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Build your own PC, part II

There's a great deal of satisfaction to be had from building your own PC from scratch and it means you end up with exactly the machine you want. With base components chosen and fitted, Gordon Laing now shows you how to install the hard disk, optical drives and multimedia cards

Building your own PC gives you the chance to create the customised system you've always dreamt of. After all, there's no compromise when you're calling the shots. Putting together your own computer is easier than you think, too. But where do you start? That's where *PC Advisor* comes in, with our three-part guide to designing and building your dream system.

In part one last month we took a close look at the latest PC components in the market and put together shopping lists for two systems, costing £1,000 and £2,000 including VAT. (You can get your hands on

a copy of last month's issue, containing part one of this series, by calling 01795 414 835.) While the higher-budget PC has allowed us to choose some of the very best parts available, both systems are excellent all-rounders that will delight the busiest office worker or keep the keenest games addict playing through the night.

Our top-of-the-range system features a 2.4GHz Pentium 4 processor with 512MB of the fastest PC4200 RDRAM memory, while the cheaper one speeds along with an AMD Athlon XP 2000+ and 256MB of PC2700 DDR (double data rate) memory. As this workshop progresses, the prices of

ILLUSTRATION: AILEEN O'DONNELL

Be prepared

The first step when handling any kind of PC hardware, whether you're upgrading a single component or building a whole PC, is to ground yourself. This ensures there's no static electricity that could otherwise fry an unsuspecting PC part. Wear an antistatic wriststrap when handling components, available from specialist stores or computer fairs.

The second step is to read the manual that came with your motherboard very carefully, as this is your bible during the DIY or upgrading process. If you lose the manual, fear not, all the motherboard manufacturers store downloadable copies on their respective websites.

The third preparatory step applies to any kind of precision work: ensure you've got plenty of room to work and sufficient lighting as well as ample time as it will take you around two hours just to physically screw the PC parts together. Speaking of which, don't forget your trusty Phillips-head screwdriver; this is the one tool you'll be using to put your PC together.

these processors are expected to fall slightly, allowing you to either save money or go for a faster chip.

While our main PC specifications are instantly recognisable, we've used this DIY project as an opportunity to select some slightly unusual components that you wouldn't normally find in our reviews. Build quality, reliability, noise pollution and good looks have all been taken into consideration.

After selecting our components last month we began the building process by fitting the motherboard in the case, then installing the processor, heatsink and memory. In part two this month, we'll complete the physical installation. If you want to play catchup, part lists are on the Print plus section of our website at www.pcadvisor.co.uk.

In part three, next month, we'll power up for the first time, install Windows, tweak the system and ensure everything's running perfectly. But first, let's finish putting it all together.

On the case

Many PCs compromise on their case, but we've budgeted for an excellent Coolermaster ATCS-201 aluminium model on both our systems. Impressively, the entire inside and rear-panel section smoothly slides out, allowing you to easily mount the motherboard and fit your cards in an open environment.

First, we're going to install the sound and graphics cards. Before inserting a card, you must ensure that the thin metal blanking plate has been removed from the

case for the corresponding slot. When it comes to inserting the card, it's easy to see which plate should be unscrewed. The Coolermaster case makes removing blanking plates and securing cards easy with its large thumbscrews.

Adding extra ports

Both of our motherboards have eight USB ports each, half of which impressively support the latest USB 2.0 standard. But where are all the connectors? Round the back of the Gigabyte GA-7VRXP motherboard used in our cheaper system you'll only find the usual pair of standard-speed USB ports. Even the Asus P4T533 used in our expensive system has just two standard and two USB 2.0 ports at the back.

The missing four and six ports on the Asus and Gigabyte motherboards respectively are delivered via special plugs on their surfaces. These should be connected to special rear-facing blanking plates or front-panels which house the USB ports themselves.

Essentials

- Tools Phillips-head screwdriver, antistatic wriststrap.
- Benefits Building your own PC gives you the perfect specification at a reasonable price. It's also a great lesson in PC hardware and good fun, too.
- Cost £1,000 and £2,000 respectively including VAT for the configurations quoted.
- Time required Approx half a day for this part; approx one day for entire three-part process.
- Difficulty level Medium to high. Must be familiar with inside of PC.
- Tips The motherboard manual is your bible. Read it thoroughly.

The cheaper Gigabyte board comes with two such blanking plates, providing access to its six additional USB ports. The more expensive Asus board only comes with one blanking plate, sporting just two USB ports. This means a pair of ports are potentially wasted.

Remember our Coolermaster case features a convenient pair of front-mounted USB ports, ready to plug into a suitable motherboard connector. This allows us to use all four of the extra USB ports on the Asus system, while dispensing with one of the blanking plates on the Gigabyte system.

The USB connectors on each motherboard are, however, wired differently. This doesn't affect the blanking plates supplied (they simply connect and work), but you'll need to make sure you connect the Coolermaster's cables the right way round.

The Coolermaster case has two cables for its two USB ports and, if you look closely at their plugs, you'll see five coloured wires going in with a pair of black wires at one side. Take a note of this side.

The USB connector on the Asus motherboard takes both of the Coolermaster's plugs alongside each other. Make sure the black-wired sides of the plugs are inserted over the end of the Asus connector that's missing a pin. Similarly, the Gigabyte board's USB connector takes both of the Coolermaster plugs, but they should be inserted opposite ways round. Again, ensure the black-wired sides of the plugs are inserted over the parts of the connectors which are missing pins. (Believe us, this all makes much more sense when you have the board in front of you.)

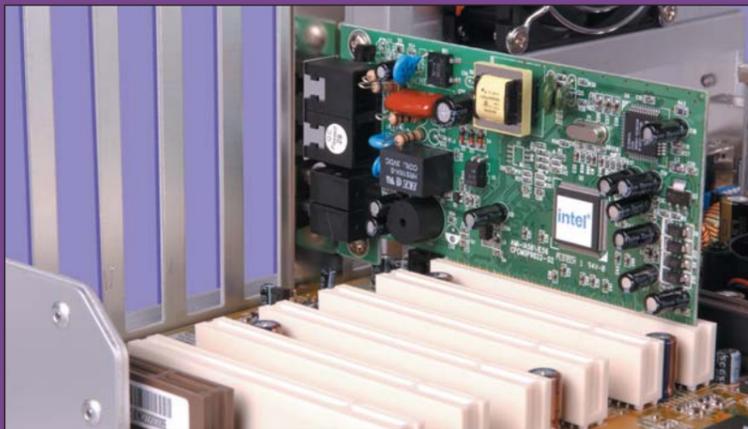
You can fit the blanking plates while the guts of the computer are removed

Installing the cards

You'll notice that both of our motherboards have two types of expansion slots. The white ones are general-purpose PCI slots, while the single brown one is the AGP slot, dedicated to graphics.

When inserting a card into either type of slot, first remove the appropriate blanking plate. Secondly, guide the bottom point of the card's metal plate into the small gap between the back of the motherboard and the case. Next, gently but firmly guide the edge connector of the card into the slot on the motherboard and push it in as far as it will go. Now screw the top of the metal plate into the case to stop the card popping out.

Do this first with the Gainward graphics card in the brown AGP slot. Secondly, insert the Dabs Value modem into any of the white PCI slots. Finally, if you're building the higher-end system, fit the Dabs Value network card into another PCI slot.



from the main case but you'll need to slide it all back into place in order to connect the front-mounted ports. Since it's easier to fit the various drives with the guts still outside, we advise postponing connecting the front-mounted ports for now.

Preparing the drives

Before installing the drives it's worth familiarising yourself with them. You'll notice all the connectors are located at one end of the drive and it's this side which must be pointing into the case (with the label facing upwards) when you physically screw the

drive into place. Each drive essentially just needs two cables – one to transfer data and the other to deliver the power. The data is transferred over flat, wide ribbon cables, supplied with the motherboards. Power is supplied through a number of chunky white four-pin plugs, which emerge from the power supply.

One of the ribbon cables is slightly narrower than the others. This one is for the floppy disk drive. The other ribbon cables are the same width and each features three connectors, one of which is about two-thirds of the way along. The connector furthest from the other two goes into the motherboard. The connector at the other end goes into the hard disk or ROM drive, leaving the one in the middle for an optional second drive.

Look more closely and you'll see at least one of these cables has finer wires than the others. While both types of cables will work with any drive, the finer-wired ones are designed to support the faster speeds of hard disks so if you only have one of these finer cables, make sure it's being used for your hard disk.

Finally, next to the connectors on the drives themselves, you'll find a small group of pins (some may have a tiny plastic square slotted over them). These are jumpers and can be slipped on and off to configure the drive as a Master or Slave. This allows two drives to be connected to the same ribbon cable without interfering with each other.

By default, all drives are set as Masters and we should leave the hard disk and DVD-ROM as such. Our higher-end system has a CD writer, too. This would normally be installed as a Slave to the DVD drive, but this can sometimes affect copying performance. Since both our motherboards feature four drive connectors, we can dedicate one cable to each of our three drives and keep them all happy as Masters.

Lights and buttons

Connect the cables (as described on pages 175 and 176), then the lights and buttons on the front of the case. Each has a wire which should be connected to appropriate pins located in a block in the bottom righthand corner of the motherboard. Refer to the motherboard manuals for details.

Installing the drives

With the case open, you'll see a series of metal cages behind the front panel. These are where you can slide in and secure the various drives. The narrower cages in the lower half are for the 3.5in-wide hard disks and floppy drives, while the wider ones in the top half are for 5.25in optical drives such as DVD-ROM and CD writers.

There's room for four hard disks in the lower cage but, to allow decent airflow around our single disk, we're going to fit it in one of the middle positions. With its label facing upwards and connectors facing into the case, slide the disk into the cage with it resting on top of the rails. With about an inch of the disk still protruding from the cage you'll see that the screw holes line up. Use the screws supplied with the case to secure the disk in place. Remove the panel from the other side of the case to secure the disk from both sides.

For the floppy disk drive, remove one of the 3.5in silver panels from the front of the case and slide the drive inside, label facing upwards. Again, secure it in place with screws on both sides.

Coolermaster assumes that you're going to fit at least one optical drive, so has already removed a silver panel from the top position in the case. Slide the DVD-ROM drive in here from the front (again with the label facing upwards) and screw it into place.

If you're fitting a CD writer, unscrew and remove one of the silver panels below the DVD-ROM, then slide in the drive and secure it in place. Now slide the main motherboard section back into the case and secure it with the thumbscrews.



Connecting the data cables

Take the narrow ribbon cable we mentioned earlier and connect one end to the back of the floppy drive and the other to the floppy connector, located in the top righthand corner of both motherboards. This connector will only fit in one way round but, if you're worried, ensure the red wire running along one side of the cable corresponds to the pin labelled 1 on the drive and motherboard plugs.

Now take one of the wider ribbon cables with the fine wires and identify the end closest to the middle connector; it will probably have a black plug. Connect this to the back of your hard disk. Again, it will only fit in one way. Connect the blue or green coloured plug at the other end of the cable to the connector labelled PRI-RAID on the Asus motherboard or IDE3 on the Gigabyte motherboard.

Take any of the other wide ribbon cables and identify the end closest to the middle connector. Put this end into the back of the DVD-ROM drive and the other end into the connector labelled Primary IDE on the Asus motherboard or IDE1 on the Gigabyte motherboard. Finally, if you're fitting a CD writer, take a third ribbon cable and connect it in the same way to the Secondary IDE connector on the Asus motherboard or to IDE2 on the Gigabyte.

In order to hear audio CDs, you'll need to connect a four-pin plug on the back of the DVD drive to a similar connector on each motherboard, labelled CD or CD-in. This cable is supplied with the DVD-ROM drive.



Finally, fit the power supply unit, connect the cables to the drives and screw the case on firmly. Phew – your PC is now built, but you must resist the temptation to power it up until next month! In the final part of this tutorial, we'll make sure it's ready to switch on and troubleshoot any hardware problems before installing Windows and all the required drivers. In the meantime, pat yourself on the back on a job well done – your dream PC is almost ready for action. ■

Fitting the power supply

The last component to be added to our system is the all-important power supply. Unscrew the aluminium panel from the back of the case at the top and position the Enermax power supply so the mains connector will be in the top lefthand corner. While feeding all the internal power cables through the hole inside the case, slide the power supply into its cage. Use four screws to attach the previously removed panel on to the back of the supply, then another four to secure the whole thing in the case.

Connecting the power cables

Now it's time to attach the cables from the power supply unit so that the PC and each of the drives can operate. The Enermax power unit comes with more than sufficient connectors, even if you want your PC to boast a CD writer as well as a DVD drive. There are several connectors on each bundle of cables. It makes no difference which of the white-capped ones you connect to the hard disk, CD or DVD drives, so choose the most convenient. Again, they only fit one way round. There will also be one smaller plug with four holes in a row, which is for the floppy drive – slip this carefully over the drive's power pins.

The motherboard also requires power, which is delivered through one white plug about two inches long. Insert this into the power connector located in the top right corner of both motherboards – this only goes in one way round and clips into place.

If you're building our higher-end system, you'll need to fit a supplementary power plug to deliver sufficient juice to the hungry Pentium 4 processor. This is a small plug with four pins arranged in a square, which connects between the CPU and graphics card on the Asus motherboard.

• Thanks to Overclockers.co.uk and Dabs.com for supplying components for photography as well as the manufacturers that provided parts to build both PCs. A full list of components can be found in the Print plus section of our website at www.pcadvisor.co.uk/printplus.

