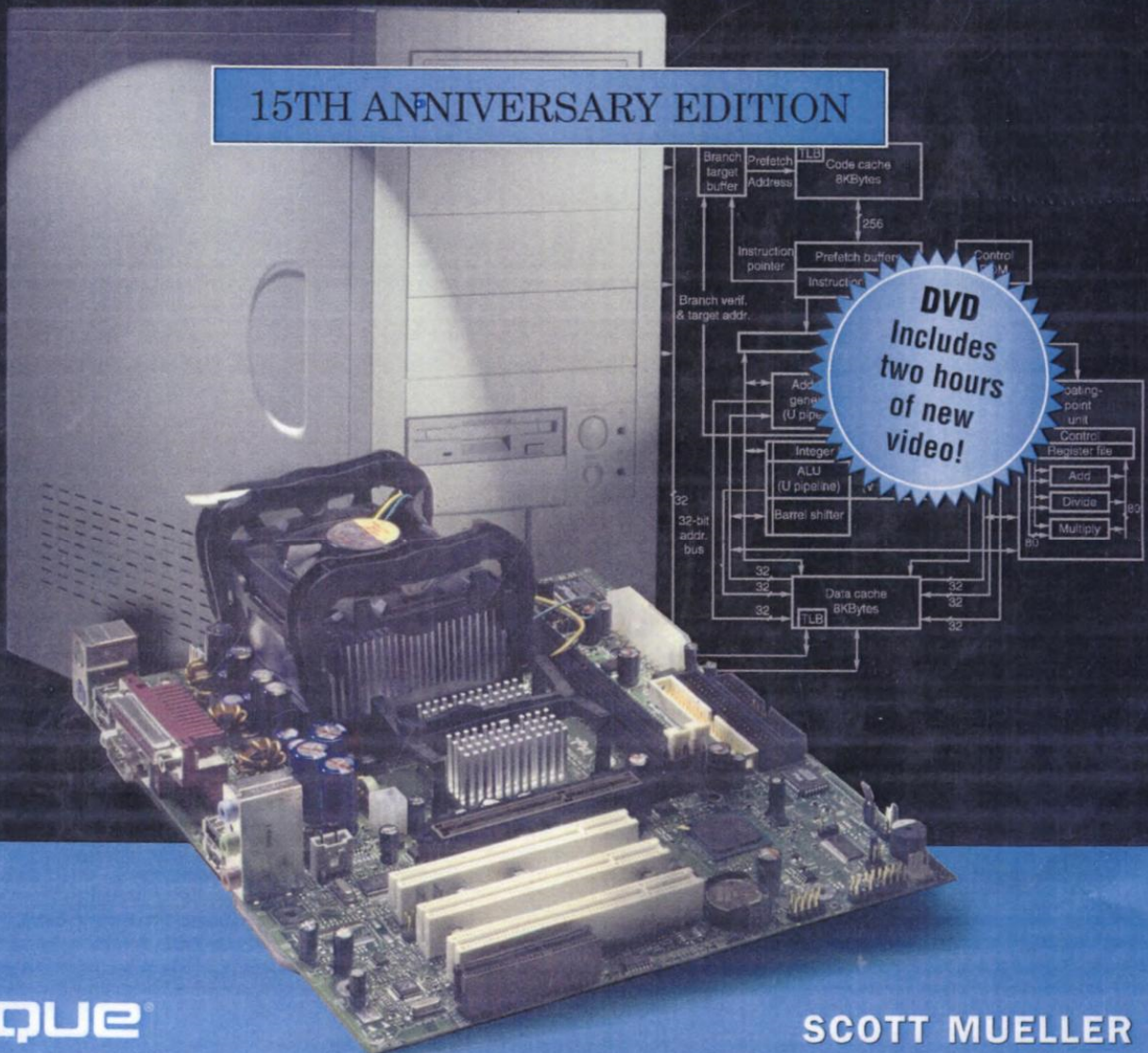


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—Gordon Mah Ung, Senior Editor, Maximum PC

Scott Mueller's UPGRADING AND REPAIRING PCs

15TH ANNIVERSARY EDITION



Upgrading and Repairing PCs, 15th Anniversary Edition

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Another source of confusion is that the interrupt listing shown in the Windows 9x Device Manager might show the PCI to ISA interrupt mapping as multiple entries for a given ISA interrupt. One entry would be for the device actually mapped to the interrupt—for example, a built-in USB controller—whereas the other entry for the same IRQ would say *IRQ Holder for PCI Steering*. This latter entry, despite claiming to use the same IRQ, does not indicate a resource conflict; instead it represents the chipset circuitry putting a reservation on that interrupt for mapping purposes. This is part of the plug-and-play capabilities of PCI and the modern motherboard chipsets. Windows 2000 and XP can also map multiple devices to the same IRQ, but they don't use the term *IRQ Holder* to avoid confusion.

Note that you can have internal devices on the PCI bus even though all the PCI slots are free. For example, most systems today have two IDE controllers and a USB controller as devices on the PCI bus. Normally, the PCI IDE controllers are mapped to ISA interrupts 14 (primary IDE) and 15 (secondary IDE), whereas the USB controller can be mapped to the available ISA interrupts 9, 10, 11, and 5.

►► See "Universal Serial Bus," p. 947.

The PCI bus enables two types of devices to exist, called *bus masters* (initiators) and *slaves* (targets). A bus master is a device that can take control of the bus and initiate a transfer. The target device is the intended destination of the transfer. Most PCI devices can act as both masters and targets, and to be compliant with the PC 97 and newer system design guides, all PCI slots must support bus master cards.

The PCI bus is an arbitrated bus: A central arbiter (part of the PCI bus controller in the motherboard chipset) governs all bus transfers, giving fair and controlled access to all the devices on the bus. Before a master can use the bus, it must first request control from the central arbiter, and then it is granted control for only a specified maximum number of cycles. This arbitration allows equal and fair access to all the bus master devices, prevents a single device from hogging the bus, and also prevents deadlocks because of simultaneous multiple device access. In this manner, the PCI bus acts much like a local area network (LAN), albeit one that is contained entirely within the system and runs at a much higher speed than conventional external networks between PCs.

IRQ Conflicts

One of the more common IRQ conflicts is the potential one between the integrated COM2: port found in most modern motherboards and an internal (card-based) ISA modem. The problem stems from the fact that true PC card-based modems (not the so-called WinModems, which are software based) incorporate a serial port as part of the card's circuitry. This serial port is set as COM2: by default. Your PC sees this as having two COM2: ports, each using the same IRQ and I/O port address resources.

The solution to this problem is easy: Enter the system BIOS Setup and disable the built-in COM2: port in the system. While you are there, you might think about disabling the COM1: port too because you are unlikely to use it. Disabling unused COMx: ports is one of the best ways to free up a couple of IRQs for other devices to use.

Another common IRQ conflict also involves serial (COM) ports. You might have noticed in the preceding two sections that two IRQs are set aside for two COM ports. IRQ 3 is used for COM2:, and IRQ 4 is used for COM1:. The problem occurs when you have more than two serial ports in a system. When people add COM3: and COM4: ports, they often don't set them to nonconflicting interrupts, which results in a conflict and the ports not working.

Contributing to the problem are poorly designed COM port boards that do not allow IRQ settings other than 3 or 4. What happens is that they end up setting COM3: to IRQ 4 (sharing it with COM1:), and COM4: to IRQ 3 (sharing it with COM2:). This is not acceptable because it prevents you from using the two COM ports on any one of the interrupt channels simultaneously. This was somewhat acceptable under plain DOS because single-tasking (running only one program at a time) was the order of the day, but it is totally unacceptable with Windows and OS/2. If you must share IRQs, you can usually get away with sharing devices on the same IRQ as long as they use different COM ports. For instance, a scanner and an internal modem could share an IRQ, but if the two devices are used simultaneously, a conflict results.

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