FVEAA NEWSLETTER
October 1995

President	Vice President & Editor	Secretary	Treasurer & Librarian	Director	Director
Ken Woods 1264 Harvest Court Naperville, IL 60564-8956 (708) 420-1118	**Bill Shafer** 308 South East Ave Oak Park, IL 60302-3512 (708) 383-0186	**Dave Aarvold** 915 Oak Street DeKalb, IL 60115-3470	**Dale Corel** 595 North Gateshead Elk Grove Village, IL 60007-3433 (708) 228-5952	**John Emde** 6542 Fairmount Downers Grove IL 60516-2919	**John Stockberger** 2 S 643 Nelson Lake Rd Batavia, IL 60510-9762

NEXT MEETING - October 20 at 7:30 PM

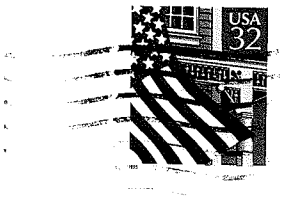
Will be **changed to Room - 157**, Building K at the College of DuPage, southwest corner of 22nd Street & Lambert Road

DISCUSSION TOPICS- 1) Candidates for 1996 officers. 3) Nissan conversion status and schedule. 3) Video of electric car race..

MEMBERSHIP INFORMATION

Any person interested in electric cars is welcome to join the FVEAA. The cost for a full year's dues is $15 which will entitle the member to receive our monthly Newsletter which contains useful information about electric car components, construction, policies, and events. Dues for new members joining in October will be $ 1.25

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



First Class

John Emde
6542 Fairmount Avenue
Downers Grove IL 60516 -2919

ADDRESS CORRECTION REQUESTED

PRESEZ

Our COOP project is moving ahead. The engine has been removed. A tow bar has been obtained and the car moved to the next station for measuring for batteries and weight distribution. The committee will report on progress at our October meeting.

A slate of candidates will be presented by the past presidents' nominating committee for consideration for election at our meeting.

The 1995 EV race won by Ohio State University that was broadcast Sunday on cable TV will be presented.

Notice the change in location for our next four meetings at the College of DuPage. The K building is located West of Lambert Road and immediately South of 22nd Street.

Ken Woods

VEEPSEZ

This newsletter contains an application for renewal of your FVEAA 1996 membership. It appears one month early. I am downsizing my house size to a ranch home (with basement) and moving to River Forest at the end of this month. I probably will be busy unpacking boxes and making changes associated with this relocation. I do not expect to be publishing and mailing the November Newsletter. My FVEAA activity for the next six weeks will be limited to furnishing Ken Woods the mailing labels. My new address will appear on the December letter.

Bill Shafer

MINUTES OF SEPT. MEETING

The meeting was called to order by President Woods at 7:40 p.m.. 15 members attended. Treasurer Corel report of $ 4261.04 in the checking account ($ 3500 for the COOP) and $ 2186.70 in savings was approved.

The motion to set 1996 dues at $ 20 was discussed and approved. VP Shafer was authorized to develop a monthly charge for new members based on this total.

Members rejected Member Clark's suggestions for less content, fewer exchange copies, and change of format to reduce the $ 64/month average cost for the newsletter.

The COOP Committee presented their report. Ray Oviyach obtained a Shop Manual. Meyer, Mock, & Corel weighed the vehicle. Mock showed a video of the process. Results appear in the article entitled "Steps" in this issue. Purchase of the car for ~~$ 550~~ $525 and 16 gel cell 12-volt batteries for an additional $ 100 was approved. The car will be moved to George Krajnovich's place for engine removal. Dave Aarvold was authorized to advertise the engine for $ 200 in the Tradin' Times. Removal by Oct. 3.

John Emde described the conversion of his Suburau. His informative presentation was supplemented by slides taken of each step. The entire process required one year, mostly for body work.

Purchase of a 9" Advanced DC, double-ended shaft motor was approved. Purchase timing and source was left to Manager Munroe & the design committee.

Meeting adjourned at 11:10 p.m.

Submitted by Secretary Dave Aarvold.

RECENT EV ARTICLES

Expo Turns Up Juice On Electric Cars - By Dave Mayfield. Chicago Sunday Tribune Sept. 24, 1995 - Transportation Section. (From America Online - Chicago Tribune) Virginia Power was a principal sponsor of an EV Expo in Richmond. Nearly 500 auto-industry executives, engineers, and designers attended. The keynote speaker was Robert Stempel, former GM CEO and EV champion who is now associated with the GM and Ovonic's battery division. He predicts tens of thousands of EVs will roll out starting in late 1997. Mandates are playing the role in forcing this development, something not viewed as an unmixed blessing. GM has invested a half-billion in EV development. The public may not be ready to accept vehicles that frankly, may not be up to snuff.

Sunrise Sets Record - Date & publication unknown. The Sunrise, developed by Solectria Corp. of Wilmington MA, traveled 238 miles of the total 310 mile distance of the sixth annual Tour-de-Sol on a single battery charge. The car employed a nickel-metal-hydride battery from Ovonics. Solectria plans to begin production of 20,000 of these cars beginning in 1998, the year that zero-emission mandates become serious.

More Jobs, Less Fluff (Hypercars save more than just fuel) - Rocky Mountain Institute (RMI) Newsletter, Summer 95, Page 3. A car that gets 150-300 equivalent miles per gallon may save jobs and fuel. This is the conclusion of a study about Hypercars in the book-length report entitled, "Hypercars: Materials and Policy Implications." Autos presently consume 70% of lead, 34% of iron, 20% of aluminum, 14% of steel, and 10% of the annual total use of these materials. Hypercars would change all of this because they would use polymer plastics and may employ fuel cells. Anyone interested in a 15-page executive summary of the proprietary report for $ 8 should contact the RMI and ask for Report T95-17.

Residents Take Role In Solar Car Race - Suburban LIFE 9/6/95, Section 3, Page 2. Jerry Zdnek of Riverside and Ivan Svetska of North Riverside, students at Rose-Hulman Institute of Technology in Terre Haute IN, helped design and build the Institute's entry in the 1995 Sunrayce competition. The car finished 14th in a field of 38.

The Race To The Electric Car - Power Transmission Design, May 1995, page 19-23. This article features the Formula Lightning race cars. These are all Indy-style races that are 163" long, 77" wide, and weigh 975 lbs. excluding drivetrain and batteries. The Bowling Green entry modified a basic C-TAC 3-phase ac motor made by Lincoln Electric in Cleveland. By operating the motor at 10,000 rpm the 3.7 kW device had an output of 60kw after rewinding the stator. The motor was cooled by an oil mist spray on the motor and bearings. Oil was cooled in a front mounted radiator. The students adapted a 350-amp peak EMS Model 2055 high speed inverter Optima batteries were selected because of their superior power-weight ration and ability to be mounted in any position. The powertrain drive selected was a Supercharger Systems cog-belt unit. Tested energy consumption on a 16.7-mile track run was 0.324 kWh/mile. Additional information about the Bowling Green effort can be obtained by contacting Barry D. Pierson, assistant to the Dean at (419) 372-7580 or write to him at College of Technology, Bowling Green State University, Bowling Green, Ohio 43403-0300.

RECENT EV ARTICLES - Continued

Electric School Buses On The Way - Government Technology, October 95, Page 8. Blue Bird Corp. the leading manufacturer of those familiar yellow school buses that have transported generations of school children, have signed an agreement with Westinghouse to build electric school and transit buses. Westinghouse will build the drive trains and Blue Bird the buses. They will use 112 advanced lead-acid batteries and a 60-80 mile range. A prototype bus tested in California last year cost 10 cents per mile to operate, four cents less than a diesel bus.

Energetic Electric Hybrid - Popular Science November 95 issue, What's new - Page 11. Mitsubishi's hybrid vehicle is in a station wagon body, has a 95-mph top speed.

The Electric Car - How It Works - FYI Section of the November 95 Popular Science on Page 81. Simplified (and understandable) diagrams of an electric car are presented that illustrate the essential elements of an electric car.

NiMH Patent Applied For - NY Times 7/3/95, Patent Section, Page 38. Energetics, a Ringwood NJ company has received Patents # 5419981 & 82 for a system that provides out-of-unit storage of hydrogen as a solid material. It is expected to find application in electric car batteries that would be used only during acceleration.

Air Expert Panel Appointed - California Air Resources Board (CARB), Sacramento. America Online Business Wire 8/29/1995. A panel of four experts has been convened by CARB to conduct a scientific evaluation of battery technology needed to produce a commercial viable zero emission vehicle for California motorists. The panel will meet with vehicle manufacturers and battery suppliers to determine the performance characteristics of specific battery technologies.

EVents

November 12-14, Solar/EV Symposium at the Rhode Island Convention Center in Providence. Sponsored by NESEA. This is the seventh annual renewal of an event that features electric car development discussions, workshops, and exhibits. Individual registration is $ 395. For information write to NESEA, 50 Miles Street, Greenfield MA 01301, Phone (417) 774-6051.

December 12-14. North American EV & Infrastructure Conference in Atlanta, GA. Organized by the E V Assn. of the Americas. Exhibits & discussions. For info call Pam Turner at (415) 855-2010 or write to SHO Inc. 444 Castro ST. # 1015, Mountain View CA 90401.

January 22-23, 1996 EnV'96 in Dearborn, MI. For information contact Rich Moziro, ESD - The Engineering Society, 2350 Green Road, # 190, Ann Arbor, MI 48105, FAX (313) 663-7835

October, 1996, EVS-13, (the 13th biennial Electric Vehicle Symposium) in Osaka, Japan.

FROM OTHER EV NEWSLETTERS

EV Circuit (The Ottawa EV Group) in their July/Aug. issue features an editorial on "Just How Serious Is The Pollution From A Gasoline Engine?" The article notes that an average car today at 23.38 mpg and driven 12,500 miles annually and uses 534 gallons of gasoline. Each car produces 4.67 tons of carbon dioxide, 412 lbs. of carbon monoxide. 56 pounds of nitrous oxides, and 57 lbs. of volatile organic compounds. For every gallon of gasoline weighing 6.13 pounds, 20.41 lbs. of pollutant is produced. They also note 75% of the energy contained in each gallon of gasoline is wasted as pollution and rejected heat.

The EV Show at Centennial College on July 30 was sparsely attended and featured 8 EVs. There were 16 EVs at a second show on July 1, but still a small crowd.

Rick Lane, an EV specialist in Ottawa, had an article that describes the conversion of his 1987 VW Jetta that was dying. The conversion was made with an 8" Advanced DC motor, Curtis 1221B controller, and 16 Trojan T-145 batteries. He installed a 3kw forced air heater so the car can be used year-round. The conversion cost was $9000 and required 200 hours of labor. It is very good at commuting and for short trips.

EEVC Newsletter (The Eastern EV Group) in their Sept. Newsletter reported on EV's at the 1995 DURYEA DAYS Event. Eleven EVs were exhibited.

A Booz-Allen & Hamilton study for the NY State legislature was summarized. The report addressed EV prospects in NY. The conclusions:

- Range & cost will continue to be major impediments.
- Cold weather has an adverse effect but can be corrected by careful thermal management of components and cabin.
- Infrastructure is inadequate.

The report lists the types of vehicles that various manufacturers plan to produce to meet the ZEV mandate.

The issue also contains a discussion of "How Many Fuses?" It suggests following the recommendations published in the IEEE Transactions on Industry Applications vol. 27, # 4, Jul/Aug 1991 pp 658-667.

SEVA Update (From Sacramento EV Club) in their Sept. issue describes EV parking/charging facilities for 25 vehicles available at Hewlett Packard in sites scattered around the Bay Area. There are three general types:

Level A provides 15A, 120-volts.
Level B is 40A, 240-volts.
Level C that provides 150A, 400 volts never caught on.

Ken Koch, a long-time electric car hobbyist, owner of KTA Services in California, and member of the EVAOSC wrote the following article that appeared in the August Isssue of that Association's Newsletter that was exchanged with the FVEAA. The last two paragraphs have been omitted for space reasons.

TechniCorner: Here comes the Battery Blaster

By Ken Koch, KTA Services Inc.

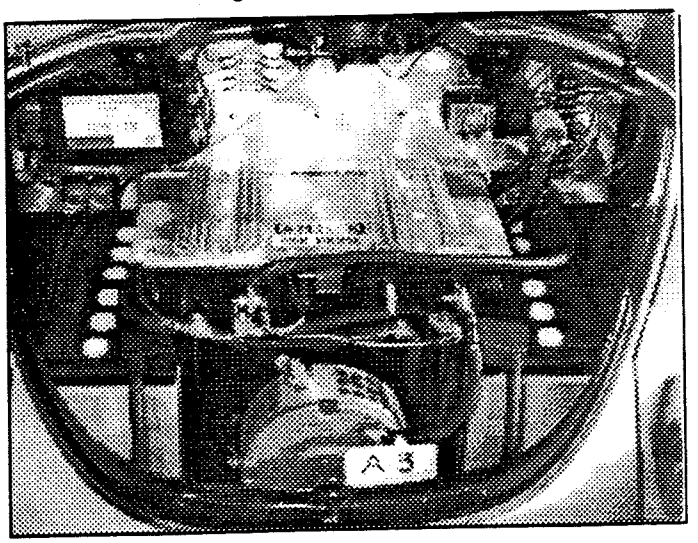
It's good to be back at the typewriter once again after taking a couple of months off between TechniCorner article. Having suffered a "digital subtraction lesson" at the hands of a folding chair, typing has been on the slow side. Full healing may take months, but good progress is being made. Thanks for all the get-well wishes and all the "9 and 2/3" teasing.

In the last TechniCorner article, we discussed upgrading an EV to 144 volts for more performance using the new Curtis-PMC Model 1231C-8801 motor controller. In that article, we concluded that the growing trend with EVs was toward better "performance" — which generally meant improved acceleration. Acceleration, of course, is affected by the weight of the vehicle and the torque developed by the motor. It can be improved by lightening a vehicle and/or developing more motor torque by employing a higher-current controller or controllers. Along those same lines, we'd like to discuss a unique new way to link up 2 motor controllers to 1 motor for improved acceleration.

Early efforts

EV hobbyists first got wind of Curtis-PMC's intent to manufacture a higher-performance controller around mid-1993. For the following 18 months, while Curtis's 1231C development work ensued, some hobbyists tired of waiting for the promised new controller. During this 18-month period, 6 or 7 individuals or companies began developing high-powered experimental controllers to satisfy the perceived demand. A few hobbyists even experimented by trying to hook up 2 Curtis 1221B units in parallel, attempting to deliver 800 amps to a motor from a pair of 400-amp controllers. Most of these experiments didn't pan out, as master-slave synchronized switching must take place for parallel Curtis units to multiply current.

Synchronizing the electronics requires opening up and modifying the controllers — a complicated process that voids the factory warranty and puts the controllers at risk. Well, then, what's the best way to get more torque to the road? Two medium-sized motors driven by 2 medium-sized controllers? One big motor with 1 powerful and very expensive experimental controller?



Two controllers, a heat sink, and a high-voltage wire.

Capt. Glenn Roach and others affiliated with Replica Roadsters took a close look at the challenge and came up with a novel approach: using 2 traditional unmodified Curtis-P{MC controllers and one slightly modified Advanced DC motor.

Enter the Battery Blaster

Capt. Glenn has built several electric vehicles, all of them with a masterful touch of quality and attention to detail. His motto is "No electric slugs — kick-butt performance only!" His latest performance creation has been dubbed the Battery Blaster (TM). To some degree, the technical details are proprietary, so this article will present only as much detail as we can without divulging all of the technology.

In a typical 4-pole, series-wound motor such as those manufactured by Advanced DC, there are 4 field windings spaced 90 degrees apart. With the larger motors, windings opposite each other are placed in series, and then the 2 series combinations are wired in parallel. The overall motor field represents 4 sets of magnetic "poles," oriented alternately as north-south-north-south. Armature windings receive their power via the brushes and commutator. The armature winding groups are excited 2 at a time. Armature windings switch pole polarity between north and south as the armature rotates through the field. Continual magnetic repulsion of like poles keeps the armature in motion, thus producing the motor's torque.

Capt. Glenn has devised a new way to modify an Advanced DC series-wound motor so the armature winding groups are split off into separate connections, each excited by a separate (but equally matched) motor controller. The technique doubles field current and armature current through the motor, and thus increases torque by as much as 2 times. Aside from producing increased torque, other advantages are greater acceleration, longer controller life at half the amps per controller, and greater capacity for heavier vehicles.

The actual implementation requires opening up the motor, changing the internal wiring, drilling through the case to add a third armature terminal, and then silver soldering a high-current wire to the added terminal. The photo shows one of Captain Glenn's Battery Blaster installations in his own Volkswagen Super Beetle. Note the 2 Curtis 1221 controllers mounted to a heat sink and the terminal identified as A-3 on the commutator end of his 8-inch Advanced DC motor. This is the terminal which is added to the motor and connects to the second controller

STEPS REQUIRED TO CONVERT A GASOLINE CAR TO ELECTRIC DRIVE

The following list of tasks involved with converting a car to electric power was approved by FVEAA members at the 1/17/95 meeting and published in the February Newsletter. Those wishing to help with a task on the Nissan Sentra conversion or observe work on a specific task should to call Project Manager Bob Munroe (708) 858-7066 to be included and notified.

Task Description	1	$	Time
Selection of car for conversion	Comp	---	
Car procurement	Comp	525 ~~550~~	
Preliminary design		---	
Measurements of the as-is car, weight on right front left front right rear left rear total front " rear TOTAL ride height	661 689 421 414 1350 835 **2185**	--- ---	
Remove all engine-related components, radiator engine (Identify & mark existing wiring) exhaust gasoline tank & lines other	 Comp " " " "		
Sell unused engine components *	Adv.		
Clean engine compartment & paint.			
Install tow bar attachment			
Repair body rust			
Paint, if necessary			
Select major electrical components, motor controller battery charger	9"DC Gel	 100	
Modify suspension components			
Fabricate motor adapter plate, keep clutch			
Balance motor-transmission assembly			
Adapt engine mounts for new motor			

FVEAA 1996 MEMBERSHIP APPLICATION

PLEASE PRINT

NAME_____ **DATE** _____

ADDRESS_____ **PHONE** ( ) ____ - _____

FAX ( ) _____ - _____ **E-MAIL** _____

CITY _____ **STATE**_____ **ZIP** _____ **SUBZIP**_____

What is your principal interest in electric cars?

____ General
____ I would like to convert a car.
____ I own an EV Make? _____ Yr ___ Year acquired ____
____ EV public policy and environmental applications.
____ Other (Please describe below)

LIST BELOW YOUR COMMENTS, QUESTIONS, OR SUGGESTED EV TOPICS FOR DISCUSSION

_____

_____

_____

_____

_____

_____

FVEAA annual membership is $ 20. The fiscal year begins November 1. Dues for new members joining after that date is adjusted according to the following schedule:

Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
$ 20.00	19.00	18.00	17.00	16.00	14.00	12.00	10.00	8.00	6.00	4.00	2.00

Make your check payable to the FVEAA and mail to :

DALE COREL , FVEAA Treasurer
595 Gateshead North
Elk Grove, IL 60007-3433