Chapter 2
Hardware design

2-1 Mainboard Layout

The PP6-NS is designed with Intel 82440FX PCIset and I/O Advanced Pro-
grammable Interrupt Controller(S820933AA I/O) APIC chipset which is developed
by INTEL Corporation to fully support Daul Intel Pentium® Pro Processor PCI/ISA
system. The Intel 82440FX PCIset chipset provides increased integration and
improved performance designs. The chipset provides an integrated IDE controller
with two high performance IDE interfaces for up to four IDE devices (hard devices,
CD-ROM device, etc). The SMC 37C669 Super I/O controller provides the
standard PC I/O functions: floppy interface, two 16 Byte FIFO serial ports and one
EPP/ECP capable parallel port. The **PP6-NS** layout is shown in nexts page (Figure
1-1) for user's reference. **Care must be taken** when inserting memory modules,
inserting Daul/Single Pentium® Pro processor CPU or even plugging PCI card into
associated slots to avoid damaging any circuits or sockets on board. A right fan and
heatsink fan is strongly recommended when installing Pentium® Pro processor due
to possible overheat.

The PP6-NS supports minimum of 8MB of System Memory and maximum of
768MB while L2 Cache and cache controller included in Pentium® Pro Processor
CPU.

The PP6-NS supports standard Fast Page, EDO (Extended Data Out or Hyper
Page Mode). **The PP6-NS** provides six 72-pins SIMM sites for memory expan-
sion. Eash socket support 1M x 32(4MB), 2M x 32(8MB), 4M x 32(16MB), 8M x
32(32MB) 16MB x 32(64MB), and 32MB x 32(128MB) single-sided or double-
sided memory modules. The memory timing requires 70 nS Fast page devices or
60 nS EDO DRAM. Memory parity generation and checking or ECC(Error
Checking and Correction) are supported DRAM Modules may be parity (x 72)or
non-parity(x 64)or ECC(x 72). The BIOS will automatically detect which DRAM
has installed in SIMM sites.

The PP6-NS supports **Onboard two PCI IDE** connectors, and detects IDE
harddisk type by BIOS utility automatically.

The PP6-NS supports Daul Pentium Pro Processor CPU. When installing Daul
Pentium Processor CPU on the PP6-NS, you will get greater performance to
execute multi-tasking in the 32-bit Operating system.

The PP6-NS's mainboard layout and system block diagram are shown in Figure
1-1, 1-2.

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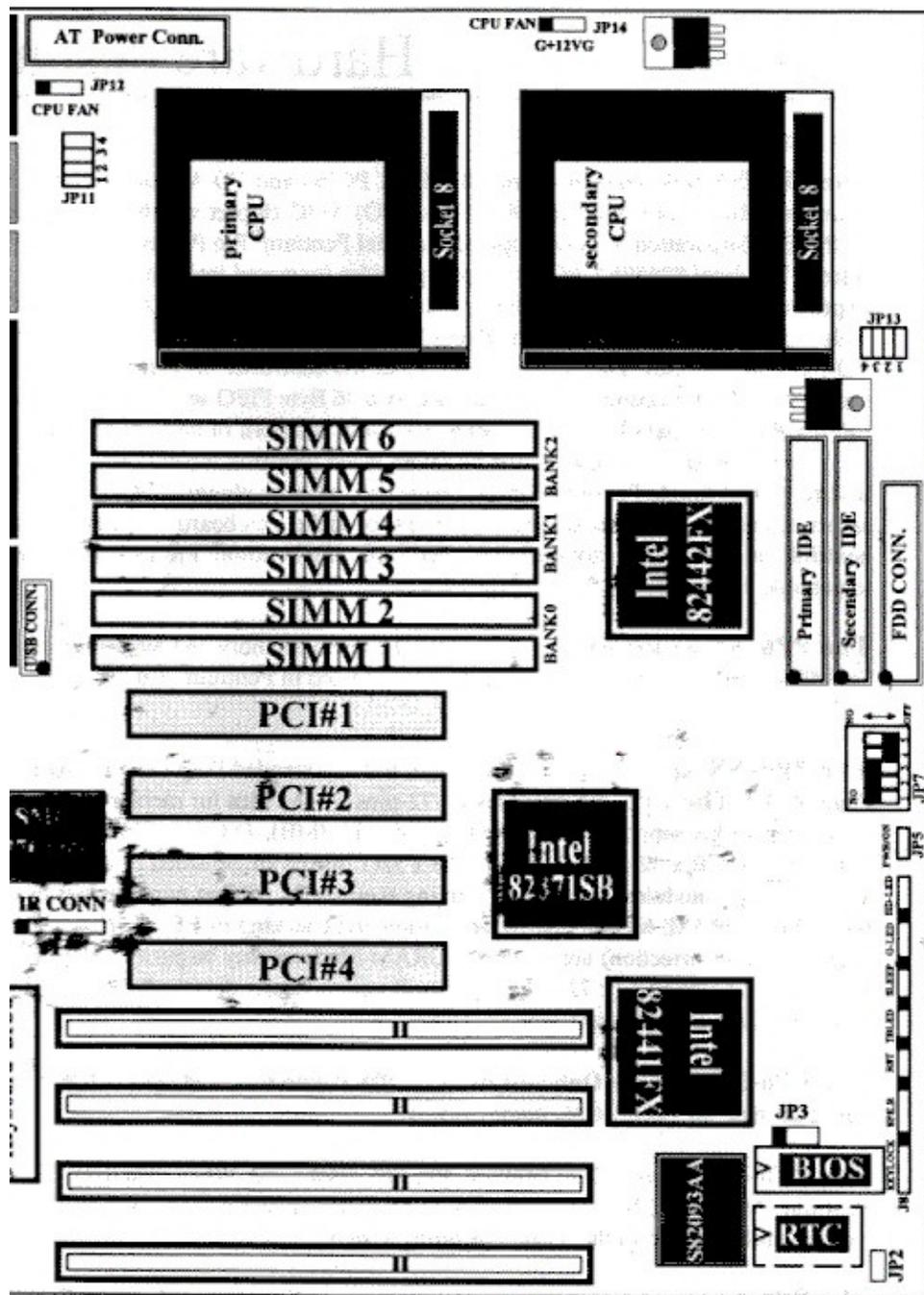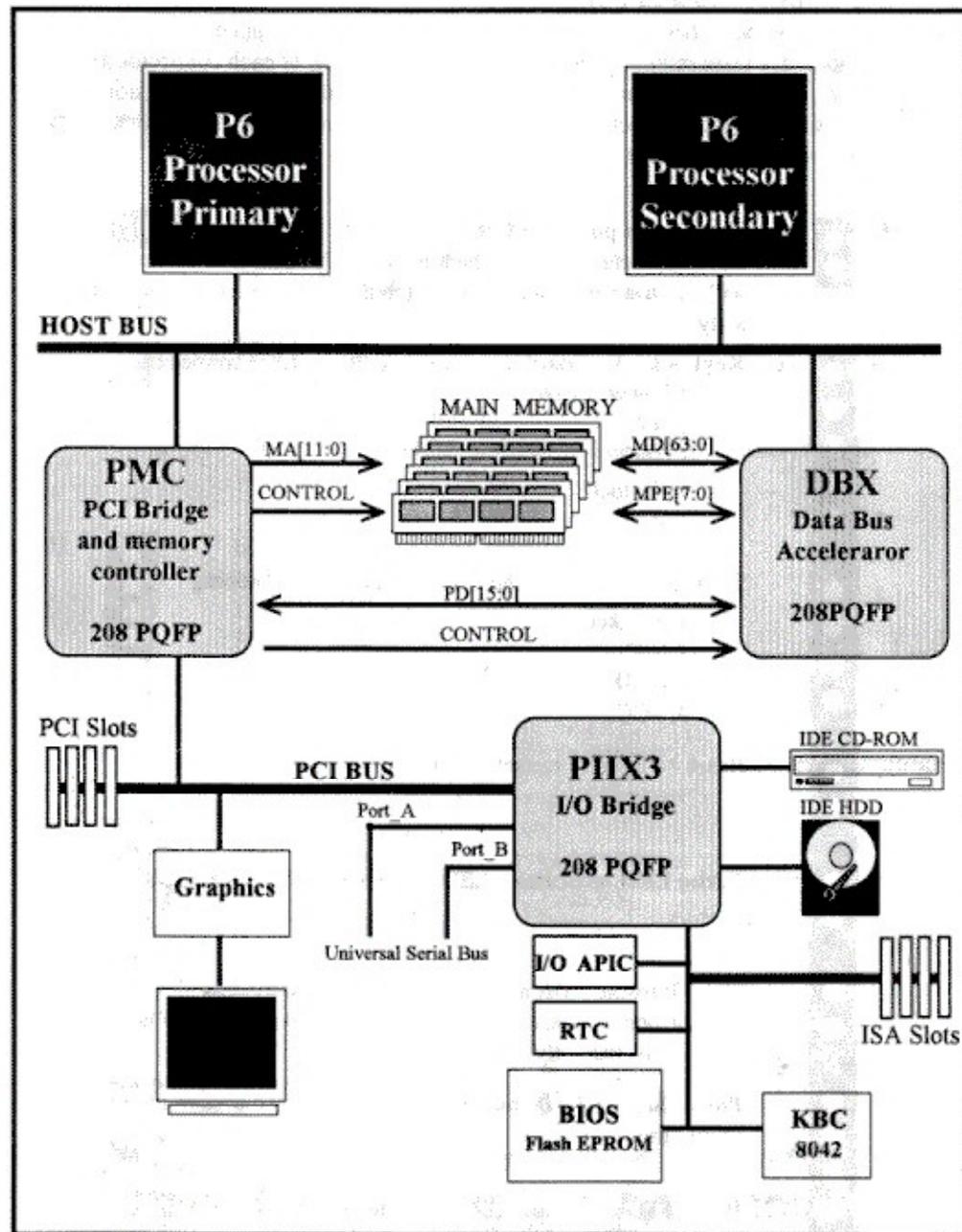
PP6-NS Layout

Figure 1-1

Figure 1-2 System Block Diagram

2-2 Connectors and Jumpers

This section describes all of the connectors and jumpers equipped in the mainboard. Please refer to **Figure 1-1** for actual location of each connector and jumper. The following jumpers will be shows graphically such as ▉ to connect pins 1&2 and ▉ to connect pins 2&3. Jumpers with two pins will be shown as ▉▉ for open and ▇▇ for close.

JP5

The system power ON/OFF switch for ATX power supply.
Use a mometary switch which is normally open. The system power will be on when pushing the switch close and releasing immediately.

J8   **KeyLock** - Keyboard lock switch & Power LED connector
1 5
      1.Power LED(+)
      2.N/C
      3.GND
      4.Keylock
      5GND

Speaker - connect to the system's speaker for beeping
      1.Speaker
      2.N/C
      3.GND
      4.VCC

Reset - Closed to restart system.

Turbo LED indicator - LED ON when higher speed is selected

Sleep/Resume switch : Closed to enter sleep mode
A keystrobe or mouse movement (mouse driver exists). The system will instantly "wake up".

Power Saving LED indicator - LED ON when system is in any saving mode

IDE LED indicator - LED ON when Onboard PCI IDE Harddisks activate

JP12
JP14
  GND
  +12V
  GND
**The Power Supply (+12V) of the Pentium® Pro CPU colling fan**

JP1
Onboard SMC's chip select :
Open: Normal operation.(Default)
Close: Disable the Onboard SMC chip.

JP3
1
3
EPROM BIOS Select :
1-2 for 12V Flash EPROM.
2-3 for 5V Flash EPROM.(Default)
Note: The JP2 setting is dependent on which EPROM type is attached.

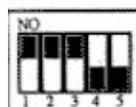**J1**
1
7
IrDA/ASK IR CONNECTOR:
1.IRRX
2.GND
3.IRTX
4.VCC
5.Reserve
6.VCC
7.GND
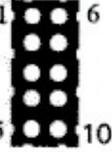
J7   1 6
    5 10
USB CONNECTOR:

1. VCC	6. VCC
2. USB P1-	7. USB P0-
3. USB P1+	8. USB P0+
4. GND	9. GND
5. NC	10. NC

I/O back pannel connector:

COM1   PS/2 Mouse   PS/2 Keyboard   parallel port   COM2

JP7
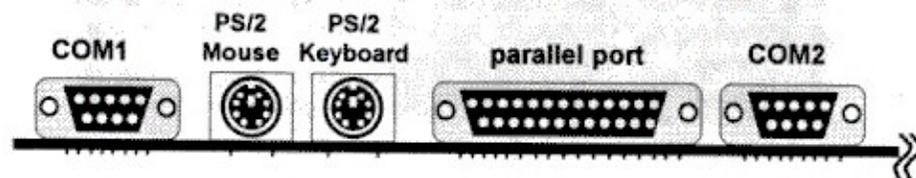
JP7	Intel Daul/Single Pentium® Pro Processor Installation				
CPU/Rate	SW1	SW2	SW3	SW4	SW5
150MHz	ON	ON	ON	ON	OFF
166MHz	ON	ON	OFF	OFF	ON
180MHz	ON	OFF	ON	ON	OFF
200MHz	ON	ON	ON	OFF	OFF	(Default)
233MHz	ON	ON	OFF	OFF	OFF

The CPU/Rate settings Table for Primary or Secondayr Socket 8.

Note1:

The current Pentium® Pro Processors support VID and will automatically setting the voltage regulator so that no jumper settings are needed in the PP6-NS's mainboard. Older Pentium® Pro Processors without VID Supports so that require manual Voltage ID setting from JP11 or JP13.(details setting table please check Appendix C: CPU's VID Settings and Jumpers)

Note2:

PP6-NS requires tht dual Pentium® Pro Processor CPUs running at the same speed, ie same Bus/Core Frenquency Ratio. Therefore, JP7 DIP Switch is used to set up the working frequency for one or two CPUs. For example, If you install one Pentium® Pro 180MHz CPU on the Primary Socket 8, you should adjust the JP7 DIP SWITCH as "ON, OFF, ON, ON, OFF"(SW1, 2, 3, 4, 5) on the PP6-NS.Then if you install another CPU(even 200MHZ) on the other Secondary Socket 8, this CPU can run as only 180MHz.

2-3 System Memory Configuration

The PP6-NS supports different type of settings for the system memory. There is no jumper nor connector needed for memory configuration. Following figures provides all possible memory combinations.

M1	BANK0 Single Side DRAM
M2	BANK0,1 Dual Side DRAM
M3	BANK1 Single Side DRAM
M4	BANK2,3 Dual Side DRAM
M5	BANK2 Single Side DRAM
M6	BANK4, 5 Dual Side DRAM

M1, M2(BANK 0)	M3, M4(BANK 1)	M5, M6(BANK 2)	Total Size
4MB, 4MB	Empty	Empty	8MB
4MB, 4MB	4MB, 4MB	Empty	16MB
4MB, 4MB	4MB, 4MB	4MB, 4MB	24MB
4MB, 4MB	8MB, 8MB	Empty	24MB
4MB, 4MB	4MB, 4MB	8MB, 8MB	32MB
4MB, 4MB	8MB, 8MB	8MB, 8MB	40MB
4MB, 4MB	16MB, 16MB	Empty	40MB
4MB, 4MB	8MB,8MB	16MB, 16MB	56MB
4MB, 4MB	16MB,16MB	16MB, 16MB	72MB
4MB, 4MB	32MB, 32MB	Empty	72MB
4MB, 4MB	16MB,16MB	32MB, 32MB	104MB
4MB, 4MB	32MB, 32MB	32MB, 32MB	136MB
4MB, 4MB	64MB, 64MB	Empty	136MB
8MB, 8MB	Empty	Empty	16MB
8MB, 8MB	8MB, 8MB	Empty	32MB
8MB, 8MB	8MB, 8MB	8MB, 8MB	48MB
8MB, 8MB	16MB, 16MB	Empty	48MB
8MB, 8MB	16MB, 16MB	16MB, 16MB	80MB
8MB, 8MB	16MB, 16MB	32MB, 32MB	112MB
8MB, 8MB	32MB, 32MB	Empty	80MB
8MB, 8MB	32MB, 32MB	32MB, 32MB	144MB
16MB, 16MB	Empty	Empty	32MB
16MB, 16MB	16MB, 16MB	Empty	64MB
16MB, 16MB	16MB, 16MB	16MB, 16MB	96MB
16MB, 16MB	32MB, 32MB	Empty	96MB
16MB, 16MB	32MB, 32MB	32MB, 32MB	160MB
32MB, 32MB	Empty	Empty	64MB
32MB, 32MB	32MB, 32MB	Empty	128MB
32MB, 32MB	32MB, 32MB	32MB, 32MB	192MB
32MB, 32MB	64MB, 64MB	Empty	192MB
32MB, 32MB	64MB, 64MB	64MB, 64MB	320MB
64MB, 64MB	64MB, 64MB	Empty	256MB
64MB, 64MB	64MB,64MB	64MB, 64MB	384MB
128MB, 128MB	128MB, 128MB	128MB, 128MB	768MB

NOTE :

1. **PP6-NS supports and extends many memory configurations on its 6 SIMM sites. The memory size of any configuration can be combined flexibly. The above table only lists the basic memory configurations for reference. There are still many configurations not yet listed on the above three banks. You can combine any configuration as you like. BIOS will detect your memory configurations and sizes automatically.**

2. **PP6-NS support Fast Page DRAM, EDO DRAM SIMMs, but they cannot be mixed within the same memory bank.**

3. **SIMMs may be parity (x 72) or non parity (x 64) or ECC(x 72).**

4. **The 70nS Fast Page Mode or 60nS EDO is necessary.**

5. **"BANK" = 64 Bit = M1, M2 = M3, M4 = M5, M6**

6. **To install the SIMM memory modules, press the memory module firmly into place starting from a 45 degree angle making sure that all the Contacts are aligned with the SIMM slot,.**

2-4 Integrated PCI Bridge

The **PP6-NS** utilizes **Intel's 440FX PCIset** chipset to support Daul or Single Pentium® Pro Processor PCI/ISA system. The Intel 82440FX PCIset chipset consists of the 82441FX PCI and Memory Controller (PMC), 82442FX Data Bus Accelerator (DBX) devices, and one 82371SB PCI ISA/IDE Accelerator (PIIX3) bridge chip. It provides an interface which translates CPU cycle into PCI bus cycle, and PCI burst read/write capability. In addition, it provides high performance PCI arbiter to support four PCI Masters, Rotating Priority Mechanism, Hidden Arbitration Scheme Minimizes Arbitration Overhead, and PCI Rev.2.1 compliant. The PMC provides bus control signals and address paths for transfers between the host bus, PCI bus, and main memory. The DBX is used to create the 64-bit CPU to main memory data path and DBX also interfaces to the 16-bit Private data bus for PCI transactions and providing optimal CPU-to-DRAM performance.(reference Figure 1-2 simple architecture)

There are four interrupts in each PCI slot : INTA#, INTB#, INTC#, and INTD#, since the **PP6-NS** adapts the PCI auto-configuration with the system BIOS Setup utility. When the system is turned on after adding a PCI add-in card, the BIOS automatically configure interrupts, DMA channels, I/O space, and other paramaters. You do not have to configure jumpers or worry about potential resource conflicts. Because PCI cards use the same interrupt resource as ISA cards, you must specify the interrupts used by ISA add-in cards in the BIOS Setup utility.

If however, a "Legacy card" (such as plug paddle card and cable into the ISA slot.) is plugged in the system, modification in the **ROM SETUP UTILITY** becomes necessary. First, enter **PCI CONFIGURATION SETUP** utility from **ROM SETUP UTILITY** main menu to set the "PCI IDE IRQ MAP TO : ISA". Secondly, you must enter **CHIPSET FEATURES SETUP UTILITY** from **ROM SETUP UTILITY** main menu and set the "Onboard Primary PCI IDE: Disabled and Onboard Secondary PCI IDE: Disabled." When you plugg the PCI/ISA IDE card into the system, You should **Disabled Onboard Primary and Secondary PCI IDE** from **CHIPSET FEATURES SETUP UTILITY** too.

Some "Legacy card" (no paddle card and cable.) you can set the system interrupt request (IRQ) on the "Legacy card" (refer to user's manual of the card) to a proper system IRQ level (in general, card's Primary assigned to INTA and Secondary assigned to INTB). If the card is plugged into slot 1(marked PCI#1), you can not use second slot (marked PCI#2) because the Secondary INT signal takes INTB from the slot (refer to Page 3-12 for circuit diagram). The user then enter **PCI CONFIGURATION SETUP** utility from **ROM SETUP UTILITY** main menu and set the "PCI IDE IRQ MAP TO : PCI-Slot 1" (depend on the slot # where the Legacy card is plugged).

2-5 Difference of Windows® NT Installation Between Daul and Single Processor

The application of dual processors is focused on 32-bit server/workstation or CAD CAM in industry or business fields at present, there are many operating systems providing solution and features for DP (Daul Processor) application. Following table shows the current OS which support Multi-processor.

Operating System Name	Revision	S82093AA APIC
Windows NT Workstation	3.51/4.0	Yes
Windows NT Server	3.51/4.0	Yes
Netware SMP	4.xx	No, will be supported in a future revision
SCO Unix MPX	3.0	No, not planned to be supported
SCO Unix Openserver	5.0	Yes
Solaris	2.4/2.5	No, will be supported in a future revision
Unixware	2.0x/2.1	No / Yes
OS/2 SMP	2.11	No, will be supported in a future revision

SPECTAL NOTES: for installation of Windows®NT (Rev, 3.51 or 4.0) on a DP (Daul Processor) or SP(Single Processor) system.

❏   If you install Windows®NT, with a HDD in a SP (Single Processor design board) mainboard based system, the Windows®NT will auto-detect this system as a Stamdard PC system. After installation. If you use this HDD in a DP (Daul Processor design board) supporting system, the screen will show

<div align="center">1 system Processor [xxxxx kb memory]</div>

during the boot-up. At this moment, the Windows®NT will only recognize as a "Single Pentium® Pro Processor" system. If you went to get 2 system processor and work properly in Windows®NT. You need use the HDD to re_installation the Windows®NT on the DP (Daul processor) mainboard.

❏   If you install Windows®NT with a DP (Daul Processor) mainboard with either one or two Pentium® Pro Processor CPU on board, the Windows®NT will of course auto dectect the system as multiprocessors. Please be noted after installation, the system will configure with multikernel. Then if only one Pentium® Pro Processor CPU is inserted, the system will still run multikernel and speed (Performance) can not be increased.

If two Pentium® Pro Processor CPUs are inserted the performance of Windows NT will be greatly speeded up. This is especially outstanding in the multi-task application.

After installing multikernel and inserting one Pentium® Pro Processor CPU:During boot-up the screen will show

<div align="center">1 system processor [xxxxx kb memory] multiprocessor kernel</div>

After installing multikernel and inserting two Pentium® Pro Processor CPU:During boot-up the screen will show

<div align="center">2 system processor [xxxxx kb memory] multiprocessor kernel</div>

For detailed information about Windows®NT installation please refer to windows® NT manual.

Chapter 3

ATX FORM-FACTOR OVERVIEW

The PP6-NS has been designed with ATX form-factor. The board size is 12" x 9.6" (305mm x 244mm). The ATX from-factor improves over Baby AT and LPX in a number of ways. By using the ATX chasis then the power supply orientation and specification and rotating the Baby AT baseboard through 90 degrees, the pentium® Pro processor can be relocated away from the expansion slots, and the longer side of Add-on card can be used to host more on board I/O. From Figure 3-1: Summary of ATX chassis features layout the user can gain a great deal improved functionality.

- ❶ Enhance the PC ease-of-use
- ❷ Supports full Length Slots for ISA and PCI Card
- ❸ Easy to install the SIMM Memory
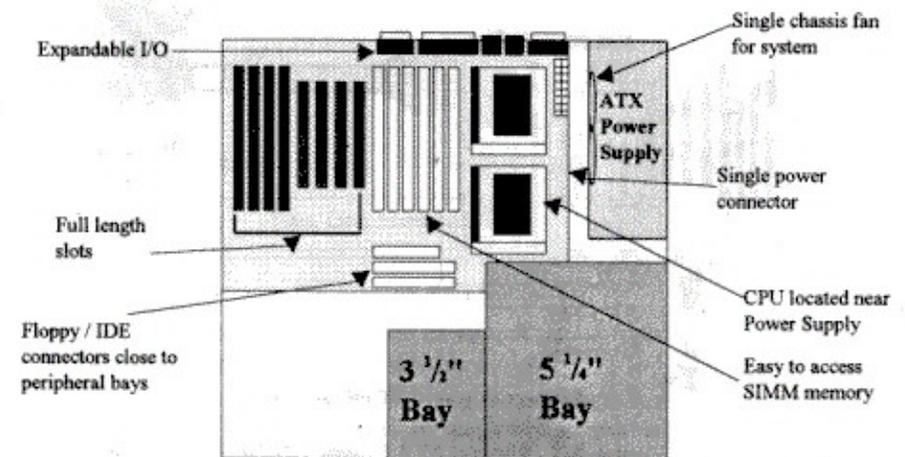- ❹ Better Support for the processor located
- ❺ Great blows air into the chasis with ATX power Supply

Figure 3-1: Summary of ATX chasis features