

4.2: Recognize Windows-specific printing problems and identify the procedures for correcting them.

- A DOS print test (type "DIR > LPT1" at the prompt) will confirm that the problem is in Windows, not in the hardware.

4.3: Recognize common problems and determine how to resolve them.

Error! Bookmark not defined.	Usually caused in Win 95 by conflicting programs running "in the background." Use Ctrl-Alt-Delete to End Task on all unneeded programs, and try again. If problem continues, reinstall program.
General Protection Fault, Invalid Page Fault, and Illegal Operation	
Invalid Working Directory	Edit the shortcut's property sheet and specify a valid working directory.

- Use REGEDIT in Windows 95 to edit the System Registry.
- Use Device Manager to resolve hardware conflicts in Win95.
- Use SYSEDIT in Windows 3.x and 95 to edit CONFIG.SYS, AUTOEXEC.BAT, SYSTEM.INI and WIN.INI.

4.4: Identify 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.

- Viruses are best detected with utilities specially designed to do so.
- For MS-DOS and Windows 3.x, boot sector virus protection can be enabled in the BIOS.

KEY TERMS

- ASYNCHRONOUS - Transfer uses this order; Start bit/Data bit/Stop bit. Does not use clock ticks. (Serial Port).
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- ATAPI ATAPI (AT Attachment Packet Interface) is an extension to EIDE (also called ATA-2) that enables the interface to support CD-ROM players and tape drives.
- AT The form factor used by most PC motherboards prior to 1998. The original motherboard for the PC-AT measured 12"x13". Baby AT motherboards are a little smaller, usually 8.5"x13"
- ATX The modern-day shape and layout of PC motherboards. It improves on the previous standard, the Baby AT form factor, by rotating the orientation of the board 90 degrees. This allows for a more efficient design, with disk drive cable connectors nearer to the drive bays and the CPU closer to the power supply and cooling fan.
- Baby AT See AT
- BIOS Stored in the CMOS, the Basic Input/Output System (BIOS) is the software for communications between the PC and its peripherals.
- BNC A coaxial network cable connector.
- BROWNOUT- Voltage drops below 110 volts for more a second or more.
- BUS MASTERING- A process to allow devices to read/write to other devices directly.
- Cache Cache is a faster type of RAM used to store information frequently used by the processor. L1 is built into the processor, and L2 is outside the processor.
- CCD (Charge Coupled Device)
- Clamping Speed- how long it takes to go from the over-voltage volts to zero volts.
- Clamping Voltage- the voltage the MOSFET shorts out.
- Coaxial 10Base5 network cable with 10Mbps transfer rate. Coaxial cables use BNC connectors.

- Control Panel The tool in Windows which allows the user to adjust system settings.
- CMOS The CMOS (Complimentary Metal Oxide Semiconductor) is the chip which contains the system BIOS, setup configuration information, and the date/time. The information is retained using the power from a small battery. Some CMOS chips can be flash-updated, where updated data is written to the chip using a special software utility. BIOS settings are held here by the battery.
- CPU The CPU (Central Processing Unit) is the "brains" of the computer. Performs all math and control functions in the PC.
- CRT A CRT (Cathode Ray Tube) is the vacuum display tube in a PC monitor.
- CSMA/CA (Checks for network activity, sends a small amount of data, then sends actual data.
- CSMA/CD (sends data without checking network activity first).
- Cylinder- the collection of tracks on all the platters.
- DIMM A DIMM (Dual Inline Memory Module) is a RAM module with a 64-bit bus to the individual chips, to allow chips to be added one at a time.
- DIP (Dual In-line Package)- individual RAM chips on very old PCs.
- DMA A DMA (Direct Memory Access) is a channel for transferring data from main memory to a device without passing it through the CPU. Modern PCs have 8 DMA channels.
- DRAM (Dynamic RAM)- uses charges in tiny capacitors; needs constant refresh.
- ECP (Enhanced Capabilities Port)
- EEPROM (Electrically Erasable Programmable Read Only Memory) Uses electrical charge to erase.
- EIDE EIDE (Enhanced IDE) is a newer version of the IDE mass storage device interface standard. It supports data rates of between 4 and 16.6 MBps. In addition, it can support mass storage devices of up to 8.4 gigabytes.
- EISA EISA (Extended Industry Standard Architecture) is a bus architecture designed for PCs using an Intel 80386, 80486, or Pentium microprocessor. EISA buses are 32 bits wide and support multiprocessing.
- EMS EMS (Expanded Memory) is converted from extended memory as needed by the DOS EMM386 memory manager. Expanded memory allows faster access.
- EPP (Enhanced Parallel Port)
- EPROM (Erasable Programmable Read Only Memory)- exposure to UV light erases the chip.
- ESD ESD (Electro-static Discharge) is a static shock. ESD can potentially destroy IC chips.
- Explorer The main user interface in Windows 95.
- FAT A FAT (File Allocation Table) is a table that the operating system uses to locate files on a disk, like an index. DOS, Windows 3.x and Windows 95 use FAT16, a 16-bit FAT table, and Windows 95 OSR2.1 and Windows 98 use FAT32. The advantage of FAT32 is the ability to have larger partitions and smaller clusters, which wastes less space on a disk.
- Firmware Software which is stored on an IC chip.
- Flux transitions- HDDs use this process with an electromagnet to write to the platter.
- Form Factor The size, shape, and dimensions of a motherboard. Common form factors are AT, Baby AT, and ATX.
- FRU An FRU (Field Replaceable Unit) is a component of a PC which can be replaced in the field, which takes no special devices (such as a soldering iron) to install.
- Full-duplex A full-duplex device can send and receive data simultaneously, where a half-duplex cannot.
- GUI A GUI (Graphical User Interface) is a way to interact with a PC using images instead of text, such as used in Windows 95.
- HMA The HMA (High Memory Area) is the memory range between 1024k-1088k, and is reserved memory used by one application or utility.

- IC An IC (Integrated Circuit) is a microchip. An IC is sensitive to Electro-static Discharge (ESD).
- IDE IDE (either Intelligent Drive Electronics or Integrated Drive Electronics) is an interface for mass storage devices, in which the controller is integrated into the disk or CD-ROM drive. IDE has been replaced with the newer EIDE standard. maximum of 528MB; Supports only 2 drives.
- IEEE (Institute of Electrical and Electronics Engineers).
- I/O Controller A card in a PC which controls hard disks and floppy drives and usually includes serial and parallel ports. This is integrated into the motherboard on newer PCs.
- IRQ An IRQ (Interrupt Request) is a hardware line over which devices can send interrupt signals to the microprocessor.
- ISA ISA (Industry Standard Architecture) is the 16-bit bus architecture used in the older IBM PC/XT and PC/AT PCs, and the AT version of this bus became the industry standard. Starting in the early 90s, ISA began to be replaced by the PCI local bus architecture. 16bit data bus that operates at 8MHz.
- LAN A Local Area Network, such a network in a single building or campus.
- Latency- Once the HDD head is in place, latency is how long until the data is moved under the head.
- LCD AN LCD (Liquid Crystal Display) is the flat-screen, fixed-pixel type of display used in laptops.
- MAN A Metropolitan Area Network . A network that connects several LANs in a city.
- MCA An MCA (Micro Channel Architecture) bus slot is a 32-bit expansion slot which was developed by IBM, but was never accepted as an industry standard. Memory Temporary, fast access data storage usually in the form RAM or ROM.
- MFM Modified Frequency Modulation
- Modem Device which communicates with other PCs via a telephone line.
- Motherboard The motherboard is the large primary board in the PC to which all other devices directly or indirectly connect. The motherboards is also known as the System board, main logic board, planar board, or mainboard.
- NIC A Network Interface Card, used to connect a PC to a network.
- NT Unofficially stands for New Technology
- OLE Object Linking and Embedding
- OSI (Open Systems Interconnection)
- Parity Parity is an error-checking system where 1 bit is added to every 8 which move in and out of system memory. This bit is called the parity bit, and will change to be a 1 or 0 depending on the number of 1 or zeroes in the 8 bits it accompanies. The system compares this bit to what it expects, and any inconsistencies generate a parity error. Not all memory uses parity.
- Partition An isolated section of a hard drive which is assigned its own drive letter.
- PCI A PCI (Peripheral Component Interconnect) bus slot is a 16, 32 and 64-bit modern expansion slot in a PC. PCI replaces ISA and EISA.
- PCMCIA PCMCIA (Personal Computer Memory Card International Association) slots are 16-bit expansion slots for portable PCs, using credit-card sized cards, called PC Cards. The slots support hot-swapping.
- PIF A PIF (Program Information file) file is a type of file in Windows that holds information about how Windows should run a non-Windows application, such as a DOS application. In Windows 95, PIF files appear as shortcuts.
- PGA (Pin Grid Array)- this is the square CPU shape.
- Plug-and-play See *PnP*
- PnP PnP (Plug and Play) is the ability of a computer system to automatically detect and configure expansion boards and other devices. PnP was first introduced to PCs with Windows 95.
- Power Spike- power overage condition that lasts a few milliseconds at the most.
- Power Surge- power overage condition that lasts several seconds.

- Processor See *CPU*
- Program Manager The primary user interface in Windows 3.x.
- PROM (Programmable Read Only Memory)- memory that can be written to once.
- RAID Redundant Array of Independent Disks
- RAM RAM (Random Access Memory) is temporary, fast access data storage. See Domain 4 of the 220-101 Study Guide for information on specific RAM types. Real-time clock See *RTC*
- Registry The Registry is a database of settings for Windows, Windows applications, users, and installed hardware.
- RLL Run Length Limited
- ROM ROM (Read-Only Memory) is a pre-programmed chip containing firmware. There are several different types of ROM chips, including PROM, EPROM, EEPROM. switches permanently manufactured in the on or off position.
- RSI (Repetitive Strain Injuries)
- SCSI SCSI (Small Computer System Interface) is a parallel interface used to connect peripherals. Devices are connected in a daisy chain, meaning each device is connected to the next in a chain. Each SCSI device must have a unique SCSI ID number, with 8 IDs available (0-7), ID 7 in use by the SCSI adapter itself. Each end of a daisy chain must have a *terminator*. A SCSI bus allows faster data access and uses only 1 *IRQ* per adapter. SCSI-1, SCSI-2, Fast-SCSI, Wide-SCSI, and Ultra-Wide SCSI.
- SEC Single Edge Connector
- Sequential- these are storage devices in which information must be fast forwarded to. (Ex: Tape Drive).
- SIMM A SIMM (Single Inline Memory Module) is a RAM module with a 32-bit bus to the individual chips. For modern Pentium microprocessors that have a 64-bit bus, pairs of SIMMs must be used.
- SRAM (Static RAM)- does NOT need a constant refresh; Bulky and limited capacity.
- STP- shielded Twisted Pair (Uses a braided foil shield around the twisted wires to decrease electrical interference).
- SVGA SVGA (Super VGA) is the modern standard for display adapters, and allows up to 1600x1200 resolution, with up to 16 million colors.
- Swap file See *Virtual memory*
- Synchronous- Uses a clock tick to transfer information. Does not use start/stop bits.
- Terminator A resistor which must be at both ends of a SCSI chain to prevent signals from reflecting back down the bus.
- TOPOLOGY A way to lay out a network.
- Toner A very fine powder bonded to iron particles used to generate images in laser printers. Comprised primarily of iron oxide and plastic resin.
- Twisted pair 10BaseT or 100BaseT network cabling which uses RJ45 end connectors.
- UMB The UMB (Upper Memory Band) is the memory range from 640k-1024k, and is used for DOS device drivers, to free up conventional memory.
- UNC Windows 95 Universal Naming Convention (UNC) for networks follows the format \\COMPUTERNAME\SHARENAME. Max characters sharename: 15
- UPS A UPS (Uninterruptible Power Supply) is a device which protects against power sags and loss by providing battery backup power.
- USB USB (Universal Serial Bus) is a new external bus standard that supports data transfer rates of 12 Mbps, in 8, 16, 32, or 64 byte packets. A single USB port can be used to connect up to 127 peripheral devices. USB also supports hot-swapping.
- UTP- Unshielded Twisted Pair
- VGA VGA (Video Graphics Array) is a video standard which is an industry base standard. It supports 320x200 resolution at 256 colors, or 640x480 at 16 colors. Virtual Machine See *VM*

- Virtual Memory A file on a hard disk, known as a swap file, which behaves like memory when needed.
- VM A VM (Virtual Machine) is a self-contained operating environment that behaves as if it is a separate computer.
- WAN Wide area network. A network that spans over long distance. Internet is an example of WAN. A Wide Area Network, such as a network which spans the U.S. Usually comprised of 2 or more LANs.
- XMS XMS (Extended Memory) is the memory above 1088k which is used for DOS programs requiring more than memory than available in conventional memory.
- MSDOSCOMMANDS

| PIPE : present data from DOS command to a DOS filter program for modification Example: type
c:\autoexec.bat | more

For more info on a command, type the command followed by /? at the DOS prompt

- ATTRIB Displays or changes a file's attributes. The attributes are *read-only*, *system*, *hidden*, and *archive*. Syntax: ATTRIB [+attribute|-attribute] [[x:\path\]filename] [/S] Switches: [/S] Act on all files in current directory and all subdirectories Notes: Turn an attribute on with the plus sign (+), and off with the minus sign (-). Attributes are A (archive), H (hidden), R (read-only), and S (system). Typing ATTRIB with no switches shows the status of all files in current directory. Example: *ATTRIB +R +S document.txt* sets document.txt to read-only and system.
- CD Changes to another directory Syntax: CD [x:\path] Notes: The CHDIR command has the same function as CD. Typing *CD..* steps back one directory, and *CD* goes to the root directory. Example: *CD c:\windows* changes to the C:\windows directory
- CHDIR See *CD*
- CHKDSK Displays a status report on the specified drive, and can fix any errors it finds. Syntax: CHKDSK [x:\path\[filename]][/F[/V] Switches: [/F] Fix any errors found, [/V] Display more detailed (verbose) information Notes: Example: *CHKDSK C: /F* will locate and fix any errors on drive C, and display a status report. Can detect hidden files.
- CLS Clears the screen
- COMMAND Loads a new instance of the DOS command interpreter, COMMAND.COM Syntax: COMMAND [x:\path].
- COPY Copies files Syntax: COPY [x:\path]SOURCE [x:\path]DESTINATION] [/Y] Switches: [/Y] Overwrite existing files without asking for confirmation Notes: Use *COPY CON filename* to create new file FILENAME. Anything typed thereafter will be saved to the new file until user presses Ctrl-Z, then Enter. Example: *Copy c:*.bat d:\temp* copies all .bat files from the root directory of C: to the TEMP directory on D:
- DATE Displays the date and allows user to specify new date Syntax: DATE [mm-dd-yyyy]. Example: *DATE 01-30-2002* changes the system date to January 30th, 2002.
- DBLSPACE Compresses a hard drive Notes: See a more in-depth reference for data on DBLSPACE.
- DEFRAG Defragments the data on a disk, saving the files into contiguous data. Syntax: DEFRAG [x:][/S:order][/H]. Switches: [/S:order] specifies the order to sort files in (see more in-depth reference for details), [/H] also moves hidden files. Notes: Not all possible switches are shown here. Example: *DEFRAG D: /H* Defragments all files on drive D, including hidden files.
- DEL Deletes a file Syntax: DEL [x:\path] filename [/P]. Switches: [/P] prompts before deleting a file. Notes: This command is equivalent to the ERASE command. Example: *DEL d:\windows\document.txt* deletes document.txt in the d:\windows directory.
- DELTREE Deletes a directory and all files it contains Syntax: DELTREE [x:\]path [/Y] Switches: [/Y] deltree will delete without prompting for confirmation. Notes: DELTREE deletes ALL files in a directory, including Hidden, Read-only, and System files. Example: *DELTREE c:\windows* deletes the Windows directory on drive C: and all files within it.
- DIR displays a list of all files and subdirectories of a directory Syntax: DIR [x:\path][filename] [/P] [/W] [/O:order] [/S] [/A:attributes] Switches: [/P] displays data one screen at a time, [/W] displays in wide format, [/S] includes all subdirectories. Notes: Type *DIR/?* at a DOS prompt for info on switches not included here. Example: *DIR *.txt /S* lists all .txt files in current directory and all subdirectories. Attributes: D (directories) H (hidden) S (system) R (read-only) A (files ready to archive). *DIR /A:H* (to see hidden files in directory)
- DISKCOPY Copies contents of one diskette to another Syntax: DISKCOPY SOURCE DESTINATION. Notes: Diskettes must be of same size and type. To copy from one disk to another with a single drive, specify the same drive for both source and destination Example: *DISKCOPY a: a:* copies one floppy disk's contents to another using the same drive.

- DISKCOMP: compare files from disk a to B
- DOSKEY Loads the DOSKEY tool, which keeps a record of all commands typed at the prompt Syntax: DOSKEY [/HISTORY] [/INSERT]. Switches: [/HISTORY] displays list of all commands in history, [/INSERT] enables you to insert text without typing over existing text. Notes: Use up/down arrows to scroll through history of commands. Example: *DOSKEY /INSERT* loads DOSKEY in INSERT mode. DOSKEY is a TSR program.
- EDIT Launches the DOS text editor Syntax: EDIT [x:\path\]filename.
- ERASE See *DEL*
- EMM386.EXE Launches the expanded memory manager Notes: Type *EMM386.EXE /?* at a DOS prompt for detailed information.
- FC Compares two files and lists all differences between them Syntax: FC [x:\path]file1 [x:\path]file2 [/C] [/N] Switches: [/C] ignores the case of letters, [/N] displays line numbers during comparison. Notes: Not all possible switches are shown here. Example: *FC data.txt backup.txt* compares data.txt with backup.txt and shows all inconsistencies.
- FDISK Configures the partitions on a hard disk, and/or allows user to view information on them Syntax: FDISK [/STATUS] [/MBR] Switches: [/STATUS] displays partition status, [/MBR] rebuilds the master boot record for a hard disk.

Menu has 5 options.
- FIND Searches for specified text in one or more files Syntax: FIND "string" [x:\path]filename [/C] [/I]. Switches: [/C] displays line count only, [/I] ignores the case of letters. Notes: Not all switches shown here. Example: *FIND "help" c:\panic.txt /I* shows all lines in c:\panic.txt which contain 'help,' ignoring case.
- FORMAT Erases a partition and/or prepares a partition to store information Syntax: FORMAT X: [/Q] [/U] [/S] Switches: [/Q] performs Quick format, [/U] performs unconditional format, [/S] copies system files to the disk after formatting Notes: Not all available switches shown here. The format command destroys all existing data on the partition or disk. Example: *FORMAT C: /S* formats drive C, then copies system files to it.
- HELP Accesses the on-line help system in DOS Syntax: HELP [topic] Notes: Not available in DOS 7 and above.
- JOIN Logically connects a drive to a directory on a different drive Syntax: JOIN [x: y:\path] | [x: /D] Switches: [/D] cancels the JOIN command Notes: This command makes the contents of drive x: appear to be in the subdirectory y:\path Example: *JOIN A: C:\diskette* makes the contents of A: appear to be in the directory C:\diskette.
- LABEL Deletes, changes, or creates a disk's volume label Syntax: LABEL [x:] *label* Example: *LABEL A: test* changes the floppy's label to 'test.'
- MEM Displays information about the system's memory and how it is allocated Syntax: MEM [/C] [/P] Switches: [/C] lists all programs in memory, [/P] pauses the screen a page at a time. Notes: Not all switches are shown here. [/F] shows free memory blocks in first 640KB
- MEMMAKER Optimizes memory on a system Syntax: MEMMAKER [/UNDO] Switches: [/UNDO] will undo the most recent changes to your system's memory Notes: This program changes lines in the Config.sys and Autoexec.bat to load as many modules in high memory as possible, etc. It should not be used when running DOS 7 or higher.
- MD Creates a directory Syntax: MD [x:]path Notes: This command is equivalent to MKDIR. Example: *MD c:\windows\new* creates a directory new inside [c:\windows](#).
- MKDIR See *MD*
- MODE Configures devices on the system Syntax: MODE [device] [/STATUS] Switches: [/STATUS] displays info about all devices attached to the system. Notes: Type *MODE /?* at a DOS prompt for detailed information on MODE.
- MORE Displays data on the screen one page at a time Syntax: command | MORE or MORE < x:\path\file Notes: . Example: *TYPE c:\data.txt | MORE* displays the contents of data.txt one screen at a time.
- MOVE Moves a file from one directory to another. Also renames directories. Syntax: MOVE *SOURCE DESTINATION* [/Y] Switches: [/Y] moves the files without confirmation Notes: If directory names are specified as SOURCE and DESTINATION, the directory renamed to DESTINATION. Example: *MOVE c:\old.doc d:\letters\old.doc* moved old.doc to d:\letters.
- MSAV MS-DOS Anti-virus software Notes: Type *MSAV /?* at a DOS prompt for info. Not used in DOS 7 or higher.
- MSBACKUP MS-DOS utility to back up files Notes: Type *MSBACKUP /?* at a DOS prompt for info. Not used in DOS 7 or higher.

- MSD Microsoft System Diagnostics utility which displays information about the PC Notes: Not all switches shown here. MSD displays info about LPT ports, COM ports, etc.
- PATH Designates the path MS-DOS should search for commands entered at the prompt Syntax: PATH [x:\path];[x:\path];[...] Notes: If DOS cannot find a typed command in COMMAND.COM or in current directory, DOS will search all directories in the PATH. Typing just PATH at the command prompt displays the current path. Example: *PATH c:\dos;c:\windows* will cause DOS to look in both directories for any commands entered.
- POWER.EXE A DOS utility to reduce the power used by the PC. Notes: Not all information shown here. POWER.EXE must be loaded in the Config.sys file to use POWER.EXE
- PRINT Prints the specified file Syntax: PRINT [x:\path\]file. Notes: Not all switches shown here, type *PRINT /?* at the DOS prompt for more info.
- PROMPT Changes the appearance of the MS-DOS command prompt Syntax: PROMPT [prompt format] Notes: Type *PROMPT /?* at a DOS prompt for detailed information. Example: *PROMPT \$p\$g* changes the DOS prompt to the default, displaying the path and a greater than (>) sign.
- REN (or RENAME) Changes the name of a file Syntax: REN [x:\path\]file1 file2 Example: *REN c:\windows\letter.txt oldbag.txt* changes letter.txt to oldbag.txt.
- RD Removes an empty directory Syntax: RD [x:\]path Notes: Use DELTREE to delete a directory that is not empty. Example: *RD c:\windows* removes the windows directory if it is empty.
- RMDIR See RD
- SCANDISK A disk repair utility Notes: Type *SCANDISK /?* at a DOS prompt for detailed information.
- SET Sets, changes, or removes DOS environment variables Syntax: SET [[variable]=text] Notes: Typing SET with no options shows all variables and their values. Including no data after the equal sign (=) deletes the value of the variable. Example: *SET DIRCMD=/A/P* sets the DIRCMD variable to '/A/P'.
- SETVER Changes the DOS version as it is reported to a program or driver. Syntax: SETVER [x:\path]file n.nn [/D] Notes: Must have SETVER.EXE loaded in Config.sys to use. This is used if a program requires an earlier version of DOS than you have, and it fails due to this. Example: *SETVER c:\games\doom.exe 5.00* tells DOS to report to doom.exe that DOS version 5.00 is in use. (n.nn) is the version we want to change it to.
- SHARE Installs file sharing and locking capabilities for local and network drives. Syntax: SHARE [/L:locks] Switches: [/L:locks] specifies the number of files which can be locked at once. Default is 20.
- SMARTDRV.EXE Creates a disk read/write cache in the extended memory Notes: Type *SMARTDRV.EXE /?* at the DOS prompt for detailed information.

/ X : disables write-back caching /S to see statistics
- SORT Reads, sorts, and returns a list of data Syntax: SORT [x:\path]file [>output] [/R] or command | SORT Switches: [/R] reverses the order. Notes: Adding >output changes where the data is output to, such as a file or the printer. Default output is to the screen. Example: *DIR | SORT* displays the directory, but all lines are sorted in alphabetical order.
- SUBST Maps a drive letter to any drive and path Syntax: SUBST [x: y:\path] [/D] Switches: [/D] deletes the drive mapping. Notes: The first parameter is an unused drive letter to assign to, and the second is the path to which you want to map the drive. Example: *SUBST G: A:\data* maps the DATA directory on the floppy disk to drive G:.
- **SYS** Copies the system bootup files from one drive to another **Syntax:** SYS [x:\path] y: **Notes:** The first parameter specifies where system files are found (not needed if system files are in current directory). The second parameter indicates the drive to copy to. **Example:** *SYS C: A:* copies the system files from C: to A:, creating a boot diskette. Copies files : io.sys, msdos.sys, command.com and drvspace
- **TIME** Displays the time and allows the user to change it **Syntax:** TIME [hours:minutes:seconds][a|p] **Notes:** a & p indicate AM or PM. Not needed if you specify time in 24-hour format. **Example:** *TIME 18:34:00* sets the time to 6:34 pm.
- **TREE** Displays a graphical 'tree' representation of the file structure **Syntax:** TREE [x:\path] [/F]

Switches: [/F] displays the filenames in each directory. **Example:** *TREE c:\windows* displays the directory layout for c:\windows and all subdirectories.

- **TYPE** Displays the contents of an ASCII text file **Syntax:** TYPE [x:\path]file **Example:** *TYPE c:\autoexec.bat* displays the contents of autoexec.bat to the screen.
- **UNDELETE** Used to recover files which have previously been deleted **Syntax:** UNDELETE [x:\path\]file **Notes:** Not all information is shown here, type *UNDELETE /?* at a DOS prompt for more info. Not used in DOS 7 or higher. DOS deletes a file by clearing the first character of the filename, so when a file is undeleted, the user is prompted for the first character. **Example:** *UNDELETE C:\windows\EMM386.EXE* attempts to undelete EMM386.EXE.
- **UNFORMAT** Attempts to recover data from a formatted disk **Syntax:** UNFORMAT [/L] [/TEST] **Switches:** [/L] lists all files found by UNFORMAT, [/TEST] simulates UNFORMAT and displays results to the user. **Notes:** UNFORMAT is no longer used in DOS 7 and above. UNFORMAT will not work on a disk formatted with the /U switch. **Example:** .
- **VER** Displays the current DOS version
- **VOL** Displays the disk volume label and serial number
- **XCOPY** Copies files and/or subdirectories **Syntax:** XCOPY *SOURCE DESTINATION* [/S] [/Y] **Switches:** [/S] copies all non-empty subdirectories, [/Y] disables the prompt to confirm overwriting existing files. **Notes:** Not all switches are shown here, type *XCOPY /?* at a DOS prompt for detailed information. **Example:** *XCOPY A: C:\backup /S* copies all files and subdirectories on the floppy disk to the backup directory on drive C: [/H] copy hidden and system files [/C] continuous copy even if errors [/Y] prompts before overwriting [/W] prompts for “key” press.

- **Connections:**

RJ-11 (Phone Cord)

RJ-12 (Smaller, running from handset to phone)

RJ-45 (Standard Network connector)

DB-25F (Probably null modem)

VGA (15pin)

- **There are four cabling methods**

- **Coaxial Cable-** consists of copper wire surrounded by insulation and a metal foil shield.
- **Fiber Optic Cable-** provides transmission speeds from 100Mbps up to 1Gbps, a maximum distance of several miles, and is completely immune to electrical interference. This is used on networks that need long distances, extremely fast transmission rates, or have had problems with electrical interference.
- **Wireless-** can use infrared light, laser light, narrow-band radio, microwave, or spread-spectrum radio.

- **Twisted Pair cable**- UTP or STP; Maximum of 100 meters.
- **Category1** is for voice only transmissions; Used in most phone systems today.
- **Category2** is able to transmit data at 4Mbps; Consists of four twisted pairs.
- **Category3** is able to transmit data at 10Mbps; Consists of four twisted pairs with three twists per foot.
- **Category4** is able to transmit data at 16Mbps; Consists of four twisted pairs.
- **Category5** is able to transmit data at 100Mbps; It contains four twisted pairs of copper wire to give the most protection.
 - Soft Memory Error- Single bit memory error that occurs with power fluctuations; Not reproducible. Caused by random events.
 - Hard Memory Error- Physical memory problems; reproducible.
 - Parity is a form of error correction that assigns a 9th bit to the end of a binary number making the string odd or even.
 - CPUs use the address bus to talk to a device; devices use the data bus to talk to the CPU.
 - 100 volts can damage a CMOS based IC.
 - Intel stopped licensing its CPU designs with the 80386 CPU.
 - External Bus (System Bus)- allows CPU to talk to another device (Expansion cards).
 - Address Bus- Addresses memory locations.
 - 5 volts = a binary 1; 0 volts = a binary 0.
 - 16-bit buses use 16 wires to transmit data; 32-bit buses use 32 wires to transmit data.

21. Where do you find a resource conflict for a device - the resource tab of the properties of an item under the systems icon of the control panel.

22. What do you view in the resources tab - configuration of a component

1. Win setup switches - /A for diskless workstation on network, /I ignores automatic hardware detection

27. 3 ways to install windows - floppies, CD, & network.

35. Thunking is where 16-bit code can call 32-bit code and vice versa

36. A virtual machine consists of a virtual address space in physical or virtual memory, processor registers, and privileges.

37. 16-bit applications share memory address spaces.

38. 32-bit applications have individual memory address spaces.

39. Each MS-DOS application has its own virtual machine.

40. What is a registered program - one that is in the Add/Remove Programs properties.

36. 4 functions of a microcomputer - input, processing, output, & storage.

37. Binary numbers, leftmost is most significant, rightmost is least significant

- 38. Binary numbers (L-R) - 128-64-32-16-4-2-1
- 42. 80386 operates at +5v
- 43. 80486DX first to operate at +3.3v
- 44. The spots where the bus connectors are located are called - adapter slots
- 47. Accessible memory is the lesser of the amount that can be installed on the system and what is addressable by the microprocessor
- 48. Non-parity memory does not provide correction or error detection
- 49. What is the fastest device you can access data in a PC - cache RAM
- 50. What is the slowest device you can access data in a PC - floppy drive
- 51. SDRAM can be accessed as fast as the motherboard speed
- 55. Interface cables -, IDE-40 pin, SCSI-50 pin, & SCSI Ultra wide-68 pin
- 70. Centronix connector is 25-pin D-shell
- 78. Modular jacks - RJ-11=2 pair (4 wires), RJ-14=3 pair (6 wires), & RJ-45=4 pair (8 wires)
- 85. 3 components necessary for Plug and Play - PnP BIOS, PnP expansion boards, PnP operating system

DEFINITIONS:

- Cooperative Multitasking- depends on the application itself to be responsible for using and then freeing access to the CPU.
- Pre-emptive Multitasking- The operating system allots each application a certain amount of processor time and then forcibly takes back control.
- Transient commands (external)- Commands that are in the DOS directory.
- Resident commands (internal)- Commands that are within COMMAND.COM

MISC:

- If NWCLIENT or LM directories are on the HDD, the DOS system is probably networked.
- There is a 512-file limit for the root directory.
- A clean boot is a boot without a CONFIG.SYS or AUTOEXEC.BAT
- DLL files are small pieces of executable code that is shared between files to help reduce program size.
- Aggressive memory searching looks for spots within a memory range reserved for a BIOS chip.
- Write-back cache is a little risky because a user may power off before the writing takes place.
- TrueType allows screen fonts to more closely resemble actual printed fonts.
- PC-DOS uses: IBMBIO.COM, IBMDOS.COM and COMMAND.COM

- Startup of a computer is referred to as booting or boot-strapping.
- SHARE.EXE provides file and record locking functions.
- TTF are True Type Font files.
- MSAV.EXE is MS Anti-virus.
- SYSETEM.INI is the primary configuration file for hardware settings. It contains the console input and output devices (keyboard and monitor), the mouse, ETC...
CONTROL.INI controls settings within the Control Panel

TROUBLESHOOTING STEPS:

- Step 1: Talk to the Customer - Find out the problem, believe the customer but use hidden skepticism.
- Step 2: Gather Information - Probe the customer for anything they might not be telling you. Dropped equipment? New hardware? Did it ever work?
- Step 3: Eliminate Possibilities - Strip down all non-essential components.
- Step 4: Document Your Work- If the process of elimination goes beyond 2 or 3 elements, start writing it down.

GENERAL

- Drvspace maximum compressed HD : 512 meg
- Hot docking: power can be on to remove/install device
- Himem.sys is needed in W3.1 (not in W95)
- System locks up: not software, then disable CPU cache in CMOS
- SET UP: tells memory used; type of drivers
- Power.exe device driver cannot be used to increase speed of CPU-intensive application at the expense of slowing disk intensive applications
- In CMOS; enable ROM-BIOS shadowing à puts a copy of BIOS in RAM
- Device driver that creates virtual drive à ramdrive.sys
- W font type of segments, no filled areas : vector (infinitely rescalable)
- Font type : dots on screen à bitmap
Filetype : TIF; BMP; PCX (not PGM)
Also known as raster image
- font type: outline à combines vector & bitmap ex: True type
- Kernel: core executable code that makes up DOS, allows other pieces of OS to talk to each other
- Win.com : checks current hardware configuration & device drivers, and determines if W should run in Standard mode or 386 enhanced mode.

- Win.com : switches to start W /s to go to standard mode
- Extract CAB file: extract.exe
- View NIC properties : device manager
- Emergency boot disk at minimum should have: io.sys-msdos.sys-command.com
- Vector based font: can be scaled and rotated (not bit mapped fonts)
- FAT files: FAT 16 – 1K file is 32 K of space
- FAT 32 supports larger partitions

MACINTOSH

- disk icon and blinking: HD no longer recognized as bootable
- no jumpers or DIP switches: all P&P
- MAC printer is serial
- Sad face: serious hardware problem; system software problem; SCSI controller defect; HD crashed; RAM defective
- Dialog box with bomb: system crash
- Diamond icon with short line: SCSI
- <....> Ethernet
- MAC powerbook based on RISC architecture
- Alias: duplicate file icon
- Extension: software extends MAC system capabilities
- Motorola manufactures Apple's CPUs.
- Bomb icon: software crash

Size of partition	FAT 16 cluster size	FAT 32
Up to 511 MB	8 KB	N/a
512 MB to 1023 MB	16 KB	4 KB
1024 MB to 2GB	32 KB	4 KB
2GB to 8GB	N/a	4 KB
8GB to 16GB	N/a	8 KB
16GB to 32 GB	N/a	16 KB
32GB to 2 TB	N/a	32 KB

Binary

0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

- W95: change file attributes: right click file, select properties, change attributes
- Optomize CD-ROM: right click My computer, properties; performance; file system, CD-ROM, set quad speed
- Optomize Hard drive: right click My computer, properties; performance; file system; HD
- Load device drivers: right click my computer; properties; device manager; select one, properties, driver
- View devices: Control Panel/system icon/properties/device manager
- Printer spooler: right click printer icon; properties; details; spool settings; choose print directly to printer
- Disable write behind caching: system properties\performance\file system\troubleshooting
- Display hidden files: view\options\show all files
- Protocols installed: my computer\control panel\network config. Tab
- Change icon: right click\properties\short cut tab\change icon button
- Share a printer: right click printer folder\properties\sharing tab
- Default printer: start, settings, printer, right click printer icon, set as default