Figure 14-9. PC/XT Sources of Hardware Interrupts
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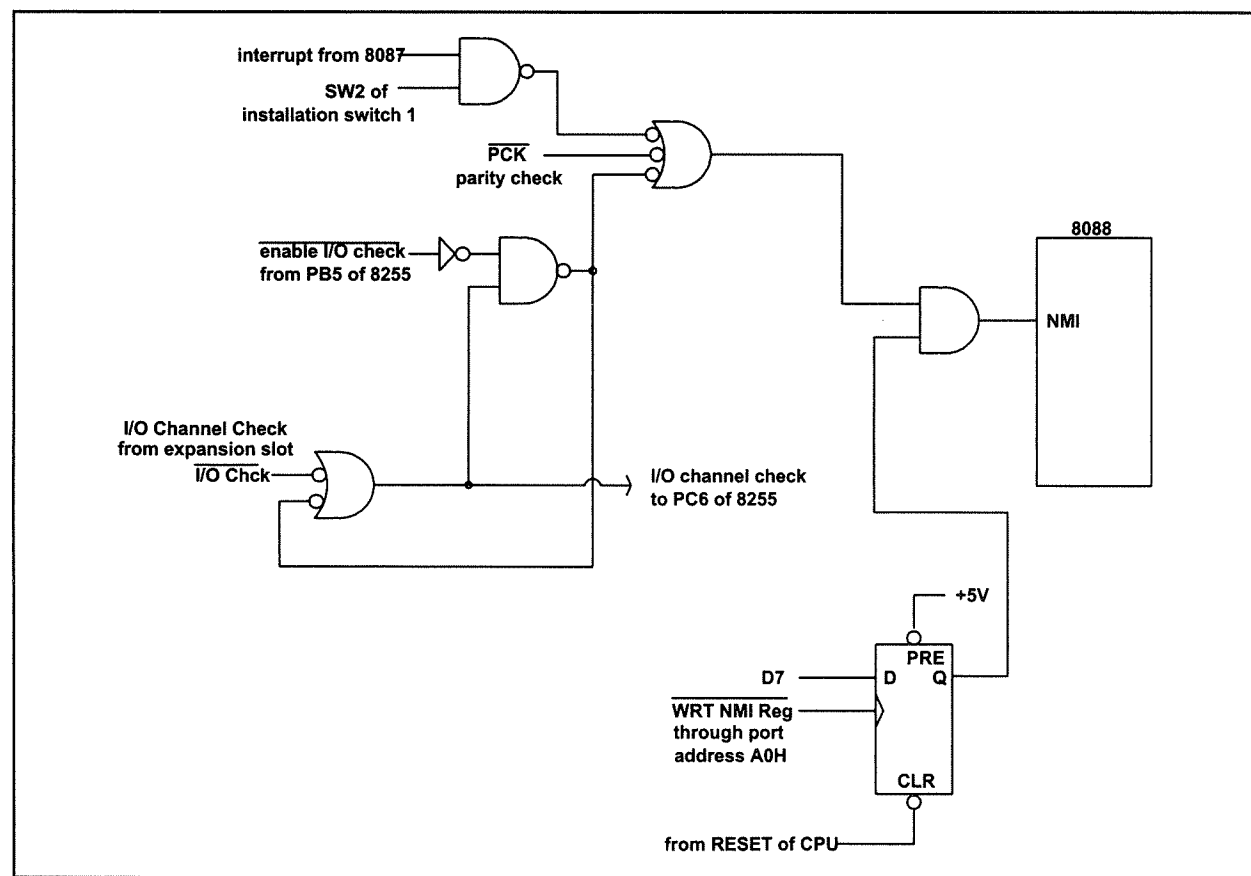

Figure 14-10. Sources of NMI in the PC/XT
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If the NMI is so important to the system, which devices can activate it, and can they be masked at all? First, as can be seen from Figure 14-10, there are three sources of activation of the NMI:

1. NPIRQ (numerical processor interrupt request)
2. Read/write $\overline{PCK}$ (parity check)
3. IOCHK (input/output channel check)

Since three different sources can activate NMI, how does the system know which one is requesting interrupt service at any given time? The IBM PC system recognizes which of these interrupt requests has been activated by checking input port C of the 8255. It looks at PC6 of the 8255 to see if it is IOCHK and at PC7 to see if it is $\overline{PCK}$. The NMI service routine software must check PC6 and PC7 and determine which one has requested service. If neither of these two is requesting service, the request must have come from the 8087 coprocessor on the motherboard (in IBM terminology, planer). IBM BIOS checks the source of each and as it finds them, displays an appropriate messages on the video screen. The BIOS code is shown next.

E2C3	746	ORG	0E2C3H	
E2C3	747 NMI_INT	PROC	NEAR	
E2C3 50	748	PUSH	AX	;SAVE ORIG CONTENTS OF AX
E2C4 E462	749	IN	AL,PORT_C	
E2C6 A8C0	750	TEST	AL,0C0H	;PARITY CHECK?
E2C8 7415	751	JZ	D14	;NO, EXIT FROM ROUTINE
....	752	...		;ADDR OF ERROR MSG
E2CE A840	753	TEST	AL,40H	;I/O PARITY CHECK
E2D0 7504	754	JNZ	D13	;DISPLAY ERROR MEG
....	755	...	...	;MUST BE PLANER
E2D6	756 D13:			
... .	757	... ...		} sends the message to
		...		} video and halts the system.
E2DF	762 D14:			
E2DF 58	763	POP	AX	;RESTORE ORIGINAL AX
E2E0 CF	764	IRET		
	765 NMI_INTENDP			

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Is there any way that NMI can be masked? The answer is yes. As can be seen from Figure 14-10, NMI is masked by a RESET signal from the CPU with CLR of the D flip-flop when the computer is first turned on. It can also be unmasked or masked through port A0H by setting D7 of the data bus to 1 (unmask) or 0 (mask). Again from the IBM PC/XT BIOS we see the following:

	1261	;	ENABLE NMI INTERRUPTS	
	1262			
E5BC B080	1263	MOV	AL,80H	;ENABLE NMI INTERRUPTS
E5BE E6A0	1264	OUT	0A0H,AL	
....	....	...	....	....

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Review Questions

1. True or false. The IBM PC/XT uses only one 8259.
2. What ports are assigned to ICWs in the PC/XT?
3. In the PC/XT, the IRQ are _____ (edge-, level-triggered).
4. Of the 256 possible interrupts of the 8088, which ones are assigned to IRQ0 - IRQ7 of the 8259?
5. True or false. IRQ0 and IRQ1 can be used by the system but not by the user.
6. Which IRQ of the 8259 is available on the expansion slot?
7. True or false. The 80x86 can mask and unmask the NMI by using the STI and CLI instructions.
8. True or false. If there is a problem with the memory of the PC, NMI is activated.