

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

**Address Correction Requested**

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**NEXT MEETING: Friday, April 17 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 - 1. Videotape made at Clean Cities Forum by Member John Emde  
2 Participation in Earth Day events. 3. Open Topics.**

**MEMBERSHIP INFORMATION**

Any person interested in electric cars is welcome to join the FVEAA. The cost for a full year's dues is \$20 which will entitle the member to receive our monthly Newsletter that contains useful information about electric car components, construction, policies and events. Dues for new members joining in April will be \$14.

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

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**APRIL, 1998 PRESSEZ**

Six FVEAA members attended a Clean Fuel Fleet Forum held at Argonne National Laboratory on Wednesday March 25. The EPA requires fleet owners with more than 10 vehicles, by late 1999, to buy vehicles fueled by propane, natural gas, methanol, alcohol, or electricity. The event was attended by about 100 fleet representatives and component suppliers.

Member George Krajnovich drove his converted Dodge Omni to the meeting from his home in Oakbrook to the Forum and exhibited the car. Member John Emde videotaped the event. The tape will be shown at the next meeting and will be followed by a discussion of the Clean Cities program. Member Ray Oviyach also attended. Ray has become an ASE certified educator qualified to instruct others in the maintenance of alternative fueled vehicles.

Ken

## MAR. 98 MEETING MINUTES

The March 20th meeting at the College of DuPage was called to order by President Woods at 7:45 PM. Seventeen members and one guest attended.

The minutes of the previous meeting were approved as published.

Treasurer Corel reported \$ 3139.78 in the checking account and no change in the savings account. His report was approved.

Member Fred Kitch announced that on 3/18 he ordered a Ford 1998 electric Ranger pickup. Principal features of the vehicle include a 312-volt system provided by 38 eight-volt sealed lead-acid batteries placed in a container that extends from the firewall to the differential. The container is between the vehicle side rails. For inspection and service the container is lowered at the dealer by using a special device he is required to have.

The original battery set is guaranteed for two years; full replacement in the first year and prorated during the second. A special plug device is required for charging at 240-volts. It appears to be a 4-wire device (Two hot leads, a neutral, and ground). It costs an extra \$ 1995. Members thought this was a high price for what appears to be a ground fault interrupter.

The A-arm front suspension is designed to carry the extra vehicle weight and differs from the standard Ranger component.

The drive system has no transmission. The shifter lever on the steering wheel stalk has four positions; drive, park, neutral and an "E" position which provides regenerative braking, reduced max speed, and increased energy economy. Reverse is electrical.

Fred expects to receive delivery in 10-12 weeks. The 60-mile range is adequate for him to drive the truck to a future FVEAA meeting for inspection. The total purchase price is expected to be \$ 35-38,000. Electric work at Fred's house will be extra.

Member Jerry Mitchell with help from Ken Myers will exhibit his two electric cars at the April 19 Earth Day event in Glenview. Jerry noted that his house is only a few blocks away from the celebration location. Member Ed Meyer will have the Nissan and Citicar at the Bolingbrook event on April 25. Ken Woods and Dana Mock will be there to assist him. Bill Shafer will update the FVEAA handout for the events.

Member Ray Oviyach brought a video of the Ballard fuel cell buses which are being tested by the CTA. Hydrogen fuel is stored in tanks on the roof. It has a 275 HP drive system, accelerates 0-30 in 19 seconds, has a top speed of 60 mph, and can climb a 2.5 % grade at 44 mph.

Member Jerry Mitchell gave a presentation on the "Solarigizer", a solar cell powered battery charger that utilizes a pulsing technique. He reports success in reviving two sulfated batteries from his electric cars. Pulse Power, the device maker, claims that the proper frequency of energy pulses helps break up sulfate deposits on battery plates. Other Pulse Power chargers are available.

Bill Shafer gave a presentation on the options he is considering when the 7-year old batteries in his 1980 Mazda RX-7 are replaced this spring. Details will appear in the FVEAA April Newsletter.

The meeting was adjourned at 10:20 p.m.

Submitted by Secretary Dave Aarvold

## RECENT ARTICLES ABOUT ELECTRIC VEHICLES

**CTA puts "clean" fuel buses into service. Chicago Sun-Times 3/17/98 Page 14.** Three fuel cell buses built by the Canadian firm of Ballard Power Systems have finished their shakedown tests and are now in revenue service on three CTA lines for two years. Route 20 (Madison), 65 (Grand), and 66 (Chicago) have the vehicles. They can be identified by a high roofline that holds hydrogen storage cylinders. Refueling of the buses is at a CTA garage facility serving the three lines. Chicago is a great test bed according to Frank Kruesi. It is hot, it's cold, it's windy, and it freezes. The buses must pass the two-year test before The CTA more purchases more for \$ 1.4 million each.

**Worldwide, automakers seeking alternative ways to power cars. The Columbus Dispatch, 2/27/98, Page 4f.** Automakers are looking into vehicles 20 years from now asking, "What will be powering them?" The options run from fuel cells to high-tech diesel engines, or even improved versions of the gasoline engine. Manufacturers are scrambling to develop cars that will deliver 80 miles per gallon (mpg). The college competition, Partnership for a New Generation of Vehicles (PNGV) has shown modified family sedans that get 40-60 mpg by replacing the standard engine with a combination of a small engine-generator, limited batteries and electric motor drive. This approach however is viewed skeptically by many. Auto technology analyst Ralph Colello observes that hybrid cars that put two power plants under the hood can't be cheaper than one.

**Big 3 promise cleaner cars by fall. Chicago Tribune 3/8/98, Transportation Section page 3.** The Big 3 automakers say that, beginning with 1998 models, they will sell cleaner cars in 12 states from Virginia to Maine. Sales will be expanded nationwide by the year 2001. Four Northeast states, Mass. New York, Maine and Vermont have adopted the California Zero Emission Vehicle (ZEV) requirement and automakers have agreed to comply. Eight other states have agreed to the compromise offered that will require cleaner cars that will be up to 99% emission free.

**Smog busters. Chicago Tribune 3/8/98.** There are several ways to make a car with fewer emissions than the present standard. Honda has shown a prototype 2.3 liter, 4-cylinder engine that employs a three-stage catalytic system that emits only 10% of the emissions produced by the standard engine version. Vehicles using compressed natural gas (CNG) are available but require compressing the 1-pound pressure gas from the mains to 3600 pounds. Storage is in steel cylinders wrapped with carbon-fiber tape. Several automakers are showing prototype hybrid cars. Fuel cell cars are a longer-term prospect.

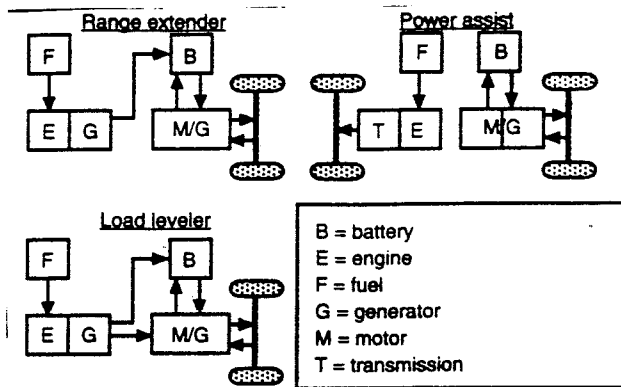
**Putting a charge into electric vehicle industry. Chicago Sun-Times 3/15/98.** Two former auto top executives have teamed up to produce and sell the Lightning, a \$ 995 electric bicycle. Lee Iacocca, Bob Stemple, joined by NiMH battery developer Stanford Ovishinski, are cooperating in the Global Motors endeavor. The bike is scheduled to go on sale later this year in a combination of bicycle shops and car dealers. The electric has a top speed of 25 mph and a range of 40 miles (without pedaling).

## RECENT ARTICLES ABOUT ELECTRIC VEHICLES - Concluded

**The stretch for better passenger fuel economy: a critical look.** *Automotive Engineering International*, March 98 Page 71. Range extension, recovery of braking energy, and power averaging are the basis for hybrid cars. Hybrids may be classified three ways: 1. Range extender, 2. Power assist, and 3. Load leveler. These options are shown in the accompanying illustration.

The range extender is a series configuration where the battery energy is replenished with an engine-generator combination

The power-assist is a parallel arrangement where the engine drives the rear wheels and the battery-motor drives the front wheels. A sophisticated control arrangement is required.



The load leveler configuration is both series and parallel hybrid. Energy can be delivered simultaneously from the fuel tank and the battery.

The engines used in each type of hybrid are undersized compared with conventional cars because the battery is used to meet peak power demands of acceleration and hill-climbing. Engines operated at their optimum point have a typical maximum brake thermal efficiency of 30-35%.

## COMMUNICATIONS RECEIVED FROM READERS AND OTHERS

Fred Green in Ottawa has a converted Fiero that he has labeled an **ELF (ELectrified Fiero)**. He acquired the car in December, 1983. Fred is retired and has driven the electric a modest 7492 miles. Energy consumption has been 0.45 kwh/mile. The car has a range of 37 miles in both winter and summer. The converted car weighs 3450 pounds, 660 above the original curb weight

Bob Wing, the West Coast Editor for EV News and a consultant has a converted 1959 MGA Roadster that has gone thru several upgrades since conversion 24 years ago. It now has an Italian ZAPI controller, a Prestolite motor, and Optima Yellow Top, sealed & valve-regulated spiral wound lead acid batteries for the 120-volt system. The batteries are equipped with Rudman regulators that control the charge of each 12-volt battery. Batteries are connected with two matched units connected in parallel and the combination connected in series with other pairs

Bob lives in California hill country so the car is equipped with regenerative braking to assist the 4-wheel drum brakes. The car is freewheeling with the controller barely on. Release of the potentiometer microswitch produces a slight regeneration. Activation of the brake lights puts it into full regeneration. You can e-mail him at [bobwing@nbn.com](mailto:bobwing@nbn.com); also <http://www.ariz.com/gleaa/>

## FROM OTHER EV NEWSLETTERS

**AVEA, the Aussies**, in their Jan/Feb newsletter featured several reports about EVS-14 by John Wayland and by Mark E. Hanson. Anyone who wishes to purchase a copy of the Proceedings can contact the Electric Vehicle Association of America, e-mail [ev@evaa.org](mailto:ev@evaa.org) or on the Net at <http://www.evaa.org> The issue also has an article with photos of connecting an Advanced DC electric motor to the transmission of a Camira. Andy and Cathy Staley who live in California have an informative 2-page article about their experiences leasing a Honda EV Plus to supplement a converted Electric Escort Wagon which they already own.

The article compares driving experience with the two electrics. The Honda is a far better vehicle but much more costly, except for Honda swallowing the extra \$ 56,000 for a NiMH battery. An "opportunity charge" at a local gas station was priced at \$ 7.50 for a measly amount of energy! That is the usual price for an emergency charge of a 12 volt battery.

The issue also has a 5-page article by Kanehira Mauro, Department of Human Technology and Human Sciences at the University of Gotheburg (Sweden). It contains lots of useful technical information. Any FVEAA member wanting to read this Newsletter issue should check it out from our Librarian, Ed Meyer.

**The Feb/Mar issue of the EEVC Newsletter** starts off with a picture and account of a small EV weighing just 250 pounds, powered by six 1/3 HP permanent magnet motors, a 138-volt system, and having a 20 mph top speed and 0-15 acceleration in 3 seconds. This is not an on-the-road vehicle. The car is owned by Tony Basilicato who moderates the EV Partners mail list on AOL.

**Electric Grand Prix Corp, the folks in Rochester NY**, in their Apr.-June Newsletter announced the Electric Cobra, a replica of a 1960's Shelby Cobra, that has been used by the club for testing purposes is available for sale for \$ 9500. The 120 volt drive system includes 10 Trojan SCS225 batteries and lots of spare parts including a spare windshield. Any interested FVEAA member can call the EEVC Newsletter Editor, Paul Heaney, at (716) 889-9516. The issue also notes that their member Che Pabalon is replacing a Renault R-16 converted in 1963 because it finally rusted out.

**SEVA, the Sacramento group** in their March Newsletter announced this may be the final issue of their monthly publication unless someone volunteers to act as editor-publisher. They send out about 150 copies of the newsletter. Since SEVA members are also members of the Electric Auto Association they will continue to receive that publication, but local news content is limited.

The issue also has a 2-page discussion titled "What is Efficiency?" Simply stated, Efficiency = output energy/input energy. The article gives typical efficiencies as:

Internal combustion engine, 15-20%  
Steam turbine, 23%

Diesel engine, 25-30%  
Electric motors, 85-90%

(Editor's note: From my ComEd experience, a coal-fired plant uses 11-12,000 Btu to generate 1 kWh of electricity (3413 Btu). Efficiency is 30% Combined-cycle plants reach 50%)

## FROM OTHER EV NEWSLETTERS - Concluded

**EV Circuit, the Newsletter of the Ottawa Club** in their Jan/Feb Newsletter featured an Earl Wallingford article about selecting industrial AC motors for EV use. Check out our library copy from Ed Meyer if you wish to read it. There is also a story about Dianne McMahon's 1982 CommutaCar she recently acquired. The car has been upgraded with an electronic controller and looks a lot like FVEAA Member Ed Meyer's car without the solar panel.

The **March issue of EV News** starts with an article about Chrysler's 2250 pound ESX2 Hybrid. It has an aluminium chassis and thermoplastic body. It has a relatively small 15 kw (20 hp) 300-volt electric motor and battery pack that is used for acceleration peak power demands and regenerative braking. The engine is a direct-injection 1.5-liter, 74 horsepower diesel engine. Chrysler estimates the ESX2 could be sold for a \$ \$15,000 premium over a standard Intrepid.

The Ford entry into the "Green Machine" class is their P-2000. It has an aluminium frame, plastic body that weighs 2000 pounds. Like Chrysler, the drivetrain is made up of a 1.2 liter direct-injected diesel and a small electric-motor + battery pack. The combination produces 63 mpg.

The GM offering is a series of cars, built around the EV1. Five power options are being considered that include electric, parallel hybrid, series hybrid, compressed gas, and fuel cells. The series hybrid features a 40 kw gas turbine-generator. The parallel hybrid uses a 75 horsepower 3-cylinder Isuzu direct-injected diesel driving the rear wheels of an EV1 stretched by 19 inches. The parallel gets 80 mpg on diesel fuel. The CNG car uses a Suzuki 1-liter, 3-cylinder engine that gets 60 mpg.

Chuck Hersh has an article about EV battery charging. The SAE has adopted two standards; J-1772 for conductive charging and J-1773 for inductive charging. Ford and Honda use a butt-type coupler while Chrysler uses a pin-type. Three charging levels are identified: Level 1 is limited to 1.5 kw demand from a 120-volt supply system. Level 2 is a 6.6 kw demand from a 240-volt supply. Level 3, also known as fast charging, is for demands over 50 kw that must have a special utility supply.

**VEVA, the Vancouver group**, has as their lead article in the March Newsletter the ZEBRA battery. It is based on the sodium/nickel metallurgy and achieves >150 wh/kg power density and 80 wh/kg energy density. The battery is being used by Mercedes in a test car. The major drawback is the 300-degree C operating temperature that was last seen in Ford's sodium-sulfur battery system.

Bill Glazier reports on the progress of work installing his continuously-variable transmission system in a reconstituted Enfield, a British small electric car. The electrical system will be 48 volts. The car will be refitted with a KOSTOV one horsepower, separately-excited motor rated at 1700 rpm @ 24-volts DC. Doubling the voltage also doubles the rpm and power rating. A short-time rating of four horsepower is expected for acceleration.

## UPGRADING A CONVERTED ELECTRIC VEHICLE

After you have converted a car to electric drive and use it you often identify ways in which the performance could be improved. The best opportunity for this may be when the battery pack is due for replacement.

My converted 1980 Mazda RX-7 needs new batteries after seven years of use. Their long life is attributed to the way I use the car. I live in a metropolitan urban area where practically everything I want, including two regional shopping malls, is available within a 5-mile radius of my home. The system almost never experiences a deep discharge cycle and driving does not require expressway travel. Last year I used the car 165 times with an average round trip length of 6.3 miles; the longest was 18.4 and the shortest 1.1 mile. Peak power for acceleration is modest.

The post-conversion curb weight of the Mazda is 2859 lbs. It presently has a 72-volt system supplied by 12 Trojan T-105 batteries connected in series. The controller is an early model Curtis 1201 with a max of 72 volts. The on-board battery charger is a 36-volt ferroresonant Lester charger modified by replacing the 1/2-wave rectifier with a full-wave bridge. The car has a 72 volt DC-12 volt DC converter. These are the only components affected by the proposed voltage increase. The 8" 203-06-4001 Advanced DC motor is ok for 96 volts.

I am considering raising the system voltage from 72 to 96 volts. The commercial availability of 8-volt deep-discharge, flooded lead-acid batteries that have the same dimensions of a 6-volt, GC 2 unit make this a feasible change. Also available are spiral wound 12-volt sealed batteries that have a high power rating and eliminate the need for periodic rewatering.

There are costs to raise the voltage. Below are the prices for changes and the Table on the following page summarizes the options.

The purchase price for affected major components are:

Trojan T-125, 6-volt Type GC2 flooded battery. (75 amps for 105 mins @ 6v = 0.78 kWh) is \$ 52

Trojan T-875, 8-volt flooded battery (75 amps for 75 mins @ 8v = 0.75 kWh) is \$ 62.

Optima D750U sealed 12 volt Deep Cycle battery (52 amp-hrs @ 12 V = 0.624 kWh. is \$ 130

New 1221C-7401 (400 Amps) Curtis Controller = \$ 750

New 1221C-7701 (550 Amps) " " = \$ 1095

New KW BC-20 battery charger = \$ 575

New Curtis 1400E48/60-1201 converter = \$ 395

I invite persons receiving the FVEAA Newsletter to express their opinion about the proposed upgrade and include your logic. You can send an e-mail, post a letter, or call. In the next newsletter I will compile the replies and reveal my decision.

Bill Shafer: e-mail [electric\\_bill @ compuserve.com](mailto:electric_bill@compuserve.com) Phone (708) 771-5202

## UPGRADE OPTIONS

Component	Option 1 72 volt system	Option 2 96 volt system	Option 3, & 3a 96 volt sealed battery
Batteries	12 @ 52 = \$ 624 Energy = 9.5 kWh Range = 28 miles Weight = 744 Lbs.	12 @ 62 = \$ 744 Energy = 9 kWh Range = 27 miles Weight = 756 Lbs.	8 @ 130 = \$ 1040 16 = 2080 (2) Energy = 5 or 10 kWh Range = 15 or 30 miles Weight = 352 or 704 Lbs
Controller	0	750	1095
Charger	0	575 (1)	575 (1)
Converter	0	395 (1)	395 (1)
Subtotal	\$ 624	\$ 3208	(3) \$ 3105 (3a) 4145
Total with Note 1	\$ 624	\$ 1594	(3) \$ 2235 (3a) 3275

Note 1: FVEAA members have offered to design and build these components for me. Expected material cost for both devices is \$ 100.

Note 2: Two parallel strings of Optima batteries for Option (3a) would weigh an acceptable 704 pounds and could be fit into the space available. The present investment in the RX-7 conversion is \$ 6305.50. Option 3(a) would be attractive if it were selected for an initial installation, particularly since the battery has a tested cycle life of 1100 if limited to a 30% depth of discharge.

Increasing the voltage will raise present 60 mph top speed by an estimated 24% and double torque @ 2000 rpm.

Reply format:

I would choose Option # \_\_\_\_\_

Because \_\_\_\_\_

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