



Uninterruptible Power Supplies

Main Resource offers uninterruptible power supplies from APC, Cyber Power Systems, ONEAC and Panamax. If you are interested in purchasing a UPS, you can order on-line or by phone at 800 362-6740.

Courtesy of Main Resource, Inc. Visit us at www.MainResource.com or call 800 362-6740 for all your telecom needs.

Uninterruptible Power Supplies (UPS)

To protect your equipment from power failure, slowdowns and brownouts, you need more than a simple surge suppressor. Blackouts and brownouts make up as much as 90% of all power disturbances affecting electrical equipment. You will need a dependable Uninterruptible Power Supply, or UPS to keep your switches and PBXs up for an extended period of time.

UPSs all come with a nickel-cadmium or lead-acid battery backup, to get you through anywhere from a few minutes to several hours of time without power. Battery power supplies direct current, and since your equipment will only run on alternating current, there's also a conversion that takes place, facilitated by an inverter. The conformity of the inverter's output wave to a true 60-cycle sine wave is an important measure of the inverter's quality. Most UPSs have microprocessors that regulate some of the functions and communicate over a LAN.

Although there is only so much variation you can produce with UPSs, telecom equipment fares best with purer output waveforms, extended battery time and the ability to manage the devices remotely.

An energy spike occurs when there is a rapid load reduction on the power grid. This can cause voltage levels to jump as much as 100%, causing electrical components to become unstable and forcing a system crash. Surges, which are basically the same as a spike, but of longer duration, will physically damage equipment. Surges are caused by lightning, a storm blowing power lines together, or sometimes by the electric company. Line noise or electrical static is caused by low-level fluctuations.



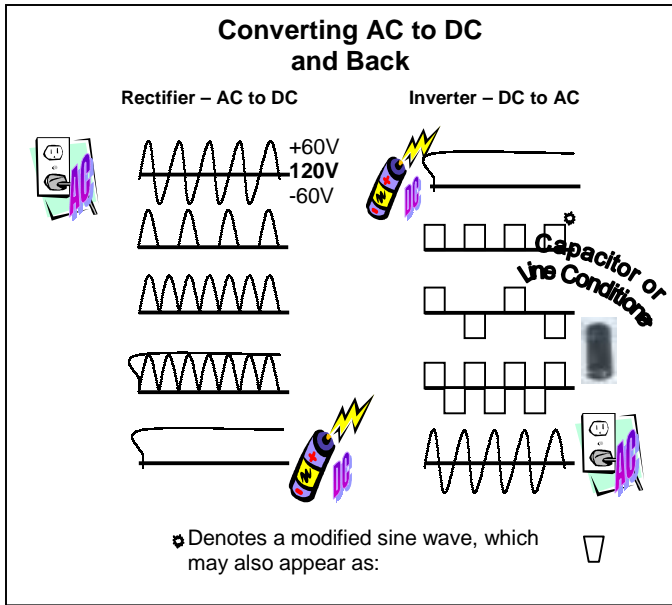
The per-hour loss for a 900-number service without power is over \$50,000, illustrating vividly the point that downed equipment is more than just a nuisance. UPSs protect you from all types of power variations, but most important is protection from a power outage, which results in lost revenue and wasted employee time.



The power generated and supplied by your local utility is a sine wave. This is because it is generated by and is a natural product of rotating AC generators.

A brownout results when there is a uniformly lower voltage that doesn't distort the power signal. Brownouts sometimes occur when internal office equipment, especially air conditioners and laser printers switch on; or during peak demand for power by a local heavy use industry. New equipment may continue to operate fine under these circumstances for some time, but it will cause damage in the long run.

When a power failure occurs and the UPS switches power to the battery, the signal generated by the inverter and supplied to the equipment may not be a true sine wave (it may be called a "modified" or "simulated" sine wave). The modified



or simulated sine wave can range from a square wave to a trapezoidal wave. These pseudo-sine waves are the product of less expensive components than those used to make true sine wave generators.

Computers using the power supplies found in most desktop PCs and servers will work fine with square waves, better with trapezoidal waves, and best with true sine waves. Generally speaking, only continuous on-line UPSs require the true sine wave to be effective.

UPSs also have a third component; the rectifier module. The rectifier keeps the batteries charged by changing AC current to DC. UPSs are classified by the way its 3

components, the inverters, rectifiers, and batteries are connected. Here are some of the more common configurations:

Standby

Standby UPSs feed AC power from the utility line through the bus, to the equipment. It will only switch to battery during a blackout or brownout. Surge protectors and filters are also utilized to smooth out high frequency spikes and line noise. Standbys commonly work best on single-use computer equipment.

Line Interactive

Like the standby, the online interactive passes the AC directly through, but will ride out fluctuations to preserve battery life. To accomplish this, a regulator filters the voltage, raising or lowering it to the proper range. When the voltage is too far out of range, the CPU will utilize the battery. As with the standby, filters are used to even out high frequency spikes and eliminate line noise.

Online

With an online UPS, the inverter is always on, converting DC to AC so there is no delay in switch-over in the event of a failure. These work by converting the power from the wall outlet from AC to DC, continually charging the batteries, through the inverter where it is converted back to AC and sent out to the equipment that is relying on it for backup, a process called “double conversion”. This design facilitates voltage regulation and pure sine wave output with limited distortion. Some also have isolation transformers which block out surges and spikes by separating the input and output lines.

Which one is right for your business?

Standby UPSs are generally not used for telecom equipment because the square wave output is not tolerated by even the best equipment. These UPSs are best for PCs because they usually supply just enough time to shutdown. Telecom equipment needs a much longer back-up period.

With line interactive and online UPSs, the battery is always on the “power bus”, hence there is no switchover time and no power interruption. There is also a pure sine wave output. Built in to the design is superior voltage regulation, surge protection and noise/spike filtering. Both can be outfitted with extra battery packs for extended periods of outage.

Line interactives can deliver the perfect sine-wave, but the option to provide that will cost extra. They usually have a fair switchover time, usually less than four milliseconds. Their surge protection meets industry standard specs, although they cannot absorb the many joules of energy that the onlines can, due to the interactive’s lack of isolation transformers. Line interactives are less error prone than the Online UPSs, partly because aside from some filtering, they are at rest most of the time. If you have only infrequent outages, you may find this the best choice, however the Line interactive UPS may not completely compensate for voltage shifts.

To get the clean AC signal from an Online UPS, you will pay more in up-front cost due to expensive special circuitry and in maintenance, with the double conversion process resulting in extra power usage. The special circuitry that makes the Online’s signal so clean is also more prone to failure than that used by the interactive. Some reports suggest that the onlines run half as long between failures as do the interactives.

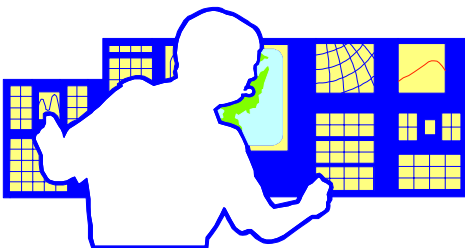
When you’re running on your UPS

When telecom equipment stability is your prime concern, you’ll want to ride through the power-outage waiting for the power to return. In this case preventive maintenance is key.

Before an outage occurs, you will want to know:

1. The current charge on the battery
2. The battery temperature

If your battery is too warm, it will lose its effectiveness and it may be a sign of another problem. Sometimes the batteries are installed backwards, or an overloaded UPS transformer may be heating up a battery pack nearby.



Load on the system, measured in KVA’s is key in determining the necessary capacity. UPSs are

rated by how much load they can support. If the devices supported by the UPS are drawing too much current, the UPS will be unstable. Some UPSs will support an adapter card with sensors that measure such external surrounding conditions as the current temperature and humidity and the presence of smoke and fire. They can even tell you whether the door to the room has been opened. Some UPSs offer a Graphical User Interface (like Windows, which uses graphics instead of characters and works with a mouse or trackball) displaying all of the above information on simulated, dials, meters, and LEDs.

Most UPSs now allow you to interface with network managing software to monitor your UPS. Besides passive monitoring, you will be able to send commands to the UPS to run diagnostic tests and to turn on and off devices that are plugged into them. This would be useful during an outage. If you see your battery runtime meter drop, you may decide to run off some non-critical equipment to preserve power for the PBX. You can do this right from your remote console.

Some Popular Uninterruptible Power Supplies

| Manufacturer | Product | KVA | Backup Time (full load in minutes) |
|---------------------|-------------------------|------------|---|
| APC* | Smart-UPS 1000 | 1000 | 10 |
| APC* | Smart-UPS 1400 | 1400 | 12 |
| APC | AP2000XL | 2000 | 30+ |
| APC | Smart UPS2200 | 2200 | 9 |
| Best Power | Fortress LI1420U | 1420 | 5 |
| Deltec | Power Rite Pro II | 1920 | 9 |
| MGE | Pulsar EX20 | 2000 | 10 |
| Para Minuteman | XRT 2000 | 2000 | 10 |
| Toshiba | 1400SE | 2000 | 10 |
| Tripp | Tripp PS 450 Online UPS | 450 | 5 |
| Tripp | Tripp PS 700 Online UPS | 700 | 5 |
| Tripp | Tripp 1250XLNET Smart | 1250 | 10+ |
| Tripp | Tripp 1050XL SmartPro | 1050 | 16 |
| TrippLite Smart | Tripp 2200 Net Smart | 2200 | 13 |

*Main Resource's Local Installation Division recommends and installs these models. They produce a true sine wave output, are moderate in price (\$600-\$700) and are good for telecommunications applications.

There is no question that with the potential loss or damage to costly equipment, the investment in an Uninterruptible Power Supply is a sound one.



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