

USER'S MANUAL

AS4 MAIN BOARD



High Performance Cache 486 System Board

OPERATIONS MANUAL

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Chapter 1

System Board Overview

This chapter is intended to guide the user how to install the AS4 series main board into the PC system.

1.1 AS4 SYSTEM BOARD Specifications

The AS4 motherboards are designed base on high-performance 80486 CPU for high-end computing power.

1. AS4 series model number:

- AS450, 50MHZ Cache 486 MB.
- AS433, 33MHZ Cache 486 MB.
- AS425, 25MHZ Cache 486SX MB.
- AS420, 20MHZ Cache 486SX MB.
- AS450N, 50MHZ NON-Cache 486 MB.
- AS433N, 33MHZ NON-Cache 486 MB.
- AS425N, 25MHZ NON-Cache 486SX MB.
- AS420N, 20MHZ NON-Cache 486SX MB.

2. Processors:

- 80486DX-50 for AS450
- 80486DX-33 for AS433
- 80486SX-25 for AS425(N)
- 80486SX-20 for AS420(N)

3. Mathematic Coprocessors:

- AS4 supports Weitek 4167 coprocessors.

4. Memory:

- AS4 provides on-board memory of 1 to 32 megabytes using 256Kx9, 1Mx9 or 4Mx9 dynamic RAM single in-line memory modules (SIMM) with 80ns access time.
- The BIOS can be copied from EPROM to 32-bit DRAM for fast access.
- The CPU working rate is switchable by the TURBO SWITCH.

5. Cache memory: (Cache board only)

- The AS4 support 32KB, 64KB, 128KB, 256KB, 512KB or 1MB of cache memory.

6. I/O slots:

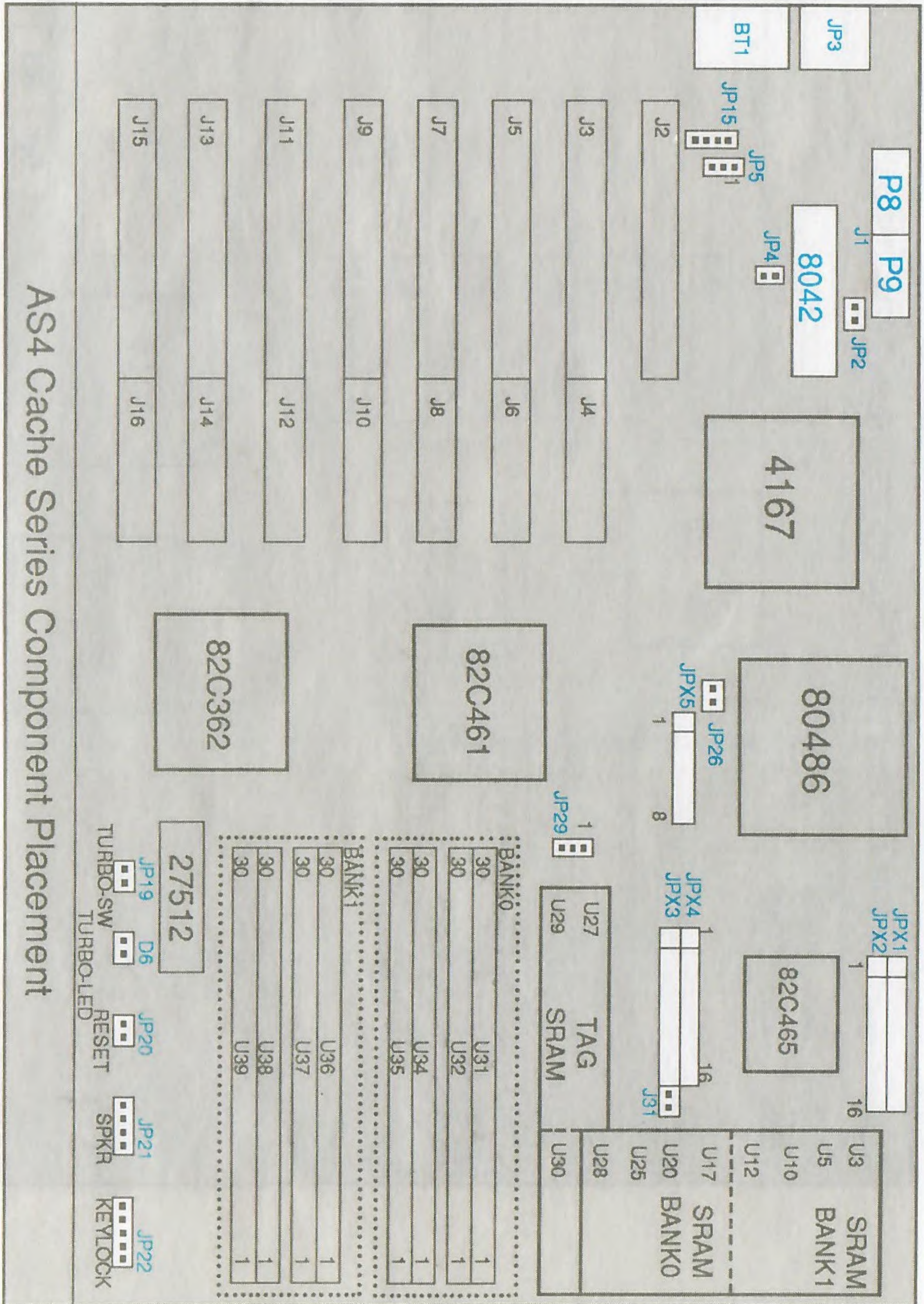
- Seven 16-bit slots plus One 8-bit slots are available to support AT-compatible add-on cards.

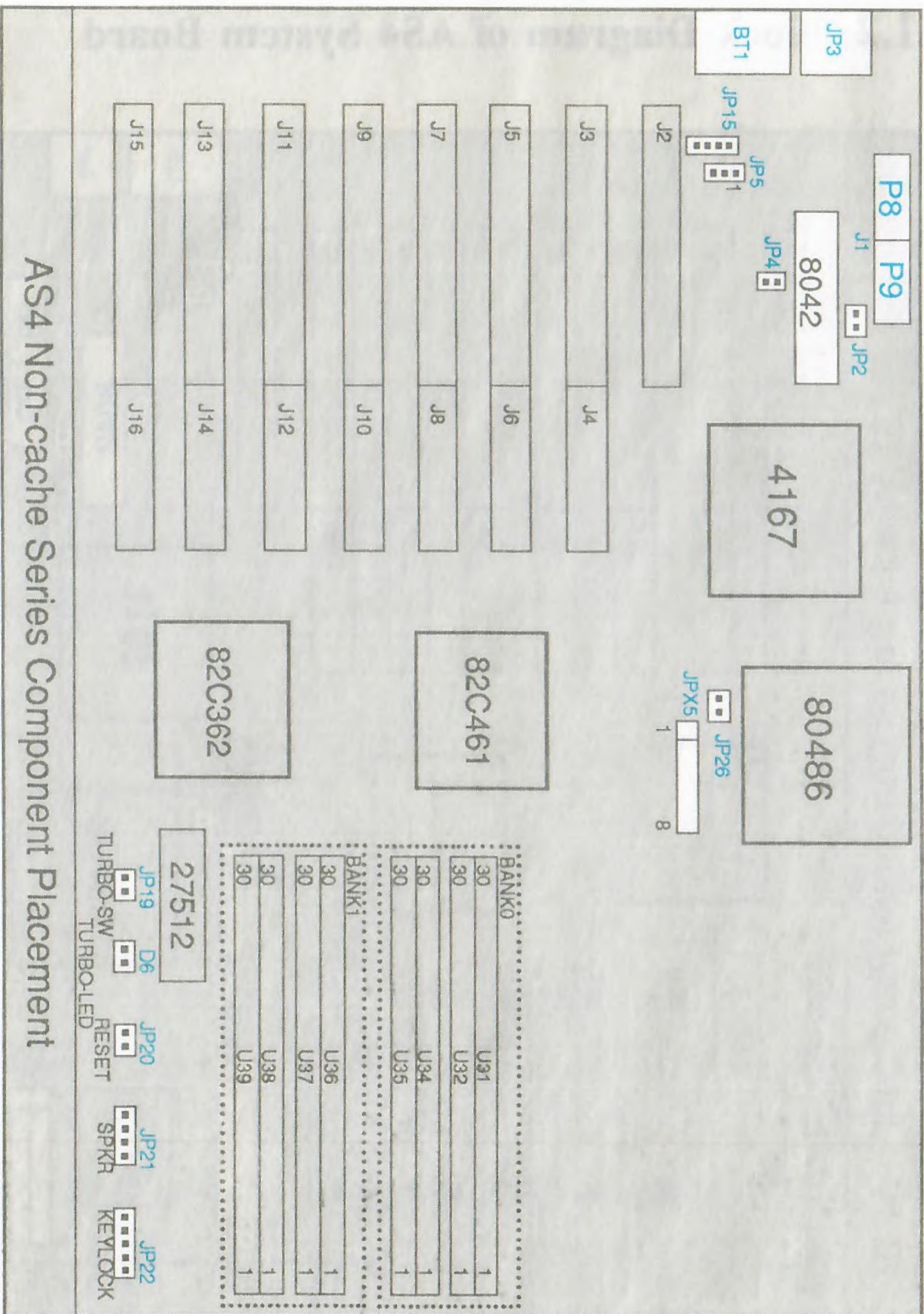
7. Miscellaneous:

- AMI BIOS or others.
- Hardware reset button reboots (cold-start) the system without turning the power off.
- CPU speed is switchable by pushing front panel button if available.
- Turbo LED indicates the CPU is running at high speed.
- Operating temperature: 0 to 45°C; Non-operating temperature: -40 to 70°C.

If your system board has been installed into the system chassis and you do not wish to change the configuration, please skip to the chapter "Setting Up the System Board".

1.2 Block Diagram of AS4 System Board





AS4 Non-cache Series Component Placement



1.3 Jumper and Connector Locations and Functions

1.3-1 Jumper Settings

Jumper No.	No. of Pins		Description	Default Setting
JP2	2		Reserved for factory Diagnostics	OFF
JP4	2	ON OFF	Select Color monitor Select Monochrome monitor	OFF
JP5	3	2-3 1-2	Discharge the power of COMS RAM in real time clock Normal operation	2-3
JP8	3		Reserved	fixed 1-2
JP14	3		Reserved	fixed 1-2
JP29	3	1-2 2-3	Select 64KX4 SRAM at U27, U29 Select 16KX4 SRAM at U27, U29	2-3
JP6	3		Reserved	fixed 1-2
JP17	2		Reserved	fixed "open"
JP31	2	ON OFF	1 Bank SRAM 2 Bank SRAM	depend
JP26	2	ON OFF	Select SX CPU Select DX CPU	depend
JPX5	8	ON OFF	Select DX CPU Select SX CPU	depend
JPX1 JPX2 JPX3 JPX4	16 16 16 16		Select Cache SRAM size	See chapter 3 for detail
JP30	2	ON OFF	other cache size 32KB cache size	fixed at "ON"
JP28	3	1-2 2-3	other cache size 32KB cache size	fixed at "1-2"

1.3-2 Connectors

Connector Name	Pin Assignments	Function
External Battery Connector: JP15 (4 PINS)	Pin 1: +6VDC. Pin 2: No connection Pin 3: No connection Pin 4: Ground	When on-board rechargeable battery is out of work, connect the 6V external battery to JP15 and take out the on-board rechargeable battery (BT1).
Turbo Connector: JP19 (2 PINS)	Pin 1: Turbo input Pin 2: Ground	Off: High speed On: Low speed
Turbo LED Connector D6 (2 PINS)	Pin 1: Negative end of Turbo LED Pin 2: $V_{cc}(+5VDC)$	If the connection is correct, the LED will light up whenever the system is in the turbo mode. Otherwise, the LED will Turn off.
Reset Connector: JP20 (2 PINS)	Pin 1: Reset input Pin 2: Ground	Connect the reset connector to the reset switch of the front panel of the Chassis. Press and hold down the Reset button for at least one second to reset the system

Connector Name	Pin Assignments	Function
Key Lock Connector: JP22 (5 PINS)	Pin 1: LED power Pin 2: No connection Pin 3: Ground Pin 4: Keyboard Inhibit Pin 5: Ground	This connector provide the power for LED and the electrical interlock, such as a key-activated switch on the front panel of the chassis. You can use the switch to lock out the keyboard.
Speaker Connector: JP21 (4 PINS)	Pin 1: Speaker drive Output Pin 2: Key Pin 3: Ground Pin 4: +5 VDC	Connector JP21 provides an interface to the speaker for audible tone generation.
Power Connector J1	 Pin 1: Power Good Signal Pin 2: +5VDC Pin 3: +12VDC Pin 4: -12VDC Pin 5 ~ Pin 8: Ground Pin 9: -5VDC Pin 10 ~ Pin 12: +5VDC	This connector is used for connecting the power from power supply to the system board.
Keyboard Connector: JP3	 Pin 1: Keyboard clock Pin 2: Keyboard data Pin 3: Spare Pin 4: Ground Pin 5: +5V DC	This connector is used for connecting the keyboard to the system board.

All other Jumpers which are not discribed in this manual are for factory testing purpose. These Jumpers should not be changed or removed.

1.4 Installation of DRAMs

There is no Jumpers to configure the DRAMs, the BIOS will test the DRAM type and size automatically. What you need to do is just plug in the SIMM DRAMs.

There are two banks of Memory (Bank 0 and Bank 1) on the system board, each bank consist of 4 pcs of SIMM DRAMs. The SIMM DRAMs can be 256Kx9, 1Mx9 or 4Mx9 module.

Following are the possible combination of the SIMM DRAMs.

Configuration	Bank 0	Bank 1	Total Memory
1	256Kx9	None	1MB
2	256Kx9	256Kx9	2MB
3	1MBx9	None	4MB
4	1Mx9	1Mx9	8MB
5	4Mx9	None	16MB
6	4Mx9	4Mx9	32MB

- Note:
1. Each bank consist of 4 pcs of SIMMs.
 2. The 80ns (Access time) DRAM is Recommended.
 3. Bank0 Location: U31, U32, U34, U35
Bank1 Location: U36, U37, U38, U39

1.5 Before Installing the AS4 system board

Before you install the system board, make sure all the jumpers and connectors are in proper configuration for your system. This includes the display type, memory configuration, speed selection, cache size, and BIOS.

1.6 Installing system board in Chassis

Chapter 5 of this manual is for trouble shooting some of the most common problems that you may have in setting up your board. If you have a problem, please look to see if it is mentioned.

Before you get started, make sure all power sources to the system have been turned off. You will need a screw driver for installation. The chassis ground should be connected to at least one of the metal plated mounting holes with metal screws and the other mounting holes can be connected to the chassis through plastic stand-offs. Be sure that the system board is mounted firmly inside the chassis.

You will need to connect the following standard devices to system board:

- Power supply to power connector (J1)
- Speaker to JP21
- Keylock to JP22
- Keyboard to Keyboard Connector (JP3)

If your system chassis has a RESET BUTTON, TURBO LIGHT or TURBO SWITCH, the following connectors are also available:

- Reset button to JP20
- Turbo light LED to D6
- Turbo switch to JP19

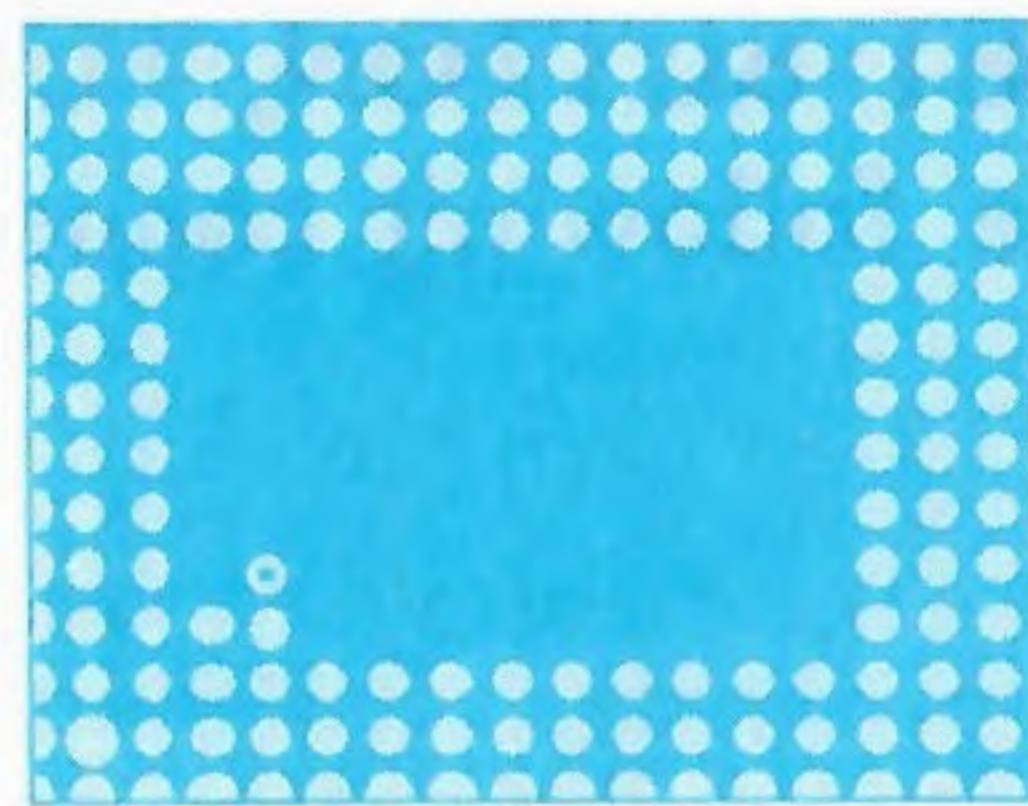
NOTE:

If a case-mounted control feature doesn't function after you start up the system, this indicates the connector orientation is wrong. In this case, turn off the system, disconnect all power sources, open the case and turn the lead's connector around the other way.

1.7 Install Weitek 4167 Coprocessors

If you want to install any math coprocessor and your motherboard is already in your case, we recommend, if at all possible, that you remove the motherboard from the case and lay it on a flat surface to install the chip.

The AS4 system board supports the Weitek 4167 math-coprocessors in the socket U11. Below are the diagrams for installing the chip.



Pin #1

A**B**

Diagram A. represents the empty socket U11 on the board. Pin #1 is located at the cropped corner of the internal square.

The Pin #1 locations on the Weitek 4167 is indicated by the depressed dot at one corner on each chip. When installing the chip, line the Pin #1 corner of the chip to the Pin #1 corner of the socket.

Diagram B. the Weitek 4167 will exactly cover the socket.

Chapter 2

Setting up the System

This chapter describes the procedure to set up your system under the AMI BIOS.

2.1 Entering the CMOS Setup

If the system does not boot up after the power is turned on, turn the power off, then hold the “INS” key down and turn the power back on.

When the system is first powered on or reset, the BIOS will display a copyright message on the first line of the screen.

If an EGA or VGA card is installed, the copyright message of the video card may be displayed on the screen first instead of the AMI BIOS.

Right after this display, the BIOS will perform the diagnostics and initialization.

The BIOS will indicate any errors or malfunctions by a series of beeps. Please refer to the section 2.8 on Error Message for detailed information.

The diagnostics and initialization can be functionally categorized as Keyboard Test; Video Test; RAM Test; and Floppy/Hard Disk Tests.

- **Keyboard Test:** Keyboard interface line, and keylock tests are performed to ensure the keyboard is correctly installed.
- **Video Test:** The BIOS will detect the presence/absence of the video card, according to the jumper (JP4) setting for either monochrome or color. If neither of them exists the BIOS will try to use an alternate one, normally an EGA or VGA card. If a video card can not be found, it will report by eight consecutive short beeps.
- **RAM Memory Test:** The RAM is tested in 64KB increments. All the base memory, extended and expansion memory will be included in the memory test. The board can have up to 15.64 mega bytes of on-board memory, depending upon the type and amount of memory being used. In the 1MB configuration, 640KB is the base memory, 384KB is the extended memory. Add-in memory boards must be properly configured to extend the on-board memory.
An [ESC] key can bypass the memory test when necessary.
- **Floppy/Hard Disk Test:** A reset command is issued to the floppy/hard disk drives. A certain amount of time is allowed for drive to response and setup a communications channel.

When all of the above tests have been passed, the message

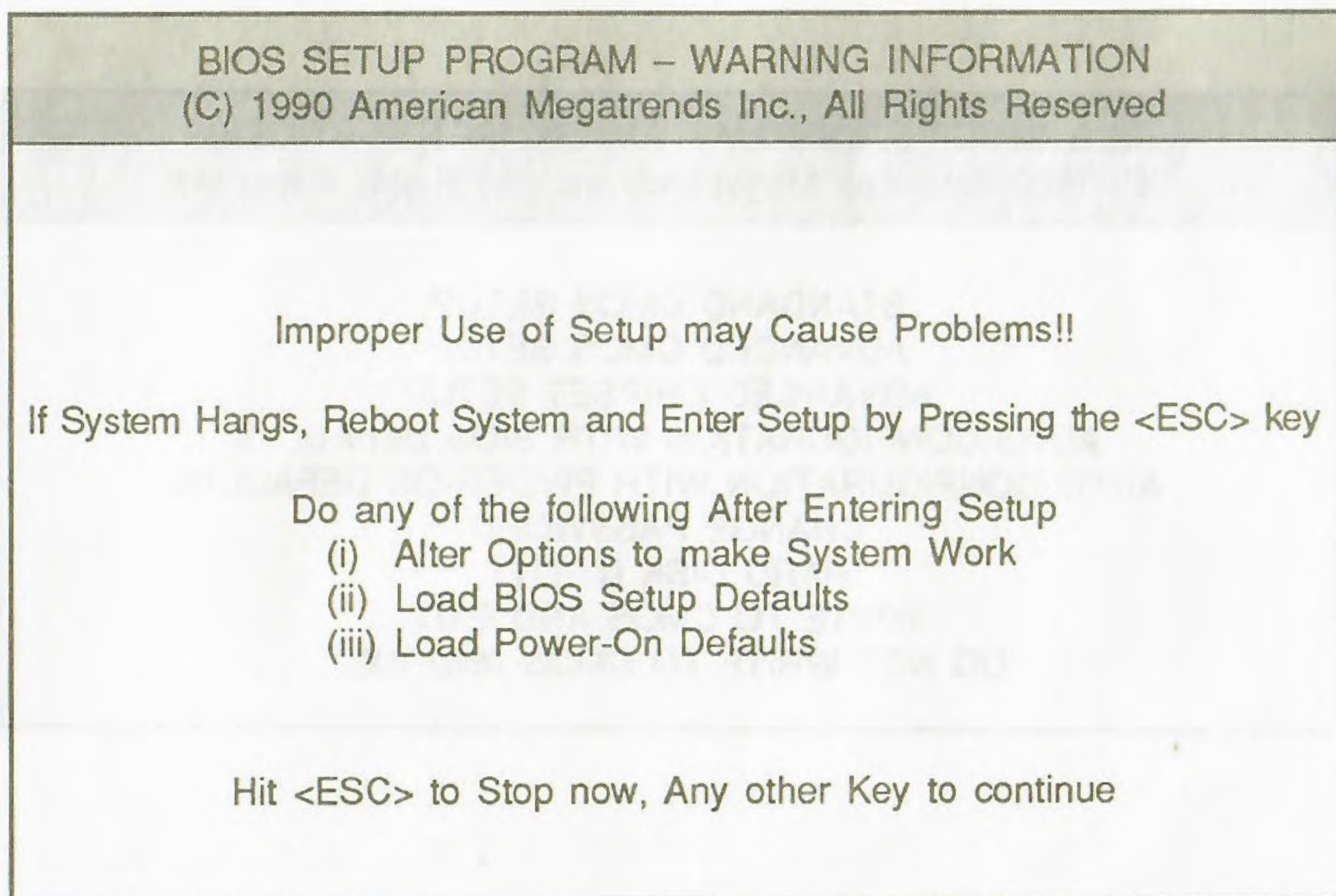
“Press [Del] key to run SETUP utility.”

is displayed. If the [Del] key is pressed, the screen will be cleared and then the following message be shown:

BIOS SETUP PROGRAM – AMI BIO SETUP UTILITIES
(C) 1990 American Megatrends Inc., All Rights Reserved

STANDARD CMOS SETUP
ADVANCED CMOS SETUP
ADVANCED CHIPSET SETUP
AUTO CONFIGURATION WITH BIOS DEFAULTS
AUTO CONFIGURATION WITH PWOER-ON DEFAULTS
CHANGE PASSWORD
HARD DISK UTILITY
WRITE TO CMOS AND EXIT
DO NOT WRITE TO CMOS AND EXIT

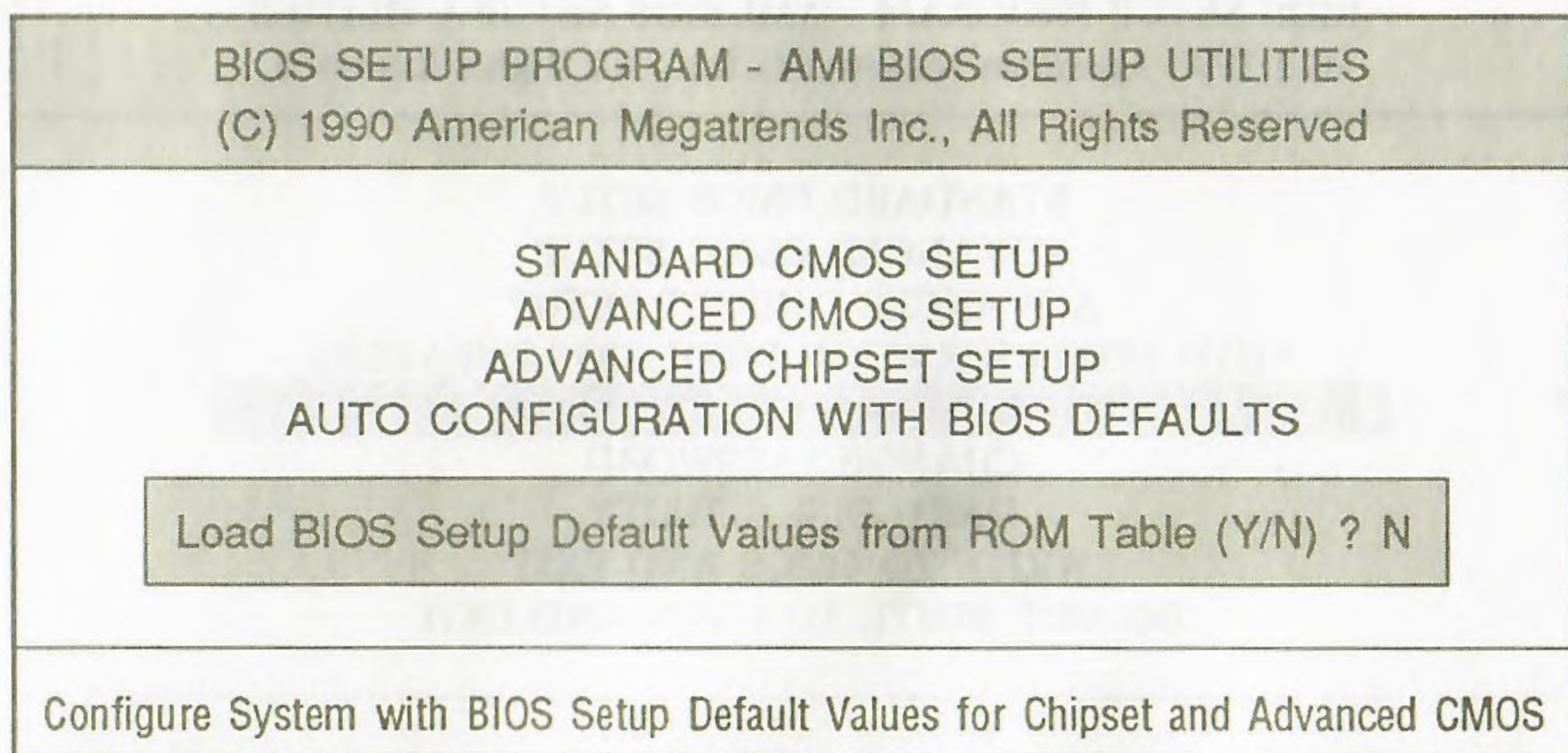
A warning message shown in Figure 2.1 is displayed each time one of the first three options (Standard CMOS Setup, Advanced CMOS Setup, and Advanced Chip Set Setup) is selected, before any changes are allowed to any of the setup parameters.



BIOS SETUP Warning Message Screen
Figure 2.1

2.1.1 AUTO CONFIGURATION WITH BIOS DEFAULTS

The Auto Configuration With BIOS feature uses the default system values before the user has changed any CMOS values. If the CMOS is corrupted, the BIOS defaults will automatically be loaded.



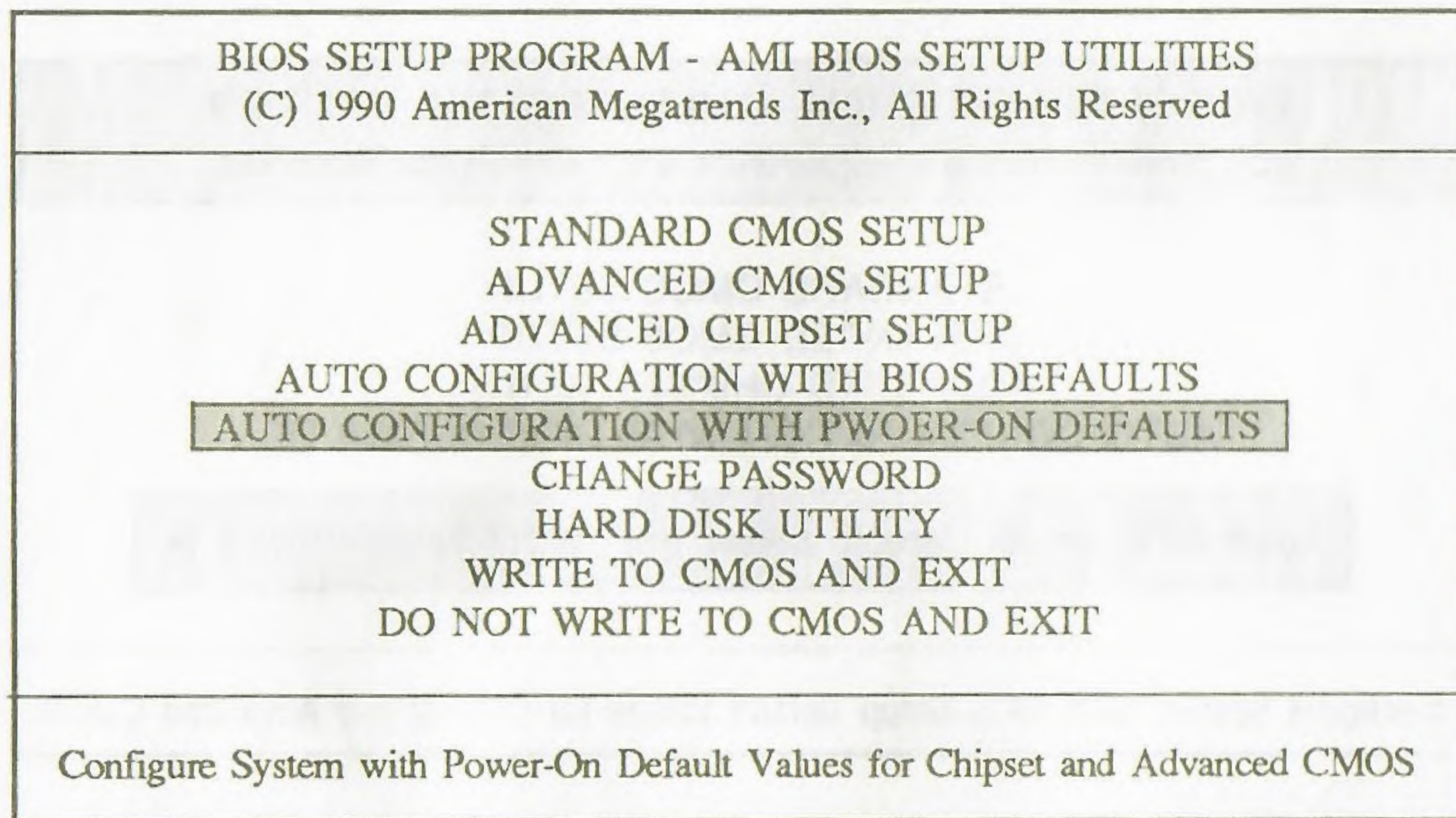
BIOS Default Auto Configuration Screen
Figure 2.2

If you wish to use the BIOS defaults, change the prompt to <Y> and press <ENTER>. The following message will appear on the screen:

“Default values loaded. Press any key to continue.”

2.1.2 AUTO CONFIGURATION WITH POWER-ON DEFAULTS

This feature uses the default Power-On values. You may wish to use this option as a diagnostic aid if your system is behaving erratically.



Power On Default Auto Configuration Screen
Figure 2.3

If you wish to use the Power-On defaults, change the prompt to <Y> and press <ENTER>. The following message will appear on the screen:

“Default values loaded. Press any key to continue.”

2.1.3 WRITE TO CMOS AND EXIT

After finish all the setup, the configuration in the Standard Setup, Advanced CMOS Setup, Advanced Chipset Setup, and the New Password Setup will be stored in the CMOS when this option is taken. The CMOS checksum is calculated and written to the CMOS. Control is then passed back to BIOS.

BIOS SETUP PROGRAM – AMI BIOS SETUP UTILITIES (C) 1990 American Megatrends Inc., All Rights Reserved
STANDARD CMOS SETUP ADVANCED CMOS SETUP ADVANCED CHIPSET SETUP AUTO CONFIGURATION WITH BIOS DEFAULTS
Write to CMOS and Exit (Y/N) ? N
Write the Settings to the CMOS and Exit

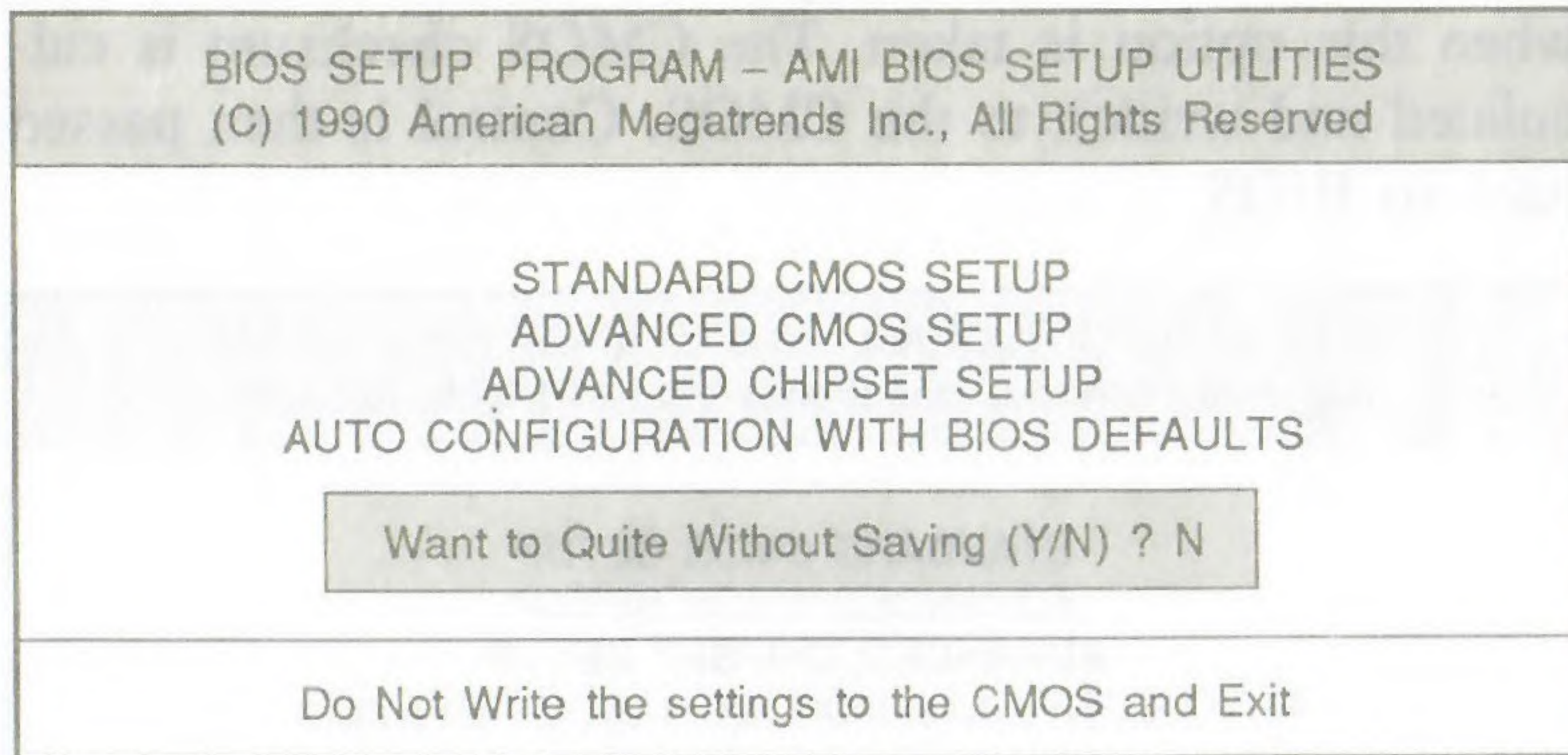
Write to CMOS Exit Screen Figure 2.4

Press <N> (No) and <ENTER> will return you to the Main Menu without saving.

Pressing <Y> (Yes) and <ENTER> will save the system parameters and continue with the booting process.

2.1.4 DO NOT WRITE TO CMOS AND EXIT

This option passes control back to BIOS without writing any changes to the CMOS.



CMOS Exit Screen
Figure 2.5

Pressing <N> (No) and <ENTER> will return the user to the Main Menu.

Pressing <Y> (Yes) and <ENTER> will continue with the booting process without saving any system parameters.

2.1.5 STANDARD CMOS SETUP BRIEF

The Standard CMOS Setup display appears on the screen as shown below.

CMOS SETUP (C) Copyright 1985-1990, American Megatrends Inc.,								
Date (mm/date/year) :	Tue, Jan 01 1980	Base memory size: 640 KB						
Time (hour/min/sec) :	09:37:07	Ext. memory size: 15360 KB						
Daylight saving :	Disabled							
Hard disk C: type:	: Not Installed	Cyl	Head	WPcom	LZone	Sect	Size	
Hard disk D: type:	: Not Installed							
Floppy drive A:	: Not Installed							
Floppy drive B:	: Not Installed							
Primary display :	: Not Installed							
Keyboard :	: Not Installed	Sun	Mon	Tue	Wed	Thu	Fri	Sat
		30	31	1	2	3	4	5
		6	7	8	9	10	11	12
		13	14	15	16	17	18	19
MoTh :	Jan, Feb, ..., Dec.	20	21	22	23	24	25	26
Date :	01, 02, 03, ...31	27	28	29	30	31	1	2
Year :	1901, 1902, ..., 2099							
ESC=EXIT, ↓ → ↑ ← = SELECT, PgUp/PgDn=Modify		3	4	5	6	7	8	9

Note the following in the standard CMOS Setup display:

- On the left side the screen, several system and hardware options/devices are displayed with their current settings. This is the user selectable CMOS Setup Configuration menu. Each individual category must be configured to your system.
- In the upper right corner, the amount of system memory and the status of the math coprocessor is displayed.

The BIOS is able to detect the amount of available RAM memory. Both the base memory size (RAM memory available in lower 1M address space) and the extended memory size (RAM memory available above the 1M address space) is displayed.

The presence of a math coprocessor is also displayed. The BIOS can detect the presence of a numeric coprocessor.

- c) The lower right corner displays a calendar indicating the current settings of the date category.
- d) Information regarding each of the CMOS menu items is displayed in the option display box located in the lower left corner of the screen.
- e) The bottom line indicated the menu key conventions.

2.1.6 Key Conventions

The following key conventions allow you to select and modify items and options in the Setup menu:

ESC: Exit to previous screen.

ARROW KEYS: Use arrow keys to move cursor to desired selection.

PgUp/PgDn/CTRL-PgUp/CTRL-PgDn: Modify the default value of the options for the highlighted feature. If there are less than 10 available options, the CTRL-PgUp and CTRL-PgDn keys function the same as the PgUp and PgDn keys.

F1: Displays help screen for selected feature.

F2/F3: Changes background and foreground colors.

F5: Retrieves the values which were resident when current setup session was started. These values will be CMOS values if the CMOS was uncorrupted at the start of the session, or they will be the BIOS Setup default values.

F6: Loads all features in the Advanced CMOS Setup/Advanced Chipset Setup with the BIOS Setup defaults.

F7: Loads all features in the Advanced CMOS Setup/Advanced Chipset Setup with the Power-On defaults.

F10: Saves all changes made to Setup and exits program.

2.2 STANDARD CMOS SETUP

The following provides information on the options of the individual standard CMOS Setup menu categories:

2.2.1 Date

The date category allows you to set or modify the month, date, and year which is displayed in the option display box as shown below:

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

Note that the calendar automatically updates its display as you select or modify each of the items in the date category with your PgUp/PgDn keys.

2.2.2 Time

The time category allows you to set or modify the hour, minute, and seconds as follows:

Time is 24 hour format:
Hour: (00-23), Minute: (00-59), Second: (00-59)
(1:30AM=01:30:00), (1:30PM=13:30:00)

2.2.3 Floppy Drive

The type of floppy drives installed on your system are selected by this category. There are four types available:

Options are:-
360KB 5 $\frac{1}{4}$ " , 1.2MB 5 $\frac{1}{4}$ "
720KB 3 $\frac{1}{4}$ " , 1.44MB 3 $\frac{1}{4}$ "

The BIOS is able to detect if a 360KB 5 $\frac{1}{4}$ " floppy drive is installed and will display this if so. However, if the BIOS has detected a floppy drive that has 80 tracks (one of the remaining 3 types of floppy drive), it will show the presence of this drive by indicating the default drive type of 1.2MB, 5 $\frac{1}{4}$ ". If your floppy drive is not this type, select the appropriate type.

2.2.4 Hard Disk

The type of fixed drives (hard drives) installed on your system must be selected by this option. You must match the correct number of cylinders, heads, and size (Refer to the hard drive manual) to select the correct type. There are 46 defined types available for selection. An optional user defined fixed drive type is also available. The option display box shows:

FIXED type=01...46, USER defined type=47,
For type 47 Enter: Cyln, Head, WPcom,
(WPcom is 0 for ALL, 65535 for NONE)

A complete listing of the available types (1-46) selected by the PgUp/PgDn keys is shown on section 2.7.

Warning: Entering the wrong hard drive type causes improper operation of the disk.

2.2.5 Primary Display

This indicates the type of monitor present with your system. The BIOS detects the type of monitor present and selects the correct option from the following types:

Options are:-

Monochrome, Color 40X25,

VGA or EGA, Color 80X25, Not Installed

2.2.6 Keyboard

This allows you to enable or disable BIOS testing of the keyboard during system initialization as indicates below:

Options are:-

Installed: Test Keyboard

Not Installed: Do not test keyboard

2.3 ADVANCED CMOS SETUP

Conjunction section 2.2 and this section are entirely enough for the users to setup their system.

The advanced CMOS setup program is equipped with a series of help screens, accessed by the <F1> key, which will display the options available for a particular configuration feature and special help for some of the options. If you don't really understand the meanings of each item, please don't change the following default value.

BIOS SETUP PROGRAM- ADVANCED CMOS SETUP (C) 1990 American Megatrends Inc., All Rights Reserved	
Typematic Rate Programming : Disabled	Password Checking Option : Disabled
Typematic Rate Delay (msec) : 250	Video ROM Shadow C000,16K : Enabled
Typematic Rate (Chars/Sec) : 10.0	Video ROM Shadow C400,16K : Enabled
Mouse Support Option : Disabled	Adaptor ROM Shadow C800,16K : Disabled
Above 1 MB Memory test : Disabled	Adaptor ROM Shadow CC00,16K : Disabled
Memory Test Tick Sound : Enabled	Adaptor ROM Shadow D000,16K : Disabled
Memory Parity Error Check : Enabled	Adaptor ROM Shadow D400,16K : Disabled
Hit <ESC> Message Display : Enabled	Adaptor ROM Shadow D800,16K : Disabled
Hard Disk Type 47 RAM Area : 0:300	Adaptor ROM Shadow DC00,16K : Disabled
Wait For <F1> If Any Error : Enabled	Adaptor ROM Shadow E000,16K : Disabled
System Boot Up Num Lock : On	Adaptor ROM Shadow E400,16K : Disabled
Numeric Processor : Absent	Adaptor ROM Shadow E800,16K : Disabled
Weitek Processor : Absent	Adaptor ROM Shadow EC00,16K : Disabled
Floppy Drive Seek At Boot : Disabled	Adaptor ROM Shadow F000,64K : Enabled
System Boot Up Sequence : A., C:	DRAM Wait State Select : 1 WS
System Boot Up CPU Speed : High	BUS Clock Selection : CLK2/4
External Cache Memory : Enabled	Decoupled Refresh Option : Enabled
Fast Gate A20 Option : Disabled	Select Cacheable Region : 8 MB

!!WARNING!!

To achieve the maximum system compatibility. We reserves the right to revise the listing items or default value of each item without notice.

Revise History:

The options for the following features of the Advanced CMOS setup are either Disabled or Enabled:

- Typematic Rate Programming
- Extended Memory Test
- Memory Test Tick Sound
- Memory Parity Error Check
- Hit <ESC> Message Display
- Wait for <F1> If Any Error
- Cache Memory
- Fast Gate A20 Option
- Video or Adapter ROM Shadow
- GA20 Line After System Boot

The options for the following features of the Advanced CMOS setup are either "Present" or "Absent:"

- Numeric Processor
- Weitek Processor

The options for **System Boot Up Num Lock** are "On" or "Off."

The options for **System Boot Up Speed** are "High" or "Low."

Typematic Rate Programming: By enabling this option, the user can adjust the rate at which a keystroke is repeated. The options "Typematic Rate Delay" and "Typematic Rate" affect this rate. When a key is pressed and held down, the character appears on the screen and after a delay set by the Typematic Rate Delay, it keeps on repeating at a rate set by the Typematic Rate value.

When two or more keys are pressed and held down simultaneously, only the last key pressed will be repeated at the typematic rate. This stops when the last key pressed is released, even if other keys are depressed.

Extended Memory Test: This feature, when enabled, will invoke the POST memory routines on the RAM above 1 MB (if present on the system). If disabled, the BIOS will only check the first 1 MB.

Memory Test Tick Sound: This option will enable (turn on) or disable (turn off) the “ticking” sound during the memory test.

Memory Parity Error Check: This option will enable or disable the memory parity error checking routines in the BIOS.

Hit <ESC> Message Display: Disabling this option, will prevent the message;

“Hit <ESC> if you want to run SETUP”
from appearing on the screen when the system boots-up.

Hard Disk Type 47 Data Area: The AMI BIOS SETUP features two user-definable hard disk types. Normally, the data for these disk types are stored at 0:300 in lower system RAM. If a problem occurs with other software, this data can be located at the upper limit of the DOS shell (640 KB). If the option is set to “DOS 1 KB,” the DOS Shell is shortened to 639 KB, and the top 1 KB is used for the hard disk data storage.

Wait for F1 If Any Error: Before the system boots-up, the BIOS will execute the POST routines, a series of system diagnostic routines. If any of these tests fail, but a non-fatal error has occurred and the system can still function, the BIOS will respond with an appropriate error message followed by the following statement:

“Press <F1> to continue.”

If this option is disabled, any non-fatal error which occurs will not generate the above statement, but the BIOS will still display the appropriate error message. This will eliminate the need for any user response to a non-fatal error condition message.

System Boot Up Num Lock: The user may turn off the “num lock” option on his enhanced keyboard when the system is powered on. This will allow him to use the arrow keys on the numeric keypad instead of using the other set of arrow keys on the enhanced keyboard. The BIOS will default to turning the “num lock” on.

Numeric/Weitek Processor(s): These options allow the user to mark the numeric processor/Weitek WTL 4167 as present or absent.

Floppy Drive Seek At Boot: The default for this option is “Disabled” to allow a fast boot and to decrease the possibility of damage to the heads.

External Cache Memory: This option will enable or disable the secondary cache controller and cache memory.

Fast Gate A20: This option uses the fast gate A20 line to access any memory above 1 MB. Normally, all RAM access above 1 MB is handled through the keyboard controller chip. Using this option will make the access faster than the normal method. This option is very useful in networking operating systems.

Video or Adaptor ROM Shadow: ROM Shadow is a procedure in which BIOS code is copied from slower ROM to faster RAM. The BIOS is then executed from the RAM. They may or may not appear on the BIOS screen. Each option, when it does appear, allows for a segment of 16 KB to be shadowed from ROM to RAM. If one of these options is enabled, and there is BIOS present in that particular 16 KB segment, the BIOS will be shadowed.

System ROM Shadow: The same concept applies here as above, except that in this case, the system BIOS (64 KB in length) is shadowed.

GA20 Line After System Boot: This option will enable or disable the use of Gate A20 after the system has booted. Gate A20 is an alternate method for accessing system RAM above 1 MB.

System Boot Up Sequence: The BIOS will normally attempt to boot from floppy drive A: (if present), and if unsuccessful, it will attempt to boot from hard disk C:. This sequence can be switched using this option. If the option is set to "C:, A:," the system will attempt to boot from the hard drive C:, and then A:. If the option is set to "A:, C:," the sequence is reversed.

Password Check Option: The option in the BIOS SETUP only allows the user to enable the password check option every time the system boots or upon entering SETUP only. A third option is to disable the password option entirely. The default option is "Disabled." The prompt for the password will not appear when the system is re-booted.

If the "Always" option is chosen at Setup, each time the system is turned on, i.e. "booted," the prompt for user password will appear.

If the "Setup" option is chosen at Setup, the password prompt will not appear when the system is turned on, but will appear if the user attempts to enter the Setup program.

The program allows three attempts to key-in the correct password. After each incorrect attempt, the prompt to enter the current password will appear, followed by an "X." After the third incorrect attempt, the system will lock and it will be necessary to reboot. The screen will not display the characters entered.

System Boot UP CPU Speed: The speed at which the system will boot up is determined with this option. Choices for this option are "high" or "low." The default speed is "high."

2.4 ADVANCED CHIPSET SETUP

The advanced chipset setup MENU is entirely chipset specific portion and requires full knowledge about the detail definition of Symphony 486 chipset. Each option is tightly corresponding with the hardware structure. Without our engineering change notice, we strongly recommended "don't change any contents in chipset setup MENU."

!!WARNING!!

To achieve the maximum system compatibility. We reserves the right to revise the listing items or default value of each item without notice.

Revise History:

Bus Clock divider

There are four options for bus clock: CLK2/3, CLK2/4, CLK2/5, and ATCLK. The bus clock options provides the flexibility of various add-on-card. The different options related to different speed:

OPTION	AS450	AS433	AS425	AS420
CLK/3:	50/3	33/3	<u>25/3</u>	<u>20/3</u>
CLK/4:	50/4	<u>33/4</u>	25/4	20/4
CLK/5:	<u>50/5</u>	33/5	25/5	20/5
ATCLK:	Inhibit	Inhibit	Inhibit	Inhibit

!!WARNING!!

The default setting was marked by underline. For the maximum compatibility with the Add-on card, PLS don't change this option.

2.5 HARD DISK UTILITY

!!WARNING!!

Performing the Hard Disk Format, Auto Interleave, and/or Media Analysis will destroy all data on the hard disk being tested. Back up the hard disk(s) before actually performing any of these routines.

NOTE: These routines are not valid for a SCSI Disk Drive.

The **Hard Disk Format** option performs a “low level” format of the hard drive(s). The user should check with the system or hard drive manufacturer to determine if this option should be taken.

The **Auto Interleave** option determines the optimum interleave factor prior to the format of the hard drive(s).

The **Media Analysis** option performs an analysis of each track of the hard drive to determine whether it is usable. If it is not usable, the track is marked as “bad” so that data cannot be stored there in the future.

2.6 System Configuration display

The system board displays your system configuration reflecting the setting of the CMOS setup program whenever the system is powered on (prior to boot). The system configuration display appears as shown below:

System Configuration (C) Copyright 1985-1990, American Megatrends Inc.,			
Main Processor	: 80486	Base Memory Size	: 640KB
Numeric Processor	: Present	Ext. Memory Size	: 7168KB
Floppy Drive A	: 360KB, 5 ¹ / ₄ "	Hard Disk C: Type	: None
Floppy Drive B	: 1.2MB, 5 ¹ / ₄ "	Hard Disk D: Type	: None
Display Type	: Monochrome	Serial Port (s)	: None
ROM-BIOS Date	: 10/30/90	Parallel Port (s)	: None

Note: If the settings as displayed in your system configuration display do not match your actual hardware configuration, run the setup program.

2.7 Standard Type of Hard disk

Standard type of hard disk supported by BIOS:

Type	Cyln	Heads	W-Pcomp	L-Zone	Capacity
1	306	4	128	305	10MB
2	615	4	300	615	21MB
3	615	6	300	615	31MB
4	940	8	512	940	64MB
5	940	6	512	940	48MB
6	615	4	FFFF	615	21MB
7	462	8	256	511	31MB
8	733	5	FFFF	733	31MB
9	900	15	FFFF	901	115MB
10	820	3	FFFF	820	21MB
11	855	5	FFFF	855	36MB
12	855	7	FFFF	855	51MB
13	306	8	128	319	21MB
14	733	7	FFFF	733	44MB
15	000	0	0000	000	00MB
16	612	4	0000	663	21MB
17	977	5	300	977	42MB
18	977	7	0000	977	58MB
19	1024	7	512	1023	61MB
20	733	5	300	732	31MB
21	733	7	300	732	42MB
22	733	5	300	733	31MB
23	306	4	0000	336	10MB
24	925	7	0000	925	56MB
25	925	9	FFFF	925	72MB
26	754	7	754	754	46MB
27	754	11	FFFF	754	72MB
28	699	7	256	699	42MB
29	823	10	FFFF	823	71MB
30	918	7	918	918	55MB

Type	Cyln	Heads	W-Pcomp	L-Zone	Capacity
31	1024	11	FFFF	1024	98MB
32	1024	15	FFFF	1024	133MB
33	1024	5	1024	1024	44MB
34	612	2	128	612	10MB
35	1024	9	FFFF	1024	80MB
36	1024	8	512	1024	71MB
37	615	8	128	615	42MB
38	987	3	987	987	25MB
39	987	7	987	987	56MB
40	820	6	820	820	41MB
41	977	5	977	977	42MB
42	981	5	981	981	42MB
43	830	7	512	830	50MB
44	830	10	FFFF	830	72MB
45	917	15	FFFF	918	115MB
46	1224	15	FFFF	1223	152MB

Type : Hard disk type number
 Cyln : Number of cylinders (tracks) per disk surface
 Heads : Number of heads (data surface)
 W-Pcomp : Write-Precompensation
 L-Zone : Landing zone
 Capacity : Formatted Capacity

2.8 Errors reported by the BIOS.

The BIOS performs various diagnostic tests at the time the system is powered up. Whenever an error is encountered during these tests, either you 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.

2.8.1 Error beeps (Fatal Errors)

NO. OF BEEPS	MEANING OF ERROR
1.	DRAM refresh is not working.
2.	Parity circuit is not working or parity status bits are not cleared when parity is disabled.
3.	First 64K memory test failure. Address line test (A0...A15) failure.
4.	System timer is not counting properly.
5.	Processor register/flag test failure.
6.	8042 keyboard controller gate-A20 error.
7.	Processor exception error encountered.
8.	Display memory R/W test failure (NON-FATAL)
9.	ROM-BIOS checksum error.
10.	CMOS Shutdown Register Read/Write Error

2.8.2 Error Message

Non-Fatal Errors

1.	CH-2 Timer Error
2.	INTR #1 Error
3.	INTR #2 Error
4.	CMOS Battery State Low
5.	CMOS checksum failure.
6.	CMOS System Options Not Set
7.	CMOS Display Type Mismatch
8.	Display Switch Not Proper
9.	Keyboard Is Locked...Unlock It
10.	Keyboard Error lock it.
11.	KB/Interface Error
12.	CMOS Memory Size Mismatch
13.	FDD Controller Failure
14.	HDD controller Failure
15.	C: Drive Error
16.	D: Drive Error
17.	C: Drive Failure
18.	D: Drive Failure
19.	CMOS Time & Date Not Set
20.	Cache Memory Bad, Do Not Set
21.	8042 Gate-A20 Error
22.	Address Line Short!
23.	DMA #2 Error
24.	DMA #1 Error
25.	DMA Error
26.	No ROM BASIC
27.	Diskette Boot Failure
28.	Invalid Boot Diskette
29.	On Board Parity Error
30.	OFF BOARD PARITY ERROR
31.	Parity Error

Chapter 3

Cache Memory Configuration

This chapter provides the information of how to install the cache RAM.

Improper installation of the cache RAM will cause the system shutdown.

!!!NOTE!!!

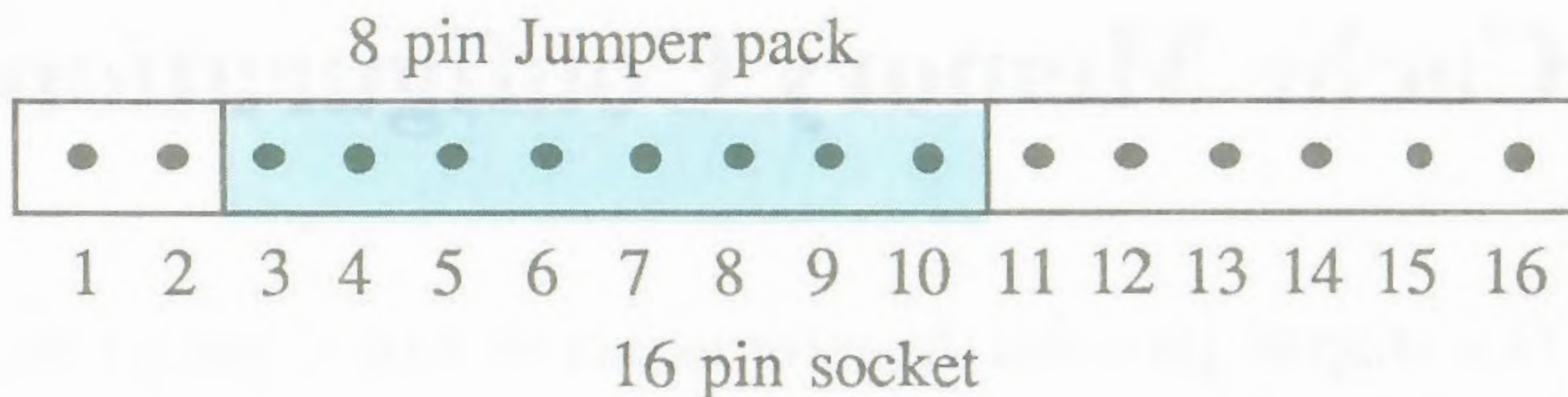
For AS4 Non-Cache Main board, Users can skip this chapter.

3.1 Cache RAM Configurations

The AS4 main board support a very flexible Cache SRAM configuration: 32KB, 64KB, 128KB, 256KB, 512KB and 1MB. For easy to use, the AS4 main board introduce the “Jumper-Pack” concept to minimize the selection jumpers, we gather all of cache size selection jumpers into four 16 pin sockets (JPX1, JPX2, JPX3, JPX4). Each socket need one 8-Pin jumper-pack to select the different cache size. The physical shape of jumper-pack is shown as below:



The jumper-packs is a non-polarity Jumper. It is not necessary to worry about the polarity of jumper-pack, please just plug it into the specific location of the 16-pin socket as described in this section.



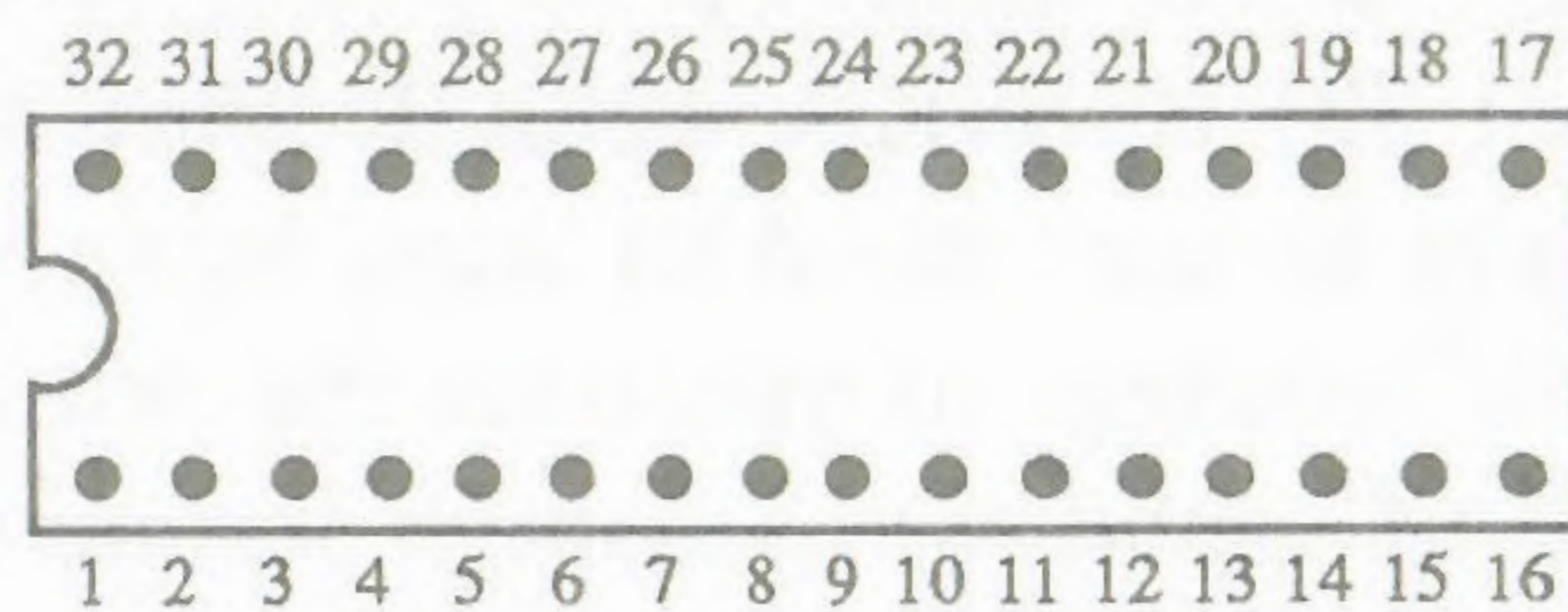
In order to have better flexibility of supporting various cache memory size, AS4 is designed to support multi-device in same socket:

Group 1:

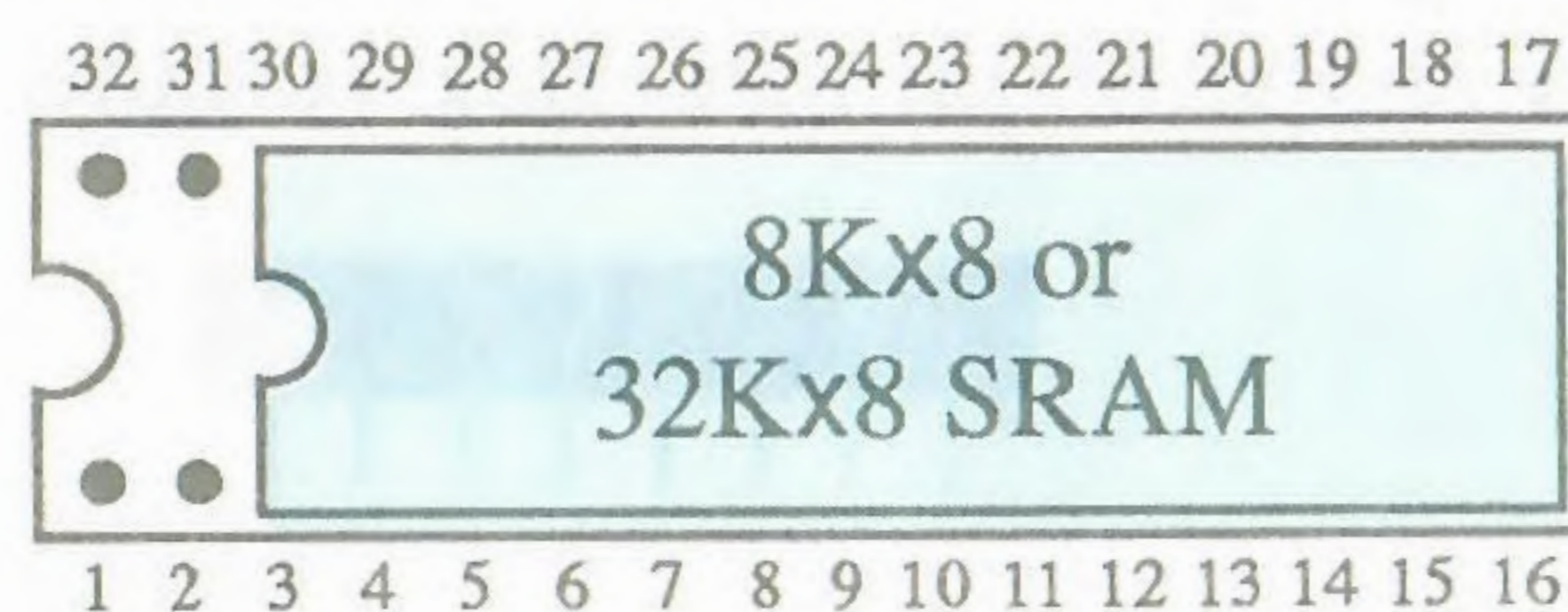
Socket Location: U3, U5, U10, U12, U7, U20,
U25, U28, U30

Supported Device: 8Kx8 SRAM
32Kx8 SRAM
128Kx8 SRAM

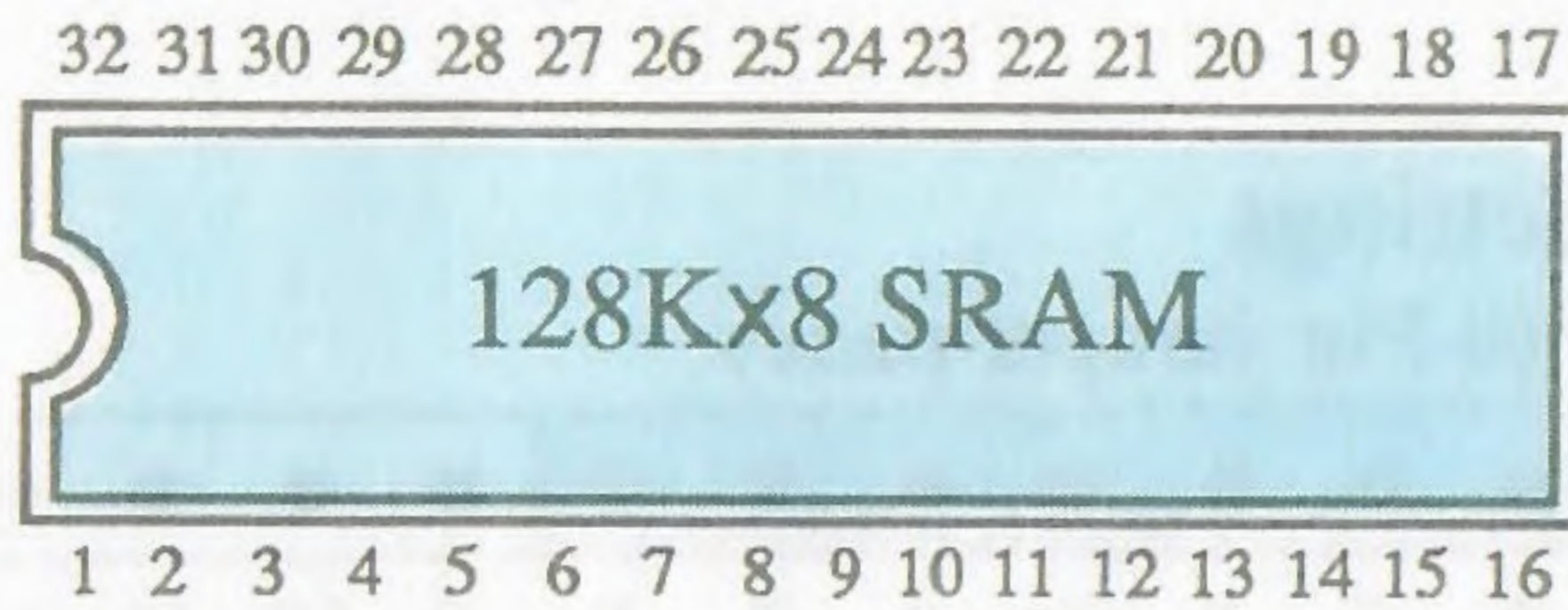
a. empty socket



b. socket with 8Kx8 or 32Kx8 SRAM



c. Socket with 128Kx8 SRAM



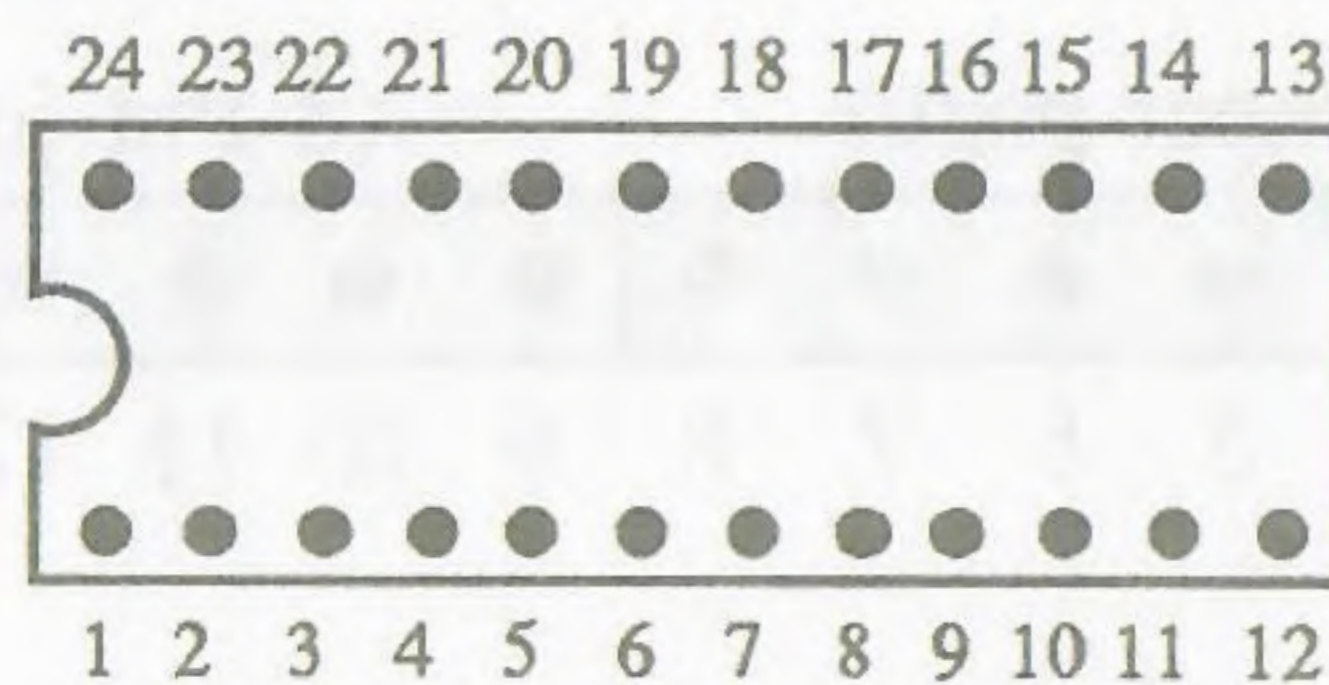
Group 2:

Socket location: U27, U29

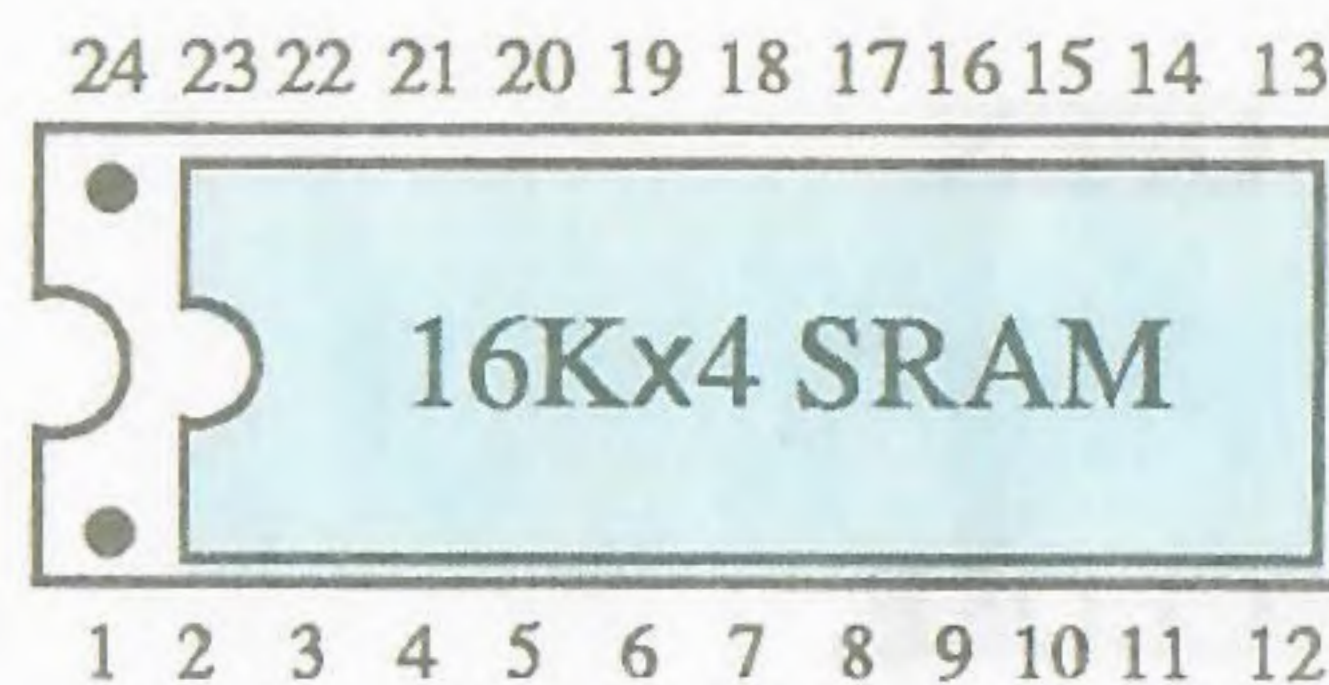
Supported Device: 16Kx4 SRAM

64Kx4 SRAM

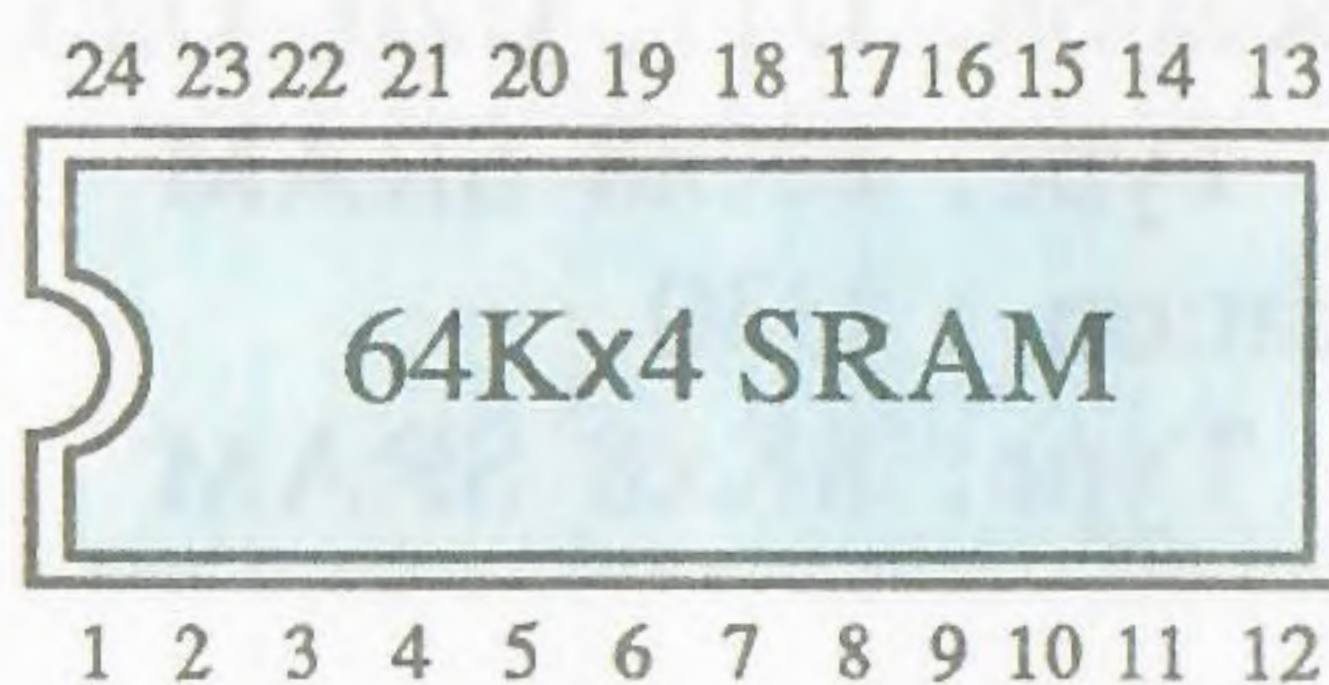
a. empty Socket



b. Socket with 16Kx4 SRAM

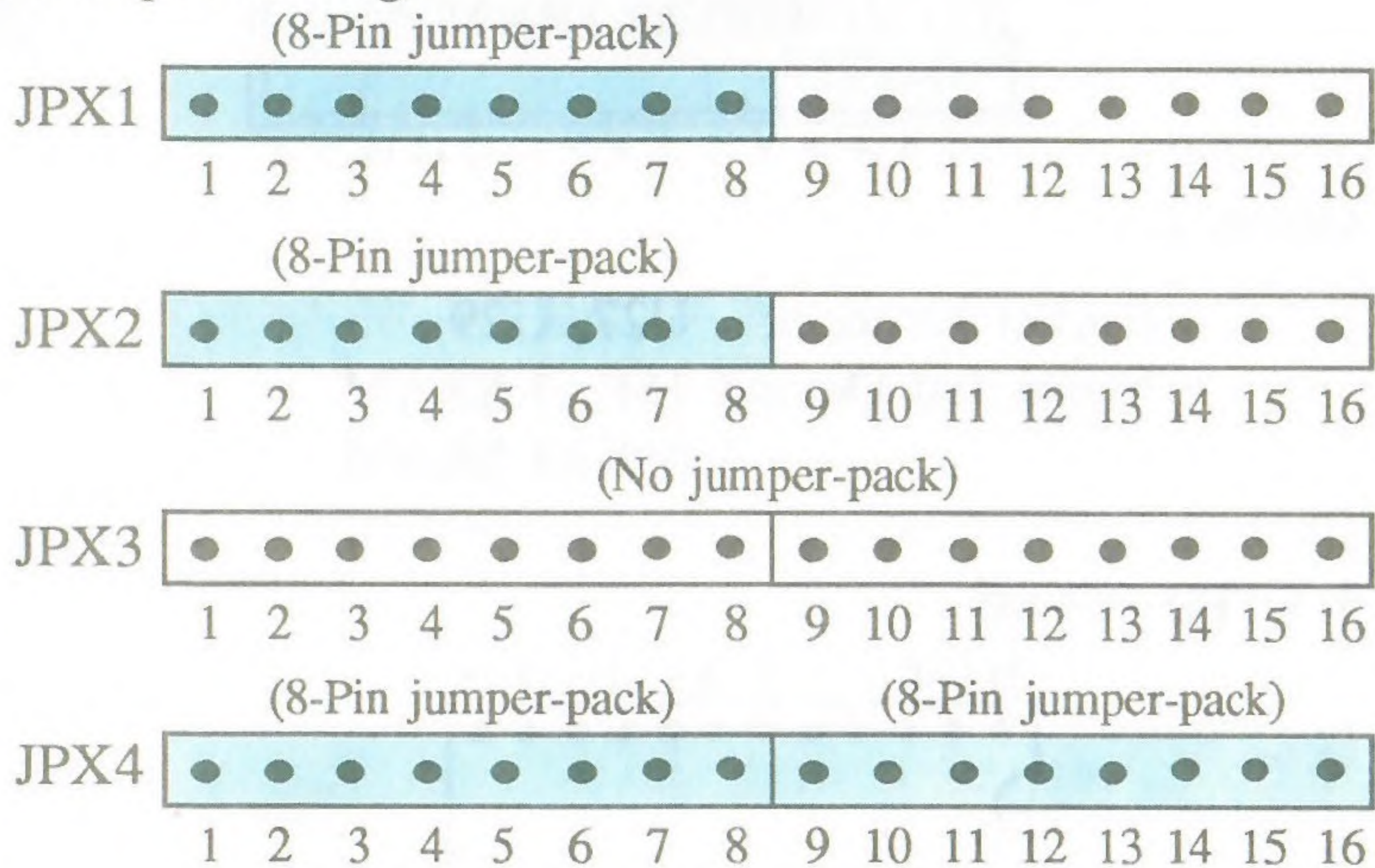


c. Socket with 64Kx4 SRAM



3.1-1 32KB cache RAM Configuration

1. Jumper Settings



* JP28  Pin 2 – 3 CLOSE.
1 2 3

* JP30  OPEN.
1 2

JP31  CLOSE.
1 2

2. Cache SRAM Location: U17, U20, U25, U28

Type: 8Kx8 SRAM

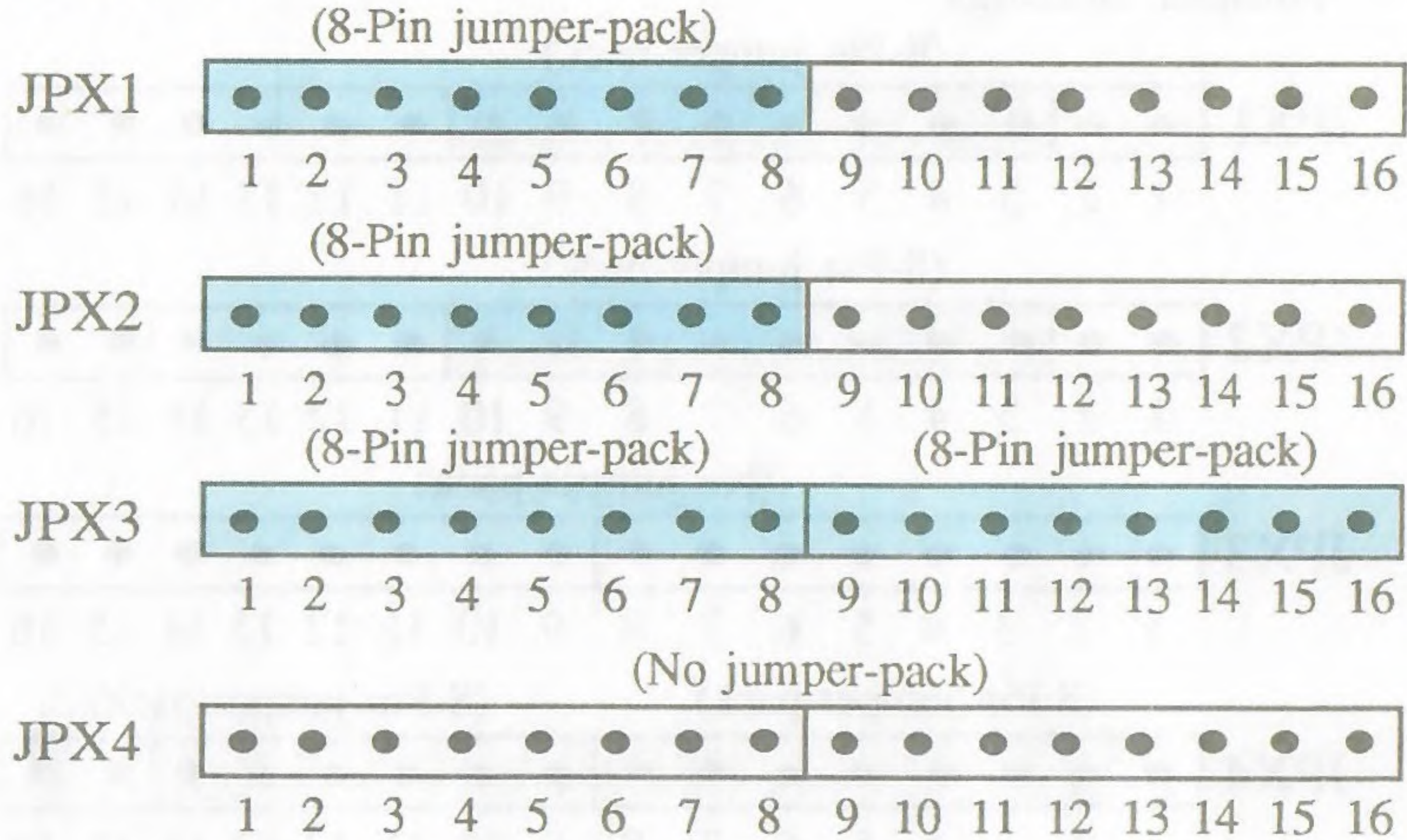
3. TAG SRAM Location : U30


Type: 8Kx8 SRAM

*Note: 1. JP28, J30 will be removed in the standard configuration, (64KB~1MB).

3.1-2 64KB Cache RAM Configuration

Jumper Settings



*JP28  Pin 1 – 2 CLOSE.
 1 2 3

*JP30  CLOSE
 1 2

JP31  OPEN
 1 2

2. Cache SRAM Location: U17, U20, U25, U28, U3, U5, U10, U12

Type: 8Kx8 SRAM

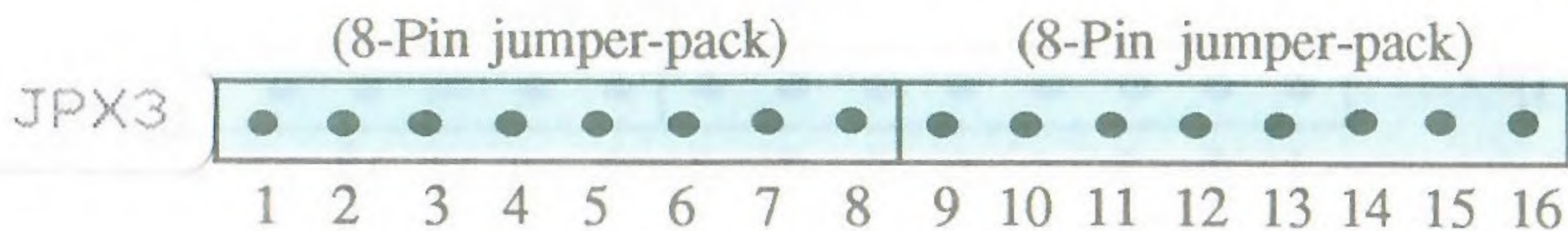
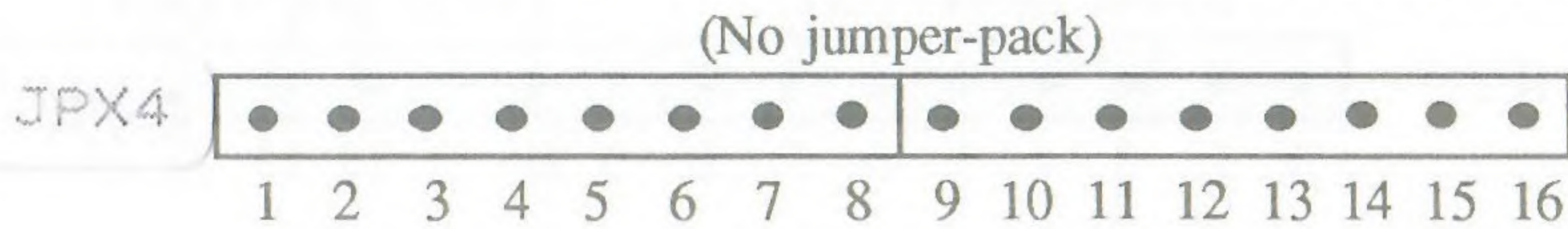
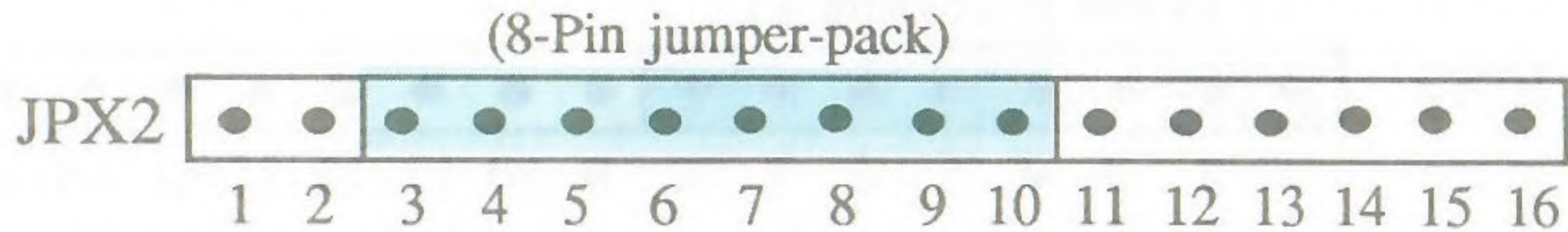
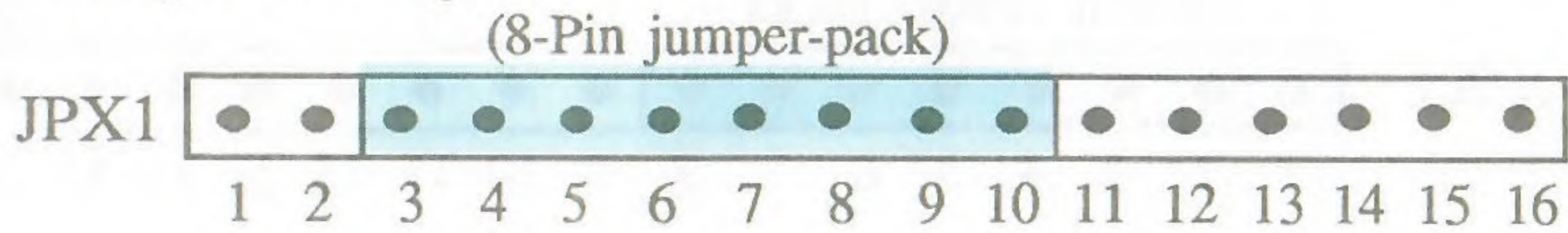
3. TAG SRAM Location : U30

Type: 8Kx8 SRAM

*Note 1. JP28, J30 will be removed in the standard configuration, (64KB~1MB).

3.1-3 128KB Cache RAM Configuration

1. Jumper Settings



2. Cache SRAM Location: U17, U20, U25, U28

Type: 32Kx8 SRAM

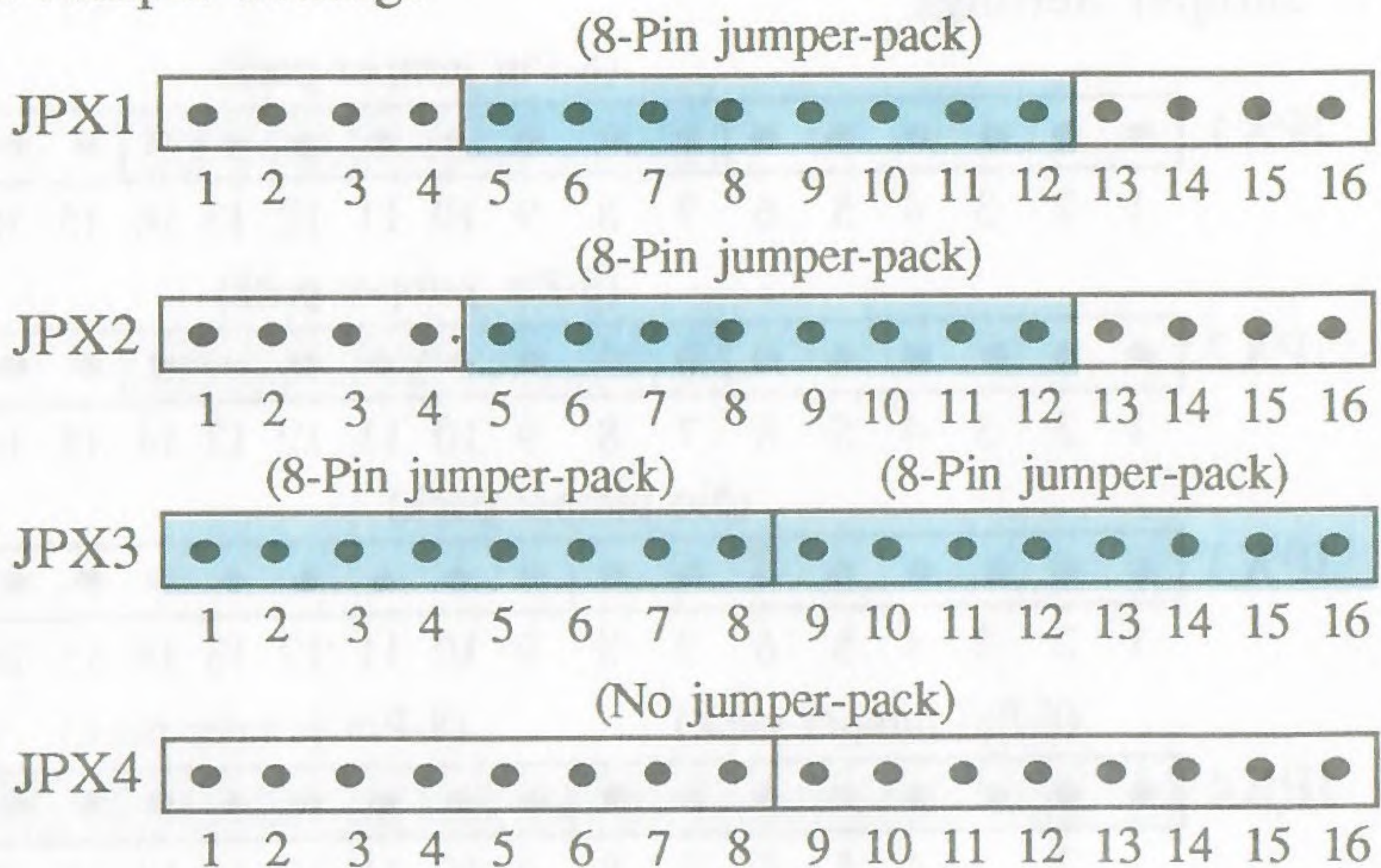
3. TAG SRAM Location : U30


Type: 32Kx8 SRAM

*Note 1. JP28, J30 will be removed in the standard configuration, (64KB~1MB).


3.1-4 256KB Cache RAM Configuration

1. Jumper Settings



* JP28  Pin 1 – 2 CLOSE.
 1 2 3

* JP30  CLOSE.
 1 2

JP31  OPEN.
 1 2

2. Cache SRAM Location: U17, U20, U25, U28, U3, U5, U10, U12

Type: 32Kx8 SRAM

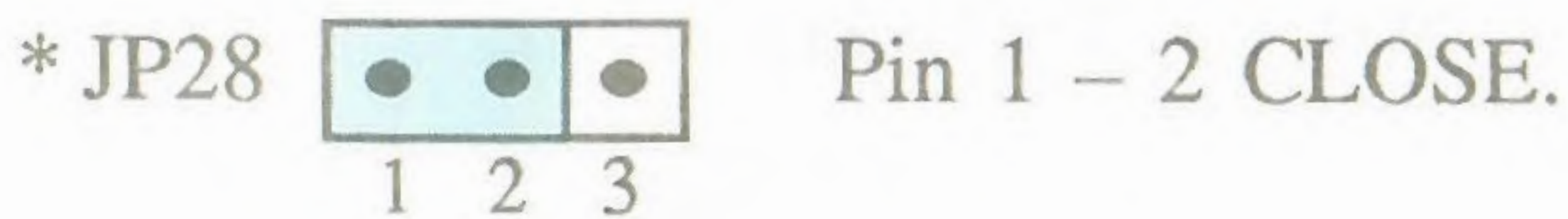
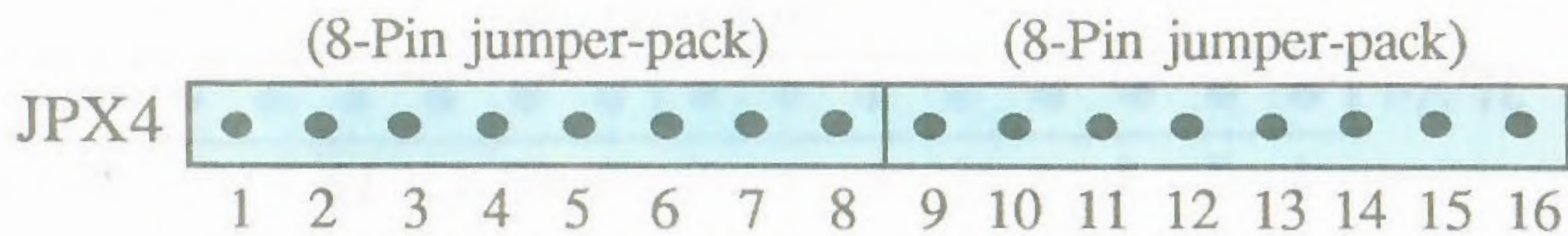
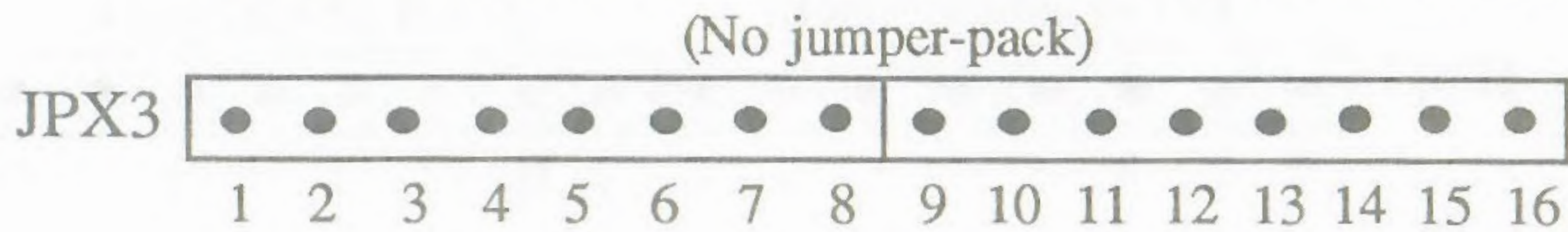
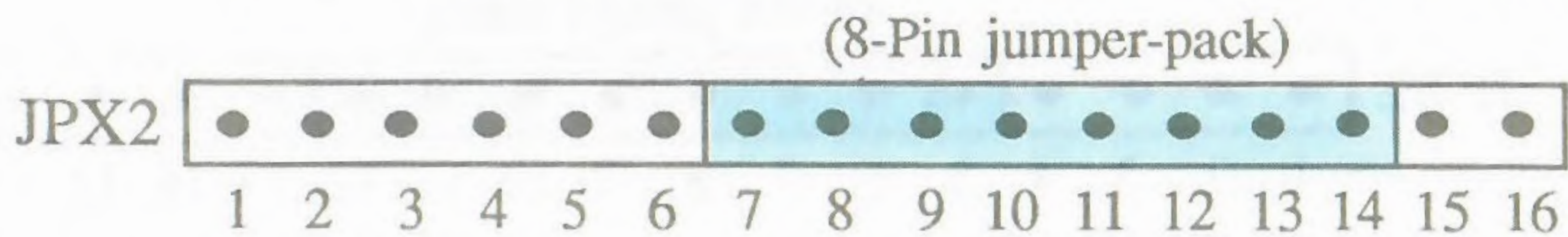
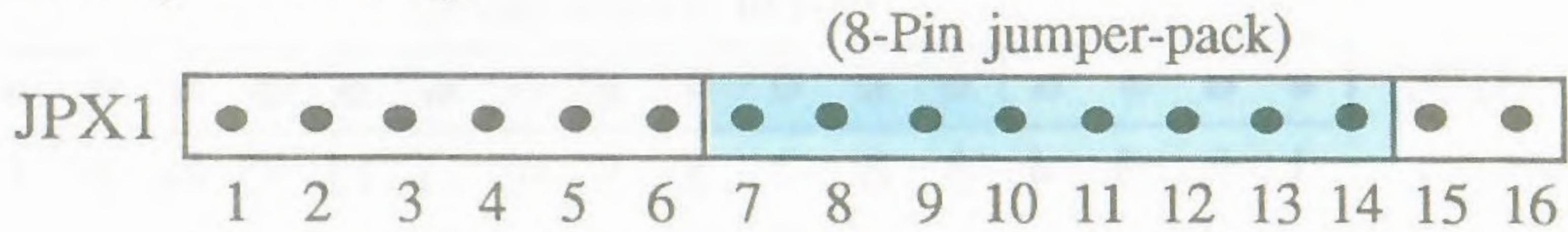
3. TAG SRAM Location : U30

Type: 32Kx8 SRAM

*Note 1. JP28, J30 will be removed in the standard configuration, (64K~1MB).

3.1-5 512KB Cache RAM Configuration

1. Jumper Settings



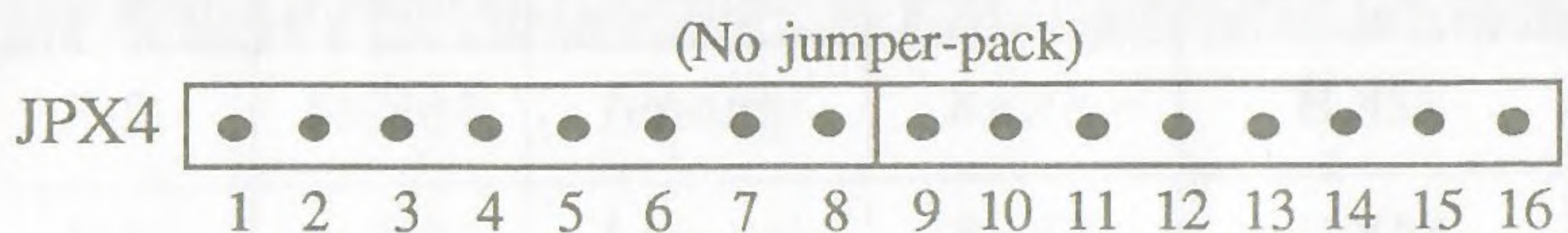
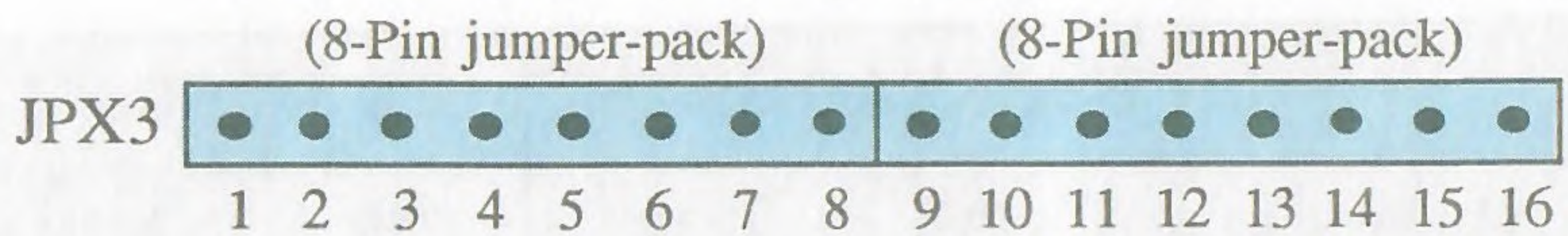
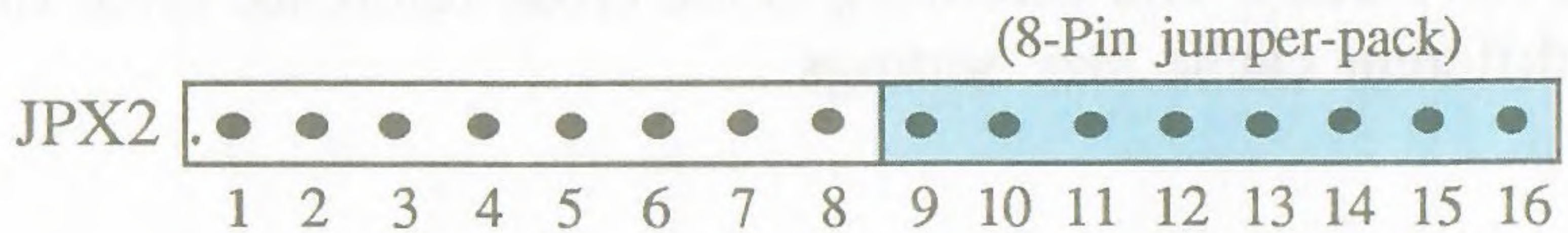
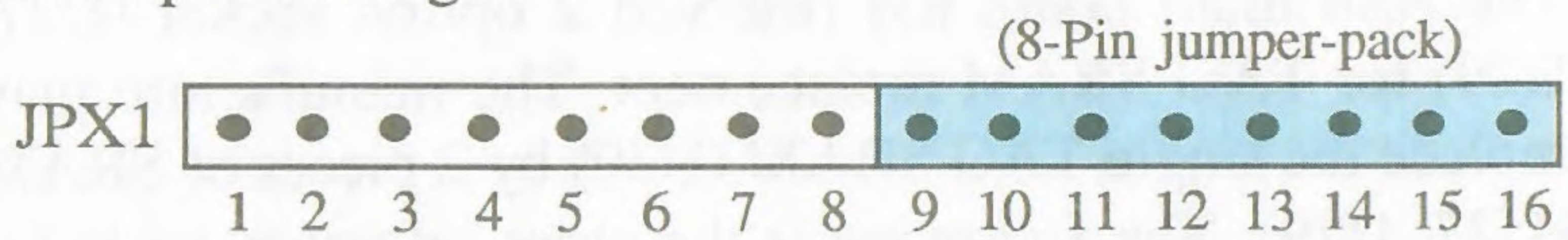
2. Cache SRAM Location: U17, U20, U25, U28
 Type: 128Kx8 SRAM

3. TAG SRAM Location : U30
 Type: 128Kx8 SRAM

*Note 1. JP28, J30 will be removed in the standard configuration, (64K~1MB).

3.1-6 1MB Cache RAM Configuration

1. Jumper Settings



2. Cache SRAM Location: U17, U20, U25, U28, U3, U5,
U10, U12

Type: 128Kx8 SRAM

3. TAG SRAM Location : U30

Type: 128Kx8 SRAM

*Note 1. JP28, J30 will be removed in the standard configuration, (64K~1MB).

3.2 Miscellaneous

The AS4 main board has reserved 2 option socket (U27, U29) for TAG SRAM replacement. The manufacture may replace the single TAG SRAM (U30) by 2 pieces of SRAM (U27, U29). The following is the cross reference table for different cache size settings.

Cache size	single TAG SRAM		2 TAG SRAM	
	TYPE	JP29	TYPE	JP29
32KB	8Kx8	ignored	16Kx4	2-3
64KB	8Kx8	ignored	16Kx4	2-3
128KB	32Kx8	ignored	64Kx4	1-2
256KB	32Kx8	ignored	16Kx4	2-3
512KB	128Kx8	ignored		
1MB	128Kx8	ignored	64Kx4	1-2

3.3 SRAM Type Recommendation.

TAG RAM:

- (1) 16Kx4-15 for 50MHz
16Kx4-20 for 33MHz.
16Kx4-25 for 25MHz/20MHz
Supplier: Motorola or others
P/N: MCM 6288-XX.
- (2) 64Kx4-15 for 50MHz
64Kx4-20 for 33MHz
64Kx4-25 for 25MHz/20MHz
Supplier: Motorola or others.
P/N: MCM 6208-XX
- (3) 8Kx8-15 for 50MHz
8Kx8-20 for 33MHz
8Kx8-25 for 25MHz/20MHz
Supplier: Motorola or others
P/N: MCM 6264-XX
- (4) 32Kx8-15 for 50MHz
32Kx8-20 for 33MHz
32Kx8-25 for 25MHz/20MHz
Supplier: Motorola or others
P/N: MCM 6206-XX
- (5) 128Kx8-15 for 50MHz
128Kx8-20 for 33MHz
128Kx8-25 for 25MHz/20MHz
Supplier: Micron or others
P/N: MT5C1008-XX

CACHE RAM:

- (1) 8Kx8-20 for 50MHz
8Kx8-25 for 33MHz
8Kx8-30 for 25MHz/20MHz

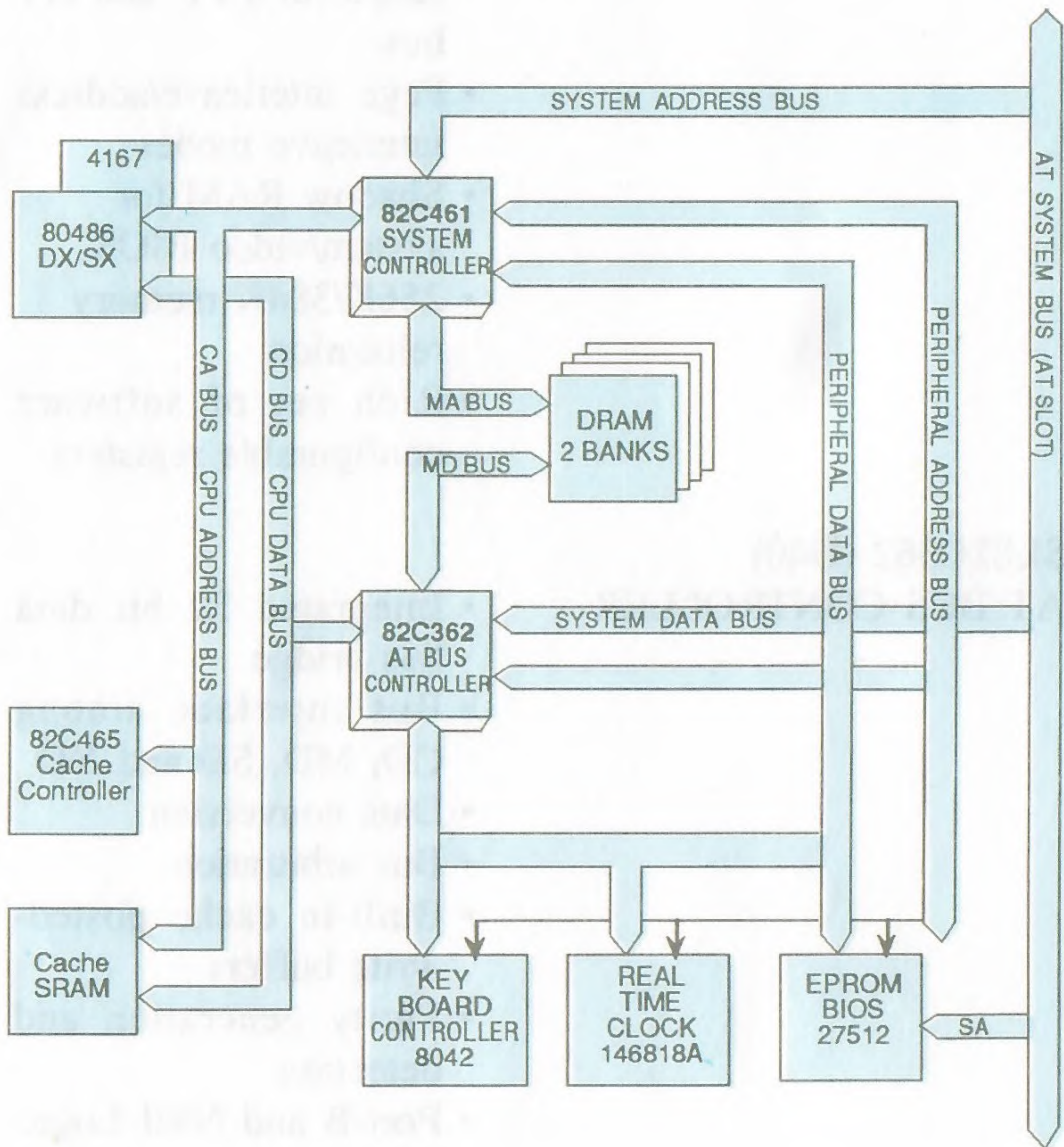
- (2) 32Kx8-20 for 50MHz
32Kx8-25 for 33MHz
32Kx8-30 for 25MHz/20MHz

- (3) 128Kx8-20 for 50MHz
128Kx8-25 for 33MHz
128Kx8-30 for 25MHz/20MHz

Chapter 4

Technical Reference

4.1 AS4 System Block Diagram



4.2 Features of the Chip set

Component Name	Associated Features
SL82C461 (U31) 486 SYSTEM CONTROLLER	<ul style="list-style-type: none"> • Integrated CPU/DRAM/ BUS controller • Burst mode cache fills • Built-in non-cacheable/ flush decoding • Programmable clock speed for CPU and AT bus • Page interleave/address interleave modes • Shadow RAM for system/video BIOS • 256K/384K memory relocation • Rich set of software configurable registers
SL82C362 (U40) AT BUS CONTROLLER	<ul style="list-style-type: none"> • Integrated 32 bit data bus bridge • Bus interface among CD, MD, SD and XD • Data conversion • Bus arbitration • Built-in cache posted- write buffers • Parity generation and detection • Port-B and NMI Logic • 8259 interrupt controller

Component Name**Associated Features**

SL82C465 (U4)
486 CACHE CONTROLLER

- 8237 DMA controller
- 8254 timer controller
- Integrated cache controller
- 25/33/40/50 MHz 80486 support
- Built-in tag comparator
- Posted write buffer control
- WT4167 interface
- Non-cacheable region support
- Cache invalidation support
- 2-1-1-1 burst mode cache fill
- Line size from 1 to 4 doublewords
- 32KB to 4MB cache size

4.3 System BIOS

This section explains the features of the BIOS for AS4 system board. The manual does not include the user's programming interface of the BIOS.

4.3-1 Basics of the BIOS

The BIOS stands for Basic Input/Output System. Basically it is the interface between the applications and the hardware.

The BIOS consists of self-diagnostics, initialization, setup utility, and the interface utilities for the application or system programming.

4.3-2 Function description of the BIOS

When system is powered on or reset, the CPU is reset and the program counter always points to F000:FFF0 (segment F000H, offset FFF0H). This is the location where ROM BIOS resides. CPU starts to fetch and execute the BIOS from here.

The BIOS will do, but is not limited to do, the following:

- self-test on CPU.
- verify ROM BIOS checksum.
- verify CMOS configuration chip.
- initialize timer.
- initialize DMA controller.
- verify DRAM memory.
- install all BIOS function call utilities.
- enable internal or external cache.
- verify/initialize all system configurations, eg. keyboard, floppy drive, hard disk, initialize EGA or VGA if there is any.
- hook to the add-in BIOS or expansion BIOS, to perform initialization and driver link to the system.

If an EGA or VGA exists, the EGA/VGA BIOS will take over the control to initialize the video card and install/replace with the new video display driver. It then return the control to ROM BIOS again.

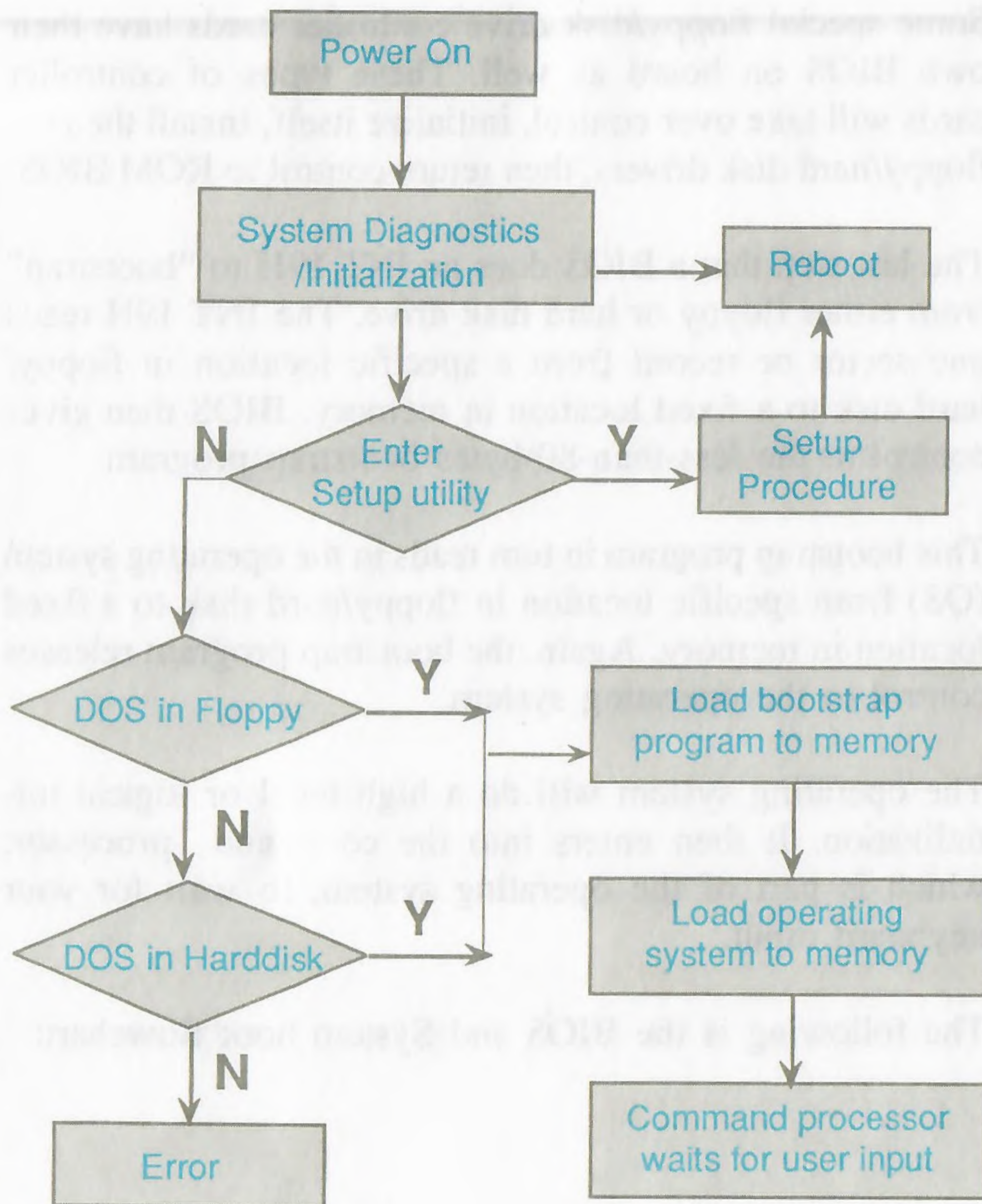
Some special floppy/disk drive controller cards have their own BIOS on board as well. These types of controller cards will take over control, initialize itself, install the new floppy/hard disk drivers, then return control to ROM BIOS.

The last step that a BIOS does an INT 19H to “bootstrap” from either floppy or hard disk drive. The INT 19H reads one sector or record from a specific location in floppy/hard disk to a fixed location in memory. BIOS then gives control to the less-than-80-bytes bootstrap program.

This bootstrap program in turn reads in the operating system (OS) from specific location in floppy/hard disk to a fixed location in memory. Again, the bootstrap program releases control to the operating system.

The operating system will do a high level or logical initialization. It then enters into the command processor, which is part of the operating system, to wait for your keyboard input.

The following is the BIOS and System boot flowchart:



4.4 Shadow BIOS

All personal computers use a BIOS, or Basic Input/Output System, to provide control for the hardware functions. The BIOS normally resides in 1 or more ROM (Read Only Memory) chips and is accessed regularly during computer operation. Because the ROM chips have slow access times compared to the rest of the system, BIOS access slows down the computer throughput. The AS4 permit the BIOS to be transferred from slow ROM to high-speed 32 bit RAM to increase the system performance. This feature is called "Shadow" BIOS and will be enabled from the BIOS setup.

4.5 Memory Map

In the real address mode, the system directly accesses 1 MByte of address space, while in the virtual address mode 16 MBytes of address space is available.

Address Range(hex.)	Function
000000-09FFFF	640 KBytes RAM on board
0A0000-0BFFFF	128 KBytes video RAM
0C0000-0DFFFF	128 KBytes user defined memory
0E0000-0EFFFF	64 KBytes system ROM expansion
0F0000-0FFFFFFF	64 KBytes BIOS reservation
100000-15FFFF	384 KBytes optional RAM on board
160000-FDFFFF	15 MBytes expansion memory
FE0000-FEFFFF	64 KBytes system ROM expansion
FF0000-FFFFFFF	64 KBytes BIOS reservation

4.6 I/O Map

(System board: 000-0FF, I/O: 100-3FF)

Address Range(hex.)	Function
000-01F	1st DMA Controller
020-03F	1st Interrupt Controller
02E1	GPiB (0)
02E2-02E3	Data Acquisition (0)
040-05F	Timer chip
060-06F	Keyboard controller
06E2-06E3	Data Acquisition (1)
070-07F	Real time clock/NMI mask
080-09F	DMA page register
0A0-0BF	Second Interrupt Controller
0AE2-0AE3	Data Acquisition (2)
0C0-0DF	2nd DMA Controller
0EE2-0EE3	Data Acquisition (3)
0F0-0F1	Clear/Reset Math Coprocessor
0F8-0FF	Math Coprocessor

***I/O Map (Cont'd.)**

Address Range (hex.)	Function
1F0-1F8	Fixed disk adapter
200-207	Game port
22E1	GPIB (1)
278-27F	PIO (2)
2B0-2DF	Enhanced Graphics Adapter
2F8-2FF	SIO (2)
300-31F	Prototype card/streaming tape adapter
360-36F	PC Network
378-37F	PIO (1)
380-38F	SDLC, BISYNC (2)
390-393	Cluster adapter
3A0-3AF	BISYNC (1)
3B0-3BF	Monochrome adapter
3C0-3CF	Enhanced Graphics Adapter
3D0-3DF	Color Graphics Adapter
3F0-3F7	Diskette Drive Adapter
3F8-3FF	SIO (1)

4.7 I/O Expansion Slots

One slot supports 8-bit bus, and 7 slots support either 8-bit or 16-bit bus

a. Slot J1, J3, J5, J7, J9, J11, J13 and J15, A side

I/O Pin	Signal Name	Direction
A1	-I/O CH CK	I
A2	SD7	I/O
A3	SD6	I/O
A4	SD5	I/O
A5	SD4	I/O
A6	SD3	I/O
A7	SD2	I/O
A8	SD1	I/O
A9	SD0	I/O
A10	-I/O CHRDY	I
A11	AEN	O
A12	SA19	I/O
A13	SA18	I/O
A14	SA17	I/O
A15	SA16	I/O

(cont'd)

I/O Pin	Signal Name	Direction
A16	SA15	I/O
A17	SA14	I/O
A18	SA13	I/O
A19	SA12	I/O
A20	SA11	I/O
A21	SA10	I/O
A22	SA09	I/O
A23	SA08	I/O
A24	SA07	I/O
A25	SA06	I/O
A26	SA05	I/O
A27	SA04	I/O
A28	SA03	I/O
A29	SA02	I/O
A30	SA01	I/O
A31	SA00	I/O

b. Slots J1, J3, J5, J7, J9, J11, J13 and J15

I/O Pin	Signal Name	Direction
B1	GND	GND
B2	RESET	O
B3	+ 5V	POWER
B4	IRQ9	I
B5	- 5V	POWER
B6	DRQ2	I
B7	- 12V	POWER
B8	-OWS	I
B9	+ 12V	POWER
B10	GND	GND
B11	-SMEMW	O
B12	-SMEWR	O
B13	-IOW	I/O
B14	-IOR	I/O
B15	-DACK3	O

(cont'd)

I/O Pin	Signal Name	Direction
B16	DRQ3	I
B17	DACK1	O
B18	DRQ1	I
B19	-REFRESH	I/O
B20	CLK	O
B21	IRQ7	I
B22	IRQ6	I
B23	IRQ5	I
B24	IRQ4	I
B25	IRQ3	I
B26	-DACK2	O
B27	T/C	O
B28	BALE	O
B29	+ 5V	POWER
B30	14.3 MHz	O
B31	GND	GND

c. Slots J4, J6, J8, J10, J12, J14 and J16, C side

I/O Pin	Signal Name	Direction
C1	SBHE	I/O
C2	LA23	I/O
C3	LA22	I/O
C4	LA21	I/O
C5	LA20	I/O
C6	LA19	I/O
C7	LA18	I/O
C8	LA17	I/O
C9	-MEMR	I/O
C10	-MEMW	I/O
C11	SD08	I/O
C12	SD09	I/O
C13	SD10	I/O
C14	SD11	I/O
C15	SD12	I/O
C16	SD13	I/O
C17	SD14	I/O
C18	SD15	I/O

d. Slots J4, J6, J8, J10, J12, J14 and J16, D side

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

NOTES:

*** SIGNAL DESCRIPTION**

The following is a description of the signals on the I/O expansion bus. All signals are TTL compatible.

Signal Name	Direction	Description
-I/O CH CK	I	Parity check error from expansion bus
SD0-SD15	I/O	16-bit data bus for memory or I/O operations/ 8-bit I/O will go thru low byte bus of SD0-SD7
-I/O CH RDY	I	Pull low to generate wait state for memory or I/O cycle
AEN	O	DMA cycle granted
SA0-SA19	I/O	20-bit real addressing mode bus can be driven by the CPU, the DMA controller or other master devices on the expansion bus.
RESET	O	Reset devices on expansion bus.
-OWS	I	Zero wait state
IRQ3-IRQ7, IRQ9-IRQ12, IRQ14-IRQ15,	I	Interrupt request lines
DRQ0-DRQ3, DRQ5-DRQ7	I	DMA request lines
-SMEMW	O	Lower 1 MBytes memory write
-MEMW	I/O	All memory write
-IOR	I/O	Read signal
-IOW	I/O	write signal
-DACK0 to 3	O	DMA acknowledge
CLK	O	AT bus clock
14.3 MHz	O	14.31818 MHz clock for video
T/C	O	Terminal count of DMA cycle
-REFRESH	I/O	Refresh cycle
BALE	O	Address latch enable
-SBHE	I/O	High byte enable

Signal Description (contd.)

Signal Name	Direction	Description
LA17-LA23	I/O	Unlatched address bit 17-bit 23
-MEM CS16	I	16-bit memory chip select
-I/O CS16	I	16-bit I/O device chip select
-MASTER	I	Master processor to request bus from CPU. The handshake sequence is going through DMA DRQ from the master device. After receiving DACK from 8237A-5, the master device may assert-MASTER line to get hold of address, data bus, and all control lines.

4.8 DMA Controllers

Two DMA controllers (8237A-5) are cascaded to serve seven DMA channels from the I/O expansion.

Channel 0: Unused

Channel 1: IBM SDLC

Channel 2: diskette adapter

Channel 3: unused

Channel 4: cascade two 8237A-5

Channel 5 through channel 7: unused

4.9 Interrupt Controllers

The AS4 System provides 16 levels of system interrupts through two 8259A interrupt controller chips. Following is the summary of all interrupts supported by the system in descending priority.

Interrupt Level	Description
SM1	parity check error
IRQ0	System timer interrupt from 8254-2
IRQ1	Keyboard output buffer full
IRQ2	Interrupt re-routing from IRQ 8-IRQ 15
IRQ3	SIO #2
IRQ4	SIO #1

Interrupt Controllers, cont'd

Interrupt Level	Description
IRQ5	PIO #2
IRQ6	Floppy disk adapter
IRQ7	PIO #1
IRQ8	Real time clock
IRQ9	Re-routing to INT OA from hardware IRQ2
IRQ10, 11, 12	Unused
IRQ13	Coprocessor
IRQ15	Unused

Chapter 5

Trouble Shooting Guide

5.1 Boot-up Problems

Q: What should I do if the power supply fan stops running?

A: Turn off the power immediately and check to see if the system power has shorted to ground.

Q: There is no video. Nothing appears on the screen. Power seems to be OK?

A: Check all jumper settings on the video adapter, and look for missing components; check for proper BIOS ROM installation in sockets U41.

Check the keyboard controller chip at U6; it must be installed properly.

Q: The monitor screen show unusual characters; or nothing appears on the monitor screen?

A: The switches on your video adapter board must be appropriately set in order to function correctly with your monitor type (monochrome, color, EGA, VGA).

Also, some adapters require switch settings on the motherboard. Refer to your adapter manual for more information.

Q: Nothing can be entered from the keyboard.

A: Make sure that your keyboard is IBM-AT compatible. Check to see if the three LEDs on the keyboard light up and flash off during boot-up. Verify that your keyboard is not locked.

Q: System won't boot, no video display, no power?

A: First turn the system off and check all connections from the power supply to the system board and the disk drives. Plug the system in and turn it on. If the fan on the power supply is not turning, and the power indicator on your case isn't on, check the power supply.

Q: No sound from speaker.

A: The speaker should be active during the system boot. If there are no beeps, check the speaker connection at JP21.

Q: BIOS is being used and the system is emitting a series of three beeps with no video.

A: Check all banks of SIMM modules. Make sure they are firmly seated in the sockets. Refer to the chapter "Setting Up the System Board". Or check your video card to make sure it is seated and all jumpers are set correctly. Check for possible conflicts with other cards by turning off the system and remove other cards one by one, rebooting the system each time.

Q: “DISPLAY SWITCH SETTING NOT PROPER” message on boot.

A: Check setting of mono/color adapter and make sure your video cable is securely connected.

Q: “CMOS memory size mismatch” message.

A: Be sure the SIMM modules are firmly plugged in to the sockets. For 1 MB on board, SIMM banks 0 should be filled with 256K x 9 SIMMs. If the BIOS detected the memory amount is consistent with the hardware installed SIMM, you just update the memory size by entering the standard setup menu.

5.2 Set Up Problems

Q: The system does not retain correct setup information after power down and power up.

A: The power supply in use may not meet specifications on the VOLTAGE REQUIREMENTS. Consult your dealer for power supply exchange or replacement. Also, check the system battery.

Q: Why is the “run system setup” message displayed, even after the BIOS setup has been run.

A: Check setup information and make sure that all information is correct. Check all jumper settings, and make sure the correct drive type is specified for your hard drive if one is installed.

Check the on-board battery and replace it if necessary. Check the power supply. It must be 200 watt AT compatible.

Q: Why is “Floppy disk controller failure” message being displayed?

A: Make sure the drive controller card is properly seated in the card slot on the system board.

Q: Why doesn't the system recognize or communicate with the floppy drives?

A: Check the cabling from your disk controller to the floppy drives. Consult your drive controller manual or your dealer to ensure you are using the proper cables. Be sure that DC power is being supplied to the disk drives by one of the four DC power cables (each with four wires). The floppy cable should be connected to the rightmost connector on the controller board.

The red or blue stripe side of the cable must be plugged into the keyed slot side of the drive connectors. Drive A should be connected to the far end of the floppy cable and Drive B to the middle connector of the cable. On both drives, jumpers should be set to the second drive position. Refer to your floppy drive manual for drive setting.

Q: The system does not recognize the fixed disk drive(s).

A: Like the floppy disk drives, proper cabling and drive settings are required. Drive C is connected to the last connector on the hard disk cable, and Drive D to the middle connector. This cable is connected to the second connector from the right side of the drive controller board. The third connector is used with the 20-pin data cable of Drive C and the fourth connector is for the data cable of Drive D. Again, drive(s) should be set to the second drive setting on jumper or DIP switches at the back of the drive.

Q: What's next after proper cabling, if fixed drives still don't function.

A: You need to run through "Setup" procedures to tell your system the number of drives you have installed and the drive type of your drives. Refer to Table for Fixed disk drive types.

After the system boots up, you would need to do the physical formatting onto your hard disk drives. Look up your disk drive utilities for more information.

The next step is to reboot your system from the DOS. The system will now allow you to run "FDISK", a DOS command, to partition the fixed disk for either DOS or other operating systems usage.

The disk drive can now be logically formatted by running the command "FORMAT C:/S/V." The system command processor file, COMMAND.COM, is loaded to the disk drive during this process, and the system will later be able to boot from the fixed disk. The rest of the operating system should then be transferred to the root directory of the fixed disk (C:\).

The fixed disk may be partitioned in a way so that more than one operating system can coexist on the drive, and you can choose your working environment. Operating systems like UNIX or XENIX require much more space than DOS. The size of the drive should be adequate to accommodate the two operating systems. When UNIX or similar operating systems are installed on a fixed disk drive, they usually require the system be booted to that system.

Refer to the operating system manuals for detailed installation information and partitioning procedures.

5.3 General System Questions

Q: Does the 256Kbytes of graphics memory on the EGA VGA board take up more system memory space?

A: Not at all. The EGA takes up 128Kbytes of its graphics memory space, starting from A000H to BFFFFH. Depending upon the modes, it actually takes from 32K to 128Kbytes of addressing space. The video BIOS starts from C0000H to C3FFFH, for a total of 16Kbytes of ROM addressing space.

Q: Certain application program do not run on the system.

A: Some commercial software with protection against duplication need to verify certain key information. Try running the software at the low speed. Push the turbo switch to change the system speed to low speed.

Q: The system can't be reset by pressing the reset button.

A: Sometimes the reset button creates a bouncing signal which may cause improper reset to the system board. Press the button firmly and slowly again.

Q: I just replaced one type of floppy drive with another and now the computer will not read my floppy disks. Why?

A: The CMOS setup RAM still contains the configuration information for the old floppy drive. Re-run the BIOS setup utility to reset the CMOS RAM.

Q: How can I expand the memory on the AS4 systemboard?

A: The AS4 uses 256K x 9, 1M x 9 or 4M x 9 Single Inline Memory Modules (SIMMs) that are designed for "Page Mode" operation. The memory can be expanded to 2 megabytes by using the 256K modules, up to 8 megabytes by using 1M modules, and 32 megabytes by using 4M modules.

