Crib Sheet on UPS Use:

1) **Recommend using a good-quality surge monitor powerboard, and a UPS.** 'The three major types of UPS system configurations are online double conversion, **line-interactive** and **offline** (also called **standby** and **battery** backup). These UPS systems are defined by how power moves through the unit.' (See also: https://www.vertiv.com/en-emea/about/news-and-insights/articles/educational-articles/what-are-the-different-types-of-ups-systems/

2) A quality powerboard with surge monitoring capabilities will, in turn, protect the UPS, and, anything else plugged in it. Note that **laser printers** should not be on this particular board, as they **draw a lot of power when switched on,** and should be directly plugged to the mains, via a separate circuit/outlet if practicable, or, switch on before switching on the rest of your systems.

Uninterruptible Power Supples, 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, **without material stress, especially heat-related.** 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 possible 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 km² 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 new; PSUs are mass-produced units, and priced accordingly, including for better quality units.**

Look for on/off switch, separate fan grills, sturdy leads, and appreciable weight, that all indicate 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!