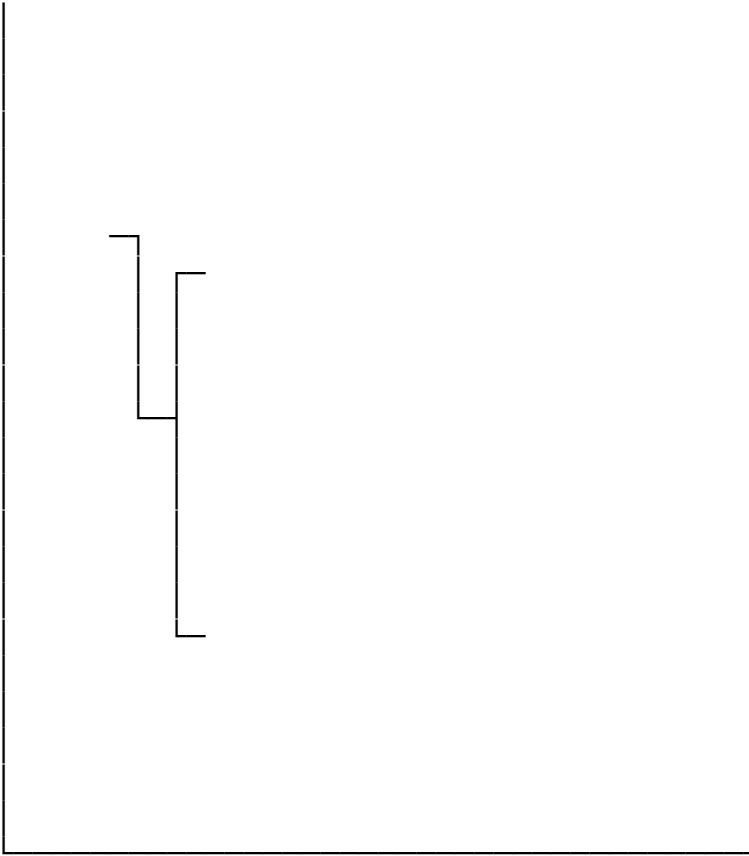
Note : Channel 1 is programmed to generate a 15-micro-second period signal.

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 Hippo-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	Realtime 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 Hippo-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 Hippo-486 provides eight 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 J3 to J10.

The following figure shows the pin numbering for I/O channel connectors J13-J20.

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

APPENDIX A SYSTEM BIOS

The system BIOS provides an interface for operating systems and applications to access hardware. It also performs self-test after reset and includes a setup program for user to configure the system.

Self-test

To ensure the computer hardware is functional, the system BIOS will carry out a self-test upon reset. The test is very intensive and covers all parts of hardware.

Unlike most of the tests which take a few time, the memory test may be very slow, especially when the memory size is large. Therefore the system BIOS allows you to bypass the memory test by pressing 'ESC'. The following message will be shown during memory test:

Press <ESC> Key to bypass MEMORY test

The total memory size is displayed after the test.

The display is not initialized and remains blank until a number of basic tests are completed. In case of serious errors, the BIOS will suspend the test. If the display is not initialized, the BIOS will report the error through a sequence of short beeps. Otherwise, error message will be shown on the screen.

System Setup

The BIOS incorporates two setup sections:

- (1) CMOS SETUP
- (2) EXTENDED SETUP PROGRAM

It is important that all setup procedures should be completed before operating the system. Otherwise, the system will not run properly with the incorrect setup information. Run the setup again if the configuration is changed.

To enter the setup section, press 'Del' when the following message is shown:

Press if you want to run SETUP/EXTD-SET

Whenever the system BIOS find that the configuration of the system is altered, error message will be shown and you may press 'F1' to run setup.

In CMOS SETUP section, you can enter system configuration information which will be stored in CMOS RAM on the motherboard. The information include the devices of the system as well as memory size.

EXTENDED SETUP PROGRAM allows you to configure the registers of the chipsets. These registers are programmed with default settings by the BIOS. You may change the setting to improve performance or to suit the system configuration. New settings will be stored on CMOS RAM and will be used after reset. Improper setting of the registers may make the system malfunction. Consult your dealer if you have any doubt.

SECTION 1 CMOS SETUP

The memory size and the numeric processor are detected by the BIOS. So you are only required to set those options on the left side of the screen. The system configuration information are shown as follows:

OPTION 1 TIME AND DATE

Use PgUp and PgDn keys to change the value.
The date and time cannot be entered directly.

OPTION 2 FLOPPY DISK DRIVE

Four types of floppy disk drives are supported:

1. 5-1/4 inch standard drive (360K)
2. 5-1/4 inch high-density drive (1.2M)
3. 3-1/2 inch standard drive (720K)
4. 3-1/2 inch high-density drive (1.44M)

Select the correct types. Otherwise the drives cannot work properly. The system BIOS supports two floppy disk drives and they are recognized as drive A and B. If one of them is not installed, select 'Not Installed' for that drive. The BIOS is able to detect the type of the drives. But remember to check the settings before exit.

There are 47 types of fixed disks supported by the BIOS. Consult your fixed disk manual to determine its correct type. The parameters such as cylinder number, head number, sector number and pre-compensation must be matched with your fixed disk.

Use PgUp and PgDn keys to change the fixed disk type. If the type of your fixed disk is not listed, define a new type as type 47. Use left and right arrow keys to move between the parameter fields and enter the parameters. The parameters will be stored in the CMOS RAM and your fixed disk can be used afterwards.

If the type of fixed disk is wrong, it takes a while before the BIOS can identify the error. After setting the fixed disk type, if the system halts after reboot, please wait for a while. It is most likely that the setting of fixed disk type is incorrect.

Some fixed disks are specially handled and must be set to 'Not Installed'. Consult the fixed disk manual for details.

OPTION 4 DISPLAY

Four types of display are supported:

1. CGA 80 column mode
2. CGA 40 column mode
3. EGA and VGA
4. Monochrome

If the type of display is incorrect, the BIOS will prompt you and ask you to set up again. But the BIOS is still able to display messages on the display attached to the system. Thus you can enter the setup program.

OPTION 5 KEYBOARD

If a keyboard is attached to the system, select 'Installed'. The BIOS will test the keyboard during self-test.

OPTION 6 Scratch RAM

The BIOS may require some storages for certain functions and this storage can be allocated in two ways. One way is to use the BIOS stack and another is to allocate a 1K bytes memory in the base memory. Generally, the former option is appropriate. If the hard disk type 47 is defined or If you run program like OS/2 which will use 80386 instruction, select the option 2.

SECTION 2 EXTENDED SETUP PROGRAM

All the registers of the chipset are set to default values. Usually, you need not modify these registers unless the configuration is changed. Since improper settings of these registers may make the system malfunction, check your settings before exit.

Select 'Write CMOS register and exit' to save the new settings in the CMOS RAM. The BIOS will then reboot the system and the new settings are in effect afterwards.

There are two ways to program the registers: advanced setup and easy setup. Advanced setup is more complicated and you have to program the registers bit by bit. In advanced setup, use arrow keys to move the cursor between each field. The corresponding explanation is displayed for your reference.

In most cases, the easy setup is adequate and simple to use. There are four groups of selections:

- (1) Clock
- (2) Wait state
- (3) Shadow RAM and remap
- (4) Cache controller

In easy setup, you simply use the up and down arrow keys to move between selections and press 'Enter' to select. The BIOS will set the registers accordingly.

(1) *Clock*

CPU clock

When set to CLKIN, the CPU will run at 33MHz for 66MHz oscillator or 25MHz for 50MHz oscillator. If ICLK is selected, the CPU will run at low speed.

ICLK clock

ICLK is used by peripherals on the motherboard and slots, such as display and DMA. If normal speed mode is enabled, the CPU will use ICLK clock.

	CPU Speed	
ICLK	33 MHz	25 MHz
CLKIN/4	8.25	6.25
CLKIN/3	11.00	8.33
CLKIN/2	16.50	12.50

To be compatible with add-on cards, the ICLK must be 8.33 MHz or less.

ATCLK stretch

When enabled, the performance is further improved. Nevertheless, compatibility problem may arise. Check with your configuration before permanently enabling this feature.

(2) *Wait state*

The number of wait state for memory read and write operations depends on the speed of DRAM.

	Number of	wait state
CPU speed	1	0
25 MHz	100ns	80ns

(3) *Shadow RAM and remap*

640K bytes is allocated for base memory. There are 384K bytes left below 1M. This part of memory is divided into three partitions: allocated for system BIOS shadow RAM, allocated for video BIOS shadow RAM and 256K bytes unused. The unused partition can be remapped to other address. Usually enable the remapping function.

(4) *Cache Controller*

There are four selections:

Cache enable/disable
Cache controller
256KB remapped area cached enabled/disabled
Cacheable address range

The cache controller is incorporated in the chipset. If the secondary cache memory is not installed, disable the cache controller.

256KB remapped area is located at a new address. Select 'enable' to inform the cache controller to include this area in the cacheable area.

Cacheable address range should be equal to the memory size on board.

APPENDIX B SYSTEM LAYOUT DIAGRAM

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