Fort Monmouth Explored Electric Cars

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Did soaring gas prices curtail your summer travel? Have you adopted any "green" habits lately? Do your ears perk up when the presidential candidates discuss energy independence? Then a Fort Monmouth report titled "Power Sources for Electric Cars" might interest you.

The report might also interest the "Big Three" automakers. *Time* reports that fewer than one million cars sold in the U.S. in September — the lowest monthly figure in 15 years. Soaring gas prices are most certainly a contributing factor. According to Bob Schnorbus, chief economist with J.D. Power and Associates, "If they [the Big three] continue to lose money at the current rate, their chances [of bankruptcy] are uncomfortably high."

Senate hearings to explore possible alternatives in vehicle transportation spurred "Power Sources for Electric Cars." Did you miss these hearings?

That might be because they occurred in 1967.

That's right- the alternative fuel, alternative power source debate is nothing new.

These 1967 Senate hearings, called by "Power Sources for Electric Cars" "the first vigorous public debate on electric cars," left participants divided into two groups. Some, as the report explains, saw the electric car as meeting "a variety of short-range transportation needs in specific urban and suburban situations." Using existing battery technology, this might include vehicles confined to cities such as Manhattan, or those used by "the housewife in her daily trips to and from shopping centers, schools, and family recreation areas." The cars wouldn't have to go very far or very fast.

Others, according to "Power Sources for Electric Cars," wanted to extend the range of electric cars by "increasing the energy storage capability of existing power sources and making major adaptations and modifications in the design of an automobile to optimize its design around the concept of electric propulsion." This would preclude having to stop after any substantial distance to recharge your car overnight, and negate speed restrictions.

Fort Monmouth's 1968 report "Power Sources for Electric Cars" thus asks, "Can we provide in [a] battery sufficient power and energy to have an electric automobile which can do all the things and provide all the conveniences which the present gasoline powered car does for the average person today?" Could a battery run for great lengths without having to be recharged? Could a recharge happen in the time it would take to fill a tank of gas, as opposed to overnight?

The complex technical report examined new batteries, fuel cells, hybrid power systems, and the optimum ratio of fuel cell power to battery stored energy. It showed that the electric car offered an "attractive alternative" to the existing internal combustion engine not only because it saved on fuel costs, but because of "its inherently lower pollution product emission."

The report concluded that "Through the use of a fuel cell-battery hybrid power source, all of the 'battery problems' can be overcome…Research progress indicates that these goals should be achieved in operational hardware within the next five to ten years."

Obviously, that did not happen. But why?

The report's author, Dr. Galen Frysinger, asserted in a recent interview that electric cars "are possible, it's a question of having incentive to want to have an energy policy which is driven in that direction. But under the petroleum administrations, in other words, i.e., up through Bush, that has not been one of the national incentives."

Dr. Frysinger received his PhD in physical chemistry from Yale University. He worked here at Fort Monmouth from 1966-1969 as Chief, Power Sources Division, Electronic Components Laboratory.

This past summer – forty years after Frysinger wrote and Fort Monmouth published "Power Sources for Electric Cars"- the Army unveiled the first hybrid drive for a ground combat vehicle. This was the first of the manned ground vehicles in Future Combat Systems (FCS), Prototype 1 of the Non Line of Sight-Cannon. C. Todd Lopez reported in the *Army News Service* that "FCS manned combat vehicles are unique in that they are electrically powered. A diesel engine on board turns a generator, which in turn charges batteries, which in turn powers electric motors that drive the tracks. In fact, the entire vehicle is electrically powered."

Prototype 1 of the Non-Line-of-Sight Cannon on Capitol Hill in Washington, D.C., June 2008. The NLOS-C is one of the eight manned ground vehicles in Future Combat Systems. U.S. Army photo

The…"unveiling of our new [Manned Ground Vehicle] hybrid-electric propulsion system shows, once again, that Future Combat Systems really are about what's happening today," said FCS Brigade Combat Team Program Manager, Major General Charles Cartwright.

Given the excitement over today's hybrid-electric propulsion systems, it might surprise you that the possibility of electric or hybrid cars existed as early as the 1960s. However, Curtis and Judy Anderson's *Electric and Hybrid Cars* reveals that "electric cars were among the first vehicles on the road. In the formative days of the automobile, a third of cars were electric, and they challenged internal combustible engine vehicles for primacy."

The Andersons reveal that electric taxicabs debuted in New York in 1896. The 1899 Electrical Exhibition at Madison Square Garden prominently featured electric vehicles. By 1904, electricity ran one third of all powered vehicles in New York City, Chicago, and Boston. Nearly 50 companies produced electric cars between 1900 and 1910 at the height of their popularity. The Philadelphia/ Baltimore area boasted 27 battery charging stations in 1910. What then led to the rise of the gasoline engine?

Michael Brian Schiffer, author of *Taking Charge: The Electric Automobile in America*, asserts that "following an initial period of experimentation and commercialization that lasted until about 1905, the electric vehicle became a reliable, clean, quiet, convenient, and sometimes economical technology." Unfortunately, history showed that single-car middle-class households chose gasoline cars. Electric cars failed simply because they were not bought by most families that could afford them: not because of inherent technology flaws. When the demand for electric vehicles diminished, it stymied electric vehicle technology.

Thomas Edison at his West Orange, NJ lab with an electric car powered by Edison batteries, 1910. Photo courtesy of the National Park Service.

The Andersons note that economic and environmental concerns have periodically revived widespread interest in electric cars and hybrid vehicles. They report however, that the manufacture of commercially viable electric cars has required government or energy industry subsidies since the 1960s. Fort Monmouth's "Power Sources for Electric Cars" exemplifies that reality.

More recently, on September 30, 2008, President Bush signed a $634 billion spending bill that included $25 billion in low-cost government loans for the auto industry. According to David Shepardson of the *Detroit News* Washington Bureau, "The landmark loan program will allow automakers to borrow money to retool plants to build advanced technology vehicles that are at least 25 percent more fuel efficient than currently required. The program gives preference to plants at least 20 years old and sets aside 10 percent of the funds for companies with 500 or fewer employees -- such as startup electric carmakers and some suppliers."

Some electric car options exist or will exist in the near future. Tesla Motors of Northern California, for example, produces a car called the Roadster. It can accelerate from 0 to 60 in four seconds, and over 6,000 finger sized laptop batteries propel it. It charges via a simple wall outlet in anywhere from 4- 30 hours. Unfortunately, it sells for $109,000. Chevy hopes to have its less expensive 4 door family electric car, the Volt, in dealerships by 2010- however the cost is still expected to be around $40,000.

This doesn't have to be so, according to Dr. Frysinger, who laments, "…when you make [electric cars] at the same rate you make Hummers, they're going to cost as much as Hummers, right? Now, when it becomes a national priority to reduce the amount of petroleum imported to the country for national security purposes, then we get around to the kind of funding necessary to engage in alternative energy sources for electric cars, or for cars with using electric or fuel cell electric. But that's not been part of our energy plan up to this point. Maybe in the next administration it will be."

Personnel interested in the technical aspects of "Power Sources for Electric Cars" can contact the Historical Office for a copy at 732 532 6322.