

# Streamlining battery testing

## New tools to quick test and energize ailing batteries

Cadex Information Bulletin QTFA-0201

For Mobile Phone Dealers and Service Centers

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**Quick test** — There is a growing need for a simple and effective method to quick test batteries. Over the years, various test schemes have appeared but none works satisfactorily. The inherent problem is poor accuracy. The battery needs to be fully charged before testing because different charge levels interfere with the state-of-health readings.

Cadex Electronics has developed a quick test technique that offers good accuracy and is fully repeatable. Based on inference technology, the *Cadex Quicktest™* uses battery specific matrices that are derived through a "trend learning" process using artificial intelligence. The ability to self-learn enables the system to adapt to new battery chemistries without having to change hardware.

Quicktest™ is available on the Cadex 7200 (two-station) and 7400 (four-station) battery analyzers. The system accommodates Li-ion, NiMH, NiCd and lead acid batteries; the required charge level is 20 to 90 percent. If outside this range, the analyzer automatically applies a brief charge or discharge. The charge level within this range does not affect the state-of-health readings.



**Figure 1: Cadex 7400 battery analyzer**

*The Cadex 7400 services Li-ion/polymer, NiMH, NiCd and lead acid batteries. The analyzer is programmable to a wide range of voltage and current settings. Battery adapters simplify the interface with different battery types. A quick test program measures battery state-of-health in three minutes; Boost re-energizes dead batteries.*

The matrix obtained through *Learn* is stored in the battery adapters that also contain the battery parameters to configure the analyzer. One *Learn* cycle is the minimum requirement to develop a working QuickTest™ matrix. Better results are achieved when *learning* several batteries with varying state-of-health conditions. Once attained, the matrix can be copied to other battery adapters. Testing a battery with a properly learned matrix achieves an accuracy of +/-5 percent on most batteries. Popular custom adapters offered by Cadex include the matrix at time of purchase.

The Cadex QuickTest™ helps customer service examine batteries at the point-of-sale. For service centers, QuickTest™ is capable of quickly separating serviceable batteries from those that exhibit genuine defects.

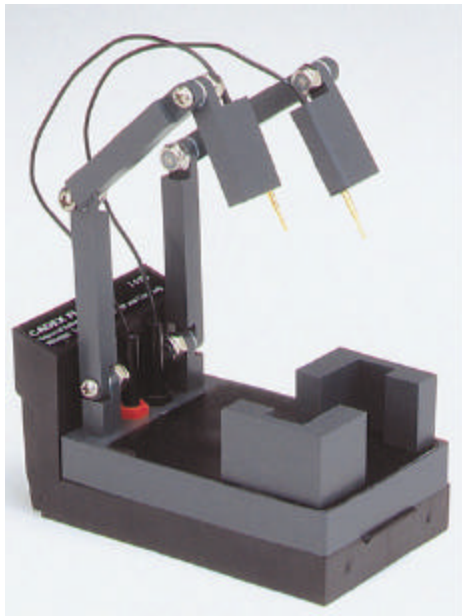
**Boost** — A common Li-ion battery failure is caused by excessive low discharge. This deactivates the internal safety circuit and the battery goes dead. The Cadex 7000 Series analyzers feature the *Boost* program, which applies a gentle current to energize and restore the battery.

Cadex tested a large number of supposedly dead Li-ion polymer batteries from various manufacturers. These batteries had no voltage and appeared dead. Charging the packs in their respective chargers was unsuccessful. After *boosting*, most batteries accepted normal charge and attained capacities of 80 percent and higher. The restored packs performed flawlessly when returned to service.

Boosting Lithium-based batteries is safe. However, if the cell voltage has fallen to 1.5 volts and has remained in that state for several days, a recharge should be avoided. A very deep discharge may form copper shunts in the cells, which can develop an electrical short. The Cadex battery analyzers identify such faults and terminate service.

Nickel-based batteries can also benefit from the *Boost* Program. Older batteries or those with advanced cycle count may exhibit high self-discharge, a condition that cannot be corrected. If activated with Boost and left unattended, the battery may revert back to its former state.

**FlexArm™** — Connecting batteries for testing has been a challenge for technicians and engineers alike. Cadex solved the problem with the *FlexArm™* adapter. Snapped into the Cadex 7200 and 7400 battery analyzers, the *FlexArm™* accommodates virtually any battery type. By lowering the two arms fitted with contact probes, narrow and awkwardly placed contacts can be reached. Magnetic guides keep the battery in any position, horizontally or vertically.



**Figure 2: Cadex FlexArm.**

*Snapped into the Cadex 7000 series battery analyzers, the FlexArm™ establishes contact by lowering the arms to the battery. Magnetic guides keep the battery in position. The FlexArm™ stores up to 10 battery types, each of which can be given a unique name.*

The Cadex FlexArm™ requires setting of battery chemistry, voltage and mAh rating. The *Edit* key on the Cadex battery analyzer prompts the user to enter the specifications. The battery setting is stored in the FlexArm™. There is room to store 10 individual battery types, each of which can be given a unique name.

To check batteries with the Cadex QuickTest™, a common matrix may be used for packs that have similar chemistry, voltage and capacity rating. This applies to cell phone batteries consisting of a single Li-ion cell. If the readings are inaccurate, a separate matrix will be required for these batteries.

The Cadex FlexArm™ is best suited for technicians dealing with constantly changing batteries. However, large groups of identical batteries (fleet environment) are best served with custom adapters. These adapters are programmed at the factory and do not require setting of battery parameters.

**BatteryShop™** — Using the FlexArm™ together with the *Cadex BatteryShop™* software allows for some interesting simplifications. Selecting the battery from the database and clicking the mouse configures the analyzer to the correct parameters, ready to service the battery. Programming the analyzer by scanning the battery model is also possible. BatteryShop™ is capable of generating bar code labels on demand.

The Internet is poised to play a pivotal role in battery testing. BatteryShop™ will be able to fetch C-Codes and matrices of new batteries, send battery test results to a central location, and download firmware to upgrade existing equipment. BatteryShop™ is equally proficient supporting one analyzer or a fully extended system of 120 units.

**Summary** — With batteries continuing to flood the market at an amazing rate, battery production may outpace the availability of suitable equipment to test them. This void is especially apparent in the mobile phone market where large quantities of batteries are being returned under warranty. Many of these presumably faulty packs are discarded without checking or attempting to restore them. In the end, the customer will pay with higher prices.

Testing and restoring batteries has become a complex assignment. The Cadex 7000 Series battery analyzers are equally proficient to service batteries at storefront and in engineering labs. The operation is simple and the staff can perform the task without much training. Engineers are able to collect and store valuable battery information by running customized test programs.

*Cadex Electronics Inc. designs and manufactures advanced battery chargers, analyzers and battery management software. The award-winning products are built with one goal in mind — to make batteries run longer. They are used in radio communications, emergency services, mobile computing, avionics, biomedical, broadcasting and defense. Cadex is ISO 9001 certified and the products are sold in over 100 countries. Visit [www.cadex.com](http://www.cadex.com) for product listing; go to [www.buchmann.ca](http://www.buchmann.ca) for battery information.*

**Dear battery user:** If you prefer not to receive further Cadex Information Bulletins, please contact [info@cadex.com](mailto:info@cadex.com).



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