

PREPARING FOR A+

CHAPTER AT A GLANCE

About A+ Certification 1907

Scheduling the Exam
 The Core Exam (Circa 1998)
 Installation, Configuration, and Upgrading
 Diagnosing and Troubleshooting
 Safety and Preventive Maintenance
 Motherboards, Processors, and Memory
 Printers
 Portable Systems
 Basic Networking

Customer Satisfaction
 The DOS/Windows Exam (Circa 1998)
 Function, Structure Operation, and File
 Management
 Memory Management
 Installation, Configuration, and Upgrading
 Diagnosing and Troubleshooting
 Networks

Taking the A+ Exam 1921

The Future of A+

If you're planning to enter the field of PC troubleshooting and repair, you're going to want some industry-recognized certification behind you. This means you're going to want "A+" certification before you sit down for that important interview. This appendix outlines the essential elements of the A+ certification, and illustrates the major areas of knowledge that you'll need to master.

About A+ Certification

A+ is a testing program sponsored by the Computer Industry Technology Association (or CompTIA) that certifies the basic competency of entry-level service technicians (those with about six months experience) in the computer industry. There are no prerequisites for A+ certification, so the exam is open to anyone. Earning A+ certification tells prospective employers that you possess the knowledge, skills, and customer relations skills essential to start a career in computer service. These competencies have been defined by experts from companies across the industry. The computer industry has widely accepted the A+ exam as a

fundamental measure of knowledge, and as of late 1999, there were over 150,000 A+-certified technicians. This number is growing daily.

The test itself (which is actually administered by Sylvan Prometric), was first available in July 1993, but the exam has been completely reworked in July 1998. The exam questions cover a broad range of hardware and software technologies—most of which are covered in this book—but the questions are not related to any vendor-specific products. To become certified, you must pass two parts: the Core module, and the DOS/Windows module. When both the Core and the DOS/Windows portions are passed within 90 calendar days, you will receive the A+ designation. Once you're A+ certified, you do not need to retake the exam as it's updated.

SCHEDULING THE EXAM

Registering for the A+ exam is a relatively simple matter. You'll need to contact your local Sylvan Prometric location at 800-776-4276 and register. The exam code for the Core exam is 220-101, and the code for the DOS/Windows module is 220-102. The cost is \$117 if you (or your employer) is a CompTIA member, or \$167 if you're not. Have your credit card handy and plan on some lengthy hold times, but once you're registered, it's just a matter of studying until the exam day.

THE CORE EXAM (CIRCA 1998)

The Core examination tests the essential competencies for a break/fix computer hardware service technician with roughly six months of on-the-job experience. You must demonstrate the knowledge needed to properly install, configure, upgrade, troubleshoot, and repair microcomputer hardware. This includes basic knowledge of desktop and portable systems, basic networking concepts, and printers. You must also demonstrate a knowledge of safety and common preventive maintenance procedures. The Core examination also includes questions that measure your knowledge of effective behaviors that contribute to customer satisfaction. Note that the customer satisfaction questions will be scored, but will not impact final pass/fail score on this examination.

INSTALLATION, CONFIGURATION, AND UPGRADING

You require the knowledge and skills to identify, install, configure, and upgrade microcomputer modules and peripherals while following established procedures for system assembly and disassembly of field-replaceable modules. This includes the ability to identify and configure IRQs, DMAs, I/O addresses, and set switches and jumpers. The areas covered here are outlined below.

- Identify the basic terms, concepts, and functions of system modules, including how each module should work during normal operation. These concepts and modules include

BIOS

Boot process

CMOS

Firmware

Memory

Modem

Monitor
 Power supply
 Processor /CPU
 Storage devices
 System board

- Identify the basic procedures for adding and removing field-replaceable modules such as:

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

- Identify available IRQs, DMAs, and I/O addresses, and understand the procedures for configuring them for device installation, including

Floppy drives
 Hard drives
 Modems
 Standard IRQ settings

- Identify common peripheral ports, associated cabling, and their connectors, including

BNC
 Cable orientation
 Cable types
 DB-25
 DB-9
 Pin connections
 PS2/MINI-DIN
 RJ-11
 RJ-45
 Serial versus parallel

- Identify the proper procedures for installing and configuring IDE/EIDE devices including:

Devices per channel

Master/slave

- Identify the proper procedures for installing and configuring SCSI devices such as:
 - Address/termination conflicts
 - Cabling
 - Internal versus external
 - Switch and jumper settings
 - Types (such as regular, wide, ultra-wide)
- Identify the proper procedures for installing and configuring peripheral devices, including
 - Modem
 - Monitor/video card
 - Storage devices
- Identify the important concepts and procedures relating to BIOS such as:
 - Methods for upgrading
 - When to upgrade
- Identify the hardware methods of system optimization and understand when to use them on:
 - Memory
 - Hard drives
 - CPU
 - Cache memory

DIAGNOSING AND TROUBLESHOOTING

You must apply your knowledge relating to the diagnosis and troubleshooting of common module problems and system malfunctions. This includes a knowledge of the symptoms relating to common problems. The principal problem areas are covered below.

- Identify the common symptoms and problems associated with each module and how to troubleshoot and isolate the problems for devices such as:
 - BIOS
 - CMOS
 - Floppy drive failures
 - Hard drives
 - Modems
 - Monitor/video

Motherboards

Mouse

Parallel ports

POST audible/visual error codes

Power supply

Processor/memory symptoms

Slot covers

Sound card/audio

Troubleshooting tools (i.e. multimeter)

- Identify the basic troubleshooting procedures and good practices for eliciting problem symptoms from customers (related to customer service) such as:

Troubleshooting/isolation/problem determination procedures

Determine whether hardware or software problem

Gather information from user regarding customer environment

Gather information from user regarding symptoms/error codes

Gather information from user regarding situation when the problem occurred

SAFETY AND PREVENTIVE MAINTENANCE

You require a working knowledge of safety and preventive maintenance. Safety includes recognizing the potential hazards to personnel and equipment when working with lasers, high-voltage equipment, ESD, and items that require special disposal procedures that comply with environmental guidelines. Preventive maintenance includes a knowledge of preventive maintenance products, procedures, environmental hazards, and precautions when working on microcomputer systems.

- Identify the purpose of various types of preventive maintenance products and procedures and when to use/perform them. This includes

Liquid cleaning compounds

Types of materials to clean contacts and connections

Vacuum out systems, power supplies, fans

- Identify the procedures and devices for protecting against environmental hazards, such as:

Determining the signs of power issues

Proper methods of storage of components for future use

UPS (uninterruptible power supply) and suppressors

- Identify the potential hazards and proper safety procedures relating to lasers and high-voltage equipment such as:
 - CRT
 - High-voltage equipment
 - Lasers
 - Power supply
- Identify items that require special disposal procedures that comply with environmental guidelines including
 - Batteries
 - Chemical solvents and cans
 - CRTs
 - MSDS (Material Safety Data Sheet)
 - Toner kits/cartridges
- Identify ESD (electrostatic discharge) precautions and procedures, including the use of ESD protection devices, and these topics:
 - What ESD can do, how it may be apparent, or hidden
 - Common ESD protection devices
 - Situations that could present a danger or hazard

MOTHERBOARDS, PROCESSORS, AND MEMORY

You must understand the specific terminology, facts, ways, and means of dealing with classifications, categories and principles of motherboards, processors, and memory in modern microcomputer systems.

- Distinguish between the popular CPU chips in terms of their basic characteristics, such as:
 - Number of pins
 - Onboard cache or not
 - Physical size
 - Sockets
 - Speeds
 - Voltage
- Identify the categories of RAM (Random Access Memory) terminology, their locations, and physical characteristics, such as:
 - DRAM (Dynamic Random Access Memory)
 - DIMMs (Dual In-line Memory Modules)

EDO RAM (Extended Data Output RAM)

Memory bank

Memory chips (8-bit, 16-bit, and 32-bit)

Parity chips versus nonparity chips

SIMMs (Single In-line Memory Modules)

SRAM (Static RAM)

VRAM (Video RAM)

WRAM (Windows Accelerator Card RAM)

- Identify the most popular type of motherboards, their components, their architecture (such as bus structures and power supplies), and their basic compatibility guidelines, including

AT (full and baby)

ATX

Communication ports

EISA

External cache memory (Level 2)

ISA

PC Card (PCMCIA)

PCI

Processor sockets

SIMM AND DIMM

USB (Universal Serial Bus)

VESA local bus (VL-Bus)

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

Boot sequence

Date/time

Disable COM/serial port

Disable/enable uni-directional, bidirectional, ECP, and EPP

Floppy drive enable/disable drive or boot, speed, density

Hard drive size and drive type

Memory address, interrupt request

Memory parity, nonparity

Passwords

Printer parallel port

PRINTERS

You require a knowledge of basic printer types, basic printer concepts, and printer components. You should know how a printers work, how they print onto a page, the paper path, understand care and service techniques, and be familiar with common problems.

- Identify basic concepts, printer operations and printer components for
 - Dot matrix
 - Ink jet
 - Laser
- Identify care and service techniques and common problems with primary printer types, including
 - Errors
 - Feed and output
 - Paper jam
 - Preventive maintenance
 - Print quality
 - Safety precautions
- Identify the types of printer connections and configurations such as:
 - Network
 - Parallel
 - Serial

PORTABLE SYSTEMS

This area of the core exam requires a knowledge of portable computers and their unique components and problems.

- Identify the unique components of portable systems and their unique problems, including
 - AC adapter
 - Battery
 - Docking stations
 - Hard Drive
 - LCD

Memory
Network cards
Types I, II, III cards

BASIC NETWORKING

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

- Identify basic networking concepts, including how a network operates, such as:

Network access
Protocol
Network interface cards
Full duplex
Twisted-pair, coaxial, fiber-optic cabling
Ways to network a PC

- Identify the procedures for swapping and configuring network interface cards.

- Identify the ramifications of repairs on the network such as:

Loss of data
Network slowdown
Reduced bandwidth

CUSTOMER SATISFACTION

You must understand and be sensitive to the behaviors that contribute to satisfying customers, including the quality of personal interactions between the technician and customer, the way you conduct yourself professionally within the customer's business setting, and the credibility and confidence you project. This area is not a test of specific company policies or procedures.

- Differentiate effective from ineffective behaviors as these contribute to the maintenance or achievement of customer satisfaction, such as:

Communicating and listening (face-to-face or over the phone)
Establishing personal rapport with the customer
Handling complaints and customers who are upset, conflict avoidance, and resolution
Helping and guiding a customer with problem descriptions
Interpreting verbal and nonverbal cues
Professional conduct (punctuality and accountability)

Responding appropriately to the customer's technical level

Responding to and closing a service call

Sharing the customer's sense of urgency

Showing empathy and flexibility

THE DOS/WINDOWS EXAM (CIRCA 1998)

The DOS/Windows part of the A+ examination measures essential operating system competencies for a break/fix microcomputer hardware service technician with six months of on-the-job experience. You must demonstrate a basic knowledge of DOS, Windows 3.x, and Windows 95 for installing, configuring, upgrading, troubleshooting, and repairing microcomputer systems.

FUNCTION, STRUCTURE OPERATION, AND FILE MANAGEMENT

This part of the exam requires a knowledge of DOS, Windows 3.x, and Windows 95 operating systems in terms of their functions and structure, managing files and directories, and running programs. It also includes navigating through the operating system from DOS command-line prompts and Windows procedures for accessing and retrieving information.

- Identify the operating system's functions, structure, and major system files, including

ANSI.SYS

AUTOEXEC.BAT

COMMAND.COM

CONFIG.SYS

Contrasts between Windows 3.x and Windows 95

EMM386.EXE

Functions of DOS, Windows 3.x, and Windows 95

GDI.EXE

HIMEM.SYS

IO.SYS

KRNLXXX.EXE

Major components of DOS, Windows 3.x, and Windows 95

MSDOS.SYS

PROGMAN.INI

REGEDIT.EXE

SYSTEM.DAT

SYSTEM.INI

USER.DAT

USER.EXE

WIN.COM

WIN.INI

- Identify ways to navigate the operating system and how to get to needed technical information such as:

Procedures for navigating through DOS to perform such things as locating, accessing, and retrieving information

Procedures for navigating through the Windows 3.x/Windows 95 operating system, accessing, and retrieving information

- Identify the basic concepts and procedures for creating, viewing, and managing files and directories, including procedures for changing file attributes and the ramifications of those changes, such as:

Command syntax

File attributes

File naming conventions

Read-Only, Hidden, System, and Archive attributes

- Identify the procedures for basic disk management, including

Backing up

Defragmenting

FAT32

File Allocation Tables (FAT)

Formatting

Partitioning

ScanDisk

Using disk management utilities

Virtual file allocation tables (VFAT)

MEMORY MANAGEMENT

This part of the DOS/Windows exam requires a knowledge of the types of memory used by DOS and Windows, and the potential for memory address conflicts.

- Differentiate between types of memory, such as:

Conventional

Extended/upper memory

- High memory
- Expanded memory
- Virtual memory

- Identify typical memory conflict problems and how to optimize memory use, such as:

- General Protection Fault
- HIMEM.SYS
- How it happens
- Illegal operations occurrences
- MemMaker or other optimization utilities
- SmartDrive
- System Monitor
- Use of expanded memory blocks (using EMM386.EXE)
- What a memory conflict is
- When to employ utilities

INSTALLATION, CONFIGURATION, AND UPGRADING

This part of the exam requires knowledge of installing, configuring, and upgrading DOS, Windows 3.x, and Windows 95. This includes a knowledge of the system boot sequences.

- Identify the procedures for installing DOS, Windows 3.x, and Windows 95, and for bringing the software to a basic operational level, including
 - Format drive
 - Loading drivers
 - Partition
 - Run appropriate setup utility
- Identify steps to perform an operating system upgrade, including
 - Upgrading from DOS to Windows 95
 - Upgrading from Windows 3.x to Windows 95
- Identify the basic system boot sequences and alternative ways to boot the system software, including the steps to create an emergency boot disk with utilities installed, such as:
 - Files required to boot
 - Creating emergency boot disk
 - Startup disk

Safe Mode

DOS mode

- Identify procedures for loading/adding device drivers and the necessary software for certain devices such as:

Windows 3.x procedures

Windows 95 plug-and-play

- Identify the procedures for changing options, configuring, and using the Windows printing subsystem.
- Identify the procedures for installing and launching typical Windows and non-Windows applications.

DIAGNOSING AND TROUBLESHOOTING

This part of the DOS/Windows exam requires the ability to apply knowledge in order to diagnose and troubleshoot common problems relating to DOS, Windows 3.x, and Windows 95. This includes understanding normal operation and symptoms related to common problems.

- Recognize and interpret the meaning of common error codes and startup messages from the boot sequence, and identify steps to correct the problems, such as:

A device referenced in SYSTEM.INI could not be found

Bad or missing COMMAND.COM

Error in CONFIG.SYS line XX

HIMEM.SYS not loaded

Incorrect DOS version

Missing or corrupt HIMEM.SYS

No operating system found

Safe Mode

Swap file

- Recognize Windows-specific printing problems and identify the procedures for correcting them, such as:

Print spool is stalled

Incorrect/incompatible driver for print

- Recognize common problems and determine how to resolve them, such as:

Application will not start or load

ATTRIB.EXE

Cannot log on to network

DEFRAG.EXE

Device Manager

EDIT.COM

EXTRACT.EXE

FDISK.EXE

General Protection Faults

Illegal operation

Invalid working directory

MEM.EXE

MSD.EXE

Option will not function

ScanDisk

SYSEDIT.EXE

System lockup

- Identify the concepts relating to viruses and virus types, their danger, their symptoms, sources of viruses, how they infect, how to protect against them, and how to identify and remove them, including:

What they are

Sources

How to determine presence

NETWORKS

This final part of the DOS/Windows exam requires a knowledge of network capabilities of DOS and Windows, and how to connect to networks, including what the Internet is about, its capabilities, basic concepts relating to Internet access, and generic procedures for system setup.

- Identify the networking capabilities of DOS and Windows, including procedures for connecting to the network, such as:

Network type and network card

Sharing disk drives

Sharing print and file services

- Identify concepts and capabilities relating to the Internet and basic procedures for setting up a system for Internet access, such as:

Dial-up access

Domain names (Web sites)

E-mail

FTP
HTML
HTTP
ISP
TCP/IP

Taking the A+ Exam

If you're planning to take the A+ exam, you should arrive at the testing center at least 15 minutes before the test is scheduled to begin. The administrator of the testing center will demonstrate how to use the computer-based testing system before the test begins. In most cases, two forms of identification are required—one must have a picture (such as a driver's license), and both must have a signature. The other can be a major credit card. Books, calculators, laptop computers, or other reference materials are not allowed during any test. Also, since the test is computer based, pens, pencils, or paper will not be needed.

The Core portion of the exam includes 69 questions, and the DOS/Windows portion of the exam includes 70 questions. You have 1 hour to complete the Core module, and 1 hour and 15 minutes to complete the DOS/Windows module. The passing grade for the Core exam is 65 percent, and the passing grade for the DOS/Windows exam is 66 percent. As soon as the test is finished, a final score will be generated, and this score will immediately show on the computer screen. A hard copy of the score report is also provided at the testing center. The score report shows whether you passed the examination or not. It will also show, by section, your performance on the test (please hold on to your score report).

After you pass the examination(s) successfully, your certificate and ID card will be forwarded by Sylvan Prometric in two to three weeks. Should you need a replacement (or a correction) to your certificate or ID card, contact Sylvan Prometric at 1-800-776-4276 if you live in the United States, Canada, or Puerto Rico. If you live outside this area, call your regional Sylvan Prometric site. If you do not pass the examination, you can register at any time to take it again. You will be able to retest after payment has been made.



Remember that the A+ exam has two test components (the Core and DOS/Windows portions), and these must be taken within 90 calendar days of each other. If you fail to pass both examinations within 90 calendar days, you will not be granted the A+ certification. You would then have to retake the Core examination—even if you had passed it previously—and retake the other portion.

THE FUTURE OF A+

The A+ exam is not a traditional exam in the sense that the questions and the format never change. Technology is changing every day, and you can expect the A+ exam to be updated every few years. By December 2000 you'll probably see the following changes to the A+ exam:

- Elimination of the Windows 3.1 objectives and items
- Elimination of the Customer Satisfaction objectives and items
- Development of new test objectives and items in the following areas:

Windows 98

Windows 2000

Windows NT, version 4.0

Linux—baseline, elementary information only

According to CompTIA, these new test items will be beta tested around May/June 2000. However, these items will not be scored and will not count toward an individual's pass/fail score. Depending on how this "beta testing" phase works out, you may see such new questions appear permanently by the end of 2000. You can stay abreast of the latest developments with the A+ exam by visiting the CompTIA Web site at **www.comptia.org**.



Currently, once you're A+ certified, you're certified for life—there is no need to recertify.