Managing all that Battery Data: Incorporating PC Software to Improve Battery Management and Enhance System Reliability

Todd J. Stukenberg
Director, Global Product Management
Stationary Power Products
Midtronics, Inc.
Willowbrook, IL 60527

As those with experience in the "industry" know, battery management is not the most exciting task an organization or an individual can undertake. However, in the grand scheme of operational tasks for telecommunications networks, data centers, power distribution infrastructure or hundreds of other developments it can be one of the most important to ensure efficiency and reliability. The establishment of efficient testing and maintenance procedures along with the surveillance and discipline to ensure obedience to them are critical to the success of a battery management program. However, historically the tedious nature of these processes oftentimes has generated creative "work arounds" to them.

Recently, the use of common technology, applied in a manner specifically designed for the battery management process as served to begin to reduce this tedium. Custom PC software, while commonly available for the management of an individual or business' schedule, finances, to-do list and more, is now becoming more and more capable and effective in the implementation of battery management programs. However, choosing and implementing the right software (and the user rules and procedures for the utilization of that software) is critical for the success of the battery management program.

Choosing Battery Management Software: 5 Keys to Success

Once the determination is made to implement a true battery management program (or to enhance/automate/modernize and existing one), choosing the correct tools to deploy in the program is critical. Management software is no exception, and a review of programs and their pitfalls has uncovered five areas that must be addressed to ensure that the program is successful not only in implementation, but from a long-term standpoint.

Key number 1: Compatibility with the chosen or legacy battery testing tools

The essence of any software program is to collect, store, manage, manipulate and transfer data. Therefore, one of the key elements that will determine whether a battery management software application is effective is the compatibility of the application with the tools that will be used to collect battery test data. Today, there are a few accepted and widely deployed tools and methods for battery testing: ohmic testers (i.e. conductance meters) are widely used due to the simplicity and speed with which a battery can be assessed, hydrometers (including the digital or electronic variety) are used to assess specific gravity of most wet cells, and the traditional load bank. Most of the aforementioned tools are offered in varieties today that allow electronic transfer of data to a PC. Having this option will save on the tedium of manual data collection and entry, two ugly tasks that will certainly kill any battery management program. There are a variety of methods by

which these devices now communicate, including infra-red transfer and the use of common data storage cards (like Secure Digital cards common with consumer electronics like digital cameras and PDAs). Use of infra-red or SD cards are preferred methods of communication due to their proven reliability and the elimination of problems that are possible with physical wired communication like electrical ground faults should the test device be connected to the battery under test and a PC wired to the AC supply simultaneously as well as simple loss of the communications cable. Consequently, the management software application should be developed in such a way that it supports these communications methods and does so seamlessly from the data stream provided by the test tool. It should also be noted that it is key to ensure that the PC hardware that will be used, be it a notebook or a desktop PC, also accommodate through a serial port or USB port, external peripherals that facilitate the capture of transferred data.

Another consideration is the compatibility with legacy data that may have been captured and stored with another software application. Newer versions software will most likely be able to accept and manage data collected by ancestor software, but this is something to check before implementation.

Key Number 2: Historical data analysis—trending over time

The true objective of any battery management program is to improve efficiency and reliability of the battery system. One of the best methods for accomplishing this is to analyze and trend battery test data over extended periods of time to assess changes, make judgment on current state and ultimately, estimate the rate of degradation. A good software application will make this process quite simple through the use of database architecture that can collect, store and compare records automatically. Software developed in this way will allow operations managers to quickly review reporting on the batteries under their responsibility and make accurate determination about the health of the batteries and then schedule maintenance as needed without the waste and stress associated with crises created by failed batteries. Figures 1, 2 and 3 illustrate examples of how an effective battery management software application presents and organizes the data in the form of the user/technician/manager interface as well as a graphical representation of the data and finally as a printed management report.

Key Number 3: Scalability

As time goes on, the tendency to collect more of anything is strong. Such is the case with battery and power management data. Most batteries have useful life spans that are measured in years and with test and maintenance routines often calling for quarterly maintenance, this translates into lots of data points when calculated over the whole of a deployed network in a region, nation or even globe. Management software must be constructed in such a way where scalability and expandability is addressed, because new batteries, power systems and even networks are added, revised and acquired on a regular basis. Nothing could be more troubling or disruptive to a maintenance program than an inability to manage and utilize the historical records that have been painstakingly collected and maintained due to the limitations of a software application.

Further to this topic, foresight is needed in the development of the software application to accommodate future technological integration (like internet connectivity, Bluetooth or other data

transfer methods, etc.) and a good application will have been developed in such a way that future releases can address the latest and greatest in technology. While perhaps not an issue today, it's a question to ask when deciding on the implementation of a new management tool.

Key Number 4: More than just test results

While the "meat" of any program is in fact the test data, other key components that will ensure the maximum gain from the implementation of the program as well as the software application, is the inclusion of data records for the site parameters, system specifications and even the assigned technician for each. A well designed software application will "connect" all of these data points to allow management to assess the overall performance of systems and technicians and appropriately manage workload, maintenance schedules, equipment replacements and more. When fully deployed, the battery management software can serve to automate much of the power management process, making it easy for management to make appropriate decisions given the fact that qualified information is available at the click of a mouse.

Key Number 5: User friendliness

While it may seem obvious, one other element that will "make or break" the implementation or integration of a battery management software application (and ultimately the program itself) is the complexity of the application from the standpoint of the user. A reduction of complexity should not be misconstrued as making a system ineffectual, as the best systems in fact are highly complex in their capabilities while remaining rather simple in operation for the average user. It must be remembered that a wide range of individuals have involvement in the battery management process, from corporate management level, to network and facilities managers, to field techs to administrative aids. These individuals have varying levels of skills and comfort when it comes to using a PC or software, and the battery management tool must take this into account and include an easily navigable structure and the implementation of guides or "wizard" modes to walk users through the basic functions of the software.

Summary

Battery management is an often forgotten or even invisible, yet key component to the overall operational health of a variety of organizations. Establishing effective processes and reinforcing the adherence to them is the first step toward the development of a program that will ensure proper management of this critical asset. Improving those same processes is an ongoing job that requires discipline and dedication. Both of these endeavors can be enhanced, made more efficient, and ultimately made more successful through the incorporation of a quality software application. Choosing the right software, and getting started on the continuous improvement of the battery management program is an effort that can pay dividends for years to come.

Figure 1. User interface—an organized approach to managing data/user interface

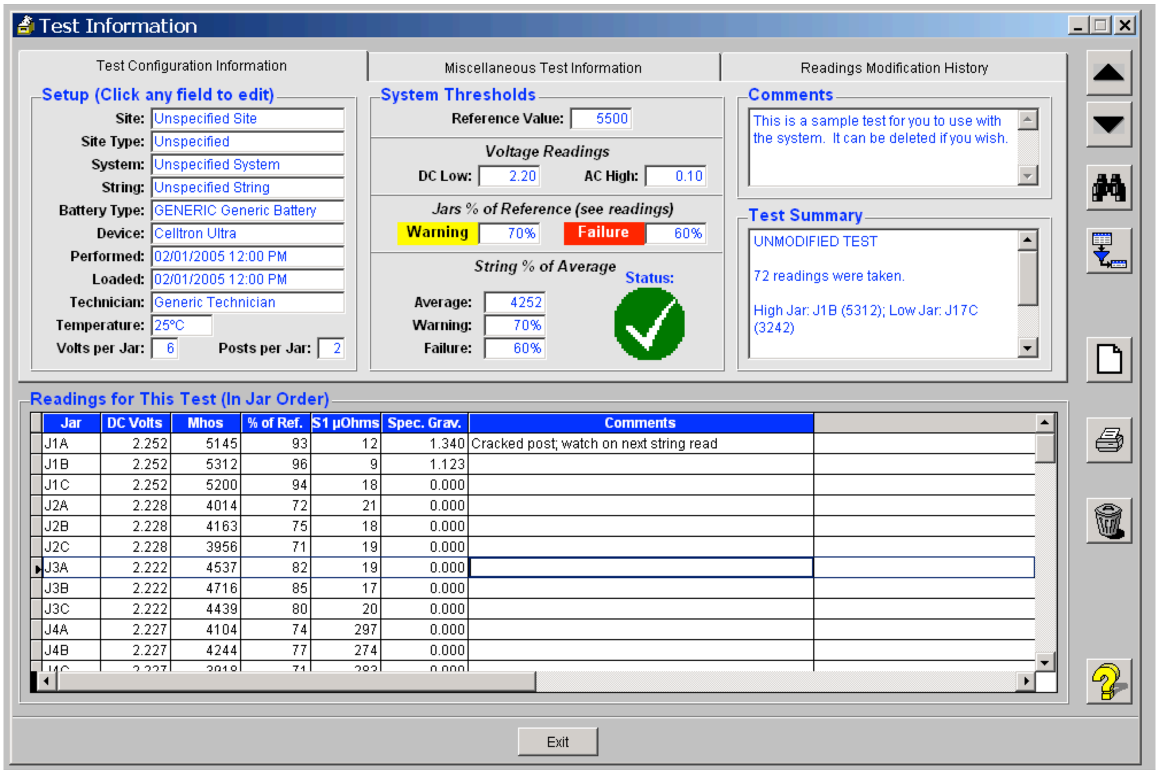

Figure 2. An example of graphical data output

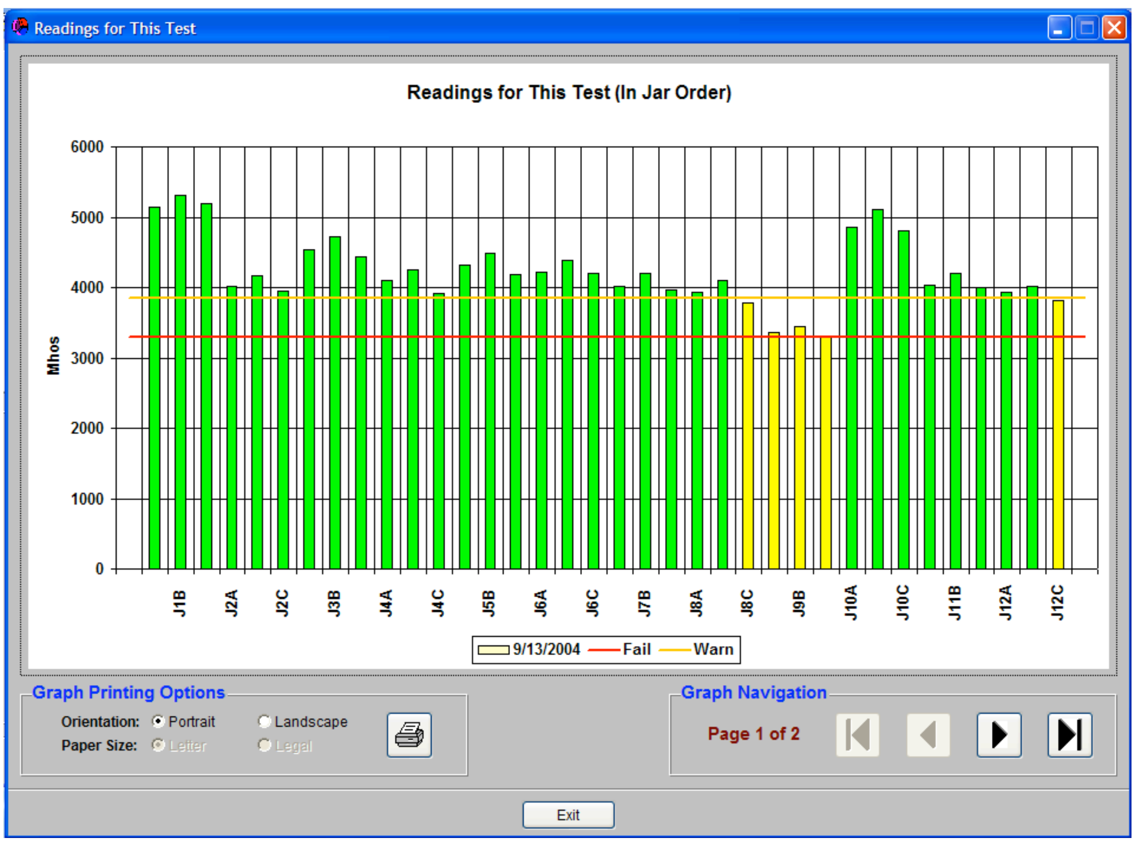

Figure 3. Printed report output

February 23, 2005 04:52 PM

PowerSure - Test Readings

Your Company Name

Readings for This Test (In Jar Order)

All Tests and Readings

MIDTRONICS

You can select your own company logo!

Test Setup Information

Site (Type): Unspecified Site (Unspecified)
System: Unspecified System
String: Unspecified String
Battery Type: GENERIC Generic Battery
Device: Celltron Ultra
Performed: 02/01/2005 12:00 PM
Loaded: 02/01/2005 12:00 PM
Technician: Generic Technician

Temperature: 25°C
Volts per Jar: 6
Posts per Jar: 2
Reference: 5500
String Average: 4252

UNMODIFIED TEST

Jar Warning/Failure: 70% 60%
String Warning/Failure: 70% 60%
Voltage Warnings DC/AC: 2.20 0.10

String Status

OK

Comments: This is a sample test for you to use with the system. It can be deleted if you wish.

Reading Status Markers: ? = Warning ! = Failure
*** next to Jar indicates reading was user-modified**

Jar	DC Volts	Mhos	Ref. Value	% of Ref. Value	Reading Status	Strap µOhms 1	Strap µOhms 2	AC Ripple Voltage	Specific Gravity	Comments
J1A	2.252	5145	5500	93	Ok	12	0	0.00	1.340	Cracked post; watch on next string read
J1B	2.252	5312	5500	96	Ok	9	0	0.00	1.123	
J1C	2.252	5200	5500	94	Ok	18	0	0.00	0.000	
J2A	2.228	4014	5500	72	Ok	21	0	0.00	0.000	
J2B	2.228	4163	5500	75	Ok	18	0	0.00	0.000	
J2C	2.228	3956	5500	71	Ok	19	0	0.00	0.000	
J3A	2.222	4537	5500	82	Ok	19	0	0.00	0.000	
J3B	2.222	4716	5500	85	Ok	17	0	0.00	0.000	
J3C	2.222	4439	5500	80	Ok	20	0	0.00	0.000	
J4A	2.227	4104	5500	74	Ok	297	0	0.00	0.000	
J4B	2.227	4244	5500	77	Ok	274	0	0.00	0.000	
J4C	2.227	3918	5500	71	Ok	283	0	0.00	0.000	
J5A	2.263	4317	5500	78	Ok	13	0	0.00	0.000	
J5B	2.263	4482	5500	81	Ok	11	0	0.00	0.000	
J5C	2.263	4189	5500	76	Ok	9	0	0.00	0.000	Corroded post; watch on next string read
J6A	2.277	4211	5500	76	Ok	12	0	0.00	0.000	
J6B	2.277	4393	5500	79	Ok	9	0	0.00	0.000	

This report is based on data currently in the system; interpretation of results should be based upon data integrity as well as your corporate policies and procedures.