

Now that you have a sense of the connectors, let's turn to the devices common to almost every PC to learn which connectors go with which device.

Cards Versus Onboard

All of the connectors at the back of the PC are just that: connectors. Behind those connectors are the actual devices that support whatever peripherals plug into those connectors. These devices might be built into the computer, such as a keyboard port. Others might be add-on expansion cards that a tech installed into the PC.

Most PCs have special expansion slots inside the system unit that enables you to add more devices on expansion cards. The picture(top right)shows a typical card. If you want some new device that your system unit doesn't have built into the PC, you just go to the store, buy a card version of that device, and snap it in. **Later** chapters of the book go into great detail on how to do this, but for now just appreciate that a device might be built in or might come on a card. Be careful in handling cards. Touch the metal plate with the 90-degree bend and try to avoid touching any of the electronics. As mentioned in the previous chapter, you can protect your cards by keeping them in an anti-static bag when moving them.



Typical expansion card



Almost all connectors are now color-coordinated to help users plug the right device into the right port. These color codes are not required, and not all PCs and devices use them.



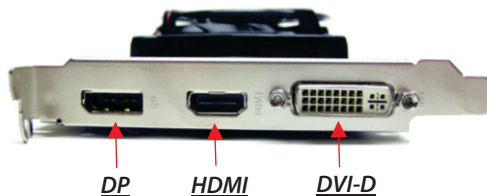
Keyboard plug and port

Keyboard

Today's keyboards come in many shapes and sizes, but they always connect to your computer by either a mini-DIN port or a USB port. Many keyboards ship with an adapter so you can use either port. Most keyboard plugs and mini-DIN keyboard ports are colored purple, as shown in the picture(right).



Video card with (from left to right) S-Video, DVI, and VGA ports



Monitor

A monitor connects to the video connector on the system unit. You'll usually see one of two types of video connectors: the older, 15-pin female DB Video Graphics Array (VGA) connector or the unique digital visual interface (DVI) connector. VGA connectors are colored blue, whereas DVI connectors are white. Many video cards have both types of connectors as shown in the picture(right) or two VGA or two DVI connectors. Other video cards also add S-Video, component, or composite ports. Video cards with two connectors support two monitors, a very cool setup to have!

The newest video connectors are *High-Definition Multimedia Interface (HDMI)* and *Display Port(DP)*, shown in the picture(right). HDMI brings a number of enhancements, such as the ability to carry both video and sound on the same cable. Primarily designed for home theaters, computers with HDMI connectors grow more common every year.



HDMI connector



The DVI connector comes in three flavors, DVI-D (all digital), DVI-A (analog), and DVI-I (both digital and analog).



There are two smaller versions of HDMI called Mini-HDMI and Micro-HDMI. You will find these primarily on high-end cell phones.

Sound

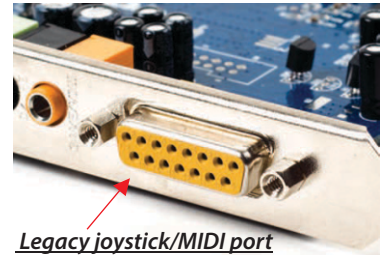
The sound device in a computer performs two functions. First, it takes digital information and turns it into sound, outputting the sound through speakers. Second, it takes sound that is input through a microphone or some other audio source and turns it into digital data. To play and record sounds, your sound device needs to connect to a set of speakers and a microphone or more. All PCs have at least two miniature audio jacks: one for a microphone and another for stereo speakers. The picture(right) shows a typical onboard sound card with six different 1/8-inch jacks. Four of these are for speakers and two are for input (such as microphones). The color scheme for sound connections is complex, but for now remember one color—green. That's the one you need to connect a standard pair of stereo speakers.

An older sound card may have a female 15-pin DB port that enables you to attach a musical instrument digital interface (MIDI) device or add a joystick to your PC, see picture(right). These multi-function joystick/MIDI ports are rare today.

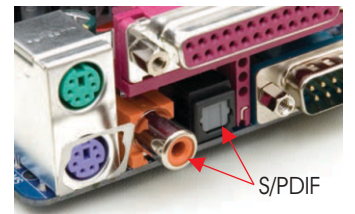
Adding more and more audio jacks to sound cards made the back of a typical sound card a busy place. In an effort to consolidate the various sound signals, the industry invented the Sony/Philips Digital Interface Format (S/PDIF) connection. S/PDIF comes in coaxial and optical versions. The picture(right) shows a motherboard with both (the coaxial connection is on the left). One S/PDIF connection replaces all of the mini-audio connections, assuming your surround speaker system also comes with an S/PDIF connection.



Typical bank of 1/8-inch audio jacks



Legacy joystick/MIDI port



S/PDIF connection

Mouse

Most folks are pretty comfortable with the function of a mouse—it enables you to select graphical items on a graphical screen. A PC mouse has at least two buttons (as opposed to the famous one-button mouse that came with Apple computers until recently), while a better mouse provides a scroll wheel and extra buttons. A mouse uses either a USB port or a dedicated, light-green mini-DIN connector as shown in the picture(far right). A variation of the mouse is a trackball. A trackball does the same job as a mouse, but instead of pushing it around like a mouse, the trackball stays in one place as you roll a ball with your fingers or thumb, see the picture on your immediate right.



Trackball



Mouse with mini-DIN connection

Network

Networks are groups of connected PCs that share information. The PCs most commonly connect via some type of cabling that usually looks like an extra-thick phone cable. A modern PC uses an RJ-45 connection to connect to the network. The picture(right) shows a typical RJ-45 network connector. Network connectors do not have a standard color.



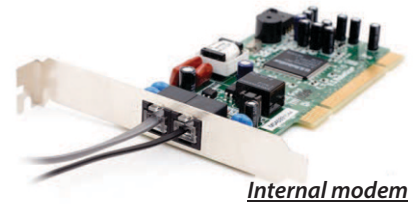
RJ-45 with its port (above) Typical network connection



Modern PCs have built-in network connections, but this is a fairly recent development. For many years, network devices only came on an expansion card, called a network interface card (NIC). The term is so common that even built-in network connections—which most certainly are not cards—are still called NICs.

Modem

A modem enables you to connect a PC to a network via a standard telephone line. Modems are another easily identifiable device in PCs as they have one or two RJ-11 jacks. One jack is to connect the modem to the telephone jack on the wall. If the modem has a second RJ-11 jack, it is for an optional telephone so you can use the phone line when the modem is not in use, see picture shown(right)



Internal modem

Printer

For many years, printers only used a special connector called a parallel port. Parallel ports use a 25-pin female DB (DB-25) connector that's usually colored fuchsia as shown in the picture(right). After almost 30 years of domination by parallel ports, most printers now come with USB, Ethernet, and Wi-Fi 802.11 b/g/n connectivity options. Parallel ports are quickly fading away from the backs of most computers. Where most of the new motherboard releases do not have this port present.



Parallel port

Joystick

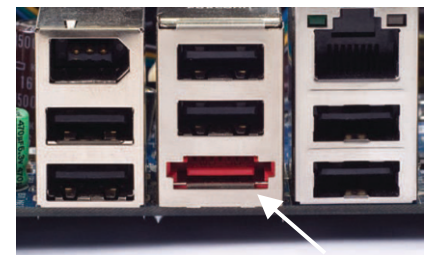
Joysticks weren't supposed to be used just for games, see picture(right). When the folks at IBM added the two-row, 15-pin female DB joystick connector to PCs, they envisioned joysticks as hard-working input devices, just as the mouse is today. Except in the most rare circumstances, however, the only thing a joystick does today is enable you to turn your PC into a rather expensive game machine. But is there a more gratifying feeling than easing that joystick over, pressing the Fire button, and watching an enemy fighter jet get blasted by a well-placed Sidewinder missile? I think not. Traditional joystick connectors are colored orange, but most joysticks today connect to USB ports.



Joystick

eSATA

More and more PCs are showing up with eSATA ports like the one shown in the picture(right). Some external hard drives and optical drives can connect via eSATA.



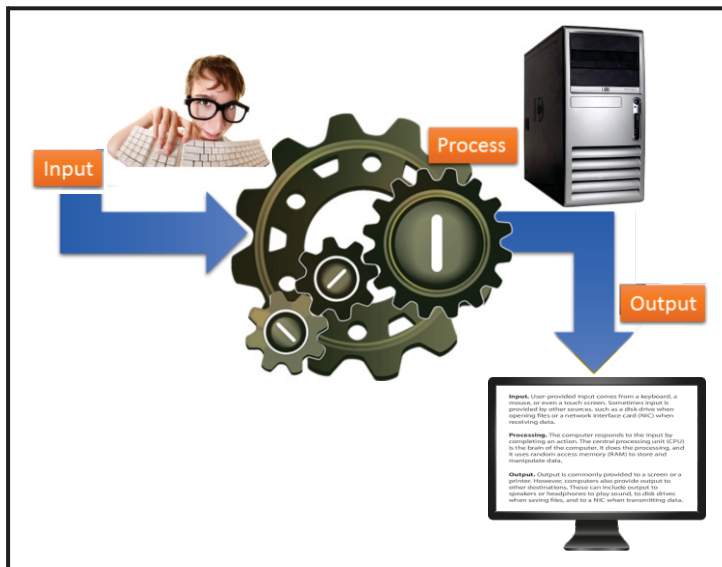
eSATA port

Keep in mind that there are lots more devices and connectors out there. This section includes only the most common and the ones you're most likely to see. As you progress through this book, you'll see some less common connectors and where they are used.

Chapter 2

Laboratory Manual

COMPUTER BASICS and ITS PERIPHERALS



Laboratory Activities

- 2.01 Exploring the Functions and Components of a PC
- 2.02 Examining User-Accessible Components
- 2.03 Recognizing External Connections
- 2.04 Identifying CPU Characteristics
- 2.05 Recognizing CPU Sockets
- 2.06 Cooling Your CPU
- 2.07 Exploring CPU Specifications with CPU-Z

Chapter 2.08 Analysis and Written Test

- 2.09 Determining the Amount of RAM in a PC
- 2.10 Identifying Types of RAM
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Chapter 2.12 Analysis and Written Test

- 2.13 Researching New Motherboards
- 2.14 Identifying Motherboard Features
- 2.15 Exploring Motherboard Features with CPU-Z
- 2.16 Identifying BIOS ROM
- 2.17 Accessing BIOS via the CMOS Setup Program

- 2.18 Configuring and Clearing CMOS Setup Program Passwords

- 2.19 Configuring BIOS Settings

Chapter 2.20 Analysis and Written Test

- 2.21 Electricity
- 2.22 Power Supply Output
- 2.23 Power Protection

Chapter 2.24 Analysis and Written Test

- 2.25 Installing Parallel ATA Hard Drives
- 2.26 Installing Serial ATA Hard Drives
- 2.27 Configuring CMOS Settings
- 2.28 Comparing Solid-State Drives and Magnetic Hard Drives

Chapter 2.29 Analysis and Written Test

Lab Activity 2.03 Recognizing External Connections

Just as you finish working with accounting's PC, the intercom buzzes. It's the head of IT, and she has a new assignment for you: The new satellite office in Makati has received a delivery of new PCs, but the machines are all in boxes and none of the sales people there knows how to set up the new PC's. Your job is to call him up and walk him through the process of connecting a PC, describing each cable and connector, and explaining how they connect to the PC.

Learning Objectives

In this lab, you will identify, describe, and explain the function of the external connections on a standard PC.

- Identify the external connectors on a PC and the related cables
- Explain the function of each external connection

Lab Materials and Setup

The materials you need for this lab are:

- At least one fully functioning PC that's less than two years old (two or more systems is ideal, with one older than and one newer than two years old).

Let's Get the Lab Started

Now it's time to learn about all the external things that can be attached to a PC. This lab exercise steps you through identifying and understanding the function of the various connectors.



Shut off the power to your system and unplug your PC from the wall socket before you start the following exercise.

Step 1 Look at all those wires coming from the back of your PC! There's a power cable, a telephone or network cable, a keyboard cable, a mouse cable, and maybe a few others, depending on your system.

The great thing about PCs is that it's difficult to connect the cables incorrectly. Each one has a unique connector; some are male (connectors with pins), and some are female (connectors with holes). Each connector has a particular shape and a specific number of pins or holes that match those of a specific device connected to the system unit.



Cables have conductors. A conductor is a wire that can carry electrical signals. You may see a cable described by the number of conductors it has; for example, a telephone cable can be a two- or four-conductor cable. A power cable is a three-conductor cable. A network cable is an eight-conductor cable.

Step 2 Unplug each of your PC's cables one at a time and practice plugging them back in until you get a feel for how each fits. You should not have to force any of the cables, though they may be firm. How is each cable held in place and prevented from coming loose? Is there a screw, clip, or some other fastener that holds the cable connector tight to the system? Is the connector keyed? What does it connect to? What is the shape of the connector on each end? Is it round, rectangular, D-shaped? How many pins or holes does it have? How many rows of pins or holes?

Step 3 Is it possible to plug any cable into the wrong connector? If so, which one(s)? What do you think would happen if you plugged something into the wrong connector?

Step 4 Disconnect the following cables from the back of your PC and record some information about each in the following table. Keep in mind that the table was created for average PCs. Provided are three additional blank spaces for any custom devices in your system . If you don't have a particular connector, don't feel bad. Just write "N/A."

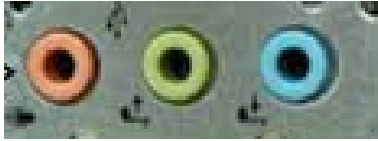
	Number of Conductor/Pins	Cable Gender	Name of the Port	Port Gender	Port Color
Mouse					
Keyboard					
Monitor					
Printer					
Network					
Modem/Phone					
Speaker					
Power					

Once you complete this table, know it, live it, and love it. Every great technician should be able to identify these connectors at a glance.

Step 5 If you're working with someone else, play "Flash Cords." Have your partner hold up various cables, and try to guess what they connect to by looking at the connectors on the ends. Then switch roles and quiz your partner. Another really good way to learn the connector names is to have your partner sit behind the computer, while you reach around from the front, feel the various ports with your fingers, and call them out by name. Switch back and forth with each other until you both can easily identify all the ports by touch.

Step 6 Properly reconnect all the cables that you removed and prepare to turn on the system. If you have an On/Off button on the back of the system, be sure it is set to the On position. Make sure the monitor is turned on as well.

Step 7 Identify the connectors pictured next. What is the name of each connector and what does it connect to?



A. _____



B. _____



C. _____



D. _____



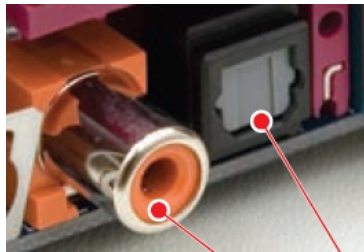
E. _____



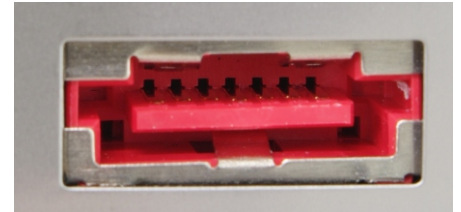
F. _____



G. _____



H. _____



I. _____

PS/2

Serial

RJ-45

VGA

Parallel

FireWire

RJ-11

S/PDIF

USB

eSATA

1/8-inch audio DVI