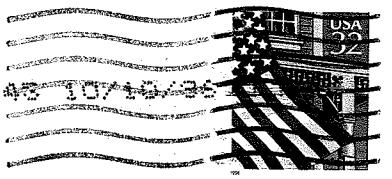
Fox Valley Electric Auto Association
1522 Clinton Place
River Forest, IL 60305-1208



John Emde
6542 Fairmount Avenue
Downers Grove IL 60516-2919

Address Correction Requested

60516-2919 48

NEXT MEETING: ~~Friday,~~ October 18 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. Project Status 2. "What's Next" Selection

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 October will be $ 2.

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

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OCTOBER , 1996 PRESEZ

1. This is a reminder that November is our month to renew our membership in the club. A membership renewal form is conveniently located in this newsletter. You may fill it out and mail your check to our treasurer or save the postage and bring it to the October meeting.

2. November is also will be the meeting that we elect officers in our club. You may give your suggestions for the coming year to me or Bill.

3. Our discussions will include Manager Munroe's Nissan Project status report and Bill Shafer will lead a consideration of **What's Next ?** after completion of our club car project. A list of preliminary proposals is on page 6 of this Newsletter.

Ken

September, 1996 Meeting Minutes

The meeting at the College of DuPage was called to order by President Woods at 7:41. Fifteen members and one guest attended.

After approval of the July meeting minutes Treasurer Corel reported $ 1360.33 in the checking and $ 2322.42 in the savings account. Participation shares in the Nissan Project remain at 47.

A programmable electric car from Radio Shack mounted on a commerative baseboard was presented to FVEAA founder John Stockberger who will be moving to Tennessee soon. Members Jerry Mitchell, George Krajanovich, Vladimir Vana, John Emde, Dale Corel, Ken Meyers, Steve Leisner, and Bill Shafer all related their early experiences with EV conversions and how John assisted them. Dana Mock videotaped the proceedings. There was a discussion about making a copy available for members who were unable to attend the meeting

Dana Mock presented the Nissan Project report in the absence of Manager Munroe. The car has been test-driven on the Clow airport taxiway. Estimated top speed was over 65 mph, acceleration is sufficient to "burn rubber" on the front wheels during a standing start. The excellent performance also was experienced with five persons in the car. Original performance expectations were achieved.

During the tests, a few minor glitches were experienced. There was an interference between the potbox operating lever and the hood in the closed position that prevented the potbox from moving through a full 5k range. This problem was solved by shortening the lever by about one-half inch. The clutch release adjustment was not properly set that caused some clutch slipping. A proper setting remedied this. The temporary charger contained a 100-volt capacitor that failed when the voltage rose to the 120 volt level, ejecting the pack out the bottom against the garage wall adjacent to where it was mounted. This failure proved the circuit breaker would promptly trip, although the reset handle extension was loosened.

There were a couple shocks administered to persons accidentally contacting exposed parts of the 120 volt circuit, and from the residual charge in the controller capacitor after the power circuit had been opened. All exposed live parts of the power circuit under the hood will be covered with rubber tape. There was also discussion of a possible interlock that would trip the breaker when the hood was raised. There was no consensus

There remain some tasks to be addressed at the next working session. The speedometer cable must be replaced before further testing. The horns must be remounted and connected. The "fuel" gage requires tweaking.

Before further testing, licensing and insurance must be in place. The title and insurance will be in President Ken Woods' name as the FVEAA President. Ken will arrange this as soon as possible.

The meeting was adjourned at 10:56.

Submitted by Secretary Dave Aarvold

ABOUT THIS ISSUE

Placement of the Membership Renewal Form may interefere with material you wish to keep. Make a photocopy if this is a problem.

The regular feature **FROM OTHER EV NEWSLETTERS** is omitted from this issue due to lack of space. We can mail five double-sided pages for 32 cents. I will include omitted material in the November issue. Bill

RECENT ARTICLES ABOUT ELECTRIC VEHICLES

Stories about GM's EV-1 appeared in many publications including the October issue of Popular Mechanics, the September 30 issue of U.S. News, The September 22 issue of the Chicago Tribune, the October issue of Car & Driver, and others. All these probably originated from a GM public relations press release. The technical details of this car have been covered in previous issues of the FVEAA Newsletter and are not repeated here. A mildly critical description of the car is in Car & Driver that has such phrases as , "The EV1's plasticky interior is reminiscent of early Saturns....".

The new information is that the car will leased in California and Arizona. The monthly lease payment for the $ 30,000+ car will be $ 500. An additional $ 50 is required to lease the Magne-Charge device that is required. GM says leasing is to protect the consumer from continued ownership of a car that they expect will rapidly become obsolete. The benefit to GM - they will retain ownership and control of the car during the lease period. Car & Driver was unable to perform tests on the car and asked any reader who leases an EV-1 to ," Offer the car to us for a test. Remember, it's only a leased car."

The Tribune had a review of books on the EV-1 entitled "The Car That Could" by author Michael Shnayerson, a $25 offering from Random House, and ,"The Critical Path" by author Brock Yates, also a $25 book from Little Brown . These books provide an account of EV-1 tortuous path through the GM executive suite before development was authorized . The book review is much too lengthy to further condense here. Suggest you try your local library.

The National Renewable Energy Laboratory in Golden, CO may be accessed on the Internet at http://www.nrel.gov for information on their activities in solar, wind, photovoltaics, and desiccant cooling Their Fall, 96 issue contains articles on these subjects that may be of interest to some FVEAA members.

Toyota has developed a car powered by a fuel cell. Chicago Tribune (Date & Page Unknown). The manufacturer has no specific date when the car might hit the market

3M Leads Charge for EV Battery. WARD's Auto World, August, 1996, Page 49. The Company is working on the lithium polymer battery for electric cars. There is a $ 32.9 million grant from the U. S. Battery Consortium to fund the study that includes partners at Argonne Lab and Hydro Quebec in Canada. The battery uses cells made from a flexible, multi-layered film only 100 microns (0.004 in.) thick. Eight layers are as thick as a credit card. They hope to give an EV a 150-300 mile range when research is completed in the millennium year. The battery capacity may reach 200 wh/kg (90 wh/lb.)

Charging Into Rechargables. Business Week, October 7, 1996, Page 142V. This is an article about the research going into batteries for cell phones and laptop computers. Some of this technology may be scaled up for electric car applications. The present leading candidates to replace nicads and alkaline types are the lithium-ion (LiON) and NIMH, both now owned by Gillette Co. Japanese producers include Sony, Sanyo, and Matsushita.

RECENT ARTICLES ABOUT ELECTRIC VEHICLES -Continued

Cutting Edge. Chicago Sun-Times, September 16, 1996, Page 1, Auto Times Section. This is a story about Bob McKee in Lake Zurich. McKee Engineering is one of the country's top vehicle research and developmental operations. He has built 120 race cars and electric cars for his clients, many of whom are celebrities. McKee has produced three-wheel vehicles, mid-engine types, and even one with a variable wheelbase and track for the U. S. Army. He has built and tested 25 electric vehicles. His most notable electric car, the Sundancer built in 1972, could travel 100 miles at 30 mph. His race car work proved valuable when tackling the problems of electric cars; both must be strong and light.

The Flywheel Storage System. Several articles have been published about flywheel storage systems. The FVEAA August newsletter reported on the work of U. S. Flywheel Co (Jack Bitterly). This month there are stories about Rosen Motor Co (Jack and Harold).

The September 14 issue of The Economist, page 70 features the backgrounds of Ben Rosen, who was an early investor in Lotus and Compaq. These ventures produced a considerable fortune. His brother Harold was director of engineering at Hughes where the first commercial satellite was produced. The brothers are together working on a hybrid vehicle using a flywheel storage system. They believe the internal combustion engine is out-of-date and could be replaced with a combination of a gas turbine engine and flywheels.

The September 30, 1996 issue of Fortune has an article on the Rosens entitled ,"Gentlemen, Start Your Engine." The Rosen system uses a Capstone turbine, 38" long and 18" in diameter, connected to a 24 kw generator that delivers enough power for a cruising 3,500 pound car. The flywheel system is optimized for acceleration. The flywheel is built with 12,000 strands of carbon-fiber strips, each strand is one-twentieth the diameter of a human hair. The flywheel is about 15 inches in diameter, weighs 21 pounds, and spins at 55,000 rpm. The assembly includes a 270-pound canister made of steel and kevlar. The article notes that last year, a German laboratory worker was killed while testing a flywheel rotor for BMW. They installed a test flywheel in a Saturn platform. During the test it ran for three hours when an electronic glitch on the control system caused failure in the magnetic bearing supporting the flywheel. This caused the flywheel to spin off its axis where backup mechanical bearings also failed. The debris was kept within its containment.

There are other companies investigating flywheels. Chrysler has scrapped plans for the Patriot race car due to concerns that the wheel could become dislodged and cut a swath through the vehicle. Ford has also abandoned further development of the Synergy 2010 car that was exhibited at last January's Detroit Auto Show. This car used a direct-injection diesel engine and a flywheel. Ford concluded it was not a buildable product. BMW, Mercedes-Benz, and a few Japanese motor car companies are also investigating flywheel use.

RECENT ARTICLES ABOUT ELECTRIC VEHICLES -Concluded

DNF for Patriot. AI, June, 1966, page 83. Chrysler pulled the plug on its Patriot race car because there was no reliable ceramic turbine wheel availability and due to concerns about the safety and durability of the flywheel assembly. The development left an impressive technical legacy. The controller uses IGBT's that let a 5-ounce module carry 600 amps at 1000 volts. A window frame construction uses coolant to handle 80 kw of waste heat the unit produced. A new DC busbar rated at 1000 amps is a seven pound unit, compared with the commercial version that weighs 70 pounds. Detroit Diesel supplied a 40-60 hp direct-injection diesel. Spiral-wound batteries were also used in the test version. Chrysler thinks the program may have reduced future hybrid-electric vehicle development time by as much as 18 months.

Battery of the Future. AI, September, 1996, page 75. This is an article about the lithium-polymer battery mention previously in this Newsletter. It starts by noting that the USABC program for battery development totals $ 165 million. The Periodic Table shows lithium to be the lightest metal with an atomic weight of 6.94. Nickel, used for other battery systems, has a weight of 58.7. Lead weighs 207.1. Lithium has an electrode potential of -3.05 volts compared with -0.25 for Nickel and a -0.13 volt for lead. This makes lithium a front-runner from a physics standpoint.

The ideal operating temperature for the cell under development is 60 C, making it a "warm" battery as contrasted with a lithium ion disulfide battery that operates at 450 C. The lithium-polymer battery is still in the research stage and commercial availability is still years away.

THE WHAT'S NEXT DISCUSSION

Item two on the October meeting discussion list is, "What's Next?" This topic was introduced at the July meeting for preliminary consideration. This is the list of eleven suggested activities together with the number of votes ( ) each received in July from the seventeen members present.

1. (1) Design and build a hybrid.
2. (4) Design and build a lightweight 3-wheel EV.
3. (2) Convert a motorcycle.
4. (5) Build an electric powered bicycle, possibly using Irwin Singh's development.
5. (3) Make a for-TV video about FVEAA member's use of their electric cars.
6. (5) Write a syllabus and EV conversion course for use by a community college.
7. (1) Seek a corporate sponsor and develop an Electrathon competition.
8. (8) Convert another Nissan, possibly using advanced technologies.
9. (1) Convert an 82 Caddy or 84 Jeep using the Barrett drive system principle.
10. (7) Develop a decision tree for conversions, using the Nissan conversion experience.
11. (5) Develop and build an AC motor controller.

FVEAA PRESENTATION TO SIGMA Xi SUSTAINABLE DEVELOPMENT FORUM IV OCTOBER 5, 1996 - HOSTED BY ABBOTT LABORATORIES

I was honored to receive an invitation to describe to this Forum 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. We recycle cars before Dave Keiling gets them I also hope to stimulate a discussion of how conversions may be applicable to the objectives of sustainable development, Chapter 9 of U. N. Agenda 21.

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 1990 when structural terminal rust sent it to the crusher. In 1990 I replaced it after replacing 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 6-7 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 The final cost of these conversions 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 FVEAA has accumulated performance data. 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 range from 500-700 watthours per travel mile.

Our experience has established favorable economics for an electric car, when it is substituted for a conventional car. For example, last year the annual cost for my Mazda was $1,275. Total fixed costs were $ 1088; including $ 375 depreciation based on a 15-year life, a $450 financing cost ($5624 @ 8% interest rate) and $263 for insurance and license. Variable costs include $ 121 for battery amortization, $ 62 for electricity, and $ 4 for maintenance. An AAA study by Runzheimer reported comparable annual cost for a 1995 Ford Escort was $4,380.

The electric car's long life contributes to its economics. An electric motor does not have the severe wear that an internal combustion engine experiences in short trip driving When I retired my DAF the drive system (motor, controller and other electrical components) were 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. Could this factor 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 are 80% nuclear powered, the annual percentage of nuclear generation from ComEd.

Conversions such as ours are probably not applicable to developing countries. Electric infrastructure there is minuscule. Improvements would be economically prohibitive. Future continued improvements in solar cells may have an influence. However, it should be noted that solar radiation is about 1kw per square meter. With a photovoltaic conversion efficiency of 15%, an electric car would have to be parked for two hours in the sunlight to drive it one 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. It seems to me U. N. policy should encourage member nations to promote this substitution. France, with 80% of its electricity now provided by nuclear sources and Japan, with its aggressive nuclear construction, should be good prospects.

I believe the emphasis on development of a better battery before beginning commercial production is futile. The periodic table yields only a few pairs of elements that can be used for reversible electrochemical storage processes. Batteries that use expensive metals such as nickel will slightly improve range but also raise EV costs to unacceptable levels. The quixotic better battery quest has diverted research efforts and government resources that should be devoted to solving the problem of global air quality.

I hope the participants will discuss the data presented today, and that the Forum will consider formulating and presenting recommendations to the U. N. on the contribution to global air quality that the proper uses of electric cars can make.

William H. Shafer, FVEAA Vice President October 5, 1996

Irwin Singh, a fellow member of the FVEAA who was the second part of the FVEAA segment, presented the case for adoption of electric bicycles in developing countries. Using India as an example, he illustrated that these would be lower in cost than mopeds and motorcycles that are becoming the choice for powered transportation. He presented his preliminary design for an electropusher that could be easily coupled to an existing bicycle. The electropusher is a narrow track, 2-wheeled platform on which is mounted a PM motor, battery pack, electrical braking system and power controller that features a microprocessor logic input. The arrangement allows thrust to be applied to the combination's center of gravity. The arrangement should be better than an invasive conversion of a bicycle as well as less-costly.

FOX VALLEY ELECTRIC AUTO ASSOCIATION
(MAZDA RX7 CONVERSION VEHICLE)

Bill Shafer

River Forest, Illinois

Actual Weight and Balance

Model (2 Door Coupe)

SERIAL NUMBER: Report Date: 10-07-96

CERTIFICATE NUMBER:

DATE Of MANUFACTURE: 1980

MAXIMUM WEIGHT: Maximum allowable Gross Weight = (3,400) pounds

Max. Gross Weight (Front) :	1700.00	pounds
Max. Gross Weight (Rear) :	1700.00	pounds

Converted Weight as weighed : No Passengers		With Driver
Left Front Wheel	629.0 Lbs.	698.0 Lbs.
Right Front Wheel	640.0 Lbs.	648.0 Lbs.
Left Rear Wheel	759.0 Lbs.	843.0 Lbs.
Right Rear Wheel	831.0 Lbs.	868.0 Lbs.
Total (T)	2,859.0 Lbs.	3,057.0 Lbs.

GEOMETRY:

WHEEL BASE - AXLE-AXLE FRONT TO REAR	=	95.30 INCHES
WHEEL TREAD -Front Axle LEFT TO RIGHT	=	55.40 INCHES
WHEEL TREAD -Rear Axle LEFT TO RIGHT	=	55.10 INCHES