# A+ Core Hardware Examination Blueprint

Version 8/30/00

## Introduction

For A+ certification, the examinee must pass both this examination and the A+ Operating System Technologies (formerly known as A+ DOS/Windows) examination. The Core Hardware examination measures essential competencies for an entry-level PC hardware service technician with six months of on-the-job experience. The examinee must demonstrate basic knowledge of installing, configuring, upgrading, troubleshooting, and repairing microcomputer systems at the standard defined by this test specification.

The skills and knowledge measured by this examination are derived from an industry-wide and worldwide job task analysis which was validated through a survey of almost 2,000 A+ certified professionals. The results of the survey are used in weighting the domains and ensuring that the weighting is representative of the relative importance of that content to the job requirements of a service technician with six months on-the-job experience. The intent is to certify individuals in a body of knowledge that is identified and accepted as the baseline or foundation of any entry-level PC technician.

**NOTE**: This examination blueprint for the A+ Core Hardware examination includes the weighting, test objectives, and example content. Example topics and concepts are included to clarify the test objectives and should not be construed as a comprehensive listing of all the content of this examination.

Examination items are currently in development and will be beta tested later in 2000. The results from the beta tests may require adjustments to be made to this draft examination blueprint. Thus, it is possible that content areas will be changed. A final blueprint will be published after the beta test analysis.

The table below lists the domains measured by this examination and the extent to which they are represented in the examination.

| Domain | % Of Examination |
|---|---|
| 1.0 Installation, Configuration and Upgrading | 30% |
| 2.0 Diagnosing and Troubleshooting | 25% |
| 3.0 Preventative Maintenance | 5% |
| 4.0 Motherboard/Processors/Memory | 15% |
| 5.0 Printers | 10% |
| 6.0 Basic Networking | 15% |
| Total | 100.00% |

## Domain 1.0 Installation, Configuration, and Upgrading

This domain requires the knowledge and skills to identify, install, configure, and upgrade microcomputer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules. Elements included are listed below with each test objective.

**Content Limits**

**1.1 Identify basic terms, concepts, and functions of system modules, including how each module should work during normal operation.**

**Examples of concepts and modules are:**

- System board
- Power supply
- Processor /CPU
- Memory
- Storage devices
- Monitor
- Modem
- Firmware
- Boot process
- BIOS
- CMOS
- LCD portable systems

**1.2 Identify basic procedures for adding and removing field replaceable modules for both desktop and portable systems.**

**Examples of modules:**

- System board
- Storage device
- Power supply
- Processor /CPU
- Memory
- Input devices

**Portable system components**

- AC adapters
- Hard drive
- Keyboard
- Processor board
- Video board
- DC controllers
- LCD panel

**1.3 Identify available IRQs, DMAs, and I/O addresses and procedures for configuring them for device installation.**

**Content may include the following:**

- Standard IRQ settings
- Modems
- Floppy drive
- Hard drive
- USB port
- Infrared Port

**1.4 Identify common peripheral ports, associated cabling, and their connectors.**

**Content may include the following:**

- Cable types
- Cable orientation
- Serial versus parallel
- Pin connections

**Examples of types of connectors:**

- DB-9
- DB-25
- RJ-11
- RJ-45
- BNC
- PS2/MINI-DIN
- USB
- IEEE-1394

**1.5 Identify proper procedures for installing and configuring IDE/EIDE devices.**

**Content may include the following:**

- Master/slave
- Devices per channel

**1.6 Identify proper procedures for installing and configuring SCSI devices.**

**Content may include the following:**

- Address/Termination conflicts
- Cabling
- Types (example: regular, wide, ultra-wide)
- Internal versus external

**1.7 Identify proper procedures for installing and configuring peripheral devices.**

**Content may include the following:**
- Monitor/Video Card
- Modem
- Storage devices
- USB peripherals and hubs
- IEEE-1394

**Portables**
- Docking stations
- Keyboard
- Mouse
- NIC

**1.8 Identify hardware methods of upgrading system performance, procedures for replacing basic subsystem components, unique components and when to use them.**

**Content may include the following:**
- Memory
- Hard Drives
- CPU
- Methods for upgrading BIOS
- When to upgrade BIOS

**Portable Systems**
**Content may include the following:**
- Battery
- Hard Drive
- Types I, II, III cards
- Memory

**Sample Test Item:**

What is unique about each device on a SCSI chain?

A. LUN
B. identification
C. master or slave
D. I/O
E.

**Correct Answer: B**

## Domain 2.0 Diagnosing and Troubleshooting

This domain requires the ability to apply knowledge relating to diagnosing and troubleshooting common module problems and system malfunctions. This includes knowledge of the symptoms relating to common problems.

**Content Limits**

**2.1 Identify common symptoms and problems associated with each module and how to troubleshoot and isolate the problems.**

**Content may include the following:**

- Processor/Memory symptoms
- Mouse
- Floppy drive failures
- Parallel ports
- Hard Drives
- Sound Card/Audio
- Monitor/Video
- Motherboards
- Modems
- BIOS
- USB
- CMOS
- Power supply
- Slot covers
- POST audible/visual error codes
- Troubleshooting tools, e.g., multi-meter
- Large LBA, LBA

**2.2 Identify basic troubleshooting procedures and good practices for eliciting problem symptoms from customers.**

**Content may include the following:**

- Troubleshooting/isolation/problem determination procedures
- Determine whether hardware or software problem
- Gather information from user regarding, e.g.,
    - Customer Environment
    - Symptoms/Error Codes
    - Situation when the problem occurred

**Sample Test Item:**

A sound card recently installed locks up the system when a parallel port tape backup unit is used. What is the most likely problem?

A: defective tape driver
B: defective sound card
C: DMA conflict
D: IRQ conflict

**Correct Answer: D**

## Domain 3.0 Preventive Maintenance

This domain requires the knowledge of safety and preventive maintenance. With regard to safety, it includes the potential hazards to personnel and equipment when working with lasers, high voltage equipment, ESD (Electrostatic Discharge), and items that require special disposal procedures that comply with environmental guidelines. With regard to preventive maintenance, this includes knowledge of preventive maintenance products, procedures, environmental hazards, and precautions when working on microcomputer systems.

**Content Limits**

**3.1 Identify the purpose of various types of preventive maintenance products and procedures and when to use/perform them.**

**Content may include the following:**
- Liquid cleaning compounds
- Types of materials to clean contacts and connections
- Vacuum out systems, power supplies, fans

**3.2 Identify issues, procedures and devices for protection within the computing environment, including people, technology and the eco-system.**

**Content may include the following:**
- UPS (Uninterruptible Power Supply) and suppressors
- Determining the signs of power issues
- Proper methods of storage of components for future use

**Potential hazards and proper safety procedures relating Lasers**
- High-voltage equipment
- Power supply
- CRT

**Special disposal procedures that comply with environmental guidelines.**
- Batteries
- CRTs
- Toner kits/cartridges
- Chemical solvents and cans
- MSDS (Material Safety Data Sheet)

**ESD (Electrostatic Discharge) precautions and procedures**
- What ESD can do, how it may be apparent, or hidden
- Common ESD protection devices
- Situations that could present a danger or hazard

**Sample Test Item:**
Where should magnetic media be stored?

A: upright position
B: with other electrical devices
C: cool, dry environment
D: cool, damp environment

Answer: C

## Domain 4.0 Motherboard/Processors/Memory

This domain requires knowledge of specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors, and memory in microcomputer systems.

**Content Limits**

**4.1 Distinguish between the popular CPU chips in terms of their basic characteristics.**

**Content may include the following:**

- Popular CPU chips (Pentium class and higher)
- Characteristics
- Physical size
- Voltage
- Speeds
- On board cache or not
- Sockets
- Number of pins

**4.2 Identify the categories of RAM (Random Access Memory) terminology, their locations, and physical characteristics.**

**Content may include the following:**

- Terminology:
- EDO RAM (Extended Data Output RAM)
- DRAM (Dynamic Random Access Memory)
- SRAM (Static RAM)
- RIMM (Rambus Inline Memory Module 184 Pin)
- VRAM (Video RAM)
- WRAM (Windows Accelerator Card RAM)
- Locations and physical characteristics:
- Memory bank
- Memory chips (8-bit, 16-bit, and 32-bit)
- SIMMS (Single In-line Memory Module)
- DIMMS (Dual In-line Memory Module)
- Parity chips versus non-parity chips

**4.3 Identify the most popular type of motherboards, their components, and their architecture (for example, bus structures and power supplies).**

**Content may include the following:**

- Types of motherboards:
- AT (Full and Baby)
- ATX
- Components:
- Communication ports
- SIMM and DIMM
- Processor sockets
- External cache memory (Level 2)
- Bus Architecture
- ISA
- PCI
- AGP
- USB (Universal Serial Bus)

- VESA local bus (VL-Bus)
- PC Card (PCMCIA)
- Basic compatibility guidelines
- IDE (ATA, ATAPI, ULTRA-DMA, EIDE)
- SCSI (Wide, Fast, Ultra, LVD(Low Voltage Differential))

**4.4 Identify the purpose of CMOS (Complementary Metal-Oxide Semiconductor) chip, what it contains and how to change its basic parameters.**

**Example Basic CMOS Settings:**

- Printer parallel port—Uni, bi-directional, disable/enable, ECP, EPP
- COM/serial port—memory address, interrupt request, disable
- Floppy drive—enable/disable drive or boot, speed, density
- Hard drive—size and drive type
- Memory—parity, non-parity
- Boot sequence
- Date/Time
- Passwords
- Plug & Play BIOS

**Sample Test Item:**

What represents the levels of cache available in a Pentium Pro processor? (Choose two)

A: L1
B: L2
C: L3
D: L4
E: L5

Correct Answer: A & B

# Domain 5.0 Printers

This domain requires knowledge of basic types of printers, basic concepts, and printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems.

**Content Limits**

**5.1 Identify basic concepts, printer operations and printer components.**

**Content may include the following:**

Paper feeder mechanisms

Types of Printers

- Laser
- Inkjet
- Dot Matrix

**Types of printer connections and configurations**

- Parallel
- Network
- USB

**5.2 Identify care and service techniques and common problems with primary printer types.**

**Content may include the following:**

- Feed and output
- Errors
- Paper jam
- Print quality
- Safety precautions
- Preventive maintenance

**Sample Test Item:**

What component on a laser printer moves the toner from the drum to the paper?

A: toner assembly
B: transfer corona
C: laser
D: primary corona

Correct Answer: B

## Domain 6.0 Basic Networking

This domain requires knowledge of basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked.

**Content Limits**

**6.1 Identify basic networking concepts, including how a network works and the ramifications of repairs on the network.**

**Content may include the following:**

- Installing and configuring network cards
- Network access
- Protocol
- Full-duplex, half-duplex
- Cabling—Twisted Pair, Coaxial, Fiber Optic**,** RS-232
- Ways to network a PC
- Physical Network topographies
- Increasing bandwidth
- Loss of data
- Network slowdown
- Infrared

**Sample Test Item:**

What does the term 10/100 refer to with respect to a NIC (Network Interface Card)?

A: protocol speed
B: bus architecture
C: fiber network
D: megabits per second

Correct Answer: D