KP 386T Mainboard

MORSE

Operation Manual

KP 386T
Mainboard
Ver. 1.01

Operation Manual

How to Use this Manual

This manual covers all necessary information to operate the KP 386T system board. It will assist you in the installation and configuration of the system. By carefully following the steps described in this manual the user should be able to handle the system without additional help.

The table of contents gives detailed information about the arrangement or layout of this manual:

Chapter I	An introduction to the KP 386T motherboard, which provides a detailed feature list.
Chapter II	Hardware installation guide for setting up the system, details all functions for connectors, jumpers, switches, and other components.
Chapter III	Covers the physical layout for KP 386T Motherboarrd. Details procedure for attaching the motherboard, jumper setting guide, system testing, and burn-in test.
Chapter IV	Details the function settings for the system, mainly the jumper settings.
Chapter V	Installing and setting up the system memory.
Chapter VI	Showing the set up for the cache memory system.
Chapter VII	Showing CMOS RAM Set Up in detailed.
Chapter VIII	Showing Extended CMOS Set Up.
Chapter IX	The Question and Answer for Servicing the KP 386T System.
Chapter X	Trouble shooting by using error messages through BIOS.
Chapter XI	Technical reference for KP 386T, showing pin assignment for all connectors.

This User Manual is written for both KP 386T 25MHz and KP 386T 33MHz mother boards. Unless specifically stated otherwise, "KP 386T" will refer to both mother board throughout this manual. We indicated "25MHz system" for KP 386T 25MHz and "33MHz system" for KP 386T 33MHz mother board.

Western Digital, IBM, PC AT/ XT, PS/2, OS/2, Intel, MS-DOS, Xenix and Novell are trademarks of their respective companies.

CONTENTS

Chapter I **Introduction** 1
I - 1 General Description 1
I - 2 Features 2

Chapter II **Installation Guide** 3
II - 1 Check List 3
II - 2 The Layout for KP 386T 4
II - 3 Connectors 5
II - 4 Jumpers 5
II - 5 Other Important Components 5

Chapter III **Installing, Testing, and Burn-in the System** .7
III - 1 Peripherals Required for Installing a System 7
III - 2 Guide for Attaching Connectors 7
III - 3 Guide for Setting Jumpers and Switches 8
III - 4 Installation Procedure for the System 9

Chapter IV **Function Settings for the System Board** 11
IV - 1 System RESET 11
IV - 2 Display Mode Setting 11
IV - 3 Setting the System Speed 12
IV - 4 Keylock Function 13
IV - 5 Installing the Coprocessor 13
IV - 6 Engage/Disengage Battery for CMOS RAM 14
IV - 7 Cache Memory Size Settings 14

Chapter V **Setting up the System Memory** 15
IV - 1 Before Installing DRAMs 15
IV - 2 Installing DRAMs 16
IV - 3 Example for RAM Bank Installation and Memory Mode Setting 16

Chapter VI **Setting UP the Cache Memory System**.....19
IV - 1 The Function of Cache Memory System.....19
IV - 2 Cache System for the KP 386T.....20
VI - 3 Cache Memory and RAM Bank Settings.....20
VI - 4 Activating or Deactivating the Cache 20
VI - 5 How to Make a Memory Block Non-cacheable 21
VI - 6 Example for Setting Non-cacheable Memory.....22

Chapter VII **CMOS RAM Setup**.....23
VII - 1 Example of Running the CMOS Setup Utility 23
VII - 2 Technical Information for the CMOS Setup Option.....26

Chapter VIII **Using Extended CMOS Setup**.....29
VIII - 1 Operational Guide.....29
VIII - 2 Example of Running the XCMOS Setup.....30
VIII - 3 The References for Extended Setup 32

Chapter IX **Q & A for Servicing the KP 386T** 37

Chapter X **Power On Self Test Error Messages**.....41
X - 1 Errors Indicated by Beeps.....41
X - 2 Errors Indicated with Display.....42
X - 3 Trouble Shooting through Check Point.....44

Chapter XI **Technical Reference**.....47
XI - 1 Pin Assignment for KP 386T Connectors.....47

Figures

1. Physical Layout of the KP 386T 4
2. CMOS Setup Display.....25
3. The Extended CMOS Setup Menu.....30

Tables

1. The Available On-board Memory.....15
2. RAM Banks for Cache Memory and Cacheable Size.....20
3. Setting the Non-cacheable Register Block.....21
4. Pin Assignment for KP 386T Connectors.....47

Chapter I

Introduction

I-1 General Description

The KP 386T is a fully PC/AT compatible system board implemented with a highly integrated chip set. It uses the advanced Intel 80386DX CPU, the ETEQ 82C391, the ETEQ 82C392 Data Buffer, and the CHIPS 82C206 peripheral controller. The ETEQ 82C391 contains the Memory Controller, AT Bus Controller, CPU Controller, and Clock generation circuitry.

The KP 386T was designed to have maximum compatibility with peripherals and flexibility to use most memory chips. The advanced SETUP Utility provides user modifiable options to improve performance and reliability, as well as the compatibility to install most peripherals.

Enhancement options include Cache and Shadow RAM functions. The Cache system uses the integrated direct map Cache Controller to improve memory transfer rates and effectively increase processor speed. The Shadow RAM allows system BIOS and Video BIOS shadowing, enabling the system faster access to system and Video BIOS.

There are two banks of SIMM sockets provided to install the memory modules (RAM Pack), with various types of DRAMs. Various sizes of memory can be installed on-board, up to 32M bytes. The on-board cache system includes 32K byte cache memory and sockets to support an additional 32K byte SRAMs.

The KP 386T system board allows users to add a numeric co-processor to upgrade the system to workstation performance, to run applications such as financial modeling and spreadsheets, CAD/CAE, or advanced graphics. The socket for the coprocessor can support both the Intel 80387 math coprocessor, or the Weitek 3167 floating-point coprocessor without any hardware modification.

The KP 386T supports DOS Conventional memory, Expanded (EMS 4.0) memory, and Extended (running in protected mode) memory functions. It is fully compatible with XT, 286 AT and 386 software. It also supports MS-DOS,

PC-DOS, OS/2, Xenix, Unix, Novell Networking and IBM PC/AT compatible application programs.

I-2 Features

- Reliable, high performance 32-bit, Intel 80386DX CPU.
- System ASICs: the ETEQ 82C391 CPU/AT and DRAM Controller the ETEQ 82C392 Data Buffer, and the CHIPS 82C206 peripheral controller.
- Cache system reduces wait state to almost 0, improves performance, and allows use of slower DRAMs.
- SHADOW RAM function for system and video BIOS improve performance.
- Function settings are highly configurable via software, no hardware jumpers are required.
- Turbo/Normal system speed selectable by hardware or software.
- Hardware and software reset.
- Supports various memory partitions, and flexible memory size for up to 32M bytes available on-board with parity check.
- Supports Conventional (DOS), Expanded memory (EMS 4.0) and Extended (Protected Mode) memory functions.
- Real time clock and calendar circuit.
- CMOS memory to maintain system configuration.
- Advanced AMI BIOS with CMOS RAM SETUP, and EXTD SETUP Utilities.
- 512KB ROM on-board with sockets for replacement.
- 8 I/O expansion slots; six 16 bit and two 8 bit slots.
- Socket for optional co-processor; Intel 80387DX or Weitek 3167.
- LED indicator for Power On and TURBO mode.
- Two sets of mounting holes fit both baby AT and standard AT compatible chassis.
- Supports multi-user and multi-tasking operating system such as Xenix, Unix, Novell and OS/2.

Chapter II

Installation Guide

This chapter explains how to configure your particular system for the KP 386T motherboard. Incorrect setup or use of the system may result in damage to the computer system or peripherals. Carefully read through this manual before you install the motherboard and peripherals into your system. The step-by-step instruction below will guide you through the installation process.

II-1 Check List

Upon receipt of your KP 386T, inspect the package for evidence of damage during transportation. Open the package and inspect the board for visible damage such as scratches, loose components or broken components. If there is damage, notify your supplier immediately and ask for a replacement.

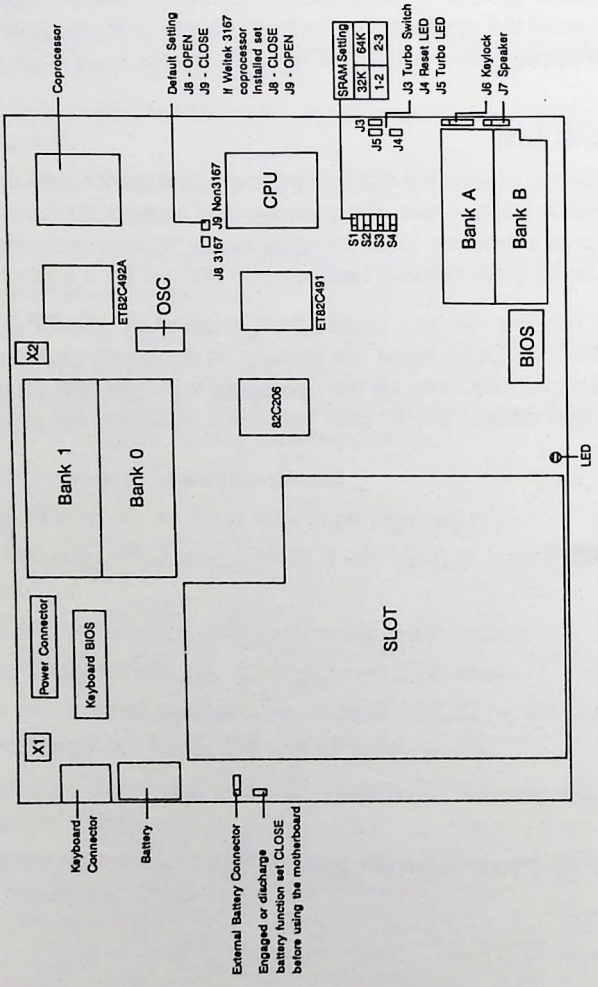
Besides this manual, you should have received the the KP 386T motherboard. If either of these items are missing or damaged, please contact your dealer. Make sure you keep all the packaging materials that accompany your KP 386T motherboard kit, in case you need to return the product for any reason.

II-2 The Layout for the KP 386T

The KP 386T is a Baby-AT size board with two sets of mounting holes to fit all types of chassis; such as portable, XT, or AT cases.

Figure 1 is the physical layout for KP 386T motherboard.

Figure 1. Physical Layout of the KP 386T



II-3 Connectors

Connector	Function & Description
JP1	Keyboard connector
JP6	External battery connector
J4	Hardware RESET connector
J5	Turbo LED indicator connector
J3	Turbo switch connector
J7	Speaker connector
J6	Keyboard inhibited and power on LED Indicator connector
J1, J2	Power supply connector
SLOT1 - SLOT14	Expansion slots

II-4 Jumpers

Jumper	Function & Description
JP2	Display mode setting
JP7	Disengage/engage battery for CMOS RAM
J8 - J9	3167/NON3167 setting

II-5 Other Important Components

Component	Function & Description
U1	Keyboard BIOS
U11	Intel 80387DX coprocessor
U36	Intel 80386DX CPU
U24	ETEQ 82C391 or 82C491
U10	ETEQ 82C392 or 82C492
U28	CHIPS P82C206
U58	ROM (system BIOS)
U8,U9,U14,U15	SIMM sockets for Bank0
U4 - U7	SIMM sockets for Bank1
U49,U50,U53,U54	DIP sockets for on-board SRAMs (32K) BankA
U51,U52,U55,U56	DIP sockets for optional SRAMs (32K) BankB
U34 - U35	DIP sockets for TAG RAM
U22	66MHz oscillator for 33MHz system 50MHz oscillator for 25MHz system

Chapter III

Installing, Testing, and Burn-in of the System

III-1 Peripherals Required for Installing a System

- KP 386T system board with DRAMs, SRAMs and BIOS.
- AT compatible chassis.
- AT or XT compatible power supply with power good signal.
- AT compatible keyboard.
- Display card.
- Monitor.
- FDD (and HDD) controller.
- Floppy (and Hard) disk drive.
- Any other XT/AT compatible equipment, such as serial port, parallel port, mouse, printer, plotter, faxcard, LANcard, etc.

III-2 Installation Procedure for the System Board

1. Install SIMM and SRAM.
2. Set jumper (JP7) to CLOSE to engage battery function for CMOS RAM.
3. Fix the motherboard to your case.
4. Connect the power supply connector to the motherboard.
5. Plug in the keyboard, speaker, turbo switch, turbo LED, power LED, and keylock switch to their connectors.
6. Attach FDD and HDD, and install their cables to the controller.

7. Firmly insert the FDD/HDD controller in a slot.
8. Install the display card.
9. Select display mode (mono/color).
10. Connect the monitor cable to the display card.
11. Check all screws and make sure that all parts are properly fixed.
12. Close case, connect power cords.
13. Switch on the monitor and the power supply.
14. Execute the setup program if your system is newly setup or has had any change of configuration.

III-3 System Test

After installing the motherboard and setting up the system, we need to make a system test to ensure all peripherals match and work properly. Following are the outlines for a basic system test.

Power-On Self Test -- Switch on the power and look for:

a. Error messages on screen, with memory check.
b. Look for memory test OK.
c. Speaker beeps.

CMOS Setup -- Execute the CMOS SETUP Utility supported by system BIOS, and verify:

a. Setup Configuration is matched with the configuration installed.
b. Memory size and memory mode, such as Shadow RAM and cache memory is enabled/disabled.
c. The Date and Time are correct.

Refer to *Chapter VII* for operating the CMOS Setup.

Keyboard -- Verify that keyboard and Keyboard Inhibits Lock works.

FDD/HDD -- Make sure that the system can boot from both the Floppy Disk Drive and the Hard Disk Drive, and can format both the floppy and hard disks.

System Speed -- Try to change the system speed for Turbo or Normal Mode by Hardware and Software.

Reset -- Check the Reset function for the system by Hardware and Software.

Software test -- Execute a standard Diagnostic program and make an extensive testing on all equipment.

III-4 Burn-in Test

The KP 386T motherboard has already had a 24-hour factory burn-in. Other components in the system may or may not have been burned-in. For this reason, after assembly and initial testing, a continous burn-in of the whole system is necessary.

Burning a system in requires running it continuously for a set period of time, as most electronic component failures occur when the product is new. If a component will fail, it will probably do so during the first 24-hours of operation.

Continuously running a series of diagnostics or a test program is a way to burn-in test as most diagnostic packages will keep a running error count displayed on the screen.

Chapter IV

Function Settings for the System Board

This section describes the general function settings by hardware for the system board. The symbol '*' means the default or factory setting. For advanced function settings or software settings and diagnostics, please refer to *Chapter VII* and *Chapter VIII.*

IV-1 System RESET (J21 & Keyboard)

There are two ways to reset the system: 1) the software RESET: press and hold the <Ctrl> and <Alt> keys, then press the <Del> key and 2) the hardware RESET: set jumper (J4) to CLOSE. The jumper is usually connected to a button switch on the front panel by wires, user just pushes the button to RESET.

RESET by	Media	Set/Pressing
Hardware	Jumper(J4)	CLOSE
Software	Keyboard	<Ctrl-Alt-Del>

IV-2 Display Mode Setting (JP2)

Jumper (JP2) is used to determine the type of display adapter attached. Below are the appropriate settings:

Jumper	Setting	Mode	Adapter Attached
JP2	1 - 2	Mono	Monochrome, Hercules
JP2	* 2 - 3	Color	CGA, EGA, VGA, EVGA

IV-3 Setting the System Speed

The system speed can be set at either NORMAL or TURBO mode by hardware (Jumper J3) or software (Keyboard). The TURBO LED indicator lights up during Turbo Mode. Turbo Mode means faster system speed and Normal Mode is the slower system speed.

The system speed for Normal Mode can be selected by using the software utilities in the BIOS to modify the Chipset Register. *Chapter VIII* details the operation of the Advanced Setup. Users may change to the desired speed as shown in the following table.

Mode	System Speed	
Turbo	25MHz	33MHz
Normal	5, 6.3, 8.3MHz	6.6, 8.3, 11MHz
Default	5MHz	6.6MHz

Note: *'Default' means the Normal System Speed automatically set by system BIOS. Users may choose the other speeds (instructions in Chapter VIII).*

Setting System Speed by Hardware:

Jumper (J3) is a hardware toggle-switch used for switching the Turbo and Normal mode. It is usually connected to a push-button type toggle switch on the front panel by wires, the user just pushes the button to set for Turbo or Normal Mode. Following are the settings:

Set **OPEN** for Normal Mode

Set **CLOSE** for Turbo Mode

Note that if you set the jumper OPEN the system will always run in Normal Mode, and you are unable to change the speed by software (Keyboard).

Setting System Speed by Software:

1) Set the Jumper (J3) CLOSE for Turbo Mode.
2) Press <Ctrl> + <Alt> + <+> for Turbo Mode, and <Ctrl> + <Alt> + <-> for Normal Mode.

Note that the Turbo-LED Indicator always lights up in Turbo or Normal Mode if setting system speed by software (Keyboard).

IV-4 Keylock Function (J6)

Connector (J6) has two functions: 1) the Keyboard Inhibited (Pin 4 & Pin 5) and 2) Power On LED Indicator (Pin 1 & Pin 3) usually connected to the front panel by wires. Insert a key and turn the keyboard switch to control the Keyboard Inhibit function.

Keylock Setting		Function
Pin 4 & Pin 5	CLOSE	Keyboard inhibit
	OPEN	Keyboard functioning

IV-5 Installing the Coprocessor

The KP 386T was designed to support a coprocessor, which is an extension to the CPU architecture. Adding a coprocessor dramatically increases the processing speed of a computer for applications which intensely utilize mathmatical operations. The KP 386T with a coprocessor makes an ideal computer workstation platform for applications such as financial modeling and spreadsheets, CAD/CAE, or graphics.

An optional 121 pin socket located at U11 is used to install a coprocessor. Both the Intel 80387DX math coprocessor and Weitek 3167 floating-point coprocessor, are supported without any hardware modification or interface with a Coprocessor Daughter Board. It is advised to carefully note the correct alignment when inserting coprocessors. The flat corner of the socket and the coprocessor must be aligned. Wrong installation will damage your system or the coprocessor itself.

An 72 pin 80387 math coprocessor chip may be inserted in the 121 pin socket. The Weitek 3167 is a 121 pin floating-point coprocessor.

3167/NON3167 Setting (J8, J9)

After the coprocessor is inserted in the socket, users are reminded to verify the jumper settings.

J8	J9	Coprocessor Installed
CLOSE	OPEN	Installed with 3167
* OPEN	CLOSE	Installed with 80387 or no coprocessor

IV-6 Engage/Disengage Battery for CMOS RAM (JP7)

This jumper is used to engage or disengage battery for CMOS RAM. The Default (factory) setting is for Disengaging battery function to avoid battery power loss or malfunction during shipment. Users are reminded to set for Engaging battery function before using the motherboard. If this jumper is not set the data of CMOS RAM will be lost when the system is turned off.

JP7	Battery Function
* OPEN	Disabling
CLOSE	Enabling

IV-7 Cache Memory Size Settings (S1 - S4)

These jumpers are used to set the Cache memory size if you have changed the size of cache memory (SRAM):

Set S1, S2, S3, S4	Total SRAM Size Installed
Pin 1 - 2 CLOSE	32K, or not installed (0K)
Pin 2 - 3 CLOSE	64K

Chapter V

Setting Up the System Memory

This chapter details the installing System Memory (DRAM) into the system and setting up the memory mode.

V-1 Before Installing DRAMs

The KP 386T was designed to have two SIMM Banks on-board, with combinations of 256K, 1M, or 4M bit of DRAMs. Each SIMM Bank needs 4 SIMM modules. Please refer to *Figure 1* for the location and layout for RAM Banks.

The on-board memory can be up to 32M bytes. There is almost no limitation on the configuration of DRAM as long as the DRAM Banks are filled in order from Bank 0 to Bank 1. The following table shows the DRAM combinations that can be installed.

Table 1. The Available On-board Memory

SIMM BANK		Total On-board Memory
Bank 0	Bank 1	
256K	-	1MB
256K	256K	2MB
256K	1M	5MB
256K	4M	17MB
1M	-	4MB
1M	256K	5MB
1M	1M	8MB
1M	4M	20MB
4M	-	16MB
4M	256K	17MB
4M	1M	20MB
4M	4M	32MB

V-2 Installing DRAMs

This section will guide you in installing DRAM and describes RAM Bank settings in detail. There is no hardware setting required after attaching DRAMs. After you have attached the DRAMs, remember to update the CMOS RAM Configuration SETUP. The memory partition size and memory mode will be automatically setup by the BIOS after you power on the system. To modify the CMOS RAM Configuration please refer to *Chapter VII.*

V-3 Example for RAM Bank Installation and Memory Mode Settings

The KP 386T was designed to have full auto-setting for Memory Partition and Memory Mode, and no hardware jumper settings are required. If you have properly installed the DRAMs you can proceed to the CMOS SETUP to determine the configuration. *Chapter VII* details the CMOS SETUP. The following is an example showing the CMOS configuration SETUP (setup utilities supported by the system BIOS) after installing DRAMs.

If you want to install or remove memory you should:

1. Switch off the power,
2. Attach or remove DRAMs, and
3. Update the CMOS configuration setup.

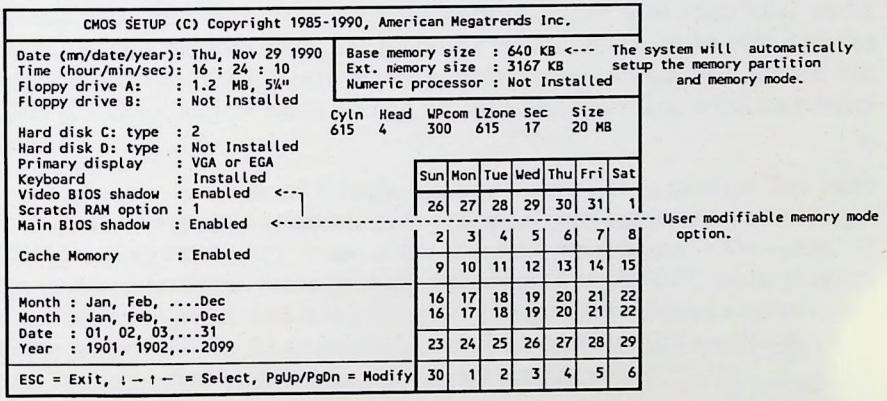
In this example, we have installed 4M bytes, in Bank 0 with 1M bit SIMM RAMs. Following is the required steps for updating the CMOS configuration setup.

A. Power-up or Reset the System

B. To Execute Setup Utilities

Press the <Del>key when you see the "Press <Del> if you want to run SETUP/EXTD-SET" message on the screen.

If errors were found the BIOS screen will show the error(s) and also the "RUN SETUP UTILITY" and " Press <F1> to RESUME" messages. After pressing the <F1> key the screen will show the CMOS SETUP Menu as follows:



C. Verify the Size of Memory

As the system BIOS will automaticaly detect the memory size during Power-on Self Test, the memory size will be displayed for us to verify.

Follow the instructed key sequence from the menu to modify other options, such as Video or Main BIOS Shadow mode.

D. Save and Quit the Utility

Press <Esc> and <Y> to save the value and exit the SETUP utility. The system will reboot.

Chapter VI

Setting Up the Cache Memory System

VI-1 The Function of the Cache Memory System

The cache memory is a system added in the memory control between main memory (DRAM) and the processor (CPU) to improve memory transfer rates and effectively increase processor speeds. It stores a copy of frequently accessed code and data from main memory in a zero wait state local cache memory, and enables the CPU to run at its full potential by reducing the average number of CPU wait states to nearly zero. A wait state means that CPU is idle for a cycle while waiting for data, and this reduces system performance.

The main function of a cache memory system is to provide fast local storage for frequently accessed code and data. The cache system intercepts CPU memory references to see if the required data resides in the cache. If the data resides in the cache (a "hit"), it is returned to the CPU without incurring wait states. If the data is not in cache (a "miss"), the reference is forwarded to the system and the data retrieved from main memory with a wait state. The data is also backed up in cache memory for further use.

An efficient cache will yield a high "hit rate" (the ratio of cache hits to total CPU data request), such that the majority of data requests are serviced with zero wait states. The net effect is that the wait states incurred in a relatively infrequent miss are averaged over a large number of accesses, resulting in an average of nearly zero wait states per access.

Since cache hits are serviced locally, a processor operating out of its local cache has a much lower "bus utilization" which reduces system bus bandwidth requirements, making more bandwidth available to other bus masters.

VI-2 Cache System for the KP 386T

The KP 386T is designed to support a Cache memory system to increase its efficiency and performance. This system provides the high hit rates necessary to make a large, relatively slow main memory array look like a fast, zero wait state memory to the CPU. The Cache Controller relocates often used data to fast access SRAM on a cache hit, therefore the system performance will be the same as if very fast new DRAM were used to gain 0 wait state memory access. *Figure 1* shows the location of SRAMs, TAG RAMs, and Jumpers for the Cache System.

VI-3 Cache Memory and RAM BANK Settings

The KP 386T has 32K bytes SRAM on-board. It can also support additional 32K bytes in the provided sockets. The cache should be 8Kx8, 25ns SRAM. If SRAM size is changed a set of four jumpers (S1, S2, S3, S4) should be set as shown below:

Table 2. RAM Banks for Cache Memory and Cacheable Size

BankA	BankB	Total Cache Size	S1, S2, S3, S4 are set for	Max. Cacheable Size (DRAM)
8Kx8	-	32K or 0K	Pin 1-2 close	8M bytes
8Kx8	8Kx8	64K	Pin 2-3 close	16M bytes

VI-4 Activating or Deactivating the Cache

The cache memory system can be activated or deactivated in the CMOS SETUP. *Chapter VII* details the operation of CMOS Setup. The following is the precedure for modifying the cache memory configuration in the CMOS Setup.

A. Execute the CMOS Configuration Setup Utility by pressing the <Del> key when the system bootups or after Reset, and choose the "RUN CMOS SETUP" option.

B. The Main Menu shows the options and setup. Press the <Up>, <Dn>, <Left>, or <Right> arrow keys to move the highlight bar to the "Cache Memory" option.

C. Press the <PgUp> or <PgDn> keys to select the desired option:

Options	Description
Enabled	To activate the cache memory system
Disabled	To deactovate the cache memory system

D. Press the <Esc> key to quit the menu, and respond <Y> to save the changes and exit the Setup Utility. The system will reboot.

VI-5 How to Make a Memory Block Non-cacheable

The Cache system in the KP 386T was designed for a 32-bit line size, with on-board 16Kx8 TAG RAM and 32K bytes of SRAM. The SRAM can be expanded to 64K bytes. The 32K bytes SRAM will allow the Cache system to access main memory (DRAM) addresses up to 8MB bytes. If the SRAM is expanded to 64K bytes, the cacheable range may be set up to 16M bytes (although the main memory (DRAMs) may be expanded to 32M bytes).

The memory beyond the cacheable range must be made non-cacheable by setting the non-cacheable register. It can run only in Page-Interleave Mode. Setting the non-cacheable register, is done by using Advanced CMOS Setup Utilities in the AMI system BIOS. *Chapter VIII* details the operation of these utilities, and the following table shows the settings for the non-cacheable register block.

Table 3. Setting the Non-cacheable Register Block

Total on board memory (DRAM)	On board 32K SRAM (max. DRAM addressable = 8MB)				On board 64K SRAM (max. DRAM addressable = 16MB)			
	REG 24		REG 25		REG 24		REG 25	
	A25-A22	A21-A18	non-cach. size	A21-A18	A25-A22	A21-A18	non-cach. size	A21-A18
1 MB	0010	0000	0000 0 MB	0000	0100	0000	0000 0 MB	0000
2 MB	0010	0000	0000 0 MB	0000	0100	0000	0000 0 MB	0000
4 MB	0010	0000	0000 0 MB	0000	0100	0000	0000 0 MB	0000
5 MB	0010	0000	0000 0 MB	0000	0100	0000	0000 0 MB	0000
8 MB	0010	0000	0000 0 MB	0000	0100	0000	0000 0 MB	0000
16 MB	0010	0000	1010 8 MB	0000	0100	0000	0000 0 MB	0000
17 MB	0010	0000	1011 9 MB	0000	0100	0000	0111 1 MB	0000
20 MB	0010	0000	1011 12 MB	0000	0100	0000	1001 4 MB	0000
32 MB	0010	0000	1100 24 MB	0000	0100	0000	1011 16 MB	0000

VI-6 Example for Setting Non-cacheable Memory

The following is an example of setting non-cacheable memory in various configurations. The system has 16M bytes main memory (DRAM), and 16Kx8 TAG RAM on-board. To set the Non-cacheable Chip Set Register in the following configurations:

a) Cache memory (SRAM) = 32K
b) Cache memory (SRAM) = 64K
c) System memory (DRAM) = 17M bytes

A. Run the XCMOS Setup Utility

B. Go to the Register

Press the arrow key to move the highlight bar to the registers. The following figure is similar to the register which will be shown on the screen.

Reg.	Bits	(7 ..0)	New Val.	Old Val.
24	0100	0000	40	40
25	0000	1101	0D	0D

C. Modify the Registers

C-1 In this example the system has 16M bytes on-board system memory (DRAM), and 32K bytes cache memory (SRAM). The non-cacheable register is:

24	0010	0000	20	40
25	1010	0000	A0	0D

C-2 If cache memory is expanded to 64K, *Table 3* shows that no DRAM address needed to Non-cacheable. The register set as:

24	0100	0000	40	40
25	0000	0000	00	0D

C-3 If the system memory (DRAM) is expanded to 17M bytes, the following table shows the suggested register to modify:

With a 32K bytes Cache memory				
24	0010	0000	20	40
25	1011	0000	B0	0D
With a 64K bytes Cache memory				
24	0100	0000	40	40
25	0111	0000	70	0D

D. Save the Changed Values and Quit the Utility

Chapter VII

CMOS RAM Setup

The system board contains user modifiable system configuration information in a CMOS RAM. This power conserving RAM is battery backed up so that it retains the configuration setup information even when the computer's power is switched off. Thus, when power is switched on, configuration information is immediately available to the BIOS and the operating system. The SETUP program allows the user to change the configuration information stored in the CMOS RAM to match the configuration of the system.

VII-1 Example of Running the CMOS Setup Utility

Below is a step by step example of running the CMOS SETUP in the BIOS.

A. Start Up the System

After the system is powered on or after RESET, the first message you will get on the display screen is the copyright messages and memory test shown as follows:

```
ETEQ/386H 386 BIOS (C)1990 American Megatrends Inc
V 1.01

xxxxx KB OK   <---------------------------------------- Memory Test

Press <ESC> To bypass MEMORY test




        (C) American Megatrends Inc.,

            E386-0000-061390-K8
```

If you do not get any response on the screen, please refer to *Chapter X* for problem solving.

B. The Power On Self Test

If you want to bypass the memory test press <Esc>, otherwise wait for the system to complete the memory test. The next screen will then show:

```
386 BIOS (C)1989 American Megatrends Inc
V 1.0i

xxxxx KB OK

Press <DEL> if you want to run SETUP/EXTD-SET



        (C) American Megatrends Inc.,

            E386-0000-061390-K8
```

If <Del> key is not pressed then the BIOS proceeds with device initialization. If there is no error then it proceeds to boot up from a bootable device, such as a hard disk drive or floppy drive.

If the BIOS finds an error(s) it will display error messages. *Chapter X* details the error messages for problem solving.

If any errors found by the BIOS are Non Fatal, then it will display:

```
Press <F1> to RESUME
```

Pressing key will let the BIOS proceed by booting from a bootable device.

If any errors found by BIOS are Fatal Errors, then it will display:

```
RUN SETUP UTILITY
Press <F1> to RESUME
```

Pressing <F1> key will let the BIOS enter into the SETUP utility.

C. To Run System Setup or Advanced Setup

If the <Del> or <F1> key is pressed after the POST, the message screen will show:

```
EXIT FOR BOOT  <-------- Highlight bar, press <Up>
RUN CMOS SETUP           or <Down> key to select,
RUN XCMOS SETUP          and <Enter> to confirm.
```

D. The CMOS Setup Program

If you select the "RUN CMOS SETUP" option the next screen will show:

Figure 2. CMOS Setup Display

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

Date (mn/date/year): Thu, Nov 29 1990      Base memory size  : 640 KB
Time (hour/min/sec): 16 : 24 : 10          Ext. memory size  : 4096 KB
Floppy drive A:    : 1.2  MB, 5¼"          Numeric processor : Not Installed
Floppy drive B:    : Not Installed

                                  Cyln  Head  WPcom  LZone  Sec   Size
Hard disk C: type  : 17           977   5     300    977    17    41 MB
Hard disk D: type  : Not Installed
Primary display    : VGA or EGA
Keyboard           : Installed
Video BIOS shadow  : Enabled
Scratch RAM option : 1
Main BIOS shadow   : Enabled

Cache Memory       : Disabled

Month : Jan, Feb, ....Dec
Date  : 01, 02, 03,...31
Year  : 1901, 1902,...2099

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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	31	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	1	2	3	4	5	6

E. Modifying the CMOS SETUP entries

The AMI SETUP Utilities provide an easy to operate screen menu guiding the user without any special operating knowledge. For example, to modify the 'Cache memory' entry press the <Up> and <Down> keys to move the high-light bar cursor to the Cache Memory entry. Pressing the <PgUp> and <PgDn> keys will change the value from Disabled to Enabled.

F. Update the CMOS SETUP and Exit the SETUP program

Press the <Esc> key, the screen will then display "Write data into CMOS and exit (Y/N)?"

Press <Y> to confirm, or <N> to return to SETUP.

G. Completing the CMOS Setup

If you type <Y> the SETUP program will write the updated data into CMOS and RESET the system.

VII-2 Technical Information for the CMOS SETUP Option

1. Key Conventions Used for Operations

The following keys are used for CMOS Setup Utilities:

<Enter> - moves the selection bar

<Left> & **<Right>** - moves selection bar

<PgUp> & **<PgDn>** - scrolls allowable settings

<Esc> - exits and saves CMOS register

<Ctrl> <Alt> <Del> - exits without saving

2. Date and Time Setup

A calendar has been provided for the users. The time here is 24-hour time.

3. Floppy Disk Drive Setup

Drives A: and B: may be one of the following types:

360KB	5.25"
1.2MB	5.25"
720KB	3.5"
1.44MB	3.5"
Not installed	

4. Hard Disk Drive Setup

Drives C: and D: are the hard drives in the system. Forty-six drive types have been defined by AMI BIOS. If for some reason your particular drive is not one of the 46 pre-defined types, simply scroll down to type 47 and enter the following drive specifications:

Cylinders, Heads, WPcom, LZone, Sectors

Please consult your vendor for the specific values that will give you optimum performance.

5. Display Type Setup

The primary display options are:

Monochrome
Color 40 x 25
Color 80 x 25
EGA or VGA
Not installed

6. Keyboard Setup

You may either choose to enable or disable the Keyboard test during Power On Self Test by setting this option as "Installed" or "Not Installed".

7. Video and Main BIOS Shadow RAM Function Setup

The Shadow RAM function can be enabled or disabled by selecting the "Enabled" or "Disabled" respectively.

8. Scratch RAM Option Setup

The purpose of this option is to save miscellaneous data such as user definable drive type 47, or Translate 80386 Load, all functions for programs like OS/2, RAMDRIVE etc. If Shadow RAM is not enabled, the parameters of the drive must be stored in normal RAM, but the integrity of the data must be maintained. The options you have are :

1. The BIOS will use 100 bytes at 30h:0
2. The BIOS will reduce the size of the base memory by 1KB

The default is 1. If you are not using Drive type 47 or not running programs like OS/2 or RAMDRIVE, this RAM will never be used so you may leave the value as 1.

9. Cache Memory

Set "Enabled" to activate the Cache Memory System, or "Disabled" to deactivate the Cache.

Chapter VIII

Using Extended CMOS Setup

The EXTENDED CMOS SETUP Utility is supplied by AMI System BIOS. It is an Advanced Setup software design to allow users to modify many motherboard configuration options. This utility takes over most hardware jumper settings, and allows control over most function settings, including: Clock selection, wait state setting, memory options, expanded memory support setting, COM/LPT port setting, FDD/HDD chip selection, keyboard selection, etc. Modifying the XCMOS SETUP requires some technical understanding of the system, and is recommended for the experienced user or technician.

The Utility programs the Chipset Extended CMOS with user defined values, which will be used by the BIOS to program the Chipset registers during system booting. If this utility is not run, then the BIOS will supply the DEFAULT values for the Chipset registers.

VIII-1 Operational Guide

The extended CMOS SETUP is easy to use, users should be able to operate without any additional knowledge. The key sequence used to operate the utility are:

<Up> or <Dn> - Moves bar to previous/next option
<Enter> - Runs a test
<Left> or <Right> - Moves cursor to previous/next option
<Esc> - Quits to previous menu
<Ctrl> <Alt> <Del> - Exits without saving

If you want to clear the Extended CMOS register allowing the BIOS to bring up the system with BIOS default values, you should follow the precedures listed below:

a) Turn off your machine.
b) Hold the <Ins> key down, and turn on the machine.
c) Release the <Ins> key when you see memory test begins on the screen.

VIII-2 Example of Running the XCMOS Setup

A. To Enter the XCMOS Setup

After the system was turned on or after a system Reset, the screen will display a message 'Press <Del> to run CMOS SETUP/EXTD SET'.

Press the <Del> key, the message screen shown as below:

```
EXIT FOR BOOT  <-------- Highlight bar, press <Up>
RUN CMOS SETUP           or <Down> key to select,
RUN XCMOS SETUP          and <Enter> to confirm.
```

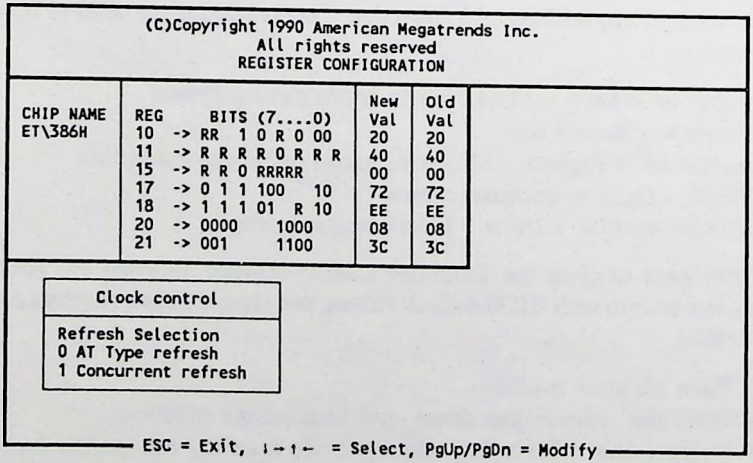
Select the "RUN XCMOS SETUP" option.

Press <Enter> to select 'ADVANCED CHIPSET SETUP' option.

B. The Extended CMOS Setup Menu

The system will now show the EXTENDED CMOS SETUP MENU similar to the following figure:

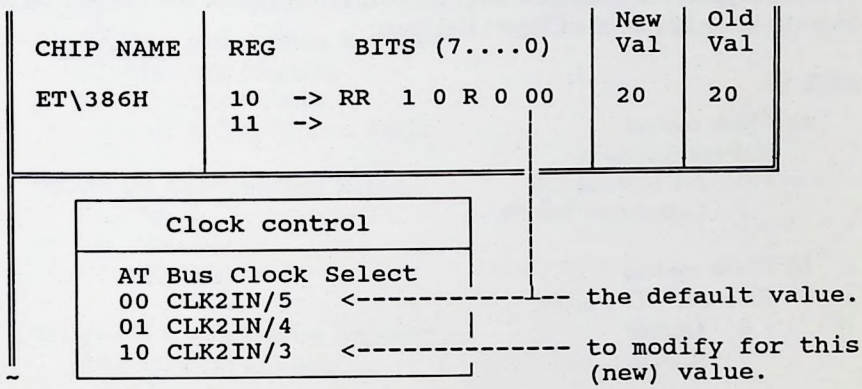
Figure 3. The Extended CMOS Setup Menu



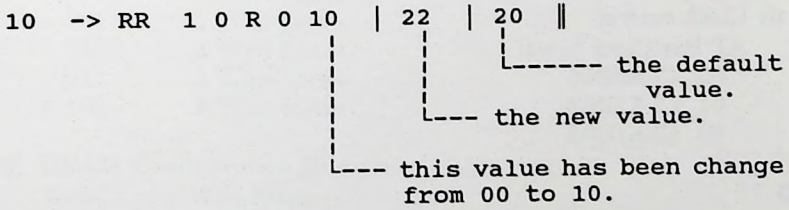
C. To Modify a Register

In this example we want to modify the 'AT Bus Clock' for 1/3 of the System Clock.

Press the arrow keys to move the highlight bar to the last bit of Register 10, the screen show similar as below:



Press the <PgUp> or <PgDn> key to modify from '00' to '10'. The Register Configuration value will change simutaneously:



D. Save and Quit the Utility

Press <Esc> and select the 'WRITE TO CMOS AND EXIT' option. The system will reboot.

VIII-3 References for Extended Setup

The previous section shows an example to operate the EXTENDED SETUP Utility. The utility changes the Chipset Registers, improper set parameters may prevent the system from booting.

Note that the " * " on this section means the default value for the System BIOS to support the CHIPSET Register. The remainder of this chapter outlines the setup bits for the Chipset Registers:

REG 10

a) **Clock control**
Refresh Selection
* 0 AT type refresh
1 Concurrent refresh

b) **Clock control**
Extended I/O Decode
* 0 Disable
1 Enable

c) **Clock control**
Processor Clock Select
* 0 CLK2IN
1 ATCLK

d) **Clock control**
AT Bus Clock Select
* 00 CLK2IN/5
01 CLK2IN/4
10 CLK2IN/3

REG 11

a) **Cache and DRAM Control Register**
Remapped 256K
* 0 Non cacheable
1 Cacheable

REG 15

a) Remap Control Register
Remapping of 256KB memory
- 0 Disable
- * 1 Enable

REG 17

a) DRAM Configuration Register
DRAM State Machine
- * 0 Supports Cache
- 1 Does Not Support Cache

b) DRAM Configuration Register
Page Mode
- 0 Disable
- * 1 Enable

c) DRAM Configuration Register
RAS Timeout Counter
- 0 Enable
- * 1 Disable

d) DRAM Configuration Register
Read Cycle Wait States
- 000 - 0 Wait States
- 001 - 1 Wait States
- 010 - 2 Wait States
- 011 - 3 Wait States
- * 100 - 4 Wait States

e) DRAM Configuration Register
Write Cycle Wait States
- 00 - 0 Wait States
- 01 - 1 Wait States
- * 10 - 2 Wait States

REG 18

a) **SRAM/DRAM Configuration Register**
RAS To CAS Delay
* 0 - 2 SYSCLK
1 - 1 SYSCLK

b) **SRAM/DRAM Configuration Register**
RAS Precharge Time
* 0 - 6 CLK2 Cycles
1 - 4 CLK2 Cycles

c) **SRAM/DRAM Configuration Register**
CAS Pulse Width
* 0 - 2 SYSCLK
1 - 1 SYSCLK

d) **SRAM/DRAM Configuration Register**
Post Write Control
* 00 - Disable Post Write
01 - 0 Wait State Write
11 - 1 Wait State Write

e) **SRAM/DRAM Configuration Register**
Cache Line Size
* 00 - 4 bytes
01 - 8 bytes
10 - 16 bytes

REG 20

a) **Non Cacheable Block 0 Address Register**
Non-Cacheable address A25-A22
* 0000

b) **Non-Cacheable Block 0 Address Register**
Non-Cacheable address A21-A18
* 0011

REG 21

a) Non-Cacheable Block 0 Address/Size Register

Non-Cacheable size

0000	Disabled	0111	1MB
0001	16KB	1000	2MB
0010	32KB	1001	4MB
* 0011	64KB	1010	8MB
0100	128KB	1011	16MB
0101	256KB	1100	32MB
0110	512KB	1101	64MB

b) Non-Cacheable Block 0 Address/Size Register

Non-Cacheable address A17-A14

* 1100

REG 22

a) Non-Cacheable Block 1 Address Register

Non-Cacheable address A25-A22

* 0000

b) Non-Cacheable Block 1 Address Register

Non-Cacheable address A21-A18

* 0011

REG 23

a) Non-Cacheable Block 1 Address/Size Register

Non-Cacheable size

0000	Disabled	0111	1MB
0001	16KB	1000	2MB
* 0010	32KB	1001	4MB
0011	64KB	1010	8MB
0100	128KB	1011	16MB
0101	256KB	1100	32MB
0110	512KB	1101	64MB

b) Non-Cacheable Block 1 Address/Size Register

Non-Cacheable address A17-A14

* 0000

REG 24

a) **Non Cacheable Block 2 Address Register**
Non-Cacheable address A25-A22 * 0100

b) **Non Cacheable Block 2 Address Register**
Non-Cacheable address A21-A18 * 0000

REG 25

a) **Non Cacheable Block 2 Address/Size Register**
Non-Cacheable size

* 0000	Disabled	0111	1MB
0001	16KB	1000	2MB
0010	32KB	1001	4MB
0011	64KB	1010	8MB
0100	128KB	1011	16MB
0101	256KB	1100	32MB
0110	512KB	1101	64MB

b) **Non Cacheable Block 2 Address/Size Register**
Non-Cacheable address A17-A14 * 1101

REG 26

a) **Non Cacheable Block 3 Address Register**
Non-Cacheable address A25-A22 * 0000

b) **Non Cacheable Block 3 Address Register**
Non-Cacheable address A21-A18 * 0011

REG 27

a) **Non Cacheable Block 3 Address/Size Register**
Non-Cacheable size

0000	Disabled	0111	1MB
0001	16KB	1000	2MB
0010	32KB	1001	4MB
0011	64KB	1010	8MB
0100	128KB	1011	16MB
* 0101	256KB	1100	32MB
0110	512KB	1101	64MB

b) **Non Cacheable Block 3 Address/Size Register**
Non-Cacheable address A17-A14 * 0000

Chapter IX

Q & A for Servicing the KP 386T

Q: Why doesn't my system work?

A: It is important to note that problems on a new system should be treated differently than problems on a system that has been working for a period of time and now suddenly has trouble. In particular, if a previously working system suddenly fails, the first thing to check is the most recent upgrade to system hardware or software. Installing new programs or system equipment can sometimes result in subtle changes to the way a system operates and affects system operation. Always try backing out of the upgrade, that is, reinstalling the new hardware or software to see if the problem goes away. If this is the case, review the installation steps taken and contact the supplier of the new equipment or software for help in installing their product.

A newly setup system may have the following problems, please check the following:

a) Power cord not plugged in, please check if the Power-on LED lights up.

b) Monitor cable not attached.

c) Keylock was engaged, release it now.

d) Connectors not firmly installed, or installed in wrong the position. Remember do not connect the Turbo-Switch wire to the Reset connector!

e) Add-on card not installed firmly.

f) You may have set the jumpers incorrectly. Refer to *Chapter IV*.

h) Floppy diskette or hard disk not formated, or formatted without bootable system.

i) Wrong configuration setup for CMOS RAM. See *Chapter VII* and *VIII*.

j) Peripherals not compatible, try to modify the Chipset Register by CMOS Advanced SETUP Utility supported by BIOS.

Q: My system has no display, or the 'Display Type Mismatch' message on the screen. What should I do?

A: First, turn the brightness and contrast controls on the monitor to the proper ranges, and make sure the video signal cable is securely connected. If there is still no display, check the switch settings on the motherboard and video adapter card (refer to your Adapter's Manual for setting the Display Mode), and verify the jumper settings on the motherboard. The following table details the settings:

Mode	Adapter installed in the system
Mono	Monochrome card, or Herculers card
Color	CGA, EGA, VGA, or EVGA

Q: Why does my system always lose CMOS RAM SETUP Configuration after turning off the power?

A: The motherboard was designed to have a protection jumper. At the factory this jumper is set OPEN to disengage battery function to avoid battery discharge and malfunction during shipment. You have to set this jumper (JP7) CLOSE before using the motherboard.

Q: How can I know whether the system is running in Turbo or Normal Mode?

A: The motherboard has an optional LED indicator, which is normally connected to a LED on the front panel. The LED illuminates when running in Turbo Mode (or full system speed).

Q: What are the advantages of the Cache memory system and Page/Interleave for the KP 386T?

A: 1) The KP 386T was designed to use a CACHE memory system to increase its efficiency and performance. It provides the high hit rates necessary to make a large, relatively slow main memory array look like a fast, zero wait state memory to the CPU. With this Cache Controller almost all critical paths are relocated to relatively small cache RAMs (of high speed SRAM) and DRAM timing is no longer a major issue. Total cost is also decreased as expensive high speed DRAMs are not required.

2) The KP 386T was designed to run in Page/Interleave mode if cache function is not activated or is set at non-cacheable. The Page/Interleave mode has better performance than Page or Interleave mode.

Q: Why does my system always show less memory during the Power On Self Test? For example, my system has a total of 4M bytes on-board memory, why does it always shows less (Base 640 / Extension 3072)?

A: The system does not test memory relocated, therefore it does not count the 384K bytes reserved for Shadow RAM and other system uses.

Q: Why is it that an add-on card from my old computer cannot work properly in this system?

A: Check the switch and jumper settings on both the add-on card and the motherboard, there may be an address or interrupt conflict. You may have a compatibility problem, as some add-on cards are designed to work at slower I/O bus speeds. The XCMOS SETUP can slow down the I/O bus speed, if desired. Note that system performance will be worse, you may choose to replace the old add-on card.

Q: My keyboard doesn't respond or gives wrong sequences.

A: Check if the Keylock Switch on the front panel is turned to the unlock position. You may have a XT/AT compatible keyboard, set the switch to the AT-position. Some keyboards will enable the NumLock function when system boots up, press the key to disable NumLock function if necessary. Please verify for the LED on the keyboard, the LED will light up and turn off during Power On Self Test. If the LED does not light up check if the Keyboard Connector is connected firmly, or contact your vendor for replacement.

Q: Why does my FDD or HDD not work?

A: You may have attached a new floppy or hard disk drive to your system, please verify that the CMOS RAM Configuration matches with your FDD/HDD type. Please check if you have scratched the diskette, if so, change to a new workable diskette. Also, make sure your HDD is formatted. To isolate the problem please reset the system, and verify that the LED on the FDD/HDD lights up briefly during Power-On Self Test, if not check the connection cables.

Q: If I have problems what information will technical Support Engineers want?

A: The Technical Support Engineer normally wants to know:

a) The (hardware) setup of your system; motherboard, HDDs, FDDs, and other peripherals in detail.

b) The vendor and version number for your System BIOS.

c) Peripherals and add-on card list; their manufacturer and version number.

d) The Operating System and version number.

e) The software you are using.

f) The operating procedure and the symptoms of your problem.

g) If you are a reseller please let us known whether all the systems have the same problem, or only happened on a particular system.

Chapter X

Power On Self Test (POST) Error Messages

The System BIOS for the KP 386T supports a Power On Self Test diagnostic routine, it performs various diagnostic tests at the time the system is powered up. When an error is encountered during these tests, you either hear a few short beeps or see an error display on your monitor. If the error occurs before the display device is initialized the system reports the error by giving a number of short beeps. If the error is FATAL then system halts after reporting the FATAL error. If the error is NON-FATAL the process continues after reporting the NON-FATAL error.

X-1 Errors Indicated by Beeps

If an error occurs before the display is initialized, BIOS will let you know through a series of error beeps:

Fatal Errors through Beeps

These errors are conveyed through a number of beeps:

Beep Count	Error Encounted
1	DRAM refresh failure
3	Base 64KB RAM failure
4	System Timer failure
5	Processor failure
6	Keyboard Controller - Gate A20 error
7	Virtual Mode Exception error
9	ROM-BIOS CheckSum fai'ure

Non Fatal Errors through Beeps

These errors are conveyed as ONE LONG BEEP followed by a number of SHORT beeps:

Beep Count	Error Encounted
3	Coventional or Extended memory test failure
8	Display test or Display vertical and horizontal retrace test failed

X-2 Errors Indicated with Display

Fatal Errors through Display

After these error messages are displayed, the screen is cleared and a line saying "SYSTEM HALTED" is shown.

Messages	Error Encounted
CMOS INOPERATIONAL	Indicates failure of CMOS shutdown register
8042 GATE-A20 ERROR	Error in getting into protected mode
INVALID SWITCH / MEMORY FAILURE	
DMA ERROR	DMA controller page register test failed
DMA#1 ERROR	DMA Unit 1 register test failed
DMA#2 ERROR	DMA Unit 2 register test failed

Non-fatal Errors through Display Offering SETUP Option

The BIOS gives error messages and suggests use of the <F1> key to run SETUP.

Messages	Error Encounted
CMOS battery state low	Indicates failure of CMOS battery or failure in the set and checksum tests
CMOS system options not set	Indicates failure of CMOS battery, or failure in set and checksum tests
CMOS checksum failure	Indicates CMOS battery low or a failure in set and checksum tests
CMOS memory size mismatch	Indicates system configuration is not the same as specified in SETUP
CMOS time & date not set	Indicates system configuration verification error and setup error (in timer)
CMOS display type mismatch	Indicates failure of display verification
C: drive failure D: drive failure	Indicates a system setup error in hard disk or malfunctioning

Non-fatal Errors through Display without SETUP Option

The BIOS gives error messages, press the <F1> key to continue to run the system.

Messages	Error Encounted
CH-2 timer error	Indicates channel 2,1,0 timer test failure
Keyboard error	Indicates keyboard test failure
KB/Interface error	Indicates keyboard test failure
INTR #2 error	
Display switch not proper	Indicates display type verification error
Keyboard is locked.. Unlock it	
FDD controller failure	Indicates system configuration verification error in floppy disk setup
HDD controller failure	Indicates system configuration verification error in hard disk setup
C: drive error	Indicates hard disk SETUP failure
D: drive error	Indicates hard disk SETUP failure

X-3 Trouble Shooting through Check Points

After powering on the system, the BIOS goes through the Power On Self Test. It outputs a series of values at different points in the BIOS to PORT 80H to indicate the tests that have been passed. These are called check points. To read the Check Point from PORT 80H, users need some hardware ability. This function is recommended for technicians or sophisticated users to use in indentifying system problems.

In case of an error when the system locks up, the display of the apparatus will show the area where the problem exists. The following is a sequential list of the check points.

Check Point	Description
01	NMI disabled & 286 register test about to start
02	286 register test over
03	ROM checksum OK
04	8459 initialization OK
05	CMOS pending interrupt disabled
06	Video disabled & system timer counting OK
07	CH-2 of 8253 test OK
08	CH-2 of delta count test OK
09	CH-1 of delta count test OK
0A	CH-0 of delta count test OK
0B	Parity status cleared
0C	Refresh & system timer OK
0D	Refresh link toggling OK
0E	Refresh perios ON/OFF 50% OK
10	Confirmed Refresh ON & about to start 64K memory
11	Address line test OK
12	64K base memory test OK
13	Interrupt vectors initialized
14	8042 keyboard controller test OK
15	CMOS read/write test OK
16	CMOS checksum/battery check OK
17	Monochrome mode set OK
18	Color mode set OK
19	About to look for optional video ROM

Check Point	Description
1A	Optional video ROM control OK
1B	Display memory R/W test OK
1C	Display memory R/W test for alternate display OK
1D	Video retrace check OK
1E	Global equipment byte set for video OK
1F	Mode set call for Mono/Color OK
20	Video test OK
21	Video Display OK
22	Power on message display OK
30	Virtual mode memory test about to begin
31	Virtual mode memory test started
32	Processor in virtual mode
33	Memory address line test in progress
34	Memory address line test in progress
35	Memory below 1MB calcutated
36	Memory size computation OK
37	Memory test in progress
38	Memory initialization over below 1MB
39	Memory initialization over above 1MB
3A	Display memory size
3B	About to start below 1MB memory test
3C	Memory test below 1MB OK
3D	Memory test above 1MB OK
3E	About to go to real mode (shutdown)
3F	Shutdown successful and entered in real mode
40	About to disable gate 20 address line
41	Gate A-20 line disabled successfully
42	About to start DMA controller test
4E	Address line test OK
4F	Processor in real mode after shutdown
50	DMA page register test OK
51	DMA unit-1 base register test about to start
52	DMA unit-1 channel OK, about to begin CH-2
53	DMA CH-2 base register test OK
54	About to test f/f latch for unit-1
55	f/f latch test both unit OK

Check Point	Description
56	DMA unit 1 & 2 programmed OK
57	8259 initialization over
58	8259 mask register check OK
59	Master 8259 mask register OK, about to start slave
5A	About to check timer and keyboard inter level
5B	Timer interrupt OK
5C	About to test keyboard interrupt
5D	ERROR! timer/keyboard interrupt not in proper level
5E	8259 interrupt controller error
5F	8259 interrupt controller test OK
70	Start of keyboard test
71	Keyboard BAT test OK
72	Keyboard test OK
73	Keyboard global data initialization OK
74	Floppy setup about to start
75	Floppy setup OK
76	Hard disk setup about to start
77	Hard disk setup OK
79	About to initialize time data area
7A	Verify CMOS battery power
7B	CMOS battery verification done
7D	About to analyze diagnostics test results for memory
7E	CMOS memory size update OK
7F	About to check optional ROM C000:0
80	Keyboard sensed to enable SETUP
81	Optional ROM control OK
82	Printer global data initialization OK
83	RS-232 global data initialization OK
84	80287 check/test OK
85	About to display soft error message
86	About to give control to system ROM E000:0
87	System ROM E000:0 check over
00	Control given to int-19, boot loader

Chapter XI

Technical Reference

XI-1 Pin Assignment for KP 386T Connectors

Table 4. Pin Assignment for KP 386T Connectors

Connectors (Function)	Pin #	Assignment
JP6 (External battery connector)	1	+6V
	2	Key
	3	Ground
	4	Ground
J1,J2 (Power supply connector)	1	Power good
	2	+5V DC
	3	+12V DC
	4	-12V DC
	5	Ground
	6	Ground
	7	Ground
	8	Ground
	9	-5V DC
	10	+5V DC
	11	+5V DC
	12	+5V DC
J5 (Turbo LED indicator connector)	1	Signal
	2	Ground
J3 (Turbo switch connector)	1	Signal
	2	Ground
J7 (Speaker connector)	1	Signal
	2	Not used
	3	Not used
	4	+5V (VCC)
J4 (Hardware RESET connector)	1	Signal
	2	Ground

Connectors (Function)	Pin #	Assignment
JP1 (Keyboard connector)	1	Keyboard clock
	2	Keyboard data
	3	Spare
	4	Ground
	5	+5V (DC)
J6 (Keyboard inhibited and power on LED indicator connector)	1	Power on LED
	2	Not used
	3	Ground
	4	Keyboard inhibit
	5	Ground

Ver. 1.01

April 1991 Release