

# FOX VALLEY ELECTRIC AUTO ASSOCIATION NEWSLETTER FOR JULY 2000

**NEXT MEETING: Friday, JULY 21 at 7:30 PM In the Triton INDUSTRIAL  
CAREERS BUILDING**

**DISCUSSION TOPICS: 1. Triton Project Staus. 2. July 4<sup>th</sup> Parade report. 3. Member  
Projects. 4. Web Status. 5. Open Topics**

## MEMBERSHIP INFORMATION

Any person interested in electric cars is welcome to join the FVEAA. The cost for a full year's dues is \$ 20 which will entitle members to receive our monthly Newsletter that contains useful information about electric car conversions, construction, news, policies, and events. Membership is not required to attend our meetings. Dues for NEW members joining in August will be \$ 6.

**To obtain info about the FVEAA you may contact either Past-President Ken Woods or President Shafer**

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## JULY 2000 PRESSEZ

Three of the June topics are recycled. There have been additional developments since last month. The Triton Project is on hold. A revised work schedule has been sent to Triton incorporating the discussion recommendations from our June meeting. There will be a report on the Riverside Parade. Dave Stensland's project progress is available on the web as well as Doug Mather's encounter with a bad road surface in his Fiero.

The website has been open for three months. Member's suggestions will be discussed.

I have made several attempts to get the media to cover the electric auto conversion answer to rising fuel prices. No success yet but I will keep trying.

BILL

## MINUTES OF THE JUNE MEETING

The meeting was at Triton was called to order by President Shafer at 7:45 PM. Fourteen members and one guest attended. The minutes of the May meeting were approved as published. Treasurer Corel reported \$ 2481.06 in the checking account and \$ 2400.03 in the savings account. His report was accepted.

Fred Kitch, Bill Shafer, and Net Gain's *Bad Amplitude* Dragster have committed to appear in the Riverside July 4<sup>th</sup> Parade.

Copies of a proposed revision to FVEAA Declaration of Energy Independence issued in 1970 were distributed and discussed. Bill proposed that a revised document be issued on July 4<sup>th</sup> in Riverside. Members made several revisions and approved the reissue.

Member Doug Mather (And our Webmaster) led a discussion of our website, [www.fveaa.org](http://www.fveaa.org) Doug recently compiled 3200 possible links to electric vehicles. He stressed the need to avoid links not related to fveaa purposes. He was authorized to review each request and grant a linkage request. place. He was also authorized to request links with other electric car organizations. Linkage development will require time.

Doug also described feeding the output of his E-Meter to a HP portable computer to log voltage, current, and power vs time. He has posted graphs on the website. He reports he can keep the current to under 100 amps during steady state cruising on level ground. Several members were interested in his report.

Doug also brought 30-watt nichrome heater element sandwiched between two plastic sheets that he used to keep his Fiero batteries at an ideal 70 degree F operating temperature in the winter. He also has an insulated, ventilated battery enclosure. The plates are thermostatically controlled and powered from the ac charging plug so no battery energy is used while driving. The battery mass and thermal inertia keeps the batteries warm while driving.

The Triton Project was discussed. Members approved the draft published in the June Newsletter but made several recommendations for changes. The principal item was for the FVEAA to ask Triton to state how they intend to use the completed car. This is essential for design purposes. Do they want a peppy car with good acceleration with the sacrifice of some range or is range their principal objective? This will affect the motor, controller and battery choices.

Shafer stated he recommends use of Optima batteries. The completed car is may not get adequate battery maintenance needed for flooded batteries. Other recommendations included having each person working on the project to bring his own hand tools to the job. A tool room checkout would be cumbersome. Finally, the FVEAA is interested on how Triton intends to recruit student participants. Shafer noted that other electric car groups working with high school students to convert a car found the students tend to disappear after an initial burst of enthusiasm. The FVEAA affirmed its commitment finish the project with FVEAA members if necessary.

The Triton response to the draft noted that a September starting date was not realistic for them.

Member Kevin Zak stated that several products are available for rust treatment or prevention. He recently used blacktop driveway sealer as an undercoating. There is also DupliColor spray-on bedliner. MEK (Methyl Ethyl Ketone) is a good organic solvent to clean surfaces.

President Shafer adjourned the meeting at 10:30 PM. Members then gathered under the parking lot lights to inspect Doug Mather's HP computer display of a data recorded during a trip.

Submitted by  
Secretary Dick Ness.

## FROM OTHER EV NEWSLETTERS

**Current Events**, the publication of the National EAA in their Feb-Mar issue, had a front-page article on how to build your own dc-dc converter for only \$ 35. EAA President Scott Cornell used two standard dc-dc modules and a few other parts to build a simple 84-144-volt input, 13.5 volt, 100 watt output converter. The article includes a schematic and parts list. More information is available from MECI, 340 E. First Street, Dayton OH ([www.meci.com](http://www.meci.com)) or All Electronics, 14928 Oxnard Street, Van Nuys, CA 91411 ([www.allelectronics.com](http://www.allelectronics.com)).

Bob Burnside has an article about his experience with a Lectra Motorbike in San Francisco. He uses the vehicle for commuting to his office and other trips under 10 miles. He is offering to sell his \$ 5000 bike for \$ 3200.

The issue also has an article about recalculating electrolyte devised by Saied Motei and used to set a distance record in the early 1980's. He built a 1"x2" minipump for each cell. It pumped electrolyte in each cell between the bottom and top. Installation required boring a hole in the case for a plastic tube to the pump at the top. The hole must be carefully sealed. Pumping prevented electrolyte stratification, allowing the total height of each plate to operate in an electrolyte with a uniform acidity.

The issue also had 24 articles concerning industry news about EVs.

**The EEVC in Valley Forge in their June Newsletter** featured another appearance of the Cinnamonsen High School electric conversion of a Ford Escort in this year's Tour de Sol competition. They finished in fifth place out of 13 entries in their class. There was a second New Jersey entrant in the event. The vehicle was assembled by a team that included the New Jersey EPA and Rutgers University students. The hybrid vehicle combined a direct-injected diesel engine and a NiMH battery pack.

The issue also reports that Ford Motor Company in Ireland built a Lithium-ion battery vehicle based on a Ka platform. The car weighed 2495 pounds. The battery pack accounted for 175 pounds of the total. Weight was reduced by extensive use of aluminum-plastic composite for some body panels. At a constant 50 mph it has a 25-mile range, a top speed of 81 mph, and a 0-60 mph acceleration in 12.7 seconds. The motor is a 3-phase asynchronous type having a 65 kW peak output.

The article also reports that auto manufacturers want out of California's Zero Emission Vehicle (ZEV) mandate requiring a specified percentage of new vehicles be electric by 2005.

Finally, they also reported that EV owners in California like their vehicles. 70% of the owners use their electric as their primary vehicle. 68% use them for work or school commuting, 64% for shopping, 55% for work related travel, and 41% for recreational driving. 14% said they drove their EV's more than 50 miles/day.

**EV News, in their June issue**, had extensive coverage of the 2000 Tour de Sol. The Honda *Insight* ran away with the mileage in the production vehicle hybrid class. It achieved 92.36 miles per gallon. An Ovionic battery scooter achieved 302.14-mpg equivalent. At the low end of the scale, a BlueBird bus registered 10.74 mpg compared with the usual diesel mileage of 4.6 mpg. A 1974 Fiat electrified by a team of students from Bolton (CT) High School topped the range for lead-acid battery cars with 164.3 miles. A GM EV-1 with NiMH batteries went 224.75. Correspondent Michal Bianchi observed, "Every year I don't care who wins what prize at Tour de Sol". There are now many different categories and the driving doesn't really reflect everyday driving requirements.

## From other EV Newsletters - Continued

### From EV News (Continued)

FVEAA member and former President Len Fisher wrote an article after entering his new Honda *Insight* in the *Tour de Sol*.

The issue notes that on April 19<sup>th</sup> Toyota started marketing its \$ 20,000 *Prius* hybrid. This vehicle weighs 2,765 pounds.

The final article was about the conclusion of a Chicago Transit Authority's 2-year revenue service test of three Ballard fuel cell busses. Air Products Company furnished liquid hydrogen to a CTA bus storage facility for the test. The gas was cryogenically stored and converted to a gas for refueling. Refueling a bus required 20-25 minutes. The procedure was similar to vehicles using compressed natural gas. The CTA would be willing to do further testing if funding is provided.

EV News reports that Ford has moved the TH!NK vehicle development group from corporate headquarters in Dearborn to San Diego. Previously it moved its Premiere Auto Group (Volvo, Jaguar, and Mazda) from Michigan to Irvine CA.

The issue also announced that Solectria has signed a \$ 1.3-million contract to furnish motor, controllers, and other EV components for electric buses to Chattanooga-based Advanced Vehicle Systems.

**EV CIRCUIT, issued by the Ottawa Canada Group**, in their May/June Newsletter notes that with annual dues of \$ 20 the cost to read the publication is only 18 cents per page.

EVCO President Darryl McMahon wrote an article *People Ask the Darndest Questions – EV Displays*. In it he lists 21 questions usually asked about electric cars on display and his answers. What follows is an excerpt.

Q- How fast does it go? A - Faster costs more money. How fast do you want to spend?

Q- How far does it go? A - Further costs more money. How far do you want to spend?

Q- How much did it cost? A – I suggest they compare a conversion to the cost of putting a new engine in their regular car. The engine will cost \$ 4000, a new ignition \$ 800, exhaust system \$ 600, cooling system \$ 500, starter \$ 150, fuel system including computer \$ 900, emission control system and catalytic converter \$ 3000 and two year's of fuel \$ 2000. This totals \$ 13,150 for parts only, no labor or taxes included. This is equivalent to what we are doing for about \$ 7000.

Q – Where can I buy an electric car? A- you can't.

Q - If EVs are so great why aren't the auto companies in production? A- They are not good for automaker's profitability.

Q – Where; do you get a long extension cord? A – At any hardware store.

Q – Don't EVs using electricity cause more pollution? A- Overall the efficiency of an electric car fueled by burning oil in a generating station is 25%. IC engine cars rarely are more than 15% efficient overall. The real beauty of electric cars is their ability to operate on electricity from any source including solar or wind.

Q - Why don't you put a generator on wheels and charge the battery while driving? A – A parasitic generator returns far less energy that is require to turn it. I suggest they get rich by building such a car.

Q – Why don't you put solar panels on the roof? A – There isn't enough space. The solar panes should be at home where the car can be connected to them for recharging.

Q – What do you do when you want to go on a really long trip? A- Use the other car.

## FROM OTHER EV NEWSLETTERS - Concluded

**Genessee Region Clean Communities (Formerly Electric Grand Prix) in NY** in their June issue had an article on fuel cells noted that the 211 grams of platinum catalyst cost for an automotive-sized cell would be \$2800. The cost goal is \$ 350/kW.

Electric Grand Prix now has a website [www.electricgrandprix.org](http://www.electricgrandprix.org) where EV information may be accessed.

They had an editorial about acid rain. Their region still has this problem in the Adirondacks area. Lake pH level ranges from 4.36-5.54 (The pH for neutral water is 7.0). Acetic rain comes from oxides of nitrogen and sulfur emitted by combustion processes. It would take a 40% reduction in emissions to stop degradation. Mobile sources are a major contributor.

**VEVA, the Vancouver Organization**, in their June Newsletter reported on their annual *Ride Electric Vehicles* event. It included an Electrathon competition that was won by an entry that completed 90 laps on a 360-meter track in the two-hour limit. Pretty good for 48 pounds of batteries. In the unrestricted class the winner completed 132 laps. The most unusual vehicle at the event was a Corbin *Sparrow*.

The issue notes that for \$ 13,990 you can buy a state-of-the art, ac drive EV kit for a Geo Metro conversion from Solectria.

The issue also has an article that answers the question, "I want an EV, but where can I get one"? They offer five choices: 1) A used conversion. 2) A used CitiCar (1600 were built). 3) A used car and conversion kit to build your own. 4) A used car and assemble a cratefull of parts to build your own. 5) A factory-built vehicle (at least \$ 30,000).

## RECENT ARTICLES AFFECTING ELECTRIC VEHICLES

The most important topic affecting electric vehicles this past month has been the unexpected rise in gasoline prices. At its peak regular gasoline in the Chicago area had a pump price of \$ 2.28 per gallon. This subject was the subject of articles appearing in the Tribune, Sun-Times, Forbes, Business Week, U S News and World Report, and probably a lot of other publications your Editor does not regularly read. This review will attempt to summarize the topic.

Articles list several causes for the price jump. 1. OPEC oil production restrictions. 2. EPA requirement for introduction of reformulated gasoline (RFG2) in new areas. 3. Lack of refinery capacity. 5. Federal, state, and local gasoline taxes. 5. An oil company price conspiracy. The first cause can be quantified by a daily examination of crude oil futures price. That price increased from around \$ 20 a barrel to over \$35 at peak.

Various sources quoted different prices for the crude oil component in a gallon of gasoline. It appears this is about 78 cents per gallon. Refining accounted for 33 (Business Week) to 90 (AAA) cents. Retailing was listed at 5 cents. Federal tax was 18.5 cents. Illinois road tax was 19 cents. Illinois sales tax added another 5% and was imposed on pump price. The Chicago tax is 5 cents. Cook County tax is 6 cents. Finally there is an Illinois Environmental tax of 1.6 cents. The total posted price in Chicago was \$ 2.39.

## RECENT ARTICLES AFFECTING ELECTRIC VEHICLES (Continued)

It is my opinion that the price increase was due to a combination of these factors. The most significant was restricted oil production. Crude oil supplies were low at the start of the summer driving season. The market reacted as expected, the more scarce supplies are the higher the prices charged. The EPA RFG mandate was initiated at the same time. Although governmental cost statements say only "pennies per gallon" refiners citing the difficulty in producing the RFG fuel have said it is up to 40 cents per gallon for some refineries. Another difficulty is the EPA has specified different RFG blends for different areas. This caused supply dislocations because it is illegal to sell an RFG specified for one area in another. It also caused additional transportation costs. Wisconsin and Illinois require 10% blend of ethanol in gasoline and this substance cannot be blended at a distant refinery and transported by pipeline.

There has been a lack of new refinery construction. It is not a profitable business. New capacity requires a large capital expenditure and several years to complete. Look for Congress to enact a tax deduction for refinery construction. It will probably be denounced as another governmental corporate welfare program.

Taxes had absolutely no effect on price rises. They remained unchanged until politicians, responding to constituent outrage in an election year, suspended the State sales tax for six months. The tax holiday will cost the State \$185 million for six months. The Illinois Legislature will have an opportunity to change the way in which sales taxes are applied during the Fall Session. I have suggested that they apply the sales tax to the commodity price for unleaded gasoline. That would cut the sales tax buy one half. Today the futures price for unleaded gasoline was \$ 1.04/gallon. That leaves unanswered the question of revenue loss. It seems to me that one tax on gasoline is enough, but road taxes are earmarked for highway construction and repair. The sales tax does not have this restriction.

I don't buy the *CONSPIRACY* cause enunciated by Senator Durbin and others. There are enough actual causes as noted above. I have suggested that President Clinton immediately suspend the EPA RFG edict for the rest of this year to determine if his EPA made a mistake. If prices decline then this can be identified as a principal cause. No response.

Each person who has completed a conversion and using his EV within its range limitation has been shielded from most of the gasoline price increase. They are beneficiaries of their previous work. It should encourage the rest of you to get started on a conversion.

This will not be the last price crisis. Prices are unlikely to drop significantly for the rest of this year. The next effect will be felt this coming winter when heating oil supplies become scarce and more expensive. The Northeast will be most affected, but I expect that natural gas prices will also rise significantly. Especially since a number of electric peaking plants using gas turbines and natural gas for fuel have been added to the power grid following electric utility deregulation in many states.

**Silent, Silent evolution. Chicago Tribune 6/18/00, Page 1, Section 12.** The commercially built electric car wouldn't exist if it weren't for all that smog in California. The State adopted a Zero Emission Vehicle (ZEV) mandate that auto companies start producing and selling these cars. The mandate required that 2% of their sales be ZEV starting in 1998. GM, Honda, Toyota, Nissan, Chrysler, and Ford all established pilot testing programs. Together they produced 1700 EVs. The State has since changed the effective date to 2003. That date will be reviewed in September of this year.

The test established that electric cars were range-limited, a fatal flaw according to the auto companies. However, many users found that the electric car could become their primary vehicle. Cost was also an obstacle. This was addressed by President Clinton's executive order directing the Department of Energy to pay \$ 10,000 for each vehicle or half of its incremental cost. Additional payments are made for new charging stations.

## RECENT ARTICLES AFFECTING ELECTRIC VEHICLES – Continued

**Pedal Power. Chicago Tribune 6/12/00, Page 5, Section 12.** Even bikes are feeling the electricity. The article lists five companies producing "bikes with a boost". A battery-assisted bike can go up to 20 miles before a recharge from a standard 15-amp, 120-volt outlet. They cost \$ 500-1000. ZapWorld is the leading supplier with ElectriCruiser that sells for \$ 824. A Chicago area dealer for the company is in Plainfield. More info is available on their website [www.zapworld.com](http://www.zapworld.com). Other sites are [www.ebike.com](http://www.ebike.com), [www.etcbikes.com](http://www.etcbikes.com), [www.cumetech.com](http://www.cumetech.com), and [www.lafree.com](http://www.lafree.com). Leader Zap sold 10,000 electric bikes last year.

**ComEd donates bikes to get cops up to speed. Chicago Tribune 5/10/00.** ComEd has donated a fleet of 180 electric bikes to Chicago and suburban communities. With them the officers will be able to cruise their beats at 18 mph out in the open. The \$ 2000 Electric Fuji Police Specials were bought from Currie Technologies in Van Nuys California. Chicago will be using them for their lakefront patrols.

**Scooters picking up serious speed. Chicago Tribune 6/15/00.** A fourteen year old boy is the envy of his peers because he has a *Big Foot* motorized scooter. The vehicle has a small gasoline engine in the rear. ZAP makes an electric powered scooter called the ZAPPY. The retailer Sharper Image is selling a non-motorized scooter, the *Razor* that is proving to be very popular.

The scooter revival began in Germany, spread to Japan, headed to Australia, and now has arrived in the USA. The 2-wheeled scooter was invented in Germany in 1816. They were very popular during the Depression ear in the USA. Scooters are stealing some of skateboard popularity because they are much less skill demanding and safer. Two Chinese factories are running at full-tilt to meet scooter new demand. Last year DJL sold 150,000 units. The fad may fade in a couple of years or it may stick around like snowboarding and rollerblading that today are multi-million businesses.

**Automotive electronics power up. , May 2000 Spectrum, a publication of the Institute of Electrical and Electronic Engineers.** Auto companies are equipping their cars with more electrical devices that put additional electrical loads on the standard 12-volt system. Recognizing that a new standard was needed a consortium on Automotive Electrical/Electronics Systems and Components was organized in 1994 by MIT at the behest of Mercedes-Benz. The consensus standard new voltage is 42 volts and is labeled PowerNet.

.Rising electrical content of cars has prompted the need to move to a higher voltage. The cost of electrical systems in today's sedans exceeds the engine and transmission cost. There is only a limited space under the hood of today's cars for a 12-volt battery and belt-driven components that include a power steering pump, air conditioning compressor and water pump. "Fan" belt driven components today are draw mechanical power from the engine and this diminishes the engine's peak power ability. In many cars, the fan is electrically driven. Then there are the door locking actuators, power windows, and many other convenience accessories. Add to this cell phones, navigation systems, and other devices and the car's alternator current is quite large.

It would require a huge investment to change all present electrical devices to 42 volts. The interim solution is a dual system with 42 volts being used for the larger loads and a dc-dc converter supplying 12 volts to smaller loads where that voltage is adequate. This arrangement is less costly and requires less space than two separate systems, one at 36-volts and the other at

12 volts. Two dc-dc converters, each capable of supplying the peak 12-volt load, will be needed to provide 12-volt system reliability.

## RECENT ARTICLES AFFECTING ELECTRIC VEHICLES - Concluded

The average 12-volt load for today's car is 0.75-1kW. The peak load can exceed 1 kW. By 2005 the peak load is expected to exceed 10kW. The article provides a table showing the anticipated electrical power loads in the year 2005:

Feature	Peak load in Watts	Average load in Watts
Electromechanical valves ( 6cy at 6000 rpm)	2400	800
Water pump	800	300
Cooling fan	800	300
Electric power steering	1000	100
Heated windshield	2500	200
Pre heat catalytic converter	3000	60
Active suspension	12000	360
Communications, navigation, and entertainment	100	100
Total	Not applicable	2000

The proposed standard will include new electrical connectors that will prevent device connections to the wrong voltage.

EV and hybrid vehicles are paving the way for the voltage change. These are dependent on power electronics devices. Development has focused attention and R & D dollars the technology needed to employ dozens of 100-watt power electronic devices. Hybrid vehicles also incorporate engine stop-start systems that are central to their mileage improvement and emission reduction. An integrated start assist system (ISA) typically has pancake-shaped 3-phase induction motor-generator connected to the engine crankshaft. This arrangement can start the engine in 500 milliseconds compared to the 800 milliseconds needed for today's starter arrangement that uses a series-wound dc motor with torque that decreases with motor speed. Fuel injection time is also reduced. Another interesting feature of this combination is electrical damping of engine torsional vibration.

Silicon devices are less expensive for 42 volts than at 14 volts where currents are larger. This should lead to eventual cost savings for a 42- volt system. Temperatures encountered by semiconductor devices installed in a car and sitting in the hot sun for hours will require further development and testing. Another factor will be the voltage transients generated by the sudden disconnection of a heavy load, such as the engine-stop function or active suspension systems.

Popular acceptance of the change may not be easy to get. After all, a customer will not care if his water pump is mechanically or electrically driven. They will not be inclined to pay extra for the electrical alternative. This is a significant challenge for automotive engineers to avoid increasing sticker prices for the benefits received from a 42-volt standard.