ELECTRIC AUTO ASSOCIATION

CURRENT EVENTS

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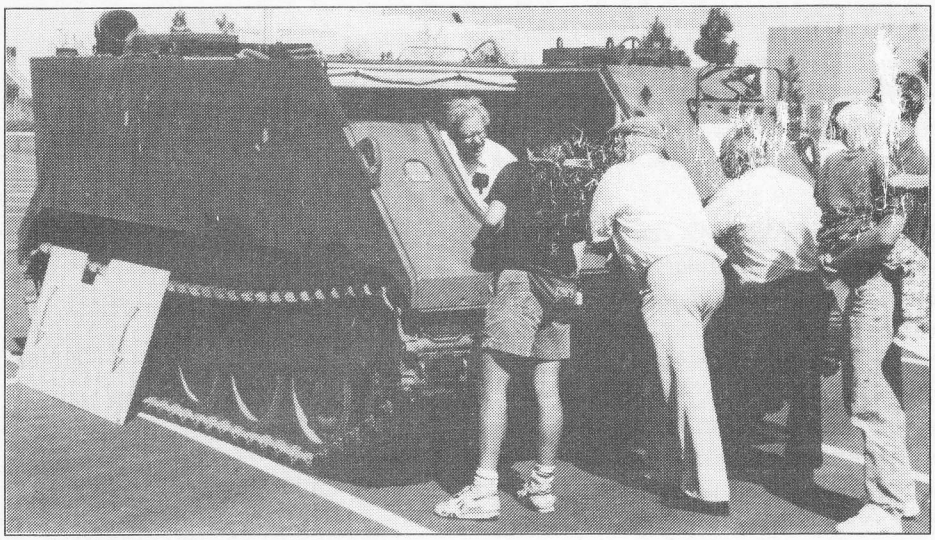

FMC's prototype electric armored troop carrier visited ATdS. Shown here while it was on display at an EAA rally event in 1992 in Sunnyvale, CA.

American Tour de Sol

By Michael H. Bianchi

ON TWO *PERFECT* DAYS, THE non-commercial ATdS entrants started to arrive in Battery Park City on the lower west side of Manhattan in the shadow of the twin towers of the World Trade Center. Some of the cars have been here since Thursday, primarily for testing on a dynamometer. The rest were tested yesterday and today. I'm told there are 57 cars registered to participate.

Most of the cars arrived on flat-bed trailers or in enclosed trailers (some with impressive art work). Some rolled out of the trailer and down to the "scruitineering" area where they were given a thorough inspection. Others developed a swarm of people putting finishing touches and parts onto the vehicles before they were ready to be looked over. As this is a road race on an open course, NESEA puts high emphasis on safety and road-worthiness. Inspections included how well the batteries were tied down and secured, driver seating and seat belts (there were a lot of 5-point harnesses in evidence), acceleration and braking, etc. I did not see the dynamometer testing, but one team member I spoke to was quite impressed at how they strapped the car down on the machine and then ran it up to it's top speed.

I spoke with several of the teams, trying to get a sense of how they felt about their cars and teams. *[See accompanying article The ATdS Race Teams on page 8.]* The SpiRIT IV and Sun Dragon IV teams had been in the SunRayce (Texas to Minnesota) and so this was old hat. The high school teams with the Lightning Volt and Ottawa Orange II were more impressed with the value of team-work and staying focused on getting things done.

Continued on page 6

The Big Three

BY ROSS M DONALD

THE BIG THREE IN THE PRODUCTION class at the Fifth Annual American Tour de Sol were Ford, Chrysler, and Solectria. The GM Impact was a no-show. Electricar wants to be a player and came with one entry. For those keeping score, Solectria-2, Ford-2, Chrysler-2, and Electricar-1.

Ford, by all appearances, intends to present a competitive challenge to East Coast favorite, Solectria. Two Ford teams — one from Ford Motor Company in Dearborn — earnestly went through the preliminary safety tests this weekend with Ecostars at Battery Park, across the West Side Highway from the World Trade Center, and grudgingly attended the various scheduling and orientation meetings.

What a difference in attitude between many of the big guys and the collegiate,

Continued on page 4

SPECIAL ISSUE

This is a special edition of Current EVents. It includes a full section of information about the EAA and Association membership. Please pass this issue along to a non-member friend, or have them call the EAA's national 800-number to get a copy.

(800) 537-2882

Editor's Note

By Clare Bell

Guest Editorial by Bruce Brooks

This month Clare is letting me use her editorial space to put in my two cents worth. Since being elected to the EAA's board of directors last September, my primary role has been upgrading the membership database. First, I must thank June Munro, our membership secretary. With the large number of members we work with and the long list of tasks she willingly performs each month, we truly appreciate what she does for the EAA.

The EAA's paid membership as of June 15, 1994 was 1525. We renew over 100 members each month; add about 50-75 new members; and loose about 50 old members for various reasons. Until recently we had very little information about our members. In March of this year, we started using a new database and membership form which asks new and renewing members to give us additional information about your interests, your electric vehicles and gives us some demographics. We have received over 250 of the new forms so far, so our sample is significant. We hope to have everyone's information by this time next year. I have not completed the data entry yet so as to give you the numbers, but I will be putting the analysis out in Current EVents over the next few months, and will share it directly with the chapters as well.

One thing the numbers do show is how geographically diverse we are becoming. We have members from all 50 states, and 10 other countries around the world (Canada has 26 members). There are 668 members scattered around California, but six other states boast 50-110 members and another seven have 20-50 active members. Another good trend is that nearly three-fourths of the members indicate they support one of the 23 chapters.

One of the goals of this Board is to help make the chapters strong. Along with Current EVents, chapter meetings and activities are the biggest reasons for belonging to the EAA. Chapters are the way we share EV information with other members and the public. New, larger, or even specialty chapters give more members a chance to explore their particular interest area and allows contact with more of the public. Chapters also generate new members which is important because a large membership gives us more contacts and more credibility when we work with government agencies, educational institutions, utility companies and businesses large and small on issues important to all of us who are interested in the future of electric vehicles.

For the organization to grow and thrive at the chapter level, the regional level and the national level, we need to better understand our membership's interests and opinions, and share information about the electric vehicles they own and how they drive them.

Thanks for taking the time to fill it out the membership application completely when you join or renew your membership.

Special Acknowledgements:
Internet American Tour de Sol Report. (Current EVents is joining the EVs riding on the info superhiway — courtesy of Mike Bianchi, Ross M. Donald, Dan Radack and others on the EV Discussion List — CB)

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Article Submissions
If you would like to submit an article for Current EVents—the preferred form is on a floppy disk, formatted for DOS (Ascii Format) along with a printed copy of the article. Also include camera-ready photos or graphics or include TIF formatted files with your copy. The deadline for articles is the 1st of the month. Articles submitted after the 1st of each month will be retained for future issues of Current EVents. Contact Clare Bell, Managing Editor for further information.

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By law, two percent of the new cars sold in California must be non-polluting by 1998; by 2003 this percentage will increase to 10 percent. Electric vehicles are viewed as the most likely way of achieving this mandate. In addition, the California Council on Science and Technology forecasts more than 70,000 jobs in the electric vehicle industry by the year 2010. Engineers and car buffs wanting skills in this new technology will need this course.

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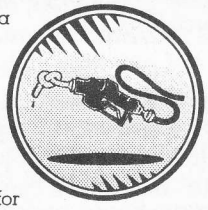

INSTRUCTOR: Kurt Pickle, was director of the electric powered vehicle project at CSULB. He is currently a design engineer responsible for the development and improvement of products at a major manufacturing company.

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Ford Ecostar Update

By Mike Bianchi

Ford Motor has 3 "Ecostars" traveling with the ATdS; 2 in the race and one strictly for display. They are demonstrating the Sodium Sulfur battery, invented by Ford in 1965; the patents have expired. Two German companies are now developing the prototypes. Sodium Sulfur boasts 80 Wh/kg; about 4 times lead-acid. The battery operates at 600 degrees F (~300 deg. C). If the batteries are charged and discharged in a steady use cycle, the batteries retain that temperature. If, however, they are not used for a long time, the battery goes dormant, or "freeze". It takes 12 hours to reheat the battery back to operating temperature. In the Ecostar, it takes 2-4 days for the pack to "freeze", depending on outside air temperature. The charging circuitry automatically maintains both charge and temperature. A single cell provides about 1.9 Volts. The cells in the Ecostar are long thin tubes, about 14 inches high. Ford sees 1998 as too soon for Ford to introduce EVs.

The think that a pilot plant for high capacity advanced battery (such as the sodium sulfur) development, is a requisite first step, followed by a couple of years of "prove-out" before you can say that you have it right and move into commercial production. 2000 is a more reasonable year, in their opinion.

Roberta Nichols, a manager in the Ford Electric Vehicle segment, provided this information. Ms Nichols also agreed to comment on the report of an Ecostar "burning up". Here is what she said. ``One of our customer cars out at EPRI, Electric Power Research Institute, had a battery that increased in temperature which resulted in (a) rear tire burning, but the vehicle itself didn't burn. It turned out that once we got the battery back to the manufacturer, ... it was one of four that they had manufactured using a slightly different process on the cells ... Three of those four were rejected, but they shipped the fourth one, ... So we think it is an isolated incident."

More info: 1-800-ALT-FUEL

The Big Three

Continued from page 1

high school, and elementary school teams. That's right, the Riverside School (grades 4-8) from Lyndonville, VT entered Helios the Heron, designed and built entirely by students, in the racing (!) category.

Meanwhile, with no interest from Northeast area auto dealers in the New York to Philadelphia media spectacle, the other Ford team — from Pennsylvania Electric Transportation in Greensburg, PA - is reaping all the free publicity it can from the week long American Tour de Sol.

James Worden and Team Solectria arrived at the last minute as usual and the vehicles, a Solectria E-10 and the Force GT 4-seater, tested and checked out late Sunday. They had planned on hitting the road from Arlington, MA at 6:00am the day before, finally leaving at 6:00pm, and after several wrong turns and detours for the trailer, the cars showed up for registration and testing mid-Sunday morning.

Besides meeting the challenges of the upstart Ford and Chrysler, Solectria had been asked by DOE to pack extra instrumentation. By late Sunday, it was unclear whether the monitors and sensors were going to be provided, so the whole bird's nest of loose wiring under the hood was required only to be securely tied down. Gary Carr from DoT, and member of the Vehicle Design Group, supervised the construction safety scrutineering.

The battery story continues with Chrysler sporting Eagle Picher NiFe (36,000wh) and Ni-Cd (60-80,00wh SAFT). Ford is going exclusively with sodium sulphur at 300 degrees C. (30-37,000wh ABB). Solectria has 19,000kw of sealed lead acid (GNB) and a Ni metal hydride (19,500kw Ovonic). Electricar is carrying 15 Kw Gates sealed lead acid.

"By the way, the air pollution was miserable, but the only thing worse than the traffic congestion in NY is the cost of parking — the cheapest lot being $12.95 per day in Soho. The inconvenience of driving an RV carrying propane or otherwise using an "alternative fuel" that cannot go through tunnels was discovered by Michael Grabscheid, the Director of the Northeast Sustainability Energy Association (NESEA, the organizers), who had to go an hour out of his way to find a the Washington Bridge into Manhattan. I took Amtrak's Ben Franklin from Boston Friday night and returned on the Sunday night Metropolitan, excursion class, $76 round trip, Club Car food and beverages not included.

While in the City, I met George Bliss, noted bicycle activist and inventor/entrepreneur, and some folks from the incipient Center for Appropriate Transportation, also, Transportation Alternatives (TA), who have contributed so much human scale common sense to transportation planning in NY, and Network for a Sustainable New York City <nycsusnet@igc.apc.org>. By the way George has taken the ultralight concept to the extreme with inflatable chassis structures out of urethane coated nylon tubes. Under pressure, blown frames are as hard as baseball bats and the bodies are crashworthy by virtue of their bouncing off whatever they hit. Mr. Bliss's many ongoing projects include the promotion of the Peda- Cab industry in NY, consisting of three-seat, two passenger, human powered city taxis. As he indicates, $50,000 of business start-up capital could produce a fleet of Peda-cabs, plus the creation of 50 jobs and a reasonable return for a socially and environmentally conscious investor.

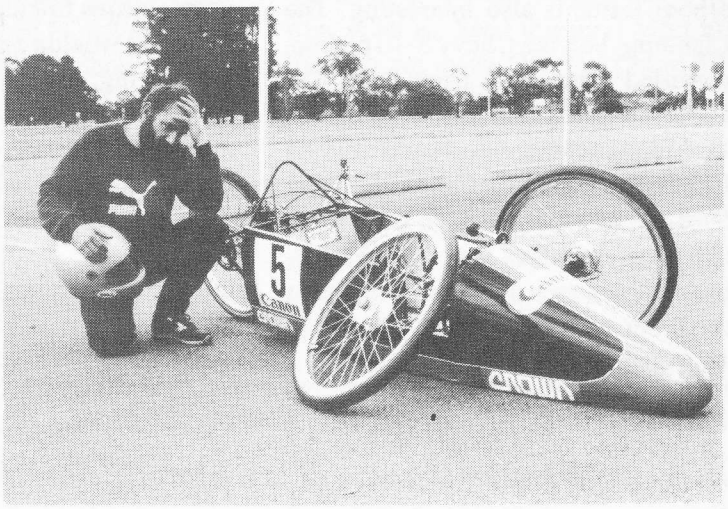
Electrathon Competition News

By Steve Van Ronk

Discussion On Race Safety

A recent accident has stimulated much discussion on logistics and safety. Areas of concern are mechanical safety of the vehicle and the competition conduct. Seat and shoulder belts must hold the driver secure in a roll and roll bars are padded extending above the drivers head. Brakes and structural integrity of wheel spindles and axles is often poor, especially with large diameter wheels. Exposed wheels colliding, can pitch like a catapult leading to some spectacular special effects. Bicycle wheels have a history of track failure. High lateral forces against the wheel can buckle rims, break spokes and spindles, and contribute to poor steering. Liquid electrolyte batteries can spill and saturate a vehicle in a roll. These things must be checked before each race and vehicles not qualifying should not compete.

Many factors must be considered and many people are required to run a good race. The track must have obstructions well out of the way or protected by resilient material capable of absorbing the energy of a runaway vehicle and driver. Spectators must not be allowed to stand where vehicles may go out of control. People must be stationed around the track able to communicate with race officials. First aid and emergency personnel must be available. Electrathon is racing and these factors are responsibilities and liabilities of the race producers.



Difficulty with large diameter wheels has been experienced for years as in this photo from 1980's Australian Electrathon.

Sanctioning and "Electrathon"

"Sanctioning" a race is traditionally performed by a group trained and responsible for seeing all necessary details are taken care of. A true sanctioning authority assumes a legal responsibility and provides guidance to those with whom they work. If the sanctioning body is an unincorporated group, it is those individuals liability and personal property at stake by their sanction.

In response to a letter from Electrathon America published in the letters column of this publication; A collected history of published articles and comments is being compiled. It is available for $10.00 from SolarEVolution, 105 N. 1st Ave. No. 125, Sandpoint, ID 83865. Expanded consideration of safety and competition conduct is also available.

Use of the term "Electrathon" by groups with differing competition rules is a matter of fact. The word "Electrathon" has been used since 1978 in several countries. It was used since 1990 in the U.S. by numerous individuals across the country including those who became Electrathon America in 1992. "Electrathon Competition News" has been published by this author since 1991. Electrathon America filed for trademark status on June 8, 1992, just prior to the scandalous SEER competition which led to a boycott of that event for misrepresentation of facts.

The claim to possession of the term by Electrathon America is unfounded. "Electrathon" is a generic term. Federal copyright laws require a trademark or copyright to be an original mark not currently in use by any other known group or individual. Applying for trademark status on a term known to be in common use could become a legal question on the legitimacy of the application. Within the five year period required for a trademark to become inalienable the theory will either remain untested and be rendered moot, or be determined through judicial process.

Electrathon Competition News is contributed monthly to CE by Solar EVolution. The opinions stated here are those of Steve Van Ronk. — Ed.

Tour de Sol

Continued from page 1

The range of approach in the high school teams is also interesting. The Lightning Volt is a Chevy S-10 pickup, modified using a kit from Solar Car Corp. in Florida, and following the advice found on the video tapes sold by Electro Automotive in California. Other S-10 conversions (and there are several) use parts and plans from Electric Vehicles of America in Massachusetts. At the other extreme, Ottawa Orange II was designed from the ground-up, starting with a popsicle-stick model to do elementary stress analysis before cutting and welding the box-tubing for the frame. It includes components from motocross cycles and other hefty pieces. Ottawa Hills HS had problems with mechanical breakdowns last year. They have clear plans not to let that stop them this year.

Sunday was the first official public viewing of the ATdS, at Battery Park City on the lower west side of New York City, on a *perfect* day.

My personal award for the Electric Vehicle I am most likely to get out of the way of is a prototype armored hybrid 8-soldier troop carrier. This is a tracked hybrid electric vehicle that uses either a 454 Chevy engine driving an alternator or 60 GNB lead-acid batteries. There are 2 275 HP AC motors which can be driven by the alternator alone or by the batteries alone. The battery-only mode is to cut down on the noise and infra-red signature of the vehicle, making it harder to spot. Battery only range is estimated at 25 miles, hybrid mode 205 miles including recharging. There were no tires to kick on this one, and frankly, I wouldn't want to try. (No, it isn't racing, just on display. It might crush over the competition; all that armor plate makes this a *heavy* dude.) *[See Photo page one.]*

A 22-seat, 45-passenger, 1 wheel chair electric bus from a fleet of 8 in active service in Chattanooga, TN, was on display. John Capell told me about the 22-foot long bus that has been in service for 2 years. Range 70 miles, last year it traveled about 14,000 miles. Manufactured by Specialty Vehicle Manufacturing Co, Downey, CA. The lead-acid flooded cells have about 400 cycles on them today, and they expect to get 1500 cycles before needing replacement. The motor is a DC Nelco, 32 kW, 40 HP. The batteries and PWM controller are by Chloride in a 216 V configuration and regenerative braking. 38 mph, 80-85 mile urban driving cycle range, 1100 Wh/mile. Batteries can be changed out in 15 minutes. John says they figure their energy costs at 4.5 cents/mile, vs 18 cents/mile for a similar diesel bus. Maintenance cost is about 1/2 that of a diesel bus. Public acceptance has been very high because it is quiet and smokeless, which Capell says the people of Chattanooga notice. The bus is not air conditioned, but, because it is use in short shuttle service, that has not been a major problem. They would like AC, but are looking for a more energy efficient systems. By the end in 1994 there will be a total of 16 of these buses in Chattanooga.

"My personal award for the Electric Vehicle I am most likely to get out of the way of is a prototype armored hybrid 8-soldier troop carrier."

At the other extreme (sponsorship-wise) is Christen Johansen, an architect in Manhattan who converted a Saab 96 V-4 to a 96 V system called "Sparky", used as a weekend runabout He considers it a "detached hybrid"; he claims that for vacations and such he will tow this EV Saab behind his Saab 900 Turbo, and then use the EV for short hops. He used a Saab because he was thoroughly familiar with the car and likes the body style. Advanced DC 9.1 inch motor, Curtis PCM controller. $4500 went into the restoration of the car (which was a basket case) and $6500 into the EV components. Took 1.5 years, most weekends, finishing up 3 weeks ago. Christen quotes 60 miles/charge highway, 30 city (which sounds backwards to me, but that is what he said.)

Aurali Arikara of UC Davis was with a converted Geo Prizm using the Powercell Corp Zinc Flow Battery. In last year's ATdS, Texas A&M ran a Geo Metro with a 22.5 kWh, 120 V Zinc Flow Battery, which took them over 150 miles on a charge using a Solectria AC induction motor and controller. This year they have a 35 kWh, 400 V ZFB using Hughes AC Dolphin drive system which uses a 3-phase induction motor and an inverter/controller capable of putting out about 50 kW. Murali has been working on programming the inverter/controller to match the drive characteristics to the battery discharge. Ideally, the battery microprocessor and the inverter/controller would work in close cooperation, but that hasn't been accomplished yet.

Note: See Side Bar Story on the Zinc-Flow Battery on next page.

This year's ATdS had two starts. An "official" start that included New York City and State officials, plus US government and military officials, and a "race" start, where the cars actually started moving in competition.

Monday was the "official" start, held in the literal shadow of the World Trade Center twin towers in Battery Park City. Along with static displays of the electric cars, a couple of electric buses and that electric armored troop carrier (mentioned earlier) there was a `Junior Solar Sprint' race where kids who had constructed cars of their own design, using a provided solar cell and motor, raced the cars about 100 feet along guide wires. It was another *perfect* day, except, because it was a normal work day, the entire city was in a thick brown haze, caused (by my reckoning) by cars. Approaching the Holland Tunnel from the New Jersey side of the Hudson River, I was facing the lower west side of the city. The haze was clearly visible up to about the 30th floor level. Anyone who saw that sight and then the electric cars had to understand the connection.

Not all the cars were at the Monday display. After the "start", those cars that were present had to negotiate the Holland Tunnel, where 8 lanes of traffic are reduced to two. Some did, some went by trailer. I am told that "The Vortex" slipped a drive chain while in the tunnel, but I have not confirmed that with the team.

Once at the Liberty Science Center in Liberty State Park (behind the Statue of Liberty), the cars were put on display for bus-loads of school kids and LSC members. They also did some required laps to qualify for the actual race. This caused a few anxious moments. For example, "Endura", the UC Davis/Powercell car, would not start. The reason turned out to be that the pot box (serves as accelerator pedal sensor) was not firmly fastened down. I interpret the explanation I heard to be that the pot was never at the neutral position and the safety circuits in the controller refused to let the car "leap" forward when the system was turned on.

Tuesday, the "race start" occurred at the LSC on the 4th *perfect* day in a row. (Can we keep this up?) Most of the cars got away OK, but I have no details on the couple that did not.

I do know that the Solar Bullet from Unetego High School suffered a suspension breakage when it hit a pot hole.

Anyhow, the mid-day stop was at the Jersey Central Power and Light building in Morristown, NJ, and the final stop was at the North Hunterdon High School in Annandale, NJ.

Sometimes the it is the non-electric things that get you. The ElecTruck from Dartmouth was being towed to Battery Park City with the rear wheels on the ground. While in tow, the transmission dropped into gear and destroyed the clutch. The team was able to find a replacement clutch in NJ.

Thursday, was when the ATdS went to the Mayfair in Allentown, PA. The Mayfair is a food, music, crafts, arts, what-have-you event that runs from

Continued on page 17

Zinc Flow Battery

By Michael Bianchi

If you are not familiar with the Powercell Zinc Flow Battery, the 2-part charged electrolyte is kept in tanks. The electrolytes are pumped between the plates of the cell stack, discharged, and the discharged electrolyte is stored. For charging, the system pumps backwards and the chemistry runs backwards.

The interesting design aspect is that, to a greater extent than with other batteries, the range and power are decoupled. Range is largely determined by the amount of electrolyte in the tanks; power by the plate area of the cells and their number. Thus it is easier to match battery power-density and energy-density to the application. Also, when the pumps are not running and the cells are drained, a fully charged battery can be totally electrically neutral! This is an important safety feature.

The Zinc-Flow powered UC Davis "Endura" is designed to have safety systems within safety systems. The battery box which contains the tanks, pumps and cells has leak detectors to detect any electrolyte that escapes the system, and shuts down the car. Ground Fault Interrupters (GFIs) detect currents escaping the system, and can shut down the car.

Finally, there is also a "Battery Mat" that absorbs and neutralizes escaped electrolyte. (Several years ago, there was a very unfortunate accident involving an early flow battery, and since then the concern for safety has been very high.)

For more information, contact Powercell Corp, (617) 374-9444.

(Article excerpted from internet Tour de Sol Report—MB)

The ATdS Race Teams

By Michael H. Bianchi

The following is based mostly on interviews with participants.

The Dane Hovey Vehicle

"The Dane Hovey Vehicle" is a 1975 MG-B converted to an MG-E by putting an approximately equivalent EV system. It was built over the past year with the ATdS as a target date. By the way, "Dane Hovey" is name of the unofficial partnership between Dan Raydock and Peter Howey; a misprint in a newspaper when they were rowing together just "stuck". The car is driven to work and in and around Philadelphia.

Batteries: 120 V, Exide GC-5
Motor: Advanced DC 15 kW cont, 52.2 kW peak
Controller: Curtis PCM 1200 series

The Potential Difference

"The Potential Difference" is from Trenton State College was in last year's race. For 1994, they added a 12 V accessory battery for running accessories and the lap-top which records data while running. They also added a box to carry 10 auxiliary solar panels with them as they race. Since they are part of the car during the race, they are allowed to deploy them during the mid-day stop and charge, which could help them every-so-slightly in the range department.

PV: 480 W
Batteries: 18000 Wh, US Battery 1450s, lead acid
Motor: Advanced DC, 23 kW continuous, 26 kW peak
Controller: Curtis PMC 1221 B

TIE-2

One of the most interesting vehicles is the TIE-2, a 2-wheel recumbant motorcycle, where the drivers legs are out in front, under a split cover that hides the legs when under way, but which allow the driver to put both feet on the ground in a moment, such as when stopping. Informally referred to as the "Mike and Mike Electric Motor Bike", it was a private 4-year project made from mostly scrounged parts from a scrap yard. Range: 50 miles, 75 Wh/mile Weight: 480 pounds Cost: approx. $4000.

Motor: 3 HP, 300 ft-lb torque, series wound
Battery: 36 V, 100 Ah, 140 lb
Controller: custombuilt, 450 A, bi-polar chopper/transistor

The Electrical Storm

"The Electrical Storm" is a converted Geo Storm owned by Lauzun Corporation, which makes controllers for EVs. Dr. Qianyi Jiang is the designer of the controller in the car, which drives a brushless DC motor and a hydraulically activated continuously variable transmission. In last year's car, the continuously variable transmission was from a snowmobile. That transmission used flyweights to vary the drive ratio, but during regenerative braking it `did the wrong thing'. Now, the controller determines both the call for regenerative braking and the drive ratio at which it the motor/ generator is being driven. Dr. Jiang uses `fuzzy logic' software in her controllers. She claims more than 85% recovery of the kinetic energy.

Batteries: 11400 Wh, Genesis
Motor: Pacific Scientific DC brushless, 10.5 kW continuous, 31.5 peak, 6-phase
Controller: Lauzun controller

The Aztec

"The Aztec" is the entry from the MIT Solar Electric Vehicle Club. Very similar to last year's entry, this year's car is boasting about 40 Wh/mile(!) It's a 3-wheel vehicle, driven by a brushless DC motor to the rear wheel. There are 2 20-inch front wheels, 26 inch back wheel, chromemolly steel tubular frame, body is carbon-fiber, honeycomb composite. It's claim to fame is a drag coefficient estimated to be 0.13 (about 1/3 of a regular car), light weight (780 pounds), thin tires, optimized suspension — anything to make the car efficient. For the 1994 race the kinematics of the suspension and the drive train have been changed. The on-board in instrumentation for the driver has been much improved.

PV: 200 W, Astropower, polycrystalline silicon
Batteries: 6800 Wh Johnson controls lead acid
Motor: Solectria DC brushless, 6.2 kW continuous, 11 kW peak
Controller: Solectria

Sunvox IV

Dartmouth Solar Racing is racing Sunvox IV, which has been in the ATdS four years. This year's car has a new stearing system and a beefed up rear suspension. They also had a on-board data collection system, but isn't working.

Wheels: 3, 2 front, 1 rear
PV: 480 W, Astropower, 232 monocrystaline
Batteries: 72 V, 3666 Wh, US Battery, lead-acid
Motor: Solectria DC brushless, 8.2 kW continuous, 15.4 kW peak
Controller: Solectria BRLS 150

The Mach .05

The Mach .05 was built by 12 students (8 ME, 4 EE, and 2 from the Art Dept) at the University of Vermont in Burlington. They estimate 5000 person-hours spent working on the car since September, and a cost of about $8,000. There is 5 speed small "'70s era" Kawasaki transmission, and a custom-made drive hub. Gear shifting is performed by a windshield wiper motor. The front wheels are on a twin A-arm suspension, and hydralic front brakes. The rear wheel is supported by 3 segments derived from old down-hill skis. The flex geometry for the ski's is printed right on the skis. They have been watching them to see if there has been any stress relaxation; so far — none. The body is made from box steel and box and tubular aluminum tubing.

Wheels: 3, 2 front, 1 rear
PV: 420 W, Siemens, monocrystaline silicon
Batteries: 120 V, 3500 Wh, Johnson Controls, deep cycle lead-acid
Motor: 3.5 HP brushed DC, 3 kW continuous, 4 kW peak, Inertial PM
Controller: Solectria DC 100H

'82 Voltswagon Vanagan

Scott Isgar from Staten Island NY has a converted '82 Voltswagon Vanagan that used to be a diesel, had 140,000 miles on it when it was burning little oil. Between the choices of a new engine, truck or conversion, he chose to turn it into the "Solar Delivery", with his friend and mechanic Angilo Esposto. It is now 2 years old, 15000 miles, about 650 cycles on the batteries. On the back of the van, Scott has written: "You are following NYC's first commuting battery electric vehicle. Charging for 60 miles is about $1.30. As compared to an internal combustion engine, you need not by things like, gas, oil, filters, points, catylitic converter, plugs, mufflers, radiators, antifreeze, distributor caps, tune ups, emission tests, fan belts, timing belts, gagets, water pumps, starter, hoses, rings, valves." It is painted in blue and yellow and is quite a standout. Angelo has been a mechanic for over 30 years. He says that garages put out a lot of waste that goes to dumps. A lot of items in that list above contribute to the land-fill problems. He thinks that EVs will help reduce the amount of "garage garbage."

PV:	**480 W, Siemens, on the roof, can be tilted to either side**
Batteries:	**96 V, ? kWh, 16 Trojan T-145, lead-acid**
Motor:	**Advanced DC, 15 kW continuous, 30 kW peak**
Controller:	**Curtis 1221-B**
Tires:	**Goodyear Invicta GAL**

Sungo

Sungo is from New Hampshire Technical Institute in Concord. It is built from welded aluminum box tubing. Each rear wheel has it's own motor, belt drive. Last year the two motors had two, separate pot boxes, one for each controller. Now one pot box drives an isolation control unit that talks to both controllers and allows the controllers to communicate, which helps stability when under way. There are also new lighter brakes and wheels. The body is fiberglass over foam.

Wheels:	**4 13-inch tires on aluminum rims**
PV:	**96 W, Solectria monocrystaline**
Batteries:	**96 V, 7200 Wh, Sears, lead-acid deep cycle**
Motors:	**2 Solectria DC brushless, 8.2 kW continuous, 11 HP**
Controllers:	**2 Solectria 180 A**

The Golden Gear Special

The Golden Gear Special is from Reading-Muhlenberg Vo-Tech in Reading, PA. They sponsored by Metropolitan Edison and General Public Utilities. It is a 1987 Fiero GT converted by the students. It is a racing equiped car, with 5-point racing harness, roll cage, etc. Essentially the entire school was involved in the car, from completely reworked interior to decals; about 120 students were involved. The motor is not directly connected to the transmission. Instead a toothed belt makes the connection, allowing them change the motor-to-transmission drive ratio (currently 7:1), and also prevents misalignment caused by the motor hanging off the transmission. Unfortunately, the students could not get out of school for the race, so the car is being driven by one of the advisors. It is a very clean looking car.

Batteries:	**20 V, ? Wh, 10 12 V Exide, lead-acid**
Motor:	**Advanced DC Series wound, 15 kW continuous, 52.2 kW peak**
Controller:	**Curtis, MOSFET**

The Solar Bullet

The Solar Bullet is from Unatego High School from Olego (upstate) NY. One of the "door-stop wedge" shaped cars, it is made of steel tubing and this is the 3rd year in the ATdS. Since last year they have cleaned up the alignment and got the bugs out. The team is 3 girls and 1.5 boys (one guy has a broken arm).

PV:	**8 panels, 396 W, Kyocara polycrystaline**
Batteries:	**48 V, 6800 Wh, Trojan T-105, lead-acid (3rd year in use)**
Motor:	**Advanced DC**
Controller:	**Sevcon**

Photon

The Salsbury School from Salsbury, CT, has entered the "Photon" in the race. The front suspension is from a Yamaha ATV, the single rear wheel is from a motorcycle. The car was 3 years in the making. The first year was research and design, the 2nd year was building and this year is testing, evaluation and racing. The ATdS is it's debut. Side of the car has the names of all the people involved painted on it; I'm guessing about 30 names. During the LSC to Morristown leg, they suffered a flat less than a mile from the finish line.

PV:	**480 W, Solarex silcon, 13% conversion**
Batteries:	**84 V, 4800 Wh, Sears DieHard lead-acid**
Motor:	**Solectria BRSL 8, brushless**
Controller:	**Solectria BRSL 100H**

TNE

Team New England is made up of people from MIT, University of Massachusetts, Boston University, plus others and they built the "TNE" vehicle to race in the World Solar Challenge in Australia. They didn't do as well as they wanted to, but the decided to modify the car to compete in the "city" environments that are a big part of the ATdS. It is a tiny 3-wheel car, weighing 400 pountds, and it sits very low to the ground; doesn't even come up above my knee. The front wheels are mounted on ski sections. It is also very areo dynamic. In the ATdS configuration, they are estimating that they can do 200-250 miles on a charge. In Australia, they did 400 miles on a charge on silver-zinc batteries! At 70 MPH! I'm told that the first day it got 62 miles/kiloWatt (16.1 Wh/mile)!

PV:	**20 W, Spacetrolab/ Lockheed**
Batteries:	**5000 Wh, ICI/Sears lead-acid**
Motor:	**Solectria BRLS 8, 6 kW continuous, 12 kW peak**
Controller:	**Solectria**

EAA Yearly EVents

Some of the major EV events held each year throughout the country.

March - Arizona Public Service Electric 500. Electric stock cars and race cars compete at Phoenix International Raceway. Contact Solar and Electric Racing Association, (602)-953-7733

April - Clean Air Road Rally. Alternate energy vehicles challenge Southern California traffic. Contact Electric Grand Prix, (310) 430-9779

May - American Tour de Sol. Classic 5-day EV road rally running from New York to Philadelphia. Contact Northeast Sustainable Energy Association, (413) 774-6051

July - Solar Energy Exposition (SEER?), Ukiah, CA. EAA will be running an EV ride and drive EVent. Contact SEER (707) 459-1256

Sept - National EAA Rally and Symposium, WESCON EV Showcase. EV display and conference at huge West Coast electronics trade show. Contact EAA, (510) 686-7580.

Oct - Sustainable Transportation S/EV. Alternate energy vehicle workshops, trade show and EV display. Contact Northeast Sustainable Energy Association, (413) 774-6051

Electric Auto Asociation History

1967 The Electric Auto Association was founded by Walter Laski in San Jose, CA

1972 First of the EAA Annual Rallies.

1974 EAA member Roger Hedlund set first world speed record for electric cars of 175 mph at Bonneville Salt Flats.

1976 EAA members assisted US Congress in creating the Electric and Hybrid Vehicle Research, Development and Demonstration Act of 1976

1977 EAA member Frank Willey developed a transistorized speed controller and earned the IEEE Outstanding Engineering Award.

1983 A fleet of EVs drove from San Jose to San Francisco and back on a single charge, a distance of 100 miles.

1985 Saied Motai drove 230 miles on a single charge

1989 California Air Resources Board (CARB) establishes ZEV mandate. 2% of total car sales by 1998 must be "zero emission vehicles (ZEVs)

1990 General Motors shows first "ground-up designed" Impact EV.

1991 First Phoenix Solar and Electric 500 Race

1992 EAA Suppports California $1000 tax credit for EVs

1993 EAA participates with Runzheimer International on first complete survey of EV usage and costs.

1993 EAA member Bob Schneeveis sustained an average speed of over 100 mph in a custom-built electric race car.

1993 EAA's EV Showcase exhibit is a feature at WESCON Electronics Trade Show in San Francisco.

1994 Twelve additional states adopt CA-type ZEV mandates

1994 California Air Resources Board upholds ZEV mandate.

EAA's Current EVents Newsletter

Current EVents, an incisive, informative national newsletter with practical information for the EV purchaser, driver or advocate. CE has recently run stories about the EV Showcase at WESCON '93, the California Air Resources Board ZEV mandate, EV insurance, how to present your EV to the press and recent changes in motor vehicle codes affecting EVs.

- The Calendar of EVents lists EV races, rallies, displays, shows, alternate energy fairs, etc. all over the US.
- The Classified Ads section is a source of EVs and parts.
- *Letters to the Editor* provides a forum for EAA members to exchange information and air concerns.
- EV vendors can be accessed through CE's display advertising.
- Current EVents serves the entire electric vehicle community, from EV racing to street-legal cars, from high school and college projects to EV conversion and components companies. CE has covered solar cars, electric bikes and motorcycles and electrathon racing.
- Current EVents' back issues are computer-indexed by subject and author. *(See page #16 for list.)*

Electric Auto Association

Introduction to EAA

The Electric Auto Association (EAA) is a non-profit educational organization for the promotion of clean, quiet electric vehicles (EVs) for personal transportation. Founded in 1967, by Walter Laski, EAA has grown from a pioneering group of EV hobbyists and engineers to a national organization whose members build, own, drive, and promote EVs as a solution to automobile-caused air pollution and dependence on fossil fuels.

EAA members have led and in some instances have initiated the present ground swell of interest in electric cars. EAA members have founded businesses supplying parts or doing conversions. Government, utilities, academia and industry have turned to EAA for technical EV expertise and practical driving experience. EAA chapters and members have been key participants and organizers in alternate energy conferences and events such as the American Tour de Sol, S/EV, SEER, the APS Phoenix Electric 500, Electric Grand Prix, Clean Air Road Rally and the recent WESCON EV Showcase.

EAA support has been and will continue to be critical to the current California Air Resources Board Zero Emission Vehicle Mandate.

Interviews with EAA members and test drives in their cars have helped turn around some of the media who have been staunchly anti-EV. With the wave of interest now building in EVs, the unique resources that EAA offers are now more valuable than ever.

How to Contact the EAA

EAA 800-Number

The EAA operates a nation-wide 800 number for the public to access information about EVs and the EAA. General Information and membership number is: 1-800-537-2882.

This will get you a packet of information, including chapter listings. Callers also have the option of speaking to a real live person, who can either answer questions or refer you to someone who can.

Current EVents

Current EVents Editor
Clare Bell
Tel: (415) 759-5165
Fax: (415) 759-5189
Internet: CBCE@delphi.com.

Advertising and Production:
Susan A. Hollis, PCTEK
Tel: (408) 374-8605
Fax: (408) 374-8750

Membership/Address Changes

For information on new membership or change of address, please send your requests to:

EAA Membership
June Munro
2710 St. Giles Lane
Mountain View, CA 94040

Technical Questions

Technical information and help hotline (415) 493-5892 or call the information number for the chapter nearest you from the Chapter list. An experienced EAA member will be glad to answer questions and direct callers to resources for EVs, components and conversions.

Many EAA Members frequently monitor and respond to the bulletin boards on *Prodigy*, *America On Line*, and *Compuserv* as well as discussion groups on Internet.

EAA Member Benefits

- Lists of EV resources, such as parts suppliers, EV vendors, books, manuals and other information.
- Chapter and national rallies, expos, ride-and-drives, media events.
- Chapter meetings for formal and informal discussions of technical and political topics.
- Yearly symposia covering important timely and interesting topics for EV enthusiasts.
- Awards to outstanding members, companies or individuals who have made significant contributions promoting electric vehicles.
- Participation in large trade shows, such as the recent WESCON '93 in San Francisco's Moscone Center.
- Representation and information is provided by members, chapters and the national organization to government officials, educational institutions, businesses, professional societies, and the public.
- Battery capacity testing and making tested batteries available at low cost to EVs that need to replace one or two batteries in an older pack. (This is being started up on an experimental basis in California, but hopefully will spread).
- Discounts: Some Chapters have arrangements with local battery sellers or parts suppliers for bulk-buy and/or chapter/club discounts. The national organization is encouraging all chapters to set up similar arrangements.
- The experience, enthusiasm, and expertise of EAA's chapter members. EAA members give hands-on help, trade equipment, loan books, exchange technical information, make charging sites available and do anything and everything to encourage and support present or potential EV drivers.

EAA Chaper Listing

Arizona

Phoenix (PHNX)
Daniel Parmley (Pres.) (602) 250-2131
POB 40153, Phoenix, AZ 85067-0153
Meetings: 4th Sat @ 8:30 AM - 11 AM APS Public Service Center 400 N. 5th St., Phoenix, AZ

California

East Bay (EBAY)
Scott Cornell (Pres.) (510) 685-7580
60 Alan Dr. Pleasant Hill, CA 95423-1902
Meetings: 2nd Sat. @ 10 AM, PG&E Service Center 4801 Oakport St.
Oakland, CA (off 880)

Los Angeles (BUR)
Irving L. Weiss (818) 841-5994
2034 N. Brighton "C", Burbank, CA 91504
Meetings: 1st Sat. 11-1 PM, Pasadena City College, Rm C306, 1507 E. Colorado Blvd., Pasadena, CA

North Bay (NBAY)
Preston McCoy (415) 499-0601
750 Pine Lane, San Rafael, CA 94903
Meetings: 3rd Sat, 9:45-12 noon, PG&E Business Center 111 Stony Circle,
Santa Rosa, CA

San Francisco Peninsula (PEN)
Ben Compton (Pres.) (415) 221-3413 x300
2nd Ave. San Francisco, CA 94118
Meetings: 1st Sat 10 AM San Bruno Public Library El Camino Real and Angus St.
San Bruno Downstairs meeting room

San Jose (SNJ)
Don Gillis (Sec/Tres.) (408) 225-5446
5820 Herma St. San Jose, CA 95123
Meetings: 2nd Sat. 10 AM-Noon, PG&E Cinabar Service Center 308 Stocton Ave
San Jose, CA

Sacramento (SAC)
Mark Bahlke (916) 356-6767
Meetings: 2nd Sat. SMUD, 6201 S St.
Sacramento, CA

San Diego EVA (SDGO)
Ron Larrea (Pres.) (619) 443-3017
9011 Los Coches Rd., Lakeside, CA 92040
Meetings: 4th Tues, 7 PM, San Diego Auto Museum 2080 Pan American Plaza, San Diego, CA

Silicon Valley (SVLY)
Chuck Olson (Pres.) (408) 296-6944
3087 Taper Ave., Santa Clara, CA 95051
Meetings: 3rd Sat. 10 AM-1PM
Call for temporary location

Florida

Florida EAA (FLA)
Bill Young (407) 269-4609
P.O. Box 156, Titusville, FL 32781-0156
Meetings: No meeting information

South Florida EAA (SFLA)
Steve McCrea (305) 463-0158
1402 E. Las Olas Blvd. #904
Ft. Lauderdale, FL 33301
Meetings: No meetings; just advises people on meeting locations and subscriptions

Massachusetts

New England EAA (NENG)
Bob Batson (Tres.) (508) 897-8828
1 Fletcher St. Maynard, MA 01754
Meetings: 1st Sat, 1 PM in March, June, Sept, Dec.

Nevada

Las Vegas (LVGS)
Gail Lucas (Bd. Mem.) (702) 736-1910
P.O. Box 19040, Las Vegas NV 89132-0040
Meetings: 3rd Thus. 7:30 PM, Desert Research Inst. Flamingo and Swenson,
Las Vegas, NV

New Jersey

TriState EAA (NJTS)
Kasmir Wysocki (201) 343-1252
293 Hudson St. Hackensack, NJ 07601
Meetings: Meets quarterly. Contact Kasmir for location.

New Mexico

Las Cruces (LCNM)
Dr. Jack Hedger (Pres.) (505) 546-0288
P.O. Box 1077, Deming, NM 88031
Meetings: 1st Wed., 7 PM, Engineering Assoc. Rm at El Paso Electric Div. Las Cruces, New Mexico

North Carolina

Southeastern EVA (SEEV)
Lawson Huntley (704) 283-1025
P.O. Box 1025, Monroe, NC 28111
Meetings: Contact Lawson for time and location

Ohio

Ohio EAA (OHIO)
Pete Gall (513) 683-3122
6875 Oakland Road, Loveland, OH 45140-9723
Meetings: Now forming

Texas

Austin (AUST)
Lewis Koiner (512) 990-9760
1413 Quail Run Rd., Pflugerville, TX 78660
Meetings: Call for location

Houston (HOUS)
Ken Bancroft (713) 729-8668
4301 Kingfisher St., Houston, TX 77035
Meetings: 3rd Sat. 12-5 PM, at above address

Utah

West Valley City (WVC)
Harry VanSoolen (Pres.) (801) 969-1130
3622 South 4840 West, West Vally City, UT 84120
Meetings: Call for location

Virginia

Central Virginia (CEVA)
Jim Robb (Pres.) (804) 367-8907
1620 Grove St. #1, Richmond, VA 23220
Meetings: 3rd Sat. @ Science Museum 2500 W. Broad St. Richmond, VA

Washington (State)

Seattle EAA (SEVA)
Ray Nadreau (206) 542-5612
19547 23rd N.W., Seattle, WA 98177
Meetings: 2nd Tues, call for location

Washington DC

EVA of Greater Washington DC (EVDC)
David Goldstein (301) 213-3990
(301) 869-4954
9140 Centerway Rd. Gaithersburg, MD. 20879
Meetings: 2nd Tues, 7 PM, Marocco's Restaurant 1120 20th St. Washington, DC

British Columbia, Canada

Vancouver (VEVA)
Bill Glazier (Tres.) (604) 980-5819
3344 Baird Rd., North Vancouver, BC, Canada, V7K 2G7
Meetings: call for location

Chapter Info:

For chapter information and a chapter startup package, call Anna Cornell (415) 685-7580 or (800) 537-2882.

All information and statistics in this application are for the exclusive use of the EAA.

Electric Auto Association -- Membership Application

New member: ☐ Renewal: ☐
Date: ___ / ___ / ___

US ☐ $35
Canada ☐ $40 USD
Other country ☐ $45 USD

Note: EAA membership dues are tax deductible as allowed by the IRS.

Name: _____ Company: _____ (If applicable)

Street: _____ Phone: ( ) - x

City: _____ Fax: ( ) -

State: _____ Zip: - (Please use 9-digit code.) Country: _____ Country Code: _____

EAA Chapter you attend or support: _____ I need chapter information! ☐

Member/Vehicle Information -- Please complete if new or changed.

Professional Background: _____ Age: _____ Sex: M / F

Please identify your primary areas of interest relating to the Electric Auto Association.
(Please rank choices with "1" being the most important, "2" second, etc.)

1	☐	Hobby / Builder
2	☐	Professional (EVs are a source of income for you.)
3	☐	Competition (Rallies, Races and Records)
4	☐	Environmental and Government Regulations for EVs.
5	☐	Social (Rallies, Shows, Dinners, other)
6	☐	New Technology and Research
7	☐	Promotion and Public Awareness of EVs
8	☐	Student or general interest
9	☐	Electrathon / Bicycle / Off-road vehicles
10	☐	Owner/Driver of electric commute vehicle
11	☐	Other: Please specify. _____

Number of Electric Vehicles you have ever owned? _____ Number of EVs you now own: _____

Please describe any Electric Vehicle you now own or are building: Veh. Lic.: _____ State: _____
(If more than one, please attach information for each.)

Vehicle Type: _____ Make: _____ Model Yr: _____ Build/Conversion Yr: _____
No. Wheels: _____ Motor: _____ Controller: _____ % Complete: _____
Batteries: No./Type ___ / _____ Pack Volts: _____ Avg. EV Mi./Week: _____
Other Features: _____ Avg. EV Trips/Week: _____

If new member, where did you hear about EAA? _____

Comments: _____

_____

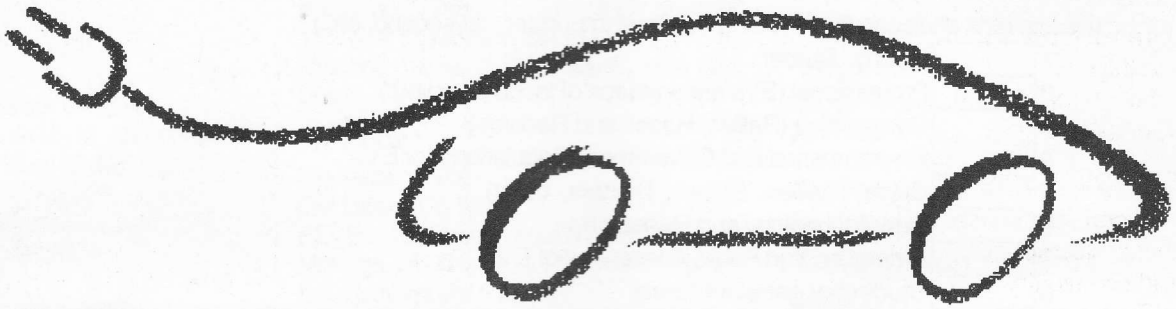
Please fasten your check or money order to this form, then fold with EAA address showing and mail.

Ver. (6/ 15/ 94)

From: **ELECTRIC AUTO ASSOCIATION**
2710 St. Giles Lane
Mountain View, CA 94040

PLACE
STAMP
HERE

Charging Into the Future!



ELECTRIC AUTO ASSOCIATION

— Fold on line AND MAIL —

From:_____
_____
_____

PLACE
STAMP
HERE

ELECTRIC AUTO ASSOCIATION
2710 St. Giles Lane
Mountain View, CA 94040

Chapter News

Contributions to: Ruth M. Shipley 102 Brighton Rd. #3 Pacifica CA 94044 (415) 359-1541, CompuServe 73043,60 Internet 73043.60@compuserve.com

Vancouver BC

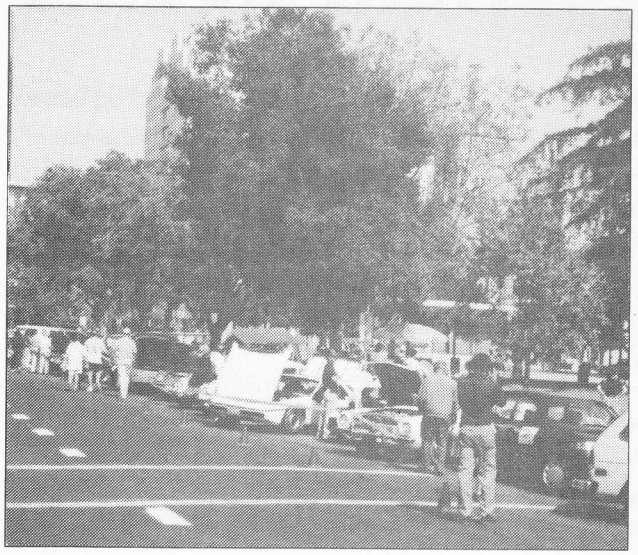
Members are still bickering over how they should spend their Casino money. We should all have such problems! An Electrathon racer constructed by a local high school using equipment purchased with Casino money was pitted against a dozen gas-powered racers and left them eating its dust. Doug Turland has exhibited the chapter's 1912 Detroit Electric in several public parades, one of which was televised. Bill Glazier testified on the state of the EV industry at Simon Frasier University on Clean Air Day (June 8).

San Diego CA

Paul Akman of High Voltage EV Systems was the speaker at a recent meeting. High voltage systems are more efficient for EVs because they have an operating voltage higher than the amperage. Akman described an invertor controller he designed that can deliver voltages up to 5 times higher than the batteries. He claims a motorbike with his controller, four 12v batteries and a 120v 6,000 rpm motor can go 45 mph and 120 miles.

Silicon Valley (Sunnyvale) CA

The members of the Silicon Valley Chapter are planning for their 22nd annual electric car rally. This year they will be returning to the Lockheed facility in Sunnyvale, the site of many previous rallies. The theme of this event, like most of the past rallies will be an endurance test using a measured 4 mile course on city streets. The public will be invited to ride along in an effort to inform and educate them on electric vehicles. There will be static displays as well, and the San Francisco Peninsula Chapter will provide a food booth.



EAA members host rally in downtown San Jose, CA.

Members in the News

"Electric Cars Give drivers a Charge" by Keiko Ohnuma, Oakland Tribune, Sept. 30, 1993 - EV Showcase at WESCON.

"Wanted: A Pioneering Spirit Who Would Love to Recharge Batteries" by Oscar Suris, The Wall Street Journal, Feb. 14, 1994

"Electric Cars are Racing into the Future" by Matthew Wald, New York Times, Mar. 21, 1994 - Coverage of APS 1994 Solar and Electric 500.

"Female Team Charges Up Auto World" by Janet Rae Dupris, San Jose Mercury News, April 20, 1994 - Coverage of women's electric racing team

"Owners of Clean Green Machines Find a Different Way of Driving" by Matt Nauman, San Jose Mercury News, May 1, 1994. Profiles of EAA members and cars.

"Electric Cars" by David Woodruff, Business Week, May 30,1994 Cover story on EV progress, technology and their future with test drive of EcoStar and visit withEAA members.

Current EVents Newsletter Articles

July '94

Breathe Deeply — CARB Mandate Stands

Tour De Sol Winners

EVs Prove "Right Stuff" in LA

ESR-1 Challenges Gas Cars

Webber State Univ. and the HEV Challenge

June '94

Ovonics/Solectria Win Aids ZEV

Students Repair Car

A SLIght Problem

EVs Hit SJ News

High School EVents

Phoenix Phoenix 500 Race Results

UCD "Endura" Wins Clean Air Road Rally

May '94

APS Electric 500 Wins Front Page of NY Times

Electric Moose Runs Wild

Race Impacts Safety Issue

Electrathon Co-operation

New 24 Hr EV Record

Japanese Team in APS Race

April '94

Tropica Roadster Flies in Florida

Green Light for NY EVs

Lead Tax Alert

Ring Around the Capitol? - Support the ZEV Mandate

GM Impact in Demand

APS Phoenix Electric 500

EV Weekend- Phoenix

17M to Reduce Smog

Mar '94

Clean Green Silver State Machine - Nevada Goes for "Watt Rod"

A. B. 2495 - Unplug EV Mandate?

EVs at Lightspeed on lnternet

APS Phoenix Electric 500 - Coming Up

Disneyland Sponsors Clean Air Road Rally

Do It Yourself - Gell-cell Belle - Olds Firenza

Take your EV to Earth Day

Feb'94

80 MPG Car Here Now - GM Impact

Impact PrEView Test Drive - In Your City Soon

Ways to Keep Your EV and Your Lover (Valentine's Day)

Announcements - Electric Grand Prix, Phoenix Electric 500

Chapter News - Converting EVs in Nepal

Big 3 Spar Over ZEV Regulations

Innovation and Risk - Responsibility of EV inventors

Jan '94

ZEV Rules Endangered - Detroit and Diesels Storm CARB

Super-Efficient Auto (ultra light "supercar" concept)

How to Get WESCON '93 Technical Papers

WESCON - A Great Opportunity for EV Promotion - photo spread

Chapter News

Nov./Dec '93

High Voltage Recognition at WESCON '93

EAA Scoops Press, EV Scoops Cornell (WESCON '93 press event)

Follow-up on "DMV Alert" - Excerpts from CA Vehicle Code

Charge in Palo Alto (CA)

Runzheimer EV Survey Results

What's Up? EAA Chapter News Round-up

Short Clrcuits - Motor Trends article, new EAA bumper sticker

Editorial - Passing the Torch (New EAA Board of Directors)

Sept/Oct. '93

Seeds of Change - Interview with Bob Schneeveis

DMV Alert for CA

Filing an EV Insurance Claim

Electric Vehicle Activities - Preview of WESCON '93

Video Review - A Quiet Revolution

Green 914s (Porsche 914 conversions)

July/August '93

Chrysler TEVan and Norvik Minut Charger

Phoenix Entry - Agua Fria High School

Gary Jackson and Little Guy Racing

High School EVents

Insurance and the EV

Meet the Press

Charging At Work

Battery Test Proposal

Do It Yourself - Recent EV conversions - Sunbeam Alpine Roadster

May/June '93

APS Phoenix 500 #3 - Still Goin', Still Growin'

EV Tax Credit Alert

Billy Roe Qualified for 1998 Indy 500'?

Safety at Phoenix - A Challenge Well-Met

Women at Phoenix

Tech Specs on Checker/Exide EX-11 - 1st Indy-style Electric

High School EVents

Other back issue information is available from the CE/EAA index.

Tour de Sol Racing Classes

By Brian E. Hannon

The various classes of cars racing in the American Tour de Sol. — some definitions:

Production Category

The Production Category is for vehicles which have been sold in a minimum quantity of five and shall be raced with exactly the same specs as sold.

American Commuter

The American Commuter category encompasses minimum two-seat vehicles which can be used as commuting vehicles. Typically conversions, these vehicles have no limits on battery pack specs, solar panel(min 1 ft x 2), or weight.

Tour de Sol Commuter

The Tour de Sol Commuter category limits the battery pack and solar panel that can be carried on-board a two-seat commuter vehicle. A more competitive racing category because the specs are limited, these vehicles are typically ground-up vehicles.

Tour de Sol Racing

Tour de Sol Racing is a category of racing vehicles, typically one-seat small ground up vehicles built by universities and high-schools, which limits solar panel to 480W and battery capacity to a solar 10hour charge, or typically 4800Wh. These vehicles face a substantial penalty for charging from the grid during the race, and are designed to travel the entire race on solar power if the weather cooperates.

Cross-Continental Racing

Cross-Continental Racing vehicles are designed to meet the specs of the Australian World Solar Challenge and the SunRayce. With no limit on battery pack or solar panels, except a limitation on the size of the vehicle, these cars are typically larger and designed to travel longer distances at slower speeds on solar power. While the Tour de Sol Racers are designed to run short legs at speed limits from battery power and then charge from the sun while on display, the Cross-Continental vehicles are designed with smaller motors and lower gearing to run on a net balance from solar power at slower speeds for long distances, and not drain the batteries much each day.

Open Category

The Open category is for everything else, encompassing vehicles which meet the goals of the competition, but which don't fall into any of the other categories. Usually these are electric vehicles, although hybrids are allowed, and they mainly encompass single-seat electric vehicles which charge from the grid overnight. Most are electric motorcycles, scooters, or electric assist bicycles.

Notice

There will be an election of three EAA directors in November 1994. This will start the rotation of directors which was voted by the EAA membership at the general meeting in September 1993.

If you wish to nominate a member to be a director, please send a letter requesting nomination along with a short biography of the person being nominated.

Address the letter to: Nominating Committee,Director, c/o Lee Hemstreet, 787 Florales Dr., Palo Alto, CA 94306.

Tour de Sol

Continued from page 7

May 26 through May 30. Last night I visited the high school where all the cars that don't get there juice from the sun were plugged into the portable charging station which travels with the race. The charging station is a BIG electrical panel that is wired into the grid, I suspect almost like a sub-station. It then provides either 110 or 208 V AC and lots of orange or black extension cords snake from the cars (parked all around it) to the plugs mounted on the panel. I'd guess that 40 of the cars were plugged in last night.

The two TEVans are being charged off the Norvik Minut Charger, which is a trailer unto itself. It contains a big portable generator and the Norvik electronics, and can bring the TEVans up to 80% charge in 20 minutes. Topping off the charge to 100% takes much longer, as the batteries' ability to accept charging decreases with increased state of charge.

After the usual 40 mile lap and display, there was a hill-climb test. The cars started at a standing start and climbed a hill I'd guess to be 1/8 of a mile long and maybe a 6% grade. My unofficial observations are that all of the Production category cars and the UC Davis Endura (all of which have AC induction drive) climbed the hill quickly and easily. Most of the pick-up truck conversions were a bit to a lot slower, but still climbed the hill. (While we were doing this, there was normal traffic on the hill and some of the smaller gasoline cars were slow climbing also. The Drexel SunDragon Cross Continental car made it up the hill OK, and the SpiRIT from RIT also made it up, but at a very slow rate.

The official race results were printed in the July issue of Current EVents.—

News in Brief . . .

Compiled by Ruth M. Shipley from Environmental Information Network. If this is reprinted, please credit CE and Ruth Shipley.

UC Davis Study Finds Strong EV Demand

The preliminary findings of a survey of 600 California households conducted for the California Air Resources Board by the Institute of Transportation Studies at the University of California at Davis indicate that almost half of those surveyed would buy an EV instead of a gas-powered vehicle if the average price was below $20,000.

Those considering small sedans unanimously chose electric vehicles over gasoline-powered cars, but buyers of mid-size sedans were more likely to prefer gasoline to electric. The survey indicates that hybrids will be the dominant choice of households buying EVs. Range was not the determining factor, though EV market potential increased as range increased.

(SACRAMENTO BEE: 6/1)

Hybrid EV Demonstrated in Washington State

Students, public utility employees and others recently took rides in a hybrid electric/natural gas car at the Snohomish County Public Utility District Office in Everett, Washington. The Viking 21 was built at a cost of $90,000 by students and faculty at Western Washington University in Bellingham.

The Viking 21 has a range of 50 miles operating on batteries, and when switched to CNG, it can travel more than 200 miles at highway speeds. The car has won a number of alternative fuel races, including the American Tour de Sol, the World Clean Air Rally and the Pikes Peak Solar/Electric Challenge.

(SEATTLE TIMES: 5/9)

CE-CERT Continues Fuel Cell Research

The College of Engineering-Center for Environmental Research and Technology (CE-CERT) at the University of California, Riverside has received a $25,000 contract from the University of California Energy Institute (UCEI) to continue its research in hydrogen fuel cell technologies.

Technical staff and students at CE-CERT have built a hybrid fuel cell/electric concept vehicle to evaluate the performance characteristics of various types of fuel cells. The electricity produced by the fuel cell charges the batteries and drives the motor, enabling the hybrid vehicle to have the range of a gasoline powered car and the zero emissions level of an EV.

For more information, contact Kathy Light at 909-781-5791.

(CE-CERT NEWS: 6/94)

Detroit Ed Supplies Charging Stations for EV Challenge

Detroit Edison will supply 30 charging stations for the 1994 Hybrid Electric Vehicle (HEV) Challenge, June 14-20, at the Lawrence Technological University (Southfield, MI). The stations were developed by Ford Motor Co., Square D Company and Hubbell, Inc. The HEV Challenge is a competition among top college engineering students to design and build high-caliber, practical hybrid EVs. Forty-two teams are expected to participate.

For further information, contact Vanessa Waters at 313- 237-7255 or Lorie N. Kessler at 313-237-8807 at Detroit Edison.

(DETROIT EDISON NEWS: 6/3)

EDF/NRDC Study Finds EVs Are Cleaner

According to a report released by the Environmental Defense Fund and the Natural Resources Defense Council, only EVs will significantly reduce smog in Los Angeles, even when emissions from power plants are considered. Cleaner formulations of gasoline will not do the job.

"Each electric vehicle in Los Angeles would contribute 49% to 66% less CO2 per mile than a gasoline-powered counterpart," said energy analyst Francis Chapman of the Environmental Defense Fund. "By switching from gasoline to electricity as a transportation fuel, Los Angeles could reduce its in-basin emissions of smog- causing pollutants from cars and light trucks by over 90 percent. As long as we minimize the use of coal in recharging electric vehicles we could significantly reduce air pollution impacts from the transportation sector."

(UPI: 6/8)

Ford Investigates Battery Fires

In the wake of two recent battery fires in its Ford Ecostar vans, Ford Motor Co. plans to install new computer software on the vans that will detect problems in the sodium-sulfur batteries and deactivate them if necessary.

On June 3, Ford asked the 12 fleet participants in the Ecostar evaluation program to stop using the vans while the company investigated the cause of a battery fire in vehicles being tested by the California Air Resources Board and the Electric Power Research Institute (EPRI) in Palo Alto, CA.

For more information, contact Pam Kueber at 313-337-2456

(FORD MOTOR COMPANY NEWS: 6/9)

Records Broken at American Tour de Sol

In the 6-day American Tour de Sol championship race from New York City to

News in Brief . . .

Philadelphia held May 22-28, Ford's Ecostar van took first place and set a new range record of 189 miles on a charge. Two Ford vehicles competed in the category in close races with a ForceGT built by Solectria Corp. of Arlington, MA and two Chrysler TEVans.

Solectria maintained its position as best American commuter car and broke the previous 180-mile range record by driving 214 miles on a charge. It used an experimental nickel metal hydride battery from Ovonics.

TravElectric displayed the Hughes inductive charging system during the EVent, and Norvik Technologies set up its quick-charge system, which supported the Chrysler TEVans.

(NESEA NEWS: 6/14)

U.S. Electricar Activities

U.S. Electricar, Inc. has started regular production of its new line of electric pick-ups. The first truck was shipped to Florida Power and Light in Miami on May 31. The company hopes to reach a capacity of 400 pickups a month.

The company also formed a joint venture with ITOCHU Corporation of Japan called Japan Electricar Corporation to import U.S. Electricar fleet vehicles designed for the Japanese market. In addition, the company signed a memorandum of understanding with two major Malaysian firms to form an EV joint venture. Under the non-binding memorandum the three companies will join forces to manufacture Malaysia's first EV for domestic and international distribution.

For more information, contact Alex Campbell or Abba Anderson at 707-525-3227.

(U.S. ELECTRICAR NEWS)

Entrepreneur Develops Solar Powered EV

A Johnson City, NY entrepreneur has developed a prototype EV that uses solar energy to power the drivetrain. The car is covered with some 100 square feet of photovoltaic cells that power an electrolytic cell that dissociates water into hydrogen and oxygen. The hydrogen is stored in a metal hydride tank and subsequently combined with atmospheric oxygen in a proton-exchange-membrane (PEM) fuel cell. Output from the PEM cell is then sent to a conventional lead-acid "surge" battery.

The car also has a motor generator that spins twin 14-inch, 160-lb flywheels at speeds up to 12,000 rpm for energy storage. Thomas Kasmer says he will use the "surge" pack when the vehicle encounters steep inclines that can drain an EV's energy.

For more information, call Thomas Kasmer at 607-770-9684.

(GREAT LAKES ELECTRIC AUTO NEWS: 6/7)

12th Annual EV Symposium & EV Expo

The 12th International Electric Vehicle Symposium will be held December 5-7 in Anaheim, CA. It will focus on current EV technology and the challenge of commercialization and will afford the opportunity for discussions with members of the EV community on topics ranging from batteries, ultra-capacitors, flywheels, marketing, infrastructure, air quality and policy considerations. It will also feature the Electric Vehicle Exposition, which will be open for additional days.

Before November 1, the registration fee is $750; $800 later. For more information or to register, contact Pam Turner, EVS-12 Symposium Manager: P.O. Box 10412, Palo Alto, CA 94303; phone 415-855-8799; fax 414-855-2041. For exhibitor information, contact SHO, Inc.: 444 Castro St., Suite 1015, Mountain View, CA 94041; phone 415-964-2050; fax 415-964-2246.

(WORLD EV ASSOCIATION RELEASE: JUNE 1994)

Member Ads

FOR SALE: 1980 Renault Lectric Leopard, 72V System, Curtis controller, US 12V batteries, Phasor charger, Goodyear Low Resistance Tires. Good condition. $6,500 or offer. Call eves. Oregon (503) 297-6767.

FOR SALE: 1980 60V Commuta Car, 22K miles, last production run, larger motor, 1221B Curtis controller, 60/120V Lester charger, heater, heavy duty suspension, remachined front end, 1 1/2 years on T145 batteries, 40-45 mph, 30 MPC. Invested $6,000. Sell for $3900 + shipping. VA. Call (703) 473-1248.

FOR SALE: Govt Surplus Jet Electric Fold Pickup Truck, 30 HP GE Series Motor, 120V system 4 speed, gas heater, EV1 controller. Low miles. Priced to sell! $1,500. Call (415) 388-0838.

FOR SALE: 1981 Electrica 007, Jet Industries, Inc. factory manufactured car. 12,000 miles, excellent condition, gas heat, everything works, all manuals, etc. $6,500/ will take offers. Call Bart (206) 775-8287.

FOR SALE: Harbilt Electric Postal Van, needs batteries. Electric motor, controller, chassis, Fiberglass shell. As is $450. Call Stan (415) 364-5956 or beeper (415) 804-8013.

WANTED: Parts (Any EV components), unfinished project car, or EV needing restoration. Call Dale, Albq, NM (505) 260-0070.

WANTED: Ford Pinto converted to electric, semi-finished project car OK, or reasonably priced finished car. Call (201) 839-9053 - NJ

Rates for Want Ads: **$7 for the first 25 words. Each additional word, 25 cents.**

Want Ads are available to EAA members for the sale of electric vehicles and related products. For display ads of commercial products, please see the Advertising Rates.

Send your Want Ads to EAA/Want Ads, 18297 Baylor Avenue, Saratoga, CA 95070. The check should be payable to EAA and included with your ad. The EAA is not responsible for the accuracy of ads.

Calendar of EVents

AUGUST 1-5	1994 Solar Energy International Has an Electric Vehicle workshop for you! One week of Expert advice from Mike Brown and Shari Prange of Electro Automotive. Cost of the work shop is $400. For more information: P.O. Box 715 Carbondale, CO 81623-0715 or Call (303) 963-8855 Laurie Stone.
AUGUST 4 1994	Carolina Vehicle Systems Consortium is having their second E.V. Conference. Guest Speakers and E. V. displays on University of North Carolina & Charlotte campus. Call the Transportation Studies Center for further details. (704) 547-3082
AUGUST 13 1994	East Bay Chapter is having a one-day mini "SEER" at the North Berkeley Bart Station. Public hours: 9:00 am - 4:00pm Electric vehicles, Alternative Energy vehilcles and Electrathons are welcome. Booths are free and available; first callers get their choice of locations. For information call Anna Cornell at (510) 685-7580.
AUG. 7-21	Ener-Run III This rally begins in Hardy, Arkansas and goes through 12 states before returning to Hardy, ARK. Maybe the Clintons should enter a car. Contact Ener-Run Inc. for more information at P.O. Box 665 Hardy, AR. 72542 (501) 856-3877
SEP. 17	Silicon Valley is having it's yearly Rally. Big fun at the usual Lockheed location in Sunnyvale, CA. just off 237 at Mathilda. Contact Lee Hemstreet (415) 493-5892 for more information.
OCTOBER 3-5	Sustainable Transportation S\EV 94. The NorthEast Sustainable Energy Association (NESEA) will host a series of workshops and a trade show. This is the one that the big three bring cars to! Exact agenda not set. Contact NESEA for more info. Tel. (413) 774-6051 Fax (413) 774-6053
NOVEMBER 18-19 1994	Phoenix E.A.A. Presents E. V. Weekend '94. Rally Ride and Drive & Scruitineering. Questions about it? Call Phil Terry (602) 243-5833 or Fax (602) 243-5812
DEC. 1-7	E.V.S. 12 at the Disneyland Hotel and Convention Center, in Anaheim, CA. Includes a parade, press events, expo, and conference. Display space: $25/sq.ft. indoors and $12/sq.ft. outdoors. Contact: SHO 167 South Antonio Road, Suite 10 Los Altos, CA. 94022 Tel. (415) 949-2050

Activities Coordinator, Anna Cornell has complete SEER information and registration forms. The EAA will have a booth at SEER and volunteers are needed. Call Anna at (510) 685-7580 for booth sign-up and information.

Electric HOT Plates!

As a feature of Current Events we will show a Vanity license plate from one of our members electric vehicles. If you spot your license, send us a picture and brief description of your car for publication in an upcoming CE.

EAA Offers EV Test Drives

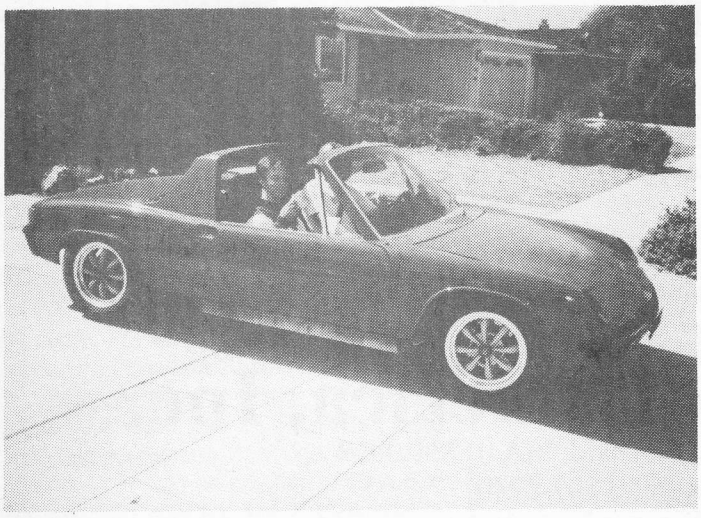
The GM Impact is not the only EV being offered for test drives. The Electric Auto Association, a non-profit organization promoting EVs, has chapters and affiliates in the US and Canada. EAA members bring electric cars to chapter meetings and will gladly give rides, demonstrations and test-drives to interested and responsible members of the general public.

There are over 400 road-going EVs driven by EAA members. Some are commercial conversions, some were done by small companies and others by individuals. They include high-performance stock conversions such as Porsche 914s, Fiat X1-9s, versatile Rabbits and Escorts, VW and S-10 pickups as well as kit cars, station wagons and vans.

EAA members have or will soon be gaining experience with EVs from the Big Three, such as the Ford Ecostar, the Chrysler TE Van and the exciting GM Impact. Members have driven EVs from small but dynamic companies such as Solectria. Also European and Japanese EVs.

A visitor to an EAA chapter meeting probably can get more hands-on experience with a greater variety of EVs than anywhere else. At least one EAA chapter (Phoenix, AZ) has begun leasing electric cars to members who want to try one out.

EAA has recently been re-energized by the election of a new Board of Directors and is taking on the task of becoming a truly national organization. Recognizing the importance of electronic mail and distribution, Current EVents' managing editor now has an Internet signon (*CBCE@delphi.com*) and subscribes to the EV News and Discussion Mailing list from *sjsuvm1.sjsu.edu*.



Advertising Rates

Qty	AD Size	1 Ad	3 Ads	12 Ads
Full page	7.25" x 9.25"	$350	$300 ea	$250 ea
1/2 page	7.25" x 4.50"	$175	$125 ea	$100 ea
1/4 page	3.50" x 4.50"	$125	$100 ea	$ 75 ea
1/8 page	2.0" x 3.5"	$ 75	$ 65 ea	$ 50 ea

- Ads may be placed for 1, 3 or 12 months. Ads are due and payable at the time of the issue. Full payment for all issues must be received at the initial order along with the camera-ready copy. For 12 ads, an invoice will be billed quarterly. A minimum of 3 ads need to be prepaid per quarter.
- Provide camera-ready copy for each prepaid AD. Ads may be submitted on diskette in TIFF format.
- For changes to the ad copy, new camera ready copy must be received *before the 1st* of each month for the next issue and must be the same size to qualify for the discounted rate.
- AD size must fall within the sizes listed above. If ad exceeds the size, the next ad size will be charged or a $10 fee will be charged to reduce the ad. Ad rates are for black and white copy only. For additional color, please add $100 per color.
- Deadline for camera-ready copy is the **1st of the month**. Copy received after the 1st will be run in the next issue. Ads will be placed in the priority received. Prepaid ads will receive 1st priority.
- Please contact Susan Hollis, Advertising Manager at (408) 374-8605 or by FAX at (408) 374-8750 for additional information or assistance. Camera-ready copy and payment for the ad should be sent to: Electric Auto Association, Attn: Advertising Mgr., 18297 Baylor Avenue, Saratoga, CA 95070

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  Facts about the battery that will change the world.
- ❒ ***Flywheel Energy Storage***
  Dr Richard Post **($5.00)**
  Dr. Post updates 1970's thinking and finds a viable solution.
- ❒ ***Team Tucson Land Speed Record Plans***
  Chuck Lemme **($5.00)**
  A wealth of technical considerations and many power and aerodynamic formulas.
- ❒ ***EAA XA-100 Hybrid* ($5.00)**
  Report on the EAA's Hybrid Vehicle Project (all 3 chapters)
  (Includes all tables)
- ❒ **Current EVents ($3.00)**
  Specify month/Year

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Please send check payable to EAA along with your order form. Include $2 for postage and handling.

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