

Building A Computer: A Beginners Guide

Mr. Marty Brandl

The following was written to help an individual setup a Pentium 133 system using an ASUS P/I-P55T2P4 motherboard. The tutorial includes the installation of a CD-ROM drive, floppy drive, hard drive, PCI video card, ISA sound card, and ISA network card. The steps will lead to the successful building of a working computer. The order of the steps is somewhat flexible, however the author has chosen this order because in his opinion it makes the most sense. Please feel free to share and distribute the directions to anyone interested in putting together a computer system. This part of the guide is mostly text. Please see the second part of the tutorial for the step-by-step process in pictures. Any errors or comments about this guide can be directed to the author via email at marty_b11@yahoo.com. Thank you. Enjoy!

1. Start by gathering all of the parts you will need and a Phillips screwdriver. The following is a checklist of everything you will need to put together a system like the one we put together in class.

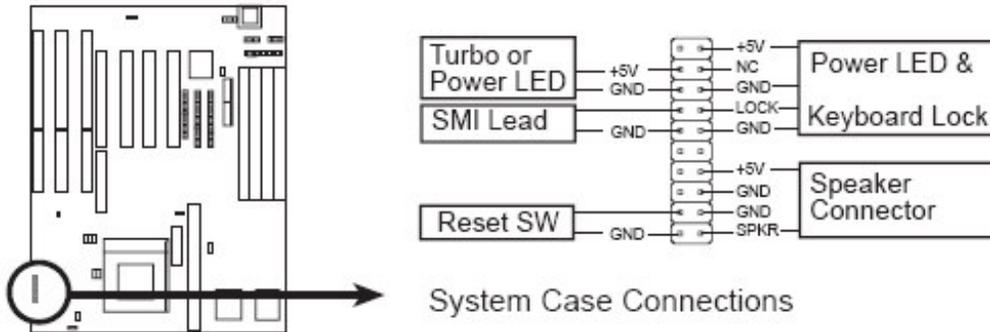
- ❑ AT Case with plastic front panel, hard drive holder, floppy drive holder, front leds, case fan mount with PC speaker.
- ❑ AT power supply
- ❑ CD-ROM drive
- ❑ Floppy Disk drive
- ❑ Hard Drive
- ❑ 2 matching pairs of RAM sticks, 4 total sticks
- ❑ motherboard
- ❑ dongles for serial ports and parallel port
- ❑ CPU
- ❑ CPU heatsink with fan
- ❑ 2 IDE cables
- ❑ Floppy drive cable
- ❑ CD audio cable
- ❑ ISA sound card
- ❑ ISA network card
- ❑ PCI video card
- ❑ 12 fine threaded screws
- ❑ 20 course threaded screws
- ❑ AT keyboard
- ❑ Serial mouse

2. Install the power supply into the case. Attach it to the rear of the case with 4 course-threaded screws. Run the thick power switch cable out the front of the case.
3. Attach the power switch and the grounding wire to the front of the case with a total of three course-threaded screws.
4. Feed the wires from the LED front panel assembly through the hole at the front right of the case. Be careful not to strip or cut any of the wires in this process.
5. Snap the plastic holder into the slots on the front of the case.
6. Take the plastic case fan holder with the PC speaker attached to it and snap it into place in the front of the case. If you have one available, you could choose to put a case fan into this holder, but we'll just use it for the speaker.
7. Pull all of the front panel connectors together and place them out of the way in the case.
8. Find your CD-ROM drive. You can put up to two IDE devices on one cable. One of them needs to be set as master, one of them slave. This is done through the jumpers on the back of the drive. We're only putting one drive on this cable, so we can just leave it as it is.
9. Slide the CD-ROM drive into its slot on the front of the case.
10. Select one of your IDE cables. Notice there are two connectors closer together on one end of the cable. We want to hook the one at that end of the cable to the rear of the CD-ROM drive. Notice the numbers above the IDE connector on the back of the drive. We want to red line on the cable to go with pin 1 on the back of the drive. Sometimes the cables are keyed so they can only go in the correct way, but not always, so make sure you check this!

11. Feed the other end of the IDE cable through the hole and down to the area where the motherboard will be mounted.
12. Now connect the CD audio cable to the rear of the drive and feed it through the hole as well. These cables are also often keyed. However, if they are not make sure the ends of the cable are oriented the same way as you put them into the connectors at both ends. On new computers these cables aren't necessary anymore, but if you want to listen to music CDs on this system, you'll need this cable!
13. Next plug a Molex connector from the power supply into the rear of the CD-ROM drive. The connectors are keyed to go in only one way, but even the right way doesn't seem very easy sometimes. Double-check to make sure you're lining it up correctly before you break something trying to put it in.
14. Then slide the drive in so the holes on the drive line up with the mounting holes in the case. Notice how it sticks out in the front. This will be covered when the front panel is snapped onto the case.
15. Use a total of 4 fine-threaded screws to secure the drive. Don't over-tighten the screws. They should be just snug.
16. Now push down the thin metal strip on the top front of the floppy drive holder and pull it out of the case.
17. Place the floppy drive into the holder and line up the holes. They will probably only line up correctly in one place. Again, notice how the drive sticks out of the front of the holder.
18. Screw the floppy drive into place using 4 fine-threaded screws. Only CD drives and floppy drives use fine threaded screws. Virtually all other screws in computers are course threaded.
19. Line up the rails on the holder and slide it back into place. It should snap in when it is inserted all the way.
20. On the rear of the floppy drive look for numbers close to where the floppy cable connects. You should see either a 1 or 2 or a 33 or 34.
21. Look at the floppy cable. This time we want to put the connector that is just after the twist in the cable into the rear of the drive.
22. Carefully, insert the floppy cable so the red line is pin 1. It seems that it is usually the opposite of what you would think it would be based on the CD drive. You will know if you put this cable on backwards because the light on the front of the drive will come on and stay on when you start the computer.
23. Find a floppy power connector from the power supply and insert it into the rear of the drive. The connector is also keyed so you shouldn't be able to put it in backwards.
24. Now remove the metal hard drive holder from under the power supply in the case. This is done in the same way as you remove the holder for the floppy drive. Push down and pull out.
25. You want to situate the hard drive so that the rear of the drive is pointing toward the front of the case. This is how we will mount it into the holder.
26. Line up the holes on the holder with the holes in the hard drive and secure it using 4 course-threaded screws.
27. Grab a second IDE cable and insert it into the rear of the drive. Again making sure the red line is pin 1.
28. Line up the holder with the rails in the case and slide it into place. It will click into place when fully inserted.
29. Insert a Molex power connector into the rear of the hard drive in the same way as you did the CD drive. Remember whenever connecting a drive there has to be at least two connections: data and power.
30. Set the case aside for now. Find the motherboard and processor. Look at the bottom of the processor and you should notice that one corner is different than the others. Notice how the same is true in the processor socket. Lift the handle of the socket to a vertical position and carefully insert the processor into the socket. It shouldn't be hard to do at all. Remember: Zero insertion force! (ZIF)
31. Once the processor is inserted into the socket, place one finger in the middle of the processor and lower the handle until it clicks into place alongside the socket.

32. Find your CPU heatsink and fan. Look on the bottom of it. Notice how one end has a part that doesn't sit down as low. This part goes over the end of the socket that identifies it, Socket 7. Place the plastic tab on the end of the socket into the hole on the metal tab on the heatsink. This is one of the most important steps as the processor creates a huge amount of heat and it needs to have the heatsink in complete contact with the processor to dissipate the heat. If not done correctly, the processor could fry in a matter of seconds!
33. Pull the top of the tab on the other side of the heatsink in toward the fan and set it down onto the processor. Push the top of the tab out making sure the metal tab goes over the plastic tab on the processor socket.
34. Pull on the sides of the heatsink a little bit. It should fit snugly on top of the processor.
35. Next we will install the RAM. We are working with SIMMs. They need to be installed in pairs. Make sure that you have two that match exactly before installing them. SIMMs are an old type of memory. RAM in more current systems is installed in as a DIMM that does not need to be installed as part of a pair, most of the time anyway, there are always exceptions, such as dual channel setups.
36. The sticks are keyed so that they only can be inserted in one direction. Notice this keying. Slide each stick in at a 45° angle. Watch to make sure it's fully inserted. You shouldn't see much, if any, of the metal at the bottom of the memory stick. Then tip the stick into a vertical position and it should snap into place.
37. Make sure you put the two matching sticks next to each other in the slots. Continue inserting memory until all your slots are filled.
38. Now it's time to insert the motherboard into the case. Turn the case so you can see the side where the motherboard will go. Line up the slots at the bottom of the metal plate holding the motherboard and tip it into place. Make sure you pull down the handle on the backside to allow it to fit fully into place.
39. Lay the case onto its side and drape the various cables out over the side of the case.
40. Pull the hard drive out and carefully balance it at the top of the case, leaving all the cables connected to it.
41. Find the serial port dongle for the motherboard.
42. Insert the two cables coming from the dongle onto the pins marked COM1 and COM2 on the motherboard. Remember, red line = pin 1. In this case, the connector is also keyed so you can only put it in the right way.
43. Place the bracket with the ports in one of the top slots at the rear of the case and screw it into place with a course-threaded screw.
44. Find the parallel port dongle for the motherboard.
45. Insert the cable coming from the bracket onto the pins on the motherboard just behind the COM1 and 2 port connectors. Red line = pin 1!!
46. Place that bracket in another one of the top slots at the rear of the case and screw it into place with a course-threaded screw.
47. Find the motherboard power connectors from the power supply. Remember the black wires need to be together in the middle. It is quite easy to plug it in incorrectly. Doing so will ruin your motherboard if you power up the system with it plugged in incorrectly.
48. Carefully plug each of the connectors into the motherboard. Tip them at a slight angle and then push them into place. It slightly challenging at first, but once you get the hang of it, it's a piece of cake.
49. Now locate the IDE cable coming from the CD drive and put it onto the pins labeled secondary IDE very near the power connector. Yes, it is still red line = pin 1!
50. Next plug in the IDE cable from the hard drive in the same way as the one from the CD drive.
51. Last, plug in the floppy drive cable just below the two IDE cables you just plugged in, again remembering the pin 1 thing.
52. Now you can put the hard drive back into place.

53. Plug the power connector from the CPU fan into a Molex connector from the power supply. This connector is a special pass-through connector. If you wanted, you could plug it into a drive as well, because of the male and female connector on the fan power cable.
54. Find all of the front panel connectors. This includes the reset switch, speaker, power LED, and hard drive LED.
55. Carefully plug each of the front panel connectors into the appropriate pins on the motherboard, as shown in the drawing below.



56. The hard drive LED goes onto the two pins just to the right of the above block of pins. It is labeled IDE Activity LED.
57. Find the PCI video card and carefully insert it into an open PCI slot. Push straight down until you can no longer see the metal contacts on the card above the PCI slot.
58. Screw the card into place in the rear of the case with a course-threaded screw.
59. Take the ISA network card and insert it into an open ISA slot. Follow the same steps as with the video card.
60. Find the soundcard and locate the connectors for the CD audio cable along the top of the card. There are two connectors that will accept the cable. Insert it into either one. It is keyed so it can only go one way.
61. Now insert the soundcard into an open ISA slot on the motherboard just as you did with the network card and secure it in the same way.
62. Time to test things out! Plug in the keyboard, mouse, monitor, speakers, and network cable. The speakers and network cable are optional, but the first three are required. Always plug in the power cord last. This is just in case the computer comes on when you plug it in. Then all of the other necessary connections have been made first.
63. It lives! Once your system boots up then shut it down. Find JP7 on the motherboard and place a jumper on it. Turn the system on for about 5 seconds. Then turn it off again and remove the jumper. This removes the password from the BIOS. This is necessary so we can change where the computer looks for something to boot from.
64. Turn the computer back on and hit the DEL key to enter the BIOS. Note: be careful what you change in here as some things can cause the computer to not startup! Use the arrow keys to go to the second item in the list. Hit enter to go into it. Find the item that says Boot Order. Use the Page Up and Page Down keys to cycle through the settings until it comes to one that says CDROM first in the list.
65. Hit Esc and choose Save and Exit.
66. Insert your DSL cd as the computer restarts and it will boot from the cd.
67. Type DSL and your computer will load a live-cd version of the DSL operating system. Play around. Don't worry about messing anything up, that's how you learn!
68. When you're satisfied that things are working the way they should be, you can put the front onto your case. Push the bottom into place first. Then snap the top into place.
69. Then you can put the top and sides back on the case and use three more course-threaded screws to secure it. Put the top on at an angle focusing on the getting the front into the slots and the rest of it should fit together very nicely.
70. Have fun!!

Additional Resources

The following are available either online or as documents on RenWeb

Items specific to the system we built in class

- Building A Computer: Pictorial Guide
- Asus motherboard manual:
<http://dlsvr03.asus.com/pub/ASUS/mb/sock7/430hx/p55t2p4/p55t2p4-311.pdf>

Websites with general information about building computers:

- PCMechanic – Build Your Own PC
<http://www.pcmech.com/byopc/>
- Cheap Computers Guide
<http://www.cheap-computers-guide.com/index.html>
- Tom's Hardware – Build Your Own: How To & Do It Yourself
<http://www.tomshardware.com/howto/howtodiy/index.html>
- Dave's Site – Computer Building Checklist
<http://www.davesite.com/computers/system/checklist.shtml>