Power Source Options for Communications

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Subject Area Logistics

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Background

It is difficult to grasp a more demanding power consumer than the military. The modern military has come to rely on increasingly complex communications/ electronic equipment that require dependable, lightweight, compact power source, and the ability to operate dependably under harsh operating conditions. Current battery sources have been and continue to be a critical issue for the Marine Corps (MC). Communications batteries are used individually or in combination with other batteries to power over 50 military systems to include radios, telephones, switches, satellite terminals, encoding devices, night vision devices, test sets, transponder sets, and land navigation devices. The BA-5590 is the most widely used portable power source for military batteries in the US Armed Forces and has been in production for 20 years. The BA-5590 lithium battery is a disposable battery used primarily in single channel ground airborne radio systems SINCGARS.

Source power options should be available for USMC communications equipment?

The Marine Corps Order (MCO) 3523.X is one of the MC steps towards a conservation policy for primary batteries. The current consumption and production conditions would

require the MC to conserve the use of primary batteries. This MCO has yet to be signed; it has remained in a DRAFT status since July of 2002. Until the reality of the necessity is faced for alternative power sources (APS), the MC will continue to use the most economic and affordable means as possible. The Marine Corps cannot continue to rely on primary batteries as the sole source of power for its communications equipment. Secondary batteries and alternate power can provide a myriad of viable solutions and present commanders with several options with which to avoid the high cost of primary batteries, meet the high demand for the warfighter, and enhance the capabilities of the Marine Corps tactical communications architecture.

USMC BA-5590 source posture Example 1

During the Gulf War the USMC arrived in theater with the equipment they owned as well as received accelerated fieldings, undertaken specifically to meet Desert Shield or Desert Storm requirements.[1] The deployment of U.S. forces to Saudi Arabia in August brought an immediate surge in battery requisitions, consuming a large portion of the Army's stock, including most of its limited ($6 million)

[1] Richard Bingham, *CECOM and the War for Kuwait August 1990 - March 1991,* Army Historical Program Monograph AMC 167, U.S. Army Communications-Electronics Command, Fort Monmouth, New Jersey, (May 1994)

war reserve. The stock of some batteries disappeared completely. During August and September, sun-loaded daytime temperatures at the desert surface under tarps or in closed vehicles reached 190o, as evidenced by the failure of stored batteries, in which thermal fuses melted and seals failed.[2] US Army Communications-Electronic Command (CECOM) had to find quick-reaction solutions to the unexpected technical and logistical problems U.S. forces encountered in the desert. Realizing a need for intensive management of battery supplies and to fill the demands of the Gulf War, CECOM processed more than 180,000 requisitions, shipped six million pieces of equipment worth $1.1 billion (including four million batteries worth $96 million), initiated 456 urgent Procurement Work Directives valued at $113 million, and procured 10.8 million pieces of equipment worth $326 million.[3]

CECOM requested and received funding of $82.6 million for urgent procurements to augment the lithium battery production base. From the end of July to the beginning of March, CECOM initiated more than twenty urgent battery procurements to meet accelerated requirements. It purchased batteries worth more than $130 million and sent

[2] Richard Bingham Ibid.
[3] Richard Bingham Ibid.

batteries worth $96 million to U.S. forces in Saudi Arabia -- that's four million batteries.

Battery demands fluctuated, producing a continuous stream of batteries that experienced critically low stockage levels on account of sudden, unexpected increases in demand. At the end of September, there were backorders for nearly 19,000; there were very few assets on hand; and demand had grown from a peacetime average of 1,300 batteries a month to 29,000 a month. CECOM awarded emergency production contracts. By 1 January 1991, the total number of CECOM batteries requisitioned for had grown to 3.53 million, and CECOM had 1.36 million of them on backorder. Of the sixty-four battery types CECOM deemed critical, there were serious shortages in stock (if not in theater) of thirteen, including the BA-5590 (VINSON/SINCGARS).

USMC BA-5590 source posture Example 2

CECOM briefed that in another Desert Storm scenario, the pipeline for BA-5590 lithium batteries would be depleted in four months due to the downsizing of MIL SPEC battery manufacturers. CECOM was not far off; the other scenario was Operation Iraqi Freedom. Battery supplies ran

dangerously low and potentially threatened to alter or cease operations.[4] In 2004 there were three Military Specialized battery manufacturers vice five in 1986. The pre-Wartime demand averaged from Oct 02 – Dec 02 Low/52,000 month to High/300,000 per month to Wartime demand Feb – Apr 03 373,000 to 460,000[5]. In 2004, the Secretary of Defense (OSD) designated the Defense Logistics Agency (DLA) assumes management from (CECOM) of critical lithium battery. The change is to focus on procurement and inventory management to meet the critical demands of the field. One of the leading manufacturers of BA-5590 is Saft. In 2003 alone, Saft delivered 1,000,000 BA-5590 batteries to the US military, and was the largest supplier during the 2003 war in Iraq. The contract was worth well over $41,000,000.[6] The problem with these batteries began to appear as a log item in General Frank's briefing to the President. On two occasions, President Bush mentioned it to Secretary of Defense Rumsfeld.[7]

[4] Geoff S. Fein, *Battery Supplies ran Dangerously Low in Iraq*, National Defense Magazine, (August 03)
[5] Geoff S. Fein Ibid.
[6] Geoff S. Fein, Defense Update International Online Defense Magazine,(Fri Aug 03, Battery Supplies ran Dangerously Low in Iraq, National Defense Magazine), (26 January 2005)
[7] Geoff S. Fein Ibid. (26 January 2005)

“We literally came within days of running out of these batteries…” Driscoll said.” (Navy Captain, Defense Contract Management Agency liaison to the Joint Staff)

Counter Argument

The resolve for this primary battery is clear – it is combat readiness required for immediate response, it is simple meeting the needs of logistics, operational readiness, high-energy density, shelf-life, and instant readiness. As long as there are manufacturers producing, money from the government, and no requirement to change our way of doing business, BA-5590s will continue to be the quick-reaction solution for the Warfighter. “What kept the military from running out of batteries and from having to change battle plans was a quick war, conservation measures, and dedication from the battery manufacturers, Driscoll said.” (Navy Captain, Defense Contract Management Agency liaison to the Joint Staff) Batteries made uniquely for the military user face little danger of being displaced. They are critical, and the battery costs factor big in the budgets of the military. 2005 is expected easily to reach $116 million for military unique batteries. Batteries are

the most expended item after bullets.[8] The BA-5590 has been tried and found true. So, despite the cost, it has become increasingly safer and maintains its high performance.

Conclusion

The MC has been procuring and testing a number of communications initiatives.

-Fuel Cells
-Recovery of the BB-390
-BB-2590
-Rechargeable battery program
-Battery chargers
-Lithium battery tester
-Advanced Primary ZINC-AIR Batteries
-Solar power applications
-Battery management/conditioning equipment
-Battery exchange program
-Battery shelf-life
-Battery service-life
-Battery operating life
-Battery self-discharge[i]

But the MC mind set is slow to change. Most of the US Army Communications-Electronic Command (CECOM) and Defense Logistics Agency (DLA) equipment in the field had been designed for and tested in a significantly less stringent temperature, sand, dust, and condensation requirements than the conditions encountered in the Saudi desert. Due to the very nature of combat operations, problems were compounded.

[8] Jeff Childs, *"Longevity, Safety Drive Military Battery Trends",* Cots Journal, The RTC Group, 2003, (May 2003)

It had proven to be extremely difficult to calculate the demand for specific batteries, given the acceleration of fielding schedules, the fielding of new equipment, and frequent increments in the number of units deployed. The deployments to Southwest Asia demanded significant measures. It has taken reoccurring lessons learned in Iraq for the military to scramble to meet the needs of the warfighter and at the very least review a policy for the most common battery which is also in the shortest supply. It is acceptable to plan for the use of primary batteries in combat, if they are available. It is more practical to expect the use of APS as much as possible to optimize limited stocks of primary batteries. The current pipeline for primary batteries, in time of national conflict, will not support both the U.S. Army and the U.S. Marine Corps requirements indefinitely. Current fast track initiatives exist but unit commitment to employ, safety, and production costs continue to keep them from be fully integrated to support the emerging warfighting requirements. The MC is evaluating the enhancements in the life cycle process for batteries and battery management, but a concerted effort is crucial in order to ascertain practical power solutions. The MC needs to reduce dependency on a single source, reduce training costs, improve management of supply

inventory, and exploit technology for APS to support training and operations. The MC has yet to make a unified commitment in putting an official conservation policy in place. Nor has it planned fully to integrate the use of APS in combat operations, or analyzed the impact of wide spread APS usage, or has it developed and standardized and equipment for practical usage, so we can ultimately train the way we fight.

"Those who cannot remember the past are condemned to repeat it." *--George Santayana*

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[i] - Fuel Cells, provide energy generated from a hydrogen gas source, testing powered up retransmission sites, current field testing in Okinawa.
- BB-2590 - A rechargeable version of the popular BA-5590/U primary battery and secondary version BB-390. 15 - 28 hrs run time. 15% more energy release. 500 plus recharge cycles.
- Lithium battery tester, often time's users will dispose of lithium batteries not knowing the actual life remaining.
- Battery shelf-life - This is the length of time a battery is required to last under storage conditions and remain capable of meeting the mission requirement.
- Battery service-life - The useful life of a battery for mission application from the time it is placed in service
- Battery operating life - The time required for battery voltage to remain above current voltage under mission load.
- Battery self-discharge - The process in which the battery discharges (loses capacity) due to internal chemical reactions without an external load applied

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