Power Supplies

A **power supply**, shown in exhibit 3-6, is the internal component that converts wall voltage (110 V or 220 V) to the various DC voltages used by the computer's other components.

Exhibit 3-6: A PC power supply

Often, you can adjust the power supply to run on either 110 V or 220 V wall voltage. To make this adjustment, with the computer off, you slide a small switch to the appropriate voltage. This switch is normally next to the electrical cord port on the back of the PC, as shown in Exhibit 3-7.

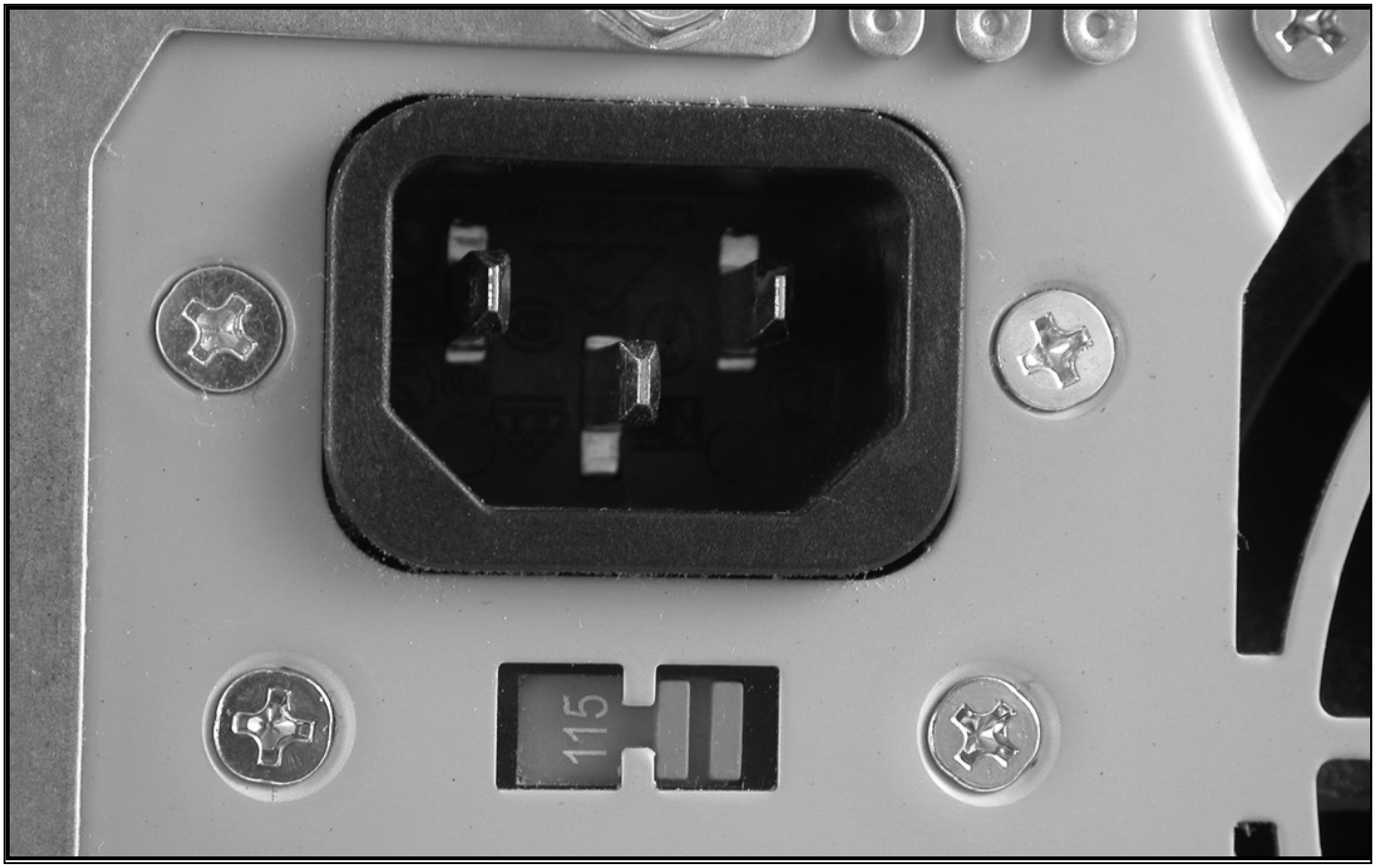


Exhibit 3-7: Voltage selection switch near the electrical cord port

Power supplies are rated according to the number of watts of DC power they output. Modern power supplies typically offer at least 300 watts (and often more) to power the PC and its internal components. Older power supplies typically offer 200 watts or less. The power supplies rating isn't necessarily an indicator of the amount of power that the unit draws from the outlet: a 350 W power supply doesn't necessarily use more electricity then a 200 W model (power supplies draw only as much power as needed to supply the internal components). The following table lists typical power requirements for common PC components. You can usually find our an exact power requirement from technical specification documents posted on manufacturers' Web sites.

Component	Typical Power requirement
Motherboard	30 W, not including the power for the CPU chip and memory. This is for full power mode. Sleeping states use less
Memory	10 W per 2 GB chip.*
CPU chip	AMD phenom processors use 65-140 W; AMD Athlon 64 processors use 45-125 W; single - core and dual – core Itanuim processors use approximately 100 W; Pentium 4 and Athlon-class processors use 65 or more watts; older CPUs use 50 W or less.
Hard drive	5-15 W. some manufacturers will print the power requirement right on the drive.
Optical Drive	Newer CD or DVD drives can suse as little as 5 W. older optical drives may require 10-20 W.
Floppy Drive	5-10 W.
Adapter Card	5-30 W. for example, the high-end graphics cards used by professional graphics software developers and computer-aided designers will require more power than normal graphocs card.
* BEHARDWARE.COM determined power consumption in a test system. They measured power consumption at 2 GB and then at 4 GB, because they state that it really isn't possible to load the memory independently of the processor; the difference is an estimate of memory power consumption	

Most power supplies provide three output voltage levels at various amperage ratings to supply power to the internal components. The following table describes these voltage levels and the typical devices that use them (more devices draw power at +12 V level than at any of the other ranges).

Standard Outputs

+3.3 V	14 A	AGP video cards, motherboard
-5 V	0.3 A	ISA bus adapter cards
+5 V	30 A	Motherboard, CD/DVD drives, hard drives, PCI adapter cards, Pentium III and earlier processors
+5 V	0.85 A	“Soft power” switch
-12 V	1 A	Older network adapters and serial ports
+12 V	12 A	CD/DVD drives, hard drives, Pentium 4 and Athlon processors, motherboard

For newer AMD processors such as the Phenom and Athlon, overall current usage limitation on the power supply doesn't exceed a combined system power output for the +5V and +3.3V outputs.

Standard power connectors are used to connect the power supply's output to the various devices. Separate standards exist for the following connectors:

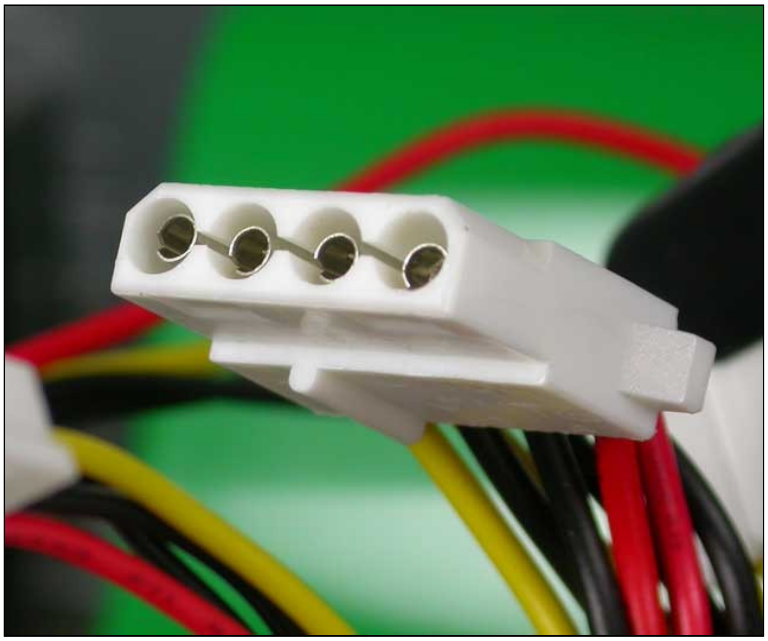
- Drive power connectors

- Motherboard power connectors

Hard drives, CD and DVD drives, and floppy drives use the power connectors that are standardized in size and shape, as well as the placement and voltage carried by the wires connected through them. There are three common power connectors: the peripheral, floppy, and **Serial ATA (SATA)** power connectors.

- The peripheral connector is sumetimes called a **Molex connector** (after one of the manufacturers of this style of connector). Peripheral connectors are typically used to connect hard drives and CD or DVD drives to the power supply.
- The floppy connector is a 4-pin **Berge connector**. The 4-pin Berge connector is smaller than a Molex connector and is used to connect the floppy drive to the computer's power supply unit.
- New serial ATA drives use the third type of power connector.

Peripheral, floppy, and serial ATA connectors are shown in Exhibit 3-8 and Exhibit 3-9.



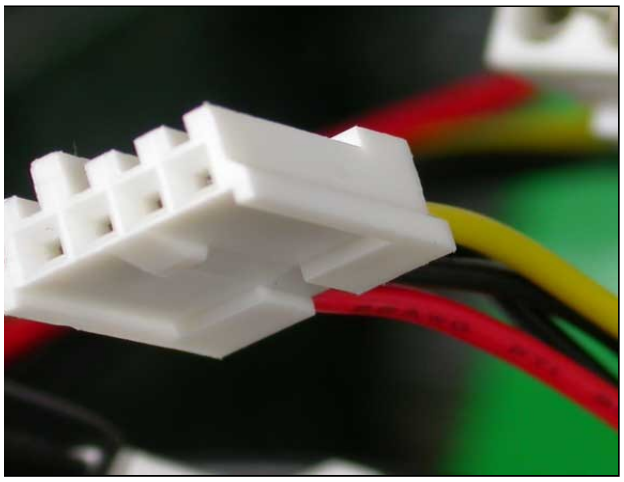


Exhibit 3-8: A peripheral power (Molex) connector, left; and a floppy power (Berge) connector, right

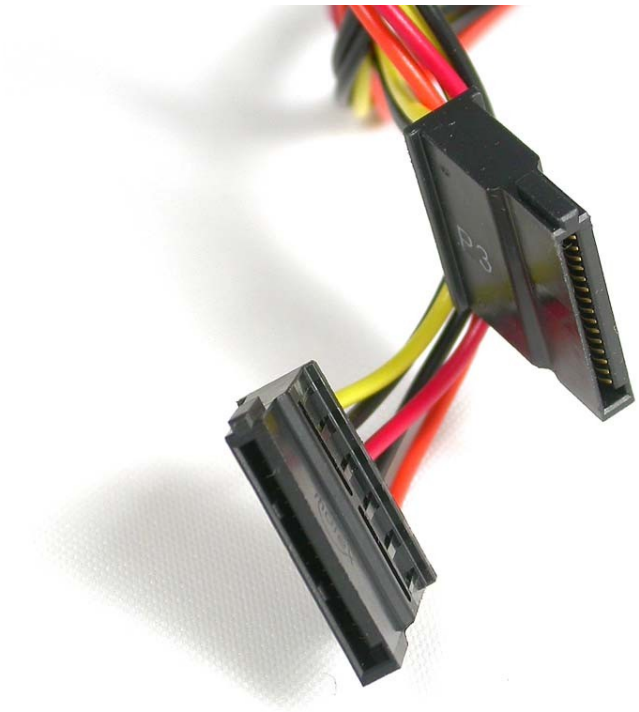


Exhibit 3-9: A serial ATA power connector

Due to their shapres, these connectors can be inserted in to the drives in only one orientation (they are said to be “keyed”, to which ensures that you connect to the appropriate power input wires to the correct point on the device) .

Wire Color	Molex Pin numbers	Berge pin numbers	SATA pin numbers	Voltage
Yellow	1	4	13, 14, 15	+12 V
Red	4	1 (optional)	7, 8, 9	+5 V
Black	2 and 3	2 (optional) and 3	10, 11, 12	Ground

The motherboard and it's components must get power from the power supply. The

motherboard is connected to the power supply with either one or two connectors. Newer, single motherboard connectors are keyed (you can't insert these connectors incorrectly, unless you force-fit them backwards). The older standard for motherboard power connectors is the two-connector system (these older connectors weren't keyed, so they could be inserted in any direction, misconnection can result in damage to the motherboard). A single motherboard power connector is shown in Exhibit 3-10, and a dual power connectors shown in Exhibit 3-11.

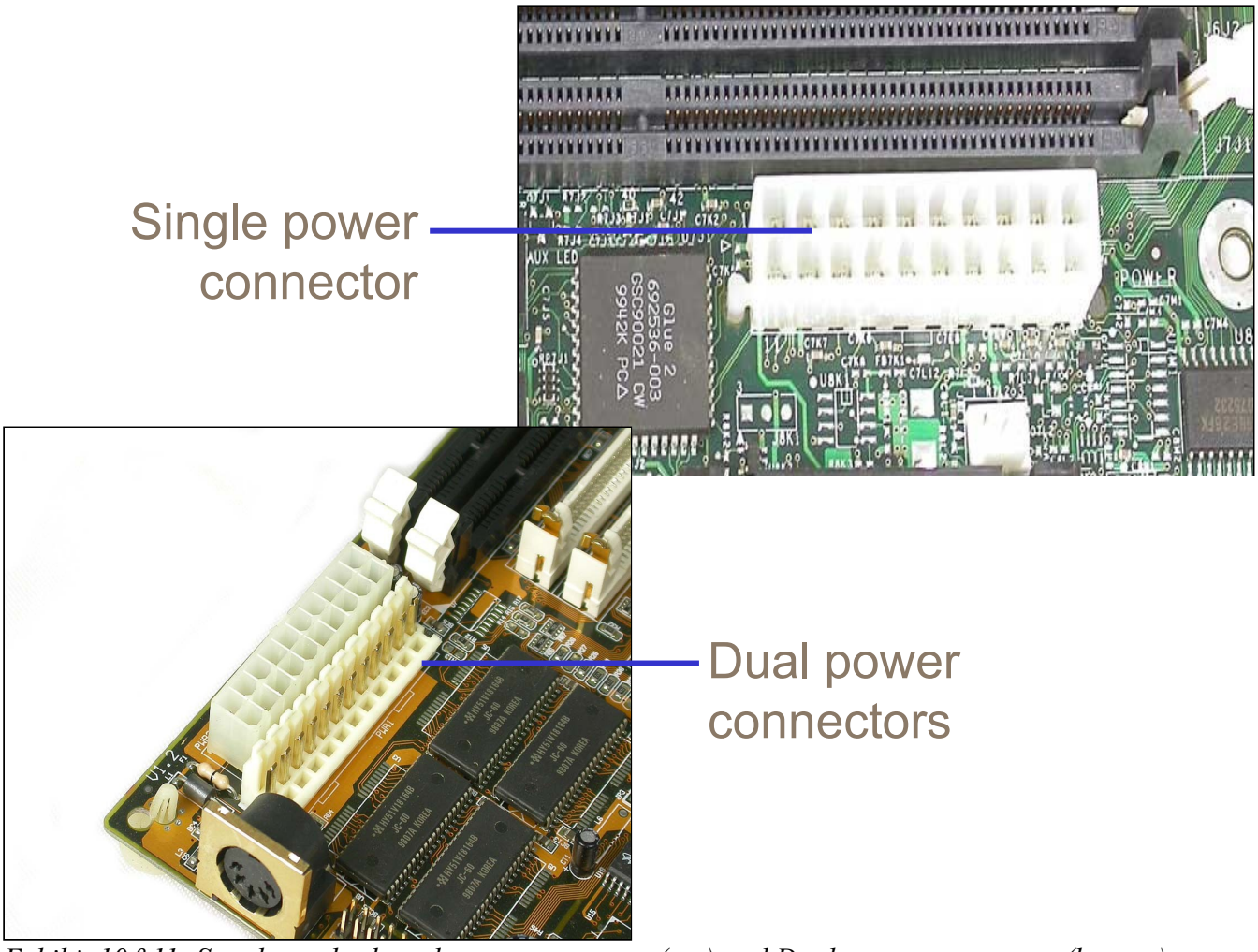
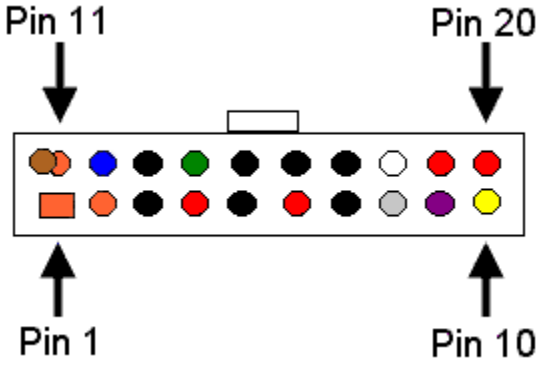


Exhibit 10&11: Sungle motherboard power connector (top) and Dual power connectors (bottom)

The following table lists the wire colors and associated pin colors for the 20-pin ATX v1.0

single motherboard connector.

Pin	Signal	Wire Color
1	+3.3Vdc	Orange
2	+3.3Vdc	Orange
3	GND	Black
4	+5Vdc	Red
5	GND	Black
6	+5Vdc	Red
7	GND	Black
8	PWR-OK	Gray
9	+5Vdc VSB standby Voltage	Purple
10	+12Vdc	Yellow
11	+3.3Vdc	Orange {brown is 3.3Vdc sense]
12	-12Vdc	Blue
13	GND	Black
14	PS-ON	Green
15	GND	Black
16	GND	Black
17	GND	Black
18	-5Vdc	White
19	+5Vdc	Red
20	+5Vdc	Red



The following table lists the wire colors and associated pin numbers for the 24-pin ATX v2.0 motherboard connector.

Pin	Name	Color	Description
1	3.3V	Orange	+3.3 VDC
2	3.3V	Orange	+3.3 VDC
3	COM	Black	Ground
4	5V	Red	+5 VDC
5	COM	Black	Ground
6	5V	Red	+5 VDC
7	COM	Black	Ground
8	PWR_OK	Gray	Power Ok is a status signal generated by the power supply to notify the computer that the DC operating voltages are within the ranges required for proper computer operation (+5 VDC when power is Ok)
9	5VSB	Purple	+5 VDC Standby Voltage (max 10mA)
10	12V	Yellow	+12 VDC
11	12V	Yellow	+12 VDC
12	3.3V	Orange	+3.3 VDC
13	3.3V	Orange	+3.3 VDC
14	-12V	Blue	-12 VDC
15	COM	Black	G
16	/PS_ON	Green	Power Supply On (active low). Short this pin to GND to switch power supply ON, disconnect from GND to switch OFF.
17	COM	Black	Ground
18	COM	Black	Ground
19	COM	Black	Ground
20	-5V	White	-5 VDC (this is optional on newer ATX-2 supplies, it is for use with older AT class expansion cards and can be omitted on newer units)
21	+5V	Red	+5 VDC
22	+5V	Red	+5 VDC
23	+5V	Red	+5 VDC
24	COM	Black	Ground

The **form factor** of a power supply refers to its size and shape. The form factor you use must not only fit into the case you use but it must also fit in relation to the motherboard and other components. The names of power-supply form factors match those given to the system cases, because together these components form a matched set.

Chapter/Unit 3 Summery from ILT series CompTIA A+ Essentials 2009 ed

Chapter/Unit Summerized by Antonay'a Judkins