

# Mini Laptop/Notebook/Netbook User's Factfile

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### Preface, as of September 2015:

The following Laptop Factfile still has relevance for current MS OSs, as to software comments, and also, to the ongoing care and management of the Wintel hardware platforms now shared by MS, Linux, and Apple/Mac systems.

See also the MiniLinux Facfile, via the Home page, for care and maintenance of Linux OSs. Apple/Mac Oss are similar, tho specialist forums and manuals should be consulted, note that Nofrillstech does not have an Apple/Mac Factfile.

Choosing/buying a laptop for reasons of quality and longevity should be undertaken carefully, and wherever you go to make your purchase, be sure to note makes, models, etc, and, at least then ask Google for opinions of merits, shortcomings, etc. Buying good second-hand, off the crest of the consumer wave, is strongly recommended, also there will be solid comments on performance online, and even by word of mouth, **and independent of your prospective vendor, OK!**

1) Be sure of what you want, now and for any foreseeable future, and, always buy an upgradable system, as to HDD/SSD, RAM, DVD, etc. Orphan makes and models should be avoided. **Intel on ASUS will be your best buy...?**

2) Sensible case architecture is important, especially for strength, durability, and upgradable features, such as panels underneath that give easy access to RAM, HDD/SSD, DVD etc. Batteries should have reasonable life left. Look for patterns of wear, cracks, etc, re the case condition, avoid purchase if excessive, or, beat down the price..?

3) Be sure that the particular CPU runs at a moderate or better temperature, and, that there are no recurring patterns of motherboard and other failures emerging from your research.

4) Macs can now run Linux, and, even MS OSs, with tweaking, but are difficult to work on, not easily upgradeable, and, are trending towards being mostly disposable as to the current Retina models. They are also much more expensive, and OSX needs to be purchased directly. Your choice, indeed, OK!!

5) **Caveat Emptor, Caveat Emptor, Caveat Emptor, OK!!** PCs have had standard architecture for years, are easily upgradeable, old PC cases last as long as you want them to, even if tinsnips and mastic are needed. Not so laptops, they are not standard in architectural detail, even within brands, and are a modern marketing dream as far as selling to gullible consumers is concerned, OK? If you have no trustworthy advisor or vendor, **Do Your Own Pre-Purchase Research..!**

**Market changes and consumer usage patterns, late 2000's**, mean that a home desktop PC is not always the first choice for a personal PC, plus, easy portable computing, and increasingly ubiquitous public Internet access, are also part of this trend. However, laptop operating systems and hardware still need care and careful use, or else expenses and inconvenience will be the inevitable penalties. This small Factfile addresses some of the measures that must be taken to avoid such penalties. **There is not much that the average user can do, technically, within a laptop, so reliance on professional technicians is usually by default. Proceed with your own in-case repairs entirely at your own risk, is always the caution, OK!**

1) **Laptop** as a generic term is being increasingly replaced by **notebook**, and, **netbook** is the smaller variety, usually without a CD/DVD. **Portable computer** covers all categories. Mobile phones and mobile BB access mean that a home phone line is less necessary 'to be in touch', plus, the portable computer option has much more flexibility of use, and/or, may complement an existing desktop PC with extra resources needed for extended program use. **However, budget computer portability presently has an increasingly strong market following, also now affecting Home PC sales.**

**Standard** laptops certainly are useful and/or cost effective if relied on extensively, **but may not always be justified** because of security risks, or maybe expense, (especially new!), and, they do not have the ease of internal access and maintenance, or flexibility of upgrade, that a desktop PC does. If a portable **note-taker** only is required, you would be well advised to obtain, in lieu, **a small notebook, netbook, or palm-top**, or, a less-expensive older model laptop, and thus release funds for a more extensive home-base **desktop PC** system and peripherals **that the cheaper portable note-taker would then support. Plus, some say a PC supports a laptop, others will say vice versa..! Others swear by one, and NOT the other!**

2) **For those whose choice or imperative is a portable computer**, note that laptops, et al, are smaller, less internally accessible, more intensively designed, have **installed batteries** as well as **mains-fed PSU power-conversion 'bricks'**, may require dedicated phone/BB connections, and, usually have, and need, more **drivers**. They may also have **operational restrictions** as to peripheral drives, heat control, and **ambient temperatures**. Also, there are limitations re magnetic/EMI ambience, handling and transport, plus user interface variables such as mouse or mouse-pad choices, screen size, etc. **Spilled beverages and loose food debris spell \$\$\$ and/or DOOM for laptops, note!**

3) **Laptops can be expensive to buy, and even more so to fix**, this is the price of miniaturisation of laptops and their working components! Throwaway units are a real possibility, ie some components may become too uneconomic to fix, motherboards are already in this category anyway. **Think and plan before you buy a new and/or expensive laptop, OK!** Do your homework before purchase, especially sales 'specials', so that you do not finish up with a model that suffers from overheating, especially of the CPU, or, potentially faulty motherboards. Redundant models, cheap or otherwise, may also be DUD models, especially in department store 'specials'...!

4) Do not cover or obstruct the fan apertures, and always ensure all-round air flow, use an oven rack, a USB fan-base, or, install small rubber legs, to enable good air flow around the base, thus, laps are not actually the best places for operating lap-tops, and/or, are beds, and carpeted floors! Install a temperature monitor such as HWMonitor, SpeedFan or CPUcool if necessary, and act on the real-time information! CPUIdle(\$\$) or CPU-specific AMD Power Monitor, are useful examples of power regulators that lower CPU operating temperatures. Note that Apple portable computers do not have vents in the base, a practice that should be followed by Wintel versions, for greater utility of use as well as easier temperature control. Reduced power consumption for given performance has improved, however, with later models, especially for netbooks. A small sheet of smooth bare metal, (eg Cu/Al), under in-use power packs will also serve to disperse excess generated heat, and, do not cover the power pack when in use. Note also 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.

5) Do not physically shock the laptop, and thus also the HDD, or, expose the laptop to direct sunlight, while operating! Be extra-caring of CD/DVD trays and all peripheral connections, especially the power connector! Note also that a very high weight to volume ratio and the hard case means a long laptop fall or drop is unlikely to be survived by the unit, especially if not protected by a padded bag. Acquisition of a proper padded laptop carry-bag is thus strongly advised, as is an external storage HDD. Laptops should be level, and, on a cool hard surface to aid air circulation, when in use. A laptop with a solid-state drive should have the same treatment as any other, note that shocks affect more components than just HDDs. Deploy any in-use power and/or ancillary leads carefully, as well.

6) To reiterate, a normal (non-ruggedised) laptop is just a small computer, even if portable, and definitely not a bullet-proof version! Physical security will also require thought and planning. Also, do not store in hot, cold, damp, or dusty conditions, direct sunlight, in areas of direct vibrational contact, when physically unsecured, or, under weighty objects. Always open a laptop evenly without twisting the monitor shell, similarly with closing up.

7) A laptop HDD can be directly piggybacked to a Desktop PC using a drive adapter, if necessary, for any data transfer, HDD cleaning and partitioning, and/or, for testing purposes. USB laptop HDD enclosures are similarly useful for these purposes, as well as for general portable HDD storage. Note that testing HDD SMART will not be possible with a USB connection.

8) PCMCIA and other card slots are very handy for extra facilities such as card modems, (a laptop will accept Ethernet cards as well as dial-up modem cards, especially useful to circumvent an installed modem), to add memory, or, external peripheral devices such as cameras, plus, auxiliary mice, keyboards and monitors can also be used via appropriate connections as required. Take special care when ancillary cards, USB drives, etc, are in use, and ensure that they are never prone to bumping or wrenching while inserted into laptop sockets, as damage may ensue to the laptop, as well as to the ancillary module.

9) Clean dusty screens with a damp sponge, and then gently rub with a dry paper tissue or soft rag. Never use any household solvents on any computer screen. A mild natural soap residue on the damp sponge should be enough to dissolve, and then physically remove, any fingerprints, or other film deposits, on a screen.

10) Children should never be entrusted with a laptop, especially an expensive one, if unsupervised, Internet access notwithstanding. Business laptops should be especially secure from any tampering, always being protected physically, and also, by passwords, codes, encrypted files, etc.

11) Laptop batteries are only good for 300 cycles, at most, and, reliance on mains power also carries the same hazards as for any electronics not further protected by a UPS/SPS and/or other power filters, especially in foreign surroundings with unknown grid or circuitry integrity. Remove battery packs if using AC mains power for extended periods, and, only remove and reinstall batteries when mains power is turned OFF. Sleep Mode is NOT 'off'!

Batteries should be charged at least monthly if portables are used infrequently, and, the batteries must be removed for any storage duration, and also before opening the case. Store any unused batteries in a cool, dry place. Rotate batteries as/when is this affordable, and, always use AC power when available, to extend battery life, and definitely when batteries are beginning to loose storage capacity. Battery storage may be enlarged by running down, then fully recharging, at least three times, and, relative to existing battery health. BatteryBar or similar will also prove useful.

Do not leave laptops turned OFF while still connected to AC, to avoid battery overcharge. Battery power availability readings may not be true until the laptop is properly warmed after Startup. Adjust power consumption settings to optimize any battery reliance. Permanent AC connection may need to be interrupted by monthly charge/recharge cycles, so, RTFM re batteries for your particular laptop, OK!

If the battery is removed for mains-only use, then utilize a good power conditioner, UPS, and/or power surge monitor, just as for a Desktop PC. Use only matching voltages, either for mains power, and/or power packs and batteries, at all times. Store unused batteries in non-conductive materials to prevent contacts shorting out! Also, for world travellers, Eaton Powerware posts national main-grid voltages, in case a suitable voltage transformer may be needed.

12) As with PCs, always make sure that you have an appropriate O/S disc, driver disc, and legitimate serial number, whatever the operating system. Avoid models with 'Restore Partitions' and bundled software, you do not need the bloat, and any 'Restore' will bring it all back, as well as the O/S re-installation being consequently outdated. Storing of a regularly updated Boot Partition image, or entire disc image, on a separate partition or storage drive, that could then

be utilized by a Recovery Disc, is probably the easiest, and most convenient backup option. Cloning is another similar option. Note also that netbooks may not have a CD/DVD, so, O/S installation via flash drive or other external USB drive is then necessary, and, the BIOS should be thus configured for Boot recognition.

13) Apart from the standard Internet security guardians, Wintel O/Ss will need to be maintained, as per scrap files, Registry entries, Defragging, etc. XP, Vista, and Win7, all respond well to using [CrapCleaner](#), [360Amigo](#), and, [Advanced System Care](#), (free versions), as minimum Housekeeping measures. Also, keep Startup files to a minimum, plus preferably turn off HDD Indexing, and also Superfetch in Vista/win7, to ease HDD function, as well as to free up resources. (See also the [Computer Beginner's Management Survival Factfile](#) or [Mini Computer Factfile](#) for more performance tweaks, Housekeeping, and program lists). Note that laptops are restricted in power use to stabilize heat generation, so, be accepting of the fact that they are rarely as fast as any PC with the same resources and software configuration.

14) Laptops may have interference problems when live mobile phones, or other similar technology, are used in close proximity, so, be sure to maintain 30 cm or more distance from the laptop.

15) Avoid environmental dust, liquids, food debris, sunlight exposure, etc, and, **always acclimatize laptops**, before Startup, when moving between differing ambiances of humidity, and temperature. One hour, opened, should suffice..?

16) Never allow a laptop to pass through a metal detector when travelling, and, always enclose any non-installed HDD in an anti-static bag. Remove and appropriately store the battery before travel as well. Ensure that a laptop is always stored securely, without any sliding and bumping eventuating. Never leave unattended either, where practicable, all part of proud laptop ownership. Security cables can also be quickly cut by a determined thief..?

**17) Health Issues and Portable Computer Use:** Laptop use is rather cramped and restrictive, especially with ever-smaller models. You may wish to try different external keyboards, eg, ergonomic or Dvorak (different key layout), and there are typing, and other aids, for those with disabilities, such as large external trackball mice. **Extensive mouse use** with one hand/arm more than the other may be alleviated by **ambidextrous mouse use**, especially when using the left/right-compatible mouse settings. Always easier, of course, for those who grow with new technology, rather than having to learn the new tricks! **However, if you do spend a lot of time at any keyboard, you risk physical damage such as RSI if care is not taken to ensure comfort and well-being over the longer term, and, do not forget wellbeing of eyes, the maintaining of good general working posture, sensible diet, and, even sensible toilet stops!.**

**RSI, Repetitive Strain Injury**, aka **Cumulative Trauma Disorder**, can, and does, affect the strongest of us, as the occurrence is not a matter of physical strength or of sheer endurance, but of the consequences of sustained tension suffered by muscles and tendons, unrelieved by variation of activity to 'work' other muscles combinations, and by the limiting of healing and repair opportunities, thus resulting in chronic inflammation, swelling, thickening, and even possible deformation by foreshortening, of involved muscles and tendons. **Keyboard activity, especially, affects some of the most complicated and nerve-rich muscle groups humans have, ie, those involving arms and hands, as well as those of the larger muscles and joints that relate to maintaining seated postural integrity.**

Overuse and consequent inflammation of the wrist can result in the well-known keyboard-related condition of **Carpal Tunnel Syndrome**, in which tendons, ligaments, and nerves that pass through tunnels between the wrist/carpal bones, within the encircling carpal tissue band, begin to exert drag as they inflame and thicken, causing more and more pain and inflammation, especially by compression of the relatively large median nerve. Other hand, arm, thoracic spine, and shoulder areas can also be affected by poor computer habits, and all will cause pain and discomfort, often continuing even after the cessation of the causative activity, and then becoming chronic in nature. As well, in susceptible people, prolonged inactivity of large lower body muscles may lead to blood clots forming, ie, **DVT**, aka **Deep Vein Thrombosis**, may result, the greatest hazard being the further movement of parts of these clots, were they to break up, which may then cause further blockages in heart, lungs or brain, after setting off on their own particular journeys of destruction.

**Note that prolonged laptop posture is even more stressful than for PC use, especially for the young with their growing bodies**, so, interspersed usage of ancillary keyboards, mice, monitors, and, other proper computer furniture and seating is advisable, as well as the prescribed mandatory exercise, relief, and relaxation breaks. Also, where practicable, use of a port replicator, in conjunction with seating at a normal computer work-desk, plus conventional keyboard and monitor, will optimise convenient and healthy laptop usage.

So, **RSI** is real, **DVTs** are real, **eye-strain** is real, and a general lack of regular exercise and postural variation breaks bring their own long and short-term health penalties. **Develop good keyboard and general computer usage habits as part of becoming a savvy and long-term effective computer operator, portable or otherwise.** Better, therefore, than to have recovery time being later imposed that reduces actual productive output, or even just hobby and browsing pleasure.

**You will not know how susceptible you are, personally, to cumulative trauma disorder, or, how or to what degree the condition will affect you, until it actually develops, so be warned, and do not put yourself to that particularly needless test, OK!** Test the [Mousotron](#) and the [Screen Magnifier](#), and see also [Eye and Arm Strain](#).

## Laptop Maintenance and Repair Tips:

For more very detailed information about overall laptop maintenance and repair, **beg, borrow, or buy the current 'Upgrading and Repairing Laptops'** by Scott Mueller. There is also much in common with PCs, and other Wintel desktop models, for software and hardware troubleshooting and repair. (See also **CBMSF**) **For those with sufficient skill and confidence, here are some tips for keeping personal laptop \$\$\$ down:**

- 1) **Avoid using a laptop in ambient conditions beyond 25°C**, (as in 4) above), consider using a cooling pad beyond this point, as the confines of a laptop case make temperature control more critical than with a PC. Plus, the occasional judicious external use of **compressed air** will keep vents, coolers, grills, and keyboards free of dust and debris. **Judicious use of compressed air** is also advised whenever the laptop case is opened, be sure to check any **cooler FINS, if present**, for dust and debris. **A small sheet of smooth bare metal, (eg Cu/Al), under in-use power packs will also serve to disperse excess generated heat, and, do not cover the power pack when in use. Material stress extremes, such as from large temperature differences, will inevitably shorten any computer module's working life.**
- 2) **RTFM is strongly advised**, so, download the appropriate **User's and Technician's Manuals** before attempting any disassembly. Often there are Web info-files on specific laptop models, with good graphics also posted, that can be consulted. **Frequent digital camera shots of disassembly stages are also useful for reassembly. First recourse for drivers and manuals should be the brand manufacturer's own website, in most cases.**
- 3) **Replacing drives and RAM should pose few problems**, and, for anything further, proceed at your own risk. **Always unplug from mains, and remove the battery, before opening the laptop case for disassembly, OK!** In regards to RAM use and RAM swapping in laptops, there is also a proprietary tendency, of late, with some brands, to match a particular RAM speed to a specific motherboard, so that RAM actually in use, does not match that installed. Thus, should this problem occur with any RAM-swapping or replacement, RAM details should be re-checked in manufacturers' specs, and, the correct size and speed RAM sticks used.
- 4) **Test components by comparing with known-goods where possible, and a handy PC is useful for drive testing, plus, digital snapshot and Webfile viewing as well. Note that testing HDD SMART will not be possible with a USB connection.**
- 5) **Replugging and use of electrical contact spray, as with PCs**, is advised to initially check pluggable module function, before any further disassembly. **Power and battery connections** can also benefit from this treatment.
- 6) **When replacing motherboard components** such as CPU and ancillary processing units, video cards, sound, CMOS batteries, fans, etc., **be sure that components do match/are compatible. Interchangeable monitors** are also possible, if connections are the same, and, the screen fits, as **usually**, voltages are all the same. However, do note that when laptop displays fail, 5 components may be involved, singly or otherwise, viz, flourescent light, inverter, display panel, connection to motherboard, and/or video card, so expert attention will be required. The simple test for video card functionality is just to plug in an external monitor.
- 7) **CD/DVD lenses** are easily cleaned with cotton bud and **propyl alcohol**. **Never use any silicon-based cleaner** in a laptop or PC, and, always use dedicated brand electrical contact cleaner on any power connections and ancillary plug-in connections.
- 8) **As with any PC disassembly and servicing, practice on an older functioning laptop before attempting these steps on a more modern model. RTFM, RYF Mueller, and, know when to consult a professional, OK!**
- 9) **Just before final case closure**, boot up the system to make sure all is well, turn off, and then complete the closure.
- 10) **Being organized, orderly, and uninterrupted, while you tinker, always helps, as does the use of correct tools. Observe standard anti-static practices** inside the laptop case, and, when handling internal components.

## 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 SSD 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, only by Win 7 O/Ss and above.** Vista and XP will need extra software and drivers for these SSD 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.**

**For Linux users, see the Mini-Linux Factfile, via the main page.**

**For Apple Users, there are many Apple books and online forums which can be consulted**, so, these 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 HDDs 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.

## Notes re Choosing and Purchasing a Laptop:

To begin with, if you actually want value for money when computing, choose a PC, as in Big Beige Case, et al, optimum 17x17x7.5 in/43x43x19 cm minitower, if available, which can also be non-new, the reason being that the BBCase will have standard mountings for motherboards of various types and sizes, plus, the case can be 'modified' for front-end fittings, etc. Always use a good quality PSU, and years, even decades, of BBCase service are possible. Lots of add-on and hand-room inside, good cooling too.

However, if computing portability is required, then some sort of laptop purchase will need to be made, new or secondhand. But, note that the same 'error' was not made, re motherboard bases being standardised, in the construction of laptops. So, interchange of non-peripheral parts, except to some extent within actual brand ranges, is almost non-existent, thus, motherboard swapping cannot be done so easily, if at all. (This also applies to other portable devices such as 'smart' phones.)

This is then, in turn, a licence to print money for expedient manufacturers, re model 'changes' and 'upgrades', which can be just cosmetic, ensuring non-interchanging of parts. This, coupled with consumer cupidity and 'designer' features, such as 'slimness', means that the practicality of portable computing is compromised, as well as useful life-span, plus, cost and waste are unnecessarily high. Ideal for sweatshop manufacturing to churn out even more questionable overdesigned and engineered products at inflated prices..?

### First of all, slimness and 'beauty' really means:

- 1) The fragility of the case must be compensated for by more screws to confer rigidity, and, there now is a semi-monocoq trend away from utilising those handy detachable base-plates that would give ready access to RAM, HDD, and fan inspection/cleaning.
- 2) Motherboards and leads, connectors, etc, all become more fragile, cases become more cramped, cooling is more of an issue, and displays, hinges, are also more fragile.
- 3) **The point can be then legitimately made, that there is no such thing as a hot CPU**, rather, the laptop into which it is fitted has been poorly designed, especially as pertains cooling passages, vents, fan, etc. Plus, the smaller the enclosure, the closer in proximity to each other are the main heat-producing components, being CPU, GPU, HDD.
- 4) **Also re heat**, even the term 'laptop' conveys a poor description of ideal running conditions, laps are not places for booted laptops, of any description, nor are bedspreads, carpets, etc, rather, firm table-tops, hard-topped lap bean bags, are more suitable, as more heat build-up means more material stress, due to a greater range of expansion and contraction. **Always use temperature-measuring software, OK!**
- 5) **Bigger cases and fans also mean more efficient cooling.** Customer education for usage is thus important, including for HDD safety and health, bumps and strong vibrations should be avoided, as well as excess heat, although SSDs are now increasingly being used, with cooler operating temps, and, are not so susceptible to bump and vibration damage.
- 6) **If small and slim really means a tablet, or even just a smartfone, then do not buy a laptop.....especially if you just need to connect to the Internet whilst travelling..?**

### Secondly, points to look for, re laptop pre-purchase choice:

- 1) **Mainstream brands will be advisable**, especially those common in your own country, and/or, look for those compatible with your own domicile, and personal, requirements.
- 2) **New is not necessary**, especially if using Linux, and also, to avoid depreciation \$\$\$. **Check for obvious signs of ill-use, wear, lid-hinge stability, cracks, dusty fan and vents, etc.** **Do your own detailed laptop research pre-purchase, new, or used, OK!**
- 3) **Check online for respective CPU operating temps**, and, avoid small cases when these hotter CPUs are being used. Recheck temps again with pre-purchase running, the underside of the case should, at most, feel comfortably warm to the hand, whilst running at more than just idle speed. **Units with small, and over-occluded fan vents, should be avoided**, unless you consider 'renovation'..? **Do not cover the PSU pack whilst in use..!**
- 4) **Sensible, serviceable cases are optimum**, with handy detachable plates for convenience, which is also good for cooling, especially if a laptop is to be used on a desk or table in lieu of a PC. **Note that laptops can also be used as desktop PCs**, if external monitors, keyboards, and mouse are used, which means that the case can be opened up, fan vents also, (get out the tin-snips...?), remove case panels, run on a hard surface, raise the laptop for more space underneath, with extra rubber pads/feet, etc.
- 5) **Sensible, accessible layout, inside the case**, especially with the HDD spaced away from CPU, fan easily accessible for dis-assembly and cleaning, similarly for CD/DVD access. **This layout detail can also be checked via Google laptop breakdown links.**

6) **On/Off switches being sensibly located**, (inside the lid, optimally), that cannot be accidentally tripped, with casual or careless handling. Check the condition of the external PSU connection, and the PSU itself, plus check the battery life, if this is important, both for new and secondhand units.

7) **Externally-fitted batteries** that can be easily detached for storage, or, to prevent accidental overcharge on mains power, etc. **Ask Google re optimal laptop battery health, OK!**

8) **Check all necessary connections**, USBs, monitor, card slots, wifi switches, CD/DVD, sundry other connections, etc, for presence, 'liveness', and, for suitability of purpose.

9) **More valuable units should have physical non-theft locking device(s) present**, but, any other hardware or software security is a personal choice, thus, do note, and remember, that software locks, and passwords, only keep honest people, and owners, out..? Anyway, purchase, and carry, **an external storage unit** of some kind, be it SD card, flash drive, or, external HDD, **always kept separate from the laptop**.

10) **Make sure the PSU pack is matched as being electrically optimal for the laptop: volts and polarity being correct, and, of quality manufacture, plus, higher amps and watts is OK, but, lower amps will mean that PSU and laptop will both run too hot, OK!**

## 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 passwords 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!**