

Index

SYMBOLS AND NUMBERS

- +++ command 382
 - 5-pin DIN connectors 46-47, 97, 212
 - 6-pin mini-DIN connectors 46-47, 766
 - ATX-style systems 211
 - keyboards 97
 - mice 98
 - 6xx error codes 351
 - 8-bit expansion slots 543
 - 9-pin D-shell connectors 46, 220
 - 10BASE-2 networks 711
 - 10BASE-5 networks 710
 - 10BASE-FL networks 721
 - 10BASE-FP networks 720
 - 10BASE-T networks 719
 - 15-pin monitor connectors 46
 - 16-bit expansion slots 543
 - 17xx error codes 353
 - 20-pin ATX system board connectors 27
 - 25-pin D-shell parallel connector 216
 - 25-pin D-shell serial connector 218, 220
 - 32-bit bus architectures 544
 - 34-pin floppy-disk drive connectors 41, 103
 - 36-pin Centronics printer connectors .. 215-216
 - 40-pin IDE connectors 43
 - 50-pin SCSI connectors 45, 211
 - 68-pin JEIDA connectors 313
 - 80-pin SCA connectors 248
 - 90x error codes 366
 - 100BASE-FX Fast Ethernet 719
 - 100BASE-FX networks 721
 - 100BASE-T networks 719
 - 100BASE-TX networks 719
 - 110x error codes 366
 - 199 error code 366
 - 201 error code 330
 - 301 error code 339
 - 432 error code 366
 - 1000BASE-LX networks 721
 - 1000BASE-SX networks 721
 - 1000BASE-T Gigabit Ethernet networks ... 720
 - 8042 Gate A20 Error message 329
 - 8088 CPUs 30, 474
 - 8250 UART devices 219-220
 - 80286 CPUs 30
 - 80486DX CPUs 30
 - 80486SX CPUs 30
 - 80586 CPUs. See Pentium CPUs
 - 80686 CPUs. See Pentium Pro CPUs
- ## A
- A+ certification 841-842
 - fixed-form exams 11-12
 - study tips 9-13
 - active study strategies 10-11
 - common-sense study strategies 11
 - macro and micro study strategies 10
 - pretesting study strategies 11
 - A-cables 248
 - AC power adapters 94-95, 156-157, 766
 - AC voltage checks 411
 - Accelerated Graphics Port (AGP)
 - expansion slots 36, 542, 549-550
 - access
 - Internet access
 - cable modem connections 753-754
 - dial-up connections 742-744
 - DSL connections 746, 748-752
 - ISDN connections 744-746
 - LAN connections 740-742
 - satellite connections 754-756
 - wireless connections 756
 - network security 724-725
 - points, wireless LANs ... 128-129, 685, 690-691

- time298, 301
- ACK/NAK protocol****120-121**
- active heat sinks****86-87, 490-492**
- active termination, SCSI devices****254**
- active-matrix displays****52**
- adapter cards****36-40**
 - defined26
 - form factor compatibility27
 - IEEE-1394 FireWire cards40, 125-127
 - installing79, 115-116
 - IEEE-1394 FireWire devices125-127
 - LAN cards687-690
 - modems118-119
 - SCSI cards123-124
 - sound cards39, 116-117, 195
 - system board compatibility305
 - USB devices124-127
 - video cards95-96, 269-270
 - wireless cards128-129
 - LAN cards39, 686-690
 - configuration settings688-689
 - installing687-690
 - optimizing307-308
 - PC Card adapters165
 - system resources196
 - troubleshooting385-386
 - wireless PC Card adapters166
 - modem cards38
 - removing77, 79
 - SCSI cards39
 - sound cards39, 116-117
 - upgrading305-306
 - high-end video cards306-307
 - network adapters307-308
 - USB cards40
 - video cards37-38, 837
 - configuring270
 - installing95-96, 269-270
 - troubleshooting418-419
 - upgrading306-307
 - VGA-to-TV converters307
 - wireless network cards40
- addresses808
 - DMA addresses185-186, 195
 - hexadecimal187-189
 - I/O186-187
 - IP. See IP addresses
 - IRQs (interrupt requests)183-185
 - memory addresses187-188
 - redundant addressing187
 - SCSI addressing251-253
- ADSL (Asymmetric Digital Subscriber Line)****749-751**
- ADSL Terminal Unit (ATU)****746-747**
- Advanced Micro Devices (AMD)**
 - microprocessors****484-485**
- Advanced Power Management (APM)**
 - standard****158**
- AGP expansion slots****36, 542, 549-550**
- air baffles****295**
- alignment tool****407**
- AMD (Advanced Micro Devices)**
 - microprocessors****484-485**
 - temperature specifications294
- American Standard Code for Information Interchange (ASCII)****808**
- ampere-hour rating****443**
- AMR (Audio Modem Riser) slots****36, 551**
- analog S-Video****307**
- antistatic**
 - devices458, 460
 - spray428
 - straps408, 776
- APM (Advanced Power Management)**
 - standard****158**
- AppleTalk protocol****697**
- application keys, portable PCs****146**
- Application Specific Integrated Circuits (ASICs)****32, 808**
- applications**
 - digital camera software277
- ASCII (American Standard Code for Information Interchange)****808**
- ASICs (Application Specific**

- Integrated Circuits)**32, 808
 - ASKIR protocol**197, 584
 - Asymmetric Digital Subscriber Line**
 - (ADSL)749-751
 - asynchronous data transmission**218-220, 808
 - asynchronous SRAM**510
 - AT Attachment Packet Interface (ATAPI)**241-242
 - AT bus. See ISA**
 - (Industry Standard Architecture) bus**
 - AT command set**379
 - Command mode379
 - Communications mode379
 - entering commands380
 - result codes380-381
 - summary of379
 - AT-style systems**21-22, 27, 536-537
 - compatibility537-538
 - I/O port connections212-215, 553-554
 - keyboard connections538
 - power supply fans25
 - power-supplies27-29, 539
 - USB host ports555
 - ATA (AT Attachment). See IDE**
 - (Integrated Drive Electronics) devices**
 - ATA flash cards**161
 - ATA-2. See EIDE (Enhanced IDE) devices**
 - ATA-3/Ultra ATA 33 specification**242
 - ATA-4/Ultra ATA 66 specification**243
 - ATAPI devices**241-242
 - ATDT*70 command**382
 - Athlon microprocessors**484-485
 - Attachment Unit Interface (AUI)**711
 - attenuation**679
 - ATTRIB command**808
 - attributes (file)**808
 - ATU (ADSL Terminal Unit)**746-747
 - ATX-style systems**27, 534-536, 808
 - compatibility537-538
 - I/O connectors211-214, 536, 552
 - keyboard connectors538
 - mounting-hole patterns535, 537
 - power supplies27-28, 539
 - connectors536
 - fans25, 86
 - system board layout29
 - USB host ports555
 - ATZ command**381
 - Audio Modem Riser (AMR) slots**36, 551
 - audio output**
 - Digital Audio Tape drives112
 - DVD-Audio45
 - sound cards39
 - installing116-117
 - system resources195
 - troubleshooting383-385
 - speakers834
 - defined23
 - troubleshooting411
 - AUI (Attachment Unit Interface)**711
 - Auto translation mode**576
 - auto-detect function, microprocessors** ..291-293
 - auto-detection functions, system boards** .541, 558
 - AUTOEXEC.BAT file**808
- ## B
- B (bearer) channels**745
 - B-cables**248
 - Baby AT systems**27, 534-537
 - compatibility537-538
 - mounting-hole patterns537
 - Bad or Missing Command Interpreter**
 - error message417
 - back lighting**51
 - back planes**24
 - back-side bus (BSB)**540
 - backbone**736
 - Backup utility**809
 - backups**809
 - storing434-435
 - Bad File Allocation Table message**417
 - bandwidth**519, 679
 - basic input/output system. See BIOS**

- Basic Rate Interface (BRI) services**745
- .BAT file extension**809
 - command prompt execution889
- batch files**809
- batteries**156
 - CMOS batteries337
 - disposal procedures463
 - maximizing life of158
 - recharging312, 391
 - storing462
 - troubleshooting390-391
 - upgrading311-312
- battery memory problems**391
- baud rate**809
- bearer channels**745
- BEDO (Burst EDO)**508
- beep code messages**412-413
- BERG connectors**33-34
- binary numbering system**187-189
- BIOS (basic input/output system)**54-56
 - boot process55-56
 - defined31
 - flash BIOS90, 296-297
 - partition limits107
 - Plug-and-Play CMOS settings579-581
 - security options585-586
 - system compatibility and54
 - upgrading296-297
 - virus warnings576-577
- BIOS Features Setup options**
 - (CMOS Setup utilities)576-577
- BISDN (Broadband ISDN)**745-746
- bitmapped fonts**598
- bits (binary digits)**809
- black pages**653, 783
- Block Check Character (BCC)**121
- Blue Screen of Death (BSOD)**809
- Bluetooth**685
- BNCs (British Naval Connectors)** ..210-213, 711
- bond paper**641
- boot disks**810
 - clean boot disks356
- boot files**59
- boot partition**810
- boot sector**810
- BOOT.INI file**810
- BOOTSECT.DOS file**810
- bootstrap loader**810
- bootstrap loader sequence**55
- bootup process**
 - boot disks. See boot disks
 - bootup55-56
 - CMOS settings35, 577, 586
 - CMOS setup utilities57-59
 - cold boots55
 - defined55
 - detection phase548
 - initialization55-56
 - POST (Power On Self Test)55
 - role in troubleshooting413-414
 - sequence, setting up577
- bps (bits per second)**809
- bridges**737
- Broadband ISDN (BISDN)**745-746
- brownouts**441
- BSB (back-side bus)**540
- Blue Screen of Death (BSOD)**809
- buffer underrun errors**361-362
- buffers**509
- bulk data transfers (USB)**555
- Burst EDO (BEDO)**508
- Burst-mode SRAM**511
- Bus Frequency Setting**
 - (CPU configuration setting)492
- bus speeds, system boards**540-541
- bus topology**673
- buses**810
 - 8-bit architecture543
 - 16-bit architecture543
 - 32-bit architecture544
 - AGP (Accelerated Graphics Port) .542, 549-550
 - AMR (Audio Modem Riser)36, 551
 - ISA (Industry Standard Architecture) 21, 543-544
 - local bus design544

- MCA (Micro Channel Architecture)544, 552
- PCI (Peripheral Component Interconnect)
 - buses544-549, 686, 829
 - upgrading system boards and292-294
- USB (Universal Serial Bus). See USB devices
- VESA (Video Electronics Standards Association)36, 542, 552, 838
- bytes810**

- C**

- cable modems753-754**
 - installing272-273
- Cable Select drives
 - IDE devices240
 - signal cables, troubleshooting357
- cable TV (CATV) connections753**
- cabling26**
 - ATA-3/Ultra 33 devices242
 - EIDE devices241
 - Fast SCSI-2 drives245
 - floppy-disk drives41, 103
 - IDE devices43, 253-241, 556-558
 - IEEE-1394/FireWire224-225
 - keyboard cabling46
 - monitors46, 48
 - Narrow SCSI drives245
 - network cables
 - coaxial681, 709-711, 718-719
 - crossover673
 - fiber-optic682, 715-716, 720-721
 - IDC connections713-714
 - plenum-rated717-718
 - testing726-727
 - token-ring696
 - twisted-pair679-680, 711-712, 719-720
 - UDC connections714-715
 - printer cables215-217, 612-613
 - infrared printers614-615
 - networked printers615
 - SCSI devices248-249
 - SCSI-1 drives245
 - serial cabling218-222, 244, 781
 - system board cabling79-80
 - terminators709
 - troubleshooting385
 - Ultra 160 SCSI drives248
 - Ultra ATA 66 drives243
 - Ultra ATA 100 devices243
 - Ultra SCSI drives246
 - upgrading hard drives and303
 - USB cabling223-224, 555-556
 - Wide Fast SCSI-2 drives246
 - Wide SCSI-2 drives245
 - Wide Ultra SCSI drives247
- cache memory513-514**
 - 1394. See also L1 cache, L2 cache
 - defined30
 - half-speed cache479
 - hit rate513
 - tag RAM478
 - upgrading299
- Cardbus160, 770**
- cartridge tapes110-111. See also tape drives**
- cartridges**
 - dot-matrix printers600
 - ink-jet printers605, 647-648
 - laser printers608-609, 651
- cases (system units)23-25**
 - removing77
- CAT (category) cable ratings712**
- Category 5 cabling225**
- cathode-ray tubes (CRTs)48-49. See also monitors**
- CATV (cable TV) connections711, 753**
- C: or D: Fixed Disk Drive Error message354**
- CD-ROM drives43-45**
 - ATAPI drivers242
 - Compact Disc File System (CDFS)109
 - CMOS settings577
 - configuring108-109
 - installing108-109
 - interface architectures44-45

- portable PCs149-154
- preventive maintenance436-438
- troubleshooting358-360
- CD-RW drives**
 - installing109
 - portable PCs153-154
 - troubleshooting360-362
- CDFS (Compact Disk File System)109**
- CDMA (Code Division Multiple Access)684**
- CDs (compact discs)43-44**
- Celeron CPUs ..479. See also Pentium III CPUs**
 - Socket 370 specifications487
- Celeron Mendocino CPUs479**
- Centronics interface811**
- certificates811**
- certification process841-842**
 - fixed-form exams11-12
 - study tips9-13
 - active study strategies10-11
 - common-sense study strategies11
 - macro and micro study strategies10
 - pretesting study strategies11
- character framing122**
- character printers. See printers**
- character type parameters122**
- Check Disk utility. See CHKDSK utility**
- chip creep429, 459, 775**
- chips**
 - installing support chips90-91
 - video controller chips37
 - video RAM chips37
- Chipset Features Setup options (CMOS Setup utilities)578-579**
- chipsets32-33, 539-541, 811**
 - CMOS settings578-579
 - defined30
 - Real-Time Clock (RTC) function574-575
- CHKDSK utility436, 811**
- clamping speed441**
- clamping voltage441**
- Class-C fire extinguishers465, 775**
- clean boot disks356. See also boot disks**
- cleaning428-429**
 - dot-matrix printer elements657-658
 - ink-jet printer elements647, 658
 - laser printer elements607, 658-659
- Clear To Send (CTS) signals811**
- client/server networks676-677, 811**
 - diskless workstations677
- clock (system), resetting574-575**
- clock speed489**
 - Athlon Duron CPUs485
 - Athlon K7 CPUs485
 - Athlon K75 CPUs485
 - Athlon Thunderbird CPUs485
 - Celeron Mendocino CPUs479
 - first-generation Pentium CPUs475
 - Pentium 4 CPUs481, 489
 - Pentium II CPUs479, 489
 - Pentium III Coppermine CPUs489
 - Pentium III CPUs480-481, 489
 - Pentium MMX CPUs476
 - Pentium Northwood CPUs481
 - Pentium Prescott CPUs481
 - Pentium Pro CPUs477
 - Pentium Xeon CPUs481
 - second-generation Pentium CPUs475
 - third-generation Pentium CPUs475
- clone microprocessors30, 484-485**
 - power-supply levels490
- Close Program dialog box. See Task Manager**
- CMOS batteries, troubleshooting337**
- CMOS Battery Low error message330**
- CMOS Checksum Failure message330**
- CMOS Display Mismatch –**
 - Failure to verify display type error344
- CMOS Display Mismatch message330**
- CMOS Inoperational message330**
- CMOS Memory Size Mismatch message ...330**
- CMOS RAM34, 572, 812**
 - bootup options577, 586
 - CD-ROM drives577
 - chipset settings578-579
 - COM ports583-584

- date/time settings574-575
- default settings572-573
- floppy drives575-577
- hard drives575-577
- infrared ports584
- onboard devices, enabling/disabling581-582
- parallel printer ports583-584
- password settings585-586
- Plug-and-Play BIOS settings579-581
- power-management settings584-585
- serial ports584
- troubleshooting configuration settings .414-417
- virus protection576-577
- CMOS Setup utilities57-59, 572-573, 811**
 - BIOS Features Setup options576-577
 - Chipset Features Setup options578-579
 - Integrated Peripherals options581-584
 - PnP/PCI Configuration options579-581
 - Power Management Setup options584-585
 - Security Configuration options585-586
 - Standard CMOS Setup options574-576
- CMOS System Option Not Set message330**
- CMOS Time & Date Not Set message330**
- CMYK color646**
- CNR (Communication and Networking Riser)**
 - cards36, 551
- coaxial cable681, 709-711, 718-719**
 - attenuation710
 - Ethernet connections718-719
 - impedance710
 - radio grade (RG) rating709
 - terminators709
 - velocity factor710
- Code Division Multiple Access (CDMA)684**
- cold boots55, 811**
- collators619, 651**
- color laser printers609-610. See also laser printers**
- color monitors811. See also monitors**
- Color Super-Twist Nematic (CSTN) displays .52**
- COM ports812**
 - AT-style systems215
 - CMOS settings583-584
 - designations222
 - troubleshooting376
- Command mode, AT command set379**
- COMMAND.COM file812**
 - copying from boot disk to hard drive356
- commands (MS-DOS)**
 - ATTRIB808
 - CHKDSK436, 811
 - DEFRAG436
 - FDISK106, 818
 - FORMAT819
 - MEM825
 - PING829
- Communication and Networking Riser**
 - (CNR) cards551
- communication software379**
- Communications mode, AT command set ...379**
- Compact Disk File System (CDFS)109**
- composite TV307**
- compound devices222**
- compression roller, laser printers608**
- CompTIA841-842. See also A+ certification**
- Computer Management Console812**
- concentrators696**
- conditioning stage, laser printers607**
- CONFIG.SYS file812**
- Configuration Manager812**
 - configuration settings34-35**
 - accessing during bootup35
 - auto-detect function291-293
 - dot-matrix printers639
 - Pentium CPUs492-493
 - troubleshooting414-417
 - hard drive problems355
 - mouse problems342-343
 - system board settings331-332
- configuring**
 - CD-ROM drives108-109
 - DVD drives108-109
 - I/O ports126-127
 - microprocessors293, 492-493
 - modems119-120, 272

- monitors270
- Conflicting Device List384**
- connectors33-34**
 - AT-style systems212-215, 553-554
 - ATX-style systems211-214, 552
 - BERG connectors33-34
 - cable modems753
 - digital cameras277-278
 - expansion slot connectors30, 35-37
 - Fast SCSI-2 drives245
 - fiber-optic cable connectors716-717
 - FireWire connectors224-225
 - I/O port connectors46-47
 - IDE drives253, 242, 556, 558
 - Insulation Displacement Connectors ...713-714
 - keyboards46-47, 97
 - portable PCs146-147, 150
 - mic46, 98-99
 - modems192
 - digital272-273
 - external270-271
 - monitors46, 48
 - mouse connectors46
 - null modem schemes220-221
 - PC Card connectors162-163
 - peripheral connectors53
 - portable PCs150-151
 - 802.11b cards167
 - CD-ROM drives153-154
 - CD-RW drives153
 - docking-port connectors168
 - DVD-RW drives153
 - floppy-disk drives153
 - keyboards146-147, 150
 - LCD panel connections144-145
 - network adapters165
 - PC Card modems165-166
 - PC Cards162-163
 - system board arrangement142
 - trackballs147
 - printer connectors53, 613
 - dot-matrix printers600
 - infrared printers614-615
 - RJ-45 connectors673, 686
 - SCSI connectors244, 248-249, 559-560
 - serial ATA drives244
 - Universal Data Connectors714-715
 - Ultra 320 SCSI drives248
 - Ultra ATA 66 drives243
 - uninterruptible power supplies280
 - USB connectors211, 223-224
- continuity tests408-411, 726-727**
- continuous forms812**
- control buses812**
- control characters812**
- control transfers (USB)555**
- control-code protocols120-121, 813**
- controllers**
 - Direct Memory Access controllers185-186
- convergence685**
- cooling systems86-89**
 - microprocessors, troubleshooting335-337
 - optimizing294-295
 - water-based CPU coolers88-89
- copper cabling679, 681**
- Coppermine 128 CPUs481, 489**
- Coppermine CPUs481, 489**
- Core Hardware Service Technician exam ...841**
 - fast facts
 - 1.0 domain764-771
 - 2.0 domain771-773
 - 3.0 domain773-776
 - 4.0 domain776-780
 - 5.0 domain780-784
 - 6.0 domain784-788
 - practice exam789-804
- core voltage supply, CPUs86, 493**
- Core-to-Bus Speed Ratio**
 - (CPU configuration setting)492
- corona wires, laser printers608**
- corrosion428-429**
- Covington CPUs485**
- CPUs. See microprocessors**
- CRC (cyclic redundancy check)813**

crosscut pliers407
crossover cabling220, 673
CRTs (cathode-ray tubes)48-49. See also monitors
CSMA/CD (carrier sense multiple-access with collision detection)692
CSTN (Color Super-Twist Nematic) displays .52
CTS (Clear To Send) signals811
Current Drive No Longer Valid message354, 772
cursor, frozen/jumping341
cyclic redundancy check (CRC)813
cylinders, hard-disk drives42, 813
Cyrix III microprocessors487

D

D channels745
DAT (Digital Audio Tape) drives112
Data Cabling testers726
data collisions692
Data Communications Equipment (DCE) ..813
Data Encryption Standard (DES)813
data error detection511
Data Link layer (OSI model)692
Data Over Cable Service Interface Specification (DOCSIS)754
Data Set Ready (DSR) signals813
Data Terminal Ready (DTR) signals813
data throughput519-520
data transfer181-182
 DMA channels185-186
 interrupts183-185
 polling181-182
 programmed I/O181-182, 831
 serial transmission modes218-220
 USB transfers555-556
data transfer rates301
 ADSL connections749-750
 ATA-3/Ultra ATA 33 drives242
 broadband ISDN connections746
 cable modems753
 DSL connections746
 EIDE drives241
 Fast SCSI-2 drives245
 FDDI networks722
 G.lite ADSL connections750
 HDSL connections752
 HDSL2 connections752
 IDE drives241
 IDSL connections752
 IEEE 802.11x wireless specifications684
 PCI Card-mounted interfaces244
 SCSI-1 drives245
 SDSL connections749, 751
 serial ATA drives244
 SHDSL connections752
 token-ring networks696
 Ultra 160 SCSI drives248
 Ultra 320 SCSI drives248
 Ultra ATA 66 drives243
 Ultra SCSI drives246
 VDSL connections751
 Wide Fast SCSI-2 drives246
 Wide SCSI-2 drives245
 Wide Ultra SCSI drives247
dates, CMOS settings574-575
DB-9M D-shell connectors211
DB-15F D-shell connectors211-212
DB-25F D-shell connectors211
DC power adapters156-157
DC voltage checks409-410
DC-2000 style tapes110
DC-6000 types110-111
DC-to-DC controllers156
DCE (Data Communications Equipment) ..813
DDR-SDRAM (double data rate SDRAM) ..506
DDS (Digital Data Storage) standards112
decimal numbering system187-189
degauss operations350, 772
demodulators ...117, 743, 814. See also modems
DES (Data Encryption Standard)813
Deschutes CPUs485
detection phase, bootup process548

- developing stage, laser printers607
- device drivers814
 - printer drivers634-635
- Device Manager814
- DHCP (Dynamic Host Configuration Protocol)815
- diagnosing and troubleshooting. See troubleshooting
- diagonal pliers407
- dial-up Internet connections814
- dial-up modems
 - configuring272
 - installing270-272
- dial-up networking742-744
- differential signaling249-251
- Digital Audio Tape (DAT) drives112
- digital cameras
 - installing277
 - software applications277
- Digital Data Storage (DDS) standards112
- Digital Linear Tape (DLT) drives112-113
- Digital Loop Carrier (DLC)752
- digital multimeters (DMMs)408-409
- Digital Subscriber Lines. See DSL
- digital versatile discs (DVDs)45
- Digital Visual Interface (DVI) video adapters 307
- DIMMs (Dual In-Line Memory Modules)32, 515-516, 814
 - installing89-90
 - MicroDIMMs518
 - optimizing298-299
 - Small Outline DIMMs (SODIMMS) ..143, 517
 - installing142
 - upgrading143-144
 - voltage-level support143
 - split-bank slot arrangement516
 - upgrading RAM297-298
- DIP (dual in-line package) sockets90-91
- DIP (Dual In-line Pin) sockets515
- Direct Memory Access. See DMA (Direct Memory Access) channels
- Direct Rambus DRAM (DRDRAM) ...509-510
- Direct Sequence Spread Spectrum (DSSS) ..684
- direct transfer thermal printers602
- directories814
 - root directory832
- Disk Administrator utility106-107
- Disk Boot Failure message356
- Disk Drive Read/Write/Seek Error message .351
- disk drives41-45, 815
 - AC power adapters94
 - CD-ROM. See CD-ROM drives
 - cleaning heads429
 - CMOS settings575-576
 - defined26
 - directory structures890-892
 - floppy. See floppy-disk drives
 - hard. See hard-disk drives
 - onboard motherboard connections556-560
 - RAID systems256-259, 770
 - translation modes576
 - troubleshooting418-419
- Disk Management utility
 - partitioning hard disks106-107
- disk operating systems. See also MS-DOS
 - files59
- disk-management tools
 - Backup809
 - CHKDSK811
 - FDISK106, 818
 - FORMAT819
- diskless workstations677
- Display Switch Setting Not Proper –
 - Failure to verify display type message344
- Distributed Splitter DSL service748
- DLC (Digital Loop Carrier)752
- DLL (dynamic link library) files816
- DLT (Digital Linear Tape) drives112-113
- DMA (Direct Memory Access) channels814
 - designations185-186
 - sound cards195
- DMA Error message329
- DMMs (digital multimeters)408-409. See also multimeters
- DNS (Domain Name System)815
- docking stations168-169, 815
 - troubleshooting391-393

- DOCSIS (Data Over Cable Service Interface Specification)**754
- Domain Name System.** See DNS
- domain-based networks.** See client/server networks
- domains**815
Domain Name System. See DNS
- DOS.** See disk operating systems; MS-DOS
- dot pitch**50, 764, 815
- dot-matrix characters**597
- dot-matrix printers**600, 780-782, 815
configuration settings639
maintenance657-658
printhead mechanisms600-602
ribbon cartridges600
troubleshooting639-645
consumables640-641
paper not advancing645
power-supply problems639-640
printhead not moving643-644
printhead not printing642
- double data rate SDRAM (DDR-SDRAM)** ..506
- Double Transition (DT) clocking techniques**247-248
- Double-layer Super-Twist Nematic (DSTN) displays**52
- Doze power-saving mode**584-585
- DRAM (dynamic RAM)**504, 816
data integrity579
DRDRAM (Direct Rambus DRAM) ...509-510
EDO DRAM (extended data out DRAM) ..508
EDRAM (enhanced DRAM)505
FPM DRAM (fast page-mode DRAM)508
hyper page-mode DRAM508
Parity Check (PCK) errors185
RDRAM (Rambus DRAM)509-510
refresh period579
refreshing511
SDRAM (synchronous DRAM)505-506
speed ratings519
VRAM (video RAM)509
WRAM (Windows RAM)509
- DRDRAM (Direct Rambus DRAM)** ...509-510
- drive arrays**256-259
mirrored257
RAID systems257-259
striped257
- Drive Mismatch message**355
- drivers.** See device drivers
- DSL (Digital Subscriber Lines)**746
ADSL (Asymmetric DSL)750-751
advantages749
disadvantages749
installing272-273
modems746-747
SDSL (Symmetric DSL)749-752
splitters747
telephone line filters748
voice-over DSL752
- DSR (Data Set Ready) signals**813
- DSSS (Direct Sequence Spread Spectrum)** ..684
- DSTN (Double-layer Super-Twist Nematic) displays**52
- DT (Double Transition) clocking techniques**247-248
- DTR (Data Terminal Ready) signals**813
- dual-booting**815
- dual in-line package (DIP) sockets**90-91
- Dual In-line Pin (DIP) sockets**515
- dual-scan LCD displays**52
- duplexers**619
- Duron microprocessors**485
- dust buildup**430
- DVD drives**
configuring108-109
installing108-109
preventative maintenance436-438
troubleshooting358-360
- DVD-Audio**45
- DVD-RAM**45
- DVD-ROM**45
- DVD-RW drives**45
installing109
portable PCs153-154
troubleshooting360-362

DVD-Video 45
 DVDs (digital versatile discs) 45
 DVI (Digital Visual Interface) video adapters 307
 dye-sublimation printers 610-611, 784
 Dynamic Host Configuration Protocol. See DHCP
 dynamic IP address assignment. See DHCP
 dynamic RAM. See DRAM

E

earth ground 461
 ECC (Error Correction Code) memory . 512-513
 ECC (error-checking and correcting)
 protocols 122
 ECHS (Enhanced Cylinder Head Sector)
 format 816
 ECP (Extended Capabilities Port)
 specification 583, 779
 two-way capabilities 216
 EDDR-SDRAM (enhanced DDR-SDRAM) .506
 edge connectors 816
 EDO DRAM (extended data out DRAM) ... 508
 EDRAM (enhanced DRAM) 505
 EEPROM (Electrically Erasable
 Programmable ROM) 816
 EIA (Electronic Industries
 Alliance) 711-712, 816
 EIA/TIA-568 cabling 711-712
 EIDE (Enhanced IDE) devices 241-242, 816
 data transfer rates 241
 upgrading hard drives 301-305
 EISA (Extended Industry Standard Architecture)
 buses 36, 817
 electrical fires 465
 electrical shorts 411
 electromagnetic interference. See EMI
 electron guns 816
 Electronics Industries Association (EIA) ... 816
 electrophotographic (ELP) cartridges .. 609-610
 electrophotographic reproduction 606
 electrostatic discharge. See ESD
 ELP (electrophotographic) cartridges .. 609-610
 emergency start disks 356
 EMI (electromagnetic interference) 816
 electrostatic discharge. See ESD
 grounding 461-462, 775
 EMS (Expanded Memory Specification) ... 817
 encryption
 WEP (Wireless Encryption Protocol) 167
 End-Of-Text (ETX) characters 121
 Energy Star-compliant monitors 345
 Enhanced Cylinder Head Sector (ECHS)
 format 107, 816
 enhanced DDR-SDRAM (EDDR-SDRAM) . 506
 enhanced DRAM. See EDRAM
 Enhanced I/O controller chip 540
 Enhanced Parallel Ports. See EPP ports
 enhanced SDRAM (ESDRAM) 506
 environmental hazards 456
 disposing of computer equipment 463
 electrostatic discharge 456-457
 causes 457
 grounds 460-462
 MOS handling techniques 458-460
 high-voltage hazards 348-350, 464-465
 storing computer equipment 462
 EPIC (Explicitly Parallel Instruction
 Computing) 482
 EPP ports 152, 583-584
 two-way capabilities 216
 EPROM (Erasable Programmable ROM) .. 817
 erase lamps, laser printers 608
 ERDs. See emergency repair disks
 ergonomics 817
 error checking 817
 error checking and correction 259
 error codes
 110x errors 366
 17xx errors 353
 199 errors 366
 201 errors 330
 301 errors 339
 432 errors 366

- 6xx errors 351
 - 90x errors 366
 - Error Correction Code (ECC) memory** .512-513
 - error messages**412-413. See also specific messages
 - floppy-disk drive errors 351
 - keyboard errors 338-339
 - port errors 365-366
 - system board errors 329-330
 - video errors 344
 - error-checking and correcting (ECC)**
 - protocols 122
 - ESCD (Extended System Configuration Data)**
 - area 579, 817
 - ESD (electrostatic discharge)** .456-457, 775, 816
 - causes 457
 - grounds 460-462
 - MOS handling techniques 458-460
 - from unplugging keyboard 97-98
 - ESDRAM (enhanced SDRAM)** 506
 - Ethernet networks** 692-693, 817
 - coaxial connections 718-719
 - fiber-optic connections 720-721
 - full-duplex mode 696
 - thinnest cabling 711
 - twisted-pair connections 719-720
 - ETX (End-Of-Text) characters** 121
 - ETX/ACK protocol** 120-121
 - Expanded Memory Specification (EMS)** ... 817
 - expansion bus architecture** 30, 35-37, 817
 - 8-bit slots 543
 - 16-bit slots 543
 - 32-bit slots 544
 - AGP (Accelerated Graphics Port) .542, 549-550
 - AMR (Audio Modem Riser) 36, 551
 - covers, importance of 25
 - ISA (Industry Standard
 - Architecture) 21, 543-544
 - MCA (Micro Channel Architecture) ... 544, 552
 - PCI (Peripheral Component
 - Interconnect) 544-549, 686, 829
 - VESA (Video Electronics Standards
 - Association) 36, 542, 552, 838
 - video adapter cards 269
 - Explicitly Parallel Instruction Computing (EPIC)** 482
 - Extended Capabilities Port.** See ECP ports
 - extended data out DRAM (EDO DRAM)** ... 508
 - Extended Industry Standard Architecture (EISA)**
 - buses 36, 817
 - extended memory** 817
 - extended partitions** 105, 765, 817
 - Extended System Configuration Data (ESCD) area** 579, 817
 - external**
 - CD-ROM drives 153-154
 - CD-RW drives 153-154
 - DVD-RW drives 153-154
 - floppy-disk drives 152-153
 - modems 744
 - configuring 272
 - connectors 118
 - installing 270, 272
 - UARTs 192
 - upgrading 308-309
 - SCSI devices 249
- ## F
- F-Type connectors** 753
 - faint print** 783
 - dot-matrix printers 640-641
 - ink-jet printers 647
 - laser printers 654
 - Fan Heat Sink (FHS) modules** 478
 - fan units** 84-87, 490-492
 - heat buildup 334
 - optimizing 294-295
 - power-supply fans 25
 - Fast Ethernet** 719
 - fast page-mode (FPM) DRAM** 508
 - Fast SCSI devices** 161
 - Fast SCSI-2** 245-246
 - FATs (file allocation tables)** 818

- FC-PGA (Flip Chip Pin Grid Array)**487
- FDDI (Fiber Distributed Data Interface)**
 - standard721-722
- FDDs.** See floppy-disk drives
- FDISK utility**106, 818
- FHS (Fan Heat Sink) modules**478
- FHSS (Frequency Hopping Spread Spectrum)**684
- Fiber Distributed Data Interface (FDDI)**
 - standard721-722
- fiber-optic cable**682, 715-716
 - color-coding716
 - connectors716-717
 - Ethernet connections720-721
 - FDDI standard721-722
 - maximum length682
 - multimode716
 - signaling rates682
 - single-mode716
- FIFO buffering**582
- file systems**818
 - CDFS-based109
- file-management tools** .59. See also specific tools
- filenames**818
- files**818
 - DOS59
 - MSCDEX109
 - swap834
 - system835
- fire extinguishers, Class-C**465
- firewalls**741
- Firewire devices**818
 - adapter cards40, 125-127
 - connectors224-225
 - installing126
 - PC Card-based161
 - system resources197
 - troubleshooting373-374
- firmware**54
 - printer updates636
- fixed-form certification exams**11-12
- Flagstaff CPUs**485
- flash BIOS**90, 296-297
- Flip Chip**487
- floppy disks**818
- floppy-disk drives**41
 - CMOS settings575, 577
 - directory structure890, 892
 - installing103
 - portable PCs149-153
 - system board cabling41
 - troubleshooting351-353, 418-419
- floppy-drive controllers**193-194
- flow control**818
- Fn function key, portable PCs**146
- Folder Options**818
- folders**818. See also directories
- fonts**598, 819
- forced perfect termination (FPT)**254
- forests**819
- form factors**27
 - AT. See AT-style systems
 - ATX. See ATX-style systems
 - Baby AT systems27, 534-538
 - system board compatibility537-539
- FORMAT command**819
- formatting**
 - hard-disk drives819
- Found New Hardware Wizard**127
- FPM DRAM (fast page-mode DRAM)**508
- FPT (forced perfect termination)**254
- FQDNs (fully qualified domain names)**819
- fragmentation**819
- Frequency Hopping Spread Spectrum (FHSS)**684
- friction-feed paper-handling mechanisms** 599-600
- front-side bus (FSB)**540-541
 - Pentium 4 CPUs481, 489
 - Pentium II CPUs489
 - Pentium III CPUs480-481
- FRUs (field-replaceable units),**
 - adding/removing, desktops71-75
 - adapter cards115-116
 - IEEE-1394 FireWire125-127
 - modems118-119
 - SCSI123-124
 - sound116-117

- USB124-127
 - video95-96, 269-270
 - wireless128-129
 - digital cameras277
 - input devices96-97
 - keyboards97-98
 - mice98-99
 - touch screens99-101
 - power supplies91-93
 - AC adapters94-95
 - adding93
 - removing92-93
 - storage devices101-102
 - CD-ROM drives108-109
 - CD-RW drives109
 - DVD drives108-109
 - DVD-RW drives109
 - floppy-disk drives103
 - hard-disk drives103-107
 - removable114
 - tape drives110-114
 - system board devices83
 - cooling systems86-89
 - memory modules89-90
 - microprocessors83-86
 - support ICs90-91
 - system boards75-82
 - adapter cards77, 79
 - cables79-80
 - external I/O systems76
 - installing81-82
 - jumper settings80
 - removing from system unit80-82
 - unit cases77
 - FRUs (field replaceable units), adding/removing,**
 - portable PCs140-141
 - display types144-145
 - docking stations168-169
 - input devices
 - keyboards145-147
 - touch pads148-149
 - trackballs147
 - memory modules142-144
 - PC Cards159-164
 - port replicators169
 - power sources156-158
 - storage devices151-152
 - CD-ROM drives153-154
 - CD-RW drives153-154
 - DVD-RW drives153-154
 - floppy-disk drives152-153
 - removable154-155
 - system boards141-142
 - FSB (front-side bus)540-541**
 - Pentium 4 CPUs481, 489
 - Pentium II CPUs489
 - Pentium III CPUs480-481
 - FTP (File Transfer Protocol)818**
 - fuel cells312**
 - full-duplex mode117, 743, 764, 819**
 - Ethernet networks696
 - token-ring networks696
 - full-speed USB devices125, 556**
 - fully formed characters597**
 - fully qualified domain names (FQDNs)819**
 - function keys819**
 - fusing rollers608**
 - fusing stage, laser printers607-608**
 - fusing units608**
- ## G
- G.lite ADSL750**
 - gas-plasma display panels50, 144**
 - gateways737**
 - GDI files819**
 - General Failure Error Reading Drive x**
 - error message417
 - General Protection Faults (GPFs)819**
 - GPE (Group Policy Editor)820**
 - GPFs (General Protection Faults)819**
 - graphical user interface (GUI)820**
 - green mode158**

green PC-compatible power-saving modes . . .585
 ground (electricity)460-462, 775, 820
 grounding straps458
 Group Policy Editor (GPE)820
 GUI (graphical user interface)820

H

HAL (Hardware Abstraction Layer)820
half-duplex mode117, 743, 764, 820
half-speed cache479
handshaking signals820
Hard Drive Boot Failure message354, 772
Hard-Disk Controller (HDC)357
hard-disk drives41-43, 820
 access time301
 backups. See backups
 clean boot disks356
 CMOS settings575-577
 data transfer rate301
 defragmenting300
 installing103-107
 optimizing300
 partitioning104-107
 BIOS limits107
 FAT-based systems105
 FDISK utility106, 818
 NTFS-based systems105-106
 root directory structures107
 portable PCs149-152
 preventive maintenance434-436
 read/write mechanism42
 rotation speed301
 SCANDISK utility436
 track seek time301
 tracks42
 troubleshooting353-357, 418-419
 basic checks356-357
 configuration checks355
 hardware checks357
 reformatting drives357
 symptoms353-354
 upgrading300-305
 cabling303
 controller cards304-305
 IDE/EIDE drives301-305
 portable drives312-313
 RAID adapters304-305
 SCSI drives303-305
 SMARTDRV configuration301
 verifying upgrade302-303
hard-drive controllers194-195
hard-memory errors334, 771
hardware820
 troubleshooting
 field replaceable units418-419
 versus software problems414-417
Hardware Abstraction Layer (HAL)820
hardware RAID259
hardware-oriented modem protocols120
Hayes-compatible command set.
 See AT command set
HCL (Hardware Compatibility List)820
HDC (Hard-Disk Controller)357
HDDs. See hard-disk drives
HDSL (High-data-rate DSL)752
HDSL2 (High-data-rate DSL)752
HDTV (High Definition TV)307, 710
Health Controller IC335
heat buildup431-432
 microprocessor fans334
 portable PCs386
 system units25
heat sinks84, 86-89, 490-492
 optimizing cooling systems294-295
heat spreaders509
Help system, Windows
 Printing Troubleshooter369
 wide area networking379
hexadecimal addresses187-189
hibernate mode157
high-speed USB devices125
high-voltage differential (HVD) signaling 250-251
high-voltage hazards464-465

monitors348-350
HIMEM.SYS file820
hit rate513, 777
hives (Windows NT Registry)821
horizontal retrace48
horizontal scanning rates, monitors38
host adapters
 IDE interface253, 556
 SCSI interface244, 559
hosts
 USB hosts222
hot insertion, PC Cards159
hot-swapping devices124, 767
hotspots128
HP (Hewlett-Packard) printer cartridges ...609
HPSIR protocol197, 584
hubs737
 USB222
 wireless networks685
HVD (high-voltage differential) signaling 250-251
hyper page-mode DRAM508, 777
HyperTerminal378

I

I/O (Input/Output)823
 data transfer181-182
 DMA channels185-186
 interrupts183-185
 polling181-182
 programmed I/O181-182, 831
 external I/O systems, removing76
 resource allocations188-192
 legacy device allocations190-191
 onboard allocations189-190, 583
 peripheral I/O allocations189
 specialty devices192
I/O addresses186-187
 floppy-drive controllers193
 hard-drive controllers194
 LAN adapter cards196

sound cards195
 USB controllers196
I/O ports46-47, 210, 823
 AT-style systems212-215, 553-554
 ATX-style systems211-214, 552
 configuring126-127
 parallel215-217
 interrupt levels217
 LPT handles217
 printer cabling215-217
 serial217-218, 222
 cabling220-222
 designations222
 transmission modes218-220
 troubleshooting365
icons821
ICs (integrated circuits)822
 IC pullers408
 installing90
IDCs (Insulation Displacement Connectors)713-714
IDE (Integrated Drive Electronics)
 devices238-244, 822
 ATA-3/Ultra ATA 33 specification242
 ATAPI specification241-242
 Cable Select configuration240
 cabling43, 253, 556-558
 CD-ROM interface connectors44
 CMOS settings581-582
 configuring240
 connectors556, 558
 controller circuitry238-253
 EIDE specification241-242
 FIFO buffering582
 host adapters253, 556
 master drive configuration240-241
 operating mode, configuring558-559
 partitions240
 PIO modes242, 582
 serial ATA standard243-244
 slave drive configuration240-241
 specifications255-256
 translation mode195

- troubleshooting355
- upgrading hard drives301-305
- IDE1 interface241-242, 556**
- IDE2 interface241-242, 556**
- IDSL (Integrated Services Digital Network DSL)752**
- IE. See Internet Explorer**
- IEEE 802.11 wireless standard684**
- IEEE 802.11a wireless standard684**
- IEEE 802.11b wireless standard167, 684**
- IEEE 802.11g wireless standard684**
- IEEE 802.11x wireless standard683-684**
- IEEE 802.3 Ethernet standard. See Ethernet networks**
- IEEE 802.5 Token Ring standard. See Token Ring networks**
- IEEE-1284 devices273-274**
- IEEE-1394 devices40, 125-127**
 - CD-ROM interface44
 - connectors224-225
 - P1394b proposal225
 - system resources197
 - troubleshooting373-374
- IEEE-803 standard720**
- impact printers597, 821**
- impedance710**
- indicator lights**
 - floppy-disk drives351
 - power-supply problems326
 - system board problems329
- Indoor Receive Unit (IRU)755**
- Indoor Transmit Unit (ITU)755**
- Infrared Data Association. See IrDA devices**
- Infrared Monitor utility277, 374**
- infrared ports614-615**
 - CMOS settings584
 - enabling197
 - system resources197
 - troubleshooting374
- .INI (initialization) files821**
- initialization process55-56, 821**
- ink ribbon (dot-matrix printers)600**
- ink-jet printers604-606, 781-782, 821**
 - cartridge disposal463
 - configuration checks646
 - consumables647-648
 - ink cartridges605, 647-648
 - maintenance658
 - solid ink-jet printers605
 - troubleshooting645-650
 - paper not advancing650
 - printhead not moving649-650
 - printhead not printing648-649
- input devices821**
 - preventive maintenance439-440
 - upgrading308-309
- installing**
 - adapter cards79, 115-116
 - IEEE-1394 FireWire devices125-127
 - LAN cards687-690
 - modems118-119
 - PC Cards159, 162-163
 - SCSI cards123-124
 - sound cards116-117
 - system board compatibility305
 - USB devices124-127
 - video cards95-96, 269-270
 - wireless cards128-129
 - digital cameras277
 - FireWire devices126
 - IEEE-1284 devices273-274
 - IrDA devices276-277
 - keyboards97-98
 - memory modules89-90
 - mice98-99
 - microprocessors83-86, 295-296
 - modems
 - digital modems272-273
 - external dial-up270, 272
 - power supplies93
 - printers611
 - cables612-613
 - IrDA-compliant ports614-615
 - networked printers611, 615
 - storage devices101-102

- CD-ROM drives108-109
- CD-RW drives109
- DVD drives108-109
- DVD-RW drives109
- external devices155, 274-275
- floppy-disk drives103
- hard-disk drives103-107
- removable114
- tape drives110-114
- support ICs90
- touch screens99-101
- UPS (uninterruptible power supply) ...279-280
- USB (Universal Serial Bus) devices126
- Insulation Displacement Connectors (IDCs)713-714**
- Integrated Peripherals screen (CMOS Setup utilities)581-584**
- Integrated Services Digital Network DSL (IDSL)752**
- Integrated Services Digital Network (ISDN) lines822**
- Intel microprocessors30.**
See also specific microprocessors
 - clones484-485
 - configuring492-493
 - Overdrive processors486
 - power supply levels489-490
 - socket specifications486
 - stepping levels295
 - temperature specifications294
- intelligent controllers822**
- interface cables696**
- internal modems118, 744**
 - connectors192
 - installing118-119
 - RJ-11 jacks211
 - UARTs192-193
- internal SCSI devices249**
- Internet736-738, 822**
 - backbone736
 - connections
 - cable modems753-754
 - dial-up742-744
 - DSL746, 748-752
 - ISDN744-746
 - LANs740-742
 - satellite754-756
 - wireless756
 - IP addresses. See IP addresses
 - ISPs (Internet service providers) ...738-739, 822
 - packet transmission736-738
 - TCP/IP. See TCP/IP
 - World Wide Web. See WWW
- Internet Printing Protocol (IPP)822**
- Internet service providers. See ISPs**
- interrupt transfers556, 778**
- interrupts183-185, 822**
- Invalid Drive Specification message ...356, 773**
- Invalid Media Type message772**
- Invalid Switch Memory Failure message ...329**
- Invalid System Disk message354**
- IO Channel Check (IOCHCK) signals185**
- IO.SYS file823**
 - copying from boot disk to hard drive356
- IP addresses822**
- IPCONFIG utility823**
- IPP (Internet Printing Protocol)822**
- IPX/SPX protocol697, 823**
- IrDA (Infrared Data Association) devices ...821**
 - CMOS settings584
 - connections225-226
 - enabling IrDA ports197
 - Infrared Monitor utility277, 374
 - installing276-277, 374
 - printer connections614-615
 - protocols226
 - support, enabling/disabling276
 - system resources197
 - troubleshooting374
- IrDA networks683**
- IrDA-FIR protocol226**
- IrDA-SIR protocol226**
- IrLPT protocol226**
- IRQs (interrupt requests)183-185, 822**

FireWire adapters	197
floppy-drive controllers	194
hard-drive controllers	194
LAN adapter cards	196
PS/2 mouse port	193
sound cards	195
USB controllers	196
IrTran-P protocol	226
IRU (Indoor Receive Unit)	755
ISA (Industry Standard	
Architecture) bus	35, 543-544
ISDN (Integrated Services Digital Network)	
connections	744-746, 822
installing	272-273
isochronous transfers (USB)	556
ISPs (Internet service providers) ..	738-739, 822
Itanium microprocessors	482-483
ITU (Indoor Transmit Unit)	755

J-K

JEIDA connectors	313
joysticks	52, 823
 jumper blocks	
IDE drives	240
SCSI drives	252-253
jumpers	33-34, 823
K5 CPUs	484
K6 CPUs	484
K6PLUS-3D CPUs	484
K7 CPUs	484-485
K75 CPUs	485
Katmai CPUs	485
KB/Interface Error – Keyboard Test	
Failure message	339
kernel	59, 823
Keyboard Error – Keyboard Test	
Failure message	338
Keyboard Is Locked – Unlock It message ..	338
keyboards	46-48, 823

cabling	46
connectors	47, 97
ATX systems	211
portable PCs	146, 150
defined	22
installing	96-98
portable PC keyboards	145-147
preventive maintenance	439
troubleshooting	338-340, 418-419
upgrading	308-309

L

L1 cache	514, 777
Athlon Duron CPUs	485
Athlon K7 CPUs	485
Athlon K75 CPUs	485
Athlon Thunderbird CPUs	485
Itanium CPUs	483
location	514
Pentium 4 CPUs	482
Pentium II CPUs	479
Pentium MMX CPUs	476
Pentium Pro CPUs	477
Tualatin CPUs	481
L2 cache	514
Athlon Duron CPUs	485
Athlon K7 CPUs	485
Athlon K75 CPUs	485
Athlon Thunderbird CPUs	485
Celeron Mendocino CPUs	479
Coppermine 128 CPUs	481
Itanium CPUs	483
location	514
Pentium 4 CPUs	482
Pentium II CPUs	479
Pentium III CPUs	480-481
Pentium MMX CPUs	476
Pentium Pro CPUs	477
Pentium Xeon CPUs	481
Tualatin CPUs	481

- L3 cache** 514
 - Itanium CPUs 483
 - location 514
- LANs (local area networks)** 672-673, 824
 - adapter cards 39, 686-690
 - configuration settings 688-689
 - installing 687-690
 - optimizing 307-308
 - PC Card adapters 165
 - system resources 196
 - troubleshooting 385-386
 - wireless LAN adapters 166, 686
 - client/server 676-677
 - control strategies 676-677
 - defined 670, 673
 - Ethernet LANs 692-693
 - coaxial connections 718-719
 - fiber-optic connections 720-721
 - twisted-pair connections 719-720
 - Internet access 740-742
 - peer-to-peer 676-677, 784
 - printers 615
 - Token Ring 693-696
 - topologies 673-675
 - troubleshooting 722-724
 - cabling 385
 - configuration checks 724
 - connections 723
 - data security 724-725
 - hardware checks 725-727
 - wireless (WLANs) 683-686
 - access points 128-129, 685, 690-691
 - adapters 40, 686
 - Bluetooth specification 685
 - IEEE specifications 683-684
 - portable PCs and 165-168
 - RF signal strength 690-691
 - security 690
 - spread spectrum technologies 684
 - WEP encryption 167
- laptops** 140-141
 - AC power adapters 95, 156-157
 - batteries 156
 - maximizing life of 158
 - recharging 312
 - storing 462
 - upgrading 311-312
- case design 24
- DC power adapters 156-157
- disk drives 149-155
- display types 50-52, 144-145
- docking stations 168-169
- fuel cells 312
- gas-plasma panels 144
- keyboards 145-147
 - application keys 146
 - connectors 146-147, 150
 - Fn function key 146
 - WIN keys 146
- LCD displays 144-145
 - preventive maintenance 433-434
 - replacing 145
- memory 142-144
 - short memory counts 143
 - Small Outline DIMMs 517
 - upgrading 143-144
 - USB plug-in modules 144
 - voltage-level support 143
- networking 164-168
- PC Cards. See PC Cards
- port connections 150-151
- port replicators 169
- power sources 156-158
 - consumption 157
 - management 157-158
- storage devices
 - CD-ROM 153-154
 - CD-RW 153-154
 - DVD-RW 153-154
 - floppy drives 152-153
 - installing 155
 - removable 154-155
- system boards 141-142
- touch pads 148-149
- trackballs 52, 147, 836

upgrading310-314
 batteries311-312
 disk drives312-313
 PCMCIA cards313-314
Large translation mode576
laser printer paper651
laser printers606-610, 781, 823
 burn hazards465
 color printers609-610
 combination units619
 compression rollers606
 corona wires608
 electrophotographic reproduction606
 maintenance658-659
 operational stages607-609
 registration operation607
 safety issues659
 thermal sensors608, 781
 toner cartridges608-651
 toner disposal procedures463
 troubleshooting650-656
 consumables651-652
 dead printers652-653
 faulty print653-655
 missing print655
 paper jams655-656
 partially disabled printers652-653
LBA (Logical Block Addressing)107, 824
LBA translation mode576
LCDs (liquid crystal
displays)50-52, 144-145, 824
 preventive maintenance433-434
 replacing145
LED (light-emitting diode)824
legacy devices119, 823
 system resource allocation190-191
Li-ion (lithium-ion) batteries311-312
line filters, DSL748
lithium-ion polymer batteries311
LNB (Low Noise Block) converters755
local analog loopback tests382
local area networks. See LANs

local bus architectures544-546
local digital loopback tests382
Logical Block Addressing (LBA)107, 824
logical hard-disk drives104-107
logical network topologies675
logons824. See also bootup process
loopback plugs367
loopbacks824
lost allocation units824
Low Noise Block (LNB) converters755
low-profile desktops23
low-speed USB devices125, 556
low-voltage differential (LVD) signaling .247, 251
LPT ports217, 824
LVD-to-SE converters251
LVD/MSE-to-LVD/MSE converters251

M

magnetic storage media40
 preventive maintenance436-438
main control boards, dot-matrix printers ...600
maintenance. See preventive maintenance
Maintenance mode (ink-jet printers)650
Maskable Interrupts183
master boot record. See MBR
master drives240-241
Master File Table (MFT)824
Material Data Safety Sheets (MSDS)463
MAU (Medium Attachment Unit)711
MBR (master boot record)824
 defined55
 missing/corrupted354-356
MBR switch, FDISK356
MCA (Micro Channel Architecture)
 bus36, 544, 552
MDC (Mobile Daughter Card) format551
mechanical vibration604
Medium Attachment Unit (MAU)711
MEM command825
memory31-32, 504-505, 825

- banks515-516
- cache memory513-514
 - defined30
 - upgrading299
- CMOS RAM. See CMOS RAM
- fast facts776-780
- hard-memory errors771
- installing memory modules89-90
- nonvolatile29, 505, 827
- optimizing298-299
- overhead511, 513
- portable PCs142-144
 - short memory counts143
 - upgrading143-144
 - USB plug-in modules144
 - voltage-level support143
- RAM. See RAM
- ROM. See ROM
- soft-memory errors771
- virtual memory838
- volatile29, 504
838
- memory addresses, LAN adapter cards**196
- menus**825
- Merced CPUs**485
- mesh topology**674
- meta-learning**11
- metal-oxide semiconductor (MOS)**825
- MFT (Master File Table)**824
- MicroDIMMs**518
- Microprocessor Type (CPU configuration setting)**492
- microprocessors**30-31. See also **specific microprocessors**
 - backward compatibility30
 - chipsets32-33, 539-541, 811
 - CMOS settings578-579
 - defined30
 - Real-Time Clock function574-575
 - clock speeds489, 541
 - configuring492-493
 - over-clocking293
- core voltage settings86
- fan units84-87, 490-492
- fast facts776-780
- heat sinks84-89, 490-492
- installing83-86, 295-296
- Pentium clones30, 484-485
- pin 1 of31
- power supply levels489-490
- socket specifications486
- stepping levels295
- summary of493
- temperature specifications294
- troubleshooting334-337
- update information, uploading479
- upgrading290-296
 - additional processors, installing295-296
 - auto-detect function291-293
 - bus-related issues292-294
 - cooling systems, optimizing294-295
 - electrostatic discharge and290
 - upgrade paths291
 - verifying upgrades292
- Microsoft Management Console (MMC)** ...825
- Microsoft System Information utility. See System Information utility**
- mid-level networks**737
- mid towers**24
- mini-ATX system boards**535
- mini-cartridge tapes**110
- mini towers**24
- mirrored drive arrays**257
- Missing Operating System error message**354, 772
- missing print**
 - dot-matrix printers642
 - laser printers653, 655
- MMC (Microsoft Management Console)** ...825
- Mobile Daughter Card (MDC) format**551
- modem adapter cards**38-39
- modems**117-118, 743-744
 - AC power adapters94
 - AT command set379-381

- cable modems753-754
- call waiting, disabling382
- character framing122
- character type parameters122
- communication software379
- configuring119-120, 272
- connections192
- DSL modems746-747
- DTR settings381
- full-duplex mode117, 743, 764
- half-duplex mode117, 743, 764
- installing118-119
 - digital modems272-273
 - external dial-up270-272
- multiplexing signal frequencies743
- null connection schemes220-221
- output volume, setting381
- PC Card modems165-166
- protocols120-122
- resetting381
- simplex mode117, 743
- troubleshooting375-379
 - COM port conflicts376
 - hardware checks382-383
 - self-diagnostic tests382-383
 - symptoms376
 - Windows checks377-379
- UARTs192-193, 766
- upgrading external modems308-309
- modified-only backups. See differential backups**
- modulators117, 743. See also modems**
- monitors48-52, 825**
 - AC power adapters94
 - cabling46
 - color settings351
 - configuring270
 - connectors48
 - defined23
 - degaussing350
 - dot pitch50
 - Energy Star-compliant345
 - horizontal scanning rates38
 - installing95-96, 269-270
 - portable display types50-52
 - preventive maintenance432-433
 - resolution49-50, 764
 - shadow masks49
 - storing462
 - troubleshooting348-351, 418-419
 - vertical refresh rates38
 - video adapter cards37-38
- monochrome monitors49**
- MOS (Metal Oxide Semiconductor)**
 - devices419, 825**
 - handling techniques458-460
- motherboards. See system boards**
- mouse825**
 - cleaning439
 - connectors46, 98-99, 211
 - defined22
 - installing98-99
 - troubleshooting340-343
 - upgrading308-309
- MS-DOS**
 - commands
 - ATTRIB808
 - CHKDSK811
 - FDISK818
 - MEM825
 - FAT-based disk structure. See FAT-based systems
 - partitioning hard disks106
- MSCDEX files109**
- MSD (Microsoft Diagnostics) utility825**
- MSDOS.SYS file826**
 - copying from boot disk to hard drive356
- MSDS (Material Safety Data Sheets)463**
- MTBF (Mean Time Between Failure)429**
- multimedia system resources195**
- multimeters408-411**
- multimode fiber-optic cable716**
- multipath691**
- multiplexing743**

N

- NAK (Negative Acknowledge)** **826**
- NAP (Network Access Point)** **739**
- Narrow SCSI** **245**
- needle-nose pliers** **407**
- Negative Acknowledge (NAK)** **826**
- NetBEUI (NetBIOS Extended User Interface)** **697, 826**
- NetBIOS** **826**
- NetWare (Novell)** **826**
- Network Access Point (NAP)** **739**
- network interface cards. See NICs**
- Network layer (OSI model)** **696**
- Network Neighborhood applet** **826**
- networks** **672-673**
 - adapter cards686-690
 - configuration settings688-689
 - installing687-690
 - system resources196
 - troubleshooting385-386
 - wireless LAN adapters686
 - client/server networks676-677, 811
 - control strategies676-677
 - defined673
 - Ethernet networks692-693
 - coaxial connections718-719
 - fiber-optic connections720-721
 - twisted-pair connections719-720
 - infrared networks683
 - mid-level networks737
 - OSI (Open Systems Interconnection) model691-692
 - peer-to-peer networks676-677, 784, 829
 - portable PCs and164-168
 - printers/printing615
 - self-tests638-639, 648
 - troubleshooting637-638
 - protocols696-698
 - IPX/SPX697, 823
 - Token Ring networks693-696, 714-715
 - topologies673-675
 - transmission media679
 - attenuation679
 - coaxial cabling681, 709-711, 718-719
 - crossover673
 - fiber-optic cabling682, 715-716
 - 720-721
 - IDC connections713-714
 - noise immunity capabilities679
 - plenum-rated cables717-718
 - testing cabling726-727
 - token-ring696
 - twisted-pair
 - cabling679-680, 711-712, 719-720
 - UDC connections714-715
 - wireless infrared links683
 - troubleshooting722-724
 - cabling385
 - configuration checks724
 - connections723
 - data security724-725
 - hardware checks725-727
 - wireless. See wireless LANs
- Ni-Cad (nickel-cadmium) batteries** **311**
- NICs (network interface cards)** **39, 686-690**
 - configuration settings688-689
 - installing687-690
 - optimizing307-308
 - PC Card adapters165
 - system resources196
 - wireless PC Card adapters166
- NiMH (nickel metal-hydride) batteries** **311-312**
- NMI (Non-Maskable Interrupts)** **183-185, 827**
- No Boot Record Found message** **351, 354, 772**
- No ROM BASIC-System Halted message** **354**
- nodes, USB** **222**
- noise immunity** **679**
- non-impact printers** **597, 827**
- Non-Maskable Interrupts (NMI)** **183-185, 827**
- Non-System Disk or Disk Error message** **354, 417, 772**
- nonstatic vacuums** **430**
- nonvolatile memory** **29, 505, 827**

Normal translation mode576

north bridge539

notebooks140-141

- AC power adapters 95, 156-157
- batteries156
 - maximizing life of158
 - recharging312
 - storing462
 - upgrading311-312
- case design 24
- DC power adapters156-157
- disk drives149-155
- display types50-52, 144-145
- docking stations168-169
- fuel cells312
- gas-plasma panels144
- IrDA (Infrared Data Association) ports584
- keyboards145-147
 - application keys146
 - connectors146-147, 150
 - Fn function key146
 - WIN keys146
- LCD displays144-145
 - preventive maintenance433-434
 - replacing145
- memory142-144
 - short memory counts143
 - Small Outline DIMMs517
 - upgrading143-144
 - USB plug-in modules144
 - voltage-level support143
- networking164-168
- PC Cards. See PC Cards
- port connections150-151
- port replicators169
- power sources156-158
- storage devices
 - CD-ROM153-154
 - CD-RW153-154
 - DVD-RW153-154
 - floppy drives152-153
 - installing155

- removable154-155
- system boards141-142
- touch pads148-149
- trackballs52, 147, 836
- upgrading310-314
 - batteries311-312
 - disk drives312-313
 - PCMCIA cards313-314

Novell NetWare826

NT Loader827

NTDETECT.COM file827

NTFS (NT File System)827

NTLDR file827

NTUSER.DAT file827

null modems connections220-221, 827

numbering systems187-189

NWLink protocol697, 823

O

odd parity827

offline UPSs442

onboard I/O resource allocations189, 583

online UPSs442

Operating System Technologies exam

- component**841

operating systems .827. See also specific systems

- bootup process. See bootup process
- defined59
- disk-management tools
 - Backup436, 809
 - CHKDSK436, 811
 - Defrag436
 - FDISK106, 818
 - FORMAT819
 - ScanDisk436
- troubleshooting. See operational problems

optical mouse828

optimizing

- hard-disk drives300
- memory298-299

network adapters307-308
OSI (Open Systems Interconnection) networking model691-692
Out of Disk Space message354
over-clocking microprocessors293, 541, 770
Overdrive processors486
oxidation buildup428-429
ozone filters, laser printers659

P

P-cables249
P1 circuit-board power connector93
P1394b IEEE standard proposal225
P2 circuit-board power connector93
P5 CPUs475. See also Pentium CPUs
P54C CPUs475. See also Pentium CPUs
P55C CPUs. See Pentium MMX CPUs
P8 power connectors27-28, 93
P9 power connectors27-28, 93
paging files. See swap files
palmtop computers278. See also PDAs
paper-feed motors, dot-matrix printers600
paper-handling mechanism599-600
 automatic sheet feeders619
 dot-matrix printers600
 ink-jet printers606
paper jams650-651, 656, 782
paper specifications641
paper weight781
parallax errors101
parallel data transfers181
parallel ports215-217, 828
 CMOS settings583-584
 IEEE-1284 devices, installing273-274
 interrupt levels217
 LPT handles217
 printer cabling215-217
 troubleshooting367-370
Parity Check (PCK) errors185
parity checking122, 511-512, 777, 828

Partition Book Sector (NFTS disk volumes) .828
partition boot records105
partitioning hard-disk drives828
 BIOS limits107
 extended partitions817
 FDISK utility106, 818
 primary partitions830
 root directory structures107
passive heat sinks86-87, 490, 492
passive termination254
passive-matrix LCD displays52
passwords828
 CMOS settings585-586
PC Card (PCMCIA) Wizard163
PC Card drives114
PC Cards159-164, 313-314
 as add-on disk drive function161
 as add-on memory devices161
 Cardbus160
 enablers159
 hot insertion159
 installing159, 162-163
 interfaces161-162
 modems165-166
 network adapters165, 166
 physical sizes313
 removing164
 support, enabling/disabling163-164
 troubleshooting388-389
 uses160
PC standards21-22
PC systems. See also specific components
 cases23-25
 components22-23
PC-AT systems21-22
PC-XT system boards534
 8-bit expansion slots543
 keyboard connectors538
 mounting-hole patterns537
PCI (Peripheral Component Interconnect)
 buses544-549, 686, 829
PCK (Parity Check) errors185

PCMCIA (Personal Computer**Memory Card International Association)****cards**159, 313-314, 686, 770, 829

Cardbus160

I/O slots162-163

physical sizes313

troubleshooting388-389

PDAs (personal digital assistants) ..278-279, 829

fuel cells312

Internet access756

Infrared Data Association ports584

pens278

peer-to-peer networks676-677, 784, 829

resource sharing677

PELs (picture elements)49**pens (PDAs)**278**Pentium 4 CPUs**481-482

clock speeds489

temperature specifications294

Pentium Celeron CPUs479**Pentium Celeron Mendocino CPUs**479**Pentium CPUs**30, 474-476

bus speeds540-541

chipsets32-33, 539-541

clock speeds489

configuring492-493

expansion slots36

fan units84, 86-87, 490-492

first-generation475

heat sinks84, 86-89, 490-492

I/O adapter cards38-39

power-supply levels489-490

second-generation475

socket specifications486

stepping levels295

temperature specifications294

third-generation475-476

upgrade information, uploading479

Pentium II CPUs30, 478-479, 776

clock speed489

Pentium III CPUs479-481, 776

clock speed489

temperature specifications294

Xeon processors481

Pentium MMX CPUs475-476**Pentium Pro CPUs**30, 477-478**PCI (Peripheral Component Interconnect)****buses**544-549, 686, 829**peripheral devices**46-47, 829. See also**specific devices**

AC power adapters94

connectors53

AT systems212-215

ATX systems211-212

data transfer

DMA controllers185-186

interrupts183-185

polling181-182

programmed I/O181-182

expansion slot connectors35-37

storing462

upgrading308-309

permissions829**persistence**49**Personal Computer Memory Card International****Association.** See **PCMCIA****personal computer systems.** See **PC systems****personal digital assistants.** See **PDAs****PGA (Pin Grid Array) specification**475**picture elements.** See **pixels****PIF (Program Information File)**831**pin #1, floppy-disk drives**41**pin 1, microprocessors**31**pin-feed paper-handling mechanisms** ..599, 829**PING command**385, 829**PIO modes**242-243, 582**pipeline SRAM**511**pixels**49, 144, 829. See also **resolution****planar boards.** See **system boards****platters, hard-disk drives**42**PLCC (Plastic Leadless Chip Carrier) sockets** 91**plenum-rated cables**717-718**pliers**407**Plug-and-Play (PnP)**35, 829

- auto-detection functions541, 558
- BIOS, CMOS settings579-581
- infrared device support, enabling/disabling .276
- PM. See preventive maintenance**
- PnP/PCI Configuration options**
- (CMOS Setup utilities)579-581
- Point of Sale (POS) operations100**
- Point-to-Point Protocol (PPP)829**
- Point-to-Point Tunneling Protocol (PPTP) ..829**
- pointing devices52, 829**
- points (fonts)598**
- polarizers (LCD displays)144**
- Policy Editor (PoEdit)830**
- polling181-182, 830**
- port replicators169, 391-393**
- portable PCs140-141**
 - AC power adapters95, 156-157
 - batteries156
 - discharging/recharging391
 - maximizing life of158
 - recharging312
 - storing462
 - troubleshooting390-391
 - upgrading311-312
- case design24
- connectors
 - 802.11b cards167
 - CD-ROM drives153-154
 - CD-RW drives153
 - docking-port connectors168
 - DVD-RW drives153
 - floppy-disk drives153
 - keyboards146-147
 - LCD panel connections144-145
 - network adapters165
 - PC Card modems165-166
 - PC Cards162-163
 - system board arrangement142
 - trackballs147
- DC power adapters156-157
- disassembling387-388
- display types50-52, 144-145
- docking stations168-169, 391-393
- fuel cells312
- gas-plasma panels144
- keyboards145-147
 - application keys146
 - connectors146-147, 150
 - Fn function key146
 - WIN keys146
- LCD displays144-145
 - preventive maintenance433-434
 - replacing145
- memory142-144
 - short memory counts143
 - Small Outline DIMMs517
 - upgrading143-144
 - USB plug-in modules144
 - voltage-level support143
- networking164-168
- PC Cards. See PC Cards
- port connections150-151
- port replicators169, 391-393
- power sources156-158
 - consumption157
 - management157-158
- storage devices149-155
 - CD-ROM153-154
 - CD-RW153-154
 - DVD-RW153-154
 - floppy152-153
 - installing155
 - removable154-155
- system boards141-142
- touch pads52, 148-149
 - cleaning439
 - troubleshooting388
- trackballs52, 147, 836
- troubleshooting386-388
 - batteries390-391
 - docking stations391-393
 - heat buildup386
 - PC Card hard drives389
 - PC Cards388-389
 - port replicators391-393
 - touch pads388

upgrading 310-314
 batteries 311-312
 disk drives 312-313
 PCMCIA cards 313-314
ports **210**
 AT-style systems 212-215
 ATX-style systems 211-214
 CMOS settings 583-584
 FireWire 373-374
 I/O ports 46-47
 AT-style Pentium system boards 553-554
 ATX-style Pentium system boards 552
 IrDA (Infrared Data Association)
 ports 225-226, 584
 CMOS settings 584
 troubleshooting 374
 printer ports 614-615
 parallel 215-217
 CMOS settings 583-584
 IEEE-1284 devices 273-274
 interrupt levels 217
 LPT handles 217
 printer cabling 215-217
 troubleshooting 367-370
 portable PCs 150-151
 serial 217-218
 cabling 218-222
 CMOS settings 584
 configuring for mouse operation 98
 designations 222
 transmission modes 218-220
 troubleshooting 368-371
 troubleshooting 365
 basic parallel ports 367-370
 basic serial ports 368-371
 CMOS options 366-367
 FireWire ports 373-374
 infrared ports 374
 mouse ports 340-341
 symptoms 365-366
 USB ports 371-373
 USB ports 124-125, 222-224, 371-373
POST (Power On Self Test) **55, 830**

POTS (plain old telephone system) **740**
POTS splitters **747**
Power Management Setup options
 (CMOS Setup utilities) **584-585**
power management software **280**
power supplies **27-29, 830**
 CPU levels 489-490
 defined 26
 dot-matrix printers 600
 fans 25, 86
 installing 93
 portable PCs 156-158
 removing 92-93
 troubleshooting 326-328
 upgrading 309-310
 wattage ratings 93
power-line protection **440-441**
 standby power systems 442
 surge suppressers 441-442
 uninterruptible power supply. See UPS
PPGA (Plastic Pin Grid Array)
 specification **480, 487**
PPP (Point-to-Point Protocol) **829**
PPTP (Point-to-Point Tunneling Protocol) .. **829**
Press F1 to Continue message **417**
preventive maintenance **830**
 cleaning procedures 428-429
 defined 429
 dust buildup 430
 fast facts 773-776
 hard-disk drives 434-436
 heat buildup 431-432
 input devices 439-440
 LCD displays 433-434
 monitors 432-433
 power variations 440-442
 printers 657-659
 removable storage systems 436-438
 rough-handling problems 430
PRI (Primary Rate Interface) services .. **745-746**
Primary Bootstrap Loader **810**
primary corona wire, laser printers **608**

- Primary IDE interface**241-242
- primary partitions**105, 830
- Primary Rate Interface (PRI) services** ..745-746
- print server ports**615
- print servers**637
- print sharing**615
- Print Troubleshooter (Windows 9x)**369
- printers/printing**830
 - AC power adapters94
 - cabling215-217, 612-615
 - collators619, 651
 - connectors53
 - defined23
 - dot-matrix printers600, 780-782, 815
 - maintenance657-658
 - printhead mechanisms601-602
 - troubleshooting639-645
 - drivers634-635
 - duplexers619, 651
 - dye-sublimation printers610-611, 784
 - fast facts780-784
 - firmware updates636
 - fonts598
 - impact printers597
 - infrared printers614-615
 - ink-jet printers604-606, 781-782, 821
 - configuration checks646
 - consumables647-648
 - ink cartridges605, 647-648
 - maintenance658
 - solid ink-jet printers605
 - troubleshooting645-650
 - laser printers606-610, 781, 823
 - burn hazards465
 - color printers609-610
 - combination units619
 - compression rollers606
 - corona wires608
 - electrophotographic cartridges609
 - electrophotographic reproduction606
 - maintenance658-659
 - operational stages607-609
 - registration operation607
 - safety issues659
 - thermal sensors608, 781
 - toner cartridges608-609, 651
 - troubleshooting650-656
 - mechanics of599-600
 - networked615
 - cabling615
 - troubleshooting637-638
 - newer interfaces615-616
 - nonimpact printers597
 - paper specifications641
 - parallel ports217
 - staplers/stackers619
 - storing462
 - thermal printers602-603
 - toner disposal procedures463
 - troubleshooting418-419
 - dot-matrix printers639-645
 - drivers634-635
 - ink-jet printers645-650
 - interface/controller problems635-637
 - laser printers650-656
 - network printers637-638
 - self-tests633, 638-639, 648
 - upgrading printers308-309, 616-619, 651
- printhead mechanism**599, 780
 - dot-matrix printers600-602
 - ink-jet printers605
 - troubleshooting642-644
- programmed I/O**181-182, 831
- Prometric testing centers**841
- Protected Mode FAT File System.** See VFAT-based systems
- protection**456
 - disposing of computer equipment463
 - electrostatic discharge456-457
 - causes457
 - grounds460-462
 - MOS handling techniques458-460
 - high-voltage hazards348-350, 464-465
 - storing computer equipment462
- protocols**831. See also specific protocols

IrDA devices226
 modem protocols120-122
 networking protocols696-698
proxy servers741
PS/2 connectors46-47, 766
 ATX-style systems211
 keyboards97
 mice98

Q-R

Q-cables249
QIC tape standards111
QIC-40 tape standard111
QIC-500M tape standard111
QIC-80 tape standard111
 quotas831
QWERTY keyboard831

radio frequency interference (RFI) signals ...336
radio grade (RG) ratings709
RADSL (Rate Adaptive DSL)751
RAID (Redundant Array

of Inexpensive Disks)256-259, 770, 832
 hardware RAID259
 software RAID259
 RAID 0257, 770
 RAID 1257-258, 770
 RAID 5258-259, 770
 RAID Advisory Board257
 RAID controller cards304-305
RAM (random access memory) ...504-505, 831
 access time298
 banks515-516
 cache memory. See cache memory
 CMOS RAM. See CMOS RAM
 data error detection511
 defined29
 DRAM (dynamic RAM)
 refreshing511
 speed ratings519

DRDRAM (Direct Rambus DRAM) ...509-510
 ECC (Error Correction Code)512-513
 EDO DDRAM (extended data out DRAM) .508
 EDRAM (enhanced DRAM)505
 modules32. See also specific modules
 installing89-90
 swapping334
 optimizing298-299
 overhead511-513
 parity checking511-512
 RDRAM (Rambus DRAM)509-510
 SDRAM (synchronous DRAM)505-506
 Shadow RAM833
 speed ratings518-520
 SRAM (static RAM)504, 510-511
 tag RAM478
 troubleshooting334
 upgrading297-299
 VRAM (video RAM)509
 WRAM (Windows RAM)509
Rambus DRAM (RDRAM)509-510
Rambus Inline Memory Modules
 (RIMMs)509-510
random access memory. See RAM
raster lines48
raster scan video signals307
raster-scanned fonts598
Rate Adaptive DSL (RADSL)751
RCA mini jacks116, 211
RDRAM (Rambus DRAM)509-510, 520
read-only memory. See ROM
Real-Time Clock (RTC) function574-575
recycling printer toner463
redundant addressing187
Redundant Array of Inexpensive Disks. See RAID
refresh settings, configuring270
refreshing DRAM devices511
RegEdit utility832
Registry832
remote digital loopback tests382
removable storage systems114
 portable PCs151, 154-155
 preventive maintenance436-438

- troubleshooting364-365
 - removing system boards****75-82**
 - adapter cards77-79
 - cables79-80
 - external I/O systems76
 - jumper settings80
 - system unit cases77
 - Reset signal****832**
 - resistance tests****408-411, 773**
 - resolution****49-50, 764, 832**
 - configuring270
 - LCD displays52
 - SVGA systems37
 - VGA systems37
 - RFI (radio frequency interference) signals** ..**336**
 - RG (radio grade) ratings****709**
 - RG-6 cabling****710, 755, 785**
 - RG-8 cabling****710-711, 785**
 - RG-58 cabling****711, 785**
 - RG-59 cabling****711, 755, 785**
 - RIMMs (Rambus Inline Memory Modules)****509-510**
 - ring topology****673, 675**
 - RJ-11 connectors****118, 211, 712, 744**
 - RJ-12 connectors****744**
 - RJ-14 connectors****744**
 - RJ-45 connectors****210, 673, 686, 712**
 - ROM (read-only memory)****505, 831**
 - defined29
 - troubleshooting335
 - ROM BASIC Interpreter Not Found message** **354**
 - ROM BIOS. See BIOS**
 - root directory****832**
 - root hub (USB)****222**
 - rotation speed, hard-disk drives****301**
 - routers****737-739**
 - RS-232 standard****218-221, 767, 832**
 - COM designations222
 - maximum cable length221
 - modem connections118
 - printer cabling613
 - RS-232C standard****218, 221**
 - COM designations222
 - maximum cable length221
 - RS-422 serial connectors****221-222**
 - RS-423 serial connectors****221-222**
 - RTC (Real-Time Clock) function****574-575**
- ## S
- Safe Mode****833**
 - safety issues****456**
 - disposing of computer equipment463
 - electrical fires465
 - electrostatic discharge456-457
 - causes457
 - grounds460-462
 - MOS handling techniques458-460
 - fast facts773-776
 - high-voltage hazards464-465
 - laser printers659
 - printers465
 - sags (voltage)****441, 774**
 - satellite communication links, installing** **272-273**
 - satellite Internet access****754-756**
 - SCA (Single Connector Attachment)**
 - connector****248**
 - ScanDisk utility****436**
 - scanners**
 - AC power adapters94
 - storing462
 - screen resolution****49-50, 764, 832**
 - configuring270
 - LCD displays52
 - SVGA systems37
 - VGA systems37
 - screwdrivers****407**
 - SCSI (Small Computer System Interface)**
 - devices****244, 834**
 - adapter cards, installing123-124
 - cabling248-249
 - CD-ROM interface connectors44
 - connectors248-249, 559-560

- Double Transition (DT) clocking
 - techniques247-248
- external249
- host adapters244, 559
- ID numbers251-253
- internal249
- large drive support355
- PC Card-based161
- signaling247, 249-251
- specifications245-248, 255-256
- termination253-255
- troubleshooting355
- upgrading SCSI hard drives301-305
- SCSI-I specification245**
- SCSI-II specification161**
- SDR-SDRAM (single data rate SDRAM)506**
- SDRAM (synchronous DRAM)505-506**
 - speed ratings519
- SDSL (Symmetric DSL)749-752**
- SE (single-ended) signaling249-251**
- SEC (Single-Edge Contact) cartridges .. .478-479**
- SECC-2 cartridges487**
- secondary corona wire, laser printers608**
- Secondary IDE interface241-242**
- sectors40**
 - CD-ROMs44
 - hard-disk drives42
- security**
 - BIOS security options585-586
 - firewalls741
 - network security724-725
 - wireless networks690
- Security Configuration options (CMOS Setup utilities)585-586**
- self-booting disks. See boot disks**
- self-tests, printers633**
 - dot-matrix printers639
 - ink-jet printers648
 - network-ready printers638
- SEPP (Single-Edged Processor Package) cartridges479**
- serial ATA standard243-244**
- serial data transfers181**
- Serial Line Internet Protocol (SLIP)833**
- serial ports217-218, 222, 833**
 - cabling218-222, 781
 - CMOS settings584
 - configuring for mouse operation98
 - designations222
 - transmission modes218-220
 - troubleshooting368-371
- series-A connectors223-224**
- series-B connectors223-224**
- servers833**
 - print servers637
 - proxy servers741
- SGRAM (synchronous graphics RAM)506**
- shadow masks49, 764**
- Shadow RAM833**
- SHDSL (Symmetric DSL)752**
- shielded twisted pair (STP) cabling680**
- short memory counts143**
- shorts, electrical411**
- signaling specifications247-251**
- SIMMs (Single In-Line Memory Modules)32, 515-516, 834**
 - installing89-90
 - optimizing298-299
 - upgrading RAM297-298
- simplex mode117, 743, 834**
- single data rate SDRAM (DR-SDRAM)506**
- Single In-line Pin (SIP) modules515**
- Single-Edge Contact (SEC) cartridges .. .478-479**
- Single-Edged Processor Package (SEPP) cartridges479**
- single-ended (SE) signaling249-251**
- single-mode fiber-optic cable716**
- SIP (Single In-line Pin) modules515**
- slave drives240-241**
- sleep mode157**
- SLIP (Serial Line Internet Protocol)833**
- Slot-1 specification478, 487**
- Slot-2 specification487**
- Slot-A specification484, 487**

- slotket processors487
- smart hubs307-308
- SMARTDRV834
 - upgrading hard drives and301
- smoke residue430
- smudged print655, 783
- Socket 370 specifications487
- socket arrangements, PCMCIA cards313
- socket services159
- socket specifications, CPUs486
- Socket-7 specification486-487
- SODIMMs (Small Outline DIMMs) .142-144, 517
 - upgrading143-144
 - voltage-level support143
- soft switches27
- soft-memory errors334, 771
- software834
 - digital camera software277
 - for infrared devices, installing277
 - power management software280
 - system software54
- software RAID259
- solid ink-jet printers605
- sound cards39
 - installing116-117
 - system resources195
 - troubleshooting383-385
- south bridge539
- speakers834
 - defined23
 - troubleshooting411
- speed ratings, RAM518-520
- SPGA (Staggered Pin Grid Array)
 - specification475
- spikes441
- spindles, hard-disk drives42
- split-bank slot arrangement (DIMMs)516
- splitter-based DSL747
- splitter-less DSL747
- splitters, DSL747
- SPP (Standard Parallel Port)
 - specification215, 583
- spread spectrum technologies684
- SRAM (static RAM)504, 510-511, 834
- Standard CMOS Setup options
 - (CMOS Setup utility)574-576
- Standard Parallel Port (SPP) specification215, 583
- standards, PC21-22
- standby power systems442
- Standby power-saving mode584-585
- star topology674
- Start-Of-Text (STX) characters121
- startup. *See* bootup process
- static buildup408
- static RAM (SRAM)504, 510-511, 834
- static-free vacuums430
- stepping levels295
- Stop screen errors834
- storage media. *See also* specific devices
 - installing101-102
 - CD-ROM drives108-109
 - CD-RW drives109
 - DVD drives108-109
 - DVD-RW drives109
 - external devices274-275
 - floppy-disk drives103
 - hard-disk drives103-107
 - tape drives110-114
 - removable114
 - portable PCs151, 154-155
 - preventive maintenance436-438
 - troubleshooting364-365
- storing computer equipment462
- STP (shielded twisted pair) cabling680
- striped
 - drive arrays257
- STX (Start-Of-Text) characters121
- sub-notebook PC memory518
- Subtitle-D dumpsites463
- Super Socket 7 specification486
- SuperDLT (Super Digital Linear Tape)
 - drives113-114
- surge suppressors441-442, 774
- surges441

- suspend mode157
 - Suspend power-saving mode584-585
 - SVGA (Super VGA) video cards37-38
 - swap files834
 - switches33-34, 307
 - Symmetric DSL (SDSL)749-752
 - Symmetric HDSL (SHDSL)752
 - symptoms and troubleshooting. *See*
troubleshooting
 - synchronous data transmission218-219
 - synchronous graphics RAM (SGRAM)506
 - synchronous SRAM510
 - synchronous transfer method834
 - SysEdit (System Editor)835
 - system boards534, 835
 - bus speeds540-541
 - chipsets539-541
 - components29-30
 - defined26, 29
 - expansion bus architectures542
 - 8-bit systems543
 - 16-bit systems543
 - 32-bit systems544
 - AGP542, 549-550
 - AMR551
 - ISA543-544
 - local546
 - MCA544, 552
 - PCI544-549
 - VESA542, 552
 - fast facts776-780
 - form factors534-537
 - AT. *See* AT-style systems
 - ATX. *See* ATX-style systems
 - compatibility537-539
 - I/O connections552-554
 - installing81-82
 - microprocessors. *See* microprocessors
 - onboard disk-drive connections556-560
 - portable PC system boards141-142
 - power connectors27-29
 - replacing75-82
 - adapter cards77-79, 552
 - cables79-80
 - external I/O systems76
 - jumper settings80
 - removing from system unit80-82
 - system unit cases77
 - support ICs, installing90
 - troubleshooting418-419
 - CMOS batteries337
 - CMOS setup failures330
 - configuration checks331-332
 - hardware checks333
 - microprocessors334-335
 - RAM334
 - ROM335
 - symptoms329-330
 - upgrading289-290
 - BIOS296-297
 - decision factors300
 - microprocessors290-296
 - RAM297-299
- system clock, resetting**574-575
- System Editor (SysEdit)**835
- system files**835. *See also* specific files
- system resources**
 - DMA addresses185-186
 - floppy-drive controllers193-194
 - hard-drive controllers194-195
 - I/O addresses186-187
 - IEEE-1394 ports197
 - infrared ports197
 - internal modems192-193
 - interrupt requests (IRQs)183-185
 - legacy device I/O resource allocations190-191
 - memory addresses187-188
 - multimedia devices195
 - network adapter cards196
 - onboard I/O resource allocations189, 583
 - peripheral I/O resource allocations189
 - specialty device I/O resource allocations192
 - USB ports196-197
- system software**54, 835
 - BIOS. *See* BIOS
 - DOS. *See* DOS

system units 835
 chipsets 33
 components 25-27
 defined 22
 heat buildup 25, 431-432
 microprocessors. See microprocessors

T

tag RAM 478
Tahoe CPUs 485
tape drives 46, 835
 DAT (Digital Audio Tape) 112
 DLT (Digital Linear Tape) 112-114
 installing 110-114
 preventive maintenance 436-438
 troubleshooting 362-364
TAPI (Telephony Application Programming Interface) 835
TAs (terminal adapters) 744
task-switching environments 835
TCP/IP 697-698, 835
 IP addresses. See IP addresses
TDM (Time Division Multiplexing) 684
TDMA (Time Division Multiple Access) 684
TDR (Time Domain Reflectometry)
 devices 726-727
Telephony Application Programming Interface (TAPI) 835
Telnet service
 HyperTerminal and 378
terminal adapters (TAs) 744
terminators 709
 SCSI devices 253-255
testing network cabling 726-727
TFT (Thin Film Transistor) arrays 52
thermal compound 294
thermal printers 602-603
thermal sensor, laser printers 608, 781
thermal shock, ink-jet printers 604
thermal wax transfer printers 602-603
thermocouples 335
thicknet coax cabling 710-711
Thin Film Transistor (TFT) arrays 52
thinnet Ethernet cabling 711
Thunderbird CPUs 485
TIA (Telecommunications Industry Association) 711-712
time, CMOS settings 574-575
Time Division Multiple Access (TDMA) 684
Time Division Multiplexing (TDM) 684
Time Domain Reflectometry (TDR)
 devices 726-727
Token Ring networks 693-696
 full-duplex mode 696
 UDC connectors 714-715
toner cartridges 608-609, 651, 835
 disposal procedures 463
topologies, LAN 673-675
total backups. See full backups
touch pads 52
 cleaning 439
 troubleshooting 388
touch screens 148-149
 installing 99-101
tower cases 24
 removing 77
TRACERT command 385, 836
track seek time 301
trackballs 52, 147, 836
 troubleshooting 341
tracks
 hard-disk drives 42
 floppy-disk disks 40
tractor-feed paper-handling mechanisms 599-600, 780
transfer corona wire, laser printers 608, 781
transfer rollers (laser printers) 781
transferring stage, laser printers 607
transients 441, 774
translation mode, IDE drives 195
translation modes, disk drives 576
Transport layer (OSI model) 696

- Troubleshooters, Windows** **836**
- troubleshooting** **407**
 - beep codes 412-413
 - bootup
 - importance of observing 413-414
 - CD-ROM drives 358-360
 - CD-RW drives 360-362
 - configuration settings 414-417
 - diagnostic/repair tools 407-411
 - DVD drives 358-360
 - DVD-RW drives 360-362
 - error codes 412-413
 - fast facts for 771-773
 - floppy-disk drives 351-353
 - field replaceable units 418-419
 - hard-disk drives 353-357
 - basic checks 356-357
 - configuration checks 355
 - hardware checks 357
 - reformatting drives 357
 - symptoms 353-354
 - hardware versus software problems 414-417
 - information gathering 411-413
 - keyboards 338-340
 - memory
 - RAM 334
 - ROM 335
 - microprocessors 334-335
 - cooling systems 335-337
 - modems 375-379
 - COM port conflicts 376
 - communication software 379-382
 - hardware checks 382-383
 - self-diagnostic tests 382-383
 - symptoms 376
 - Windows checks 377-379
 - monitors 348-351
 - mouse problems 340-343
 - networks 722-724
 - adapter cards 385-386
 - cabling 385
 - configuration checks 724
 - connections 723
 - data security 724-725
 - hardware checks 725-727
 - portable PCs 386-393
 - batteries 390-391
 - docking stations 391-393
 - heat buildup 386
 - PC Cards 388-389
 - port replicators 391-393
 - touch pads 388
 - ports 365
 - basic parallel ports 367-370
 - basic serial ports 368, 370-371
 - CMOS options 366-367
 - FireWire ports 373-374
 - infrared ports 374
 - mouse ports 340-341
 - symptoms 365-366
 - USB ports 371-373
 - power supplies 326-328
 - printers 633-634
 - dot-matrix printers 639-645
 - drivers 634-635
 - ink-jet printers 645-650
 - interface/controller problems 635-637
 - laser printers 650-656
 - network printers 637-638
 - self-tests 633, 638-639, 648
 - removable storage media 364-365
 - sound cards 383-385
 - system boards
 - CMOS batteries 337
 - CMOS setup failures 330
 - configuration checks 331-332
 - hardware checks 333
 - microprocessors 334-335
 - RAM 334
 - ROM 335
 - symptoms 329-330
 - tape drives 362-364
 - video display 343, 345-348
- TrueType fonts** **598**

Tualatin processors481
 twisted-pair cabling679-680, 711-712
 Ethernet connections719-720
 Type 47 entry576
 Type CMP (Communications Plenum) cables 717
 Type I PCMCIA cards313
 Type II PCMCIA cards165-166, 313
 Type III PCMCIA cards152, 161, 313
 Type MPP (Multipurpose Plenum) cables ..717
 type-66 termination blocks713
 type-96 termination blocks713-714

U

UARTs (Universal Asynchronous Receiver-
 Transmitters)192-193, 219-220, 766, 837
 UDCs (Universal Data Connectors)714-715
 UDMA (Ultra DMA) protocol242-243, 836
 Ultra 160 SCSI specification247
 Ultra 320 SCSI specification248
 Ultra ATA 66 specification243
 Ultra ATA 100 specification243
 Ultra DMA (UDMA) specification .242-243, 836
 Ultra Extended VGA (UXGA)307
 Ultra SCSI devices246, 836
 PC-Card based161
 UMA (upper memory area)837
 UMBs (upper memory blocks)837
 UNC (Universal Naming Convention) path .837
 Universal Data Connectors (UDCs)714-715
 Universal Naming Convention (UNC) path .837
 Universal Serial Bus. See USB devices
 Universal Synchronous Asynchronous
 Receiver/Transmitters (USARTs)837
 Unplugged Keyboard message339
 unshielded twisted pair (UTP)
 cabling680, 711-712
 CAT ratings712
 color-coding712
 IDC connectors713-714
 UDC connectors714-715

upgrading837
 adapters305-307
 hard-disk drives300-305
 cabling303
 controller cards304-305
 IDE/EIDE drives301-305
 portable drives312-313
 RAID adapters304-305
 SCSI drives303-305
 SMARTDRV configuration301
 verifying upgrade302-303
 peripheral devices308-309
 portable systems310-314
 disk drives312-313
 fuel cells312
 PCMCIA cards313-314
 power supplies309-310
 system boards289-290
 BIOS296-297
 decision factors300
 microprocessors290-296
 RAM297-299
 upper memory area (UMA)837
 upper memory blocks (UMBs)837
 UPS (uninterruptible power supply) 442-446, 836
 installing279-280
 manual bypass switch445
 nonessential peripheral devices444
 ratings443
 shutdowns and444-445
 testing445-446
 URLs (uniform resource locators)836
 USARTs (Universal Synchronous Asynchronous
 Receiver/Transmitters)837
 USB (Universal Serial Bus) devices767, 837
 AC power adapters94
 adapter cards40
 cabling223-224, 555-556
 connection architecture222
 connectors44, 222-224
 data transfers555-556
 full-speed125, 556

hosts222
 hubs222
 installing126
 low-speed125, 556
 PC Card-based161
 port connectors211
 speed ratings556
 system resources196-197
 troubleshooting371-373
USB Active Extension Cables556
usernames837
utility files59
UTP. See unshielded twisted pair cabling
UXGA (Ultra Extended VGA)307

V

VA (volt-ampere) ratings443
VACHE configurations301
vacuum cleaners430, 658-659
VCM-SDRAM (virtual channel memory SDRAM)506
VDSL (very-high-bit-rate DSL)751
vector-based fonts598, 780
vertical refresh rates, monitors38
vertical retrace49
very large scale integration (VLSI)837
very-high-bit-rate DSL (VDSL)751
VESA (Video Electronics Standards Association) buses36, 542, 552, 838
VGA video cards37
 configuring270
 installing95-96, 269-270
 refresh rate, default269
 resolution, default269
VGA-to-TV converters307
video adapter cards37-38, 837
 configuring270
 installing95-96, 269-270
 troubleshooting418-419
 upgrading320-307

VGA-to-TV converters307
video controller chips37
video RAM (VRAM)37, 509
video services
 RG-6 cabling710
 RG-59 cabling711
 troubleshooting343-348
View menu838
virtual channel memory SDRAM (VCM-SDRAM)506
Virtual File Allocation Table. See VFAT-based systems
virtual memory838
Virtual Memory Manager (VMM)838
viruses838
VLSI (Very Large Scale Integrated)
 circuit devices32, 837
voice-over DSL752
volatile memory29, 504, 838
volt-ampere (VA) ratings443
voltage levels489-490
 clone microprocessors490
 first-generation Pentium CPUs475
 high-voltage hazards348-350, 464-465
 Itanium CPUs483
 PCMCIA cards313
 Pentium 4 CPUs482
 Pentium MMX CPUs476
 sags441
 second-generation Pentium CPUs475
 third-generation Pentium CPUs475
voltage regulator modules (VRMs)86, 490
VOMs (volt-ohm-milliammeters)408
VRAM (video RAM)509
VRMs (voltage regulator modules)86, 490
VUE testing centers841

W

warm boots55, 838
water-based CPU coolers88-89

- wattage ratings93, 443
- wax-jet printers605
- Web sites838. See also Internet
- WEP (Wired Equivalent Privacy) standard ..690
- WEP (Wireless Encryption Protocol)167
- white-page faults783
 - ink-jet printers649
 - laser printers653-654
- wide area networks. See WANs
- Wide Fast SCSI-2246
- Wide SCSI-2245
- Wide Ultra SCSI246
- Wide Ultra2 SCSI247
- WiFi (Wireless Fidelity)756
- wildcards839
- Williamette 423 CPUs. See Pentium 4 CPUs
- Williamette Processor New Instructions (WPNI)482
- WIN (Windows) keys, portable PCs146
- Windows
 - disk-management tools
 - CHKDSK436, 811
 - ScanDisk436
 - Help system
 - Printing Troubleshooter369
 - wide area networking379
 - troubleshooting
 - CD-ROM drives359
 - docking stations392
 - DVD drives359
 - FireWire ports373-374
 - floppy-disk drives352
 - hard-disk drives356-357
 - infrared ports374
 - keyboard problems339
 - modem problems377-379
 - mouse problems342-343
 - parallel ports368-370
 - PCMCIA cards388-389
 - removable storage media364-365
 - serial ports370-371
 - sound cards383-384
 - USB ports371-373
 - video hardware problems346-348
- Windows 9x
 - Explorer839
 - partitioning hard disks106
 - PC Card (PCMCIA) Wizard163
 - Printing Troubleshooter369
 - troubleshooting
 - parallel ports, troubleshooting369
- Windows 95. See also Windows 9x
- Windows 98. See also Windows 9x
- Windows CE279
- Windows Explorer. See Explorer
- Windows Internet Naming Service (WINS) ..839
- Windows Me (Millennium Edition)
 - partitioning hard disks106
- Windows NT
 - Explorer839
- Windows RAM (WRAM)509
- Windows XP
 - digital camera software277
 - NT File System. See NTFS
 - partitioning hard disks106-107
- WINS (Windows Internet Naming Service) ..839
- Wired Equivalent Privacy (WEP) standard ..690
- Wireless Encryption Protocol (WEP)167
- wireless Internet access756
- wireless LANs (WLANs)683-686
 - access points128-129
 - 685690-691
 - adapters40, 686
 - Bluetooth specification685
 - IEEE specifications683-684
 - portable PCs and165-168
 - RF signal strength690-691
 - security690
 - spread spectrum technologies684
 - WEP encryption167
- workgroups839
- workstations, diskless677
- WPNI (Williamette Processor New Instructions)482

WRAM (Windows RAM)509
writing stage, laser printers607

X-Y-Z

X rays, color monitors350
X-ON/X-OFF protocol120
X5 CPUs484
xDSL749-750
Xeon CPUs481
xerographic paper641
Xmodem protocol839
XON-XOFF protocols839

Ymodem protocol840

ZIF (Zero Insertion Force) sockets83-84
Zip drives114
Zmodem protocol840