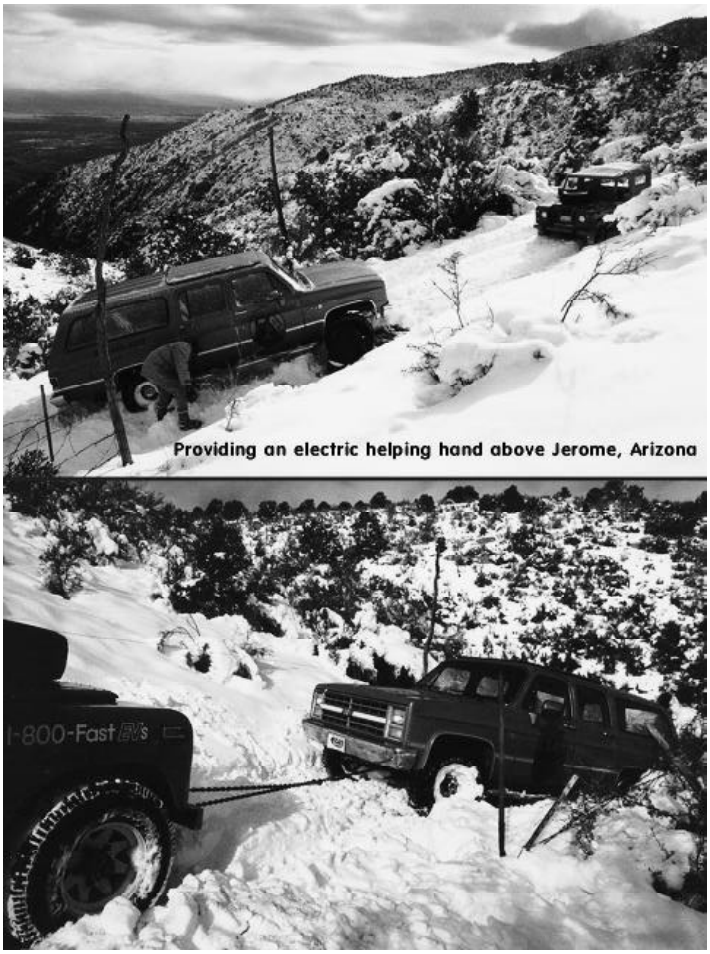
Electric Auto Association

CURRENT EVENTS

Jan-Feb 2002 | Promoting the use of electric vehicles since 1967 | Vol. 34 No. 1 & 2

'LETRO ROVER - AN EV FOR THE OUTBACK



Providing an electric helping hand above Jerome, Arizona

By Wilde
EVolutions, Inc.

From time to time, someone explores the non-typical EV applications, and questions are asked "has anyone thought of this before?" One of these applications is the conversion of a four-wheel-drive vehicle to EV propulsion. Has anyone successfully converted an existing 4x4 to electric? Any how has this vehicle held up?

Wilde Evolutions, while based out of Arizona (recently merged with EVparts in Washington State), converted a gas Land Rover to electric. Here is how the EV compared to it's gas equivalent. Also, this vehicle was recently featured in the December 2001 issue of "Four Wheeler" magazine.

The Land Rover is renowned for off-road versatility around the world. Although often used as a recreational vehicle, it was designed as a multi-purpose utility vehicle for rural areas. With its excellent ground clearance and geared front and rear power-take-offs, it is far more than a superb all-weather vehicle; it can be used for everything from snow removal to drilling postholes.

In a truly rural setting, an electric powered utility vehicle has a tremendous advantage over its gasoline or diesel powered counterpart ... the operating fuel can be obtained on-site via solar collectors, or wind or hydro generators. And whether on the move or doing stationary work, the clean electric power does not bathe the operator or passengers in exhaust fumes.

With almost 30 years of Land Rover experience (Bob still has a '69 he bought new), converting a Land Rover as the Wilde EVolutions' shop truck was a natural. Our restored '71 Rover provides endless enjoyment for our staff and visitors.

In the Spring of 1999 we did a little gas-vs.-electric comparison between two similar Land Rovers.

Venue

This EV conversion participated in the 33rd Annual Easter Jeep Safari in Moab, Utah, 27 March through 4 April 1999.

Moab, Utah is the Mecca of the 4WD world, with trails covering some of the most rugged and scenic country to be found anywhere. Forest, desert, steep sculptured canyon walls and rims, rivers, mountains, and famous Moab "slick rock" provide incredible variety and captivating beauty. The trail difficulties range from easy to nearly impossible to satisfy every level of 4WD trail addiction.

The Easter Jeep Safari is one of the largest organized 4WD trail ride events in the United States. On 'Big Saturday' over 1,000 4WDs depart Moab for the surrounding 4WD trails. The Safari is not restricted to Jeeps. There is no restriction as to manufacturer of the vehicle, but no ATV's or motorcycles are allowed. The Red Rock 4-Wheelers offer 30 different trails ranging in difficulty from easy to very difficult over the 8 days preceding Easter Sunday with the 9th and last day of the event being Easter Sunday.

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Toyota EV RAV4 in 2002 *see page 4*

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Photos by Wilde EVolution and Toyota.

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Jim Toyne - EV Educator and Innovator

Tribute to Jim Toyne

I met Jim Toyne in the early 1990's at an electric car organization meeting sponsored by Burton Gabriel and Rod Wilde. As the club (NOPEC) grew, Jim opened the High School shop once a month for our meetings. We became his sounding board for his new ideas, of which he had many.

As anyone involved with the EV races in Phoenix may recall, it was the Port Townsend #77 car that was the car to beat in the mid-1990's.

Jim came up with such innovations as running bypass and light batteries for the drags, dual 8": motors for improved speed and cooling, and experimental controllers. He was willing to try most anything.

What a lot of folks may not know is that after putting in a full-day teaching school, Jim would open the shop again at 5:30 and the kids would return to work on the car until 9 or 10 at night.

He was a very dedicated educator and he will be greatly missed by those whose lives he touched.

There was standing room only at his memorial service, which took place at the Port Townsend High School auditorium. Many in attendance were students (now adults) who spoke of how Jim not only taught them new skills, but also gave them direction towards careers in which they are now happily employed.

Karl Schreiber, NOPEC

It saddens me deeply that I must announce the passing on Saturday December 1st of a longtime good friend and mentor to many young aspiring EV enthusiasts who lost his battle against cancer. Those of you who attended the "APS Electric" events may best remember Jim Toyne, who taught shop at Port Townsend High School in Washington State. His team of young future EV engineers put together first an RX7 and then a Ford Probe, that was donated to his program by Ford Motor Co., that went on to dominate the sport of High School EV Racing. They were always in the top three and many times number one. Their Probe still holds a NEDRA world record for HS/G class. Needless to say, he inspired many young minds in his tenure at Port Townsend High. He will be greatly missed by many in our EV community.

Roderick Wilde

Three Strikes

by Greg Hanssen

On Dec 5th 1996 GM introduced the EV1 at a large number of Saturn dealerships with a decent amount of publicity. Very soon after, the publicity stopped and a series of obscure print ads showed up. Of course the car cost $550/month not including charger installation and the 70-90 miles range was really more like 50 or 60 (with acceleration test drives resulting in range numbers in the 20s and 30s). Sales weren't so hot in 1997 and I think everyone (including GM) learned that leasing EVs is not a trivial task. Of course by then GM was probably trying to kill the program anyway... but they still managed to spend a lot of money and claim that despite their best efforts, few were leased.

In mid 1997 Honda introduced the EV+ at 4 dealerships (not nearly as well promoted at the showroom as Saturn did for EV1). A smattering of print ads and some nice promotional material (probably not seen by many) attempted to move the 300 cars they had produced for the MOA. Honda managed to claim that despite their best efforts, few vehicles were leased to consumers.

At the Y2K ARB review, we all marched up in front of the staff and board members and proclaimed the numerous ways that GM and Honda did it all wrong and that there really is demand out there if it is handled correctly. I do believe this. We now know that environmental benefits alone are not nearly enough to sell an expensive, short-range vehicle. $30,000 seems like a lot for a car that "only" goes 80-100 miles before "needing to be plugged in".

We know that no amount of advertising promotion or education can replace first hand experience. People don't "get it" until they've had several days to drive it and confirm that it actually does get them where they need to go. The convenience of home charging really needs to be experienced to be fully appreciated.

Now Toyota offers the most excellent RAV4-EV for SALE (as well as 3, 4 or 5-years leases) at $30,000 (post incentive) including charger and a 5yr/60k mi. battery warranty. They say they will promote the vehicle in print, on radio and on TV... no doubt a good deal of money will be spent. They will be offering about 300-500 vehicles, half of which are slated to go to the public.

Nothing is easy and we shouldn't take anything for granted. I'm not sure what the pass/fail criteria is, but if 12 months from now Toyota can say there was not sufficient demand for the RAV4-EV despite their best marketing efforts... well..

I doubt we'll get a 4th chance at bat.

— Greg Hanssen, greg@zefiro.com
Energy Control Systems Engineering, Inc
Production Electric Vehicle Drivers Coalition

Comments:
If these vehicles don't sell then production EVs and the ZEV mandate are going to be history.

The good news is that they are only going to be offering about 180 a year to the general public and if they really offer then through dealerships in all the major metropolitan areas then each dealership would only need to average about 1 a month. Based on sales of the EV1 I suspect that these EVs will be sold out before the end of May but we can help by getting the word out about them

Most reports about the failure of EVs claim that vehicles didn't sell well. The truth is SALES were ZERO. The EV1 and EVplus have never been available for sale...while some of us like leasing, that was an important detail for many could-have-been customers.

continued on page 16.

Toyota to Offer RAV4-EV

Toyota Motor Sales, USA, Inc. (TMS) recently announced it will begin offering the company's electric-powered RAV4 sport-utility vehicle (SUV) to **retail customers** in **California** beginning in February 2002. The automaker first offered the electric vehicle (EV) through a special fleet lease program to major corporations and utilities in 1997. TMS said there are currently more than 900 RAV4-EVs in service nationwide.

"Being one of the first EVs to market demonstrates Toyota's commitment to the environment, [the California Air Resources Board (CARB)], the EV market and consumers who are looking for a functional zero-emission vehicle to meet their needs," said TMS corporate vehicle marketing manager Ernest Bastien. "The RAV4-EV combines the best of both worlds. It is 100 percent emissions-free and has 100 percent of the versatility of an SUV."

TMS said the RAV4-EV is powered by a 50-kilowatt, permanent magnet motor, with a top speed of 78 miles per hour. The EV has a single charge range between 80 and 100 miles. The manufacturers suggested retail price of the RAV4-EV will be $42,000, but a $9,000 incentive from CARB and a $3,000 federal tax credit will reduce the cost of the vehicle to $30,000, including an in-home charging device.

In other company news, Toyota senior managing director Hiroyuki Watanabe announced that the automaker plans to increase its initial allotment of Prius hybrid electric vehicles supplied to the U.S. by 40 percent. The company said the increase will bring the total number of Prius hybrids available to 17,000.

"The Prius allotment increase [is one of] the latest signs of our commitment to environmental responsibility and continued progress towards sustainable development," said Toyota Motor North America, Inc. president and CEO

Toshiaki Taguchi.

Contact: Joe Tetherow, TMS, phone 310-291-8321; Sam Butto, TMS, phone 310-468-7728.

Summary:

- purchase price: US$42k
  (US$30k after government incentives)
- pack is warranted for: 5yrs/60k miles
- pack replacement cost: US$30k
  (24-12V NiMH, air cooled)
- # available in 2002: 300.

Web Site information:
toyota.com/rav4ev This link is effectively identical to: http://gotoyota.programhq.com/fi/fimain.asp?model=rav Navigate to the Matrix page to receive updates for the RAV4 EV. Updated page: http://www.toyota.com/html/shop/look_ahead/rav4ev/ The page can also be accessed from Toyota's main page under "What's New @ Toyota."

If fleet purchasers are also competing for these vehicles, then there may not be many at all left for consumers. So if you want a RAV4 EV, get on the reservation list before February. Currently there is no other freeway-capable (full-function) EV with announced availability for 2002.

specs: http://ev.inel.gov/fop/eva/toyrav98.html

'LECTRO ROVER - from page 1

Coverage

Automotive writer Jim Allen, impressed by our Land Rover, proposed the idea of a trail comparison pitting the electric 4x4 against a conventional internal combustion rig. Jim contacted two of his favorite editors to gauge their interest.

John Stewart, editor of Four Wheeler Magazine was extremely interested and said "go as tech-heavy on it as you can." Four Wheeler is the cornerstone American 4x4 magazine, having been around since 1962.

Richard Howell-Thomas, editor of LRM, a large Land Rover magazine published in England, was also enthusiastic.

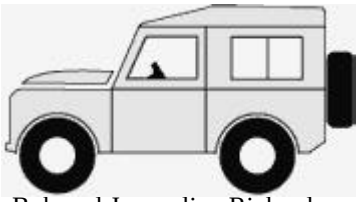
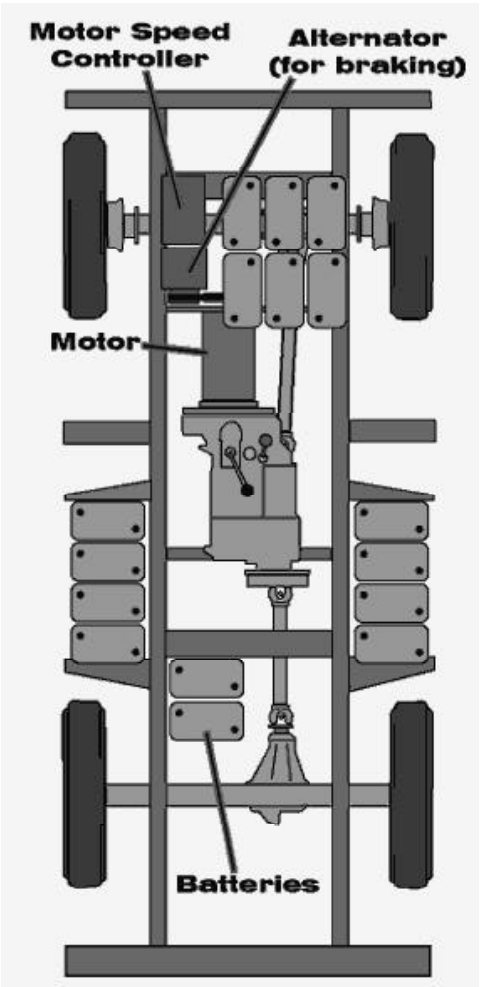
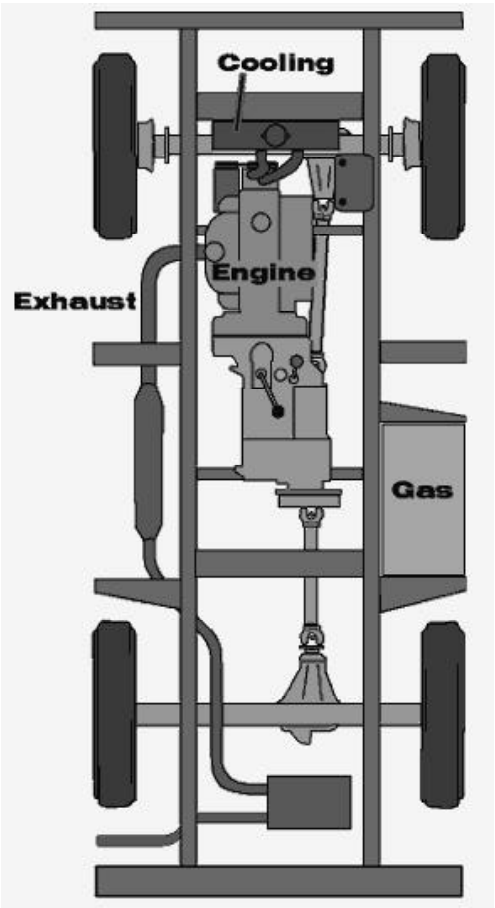
Jim's article in the January 2000 issue of LRM declares the electric Land Rover the clear winner in almost every category. Meanwhile, a change in ownership at Four Wheeler Magazine apparently made them unwilling to upset their advertisers with an article favorable to EVs.

Results

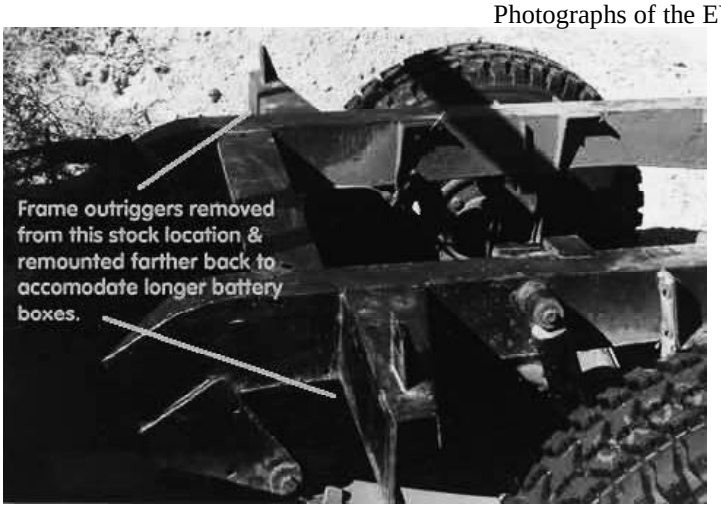
It was a great trip. The "ElectroRover" (as Jim Allen calls it) out performed its gas sibling in many ways. The auxiliary power unit loaned to us by Fisher Electric Technology freed us from the power grid. The air lockers from ARB USA and the sticky tires from Goodyear allowed us to climb the "Dump Bump," a feat accomplished by only about one out of every fifty who attempt it, according to Jim Allen.

Land Rover Face Off

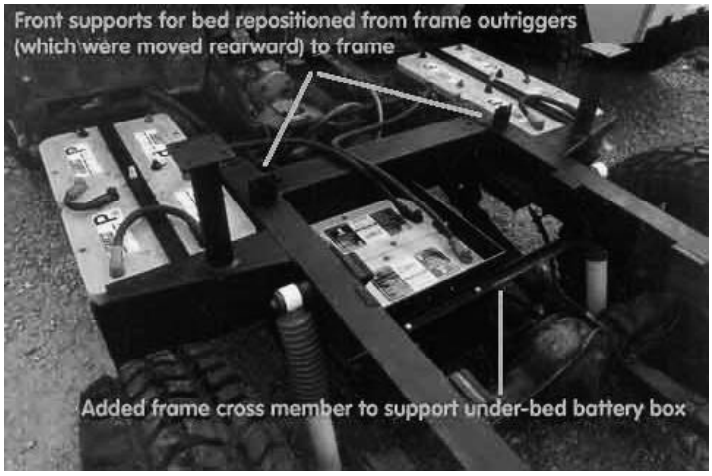
The old adage is **Choose The Right Tool For The Job**. But in order to choose between two tools, you've got understand the strengths and weaknesses of each. Our electric Land Rover is a lot of fun. But how does it stack up against a traditional petrol powered Land Rover? We wanted to find out.

	The Electric Challenger	Tradition
		
Owner:	Wilde EVolutions, Inc.	Bob and Jacqueline Rickard
Vehicle:	1971 Series IIA 88	1969 Series IIA 88
Power Source:	Series wound DC motor, Raptor Motor Speed Controller Optima Yellow-Top batteries	2-1/4 litre, 4 cyl. petrol engine
Transmission:	Stock 4 speed	Stock 4 speed
Transfer case:	Stock 2 speed	Stock 2 speed
Axles:	Stock 10 spline front Auto Conversions 24 spline rear	Stock 10 spline front Auto Conversions 24 spline rear
Differentials:	ARB Air Lockers	ARB Air Lockers
Shocks:	Rancho RS5000	Rancho RS5000
Wheels:	Safari Gard 15 x 7 steel	Safari Gard 15 x 7 steel
Tires:	Goodyear Wrangler MT 31-10.50R15	Goodyear Wrangler MT 31-10.50R15
Genset: 3.5 kW, 240 Volt Fisher Electric Technology		
Chassis Layout:		

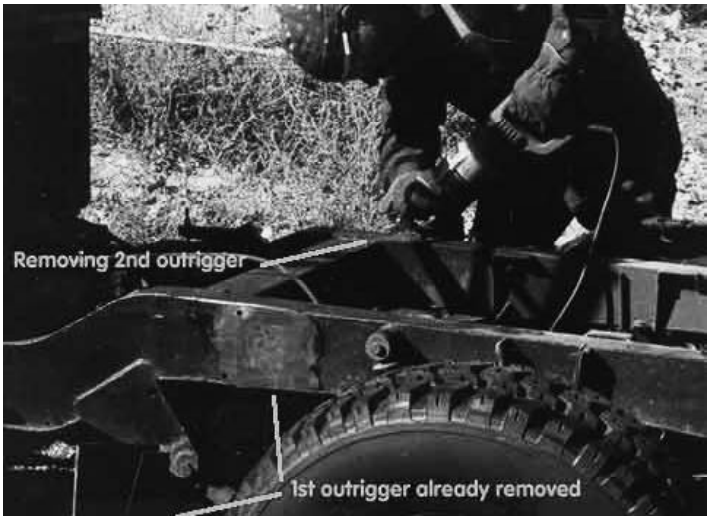
Photographs of the EV conversion process.



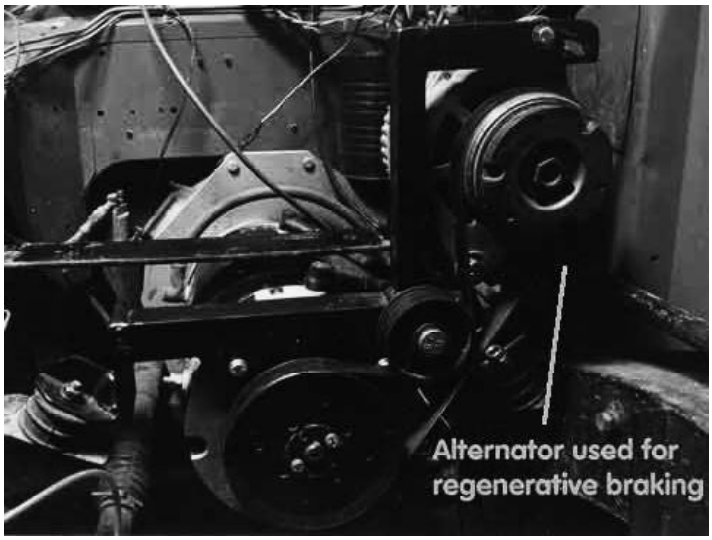
Frame modifications to accomodate batteries.



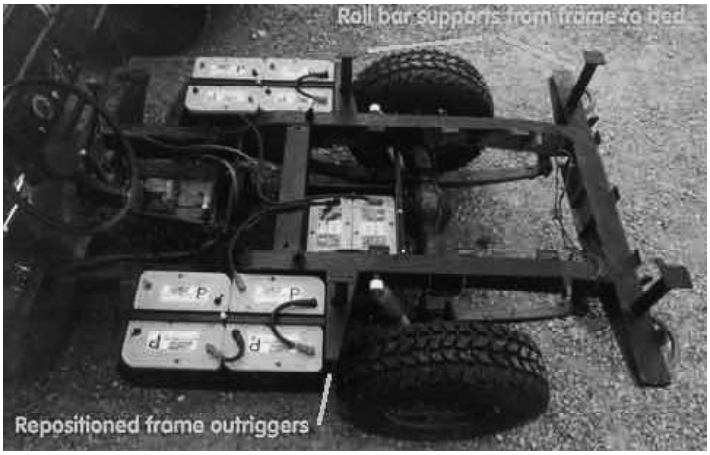
Frame adjustments and batteries in place.



In the process of relocating outriggers.



Motor installation and special regen adaptation.



View of rear frame for battery layout.

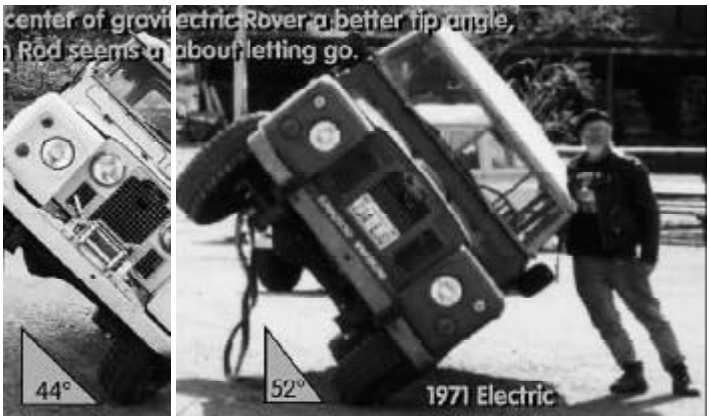
Underside, while tilting > 45 degrees!

On the course, pulling up and over, without a sweat.

Conveying the Kinetic Kops through the Dismal Bog at the annual Kinetic Sculpture Race in Port Townsend, Washington

(photo courtesy of The Port Townsend Jefferson County LEADER)

Example of how conversion handles water crossings.

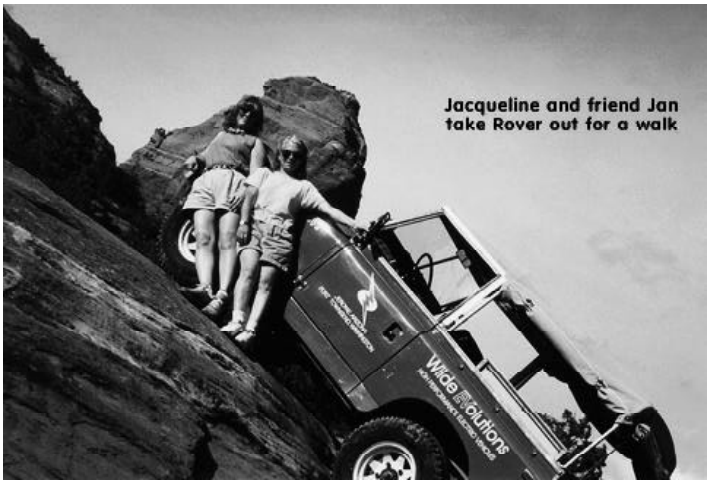


A lower center of gravity gives the Electric Rover a better tip angle, although Rod seems a little nervous about letting go ...

John Wayland's White Zombie proves no match for Rover in a Vancouver, British Columbia "Drag Race"

The Rover even outpulls the famous "White Zombie".

The final construction, as displayed in a Concours d'Elegance.



Simply amazing how it can not just cling, but climb to new heights.

CONVERSION WORKSHOP, STEP 8
BATTERY RACK DESIGN PART 1

By Michael P. Brown, ©2001 & 2002

In the last issue we went over the design of the motor mount. In the next few articles we will discuss the design and fabrication of the battery racks and boxes.

In general, the most common systems used in conversions have flooded lead-acid golf car batteries, and pack voltages up to 144 volts. The minimum battery pack voltage we recommend for a steel-bodied conversion with freeway capability is 96 volts, and the maximum voltage is 144 volts. At voltages above that, components such as motors, controllers, DC-DC converters, and chargers are more expensive and harder to find.

For the purposes of this article, let's assume that we have decided on a 120-volt pack made up of twenty 6-volt golf car batteries. Now we'll start trying to find a way to fit them into the car to be converted.

Where?

The ideal place for the batteries to go would be between the axles, and as close to the ground as possible. This keeps the center of gravity low and centered, which is critical for safety and good handling. However, this is usually the space occupied by passengers or cargo. In most car conversions, you are left with three places where batteries can go.

The first place is under the hood where the engine and radiator were. This area should be considered "prime real estate" for batteries. Many people make the mistake of mounting every electronic component in the conversion on one large mounting plate, and installing it in the middle of this area, destroying good battery space. It's fairly easy- and appropriate-to mount components ("peripherals") individually around the perimeter of the engine bay. It is nearly impossible to do so with individual batteries, so it is important to preserve any large open areas for groups of batteries.

The second place is under (or in the place of) the back seat. The decision to use this space for batteries or keep it for passengers depends on what you need the car to do. If you want to use the space for both passengers and batteries, check to see if the floor under the seat has enough room for the batteries, battery box, and battery rack. If so, sinking the battery assembly into the floor and modifying the seat cushion as necessary is a viable option.

The trunk or hatchback is the third place for batteries. This area has the advantage of usually having a flat floor, into which you can cut a hole to sink a battery box and rack assembly into the structure.

In the second and third options, the batteries share space with the passengers. In these cases, a sealed, ventilated battery box with proper hold-downs is required for passenger safety. This applies to cars with trunks also, since a piece of cardboard is often all that separates the trunk from the back seat, and this is not enough protection.

In a light truck conversion, there is space for batteries under the hood, in a box in the bed, or under the bed between the frame rails on either side of the drive shaft. Even though batteries under the bed are not in contact with the passengers, it is best to put them in boxes to keep the batteries clean. A clean battery is a happy battery.

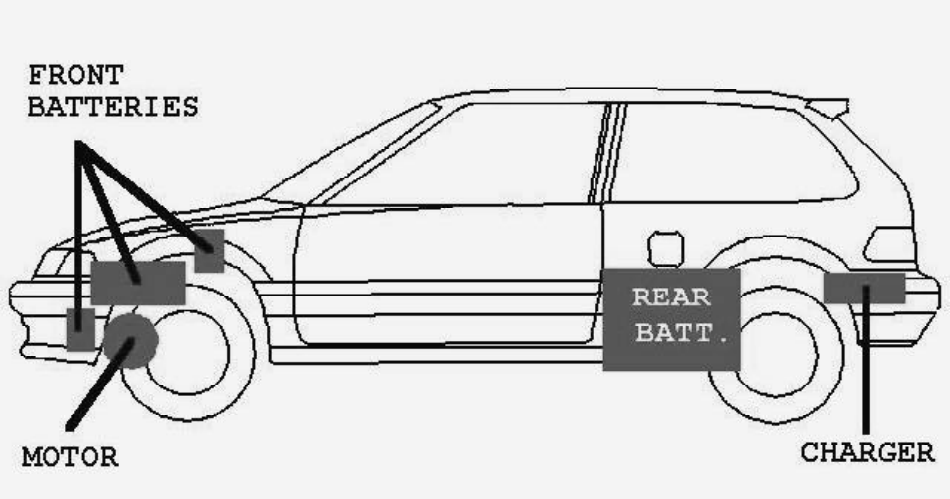
If you are doing a small van, there might be some room under the hood, but most of the batteries could go in the center of the van under the floor. Another option is putting them in a box on the floor, and upholstering the box to be used as a seat.

There are two important things to remember about battery placement. The first is to keep the mass of the batteries as low as possible to maintain the car's center of gravity for good handling. The second is to distribute the weight of the batteries as evenly as you can to maintain the car's front-to-rear weight distribution ratio. Too much weight in either the front or rear, or placed too high, will make for poor handling and an unsafe car.

How Many?

To determine how many batteries go where, you need to do some calculations and take some measurements. What you discover through these measurements may determine whether or not the batteries are enclosed in boxes, and what material the boxes are made of.

Let's say we are doing a hatchback car, and start with the area under the hatch. We want to sink the batteries into the floor of the hatch area, for both weight distribution and safety reasons. This means we have to see how big a hole we can cut in the floor without interfering with frame members, brake lines and hoses, emergency brake cables, suspension parts, or the rear axle. Make the potential hole measurements both on top of the hatch floor and under the car, where the possible interferences mentioned above are located.



Battery layout by Mike Chancey for Honda conversion

Once you have found the dimensions of a rectangle that clears every obstruction, it's time to see how many batteries you can fit in that space. Dividing the width of the rectangle does this by the length of your chosen battery. Then try dividing the width of the rectangle by the width of the battery. Do the same calculations for the length of the rectangle (Get the battery dimensions from the battery manufacturer).

This is a rough calculation to determine which way of orienting the batteries allows you to fit the most batteries in the space given. Do you line up your rows side by side, or end to end? This is a rough estimate, and the batteries should not take up all the space inside the rectangle, since we still have to have room for racks and boxes.

Sizing for Racks & Batteries

Now we do some precision calculations to include the thickness of the battery box walls and supporting racks. Boxes are essential here, since the batteries are in the passenger compartment of the car.

Start the calculations by adding 1/16 inch to the length and width of each battery. This is to compensate for the swelling that occurs as the batteries age. Without this extra space, when your batteries finally give up the ghost, you could find them hopelessly wedged into place. Multiply this new battery dimension by the number of batteries in a row across the width of the car. To this total, add another 1/16 inch for clearance between the last battery in the row and the battery box wall.

Next, take the thickness of the material you hope to use for the battery box and double it, since the box will have two walls. If you are considering several different materials for battery boxes, go with the thickest at this point in the process, since space considerations might make your material decision for you. (The thickest material would probably be 5/8-inch plywood.) Add this to the total for the batteries and clearance space.

Now add 1/4 inch to the total to allow for the 1/8 inch radius on the inside of the angle stock used for the rack. This allowance makes it much easier to install the battery box in the rack and have the bottom of the box sit flat on the rack. If this rack is being sunk in the floor of the hatch area as I recommend, it will be bolted to the car's body with bolts through a flange on the top of the rack. We must add twice the width of the flange to the running total. If the rack is being attached to the car in some other manner, you only need to add twice the thickness of the rack material.

You now have the total width of the battery box/rack assembly. Do the same calculations for the length of the proposed battery pack, and you will have the true size of the space required for that battery pack. This dimension is also the size of the hole you need to cut in the floor of the car (less the flange measurements).

Now compare the rectangle you measured first with the one you just calculated. Does the rack with the mounting flange fit in your original rectangle of available clear space? Does the hole size fit within the clear space rectangle, with room for the mounting flange? Is there clear space under the flange for enough fasteners to hold the rack to the body? The answers to these questions might

be easier to find if you cut pieces of cardboard to the size of the flange and hole dimensions and see how they fit in and under the car.

If there is interference with the body in some spot, and it isn't more than 1/4 inch (6 mm), a few clearancing blows with a hammer would not be out of order, as long as it's only sheet metal and not a structural support. As for the brake lines, hoses or handbrake cables, a little careful repositioning might make a big difference. Go about this process slowly and carefully. Remember: measure twice, cut once.

If your space available is close, but not quite enough, you might want to think about using a different material for your battery box, something that is stronger, so it can be thinner. Box materials include plywood, fiberglass, polypropylene, and metal. We'll get into more specifics about each of these in my next column. This measurement and calculation process is the same for the remaining box and rack assemblies in the car, and will probably be a little easier each time you do it.

Under The Hood

Up front in the former engine compartment, there are some other factors to consider. (Yes, air-cooled VW fans, I know your engine was at the other end.) The battery rack/box dimension measurements should be made with the electric motor and transmission installed on the mounts you have designed for them, with all the shift linkage parts and torque rods in place. It's painful to find a battery sitting where a shift rod has to go when it's too late to change anything easily.

Since you are replacing a large, upright rectangular engine with a small, round electric motor, a fair amount of space is opened up. As I said earlier, this is "prime real estate" for batteries, but even a dream lot may have a few rocks or trees in the way.

In a front engine/rear wheel drive car or light truck, about all that protrudes into this space is the steering column, sometimes the steering box itself, a few inches of the adaptor and transmission, and the power brake booster/master brake cylinder assembly. This arrangement usually results in one box or rack holding six to eight batteries, and sitting a little offset toward the passenger side of the vehicle. Do your measurements and calculations, and see what fits.

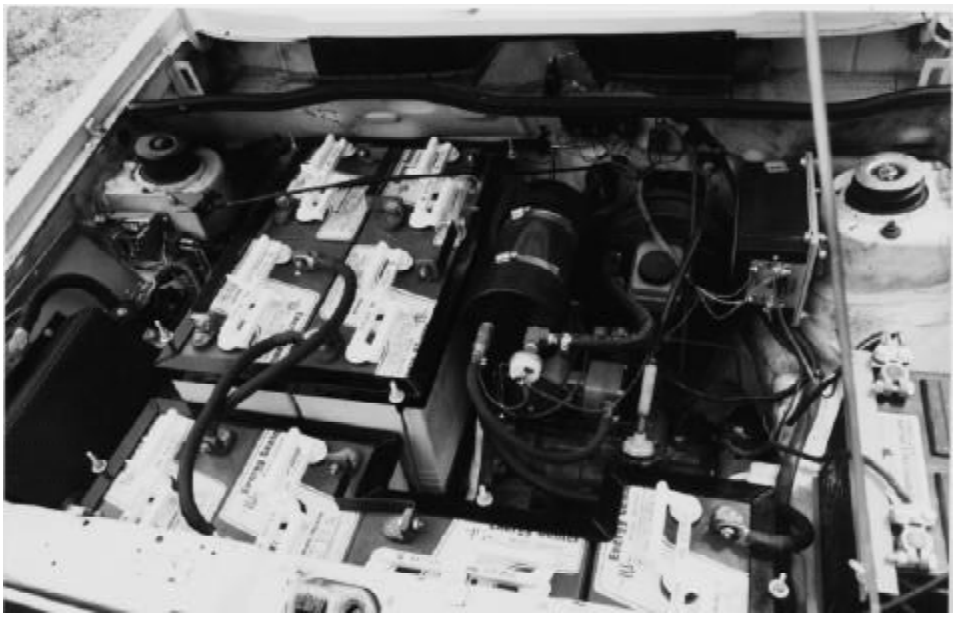
The height of the battery box/rack assembly is an additional factor, since the hood has to close without interference. Sometimes this question is best answered with cardboard mockups. The hood issue is one that needs to be resolved very early in the design process. Mistakes made here can be very hard to correct later. Pay special attention to the stiffening ribs on the underside of the hood. They stick down farther than you might think, and will cause trouble if given a chance.

On a front-engine/front-wheel drive car, you may have a little of the steering column and the power brake/master brake cylinder assembly taking up room. In addition, you also have the transmission and its linkage to work around. This usually leads to a split-level or two-piece front battery pack, with four or more batteries above the motor and toward the rear of the car, offset toward the passenger side. The remaining batteries end up along the front of the car in the space where the radiator usually goes.

Don't worry about the different heights of the battery packs and the offset. Our Voltsrabbit's front battery pack is configured like this, and it handles very well. The hood issue mentioned above is still very important, and should be resolved early on in the design process.

If space is so tight that the additional thickness of a battery box is too much, the under-hood area is one place where a plain rack with adequate hold-downs is enough containment. The car manufacturers usually go to great lengths to isolate the engine compartment from the passenger compartment. Again, the use of cardboard mockups will be a big help in the design process.

I hope this journey through measurements, calculations, and mockups have helped you determine how many batteries you can use and where they will go. Next up is the actual design and fabrication of the boxes and racks, which I will get into in the next issue. If you are in the middle of the process and can't wait that long, call or email me and I'll see if I can help.



Battery rack layout in VW Rabbit - conversion kit by Electro Automotive

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.

Michael can be reached by email at electro@electroauto.com.

EV Challenge Mobile Classroom is Ready to Roll

by Ken Dulaney

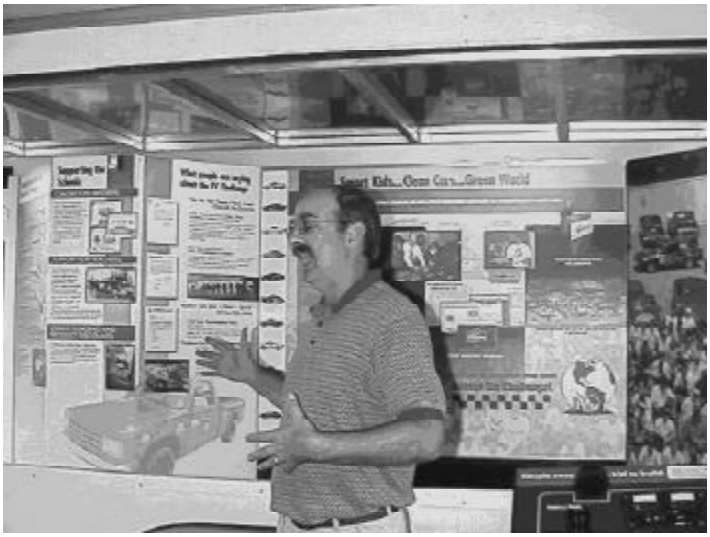
The Carolina Electric Vehicle Coalition based in Raleigh, NC unveiled the EV Challenge Mobile Classroom on October 4th as part of their mission to educate young people and the general public about the benefits of driving electric vehicles. The debut occurred at a training session for volunteers who will staff the Mobile Classroom during its display at the North Carolina State Fair beginning October 12th and ending October 21st.

"The Mobile Classroom is an incredible way of teaching people about electric vehicles and alternative fuels," said Eric Ryan, Director of the EV Challenge. "We hope people come away from the display inspired about the exciting world of electric vehicle education."

The Mobile Classroom will be displayed at various events around the nation to promote the EV Challenge, the primary activity of the Carolina Electric Vehicle Coalition. The EV Challenge is an educational program where students convert an existing gasoline vehicle to electric. The converted vehicle becomes the centerpiece of a yearlong program that culminates in a two-day competition where high school teams participate in road rally, autocross, oral presentation, web page design, and technical troubleshooting events. The program also contains a middle school component where younger students build and compete Junior Solar Sprint cars. This year over 40 schools from across the US are participating.

The Mobile Classroom is a customized auto transport trailer. The customizations include a side entry door, a roll out awning, and display panels. A 1980 Triumph Spitfire converted to a 156-volt electric drivetrain by North Johnston High School is also part of the display.

"Students often think of electric vehicles as being slow and not very much fun," said Ralph Goodwin, Chairman of the Carolina EV Challenge Steering Committee. "When they see the Spitfire, they realize that electric vehicles can be fun and exciting! They are then challenged to design and build an electric vehicle that meets their expectations of what an electric car should be."



The interior of the Mobile Classroom contains display panels and a video narrated by Ed Begley, Jr., movie and television actor and a vocal supporter of electric vehicles. The video includes clips of students working on their vehicles, discussing issues with teachers, and competing in the final autocross event.

"These educational programs are essential to show our young people that electric vehicles work, and that they can be cost-effective," said Begley.

Another part of the classroom is the EV Demo Board. The Demo Board is a panel that attaches to the side of the trailer and displays the basic operation and design of an electric vehicle. Four plastic wheels are mounted on the board and graphics show the location of batteries and a controller. A small accelerator pedal and a forward-neutral-reverse switch control the motion of a drive wheel. Gages display the voltage and current.

To complete the picture of reducing emissions from transportation sources, the Mobile Classroom is towed by a Chevrolet Sierra 2500 bi-fuel pickup. The truck is de-

continued on page 16.

Inside the mobile classroom are detail training material.

Stanford University participates in the Route66 Solar Race

By Dawn Levy

Route 66 has seen faster cars, but few drivers have gotten their kicks along the historic road from Chicago and Los Angeles without a drop of gas. That changed July 15-25, when students from Stanford and 26 other institutions competed in the world's longest solar car race in a shining demonstration of the potential of renewable energy and electric vehicle technologies.

"The whole machine is doing 40 miles an hour off the power of a hair dryer — about 1,000 watts," Stanford Solar Car Project leader Joel Segre said of one of the two Stanford cars that participated in the race. "If you convert that into efficiency, as in miles per gallon of gasoline, that's in the 800 to 1,200 miles-per-gallon range," the junior majoring in biomechanical engineering added.

Stanford was the only school to enter two vehicles in the American Solar Challenge, which was sponsored by the U.S. Department of Energy and its National Renewable Energy Laboratory, as well as companies EDS and Terion Inc. The first Stanford car, named the Third Degree Burner, competed in the stock class, which specifies lead acid batteries and prohibits arrays of photovoltaic, or solar, cells worth more than $10 per watt. That vehicle, which resembles a flat, red spaceship and took two years and $30,000 to build, took second place in its class with a completion time of 91 hours. The University of Arizona's Monsoon blew away competitors to take first place in stock class with a completion time of 70 hours.

Stanford's second car, the Backburner, a sleek three-wheeler, raced in the less stringent open class, which allows almost any battery type but restricts battery weight depending on chemistry considerations. Placing 18th with a completion time of 100 hours, the Backburner employed relatively inexpensive, used nickel metal hydride batteries. First place in open class went to the University of Michigan's M-Pulse, which took 56 hours to make the trip at an average speed of 40 miles per hour.

At 2,300 miles, the American Solar Challenge is the longest solar car race in the world, outdistancing the 1,882-mile trans-Australian route of the World Solar Challenge and the 1,300-mile Sunrayce '99 from Washington, D.C., to Orlando, Fla. Drivers have been racing solar cars since 1982.

How viable are solar cars?

Every day enough solar energy reaches Earth to meet the world's energy demands for a full year — if only it could be harnessed.

Just as conventional batteries harness chemical differences to generate voltage, photovoltaic cells use special silicon wafers with two layers — one that donates electrons, one that accepts electrons — to create a difference in electrical potential.

"When sunlight hits a cell, it pings an electron off of the donor and it goes to the acceptor, and current flows," Segre explained. The electric current flows through a wire that connects to eight batteries storing a total of 96 volts to power the solar car's motor.

The solar cells are strung into seven independent arrays containing more than 100 solar cells each. But woe if one cell breaks, Segre said: "It's akin to the Christmas tree light effect."

Power consumption depends on vehicle speed. When the car moves slower than 40 miles per hour, batteries store the excess power generated by the solar arrays. At faster speeds, the car sucks juice from the battery.

The car also features "regenerative brakes," which "recycle" energy of motion that in conventional cars is lost during braking. Regenerative brakes trap significant power. Segre recalled a highlight of the race as the Third Degree Burner neared the finish line in Claremont, Calif.: "The driver was descending at 70 miles per hour from a beautiful mountain pass, passing traffic, getting 1,000 watts from the solar array and generating 5,000 watts from its regenerative brakes. So there we were, passing traffic and charging our batteries. Everyone was so excited, and the driver was howling into the radio."

Cost, not technology, remains the biggest deterrent to commercial viability, Segre said. Like computer chips, solar cells are made from silicon wafers requiring pure and exotic materials, and chip manufacturers demand top dollar. Whereas one silicon wafer is used to make one solar cell, that same wafer can be the precursor of many computer chips, each of which command a handsome price.

The Third Degree Burner's solar arrays cost more than $5,000. Some open-class teams ran solar arrays that put out triple the power but cost 100 times as much.

Light and strong, the chassis is the stuff of space shuttles and fighter jets. Its structure — a Kevlar-based honeycomb sandwiched between carbon-fiber laminates — yields an incredibly high strength-to-weight ratio. Formed on site from composite materials, the chassis weighs only 20 pounds but supports more than 800 pounds – 350 pounds of batteries, 200 pounds of driver, 300 pounds of car parts.

Designers can't just throw solar arrays atop conventional cars to convert them. Despite their cost, solar cells produce relatively small amounts of power. The reason solar cars can get away with such small power sources is

that they are designed with efficiency — rather than comfort or practicality — in mind. Solar cars owe their extreme efficiency in part to their aerodynamics. They're short, flat and close to the ground. Adding rearview mirrors alone would double the drag of the car, Segre said: "That sort of attention to detail makes this car incredibly efficient but also incredibly impractical."

It's no surprise that the companies that recently came out with hybrid or electric cars — GM/Saturn, Honda and Toyota — have raced solar cars. "Solar cars are excellent testbeds," Segre said. "If you have inefficiency in the drive train, or some little rear view mirror that's not aerodynamic, it's going to show up." Contrast that with the average sport-utility vehicle, which is so inefficient to begin with that a less-than-aerodynamic rearview mirror escapes notice.

Solar cars also are hot. How hot? "Hot enough that I'm glad I'm too big to fit in the cockpit," said Segre, 6-foot-4. But students Scott Kohn, Ray Chen and Andy Gotterba were happy to take the driver's seat, sometimes for as long as six hours in heat topping 105 degrees.

It seems fitting then that all of Stanford's solar cars have had the root word "burner" in their names: 1993 saw the introduction of the Sunburner, followed by the Afterburner in 1995 and Afterburner II in 1997. The Third Degree Burner, which debuted in 1999, was raced in this year's stock class while the Backburner competed in the open class.

'On your mark, get set...'

The Stanford Solar Car Project is housed in an aluminum edifice on Stock Farm Road that is cheerily painted with a giant cardinal sun. A week before the race, the building was filled with exhausted but upbeat students working to troubleshoot problems that could turn Route 66 into the highway to hell.

Alumni of the Stanford Solar Car Project and the technical community, both at Stanford and beyond, have been hugely supportive. A week before the race, a student shorted out a $5,000 power supply necessary to charge the cars' batteries. Leonard Magelky of Dovebid offered to rent the students a replacement for just $150. The next day, after perusing the project website (http://www.stanford.edu/group/SSCP/index.htm), he decided he'd rather list his company as a sponsor, so he gave the students the power supply for free and offered to repair the old one at no charge.

Additional help came in the form of substantial cash donations from Google and Juniper Networks, a 15-passenger van from Ford, powerful computing tools from Compaq and Quantex, satellite phones and service from Globalstar and special funding from Stanford's student body.

Besides Segre, Kohn, Chen and Gotterba, project participants included Eloy Avila, Alan Amaya, John Cieslewicz, Alex Starns and Grace Liu, all of Stanford; Verity Pang of West Valley College in Saratoga, Calif.; and Ernie Avila of Elko High School in Elko, Nev.

"Safety first" was the rule of the road as the cars were preceded by a lead car and followed by a chase vehicle. Students in the lead vehicle communicated via radio with the race-car driver to alert him to potholes and hills or just help navigate Route 66, parts of which are unmaintained, and to direct him to checkpoints, which were often off the beaten path.

Students in the chase vehicle used laptop computers to model race performance and determine the optimal speed given cloudcover, elevation profile, wind speed and time of day. Satellite uplink to the web allowed them to view incoming weather systems and check the position of competing teams on the route. "After much pulling of hair and gnashing of teeth, we would eventually come out with a statement that the car should either speed up or slow down," Segre said.

The students' dedication paid off. The racing cars encountered no major setbacks, though flat tires were numerous. Solar car tires – tubeless tires run at very high pressures — are designed to minimize rolling resistance. When they heat up on hot pavement, the pressure inside increases, making them even more susceptible to popping. "The craterlike potholes of Route 66 don't help much either," Segre said. Nonetheless, Stanford's solar cars proved themselves viable highway vehicles. The Backburner has logged a top speed of 74 miles per hour, and the Third Degree Burner, 70 miles per hour.

Materials science and engineering Professor John Bravman, vice provost for undergraduate education, is faculty adviser for the project.

By Bob Oldham

Current and developing environmentally friendly automotive technologies were showcased in California recently during three days of testing and evaluation. Michelin Challenge Bibendum 2001 was designed as a means for manufacturers to showcase current and developing environmentally friendly automotive technologies. During the two days of testing and evaluation, entrants were judged on design, performance, emissions, and fuel-efficiency before beginning a 275-mile trip to Las Vegas, a real test of real-world conditions.

The colorful XCELLSIS ZEbus (zero-emissions bus), powered by a hydrogen fuel-cell drive system and trailing a plume of pure water vapor, made the trip across the desert from Los Angeles to Las Vegas. It was in the company of nearly 50 other environmentally friendly vehicles in the final phase of Michelin Challenge Bibendum 2001., held at the end of October. The ZEbus was largest vehicle in the caravan.

The EXCELLSiS ZEbus, powered by a hydrogen fuel cell engine, completed the trip from Fontana, CA to Las Vegas with the other Challenge Bibendum competitors.

Diverse Vehicles and Power Sources

Challenge Bibendum competitors constituted a diverse field of vehicle types and power sources. On one extreme were the most state-of-the art current production vehicles such as the Nissan Sentra CA, the Honda Civic Hybrid, and the Ford F-150 Bi-Fuel. The Sentra and the Civic both have very clean and efficient gasoline internal-combustion engines, while the F-150 and some other entries could operate on natural gas as well as gasoline.

One of the most recognizable vehicles was a Red 1965 Shelby 427 Cobra replica. Although powered by an internal-combustion engine, this Cobra was different because the engine burns hydrogen instead of gasoline.

General Motors' HydroGen1 fuel-cell vehicle successfully made the 275-mile drive from Fontana, California to Las Vegas with other Challenge Bibendum competitors.

A total of seven fuel-cell vehicles competed, possibly the largest group of different fuel-cell vehicles ever assembled. The California Fuel Cell Partnership (CaFCP) entered four vehicles, with DaimlerChrysler, Ford, and General Motors entering the remaining three. The CaFCP is a collaboration among auto manufacturers, energy companies, fuel-cell technology companies, and government agencies working to commercialize fuel cells.

Two current production hybrids represented hybrid vehicle technology. The Honda Insight and the Toyota Prius competed alongside prototype hybrids. One prototype hybrid, which looked like an exotic sports car, was a red open-top two-seater called the L3. Other vehicles entered featured liquefied petroleum gas, compressed natural gas, diesel and biofuel technology, each in an attempt to improve fuel consumption and environmental impact.

Sustained Mobility

Challenge Bibendum, evidence of Michelin's commitment to "Sustained Mobility" for the coming century, offers a forum for emerging technology that will help reduce the reliance of personal transportation on finite natural resources, as well as reducing the impact on the environment. "Clean, Safe and Green" is how Edouard Michelin, CEO and managing partner of Michelin, described the future of mobility to Challenge Bibendum participants. He added, "The future will be diverse."

A Honda Insight leads a Ford Explorer during 100-mile efficiency and range testing on the California Speedway oval.

Michelin created Challenge Bibendum in 1998 as a competition in France to encourage manufacturers to showcase their progress in developing environmentally positive vehicles. Named after the Michelin symbol Bibendum, known to most Americans as the "Michelin Man," Challenge Bibendum will be an annual event, with the fourth to be held in France, once again concluding in Paris prior to the 2002 Paris Motor Show. Challenge Bibendum will return to the United States for 2003 and alternate between the two countries each year.

The 100th Anniversary of Bibendum, also know as the Michelin Man, was the occasion for the inaugural Michelin Challenge Bibendum held in France in 1998.

Forum for Comparison

Michelin Challenge Bibendum provides a forum for the comparison of a wide variety of promising technologies, at least some of which may lead to commercially viable alternative to current production vehicles. The event varies from other types of competition because the entrants are not competing against each other, but against pre-set standards in seven performance categories. Standards are set for three size categories: Subcompact/Compact, Midsize/Full-size and Lt. Truck/Van/SUV1. Standards are set for each category, and the performance tests include Emissions, Noise, Acceleration, Braking, Slalom, Efficiency, and Range.

Design and Performance

Challenge Bibendum officially opened on October 26th at the historic Spanish Courtyard of the Automobile Club of Southern California. The competitors were judged on Interior Design, Exterior Design and Design Integration/Use of New Technology. On Saturday the performance evaluations were conducted at California Speedway in Fontana, California.

The acceleration, braking, slalom and noise tests were held at various speedway locations before the competitors took to the oval for efficiency and range evaluation. The competitors had to complete 100 miles at an average speed of 55 mph on the track. The Auto Club's Test and Evaluations manager set up the range course. The drivers had to do 50 2-mile laps, and keep an average speed of 55 mph. However, they had to slow to 10-15 mph through one group of barriers, meaning that they then had to accelerate to 70 to make up time. Greg Hanssen in his Panasonic PbA EV1 and Mike Reagan in a NiMH EV1 represented the EV community. Greg went over 80 miles under this condition. All the Electrics made the highest score possible on efficiency; the Insight was rated as a 'B'. The two EV1s also made the trip from Los Angeles to Las Vegas.

Throughout the day, auto journalists and were able to drive several of the competition vehicles along with other environmentally efficient vehicles on a "City Drive" course. The vehicles ranged medium-duty delivery vehicles to electric micro-cars. The Michelin Challenge Bibendum 2001 ended with a 275-mile trek from Los Angeles to Las Vegas on Sunday.

The Future of Mobility

Edouard Michelin described the future as offering vehicles that are clean, safe and fun. Challenge Bibendum, an event whose time has definitely come, provides an international gathering of environmentally positive vehicles to give the world a glimpse of vehicle options for the future...

EV MOTOR 101

By John Wayland, NEDRA

Here's John explaining DC electric motors from the Honda Insight Discussion List:

Electric Motors 101 (for beginners)

The name is definitely confusing, because a brushless DC motor is in fact, an electronically commutated AC motor. A standard fare permanent magnet (PM) DC motor, like the tiny ones used in slot cars, or the ones used in cordless electric drills, are also AC motors....I'll explain.

All motors spin by utilizing AC (alternating current) no matter if the motor is a series-wound DC motor or an AC induction motor. The series-wound DC motor is like the starter motor in a car that gets it's power from a pure DC source via the car's 12v battery. An AC induction motor can be found in your everyday washing machine that gets its power from the AC line voltage coming from the wall socket.

The names 'DC motor' and 'AC motor' then, are to describe the power source the motors run off of. Series wound, shunt wound, compound wound, and standard PM are all type of DC motors, and all of them have a wound armature (electromagnets) that spins and delivers the hp and torque out its shaft. All of these DC motors also have fixed, non-moving fields that interact with the electromagnets of the armature in an attraction/repulsion affair that cause the armature to rotate...this is how the motor 'works'.

The fields in all but the PM motor, are wound types...PM motors usually have a magnetic ceramic 'ring' that surrounds the spinning armature. The wound fields are simply powered up to provide a non-changing magnetic field (the permanent magnet fields of the standard permanent magnet motor also provide a non-changing magnetic field). To get the motor action to take place the armature's electromagnets need to be fed an AC voltage, not the DC voltage of the supply to the motor.

Feeding an AC voltage into the armature causes the electromagnets to change their magnetic field from north to south with each reversal of the AC signal, and this causes the repulsion/attraction of magnetic fields that cause the armature to spin.

To get AC from the DC source, the power coming into the armature is 'commutated' via the commutator and brush rigging.... in other words, the power is converted from DC to AC using an electromechanical device. The commutator is made up of smooth copper conduction bars that wrap around the motor shaft at one end and that have brushes that ride against them and make electrical contact. As the armature spins, the bars make and break contact with the brushes, and this then switches the DC current into AC current. Though this setup has worked for 100 years, it isn't the best way to go and it has it's problems:

(1) In all of these DC motors, including the PM type, the windings of the armature get hot and need to be cooled, but being that they are located in the center of the motor and are spinning, this is hard to do.

(2) Because of the windings and the com bars of the commutator, the armature is limited in how many rpm's it can turn before it flies apart from centrifugal forces.

(3) Because the brushes need to always make good electrical contact with the com, they are pressed against it with pressure from springs, and this creates mechanical drag.

(4) To have good electrical conduction and lubrication qualities, the brushes are made from carbon. This material works well, but not perfects, and there is electrical resistance in the brushes.

(5) The motor's brushes are 'timed' for the best efficiency as a motor, but this ideal motor timing is the worse type for using the motor as a generator. If the brushes are instead, timed to act the best for a generator, then the generator makes a poor motor. It is not possible then, for a motor with properly timed brushes to act as an efficient generator, and it is not possible for a generator with properly timed brushes to act as an efficient motor.

(6) There electrical limitations in the com/brush configuration that limit the amount of current and voltage that can be fed to the

motor without a resultant fireball from brush 'flash over'.

(7) The brushes and com are wear-out items that need maintenance, and as the brushes ear down over time, they create conductive brush dust that can lead to flash over and motor failure.

(8) Efficiency is in the range of 87-90%.

What if we could rearrange things? Taking a PM type wound armature motor, let's take the magnets off from their field position, put them on the armature, and take the armature's windings and put them on the outside of the motor. While we're at it, let's throw away the commutator and brushes and replace them with transistors that can electronically switch the DC into AC. Now that there are no windings and no commutator, we won't be calling the spinning part of the motor the 'armature', but instead, it gets a new name, the 'rotor'. The rotor can be made as a solid chunk of magnetized parts, and without wires and com bars to fly apart, it can spin much faster than an armature...this makes for higher rpm hp! With the windings now mounted on the outer perimeter (as the fields of a shunt or series-wound motor are) of the motor, they can be easily cooled with heat sink fins, or liquid cooling. Since the commutator and brushes are gone, there are no longer these items to wear out, flash over and arc, and to cause mechanical drag and electrical resistance.

Using modern electronics and stout transistors to do the work, this new kind of PM motor can be electronically commutated. This is accomplished by having the DC current switched into AC and fed to the field coils on the outer perimeter of the motor, and as this happens, the magnets in the rotor will try to follow the shifting magnetic field as the rotor spins...isn't this cool?

Here's what we end up with:

(1) A PM motor with the parts reversed so that the PM's are in the rotor and the windings are in the fields.

(2) A smooth and solid rotor instead of a wound and commutator equipped armature.

(3) Mechanical commutation that can wear out and arc replaced by solid state motor controller.

(4) A motor that never needs maintenance, which can spin up to very high rpm's without damage while providing a greater amount of power.

(5) A motor that is always timed perfectly by the solid state controller that controls phase shift and commutation angle, so that this machine can be both a terrific motor AND a terrific generator.

(6) Efficiency in the range of 95-98%!

Is there a downside? No, not really. From a backyard EV builder's perspective, the cost for a high power BDC motor and its requisite 3 phase AC controller is way more than that of an off the shelf series-wound motor and DC controller. However, in the long run for OEM's, it is actually less expensive to design from scratch, a BDC motor and controller than it is for them to design and build big series-wound motors and controllers.

With the Insight, Honda engineers were very clever and they made the ICE's flywheel and the BDC's rotor one in the same. The ICE's flywheel has PM's in it, turning it into a rotor for the BDC.

Hope this helps....

EV Challenge - *continued from page 11*

signed to operate on gasoline or compressed natural gas. The truck provides another example of using clean fuels whenever possible.

First stop for the Mobile Classroom is the North Carolina State Fair. Members of the Triangle Electric Auto Association will staff the display along with volunteers from other sponsoring organizations. And if the flashy, red Spitfire is not enough to catch fairgoer's attention, this year's display will include a chance to win a Curry electric scooter. The scooter was donated to the Coalition by Alternate Neighborhood Transportation, a low speed electric vehicle dealer based in Southport, NC.

After the Fair, the Mobile Classroom will embark on a multi-state tour of rookie EV Challenge schools. The EV Challenge is sponsored in part by Advanced Energy Corporation, Carolina Power & Light, Dominion Virginia Power, Duke Power, the Energy Office of the North Carolina Department of Administration, the Air Quality Division of the North Carolina Department of Natural Resources, and the Office of Transportation and Air Quality of the US EPA.

Many hope to get ahold of the Toyota RAV4 EV in 2002, especially since leases will be available to the general public, and some will be (finally) for sale.

Three Strikes - *continued from page 3*

Even then, every EV1 offered was leased... and by the time the Gen2/improved batteries came around, the demand was so high, GM basically confined the cars to existing customers and those that had been waiting on a lucky list for perhaps a year or more.

The 2-seat EV1 also has limited appeal to the large majority of the market. Still, GM (and other manufacturers) have not disclosed how may drivers have signed up on their waiting lists.

To expect at least as many RAV4 EV deliveries to consumers as the EV1 did in year-1 is, I think, more than reasonable. ....

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

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."

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.

Electric Auto Association

(A California Nonprofit Public Benefit Corporation With Members)

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.

II. OFFICES:

A. The principal office and any other office(s) shall be located at such place(s) as the Board of Directors shall authorize. [5160]*

III. MEETINGS AND VOTING RIGHTS:

A. REGULAR MEETINGS: The annual meeting of the members of the corporation shall be held each year at a place, date and time arranged by the Board of Directors. Notice of the meeting shall be sent to each member of record, as of the date of notice, by mail not less than 20, nor more than 90 days prior to the meeting date. At each annual meeting directors shall be elected and any other business may be transacted which may properly come before the meeting. [5510 (a), (c)]

B. CHAPTER MEETINGS: For the convenience of participation, groups of members may form chapters in geographic regions. Meetings of chapters shall be held at times and places determined by the chapter officers and its members. [5510(a)].

C. SPECIAL PURPOSE MEETINGS of members may be called by the Board of Directors, the Chairman, the President or by 5% or more of the members. Special purpose meetings shall be held not less than 35 nor more than 90 days after receipt of a valid request. [5510(e), 5512]

D. NOTICE OF SPECIAL PURPOSE MEETINGS of members shall be sent by EAA to all members of record, by mail, not less than 20, nor more than 90 days prior to the meeting date. Meeting notices shall state the business to be transacted and nominees for positions, if an election is to be held, as well as the time and place of the meeting and date by which proxies must be received. Business at special purpose meetings shall be limited to that stated in the meeting notice. A proxy form shall be furnished to each member with the meeting notice with which the member may vote absentia on the business or the candidate. [5511]

E. QUORUM FOR THE TRANSACTION OF BUSINESS: At any meeting of the members those present plus those represented by proxy shall constitute a quorum, if 5% or more of the members are represented. The affirmative vote of a majority of those voting in person and by proxy shall be the act of the members. [5510(d), 5512]

F. ACTION BY WRITTEN BALLOT WITHOUT A MEETING: Any action, including election of directors, which may be taken at a meeting of members maybe taken without a meeting by mailing to each member of record a ballot describing the proposed action with an opportunity for the member to specify approval or disapproval of the proposal(s). A reasonable time limit for the return of the ballots shall be stated. Approval on a majority of the ballots received by the stated time shall be the act of the members if 5% or more of the members voted. If directors are to be elected by mailed ballot, without a meeting, the number to be elected shall be stated and that number of candidates receiving the highest numbers of votes on ballots received by the stated time shall be considered elected. Written ballots are irrevocable. [5513(d)]

G. VOTING: Each member shall be entitled to one vote on proposals and for candidates at general meetings of members in person or by proxy or by mailed ballot if a meeting is not held.. [5610]

H. PROXIES: Each member entitled to vote, may do so by sending a proxy to the Secretary of the corporation, which must be received by the date set in the meeting notice. A proxy shall be valid only for the specific meeting and proposal(s) stated in the meeting notice. Proxies must be delivered in a sealed envelope and are to be opened only by a teller committee appointed by the Board of Directors.[5613]

IV. BOARD OF DIRECTORS:

A. POWERS OF THE BOARD: The activities and affairs of the corporation shall be conducted by or under the direction of the Board of Directors subject to any limitations in the Articles of incorporation or these bylaws. [5210, 5150 (a)]

B. NUMBER OF DIRECTORS: The authorized number of directors of the corporation shall be an odd number not less than three(s) nor more than eleven (11). The exact number of directors shall be set within these limits from time to time by affirmative vote of a majority of the directors or by affirmative vote of a majority of members voting at a duty held meeting and by proxy or by mail received by the time limit stated in the notice. The maximum and/or minimum number of directors may be only changed by approval of the members. [5151]

C. DIRECTORS NOMINATION, ELECTION AND TERM: Nominations of candidates for director may be made to the Board of Directors by any member at any time to fill vacancies or to replace members whose term has expired. Nominations shall close 60 days prior to the date of the meeting at which the election is to occur or the date by which written ballots must be received. The Board shall provide nominee a reasonable opportunity to accept or reject nomination, communicate to members their qualifications and reasons for candidacy and

to solicit votes. Directors shall be elected at each annual meeting of members and shall hold office until the expiration of the term for which elected and until their respective successors are elected and qualified or until death, resignation, or removal. Directors shall be elected for terms not exceeding three (3) years. Terms shall be arranged so that no more than one half will expire in a single year any bylaw amendment increasing the terms of directors or extending any director's term, must be approved by the members. [5220]

D. RESIGNATIONS: Any director may resign effective upon giving written notice to the Chairman of the Board or to the Secretary of the Board. However, no director may resign if such resignation would leave the corporation without a duly elected director in charge of its affairs. [5224, 5226]

E. REMOVAL: The Board of Directors may declare vacant the office of a director, elected subsequent to the adoption of this bylaw, who fails to attend or otherwise actively participate in three consecutive board meetings. If not in attendance, active participation may be by written input to the upcoming meeting. The entire Board of Directors, or any individual member of the board, may be removed from office by affirmative vote of the majority of members voting by written ballot or in person and by proxy at a duly held meeting for which such removal was stated in the meeting notice as a proposal to be decided at the meeting. If the members act to remove the entire board they must immediately elect a replacement board. [5221, 5222]

F. VACANCIES: A vacancy(s) on the Board of Directors shall be deemed to exist whenever there are fewer directors than the authorized number Such vacancies may be filled by a majority of the remaining directors or by a sole remaining director. The members may elect a director at any time to fill any vacancy not filled by the Board of Directors. [5075, 5224(b)]

G. REGULAR MEETINGS: The board shall meet at least quarterly. One board meeting shall be held immediately after each regular meeting of members for the purpose of organization, appointment of officers and transaction of other business. [5211]

H. SPECIAL MEETINGS OF THE BOARD OF DIRECTORS may be called by the Chairman or the President or any Vice President or the Secretary of the corporation or by any two (2) directors or by five (5) percent or more of the members. [5211(a)(1)]

I. NOTICE OF MEETINGS: Notice of the time, date and place of all meetings of the Board of Directors shall be delivered to all directors at least one week in advance by first class mail or 48 hours notice, before a special urgent meeting, by personal delivery or telephone, including a voice messaging system or other system or technology designed to record and communicate messages, telegraph, facsimile, electronic mail, or other electronic means. [5211(a)(2)]

J. ACTION WITHOUT A MEETING: Any action which may be taken by the Board of Directors, may be taken without a meeting if all directors consent in writing to such action. Such consent shall be filed with the minutes of proceedings of the Board of Directors. [5211(b)]

K. QUORUM AND TRANSACTION OF BUSINESS: A majority of the authorized number of directors present in person or participating by phone shall constitute a quorum for the transaction of business. Every act done or decision made by a majority of Directors present at a meeting duly held at which a quorum is present shall be the act of the Board of Directors. Any board meeting may be held by conference telephone, video screen communication, or other communications equipment. Participation in a meeting under this Section shall constitute presence in person at the meeting if all of the following apply:

1. Each member participating in the meeting can communicate concurrently with all other members.

2. Each member is provided the means of participating in all matters before the board, including the capacity to propose, or to interpose an objection to, a specific action to be taken by the corporation.

3. The board has adopted and implemented a means of verifying both of the following:

a) A person participating in the meeting is a director of other person entitled to participate in the board meeting.

b) All actions of or votes by the board are taken or cast only by the directors and not by persons who are not directors. [5211(a)(6)(7),(8)]

L. MEETINGS: The Chairman of the Board shall preside at every meeting of the board, if present. If no chairman is present a chairman chosen by a majority of directors present shall act as chairman. The Secretary of the corporation or in the absence of the Secretary, any person appointed by the Chairman shall act as secretary of the meeting.

M. COMPENSATION: Directors and members of any committees shall serve without compensation except for reimbursement of expense incurred on behalf of the corporation and subject to prior approval by the Board of Directors. [5235]

N. COMMITTEES: The Board of Directors may create one or more committees each consisting of two or more directors and may include other members of the association. The board shall define the responsibilities and authority of each committee. [5212]

V. ORGANIZATION

A. OFFICERS: The corporation shall have a Chairman of the Board, or a President or both, a Secretary, a Treasurer and such other officers with such titles and duties as the Board of Directors shall determine. All officers shall be chosen and appointed by the Board of Directors and serve at the pleasure of the Board. [5212, 5213]

B. THE CHAIRMAN OF THE BOARD shall exercise such powers and perform such duties as may be assigned by the Board of Directors. The Chairman may sign and execute, in the name of the corporation, any instrument authorized by the Board of Directors. The Chairman shall have all the general powers and duties of management usually vested in the President or Chief executive Officer of a corporation.

C. THE SECRETARY shall keep, or cause to be kept, in a place and form readily

available to any director:

1. Minutes of all meetings of the corporation members, Board of Directors and committees of the Board of Directors.

2. Names and addresses of all members.

3. The original or copy of the Articles of Incorporation.

4. These bylaws including any revisions.

D. THE TREASURER shall be responsible for maintaining accurate and correct books and records of moneys of the corporation received and disbursed and for depositing same in the name to the credit of the corporation and shall provide a statement of financial condition of the corporation to the Board of Directors when called upon to do so.

E. CHAPTERS: Members may form Chapters. Each Chapter has its own meetings, procedures and activities, Chapters must establish and maintain a relationship as affiliates of the EAA and agree to abide by the bylaws and Code of Ethics of the Electric Auto Association.

VI. CONTRACTS AND LOANS:

A. CONTRACTS: The Board of Directors may authorize any director, committee of directors or officer of the corporation to enter into any contract or execute and deliver any instrument in the name of and on behalf of the corporation. Without such expressed and recorded authorization no director, committee, officer or other person shall have the power or authority to bind the corporation or to render it liable for any purpose or in any amount. [5141,5210]

B. LOANS: No loans shall be contracted on behalf of the corporation unless authorized by the Board of Directors.

VII. MEMBERSHIPS:

A. ADMISSION OF MEMBERS: The corporation, shall admit as a member anyone who pays the annual membership fee and shall consider each such person a member for one year following receipt by the corporation of each membership fee. Certain institutions, organizations and individuals may be granted complimentary memberships at the discretion of the Board of Directors. Any member may resign at any time by written notice to the Board of Directors. [5310]

B. CLASS OF MEMBERS: The corporation, shall have one class of members and each member shall have one vote on matters to be voted on by the members. [5330]

C. DUES: The Board of Directors may levy upon members such dues, assessments and fees as it may deem appropriate. [5351]

VIII. INSPECTION OF CORPORATE RECORDS:

A. Every director shall have the right to inspect and copy all books, records and documents of the corporation and to inspect the physical properties of the corporation at any reasonable time. Each member shall have the same right of inspection for purposes reasonably related to the business of the association and in the interests of the membership, upon written request stating the purpose, to the Board of Directors. No director or member shall use any record, such as members' names and addresses, for any purpose not in the best interests of the corporation or any member.

IX. MISCELLANEOUS:

A. FISCAL YEAR: The fiscal year of the corporation shall end on the last day of December of each calendar year.

B. ANNUAL REPORT: The Board of Directors shall cause an annual report to be prepared and sent to members, within 120 days after the close of each fiscal year. The report shall include, in appropriate detail: summaries of the corporation, chapter and member activities and corporation income and expenses.

C. BYLAWS: It is the intent of these bylaws to comply with mandatory requirements of the California Nonprofit Corporation Law. The Board of Directors will correct any noncompliance brought to its attention. These bylaws may be adopted, amended, revised or repealed by the Board of Directors or by the members unless the action would materially and adversely affect the rights of the members. [5150]

D. CODE OF ETHICS: The Association will adopt and abide by a Code of Ethics published to the membership as a separate document.

E. AWARDS: The association may grant awards for meritorious service, technical achievement, or other purposes as determined by the Board of Directors.

* Numbers in brackets refer to California Nonprofit Corporation Law. If this law should change, the intent of these sections in this document is to follow the law as modified.

Announcing the 2002 Annual EAA Meeting - February 9, 2002

Will be helped at HP Offices in Palo Alto, in place of the Silicon Valley EAA Chapter meeting, in February.

Issue to be presented:
Review of the 2001 year.
Installment of 3 new officers, with proposed roles to be considered:
Greg Pitz - Charging Infrastructure Liaison, CE Feedback Manager
Scott Leavitt - EAA Secretary & Current Events Editor
Gabrielle Adelman - Treasurer

Agenda to be mailed out before meeting.

EV Miles

As of Dec 3, 2001, the EAA membership (of those who have provided current information) are driving 60 vehicles and have accummulated over 1,006,741 EV miles.

Kilowatt, save a tree, do it faster & cheaper without becoming a Geek - Part I

by Bruce {EVangel} Parmenter, EAA webmaster

Too many people are limiting themselves by not becoming familiar with how to use the Internet. Paper has its uses, but not knowing how to use the Internet today is like not knowing how to use a telephone or an ATM. I have noted with dismay that in my years of working with Electric Vehicle (EV) builders, many of them build great EVs but have no easy way to share their knowledge and experiences. If only that knowledge and experience was documented on a web page for everyone around the world to see. People interested in EVs that I meet or talk to at shows and EVents can easily obtain the EV information they seek via web pages on the Internet.

The paper brochures EV companies hand out have good information, but one can't carry all those around plus they are out of date by the time they are printed. A web page address (called a URL for Uniform Resource Locator) is much easier pass on, and these pages can be more up to date than the paper brochure. The web page not only has product information, details, examples with images, it also has company contact information for any questions (one stop shopping). If, for example the brochure is several years old, then the likelihood of the telephone number or street address being obsolete is very high.

So how you get Internet access without turning into a geeky nerd?

THE COMPUTER SYSTEM

A lot has changed since the early days of computers and now with the Internet. Today's push button telephones are much easier to use than the old 'crank' telephones where you had to ask Lulabell to connect you to a number. Similarly, today's PCs are easier to use and you won't need a University degree to use them. But if you are still hesitant some other ideas might appeal: enroll in an adult education class in your local area, or perhaps asking a youngster (neighbor, family friend) to assist you getting started. But to assist you with some of the basics, this article may be of use.

Today PC operating systems use a Graphical User Interface (GUI) to make using a PC as simple as moving the mouse, pointing and clicking on what you want to see or activate.

I have taught many local EAA members how to use a PC. The more EV knowledgeable and connected we EAA members become, the more useful we become to promote our "mutual public EV use" cause. Having the right answers when the public asks questions will go a long way to make the public aware of how EVs could work and fit into their daily lives for them.

There are different types of PC performance and cost configurations. But we will discuss the Microsoft Windows PC as they are in the majority, which makes them the cheapest and easiest to obtain. My focus will be for the novice (newbie) entry-level or low cost approach.

Microsoft Windows 95 on a Pentium based PC with 32MB of memory (or RAM), a 1GB hard drive, and a 16-bit color display (VGA) is the minimum platform one should strive to start with. This will be cost effective (cheaper) yet still provide easy PC use with Internet access (for Web navigation). [MB = megabyte, GB = gigabyte, RAM = random access memory, the computer's volatile storage area, hard drive = internal non-volatile rotating hard disc drive]. The capacity of the hard disc drive as well as its rotational speed (rpm) dictates the cost.

The first Pentium generation was simply called a Pentium, or P1. The newer Pentiums are called Pentium 2, 3, 4 etc. Each generation raises the performance capability of the PC, but costs more. Microsoft Windows98, 2000, or XP operating systems progressively use more PC hardware horsepower, demanding a faster, more costly PC to function.

As a general rule more RAM improves performance. Since RAM is now cheap, adding more RAM to a PC, provides more "bang for the buck" when trying to do a low cost performance upgrade to your PC. A rule of thumb today should be to use at least 32 MB of main memory. As an example, recently an EAA member that paid me to upgrade his PC (I'm cheap service and the money went to the San Jose EAA treasury). He upgraded from 16MB RAM to 64MB and saw a significant performance improvement. There is less performance improvement above 128mb. More than 256mb, you may be wasting money as PC programs today don't use all of that memory.

For the casual user, who reads and sends email daily, and occasionally looks at (browses)(EV) web pages getting an expensive high performance unit is not a wise economic decision. Similarly, money spent on a huge hard drive (>20Gb) is not needed justifiable if you don't use the PC much.

If you want to load a lot of programs (applications like word processors, spreadsheets, etc), you should consider a hard drive that is larger than 3GB. But some people are minimalists and can be quite happy as little as a 2GB hard drive. There is a caveat: the more you programs and data you store on your drive, potentially the more you have to store off (backup) and put back on (recover) if the PC stops working (crashes). Financial files should always be backed up.

The PC industry is constantly trying to obsolete last year's model, so as to entice you to buy a new PC. But a wise PC purchase should do everything you want and last several years before becoming "too slow" and / or "obsolete".

[I am going to include some web page links (URLs) that you can use with someone who has Internet access or at a library which has PCs with Internet access. These URLs are to be typed in at the top of the web page viewer (browser), and after you hit the "enter" key, they make the browser go out and look for that page. Several examples are provided below. They start with http://]

INTERNET CONNECTION

The PC alone without an Internet connection is limited in its use. You can't view web pages, nor send / receive email.

Instead of discussing high-speed access (via cable DSL, , Broadband), I will focus on cheap and easy modem connectivity. [modem = allows the PC to talk to the world on

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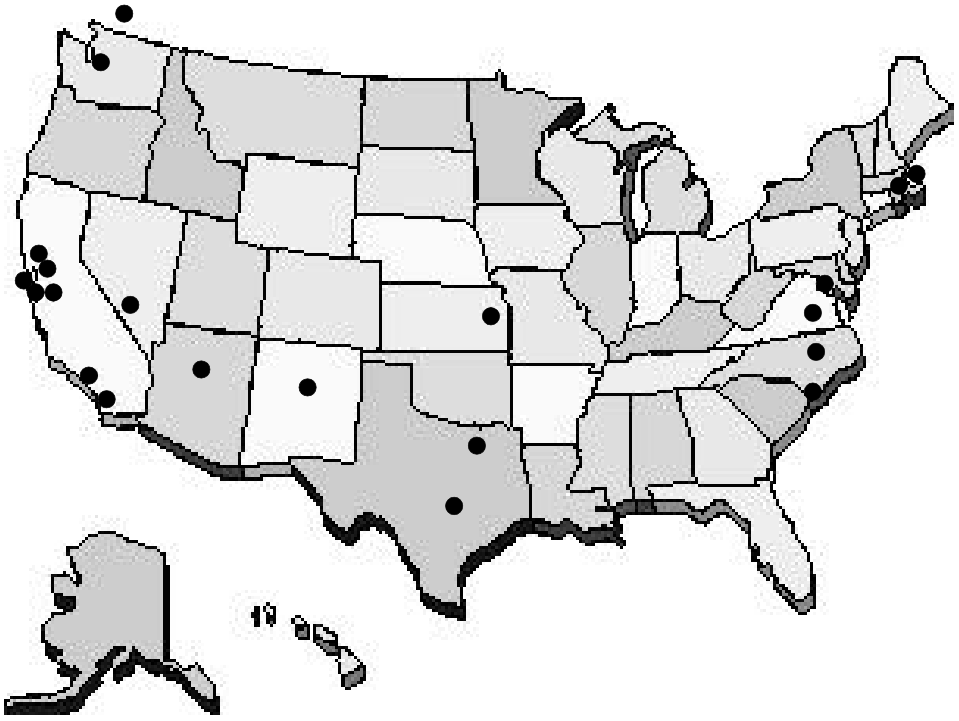
CANADA

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: Leni Goldberg, 1-323-935-2690, warbuks@mediaone.net
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/
Email: info@abqev.org
Contact: Neil Wicai, 1-505-899-7660, info@abqev.org
Mailing: 19 Santa Maria, Corrales, NM 87048-6003, 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 12/24/01. Welcome to the return of North Texas and the addition of the new Coastal Carolinas EAA Chapters.

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

Board of Directors 2001

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rfreund@cup.hp.com

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willbeckett@email.com
1-650-494-6922

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EAA-contact@excite.com
1-510-864-0662

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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

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

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

April 26 - 27, 2002
7TH ANNUAL FINAL EVENT OF THE EV CHALLENGE, TBD
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 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.

Sources for Existing EVs for Sale:

Silicon Valley Chapter EAA
http://home.pacbell.net/beckettw/forsale.htm#owned

Innevations
http://www.innevations.com/used-evs.html

Eco-Motion Electric Cars
http://www.halcyon.com/slough/contributions.html

Arcata Electric Car
http://www.tidepool.com/~ecar/list.html

EV Tradin' Post
http://members.nbci.com/evalbum/geobook.html

EVA/DC
http://www.evadc.org/forsale.html

Triangle EAA
http://www.rtpnet.org/~teaa/forsale.html

Check out these websites and the various EAA Chapter websites for new and used EV vehicles, production and conversions, and EV parts.

INTERNET *continued from page 25*

the Internet using an ISP via your telephone line.]

The 56k modem is now the standard costing about $15. 56k winmodems that use the power of the PC's Pentium processor to do the modem work. Non-winmodems have their own processors, cost more yet don't slow the PC's processor down. Be aware, you might have a fancy 56k modem but you will never get more performance than the telephone pole hardware can provide.

As an example, I recently moved from area code 408 to 650 (10 miles North) in Silicon Valley. I was getting 54k connections in the 408 area code. Now, I am lucky to get 44k, and usually getting 32k connections. This is because of the telephone company's hardware had been upgraded in the 408 area code, but not yet so in all areas of the new 650 area code. (Its not always your PC). But there is hope -even connected at the slower speeds, you can get what you need done, it just takes a bit longer.

You need to have an Internet Service Provider (ISP) to connect your PC to the Internet via your modem. Before you choose an ISP the very first thing to check is if there are multiple 'local' telephone numbers available (without any toll charges). As an example, I am connected to AOL (listening to web radio as I type this article) with a Palo Alto access number. Now Palo Alto, Redwood City Menlo Park, San Carlos are all local telephone numbers for me. Thus if one numbers is busy or produces a slow connection (as often can happen), I have several other numbers to try My telephone plan provides unlimited local calls.

There are low cost ISPs for a monthly $10 fee. Check out http://search.yahoo.com/bin/search?p=cheap+isp You do not need to spend $20 or more per month (like with AOL, Earthlink and others). There are also free ISPs that force you to read their advertisements as a banner that eats up some of your PC screen area. I have tested many and the best free ISPs for newbies are http://netzero.com or http://juno.com.

These ISP's provide access programs for your PC at home. They can be saved from their web pages (downloaded) to your floppies, or a CD can be ordered from their web site. Sometimes a friend may have one of these CDs which you can borrow to use (this is legal, as it is free software).

Now what do you do with it?

I have addressed getting started if you are considering the purchase of that PC which would allow you to talk (network) with other EV people, sharing information, browsing web pages, and reading the EVDL (EV Discussion List) to hear the latest EV news.

So let's assume you sat down with a friend who has a PC and you think it is easy to use. Further let's,assume that with the help of your friend you have purchased a PC for your home. Finally let's assume you have set up and installed the ISP and can connect to the Internet using your web page viewer (the browser)... Now let go further.

Email

You need to set up facilities so you can exchange mail and communicate with others via email messages. You should check your email at least once a week. Usually people check it like a telephone answering machine, once a day. I suggest setting up a web page email account (web email). Having a local email program on your PC (Typically called Outlook, Netscape Messenger, POP mail, etc.) is not recommended because it will allow computer viruses to propagate viruses to all of the email addresses in your PC's address book (this is a very bad thing). Web email does not have this problem.

Web email also allows you to check your email from any PC that has web access (a friend's PC, the local public library, airport kiosks, a laptop in a motel, etc.).

One of the easiest free of charge web emails to setup and use is http://mail.yahoo.com. Before you start though, you need to choose a user name that is easy for others to remember and use. Jane Doe might choose janedoe or janed (use of spaces and some special characters is not allowed). This user name becomes the first part of her email address.

If Jane Doe choose janedoe as her user name, then her email on the yahoo email host would be janedoe@yahoo.com I suggest you don't choose a silly user name, as no one will know who is sending the message. Someone might think a message from sillyme@waatzup.com is just junk mail (called SPAM) and quickly delete it without reading (opening) it.

More next issue.

Bruce {EVangel} Parmenter, EAA webmaster http://members.aol.com/brucedp

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.

New Member: ❑ Renewal: ❑ Country (if non-USA):_____ Date: _____

Name: _____ *email: _____

Mailing Street Address: _____ Home phone#: _____

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.

(fold back ward, this will protect your personal information, placing it on the inside)

Please Identify your primary areas of interest relating to the EAA (check as many as you wish):

❑ Hobby/Builder ❑ Professional (income) ❑ Competition (Rallies, Races, Records) ❑ Owner/Driver
❑ 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.

(fold the bottom half under. This will now be the front of the letter. Be sure to seal it with tape)

Return address

_____

_____

_____

membership@eaaev.org

1st Class Postage Here

Electric Auto Association
Membership Renewals
4189 Baker Ave.
Palo Alto, CA 94306-3908 USA

EAA Merchandise

The **Electric Auto Association** (EAA) is a nonprofit organization for the promotion of public awareness of Electric Vehicle use as a viable transportation option. All minor sales proceeds are used to cover the costs of our nonprofit efforts in this cause. Please show your support with your purchases for better, cleaner, quieter, and lower maintenance transportation.

Product	Description	Comments	Item#	Price
Licence Plate Holder	Black plastic frame, white lettering on visible green.	Allow 6 weeks.	LICPH1	$ 10.00
Licence Plate Holder	For motorcycles. Black or chrome metal.	Allow 6 weeks.	LICPH2	$ 14.00
Embroidered Patch	White, Sew-On.	Allow 3 weeks.	PATCH1	$ 6.50
Embroidered Patch	Green, Sew-On.		PATCH2	$ 6.50
Embrodered Hat	Adjustable fit.		CAP002	$ 15.00
"Electric Vehicle Parking Only" Sign	Metal sign, reflective white background with dark green lettering. Wall or pole mounting.	Like public no-parking sign quality.	PARK01	$ 25.00
EAA Key **Chain**	With LED light and "30 years 1967-1997".		KEY01	$ 2.50
Coffee Mug	Ceramic.		MUG03	$ 5.50
Insulated Car Coffee Mug	Plastic.		MUG02	$ 6.50
Embroidered Polo Shirt	Size: S,M,L,XL,XXL. Color: Forest, Teal, or Navy.	Allow 10 weeks.	SHIRT01	$ 40.00
EAA Jacket	Size: S,M,L,XL,XXL. Color: Blue or Black.	Allow 10 weeks.	JACKE1	$ 59.00
EAA Wind Breaker	Size: S,M,L,XL,XXL. Color: Blue or Black.	Allow 10 weeks.	WBREK1	$ 49.00
EAA Sweat Shirt	Size: S,M,L,XL,XXL. Color: Blue or Black.	Allow 10 weeks.	SWEAT1	$ 39.00
EAA ball-point pen	EAA ball-point pen with EAA.	Sold individually.	PEN01	$ 1.00
Car Window Shade	EAA Car Window Shade.		SS001	$ 8.00
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1999	Electrifying Times	Not available.	BG1999	NA
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1997	1997 EV Buyers Guide.		BG1997	$ 5.95
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