
Part 4 Appendixes

Contents

Appendix A Resource Mapping	221
ISA Interrupts	221
Legacy ISA DMA Assignments	222
Legacy ISA I/O Address Assignments	222
Required Interrupts for PC 2001 Legacy-Free Systems	224
Appendix B Remote Lockout	227
Inquire Lockout Capabilities (00H)	228
Get Remote Lockouts (01H)	229
Set Remote Lockouts (02H)	230
Appendix C PC 2001 Master Checklist	231
Appendix D Master Reference List	253
Glossary	267

Appendix A Resource Mapping

This appendix summarizes assignments for IRQ, DMA, and I/O port addresses used by built-in devices on legacy system boards. This appendix also includes details about required interrupts for legacy-free PC 2001 systems.

ISA Interrupts

Some IRQ assignments are fixed as specified in the table below. Any interrupt assignment that is not considered fixed is available for reassignment by the system.

For legacy-free systems, some unused IRQs are reserved, since there is no way for them to be used by another system function. Unused and reserved IRQs should be enabled and unmasked in the Programmable Interrupt Controller (PIC), and they must not be connected to an active signal source.

ISA Interrupts

Hardware IRQ	Legacy-reduced system	Legacy-free system
IRQ 0	System timer	System timer
IRQ 1	Keyboard	Keyboard for mobile or reserved.
IRQ 2	Second PIC cascade	Second PIC cascade
IRQ 3	COM 2	Not considered fixed
IRQ 4	COM 1	Not considered fixed
IRQ 5	Sometimes LPT 2—not considered fixed	Not considered fixed
IRQ 6	FDC	Not considered fixed
IRQ 7	LPT 1	Not considered fixed
IRQ 8	Real-time clock/CMOS	Real-time clock/CMOS
IRQ 9	Not considered fixed	Not considered fixed
IRQ 10	Sometimes COM 4—not considered fixed	Not considered fixed
IRQ 11	Sometimes COM 3—not considered fixed	Not considered fixed

Hardware IRQ	Legacy-reduced system	Legacy-free system
IRQ 12	PS/2-style mouse	Not considered fixed or integrated pointing device for mobile
IRQ 13	Coprocessor	Coprocessor
IRQ 14	Primary IDE controller	Primary IDE controller
IRQ 15	Secondary IDE controller	Secondary IDE controller

Legacy ISA DMA Assignments

Legacy-reduced PCs are permitted to use ISA DMA channels 2 and 3 for the functions specified in the table below. Legacy-free PCs are not permitted to use any ISA DMA channels.

Legacy ISA DMA Considered Fixed

Hardware DMA	System function (default)
DMA 0	ISA expansion devices. Reserved. Do not use.
DMA 1	ISA expansion devices. Reserved. Do not use.
DMA 2	FDC
DMA 3	Extended capabilities port (ECP) parallel port on LPT 1.
DMA 4	DMA controller cascading. Do not use.
DMA 5	ISA expansion devices. Reserved. Do not use.
DMA 6	ISA expansion devices. Reserved. Do not use.
DMA 7	ISA expansion devices. Reserved. Do not use.

Legacy ISA I/O Address Assignments

The following table lists I/O addresses that are used by legacy ISA devices and are therefore considered fixed.

Legacy ISA System I/O

I/O address	Default system function
0000–000F	Slave DMA
0010–0018	System
0001F	System
0020–0021	Master 8259
0040–0043, 0048–004B	PIT #1, PIT #2
0050–0052	System
0060	Keyboard/mouse controller
0061	System control port B

I/O address	Default system function
0064	Keyboard/mouse status
0070–0071	NMI enable/real-time clock
0081–008B	DMA page registers
0090–0091	System
0092	System control port A
0093–009F	System
00A0–00A1	Slave interrupt controller
00C0–00DE	Master DMA controller
00F0–00F1	Coprocessor busy clear/reset
0170–0177	Secondary IDE controller
01F0–01F7	Primary IDE controller
0201	Joystick interface ¹
0220–022F	Sound Blaster ¹
0278–027A	LPT 2 (XT parallel port 3) ¹
02E8–02EF	Alternate COM (4) ¹
02F8–02FF	COM 2 ¹
0330–0331	MPU-401 ¹
0376	IDE Controller
0378–037A	LPT 1 (XT parallel port 2) ¹
0388–038B	FM synthesis
03B0–03BB	MDA, EGA/VGA
03BC–03BE	LPT 3 (XT parallel port 1) ¹
03C0–03DF	EGA/VGA
03E0–03E7	PCIC PCMCIA controllers
03E8–03EF	Alternate COM (3) ¹
03F0–03F7	FDC—excluding 03F6 ¹
03F8–03FF	COM 1 ¹
0534–0537	Windows Sound System-compatible
0CF8–0CFB	PCI ports

¹ These addresses are restricted and must not be used by PC 2001 legacy-free systems. Processor reads of the byte addresses in the shaded rows of this table must return FFH.

Required Interrupts for PC 2001 Legacy-Free Systems

The following table lists required interrupts for PC 2001 legacy-free systems.

Required Interrupts for PC 2001 Legacy-Free Systems

Interrupt	Description
INT 8 (IRQ 0)	System timer. Used to keep the time-of-day clock updated.
INT 9	<p>INT 9 is invoked only by software and does not use IRQ 1 signaling. However, for proper system operation, this handler must perform the same operations as on legacy systems, which are:</p> <p>The interrupt handler needs to be in the IVT chain for INT 9.</p> <p>IRQ 1 is unmasked at the PIC.</p> <p>The INT 9 handler required in the BIOS is exactly the same as that which is required in systems that contain legacy components. This handler is not intended for use during the boot process, it is available to help support legacy applications running in Microsoft MS-DOS Virtual Machines (MS-DOS-boxes).</p> <p>For backward compatibility with MS-DOS applications, Windows Me implements a complete "Virtual" keyboard controller and passes all keyboard traffic through it regardless of whether it is from a real keyboard controller or a USB keyboard. This allows both Win16 applications and MS-DOS-based applications to continue to function. In order to support legacy applications in MS-DOS Virtual Machines, the command interpreter must behave the same as on a legacy system, which requires the full INT 9 support provided by legacy systems. This handler handles input from port 60h, passes it off to INT 15h / AH=4Fh, stores the data in the keyboard buffer of the BIOS Data Area, and updates the flags. The following provides reference code for the required capabilities:</p> <pre> push es push ds push a push f mov ax, 40h mov es,ax mov ax, <segment of translation table> mov ds,ax xor bx, bx in al, 60h mov ah, 4Fh int 15h jnc SkipProcess mov bl,al shl ax, 8 mov al, ds:[bx]</pre>

Interrupt	Description
	<pre> mov bx, es:1ah mov es:[bx] inc bx inc bx mov es:1ah, bx mov al, 61h out 20h, al SkipProcess: popf popa pop ds pop es iret </pre>
INT 10	Set video mode.
INT 11	<p>Equipment determination.</p> <p>If there are devices that appear as FDDs (for example, El Torito capable CD-ROM devices), then:</p> <ul style="list-style-type: none"> Bit Mask 0x0001 (bit 0) in AL must be set. Bits 6 and 7 must properly indicate the number of FDD devices and devices that appear as floppy disk devices. <p>If there are no devices that appear as FDDs, then:</p> <ul style="list-style-type: none"> Bit mask 0x0001 (bit 0) must be clear. Bits 6 and 7 must be set to 0.
INT 13	<p>High-capacity drive support.</p> <p>All subfunctions, including AH = 40h–48h.</p> <p>Disk operation notes:</p> <ul style="list-style-type: none"> ROM BIOS must set the head settle, motor start, and format gap values in the disk table pointed to by interrupt vector 1Eh. Implement the INT 13h AH = 17h call, that is, set the DASD type for format. Support the change line (INT 13h AH = 15h) on INT 13h FDDs. Support INT 13h AH = 8 (Get device parameters). Implement the extended INT 13h services (AH functions 41h – 48h). <p>For INT 13h with AH = 48h for installed FDDs:</p> <ul style="list-style-type: none"> If there are no FDDs attached as INT 13h devices, INT 13h AH = 48h must fail for all floppy drive numbers (drive 0, in particular). However, INT 13h AH = 8 on drive number 0 (DL=0) must work even if there are no INT 13h FDDs, and it must return a FDD count of 0 in the DL register to indicate that no FDDs are present. If a FDD is an industry-standard 1.44-MB, 3.5-inch drive, the INT 13h AH = 8 call on the device should not modify the BL register. If the device is something other than an industry-standard 1.44-MB, 3.5-inch drive, but is media compatible with the 1.44-MB floppy

Interrupt	Description
	<p>standard, the INT 13h AH = 8 call on the device should return the parameters for a 1.44-MB industry-standard floppy disk drive but set the BL register to 10h and return the true maximum-supported capacity parameters on the INT 13h AH = 48h call.</p> <p>For floppy devices that are not media compatible with the 1.44-MB floppy standard, the INT 13h AH = 8 call should return the closest reasonable parameters, set the BL register to 10h, and return the true maximum supported capacity parameters on the INT 13h AH = 48h call.</p> <p>The INT 13h AH = 8 (Get device parameters) call must not turn on the drive motor for FDDs.</p>
INT 15	<p>The following subfunctions are required:</p> <p>AH</p> <p>C0 Get configuration 4F Translate keyboard scan code 87 Copy extended memory 88 Get extended memory size</p> <p>AX</p> <p>C2xx Mouse functions E820 Get system memory map E801 Get memory size</p> <p>Function 4Fh is expected to pass all keys from the keyboard, and respect the status of the carry flag on return. The HID key codes from USB keyboards must be translated to PS/2 key codes for backward compatibility with other key filters. All keyboards must be supported, including-but not limited to-101/102 key English, 105 key European, 106 and 109 key Japanese. HID to PS/2 translation tables are available at: http://www.pcdesguide.org/documents/keycode.htm</p>
INT 16	<p>The following subfunctions are required:</p> <p>AH</p> <p>00h Get keystroke 01h Check for keystroke 02h Get control keys 10h Get enhanced keystroke 11h Check for enhanced keystroke 12h Get control keys for enhanced keyboard</p>
INT 19	Bootstrap loader
INT 1A	<p>The following subfunctions are required:</p> <p>AH 0x RTC AX B1xx PCI BIOS</p>
INT 1B	CTRL+Break Handler
INT 23	CTRL+C, CTRL+Break Handler