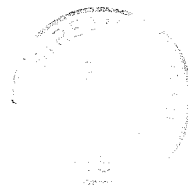


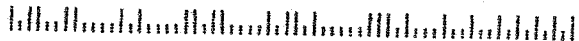
Fox Valley Electric Auto Association  
1522 Clinton Place  
River Forest, IL 60305-1208



John Emde  
6542 Fairmount Avenue  
Downers Grove IL 60516 -2919

**Address Correction Requested**

60316+2919



**NEXT MEETING: Friday, March 21 at 7:30PM in Room K-161 at the College of DuPage, SW corner of 22nd Street & Lambert Road in Glen Ellen**

**DISCUSSION TOPICS - 1. Owners Manual preparation procedure. 2. Refinements required for the Nissan before auction. 3. Open topics time.**

#### **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. 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:

President - Ken Woods  
1264 Harvest Court  
Naperville, IL 60564-8956  
(630) 420-1118  
E-mail Casa Zeus2@aol.com

Vice President & Editor - Bill Shafer  
1522 Clinton Place  
River Forest, IL 60305-1208  
(708) 771-5202  
WShaffer@aol.com

**MARCH 1997 PRESSEZ**

A big thanks to John Stockberger, founder of the FVEAA, for the generous donation of his electric car components and library before he moved. The inventory included 194 items. Also thanks to Dave Aarvold for picking up the items and storing them. Copies of the inventory were sent to Property Manager Dana Mock, VP Bill Shafer, and Secretary Dave Aarvold.

The next meeting will cover the preparation of the Nissan owner's manual and a report on the refinements required for the club car before it is auctioned to a member of the FVEAA in June. There should also be time for open topics discussions.

KEN

## MINUTES OF FEBRUARY MEETING

The meeting at the College of DuPage was called to order by President Woods at 7:38. Eleven members and two guests attended.

Treasurer Corel reported \$ 1797.86 in the checking account, \$ 2322.42 in the savings account and \$ 200 for Participation Certificate redemptions.

Steve Clark, Ed Meyer, and Bob Munroe were elected as directors for 1997. Dana Mock was renamed as property manager.

Project Manager Munroe reported on the FVEAA exhibit at the World of Wheels in January. About 200 handouts were distributed to persons who seemed genuinely interested. It was a positive experience to show our cars in an event that had never before seen electric car conversions. Attendance at the event was restricted by the very poor winter weather during the show. He expressed thanks to the 16 FVEAA members who manned the exhibit during showtimes. Member Ed Meyer is due \$70 reimbursements for stanchion and rope rental and for overnight parking at the conclusion of the show. The Nissan is now in the custody of Member John Emde.

Member Ed Meyer gave a presentation on the Nissan battery charger that he developed. It utilizes a toroidal transformer isolation transformer core that is more efficient than the usual metal sheets. In operation, it provides a hi-low charge regime, 120 volts input to one transformer that feeds a step down 16-volt bridge to the battery thru the breaker. The negative goes thru a relay to the battery for hi. A SCR is fired by a potentiometer set to feed to the gate. A circuit diagram will be provided in a future newsletter issue.

There remain some development items for the Nissan and charger:

1. A plug default.
2. Ramp-up for hi position rush suppression
3. Addition of ground fault protection
4. Defroster motor only operates on HI
5. Washer pump inoperative
6. No dash lights
7. Explore ceramic heater core use
8. Explore drive-up coupler

There was a discussion of fuel cells for EV applications. Chrysler has begun a fuel cell development that can use gasoline for input. Others are considering methanol.

Member Jerry Mitchell discussed his experience with the "Solargizer" and with pulse application to recondition a sulfated battery.

President Woods asked for an opinion about the FVEAA again exhibiting cars at the Downers Grove Heritage Fest. There are other requests for Beecher on May 10th and for Earth Day in April.

Member Bob Barrett presented comments at the Hearing for Alternative fuels held at the State of Illinois Building in Chicago.

There was a discussion about club property. The goal is eventually to have all of it a headquarters building.

The subject of Hamfet sales to provide income was discussed.

We have received no response to our original offer to provide the Nissan Zone personnel with a tutorial on our conversion. This must be resolved by June 1. President Woods will work with Member Meyer and may send a follow-up letter.

Meeting adjourned at 10:37

Submitted by:

Dave Aarvold - Secretary

## FROM OTHER EV NEWSLETTERS - Continued

I accumulated three months of newsletters from SEVA, the busy club in Sacramento. The January issue reported on a 24-hour endurance run of 1020.5 miles by AeroEnvironment and Delphi (GM). The car was fast-charged after every 44 miles using a newly-designed ProCharger that gave a 12-minute recharge in 12 minutes.

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They also have a report by Jeff Simpson of Kansas City describing his 126-mile daily commute in a converted Porsche 914 with the help of opportunity charging at work. He reports putting on 20,000 miles with his first set of Trojan T-12 batteries before their replacement.

## RECENT ARTICLES ABOUT ELECTRIC VEHICLES

Articles about user experience with the GM EV-1 appeared in many newspapers. A January 26 article written by Chicago Tribune auto writer Jim Mateja reported that Saturn, GM's marketing arm for the EV-1, is pleased by early reports. Seventy six cars have been leased from 26 dealers in CA and AZ, and an additional 469 customers are in negotiations. With a lead-acid battery the car has an advertised 70 mile range. An optional NiMH battery would extend this to about 150 miles but cost the customer an extra \$ 30,000 on top of the \$33,995 car price. A charger can add another \$ 7,500 plus the customer's cost for rewiring his garage for the charger.

The Chicago Tribune had another article about this in the February 26 issue. Dr. Gene Smith, a professor of mechanical engineering at the University of Michigan, observed that marketing of an electric vehicle has so many variables that forecasts made at the present time will turn out to be inaccurate. The SAE, on behalf of Argonne Lab, conducted a survey that concluded that EV's will initially be a low volume niche market. EV market penetration is predicted to go from less than 1% of all sales in the year 2000 to 7.5% by 2020. They report that government regulation will play a big part and causes uncertainty.

Infrastructure is a major item, particularly for GM's EV-1 that uses the MagenCharge system. Thirty six charging stations have been installed in the Los Angeles area so far at home locations and another one each at a Denny's restaurant, the LA Metro Station, and in Palm Springs.

The New York Times February 27 issue published an informative article about the technical innovations in the EV-1. The new lightweight materials used in the vehicle have required a new set of manufacturing techniques at the Lansing (MI) Craft Center where the car is produced. The 300-pound frame is about 60% lighter than a conventional car. GM glues the frame together and bakes it in a giant oven at 375 degrees for 15 minutes. Welding techniques do not work well with aluminum. The body is also fastened to the frame with adhesives.

These new procedures are also causing the Auto Workers Union some concern. In a typical plant workers have about 60 seconds to accomplish a defined task. The EV-1 stays an average of 45 minutes at each of a dozen stops on the assembly line. Assembly functions that each worker must memorize are 120-150 times longer than for a conventional car. Only a single robot is used to install the windshield. The manufacturer who learns flexible production techniques or low-volume cost control is expected to enjoy an advantage.

The Chicago Tribune on February 23 also had an article about Motorola components supplied for the EV-1. The Semiconductor Products Division worked with GM to develop the power electronics required for the AC drive system. The maximum power level of the system is 100 kw. They report not a single component failure in the entire development process. A Motorola employee leased the first production car (VIN No. 154). Previous vehicles were a variety of pre-production cars that were put through a 3-million mile testing program. Motorola is planning to be a co-sponsor a proposed Clean Car World Tour, a modern version of an early 19th century program that promoted early piston-engine cars.

## RECENT ARTICLES ABOUT ELECTRIC VEHICLES - Continued

**Car and Driver** in their March issue had A 4-page article about their four-day test of the GM EV-1. It was conducted in Los Angeles. The car was first trucked to a desert test site some 80 miles north of the city. Starting the car involved entering a five-digit code and then choosing the "RUN" option that activated a self-check sequence. The gearshift was then placed into the drive position and the accelerator pedal depressed to start the car rolling.

A 0-60 mph acceleration time was 8.4 seconds, with some wheel-spinning. The quarter-mile test time was 16.7 seconds. There were two flat out acceleration runs, the standard 30-50 mph run, a 50-70 mph test and 5 runs 50-60 mph. The odometer showed 12 miles but the dashboard charge indicator showed that half the available charge had been consumed during the high-power tests. The car was then trucked back to the office for a 2 1/2-hour, 30 minute recharge. The day was concluded with a 4.9-mile freeway trip from office to home.

The trip proved the car had performance more than adequate to merge and drive with rush hour traffic. The range meter at the end of the commute showed 27 miles remaining with 10% of available charge used. The 120-volt small charger supplied with the car was then used. It takes more time to charge batteries from 80 to 100% than it does to move from 20-40%.

The next day the car was used for the home-office commute. This time the headlights and wipers were used and the range predictor showed 25 miles left. The constant-torque and gearless operation contributed to a good ride. The car was not used the following day because it is only a 2-seater and there were three persons at the house.

The final day of testing was a for range and hill-climbing. The initial range indicator displayed 26 miles, 20 miles short of their destination. This improved when the cruise control was locked on 55 mph. The range predictor increased the remaining mileage to 30 miles after going 11 miles in this driving mode. The regenerative braking used during this trip allowed an energy recovery.

After a 3-3/4 hour, 45-minute recharge during breakfast the battery was 97% recharged and ready for a hill-climbing test that involves a 3-mile trip before the climb. During the climb the "reduced performance" warning light came on and the car slowed to 15 mph, after driving 22.5 miles and going up 5500 feet. Regeneration was used during descent to add 6 miles to expected range.

Their final verdict - "A quiet, smooth-running, no-pollution vehicle with limited range, a charge time that must be considered by the user, and a threat of being stranded. A vehicle that makes sense for only a few people".

The article has **CAR & DRIVER TEST RESULTS** and technical specifications that would be useful to anyone contemplating an electric car.

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## FROM OTHER EV NEWSLETTERS - Concluded

EV NEWS, January issue covered Corbin's SPARROW, exhibited for the first time at the Infrastructure Conference. (See AVEA on Page 3) The vehicle's basic concept that 90% of cars today only have a single occupant is sound, and so is the 3-wheel design that evolved. The devil is in the details. For example, the vehicle does not have a windshield wiper. Also, the small interior could give a claustrophobic reaction. Estimated cost is \$ 12,000. If you want to learn more about the SPARROW, you can contact the writer, Michael Tassano, at 1247 Audrey Avenue in Campbell, CA 95008 or e-mail him at [mike@tasso.org](mailto:mike@tasso.org).

The issue also had an extensive report on the Conference by Bob Wing and Mary Ann Chapman. They describe eight vehicles, auxiliaries such as charging systems, and remarks by the speakers. Particularly interesting were the observations of Dr. Thomas Turrentine from the Uof CA - Davis who noted six emerging markets for EVs: Taxi service in urban areas, high-density urban homes, medium density residential areas, gated communities, neighborhood electric cars, and station or instant-rental cars for low-density areas.

In the February Executive Report is a coverage of the hydrogen-from-gasoline fuel cell concept by Chrysler. The issue also presents info on the EPA proposed new regulations. There is also a brief article about the collaboration between Bajaj Auto Ltd., the Indian producer of "Autorickshaws" and Unique Mobility. The combination intends to develop an electric version that could replace the 1.3-million "tuk-tuk's" produced each year.

VEVA, the Vancouver folks in their February Newsletter describes the Nissan "Prarie Joy", and notes the first successful road test of the Rosen Motors flywheel powertrain. The article includes a description of the system.

There is also an article reporting that Shanghai is considering a plan to replace 80% of the gasoline-powered mopeds with electric bikes to reduce air pollution in that city. There are presently 470,000 mopeds in the city. This will be reduced by the year 2000 to 100,000. Using a new type of nickel-hydrogen battery, electric bikes are expected to have a 25-mile range and last for more than 1000 miles. Electric bikes are expected to sell for about \$ 360 (3000 yuan).

It was also noted that Johnson Controls, the folks who gave us the "Die-Hard" battery, has an agreement with BOLDER Technologies to produce the patented thin-film, high-power rechargeable battery. The 500-cycle life, 2.1-volt, sub C cell is rated 1.2 ampere-hours, a power density of 1kw/kg, an energy density of 84 Wh/liter, an internal resistance of 1.7 milliohms, and a recharge time of 10-15 minutes.

Near the end of the issue is an interesting opinion written by D. White that urges would-be electric car buyers to bypass GM's EV-1 in favor of Honda's EV PLUS. According to his analysis the fit and finish of the Honda is better and lease terms more favorable. The dealer was willing to take his 1963 Escort conversion in on a trade for the EV PLUS.

The following text was a presentation to a graduate student seminar held at the Illinois Institute of Technology. It was given by FVEAA Vice President Bill Shafer. About 35 persons attended. There were many questions about electric car conversions. After the session, several of the students remarked that it was an interesting and informative event.

W. H. Shafer

## **FVEAA PRESENTATION TO IIT SEMINAR**

**February 28, 1997**

I was honored to receive an invitation from Professor Flueck to describe to this seminar the activities of the Fox Valley Electric Auto Association (FVEAA). In my presentation I will show how members of our Association have recycled and converted conventional cars to electric power. I also will report on our operating experience and economics of using limited-range electric cars in urban areas. I hope to also stimulate your interest and discussion of the subject.

The FVEAA was formed in 1975, two years after the first oil crisis. It was chartered as an Illinois Not-For-Profit Corporation the following year. Over 20 of our members own and regularly use EV's. I have driven electric cars in the Chicago urban area since 1976. My first conversion was a Dutch 1967 DAF that I drove for 15 years until 1991 when structural terminal rust sent it to the crusher. In 1990 I replaced it with a converted 1980 Mazda RX-7.

Here are slides of my Mazda conversion that illustrate the procedure. The process is also the subject of Bob Brandt's book, "Build Your Own Electric Car". (Slides)

Typically, the conversion parts and outside machine shop work will cost about seven thousand dollars. My Mazda project had a final cost of \$ 5,623.87. The FVEAA spent \$ 6,674.97 for a recent conversion of a 1990 Nissan Sentra. Our conversion cost is about one-fifth of the projected \$ 30,000+ selling prices for commercially-built electric cars. Two factors contribute to our economy; recycling the base car and the owner providing most of the conversion labor.

The two FAQ's are: How fast will it go, and how far will it go? The FVEAA has accumulated performance data. Our Nissan had a top speed of 75 mph on the taxi strip of Clow Airport. Our electric cars, that use conventional lead-acid batteries, achieve a single-charge range of 20-30 miles in urban traffic. This is adequate for over 80% of driving trips in our metropolitan area. Energy consumption has been metered on the ac supply side and found to be 350-700 watt-hours per travel mile. Our experience has established favorable economics for an electric car, when it is substituted for short trips in a conventional car .

The following tables present an annual cost comparison of conventional cars with my Mazda RX-7 conversion that was completed in 1991. Conventional car data was a published 1996 AAA Survey conducted by Runzheimer Associates. They assumed 10,000 miles of driving. Insurance cost was based on personal use, driven less than 10 miles/day, with no youthful driver. Gasoline cost was \$ 1.20 per gallon. Operating costs include gasoline, oil, maintenance and tires. Fixed costs include insurance, license, registration fees, depreciation, and finance charges.

Car Type	Annual Cost	Annual Operating Costs	Annual Fixed Costs
Escort Subcompact	\$ 4380	\$ 800	\$ 3580
Taurus Midsize	5133	1000	4133
Caprice Full-sized	6720	1080	5189
Caravan Minivan	5250	1020	4230

For comparison purposes the second table lists 1995 cost items for my Mazda RX-7.

Conversion Cost	Annual Cost	Battery Amortization @ 11 cents/mile	Electricity 767 kWh @ 10 cents/kWh	Maintenance Costs	Operating Costs Col 3+4+5	Fixed Costs See Note A
\$ 5624	\$ 1286	\$ 121	\$ 77	\$ 4	\$ 202	\$ 1084

Note A - Fixed costs include depreciation = project cost/ 15 years expected life (\$375), annual finance charge = 8% of project cost (\$450), liability insurance (\$210), license and local vehicle taxes (\$49). Driven 1100 miles.

The above comparison must be adjusted for the difference in driving mileage. Using the AAA assumption that daily driving is limited to 10 miles, the electric could be substituted for 3300 of the 10,000 annual mileage. This is three times the Mazda driving. Multiplying the Mazda annual operating cost of \$ 202 by three yields an adjusted annual operating cost of \$ 606. Fixed cost for an electric is unchanged. The adjusted total annual cost for the Mazda becomes \$ 1690, only 38% of the Escort figure.

The electric car's long life contributes to its economics. An electric motor does not have the accelerated wear that an internal combustion engine experiences during short trip driving. When I retired my DAF, the drive system (motor, controller and other electrical components) was recycled for conversion of a Ford Escort by another FVEAA member. Visits to a dealer to buy a new car are reduced for an electric car owner. This factor may contribute to car manufacturer's skepticism about electric cars.

Two non-economic benefits, not included in the preceding paragraph, are energy independence and the absence of combustion emissions. FVEAA cars last year were essentially 70% nuclear powered, the 1996 percentage of nuclear generation from ComEd.

A word here about infrastructure and solar energy as applied to conversions. We use a standard 15-amp, 120-volt supply that is available everywhere. It requires an overnight charge to replenish the battery after a full discharge. The recharge time is much less if the battery is plugged in for recharge after each short trip. Only a small infrastructure investment is required, principally for opportunity charging at work sites and shopping areas. The battery may be partially recharged during other activities. Solar panels are unable to provide significant energy. Solar radiation is about 1kw per square meter. With a photovoltaic conversion efficiency of 15%, an electric car would have to be parked in the sunlight for two hours to drive it 1 mile.

Electric car use in urbanized metropolitan areas can produce global environmental benefits. It is well documented that auto use is responsible for much of the emissions that adversely affect air quality. Electric cars could replace conventional cars where driving trips are within the EV's range capability. Changing attitudes about use patterns is a marketing challenge.

I believe the emphasis on development of a better battery before undertaking electric car commercial production is futile. The electrochemical series yields only a few pairs of elements that can be used for reversible storage processes. Many of the reactions are unsuitable for automotive applications. Batteries that use expensive metals such as nickel can double range but also raise EV costs to unacceptable levels. The quixotic better battery quest has diverted research efforts and government resources that could be redirected to correcting air quality problems by using electric cars for short range driving trips.

I would now like to open the program to discuss the electric car data presented today.

William H. Shafer  
February 22, 1997

## MEMBERS WITH CONVERSION PROJECTS IN PROGRESS

The editor knows of three members who have conversion projects in progress. New member Rob Bohnivert of Antioch acquired the Audi Fox owned by former Member Andy Wohlert. It had the motor and battery racks in place. Member Fred Kitch in Riverside will be working on the restoration of the Bradley he acquired from former Member John Stockberger. Member George Krajonivch in Oakbrook Terrace has started conversion of a Plymouth Horizon that will replace the MI Towncar he converted in 1982. All of these persons can use some help with their projects from FVEAA members.