Chapter 1: Personal Computer Background

Key terms/concepts:
- digital computer
- electronic switch
  - vacuum tube
  - transistor
  - integrated circuit
- bit/byte
- CPU chip
- Apple I, Apple II
- IBM PC
- IBM-compatible

Chapter 2: PC Components, Features, and System Design

Who controls PC hardware?

Who controls PC software?

System Components:
- case
- power supply
- motherboard
- processor
- memory (RAM)
- floppy disk drive
- hard disk drive
- video card
- monitor
- keyboard
- mouse
- CD-ROM drive
- sound card
- speakers
Modern Marvels: Computers

binary digital devices (on/off states)
hardware and software
input, processing, storage, output
MIPS (million instructions per second)
RAM (primary memory) -vs- Disk (secondary storage)

Charles Babbage (Analytical Engine)
Herman Hollerith (punched cards)
Eckert and Mauchly (ENIAC)
John von Neumann (von Neumann architecture)
UNIVAC
IBM
NASA
vacuum tube
transistor
integrated circuit
Ted Hoff (microprocessor)
Intel
Steve Jobs/Steve Wozniak
Apple
Altair
IBM PC
software
Bill Gates
Microsoft
operating system
internet
world wide web
smaller, faster, cheaper, more reliable
Chapter 3: Microprocessor Types and Specifications

CPU chip concepts
- Speed
- Machine cycle
- Benchmarks
- CPU speeds/motherboard speeds

Width
- Internal registers
- External data bus
- Address register/bus

Internal (Level 1) cache
External (Level 2) cache

Dynamic Execution

DIB (Dual Independent Bus) architecture

Physical Packaging
- PGA (Pin Grid Array)
- SEC (Single Edge Cartridge)

Heating/cooling problems

Math coprocessors

Processor types
- First generation: 8086/8088
- Second generation: 80286
- Third generation: 80386
- Fourth generation: 80486
- Fifth generation: Pentium
- Sixth generation: Pentium Pro, Pentium II, Pentium III
- Seventh generation: Pentium IV
Hardware.wpd
PC Magazine article: Good-bye, Gigahertz
Chapter 4: Motherboards and Buses

Form factors
ATX
- built-in double-high external I/O connector panel
- single keyed internal power supply connector
- relocated CPU and memory slots/sockets
- relocated internal I/O connectors
- improved cooling
- lower cost to manufacture

Motherboard components
Processor sockets/slots
Chipsets
- North bridge
- South bridge
Super I/O chip
BIOS chip (EPROM)
- POST
- Bootstrap loader
- Basic Input/Output System
- CMOS setup

System Buses:

<table>
<thead>
<tr>
<th>Bus</th>
<th>Speed</th>
<th>Width</th>
<th>Throughput</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA</td>
<td>8MHz</td>
<td>16b (2B)</td>
<td>16MBps</td>
</tr>
<tr>
<td>PCI</td>
<td>33MHz</td>
<td>32b (4B)</td>
<td>132MBps</td>
</tr>
<tr>
<td>External Data</td>
<td>50/60/66/100/133/400/533/800MHz</td>
<td>64b (8B)</td>
<td>800MBps @100MHz</td>
</tr>
<tr>
<td>AGP</td>
<td>66MHz</td>
<td>32b (4B)</td>
<td>264MBps</td>
</tr>
</tbody>
</table>

Expansion Slots
ISA bus
PCI bus
AGP bus

System Resources
Interrupt Request Channels (IRQs)
Memory addresses
DMA channels
I/O port addresses

Selection Criteria
- Processor
- Processor sockets
- Motherboard speed
- Cache memory
- SIMM/DIMM memory
- Bus type
- BIOS
- Form factor
- Built-in interfaces
- Plug and Play
- Power management
- Motherboard chipset
- Documentation
motherboard picture (from Adobe Photoshop)
ASUS P55TP4N is built to be a reliable partner for home. It’s proven to be a trusted workhorse for your day-to-day applications. The highly integrated Intel 430FX chipset used on board reveals the full potential of Pentium® processor-based systems.

- Support FP, DRAM
- Support pipelined burst SRAM
- Integrated bus master IDE
- Plug-and-play port support controller
- Improved PCI data streaming
- Improved memory performance

**Processor**
- Intel Socket 7 ZIF Socket for CPU
- Intel Pentium Processor
  - 75/90/100/120/133/150/166/200 MHz (P54C/CS)
- AMD K5 5X86/86/90

**Coprocessor**
- Internal Coprocessor of Pentium Processor

**Chipset**
- Intel 430FX PCIset

**Architecture**
- 32-bit PCI Bus and 16-bit ISA Bus compatible

**Cache Memory**

<table>
<thead>
<tr>
<th>Total Cache Size</th>
<th>On Board</th>
<th>Cache Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>256KB</td>
<td>PB 256KB</td>
<td>PB 256KB</td>
</tr>
<tr>
<td>512KB</td>
<td>PB 256KB</td>
<td>PB 256KB</td>
</tr>
</tbody>
</table>

**System Memory**
- Four 72-pin SIMM sockets, Support 8MB to 128MB
- Use 4/8/16/32MB 72-pin DRAM Module with 70ns Fast Page Mode or DRAM
  (60 ns DRAM required when using 66MHz external clock)

**On Board Super I/O**
- 1 Floppy Port (up to 2.88MB)
- 2 Serial Ports (16550 Fast UART Compatible)
- 1 Parallel Port (ECP, EPP Port)
- IrDA TX/RX Header (Optional)

**On Board PCI IDE**
- 2 x PCI Bus Master IDE ports (up to 4 IDE devices)
  - FIO Mode 3 & 4
  - DMA Mode 2

**Expansion Slots**
- 3 32-bit PCI slots
- 1 ASUS MezzBus slot Rev. 2.0 (1 x PCI slot plus ASUS proprietary slot)
- 3 16-bit ISA slots

**BIOS**
- Award Pentium PCI BIOS with Green and Plug and Play Features
- NCR PCI SCSI BIOS
- 1MB Flash EEPROM

**Board Size**
- 27.2cm x 22.2cm (10.7” x 8.7”)

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Please note that the diagram or image is not clearly visible due to the format constraints.
CPU Support and Jumper Setting for P/1-P55TP4N Mainboard

**CPU Internal Clock Setting**

<table>
<thead>
<tr>
<th>CPU internal clock</th>
<th>JP14</th>
<th>JP15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 x External Clock</td>
<td>open</td>
<td>open</td>
</tr>
<tr>
<td>2 x External Clock</td>
<td>open</td>
<td>short</td>
</tr>
<tr>
<td>2.5 x External Clock</td>
<td>short</td>
<td>short</td>
</tr>
<tr>
<td>3 x External Clock</td>
<td>short</td>
<td>open</td>
</tr>
</tbody>
</table>

**CPU External Clock Setting**

<table>
<thead>
<tr>
<th>CPU</th>
<th>Ext. clk</th>
<th>JP26</th>
<th>JP27</th>
<th>JP28</th>
<th>Int. clk</th>
</tr>
</thead>
<tbody>
<tr>
<td>200Mhz</td>
<td>66Mhz</td>
<td>2&amp;3</td>
<td>1&amp;2</td>
<td>2&amp;3</td>
<td>3x</td>
</tr>
<tr>
<td>180Mhz</td>
<td>60Mhz</td>
<td>2&amp;3</td>
<td>2&amp;3</td>
<td>1&amp;2</td>
<td>3x</td>
</tr>
<tr>
<td>166Mhz</td>
<td>66Mhz</td>
<td>2&amp;3</td>
<td>1&amp;2</td>
<td>2&amp;3</td>
<td>2.5x</td>
</tr>
<tr>
<td>150Mhz</td>
<td>60Mhz</td>
<td>2&amp;3</td>
<td>2&amp;3</td>
<td>1&amp;2</td>
<td>2.5x</td>
</tr>
<tr>
<td>133Mhz</td>
<td>66Mhz</td>
<td>2&amp;3</td>
<td>1&amp;2</td>
<td>2&amp;3</td>
<td>2x</td>
</tr>
<tr>
<td>120Mhz</td>
<td>60Mhz</td>
<td>2&amp;3</td>
<td>2&amp;3</td>
<td>1&amp;2</td>
<td>2x</td>
</tr>
<tr>
<td>100Mhz</td>
<td>66Mhz</td>
<td>2&amp;3</td>
<td>1&amp;2</td>
<td>2&amp;3</td>
<td>1.5x</td>
</tr>
<tr>
<td>90Mhz</td>
<td>60Mhz</td>
<td>2&amp;3</td>
<td>2&amp;3</td>
<td>1&amp;2</td>
<td>1.5x</td>
</tr>
<tr>
<td>75Mhz</td>
<td>50Mhz</td>
<td>1&amp;2</td>
<td>2&amp;3</td>
<td>2&amp;3</td>
<td>1.5x</td>
</tr>
</tbody>
</table>

**CPU Voltage Setting**

<table>
<thead>
<tr>
<th>Voltage Type</th>
<th>JP22</th>
<th>JP23</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD/VR 3.3V + 5%</td>
<td>short</td>
<td>open</td>
</tr>
<tr>
<td>VRE 3.4V - 3.6V</td>
<td>open</td>
<td>short</td>
</tr>
</tbody>
</table>

**L2 Cache Upgrade and Jumper Setting for P/1-P55TP4N Mainboard**

**Total L2 cache size Setting**

<table>
<thead>
<tr>
<th>L2 Size</th>
<th>JP16</th>
</tr>
</thead>
<tbody>
<tr>
<td>256KB</td>
<td>2&amp;3  short</td>
</tr>
<tr>
<td>512KB</td>
<td>1&amp;2  short</td>
</tr>
</tbody>
</table>

**Cacheable Memory Size**

<table>
<thead>
<tr>
<th>L2 Cache Size</th>
<th>Cacheable Memory Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>256KB</td>
<td>32MB</td>
</tr>
<tr>
<td>512KB</td>
<td>64MB</td>
</tr>
</tbody>
</table>
Chapter 5: BIOS

Hardware/Software/Firmware

Device drivers

Adapter ROM

Motherboard BIOS

Types of ROM (physical):
- ROM
- PROM
- EPROM
- EEPROM

ROM BIOS manufacturers

Upgrading the BIOS

Plug and Play
Chapter 6: Memory

Types of memory (physical):
  ROM
  DRAM
    - EDO RAM
      burst mode data transfers
    - SDRAM
    - DDR SDRAM
  SRAM

Physical memory:
  SIMM
  DIMM

Reliability
  parity
  ECC
Chapter 9: Magnetic Storage Principles

Storage capacity terms: Kilobyte, Megabyte, Gigabyte, Terabyte

Chapter 10: Hard Disk Storage

Advances in hard disk technology:
- storage capacities
- data transfer rates
- seek times
- cost

Hard disk components (physical):
- platters
- read/write mechanism
- read/write heads
- air filters
- configuration items
- cable (power, data)
- controller

Hard disk components (logical):
- track
- sector
- cylinder

Formatting a disk:
- low-level
- high-level

Partitioning a disk:
- FAT16
- FAT32

Performance:
- seek time
- rotational delay/latency
- data transfer time/rate
- caching, caching controller
- reliability
- temperature acclimation

Disk capacities:
- Unformatted/Formatted
- Calculations

Interfaces:
- IDE
- SCSI
Hard disk advertisements
Chapter 15: Video Hardware

Video subsystem components:
  monitor
  graphics card

Monitor concepts/characteristics:
  persistence
  scanning frequency
  refresh rate (vertical scan rate)
  multisync

  size
  resolution
  dot pitch
  interlacing
  power management

Graphics cards concepts/characteristics:
  standards: MDA, CGA, EGA, VGA, XGA, SVGA
  digital/analog
  VGA
    640x480, 16 colors
  SVGA
    VESA BIOS Extension
Components:
  video BIOS
  video processor
  video memory
  digital-to-analog converter (RAMDAC)
  bus connector
    VLB
    PCI
    AGP
  video driver
Chapter 25: File Systems and Data Recovery

FAT Disk Structures:
  master and extended partition boot sectors
  volume boot sector
  root directory
  FAT
  clusters (disk allocation units)
  data area
  diagnostic read/write cylinder

FDISK

FAT Systems
  FAT16
  FAT32
  VFAT
  NTFS

FAT File System Errors
  Lost clusters
  Cross-linked files
  Invalid files or directories
  FAT errors

FAT File System Utilities
  Fdisk
  Chkdsk
  Recover
  Scandisk
  Defrag
  3rd party utilities