Electric Auto Association

CURRENT EVENTS

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TAKING A SPARROW THE DISTANCE

The Wish Rally is the first event of Electric Vehicle Association of San Diego's (EVAoSD) "Z.E.V. (Zero Emissions Vehicles) For Life" program which was established to use electric vehicles to make the strongest impact possible on the quality of life today. We believe that Electric Vehicles (EV's) can do a lot more for humanity than just reduce air pollution.

The "Wish Rally" occurred on December 8 through 10, 2001. The goal was for Chris Jones to raise money for the *Let's Celebrate Foundation* by driving his electric Sparrow "Red Beet" as far as he could in three days. The route was to go as far north as Corbin Motors , the Sparrow factory in Hollister CA, (410 miles) then turn around and head back to San Diego. Corporate and personal sponsorship was based on the number of miles covered in the three days, up to a maximum distance of 800 miles. Chris Jones, a father of four from Cardiff By The Sea, asked for pledges from anyone wishing to help this cause, for a specific amount or per mile. At the end, he raised over $2,000 while driving a total of 709.1 miles in 51 hours and 27 minutes.

The *Let's Celebrate Foundation* makes birthday wishes come true for children with AIDS. Every dollar donated goes straight to the children. This rally is challenging to do in a Sparrow since it has been specifically designed as a commuter vehicle with a range of 40 to 60 miles per charge. This will be a test of the availability of charging stations. If the Sparrow can make this trek then it should be easy for EV's designed to cover longer distances. A by-product of the "Wish Rally" is to raise the public's awareness that EV technology works and is a viable means of transportation now, and that there are reliable alternatives to vehicles with internal combustion engines.

As an explanation of this rally, we've captured a summary of the 18 legs of the journey traveled between San Diego and Hollister and some pictures along the way.

Leg 1, Encinitas to Oceanside
Miles: 15.4 Time: 52 minutes KWH: ?

We left from Glen Park in Cardiff by the Sea at 10:10 AM and headed to Barry Shaffer's house in Oceanside for our first hop. We were already an hour behind schedule because there was a major accident on the freeway that stopped traffic and delayed picking up the trailer. Barry Schaefer drove the chase car, Kevin Taylor was the navigator and relief Sparrow driver and Chris Jones was the primary Sparrow driver. On the way to Barry's house we stopped off and picked up a gas generator and attached it to the trailer to use as a last resort (we never had to start it).

Leg 2, Oceanside to San Juan Capistrano
Miles: 31.7 Time: 1 hr 56 min KWH: 3.9

We pulled into Barry's garage and plugged in the 110 charger while Barry wired in a 220 cable into his breaker box. Barry's electrician experience came in handy several times on the trip. When all was ready we connected the "Y" adapter to the battery pack, the 110 charger and the 220 charger, plugged them both in and **23.5 Amps** were flowing into the pack! We were charging at about 3x the normal rate.

We charged for about an hour. This gave us time to get setup for the data we wanted to track, identify our next charging location and review the mapping software on the laptop. Greg Hanssen (who has driven his EV1 from LA to Montreal, http://www.evodyssey.com/) recommended calling the Saturn dealer in San Juan Capistrano (33033 Camino Capistrano, San Juan Capistrano, CA (949) 248-5411). They said if we could find a plug we could use it, so we were set. We unplugged about noon, wound up all the cables and headed out on the 5 Freeway. We drove for close to an hour and arrived at the dealership.

Leg 3, San Juan Capistrano to Westminster
Miles: 39.9 Time: 2 hr 2 min KWH: 3.9

We arrived at the Saturn dealer around 12:50 PM. After 10 minutes of talking and searching Kevin was able to locate the outlets we needed in a service bay and the 110 and 220 chargers were buzzing again. The folks at the dealership were very helpful. They were excited to be able to get a close look at another EV and take part in the rally.

While waiting for the charge we made arrangements to meet up with Greg Hanssen and follow him in his EV1 to Bill Kortoff's

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COVER STORY

Photos by Chris Jones of the San Diego EAA Chapter

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Electric Horses for an Old Mustang (Australia)

from Energy Matters No 11, Nov 1999

Electric cars are sold in Germany, France, the US and Japan, but not in Australia. But this minor hindrance has not stopped some of the Perth's more adventurous backyard mechanics from building their own. When retired engineer Jim Lissiman decided his Ford Courier utility needed a new engine, he decided to go electric rather than install a reconditioned engine. The Courier is now powered by a 75kW series-wound DC motor, a Curtis controller and 20 lead-acid batteries. With a top speed of 120 km/h, a range of 120 km and energy use of 18 kWh per 100 km (that's equivalent of 1.9 L/100 km), Jim hasn't looked back (except in his rear vision mirror when he passes the queue at a service station). His latest pride and joy, as seen in this picture, is a 1965 Ford Mustang powered in a similar manner to the Courier. Rather than turning heads by its good looks an d deep V-8 rumble, it now turns even more heads by its almost silent motion.

Bob Wing Appreciation

We want to acknowlege a Lifetime Appreciation award for Bob Wing. Over the years Bob has contributed much to the EV cause, both inside and outside of the EAA organization. The following is a little history Bob put together of his activities since the 1970's.

Founded several EAA chapters:
Seattle, WA
Portland, OR
Albany-Corvallis, OR
Medford, OR
North Bay (Sonoma County), CA

I have known Bob since about 1995. Bob showed his MG at every EV show in the area, went to every EV conference, wrote in many EV journals, and promoted most every EV company and business. He tried to help me with parts sales for my business InnEVations. He was willing to experiment with new components such as the ZAPI H2 controller, and Zivan battery management system, which myself and Greg McCrae were introducing to the market.

Bob has an extra room at their place in Inverness, which he makes available to EV people to stay in for free. Bob offered to share rooms at EV conferences. I think Bob spends almost every minute of his spare time promoting EVs, and he has probably done so since 1973.

He is getting up in age and his health isn't what it used to be. I can't think of a more deserving person to recognize for his 30 years of efforts in support of EVs and the EAA.

Sincerely, *Gary Flo*

The EAA direction in 2002:

Poised for growth on solid ground

What three principles build a strong foundation for the EAA?

1. Focus on Sound Science.

We base our publications, investigations, and projects on sound, safe, and proven principles, and we distance ourselves from pseudo-science, the false promises of fringe "technical groups" that tarnish our cause. The laws of physics can not be rescinded.

2. Encourage Innovation among Members.

I believe that it takes a group of individuals, each with strong curiosity, determination and focus. These are the members of our various chapters, and they need to be able to interact intelligently beyond their own garage, chapters, and country to share ideas. This sharing of ideas leads to encouraging each other to think, to act, and to grow, and is a source of creativity. In the past we've seen many beneficial results from the processes: local chapter meetings, nationwide EVents (such as the recent Washington, DC Autoshow), the EVDL (EV discussion list), the various vehicle specific discussion groups set-up on the Internet, etc. Quite often members can develop friendships and establish good results in their daytime work as a result of such positive sharing.

3. Promote Teamwork among Chapters, Members, and the Public.

Great results are most often achieved through teamwork, where people in different organizations, of different locales, and from different backgrounds coordinate their unique abilities to achieve great ends. This teamwork and synergy in local chapters gives our organization strength, inspires others and binds us together as believers in our cause. Our goal is to combine our strengths through education and communication, for the good of all.

The Electric Auto Association (or EAA) national web site http://www.eaaev.org spells out the organization's purpose. We invite you to visit and send us your feedback.

Ron Freund, EAA Chair

First Ever EAA Chapters Meeting and Conference ! ! !

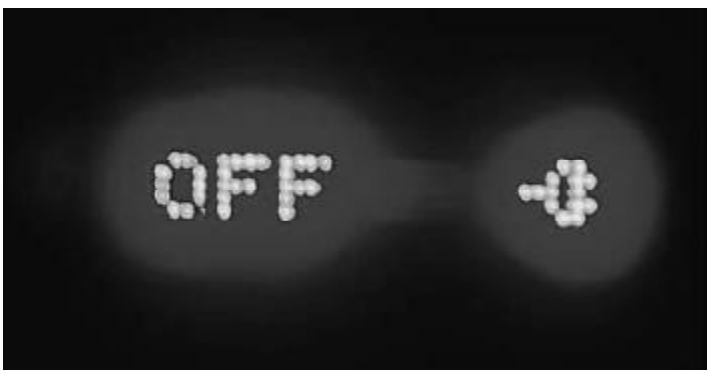
Coming up **May 12-15** in the greater Washington/Baltimore area. Sponserred by the EAA National organization and EAA Board, and hosted by the EVADC Local Chapter. Timed to coincide with the kickoff of the annual Tour de Sol.

Contact: *Jerry Asher*, evjerry@usa.net
EVADC website: http://www.evadc.org/

By Victor Tikhonov

The idea behind the status display came naturally after everyday EV use. When I plug in my EV for charging, (especially away from home with a known power source), I need to know if the outlet is alive (circuit breaker did not trip), battery pack still being bulk charged or is near completion, if any errors have occurred, etc. Also, since I have electric battery heaters, I'd like to know if the pack temperature is at least within preset limits. I used to have all the status LEDs clustered in one spot near the charger and every time I wondered what was going on, I had to walk over to the car, open the door, and look at the display. Well, it would be nice to have a remote wireless status display, but I'll probably leave it for the next ultimate EV project. For now, I've decided to settle for LED matrix lighting doubling as the charging/heating status display.

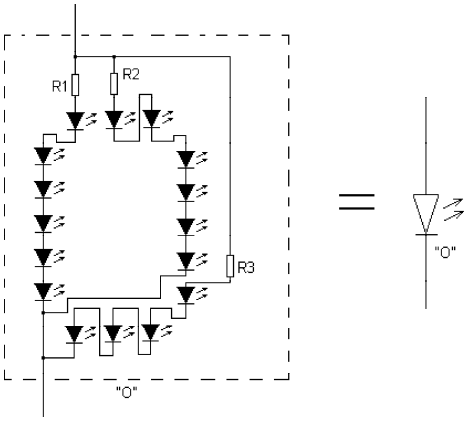
The idea to use a LED matrix for the stop, park, marker, and turn signals is not new. But so far I've not seen the LED matrix used to form any characters and display desired information so it can be read from a distance. In my Honda CRX rear lights are arranged behind convenient rectangular diffuser lenses, so replacing stock incandescent light bulbs with rectangular PCBs with high brightness LEDs was a quite trivial task.



My approach is very simple, and actually I can't output any ASCII character like on the stock ticker board. I have several characters hard wired, so for now, other than whole matrix or single LEDs lit, I can display the words "ON", "OFF" and the electric plug symbol. Right and left sides can display independent information.

Initially I planned to have two on board chargers connected in series, so naturally the left rear light would display "left" charger status, and right light – the right charger. Later on I had to change this approach and got one charger. This freed up one rear light for displaying heater information. So, right now the arrangement is this: as soon as I plug in, if the outlet is alive, the plug symbol appears on both sides.

Figure 1 - The letter "O"



The charger side displays "OFF" and the heater side – "ON" or "OFF" depending on the battery temperature – this will cycle as long as the AC power is on. When I turn the charger on, if the pack is discharged, the status is changed from "OFF" to "ON" as the charging takes place. After completing the first two charging stages and going to float mode, the status changes back to "OFF" and an additional LED indicates that the battery is full. In case of any errors other dedicated LEDs come on flashing, indicating that attention is needed.

The matrix itself consists of about 280 LEDs (for each side). The top two and bottom two rows are dedicated for side marker function, and the middle section for stop signal and character display. Each character is formed using standard 5x7 matrix. For instance it takes 16 LEDs to display letter "O" (fig 1). LEDs themselves are connected in parallel groups, each consisting of 4, 5, or 6 LEDs and current stabilizing resistor, all connected in series. The working voltage of the 12V system in my CRX is actually 14.1V at the lamp socket. This dictates how many LEDs maximum can be connected in series. The way to calculate the resistor value is as follows:

First find out what is the voltage drop across the LED when nominal current flows through it (usually 20 mA). In my case it was 1.9V per LED. I can connect 6 LEDs, which will require:

1.9V (per LED)*6 (LEDs in series)
= 11.4V total.

Extra voltage will have to drop on the resistor, and it is:

14.1V(actual system voltage)
-11.4V (drop on 6 LEDs) = 2.7V.

This resistor will maintain about 20 mA working current despite slight deviations in the working voltage. Since dynamic resistance of an LED is very low, without a resistor the brightness of the LEDs will vary a lot with slight voltage changes. The value of the resistor is:

2.7V/20mA= 0.135 kOhm,

or nearest standard value 130 Ohm. The power dissipated on it is:

2.7V*20mA=54 mW.

If only 5 or 4 LEDs are connected in series, of course the value of the current limiting resistor will be larger to accommodate a bigger voltage drop across it. The way to calculate its value though is exactly as above.

On the fig 2 the whole arrangement is shown. For displaying "ON" and "OFF" on the same place, the LEDs are connected with simple diode "AND" encoder. Common for both words (which is letter "O" and one vertical line, common for "N" and "F") will light in any case. Remaining LEDs for "on"

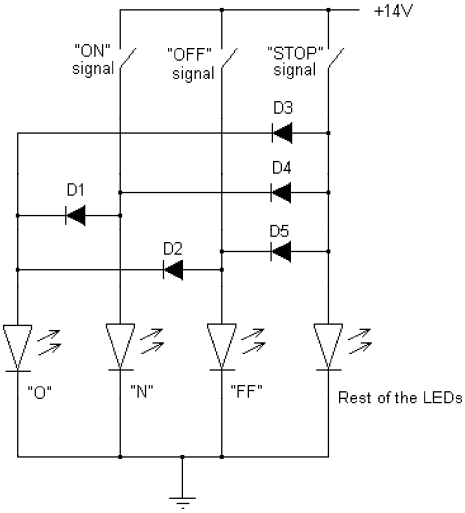


Figure 2 - Combining the letters together

are rest of letter "N" and for "off" - "FF" with the first letter "F" without its vertical line. On top of that all the LEDs around those forming letters (like those inside letter "O" are also connected together and to the diode encoder, so when the stop pedal is pressed, ON OFF and every single LED in between all light, forming a solid rectangular.

Granted, to mount the PCB with LED matrix I had to remove all existing harness and mill out the plastic case from the sockets side making a wide rectangular opening. As a prototype, I've used perforated breadboard PCB, cut to actual size just to fit in the opening. Connecting all the LEDs in the right order turned out to be a far more tedious task than I had anticipated, especially because I had to do it twice, for both sides. If I ever will do it again, I'll definitely design a dedicated PCB with all needed traces already in place.

An actual "message" requires applying 12V only to one wire, so a simple relay connected to the charger's power-on LED would be able to control displaying ON or OFF. For heaters such a relay is connected in parallel to one of the 12V heating elements. The concept with the power plug symbol is even simpler – a small transformer connected directly to the AC power input and rectifier connected to the "plug" LED arrangement makes the plug symbol light as soon as the line voltage is present.

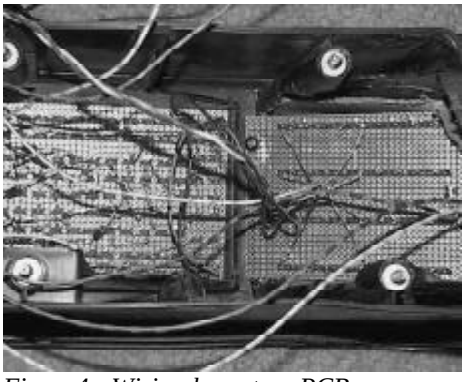


Figure4 - Wiring layout on PCB

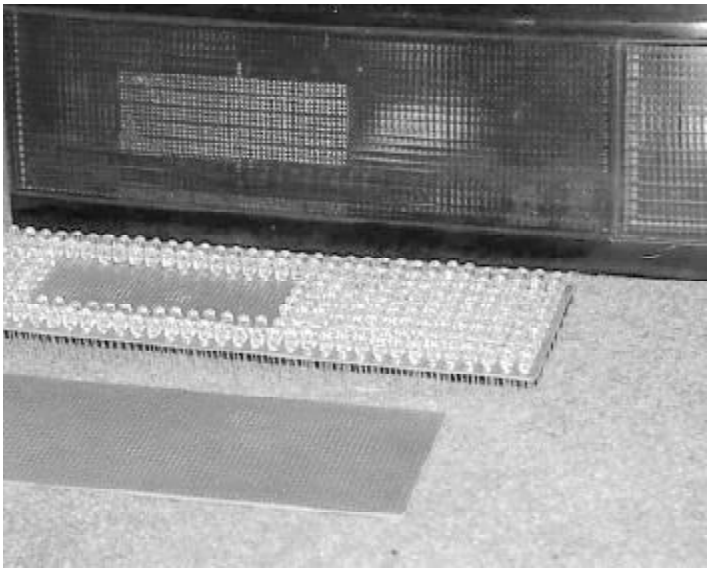


Figure 3 - PCB Board, LED panel & lense

Red LEDs used in the matrix have a brightness of 3000 mCd at 20 mA. The front and rear turn lights use amber LEDs with 4500 mCd output at 25 mA. The current consumed by each red light when all the LEDs forming the stop signal are energized is 400 mA, which equals a 5.6W light bulb. Visually though the light is brighter than when a stock 40W light bulb was used. At nighttime it's pretty painful to look straight at the matrix from the distance of 2-3 feet when the brake pedal is on. So another benefit of using the LED lighting is saving precious battery energy.

The bare assembled PCB looks as shown on fig 3, and the wiring behind the board is shown in fig 4. A close up of the messages are shown at the start of the article and an overview of what it looks like in the dark in fig 5.

Each brake and turn light can be converted to LED lighting, and are mounted in similar fashion. Clusters of LEDs to replace conventional light bulbs can generate ample light, even too much.

For more images please visit my web site http://www.metricmind.com. Click on the "Example of the EV conversion" in the middle of the page and then on the "LED lighting and instrumentation" link on the side bar.

Victor Tikhonov
'91 CRX EV

Additional technical EV enhancements will be presented in future articles, learned from Victor's ingenious features prototyped and incorporated in his Honda CRX conversion.

Figure 5 - LED wording at night, says it all

parent's house in Westminster. We also took the opportunity to check out a couple Generation 2 EV1s on the lot.

We discovered that one of the major benefits of the Sparrow is how quickly it charges. The dealer was explaining that when you plug in an EV1 to charge a lot of the power goes to cooling the battery pack. The warmer the weather the longer it takes to charge the car. The extreme case being that the car will lose power in its batteries because it took more energy to cool the batteries than what was available from the charging station. We charged for 54 minutes and were back on the road by 1:56 PM. Heading north on route 1. Just one stop to meet Greg who was waiting for us at an exit along the way, a quick hello and we were off to Westminster.

Leg 4, Westminster to Santa Monica
Miles: 36 Time: 2 hr 35 min KWH: 4.7

We arrived around 3:00 PM. Unfortunately the Kortoffs were not home, but Greg had arranged to have a 220 and 110 extension cords setup for us. We plugged in and headed off (on foot) to Taco Bell for a quick bite to eat.

The revised "California ZEV Mandate" was released earlier in the day and Greg filled us in on some of the major changes. After lunch, Greg decided to join us on the next hop up to Santa Monica. So we synchronized our Motorola radios to the same channel and after 1 hour and 19 minutes of charging we were off. We took route 1 to the 405.

Leg 5, Santa Monica to Oxnard
Miles: 49.8 Time: 4 hr 12 min KWH: 6.4

We arrived at the Santa Monica City Hall at 5:30 PM. This was an amazing charging station. It had over 6 outlets for 220 a few 110 outlets a couple of AVCON conductive and inductive chargers. Above our heads were banks of solar panels wired into a center console where the current could be monitored. The only thing missing was a bathroom (which we found inside the City Hall).

It was here that we discovered that we were missing one of the most common 220 adapters a NEMA 14-50. We plugged in the 110 and Greg was able to rig up an adapter to get the 220 charger going but we had to make a Home Depot run to buy the parts for the omitted adapter. When we go back the 220 charger was not running. Someone must have tripped over the cable and worked the connections lose in the makeshift adapter. We lost about 40 minutes.

While we were there we tested the AVCON adapter box. Bill Kortoff loaned us one he made and Barry brought one along that he purchased from the EVAA website. First we tried Bill's and all seemed OK then after 1 minute the AVCON shut off. We tried a trick posted to one of the newsgroups of putting in a length of 16 gage wire between the charger and the AVCON. It still kept shutting down. Barry dug out his adapter, we plugged in and YES, it worked, the AVCON did not shut off. So we thought we had the situation under control but further down the road we found out differently.

We charged for a total of 2 hours 45 minutes. We thanked Greg for his help, packed up the adapters and cables and at 8:20 PM set our sights on he Costco in Oxnard. Along the way we touched base with Bruce Tucker from the Sparrow owners newsgroup. He posted an update to the group and arranged to meet us at the Costco. It was a bit further than we anticipated and the Sparrow was getting close to the end of its charge. Nothing like a little late night drama to keep you alert.

Leg 6, Oxnard to Santa Barbara
Miles: 37.4 Time: 4 hr 27 min KWH: 4.7

We found the AVCON at the front left side of the Costco building around 9:45 PM. Bruce was there with his wife and daughter to offer their support and take a look at the Sparrow. We were able to chat a while and take a few pictures before they headed back home.

There was no 110 outlet this time so we were limited to what we could get out of the AVCON and unfortunately it was shutting off every minute. The problem we thought was solved back in Santa Monica still plagued us. While Kevin and Chris were scratching their heads trying to figure out what to do next, Barry located a patch box on the back of the AVCON unit! He fetched his cable and tools and wired us directly into the circuit bypassing the AVCON.

Even with that solved we only had the one 220 charger so we were going to loose some more time. Chris took advantage of this to catch a few extra winks. 3 hours and 15 minutes later, Barry and Kevin packed up the cables, woke Chris up and we were on the road again at 1:14 AM. Next stop Santa Barbara.

Leg 7, Santa Barbara to Buellton
Miles: 44.4 Time: 3 hr 17 min KWH: 5.5

We pulled in to the parking garage in Santa Barbara around 2:14 AM to wrestle with another AVCON charger. There were 110 outlets available so we wired the 110 and 220 chargers up and plugged them both in. The AVCON again was shutting down every minute. The parking lot attendant was there so looking for a "direct connect" was out of the question. The attendant told us about another charger at the police station down the road that worked much better than the one in the garage.

Pushing the button to restart the AVCON was not nearly as annoying as the woman's voice belting out the error number and

charge time every minute and having it echo around the parking garage's cement walls. We came up with a plan. Kevin and Barry walked to the station to investigate the other charger while Chris modified a 50 foot 16 gage extension cord so that it would connect to the other 220 cables. The theory was that if the 5 feet of 16 gage wire was not enough resistance to filter out the current spikes from the charger then maybe 50 feet would do the trick.

By the time Kevin and Barry returned the cable was ready to go. We plugged together all the cables we had plus the newly modified extension cord, close to 150 feet of wire, and it did the trick! The AVCON stopped resetting! It took us 1 hour 50 minutes to get enough juice to make our next destination the Flying Flags RV Park in Buellton. 4:04 AM we were back on the road. Barry and Chris chatted back and forth on the Motorola radios to keep awake.

Leg 8, Buellton to Santa Maria
Miles: 32.6 Time: 2 hr 35 min KWH: 4.1

The Flying Flags RV Park was easy to find. We pulled in at 5:15 AM. Barry and Kevin immediately started searching for the spots with the 50 Amp plugs. 15 minutes later we had both chargers hooked up; time for a little sleep. 1 hour 50 minutes later dawn was coming and it was cold! We packed up and were on the road by 7:30 AM.

Next stop, the Saturn Dealer in Santa Maria. It was a bit of a long shot since it wasn't prearranged. After such a great reception at the dealership in San Juan Capistrano we were hoping a similar reaction in Santa Maria.

Leg 9, Santa Maria to San Luis Obispo
Miles: 31.8 Time: 2 hr 18 min KWH: 3.7

We made it to the dealership at 8:06 AM. It was good timing because they were just opening. After speaking with the Service Manager and some Sales Consultants they lead us to the inductive charger at the front of the building. On the wall behind the charger was yet another beautiful breaker box.

They had to move a car out of the way for us to get the Sparrow in. Barry performed his magic once again and we had the 220 charger going by 8:20 AM. We had to do some repair to the 110 outlet and had the 110 charger pumping by 8:53 AM. We gave the "tour" of the Sparrow to all that were interested and thanked them profusely for letting us charge. Jay Kamiya gave us his card and said to let him know when we're on our way back and he'll make sure the spot is clear.

Kevin did some calculations based on our average speed and determined we were not going to get to the Corbin factory in Hollister before it closed on Saturday. This threw a wrench into things because Barry was planning on picking up his new Sparrow at the factory. It was time to get on the cell phone and speak with Jeff James at Corbin to see what our options were. Jeff worked it out so that we could pick up Barry's Sparrow whenever we pulled in that evening. That put a smile on everyone's face. Jeff James comes through once again!

We unplugged at 9:31 AM and were moving toward San Luis Obispo by 9:39.

Leg 10, San Luis Obispo to Paseo Robles
Miles: 33.2 Time: 2 hr 5 min KWH: 4.5

We made it to the AVCON charger in the First Bank parking lot in SLO around 10:24 AM.

Confident that we finally had the AVCON charging bugs worked out, we pulled out all our cables, plugged them all together and turned on the AVCON . . . "Error Power overload. Charging completed at . . . . " that all too familiar voice was back again. We figured out another element to AVCON problem, when the 220 charger is pulling over 21 amps it will trigger the AVCON to reset. But once the batteries have been charging for a while and the current draw falls below 21 amps the AVCON will stop resetting.

While we were doing the " AVCON Tango" an electric Ford Ranger pulled up. It was driven by one of the employees of the bank dressed up as one of Santa's helpers. She seemed surprised that someone else was using the charger. We told her about the Wish Rally and offered to plug in her truck once we were finished.

We filled up for 1 hour and 11 minutes, plugged in the Ford Ranger and were on the road by 11:35 AM. Next stop is Bob Tullock's place in Paseo Robles. Bob Tullock was Bill Kortoff's professor in college. He has a small farm and antique store just off of the 101 and installed a 220v, 40 amp outlet and a 110v, 20 amp outlet on a telephone pole next to the store.

Leg 11, Paseo Robles to King City
Miles: 45 Time: 3 hr 1 min KWH: 4.7

We had to keep an eye out for the antique store by the side of the road then turn off on Xline Road. We arrived at 12:30 PM, and plugged both chargers right in. We had to keep resetting the 110 breaker but the 220 held strong.

Bob came down from his house driving 1963 tractor and parked next to the Sparrow. We were a little worried because he was shaking his head. Did we get the wrong pole, or the wrong antique store? We did a quick round of introductions and Bob remembered Chris' phone call earlier in the week.

Bob was shaking his head because he was

continued on page 14

CONVERSION WORKSHOP, STEP 9
BATTERY RACK DESIGN PART 2

By Michael P. Brown, © 2002

In the last issue, we talked about battery layout, and finding out how many batteries will go where. We determined how much space was needed for the batteries, the battery box, and the battery rack. Now we will take our two-dimensional length and width layout and add a third dimension-depth. We will pick the material to build the rack with, and determine how to fasten the rack to the car.

Suspension Racks

First let's look at the type of battery rack that is sunk into the floor of the trunk or hatch area, under the back seat of the car, or between the frame rails of a pickup truck under the bed. I call this type of rack a suspension rack because the weight of the batteries is suspended between the top of the rack, where it is attached to the car body by its flange, and the bottom of the rack, which is unsupported. This type of rack is shaped like a basket, with a flange around the top edge, and vertical supports extending down to the base.

The amount of depth to be added to this rack is limited by the amount of ground clearance needed to permit driving over all the various dips and bumps found on the streets. Another issue to consider is the pavement's angle of departure, or how abruptly it shifts from flat to uphill or downhill. How steep a driveway can the car be driven up before the bottom of the battery rack scrapes on the pavement?

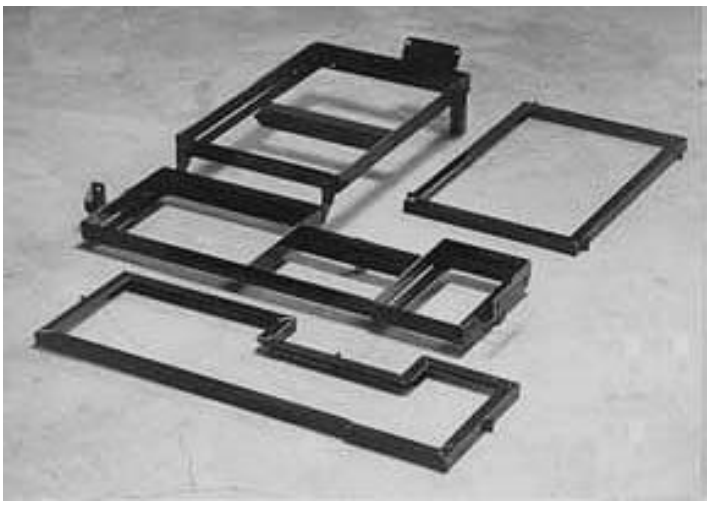
The rule of thumb I use is that no part of the battery rack should be any lower than the lowest non-movable part of the rear suspension. This rule has worked well for me over the years. The rack won't bottom out, but it still carries most of the batteries' weight below the floor level of the car. This is a very important safety factor in case of a collision.

My material of choice for battery racks is 1/8 inch thick steel angle stock. Depending on which type of rack it is, the size (width of the arms) of the angle stock varies from one inch to two inches wide. The size of the angle stock is determined by where it is used in the rack.

For example, the base of our Voltsrabbit rear rack, which supports eight batteries and their box, is 1-1/2 inch angle stock. The top of the rack is 2 inch angle stock. This provides a wide flange where the rack meets the floor of the car and gives space for the 1-1/4 inch fender washers with the nuts and bolts to fasten the rack to the body.

The distance from the surface that will support the flange down to your needed ground clearance determines how deep the rack will be. The tops of the batteries and battery box may extend a few inches above the flange at the top of the rack. The top and bottom of the rack are held together at the proper distance by four pieces of 2 inch angle stock at the corners of the rack.

The corners are butt-welded to the edges of the top and bottom angle stock. Additional strength is added by welding 1 by 1/8 inch flat stock straps to the outside of the angle stock from top to bottom at the center of each side of the rack. If the rack is a large one, the bottom can be reinforced with a piece of 1-1/4 inch square tube running from side to side under the center of the rack.



It's necessary to have each battery in the pack supported on at least two edges by the rack, even if the batteries are in a box. It is very important to size the material of the rack top and bottom, the corner pieces that hold the top and bottom together, and any reinforcing straps used between the top and bottom to suit the weight the rack is supporting. Attention should also be given to the number and type of welds holding the rack together, and their weight-carrying ability.

If you are not an experienced fabricator and welder, it might be best to bring a professional welder in at the start of the rack design to help determine material size and design for ease of assembly. What you pay for design help will save you money when you start fabricating the rack, and will eliminate the possibility of failure due to a weak design.

Bridge Racks

Now let's look at the type of rack that would be found in the former engine compartment of a car or truck. I call this the bridge rack because it carries a load (batteries) over a gap (the space above or around the motor) and is attached to an abutment (the frame or body of the car). This is also the type of rack you would use in a VW bug if you were going to put batteries where the back seat was.

Instead of a basket shape, this type of rack is more of a tray with a lip around the edges. It needs to be paired with a matching hold-down frame that encloses the tops of the batteries.

In my last column, we determined how many batteries we are supporting and where we are putting them. We proved that we can close the hood over them safely (the depth dimension again) by taking measurements and building mock-ups. Now we can proceed with the design of the rack.

The materials remain the same angle stock in 1 or 1-1/2 inch widths. Which size to use depends on the number of batteries the rack is supporting and the distance it has to span

without support. If any tube or angle stock is added to the underside of the rack for battery support, make sure it doesn't interfere with any other part of the car, like the motor or transmission.

Most front engine/rear wheel drive cars and trucks have a large open space where the engine was. The boxes and racks that fill those spaces tend to be rectangles of varying sizes. The front engine/front wheel drive cars have a differently shaped space for batteries because the transaxle remains in the engine compartment after the engine is removed.

This results in a battery space that is L-shaped, and often the batteries in the base of the L are lower than the batteries in the upper part of the L. This split level space situation can be handled with separate upper and lower racks, or a one-piece split-level rack. Which alternative to use depends mainly on the availability of places to mount the racks to the car. The bridge type rack presents you with some choices to make, but the layout still comes down to rectangles of varying sizes.

Floor Racks

The third type of battery rack we are going to discuss is called the floor rack. This kind of rack is found in van type vehicles, usually under or between the seats. It is also found in pickup trucks where the batteries are put in a box in the bed instead of boxes and racks under the bed. It could also be used in a hatchback style car where sinking the rack is not possible. In short, this rack works anywhere there is a perfectly flat floor to set the rack on.

This type of rack is almost always a large rectangular tray with ten to twenty batteries in a box. Since the rack is fully supported by the floor of the vehicle, the 1 inch angle stock is strong enough for the perimeter. Flat stock should be added to support the floor of the battery box where the edges of the batteries meet. Supporting the weight of the batteries is not as big a problem with this rack, but mounting the rack to the floor and securing the batteries and battery box to the rack is a challenge.

Attaching Suspension Racks to the Chassis

The primary job of the battery box/battery rack system is to keep the batteries secured in their place and isolated from the passengers. How the battery racks are attached to the car's chassis or body is a crucial part of the battery rack's design.

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Attaching the suspension type battery rack to the car's body is made a little easier by its position in the body. Because it is in a hole in the floor of the car's body that is only a little bigger than the outside dimension of the rack, it is well confined in the front-to-back and side-to-side directions. Since most of the battery pack's mass is below the level of the car's floor, in the event of a collision, the batteries will stay below the floor.

All of the good news mentioned above does not eliminate the need for fasteners. Our Voltsrabbit's sunken rear rack is held in place by twelve 1/4 inch bolts. The bolts go into holes in the rack, through holes in the body. From under the car, a 1-1/4 inch diameter fender washer is placed over the bolt and a 1/4 inch nylock nut is threaded onto the bolt and tightened.

This may seem like too few bolts of too small a diameter, but shear forces (forces that are trying to cut the bolt in two across the diameter) on the bolt are limited by the close fit of the rack to the hole in the body. In a collision, horizontal forces would not be carried by the bolts alone, but would be distributed along the entire angle stock flange where it meets the body.

Under tension (where the forces acting on the bolt are trying to pull it apart lengthwise), the tensile strength of the bolts combined with the amount of contact between the rack's flange, the car's body, and the fender washers keeps the loads within safe limits.

The practical proof of these statements is the fact that the rear of a Voltsrabbit can be lifted with a floor jack using the reinforcing bar on the bottom of the battery rack as a jack point. This is done without any distortion of the body around the rack or any damaged bolts. Since our car is torn down regularly for classes, we have been able to check for any damage or distortion from the forces encountered in long-term use. In nearly ten years, we have found none.

If your suspension type rack is holding more than eight batteries, you could go to a 5/16 inch bolt. Always use as many bolts as you can place around the perimeter of the rack at 6 inch intervals and have body metal under them to fasten to. When you are ready to install the rack, place it in the hole, clamp it in place, and spot drill through the holes in the rack to locate where to drill the holes in the body. Use a felt pen to mark the outside edge of the rack's flange. Remove the rack, and finish drilling the holes.

You may have to drill through a thin sheet metal frame member on a unibody car to bolt the rack to the car. If so, run the bolt through a pipe spacer inside the frame member to prevent crushing the frame when you tighten the bolt. The spacer should be as long as the depth of the frame member it is going into, minus the thickness of the metal the frame member is made of. Try to get this dimension as close as possible. Too long a spacer will keep the rack from being tightly fastened to the frame member. Too short a spacer will result in the frame member being crushed. A little too short is better than too long; a little crush is all right.

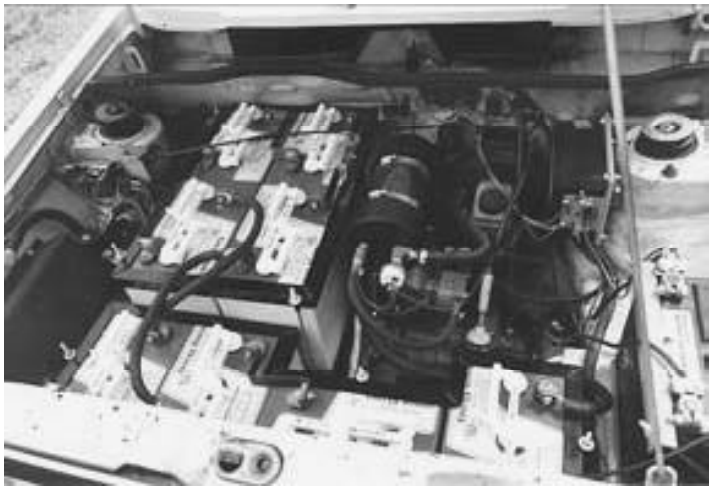
To install the spacer, drill holes to fit the bolt size through both the top and bottom of the frame member. Next, drill the bottom hole out to the size needed to allow the spacer to enter the frame member. When you are ready to do the final installation of the rack, apply a thick bead of silicone caulk to the top of the body between the edge of the hole and the felt pen mark you made earlier. Put the rack in the hole, and line up the bolt holes in the rack and the body. Install the bolts in their holes, using longer bolts where needed to go through the frame member.

From the underside of the car, install the fender washers and nylock nuts on the bolts, and tighten securely. When you get to one of the bolts that needs a spacer, put the spacer over the bolt, install the fender washer and nylock nut, and tighten as before.

When these steps are completed and the battery rack is securely attached to the car body, any chassis stiffness lost by cutting the hole in the car's floor is replaced by the battery rack. Installation of a suspension type rack in a pickup is a similar process. The truck frame, however, is much thicker than a car's sheet metal floor, so the bolt hole spacing could go out to 8 inches apart, the bolt size could go up to 5/16 inch, and there is no need for the fender washers.

Attaching Bridge Racks to the Chassis

How difficult it is to install a bridge-type battery rack depends on the number of mounting points available on the car's chassis. You need to find a place to make your attachment. Then design a welded extension to your rack to reach the attachment point. The first thing to look for is an existing bumper mount whose bolts could also be used for a battery rack mount.



Motor mount bolts can also be used, even if you are still using them to mount the electric motor. A non-moving part of the suspension, such as an upper shock absorber mount or suspension pivot mount, can be used. But it must be strong enough to take the load you are adding to the existing load.

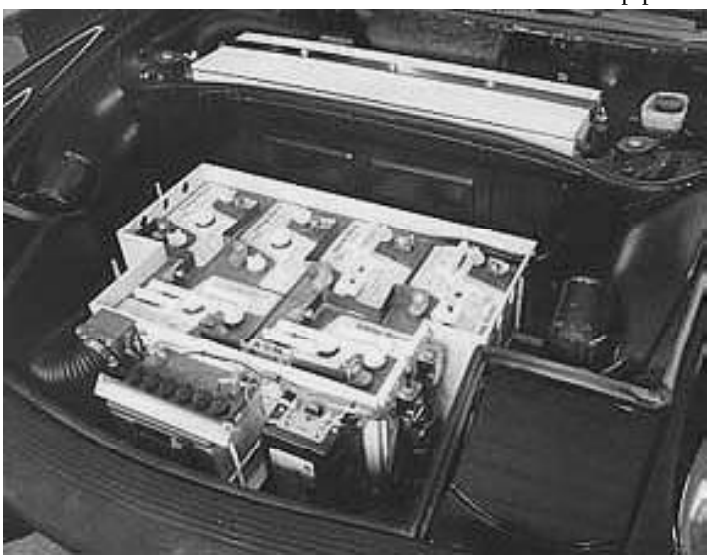
You will probably have to substitute longer bolts to make up for the thickness of the mount you are adding and still have the same amount of thread engagement as the original bolt did. When substituting bolts, be sure to get the same thread pitch, size (diameter), and class of hardness as the original bolt.

Now, what do I do? I've used the front bumper mount bolts to support the front of the rack, but at the rear there are no ready-made places to attach the rack to. In a unibody car, this can be a problem. If there is a welded sheet metal frame member that would support a rack mount, you could use

the long bolt and spacer method described above.

If it looks like all that you have to attach the rack mount to is the vertical sheet metal firewall, it's time to make a sandwich. It's not edible, but it does give strength to a thin steel firewall by distributing the loads from the battery rack over a larger area of the firewall and stiffening the fire wall at that point.

This type of mount consists of a flat steel plate 1/8 inch thick welded or bolted to the rack. This plate should be as big as it can be and still fit against a flat spot on the firewall. There are a number of 1/4 inch holes drilled



in the plate. An identical steel plate, the same size and shape with the same number and location of holes, is fabricated at the same time. This plate is the backup plate, and it goes inside the car on the opposite side of the firewall from the mount plate.

Sometimes it can be difficult to hold the backup plate in place while threading a bolt through both plates and the firewall and tightening a nut on it. In this situation, I weld a nut to the backup plate, which gives me what is called a captive nut.

When the rack is installed and bolted to the other mount points, the mount plate is held in place against the firewall by the other mounts. Then the locations of the holes in the mount are transferred to the firewall by spot drilling through the holes in the mount. The rack is removed, and the holes are ready to be drilled the rest of the way through the firewall. Before you start drilling, it is wise to check to make sure that there are no vital components like heater cores, wire bundles, or electrical components where you are going to be making holes.

Install the rack for the final time, securing the other mounts loosely for now. Line up the holes in the sandwich mount with the holes in the firewall. Have an assistant inside the car hold the backup plate in place and line its holes up with the mount and firewall holes. Now insert the bolts through the three holes and secure with the nylock nut.

If the backup plate has captive nuts, I have found that it is easier if I line up one set of holes by inserting a small punch through all three pieces. Then I have an assistant move the plate until I can thread one of the bolts through one of the other holes and into one of the captive nuts. Thread the remaining bolts with lock washers into the backup plate captive nuts, and tighten them enough to hold the plate in place. Then remove the punch and install the final bolt and lock washer.

The small pickup trucks that are converted are of the body-on-frame type of construction, which offers its own set of challenges. There are few mounts or existing bolts to use to help mount the battery rack. There are, however, two heavy frame rails that could have rack mounts bolted or welded to them. The design of these mounts might be another place where a consultation with your welder would be helpful. One word of warning, however. If you weld the rack mounts to the frame, bolt-don't weld-the mounts to the rack. You might need to remove the racks to service the motor, and you don't want to have to cut them up to get them out.

Attaching Floor Racks to the Chassis

The floor type battery rack could be mounted like the suspension type rack with a bolt, flange, fender washer, and nylock nut system. However since the loads on the mount come from above the flange, I don't think this system is strong enough. I have seen videos of accidents in EV races where a car went into a wall. When the rack sat on top of the floor and was attached by bolts, washers, and nuts, it tore loose because the washers pulled through the body metal.

The sandwich system, which spreads the load over a larger area, is preferable. The mount plates could be welded inside the perimeter of the rack to free up floor or bed space. In this case, the mounting bolt holes should be countersunk, and flat head bolts should be used to avoid interference with the bottom of the battery box. Mount plates should be placed at each corner of the rack and in the center of the long side of the rack. Be sure to check the underside of the vehicle for interference with the backup plates and nuts.

Both the bridge and floor type racks have the battery box and batteries sitting on them. In some situations, this means they should be built with a bottom, sides, and top like the suspension rack, but without the top mounting flange. The sides should be high enough to contain the majority of the batteries' mass like the suspension style rack. I'll discuss this further next issue when we talk about battery box and battery box hold-down design, as well as protective coatings for the racks.

I have tried to write this with as much detail as space permits, but if I haven't been clear enough or you have more questions, please write, phone, or email me and we will talk about it.

Michael Brown is chronicling the various stages of the ICE to EV conversion process. As fonder of Electro Automotive, he has many years of hands-on professional experience in the automotive industry, working with both ordinary family cars and race cars.

Access
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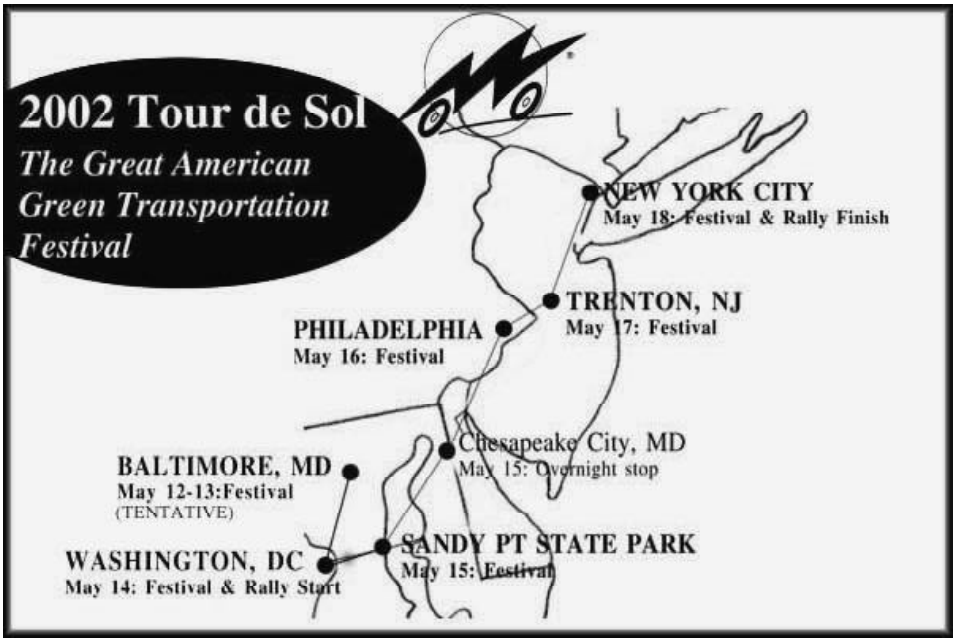

Tour De Sol: The Great American Green Transportation Festival

This Festival is a unique, award-winning, year-round public education campaign that culminates in May in a series of festivals in the Northeast linked by a road-rally competition.

This year the rally will be during National Transportation Week, and Clean Air Month.

Come visit one of the festivals to be held May 12-18, 2002 and learn first-hand about products and services available today, or in the near future, that can improve our national security, the economy, public health, and the environment by reducing oil use, pollution, and global warming. See state-of-the-art cars, buses, bikes, neighborhood vehicles, green electricity choices, renewable energy displays, and other displays of Earth-friendly products. Test-drive new clean cars on the market today.

Each festival is unique. Weekend festivals have entertainment and music. Check this site frequently for regular updates about the festival of your choice and find out all the details including directions.

Following is a very short list of some of the highlights of the 2002 Tour de Sol:

- Opening Ceremonies will be held in Washington, DC for the first time, and Transportation Secretary Mineta has invited President Bush to participate.

- We have a new partner and location for the grand finale in New York City. We will be at Hudson River Park next to two major tourist attractions. Hudson River Park uses EVs for much of their daily work.

- Entrants' registrations are coming in every day. Honda's new hybrid Civic will be the Official Pace Car, DaimlerChrysler is on board with several very exciting concept vehicles and their electric GEM, and we expect to receive confirmations from Toyota, Ford TH!NK, and GM very soon.

- Local organizing committee members are awesome! Several events are scheduled to attract key legislative and business audiences. Philadelphia's festival will have a renewable energy and green electricity choice theme, and lots of committee members want to exhibit at the festival, and help with marketing.

- We have excellent public school partners for our spring teacher workshops, and so we expect thousands of children to come to the Tour de Sol on field trips.

40,000 people attend the Tour de Sol festivals each year. They are popular destinations for the public - families, students, and teachers.

First Ever EAA Chapters Meeting and Conference ! ! !

Coming up **May 12-15** in the greater Washington/Baltimore area. Sponserred by the EAA National organization and EAA Board, and hosted by the EVADC Local Chapter. Timed to coincide with the kickoff of the annual Tour de Sol.

Contact: *Jerry Asher*, evjerry@usa.net
EVADC website: http://www.evadc.org/

Education Corner – Starting a School-based EV Program

By Eric Ryan

As any veteran EV teacher will tell you, EV education programs are extremely effective educational experiences for students, faculty, and community members. Building an EV requires students to apply science, math and technical skills in a real project, as well as develop environmental, business, and marketing knowledge to create a sustained program. Teachers benefit by developing new ways to teach their curriculum and by participating in an exciting venture that can reenergize their career. And many community members are eager to get involved with young people and their local school.

However, accompanying the incredible educational value of EV education is the fact that education of this sort can be difficult to implement. Most schools are not well structured to support students, teachers, and the community working together on a real project. This is especially true in today's high stakes testing environment where students are prepared to perform on pencil and paper tests and authentic educational experiences aren't often encouraged.

So what is an EV educator wanna-be to do?

As with any ambitious pursuit, starting an EV education project or program should first begin with a sound plan that answers the following questions:

- What are your goals and objectives?
- How will the program be funded? What is the budget? (Be very specific.)
- How will this activity help students learn better and more effectively than before?
- How will the EV education program better meet a school's educational standards and objectives?
- Is this going to be a one-time activity or an ongoing program?
- What teachers will work together on the project?
- Where will the project be completed?
- What is the timeline?
- Are there any educational programs or competitions to participate in?
- What will the project be? An electrathon-type vehicle? A go-kart? A junior dragster? A solar car? A solar bike? A full-size conversion? A hybrid?
- How will safety be ensured?
- What sort of time will it require – both during and after school?
- What role will the community play in the program? How will community members get involved? What community members will get involved?
- How will the local media get involved?
- What books, videos, curriculum materials and other educational resources will be used to teach the students?
- Where will the supplies and materials for the project be purchased?

Having answered these basic questions, one is now in a much better position to gather the necessary administrative and community support to start the project and successfully teach young people about the exciting world of electric vehicles!

Upcoming Educational Events

March – May Portland General Electric's Electron Run (www.pge-edsvcs.com/ElectronRun/erunpage1.htm)

April 26-27 Finale of the 2001-2 EV Challenge Program (www.evchallenge.org)

April – May Omaha Public Power District Power Drive (www.oppd.com/powerdrive/news.html)

May 12-18 Tour de Sol: The Great American Green Transportation Festival (www.nesea.org)

May 17-19 Solar BikeRayce USA (www.solarbike.org)

July 14-18 Green Mountain Energy's Winston Solar Challenge (www.winstonsolar.org)

Ongoing National Renewable Energy Lab Junior Solar Sprint Events (www.nrel.gov/education/host_sites.html)

Eric has been in the EV education field for nine years as a teacher, consultant, and director of the EV Challenge (www.evchallenge.org)

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EV Go-Karts near Philly, PA

by Cliff Rassweiler

I went on a small EV field trip to Arnolds in Oaks, PA. Check out their website at http://www.ArnoldsGoKarts.com for more info. Arnolds is an entertainment center that offers Electric Go Kart Races.

The Adult Go-Karts are $15 for a ten minute session. You are required to watch a brief safety video, put on safety goggles (bring your own, rent for a dollar, or buy for $3) and a helmet (free), and then you can race.

The track is inside a warehouse with fairly slick concrete floors and stacked tire fenders. The Go-Karts look fairly substantial. They use stock go-kart slicks. The wheels are surrounded to prevent contact and the karts have fenders. Six -12 volt Hawker Genesis batteries and a series motor power them.

The Karts have an interesting feature, in that the power available can be controlled remotely by the staff. When you start your laps, your kart is set at slow. After a lap or two, they use the system to turn everyone's power up. If there is an accident, they shut off everyone's power for safety. If someone is driving recklessly (well, the outer limits of recklessly), they can turn just that person's kart to low power.

I find it often difficult to judge the relative power levels of vehicles. A high powered Kart with grippy tires can feel underpowered, while a lawn mower engine on rock hard tires feels like a V8. I would guess that these Karts at the standard race settings were more powerful than the basic Briggs and Stratton Karts and less powerful than a Yamaha 100 Kart.

More importantly, the karts power to grip ratio was well balanced for fun driving. The Karts felt very responsive and not slow or heavy. They slide under cornering. Too much throttle can spin the tires, too much brake will lock them. At top speed, you would not want to hit the tire walls.

Transponders catch lap times, which appear on a large TV screen in front of the stands. The current session times appear as they happen on the left side of the screen, fastest qualifier on top (think Formula-1 Qualifying), while each person's best lap from the session before remains on the right side of the screen.

For the dedicated, they offer Pro nights. After racing at Arnolds ten times and being approved by their staff, they allow you to run races with the power set even higher.

The concept seems to be well thought out. The Karts are lined up in the pits in 6 rows of ten. The first group of up to ten Karts runs for ten minutes. As these Karts pull into the back of their row and start plugging in, the next group is leaving the pits to the track. The motors are unplugged and each kart is connected to a charger. The chargers were showing 60 amps when first plugged in, and have bulk, finish, float, and hot battery lights. According to a staff person, the Karts charge in less than 60 minutes and have a maximum run time of about 15 minutes. This allows maximum use of the track and by having six groups, allows the Karts to recharge before they return to the front of the queue.

Most Rental Go-Kart track businesses flounder because of poor maintenance. Breakdowns leave fewer available Karts , and the remaining ones are so unequal in performance that they are not fun to race. Asking untrained minimum- wage staff to fix the Karts usually compounds the difficulties of maintaining internal combustion engine (ICE) Karts.

With electric karts, the motor and controller should need minimal maintenance and are handsoff. The chargers looked automatic. Plugging in the Karts each session requires no training or special skills. One employee needs to be computer literate to run the software that posts times and controls power. The motors should remain close to equal but can be tweaked with the software. You still need some employees with mechanical skills to occasionally reset camber, toe, wheel pressure, corner weights and perform preventive maintenance like replacing wheel bearings, to keep the karts even. For racing leagues, it would not be hard to come up with a weight to power formula to allow even racing without having to put weights on the Karts (i.e. heavier people have their power set higher).

The maintenance costs could be lower than those of an ICE Kart. The big question is how well the batteries will hold up. How often will they have to be replaced?

The whole set up is a big investment. 60 Karts is minimal quanty. The resto of the operation consists of a computer control and timing system, Big-screen TV, and Warehouse rental.

The track seemed really busy (on a Friday night) and has been operating since 1996, so hopefully they are making money. This is some very fun EV racing. I would be here often if it were located in Miami!

Cliff
[cliffrassweiler@hotmail.com]

surprised by the 3-wheeled Sparrow, he was expecting an EV1. He had not seen a three wheeled car design that he had liked. He felt three wheelers always compromised too much functionality. After giving him the tour I think he was impressed but still not convinced.

It was great chatting with Bob about his farm and antique store. He flagged down his neighbor who came over to have a look at the Sparrow. This neighbor gave us a lead on a place to charge in King City, a truck stop and RV park called "Wild Horse". We called ahead and confirmed there were 50 amp circuits available. Bob fired up his tractor and drove off to his store. We packed up after close to 2 hrs of charging and were rolling at 2:22 PM.

Leg 12, King City to Salinas
Miles: 52.4 Time: 3 hr 24 min KWH: 5.7

We arrived at the Wild Horse truck stop at 3:30 PM. When we pulled into the RV site we discovered that it was not wired for 220v. We plugged in the 110 charger and we all started searching for a 220v plug. Barry noticed a makeshift welding area where they were working on expanding the RV Park and found 220v, 50 amp outlet attached to a post. After getting permission from the grounds keeper we plugged in the 220 charger. Either we were just very lucky or Barry has a good nose for finding outlets, probably both!

We did not have a firm location to charge in Salinas. All our contacts had fallen through. All we had was one spot marked on the map imported from a list off the Internet as an unverified RV park. We decided to go for it and see what we came across once we got there. We had the gas generator as a backup in case we could not find a plug.

We charged for 1 hour and 45 minutes then headed out to Salinas at 5:14 PM. We exited off the highway into Salinas around 6:25 PM and started asked gas stations and restaurants if there was a plug available. Everything came up dry as we worked our way to the dot on the map.

When we finally arrived at the location it wasn't an RV park at all but a municipal fueling station! We could not figure out why this spot would have made it on the Internet list. This time Kevin got out, did a lap around the main building and found a 220 plug. The next question was, is it live?

Leg 13, Salinas to Hollister
Miles: 51.1 Time: 3 hr 10 min KWH: 6.6

At 6:45 PM we unplugged the Coke machine to plug in the 110 charger and held our breath as we plugged in the 220 charger, "Beep Beep . . . Beep Beep" both chargers fired up! It must have been quite a strange sight to see three guys jumping around in the parking lot giving each other high fives for no apparent reason.

There was a compressor that fired up around every 15 minutes. We unplugged the 220 while it was running just not to risk blowing the breaker. After about 30 minutes a police car pulled in to fill up with gas. While his car was filling up he came over and chatted with us. We explained the Wish Rally to him and answered his questions about the Sparrow. He sat in the car and admired the workmanship. He wished us luck and went on his way.

10 minutes later another police car zoomed

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into the lot and jammed on its breaks. The officer got out and yelled, "So what is it like to be stealing electricity!" We explained that an officer was just there and it turned out he was the one that reported us?!?! So again we went over the Wish Rally and showed the officer the mapping software with all the charging locations imported from the Internet. He had seen a Sparrow before and had heard of Corbin. We talked for a while longer and he gave us permission to finish charging and charge on the way back home.

Well that was enough stress for one evening. We unplugged after 1 hour and 32 minutes of charging and rolling again by 8:34 PM. Next stop the Corbin factory in Hollister, our turn around point to head south again.

We had arranged to call Michael D'Andrea when we got close to the factory and he would meet us there to show us where to plug in and present Barry with his Sparrow. Our mapping software failed us and was missing the intersection we needed to take to get to the factory, so we ended driving an extra 19 miles before Michael was able to guide us in.

Leg 14, Hollister to Salinas
Miles: 32.5 Time: 3 hr 59 min KWH: 3.9

We arrived at the factory at 10:04 PM and followed Michael to the back of the building. A 220 extension cord had been run outside one of the bay doors. Michael had Barry's new 220 charger and a 220 splitter adapter with him that would allow us to plug in the two 220 chargers. We wired it all up and were pumping **34 amps** into the battery pack!

Michael presented us with a donation to the Let's Celebrate Foundation, then we all piled into his car and headed off to Michael's house to pick up Barry's new Sparrow.

When we got back to the factory Pamela Denner was there with her husband to greet us. We drove both Sparrows to the front of the factory for a photo shoot by the big Corbin sign. Then Pamela and Michael bought all of us dinner. While we were loading the new Sparrow on the trailer Martin Benitez (works with Jeff James) came by to wish us luck. We were amazed at how well we were received so late at night. It was just more evidence of how much Corbin believes in their products and the lengths they will go to support their customers.

After 2 hours and 41 minutes of charging we unplugged and were heading back to Salinas by 12:55 AM.

Leg 15, Salinas to King City
Miles: 51 Time: 2 hr 59 min KWH: 6

We were back at the municipal fueling station at 2:03 AM. We used Barry's new "Y" adapter to connect the chargers and ended up blowing the 110 charger because the adapter had one connecter's wires switched. So we pulled the 110 charger out of Barry's car and got everything working.

While we charged, Barry and Kevin got a few winks and Chris stood watch. The exact same situation with the police happened again. This time the officers asked a lot more questions and ran an id check. We were on the road again at 3:44 AM after 1 hour and 41 minutes of charging.

Leg 16, King City to Paseo Robles
Miles: 45 Time: 2 hr 30 min KWH: 5.1

We arrived at the Wild Horse truck stop and RV park around 5:05 AM. We made a 220 splitter adapter and plugged both 220 chargers. 34 amps charges the pack quickly. In 1 hour 27 minutes we were fully charged up. At 6:32 AM we were on the road back to Bob's farm in Paseo Robles.

Leg 17, Paseo Robles to Santa Maria
Miles: 64.5 Time: 2 hr 56 min KWH: 7.2

We hooked up both 220 chargers to the car and plugged into the pole at Bob's farm at 7:35 AM.

We were running out driving time for the Wish Rally so we decided to do one last hop all the way to Santa Maria, skipping the stop in San Luis Obispo. Bob waved from his house at the top of the hill, but it was a little too early and too cold to come down for a quick chat. We were ready to go after 1 hour and 15 minutes of charging and started out at 8:51 AM.

There were some great downhill runs and we drafted as best we could off of the trailer. The last 5 miles to the Saturn station were pretty nerve racking. The exit to Santa Maria came just in time and we crawled into the dealership.

Barry wired into the fuse box and we plugged in both 220 chargers again. After 1 hour and 20 minutes of charging we loaded the Sparrow on the trailer and headed for Oceanside.

Leg 18, Oceanside to Cardiff by the Sea
Miles: 15.4 Time: NA KWH: ?

We unloaded the trailer at Barry's house in Oceanside. Returned the trailer to his neighbor and drove the last 15.4 miles back to Cardiff by the Sea.

AVERE to Host EVS 18 in Berlin Later This Month

The European Electric Road Vehicle Association (AVERE) will host the 18th International Electric Vehicle Symposium and Exhibition (EVS 18) October 20 through 24 in Berlin, Germany. The conference is hailed as the "world's largest event for electric-battery and fuel cell-powered — and hybrid road vehicles."

Event organizers said the conference will focus on fuel cell-powered vehicles, battery-powered vehicles, hybrid electric vehicles, electric vehicle (EV) components, EV test programs, and strategies for the introduction of new vehicles.

The conference will open with an EV parade from Kurfurstendamm to the Brandenburg Gate. On October 21, the EVS 18 exhibition and "ride and drive" will open, with a welcome reception to be held in the exhibition halls.

Presentations on October 22 will cover such topics as all-electric and hybrid electric vehicles, fuel cell vehicles (FCVs) and FCV systems, EV fleets, light vehicles and EV drivetrains. On October 23, presentations will be given on advanced batteries, public transport, batteries in hybrid electric vehicles, EV standards and public legislation, EV battery chargers and infrastructure, and EV modeling and simulation.

The final day of the conference will include information on the environmental aspects of FCVs, fuel cell infrastructure, ultra capacitor peak power systems, and public policy and EV promotion.

Event organizers said the EVS 18 exhibition will feature displays from vehicle manufacturers, component manufacturers, energy companies, fuel cell systems, battery systems, electric drive systems, and EV research and test programs.

GEM, Playa Vista to Design NEV System

Global Electric Motorcars, LLC (GEM) recently announced it is has joined with the developers of Playa Vista — a West Los Angeles, CA-based, master-planned community — to design the community's transportation system around the use of electric-powered neighborhood electric vehicles (NEVs).

The company said it has launched a research program with the Playa Vista development in order to determine how the NEVs will be integrated with the community's internal road network, external connection points with transit systems and community fleet applications.

"Vehicles like these will help fulfill Playa Vista's vision of creating a community that takes advantage of new technologies which help protect the environment," said Playa Vista marketing vice president Ken Agid. "One of our goals is to reduce dependence on automobile use in Playa Vista, so over the next three months, we're going to look at all the ways neighborhood electric vehicles can supplement our planned use of all modes of alternative transportation."

The company said the mixed-use project is being developed on the 1,087-acre former industrial and agricultural site that once served as the headquarters for Hughes Aircraft. The first phase of the project will include up to 3.2 million-square feet of office, commercial, and retail building space and is approved for 3,246 residential units.

"Our entire transportation system is multimodal in its approach," said Agid. "Playa Vista residents will be able to park their cars in below-grade parking facilities and use NEVs to move around our community — going to the store, picking up laundry and getting to work."

NYPA Launches New Program With Th!nk EV

The New York Power Authority, the Long Island Power Authority and Ford's Th!nk green car division recently launched a new project that will offer commuters in the New York City area the chance to lease an all-electric Th!nk City electric vehicle (EV) for less than $200 a month. Officials said a lottery will be used to select people to offer a lease on the vehicle. Lottery winners will also get a $2,000 charging station installed at their homes for free.

The City EV program in New York is modeled after a similar effort underway in California. However, program officials said the flatter terrain in and around New York City should provide a performance advantage for the City EV, which a Th!nk international marketing manager called "relatively slow."

"The Th!nk City EV not only offers an emissions-free ride, it can also provide an all-electric commute when combined with electric-powered commuter trains," said NYPA president Eugene Zeltmann.

The City EV is already available in Scandinavian nations, where it sells for about $20,000. Ford plans to introduce the EV in the U.S. next year, but has not yet determined how much it will charge for the vehicles.

The Th!nk EVs have a top speed of approximately 56 miles per hour (mph), and require about seven seconds to accelerate to 30 mph. The vehicles have a single charge range of about 50 miles.

The City EV lottery and lease program is scheduled to begin in November 2001.

eCycle Develops Hybrid Electric Motorcycle

eCycle, a small high technology company, based in Temple, PA, recently announced it is developing a hybrid electric motorcycle that it plans to market in 2002. The bike

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will weigh about 230 pounds and will be powered by a 125-cubic centimeter, two-stroke, direct-injection engine paired with a 10-kilowatt electric motor.

The company said the motorcycle will have a top speed of 80 miles per hour (mph) and will be able to accelerate from zero to 60 mph in six seconds. The fuel economy is expected to be 150 miles per gallon (mpg) and the target price is $5,000.

Presently in North America there are more than 50 companies manufacturing or distributing motorcycles. In the world, sales of two-wheelers are in excess of 20 million units per year.

eCycle said that it has identified primary, secondary and tertiary markets for its motorcycles. The company said that the primary target market is the entry level motorcycle consumer, the secondary market is the female population interested in motorcycles, and the tertiary market is the experienced rider looking to buy a second motorcycle.

eCycle said it will feature a parallel hybrid powertrain that will "separate the vehicle's requirements for acceleration and for steady state travel." The control system on the bike will sense the throttle input and then deliver power to the electric motor from the batteries. This will cause the engine to start spinning. The motorcycle will then receive torque input from the diesel engine and the electric motor. The electric motor will be used to generate electricity to recharge the battery pack.

eCycle said its hybrid system produces very low emissions and since the oil remains clean, oil can be changed every 60,000 miles. The battery pack uses thirteen 12-Volt, 5-Ampere hour, sealed-lead acid batteries. The total weight of the battery pack is 57.5 pounds. (HYBRID VEHICLES: OCTOBER 2001)

Energy Bill Would Provide Incentives for EVs

Earlier this year, the U.S. House of Representatives passed a 511-page energy bill that included numerous tax credits and funding opportunities for electric vehicle (EV) technology and infrastructure. Industry officials said the bill, known as H.R. 4 "Securing America's Future Energy (SAFE) Act of 2001," has been sent to the U.S. Senate, where it has support from many Senators. In addition, White House officials said the Bush administration backs the legislation "in general."

The House-approved version of the bill would provide income tax credits up to 10 percent of the purchase price of battery-powered EVs, including neighborhood EVs, and $1,000 more for battery EVs with a single charge range of at least 70 miles or a 1,000-pound carrying capacity. Additionally, battery-powered EVs weighing between 8,500 and 26,500 pounds will be eligible for credits ranging from $10,000 to $40,000.

Fuel cell-powered EVs will also be eligible for a similar tax credit up to $4,000, with between $1,000 and $4,000 more for fuel cell vehicles offering 150 to 300 percent better fuel economy over the comparable conventionally fueled car for model year 2000. Heavy-duty fuel cell vehicles will be eligible for tax credits similar to those for heavy-duty battery-powered EVs.

Finally, light hybrid electric vehicles will qualify for tax credits ranging from $250 to $1,000 depending on the power available from the vehicle's rechargeable batteries. Vehicles that achieve a fuel economy that is 125 to 150 percent higher than comparable conventional vehicles will be eligible for tax credits ranging from $1,000 to $3,500. Larger credits will also be available for consumer buyers of heavy-duty hybrid electric vehicles.

US Postal Service Receives 40 New Electric Delivery Vehicles

The Los Angeles Department of Water and Power (LADWP) recently announced that 40 new all-electric delivery vehicles have been put into service by the U.S. Postal Service (USPS) at its Dockweiler facility in south Los Angeles, CA. The vehicles were obtained through the efforts of a partnership involving USPS with LADWP and the South Coast Air Quality Management District (SCAQMD).

"LADWP is proud to cooperate with USPS in bringing electric transportation and technology to the forefront," said LADWP general manager David Wiggs. "As more and more people become aware of the benefits of this technology, we will see an upsurge of electric vehicle [EV] use and the quality of the air we breathe will only improve."

In addition to the Dockweiler post office, four other USPS facilities in the Los Angeles area will also receive the electric route delivery vehicles, with a total of 110 expected to be in operations.

Charging stations will be set up at each post office, and the facilities will be able to charge their vehicles overnight, taking advantage of a discounted power rate for EV charging offered by LADWP.

Other collaborations throughout the nation between public and private partners and USPS will bring a total of 500 electric delivery vehicles into service.

GEM Debuts NEV at Portland Exposition

DaimlerChrysler recently announced its Global Electric Motorcars (GEM) neighborhood electric vehicle (NEV) was on display in Portland, OR, last week at the Society of Environmental Journalists' (SEJ) Environmental Exposition. The company said the GEMs augmented the exhibit on public display at Portland State University.

"Neighborhood electric vehicles like the GEM are a great new tool for tackling traffic congestion and auto-related air pollution," said GEM president Ken Montler. "Our vehicle is designed to be a way for employers to close the loop for people who use alternative models of travel to work. Workers who commute in a carpool, on the bus or by light rail no longer need to be stuck without wheels once they're at work.

GEM said its neighborhood electric vehicle is a new concept in transportation that offers an inexpensive and efficient form of travel. The GEM was designed to be a "street-legal vehicle" for use in and around city centers, planned communities, resorts and large industrial campuses.

The company said its vehicle has a unique, "high profile" design and comes in two- and

four-passenger models, as well as two-passenger short- and long-bed utility versions.

NY Power Authority Presents EV to Community College

New York Power Authority (NYPA) president and chief operating officer Eugene Zeltmann recently presented a Toyota RAV4 electric vehicle (EV) to Hostos Community College (HCC) president Dolores Fernandez, for use by the college in student recruitment and at public events.

"The visibility of this vehicle and those used by others will help to further promote interest in this clean technology and lower its costs," said Zeltmann. "Thanks to Governor George Pataki and organizations like Hostos Community College, the [NYPA] has helped to put more than 200 EVs of various kinds on New York state roads. This is a logical extension of our role as the country's largest supplier of electricity for mass transit."

The EV is intended for use by the HCC admissions office at student recruitment drives, parades and other community events. NYPA said it is providing the car through a one-year loan, which can be renewed.

The RAV4 EV features a nickel-metal hydride battery that provides a single charge of approximately 80 miles. NYPA said it has spent a significant amount of money on providing EVs for vehicle fleets operated by a number of public entities that receive the utility's low-cost electricity.

NYPA has also been a leader in introducing electric and hybrid-electric buses as well as electric postal delivery vehicles. Last year, NYPA became the first electric utility in the Northeast to reach the "million-mile mark" for distances traveled by EVs operated by a utility and its customers.

Canadian Standards Association Approves Standards for EV Battery Chargers

The Electric Vehicle Association of Canada (EVAC) recently announced that the Canadian Standards Association (CSA) has approved publication of standards related to the certification of electric vehicle (EV) battery chargers. EVAC said the new standards will "improve the ability of utilities, automakers and consumers to import, purchase and install [EV] chargers in Canada."

"This is a very important step in the commercialization of [EVs] in Canada," said EVAC executive director Tom Lewinson. "Recent studies have shown that [battery-powered EVs] will be a highly usable form of transportation in Canada, and that all Canadian provinces will realize enormous greenhouse gas and toxic emission reduction benefits for their use in our transportation mix."

The development of the new EV charger standard was coordinated by EVAC and funded by Ford Motor Company, General Motors, Hydro-Quebec, Manitoba Hydro and Natural Resources Canada.

"Recharging is a key issue," said EVAC chairman Serge Roy. "The new standard not only provides industry and governments with the necessary standards, but also serves to reassure consumers of the safety of the whole recharging operation."

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EVAC noted that it worked closely with CSA to ensure the "highest level of harmonization between Canada's regulations for EV chargers and standards currently in effect in the U.S."

Run for Green L.A. Event Features Many EVs

The Los Angeles Department of Water and Power (LADWP) recently announced that its annual "Run for Green L.A." races featured more than 60 environmental displays, including many electric vehicles (EVs).

"We are proud to host this run and festival, which promotes the benefits of the Green L.A. programs," said LADWP board president Kenneth Lombard. "The Green L.A. program works to enhance air quality, sponsors efforts to use resources more wisely [and] provides new clean renewable energy to Los Angeles."

LADWP said a fleet of EVs ranging from shuttle buses and vans to sport-utility vehicles (SUVs) were used at the event to move runners and festival participants between different areas. The event also included stationary displays of EVs, including General Motors' EV1, electric bicycles and electric scooters.

LADWP's Electric Vehicle Program is part of the utility's Green L.A. initiative. So far, the program has installed more than 400 charging stations throughout Los Angeles. In addition, the program offers LADWP customers special electric rate discounts to charge their EVs.

Solectria to Provide Motor for eMotion EVs

eMotion Mobility recently announced that it has selected Solectria Corporation to provide the electric drive system for its new electric vehicle (EV) station car program, known as eMotion. The company said Solectria's alternating current (AC) induction drive motor will be fitted in a two-seat City Coupe manufacturered by MCC smart GmbH. The eMotion station car program will offer the City Coupe EVs for short-term, shared use in urban centers in the U.S.

"We are thrilled to be partnering with eMotion Mobility on this exciting venture," said Solectria CEO James Worden. "The decision to use Solectria technology in a commercial station car application reflects a coming of age of the EV industry. The demonstrated commitment of major industry players to this novel program will demonstrate that electric vehicles are ideally suited for specific applications."

eMotion will begin its service in Atlanta in late 2002, with more than 100 vehicles at selected transit stations. The company said it hopes to implement another 2,400 vehicles at its Atlanta operations over the next five years.

In addition, eMotion plans to launch programs in the Northeast U.S. and California. The company said the station car programs was designed to allow commuters and urban residents to arrange for the use of a zero-emission vehicle on a short-term, as-needed basis.

The company said the City Coupe is a two-seat model that has "proven popular in Europe since its 1998 introduction," and was selected for the eMotion program due to its "overall ideal characteristics for an urban vehicle."

Transit Initiative Looks to Future

Oddly enough, one of Atlanta's top parking companies is trying to get people out of their cars. Lanier Parking Systems Inc. is teaming up with Georgia Power Co. and Midtown Transportation Solutions to set up electric car stations and chargers for use by commuters who ride mass transit to work.

The program is using federal grant money to set up the chargers at five Midtown properties and one downtown property. In Midtown, 730 Peachtree (where Lanier has its headquarters), The Biltmore, Atlantic Center Plaza, BellSouth's Midtown Center, and Atlantic Station will have electric charging stations. And downtown, Underground Atlanta will have a charging area.

Lanier facilitated the federal grants and approached its client projects first, said Glenn Kurtz, vice president of alternative transportation solutions for Lanier. The stations should be up and running in the spring. Next up will be a small fleet of electric cars, which cost around $20,000 each. With the grant money for cars yet to be released, properties have requested cars but do not know when they will get them. Lanier wants three for its building, The Biltmore has requested two, Underground is after one and Atlantic Station initially has requested nine cars, Kurtz said.

Kurtz said he is pretty confident the cars (most likely the Ford Think) will arrive in late spring or early summer next year. The question for Lanier could be: Doesn't fewer cars mean fewer paying customers? Kurtz said Lanier's parking lots still will be full, especially in Midtown and downtown where parking already is at a premium. By offering these types of "added-value" services for its clients, Lanier is betting that it can win more business while not adding to the terrible traffic congestion that the city is known for, Kurtz said. "You can definitely make money off parking and still do the right thing," he said.

Ebus Electric Shuttle Reaches First Anniversary

Ebus, Inc. recently announced that its all-electric shuttle vehicle recently celebrated its first anniversary of use in the city of Carpinteria, CA. The company said the shuttle bus, which operates 29 days per month covering about 80 miles per day, has logged over 24,000 miles.

"We believe that 24,000 all-electric miles is the longest, all-electric range that any transit property has been able to attain from a single vehicle in one year without battery swapping," said Santa Barbara Metropolitan Transit District (SBMTD) general manager Gary Gleason. "The community of Carpinteria warmly embraced these electric shuttles from the first day they went into service and our ridership has continued to be very high."

Ebus said the all-electric shuttle features a 288-volt, nickel cadmium (NiCd) battery back. Ebus president William Webster said the NiCd batteries have provided the vehicle with better range, reliability and cost performance than other battery chemistries the company had considered. The company noted that it plans to incorporate similar battery systems in all of its vehicles.

SBMTD maintenance director Ralph Brannan said with the exception of regular maintenance, the Ebus vehicle has provided the transit district with uninterrupted and reliable service. Brannan said the Ebus vehicle has had fewer manufacturing defects or warranty claims than SBMTD's traditional diesel-fueled vehicle fleet.

Ebus' electric vehicles include 22-foot transit buses, shuttle buses and vintage trolley replicas with all-electric or hybrid-electric propulsion systems.

Hyperminis to Mark Launch of EV Study in CA

The University of California-Davis' (UC-Davis) Institute of Transportation Studies (ITS-Davis) recently hosted an event to launch its new study of consumer response to Nissan's Hypermini city electric vehicles (EVs) in downtown Davis, CA. The event included officials and researchers from ITS-Davis, the Nissan Technical Center North America and the city of Davis, and featured 10 Hypermini city EVs.

ITS-Davis said the Hypermini city EVs are an "all-electric vehicle designed to carry two people comfortable around town." The event marked the launch of ITS-Davis' study examining the markets for city EVs, such as the Hypermini.

During the study, various residents of Davis will have the opportunity to use the city EVs for commuting around the UC-Davis campus and the city of Davis. Each driver will assess the cars according to criteria including interior space, speed, range, safety and usefulness compared with other conventional transportation options.

In addition, the researchers will work to gauge the amount of discussion that the vehicles generate in the community about such issues as air quality, climate change and energy supplies.

NY Could Move EV Mandate to 2007

Officials in the state of New York recently proposed moving back a mandate that would require major automakers to sell a certain percentage of electric vehicles in the state from 2004 to 2007. Clean air groups in the state expressed surprise at the announcement, citing New York governor George Pataki's previous assertions about making the state one of the main centers for the electric vehicle (EV) industry.

"It's hard to believe that Governor Pataki, arguably one of the most vocal electric car advocates in the Northeast, would allow his agency to consider a three-year delay," said American Lung Association of New York State director of environmental health Pete Iwanowicz.

A spokesperson for the state noted that the new implementation date for the EV requirements was "only a proposal that is still being discussed internally." New York Department of Environmental Conservation official Jennifer Post said that automakers could only avoid the mandate if they could prove that cars sold between 2004 and 2007 provide the same air quality benefits as EVs.

The current EV mandate would implement "California-style" rules that require automakers' fleets to be at least 10 percent "zero-emission vehicles" by 2004.

Automakers applauded the three-year extension to the EV mandate, saying that it is a "trend in the right direction," but noted that the industry believes it shouldn't have to sell "something that the market doesn't want." However, environmental groups argued that the general public would accept EVs if the major automakers marketed the vehicles effectively.

"If they spent just a fraction of what they spend marketing sport-utility vehicles, you would see much greater consumer acceptance of [EVs]," said Iwanowicz. (NEWSDAY: 11/6)

SVP to Debut Hybrid Electric Bus in California

The Santa Clara, CA area electric power utility company Silicon Valley Power (SVP) recently introduced its "Breathe Easy Express" (BEE) at the Santa Clara train station near Santa Clara University. SVP said the BEE is a hybrid electric bus that provides a clean alternative to diesel-powered buses.

The utility said the BEE primarily uses electric power, but also includes two Capstone microturbines that are fueled by propane. The turbines help boost the BEE's mileage potential during nightly charges.

Commuters in the Santa Clara area are being urged to try out the BEE as a commuting alternative. The BEE can travel at close to 50 miles an hour, and even boasts coffee cup holders for morning riders.

Diamond Lane Signage and Special Licenses in Georgia

In the State of Georgia, Alternative Fuel identification for Express (Diamond) Lane access is identified by a new license plate and road signage.

What the road signs look like.

How the new plates look on an EV1, ready for a quick, unfettered commute.

HUMOR: ELECTRIC CAR MPG FABLE

By David Butcher

A fable about the "hybrid," the Sparrow and the future.

I have a friend who is a car nut, who goes by the name "Tintoy" on the Internet.

Sparrow compared to Honda Insight & old Fiat

Tintoy and I are both pretty green (environmentally conscious) so one day we decided to buy "green" cars. Tintoy found a dealer who would sell him a "hybrid" with a great incentive - his first 100 gallons of gasoline were included with the car! I found a dealer selling "Sparrows," a little three-wheeled electric car. There was no incentive available, so I had to create one myself. I surfed the Internet a bit, and found that it takes the energy in around 100 gallons of gasoline to create 1000 watts of Solar Panels (the kind that generate electricity). Feeling like I deserved the same "energy bonus" Tintoy got when he bought his "hybrid," I bought 1kW worth of Solar Panels and had them installed. Six months after we had bought our cars, I happened to see Tintoy in a gas station, filling his tank. I pulled in next to him.

Me: How do you like your "hybrid," Tintoy?
Tintoy: Love it!
Me: Is this part of your free 100 gallons of gas?
Tintoy: No, I have driven 4,500 miles and I am paying for my first tank of gas! The first 100 gallons is all gone.

(Tintoy looks over his shoulder as he pumps at the SUV driver next to us, points to his "hybrid" and says proudly "It's electric!" The SUV driver scowls.) Tintoy finishes filling his "hybrid" with gas, and gets back in to drive away. He rolls down the window and points to the Sparrow.

Tintoy: What's it cost to drive that thing? (He does not know that much about pure electric cars, but he knows enough not to ask "How much gas does it use?").
Me: (I see that the driver behind Tintoy is impatient, so I just give a quick answer...) You know that first 100 gallons of gas you got with your car? I set aside the same amount of energy when I bought my car. I still have all of mine.
Tintoy looks startled, then confused. The driver behind him toots his horn, so Tintoy just waves and drives away.

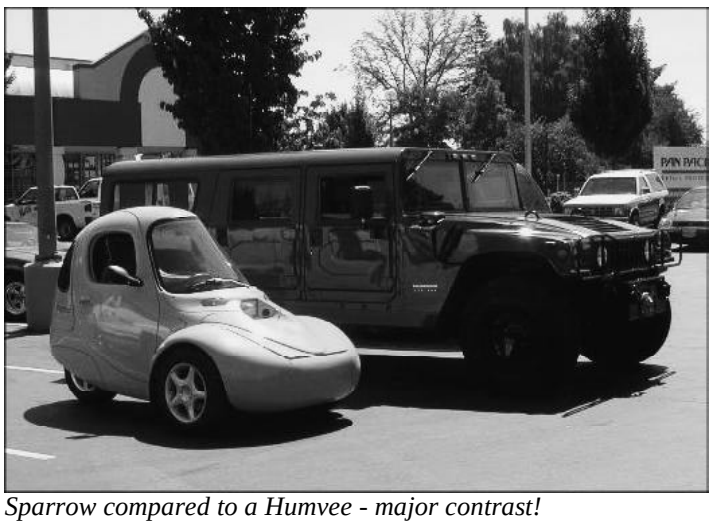
Three months later, I saw Tintoy at the same gas station, filling up. I pulled the Sparrow in beside him again.

Me: Hi!
Tintoy: Howdy! Good to see you again. Hey, I wanted to ask you, what did you mean last time we spoke when you said you "still had all your energy?" Are you not driving your car? I also poked around on the Internet a bit, and I read that electric cars get about the same "gas mileage" - I think that is what they meant - as "hybrids," at least as far as energy goes. What "gas mileage" does your Sparrow get? (Tintoy smiles at the driver of a Diesel pickup as Tintoy clicks the last few ounces of gasoline into his "hybrid." "I get close to 55 MPG" he says to the truck driver. The truck driver scowls.)
Me: Well, Tintoy, to answer your second questions first, I have driven about 4,500 miles, and I am getting the equivalent of 45 MPG.
Tintoy: (grinning) I thought so. My electric car gets better "gas mileage" than your electric car!
Me: Yes, Tintoy, you are correct. Today. Let's check our "mileage" the next time we meet! You may be surprised.

Once again, Tintoy looks confused. With the line of cars behind him inching relentlessly forward, though, he has no time to ask what I meant. He gets into his car, starts the motor, waves, and drives off.

Months went by, and on Labor Day weekend I spotted Tintoy once again, at the same gas station. The price of gas had gone up about 30% during the past few months, and the TV news stations all said it would continue to go up. I pulled up silently next to Tintoy's "hybrid" and said hello.

Me: I'll bet you are glad you have that "hybrid" now, with gas prices going up!
Tintoy: Absolutely! I am paying MUCH less than them (he gestures with his free hand to the other drivers pumping gas) for gas and I have learned how to drive my car carefully to get even better mileage! My last ten-gallon tank took me 650 miles! That is 65 MPG! (Tintoy looks with disdain at the other drivers in line, all filling up for the holiday weekend.)
Me: That is great news, Tintoy. However, I have a surprise for you. I told you to check with me on my "gas mileage" the next time we met. I have driven my Sparrow 7,000 miles, and I am now getting the equivalent of 70 MPG.



Sparrow compared to a Humvee - major contrast!

Tintoy: (looking shocked) What? How can that be? Are you driving slowly and carefully like I am? Have you inflated you tires

to 60 PSI like I have?

(Tintoy's gas tank fills, and he puts the nozzle back in the gas pump, I notice he had added a "Drive Electric!!" bumper sticker to his car.)

Me: I will tell you all about it next time. I also still have all the 100 gallons of "gas" energy I started with when I bought my car.
Tintoy: You don't expect me to believe that, do you? That is impossible! That would mean your car uses no energy at all! (he gets into his car and prepares to drive away).
Me: (waving) Details next time!
Tintoy pulls into traffic and slowly drives away.

A few more months passed, and I spotted Tintoy just as he pulled into line at the gas station. I pulled in silently with the Sparrow, and parked out of the way. I walked over to Tintoy's "hybrid" and said hello.

Me: How's it going!
Tintoy: Great. It sure is nice not to have to do this very often.
Me: (smile)
Tintoy: So, hotshot, tell me how you are getting 70 MPG in your car. I can't believe it.
Me: Well, Tintoy, actually, I have driven 10,000 miles, and I am now getting 100 MPG.
Tintoy: (looking clearly frustrated) Are you telling me that you keep getting better and better mileage out of that thing? (he gestures over to the Sparrow, then pulls up a space as the SUV in front of him finishes taking on 50 gallons of fuel).
Me: Yes. Exactly. Every time I drive another 100 miles, my "gas mileage" goes up by one mile per gallon.
Tintoy: (now clearly confused, disbelieving, and a little frustrated) Ok, Einstein, tell me how you do the impossible. (he pulls up to the pump, and starts to fill his gas tank.)

A young girl (around ten years old) gets out of the Minivan next to us and comes over to where we are standing. She points to the Sparrow and asks me "Is that your electric car?"
Me: Yes!
Tintoy: Mine is electric too! he says, as he pumps it full of gas.
The girl stands there listening to the conversation.
Me: Like I said, Tintoy, I am now getting the equivalent of 100 MPG, and I have all the energy I started with. The reason I have all my original energy and am getting more to drive the car is that I used the first 100 gallons worth of energy to acquire Solar Panels, and they are providing the power to run my car.
The young girl smiles brightly. "That means you can drive forever on the first 100 gallons of energy, right?"

Tintoy: (looking stern) It's too complicated for you to understand, little girl. I think your Mom is ready to leave. Run along.
Me: (I smile at the girl, wink, and mouth the word "bingo" - she smiles back and leaves) Tintoy, it's not that complicated. (I struggle to think of an example that makes sense. From the look on Tintoy's face, I know I have little chance of explaining anything to him at this point, but I have to try).
Me: Imagine you take 100 dollars to a bank. You can put it in a checking account with no interest and spend it as you need it until it is gone. That is like the first 100 gallons of gas you put in your hybrid You could also invest the money in a CD, for example, and only spend the interest you earn. That is like what I did with my first 100 worth gallons of "gas" energy when I bought Solar Panels. After you spend your 100 gallons, it is gone for good, but I can keep on spending the "interest" energy my Panels create forever, and I always have the energy I started with.
Tintoy: (looking hopelessly confused) So you put your money in an "energy bank" somewhere? And you are getting "energy interest" and driving your Sparrow with it? Come on! (the gas nozzle clicks off, and Tintoy gets back into his "hybrid" to prepare to drive away)
Me: Sort of. Well, yes. My Solar Panels are the "energy bank" and the energy they produce is the "interest."
Tintoy: Well I have to go. It sounds like you are getting something for nothing. You can't get more energy out of gas than it has. My next car will have fuel cells, and it will come closer than ever to using 100% of the energy in the gas. I will get over 120 MPG!
Me: And by that time I will be getting over 200 MPG. You see, you can't get more energy out of gas than it has in it if you burn it to drive your car! But if you use that energy to make Solar Panels, you can then use them to produce many times more energy than what you started with! The secret is to not burn the gas to move the car!!

Tintoy does not say anything. It is clear he does not believe a word of it. He waves and slowly accelerates into traffic. As Tintoy started his motor and drove away, I walked back to the Sparrow. I thought back to the young girl who was able to grasp the concept so easily. Her mind had not yet been programmed that there was only one choice, that the only way vehicles could be powered was by directly consuming petroleum.

So small, you can fit 4 in a regular parking space.

I realized that our generation may not ever "get it" - that we would just keep writing energy "checks" until the account ran dry, because we failed to see the leverage in using the petroleum to create energy "collectors and concentrators" like wind farms and Solar Panels instead of burning it directly.
I thought back to the young girl and smiled. My generation might not get it, but maybe hers would. She was off to a good start! I started my Sparrow, and sped silently, cleanly down the road, getting 100 MPG and climbing, thinking about the future and smiling.

*David Butcher * Copyright 2001*

Electric Auto Association Annual Meeting

Agenda Outline

Open meeting
  Chair's opening remarks
Treasurer Report
Secretary Report
  Membership Report
  Chapter Relations
  Newsletter Report
Historian Report
Webmaster Report
Awards
Elections
Member Comment
Chair Summary

1. Opening Remarks
Ron Freund
  Overview of EAA

2. Treasurer Report
Stan Skokan
  Treasurer, Income for 2001
    $31,500 Membership Dues
    $2,700 Newsletter Advertising
    $1432 EAA Merchandise
    $596 Refunds
    $110 bank interest
    Total income $36,338

  Treasurer, expenses for 2001
    Membership income 15% below target
    Advertising income 46% below target
      $13,162 Publishing
      $4,530 Rebates to Chapters
      $2,117 Membership Administration
      $1,417 Liability insurance
      $1,551 EAA Store expenses
      $449 Board Administration
      $135 Web hosting expenses (next 12 months)
      Total Expenses $23,363

  Treasurer's Summary
    Savings
      Publication
        Volunteer editors
        Volunteer publishers
      Rebates to Chapters
        Lower membership numbers
        Loss of chapters
    Total ledger balance $27,445

3. Secretary Responsibilities
  Secretarial Functions – Ed Thorpe
  Membership – Will Beckett
  Chapter Relations- Anna, Jerry & Will

4. Secretary Report
Ed Thorpe
  Board meeting minutes/notes
  Change in bulk mailing permit
  Membership delegation
  Board contact person – email, mail, links

5. Membership Report
Will Beckett
  Procedural changes in the last year
    Documentation/backup
    DB enhancements
    Member card/ renewal letter
    PayPal
  Current state of the membership (levels)
  Objectives for growing membership

6. Chapter Relations
Anna Cornell, Jerry Asher & Will Beckett
  State of Chapter Relations
    Map of locations (map)
    EAAEV group (online communication)
      http://groups.yahoo.com/group/eaaev/

7. Newsletter Report
Ed Thorpe
  Restoration of CE publication
  Reduced expenses
  Gathered team (editors & columnists)
  Formed process (CE on track)
  Special Rally Issue, plus standard six issues
  Website used for CE editing and review
  Future Plans

Break

8. Historian Report
Terry Wilson
  Archivist in 2001
    Scanned EV and EAA documents
    Stored CE's on CD's in PDF format
    Collected marketing brochures

9. Webmaster Report
Bruce Parmenter
  Web review for 2001
  Plans for 2002
    The new web site

10. Awards
Terry Wilson
  Stan Skokan
  Anna Cornell
  Ed Thorpe

11. Elections
Bill Carroll
  Results
    821 ballots sent out
    285 ballots received back
    CA – 47.7%
    MA – 5.3%
    AZ – 4.5%
    WA – 3.5%
    NY, NM, TX – 3.2%
    MD – 2.4%
    CN, MI – 1.7%
    NC, FL, CO – 1.4%
    NJ, VA, OH, IL, CAN 1.1%
    Others – less than 1%

12. Member Comments
Ron Freund
  Open Forum

13. Chair's Summary
Ron Freund
  Summary of comments from members
  Where we are, Where we are going

I. CORPORATION PURPOSES:

A. To act as a source of information for the membership, other organizations and the public, on the current state of electric vehicle technology worldwide.

B. To encourage experimentation in the building of electric vehicles, particularly to improve energy and resource efficiency, reduce emissions and improve vehicle safety.

C. To promote and organize public exhibits of electric vehicles built by members and others for the purpose of informing the public on the progress of electric vehicle technology and conducting public opinion polls.

D. To use all media, such as newsletters, web sites, information packages, and other paper and electronic media designed to inform the public and promote the cause of electric vehicles.

FELLOWSHIP AWARDS PRESENTATION

By Terry Wilson

The EAA Fellowship Awards were established, to recognize outstanding service to the Electric Auto Association, and this year, we have three recipients. Due to time constraints I will keep my speech short, but profiles of this years recipients will appear in upcoming CE's.

The first presentation could also be called the "Man of the Year Award". There were many outstanding individual efforts this past year, however the number one issue the last 4 years was without a doubt our Current Events magazine. Board Director Ed Thorpe was elected to be the Manager of Editing and Publishing. Having to basically start from scratch, with no template, no ads, no articles, with, in fact, nothing passed along from the previous Editor/ Publisher, Ed recreated CE. Ed began Editing, did all the Publishing, he dealt with the Printer, and the Post Office. Before the end of the year, due to the efforts of Ed Thorpe, CE is caught up, and has been sent out on time and regularly. Ed Thorpe, the EAA is proud and grateful for your outstanding efforts to make Current EVents- current!

Our next presentation is an acknowledgement of many years of service to the EAA. Each person who volunteers to serve the EAA gives whatever time and effort they can. Some do tasks they want to do, some do tasks they see that need to be done, and some do jobs nobody else is willing to do. Our next recipient has done all three. Since joining the EAA in 1985, Anna Cornell filled in to many roles. She hosted Board Meetings in her own home, orchestrated EVents, attended other EVents, served as a Chapter Officer, in whatever position was needed, and also served on the Board in whatever position was needed, Anna Cornell has given countless hours to our organization. For those who have not been on the Board or served as a Chapter Officer, it is important that you know the efforts these people make. The EAA cannot exist without certain tasks being performed. If one of these tasks needed to be done Anna was there. If you counted up all the hours she has given over all these years, I think you would find that Anna has given the EAA an amount of time and effort that is equaled or exceeded by only by 1 or 2 others. Anna, the EAA is proud and grateful for your outstanding efforts for all the years, all the hours, all the effort you have given.

Our next presentation is an acknowledgement of many years of service to the EAA. The achievements of Stan Skokan are too numerous to say in the time available to us. Stan joined the EAA in 1975 and in 1976 became Vice President of the Santa Clara Chapter of EAA, in 1982 he received the Keith Crock Technical Award and was elected to the EAA National Board of Directors. In 1993 he was elected President of the Silicon Valley Chapter. Stan's experience and knowledge of California non-profit laws, Roberts's rules of Order, EAA Bylaws and Code of Ethics, have served and protected the EAA over many years. Stan, for all the years you have given to us, for having kept us safe from the IRS, and the State of California, for warning those new to the Board of our mistakes of ignorance, we thank you.

The new trademark of the EAA.
This long-time log of the EAA is now a federally registered trademark, thanks to the efforts for Board member Jerry Asher.

First Ever EAA Chapters Meeting and Conference ! ! !

Coming up **May 12-15** in the greater Washington/Baltimore area. Sponserred by the EAA National organization and EAA Board, and hosted by the EVADC Local Chapter. Timed to coincide with the kickoff of the annual Tour de Sol.

Contact: *Jerry Asher*, evjerry@usa.net
EVADC website: http://www.evadc.org/

EAA 2002 Board of Directors Election Results

By Bill Carroll

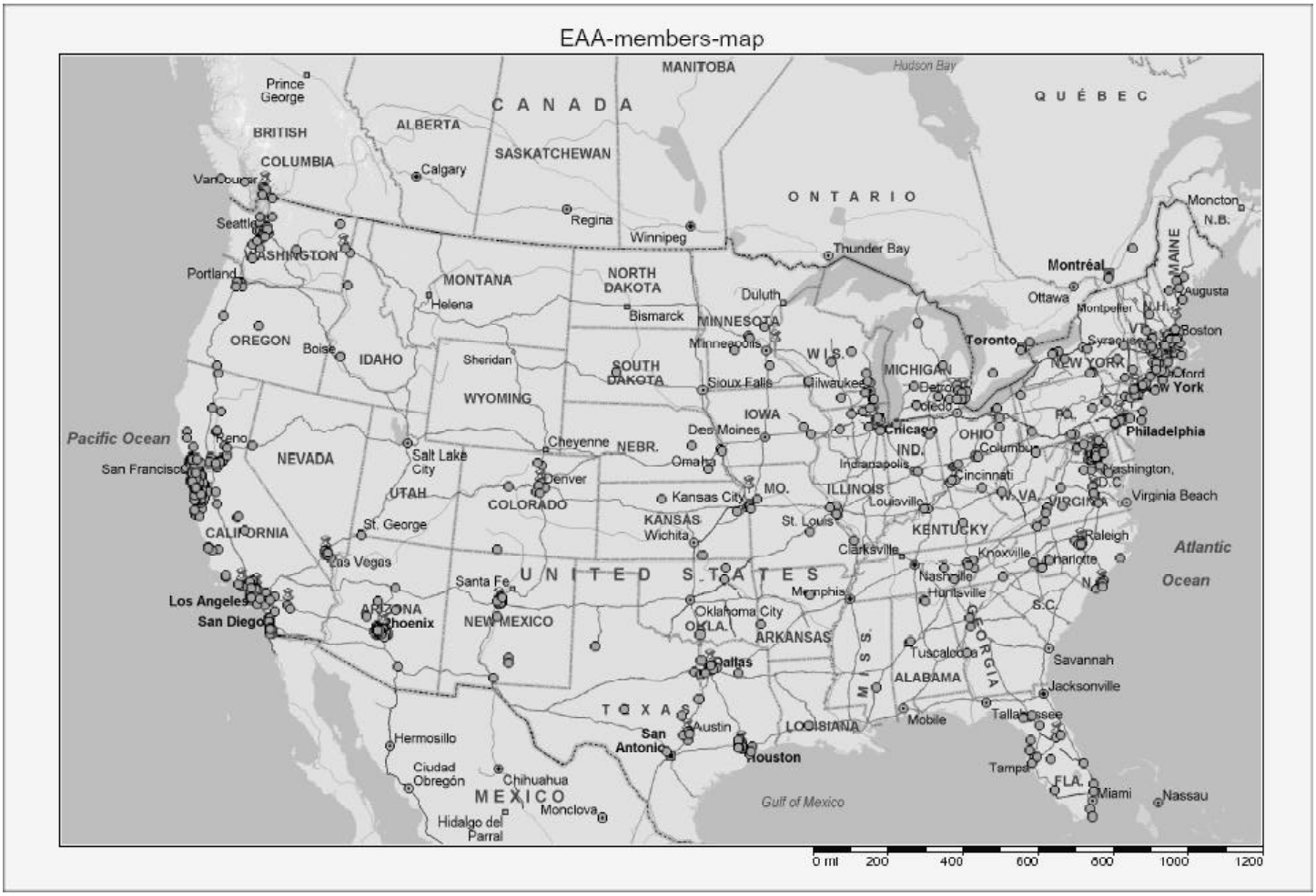
Only had 3 candidates for 3 positions, so everyone won.

Candidates were:
Greg Pitz
Scott Leavitt
Gabrielle Adelman

The Board had asked each candidate to outline their qualifications for at least two board positions. The line on the ballot just listed those two positions and was not intended to imply that voters were electing them for these positions. This information was just provided to express that the candidates were interested and qualified for coming to the board and contributing.

total of 821 ballots sent out
recvd. 285 ballots ... response of 34.7 %
total of 37 states and 2 countries represented

CA=136=47.7% OF RCVD
MA=15=5.3%
AZ=13=4.5%
WA=10=3.5%
NY.NM.TX.=9=3.2%
MD=7=2.4%
CN.MI=5=1.7%
NC.FL.CO.=4=1.4%
NJ.VA.OH.IL.CAN.=3=1.1%
PN.WV.TN.IN.AK.NV.OR.UK.WI.=2=0.7%
RI.WDC.GA.MS.IA.MO.KS.NB.LA.OK.UT.HW.=1=0.4%
(multiple listing = same for each example NY.NM.TX. 9 each=3.2%)



CANADA

VANCOUVER EVA
Web Site: http://www.veva.bc.ca/
Contact: Haakon MacCallum, 1-604-258-9005, info@Veva.bc.ca
Mailings: P.O. Box 3456, 349 W. Georgia St., Vancouver, BC V6B3Y4, Canada
Meetings: 3rd Wed./month, 7:30 pm
Location: Varies, see Web Site for details.

UNITED STATES

ARIZONA

PHOENIX EAA
Web Site: http://www.phoenixeaa.com
Contact: Sam DiMarco, 1-480-948-0719, voltek_2000@yahoo.com
Mailing: PO Box 6465, Scottsdale, AZ 85258-6465, USA
Meetings: 4th Sat./month, 9:00 am
Location: Varies, see Web Site for details.

CALIFORNIA

EAST (SF) BAY EAA
Web Site: http://www.geocities.com/MotorCity/1756/
Contact: Ed Thorpe, 1-510-864-0662, EAA-contact@excite.com
Mailing: 2 Smith Ct., Alameda, CA 94502-7786, USA
Meetings: 4th Sat./month, 10:00 am.
Location: Alameda First Baptist Church, 1515 Santa Clara Ave, Alameda, CA

LOS ANGELES EAA
Contact: Louis Weiss, 1-323-935-2690
Mailing: 1811 Hi Point St., Los Angeles, 90035-4621, USA
Meetings: 1st Sat./month, 10:00 am
Location: 1200 E. California Blvd, Pasadena, CA

NORTH BAY EAA
Web Site: http://www.geocities.com/MotorCity/1757/
Contact: Don McGrath, 1-707-968-9667, vintner@pobox.com
Meetings: 3rd Sat./month, 10:00 am.
Location: Call for meeting details.

SAN DIEGO ELECTRIC VEHICLE ASSOCIATION
Web Site: http://home.att.net/~NCSDCA/EVAoSD/
Contact: Chris Jones, 619-913-6030, NCSDCA@WorldNet.ATT.net
Mailing: 315 South Coast Highway 101, Suite U44, Encinitas, CA 92024-3543, USA
Meetings: 4th Tues./month, 7:00 pm
Location: San Diego Automotive Museum, 2080 Pan American Plaza, Balboa Park, San Diego, CA

SAN FRANCISCO PENINSULA EAA
Web Site: http://www.geocities.com/MotorCity/1759/
Contact: Bill Carroll, 1-650-589-2491
Mailing: 160 Ramona Ave., San Francisco, CA 94114-2736, USA
Meetings: 1st Sat./month, 10:00 am
Location: San Bruno Public Library, 701 West Angus St., San Bruno, CA

SAN JOSE EAA
Web Site: http://geocities.com/sjeaa/
Contact: Mike Thompson, m.t.thompson@ieee.org
Contact: Roy Paulson, 1-408-269-7937
Mailing: 1592 Jacob Ave., San Jose, CA 95118-1612, USA
Meetings: 2nd Sat./month, 10:00 am
Location: Reid-Hillview Airport, 2350 Cunningham Ave., San Jose, CA

SILICON VALLEY EAA
Web Site: http://eaasv.org/
Contact: Will Beckett, 1-650-494-6922, willbeckett@email.com
Mailing: 4189 Baker Ave., Palo Alto, CA 94306-3908, USA
Meetings: 3rd Sat./month, 10:00 am
Location: Hewlett-Packard Co, Lobby A Auditorium, 3000 Hanover St., Palo Alto, CA

KANSAS / MISSOURI

MID AMERICA EAA
Web Site: http://maeaa.org/
Contact: Mike Chancey, 1-816-822-8079, eaa@maeaa.org
Mailing: 1700 E. 80th St., Kansas City, MO 64131-2361, USA
Meetings: 2nd Sat./month, 1:30 pm
Location: see Web Site for details.

MASSACHUSETTS

NEW ENGLAND EAA
Web Site: http:/neeaa.org/
Contact: Tony Ascrizzi, 1-508-799-5977, tonyascrizzi@juno.com
Mailing: 34 Paine Street, Worcester, MA 01605-3315, USA
Meetings: 2nd Sat./month, 2:00 pm
Location: Call/email for meeting location.

PIONEER VALLEY EAA
Web Site: http://www.geocities.com/pveaa/
Contact: Emlen Jones, 1-413-549-6522, pveaa@hotmail.com
Mailing: P.O. Box 153, Amherst, MA 01004-0153 USA
Meetings: 3rd Sat./month, 2:00 pm
Location: Jones Library, Amhurst, MA.

NEVADA

LAS VEGAS EVA
Web Site: http://www.lveva.org/
Contact: William Kuehl, 1-702-645-2132, bill2k2000@yahoo.com
Mailing: 4504 W. Alexander Rd., N. Las Vegas, NV 89115-2489, USA
Meetings: 1st Sat./month, 10:00 am
Location: Clark County Library, 1401 E. Flamingo Rd, Las Vegas, NV

NEW MEXICO

ALBUQUERQUE EAA
Web Site: http://abqev.org/
Contact: Tom Stockebrand, 1-505-856-1412
Mailing: 1013 Tramway Ln NE, Albuquerque, NM 87122-1316, USA
Meetings: 1st Tues./month, 7:00 pm
Location: Shoney's Restaurant, 6810 Menaul NE, Albuquerque, NM

NORTH CAROLINA

COASTAL CAROLINAS EAA
Contact: Jayne Howard, 1-910-457-4383, EAAofCC@aol.com
Mailing: 4805 E. Southport Supply Rd.,Hwy 211, Southport, NC 28461-8741, USA
Meetings: Varies, call for details.
Location: 4805 E. Southport Supply Rd.,Hwy 211, Southport, NC

TRIANGLE EAA
Web Site: http://www.rtpnet.org/~teaa/
Contact: Ken Dulaney, 1-919-461-1241, teaa@rtpnet.org
Mailing: 202 Whitehall Way, Cary, NC 27511-4825, USA
Meetings: 3rd Tues./month, 5:30 pm
Location: Varies, call for details.

TEXAS

HOUSTON EAA
Web Site: http://www.dataline.net/hceaa/
Contact: Dale Brooks, 1-713-218-6785, brooksdale@usa.net
Mailing: 8541 Hatton St., Houston, TX 77025-3807, USA
Meetings: 3rd Thurs./month, 6:30 pm
Location: The Citizen Environmental Center, 2nd flr, rm 280, 3015 Richmond Ave., Houston, Texas

NORTH TEXAS EAA
Web Site: http://www.dataline.net/hceaa/
Contact: Paul Schaffer, 1-972-437-1584, pshf@hotmail.com
Mailing: 430 Ridge Crest, Richardson, TX 75080-2532, USA
Meetings: Varies, call/email for details.

VIRGINIA

CENTRAL VIRGINIA EAA
Contact: Ernest Moore, 1-804-271-6411, ernie_moore@yahoo.com
Mailing: 4600 Melody Ct., Richmond, VA 23234-3602, USA
Meetings: 3rd Wed./month, Call for details.
Location: Richmond Technical Center, Westwood Ave., Richmond, VA

WASHINGTON

SEATTLE ELECTRIC VEHICLE ASSOCIATION
Web Site: http://slough1.home.mindspring.com/seva.html
Contact: Steven Lough, 1-206-524-1351, slough1@mindspring.com
Mailing: 6021 32nd Ave. NE, Seattle, WA. 98115-7230, USA
Meetings: 2nd Tues./month, Call for details
Location: See website.

WASHINGTON D.C.

EVA OF WASHINGTON DC
Web Site: http://www.evadc.org/
Contact: David Goldstein, 1-301-869-4954, goldie.ev1@juno.com
Mailing: 9140 Centerway Rd., Gaitherburg, MD 20879-1882, USA
Meetings: 2nd or 3rd Tues./month, 7:00 pm
Location: National Institute of Health (NIH), Building 31-C, 6th Floor, Bethesda, MD.

Listing updated, verified and current as of 02/15/02.

More chapters are being formed this year. If you don't have a Chapter in your local area and are interested in starting one, please contact membership@eaaev.org for information and process on how to organizae a Chapter.

Also note that our membership is International and not limited to the United States nor Canada.

For information on how to become affiliated with the EAA, checkout ***http://www.eaaev.org***

Board of Directors 2002

Chairman
Ron Freund
rfreund@cup.hp.com

Vice-Chairman
EAA Membership
Will Beckett
membership@eaaev.org
1-650-494-6922

Secretary
Scott Leavitt
secretary@eaaev.org

Treasurer
Gabrielle Adelman
treasurer@eaaev.org

CE Publications
Ed Thorpe
contact@eaaev.org
1-510-864-0662

EAA Historian
EAA Awards
Terry Wilson
historian@eaaev.org

EAA Technology
Bruce Parmenter
brucedp@n2mail.com

EAA Chapter Relations East
Jerry Asher
evjerry@usa.net

EV Charging
Greg Pitz

EAA Board contact:
e-mail: board@eaaev.org
phone: 1-510-864-0662

EAA Membership contact:
e-mail: membership@eaaev.org
phone: 1-650-494-6922

Notice: IRS requires us to ask for a full discloser by the donor for donations of $1000 or more. This should include Full Name, Complete Address, Phone Number, and Social Security or Tax ID Number.

CALENDAR OF EVENTS

January 14 - 17, 2002
AUTOMOTIVE NEWS WORLD CONGRRESS , Dearborn, Michigan, USA
Annual conference on the state of the international automotive industry.
Contact: ANWC 2002
Phone: 1-734-662-6649
E-mail: jtroy@erim.org
Web Site: www.autonews.com

February 4 - 7, 2002
ADVANCED AUTOMOTIVE BATTERY CONFERENCE , Las Vegas, Nevada, USA
Second annual conference on battery technologies with emphasis this year on the 42-volt and hybrid electric battery technology.
Contact: Advanced Automotive Batteries
Phone: 1-530-692-0140
E-mail: info@advancedautobat.com
Web Site: www.advancedautobat.com

February 15 - 16, 2002
MIRAMAR HS EVENT, Florida, USA
Web Site: http://www.evchallenge.org

February 20 - 22, 2002
CLEAN HEAVY-DUTY VEHICLES FOR THE 21ST CENTURY, Tempe, Arizona, USA
Hosted by WestStart and the U.S. Army National Automotive Center, this second annual conference will explore international trends in advanced transportation technologies for heavy-duty vehicles and clean fuels.
Contact: Susan Romeo, WestStart
E-mail: sromeo@calstart.org
Web Site: www.calstart.org

March 4 - 7, 2002
SAE 2002 WORLD CONGRESS, Detroit, Michigan, USA
Annual SAE meeting reviewing the latest in vehicles and vehicle technologies
Contact: SAE
Web Site: www.sae.org

March 11 - 14, 2002
19TH INTERNATIONAL SEMINAR ON PRIMARY AND SECONDARY BATTERIES, Fort Lauderdale, Florida, USA
A comprehensive review of the current status and future outlook of primary and secondary battery technology and applications.
Contact: Florida Educational Seminars
Phone: 1-561-367-0193
E-Mail: powersourcesnet@aol.com
Web Site: www.powersources.net

March 13 - 15, 2002
GLOBE 2002 DRIVING CORPORATE LEADERSHIP AND GLOBAL ENVIRONMENTAL BUSINESS TO NEW HEIGHTS, Vancouver, British Columbia Canada
Conference on balancing business, energy and environmental agendas that will define the emerging energy strategies in North America.
Contact: Globe 2002
Phone: 1-604-775-7300
Fax: 1-604-666-8123
E-Mail: info@globe.apfnet.org
Web Site: www.globe.ca

March 19 - 21, 2002
WORLD FUELS CONFERENCE, San Antonio, Texas, USA
Annual conference on the state of vehicle fuels and future fuels.
Contact: Chemical Week Conferences
Phone: 1-212-621-4978
E-Mail: reg@chemweek.com
Web Site: www.chemweek.com

March 23, 2002
WICKED WATTS, Las Vegas Motor Speedway, Las Vegas, Nevada, USA
National Electric Drag Racing Association's season opener.
Web Site: http://www.nedra.com/upcomeLV.html

April, 2002
EARTHDAY EVENTS, Everywhere
Various local celebrations of Earthday. Plenty of opportunities to participate with EVs, from display to presentations and rides.

April 21, 2002
CAL POLY EV RALLY, San Luis Obispo, California, USA
Third annual EV expo and Rally i combination with Cal Poly's open house.
Contact: Mr. Clark
Phone: 1-805-621-4978
E-Mail: crclark@calpoly.edu

April 26 - 27, 2002
7TH ANNUAL FINAL EVENT OF THE EV CHALLENGE, Raleigh, NC, USA
Attend the largest middle school and high school electric vehicle event in the US's history!!
Web Site: www.evchallenge.org/

May 12 - 18, 2002
14TH ANNUAL TOUR DE SOL, Washington, DC to New York City
Manufactured, student and individual built cars will compete in a road rally event for the Tour de Sol championship.
Web Site: www.nesea.org/transportation/tour/

May 12 - 14, 2002
1ST ANNUAL TOUR DE SOL, Washington, DC to New York City
Manufactured, student and individual built cars will compete in a road rally event for the Tour de Sol championship.
Web Site: www.nesea.org/transportation/tour/

May 15 - 17, 2002
6TH EUROPEAN CONFERENCE ON MOBILITY MANAGEMENT, Gent, Belgium
Conference on the strategies for sustainable mobility.
Contact: ECOMM 2002
Web Site: www.ecomm.org

June, 2002
JUNIOR SOLAR SPRINT NORTHEAST CHAMPIONSHIP, TBD
Over 100 middle school groups from across the Northeast will compete with model solar cars for the Northeast Championship. Cars will be judged for Speed, Innovation, Craftsmanship, and Technical Merit.
Web Site: www.nesea.org/education/jss/

June 3 - 5, 2002
2002 FUTURE CAR CONGRESS, Arlington, Virginia, USA
Conference addressing issues involved in the development of automotive technologies aimed at reducing fuel consumption and emissions.
Contact: SAE
Phone: 1-724-772-4006
E-mail: meetings@sae.org
Web Site: www.futurecarcongress.org

June 9 - 14, 2002
14TH WORLD HYDROGEN ENERGY CONFERENCE, Montreal, Quebec, Canada

Conference on hydrogen as an energy source.
Contact: University of Quebec
Phone: 1-819-376-5108
Fax: 1-819-376-5164
E-mail: irhydrog@UQTR.Uquebec.Ca

June 19 - 21, 2002
11TH INTERNATIONAL TRANSPORT AND AIR POLLUTION SYMPOSIUM, Graz, Austria
Scientific conference assessing air pollution from transportation systems and effects on the environment.
Contact: Peter Sturm, Graz University of Technology
E-mail: sturm@vkmb.tu-graz.ac.at
Web Site: www.fvkma.tu-graz.ac.at

July 21, 2002
FEDFLEET2002, Kansas City, Missouri, USA
Annual workshop of the National Federal Fleet Managers. Forum for fleet professionals at all levels of government as well as private fleets.
Contact: FedFleet 2002
Phone: 202/501-1777
E-mail: vehicle.policy@gsa.gov.org

All EAA Chapters - please email <cenews@eaaev.org> to have Chapter EVents listed in this calendar.

Used EVs for Sale

With a little research by using the EVs For Sale links on the http://eaaev.org page , it is easy to find an EV that will fit your needs. You will need to add the cost to winterize the EV you buy: adding plate battery heaters http://www.reiffpreheat.com/Battery%20Heater.htm and a new battery pack http://usbattery.com

-http://eaasv.org
1974 Rotary pick-up, Mazda, converted in 1993, 108vdc, 18 batteries, 4 speed manual transmision, max speed: 67, 3 pasengers, light blue, runs well, 45 mile range per charge, comes with camper shell (currently off vehicle), new Trojan 125 batteries and auxillary 12V batt. installed July 2001, refinished interior, says 'Electric Vehicle' on tailgate, onboard K&W charger, Curtis PMC 1221 controller, power brake booster system; can handle a full payload of material easily and is a very attractive truck! $5300 Contact: Brian Barth, Ben Lomond (near Santa Cruz, CA),(831) 335-2689 slowlybeautiful1@hotmail.com (12/5/2001)

-http://eaasv.org
1981 VW Pick Up, converted 1990, Voltage: 120, 20 6volt batteries manual transmission, top speed 75, two passenger This is a great second car. It can get about 50 miles per charge. Batteries have about 8,000 miles on them. Asking $6,000 call if your interested. John Haskins, Castroville, CA (831) 632-4451w, (831) 915-3197h jhaskins@mlml.calstate.edu (9/13/2001)

-http://eaasv.org
1980 Honda Accord Electric, converted 09/01/98, 99 horsepower GE motor, 400 amp controler, 120 vdc with 20 batteries, 5 speed manual transmission, max speed 60mph, new tires, used for comute to work but now I must sell it. I have auto trailer to deliver it in the S.F. Bay area. I has not been licenced for two years For the price of new batteries it's a super deal. $1400 Contact: Jeff Stanley, Napa, Calif, (707)257-3120 (h) j5108l@netzero.net (1/9/2002)

-http://evalbum.com/evalbum/geobook.html
1980 Plymouth Horizon EV Conversion $5000 Paul F. Wood - Posted 01/30/02 My Email: pw12423@earthlink.net Phone: (402)486-3339 Location: Lincoln, Nebraska Solid, honest 1980 Plymouth Horizon/TC3/Dodge Duster body style 60mph EV. 15,000 all season Nebraska miles, many upgrades, four passenger, white, lt.blue interior, new 12v.accessory batter, 20 6v. motive power (golf cart) batteries, new batts available $20 each locally, Ziebart anti-rust treat,ent(effective!), off-board 220v. Lester Electric charger(re-installable). Paul Wood, EV author(EV's, Blood Sweat and Some Tears), owner of six of the beasts! $5,000 owner motivated, (402)486-3339 / pw12423@earthlink.net

-http://evalbum.com/evalbum/geobook.html
1981 Jet Electrica Daniel Rivest - Posted 01/18/02 My Email: beyondoil@juno.com Location: Mill Valley, California PMC Controller, 4k miles, 23 HP GE DC Motor, 20 deep cycle 6 volt batteries, 4 speed, gas heater, prototype regeneration system 4 Invicta tires, variac 110 volt onboard charger, AM FM Radio, Factory Manual. Original gauges have been modified to work as gauges for the electrical components. Gas gauge is voltmeter Ampmeter acts as current amps for motor. Car is going to need new batteries and a paint job.

-http://evalbum.com/evalbum/geobook.html
Fred Miller - Posted 10/01/01 My Email: fmiller2@rochester.rr.com Phone: (716) 682-3484 Location: Lyndonville, New York Checked: 01/19/02 White 1981 VW Rabbit converted by SCT for Niagara Mohawk Power Co., sold at one of their auctions, and unused for several years. In very good condition, no batteries [108 V system], diesel heater, Lestronic on-board charger, with spare speed controller and operating manuals. Have photos that can be emailed. See - Mr. Sharkey's Home Page - on the web, for an excellent description of his vehicle, which is the same as mine. Located in Western New York. Email address is fmiller2@rochester.rr.com

-http://www.infoev.com/
1986 Escort Ev for sale David Brandt 3 Jan 2002 12:25 108V system (T-125's) Curtis 1221B controller 9" GE motor K & W BC-20 charger (factory rebuilt, 1999) 5-speed manual Trans. Escort GT 15" rims with new bridgestone potenza re 910 tires 1500 W Ceramic heater element Absolutely no defects on the car, whatsoever, except that it needs a new traction pack (about $1000). Visit my EV album entry for more info. David Brand 918-342-1252 davidbr13@hotmail.com

Electric Geo with new batteries. range: 30 - 40 miles. price: $5000. in Sacramento, CA. Ruth MacDougall 916-732-6625 rmacdougall10@attbi.com

Electric Auto Association (EAA) Membership Application Form

Copy and fill out this form, attach a check or money order or use PayPal in US funds only for $39 ($42 Canada) ($45 International) payable to '**Electric Auto Association**'. You can fold this form as indicated and mail it with your payment enclosed. Do not use staples, instead use tape to seal the form before you mail it. Or send an e-version of this form, pay through PayPal using the link on http://www.eaaev.org/eaamembership.html.

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Mailing City, State & ZIP: _____ *Work phone #: _____

*Do you ❑ own or ❑ lease an Electric Vehicle? ❑ Production ❑ Conversion ❑ Bicycle ❑ Other:_____ ❑ No

I support the _____ EAA Chapter, or please select an EAA Chapter closest to me. ❑

(*optional) All information in this application is for the exclusive use of the EAA and not be sold or given to any other organization.

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❑ Environmental/Gov. Regs. ❑ Social (Rallies, Shows, Dinners) ❑ New Technology & Research
❑ Promotion & Public Awareness of EVs ❑ Student or General Interest ❑ Electrathon/Bicycle/other

The Electric Auto Association www.eaaev.org

'Providing free Electric Vehicle information to the public since 1967'

The Electric Auto Association (EAA) is a non-profit organization (eaaev.org 501c3) for the promotion of Electric Vehicle use in and by the public. Your membership is Tax Deductible and you will receive the informative EAA publication, "**Current EVents**". All information and statistics in this application are for the exclusive use of the EAA and is not sold or given to any other organization or company. From your membership dues, a percentage goes to the EAA Chapter you support for public Electric Vehicle promotion activities like EVents, Rallies, Shows, and EV rides.

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	— EV Buyers Guides —			
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	— Literature —			
Convert-It	EV conversion Book		CONV01	$ 24.95
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