



DIY Computer Repair

Self Computer Repair Unleashed

You have the parts.
Now you need the
technical expertise to
do the repair. It is in
HERE!

Trouble shoot it!

Workstations

Custom

Upgrade It!

Laptops

Hide it!

Gaming

Servers

Fix it!

Build it!

Operating Systems

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Self Computer Repair Unleashed!

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What your Mother never told you about computers

General

1. Static Electricity and ESD

What is it?

- Static electricity is electricity that is all around you, when you move you collect the electrons. On dry or low humidity days you can actually feel the electricity, run a comb through your hair and the hair stands up when you move the comb away.
- When it is discharged it when the damage is done, if it is discharged to a ground no damage is done, well you finger tip might get a slight shock but that is all.
- If it discharges through an electrical component such as a computer component the amperage/voltage though extremely small is high enough to damage the component.
- This is called **ESD - Electro Static Discharge**.

How to keep it from damaging your components

- To protect components from damage you need to ground the computer chassis and yourself.
- If you remove a part from a computer you need to place it on something that will draw static electricity away from the component.
- All ways touch the computer chassis (bear metal) before touching a component. The chassis will absorb a lot of static electricity.



2. Surge Protection

Why a power strip **is not** surge protection

- When the local power company has a power outage and then turns the power back on the amount of power that is sent down the main power line is huge in comparison to what you have in your home or business. This large 'surge' of power will do a lot damage to all power consuming devices if left on. Another type of 'surge' is a lightning strike, it could be miles away and still cause a lot of damage to



Troubleshooting a Computer

General problems

I classify general problems as a problem that causes the computer to not start at all.

Note: If this checklist does not list your problem or device then go to the specific device in this section.

Observe ESD - Electro Static Discharge - This is static electricity that is present everywhere. When you move you store up static electricity, when you touch something with less charge or more charge than your body you get a discharge of the static electricity either from you or to you. To keep from damaging components with static electricity you need to ground your body before handling them.

Anti Static wrist strap



Power

The main problem most users encounter is the computer fails to start when the power button is pressed.

The cause of the problem can be

- No power to the computer
 - Check the AC outlet is the power cord plugged in.
 - Check the back of the computer is the power cord plugged in to the power supply?
 - Check the back of the computer is there a manual off/on switch?
 - Is it on?
 - Do you have a power strip or surge protector?
 - Is it on?
 - Has the circuit breaker tripped?

If the above check list resolves your problem you are done, if it doesn't the next step is to open the computer case.

Troubleshooting a Computer

Storage

Storage problems range from noise to the device not responding or being available when the computer is started.

Noise -

Hard drives make all kinds of noises. Normal operation on a new drive will be very quiet. An older drive will make some 'clicking' noises barely audible.

When you start hearing new noises is when you need to backup your data.

- **Loud and persistent clicking** - the seeker head is having trouble finding or staying on the track that it needs to read or write to.
- **High pitched screech** - the seeker head has either impacted a platter and is stuck between the actuator arm and the platter or the arm has broken and is setting on the platter. As the platter spins the seeker head is being dragged along the platter, sounds like someone scratching on a black board.
- **High 'Hum'** - When a drive starts to get older the motor that rotates the platters, the bearings start to wear. This is a minor concern when it starts but it will get worse with time, then the motor will seize up.

Heat -

Hard drives create a lot of heat, a hot hard drive will expand, when it is cool or cold it will contract. This expanding and contracting will cause cracks in the PCB and eventually the electronics will fail.

Shock -

Hard drives are resistant to 15 G's (Gravity) of shock any more will break the seeker head out of its 'parked' position and will impact a platter.

Disk failure on start -

You start your computer and see on the screen - **Operating System not found**

You start your computer and see - **Stop: c0000221 Unknown Hard Error**
\SystemRoot\xxxxxx

These two errors are the most common for hard drive failures.

Repairing a Computer

General

"Most computer repair problems can be fixed in less than fifteen minutes. The main reason why more people don't do it themselves is they lack the proper instructions to complete the repair with confidence and in a timely manner. What good is it to search the web for a solution when it takes longer to find the solution than it would to call and schedule a technician to come and fix the darn thing?"

Monte Russell
Author/Owner
DIY Computer Repair
Oct, 2006

So now you know why I started www.diy-computer-repair.com.

Before you start your repair you need to prep the work area. Prepping the computer, tools, and yourself will keep you from damaging the computer or yourself.

A clean open area is better than a cluttered small space where tools, parts, and other things go missing, I hate to have extra screws when I finish a job, that means I have to take it apart again and put those extra screws where they belong!

A computer is not a toy, it is a tool, and that tool is dangerous if the proper precautions are not taken.

- The computer has a potential of 120 volts at 10 amps in the power supply even when it is disconnected from the AC wall outlet. This is enough to kill you.
- Under no circumstances open a power supply. It does not have any serviceable parts in it nor can you repair it. **Period.**
- When you work on the computer (my practice is to) always disconnect the power cord from the computer, not from the AC wall socket connection, but from the power supply, that way it is easier to visually check the power cord is disconnected.
- Never put your hand inside a computer that is powered up!
- The next thing is for \$20 or less you can get an **Anti Static mat** and a **personal Grounding strap**. The anti static mat makes it easy to ground the computer from stray static electricity and it is necessary you ground yourself while working with computer components. As you move about you build up static electricity. Although this is a small amount it has the potential to damage computer components.

Tools -

Repairing a Computer

Replacing Failed Hardware

Installing new hardware is fairly simple, you check the oil level in your car engine, if it is low you add the appropriate amount.

ESD - Electro Static Discharge - This is static electricity that is present everywhere. When you move you store up static electricity, when you touch something with less charge or more charge than your body you get a discharge of the static electricity either from you or to you. To keep from damaging components with static electricity you need to ground your body before handling them.

For a computer, **safety** is the most important part of hardware installation. So here is a small checklist to help you (print it out if you would like a hard copy).

- Disconnect the power cord
- If you are working in a area where access is tight I suggest you move the computer to an area where you have more room.
- Have an anti-static wrist band.
- Have an anit-static mat (optional)

Handling new components

- New components come in an anti-static container.
 - Envelope
 - Plastic box
- Ground yourself before opening the case or packages.
- Leave the part in the package until ready to install.

Before opening the computer case to remove the failed component and the computer will still start it would be advisable to go in to the 'Safe Mode' and uninstall the failed component from the Device Manager. This will make the installation of the new component easier. Of course if this is a power supply then it isn't required.

Check the area where the new component will go, remove any components in the way, set aside in an anit-static environment. (on the anti-static mat or in a anti-static container).

- Read the installation instructions (You experts too!)
- Insure you are grounded.

Upgrading a Computer

General

When you think of upgrading do you think in terms of a new computer, or just parts of the computer that are getting older, that the technology has moved past your video card or your Operating System (OS) is telling you the 30 Gig Hard Drive has 10% space left open.

Maybe a some, ummm, suggestions before you go out and spend that hard earned money...

Research -

- The replacement product, two or three different manufactures. Look at the specifications. Different parts have different specifications
- Not one, not two, but three or more online sellers, two local retail stores (I know the economic down turn has had an effect on how many there are now, that is why I mentioned online first) for pricing and availability.
- So you are doing a component upgrade, that is one or two components such as memory and video or just a hard drive.
- Before you purchase what Jim next door has you need to know if the same thing will work in your computer. He may have a 66MHz system bus in his computer and you have a 33 MHz system bus.
- Most motherboard and computer manufactures give out a manual with their products. The manual will have such things as the maximum FSB supported by the system bus, the type and number of slots.
- In some of the manuals will be a chart for memory sizes and FSB speeds very handy. ASUS lists major manufacture's part numbers also.
- If on the other hand you have gave that computer as much TLC it can take and it is still slow, hard drive is full, the last program you installed runs like it is stuck in quick sand because there just isn't enough memory and the processor is four versions behind your neighbors Core 2 Quad i7.

Now when you decide to upgrade do you want the whole ball of wax or just some of it?

I mean will you buy a new -

- Antec case with 1200 watt power supply
- DVD that is Blue Ray capable?
- Go for the i7?
- Get the 1366 FSB memory?
- Run a Dual Video with those monster 24" monitors?
- 8 to 12 gig of Ram?
- 1 Gig of ram on each video card?

Upgrading a Computer

Motherboard

A new motherboard will breath new life in to your computer.

Considerations -

Motherboard only

- Keeping processor
- Keeping memory
- Will they run

Motherboard with new

- Processor
- Memory
- Power Supply
- Heat sink and fan
- Additional fans

Motherboard only upgrade -

Lets say one of the on board controllers failed and you need to replace the motherboard but the version you have is out of production. You can't find the same motherboard but you can find one that the processor and memory you have will work with it. (You can upgrade those at a later time).

- First on this type of upgrade would be to find out what the power consumption is and will the power supply you have be significant?
- Next measurements, you need to measure the motherboard you have and compare them with the specifications of the new motherboard.
- Next will be the ports, look at your case, is there a 'template' where the ports are or is holes cut in the case? If there is a template then the new motherboard should have a template that matches the ports on the new motherboard, you just pop out the old template and press in the new one. If the case just has the holes for the ports cut in it you may have to cut new holes, cut the case so the new motherboard port template fits, or buy a new case.

You take the measurements, the template will work, so you order the motherboard. It arrives, all set to do the deed.

Hold on!

Laptops

General

Originally called portables, then notebooks, now laptops.

A portable was a self contained computer. Like the laptop of today everything was contained in a carrying case. The carrying case was about 30 inches wide, 26 inches long, and 6 to 8 inches high (depending on manufacture). Three companies made portables - IBM, Compaq, and Kaypro. The video was a mono chrome CRT with a 6 or 8 inch diagonal measurement. They weighed 16 to 22 lbs. The case looked like an old time portable sewing machine your Grandmother had in the closet. The first portables had dual floppy drives, then they came with a hard drive.

Only Compaq and Kaypro had a second generation of the portable and they came with the 286 processor. The Compaq Portable II was the first computer to have a plasma display and it was color - Orange! The Compaq Portable II was the first computer to have a interface for the BIOS to set parameters. Until this time things like port speed for the serial ports, the hard drive size, and memory functions had to be set by a batch file. The Kaypro was the only portable to have a 386 processor, it also supported 16 meg of memory.

The next step towards the laptop is the notebook. Compaq introduces the notebook in the late 1980's it will come with either a 286 or a 386 processor it will also have color plasma screen, light blue back ground with black lettering which could be change to white background with black lettering. It was unfortunate that Compaq didn't realize that the black lettering would burn in on the screen if it was not shut down when inactive. If the screen had been black with white lettering the burn in would have been less noticeable. This will be one of the first notebooks to run Windows CGA. The 386 Notebook II will support 32 Meg of memory and have an IDE 30 Meg Hard Drive. The Compaq Notebook and Notebook II will be the only notebooks on the market until IBM introduces the IBM ThinkPad series in at the start of the 1990's. Notebooks were very small in comparison to laptops, they were approximately 10 inches by 10 inches and the video was 11 inches diagonally. They also weighed 8 to 11 pounds.

IBM will introduce the ThinkPad series and it will be the first true laptop measuring 11 x 11, weighing in at 6 lbs! The video will be true VGA color, 1 million colors with a resolution of 800x600. The processor will be a 386, the memory will be maxed out at 32 meg, and the hard drive will be the first real laptop 3.5 inch 120 Meg IDE. And the cost was that of a medium sized car of the day. This will be the first laptop to run Windows or OS/2. To install either OS you had to use floppies, CD ROM had not come to laptops yet, 90 floppies!

At the same time as IBM introduces the ThinkPad Apple will introduce its laptop, the differences are striking. The Apple laptop will measure 12 x 13 inches and weigh 12 lbs.

Laptops

Processor

Like their counter part the desktop processor the laptop processor can be replaced and / or upgraded.

The laptop processor is a completely different processor than the desktop processor. They are smaller, they consume less electrical power. That doesn't mean they are any less powerful for computing.

A laptop processor can be replaced or it can be upgraded. How far you can go with a processor upgrade depends on the processor and the computer manufacture.

Some laptop manufactures use a limited BIOS and you may not be able to increase the processor more than one or two steps. That is if the processor is say a P4 1.8 MHz you may not get the BIOS and motherboard to see a 2.5 MHz but it might see a 2.4 MHz processor.

Examples -

Some upgrades I have done

- IBM T-23
 - This is a PIII motherboard.
 - Upgrade a 600 MHz to a 999 MHz
 - Good upgrade? Yes
- IBM T-30
 - This is a P4 motherboard
 - Upgrade 1.8 GHz to a 2.5 GHz
 - Good upgrade? Yes
- ACRE 2440
 - This is a P4 motherboard
 - Upgrade from 1.4 GHz to a 1.8 GHz
 - Good upgrade? No

So as you can see some motherboards will take an upgrade some will not.

Disconnect the AC power adapter, remove the battery, this will prevent inadvertent power up of the computer.

To remove the processor you may only have to lift off the keyboard (IBM/Leveno/Sony). Some you have to take the motherboard out of the case (Acre/Toshiba).

How To...

This is a section that is very helpful for other things that we would like to know how to do but either don't have time to search for the answer or even know that there is a way to do something.

Now this will get a little geeky from time to time so if you don't understand the process send me an email and I will help you.

So what is here you ask?

How to...

1. Disaster Recovery

- a. Back up your data!
- b. Restore your data!
- c. Backup your Operating System
- d. Restore your Operating System
- e. NAS (Network Attached Storage)

2. General Maintenance

- a. Installing a hard drive
- b. Hard drive Partitioning and Formating

3. Make your computer faster

- a. Defragment your hard drive(s)
- b. Network connection

4. Make an Emergency Repair Disk (ERD)

- a. Make a bootable floppy
- b. Make a bootable CD/DVD
- c. Make a bootable USB Pen/Flash drive
- d. Make a bootable external hard drive
- e. Batch Files

5. Setup your router

- a. Keep the hackers out!
- b. Why have a Software Firewall / Proxy
- c. Windows Firewall

How To...

NAS (Network Attached Storage)

I will explain -

You do a scheduled backup of your data to a external device and then you have to remove that device and store it in a safe place.

Lets say you have an older computer setting around collecting dust, you plan on either donating it to a local charity or giving it to your nice to practice her new found tech skills because you gave her a yearly membership to this site. But wait! That computer can do more!

Yes that computer still has much life left in it (unless it is totally destroyed by a power surge or power supply failure) and can be very useful.

Network Attached Storage or NAS is a computer with the minimum of frills. It has an Operating System, no sound, a low resolution video (or what ever came on the motherboard), maybe a cd/dvd, and a hard drive (the larger the better). Some computers will start with out a keyboard. If you have one that will do this you will have to remote in to the computer to do any work or shut it down and connect the keyboard and mouse to do any work. Some companies use this method to secure high value systems from being tampered with such as in ATM's or Kiosks where the public can use a touch screen to navigate around the menus.

So how would you accomplish this miracle?

You only need an old computer -

- A computer with enough storage to house your backups both data and images.
 - Your old computer will work with a few upgrades.
 - The processor does not need to be upgraded.
 - Memory of onr or two gig is sufficient.
 - Hard drive should have enough storage space to accommodate one year's backup of your data and any hard drive images you make over a years time.

Once you have it set up then you create your accounts and then share a folder for your files.

Consider this -

Computer components

This section is general information about the components of a computer, most is general knowledge, some of it is specialized in that a Technician or Engineer would know it but the normal user wouldn't. It maybe of interest to you to help understand how a computer works and what some of those 'things inside the box' are.

Cases

Cases come in a plethora of designs. There are small ones, tall ones, short ones, fat ones, skinny ones.

There are desktop, there are towers, and there are rack mounted (server) cases.



Basically a case holds all the components of the computer from the power supply to the hard drive.

Most cases are split up in three parts. The main bay will be where the motherboard and most cables are located. It may have racks or slots for hard drives. Then there will be a bay for hard drives, cd or DVD drive and some will have a slot for a floppy drive. The last bay if it is separate will be for the power supply. Some cases have the power supply in the drive bay this would be a two bay case.

Desktop cases are smaller and take up less room. The draw back of a desktop case is the room inside for the components. A mini computer has less room than the standard desktop but the area it occupies is very small.

Tower cases sit beside a desk, under a desk, or table. These typically have three or more slots for hard drives. The bay for the power supply is larger and will accommodate a higher wattage power supply than a desktop. The main bay will have room for a fairly large motherboard, all of the cables and extra fans. Some cases have extra openings on the sides of the case to exhaust hot air from the fan mounted over the processor. Most tower cases have accommodations for one or more intake fans at the front of the case and for one or more exhaust fans at the rear of the case.

Caution – Because some cases are very cheaply made they are from a stamped process where the case manufacture uses a large press to cut the parts of the case from sheet metal. The metal cuts are not 'deburred' that is rounding of the edges. These cases can have edges that are very sharp, a cut would be the same as using a razor blade, very deep and very thin, and painful.

When working inside the case be careful to not drop any fasteners, if you drop one you need to get it out of the case. If you fail to get it out of the case it could become lodged between the case and a component and cause a short or even a fire.

Computer Components

Power Supply

What is it, what does it do, and why do I need one?

The modern computer runs on DC (Direct Current) and most buildings are supplied with AC (Alternating Current) all over the world.

When IBM decided to build the modern PC there were a lot of other computers available. IBM being a Global Corporation had the world in mind when the design teams were brought together. Knowing that electrical power in different parts of the world ranges from 240 to 110 volts AC they wanted a way to reduce that AC voltage to DC voltage and standardize the power requirements for off the shelf components such as IC's (Integrated Circuits), memory, processors, and at the time floppy drives.

All components inside a computer run on two voltages. There are four auxiliary voltages for the modern motherboard only.

- 12 volts positive
- 5 volts positive
- auxiliary voltages
 - 12 volts negative
 - 5 volts negative
 - 3 volts positive
 - 3 volts negative



The power supply takes the 'house voltage' and amperage that is supplied at the outlet and first reduces it to 240 volts AC through what is called a rectifier. Then through a series of diodes, capacitors, and resistors it reduces that voltage down to 120 volts. This voltage is still AC. With a diode bridge the 120 volts AC is split off to 120 volts positive and 120 volts negative DC. These voltages are reduced in amperage through a series of capacitors and resistors. Once the voltage and amperage is at specifications then part of this voltage is made available by wiring harness to the computer.

Part of the 120 volts positive and 120 volts negative is further reduced to 5 volts positive and 5 volts negative when the correct voltage and amperage is achieved it is then made available by wiring harness.

Another reduction of voltage is required on newer motherboards that is 3 volts positive and 3 volts negative.

When you look at the connectors coming from the power supply you will see a plethora of connectors.

Operation of a Computer

When and where it started

When the microprocessor was a 4 bit device it didn't have the power or the instruction set to do very much. Turn this solenoid on, turn this solenoid off. Simple stuff for controlling valves and other switches.

Then Intel and a couple of other companies introduced the 8 bit processor. The 8 bit processor will bring life to now what is called Microcomputers. One student was keen on getting the Intel 8080 to work with out the same type of equipment that the Main Frames and Mini Computers used for inputting and saving data, that was the Tape Drive and the Teletype that used paper tape to transfer the code in to the processor and the tape to save the data that was produced.

This young collage student just out of the US Navy was Gary Kildall and it was 1973. What he wanted to do was using a floppy drive (remember the 15" floppy?) to put the code on and have the 8080 read the floppy and do the computations then write the result back to the floppy. Basic I/O (Input and Output). The program he wrote to execute his instructions was called Basic. At the same time some other young college students were also working on a way to use the Intel 8080, the Z80, 6800, and the Z8001. One of these young students was Bill Gates, and down in California in a garage two other students were trying to get the 6800 Motorola processor to talk to a tape drive, one of them was Steve Jobs.

When Gary Kildall perfected his I/O program he called it CP/M which means - Control Program for Microcomputers. He will later on Copyright and Trademark the name CP/M. And then he will make a mistake that will cost him. He works with a company called Micro Soft. Micro Soft is working on different programs for the 8080, Z80, and 6405 and needed a Operating System to get the I/O from a tape or floppy to the processor to run their programs. Gary Kildall will sell his rights to Micro Soft for the CP/M and Basic programs.

From here on out it is all down hill, this small program will be the base from which all Disk Operating Systems will be derived.

Operation of a Computer

Memory Timing

Memory timing is an advanced topic with a lot of theory and concepts so if this confuses you don't worry I wrote it and I am still confused!

Timing and voltage are the necessary ingredients for faster memory there are some concepts and acronyms that need to be explained before I get in to the actual timing discussion.

DRAM (Dynamic Random Access Memory) speed is rated in nana seconds. How fast the DRAM can get the memory to the system bus is the game.

And it is all in the timing. Timing depends on some components either as part of the memory or as part of the system bus.

Newer memory chips are mounted on a small PCB that is called a memory module. There are five main types of memory modules:

- SIMM
- DIMM
- DDR
- DDR2
- DDR3

Each one starting with the SIMM has a role to play in how fast memory is accessed in today's computers.

First some 'electrical' terms, this may get a little 'Geeky' but it is necessary to understand how the timing and voltage effects the speed that is realized from 'tweaking' these items -

- **RAS** - **Row Address Select** - This must be at a low voltage before and during a read or write operation and can be used to initiate a refresh
- **CAS** - **Column Address Select** - This is used to initiate a read or a write to the memory address, it is also used to initiate a refresh through the RAS. this CAS initiated refresh is called *precharge*.
- **WE** - **Write Enable** is used to initiate a read or a write operation, low voltage means read, high voltage means write.
- **Data In or Out - DQ** - When voltage is applied to this pin the memory address cell can be written to. If voltage is absent the it would be a read operation
- **Voltage** - Voltage applied is 1, voltage absent is 0. The value of the voltage when increase causes a decrease in the refresh rate, a decrease in voltage will case an increase in the refresh rate, that is the higher the voltage applied to the DRAM then the longer the charge in the transistor will last thus the refresh rate will drop.

Operating Systems

DOS

When the microprocessor was a 4 bit device it didn't have the power or the instruction set to do very much. Turn this solenoid on, turn this solenoid off. Simple stuff for controlling valves and other switches.

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In the late 1970's IBM is developing a new computer aimed at the Business world after all they are the International Business Machine company. This new computer will not be a kit computer like the Altair, Atari, or any of the small 8 bit computers on the market. No this computer will be using a new processor that Intel has been developing in semi-secrecy for the last few years the 8088 a 16 bit processor.

IBM contacts some of the young now graduates that have started their own companies writing code, developing computers, and making game machines like Pong. The companies contacted will be Digital Research, Micro Soft, and Xerox. For some reason IBM did not seem to like the atmosphere at all of these companies but chose to do business with Micro Soft. IBM contracts Micro Soft to write two programs one will be a

Operating Systems

Windows

When Xerox sold it's copyright to the process of creating little pictures of different functions on it's copiers to Apple they became Icons. An ICON is a symbol, could be a religious figure, a business figure, it could be almost any thing but Xerox copyrighted it first. Then sold it to Apple.

Why does this have anything to do with Windows? Well your desktop has Icons to represent different items. Directories, programs, disks, etc and Windows would not be what it is today with out the ICON. They are also know as Objects in other Operating Systems, OS/2 comes to mind when speaking of the desktop 'Objects' or icons.

Windows - The early years

Windows started out as a replacement for DOS with a **Graphics User Interface (GUI)** and would hide most of the functions of DOS behind the GUI. Seemed like a good idea at the time.

IBM and Microsoft were working in collaboration on the next 'Killer App' (Bill Gates' words not mine!) called OS/2 this would be a true 32 bit Operating System and would feature a GUI, and would have graphic representations for different things or functions.

At the same time Microsoft was using the same technology to create their own version of a GUI and 16 bit operating system called Windows.

When the first version of OS/2 ver 1.1 was introduced by IBM with the IBM PS/2 386 IBM and Microsoft would part ways for a while and the copyright suits would follow from both sides.

Microsoft will introduce Windows at ComDex 1988 and they will use a Compaq 386 Deskpro to do the demo. It was a black and white demo, not even in color but it worked.

The next version of Windows will be a color version and will be 1.1, other than the color not much new with Windows, ho-hum, OS/2 had color in 1 million colors, Windows 1.1 was CGA - 16 colors and it was only a 16 bit OS!

Microsoft and IBM make friends again in 1990 and begin on a new version of OS/2 ver 1.2. This version will be available on a CD instead of over 90 3.5 floppy disks. Windows 2.0 will be introduced but it still isn't ready for prime time, to many bugs, the 16 bit OS can not break the 1 Meg memory barrier that OS/2 broke three years ago. ('No OS will need more than 640 K of memory' - Bill Gates - ComDex 1985 when asked about the IBM PC XT that had 1 meg of memory).

Advanced Computer Repair Techniques

General

This section has repair techniques that a seasoned veteran repair tech would use on a daily basis. Some would call this a tips and tricks section but some of the things here take more than a tip or trick to understand and use.

What is in this section

- **How to make a boot device**
- **Backing up the registry**
- **Registry editing**
- **Restore a registry**
- **Registry changes**
 - **Group Policies – XP (See Appendix)**
 - **Group Policies - Vista/Windows 7 (See Appendix)**
 - **Services – XP (See Appendix)**
 - **Services - Vista/Windows 7 (See Appendix)**
- **Operating System Optimization - XP**
- **Operating System Optimization - Vista/Windows 7**

Before you head out to fix all those nagging problems please read this caution -

As with any repair always read the instructions if provided first. If you don't understand the instructions read them again. Lacking understanding of some instructions will be disastrous. Not only to your data, your computer, and maybe to you personally.

If you read the instructions and still feel you don't understand them the please contact me and I will endeavor to explain the instructions to you.

When you are trying to fix a problem and can't find the driver here is a web site I use frequently for drivers:



Advanced Computer Repair Techniques

Using a registry change to delay the startup of services, this will allow the desktop to load faster.

When the registry is read at initialization the services have five states for startup:

- **0** – Boot Loader by kernel loader. Components of the driver stack for the boot (startup) volume must be loaded by the kernel initialization.
- **1** – System: Loaded by I/O subsystem. Specifies that the driver is loaded at kernel initialization.
- **2** – Automatic: Loaded by Service Control Manager. Specifies that the service is loaded or started automatically.
- **3** – Manual: The service does not start until the user starts it manually, such as by using Services or Devices in Control Panel. Or through a program that requires the service.
- **4** – Disabled: Specifies that the service should not be started.

Note: Any service that has a type of **0** or **1** do not use this mod for. If you delay a driver for hardware by mistake you may cause the OS to hang or blue screen on start. Pay attention to the type key before modifying the startup.

To delay a service from starting when the Service Control Manager runs the **Automatic** startup the service must have an entry in the registry that will cause the Service Control Manager to search for another existing value. By adding a DependOnService value to the service.

Warning: Do not use a non-existent value for DependOnService. This will cause what is called a ‘circular dependency’ and may cause the Operating System to fail.

- By using two or three other services as the dependency the service will wait on the dependency services to start before it starts thus causing the service to start later in the initialization phase.
- Before modifying the registry with the following instructions you need to decide which services you want to delay and which services to use as the Dependancy services.
- To find a service that Automatically starts that you do not want to delay open the System Manager, go to Services, in the right hand column find two or three services that you will not be modifying. The services I would pick are the Cryptographic Services, Event Log, Plug and Play, or Remote Procedure Call (RPC). These services are started automatically and are installed when the OS is installed.

Extreme Computing

Over Clocking Introduction

This is where you can push your computer and you sanity to the limit. This is where you can take a \$5000 perfectly good computer and melt it.

Before you proceed to the other parts of this section read this:

Disclaimer!

Over clocking your computers processor and memory means that you are going to stress the physical components beyond manufactures specifications. I disavow any responsibility for your actions and am not liable for any damages you incur if you proceed with this section. All actions take by you are yours alone. If you do continue this section you alone are liable for any damage you do to your computer or the components of the computer.

Question -

“Why would a sane person take a perfectly good car with a perfectly good engine and add nitrous to the carburetion? A sane person knows that Nitrous is a very explosive gas and it is also very dangerous to breath. But we do it, we take an engine apart and over bore the cylinders to put in bigger pistons, we shave the heads to increase the compression. We know we are voiding any warranty on the car but we do it. Why? For one thing we know more than those egg head engineers that designed the engine, right? And because we can!”

That is the same ideology that Over Clockers have. Why? "To go faster! Because we can! And we know more than them geek engineers!"

Ok, so how do you push your processor and memory right up to the micromillimeter edge of melt down?

Very carefully and with a lot of cold air, water, or Freon.

"Are ya skerd yet?" He asks as he runs the tac up to 7 grand before he pops the clutch!

There are seven parts to this section, I will advise you to go through each one slowly and understand what the text is telling you.

Over Clocking

Effects of heat

Why you over clock and the effects of heat.

To understand the effect of heat on the components of a computer you have to understand how the heat is produced.

When electrons flow from one point to another it is energy. The resistance to the flow of the electrons creates friction. This friction is turned in to heat. Such as a light bulb, if you have a forty watt light bulb and it is on for a few minutes it is fair to say it is hot, if you have a 100 watt light bulb and have it on for a few minutes it is fair to say you can feel the heat from a couple of inches away. The reason for this heat is the electricity flowing through the filament in the light bulb has enough resistance to create the heat necessary for the filament to glow white hot.

This same principle applies to all computer components some more, some less than others. The largest heat producing component of a computer is the Power Supply (**PSU**). The next rival to the PSU in heat generation is the **processor**. The processor creates heat because the size of the 'wires' (traces) inside the silicone container are extremely small, nana technology. That is the trace is 0.000001 of an inch, small. The electrons flowing inside these small traces are also extremely small but smaller than the trace. How small ? very small. Let's not get number bound or we will be here for a couple of years. Needless to say that the flow of electrons inside the traces will light up the processor if it wasn't encased in opaque silicon. This movement of electrons creates heat, lots of heat. Now how to dissipate this heat? By putting a piece of metal on the silicon to absorb it and move it away from the delicate traces. Along with the piece of metal there is another larger piece of metal with fins this is called a heat sink, it absorbs the heat from the metal of the cpu package. Add a fan to the heat sink and you have adequate cooling for normal operations. Increase the electron flow and then you have to increase the cooling either with more fans, a bigger heat sink, a lower air temperature, or all three!

There are different types of heat sinks, the most common are the blocks of metal usually aluminum that have fins machined or cast on them. These are engineered by the processor manufacture to draw as much heat away from the processor as possible and be economic in production and cost to the consumer.

The next type of heat sink is a third party heat sink that is engineered to draw away more heat from the processor and place it where circulating air will remove it from the computer. Some of these heat sinks are made of copper instead of aluminum. They also have what are known as heat pipes, these are pipes made out of copper tubing that lift the heat to another heat sink away from the processor. Add an extraction fan to the upper heat sink and the temperature of the processor will drop dramatically.

Virtual Computing

Quote <http://www.yourdictionary.com/virtual>

virtual Definition

vir•tual

adjective

1. being such practically or in effect, although not in actual fact or name a virtual impossibility

2. COMPUT.

a. designating or of a kind of memory (sense 8b) that makes use of disk space to supplement main memory while large programs are being executed

b. of, pertaining to, or taking place in cyberspace or in virtual reality

virtual shopping

Everyone has heard of virtual reality, but do you really know what it is? It is one thing to play a game on a computer and another to do it in real life. Games are not virtual reality, some hypsters will tell you they are but they don't fit the criteria.

A real 'virtual Reality' would be a flight simulator where you are in the cockpit of say a 747 or the latest and greatest fighter learning how to fly the aircraft. Another type of 'Virtual Reality' are the new resonance aircraft the military use. The aircraft is a robot flown by a pilot in a remote location. The pilot has video of the aircraft in flight to tell him what the vehicle is doing. The pilot has controls that are exactly like a cockpit in a real aircraft has. This is Virtual Reality.

When you play a game it is a simulation and it is virtual but it is not reality you are not interacting with anything except the game. I would also consider on line games as simulations. You maybe playing with or against other players but you are not interacting with anything in the real world.

There are different types of virtual devices -

- Virtual CD/DVD Drive (VCD)
- Virtual Hard Drive (VHD)
- Virtual Computer (VC)
- Virtual Memory (VM)
- Virtual Networking (VPN)
- Virtual Drive (RAM Drive)
- Virtual Assistance (VA)

Virtual Computing

Virtual Computers

A couple of years ago I had my home computer setup just about perfect. It was fast, it had enough storage, and it had all my games installed. Life was great.

Then one evening after work I decided to download a program that one of my co-workers said was a good program for making cd's and it was free. I had Adaptec Eazy CD Creator but wanted to try the program. So I downloaded the program and installed it.

The next night I fired up my computer and proceeded to make a cd. It worked pretty good so I made a couple of bootable cd's then closed the program.

On the third night when I started my computer I got the ominous **hard drive not found or system disk error** on the monitor. Huh? I thought 'That ain't right! I used my computer last night!' So I put in my trusty IT bootable cd and start poking around. My hard drive was wiped clean! You got it the program was a virus.

My next step after getting over the sinking gut feeling and being mad was to look at the three cd's I had made the night before - blank, nada, nothing on them. To be careful to not infect another computer or mine again I destroyed the three cd's. Now this hurt because at that time a cd cost about two dollars and I was making around ten dollars an hour.

So you can see why I am a Virtual Computer (or VM as VMWare calls it's product) user and advocate. If your VM gets infected with a virus you can either try to clean it or just delete it and make another one.

There are a number of different Virtual Computer programs on the market.

Microsoft has came out with one called Virtual PC (see my [article](#)) and it has problems to fix before I would recommend it to anyone that is not a programmer.

The program I use a lot is Virtual Machine by VMWare (see my [article](#)), you can download a trial copy that is good for 30 days. I have been using this program since my first encounter with a destructive virus. For the most part when I download a 'Free' program from a web site that is not the publishers I run it in a VM first, if some hacker/thief has put a virus in it that the virus scanner can't find and it trashes the VM, no problem. Delete and make a new VM.

Definitions / Glossary

Note: Not a complete listing of computer terms. These are the most common terms, all the computer terms would fill a good sized dictionary.

A

Algorithm - a programming technique for gaining a desired result by manipulating data. AGP - Accelerated Graphics Port: Allows for acceleration of 3D computer graphics, this means that the graphics are read from the system ram (memory) by the adapter instead of being processed through the system processor. Thus speeding up the display of 3D graphics.

B

BIG - Built In Garage. When the "Clone" revolution was at its peak some computer companies were housed in the owners garage. A lot of the sole proprietorship companies (i.e. startup companies) start in garages or spare bedrooms. BIG Computers.

BIOS - Basic Input Output System the underlying program that controls the input and output of the physical devices connected to the computer. A embedded program that can not be changed.

Binary - Base two digit numbering system. (two digits zero and one, off or on, true or false, Computers use the binary system to manipulate data)

Bit - Basic building block of the computer, one binary digit, one storage location, can only be zero or one.

Boot - The process of starting up the computer, loading the BIOS, the POST process, and starting the OS.

Byte - Eight bits, binary number of bits that are the building blocks of programming for computers. Most computer components are measured in BYTES, some confuse the measurement with BITS. Such measurements reduce the measurement by a factor of EIGHT. KiloBYTE. MegaBYTE, GigaBYTE.

C

Clone - Computers that had the IBM PC style case and a compatible main board and were cheaper than the IBM PC by thousands of dollars.

CD-ROM - Compact Disk - Read Only Memory, CD's became available for music in the 1980's, early in the 1990's CD ROM Drives became available for the computer market. Writeable CD's with the correct format can be used in Audio CD players, or you can store up to 800 meg of data on one disk. Also comes in Re-Writeable format.

Cache – A place where temporary data is stored for a short period of time. On the processor there is a small amount of memory where incoming data is stored until the processor is ready to act on it. (Also known as read ahead memory). For browsers it is a temporary area for files that are downloaded to make the viewed page display properly, a temp folder.

D

Defragmentation - The process of taking all the parts of a file and writing them to contiguous blocks

Appendix

The following checklists are for you use, they are printable and if you would like to print them out and give them to your friends please feel free to do so as long as the cover and copyright pages remain in tact.

Here is a list of the checklists:

1. Cleaning a virus from your computer checklist.pdf
2. Computer repair eight part checklist.pdf
3. Creating an image of the boot partition checklist.pdf
4. Hard drive remove and replace checklist.pdf
5. How to dual boot checklist.pdf
6. Installing and or uninstalling programs checklist.pdf
7. Installing new hardware checklist.pdf
8. Network connectivity checklist.pdf
9. OS installations checklist Windows 7.pdf
10. OS installations checklist XP.pdf
11. Partitioning and formatting a hard drive checklist.pdf
12. Services and GPO list Windows-7.pdf
13. Services and GPO list Windows XP.pdf

These are my current Repair Manuals, I think you will find them of great interest:



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