

Contents

Foreword	xv
Acknowledgments	xvii
Introduction	xix

Part I

Interfacing with the Mouse

1	How To Communicate with the Mouse: Interrupt 33 Hex	3
	The Mouse Driver	3
	Interrupt 33 Hex	4
	Interrupt Service Functions	4
	The Working Registers	5
	Declarations	5
	The General Registers	6
	Making a Function Call to the Mouse Driver	6
	Borland and Microsoft Compiler Compatibility	7
	Modifying COMPILER.H	9
	Graphics and Text I/O	10

2	The Video Function Library	11
----------	-----------------------------------	-----------

	Introduction to the Video Function Library	11
	Using the Same Format for Graphics and Text Modes	11
	Inner Workings of the Video Function Library	12
	Source Code for the Video Function Library	15
	The Borland Video Function Library	15
	The Microsoft Video Function Library	21
	Notes on the Video Function Library	28
	Testing the Video Function Library	29
	Compiling the Test Program	29
	Running the Test Program	30

	The Ten Necessary Mouse Functions	33
--	--	-----------

	Mouse Buttons	33
	The Mouse Functions	34
	Global Variables	35
	About Graphics and Text Modes	36

The Mouse Function Library	36
Mouse Function 0: Reset and Status	44
Determining Mouse Presence	45
Number of Buttons	46
Text Cell Sizes	46
Mouse Cursor Size	47
Your First Mouse Program	47
The Invisible Mouse Cursor	49
Limiting the Range Based on	
Mouse Cursor Size	51
Warning: Mouse Function 38	52

How To Keep A Mouse from Turning into a Rat 53

The Golden Rule	53
The Problem	54
The Solutions	57
Method 1: Hiding and Showing the Mouse Cursor	58
Method 2: Setting an Exclusion Area	62
EGA Registers, Compatibility, and OEM Mice	66
EGAS.SYS	68
The EGA_REG-READ Variable	68
EGA Workaround	69

Tracking the Mouse Cursor and Emulating Cursor Movement with the Keyboard 71

Tracking Mouse Coordinates	71
Tracking Text Coordinates in a Graphics Mode	74
Emulating Mouse Cursor	
Movement with the Keyboard	76
Moving the Mouse Cursor	77

6 Determining the Button Status and Limiting the Range of Movement 81

The Button Functions	81
----------------------	----

Trapping Single Button Presses and Releases	83
The Reverse Trap	86
Double-Clicking Mouse Buttons	86
Timing a Double-Click	86
Determining a Double-Click	87
Limiting Range in Sequential Applications	90

7 Creating an Event Handler 95

The Problems with Polling	95
What is an Event Handler?	96
Installing an Event Handler	96
The Call Mask	96
Event Handler Address	97
Mouse Functions Used to Install an Event Handler	97
Mouse Function 12: Set Event Handler	98
Limitations	100
Overcoming the Limitations in Assembler	100
Compiling the Event Handler	107
Different Memory Models	108
If You Don't Have the Assembler	108

Using the Event Handler 111

Compiling a Program that Uses the Event Handler	111
File Order	112
Stack Checking	112
Integrated Environment	
Compiling	112
Command-Line Compiling	113
The New Header File	115
Your First Program Using the Event Handler	115
Terminating the Application and Event Handler	117
Resetting the Global Status Variables	118
The Full-Blown Event Handler/Processor	118
Revisiting the touch_cursor() Function	122

Using the Mouse Cursor	
Coordinates	123
Other Event Handler Functions	123
Mouse Function 20: Swap Event	
Handlers	123
Mouse Function 24: Set	
Alternate Event Handler	124
The spawn () and exec () Functions	124
Terminate-and-Stay-R&dent	
Applications (TSRs)	125
Moving Forward	125

9 --- Handling Menus **127**

Floating Menus	127
Keeping It Simple	128
Horizontal Menu Considerations	128
Vertical Menu Considerations	130
Combined Menu Considerations	131
The Floating Menu Program	131
Finer Points and Details	143
Restoring the Range	143
Restoring the Mouse Cursor	
Position	143
Resetting Event Status Variables	145
Keyboard Input	146

10 --- Using the Mouse as a Crosshair **151**

Defining the Crosshair	151
Interacting with the Mouse Cursor	153
The Crosshair Algorithm	153
Crosshair Restriction	154
Crosshair Example	155
Program Details	160
Defining the Crosshair	160
Turning the Mouse Cursor Off	161
Turning the Mouse Cursor On	161
Defining the Chart Coordinates	162
Why a Crosshair?	164

11 --- Using the Mouse In CAD-Type Operations **165**

Stretching or Dragging?	165
-------------------------	-----

Stretching a Graphics Object	166
Dropping the Anchors	166
The Undo Option	167
XOR and COPY-PUT Drawing	
Modes	167
Line Stretching Example	168
Rectangle Stretching Example	171
Ellipse Stretching Example	172

12 --- The Optional Mouse Functions **179**

Six New Mouse Functions	179
Using the Optional Functions	184
About the Information	186
Mouse Type and IRQ Number	186
CRT Page	187
Major and Minor Version	
Numbers	187

13 --- Setting the Speed: Mickeys and Pixels **189**

Mickeys	189
Mickey-to-Pixel Ratio	190
Multiplication Factor	190
Double-Speed Threshold	190
Changing the Speed	190
Speed Sensitivity Rates	191
Speed Sensitivity Example	192
Double-Speed Threshold	
Example	194
Maximum Speed	198

14 --- Changing and Managing the Graphics Mouse Cursor **199**

Graphics Mouse Cursor Mechanics	200
The Screen and Cursor Masks	200
Bit Expansion	201
The Hot Spot	203
Setting the Mouse Cursor Shape	203
Windows-Style Cursor Management	
in DOS	208
Sizing Arrows on Borders	208
The Default Mouse Cursor Shape	209

15 **The Mouse's Text Cursor** 229

The Two Types of Text Cursors	229
The Software Text Cursor	230
The Hardware Text Cursor	230
Using the set_text_cursor() Function	231
Modifying the Software Text Cursor	231
Modifying the Hardware Text Cursor	234

16 **Combining the Functions into One Library** 239

A Real Mouse Function Library	239
Library Files	240
Creating the Library File	240
Using the Library	245
Using the Library with Your Own Applications	248

Part II **Building Your Own Mouse Cursor and the Elusive 800 x 600 16-Color Mode**

17 **Building Your Own Mouse Cursor** 253

The Reason for Building Your Own Mouse Cursor	253
The 800 x 600 16Color Super VGA Mode	254
Existing Solutions	256
A Universal Solution	257

18 **Building the Sprite Driver** 259

The Graphics Mouse Cursor	260
---------------------------	-----

EGA/VGA Read/Write Mode 0 Cursor/Sprite Mechanics	262
The Sprite Driver	263
Low-Level Graphics Functions	264
Sprite Functions	265
The Sprite Driver Source Code	266
Compiling SPRITE.LC	288
On to the New Mouse Function Library	290

19 **The New Mouse Function Library and Sprite Cursor** 291

Modifying the Mouse Function Library	291
Show and Hide Functions	291
Setting an Exclusion Area	292
Event Processor	292
Cursor Position	292
The New Mouse Function Library	293
Compiling MOUSEDRV.C	304
Combining the Event Handler, Mouse Function Library, and Sprite Driver	306
The New Library Header File	306
Using the Sprite Cursor	310
Initializing the Sprite Cursor	313
Destroying the Sprite Cursor	316
The Default Mouse Cursor	316

20 **The Sprite Cursor in the 800 x 600 16-Color Mode** 317

New Video Functions	317
Running in Any 16-Color Mode	322
Setting the 800 x 600 16-Color Mode	326
Verifying Proper Behavior	326

21 **Sprite Usage Rules and Features** 333

Sprite Cursor Usage Rules	333
Global Variables	333
Valid Ranges	334
Display Boundaries	334
Hiding the Sprite Cursor	334

Switching Cursors	335
Keeping the Event Handler Active	335
Destroying the Sprite Cursor	336
Sprite Features	336
Modifying the Sprite Color and Write Mode	337
Changing the Sprite Cursor Mask	342
Using Other Sprites	348
Dual Sprite Cursors	348
The Dual Cursor CAD Mirror Program	350

Part III

Interfacing with the Mouse in Windows

22 **The Generic Windows Program** **367**

Windows, the Big Event Processor	368
Communicating with the Mouse in Windows	368
The Fundamental Windows Program	369
The Module Definition File	371
Compiling GENERIC.C	371
Running GENERIC.EXE	374
Understanding GENERIC.C	376
Understanding GENERIC.DEF	380

23 **Windows Mouse Button Messages** **383**

Button Press and Release Messages	383
Additional Information from Button Messages	390
Detailed Information in the Client Area	391
Detailed Information in the Nonclient Area	398
Double-Click Time	405

24 **Changing the Windows Cursor** **413**

The Standard Windows Cursors	414
Setting the Default Registered Cursor	414
Loading Windows Cursors on the Fly	414
WM_MOUSEMOVE	420
WM_SETCURSOR	420
Creating and Using Your Own Cursors	426
Resource Cursors	427
Dynamic Cursors	434

25 **Additional Windows Mouse-Related Topics** **445**

Tracking Cursor Coordinates in Windows	445
Emulating Mouse Movement with the Keyboard	450
Determining Mouse Presence	452
Moving the Cursor with the Keyboard	452
The Internal Display Count	452
Limiting Range of Movement	454
Keyboard Mouse-Emulation Program	455
Scope	461
WM_NCHITTEST	462

Part IV

Appendixes

A **The 50 Documented Mouse Functions** **465**

Conventions	465
Mouse Function 0: Mouse Reset and Status	466

Mouse Function 1: Show Cursor	468	Mouse Function 28: Set Mouse Interrupt Rate	491
Mouse Function 2: Hide Cursor	468	Mouse Function 29: Set CRT Page Number	492
Mouse Function 3: Get Button Status and Cursor Position	469	Mouse Function 30: Get CRT Page Number	493
Mouse Function 4: Set Mouse Cursor Position	470	Mouse Function 31: Disable Mouse Driver	494
Mouse Function 5: Get Button Press Information	471	Mouse Function 32: Enable Mouse Driver	494
Mouse Function 6: Get Button Release Information	472	Mouse Function 33: Software Reset	495
Mouse Function 7: Set Min/Max Horizontal Cursor Position	473	Mouse Function 34: Set Language for Messages	496
Mouse Function 8: Set Min/Max Vertical Cursor Position	474	Mouse Function 35: Get Language Number	497
Mouse Function 9: Set Graphics Cursor	475	Mouse Function 36: Get Driver Version, Type, and IRQ #	498
Mouse Function 10: Set Text Cursor	476	Mouse Function 37: Get General Driver Information	500
Mouse Function 11: Read Mouse Motion Counters	477	Mouse Function 38: Get Maximum Virtual Coordinates	501
Mouse Function 12: Set Event Handler	478	Mouse Function 39: Get Screen and Cursor Mask Values and Mickey Count	502
Mouse Function 13: Light-Pen Emulation Mode On	479	Mouse Function 40: Set Video Mode	503
Mouse Function 14: Light-Pen Emulation Mode Off	480	Mouse Function 41: Enumerate Video Modes	504
Mouse Function 15: Set Mickey-to-Pixel Ratio	480	Mouse Function 42: Get Cursor Hot spot	505
Mouse Function 16: Set Exclusion Area	481	Mouse Function 43: Load Acceleration Curves	506
Mouse Functions 17 and 18: Undocumented	482	Mouse Function 44: Read Acceleration Curves	508
Mouse Function 19: Set Double-Speed Threshold	482	Mouse Function 45: Set/Get Acceleration Curve	509
Mouse Function 20: Swap Event Handlers	483	Mouse Function 46: Undocumented	510
Mouse Function 21: Get Mouse Driver State Buffer Size	485	Mouse Function 47: Mouse Hardware Reset	510
Mouse Function 22: Save Mouse Driver State	485	Mouse Function 48: Set/Get Ballpoint Information	511
Mouse Function 23: Restore Mouse Driver State	486	Mouse Function 49: Get Min/Max Virtual Coordinates	512
Mouse Function 24: Set Alternate Event Handler	487	Mouse Function 50: Get Active Advanced Function	513
Mouse Function 25: Get Alternate Event Handler	489	Mouse Function 51: Get Switch Settings	514
Mouse Function 26: Set Sensitivity Rate	490	Mouse Function 52: Get MOUSE.INI	516
Mouse Function 27: Get Sensitivity Rate	491		

B _____

Windows Mouse and Cursor

Functions 517

ClipCursor	518
CreateCursor	519
DestroyCursor	519
GetCapture	520
GetClipCursor	520
GetCursorPos	521
GetDoubleClickTime	521
LoadCursor	521
ReleaseCapture	523
SetCapture	523
SetCursor	523
SetCursorPos	524

SetDoubleClickTime	524
ShowCursor	525
SwapMouseButton	525

C _____

Windows Mouse Messages 527

HIWORD() and LOWORD()	527
Client Area Button Messages	527
Nonclient Area Button Messages	528
WM_MOUSEACTIVATE	529
WM_MOUSEMOVE	530
WM_NCHITTEST	531
WM_NCMOUSEMOVE	532
WM_SETCURSOR	532