CAROL STREAM IL P&DC 601 18:47 07/16/96

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

NEXT MEETING: Friday, July 19 at 7:30PM will be back 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. Heritage Day Report 3. What's Next?

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 July will be $ 8.

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

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JULY, 1996 PRESEZ

Long time member Jerry Mitchell was honored by an open house at the studio of WYLL (106.7) on July 12 to celebrate his 50th year in Chicago Broadcasting. Jerry drives his electric car from his home in Glenview to the studio in Des Plaines. In addition he has installed three photovoltaic panels on the car roof for battery charging on sunny days. Jerry has owned electric cars for almost half of his broadcasting career.

At the next meeting will have our usual report on project status, the Downers Grove Heritage Fest participation, and Bill Shafer will lead a discussion on projects the Club could consider after completion of the Nissan.

KEN

MINUTES OF JUNE 20TH MEETING

The meeting was called to order by President Woods at 8:42. Twenty one members and two guests attended

It opened with a presentation by two persons from ComEd who gave an update report on one year of experience with testing Ford ECOSTAR vans. ComEd selected Ford because Ford had an aggressive electric vehicle program, and because Ford had a major assembly plant for Taurus cars in Chicago. Virginia Tong from ComEd's special projects staff stated Ford established 11 test sites in the US for the Ford conversion of a British van.

The vans have built-in test equipment that log many variables directly on a compact disks. ComEd regularly removes a data disk and sends it directly to Ford. Test data is proprietary for Ford. There are five computers in the vehicle; one for motor logic control, one for battery temperature management, one for battery control, one for data recording, and one for backup.

The 800-pound sodium-sulfur battery; must be maintained at a temperature above the electrolyte melting point. This precludes leaving the battery in a partially-charged state for an extended period. Charging overnight from a 60-amp,1-phase ac source has been adequate. It was marginal from a 15-amp source. Winter weather adversely affected the battery. At times the electrolyte "froze". Charging required first heating the battery bank with belly-band elements.

The van was imported into the US specifically for the test. The import license requires the cars to be physically exported after the test program.

The Nissan coop project still needs a 3-pole battery bank isolating switch. Member Ed Meyer has located a firm in Joliet that will manufacture new rear springs. The voltmeter electronics are complete but an enclosure will be needed. Temperature monitoring gage work is complete. Member Ken Woods suggested the use of LED light array for state-of-charge indication.

The FVEAA plans to tow the car for display at the Downes Grove Heritage Fest on June 30. It will be exhibited as "WORK IN PROGRESS". Ed Meyers and Steve Clark have agreed to have their cars on exhibit.

Member Bob Barrrett again brought up the subject of converting an 82 Cadillac or Jeep. Members though the club should concentrate on finishing the Nissan.

Member Fred Kitch brought a 12-volt blower motor for the Bradley EV he is restoring. It included an intake air filter to prevent particles from entering the commutator end of the motor. This is a no-no. Any restriction on the intake causes the motor to overspeed and seriously reduce the delivered air. A "snorkel" intake tube that allows air to be drawn from the cab was recommended.

The Editor was requested to find a place on the cover for identification of the issue month. It will appear in the PRESEZ space.

The meeting was adjourned at 10:18PM

Submitted by Secretary Dave Aarvold

FROM OTHER EV NEWSLETTERS

Exchange newsletters were received from only three sources this month. Two were outside the USA. Must be an off publication month for those organization that send bimonthly newsletter.

AVEA, the Aussies in their May/June issue had interesting photographs of electric cars exhibited at the Hanover (Germany) Fair held in April. The first was a City-el, a 3-wheel vehicle, with a 126 cm height (238 with the top opened), 246 cm length, 106 cm width, a max speed of 50 km/h (31 mph), and costing 11998DM for the basic car and 14999DM for the executive model. The second was a 2-seater "Buggy" version of the Treffpunkt Zukunft (Try pronouncing that!) This 4-wheel car is 150 cm high, 270 cm long, 148 cm width, 830 kg (1826 lb) weight. Its weight is 400 kg (880 pounds). Maximum speed is 100km/h (62 mph), goes 0-60 km/h (38 mph) in 10 seconds. Energy consumption is 12-14 kWh per 100 km (0.2-0.33 kWh/mile). Hobenblitz has manufactured 150 of these vehicles that sell for around 35000DM. Also described was the Citroen Electrique, that is 253 cm long, 156 cm wide, 136 cm high and has a weight of 995 kg (452 lbs). It sells for about 40,000 DM in the electric version and 23000DM as a petrol model.

In their "Remember When" feature, they note that at the December 1992 AVEA Melbourne Branch BBQ, an event called SLI battery hurling was held. The object was to throw a 15 kg (6.8 lb) battery. The men's champion achieved 5.24 meters; the women's was 3.28 meters.

AVEA will also sponsor an Electrathon event at their September 21 National Field Day with three classes; Electrathon, Electrocycle, and Electromite. The event also schedule a parade, demonstration, exhibition with limited "scruitineering" preceding the first race.

AVEA member Ron Penfield described his Suburau Electric Sherpa, a converted 1983 Suburau powered by a 10 kw, 72-volt DC series motor, 350 kg of lead-acid batteries with a curb weight of 880 kg. In four years he has driven the car 33,000 km (20,000 miles).

They also announced the Great Souther International Sunrace that will cover 1487 km between Adelaide and Melbourne Jan 19-26 next year. More information can be obtained from John Horner who has an E-mail address of sunrace@netlink.com.au.

EV Circuit from the Vancouver, BC Canada organization, EVCO, in their May/June newsletter reviewed twelve EV's shown at the International Auto Show in Frankfurt, Germany in September, 1995. These cars were described in the IEEE Feb. 1996 issue of AES Systems magazine. EVCO member Darryl McMahon reported on his experience trying to find a recharging facility for his EV he wanted use for a 20 km commute. His final sentence - "The moral of the story appears to be, local government and electric utilities want us to drive non-polluting electric vehicles, they just don't want us to park them".

SEVA, the Sacramento active group in their July newletter had Part IV of their basic electrical technology of EV's that overed AC Motors. It is included in this FVEAA issue for the information of our members.

RECENT ARTICLES ABOUT EV'S

Articles about EV's have also seemed to dry up, particularly following the Zero EV action by the California Air Quality Board. The Editor doesn't read every publication so if you see something about EVs that would interest your fellow FVEAA members send it to me, or at least let me know about it. - BILL.

EV's ready and willing, but are they able? The Institute, (Institute of Electric and Electronic Engineers Society in their July issue had a front page story on electric cars. It begins by noting that GM's EV1 that will be sold in four western states will have a $30,000 price tag. Other automakers are breathing down GM's neck. Toyota is ready with its RAV-4, Chrysler will offer the EPIC - a converted Voyager, Ford will offer an electrified version of its Explorer. All these arrive with a feeble heartbeat supplied by lead-acid batteries.

Some manufacturers will offer NiMH batteries at extra cost. The U.S. Advanced Battery Consortium is leading a combined effort to create a "better battery" that will be reasonably priced, long-lived, free of corrosive components, and easy to recharge. The funds spent on this research makes you want to hide your checkbook. Solectria offers its **FORCE** EV equipped with lead-acid batteries for $ 33,995 but lists a NiMH equipped version for $ 74,495.

Two More Electrics. Popular Mechanics, August 96, page 27. Honda and Toyota will sell electric cars in California. The Honda will be first next spring with their Honda EV. It looks similar to a Ford Aspire with small wheels. Honda says that 75% of the car is made up of new components. The performance of the 3593-pound car is a range of 125 miles, 0-60 in an anemic 18.7 seconds, and 8-hour recharging with a 240-volt ac source. They plan to lease 300 of these cars through select dealers in Southern California.

Toyota's RAV-4 will be leased for fleet use. The car weighs 3373 pounds has a NiMH battery, and can hit 79 mph. It also uses a 240 volt ac source for recharging that requires 6-8 hours.

Nissan plans EV lease in Japan. Chicago Tribune, Transportion Section. Their Prairie Joy EV has a 124-mile range with lithium batteries.

Long-Range for Electrics. Popular Science, June 96, page 46. 3M Company is developing a lithium-polymer battery for electric cars. The design consists of cells made from a flexible, multilayered film laminate about 100 microns thick. There are five layers: current-collecting metal foil, cathode, electrolyte, lithium foil anode, and an insulator. The film is wound to form the battery. Theoretical projections give a car a 300-mile range.

Daimler gets emissions out with hydrogen. Chicago Tribune, Transportation Section, page 7. Mercedes has succeeded in reducing the size of a fuel cell and installing it in an a van-type vehicle for test. The van has a blister on top that houses the hydrogen storage system. They hope that further progress will further shrink the package enough to allow application to S-Class and Smart cars.

BASIC ELECTRICAL TECHNOLOGY OF ELECTRIC VEHICLES.

By Eckart Schroeder. PART IV

1b) AC -Motors:

As already mentioned before, any motor, DC or AC type, is depending on the mechanical effect of current carrying wires in a magnetic field. The difference between AC or DC types is in the way the field and the current in the wires is produced. Above was explained that the DC-motor generated the field by windings around a magnet core, carrying a DC current. Also a DC current is fed into the wires of the armature via the commutator and carbon brushes.

AC Induction Motors:

The AC induction motor, as used for an EV, utilizes a three-phase stator and a so-called squirrel- cage rotor. It does not need a collector and carbon brushes; thus, it is more rugged and lower in maintenance than a DC-motor, a very important advantage, traded-in with a much more complicated control in order to generate the necessary AC three-phase power from the DC of the battery. More about that follows in the chapter Controls for AC-motors.

The rotor consists of a cylindrical iron core, containing circumferentially arranged copper or aluminum rods in slots of the iron core. All rods on both ends of the cylinder are short-circuited with heavy rings. See Fig. 9. (Looking at the rods and the short-circuiting rings, for a moment forgetting the iron core, the rotor looks like a cage, suitable for a squirrel, which gave the name to this type of motor)

The stator is a short iron tube the length of the rotor. The inside of the tube contains many slots which carry the stator windings. These windings are positioned in a triangular or star-shaped arrangement, 1200 (1/3 of the circumference) apart. Each of these windings is connected to one of the phases of the three-phase electrical power, generated from the battery. See a principle sketch of a three-phase stator, Fig. 10

In contrast to DC, AC is not constant but changes its voltage in a so-called sine wave, starting with zero volts, increasing to a maximum positive voltage, decreasing again to zero in order to become negative up to a maximum negative value and finally becoming zero again. This described procedure is called one period, and the normal household current goes through such a period 60 times in each second. This is called a frequency of 60 Hertz (Hz).

Three-phase current is nothing else than three of such systems, however running each 1/3 of a period in time apart. See Fig. 11. Due to the local distribution of the windings on the circumference of the stator and the 1/3 period delay of the feeding of the windings, a magnet field is created by the stator which rotates for instance 60 times per second if the frequency is 60 Hz. This results in a rotational speed of the stator field of 3,600 rpm.

This field is passing through the rods of the rotor also at 3,600 rpm if the rotor is at standstill at the beginning. In accordance with equation (4) or (4a), an EMF is generated in the rotor rods, resulting in a current flowing through the rods since all rods are short-circuited at the ends.

We have now again the same picture as before, a field and current carrying wires, as applicable for the DC-motor. However, the current in the rotor wires is now generated by so-called induction, another word for the process in accordance with equation (4) or (4a). This gave the name "induction motor" to this type of machine. In accordance with equation (1), a force F is generated which will start the rotation of the rotor.

The speed of the rotating stator field is determined by:

$$n = \frac{f \times 60}{p} \qquad (7)$$

n = rotational speed of the stator field, also called synchronous speed in rpm
f = frequency of the AC three-phase system in Hz.
p = number of pole pairs (N- and S- pole are a pole pair, in Fig. 10 we have 1 pole pair).

This explains why we have spoken above about a synchronous speed of the stator field of 3,600 rpm if the frequency is 60 Hz.

(Continued on page 6)

(Continued from page 5)

In order to provide an EMF and a current in the rotor wires (rods), it is necessary that the rods of the rotor continue to "cut" the rotating magnetic field. If the rotor would assume the same speed as the rotating field, no EMF and no current would be created; thus, the speed of the rotor has to drop slightly in order to obtain a relative motion to the field. For practical purposes, the rotor can never reach synchronous speed, it will stay approximately 3 to 5% below the synchronous speed, i.e. it turns "asynchronously". Hence also the name "asynchronous motor" for this type of machine.

Equation (7) indicates a possibility of speed control possible for this type of motor: It can be achieved by changing the frequency. This is practically all what can be done with an AC-motor, one of the disadvantages as compared to the DC-motor. On the other hand, an AC-motor can operate at much higher speeds, not being exposed to the limitations which are dictated by commutator and brushes. Higher speed means also smaller motors for the same horsepower (see equation 3: The higher the speed n is, the lower the torque T can be for the same power P, meaning lower mechanical forces, thus smaller motors). If, for instance, we would use a frequency of 180 Hz, three times the normal household frequency, the synchronous speed would be 10,800 Hz, providing a rotor speed of over 10,000 rpm with a motor approximately 1/2 to 1/3 the size and weight of a 60 Hz motor, which itself is already smaller and lighter than a comparable DC-motor. The advantage is visible.

To regulate such induction motor with regard to speed is, however, a major undertaking. This is, as already mentioned, to an extent caused by the fact that the battery DC has to be converted into three-phase AC. But that is not all. Since the induction motor is a magnetic AC consumer, the AC resistance, also called impedance, is variable with the frequency, i.e. at high frequency it represents a high impedance, at low frequency a low impedance. In order not to excessively increase the current through the windings of the motor at low frequencies, the voltage has to be lowered. In other words, the factor E / f, i.e. voltage / frequency, has to be kept constant, complicating the speed control even further.

Speed reversal is easy by exchanging any two of the three connections to the motor.

Regenerative braking is also possible by simply lowering the synchronous speed of the magnetic field of the stator until the rotor turns faster than the magnetic field. Under these conditions, the asynchronous motor operates as an asynchronous generator and would be able to supply energy back into the battery, provided that the controller has this function built-in, another task not easily achieved.

When designing an AC drive system for an EV, it is particularly important to observe that the standard induction motor has a rather low starting torque, which sets it apart from a DC series wound motor, which has an excellent starting torque. It is, however, possible to partially overcome this deficiency of the induction motor by providing especially shaped rotor rods or even a double- rod rotor, changing the starting characteristic considerably. The author has the feeling that particularly this fact has not been properly taken care of in a number of AC drives presently operating where the starting torque is absolutely unacceptable.

Equation (7) indicates also that a change to lower speeds is possible by altering the number of pole pairs. Normally this is of not such great importance since we are looking actually more for higher speeds. However, in connection with overcoming the low starting torque, it may help to temporarily use a higher number of pole pairs in the stator windings. This is a matter of deciding it after careful study of the specific motor characteristics in comparison to the required characteristics of the EV. If it appears of advantage to use a higher number of pole pairs for the low speed range and for starting, the stator winding can be laid-out to be switched by contactors or power relays from one pole pair to two pole pairs. This complicates matters slightly but may be worthwhile under specific circumstances.

Recapitulating the above, it can be stated that the AC induction motor is a viable drive motor for an EV, provided that the very complicated control problems can be resolved and the design of the motor itself is properly executed with regard to the starting torque etc.

Next Month: AC Synchronous Motors

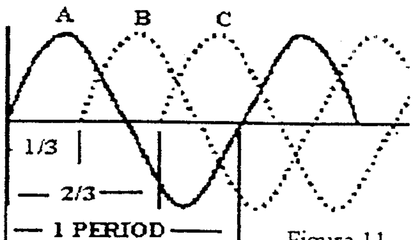


Figure 11

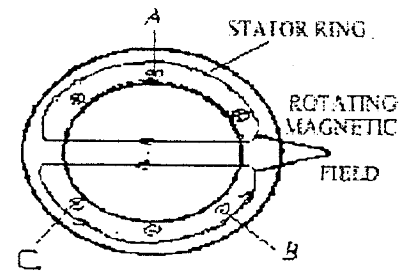


Figure 10

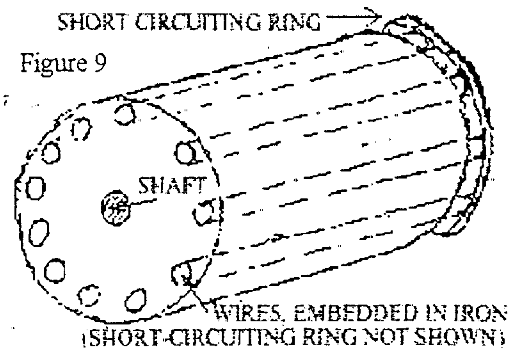


Figure 9

RESULTS: 1996 NESEA American Tour de Sol

*Please see over for Footnotes to Results

Standing[1]	NESEA Best Vehicle Prizes[2]	DOE student Prizes[3]	Tour Miles Total[2]	Range (miles)[4]	Vehicle Efficiency[5] (miles/kwh)	Autocross best time (seconds)[6]	VEHICLE # and NAME	TEAM NAME	TOWN STATE	CONTACT PERSON	DESCRIPTION: Vehicle Type (Battery Mfg, Chem)
NAVC Production Category											
1	A		604.7	244.2*a	8.70	38.283*	4 *Solectria Force NMH*	Solectria	Wilmington, MA	Mark Kopec, Karl Thidemann 508-658-2231 Fax 3224	Solectria Force NMH (Ovonic, NiMH)
2	B		538.7	227.0*b	n/a	38.371*	17 *Ford Ecostar*	Allegheny Power	Greensburg, PA	Jeffery D. Merola 412-830-5659, Fax-5009	Ford Ecostar (ABB, Sodium Sulfur)
3	C		388.6	132.4*c	8.85	41.899	50 *Solectria / Horizon*	Connecticut EV/NAVC	Windsor, CT	David Fabricatore 860-298-7000 x210, Fax-7040	'95 Solectria Force (Electrosource, PbA)
4			385.5	106.6	9.09	43.545	34 *State Power*	STAPPA / ALAPA	Washington, DC		Solectria Force GT / SAFT / Nickle Cadmium
5			383.3	132.4*c	10.53	DNF	7 *Nordic Challenger*	EVermont / NAVC	Waterbury, VT	Richard Watts 802-241-3556, Fax-2590	1994 Solectria Force (Sonnenschein, PbA)
6			382.2	132.4*c	9.17	41.785	15 *Solectria Force*	JCP&L	Morristown, NJ	Donna Rovins 201-455-8641, Fax-8976	Solectria Force (Interstate, PbA)
7	D		316.7	72.2	17.86	47.573	12 *Twike*	Twike, AG, Switzerland	Switzerland,	R. Schnyder 061 981 54 08, Fax 061 981 36 00	Twike, AG, Switzerland (Panasonic, NiCad)
8			286.2	80.8	n/a	48.897	14 *Chrysler TE Van*	Met-Ed Penelec/JCP&L/GPU	Reading, PA	Marie Wright 610-921-6491, Fax 921-6571	Chysler TEVan (Saft, NiCad)
US DOE Commuter Category											
1	E		772.7	373.7*d	11.24	38.270	63 *Solectria Sunrise*	NAVC / BECO / Solectria	Wilmington, MA	Mark Kopec or Karl Thidemann 508-658-2231, Fax-3224	Pre-production prototype (Ovonic, NiMH)
2	F	1	384.6	123.8*e	9.09	39.223	72 *Sungo*	NHTI Electric Car Team	Concord, NH	Eric Ostman 603-225-1825, Fax-1895	Purpose-Built Commuter (Electrosource, PbA)
3		2	382.3	123.8*e	3.69	DNF	57 *George the Geo*	FMRHS-Solar Electric Racing	Langdon, NH	Lisa Andreoli 603-835-6318, Fax-6259	'91 Geo Metro (Trojan, PbA)
4		3	378.6	123.8*e	5.99	37.685	32 *Porche 914 Electric Bull*	Shadow Mtn. Electric Matadors	Phoenix, AZ	Michael Golden 602-867-5359, Fax 5228	'73 Porsche (Trojan, PbA)
5	G		361.4	106.6	4.26	43.725	88 *OHM Ranger*	Neocon / NYSEG	West Babylon, NY	Glen Cobb 607-762-4387	'94 Ford Ranger (Electrosource, PbA)
6			357.4	115.2	8.85	36.270*1	31 *Spyder Juice*	Solar Electric Spyder Juice	Tallahassee, FL	Al Simpler 904-576-5271, Fax 5274	Pre-Production Prototype (GNB, PbA)
7		4	356.4	106.6	6.33	41.887	43 *KA1000*	Polytech Chargers	Farmingdale, NY	Peter Voltz 516-755-4215, Fax-4404	Purpose-Built (Deka, PbA)
8			344.2	89.4	5.05	42.317	39 *Sparky*	EV Moore - CEVA	Richmond, VA	Ernest V. Moore 804-273-2273, Fax-3543	'86 Mercury Lynx (Trojan, PbA)
9		5	342.3	98.0	4.05	46.564	35 *Kineticar*	CSERT - NVCTC	Waterbury, CT	Donald Narducci 203-575-8090, Fax-596-8674	Chevy S-10 w/Solar (Trojan, PbA)
10			336.7	89.4	4.85	DNS	42 *Golden Gear Special*	RMAVTS -- Golden Gear	Reading, PA	Jerry Cunningham 610-921-7306, fax 7367	'87 Pontiac Fiero GT (Deka, PbA)
11			335.5	98.0	10.64	67.863	38 *Sparky 2*	Wooster's Charge	Danbury, CT	Mary Nahley 203-830-3920, Fax 790-7147	'72 Saab (Trojan, PbA)
12			331.7	89.4	5.88	42.216	65 *Electric Hare*	Wattsmen	Falmouth, ME	Erica Pearl 207-781-7429, Fax-5711	'84 VW Rabbit (US Battery, PbA)
13			328.1	80.8	3.91	81.674	66 *Genesis I*	Genesis Team	Saginaw, MI	Mark Parthe 517-686-9211, Fax-8736	'84 Dodge D-50 pick-up (Trojan, PbA)
14			324.1	80.8	3.64	49.395	33 *Solar Bus*	Bridgewater Solar Works	Bridgewater, CT	Ellen Shrader 860-350-1128	'69 VW Bus / Solar (Trojan, PbA)
15			296.9	89.4	4.78	37.426*3	46 *Utility EV*	PETC	Allentown, PA	Marie Wright 610-921-6491, Fax-6571	Pre-Production Prototype (Electrosource, PbA)
16			289.7	80.8	3.88	45.278	74 *Lightning Volt*	Parkland High School	Orefield, PA	Jim Kester 610-395-2021, Fax-4189	Chevy S-10 (Trojan, PbA)
17			159.8	89.4	4.42	43.019	44 *SolarSaurus*	Rocky Hill High School	Rocky Hill, CT	Pat Hayden 860-529-2583	'82 Dodge Rampage (Trojan, PbA)
18			83.4	63.6	1.69	45.938	82 *Lectric Lion*	North Hunterdon H.S.	North Hunterdon, NJ	Donna Rovins 201-455-8641, Fax-8976	'89 Chevy S10 (Trojan, PbA)
19			20.8	98.0	4.67	42.427	54 *Roadrunner*	G.H.S. Solar Flair	Greenwich, CT	Scott Caroll or Christian Anderson 203-625-8041	'79 Mazda RX-7 (Trojan, PbA)
20			-1.1	72.2	10.31	DNF	79 *1959 Berkeley*	Team New England	Lexington, MA	Olaf Bleck 617-275-9444	1958 Berkeley roadster (Delphi, PbA)
21			-7.5	67.5	4.08	DNS	47 *Electruck*	Taylor-Dunn	Anaheim, CA	Rick Doran 714-956-4040, Fax-0504	Modified Production Electruck (Trojan, PbA)
22			-230.7	63.6	n/a	DNS	45 *Regenerative Braking*	Alternative Energy	Glastonbury, CT	William Glickman 203-633-2462	1978 Jet Industries Electrivan (Trojan, PbA)
Solar Commuter Category											
1	H		30%sol	63.6	9.62	44.675*	83 *Sol Survivor IV*	CONVAL Solar Car Team	Dublin, NH	Paul Waterman 603-924-9818	Purpose-Built Solar (Powersonic, PbA)
2			10%sol	51.0	3.98	DNS	58 *Sol Machine*	Newburgh Free Academy	Newburgh, NY	Lee Cabe 914-563-7500 x33, Fax-7493	Purpose-Built Solar (Concord, PbA)
3			n/a	39.1	n/a	130.000	93 *Helios the Heron*	Riverside School	Lyndonville, VT	Cara Berryman 802-626-8552, Fax-4156	Purpose-Built Solar (Deka, PbA)
4			n/a	38.9	n/a	DNS	36 *Texas Native Sun*	Longhorn Solar Racing Team	Austin, TX	Kathryn Duvai 512-475-6740, Fax-471-5532	Purpose-Built Solar (Trojan, PbA)
Chrysler Hybrid Category											
1	I		471.1	330.1*f		43.746	94 *Hopper EV*	Hopper EV	Concord, NH	Tom Hopper 603-225-1825, Fax-1895	Hybrid Purpose-Built (Optima, PbA / Bio Diesel)
2	J	5	470.9	196.1		DNF	96 *Project e*	Mount Everett Project e	Sheffied, MA	Paul O'Brien 413-229-8734, Fax-2044	Hybrid Chevy S-10 (U.S. Battery, PbA / LPG)
3		3	427.9	161.1		42.042	23 *Viking 23*	Western Washington Univ.	Bellingham, W	Eileen Seal 360-650-3045 or Lynne Masland 360-650-3445	Hybrid Purpose-Built (Saft, NiCad / CNG)
4		4	366.9	127.3		41.077	48 *Electric Lion*	Penn State SAE	University Park, PA	Duane Hobbs 814-862-2525	Hybrid Ford Escort (Exide, PbA / Methanol)
5		2	288.4	75.0		41.833	81 *VT Ani mul SL*	HEV Team of Virginia Tech	Blacksburg, VA	Duane Blackburn 540-231-0126, Fax-231-9100	Hybrid Lumina (Hawker, PbA / LPG)
6			251.8	75.0		41.955	26 *Hyperion*	Team Hyperion - WIT	Boston, MA	Victoria May or Shawn Newell 617-442-9010	Hybrid Saturn (Optima, PbA / Ethanol)
7		1	243.3	71.4		36.875*2	84 *Paradigm*	Team Paradigm - UW	Madison, WI	Neel Vasavada 608-265-3204, Fax-2316	Hybrid Escort Wagon (JCI, PbA / RFG)
8		1neon	81.7	71.4		41.906	25 *Viking 25*	Western Washington Univ.	Bellingham, W	Eileen Seal 360-650-3045 or Lynne Masland 360-650-3445	Hybrid Neon (Saft, NiCad / CNG)
9			-248.3	71.3		DNS	28 *Hybrid APV*	Electric Transportation Design	Yachats, OR	Clarence Eilers 541-547-3506	Hybrid Lumina Van (US Batteries, PbA / Gasoline)
10		3neon	-274.9	78.0		DNS	19 *HEV U Florida*	Univ. of FL HEV Society	Gainsville, FL	Swan Tai 352-372-2044, Fax 392-1071	Hybrid Neon (Saft, NiCad/CNG)
11		2neon	-387.9	na		DNS	21 *Hy Potential IV*	University of Tennesse	Knoxville, TN	Stuart Wood 423-540-0610, Fax-974-5274	Hybrid Neon (Alexander, NiMH / CNG)
Open Category											
1	K	1	257.8	80.8*g	12.2	DNS	92 *Sunpacer*	Cato-Meridian HS Tech Team	Cato, NY	Earl Billings 315-626-3317, Fax-2888	One-person Purpose-built (Hoxan, PbA)
2			83.8	66.0	11.0	47.002	64 *Proteus i*	Union College	Schenectady, NY	Frank Wicks 518-388-6267, Fax-6789	One-Person Purpose-Built (Charter Power, PbA)
3	L		81.8	72.2	n/a	47.000*	52 *Electrobike*	CTC NEastAdvVehTecCtr	Westboro, MA	Judy Rovens 203-454-7203, Fax-3241	Electric Bicycle (Energi[illegible] NiCad)
4			43.3	66.0	10.0	DNS	37 *Ottawa Orange IV*	Tech Prep	Grand Rapids, MI	Joshua Ike or Rachel McDiarmid 616-771-2921	One-Person Purpose-[illegible]xide, PbA)

Northeast Sustainable Energy Association 50 Miles Street, Greenfield, MA 01301 413-774-6051, Fax-6053

THE NISSAN PROJECT

For several months the Nissan project has been stalled. The initial enthusiasm and work by about eight FVEAA members made a lot of progress. We seem to be hung up by four items: 1. The preliminary test using a 120-volt system and gel cells. 2. Lack of a controller. 3. No battery charger and dc-dc converter. 4. Instrumentation.

The observation has been made that the car would be on the road today if we had stayed with the original premise of the project- to use off-the shelf. commercially available components for a conversion that would serve as a learning experience for FVEAA members who wished to participate. While controller development, a concession price for the gel cells, and the club's agreement to make a trial run with a 120-volt system will significantly reduce the project cost, it has produced delays.

It is time at the July meeting to review these decisions. It is also time to set up a work schedule for specific tasks, get the job done, and get the car on the road this summer.

It is also time for previously uninvolved members to work on the project if they still want to benefit by working with members who already have gone through the process.

BARGAIN BATTERIES

Member Dick Ness has four golf-car type, deep-cycle, 6-volt batteries that were removed from an industrial application. He says three are ok while one is marginal. If you need a battery to replace a weak one in your string, you can buy it from Dick for $ 5 cash and carry from his house in Chicago.

WHAT'S NEXT ?

The July agenda contains this item. It will offer several ideas for projects the members could consider after the Nissan work is behind us. The list includes the following:

1. Design and build a hybrid conversion.

2. Design and build a lightweight 3-wheel EV. It would be considered a motorcycle under existing Illinois requirements.

3. Design and build a motorcycle conversion

4. Design and build a an electric-powered bicycle.

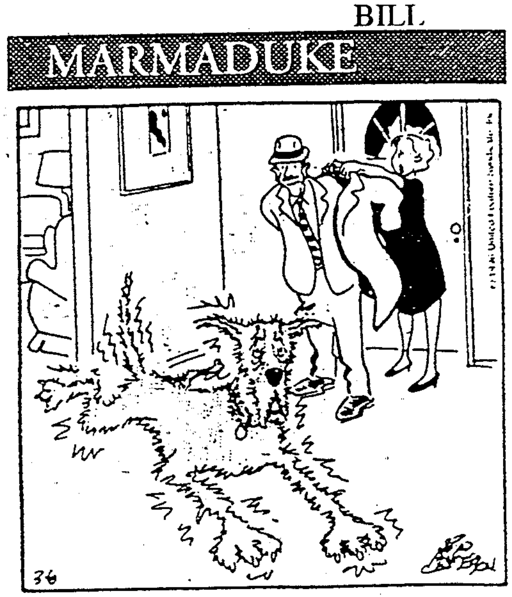
5. Make a for-cable TV video featuring member's cars being used. Emphasize the current advantages of limited-range cars we have experience in building and operating.

6. Develop a syllabus and EV conversion course for use by a community college.

7. Seek a corporate sponsor and develop an Electrathon competition for Chicago-area high schools.

If you have any other ideas to offer, be prepared to present them at the meeting

BILL



"He caught an electric car."