

ARMY LOGISTICIAN

PROFESSIONAL BULLETIN OF UNITED STATES ARMY LOGISTICS



PB 700-06-06 Volume 38, ISSUE 6

November - December 2006

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Making the Most of New Batteries

by *Perry A. Cushman*

The 2d Infantry Division found that adopting advanced-technology batteries was more than a matter of simply installing the batteries in its vehicles. Division maintainers also learned that they needed a support plan if they were going to realize the benefits of the new technology.

Since September 2005, the 2d Infantry Division in Korea has experienced a remarkable turnaround in vehicle battery maintenance. Changes in the division's battery maintenance program have saved nearly \$400,000—a cost saving of 80 percent compared to the previous fiscal year. Battery usage has dropped by 75 percent during the same period. More important has been the increase in the division's equipment readiness posture that has resulted from this program.

These improvements can be attributed to the investment the 2d Infantry Division has made in new battery technology. In an effort to decrease battery use and increase readiness rates, the division began replacing 6TN batteries, which use the older flooded-cell lead-acid technology, with "HAWKER" batteries, which incorporate the newer absorbed-glass-mat (AGM) battery technology. [Flooded cell (wet), absorbed glass mat, and gelled are the three major types of battery construction. An AGM battery incorporates boron-silicate glass mats between its plates. It is sealed and therefore maintenance free.]

The division's maintenance leaders invested \$1.5 million to purchase nearly 5,400 AGM HAWKER batteries and convert critical combat fleets to the maintenance-free AGM technology. However, what the leaders did not realize at first was that the HAWKER battery had to be treated as a component of an overall battery plan. They learned that they also should have invested in additional support equipment—specifically, PulseTech smart battery chargers and Pulse Tech 490PT battery analyzers—and in a training package to create an overall battery maintenance program.

New Ways of Maintenance

Initially, the conversion to HAWKER batteries was painful because the division's Soldiers were not trained on the AGM technology and therefore did not understand how their standard maintenance procedures actually created battery problems rather than prevented or eliminated them. However, with training, they eventually caught on.

The division's maintenance leaders contacted the Army Materiel Command (AMC) Logistics Support Element (LSE) for the 2d Infantry Division for assistance. Logistics assistance representatives (LARs) from the Tank-automotive and Armaments Life Cycle Management

Command (TACOM) and the chief of the LSE investigated and found that several thousand of the division's new HAWKER batteries had voltage readings below 8 volts; more than half showed readings below 5 volts. All of these batteries were less than 2 years old, had been installed in vehicles for less than 30 days, and apparently were dead when installed. Unit maintenance personnel had been trying, with little success, to charge the "dead" HAWKER batteries since they were received.

In an effort to decrease battery use and increase readiness rates, the division began replacing 6TN batteries, which use the older flooded-cell lead-acid technology, with "HAWKER" batteries, which incorporate the newer absorbed-glass-mat (AGM) battery technology.

After further investigation, it was determined that the HAWKER battery has a shelf life of 30 months. If taken off the shelf before the 30-month limit and properly charged before installation, the battery will fully recover and provide 54 months of use. The batteries that the division had issued to its units had been on the shelf for nearly 24 months when they were installed in vehicles, so they were not actually dead. Based on what they had found, the senior TACOM LAR requested assistance on fault isolation and problem solution from TACOM's Team Power in Warren, Michigan. TACOM responded by sending a detailed description of the HAWKER battery technology.

After studying all that he had been provided, the senior TACOM LAR for the division briefed the division G-4's maintenance officer and the LSE chief on his finding that the division's HAWKER batteries were not, in fact, dead. The problem was that the majority of batteries had simply reached a state of discharge so that they were actually in hibernation. By investing in smart battery chargers and battery analyzers, the division would be able to recover thousands of the HAWKER batteries issued to its units and installed in combat and tactical vehicles. Together with G-4 maintenance personnel, the LSE chief determined that the minimum requirement for smart battery chargers (national stock number 6130-01-500-3401) was one for each maintenance activity. An equal number of battery analyzers (national stock number 6130-01-510-9594) also would be required.

AMC LSE personnel then suggested that the 2d Infantry Division request the assistance of the AMC Battery Office in obtaining a portion of the required charging equipment. The LSE chief contacted Rafael Casanova at the AMC Battery Office, who offered to provide 100 PulseTech smart chargers and Pulse Tech 490PT analyzers to the division. The analyzers and chargers were received and distributed to each of the division's maintenance activities.

That solved the hardware problems, but one critical problem remained: division Soldiers still needed training on AGM battery technology, battery recovery, and sustainment maintenance procedures. The LSE chief and the commander of Army Field Support Base Far East briefed the training requirement to General Benjamin S. Griffin, the AMC commanding general, during his visit to Korea in January 2006. At that time, the TACOM commander took the requirement back to TACOM as an issue. TACOM offered to have a PulseTech factory training technician travel to Korea and provide the

required battery training to division personnel. This training was scheduled, and the technician taught battery maintenance to more than 75 mechanics, 9 battery shop local nationals, and 7 TACOM LARs.

After all personnel were trained, the 2d Infantry Division saw an immediate reduction in battery-related problems. During the first 2 months, the division recovered nearly 2,000 batteries that previously were thought to be unserviceable. The estimated saving to the division since this process was implemented is more than \$750,000 in cost avoidance. The overall program has been a total success. This success story filtered to other units on the Korean peninsula. As a result, the PulseTech factory technician returned to Korea and trained the battery maintenance personnel at the Materiel Support Center Korea and Army Pre-positioned Stocks 4 sites. It also was determined that, to accommodate the division's rotation of mechanics, training should be provided at least annually; semiannual training, when possible, would be even more effective.



A HAWKER absorbed-glass-mat battery.

HAWKER Battery Advantages

The HAWKER battery is like no other battery the military has ever used. While its cost is nearly three times that of a conventional 6TN flooded cell battery, its potential life cycle is five times longer. The HAWKER battery is a deep cycle battery with remarkable recovery capabilities. [A deep cycle battery provides a steady current over a long period of time. A typical automobile battery, by contrast, provides a very large amount of current for a short time.] The division's experience has shown that the HAWKER battery can be recovered to full charge with no internal damage from a discharged rate as low as 0 volts. Most dead or discharged batteries have tested at between 2 and 5 volts. Experience has shown that the only HAWKER batteries that could not be recovered and fully charged were those that recorded a "Bad Cell—Replace" result when analyzed. All other batteries were recovered, recharged, and put back into service at no monetary cost to the unit. The only cost of this recovery process was time.

A fully discharged, or hibernating, battery was found to take as long as 3 days to fully charge. A battery is at all times in one of two states, charging or discharging. The HAWKER battery is half discharged when it reads 12.2 volts and is fully charged at 12.8 volts. A battery with less than 12 volts is nearly dead. This was a big problem for Soldiers and mechanics, who expected a battery with 12 volts to be fully charged (which is the case with the 6TN flooded cell battery).

The HAWKER battery is also "maintenance free." Most of the division's leaders thought this meant "Place them and forget them"; the batteries would not need maintenance for 54 months. The 54-month figure is the advertised life expectancy of AGM batteries. The term "maintenance free" refers to the fact that operators do not have to check or replace the electrolyte, which they do in preventive maintenance checks and services for other batteries. The HAWKER's battery terminals also are made of tin over brass rather than lead and therefore resist corrosion, which eliminates the requirement to grease the terminals. Eliminating the grease also greatly reduces the dirt buildup in the battery box. About the only problem with the HAWKER battery is that it can be overcharged, in which case it will then "vent," or boil. This will cause the acid in the absorbed glass mats to vent out of the battery and eventually short the cells, which will result in the "Bad Cell—Replace" message when the battery is analyzed. The only requirement the operator has once the battery is fully charged and installed is to keep the battery clean and charged and the terminals tight.

The 2d Infantry Division has found that the AGM technology embodied in the HAWKER battery is far superior to the flooded cell battery and has a life cycle nearly five times longer. The HAWKER batteries have a shelf life of 30 months and must be fully charged to 12.8 volts before they are installed and used. Units using the HAWKER batteries must be trained on AGM technology and must have the proper tools and test equipment to maintain the batteries. PulseTech provides a variety of chargers, including solar chargers and analyzers, that are approved by TACOM and must be used. The current equipment fielded to the 2d Infantry Division is the approved smart charging equipment that is included in the new Standard Army Tool Set. The division has the absolute minimum number of required smart chargers, but maintenance sections also should have one Pulse Tech 490PT analyzer for every four mechanics.

The 2d Infantry Division has found that the AGM technology embodied in the HAWKER battery is far superior to the flooded cell battery and has a life cycle nearly five times longer.

Currently, the HAWKER battery has an initial cost that is three to four times the cost of the older flooded cell battery technology. However, the HAWKER is more environmentally friendly, lasts five times longer, and can be transported safely by air since it is a completely sealed battery. As more of the Army converts to the AGM-type battery and the Defense Logistics Agency is able to make larger buys, its price is expected to come down. I recommend that the AGM-technology battery be the one type of battery the Army uses and that AGM technology be expanded to include all battery applications.

ALOG

Perry A. Cushman is the Tank-automotive and Armaments Life Cycle Management Command senior staff technical representative for 2d Infantry Division and Area I support at Tongduchon, Korea. He is a retired chief warrant officer (W-4).

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