B&R Enclosures Pty Ltd

Common Power Problems Affecting Computers

Technical Paper

Originally published by Chase Power

INTRODUCTION

In this paper, we review the problems associated with power disruptions, the impacts of subsequent business interruptions, and the ability to solve these issues with Uninterruptible Power Supplies (UPS).

The functionality of electronic equipment is critically dependent upon the supply of clean, consistent power.

Despite significant advances in technology, electronic equipment remains highly susceptible to disruptions, which can cause major business interruption issues, including data loss.

One in seven businesses experience a loss in income due to a business interruption.[1] With the high potential for business interruptions to damage a company's data and credibility, it is important to consider every point at which equipment is susceptible to power disruptions, and put systems in place to combat any issues.

One way to reduce the susceptibility of servers to damage and maintain clean power is to install a high quality UPS within a data centre.

IMPACTS OF BUSINESS INTERRUPTIONS

Business interruptions can affect productivity, lead to the loss of work and stored material, and have a severe financial impact on a company.

Business interruptions can cause disruptions to IT systems for over a week, and can cost companies anywhere from $26,000 up to $2.6 million.[2] Of these business interruptions, about 28% are caused by power problems. Recovery time from these disruptions can vary, and this delay can continue to have a rolling affect on businesses for weeks.

- 33% of companies take more than a day to recover.
- 10% of companies take more than a week.

Recovery delays can include reconfiguring a network and re-entering lost data. This can take from days up to weeks.

Without sufficient contingencies in place to prevent serious business interruptions, a power failure disrupting IT systems can cause long term financial problems for a company.

- 33% of companies lose $26,000-$660,000.
- 20% of companies lose $660,000-$2.6 million.
- 15% of companies lose more than $2.6 million.[3]

A study by CGU Insurance in Australia found that, of nearly 500 small businesses, 25% would have to shut down operations if they experienced a serious business disruption.[4] This figure jumped to 38% if the shutdown occurred during a busy period in the year for that business.

It is important to ensure that a data centre is complete with accessories and equipment to defend against business interruptions. These accessories could include back-up generators, iPDUs, and Uninterruptible Power Supplies.

WHAT IS A UPS?

A UPS, or Uninterruptible Power Supply, protects against loss of electricity supply by providing battery back-up for a period of time.

A UPS will work to protect against other power quality problems common in electricity supply, such as surges, voltage sags, spikes, and RF noise, that occur without warning.

UPS's can be utilised to provide short-term power during an outage, or until a standby generator is started for longer-term power back up. This is more likely the case in larger industrial power applications where critical supply is required, for example at hospitals, aged care facilities and high security facilities.

All Chase Power UPS's are supplied with software to help manage any issues. In the event of a long power interruption, the software instructs the computer to save current work and shut down, without the operator having to be in attendance.

WHAT LEVEL OF PROTECTION DOES A UPS OFFER?

Selection of the most appropriate technology to suit user applications is of vital importance; this level of protection is where various UPS technologies differ.

Chase Power's UPS range are available in Line Interactive and Online Double Conversion technologies, with expandable battery back-up times to meet any requirement.

Line Interactive UPS's regulate incoming AC voltage to a specified output voltage, ensuring that power variations are removed from the power supply before reaching the server.

Online Double Conversion UPS's work with the same result, but by taking the input AC voltage and rectifying it to create a DC voltage. This DC voltage is then used to create a new AC output voltage waveform, which is completely controlled by the UPS inverter.[5]

With Line Interactive and Online Double Conversion technologies, a UPS can protect servers and systems from typical power supply issues, including voltage sags, surges and power interruptions.

Image credit: www.iroy

TYPES OF POWER PROBLEMS

Most people believe that blackouts are the biggest problem associated with power. However, voltage sags and power spikes can cause long-lasting problems to a computer system, without warning.

Even the smallest disruption can cause damage to business computers, networks, and other sensitive electrical items. This could include cash registers, telephone systems, EFTPOS machines, computer peripheral equipment and process control equipment.

At the very least, power problems can cause data loss and unexpected shutdowns. In severe cases, bad power can cause damage or destroy equipment.

Bad power can be identified by many different indicators, including:

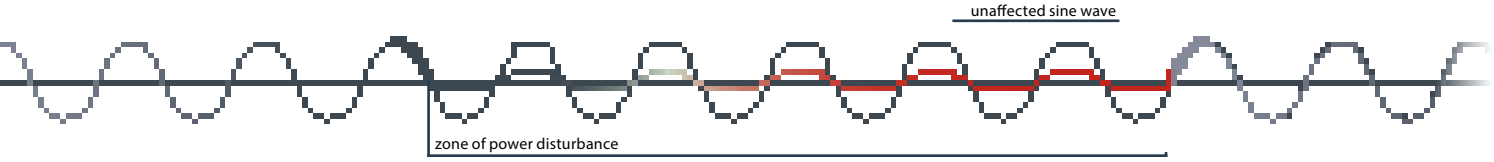
- A computer's monitor and indicator lights flickering or becoming wavy.
- Unexplained errors in transmission of data.
- Sudden loss of internet connections.
- System lockups.
- Aborted modem transfers.
- Hard drive crashes.

Voltage Sag – Short-term decreases in voltage levels

Causes – Start-up power demands of electrical devices, e.g. motors, elevators, inadequate power supply, and poor circuit design. Some utility power companies cope with extreme demands on the power grid by systematically lowering voltage levels in certain areas for hours or days at a time.

Effects – Computers become starved of the power required to operate, resulting in keyboards lock ups, unexpected system crashes, reduced efficiency, reliability and life span in electrical equipment, active data loss and/or data corruption.

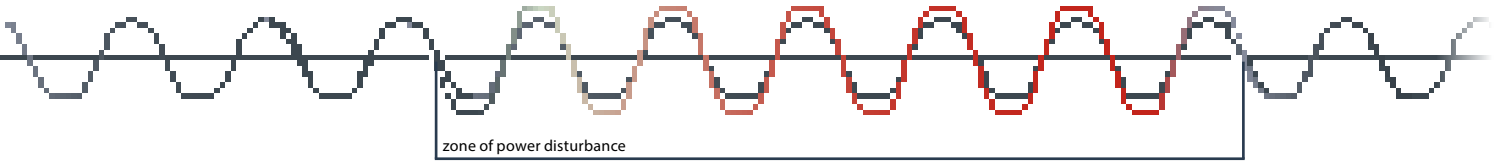
Voltage sags are often followed by spikes, which are also damaging to computer components and data.



Spikes – An instantaneous dramatic increase of voltage

Effects – Computer lock up and data loss.

Spikes are like an electrical tidal wave to any electronic equipment.

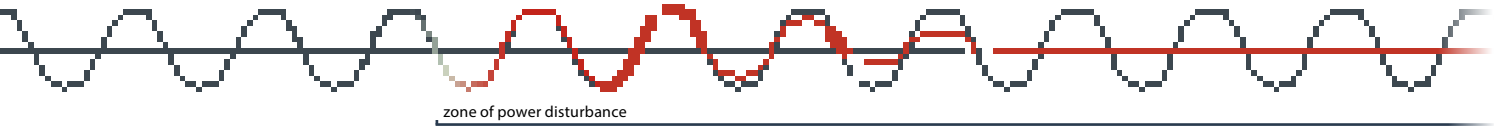


Interruptions (Blackouts) – A total loss of power

Causes – Excessive demands.

Effects – Loss of productivity, work and stored material.

Major Concerns – Business interruption costs.



DEFINITION OF TERMS

Power problems which affect the performance and reliability of computer systems include:

- Voltage sag or dip – a "dip" in the voltage level from the electrical power supply. These are extremely common and occur without warning and often without the consumer knowing. Power sags or dips account for the majority of power quality problems.
- Spike (also called a surge) – a very rapid and temporary increase in the electrical power supply. These are a serious source of distortion and are a very destructive problem.
- Interruption (also called an outage or blackout) – a total loss of supply for a period of time.
- Transients – a temporary excess of voltage, current or load in an electrical system which has been disturbed. Transients are short duration events.

Other problems which can impact negatively on a systems operation include:

- Electrical Line Noise – a high frequency distortion of the voltage waveform.
- Harmonics – a recurring distortion of waveform of the supply voltage.
- Notching – a disturbance of opposite polarity.
- Over-voltage – occurs when the voltage is raised above design limits.
- Short Circuits – when two electrical wires (positive and negative) are incorrectly connected together.
- Swell – an increase in voltage.
- Frequency Variation – a change in frequency from the power source.
- Power Factor – the measure of effectiveness with which an electrical device converts volt-amperes to watts.

CONCLUSION

Demand for clean, consistent power is now a critical requirement for business operations everywhere.

Contingency systems are often in place to protect the health and safe operation of vulnerable equipment, and reduce the risk of business interruptions.

As discussed in this paper, a UPS provides a complete solution to minimise the impact of power supply issues. As the last line of defence, a UPS will remove any power variations from supply, such as voltage sags or surges, and minimise the damage caused by extended business interruptions.

HOW CAN B&R HELP?

B&R's partnership with Chase Power allows us to deliver a product of the highest quality.

Combine a B&R data cabinet with a UPS and you have a smart rack capable of ensuring safe and reliable power is supplied to your system.

All B&R's data cabinets are fully customisable to suit any application and 100% fit-for-purpose. Our technical sales team are available to assist when deciding what UPS is required to ensure protection of your equipment and facility.

Call 1300 ENCLOSURES (1300 362 567) to talk to our team of experts, or visit brenclosures.com.au for more information.

References:

[1,4] CGU Insurance Ltd. 2014. Insuring for Business Interruptions. [ONLINE] Available at: https://www.cgu.com.au/insurance/Business/Explore-Business/insuring-for-business-interruptions. [Accessed 2 September 2016].

[2,3,5] Hwaiyu Geng, P.E., 2015. Data center handbook. 1st ed. New Jersey: John Wiley & Sons, Inc.

This paper was originally created by Chase Power, and has been reproduced by B&R Enclosures with Chase Power's permission.

Head Office
51 Stradbroke Street Heathwood QLD 4110 Australia
PO Box 1151 Browns Plains BC QLD 4118 Australia
T: +61 7 3714 1000

QLD Office – Sales & Warehouse
51 Stradbroke Street Heathwood QLD 4110 Australia
PO Box 1151 Browns Plains BC QLD 4118 Australia
T: +61 7 3714 1111

North QLD Office – Sales & Warehouse
4 /780 Ingham Road Mount Louisa QLD 4814 Australia
PO Box 7615 Garbutt QLD 4815 Australia
T: +61 7 4727 1900

NSW & ACT Office – Sales & Warehouse
7 Metters Place Wetherill Park NSW 2164 Australia
T: +61 2 9915 9555

Newcastle – Distribution
Ross Joice Agencies Pty Ltd
109-111 Broadmeadow Road Broadmeadow NSW 2292 Australia
T: +61 2 4961 4433

Tasmania – Distribution
W P Marting Pty Ltd
85 Elizabeth Street Launceston TAS 7250 Australia
T: +61 3 6331 5525

VIC & TAS Office – Sales & Warehouse
50-52 Sunmore Close Heatherton VIC 3202 Australia
T: +61 3 9552 0552

SA & NT Office – Sales & Warehouse
505 Grand Junction Way Wingfield SA 5013 Australia
T: +61 8 8417 6222

WA Office – Sales & Warehouse
6 Montgomery Way Malaga WA 6090 Australia
T: +61 8 6310 4777

National Sales
T: 1300 Enclosures (1300 362 567)
E: sales@brenclosures.com.au

brenclosures.com.au