

FVEAA NEWSLETTER

March 1995

| President | Vice President & Editor | Secretary | Treasurer & Librarian | Director | Director |
|---|---|--|--|---|---|
| Ken Woods 1264 Harvest Court Naperville, IL 60564-8956 | Bill Shafer 308 South East Ave Oak Park, IL 60302-3512 | Dave Aarvold 915 Oak Street DeKalb, IL 60115-3470 | Dale Corel 595 North Gateshead Elk Grove Village, IL 60007-3433 | John Emde 6541 Fairmount Downers Grove IL 60516-2919 | John Stockberger 2 S 643 Nelson Lake Rd Batavia, IL 60510-9762 |

NEXT MEETING - March 17 at 7:30 PM

Will be in Room 1046 in the Student Resource Center at
the College of DuPage, southeast corner of 22nd Street & Lambert Road

DISCUSSION TOPICS - Approve FIAT disposal; Cooperative Construction
Project Decision; Earth Day 1995 observance.

MEMBERSHIP INFORMATION

Any person interested in electric cars is welcome to join the FVEAA. The cost for a full year's dues is \$15. Dues for new members joining in March will be \$ 10. Members will receive our monthly Newsletter which contains useful information about electric car components, construction, policies, and events.

FOX VALLEY ELECTRIC AUTO ASSOCIATION
308 South East Avenue
Oak Park, IL 60302-3512



FIRST CLASS

John Emde
6542 Fairmount Avenue
Downers Grove IL 60516 -2919

ADDRESS CORRECTION REQUESTED

VEEPSEZ

President Woods asked that I write his column this month and conduct the Friday meeting. Ken is studying for the final exam in his CAD course at COD. The exam will be at the same time as the FVEAA March meeting.

The FVEAA has a number of important decisions to make at the meeting:

1. We need to finally resolve the FIAT disposal question.
2. It is decision time for the cooperative construction project.
3. The 25th anniversary of Earth Day will be observed in April. The FVEAA should plan an appropriate observance.

I received a call from Member Al Wilson in Beloit informing me that a local part-time auto dealer advertised a '79 Mazda RX-7 and an '84 323 for sale. Both had blown engines. Both were listed for under \$ 300. He asked if the FVEAA would be interested. I pointed out that Janesville was a long way from John Emde's plant. Al has a towing dolly and noted moving the car would be no problem. I asked him to check condition of the cars.

Unfortunately, both cars had been sold by the time Al got to the dealer. In his second call he reported the dealer said that almost any dealer would be willing to sell a car that had a little or no resale value. Most of these are sent directly to the crusher.

This information may be relevant to our consideration of the coop project.

Bill

MINUTES OF FEBRUARY MEETING

The meeting at COD was called to order by VP Shafer at 7:35 PM. President Woods was attending a CAD class. Fifteen members and two former members attended. New member Matt Anderson from Libertyville attended his first meeting. There are 61 persons on the Treasurer's paid-up list.

The members decided that the final disposal of the FIAT will be made at the March meeting. Three persons have expressed an interest in the car. Member Alcon was given authority to sell the car for any price. President Woods will retain the title until a sale. The towbar, loaned to the FVEAA by Member Mock, is not part of the sale.

Member Bob Barrett reported that a Mercury Marquis with a blown engine was available. The car did not meet requirements already established for a conversion car.

A consideration of the conversion task list was initiated and interrupted by the late arrival of President Woods.

President Woods described a development that could be an alternate to the coop project. Due to its confidential nature, members approved a motion to suppress a description of the subject in the Newsletter, pending further negotiations.

Member Kitch reported acquisition of a Bradley GT EV from Member Stockberger.

Member Barrett made a brief presentation of a paper he will present to the SAE on his unique (Patent Pending) EV drive system.

The meeting was adjourned at 10:45PM

Dave Aarvold

RECENT EV ARTICLES

Pollution risks high at any level. Chicago Tribune 3/10/95, Page 8. A study of more than a half-million Americans was published in the American Journal of Respirator and Critical Care Medicine. It found that tiny particles resulting from combustion in car engines, smokestacks, and other sources that meet clean air standards can kill. Deaths were 17% higher in areas most polluted by these particles compared with the least polluted areas.

Labor Secretary Aims to End Black Lung. Press release from the Department of Labor, Mine Safety and Health Administration on January 31, 1995. Additional regulation is needed to control dust levels in coal mines. Present dust levels set in 1969 are inadequate. The law also provides disability benefits for 75,000 miners that have contracted black lung disease. The current cost for this program exceeds \$ 1.3 billion. Last year the industry employed 140,000 miners, 50,000 in underground mines where dust is a problem. The total value of coal mined last year was nearly \$ 19 billion. Coal provides over half of U.S. electric power.

Supports electric cars. Register Star, date and page unknown. An EV powered from an electric generating station can reduce carbon dioxide by 50%, nitrous oxides by 70% and volatile organic compounds by 96%.

Editor's Note - It appears to me these three articles make an argument for electric power from uranium, hydro, solar, and wind sources. These can be used for zero emission EVs.

Ford drafting EV guidelines. Chicago Tribune Transportation Notes, date and page unknown. Ford is working with U S Electricar to draft guidelines for firms to use motorless "gliders" from assembly plants to be used for electric drive conversion. These EVs could be on the road as early as next year.

Phord philanthropy. Chicago Tribune, 1/29/95, page unknown. Asked why Ford doesn't subsidize EV sales in California, The company Chairman, Alex Trotman, replied: "Because we aren't a charitable institution, and we don't give away huge sums of money."

Electric Cars Charge Into Slow Lane. Christian Science Monitor, 12/14/94, page 9. The cars lined up outside Disneyland for the Electric Vehicle Symposium may be taking over the highways. A few years ago EVs were seen as a goofy idea embraced by crackpots and tree-huggers. There are an estimated 2000 EVs running today. GM remains unconvinced there is an adequate market for an EV based on its IMPACT concept car. New ventures, such as Solectria in Wilmington MA and foreign auto companies, may present a significant challenge to that position. Ready or not, EVs are on their way.

Mass-producible EV Unveiled. Electric Light & Power, February 95. The Sunrise, designed by Solectria will use an ac induction drive motor that operates at a higher efficiency than dc motors currently used. The company is a part of an effort coordinated by the Northeast Alternative Vehicle Consortium and is funded by the Advanced Research Projects Agency and Boston Edison. The car is expected to sell in 1997 for about \$20,000 with orders for 20,000 units.

RECENT EV ARTICLES - Continued

Dodge's Intrepid may be modified for methanol fuel to meet Clean Air Act mandates. Mopar First X-pressions, Jan-Feb 95, page 17. A standard Intrepid has been modified to use a fuel mixture of 85% methanol and 15% unleaded gasoline. The car, meant for fleet applications, meets California Transition Low-Emission Vehicle requirements. The system uses a "Smart Sensor" that directs the engine computer to adjust spark advance, fuel injection, and other inputs for the type of fuel being used. The car requires a special engine oil.

Wind Energy: the Next Generation. National Renewable Energy Laboratory (NREL) Winter 94-5 Edition, page 18. NREL and DOE are negotiating with nine U S companies to lower the cost of wind power. Two million of the funds will help companies to complete their concept definition studies. About \$30-million in federal funds will be available for the second project stage to achieve a four-cent/ kwh energy cost goal for wind-generated electricity. Total project cost, including matching funds, is \$ 60 million.

Advanced Batteries for Electric Vehicles. American Chemical Society CHEMTECH, 24, 1994 page 32 This five page paper written by three Argonne Lab researchers provides an analysis of battery chemistry and parameters for EV battery development. The following table provides a performance summary of EV battery systems evaluated by Argonne between January 1991 and December 1992.

| Battery description | | | Initial module | | Specific energy, ^a Wh/kg | Energy density, ^a Wh/L | Peak power, ^a W/kg | Efficiency ^a | | Life ^a cycles | Van range, ^a mi (km) |
|----------------------|--------------|-------------------|----------------|---------------------------|-------------------------------------|-----------------------------------|-------------------------------|-------------------------|----------|--------------------------|---------------------------------|
| Technology | Manufacturer | Model | Weight, kg | Capacity, ^a Ah | | | | Coulombic % | Energy % | | |
| Sodium/sulfur | ABB | B-11 ^a | 253 | 238 | 81 | 83 | 152 | 100 | 91 | 592 | 154 (246) |
| | CSPL | BP-MK3 | 29.2 | 292 | 79 ^a | 123 ^a | 90 ^a | 100 | 88 | 795 | 150 (240) |
| Zinc/bromine | SEA | ZBB 5/48 | 81 | 126 | 79 | 56 | 40 | 93 | 75 | 334 | 93 (149) |
| Nickel/metal hydride | Ovonics | H-cell | 0.628 | 28.0 | 55 | 152 | 175 | 90 | 80 | 505 ^a | 97 (155) |
| Nickel/cadmium | SAFT | STM5-200 | 24.5 | 214 | 55 | 104 | 175 | 90 | 78 | 1018 ^a | 102 (163) |
| Nickel/iron | Eagle-Picher | NIF200 | 25 | 203 | 51 | 118 | 99 | 74 | 58 | 918 | 87 (139) |
| Lead-acid | Sonnenschein | 6V160 | 31.5 | 184 | 36 | 92 | 91 | 94 | 84 | 370 ^a | 51 (82) |
| | CEVS | 3ET205 | 32.8 | 185 | 33 | 78 | 68 | 87 | 68 | 149 | 47 (75) |

Environmental Vehicles '95: Hybrid-Electrics are coming. WARD's Auto World, March 1995, page 131. A Conference on future "supercars" held in Dearborn, MI noted that the Big Three automakers plan to have supercar prototypes ready for testing by 1997-98. The Japanese were not represented at the conference. Hybrid-electric (HEV) cars will require electric drive efficiency improvements and optimizing heat engine thermal efficiency. Direct-injected piston engines, including diesels, offer attractive possibilities. Two-stroke diesel efficiency is more than 50% in constant speed-load operation but will probably have trouble with emission limits. Gas turbines with a 30% efficiency is another possibility. There is considerable skepticism that a pure electric Taurus/Lumina-sized car with seating for 5, 0-60 mph in 11 seconds, and with acceptable range is possible. Auto manufacturers have studied many HEV combinations. The consensus believes a future HEV or supercar will have some sort of diesel engine.

RECENT EV ARTICLES - Continued

Drive Systems With Permanent Magnet Synchronous Motors. Automotive Engineering, February 1995, pages 75-81. This article provides a comprehensive description of permanent magnet electric motors for EV use. Improvements in the energy density of permanent magnet material have made these motors attractive for EV applications. An NdFeB magnet has the highest energy density and is the most cost-effective. Its temperature sensitivity is a major drawback. Field weakening can be used with PM motors and the article includes a description of the applicable theory. These motors are intended for electrical systems with an approximate 200 volt level. A table is included that shows a Unique Mobility prototype 32 kw PM motor developed with support from BMW, the German automaker. It weighs 38-57kg and has an efficiency of 85-91%. An American Brown Boveri (ABB) manufacturing study shows PM motors can be produced for a price premium of 15% compared with other asynchronous motors.

GM's PrEView Impact Electric Vehicle. Automotive Engineering (SAE) February, 1995, pages 85-89. This article features a comprehensive review of the components making up GM's IMPACT, now being evaluated by test drivers in California and eight other cities. Some highlights: the chassis has a 0.19 drag coefficient and aluminum frame weight of 134 kg. The car has molded fenders and wheel skirts. The wiring harness is designed for 400 volts. The ac induction motor is liquid-cooled and rated for 102 kw. The propulsion inverter converts 316 volts dc from the battery to ac. The 500-kg battery pack includes an inductive charging system. Power steering uses an electrohydraulic system. The braking system uses a microprocessor that supervises six primary braking functions for all four wheels. Heating and air conditioning is provided by a reversible heat pump that requires 1-1.5 Kw compared with 4-5 for a conventional system. The car has a 70-mile range in city driving and 90 miles for the EPA highway cycle. It has 0-60 mph acceleration in 8.5 seconds and a top speed of 80 mph.

FROM OTHER EV NEWSLETTERS

EEVC (The Philadelphia Group) in their February newsletter presented plans for Mike Wyka to drive the 1912 Baker Electric at the Boyertown (PA) museum across the country. The car has a 48-volt system with a motor rated at 26 amps. The motor will be replaced for the trip with an Advanced DC unit and the system voltage raised to 72 volts. An Ovonic battery will be used. The trip is scheduled to begin in California at the end of May, heading for Atlantic City.

EVAOSC (The Southern California Association) in their February issue has articles on experiences with a G-Van, the ECOSTAR, and "EPTO" (Conventional car with an electric power Train Option). They also list 29 locations in their area that offer opportunity charging. Their president, Chris Martin, proposed formation of a BATT team, a group of members who would use club-owned equipment to assist members in changing batteries.

The Maine Sun (Maine Solar Energy Assn) in their winter 95 issue plans to organize EV events during the Tour de Sol time, May 20-27.

FROM OTHER EV NEWSLETTERS - Continued

SEVA (The Sacramento Group) in their February issue commented on the rainstorms that disrupted the area. Fuel cells were the subject of their meeting and the issue has a simplified description of their operation. The City has 15 spaces in garages for EV recharging. The issue has two pages of photos taken by member Ruth McDougall of EVs at EVS-12. The March issue has an article suggesting that member write the California Public Utility Commission about objections by ARCO, Chevron, and others to utility spending of funds for the development and promotion of EVs.

GLEAN (The Great Lakes Association) had 47 pages in their Jan-Feb issue. Almost every aspect of electric car activity was covered. Space available here prohibits a summary on all topics. Any FVEAA member wishing to read the issue can check it out from Dale Corel, our Treasurer-Librarian.

VEVA (The Vancouver Association) in their February issue notes that MOLI has renewed production of lithium-ion batteries. Monthly production, now 30K cells, is expected to increase to 300K by fall. These cells are used for portable equipment use because they have 1.5 times the energy capacity by weight and 1.2 time by volume of nicads. They also note that the Horizon battery, a sealed gel type lead-acid battery that has good life and a 42kw/kg power ability, is available @ \$400/kw. They reported on their sponsorship of ELECTRATHON CANADA competition. This involves the distance a single seat, electric powered vehicle fitted with 64 lbs of lead acid batteries can travel in a 1-hour time limit. Member Glenn Huston offers the AC-100 and AC-150 electric vehicle drive systems. The 100 model was used for the IMPACT.

NESEA (The Northeastern Sustainable Energy Association) in the February issue briefly reported on the 1995 Tour de Sol. A schedule of events for the May 20-27 race was included. Copies of the 300-page book that includes papers presented at the 1994 event is available from NESEA for \$40.

World Electric Transportation in Yachats, OR published the 1995 update of Clarence Eller's annual directory of associations, components, manufacturers, and other EV ventures. This is the 13th version of this useful guide.

The 1995 Michigan High School Electrathon Group, headed by Paul Zellar, in the 12th edition provides information on the 1995 competition.

Events

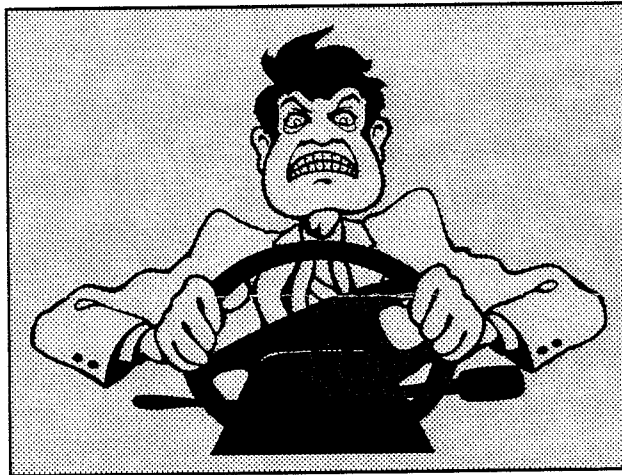
Sun Day Challenge, April 1-2
Earth Day Anniversary, April 22
American Tour de Sol, May 20-29
Milwaukee Alternative Fuel Conf. June 28-30

Cleveland "Lightning " Race, July 21-23
Electricore "Lightning "Race, August 17
S/EV95 Symposium, October

CONTRIBUTIONS RECEIVED FOR THE COOP PROJECT

Treasurer Corel reports \$ 1800 has been contributed for the Cooperative Construction Project proposed by Member Bob Munroe. The meeting on Friday, March 17th is decision time for endeavor. Anyone who wishes to support the effort should bring his check to the meeting or call Treasurer Corel (708) 228-5952 with a pledge to participate. Remember next Friday is St Patrick's day and the color for the event is **GREEN**.

There was an important development discussed at the last meeting that may affect the project decision. Because of the confidential nature of negotiations in progress no report is included in this newsletter. A meeting is scheduled between FVEAA representatives and a company interested in our skills. The subject will probably be covered at the March meeting. In the meantime, the FVEAA needs the participation of members to support the Coop project.



LOST - AIRCRAFT-STYLE CONTACTORS

Former FVEAA President Dana Mock about 5 years ago gave another club member several contactors to be fitted with new contacts and returned to the club. Dana subsequently temporarily suspended his EV activities for other pursuits. Now that he has returned and is in process of getting his 007 OMNI back running, he can use the contactors. If anyone knows the whereabouts of these, please Call Dana at (708) 759-8033.

THE BARRETT DRIVE SYSTEM

Member Bob Barrett has filed for a patent on a different drive system for electric vehicles. He briefly explained the concept to members at the February meeting. While there was no consensus about the development at the meeting, the following summary is provided for the information of members who did not attend.

This concept is based on the simplest of control systems, an on-off switch. A motor is energized at full battery voltage for a time; the switch is then turned off and the vehicle coasts down using the vehicle inertial energy. The weight of the vehicle determines how long before the switch is again closed and the vehicle accelerates. The process is repeated.

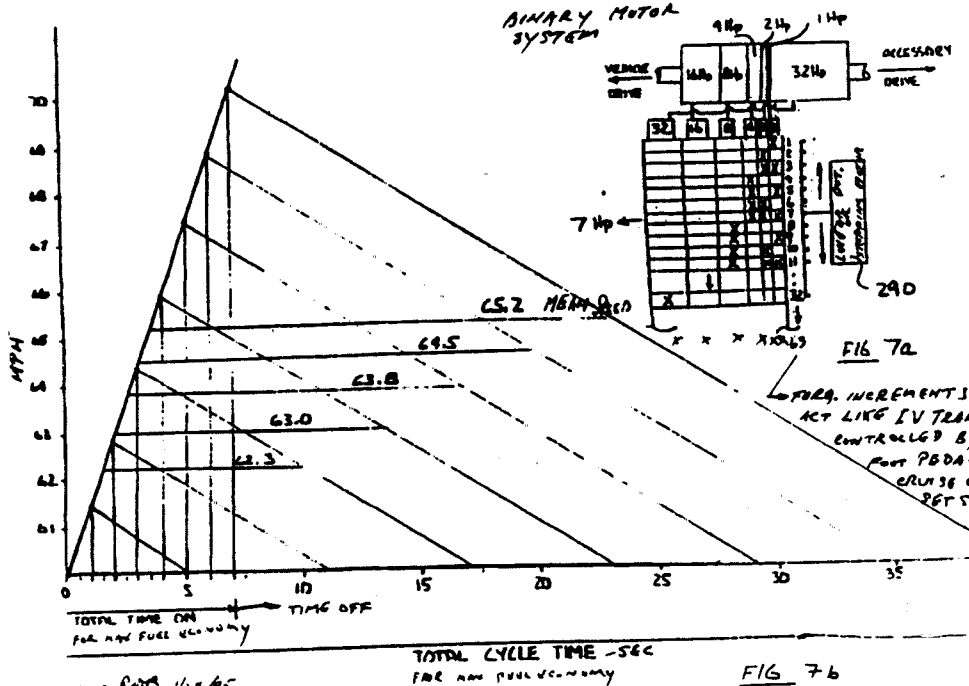
His system expands on this concept by offering a choice of motors with varying ratings connected to the drive system. His accompanying sketch shows 6 motors connected to drivetrain. Motor size is 1,2,4,8,16, and 32 horsepower. Other ratings can be obtained by combining these motors to provide a choice of 30 torque levels with 2 hp increments.

The control system is microprocessor controlled to energize a particular combination of motors to provide the torque required determined by accelerator pedal position. For example, seven horsepower would be obtained by energizing the 4, 2, and 1 HP motors for an assumed 1 second period. The controller would then switch off these motors for a 5-second coast down period that relies on the inertial energy of the vehicle. The cycle is then resumed causing the vehicle speed to oscillate between upper and lower set limits. Relative on-off periods are determined by vehicle weight and speed.

The motor works at peak efficiency with this system. Torque is not controlled by the usual chopper action but instead by a slow-speed switching action. Motor hysteresis losses that accompany the usual dc chopper system are avoided. The driver can choose between energy economy and high performance inputs to the microprocessor. The on period is minimized for maximum energy economy.

The typical power profile is expected to be on-17% @ 200-400 amps, 120 volts, off-78%, and the remaining 5% for regenerative braking. The switching profile for a 65 mph speed is shown by the accompanying diagram.

Anyone desiring additional information should call Bob Barrett at (708) 865-7027 or -0249. His address is 10261 Canterbury Street, Westchester, IL 60154-3640.



O.K. BOTS 1/2/95
ADDITIONAL 19, 18, 28, 24