VESA LOCAL BUS 3486

VL-BUS 3486

786 MINI-BOARD USER'S MANUAL

Introduction

The 786 **AIO** system board is a "MINI" AT size, fully PC/AT compatible motherboard with two 32 bit VESA standard Local Bus slots, and the ability to use 486 or 386 microprocessor. It combines the latest technology with design elegance unsurpassed by other comparable system boards.

With a sophisticated secondary cache of 64 KB , 128 KB, or 256 KB high speed SRAM, and a maximum of 64 MB on-board main memory, it is well suited for all high-end applications such as file-servers and advanced workstations.

The 786 **AIO** system board incorporates the highly integrated USA Integration chip set. System reliability is greatly enhanced by using this chip set with few other discrete components.

The memory banks on the system board are located on the side of the expansion **slots.** Full length cards can be installed in all expansion slots. Seven **16-bit** expansion slots (two with **32-bit** Local Bus socket) and one **8-bit** slot are provided.

Intel 486 DX, 486 **DX/2, 486** SX and 386DX microprocessors can be used.

Other features include programmable bus speed, 2 programmable non-cacheable areas and BIOS shadow RAM.

The system board is fully compatible with many operating environments including MS-DOS, Windows, UNIX, XENIX, OS/2 and the NOVELL Netware Operating System.

Chapter 1 Main Features of System Board

Intel 486SX, 486DX/2, 486DX, 386DX Microprocessor

The Intel 486 microprocessor offers the highest performance possible for all operating systems and applications. Its one million transistors integrate 8 KB of internal cache with a built-in cache controller, floating-point coprocessor (except 486SX) and memory management unit, while it remains fully compatible with 386DX and SX microprocessors.

The Intel 486DX/2 clock-doubling microprocessor operates at the maximum rated internal speed, while it interfaces with external logics in half the internal clock rate. The DX/2 processor offers the best price/performance ratio possible.

The 386 DX microprocessor has the same 32 bit addressing and instruction capability, but it does not contain an internal cache or a built-in floating point processor. It is an entry-level member the 486/386 family of microprocessors.

The 786AI0 Motherboard can utilize all the follow microprocessors: 486 DX, 486DX/2, 486 SX, and 386DX.

64 MB On-Board Main Memory

The 786 AIO system board has 2 DRAM banks. Four types of SIMMs are supported for up to 64 MB on-board memory: 256 KB x 9, 1 MB x 9 , 4 MB x 9 and 16 MB x 9 SIMM modules, which should satisfy even the most demanding applications.

Secondary Cache Memory System

To compliment the microprocessor's internal cache, and to reduce the need for main memory access, a secondary cache system is provided, utilizing 64 KB, 128 KB or 256 KB bytes of high speed

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SRAM. The Secondary Cache System utilizes a Write-Back Algorithm for optimum speed and performance.

Cache memory is used to store the most recently used instructions or data. When the system is reset or powered-up, the cache memory is empty. As the CPU reads data or instructions from the main memory, this information is copied into the cache memory. Contents of cache memory are referenced by cache "'tags" stored in high speed SRAM tag memory. When an address is applied to access data or instructions, the tags are compared with the address, and access to the contents of cache memory is granted if the tag and the address match. This is called a *cache hit.* If they do not match, it is called a *cache miss,* and a main memory read cycle is performed. Since the typical access time of cache SRAM is about 20 to 25 ns, compared to the 60 to 100 ns for main memory DRAM, cache memory access is much faster. However, the actual increase in system performance depends on the nature of the software application.

Operation of the internal and secondary cache is transparent to the user and to the software. When there are many more cache hits than misses, the *cache hit ratio* is high. Memory access becomes virtually immediate, and zero wait state memory access is achieved.

USA Integration Chip Set

The USA Integration chip set has the following features:

> -Direct mapped organization with write-back protocol
> -0 wait state for cache read / write hit
> -Programmable cache read / write hit wait state.
> Cache controller can be enabled or disabled
> -Programmable cache line size
> -Flexible cache size
> -One or two bank of cache SRAM
> -Flexible direct SRAM access mode
> -Support for both hidden and conventional DRAM refresh
> -Support for two independent non-cacheable regions

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-Video and System BIOS Shadow RAM can be cacheable
 in either the secondary cache or the 486 internal cache
-Support of fast Gate A20 operation for optimization of
 OS / 2 operations
Support for Fast / Standard page mode DRAM
-Support for 2 banks of DRAM with memory size up to 64
 MB
-Flexible system memory configurations
-Support mixable 256 KB x 9,1 MB x 9, 4 MB x 9 , and 16
 MB x 9 SIMM modules between banks
-Programmable DRAM wait state
Programmable cache flush
-Relocation of unused first 1 MB segments (128 KB, 256
 KB, or 384 KB) to top of DRAM memory
-Automatic memory size detection
-CPU interface logic
-Data bus buffer control logic
-Reset and shutdown logic
-NMI and port B support
-Feedback CPU clock to reduce clock skew
-Support for turbo / non-turbo mode
-Support for software turbo switch
-Support for conventional / hidden refresh
-Programmable bus clock
-DMA interface and arbitration logic
-Refresh address and control logic
-Data bus conversion logic
-Bus interface between different data buses
-Parity generation and checking logic
- 14.3 18Mhz and divide 12 counter
-AT Bus I/O recovery option for slower I/O cards

Fig. 1 USA Integration SC chipset

SC

USA Integration

#	Left pins
53	LD30
54	LD29
55	LD28
56	LD27
57	LD26
58	LD25
59	LD24
60	VSST
61	VDD13
62	LD23
63	LD22
64	LD21
65	LD20
66	LD19
67	LD18
68	LD17
69	LD16
70	LD15
71	LD14
72	LD13
73	LD12
74	VSST
75	LD11
76	LD10
77	LD9
78	LD8
79	LD7
80	LD6
81	LD5
82	LD4
83	LD3
84	LD2
85	LD1
86	LD0
87	PADSN
88	IPBE3N
89	IPBE2N
90	IPBE1N
91	IPBE0N
92	PWR
93	PDC
94	PMIO
95	PRDYN
96	VSST
97	VDD13
98	LED
99	SPKDAT
100	ER7FERN
101	IHLDA
102	CRSTN
103	TURBO2W
104	TA16

#	Right pins
208	XD13
207	XD14
206	XD15
205	IOUT2
204	OAEN8N
203	OAEN16N
202	ADSTB8
201	VDD13
200	VSST
199	ADSTB16
198	SMEMWN
197	SMEMRN
196	OMEMWN
195	OMEMRN
194	KBOCSN
193	GATE2ON
192	DMAHLDA
191	GATE2
190	FLUSHN
189	B27A2ON
188	BIOSLN
187	OINTAN
186	IRQ13
185	RTCAS
184	HRQ
183	KBRSTN
182	OUT1
181	IOCHKN
180	I7RDYN
179	RSTDRVN
178	M119
177	MHZ14
176	BALEN
175	REFRSH
174	S8HEN
173	OIOWN
172	OIORN
171	OSYSCLK
170	DP3
169	DP2
168	DP1
167	DP0
166	CLK8N
165	VDD13
164	VSST
163	ENSDN
162	DRL
161	DRH
160	IMASTERN
159	ZWSN
158	ICHRDY
157	M16N

8 Fully Accessible Bus Slots

The 786 AIO system board has 7 standard 16-bit slots and 1 standard 8-bit slots. Two of the 16 bit slots has VESA standard 32 -bit Local Bus expansion sockets. These slots accept all AT and XT compatible expansion cards as well as VESA complient Local Bus expansion cards.

The 16 bit expansion slots consists of parallel rows of pins which match the connectors on the expansion cards. There are two sections on the expansion slots: one long and one short. The long sections are fully functional 8-bit slots. Both sections are used together to function as a 16-bit slot.

Local Bus slots are available on the two right-most expansion slots. These two slots could accomodate 8-bit, 16-bit or VESA Local Bus 32-bit expansion cards. Local Bus expansion cards bypass the slower ISA Bus and communicate with the CPU Bus directly at the maximum bandwidth of 66MHz (with 486 DX/2 66MHz processor).

Since the memory banks are located on the right side of the expansion slots, full length expansion cards can be used in all 8 slots without obstruction by the DRAM SIMMs.

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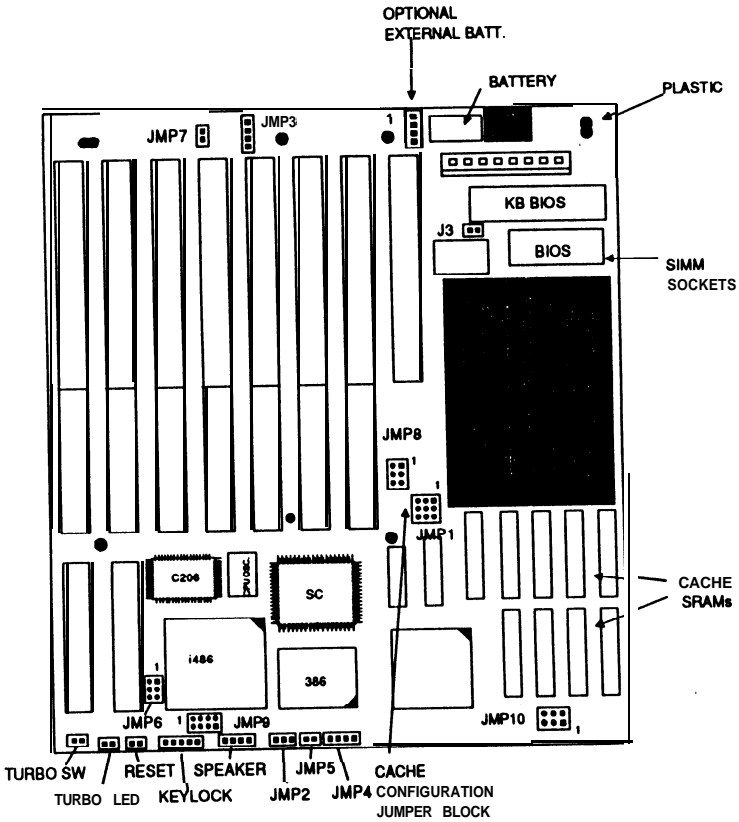
Component Layout

Fig. 2 System Board Component Layout

Chapter 2 Hardware Configuration

Static Discharge Precautions !

Many components on the system board are sensitive to static electricity. Special precautions must be taken when you handle the system board to prevent damage. Discharge the static electricity on your body by touching a grounded metal object, or by wearing a grounded static wrist strap. Handle the system board by the edges whenever possible.   Avoid touching the surface on the system board, and put the system board in a static-safe plastic bag before transportation.

Jumper Settings

Jumper switches allow the user to choose among two or more modes of operations. The switches have pins projecting from the system board. A jumper cap is used to make connection between two jumper pins. A jumper switch is *closed* when a jumper cap is installed, and it is *open* when the pins are not connected by the jumper cap.

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Cache Memory Size Jumper

Two jumpers have to be set to choose the secondary cache memory size: JMP1 and JMP8.

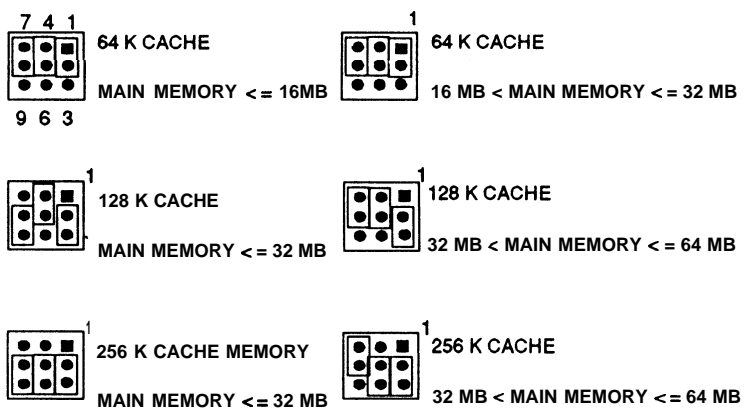Jumper JMP1 has 3 rows of pins adjacent to each other. JMP1 has the following settings:

Cache Size	Memory Size	Jumper Setting
64 kBytes	1 - <=16 MB	pins l-2,4-5,7-8 closed
64 kBytes	>16 - <=32 MB	pins l-2,4-5,7-8 closed
128 kBytes	1 - <=32 MB	pins 2-3, 4-5, 8-9 closed
128 kBytes	>32 - <=64 MB	pins 2-3, 4-5, 7-8 closed
256 kBytes	1 - <= 32 MB	pins 2-3, 5-6, 8-9 closed
256 kBytes	>32 - <=64 MB	pins 2-3, 5-6, 7-8 closed

Jumper JMP8 has two rows of pins. It has the following settings:

Cache Size	Jumper Setting		
64 kBytes	pins	1-2,	4-5	closed
128k Bytes	pins	2-3,	4-5	closed
256k Bytes	pins	2-3,	5-6	closed

**CACHE MEMORY
CONFIGURATION JUMPER**

JMP 8 Setting:

4 1

64 K CACHE

6 3

128 K CACHE

256 k CACHE

JM P1 Setting:

7 4 1

64 K CACHE

MAIN MEMORY < = 16MB

9 6 3

64 K CACHE

16 MB < MAIN MEMORY < = 32 MB

128 K CACHE

MAIN MEMORY < = 32 MB

128 K CACHE

32 MB < MAIN MEMORY < = 64 MB

256 K CACHE MEMORY

MAIN MEMORY < = 32 MB

256 K CACHE

32 MB < MAIN MEMORY < = 64 MB
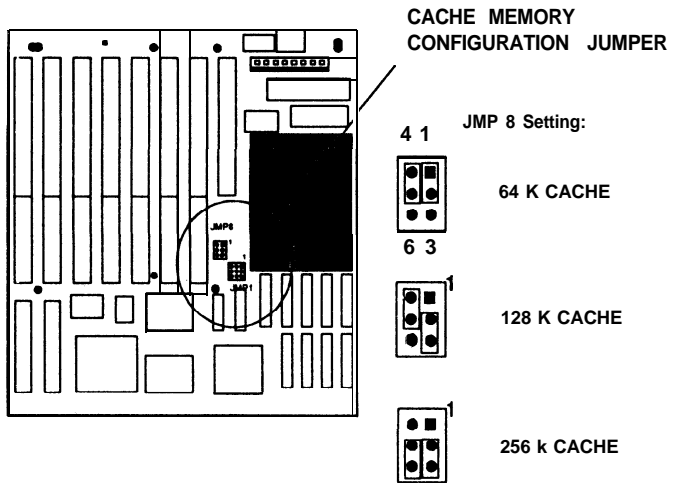
Fig. 3 Cache Size Jumper Setting

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486 DX/ SX Selection Jumper

This jumper must be set according to the type of 486
processor in use. It is marked on the main board as JMP 2.
The available settings are:

```
1  [ ■ ● ● ]          1  [ ■ ● ● ]
   486 DX               486 SX
```

Fig. 4   486 DX / SX Selection Jumper

Numeric Processor Jumper

This jumper, JMP4, must be set in the presence of a 80387
math coprocessor:

```
1  [ ■ ● ● ]          1  [ ■ ● ● ]
    80387               NO NPU
   PRESENT             PRESENT
```
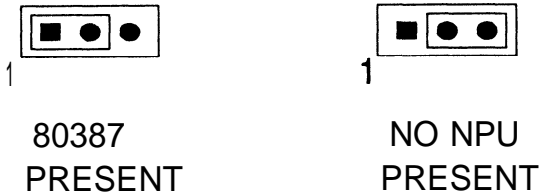
Fig. 5   387 Numeric Processor Jumper

CPU Type Jumper

You must set this jumper **JMP5** to select either a 486 or 386 CPU:
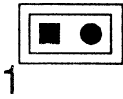
WITH
80386

WITH
80486

Fig. 6   CPU Type Jumper

486-50 MHz CPU Jumper

Close the jumper **JMP7** when a 486-50 **MHz** CPU is present:

WITH
486-50
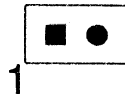
WITHOUT
486-50

Fig. 7 486-50 CPU Present Jumper

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CPU Clock Frequency Jumper

Set this jumper JMP 9 according to the type of CPU installed:

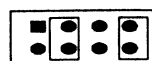| CPU	Jumper Closed
386/40	1-5,2-6
386/33	1-5,3-7,4-8
386/25	1-5,2-6,4-8
486DX/50	3-7
486DX/33, 486DX2/66	3-7, 4-8
486SX/25, 486DX2/50	2-6,4-8
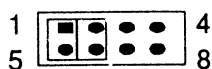
386/40
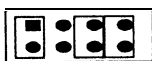
386133
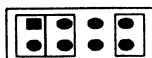
386/25
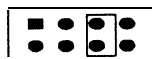
486DX/50
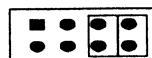
486DX/33
486DX2/66

486SX/25
486DX2/50

Fig. 8 CPU Clock Frequency Jumper

VESA Local Bus Jumper

Do not change the default factory setting of jumper JMP 6.
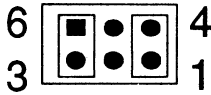

Fig. 9 VESA Local Bus Jumper

Battery Setting Jumper

An optional external battery can be attached to the board via jumper pins J7. Battery setting jumper JMP3 is used to select the built-in internal battery , the external battery, or to erase the current CMOS setup in case of the its setting becomes corrupt and unusable. The setting for JMP3 is as below:

Fig. 10 Battery Setting Jumper

Processor Installation

Installing CPU

Special care should be taken when you install the CPU. It should be installed only when the system board has not yet been installed inside the system case. You should be aware of possible static discharge causing damage to the CPU and system board.

The system board should be laying on a flat surface facing upward and be supported by a firm pad of foam or rubber. Locate the CPU socket on the system board. The socket has many holes which match the pins on the CPU itself. One comer of the socket is notched; this is the pin 1 comer of the socket. The CPU has a notched pin 1 comer as well, which is also indicated by a "dot" at that comer. Carefully align the CPU with the socket so that the notched comers are oriented in the same direction. Line up the pins on the chip with the holes on the socket and press down firmly to complete the installation.
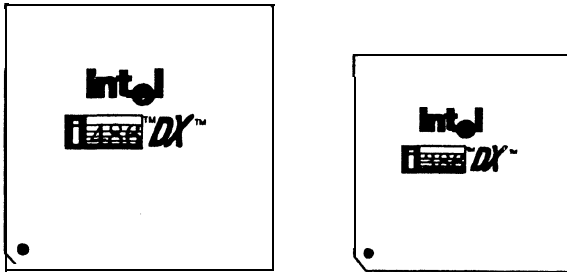
Fig. 11 Intel 486 & 386 CPU

Memory Installation

Available SIMM Configurations

The 786 AIO system board supports two banks of SIMMs. Memory configuration is very simple due to the automatic memory sizing and re-map feature of the system board. Up to 64 MB of SIMMs may be installed. Different types (256 KB x 9, 1 MB x 9, 4 MB x 9, 16 MB x 9) of SIMMs may be used for different banks, but only one type of memory can be used in each bank. Each memory bank can be disabled or ignored by setting the appropriate CMOS register.
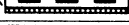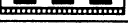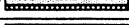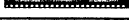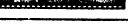
If the lowest memory bank (bank 0) has SIMMs installed, it will be *the logically lowest* memory bank. However, the system board automatically detects the logically lowest memory bank for memory re-map, without having the memory to be physically present on the lowest bank. If the SIMMs on bank 0 are not present , SIMMs located on memory bank 1 will be re-mapped to bank 0, the logically lowest bank.

A memory bank must be filled completely in order for the system board to work properly; therefore, the minimum memory size is 1 MB. Up to 17 memory configurations are possible:

Bank 0 Type	Bank 1 Type	Total Memory Size
256 KB	None	1 MB+ 0 = 1 MB
None	256 KB	0 + 1 MB = 1 MB
256 KB	256 KB	1 MB + 1 MB = 2MB
1 MB	None	4 MB+ 0 = 4MB
None	1 MB	0 + 4 MB = 4 M B
256 KB	1 MB	1 MB+ 4 MB = 5MB
1 MB	256 KB	4 MB+ 1 MB= 5MB
1 MB	1 MB	4 MB + 4 MB = 8 M B

4 M B	None	16 MB + 0 = 1 6 M B
None	4 M B	0 + 16MB = 16 MB
256 KB	4 M B	1 MB + 16 MB = 17 MB
4 M B	256 KB	16 MB + 1 MB = 17 MB
1 MB	4 M B	4 MB + 16 MB = 20 MB
4 M B	1 MB	16 MB + 4 MB = 20 MB
4 M B	4 M B	16 MB + 16 MB = 32 MB
16MB	none	64 MB + 0 = 64 MB
none	16MB	0 + 64 MB = 64 MB

Fig. 12 Memory Configuration Chart

Bank 0 Type	Bank 1 Type	Total Memory
256K ▣	□	1 MB
□	256K ▣	1 MB
256K ▣	256K ▣	2 MB
1M ▣	□	4 MB
□	1M ▣	4 MB
256K ▣	1M ▣	5 MB
1M ▣	256K ▣	5 MB
1M ▣	1M ▣	8 MB
4M ▣	□	16 MB
□	4M ▣	16 MB
256K ▣	4M ▣	17 MB
4M ▣	256K ▣	17 MB
1M ▣	4M ▣	20 MB
4M ▣	1M ▣	20 MB
4M ▣	4M ▣	32 MB
16M ▣	□	64 MB
□	16M ▣	64 MB

□ = No SIMMs installed

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Installing SIMMs

Before installing or removing **SIMMs** on the system board, turn off the power supply !

You should refer to **Available SIMM Configuration** to find out the desired memory configuration. Make sure only same type of **SIMMs** are used in each bank. SIMM modules of different types are not allowed within the same bank.

Whether Bank 0 only, Bank 1 only, or both memory banks are installed, you should start the installation from the right side of the board and proceed to the left (near the ISA expansion slots).

A small hole is present on both ends of each SIMM. They are used to snap the SIMM into the socket. Orient the SIMM module such that the side without memory chips faces the ISA expansion slots. Insert the SIMM firmly at an **45** degree angle in the SIMM socket and push the SIMM module down and to the right, towards the retaining arms of the socket. The SIMM should gently snap into place.

Repeat the above process until the desired memory size is reached.

Automatic Memory Sizing

Once the system is powered up, the BIOS automatically determines how much memory is present in the system. However, it needs to be configured before the system can operate. Please refer to Chapter 4 **- Using the BIOS setup** for more information.

Available Cache SRAM Configuration

Up to **2** banks of data cache SRAM are supported on the 486 ISA system board to give possible cache size of 64 KB, 128 KB, and 256 KB. The access time of the cache SRAM must be 25 ns or better. Two types of SRAM are used to achieve different cache sizes:

Data Cache Size	Bank 0	Bank 1
64 KB	four 8 KB x 8	four 8 KB x 8
128 KB	four 32 KB x 8	
256 KB	four 32 KB x 8	four 32 KB x 8

Cache Banks are labeled on the system board as follows:

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Cache Bank 0	U18, U19, U20, and U21
Cache Bank 1	U22, U23, U24, and U25

The corresponding SRAM Tag size is as follows:

Data Cache Size	Memory Size	SRAM Tag Size
64 KB	1 - <=16 MB	8 K x 8
64KB	>16 - <=32 MB	8 K x 8 + 16K x 4
128 KB	1 - <=32 MB	8 K x 8
128 KB	>32 - <= 64 MB	8 K x 8 + 16K x 4
256 KB	1 - <= 32MB	32 K x 8
256 KB	>32 - <= 64 MB	32 K x 8 + 16 K x 4

The tag SRAM is located on the system board as U26 and u 27.

Fig. 13 The SRAM

U27

U26
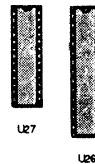
Installing Cache SRAM

If the 786 AIO system board has SRAM installed already, and you do not wish to alter the size of the Cache Memory, please skip this section. Otherwise, we assume you are installing cache SRAM on the system board for the first time, or you wish to change the size of the cache memory.

Two types of SRAM (8 KB x 8 and 32 KB x 8) are used to obtain different cache sizes. Correct cache size is obtained by using the proper type of SRAM for the Cache Memory AND the Cache Tag.

The Cache Tag stores the address of the information that is located in the cache. Its function is similar to a look-up table; the processor looks in the cache tag for the required address, if the address is found, the corresponding cache memory location is accessed. Otherwise, the main memory is accessed.

Before proceeding to installation, notice the following:

-Observe static discharge precautions!

-Timing requirements of the Cache Memory and the Cache Tag are different. Access time of Cache Memory chips should be equal to or less than 25 ns, and 20 ns or less for the Cache Tag SRAM.

-Special tools may be required to remove the installed SRAM chips from their sockets without causing damage. If you are unsure of your ability to perform the installation, you should have a trained technician perform the installation for you.

Identify the type of the SRAM chips already installed on the board. Two types of chips are used: 8 KB x 8 and 32 KB x 8. The actual identification on the chips are quite different and they are manufacturer dependant. Consult the respective chip manufacturer's hardware guide to determine the appropriate part required.

Two alternatives may be used to determine the current cache memory size:

-If the system board is already installed in a complete computer system, turn on the power and observe the reported cache size on the screen. Remove the system board from the case before proceeding to installation.

-Read the Cache Memory Jumper setting on the system board, and the number of cache memory banks occupied. Compare the jumper setting and the number of SRAM banks occupied with Fig *Cache Memory Setting* to determine the current cache size.

The system board should be laying flat on a firm surface facing upward, supported by a piece of foam or rubber.

Locate the SRAM sockets on the system board. Carefully remove the installed SRAM chips if necessary.

Prepare the SRAM chips to be installed by orienting the chips correctly as in Fig.1 3 Each chip has a notch on one end, and it should match the notch on the socket where the chip is to be installed.

Align the pins on the chip with the holes in the socket. Press the chip down firmly. Inspect the pins on the chip to make sure that none are bent.

Install each chip individually until the desired cache size is reached.

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Locate the cache memory jumper blocks **JMP1** and **JMP8** on the system board.

Set the jumpers according to the installed cache size:

Data Cache Size	Memory Size	SRAM Tag Size
64KB	1 - <=16 MB	8 K x 8
64KB	>16 - <=32 MB	8 K x 8 + 16K x 4
128 KB	1 - <=32 MB	8 K x 8
128 KB	>32 - <= 64 MB	8 K x 8 + 16K x 4
256 KB	1 - <= 32MB	32 K x 8
256 KB	>32 - <= 64 MB	32 K x 8 + 16 K x 4

Verify the jumper settings with Fig 3 to complete the installation.

Chapter 3 Installation Guide

Static Discharge Precautions !

Many components on the system board are sensitive to static electricity. Special precautions must be taken when you handle the system board to prevent damage. Discharge static electricity on your body by touching a grounded metal object, or by wearing a grounded static wrist strap. Handle the system board by the edges whenever possible.   Avoid touching the surface on the system board, and put the system board in a static-safe plastic bag before transportation.

installing The System Board

If your system board has not yet been installed, follow the instructions below to insure proper installation.   Otherwise, you may skip this chapter and proceed to the next.

The 786AI0 system board is designed to fit into many different types of cases.   Since it is not possible to cover all installation situations, this chapter will illustrate the basic steps to install the board in most common cases.

The system board has many drilled mounting holes. Some of which line up with the mounting holes in the case. Mounting hardwares such as plastic stand-offs, metal fasteners and screws are required to secure the board inside the case.

You should use the mounting hardwares which came with the case if possible to allow a better fit.

The locations to install the plastic stand-off on the system board varies with the make and type of cases you use. You should use as many stand-offs as the case will allow, to provide the system board

a good support in the case's chassis, and to resist the downward force from the expansion cards.

Try out the stand-off locations by aligning the system board with the chassis of the system case.

Most. cases have several pre-drilled screw holes for metal fasteners. Identify the proper locations to install the metal fasteners onto the chassis. Two metal fasteners should be sufficient.

Snap on the plastic stand-offs on the system board from the bottom, and gently lower the board inside the case. Line up the stand-offs with the notches on the chassis and slide the board into place. Carefully line up the board on the chassis such that the threads of the metal fasteners are exposed inside the holes on the board.

Install the screws on the metal fasteners to complete the installation.

installing Power Connector

The system board draws power from the power supply through its power connector. Most expansion cards also draw power from the power supply indirectly through the AT expansion slots.

There are two power connectors from the power supply to the system board. They are distinguishable only by the color of wires which they are attached to. Extreme care should be taken to ensure proper polarity. Severe damage to the system board could occur if the position of the power connectors is incorrect.

A simple rule to install the power connectors:

Black colored ground wires should be in the middle of the connector.

Locate the power connectors on the system board and connect them to the power supply exactly as shown in Fig.14

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Connecting the **Keylock,** Reset **&** Turbo Switches

Several wired connectors can be found coming from the case's front panel. They are usually for the Keylock, Speaker, Reset and Turbo switches, and Turbo LED.

Locate the jumper pins on the system board for these switches and LED. They are clearly marked on the system board near the CPU. Connect all the switches as marked.

Fig. 14 Installing Power Connector

BLACK WIRES
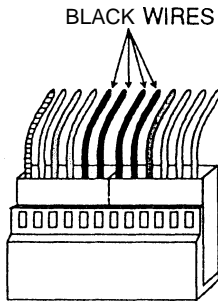
Chapter 4 Using the BIOS Setup

In this chapter we will explain the use of the BIOS setup program from American. Megatrends Inc.

This setup program resides n the ROM BIOS and it is used to re-cord system hardware settinge. If the system board has already been installed and is functional, you do not need to alter the settings in the CMOS Setup. If you are setting up the system board for the first time, changing systm hardware configuration, or you have lost the CMOS Setup due to battery drainage, the system board via the BIOS setup program.

If you are settion up a new system board, the BIOS Setup program is invoked automatically after Power On Self Test (POST). If an error is encountered during POST, te system would notify the user in two ways. If the display device (i.e. video Adapter) has not been in-itialized, a beep code is sent to the speaker. Otherwise, an error me-ssage is displayed on the screen. For non-fatal errors, you could byapss the setup program by pressing the ⟨F1⟩ key and allow to sy-stem to boot up from the floppy drive or hard drive.

The enter the CMOS setup, perform a system reset by one of the following methods:

a. Turn off the power. Wait 10 seconds. Turn power back on.
b. Press the Reset Switch on the case's front panel.
c. Press ⟨Del⟩ keys simultaneously.

the follcwing message is displayed on the screen:
"Hit ⟨Del⟩, if you want to run SETUP"

Press ⟨Del⟩ key immediately to enter the CMOS SETUP program.
Follow the instructions displayed to move around the different setup screens. Use the arrow keys to switch fields. <Page Up> and

(Page Down) to scroll through possiblee parameters. ⟨F1⟩ and ⟨F3⟩ to change the color on the screen and ⟨Etc⟩ to exit the setup screens.

Improper Use Caution !

A warning screen is displayed when you enter any of the setup screens.

Improper setp of CMOS parameters could result in system malfunction or system hang. Follow the instructions on the Warning Screen to restore CMOS values in case you run into problems with the setup program.

Fig. 10 AMI BIOS Setup Program

```
┌─────────────────────────────────────────────────────────────┐
│  BIOS SETUP PROGRAM-AMI BIOS SETUP UTIL ITIES                │
│    (C) 1990 Americocan Megatrends Inc., All Rights Reserved  │
├─────────────────────────────────────────────────────────────┤
│                  STANDARD CMOS SETUP                         │
│                  ADVANCED CMOS SETUP                         │
│                  ADVANCED CHIPSET SETUP                      │
│           AUTO CNFIGURATION WITH BIOS DERAULTS              │
│        ARTOCONFIGURATION WITH OPWER-ON DEFAULTS            │
│                    CHANGE PASSWORD                          │
│                    HARD DISK UTILITY                        │
│                 WRITE TO CMOS AND EXIT                      │
│              DO 'NOT WRITE TO CMOS AND EXIT                 │
├─────────────────────────────────────────────────────────────┤
│  Standard CMOS Setup for Changing Time, Date, Hard Disk Type, etc │
│         ESC; Exit XXXXX F2/F3 Color F10: Save & Exit        │
└─────────────────────────────────────────────────────────────┘
```

Stanard CMOS Setup

Standard CMOS Setup records such information as date, time, hard drive types and etc. As you enter the Standard CMOS Setup screen. A small "Help Window" is displayed, showing a description of the current field and the acceptable field entries. the calendar and memory size disp;ayed on the right side of screen are automatic.

The first twr lines in this screen records the date and time. Enter them according to the format suggested in the' Help Window.

Daylight Savings--adds one hour to the CMOS time when daylight saving begins, and subtracts one hour when standard time returns.

Hard Disk C: and Hard Disk D: Type--type of hard disks prsent for the first and second physical hard drives. Forty-seven types are possible under AMI BIOS. With the last type being an User Definable Types. If no drives are present, choose "Not Installed".

Drive type number 1-46 are pre-defined types. Please refer to Chapter 5: Technical Information--AMI BIOS Hard Drive types for more information

Type 47 is a user definable type, the following information are needed for each hard drive installed:

Clyn--   Number of cylinders.
Head--   Number of heads.
WPcom-- Write precom.
Lzone--   Landing zone of heads.
Size--   Capacity of drive, datermined automatically.

Notice that if yor are using a SCSI hard drive, the drive type should be "not Installed". If you are using an Intelligent IDE Controller or ESDI the drive type should be "1".

Floppy Drive A: and Floppy Drive B--Floppy drives A ans B types, Fire types are available: 360KB 5 1/4", 1.2MB 5 1/4", 720KB 3 1/2", 1. 44MB 3 1/2", and "Not Installed"

Primary Display--Type of video display in the systim. The options are:

Not Installed

Monochrome (for Hercules of MDA)

Color 40x25

VGA/PGA/EGA

Color 80x25

Not Installed

Keyboard--The options are either "Installed" or "Not Installed". If "Not Installed" is chosen, the system would not halt on keyboard errors.

After you have entered all the selections, oredd <Esc> to return to previous screen and opoceed to Advanced CMOS setup.

Fig. 11 Standard CMOS Setup

BIOS SETUP PROGRAM-STANDARD CMOS SETUP
(C) 1990 American Megatrends Inc., All Rights Recerved

Date (mm/date/year): Wed, Dec 26 1991
Time (hour/min/sec): 08: 09: 15
Hard disk C: type:47 = USER TYPE
Hard disk D: type:Not Installed
Floppy drive A: 1.2 MB, 5 1/4"
Floppy drive B: 1.44 MB, 3 1/2"
Primary display:VGA/PGA/EGA
Keyboard: Installed

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

	Cylin	Head	Wpcom	LZone	Sec	Size MB
	873	13	0	0	37	199

Sun		Tue	Wed	Thr	Fri	Sat
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	31	1	2
3	4	5	6	7	8	9

ESC: Exit XXXXX F2/F3:Color PU/PD:Modify

Advanced CMOS Setup

Advanced CMOS Setup csreen contains a list of systom features. Some of which are urilized to fine tune systim performance. The default settings are listed in Figure 13.

Typematic Rate Programming--Control the rate at shich the system can accept input from the keyboard. Default setting is "Disabled".

Typematic Rte--Delay time for keyboard input. Options are 250ms, 500ms, 750ms, and 100ms, Default setting is 500ms, 15 chars/sec.

Above 1MB Memory Test--Default setting is "Enabled".

Memory Parity Error Check--Test for errors during memory read. Default is "Enabled".

Hit <Del> Message Display--Controls the screen prompt to access the setup program. Default is <Enabled).
Hard Disk Type 47 RAM Area--Two options are available: 0;300 and DOS 1KB. Option 0:300 places the hard disk type information at RAM address 0:300, while DOS 1KB places them in the top 1KB of the 640KB base memory. Default is "DOS 1KB".

Wtit For ⟨F1⟩ If Ang Error--System halts when error is encountered. Resume operation wher ⟨F1⟩ is pressed. Default is "Enabled".

System Boot Up Mum Lock--Enables the numeric keys on the keypad upon power up, instead of the regular arrow key functions, Default is "On".

Weitek Processsor--If installed, enable Weitek Processor by setting this feature to "Present". Default setting is "Absent".

System Boot Up Sequence--the default boot sequence is "C:;A:", from drive C: to drive A: It can be reversed to "A:;C:", from drive A: to drive C:.

System Boot Up CPU Speed--Default is "High".

Cache Memory controller--CPU Internal Cache Memory Con troller enable. Default is "Enabled".

Internal Cache Memory--Internal Cache Memory enable. Default is "Enabled".

Fast Gate A20 Option--Default is "Enabled".

Password Check Option--This feature can becaused to prevent unauthorized system boot-up or unauthorized use of BIOS CMOS setup program. Two options are available:

1. "Always'--Prompt for password is displayed when the system is powered up.
2. "Setup'--Prompt for password is displayed when CMOS setyp program is accessed.

If enabled, the user has three attempts to enter the correct password. After the third incorrect attempt, the system locks up and a reboot is required.

To enable this feature, or to change the password, select the Change Password option from the first setup screen.

Video ROM Shadow xxxx. 16K--If this feature is enabled, the video

KOM starting at address xxxx is copied into memory.

Remap Unused Shadow memory--Default is "Disabled".

Fig. 12 Advanced CMOS Setup

```
┌─────────────────────────────────────────────────────────────────────┐
│           BIOS  SETUP  PROGRAM-ADVANCED  CMOS  SETUP                  │
│       (C) 1990  American  Megatrends  Inc.,  All  Rights  Reserved    │
├─────────────────────────────────────────────────────────────────────┤
│ Typematic  Rate  Programming    :Disabled  Password Checking Option'  : Setup    │
│ Typematic  Rate  Delay  (msec)  :500       Shadow  RAM  Option        : Both     │
│ Typematic  Rate  (Chars/Sec)    :15        Remap Unused Shadow Memory- : Enabled │
│ Above  1  MB  Memory  Test      :Disabled  Boot Sector Virus Protection : Enabled│
│ Memory  Test  Tick  Sound       :Enabled                              │
│ Memory  Parity  Error  Check    :Enabled                              │
│ Hit  [DEL]  Message  Display    :Enabled                              │
│ Hard  Disk  Type  47  RAM  Area :0:300                                │
│ Wait  For  [F1]  If  Any  Error :Enabled                             │
│ System  Boot  Up  Num  Lock     :On                                   │
│ Weitek  Processor               :Absent                               │
│ Floppy  Drive  Seek  At  Boot   :Disabled                            │
│ System  Boot  Up  Sequence      :C:,A:                                │
│ System  Boot  Up  CPU  Speed    :High                                 │
│ Cache  Memory  Controller       :Enabled                             │
│ Internal  Cache  Memory         :Enabled                             │
│ Fast  Gate  A20  Option         :Enabled                             │
│ Turbo  Switch  Function         :Enabled                             │
└─────────────────────────────────────────────────────────────────────┘
```

----ESC:Exit XXXXX (Ctr!) Pu/Pd:Modify F1:Help F2/F3:color----
----F5:Old Values F6:BIOS Setup Defaults F7:Power0on Defaults----

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Bus Frequency Select--This feature is used only if the CPU is driven by its synchronous clock source "CLKIN" The actual bus clock frequency is CLKIN divided by a factor of 4, 6, 8 or 10. Select the proper speed according to the frequency of crystal used as CLKIN, which is marked on the crystal next to the CPU socket. The resulting bus clock frequency should not exceed 8.33MHz.

CLKIN/x = Bus Clock Freq.

I/O Cyle Delay--Default is 250ns. Available options are Ons. 250ns, 500ns, 1000ns.

Refresh Methods--Memory Refresh Methods. Options are "Normal " and "Hidden . Choose "Hidden" for faster performance.

Diagnostic Bits OxxH--Default setting is "0" .

Diagnostic Bits O3EH,(7,6)--Default setting is "1".

Diagnostic Bits O41H--Default setting is "0" ,If a 20MHz486SX is used, change this value to "16"

Diagnostic bits O3DH--These Bits are used to program the CPU speed in Non Turbo Mode. The smaller the value, the slower the CPU speed Default setting is OCH.

Advanced CMOS Setup

Above 1 MB Memory Test--Default Setting is "Disable"

For 50MHz:Cache read wait states is :1
:Cache write wait states is :1
:DRAM wait states is :2
:BUS frequency select :CLKIN/6

BIOS SETUP PROGRAM-ADVANCED CHIPSET SETUP
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Co-Processor Wait States	:o w/s	486 Internal Cache, C000	:Enabled
Cache Read Wait States	:1 w/s	Keyboard Frequency Select	:BUS CLK
Cache Write Wait States	:1 w/s	Bus Frequency Select	:CLKIN/8
DRAM Wait States	:2 w/s	I/O Cycle Delay	:250 nS
Non-Cacheable Block 0 Size	:0 KB	Refresh Method	:Hidden
Non-Cacheable Block 0	:512 KB	Parity Checking Method	:Every
Non-Cacheable Block 1 Size	:0 KB	Diagnostic bits 03EH,(7,6)	:o
Non-Cacheable Block 1	:512 KB	Diagnostic bits 03FH, (7-O)	:o
Cache FOOO Shadow ROM, 64KB	:Disabled	Diagnostic bits 041H, (7-O)	:o
486 Internal Cache, F000	:Enabled	Diabnostic bits 03DH, (7-O)	:12

	ESC:Exit XXXX (Ctrl) Pu/Pd:Modify F1:Heip F2/F3:color
	F5:Old Values F6:BIOS Setup Defaults F7:Power-on Defaults

Auto-configuration with BIOS Defaults

This option allows the use of default system values befor the user has made any changes to the CMOS. If the CMOS is corrupted, the BIOS default settings are used.

Auto-Configuration With Power-on Defaults

This features uses the CMOS values from the last system power up. It is useful as a diagnostic aid if the system is having abnormal behavior.

Change Password

The Password-Check option is enabled when the system board is shipped. With default password "AMI". The maximum length of password is 6 characters.

> If Password is Enabled: To disable the password-check enter a (return) character at the "New Password" prompt and press (return)again to confirm. To change the current password, enter the current password at "Current Password" prompt. You will be asked to enter a new password. Enter the new passowrd and press (return). Enter the password again and press (return) to confirm the setup.
>
> If Password is Disabled: To enable the password-check enter a new password at the "New Password" prompt and press (return). Enter the password again and press (return) to confirm the setup.

<div align="center">Fig. 14 Password Setup Screen</div>

```
┌─────────────────────────────────────────────────────┐
│   BIOS  SETUP  PROGRAM-CHANGE  PASSWORD              │
│  (C)1990  American  Megatrends  Inc., All Rights Reserved│
├─────────────────────────────────────────────────────┤
│                                                     │
│                                                     │
│                                                     │
│              ┌───────────────────────────┐          │
│              │                           │          │
│              │   Enter  current  password: │        │
│              │                           │          │
│              └───────────────────────────┘          │
│                                                     │
│                                                     │
│                                                     │
└─────────────────────────────────────────────────────┘
        Use  Maximum  6  ASCII  Characters,  ESC:Exit
```

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Hard Disk Utillity

This utility is for MFM encoded hard drives only. It peroforms low-le-
vel formatting on Mfm HARD DRIVES. All the options in this utility
are data destructive, and they should be used only when low-level for-
matting is required.

1. Hard Disk Format--Perform low-level format on hard disk

2. Auto Inter leave--determines the optimum inter leave factor by mea-
        sureing the transfer rate for four different inter leave values
        prior to formatting.

3. Media Analysis--performs an analysis of each track of the hard drive
        to determine whether it is usable. If the track is found unus-
        able, it is marked as " bad" in the bad Track List Table.

    IDE, ESDI, and SCSI hard drives cannot use the AMI BIOS hard
    disk utility. Separate utilities are required for these drives.
        Fig. 15 AMI BIOS Hard Disk Utility Screen

BIOS SETUP PROGRAM-HAARD DISK UTILITIES
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```
                        Cyln Head Wpcom LZone Sect Size(MB)
Hard Disk C: Type: 47-USER TYPE 873 13 00 37 199
Hard Disk D: Type: Not Installed
Hard disk Type can be changed from the STANDARD CMOS SETUP
option in Main Menu




```

Hard Disk Format

Auto Interleave

Media Analysis

ESC:Exit XXXX F2/F3:Color

Write To CMOS And Exit

After the completion of all setups, choose Write To CMOS And Exit to save the data and values changed. System reboots automatically.

Do Not Write To CMOS And Exit

Abandon the BIOS Setup program and reboot system.