

Index

Numbers

- 12V power sources, 1210
- 5V power sources, 1210
- .13 micron manufacturing, 91
- 0.85-inch drive, 668
- 1-inch drives (Microdrive), 668
- 1st ATAPI CD-ROM Drive setting (Boot menu), 497
- 1st Boot Device setting (Boot menu), 497
- 1st Hard Disk Drive setting (Boot menu), 497
- 1st Removable Device setting (Boot menu), 497
- 1.2MB 5 1/4-inch floppy drives, 714
- 1.44MB 3 1/2-inch floppy drives, 714
- 1.8-inch floppy drives, 668
- 2D graphics, 938-939
- 2nd Boot Device setting (Boot menu), 497
- 2-2-2 timing, 294
- 2.1GB barrier (CHS), 626
- 2.5-inch ATA drive cables, 1397
- 2.5-inch drives, 667
- 2.88MB 3 1/2-inch floppy drives, 714

3D audio

- DirectX support, 1009-1010
- positional audio, 1007-1008
- processing, 1009

3D chipsets, 961

- ATI chipsets, 962
- Matrox chipsets, 966
- NVIDIA chipsets, 968-972

3D graphics

- alpha blending, 954
- animation, 953
- antialiasing, 953-955
- bilinear filtering, 954
- chipsets, 961
 - ATI chipsets, 962
 - Matrox chipsets, 966
 - NVIDIA chipsets, 968-972
- depth cueing, 953
- DirectX 6.0-9.0, 956
- displacement mapping, 954
- dual-GPU scene rendering
 - ATI CrossFire, 960-961
 - NVIDIA SLI, 959-960
- environment-based bump mapping, 954
- flat shading, 951
- floating-point calculations, 955

- fogging, 953
- Gouraud shading, 951, 954
- hardware/software
 - acceleration, 956-957
- history of, 951-952
- image abstractions, 953
- image rendering, 953, 956
- keyframe interpolation, 955
- MIP mapping, 953-954
- perspective correction, 953
- primitives, 953
- scan conversion, 953
- shading, 953-955
- software optimization, 957
- stencil buffering, 954
- T&L (transform and lighting), 955
- T-buffers, 955
- texture mapping, 951-953
- textures, 953
- trilinear filtering, 954-955
- vertex skinning, 955
- vertices, 953
- video memory
 - requirements, 939-941
- visible surface
 - determination, 953
- Z-buffering, 954
- 3DNow! technology, 82-83**
- 3M Ergonomic Mouse, 1095**
- 3rd Boot Device setting (Boot menu), 497**
- 3-3-3 timing, 295**
- 3x series chipsets (Intel), 315-317**
- +3.3V power sources, 1208**
- 3.5-inch drive enclosure, 1397**
- 3.5-inch drives, 667, 714**
- 4-pin +12V power connectors (ATX), 1245-1246**
- 4th Boot Device setting (Boot menu), 497**
- 4-way set associative cache, 76**
- 4.2GB barrier (CHS), 626-627**
- 5GHz band W-Fi, 1157, 1162**
- 5-pin DIN keyboard connectors, 1073**
- +5V power sources, 1208**
- 5.1 Surround sound, 1022**
- 5.25-inch drives, 667, 714-715**
- 6-pin auxiliary power connectors (ATX), 1240-1241**
- 6-pin mini-DIN keyboard connectors, 1073**
- 7.1 Surround sound, 1022**
- 8B/10B encoding, 606**
- 8-bit ISA (Industry Standard Architecture) buses, 391-392**
 - DMA (direct memory access) channels, 417
 - interrupts, 410
- 8-bit processors, 124-125**
- 8-bit systems (PC/XT class), 35-36**
- 8-pin +12V power connectors (ATX), 1246-1248**
- 8.4GB barrier (CHS), 630-631**
- 9-pin serial port connectors, 1049**
- 9-pin to 25-pin serial port connectors, 1049**
- 10BASE-T, 1159**
- 11Mbps Wi-Fi standard, 1157, 1161-1162**
- +12V power sources, 1208**
- 14.31818Mhz crystals, 1339**
- 16-bit ISA (Industry Standard Architecture) buses, 392-393, 585**
 - DMA (direct memory access) channels, 418
 - interrupts, 411
- 16-bit processors**
 - 8086, 123-124
 - 80286, 125-126
 - 80386, 128
 - real mode operation, 51
- 16/32/64-bit (AT-class) systems, 35-36**
- 20-pin main power connectors (ATX), 1236-1238**
- 24-bit mode (video adapters), 940**
- 25-pin serial port connectors, 1049**
- 30-pin SIMMs (single inline memory modules), 533-534, 537**
- 32-bit ISA (Industry Standard Architecture) buses, 393, 585**
- 32-bit mode (video adapters), 940**
- 32-bit processors**
 - 80386, 126-128
 - 386DX, 128
 - 386SL, 128-129
 - 386SX, 128
 - 80387 math coprocessor, 129
 - 82350 chipsets, 283
 - IA-32 mode operation, 51-52
 - Intel chipsets, 283-284, 532
 - 80486, 129-131
 - 486DX, 131-132
 - 486DX2, 136
 - 486SL, 132-133
 - 486SX, 133-134
 - 486SX2, 136
 - 487SX math coprocessor, 134
 - 82350 chipsets, 283

- AMD 486 (5x86), 136-137
- Cyrix/TI 486, 137
- DX2/OverDrive, 134-136
- Intel chipsets, 283-284
- maximum installable memory, 532
- Pentium OverDrives, 136
- sockets, 97-99
- AMD K5, 148-149
- IA-32 mode operation, 51-52
- IA-32 virtual real mode operation, 52-53
- IA-32e 64-bit extension mode operation, 53-55
- Pentium, 138
 - address bus width, 140
 - addressable memory, 140
 - BiCMOS, 140
 - BTB (branch target buffer), 139
 - cache, 140
 - classic (non-MMX) steppings, 147
 - DIMM width, 140
 - FDIV (floating-point divide) bug, 145-146
 - first-generation, 142
 - instruction processing, 140
 - math coprocessor, 141
 - Model 1 steppings, 147
 - packaging, 141
 - power management bugs, 147
 - second-generation, 142-144
 - SIMM width, 140
 - specifications, 138-139
 - superscalar architecture, 138
 - twin data pipelines, 138-139
 - voltage, 141, 147-148
- Pentium OverDrive, 147-148
- Pentium-MMX, 144-148
- 40-pin ATA connectors, 593-595**
- 50-pin ATA connectors, 596-597**
- 56Kbps modems, 1134-1135**
 - chipsets, 1136
 - limitations, 1135-1136
 - Modem-on-Hold feature, 1137
 - PCM Upstream feature, 1138
 - performance optimization, 1141-1142
 - QuickConnect, 1137
 - speed, 1136
 - V.44 standard, 1137-1138
 - V.90 standard, 1137
 - V.92 standard, 1137-1138
- 64-bit extension mode, 53-55**
- 64-bit processors**
 - AMD Athlon 64, 210-211, 214-215
 - AMD Athlon 64 FX, 210-211, 214-215
 - AMD Opteron, 218
 - AMD Sempron (Socket 754), 217-218
 - Celeron, 149
 - benefits, 168
 - Celerons D, 172-175
 - DIB (Dual Independent Bus), 149
 - dynamic execution, 149
 - FC-PGA (flip chip pin grid array) package, 166
 - history of, 169
 - instruction execution, 150
 - manufacturing, 168
 - PPGA (plastic pin grid array) package, 166-167
 - processor variations, 170-171
 - running 32-bit software, 150
 - SEP (single edge processor) package, 166
 - Socket 370 Celerons, 171
 - Socket 478 Celerons, 172
 - Socket T (LGA 775) Celerons, 172
 - Tualatin, 171
- Pentium II
 - cache, 160
 - DIB (Dual Independent Bus), 149, 158
 - die sizes, 157
 - dynamic execution, 149, 158
 - heating/cooling issues, 160
 - iCOMP 2.0 Index rating, 157
 - installation, 160
 - instruction execution, 150
 - MMX technology, 157
 - multiprocessing, 160
 - power usage, 157
 - processor ID information, 161-164
 - running 32-bit software, 150
 - SEC (Single Edge Contact) packaging, 154-156
 - specifications, 158-160
 - speeds, 157
 - transistors, 157
 - voltage ID definitions, 165-166
- Pentium II/III Xeon, 182-184
- Pentium III, 149, 175
 - architectural features, 176
 - DIB (Dual Independent Bus), 149
 - dynamic execution, 149
 - ID markings, 177

- instruction execution, 150
- Level 2 cache, 176
- overclocking, 182
- running 32-bit software, 150
- SECC2 package, 176
- variations, 176-182
- Pentium Pro
 - cache, 151
 - chipsets, 153
 - DIB (Dual Independent Bus), 149-151
 - Dual Cavity PGA packaging, 150
 - dynamic execution, 149
 - instruction execution, 150
 - integrated L2 cache, 153
 - MCM (multichip module), 150
 - running 32-bit software, 150
 - specifications, 152
 - speeds, 153
 - transistors, 150
 - VID (voltage identification) pins, 154
- 72-pin SIMMs (single inline memory modules), 533-535**
 - capacities, 537
 - pinouts, 540-543
 - presence detect pin configurations, 541-542
- 82C206 chips, 274**
- 82C836 SCAT (Single Chip AT) chipsets, 274**
- 96x series chipsets (Intel), 315**
- 1xx-243xxx POST (power on self test) codes, 1377-1379**
- 100BASE-TX, 1159**
- 101-key keyboards, 1059-1061, 1072**
- 104-key keyboards, 1061**
- 137GB barrier (CHS), 631-633**
- 168-pin DIMMs (dual inline memory modules)**
 - capacities, 537
 - illustration, 535
 - pinouts, 543-544
- 184-pin DIMMs (dual inline memory modules)**
 - capacities, 537
 - illustration, 535
 - pinouts, 545-546
- 184-pin RIMMs (Rambus inline memory modules), 537-538**
- 240-pin DDR2 DIMMs (dual inline memory modules)**
 - capacities, 538
 - pinouts, 547-548
- 240-pin DDR3 DIMMs (dual inline memory modules)**
 - capacities, 538
 - pinouts, 548-550
- 250-pin DIMMs (dual inline memory modules), 536**
- 286 processors, 125-126**
 - 80287 math coprocessor, 126
 - maximum installable memory, 532
 - real mode operation, 51
- 305 RAMAC (Random Access Method of Accounting and Control) drives, 638**
- 360KB 5 1/4-inch floppy drives, 715**
- 386 processors, 126-128**
 - 386DX, 128
 - 386SL, 128-129
 - 386SX, 128
 - 80387 math coprocessor, 129
 - 82350 chipsets, 283
- IA-32 mode operation, 51-52
- Intel chipsets, 283-284
 - maximum installable memory, 532
- 450KX/GX chipsets, 153**
- 486 processors, 129-131**
 - 486DX, 131-132
 - 486DX2, 136
 - 486SL, 132-133
 - 486SX, 133-134
 - 486SX2, 136
 - 487SX math coprocessor, 134
 - 82350 chipsets, 283
 - AMD 486 (5x86), 136-137
 - Cyrix/TI 486, 137
 - DX2/OverDrive, 134-136
 - Intel chipsets, 283-284
 - maximum installable memory, 532
 - sockets, 97-99
- 487SX math coprocessor, 134**
- 528MB barrier (CHS), 621-623**
- 555.2 Harmonics standard (IEC), 1265**
- 586 processors. See Pentium processors**
- 645/645DX chipsets (SiS), 320**
- 648/648FX chipsets (SiS), 320**
- 649/649FX chipsets (SiS), 322**
- 650/651 chipsets (SiS), 320**
- 655/655FX/655TX chipsets (SiS), 320**
- 656/656FX chipsets (SiS), 321-322**
- 661FX chipsets (SiS), 321**
- 686 processors. See P6 (686) processors**
- 701 Defense Calculator, 638**
- 720KB 3 1/2-inch floppy drives, 714**

- 726 Tape Unit, 638
 - 730S chipsets (SiS), 344-345
 - 733 chipsets (SiS), 345
 - 735 chipsets (SiS), 345
 - 740 chipsets (SiS), 345
 - 741/741GX chipsets (SiS), 346-347
 - 745 chipsets (SiS), 345
 - 746 chipsets (SiS), 346
 - 748 chipsets (SiS), 346
 - 750 chipsets (AMD), 332-333
 - 755/755FX chipsets (SiS), 363-364
 - 756 chipsets (SiS), 364
 - 760 chipsets (AMD), 333-334
 - 760/760GX chipsets (SiS), 364, 366
 - 761/761GX chipsets (SiS), 366
 - 802.11-based wireless networks. *See* Wi-Fi
 - 810 chipsets (Intel), 290-291
 - 810E chipsets (Intel), 290-291
 - 810E2 chipsets (Intel), 290-291
 - 815 chipsets (Intel), 293-295
 - 815E chipsets (Intel), 293-295
 - 815EP chipsets (Intel), 293-295
 - 820 chipsets (Intel), 295-297
 - 820E chipsets (Intel), 295-297
 - 840 chipsets (Intel), 297-298
 - 845 chipsets (Intel), 310-311
 - 848P chipsets (Intel), 312
 - 850 chipsets (Intel), 308-309
 - 860 chipsets (Intel), 353
 - 865 chipsets (Intel), 312
 - 875P chipsets (Intel), 313
 - 915 chipsets (Intel), 313
 - 925X chipsets (Intel), 313
 - 945 Express chipsets (Intel), 314
 - 955X chipsets (Intel), 314-315
 - 975X chipsets (Intel), 314-315
 - 1000-3-2 Harmonics standard (IEC), 1265
 - 1000-3-3 Flicker standard (IEC), 1265
 - 1284 parallel port standard (IEEE), 1054-1055
 - 1394 standard (IEEE)
 - 1394a standard, 1042-1044
 - 1394b standard, 1042-1044
 - advantages of, 1026
 - CD/DVD drives, 811-812
 - compared to USB, 1026-1028
 - motherboard front panel IEEE 1394 connector pinout, 374
 - performance myths and realities, 1028-1031
 - 4004 processors, 40
 - 6502 processors, 41
 - 8000 (8151) chipsets (AMD), 354-355
 - 8008 processors, 40
 - 8048 keyboard controllers, 1068
 - 8085 processors, 41
 - 8086 processors, 41, 123-124, 532
 - 8088 processors, 41, 124, 532
 - 8250 UART chips, 1050
 - 8255 PPI chips, 1069
 - 8742 UPI chips, 1069
 - 9100A electronic calculator, 26
 - 16450 UART chips, 1050
 - 16550 UART chips, 1050
 - 80186 processors, 124-125
 - 80188 processors, 124-125
 - 80286 processors. *See* 286 processors
 - 80287 math coprocessor, 126
 - 80386 processors. *See* 386 processors
 - 80387 math coprocessor, 129
 - 80486 processors. *See* 486 processors
 - 80586 processors. *See* Pentium processors
 - 80686 processors. *See* P6 (686) processors
 - 82350 chipsets (Intel), 283
 - 82801 ICH (Integrated Controller Hub), 291, 298
 - 82801BA ICH (Integrated Controller Hub), 309
 - 82802 FWH (Firmware Hub), 291, 298
 - 82803 memory repeater hub, 298
 - 82804 memory repeater hub, 298
 - 82806 PCI controller hub, 298
 - 82810E GMCH (Graphics Memory Controller Hub), 291
 - 82840 GMCH (Graphics Memory Controller Hub), 298
 - 82850 GMCH (Graphics Memory Controller Hub), 309
-
- ## A
- A-Link architecture, 283
 - a-Si (hydrogenated amorphous silicon), 887
 - ABC (Atanasoff-Berry Computer), 13
 - Absolute Beginner's Guide to Security, Spam, and Spyware*, 1127
 - AC '97 integrated audio, 1004-1006

- AC adapters, 1020
- AC power switches, 1231-1232
- AC ripple, 1264
- Accelerated Graphics Port (AGP) buses, 378, 405-408, 942-943, 1307
 - Direct AGP, 292
- accelerated hub architecture (AHA), 281
- acceleration (hardware/software), 956-957
- Access Mode setting (Drive Configuration menu), 486
- access points, 1184-1186
- access times
 - CD/DVD drives, 808
 - hard drives, 702
- Acer Laboratories. *See* ULi Electronics chipsets
- ACPI (Advanced Configuration and Power Interface), 501-502, 910-911, 1273-1275
- active backplane systems, 271
- active heatsinks, 116, 1308, 1344-1347
- active PFC (power factor correction), 1265
- active preventative maintenance. *See* preventative maintenance
- active-matrix LCD (liquid crystal display) monitors, 887
- actuator mechanisms (heads), 668, 684
 - comparison of, 685
 - servo mechanisms, 688-691
 - dedicated servo, 690-691
 - disk sweep, 689
 - embedded servo, 690
 - gray code, 688
 - servowriters, 688
 - thermal recalibration, 689
 - wedge servo, 689
- stepper motors, 685
- voice-coil actuators, 686-688
- ad hoc mode, 1186
- adapters. *See also* 3D graphics; controllers
 - 2 1/2" ATA drive cables and adapters, 1397
 - AC adapters, 1020
 - audio adapters (sound cards)
 - 3D audio, 1007-1010
 - AdLib, 988
 - CA0102 (Audigy 2), 1003
 - CA0102-ICT (Audigy 2 ZS), 1003
 - CA0185, 1003
 - CA0186, 1003
 - choosing, 1308
 - connectors, 990-994
 - data compression, 997-998
 - DirectX, 988-989
 - discontinued sound cards, 1004
 - drivers, 998-999
 - DSPs (digital signal processors), 998
 - EMU-8000, 1003
 - EMU10K1, 1003
 - EMU10K2 (Audigy), 1003
 - Ensoniq ES137x series, 1002
 - frequency response, 1000
 - history of, 988
 - installing, 1010-1012
 - integrated audio chipsets, 1004-1007
 - legacy audio support, 989
 - manufacturers, 1002-1003
 - MIDI support, 997
 - monophonic/stereophonic, 997
 - Philips, 1003
 - resource conflicts, 1014
 - sampling, 1001
 - SNR (signal-to-noise ratio), 1000
 - Sound Blaster, 988
 - Sound Blaster Pro, 988
 - sound production features, 999
 - sound properties, 1000
 - speaker connections, 1012
 - stereo system connections, 1013-1014
 - total harmonic distortion, 1000
 - troubleshooting, 1014-1019
 - USB-based audio processors, 995-996
 - Vibra-16, 1002
 - volume control, 996
 - X-Fi (Extreme Fidelity), 1003
 - Yamaha, 1003
- BIOS, 445
- data transfer cables and adapters, 1397
- expansion cards, 1329
- integrated adapters, 1304
- multiple-COM-port adapters, 432
- NICs (network interface cards), 1166
 - bus types, 1167-1168
 - connectors, 1169-1170
 - costs, 1167
 - diagnostic software, 1381-1382
 - full-duplex, 1167
 - half-duplex, 1167

- installation, 1197-1198
- speed, 1167
- testing, 1198
- Wi-Fi (Wireless Fidelity), 1186
- PCI (Peripheral Connect Interface) buses, 401
- PS/2 Y adapter, 1398
- SCSI (Small Computer Systems Interface), 431
- troubleshooting, 1432, 1443
- Type II PC Card adapters, 741
- USB (universal serial bus), 1041-1042
- USB/FireWire cable adapter, 1398
- video adapters, 885, 924, 927-928
 - 24-bit mode, 940
 - 32-bit mode, 940
 - analog signals, 925-926
 - APIs (application programming interfaces), 957-959
 - buses, 942-944, 1307
 - width of, 941
 - chipsets, 928-935, 961-962, 966-972
 - choosing, 1307-1308
 - comparison of, 974-975
 - components, 933
 - configuring, 944-946
 - desktop video boards, 977-980
 - digital signals, 925-926
 - dual-GPU scene rendering, 959-961
 - installation, 1328-1329
 - multiple monitors, 947-950
 - RAMDAC (digital-to-analog converter), 941
 - removing, 1329
 - replacing, 972-974
 - SVGA (Super VGA), 924-927
 - television/computer signal comparison, 975-976
 - testing, 986
 - troubleshooting, 981-986
 - TV tuners, 972
 - UMA (unified memory architecture), 928
 - upgrading, 972-974
 - VGA (Video Graphics Array), 926-927
 - video BIOS, 933-934
 - video capture boards, 972
 - video capture devices, 976-981
 - video drivers, 944-947
 - video RAM, 936-941
 - video-output adapters, 976
 - warranties, 974
- Adaptive Differential Pulse Code Modulation (ADPCM), 997**
- ADCs (analog-to-digital converters), 1001**
- additional boot devices, 708**
- AddOn ROM Display Mode setting (Boot menu), 498**
- address buses, 48-49**
 - 8086 processors, 123
 - Pentium processors, 140
- ADDRESS MARK sector data, 673**
- addressable memory, 140**
- addresses**
 - CMOS RAM, 471-473
 - motherboard CMOS RAM addresses, 368
 - parallel ports, 1056-1057
 - port addresses, 418
 - bus-based device port addresses, 419-421
 - chipset-based device port addresses, 419
 - motherboard-based device port addresses, 419
 - serial ports, 1051
 - storing, 1182
- addressing sectors**
 - capacity limitations, 617
 - CHS (cylinder head sector)
 - 2.1GB barrier, 626
 - 4.2GB barrier, 626-627
 - 8.4GB barrier, 630-631
 - 137GB barrier, 631-633
 - 528MB barrier, 621-623
 - ATA CHS parameter limits, 623
 - BIOS CHS parameter limits, 622
 - BIOS commands, 621
 - CHS bit-shift translation, 624-626
 - combined parameter limits, 623
 - compared to LBA (logical block address), 619-620
 - converting to LBA (logical block address), 620-621
 - LBA-assist translation, 627-630
 - LBA (logical block address)
 - BIOS commands, 621
 - compared to CHS (cylinder head sector), 619-620
 - converting to CHS (cylinder head sector), 620-621
 - LBA-assist translation, 627-630
 - prefixes for decimal/binary multiples, 616-618

- Adesso mechanical-switch keyboards, 1063
- AdLib sound card, 988
- ADPCM (Adaptive Differential Pulse Code Modulation), 997
- ADSL (Asymmetric DSL), 1111-1113
- Advanced Configuration and Power Interface (ACPI), 501-502, 910-911, 1273-1275
- Advanced Host Controller Interface (AHCI), 610-611
- Advanced Liquid Cooling Technology (ALCT), 1357
- Advanced menu (BIOS Setup)
 - Boot Configuration submenu, 482
 - Chipset Configuration submenu, 482-484
 - Drive Configuration submenu, 486-489
 - Event Logging submenu, 489-490
 - Fan Control Configuration submenu, 493
 - Floppy Configuration submenu, 489
 - Hardware Monitoring Display, 493-494
 - Memory Configuration submenu, 481-482
 - PCI Configuration submenu, 480
 - PCI Express Configuration submenu, 481
 - Peripheral Configuration submenu, 484-486
 - USB Configuration submenu, 491-492
 - Video Configuration submenu, 490-491
- Advanced Optical Disc (AOD), 776-777
- Advanced Power Management (APM), 910, 1272-1273
- advanced programmable interrupt controller (APIC), 143, 415
- Advanced Run Length Limited (ARLL), 652
- AFC (antiferromagnetically coupled) media, 658, 682-683
- After Power Failure setting (Power menu), 496
- aftermarket diagnostic software, 1368
- AGC (automatic gain control) circuitry, 772
- AGP (Accelerated Graphics Port) buses, 378, 405-408, 942-943, 1307
 - Direct AGP, 292
- AGP/PCI Burn-in Mode setting (Chipset Configuration menu), 483
- AHA (accelerated hub architecture), 281
- AHCI (Advanced Host Controller Interface), 610-611
- air bearing heads, 671
- air filters, 692-693
- Aladdin P4 (M1671) chipsets, 324
- Aladdin Pro II chipsets, 299-300
- Aladdin Pro 4 chipsets, 299-300
- Aladdin Pro 5 chipsets, 299-300
- Aladdin TNT2 chipsets, 299-300
- ALCT (Advanced Liquid Cooling Technology), 1357
- Alderwood (925X) chipsets, 313
- algorithms, ADPCM (Adaptive Differential Pulse Code Modulation), 997
- ALi Corporation. *See* ULi Electronics chipsets
- alignment of read/write heads, 716
- ALiMagik1 chipsets, 347-348
- allocation units, 678, 724
- alpha blending, 954
- alpha particles, 558
- ALPS Electric
 - Glidepoint pointing device, 1094
 - mechanical keyswitches, 1063
- Altair, 20, 26
- alternative pointing devices, 1093-1094
 - Ergonomic Mouse, 1095
 - GlidePoint, 1094
 - trackballs, 1094-1095
- aluminum
 - aluminum foil, 1313
 - aluminum/magnesium alloy platters, 681
 - in hard disks, 640
- Am5x86(TM)-P75 processors, 136-137
- AMD
 - chipsets, 278-279
 - AMD 8000 (8151), 354-355
 - AMD-750, 278, 332-333
 - AMD-760, 279, 333-334
 - AMD-760MP, 334
 - AMD-760MPX, 334
 - industry control, 31
 - reference table, 331-332
 - CPUInfo, 439
 - P-Ratings, 67-69

- processors
 - Am5x86(TM)-P75 processor, 136-137
 - Athlon, 188-192
 - Athlon 64, 210-211, 214-215
 - Athlon 64 FX, 210-211, 214-215, 226-230
 - Athlon 64 X2, 226-230
 - Athlon MP, 196-197
 - Athlon XP, 194-197
 - development of, 19-20
 - Duron, 192-193
 - Intel-compatible processors, 120-121
 - K5, 148-149
 - K6, 82-83, 185-187
 - Opteron, 46, 120, 218
 - Sempron (Socket 754), 217-218
 - Sempron (Socket A), 197-198
- AMDClock, 439**
- AMI (American Megatrends, Inc.) BIOS**
 - BIOS ID string, 455
 - diagnostics, 458
 - error messages, 505-506
 - POST (power-on self test) error codes, 1370
- AMIDiag Suite, 1382**
- amorphous state, 822**
- amplification, 1019**
- amplitude, 1000**
- AMR (anisotropic magneto-resistant) heads, 644-645**
- AMR (Audio Modem Riser), 379**
- analog joysticks, 1096**
- analog modems. *See* dialup modems**
- analog protection system (APS), 801**
- analog signals, 925-926**
- analog-to-digital converters (ADCs), 1001**
- Analytical Engine, 13**
- Andromeda Research Labs, 451**
- angle boards, 583**
- animation, 953**
- anisotropic magneto-resistant (AMR) heads, 644-645**
- Antec power supplies, 1284**
- antialiasing, 953-955**
- antiferromagnetically coupled (AFC) media, 658, 682-683**
- antivirus software, 1421**
- AOD (Advanced Optical Disc), 776-777**
- AOpen TubeSound, 1007**
- aperture, 776**
 - aperture grille picture tubes, 908-909
 - Aperture Size setting (Video Configuration menu), 490
- APIC (advanced programmable interrupt controller), 143, 415**
- APIs (application programming interfaces), 957**
 - definition of, 443
 - DirectX, 958-959
 - OpenGL, 958
- APM (Advanced Power Management), 910**
 - APM setting (Power menu), 496
 - system states, 1272-1273
- Apollo**
 - KT133 chipsets, 337-338
 - KT133A chipsets, 337-338
 - KT266 chipsets, 338-339
 - KT266A chipsets, 338-339
 - KT333 chipsets, 339
 - KT400/KM400 chipsets, 339
 - KT400A chipsets, 339-340
 - KT600 chipsets, 340
 - KX133 chipsets, 336-337
 - P4X266 chipsets, 329
 - P4X400 chipsets, 330
 - P4X400A chipsets, 330
 - P4X533 chipsets, 330
- Apple**
 - Apple I, 21
 - Apple II, 21
 - HFS (Hierarchical File System), 795
 - Lisa computers, 1081
 - Mac OS X, 28-29
 - QuickTime Pro, 978
 - proprietary design, 24
 - shift to PC architecture, 24
- application programming interfaces. *See* APIs**
- APS (analog protection system), 801**
- arbitrated buses, 415**
- architecture, layered, 443-444**
- archiving to tape drives, 744-746**
- ARCnet, 1158**
- areal density**
 - definition of, 655
 - growth rate, 656
 - increasing, 657-658
 - pixie dust technology, 658
- ARLL (Advanced Run Length Limited), 652**
- ASF Support setting (Boot Configuration menu), 482**

- assembling systems. *See* system assembly
- Asymmetric DSL (ADSL), 1111-1113
- asymmetrical networks, 1109
- asynchronous cache design, 516
- asynchronous modems. *See* dialup modems
- asynchronous serial interface. *See* serial ports
- AT Attachment. *See* ATA
- AT-bus. *See* ISA buses
- AT-class (16/32/64-bit) systems, 35-36
- AT commands, 1130
- AT desktop systems, 1214
- AT/Desktop power supply, 1214
- AT motherboards
 - Baby-AT, 239-240
 - full-size AT, 238-239
 - power supply connectors, 1233-1235
- AT power supply connectors, 1233-1235
- AT tower systems, 1214-1215
- AT/Tower power supply, 1214-1215
- ATA (AT Attachment), 581-582
 - advantages of, 585
 - ATAPI (AT Attachment Packet Interface), 615-616
 - backward compatibility, 587
 - BIOS limitations, 619
 - buses, 583-585
 - busmaster ATA, 603
 - cables, 597-599
 - CAM ATA (Common Access Method ATA), 585
 - capacity limitations, 617, 697
 - CD/DVD drive
 - interfaces, 810-811
 - CHS (cylinder head sector) addressing
 - 2.1GB barrier, 626
 - 4.2GB barrier, 626-627
 - 8.4GB barrier, 630-631
 - 528MB barrier, 621-623
 - 137GB barrier, 631-633
 - ATA CHS parameter limits, 623
 - BIOS CHS parameter limits, 622
 - BIOS commands, 621
 - CHS bit-shift translation, 624-626
 - combined parameter limits, 623
 - compared to LBA (logical block address), 619-620
 - converting to LBA (logical block address), 620-621
 - LBA-assist translation, 627-630
- commands, 585, 612-613
- connectors
 - 40-pin, 593-595
 - 50-pin, 596-597
 - keying, 597
 - master position, 591
- controllers, 583-584
- costs, 585
- DMA (direct memory access), 603-604
- drive capacity limitations, 616
- dual-drive configurations
 - CS (cable select), 601-602
 - daisy chains, 600
 - jumper settings, 601
 - slave drives, 600
- endecs, 583
- hardcards, 583
- history of, 582-585
- HPAs (host protected areas), 614-615
- interposer cards, 583
- low-level drive formatting, 877-878
- operating system limitations, 633-634
- Parallel ATA (PATA), 585
- performance issues, 585
- PIO (Programmed I/O) modes, 602-603
- precursors to, 582
- prefixes for decimal/binary multiples, 616-618
- RAID (redundant array of independent disks), 634-636
- reliability, 583
- SATA (Serial ATA), 605-608
 - 8B/10B encoding, 606
 - AHCI (Advanced Host Controller Interface), 610-611
 - backward compatibility, 605
 - BIOS setup, 608-610
 - data connector pinouts, 608
 - differential NRZ (Non Return to Zero), 606
 - host adapters, 607
 - power connector pinouts, 608
 - second-generation SATA, 610
 - Serial ATA International Organization, 586, 605
 - signal and power connectors, 607

- standards, 606
- transfer modes, 606, 611-612
- Security Mode, 613-614
- signals, 599-600
- standards, 586-587
 - ATA-1 standard, 587
 - ATA-2 standard, 589
 - ATA-3 standard, 589-590
 - ATA-4 standard, 590-591
 - ATA-5 standard, 591
 - ATA-6 standard, 592
 - ATA-7 standard, 592-593
 - ATA-8 standard, 593
 - table of, 587-588
 - tailgates, 591
 - Technical Committee T13, 586
- ATA/IDE Configuration setting (Drive Configuration menu), 486**
- ATAINF utility, 613**
- Atanasoff, John V., 13**
- Atanasoff-Berry Computer (ABC), 13**
- ATAPI (ATA Packet Interface), 615-616**
 - ATA-4 standard, 590-591
 - ATA-5 standard, 591
 - ATA-6 standard, 592
 - ATA-7 standard, 592-593
 - ATA-8 standard, 593
 - CD/DVD drive interfaces, 810-811
 - line-in motherboard connectors, 377
- Athlon 64 processors, 210-211, 214-215**
 - Athlon 64 FX, 210-211, 214-215, 226-230
 - Athlon 64 X2, 226-230
- chipsets
 - AMD 8000 (8151), 354-355
 - ATI RS480/RX480/RD580, 355-357
 - K8T800/K8T800 Pro/K8M800, 359-360
 - K8T890/K8M890, 360
 - nForce 410/430 series, 362
 - nForce Professional series, 362
 - nForce3 150/nForce3 Pro 150, 361
 - nForce3 250 family, 361-362
 - nForce4 series, 362
 - SiS755/755FX, 363-364
 - SiS756, 364
 - SiS760/760GX, 364-366
 - SiS761/761GX, 366
 - ULi M1687, 357
 - ULi M1689, 357
 - ULi M1695, 357-358
- Athlon chip (AMD), 188-189**
 - Athlon MP, 196-197
 - Athlon XP, 194-197
 - PGA processor information, 191-192
 - Slot-A cartridge processor information, 189-190
- Athlon MP processors, 196-197**
- Athlon processors. *See also* Athlon 64 processors; Athlon MP processors; Athlon XP processors**
 - chipsets, 331-332
 - ALiMagik1, 347-348
 - AMD-750, 332-333
 - AMD-760, 333-334
 - AMD-760MP, 334
 - AMD-760MPX, 334
- Apollo KT133, 337-338
- Apollo KT133A, 337-338
- Apollo KT266, 338-339
- Apollo KT266A, 338-339
- Apollo KT333, 339
- Apollo KT400/KM400, 339
- Apollo KT400A, 339-340
- Apollo KT600, 340
- Apollo KX133, 336-337
- KT880, 340
- MuTIOL architecture, 344
- nForce/nForce2, 348-350
- ProSavage KM133, 338
- ProSavage KM266, 339
- Radeon, 350, 352
- SiS chipset reference tables, 341-342
- SiS730S, 344-345
- SiS733, 345
- SiS735, 345
- SiS740, 345
- SiS741/741GX, 346-347
- SiS745, 345
- SiS746, 346
- SiS748, 346
- VIA chipset reference table, 335-336
- maximum installable memory, 532
- Athlon XP processors, 194-197**
- ATI Technologies, Inc.**
 - chipsets
 - 3D chipsets, 962
 - A-Link architecture, 283
 - ATI RS480/RX480/RD580, 355-357
 - Radeon, 350-352
 - reference table, 325-326
 - CrossFire, 960-961

- ATX motherboards, 249-251**
 - color coding, 255
 - compared to Baby-AT and LPX, 250
 - connector panel, 250
 - connectors, 250
 - cooling features, 251
 - extended ATX, 255
 - FlexATX, 258-259
 - identifying, 253
 - manufacturing costs, 251
 - memory location, 250
 - microATX, 257-258
 - MiniATX, 252
 - ports, 253
 - power supply, 1217-1220
 - power supply connectors, 250, 1235
 - 4-pin +12V power connectors, 1245-1246
 - 8-pin +12V power connectors, 1246-1248
 - ATX12V 1.x power supply connectors, 1235-1241
 - ATX12V 2.x 24-pin, 1241-1243
 - backward/forward compatibility, 1248-1250
 - Dell proprietary ATX design, 1251-1253
 - maximum power-handling capabilities, 1239-1240
 - Molex Mini-Fit Jr. power connectors, 1238-1239
 - PCG (Platform Compatibility Guide), 1244-1245
 - VRM (voltage regulator module), 1243-1244
- processor location, 250
- riser cards, 255-257
 - specification, 255
- Audigy, 1003**
- Audigy 2, 1003**
- Audigy 2 ZS, 1003**
- audio, 987**
 - 3D audio
 - DirectX support, 1009-1010
 - positional audio, 1007-1008
 - processing, 1009
 - front panel audio connector pinout, 375
 - integrated audio chipsets
 - AC '97 integrated audio, 1004-1006
 - AOpen TubeSound, 1007
 - Intel 'Azalia' HD Audio, 1006-1007
 - Intel High Definition Audio, 1006
 - microphones, 1022-1023
 - MIDI, 988
 - music CDs, creating with DAE (digital audio extraction), 827-829
 - POST audio error codes, 1369
 - AMI BIOS, 1370
 - Award BIOS/Phoenix FirstBIOS, 1371
 - IBM BIOS, 1376
 - Phoenix BIOS, 1373-1375
 - sampling, 1001-1002
 - sound cards
 - 3D audio, 1007-1010
 - AdLib, 988
 - CA0102 (Audigy 2), 1003
 - CA0102-ICT (Audigy 2 ZS), 1003
 - CA0186, 1003
 - CA0185, 1003
 - choosing, 1308
 - connectors, 990-994
 - data compression, 997-998
 - DirectX, 988-989
 - discontinued sound cards, 1004
 - drivers, 998-999
 - DSPs (digital signal processors), 998
 - EMU10K1, 1003
 - EMU10K2 (Audigy), 1003
 - EMU-8000, 1003
 - Ensoniq ES137x series, 1002
 - frequency response, 1000
 - history of, 988
 - installing, 1010-1012
 - integrated audio chipsets, 1004-1007
 - Intel 'Azalia' HD Audio, 1006-1007
 - legacy audio support, 989
 - manufacturers, 1002-1003
 - MIDI support, 997
 - monophonic/stereophonic, 997
 - Philips, 1003
 - resource conflicts, 429-431, 1014
 - sampling, 1001-1002
 - SNR (signal-to-noise ratio), 1000
 - Sound Blaster, 988
 - Sound Blaster Pro, 988
 - sound production features, 999
 - sound properties, 1000
 - speaker connections, 1012

- stereo system
 - connections, 1013-1014
 - total harmonic distortion, 1000
 - troubleshooting, 1014-1019
 - USB-based audio
 - processors, 995-996
 - Vibra-16, 1002
 - volume control, 996
 - X-Fi (Extreme Fidelity), 1003
 - Yamaha, 1003
 - sound properties, 1000
 - speakers
 - AC adapters, 1020
 - amplification, 1019
 - buying tips, 1019
 - choosing, 1308
 - DBB (dynamic bass boost), 1020
 - frequency response, 1019
 - headphones, 1021
 - interference, 1021
 - magnetic shielding, 1019
 - satellite speakers, 1020
 - sleep feature, 1020
 - surround
 - sound, 1021-1022
 - total harmonic distortion, 1020
 - troubleshooting, 1016-1017
 - volume control, 1020
 - watts, 1020
 - Audio Modem Riser (AMR), 379**
 - AUTOEXEC.BAT file, 1388**
 - automated bootable media images (flash ROM), 465-466**
 - automatic disk installation programs, 872**
 - automatic drive detection, 860-861**
 - Automatic Fan Detection setting (Fan Control Configuration menu), 493**
 - automatic gain control (AGC) circuitry, 772**
 - automatic head parking, 692**
 - autosynchronous monitors, 900**
 - autotracking monitors, 900**
 - aux in connectors, 994**
 - auxiliary power connectors (ATX), 1240-1241**
 - Auxiliary Power setting (Peripheral Configuration menu), 485**
 - Award BIOS**
 - error messages, 506
 - POST (power-on self test) error codes, 1371
 - POST (power-on self test) onscreen messages, 1372-1373
 - Azalia HD Audio, 1006-1007**
 - azimuth, 687**
-
- B**
- Babbage, Charles, 12**
 - Baby-AT motherboards, 239-240, 1216**
 - backplane systems**
 - active, 271
 - passive, 269
 - backups, 1411-1413**
 - CMOS RAM setup, 463
 - hard-drive based backups, 744
 - importance of, 708
 - power supply**
 - standby power supply, 1288
 - UPS (uninterruptible power supply), 1288-1290
 - ROM BIOS, 462-463
 - tape drives, 744-746
 - backward compatibility**
 - ATA (AT Attachment), 587
 - DVD drives, 798
 - motherboard power connectors, 1248-1250
 - SATA (Serial ATA), 605
 - bad pixels (LCDs), 886-887**
 - Balanced Technology Extended (BTX) motherboards, 263-265**
 - ball-driven mouse devices, 1082**
 - bandwidth, 538**
 - buses, 38-384
 - CATV networks, 1109-1110
 - DDR SDRAM (double data rate SDRAM), 525-526
 - DDR2 SDRAM, 527
 - DDR3 SDRAM, 529
 - ISA (Industry Standard Architecture) buses, 391
 - RDRAM (Rambus DRAM), 531
 - SDRAM (synchronous DRAM), 524
 - banks (memory), 390, 555-557**
 - definition of, 538
 - widths, 555-556
 - Bardeen, John, 15**
 - Base I/O Address (for the Parallel Port) setting (Peripheral Configuration menu), 485**
 - Base I/O Address (for the Serial Port) setting (Peripheral Configuration menu), 485**

- base memory, 479
- basic input/output system.
See ROM BIOS
- basic rate interface (BRI), 1121
- batteries
 - connectors, 376
 - lithium coin cell batteries, 1398
 - replacing, 1294
 - RTC/NVRAM
 - modern CMOS batteries, 1291-1293
 - obsolete/unique CMOS batteries, 1293
 - troubleshooting, 1293-1294
- baud rates, 1130
- BBSs (bulletin board systems), 1103
- BBUL (bumpless build-up layer), 95
- BD (Blu-ray) discs, 775-777, 800
- BDF (Blu-ray Disc Founders), 775
- bearings, fluid dynamic, 695
- Bearlake (3x series) chipsets, 315-317
- BEDO RAM (burst extended data out RAM), 522
- beep error codes (POST), 1369
 - AMI BIOS, 1370
 - Award BIOS/Phoenix FirstBIOS, 1371
 - IBM BIOS, 1376
 - Phoenix BIOS
 - Phoenix BIOS 4 and later, 1375
 - Phoenix BIOS 486 and earlier, 1373-1375
- bench testing power supplies
 - digital infrared thermometers, 1281
 - variable voltage transformers, 1281-1282
- benchmarks (processor speed)
 - iCOMP 2.0 index ratings, 57-58
 - iCOMP 3.0 index ratings, 58
 - Pentium 4 SYSmark 2002 ratings, 58, 65
 - Pentium 4 SYSmark 2004 ratings, 59-62, 65
 - Pentium 4 SYSmark 2004 SE ratings, 63-65
 - Pentium 4 SYSmark 2007 ratings, 66
 - upgrading processors, 231
- Berkeley, Edmund C., 26
- Berry, Clifford, 13
- bezels, 720, 856
- BF (bus frequency) pins, 93
- BiCMOS (bipolar complementary metal oxide semiconductor), 140
- bilinear filtering, 954
- binary digits (bits), 14
- binary kilobytes, 1122
- binary multiples
 - IEC prefixes, 723
 - prefixes for, 616-618
- BIOS (basic input/output system). See ROM BIOS
- The BIOS Companion*, 459
- BIOS RAM checksum error – System halted (error message), 1372
- Bipolar Complementary Metal Oxide Semiconductor (BiCMOS), 140
- bits (binary digits), 14
 - bit cells, 641
 - bit-level ECC (error-correction codes), 635
 - bit rates, 1130
 - bit-shift translation (CHS), 624-626
 - merge bits, 760
 - parity bits, 560
- BlackICE Software, 1139
- blanks, 1337
- BLER (block error rate), 759
- Blinkenlights Archaeological Institute, 26
- block error rate (BLER), 759
- Block Mode PIO (Programmed I/O), 603
- blocked data with distributed parity, 635
- blocked data with double distributed parity, 635
- blocked data with parity, 635
- Blu-ray Disc Founders (BDF), 775
- Blu-ray discs, 775-777, 800
- Blue Book standard (CD EXTRA), 787-788
- Bluetooth, 1099-1100, 1165-1166
- Board ID setting (BIOS Maintenance menu), 478
- bonding, 92
- book recommendations
 - Absolute Beginner's Guide to Security, Spam, and Spyware*, 1127
 - The BIOS Companion*, 459
 - Parkinson's Law*, 664
 - Programmer's Guide to the AMIBIOS*, 458

- Special Edition Using Windows Vista*, 1202
- Upgrading and Repairing Microsoft Windows*, 508
- Upgrading and Repairing Windows, Second Edition*, 1203
- Boot Configuration menu (BIOS Setup)**, 482
- Boot menu (BIOS Setup)**, 497-499
- boot process**, 1383-1384
 - additional boot devices, 708
 - boot floppy disks, 839-841
 - bootable CDs, 842-843, 847
 - bootable DVDs, 842-843
 - booting from CD-ROM, 1385
 - bootstrap loader, 447
 - DOS, 1388
 - operating system
 - independent, 1384-1387, 1431-1433
 - quiet boots, 461
 - rescue CDs, 842
 - troubleshooting, 1430-1432, 1439-1440
 - Windows 9x/Me, 1388
 - IO.SYS file, 1389
 - real-mode configuration, 1389-1390
 - WIN.COM file, 1390-1391
 - Windows NT/2000/XP, 1391
- boot ROM (read-only memory)**, 445
- Boot to Network setting (Boot menu)**, 498
- Boot to Optical Devices setting (Boot menu)**, 498
- Boot to Removable Devices setting (Boot menu)**, 498
- Boot Up Floppy Seek feature (BIOS)**, 500
- Boot Up System Speed feature (BIOS)**, 500
- bootable CDs**,
 - creating, 842-843, 847
- bootable DVDs**,
 - creating, 842-843
- bouncing keystrokes**, 1068
- boutique heatsinks**, 1348-1349
- boxed processors**, 250
- branch prediction**, 83, 139, 149
- branch target buffer (BTB)**, 139
- Brattain, Walter**, 15
- Break codes (keyboards)**, 1071
- breakout boxes**, 1402
- BRI (basic rate interface)**, 1121
- bridges**
 - bridge taps, 1112
 - wireless bridges, 1187
- brightness (LCD panels)**, 909
- broadband modems**
 - advantages, 1104-1105
 - cable modems
 - asymmetrical networks, 1109
 - bandwidth, 1109-1110
 - broadband networks, 1109
 - bundled cable modems, 1107
 - CableLabs Certified cable modems, 1108
 - CATV networks, 1107-1109
 - connecting to Internet with, 1106
 - costs, 1110
 - performance, 1110
 - security, 1110
- comparison of access types, 1105, 1123-1124
- convenience, 1105
- cost, 1105
- DOCSIS standards, 1108
- DSL (digital subscriber line)
 - ADSL (Asymmetric DSL), 1111-1113
 - advantages, 1111
 - availability, 1112
 - CAP (carrierless amplitude/phase), 1111
 - CDSL (Consumer DSL), 1113
 - costs, 1115-1116
 - DMT (discrete multitone), 1111
 - DSL modems, 1114
 - DSLAM (DSL access multiplier), 1112
 - DSLReports.com website, 1112
 - G.Lite, 1113
 - low-pass filters, 1111
 - microfilters, 1114
 - SDSL (Symmetrical DSL), 1113
 - security, 1115-1116
 - service providers, 1112
 - splitters, 1114
 - technical problems, 1116-1117
 - telephone line issues, 1112
 - transceivers, 1112
 - type comparison, 1113-1114
 - xDSL, 1111
- ease of reconnection, 1105
- fixed-base wireless broadband, 1117

- HughesNet, 1118-1119
- ISDN (Integrated Services Digital Network), 1120-1121
 - BRI (basic rate interface), 1121
 - costs, 1122
 - kilobytes, 1122
 - multiple call signaling, 1122
 - PRI (primary rate interface), 1122
 - TAs (terminal adapters), 1123
 - wire feet, 1122-1123
- ISPs (Internet Service Providers), 1106
- leased lines, 1125-1126
- satellite performance, 1120
- service interruptions, 1124
- signal lights, 1146
- speed, 1104, 1124
- StarBand, 1119-1120
- TCP/IP settings, 1125
- telephone line usage, 1105
- Broadwater (96x) chipsets, 315**
- brushes, 1416**
- BTB (branch target buffer), 139**
- BTX motherboards, 263-265**
- bucking spring capacitive keyswitches, 1067-1068**
- buffers**
 - buffer underruns, 825-826
 - buffered DIMMs (dual inline memory modules), 544
 - CD/DVD drives, 808
 - stencil buffering, 954
 - T-buffers, 955
 - TLB (translation lookaside buffer), 77
 - Z-buffering, 954
- bugs. *See also* troubleshooting**
 - MTH (Memory Translator Hub) bug, 297
 - Pentium processors
 - FDIV (floating-point divide), 145-146
 - power management, 147
 - processor bugs, 119
- bulk on spindle media (CD-R), 820**
- bulletin board systems (BBSes), 1103**
- bumpless build-up layer (BBUL), 95**
- bundled cable modems, 1107**
- burning CDs, 817, 824-826**
 - buffer underruns, 825-826
 - recording software, 826-827
- burst extended data out RAM (BEDO RAM), 522**
- bus frequency (BF) pins, 93**
- bus masters, 77, 415**
- bus snooping, 77**
- buses, 33-34, 378, 384-389**
 - address buses, 48-49
 - AGP (Accelerated Graphics Port), 378, 405-408
 - arbitrated buses, 415
 - ATA (AT Attachment), 583-585
 - bandwidth, 380-384
 - bus masters, 77
 - bus snooping, 77
 - compatibility, 390
 - definition of, 378
 - DIB (Dual Independent Bus) architecture, 84
 - DMA (direct memory access) channels, 417-418
- EISA (Extended Industry Standard Architecture), 395-396, 411
 - external, 48
 - HyperTransport, 283
 - I/O port addresses, 418
 - bus-based device port addresses, 419-421
 - chipset-based device port addresses, 419
 - motherboard-based device port addresses, 419
 - identifying, 390
 - importance of, 390
 - internal, 49-50
 - IRQs (interrupt request channels)
 - 8-bit ISA bus interrupts, 410
 - 16-bit ISA/EISA/MCA bus interrupts, 411-412
 - Advanced Programmable Interrupt Controller (APIC), 415
 - conflicts, 416-417
 - edge-triggered interrupt sensing, 409
 - interrupt sharing, 410
 - maskable interrupts, 410
 - PCI interrupts, 412-415
 - PCI IRQ Steering, 410, 414
 - ISA (Industry Standard Architecture), 379
 - 8-bit, 391-392
 - 16-bit, 392-393
 - 32-bit, 393
 - bandwidth, 391
 - DMA (direct memory access) channels, 417-418
 - interrupts, 410-411
 - local buses, 396-399

MCA (microchannel architecture), 393-395, 411
 memory buses, 389
 MuTIOL architecture, 344
 NICs (network interface cards), 1167-1168
 overclocking, 1343
 PCI (Peripheral Connect Interface), 378, 400-403
 adapter cards, 401
 board
 configurations, 402-403
 bus types, 401
 interrupts, 412-415
 PCI-Express, 403-405
 specifications, 399-400
 PCI-Express, 378
 PCI-X, 378
 S-100, 21
 slaves, 415
 speeds, 520
 topology, 1179
 USB (universal serial bus), 1031-1032
 adapters, 1041-1042
 advantages of, 1026
 cables, 1034
 CD/DVD drives, 811
 compared to IEEE 1394, 1026-1028
 connectors, 1035-1037
 drivers, 1038
 enabling, 1038
 functions, 1032
 game ports, 1096
 hubs, 1032-1033
 keyboards, 1075-1077
 mouse interfaces, 1087-1088

NRZI (Non Return to Zero Invert) data encoding, 1032
 performance myths and realities, 1028-1031
 power requirements, 1033
 resource conflicts, 432-433
 self-identifying peripherals, 1038
 speed, 1035
 support for, 1037
 troubleshooting, 1442
 USB 2.0, 1039-1040
 USB flash drives, 736-737
 USB On-The-Go, 1040
 wireless USB, 1040-1041
 VESA (Video Electronics Standards Association), 399
 video adapters
 AGP (Accelerated Graphics Port), 942-943, 1307
 comparison of, 944
 PCI Express, 943-944
 width, 941

Busicom, 17

busmaster ATA (AT Attachment), 603

busmaster DMA (direct memory access), 604

C

/c switch (XCOPY32 command), 874

C1E setting (BIOS Maintenance menu), 478

C3 processors (VIA), 198-199

CA0102 (Audigy 2) audio chip, 1003

CA0102-ICT (Audigy 2 ZS) audio chip, 1003

CA0185 audio chip, 1003

CA0186 audio chip, 1003

Cable Detected setting (Drive Configuration menu), 486

cable modems

 asymmetrical networks, 1109
 bandwidth, 1109-1110
 broadband networks, 1109
 bundled cable modems, 1107
 CableLabs Certified cable modems, 1108
 CATV networks, 1107-1109
 connecting to Internet with, 1106
 costs, 1110
 DOCSIS standards, 1108
 performance, 1110
 security, 1110

cable select (CS), 601-602

cable select (CSEL) signals, 600

CableFree USB, 1041

CableLabs Certified cable modems, 1108

cables, 1170

 ATA (AT Attachment), 597-599
 buying tips, 1198-1199
 cable distance
 limitations, 1177-1178
 cable-ties, 1397
 choosing, 1309
 Direct Cable Connection technology, 1204
 drive installation, 855-856
 external cables,
 connecting, 1329
 FIC (flex interconnect cable), 647

- floppy disk controller
 - cables, 721-722
- floppy drive interface
 - cables, 882
- grounding loops, 1172
- hard drives, 696
- installation
 - cable distance
 - limitations, 1177-1178
 - cable selection, 1172
 - crossover cables, 1174
 - custom-built UTP
 - (unshielded twisted-pair)
 - cables, 1175-1177
 - twisted-pair wiring
 - standards, 1174
- keyboard cables, 1077-1078
- motherboard
 - cables, 1325-1326
- testing, 1077
- Thicknet, 1170
- Thinnet, 1170
- twisted-pair
 - building, 1173-1177
 - Category 3, 1172
 - Category 5, 1172-1173
 - Category 5e, 1172
 - Category 6, 1172
 - Category 7, 1173
 - crossover cables, 1174
 - STP (shielded twisted pair), 1171-1172
 - UTP (unshielded twisted pair), 1171, 1175-1177
 - wiring standards, 1174
- USB (universal serial bus), 1034
- cache, 1303-1304**
 - access times, 514
 - asynchronous design, 516
 - bus snooping, 77
 - cache controllers, 77
 - CD/DVD drives, 808
 - controllers, 516
 - definition of, 71, 515
 - direct-mapped cache, 76
 - evolutionary changes, 517
 - four-way set associative
 - cache, 76, 151
 - fully associative mapped
 - cache, 76
 - hard disk drive cache
 - programs, 702-703
 - hit ratio, 515
 - internal, 140
 - Level 1 cache, 72-73, 515
 - cache misses, 74
 - cache operation, 73-74
 - importance of, 72
 - NexGen Nx586
 - processors, 184
 - Pentium II processors, 160
 - Pentium Pro
 - processors, 151
 - Pentium-MMX
 - improvements, 81
 - Level 2 cache, 74, 516
 - Pentium II processors, 160
 - Pentium II/III Xeon
 - processors, 183
 - Pentium III processors, 176
 - Pentium Pro
 - processors, 153
 - Level 3 cache, 74-75, 516
 - maximum cache, 517
 - nonblocking cache, 77
 - Pentium II processors, 160
 - Pentium Pro processors, 151
 - performance and
 - design, 75-76
 - set associative cache, 76
 - speed, 77-78
 - TLB (translation lookaside buffer), 77
 - two-way set associative, 151
 - write-back cache, 574
 - write-through cache, 77
- cache controllers, 77**
- caddy load mechanism (CD/DVD drives), 812-813**
- Cady, Walter G., 1338**
- calculations**
 - floating-point
 - calculations, 955
 - power
 - consumption, 1266-1268
 - video RAM, 938
- calculators**
 - 701 Defense Calculator, 638
 - 9100A electronic calculator
 - (Hewlett-Packard), 26
 - mechanical calculators, 12
- CAM ATA (Common Access Method ATA), 585**
- cameras, digital. See digital cameras**
- Canadian Standards Agency (CSA) power supply safety certifications, 1266**
- CAP (carrierless amplitude/phase), 1111**
- capacitive**
 - keyswitches, 1067-1068
- capacitors (DRAM), 513**
- capacity**
 - ATA (AT Attachment), 617
 - CDs, 748, 759-760, 817-818
 - drive capacity limitations, 616
 - DVDs, 772-775
 - of flash memory cards, 738
 - floppy disks, 723

- hard drives, 664-665, 696-697
 - BIOS limitations, 697-698
 - capacity limitations, 697
 - operating system limitations, 698
- magnetic storage, 654-655
- maximum installable memory, 532
- card readers, 739**
- card/edge connectors, 391**
- care and maintenance. *See also troubleshooting***
 - 2 1/2" ATA drive cables and adapters, 1397
 - CD/DVD drives, 762-763
 - drive sealing, 814
 - internal versus external, 814
 - self-cleaning lenses, 814
 - CDs/DVDs, 750, 762-763
 - cleaning
 - boards, 1417-1418
 - brushes, 1416
 - CD/DVD drives, 814
 - CDs, 762
 - chemical-freeze sprays, 1416
 - cleaning supply companies, 1417
 - compressed air, 1415
 - connectors, 1418
 - contact cleaners/lubricants, 1415
 - contacts, 1418
 - disassembly and cleaning tools, 1413-1414, 1417
 - erasers, 1416
 - keyboards, 1078-1079, 1419
 - keyswitches, 1065
 - mouse devices, 1088, 1419
 - silicone lubricants, 1417
 - standard chemical cleaners, 1414-1415
 - swabs, 1416
 - vacuum cleaners, 1416
 - data transfer cables and adapters, 1397
 - floppy disks, 728-729
 - keyboards
 - cleaning, 1078-1079
 - defective cables, 1077-1078
 - keyboard disassembly, 1078
 - keyswitches, 1065, 1078
 - monitors, 923
 - mouse, 1088
 - power-protection systems, 1285-1286
 - backup power, 1288
 - line conditioners, 1287-1288
 - phone line surge protectors, 1287
 - surge protectors, 1286-1287
 - preventative maintenance
 - active/passive, 1409-1411
 - cleaning, 1413-1419
 - dust, 1427
 - hard drives, 1419-1421
 - heating and cooling, 1421-1422
 - Maintenance Wizard, 1420
 - operating environment, 1421
 - pollutants, 1427
 - power cycling, 1422-1424
 - power-line noise, 1425-1426
 - RFI (radio-frequency interference), 1426-1427
 - static electricity, 1424-1425
 - system backups, 1411-1413
 - tool/supply vendors, 1426
 - PS/2 Y adapter, 1398
 - safety, 1398-1399
 - spare parts, 1398
 - System Restore, 1410
 - tools, 1392-1393
 - 2 1/2" ATA drive cables and adapters, 1397
 - 3 1/2" drive enclosure, 1397
 - breakout boxes, 1402
 - chip extractors, 1394-1395
 - chip inserters, 1394
 - cleaning materials, 1397
 - data transfer cables and adapters, 1397
 - DMMs (digital multimeters), 1397, 1402-1403
 - electric screwdrivers, 1396, 1407
 - electrical testing equipment, 1401
 - English/metric fasteners, 1400-1401
 - ESD (electrostatic discharge) protection kits, 1396-1398
 - files, 1397
 - flashlights, 1396
 - hemostats, 1396
 - infrared thermometers, 1407-1408
 - lithium coin cell batteries, 1398
 - logic probes, 1403
 - logic pulsers, 1404
 - loopback connector, 1401-1402

- markers/pens, 1397
- memory testers, 1406
- needle-nose pliers, 1396
- nut drivers, 1393
- nylon cable-ties, 1397
- outlet testers, 1404-1405
- parts grabbers, 1395, 1409
- Phillips-head screws, 1400
- PS/2 Y adapter, 1398
- screwdrivers, 1394
- slotted-head screws, 1400
- spare parts, 1398
- temperature probes, 1407
- thumb screws, 1400
- Torx drivers, 1395
- Torx screws,
 - 1399-1400, 1407
- tweezers, 1395
- USB/FireWire cable
 - adapter, 1398
- vises/clamps, 1397
- Windows 98 2000/XP
 - bootable CD, 1397
- Windows 98/98SE or Me
 - Startup floppy, 1397
- Windows Vista bootable
 - DVD, 1397
- wire cutters, 1396
- wire strippers, 1396
- USB/FireWire cable
 - adapters, 1398
- carrierless amplitude/phase (CAPs), 1111**
- CAS-2 (column address strobe) timing, 294**
- cases, 1297-1299**
 - cover assembly, 1329
 - definition of, 37
 - mounting motherboards
 - in, 1318-1323
 - no-tool, 1400
- Category 3 cables, 1172**
- Category 5 cables, 1172-1173**
- Category 5e cables, 1172**
- Category 6 cables, 1172**
- Category 7 cables, 1173**
- cathode ray tube monitors. *See* CRT (cathode ray tube) monitors**
- CATV networks, 1107-1109**
- CAV (constant angular velocity) technology**
 - CDs, 803
 - DVDs, 807
- CCITT (Comité Consultatif International Telephonique et Telegraphique), 1129**
- CD discs, 749-750**
 - bootable CDs, 842-843, 847
 - buffer underruns, 825-826
 - burning, 824-826
 - capacity, 748, 759-760
 - care and maintenance,
 - 750, 762-763
 - CD EXTRA, 787-788
 - CD-i, 779-780
 - CD-DA, 779
 - CD-R, 783, 816-817
 - bulk on spindle media, 820
 - compared to CD-RW, 821
 - conventional surface media, 819
 - disc read errors, 844
 - jewel cases, 819
 - media color, 818-819
 - printable surface media, 819
 - slimline cases, 820
 - speed ratings, 820
 - unbranded media, 819
- CD-RW, 820
 - compared to CD-R, 821
 - disc read errors, 844, 847
 - disc write errors, 845
 - media layers, 821-822
 - speeds, 822-823
- CD TEXT discs, 758
- CD XA
 - interleaving, 780
 - sector modes and forms, 780-782
- copy protection, 759, 829-830
- DAE (digital audio extraction), 827-829
- double-density discs, 788
- DRM (digital rights management), 830-831
- DualDisc, 789-790
- EFM data encoding, 760-762
- error handling
 - BLER (block error rate), 759
 - CIRC (cross-interleave Reed-Solomon code), 758
- file systems, 790-791
 - HFS (Hierarchical File System), 795
 - High Sierra, 791-792
 - ISO 9660, 792-793
 - Joliet, 793
 - Rock Ridge, 795
 - UDF (Universal Disk Format), 794
- For Music Use Only discs, 829
- form factor, 748

- history of, 749
 - hub clamping area, 754
 - interleaves, 758
 - Labelflash direct disc labeling system, 844
 - lands, 750-752
 - lead-in, 754
 - lead-out, 754
 - LightScribe direct disc labeling system, 843
 - mass production, 750-751
 - Mount Rainier standard, 795-796
 - MultiRead specifications, 823-824
 - multisession recording
 - Disc-at-Once, 783
 - packet writing, 784-785
 - Track-at-Once, 784
 - PCA (power calibration area), 754
 - Photo CD, 785-786
 - Picture CD, 786
 - pits, 750-752
 - PMA (power memory area), 754
 - program area, 754
 - reading, 752-753
 - recording software, 826-827
 - rescue CDs, 842
 - sampling rates, 756-757
 - sectors, 756
 - subcode bytes, 757-758
 - summary of formats, 777, 779
 - Super Audio CD (SA-CD), 789
 - Super Video CDs, 787
 - technical parameters, 755-756
 - tracks, 753-754
 - troubleshooting, 844-847
 - video CDs, 787
 - virgin CDs, 816
 - Windows 2000/XP bootable CD, 1397
 - Yellow Book standard, 779
- CD drives, 748**
- access times, 808
 - audio connectors, 377, 993
 - bootable CDs, 842-843, 847
 - booting from, 1385
 - booting from floppy disk, 839-841
 - buffer underruns, 825-826
 - buffers/cache, 808
 - burning CDs, 824-826
 - care and maintenance, 762-763
 - CAV (constant angular velocity) technology, 803
 - CD EXTRA, 787-788
 - CD-i, 779-780
 - CD-DA, 779
 - CD-R, 783, 815
 - buffer underruns, 825-826
 - bulk on spindle media, 820
 - burning CDs, 824-826
 - capacity, 817-818
 - compared to CD-RW, 821
 - conventional surface media, 819
 - copy protection, 829-830
 - DAE (digital audio extraction), 827-829
 - disc read errors, 844
 - DRM (digital rights management), 830-831
 - For Music Use Only discs, 829
 - jewel cases, 819
 - mechanical drive operation, 816-817
 - media color, 818-819
 - overburning, 817
 - printable surface media, 819
 - recording software, 826-827
 - slimline cases, 820
 - speed ratings, 820
 - unbranded media, 819
- CD-RW, 815, 820
- compared to CD-R, 821
 - mechanical drive operation, 821-822
 - media layers, 821-822
 - speeds, 822-823
- CD XA
- interleaving, 780
 - sector modes and forms, 780-782
- choosing, 1306
- CLV (constant linear velocity) technology, 803
- configuration
 - jumper settings, 879-880
 - system configuration, 882
- copy protection, 829-830
- CPU utilization, 808-809
- DAE (digital audio extraction), 827-829
- data transfer rates, 802
- definition of, 37
- DMA (Direct Memory Access), 809-810
- double-density drives, 788
- drive sealing, 814
- DRM (digital rights management), 830-831

- DualDisc, 789-790
- file systems, 790-791
 - HFS (Hierarchical File System), 795
 - High Sierra, 791-792
 - ISO 9660, 792-793
 - Joliet, 793
 - Rock Ridge, 795
 - UDF (Universal Disk Format), 794
- firmware updates, 847-850
- For Music Use Only discs, 829
- history of, 749
- installation, 839,
 - 878-879, 1326-1328
 - jumper settings, 879-880
 - PATA (parallel ATA) optical drives, 880-881
 - SATA (serial ATA) drives, 881-882
- interfaces
 - ATA/ATAPI, 810-811
 - FireWire, 811-812
 - SATA, 810
 - USB (Universal Serial Bus), 811
- internal versus external, 814
- Labelflash direct disc labeling system, 844
- laser operation, 751-752
- LightScribe direct disc labeling system, 843
- loading mechanisms, 812-813
- mechanical drive
 - operation, 752-753
- Mount Rainier
 - standard, 795-796
- MultiRead
 - specifications, 823-824
- multisession recording
 - Disc-at-Once, 783
 - packet writing, 784-785
 - Track-at-Once, 784
 - Photo CD, 785-786
 - Picture CD, 786
 - recording software, 826-827
 - rescue CDs, 842
 - self-cleaning lenses, 814
 - speed, 802-805
 - summary of formats, 777-779
 - Super Audio CD (SA-CD), 789
 - Super Video CDs, 787
 - transfer rates, 804
 - troubleshooting, 1442
 - disc read failures, 844-847
 - disc write failures, 845-847
 - slow drive speeds, 846
 - video CDs, 787
 - Yellow Book standard, 779
- CD EXTRA, 787-788**
- CD SPDIF (Sony/Philips Digital Interface) in/out sound card connectors, 994**
- CD TEXT discs, 758**
- CD XA drives**
 - interleaving, 780
 - sector modes and forms, 780-782
- CD-DA drives, 779**
- CD-i, 779-780**
- CD-R drives, 783, 815**
 - buffer underruns, 825-826
 - bulk on spindle media, 820
 - burning CDs, 824-826
 - capacity, 817-818
 - compared to CD-RW, 821
 - conventional surface media, 819
 - copy protection, 829-830
 - DAE (digital audio extraction), 827-829
 - disc read errors, 844
 - DRM (digital rights management), 830-831
 - For Music Use Only discs, 829
 - jewel cases, 819
 - mechanical drive
 - operation, 816-817
 - media color, 818-819
 - overburning, 817
 - printable surface media, 819
 - recording software, 826-827
 - slimline cases, 820
 - speed ratings, 820
 - unbranded media, 819
- CD-ROM discs. See CD discs**
- CD-ROM drives. See CD drives**
- CD-RW discs, 820**
 - buffer underruns, 825-826
 - burning, 824-826
 - compared to CD-R, 821
 - copy protection, 829-830
 - disc read errors, 844, 847
 - disc write errors, 845
 - DRM (digital rights management), 830-831
 - mechanical drive
 - operation, 821-822
 - media layers, 821-822
 - speeds, 822-824
- CD-RW drives, 815, 820**
 - buffer underruns, 825-826
 - burning CDs, 824-826
 - compared to CD-R, 821
 - copy protection, 829-830
 - DAE (digital audio extraction), 827-829
 - DRM (digital rights management), 830-831
 - For Music Use Only discs, 829

- mechanical drive
 - operation, 821-822
- media layers, 821-822
- MultiRead
 - specifications, 823-824
- recording software, 826-827
- speeds, 822-823
- CDSL (Consumer DSL), 1113**
- Celeron processors, 149, 166**
 - benefits, 168
 - Celeron D, 172-175
 - chipsets
 - Aladdin P4 (M1671), 324
 - Apollo P4X266 family, 329
 - Apollo P4X400, 330
 - Apollo P4X400A, 330
 - Apollo P4X533, 330
 - ATI chipsets, 325-326
 - ICH5, 312
 - ICH5R, 312
 - Intel 845 family, 310-311
 - Intel 848P, 312
 - Intel 850 family, 308-309
 - Intel 865 family, 312
 - Intel 875P, 313
 - Intel 915, 313
 - Intel 925X, 313
 - Intel 945 Express, 314
 - Intel 955X, 314-315
 - Intel 96x series, 315
 - Intel 975X, 314-315
 - Intel chipsets reference tables, 302-308
 - Intel Extreme Graphics Architecture, 277-278
 - M1681/M1663, 324
 - M1685, 324-325
 - ProSavage P4M266, 329
 - PT800/PM800/PT880/PM880, 330
 - PT880/PT894/PT894 Pro, 330
 - SiS chipset reference tables, 317-319
 - SiS645/645DX, 320
 - SiS648/648FX, 320
 - SiS649/SiS649FX, 322
 - SiS650/651, 320
 - SiS655/655FX/655TX, 320
 - SiS656/SiS656FX, 321-322
 - SiS661FX, 321
 - SiSR658/R659, 321
 - ULi chipset reference tables, 322
 - VIA chipset reference tables, 327-328
 - VIA Modular Architecture Platforms (V-MAP), 328-329
 - DIB (Dual Independent Bus), 84, 149
 - dynamic execution, 149
 - FC-PGA (flip chip pin grid array) package, 166
 - history of, 169
 - iCOMP 2.0 index ratings, 57
 - instruction execution, 150
 - manufacturing, 168
 - PPGA (plastic pin grid array) package, 166-167
 - processor variations, 170-171
 - running 32-bit software, 150
 - SEP (single edge processor) package, 166
 - Socket 370 Celerons, 171
 - Socket 478 Celerons, 172
 - Socket 4T (LGA 775) 78 Celerons, 172
 - Tualatin, 171
- cells, bit, 641**
- central processing units (CPUs). See processors**
- central switch (CS), 1112**
- Certified Wireless USB, 1041**
- CFCs (chlorofluorocarbons), 1414**
- CFX12V power supply, 1227**
- chassis**
 - Chassis Intrusion setting (Security menu), 494
 - definition of, 37
 - intrusion connectors, 376
 - thermally advantaged chassis, 1358
 - cooling fans, 1359
 - maximum heatsink inlet temperatures, 1359-1360
 - processor ducts, 1360-1366
 - specifications, 1360
- Chassis Intrusion setting (Security menu), 494**
- checkpoint codes (POST), 1369-1370**
- chemical cleaners**
 - chemical-freeze sprays, 1416
 - contact cleaners/lubricants, 1415
 - silicone lubricants, 1417
 - standard cleaners, 1414-1415
- Chemtronics, 1417**
- Chernobyl virus, 464**
- chip creep, 533**
- chip extractors, 1394-1395**
- chip inserters, 1394**
- chip on ceramic (COC) technology, 647**
- chips, memory. See modules (memory)**
- Chips and Technologies, 274**
- Chipset Configuration menu (BIOS Setup), 482-484**

chipsets, 273

56Kbps modems, 1136

82C206 chips, 274

82C836 SCAT (Single Chip AT) chipsets, 274

AMD

AMD 8000 (8151), 354-355

AMD-750, 278, 332-333

AMD-760, 279, 333-334

AMD-760MP, 334

AMD-760MPX, 334

reference table, 331-332

AT motherboards, 274

ATI

A-Link architecture, 283

ATI RS480/RX480/
RD580, 355-357

Radeon, 350-352

reference table, 325-326

choosing, 1302-1303

CS8220 chipset, 274

data books, 1303

documentation, 437-438

history and

development, 273-275

hub architecture, 280-281

industry control of, 31

Intel, 275-276

3x series, 315-317

96x series, 315

386/486 chipsets, 283-284

810, 290-291

810E, 290-291

810E2, 290-291

815, 293-294

815E, 293-295

815EP, 293-295

820E, 295-297

82350 chipsets, 283

845 family, 310-311

848P, 312

850 family, 308-309

865 family, 312

875P, 313

915, 313

925X, 313

945 Express, 314

955X, 314-315

975X, 314-315

Extreme Graphics

Architecture, 277-278

ICH5, 312

ICH5R, 312

model numbers, 276-277

North Bridge, 279-280

Pentium 4 chipset

reference tables, 302-308

Pentium chipsets, 284-286

Pentium Pro chipset

reference tables, 286-290

RNG (Random Number
Generator), 293

South Bridge, 279-280

Super I/O chips, 279

workstation chipset

reference table, 352-353

NEAT (New Enhanced AT)

CS8221 chipset, 274

NVIDIA

nForce 410/430 series, 362

nForce Professional
series, 362

nForce/nForce2, 348-350

nForce3 150/nForce3
Pro 150, 361

nForce3 250

family, 361-362

nForce4 series, 362

PC/XT motherboards, 274

Pentium Pro

motherboards, 153

**SiS (Silicon Integrated
Systems)**

Athlon/Duron chipset

reference tables, 341-342

MuTIOL architecture,

283, 344

P6-class chipset reference
table, 303

Pentium 4/Pentium D

chipset reference

tables, 317-319

SiS645/645DX, 320

SiS648/648FX, 320

SiS649/SiS649FX, 322

SiS650/651, 320

SiS655/655FX/655TX, 320

SiS656/SiS656FX, 321-322

SiS661FX, 321

SiS730S, 344-345

SiS733, 345

SiS735, 345

SiS740, 345

SiS741/741GX, 346-347

SiS745, 345

SiS746, 346

SiS748, 346

SiS755/755FX, 363-364

SiS756, 364

SiS760/760GX, 364-366

SiS761/761GX, 366

SiSR658/R659, 321

Super I/O chips, 367-368

top 25 companies ranked
by sales, 32**ULi Electronics**

Aladdin P4 (M1671), 324

Aladdin Pro 4, 299-300

Aladdin Pro 5, 299-300

- Aladdin TNT2, 299-300
- AliMagik1, 347-348
- M1681/M1663, 324
- M1685, 324-325
- Pentium 4 chipset
 - reference tables, 322
- ULi M1687, 357
- ULi M1689, 357
- ULi M1695, 357-358
- VIA Technologies
 - Apollo KT133, 337-338
 - Apollo KT133A, 337-338
 - Apollo KT266, 338-339
 - Apollo KT266A, 338-339
 - Apollo KT333, 339
 - Apollo KT400/KM400, 339
 - Apollo KT400A, 339-340
 - Apollo KT600, 340
 - Apollo KX133, 336-337
 - Apollo P4X266 family, 329
 - Apollo P4X400, 330
 - Apollo P4X400A, 330
 - Apollo P4X533, 330
 - Athlon/Duron chipset
 - reference tables, 335-336
 - KT880, 340
 - K8T800/K8T800
 - Pro/K8M800, 359-360
 - K8T890/K8M890, 360
 - P6-class chipset reference tables, 300, 302
 - Pentium 4 chipset
 - reference tables, 327-328
 - ProSavage KM133, 338
 - ProSavage KM266, 339
 - ProSavage P4M266, 329
 - PT800/PM800/PT880/
PM880, 330
 - PT880/PT894/PT894
Pro, 330
- V-Link architecture, 282
- VIA Modular Architecture Platforms (V-MAP), 328-329
- video adapters
 - 3D chipsets,
 - 961-962, 966-972
 - identifying, 935
 - integrated video/
motherboard
chipsets, 928-932
 - video processor technologies, 934
- chlorofluorocarbons (CFCs), 1414**
- CHS (cylinder head sector) addressing**
 - 2.1GB barrier, 626
 - 4.2GB barrier, 626-627
 - 8.4GB barrier, 630-631
 - 137GB barrier, 631-633
 - 528MB barrier, 621-623
 - ATA CHS parameter limits, 623
 - BIOS CHS parameter limits, 622
 - BIOS commands, 621
 - CHS bit-shift translation, 624-626
 - combined parameter limits, 623
 - compared to LBA (logical block address), 619-620
 - converting to LBA (logical block address), 620-621
 - LBA-assist translation, 627-630
- CIH virus, 464**
- CIRC (cross-interleave Reed-Solomon code), 758**
- circuit boards, 719**
- Cirque Glidepoint pointing device, 1094**
- CISC (Complex Instruction Set Computer) chips, 80**
- citrus-based cleaners, 1414**
- clamping force (heatsinks), 1349-1350**
- clamps, 1397**
- clean-room approach, 458**
- cleaning. *See also* care and maintenance**
 - boards, 1417-1418
 - brushes, 1416
 - CD/DVD drives, 814
 - CDs, 762
 - chemical-freeze sprays, 1416
 - cleaning supply companies, 1417
 - compressed air, 1415
 - connectors, 1418
 - contact cleaners/
lubricants, 1415
 - contacts, 1418
 - disassembly and cleaning tools, 1413-1414, 1417
 - erasers, 1416
 - keyboards, 1078-1079, 1419
 - keyswitches, 1065
 - mouse devices, 1088, 1419
 - silicone lubricants, 1417
 - standard chemical cleaners, 1414-1415
 - swabs, 1416
 - vacuum cleaners, 1416
- Clear All DMI Event Log setting (Event Logging menu), 490**
- Clear All Passwords setting (BIOS Maintenance menu), 478**

- Clear Trusted Platform Module setting (BIOS Maintenance menu), 478**
- Clear User Password setting (Security menu), 494**
- ClickLock feature (IntelliMouse), 1090**
- clients, 1154**
 - client/server networks, 1154-1156
 - thin clients, 748
- CLKMUL (clock multiplier), 131**
- clock doubling, 134-136**
- clock multiplier (CLKMUL), 66, 131, 143**
- clock signals, 55, 650**
- clock speed, 55, 58, 518-519, 1339-1341. *See also* RTC/NVRAM (real-time clock/nonvolatile memory batteries)**
 - 486 processors, 130
 - 486DX processors, 131
 - 486SX processors, 133
 - 8088 processors, 124
 - Am5x86(TM)-P75 processors, 136
 - AMD-K6 processors, 187
 - AMD P-Ratings, 67-69
 - CLKMUL (clock multiplier), 131
 - clock signal, 55
 - Cyrix P-Ratings, 67
 - Cyrix/TI 486, 137
 - doubling, 134
 - iCOMP 2.0 index ratings, 57-58
 - iCOMP 3.0 index ratings, 58
 - Intel ratings, 66-67
 - motherboard speeds, 66-67
 - overclocking, 69-71, 438-439
 - Pentium II processors, 157
 - Pentium III processors, 182
 - Pentium Pro processors, 153
 - Pentium 4 SYSMARK 2002 ratings, 58, 65
 - Pentium 4 SYSMARK 2004 ratings, 59-62, 65
 - Pentium 4 SYSMARK 2004 SE ratings, 63-65
 - Pentium 4 SYSMARK 2007 ratings, 66
 - wait states, 55
- closed loop feedback mechanism, 686**
- clusters, 678, 724**
- CLV (constant linear velocity) technology**
 - CDs, 803
 - DVDs, 805
- CMOS batteries**
 - modern CMOS batteries, 1291-1293
 - obsolete/unique CMOS batteries, 1293
 - troubleshooting, 1293-1294
- CMOS battery failed (error message), 1372**
- CMOS checksum error – Defaults loaded (error message), 1372**
- CMOS RAM setup**
 - accessing, 476
 - additional setup features, 499-500
 - addresses, 471-473
 - Advanced menu, 480
 - backing up, 463
 - Boot Configuration menu, 482
 - Boot menu, 497, 499
 - Chipset Configuration menu, 482-484
 - compared to BIOS, 445-446
 - diagnostic status codes, 472-473
 - Drive Configuration menu, 486-489
 - Event Logging menu, 489-490
 - Exit menu, 499
 - Fan Control Configuration menu, 493
 - Floppy Configuration menu, 489
 - Hardware Monitoring Display, 493-494
 - main menu, 478-480
 - Maintenance menu, 477-478
 - Memory Configuration menu, 481-482
 - motherboard addresses, 368
 - PCI Configuration menu, 480
 - PCI Express Configuration menu, 481
 - Peripheral Configuration menu, 484-486
 - Power menu, 495-497
 - saving, 463
 - Security menu, 494-495
 - summary of menus, 477
 - USB Configuration menu, 491-492
 - Video Configuration menu, 490-491
- CNR (Communications and Networking Riser), 379, 1004**
- coaxial cables, 1170**
- COC (chip on ceramic) technology, 647**
- code-free DVD players, 799**
- codexes, 978**
- codenames of processors, 120-123**

codes

- keyboard scan
 - codes, 1071-1072
- POST (power-on self test)
 - audio error codes, 1369
 - AMI BIOS, 1370
 - Award BIOS/Phoenix FirstBIOS, 1371
 - IBM BIOS, 1376
 - Phoenix BIOS, 1373-1375
 - POST (power-on self test) checkpoint codes, 1369-1370

coercivity (floppy disks), 728**color coding standards**

- ATX motherboards, 255
- CD-Rs, 818-819
- network cabling, 1174
- power switch
 - connectors, 1232

Colossus, 14**column address strobe (CAS-2) timing, 294****COM ports**

- mouse interrupt
 - conflicts, 1089
- serial mouse
 - connections, 1085

combo adapters, 1169**Comité Consultatif**

International Telephonique et Telegraphique (CCITT), 1129

commands

- AT commands, 1130
- ATA (AT Attachment), 612-613, 585
- StartBIOS, 1070
- StopBIOS, 1070

Common Access Method ATA (CAM ATA), 585**Communications and Networking Riser (CNR), 379, 1004****communications.**

See networking

compact disc read-only memory. *See* CD discs; CD drives**compact form factor (CFX12V) power supply, 1227****CompactFlash, 734****CompactFlash**

Association, 735

Compaq

- ATA. *See* ATA (AT Attachment)
- BIOS error messages, 506
- reverse engineering of IBM software, 27-28

compatibility

- Baby-AT motherboards, 240
- buses, 390
- DVD drives, 798
- pointing devices, 1096
- recordable DVD, 832
- Sound Blaster Pro sound cards, 988

Complex Instruction Set Computer (CISC) chips, 80**Compliance Test Pattern**

setting (PCI Express Configuration menu), 481

component video, 978**composite ferrite read/write heads, 643****compressed air, 1079, 1415****compression**

- codecs, 978
- MNP 5 standard, 1134
- sound card data, 997-998
- V.42bis standard, 1133
- V.44 standard, 1134

computer history. *See* history of computers**CONFIG.SYS file, 1388****configuration. *See also***

installation; system assembly

ATA (AT

Attachment), 600-602

CD-ROM drives

- jumper settings, 879-880
- system configuration, 882

documentation, 1313-1315

DVD-ROM drives

- jumper settings, 879-880
- system configuration, 882

hard drives

- automatic drive detection, 860-861
- host adapters, 852-854

manual drive

parameters, 861

monitor refresh rates, 914-915

networking

software, 1201-1202

parallel ports, 1056-1057

power supply, 1323

processor operating voltages, 114-116

removable-media drives, 712

serial ports, 1051

speakers, 1012

system-configuration

templates, 424-428

video adapters, 944-946

Configure SATA as setting (Drive Configuration menu), 486**conflicts**

- IRQs (interrupt requests), 416-417, 1088-1089
- sound cards, 1014

connecting components.*See configuration***connectors**

ATA (AT Attachment)

40-pin, 593-595

50-pin, 596-597

keying, 597

master position, 591

card/edge connectors, 391

cleaning procedures, 1418

EISA (Extended Industry
Standard Architecture)

buses, 396

floppy drives, 1255-1256

pinouts, 721

power connectors, 720-721

signal connectors, 720-721

full-size AT

motherboards, 239

hard drives, 696

keyboards, 1060,

1073-1075, 1078

motherboards, 368-369,

373-374, 1233

4-pin +12V power

connectors, 1245-1246

8-pin +12V power

connectors, 1246-1248

alternative single-row

front panel connector

pinouts, 372

AMR (Audio Modem

Riser), 379

AT, 1233-1235

ATAPI-style line-in

connectors, 377

ATX, 250

ATX/ATX12V 1.x,

1235-1241

ATX12V 2.x 24-pin,

1241-1243

Baby-AT, 240

backward/forward

compatibility, 1248-1250

battery connectors, 376

CD audio connectors, 377

chassis intrusion

connectors, 376

CNR (Communications

and Networking

Riser), 379

Dell proprietary ATX

design, 1251-1253

front panel audio

connector pinout, 375

front panel IEEE 1394

(FireWire/i.LINK)

connector pinout, 374

front panel switch/

LED connector

pinouts, 370-371

front panel USB header

connector pinout, 373

infrared data front panel

connector pinout, 376

LED and keylock

connectors, 376

LPX, 242-244, 1230-1232,

1236, 1243-1245

microprocessor fan power

connectors, 377

power LED

indications, 371

speaker connectors, 376

telephony connectors, 377

Wake on LAN

connectors, 376

Wake on Ring

connectors, 377

mouse devices, 1073-1075

hybrid mouse, 1086

PS/2 mouse interfaces,

1085-1086

serial, 1085

USB (Universal Serial Bus),

1087-1088

NICs (network interface
cards), 1169-1170

PCI Express x16

Graphics Power

connectors, 1257-1258

peripheral power

connectors, 1254

SATA (Serial ATA),

607-608, 1256-1257

serial ports, 1049

sound card, 990-992

aux in, 994

CD SPDIF in/out, 994

internal CD-audio, 993

line-in, 992

line-out, 992

MIDI in/out, 993

mono-in, 992

optical SPDIF in/out, 994

rear-out, 992

SPDIF in/out, 993-994

TAD (Telephone Answering
Device) in, 994

USB (universal serial bus),

1035-1037

Conner Peripherals, Inc., 667**constant angular velocity.***See CAV technology***constant linear velocity. *See*****CLV technology****constant voltage power****supply, 1208****Consumer DSL (CDSL), 1113****consumption of power supply,****calculating, 1266-1268****contact cleaners/****lubricants, 1415**

- contact start stop (CSS)
 - design, 670
- contacts, cleaning, 1418
- content scramble system (CSS), 800-801
- contrast (LCD panels), 909
- controllerless
 - modems, 1140-1141
- controllers. *See also* adapters
 - ATA (AT Attachment), 583-584
 - cache controllers, 77, 516
 - configuration, 852-854
 - DualDDR, 349
 - floppy drives, 719-720
 - keyboards, 1068-1069
 - ST-506/412 MFM controllers, 675
 - Super I/O chips, 367
- conventional memory, 479
- conventional surface media (CD-R), 819
- converters, VGA-to-NTSC, 976
- converting sector addresses, 620-621
- cooling. *See* heating/cooling issues
- coppermine, 90
- coprocessors. *See* math coprocessors
- copy protection
 - CDs discs, 759, 829-830
 - DVDs, 798-799
 - APS (analog protection system), 801
 - CSS (content scramble system), 800-801
 - ProtectDisc, 802
 - RPC (regional playback control), 799-800
 - software, 27
- CopyGuard, 801
- cordless input devices. *See* wireless input devices
- Core 2 processors (Intel), 222-224, 315-317
- cosmic rays, 558-559
- cover assembly (cases), 1329
- CPC Override setting (Memory Configuration menu), 481
- CPU at *nnnn* (error message), 1372
- CPU Fan Control setting (Fan Control Configuration menu), 493
- CPU Frequency Multiplier setting (BIOS Maintenance menu), 478
- CPU Internal Cache/External Cache feature (BIOS), 499
- CPU Microcode Update Revision setting (BIOS Maintenance menu), 478
- CPU Stepping Signature setting (BIOS Maintenance menu), 478
- CPU-Z, 277
- CPUs (central processing units). *See* processors
- crashes, head, 670. *See also* troubleshooting
- CRC (cyclical redundancy checking), 591
- CRC sector data, 673-674
- Creative Labs
 - CA0102 (Audigy 2) audio chips, 1003
 - CA0102-ICT (Audigy 2 ZS) audio chips, 1003
 - EAX (Environmental Audio Extensions), 1007
 - EMU10K1 audio chips, 1003
 - EMU10K2 (Audigy) audio chips, 1003
 - EMU-8000 audio chips, 1003
 - Ensoniq ES137x series sound cards, 1002
 - Sound Blaster Pro sound cards, 988
 - Sound Blaster sound cards, 988
 - Vibra-16, 1002
- cross-interleave Reed-Solomon code (CIRC), 758
- CrossFire (ATI), 960-961
- crossover UTP (unshielded twisted-pair) cables, 1174
- CRT (cathode ray tube) monitors, 886
 - compared to LCD, 901-902
 - curved picture tubes, 900-901
 - dot pitch, 899, 907-908
 - electron guns, 898
 - FST (flat square tube) designs, 900
 - horizontal scan rates, 899
 - interfaces, 901
 - multiple-frequency monitors, 900
 - persistence, 899
 - phosphor triads, 907
 - raster, 899
 - refresh rates, 899-900
 - scanning frequency, 899
 - screen phosphors, 907
 - shadow masks, 898, 907
 - slotted masks, 908
 - stripe pitch, 908
- crystals, quartz, 1336-1338
- CS (cable select), 601-602
- CS (central switch), 1112
- CS8220 chipsets, 274

- CS8221 chipsets, 274
- CSA (Canadian Standards Agency) power supply safety certifications, 1266
- CSA Device setting (Chipset Configuration menu), 483
- CSEL (cable select) signals, 600
- CSS (contact start stop) design, 670
- CSS (content scramble system), 800-801
- curved picture tubes, 900-901
- custom PROM (programmable ROM) programming, 451
- Customizer 101
keyboards, 1068
- Customizer 104
keyboards, 1068
- cycle times, 518-519
- cyclical redundancy checking (CRC), 591
- cycling power, 1268-1271
- cylinder head sector addressing. *See* CHS addressing
- CYLINDER NUMBER sector data, 673
- cylinders, 668, 716, 724
- Cyrix
integrated video/motherboard chipsets, 928
- P-Ratings, 67
- processors
486 processors, 137
- 6x86/6x86MX processors, 198
- codenames, 120
- Cyrix III (C3) processors, 198
- specifications, 46
- D**
- d-limonene, 1414
- D. W. Electrochemicals Stabilant 22a, 1065
- DACs (digital-to-analog converters), 1001
- DAE (digital audio extraction), 827-829
- daisy chains (ATA), 600
- DAO (Disc-at-Once) recording, 783
- DASP (drive action/slave present) signals, 599
- DASP (dynamic adaptive speculative preprocessor), 349
- data bits, 1129
- data books, 1303
- data buses. *See* buses
- data encoding schemes. *See* encoding schemes
- data pipelines, 138-139
- DATA sector data, 673-674
- DATA SYNC VFO LOCK sector data, 673
- data transfer
cables, 1397
- DMA (direct memory access), 603
busmaster DMA, 604
multiword, 604
singleword, 603-604
UDMA (Ultra-DMA), 604
- flash memory
card readers, 739
Type II PC Card adapters, 741
- PIO (Programmed I/O) modes, 602-603
- rates, 699-701
between systems, 709
- data zone (DVDs), 767
- data-compression standards
MNP 5 standard, 1134
V.42bis standard, 1133
V.44 standard, 1134
- dataflow analysis, 83, 149
- DataMaster design, 22
- db (decibels), 1000
- DB-9 connectors, 1169, 1085
- DB-15 cable (Thicknet), 1170
- DB-25 connectors, 1085
- DBB (dynamic bass boost), 1020
- DC voltages
negative voltages, 1210
positive voltages
voltage rails, 1208-1209
voltage regulators, 1209
- DCMA (Digital Millennium Copyright Act), 799
- DDR SDRAM (double data rate SDRAM), 525-526, 937, 1303
- DDR2 SDRAM, 526, 937
- DDR2 Voltage setting (Chipset Configuration menu), 483
- DDR3 SDRAM, 528-529
- DDWG (Digital Display Working Group), 890
- De Forest, Lee, 15
- dead pixels (LCDs), 886
- debouncing keystrokes, 1068
- decibels (db), 1000
- decimal-based multiples, prefixes for, 616, 618
- decimal kilobytes, 1122
- dedicated servo mechanisms, 690-691
- Default Frequency Ratio setting (BIOS Maintenance menu), 478

- Defense Calculator**, 638
 - defragmenting files**, 1419-1420
 - Dell Computers**
 - ATX power supply connectors, 1251-1253
 - XPS systems, 237
 - density**
 - areal
 - definition of, 655
 - growth rate, 656
 - increasing, 657-658
 - pixie dust technology, 658
 - floppy disks, 727
 - tracks, 670
 - depot repair**, 982
 - depth cueing**, 953
 - designing systems**. *See* **system assembly**
 - Desktop Form Factors website**, 1302
 - desktop video boards**, 977-980
 - detecting processor speed**, 439
 - detents (stepper motors)**, 717
 - Deutsche Industrie Norm (DIN)**, 1060
 - device drivers**. *See* **drivers**
 - Device Manager**
 - mouse conflicts, 1089
 - resource conflicts, 429
 - DFP (Digital Flat Panel)**, 890
 - DHCP (Dynamic Host Configuration Protocol)**, 1190
 - DIAG utility**, 1381
 - diagnostics**, 1367. *See also* **troubleshooting**
 - aftermarket software, 1368
 - digital infrared thermometers, 1281
 - DMMs (digital multimeters)**
 - back probing, 1280-1281
 - buying tips, 1278-1280
 - measuring voltage with, 1280-1281
 - general-purpose diagnostics**, 1382
 - loopback testing**, 1053
 - manufacturer-supplied software**, 1368
 - MSD (Microsoft Diagnostics)**, 1052
 - network interface adapters**, 1381-1382
 - operating system diagnostics**, 1382-1383
 - operating system software**, 1368
 - peripheral diagnostics software**, 1368
 - POST (power-on self test)**
 - audio error codes, 1369-1376
 - checkpoint codes, 1369-1370
 - diagnostic services, 1368
 - error display, 1369
 - fatal errors, 1369
 - memory count, 1381
 - onscreen messages, 1370-1373, 1377-1380
 - processor-testing software**, 119
 - variable voltage transformers**, 1281-1282
- dialup modems**, 1127
 - 56Kbps modems, 1134-1135
 - chipsets, 1136
 - limitations, 1135-1136
 - Modem-on-Hold feature, 1137
- PCM Upstream feature**, 1138
- performance optimization**, 1141-1142
- QuickConnect**, 1137
- speed**, 1136
- V.44 standard**, 1137-1138
- V.90 standard**, 1137
- V.92 standard**, 1137-1138
- AT commands**, 1130
- baud rates**, 1130
- bit rates**, 1130
- data bits**, 1129
- data-compression standards**
 - MNP 5 standard, 1134
 - V.42bis standard, 1133
 - V.44 standard, 1134
- error-correction protocols**, 1132-1133
- external**, 1139
- fax modems**, 1138
- internal**, 1139
- modulation standards**
 - FSK (frequency-shift keying), 1131
 - full-duplex protocols, 1132
 - half-duplex protocols, 1132
 - PSK (phase-shift keying), 1131
 - QAM (quadrature amplitude modulation), 1132
 - V.90 standard, 1132
 - V.92 standard, 1132
- parity**, 1128
- proprietary standards**, 1134
- recommendations**, 1139-1140
- standards organizations**, 1129-1130

- start-stop communications, 1128-1129
- stop bits, 1129
- support for, 1141
- TCP/IP, 1192-1193
- telephone company upgrades, 1142
- troubleshooting
 - computer lockups, 1147
 - dialup problems, 1146-1147
 - modem sounds, 1149
 - undetected external modems, 1148
 - WinModems, 1140-1141
- DiamondTron picture tubes, 908**
- DIB (Dual Independent Bus), 84**
 - Celeron processors, 149
 - Pentium II processors, 149, 158
 - Pentium III processors, 149
 - Pentium Pro processors, 149-151
- dies, 88**
 - Pentium II processors, 157
 - Pentium Pro processors, 150
 - Pentium processors, 142
- Difference Engine, 12**
- differential NRZ (nonreturn to zero), 606**
- digital audio extraction (DAE), 827-829**
- digital cameras**
 - flash memory, 733-734
 - capacities, 738
 - CompactFlash, 734
 - comparison of, 737-739
 - MMC (MultiMediaCard), 735
 - PC Card, 736
 - physical size, 734
 - reading, 739-741
 - SD (SecureDigital), 735
 - SmartMedia, 735
 - Sony Memory Stick, 735
 - Sony Memory Stick Pro, 736
 - USB flash drives, 736-737
 - xD-Picture Card, 736
- Microdrive technology, 742-744
- digital CATV service, 1107**
- Digital Display Working Group (DDWG), 890**
- Digital Flat Panel (DFP), 890**
- digital infrared thermometers, 1281**
- digital light processing (DLP) projectors, 920-922**
- digital micromirror device (DMD), 920**
- Digital Millennium Copyright Act (DCMA), 799**
- digital multimeters. *See* DMMS**
- Digital Research, 22, 28**
- digital rights management (DRM), 830-831**
- digital signal processors (DSPs), 998**
- digital signals (video adapters), 925-926**
- digital subscriber line. *See* DSL**
- digital versatile disc. *See* DVD discs; DVD drives**
- Digital Video Express (DIVX), 798**
- Digital Visual Interface (DVI), 890**
- digital-to-analog converters (DACs), 941, 1001**
- DIMMs (dual inline memory modules), 533, 1303**
 - 168-pin DIMM pinouts, 543-544
 - 184-pin DIMM pinouts, 545-546
 - 240-pin DDR2 DIMM pinouts, 547-548
 - 240-pin DDR3 DIMM pinouts, 548-550
 - buffered, 544
 - buying tips, 568
 - capacities, 537-538
 - illustration, 535
 - installation, 1317
 - memory banks, 555-557
 - SPD (serial presence detect), 544
 - unbuffered, 544
 - width, 140
- DIN (Deutsche Industrie Norm), 1060**
- DIP (dual inline package) chips, 533**
- direct memory access channels. *See* DMA**
- Direct AGP, 292**
- Direct Cable Connection technology, 1204**
- direct disc labeling systems, 843-844**
- direct-mapped cache, 76**
- Direct Media Interface (DMI), 281, 307**
- direct memory access. *See* DMA**
- directories, phantom, 725**
- DirectShow, 978**
- DirectX, 958-959**
 - 3D audio support, 1009-1010
 - 3D rendering, 956
 - sound cards, 988-989

- DirecWay. *See* HughesNet
- disabling parity-checking, 563
- disassembly
 - cleaning procedures, 1417
 - keyboards, 1078
- Disc-at-Once recording, 783
- discontinued sound cards, 1004
- discrete multitone (DMT), 1111
- discs. *See* CD discs; DVD discs
- DiscT@2 (“disk tatoo”) technology, 844
- DISK BOOT FAILURE (error message), 506
- Disk Change signal, 725-726
- disk drive power
 - connectors, 1254
- Disk Management, 867-869
- disk sweep, 689
- Diskette Controller setting (Floppy Configuration menu), 489
- Diskette Write Protect setting (Floppy Configuration menu), 489
- DISKPART utility, 678-679
- disks, floppy. *See* floppy disks
- DISPART utility, 867-869
- displacement mapping, 954
- Display Power-Management Signaling (DPMS), 910
- Display Setup Prompt setting (Boot Configuration menu), 482
- Display switch is set incorrectly (error message), 1372
- DisplayMate, 986
- displays. *See* monitors
- disposable PCs, 237
- distributed parity, blocked data with, 635
- divide errors, 573
- DIVX (Digital Video Express), 798
- DLP (digital light processing) projectors, 920-922
- DLSReports.com, 1112
- DMA (direct memory access)
 - CD/DVD utilization, 809-810
 - channels, 417-418
 - multiword, 604
 - singleword, 603-604
 - UDMA (Ultra-DMA) transfer modes, 604
 - Mode 2, 590
 - Mode 4, 591
 - Mode 5, 592
 - Mode 6, 592
 - UDMA/66, 591
- DMA Mode setting (Drive Configuration menu), 487
- DMD (digital micromirror device), 920
- DMI (Direct Media Interface), 281, 307
- DMI Event Log setting (Event Logging menu), 490
- DMMs (digital multimeters), 1077, 1397, 1402-1403
 - back probing, 1280-1281
 - buying tips, 1278-1280
 - measuring voltage with, 1280-1281
- DMT (discrete multitone), 1111
- DOCSIS standards (modems), 1108
- documentation
 - chipsets, 437-438
 - Global Engineering Documents, 586
 - motherboards, 437-438
 - physical configuration, 1313-1315
- Dolby Digital surround sound, 1022
- doping, 16, 88
- DOS
 - boot process, 1388
 - capacity limitations, 698
 - DOS extenders, 53
 - DPMI (DOS protected mode interface), 53
 - DR-DOS, 28
 - drive formatting, 1333
 - drive limitations, 633
 - drive migration, 873
 - FreeDOS, 28
 - licensing, 28
 - XCOPY, 873
- DOS protected mode interface (DPMI), 53
- dot pitch, 899, 907-908
- double data rate SDRAM, 525-526, 937, 1303
- double-density CD media, 788
- Double-Density recording, 651
- double distributed parity, blocked data with, 635
- double-sided memory modules, 534
- doubleword DMA (direct memory access), 604
- DPMI (DOS protected mode interface), 53
- DPMS (Display Power-Management Signaling), 910
- DR-DOS/OpenDOS Enhancement Project, 28

- DRAM (dynamic random access memory)**
 - compared to SRAM, 514-515
 - DDR SDRAM (double data rate SDRAM), 525-526
 - DDR2 SDRAM, 526
 - DDR3 SDRAM, 528-529
 - development of, 17
 - FPO DRAM (Fast Page Mode DRAM), 520-521
 - RDRAM (Rambus DRAM), 529-532
 - refresh rates, 512
 - SDRAM (synchronous DRAM), 522-524
 - soft errors, 513
 - transistor/capacitor pairs, 513
- drive action/slave present (DASP) signals, 599**
- Drive Configuration menu (BIOS Setup), 486-489**
- Drive Installed setting (Drive Configuration menu), 487**
- drive migration**
 - MS-DOS, 873
 - Windows 2000/XP/Vista, 874-875
 - Windows 9x/Me, 873-874
- drivers. *See also* ROM BIOS**
 - definition of, 27
 - floppy-based driver installation, 709
 - installation, 1333
 - mouse drivers, 1090
 - sound card drivers, 998-999
 - USB (universal serial bus), 1038
 - video drivers, 944-947
 - VxDs, 1390
- drives. *See specific drives (for example, CD drives)***
- DRM (digital rights management), 830-831**
- DSK (Dvorak Simplified Keyboard), 1076**
- DSL (digital subscriber line)**
 - ADSL (Asymmetric DSL), 1111-1113
 - advantages, 1111
 - availability, 1112
 - CAP (carrierless amplitude/phase), 1111
 - CDSL (Consumer DSL), 1113
 - costs, 1115-1116
 - DLSReports.com, 1112
 - DMT (discrete multitone), 1111
 - DSL modems, 1114
 - DSLAM (DSL access multiplier), 1112
 - G.Lite, 1113
 - low-pass filters, 1111
 - microfilters, 1114
 - SDSL (Symmetrical DSL), 1113
 - security, 1115-1116
 - service providers, 1112
 - splitters, 1114
 - technical problems, 1116-1117
 - telephone line issues, 1112
 - transceivers, 1112
 - type comparison, 1113-1114
 - xDSL, 1111
- DSLAM (DSL access multiplier), 1112**
- DSPs (digital signal processors), 998**
- DTS Surround sound, 1022**
- DTX motherboards, 260**
- Dual Cavity PGA packaging, 150**
- dual-channel memory, 557**
- dual-core processors. *See* multicore processors**
- dual-drive ATA (AT Attachment) configuration**
 - CS (cable select), 601-602
 - daisy chains, 600
 - jumper settings, 601
 - slave drives, 600
- dual-GPU scene rendering**
 - ATI CrossFire, 960-961
 - NVIDIA SLI, 959-960
- Dual Independent Bus. *See* DIB**
- dual inline memory modules. *See* DIMMs**
- dual inline package (DIP) chips, 533**
- dual-plane power design, 114-115, 186**
- dual-speed hubs, 1184**
- dual-speed switches, 1184**
- DualDDR controller, 349**
- DualDisc, 789-790**
- DualHead 2Go, 950**
- duplicate computer IDs, troubleshooting, 1204-1205**
- Duron chip (AMD), 192-193**
- Duron processors**
 - chipsets, 278-279
 - ALiMagik1, 347-348
 - AMD-750, 332-333
 - AMD-760, 333-334
 - AMD-760MP, 334
 - AMD-760MPX, 334
 - Apollo KT133, 337-338
 - Apollo KT133A, 337-338
 - Apollo KT266, 338-339
 - Apollo KT266A, 338-339
 - Apollo KT333, 339

- Apollo KT400/KM400, 339
- Apollo KT400A, 339-340
- Apollo KT600, 340
- Apollo KX133, 336-337
- KT880, 340
- MuTIOL architecture, 344
- nForce/nForce2, 348-350
- ProSavage KM133, 338
- ProSavage KM266, 339
- Radeon, 350-352
- reference table, 331-332
- SiS chipset reference tables, 341-342
- SiS730S, 344-345
- SiS733, 345
- SiS735, 345
- SiS740, 345
- SiS741/741GX, 346-347
- SiS745, 345
- SiS746, 346
- SiS748, 346
- VIA chipset reference table, 335-336
- maximum installable memory, 532
- dust, 1415-1416, 1427**
- DVD CCA (DVD Copy Control Association), 798**
- DVD discs**
 - capacity, 772-775
 - care and maintenance, 762-763
 - copy protection, 798-799
 - APS (analog protection system), 801-802
 - CSS (content scramble system), 800-801
 - RPC (regional playback control), 799-800
 - data zone, 767
 - DVD-5, 772
 - DVD-9, 772
 - DVD-10, 772
 - DVD-18, 772
 - DVD+R, 837
 - DVD-R, 834-835
 - DVD-R DL, 835-836
 - DVD-RAM, 832-834
 - DVD+RW, 836-839
 - DVD-RW, 836
 - DVD-Video, 764
 - EFM+ data encoding, 775
 - error handling, 770-771
 - HD-DVD, 776-777
 - history of, 764-765
 - hub clamping area, 766
 - Labelflash direct disc labeling system, 844
 - lands, 765-766
 - lead-in, 766
 - lead-out zone, 767
 - LightScribe direct disc labeling system, 843
 - media compatibility, 832
 - MultiRead
 - specifications, 823-824
 - OTP (opposite track path) construction, 772-773
 - pits, 765-766
 - PTP (parallel track path) construction, 773
 - reading, 765
 - sectors, 769-770
 - summary of standards, 831
 - technical parameters, 767-769
 - tracks, 766-767
 - troubleshooting, 844-847
 - Windows Vista bootable DVD, 1397
- DVD drives, 763-764**
 - bootable DVDs, 842-843
 - booting from floppy disk, 839-841
 - buffers/cache, 808
 - care and maintenance, 762-763
 - CAV (constant angular velocity) technology, 807
 - choosing, 1306
 - CLV (constant linear velocity) technology, 805
 - compatibility, 798
 - configuration
 - jumper settings, 879-880
 - system configuration, 882
 - CPU utilization, 808-809
 - data transfer rates, 808
 - definition of, 37
 - DIVX (Digital Video Express), 798
 - DMA (Direct Memory Access), 809-810
 - drive sealing, 814
 - DVD Forum, 765
 - DVD+R, 837
 - DVD-R, 834-835
 - DVD+R DL, 839
 - DVD-R DL, 835-836
 - DVD-RAM, 832-834
 - DVD+RW, 836-839
 - DVD-RW, 836
 - DVD+RW Alliance, 765
 - firmware updates, 847-850
 - history of, 764-765
 - installation, 839, 878-879
 - jumper settings, 879-880
 - PATA (parallel ATA) optical drives, 880-881
 - SATA (serial ATA) optical drives, 881-882

- interfaces
 - ATA/ATAPI, 810-811
 - FireWire, 811-812
 - SATA, 810
 - USB (Universal Serial Bus), 811
 - internal versus external, 814
 - Labelflash direct disc labeling system, 844
 - LightScribe direct disc labeling system, 843
 - loading mechanisms, 812-813
 - mechanical drive
 - operation, 765-766
 - media compatibility, 832
 - MPEG decoder hardware, 798
 - multiformat rewritable drives, 839
 - MultiRead
 - specifications, 823-824
 - self-cleaning lenses, 814
 - speed, 805-807
 - summary of standards, 796-798, 831
 - transfer rates, 806-807
 - troubleshooting, 844-847, 1442
 - DVD-5 discs, 772
 - DVD-9 discs, 772
 - DVD-10 discs, 772
 - DVD-18 discs, 772
 - DVD Forum, 765
 - DVD Phase Change Rewritable, 836-839
 - DVD+R DL drives, 839
 - DVD-R DL drives, 835-836
 - DVD+R drives, 837
 - DVD-R drives, 834-835
 - DVD-RAM drives, 832-834
 - DVD+RW Alliance, 765
 - DVD+RW drives, 836-839
 - DVD-RW drives, 836
 - DVD-Supply.com media compatibility list, 817
 - DVD-Video, 764
 - DVDs. *See* DVD discs
 - DVI (Digital Visual Interface), 890
 - DVMT Mode setting (Video Configuration menu), 491
 - Dvorak keyboard layout, 1076
 - Dvorak, August, 1076
 - DX2/OverDrive processors, 100, 134-137
 - DX4 processors, 137
 - dynamic adaptive speculative preprocessor (DASP), 349
 - dynamic bass boost (DBB), 1020
 - dynamic execution
 - Celeron processors, 149
 - dataflow analysis, 83
 - multiple branch prediction, 83
 - Pentium II processors, 149, 158
 - Pentium III processors, 149
 - Pentium Pro processors, 149
 - speculative execution, 83-84
 - dynamic random access memory. *See* DRAM
 - dynamic video memory, 278
- E**
-
- /e switch (XCOPY32 command), 874
 - E7205 chipsets (Intel), 353
 - E7505 chipsets (Intel), 353-354
 - EAX (Environmental Audio Extensions), 1007-1008
 - ECC (error-correcting code), 564-565
 - bit-level, 635
 - SEC-DED, 564
 - ECC Event Logging setting (Event Logging menu), 490
 - ECHS, 624-626
 - Eckert, John P., 14
 - ECP (Enhanced Capabilities Port), 1056
 - ECP Mode Use DMA setting (Peripheral Configuration menu), 485
 - ED (extra-high density) floppy format, 660
 - EDD (Enhanced Disk Drive), 624
 - edge-triggered interrupt sensing, 409
 - EDO RAM (extended data out RAM), 521-522
 - EEPROM (electronically erasable programmable ROM), 453-454
 - upgrading, 464-465
 - automated bootable media images, 465-466
 - emergency recovery, 467-470
 - user-created bootable media, 466-467
 - Windows executable upgrades, 465
 - write protection, 464
 - EFM (eight to fourteen modulation) data encoding, 760-762
 - EFM+ (eight to sixteen) data encoding, 775

- eighth-generation processors**
 - AMD Athlon 64, 210-211, 214-215
 - AMD Athlon 64 FX, 210-211, 214-215
 - AMD Opteron, 218
 - AMD Sempron (Socket 754), 217-218
- EISA (Extended Industry Standard Architecture) buses, 395**
 - connectors, 396
 - interrupts, 411
 - pinouts, 396
- EIST setting (Power menu), 496**
- El Torito support, 842-843**
- electric screwdrivers, 1396, 1407**
- electrical costs, 1269-1270**
- Electrical Numerical Integrator and Calculator (ENIAC), 14**
- electrical power. *See* power supply**
- electroforming, 750**
- electromagnetism, 639-640, 911-912**
- electron guns (CRT), 898**
- electronically erasable programmable ROM. *See* EEPROM**
- electrostatic discharge (ESD) protection, 569, 1311-1313, 1396-1398**
- ELF (extremely low frequency) emissions, 911**
- embedded servo mechanisms, 690**
- emissions (monitors), 911-912**
- EMU10K1 audio chip, 1003**
- EMU10K2 (Audigy) audio chip, 1003**
- EMU-8000 audio chip, 1003**
- Enabled state (APM), 1272**
- encoders/decoders (endecs), 649**
- encoding schemes, 641, 649-650**
 - 8B/10B encoding, 606
 - ARLL (Advanced Run Length Limited), 652
 - clock signals, 650
 - comparison of, 653-654
 - EFM (eight to fourteen modulation) data encoding, 760-762
 - EFM+ (eight to sixteen) data encoding, 775
 - endecs, 649
 - FM (Frequency Modulation), 650
 - MFM (Modified Frequency Modulation), 641, 651
 - RLL (Run Length Limited), 641, 651-652
 - timing, 649-650
- endecs, 583, 649**
- EnduraPro/104 keyboards, 1068**
- Energy 2000 standard, 911**
- Energy Lake setting (Power menu), 496**
- Energy Star standard, 147, 911, 1272**
- energy-saving features**
 - Energy 2000 standard, 911
 - Energy Lake setting (Power menu), 496
 - Energy Star standard, 147, 911, 1272
- monitors**
 - emissions, 911-912
 - power management, 910-911
- Englebart, Douglas, 1081**
- English/metric fasteners, 1400-1401**
- Enhanced 101-key keyboards, 1059-1061, 1072**
- Enhanced 3DNow! technology, 82-83**
- Enhanced Capabilities Port (ECP), 1056**
- Enhanced Disk Drive (EDD), 624**
- Enhanced Parallel Port (EPP), 1056**
- ENIAC (Electrical Numerical Integrator and Calculator), 14**
- Ensoniq ES137x series sound cards, 1002**
- environment-based bump mapping, 954**
- Environment FlexiFX, 1008**
- environmental acclimation (hard drives), 693-694**
- Environmental Audio Extensions (EAX), 1007-1008**
- EPP (Enhanced Parallel Port), 1056**
- EPROM (erasable programmable ROM), 452-453**
- EPS power supply, 1224-1226**
- EPS12V power supply, 1224-1226**
- erasable programmable ROM (EPROM), 452-453**
- erasers, 452-453, 1416**
- ergonomic keyboards, 1076-1077**
- Ergonomic Mouse, 1095**
- Ergonomic Resources mechanical-switch keyboards, 1063**
- error-correcting code. *See* ECC**

error-correction protocols, 1132-1133

error handling

ACPI (Advanced Configuration and Power Interface), 502

BIOS, 503-504

- AMI BIOS
 - messages, 505-506
- Award BIOS messages, 506
- Compaq BIOS
 - messages, 506
- geometry translation
 - problems, 508
- IBM BIOS
 - messages, 504-505
- MBR boot error
 - messages, 506-508
- Phoenix BIOS
 - messages, 506

CDs discs

- BLER (block error rate), 759
- CIRC (cross-interleave Reed-Solomon code), 758

Disk Change, 725-726

DVDs, 770-771

error-correction protocols, 1132-1133

Fatal Exception errors, 1434

Missing operating system errors, 1439-1440

POST (power-on self test)

- audio error
 - codes, 1369-1376
- checkpoint
 - codes, 1369-1370
- error display, 1369
- fatal errors, 1369
- memory count, 1381
- onscreen messages, 1370

Award BIOS/Phoenix FirstBIOS, 1372-1373

IBM BIOS, 1377-1379

IBM/Lenovo BIOS POST/Diagnostics, 1379-1380

soft memory errors, 513

alpha particles, 558

cosmic rays, 558-559

ECC (error-correcting code), 564-565

fault tolerance, 559-560

heat buildup, 559

incorrect memory types, 559

line noise, 559

parity checking, 560-561

power glitches, 559

radio frequency interference, 559

static discharge, 559

timing glitches, 559

sound cards

advanced features, 1018

Chipset Setup options, 1019

low volume, 1016

no sound, 1015-1016

parity errors, 1018

scratchy sound, 1017-1018

startup problems, 1018

STOP errors, 1433-1434

Error loading operating system (error message), 507-508

ESD (electrostatic discharge) protection, 569, 1311-1313, 1396-1398

Estridge, Don, 22

Ethernet, 1157-1158

cables, 1170

definition of, 1158

Fast Ethernet, 1157-1159

Gigabit Ethernet, 1157-1159

hubs

buying tips, 1199

compared to switches, 1182-1184

dual-speed, 1184

managed/unmanaged, 1182

placement of, 1185

ports, 1184-1185

stackable, 1184

Intel 815/815E chipsets, 294

network adapter connectors, 1169-1170

switches

address storing, 1182

buying tips, 1199

compared to hubs, 1182-1184

dual-speed, 1184

placement of, 1185

ports, 1184-1185

stackable, 1184

Wi-Fi (Wireless Fidelity), 1160. *See also*

wireless networks

802.11a standard, 1157, 1162

802.11b standard, 1157, 1161-1162

802.11g standard, 1163

802.11n standard, 1163-1164

access points, 1184-1186

comparison of standards, 1164-1165

DHCP support, 1190

NICs (network interface cards), 1186

point-to-point topology, 1188

- security, 1188-1190
- signal boosters, 1188
- specialized network
 - hardware, 1188
- star topology, 1188
- users per access
 - point, 1190
- wireless bridges, 1187
- wireless repeaters, 1187
- wireless routers, 1188

even cycles (RDRAM), 530

Event Log Capacity setting (Event Logging menu), 490

Event Log Validity setting (Event Logging menu), 490

Event Logging menu (BIOS Setup), 489-490

Exit menu (BIOS Setup), 499

expansion cards, 1329

expansion slots. *See* I/O buses

extended ATX motherboards, 255

Extended Burn-in Mode setting (Chipset Configuration menu), 483

Extended Configuration setting (Chipset Configuration menu), 483

extended data out RAM (EDO RAM), 521-522

Extended Industry Standard Architecture buses. *See* EISA buses

extended memory, 479

extenders (DOS), 53

external cache. *See* Level 2 cache

external CD/DVD drives, 814

external data buses, 48

external dialup modems, 1139

external speakers

- AC adapters, 1020
- amplification, 1019
- buying tips, 1019
- DBB (dynamic bass boost), 1020
- frequency response, 1019
- headphones, 1021
- interference, 1021
- magnetic shielding, 1019
- satellite speakers, 1020
- sleep feature, 1020
- surround sound, 1021-1022
- total harmonic distortion, 1020
- volume control, 1020
- watts, 1020

extra-high density (ED) floppy format, 660

extranets, 1152-1153

Extreme Edition processors, 219-221

Extreme Fidelity (X-Fi), 1003

Extreme Graphics Architecture, 277-278

extremely low frequency (ELF) emissions, 911

F

faceplates, 720, 856

failures, memory

- hard fails, 557
- soft errors
 - alpha particles, 558
 - cosmic rays, 558-559
 - ECC (error-correcting code), 564-565

fault tolerance, 559-560

- heat buildup, 559
- incorrect memory types, 559
- line noise, 559
- parity checking, 560-561
- power glitches, 559
- radio frequency interference, 559
- static discharge, 559
- timing glitches, 559

failures, power, 1276-1277

- diagnostic procedures, 1277
- digital infrared thermometers, 1281
- DMMs (digital multimeters)
 - back probing, 1280-1281
 - buying tips, 1278-1280
 - measuring voltage with, 1280-1281
- inadequate cooling, 1277-1278
- overloaded power supply, 1277
- variable voltage transformers, 1281-1282

Fair Access Policy (FAP), 1119

Fan Control Configuration menu (BIOS Setup), 493

fans, 377, 1359

FAP (Fair Access Policy), 1119

Faraday, Michael, 639

Fast Ethernet, 1157-1159

Fast Mode parallel ports, 1056

Fast Page Mode DRAM (FPO DRAM), 520-521

Fastchip, 454

FAT (file allocation table) partitions, 678

- FAT16 partitions**
 - creating with FDISK, 866-867
 - creating with third-party utilities, 870-871
- FAT32 partitions, 678**
 - creating with FDISK, 866-867
 - creating with third-party utilities, 870-871
- fatal errors, 573, 1369, 1434**
- fathers (CDs), 750**
- fault tolerance, 559-560**
 - ECC (error-correcting code), 564-565
 - parity checking
 - disabling, 563
 - NMIs (nonmaskable interrupts), 562
 - odd parity, 561
 - parity bits, 560
 - parity-check messages, 561-564
- fax modems, 1138**
- FC-PGA (flip chip pin grid array), 94, 166**
- FCC (Federal Communications Commission), 1266**
- FDDI (Fiber Distributed Data Interface), 1180**
- FDISK utility, 678-679, 1332**
 - assigning drive letters, 864-866
 - limitations, 872-873
 - partitioning hard drives, 862-863, 866-867
 - advantages of, 862
 - drive letter assignments, 864-866
 - FAT32 volumes, 866-867
 - large hard disk support, 863-864
- FDIV (floating-point divide) bug, 145-146**
- Federal Communications Commission (FCC), 1266**
- Femto air bearing sliders, 648-649**
- ferrite read/write heads, 643**
- FHSS (frequency hopping spread spectrum), 1166**
- Fiber Distributed Data Interface (FDDI), 1180**
- fiber-optic cables, 1112**
- FIC (flex interconnect cable), 647**
- fields**
 - magnetic, 640-641
 - sectors
 - ADDRESS MARK, 673
 - CRC, 673-674
 - CYLINDER NUMBER, 673
 - DATA, 673-674
 - DATA SYNC VFO LOCK, 673
 - HEAD NUMBER, 673
 - ID VFO LOCK, 673
 - INTER-RECORD GAP, 673-674
 - POST INDEX GAP, 673-674
 - PRE-INDEX GAP, 673-674
 - SECTOR NUMBER, 673
 - SYNC BYTE, 673
 - WRITE TURN-OFF GAP, 673
 - WRITE TURN-ON GAP, 673-674
- FIFO (first in first out) buffers, 1050**
- fifth-generation processors**
 - chipsets, 284-286
 - Intel-compatible, 148-149
 - MMX (multimedia extensions), 80-81
- Pentium**
 - address bus width, 140
 - addressable memory, 140
 - BiCMOS, 140
 - BTB (branch target buffer), 139
 - cache, 140
 - DIMM width, 140
 - FDIV (floating-point divide) bug, 145-146
 - first-generation, 142
 - instruction processing, 140
 - math coprocessor, 141
 - packaging, 141
 - power management bugs, 147
 - second-generation, 142-144
 - SIMM width, 140
 - specifications, 138-139
 - superscalar architecture, 138
 - twin data pipelines, 138-139
 - voltage, 141, 147-148
- Pentium-compatible**
 - AMD-K6, 82-83, 185-187
 - Cyrix 6x86/6x86MX, 198
- Pentium OverDrive, 147-148**
- Pentium-MMX, 144-148**
- SSE (Streaming SIMD Extensions), 81-82**
- Fifth SATA Master setting (Drive Configuration menu), 488**
- file systems**
 - CD file systems, 790-791
 - HFS (Hierarchical File System), 795
 - High Sierra, 791-792
 - ISO 9660, 792-793

- Joliet, 793
 - Rock Ridge, 795
 - UDF (Universal Disk Format), 794
 - FAT (file allocation table), 678
 - FAT16, 866-867, 870-871
 - FAT32, 678, 866-867, 870-871
 - NTFS (Windows NT File System), 678
 - files**
 - AUTOEXEC.BAT, 1388
 - CONFIG.SYS, 1388
 - defragmenting, 1419-1420
 - IBMBIO.COM, 1388
 - IO.SYS
 - DOS boot process, 1388
 - Windows 9x/Me boot process, 1389
 - MSDOS.SYS, 1388
 - PCDEVS.TXT, 501
 - WIN.COM, 1390-1391
 - files (metal), 1397**
 - filtering**
 - bilinear filtering, 954
 - trilinear filtering, 954-955
 - filters**
 - air filters, 692-693
 - low-pass filters, 1111
 - polarizing LCD filters, 886
 - firewalls, 1153**
 - FireWire**
 - 1394a standard, 1042-1044
 - 1394b standard, 1042-1044
 - advantages of, 1026
 - CD/DVD drives, 811-812
 - compared to USB, 1026-1028
 - motherboard front panel
 - IEEE 1394 connector pinout, 374
 - performance myths and realities, 1028-1031
 - tailgates, 591
 - firmware, 442, 454, 847-850, 934**
 - Firmware Hub (FWH), 291, 298**
 - first in first out (FIFO) buffers, 1050**
 - First SATA Master setting (Drive Configuration menu), 488**
 - first-generation Pentium processors, 142**
 - first-generation processors**
 - 8086, 123-124
 - 8088, 124
 - 80186, 124-125
 - 80188, 124-125
 - maximum installable memory, 532
 - FirstBIOS (Phoenix Award BIOS), 458**
 - fixed-base wireless broadband, 1117**
 - Fixed Disk Boot Sector setting (BIOS Maintenance menu), 478**
 - fixed disk drives. *See* hard drives**
 - Flash memory, 510, 733-734**
 - flash memory, 453-454, 711**
 - capacities, 738
 - CompactFlash, 734
 - comparison of, 737-739
 - MMC (MultiMediaCard), 735
 - PC Card, 736
 - physical size, 734
 - reading
 - card readers, 739
 - Type II PC Card adapters, 741
 - SD (SecureDigital), 735
 - SmartMedia, 735
 - Sony Memory Stick, 735
 - Sony Memory Stick Pro, 736
 - upgrading, 464-465
 - automated bootable media images, 465-466
 - emergency recovery, 467-470
 - IML system partition BIOS, 470-471
 - user-created bootable media, 466-467
 - Windows executable upgrades, 465
 - USB flash drives, 736-737
 - write protection, 464
 - xD-Picture Card, 736
- flashlights, 1396**
 - flat-panel LCD (liquid crystal display) monitors, 896-897**
 - flat shading, 951**
 - flat square tube (FST) monitors, 900**
 - flex interconnect cable (FIC), 647**
 - FlexATX**
 - motherboards, 258-259
 - flexible motherboards, 106**
 - flicker (screen), 899, 913**
 - flip chip pin grid array (FC-PGA), 94, 166**
 - flip-chip pin grid array (FC-PGA)**
 - floating-point calculations, 955**
 - floating-point units. *See* FPU's**
 - floating-point divide (FDIV) bug, 145-146**
 - Floppy A setting (Floppy Configuration menu), 489**

- Floppy Configuration menu (BIOS Setup), 489**
- floppy disks. *See also* floppy drives**
 - booting from, 839-841
 - care and handling
 - magnetic fields, 728
 - metal detectors, 729
 - temperatures, 728
 - x-ray machines, 728-729
 - ED (extra-high density) floppy format, 660
 - floppy-based driver installation, 709
 - media specifications
 - coercivity, 728
 - density, 727
 - disk thickness, 728
 - physical construction
 - case and shutter, 726
 - media-density-selector hole, 727
 - write-protect hole, 726
 - Windows 98/98SE or Me Startup floppy, 1397
 - write protection, 726
- Floppy disks(s) fail (error message), 1372**
- floppy drives. *See also* floppy disks; magnetic storage**
 - 1.2MB 5 1/4-inch drives, 714
 - 1.44MB 3 1/2-inch drives, 714
 - 2.88MB 3 1/2-inch drives, 714
 - 360KB 5 1/4-inch drives, 715
 - 720KB 3 1/2-inch drives, 714
 - alternatives to, 714
 - capacity, 723
 - clusters, 724
 - connectors,
 - 720-721, 1255-1256
 - controller cables, 721-722
 - controllers, 719-720
 - cylinders, 716, 724
 - definition of, 37
 - disk capacities, 723
 - Disk Change signal, 725-726
 - disk formats, 723
 - faceplate/bezel, 720
 - formatted parameters, 713
 - formatting, 723-724
 - head actuator mechanisms, 716-717
 - history of, 713
 - installation, 729, 882-883, 1326-1328
 - interfaces, 715
 - logic boards, 719
 - physical operation, 723
 - power connectors, 1255-1256
 - read/write heads, 716-717
 - sectors, 723
 - spindle motors, 718
 - stepper motors, 717-718
 - tracks, 723
 - troubleshooting, 730
 - tunnel erasure, 716
 - floppy upgrade boards (BIOS), 445**
 - Flowers, Tommy, 14**
 - fluid dynamic bearings, 695**
 - flux, 641**
 - FM (Frequency Modulation) encoding, 650**
 - FM synthesis, 997**
 - foam element**
 - keyswitches, 1064-1065
 - fogging, 953**
 - For Music Use Only discs, 829**
 - foreign language keyboard layouts, 1072-1073**
 - Form Factors website, 255**
 - FORMAT.COM utility, 679**
 - high-level formatting, 871-872, 1333
 - limitations, 872-873
 - formatted floppy drive parameters, 713**
 - formatting**
 - floppy drives, 723-724
 - hard drives, 861. *See also* partitioning hard drives
 - high-level formatting, 675, 679, 871-873, 1333
 - low-level formatting, 675-678, 876-878
 - forum.scottmueller.com, 6**
 - four-way set associative cache, 76, 151**
 - fourth-generation processors, 129-131**
 - 486DX, 131-132
 - 486SL, 132-133
 - 486SX, 133-134
 - 487SX math coprocessor, 134
 - AMD 486 (5x86), 136-137
 - Cyrix/TI 486, 137
 - DX2/OverDrive, 134-136
 - Pentium OverDrives, 136
 - Fourth SATA Master setting (Drive Configuration menu), 488**
 - FPO DRAM (Fast Page Mode DRAM), 520-521**
 - FPU(s) (floating-point units), 117**
 - 487SX, 134
 - Pentium processors, 141, 145-146
 - Frame Buffer Size setting (Video Configuration menu), 491**
 - fraudulent processors, 92-93**

- FreeDOS, 28
 - frequencies, 912-913
 - FHSS (frequency hopping spread spectrum), 1166
 - FM (Frequency Modulation) encoding, 650
 - frequency response, 1000, 1019
 - frequency synthesizers, 1340
 - FSK (frequency-shift keying), 1131
 - FTG (frequency timing generator), 1340
 - horizontal
 - frequencies, 915-916
 - vertical scan
 - frequencies, 913-914
 - fretting, 543
 - Front Panel 1394 Port 1 setting (Peripheral Configuration menu), 485
 - Front Panel 1394 Port 2 setting (Peripheral Configuration menu), 485
 - front panel connectors
 - alternative single-row front panel connector pinouts, 372
 - audio connector pinout, 375
 - IEEE 1394 (FireWire/i.LINK) connector pinout, 374
 - infrared data front panel connector pinout, 376
 - motherboard-controlled switches, 1231
 - power LED indications, 371
 - power supply AC switches, 1232
 - switch/LED connector pinouts, 370-371
 - USB header connector pinout, 373
 - frozen systems, troubleshooting, 1438-1443
 - FSB (front-side bus), 378, 384-389. *See also* buses
 - FSK (frequency-shift keying), 1131
 - FST (flat square tube) monitors, 900
 - FTG (frequency timing generator), 1340
 - Fujiwara, T., 660
 - Full On state (APM), 1272
 - full-duplex protocols, 1132, 1167
 - full-size AT motherboards, 238-239
 - fully associative mapped cache, 76
 - functions (USB), 1032
 - FWH (Firmware Hub), 291, 298
-
- ## G
- G.Lite, 1113
 - Gamberg, Richard, 1138
 - game playing. *See also*
 - 3D graphics
 - 3D audio
 - DirectX support, 1009-1010
 - positional audio, 1007-1008
 - processing, 1009
 - 3D chipsets, 961
 - ATI chipsets, 962
 - Matrox chipsets, 966
 - NVIDIA chipsets, 968-972
 - APIs, 957
 - DirectX, 958-959
 - OpenGL, 958
 - multimedia, 989-990
 - sound cards
 - 3D audio, 1007-1010
 - AdLib, 988
 - CA0102 (Audigy 2), 1003
 - CA0102-ICT (Audigy 2 ZS), 1003
 - CA0185, 1003
 - CA0186, 1003
 - choosing, 1308
 - connectors, 990-994
 - data compression, 997-998
 - DirectX, 988-989
 - discontinued sound cards, 1004
 - drivers, 998-999
 - DSPs (digital signal processors), 998
 - EMU10K1, 1003
 - EMU10K2 (Audigy), 1003
 - EMU-8000, 1003
 - Ensoniq ES137x series, 1002
 - history of, 988
 - installing, 1010-1012
 - integrated audio chipsets, 1004-1007
 - legacy audio support, 989
 - manufacturers, 1002-1003
 - MIDI support, 997
 - monophonic/stereophonic, 997
 - Philips, 1003
 - resource conflicts, 1014
 - Sound Blaster, 988
 - Sound Blaster Pro, 988
 - speakers, 1012, 1016-1017, 1308
 - stereo system connections, 1013-1014

- troubleshooting, 1014-1019
- USB-based audio processors, 995-996
- Vibra-16, 1002
- volume control, 996
- X-Fi (Extreme Fidelity), 1003
- Yamaha, 1003
- pointing devices, 1096
 - compatibility issues, 1096
 - joysticks, 1096
 - USB (Universal Serial Bus) ports, 1096
- GameCODA audio middleware, 1008**
- gang programmers, 451**
- Gate A20 Option feature (BIOS), 500**
- gateways, 1143-1144, 1199**
- GDDR3 SDRAM, 937**
- GDDR4 SDRAM, 937**
- GeForce2 MX video, 349**
- general memory faults, 573**
- general-purpose diagnostic software, 1382**
- generic hubs, 1032**
- geometry, 508, 953**
- ghost images (monitors), 899**
- GHz (gigahertz), 43, 517**
- Giant Brains, or Machines That Think, 26***
- giant magneto-resistive (GMR) read/write heads, 646-647**
- GiB (gigabinarybytes), 623**
- Gibson Research Corporation**
 - Shields Up service, 1127
 - SpinRite, 878
- Gibson, Steve, 1127**
- gigabinarybytes (GiB), 623**
- Gigabit Ethernet, 1157-1159**
- gigahertz (GHz), 43, 517**
- glass**
 - in hard disks, 640
 - platters, 681
- Glidepoint pointing device, 1094**
- Global Engineering Documents standards documentation, 586**
- global protection faults, 573**
- GM Vehicle Calibration Information, 454**
- GMCH (Graphics Memory Controller Hub)**
 - 82810E, 291
 - 82840, 298
 - 82850, 309
- GMR (giant magneto-resistive) read/write heads, 646-647**
- Goldstein, Mark, 1076**
- Gouraud shading, 951, 954**
- GPA (graphics performance accelerator) cards, 294**
- Granite Bay (E7205) chipsets, 353**
- Grantsdale (915) chipsets, 313**
- graphics**
 - 2D graphics, 938-939
 - 3D graphics
 - alpha blending, 954
 - animation, 953
 - antialiasing, 953-955
 - bilinear filtering, 954
 - chipsets, 961-962, 966-972
 - depth cueing, 953
 - DirectX 6.0-9.0, 956
 - displacement mapping, 954
 - dual-GPU scene rendering, 959-961
 - environment-based bump mapping, 954
 - flat shading, 951
 - floating-point calculations, 955
 - fogging, 953
 - Gouraud shading, 951, 954
 - hardware/software acceleration, 956-957
 - history of, 951-952
 - image abstractions, 953
 - image rendering, 953, 956
 - keyframe interpolation, 955
 - MIP mapping, 953-954
 - perspective correction, 953
 - primitives, 953
 - scan conversion, 953
 - shading, 953-955
 - software optimization, 957
 - stencil buffering, 954
 - T&L (transform and lighting), 955
 - T-buffers, 955
 - texture mapping, 951-953
 - textures, 953
 - trilinear filtering, 954-955
 - vertex skinning, 955
 - vertices, 953
 - video memory requirements, 939-941
 - visible surface determination, 953
 - Z-buffering, 954
- automated bootable media images (flash ROM), 465-466
- Extreme Graphics Architecture, 277-278
- image abstractions, 953
- user-created bootable media (flash ROM), 466-467

graphics adapters. *See*
video adapters

Graphics Memory Controller
Hub. *See* GMCH

graphics performance
accelerator (GPA) cards, 294

gray code, 688

Green Book standard
(CD-i), 779-780

Green PCs, 147

ground connectors, 696

grounding loops, 1172

Grove, Andrew, 17

Grover, George, 1353

H

/h switch (XCOPY32
command), 874

half-bridge forward converting
switching power supply, 1259

half-duplex operation, 1167

half-duplex protocols, 1132

Halt On setting (Boot menu),
498

hand tools

2 1/2" ATA drive cables and
adapters, 1397

3 1/2" drive enclosure, 1397

chip extractors, 1394-1395

chip inserters, 1394

cleaning materials, 1397

data transfer cables and
adapters, 1397

electric screwdrivers, 1396

ESD (electrostatic discharge)
protection kits, 1396-1398

files, 1397

flashlights, 1396

hemostats, 1396

lithium coin cell
batteries, 1398

markers/pens, 1397

needle-nose pliers, 1396

nut drivers, 1393

nylon cable-ties, 1397

parts grabbers, 1395, 1409

PS/2 Y adapter, 1398

screwdrivers, 1394

spare parts, 1398

Torx drivers, 1395

tweezers, 1395

USB/FireWire cable
adapter, 1398

vises/clamps, 1397

Windows 98 Startup
floppy, 1397

Windows 2000/XP
bootable CD, 1397

Windows Vista bootable
DVD, 1397

wire cutters, 1396

wire strippers, 1396

**HARD DISK inializing. Please
wait a moment (error
message), 1373**

**HARD DISK INSTALL FAILURE
(error message), 1373**

**Hard Disk Pre-Delay setting
(Drive Configuration
menu), 487**

**Hard Drive setting (Power
menu), 496**

**hard drives. *See also*
magnetic storage**

0.85-inch drive, 668

1.8-inch drive, 668

2.5-inch drives, 667

3.5-inch drives, 667

5.25-inch drives, 667

305 RAMAC (Random Access
Method of Accounting and
Control) drives, 638

access times, 702

actuators, 668

air filters, 692-693

areal density

definition of, 655

growth rate, 656

increasing, 657-658

pixie dust technology, 658

BIOS limitations, 619

for backup purposes, 744

cache programs, 702-703

capacity, 616,

664-665, 696-698

choosing, 1305-1306

CHS (cylinder head
sector) addressing

2.1GB barrier, 626

4.2GB barrier, 626-627

8.4GB barrier, 630-631

137GB barrier, 631-633

528MB barrier, 621-623

ATA CHS parameter
limits, 623

BIOS CHS parameter
limits, 622

BIOS commands, 621

CHS bit-shift
translation, 624-626

combined parameter
limits, 623

compared to LBA (logical
block address), 619-620

converting to LBA (logical
block address), 620-621

LBA-assist

translation, 627-630

- configuration
 - automatic drive detection, 860-861
 - dual-drive configurations (ATA), 600-602
 - host adapters, 852-854
 - manual drive parameters, 861
- costs, 665, 706
- CSS (contact start stop) design, 670
- cylinders, 668
- definition of, 37, 663
- drive letters, assigning, 864-866
- form factors, 665-666
- ground connectors, 696
- heads
 - air bearing, 671
 - automatic head parking, 692
 - cautions, 670
 - comparison of, 685
 - HDAs (head disk assemblies), 670
 - head crashes, 670
 - head/medium interaction, 670-671
 - head sliders, 647-649
 - read/write heads, 683-684
 - stepper motors, 685
 - voice-coil actuators, 686-688
- heating/cooling issues, 693-694
- high-level formatting, 675, 679, 871-873, 1333
- installation, 851-852, 1326-1328
 - automatic disk installation programs, 872
 - cables, 855-856
 - drive configuration, 852
 - drive-mounting hardware, 855
 - faceplates/bezels, 856
 - host adapter configuration, 852-854
 - PATA (parallel ATA) drives, 857-858
 - SATA (serial ATA) drives, 859-860
 - system configuration, 860
- interface connectors, 696
- interleave, 703
- latency, 702
- LBA (logical block address) addressing
 - compared to CHS (cylinder head sector), 619-620
 - BIOS commands, 621
 - converting to CHS (cylinder head sector), 620-621
 - LBA-assist translation, 627-630
- load/unload mechanism, 670
- logic boards, 695
- low-level formatting, 876-877
 - ATA (AT Attachment), 877-878
 - nondestructive formatters, 878
 - standard recording, 676
 - ZBR (zoned-bit recording), 675-678
- Microdrive, 668
- migration
 - MS-DOS, 873
 - Windows 2000/XP/Vista, 874-875
 - Windows 9x/Me, 873-874
- mirroring, 635
- NAS (Network Attached Storage) drives, 744
- operating system limitations, 633-634
- partitioning, 678-679, 1332
 - Disk Management, 867-869
 - FAT, 678
 - FDISK, 862-867, 872-873
 - third-party utilities, 870-871
- platters, 668, 680-681
- power connectors, 696
- prefixes for decimal/binary multiples, 616-618
- preventative maintenance
 - file defragmentation, 1419-1420
 - Maintenance Wizard, 1420
 - virus checking, 1421
- RAID (redundant array of independent disks), 634-636
- read/write heads, 642
 - ferrite, 643
 - GMR (giant magneto-resistive), 646-647
 - MIG (Metal-In-Gap), 643
 - MR (magneto-resistive), 644-645
 - PMR (perpendicular magnetic recording), 659-661
 - TF (thin film), 644
- recording media
 - AFC (antiferromagnetically coupled), 682-683
 - oxide, 681
 - thin-film, 681-682
- reliability
 - MTBF (mean time between failures), 703-704
 - PFA (Predictive Failure Analysis), 704

- S.M.A.R.T.
(Self-Monitoring,
Analysis, and Reporting
Technology), 704-706
 - sectors, 668
 - data bytes, 672
 - fields, 673-674
 - gaps in, 672
 - headers/trailers, 672
 - No-ID recording, 672
 - No-ID sector
formatting, 672
 - numbering, 672
 - typical track/sector
format, 673-674
 - usable space, 672-673
 - seek times, 665, 701
 - servo mechanisms
 - dedicated servo, 690-691
 - disk sweep, 689
 - embedded servo, 690
 - gray code, 688
 - servowriters, 688
 - thermal recalibration, 689
 - wedge servo, 689
 - spin rates, 669
 - spindle motors, 694-695
 - striping, 635
 - technological
advancements, 664-665
 - testing, 875-876
 - tracks, 668
 - definition of, 672
 - densities, 670
 - typical track/sector
format, 673-674
 - transfer rates, 665, 699-701
 - troubleshooting,
875, 1439-1443
 - Winchester drives, 663
 - zones, 676
- hard error rates (HERs), 558**
 - hard memory fails, 557**
 - hardcards, 583**
 - Hardware Monitoring Display
(BIOS Setup), 493-494**
 - hardware resources, 1309-1310**
 - harmonic distortion,
1000, 1020**
 - Haughton, Ken, 663**
 - HD-DVD, 776-777**
 - HDAs (head disk
assemblies), 670**
 - HDMI (High
Definition Multimedia
Interface), 891-895**
 - Head 0 (floppy drives), 716**
 - Head 1 (floppy drives), 716**
 - head actuator mechanisms, 684**
 - comparison of, 685
 - floppy drives, 716-717
 - servo mechanisms, 688-691
 - dedicated servo, 690-691
 - disk sweep, 689
 - embedded servo, 690
 - gray code, 688
 - servowriters, 688
 - thermal recalibration, 689
 - wedge servo, 689
 - stepper motors, 685
 - voice-coil actuators, 686-688
 - head crashes, 670**
 - head disk assemblies
(HDAs), 670**
 - HEAD NUMBER sector
data, 673**
 - Head Related Transfer Function
(HRTF), 1007**
 - head sliders, 647-649**
 - head/medium interaction
(hard drives), 670**
 - headphones, 1021**
- heads, 670**
 - air bearing, 671
 - automatic head parking, 692
 - cautions, 670
 - floppy drives
 - head actuator
mechanisms, 716-717
 - read/write heads, 716-717
 - tunnel erasure, 716
 - HDAs (head disk
assemblies), 670
 - head actuator
mechanisms, 684
 - comparison of, 685
 - floppy drives, 716-717
 - stepper motors, 685
 - voice-coil
actuators, 686-688
 - head crashes, 670
 - head/medium
interaction, 670-671
 - read/write heads,
640-642, 683-684
 - ferrite, 643
 - GMR (giant magneto-
resistive), 646-647
 - MIG (Metal-In-Gap), 643
 - MR (magneto-
resistive), 644-645
 - PMR (perpendicular
magnetic recording),
659-661
 - TF (thin film), 644
 - servo mechanisms
 - dedicated servo, 690-691
 - disk sweep, 689
 - embedded servo, 690
 - gray code, 688
 - servowriters, 688
 - thermal recalibration, 689
 - wedge servo, 689

- heat pipes, 1353-1355
- heat spreaders, 95
- heating/cooling issues
 - ATX motherboards, 251
 - cooling fans, 1309
 - floppy disks, 728
 - hard disk temperature acclimation, 693-694
 - heatsinks, 250, 1343-1344
 - active heatsinks, 116, 1344-1347
 - boutique heatsinks, 1348-1349
 - choosing, 1308-1309
 - heatsink clamping force, 1349-1350
 - heatsink clips, 1344
 - IHS (integrated heat spreader), 1349
 - installation, 1315-1317, 1351-1352
 - passive heatsinks, 1347-1348
 - ratings and calculations, 1350
 - infrared thermometers, 1407-1408
 - liquid cooling, 1352-1353
 - ALCT (Advanced Liquid Cooling Technology), 1357
 - heat pipes, 1353-1355
 - refrigeration, 1358
 - water cooling, 1355-1357
 - maximum heatsink inlet temperatures, 1359-1360
 - Pentium II processors, 160
 - positive-pressure-ventilation design, 1219
 - power supply, 1277-1278
 - preventative maintenance, 1421-1422
 - temperature probes, 1407
 - thermally advantaged chassis, 1358
 - cooling fans, 1359
 - maximum heatsink inlet temperatures, 1359-1360
 - processor ducts, 1360-1364, 1366
 - specifications, 1360
 - troubleshooting, 1438-1439
- heatsinks, 250, 1308, 1343-1344
 - active heatsinks, 116, 1344-1347
 - boutique heatsinks, 1348-1349
 - choosing, 1309
 - heatsink clamping force, 1349-1350
 - heatsink clips, 1344
 - IHS (integrated heat spreader), 1349
 - installation, 1315-1317, 1351-1352
 - maximum heatsink inlet temperatures, 1359-1360
 - passive heatsinks, 1347-1348
 - Pentium II processors, 160
 - ratings and calculations, 1350
- help. *See* diagnostics; troubleshooting
- hemostats, 1396
- HERs (hard error rates), 558
- Hertz (Hz), 1000
- Hertz, Heinrich Rudolph, 55
- Hewlett-Packard
 - 9100A electronic calculator, 26
 - KittyHawk, 668
 - LightScribe, 843
- HFC (hybrid fiber/coax) networks, 1107
- HFS (Hierarchical File System), 795
- Hi-Flex BIOS, 456-458
- Hi-Speed USB, 1039-1040
- Hibernate (S4) state, 1271
- HID (Human Interface Device) codes, 1072
- Hierarchical File System (HFS), 795
- high-capacity magnetic storage devices, 730-731
 - Iomega REV drives, 732
 - Zip drives, 731-732
- High Definition Multimedia Interface (HDMI), 891-895
- high-level formatting, 675, 679, 871-873, 1333
- high memory area (HMA), 53
- High Sierra file system, 791-792
- high-speed Internet access. *See* broadband modems
- high-speed serial port cards, 1050
- highly parallel instructions, 81
- history of computers
 - Analytical Engine, 13
 - ATA (AT Attachment), 582-585
 - Atanasoff-Berry Computer, 13
 - CD discs, 749
 - CD drives, 749
 - chipsets, 273-275
 - Colossus, 14
 - Difference Engine, 12
 - DVD discs, 764-765
 - DVD drives, 764-765
 - ENIAC (Electrical Numerical Integrator and Calculator), 14

- floppy drives, 713
 - ICs (integrated circuits), 17
 - mechanical calculators, 12
 - microprocessors, 17-20
 - mouse, 1081-1082
 - PCs (personal computers), 20-22
 - IBM personal computers, 22-23
 - Moore's Law, 23
 - recent developments, 23-24
 - processors, 40-43
 - punch-card systems, 13
 - sound cards, 988
 - timeline, 7-12
 - transistors, 15-17
 - UNIVAC (Universal Automatic Computer), 14
 - vacuum tubes, 14-15
- hit ratio (cache), 515**
- Hitachi**
- Global Storage Technologies, 665
 - Super-IPS (in-place switching), 887
- HLF (high-level formatting), 675, 679, 871-873, 1333**
- HMA (high memory area), 53**
- Hoff, Ted, 17**
- hold-up time (power supply), 1263**
- Hollerith, Herman, 13**
- home networking. *See also networking***
- Ethernet. *See* Ethernet
 - HomePNA, 1194-1195
 - powerline networking, 1196
- HomePlug 1.0, 1196**
- HomePlug AV, 1196**
- HomePNA, 1194-1195**
- horizontal frequencies (monitors), 915-916**
- horizontal scan rates (CRT), 899**
- host adapters. *See* controllers**
- Host Burn-in Mode setting (Chipset Configuration menu), 483**
- Host Burn-in Mode Type setting (Chipset Configuration menu), 483**
- host protected areas (HPAs), 614-615**
- Host Spread Spectrum setting (Chipset Configuration menu), 483**
- hot-plugging, 1043**
- HP. *See* Hewlett-Packard**
- HPAs (host protected areas), 614-615**
- HPET setting (Chipset Configuration menu), 483**
- HRTF (Head Related Transfer Function), 1007**
- HT (Hyper-Threading) Technology, 84-86**
- hubs, 1032-1033**
- AHA (accelerated hub architecture), 281
 - buying tips, 1199
 - chipset hub architecture, 280-281
 - compared to switches, 1182-1184
 - dual-speeds, 1184-1185
 - hub clamping area
 - CDs, 754
 - DVDs, 766
 - ICH (I/O Controller Hub), 280
 - managed/unmanaged, 1182
- MCH (Memory Controller Hub), 280**
- self-powered hubs, 1032**
- USB (Universal Serial Bus) keyboards, 1077**
- HughesNet**
- FAP (Fair Access Policy), 1119
 - HughesNet Uncensored! website, 1119
 - purchasing, 1119
 - requirements, 1118
- Human Interface Device (HID) codes, 1072**
- HWinfo software, 555**
- hybrid bus designs, 50**
- hybrid fiber/coax (HFC) networks, 1107**
- hybrid mouse, 1086**
- hybrid processors (fifth/sixth generation)**
- AMD-K6
 - 3DNow! technology, 82-83
 - BIOS support, 186
 - motherboard compatibility, 186
 - multiplier settings, 187
 - specifications, 186-187
 - technical features, 185
 - voltage, 186
 - Cyrix 6x86/6x86MX, 198
 - NexGen Nx586, 184-185
- hydrogenated amorphous silicon (a-Si), 887**
- Hyper Page mode memory, 521-522**
- Hyper-Threading (HT) Technology, 84-86**
- HyperStreaming, 283, 344**
- Hypertech, 454**
- HyperTransport, 283, 348**
- Hz (Hertz), 1000**

i.Link. *See* FireWire

I/O buses (expansion slots), 390

AGP (Accelerated Graphics Port), 405-408
 arbitrated buses, 415
 bus masters, 415
 compatibility, 390
 DMA (direct memory access) channels, 417-418
 EISA (Extended Industry Standard Architecture), 395
 connectors, 396
 interrupts, 411
 pinouts, 396
 identifying, 390
 importance of, 390
 IRQs (interrupt request channels)
 8-bit ISA bus
 interrupts, 410
 16-bit ISA/EISA/MCA bus
 interrupts, 411-412
 Advanced Programmable Interrupt Controller (APIC), 415
 conflicts, 416-417
 edge-triggered interrupt sensing, 409
 interrupt sharing, 410
 maskable interrupts, 410
 PCI interrupts, 412-415
 PCI IRQ Steering, 410, 414
 ISA (Industry Standard Architecture)
 8-bit, 391-392
 16-bit, 392-393
 32-bit, 393
 bandwidth, 391

DMA (direct memory access) channels, 417-418

interrupts, 410-411

local buses, 396-399

LPX motherboards, 242

MCA (microchannel architecture), 393-395, 411

PCI (Peripheral Connect Interface), 400-403

 adapter cards, 401

 board configurations, 402-403

 bus types, 401

 interrupts, 412-415

 PCI-Express, 403-405

 specifications, 399-400

port addresses, 418

 bus-based device port addresses, 419-421

 chipset-based device port addresses, 419

 motherboard-based device port addresses, 419

slaves, 415

VESA (Video Electronics Standards Association), 399

I/O (input/output) devices, 1025. *See also* I/O buses; **input devices**

IEEE 1394

 1394a standard, 1042-1044

 1394b standard, 1042-1044

 advantages of, 1026

 CD/DVD drives, 811-812

 compared to

 USB, 1026-1028

 motherboard front panel

 IEEE 1394 connector pinout, 374

 performance myths and realities, 1028-1031

 tailgates, 591

parallel ports, 1053

 configuration, 1056-1057

 ECP (Enhanced Capabilities Port), 1056

 EPP (Enhanced Parallel Port), 1056

 IEEE 1284

 standard, 1054-1055

 pinouts, 1054

 testing, 1057

serial ports

 configuration, 1051

 connectors, 1049

 high-speed serial port cards, 1050

 locations, 1046-1047

 multi-I/O cards, 1046

 shared interrupts, 1052

 testing, 1052-1053

 loopback testing, 1053

 MSD (Microsoft Diagnostics), 1052

 Windows operating systems, 1052-1053

 UART (Universal Asynchronous Receiver/Transmitter) chips, 1050

USB (universal serial bus), 1031-1032

 adapters, 1041-1042

 advantages of, 1026

 cables, 1034

 compared to

 IEEE 1394, 1026-1028

 connectors, 1035-1037

 drivers, 1038

 enabling, 1038

 functions, 1032

 hubs, 1032-1033

 keyboards, 1075-1076

- NRZI (Non Return to Zero Invert) data encoding, 1032
- performance myths and realities, 1028-1031
- power requirements, 1033
- self-identifying peripherals, 1038
- speed, 1035
- support for, 1037
- USB 2.0, 1039-1040
- USB On-The-Go, 1040
- wireless USB, 1040-1041
- 1998xxxx-I99906xx**
- POST (power-on self test) codes, 1379**
- IA-32 mode, 42, 51-52**
- IA-32 virtual real mode, 52-53**
- IA-32e 64-bit extension mode, 53-55**
- IA-62 processors, 42, 532**
- IBM**
 - 305 RAMAC (Random Access Method of Accounting and Control) drives, 638
 - 701 Defense Calculator, 638
 - 726 Tape Unit, 638
 - 8088 processors, 124
 - BIOS error messages, 504-505, 1376-1380
 - development of IBM PCs, 22-23
 - development of magnetic storage, 638
 - founding of, 13
 - keyboards, 1080
 - MicroDrive, 668, 742-744
 - Model 5100 PC, 21
 - Model 5150 PC, 21
- IBM clones, 25**
- IBM compatibles, 25**
- IBMBIO.COM file, 1388**
- ICH (Integrated Controller Hub), 280**
 - 82801, 291, 298
 - 82801BA, 309
- ICH5 chipsets (Intel), 312**
- ICH5R chipsets (Intel), 312**
- iCOMP index**
 - iCOMP 2.0 index ratings, 57-58, 157
 - iCOMP 3.0 index ratings, 58
- ICs (integrated circuits), 17**
- ID error detection (IED) codes, 769**
- ID strings (BIOS)**
 - AMI Hi-Flex BIOS, 456-457
 - AMI Hi-Flex BIOS String 2, 457
 - AMI Hi-Flex BIOS String 3, 457-458
 - older AMI BIOS versions, 456
 - viewing, 455
- ID VFO LOCK sector data, 673**
- IDE (Integrated Drive Electronics). See ATA (AT Attachment)**
- PC AT**
 - Enhanced
 - 101-key keyboard, 1059-1061, 1072
 - typematic functions, 1070-1071
- PC XT, 1059-1061, 1072**
- PS/2 mouse interfaces, 1085-1086**
- Scrollpoint Pro, 1090**
- TrackPoint, 1090-1093**
- Travelstar 32GH 2 1/2 hard drive, 676**
- IDENTIFY DRIVE command (ATA), 612**
- IDT processors, 46**
- IEC (International Electrotechnical Commission)**
 - 1000-3-2 Harmonics standard, 1265
 - 1000-3-3 Flicker standard, 1265
 - capacity measurements, 654
 - prefixes (binary multiples), 723
- IED (ID error detection) codes, 769**
- IEEE (Institute of Electrical and Electronic Engineers), 1042**
 - 802.11a standard, 1157, 1162
 - 802.11b standard, 1157, 1160-1162, 1188-1190
 - 802.11g standard, 1163
 - 802.11n standard, 1163-1164
 - IEEE 1284 parallel port standard, 1054-1055
 - IEEE 1394 standard
 - 1394a standard, 1042-1044
 - 1394b standard, 1042-1044
 - advantages of, 1026
 - CD/DVD drives, 811-812
 - compared to
 - USB, 1026-1028
 - motherboard front panel
 - IEEE 1394 connector pinout, 374
 - performance myths and realities, 1028-1031
 - tailgates, 591
- IGPs (integrated graphics processors), 349**
- IHS (integrated heat spreader), 1349**
- IMA (Interactive Multimedia Association), 997**

- images. *See* graphics
- IMAPI (image mastering application program interface), 785
- ImgBurn, 466
- IML (Initial Microcode Load), 470-471
- in-plane switching (IPS), 887
- Inactivity Timer setting (Power menu), 496
- inductive power, 1264
- industry control
 - hardware, 29-32
 - software, 26-29
- Industry Standard Architecture. *See* ISA buses
- industry-standard replaceable components, 1428-1429
- infrared (IR) input devices, 1097
- infrared data front panel connector pinout, 376
- infrared thermometers, 1281, 1407-1408
- infrastructure mode, 1186
- Initial Microcode Load (IML), 470-471
- initial program load (IPL) ROM, 445
- initialization strings, 1130
- initializing PnP (Plug and Play) devices, 502-503
- input devices
 - alternative devices, 1093-1094
 - Ergonomic Mouse, 1095
 - GlidePoint, 1094
 - trackballs, 1094-1095
 - gaming devices, 1096
 - keyboards, 1059, 1306-1307
 - 104-key, 1061
 - choosing, 1080-1081
 - cleaning, 1078-1079, 1419
 - connectors, 1073-1075, 1078
 - controllers, 1068-1069
 - definition of, 37
 - disassembling, 1078
 - Dvorak layout, 1076
 - Enhanced 101-key, 1059-1061, 1072
 - ergonomic, 1076-1077
 - international layouts, 1072-1073
 - key matrix, 1068
 - key numbers, 1071-1072
 - keyboard interface, 1068-1070
 - keyswitch design, 1063-1068
 - Num Lock, 1062-1063
 - QWERTY layout, 1076
 - replacing, 1080-1081
 - scan codes, 1071-1072
 - skins, 1079
 - troubleshooting, 1077-1078
 - typematic functions, 1070-1071
 - USB (Universal Serial Bus), 1075-1077
 - Web-enabled, 1077
 - mouse devices
 - ball-driven mouse, 1082
 - buttons, 1082
 - choosing, 1306-1307
 - cleaning, 1088, 1419
 - components, 1082
 - connectors, 1073-1075
 - definition of, 37
 - Ergonomic Mouse, 1095
 - history of, 1081-1082
 - hybrid mouse, 1086
 - IntelliMouse Explorer, 1082
 - manufacturers, 1082
 - optical mouse, 1082-1085
 - opto-mechanical mechanism, 1083
 - PS/2 mouse interfaces, 1085-1086
 - scroll wheels, 1090
 - Scrollpoint Pro, 1090
 - serial interfaces, 1085
 - troubleshooting, 1088-1090
 - USB (Universal Serial Bus), 1087-1088
 - pointing devices, 1090-1093
 - power connectors, 1254
 - trackballs, 1081
 - wireless
 - Bluetooth, 1099-1100
 - IR (infrared), 1097
 - power management, 1100
 - proprietary radio frequency, 1098
 - troubleshooting, 1100-1101
- input range (power supply), 1263
- installation. *See also* configuration; system assembly
 - cables
 - cable distance limitations, 1177-1178
 - cable selection, 1172
 - crossover cables, 1174
 - custom-built UTP (unshielded twisted-pair) cables, 1175-1177
 - twisted-pair wiring standards, 1174

- CD/DVD drives, 839, 878-879, 1326-1328
 - jumper settings, 879-880
 - PATA (parallel ATA)
 - optical drives, 880-881
 - SATA (serial ATA) optical drives, 881-882
 - CD/DVD firmware, 849
 - drivers, 709, 1333
 - expansion cards, 1329
 - external cables, 1329
 - floppy drives, 729, 882-883, 1326-1328
 - hard drives,
 - 851-852, 1326-1328
 - automatic disk installation programs, 872
 - cables, 855-856
 - drive configuration, 852
 - drive-mounting hardware, 855
 - faceplates/bezels, 856
 - host adapter configuration, 852-854
 - PATA (parallel ATA) drives, 857-858
 - SATA (serial ATA) drives, 859-860
 - system configuration, 860
 - heatsinks,
 - 1315-1317, 1351-1352
 - memory modules, 1317
 - motherboard
 - cables, 1325-1326
 - networking
 - software, 1200, 1203
 - NICs (network interface cards), 1197-1198
 - operating systems, 1332
 - Pentium II processors, 160
 - power supply, 1323
 - processor ducts, 1363-1366
 - processors, 1315-1317
 - RAM (random access memory)
 - ESD (electrostatic discharge), 569
 - RIMMs, 552
 - SIMMs, 571-572
 - removable-media drives, 712
 - sound cards, 1010-1012
 - speakers, 1012
 - stereo systems, 1013-1014
 - video adapters, 1328-1329
- instruction processing, 140**
- instruction sets (math coprocessors), 118**
- INT13h, 621-622**
- INTA# interrupts, 412**
- INTB# interrupts, 412**
- INTC# interrupts, 412**
- INTD# interrupts, 412**
- integral cache. *See* Level 1 cache**
- Integral Peripherals, 668**
- integral power supply AC switches, 1231**
- integrated adapters, 1304**
- integrated audio chipsets**
 - AC '97 integrated audio, 1004-1006
 - AOpen TubeSound, 1007
 - Intel 'Azalia' HD Audio, 1006-1007
- integrated circuits (ICs), 17**
- Integrated Controller Hub. *See* ICH**
- Integrated Drive Electronics (IDE). *See* ATA (AT Attachment)**
- integrated graphics processors (IGPs), 349, 950**
- integrated heat spreader (IHS), 1349**
- Integrated Services Digital Network. *See* ISDN**
- integrated video/motherboard chipsets, 928-932**
- Intel**
 - 'Azalia' HD Audio, 1006-1007
 - chipsets, 275-276
 - 3x series, 315-317
 - 96x series, 315
 - 386/486chipsets, 283-284
 - 450KX/GX chipset (Pentium Pro), 153
 - 810, 290-291
 - 810E, 290-291
 - 810E2, 290-291
 - 815, 293-295
 - 815E, 293-295
 - 815EP, 293-295
 - 820, 295-297
 - 820E, 295-297
 - 82350, 283
 - 840, 297-298
 - 845 family, 310-311
 - 848P, 312
 - 850 family, 308-309
 - 860, 353
 - 865 family, 312
 - 875P, 313
 - 915, 313
 - 925X, 313
 - 945 Express, 314
 - 955X, 314-315
 - 975X, 314-315
 - Chipset Identification Utility, 277

- E7205, 353
- E7505, 353-354
- hub architecture, 280-281
- ICH5, 312
- ICH5R, 312
- industry control, 31
- integrated video/
motherboard
chipsets, 928
- Intel Extreme Graphics
Architecture, 277-278
- model numbers, 276-277
- North Bridge, 279-280
- Pentium 4 chipset
reference tables, 302-308
- Pentium chipsets, 284-286
- Pentium Pro chipset
reference tables, 286-290
- RNG (Random Number
Generator), 293
- South Bridge, 279-280
- Super I/O chips, 279
- workstation chipset
reference table, 352-353
- Extreme Graphics
Architecture, 277-278
- High Definition Audio, 1006
- iCOMP index
 - iCOMP 2.0 index ratings,
57-58, 157
 - iCOMP 3.0 index
ratings, 58
- keyboard controllers, 1068
- motherboards
 - BTX motherboards,
263, 265
 - industry control, 30
- processors
 - 4004, 40
 - 8008, 40
 - 8085, 41
 - 8086, 41, 123-124
 - 8088, 41, 124
 - 80186, 124-125
 - 80188, 124-125
 - 80286, 125-126
 - 80386, 126-129
 - 80486, 129-136
 - Celeron, 149-150, 166-175
 - codenames, 120-123
 - compatible
processors, 120-121
 - Core 2, 222-224
 - development of, 17-20
 - Extreme Edition, 219-221
 - IA-32, 42
 - Itanium, 42
 - Pentium, 138-148
 - Pentium II, 149-166
 - Pentium II/III
Xeon, 182-184
 - Pentium III,
149-150, 175-182
 - Pentium 4,
199-202, 206-209
 - Pentium 4 Extreme
Edition, 206-207
 - Pentium D, 219-221
 - Pentium-MMX, 144-148
 - Pentium
OverDrive, 147-148
 - Pentium Pro, 149-153
 - specifications, 43-44
 - speed ratings, 66-67
 - Xeon, 209
 - RNG (Random Number
Generator), 293
- Intel Chipset Identification
Utility, 277**
- Intel-compatible processors**
 - AMD 486 (5x86), 136-137
 - AMD Athlon, 188-189
 - PGA processor
information, 191-192
 - Slot-A cartridge processor
information, 189-190
 - AMD Athlon MP, 196-197
 - AMD Athlon XP, 194-197
 - AMD Duron, 192-193
 - AMD K5, 148-149
 - AMD-K6
 - 3DNow! technology, 82-83
 - BIOS support, 186
 - motherboard
compatibility, 186
 - multiplier settings, 187
 - specifications, 186-187
 - technical features, 185
 - voltage, 186
 - Cyrix 6x86/6x86MX, 198
 - Cyrix/TI 486, 137
 - NexGen Nx586, 184-185
 - Sempron (Socket A), 197-198
 - VIA C3, 198-199
- Intel Processor Frequency ID
Utility, 439**
- Intel Quick Resume
Technology setting (Power
menu), 496**
- Intel RAID Technology
setting (Drive Configuration
menu), 487**
- Intel Rapid BIOS Boot setting
(Boot menu), 498**
- intelligent memory
management, 278**
- intelligent sharing, 1151**
- IntelliMouse Explorer, 1082**

- INTER-RECORD GAP sector data, 673-674**
- Interactive Multimedia Association (IMA), 997**
- interfaces**
 - ATA (AT Attachment). *See* ATA
 - DVD drives
 - ATA/ATAPI, 810-811
 - FireWire, 811-812
 - SATA, 810
 - USB (Universal Serial Bus), 811
 - floppy drives, 715
 - keyboard interface, 1068-1070
 - mouse interfaces
 - hybrid mouse, 1086
 - PS/2 mouse interfaces, 1085-1086
 - serial, 1085
 - USB (Universal Serial Bus), 1087-1088
 - removable-media drives, 711-712
- interference**
 - RFI (radio-frequency interference), 1426-1427
 - speakers, 1021
- interlaced monitors, 909**
- interleave, 521, 703, 758, 780**
- internal cache. *See* Level 1 cache**
- internal CD-audio connectors, 993**
- internal CD/DVD drives, 814**
- internal dialup modems, 1139**
- internal hub spindle motors, 694**
- internal optical drives, installing**
 - PATA (parallel ATA) optical drives, 880-881
 - SATA (serial ATA) optical drives, 881-882
- internal registers, 49-50**
- International Electrotechnical Commission. *See* IEC**
- international keyboard layouts, 1072-1073**
- International Telecommunication Union. *See* ITU**
- Internet connections, 1143, 1203. *See also* networking**
 - broadband modems
 - advantages, 1104-1105
 - cable modems, 1106-1110
 - choosing, 1126
 - comparison of access types, 1123-1124
 - DSL (digital subscriber line), 1111-1117
 - fixed-base wireless broadband, 1117
 - HughesNet, 1118
 - ISDN (Integrated Services Digital Network), 1120-1123
 - ISPs (Internet Service Providers), 1106
 - leased lines, 1125-1126
 - satellite performance, 1120
 - security, 1127
 - service interruptions, 1124
 - signal lights, 1146
 - speeds, 1124
 - StarBand, 1119-1120
 - summary of access types, 1105
 - TCP/IP settings, 1125
- dialup modems, 1127**
 - 56Kbps modems, 1134-1138, 1141-1142
 - AT commands, 1130
 - baud rates, 1130
 - bit rates, 1130
 - data bits, 1129
 - data-compression standards, 1133
 - error-correction protocols, 1132-1133
 - external, 1139
 - fax modems, 1138
 - internal, 1139
 - modulation standards, 1131-1132
 - parity, 1128
 - proprietary standards, 1134
 - recommendations, 1139-1140
 - standards
 - organizations, 1129-1130
 - start-stop communications, 1128-1129
 - stop bits, 1129
 - support for, 1141
 - telephone company upgrades, 1142
 - troubleshooting, 1146-1149
 - WinModems, 1140-1141
 - gateways, 1143-1144
 - proxy servers, 1143-1144
 - routers, 1143-1145
 - troubleshooting, 1145-1146
- Internet Protocol (IP), 1192**

- Internet Service Providers (ISPs), 1106
 - Internetwork Packet Exchange (IPX), 1193
 - interpolation, 759
 - interposer cards, 583
 - Interrupt (for the Parallel Port) setting (Peripheral Configuration menu), 485
 - Interrupt (for the Serial Port) setting (Peripheral Configuration menu), 485
 - interrupts. *See* IRQs (interrupt request channels)
 - intranets, 1152-1153
 - Invalid partition table (error message), 507
 - IO.SYS file
 - DOS boot process, 1388
 - Windows 9x/Me boot process, 1389
 - IOAPIC Enable setting (Chipset Configuration menu), 483
 - Iomega
 - REV drives, 732
 - Zip drives, 731-732
 - ion bombardment, 16
 - IP (Internet Protocol), 1192
 - IPL (initial program load) ROM, 445
 - IPS (in-plane switching), 887
 - IPX (Internetwork Packet Exchange), 1193
 - IR (infrared) input devices, 1097
 - iron oxide, 640, 681
 - IRQs (interrupt request channels)
 - 8-bit ISA bus interrupts, 410
 - 16-bit ISA/EISA/MCA interrupts, 411-412
 - Advanced Programmable Interrupt Controller (APIC), 415
 - conflicts, 416-417
 - edge-triggered interrupt sensing, 409
 - interrupt sharing, 410
 - maskable interrupts, 410
 - mouse conflicts, 1088-1089
 - PCI interrupts, 412-415
 - PCI IRQ Steering, 410, 414
 - sound card conflicts, 1014
 - IRs (infrared thermometers), 1407-1408
 - ISA (Industry Standard Architecture) buses, 379
 - 8-bit, 391-392
 - 16-bit, 392-393
 - 32-bit, 393
 - bandwidth, 391
 - DMA (direct memory access) channels, 417-418
 - interrupts, 410-411
 - ISA Enable Bit setting (Chipset Configuration menu), 484
 - ISDN (Integrated Services Digital Network), 1120-1121
 - BRI (basic rate interface), 1121
 - costs, 1122
 - kilobytes, 1122
 - multiple call signaling, 1122
 - PRI (primary rate interface), 1122
 - TAs (terminal adapters), 1123
 - wire feet, 1122-1123
 - ISO (International Organization for Standardization) 9660 standard, 792-793
 - isolating memory defects, 576-578
 - ISPs (Internet Service Providers), 1106
 - Itanium processors (Intel), 42, 532
 - ITU (International Telecommunication Union), 1129
 - fax modem standard, 1138
 - V.42 standard, 1133
 - V.42bis standard, 1133
 - V.44 standard, 1134, 1137-1138
 - V.90 standard, 1132, 1137
 - V.92 standard, 1132, 1137-1138
 - ITX motherboards, 260-263
 - Iwasaki, Dr. Shun-ichi, 660
-
- ## J
- JEDEC (Joint Electron Device Engineering Council), 523
 - Jensen Tools, Inc., 1399
 - jewel cases, 819
 - jitter (signals), 1026
 - Jobs, Steve, 1081
 - Joint Electron Device Engineering Council (JEDEC), 523
 - Joint Photographic Experts Group (JPEG), 978
 - Joliet file system, 793
 - joysticks, 1096
 - JPEG (Joint Photographic Experts Group), 978
 - Jscreenfix, 887

jukeboxes (CD/DVD), 813

jumper settings

- ATA (AT Attachment), 601
- floppy drives, 883
- optical drive
 - installation, 879-880

K

/k switch (XCOPY32 command), 874

K5 processors (AMD), 148-149

K56flex chipsets, 1136

K6 processors (AMD)

- 3DNow! technology, 82-83
- BIOS support, 186
- motherboard
 - compatibility, 186
- multiplier settings, 187
- specifications, 186-187
- technical features, 185
- voltage, 186

K8M890 chipsets (VIA), 360

K8T800/K8T800 Pro/K8M800 chipsets (VIA), 359-360

K8T890 chipsets (VIA), 360

Kerr effect, 733

key matrix, 1068

Keyboard error no keyboard present (error message), 1373

Keyboard Select setting (Power menu), 496

keyboards

- 104-key, 1061
- choosing,
 - 1080-1081, 1306-1307
- cleaning, 1078-1079, 1419

connectors, 1073-1075

- Baby-AT
 - motherboards, 240
- full-size AT
 - motherboards, 239
 - troubleshooting, 1078

controllers, 464, 1068-1069

definition of, 37

disassembling, 1078

Dvorak layout, 1076

Enhanced 101-key, 1059-1061, 1072

ergonomic, 1076-1077

international

- layouts, 1072-1073

key matrix, 1068

key numbers, 1071-1072

keyboard interface, 1068-1070

keyswitch design

- capacitive, 1067-1068
- foam element, 1064-1065
- membrane, 1065-1067
- pure mechanical, 1063
- rubber dome, 1065

Num Lock, 1062-1063

QWERTY layout, 1076

replacing, 1080-1081

scan codes, 1071-1072

skins, 1079

troubleshooting,

- 1077-1078, 1435
- connectors, 1078
- defective cables, 1077-1078
- motherboards, 1078
- stuck keyswitches, 1078

typematic

- functions, 1070-1071

USB (Universal Serial Bus), 1075-1077

Web-enabled, 1077

wireless

- Bluetooth, 1099-1100
- IR (infrared), 1097
- power management, 1100
- proprietary radio frequency, 1098
- troubleshooting,
 - 1100-1101

keycaps, cleaning, 1079

keychain drives, 714

keychain flash memory, 711

keyframe interpolation, 955

keylock connectors, 376

keystrokes, bouncing/debouncing, 1068

keyswitches, 1063

- capacitive, 1067-1068
- cleaning, 1065
- foam element, 1064-1065
- membrane, 1065-1067
- pure mechanical, 1063
- rubber dome, 1065

KeyTronicEMS keyboards, 1065

kibibytes, 1122

kilobytes, 1122

kilovolt-amperes-reactive (KVAR), 1265

Kinesis mechanical-switch keyboards, 1063

KittyHawk, 668

KM400 chipsets, 339

known-good spare troubleshooting technique, 1429-1430

KT400 chipsets, 339

KT400A chipsets, 339-340

KT600 chipsets, 340

KT880 chipsets, 340

KVAR (kilovolt-amperes-reactive), 1265

- L**
-
- L-CHS parameters**, 624
- L1 cache**. *See* **Level 1 cache**
- L2 cache**. *See* **Level 2 cache**
- L3 cache**, 74-75, 516
- Labelflash**, 844
- lands**, 110
- CDs, 750-752
 - DVDs, 765-766
- LANs (local area networks)**, 1152. *See also* **networking**
- LAPM (Link Access Procedure for Modems)**, 1133
- laptops**, 128-129
- Larson, Earl R.**, 14
- Laser Beam Recorder (LBR)**, 750
- lasers (CD drives)**, 751-752
- latency (hard drives)**, 702
- latent heat of evaporation**, 1353
- layered architecture**, 443-444
- layouts**
- Enhanced 101-key keyboards, 1060
 - memory, 510, 578-580
- LBA (logical block address) addressing**
- BIOS commands, 621
 - compared to CHS (cylinder head sector), 619-620
 - converting to CHS (cylinder head sector), 620-621
 - LBA-assist translation, 627-630
- LBR (Laser Beam Recorder)**, 750
- LCD (liquid crystal display) monitors**
- active-matrix, 887
 - advantages of, 889-890
 - bad pixels, 886-887
 - brightness and contrast, 909
 - buying tips, 897-898
 - compared to CRT, 901-902
 - costs, 888
 - dead pixels, 886
 - DFP (Digital Flat Panel), 890
 - disadvantages of, 896-897
 - display connections, 890
 - display size, 888
 - DVI (Digital Visual Interface) standard, 890
 - flat-panel, 896-897
 - HDMI (High Definition Multimedia Interface), 891-895
 - interlaced/noninterlaced, 909
 - maximum allowable defects, 887
 - monochrome, 889
 - passive-matrix, 889
 - polarizing filters, 886
 - projectors, 919-922
 - resolution, 888
 - stuck pixels, 886
 - wide-screen, 895-896
- lead-in areas**
- CDs, 754
 - DVDs, 766
- lead-out areas**
- CDs, 754
 - DVDs, 767
- leased lines**
- choosing, 1126
 - definition of, 1125
 - PoP (point of presence), 1125
 - T-1 connections, 1125-1126
 - T-3 connections, 1126
- LED connectors**, 376
- legacy cards**, 434
- Legacy Front Panel Audio setting (Peripheral Configuration menu)**, 485
- Legacy IDE Channels setting (Drive Configuration menu)**, 487
- legacy motherboards**, 106
- legacy ports**, 1304
- legacy support**
- audio support, 989
 - USB (Universal Serial Bus), 1075-1076
- Leibniz, Gottfried Wilhelm von**, 12
- Lempel, Abraham**, 1134
- Lenovo POST (power-on self test) onscreen messages**, 1379-1380
- letters (drive), assigning**, 864-866
- Level 0 RAID**, 635
- Level 1 cache**, 515
- cache misses, 74
 - cache operation, 73-74
 - importance of, 72
 - NexGen Nx586 processors, 184
 - Pentium II processors, 160
 - Pentium Pro processors, 151
 - Pentium-MMX improvements, 81
- Level 1 RAID**, 635
- Level 2 cache**, 74, 516
- Pentium II processors, 160
 - Pentium II/III Xeon processors, 183

- Pentium III processors, 176
 - Pentium Pro processors, 153
 - performance and design, 75-76
 - Level 2 RAID, 635
 - Level 3 cache, 74-75, 516
 - Level 3 RAID, 635
 - Level 4 RAID, 635
 - Level 5 RAID, 635
 - Level 6 RAID, 635
 - level-sensitive interrupts, 412
 - Lexar Memory Stick Pro, 736
 - LFX12V power supply, 1229
 - licensing (MS-DOS), 28
 - LIF (low insertion force) sockets, 99
 - LightScribe, 843
 - LIM (Lotus Intel Microsoft), 128
 - Limit CPUID MaxVal setting (Boot Configuration menu), 482
 - line conditioners, 1287-1288
 - line-in sound card connectors, 992
 - line-out sound card connectors, 992
 - line regulation (power supply), 1264
 - linear density (floppy disks), 727
 - linear power supply, 1259
 - linear voice-coil actuators, 687
 - Link Access Procedure for Modems (LAPM), 1133
 - Link Stability Algorithm setting (PCI Express Configuration menu), 481
 - liquid cooling, 1352-1353**
 - ALCT (Advanced Liquid Cooling Technology), 1357
 - heat pipes, 1353-1355
 - refrigeration, 1358
 - water cooling, 1355-1357
 - Lisa computers (Apple), 1081
 - lithium coin cell batteries, 1398
 - LLF. *See* low-level formatting
 - load regulation (power supply), 1264
 - load/unload head mechanism, 670
 - loading coils, 1112
 - loading mechanisms (CD/DVD drives)
 - caddies, 812-813
 - jukeboxes, 813
 - slots, 813
 - trays, 812
 - loads (power supply), 1259-1260, 1264-1265
 - local area networks (LANs), 1152. *See also* networking
 - local buses. *See* buses
 - locked systems, troubleshooting, 1018, 1147, 1438-1443
 - logic boards, 695, 719
 - logic probes, 1403
 - logic pulsers, 1404
 - logical block address. *See* LBA addressing
 - logical formatting, 675, 679, 871-873, 1333
 - logical mapping (memory), 510
 - logical memory, 578-580
 - logical ring topology, 1180
 - Logitech mouse devices, 1082
 - longitudinal density (floppy disks), 727
 - loopback connector, 1401-1402
 - loopback testing, 1053
 - Lotus Intel Microsoft (LIM), 128
 - low insertion force (LIF) sockets, 99
 - low-level formatting, 675, 876-877
 - ATA (AT Attachment), 877-878
 - nondestructive formatters, 878
 - standard recording, 676
 - ZBR (zoned-bit recording), 675-678
 - low-pass filters, 1111
 - low profile form factor (LFX12V) power supply, 1229
 - low-temperature polysilicon (p-Si), 887
 - low volume, troubleshooting, 1016
 - Lowest System Fan Speed setting (Fan Control Configuration menu), 493
 - LPX motherboards, 242-244, 1217, 1233-1235
 - lubricants, 1415-1417
-
- ## M
-
- M1647 chips, 348
 - M1671 chipsets, 324
 - M1681/M1663 chipsets, 324
 - M1685 chipsets, 324-325
 - M1687 chipsets, 357

- M1689 chipsets, 357
- M1695 chipsets, 357-358
- Macintosh. *See* Apple
- Macrovision
 - CopyGuard, 801
 - SafeAudio, 830
 - SafeDisc, 830
- magnetic disk media, 710
- magnetic fields, 640-641
 - flux, 641
 - risks to floppy disks, 728
- magnetic shielding, 1019
- magnetic storage, 637. *See also* hard drives; floppy drives; optical storage
 - areal density
 - definition of, 655
 - growth rate, 656
 - increasing, 657-658
 - pixie dust technology, 658
 - bit cells (transition cells), 641
 - capacity measurements, 654-655
 - disk/tape material, 640
 - electromagnetism, 639-640
 - encoding schemes, 649-650
 - ARLL (Advanced Run Length Limited), 652
 - clock signals, 650
 - comparison of, 653-654
 - endecs, 649
 - FM (Frequency Modulation), 650
 - MFM (Modified Frequency Modulation), 641, 651
 - RLL (Run Length Limited), 641, 651-652
 - timing, 649-650
 - flux, 641
 - head sliders, 647-649
 - high-capacity magnetic storage devices, 730-731
 - Iomega REV drives, 732
 - Zip drives, 731-732
 - history of, 638
 - magnetic fields, 640-641
 - magneto-optical drives, 732-733
 - Microdrive
 - technology, 742-744
 - PMR (perpendicular magnetic recording), 659-661
 - PRML (Partial-Response, Maximum-Likelihood), 654
 - read process, 641-642
 - read/write heads, 640-642
 - ferrite, 643
 - GMR (giant magneto-resistive), 646-647
 - MIG (Metal-In-Gap), 643
 - MR (magneto-resistive), 644-645
 - TF (thin film), 644
 - tape drives, 744-746
 - tape media, 710
 - write process, 641-642
- magneto-optical drives, 732-733. *See also* optical storage
- magneto-resistive (MR)
 - read/write heads, 644-645
- main memory. *See* RAM (random access memory)
- main menu (BIOS Setup), 478-480
- Maintenance menu (BIOS Setup), 477-478
- Maintenance Wizard, 1420
- maintenance. *See* care and maintenance
- Make codes (keyboards), 1071
- managed hubs, 1182
- manual drive parameters, configuring, 861
- manufacturer-supplied diagnostic software, 1368
- manufacturing process
 - CDs, 750-751
 - manufacturing tests, 503
 - processors
 - .09 micron
 - manufacturing, 91
 - .13 micron
 - manufacturing, 91
 - bonding, 92
 - Celeron processors, 168
 - coppermine, 90
 - dies, 88
 - doping, 88
 - metallization layers, 90
 - overclocking protection, 93
 - photolithography, 88, 91
 - processor remarking, 92-93
 - silicon, 88
 - silicon on insulator (SOI), 90
 - steppers, 88
 - test process, 92
 - wafers, 88, 91
 - yields, 92
- mapping
 - displacement mapping, 954
 - environment-based bump mapping, 954
 - MIP mapping, 953-954
 - texture mapping, 953
- Mark DMI Events As Read setting (Event Logging menu), 490
- Mask ROM (read-only memory), 450

- maskable interrupts, 410
- mass-producing CDs, 750-751
- master position (ATA), 591
- master separation (CDs), 750
- math coprocessors, 117-118
 - 487SX, 134
 - 80287, 126
 - 80387, 129
 - instruction sets, 118
 - optional, 118
 - Pentium processors, 141, 145-146
 - specifications, 119
 - speeds, 118
- matrix math extensions (MMX), 80-81
- Matrox
 - 3D chipsets, 966
 - DualHead 2Go, 950
 - TripleHead 2Go, 950
- Mauchly, John W., 14, 26
- maximum allowable defects (LCDs), 887
- maximum cache, 517
- Maximum Capacity setting (Drive Configuration menu), 487
- maximum load current (power supply), 1264
- Maximum PC Guide to Extreme PC Mods*, 1336
- MBR (master boot record) error messages, 506-507
 - Error loading operating system, 507-508
 - Invalid partition table, 507
 - Missing operating system, 508
- MCA (microchannel architecture) buses, 393-395, 411
- MCH (Memory Controller Hub), 280
- MCH Voltage Override setting (Chipset Configuration menu), 484
- MCM (multichip module), 150
- MCPs (media and communications processors), 349
- mean time between failures (MTBF), 703-704, 1263
- Mean Time To Failure (MTTF), 1263
- measurements
 - magnetic storage capacity, 654-655
 - voltage, 1280-1281
- mechanical calculators, 12
- mechanical computers, 12-13
- mechanical keyswitches
 - capacitive, 1067-1068
 - foam element, 1064-1065
 - membrane, 1065-1067
 - pure mechanical, 1063
 - rubber dome, 1065
 - troubleshooting, 1078
- media and communications processors (MCPs), 349
- media-density-selector hole (floppy disks), 727
- megahertz (MHz), 43, 517-519
- membrane keyswitches, 1065-1067
- MemCor, 681
- memory. *See* RAM (random-access memory); ROM BIOS
- memory buses, 389
- Memory Configuration menu (BIOS Setup), 481-482
- Memory Controller Hub (MCH), 280
- Memory Correction setting (Memory Configuration menu), 481
- Memory Frequency setting (Memory Configuration menu), 481
- memory management unit (MMU), 127
- memory mirroring, 354
- Memory Mode setting (Memory Configuration menu), 481
- memory scrubbing, 354
- Memory Stick, 735
- Memory Stick Pro, 736
- Memory Test error message, 1373
- Memory test fail (error message), 1373
- memory testers, 1406
- Memory Translator Hub (MTH), 297
- merge bits, 760
- merged MR (magneto-resistive) heads, 645
- messages
 - error messages
 - ACPI (Advanced Configuration and Power Interface), 502
 - BIOS, 503-508
 - parity-check messages, 561-564
 - POST (power-on self test), 1370
 - Award BIOS, 1377-1379
 - Award BIOS/Phoenix FirstBIOS, 1372-1373
 - IBM/Lenovo BIOS POST/Diagnostics, 1379-1380

- metal detectors, 729
- Metal Oxide Semiconductor Field Effect Transistors (MOSFETs), 15-16
- Metal-In-Gap (MIG) read/write heads, 643
- metal-oxide varistors (MOV), 1287
- metalization
 - CDs, 751
 - processors, 90
- metric fasteners, 1400-1401
- mezzanine buses. *See* PCI (Peripheral Connect Interface) buses
- MFM (Modified Frequency Modulation), 641, 651
- MHz (megahertz), 43, 517-519
- Micro-AB connectors (USB), 1035
- micro-AT motherboards, 240
- Micro-B connectors (USB), 1035
- Micro Instrumentation and Telemetry Systems, 21
- microATX
 - motherboards, 257-258
- microchannel architecture (MCA) buses, 393-395
- Microcode Revision
 - setting (BIOS Maintenance menu), 478
- microcode, reprogrammable, 120
- Microcom Network Protocol (MNP), 1130, 1134
- MicroDrive, 668, 742-744
- microfilters, 1114
- Microid Research (MR), 459
- microphones, 1022-1023
- microprocessors. *See* processors
- MicroScope, 1382
- Microsoft
 - DirectShow, 978
 - DirectX, 958-959
 - 3D audio support, 1009-1010
 - 3D rendering, 956
 - sound cards, 988-989
 - industry control, 26-29
 - mouse devices, 1082
 - MS-DOS, 28
 - MSD (Microsoft Diagnostics)
 - mouse conflicts, 1089
 - serial ports, 1052
 - PC *XX* Design Guides, 33
- mid-tower cases, 1298
- MIDI (Musical Instrument Digital Interface)
 - connectors, 993
 - history of, 988
 - sound card support, 997
- MIG (Metal-In-Gap) read/write heads, 643
- migrating hard drives
 - MS-DOS, 873
 - Windows 9x/Me, 873-874
 - Windows 2000/XP/Vista, 874-875
- MII (Cyrix 6x86/6x86MX) processors, 198
- Mini-A connectors (USB), 1035
- Mini-AB connectors (USB), 1035
- mini-AT motherboards, 240
- Mini-DTX motherboards, 260
- Mini-ITX
 - motherboards, 260-263
- mini-LPX motherboards, 242-244
- mini-tower cases, 1298
- Mini-Winchester sliders, 647
- MiniATX motherboards, 252
- minimum load current (power supply), 1264
- MIP mapping, 953-954
- mirroring disks, 635
- misses (cache), 515
- Missing operating system (error message), 508, 1439-1440
- MITS Altair, 20, 26
- Mitsubishi DiamondTron picture tubes, 908
- MMC (MultiMediaCard), 735
- MMU (memory management unit), 127
- MMX (multimedia extensions), 80-81, 157
- MNP (Microcom Network Protocol), 1130, 1134
- MO drives, 732-733. *See also* optical storage
- modding. *See* heating/cooling issues; overclocking
- Model 1 steppings, 147
- Model 5100 PC, 21
- Model 5150 PC, 21
- model numbers (Intel), 276-277
- Modem-on-Hold feature, 1137
- modems. *See* broadband modems; dialup modems
- Modemsite, 1138
- modes
 - PIO (Programmed I/O) modes, 602-603
 - processors, 50
 - IA-32 mode, 51-52
 - IA-32 virtual real mode, 52-53
 - IA-32e 64-bit extension mode, 53-55
 - real mode, 51

- protected, 578
- real, 532
- UDMA (Ultra-DMA) transfer modes
 - Mode 2, 590
 - Mode 4, 591
 - Mode 5, 592
 - Mode 6, 592
- modifications. See heating/cooling issues; overclocking**
- Modified Frequency Modulation (MFM), 641, 651**
- modulation standards**
 - FSK (frequency-shift keying), 1131
 - full-duplex protocols, 1132
 - half-duplex protocols, 1132
 - PSK (phase-shift keying), 1131
 - QAM (quadrature amplitude modulation), 1132
 - V.90 standard, 1132
 - V.92 standard, 1132
- modulator/demodulators. See dialup modems**
- modules (memory)**
 - ATX motherboards, 250
 - buying tips, 567-568
 - chip creep, 533
 - chip extractors, 1394-1395
 - chip inserters, 1394
 - chip on ceramic (COC) technology, 647
 - CISC (Complex Instruction Set Computer), 80
 - DIMMs (dual inline memory modules), 533
 - 168-pin DIMM pinouts, 543-544
 - 184-pin DIMM pinouts, 545-546
 - 240-pin DDR2 DIMM pinouts, 547-548
 - 240-pin DDR3 DIMM pinouts, 548-550
 - buffered, 544
 - buying tips, 568
 - capacities, 537-538
 - illustration, 535
 - SPD (serial presence detect), 544
 - unbuffered, 544
 - DIP (dual inline package) chips, 533
 - double-sided, 534
 - dual-channel memory, 557
 - EEPROM (electronically erasable programmable ROM), 453-454
 - emergency recovery, 467-470
 - upgrading, 464-467, 470-471
 - write protection, 464
 - EPROM (erasable programmable ROM), 452-453
 - flash ROM, 453-454
 - emergency recovery, 467-470
 - upgrading, 464-467, 470-471
 - write protection, 464
 - hard fails, 557
 - identifying module type size, and speed, 553-555
 - installation, 569-571
 - ESD (electrostatic discharge), 569
 - SIMMs, 571-572
 - keyboard-controller chips, 464
 - maximum installable memory, 532
 - memory banks, 555-557
 - definition of, 538
 - widths, 555-556
 - OTP (one-time programmable) chips, 450
 - parity checking
 - disabling, 563
 - NMIs (nonmaskable interrupts), 562
 - odd parity, 561
 - parity bits, 560
 - parity-check messages, 561-564
 - registered modules, 539-540
 - RIMMs (Rambus inline memory modules), 534
 - buying tips, 568
 - capacities, 538
 - installation, 552
 - pinouts, 550-552
 - RISC (Reduced Instruction Set Computer), 80, 138
 - RTC/NVRAM (real-time clock/nonvolatile memory) chips, 445
 - SIMMs (single inline memory modules), 533
 - buying tips, 567-568
 - capacities, 537
 - illustration, 534
 - installation, 571-572
 - memory banks, 555-557
 - pinouts, 540-543
 - presence detect pin configurations, 541-542
 - single-sided, 534
 - soft errors
 - alpha particles, 558
 - cosmic rays, 558-559

- ECC (error-correcting code), 564-565
- fault tolerance, 559-560
- heat buildup, 559
- incorrect memory types, 559
- line noise, 559
- parity checking, 560-561
- power glitches, 559
- radio frequency interference, 559
- static discharge, 559
- timing glitches, 559
- speed, 557-538
- Super I/O chips, 367-368
- troubleshooting
 - diagnostics utilities, 572
 - divide errors, 573
 - fatal exception errors, 573
 - general faults, 573
 - global protection faults, 573
 - memory defect isolation, 576-578
 - module testers, 573
 - parity errors, 573
 - step-by-step procedures, 575-576
 - write-back cache, 574
- unbuffered modules, 539
- upgrading
 - higher-capacity modules, 569
 - upgrade options and strategies, 565-566
- Molex Mini-Fit Jr. power connectors (ATX), 1238-1239**
- monitors, 885**
 - care and maintenance, 923
 - choosing, 1307
 - brightness and contrast, 909
 - digital controls, 916-918
 - dot pitch, 907-908
 - emissions, 911-912
 - frequencies, 912-916
 - interlaced/noninterlaced, 909
 - power management, 910-911
 - refresh rates, 913-914
 - resolution, 904-907
 - size, 903-904
 - stripe pitch, 908
- compared to television signals, 975-976
- CRT (cathode ray tube), 886
 - compared to LCD, 901-902
 - curved picture tubes, 900-901
 - dot pitch, 899, 907-908
 - electron guns, 898
 - FST (flat square tube) designs, 900
 - horizontal scan rates, 899
 - interfaces, 901
 - multiple-frequency monitors, 900
 - persistence, 899
 - phosphor triads, 907
 - raster, 899
 - refresh rates, 899-900
 - scanning frequency, 899
 - screen phosphors, 907
 - shadow masks, 898, 907
 - slotted masks, 908
 - stripe pitch, 908
- digital controls, 916-918
- DLP projectors, 920-922
- emissions, 911-912
- frequencies, 912-913
 - horizontal frequencies, 915-916
 - vertical scan frequencies, 913-914
- LCD (liquid crystal display)
 - advantages of, 889-890
 - bad pixels, 886-887
 - brightness and contrast, 909
 - buying tips, 897-898
 - compared to CRT, 901-902
 - costs, 888
 - dead pixels, 886
 - DFP (Digital Flat Panel), 890
 - disadvantages of, 896-897
 - display connections, 890
 - display size, 888
 - DVI (Digital Visual Interface) standard, 890
 - flat-panel, 896-897
 - HDMI (High Definition Multimedia Interface), 891-895
 - interlaced/noninterlaced, 909
 - maximum allowable defects, 887
 - monochrome, 889
 - passive-matrix, 889
 - polarizing filters, 886
 - projectors, 919-922
 - resolution, 888
 - stuck pixels, 886
 - wide-screen, 895-896

- multiple monitors
 - hardware
 - requirements, 949
 - integrated graphics, 950
 - Windows 98-Windows XP support, 947-948
 - Windows Vista support, 948-949
- plasma displays, 902-903
- power management
 - ACPI (Advanced Configuration and Power Interface), 910-911
 - APM (Advanced Power Management), 910
 - DPMS (Display Power-Management Signaling), 910
 - Energy 2000 standard, 911
 - Energy Star standard, 911
- refresh rates
 - comparison of, 913-914
 - definition of, 913
 - flicker-free refresh rates, 913
 - minimum recommendations, 914
 - setting, 914-915
- resolution, 904-907
- size, 903-904
- testing, 918-919, 986
- troubleshooting, 982-984, 1436
- video adapter types, 927-928
- mono-in sound card connectors, 992**
- monochrome LCD (liquid crystal display) monitors, 889**
- monophonic sound cards, 997**
- Moore's Law, 23**
- Moore, Gordon, 17, 23**
- MOS Technologies 6502 processor, 41**
- MOSFETs (Metal Oxide Semiconductor Field Effect Transistors), 15-16**
- Motherboard Homeworld's Mobot search engine, 437**
- motherboards, 1301. See also buses; chipsets; power supply; ROM BIOS**
 - AT, 238-239, 1233-1235
 - ATX, 249-255
 - color coding, 255
 - compared to Baby-AT and LPX, 250
 - connector panel, 250
 - connectors, 250
 - cooling features, 251
 - identifying, 253
 - manufacturing costs, 251
 - memory location, 250
 - ports, 253
 - power supply, 1217-1220
 - power supply connectors, 250, 1235-1253
 - processor location, 250
 - riser card, 255-257
 - specification, 255
- Baby-AT, 239-240, 1216
- backplane systems
 - active, 271
 - passive, 269
- BTX, 263-265
- buying tips, 435-437
- cables, 1325-1326
- CMOS RAM addresses, 368
- connectors, 368-369, 373-374
- 4-pin +12V power connectors, 1245-1246
- 8-pin +12V power connectors, 1246-1248
- alternative single-row front panel connector pinouts, 372
- AMR (Audio Modem Riser), 379
- ATAPI-style line-in connectors, 377
- AT, 1233-1235
- ATX/ATX12V 1.x, 1235-1241
- ATX12V 2.x 24-pin, 1241-1243
- backward/forward compatibility, 1248-1250
- battery connectors, 376
- CD audio connectors, 377
- chassis intrusion connectors, 376
- CNR (Communications and Networking Riser), 379
- Dell proprietary ATX design, 1251-1253
- front panel audio connector pinout, 375
- front panel IEEE 1394 (FireWire/i.LINK) connector pinout, 374
- front panel switch/LED connector pinouts, 370-371
- front panel USB header connector pinouts, 373
- infrared data front panel connector pinouts, 376
- LED and keylock connectors, 376

- microprocessor fan power connectors, 377
- multiple power connectors, 1236
- PCG (Platform Compatibility Guide), 1244-1245
- power LED indications, 371
- power switch connectors, 1230-1232
- speaker connectors, 376
- telephony connectors, 377
- VRM (voltage regulator module), 1243-1244
- Wake on LAN connectors, 376
- Wake on Ring connectors, 377
- definition of, 37
- Desktop Form Factors website, 1302
- disposable PCs, 237
- documentation, 437-438
- DTX, 260
- extended ATX, 255
- FlexATX, 258-259
- flexible motherboards, 106
- industry control of, 29-30
- integrated adapters, 1304
- Intel-compatible, 186
- ITX, 260-263
- legacy motherboards, 106
- LPX, 242-244, 1217, 1233-1235
- microATX, 257-258
- Mini-DTX, 260
- Mini-ITX, 260-263
- MiniATX, 252
- mounting in case, 1318-1323
 - NLX, 245-249
 - overclocking, 438-439
 - PnP (Plug and Play), 433-435
 - ports, 1304-1305
 - PPI (Programmable Peripheral Interface) chips, 1069
 - processor sockets/slots, 97, 271-273
 - proprietary designs, 268-269
 - PS/2 mouse interfaces, 1085-1086
 - resource conflicts
 - Device Manager, 429
 - multiple-COM-port adapters, 432
 - NICs (network interface cards), 432
 - PnP (Plug and Play), 433-435
 - preventing, 422-424
 - resolving manually, 424
 - SCSI adapter boards, 431
 - sound cards, 429-431
 - system-configuration templates, 424-428
 - USB (Universal Serial Bus), 432-433
 - video software, 433
 - speed
 - AMD P-Ratings, 67-69
 - Cyrix P-Ratings, 67
 - processor bus speeds, 520
 - processor comparisons, 66-67
 - processor overclocking, 69-71
 - summary of form factors, 235-237
 - Super I/O chips, 367-368
 - troubleshooting, 1078, 1443
 - Tualatin-ready, 106
 - voltage regulators, 1209
 - WTX, 266-268
 - XT, 237-238
- mothers (CDs), 750**
- Motion Picture Experts Group (MPEG), 798, 978, 998**
- motors**
 - spindle motors, 694-695, 718
 - stepper motors, 685, 717-718
- Mount Rainier standard, 785, 795-796**
- mounting motherboards, 1318-1323**
- mouse devices**
 - ball-driven mouse, 1082
 - buttons, 1082
 - choosing, 1306-1307
 - cleaning, 1088, 1419
 - components, 1082
 - connectors, 1073-1075
 - definition of, 37
 - Ergonomic Mouse, 1095
 - history of, 1081-1082
 - hybrid mouse, 1086
 - IntelliMouse Explorer, 1082
 - manufacturers, 1082
 - optical mouse, 1082-1085
 - opto-mechanical mechanism, 1083
 - PS/2 mouse interfaces, 1085-1086
 - scroll wheels, 1090
 - Scrollpoint Pro, 1090
 - serial interfaces, 1085
 - troubleshooting
 - cleaning, 1088
 - drivers, 1090
 - interrupt conflicts, 1088-1089

- USB (Universal Serial Bus), 1087-1088
 - wireless
 - Bluetooth, 1099-1100
 - IR (infrared), 1097
 - power management, 1100
 - proprietary radio frequency, 1098
 - troubleshooting, 1100-1101
- MOVs (metal-oxide varistors), 1287
- MPEG (Motion Picture Experts Group), 798, 978, 998
- MPR I emissions standard, 912
- MPR II emissions standard, 912
- MPS 1.1 (Multiprocessor Specification), 153
- MR (magneto-resistive) read/write heads, 644-645
- MR (Microid Research), 459
- MRH-R (memory repeater hub, RDRAM-based), 298
- MRH-S (memory repeater hub, SDRAM-based), 298
- MS-DOS. *See* DOS
- MSAUs (multistation access units), 1180
- MSD (Microsoft Diagnostics)
 - mouse conflicts, 1089
 - serial ports, 1052
- MSDOS.SYS file, 1388
- MTBF (mean time between failures), 703-704, 1263
- MTH (Memory Translator Hub), 297
- MTTF (Mean Time To Failure), 1263
- multi-I/O cards, 1046
- multichip module (MCM), 150
- multicore processors, 86-87**
 - AMD 64 FX, 226-230
 - AMD Athlon 64 X2, 226-230
 - Intel Core 2, 222-224
 - Intel Extreme Edition, 219-221
 - Intel Pentium D, 219-221
- multidomain vertical alignment (MVA), 887**
- multiformat rewritable DVD drives, 839**
- multifrequency monitors, 900**
- multifunction USB hubs, 1041**
- multimedia. *See also* audio; DVD discs; video adapters**
 - 3D graphics accelerators
 - 3D chipsets, 961-962, 966,-972
 - alpha blending, 954
 - animation, 953
 - antialiasing, 953-955
 - bilinear filtering, 954
 - depth cueing, 953
 - DirectX 6.0-9.0, 956
 - displacement mapping, 954
 - dual-GPU scene rendering, 959-961
 - environment-based bump mapping, 954
 - flat shading, 951
 - floating-point calculations, 955
 - fogging, 953
 - Gouraud shading, 951, 954
 - hardware/software acceleration, 956-957
 - history of, 951-952
 - image abstractions, 953
 - image rendering, 953, 956
 - keyframe interpolation, 955
 - MIP mapping, 953-954
 - perspective correction, 953
 - primitives, 953
 - scan conversion, 953
 - shading, 953-955
 - software optimization, 957
 - stencil buffering, 954
 - T&L (transform and lighting), 955
 - T-buffers, 955
 - texture mapping, 951-953
 - textures, 953
 - trilinear filtering, 954-955
 - vertex skinning, 955
 - vertices, 953
 - visible surface determination, 953
 - Z-buffering, 954
 - history of, 989-990
 - MMC (MultiMediaCard), 735
 - MMX (multimedia extensions), 80-81
 - Multimedia CD, 764
 - SSE (Streaming SIMD Extensions), 81-82
- Multimedia CD, 764**
- multimedia extensions (MMX), 80-81**
- MultiMediaCard (MMC), 735**
- MultiMediaCard Association, 735**
- multimeters, 1397, 1402-1403**
- multiple branch prediction, 83, 149**
- multiple call signaling, 1122**
- multiple-COM-port adapters, 432**

multiple-frequency monitors, 900

multiple monitors

hardware requirements, 949

integrated graphics, 950

Windows 98-Windows XP support, 947-948

Windows Vista support, 948-949

multiprocessing, 160

Multiprocessor Specification (MPS) 1.1, 153

MultiRead, 823-824

multiscan monitors, 900

multisession recording

Disc-at-Once, 783

packet writing, 784-785

Track-at-Once, 784

multistation access units (MSAUs), 1180

multisync monitors, 900

multiword DMA (direct memory access), 604

music. See audio

Musical Instrument Digital Interface. See MIDI

MuTIOL architecture, 283, 344

MVA (multidomain vertical alignment), 887

Mylar, 640

N

Nano-ITX motherboards, 263

nanoseconds, 517

Napier's Bones, 12

Napier, Charles, 12

narrow-channel systems, 530

NAS (Network Attached Storage) drives, 744

National Committee on Information Technology Standards (NCITS), 586

National Television System Committee (NTSC), 975

NCITS (National Committee on Information Technology Standards), 586

NEAT (New Enhanced AT) CS8221 chipset, 274

needle-nose pliers, 1396

negative DC voltages, 1210

NetBEUI (NetBIOS Extended User Interface), 1193-1194

NetWare operating systems, 633

Network Attached Storage (NAS) drives, 744

network interface adapters, 1381-1382

network interface cards. See NICs

networking, 1103-1104, 1151

ad hoc mode, 1186

benefits, 1152

broadband modems

advantages, 1104-1105

cable modems, 1106-1110

choosing, 1126

comparison of access types, 1123-1124

DSL (digital subscriber line), 1111-1117

fixed-base wireless broadband, 1117

HughesNet, 1118

ISDN (Integrated Services Digital Network), 1120-1123

ISPs (Internet Service Providers), 1106

leased lines, 1125-1126

satellite performance, 1120

security, 1127

service interruptions, 1124

signal lights, 1146

speeds, 1124

StarBand, 1119-1120

summary of access types, 1105

TCP/IP settings, 1125

cables

buying tips, 1198-1199

cable distance

limitations, 1177-1178

Direct Cable Connection technology, 1204

grounding loops, 1172

installation, 1172-1178

Thicknet, 1170

Thinnet, 1170

twisted-pair, 1171-1177

CATV networks

asymmetrical networks, 1109

bandwidth, 1109-1110

broadband networks, 1109

bundled cable modems, 1107

CableLabs cable modems, 1108

costs, 1110

performance, 1110

security, 1110

client/server

networks, 1154-1156

- definition of, 37, 1151-1152
- dialup modems, 1127
 - 56Kbps modems, 1134-1138, 1141-1142
 - AT commands, 1130
 - baud rates, 1130
 - bit rates, 1130
 - data bits, 1129
 - data-compression standards, 1133
 - error-correction protocols, 1132-1133
 - external, 1139
 - fax modems, 1138
 - internal, 1139
 - modulation standards, 1131-1132
 - parity, 1128
 - proprietary standards, 1134
 - recommendations, 1139-1140
 - standards organizations, 1129-1130
 - start-stop communications, 1128-1129
 - stop bits, 1129
 - support for, 1141
 - telephone company upgrades, 1142
 - troubleshooting, 1146-1149
 - WinModems, 1140-1141
- Ethernet, 1157-1158
 - cables, 1170
 - definition of, 1158
 - Fast Ethernet, 1157-1159
 - Gigabit Ethernet, 1157-1159
 - hubs, 1182-1185, 1199
 - network adapter connectors, 1169-1170
 - switches, 1182-1185, 1199
 - Wi-Fi (Wireless Fidelity), 1160, 1190
 - wireless Ethernet.
See wireless networks
- extranets, 1152-1153
- gateways, 1199
- hardware and software requirements, 1153, 1199-1200
- HFC (hybrid fiber/coax) networks, 1107
- HomePNA, 1194-1195
- hubs
 - buying tips, 1199
 - compared to switches, 1182-1184
 - dual-speed, 1184
 - managed/unmanaged, 1182
 - placement of, 1185
 - ports, 1184-1185
 - stackable, 1184
- infrastructure mode, 1186
- intelligent sharing, 1151
- intranets, 1152-1153
- LANs (local area networks), 1152
- networking software
 - configuration, 1201-1202
 - installation, 1200
 - Windows Vista, 1202-1203
- NICs (network interface cards), 1166
 - bus types, 1167-1168
 - connectors, 1169-1170
 - costs, 1167
 - full-duplex, 1167
 - half-duplex, 1167
 - installation, 1197-1198
 - speed, 1167
 - testing, 1198
 - Wi-Fi (Wireless Fidelity), 1186
- peer-to-peer networks, 1155-1156
- powerline networking, 1196
- protocols, 1191-1192
 - definition of, 1130
 - DHCP (Dynamic Host Configuration Protocol), 1190
 - Ethernet, 1157-1160, 1169-1170, 1182-1185, 1190, 1199
 - full-duplex protocols, 1132
 - half-duplex protocols, 1132
 - importance of, 1156
 - IP (Internet Protocol), 1192
 - IPX (Internetwork Packet Exchange), 1193
 - MNP (Microcom Network Protocol), 1130, 1134
 - NetBEUI, 1193-1194
 - RRIP (Rock Ridge Interchange Protocol), 795
 - TCP/IP, 1125, 1192-1193, 1206
 - Token-Ring, 1157-1158
- recording network information, 1199-1200
- shared hardware components, 1152
- shared Internet connections
 - gateways, 1143-1144
 - proxy servers, 1143-1144

- routers, 1143-1145
 - troubleshooting, 1145-1146
 - switches
 - address storing, 1182
 - buying tips, 1199
 - compared to hubs, 1182-1184
 - dual-speed, 1184
 - placement of, 1185
 - ports, 1184-1185
 - stackable, 1184
 - tips and tricks, 1203
 - Token-Ring, 1157-1158
 - topologies
 - bus, 1179
 - comparison of, 1178-1179
 - point-to-point, 1188
 - ring, 1180-1181
 - star, 1181, 1188
 - troubleshooting
 - shared resources, 1205
 - software setup, 1204-1205
 - TCP/IP, 1206
 - WANs (wide area networks), 1152
 - wireless. *See* wireless networks
- Neumann, John von**, 14
- New Enhanced AT (NEAT) CS8221 chipset**, 274
- New Partition Wizard**, 869
- NexGen Nx586 processors**, 46, 184-185
- nForce chipsets**, 348-350
- nForce 410/430 series, 362
 - nForce Professional series, 362
 - nForce/nForce2 series, 348-350
 - nForce3 150 series, 361
 - nForce3 250 series, 361-362
 - nForce3 Pro 150 series, 361
 - nForce4 series, 362
- Nibble Mode memory**, 520-521
- Nicely, Thomas R.**, 145
- nickel-ferrite (NiFe) film**, 645
- NICs (network interface cards)**, 1166
- bus types, 1167-1168
 - connectors, 1169-1170
 - costs, 1167
 - full-duplex, 1167
 - half-duplex, 1167
 - installation, 1197-1198
 - resource conflicts, 432
 - speed, 1167
 - testing, 1198
 - Wi-Fi (Wireless Fidelity), 1186
- NiFe (nickel-ferrite) film**, 645
- NLX motherboards**, 245-249
- NMIs (nonmaskable interrupts)**, 562
- NMOS transistors**, 16
- No boot device available (error message)**, 506
- No-ID recording**, 672
- No-ID sector formatting**, 672
- NO ROM BASIC - SYSTEM HALTED (error message)**, 505
- no-tool cases**, 1400
- non-PC ROM upgrades**, 454
- Non Return to Zero (NRZ)**, 606
- Non Return to Zero Invert (NRZI)**, 1032
- Non-System disk or disk error (error message)**, 506
- nonblocking cache**, 77
- nondestructive formatters**, 878
- noninterlaced monitors**, 909
- nonlinear power**, 1265
- nonmaskable interrupts (NMIs)**, 562
- nonvolatile memory. *See* ROM BIOS**
- nonvolatile storage**, 663. *See also* hard drives
- North Bridge chipsets**, 279-280
- ALiMagic1, 348
 - AMD-761, 333
 - Apollo KT133A, 338
 - Apollo KX133, 337
 - NVIDIA, 348
 - Radeon, 352
- notebooks**, 128-129
- Novell NetWare operating systems**, 633
- Noyce, Robert**, 17
- NRZ (Non Return to Zero)**, 606
- NRZI (Non Return to Zero Invert)**, 1032
- Ntdetect.com**, 1391
- NTFS (Windows NT File System) partitions**, 678
- NTSC (National Television System Committee)**, 975
- Num Lock feature (keyboards)**, 1062-1063
- numbers**
- Intel model numbers, 276-277
 - key numbers, 1071-1072
 - ROM (read-only memory) chip part numbers, 449
 - EEPROM (electronically erasable programmable ROM), 453
 - PROM (programmable ROM), 450
 - sector numbers, 672

- numerical aperture, 776
- Numlock setting (Boot Configuration menu), 482
- nut drivers, 1393
- NVIDIA
- chipsets
 - 3D chipsets, 968-972
 - nForce 410/430 series, 362
 - nForce Professional series, 362
 - nForce/nForce2 series, 348-350
 - nForce3 150/nForce3 Pro 150 series, 361
 - nForce3 250 series, 361-362
 - nForce4 series, 362
 - SLI, 959-960
- nView multidisplay hardware, 349
- Nx586 processors (NexGen), 184-185
- nylon cable-ties, 1397
- O**
-
- object-code compatibility, 125
- odd cycles (RDRAM), 530
- odd parity, 561
- OEMs (original equipment manufacturers), 455
- Oersted, Hans Christian, 639
- OFDM (orthogonal frequency division multiplexing), 1196
- Off state (APM), 1272
- OLGA (organic land grid array) packaging, 164
- Onboard 1394 setting (Peripheral Configuration menu), 485
- Onboard Audio setting (Peripheral Configuration menu), 485
- Onboard Chip SATA setting (Drive Configuration menu), 487
- Onboard LAN Boot ROM setting (Peripheral Configuration menu), 485
- Onboard LAN setting (Peripheral Configuration menu), 485
- Onboard Video Memory Size setting (Video Configuration menu), 491
- one-time programmable (OTP) chips, 450
- onscreen messages (POST), 1370
 - Award BIOS/Phoenix FirstBIOS, 1372-1373
 - IBM BIOS, 1377-1379
 - IBM/Lenovo BIOS POST/Diagnostics, 1379-1380
- OpenGL, 958
- operating environment maintenance, 1421
- operating range (power supply), 1263
- operating systems. *See also specific operating systems*
 - definition of, 27
 - diagnostic software, 1382-1383
 - drive limitations, 633-634
 - drive partitions, 1332
 - hard disk capacity limitations, 698
 - installation, 1332
- operating-system-independent boot process, 1384-1387, 1431-1433
- opposite track path (OTP), 772-773
- Opteron processors (AMD), 218
- optical mouse devices, 1082-1085
- optical SPDIF in/out connectors, 994
- optical storage, 747-748. *See also magneto-optical drives*
 - Blu-ray discs, 775-777, 800
 - care and maintenance, 762-763
 - CDs. *See* CD discs; CD drives
 - choosing, 1306
 - configuration
 - jumper settings, 879-880
 - system configuration, 882
 - DVDs. *See* DVD discs; DVD drives
 - HD-DVD, 776-777
 - installation, 878-879
 - jumper settings, 879-880
 - PATA (parallel ATA) optical drives, 880-881
 - SATA (serial ATA) optical drives, 881-882
 - troubleshooting
 - disc read failures, 844-847
 - disc write failures, 845-847
 - firmware updates, 847-850
 - slow drive speeds, 846
- Optical Storage Technology Association (OSTA), 794
- optimal resolution, 914
- optimizing performance. *See* performance optimization
- opto-mechanical mouse mechanisms, 1083

Orange Book standard, 783
organic land grid array (OLGA)
 packaging, 164
original equipment
 manufacturers (OEMs), 455
orthogonal frequency division
 multiplexing (OFDM), 1196
OS/2 Warp, 633
OSTA (Optical Storage
 Technology Association), 794
OSx86 Project, 29
OTP (one-time programmable)
 chips, 450
OTP (opposite track
 path), 772-773
outlet testers, 1404-1405
output ratings (power supply),
 1260-1262
overburning CDs, 817
overclocking, 69
 bus speeds and
 multipliers, 1343
 definition of, 1336
 history of, 1338-1339
 modern PC clocks, 1339-1341
 motherboards, 438-439
 overclocking protection, 93
 Pentium III processors, 182
 Pentium processors, 144
 potential problems, 69-71
 quartz crystals, 1336-1338
 Socket A processors, 71
 tips and
 guidelines, 1341-1342
 voltage settings, 71
OverDrive processors, 100, 230
 DX2, 134-136
 Pentium, 136
 sockets, 100

overheating. See heating/
 cooling issues
overloading power
 supply, 1277
overvoltage protection (power
 supply), 1264
oxide recording media, 681

P

P-CAV (Partial-CAV)
 technology, 803
P-CHS parameters, 624
P-Ratings (Performance
 Ratings)
 AMD processors, 67-69
 Cyril processors, 67
p-Si (low-temperature
 polysilicon), 887
P4M266 chipsets (VIA), 329
P4X266 chipsets (VIA), 329
P4X400 chipsets (VIA), 330
P4X400A chipsets (VIA), 330
P4X533 chipsets (VIA), 330
P5 (586) processors
 (Pentium), 138
 address bus width, 140
 addressable memory, 140
 BiCMOS, 140
 BTB (branch target
 buffer), 139
 cache, 140
 DIMM width, 140
 first-generation, 142
 instruction processing, 140
 math coprocessor,
 141, 145-146
 OverDrive Processors, 147-148

packaging, 141
Pentium-compatible
 AMD-K6, 82-83, 185-187
 Cyril 6x86/6x86MX, 198
 NexGen Nx586, 184-185
Pentium-MMX, 144-148
power management bugs, 147
second-generation, 142-144
SIMM width, 140
specifications, 138-139
steppings, 147
superscalar architecture, 138
twin data pipelines, 138-139
voltage, 141, 147-148
P6 (686) processors
 Celeron
 benefits, 168
 Celeron D, 172-175
 DIB (Dual Independent
 Bus) architecture, 84, 149
 dynamic execution, 149
 FC-PGA (flip chip pin grid
 array) package, 166
 history of, 169
 instruction execution, 150
 manufacturing, 168
 PPGA (plastic pin grid
 array) package, 166-167
 processor
 variations, 170-171
 running 32-bit
 software, 150
 SEP (single edge processor)
 package, 166
 Socket 370 Celerons, 171
 Socket 478 Celerons, 172
 Socket T (LGA 775)
 Celerons, 172
 Tualatin, 171

- Pentium II
 - cache, 160
 - chipsets, 290-302
 - DIB (Dual Independent Bus) architecture, 84, 149, 158
 - die sizes, 157
 - dynamic execution, 83, 149, 158
 - heating/cooling issues, 160
 - iCOMP 2.0 Index rating, 157
 - installation, 160
 - instruction execution, 150
 - MMX technology, 157
 - multiprocessing, 160
 - power usage, 157
 - processor ID information, 161-164
 - running 32-bit software, 150
 - SEC (Single Edge Contact) packaging, 154, 156
 - specifications, 158-160
 - speeds, 157
 - transistors, 157
 - voltage ID definitions, 165-166
- Pentium II/III Xeon, 182-184
- Pentium III, 175
 - architectural features, 176
 - chipsets, 290-302
 - DIB (Dual Independent Bus) architecture, 84, 149
 - dynamic execution, 149
 - ID markings, 177
 - instruction execution, 150
 - Level 2 cache, 176
 - overclocking, 182
 - running 32-bit software, 150
 - SECC2 package, 176
 - variations, 176-182
- Pentium-compatible
 - AMD Athlon, 188-192
 - AMD Athlon MP, 196-197
 - AMD Athlon XP, 194-197
 - AMD Duron, 192-193
 - AMD-K6, 82-83, 185-187
 - Cyrix 6x86/6x86MX, 198
 - NexGen Nx586, 184-185
 - Sempron (Socket A), 197-198
 - VIA C3, 198-199
- Pentium Pro
 - cache, 151
 - chipsets, 153
 - DIB (Dual Independent Bus) architecture, 84, 149-151
 - Dual Cavity PGA packaging, 150
 - dynamic execution, 83, 149
 - instruction execution, 150
 - integrated L2 cache, 153
 - MCM (multichip module), 150
 - running 32-bit software, 150
 - specifications, 152
 - speeds, 153
 - transistors, 150
 - VID (voltage identification) pins, 154
- P64H (PCI controller hub), 298**
- P8 power supply connectors, 1233-1235**
- P9 power supply connectors, 1233-1235**
- PAC (PCI/AGP Controller). See North Bridge chipsets**
- packaging**
 - BBUL (bumpless build-up layer), 95
 - Dual Cavity PGA packaging, 150
 - FC-PGA (flip-chip pin grid array), 94
 - PGA (pin grid array), 93-95
 - PLGA (plastic land grid array), 164
 - SEC (single edge contact), 95, 154-156
 - SECC2 (single edge contact cartridge 2), 96-97
 - SEP (single edge processor), 95
 - SPGA (staggered pin grid array), 94
 - TCP (tape carrier packaging), 141
- packet writing, 784-785**
- paddle boards, 583**
- Page Mode memory, 520-521**
- paged memory, 520-521**
- pairing data pipelines, 139**
- PAL (Phase Alternate Line), 975**
- paragraphs (ROM), 448**
- parallel ATA (PATA), 582, 585, 857-858, 880-881**
- Parallel Port Mode setting (Peripheral Configuration menu), 485**
- Parallel Port setting (Peripheral Configuration menu), 485**
- parallel ports, 1053**
 - configuration, 1056-1057
 - ECP (Enhanced Capabilities Port), 1056
 - EPP (Enhanced Parallel Port), 1056

- IEEE 1284
 - standard, 1054-1055
- pinouts, 1054
- Super I/O chips, 367
- testing, 1057
- parallel track path (PTP), 773**
- parameter limitations (CHS)**
 - ATA CHS parameter limits, 623
 - BIOS CHS parameter limits, 622
 - combined parameter limits, 623
- parameter translation.**
See translation
- PARD (Periodic and Random Deviation), 1264**
- parity**
 - block data with, 635
 - dialup modems, 1128
 - parity bits, 560
 - parity checking
 - disabling, 563
 - NMIs (nonmaskable interrupts), 562
 - odd parity, 561
 - parity bits, 560
 - parity-check messages, 561-564
 - parity errors, troubleshooting, 1018
 - PI (parity inner) bytes, 769
 - PO (parity outer) bytes, 769
 - striping with, 635
- Parkinson's Law, 664**
- Parkinson, Cyril Northcote, 664**
- part numbers (ROM), 449**
 - EEPROM (electronically erasable programmable ROM), 453
 - PROM (programmable ROM), 450
- Partial-CAV (P-CAV) technology, 803**
- Partial-Response, Maximum-Likelihood (PRML), 654**
- Partition Commander, 870-871**
- partitioning hard drives, 678-679, 1332**
 - advantages of, 862
 - Disk Management, 867-869
 - FAT, 678
 - FAT32 (file allocation table, 32-bit), 678, 866-867
 - FDISK, 862-863
 - drive letter assignments, 864-866
 - FAT32 volumes, 866-867
 - large hard disk support, 863-864
 - limitations, 872-873
 - NTFS (Windows NT File System), 678
 - third-party utilities, 870-871
- PartitionMagic, 870-871**
- parts grabbers, 1395, 1409**
- Pascal, Blaise, 12**
- passive backplane systems, 269**
- passive heatsinks, 1308, 1347-1348**
- passive-matrix LCD (liquid crystal display) monitors, 889**
- passive PFC (power factor correction), 1265**
- passive preventative maintenance.** *See preventative maintenance*
- passwords, 494**
- PATA (parallel ATA), 582, 585, 857-858, 880-881**
- patents, 27**
- PC Card, 736**
- PC Power and Cooling, 1284**
- PC XX Design Guides, 33**
- PC/XT-class (8-bit) systems**
 - compared to AT-class systems, 36
 - overview, 35-36
 - power supply, 1214
- PC133 memory, 294-295, 524**
- PC99 Design Guide, 990**
- PCA (power calibration area), 754**
- PCDEVS.TXT file, 501, 504**
- PCG (Platform Compatibility Guide), 1244-1245**
- PCI (Peripheral Connect Interface) buses, 378, 400-403**
 - adapter cards, 401
 - board configurations, 402-403
 - bus types, 401
 - interrupts, 412-415
 - PCI-Express, 378, 403-405
 - PCI-X, 378
 - specifications, 399-400
- PCI Burn-in Mode setting (Chipset Configuration menu), 484**
- PCI Configuration menu (BIOS Setup), 480**
- PCI Express Burn-in Mode setting (Chipset Configuration menu), 484**
- PCI-Express buses, 378, 943-944**

- PCI Express Configuration menu (BIOS Setup), 481
- PCI-Express x16 Graphics Power connectors, 1257-1258
- PCI IDE Bus Master setting (Drive Configuration menu), 487
- PCI Industrial Computer Manufacturers Group (PICMG), 269
- PCI IRQ Steering, 410, 414
- PCI-X buses, 378
- PCI/VGA Palette Snoop setting (Video Configuration menu), 491
- PCIe x16 Link Retrain setting (PCI Express Configuration menu), 481
- PCKeyboard.com, 1068
- PCM Upstream, 1138
- PCMCIA (Personal Computer Memory Card International Association), 736
- PCs (personal computers), definition of, 25-26
- peak inrush current (power supply), 1263
- peer-to-peer networks, 1155-1156
- PEG Allow > x1 setting (Chipset Configuration menu), 484
- PEG Negotiated Width setting (PCI Express Configuration menu), 481
- Pentium. *See also* Pentium II; Pentium II/III Xeon; Pentium 4; Pentium-MMX; Pentium Pro
 - address bus width, 140
 - addressable memory, 140
 - BiCMOS, 140
 - BTB (branch target buffer), 139
 - cache, 140
 - chipsets, 284-286
 - DIMM width, 140
 - first-generation, 142
 - iCOMP 2.0 index ratings, 57
 - instruction processing, 140
 - math coprocessor, 141, 145-146
 - maximum installable memory, 532
 - MMX (multimedia extensions), 80-81
 - OverDrive processors, 100, 136, 147-148
 - packaging, 141
 - power management bugs, 147
 - second-generation, 142-144
 - SIMM width, 140
 - sockets, 97-99
 - specifications, 138-139
 - SPGA (staggered pin grid array) packaging, 94
 - SSE (Streaming SIMD Extensions), 81-82
 - steppings, 147
 - superscalar architecture, 138
 - twin data pipelines, 138-139
 - voltage, 141, 147-148
- Pentium II, 154**
 - cache, 160
 - chipsets, 286-290
 - Aladdin Pro 4, 299-300
 - Aladdin Pro 5, 299-300
 - Aladdin TNT2, 299-300
 - Intel 810, 290-291
 - Intel 810E, 290-291
 - Intel 810E2, 290-291
 - Intel 815, 293-295
 - Intel 815E, 293-295
 - Intel 815EP, 293-295
 - Intel 820, 295-297
 - Intel 820E, 295-297
 - Intel 840, 297-298
 - SiS chipset reference table, 303
 - VIA chipset reference tables, 300-302
- DIB (Dual Independent Bus) architecture, 84, 149, 158
- die sizes, 157
- dynamic execution, 83-84, 149, 158
- heating/cooling issues, 160
- iCOMP 2.0 index ratings, 57, 157
- iCOMP 3.0 index ratings, 58
- installation, 160
- instruction execution, 150
- Level 1 cache, 160
- Level 2 cache, 160
- maximum installable memory, 532
- MMX technology, 157
- multiprocessing, 160
- power usage, 157
- processor ID information, 161-164
- running 32-bit software, 150
- SEC (single edge contact) packaging, 95, 154-156
- SEP (single edge processor) packaging, 95
- socket specifications, 97-99
- specifications, 158-160
- speeds, 157
- transistors, 157
- voltage ID definitions, 165-166

Pentium II/III Xeon, 182-184**Pentium III, 175**

- architectural features, 176
- chipsets, 286-290
 - Aladdin Pro 4, 299-300
 - Aladdin Pro 5, 299-300
 - Aladdin TNT2, 299-300
 - Intel 810, 290-291
 - Intel 810E, 290-291
 - Intel 810E2, 290-291
 - Intel 815, 293-295
 - Intel 815E, 293-295
 - Intel 815EP, 293-295
 - Intel 820, 295-297
 - Intel 820E, 295-297
 - Intel 840, 297-298
- SiS chipset reference table, 303
- VIA chipset reference tables, 300-302
- DIB (Dual Independent Bus) architecture, 84, 149
- dynamic execution, 149
- iCOMP 3.0 index ratings, 58
- ID markings, 177
- instruction execution, 150
- Level 2 cache, 176
- maximum installable memory, 532
- overclocking, 182
- running 32-bit software, 150
- SEC (single edge contact) packaging, 95
- SECC2 (single edge contact cartridge 2) packaging, 96-97, 176
- SEP (single edge processor) packaging, 95

socket specifications, 97-99

SSE (Streaming SIMD Extensions), 81-82

variations, 176-182

Pentium 4, 199-202, 206

chipsets

- Aladdin P4 (M1671), 324
- Apollo P4X266 family, 329
- Apollo P4X400, 330
- Apollo P4X400A, 330
- Apollo P4X533, 330
- ATI chipsets, 325-326
- ICH5, 312
- ICH5R, 312
- Intel 845 family, 310-311
- Intel 848P, 312
- Intel 850 family, 308-309
- Intel 865 family, 312
- Intel 875P, 313
- Intel 915, 313
- Intel 925X, 313
- Intel 945 Express, 314
- Intel 955X, 314-315
- Intel 96x series, 315
- Intel 975X, 314-315
- Intel Extreme Graphics Architecture, 277-278
- Intel workstation chipset reference table, 352-353
- M1681/M1663, 324
- M1685, 324-325
- Pentium 4 chipset reference tables, 302-308
- ProSavage P4M266, 329
- PT800/PM800/PT880/PM880, 330
- PT880/PT894/PT894 Pro, 330

SiS chipset reference tables, 317-319

SiS645/645DX, 320

SiS648/648FX, 320

SiS649/SiS649FX, 322

SiS650/651, 320

SiS655/655FX/655TX, 320

SiS656/SiS656FX, 321-322

SiS661FX, 321

SiSR658/R659, 321

ULi chipset reference tables, 322

VIA chipset reference tables, 327-328

VIA Modular Architecture Platforms (V-MAP), 328-329

maximum installable memory, 532

Pentium 4 Extreme Edition, 206-207

Pentium 4 SYSmark 2002 ratings, 58, 65

Pentium 4 SYSmark 2004 ratings, 59-62, 65

Pentium 4 SYSmark 2004 SE ratings, 63-65

Pentium 4 SYSmark 2007 ratings, 66

power supply issues, 208-209

Pentium-compatible processors. *See also* Athlon processors; Duron processors

AMD-K6

3DNow! technology, 82-83

BIOS support, 186

motherboard compatibility, 186

multiplier settings, 187

specifications, 186-187

- technical features, 185
- voltage, 186
- Cyrix 6x86/6x86MX, 198
- NexGen Nx586, 184-185
- Sempron (Socket A), 197-198
- VIA C3, 198-199
- Pentium D, 219-221, 317-319**
- Pentium-MMX, 80-81, 144-145**
 - iCOMP 2.0 index ratings, 57
 - steppings, 147
 - voltages, 147-148
- Pentium OverDrive, 100, 136, 147-148**
- Pentium Pro, 149-150**
 - cache, 151
 - chipsets, 153, 286-290
 - Aladdin Pro 4, 299-300
 - Aladdin Pro 5, 299-300
 - Aladdin TNT2, 299-300
 - Intel 810, 290-291
 - Intel 810E, 290-291
 - Intel 810E2, 290-291
 - Intel 815, 293-295
 - Intel 815E, 293-295
 - Intel 815EP, 293-295
 - Intel 820, 295-297
 - Intel 820E, 295-297
 - Intel 840, 297-298
 - SiS chipset reference table, 303
 - VIA chipset reference tables, 300-302
- DIB (Dual Independent Bus) architecture, 84, 149-151
- Dual Cavity PGA packaging, 150
- dynamic execution, 83-84, 149
- iCOMP 2.0 index ratings, 57
- instruction execution, 150
- integrated L2 cache, 153
- maximum installable memory, 532
- MCM (multichip module), 150
- running 32-bit software, 150
- socket specifications, 97-99
- specifications, 152
- speeds, 153
- SPGA (staggered pin grid array) packaging, 94
- transistors, 150
- VID (voltage identification) pins, 154
- performance optimization. *See also heating/cooling issues***
 - 56Kbps modems, 1141-1142
 - ATA (AT Attachment), 585
 - CATV networks, 1110
 - CD/DVD drive standards and specifications
 - access times, 808
 - buffers/cache, 808
 - CPU utilization, 808-809
 - data transfer rates, 802
 - DMA (Direct Memory Access), 809-810
- hard drives
 - access times, 702
 - average seek times, 701
 - cache programs, 702-703
 - interleave, 703
 - latency, 702
 - reliability, 703-706
 - transfer rates, 699-701
- memory
 - clock speeds, 518-519
 - cycle times, 518-519
- DDR SDRAM (double data rate SDRAM), 525-526
- DDR2 SDRAM, 527
- DDR3 SDRAM, 529
- GHz (gigahertz), 517
- interleaving, 521
- MHz (megahertz), 517-519
- module speeds, 557
- nanoseconds, 517
- processor bus speeds, 520
- RDRAM (Rambus DRAM), 531
- SDRAM (synchronous DRAM), 524
- overclocking
 - bus speeds and multipliers, 1343
 - definition of, 1336
 - history of, 1338-1339
 - modern PC
 - clocks, 1339-1341
 - quartz crystals, 1336-1338
 - tips and guidelines, 1341-1342
 - software, 957
- Performance Ratings. *See P-Ratings***
- Periodic and Random Deviation (PARD), 1264**
- Peripheral Configuration menu (BIOS Setup), 484-486**
- Peripheral Connect Interface buses. *See PCI buses***
- peripheral diagnostics software, 1368**
- peripherals. *See input devices***
- perpendicular magnetic recording (PMR), 659-661**
- persistence, 899**

- Personal Computer Memory Card International Association, 736
- personal computers, definition of, 25-26
- perspective correction, 953
- PFA (Predictive Failure Analysis), 704
- PFC (power factor correction), 1264-1265
- PGA (pin grid array), 93-95
- PGA-370 sockets, 105-106, 166
- phantom directories, 725
- Phase Alternate Line (PAL), 975
- phase-change material, 1351
- phase-shift keying (PSK), 1131
- Philips
 - CD-ROM design and development, 749
 - sound cards, 1003
- Phillips-head screws, 1400
- Phoenix Technologies
 - BIOS
 - error messages, 506
 - Phoenix Award BIOS, 458
 - POST (power-on self test) error codes, 1371-1375
 - SecureCore, 458-459
 - TrustedCore, 458-459
 - reverse engineering of IBM software, 27-28
- phone line surge protectors, 1287
- phosphor triads, 907
- Photo CDs, 785-786
- photolithography, 88, 91
- photoresist coating (CDs), 750
- physical formatting. *See* low-level formatting
- physical installation. *See* installation; system assembly
- PI (parity inner) bytes, 769
- PICMG (PCI Industrial Computer Manufacturers Group), 269
- Pico-ITX motherboards, 263
- Picture CDs, 786
- piezoelectricity, 1336
- pin grid array (PGA), 93-95
- pinouts
 - ATA (AT Attachment)
 - 40-pin connectors, 593-595
 - 50-pin connectors, 596-597
 - DIMMs (dual inline memory modules)
 - 168-pin DIMMs, 543-544
 - 184-pin DIMMs, 545-546
 - 240-pin DDR2 DIMMs, 547-548
 - 240-pin DDR3 DIMMs, 548-550
 - SPD (serial presence detect), 544
 - EISA (Extended Industry Standard Architecture) buses, 396
 - floppy disk drive connectors, 721
 - HDMI (High Definition Multimedia Interface), 894
 - interrupt assignments, 411-412
 - motherboard connectors, 368-369, 373-374
 - alternative single-row front panel connector pinouts, 372
 - ATAPI-style line-in connectors, 377
- battery connectors, 376
- CD audio connectors, 377
- chassis intrusion connectors, 376
- front panel audio connector pinout, 375
- front panel IEEE 1394 (FireWire/i.LINK) connector pinout, 374
- front panel switch/LED connector pinouts, 370-371
- front panel USB header connector pinout, 373
- infrared data front panel connector pinout, 376
- LED and keylock connectors, 376
- microprocessor fan power connectors, 377
- power LED indications, 371
- speaker connectors, 376
- telephony connectors, 377
- Wake on LAN connectors, 376
- Wake on Ring connectors, 377
- parallel ports, 1054
- power connectors
 - AT/LPX, 1235
 - ATX auxiliary power connectors, 1240
 - ATX/ATX12V 1.x main power connectors, 1238
 - ATX/ATX12V 1.x Mini-Fit Jr., 1239
 - ATX12V 2.x 24-pin, 1243
 - Dell proprietary ATX connectors, 1252, 1261
 - floppy drive power connectors, 1255

- PCI Express x16 Graphics Power connectors, 1258
- peripheral power connectors, 1255
- RIMMs (Rambus inline memory modules), 550-552
- SATA (Serial ATA), 608
- SIMMs (single inline memory modules)
 - presence detect pin configurations, 541-542
 - standard 72-pin pinout, 540-543
- Socket 7, 104
- SVGA (Super VGA) video adapters, 924-925
- USB connectors, 1037
- WTX motherboards, 267
- PIO (Programmed I/O) modes, 602-603**
- PIO Mode setting (Drive Configuration menu), 487**
- pipelines, 138-139**
- pipes (heat), 1353-1355**
- pitch, 1000**
- pits**
 - CDs, 750-752
 - DVDs, 765-766
- pixels (LCD), 886-887**
- pixie dust technology, 658**
- plasma displays, 902-903**
- plastic land grid array (PLGA) packaging, 164**
- plastic leaded chip carrier (PLCC), 291**
- plastic pin grid array (PPGA) package, 166-167**
- plated thin-film recording media, 681-682**
- Platform Compatibility Guide (PCG), 1244-1245**
- platters, 668, 680-681**
- players, CD-i, 779-780**
- PLCC (plastic leaded chip carrier), 291**
- PLGA (plastic land grid array) packaging, 164**
- pliers, needle-nose, 1396**
- Plug & Play O/S setting (Boot Configuration menu), 482**
- Plug and Play. See PnP**
- Plus Development Division (Quantum), 583**
- PM800 chipsets (VIA), 330**
- PM880 chipsets (VIA), 330**
- PMA (power memory area), 754**
- PMOS transistors, 16**
- PMR (perpendicular magnetic recording), 659-661**
- PnP (Plug and Play), 433-434**
 - BIOS, 500-501
 - ACPI (Advanced Configuration and Power Interface), 501-502
 - device IDs, 501
 - initializing, 502-503
 - BIOS component, 434
 - hardware component, 434
 - operating system component, 434-435
- PO (parity outer) bytes, 769**
- point of presence (PoP), 1125**
- point-to-point topology, 1188**
- pointing devices**
 - alternatives to, 1093-1094
 - Ergonomic Mouse, 1095
 - GlidePoint, 1094
 - trackballs, 1094-1095
 - choosing, 1306-1307
 - gaming devices, 1096
- mouse**
 - ball-driven mouse, 1082
 - buttons, 1082
 - cleaning, 1088
 - components, 1082
 - Ergonomic Mouse, 1095
 - history of, 1081-1082
 - hybrid mouse, 1086
 - IntelliMouse Explorer, 1082
 - manufacturers, 1082
 - optical mouse, 1082-1085
 - opto-mechanical mechanism, 1083
 - PS/2 mouse interfaces, 1085-1086
 - scroll wheels, 1090
 - Scrollpoint Pro, 1090
 - serial interfaces, 1085
 - troubleshooting, 1088-1090
 - USB (Universal Serial Bus), 1087-1088
- trackballs, 1081**
- TrackPoint, 1090-1093**
- wireless**
 - Bluetooth, 1099-1100
 - IR (infrared), 1097
 - power management, 1100
 - proprietary radio frequency, 1098
 - troubleshooting, 1100-1101

polarizing filters (LCDs), 886

pollutants, 1427

PoP (point of presence), 1125

ports, 1032

- addresses, 418
 - bus-based device port
 - addresses, 419-421
 - chipset-based device port
 - addresses, 419
 - motherboard-based device port
 - addresses, 419
 - ATX motherboards, 253
 - choosing, 1304-1305
 - COM
 - mouse interrupt
 - conflicts, 1089
 - serial mouse
 - connections, 1085
 - hub ports, 1184-1185
 - IEEE 1394
 - 1394a standard, 1042-1044
 - 1394b standard, 1042-1044
 - advantages of, 1026
 - compared to
 - USB, 1026-1028
 - performance myths and realities, 1028-1031
 - legacy ports, 1304
 - motherboard mouse port (PS/2), 1085-1086
 - parallel ports, 1053
 - configuration, 1056-1057
 - ECP (Enhanced Capabilities Port), 1056
 - EPP (Enhanced Parallel Port), 1056
 - IEEE 1284
 - standard, 1054-1055
 - pinouts, 1054
 - Super I/O chips, 367
 - testing, 1057
- removable-media drives, 712

serial ports, 1046

- configuration, 1051
 - connectors, 1049
 - high-speed serial port cards, 1050
 - locations, 1046-1047
 - multi-I/O cards, 1046
 - shared interrupts, 1052
 - Super I/O chips, 367
 - testing, 1052-1053
 - UART (Universal Asynchronous Receiver/Transmitter) chips, 1050
- switch ports, 1184-1185**
- USB (universal serial bus), 1031-1032
 - adapters, 1041-1042
 - advantages of, 1026
 - cables, 1034
 - compared to
 - IEEE 1394, 1026-1028
 - connectors, 1035-1037
 - drivers, 1038
 - enabling, 1038
 - functions, 1032
 - game ports, 1096
 - hubs, 1032-1033
 - keyboards, 1075-1076
 - NRZI (Non Return to Zero Invert) data encoding, 1032
 - performance myths and realities, 1028-1031
 - self-identifying peripherals, 1038
 - speed, 1035
 - support for, 1037
 - USB 2.0, 1039-1040
 - USB On-The-Go, 1040
 - wireless USB, 1040-1041

positional audio, 1007-1008**positive DC****voltages, 1208-1209****positive-pressure-ventilation design, 1219****POST (power-on self test), 446, 1368**

- audio error codes, 1369
 - AMI BIOS, 1370
 - Award BIOS/Phoenix FirstBIOS, 1371
 - IBM BIOS, 1376
 - Phoenix BIOS, 1373-1375
- checkpoint codes, 1369-1370
- diagnostic services, 1368
- error display, 1369
- fatal errors, 1369
- memory count, 1381
- onscreen messages, 1370
 - Award BIOS/Phoenix FirstBIOS, 1372-1373
 - IBM BIOS, 1377-1379
 - IBM/Lenovo BIOS POST/Diagnostics, 1379-1380
- troubleshooting, 1431-1433

POST INDEX GAP sector data, 673-674**Poulsen, Valdemar, 660****power calibration area (PCA), 754****power connectors. *See also* power supply**

- AT, 1233-1235
- ATX/ATX12V 1.x, 1235
 - 4-pin +12V power connectors, 1245-1246
 - 8-pin +12V power connectors, 1246-1248
 - 6-pin auxiliary power connectors, 1240-1241

- 20-pin main power connectors, 1236-1238
- maximum power-handling capabilities, 1239-1240
- Molex Mini-Fit Jr. power connectors, 1238-1239
- ATX12V 2.x 24-pin, 1241-1243
- backward/forward compatibility, 1248-1250
- color coding, 1232
- Dell proprietary ATX design, 1251-1253
- floppy drives, 720-721, 1255-1256
- front panel motherboard-controlled switches, 1231
- front panel power supply AC switches, 1232
- hard drives, 696
- integral power supply AC switches, 1231
- multiple power connectors, 1236
- PCG (Platform Compatibility Guide), 1244-1245
- PCI Express x16 Graphics Power connectors, 1257-1258
- peripheral power connectors, 1254
- power switch connectors, 1230
 - color coding, 1232
 - front panel motherboard-controlled switches, 1231
 - front panel power supply AC switches, 1232
 - integral power supply AC switches, 1231
- SATA (Serial ATA), 608, 1256-1257
- VRM (voltage regulator module), 1243-1244
- power cycling**, 1268-1271, 1422-1424
- power factor correction (PFC)**, 1264-1265
- Power_Good signal**, 1210-1212
- power LED indications**, 371
- power-line noise**, 1425-1426
- power management**, 1271-1273
 - ACPI (Advanced Configuration and Power Interface), 1273-1275
 - APM (Advanced Power Management), 1272-1273
 - Energy Star systems, 1272
 - monitors, 910-911
 - wireless input devices, 1100
- power memory area (PMA)**, 754
- Power menu (BIOS Setup)**, 495-497
- Power_OK signal**, 1210-1212
- power-on self test**. *See* POST
- power supply**. *See also*
 - power connectors**
 - 12V power sources, 1210
 - 5V power sources, 1210
 - +3.3V power sources, 1208
 - +5V power sources, 1208
 - +12V power sources, 1208
 - backup power
 - standby power supply, 1288
 - UPS (uninterruptible power supply), 1288-1290
- batteries
 - replacing, 1294
 - RTC/NVRAM, 1291-1294
- BIOS Power menu, 495-497
- connecting, 1323
- constant voltage, 1208
- definition of, 37
- efficiency, 1264
- ESD (electrostatic discharge), 569, 1311-1313, 1396-1398
- form factors, 1212
 - AT/Desktop, 1214
 - AT/Tower, 1214-1215
 - ATX/ATX12V, 1217-1220
 - Baby-AT, 1216
 - CFX12V, 1227
 - EPS/EPS12V, 1224-1226
 - industry standards, 1208, 1212-1213
 - LFX12V, 1229
 - LPX, 1217
 - PC/XT, 1214
 - proprietary standards, 1214
 - SFX/SFX12V, 1220-1224
 - table of, 1213-1214
 - TFX12V, 1226-1227
- hold-up time, 1263
- importance of, 1207-1208
- input range, 1263
- line regulation, 1264
- linear design, 1259
- loads, 1259-1260, 1264-1265
- manufacturers, 1284
- MTBF (Mean Time Between Failures), 1263
- negative DC voltages, 1210
- outlet testers, 1404-1405
- output ratings, 1260-1262

- overloading, 1277
- overvoltage protection, 1264
- PARD (Periodic and Random Deviation), 1264
- peak inrush current, 1263
- Pentium II issues, 157
- Pentium 4 issues, 208-209
- PFC (power factor correction), 1264-1265
- positive DC voltages, 1208-1209
- power cycling, 1268-1271
- Power_Good signal, 1210-1212
- power management, 1271
 - ACPI (Advanced Configuration and Power Interface), 1273-1275
 - APM (Advanced Power Management), 1272-1273
 - Energy Star systems, 1272
 - SMM (System Management Mode), 78-79
 - wireless input devices, 1100
- power-protection systems, 1285-1286
 - backup power, 1288
 - line conditioners, 1287-1288
 - phone line surge protectors, 1287
 - surge protectors, 1286-1287
- power-use calculations, 1266-1268
- powering off/on
 - electrical costs, 1269-1270
 - S3 (Suspend To RAM) state, 1270-1271
 - S4 (Hibernate) state, 1271
 - thermal shock, 1268-1269
- preventative maintenance
 - power cycling, 1422-1424
 - power-line noise, 1425-1426
 - static electricity, 1424-1425
- processor operating voltages, 71
 - AMD-K6 processors, 186
 - dual-plane power design, 114-115
 - Pentium II processors, 165-166
 - Pentium processors, 141, 147-148
 - setting, 114-116
 - single-plane power design, 114-115
 - Socket 7 processors, 114-115
 - VID (voltage identification), 154
 - VRT (voltage reduction technology), 114
- protective features, 1262-1263
- repairing, 1282-1283
- replacing, 1283-1284
- ripple, 1264
- safety certifications, 1266
- soft-power feature, 1210
- switching design, 1208, 1259
- test equipment
 - back probing, 1280-1281
 - digital infrared thermometers, 1281
 - DMMs (digital multimeters), 1278-1281
 - variable voltage transformers, 1281-1282
- transient response, 1263
- troubleshooting, 1276-1277, 1433
 - diagnostic procedures, 1277
 - inadequate cooling, 1277-1278
 - overloaded power supply, 1277
 - universal power supplies, 1262
 - VID (voltage identification) pins, 154
 - video monitor energy-saving features emission, 911-912
 - power management, 910-911
 - VRT (voltage reduction technology), 114
 - VRM (voltage regulator module), 1243-1244
 - voltage measurements, 1280-1281
- powerline networking, 1196**
- PowerQuest PartitionMagic, 870-871**
- Poynton, Charles, 916**
- PPGA (plastic pin grid array) package, 166-167**
- PPI (Programmable Peripheral Interface), 1069**
- PR scale. *See* P-Ratings**
- PrairieTek 2.5-inch drives, 667**
- pre-grooves (CD-R), 816**
- PRE-INDEX GAP sector data, 673-674**
- preboot environment (BIOS), 474-476**
- Predictive Failure Analysis (PFA), 704**
- prefixes (decimal/binary multiples), 723, 616-618**

- presence detect pin configurations (SIMMs), 541-542**
- preventative maintenance**
 - active versus
 - passive, 1409-1411
 - cleaning
 - boards, 1417-1418
 - brushes, 1416
 - chemical-freeze sprays, 1416
 - cleaning supply companies, 1417
 - compressed air, 1415
 - connectors, 1418
 - contact cleaners/lubricants, 1415
 - contacts, 1418
 - disassembly, 1417
 - disassembly and cleaning tools, 1413-1414
 - erasers, 1416
 - keyboards, 1419
 - mouse devices, 1419
 - silicone lubricants, 1417
 - standard chemical cleaners, 1414-1415
 - swabs, 1416
 - vacuum cleaners, 1416
 - dust, 1427
 - hard drives
 - file defragmentation, 1419-1420
 - Maintenance Wizard, 1420
 - virus checking, 1421
 - heating and cooling, 1421-1422
 - operating environment, 1421
 - pollutants, 1427
 - power cycling, 1422-1424
 - power-line noise, 1425-1426
 - RFI (radio-frequency interference), 1426-1427
 - static electricity, 1424-1425
 - system backups, 1411-1413
 - System Restore, 1410
 - tool/supply vendors, 1426
- PRI (primary rate interface), 1122**
- Primary IDE Master setting (Drive Configuration menu), 487**
- Primary IDE Slave setting (Drive Configuration menu), 487**
- primary rate interface (PRI), 1122**
- Primary Video Adapter setting (Video Configuration menu), 491**
- primitives, 953**
- printable surface media (CD-R), 819**
- PRML (Partial-Response, Maximum-Likelihood), 654**
- probes (logic), 1403**
- processor ducts, 1360-1366**
 - effects of, 1362
 - installing, 1363-1366
 - placement, 1361
- Processor Stepping setting (BIOS Maintenance menu), 478**
- Processor Zone Response setting (Fan Control Configuration menu), 493**
- processors, 39-40. *See also specific processors (for example, Athlon processors, Pentium processors)***
 - boxed processors, 250
 - bugs, 119
 - choosing, 1299-1301
 - codenames, 120-123
 - definition of, 37
 - dual-core processors, 42
 - dynamic execution, 83-84
 - history of, 17-20, 40-43
 - installation, 1315, 1317
 - manufacturing
 - .09 micron manufacturing, 91
 - .13 micron manufacturing, 91
 - bonding, 92
 - Celeron processors, 168
 - coppermine, 90
 - dies, 88
 - doping, 88
 - metallization layers, 90
 - overclocking protection, 93
 - photolithography, 88, 91
 - processor remarking, 92-93
 - silicon, 88
 - silicon on insulator (SOI), 90
 - steppers, 88
 - test process, 92
 - wafers, 88, 91
 - yields, 92
- math coprocessors, 117-119
- modes, 50
 - IA-32 mode, 51-52
 - IA-32 virtual real mode, 52-53
 - IA-32e 64-bit extension mode, 53-55
 - protected mode, 578
 - real mode, 51, 532
 - SMM (System Management Mode), 78-79
- overclocking, 69-71

- packaging
 - BBUL (bumpless build-up layer), 95
 - FC-PGA (flip-chip pin grid array), 94
 - PGA (pin grid array), 93-95
 - PLGA (plastic land grid array), 164
 - SEC (single edge contact), 95
 - SECC2 (single edge contact cartridge 2), 96-97
 - SEP (single edge processor), 95
 - SPGA (staggered pin grid array), 94
 - TCP (tape carrier packaging), 141
- processor complex, 271
- processor ducts, 1360-1366
 - effects of, 1362
 - installing, 1363-1366
 - placement, 1361
- reprogrammable microcode, 120
- superscalar execution, 80
- testing, 119
- troubleshooting, 231-233, 1437-1438
- upgrading, 230-231
- Professional 3DNow! technology**, 82-83
- program area (CDs)**, 754
- Programmable Peripheral Interface (PPI)**, 1069
- programmable ROM**. *See* PROM
- Programmed I/O (PIO) modes**, 602-603
- Programmer's Guide to the AMIBIOS*, 458
- projectors**
 - DLP projectors, 920-922
 - LCD (liquid crystal display) projectors, 919-922
- PROM (programmable ROM), 450-451**
 - burning, 450
 - cost, 450
 - custom programming, 451
 - EPROM (erasable programmable ROM), 452-453
 - EEPROM (electronically erasable programmable ROM), 453-454
 - emergency recovery, 467-470
 - upgrading, 464-467, 470-471
 - write protection, 464
 - gang programmers, 451
 - OTP (one-time programmable) chips, 450
 - part numbers, 450
- proprietary-design motherboards**, 268-271
- proprietary modem standards**, 1134
- proprietary power supply designs**, 1283
- proprietary radio frequency input devices**, 1098
- ProSavage KM133 chipsets**, 338
- ProSavage KM266 chipsets**, 339
- ProSavage P4M266 chipsets**, 329
- ProtectDisc**, 802
- protected mode**, 578
- protective CD coating**, 751
- protocols, 1191-1192**
 - definition of, 1130
 - DHCP (Dynamic Host Configuration Protocol), 1190
 - Ethernet
 - cables, 1170
 - definition of, 1158
 - Fast Ethernet, 1157-1159
 - Gigabit Ethernet, 1157-1159
 - hubs, 1182-1185, 1199
 - network adapter connectors, 1169-1170
 - switches, 1182-1185, 1199
 - wireless Ethernet. *See* wireless networks
 - full-duplex protocols, 1132
 - half-duplex protocols, 1132
 - importance of, 1156
 - IP (Internet Protocol), 1192
 - IPX (Internetwork Packet Exchange), 1193
 - MNP (Microm Network Protocol), 1130, 1134
 - NetBEUI, 1193-1194
 - RRIP (Rock Ridge Interchange Protocol), 795
 - TCP/IP
 - broadband settings, 1125
 - dial-up networking, 1192-1193
 - troubleshooting, 1206
 - Token-Ring, 1157-1158
- proxy servers**, 1143-1144
- PS/2 power supply**, 1217
- PS/2 Y adapter**, 1398
- PS_ON signal**, 1210, 1231
- PSB (processor side bus)**. *See* buses

pseudo-open drain, 937
 PSK (phase-shift keying), 1131
 PT800 chipsets (VIA), 330
 PT880 chipsets (VIA), 330
 PT894 chipsets (VIA), 330
 PT894 Pro chipsets (VIA), 330
 PTP (parallel track path), 773
 pulsers, 1404
 punch-card systems, 13
 pure mechanical
 keyswitches, 1063
 Purple Book standard (video
 CDs), 788
 PWR_OK signal, 1210-1212
 PXE Boot to LAN setting (Boot
 menu), 498

Q

QAM (quadrature amplitude
 modulation), 1132
 QuantiSpeed (Athlon XP), 194
 Quantum hardcards, 583
 quartz crystals, 1336-1338
 Quick Power-On Self Test
 feature (BIOS), 500
 QuickConnect standard, 1137
 QuickStop response
 (TrackPoint), 1093
 QuickTime Pro, 978
 quiet boots, 461
 QWERTY keyboard
 layout, 1076

R

/r switch (XCOPY32
 command), 874
 R658/R659 chipsets (SiS), 321
 RAB (Raid Advisory
 Board), 634
 Radeon chipsets, 350, 352
 radio frequency. *See* RF
 RAID (redundant array of
 independent disks), 445,
 634-636, 744
 Raid Advisory Board
 (RAB), 634
 rails (voltage), 1208-1209
 RAM (random access memory),
 509. *See also* ROM BIOS
 8088/8086 processors, 124
 ATX motherboards, 250
 banks, 538, 555-557
 BEDO RAM (burst extended
 data out RAM), 522
 buffer underruns, 825-826
 buying tips, 567-568
 cache, 1303-1304
 access times, 514
 asynchronous design, 516
 bus snooping, 77
 cache controllers, 77
 CD/DVD drives, 808
 controllers, 516
 definition of, 71, 515
 direct-mapped cache, 76
 evolutionary changes, 517
 four-way set associative
 cache, 76, 151
 fully associative mapped
 cache, 76
 hard disk drive cache
 programs, 702-703
 hit ratio, 515
 internal, 140
 Level 1 cache, 72-74, 81,
 151, 160, 184, 515
 Level 2 cache, 74, 153,
 160, 176, 183, 516
 Level 3 cache, 74-75, 516
 maximum cache, 517
 nonblocking cache, 77
 Pentium II processors, 160
 Pentium Pro
 processors, 151
 performance and
 design, 75-76
 set associative cache, 76
 speed, 77-78
 TLB (translation lookaside
 buffer), 77
 two-way set
 associative, 151
 write-back cache, 574
 write-through cache, 77
 CMOS RAM setup
 accessing, 476
 additional setup
 features, 499-500
 addresses, 471-473
 Advanced menu, 480
 backing up, 463
 Boot Configuration
 menu, 482
 Boot menu, 497-499
 Chipset Configuration
 menu, 482-484
 compared to BIOS, 445-446
 diagnostic status
 codes, 472-473
 Drive Configuration
 menu, 486-489

- Event Logging
 - menu, 489-490
- Exit menu, 499
- Fan Control Configuration
 - menu, 493
- Floppy Configuration
 - menu, 489
- Hardware Monitoring
 - Display, 493-494
 - main menu, 478-480
- Maintenance
 - menu, 477-478
- Memory Configuration
 - menu, 481-482
- motherboard CMOS RAM
 - addresses, 368
- PCI Configuration
 - menu, 480
- PCI Express Configuration
 - menu, 481
- Peripheral Configuration
 - menu, 484-486
- Power menu, 495-497
 - saving, 463
- Security menu, 494-495
- summary of menus, 477
- USB Configuration menu, 491-492
- Video Configuration
 - menu, 490-491
- compared to ROM (read-only memory), 512
- compared to storage, 510
- cost, 511
- definition of, 37, 509
- DIMMs (dual inline memory modules), 533, 1303
 - 168-pin DIMM
 - pinouts, 543-544
 - 184-pin DIMM
 - pinouts, 545-546
 - 240-pin DDR2 DIMM
 - pinouts, 547-548
 - 240-pin DDR3 DIMM
 - pinouts, 548-550
 - buffered, 544
 - buying tips, 568
 - capacities, 537-538
 - illustration, 535
 - installation, 1317
 - memory banks, 555-557
 - SPD (serial presence detect), 544
 - unbuffered, 544
 - width, 140
- DIP (dual inline package) chips, 533
- DMA (direct memory access)
 - 8-bit ISA, 417
 - 16-bit ISA, 417-418
 - busmaster DMA, 604
 - CD/DVD drives, 809-810
 - multiword, 604
 - singleword, 603-604
 - UDMA (Ultra-DMA), 604
- DRAM (dynamic RAM)
 - compared to
 - SRAM, 514-515
 - development of, 17
 - DDR SDRAM (double data rate SDRAM), 525-526, 1303
 - DDR2 SDRAM, 526
 - DDR3 SDRAM, 528-529
 - FPO DRAM (Fast Page Mode DRAM), 520-521
 - RDRAM (Rambus DRAM), 529-532
 - refresh rates, 512
 - SDRAM (synchronous DRAM), 522-524
 - soft errors, 513
 - transistor/capacitor pairs, 513
- dual-channel memory, 557
- EDO RAM (extended data out RAM), 521-522
- flash memory, 711, 733-734
 - capacities, 738
 - CompactFlash, 734
 - comparison of, 737-739
 - MMC (MultiMediaCard), 735
 - PC Card, 736
 - physical size, 734
 - reading, 739-741
 - SD (SecureDigital), 735
 - SmartMedia, 735
 - Sony Memory Stick, 735
 - Sony Memory Stick Pro, 736
 - USB flash drives, 736-737
 - xD-Picture Card, 736
- hard fails, 557
- HMA (high memory area), 53
- identifying module type size, and speed, 553-555
- installation, 569-571
 - ESD (electrostatic discharge), 569
 - SIMMs, 571-572
- intelligent memory management, 278
- logical memory layout, 510, 578-580
- maximum installable memory, 532
- memory buses, 389
- memory testers, 1406
- MMU (memory management unit), 127
- narrow-channel systems, 530

- parity checking
 - disabling, 563
 - NMIs (nonmaskable interrupts), 562
 - odd parity, 561
 - parity bits, 560
 - parity-check messages, 561-564
- POST (power-on self test)
 - memory count, 1381
- registered modules, 539-540
- RIMMs (Rambus inline memory modules), 530, 534
 - buying tips, 568
 - capacities, 538
 - installation, 552
 - pinouts, 550-552
- RTC/NVRAM (real-time clock/nonvolatile memory), 445
 - modern CMOS batteries, 1291-1293
 - obsolete/unique CMOS batteries, 1293
 - troubleshooting, 1293-1294
- SIMMs (single inline memory modules), 533
 - buying tips, 567-568
 - capacities, 537
 - illustration, 534
 - installation, 571-572, 1317
 - memory banks, 555-557
 - pinouts, 540-543
 - presence detect pin configurations, 541-542
 - width, 140
- soft errors
 - alpha particles, 558
 - cosmic rays, 558-559
- ECC (error-correcting code), 564-565
- fault tolerance, 559-560
- heat buildup, 559
- incorrect memory types, 559
- line noise, 559
- parity checking, 560-561
- power glitches, 559
- radio frequency interference, 559
- static discharge, 559
- timing glitches, 559
- speed
 - clock speeds, 518-519
 - cycle times, 518-519
 - GHz (gigahertz), 517
 - interleaving, 521
 - MHz (megahertz), 517-519
 - module speeds, 557
 - nanoseconds, 517
 - processor bus speeds, 520
- SRAM (static RAM), 514-515
- System Management Memory, 133
- troubleshooting, 1440-1442
 - diagnostics utilities, 572
 - divide errors, 573
 - fatal exception errors, 573
 - general faults, 573
 - global protection faults, 573
 - memory defect isolation, 576-578
 - module testers, 573
 - parity errors, 573
 - step-by-step procedures, 575-576
 - write-back cache, 574
- Ultra-DMA, 809
- UMA (upper memory area), 854-855
- unbuffered modules, 539
- upgrading
 - higher-capacity modules, 569
 - upgrade options and strategies, 565-566
- video RAM, 936
 - DDR SDRAM (Double Data Rate SDRAM), 937
 - DDR2 SDRAM, 937
 - dynamic video memory, 278
 - GDDR3 SDRAM, 937
 - GDDR4 SDRAM, 937
 - minimum requirements, 938-941
 - RAM calculations, 938
 - SDRAM (Synchronous DRAM), 937
 - SGRAM (Synchronous Graphics RAM), 937
 - speed, 938
 - video bus width, 941
- volatile storage, 510
- wide-channel systems, 529
- RAMAC (Random Access Method of Accounting and Control) drives, 638**
- Rambus DRAM (RDRAM), 529-532**
- Rambus inline memory modules. See RIMMs**
- RAMDAC (digital-to-analog converter), 941**
- random access memory. See RAM**
- Random Number Generator (RNG), 293**

- rapid pixel and texel rendering engine, 278
- raster, 899
- rasterization, 953
- Ratio Actual Value setting (BIOS Maintenance menu), 478
- Raytech, 1281, 1408
- RD580 chipsets (ATI), 355-357
- RDRAM (Rambus DRAM), 529-532
- reactive power, 1265
- Read Multiple command (ATA), 613
- read-only memory. *See* ROM BIOS
- read process
 - CDs
 - error handling, 758-759
 - hub clamping area, 754
 - interleaves, 758
 - lead-in, 754
 - lead-out, 754
 - mechanical drive operation, 752-753
 - PCA (power calibration area), 754
 - PMA (power memory area), 754
 - program area, 754
 - sampling rates, 756-757
 - sectors, 756
 - subcode bytes, 757-758
 - tracks, 753-754
 - DVDs, 765
 - flash memory
 - card readers, 739
 - Type II PC Card adapters, 741
 - magnetic storage, 641-642
 - magneto-optical drives, 732-733
- read/write heads, 640-642, 683-684
 - ferrite, 643
 - floppy drives, 716-717, 724
 - GMR (giant magneto-resistive), 646-647
 - MIG (Metal-In-Gap), 643
 - MR (magneto-resistive), 644-645
 - PMR (perpendicular magnetic recording), 659-661
 - TF (thin film), 644
- real mode, 1389-1390
- real-time clock batteries. *See* RTC/NVRAM batteries
- rear-out sound card connectors, 992
- recordable DVD drives
 - DVD+R, 837
 - DVD-R, 834-835
 - DVD+R DL, 839
 - DVD-R DL, 835-836
 - DVD-RAM, 832-834
 - DVD+RW, 836-839
 - DVD-RW, 836
 - media compatibility, 832
 - multiformat rewritable drives, 839
 - summary of standards, 831
- recording
 - CDs, 817, 824-826
 - buffer underruns, 825-826
 - multisession recording, 783-785
 - recording software, 826-827
 - floppy disks, 716
- recording media
 - AFC (antiferromagnetically coupled), 682-683
 - oxide, 681
 - thin-film, 681-682
 - sound sampling, 1001-1002
 - standard recording, 676
 - ZBR (zoned-bit recording), 675-678
- Recording Review, 999
- recovery
 - flash BIOS, 467-470
 - System Restore, 1410
- Red Book format, 779
- redrawing CRT (cathode ray tube) monitors, 899-900
- Reduced Instruction Set Computer (RISC) chips, 80, 138, 1059
- redundant array of independent disks (RAID), 445, 634-636, 744
- refresh rates
 - CRT (cathode ray tube) monitors, 899-900
 - DRAM (dynamic RAM), 512
 - monitors, 913-915
- refrigeration, 1358
- region-free DVD players, 799
- regional playback control (RPC), 799-800
- registered memory modules, 539-540
- regulators (voltage), 1209
- reinstallation of components, 1429
- reliability
 - ATA (AT Attachment), 583
 - hard drives
 - MTBF (mean time between failures), 703-704

- PFA (Predictive Failure Analysis), 704
- S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology), 704-706
- remarking processors, 92-93**
- remote power connectors. See power connectors**
- removable-media drives**
 - advantages, 707-709
 - choosing, 741-742, 1306
 - connecting, 712
 - flash memory media, 711
 - floppy. *See* floppy drives
 - installation, 712
 - interfaces, 711-712
 - Iomega REV drives, 732
 - magnetic disk media, 710
 - magnetic tape media, 710
 - magneto-optical drives, 732-733
 - tape drives, 710, 744-746
 - Zip drives, 731-732
- rendering images, 953, 956**
- repair. See troubleshooting**
- Repeat Delay parameter (Windows keyboards), 1070**
- Repeat Rate parameter (Windows keyboards), 1070**
- repeaters, wireless, 1187**
- replacing components**
 - batteries, 1294
 - BIOS chips, 473
 - bootstrap
 - approach, 1430-1431
 - compared to reinstalling components, 1429
 - hard drives. *See* drive migration
 - industry-standard replaceable components, 1428-1429
 - keyboards, 1080-1081
 - known-good spare technique, 1429-1430
 - power supply, 1283-1284
 - video adapters, 972, 1329
 - TV tuners, 972-973
 - video capture, 972-973
 - warranty and support, 974
- Report No FDD for feature (BIOS), 500**
- reprogrammable microcode, 120**
- rescue CDs, creating, 842**
- Reset Intel AMT to default factory settings (BIOS Maintenance menu), 478**
- resistive power, 1264**
- resolution, 888, 904-907, 914**
- resolving resource conflicts**
 - Device Manager, 429
 - manually, 424
 - multiple-COM-port adapters, 432
 - NICs (network interface cards), 432
 - PnP (Plug and Play), 433-435
 - SCSI adapter boards, 431
 - sound cards, 429-431
 - system-configuration templates, 424-428
 - USB (Universal Serial Bus), 432-433
 - video software, 433
- resource sharing, 1203**
- resources. See system resources**
- restore points, 1410**
- Resuming from disk, Press TAB to show POST screen (error message), 1373**
- REV drives, 732**
- reverse-engineering software, 27-28**
- RF (radio frequency)**
 - input devices, 1098
 - interference, 559, 1426-1427
- RG-58 cable (Thinnet), 1170**
- RIMMs (Rambus inline memory modules), 530, 534**
 - buying tips, 568
 - capacities, 538
 - installation, 552
 - pinouts, 550-552
- ring topology, 1180-1181**
- ripping CDs, 827-829**
- ripple (power supply), 1264**
- RISC (Reduced Instruction Set Computer) chips, 80, 138, 1059**
- Rise processors, 46**
- riser cards**
 - ATX motherboards, 255-257
 - LPX motherboards, 242
- RJ-45 connectors, 1169**
- RLL (Run Length Limited), 641, 651-652**
- RNG (Random Number Generator), 293**
- Roberts, Ed, 21**
- Rock Ridge Interchange Protocol (RRIP), 795**
- ROM BIOS (read-only memory basic input/output system), 441-444, 512. See also POST (power-on self test)**
 - adapter cards, 445
 - AMD-K6 processors, 186
 - backing up, 462-463
 - The BIOS Companion*, 459
 - boot ROM, 445

- bootstrap loader, 447
- capacity limitations, 697-698
- choosing, 1303
- CMOS RAM setup
 - accessing, 476
 - additional setup
 - features, 499-500
 - addresses, 471-473
 - Advanced menu, 480
 - backing up, 463
 - Boot Configuration menu, 482
 - Boot menu, 497, 499
 - Chipset Configuration menu, 482-484
 - diagnostic status codes, 472-473
 - Drive Configuration menu, 486-489
 - Event Logging menu, 489-490
 - Exit menu, 499
 - Fan Control Configuration menu, 493
 - Floppy Configuration menu, 489
 - Hardware Monitoring Display, 493-494
 - main menu, 478-480
 - Maintenance menu, 477-478
 - Memory Configuration menu, 481-482
 - PCI Configuration menu, 480
 - PCI Express Configuration menu, 481
 - Peripheral Configuration menu, 484-486
 - Power menu, 495-497
 - saving, 463
 - Security menu, 494-495
 - summary of menus, 477
 - USB Configuration menu, 491-492
 - Video Configuration menu, 490-491
- compared to RAM (random access memory), 445-446, 512
- dates, 461-462
- definition of, 27, 441
- drive capacity limitations, 619
- drivers, 447
- EEPROM (electronically erasable programmable ROM), 453-454
 - emergency recovery, 467-470
 - upgrading, 464-467, 470-471
- EPROM (erasable programmable ROM), 452-453
- error messages, 503-504
 - AMI BIOS messages, 505-506
 - Award BIOS messages, 506
 - Compaq BIOS messages, 506
 - geometry translation problems, 508
 - IBM BIOS messages, 504-505
 - MBR boot error messages, 506-508
 - Phoenix BIOS messages, 506
- firmware, 442
- flash ROM, 453-454
 - emergency recovery, 467-470
 - upgrading, 464-467, 470-471
 - write protection, 464
- ID strings
 - AMI Hi-Flex BIOS, 456-457
 - AMI Hi-Flex BIOS String 2, 457
 - AMI Hi-Flex BIOS String 3, 457-458
 - older AMI BIOS versions, 456
 - viewing, 455
- IPL (initial program load) ROM, 445
- manufacturers, 454-455
 - AMI (American Megatrends, Inc.), 455-458
 - MR (Microid Research), 459
 - OEMs (original equipment manufacturers), 455
 - Phoenix, 458-459
- Mask ROMs, 450
- motherboard BIOS, 444-447
- non-PC ROM upgrades, 454
- paragraphs, 448
- PnP (Plug and Play), 434, 500-503
- preboot environment, 474-476
- PROM (programmable ROM), 450-451
- replacing, 473
- ROM chip part numbers, 449
- ROM hardware, 447-449
- ROM shadowing, 449

- RTC/NVRAM (real-time clock/nonvolatile memory) chips, 445
 - SATA (Serial ATA) setup, 608-610
 - Setup program, 446
 - accessing, 476
 - additional setup features, 499-500
 - Advanced Drive Configuration menu, 487
 - Advanced menu, 480
 - Boot Configuration menu, 482
 - Boot menu, 497-499
 - Chipset Configuration menu, 482-484
 - Drive Configuration menu, 486-489
 - Event Logging menu, 489-490
 - Exit menu, 499
 - Fan Control Configuration menu, 493
 - Floppy Configuration menu, 489
 - Hardware Monitoring display, 493-494
 - main menu, 478-480
 - Maintenance menu, 477-478
 - Memory Configuration menu, 481-482
 - PCI Configuration menu, 480
 - PCI Express Configuration menu, 481
 - Peripheral Configuration menu, 484-486
 - Power menu, 495-497
 - running, 1331
 - Security menu, 494-495
 - summary of menus, 477
 - USB Configuration menu, 491-492
 - Video Configuration menu, 490-491
 - updates, obtaining, 460
 - upgrading
 - advantages of, 459-460
 - chip replacements, 473
 - CMOS RAM addresses, 471-473
 - CMOS RAM backups, 463
 - CMOS RAM diagnostic status codes, 472-473
 - flash ROM upgrades, 464-467, 470-471
 - IML (Initial Microcode Load), 470-471
 - keyboard-controller chips, 464
 - obtaining updates, 460
 - prerequisites, 461
 - version information, 461
 - Y2K issues, 474
 - version, determining, 461
 - video BIOS, 933-934
 - root hubs, 1032**
 - rotary voice-coil actuators, 687**
 - routers, 1143-1144**
 - Internet sharing, 1144-1145
 - wireless routers, 1188
 - RPC (regional playback control), 799-800**
 - RRIP (Rock Ridge Interchange Protocol), 795**
 - RS-422 serial interface, 1050**
 - RS480 chipsets (ATI), 355-357**
 - RTC/NVRAM (real-time clock/nonvolatile memory) batteries, 445**
 - modern CMOS batteries, 1291-1293
 - obsolete/unique CMOS batteries, 1293
 - troubleshooting, 1293-1294
 - rubber dome keyswitches, 1065**
 - Run Length Limited (RLL), 641, 651-652**
 - ruthenium, 658**
 - Rutledge, Joseph, 1091**
 - RX480 chipsets (ATI), 355-357**
-
- S**
- S-100 bus, 21**
 - S-video connectors, 978**
 - S3 (Suspend To RAM) state, 1270-1271**
 - S4 (Hibernate) state, 1271**
 - SA-CD (Super Audio CD), 789**
 - SafeAudio, 830**
 - SafeDisc, 830**
 - safety. See security**
 - SAL (Soft Adjacent Layer) structure, 645**
 - sampling, 756-757, 1001-1002**
 - SanDisk Corporation CompactFlash, 734**
 - Sandra software, 555**
 - SASI (Shugart Associates System Interface), 667, 713**
 - SATA (Serial ATA), 582**
 - 8B/10B encoding, 606
 - AHCI (Advanced Host Controller Interface), 610-611

- backward compatibility, 605
- BIOS setup, 608-610
- CD/DVD drive interfaces, 810
- data connector pinouts, 608
- differential NRZ (Non Return to Zero), 606
- drive installation, 859-860
- host adapters, 607
- optical drive
 - installation, 881-882
- power connector pinouts, 608
- power connectors, 1256-1257
- SATA-8 standard (ATA-8), 593
- second-generation SATA, 610
- Serial ATA International Organization, 586, 605
- signal and power connectors, 607
- standards, 606
- transfer modes, 606, 611-612
- satellite speakers, 1020**
- satellite-based Internet access**
 - HughesNet, 1118-1119
 - performance, 1120
 - StarBand, 1119-1120
- SBCs (single-board computers), 269**
- SC242 slots, 112**
- SC330 slots, 112-113**
- scalable link interface (SLI), 1257-1259**
- scan codes (keyboards), 1071-1072**
- scan conversion, 953**
- scan-line interfacing (SLI), 959**
- Scan User Flash Area setting (Boot menu), 498**
- scanning frequency (CRT), 899**
- Scarlet Book standard (SA-CD), 789**
- SCAT (Single Chip AT) chipsets, 274**
- scratchy sound, troubleshooting, 1017-1018**
- screens. *See* monitors**
- screwdrivers, 1394-1396, 1407**
- screws**
 - Phillips-head screws, 1400
 - slotted-head screws, 1400
 - thumb screws, 1400
 - Torx screws, 1399-1400, 1407
- scroll wheels (mouse), 1090**
- SCSI (Small Computer Systems Interface)**
 - adapter boards, 431
 - adapters, 445
 - optical drive
 - installation, 878-879
 - jumper settings, 879-880
 - PATA (parallel ATA) optical drives, 880-881
 - SATA (serial ATA) optical drives, 881-882
- SD (SecureDigital), 735**
- SD (Super Density) disks, 764**
- SDRAM (synchronous DRAM), 481-482, 522-524, 937, 1303**
- SDSL (Symmetrical DSL), 1113**
- sealing CD/DVD drives, 814**
- SEC (single edge contact) packaging, 95, 154, 164, 156, 182**
- SEC-DED (single-bit error-correction double-bit error detection), 564**
- SECAM (Sequential Couleur Avec Memoire), 975**
- SECC2 (single edge contact cartridge 2) packaging, 96-97, 176**
- Second SATA Master setting (Drive Configuration menu), 488**
- second-generation processors, 125-126**
- secondary cache. *See* Level 2 cache**
- Secondary IDE Master setting (Drive Configuration menu), 488**
- Secondary IDE Slave setting (Drive Configuration menu), 488**
- Secondary master hard disk fail (error message), 1373**
- Secondary SATA Controller setting (Peripheral Configuration menu), 485**
- Secondary slave hard disk fail (error message), 1373**
- Secondary Video Adapter setting (Video Configuration menu), 491**
- SECTOR NUMBER sector data, 673**
- sectors, 668, 672. *See also* tracks**
 - CD XA drives, 780-782
 - CDs, 756
 - CHS (cylinder head sector)
 - 2.1GB barrier, 626
 - 4.2GB barrier, 626-627
 - 8.4GB barrier, 630-631
 - 137GB barrier, 631-633
 - 528MB barrier, 621-623
 - ATA CHS parameter limits, 623
 - BIOS CHS parameter limits, 622
 - BIOS commands, 621

- capacity limitations
 - for sector addressing methods, 617
 - CHS bit-shift translation, 624-626
 - combined parameter limits, 623
 - compared to LBA (logical block address), 619-620
 - converting to LBA (logical block address), 620-621
 - LBA-assist translation, 627-630
 - data bytes, 672
 - definition of, 723
 - DVDs, 769-770
 - fields, 673-674
 - gaps in, 672
 - headers/trailers, 672
 - LBA (logical block address)
 - BIOS commands, 621
 - capacity limitations
 - for sector addressing methods, 617
 - compared to CHS (cylinder head sector), 619-620
 - converting to CHS (cylinder head sector), 620-621
 - LBA-assist translation, 627-630
 - No-ID sector formatting, 672
 - numbering, 672
 - prefixes for decimal/binary multiples, 616-618
 - translation, 701
 - typical track/sector format, 673-674
 - usable space, 672-673
- SecureCore BIOS, 458-459**
- SecureDigital (SD), 735**
- security**
- ATA
 - HPAs (host protected areas), 614-615
 - Security Mode, 613-614
 - BIOS, 494-495
 - broadband modems, 1127
 - CATV networks, 1110
 - CD copy protection, 759, 829-830
 - DRM (digital rights management), 830-831
 - DSL (digital subscriber line), 1115-1116
 - DVD copy protection
 - APS (analog protection system), 801
 - CSS (content scramble system), 800-801
 - ProtectDisc, 802
 - RPC (regional playback control), 799-800
 - extranets, 1153
 - floppy disk write protection, 726
 - Intel RNG (Random Number Generator), 293
 - intranets, 1153
 - networks, 1203
 - passwords, 494
 - power-protection systems, 1285-1286
 - backup power, 1288
 - line conditioners, 1287-1288
 - phone line surge protectors, 1287
 - surge protectors, 1286-1287
 - war driving, 1188
 - Wi-Fi (Wireless Fidelity), 1188-1190
- Security menu (BIOS Setup), 494-495**
- Security Option setting (Security menu), 494**
- seek times, 665, 701
- self-cleaning lenses (CD/DVD drives), 814
- self-identifying peripherals, 1038
- Self-Monitoring, Analysis, and Reporting Technology (S.M.A.R.T.), 589, 704-706**
- self-powered hubs (USB), 1032
- Selker, Ted, 1091
- semiproproprietary LPX motherboards, 242
- Sempron processors (AMD), 197-198, 217-218**
- SEP (single edge processor) package, 166**
- Sequential Couleur Avec Memoire (SECAM), 975**
- Serial ATA International Organization, 586, 605**
- Serial ATA. *See* SATA**
- serial-bus architectures, 1025**
- advantages of, 1026
 - IEEE 1394
 - 1394a standard, 1042-1044
 - 1394b standard, 1042-1044
 - compared to
 - USB, 1026-1028
 - performance myths and realities, 1028-1031
 - USB (universal serial bus). *See* USB
- serial mouse, 1085**
- serial numbers (Intel processors), 176**
- Serial Port setting (Peripheral Configuration menu), 485**

- serial ports, 1046**
 - configuration, 1051
 - connectors, 1049
 - high-speed serial port cards, 1050
 - locations, 1046-1047
 - multi-I/O cards, 1046
 - shared interrupts, 1052
 - Super I/O chips, 367
 - testing, 1052-1053
 - UART (Universal Asynchronous Receiver/Transmitter) chips, 1050
- serial presence detect (SPD), 544**
- Series A connectors (USB), 1035**
- Series B connectors (USB), 1035**
- SERs (soft error rates), 558**
- servers, 1143-1144, 1154**
- servo mechanisms, 688-691**
 - dedicated servo, 690-691
 - disk sweep, 689
 - embedded servo, 690
 - gray code, 688
 - servo-controlled systems, 686
 - servowriters, 688
 - thermal recalibration, 689
 - wedge servo, 689
- set associative cache, 76**
- SET MAX ADDRESS command (ATA), 615**
- Set Supervisor Password setting (Security menu), 495**
- Set User Password setting (Security menu), 495**
- setup passwords, 494**
- Setup program (BIOS), 446**
 - accessing, 476
 - additional setup features, 499-500
 - Advanced menu, 480
 - Boot Configuration menu, 482
 - Boot menu, 497-499
 - Chipset Configuration menu, 482-484
 - Drive Configuration menu, 486-489
 - Event Logging menu, 489-490
 - Exit menu, 499
 - Fan Control Configuration menu, 493
 - Floppy Configuration menu, 489
 - Hardware Monitoring Display, 493-494
 - main menu, 478-480
 - Maintenance menu, 477-478
 - Memory Configuration menu, 481-482
 - PCI Configuration menu, 480
 - PCI Express Configuration menu, 481
 - Peripheral Configuration menu, 484-486
 - Power menu, 495-497
 - running, 1331
 - Security menu, 494-495
 - summary of menus, 477
 - USB Configuration menu, 491-492
 - Video Configuration menu, 490-491
- seventh-generation processors. *See* Pentium 4**
- SFX power supply, 1220-1224**
- SFX12V power supply, 1220-1224**
- SGI OpenGL, 958**
- SGRAM (Synchronous Graphics RAM), 937**
- shading, 951-955**
- shadow masks (CRT), 898, 907**
- shadowing ROM (read-only memory), 449**
- sharing. *See also* networking**
 - intelligent sharing, 1151
 - Internet connections
 - gateways, 1143-1144
 - proxy servers, 1143-1144
 - routers, 1143-1145
 - troubleshooting, 1145-1146
 - interrupts, 410
- shielded twisted pair (STP) cables, 1171-1172**
- Shields Up service, 1127**
- Shockley, William, 15**
- Shugart Associates System Interface (SASI), 667, 713**
- Shugart, Alan, 638, 667, 713**
- shutdown process, troubleshooting, 1434**
- signals**
 - ATA (AT Attachment), 599-600
 - boosters, 1188
 - connectors, 720-721
 - Disk Change, 725-726
 - jitter, 1026
 - keyboard connector signals, 1074
 - lights (broadband devices), 1146
 - Power_Good, 1210-1212
 - PS_ON, 1210, 1231
 - skew, 1026
 - SNR (signal-to-noise ratio), 1000
- Silent Boot setting (Boot menu), 498**

- silicon, 88
 - lubricants, 1417
 - SOI (silicon on insulator), 90
- SIMD (single instruction multiple data), 145**
- SIMMs (single inline memory modules), 533**
 - buying tips, 567-568
 - capacities, 537
 - illustration, 534
 - installation, 571-572, 1317
 - memory banks, 555-557
 - pinouts, 540-543
 - presence detect pin configurations, 541-542
 - width, 140
- single-bit error-correction double-bit error detection (SEC-DED), 564**
- single-board computers (SBCs), 269**
- Single Chip AT (SCAT) chipsets, 274**
- single edge contact (SEC) packaging, 95, 154, 164, 156, 182**
- single edge contact cartridge 2 (SECC2) packaging, 96-97, 176**
- single edge processor (SEP) packaging, 95**
- single-gap heads, 645**
- single inline memory modules. See SIMMs**
- single instruction multiple data (SIMD), 145**
- single-plane power design, 114-115**
- single-sided memory modules, 534**
- singleword DMA (direct memory access), 603-604**
- SiS (Silicon Integrated Systems) chipsets**
 - Athlon/Duron chipset reference tables, 341-342
 - MuTIOL architecture, 344
 - P6-class chipset reference table, 303
 - Pentium 4/Pentium D chipset reference tables, 317-319
 - SiS645/645DX, 320
 - SiS648/648FX, 320
 - SiS649/SiS649FX, 322
 - SiS650/651, 320
 - SiS655/655FX/655TX, 320
 - SiS656/SiS656FX, 321-322
 - SiS661FX, 321
 - SiS730S, 344-345
 - SiS733, 345
 - SiS735, 345
 - SiS740, 345
 - SiS741/741GX, 346-347
 - SiS745, 345
 - SiS746, 346
 - SiS748, 346
 - SiS755/755FX, 363-364
 - SiS756, 364
 - SiS760/760GX, 364, 366
 - SiS761/761GX, 366
 - SiSR658/R659, 321
 - SiS963L South Bridge chip, 346
- SiSoftware Sandra, 555**
- Sixth SATA Master setting (Drive Configuration menu), 488**
- sixth-generation processors. See P6 (686) processors**
- size**
 - Baby-AT motherboards, 240
 - hard disk drive platters, 680
 - LCD (liquid crystal display) monitors, 888
 - NLX motherboards, 247
 - peer-to-peer networks, 1155
 - video monitors, 903-904
- skew (signals), 1026**
- skins (keyboard), 1079**
- slaves, 415, 600**
- sleep feature (speakers), 1020**
- SLI (scalable link interface), 1257-1259**
- SLI (scan-line interfacing), 959**
- sliders (head), 647-649**
- slimline cases, 820, 1298**
- Slimline power supply, 1217**
- slots**
 - expansion. *See* I/O buses
 - Slot 1 (SC242), 112
 - Slot 2 (SC330), 112-113
 - slot load mechanism (CD/DVD drives), 813
 - specifications, 97, 271-273
- slotted-head screws, 1400**
- slotted masks, 908**
- S.M.A.R.T. (Self Monitoring, Analysis, and Reporting Technology), 589, 704-706**
- S.M.A.R.T. setting (Drive Configuration menu), 488**
- SmartMedia, 735**
- SMI (System Management Interrupt), 128, 133**
- SMM (System Management Mode), 78-79, 133**
- snooping (bus), 77**

- SNR (signal-to-noise ratio), 1000
- socketed ROM, replacing, 473
- sockets
 - LIF (low insertion force), 99
 - Socket 1, 100
 - Socket 2, 100
 - Socket 3, 101
 - Socket 4, 102
 - Socket 5, 103
 - Socket 6, 103
 - Socket 7/Super7, 103-104, 114-115
 - Socket 8, 104
 - Socket 370 (PGA-370), 105-106, 166, 171
 - Socket 423, 106
 - Socket 478, 107, 172
 - Socket 603, 109
 - Socket 754, 109
 - Socket 939, 109
 - Socket 940, 109
 - Socket A (Socket 462), 107-108
 - Socket AM2, 111
 - Socket F (1207FX), 111
 - Socket LGA775, 110
 - Socket T (LGA 775) Celerons, 172
 - specifications, 97-99, 271-273
 - ZIF (zero insertion force), 93, 99
- Soft Adjacent Layer (SAL) structure, 645
- soft memory errors, 513
 - alpha particles, 558
 - cosmic rays, 558-559
 - heat buildup, 559
 - incorrect memory types, 559
 - line noise, 559
- parity checking
 - disabling, 563
 - NMIs (nonmaskable interrupts), 562
 - odd parity, 561
 - parity bits, 560
 - parity-check messages, 561-564
- power glitches, 559
- radio frequency interference, 559
- SERs (soft error rates), 558
- static discharge, 559-560
- Soft Power, 1210, 1220
- software, 830. *See also specific software (for example, SafeAudio, SafeDisc)*
 - 32-bit, 150
 - acceleration, 956-957
 - CD-burning software, 826-827
 - copyright protection, 27
 - diagnostic software, 1367
 - aftermarket software, 1368
 - general-purpose diagnostics, 1382
 - manufacturer-supplied software, 1368
 - network interface adapters, 1381-1382
 - operating system diagnostics, 1382-1383
 - operating system software, 1368
 - peripheral diagnostics software, 1368
 - POST (power-on self test). *See* POST
 - drivers. *See* drivers
 - firmware, 847-850, 934
 - industry control of, 26-29
- networking requirements, 1153
- networking software
 - configuration, 1201-1202
 - installation, 1200
 - troubleshooting, 1204-1205
 - Windows Vista, 1202-1203
- processor-testing software, 119
- reverse-engineering, 27-28
- software acceleration, 956-957
- software resources, 1309-1310
- troubleshooting, 1432
- SOI (silicon on insulator), 90
- Sony
 - CD-ROM design and development, 749
 - DRM (digital rights management), 831
 - Memory Stick, 735
 - SPDIF in/out sound card connectors, 993-994
 - Trinitron picture tubes, 908
- sound. *See* audio
- Sound Blaster, 988
- Sound Blaster Pro, 988
- Sound Blaster X-Fi Elite Pro, 999
- sound cards. *See also* audio
 - 3D audio
 - DirectX support, 1009-1010
 - positional audio, 1007-1008
 - processing, 1009
 - AdLib, 988
 - amplitude, 1000
 - CA0102 (Audigy 2), 1003
 - CA0102-ICT (Audigy 2 ZS), 1003

- CA0185, 1003
- CA0186, 1003
- choosing, 1308
- connectors, 990-992
 - aux in, 994
 - CD SPDIF in/out, 994
 - internal CD-audio, 993
 - line-in, 992
 - line-out, 992
 - MIDI in/out, 993
 - mono-in, 992
 - optical SPDIF in/out, 994
 - rear-out, 992
 - SPDIF in/out, 993-994
 - TAD (Telephone Answering Device) in, 994
- data compression, 997-998
- definition of, 37
- DirectX, 988-989
- discontinued sound cards, 1004
- drivers, 998-999
- DSPs (digital signal processors), 998
- EMU10K1, 1003
- EMU10K2 (Audigy), 1003
- EMU-8000, 1003
- Ensoniq ES137x series, 1002
- frequency response, 1000
- history of, 988
- installing, 1010-1012
- integrated audio chipsets
 - AC '97 integrated audio, 1004-1006
 - AOpen TubeSound, 1007
 - Intel 'Azalia' HD Audio, 1006-1007
- legacy audio support, 989
- manufacturers
 - Aureal, 1003
 - Creative, 1002
 - Philips, 1003
- MIDI support, 997
- monophonic/
stereophonic, 997
- Philips, 1003
- pitch, 1000
- resource conflicts, 429-431, 1014
- sampling, 1001-1002
- SNR (signal-to-noise ratio), 1000
- Sound Blaster, 988
- Sound Blaster Pro, 988
- Sound Blaster X-Fi Elite Pro, 999
- sound production features, 999
- stereo system
 - connections, 1013-1014
- total harmonic distortion, 1000
- troubleshooting, 1014
 - advanced features, 1018
 - Chipset Setup options, 1019
 - lockups, 1018
 - low volume, 1016
 - no sound, 1015-1016
 - parity errors, 1018
 - resource conflicts, 1014
 - scratchy sound, 1017-1018
 - startup problems, 1018
- USB-based audio processors, 995-996
- Vibra-16, 1002
- volume control, 996
- X-Fi (Extreme Fidelity), 1003
- Yamaha, 1003
- South Bridge chipsets, 279-280**
 - ALi chipsets, 300
 - ALiMagic1, 348
 - AMD-766, 333
 - Apollo KT133A, 338
 - Apollo KX133, 337
 - NVIDIA, 350
 - Radeon, 352
 - SiS963L, 346
 - VIA, 302
- SPD (serial presence detect), 544**
- SPDIF (Sony/Philips Digital Interface) in/out sound card connectors, 993-994**
- speakers**
 - AC adapters, 1020
 - amplification, 1019
 - buying tips, 1019
 - choosing, 1308
 - connecting, 1012
 - connectors, 376
 - DBB (dynamic bass boost), 1020
 - frequency response, 1019
 - headphones, 1021
 - interference, 1021
 - magnetic shielding, 1019
 - satellite speakers, 1020
 - sleep feature, 1020
 - surround sound, 1021-1022
 - total harmonic distortion, 1020
 - troubleshooting, 1016-1017
 - volume control, 1020
 - watts, 1020
- Special Edition Using Windows Vista, 1202***
- Specialized Products Company, 1399**

speculative execution,
83-84, 149**speed**

56Kbps modems, 1136

broadband modems,
1104, 1124

cache, 77-78

CD/DVD drives, 802-807

access times, 808

buffers/cache, 808

CD-R, 820

CD-RW, 822-823

CPU utilization, 808-809

data transfer rates, 802

DMA (Direct Memory
Access), 809-810CLKMUL (clock
multiplier), 131

hard drives

access times, 702

average seek times, 701

cache programs, 702-703

interleave, 703

latency, 702

transfer rates, 699-701

locking, 478

memory

clock speeds, 518-519

cycle times, 518-519

DDR SDRAM (double data
rate SDRAM), 525-526

DDR2 SDRAM, 527

DDR3 SDRAM, 529

GHz (gigahertz), 517

interleaving, 521

MHz (megahertz), 517-519

module speeds, 557

nanoseconds, 517

processor bus speeds, 520

RDRAM (Rambus
DRAM), 531SDRAM (synchronous
DRAM), 524

motherboards

AMD P-Ratings, 67-69

Cyrix P-Ratings, 67

processor

overclocking, 69-71

NICs (network interface
cards), 1167

overclocking, 438-439

bus speeds and
multipliers, 1343

definition of, 1336

history of, 1338-1339

modern PC

clocks, 1339-1341

quartz crystals, 1336-1338

tips and

guidelines, 1341-1342

processors, 55

486 processors, 130

486DX processors, 131

486SX processors, 133

8088 processors, 124

Am5x86(TM)-P75

processor, 136

AMD P-Ratings, 67-69

Cyrix P-Ratings, 67

Cyrix/TI 486, 137

detecting, 439

DX2/OverDrive, 134

iCOMP 2.0 index

ratings, 57-58

iCOMP 3.0 index

ratings, 58

Intel ratings, 66-67

math coprocessors, 118

motherboard speeds, 66-67

overclocking, 69-71

Pentium, 143

Pentium II, 157

Pentium III, 182

Pentium 4 SYSmark 2002
ratings, 58, 65Pentium 4 SYSmark 2004
ratings, 59-62, 65Pentium 4 SYSmark 2004
SE ratings, 63-65Pentium 4 SYSmark 2007
ratings, 66

Pentium Pro, 153

wait states, 55

USB (universal serial
bus), 1035

video RAM, 938

**SPGA (staggered pin grid
array), 94, 143****spills on keyboards,
cleaning, 1079****spin-coating process
(CD-R), 816****spin rates (hard drives), 669****spin-valve heads, 646-647****spindle motors, 694-695, 718****Spindle Synchronization
(SPSYNC) signals, 600****SpinRite, 878****Spitfire. *See* Duron processors****splash screens, 461****split-plane power
designs, 114-115****Splitterless DSL (digital
subscriber line), 1113****splitters, 1114****SPPs (system platform
processors), 349****SPS (standby power
supply), 1288****SPSYNC (Spindle
Synchronization) signals, 600**

- sputtered thin-film recording media, 681-682
- sputtering, 643
- SRAM (static RAM), 514-517.
See also cache
- SSE (Streaming SIMD Extensions), 81-82
- ST-506/412 MFM controllers, 675
- Stabilant 22a, 1065, 1415
- stackable hubs, 1184
- stackable switches, 1184
- staggered pin grid array (SPGA), 94
- standard chemical cleaners, 1414-1415
- standard recording, 676
- standby power supply, 1288
- Standby state (APM), 1272
- Star 8010 computer, 1081
- star topology, 1181, 1188
- StarBand, 1119-1120
- start-stop communications, 1128-1129
- StartBIOS command, 1070
- startup process, troubleshooting, 1018
- Static Column memory, 520
- static discharge, 559, 1424-1425
- static-filled sound, troubleshooting, 1017-1018
- static RAM (SRAM), 514-517.
See also cache
- status codes (CMOS RAM), 472-473
- stencil buffering, 954
- stepper motors, 88, 685, 717-718
- steppings
 - Pentium, 147
 - Pentium II, 161-162, 164
 - Pentium III, 176-182
 - Pentium-MMX, 147
- stereo systems, 1013-1014
- stereophonic sound cards. *See* sound cards
- STNs (supertwist pneumatic design LCDs), 889
- stop bits, 1129
- STOP errors, 1433-1434
- StopBIOS command, 1070
- stored-program technique, 14
- STP (shielded twisted pair) cables, 1171-1172
- streams
 - HyperStreaming, 344
 - SSE (Streaming SIMD Extensions), 81-82
 - StreamThru architecture, 349
- strings, ID. *See* ID strings
- stripe pitch (CRT monitors), 908
- striping disks, 635
- stuck keyswitches, troubleshooting, 1078
- stuck pixels (LCDs), 886
- subcode bytes (CDs), 757-758
- subdividing hard disks drives. *See* partitioning hard drives
- substrate material, 640
- Super Audio CD (SA-CD), 789
- Super Density (SD) disks, 764
- Super I/O chips, 279, 367-368
- Super-IPS (in-place switching), 887
- Super South Bridge chips, 368
- Super Video CDs, 787
- Super Video Graphics Array, 924-927
- Super7 sockets, 103-104, 114-115
- Superchips, 454
- superparamagnetic effect, 658, 682
- superscalar architecture, 50, 80, 138
- supertiling, 960
- Supervisor Password setting (Security menu), 495
- surge protectors, 1286-1287
- surround sound, 1021-1022
- Suspend state (APM), 1272
- Suspend To RAM (S3) state, 1270-1271
- SVGA (Super VGA), 924-927
- swabs, 1416
- switches
 - address storing, 1182
 - buying tips, 1199
 - compared to hubs, 1182-1184
 - dual-speed, 1184
 - front panel AC switches, 1232
 - front panel motherboard-controlled, 1231
 - integral AC switches, 1231
 - placement of, 1185
 - ports, 1184-1185
 - stackable, 1184
 - switching power supply, 1208, 1259-1260, 1264-1265
 - symmetric multiprocessing, 160
 - Symmetrical DSL (SDSL), 1113
 - SYNC BYTE sector data, 673
 - synchronous DRAM (SDRAM), 522-524, 937
- Synchronous Graphics RAM (SGRAM), 937

SYSmark ratings

- 2002 ratings, 58, 65
- 2004 ratings, 59-62, 65
- 2004 SE ratings, 63-65
- 2007 ratings, 66

system assembly, 1295-1297

- BIOS Setup program, 1331
- cables, 1309
- cases, 1297-1299
 - cover assembly, 1329
 - mounting motherboards in, 1318-1323
- CD-ROM drive
 - installation, 1326-1328
- cooling fans, 1309
- documentation of physical configuration, 1313-1315
- ESD (electrostatic discharge) protection, 1311-1313
- expansion cards, 1329
- external cables, 1329
- floppy drive installation, 1326-1328
- hard drives
 - choosing, 1305-1306
 - installation, 1326-1328
- hardware resources, 1309-1310
- heatsinks, 1308-1309
- input devices
 - keyboards, 1306-1307
 - mouse, 1306-1307
- miscellaneous hardware, 1309
- motherboards
 - BIOS (basic input/output system), 1303
 - cables, 1325-1326
 - chipsets, 1302-1303
 - Desktop Form Factors website, 1302

- heatsinks, 1315-1317
- integrated adapters, 1304
- memory, 1303-1304, 1317
- mounting in
 - case, 1318-1323
- ports, 1304-1305
- processors, 1299-1301, 1315-1317
- operating system
 - installation, 1332-1333
- power supply, 1323
- preparation, 1311
- removable drives, 1306
- required tools, 1311
- software resources, 1309-1310
- sound cards, 1308
- speakers, 1308
- troubleshooting, 1331-1332
- video adapters, 1307-1308
 - installation, 1328-1329
 - removal, 1329
- white box components, 1309

system backups, 1411-1413**system boot process.***See boot process***system-configuration****templates, 424-425, 427-428****system disassembly, 1333-1334****System Fan Control setting (Fan Control Configuration menu), 493****System Management****Interrupt (SMI), 128, 133****System Management****Memory, 133****System Management Mode****(SMM), 78-79, 133****system platform****processors (SPPs), 349****system resources, 408-409****conflicts**

- Device Manager, 429
- multiple-COM-port adapters, 432
- NICs (network interface cards), 432
- PnP (Plug and Play), 433-435
- preventing, 422-424
- resolving manually, 424
- SCSI adapter boards, 431
- sound cards, 429-431
- system-configuration templates, 424-428
- USB (Universal Serial Bus), 432-433
- video software, 433

DMA (direct memory access) channels, 417-418**I/O port addresses, 418-421****IRQs (interrupt request channels)**

- 8-bit ISA bus
 - interrupts, 410
- 16-bit ISA/EISA/MCA bus
 - interrupts, 411-412
- Advanced Programmable Interrupt Controller (APIC), 415
- conflicts, 416-417
- edge-triggered interrupt sensing, 409
- interrupt sharing, 410
- maskable interrupts, 410
- PCI interrupts, 412-415
- PCI IRQ Steering, 410, 414

System Restore, 1410

T

- T&L (transform and lighting)**, 955
- T-1 connections**, 1125-1126
- T-3 connections**, 1126
- T-buffers**, 955
- tactile feedback**
mechanisms (pure mechanical switches), 1063
- TAD (Telephone Answering Device) in connectors**, 994
- tailgates**, 591
- TAO (Track-at-Once) recording**, 784
- tape carrier packaging (TCP)**, 141
- tape drives**, 710, 744-746
- tape monitors**, 1013-1014
- TAs (terminal adapters)**, 1123
- TCO2 emissions standard**, 912
- TCP (tape carrier packaging)**, 141
- TCP/IP (Transmission Control Protocol/Internet Protocol)**, 1125
broadband settings, 1125
dial-up networking, 1192-1193
troubleshooting, 1206
- Technical Committee T13**, 586
- telco return**, 1106
- Telephone Answering Device (TAD) in connectors**, 994
- telephony connectors**, 377
- television signals**, 975-976
- temperature acclimation (hard drives)**, 693-694
- temperature probes**, 1407
- temperature. See heating/cooling issues**
- templates, system-configuration**, 424-428
- terminal adapters (TAs)**, 1123
- terminal emulation**, 1129
- testing. See also troubleshooting**
cables, 1077
hard drives, 875-876
manufacturing tests, 503
monitors, 918-919
NICs (network interface cards), 1198
parallel ports, 1057
power supply
back probing, 1280-1281
digital infrared thermometers, 1281
DMMs (digital multimeters), 1278-1281
variable voltage transformers, 1281-1282
processors, 92, 119
serial ports
loopback testing, 1053
MSD (Microsoft Diagnostics), 1052
Windows operating systems, 1052-1053
- test equipment**
breakout boxes, 1402
DMMs (digital multimeters), 1397, 1402-1403
electric screwdrivers, 1407
electrical testing equipment, 1401
logic probes, 1403
- logic pulsers, 1404
loopback connector, 1401-1402
memory testers, 1406
outlet testers, 1404-1405
video adapters, 986
video monitors, 986
- texture mapping**, 951-953
- textures**, 953
- TF (thin film) read/write heads**, 644
- TFT (thin film transistor)**, 887-889
- TFX12V power supply**, 1226-1227
- THD (total harmonic distortion)**, 1000, 1020
- theater surround sound**, 1021-1022
- thermal grease**, 1352
- thermal recalibration (servo mechanisms)**, 689
- thermal resistance**, 1350
- thermal shock**, 1268-1269
- thermally advantaged chassis**, 1358
cooling fans, 1359
maximum heatsink inlet temperatures, 1359-1360
processor ducts, 1360-1366
effects of, 1362
installing, 1363-1366
placement, 1361
specifications, 1360
- thermometers**
digital infrared thermometers, 1281
infrared thermometers, 1407-1408

- thick Ethernet coaxial cables**, 1170
- thickness of floppy disks**, 728
- Thicknet**, 1170
- thin clients**, 748
- thin Ethernet coaxial cables**, 1170
- thin film (TF) read/write heads**, 644
- thin-film recording media**, 681-682
- thin-film transistor (TFT)**, 887-889
- thin form factor (TFX12V) power supply**, 1226-1227
- thin small outline package (TSOP) packages**, 291
- Thinnet**, 1170
- Third SATA Master setting (Drive Configuration menu)**, 488
- third-generation processors**, 126-128
 - 386DX, 128
 - 386SL, 128-129
 - 386SX, 128
 - 80387 math coprocessor, 129
 - 82350 chipsets, 283
 - IA-32 mode operation, 51-52
 - Intel chipsets, 283-284
 - maximum installable memory, 532
- Thomas, Charles Xavier**, 12
- Thomas, Thampy**, 184
- threads**, 87
- throughput**. *See* **bandwidth**
- thumb drives**, 714
- thumb flash memory**, 711
- thumb screws**, 1400
- ThunderBird sound cards**, 1003
- timeline of computer history**, 7-12
- timing**
 - CAS-2 (column address strobe) timing, 294
 - encoding schemes, 649-650
 - timing glitches, 559
- TLB (translation lookaside buffer)**, 77, 140
- Token-Ring**, 1157-1158
- tools**. *See also* **utilities**
 - cleaning tools
 - brushes, 1416
 - chemical-freeze sprays, 1416
 - cleaning supply companies, 1417
 - compressed air, 1415
 - contact cleaners/lubricants, 1415
 - disassembly tools, 1413-1414
 - erasers, 1416
 - silicone lubricants, 1417
 - standard chemical cleaners, 1414-1415
 - swabs, 1416
 - vacuum cleaners, 1416
 - digital infrared thermometers, 1281
 - DMMs (digital multimeters)
 - back probing, 1280-1281
 - buying tips, 1278-1280
 - measuring voltage with, 1280-1281
 - line conditioners, 1287-1288
 - maintenance tools, 1392-1393
 - 2 1/2" ATA drive cables and adapters, 1397
 - 3 1/2" drive enclosure, 1397
 - breakout boxes, 1402
 - chip extractors, 1394-1395
 - chip inserters, 1394
 - cleaning materials, 1397
 - data transfer cables and adapters, 1397
 - DMMs (digital multimeters), 1397, 1402-1403
 - electric screwdrivers, 1396, 1407
 - electrical testing equipment, 1401
 - English/metric fasteners, 1400-1401
 - ESD (electrostatic discharge) protection kits, 1396-1398
 - files, 1397
 - flashlights, 1396
 - hemostats, 1396
 - infrared thermometers, 1407-1408
 - lithium coin cell batteries, 1398
 - logic probes, 1403
 - logic pulsers, 1404
 - loopback connectors, 1401-1402
 - markers/pens, 1397
 - memory testers, 1406
 - needle-nose pliers, 1396
 - nut drivers, 1393
 - nylon cable-ties, 1397
 - outlet testers, 1404-1405
 - parts grabbers, 1395, 1409
 - Phillips-head screws, 1400
 - PS/2 Y adapter, 1398
 - screwdrivers, 1394
 - slotted-head screws, 1400

- spare parts, 1398
- temperature probes, 1407
- thumb screws, 1400
- Torx drivers, 1395
- Torx screws,
 - 1399-1400, 1407
- tweezers, 1395
- USB/FireWire cable adapter, 1398
- vises/clamps, 1397
- Windows 2000/XP bootable CD, 1397
- Windows 98/98SE or Me Startup floppy, 1397
- Windows Vista bootable DVD, 1397
- wire cutters, 1396
- wire strippers, 1396
- phone line surge protectors, 1287
- surge protectors, 1286-1287
- system assembly tools, 1311
- variable voltage transformers, 1281-1282
- topologies**
 - bus, 1179
 - comparison of, 1178-1179
 - IEEE 1394a, 1043
 - point-to-point, 1188
 - ring, 1180-1181
 - star, 1181, 1188
- torroids**, 1426
- Torx drivers**, 1395
- Torx screws**, 1399-1400, 1407
- total harmonic distortion**, 1000, 1020
- Total Memory setting (Memory Configuration menu)**, 482
- touch pads**, 1094
- tower cases**, 1299
- TPI (tracks per inch)**, 670
- track following systems**, 687
- track pads**, 1094
- Track-at-Once (TAO) recording**, 784
- trackballs**, 1081, 1094-1095
- TrackPoint pointing device**, 1090-1093
- tracks**, 668. *See also* sectors
 - CDs, 753-754
 - definition of, 672, 723
 - densities, 670
 - DVDs, 766-767
 - TPI (tracks per inch), 670
 - typical track/sector format, 673-674
- trailers (sectors)**, 672
- transceivers (DSL)**, 1112
- transfer modes (SATA)**, 606, 611-612
- transfer rates**
 - CD drives, 802-804
 - DVD drives, 806-807
 - hard drives, 665, 699-701
- transferring data between systems**, 709
- transformers, variable voltage**, 1281-1282
- transient response (power supply)**, 1263
- transistors**
 - DRAM (dynamic RAM), 513
 - invention of, 15-17
 - Pentium II processors, 157
 - Pentium Pro processors, 150
- transition cells**, 641
- translation**
 - CHS bit-shift translation, 624-626
 - LBA-assist translation, 627-630
 - TLB (translation lookaside buffer), 77, 140
- Transmission Control Protocol/Internet Protocol**. *See* TCP/IP
- Travelstar 32GH 2 1/2 hard disk drive**, 676
- tray load mechanism (CD/DVD drives)**, 812
- trichloroethane**, 1414
- trilinear filtering**, 954-955
- Trinitron picture tubes**, 908
- triodes**, 15
- TripleHead 2Go**, 950
- troubleshooting**. *See also* care and maintenance; diagnostics
 - ACPI (Advanced Configuration and Power Interface) error codes, 502
 - adapter cards, 1432, 1443
 - basic guidelines, 1427-1428
 - BIOS error messages, 503-504
 - AMI BIOS messages, 505-506
 - Award BIOS messages, 506
 - Compaq BIOS messages, 506
 - geometry translation problems, 508
 - IBM BIOS messages, 504-505
 - MBR boot error messages, 506-508
 - Phoenix BIOS messages, 506

- boot process, 1431-1432, 1439-1440
- bootable CDs, 847
- bootstrap
 - approach, 1430-1431
- broadband service
 - interruptions, 1124
- broadband signal lights, 1146
- CD/DVD drives, 1442
 - disc read failures, 844-847
 - disc write failures, 845-847
 - firmware, 847-850
 - slow drive speeds, 846
- CMOS batteries, 1293-1294
- dialup modems, 1434-1435
 - computer lockups, 1147
 - dialup
 - problems, 1146-1147
 - modem sounds, 1149
 - undetected external modems, 1148
- DSL (digital subscriber line), 1116-1117
- emergency flash BIOS recovery, 467-470
- ESD (electrostatic discharge), 1311-1313
- Fatal Exception errors, 1434
- floppy drives, 730
- frozen/locked systems, 1438-1443
- graphics acceleration settings
 - Windows 9.x/Me, 946
 - Windows XP, 945-946
- hard drives, 875, 1439-1443
- industry-standard replaceable components, 1428-1429
- IRQs (interrupt request channels) conflicts, 416-417
- keyboards, 1435
- cleaning, 1078-1079
- connectors, 1078
- defective cables, 1077-1078
- keyboard
 - disassembly, 1078
- keyboard
 - replacement, 1080-1081
- motherboards, 1078
- stuck keyswitches, 1078
- known-good spare technique, 1429-1430
- memory failures
 - ECC (error-correcting code), 564-565
 - hard fails, 557
 - heat buildup, 559
 - parity checking, 560-561
 - soft errors, 558-560
- microphones, 1023
- Missing operating system error message, 1439-1440
- monitors, 1436
- motherboard installation, 1443
- mouse devices
 - cleaning, 1088
 - drivers, 1090
 - interrupt conflicts, 1088-1089
- MTH (Memory Translator Hub) bug, 297
- networks
 - networking software setup, 1204-1205
 - shared resources, 1205
 - TCP/IP, 1206
- parallel ports, 1057
- phantom directories, 725
- POST (power-on self test), 446
 - audio error
 - codes, 1369-1376
 - checkpoint
 - codes, 1369-1370
 - diagnostic services, 1368
 - error display, 1369
 - fatal errors, 1369
 - memory count, 1381
 - onscreen messages, 1370-1373, 1377-1380
 - troubleshooting, 1431-1433
- power supply, 1276-1277, 1282-1283, 1433
 - diagnostic procedures, 1277
 - inadequate cooling, 1277-1278
 - overloaded power supply, 1277
- processors, 231-233
 - bugs, 119
 - reprogrammable microcode, 120
 - upgrades, 1437-1438
- RAM (random access memory), 1440-1442
 - diagnostics utilities, 572
 - divide errors, 573
 - fatal exception errors, 573
 - general faults, 573
 - global protection faults, 573
 - memory defect isolation, 576-578
 - module testers, 573
 - parity errors, 573
 - step-by-step procedures, 575-576
 - write-back cache, 574

- reinstallation versus replacement, 1429
- resource conflicts
 - Device Manager, 429
 - multiple-COM-port adapters, 432
 - NICs (network interface cards), 432
 - PnP (Plug and Play), 433-435
 - prevention, 422-424
 - resolving manually, 424
 - SCSI adapter boards, 431
 - sound cards, 429-431
 - system-configuration templates, 424-428
 - USB (Universal Serial Bus), 432-433
 - video software, 433
- serial ports, 1052-1053
- shared Internet connections, 1145-1146
- software, 1432
- sound cards, 1435
 - advanced features, 1018
 - Chipset Setup options, 1019
 - lockups, 1018
 - low volume, 1016
 - no sound, 1015-1016
 - parity errors, 1018
 - resource conflicts, 1014
 - scratchy sound, 1017-1018
 - startup problems, 1018
- speakers, 1016-1017
- system assembly, 1331-1332
- tools, 1392-1393
 - 2 1/2" ATA drive cables and adapters, 1397
 - 3 1/2" drive enclosure, 1397
- breakout boxes, 1402
- chip extractors, 1394-1395
- chip inserters, 1394
- cleaning materials, 1397
- data transfer cables and adapters, 1397
- DMMs (digital multimeters), 1397, 1402-1403
- electric screwdrivers, 1396, 1407
- electrical testing equipment, 1401
- English/metric fasteners, 1400-1401
- ESD (electrostatic discharge) protection kits, 1396-1398
- files, 1397
- flashlights, 1396
- hemostats, 1396
- infrared thermometers, 1407-1408
- lithium coin cell batteries, 1398
- logic probes, 1403
- logic pulsers, 1404
- loopback connector, 1401-1402
- markers/pens, 1397
- memory testers, 1406
- needle-nose pliers, 1396
- nut drivers, 1393
- nylon cable-ties, 1397
- outlet testers, 1404-1405
- parts grabbers, 1395, 1409
- Phillips-head screws, 1400
- PS/2 Y adapter, 1398
- safety, 1398-1399
- screwdrivers, 1394
- slotted-head screws, 1400
- spare parts, 1398
- temperature probes, 1407
- thumb screws, 1400
- Torx drivers, 1395
- Torx screws, 1399-1400, 1407
- tweezers, 1395
- USB/FireWire cable adapter, 1398
- vises/clamps, 1397
- Windows 2000/XP bootable CD, 1397
- Windows 98/98SE or Me Startup floppy, 1397
- Windows Vista bootable DVD, 1397
- wire cutters, 1396
- wire strippers, 1396
- USB (Universal Serial Bus), 1442
- video adapters, 981-986
- video capture devices, 981
- video cards, 1436-1437
- video monitors, 982-984
- Windows
 - shutdown, 1434
 - STOP errors, 1433-1434
 - wireless input devices, 1100-1101
- TRS-80 Model 1 computers, 41**
- Trusted Platform Module setting (Peripheral Configuration menu), 485**
- TrustedCore BIOS, 458-459**
- TSOP (thin small outline package) packages, 291**
- Tualatin Celerons, 171**

Tualatin-ready motherboards, 106

tubes, 14-15

TubeSound, 1007

Tumwater (E7505) chipsets, 354

tunnel erasure, 716

turning off/on systems

electrical costs, 1269-1270

S3 (Suspend To RAM) state, 1270-1271

S4 (Hibernate) state, 1271

thermal shock, 1268-1269

TV tuners, 972-973

tweezers, 1395

twisted-pair cables

building, 1173-1177

Category 3, 1172

Category 5, 1172-1173

Category 5e, 1172

Category 6, 1172

Category 7, 1173

crossover cables, 1174

grounding loops, 1172

STP (shielded twisted pair), 1171-1172

UTP (unshielded twisted-pair), 1175-1177

wiring standards, 1174

two-way set associative cache, 151

Type II PC Card adapters, 741

Type setting (Drive Configuration menu), 488

Typematic Delay (Msec) feature (BIOS), 500

typematic functions, 1070-1071

Typematic Rate feature (BIOS), 500

Typematic Rate Setting feature (BIOS), 500

U

u-pipes, 139

UART (universal asynchronous receiver transmitter), 367, 1050

UART-free modems, 1140-1141

UDF (Universal Disk Format) file system, 794

UDMA (Ultra-DMA), 604

CD/DVD drives, 809

Mode 2, 590

Mode 4, 591

Mode 5, 592

Mode 6, 592

UDMA/66, 591

Udpixel, 887

UL (Underwriters Laboratories)

power supply safety certifications, 1266

surge protector standards, 1287

ULi Electronics chipsets

Aladdin P4 (M1671), 324

Aladdin Pro 4, 299-300

Aladdin Pro 5, 299-300

Aladdin TNT2, 299-300

ALiMagik1, 347-348

M1681/M1663, 324

M1685, 324-325

Pentium 4 chipset reference tables, 322

ULi M1687, 357

ULi M1689, 357

ULi M1695, 357-358

Ultimate Boot CD, 613, 870

Ultimate Boot CD for Windows, 870

Ultra-DMA. *See* UDMA

UMA (unified memory architecture), 928

UMA (upper memory area), 854-855

unbranded media (CD-R), 819

unbuffered memory modules, 539, 544

Underwriters Laboratories. *See* UL

undetected external modems, troubleshooting, 1148

Unicomp keyboards, 1080

unified memory architecture (UMA), 928

uninterruptible power supply, 1288-1290

UNIVAC (Universal Automatic Computer), 14

universal asynchronous receiver transmitter (UART), 367, 1050

Universal Automatic Computer (UNIVAC), 14

Universal Disk Format (UDF) file system, 794

Universal DSL, 1113

universal power supplies, 1262

universal serial bus. *See* USB

Unlock Intel(R) QST setting (Fan Control Configuration menu), 493

unmanaged hubs, 1182

unshielded twisted pair. *See* UTP cables

upgrades

486 processors, 131

CD/DVD firmware, 847-850

processors

benchmarks, 231

DX2/OverDrive

processors, 134-136

microcode, 120

- OverDrive processors, 230
- Pentium OverDrives, 136
- proprietary-design motherboards, 268
- RAM (random access memory)
 - higher-capacity modules, 569
 - upgrade options and strategies, 565-566
- ROM BIOS
 - advantages of, 459-460
 - BIOS dates, 461-462
 - chip replacements, 473
 - CMOS RAM
 - addresses, 471-473
 - CMOS RAM backups, 463
 - CMOS RAM diagnostic status codes, 472-473
 - flash ROM upgrades, 464-467, 470-471
 - keyboard-controller chips, 464
 - obtaining updates, 460
 - prerequisites, 461
 - version information, 461
- system disassembly, 1333-1334
- video adapters
 - TV tuners, 972-973
 - video capture, 972-973
 - warranty and support, 974
- Y2K issues, 474
- Upgrading and Repairing Laptops, 2nd Edition***, 141
- Upgrading and Repairing Microsoft Windows***, 508
- Upgrading and Repairing Servers***, 1025
- Upgrading and Repairing Windows, Second Edition***, 1203
- upgradingandrepairingpcs.com website**, 6
- uplink ports (hubs)**, 1184
- upper memory area (UMA)**, 854-855
- UPS (uninterruptible power supply)**, 1288-1290
- USB (universal serial bus)**, 1031-1032
 - adapters, 1041-1042
 - advantages of, 1026
 - cables, 1034
 - CD/DVD drives, 811
 - compared to IEEE 1394, 1026-1028
 - connectors, 1035-1037
 - drivers, 1038
 - enabling, 1038
 - functions, 1032
 - game ports, 1096
 - hubs, 1032-1033
 - keyboards, 1075-1077
 - mouse interfaces, 1087-1088
 - NRZI (Non Return to Zero Invert) data encoding, 1032
 - performance myths and realities, 1028-1031
 - power requirements, 1033
 - resource conflicts, 432-433
 - self-identifying peripherals, 1038
 - speed, 1035
 - support for, 1037
 - troubleshooting, 1442
 - USB 2.0, 1039-1040
 - USB-based audio processors, 995-996
 - USB Configuration menu (BIOS Setup), 491-492
 - USB flash drives, 736-737
 - USB On-The-Go, 1040
 - wireless USB, 1040-1041
- USB Boot setting (Boot menu)**, 498
- USB Configuration menu (BIOS Setup)**, 491-492
- USB Mass Storage Emulation Type setting (Boot menu)**, 498
- USB/FireWire cable adapter**, 1398
- Use Automatic Mode setting (Drive Configuration menu)**, 488
- Use Maximum Multiplier setting (BIOS Maintenance menu)**, 478
- User access Level setting (Security menu)**, 495
- user-created bootable media (flash ROM)**, 466-467
- User Password setting (Security menu)**, 495
- utilities. *See also* tools**
 - ATAINE, 613
 - automatic disk installation programs, 872
 - DISKPART, 678-679, 867-869
 - FDISK, 678-679, 1332
 - assigning drive letters, 864-866
 - limitations, 872-873
 - partitioning hard drives, 862-867
 - FORMAT, 679
 - high-level formatting, 871-872, 1333
 - limitations, 872-873
 - processor-testing software, 119
 - SpinRite, 878

- XCOPY, 873
 - XCOPY32, 873-874
 - UTP (unshielded twisted-pair) cables, 1171
 - building, 1173-1177
 - Category 3, 1172
 - Category 5, 1172-1173
 - Category 5e, 1172
 - Category 6, 1172
 - Category 7, 1173
 - crossover cables, 1174
 - wiring standards, 1174
- V**
-
- V.42 modem standard, 1133
 - V.42bis modem standard, 1133
 - V.44 modem standard, 1134, 1137-1138
 - V.90 modem standard, 1132, 1137
 - V.92 modem standard, 1132, 1137-1138
 - V-Communications Partition Commander, 870-871
 - V-Link architecture, 282
 - V-MAP (VIA Modular Architecture Platforms), 328-329
 - v-pipes, 139
 - vacuum cleaners, 1416, 1079
 - vacuum tubes, 14-15, 1007
 - variable voltage transformers, 1281-1282
 - vendor-unique commands (ATA), 585, 613
 - vertex blending, 955
 - vertex morphing, 955
 - vertex skinning, 955
 - vertical recording, 659
 - vertical scan frequencies (monitors), 913-914
 - vertices, 953
 - very large scale integration (VLSI), 128
 - very low frequency (VLF) emissions, 911
 - VESA (Video Electronics Standards Association)
 - buses, 399
 - SVGA (Super VGA), 927
 - VGA (Video Graphics Array) video adapters, 926-927
 - VGA-to-NTSC converters, 976
 - VIA Modular Architecture Platforms (V-MAP), 328-329
 - VIA Technologies
 - chipsets
 - Apollo KT133, 337-338
 - Apollo KT133A, 337-338
 - Apollo KT266, 338-339
 - Apollo KT266A, 338-339
 - Apollo KT333, 339
 - Apollo KT400/KM400, 339
 - Apollo KT400A, 339-340
 - Apollo KT600, 340
 - Apollo KX133, 336-337
 - Apollo P4X266 family, 329
 - Apollo P4X400, 330
 - Apollo P4X400A, 330
 - Apollo P4X533, 330
 - Athlon/Duron chipset
 - reference tables, 335-336
 - KT880, 340
 - K8T800/K8T800
 - Pro/K8M800, 359-360
 - K8T890/K8M890, 360
 - MuTIOL architecture, 283
 - P6 chipset reference tables, 300-302
 - Pentium 4 chipset
 - reference tables, 327-328
 - ProSavage KM133, 338
 - ProSavage KM266, 339
 - ProSavage P4M266, 329
 - PT800/PM800/PT880/PM880, 330
 - PT880/PT894/PT894 Pro, 330
 - V-Link architecture, 282
 - VIA Modular Architecture Platforms (V-MAP), 328-329
 - motherboards, 260-263
 - processors
 - C3 processors, 198-199
 - specifications, 46
- Vibra-16 sound cards, 1002**
- VID (voltage identification) pins, 154**
- video adapters, 885, 924, 927-928. See also 3D graphics accelerators**
- 24-bit mode, 940
 - 32-bit mode, 940
 - 3D chipsets, 961
 - ATI chipsets, 962
 - Matrox chipsets, 966
 - NVIDIA chipsets, 968-972
 - analog signals, 925-926
 - APIs (application programming interfaces), 957
 - DirectX, 958-959
 - OpenGL, 958
 - BIOS, 445

- buses
 - AGP (Accelerated Graphics Port), 942-943, 1307
 - comparison of, 944
 - PCI Express, 943-944
 - width, 941
 - chipsets
 - identifying, 935
 - integrated video/
motherboard
chipsets, 928-932
 - video processor
technologies, 934
 - choosing, 1307-1308
 - comparison of, 974-975
 - components, 933
 - configuring, 944-946
 - definition of, 37
 - desktop video boards, 977-980
 - digital signals, 925-926
 - dual-GPU scene rendering
 - ATI CrossFire, 960-961
 - NVIDIA SLI, 959-960
 - GeForce2 MX video, 349
 - installation, 1328-1329
 - multiple monitors
 - hardware
requirements, 949
 - integrated graphics, 950
 - Windows 98-Windows XP
support, 947-948
 - Windows Vista
support, 948-949
 - RAMDAC (digital-to-analog
converter), 941
 - removing, 1329
 - replacing
 - TV tuners, 972-973
 - video capture, 972-973
 - warranty and support, 974
 - resource conflicts, 433
 - SVGA (Super VGA)
 - pinouts, 924-925
 - VESA (Video Electronics
Standards Association)
standards, 927
 - television/computer signal
comparison, 975-976
 - testing, 986
 - troubleshooting,
981-986, 1436-1437
 - TV tuners, 972
 - UMA (unified memory
architecture), 928
 - upgrading
 - TV tuners, 972-973
 - video capture, 972-973
 - warranty and support, 974
 - VGA (Video Graphics
Array), 926-927
 - video BIOS, 933-934
 - video capture devices,
972, 976-977
 - comparison of, 979-980
 - component video, 978
 - data compression, 978
 - hardware/software
requirements, 978
 - S-video connectors, 978
 - troubleshooting, 981
 - video capture
boards, 977-979
 - video drivers, 944-947
 - video-output adapters, 976
 - video RAM, 936
 - DDR SDRAM (Double Data
Rate SDRAM), 937
 - DDR2 SDRAM, 937
 - GDDR3 SDRAM, 937
 - GDDR4 SDRAM, 937
 - minimum
requirements, 938-941
 - RAM calculations, 938
 - SDRAM (Synchronous
DRAM), 937
 - SGRAM (Synchronous
Graphics RAM), 937
 - speed, 938
 - video bus width, 941
 - warranties, 974
- video capture devices, 976-977**
comparison of, 979-980
component video, 978
data compression, 978
hardware/software
requirements, 978
S-video connectors, 978
troubleshooting, 981
upgrades, 972-973
video capture boards, 977-979
- video cards. *See* video adapters**
- video CDs, 787**
- Video Configuration menu
(BIOS Setup), 490-491**
- video drivers, 944-947**
- Video Electronics Standards
Association. *See* VESA**
- Video Graphics Array (VGA)
adapters, 926-927**
- video monitors. *See* monitors**
- video-output adapters, 976**
- video RAM (random access
memory), 936**
DDR SDRAM (Double Data
Rate SDRAM), 937
DDR2 SDRAM, 937
GDDR3 SDRAM, 937
GDDR4 SDRAM, 937
minimum
requirements, 938-941

RAM calculations, 938
 SDRAM (Synchronous DRAM), 937
 SGRAM (Synchronous Graphics RAM), 937
 speed, 938
 video bus width, 941
Video Repost setting (Power menu), 496
View Event Log setting (Event Logging menu), 490
 virgin CDs, 816
 virtual device drivers (VxDs), 1390
 virtual real mode, 52-53
 virtualization, 989
Virus Warning feature (BIOS), 499
 viruses
 checking for, 1421
 CIH, 464
 vises, 1397
 visible surface
 determination, 953
 VL-Bus, 399
VLF (very low frequency) emissions, 911
VLSI (very large scale integration), 128
 voice-coil actuators, 686-688
 volatile storage. *See* RAM (random access memory)
 voltage identification (VID) pins, 154
 voltage reduction
 technology (VRT), 114
 voltage regulator module (VRM), 1243-1244
 voltage. *See* power supply

volume control
 sound cards, 996
 speakers, 1020
 troubleshooting, 1016
VRM (voltage regulator module), 1243-1244
VRT (voltage reduction technology), 114
VT Technology setting (Security menu), 495
 VxDs (virtual device drivers), 1390

W

wafers, 88, 91
 wait states, 55, 515
Wake on LAN connectors, 376
Wake on LAN from S5 setting (Power menu), 496
Wake on Modem Ring setting (Power menu), 496
Wake on PCI PME setting (Power menu), 496
Wake on PS/2 Mouse from S3 setting (Power menu), 496
Wake on Ring connectors, 377
 Walker, Andy, 1127
WANs (wide area networks), 1152
 war driving, 1188
Watchdog Timer setting (Chipset Configuration menu), 484
 water cooling, 1355-1357
 watermarks, 830
 watts (speakers), 1020
 waveform audio,
 sampling, 1001-1002
 wavetable adapters, 997
WD1003 commands, 612
 wear leveling, 689
Web-enabled keyboards, 1077
 wedge servo mechanisms, 689
Western Digital ATA. *See* ATA (AT Attachment)
White Book standard (video CDs), 787
 white box systems, 30, 1309
Whitney chipsets, 290-291
Wi-Fi (Wireless Fidelity), 1160
 802.11a standard,
 1157, 1162
 802.11b standard,
 1157, 1161-1162
 802.11g standard, 1163
 802.11n standard, 1163-1164
 access points, 1184-1186
 comparison of
 standards, 1164-1165
 DHCP support, 1190
 NICs (network interface cards), 1186
 point-to-point topology, 1188
 security, 1188-1190
 signal boosters, 1188
 specialized network hardware, 1188
 star topology, 1188
 users per access point, 1190
 wireless bridges, 1187
 wireless repeaters, 1187
 wireless routers, 1188
wide area networks (WANs), 1152
wide-channel systems, 529
wide-screen LCD (liquid crystal display) panels, 895-896

width

- bus widths, 34
 - 8086 processors, 123
 - Pentium processors, 140
- DIMMs, 140
- memory banks, 555-556
- processor specifications, 43
- SIMMs, 140

WIN.COM file, 1390-1391**Winchester drives, 663. *See also* hard drives****Windows 9x/Me**

- 104-key keyboards, 1061
- boot process, 1388
 - IO.SYS file, 1389
 - real-mode
 - configuration, 1389-1390
 - WIN.COM file, 1390-1391
- capacity limitations, 698
- Device Manager, 1089
- diagnostic software, 1368
- drive formatting, 1333
- drive limitations, 633
- drive migration, 873-874
- IA-32 virtual real mode
 - operation, 52-53
- IA-32e 64-bit extension mode
 - operation, 53-55
- multiple monitors, 947-948
- serial port testing, 1052-1053
- troubleshooting, 946
- XCOPY32, 873-874

Windows 2000/XP

- 104-key keyboards, 1061
- boot process, 1391
- Device Manager
 - mouse conflicts, 1089
- diagnostic software, 1368

- drive formatting, 1333
- drive limitations, 633
- drive migration, 874-875
- error messages
 - Fatal Exception, 1434
 - STOP, 1433-1434
- multiple monitors, 947-948
- serial port testing, 1052-1053
- troubleshooting, 945-946

Windows executable upgrades (flash ROM), 465**Windows NT**

- boot process, 1391
- diagnostic software, 1368
- drive limitations, 633
- error messages
 - Fatal Exception, 1434
 - STOP, 1433-1434
- multiple monitors, 947
- NTFS (Windows NT File System), 678

Windows Vista

- boot process, 1392
- DirectX 10 audio support, 1009-1010
- drive formatting, 1333
- drive limitations, 633
- drive migration, 874-875
- error messages
 - Fatal Exception, 1434
 - STOP, 1433-1434
- multiple monitors, 948-949
- networking, 1202-1203
- serial port testing, 1052-1053

WinGate, 1143**WinModems, 1140-1141****WinProxy, 1143****wire cutters, 1396****wire feet (ISDN), 1122-1123****wire strippers, 1396****wireless bridges, 1187****Wireless Fidelity. *See* Wi-Fi****wireless input devices**

- Bluetooth, 1099-1100
- IR (infrared), 1097
- power management, 1100
- proprietary radio frequency, 1098
- troubleshooting, 1100-1101

wireless networks,**1153, 1159-1160**

- Bluetooth, 1165-1166
 - topologies, 1188
 - Wi-Fi (Wireless Fidelity), 1160
 - 802.11a standard, 1157, 1162
 - 802.11b standard, 1157, 1161-1162
 - 802.11g standard, 1163
 - 802.11n standard, 1163-1164
 - access points, 1184-1186
 - comparison of standards, 1164-1165
 - DHCP support, 1190
 - NICs (network interface cards), 1186
 - security, 1188-1190
 - signal boosters, 1188
 - specialized network hardware, 1188
 - users per access point, 1190
 - wireless bridges, 1187
 - wireless repeaters, 1187
 - wireless routers, 1188
- wireless repeaters, 1187
- wireless routers, 1188
- wireless USB, 1040-1041

Wireless-G, 1163
Wireless-N, 1163-1164
wires. *See* cables
wizards
 Maintenance Wizard, 1420
 New Partition Wizard, 869
working power, 1265
workstation chipsets
 Intel 860, 353
 Intel E7205, 353
 Intel E7505, 353-354
 reference table, 352-353
WORM (write once, read many), 815
wrap plugs, 1401-1402
writable CD drives. *See* CD-R drives; CD-RW drives
writable DVD drives. *See* recordable DVD drives
Write Multiple command (ATA), 613
write once, read many (WORM), 815
write process, 641-642
write protection (floppy disks), 726
WRITE TURN-OFF GAP sector data, 673
WRITE TURN-ON GAP sector data, 673-674

write-back cache, 140, 574
write-through cache, 77, 140
write/read heads, 683-684
WTX motherboards, 266-268

X

X-Fi (Extreme Fidelity), 1003
x-ray machines, floppy disks and, 728-729
XCOPY utility, 873
XCOPY32 utility, 873-874
XD Technology setting (Security menu), 495
xD-Picture Card, 736
xDSL (digital subscriber line), 1111
Xeon processors, 209
 Intel 860 chipset, 353
 Intel E7205 chipset, 353
 Intel E7505 chipset, 353-354
 Intel workstation chipset reference table, 352-353
Xerox Star 8010 computer, 1081
XT motherboards, 237-238

Y

Y2K boards, 445
Y2K issues, 474
Yamaha sound cards, 1003
Yellow Book standard, 779
yields, 92

Z

Z-80 processor (Zilog), 40
Z-buffering, 954
ZBR (zoned-bit recording), 675-678
ZIF (zero insertion force) sockets, 93, 99
Zilog Z-80 processor, 40
Zip drives, 731-732
ZIP Emulation Type setting (Boot menu), 498
Ziv, Jakob, 1134
zone rendering, 278
zoned-bit recording (ZBR), 675-678
zones, 676
Zuse, Konrad, 13