Tiger i7525 /// (S2672)

Revision 1.00

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Before you begin…

Check the box contents!
The retail motherboard package should contain the following:


1x Tiger i7525 (S2672) motherboard


1x 34-pin floppy drive cable


1x 80-pin Ultra-DMA-133/100/66/33 IDE cable


1x Tiger i7525 (S2672) User's Manual


1x Tiger i7525 (S2672) Quick Reference


1x TYAN driver CD


1x I/O shield


1 x Serial ATA driver diskette


1 x Serial ATA power cable

2 x Serial ATA cables

If any of these items are missing, please contact your vendor/dealer for replacement before continuing with the installation process.

Chapter 1: Introduction

1.1 – Congratulations!

You have purchased one of the most powerful Intel Xeon®-based workstation solutions in a standard ATX form factor.
Based on the Intel E7525 chipset, the Tiger i7525 (S2672) features some state-of-the-art technologies such as dual/single 800 MHz FSB Xeon® processor support, multiple PCI-Express buses, dual channel DDR2 memory design, onboard x1 PCI-Express Gigabit Ethernet port, Serial-ATA IDE ports, and multiple USB2.0 (Universal Serial Bus) ports. By doubling the capability of existing AGP8x designs with transfer rates of 4.0 Gigabytes per second over a x16 PCI Express lane for graphics controllers, the onboard x16 PCI-Express slot supports a high performance graphics infrastructure for high-end gaming or multimedia.

Visit Tyan's website at http://www.tyan.com. There, you can find information on all of Tyan's products with up-to-date FAQs, a list of worldwide distributors, Tyan software utilities, the latest drivers, memory compatibility listings, and BIOS setting explanations.

1.2 – Hardware Specifications

Processors

- Dual mPGA604 ZIF sockets
- Supports single or dual Intel Xeon® processors
- 800MHz Front-Side Bus
- Dual onboard 4-phase EVRD10.1 complaint voltage regulation design

Chipset

- Intel's Tumwater (E7525) chipsets
  - E7525 MCH (North Bridge)
  - ICH5R (South Bridge)
- SMSC LPC47B397 Super I/O chip

Expansion Slots

- One X16 PCI-Express high-performance Graphics slot
- One x8 PCI-Express slot with x4 PCI-Express signals
- Four PCI 32-bit 33MHz (5-Volt) slots
- Total of six usable slots

Memory

- Four 240-pin 1.8-Volt DDR2 400 DIMM sockets
- Dual channel memory bus
- Supports ECC or non-ECC memory
- Up to 8GB of Registered DDR2 DDR modules

System Hardware Health Monitor

- Total seven 3-pin fan headers with tachometer monitoring and five of them with PWM control
- Chassis intrusion header
- Temperature and voltage monitoring
- Watchdog timer

BIOS

- Phoenix BIOS 4Mbit flash ROM
- Supports ACPI 1.0b, PnP, DMI 2.0
- Auto configuration of IDE devices
- User-define hardware monitoring
- Multiple boot options
- Power Management: ACPI S1, S3, S4 and S5 modes

Other Integrated I/O Interfaces

- One floppy connector for up to two drives
- One UART serial port connector
- One ECP/EPP/SPP parallel connector
- Eight USB2.0 ports (2 front USB ports via an optional cable)
- PS/2 mouse & keyboard ports

Integrated Audio

- Intel ICH5R AC'97 compliant audio link
- Analog Device AD1981B CODEC
- Line-in, Line-out, Mic-in rear vertical jacks and a front panel audio header
- One 4-pin CD-ROM audio input header
- One 4-pin Auxiliary header

Integrated LAN

- Broadcom BCM5751 PCI Express Gigabit Ethernet

Integrated Mass Storage Port

- Two 82801ER (ICH5R) integrated SATA ports up to 1.5 Gbit/s with SATA RAID 0,1 under Windows
- Two bus-master UDMA ATA100/66/33 Parallel IDE channels support up to 4 ATA/ATAPI complaint devices

Form Factor

- ATX 2.03 (12"x9.6")
- EEB V3.51 power connectors
- Rear I/O
  - Stacked PS/2 mouse and keyboard connectors
  - One VGA connector
  - One parallel connector
  - Stacked four USB connectors
  - One GbE RJ45 connector stacked with two USB connectors
  - Stacked audio connector for MIC, Line_out and Line_in.

Regulatory

- FCC Class B (Declaration of Conformity)
- European Community CE (Declaration of Conformity)

Note: TYAN reserves the right to add support or discontinue support for any OS with or without notice.

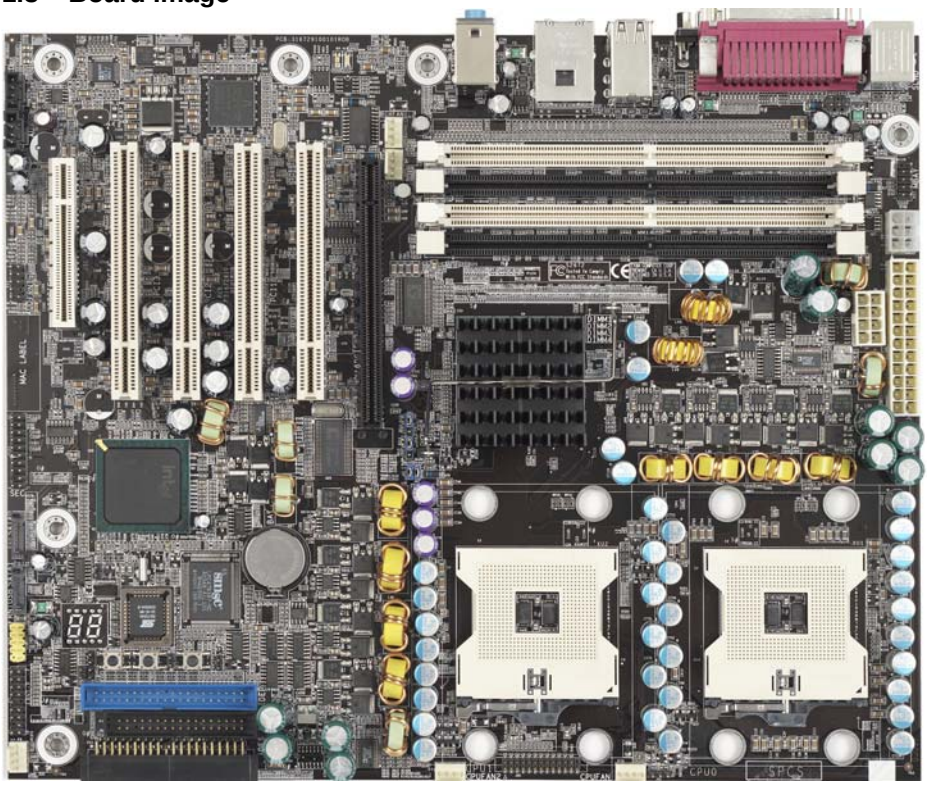
Software Specifications

OS (Operating System) Support

Microsoft Windows XP
Microsoft Windows 2000 advanced Server
Microsoft Windows Server 2003
Microsoft Windows NT4.0
Red Hat 8.0, 9.0
SuSE Server 8.0
Other distributions of Linux pending validation

TYAN reserves the right to add support or discontinue support for any OS with or without notice.

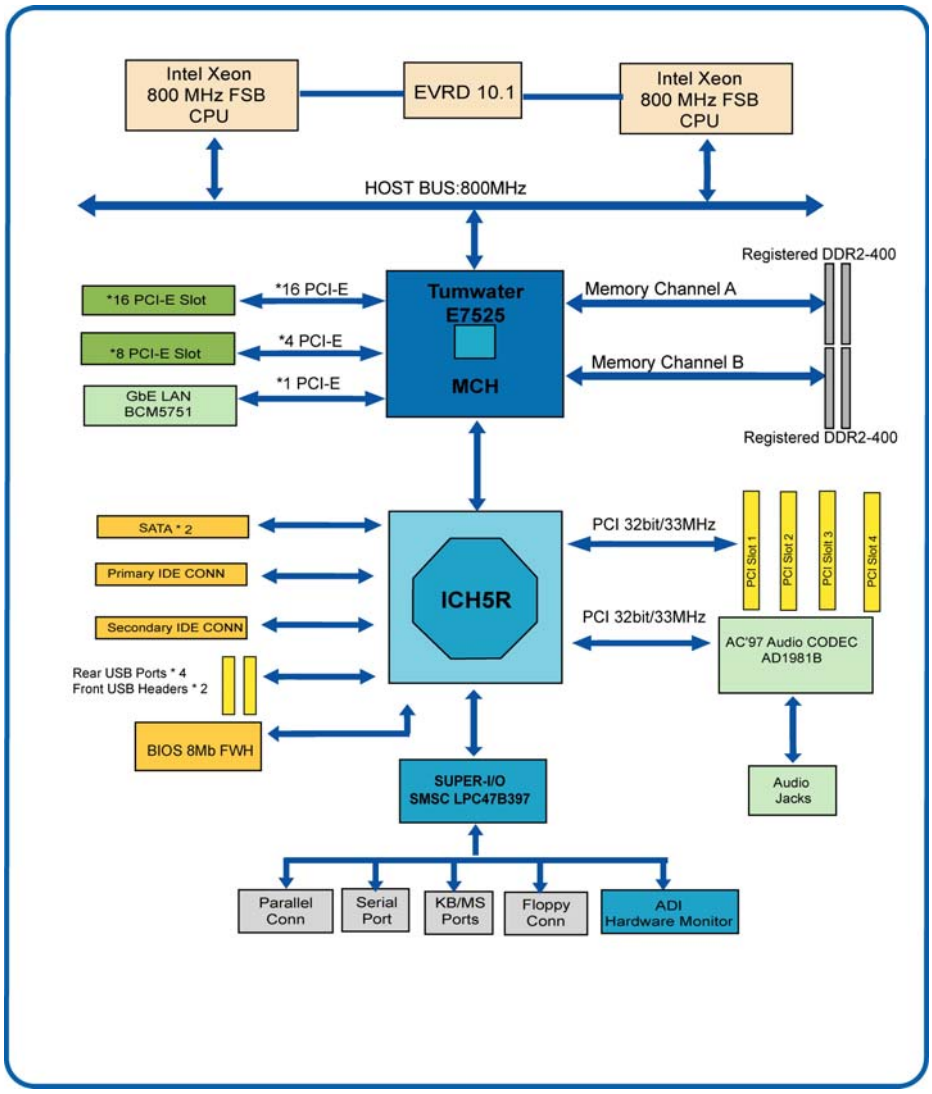
1.3 – Board Image



The above picture is purely representative. Due to engineering updates and new board revisions, certain components may change and or be repositioned. The picture above may or may not look exactly like the board you received.

The following page includes details on the vital components of this motherboard.

1.4 – Board Diagram



Chapter 2: Choose Proper Parts For Your System

Before you installing a system with this motherboard, make sure your major system parts meet the following basic guidelines and requirements:

2.1 – Central Processor Unit (CPU) Considerations

- **Process Type and Package**
  Tiger i7525 (S2672) board supports Intel Xeon® processors in 604-pin Pin Grid Array package.
- **Front Side Bus (FSB)**
  The processor host bus, or called Front Side Bus (FSB), always operates at 800 MHz. Choose Intel Xeon® 800 MHz FSB processors for Tiger i7525 (S2672) board.
  The system will not be operational with installing Intel Xeon® 533 or 400 MHz FSB processors.
- **Single/Dual Processor System**
  Tiger i7525 (S2672) board supports single or dual Intel Xeon® processors.
  Single Processor System:
  When only install a single processor on Tiger i7525 (S2672) board, the processor must be installed on the CPU1 ZIF (Zero-Insertion-Force) socket.
  Dual Processor System:
  Tiger i7525 (S2672) board supports dual processor configurations only in which both processors operate with the same FSB frequency, core frequency, and have the same internal cache sizes. Mixing processors operating at different FSB frequency, core frequency, or cache sizes may cause system non-operation or damages on processors and/or the motherboard.

2.2 – Memory Considerations

- **Memory Type**
  Tiger i7525 (S2672) board supports up to four 240-pin 1.8-Volt *DDR2-400 Registered ECC* DIMM modules. The DDR2-400 memory modules can be installed using 256Mb, 512Mb and 1MB sizes. DDR-I or Unbuffered/non-REG DDR memory modules are **NOT** supported by Tiger i7525 (S2672) design. Visit Tyan's web site for the memory recommendation list: http://www.tyan.com/support/html/memory_support.html
- **Memory Installation**
  The Tiger i7525 (S2672) is based on Intel's E7525 Tumwater chipset, which supports 144-bit wide dual memory channels in memory-interleaved scheme. The system requires a minimum of two memory modules to run in Dual-Channel mode. Installing memory in one or three memory module configurations will cause the system to operate in Single-Channel mode. You will get better memory performance if you run in a Dual-Channel memory configuration. You must install two memory modules at a time, stating from DDR2-DIMM1 and DDR2-DIMM2.
  Each pair must be in the same capacity, speed, and configuration to function properly in a Dual-Channel alignment.

2.3 – Chassis/Enclosure Considerations

- **Motherboard size**
  Tiger i7525 (S2672) board is in the board size of 12" (W) x9.6" (L).
- **Motherboard and CPU Heat-sink Mounting Holes**
  There are six motherboard-mounting holes and eight CPU heat-sink mounting holes on Tiger i7525 (S2672) board design. The motherboard and CPU mounting hole locations follow SSI EEB v3.51 (A Server System Infrastructure specification for Entry Pedestal Servers and Workstations) specifications. Ensure that your chassis supports those 6 motherboard-mounting holes to secure the motherboard.
  Tiger i7525 (S2672) supports Intel's CEK (*Common Enabling Kit*) for securing Intel's Xeon® 800 MHz FSB processors in the chassis. Two CEK springs for the dual processors are pre-assembled with the motherboard or enclosed in the motherboard accessory package. The CPU heat-sinks must be mounted down to the chassis base pan with stand-offs. Any additional chassis standoffs, besides the 6 motherboard-mounting holes and 8 CPU heat-sink mounting holes, should be removed to preventing from short-circuit or motherboard damage.
- **Others**
  As a system integrator, the air-flow/thermal, EMI/EMC, shock/vibration, and system packing should be also considered for choosing a proper enclosure.

2.4 – Power Supply Considerations

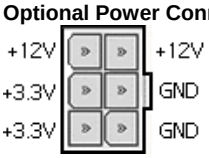
- **Power connectors**
  Tiger i7525 (S2672) board supports EPS/12V power supply unit (PSU) with three power connectors listed below.

EPS/12V Power Connectors

24-pin system power connector

8-pin CPU power connector (split CPU power planes)

Optional Power Connector



6-pin Workstation power connector (for x16 PCI-Express graphics card)

- **Split processor power planes**
  Tiger i7525 (S2672) board supports dual Intel's 800 MHz FSB Xeon® processors, which could reach up to 140 Watts per processor. (Check Intel's web for the processor specifications.) By following SSI EEB v3.51 specifications, Tiger i7525 (S2672) is designed with two separate voltage regulator circuits to provide the power for both onboard processors in separate power rail. Using a power supply with a combined CPU power plane from the CPU power connector, is not allowed and may cause system failed to power up or a damage to power supply.

- **Power requirements**
  Check your power supply specifications to ensure sufficient power currents for each power rail based on your system configuration.
  The major system components/parts power sources are listed below as reference:

Components/Parts	Main Power Source	Power Connectors
CPU1	+12V_CPU1	8-pin CPU power connector
CPU2	+12V_CPU2	8-pin CPU power connector
Memory (Normal)	+12V	24-pin and 6-pin power connectors
Memory (Suspend to RAM)	+5Vstandby	24-pin power connector
System logic	+3.3V	24-pin and 6-pin power connectors
X16 PCI-Express Graphic card	+12V and +3.3V	24-pin and 6-pin power connectors
X8 PCI-Express	+12V and +3.3V	24-pin and 6-pin power connectors
32-bit PCI	+12V, +5V and +3.3V	24-pin and 6-pin power connectors
Cooling fans	+12V	24-pin and 6-pin power connectors
IDE/SATA hard drives	+12V and +5V	From PSU
CDROM/DVD drives	+12V and +5V	From PSU

Chapter 3: Board Installation

How to install our products right…. the first time!

The first thing you should do read this user's manual. It contains important information that will make configuration and setup much easier. Here are some precautions you should take when installing your motherboard:

(1) Ground yourself properly before removing your motherboard from the antistatic bag. Unplug the power from your computer power supply and then touch a safely grounded object to release static charge (i.e. power supply case). For the safest conditions, TYAN recommends wearing a static safety wrist strap.
(2) Inspect the mounting holes pattern of the Tiger i7525 (S2672) to match your chassis standoff locations and remove the additional standoffs.
(3) Hold the motherboard by its edges and do not touch the bottom of the board, or flex the board in any way.
(4) Avoid touching the motherboard components, IC chips, connectors, memory modules and leads.
(5) Place the motherboard on a grounded antistatic surface or on the antistatic bag that the board was shipped in.
(6) Inspect the board for damage.
(7) Check the jumper settings and connector locations as described in next sections.

In last sections of this chapter, we will cover the details on how to install your motherboard into your chassis, as well as installing the processor, memory, disk drives and cables.

Note: DO NOT APPLY POWER TO THE BOARD IF IT HAS BEEN DAMAGED

3.1 – Jumper Locations

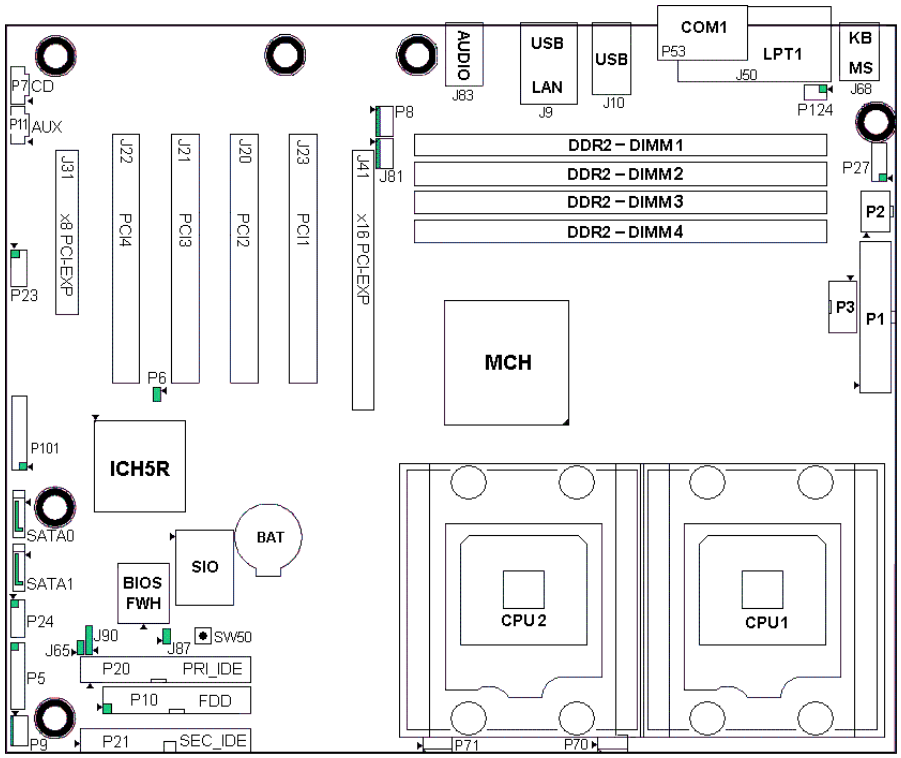


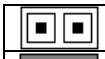
Fig. 3-1 Tiger i7525 (S2672) Jumper Location

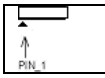
This jumper diagram is representative of the latest board revision available at the time of publishing. The board you receive may or may not look exactly like the above diagram. The board parts are not to scale.

3.2 – Jumper Settings & Definitions

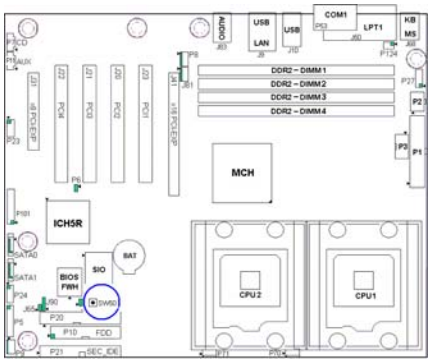
Jumper / Connector	Function	Ref. Page
P1	24-pin system power connector	Page 27
P2	8-pin CPU power connector	Page 27
P3	6-pin Workstation power connector	Page 27
P5	Front panel header	Page 14
P6	Reserved	-
P7	CDROM audio input connector	-
P8	Chassis fan connector	Page 13
P9	Chassis fan connector	Page 13
P10	Floppy drive connector	Page 24
P11	Auxiliary audio input connector	-
P20	Primary IDE connector	Page 23
P21	Secondary IDE connector	Page 23
P23	Reserved	-
P24	Front USB Header	Page 15
P27	Reserved	-
P53	COM1 connector	Page 26
P70	CPU1 fan connector	Page 13
P71	CPU2 fan connector	Page 13
P101	Reserved	-
P124	Reserved	-
J9	Stacked 2-port USB and one GbE RJ45 connector	Page 26
J10	Stacked 4-port USB connector	Page 26
J50	Parallel port connector	Page 26
J65	External hard drive LED input header	Page 15
J68	Stacked PS/2 keyboard and mouse connector	Page 26
J81	Chassis fan connector	Page 13
J83	Stacked audio jacks	Page 26
J87	Alternative Reset Jumper	-
J90	External hard drive LED input header	Page 15
SW50	CMOS Clear switch	Page 13
SATA0	Serial ATA-0 connector	Page 16
SATA1	Serial ATA-1 connector	Page 16

Jumper Example

	**OPEN - Jumper OFF**	**Without jumper cover**
	**CLOSED - Jumper ON**	**With jumper cover**

	**To indicate the location of pin-1**

3.2.1 - Clear CMOS Switch



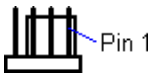
SW50

You can reset the CMOS settings by pressing this button, if you have forgot your system/setup password or need to clear system BIOS settings.

- Power off system and **disconnect both power connectors from the motherboard**
- Press the button for several seconds to Clear CMOS
- Release the button

Reconnect power & power on system

3.2.2 - Fan Connector



Pin1: GND
Pin2: +12V
Pin3: Tachometer
Pin4: Fan PWM (Speed) Control

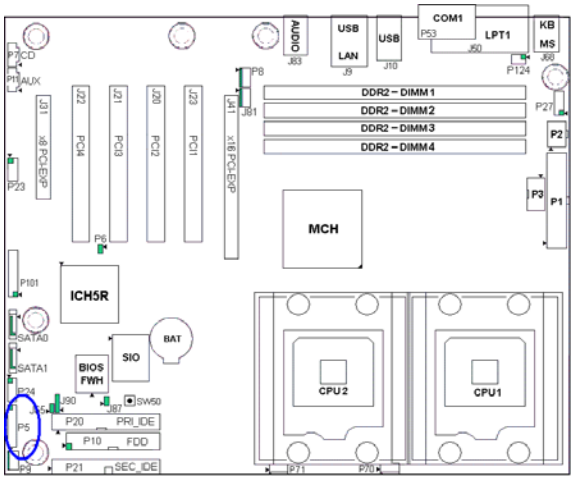
* PWM stands for Pulse Width Modulation

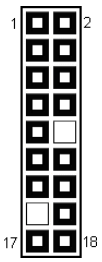
This 4-pin fan connector supports a new standard fan with integrated fan speed control on the fan itself for better fan life. The first 3 pins of this 4-pin fan connector are backward compatible with a traditional 3-pin fan connector without PWM fan speed control. (Pin4 will be unconnected for connecting a 3-pin fan).

There are five 4-pin fan connectors on Tiger i7525 (S2672) board. Use these connectors to connect chassis and processor cooling fans to your motherboard. Cooling fans can keep the system stable and reliable for its product life. By default, the PWM signals are programmed to fully turn on the fans.

3.2.3 - Front Panel Header

Normally, a chassis has some control or signal wires can be connected onto a motherboard for hard drive LED, Power LED, power button, and reset button. The front panel header (marked as “P5”) has been implemented on Tiger i7525 (S2672) board for such purposes.

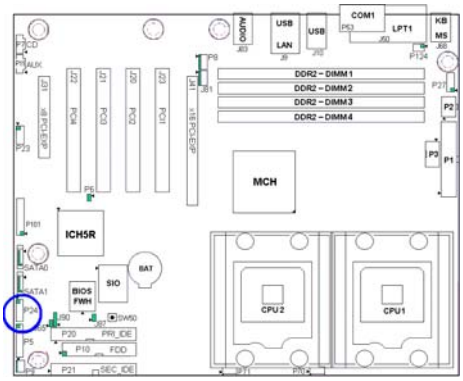


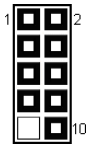


Front Panel Header (P5)

Function	PIN #	PIN #	Function
HDD LED+	1	2	PWR LED+
HDD LED -	3	4	PWR LED-
GND	5	6	PWR_ON-
RESET -	7	8	GND
+5V	9	10	Key
Reserved	11	12	Reserved
GND	13	14	Reserved
Key	15	16	Reserved
Ext. SPEAKER +	17	18	Ext. SPEAKER -

3.2.4 - Front USB Connector (USB2)

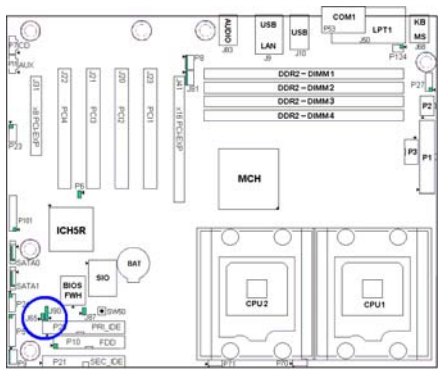




Front USB Header (P24)

Function	Pin#	Pin#	Function
Power	**1**	**2**	Power
USB6-	**3**	**4**	USB7-
USB6+	**5**	**6**	USB7+
GND	**7**	**8**	GND
Key	**9**	**10**	Reserved

3.2.5 – External HDD LED Input Headers (J65 and J90)



J65

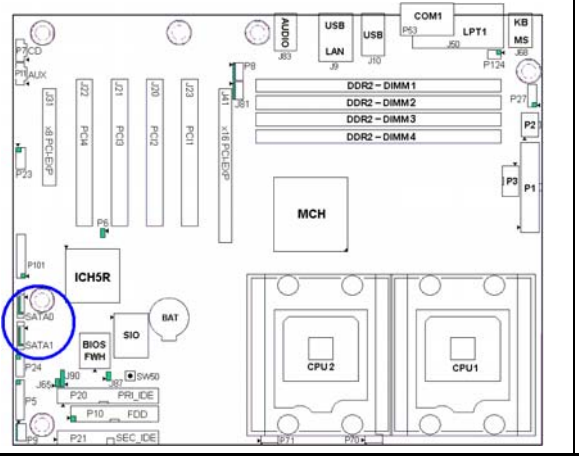
Pin#	Function
1	NC
2	LED1-

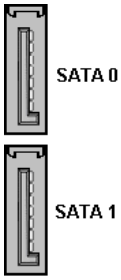
J90

Pin#	Function
1	NC
2	LED2-
3	LED2-
4	NC

3.2.6 - Serial ATA Connectors (SATA0 & SATA1)

SATA0/SATA1 (from Intel's FW82801ER/ICH5R South Bridge chip):
User can connect up to two serial ATA hard disks to run IDE mode or configure both drives to a RAID under Windows. The RAID level 0 or level 1 function is supported for Microsoft's Windows XP and Windows 2000 operating systems.





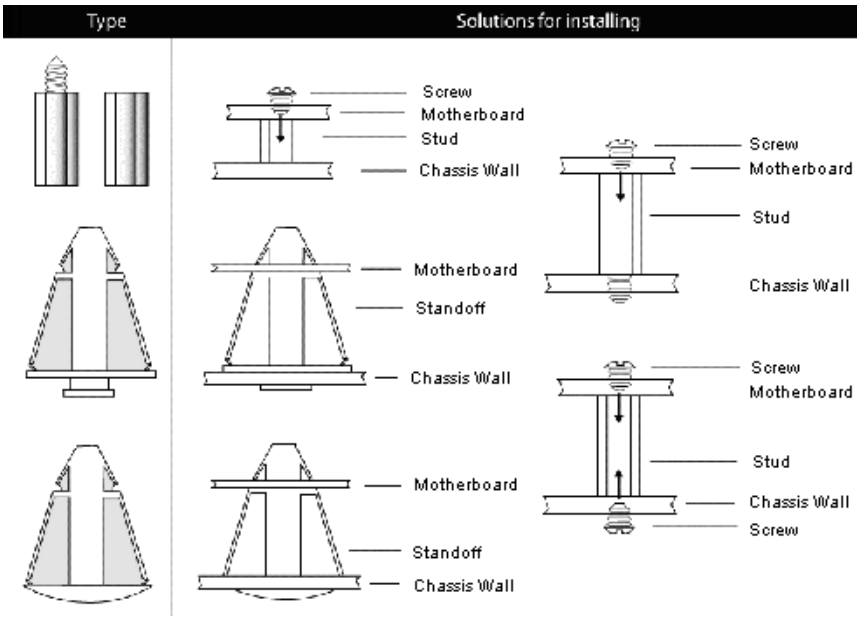
Serial ATA connectors

For information regarding the setup of SATA/RAID, you may search the contents of the driver CD that shipped with your motherboard or visit our website at:
HTTP://WWW.TYAN.COM/

3.3 – Mounting the Motherboard

Before installing your motherboard, make sure your chassis has the necessary motherboard support studs installed. These studs are usually metal and are in gold or silver color. Usually, the chassis manufacturer will pre-install the support studs. Remove the unused or additional studs, which may scratch the motherboard or cause short-circuit with the components on the bottom side. If you're unsure of stud placement, simply lay the motherboard inside the chassis and align the screw holes of the motherboard to the studs inside the case. If there are any studs missing, you will know right away since the motherboard will not be able to be securely installed. Some chassis' include plastic studs instead of metal. Although the plastic studs are usable, TYAN recommends using metal studs with screws that will fasten the motherboard more securely in place.

Below is a chart detailing what the most common motherboard studs look like and how they should be installed it.

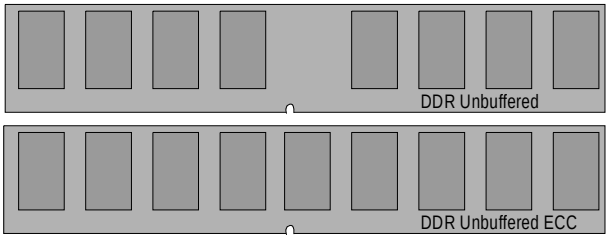


TIP: Use metal studs if possible, as they hold the motherboard into place more securely than plastic standoffs.

3.4 – Installing the Memory

Before attempting to install any memory, make sure that the memory you have is compatible with the motherboard as well as the processor. For this information, please check TYAN's web site at: www.tyan.com

The following diagram shows the types of RAM modules you may encounter depending on your board:



Here are a few key points to note before installing memory into your Tiger i7525 (S2672):
128MB, 256MB, 512MB and 1GB Registered ECC DDR2-400

- All installed memory will be automatically detected - no need to set any jumpers
- The Tiger i7525 (S2672) supports up to 4GB of memory
- **Unbuffered Memory is NOT supported**.
  You can install memory in either a Single Channel or Dual Channel configuration. Please note that the same type and density memory modules are necessary while using dual-channel DDR, otherwise it may cause system instability. Please refer to the chart below for the proper way to install the modules.

	No. of Memory Modules	DDR2-DIMM 1 (Ch. B)	DDR2-DIMM 2 (Ch. A)	DDR2-DIMM 3 (Ch. B)	DDR2-DIMM 4 (Ch. A)
Conf. 1	1	X			
Conf. 2	2	X	X		
Conf. 3	3	X	X	X	
Conf. 4	4	X	X	X	X

Only Configuration 2 and Configuration 4 operate dual-channel memory mode.

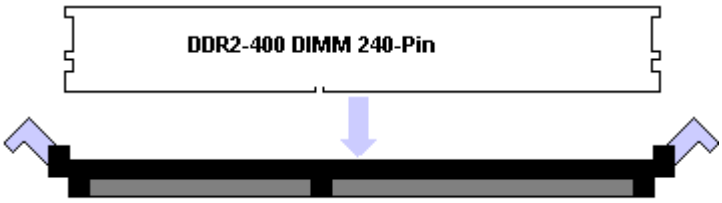
- **Supported System Bus Frequency and Memory Speed Combinations**

To use this type of DIMM…	The processor's system bus frequency must be…
DDR2-400	800MHz

NOTE:
While using ECC type memory, it will take longer time to post. Due to the manner in which it counts the memory and has to write zero's to every bit of the stick before progressing through the POST.

3.5 – Memory Installation Procedure

When installing memory modules, make sure the modules align properly with the memory socket. There should be keys (small indents) on your memory modules that fit according to the keys in the memory socket. DDR2 modules and sockets have only one key, which is slightly near the center of the module/socket. The method of installing memory modules is detailed in the following diagrams.



Once the memory modules are firmly seated in the socket, two clamps on either side will close and secure the module into the socket. Sometimes you may need to close the clamps manually.

To remove the memory module, simply push the clamps outwards until the memory module pops up. Then simply remove the module.

TIP: When installing memory, a module may require a considerable amount of force to seat properly, although this is very rare. To avoid bending and damaging your motherboard, place it on its anti-static bag and onto a flat surface, and then proceed with memory installation.

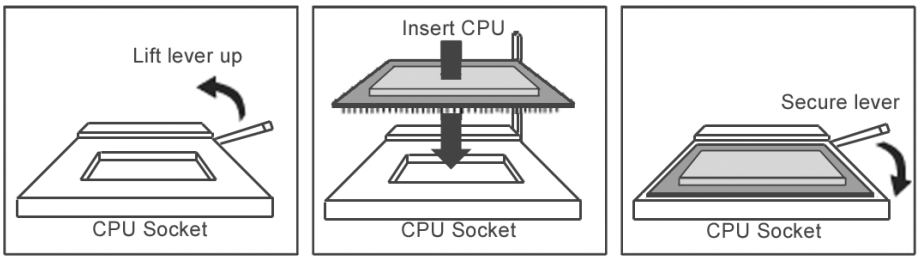
Note: You **MUST** unplug the power connector to the motherboard before performing system hardware changes, to avoid damaging the board or expansion device

3.6 – Installing the Processor

Your Tiger i7525 (S2672) supports the latest processor technologies from Intel. Check the following page on TYAN's website for latest processor support:

http://www.tyan.com

The following diagrams will detail how to install your processor:



The diagram is provided as a visual guide to help you install socket processors and may not be an exact representation of the processors you have.

1. **Lift the lever on the socket until it is approximately 90° or as far back as possible to the socket.**
2. Align the processor with the socket. There are keyed pins underneath the processor to ensure that the processor's installed correctly.
3. Seat the processor firmly into the socket by gently pressing down until the processor sits flush with the socket.
4. Place the socket lever back down until it locks into place.
5. Your processor is installed.

Take care when installing the processor as it has very fragile connector pins below the processor that can bend and break if inserted improperly.

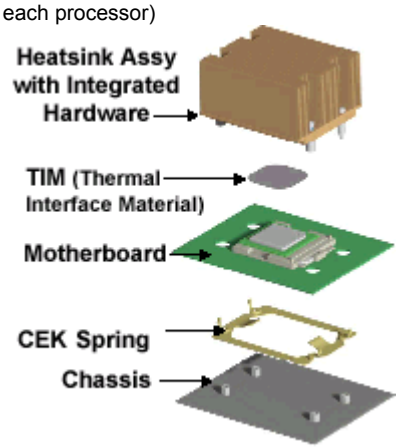
Heatsink Installation

After you are done installing the processor, you should proceed to installing the heatsink. Heatsink will ensure that the processor not overheat and continue to operate at maximum performance for as long as you own them. An overheated processor is dangerous to the health of the motherboard.

Because there are many different types of heatsinks available from many different manufacturers, a lot of them have their own method of installation. For the safest method of installation and information on choosing the appropriate heatsink, please refer to INTEL's website at www.Intel.com.

3.7 – Installing the Processor Heatsink

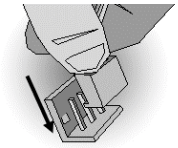
DCA (Direct Chassis Attach) is required to install the Intel Xeon®processors on Tiger i7525 (S2672). The processor heat-sinks need to be Intel's CEK (Common Enabling Kit) compliant. Each processor heat-sink needs to be mounted to chassis with which are 8 processor heat-sink mounting holes (4 holes for each processor)



- **Memory Type**:
  The Tiger i7525 (S2672) supports **DDR2 Registered** type memory modules and requires minimum two memory modules to power up the system. **Unbuffered** or **DDR-I** Memory **is NOT supported**.

Finishing Installing the Heatsink

After you finish installing the heatsink onto the processor and socket, attach the end wire of the fan (which should already be attached to the heatsink) to the motherboard. The following diagram illustrates how to connect fans onto the motherboard.

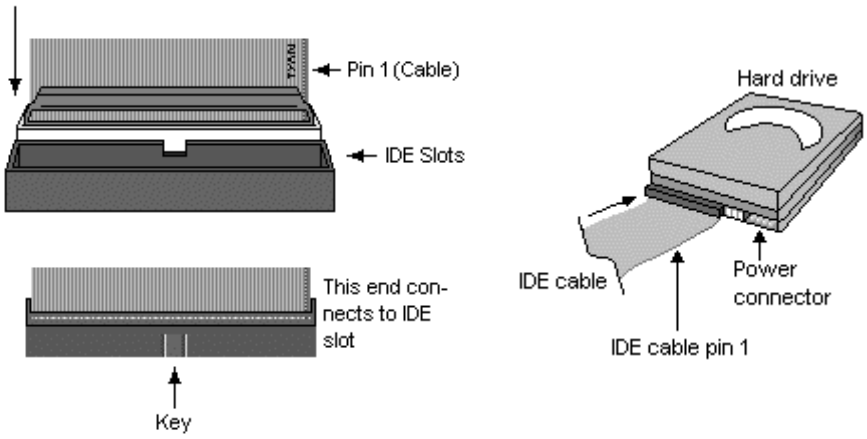


After you're finished installing all the fans you can connect your drives (hard drives, CD-ROM drives, etc.) to your motherboard.

3.8 – Attaching Drive Cables

Attaching IDE drive cabling is simple. These cables are "keyed" to only allow them to be connected in the correct manner. TYAN motherboards have two on-board IDE channels, each supporting two drives. **The black connector designates the Primary channel, while the white connector designates the Secondary channel.**

Attaching IDE cables to the IDE connectors is illustrated below:

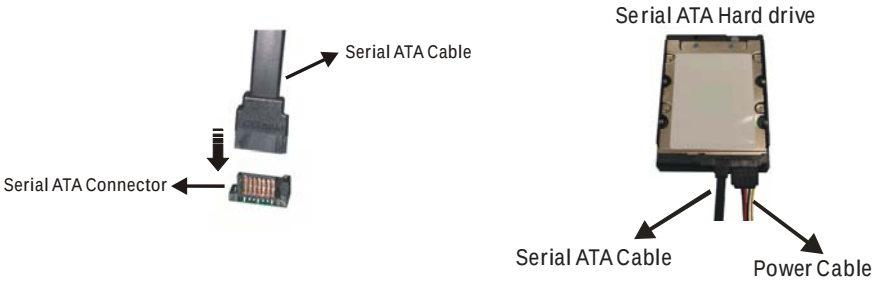


Simply plug in the BLUE END of the IDE cable into the motherboard IDE connector, and the other end(s) into the drive(s). Each standard IDE cable has three connectors, two of which are closer together. The BLUE connector that is furthest away from the other two is the end that connects to the motherboard. The other two connectors are used to connect to drives.

TIP: Pin 1 on the IDE cable (usually designated by a colored wire) faces the drive's power connector.

Serial ATA

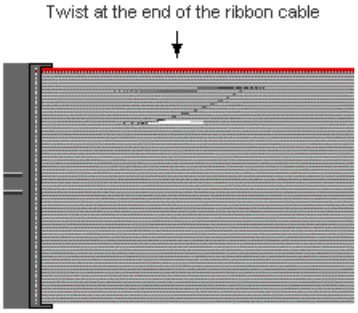
Attaching Serial ATA cables to the Serial ATA connectors is illustrated below:



Simply plug in the BLACK END of the Serial ATA cable into the motherboard Serial ATA connector, and the other end(s) into the drive(s). Each standard Serial ATA cable has two connectors. Both BLACK ENDS of the Serial ATA cable are the same that are used to connect to drives or motherboard.

Floppy Drives

Attaching a floppy drive can be done in a similar manner to an IDE drive. See the diagram below for an example of a floppy cable. Most of the current floppy drives on the market require that the cable be installed with the colored stripe positioned next to the power connector. In most cases, there will be a key pin on the cable which will force proper connection of the cable.



The first floppy drive (commonly denoted as **A:**) is usually attached to the end of the cable with the twist in it. Drive B: is usually connected to the second or third connector in the cable (the second or third connector after you install Drive **A:**).

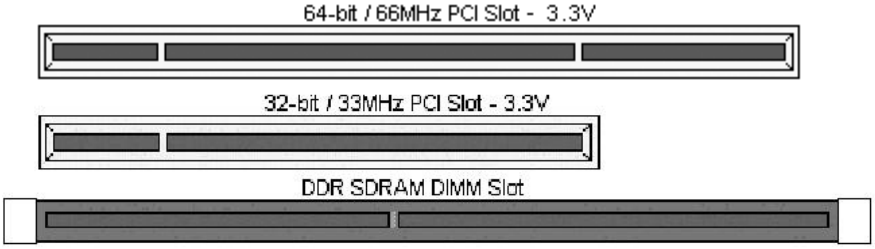
Refer to your floppy drive's installation instructions (if available), or contact your dealer if you are unsure about how to attach the floppy drive(s). Remember, you can only have 2 floppy drives connected at any given time.

Below are some symptoms of incorrectly installed floppy drives. While they are minor and installing them incorrectly doesn't cause severe problems, it may cause your system to freeze or crash when trying to read and/or write to diskettes.

Symptoms of incorrectly installed floppy drives	
Drive is not automatically detected	Usually caused by faulty cables, cables put in backwards or a bad floppy drive or motherboard. Try another floppy drive to verify the problem if the cable is properly installed or try replacing the actual cable. Also check to see if the onboard floppy controller is enabled in the BIOS setup.
Drive Fail message at bootup	The cable, floppy drive or motherboard may be faulty. Try another drive or cable to verify.
Drive does not power on	Check power cable and cabling. Maybe a bad power supply or drive cable problem.
Drive activity light is constantly on	Usually signifies that the cable on the drive is on backwards, which is a common issue. Reverse the cable at the floppy drive end and try again.

3.9 – Installing Add-In Cards

Before installing add-in cards, it's helpful to know if they are fully compatible with your motherboard. For this reason, we've provided the diagrams below, showing the most common slots that may appear on your motherboard. Not all of the slots shown will necessarily appear on your motherboard, however, there will be combinations of what you see here.



Simply find the appropriate slot for your add-in card and insert the card firmly. Do not force any add-in cards (or anything else) into any slots if they won't seat in place. It's better to try another slot or return the faulty card rather than damaging both the motherboard and the add-in card.

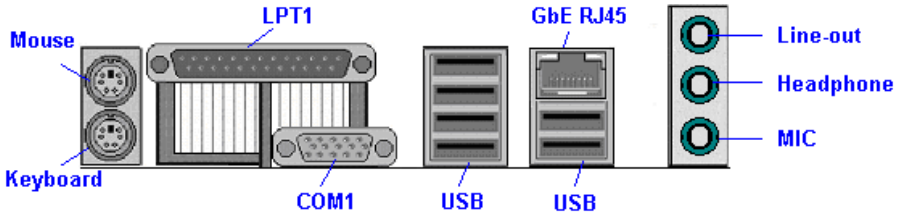
TIP: It's a good practice to install add-in cards in a staggered manner, rather than directly adjacent to each other. This allows air to more easily circulate within the chassis, providing improved cooling for all installed devices.

Note: YOU MUST unplug the power connector to the motherboard before performing system hardware changes, to avoid damaging the board or expansion device.

3.10 – Connecting External Devices

Connecting external devices to the motherboard is an easy task. The standard devices you should expect to plug into the motherboard are keyboards, mouse, and printer cables. The following diagram will detail the ATX port stack for the following board:

Tiger i7525 (S2672)



Besides being used primarily to connect printers, the Printer Port is also used for devices such as Zip drive, some external CD-RW drives and or other external devices. More on the uncommon side these days are the Serial Ports. They were primarily used to connect external modems, but most modems today are using USB or are installed internally.

TIP: While the ports have been created to accept connectors in only one direction, make sure to be careful when inserting connectors. At times, attaching connectors in the incorrect orientation can damage, bend and or break the pins.

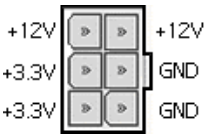
3.11 – Installing the Power Supply

- **Power connectors**
  Tiger i7525 (S2672) board supports EPS/12V power supply unit (PSU) with three power connectors listed below.

EPS/12V Power Connectors

24-pin system power connector **8-pin CPU power connector (split CPU power planes)**

Optional Power Connector for a x16 PCI-Express graphic card



This optional 6-pin power connector is designed for providing additional power to a x16 PCI-Express graphic card. If your power supply does not have this optional 6-pin power connector, you may use the power split cables. Usually the graphic card company provides the power split cables for your PCI-Express graphic card, if necessary. Check your graphic card user's manual for its power requirements.

NOTE You **MUST** unplug the power supply before plugging in the 20-pin and 8-pin power cables to motherboard connectors.

3.12 – Finishing Up

Congratulations on making it this far! You're finished setting up the hardware aspect of your computer. Before closing up your chassis, make sure that all cables and wires are connected properly, especially IDE cables and most importantly, jumpers. You may have difficulty powering on your system if the motherboard jumpers are not set correctly.

In the rare circumstance that you have experienced difficulty, you can find help by asking your vendor for assistance. If they are not available for assistance, please find setup information and documentation online at our website or by **calling your vendor's support line.**

Chapter 4: BIOS Setup

Installation

The BIOS is the basic input/output system, the firmware on the motherboard that enables your hardware to interface with your software. This chapter describes different settings for the BIOS that can be used to configure your system.

The BIOS section of this manual is subject to change without notice and is provided for reference purposes only. The settings and configurations of the BIOS are current at the time of print, and therefore may not match exactly what is displayed on screen.

This section describes the BIOS setup program. The setup program lets you modify basic configuration settings. The settings are then stored in a dedicated, battery-backed memory (called NVRAM) that retains the information when the power is turned off.

This motherboard's BIOS is a customized version of the industry-standard BIOS for IBM PC AT-compatible personal computers. The BIOS provides critical, low-level support for the system's central processing unit (CPU), memory, and I/O subsystems.

This BIOS has been customized by adding important features such as password protection, power management, and chipset "tuning" features that control the system. This section will guide you through the process of configuring the BIOS for your system setup.

Starting Setup

The BIOS is immediately activated when you turn on the computer. The BIOS reads system configuration in CMOS RAM and begins the process of checking out the system and configuring it through the Power-On-Self-Test (POST).

When these preliminary tests are complete, the BIOS searches for an operating system on one of the system's data storage devices (hard drive, CD-ROM, etc). If one is found, the BIOS will launch that operating system and hand control over to it. You can enter the BIOS setup by pressing the [**Delete**] key when the machine boots up and begins to show the memory count.

Setup Basics

The table below shows how to navigate in the setup program using the keyboard.

Key	Function
Tab	Moves from one selection to the next
Left/Right Arrow Keys	Change from one menu to the next
Up/Down Arrow Keys	More between selections
Enter	Opens highlighted section
PgUp/PgDn Keys	Change settings.

Getting Help

Pressing [**F1**] will display a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window, press [**ESC**] or the [**F1**] key again.

In Case of Problems

If you discover that you have trouble booting the computer after making and saving the changes with the BIOS setup program, you can restart the computer by holding the power button down until the computer shuts off (usually within 4 seconds); resetting by pressing CTRL-ALT-DEL; or clearing the CMOS.

The best advice is to only alter settings that you thoroughly understand. In particular, do not change settings in the Chipset section unless you are absolutely sure of the outcome. The Chipset defaults were carefully chosen by TYAN or your system manufacturer for the best performance and reliability. Even a seemingly small change to the Chipset setup options may cause the system to become unstable or unusable.

Setup Variations

Not all systems will have the same BIOS setup layout or options. While the basic look and function of the BIOS setup remains more or less the same for most systems, the appearance of your Setup screen may differ from the charts shown in this section. Each system design and chipset combination requires a custom configuration. In addition, the final appearance of the Setup program depends on the system designer. Your system designer may decide that certain items should not be available for user configuration, and remove them from the BIOS setup program.

NOTE: On the following pages, options written in **bold type** represent the BIOS Setup default.

4.1 – Main BIOS Setup

System Time: [HH:MM:SS]
System Date: [MM/DD/YYYY]

Legacy Diskette A: [1.44/1.25 MB 3½"]

- ► Standard IDE: [xxx-(PM)]
- ► Standard IDE: [xxx-(PS)]
- ► Standard IDE: [xxx-(SM)]
- ► Standard IDE: [xxx-(SS)]
- ► Native IDE: [xxx-(SATA1)]
- ► Native IDE: [xxx-(SATA2)]

Installed O/S: [Other]

► System Information

Base Memory: 640K
Extended Memory: 512M

Setup Item	**Selections (default values are in bold)**	**Item Specific Help**
System Time:	00:00:00 … 23:59:59	<Tab>, <Shift-Tab> or <Enter> selects field.
System Date:	01/01/1980 ... 12/31/2079	<Tab>, <Shift-Tab> or <Enter> selects field.
Legacy Diskette A:	Disabled 360 KB 5¼“ 1.2 MB 5¼“ 720 KB 3½“ **1.44/1.25 MB 3½“** 2.88 MB 3½“	Selects floppy type.
Standard IDE:	None DriveName-(PM)	View drive options.
Standard IDE:	None DriveName-(PS)	View drive options.
Standard IDE:	None DriveName-(SM)	View drive options.

Standard IDE:	None DriveName-(SS)	View drive options.
Native IDE:	None DriveName-(SATA1)	View drive options.
Native IDE:	None DriveName-(SATA2)	View drive options.
Installed O/S:	**Other** Windows 32 bit Windows 64 bit Linux	Select the operating system installed on your system which you will use most commonly. Note: An incorrect setting can cause some operating systems to display unexpected behaviour.
System Information	-	View system information.

4.2 – Main Submenu Standard / Native IDE

Maximum Capacity:	160 GByte
PIO Mode:	PIO 4
DMA Mode:	UDMA 5

Setup Item	Selections (default values are in Bold)	Item Specific Help
Maximum Capacity:	xxxx GByte (only view the current setting, it should not be selectable!!)	-
PIO Mode:	PIO 0 PIO 1 PIO 2 PIO 3 PIO 4 PIO 5 (only view the current setting, it should not be selectable!!)	-
DMA Mode:	None UDMA 1 UDMA 2 UDMA 3 UDMA 4 UDMA 5 (only view the current setting, it should not be selectable!!)	-

4.2.1 Main Submenu System Information

BIOS Version:	1.00.1691
BIOS Build Date:	03/11/2004
Ident-Nr.:	
System:	Tiger i7525
System Version:	
System Serial:	
Board:	(S2672)
Board Version:	S26361-D1691
Asset Tag:	
MAC Address:	00:E0:81:60:90:40

Setup Item	Selections (Default values are in bold)	Item Specific Help
BIOS Version	Must reflect the current installed BIOS version.	Any items on this menu can not be modified within BIOS Setup menu.
BIOS Build Date:	Must reflect the Build date of the current installed BIOS version. Format must be MM/DD/YYYY	
Ident-Nr.:		
System:		
System Version:		
System Serial:		
Board:		
Board Version:		
Asset Tag:		
MAC Address:	Must display the MAC address of the onboard LAN.	

4.3 – Advanced BIOS Features

- ► Hardware Monitoring
- ► BIOS Event Logging
- ► Processors
- ► Chipset
- ► Diskette Controller
- ► ATA Controller
- ► Integrated SCSI Controller
- ► Integrated Network Interface
- ► Integrated Audio
- ► Integrated 1394
- ► Integrated USB
- ► I/O Device Configuration
- ► PCI Configuration

Reset Configuration Data: [No]

Setup Item	Selections (default values are in bold)	Item Specific Help
Hardware Monitoring	-	Hardware monitoring configuration
BIOS Event Logging	-	BIOS event logging configuration
Processors	-	Display of processor information and configuration of processor features.
Chipset	-	Configuration of the chipset features
Diskette Controller	-	Configuration of the integrated floppy disk controller
ATA Controller	-	Configuration of the integrated PATA and SATA controllers
Integrated SCSI Controller	-	Configuration of the integrated SCSI controller
Integrated Network Interface	-	Configuration of the integrated network

		interface
Integrated Audio	-	Configuration of the integrated audio controller
Integrated 1394	-	Configuration of the integrated IEEE 1394 controller
Integrated USB	-	Configuration of the integrated USB controller
I/O Device Configuration	-	Peripheral configuration
PCI Configuration	-	PCI device configuration
Reset Configuration Data:	**No** Yes	Select 'Yes' if you want to clear the Extended System Configuration Data (ESCD) area.

In Advanced BIOS features, you will be able to adjust many of the feature that effect system speed and boot-up options.

4.3.1 Advanced Submenu Hardware Monitoring

Fan Speed Control: [Auto]
► Realtime Sensors

Setup Item	Selections (Default values are in bold)	Item Specific Help
Fan Speed Control:	Silent **Auto** Full Speed	[Silent] Fans are working with the lowest possible speed. Silent mode could cause performance loss. [Auto] Optimum temperature control at maximum CPU performance. [Full Speed] All fans are working at full speed.
Realtime Sensors		This screen displays information about hardware monitoring sensors.

4.3.2 Hardware Monitoring Submenu Realtime Sensors

Sensor xxx: value yyy

Setup Item	Selections (Default values are in bold)	Item Specific Help
Please display all available sensors on board and describe them clear (e.g. CPU1 settings missing or how can I determine which one is ADT1 and which one is ADT0?).		All items on this menu cannot be modified.

4.3.3 Advanced Submenu BIOS Event Logging

BIOS Event Logging:	[Enabled]
View BIOS Event Log:	[Enter]
Clear BIOS Event Log:	[Disabled]

Setup Item	Selections (Default values are in bold)	Item Specific Help
BIOS Event Logging:	**Enabled** Disabled	[Enabled] Errors will be logged to BIOS event log. [Disabled] Errors will not be logged to the BIOS event log.
View BIOS Event Log:	**Enter**	Select <Enter> to view the content of the BIOS event log.
Clear BIOS Event Log:	**Disabled** Enabled	Setting this to enabled, will clear BIOS event log after rebooting the system.

4.3.4 Advanced Submenu Processors

CPU0 Type:	Intel® XEON™
CPU0 Speed:	3.2 GHz
CPU0 ID:	0F29
CPU0 Patch ID:	0015
CPU0 FSB:	800 MHz
CPU1 Type:	Intel® XEON™
CPU1 Speed:	3.2 GHz
CPU1 ID:	0F29
CPU1 Patch ID:	0015
CPU1 FSB:	800 MHz

Hyper-Threading: [Enabled]

MPS Version: [1.4]

Setup Item	Selections (Default values are in bold)	Item Specific Help
CPU0 Type:	Display the current installed CPU type	-
CPU0 Speed:	Display the current installed CPU speed	-
CPU0 ID:	Display the current installed CPU ID	-
CPU0 Patch ID:	Display the current installed Patch ID	-
CPU0 FSB:	Display the current maximum FSB speed	-
CPU1 Type:	Display the current installed CPU type	-
CPU1 Speed:	Display the current installed CPU speed	-
CPU1 ID:	Display the current installed CPU ID	-
CPU1 Patch ID:	Display the current installed Patch ID	-
CPU1 FSB:	Display the current maximum FSB speed	-
Hyper-Threading:	**Enabled** Disabled	Hyper-Threading causes a single physical processor to appear to be two or more logical processors. It may improve the system performance, if enabled. This feature is not supported by all operating systems.
MPS Version	1.1 **1.4**	Configures the MP Specification revision level. Some OS will require 1.1 for compatibility reasons.

4.3.5 Advanced Submenu Chipset

ECC Memory Checking: [Enabled]

Setup Item	Selections (Default values are in bold)	Item Specific Help
ECC Memory Checking:	**Enabled** Disabled	If all memory modules in the system supporting parity this selection enables ECC mode.

4.3.6 Advanced Submenu Diskette Controller

Diskette Controller: [Enabled]

Setup Item	Selections (Default values are in bold)	Item Specific Help
Diskette Controller:	**Enabled** Disabled	Enable/Disable the floppy disk controller.

4.3.7 Advanced Submenu ATA Controller

P-ATA Interface: [P-ATA 1/2 + P-ATA 3/4]
S-ATA Interface: [Enabled]
S-ATA Mode: [Native]

Setup Item	Selections (Default values are in bold)	Item Specific Help
P-ATA Interface:	**P-ATA 1/2 + P-ATA 3/4** P-ATA 1/2 P-ATA 3/4	Enables/Disables the Parallel ATA channels.
S-ATA Interface:	**Enabled** Disabled	Enables the Serial ATA Interface.
S-ATA Mode:	Compatible RAID **Native**	[Compatible] Serial ATA is mapped to the standard IDE drive interface. [RAID] Requires two identical SATA drives. [Native] Serial ATA configured in native mode. Some operating systems do not support native IDE devices.

4.3.8 Advanced Submenu Integrated SCSI Controller

Integrated SCSI Controller:	[Enabled]
Option ROM Scan:	[Enabled]
SCSI Mode:	[SCSI]

Setup Item	Selections (Default values are in bold)	Item Specific Help
Integrated SCSI Controller:	**Enabled** Disabled	Enable/Disable the onboard SCSI controller.
Option ROM Scan:	**Enabled** Disabled	Initialize device expansion ROM.
SCSI Mode:	**SCSI** Host RAID	Configure SCSI Mode.

4.3.9 Advanced Submenu Integrated Network Interface

Integrated Network Interface:	[Enabled]
Option ROM Scan:	[Enabled]
Latency Timer:	[0040h]

Setup Item	Selections (Default values are in bold)	Item Specific Help
Integrated Network Interface:	**Enabled** Disabled	Enables the onboard LAN controller.
Option ROM Scan:	**Enabled** Disabled	Initialize device expansion ROM.
Latency Timer:	Default 0020h **0040h** 0060h 0080h 00A0h 00C0h 00E0h	Minimum guaranteed time slice allotted for bus master in units of PCI bus clocks.

4.3.10 Advanced Submenu Integrated Audio

Integrated Audio: [Enabled]

Setup Item	Selections (Default values are in bold)	Item Specific Help
Integrated Audio:	**Enabled** Disabled	Enables/Disables the integrated audio controller.

4.3.11 Advanced Submenu Integrated 1394

Integrated 1394: [Enabled]

Setup Item	Selections (Default values are in bold)	Item Specific Help
Integrated 1394:	**Enabled** Disabled	Enables/Disables the integrated 1394 controller.

4.3.12 Advanced Submenu Integrated USB

Integrated USB 1.1:	[Enabled]
Integrated USB 2.0:	[Enabled]
USB Legacy Support:	[Enabled]

Setup Item	Selections (Default values are in bold)	Item Specific Help
Integrated USB 1.1:	**Enabled** Disabled	Enables or Disables the USB hardware.
Integrated USB 2.0:	**Enabled** Disabled	Enables or Disables the USB 2.0 hardware.
USB Legacy Support:	**Enabled** Disabled	Enable legacy keyboard support for the Universal Serial Bus.

4.3.13 Advanced Submenu I/O Device Configuration

Serial Port A:	[Auto]
Base I/O Address:	[3F8]
Interrupt:	[IRQ4]
Parallel Port:	[Auto]
Mode:	[ECP]
Base I/O Address:	[378]
Interrupt:	[IRQ7]
DMA channel:	[DMA3]

Setup Item	Selections (Default values are in bold)	Item Specific Help
Serial Port A:	**Auto** Enabled Disabled	Configure serial port using options: [Disabled]

		No configuration [Enabled] User configuration [Auto] BIOS or OS chooses configuration.
Base I/O Address:	**3F8** 2F8 3E8 2E8	Set the base I/O address for the serial port.
Interrupt:	IRQ3 **IRQ4**	Set the IRQ for the serial port.
Parallel Port:	**Auto** Enabled Disabled	Configure parallel port using options: [Disabled] No configuration [Enabled] User configuration [Auto] BIOS or OS chooses configuration.
Mode:	**ECP** EPP Bi-directional Output only	Set the mode for the parallel port.
Base I/O Address:	**378** 278 3BC	Set the base I/O address for the parallel port.
Interrupt:	IRQ5 **IRQ7**	Set the IRQ for the parallel port.
DMA channel:	DMA1 **DMA3**	Set the DMA channel for the parallel port.

4.3.14 Advanced Submenu PCI Configuration

PCI Express x16: [Auto]

- ► PCI Device, Slot #1
- ► PCI Device, Slot #2
- ► PCI Device, Slot #3
- ► PCI Device, Slot #4
- ► PCI Device, Slot #5

- ► PCI/PNP IRQ Exclusion

Setup Item	Selections (Default values are in bold)	Item Specific Help
PCI Express x16	**Auto** Disabled Enabled	Configures the PCI Express x16 Slot: [Auto] BIOS configures the slot. [Disabled] Slot is disabled. [Enabled] Slot is always enabled.
PCI Device, Slot #1	-	Configuration of the Specific PCI device.
PCI Device, Slot #2	-	Configuration of the Specific PCI device.
PCI Device, Slot #3	-	Configuration of the Specific PCI device.
PCI Device, Slot #4	-	Configuration of the Specific PCI device.
PCI Device, Slot #5	-	Configuration of the Specific PCI device.
PCI/PNP IRQ Exclusion	-	Reserve specific IRQs for use by legacy devices.

4.3.15 Advanced PCI Configuration Submenu PCI Device, Slot #x

Option ROM Scan:	[Enabled]
Latency Timer:	[Default]

Setup Item	Selections (Default values are in bold)	Item Specific Help
Option ROM Scan:	**Enabled** Disabled	Initialize device expansion ROM.
Latency Timer:	**Default** 0020h 0040h 0060h 0080h 00A0h 00C0h 00E0h	Minimum guaranteed time slice allotted for bus master in units of PCI bus clocks.

4.3.16 Advanced PCI Configuration Submenu PCI/PNP IRQ Exclusion

IRQ3:	[Available]
IRQ4:	[Available]
IRQ5:	[Available]
IRQ7:	[Available]
IRQ10:	[Available]
IRQ11:	[Available]

Setup Item	Selections (Default values are in bold)	Item Specific Help
IRQ3	**Available**	Reserves the specified

	Reserved	IRQ for use by legacy devices.
IRQ4	**Available** Reserved	Reserves the specified IRQ for use by legacy devices.
IRQ5	**Available** Reserved	Reserves the specified IRQ for use by legacy devices.
IRQ7	**Available** Reserved	Reserves the specified IRQ for use by legacy devices.
IRQ10	**Available** Reserved	Reserves the specified IRQ for use by legacy devices.
IRQ11	**Available** Reserved	Reserves the specified IRQ for use by legacy devices.

4.4 – Security Menu

Setup Password	Not Installed
User Password	Not Installed
Set Setup Password:	[Enter]
Set User Password:	[Enter]
Password on boot:	[Disabled]
Start from Floppy:	[Enabled]
Start from IDE CD-ROM:	[Enabled]
Setup Prompt:	[Enabled]
Fixed disk boot sector:	[Normal]
Write on Flexible Disks:	[Disabled]
BIOS Write Protect:	[Disabled]
Cabinet Monitoring:	[Disabled]
Trusted Platform Module:	[Disabled]

Setup Item	Selections (Default values are in bold)	Item Specific Help
Setup Password	'Installed' or **'Not Installed'**	-
User Password	'Installed' or **'Not Installed'**	-
Set Setup Password:	**Enter**	Setup Password controls access to the setup utility. Use at least 4 characters for the password; otherwise the system can be tampered easily.
Set User Password:	**Enter**	User Password controls access to the system at boot. Use at least 4 characters for the password; otherwise the system can be tampered easily.
Password on boot:	**Disabled** Enabled	Enable/Disable password entry on boot.
Start from Floppy:	**Enabled** Disabled	Allows you to disable the boot from diskette. The drive will still be available for reading and writing data.
Start from IDE CD-ROM:	**Enabled** Disabled	Allows you to disable the boot from CD-ROM. The drive will still be available for reading and writing data.
Setup Prompt:	**Enabled** Disabled	Display setup entry prompt on boot; disabled doesn´t prevent setup entry.
Fixed disk boot sector:	**Normal** Write Protect	Write protects boot sector on hard disk to protect against viruses.
Write on Flexible Disks:	**Unlocked** Locked	[Unlocked] Data can be written to

		floppy disk. [Locked] No data can be written to floppy disk.
BIOS Write Protect:	**Disabled** Enabled	When set to enabled the BIOS Flash Memory will be write protected.
Cabinet Monitoring:	**Disabled** Enabled	When enabled, the system's housing is monitored.
Trusted Platform Module:	**Disabled** Enabled	Allows to enable the Trusted Platform Module (TPM).

4.5 – Power Menu

APM Interface:	[Enabled]
APM Power Saving:	[Customized]
Standby Timeout:	[15 min]
Suspend Timeout:	[Disabled]
APM Resume Timer:	[Disabled]
APM Resume Time:	[00:00:00]
Power-on via LAN:	[Enabled]
Power-off via Keyboard:	[Disabled]
Power Failure Recovery:	[Last State]

Setup Item	**Selections (Default values are in bold)**	**Item Specific Help**
APM Interface:	**Enabled** Disabled	Enable/Disable Advanced Power Management (APM) BIOS-interface for non-ACPI operating systems.
APM Power Saving:	Disabled **Customized** Maximum Power	Configure the BIOS-controlled APM.

	Savings Minimum Power Savings	[Disabled] No BIOS-controlled power management. [Customized] User-defined power management. [Maximum Power Saving] Minimum power consumption. [Minimum Power Saving] Maximum power consumption.
Standby Timeout:	Disabled 2 min 5 min 10 min **15 min** 30 min	Time the system is inactive before entering Standby mode. In Standby mode the screen is dark.
Suspend Timeout:	**Disabled** 2 min 15 min 30 min 1 h 2 h	Time the system is in Standby mode before entering Suspend mode. In Suspend mode the CPU is stopped.
APM Resume Timer:	**Disabled** Enabled	Resume at a specified time from Suspend mode. Valid for non-ACPI operating systems.
APM Resume Time:	**00:00:00** ... 23:59:59	Specify the time when the system is to wake up. <Tab>, <Shift-Tab> or <Enter> selects input fields.
Power-on via LAN:	**Enabled** Disabled	Allows the system to be switched on via a LAN wakeup.
Power-off via Keyboard:	**Disabled** Enabled	Allows the system to be switched off via power button on the keyboard.
Power Failure Recovery:	**Last State** Stay Off	After recovery form power failure:

	Power On	[Stay off] Switch off. [Power On] Switch on. [Last State] Switch to the state the system was in before power failure.

4.6 – Boot Menu

Halt on POST Errors: [Enabled]
Fast Boot: [Enabled]
Quiet Boot: [Enabled]
Boot Menu: [Enabled]

► Boot Device Priority

Setup Item	Selections (Default values are in bold)	Item Specific Help
Halt on POST Errors:	**Enabled** Disabled	Pauses and displays setup entry or resume boot prompt if error occurs at boot. If disabled, system always attempts to boot.
Fast Boot:	**Enabled** Disabled	Allows the system to skip certain tests while booting. This will decrease the time needed to boot the system.
Quiet Boot:	**Enabled** Disabled	Minimal startup display during boot.
Boot Menu:	**Enabled** Disabled	Allows you to bypass the normal sequence of

		boot devices. Before loading the OS press <F12> and select an alternate boot device from a menu.
Boot Device Priority	-	Select which order the BIOS should use between devices when trying to boot.

4.6.1 Boot Submenu Boot Device Priority

+ Removable Devices
+ Hard Drives
+ CD-ROM Drives
  Network Boot

Setup Item	Selections (Default values are in bold)	Item Specific Help
-	-	Keys used to view or configure devices: <Enter> expands or collapses devices. <Ctrl+Enter> expands all <Shift+1> enables or disables a device. <d> Remove a device that is not installed. <+> and <-> moves the device up or down. <n> Move a removable device between Hard Disk or Removable Disk

4.7 – Exit Menu

Save Changes & Exit
Discard Changes & Exit
Get Default Values
Load Previous Values

Setup Item	Selections (Default values are in bold)	Item Specific Help
Save Changes & Exit	-	Exit System Setup and save your changes to CMOS.
Discard Changes & Exit	-	Exit utility without saving Setup data to CMOS.
Get Default Values	-	Load default values for all Setup items.
Load Previous Values	-	Load Previous values from CMOS for all Setup items.

Chapter 5: Diagnostics

Note: if you experience problems with setting up your system, always check the following things in the following order:

Memory, Video, CPU

By checking these items, you will most likely find out what the problem might have been when setting up your system. For more information on troubleshooting, check the TYAN website at: http://www.tyan.com.

5.1 Beep Codes

Fatal errors, which halt the boot process, are communicated through a series of audible beeps. For example, if the BIOS POST can initialize the video but an error occurs, an error message will be displayed. If it cannot display the message, it will report the error as a series of beeps.

The most common type of error is a memory error.

Before contacting your vendor or TYAN Technical Support, be sure that you note as much as you can about the beep code length and order that you experience. Also, be ready with information regarding add-in cards, drives and O/S to speed the support process and come to a quicker solution.

5.2 Flash Utility

Every BIOS file is unique for the motherboard it was designed for. For Flash Utilities, BIOS downloads, and information on how to properly use the Flash Utility with your motherboard, please check the TYAN web site: http://www.tyan.com/

Note: Please be aware that by flashing your BIOS, you agree that in the event of a BIOS flash failure, you must contact your dealer for a replacement BIOS. There are no exceptions. TYAN does not have a policy for replacing BIOS chips directly with end users. In no event will TYAN be held responsible for damages done by the end user.

Appendix I: Glossary

ACPI (Advanced Configuration and Power Interface): a power management specification that allows the operating system to control the amount of power distributed to the computer's devices. Devices not in use can be turned off, reducing unnecessary power expenditure.

AGP (Accelerated Graphics Port): a PCI-based interface which was designed specifically for demands of 3D graphics applications. The 32-bit AGP channel directly links the graphics controller to the main memory. While the channel runs at only 66 MHz, it supports data transmission during both the rising and falling ends of the clock cycle, yielding an effective speed of 133 MHz.

ATAPI (AT Attachment Packet Interface): also known as IDE or ATA; a drive implementation that includes the disk controller on the device itself. It allows CD-ROMs and tape drives to be configured as master or slave devices, just like HDDs.

ATX: the form factor designed to replace the AT form factor. It improves on the AT design by rotating the board 90 degrees, so that the IDE connectors are closer to the drive bays, and the CPU is closer to the power supply and cooling fan. The keyboard, mouse, USB, serial, and parallel ports are built-in.

Bandwidth: refers to carrying capacity. The greater the bandwidth, the more data the bus, phone line, or other electrical path, can carry. Greater bandwidth, then, also results in greater speed.

BBS (BIOS Boot Specification): is a feature within the BIOS that creates, prioritizes, and maintains a list of all Initial Program Load (IPL) devices, and then stores that list in NVRAM. IPL devices have the ability to load and execute an OS, as well as provide the ability to return to the BIOS if the OS load process fails for some reason. At that point, the next IPL device is called upon to attempt loading of the OS.

BIOS (Basic Input/Output System): the program that resides in the ROM chip, and provides the basic instructions for controlling your computer's hardware. Both the operating system and application software use BIOS routines to ensure compatibility.

Buffer: a portion of RAM which is used to temporarily store data, usually from an application, though it is also used when printing, and in most keyboard drivers. The CPU can manipulate data in a buffer before copying it, all at once, to a disk drive. While this improves system performance ---- reading to or writing from a disk drive a single time is much faster than doing so repeatedly ---- there is also the possibility of losing your data should the system crash. Information stored in a buffer is temporarily stored, not permanently saved.

Bus: a data pathway. The term is used especially to refer to the connection between the processor and system memory, and between the processor and PCI or ISA local buses.

Bus mastering: allows peripheral devices and IDEs to access the system memory without going through the CPU (similar to DMA channels).

Cache: a temporary storage area for data that will be needed often by an application. Using a cache lowers data access times, since the needed information is stored in the SRAM instead of in the slow DRAM. Note that the cache is also much smaller than your regular memory: a typical cache size is 512KB, while you may have as much as 4GB of regular memory.

Cache size: refers to the physical size of the cache onboard. This should not be confused with the cacheable area, which is the total amount of memory which can be scanned by the system in search of data to put into the cache. A typical setup would be a cache size of 512KB, and a cacheable area of 512MB. In this case, up to 512KB of the main memory onboard is capable of being cached. However, only 512KB of this memory will be in the cache at any given moment. Any main memory above 512MB could never be cached.

Closed and open jumpers: jumpers and jumper pins are active when they are “on” or “closed”, and inactive when they are “off” or “open”.

CMOS (Complementary Metal-Oxide Semiconductors): chips that hold the basic startup information for the BIOS.

COM port: another name for the serial port, which is called as such because it transmits the eight bits of a byte of data along one wire, and receives data on another single wire (that is, the data is transmitted in serial form, one bit after another). Parallel ports transmit the bits of a byte on eight different wires at the same time (that is, in parallel form, eight bits at the same time).

DDR (Double Data Rate): is a technology designed to double the clock speed of the memory. It activates output on both the rising and falling edge of the system clock rather than on just the rising edge, potentially doubling output.

DIMM (Dual In-line Memory Module): faster and more capacious form of RAM than SIMMs, and do not need to be installed in pairs.

DIMM bank: sometimes called DIMM sockets, because the physical slot and the logical unit are the same. That is, one DIMM module fits into one DIMM socket, which is capable of acting as a memory bank.

DMA (Direct Memory Access): channels that are similar to IRQs. DMA channels allow hardware devices (like soundcards or keyboards) to access the main memory without involving the CPU. This frees up CPU resources for other tasks. As with IRQs, it is vital that you do not double up devices on a single line. Plug-n-Play devices will take care of this for you.

Doze mode: in this mode, only the CPU’s speed is slowed.
DRAM (Dynamic RAM): widely available, very affordable form of RAM which has the unfortunate tendency to lose data if it is not recharged regularly (every few milliseconds). This refresh requirement makes DRAM three to ten times slower than non-recharged RAM such as SRAM.

ECC (Error Correction Code or Error Checking and Correcting): allows data to be checked for errors during run-time. Errors can subsequently be corrected at the same time that they’re found.

EEPROM (Electrically Erasable Programmable ROM): also called Flash BIOS, is a ROM chip which can, unlike normal ROM, be updated. This allows you to keep up with changes in the BIOS programs without having to buy a new chip. TYAN’s BIOS updates can be found at http://www.tyan.com

EMRL: Embedded RAID Logic. An Adaptec specific RAID technology.

ESCD (Extended System Configuration Data): a format for storing information about Plug-n-Play devices in the system BIOS. This information helps properly configure the system each time it boots.

Fault-tolerance: a term describing a system where one component can quickly be replaced without causing a loss of service, such as in a RAID system.

Firmware: low-level software that controls the system hardware.

Form factor: an industry term for the size, shape, power supply type, and external connector type of the Personal Computer Board (PCB) or motherboard. The standard form factors are the AT and ATX, although TYAN also makes some Baby-AT and ATX Footprint boards.

Global timer: onboard hardware timer, such as the Real-Time Clock (RTC).

Handshaking: a process where two devices initiate communications. One device, typically the server, sends a message to another device, typically a client, in order to request establishment of a communications channel. The two devices will then exchange messages back and forth in order to settle on a communications protocol.

HDD: stands for Hard Disk Drive, a type of fixed drive.

H-SYNC: controls the horizontal synchronization/properties of the monitor.

IC (Integrated Circuit): the formal name for the computer chip.

IDE (Integrated Device/Drive Electronics): a simple, self-contained HDD interface. It can handle drives up to 8.4 GB in size. Almost all IDEs sold now are in fact Enhanced IDEs (EIDEs), with maximum capacity determined by the hardware controller.

IDE INT (IDE Interrupt): a hardware interrupt signal that goes to the IDE.

I**/O (Input/Output):** the connection between your computer and another piece of hardware (mouse, keyboard, etc.)

Initial Program Load (IPL): a feature built into BBS-compliant devices, describing those devices as capable of loading and executing an OS, as well as being able to provide control back to the BIOS if the loading attempt fails.

IPL: see Initial Program Load.

IRQ (Interrupt Request): an electronic request that runs from a hardware device to the CPU. The interrupt controller assigns priorities to incoming requests and delivers them to the CPU. It is important that there is only one device hooked up to each IRQ line; doubling up devices on IRQ lines can lock up your system. Plug-n-Play operating systems can take care of these details for you.

ISA (Industry Standard Architecture): a slower 8- or 16-bit bus (data pathway).

Latency: the amount of time that one part of a system spends waiting for another part to catch up. This is most common when the system sends data out to a peripheral device, and it waiting for the peripheral to send some data back (peripherals tend to be slower than onboard system components).

Mirroring: see RAID.

NVRAM: ROM and EEPROM are both examples of Non-Volatile RAM, memory that holds its data without power. DRAM, in contrast, is volatile.

OEMs (Original Equipment Manufacturers): Compaq or IBM package other companies' motherboards and hardware inside their case and sell them.

Parallel port: transmits the bits of a byte on eight different wires at the same time (that is, in parallel form, eight bits at the same time).

PCI (Peripheral Component Interconnect): a 32 or 64-bit local bus (data pathway) which is faster than the ISA bus. Local buses are those which operate within a single system (as opposed to a network bus, which connects multiple systems).

PCI PIO (PCI Programmable Input/Output) modes: the data transfer modes used by IDE drives. These modes use the CPU for data transfer (in contrast, DMA channels do not). PCI refers to the type of bus used by these modes to communicate with the CPU.
PCI-to-PCI bridge: allows you to connect multiple PCI devices onto one PCI slot.

Pipeline burst SRAM: a type of RAM that can maintain it's data as long as power is provided to the memory chips. In this configuration, SRAM requests are pipelined, which means that larger packets of data are sent to the memory at one time, and acted upon quickly. This type of SRAM operates at bus speeds higher than 66MHz.

Pipelining: improves system performance by allowing the CPU to begin executing a second instruction before the first is completed. A pipeline can be likened to an assembly line, with a given part of the pipeline repeatedly executing a set part of an operation on a series of instructions.

PM timers (Power Management timers): software timers that count down the number of seconds or minutes until the system times out and enters sleep, suspend, or doze mode.

PnP (Plug-n-Play): a design standard that has become ascendant in the industry. Plug-n-Play devices require little set-up to use. Novice end users can simply plug them into a computer that is running on a Plug-n-Play aware operating system (such as Windows 98), and go to work. Devices and operating systems that are not Plug-n-Play require you to reconfigure your system each time you add or change any part of your hardware.

PXE (Preboot Execution Environment): one of four components that together make up the Wired for Management 2.0 baseline specification. PXE was designed to define a standard set of preboot protocol services within a client, towards the goal of allowing networked-based booting to boot using industry standard protocols.

RAID (Redundant Array of Independent Disks): a way for the same data to be stored in different places on many hard drives. By using this method, the data is stored redundantly, also the multiple hard drives will appear as a single drive to the operating system. RAID level 0 is known as striping, where data is striped (or overlapped) across multiple hard drives, but offers no fault-tolerance. RAID level 1 is known as mirroring, which stores the data within at least two hard drives, but does not stripe. RAID level 1 also allows for faster access time and fault-tolerance, since either hard drive can be read at the same time. RAID level 0+1 is both striping and mirroring, providing fault-tolerance, striping, and faster access all at the same time.

RAIDIOS: stands for RAID I/O Steering, a type of RAID technology from Intel. RAIDIOS is a specification used to enable an embedded I/O controller, embedded on the motherboard, to be used as just an I/O controller or to be the I/O component of a hardware RAID subsystem. The RAIDIOS circuit allows an I/O Processor (either embedded on the motherboard or on an add-in card) to configure the I/O controller and service the I/O controller's interrupts. The I/O controller and the I/O Processor together are two of the primary components of a hardware RAID subsystem.

RAM (Random Access Memory): technically refers to a type of memory where any byte can be accessed without touching the adjacent data, is often used to refer to the system's main memory. This memory is available to any program running on the computer.

ROM (Read-Only Memory): a storage chip which contains the BIOS; the basic instructions required to boot the computer and start up the operating system.

SATA (Serial ATA): is an evolutionary replacement for the Parallel ATA physical storage interface. Serial ATA is a drop-in solution in that it is compatible with today's software and operating systems. It will provide for systems which are easier to design, with cables that are simpler to route and install, smaller cable connectors, and lower voltage requirements.

SDRAM (Synchronous Dynamic RAM): called as such because it can keep two sets of memory addresses open simultaneously. By transferring data alternately from one set of addresses and then the other, SDRAM cuts down on the delays associated with non-synchronous RAM, which must close one address bank before opening the next.

Serial port: called as such because it transmits the eight bits of a byte of data along one wire, and receives data on another single wire (that is, the data is transmitted in serial form, one bit after another).

SCSI Interrupt Steering Logic (SISL): Architecture that allows a RAID controller, such as AcceleRAID 150, 200 or 250, to implement RAID on a system board-embedded SCSI bus or a set of SCSI busses. SISL: SCSI Interrupt Steering Logic (LSI) (only on LSI SCSI boards)

SIMM (Single In-line Memory Module): formally the most common form of RAM for motherboards. They must be installed in pairs, and do not have the carrying capacity or the speed of DIMM modules.

Sleep/Suspend mode: in this mode, all devices except the CPU shut down.

SRAM (Static RAM): unlike DRAM, this type of RAM does not need to be refreshed in order to prevent data loss. Thus, it is faster and more expensive.

SSI (Server System Infrastructure): an industry initiative intended to provide ready-to-use design specifications for common server hardware elements (chassis, power supplies, and racks) to promote and support server industry growth.

Standby mode: in this mode, the video and hard drives shut down; all other devices continue to operate normally.

Striping: see RAID

UltraDMA-33/66/100: a fast version of the old DMA channel. UltraDMA is also called UltraATA. Without proper UltraDMA controller, your system cannot take advantage of higher data transfer rates of the new UltraDMA/UltraATA hard drives.

USB (Universal Serial Bus): a versatile port. This one port type can function as a serial, parallel, mouse, keyboard or joystick port. It is fast enough to support video transfer, and is capable of supporting up to 127 daisy-chained peripheral devices.

VGA (Video Graphics Array): the PC video display standard

V-SYNC: controls the vertical scanning properties of the monitor.

ZCR: Zero Channel RAID. PCI card that allows a RAID card to use the onboard SCSI chip, thus lowering cost of RAID solution

ZIF Socket (Zero Insertion Force socket): these sockets make it possible to insert CPUs without damaging the sensitive CPU pins. The CPU is lightly placed in an open ZIF socket, and a lever is pulled down. This shift the processor over and down, guiding into the board and locking it into place.

Appendix II: Post Error Code for BIOS

POST (hex)	Description
CFh:	Test CMOS R/W functionality.
C0h:	Early chipset initialization: -Disable shadow RAM -Disable L2 cache (socket 7 or below) -Program basic chipset registers
C1h:	Detect memory -Auto-detection of DRAM size, type and ECC. -Auto-detection of L2 cache (socket 7 or below)
C3h:	Expand compressed BIOS code to DRAM
C5h:	Call chipset hook to copy BIOS back to E000 & F000 shadow RAM.
01h:	Expand the Xgroup codes locating in physical address 1000:0
03h:	Initial Superio_Early_Init switch.
05h:	1. Blank out screen 2. Clear CMOS error flag
07h:	1. Clear 8042 interface 2. Initialize 8042 self-test
08h:	1. Test special keyboard controller for Winbond 977 series Super I/O chips. 2. Enable keyboard interface.
0Ah:	1. Disable PS/2 mouse interface (optional). 2. Autodetect ports for keyboard & mouse followed by a port & interface swap (optional). 3. Reset keyboard for Winbond 977 series Super I/O chips.
0Eh:	Test F000h segment shadow to see whether it is R/W-able or not. If test fails, keep beeping the speaker.
10h:	Auto detect flash type to load appropriate flash R/W codes into the run time area in F000 for ESCD & DMI support.
12h:	Use walking 1's algorithm to check out interface in CMOS circuitry. Also set real-time clock power status, and then check for override.
14h:	Program chipset default values into chipset. Chipset default values are MODBINable by OEM customers.
16h:	Initial onboard clock generator if Early_Init_Onboard_Generator is defined. See also POST 26h.

POST (hex)	Description
18h:	Detect CPU information including brand, SMI type (Cyrix or Intel) and CPU level (586 or 686).
1Bh:	Initial interrupts vector table. If no special specified, all H/W interrupts are directed to SPURIOUS_INT_HDLR & S/W interrupts to SPURIOUS_soft_HDLR.
1Dh:	Initial EARLY_PM_INIT switch.
1Fh:	Load keyboard matrix (notebook platform)
21h:	HPM initialization (notebook platform)
23h:	1. Check validity of RTC value: e.g. a value of 5Ah is an invalid value for RTC minute. 2. Load CMOS settings into BIOS stack. If CMOS checksum fails, use default value instead.
24h:	Prepare BIOS resource map for PCI & PnP use. If ESCD is valid, take into consideration of the ESCD's legacy information.
25h:	Early PCI Initialization: -Enumerate PCI bus number. -Assign memory & I/O resource -Search for a valid VGA device & VGA BIOS, and put it into C000:0
26h:	1. If Early_Init_Onboard_Generator is not defined Onboard clock generator initialization. Disable respective clock resource to empty PCI & DIMM slots. 2. Init onboard PWM 3. Init onboard H/W monitor devices
27h:	Initialize INT 09 buffer
29h:	1. Program CPU internal MTRR (P6 & PII) for 0-640K memory address. 2. Initialize the APIC for Pentium class CPU. 3. Program early chipset according to CMOS setup. Example: onboard IDE controller. 4. Measure CPU speed.
2Bh:	Invoke Video BIOS
2Dh:	1. Initialize double-byte language font (Optional) 2. Put information on screen display, including Award title, CPU type, CPU speed, full screen logo.
33h:	Reset keyboard if Early_Reset_KB is defined e.g. Winbond 977 series Super I/O chips. See also POST 63h.
35h:	Test DMA Channel 0

POST (hex)	Description
37h:	Test DMA Channel 1.
39h:	Test DMA page registers.
3Ch:	Test 8254
3Eh:	Test 8259 interrupt mask bits for channel 1.
40h:	Test 8259 interrupt mask bits for channel 2.
43h:	Test 8259 functionality.
47h:	Initialize EISA slot
49h:	1. Calculate total memory by testing the last double word of each 64K page. 2. Program write allocation for AMD K5 CPU.
4Eh:	1. Program MTRR of M1 CPU 2. Initialize L2 cache for P6 class CPU & program CPU with proper cacheable range. 3. Initialize the APIC for P6 class CPU. 4. On MP platform, adjust the cacheable range to smaller one in case the cacheable ranges between each CPU are not identical.
50h:	Initialize USB Keyboard & Mouse.
52h:	Test all memory (clear all extended memory to 0)
53h:	Clear password according to H/W jumper (Optional)
55h:	Display number of processors (multi-processor platform)
57h:	1. Display PnP logo 2. Early ISA PnP initialization -Assign CSN to every ISA PnP device.
59h:	Initialize the combined Trend Anti-Virus code.
5Bh:	(Optional Feature) Show message for entering AWDFLASH.EXE from FDD (optional)
5Dh:	1. Initialize Init_Onboard_Super_IO 2. Initialize Init_Onbaord_AUDIO.
60h:	Okay to enter Setup utility; i.e. not until this POST stage can users enter the CMOS setup utility.
63h:	Reset keyboard if Early_Reset_KB is not defined.
65h:	Initialize PS/2 Mouse

POST (hex)	Description
67h:	Prepare memory size information for function call: INT 15h ax=E820h
69h:	Turn on L2 cache
6Bh:	Program chipset registers according to items described in Setup & Auto-configuration table.
6Dh:	1. Assign resources to all ISA PnP devices. 2. Auto assign ports to onboard COM ports if the corresponding item in Setup is set to "AUTO".
6Fh:	1. Initialize floppy controller 2. Set up floppy related fields in 40:hardware.
75h:	Detect & install all IDE devices: HDD, LS120, ZIP, CDROM…..
76h:	(Optional Feature) Enter AWDFLASH.EXE if: -AWDFLASH.EXE is found in floppy drive. -ALT+F2 is pressed.
77h:	Detect serial ports & parallel ports.
7Ah:	Detect & install co-processor
7Ch:	Init HDD write protect.
7Fh:	Switch back to text mode if full screen logo is supported. -If errors occur, report errors & wait for keys -If no errors occur or F1 key is pressed to continue: ◆Clear EPA or customization logo.

E8POST.ASM starts	Description
82h:	1. Call chipset power management hook. 2. Recover the text fond used by EPA logo (not for full screen logo) 3. If password is set, ask for password.
83h:	Save all data in stack back to CMOS
84h:	Initialize ISA PnP boot devices
85h:	1. USB final Initialization 2. Switch screen back to text mode
87h:	NET PC: Build SYSID Structure.
89h:	1. Assign IRQs to PCI devices 2. Set up ACPI table at top of the memory.
8Bh:	1. Invoke all ISA adapter ROMs 2. Invoke all PCI ROMs (except VGA)
8Dh:	1. Enable/Disable Parity Check according to CMOS setup 2. APM Initialization
8Fh:	Clear noise of IRQs
93h:	Read HDD boot sector information for Trend Anti-Virus code
94h:	1. Enable L2 cache 2. Program Daylight Saving 3. Program boot up speed 4. Chipset final initialization. 5. Power management final initialization 6. Clear screen & display summary table 7. Program K6 write allocation 8. Program P6 class write combining
95h:	Update keyboard LED & typematic rate
96h:	1. Build MP table 2. Build & update ESCD 3. Set CMOS century to 20h or 19h 4. Load CMOS time into DOS timer tick 5. Build MSIRQ routing table.
FFh:	Boot attempt (INT 19h)

Technical Support

If a problem arises with your system, you should turn to your dealer for help first. Your system has most likely been configured by them, and they should have the best idea of what hardware and software your system contains. Hence, they should be of the most assistance. Furthermore, if you purchased your system from a dealer near you, you can actually bring your system to them to have it serviced, instead of attempting to do so yourself (which can have expensive consequences).

Help Resources:

1. See the beep codes section of this manual.
2. See the TYAN website for FAQ's, bulletins, driver updates, and other information: http://www.tyan.com
3. Contact your dealer for help BEFORE calling TYAN.

Returning Merchandise for Service

During the warranty period, contact your distributor or system vendor FIRST for any product problems. This warranty only covers normal customer use and does not cover damages incurred during shipping or failure due to the alteration, misuse, abuse, or improper maintenance of products.

NOTE: A receipt or copy of your invoice marked with the date of purchase is required before any warranty service can be rendered. You may obtain service by calling the manufacturer for a Return Merchandise Authorization (RMA) number. The RMA number should be prominently displayed on the outside of the shipping carton and the package should be mailed prepaid. TYAN will pay to have the board shipped back to you.

Notice for the USA
Compliance Information Statement (Declaration of Conformity Procedure) DoC
FCC Part 15: This device complies with part 15 of the FCC Rules

Operation is subject to the following conditions:

1) This device may not cause harmful interference, and
2) This device must accept any interference received including interference that may cause undesired operation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

    - Reorient or relocate the receiving antenna.
    - Increase the separation between the equipment and the receiver.
    - Plug the equipment into an outlet on a circuit different from that of the receiver.
    - Consult the dealer on an experienced radio/television technician for help.

Notice for Canada
This apparatus complies with the Class B limits for radio interference as specified in the Canadian Department of Communications Radio Interference Regulations. (Cet appareil est conforme aux norms de Classe B d'interference radio tel que specifie par le Ministere Canadien des Communications dans les reglements d'ineteference radio.)

Notice for Europe (CE Mark)
This product is in conformity with the Council Directive 89/336/EEC, 92/31/EEC (EMC).

CAUTION: Lithium battery included with this board. Do not puncture, mutilate, or dispose of battery in fire. Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by manufacturer. Dispose of used battery according to manufacturer instructions and in accordance with your local regulations.

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