

FVEAA NEWSLETTER

JUNE 1995

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NEXT MEETING - June 16 at 7:30 PM

Will be in Room 1048 in the Student Resource Center at
the College of DuPage, southeast corner of 22nd Street & Lambert Road

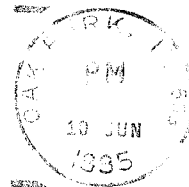
DISCUSSION TOPICS - No topic is scheduled for discussion; however, June 16th is
decision time for contributions received for the cooperative construction project. Do we proceed?

MEMBERSHIP INFORMATION

Any person interested in electric cars is welcome to join the FVEAA. The cost for a full year's dues is \$15. This will entitle the member to receive our monthly Newsletter that contains useful information about electric car components, conversion techniques, policies, and events. Dues for new members joining in June is \$6.25.

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

PRESEZ

The PRESEZ column material was not received by the deadline date - probably delayed by the postoffice because it was a thick letter with two stamps. Ken says Hi and hope to see you on June 16th.

MAY 19 MEETING MINUTES

The meeting was called to order by President Woods at the College of DuPage at 7:37 PM. Twenty three members and one guest attended. Treasurer Corel reports there is \$ 2747.25 in the checking account (Including \$ 1900 in coop construction contributions) and \$ 2186.70 in the savings account.

Procurement of a conversion car was discussed. Member Barrett offered four options; a full-sized handicapped van equipped with a lift from Marianjoy, a Postoffice truck, a car provided by NIPSCO, and a car from City Dodge. Only the latter was considered acceptable for the project. President Woods urged members to be on the lookout for a suitable vehicle. New Member Ed Meyer will follow up his discussion with an Auto Auction firm in Bolingbrook.

Exhibit cars are being solicited for the Downers Grove Heritage Days event in June. Arrangements are being made by Member Alcon. Pres. Woods will contact ComEd for display of an ECOSTAR van.

Wood & Shafer reported that attendance at the Geneva observance of Earth Day had a very low turnout.

Member Munroe asked that an updated inventory of equipment remaining from John Newton's collection be published in the June Newsletter. Items remaining after June 16 will be disposed of because Member Potyen, who provided storage space, needs his barn back. Member Munroe was granted disposal authority after June 16.

Member Dana Mock gave a brief report on his IGBT controller project. Lack of an overhead projector hampered his presentation which will be continued at a future meeting. The meeting was adjourned at 10:22PM.

Dave Aarvold
Secretary

EDITOR'S COMMENTS

This Newsletter contains a review of an article published in the May 19th issue of Science that was sent to me by Member Mock. The subject is "Environmental Implications of Electric Cars" written by three Carnegie Mellon University Professors. The article was printed in the policy forums section and evidently not subjected to the usual peer review process required for other types of papers. The article was picked up by the Chicago Tribune who published an article titled "The Perennial Dream of the Electric Car."

The paper states that a 1998 model electric car is estimated to release 60 TIMES more lead per kilometer of use relative to a comparable car burning leaded gasoline. Can this be true? Ken plans to discuss this paper at the June meeting and ask the FVEAA to approve a response based on the experience of our members.

Bill Shafer

RECENT EV ARTICLES

The Myth of 'Zero-Emission' Vehicles - National Review May 29, 1995, Pages 32-38 by Michael McKenna, policy and planning director at the Virginia Department of Environmental Quality and Chicago Tribune 5/28/95 article written by Steven Chapman.

If environmental extremists have their way, consumers will be forced into buying an electric cars that will cost \$100,000, require \$ 30,000 in repairs over its lifetime, have a limited range, will not be equipped with many luxuries such as power steering and air-conditioning, and may cause more pollution than the conventional cars they replace according to the author.

Limited production EVs will cost five times what present cars cost. To attract buyers, automakers may cover that loss by raising prices of conventional vehicles. Eight states have mandated the sale of EVs in eight states, including CA, NY, and MA. California requires out 125,000 electric cars be sold by 2003. Electric utilities are eager for the added profits, particularly from overnight recharging. Pacific Gas & Electric estimates \$200-million in added revenue by 2005. The author states that an alliance of environmentalists and monopolists have backed EV mandates. He states asoline prices have been flat or declining over the last two decades while electricity steadily increased from a national average of 4.8 cents/kwh in 1969 to 5.6 cents/kwh in 1992 , (1987 dollars).

The electric car has become so entrenched that uncomfortable facts are disregarded. The EPA has released a draft report showing that electric cars are not "Zero-Emission" as they are advertised. Power plant emissions resulting from electric car use are almost sure to result in significantly higher emissions. A new gasoline car emits about 354 grams of CO, and 1.18 grams of NOx per mile. Power plant emissions would increase CO by 393 grams and NOx by 1.49 grams. (Editors note-In IL, the power for our electric cars is provided by nuclear plants that have none of these emissions.)

The Perennial Dream of the Electric Car - Chicago Tribune 5/28/95 by Stephen Chapman in a letter to the Editor. The writer observes that the electric car is a perennial greenm that grows partly out of a dislike of modern transportation. Contemporary environmentalists may have given up hope getting rid of cars, but they want to junk the gasoline-powered version. This view was expressed by Vice President Al Gore in his 1992 book, "Earth in Balance". The 1990 version of the Clean Air Act allows states to mandate the sale and purchase of electric cars to combat air pollution. The advent of the electric car will mean using a tiny, temperamental is suitable only for short trips and comes with a considerable price tag. These inconvenient facts are not likely to dampen hard-core environmentalists who regard auto makers and oil companies as the root of all evil, but to the clear headed, electric cars look like an answer in search of a question.

Sporty Electric - FuelLine, an independent newspaper for auto-related industries. The cover story features the Tropica roadster developed by Renaissance in Ft. Lauderdale. The company is setting up a production line for eight of these cars a day. They will be sold for \$16,000 by a network of 20 dealers.

RECENT EV ARTICLES -continued

I'd Buy an Electric Car Tomorrow - New York Times 5/14/95 letter to the Editor from Daniel Wardlow, Associate professor of marketing at San Francisco University. The author reports he had a 2-week opportunity to test drive a GM IMPACT. His car had a curb weight of 2970 pounds, including 1100 pounds of lead-acid batteries. The car routinely provided 60 miles on a single charge, even in San Francisco hills. It met his driving needs 98% of the time. The writer concludes he would buy one tomorrow if GM can get the price to about \$ 20,000.

In Future Drive: Electric Vehicles and Sustainable Transportation - This is a book written by Daniel Sperling, director of the Institute of Transportation and a civil engineering professor at the University of California, Davis. The author illustrates the energy and environmental consequences of increased car travel and outlines strategies for an environmentally benign transportation system based on electric propulsion. Info on the book is available from Lisa Magnino, Island Press, 1718 Connecticut Ave # 300 in Washington DC 20009.

Future Drive is a new publication from Argonne Lab with a purpose to inform past, present, and potential sponsors, participants, organizers, volunteers, and others interested in DOE-sponsored vehicle competitions about the plans for and results from the competitions. Vol 1, No 1, Spring 1995 issue contains 12 pages of useful information. To be added to the mailing list write to Cheryl Drugan, Future Drive, Argonne National Laboratory, Energy Systems Division, Bldg 362, 9700 South Cass Avenue, Argonne, IL 60439 or send an E-Mail to cdrugan@anl.gov with your name, title/company, address, city, state, zip, and advise how you found out about Future Drive.

Will Pete Wilson Zap Electric Cars? Business Week 6/12/95, page 6. The California Governor may pull the plug on electric cars. Detroit figures Wilson is worried that the EV mandate could become a liability to his presidential campaign among regulation-hating conservatives.

Events

Sunrayce 95 starts June 20 in Indianapolis and finishes in Golden CO on June 29. Forty cars are entered. Overnight stops will be made in Terre Haute, IN on Jan 20 and Alton, IL the following day. This is a biennial intercollegiate competition for solar-powered vehicles.

Alternative Fuels Conference and Expo June 28-30 in Milwaukee. For information call Bridges Public Relations and Marketing, (800) 447-5088.

Cleveland Electric Formula Classic, July 21-22 at Burke Lakefront Airport.

Electricore Formula Lightning Race, August 7 in Indianapolis. For information, call Jim Hunnicutt at Electricore (317) 278-1673.

EVents - continued

Central EV Symposium, October 21-24 in Austin, TX .will include seminars, exhibits, solar car races, and model race cars powered by solar cells and motors provided by NERL. For information about the event, contact Dr Ronald J LaSpisa, Executive Director of the Central EV Coalition (405) 325-4721, FAX (405) 325-7066.

Solar/EV 95 Symposium, November 13-15 in Boston, MA. Call NESEA at (413) 774-6051.

FROM OTHER EV NEWSLETTERS

AVEA (The Aussies) in their May issue reported on the National Electric Field Day held April 1. The issue also featured part 1 of an article by R D Weller describing his conversion of a Diahatsu Handivan to electric drive. The original car had a curb weight of 570 kg and a 1020 kg gvw. An interesting requirement was battery constraint specified by Road & Traffic Authority. The battery had to meet 20g for head-on impact, 15 g for side, and 10 g for rear collision and rollover.

EVAOSC (The Southern CA Association) in their May issue reported on a presentation made by David Harbaugh, engineering vice president for Arias Research, at their April meeting. That company has concluded that a Sealed Bipolar Lead Acid (SBLA) battery would give a 90-mile range and would sell for 1.8 times the price of a golf-cart battery. Other advanced batteries that range from 3.2 to 5.0 times the cost of the golf cart unit will not be cost-effective he concluded. A reprint of Ken Koch's article regarding components is included in this FVEAA newsletter.

The South Florida Electric Auto Association sent an proposal for an enclosed, 2-person vehicle. If you are interested, contact Dale Corel, our librarian.

Michigan Electrathon May issue reported that three vehicles built by Coopersville High School took advantage of the May 27 test day at the Grattan track check out three cars they have built and entered in the June 10 race. The winning car made 8 laps of the difficult 2.1 mile course at an average speed of 33.7 mph.

EV Circuit, published by the Ottawa Group in their March-April issue carried a critique of Kathy Wilson's report of her 2-week experience driving the G IMPACT. Fred Green cautioned her to respect the capability of that vehicle with its 130hp motor. The issue also has a description of the TULIP (Transportation Urbain Libre Individual Public) 2-seater EV developed by Pugeot-Citroen intended for use on a rental basis in urban European areas.

SEVA (The Sacramento Club) in their May issue described the President Mike Bahlke's experiences with an EV conversion made with the assistance of other club members.

FROM OTHER EV NEWSLETTERS - continued

VEVA (The Vancouver Group) in their May Newsletter announced the first ELECTRATHON competition on June 5 with 13 schools participating. Specifications for the Ballard Fuel Cell Bus were included. The system voltage ranges 450-750, the motor is a Kaman liquid cooled disc brushless dc. The system contains storage for 28,000 scf of hydrogen @ 3600 psi for the fuel cells. They report that a Trojan 27 TM battery can maintain 200 amps for 10.72 minutes. Chrysler has chosen the Electrosorce Horizon battery for their next-generation electric minivan.

World Electric Transportation - Clarence Eller's May Newsletter contains a critique of the Carnegie Mellon study of lead-acid batteries, calling the effort "seriously flawed". He also reports that the American Automobile Manufacturers Association is pressuring California Governor Pete Wilson to delay or kill the zero emission vehicle requirement to enhance his presidential aspirations.

THE NEWTON INVENTORY - updated

This listing of material salvaged from the Newton Estate is updated and published again. Member Alan Potyen who has stored the items in his barn needs the space so any items remaining after June 16 will be disposed of by Member Munroe. Call him at (708) 858-7066 if you are interested.

Item Description	Value	Item Description	Value
Motors & Generators		Miscellaneous Items	
Motor-generator, variable voltage	75	Floor jack	20
1 1/2 HP engine-alternator	35	5HP 5-gang riding mower	65
2-cyl dual output engine-alternator	30	Single reel riding mower	40
Automotive alternator	10	2 pumps, (1 with motor)	7
5 small motors	4	2 small gas engines	10
4 single-phase motors @ 1	4	1 gas engine	10
20 small motors @ 1.50	30	Gear Drive	10
3 motors @ 2	6	Vertical Drive	15
Fan & motor	3	CB radio nooster antenna	3
3 automotive starters @ 3	9	Timer	2
4 small generators @ 4	20	Small Rheostat	2
		4 Power Rheostats	5
		Briggs & Stratton engine	10
		Power converter	25
		2 solenoids @ 5	10
		Transformer	3
		20 lamp bulb sockets	2
		Machinist's shaper	10
		Small motor controllers	3
		Scrap wire, 40# @ .30	12
		Wire on reel, 300-ft	3
		Terminals & connectors	10
		8 tires & tubes	8
Meters & Instruments			
8 misc meters @ 5	40		
Lab voltmeter in wooden box	25		
1 voltmeter	10		
2 dual-scale meters in boxes @ 5	10		
VOM & 15 misc meters	55		
Lab thermometer	5		
Auto timing light	20		
Winding tester for armatures	25		
Large thermometer	10		
2 pressure gages @ 1	2		

Environmental Implications of Electric Cars

This is a condensed version of an article originally appearing on pages 993-995 of *Science*, a publication of the American Academy of Science. The three authors are professors at Carnegie Mellon University in Pittsburgh. The article has been picked up and quoted in several other publications. The FVEAA will discuss the paper at the June 16 meeting. If you have comments they can E-mailed to cth@cmu.edu.

California and other states have, under the authority in the 1990 Clean Air Act, mandated that 2% of 1998 cars sold in their jurisdiction must be zero-emission vehicles (ZEV). Electric cars by themselves do not produce emissions, however the authors state the mining of lead, battery manufacturing, and recycling may cause the release of unacceptable quantities of lead into the environment that exceed the amount of lead emissions previously caused by the use of leaded gasoline whose use has been banned.

The authors point out that lead emissions will be from point sources where the mining, manufacturing, and recycling are located. These are not usually found in concentrated urban areas where the other pollutants of CO, NOx, and volatile Organic Compounds (VOC) cause problems today. The authors acknowledge that central station generating plants are able to achieve fewer emission per mile of travel than to internal combustion engines in vehicles. They note that pollution control devices have lowered emission by 98% as compared with an uncontrolled cars.

The authors state that lead acid batteries are the only present electrical energy storage system available at a reasonable cost for 1998 electric cars. Alternative battery systems are being developed, but each of these systems may have problems with materials that are expensive and may be toxic.

A gasoline car having a 11 gal tank that has gets 35 miles per gallon has a range of 375 miles. A kilogram of gasoline is equivalent to 13,000 Wh of electrical energy. A lead acid battery can only store 38 Wh and this limits an electric car range to less than 100 miles. The authors use the GM IMPACT as a representative electric car and state the car contains 500 kg of batteries with an energy supply of 16.8 kWh. Batteries replacement is expected every 20-40,000 miles.

The Bureau of Mines has found that 6.5% of primary lead production, 3.4% of secondary production, and 1.1% of manufacturing lead is released to the environment. The EPA estimates that current lead processing releases 12% of the lead involved. The EPA Toxic Release Inventory for 1992 shows 1.2 Gg of lead and 6 Gg of lead compounds released. The EPA 1989 Resource Conservation and Recovery (RCRA) reported that lead-contaminated wastes were more than 830Gg.

The authors using 4% loss during production, 2% from recycling & reprocessing, and 1% from battery manufacturing calculated that 1340 mg of lead would be released per km of EV travel if virgin lead is used (See Table 1). They make a comparison with leaded gasoline sold in 1972 that contained 2.1 g of lead per gallon. Using a Geo Metro that gets 45 miles per gallon, emissions would be 22 mg per mile traveled, assuming 25% of lead would be retained in the engine and exhaust. They conclude that when these factors are considered, an EV would emit 60 times as much lead to the environment when compared to a 1995 Geo Metro.

Table 1. Typical lead-acid battery and electric vehicle performance

Battery and vehicle assumptions	Available technology
Energy density of battery (Wh/kg)	18
Number of driving cycles per battery	450
Vehicle energy requirements (Wh/km)	310
Average distance per driving cycle (km)	80
Energy for driving cycle (kWh)	25
Battery mass for driving cycle (kg)	1,378
Battery life-cycle distance (km)	36,000
Lead percentage of battery mass (%)	70
Battery lead mass (kg)	964
Battery lead per life-cycle kilometer (g/km)	27
Lead releases per life-cycle kilometer	
Virgin production (4%) (mg/km)	1,072
Recycling production (2%) (mg/km)	536
Battery manufacture (1%) (mg/km)	268

Ken Koch (KTA Services) is an EV pioneer with experience with building on-the-road EV conversions. The April issue of the EVOSC Newsletter contained his observations about EV motors and controllers.

The most common motor controller used in today's on-road EVs is the Curtis-PMC model 1221B-7401. This particular MOSFET type is rated for battery packs of 72-120 volts. Motor current is limited to 400 amps. It switches at a constant frequency of 15 kHz.

The 1221B was put into production back in 1990. It was compatible with all on-road EV motors known at the time - and it has been for just about all motors produced since then. In 1992 Advanced DC Motors produced the first 9-inch (FBI) motor for on-road use. At the time most of us took a look around for a controller that might be used with this new motor. The Curtis 1221B appeared to be the ideal candidate, although it was designed for smaller motors 2 years before the FBI motor appeared.

Many 1221B controllers have been used successfully with FBI motors, however a small percentage have developed problems. The built-in free-wheel diodes have failed. When these fail, the MOSFET will soon bite the dust and controller replacement or repair is needed.

A small percentage (6-7%) of the failures could have been avoided if EV owners had properly driven their vehicles. An EV should be driven so motor RPM is kept high. Driving at 15mph or up a 10% grade in third gear creates a lot of stress on the diodes, especially with a heavy vehicle. Under such conditions the controller is forced into current limit at a very low duty cycle. If you have a choice of gears for cruising at a particular speed, choose the lowest gear that will keep motor speed up.

Curtis newer controller designs carry a C-suffix. These have a new logic board that provides new features, including an improved response curve and frequency shifting. The new unit operates at 1.5Khz for the first 10% of pedal position. Both features improve low-speed controllability. In addition, the frequency shifting allows the controller to properly limit current in low-impedance low-resistance loads such as the FBI motor. A side effect is the controller becomes audible with pedal settings less than 10%. Above that, the unit is silent. The new 1221C controllers are also suitable for light and medium duty applications with proper driving patterns.

Both the B and C models have the same ratings, size, shape, and are pin-for-pin compatible. Eventually the B model will be phased out. Both the B and C models are fully usable on Advanced DC's motor line of 8 and 6.7 inch (diameter) without worries about free-wheel diode problems. The FBI motor presents a challenge.

The Curtis C-series comes in two versions, the 1231C-8601 and 1231-7701. The 8601 is rated at 96-144 volts. The 7701 has a 72-120 volt rating. Both units have a 550 amp current rating. Both C-models are recommended for the FBI 9-inch motor.

The C units have substantial increases in heatsinking, larger MOSFETs, and an increase compliment of freewheeling diodes that make them far more tolerant of abuse in most applications. The power rating increase offers improved vehicle performance. With no change in battery pack voltage vehicle acceleration can improve by as much as 35% over the B-model. The price for either of the 1231C models at KTA Services is \$1095.

A few C-model users have expressed some concern after upgrading. The C controller operates at 1.5 kHz during the first 10% of pedal position. "What's the noise" one customer asked after becoming accustomed to the total silence of this B-model. I recalled the old Curtis model P-21 and P-25 controllers switched at 2 Khz and were audible. It is all a matter of personal perspective. There may be a little noise at first, but I think added power and reliability are worth the whistle.

Ford will sell Ranger Pickup Gliders

On April 7, Ford Motor Company announced it will sell a glider version of the Ford Ranger pickup truck from the Edison, NJ assembly plant. These will be the standard cab model with 114-in wheelbase, rear drive, heavy-duty springs & shocks, and conventional wiring. They will be sold only to Ford Qualified Vehicle Modifiers who must enter into agreements with Ford on product liability, insurance, financial responsibility, advertising, security, and dealer relationships. This rules out an individual who wishes to do his own conversion for his own use, but would like to start with a new vehicle. It seems like a cautious step in the right direction. Perhaps the EV groups should inquire about arrangements for their members who might be interested.