

THE PAYOFF OF PREVENTIVE MAINTENANCE *by Kyle Tessmer*

Get a little peace of mind.

In the current age of information and technology, the safety of your data is more important than ever. In addition, the electrical system supporting your data is its lifeline and ultimately responsible for its security. It's no wonder then that incorporating an uninterruptible power supply (UPS) into data storage systems is considered a good security strategy. The UPS is the most critical component in protecting the integrity of your data, regardless if it's merely providing sufficient opportunity to close your PC, laptop or notebook securely, or if it is functioning as a stopgap measure by supplying power before a back-up generator takes over. A maintenance plan for your UPS provides that peace of mind. No matter what your industry is, your UPS must be taken care of by a maintenance plan.

A recent study conducted by The National Survey on Data Center Outages stated that the typical consequence of interruption was \$1.7 million per year, costing \$7,900 per minute, and these numbers are projected to grow rapidly. Despite the importance of a company's equipment, most every organization in the study had at least one outage in the past two years, averaging 2.48 complete shutdowns over the two-year period, with an average duration of 107 minutes. The duration of the company outage correlates to lack of resources and planning, as only 37% of applicants agree there are ample resources to keep their data center fully functional if there is an unplanned outage.

Research indicates that regular preventative maintenance can extend your UPS unit's life cycle and can alert you to potential problems before they become significant issues. That same research also concluded that UPSs that were properly maintained were significantly less likely to succumb to any downtime; in fact, customers without the recommended two maintenance visits per year were highly vulnerable to equipment malfunctions.

Most UPS system failures can be categorized by six symptoms: Failure of the DC source (batteries), improper grounding systems, distribution system faults, poor maintenance practices, incorrect distribution coordination (DCF), or human error. Surprisingly, more than two-thirds of downtime events stem from a preventable cause. Through systematic inspections, a maintenance program ensures that the numerous parts of the UPS are thoroughly evaluated, cleaned, tested, and calibrated. A successful maintenance plan takes into account the age of the UPS and helps customers budget for major replacement intervals.

WHAT SERVICE IS BEST FOR YOU?

Preventative maintenance can be defined as the use of instruments and analysis to determine equipment condition and to perform corrective measures in order to predict failure before it takes place. Choosing a service provider can be a daunting decision. Some customers prefer a contract with an independent vendor, while others choose a service contract or extended warranty from the UPS manufacturer. A number of companies employ engineers who are able to service the UPS; others choose to engage service only when an issue arises. All these options have advantages and disadvantages. No one choice is the best solution for every organization.

QUESTIONS FOR CHOOSING A SERVICE PROVIDER AND PLAN

- If the UPS fails, what is the cost of downtime to my company?
- How critical is power to my application? Is it an inconvenience or would I lose sales or shut down critical servers?
- What response time do I need in an emergency situation?
- How many trained field technicians are in my area who can specifically service my UPS model? Also, do they carry spare part kits?
- Do I have any budget constraints for the UPS service?
- How much maintenance do I need for what I can afford?
- What service package is recommended by the manufacturer?
- Have I budgeted for replacement parts, planned or unplanned (battery, capacitors, fans)?
- What is my risk tolerance in terms of a UPS failure and what happens if the UPS fails?

Regardless of answers to the above questions, a preventative maintenance plan will save you time and money by minimizing interruptions and maximizing uptime, along with enhancing your overall return on investment. The following are various service option considerations.

OPTION A: OEM SERVICE CONTRACT

A service contract with the manufacturer of your UPS offers a number of benefits. First of all, purchasers obtain the extensive knowledge, expertise, and capabilities of factory-trained field technicians who receive continuous training from the manufacturer of specific UPS systems. This results in knowledgeable technicians who have current and comprehensive information regarding the functionality of your UPS — along with the latest software and upgrade kits to maintain peak-performance levels. Field technicians also possess advanced troubleshooting capabilities and techniques, reducing repair time.

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Routine maintenance through OEM service will provide history that can be trended over time to predict underperforming parts, batteries, and end of equipment life. The recommended parts replacement schedule can be completed during routine maintenance visits, and these changes are documented over time. A routine maintenance program will also provide documentation and validation for any warranty claims.

In addition to a national infrastructure of field technicians, technical support personnel and engineers, UPS manufacturers possess a higher number of field personnel and office resources. Included in this are risk programs that can be overlooked by customers, such as safety protocols and levels of insurance.

The manufacturer's technicians also have the advantage of quick access to spare parts. The spare parts are kept either in stock in a van or central location, ensuring that an issue is resolved immediately. Many service plans offer discounts on these spare parts and upgrades, further reducing the overall cost.

To meet customer-specific needs, UPS manufacturers offer a variety of service plans, including preventative maintenance, extended warranty, and parts/labor coverage. Various features can also include 24x7 coverage, quarterly maintenance visits, remote monitoring, and response times.

Although the service may be priced slightly higher than that of an independent service company, the advantages that only a UPS manufacturer can provide may outweigh the additional costs.

OPTION B: INDEPENDENT SERVICE PROVIDER

These businesses provide services for UPSs, such as maintenance, start-up installation, or emergency services. Independent service providers are generally priced lower than a manufacturer, although they may have fewer resources available and may not be trained on your particular model of UPS.

An independent service provider's field technicians generally have been trained on a specific product or brand but are not certified by the manufacturer. Important to note: unauthorized service work on your equipment will void the warranty. UPS products are continuously updated and modified. For that reason, if a technician has not been trained by the manufacturer, he or she may not have the knowledge to service the UPS properly. This can result in hazardous conditions and potential load loss. Please remember: if a potential service provider's

authorized status is in question, you should contact the OEM and verify the status.

Generally, independent service providers will contact a UPS manufacturer's engineers and technical support experts in order to back up their own field teams. To obtain spare parts, these providers will contact the equipment manufacturer and will typically give the customer a longer than expected lead time for the parts arrival onsite. From time-to-time, the OEM will release software updates for your UPS, which an independent service company will not have access to and could leave your equipment prone to failure. In addition, the service provider's safety records and insurance requirements may or may not be kept at acceptable levels.

While independent service providers do not generally offer a written guarantee from the UPS maker, they do offer preventive maintenance with a variety of service levels.

OPTION C: SELF-MAINTENANCE

While self-maintenance is a service option, it is not recommended by the majority of OEM's, as service on this equipment should be left to a factory authorized technician.

If a company has an internal resource with sufficient safety and electrical skills, it may elect to maintain the UPS system in-house. The most important part of self-maintenance is ensuring you have an effective plan in place and that you have the necessary skills for in-house maintenance.

First responder training is available to all customers. This training can enable a skilled person to understand the operation, safety, and environmental concerns and basic preventive maintenance for your UPS. In addition, the designated person must understand the alarm conditions and required responses for specific events, along with the precise steps to start and stop a UPS in various scenarios.

Spare parts kits are available through the manufacturer and can supplement any service plan for their equipment. It is important, however, that an organization has access to a service provider for critical repairs or in case of an emergency situation.

OPTION D: TIME & MATERIAL

The time and material option (pay as you go) is an approach that some customers elect to take and only call for service periodically.

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	Year														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Preventive Maintenance															
UPS PM	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Battery PM	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Replacement Parts															
Air Filter	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cooling Fans			↔		•		↔			•	↔			↔	
Electrolytic Capacitors							□							□	•
AC Filter Capacitors							□							□	•
Control Relays										□					•
Contactors											□				•
Printed Circuit Boards											□				•
Control Power Supply											□				•
LCD										•					
Fuses										•	□				
Thermal Relays										•	□				
Battery (VLRA)			↔					↔					↔		
Battery (Wetcell)												•			

- Indicates Mitsubishi PM schedule/replacement timeline
- Indicates industry standard PM replacement schedule

Time and material (T&M) are available at any time, for all customers. Typically charged per hour of labor, with a minimum time frame, T&M rates may vary depending on the maintenance window; this can include after-hours or weekend services. Response times can vary but would typically be “best effort,” with no guarantee of arrival, as contract customers are given priority.

A downside to T&M is that replacement parts are typically more expensive; contract customers are given discounts off the list price of parts and labor.

CONCLUSION

UPS technology is advancing and has significantly improved. With this expansion, it is critical to ensure that your system is supported

by a maintenance plan. The benefits of preventative maintenance are something you should be aware of as a consumer; there are advantages and disadvantages to each option.

Regardless of the process you choose, some form of maintenance is crucial to maximizing uptime and the effectiveness of your UPS. Without proper maintenance, a UPS will eventually deteriorate and can expose the facility to an equipment malfunction or failure. Regularly scheduled maintenance for the UPS will ensure equipment reliability and benefit the organization’s bottom line.

Preventive maintenance objectives are to maximize uptime by making necessary repairs as necessary. Routine maintenance will provide records of your equipment performance and allow you to budget for replacement intervals, reducing or eliminating downtime.