

# **Nofrillstech's Mini Computer Beginner's Factfile**

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## System Optimization:

### There are 5 steps to optimize system software health:

- 1) General File and Internet File cleaning, then File Check via the O/S facility, or, a custom File Checker
- 2) Registry cleaning
- 3) Defrag of HDD or Boot partition
- 4) Defrag Registry
- 5) Boot Defrag

### There are 5 Guardians to optimize software protection:

- 1) Firewall
- 2) Antivirus
- 3) Anti-Adware/Anti-Spyware
- 4) Anti-Rootkits, and, in addition, keep them all current, plus:
- 5) **Always unplug/disconnect from the Internet during cleaning, or, when not required, for extra security...?**

### There are 5 steps to optimize system protection for non-ruggedised systems:

- 1) Temperate and non-high-traffic ambient surroundings, with all leads and switches protected from disturbance
- 2) Clean Mains power, with surge protector(s), power conditioner, or preferably, a UPS, excluding laptops
- 3) Hardware monitor programs installed for temperatures, HDD health, etc
- 3) No floor-level deployment of any computer equipment, to minimize/avoid heavy dust accumulation
- 4) Regular quarterly(?) checks inside the case for dust removal, plus, replug all leads and cards concurrently
- 5) Avoid static/EMF contact, especially inside the case, turn off and unplug **ALL** systems in violent weather

### There are 5 additional schedule steps:

- 1) Cleaning should be done weekly, or, just one or two steps per day, everyday, will achieve the same result
- 2) To check O/S health, perform Start/Run **sfc /scannow** monthly, with O/S disk installed
- 3) Check for O/S updates, including Custom Updates, but only download from Custom what you **really** need
- 4) Backup Registry Files and Drivers regularly, keep these folders safe on separate drives, or a CD
- 5) Have boot partitions cloned, and preferably to a separate HDD, ready for dual-boot and/or re-cloning

### There are 5 emergency steps to try before advanced problem-solving:

- 1) Task Manager, and check for non-responding programs, then Restart
- 2) Turn off and leave for 15 minutes, or, overnite is ideal, before restarting.
- 3) Restore Point, or, other Registry Backup utilised
- 4) F8 Start, then uninstall the problem program, or, rollback a problem driver
- 5) Complete clean and defrag as above, then File Check, via the O/S facility, or, a custom File Checker
- 6) Start/Run **sfc /scannow** or, Windows Repair as last resort, **before** complete clean and O/S reinstall
  - **Enclosed are program lists that can be consulted, relevant to the O/S installed, from 2000-Win 7**
  - **RTFM, so, to do this, be sure to have current and relevant software and hardware manuals on your desk**
  - **For the full Beginner's Manual, with headings and additional details, consult <http://nofrillstech.net/>**
  - **ASK GOOGLE! There are many useful resources and answers Out There!**

## The weekly housekeeping regime, depending on custom programs in use:

- 1) Delete all unwanted personal, (delete large files in batches, **do not choke the Recycle Bin**)
- 2) Install/de-install programs as required, preferably using a utility program
- 3) Empty Recycle Bin and Documents Shortcut File
- 4) Perform Internet Options deletions, remember Files, Objects, History, etc.
- 5) Perform any necessary back-ups at this stage, including reinstalling programs, **and data backup**
- 6) Run Guardians, **Avira, Ad-aware**, etc., and, Cleaners such as **Crap Cleaner, WinTools**, or similar
- 7) Empty Recycle Bin once more to be sure, and, do not use the Recycle Bin as a storage facility!
- 8) Perform **Scandisk/Checkdisk, Disk Cleanup** and **Defrag**
- 9) Keep Drivers back-ups, Registry backups, Custom programs, **and Microsoft Update**, all up to date

**Important:** Stay in Desktop to run housekeeping programs singly and consecutively, and **do not** concurrently open other files, programs or Windows, as there may be a clash, or even an inadvertent file corruption that will cause a malfunction, and loss of data. Not worth the risk to try this as a time saver. **Tidy your desk instead..?**

**Seldom defragment solid state HDDs, including flash, for longer working life. There is finite life span for their memory cells, which are flashed repeatedly to effect data saving.**

### Custom Housekeeping programs examples:

Virus, Trojan Checkers	<a href="#">Vet(\$)</a> , <a href="#">Avira</a> , <a href="#">Avast</a> , (f), viruses, trojans and spyware only
Adware, Spyware	<a href="#">Ad-Aware</a> , <a href="#">Spybot</a> , <a href="#">Threatfire</a> , <a href="#">PopUpKiller</a> , <a href="#">SpywareTerminator</a> (f)
Firewall & Virtual Browsing	<a href="#">ZoneAlarm</a> , <a href="#">Sandboxie</a> (f)
Cookies, Internet, etc.	<a href="#">Cookie Monster</a> , <a href="#">CrapCleaner</a> , <a href="#">StartPageGuard</a> , (f)
Email Backup	<a href="#">Outlook Express Backup</a> (f)
Online Email Checkers	<a href="#">Mailwasher Pro</a> (\$)
RAM Monitor	<a href="#">FreeRam XPPro</a> , <a href="#">Memory Booster</a> , (f) NB, <b>Low RAM overworks the Boot HDD!</b>
Utilities (&/or)	<a href="#">RegSeeker</a> , <a href="#">ERUNT/NTRegOpt</a> , <a href="#">Auslogics Defrag</a> , <a href="#">DustBuster</a> , <a href="#">360Amigo</a> , <a href="#">Advanced System Care</a> , <a href="#">Glary Utilities</a> (s/f); <a href="#">Wintools</a> , <a href="#">Registry Mechanic</a> (\$),
Drivers Backup	<a href="#">DriverWizard</a> , <a href="#">DriverMax</a> , <a href="#">Unknown Device identifier</a> , <a href="#">WinDrvBackup</a> (f),
System Analyst	<a href="#">SANDRA Lite</a> , <a href="#">SIW</a> (f), using <a href="#">Gadwin Printscreen</a> (f) for easy printouts
Web Upload/Download	<a href="#">CoreFTP Lite</a> , <a href="#">FreeDownloadManager</a> , <a href="#">NetMeter</a> , <a href="#">TCPOptimiser</a> , (f)
File Zip/Recover/Find	<a href="#">IZarcFileUtility</a> , <a href="#">FreeUndelete</a> , <a href="#">SearchInformDesktopFree</a> (f)
HTML	<a href="#">NvuHTML</a> (f), or such as <a href="#">Dreamweaver</a> , <a href="#">Frontpage</a> , (\$)
PDF	<a href="#">pdf995</a> (\$), <a href="#">PDFCreator</a> , <a href="#">Adobe Reader</a> , <a href="#">FoxitPDF</a> , <a href="#">doPDF</a> (f)
Audio-Visual	<a href="#">MediaPlayer 10/11</a> , <a href="#">QuickTime</a> , (f), ask Google.
Burner	<a href="#">CDDVDBurnerXPPro</a>

**Also, remember that 32-bit and 64-bit systems will use corresponding Custom Programs, OK!**

## REGULARLY BACKUP YOUR OWN DATA!

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## Nofrillstech's Own Essential Programs List:

**Avira** virus checker, and, **AVG Anti-Rootkit**, **ZoneAlarm** Firewall, or, a less resource-hungry virus checker is **PCTools Free Antivirus**, similarly, a less resource-hungry firewall is **PCTools Free Firewall**, both quite effective

**Ad-Aware** Adware and Trojan checker, and, **Threatfire**, especially for rootkits

**Firefox** Browser and **Thunderbird** Email to avoid Microsoft-targeted online mischief-making

**Wintools(\$)**, **EusingFRC(f)**, for cleaning Files, Shortcuts, and Registry Entries, Startup, Uninstall, and also TweakUI

**CrapCleaner** for Internet Files, Applications, and some Registry Entries, plus Startup and Uninstall

**Advanced System Care** for extra Housekeeping and Security use, **SpeeditupFree** for system efficiency

**DustBuster** , **360Amigo** for advanced automatic file cleaning

**Auslogics Defrag** for speed, good graphic, and settings that include USB or other external drives, **Page Defragmenter** for boot-time defrag of System Files and Registry, (excluding **Vista/Win7** as of May 08, a custom (\$) program may be needed)

**ERUNT** for Registry Backup, and **Auslogics RegDefrag** for Registry Defrag

**CheckDisk** will do just that in Windows, and report, in lieu of a boot-time Windows File Check

**Autostart and Process Viewer** finds and displays just as it says

**Driver Wizard** for Driver ID and finding, also **WinDrvrBackup** for Driver Backup

**HDDHealth** for HDD monitoring, **HDTune** for HDD analysis and checking, **CheckDisc**  for file indexes

**Rubber Ducky** for a good real-time system function graphic, **Sensors View(\$)** for real-time system vital signs monitoring

**SIW** for quick system analysis details, **HWMonitor** for temperatures and voltages

**IZarc File Utility** or **Zip Genius**, handy file utilities, **Fences** for handy Desktop Icon control

## Highly Commended:

**Eusing Free Registry Cleaner**, nearly as good as **Wintools** for the Registry

**FoxitPDF**, small and effective PDF Reader; **doPDF** small and effective PDF maker, **PDFCreator**  is larger, more technical

**FreeUndelete** for those deleted file recovery missions, **EasyUninstaller** for problem programs

**Eraser** when you really mean it; also includes the Boot HDD cleaner, **DBan**

**HDDWipe/LLFormat** cleans and/or wipes Slave HDDs in Windows, and, more effectively than O/S Reformats do

**SyncBack** for file and folder backups, **Gadwin Printscreen** for Desktops images

**Sage Dictionary**, **Vikrant's PC Glossary** for respective quick references

**Mailwasher Pro(\$)** for that very useful anti-spam bounce function

**Google Toolbar** now locks a Home Page, **TCPOptimiser** tweaks Internet bandwidth and speed

**VLCMedia Player** seems to work when not all others do..? **CDDVDBurnerXPro** for a good, all-purpose burner

**PowerSuite BootDisk(\$)**, **Vista/Win7PE**, **BartPE**, **MiniPE**, **Hiren's BootCD**, via **ImageBurn**, all make useful boot disks for data retrieval and system repair and/or HDD/partition copying/imaging; **Puppy Linux** for quick data recovery, **2000-Vista/Win7**

Add your own...?

## A Starter 32-bit Vista/Win7 Custom Software Suite:

ZoneAlarm, Avira, PCTools Free Antivirus, PCTools Free Firewall, Ad-Aware, CrapCleaner, 360Amigo Threatfire, SuperUtilities(\$), Wintools(\$), Registry Mechanic(\$), Glary Utilities, RegSeeker, EusingFRCleaner, DustBuster [], Advanced System Care, Auslogics Defrag, Auslogics RegDefrag, ERUNT/NTRegOpt, ImageBurn, FreeRam XPPro, HWMonitor, Sensors View(\$), Autostart and Process Viewer, HDDLife, HDTune, SIW, Driver Wizard, WinDrvBackup, HDDWipe/LLFormat, Rubber Ducky, Checkdisc, MagicJellybean Keyfinder, Actual Booster, CheckDisc, TCPOptimiser, Fences

IZarc File Utility, OpenOffice [], Eraser [], NvuHTML, StripFile, doPDF, FoxitPDF, CoreFTP Lite [], Gadwin Printscreen, Vikrant's PC Glossary, Sage Dictionary, SyncBack, Google Toolbar, Rubber Ducky, PowerSuite BootDisk(\$), MiniPE

VLCMedia Player, CDDVDBurnerXPPro, and, see also FreeVista/Win7Files for more Vista/Win7-compatible general software choices.

**Note that Win O/S efficiency improvements, plus, ever-increasing system resources and performance, will tend to render this particular aspect of Housekeeping less of a priority, however, always have O/S images, clones, and/or Recovery Discs, up-to-date if using such Custom programs, regardless of their provenance and/or reputation. Also, remember that 32-bit and 64-bit systems will use corresponding Custom Programs, OK!**

Two good tweaks that will increase Vista/Win7 speed are, Disable/Stop of Superfetch, and, HDD Indexing Services, via Administrative Tools. Also, turn off hiberfil.sys via regedit if hibernation is not needed, (Win7 HDD Indexing also turns off same as for XP.) SpeeditupFree does wonders for Vista/Win7's system efficiency. Win7 will have a Startup-tweaking facility to minimize the number of running programs that consume memory. Some Custom programs such as ASC will also perform Registry Tweaks. Reputable computer magazines will also have dependable O/S tweaks. Follow online tweak advice with caution, however, especially in relation to O/S Services.

Nofrillstech has trialled Win8 Beta as of August 2011, and found it to be a good RAM utiliser, as well as being more like XP, at least at the beta stage. Let us hope than this remains the case, tho this 32/64 bit version would only run on a minimum dual-core system. Tweaks were the same as for Vista/Win7, ie, turn off Prefetch and hiberfil.sys, plus HDD Indexing, via HDD Tools. Great care is needed to turn off other Services, do so at your own risk, and, according to your own needs, there is plenty of advice in Google on the subject, and the hiberfil.sys Regedit turnoff instructions are posted there as well. UAC turnoff may also be wanted, also via Regedit. Meanwhile, use effective cleaning and defragging programs to optimise system performance, accept Updates, and all should be well.

**For Linux users,** See the Min-Linux Factfile via main page.

**For Apple users,** there are many Apple books and online forums which can be consulted, so, these few Apple comments file merely presents some initial common-sense tips, for new and average users. As well, only desktops and laptops, and relevant OSs, are discussed.

Apple desktop and laptop systems hardware are now based on Wintel platforms, which means easy transfer of skills for management, maintenance, and troubleshooting. The OSs are similar in layout to Linux, including Terminal Command line use, being based, in turn, on Unix. The OSs are relatively cheap, but Apple hardware is expensive, and Apple prefers that only their own OSs will run on these machines. Note that this rule can be circumvented, but, is best left to more expert users to practice. The OSs are not licenced as MS OSs are, but do have a cost, however, and just downloading a Mac OS iso, especially an older version, can be problematical, especially older versions, Apple itself does not help in this regard. Apple OSs are, at present, 2015, variations on OS X.

Installing Mac OSs needs the correct disc for your model, after which you can boot holding down the Alt key, with the disc installed, or, you can insert the OS disc while the system is running normally, and select the install option that way, if practicable.

Apple computers and laptops come in just a few models, so, hardware and software compatibility throughout the range is generally assured, 'integration' is thus the key descriptor. The systems are robust, but, only the newer A-type laptop models are relatively easy to disassemble. Sadly, the latest Retina models now revert to custom HDDs/SSDs, and RAM is soldered onto the system board. Similarly for Apple all-in-one systems. PC-style cases and contents are more straightforward, well, at present, anyway. For the average user, access to battery, RAM, HDD, and CD/DVD is important, and Wintel models are thus much easier to work on, and recyclable, if you are that way inclined?

For Apple, the change to Wintel systems came 2006/7, thus, OS install discs also reflect that change. For laptops the change came between G3 iBooks, and Macbooks, so select the correct OS type and number for your particular system.

Mac hardware diagnostics can be run by pressing 'D' at boot, Disk Utility can be used to check the HDD/SSD when the system is running. System Reporter and Onyx can also be used, check for particular model numbers before downloading. Otherwise, plug to other systems to test as practicable. On Older Macs, HDDs and/or their ribbon cables were very common failures. Memtest will test memory while the system is running. Note that programs are downloaded and then run, recommend using the Applications folder, and to uninstall, just dump in the Recycle Bin.

**Note that Mac OSs recognise Fat32, the universal file system, so ensure this is used as drive formatting when swapping storage between MS, Apple, and Linux systems.**

**Note that the same physical handling rules apply for any Apple systems, that apply to all computer hardware, viz, keep as cool as possible, do not jolt or drop while operating, (especially with SSDs installed), keep away from liquid spills, direct sunlight, avoid excessive EMF, and, ensure a steady mains electricity supply, where possible, etc.**

**Apple systems now have problems with viruses and other malware, thus Sophos(f) antivirus is recommended, as well as Malwarebytes, although be sure you have the genuine article of the latter. Time Machine can restore infected systems as well, but as for all Internet use, common-sense prevails, and supervision of minors, in other words, so, be always wary online, of what is searched, and/or clicked on....OK!**

**Additional software** can be downloaded from the Apple App Store, plus other sources, but, is best left to advanced users, or, seek informed help as required.

**OS Updates can be manual or automatic, but are best allowed to proceed uninterrupted, as with any OS, to forestall being corrupted, and consequently causing problems even to the extent of clean booting failure. Make sure that the system clock is set to the correct time before updates**

**Apple OSs defrag automatically, cleaning for speed does not involve file accumulation, but more streamlining operations, as per following excerpts:**

<http://osxdaily.com/2014/01/13/defrag-mac-hard-drive-necessary-or-not/>

<https://discussions.apple.com/thread/3642953> Kappy's Personal Suggestions for OS X Maintenance

Plus <https://discussions.apple.com/docs/DOC-4032> see also **Everyday Mac, How To Geek/Apple**

**Backup is needed, beyond the given system, or The Cloud, and, a good quality platter external drive is still recommended. (WD Black or Blue HDDs, not Green.) Note that SSDs usually fail catastrophically when they do fail, and, are thus not recommended for long-term storage, similarly for flash drives.**

**Store partitions** are not as easy to set up as for MS and Linux OSs, but, can be done by advanced users. Resizing partitions can be done with the OS disc, for more expert users. Cloning entire Mac drives is achievable with **Easeus Disk Clone**, (latest version of which includes SSDs), so, for the ultimate clean back-up, just swap the drives, update, and then reclone to another HDD/SSD to store.

**Running MS apps on Apple Systems, and vice-versa, look for, and use, the respective equivalent native formats first, after which seek advice, virtual environment programs may need to be used.**

**Portable Broadband USB modems** are simple mobile phones that draw power from a computer, and thus connect wirelessly to the Internet, the best option for independence and portability within specified mobile signal range. This is the ultimate no-frills option for Internet access without fuss, and, unwanted or unnecessary hard-wired phone connections.

**Finally, computers, OSs, and other software, are either all useful tools, or, just gadgets and gimmicks, thus, you will decide your own usage purposes.**

### **Note also:**

**One motto and one maxim to observe, both most important for effective computer management:**

**Persevere, with Patience and Purpose, plus,**

**Those who do ask questions are fools for 5 minutes, but, those who will not are fools forever**

(China Trad.)

**The 5 Principal Computer Vulnerabilities to continually oversee and manage are:**

**Power, Cooling, Security, Housekeeping, and Backup.**

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## The Least You Must Know About Effective Computer Management:

### A) To make it all so much easier:

- 1) Learn to touch-type, the only true computer and/or keyboard shortcut.
- 2) Alternating ambidextrous mouse use will alleviate fatigue, and prevent possible RSI.
- 3) Define (optimally) what you need to do, and thus, what you need to know to accomplish this.
- 4) Buy popular and reputable, buy new(ish), buy optimal, especially RAM.
- 5) Buy computer literature similarly; useful, but not too glossy.
- 6) RTFMs when you have bought them, keep a log, and study just like in school, believe it!
- 7) Plan modest projects, learn in small steps, and take relevant computer classes if possible.
- 8) Keep a Computer Day Diary or log, organise Time, and both of your desktops.
- 9) Use sensible furniture, sensible time-spans, sensible exercise breaks.
- 10) Always pause/quit when you are ahead, as tiredness engenders problems.
- 11) Practice, and how much is needed, may depend on age and/or strength of purpose.
- 12) Observe default settings, and always make expendable data copies to edit and practice with.
- 13) Never needlessly tinker with Rash Uninstalls, Unknown Programs, DOS, or, Hidden Files, OK!
- 14) **Faultfinding and trialling always undertake in single, simple steps, and log your actions.**
- 15) **Regularly Save, use Restore Points or ERUNT, Back-up, Backup, Backup, VERIFY, and then Safe-Keep, OK!**
- 16) If you do not want to manage computer systems, then delegate and pay someone who will, or, \$\$\$!

### B) For Beginners, also t.m.i.a.s.m.e. to decide on system purchase:

- 1) Experiment and practice wherever you can, before you buy, or, just buy very basic or second-hand systems. Save the big purchase until real work and/or extensive use of the Internet beckon.
- 2) If you want the Net only for email, or odd searches, just use the Library, or visit a friend; buying for the regular and optimal use of the Internet is a more serious financial step.
- 3) Sensible and useful Net communication is the ultimate use of a computer, and this already shapes our future, so do not spurn any opportunity to learn and experience the Net, even if you do not own or manage a personal computer, because there is so much, Net-wise, that is worthwhile, even if you just augment existing hobbies.
- 4) Take care with committing to Internet contracts, dialup or broadband, consider what is really needed, the durability and reputation of the service provider, and, any fine print re finance, cancellation, etc.

### C) For Computer Operation and Management, once again t.m.i.a.s.m.e:

- 1) Take good physical care of your investment, CBMSF et passim, ie, give it A Good Home, and Good Housekeeping! A computer is not like a fridge that is bought, unread paperwork filed/lost, thermostat set, and then it chugs along for 25 years. For a computer, from the outset, the priority is to see that it is cared for and managed properly, because there is no either/or in this respect if you want to get your money's worth, and, optimal use of computer time. **The 5 Principal Computer Vulnerabilities to continually oversee are Power, Cooling, Security, Housekeeping, and Backup.**
- 2) **At the very least, install these programs in an Internet-ready computer:** virus checker, ad-ware checker, firewall, Temporary/Internet File cleaner, home-page lock, Registry cleaner, and email cleaner, update them all ad hoc, plus check regularly with **Microsoft Update**, and do not forget Removable Media checks.
- 3) Learn as diligently about hardware as you do software. Hone observation and pattern-recognition skills, especially of Desktop messages, as you work! **Observation aids record-keeping, which aids pattern recognition, which in turn aids problem solving, axioms applicable to all computer endeavours.**
- 4) **If you care about data integrity**, ensure that all HDDs are formatted to NTFS, including external drives, too, also important for Networking. Always use a custom program to perform an initial low-level HDD cleaning.
- 5) Have optimum RAM installed to ease the labour of the HDD, and **optimise software functions**. Download Internet updates in quieter hours, avoid static time online at peak hours, especially if the computer is unattended. Dial-up is slower than ADSL/Broadband, but it is cheaper, your IP address changes each time. Use an Internet Connection optimiser such as **TCPOptimiser** for improving either service. (See also **Beginner Business Computer**)
- 6) Security programs such as virus checkers and firewalls should be disabled for major O/S repairs or re-installations, and for housekeeping that involves installation and activation of special and/or new programs, enable these again

when all related tasks are completed. Always use Restore Points and backup options when Housekeeping, also ensuring all is well before deleting any of this stored backup.

7) Computer-related Backup should include drivers, O/Ss, custom programs, relevant emails, receipts, and Favourites, VERIFIED, and all for long-term safe-keeping, OK!

8) **Cleaning of CD/DVDs is best done by propyl alcohol on cotton wool, with outward strokes.** A short burst of fresh air through the open flap, and/or short insertion time of a correct cleaning disc, will suffice to keep CD/DVD drives and laser lenses clear of dust and debris, but check all disc surfaces before insertion. **Do not flex discs, or risk damaging the laminations, and thus jeopardizing disc readability! Faulty CD/DVD drives can halt POST at Startup!**

9) Consult your own computer records to aid professionals when their time and skills are needed; trial-and-error faultfinding are expensive, and strain relations, plus, knowing the right questions will also help, so do your homework. **Print your BIOS/CMOS settings directly from Setup; printer On+paper, hit Printscreen key.**

10) **Use a UPS/SPS, utilising power and phone line filters to protect that as well! To make things easier for the good professionals, computers should be enabled to run only when connected to a UPS/SPS, and when a full updated Security Suite is also in place, and believe it, OK!**

11) **Peripherals need not necessarily be replaced if you just need a new motherboard/chip, bigger/extra IDE/SATA drives and/or a thermally-advantaged case, so consult if necessary! Vista/Win7 O/S use, however, may enforce Old Faithful program replacements, so, be warned. If XP still does the job, then perhaps you do not really need Vista/Win7..?**

12) **The First Minor Law Of Human Computer Logic is to RTFM, OK! Delegate wisely if you do not intend to RTFM, RTF Books, or, be otherwise interested or Hands-On, OK! To gain the right computing answers does mean knowing the right questions in the first place, and someone needs to be responsible!**

13) **If it ain't broke, don't 'fix' it, and/or use the system wisely in the first place, thus avoiding problems and crashes that would need fixing. Also, if it runs well do not clog it, and never rely solely on Recovery Procedures! Faultfinding and trialling always should be undertaken undertake in single, simple steps, and log your actions!**

14) **Always SWITCH OFF MAINS POWER to systems before opening cases, and use sensible EMF/EMI/ESD/RFI prevention practices. Always disconnect from power and phone line during bad weather, or when not in use.**

15) **Use booted computers with cases closed and intact, where possible, to protect both system and operators from adverse effects of EMF/EMI. Cable networks rather than wireless are also advisable in high EMI environments. Note that the cheapest, most reliable, and secure network of all, is a clean USB or similar external drive.**

16) **Fit system fans and/or use ambient air conditioning, and also utilise 'thermally advantaged' system cases, ideally full towers, to counter system heat buildup.** The average system operating temperatures should be no more than mid-high 30s°C, CPU and HDD, for a PC, and for laptops allow another 5°C max. If more in either 'case', install fan cooling, ambient cooling, or, relocate, as applicable.

17) Computer problems may 'hide' behind each other, or, manifest similar symptoms, thus epitomising the influences of The Laws on such complex systems. Solutions, therefore, may range from simple and low-tech to complex and comprehensive, but, any analysis or remediation always requires patience, logical and orderly thinking, and, perseverance. Computer Faultfinding Motto: **Persevere, with Patience and Purpose, OK!**

18) **Windows Vista/Win7 Upgrade Advisor** will help with dependent decisions, and remember to factor in all ancillaries and peripherals when estimating prospective system requirements and resources for respective Vista/Win7 level matching. **But, optimal Vista/Win7 performance, with optimum drivers included, will take two years, after the 2008 launch, to effectively implement.** So, plan a wise and utilitarian **Vista/Win7 Upgrade** decision as/when necessary.

19) **The Ultimate Backup is a clean, original boot HDD or partition, updated and always ready to clone, with the scion being used for everyday purposes?** (There are technical reasons, to do with uninstalling and/or updating programs, which mandate keeping the original HDD as the main backup.) Vista/Win7 Business, Enterprise, and, Ultimate Versions, have a native **Complete PC Backup** facility, as well as **System Restore** and **Files and Folders**, which can all be accessed via the Backup and Restore Centre.

20) **Modern large HDDs should have multiple partitions for optimal performance and data deployment, and to confine the O/S working area. There should always be 20% free working space an any HDD, note.**

21) **Check BIOS/CMOS settings, especially on unknown systems, for optimised settings relating to CPU, RAM, and BUS speeds, also USB-enabling, PnP, boot order, quiet boot, etc. Consult if you need to, OK!** Note also that **Locked BIOS = EI Cheapo Computer** is a good Rule of Thumb, and means the CPU is already set to its operating limits.

22) **Note that some system adjustments, such as for ESCD, PnP, or RAM changes, are not effective without a proper 'cold' boot rather than just a 'warm' restart,** and, leaving the system to sit for an extra hour or two when dealing with persistent anomalies is also effective as 'current' electrical traces will eventually dissipate. With Reboot(s), the system will then rescan for any changes, and, **should** boot as normal, incorporating the desired settings. **Note that warming a system case interior with a hair-dryer** may help with booting, in an emergency, when all else has been tried. This is itself a sign of

impending Mb failure, because material stress over time has caused some conductive filament to fail at a cool or cold temperature.

**23) Reseat, Restart, Reset, Restore, (as in Defaults, Registry, or Points!), Replace, Reinstall, Rerun, Repair, Replenish, (as in upgrade!), Refine, (as in using mains/phone filters and UPS/SPS power!), Recheck, even Reformat and/or Repartition, then Reinstall once again. The 12 Rs of System Recovery!**

**24) Bootable USB Drives:** Whole customised O/Ss can now be loaded onto USB external and flash drives, given that the parent computer will boot to USB in BIOS, and, **MiniPE, BartPE and Vista/Win7PE** can also be loaded to a flash drive for emergency HDD data access. (See also **LiveUSB, BootDisk**, and **PCStats** re bootable USB drives, including for installation of OSs on USB drives) **Never defragment solid state HDDs, including flash, for longer working life.**

## **D) Some professional scams, and related factors, to be aware of:**

# **Ram substitution** will involve, for example, swapping into a system two older 256 Mb modules for a single 512 strip, because the 256Mb strip can then later be sold for a good profit. The system RAM is then harder to upgrade as a result, as the sockets are taken up with RAM that must be **completely** replaced.

# **RAM stripping** means to remove the 'excess' RAM from a computer before re-sale, usually followed by reinstalling it in the same computer, often at the customer's request, following a costly 'offer' to 'boost RAM'. A **'net' RAM replacement**, (retaining the difference for expedient resale), rather than adding additional RAM, is another similar ploy. Always ascertain what optimum RAM incorporation is possible for your system, including the current modules, before extra RAM purchases are made.

# **Under-RAM** means just that, especially in a new computer; do not bother with less than 256 Mb in a new XP-based computer, and preferably, have **512Mb** installed, circa 2008. 128Mb will hardly boot a modern computer, thus, no new computer should be sold with so little RAM, as you will soon be back for more! A good professional should advise you on the best computer capacity for projected use, but, **you** must also know what you really **need**, as opposed to just wanting. **1000 Mb RAM is the XP O/S minimum, 2010; 2000 Mb is now the minimum for Basic Vista/Win7, in 2010!**

# **Overclocking** means to swap a smaller CPU for a larger CPU that can be re-sold, the smaller CPU is then over-clocked to run faster, in **your** computer, usually with deleterious results such as over-heating, damage, and program malfunction.

# **Unexplained lock-ups not attributable to viruses or trojans** may be caused by software bugs inserted to 'time out' and manifest themselves sometime after a service or repair; aka **logic bombs**, naturally necessitating a return for more 'service'.

# **Not returning hardware after an unsuccessful driver 'search'**, ensuring yet another sale, at a later date, of the 'junk' so kindly 'disposed of' on the unwitting and trusting customer's behalf. **Actually, a driver search** is a handy way to test the integrity of a professional without endangering your entire system, or without outlaying too much cash, as well. Otherwise, ask Google if you are proficient enough to essay an online search, and there are also dedicated sites such as **DriversGuide.com**, or, use **Driver Wizard**.

# **Beware the default full reformat and reinstall** that avoids attempting professional software problem-solving, especially if there is a driver or other software search; **usually done without further consultation**, and, too bad if you do not have back-up, although there can be a handy in-house charge imposed for that as well. **Modest system problem-solving efforts, at least, should be expected, and you, the computer owner/manager, are responsible for backing up your own data. Note that a full HDD or partition wipe and O/S re-installation still may be more cost effective than essaying major software problem-solving. An optimally partitioned HDD, or even better, cloned HDD or partition, are therefore very handy, OK!**

# **Not telling you that all computers DO need proper Security and Housekeeping programs**, including for trash files, software health, and for cleaning the **Registry**, plus regular HDD checks and defragging, **including Registry defrag**. If these procedures are not regularly carried out, systems will slow down, there will be software problems, reformats and/or complete HDD clean-and-reinstalls will be needed sooner rather than later, and **you will pay** if you cannot do all or any of this yourself! **Extra RAM** is no sensible substitute for routine **Housekeeping!** **Prevention v. Cure, OK!**

# **Not providing appropriate original O/S system and driver discs**, and also current, plus legitimate serial numbers; such standards apply to any other accompanying peripheral or installed program that should be thus supported.

# **Not providing a coherent and sound warranty** that includes in clear terms, parts and labour, and duration, as well as any possible extent of financial liability. **The responsibilities of both buyer and seller at time of sale should also be explicitly stated. Caveat Emptor, Caveat Emptor, Caveat Emptor, OK!**

# **Not giving you the option, or, even the encouragement, to purchase a UPS/SPS, or even a basic power surge monitor to use with your computer, or even explaining why power and phone lines need appropriate electrical filters.**

# **Always ensure that you record the relevant statistics of your computer via System or a system analyst before committing to an outside service or repair, and re-check when your computer is returned.** RAM strips and their respective sizes, and, HDD/Optical Drive brands and specifications, must also be checked by sighting them inside the system case. Once again, having an IT professional handy whom you can trust implicitly is very important, so seek until you can find one! To repeat, **caveat emptor**, and knowing the right questions is also necessary before seeking the right answers! **Do your own computer homework, or be sure delegate this responsibility effectively!**

# **The worst example of professional misconduct so far**, as witnessed by Nofrillstech, was RAM swapping in a blind man's computer by a supposedly respectable member of a certain NSW/Australian small-town business community.

# **The worst example of professional lying, no doubt in pursuit of possible profit**, was an IT professional's 'special test' once carried out to prove that Nofrillstech's Notemaker 'had the wrong charge to ever touch computers'. Many computers since have been thus 'touched' by said Notemaker, with no ill-effects for either party, while just using sensible anti-static precautions..! IT service and repair should never be a just licence to print money..!

## **A serviceable Wintel computer system, PC or portable, should have the following operational factors:**

- 1) **Genuine O/S number**, certainly within the software, and definitely on the case, sometimes there may even be a different number. So, always test with **SIW** or similar, also for other software numbers. Record these numbers, and store securely. **Always check new systems for an O/S label on the case, refuse the sale if this is not present.**
- 2) **Additional support discs**: An O/S disc that goes with number(s), system, viz. age, type, 32/64 bit etc; Startup disc, Drivers disc, ancillary software discs, or other appropriate media. O/S discs can be downloaded, Startup discs made as per O/S facility, and, drivers can be recorded and saved with **DoubleDriver** or similar, also on appropriate media for the system in use. Be sure to check that all drivers are present. Updated drivers are not so important **as actually having drivers that work**, especially for network and Internet use, being most important for solo home systems, OK!
- 3) **Note that modern BIOSs will enable booting from a USB and/or portable media**, especially important for those systems that no longer have a floppy or a CD/DVD. USB flash drives must be made bootable with **Unetbootin**, or similar. **Ask Google, there is much on offer on this topic.**
- 4) **Ideally, Windows O/Ss should be constrained within a boot partition**, 50 Gb min should do, and, there should be one or more storage partitions on that HDD. Systems with extra partitions set by commercial installers can be zeroed, then a fresh O/S installation undertaken, given that factors, listed in 1) and 2), are available, of course. System managers will also avoid bundled software, spreading of O/S software, lack of extra partitioning opportunity, etc. **Be sure to disable Indexing and Superfetch, which will avoid unnecessary HDD activity, and thus wear. Check HDD SMART at least monthly**, with **CrystaDiskInfo** or similar.
- 5) **Always have a good quality flash drive to save data externally, on a temporary basis, and a similarly, a conventional HDD for long-term bulk storage. Note that Solid State HDDs are not suitable, value-for money, for bulk storage, and will also only be fully catered for anyway, re formats, no-defrag, and partition alignment, by Win 7 O/Ss and above. Vista and XP will need extra software and drivers for SSD management purposes**, so, consider these factors before buying SSDs, including the fact that 4<sup>th</sup> generation SSDs are the current optimum choice, after development problems up till that stage.
- 6) **Recommend a clone boot partition also**, depending on system management expertise, easy enough with XP, though use of Easy BCD is required for Vista/Win7/8. **Consider also a spare cloned HDD for any computer**, kept up-to-date by USB enclosure use, and easily swapped when needed, then the original drive can be repaired or replaced. **Booting from an inner partition is desirable**, with HDD age, thus spreading the HDD wear.
- 7) **If you just want the basics of Internet, Email, and word-processing, graphics, etc, then consider using freeware Open Source O/Ss**. The gaps between these O/Ss in performance, between Wintel, and now 'Mactel', are always steadily closing. Little if any Housekeeping is required, and any HDD, PC or portable, can be likewise used in any other appropriate system. **Pentium 4s can still be used**, although bundled drivers may not be more than basic for older systems, no such problem for newer systems, including for dual monitors.
- 8) **Consider that your computer system is a tool**, rather than an end in itself, just to own and admire, with no real-world gain for money spent, and thus, avoid pitfalls of blindly following marketing trends. Stay just off the crest of the marketing wave, do system pre-purchase research, plus, incorporate sensible computer management and usage patterns. Note also that XP has much life left, most new systems have XP drivers available, as of 2011, **though avoid HP/Compaq**, as they do not supply XP drivers for newer systems. **Once again, ask Google re usage of XP in this regard.**

## **Care and Maintenance of Data:**

1. **Never trust a computer and/or its HDD, and, never solely rely on either for data safety, including USB flash drives.**
2. **Use an external HDD for data storage, (conventional, with platters, not SSD), even use more than one, and store separately for safety, plus, never leave permanently connected to the system, thus wearing them even when not used directly.**
3. **USB flash drives are useful interim storage, but have finite lives, (as do Solid State Drives), so if used often, should be replaced yearly or so, especially if left plugged in. Do not unplug flash drives without 'permission' from the O/S, if this is required. Do not defrag any solid state drive, USB or otherwise, as this shortens their working life.**
4. **Create additional store partitions on your HDD, separate to the boot partition, so that data can be saved if the boot partition fails, and the HDD needed to be piggy-backed.**

5. Shift the boot partition to a less-used part of the HDD, this will require cloning. The wear on the HDD is thus spread, and you will extend the life of the HDD as a result. Also, confining the space within which the O/S runs will promote efficiency, and thus operational speed, especially with MS O/Ss.
6. Use a SMART program, or native Disk Utility, to check HDD Smart, especially if the HDD has some age. If a new HDD does not fail within 3 months of use, it should last OK up to 5-6 years, start any SMART observations at least after 3 years for all critical systems, eg, business.
7. Run regular file checks on any system, to keep file systems in order, which will also ultimately protect data integrity, forestalling corruption and possible data loss. This will include storage drives.
8. CD/DVD storage must be under ideal conditions, cool, dry, stacked flat or vertical, etc, they will last a decade or so, if not used regularly. CDs are better than DVDs for data. Every few years you should transfer any data to new media anyway. Cloud Storage is an additional option. Hard copy should always be monitored for any deterioration.
9. Always conserve file originals, with clear names and dates, as backups, especially if using more than one Office-style program, note that fonts, bold, colour, and also font sizes can be affected when switching from one program to another
10. Children **MUST** be carefully and patiently taught software and computer care, plus, it is strongly recommended that there always be a separate computer for them to use, away from adult personal or business systems.

### Optimise Computer Software:

1. Limit Startup folder to only those programs necessary to run the computer, and/or turn off those not immediately necessary.
2. Un-install any unused or unnecessary software.
4. Use an external HDD, or, another partition on the system HDD, to store and run movies, games, etc. Take care that any downloads of this nature are directed to this separate storage.
5. Use Housekeeping programs as applicable, and do full system Housekeeping regularly. Defrag the registry as well as general files in the Boot Partition. Empty the Recycle Bin, do not use this as a file store..!
6. Shift as much personal data as possible to an external drive, as above, and then delete these folders/files from the Boot partition. Similarly, empty the Downloads folder as necessary, also, store the wanted downloads on external storage.
7. Turn off any unused concurrent running programs in the Taskbar, and, do not strain the system resources with too many simultaneously open Windows of any kind, be they folders, files, or programs, etc.
8. When browsing on the Internet, be careful of what you click on, and, when downloading or installing programs, again be careful of what you click on, read the message windows as they appear, which will avoid unwanted cookies, adware, browser helpers, etc. Block automatic outside access, via the firewall, to installed programs that do not require this.
9. Keep your Internet Guardians up to date, and run regular checks with them.
10. Children **MUST** be carefully and patiently taught software and computer care, plus, it is recommended that there always be a separate computer for them to use, away from adult personal or business systems.

### Care and Maintenance of Drivers:

- 1) Drivers are modules of software that enable the hardware and software of a system to communicate and interact with each other. They are often specific to a particular O/S, as well as to the actual hardware components themselves, including chipsets and peripherals.
- 2) If present and functioning properly within a booted system, drivers should be saved and stored securely, using a driver-saving program such as **DoubleDriver**, in case repair or replacement is necessary at any stage of the working life of that system. Use of a CD/DVD for storage and deployment is recommended, as the system will search for drivers automatically within this type of media, as required, whereas, storage on other media will require a specific location search to be made for driver installation and/or update to be effective..
- 3) When drivers are required, they can be found online by different means, tho starting with the motherboard brand website is firstly recommended, providing specific motherboard and chipset data. Peripherals drivers can be similarly found at brand websites, otherwise recourse to sites such as PCI Vendor may be necessary, especially if the drivers are not particularly new, and thus, no longer found on brand websites. A properly descriptive entry in Google search may also bring good results.

- 4) Beware of third-party attempts to inveigle money or personal details from you, in return for driver downloads, they can be ignored, unless the driver is extremely rare, and, not obtainable by normal means. Also check that what you do download is really the driver sought, and not some scam third-party software, all too common on the contemporary internet, sadly.
- 5) Hardware and driver details, including PCI\_VEN numbers, can be provided by system analysis programs such as **SIW**, also via O/S Hardware Properties, which gives the PCI\_VEN details, as well as the option to rollback incompatible drivers if this is required. Note that reboots are often required after installation, and, turning off the system and leaving it to have a cup off coffee, will then enable flushing of the RAM, which may be necessary for completion of a successful driver upgrade.
- 6) Note that driver-finding and updating programs, which usually cost money, may not provide accurate matching, or, valid drivers that are supposedly required, with attendant difficulties ensuing from incompatibility. So, 'if it is not broke, then do not fix it' without a very good reason for doing so, as serious driver incompatibility may prevent successful booting, which will then necessitate O/S Repair, and all that this requires.
- 5) Drivers that are not installed automatically should be installed manually, from within Program Files, to avoid clutter and confusion in C: drive, just another example of good system housekeeping practice.
- 6) Note that a BIOS/CMOS upgrade is an advanced form of driver upgrade, relating to motherboard hardware and vintage, that is best left to experts, if even really necessary, as such an upgrade that is unsuccessful, will mean an unbootable system, requiring recourse to technical skills and knowledge to remediate. Once again, **'if it is not broke, then do not try to fix it', OK..!**

**Finally, if you do not want to know any or all of these facts, and/or perform the steps involved, then, be prepared to pay the full professional price, OK!**

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**For the full Computer Beginner's Management Survival Factfiles, with extra headings and additional details, consult the main page.**

## Computer Workshop Setup and Troubleshooting Procedures:

Firstly, effective computer and/or laptop troubleshooting requires a tidy, well-lit, spacious, dust-free and organised workbench, plus a tidy, patient, organised, and logical mind. A 'feel' for electronic components, and appropriate tool use, are also necessary, some parts are very fragile, some are easily damaged by EMF, all require optimum conditions for storage, assembly, and continued use. A good basic supply of 'known-goods' is important for component testing, plus appropriate tools, including voltmeter, USB socket tester and/or light, laser heat-sensor, propyl alcohol, PSU tester, 'magic' contact spray, mains test lights, mice, keyboard, monitor(s), converters, soft natural fibre brushes, air-blowing/compressing source, magnet rod, magnets from HDDs for tool attachment, etc. **Most importantly, be well-rested and relaxed, with a clear mind, before tackling computer troubleshooting.**

**Note-taking, photos, online or other info sources, plus proper record-keeping, are also necessary.** For the beginner, checklists and reminders will be especially useful, a felt pen will always be useful. Marking components or systems will avoid double handling, and, help with part storage and search, etc. Shelves with marked storage containers are a must. One good desk system, always online, will be useful for checking facts, specs, etc, via Google. An extra test system or 2 can be useful for parts and/or software testing. **Note also that proficiency with computer assembly, disassembly, and troubleshooting, should precede such involvement with laptops, notebooks, etc.**

**Test all variables sequentially, to be more precise,** and, be ruthless with separating good parts from bad, the proper recycle is recommended for faulty and unwanted parts. Without observing all of these listed basic requirements, troubleshooting efforts may well fail. **A professional will need to deal with less-than-adequate conditions if out on call,** but, ability to deal well with lesser conditions is made easier with properly learned work-habits, and an orderly mental approach. **Encourage all computer work to come to your own workshop,** if possible, where familiar tools and surroundings make all such work much easier.

**Breaking down computers and laptops for recycle and/or spare parts** requires a careful approach, just as with repair and assembly, and all other workshop conditions should be met, plus, components should be carefully handled, cleaned, tested, and properly stored, in anti static bags or cardboard containers. **EMF is a problem that increases with lessening humidity,** also beware of synthetic materials, especially carpets, that can generate static. Use a bracelet, and/or exercise careful grounding, plus, rubber, wood or cardboard bench-covers, are important. Paper is also EMF-neutral, good for wrapping if anti-static bags are not available, never use ordinary plastic wrapping. **Note that WD-40 and similar liquids should not be used inside any case,** unless/except a discrete amount is used for loosening stubborn fasteners. Wipe off any remaining traces to prevent dust entrapment. Monitor screens are best cleaned with a DAMP sponge and dilute detergent, then dried with a paper tissue. Citronella is useful for labels and stubborn marks on cases, again, damp rather than wet application is advised, to avoid drips.

**Screws should always be saved,** and small fittings, cables, etc, as well as representative sets of fans, largest and smallest are usually least common. Make sure all good fans are oiled, behind the label, with a drop or 2 of light oil, even if a small hole needs to be drilled for access, then seal with insulating tape. Brighter tape colours are recommended, and, can be well marked with a felt pen, unlike black tape. **Larger salvage objects saved will depend on space, market demand, and workshop specialisation.**

Best initial troubleshooting steps are just basic checking, ie, magic (contact) spray, unplug and replug, component isolation, plus JP1 reset and/or battery removal, to reset CMOS to default. **Always press Start after power and/or battery has been disconnected, to drain capacitors, before attempting any component replacement, and/or testing with known-goods.** If booting is problematical after initial steps, leave systems off overnight, before reboot, to totally drain any power, some RAM drains less quickly than others, and, errors held in live RAM confuse troubleshooting. **Alternatively, stored RAM substitution will achieve the same effect, if available. These initial troubleshooting steps should precede component swapping, and further disassembly.**

**Visual signs re troubleshooting** are important, so, apart from a quick blast of compressed air, if needed, do not clean cases or parts until first testing bootup, as there may be useful hints as to the life and treatment of any given system that is being tested. When air cleaning is performed, mild compressed air is best, and be sure to do so outdoors and well away from workbench area, plus, for personal health reasons. Do not breathe in the dust, this contains microparticles, and, the origins of this dust could be hazardous to human health. **Keep all such dust and debris well away from the tech area.** Take photos of damage and/or contamination signs, for records, and to show interested parties. Recommended also is that any system be positioned at least a meter from the floor, to lessen dust accumulation. Household pets are also a source of dust and debris, and should be kept away from booted systems and tech areas. **EMF attracts dust and debris, that is the electrical nature of booted PC, laptop, et al systems.**

**Best also to plug untested systems directly to mains,** and not running them thru a UPS, in case of any PSU problems. (A fuse problem is easily dealt with, a damaged UPS less so.) UPSs should be used with any

important systems, (there are 3 main types), next are power conditioners, and lastly, power surge monitors on plug boards are the minimum requirement to protect systems. Laptops have their own UPS, if a battery is present, and still still capable of storing charge. System capacitors can cope with very minor power fluctuations only, and damage can be catastrophic, or incremental, with repeated events. Consult Google.

RAM, motherboards, HDDs may have useful visible signs of problems, **a loupe or magnifying glass can be useful**. Blown capacitors being one such example. Replacement of capacitors is difficult with new high-temperature solder, motherboard damage is the usual result. RAM and peripheral card contacts should be cleaned with 'magic' contact spray, including the actual bottom underside strip in case of contaminant bridging, using a cotton bud or similar, but, **leave no fibres afterward**. **Propyl alcohol** on a cotton-bud is recommended to properly clean optical drive lenses, leave to dry before re-testing.

**CPUs are manufactured at high temps**, with thermostatic regulation built in, and thus rarely give problems, unless physically mistreated, or, due to careless handling when not installed. Careful scrutiny of CPU sockets will show up damage to tiny pins. These pins, in the past, were on the CPU, and now are transferred to the socket, nevertheless, care is still needed, **a damaged CPU socket usually means motherboard replacement**. Always carefully remove the CPU to check socket condition, most likely any suspected damage is caused by amateur tampering. **Reseat CPUs with magic spray, and then use fresh silver heat paste to reseat the heat sink, never 'convenient' heat pads, or cheaper paste products. A bare minimum is all that is required, see Intel's own thermal paste application instructions and pics online.**

**Non-booting** can mean a **JP1 reset or battery removal** to rule out BIOS tampering, and, beeps usually mean RAM faults, run such as Memtest, remember that RAM channels can also develop faults, test accordingly with known-good RAM. Sequentially remove/test all peripherals if necessary, including cards, and any drives. Note that **Linux boot disks usually have SMART reading capabilities**, will display system info, and also, give the option to run **Memtest** at boot, given that video card and monitor are operational. **A Linux OS on an HDD/SSD will usually boot to any PC or laptop**, which makes system specs and performance checks much easier.

**Locked BIOS and/or HDDs/SSDs** are growing problems, discourage such password practices if possible, or, owners risk tossing out a motherboard and/or disk-drive when passports are lost. These problems can be rectified, but expensive expert help is required, unless you wish to specialise in such repairs. Also, as part of trouble-shooting, encourage regular back-up, **'if not backed up 3 x, then not backed up at all'**, so, flash drive, storage partition, and offline drive, makes three, and then the Cloud makes a lucky fourth. There should always be a storage partition on an HDD/SSD as well as a boot partition, so that if the boot partition fails, data is still available, and the OS is more compactly confined, especially in the case of MS Win OSs. **Sympathy should not be wasted on those who will not back up, and that includes password loss.**

**HDD/SSD SMART is a useful indicator of HDD/SSD wear**, even if not always precise, and, this is most relevant for computers that do not run continuously. HDD platter errors may be virtual, caused by power fluctuations, improper shut-down, etc, and these can be corrected with HDAT2 or similar, tho actual physical damage cannot be thus repaired, and such HDDs should never be used for other than testing purposes, with appropriate partitioning to isolate bad sectors. **Note that SSD failure can be catastrophic**, so, SSDs are not advised for long-term data storage, **replace SSDs ASAP if SMART indicates any problems.**

**SMART-test at least weekly for drives over 3 years old**, especially if secondhand, and note that **HDDs and SSDs drive, in general, will fail early, usually within 3 months if faulty when new**, or, will thenceforth perform consistently when 'good', tho only if treated well. 5-6 years effective lifespan is quite possible for a well-treated drive that is regularly in use. SSDs are getting better, both in transistor manufacture, and in management software development, best used for boot drives tho, especially for their speed benefits. See Google in this regard, also re **SSD TRIM requirements**.

**Troubleshooting inspections** mean looking for damaged/dented cases, both for PCs and laptops et al, plus, dust, wear and tear marks, cracked screens, stains, spills, dirty fingermarks, dusty/dirty keyboards, smells, etc, and if booted, cluttered desktops and poorly responsive software. Note that faulty and/or over-full HDDs will also show these same symptoms, the 80% Full Rule still applies for boot drives. All this is typical of the adage that **when troubleshooting computer systems, one problem may be hiding behind another, especially when possible problem symptoms are similar**. There are all sorts of tips online re troubleshooting, incl. flow charts, forums, etc., tho usually, just a concise and lucid Google Search question will bring results. **Commonsense, and patience, will be the keys to successful online searches.**

**Older systems are useful for learning**, pulling multiple PCs and laptops apart will show recurring patterns of wear, and also, older systems that have been stored in indifferent conditions will display interesting signs of deterioration. **Materials may break down with age, and corrosion WILL occur**, in fact, PCs and laptops are built to WORK, and this means moisture accumulation is mostly minimised if running regularly, even if not continuously.

**Moisture settling will lead to corrosion, shorting, heat accumulation, as air is seldom pure, dust particles may be soluble, and thus prove to be acid or alkaline. Airtight long-term storage is thus essential for any electronic parts or systems.** As well, when passing from cold to warm surroundings, passive acclimatisation may take hours, condensation being the problem, especially for platter HDDs. An already running and warmed-up system should make the transition quickly, especially if passing thru an intermediate zone, resting say 30 minutes or so.

**Note, in the case of older systems being cleaned and repaired,** that years of material stress due to thermal shock, plus general expansion and contraction, will mean that system components, especially the motherboard, will need to be handled carefully. The motherboard should not be flexed unduly, and also, be sure to just lightly wield a cleaning brush, blow out any dust from inside the case and heatsink, then try to boot, and, if successful, be content with that. Only replace the CPU heat paste if absolutely necessary, as extra flexing of the motherboard will be part of this process. **Contact spray and system replug are also advised,** though do so as carefully as possible.

**Long-term storage of computers and laptops:** Run the system for 30 mins or so, to drive off any residual moisture, preferably on a fine day, or in a warm room, then shrink-wrap, preferably, and **render the wrap as airtight as possible.** Laptops should have the battery removed, and be then stored in the same container, fully charged, separately wrapped to avoid knocks, accidental shorting, etc. Gel sachets enclosed would be an extra benefit. Similarly, warm a non-booting system, or parts, with a hair-dryer, in similar surroundings, before wrapping, as above.

**Language,** written or spoken, should be concise and to the point, as for any technical situation, special care is needed if there is any sort of personal language difficulty, or, expensive mishaps may result. **Record keeping should be concise, organised, and kept dated and sequential,** especially important when there is battery of systems to care for, so, routine maintenance, parts, and repairs, all should feature as part of the history of any given system, if at all important, even if secondhand.

**Never fix any sort of computer for friends, relatives, or idiots...**at least for idiots, only if done professionally, charging well for services rendered, and, for the others, well, make sure there is a fair quid pro quo agreed upon, that recompenses time, margin of skill, etc, however constituted. This will avoid the all-to-common problem of such skilled work just being taken for granted.

**Computer education** is necessary when The Market does not want educated consumers...and this should emphasise that temperature dust, excess heat, liquids, vibration, shock, static, and power anomalies, all will take their toll on systems, either instantly or incrementally. **SMART is especially useful if G-sensor stats can be read,** important for life span of HDDs, tho **having an SSD does not mean that other details of system care can be overlooked,** even if the shock hazard for platter HDDs is circumvented.

**Computer Software Maintenance:** MS Windows systems will always need extra cleaning and tweaking, and **Toolwiz, CrapCleaner, Auslogics Defrag, or similar, are recommended, Speedfan will show operating temps, and SMART. CrystalDisk Info and Victoria** are also useful for SMART. Carefully check program tweaks for best results. Turning off unneeded Win Services will also increase speed, consult Google, and proceed with care, and records. **Mac and Linux OSs are less likely to require cleaning and tweaking,** and, **Linux OSs installed on HDDs/SSDs can be plugged into any system for specs, testing stats,** performance, etc., as can bootable Linux OS discs. **Hiren's Boot CD** has many test programs that are worth investigating, even if just out of curiosity, and individual programs of interest for troubleshooting can be sourced separately.

**There are other electronic consumer items that require service and repair,** such as tablets, smartphones, etc, should you wish to specialise, and, in general, all the above principles of workshop mnagement, record-keeping and troubleshooting will still apply. Tiny parts and screws at assembly or disassembly should be best dealt with over a patch of light-coloured and well-lit natural short-fibre carpet, and, even by utilising a bench-apron such as watchmakers use, both help to prevent fretting over lost screws, and lost time. A magnet rod is very useful for pickups, tho, always best to prevent the problem of dropped parts in the first place.

### **Three Golden Rules Of System Troubleshooting:**

- 1) If there is more than one solution to a problem, utilise the lowest-tech first, and, one problem may hide behind another, but, act first on most recent changes.**
- 2) Plus, if it is not broken, do not 'fix' it, and risk causing more problems..!**

3) Also, perform consistent and orderly testing, one variable at a time, log your activities, and think calmly about what you are doing.

*So, assuming that the system has been running properly hitherto, and is protected by a mains power surge monitor and/or UPS, and a Telecom surge monitor:*

- 1) Replug everything, inside and outside the system, including mains and phone, if the Internet is being used, and Include motherboard switch/light connectors, and Startup switch. Similarly, loose connections such as USB sockets or fan connectors that contact metal projections can cause problems, so make sure these are properly located. Test any new leads or connectors, these can be faulty, even when mass-produced. Ensure that all USB or similar secondary motherboard connections are plugged correctly. Check that the PSU switch is on, then attempt Restart.
- 2) Ensure at restart that the CPU fan runs, and, that drive lights show, plus, normal systems sounds ensue at Startup. Check by touch for any signs of overheating or unusual vibration.
- 3) If not successful, and, using known-good substitutes, check all drives and controllers, plus RAM and channels, for full functionality, noting that intermittent faults will/may not show in pre-Boot warnings. Also use CD/DVD-ROM and/or floppy-based testing programs if the system does boot.
- 4) Perform a JP1 reset, or, at least perform an ESCD reset. Replace the CMOS battery, if necessary, and reset the time and date in BIOS, and the Boot Order
- 5) Remove all plugged drives and plugged cards, as practicable, then re-add units individually with restarts. Adding or replacing parts to upgrade systems is best done after successfully migrating to a more modern case, to reduce the number of possibly fault-prone variables, including that of drivers..? Electrical contact spray on all physical connections...? Expansion cards should be situated either in their respective slots, or, in antistatic bags, do not place on or near any potential EMF source such as a monitor, PSU, or UPS during handling and/or system assembly.
- 6) Test the system with a bootable CD/DVD, and/or an HDD with Puppy Linux or Ubuntu O/S installed.
- 7) Ensure at restart that the CPU fan runs, and, that drive lights show, plus, normal systems sounds ensue at Startup. Check by touch for any signs of overheating or vibration.
- 8) Check for any hidden fuses in the system, eg, UPSs or PSUs can have fuses at the power switches, and, if blown fuses are found, check for reasons why they blew, or, just accept that age and constant use can weaken a fuse.
- 9) Leave the computer off for 30 mins or so, this will effectively remove any residual circuit EMF, and, drain power from the RAM. A cup of coffee at this time will be good for you as well. A JP1 reset or battery removal at this stage will also be beneficial, if not already performed. Leave overnight or, consider installing similar RAM, if available, then retest. Reconfigure the BIOS at next Startup.
- 10) **One Special Fourth Golden Rule of Faultfinding** is to periodically check all known-good components for their current integrity, then retest with these asinstalled system components once more, for more successful troubleshooting. *Quis Custodiet Ipsos Custodes, OK!*

The Last Resort for locating motherboard problems is to uninstall, and then check the case and baseboard for any loose screws or improperly located base contacts that may be causing shorts. Check the board itself, both sides, with a magnifying glass for any visible damage. Beyond step that lies known-good CPU testing. However, always consider that a major or minor system part fault can occur at any time, regardless of your current activities. Computer system parts eventually fail, one way or the other, and, that is a fact of machinery life, especially complex machines, down to the smallest fuse or diode. If something has failed at the time of reassembly, and this was not necessarily due to a handling mishap, you should accept that failure was imminent anyway, especially with an older system. **Better now, than when processing valuable data later! Time to upgrade for motherboard and CPU, at least.**

*A final note about 'making do', notwithstanding the preceding system upgrade information:*

**Nofrillstech** has a much-treasured **500 Mhz Intel Coppermine CPU/256 Mb SDRAM Mini-ATX system** set up as a standby for reading papers, journals, and emails online if there is such a need, due to possible problems with larger and more modern systems, or, even made available as an occasional 'loan' computer for others in similar need. **On the twin cloned 4Gb HDDs is Puppy Linux.**

Furthermore, the **ex-circa-2001 Gateway**, utilising just the PSU and CPU fans for cooling, is quite sufficient for housing the system, with provision for 2 HDDs, one floppy, one multi-purpose CD/DVD, USB or similar, and, for adequate system temperature regulation. **This stalwart system remains on active Internet standby.** In addition, **older laptops** run Puppy very effectively, which also prolongs their useful lives, and, conserves \$\$\$ resources.

For data rescue, **Linux Mint and Puppy Linux** will both read **Windows files**, but, **do plug required USB drives before booting to the CD.** MiniPE, Puppy Linux and Parted Magic will also copy or image your drives or partitions to an external drive, especially useful for laptop drive backup where there is usually only one HDD present. **EaseusDiskClone(f)** is another boot alternative, and, being a dedicated cloning program, will use less resources, when and where this is important.

**Linux Mint XFCE(f)** loaded onto a spare HDD makes a very handy O/S standby, just plug into any modern Wintel system, and boot. **You can use Firefox and Thunderbird for Web and email access, and there are many other downloadable programs to choose from. Physical system care is still the same, but, Housekeeping and Security are not as important as with Microsoft's OSs.** (Note, however, that Open Source custom boot discs, including O/S discs, may not boot when extra or incompatible graphics/video cards are present.)

**For those who do not need MS O/Ss for email and online research**, consider installing **Puppy** on older laptops to prolong their useful life. The instructions for installing from Puppy's ISO CD are straightforward, and many programs such as for word-processing, email and web-browsing are included in the install, as is the case for **Mint. Puppy is quite effective as an O/S, yet the resource needs are modest, and, Puppy is seemingly untroubled by dual monitors. Puppy is also a handy all-systems O/S standby when installed on a spare HDD.**

Note that either of these installed Open Source O/Ss may be useful for boot-testing a system, beyond just using a bootable CD/DVD. **Open Source/Linux testing** programs could be also included in either installation for further system testing procedures. Certainly, both of these O/Ss are useful in an emergency for other reasons, as above. If you have spare HDDs under 20 Gb that are otherwise unused, just install these O/Ss from their downloadable ISOs when burnt onto a CD with an image-burning program. Not needing a DVD is an added bonus, and, makes for a smaller O/S installation as well. **Swappable HDDs with O/Ss that boot with any CPU are so adaptable..! Puppy can also boot from a USB drive.**

So, these particular examples of **computing, system testing, and Internet minimalism** are hereby proffered to **provide an extra dimension to any upgrade decision** you may be contemplating, and as to **why** you are doing it. Also, to emphasise that there always needs to be **hardware backup**, including, as in this case, a **spare system for Internet access**, if this is important to you. Thus, if you still want to upgrade and migrate a present system, bear in mind that a suitable older, and smaller, system will still have very important backup uses, and, **if all you want to do is read papers, journals, and email online, then 'going large,' system-wise or software-wise, is definitely not necessary for quality Internet access.**

**Even easier, given a handy computer-access plug-in opportunity, you can nowadays do this all of this, as well as in lieu of even laptop use, by using a portable flash drive loaded with those handy Linux OSs especially when 'on the road,' and travelling light! All you need is another system to plug into, be it at a private home, in an Internet Café, or whatever.**

**Bootable USB Drives: Whole customised O/Ss can now be loaded onto USB external and large flash drives, given that the parent computer will boot to USB in BIOS, and, these MiniPE, BartPE and Vista/Win7PE, which can also be loaded to a flash drive for emergency HDD data access.**

## **Uninterruptible Power Supplies, aka UPSs:**

**The importance of uninterruptible or standby power supplies for the smooth and trouble-free operation of computer systems, (and other sensitive electronic equipment), is paramount.** Not only is data preserved from untimely deletion or corruption by power fluctuations and/or outages, but CPU and other transistors, and circuits, are also guarded against untimely death as a poor or inconstant electrical diet inevitably takes its toll.

**Even if there is no actual hardware or software damage or shut-down with a power disturbance, RAM performance may still be inhibited, which also jeopardises interim data integrity, and, current program performance integrity, plus any updates, defrags, installing of programs, or flashing of BIOS. An uninterruptible power supply draws directly from a charged battery, and a standby power supply, (less expensive), simply cuts in to draw from a charged battery, when mains power supplies falter, fluctuate, or fail. Line Boost is the intermediate specification, and, is recommended as a good balance between effectiveness, and, budgetary constraints. PSUs do have some resilience against power fluctuations, but this is limited, and they do fail more often than any other PC hardware component.**

**If you care about your own digital investment**, and the data contained within it, invest in a **UPS/SPS**, the standard versions of which are not expensive, (**usually they have lead-acid gel/AGM batteries, ie SLA or Sealed Lead-Acid Batteries, with low-maintenance lead-calcium plates**), in return for what essential service they **will** provide; the first time your **UPS/SPS** 'cuts in' to maintain system function during a power disturbance, the investment is definitely realised. **Nofrillstech will not boot-up any computer without filtering power via a powerboard, and then utilising further power filtering via an ancillary UPS/SPS, to guard both systems and data. For battery details see Car and Deep Cycle Battery FAQ/7.1, et passim.**

**Clean power outages may not harm the computer, although data may not be so lucky, but, mains power can surge, brownout, fluctuate, or cut out**, while your electronic system needs **constant** voltage and cycles to operate smoothly, and, to ensure optimum health and useful life. The mains power is **AC**, (alternating/cycling current), this is converted to **DC**, (direct current) by the **UPS/SPS** to charge the battery, then inverted to **AC** again for use by the system **power supply unit, PSU**, which then converts the power again to **DC** in the respective voltages required by the motherboard and drives, etc. The **economy SPS** is usually a **standby unit**, (as opposed to the more expensive **inline** type), whose electronics is fast enough to sense a power disturbance, and subsequently cuts in **between** Hertz cycles(!), to ensure that power flow to the system is continuous. The always-stable **direct current** that ultimately reaches your motherboard and peripherals in required voltages is required for smooth electronic function. **Note that 'power conditioners' are no real substitute for a matched UPS/SPS.**

An **in-line powerboard**, or power conditioner, sophisticated or otherwise, is still important to guard the overall function of inter-connected electrical computer devices, and must also have a **modern surge protector**, (not just a circuit breaker), to be fully effective, as well as phone line filter, regardless of what the **UPS/SPS** may also provide. **This ensures that the UPS/SPS is always preserved and protected, as well as all the other peripherals.** Your phone line should also have a plasma fuse outside the building, and you may need to consult your utility provider to obtain installation. Only a **plasma fuse** has any hope of containing a damaging surge down your phone line.

Your UPS specifications should also exceed expected loads, so do your sums. To test a UPS/SPS, connect a known-good PSU, then, test that with a standard PSU tester, as well as with momentary disconnection from the mains supply. **Irrespective of testing methods, there should be a draw, and no voltage fluctuation. If the results indicate less than optimum performance, or failure, then repair or replace the UPS. As always, faultfinding should be a systematic search, and, power problems that may involve a UPS are no exception. UPS/SPSs should also be set to the correct mains voltage, like PSUs.** Do not connect laser printers or other high initial power draw units to UPS/SPSs.

Remember always, that without a UPS/SPS, any software or hardware problems, **with no apparent explanation as to cause, are most probably due to power fluctuation, and then there is that consequent slow and cumulative CPU transistor death, if not actual catastrophic failure, as well as probable RAM damage. Smoother system operation is also immediately noticeable with UPS/SPS operation, and this includes monitors if the UPS/SPS is large enough to accommodate them on the circuit as well. Note that wattage should be read as 60% VA (Volts/Amps), as applicable.**

Once again, do not use electrical equipment, especially electronic, and/or phones and modems, during thunderstorms or other wild weather, if this can possibly be avoided, so unplug from power and phone lines completely. Copper lines for power and phone use are subject to inductive accumulation of charge during electrical atmospheric disturbance; 160 km<sup>2</sup> is a minimum buffer zone, and there is no certainly safety in urban numbers, with extra copper cable present to aid inductive charge accumulation and transfer! Your own safety is also at stake!

Connection and installation of a **programmed UPS/SPS** is not difficult via either serial, or increasingly, **USB** ports; in general, just set up as per the instructions, though note that usually there is an 8-hour battery charging period before standard system usage begins. All that means is, do not plug in any potential loads during the initial charging period. **Nofrillstech** has found that it is worthwhile to check the **UPS/SPS** manufacturers' websites for updated software, which should contain necessary drivers as well as **GUI** programs.

**Windows** has an APC, and, a generic UPS/SPS program, plus, there is another **generic UPS/SPS program**, Winpower, which you could try, if you have difficulties with finding an original, and **not-quite-recent**, dedicated UPS/SPS program and its required drivers. **Be sure to download and read the Winpower Quick Start Guide** after you download the program, plus, after the downloaded program is unpacked, you can also find the **Setup Icon** in the **Program Folder** of the relevant O/S. You will need a relevant **UPS/SPS serial number** to open and run the **Winpower GUI** program, however.

One O/S Setup caution: **when installing or upgrading O/S software, always disconnect the UPS/SPS:system interface cable, if in use, as this may cause software conflicts. Reconnect/reinstall the UPS/SPS after the O/S installation or upgrade is complete.**

If you want **regulated power shutdown**, this can, of course, be set up via the **GUI** program, but if preferred, **the**

**UPS/SPS can be run just as effectively without reference to the software**, and can just sit and hum along and do its work **if you are always close by** to make a decision of normal shutdown, if an outage is sufficiently prolonged to warrant this. If you have a separate desk light on mains power, even if you cannot hear the UPS/SPS click-in, then you will be made aware of a power fluctuation incident when this occurs.

**UPS/SPSs can be equally effective, and more budget-priced, if they support only system cases and external modems**, and, even if the GUI program is not utilised, this will ensure **>30 minutes**, (depending on actual battery capacity, naturally, plus your correct sums), to either ride out a power problem, and/or time to quickly connect a monitor to the **UPS/SPS circuit** to achieve a normal shut-down if this is required. This time lag is especially useful if you are periodically away from your computer, and, **if you have backed up before you left**, then only a **Folder Scan** ensues at re-boot, **even if you do not get back in time** for a conventional shut-down. The main point being, whatever else happens, the system itself is saved, and all of your current, (backed-up!), data.

The **UPS/SPS** may also be required to support the system for sufficient time to cover the lag before a **supplemental power generating system** is enabled, this certainly would be a factor in maintaining digital integrity of **essential or medical services**, businesses, public service administration, and etc. While the supplemental generation is functioning, the **UPS/SPS** would again continue to operate as power filter and battery standby once more. **Nofrillstech has lost count of the times, over the years since Home SPS use began, in towns and cities as well as rural districts, when the installed SPS has literally saved the day, both for system and operator.** To hear that brisk, reassuring click even as the desk light falters, (and the monitor, if on the filtered mains circuit), while the computer never misses a beat, **is such a relief, and believe it, OK!**

**Defrag, cloning, or BIOS upgrade**, are the times of maximum system vulnerability if mains power fluctuates, **as data lost then may never be able to be replaced**, even with O/S or other program repair, and/or there may be HDD or other 'collateral damage', with the inevitable full erase, partition, reformat, and complete reinstall, being needed to restore both functional and data integrity, whether any consequent physical repair is needed or not. **What is \$150 or so, paid one-off for at least an SPS, if not a UPS, and \$35 minimum every 3-4 years for battery replacement, if that sort of needless chore can be averted?**

**Nofrillstech** uses a Web interface computer system, plus work computer system when necessary, both being operated simultaneously on the same **UPS/SPS**. Each circuit is also power and phone double-filtered, including the **UPS/SPS** circuits. **Whilst normally running systems and modems only via the UPS/SPS power**, monitor plugs are marked for quick CRT transfer to the UPS/SPS circuit if ever required. **Most mains power problems are 95% transitory, and/or of less than 5 minutes** duration, but knowing you have extended shut-down time while temporarily absent from the computer is also of great comfort! **So, with this method, you can concurrently run two, or more, computer systems and modems on the one conventional home UPS/SPS of sufficient capacity, with peripherals for each on separate filtered power boards and phone line(s).** Flat-screen monitors use less power than CRTs, so, running **them** from a UPS/SPS full time is reasonable, but, still do the sums required to ascertain the running wattage load versus the UPS/SPS wattage rating.

Note that VA = Watts x 1.6, or, Amps x Mains, all summed, when calculating UPS/SPS needs. **Note that computers have a safe Power/Loss Factor of 60%.** (See Troubleshooting, Maintaining and Repairing PCs, References, especially the accompanying standard **Runtime/Load Table.**) The Power Wattage Calculator **gives good results, though should an on-board video card be included?** Also, note that **not all full draws may be present, especially in hibernation, or, are all concurrent when in use.** Working wattage values should thus be read as **2/3 of the total VA calculation.** Note that, in regard to battery amp-hour ratings, conventional UPS/SPSs will usually protect 25% of their stored charge. Always test units, and their chargers, using known-good batteries, **as UPS/SPSs will not charge defunct batteries, only batteries within acceptable 'health' limits.**

**An ad hoc UPS/SPS** could also be a solar battery, or similar, such as a suitable conventional lead-acid AGM/Gel/VRLA standby-battery with an appropriate inverter, although that does mean matching voltage type as well as suitable wattage capacity. As well, this basic standby battery could still be on a mains supply charger while you work when used with a matched inverter, this would also suit financial budgeting, and the battery is easily replaced as required. **Most importantly, during this ad hoc 'UPS/SPS' usage, an ultimately smooth flow of DC system power is assured where this is needed most, within the computer system.** Note that a software interface program is really only necessary for always-on or unattended systems. Opinion seems to be divided re using a surge monitor on the mains plug, ahead of a plugged-in UPS, however, Nofrillstech had had no problems over 20 years, living with indifferent mains power, and with frequent UPS cut-ins.

**Your computer will also require this system of power transfer via a UPS/SPS, of whatever form, if independent and steady non-mains current is not available**, such as from a mechanical generator, so testing is advised before operation if using a power supply that may not deliver optimal current for electronic well-being. **Laptops** have their own UPS/SPS, of course, but be very careful to match their mains supply carefully, (and phone lines), especially when travelling. **Utilising the conventional interface program, and either serial or USB**

**connections**, is a matter of personal choice, but certainly advisable if a computer runs autonomously, or unattended, for any length of time, and this would apply especially for **businesses or utility monitoring**. **However**, what is important is **how much run time it will deliver when the main supply fails, noting that the unit will protect at least 25% of its charge prior to closing down**.

HWMonitor, SpeedFan(f), CPUCool(s), or Sensors View(\$), (using MS OSs), **show PSU voltages in real time**, so, if you have an intermittent computer power supply problem that is not apparently attributable to mains supply or to the **UPS/SPS**, if present, then check these readings against system specifications; eg, voltages may appear as 1.54, 3.3, 5, and 12, or, similar readings that are both very close to prescribed standards, and most importantly, steady. **For Linux PC systems with lm\_sensors installed, run 'sensors' command**. **Programs such as this are recommended to be installed in PCs, Macs, laptops, or any other computer system where such readings can be made, especially given that PSU failure is the most common major computer component malfunction**. **PSU voltage integrity can also be measured by a voltmeter while systems operate, if you have the skills required**. *An electronic PSU tester is strongly recommended*.

Be sure to test any unknown and previously used PSUs directly on the mains, with a load such as a test motherboard or system, or, an electronic PSU tester, **before plugging into a computer and UPS/SPS, as any internal short in the PSU will cause damage to the UPS/SPS, from blowing a fuse to something much worse, that may result in costly repairs**. **Burnt odour and fan irregularities, such stiffness or resistance when revolving, are also pre-test indicators that a PSU may be faulty, thus the unit should be disposed of, and replaced by a new one of good quality, before any further operations**. If in doubt, buy a new one; PSUs are mass-produced units, and priced accordingly, including for better quality units. Look for o/off switch, separate fan grills, and appreciable weight that indicates quality.

**Set PSU mains voltages correctly, 120 or 240 volts, and do ensure that replacement PSUs have correct voltages and connector wiring and plugs for the motherboard, most important for non-standard older systems, eg, Dell and Compaq**. Modern ATX power supplies may also have a missing lead for a voltage, (-5v for ISA), that is no longer required by modern motherboards.

**Of course, without installed batteries, laptops are susceptible to power fluctuations just as unprotected desktop PCs are, plus, both thus need overall surge protection anyway, and for their peripherals, as well as that all-important uninterrupted system power supply**. **Remove battery packs if using AC mains power for extended periods**. RTFM re batteries, OK! (See **Upgrading and Repairing Laptops**, and, for world travellers, **Eaton Powerware posts world main grid voltages**.)

**Finally, all of your computer and peripheral systems must be running on 3-core and properly-earthed power leads, whether you have power filters or not, and this is also for your own safety**. **Your computer-related systems should all be on the same dedicated circuit, and, not shared with any heavy loads; plus, if necessary, get your dwelling circuits checked if you suspect poor earthing due to faulty or incorrect wiring**. This can be done with a just circuit tester, but you must know what you are doing, of course, electricity being what it is, so, all you do-it-yourselfers, preferably **CONSULT** about mains power circuit integrity, OK!