

SECOND EDITION

PC

INTERRUPTS

A PROGRAMMER'S REFERENCE TO
BIOS, DOS, AND THIRD-PARTY CALLS

Ralf Brown and Jim Kyle



Addison-Wesley Publishing Company

Reading, Massachusetts Menlo Park, California New York
Don Mills, Ontario Wokingham, England Amsterdam Bonn
Sydney Singapore Tokyo Madrid San Juan
Paris Seoul Milan Mexico City Taipei

Table of Contents

CHAPTER 1 Introduction	1
Why This Book Exists 1, Interrupts and the '86 CPU Family 2, Some Words of Caution 2, Sample Entry 3, About The Authors 4, Acknowledgments 4,	
CHAPTER 2 Organization and Master Interrupt List	7
CHAPTER 3 Hardware Interrupts	21
CPU-generated Interrupts 21, External Hardware Interrupts 25	
CHAPTER 4 ROM BIOS	31
CHAPTER 5 Expansion Bus BIOSes	64
EISA System ROM 64, Intel PCI BIOS 65, PCMCIA Socket Services 68	
CHAPTER 6 Japanese ROM BIOS Extensions	77
AX PC (Japanese) 77, NEC 80,	
CHAPTER 7 Vendor-Specific ROM BIOS Extensions	83
Acorn BBC Master 512 83, Amstrad 87, Atari 89, AT&T 89, Compaq 90, Corona 94, Hewlett-Packard 94, Phoenix 96, Tandy 96, Victor 96, Zenith 96	
CHAPTER 8 Video	99
Standard BIOS Calls 99, Vendor-Specific Extensions 138, EGA Register Interface Library 154, Hercules GRAFIX 157, UltraVision 159, Miscellaneous Display Drivers 163	
CHAPTER 9 SuperVGA	183
VESA SuperVGA BIOS Extensions 183, SOLLEX SuperVGA Extensions 188, Cirrus Logic 194, Trident Video BIOS 197, Tseng Video BIOS 197, OPTIMA/ET-3000 Zoom TSR 198, Miscellaneous 201	
CHAPTER 10 Low-Level Disk I/O	203
Standard BIOS 203, ESDI Controllers 212, Vendor-Specific Extensions 214, RAMdisks 218	
CHAPTER 11 SCSI Device I/O	221
ASPI 221, Common Access Method 224, CMC International TARGA.DEV 230, Future Domain 234, SCSILink 240, SDLP 242, Miscellaneous 243	
CHAPTER 12 Serial I/O	247
Standard BIOS 247, Digiboard 250, FOSSIL 253, MBBIOS 264, AVATAR.Serial Dispatcher 266, COURIERS.COM 266, IBM/Yale EBIOS 268, TSRCOMM 269, Miscellaneous 271	

CHAPTER 13 Keyboard Enhancers	275
Anarkey 275, DOSKEY 277, PCED 278, Phantom of the Keyboard 279, Miscellaneous 280	
CHAPTER 14 Screen Blankers	287
After Dark 287, Blank-It 289, Explosiv 291, Miscellaneous 293	
CHAPTER 15 Printer Services and Print Spoolers	295
Standard BIOS 295, Frieze 296, INSET 298, NorthNet Jetstream 300, Postscript converters 301, Print Spoolers—Disk Spool II 305, Print Spoolers—PCSpool 310, Print Spoolers—PRINT 312, Printer Redirectors 316, Miscellaneous 317	
CHAPTER 16 Disk Compression	321
DIET 321, DoubleSpace 324, Microsoft Real-Time Compression Interface 328, NewSpace 329, Stacker 331, SuperStor 332, Miscellaneous 333	
CHAPTER 17 Disk Caches	337
FAST! 337, HyperDisk 339, NOW! 341, PC-Cache 343, QuickCache II 344, SmartDrive 350, Super PC-Kwik 354, Miscellaneous 360	
CHAPTER 18 Virtual DMA Specification	365
CHAPTER 19 Advanced Power Management Specification	371
CHAPTER 20 Hewlett-Packard HP 95LX System Services	379
CHAPTER 21 Mouse Support	437
PS/2 Pointing Device 437, Microsoft Mouse 439, Mouse Systems 453, Logitech 457, Smooth Mouse Driver 461, Quick Mouse Reset 462, Miscellaneous 463	
CHAPTER 22 Sound and Sound Boards	465
Ad Lib 465, SoundBlaster 467, PCM driver 469, Media Vision 471, Tandy 477, SND 478, RESPLAY 479, IBMSND driver 480, FARTBELL 483, Speech 483	
CHAPTER 23 Screen Readers and Magnifiers	485
AccessDOS 485, ASAP 485, AutoBraille 486, MAGic 488, TINYtalk Personal 490	
CHAPTER 24 MS-DOS Kernel	493
INT 21h Services 495, INT 2Fh Services 582, Other Services 596	
CHAPTER 25 European MS-DOS 4.00	603
Kernel 603, POPUP Utility 610	
CHAPTER 26 MS-DOS Compatibles	613
Digital Research / Novell DOSes 613, OS/2 621, Miscellaneous 627	
CHAPTER 27 MS-DOS Utilities	629
ANSI.SYS 629, APPEND 630, ASSIGN 632, Critical Error Handler 632, DISPLAY.SYS 633, GRAFTABL 634, GRAPHICS 635, KEYB 635, NLSFUNC 637, SHARE 638, XMAZEMS 640, Miscellaneous 641	

CHAPTER 28 COMMAND.COM and Replacements	643
COMMAND.COM 643, 4DOS / NDOS 645	
CHAPTER 29 Virtual Control Program Interface (VCPI)	649
CHAPTER 30 DOS Protected-Mode Interface (DPMI)	653
CHAPTER 31 DOS Protected Mode Services (DPMS)	679
CHAPTER 32 Cloaking	683
CHAPTER 33 Phar Lap and FlashTek DOS Extenders	689
Phar Lap 689, FlashTek Extensions 702	
CHAPTER 34 OS/286 and OS/386	705
CHAPTER 35 Rational Systems DOS Extenders	709
CHAPTER 36 Borland DOS Extenders	715
DPMILOAD 715, RTM 725, TKERNEL 726	
CHAPTER 37 Other DOS Extenders	733
GO32 733, DBOS (University of Salford Extender) 734, Miscellaneous 735	
CHAPTER 38 EMS and XMS	737
EMS 737, Extended Memory Specification (XMS) 746	
CHAPTER 39 Quarterdeck QEMM-386	753
CHAPTER 40 Qualitas 386MAX	769
CHAPTER 41 Helix Netroom	783
CHAPTER 42 Other Memory Managers	795
Common Calls 795, Microsoft HIMEM and EMM386 797, Compaq CEMM 799, The Last Byte 800, Nanosoft MD386 802, Miscellaneous 803	
CHAPTER 43 Microsoft Windows	805
Windows Interrupt Calls 805, Virtual Device Drivers 813, Video Sup- port 816, WINOLDAP 817, WINX 821	
CHAPTER 44 TopView, DESQView, and DESQView/X	823
TopView 823, DESQview 856, DESQview/X 874, DESQview External Device Interface 879, Miscellaneous 883	
CHAPTER 45 MultiDOS Plus	887
Multitasker 887, I/O Drivers 896	
CHAPTER 46 VMiX	901
CHAPTER 47 DR-DOS TaskMAX	911
CHAPTER 48 DR Multiuser DOS	917
CHAPTER 49 Other Multitaskers/Task Switchers	929
Back and Forth 929, Cswitch 930, DOSSHELL 933, DOS Task Switcher 935, DoubleDOS 939, Helix Software Headroom 943, OmniView 945, PC-MOS/386 946, PC Tools CPTASK 960, Software Carousel 962, SWELL (Swapping Shell) 965, Switch-It 966, Miscellaneous 969	
CHAPTER 50 Alternate Multiplex Interrupt	971
CHAPTER 51 TSR Libraries	977
CHAPTER 52 FastGraph/Light	987
CHAPTER 53 STSC APL*Plus/PC	1013
CHAPTER 54 Programming Language Runtime Support	1019

CHAPTER 55 Intel Image Processing Interface	1031
CHAPTER 56 System Profilers	1035
Microsoft Profiler 1035, SYS_PROF 1037	
CHAPTER 57 Debuggers and Debugging Tools	1039
CAPDOS 1039, CONTROL Hostess i/ISA Debugger 1040, INTMON 1041, MDEBUG 1042, Soft-ICE 1050, Turbo Debugger 1052, Miscellaneous 1054	
CHAPTER 58 Remote Control Software	1059
Carbon Copy Plus 1059, COMMUTE 1059, pcANYWHERE 1060, Miscellaneous 1064	
CHAPTER 59 Viruses and Anti-Viral Tools	1067
Viruses 1067, Anti-Viral Tools 1074	
CHAPTER 60 ZIPKEY	1081
CHAPTER 61 PC Tools	1085
CHAPTER 62 Norton Utilities	1101
CHAPTER 63 Miscellaneous Quarterdeck Programs	1105
CHAPTER 64 FAX Software	1109
BitFax Scheduler 1109, FaxBIOS 1110, MTEZ XpressFax 1122, RainbowFAX 1122, ZyXEL ZFAX 1124, Miscellaneous 1125	
CHAPTER 65 Communicating Applications Specification	1127
CHAPTER 66 Miscellaneous APIs	1139
Installation Checks only 1139, APCAL 1145, ASCII 1146, AutoCAD 1146, CU Writer 1148, FSBBS 1149, GOLD 1151, Jot-It! 1151, Kingswood TSR Windows 1152, METZTSR 1153, PCL-838 1154, PC Thuis Shell and Vandraart Text Windows 1155, PCW Weather Card 1160, RAID 1161, RighTime 1161, Screen Thief 1162, SETDRIVER 1163, SitBack 1164, StackMan 1165, Trusted Access 1166, VEDIT VSWAP 1167, WHOA! 1167, XVIEW 1168, Miscellaneous 1169	
Index	1179