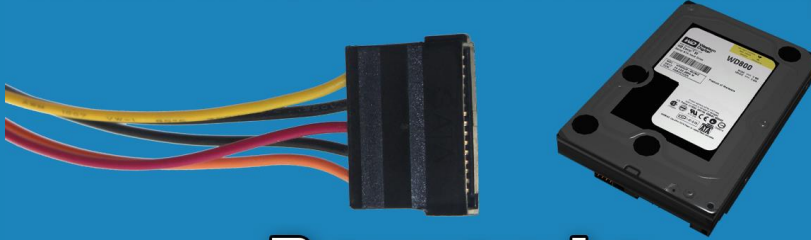


# ITFreeTraining



## Power to Internal Peripherals

For the free video please see  
<http://itfreetraining.com/ap/1c50>

In this video from ITFreeTraining, I will have a look at the internal power connectors that are used inside the computer. These power connectors provide electricity to peripherals inside your computer and sometimes to the devices outside your computer.

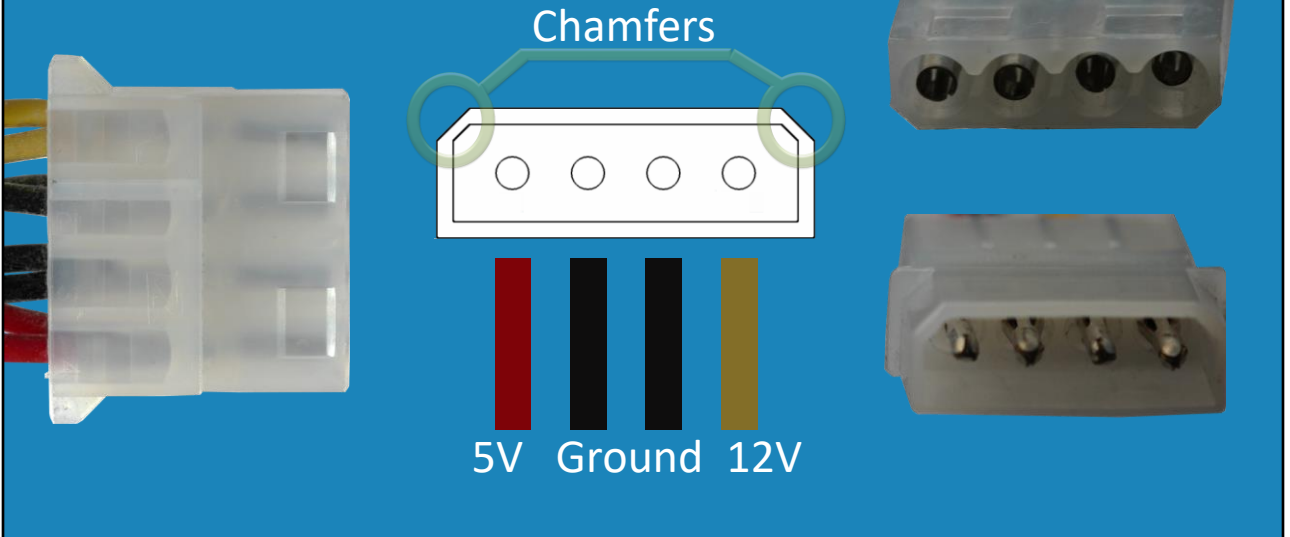


0:13 There are many devices in your computer that require power. The typical ones are your hard disk drive, solid state drive, optical drive and fans. The three main power connectors for these are the Molex, mini Molex and SATA.

These are the three standard power connectors that are used inside a computer to power devices. There are other cables that are used to power expansion cards and the motherboard; however, I will look at these in a different video.

# Molex Power

- Used to power older devices



0:41 The first connector that I will look at is the Molex connector. Molex connectors were designed back in the early 1960s. There were many different types of Molex connectors and they became quite popular in electrical equipment.

In computers, the large Molex connector is the primary one that is used. This male connector has cylindrical metal sockets. The female connector has cylindrical sprung-metal pins. The idea being that, when put into the plug, the metal sockets expand to lock the connector into place.

Although this Molex connector in the old days was quite popular, nowadays this connector is only used on older devices and some internal fans.

Due to the way the connector is designed, this does mean that some force needs to be used to plug and unplug these connectors. To prevent the connector being put in the wrong way, there are chamfers on one side of the connector.

A chamfer is essentially an angular notching on the connector. You can see that these make the connector angular at the top. When inserting these connectors, make sure that the chamfers line up. It is possible (using a lot of force) to get the connector in, incorrectly, but this will most likely damage the device.

If you do get the Molex connector in the wrong way, the power going to the device will be swapped. As you can see, the red wire is five volts and the yellow wire is 12 volts. When the connector is reversed, the voltages will be reversed and potentially the device connected to it

will be damaged.

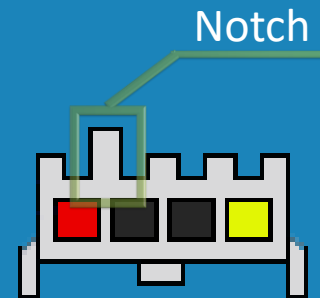
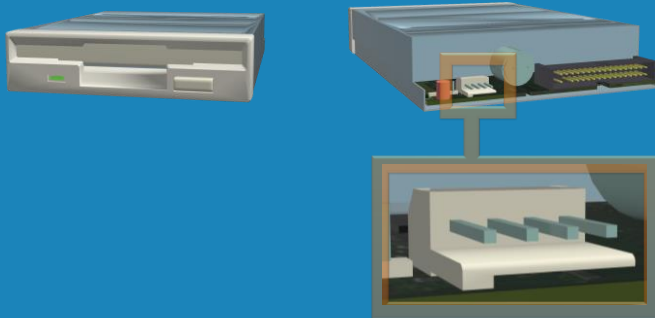
Nowadays this connector is mainly used for older hard disk drives and case fans. On older motherboards, you may find that there is one of these connectors to provide extra power to the motherboard. On modern motherboards, due to the increase in the number of wires used to power the motherboard, you generally don't find the Molex connector is used anymore, since the motherboard already has enough power from these wires.

You may also find that some old video cards have a Molex connector, but like the motherboards, modern power supplies have additional power cables that can be used to supply a video card's extra power requirement, rather than using the Molex connector.

The Molex connector is good for big devices, but for small devices it is a little too big.

# Mini Molex or Berg Connector

- Same as Molex electrically but smaller
- Primarily used for floppy disk drives
  - Some other devices (Not many)



2:58 To make the power connector smaller, the mini Molex or Berg connector was added. This connector was the same electrically as the larger Molex connector but only smaller. It was primarily used for floppy disk drives. For this reason, you may see it referred to in documentation as the floppy disk power connector. Primarily it is used for floppy disk drives; however, you may find it used in other devices, but not many.


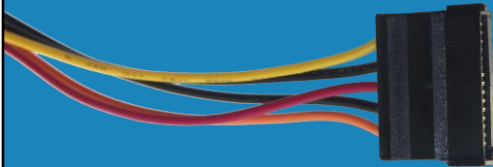
Nowadays, the floppy disk drive is obsolete technology. Very rarely I will use a floppy disk drive to update an old motherboard's BIOS, but having said that, most old motherboards support USB flash RAM. I have not had the need to use the mini Molex connector – I would say – for the last ten years. For this reason, you will find that some power supplies will no longer include the mini Molex connector.

The main use of the connector is on the back of the floppy disk drive. It essentially has four pins. In order to ensure the connector is plugged in the correct way, on the top of the connector is a notch. This notch is designed to prevent the cable being plugged in the wrong way. However, if you use enough force you can plug the cable in the wrong way. It is a lot easier to plug the mini Molex connector in upside down than the Molex connector. If you ever plug a mini Molex into a floppy disk drive the wrong way up you will know because the floppy disk drive will emit a certain smell. This is the smell of the electronics inside the floppy disk drive no longer working.

The Molex connector is quite large. As technology improved, the connector needed to be made smaller and also support additional features, thus a new connector was required.

# SATA Power Connector

- Flat connector
- Has 15 pins
- Some pins are longer
  - Helps support hot swapping
- Adds 3.3V
  - Most devices don't use it



Pin	Function
-	Keying notch
1	3.3V Power
2	3.3V Power
3	Enter/Exit power disable
4	3.3V Power
5	Ground
6	Ground
7	5V pre-charge
8	5V power
9	5V power
10	Ground
11	Staggered spinup/activity
12	Ground
13	12V pre-charge
14	12V Power
15	12V Power

4:39 To address some of these problems, the SATA power connector was introduced. The SATA connector is a flat connector which is much smaller than the Molex connector. With devices like solid-state drives, having a flatter connector became more important because the devices themselves became flatter.

The SATA power connector has 15 pins. It may seem strange why there are so many pins on the connector, considering there are only five wires going into the connector from the power supply. Closer inspection of the power connector will show you that some of the pins are longer than the others. It is done this way so that when the power plug is plugged in, some pins are connected before the others. This helps support hot swapping.

Essentially the longer pins transfer power before the shorter pins to give the device a split-second notice that it is being plugged in. This allows the device to redirect the initial power away from the device's electronics. When the device is first plugged in there can potentially be an overload or arcing over the power connectors. Having the pins staggered like this allows overload or arcing to be transferred away from the electronics which reduces the chance of damaging the device when it is plugged in.

The SATA power connector adds 3.3 volts of power. Although the SATA power connector is designed to be compatible with the Molex connector, the 3.3 volt power is not available in the Molex connector. In the real world, this generally is not a problem because not many devices use the 3.3 voltage.

The age of your power supply will determine how many of each type of connector you will have. Newer power supplies will have more SATA connectors than Molex connectors. The older the power supply gets, the more Molex connectors and fewer SATA connectors it will have. This is simply because when the power supply was made, the choice of connector matched what was currently on the market. If you need more connectors than what the power supply has provided, you can add or convert additional connectors for your needs.

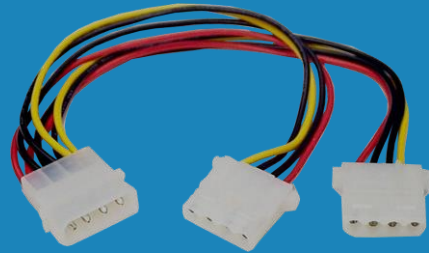
# Splitters/Converters



\* Converter Molex to SATA



\* Converter Molex to 2xSATA



Molex to 2xMolex

\* Molex to SATA will not have 3.3V

6:41 There are a number of splitters and converters that are available on the market. For example, there is a Molex to SATA converter. Keep in mind that Molex does not have a 3.3-volt wire, but since most devices on the market do not use the 3.3 volts, generally this is not a problem.

If you need more connectors, you can use a splitter. For example, split a Molex connector into two SATA connectors. You could also split a Molex into two Molex connectors. Using a few of these to increase your connectors should not cause any problems. However, keep in mind that these put more load on your power supply. If you start using a few of them, you may need to consider getting a larger power supply!

This concludes this video on internal power cables inside your computer. I hope you have found this video useful and I look forward to seeing you in the next video from us. Until that video, I would like to thank you for watching.

## References

“The Official CompTIA A+ Core Study Guide (Exam 220-1001)” Chapter 3 Position 11267-11385

“CompTIA A+ Certification exam guide. Tenth edition” Pages 263 – 265

“Molex connector” [https://en.wikipedia.org/wiki/Molex\\_connector](https://en.wikipedia.org/wiki/Molex_connector)

“Berg connector” [https://en.wikipedia.org/wiki/Berg\\_connector](https://en.wikipedia.org/wiki/Berg_connector)

“Serial ATA” [https://en.wikipedia.org/wiki/Serial\\_ATA](https://en.wikipedia.org/wiki/Serial_ATA)

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