EEVC NEWSLETTER

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THE CAR THAT COULD- PART VII
Before the EV-1 Came the Impact
A continued book review by Oliver H. Perry

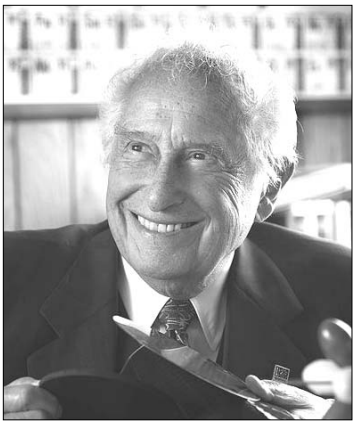
My reviews of "The Car That Could," by writer Michael Shnayerson, continue to intrigue readers who take the time to read them. Shnayerson provides us with an excellent drama of GM's most famous electric adventure. If one didn't know that the story took place in the nineties they might think I was reviewing a book providing an inside view of today's EV industry.

A Chrysler TEVan, used as a test bed for the Ovonic battery pack

We ended Part VI with a statement from Stan Ovshinsky to his staff (on February 9, 1982) that his little amorphous based prototype battery would someday be in every battery powered consumer device in the world and even drive electric cars.

Ovshinsky's Battery

Soon Ovshinsky's engineers scaled up his tiny demo electric cell to a C sized battery capable of powering laptops, cell phones, and flashlights. Most of the metals used in manufacturing the batteries were recycled from scrap. Titanium might have come from old airplane fuselages, vanadium from used tool steel, zirconium from the chemical and nuclear industries, and the cobalt, manganese, aluminum, and iron from anywhere. Eight or nine of these elements were melted down in a crucible, made into an ash and used as the negative electrode. Instead of using solid nickel as Edison had used in his nickel-iron



Stanford Ovshinsky (photo: Wikipedia)

battery, Ovshinsky used a newly created nickel foam which provided a much lighter electrode. The electrolyte was made up of a liquid mix of water and potassium hydroxide.

Ovshinsky's nickel-metal-hydride battery could be made as cheaply as the nickel-cadmium battery on the market at the time but didn't have the toxic cadmium. And Ovshinky's battery technology was protected by thirty patents.

Ovshinsky's company ECD began making the battery's essence, metal hydride powder, and shipped it to licensees such as Hitachi-Maxwell, Gold Peak, and Matsushita who produced the batteries. Meanwhile the company chemists continued to work on a design for a much larger electric car battery. As I mentioned in an earlier part, eventually ECD would receive a grant from the USABC to further develop the concept.

Stan Ovshinsky must be given credit for being a visionary. When he began his quest to produce an electric car battery capable of changing the world, the year was 1982. At that point in time few major car companies were seriously predicting a future for electric cars. (The Eastern Electric Vehicle Club — EEVC — was formed in 1980 with the hopes of changing that view.)

A Manhattan Project for Batteries

Shnayerson chose the above title for chapter 9 in his book "The Car That Could." In the first part of my review of his book I mentioned the formation of the United States Advanced Battery Consortium (USABC). Shnayerson devotes considerable time to the formation of the USABC and the participation of the big three automakers in it.

According to Shnayerson the ingrained competitiveness of the major car companies forbade any notion of supporting a cooperative effort in developing a battery capable of bringing electric cars to main street USA. Credit for the USABC goes to Michael Davis, a new assistant secretary to the U.S. Department of Energy appointed by the Bush administration. Rather than see driblets of money from the Department of Energy continue going out in all directions to university labs and battery companies for renewable resources for advanced battery development, Davis suggested that the DoE pool all of the money and add a requirement that the Big Three add their own battery research funds to it. Perhaps with everyone working together, a real battery breakthrough would finally come about.

Under the guidelines that Davis brokered with the Big Three and the DoE, The Big Three would in effect receive six dollars of R&D for every one spent. They could decide among themselves which battery developers should be given grants. Requests for proposals from battery developers would be established by the Big Three, not the government. All parties would be working for themselves, not the government. There would be no anti-trust fears. If and when the big battery breakthough came, the car makers would share equal rights to the technology. At the same time the Big Three could continue to compete with each other with the vehicles that utilized a commonly owned battery. The consortium, not the government would own the battery patents. In general the EV side of the battery intellectual property would belong to the Big Three and the remaining rights to the battery companies and utilities.

On October 25th, 1991 the White House called for a Rose Garden ceremony to give USABC an official launch. President Bush offered a short speech and was offered to drive one of three electric cars, the original Impact prototype, a Ford Ecostar, and the Chrysler minivan. Bush jumped in the Chrysler minivan, his choice chosen by lot. He pressed the accelerator. Nothing happened. Mechanics rushed to the scene and two minutes later he drove the battery powered van a few hundred feet for the press.

On August 9, 1993, about two years later, a small crowd of engineers gathered by a low-lying building in a small industrial park in Troy, Michigan to watch another Chrysler TEVan make an historic trip. This van was

driven by the first recipient of a USABC grant, Stan Ovshinsky, as he demonstrated his advanced nickel metal hydride battery.

Those present were less than a mile from Impact's offices, but NONE worked for GM, or FORD, or CHRYSLER. Ovshinsky had persuaded Chrysler to allow him to use their TEVan, loaded with 1500 pounds of his nickel metal hydride batteries (with the promise to keep the matter secret) for a maiden voyage. Stan Ovshinsky knew he had skeptics within USABC and he felt the best way to convince them was not to first seek permission for the trial (and be given restrictions) but to ask for forgiveness later when the success could not be ignored. Over a 15 month period Ovshinsky's engineers had used the first part of his $18.5 million dollar grant to laboriously (and not without failures) configure his C sized cells into a 35 kWh pack that powered the heavy steel-bodied van 85 miles. Shnayerson states that in its own way the unsanctioned drive was as dramatic as the first flight at Kitty Hawk.

Of all of the early recipients of a USABC grant Ovshinsky was the first to demonstrate a true advancement in battery technology. Most developers were like miners, Ovshinsky liked to say, excavating to find the perfect pair of existing elements that might provide greater energy when put together. His team turned not to the mine but rather to the mind. Using the inventor's theory of amorphous materials they created new metallic alloys and engineered them. The battery that emerged from their alchemy was not merely new but unique. As to whether or not the battery could be manufactured and produced at a reasonable price, perform consistently well, and undergo as many cycles as Ovshinsky predicted, that still remained to be prove.

For the moment the van ride had had demonstrated that the Ovonic battery worked well enough for a celebration. Ovshinsky jumped out of his van presumptuously assured that the Big Three would now produce his battery. His battery had demonstrated that the Californian mandate could be met and the U.S. would triumph over Japan.

Although Stan and his wife Iris Ovshinsky had personally made plenty of money and lived in luxury from over 300 patents in the US and more than 1500 abroad, they were still not completely satisfied. ECD had still not transformed one of their energy inventions into a manufactured, mass-marketed product that might help wean the world from its dependence on oil. Stan hoped that his Ovonic battery, at last might be that product.

The Ovonic battery belonged to USABC, not ECD

John Williams, the former four-phase planner for the GM Impact program, had taken over the technical affairs at USABC. Williams was furious when he read about Ovshinsky's 85 mile TEVan ride in the local newspaper that covered the event. In William's mind the article made mockery of USABC's right to control its own programs. The newspaper article broadcast the results of the Ovonic battery to the Japanese as well as set up high expectations at CARB that the EV battery problem was solved. The miracle battery was not being manufactured, it was not available, and it had no cost projections. The whole demonstration was premature. Williams instructed Ovshinsky to say no more about the battery and coldly reminded him that it was up to the consortium to determine when his findings could be made public. The first step was to have a respected national lab review the battery. A report would be sent up the corporate chains of command, eventually reaching the CEOs of each of the Big Three. When they gave their blessing, and not before, would the results be announced. To make sure things were clear the details were provided in a legal letter to Ovshinsky's lawyers.

Ovshinsky was furious that the consortium continued to restrain him, constantly reminding the inventor what he could and could not do with his invention. As time went on Ovshinsky began to feel that the Big Three were hiding his results from CARB. In his mind he suspected that the Big Three wanted to prove to California that EVs didn't really meet the challenge and that a suitable battery was not available. They wanted both the government and the public to believe that EVs were totally impractical.

Angry letters flew back and forth between USABC and ECD. Eventually Ovshinsky decided to heed the advice of his lawyers and keep silent regarding the battery. But he

resolved to find a way to bypass USABC and draw attention to his battery without repercussion. According to author Shnayerson, Ovshinsky felt that if he could get his Ovonic batteries into an Impact and run another test he could blow the doors off secrecy. He needed to find somebody within GM that was as passionate about the future of EVs as he was. Maybe with their help he could somehow bypass GM's John Williams who upheld the USABC restrictions. He would not sit back and silently allow the misconception that a suitable battery was not in sight.

The fact of the matter was that Ovshinsky was a known quantity among the Big Three. It was not long before others in the electric vehicle research community heard about the Ovonic pack and had a chance to drive the Ovonic powered TEVan. One of those individuals happened to be Bob Stempel, the demoted GM chief who had been made a GM consultant. Bob had decided to invest what was left of his life into the advancement of electric cars. With the blessings of the new GM boss, Jack Smith, Stempel was free to wander around the globe and check out all of the companies involved in EV development.

After driving the TEVan and looking closely at Ovshinsky's battery pack, Stempel declared that, unlike many other patents, the Ovonic battery patents were easy to understand and solidly patented. Stempel felt that the nickel metal hydride technology was indeed the breakthrough the industry was looking for and would serve as a bridge between lead acid batteries and some future better technology ten years down the road. He promised that he would help Ovshinsky as much as possible to get Ovonics into an Impact.

For a nice outline of ECD history google, Energy Conversion Devices History.

The TEVan demonstration took place in 1993. Ovonic EV research batteries were a known quantity in 1992. The following quote is taken from *Popular Science* magazine, April 1992, page 38. "Now a company specializing in materials engineering claims to have found the solution: A metal hydride battery that could extend an electric vehicle's range and improve its acceleration. Developed by Ovonic Battery Co., a division of Troy, Mich-based Energy Conversion Devices, the metal hydride technology uses a configuration similar to that of nickel cadmium. If Ovonic's claims are accurate the new battery could push electric vehicle technology several years ahead of its current pace."

To be continued…

BILL VISHER DIES

Long-time EEVC member Bill Visher passed away on September 2. His son Don reports that Bill, who had suffered a stroke some years before, died in his sleep of a cerebral hemorrhage. We will have a more complete tribute to Bill in an upcoming issue.

PRESIDENT'S MESSAGE
Oliver Perry

Since this month is November and this week is an election week I thought for a nonpartisan political message appropriate.

The Wall Street Journal, Monday November 7, 2011

Opinion section, page A18

"The Corporate Welfare State"

"The Occupy Wall Street protesters aren't good at articulating what they want, but one of their demands is "end corporate welfare." "Corporate welfare is the offer of special favors — cash grants, loans guarantees, bailouts, and special tax breaks… to specific industries or firms. The government doesn't track the overall costs of these programs, but in 2008 the Cato Institute made an attempt and came up with $92 Billion in 2006, which is more than the U.S. government spends on homeland security."

The problem, the article states, with the government becoming involved in loaning or granting money to specific industries is that the tax payers often become stuck with expensive flops if the government chooses to back an economic loser. If the ventures succeed the private investors and companies get rich, not the tax payers. If they flop the tax

payers lose, not the investors.

Recently we have heard the phrase, repeated frequently, that our government should not become involved in picking winners and losers in the marketplace. The failure of the solar company Solyndra, which cost the U.S. taxpayers more than $500 million when Solyndra went bust, has been especially headlined as an example of our government picking losers.

"According to the Pew Research Center's subsidy scope data base, direct expenditures in the energy industry more than quadrupled in Mr. Obama's first year of office to $18 billion from less than $4 billion in 2008." The question being argued today among both politicians and voters, is this investment going to pay off or bankrupt us?

Looking back over the past we find examples of a number of tragic flops. The Supersonic Transport Plane of the mid 70ties, Jimmy Carter's $2 Billion dollar Synthetic Fuels Corporation, Amtrak, and the biggest failure of all, Fannie and Freddie Mac, which have cost taxpayers $142 billion.

Included in the list are a number of additional gracious government handouts:

1. The ethanol subsidy, benefitting mostly farmers and corporate fuel blenders.
2. The Universal Service Fund bringing broadband development to rural America.
3. The Agriculture Department's Market Access program.
4. Crop supports that spend half of their funds on wealthy large farmers and corporations in the farm belt.
5. The Advanced Technology Vehicle Manufacturing Loan Programs that go to Nissan, Ford, and Tesla Motors for fuel efficient cars, with an additional $2.4 billion to manufacturers attempting to build battery-operated cars.

Defenders of the present government subsidy policy claim that without the subsidies the U.S. will lose out to foreign governments that heavily subsidize their industries. Defenders claim that these policies are good for American competitiveness.

Those critical of the subsidy program claim that cutting them would cut 35% off of the corporate income tax rate and make us more competitive in the marketplace, providing more jobs and wealth.

So what does this all boil down to?

It seems as if both Republicans and Democrats favor subsidies and government handouts. The Tea Party seems to favor cutting these subsidies no matter what party favors them. When it comes to energy and transportation, the Democrats apparently favor the green sustainable energy side of the aisle while the Republicans favor handouts to the nuclear industry and perhaps the fossil fuel side as well. Over the years billions of dollars have been poured into the nuclear industry in the form of loan guarantees and cut-rate insurance policies, even though new nuclear plants do not make economic sense in light of the use of natural gas. The Tea Party is against both sides when it comes to government handouts.

The House Energy and Commerce Committee Serves Subpoenas

Late last Friday evening I sat down on the couch next to my wife, turned on the TV and began looking for something of interest. I stopped surfing when I happened upon CNN. I became captivated with the live coverage of the House Energy and Commerce Committee congressional investigation of the Solyndra bankruptcy case. (Solar company receiving heavy government loans that went bankrupt.) The heated debate as to whether or not to subpoena the White house in order to provide more information on the Solyndra scandal was purely along party lines. What was interesting to me was how both my wife and I constantly flip flopped back and forth between both sides of the debate. Each proponent for and against the subpoena seemed very convincing until the opposing side addressed the same point. It was difficult to know whom to believe or what the real facts in the case genuinely were. I was reminded of the danger inherent in hearing only one point of view.

At long last one participant spoke up and made it clear what the whole debate boiled down to. I wish I had noted who the speaker was and what state he was from. I only remember that he was a Democrat. Basically, the Democrat angrily declared that none of the facts in the case really mattered. The vote was already decided. The Republican controlled committee, he fervently declared,

never subpoenaed the major executives involved in the oil spill in the Gulf when it was obvious they should have been. Now the same committee wanted to subpoena a Democrat controlled White House which believed in subsidizing solar and wind green energy and was anti fossil fuel. In essence he stated that Republicans favor fossil fuel and Democrats are against it. He concluded that the whole debate was a war between two views as to how we should provide our future energy, not about a mishandling of public taxpayers money.

The Republican members of the same committee, by the way, have taken the House floor to urge president Obama to approve the presidential permit for the Keystone XL pipeline which would bring much needed jobs and secure energy supplies to the United States.

I would like to add that Mr. Henry Waxman, Democrat from California, a very entertaining personality, at the very end of the above debate pointed out a critical detail that had not been thoroughly addressed. Even if I favored the need for a subpoena I agreed with Waxman that the resulting motion, about to be passed, seemed weak in clarity of specific document production and time expectations. It empowered the chairman of the committee to generally procure documents in a manner that he felt was best to further the investigation, without approval of other members of the committee. And this is fine if the chairman behaves in an ethical unbiased fashion, but not so fine if he is on a witch hunt.

NEWS UPDATE

Nissan aspires to green leadership

An October 25, story by AP business writer Yuri Kageyama reports that "Nissan Motor Co. is aiming to be the world's No. 1 in green cars, targeting cumulative sales of 1.5 million zero-emission vehicles by 2017 with alliance partner Renault SA of France." The company's six-year strategy, the article says, includes a plug-in hybrid "by the fiscal year ending March 2017 and reducing carbon dioxide emissions by 20 percent per vehicle compared with 2005 levels."

The company is aiming at improving fuel efficiency by 35 percent compared with 2005. Projects include fuel cell and clean diesel vehicles.

Bob Beaumont, Citicar founder, dies at 79

The New York Times on October 29 reported that Bob Beaumont, who started the Florida company Sebring Vanguard that developed and manufactured the CitiCar beginning in 1974, has died at the age of 79 of emphysema. Bob sold about 2000 CitiCars, and a fair number of them are still on the road, as are some of the car's successor, the Commuta-Car, built by Frank Flowers' Commuter Vehicles, in Sewell, NJ.

Long-time EEVC members will remember Bob fondly from his visits and talks to our meetings.

Plug-in America

John McMillian, founder and designer at Shockwave Motors, directs our attention to his interview at National Plug-in Day in Knoxville, TN on October 14. You can find it at www.youtube.com/watch?v=FdheY34zXlk&feature=youtu.be

Shockwave Motors (www.shockwavemotors.com) hopes to have a line of three-wheeled electric roadsters in production next spring. How realistic this is we don't know, but we wish John well.

Electrics at the Smithsonian

The Smithsonian's National Museum of American History has mounted an exhibit on the history of the electric car. The display, called "Electrifying Cars," showcases two cars—a 1904 Columbia electric runabout, the best-selling car in the United States at the turn of the century and a 1913 Ford Model T touring car, a gasoline car equipped with an early type of electric starter and electric headlights. The cars, along with a battery charger for General Motors' EV1 and images of additional electric models, car owners and power sources, follow the historical, cultural and physical development of the electric car.

Biofuels offer no net advantage

There has been considerable discussion as to the overall greenhouse gas impact of alternate fuels. The latest news comes from the

University of Leicester, which reports that it has conducted a study that found, at least in oil palm plantations, that the biofuel produced had as big a carbon footprint as conventional fuel.

Says the university, "The study from the University of Leicester was conducted for the International Council on Clean Transportation, an international think tank that wished to assess the greenhouse gas emissions associated with biodiesel production. Biodiesel mandates can increase palm oil demand directly (the European Biodiesel Board recently reported big increases in biodiesel imported from Indonesia) and also indirectly, because palm oil is the world's most important source of vegetable oil and will replace oil from rapeseed or soy in food if they are instead used to make biodiesel."

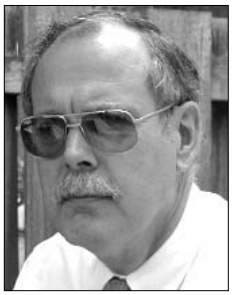
"The Leicester team established that the scale of greenhouse gas emissions from oil palm plantations on peat is significantly higher than previously assumed. They concluded that a value of 86 tonnes of carbon dioxide (CO_2) per hectare per year (annualised over 50 years) is the most robust currently available estimate; this compares with previous estimates of around 50 tonnes of CO_2 per hectare per year. CO_2 emissions increase further if you are interested specifically in the short term greenhouse gas implications of palm oil production – for instance under the EU Renewable Energy Directive which assesses emissions over 20 years, the corresponding emissions rate would be 106 tonnes of carbon dioxide (CO2) per hectare per year."

Fire investigation halts Na-S battery sales

Remember sodium-sulfur batteries? They were touted at one time as the energy storage method of the future, sure to give EVs the range they needed to compete with internal combustion vehicles. The big problem with them is that they operate at an internal temperature of about 300ºC, and have to be enclosed in big stainless-steel vacuum containers. Despite all this thermal isolation they can have problems. Some years ago the Boyertown Museum acquired a van that had been powered by them; there were so many cautions and warning notices plastered inside the thing that it was basically a warning label with a vehicle attached. As we recall, one label said not to stop the vehicle in high grass, and another said it was never to be parked indoors!

That said, some (primarily Japanese companies worried about power interruptions due to problems with nuclear generating plants) are still interested in Na-S batteries for back-up power. Unfortunately NGK Insulators Ltd., the sole producer, has suspended production pending investigation of a fire at Mitsubishi Materials Corp., Kyodo News Service reports.

OCCUPY THIS
By California Pete



The nearby city of Oakland has been much in the news lately because of the Occupy demonstrators. The local branch, Occupy Oakland, set up tents near Oakland's city hall. At first the ultra-liberal Mayor Jean Quan, who, according to the *San Francisco Chronicle*, "does not believe in law enforcement," allowed them to stay. Then, after the accumulated trash and worse (complete with rats running through it) became too much to bear the police moved to push the demonstrators out. The demonstrators began throwing rocks and bottles, and the police responded with tear gas.

But that wasn't the end of the story. Mayor Quan, apparently horrified at the thought of the police actually attempting to restore public order, ordered them to allow the Occupiers to come back and set up their tents again. These worthies then began calling for a general strike to shut down all business in the city, and announced plans to march on, and shut down, the Port of Oakland. Which they then did, with little interference by the police. Who was hurt? Small business owners, their employees, and the longshoremen and truck drivers who work at the port, not the Big Bad Establishment. If this goes on much longer a lot more people in Oakland will be out of work, and few people will ever entertain the idea of trying to do establish businesses in Oakland. Dumb.

Wanna buy a starter house?

San Francisco, which also has Occupy demonstrators, seems to be faring a bit better, and some activites continue. Real estate sales, for example. A house in the city's Pacific Heights (aka Pacific Whites) Gold Coast neighborhood, boasting 11,000 square feet of space and "panoramic views of San Francisco Bay" sold recently for $29.5 million — marked down from the original asking price of $39 million. That price, according to a local real estate expert quoted in the *Chronicle*, is realistic: "Nearby properties listed for $40 million to $60 million ... never sold." The rich are always with us.

Tesla fears not China

In an October 28 interview on Bloomberg TV, Elon Musk, head of Tesla Motors, speaking of potential competition from Chinese EV maker BYD, said that, aside from the higher-prices Tesla Model S (abve) being a better car, the Chinese supply chain numbers don't work. He said that an analysis of costs for Tesla showed that China was not the low-cost component supplier, and that in many cases U.S. sources, especially in California, were less costly.

That's not to say that Tesla is actually making a profit. A November 3 AP story reports that Tesla's loss increased to $65.1 million (63 cents per share), for the most recent quarter. While revenues increased "almost 85 percent to $57.7 million," a doubling of R&D expenses led to the loss.

Hybrids from the Hummer plant?

A recent AP story reports that "Bright Automotive [has] announced [that it has] signed an agreement for AM General to start building its Idea work van in 2013 or 2014 at the Mishawaka ... factory." This is where AM General built that paragon of fuel economy, the H2 Hummer. "Bright Automotive is seeking a federal loan to finance the start of production."

COMING EVENTS

SAE International 2011 Vehicle Battery Summit
Nov 14-15, Shanghai. Go to www.sae.org/events/battery/?&PC=11VBSSDEML&PCN=6125556048

SAE 2011 Powertrain Electric Motors Symposium for Electric and Hybrid Electric Vehicles
Nov 16, Shanghai. Go to www.sae.org/events/training/symposia/emotor/?&PC=11EMOTSDEM&PCN=6125556048

Community EcoExpo
Jan 22, Maple Glen, PA. For info call Lisa Brown at 215-628-9970

Solar POWER-GEN Conf & Exhibition
Feb 14-16, Long Beach, CA. Go to www.solar-powergen.com/index.html

EVS26
May 6-9, Los Angeles. www.evs26.org/

2012 Drag Racing Expo Event
May 18, Lebanon Valley Dragway, West Lebanon, NY. For info go to www.ecedra.com/2012evdragracingexpo.html

MEETING SCHEDULE

Meetings are held in Room 49, Plymouth-Whitemarsh High School, 201 East Germantown Pike in Plymouth Meeting, PA, and begin at 7:00 p.m.

December 14

January 11

February 8

March 14

April 11

May 9