Electric Auto Association

CURRENT EVENTS

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Portland 'Clean Air Action Day'

By John Wayland, NEDRA & OEVA
(pictures by Alan Batie)

As many know, out here in the West this past week, we've had quite a heat wave...yeah, I know you Phoenix guys are falling out of your air-conditioned chairs LOL right now, but high 90 degree temps for days in a row plus 100 degrees posted in downtown Portland in the middle of July, is a heat wave around here! Medford Oregon hit 108! We do usually get high temps in 90-100 degree range for a few days in August, but July's a bit early for the Pacific NW area.

Anyway, as with the folks south of us in California, due to the heavy temperature inversion over the Portland metro area, we had a couple of 'Clean Air Action Days' posted where similar to California's 'Spare the Air' event, Oregon air quality management officials called for everyday folks (gasoholics) to not mow their lawns and drive as little as possible. The timing for the first of the two CAA days couldn't have been better, Thursday, July 11th, the OEVA EV meeting.

At the evening meeting, many of our members showed up in either their hybrid or EV...a few vehicles over the average amount we usually see. We had Gary Grunke's silver Prius (he also has a nice Chevy S10 EV), and Ken Brown's hot-looking red Insight in the hybrid camp, and representing EVs, we had Paul's tidy and clean blue Sparrow still adorned with red, white, and blue ribbons from his recent involvement in an area parade, my old but clean and straight '67 Datsun 168v minitruck EV 'Baby Blue' that now belongs to my friend John Tuss.

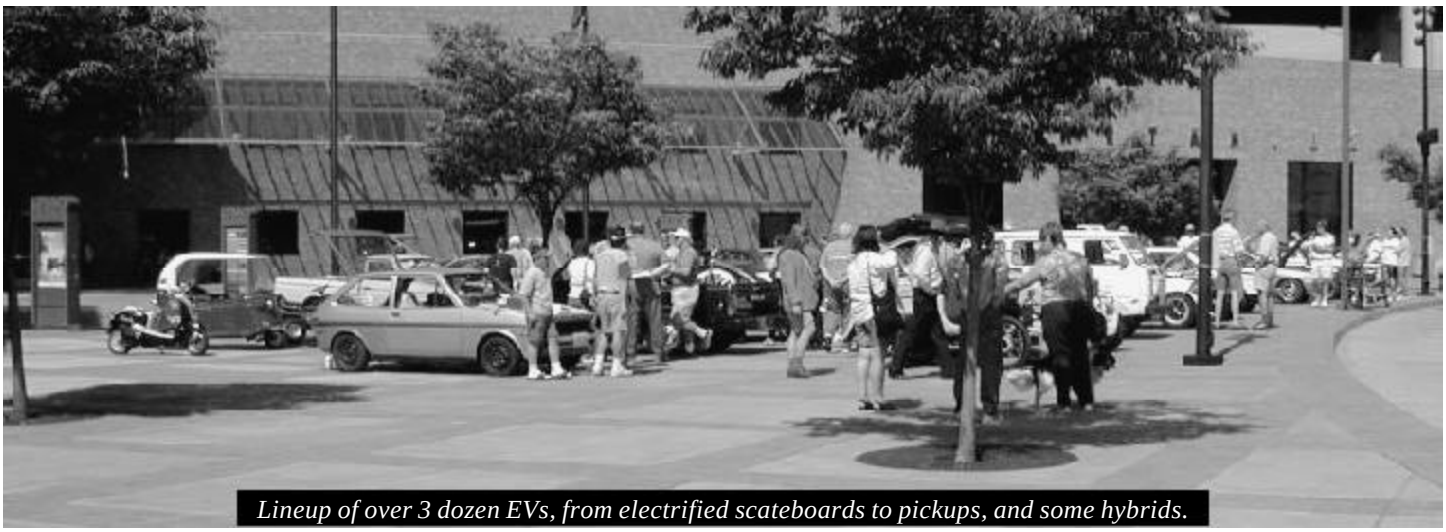
Victor Tikhonov's AC-powered CRX

We also had a latter model black 156v Datsun minitruck with a tilt bed that now belongs to Eric Johnson (who also owns a Prius), Ralph Merwin's immaculate Teal Green Geo Prism powered by NiCads (you have to see his workmanship to appreciate it)...Ralph also owns a Prius, Victor's high voltage AC-powered CRX, and I had driven my street legal 336v Datsun race car, 'White Zombie'.

Oh yeah, almost forgot...Bruce Meland was cruising around on an electric skateboard, too. It's safe to say, we had a large variety of vehicles, all of which were kind to the environment.

As I sat there taking it all in, it hit me, that it was just too good for a TV news station not

continued on page 4



Lineup of over 3 dozen EVs, from electrified scateboards to pickups, and some hybrids.

IN THIS ISSUE

COVER STORY

Photos by Alan Baties

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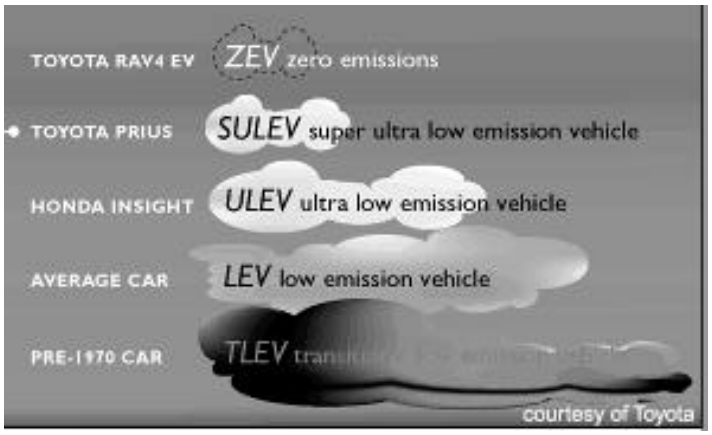
WHERE ARE WE GOING WITH OUR TRANSPORTATION?

All this hype about hybrids. As auto salespeople are trying to hawk the 2002 car models, the American public keeps getting a mixed message. EVs with their environmentally friendly zero-emissions, are virtually missing from the market. The only EV being sold as new today is the Toyota EV RAV4, with a high out-the-door price tag of about $45,000 and a nonstandard charging system, the small paddle Magnacharge Inductive system.



Next come the hybrids - Honda 2-seat Insight (3 years in the market place), Toyota 5-seat Prius (about 3 years in the market place) and Honda Civic Hybrid 5-seat (less than 1 year, midyear introduction). Only the first two have SULEV ratings. The HCH is only ULEV, exactly like it's all-gas twin, the Honda Civic sedan. So, for the consumer, the HCH lacks even environmental incentives - for typically $2,000-3,000 higher price one gets 25% better mpg performance but loses the practical folding rear seat and sunroof that come with the fully loaded Honda Civic EX. Where's the incentive for being green?

Most of the 4-door sedan market is priced $3,000-5,000 below the low emissions hybrids. And even Detroit is delaying on their release of new hybrids. Is the public really ready to pay for green? I don't think so, especially how the automotive industry is positioning these options.

For instance, how many consumers know that if you buy a 2002-2003 year hybrid you qualify for a $2,000 federal tax credit. This applies to all of the United States, not just California. But remember to do your math - this next maybe $500-700 reduction in your taxes, depending on your tax bracket. You don't get the full $2,000 off the price for buying green.

Also, in certain parts of California only (like San Francisco Bay Area, San Joaquin Valley and Riverside areas) there is a $1,000 cash-back to buyers of 2002-2003 year Honda hybrids at time of purchase. This little know perk is available through these area's Air Quality Management Districts, and only available if the Honda Hybrid is sold at or below MSRP. Some Honda Dealerships see the hybrid as a hot item and are selling them for over MSRP, which disqualifies the buyer from receiving this local rebate, being passed through Honda. Ok, but why isn't there a similar incentive through Toyota? Because Toyota decided not to participate in this program, although in many ways they are the clearer, more EV-like, vehicle.

What other alternatives are there today? Well, Honda sells a CNG (compressed natural gas) 4-door Civic, model GX, which qualifies as a near-ZEV car. Buyers receive $3,000 from California, similar to the $1,000 listed previously. Plus the $2,000 federal tax credit. And, when registered properly with the DMV, are allowed diamond lane access and free toll crossings during standard commute times, through the AB71 legislation passed two years ago. I don't know if Toyota is still selling their CNG Camrys, but Ford still has their Crown Victoria CNGs, many which are used in the taxi fleets.

For those looking for EVs (battery electric vehicles), the current market is mainly used small-scale productions, like Solectria Force, Corbin Sparrow, and 1980s electrics, or used conversions. Manufacturers are dragging their feet on the Ford City TH!NK, the Smart car and others. It's not so much that the common consumer cannot buy a new EV, it's that there's only one available - the EV RAV4 - and the pricing and charging are difficultdhurtles to accept. The NEVs have flopped, with even some companies trying to promote "21 mph" vehicles, which are just golf carts, as something people will drive on the city str'eets. Lets face it. Most Americans need a vehicle which goes at least 35-40 mph in order to use the downtown streets. Slow 25 mph NEVs on a 35 mph street are going to be backing traffic for blocks and giving EVs a bad reputation.

So, what can we do? We can talk up the viability of EVs to everyone we meet. We can continue to drive our old production and conversion EVs to show that it works. We can work collectively as individual taxpayers and voters to pressure the politicians and auto manufacturers to reduce or remove the roadblocks from EV production and distribution processes. We can make a difference, a little bit at a time. As the environment gets worse and gas prices go up (although politics and public opinion kept pricing artificially low), our positioning of EVs as the solution will attract more interest over time.

Do this, for our children's children, and the whole earth.

Ed Thorpe, CE Editor

continued from page 1

to cover, so I got on the cell phone and made the calls. It went like this:

News Channel..."KPTV Ch. 12 News desk."

Plasma Boy..."Hey, you know that clean air action day you guys have been reporting on? You know what? I and my friends treat 'every day' as if it were a clean air action day, that's why we all drive electric and hybrid cars. Instead of making it newsworthy to limit driving a polluting gas car, why not show folks a real alternative that has positive effects 'every' day? If you get down to 2 World Trade Center soon, you'll find both hybrids and pure electrics all gathered in one spot, at our monthly electric car club meeting, and their owners are all ready to tell you how they are putting their money where their mouth is, when it comes to 'really' being concerned about air pollution, OPEC dependence, and dwindling resources."

News Channel..."I couldn't agree with you more...could you hold on, please?"

To make a long story a bit shorter....Ch. 12 was way cool about this and sent a news crew and a remote broadcast van, complete with a tripod tower transmitter to the scene to do a live broadcast for their 10 o'clock news segment! For some reason, the crew could not get a good transmission angle from the 2 World Trade Center court yard, so they asked if we get take our EVs and hybrids a few blocks away to the Justice center parking lot...of course, we were happy to do so.

I had the Zombie's small racing battery pack (378 lbs.) fully charged up after its 9 mile trek to downtown from my house, and had an EV newbie in the car, because he knew exactly where we had to go and I did not. I eased the car ahead using the svelte control of the 'Zilla motor controller, and carefully rolled out of the courtyard and onto the street...I was driving like a grandma, and I imagine my passenger was a bit under whelmed with this sedate ride in my radical looking racer type EV.

We were at a weird intersection where a two-lane road changes from one way to two-way traffic, and I stabbed the throttle a bit as we needed to quickly merge into the flow. I really, honestly, did NOT floor it, because doing so on city streets causes immediate tire ignition of both rear meats and a decidedly sideways type of rapid acceleration, but I did punch it enough to bring up the motor amps to serious torque-producing levels...the car leaped ahead as it pushed us both back into the seats (after my recent recuperation from a bad accident, I'm sure my doctor would not approve of the head and neck trauma). My passenger was stunned, I think, with the way the car accelerated instantly, and in a half kidding manor, he complained of neck strain. For me, it was a fairly mild event, as the tires never spun once, but it did feel good nonetheless.

At the TV crew scene, we had all of the EVs and hybrids gathered together, and the reporter apologized in advance for the short time frame that would be their coverage. He did add though, that before they had arrived, he made a taped segment where he talked about the air pollution conditions and how some Oregonians were taking a 'different approach'. I was able to talk with him just before he went live on camera, and I used the phrase 'every day is a clean air action day, as far as all of us were concerned'. As I overheard his live TV bit, he actually used those exact words. After his part was done, he remembered that he had failed to mention OEVA's big EV show on August 3rd, so he called the station back and asked to have the news anchors say something about it at the broadcast's end. None of us, of course, got to see the news coverage since it was live, but I hope to see a video copy of it.

My longtime EV sidekick, Marko Mongillo (of 'Fiamp' fame) was EV-less for a while that night, since his electric Fiat's prototype group 31 Optimas had been beat up pretty bad the last three years or so. When he heard we had a TV crew on the way, and since John Tuss had made a quick stop by the meeting, Marko made arrangements with him to go back to the east side near my home, to John's place, and drive one of the two Datsun EV pickups back downtown (that would be Baby Blue). John Tuss had to get to bed early that night for his morning work shift, but kindly offered one of his EV pickups.

Anyway...after the TV thing, Marko wanted to drop back over to the 2 World Trade Center zone and to the nearby EV charging station, so he could top off the minitruck's batteries, as they did not get enough time on charge before the TV coverage event. I followed him over, and at the street-located charging stand, the two vintage Datsuns (a '67 and a '72) took on two different charges....the minitruck was charging up the traction pack, and the Zombie was having its under-hood 12v battery freshened up, as the race car has no on-board DC-DC converter, and instead, uses a Baby Optima 12 ahr battery to run everything. Knowing I would be running all of the car's normal race track stuff...contactors, relays, a cooling pump, etc., plus the headlights, sidelights and taillights, I wanted to make sure the little battery was at a full charge.

As we hung out together with the two EVs taking on juice for about 45 minutes or so, two fun things happened.

The first thing, was when a younger dude (anyone in their 30's falls into this category for me these days) came jogging by in the late night heat...it was about 11:15 or so). He was the kind of guy that 50-ish males want to hate...shirtless and wearing shorts, he was dripping wet with sweat and was built like Mr. perfect...not an ounce of body fat anywhere, and muscle definition I only dreamed about when I was his age, and try to ignore at my age. As he was coming up the sidewalk but still 30 feet or so away, I looked at Marko and sarcastically said, "That's what I look like when I take my shirt off"...this broke us both into hysterical laughter. The dude came pumping up, paused next to us, slightly leaning over to catch his breath, and sweating like an NBA pro, wiped himself down with a towel he had (where did that come from?). He turned out to be a very nice, polite guy, and it made me feel guilty for wanting to hate him :-)

He was very excited to see the two classic Datsuns together, and he excitedly began to talk in Datsuneese to both of us, complementing us on our cherry condition rides. He stopped raving about the Datsuns long enough to realize we had both of them plugged in! He went wild over the fact that they were both electrified! We first gave him the tour of the minitruck with its DCP T Rex controller, beefy group 31 Optimas, 4 ought power cables, and its clearly viewable 9 inch ADC motor under the hood. He was pretty

Rick & Bryan Woodbury's top-notch Tango CommuterCar

One of several E-traks electric mower / tractor (Tool Time envy)

Electric motorcycles in all sizes.

Even some go-carts. Electric can be used for any vehicle.

Eric Johnson's Datsun minitruck with tilt-bed.

Under the tilt-bed are the YT batteries and a new PFC-20 charger.

John Bryan's wonderful Karmann Ghia Conversion.

The unusual Bruce Meland's electric skateboard.

Marko Mongillo's 1959 Fiat 600 conversion, "Fiamp".

Mr. Sharkey's VW w/ biodiesel pusher trailer for range extension.

John Wayland's 336v Datsun "White Zombie" - ready to street race.

Gary Grunke's Prius, just like the Portland parking patrol officer's.

60's-70's circa Datsun savvy and quickly noticed the minitruck's Hella headlights and aircraft landing light high beams. He was blown away with truck's clean condition and 'mostly factory original' robin egg blue paint. Next up, he got quite an eyeful at the twin 8 inch motors under the hood of the Datsun 1200, and he was floored to hear of the 500+ ft. lbs. of torque stuffed into the tiny and light economy car, and its nearly 13 second flat 1/4 mile ET capability. Anyway, Aaron turned out to be a smart, nice fellow (but I still hated him). With a couple of firm handshakes, he jogged off deeper into the city.

Just when Marko had thought we had the 'when you hang out with Plasma Boy, you meet all sorts of interesting folks' EVent of the night, the second feature showed up, right on cue!

I had just unplugged my outboard Todd DC-DC converter from both the charging stand and the under-hood Anderson connector and had closed the Zombie's hood and had the car all buttoned up for the up-hill ride home, and Marko had also just disconnected and had put away his charging gear, when a snow white Toyota Prius hybrid car, obviously in its EV 'stealth mode' silently rolled up next to us, stopping right in her lane on the street...it had the 'City of Portland' logo all over it, and she was in uniform. Yup, Portland's parking patrol had stopped by to ticket us for having assumed gas cars in the EV charging spot, as she coldly asked,"You charging? This is only for electric cars!" .....

OK now..... anyone here on this EVDL, remember any of my older posts regarding Red Beastie?...does this sound like deja vu?

I instantly went into my sarcastic but friendly mode....

Plasma Boy..."Are you charging?.... Wait, don't answer that...you 'can't charge' that hybrid car, can you? Yeah, that's right, you're driving the car that Toyota brags, 'you never have to plug it in'. I guess that's why you're so concerned about this parking space...it's 'cause you can't use it...only real electric cars can!"

Of course, having had the tables suddenly turned against her and being bewildered that I even knew she was in a hybrid, she was instantly at a loss of words and her response was kind of like this....

Parking patrol officer..."Oh...uh, well uh....uh humm....look, you can't park here, it's a ticketable offense, can't you read the sign on that charging station?

Plasma Boy..."You mean 'this' charging station, the one I helped to make happen, the one I was involved with in countless Oregon Electric Vehicle Association meetings when we lobbied in favor of PGE putting it in? Oh sure, I'm well aware that only electric vehicles can park here 'while charging', and that's what we have been doing for the last hour or so.

Parking patrol officer..."You mean these ARE electric cars?"

Plasma Boy (still in full sarcasm mode)..."No, I mean one's an electric CAR and the other is an electric TRUCK."

Parking patrol officer (again sounding confused and befuddled, still holding what looked like a ticket book in her hands)..."Oh...uh humm....uh, well uh....you need to be charging while you are here."

About this time, Marko spoke up, and with a heavy variac charger dangling from one hand, and a charge cord in the other, he said, "Look, we just unplugged everything as you were pulling up...wanna feel this, it's still warm? (OK, I know that via the email thing that sounds kinky, but Marko was referring to John Tuss's AC power cord that seems to have a bad connection at the female end, and it had gotten hot enough to partially melt the plastic parts of it.) As Marko was on the defensive, I opened the Zombie's trunk and showed her the small Todd charger and the Anderson-to-Anderson charge cord. At this point, her sternness had started to turn into a more friendly look as she finally figured out we weren't lying to her. I let on to her that I really wasn't serious about some of my comments, and asked her if she wanted to see under the hoods of our EVs. She declined, but continued to stay seated in her Prius, still with its gas engine off.

We had a pretty nice chat, and she was amazed to hear about how many of our friends had, not only electrics, but either a Prius or an Insight as well. I started to answer all of her questions about the car she was in, and it further impressed her, that I knew far more about the car she regularly drives, than did she. When I asked how she liked it, she said, "Oh, it's pretty nice, but I feel safer in my SUV."....I about cried! I asked what she thought about the Clean Air Action Day and if she felt good about sitting there, not using any gas at all and not producing any pollution while in the electric mode, and about how it felt to be driving the world's cleanest running gasoline car.

Again, a moment of huge disappointment as she told us that she had no idea the car was cleaner than her SUV. She did report that the city's Priuses got in the low 40 mpg range in the city, and of course, I was happy to tell her that others got in 50 mpg range in the same driving conditions. I also told her how my Honda Insight gets in the mid to high 60's in congested city traffic, and even as high as in the low 90 mpg area while driving at 60 mph on level ground. I told her about the Prius, Insight, Honda Civic hybrid, and EV discussion lists on the internet, but it was pretty clear to me, that she most likely would never attempt to learn more about EVs or hybrids...and with that, she stepped down harder than she needed to on the accelerator pedal, evoking the gas engine when it wasn't even needed, and off she went into the night.

Marko and I just shook our heads over this public employee's near total lack of concern over air quality, and her lack of interest in either EVs or hybrids. We also started to laugh about how we were nearly ticketed for using the EV charging station exactly as it was intended; all because the parking patrol officer was clueless about EVs.

Oh well, Bruce P. and all of the rest of us devoted EVers and hybridders will keep on trying to change things by continuing to educate the clueless, one at a time if need be.

See Ya.....John Wayland
dat1200@europa.com

more pictures on the Portland EV event at http://alan.batie.org/photos/020803_oeva/

CONVERSION WORKSHOP, STEP 12
INSTALLING EV COMPONENTS - PART TWO

By Michael P. Brown, © 2002

In the last issue, we ended the article with the installation of the potbox. In this issue we will discuss installing the remaining EV components: the DC-DC converter, the circuit breaker, the power brake vacuum system, and the battery charger.

DC-DC Converter

The DC-DC converter is an electronic device that I like to call a beltless alternator. Its job is to keep the 12-volt battery (known as the auxiliary battery, which powers the vehicle's original electrical system) charged as the EV is driven. Using a DC-DC converter eliminates the need for a separate charger for this battery, and increases the usefulness and reliability of the conversion.

There have been DC-DC converters from computers and other electronics stationary applications that have been adapted to EV use with varying degrees of success. However, since they have their own heatsink and wiring requirements, I am not going to discuss them here. In general, it is better to use components that were designed for the rigors of an automotive application.

There are two primary companies, Sevcon and Curtis Instruments, which make DC-DC converters for electric vehicle use. They are built to take the bumps and vibration that occur in daily driving. The high voltage and low voltage sides are electrically isolated from each other, much like the controllers. Both manufacturers provide converters with input voltage requirements that are compatible to the popular battery pack voltages used in conversion EVs.

DC/DC Converter, draws 12v off pack.

Mounting either of these DC-DC converters is fairly easy. Since they don't require an additional heatsink, it is usually just a matter of drilling mounting holes in the body, or making the brackets to fasten it to the chassis.

It is best to locate the DC-DC converter as close as possible to the auxiliary battery to avoid long runs of wire carrying the high amperage output of the converter.

Circuit Breaker

Every electric vehicle should have a high current circuit breaker. A circuit breaker serves as a manual or automatic emergency disconnect that shuts down the electric drive system. This shut down is done automatically if the circuit breaker detects a high current draw that is above its rated capacity for a longer period of time than its built-in delay curve. The circuit breaker can also be opened manually if the driver suspects a problem with the EV. It can also be used as a safety disconnect when parts of the drive system are being worked on.

It is important that circuit breaker used is a DC circuit breaker. An AC circuit breaker is built with different performance characteristics and will not give you the kind of protection you need. It is also important that the current rating and delay curve profile match the duty cycle of the controller.

The circuit breaker can be installed between the battery pack most positive terminal and the main contactor, which opens the circuit between the battery pack and the rest of the drive system but leaves the battery pack series circuit intact. The other option is to install the breaker between two batteries, which breaks the battery pack's series circuit and de-energizes the whole drive system. In this option the circuit breaker is often installed between the front and rear battery packs.

For ease of manual operation, the circuit breaker should be mounted where the driver can reach it. This can be in or under the dashboard, in the center console, or on the kickpanel on the side of the driver's footwell in front of the door. Care must be taken to avoid any interference between the circuit breaker with its cables and any of the operating controls of the vehicle or the hands or feet of the driver.

Circuit Breaker, disables pack voltage.

Some converters consider any cables inside the passenger compartment a hazard to the driver and any passengers. I feel that if the cable routing is done correctly, only the positive leg of the circuit is in the passenger compartment, which presents no shock or fire hazard to anyone in the vehicle.

If there is no suitable place within the driver's reach in the passenger compartment, or you just don't want the circuit breaker and its cables in there with you, the breaker can be mounted in a remote location. Most of the remote mounted circuit breakers I have seen have been mounted in the former engine compartment. That location is good for both electrical and operational reasons.

From an electrical standpoint, the underhood area is where the main contactor and controller are, along with both output cables of the battery pack. This proximity makes for easy and efficient cable runs. The underhood location makes the breaker easy to reset if it opens automatically, or easy to manually open for safety when you want to work on the drive system.

Even though the circuit breaker is located under the hood or some other remote location, it is important that the driver be able to open it from the driver's seat in case of an emergency. A cable connecting the on/off lever of the breaker to a knob for the driver to pull in the passenger compartment usually accomplishes this.

If you are using a cable and knob to open the circuit breaker, there are some potential problems to watch out for. Most of the aftermarket cable and knob assemblies sold are meant to open and close things like a hand choke on the carburetor of a gas engine. This choke control assembly consists of a metal outer housing with a solid wire running through it. The solid wire gives the push/pull action necessary to open and close whatever is being controlled, and the friction between the wire and the housing lets the amount of opening to be set and held.

In an EV, this cable is only being used to pull open the circuit breaker, not to hold it at a partial open setting. The on/off lever should be attached to the cable in such a way that the combination of the rigid wire and its friction with the housing does not interfere with the movement of the on/off lever if the breaker detects a short and opens automatically. In other words, you want to be sure the cable will not hold the breaker closed if it needs to open by itself.

There are several ways to do this, but the principle is the same for all of them. The on/off lever is latched against a spring in the "on" position. The wire is loosely attached to the lever, and when the knob is pulled the wire only pulls the lever enough to overcome the latch. After the latch is released, the spring moves the lever to the "off" position with no further interference from the wire.

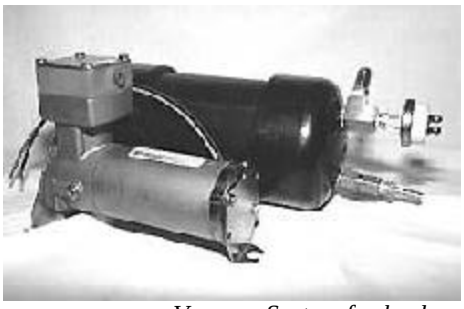
This limited contact between the lever and the wire does not allow resetting the breaker from the driver's seat. However, if the breaker opens automatically or you pull the knob to open it, you will want to open the hood to see what's wrong before resetting the breaker. The cable housing should also be positioned to have no contact with the on/off lever when it is in the "off" position.

Power Brake Vacuum System

Almost all cars and small trucks that are being converted at this time have power brakes. Since we no longer have the engine manifold vacuum that supplies the power for the power brakes, we have substituted a small electric vacuum pump that gets its power from the 12-volt auxiliary battery.

Some converters hook the pump directly to the brake booster and let it run whenever the ignition switch is on. I like to go a little further and add a few more parts. The first additional part is a vacuum reservoir, which stores enough vacuum for a couple of brake applications without the pump running. The reservoir gives me a place to install a vacuum switch, which turns the vacuum pump on when the vacuum in the reservoir falls below a preset limit and off when it reaches that level again. The switch and reservoir combination allows us to run the vacuum pump only when needed, which saves energy and cuts down on noise.

The vacuum pump and reservoir should be located as close as possible to the power brake booster to avoid long runs of the hoses



Vacuum System for brakes.

used to connect them to each other. The pump should be mounted on vibration suppressing rubber mounts, and be protected from road splash.

The reservoir I use is made of an 8" long piece of 4" diameter ABS plastic pipe and two 4" caps of the same material. One of the caps has two holes drilled and tapped to accept the ¼" pipe fittings that are the inlet and outlet for the vacuum. The reservoir can be mounted anywhere it will fit but try to avoid the long hose runs mentioned above.

One final word of caution regarding the hoses mentioned above. Be sure that the hoses you use to hook up the power brake system are the special type of hose manufactured for that application. Ordinary hose such as fuel line or heater hose will collapse if a vacuum is applied to it.

Charger

Since all of the modern 110-volt AC input onboard chargers come with detailed installation/operation manuals, about all I can talk about here is general location and wiring issues.

The physical location of the charger is defined by two criteria: where is the AC inlet or charging port going to be located on the car, and where will the charger fit in the vehicle?

The location of the charging port is often determined by where the EV will be charged most of the time. Several of the onboard chargers being used in conversions at this time specify a maximum extension cord length of twenty-five feet. Those twenty-five feet of cord includes the length of any cord used to connect the charging port to the charger.

If you are primarily charging in your own garage and can park the EV to put it in easy reach of an outlet or can install a dedicated charging outlet, where to place the charging port is up to you. Most converters, when given the choice choose the "traditional" location, which is where the gas cap was on the vehicle before it was converted.

Typical Charger, sized tor pack.

However, if your parking situation at home or at work limits your access to an electrical outlet, locating the charging port in the front of the vehicle or elsewhere might be necessary to keep the extension cord at or below the required length.

The installation of a modern charger is a matter of finding a place in the conversion that it fits in, building any brackets that might be needed, and mounting it. This process is made easier by the small size and low weight of the modern chargers.

When you are looking for places to install the charger, one thing to keep in mind is that the charger needs an adequate air supply for its cooling fan and a place for the air to go after it has cooled the charger's electronics. If the charger is installed in a sealed space such as the trunk, air intake and exhaust vents should be installed to insure that air supply. If the charger is installed under the hood it must be protected from rain and road splash.

Since we have already discussed the desirability of mounting the charger as close as possible to the charging port, the AC input wiring has been partially covered. The remaining point applies to both the AC input and the DC output wiring. The charger should not be hard wired into the EV. Trying to fasten the input and output wires to the terminal blocks of an already mounted charger is very difficult and could lead to an expensive mistake. Let's look at the safe, easy way to do it.

We will work on the AC input side first. Temporarily mount the charger in its location with enough fasteners to hold it in place. Next, identify an area close to the charger and mount a three-place terminal block. Cut a piece off of your twenty-five foot extension cord long enough to connect the charger to the terminal block. Remove the charger from the vehicle. Crimp suitable connectors on both ends of the piece of extension cord. With the charger on the bench, install the three wires from the cord into the charger according to the manufacturer's instructions.

Moving to the DC output side, cut two pieces of 10 gauge wire about three feet long, crimp suitable connectors on one end of each wire, and install them in the charger. The other ends of these wires will have one half of a quick-disconnect Anderson connector installed on them. The other half of the connector will be wired to the appropriate terminals of the battery pack later in the conversion process.

Note: depending on the brand, the charger might have either the AC input or DC output pre-wired.

When the time comes for the final installation of the charger, it's just a matter of a few nuts and bolts, connecting three wires to a terminal block, and snapping two halves of an Anderson connector together. Removing the charger for service is just as easy.

DFIOS

Automobile manufacturers pay a lot of attention to something they call DFMA, which means Design For Manufacturing and Assembly. It is your job as a converter to Design For Installation, Operation, and Serviceability.

Install the various components according to the manufacturers' instructions. At the same time, do the installation in a way that is as easy as possible to do, yet results in a clean, professional looking conversion. Pay close attention to anything the components require for safe reliable operation. Meet and if possible exceed those requirements.

Think about the serviceability of the components. If I put this component here, what will I have to do to remove it if it needs to be repaired or serviced? Make the potential failure items the easiest items to get to. Remember, you are building an EV that you (and possibly others) will have to live with. Make that life as easy and pleasant as you can.

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DUMP CHARGING TECHNIQUES

By John Wayland, NEDRA

Question: How do you dump charge 28 12V modules from 17? Are you dumping from 17 24V modules?

(Editor's note: Dump charging involves using one battery pack, to very quickly charge a vehicle's battery pack. Usually the pack supplying the charge is of larger capacity than the one in the vehicle. This way, when the dump pack equalizes with the vehicle's battery pack, the vehicle's pack will be full.)

The race car's 28 small Hawker 12V batteries are all wired in series with a big 'ol Kilovac Bubba contactor wired in series between two battery strings, each with 14 modules for 168 volts. The Kilovac contactor is mounted right in there with the batteries. When the car is in the off mode or when the rear exposed ON-OFF switch is turned OFF, the 336V battery pack is open circuited and split into two 168V packs. When the rear exposed ON-OFF switch is turned ON and the ignition switch is placed in the pre-charge or full on mode, the Bubba within the pack fires and connects the negative of one 168V pack with the positive of the other 168V pack, completing the circuit for the full 336 volts.

After making a 1/4-mile run, back in the pits, the car is turned off and the pack is once again automatically separated into two 168V packs. If the fuel filler door (where a 175 amp Anderson connector lurks) is opened with the ignition key, a pin switch closes and fires a pair of high current relays (only if there is no signal present from the main contactor being on).... one connects the positive from each 168V pack together, and the other connects the negative from each 168V pack together. This effectively parallels the two 168V packs and helps them equalize a bit after the heavy discharge from the run.

To dump charge, the fully charged pack of 17 Optimas (nominally at 204V) is connected via a contactor to the paralleled 168V pack in the racecar. The dump charge pack is kept on charge while I'm out racing, so it's really at about 255 volts when the dump charger contactor is first fired. After the 1/4-mile run, the race car's batteries are heavily discharged, and register at about 160V or so off load. The initial current flow is right at around 200 amps, with the Optimas sagging down while the Hawkers climb up, to where the voltage of both packs is the same at around 180 volts. After 3 minutes or so, the Hawkers are about 80% charged and have risen to 200 volts or so, and of course, the Optimas also are at that same level. The last 5 minutes of the dump charge, the current ramps down lower and lower to where it ends up at around 4-5 amps with both the Optimas and the Hawkers sitting at 210 volts. Right after the charge, when the racecar pack is reconfigured to series again, the fully charged pack settles down to around 380 volts.

I put a lot of thought into my dump charger. If I kept the racecar's pack at 336V all the time, I'd need 34 Optimas, or 1500 lbs. of batteries in the van! Using the method I use, the dump charge pack weight is halved to just 750 lbs. It also makes good sense to parallel the little 13.5 lb., 16 ahr Hawkers immediately following their 13+ seconds of torture down the track, as it brings up the lowest batteries right away. The paralleling of the two 168V packs also reduces the max current each battery can see during the initial high rate of current. There is an extra margin of safety in splitting up the high voltage pack, too.

Dump charging works well for me, especially when I bracket race and have to turn right around and go race again minutes after making a 1/4 mile run...it keeps the electric car competitive with the gas cars. When I raced in the Import Challenge last year, could you imagine telling the control tower the audience would have to wait a half hour while I tried to get my EV charged back up to race that gasser Civic?

Hope this helps explain things better.
See Ya.....John Wayland

RENT-A-GRIN: ONE WEEK IN AN EV-1

By Mike Hoskinson, VEVA member

A while ago there were posts on the EV List about Budget's EV rentals http://www.evrental.com/ available at several US destinations. I had a conference to attend in LA in mid-June and my wife Gisele wanted to spend a day or two in San Diego. So here was our chance to try an EV-1 before they were all crushed. On the evrental site, the EV-1 is listed as an "economy" car at $329 per week. Best $329 I EVer spent. Here are some notes from our trip.

Wednesday June 12. Arrived at Lax after a 3 1/2 hour flight from Edmonton. A good omen: all of our baggage made it. We went outside and flagged down a Budget shuttle. "Do you go to the electric car rental place?" "We don't have any cars." (Monty Python drives bus in LA?) "I reserved an electric car". "You have a reservation? Well, that's different. Hop in!"

The EV Grin

We approached the counter. "Don't know if we have one for you." "Well, that's what I reserved, eh?" "I'll have to call Greg. He's our EV specialist". Phone conversation with Greg ensues while I bite my nails, nightmare vision of a Grand Prix or a Lumina in my head. Maybe a free upgrade to a Lincoln Navigator! Finally, Greg appears. "Yes, we have one. (my heart soars like an eagle) You want it for a whole week? Most people take one for just a day or two." I assured him that one week is exactly how long I wanted to rent it. "That's the whole point of the holiday, and by the way is there any chance of getting a Gen II model, because I plan to drive to San Diego?" Sadly, there was only a Gen I, 80 mile range. I said no problem; we have to stop for lunch anyway. So it's off to the lot where the sleek little red missile sat, charged and ready to go. Our big rolling suitcase fit perfectly into the narrow forward extension of the trunk, other bags behind. There was enough room behind the seats for Gisele's backpack. Where the heck do they put the batteries? Greg explained about the push-on, push-off regen button on the console-mounted shifter (I wish my Insight had that) and the benefit of coasting. No key, just punch the code into the keypad and press 'run'.. Do this and a whole row of indicator lights come to life along the whole bottom edge of the windshield, the sort of thing you would expect to see in a sci-fi movie. This is sooo cooool, I say to myself. The digital dash boots up and settles into a display of range remaining, a fuel gauge in 12 bars of light, and an odometer/trip meter. The console is configurable in miles or kilometers; I decide to leave it in miles (I use km in Canada). Starting range: 65 miles, fully charged, according to the range meter. "Be careful steering when you give it full acceleration", says Greg. "One of our customers recently lost control and wiped out."

Finally we are off, a little cautiously at first, but when it came time to merge onto the freeway, man, we were there. The car makes a turbine-like whine when running, upward sliding frequency as the speed increases, a really fine down-frequency in regen, just light tire noise when coasting.

For the first 25 miles, the farther we went, the higher the remaining range indicator went. It went over 90 before it started to fall. I began to believe in perpetual motion. At Huntington Beach we had gone 35 miles and had 73 to go on the range meter, not bad considering that the range said 65 when we started. I call Greg to ask him 'what the heck?' He said to ignore the 73 and just look at the fuel gauge. Should get 5-7 miles per bar. So ok, we'll still stop at San Juan Capistrano for lunch and a charge. Not sure if we would make it to Oceanside with a comfortable reserve.

Greg had given us a book of directions to various charging stations, at least as far south as San Juan Capistrano. So we had good directions to the local Saturn dealer. This turned out to be about a 20-minute walk along a busy, noisy road back to the main shopping area. We did not actually make it that far but stopped at a strip mall along the way where we found a reasonable Italian restaurant. The watt fairy told us that our state of charge was 34%.

One hour 50 minutes after plugging in, we retrieved the car (87% SOC) and moved on, but not for long. About 10 minutes down the road, we ran into the mother of all traffic jams (caused, ironically, by a big spill from an accident involving a tanker truck). It took us 4 1/2 hours to get about 30 miles to Oceanside, most of that spent creeping at a couple of mph or just plain stopped for 20 minutes at a time. By the time we got to there, we were tired and hungry and the charge was down below 1/2, so we stopped there for food and electrons. No trouble finding the Saturn dealer there, though we missed the exit because we were in the wrong lane. They were just closing up, but were happy to direct us to the watt fairies and point us to the nearest restaurant, a short walk from there. 39% to 95% while we ate a leisurely dinner.

Budget's maps did not include San Diego. The closest charge station that we had looked up before the trip was just a couple of blocks away, but they wanted $20 per day for parking with no in-out privileges, so forget that. The hotel had an Internet terminal in the lobby, so we looked up alternatives at the EV-1 Club site. Found one at the County Admin building. There was free parking and a watt fairy right at the harbor. We took a harbor cruise, had a nice lunch and took a long walk. It was a nice day in a beautiful place.

Friday we went to Balboa Park. There was free parking and charge at the Auto Museum. Ours was the coolest car there; the only EV in the show was a 1930 Detroit Electric. 1930? Man those things had a long run. The one that the Vancouver EV club owns is 1912, if I remember correctly. High point of the week was just as we pulled up there to plug in, a passerby called out, "Hey, is that a Citroen?" The world is truly ready for my Electric D! Gotta get that puppy finished. Met an Electric Ranger the second time we charged there. The owner (whose name I forget now) spoke of his dream of battery filling stations where an automated mechanism would swap out your battery pack, charging you, so to speak, for the juice and the battery life used.

Women and Wheels. Gisele plugs in at the SD Automotive Museum.

- Balboa Park to Mission Viejo. Down to 8 miles range by the time we figured out that the directions in the book were wrong! Total 75 miles on that charge. Charged at Mission Hospital (parking $1 for 2 hours), next to a mall, where we shopped and had a nice dinner.

- Father's Day BBQ at our son's girlfriend's parent's place on a man-made lake at Yorba Linda. On one side of the house electric boats silently plied the waters; on the other side big gas-guzzling SUV's waited for the next chance to pollute. The little red EV-1 was the big hit of the party; EVerybody who wasn't drunk got a chance to take it for a spin around the block. Lots of EV grins, and maybe some converts. We had charged up in Newport Beach while we had lunch with our son, and we had just enough juice left to get back to LA that EVening.

There was no charging station at our motel in West Hollywood. I snoozed for an hour at a park about 2 miles away while the watt fairy pumped in a few jewels (sorry, joules) so there would be enough for a trip to LAX to pick up our oldest son. He had a conference to attend in Santa Barbara so he was coming down a few days early to spend some time with us. Turns out he took the city bus to our motel (our son is a very resourceful user of public transit), but at least we had some juice for the morning. This was the only inconvenient charging experience of the trip. The only other semi-inconvenient charge was a 45-minute top-up at the New Otani Hotel in downtown LA late one night, but hey, they waive the ($2 for each 20 minute) parking fee for electric vehicles for the first 2 hours of charging and I had a nice Japanese beer with friends while I waited. One day I took the EV-1 to my conference - parking


ICE's eye view of the EV-1

at the Convention Center was just $8 for the day and there was a convenient watt fairy in the indoor parking lot. Another night we charged at the Petersen Auto Museum while we attended a party there sponsored by Philips, who makes the gamma cameras we use in our nuclear medicine departments. The Auto Museum was OK; there were some mighty fine cars there, but no EV's at all. I gave rides around the block to my friends from Philips and some of my colleagues from other towns. The jaw-dropping acceleration was a big hit, to say the least.

All in all, it was a most memorable EV tourism experience. The EV-1 has awesome acceleration, and the 80-mile range was not that big a deal. We got to see a lot more of California than we would in a high range gas car. And somebody mistook it for a Citroen! Gotta get going on my conversion.

Renting an EV-1 at LAX couldn't be easier. Book on the web at http://www.evrental.com/ and then when you get to LAX flag down a Budget shuttle. I EVen got a 10% AAA discount.

Best sign seen:
"Long Beach, next 10 exits" (Hwy 405).
Most welcome sign:
"Electric Vehicle Charging Station Next Exit" at Costa Mesa.
Worst sign seen:
"We Certify Gross Polluters" at a shop on Beverly in LA.
EV's seen:
3 EV-1's, one at a watt fairy in Mission Viejo, 2 at a Saturn dealership; one Ranger EV in San Diego (the only one seen with a driver), several EV+ and Rav4 EV's parked at Newport Beach. One hybrid was seen, an Insight in the County Administration building in San Diego.

By Eric Ryan, Director, EV Challenge (www.evchallenge.org)

Chris and the Karmann Ghia on the inaugural run.

On the peaceful and bright summer morning of Monday, June 17th, a gregarious group of teenagers and I took our car out for its last spin as a gasoline vehicle. A beautifully restored 1965 VW Karmann Ghia convertible, the freshly-waxed pearl blue and shiny chrome car caught everybody's attention as we cruised down Main Street in our town of Chico in northern California. Little did the bystanders know that in a few hours the kids would be violently ripping the global warming soul out of this little gem.

Eleven days later, on Friday, June 29th, we repeated our trip. This time, however, gone were the fumes and noise of the air-cooled engine. In its place was an electric drive system that had 2 ½ times the horsepower and torque of its predecessor and infinitely less pollution. The VW is still air-cooled, albeit in a slightly different manner…

Background

As the director of the nonprofit EV Challenge educational program (www.evchallenge.org), I wanted to get my nearby schools interested in electric vehicle projects. Interestingly, I'm on the opposite coast from where all of the EV Challenge schools are located and none of my local schools have EV programs.

I knew that if I could show the schools a fast and attractive EV, interest would develop. The main obstacle? Cash.

I knocked on a few doors looking for help and eventually met Gail Williams, an air quality planner with the Butte County Air Quality Management District. As a driver of a state-owned Honda EV Plus and an active advocate for education, she was tremendously supportive of my idea and advised me of grant funding available through the Air District. Several months and a grant application later, my idea was funded and I was on my way.


Ed, Raul and Oya on the drill press.

The Plan

My original idea was to bring teachers and students together from several county schools and build a vehicle during the course of an entire school year. However, my EV Challenge work obligations precluded that from happening and the project got put on a back burner.

After nearly a year and the end of the grant cycle in sight, I was faced with requesting an extension on the funding or suck it up and take a two-week work vacation to get the vehicle built. Having led groups of teachers through one-week conversion workshops, I felt confident that two weeks was ample time.

However, I was unable to get any teachers to commit to two weeks during the summer and the only got six students to tackle the project – two middle school and four high school students. Six students. Two short weeks. One high-tech electric vehicle conversion project. Hmmm…

The Students

Although I have led teenage students through conversion projects before, I was used to working with dozens of students at a time – not six. Plus, the students that accepted the two-week challenge didn't have a lot of shop

experience. On paper, it was a recipe for disaster.

As it turned out, I was more than pleasantly surprised. These young people were awesome. Oya, our youngest student at 14 and only girl, was ready to tackle anything and learn everything. Chris, also 14, was a natural with his hands and was especially excited to participate because he was able to get summer school credit for participating in the project. Felipe, a high school junior, provided comic relief, keen intelligence and limitless energy. Our most electrically experienced student, Allen, provided excellent technical analysis of the battery box construction. And finally, there was Raul and Solomon, seniors that were simply looking for something cool to do during their summer. Luckily these two chose this project – their technical leadership was essential to the success of the conversion.

The group gelled beautifully and formed a fantastic team, working long hours in a hot shop setting. This became the easiest conversion I've ever worked with students on; the main physical help that I provided was in the process of installing the motor. The students did the rest and it was a joy to watch.

The Car

We wanted to select a vehicle that would catch people's attention, had readily available inexpensive parts, and was small enough to show-off the vehicle's acceleration and handling capabilities. And it had to be a convertible. Although we considered a Mazda Miata and a late model Ford Mustang, we chose a recently restored 1965 VW Karmann Ghia. As a restored vehicle, the students would bypass the cleaning and bodywork that accompanies most conversion projects and be able to concentrate on the mechanical and electrical work.

The following components were chosen:

8" Dual Shaft Advanced DC Motor (a 9-inch motor was considered, but the smaller motor provides ample torque and produces excellent RPM at the top end)
DC Power Raptor 1200 Controller
Hawker 42-AH Batteries
DC Power DC-DC Converter
Kilovac EV250-2A Main Contactor
Home-built Charger
1000-amp E-meter

In addition, a reinforced transmission, pressure plate, racing clutch, and axle assembly were installed that could handle the torque of the new motor.

The vehicle is currently running at 156-volts.

Solomon installing adaptor and flywheel

This has provided a top speed of over 90 mph and excellent acceleration. Although the range is small – about 25 miles around town – this hasn't been a problem in a town that is 10 miles at its widest.

The Final Result

After all of our wiring was complete, the car started up the first time we turned the key. We haven't had to rewire a single component in the month that we've been running the vehicle. It runs like a dream and is acquiring tremendous public attention.

Once again, I've seen how an electric vehicle project is the best educational experience around. The students have learned hands-on skills, applications of math and science, teamwork, how to speak with the public, and are now aware that they can get around in more sustainable ways. Perhaps this project will open the door to more local students learning about the benefits of electric transportation technology.

This article is a new feature called the "Education Corner." Information is geared toward those involved in EV education programs and is written and edited by Eric Ryan.

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

Felipe grinding a bracket.

Corbin Reflects on Poor Sales of Sparrow EV

Four years after the introduction of Corbin's three-wheel "Sparrow" electric vehicle, more than 200 of the 285 units sold have been recalled and complaints have been lodged against the Hollister, CA-based automaker by Sparrow dealerships, Corbin investors, automobile parts vendors and vehicle safety groups.

Industry observers said the Sparrow, touted initially as an environmentally friendly, traffic-reducing vehicle option, appears to have fallen short of its promise. Sparrow dealers have still not received vehicles they purchased last year, investors and parts vendors continue to seek payment and have taken Corbin to court on several occasions, and safety experts claim the Sparrow is susceptible to rolling over, as well as experiencing electrical problems during rainstorms and a malfunctioning direct current (DC) controller.

However, despite the litany of troubles facing the company, Corbin president Tom Corbin defended the vehicle. "The Sparrow is a 'proof of concept' vehicle, handmade," said Corbin. "The investors know that and the buyers know that. Like every small company, we had a brutal winter." Corbin said the company will fix all defective Sparrows and plans to introduce a new and improved Sparrow II. In addition, the company will soon unveil a hybrid electric Merlin Roadster that Corbin expects will help recoup some profits.

Th!nk Nordic Unveils New EV

Norwegian car manufacturer Th!nk Nordic recently announced plans to begin production of its new 2002 model year electric vehicles (EVs) in the third quarter of this year. Th!nk Nordic, a wholly-owned subsidiary of Ford Motor Company, said production of the new model is targeted at U.S. markets and will probably not be introduced elsewhere until 2003.

The company said it produced 1,006 models of its previous model, the Th!nk City EV, at its plant in Aurskog, Norway. The plant has now been overhauled to accommodate production of the new model. In Norway, EV drivers receive special privileges including free parking, free access to toll roads and exemption from annual road taxes, the company said.

Representative Jane Harman Touts Hybrid EVs

U.S. Representative Jane Harman (D-CA) recently expressed support for alternative technologies by highlighting EV Rentals' use of hybrid electric vehicles at Los Angeles International Airport (LAX).

"The debate on airport growth and its impact on surrounding communities and the environment is complex," said Harman. "We have to keep our regional economic engine — LAX — running strong. But the neighboring communities I represent cannot continue to bear an unfair share of the air pollution and other burdens that accompany this hub. One solution is the use of smarter, cleaner technology."

Under the Green Airport Initiative, Harman helped secure a $1.9-million grant to expand EV Rentals' business at LAX. The company will also receive a grant under the Transportation and Community and System Preservation Pilot Program, which it will use to purchase new hybrid electric vehicles from Toyota and Honda.

"While alternative energy technology is not a panacea, it can make LAX and airports nationwide more efficient and cleaner," said Harman. "EV Rentals is a perfect example. As more travelers turn to alternative vehicle rentals, the total tons of air pollution around LAX decreases. To date, [EV Rentals] estimates that their rentals have cut down on the release of 25 tons of air pollution at LAX."

DaimlerChrysler Scraps Hybrid Durango

DaimlerChrysler recently announced it has cancelled plans to market a hybrid-electric version of its Dodge Durango sport-utility vehicle (SUV). The company said that the hybrid Durango, which was designed to reduce emissions and fuel consumption, was scrapped because of low consumer interest and fears of poor demand.

The company said although the vehicle's performance was equivalent to that of a V8-equipped Durango, the hybrid drivetrain required a reduction in cargo capacity. Additionally, the company had planned on passing the additional cost of the hybrid drivetrain conversion to the consumer. However, the cost was so high that the company thought many traditional Durango customers would not be interested.

DaimlerChrysler said it still plans on developing and marketing hybrid electric drive systems for its vehicles, including the Chrysler Sebring sedan, Dodge Ram pickup and Jeep Liberty SUV. It is also developing fuel cell vehicles based on sodium borohydride technology. They hope to develop components that can be used in a variety of vehicle applications, as well as technologies that reduce the cost of advanced technology vehicles. (DETROIT NEWS: 5/17)

EVAA Announces Theme for 20th Symposium

The Electric Vehicle Association of the Americas (EVAA) recently announced the theme for the 20th Electric Vehicle Symposium (EVS) to be held November 15 to 19, 2003 in Long Beach, CA. The group said the title and theme of the upcoming conference, which gathers together members of the international battery, hybrid and fuel cell electric vehicle industry, is "EVS-20: Powering Sustainable Transportation."

"This year's theme...reflects the industry's current focus on defining and building the infrastructure that will be required to power battery, hybrid and fuel cell electric transportation options," said EVAA executive director Kateri Callahan. "[It also] emphasizes that electric transportation technologies represent a sustainable solution to providing the world clean and efficient mobility that can be powered by renewable energy sources."

According to Florida Power and Light

regional fleet manager and EVAA conferences committee co-chair Bob Schomber, the upcoming EVS also recognizes that the event will showcase more than simply passenger and light-duty vehicles."Electric transportation now comes in all shapes and sizes, one of which is likely to meet any transportation need that can be identified," said Schomber. "There are electric shuttle and transit buses, electric airport equipment, forklifts, bikes and scooters, and even electric snowmobiles and boats available in the market today."

Q4 Associates Examines Rental BEVs for Denver

Oakland, CA-based Q4 Associates has conducted a study examining the feasibility of building a battery electric vehicle (BEV) rental business in the city of Denver, CO's Union Station long-distance rail terminal. The station is currently being renovated into a "modern intermodal transit center" that will include bus and light-rail services, bicycle parking and other transportation services. The BEV rental business would provide short-term use of BEVs for residents of downtown Denver, individuals that use mass transit to commute downtown, local businesses and visitors who need temporary access to a vehicle. The Q4 study examined the potential market size for short-term car rental companies, identified interested vendors and predicted the environmental benefits of the BEV program, ultimately creating a list of 27 recommendations for the city.

The company also completed a financial analysis that determined that approximately 4,300 people would have to utilize a 200-vehicle fleet in order for vendors to achieve profitability within the first two years of operation. Q4 said much of the data used in the study was collected from focus groups involving residents of two Denver neighborhoods and an informal telephone survey of downtown businesses.

Q4 said Denver should place two BEV rental locations in the downtown area, including one at Union Station. Additionally, the report recommended that several BEV "pods" be located in five neighborhoods in the downtown area.

Q4 suggested that Denver only use "city class BEVs built by original equipment manufacturers" and place 240-volt conductive chargers at the stations and pods, with one charging port per car in the system. For the Union Station site, the report recommended implementing a 10-car system and siting another location nearby when "five or more subscribers within a couple of blocks of each other join the program."

In addition, the report said Denver should provide free BEV parking spots on streets, parking garages and areas that are too small for conventional parking spots. (THE CLEAN FUELS REPORT: JUNE 2002)

USPS Passes on Electric Postal Van Purchase

The U.S. Postal Service (USPS) recently decided not to exercise the option to purchase additional electric-powered postal vans manufactured by Ford Motor Company.

USPS received an initial delivery of 500 electric vans in 1999, with the option to purchase an additional 1,000 units. Ultimately, the agency hoped to create a fleet of 6,000 battery-powered postal vans for use on delivery routes across the country.

"We are not spending money on new capital projects," said a USPS spokesman. "In fact, we have had a freeze on them." The agency cited cost as its primary issue with the electric vans. Originally, USPS had said it would pay no more for electric vehicles — priced at $46,000 — than it had for its flexible fuel models, which were purchased for $22,868.

However, the agency moved forward with the purchase of the electric models after receiving additional funds from outside parties, including the state of California and the Department of Energy. The total package cost approximately $24 million, with USPS contributing about $12 million. The agency noted that no similar effort is underway for additional van purchases.

The electric vans, featuring a Ford Ranger EV electric drivetrain and Grumman aluminum bodies, were tested by researchers at Southern California Edison's (SCE) Electric Transportation Division. The tests used a dynamometer to determine that the vans met all USPS requirements, except range. The scientists reported that the electric vans averaged 31 miles per charge under "a tough postal cycle involving many starts and stops." However, researchers said the vans' performance should be adequate since most postal routes are only 15 miles long. (EV NEWS: JUNE 2002)

California Judge Delays Electric Vehicle Mandate

U.S. district judge Robert Coyle recently issued a preliminary injunction delaying the enforcement of California's zero-emission vehicle (ZEV) mandate until 2005. The ZEV rule, which was originally scheduled to take effect next year, requires automakers to include a certain percentage of ZEVs in their California fleets. The injunction request was filed by General Motors Corporation and DaimlerChrysler AG's Chrysler unit, the two companies that have filed a joint lawsuit against the California Air Resources Board (CARB) alleging the ZEV mandate is illegal because it seeks to regulate fuel economy, an authority reserved for the federal government.

GM officials said the injunction would delay the introduction of the program until 2005. However, officials with CARB argued that the judge's order still allows the program to begin next year, only now without a set of changes that CARB made last year to allow automakers to receive credits toward the mandate using hybrid electric vehicles and low-emission, gasoline-powered vehicles.

"The thing that's sort of odd about this is it appears the automakers have litigated against a rule that gave them more options and more flexibility," said CARB spokesman Richard Varenchik. "And now they're thrown back on a rule that gives them less options and less flexibility." (WALL STREET JOURNAL: 6/17)

Beijing to Introduce Replacement Electric Buses

According to Tsinghua University electric vehicle research division director Chen Shiquan, the municipal government of Beijing, China recently announced plans to replace approximately 800 to 1,000 conventionally fueled buses with electric vehicles by 2008, when the city is set to host the Olympic Games.

"Electric vehicles are one of the most feasible ways to meet the government's emission control target, especially when the quality improvement of Chinese gasoline and diesel products are discouraging at present," said Chen. Chen said the country also expects to introduce electric cars for use during the 2008 Games.

China has already committed to investing 880 million yuan renminbi (about $106 million) in electric vehicle development efforts, and the Ministry of Science and Technology has incorporated the introduction of electric vehicles into its scientific plan for the next few years.

Li Jian, director of the ministry's Department of High-Tech Development and Industrialization, said the government encourages all domestic companies to contribute to the development of electric vehicles and other environmentally friendly energy sources. Chen said Ford and Volkswagen have already expressed interest in working with Chinese companies on electric vehicle initiatives. (ASIA INTELLIGENCE WIRE: 6/19)

University of Wisconsin Team Wins FutureTruck Competition

Officials with the FutureTruck competition recently announced that a biodiesel-fueled hybrid electric 2002 Ford Explorer sport-utility vehicle (SUV) developed by a team of students at the University of Wisconsin-Madison (UW-Madison) finished first at the competition. The second place finisher was a reformulated gasoline-fueled hybrid electric SUV developed by the team from Michigan Technological University.

The FutureTruck competition challenges teams of students from North American universities to lower the emissions and increase the fuel economy of a conventionally fueled 2002 Ford Explorer SUV without sacrificing "safety, performance [or] comfort levels." Judging for the competition was held earlier this month at the Ford Proving Grounds in Yucca, AZ, and the California Motor Speedway in Fontana, CA. Teams competed in more than 10 events, including design evaluation, consumer acceptability and performance. "This was such a challenging endeavor to undertake, but it is rewarding to participate and receive recognition," said UW-Madison team advisor Glenn Bower. "We've worked hard, tackled obstacles and in the end we succeeded above and beyond our goals."

FutureTruck officials said the UW-Madison team reduced its greenhouse gas emissions index by 50 percent and increased the over-the-road fuel economy of the SUV by 45 percent using re-engineered components and advanced materials such as an aluminum and steel hybrid frame and a titanium exhaust system. "I congratulate all of the universities, team members, faculty and staff who embraced the FutureTruck challenge to

explore clean, fuel-efficient automotive technologies which help reduce petroleum usage and [carbon dioxide] emissions," said Department of Energy (DOE) assistant secretary of transportation technologies Tom Gross.

Tourists to Use Electric Buses at Ajanta Caves

Officials in Aurangabad, Maharashtra, India recently announced the completion of a new shopping center near the Ajanta caves that will ferry tourists to and from the site using battery-powered buses. The new shopping center is located approximately two kilometers from the base of the mountain where the caves are located.

"The area has been insulated from noise and all hustle-bustle so that people can spiritually regenerate themselves and connect with the message of serenity depicted in the paintings," said a local official.

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), the paintings and sculptures in the Ajanta caves date from the 2nd and 1st centuries B.C. The group said the cave monuments are considered "masterpieces of Buddhist religious art, [and] have had a considerable artistic influence." "Our aim is to synthesize tourism with culture, and [we] believe a culture hub like this should be created in every state for cultural regeneration of the country," said Aurangabad officials. (PRESS TRUST OF INDIA: 6/21)

Compact Power, Inc. Electric Racer 2 Sets New Record at Pikes Peak

Compact Power, Inc. (CPI) recently announced that its Electric Racer 2 (ER2) set a new record for electric vehicles (EVs) at last month's Pikes Peak International Hill Climb automobile and motorcycle race in Colorado's Rocky Mountains. According to CPI, the ER2 completed the 12.4-mile race in 15 minutes and 18.64 seconds, beating the previous EV record set by Honda's EV Plus in 1999.

The company said the ER2 employed a 11.5-kilowatt hour (kWh), lithium ion polymer (LiPB) battery pack that weighed half as much as the EV Plus' 29-kWh, nickel-metal hydride battery pack. CPI said it developed the ER2 with Seoul, Korea-based LG Chem.

"We raced to prove that our present development course is correct," said CPI president and CEO Dan Rivers. "Now we know that LiPB technology holds the future and we will accelerate our efforts to develop this technology. We plan to participate in this race again and hope to break the 10-minute barrier in the future." CPI said the ER2 will be on view at the 19th Electric Vehicle Symposium in Korea October 19 through 23 and at the Electric Vehicle Association of the Americas' Electric Transportation Industry Conference in Florida December 10 through 13.

Reva Electric Car Company Announces Plans to Increase Production

Last month, Bangalore, Karnataka-based Reva Electric Car Company (RECC) announced plans to roll out 1,500 to 2,000 vehicles by the end of the year. Currently, the company produces 60 electric vehicles (EV) per month, with plans to increase its production to 150 cars per month by September and between 250 and 300 EVs per month by 2003. RECC managing director Chetan Maini said the company's ultimate goal is to increase its production capacity from 5,000 vehicles per year to 12,000.

The company said its two-door, battery-powered hatchback EV is the result of six years of development. The EV weighs approximately 1,600 pounds and is able to travel between 40 and 50 miles on a single charge. The vehicle's batteries were developed in the U.S. by Exide and manufactured in India by Tudor India, an Exide subsidiary. Maini noted that while the Reva EV costs between $7,000 and $10,000, it is still less expensive than other small battery-powered vehicles, including Honda's City Pal and Ford's Th!nk line of EVs.

"India has an excellent opportunity of exploiting existing EV technology, which is most suitable to its current needs of city mobility," said Maini. "The government can play the role of a catalyst, integrating the efforts for the EV industry for the effective utilization of our resources. Industry and government can act together to create a leading, globally competitive, India-based EV industry."

eMotion EV Selected as Road Race Pace Car

Personal mobility systems developer eMotion Mobility recently announced that its electric vehicle (EV) has been selected to serve as the official pace car for the 2002 Peachtree Road Race in Atlanta, GA. The company said the annual, 10-kilometer race will help introduce the eMotion EV to an estimated 200,000 spectators and runners, providing a preview of the mobility service slated to debut in metro Atlanta next year.

"The Peachtree Road Race, with its focus on motion and mobility, affords the perfect opportunity to introduce eMotion's all-electric personal mobility service...which will enable metro residents to declare their independence from transportation tyranny," said eMotion president and CEO John Wilson.

The company said its eMotion EVs incorporate "state-of-the-art, intelligent vehicle" technology such as easy activation and entry using an electronic access key, computerized vehicle diagnostics, global positioning systems, Internet access and hands-free wireless communication. According to eMotion, the company's car-sharing system will provide instant access to a network of electric cars available throughout the city at all times on a per-trip basis. The company said users will be able to reserve EVs in advance and return them to any local mobility station, while corporations will have the option to participate in a fleet leasing program.

The company said that once operational, it anticipates the eMotion system will reduce daily vehicle miles traveled (VMT) by as many as 150,000 miles, eliminating more than 3.2 tons of pollution per day.

Carpinteria Buses Complete First Year in Service

Local officials in the city of Carpinteria, CA, recently announced that the city's seaside electric shuttle bus service logged 24,000 miles of revenue service in its first year of operation. The electric buses feature a 288-volt nickel-cadmium (Ni-Cd) battery pack manufactured by Saft and chassis and drive systems manufactured by Ebus.

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

With the exception of scheduled maintenance, the 22-passenger buses provided the SBMTD with "uninterrupted service...from the first day of delivery." Since the launch of the first electric bus in their fleet, SBMTD has added eight new Ebus vehicles to its fleet. "We were pleased to discover that these new shuttle buses from Ebus have had fewer manufacturing defects or warranty claims than our traditional diesel buses and have proven to be very reliable," said SBMTD maintenance director Ralph Brannan.

'Milkfloat' EVs Embarrass U.K. Police Officers

Police officers in London, England, recently complained that the new low-speed, electric-powered "milkfloats" used to patrol the city's Kew Gardens are humiliating, and have drawn "laughs and jeers" from both children and retirees.

The four-seater electric vehicles (EVs) are painted green with two blue lights and are able to reach speeds up to 10 miles per hour (mph). Although the EVs cost approximately 14,000 pounds (about $21,000) each, members of the Royal Botanic Gardens Constabulary said the vehicles have made them a "laughing stock." "While taking out the vehicle for a test drive, everyone from garden staff to schoolchildren... started laughing and jeering when they saw us in it," said one officer. "Despondence, disillusionment and ridicule are just some of the feelings officers get with regard to this vehicle."

Officials with the gardens said the EVs were selected because they fit with the areas "tranquil setting" and presented the "right environmental and safety messages" to visitors. "Our police don't need to get across the gardens at incredible speeds," said a Kew spokeswoman. "Vehicles are only allowed into the garden through the gates and we have a 10-mph speed limit."

An official with the union representing the garden's 15 police officers said there are "concerns about whether the vehicle is suitable for the work that the constabulary does." (WESTERN DAILY PRESS: 7/22)

EV Monster Mash

By Lee Hart, EAA Member

I was working in the lab, late one night
When my eyes beheld an eerie sight
I got in my car, to go out for a bite
But I turned the key, and to my delight

Refrain
(It's an EV)... It's now my new EV
(It's an EV)... It runs electrically
(It's an EV)... It's now pollution free
(It's an EV)... They'll sell no gas to me!

Once it was a Rabbit, old and grey
But my trusty tools stripped its engine bay
In its place, I installed a big ADC
>From a Ebay bargain Igor happened to see

refrain

When the batteries died, I just used my head
They say I'm good at bringing life to the dead
And now I can charge as fast as I like
By arranging an appropriate lightning strike

refrain

Out from the crypt Drac's voice did ring
Seems he'd discovered some little thing
He'd picked up a cell, and took a big bite
And said, "You know, blood's an electrolyte!"

refrain

The time slips hidden underneath the seat
Tell me Igor's racing when the dragsters meet
Igor, if you want to win that dare
Let's add the knife switch from our electric chair

refrain

I can't tell you how much joy I've got
Scaring people to death in the parking lot
So, if you want to transform your car, too
Call your EV vendor and say, "Boris sent you"

Happy Halloween!

Electric Pickup (EV GRIN)
By Steve Clun, EAA Member

I've been pulling a 1,600 lb. trailer everyday for the last 8 behind a 1983 Ford Ranger work truck, with 50,000 all-electric EV miles.

Pulling this heavy trailer only cuts 10 mph off the top speed. Typically, I drive 35 mph with the trailer using the same amps as 45 mph without the trailer (trailer with a lawn mower is 5,800 lbs total weight). This really drives home the point about EV's to people who see me on the road.

Recently I towed home a fellow lawn man with his truck and trailer. To say the least, he was impressed, that my pickup could tow such a load AND with only electric power.

I have "Electric Powered" written on the side of the truck. Many people tell me that they didn't know it was electric powered, thinking it was the name of my Lawn service! That's how hard it is for some people to think "EV".

Stats

Location:
Fort Pierce, Florida
Contact:
1sclun@msn.com
Webpage: http://www.grassrootsev.com
Base Vehicle:
1983 Ford Ranger
Motor: 11" Kostof
Drivetrain: 4 speed
Controller: Zapi H2
Batteries: 20 - 6 Volt golf cart = 120V
Top Speed: 65 mph
Range: 70 miles at 30 mph
Seating Capacity:
2 adults
Curb Weight:
3600 lbs.

By Bob Rice, NEEAA Chapter

Back home in CT after the Power of DC EVent at Woodburn (East), or Mason-Dixon Dragway. I had a great time, as usual, and meeting up with more List-ers in person makes the ten-hour trek all worth it.

We, the New England EAA Chapter, Tony Ascrizzi, Brian Metheny, and Ric Morgan-O'Connor, made the trip down starting out of Worchester, MA at 5 am or so. Ric and Brian were putting the finishing touches on the new repowered MR-2 of Jason Hills fame, for it's race date, repowered with new old-stock 12-volt Varla Gel cell-go 27-UPS-type batteries for180 volts or so. Last minute problems with the @#$%^ hydraulic clutch, Brian figured that the position of the coupling on the motor shaft was just a tad too far back for the throw out lever to be able to do it's throw out thing, so, no clutch. And, of course, no time, as it was Race day, already. Hmmm, just like Out West!

Also no real time to break in the batteries. Gotta go! They swang down through CT and I came about later that midday, at Clinton, sorta along their way. Of course we hit all the NY suburban, subhuman traffic at Prime Time, one and a half hours to go 15 miles to the Tappan Zee bridge. Any of you that know the NYC area KNOW that it is ENDless construction zones, have been for the last 50 years. It was easier to endure aboard Ric's spiffy, comfortable Motor Home, that towed the MR2 effortlessly, while we could fix snacks and meals on the fly, use the head, or just wander around, like on the train. Remarkably easy to pilot, hafta remember to steer, unlike my trains, though<G>! Can't make U-turns like a Rabbit, I found, embarrassingly quickly when I thought I could just turn around over there!

Pulled into Hagerstown, the dragway, about 10:30pm, put the rig in Park, crashed for the nite. The DC guys showed up that morning. cars in hand, and the fun begins. It was a pleasure to see the guys from last year as well as from last month's Tour de Sol. The EAA DC chapter has its act together in getting all of this organized, and making it happen. This is no small task - details, details. But it was in place and working smoothly. A big diesel genny provided lavish amounts of charging current we spotted allowed us to move the Motor Home in sorta the center of things, rolled out the awning, and deck chairs to try to create an EVoasis in the blazing sun. Yeah! it was HOT, but no rain on our parade, like last year. Cold drinks in the fridge, and a bit of shade. Next year were gunna bring the TV vcr combo and run John Bryan's Woodburn tapes. This would blow away the Eastern Crowd, as they have no IDEA, and words just can't describe the burnoff contests and White Zombie, Goldie and Others Out There. Most Easterners are clueless, but we're working on it. We have a list of must doos for next year<G>!

One thing missing, but almost made it, was Bad Amplitude, of Netgain fame. Motor wasn't ready. Hmmm, sound familiar? Gees, maybe we EVers should schedule a race than move it back a few weeks, at the last second, then EVerybody would be ready, Right? Amplitude made it last year, turned a lotta heads.Big time!

On the other end of the spectrum, I actually DROVE a couple of runs. Charlie Garlow let me run his Chevy S-10 a few trips. Never drove in a drag race on a strip im my life! When do ya go, when the lights get to green? Hell, the HS guys I was running against were GONE by then. Like second and a half reaction time?! OK on the RR, after the conductor sez "OK to GO", but never do. On Race day, it's another story<G>! Got my butt kicked on THAT one, got her up to 64 mph in the quarter, I can hear you West Coasters snickering. I know, but it's a lotta fun. Don't do much with a factory S-10, just floor it and aim. It's silky smooth acceleration gives ya an EV grin every time. second run got the reaction time down to half a second or so, as I got the light thing down a bit better. Never too old, 61, to start racing<G>! Hmmm, with that gift-horse 2-door Rabbit stripped out, 300 volts or so of Hawkers, or, cheaper yet those UPS batteries (I've got a pallet full still), a rear axle direct-drive with that old EFP Baker 11 motor I have lurking in the cellar, a 1200-amp Rapture, and I'm off to the races. Got me thinking. The" Grey GHOst"?? Based on White Zombie designs. Could I get a Rabbit as light as a Datsun? Don't think it would be that great as a front-wheel drive as a drag car, but ya shoulda seen Bob Salem's Rabbit pickup GO with a Kostov squeezed onto the Rabbit tranny and only <G> 240 volts of Hawkers. The whole pack weighs less than I do, fits in its entirety in the front, two neat lines of cells, fitting in beautifully, and the most gorgeous buss bar hookup anywhere. He puts the hammer down, and it GOES! A

Race results and records can be found at http://www.powerofdc.com/pdc_results.html

Shenandoah Valley's Datsun 240Z vs Devin Battley's Sparrow.

nice bit of tire ignition sequence off the line! Gees, what if he filled up the glove box and a few other nooks and crannies with a buncha MORE batteries? Say, toward Waylandsque voltages? Got me thinkin' with the Rabbit above.

Meanwhile, back at the races; With no clutch, Brian couldn't speed shift, but crash it into higher gears as he got going. The grind audible as he went down the strip. Starting out in third, and trying for something faster as he got going. He did in the respectable 70's, damn good, all things considered. The batteries weren't broken in, ether. As he ran repeatedly, they started "warming up" a bit.

Off Topic, on topic. Especially you newbees: listen up! Ya gotta break in batteries VERY carefully. Tony walked the gig with me with my new T-145's, very short, light amp trips, charging careful between, no deep cycles for dozens of charge-run cycles, no overcharging. The batteries will reward and thank you, with lavish amounts of current, and range in gratitude. I feel like I'm hooked up to Niagara Falls, now, do my 60 mile RT to work, and have plenty of juice left. Of course, it has been too damn hot here anyhow. Talk to me when it's 15 degrees out this winter<G>! Think nothing of a 65 mile RT to a parts house I trade with for Gas Rig parts. Roll UP the driveway, Duz ANYBODY wth an EV live at the BOTTOM of a hill? With 120 plus volts left. Yeah, I know insulated battery boxes is the way to go, but the batteries would be smokin' in this 90 degrees stuff. Been like Florida or Taiwan lately, both places I've spent summers in.

Meanwile, back at the Races. Of course we didn't have the Track all to ourselves. EV's just sorta ran when they felt like it, mixed in with the gas stuff. Hell ! It's fun watching the ICE stuff run, too. Some of the wheelie like launches, of the mighty American., hear my flag waving? Thundering V-8's Nothing like it in the world! In audio contrast to the tricked out Hondas, 4 bangers. When in jest, swatted my arms and sed;" Geees! Sure alota mosquitoes 'round here!" EVerybody knew what I meant.

The day moved on, EVerybody was just having FUN. Hey! That's where it's at for me. Of course, the awards, then pack it up and head over to the Ledo's Pizza Place in Hagerstown, the strange looks as we were led into the back room to continue the races over good food and drink. Time to hit the road came all too soon. Amid "See ya next year" we got going about 9pm for home. Driving through the night and hitting the NY sub-human area at about 3am, we just breezed through, HOURS less time than the flight down. Dropped off at CT about 5am, Brian and Ric took a break at my commuter lot at Clinton, quiet, off the road took a nap. Home again, a little sleep before racing my OTHER electric :Amtrak's train 165 that afternoon.

If more people knew how much fun it is to be in the EV "IN" crowd, we would get many new "members" in our fraternity. IMHO. We hafta soldier on, have fun, and show the World that EV's are fun and practical.

Same thought frame, howz about Woodburn, a month away? Whose going? Good turnout? We hafta start talking about it pretty soon. Not work on cars yet, not until the last day<G>!

Bottom line, at last! Thanks to the EAADC guys, BIG thanks for making it happen, again. Had a great time. If ya live in this area, the East., plan on next year, bring a car, or bring yourself, but BE THERE. You'll have fun, and learn more, about our unique interest.

See ya'
Bob *bobrice@snet.net*

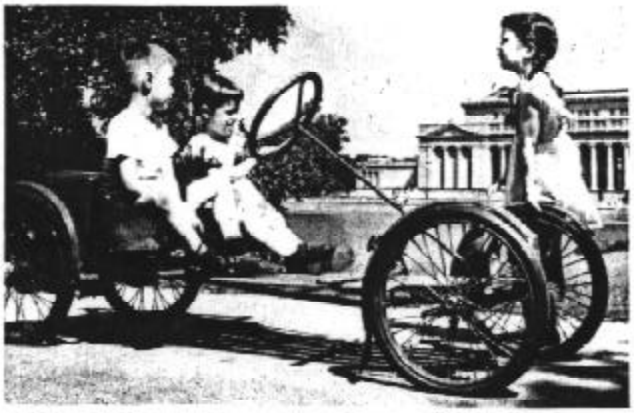
Charlie Garlow's Chevy S-10 vs. Chip Gribben's Ford Escort.

Eric Miller's "Arizona Jack Rabbit" Jr. Dragster 10.48 sec 1/8 mile.

The Restored and the Restorer

More beautiful examples of the restorer's art from the Chicago Museum: (*A*) a 1915 Electric Buckboard using bicycle wheels and designed primarily for children's use, although some were used by adults; (*B*) a 1913 Chicago Electric alongside a 1902 miniature electric runabout; (*C*) a 1910 McIntyre in the first stages of restoration; (*D*) a 1906 White Steamer being restored; (*E*) an 1893 French De Dion Bouton three-wheel steam car; (*F*) Maj. Lennox R. Lohr beside some of his collection—left to right, a 1911 Stoddard-Dayton, a 1913 Chicago Electric, a 1910 Milburn Electric, a 1910 Sears, and a 1900 Locomobile Steamer.

A



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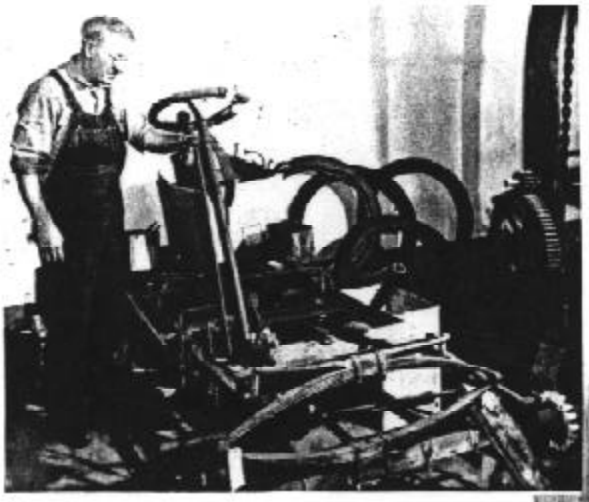

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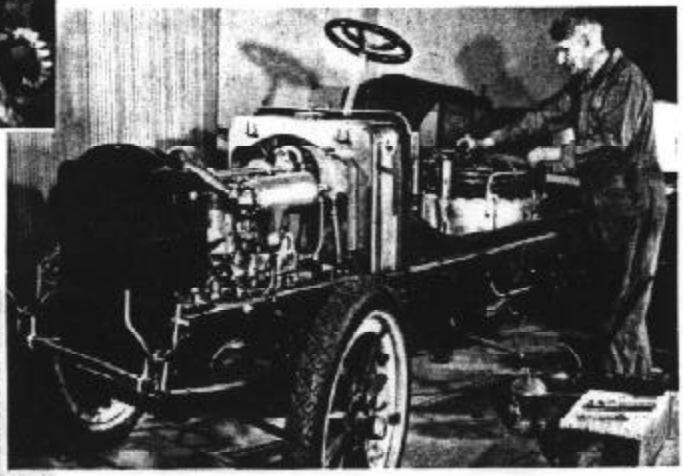

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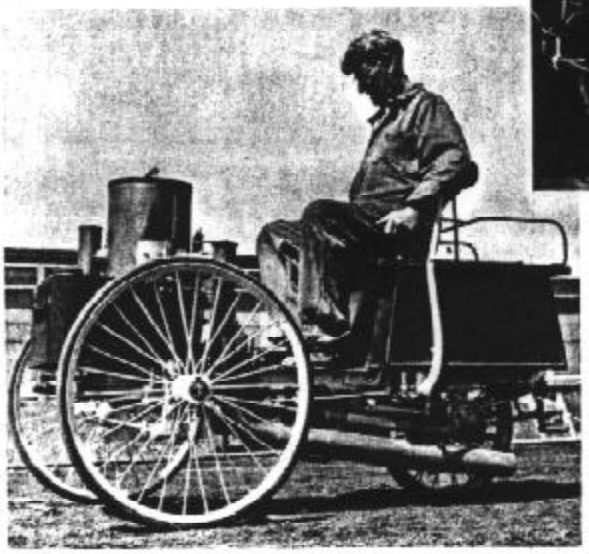

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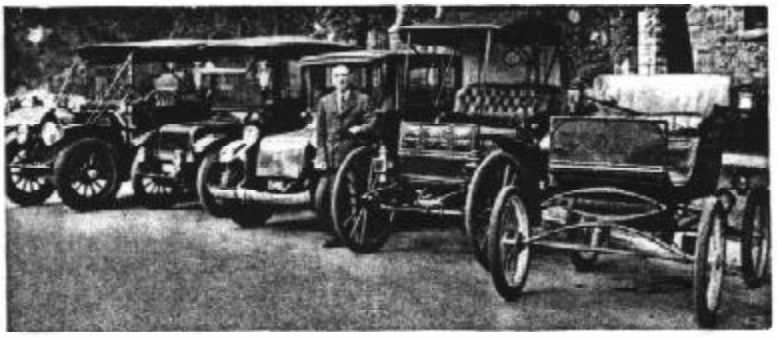


Nominations For The EAA Keith Crock and Fellow Awards

By Terry Wilson, EAA Historian

The EAA would like to receive nominations for our EAA Fellow Award and Keith Crock Awards. These awards will be presented at the 2003 Annual EAA meeting in February next year.

The Fellow Award is made to individuals for outstanding activities in areas relating to support of the EAA, advancing the cause of electric vehicles, or other activities of benefit to the EV industry.

The Keith Crock Award can be given to an individual, a group, a company, or other organization. This award is given for technical excellence and can be in the form of a vehicle, component, a drive system, supporting infrastructure, etc.

We ask that anyone wishing to make a nomination, submit in any form they chose, all pertinent information such as nominee's:
- full name
- email address
- phone number
- PO mailing address
- which award (Fellow or Keith Crock)
- a detailed description of their EV activities and accomplishments.

Please provide photos or images in jpg format if possible. Submissions will also be considered for profile in CE, and in our historical records. As part of EAA policy, personal addresses and phone numbers will not be given out, without the nominee's permission.

Please send your nomination by **Nov.1 2002** to: Terry Wilson
20157 Las Ondas Way
Cupertino,CA. 95014-3132
eaahistorian@care2.com
408-446-9357

Recipients of past awards
Fellow Award (most resent):
'02 Stan Skokan
'02 Anna Cornell
'02 Ed Thorpe

Keith Crock (last 5):
'93 Paul Brasch
'94 Ed Rannberg
'95 Bob Schneeveis
'96 Jim Worden
'97 Lloyd Healey

Keith Crock was an EAA Member who passed away in 1982. Keith developed a diode based speed controller that he used and which he extensively and meticulously tested. From EAA News July 1982 (EAA News was the original name for CE), titled "We Have Lost a Champion", by Bill Williams.

For those of you not yet aware, we are grieved to announce that Keith Crock passed away from a heart attack on March 29, 1982. Keith had been a very active member of the EAA since 1975, when he performed his conversion of a Nash Metropolitan. A veteran of seven consecutive Annual EAA Rallies, his "Metro" was widely recognized as being "one of the best," having received several endurance awards as well as Most Beautiful Electric. Besides serving one term as President and one as Educational Vice President of the Santa Clara Chapter, Keith frequently spoke out for The Electric Vehicle cause to California Legislatures, Public Utility Commission, radio and television stations. Keith was always willing to "take time off from his daily Ford Aerospace job" to display his car to the public in order to further the cause of Electric Vehicles.

First EAA Rally in 1967, picture by Bob Wing

EAA Board Elections & Request for Candidates

By Bill Carroll, EAA Elections

Elections... something that is with us always. Each year it seems that there is an election held for our national board. This is easily explained... Our national board is set up so that there will always be a cadre of people who know what is in the works for our organization. Each seat on the board is for a three-year term and the terms are staggered meaning that at least one but no more than three seats are up for election at any one time.

This year there are three seats open, two three-year terms and one two-year term, so that the next thing for the membership to do is come up with some candidate nominations. Let me point out something that has bothered me in the past, "it seems that board members were elected because they had much experience in electric cars", owning an electric car is not a requirement to serve on the board. What is needed is willingness to serve. There are many jobs to be filled by board members, and delegates alike. That is something else we still need: delegates from the chapters. At the present time we have 1 (one); we need more. Being a delegate will ensure that your chapter will be in on the know of what is happening nationally.

My request is for candidates' statements are due by **October 1, 2002**, to include in the next issue of CE, so the membership will know a bit about the people who are willing to serve on the board.

Candidates can send the EAA Statement using e-mail to our Election Committee Chairman:
Bill Carroll
<billcarroll@eaaev.org>
or Membership Chairman:
Will Beckett
<membership@eaaev.org>
or snail-mail to:
W. D. Carroll
160 Ramona Ave.
So. San Francisco, CA 94080.

Election Committee, Chair
Bill Carroll
electionadmin@eaaev.org

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, Vancouver, BC V6B3Y4, Canada
Meetings: 3rd Wed./month, 7:30 pm
Location: 3750 Kitchener St., BC Transit Operator's Lounge

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://geocities.com/ebeaa/
Contact: Ed Thorpe, 1-510-864-0662, eaa-contact@excite.com
Mailing: 2 Smith Ct., Alameda, CA 94502-7786, USA
Meetings: 4th Sat./month, 10:00 am.
Location: Alameda First Baptist Church, 1515 Santa Clara Ave, Alameda, CA

LOS ANGELES EAA

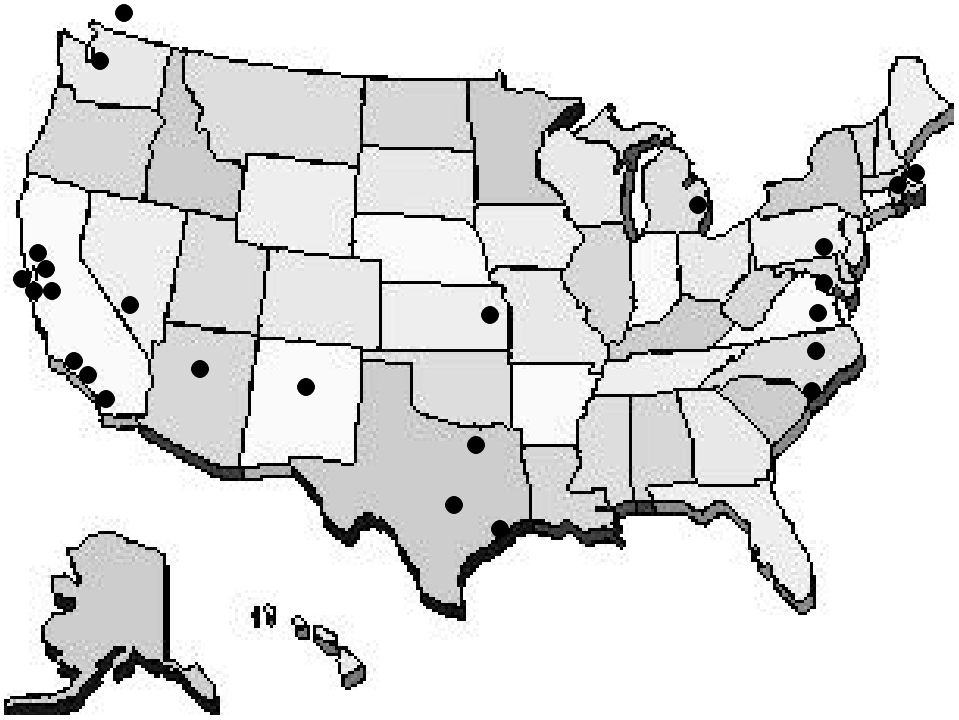
Contact: Louis Weiss, 1-323-935-2690
Mailing: 1811 Hi Point St., Los Angeles, 90035-4621, USA
Meetings: 1st Sat./month, 10:00 am
Location: 1200 E. California Blvd, Pasadena, CA

NORTH BAY EAA

Web Site: http://geocities.com/nbeaa/
Contact: Dr. Nick Carter, 1-707-573 9361, nick@npcimaging.com
Mailing: 3000 Cleveland Avenue, Suite 209, Santa Rosa CA 95403-2117, USA
Meetings: 2nd 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, SD



SAN FRANCISCO PENINSULA EAA

Web Site: http://geocities.com/sfpeaa/
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, 1-408-997-2404
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, will@becketts.ws
Mailing: 4189 Baker Ave., Palo Alto, CA 94306-3908, USA
Meetings: 3rd Sat./month, 10:00 am
Location: Hewlett-Packard Corp., Lobby A Auditorium, 3000 Hanover St., Palo Alto, CA

VENTURA COUNTY EAA

Web Site: http://geocities.com/vceaa/
Contact: Bruce Trucker, 805-495-1026, tuckerb2@adelphia.net
Mailing: 283 Bethany Court, Thousand Oaks, CA 91360-2013 ,USA
Meetings: Call or email for location and meeting schedule

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, eaa@maeaa.org
Mailing: 34 Paine Street, Worcester, MA 01605-3315, USA
Meetings: 2nd Sat./month, 2:00 pm
Location: Call or email for meeting location.

PIONEER VALLEY EAA

Web Site: http://geocities.com/pveaa/
Contact: Karen Jones, 1-413-367-9585, pveaa@hotmail.com
Mailing: P.O. Box 153, Amherst, MA 01004-0153 USA
Meetings: 3rd Sat./month, 2:00 pm
Location: Jones Library, 43 Amity Street, Amhurst, MA.

MICHIGAN

DMC-EAA DETROIT MOTORCITY CHAPTER

Web Site: http://geocities.com/detroit_eaa/
Contact: Richard Sands, 1-734-281-4087, rsands01@comcast.net
Mailing: 13162 Fordline St, Southgate, MI

48195-2435, USA
Meetings: Call or email for location and meeting schedule.

NEVADA

LAS VEGAS EVA
Web Site: http://geocities.com/lveva/
Contact: William Kuehl, 1-702-645-2132, bill2k2000@yahoo.com
Mailing: 4504 W. Alexander Rd., N. Las Vegas, NV 89115-2489, USA
Meetings: 2nd Sat./month, 10:00 am
Location: Clark County Library, 1401 E. Flamingo Rd, Las Vegas, NV

NEW MEXICO

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

NORTH CAROLINA

EAA OF COASTAL CAROLINAS
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.

PENNSYLVANIA

EASTERN ELECTRIC VEHICLE CLUB
Web Site: http://members.aol.com/easternev/
Contact: Peter Cleaveland, 1-610-828-7630, easternev@aol.com
Mailing: P.O. Box 717, Valley Forge, PA, 19482-0717
Meetings: 2nd Wed./month, 7:00 pm
Location: Plymouth Whitemarsh High, 201 E Germantown Pike, Plymouth, PA

TEXAS

AUSTIN AREA EAA
Web Site: http://www.austinev.org/
Contact: Aaron Choate, 1-512-453-2890, info@austinev.org
Mailing: PO Box 49153, Austin, TX 78765, USA
Meetings: Call or email for location and meeting schedule.

HOUSTON EAA
Web Site: http://www.bwsoft.com/eaa/
Contact: Dale Brooks, 1-713-729-8668, brooksdale@usa.net
Mailing: 8541 Hatton St., Houston, TX 77025-3807, USA
Meetings: 3rd Thurs./month, 6:30 pm
Location: The Citizen Environmental Center, Rm 280, 3015 Richmond Ave., Houston, TX

NORTH TEXAS EAA
Web Site: http://www.geocities.com/nteaa/
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, 7:00 pm
Location: See website, call for details.

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 08/15/02. Please check main web page for any changes in current listing. The Electric Auto Association is a 501 (c)(3) nonprofit organization.

Board of Directors 2002

Chairman
Ron Freund
chairman@eaaev.org

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

Secretary
Scott Leavitt
secretary@eaaev.org

Treasurer
Gabrielle Adelman
treasurer@eaaev.org

CE Publications
Ed Thorpe
contact@eaaev.org

EAA Historian EAA Awards
Terry Wilson
historian@eaaev.org

EAA Technology
Bruce Parmenter
webmaster@eaaev.org

EAA Chapter Relations East
Jerry Asher
ChapterRelationsEast@eaaev.org

Delegates:
Bill Carroll - *Board Elections*
electionadmin@eaaev.org

Tom Dowling - *EV Charging*
charging@eaaev.org

Charlie Garlow - *Junior Solar Sprints*
juniorsolar@eaaev.org

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

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

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

Sept 1, 2002

NEDRA NATIONALS, Woodburn Drag Strip, Woodburn, Oregon, USA
Annual national electric drag races.
Web Site: www.nedra.com

Sept 4 - 5, 2002

42 VOLT AUTOMOTIVE SYSTEMS: STRATEGIES FOR SUCCESSFUL IMPLEMENTATION AND COMMERCIALIZATION, Cleveland, Ohio, USA
Conference focused on the converging market and technical trends in automotive electrical system design as they relate to the transition of vehicles from 14 to 42 volt batteries.
Contact: Intertech
Phone: 1-207-781-9800
Fax: 1-207-781-2150
E-mail: info@intertechusa.com

Sept 14 - 15, 2002

GASLESS AT THE CROSSROADS, Seattle, Washington, USA
Alt.Fuel Vehicle / and Electric Vehicle show, sponsored by the Seattle EVA, will be located at Bellevue's Crossroads Shopping Mall.
Web Site: http://slough1.home.mindspring.com/seva.html

Sept 21, 2002

SVEAA ANNUAL ELECTRIC CAR RALLY, Stanford, California, USA
30th annual Premere West-coast EV rally.
Web Site: www.becketts.ws/eaa/rallyinfo.htm

Sept 23 - 25, 2002

2ND MICHELIN CHALLENGE BIBENDUM, Paris, France
Second road challenge of clean fuel vehicles, from Hockenheim, Germany to Paris, France.
Contact: Ron Musgnug
Phone: 1-864-458-4588
Fax: 1-864-268-3374
E-mail: rcm324@aol.com
Web Site: www.challengebibendum.com

Oct 4 - 5, 2002

NORTHAMPTON ELECTRIC VEHICLE RALLY, Northampton, North Carolina, USA
7th Annual road rally and autocross, the kickoff event for the 2002-3 EV Challenge.
Contact: Danny Johnson
Email: johnsond.east@ncs.schoollink.net
Telephone: 1-252-534-1258
Web Site: www.evchallenge.org

Oct 8 - 10, 2002

NGV 2002: CLEAN TRANSPORTATION IN A LIVABLE WORLD, Washington, D.C., USA
8th national NGV Conference focusing on the latest in nature gas vehicle technologies.
Contact: NGV Coalition
Phone: 1-202-824-7360
Fax: 1-202-824-7367
Web Site: www.ngvc.org

Oct 19 - 23, 2002

EVS-19, Busan, Korea
The annual electric vehicle symposium.
Contact: Korean Society of Automotive Engineers
Phone: +82-2-564-3971
Fax: +82-2-564-3973
E-mail: evs19@evs19.org
Web Site: www.EVS19.org

Nov 2, 2002

"SILENT THUNDER", Sacramento Raceway, Sacramento, California, USA
Electric drag races in California.
Web Site: www.nedra.com

Nov 2002 *(Date TBD)*

RICHMOND EV RALLY, Richmond, Virginia, USA
6th Annual rally at Richmond Technical Center
Contact: William Baul
Email: basketbaul@aol.com
Phone: 1-804-780-6237
Web Site: www.evchallenge.org

Dec 10 - 12, 2002

ELECTRIC TRANSPORTATION INDUSTRY CONFERENCE, Hallandale, Florida, USA
Annual meeting of the Electric Vehicle Association of America.
Contact: Kara Elsden
Phone: 1-202-508-5039
Fax: 1-202-508-5924
E-mail: kelsden@evaa.org
Web Site: www.evaa.org

Feb 15, 2003 (tent.)

ANNUAL EAA NATIONAL MEETING, Palo Alto, California, USA
Review of past year, planning for new year and installment of new Board members for the EAA.
Web Site: eaaev.org

Mar 29 - 30, 2003 (tent.)

2ND EAA ALL-CHAPTERS CONFERENCE, Phoenix, Arizona, USA
Planned to be held in conjunction with the return of the Tour de AZ.
Contact: Jerry Asher
E-mail: evjerry@usa.net

All EAA Chapter Events - please email <cenews@eaaev.org> to have Chapter EVents listed in this calendar. Events are also posted on the EAA's website at www.eaaev.org.

EV Charging Maps And Information:

Tom Dowling's EV Charger list
Covers Arizona, California and Georgia.
Web Site: http://evchargernews.home.attbi.com/

EV1-club inductive Charging
Web Site: http://ev1-club.power.net/chglist.htm

AVCON Charging
Web Site: http://www.hondaev.org/chg.html

Arizona EV Public Charging Sites
Web Site: http://www.1opossum.com/chargers/

Ottawa Canada Charging Locations
Web Site: http://www.econogics.com/ev/chargloc.htm

Additional Canada Charging Locations
Web Site: http://www.ve-montreal2000.com/site/en/vebornes/Cartebornes.htm

How to Install Electric Vehicle Charging
Web Site: http://www.eaaev.org/eaaevcharging.html
Web Site: http://www.geocities.com/evcharging/

Other USA EV Groups:

Bay Area Action
Web Site: http://www.baaction.org/
Location: San Francisco Bay Area, CA

Fox Valley
Web Site: http://www.fveaa.org
Location: Chicago, IL

Denver EV Council - DEVC
Web Site: http://www.devc.org
Location: Denver, CO

Oregon Electric Vehicle Association - OEVA
Web Site: http://www.oeva.org/
Location: Portland, OR

National EV Organizations:

Electrathon America
Web Site: http://electrathonamerica.org/
Focus: Light-weight EV racing

EV Challenge
Web Site: http://www.evchallenge.org/
Focus: Educating Middle & High School children

National Electric Drag-Racing Association - NEDRA
Web Site: http://www.nedra.com/
Focus: EV racing

National Station Car Project
Web Site: http://www.stncar.com/
Focus: EVs to public Transportation

Electric Vehicle Association of the Americas - EVAA
Web Site: http://www.evaa.org/
Focus: EV industry organization

Northeast Sustainable Energy Association, - NESEA
Web Site: http://www.nesea.org/
Focus: Sponsers of the annual Tour de Sol

EV List Photo Album
Web site: http://www.evalbum.com/
Focus: Listing almost 400 electric vehicles from around the world - EVDL List owners

Union of Concerned Scientists
Web Site: http://www.ucsusa.org/
Focus: Citizens and Scientists for Environmental Solutions

Non-USA EV Groups:

EV Council Of Ottawa
Web Site: http://econogics.com/ev/evco.htm
Location: Ottawa, Canada
Focus: Canadian EV organization and resource

Australian Electric Vehicle Association
Web Site: http://aeva.asn.au/
Focus: Australia national group

Japan Electric Vehicle Club
Web Site: http://www.asahi-net.or.jp/~MR5T-OKB/index.html
Focus: Japan national group (Choose the english pages)

Additional EV Information:

The California Air Resources Board - CARB
Web Site: http://www.arb.ca.gov/
Focus: Setting standards for EV mandates.

Sources - Existing EV 4 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://www.austinev.org/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.

Hybrid Tax Credit Clarification

Additional information for followup with Jul-Aug 2002 article on Hybrids and "the Federal Income Tax rebate of $1500 on hybrids this year."

This is a tax credit, not rebate. It is a one-time credit on your tax return, Form 8834. It is offered for any of the 2002-03 Hybrids (not before) - Toyota Prius, Honda Insight and Honda Civic Hybrid. Applies for purchases in any of the US States, not just California.

For more detailed information, see http://www.fueleconomy.gov/feg/tax_afv.shtml#cleanfuel. Includes some instructions for tax forms. Also see the IRS website for details on specific tax forms. Note that this credit is being phased out during 2004-06.

EVs For Sale & Display

FOR FREE: 96vdc 1981 Gradley GT EV.
Contact: All Smith, Coronado, CA
Phone: (619)575-3830, leave msg.
Southern California residents only, please.
You pick up - car has tow hitch.

Big Giant Head for Burning Man 2000, by Dale Huntsman of Nevada. Other unusal and normal EV creations can be found on the EV Album, found at http://evalbum.com/.

Please consider submitting your EV (or Hybrid) to the album, to let others know that EVs are out there and being used daily.

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. Use tape to seal the form before you mail it. Or send information in this form and pay through PayPal using http://eaaev.org/membership.htm.

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 is a non-profit, 501(c)(3) for the promotion of electric vehicles. Membership includes the informative complementary EAA publication, "**Current EVents**". Donations are tax deductible. 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 EVents like 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

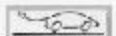
_____
_____
_____

membership@eaaev.org

1st Class Postage Here

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

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

Image	Description	Item#	Price	#
	License Plate Holder, black plastic frame, white lettering on visible green.	LICPH1	$10.00	
	In motorcycle size, only comes in metal & in either black or chrome, special order. allow 6 weeks.	LICPH2-B LICPH2-C	$14.00	
	*Embroidered Sew-On Patch, white This is a special order, please allow an additional three weeks.*	PATCH1	$ 9.00	
	*Embroidered Sew-On Patch, green This is a special order, please allow an additional three weeks.*	PATCH2	$ 9.00	
	*Embroidered Hat, adjustable fit.*	CAP002	$15.00	
	*Embroidered Bucket Hat, comes in: small/medium and large/xlarge.*	DCP01-S/M DCP01 L/XL	$25.00	
	*Long lasting metal "Electric Vehicle Parking Only" sign. Same materials used as a public no parking sign. Reflective white background with dark green lettering. Wall or pole mounting.*	PARK02	$40.00	
	*Diamished, Long lasting metal "Electric Vehicle Parking Only" sign. Same materials used as a public no parking sign. Reflective white background with dark green lettering. Wall or pole mounting.*	PARK01	$20.00	
	*Ceramic Coffee Mug*	MUG003	$ 5.50	
	*Insulated Car Coffee Mug*	MUG02	$ 6.50	
	*EAA Car Window Static*	SS001	$ 3.00	
	*EAA Bumper Sticker #1 (10.5x3.75 inch)*	BS000	$ 2.00	
	*EAA Bumper Sticker #2 (The Switch is on) (15x3.75 inch)*	BS002	$ 2.00	

	*Embroidered Polo Shirt (Forest or Navy S,M,L,XL,XXL). 10 weeks for all colors other then the Forest.*	SHIRT01-F- SHIRT01-N	S M L XL XXL	$40.00
	-- EV Buyers Guides --			
	*Electrifying Times Preview 2000* *1997 EV Buyers Guide* *1996 EV Buyers Guide* *1995 EV Buyers Guide*	BG1998 BG1997 BG1996 BG1995		$ 5.95
	-- Literature --			
	*Convert-It EV conversion Book*	CONV01		$24.95
	*KTA Electric Vehicle Kits & Component Parts Catalog*	CATALT		$5.00
	Window Literature Holder (light plastic)	WLH02		$10.00
	Back issues of CC (Specify month/year)	CC001		$ 3.00
	-- Special --			
	*AVCON In 14-50 adapter kit - sized metal box, 14-50 outlet (2 hots and a ground, no neutral), for 208 VAC chargers, on 120 VAC * some assembly required - 6+ week delivery after payment deposited.*	ADAPT1		$200.00
	Electric Auto Association Membership	EAAM01		$30.00
		SUBTOTAL		$____
	US RATE - 10%, or CANADA=15%, or OTHER = 20% of the total	Shipping		$
		Handling		$ 2.00
		TOTAL		_____

To order:

- Check the items and how many you want, total the amount
- Paste mail it with your payment for the amount plus shipping and handling to:

EAA Merchandise, 5820 Herma St., San Jose, CA. 95123 USA

Name: _____

Address: _____

City, State Zip: _____

Email, Tel#: _____

ELECTRIC AUTO ASSOCIATION
2 Smith Ct, Alameda, CA 94502-7786

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HAYWARD, CA
PERMIT #546