



# EEVC NEWSLETTER

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## EVS BURN RUBBER IN MD; OLYMPIAN SETS RECORD

The Power of DC electric drag racing event was held as promised on June 19 at the Mason-Dixon Dragway, Hagerstown, MD, organized by the Electric Vehicle Association of Washington DC and sanctioned by the National Electric Drag Racing Association (NEDRA).

Competitors included Shawn Lawless, of Youngstown, Ohio in a 240-volt Electric Rail dragster called Orange Juice; Chip Gribben of Laurel, Maryland, organizer of the event, in a 156-volt electric Ford Escort; EEVC President Oliver Perry in Cinnaminson High School's 144-volt converted Ford Escort, the Olympian; Bryan Murtha, of Owings, Maryland, in a 288-volt RAV-4 EV; Central Shenandoah Valley Regional Gover-



*The Cinnaminson High School Olympian faces off with the Great Mills High School Green Hornet at the Power of DC drag races in Maryland.*

nor's School, with a 120 volt 240-Z called the Sweetheart; Great Mills High School, with a 216-volt Toyota MR-2 called the Green Hornet; and Valerie Myers, of Hagerstown, Maryland with her 156-volt Sparrow.

The cars ran on the regular 1/4-mile track used for other drags, and are clocked at both 1/8 and 1/4 mile.

Competitors are divided into 11 classes, as follows:

SP	Street Production
MP	Modified Production
SC	Street Conversion
MC	Modified Conversion
MT	Motorcycle or Trike
DR	Dragster
GE	Go-Cart
HS	High School Street
HM	High School Modified
CSF	Class 64

Within each class are ten voltage divisions:

- A 241V and above
- B 193V - 240V
- C 169V - 192V
- D 145V - 168V
- E 121V - 144V
- F 97V - 120V
- G 73V - 96V
- H 49V - 72V
- I 25V - 48V
- J 24V and below



The fastest vehicle was the 240-volt dragster, "Orange Juice," which ran the 1/4 mile in 11.39 seconds at a speed of 112 mph. A look at the car's battery pack gives some clue as to why it's so fast.



Orange Juice ran into some problems during the race: it was using older batteries, had low fluid in its Power Glide transmission, and was spitting sparks at one point. It has gone faster in the past, with a 10.8 second run at 119.5 mph in June of 2003.

EEVC resident Oliver Perry and vice president Mike Deliso took the Cinnaminson High School Olympian converted Ford Escort, veteran of the Tour de Sol, and ran to

see what would happen. With Ollie driving they managed to set a record, with a best run of 24.65 seconds in the 1/4 mile and a speed of 55.9 mph. It was a little disconcerting to Ollie to be paired with the Great Mills High School Green Hornet, which did 16.665 seconds and 80.67 mph, but the Olympian ran in division E (121-144 V), while the Great Mills car was in division B at 216 V.

With nine entrants divided among so many categories it's not surprising that every one was declared a winner. Results are as follows:

Vehicle	Owner	Driver	Time	Speed	Distance	Class
Orange Juice 240 V Dragster	Shawn Lawless	Mark Moore	11.39	112	1/4 mile	DR/B
Green Hornet 216V MR-2	Great Mills HS	Paul Graham	16.665	80.67	1/4 mile	HS/B
Piranha 48V Cycle	Darin Gilbert	Darin Gilbert	9.513	65.49	1/8 mile	MT/I
Sweetheart 120V 240-Z	Central Shenandoah School	Coby Hausrat	18.623	66.33	1/4 mile	HM/F
Watson 156V Escort	Chip Gribben	Chip Gribben	19.865	67.12	1/4 mile	SC/D
Sun Power 288V RAV-4	Bryan Murtha	Bryan Murtha	20.644	64.65	1/4 mile	SP/A
Chevy S-10 312V	Charlie Garlow	C. Garlow	20.876	64.75	1/4 mile	SP/A
Sparrow 156V	Valerie Myers	Valerie Myers	21.115	56.71	1/4 mile	SP/D
Olympian 144V Escort	Oliver Perry	Oliver Perry	24.65	55.9	1/4 mile	HS/E

Perhaps the fastest acceleration came from Darin Gilbert's Piranha 48 volt motorcycle, which reached 65.49 mph in 1/8 mile.

Electric drag racing is becoming a more established sport, and there are competitors that tour the country, just as with the gas-powered cars. Check out the NEDRA Web site at [www.nedra.com](http://www.nedra.com), as well as Suck Amps EV racing, at [www.suckamps.com](http://www.suckamps.com). and for more information on the event, go to [www.powerofdc.com](http://www.powerofdc.com).

*Our thanks to Chip Gribben for much of the above information.*

### The Olympian, #16 Makes its First Entry Oliver Perry

Saturday, June 19th, I decided to tow the Cinnaminson Electric Car out to Hagerstown, Maryland, to participate in the EAA/DC Electric Drag event, organized by EAA/DC member Chip Gribben, who works with the National Electric Drag Racing Association (NEDRA) and the Mason Dixon Dragway to make this these electric drags happen. This was the fourth annual Power of DC Watt-

Wheels drag race. It was fun and quite an experience. Thanks to our Washington friends, EAA/DC, for making it possible.

I have been asked several times to participate in this unique electric car experience. Until this year I have always had prior commitments. Even this year I had a thousand other things to do, but knowing that EEVC members Mike Deliso and Paul Kydd were driving out to watch (regardless of whether or not we took the car) and my school fund had enough money left in the account to cover expenses, I decided at the last minute to make the haul. And it turned out to be a haul. Towing the car with my Dodge Van took me a little over four hours, one way. Mike routed me out the PA turnpike and down Rt 81. For towing, it was a straightforward and easy route to take.

Having never participated in a drag event I didn't have a clear picture in my mind as to how the drag would be operated. I was surprised to find out that the regular guys in gasoline fueled dragsters were also in attendance. It seemed as if there were hundreds of loud gas guzzling monsters waiting in line for their chance to run the measured quarter mile track. But, it gave us a chance to expose electric cars to an audience that we otherwise would not have had. Also the gas cars pay for most of the expenses of operating the track. I doubt if we could have afforded our own private electric drag event.

The actual dragging did not begin until late in the afternoon. Since the electrics were vastly outnumbered we were interspersed between the main gasoline fuel attractions. It actually worked out very well. Announcements were made throughout the late afternoon and early evening when the track was open for electric cars. Each car had to pass a very preliminary inspection (make sure the entry fee was paid) after which an identification number was soaped on the car windows. Then the inspected cars were free to line up in lanes and wait for their call to the line.

Cars lined up side by side on the drive leading to the starting gate, and then when called, two cars at a time would be waved to the start line to make timed runs against each other. There were two sets of starting lights, one for each driver. You had to ready yourself for the pedal with two sequential yellow

warning lights and then take off on the green. I had never done this before and found it a little unnerving the first time. When you are sitting there in front of the bleachers (filled with spectators listening to the announcer describe your car) waiting for the lights to flash, you wish you had a 500 volt battery pack, a Zilla controller, and a vehicle weight of 1500 pounds, instead of a weight of 3600 pounds, 144 volts, and a controller limited (at best) to 500 amps.

### **Yellow, Yellow, Green! Why are you still sitting there?**

First trial: My reaction time was 1.8 seconds. That is, it took me a full 1.8 seconds to get my car going after the green light flashed. Even though two sequential yellow lights warned me of the coming green I was still slow to react. My opponent (a high school boy from North Carolina, I believe) only took 0.8 seconds to respond. I was told that the reaction time is included in the total time for each specified distance. Therefore the quickness of the driver's response to the starting light affects his final 1/4 mile time.

After the drag is completed and the drivers take the return road to the start, each participant is handed an electronic printout that provides the performance times of each car. So each driver drives away with a record of both times.

How do you think I felt seeing the rear of my opponent leave me at the starting line? It took him 2.6 seconds to get to the 60 foot mark and 3.4 seconds for me! But, the printout shows that it took my opponent 11 seconds to get to the 330 feet while I got there in 9.3 seconds. What happened?

Suddenly, after the opponent's car had left me sitting at the line, it blew a fuse somewhere in the accelerator system. I actually got excited as I passed the car halfway down the track. But then my hopes were dashed and I was humiliated when the same car passed me going 80 mph at the quarter mile mark. I limped over the 1/4 mark at 55 mph with a time of 22.9 seconds. His time was 21.4 seconds, and that included his mini breakdown and quick repair.

Later I was to go against him when his car didn't break down. He crossed the 1/4 line at 73 mph and in a time of 16.9 seconds. I also

went side by side with him when he broke down for the second time, either at or near the start, and didn't recover. So if you averaged the results of our three head to head runs, the Olympian didn't do that badly. We again demonstrated that although the Olympian may not be the fastest car on the circuit, it seldom breaks down. It is like the Energizer Bunny, it just keeps on running.

I think that the car I competed head to head with was from Northeast-Guilford High School. I never got the specific specs on the vehicle. In fact I don't even remember what the original body type was. Their pit area was not near ours. Their car was a small converted front wheel drive sedan with the same 9 inch Advanced DC motor that we have, under a sloped-to-the-bumper hood. But it also had a Zilla controller and a voltage of over 200 volts. The car definitely did not have the range of the Escort. Their car was designed to drag, not for long distance. After several drags they needed a recharge. We didn't notice much difference after 5 drags with no recharges.

I ran several other trials. In one I tried to shift between first and second gear. That was a predicted disaster. I arrived at the finish line in 32 seconds at a speed of 26 mph. I have never been able to throw a quick shift (we have no clutch) under load. However I was able (even with my slow reaction time of 1.7 seconds) to get to the 60 foot mark in first gear in 2.8 seconds! When I shifted out of first I got stuck in neutral and couldn't find any gear until eventually I found third.

It turned out that our best time for the Escort was achieved in my first run. I suppose that our batteries were freshest at that point. I ran it in 2nd gear. The best final speed at the end of the 1/4 mile run occurred in the last of five runs. That speed was 61.4 mph at a time of 24.4 seconds, performed in third gear.

If we look at the 1/8 mile statistics we find that my best time for the 1/8 mile was achieved in the first run at 14.3 seconds, at a line speed of 48 mph. It was done in 2nd gear. In the last run ( third gear) it took me 16 seconds to get to 1/8 of a mile and my speed was also 48 mph. In third gear the acceleration is good above 40 mph. As one of the spectators told me at the end of my last run

(in third gear), "Boy that car really takes off when it reaches the 1/4 mile mark." I got annoyed at always losing by big margins and decided on my last run to show (anybody looking) that our car could reach high speeds. I kept the pedal to the metal after I crossed the finish line and continued to accelerate down the section of the track where real racers open their parachutes. It was also the point at which my opponents were slowing down. Warped as it may appear, it felt good to pass them. The car really did start to move after 40 mph, and it kept accelerating. At about 75 to 80 mph I reached the end of the runway and realized I was not taking off in an airplane so I braked.

The competition is called the "quarter mile" drag and it shows what it takes to quickly get up to highway speeds, not how fast your car can go once you pass the quarter mile. Our Ford Escort is not designed to set the standard in the quarter mile.

However, and I must add a HOWEVER, if the truth is to be known, Mike Deliso had researched the records of NEDRA June 18th and found out that up to that date that no street legal, high school entry in the 144 volt category had ever been officially entered into an official NEDRA event. And upon his advice and suggestion we felt it might be worth the trip out to Hagerstown to officially enter this class and put the Escort into the record books. So even though there was also good will intended for just participating in the Power of DC 2004 event, the possibility of setting a record, no matter how pitifully poor it was, was just too much to pass up. That is why I finally decided to haul the Escort all the way out to Hagerstown. And after we ran the first trial and we felt that nobody else was going to enter our class, we decided it was not worth the effort to take out one set of the two 12 battery packs to make the car lighter and earn a definite better time. With just one set of 12 batteries we are considerably lighter and quicker.

As Mike said, " We came out here to have a good time and set a record. It appears as if we have set the record since nobody else entered our class. Taking the batteries out and then having to put them back in again would not give us a good time. So let's just leave them in and be content to be the first to get in

the record books. Who cares what the time was?" "Besides," he added, "It wouldn't look good coming in here for the first time and beating everybody else. Why, Ollie, do you always have to be so competitive? Try making friends instead of always trying to beat people. If you really want to beat somebody why don't you race against Jerry Asher's electric bike? The Escort should be able to beat him. (Only kidding.)

My answer to Mike was simple. "I do it for my major sponsor, Eugene Lemieux. "When my car pulled up to the starting line I heard the announcer introduce me as Eugene Lemieux from Middletown, New York! Lemieux does not back losers!

Anyway, the advisor of the green speedster from Carolina, the car that beat us, gave me a suggestion. Connect the two battery packs in series and go to 288 volts instead of 144. Put in a Zilla controller and adjust the fuses. The motor can take it for twenty seconds. According to him we would fly!

Maybe next time, if there is a next time?

*Editor's note: Kudos to Ollie, who doesn't mention that he has donated the \$500 prize the Cinnaminson car won for coming in second in the Tour de Sol to the EEVC treasury.*

## **PRESIDENT'S MESSAGE** **July 4th, 2004** **Oliver Perry**



As you have read in several of our past July Newsletters, the Cinnaminson High School Electric car, The Olympian, made another appearance in the annual 4th of July Riverton (New Jersey) Parade. The Riverton Parade is one of the older, if not one of the oldest annual 4th of July parades in the country. The

parade forms by the Riverton Yacht Club, down at the Delaware River near the Tacony Palmyra Bridge, crosses over River Rd (and the tracks of the River Line in Riverton) and ends up in Riverton Park. The distance of about two miles (at most) is lined with throngs of spectators. Our car traditionally follows our high school band. This year it was driven by Kevin Latonic, one of my physics students who participated in the Tour de Sol last May. His younger brother rode in the passenger seat.

Kevin told me that he and his family always attend the Riverton Parade but this year was the first year that he had ever been in it. Again the car received generous applause as it crawled along the parade route. I walked along side the route, across lawns and against store fronts, taking a few pictures. When I ran out of space on the computer chip for more pictures I took a short cut to the finish line and waited for Kevin and his brother. I am guessing that it took about 40 minutes for them to cover the parade route. When I took Kevin back to his parking spot near the beginning of the parade, over an hour from when we started, I was able to greet some individuals in sports cars who were just beginning the parade. Riverton is a small town with a big parade.

As far as I know we had the only electric car in the parade. One enthused individual proudly showed me his Vegetarian entry. It had a small diesel that ran on vegetable oil. Several bystanders showed genuine interest in the mechanics of both vehicles while we were in line waiting for the parade to begin. Parades provide an excellent means to increase public awareness of alternative energy vehicles.

Later in the weekend my wife and I attended the 4th of July parade that marched from Center City Philadelphia to the art museum. The route was packed with thousands of spectators. Southwest Airlines sponsored the parade and had hundreds of marchers in it. Southwest made quite an impression. As I sat there watching I couldn't help but speculate as to whether or not electrics could also have also had representation. Years ago I remember Guy Davis having been in a Philadelphia parade with electrics.

## HONDA RELEASES PHOTOS OF HYBRID ACCORD



American Honda has released the first images of its 2005 Accord V6 Hybrid, scheduled to go on sale later this year. The car uses a next-generation hybrid powertrain with a V6 engine and is touted as having

power and performance above the current 240-horsepower Accord V6 with the fuel economy of a four-cylinder Civic sedan.

Features include Variable Cylinder Management (VCM) technology that shuts down three of the engine's six cylinders during cruising and deceleration and the Integrated Motor Assist (IMA) hybrid system.

## WE'RE NOT IN KANSAS ANY MORE

Since moving to California, your editor has begun to discover some of the strange ways of the natives. Two of the hardest to get used to have to do with cars. First off, California has a strict rule about pedestrians and cars. If a pedestrian even looks as if he might venture off the sidewalk, even if it's in the middle of a block, all traffic immediately screeches to a halt. As a consequence, the locals just saunter out into traffic, completely oblivious to anything coming. It's as if they're all on drugs. They wouldn't last five minutes in New York or Philadelphia!

The second oddity is not immediately annoying, but is an immediate danger. California has no vehicle safety inspections. They do emission tests every two years, but that's all. A car can have no brakes, no lights, and bald tires, yet it's still legal to drive. Kind of gives you a warm feeling going down a six-lane freeway in heavy traffic.

More on California next month.

## NEWS UPDATE

### Glass spheres for hydrogen storage

Researchers at Alfred University in Alfred, NY are working on a technology that EERC members have known about for about a decade: the storage of hydrogen under great pressure in tiny glass spheres. The idea is that glass spheres 50 microns in diameter are

immensely strong, and can hold hydrogen at pressures of 10,000 psi. It's a very safe way to hold the hydrogen, and takes no expensive pressure vessel.

The Alfred University breakthrough deals with ways to release the hydrogen easily and controllably from the spheres. They have found that by treating the spheres with certain chemicals they can be made to release their hydrogen when struck by light. Adjusting the intensity of the light, they say, would adjust the rate of hydrogen release.

### Joint venture for hybrid car batteries

On June 30 Hitachi Ltd. and Hitachi Maxell announced a joint venture with Shin-Kobe Electric Machinery Co. to establish a joint venture called Hitachi Vehicle Energy, Ltd. to market, develop and manufacture rechargeable lithium-ion batteries for EV applications. The business was due to start July 1.

### Hydrogen Hummer for the Governor?

There have been several news stories (on MSNBC, among others) that California Governor Arnold Schwarzenegger wants a hydrogen-powered Hummer. Schwarzenegger claims that he was the one who convinced General Motors to build the Hummer, he says, after spending \$100,000 to convert a military model.

One of the bidders for the job is Intergalactic Hydrogen, which makes multi-fuel conversions to allow gasoline and diesel-powered vehicles to run on hydrogen. The company's president and founder, ex-olympic skier Tai Robison, recently drove his own converted pickup truck across the country.

### The wind in Spain...

A Reuters story by Alejandro Lifschitz dated July 8 reports that the village of Higuera, Spain is the home of Europe's largest wind farm. The 244 windmills, 180 feet high, have a capacity of 160 MW, and provide both cash to the town government (450,000 euros a year) and maintenance work for 25 of its residents.

Spain is the world's third-largest producer of wind power behind Germany and the United States, says the story, and it wants 15 percent of installed energy capacity to come from wind power by 2011.

## Electric still beats hydrogen

A recent study by the Institute for Lifecycle Environmental Assessment ([www.ilea.org](http://www.ilea.org)) finds that the hydrogen economy may not be all it's cracked up to be. The study, authored by Patrick Mazza and Roel Hammerschlag, compares the losses and environmental costs of using electricity from renewable sources directly or using it to electrolyze water for hydrogen. Not surprisingly, it finds ReH<sub>2</sub> flawed, because it involves extra steps, with their attendant losses. For example, going from electricity to hydrogen electrolytically, and then going back to electricity in fuel cells has a loss of about 40%. The reason, says the paper, that ReH<sub>2</sub> is still considered is that "it is viewed as capable of providing services in areas where direct electricity is seen as falling short, in particular vehicle fuel and energy storage."

Producing hydrogen via steam reforming of natural gas is much less costly than ReH<sub>2</sub> and likely to remain so for a long time, but producing hydrogen from fossil fuels does nothing to solve the greenhouse gas problem.

Where portability is not a consideration, the study says, the use of hydrogen as means of storing energy from intermittent sources, like solar or wind, is not economical, citing an estimate that "a 100-turbine wind farm that employs developing battery technologies will deliver as much end use energy as a 160-turbine wind farm that stores energy with H<sub>2</sub>."

The study also cites an estimate that a solar farm making electricity and electrolyzing water to make hydrogen sufficient to provide the energy needs of the entire U.S. vehicle fleet (assuming 100% use of fuel cells) "will require 31,000 square kilometers, about 5% the land area of Arizona and New Mexico" devoted to solar panels.

While this might seem economically—if not aesthetically—attractive, it does not address the problems of transmission. When the losses involved in transporting hydrogen (which has very low energy density on a volumetric basis) are considered, hydrogen looks much less attractive.

Would it help to generate the electricity at a centralized location, with solar panels in the Southwest or with large-scale hydro in the Northwest, transmit the energy as electricity, then convert it to hydrogen?

In a word, no. The existing electrical grid couldn't handle it, and it's inefficient to send electricity such long distances anyway.

When it comes to EVs and fuel cell vehicles, the report suggests that EVs have a lot going for them, and should be examined more closely: "[C]onventional wisdom has it that EVs are a technological dead-end hobbled by limited range and extended recharging times, so the potentially less restricted FCV [fuel cell vehicle] is the wave of the future. Yet EV limitations pose less of an obstacle than is generally believed, while the efficiencies offered by battery electric transportation make a strong argument for revisiting the EV as a serious alternative."

The study says that manufacturers have not paid enough attention to recent battery advances, particularly in lithium-ion cells: "Technology is in place to develop commercial Li-ion battery packs that store electricity at an energy density of about 1.8 MJ per liter (MJ/L) and a specific energy of 0.72 MJ/kg. Lead acid batteries... compare at a paltry 0.3 MJ/L and 0.16 MJ/kg. Li-ion batteries also exhibit a substantial cycle life: at the rate discharged in automobiles, a Li-ion battery can be expected to retain over 90% of its capacity after 500 full discharges. The cycle life, for typical driving, will in fact approach the battery's calendar life of roughly 10 years."

The report further finds that fuel cell vehicles compare poorly in overall efficiency with EVs, and cites a study that says that a Honda FCX fuel cell vehicle uses almost four times as much energy per mile as a RAV-4 EV, when the hydrogen for the FCX comes from electrolysis. In addition, EVs could be brought to the market immediately.

The study adds one other contender to the mix: the plug-in hybrid (PHEV). By increasing the battery capacity of an HEV and allowing for mains recharging, range without use of the engine can be substantially increased and operating cost reduced.

There is a great deal more of interest in the report, and we recommend reading it and passing it on to others. The ILEA allows for unlimited reproduction and distribution, and the report is available for download as a PDF file from [www.ilea.org/downloads/Mazza-Hammerschlag.pdf](http://www.ilea.org/downloads/Mazza-Hammerschlag.pdf)

## COMING EVENTS

### **FedFleet 2004: The 4th National Federal Fleet Manager Workshop and Information Fair**

July 20-22, New York. Call 800-315-4333

### **Hydrogen—Fueling the Clean Air Future**

August 16-17, Palm Desert, CA. Contact South Coast AQMD, 909-369-2000, or go to [www.aqmd.gov/tao/new-events/hydrogen-conference.htm](http://www.aqmd.gov/tao/new-events/hydrogen-conference.htm)

### **Advancements in Battery Charging, Monitoring & Testing Technology Symposium**

August 18-19, Denver, CO. For information go to [www.batterypoweronline.com](http://www.batterypoweronline.com).

### **World Renewable Energy Conference VIII**

Aug 28 to Sep 3, Denver, CO. Call Robert Noun, NREL, 303-275-3062.

### **Cruisin' Southern Cal: 2004 Fuel Cell Vehicle Road Rally**

Sept. 17-19, Los Angeles to San Diego, CA. Contact The California Fuel Cell Partnership, 916-371 2870, or go to [www.fuelcellpartnership.org](http://www.fuelcellpartnership.org).

### **AltWheels Alternative Transportation Festival**

Sept. 17-19, Brookline, MA. Contact Alison Sander, 202-824-7362, or go to [www.altwheels.org/index.html](http://www.altwheels.org/index.html).

### **22nd National NGV Conference and Exhibition**

Sept. 19-22, San Antonio, TX. Contact Stephe Yborra, 202-824-7362, or go to [www.ngvc.org/](http://www.ngvc.org/)

### **Electric Drive Transportation Association Conference**

Sept 21-23, Orlando, FL. Contact Pam Turner, EDTA Conference Manager, 408-741-5870, or go to [www.edtaconference.com](http://www.edtaconference.com)

### **Electric Transportation Industry Conference 2004**

Sept 21-25, Kissimmee, FL. Call Kara Elden, 202-408-0774

### **Hydrogen and Fuel Cells 2004 Conference and Trade Show**

Sept. 25-28, Toronto. Contact Advance Group, 800-555-1099 x2, or go to [www.ngvc.org/](http://www.ngvc.org/)

### **ITSC 2004, 7th International IEEE Conference on Intelligent Transportation Systems**

Oct 3-6, Washington, DC. Contact ITSC

2004, 732-562 3870, or go to [www.itsc2004.org/registration.html](http://www.itsc2004.org/registration.html).

### **Alternative & Advanced Energy Technologies: Manufacturing Challenges & Opportunities**

October 12-13, Dearborn, MI. Contact Irene Spanos, SME Communications, 313-425-3155, [communications@sme.org](mailto:communications@sme.org).

### **Michelin Challenge Bibendum 2004**

Oct. 12-14, Shanghai, China. Contact Nathalie Zhang, 86-21-5835-6012, or go to [www.challengebibendum-registration.com/Default.asp?language=EN](http://www.challengebibendum-registration.com/Default.asp?language=EN)

### **The 2004 Fuel Cell Seminar**

Nov. 1-5, San Antonio, TX. Contact Courtesy Associates, Inc., 847-768-0816, or go to [www.fuelcellseminar.com](http://www.fuelcellseminar.com).

### **SAE seminar: Hybrid Vehicle Technologies—Today & Tomorrow**

February 9-10, 2005, Costa Mesa, CA. Contact Nancy Eiben, 724-772-8525.

### **POWER-GEN Renewable Energy**

March 1-3, 2005, Las Vegas, NV. Contact Donna Welch, 918-835-3161, <http://pgre05.events.pennnet.com>.

### **EVS-21: The 21st Worldwide Battery, Hybrid and Fuel Cell Electric Vehicle Symposium & Exhibition**

April 2-6, 2005, Monte Carlo, Monaco. Contact the EVS-21 Monaco Organization, +377 97 77 54 21/+377 97 77 54 22.

## MEETING SCHEDULE

Due to difficulty in obtaining a meeting venue during the summer, club meetings will be suspended until September 8. Look for a notice of possible change in location.

September 8

October 13

November 10

December 8