Battery Monitoring
using the MultiScan™

Batteries have been in use since before incandescent lamps. More widespread today than ever, batteries can be found in everything from cellular phones to industrial vehicles, enabling the use of electronic devices where a power source is either unfeasible or unavailable. To ensure that batteries are reliable, battery manufacturers thoroughly test their products before offering them for sale.

Application Summary

All batteries consist of one or more electro-chemical cells, which are electrically tied together to provide the correct amount of power for a specific type of application.

To test a battery, battery manufacturers connect the battery cells together exactly the way these cells would be used in the equipment to be powered. The battery cells can be connected in parallel by separately joining all the positive terminals together and all the negative terminals together. Battery cells can also be connected in series by alternating the joining of a positive terminal to a negative terminal for all the battery cells within a group. A third option is for the battery cells to be joined together via a combination of serial and parallel connections.

During the final stages of the manufacturing process, each battery is tested to ensure that it is able to hold its specified charge. For example, one leading manufacturer of lead-acid batteries conducts a charge-discharge test on hundreds of batteries at a time during the company's final manufacturing process. To conduct a charge-discharge test, the manufacturer connects a charger to each battery and charges it until the battery's peak capacity is reached. Then, the manufacturer connects a load to the battery to discharge it.

To evaluate each battery during its charge-discharge test, the manufacturer monitors each battery cell's voltage, the overall battery voltage, and the current passing through the battery. In some charge-discharge tests, the manufacturer may also measure battery temperature and barometric pressure for information about a battery's chemical reaction rate.

Monitoring all these parameters on a production quantity of batteries can be a time-consuming and labor-intensive process.

Potential Solutions

One battery manufacturer used a primitive method for monitoring quantities of batteries—a technician took a series of readings using a handheld meter and recorded each battery's parameters on paper. The manufacturer's battery-test engineers decided to search for a method of recording the parameters that was less time-consuming, yet did not require the purchase of expensive equipment.

One method the battery-test engineers considered was using programmable digital multimeters with a custom software program that would enable them to read all the channel inputs automatically. They rejected this solution because of the development time required to write the program and integrate such a system.
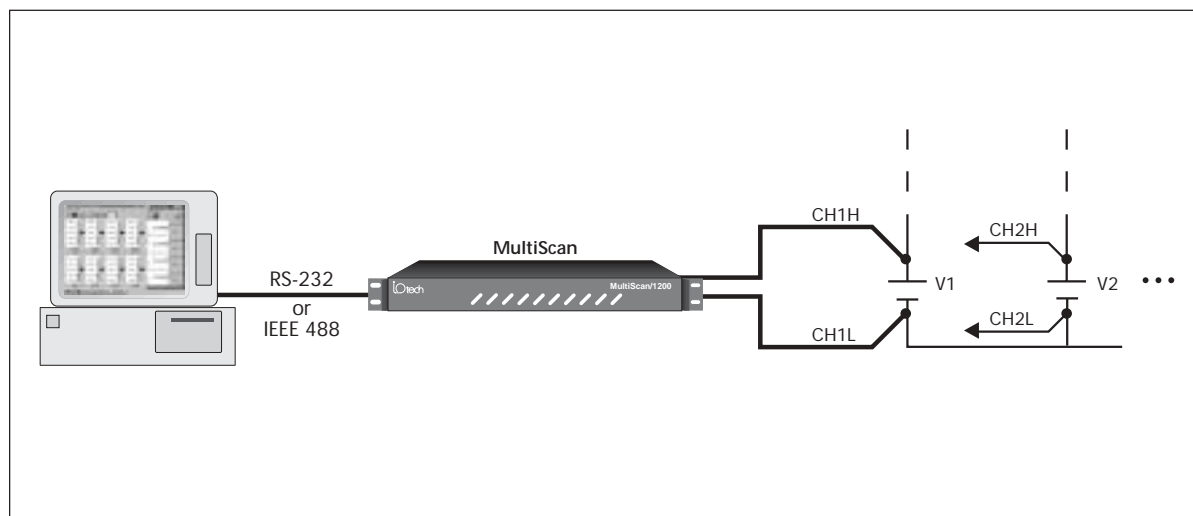
The battery test set-up

IOtech's Solution

The battery-test engineers selected the MultiScan as their battery-test solution because it enables them to easily monitor multiple parameters in several battery-test stands with very little effort or expense. The MultiScan lets them cost effectively measure temperature, voltage, and numerous inputs using a single instrument. What's more, its included easy-to-use ChartView software, eliminates the need to create custom software.

The MultiScan enabled the battery-test engineers to automate their manual collection process without encountering the problems typically associated with integrating multiple discrete instruments. The electrically isolated MultiScan offers them the flexibility to measure up to 744 isolated channels. Its compact size allows them to fit it in a 19" rack with plenty of room left over for other equipment. The battery-test engineers especially like the unit's included ChartView software, which they use for configuring and logging the data acquired by the MultiScan to disk. The MultiScan also includes eZ-PostView software for viewing the data after acquisition. The data stored by ChartView can be easily imported into a variety of popular data analysis software packages, such as Excel, Lotus 123, and MATLAB.

Conclusion

The MultiScan's expandability and isolation make it an ideal solution for many battery-monitoring applications.

MultiScan

The MultiScan™ is ideal for temperature and voltage measurements that require more channel-to-channel isolation than the TempScan can offer. The unit provides up to 500V of channel-to-channel isolation for voltage and 200V of channel-to-channel isolation for thermocouples. The MultiScan uses relays to provide isolation and to scan thermocouples and volts at up to 147 channels/s. The unit can also digitize waveforms on a single channel at up to 20 kHz.

Features

- Measures isolated temperature, DC volts, AC volts, and waveforms in one compact instrument

- Scans thermocouples and DC volts at up to 147 channels/s

- Single-channel burst mode for digitizing waveforms at rates up to 20 kHz

- Two scanning modules available for measuring 24 channels of thermocouples/volts or high voltage, respectively

- Expandable up to 744 channels

- IEEE 488 & RS-232/422 interfaces

- Ethernet communication with optional Net232

- 32 TTL digital alarm outputs and 8 TTL-compatible digital inputs

- Custom thermocouple types for user-defined linearization tables

- Two programmable scan rates for:
    - pre-trigger & post-trigger sampling
    - accelerated sampling on-event detection

- 128 Kreadings of memory, expandable up to 4 Mreadings

- Built-in real-time clock:
    - synchronizes acquisition to time of day
    - provides time and date stamping for trend monitoring
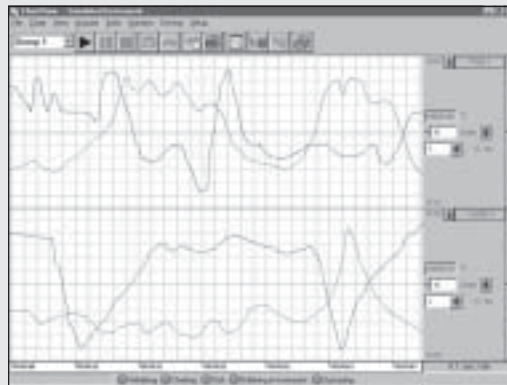
Software

- ChartView™, an *Out-of-the-Box*™ data logging application for effortless setup, acquisition, & real-time display

- eZ-PostView™ included free with *Out-of-the-Box*™ application software

- ScanCal™, calibration software

- Citect SCADA/HMI software with dedicated TempScan and MultiScan drivers

ChartView™, eZ-PostView™, MultiScan™, TempScan™, and *Out-of-the-Box*™ are the property of IOtech; all other trademarks and tradenames are the property of their respective holders.