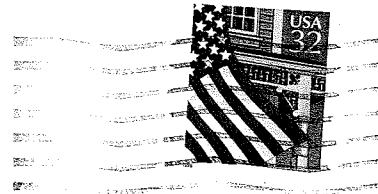


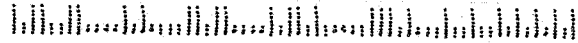
**Fox Valley Electric Auto Association  
1522 Clinton Place  
River Forest, IL 60305-1208**



John Emde  
6542 Fairmount Avenue  
Downers Grove IL 60516 -2919

Address Correction Requested

60516+2919



**NEXT MEETING: Friday, December 19 at 7:30 PM in Room K-161 at The College of Dupage SW Corner of 22nd Street & Lambert Road in Glen Ellen.**

**DISCUSSION TOPICS - Open Topics (Something we have not had for quite a while)**

**MEMBERSHIP INFORMATION**

Any person interested in electric cars is welcome to join the FVEAA. The cost for a full year's dues is \$20 that will entitle the member to receive our monthly Newsletter that contains useful information about electric car components, construction, policies and events.

To obtain information about the FVEAA, you may contact either President Woods or Vice President Shafer:

President - Ken Woods  
1264 Harvest Court  
Naperville, IL 60564-8956  
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E-mail Casa Zeus2@aol.com

Vice President & Editor - Bill Shafer  
1522 Clinton Place  
River Forest, IL 60305-1208  
(708) 771-5202  
E-mail electric-bill@compuserve.com

**DECEMBER 1997 PRESSEZ**

There will be an open discussion concerning the 1998 club agenda and other topics. In addition member Jerry Mitchell will report on his experience in rejuvenating several of his old batteries.

2. Note on the last page that this will be the last issue of the FVEAA Newsletter for those members who have failed to renew by December 31.

3. I wish you and your family a very happy holiday season and electric motoring next year..

Sincerely,

Ken

## MINUTES OF NOVEMBER MEETING

The meeting at the College of DuPage was called to order by President Woods at 7:43 PM. Nineteen members and eight guests attended.

Treasurer Corel reported the checking account balance was \$ 2636.48 and no change in the savings account. His report was accepted.

FVEAA officers for 1998 were elected:

President - Ken Woods  
Vice-President - Bill Shafer  
Treasurer - Dale Corel  
Secretary - Dave Aarvold  
Director - Ed Meyer  
" - Dana Mock  
" - Bob Munroe

Guest Mike Duoba from Argonne Lab presented a program on the 1997 Future Car Challenge. A full-sized sedan donated by Ford, GM, and Chrysler is given to a participating university with the objective to increase the fuel efficiency by any means they choose. The goal is an 80 mpg car.

In 1995, there were 38 participants, in 96 there were 12, and in 97 there were 14 expected with 8 showing up. The techniques employed were:

Virginia - Series hybrid, propane fuel.  
Concordia - Parallel hybrid, direct-injected diesel engine, small electric motor.  
West Virginia - Parallel hybrid with a Saturn engine, manual transmission with computer controlled shift points.  
California - Parallel hybrid with a Geo Metro engine, NiMH battery.  
Michigan Tech - Series hybrid  
Wisconsin - Parallel hybrid, 4 wheel drive transmission with computer shifting.

Ohio State - Parallel hybrid, VW diesel engine, small battery.

The best of these entries came close to achieving 60 mpg.

A discussion of the material followed the presentation.

Member Shafer led a discussion on the general principles of fuel cells. Each type depends on a hydrogen-oxygen reaction across the anode-cathode-separator combination in each cell. Fuel cells do not use carbon in the reaction, and in some cases carbon can inhibit or poison the reaction.

He stated that hydrogen is the preferred fuel but is difficult to handle. Only limited quantities can be stored on-board if the fuel is in gaseous form and stored at high pressure. The energy required to compress the gas is almost equivalent to the energy consumed during driving. Only limited quantities of the gas can be stored as a hydride and heat is necessary to get the fuel in gaseous form for cell use.

The preferred liquid fuel is ethanol due to the high ratio of hydrogen in the molecule. Ethanol is derived from agricultural crops but requires a lot of energy to produce. Methanol is a second choice. Petroleum is further down the list because it contains complex molecules of other substances that potentially can ruin a catalyst.

Member Ed Meyer demonstrated the charger built for the Krajanovich conversion. Current control is used. Ken Meyers presented an alternative design for discussion. Ken has bought a Ford Festiva for conversion and needs a shop manual for the car

The meeting adjourned at 10:30  
Dave Aarvold- Secretary

## RECENT ARTICLES ABOUT ELECTRIC VEHICLES

### HYBRID VEHICLES

**Crossing the line. Chicago Tribune 10/19/97, Page 7 (Transportation)** Toyota has introduced the first gasoline-electric hybrid car. The PRIUS is a small 4-door sedan that will initially be sold in Japan for about \$ 17,700. US sales are expected to start in mid-1998. The selling price is subsidized as an "advertising expense" by the manufacturer. Outsiders estimate the car will cost Toyota about \$ 41,000 to produce. The car achieves 68mpg. Fuel price in Japan is currently \$ 2.80/gallon.

**Getting a handle on a hybrid. Chicago Sun-Times 11/16/97, Page 57 (Science).** Toyota's PRIUS starts from battery power and the engine is started automatically at 13 mph. After that the unique power-splitting parallel system uses a combination of engine and motor power as directed by an on-board computer. Emissions for the car are low enough to qualify as a "zero-emission" vehicle as defined by California's stringent regulations. All development was by Toyota.

**Toyota gives a jolt to electric cars. Chicago Tribune writer Jim Mateja.** Toyota makes a pure electric car, the RAV-4 that sells for \$ 41,000, about \$ 10k more than GM's EV-1. The PRIUS is the second electric car offered by the manufacturer. It uses 40 NiMH batteries and a 1.5-liter, 65 hp engine-generator in a parallel configuration. The PRIUS can travel 800 miles on a 13 gallons of gasoline and fully-charged battery. Toyota plans to build 1000 PRIUS vehicles per month. "You have to suspect that Toyota's rivals are reaching for their dust cloths" noted Mateja.

### FUEL CELL CARS

**Electric car breakthrough has industry buzzing. Columbus (Ohio) Dispatch, 10/22/97, P. 1** Arthur D. Little, a Boston-based energy consulting company has devised a fuel cell that operates on gasoline as a fuel. The estimate the development can be commercial in another 8 years. The firm has done the research for Chrysler who earlier announced plans to develop the vehicle. They expect the car to deliver 80 mpg and reduce carbon emissions by 50% from present levels.

**Fuel cell "breakthrough" for cars is a real gas. Chicago Tribune 10/22/97.** Energy Secretary Fredrico Pena made an announcements about the development. He stated the federally-finance **Partnership For a New Generation of Vehicles (PNGV)**, a cooperative project jointly funded by the Department of Energy and the Big 3 automakers, is examining the AD Little fuel cell development. Last month, the Chicago Transit Authority began running three fuel cell buses developed by Ballard Power Systems, a Canadian company. If you want more information on electric car developments, access the web at: [chicago.tribune.com/go/electric](http://chicago.tribune.com/go/electric)

**Cars of the future in lab today. Editorial in the (Chicago Suburban) Daily Herald.** It would be a mistake to underestimate this nation's ability to come up with technological solutions as they are needed the most. (The rest of the Editorial describes the A. D. Little development).

## RECENT ARTICLES ABOUT ELECTRIC VEHICLES - Continued

**Powering the future and Fuel cells could power electric car. Chicago Sun-Times 10/23/97, Page 7 and 11/3/97, Page 39.** The first article is about the A. D. Little development of a fuel cell that shows promise to be useful for cars. The second article covers a description of fuel cell operation, their history, pollution concerns, recent advances and problems. In the cell, gasoline is first vaporized and converted to gases. Next comes a partial oxidation reactor where vaporized fuel is burned with a small amount of air that produces hydrogen and carbon monoxide gases. Third in line is a water-gas shift where steam reacts with most of the carbon monoxide converting it to carbon dioxide and additional hydrogen. The fourth step is a preferential oxidation stage in which the remaining carbon dioxide is burned over a catalyst to form carbon dioxide and water vapor, leaving a hydrogen-rich gas stream. The carbon dioxide and water is discharged to the atmosphere. In the fifth stage the hydrogen reacts with oxygen in the air to produce electricity. The remaining parts are the same as other electric cars, a motor, battery, and controller.

**Honda develops gas-electric engine. Columbus Dispatch, date and page not provided.** Honda has developed a gasoline-electric hybrid, Called the Hybrid Integrated Motor Assist (IMA) system that is simpler and more efficient than the Toyota system. The engine runs all the time and is probably a series hybrid.

### MISCELLANEOUS ARTICLES

**Ford and Honda agree on EV charging. (Source not identified)** The two companies have agreed to each spend \$ 100,000 to build public charging stations in California. A conventional conductive connection will be provided. GM and Nissan favor an inductive connection. Eventually, the customer will choose which system they prefer. Ford will begin selling its converted Ranger pickup at 10 California dealers in December. Vehicle cost is \$ 32,950, including an on-board charger. Honda's offering is the EV PLUS.

**Rosen Motors, developer of a turbine-flywheel combination (See FVEAA April 97 Newsletter for information) has closed its doors after spending \$ 74-million.** The owners say they were unable to obtain a commitment from any Big 3 automaker to use their system.

**Automakers on opposite tacks. Chicago Sun-Times 10/23/97.** While the Japanese are showing off superclean cars their US rivals flashed slogans like, "A distinctly American muscle car". The Japanese stress technological substance while the Americans were pushing sizzle and style. It begins to look like a replay of the earlier confrontation where the Japanese swept the market.

**Autowriter Dan Jedlika** answered Editor Bill Shafer's question about engine life. Bill noted he has heard the average running life for an internal combustion engine is only about 2000 hours. Dan replied that he knows of no research where an engine-hour meter was used. Because of the widely-varying way in which drivers use their cars and perform maintenance, an average figure is not meaningful. (Editor's note - it would be informative to equip a new car with an engine-hour meter and see what it records over the vehicle lifetime)

## RECENT ARTICLES ABOUT ELECTRIC VEHICLES - Concluded

I received an interesting article appearing the October 25 issue of the **ECONOMIST** Titled the **Third age of fuel**. The subtitle is "Just as coal gave way to oil, oil may now give way to hydrogen. Matthew Boulton, the manufacturer and seller of James Watt's steam engine grasped the realities of in Industrial Revolution this device made possible. He said, "I sell here, sir, what all the world desires to have - Power." Coal was the source of energy for 100 years and oil has been the fuel of choice for another 100. Hydrogen used in fuel cells may be the third shift in fuel.

The fuel cell was invented in 1839 by British scientist William Grove. Lack of suitable materials and techniques prevented exploitation of this device until the 1960's. There are five basic types of fuel cells:

1. The alkali cell uses expensive materials such as platinum and gold to coat electrodes. Potassium Hydroxide, a corrosive material, is used as the electrolyte. Its use is limited to special applications such as space where there are on-board supplies of liquid hydrogen and oxygen.
2. Molten carbonate cells run at 600 degrees C. This is a hostile environment that causes its electrodes to give up after a short time.
3. Solid-oxide cells operate at 1000 degrees C. Molten carbonate and solid-oxide cells do not need special catalysts and can use methane as a fuel. The oxides use compounds of exotic materials such as yttrium and zirconium.
4. The phosphoric acid cell runs at a mere 200 degrees C and also uses methane. It is considered a candidate for co-generation of electricity where the heat given off can be used for some other application, such as cooking french fries. It costs about \$ 3000/kw to build, over twice the cost of conventional utility generators.
5. The permeable membrane (PEM) cell is the final type, used for most motive experiments. Ballard, Toyota and Mercedes-Benz all use this type. The cell operates at a manageable 80 degrees C. The PEM system was initially developed by General Electric and needed \$ 30,000 of platinum to make the reaction work. Ballard modified this by applying the technique used in catalytic converters to maximize the platinum surface area. Only about \$ 140 of platinum is needed for a small car fuel cell. Today's fuel cell for a car costs about \$ 3,000/ kw while today's car engine costs a mere \$ 50/kw. The PEM fuel cell is 30% efficient in converting fuel to work.

Only two years ago Detroit was dismissing fuel cells as impractical. It is ironic now that great attention is being paid to fuel cells for cars. The key need is range. A tankful of gasoline will drive a Toyota RAV-4 about 300 km. A fuel cell version of the RAV-4 can go 400 km on the same quantity of methanol fuel.

## FROM OTHER EV NEWSLETTERS

**EEVC, the eastern club** in their October Newsletter reported the guest speaker at their September meeting presented a controversial report on the work of inventor Tony Basilcato who has produced a 3-wheel vehicle with a claimed 100 pounds of drawbar pull from a 1/4 horsepower motor only two inches of diameter. The program generated a spirited discussion. They also note that new EVs are expected to be shown for the first time at the Los Angeles auto show, Jan 2-11. The issue also provides data on Hundai's new Altos EV. It is a 5-passenger car weighing 2585 pounds, uses 24 NiMH batteries and a 50 kw ac induction motor connected to a single-speed transmission. Claimed range is 120 miles and top speed of 80 mph.

In their November issue, they provide information on Toyota's PRIUS hybrid. They also cover the A. D. Little fuel cell development, covered elsewhere in this issue of the FVEAA Newsletter. (Editor's note, I suspect all the fuel cell coverage originated from the same news releases.)

**EV Circuit, the publication of the active Ottawa group** in their Sept/Oct Newsletter had an interesting account of their participation in a Canadian plowing match. Now that's an imaginative place for EVs! The annual event is attended by 150,000 persons and featured 500 exhibits. In the words of STAR TREK - to go where no man has gone before. The issue also has an extensive article of the Wallingford AC full-wave inverter and an article on a spark-free connect-disconnect system by their builder. Interested members should check out the library copy of the Newsletter.

**EV NEWS, the monthly publication of Larry Dussalt's organization** in the November issue covers the Frankfort auto show and the fuel-cell cars exhibited, the Sun Day annual rally in Florida where 27 entrants finished the 73-mile event, a progress report by the Electric Transportation Coalition (ETC) on their efforts, and a report on a prototype "FUN CAR" built on a Geo Metro chassis and using Solectria components.

The issue also updates the court status of the New York zero-emission vehicle mandate. The requirement has been upheld in New York and automakers have filed an appeal with the US Appeals Court. The basis for appeal is that state emission requirements are secondary to the emission standards contained in the 1990 Clean Air Act. California is the only exception provided for in this law and they have since modified their requirements under heavy pressure from auto manufacturers.

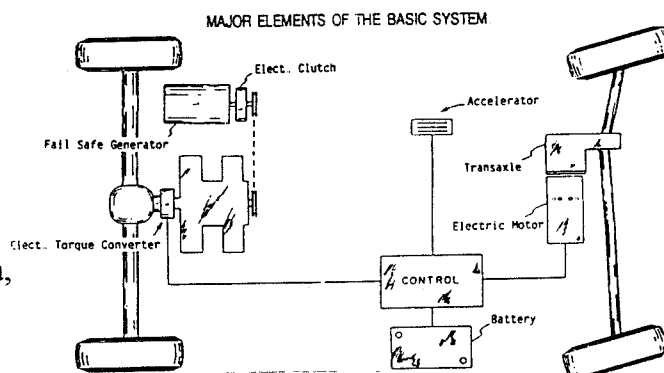
**VEVA, the Vancouver club** in their November Newsletter featured a story about Solectria's achievement of driving from Boston-New Your on a single charge during the NESEA annual event. Thirty Ovionic NiMH batteries provided 28.3 Kwh to travel the 348 km, fantastic 0.132 kwh/mile. Average speed during the run was 54.8 mph. The group is also producing 1998 calendars featuring 12 electric vehicles owned by club members.

## FROM OTHER EV NEWSLETTERS - Concluded

World Electric Transportation, Clarence Eller's Newsletter he writes from Yachats, Oregon final issue was in April, 1997. It was received in November. Considerable space in this Newsletter will be devoted to this development. Clarence, along with Irving Lasky who founded the Electric Auto Association two decades fifteen years ago are EV pioneers. Clarence was the editor of the EAA publication until he and four others resigned in 1989 to protest the censorship of the newsletter. There are now at least 30 EV Newsletters now being published.

In 1980 Clarence developed and built a hybrid car using an lightweight chassis and an Aztec body shell. He used a Kawasaki 440 engine directly coupled to the differential and an electric drive powered by 16 US 135 EV lead acid batteries. In tests, it achieved 84 mpg. Clarence patented the hybrid system in 1990. The achievement was recognized by several acknowledged experts. The basic elements of the system are shown by the following sketch taken from the newsletter.

Clarence is critical of the government's PNGV program. The partnership between the DOE and Big 3 automakers Clarence believes will only build prototypes and raise government research money. He recommends a different approach. He would offer a \$ 25-million grant to AeroEnvironment, Dana Corporation, Solectria, Unique Mobility, ETD, or other experienced company with a requirement that within one year they deliver on an ultra-lite platform a Taurus-sized, operating vehicle.



Clarence Ellers  
Prototype & Licensing For Sale  
P.O. : USA 4 923 025/ CANADA 1 289 892

Clarence is closing his newsletter to devote his time to the PNGV hybrid program. We all wish him well in his future endeavors. The experience of pioneers should be carefully considered because, as has been noted; "Those ignorant of the past are likely to repeat previous mistakes."

## FVEAA MEMBERSHIP RENEWALS

As of November 21, thirty four present FVEAA members have failed to send to Treasurer Corel their \$ 20 renewal for continued membership in 1998. This will be the final FVEAA Newsletter for those failing to renew by December 31. The FVEAA needs your membership to continue to function as it has.

Bill Shafer - Newsletter Editor

## GUEST EDITORIAL BY MEMBER DAVE AARVOLD

The "Greenhouse" debate shifted to another level with advertising taking the negative side. It seems that scientific methods may be confronted and/or discussed with emphasis on dollar consequences and its ability to sway public opinion. I feel that most people would love to not have the problem and are therefore are "ripe" for any excuse to dismiss the evidence.

Personally, I feel that the question can ultimately be answered, but when it is the consequences may be far too advanced for a workable solution. Since we know there is a possibility of a "Greenhouse" effect, why not treat it as a real entity and deal with it as pollution? If all the energy spent on trying to define the problem were expended toward solving it, we would not have an issue.

The Big 3 are now manufacturing sport-utility vehicles that add to pollution and carbon emission. The folks in Kyoto added their share of hot air.

I have a proposal. If the total amount of combustion (engine displacement x times rpm x running time x the number of engine-powered devices {cars, tractors, aircraft, lawnmowers, and other engines} could be determined, we could see what % of the earth's total atmosphere is made up of engine discharges. We could also determine at what point the % becomes a known health hazard. and say draw the line before we get there.

Editor's comment: This is an interesting proposal but it only treats the emissions on a volumetric basis. It does not address the specific effect carbon dioxide has in altering the incoming solar radiation and containment of outgoing heat reflection. That is really what all the discussion is about. There is as yet no scientific consensus on the ability of the ocean and living material that absorbs carbon dioxide and converts it into either carbonaceous rock or trees and plants. Over time there have been many variations in atmospheric carbon dioxide. There is no question that carbon dioxide has increased significantly since the Industrial Revolution 200 years ago when the carbon stored in coal and oil has been burned in combustion processes to release carbon dioxide to the atmosphere.

The question has policy implication for electric car energy sources. Only hydro, nuclear, solar, and wind power consume no carbon-based fuels. Do we want to support a technology such as a fuel cell that uses gasoline as proposed by Chrysler? Do we want to see methanol, that is made from coal, oil or gas as the fuel of choice? Would we rather see ethanol that can be made from agricultural waste as the fuel? Do we want to see sport-utility vehicles sold in China?

## RESPONSE RECEIVED TO REQUEST FOR EV EFFICIENCY DATA

Paul Heany, Editor of the Electric Grand Prix was the only respondent to my request for data on energy consumption of converted cars. His Electric Cobra logged 2289 miles and used 723 kwh for an average efficiency of 0.316 kwh/mile. In the second phase, 1356 miles were logged with an average efficiency of 0.553kw/mile.

Thanks Paul.