

T R O U T

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VERSION: 1.0

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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 Trout-386 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 technical information for hardware and software engineers.

In this manual, there are 4 chapters. Chapter 1 contains a brief introduction and specification of OCTEK Trout-386 motherboard. In the chapter 2, the functions of Trout-386 are explained. It also outlines many advanced features of the CPU and the system architecture. Chapter 3 explains the installation of coprocessor, DRAM modules and jumpers. Technical information is provided in the chapter 4.

System BIOS and the system setup are described in the appendix A. All setup procedures are explained. Appendix B contains the information about the memory expansion board.

Additional information are given in appendix C, D, E and F for the maintenance purpose.

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Chapter 1

Introduction

32-bit computing will be the new standard for personal computer. New generation of applications will be design to take advantage of the 32-bits architecture and the advanced functions of 80386DX. OCTEK Trout-386 is built with 80386DX microprocessor and a highly integrated chipsets to provide high performance, reliability and compatibility at relatively low cost.

OCTEK Trout-386 supports 80387 or WEITEK 3167. A sophisticated memory controller with page/interleaved mode is implemented. The total memory is 16MB. 8MB memory is installed on board and additional 8MB is on memory expansion board which is installed on a fast speed 32-bits memory expansion slot. Shadow RAM and memory remapping functions are also employed.

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 Trout-386. 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 80386DX CPU
with optional 80387DX Math
Co-processor
or WEITEK 3167 Coprocessor*

Speed:

*Turbo/normal speed
Software/hardware selectable*

I/O Slot:

*Compatible to standard AT bus
One 8-bit and seven 16-bit slots*

Memory:

*Shadow RAM for system BIOS and video
BIOS
Page/Interleaved mode
SIMM sockets for 256K or 1M modules
8M bytes on board
Up to 16M bytes with optional memory
expansion 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 backup
- Fast A20 gate and fast reset

Other Features:

- On board POWERGOOD generation
 - External battery connector
 - Hardware turbo switch
-

PROCESSOR

80386DX is a true 32-bit microprocessor with 32-bit external data bus and 32-bit external address bus. Therefore it processes more data at the same time than 80286 or 80386SX which have 16 bit external data bus and can access a large memory size which is necessary for 32-bit applications. To combine the wider bus structure and all the advanced functions on chip, total 275,000 transistors are integrated together.

A complicated pipeline architecture is implemented to speed up instruction decoding operation. Next four bytes of instructions are prefetched into the CPU whenever the bus is idle. The size of the prefetch queue is increased to hold 12 bytes. This architecture reduces the overhead of retrieving and decoding of the instructions.

80386DX is not only an enhanced version of 80286, but is designed to overcome the deficiencies of 80286 and provides more functions for advanced applications and operation systems.

80286 PC/AT has been used for many years and its limitations become obvious when more powerful applications are being developed. This microprocessor is limited by its 16-bit architecture. So, it takes longer time to transfer large amount of data.

GENERAL FEATURES

The 64KB segment size also becomes an obstacle to complicated software. Software developers have to partition their software into multiple code and data segments, which means larger program size and less efficiency. 80286 lacks a complete facility to switch between real and protected mode. So operating systems need to handle the mode switching and the performance is greatly downgraded.

80386DX is aimed to provide advanced facilities to sophisticated software, but still remains compatible with existing software. It operates at real mode and protected mode. At real mode, all existing software for XT/AT can be used without any problem. Furthermore, new mechanism allows switching between real mode and protected mode at fast speed. Hence applications using EMS memory can run efficiently although they only use software driver to emulate EMS memory.

The protected mode of 80386DX is fully compatible with 80286. All privilege - level and I/O protection system are supported. New system control instructions, memory paging, I/O permission bit map are provided to make 80386DX ideal for multi-tasking operation systems.

In addition, a virtual 8086 mode is provided. In this mode, the CPU can be considered by the programs as being divided into several 8086 CPUs and each program has their own CPU and memory space. Several programs for XT/AT as well as operating systems for 80286 and 80386DX can be executed simultaneously. Programs are isolated and protected from each other by 80386DX. Each program can consider that it is running at a XT/AT.

Internal memory management unit is much more complicated than 80286, but provides a more 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

GENERAL FEATURES

by 80386DX 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. It eliminates the need for the software to manage multiple code and data segments.

80386DX includes many new instructions for system control, high level language support and processor control. These instructions are used in protected mode. New operation systems and software can make use of these instructions for their advanced features, such as concurrent operation and virtual memory.

MATH COPROCESSOR

The demand for sophisticated, number-crunching scientific and business applications has rapidly increased in recent years. 80386DX 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 overcome this obstacle, external Math coprocessor is necessary. The Math coprocessor contains complex hardware and large data registers for floating-point numeric operations. In OCTEK Trout-386, the Math coprocessor is optional and both Intel 80387 and WEITEK 3167 are supported.

80387 is upward object-code compatible from 80287 and 8087, but runs 6 to 11 times faster than 80287 used in AT. It fully implements the IEEE 754 Binary Floating-point Arithmetic standard with a high precision 80-bits internal architecture.

WEITEK 3167 can deliver more power than 80387 and is supported by various operation systems and high level programming language compilers. It has a direct interface with the CPU. So the data are transferred between them at full speed.

MEMORY SYSTEM

Four banks of DRAMs can be installed. Two banks are available on motherboard and others are on optional memory expansion board. One bank of DRAM refers to four pieces of SIMM modules. 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. In general, the 8MB on-board memory will be sufficient for most applications. The use of memory expansion board may not be necessary.

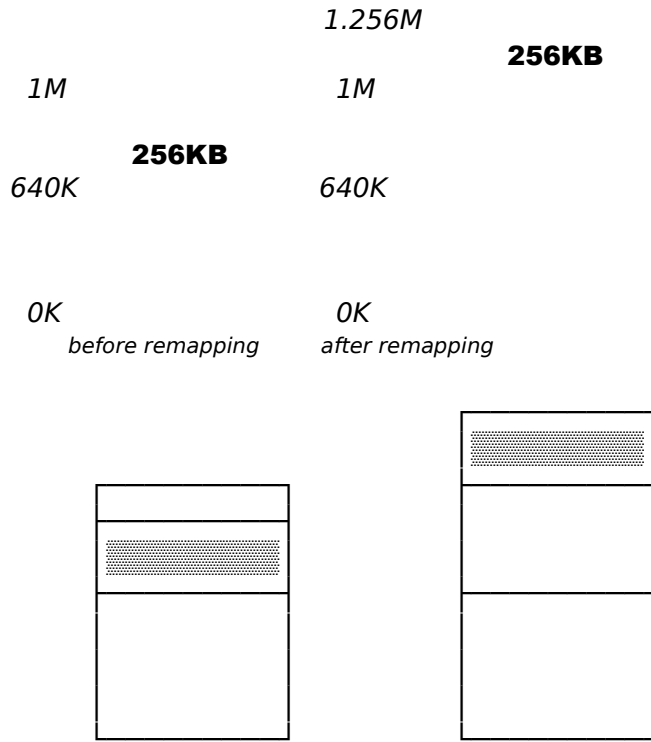
Since the CPU is running at 25MHz, a simple memory architecture is not able to catch up with the CPU and thus affects the overall performance. The memory system supports page-interleaved mode. The memory is divided into pages. Successive memory accesses within the same page need not require wait state and thus CPU can run at full speed. 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. 640K bytes is allocated as base memory. On the other hand, system BIOS and video BIOS occupy some locations between 640K and 1M. When 1M bytes or

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more are installed, there are some portions of DRAM overlapping with the BIOS and cannot be accessed by applications. Memory remapping allows these portions of memory to be accessed at other locations and thus can be utilized by the software. Memory remapping is supported by hardware and can be enabled in system setup.



Memory remapping



GENERAL FEATURES

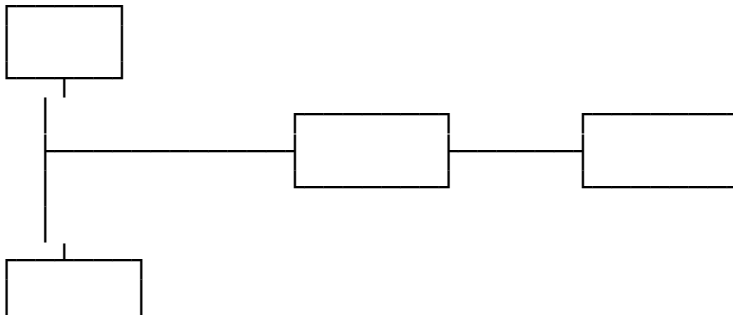
DUAL BUS DESIGN

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 and main memory. This bus is synchronous with 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 compatibility problem.



Main Memory



GENERAL FEATURES



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 Trout-386 is designed to be compatible with standard AT bus. All the expansion cards conformed to the standard AT bus can be used in OCTEK Trout-386 without problem.

Chapter 3

Installing Components

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

INSTALLING MATH COPROCESSOR

Math coprocessor 80387 and WEITEK 3167 are PGA devices. Beside the CPU, there is a 121-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. Make sure that the coprocessor is firmly inserted into the socket.

INSTALLING COMPONENTS

The WEITEK 3167 is a 121-pin chip which matches the pin count of the socket. Align the pins and gently insert the chip into the socket. However, 80387 has 69 pins and its package is smaller and different from WEITEK 3167. So, it only occupies the inner pins of the socket.

Before installing the Math coprocessor, make sure all the pins are straight. The pins are very fragile. Once these pins are bent, the coprocessor may be damaged.

Check whether the system BIOS can find the coprocessor after reset. The system BIOS will display a list of devices on the motherboard after self-test. If the coprocessor is installed, it should show the type of coprocessor.

INSTALLING RAM MODULES

OCTEK Trout-386 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 CPU as shown in 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 a 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 (J10) for the battery is located beside the keyboard connector on the rear of the board. Use a 3.6V battery. Turn off the power before install the battery. The location of the connector J10 is shown below.



CONFIGURATION OF MEMORY

The configuration of the memory is very flexible. Either 256KB or 1MB 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 later more memory can be installed when upgrading the system. The different configurations of memory is illustrated on next page.

There are totally four banks of DRAM. Two banks (bank 0 and 1) are on the motherboard and the others (bank 2 and 3) are on the memory expansion board. If bank 0 and 1 are filled, you have to use bank 2 and 3.

Page mode is always active. Interleaved mode is only enabled for those banks with similar pairs or quartet of DRAMs. The performance is automatically improved whenever the interleaved mode is active.

The memory size is detected automatically by system BIOS and indicated during memory test after reset. No jumper is needed to be set for the memory size and DRAM type.

To determine what DRAM speed rating should be used depends 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. If zero wait state is selected, fast page mode DRAM is needed.

INSTALLING COMPONENTS

The wait state setting is applied to four 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.

Because of the shadow RAM and memory remapping feature, the memory size may not equal to the actual memory size. Suppose that there is 1MB on board. If memory remapping is disabled, the BIOS will show the memory size is 640KB. After enabled, the memory size is increased to 896KB. The rest of the memory (128KB) is assigned for shadow RAM and can not be used by software.

The number of wait state is assigned in the BIOS setup. Improper setting may make the system malfunction. In this case, reset the CMOS setup using JP11. Then reset the system and go through the system setup again.

INSTALLING COMPONENTS

DRAM CONFIGURATION

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

INSTALLING COMPONENTS

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

CONTROL OF SYSTEM SPEED

System Speed can be controlled by hardware switch and keyboard. Connector SW2 is connected to the turbo switch of the case and turbo LED connector can be connected to CR4. 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.

Note that when the hardware turbo switch is set to low speed, the system speed is controlled by keyboard. On the contrary, after you set to low speed by keyboard, the hardware turbo switch can toggle the system speed.



SYSTEM BOARD JUMPER SETTING

Display Selection

<i>JP1</i>	
<i>ON</i>	<i>CGA, EGA, VGA</i>
<i>OFF</i>	<i>Monochrome display *</i>

*Note : * factory setting*



INSTALLING COMPONENTS

SYSTEM BOARD CONNECTORS

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

<i>Connector</i>	<i>Function</i>
<i>SW1</i>	<i>Hardware reset connector</i>
<i>J22</i>	<i>Speaker connector</i>
<i>SW2</i>	<i>Turbo switch connector</i>
<i>CR4</i>	<i>Turbo LED connector</i>
<i>J23</i>	<i>Power LED & Ext-Lock connector</i>
<i>J11,J12</i>	<i>Power supply connector</i>
<i>J10</i>	<i>External battery connector</i>
<i>J9</i>	<i>Keyboard connector</i>

Pin assignments of the connectors are illustrated as follows:

SW1 - Hardware Reset Connector

<i>Pin</i>	<i>Assignment</i>
<i>1</i>	<i>Selection Pin</i>
<i>2</i>	<i>Ground</i>

INSTALLING COMPONENTS

J22 - Speaker Connector

<i>Pin</i>	<i>Assignment</i>
<i>1</i>	<i>Data out</i>
<i>2</i>	<i>+5 Vdc</i>
<i>3</i>	<i>Ground</i>
<i>4</i>	<i>+5 Vdc</i>

SW2 - Turbo Switch Connector

<i>Pin</i>	<i>Assignment</i>
<i>1</i>	<i>Selection Pin</i>
<i>2</i>	<i>Ground</i>

CR4 - Turbo LED Connector

<i>Pin</i>	<i>Assignment</i>
<i>1</i>	<i>+5 Vdc</i>
<i>2</i>	<i>LED signal</i>

INSTALLING COMPONENTS

J23 - Power LED & Ext-Lock Connector

<i>Pin</i>	<i>Assignment</i>
1	+5 Vdc
2	Key
3	Ground
4	Keyboard inhibit
5	Ground

J11,J12 - Power Supply Connector

<i>Pin</i>	<i>Assignment</i>
1	POWERGOOD
2	+5 Vdc
3	+12 Vdc
4	-12 Vdc
5	Ground
6	Ground

<i>Pin</i>	<i>Assignment</i>
1	Ground
2	Ground
3	-5 Vdc
4	+5 Vdc
5	+5 Vdc
6	+5 Vdc

INSTALLING COMPONENTS

J10 - External Battery Connector

<i>Pin</i>	<i>Assignment</i>
<i>1</i>	<i>+ Vdc</i>
<i>2</i>	<i>not used</i>
<i>3</i>	<i>Ground</i>
<i>4</i>	<i>Ground</i>

J9 - Keyboard Connector

<i>Pin</i>	<i>Assignment</i>
<i>1</i>	<i>Keyboard clock</i>
<i>2</i>	<i>Keyboard data</i>
<i>3</i>	<i>Spare</i>
<i>4</i>	<i>Ground</i>
<i>5</i>	<i>+5 Vdc</i>

Chapter 4

Technical Information

This section provides technical information about OCTEK Trout-386 and is intended for advanced users interested in the basic design and operation of OCTEK Trout-386.

MEMORY MAPPING

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

TECHNICAL INFORMATION

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.

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



TECHNICAL INFORMATION

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 Trout-386 has three programmable timer/counters controlled by 82C206 and they are defined as channels 0 through 2:

<i>Channel 0</i>	<i>System Timer</i>
<i>Gate 0</i>	<i>Tied on</i>
<i>Clk in 0</i>	<i>1.190 Mhz OSC</i>
<i>Clk out 0</i>	<i>8259 IRQ 0</i>

<i>Channel 1</i>	<i>Refresh Request Generator</i>
<i>Gate 1</i>	<i>Tied on</i>
<i>Clk in 1</i>	<i>1.190 Mhz OSC</i>
<i>Clk out 1</i>	<i>Request Refresh Cycle</i>

TECHNICAL INFORMATION

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

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

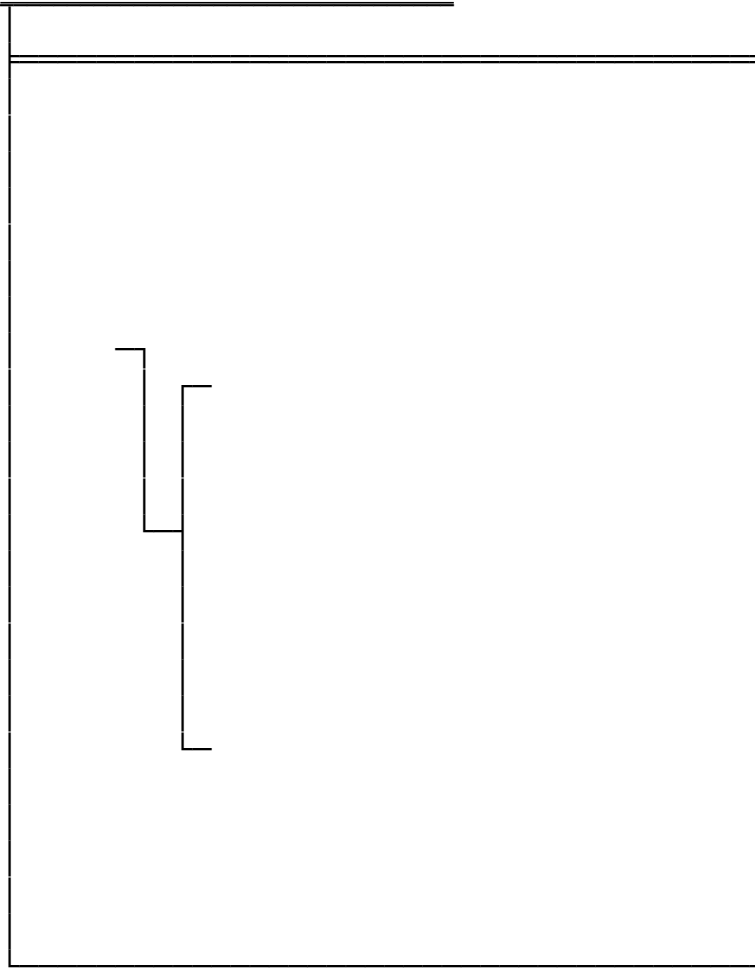
The 8254 Timer/Counters are treated by system programs as an arrangement of four programmable external I/O ports. Three are treated as counters and the fourth is a control register for mode programming.

SYSTEM INTERRUPTS

Sixteen levels of system interrupts are provided on OCTEK Trout-386. The following shows the interrupt-level assignments in decreasing priority.

Level		Function
<i>Microprocessor NMI</i>		<i>Parity or I/O Channel Check</i>
<i>Interrupt Controllers</i>		
<i>CTLR 1</i>	<i>CTLR 2</i>	
<i>IRQ0</i>		<i>Timer Output 0</i>
<i>IRQ1</i>		<i>Keyboard (Output Buffer Full)</i>
<i>IRQ2</i>		<i>Interrupt from CTLR 2</i>
	<i>IRQ8</i>	<i>Real-time Clock Interrupt</i>
	<i>IRQ9</i>	<i>Software Redirected to INT 0AH (IRQ2)</i>
	<i>IRQ10</i>	<i>Reserved</i>
	<i>IRQ11</i>	<i>Reserved</i>
	<i>IRQ12</i>	<i>Reserved</i>
	<i>IRQ13</i>	<i>Coprocessor</i>
	<i>IRQ14</i>	<i>Fixed Disk Controller</i>
	<i>IRQ15</i>	<i>Reserved</i>
<i>IRQ3</i>		<i>Serial Port 2</i>
<i>IRQ4</i>		<i>Serial Port 1</i>
<i>IRQ5</i>		<i>Parallel Port 2</i>
<i>IRQ6</i>		<i>Diskette Controller</i>
<i>IRQ7</i>		<i>Parallel Port 1</i>

TECHNICAL INFORMATION



DIRECT MEMORY ACCESS (DMA)

OCTEK Trout-386 supports seven DMA channels.

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

TECHNICAL INFORMATION

The following shows the addresses for the page register.

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



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

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

TECHNICAL INFORMATION

REAL TIME CLOCK INFORMATION

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

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

SYSTEM EXPANSION BUS

OCTEK Trout-386 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*
-

TECHNICAL INFORMATION

The following figure shows the pin numbering for I/O channel connectors J3 to J10.

TECHNICAL INFORMATION

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

TECHNICAL INFORMATION

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

TECHNICAL INFORMATION

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

TECHNICAL INFORMATION

I/O Channel (B-Side)

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

TECHNICAL INFORMATION

<i>B26</i>	<i>-DACK2</i>	<i>O</i>
<i>B27</i>	<i>T/C</i>	<i>O</i>
<i>B28</i>	<i>BALE</i>	<i>O</i>
<i>B29</i>	<i>+5 Vdc</i>	<i>Power</i>
<i>B30</i>	<i>OSC</i>	<i>O</i>
<i>B31</i>	<i>GND</i>	<i>Ground</i>

TECHNICAL INFORMATION

I/O Channel (C-Side)

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

TECHNICAL INFORMATION

I/O Channel (D-Side)

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

Appendix A

System BIOS

The system BIOS provides an interface for operating systems and applications to access hardware. It is fully compatible with standard AT BIOS and works in the network system. It also performs self-test after reset and includes a setup program to setup 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. It takes a while before some messages are shown on the screen. It does not mean that the system is not working when the screen is blank. So wait for a while after turning on the power and listen carefully to the speaker. Some errors are reported by a number of beep sounds. After completing the self-test, the BIOS will display some messages on the screen.

Unlike most of the tests which take a short 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

SYSTEM BIOS

It is recommended to complete the memory test. The total memory size is displayed after the memory test.

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 beep sounds. Otherwise, error message will be shown on the screen.

There are two types of errors reported by beep sounds. One is conveyed as one long beep followed by a number of short beeps. The meanings of the errors are as below :-

<i>Short Beep Count</i>	<i>Meaning</i>
<i>3</i>	<i>Memory Failure</i>
<i>8</i>	<i>Display Adapter Failure</i>

The other type of errors are serious failure and are conveyed as a number of beep and repeated infinitely.

<i>Beep Count</i>	<i>Meaning</i>
<i>1</i>	<i>DRAM Refresh Failure</i>
<i>3</i>	<i>Base 64K Byte Memory Failure</i>
<i>4</i>	<i>System Timer Failure</i>
<i>5</i>	<i>Processor Failure</i>
<i>6</i>	<i>Keyboard Controller - Gate A20 Failure</i>
<i>7</i>	<i>Virtual Mode Exception Error</i>
<i>9</i>	<i>ROM-BIOS Checksum Failure</i>

If no error is found during self-test, the system BIOS will proceed to boot from floppy disk or hard disk. The system BIOS will list the system configuration on the screen as below.

SYSTEM BIOS

System Configuration (C) Copyright 1985-1990, American Megatrends Inc.,

Main Processor	: 80386	Base Memory Size	: 640 KB
Numeric Processor	: None	Ext. Memory Size	: 7424 KB
Floppy Drive A:	: 1.2 MB, 5¼"	Hard Disk C: Type	: 2
Floppy Drive B:	: 1.44MB, 3½"	Hard Disk D: Type	: None
Display Type	: VGA or EGA	Serial Port(s)	: None
ROM-BIOS Date	: 04/30/90	Parallel Port(s)	: 3BC

Do check the list to make sure that the configuration is correct. Sometimes, problems arise because of the incorrect information of the configuration. For example, if you forget to modify the setup after changing the floppy disk drive from one type to another, it can not boot from floppy disk or may not work properly. If you check the list, you can find the cause of the problem.

SYSTEM SETUP

The BIOS incorporates two setup sections:

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

It is important that all the 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 finds that the configuration of the system is altered, error message will be shown and you may press 'F1' to run setup. Then the following messages are shown on the screen.

**EXIT FOR BOOT
RUN CMOS SETUP
RUN XCMOS SETUP**

SYSTEM BIOS

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

XCMOS SETUP (EXTENDED SETUP PROGRAM) allows you to modify the registers of the chipsets. These registers are programmed with default settings by the BIOS. You may change the settings to improve the system performance or to suit the system configuration. Improper settings of the registers may cause the system malfunction. Consult your dealer if you have any doubt.

(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:

CMOS SETUP (C) Copyright 1985-1990, American Megatrends Inc.,

Date (mn/date/year) : Sun, Jul 01, 1990 Base memory size : 640 KB
 Time (hour/min/sec) : 12 : 05 : 30 Ext. memory size : 7424 KB
 Floppy Drive A: : 1.2 MB, 5¼" Numeric Processor: None
 Floppy Drive B: : 1.44 MB, 3½"

Hard Disk C: type : Not Installed
 Hard Disk D: type : Not Installed
 Primary Display : VGA or EGA
 Keyboard : Installed
 Video BIOS Shadow : Disabled
 Scratch RAM Option : 1
 Main BIOS Shadow : Enabled
 Memory Relocation : Enabled
 AT Clock Stretch : Disabled

Cyln Head WPcom LZone Sect Size

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4
5	6	7	8	9	10	11

Month : Jan, Feb, Dec
 Date : 01, 02, 03,
 Year : 1901, 1902,

ESC=Exit, ↓→↑←=Select, PgUp/PgDn=Modify

SYSTEM BIOS

OPTION 1 TIME AND DATE

Use PgUp and PgDn keys to change the value. The date and time cannot be entered directly. An calender is displayed on the lower right corner of the screen for your reference.

OPTION 2 FLOPPY DISK DRIVE

Four types of floppy disk drives are supported:

- 1. 5-¼ inch standard drive (360K)*
- 2. 5-¼ inch high-density drive (1.2M)*
- 3. 3-½ inch standard drive (720K)*
- 4. 3-½ inch high-density drive (1.44M)*

The system BIOS supports two floppy disk drives and they are recognized as drive A and B. Select the correct types. Otherwise the drives cannot work properly. If one of them is not installed, select 'Not Installed' for that drive.

The BIOS is able to detect the type of the drives automatically. But remember to check the settings before exit.

SYSTEM BIOS

OPTION 3 FIXED DISK DRIVE

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 match your fixed disk's parameters.

Use PgUp and PgDn keys to change the fixed disk type. If the type of your fixed disk is not included in the hard disk list, 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. Each hard disk can be assigned a different type 47 hard disk. So two hard disks which are not included in the list can be used together in your system.

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.

When you install a new hard disk, make sure whether it is already formatted. If not, the BIOS has to check for a while before reporting the hard disk error. In fact, the error arises only because the hard disk is not formatted. If the hard disk is formatted, you can run DOS FDISK and DOS FORMAT.

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.

The jumper JP10 must be set according to this setting. Otherwise, the BIOS will report error after self-test.

SYSTEM BIOS

OPTION 5 KEYBOARD

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

OPTION 6 VIDEO BIOS SHADOW

If enabled, the content of the video BIOS is copied to the on board memory and thus the operation of the video BIOS is speeded up. This feature is useful for VGA BIOS because it does not occupy the main memory space.

OPTION 7 SCRATCH RAM OPTION

The BIOS may require memory storage for certain functions and the 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 80386DX instruction, select the option 2.

OPTION 8 MAIN BIOS SHADOW

If enabled, the content of the system BIOS is copied to the on board memory and thus the operation of the system BIOS is speeded up.

OPTION 9 MEMORY RELOCATION

Of the on board memory, 640K bytes are allocated for main memory and 128K bytes are assigned for shadow RAM function. So, there will be 256K bytes left below 1M bytes. If the option is enabled, this part of memory can be used by applications but will be accessed at other location. If disable, this memory area cannot be used.

OPTION 10 AT CLOCK STRETCH

It is a special feature to improve the system performance by speeding up I/O slot operation. When ATCLK Stretch is enabled, the performance is further improved. However, test your configuration before permanently enabling this feature. Some add-on cards may not work with this feature and you need to disable it.

(2) EXTENDED SETUP PROGRAM

All the registers of the chipsets are set to default values by the system BIOS. Usually, there is no need to modify these registers unless the configuration is changed. Since improper settings of these registers may cause the system malfunction, check your settings carefully before exit.

In EXTENDED SETUP PROGRAM, the main menu is shown as below:

*EASY SETUP OPTI CHIPSET
ADVANCED SETUP OPTI CHIPSET
WRITE CMOS REGISTERS AND EXIT
DO NOT WRITE CMOS REGISTERS AND 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.

After changing the registers' settings, test your system first to make sure that the settings are correct. It is possible that your system becomes unstable and you need to setup the registers again.

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 easy setup, the system BIOS allows you to modify some registers which are likely to be changed if system configuration is modified.

EASY SETUP OPTI CHIPSET

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

- (1) OPTi Clock Selection*
- (2) OPTi Wait State Setting*
- (3) OPTi fast gate A20 control*

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

CPU Clock Selection

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

ICLK Clock Selection

ICLK is used by peripherals on the motherboard and slots, such as display and DMA. If normal speed mode is enabled, the CPU will also use *ICLK* clock. *ICLK* is generated from *CLKIN* and the speed of *ICLK* is shown below.

<i>CPU</i>	<i>SPEED</i>
<i>ICLK</i>	25 Mhz
<i>CLKIN/4</i>	6.25
<i>CLKIN/3</i>	8.33
<i>CLKIN/2</i>	12.50

The system performance can be improved by selecting a higher *ICLK* speed. To be compatible with general add-on cards, the *ICLK* must be 8.33 Mhz 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.

(2) OPTi Wait State Setting

The number of wait state for memory read and write operations depends on the clock speed of CPU and the speed rating of the DRAM. The following table shows the recommended speed ratings. To ensure the stability of the system, select DRAM equivalent to or better than these ratings.

	<i>Number of</i>	<i>wait state</i>
<i>CPU speed</i>	<i>1</i>	<i>0</i>
<i>25 Mhz</i>	<i>100ns</i>	<i>80ns</i>

Check carefully whether your DRAM is suitable for the number of wait states you want to select. Improper setting can make the system unstable. The DRAM timing is tight at zero wait state. Since the specification of DRAM from different manufacturers may vary, it would be better to consult your local dealer for the detail information.

SYSTEM BIOS

(3) OPTi Fast Gate A20 Control

The control signal GATE A20 is a special signal for protected mode operation and is usually generated by external logic. Fast gate A20 control is a feature to toggle this signal without delay.

In this section, the status of fast gate A20 control can be set to a default statue after power up. Some applications using protected mode will need the fast gate A20 control to be enabled. One of the application is Windows 3.0. If you find that some other applications are working intermittently, try enable it and check whether the problem is solved.

Please note that this feature is not a standard feature. So make sure that your applications work fine with this feature enabled before permanently setting to 'enable'.

ADVANCED SETUP OPTi CHIPSET

In this setup section, a setup menu is shown as following.



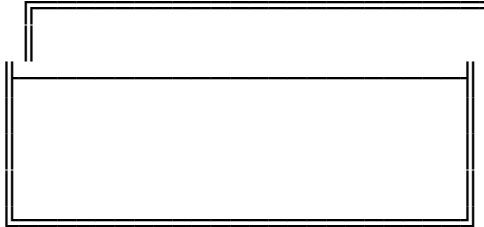
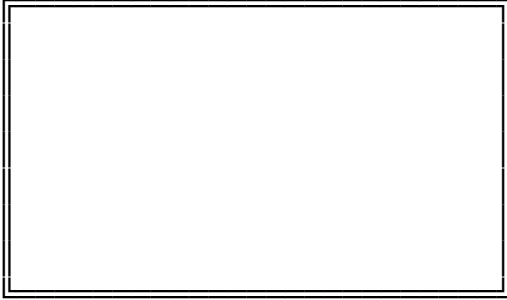
BITS 7 - 0
82C381 00H -> R R R R 0 01 R Go to Prev/Next Register - ↑ ↓
 Go to Prev/Next Entry - -
 Scroll Bit Value - PgUp/PgDn
82C382D 11H -> R R R R R 0 R R Return to MAIN MENU- <ESC>
 14H -> 00 0 R R R R R
 16H -> R R R R 0 R R R

CLOCK select

CPU clock select

0 -> CLKIN

1 -> ICLK



Under normal circumstances, advanced setup is not necessary. In advanced setup, you can directly modify each bits of the registers in the chipset. A comprehensive explanations are provided for your reference.

In advanced setup, use arrow keys to move the cursor between each field. The corresponding explanation is displayed on the right side of the screen. Use PgUp and PgDn keys to change the bit value. Related bits are grouped together.

'0' represents the bit is 0 and '1' represents the bit is 1. 'R' means reserved bit which is not allowed to be changed.

Except bit 2 of register 11H, other options can be modified through EASY SETUP. This bit controls the RAS timeout precharge counter. RAS* is a control signal to DRAM and should be inactive for a while after a certain period. During the inactive period, the DRAM can not be accessed and the memory operation has to be postponed. If enabled, the inactive period is cancelled and thus the memory need not to be delayed. It will lead to an improvement of the performance. However, since it violates the specification of DRAM, it is possible to cause stability problem. Therefore, make sure your system work fine before permanently enabling this feature.*

Appendix B

Memory Expansion Card

Memory expansion card contains bank 2 and bank 3 of memory. There are 8 SIMM modules on the card and total memory on this card is 8MB. Please refer to Chapter 3 for the configuration of the memory.

After installing the memory card, the system BIOS will determine the type of DRAM and the amount of total memory. There is no need to set any jumper. The system BIOS will prompt you to setup the memory size after re-boot.

However, you should make sure that the memory on the memory expansion board can be used reliably with the current setting of wait state. If there is any problem, increase the number of wait state.

There is a mounting plate on rear of the card. This mounting plate is used to keep the card on the slot firmly. Use a screw to fasten the card to the case.

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Appendix C

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 D

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 E

System Board Layout

Appendix F

Memory Expansion Card

Layout
