



CURRENT EVENTS

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Promoting the Use of Electric Vehicles Since 1967

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PLANS WELL ALONG FOR INDY'S FIRST 'ELECTRIC'

National Speed Sport News, Sept. 18, 1991

Remember all the jokes about the early electric cars? "How long's the cord? Where do you plug it in?", were just a sampling.

LONG A LAUGHING MATTER

Race fans have also long laughed at electric-powered cars, but if Larry Burton's plan succeeds there may well be an electric-powered car in the starting field for the 76th running of the Indianapolis 500 next May.

Burton, in a wheelchair since a bout with polio in 1959, is a veteran Indy Car mechanic, having first ventured to the Speedway in 1966 with the Michner Petroleum team. Over the years he has worked with such Indy legends as Jim Hurtubise, Clint Bowyer, Grant King and A.J. Watson.

The 54-year-old Burton says his aim is not to go to Indy and "pull off some sneaky deal and beat everyone," but rather to "Demonstrate technology and stimulate public awareness and interest in electric vehicles and address environmental issues."

Currently Burton and his wife are alone at the helm of the project with some help from a few electrical laboratories. He envisions it as a \$10 million project, but says only \$2.2 million is needed to start. That money would cover the construction costs of the car, transporter, parts, logistics and a test program.

Burton told NSSN a standard Indy Car chassis would be used with a "spacer" or chassis extension replacing today's engine that serves as a stressed member of contemporary Indy Cars.

Burton says his electric motor can be made to fit the current USAC regulations, but USAC's new technical director Mike Devin told NSSN the rules will need revising before an electric car can run at the midway.

According to Burton, his electric motor, which is 12 1/2 inches in diameter and 22 inches long, weighs only 78 pounds. The

batteries, the type and design of which are being kept secret, will weigh more than the engine.

"In today's Indy Car the engine and other power items require 26.8 cubic feet," said Burton. "Our motor and batteries need no more."

Burton says .746 kilowatts of electric power equal one horsepower. He says a 600-kilowatt electric motor creates about 800 horsepower, approximately the amount created by the current internal combustion Indy Car engines.

From USAC's standpoint, Burton says a circuit breaker could be inserted that would be the equivalent of the popoff valve currently used on turbocharged engines. The circuit breaker could be set for the same horsepower level as the popoff valves, says Burton.

CONSTANT WEIGHT

An Indy Car weighs 1,550 pounds dry and some 2,000 pounds fully fueled with a driver. "Our car will weigh in that range, but its weight will not change during the race," Burton said.

Burton says the electric car would not have a transaxle, but rather a system where power to each driving wheel can be controlled—much like an ABS brake system—to eliminate wheelspin.

The electric-powered car also will need no refueling as such, but the energy source must be "revitalized" during tire stops. Asked how long this would take, Burton said, "About as long as a normal Indy pit stop first time out and a lot quicker in '93." Burton says today's Indy Car, with a 40-gallon fuel tank with 38 usable gallons of fuel can go 28 laps at Indy before needing more fuel. "Our car will go 26 laps before we have to stop, so we're close."

Burton reports they are currently working on several methods to "refuel" the car.

(See Indy's First EV on page 3)

MORE ELECTRIC INDY CAR

Keith Waltz, National Speed Sport News, November 20, 1991

PHOENIX—Many in the auto racing fraternity are still scratching their heads over Larry Burton's plan to field an electric-motored Indy Car in the 1992 Indianapolis 500, but Burton's plans have apparently created a great deal of interest inside and outside the racing community.

TWO INDY WINNERS

Burton reports he has lined up former Indy winners Al Unser and Johnny Rutherford to drive his cars. In fact, a rendering of an electric-powered Indy Car in Burton's office carries Al Unser's name on the bodywork and the four-time Indy winner was on hand for a recent demonstration run of one of the motors.

"We've got several people, both potential investors and potential sponsors, interested in the project," Burton said. "If you're going to demonstrate what you can do, what better place to do it than the Indianapolis Motor Speedway?"

(See More on Indy Car on Page 3)

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EDITOR'S CORNER

Back in June I wrote an editorial titled "The Search for the 100th Monkey" wherein I exemplified that when a certain number of individuals start doing or utilizing something it becomes a trend. Could it be that we are approaching the 100th "monkey" (or person), at least as far as business is concerned? Why do I say this? I just received a letter from the Solar & Electric Racing Association stating that General Electric will give a free electric motor, controller and technical advice to any team entered into the Solar & Electric 500 in Phoenix. What GE wants in return is to have it's logo displayed prominently on the side of the team car. For details call SERA at (602) 953-6674.

Why would they give out perhaps \$30,000 to \$50,000 for logo advertising? Well, the next month (May 1992), at Indianapolis there just may be two to four electrics competing in the Indianapolis 500 race that will attract world wide attention, and they won't be carrying a GE logo to my knowledge. Also, the second Solar & Electric 500 race (to take place in April 24 - 26, 1992 in Phoenix, Arizona) should get some real press this time around. Thus GE can start to get their logo connected with the world of auto racing before the Indy 500.

So in addition to the traditional auto manufacturers, other big business is getting interested in EV's. And if even one electric car is entered in the Indy 500, that will finally get the world public's attention that EVs are capable (see 2 articles starting on the front page).

In other news, I recently got a tour at Poly Plus in Berkeley by Dr. Steven Visco. I can say that it does indeed exist. I was there. It is modest, in a small warehouse, but, it is real. Last June I did some calculations on applying this battery to an Indy car, I believe that it could do it, as this battery has the power and the energy to last the 75 miles to the next pit stop. This is not available yet so what Larry Burton plans to use for his entry (in the Indy 500) is only a guess. But, even if he has a problem in 1992, you can be sure that someone will try with other technology next year, or the year after.

Starting in this issue is a "Letter to Editor" column. Sorry it has taken so long to get this started. It will take a few issues to get caught up, but I will attempt to keep it current thereafter. Also new in this issue, you will find information on a newly designed charger for sale.

We now have a toll free number to solicit new membership. Please give this number to anyone who wants more information on the EAA. The toll free number is 1-800-537-2882. Please DO NOT call this number yourself, as each call costs the EAA 31 cents per minute. If you must check out the message yourself, PLEASE call the (415) 306-0414 number.

1991 has been an amazing year for EVs. and the new year promises to be even more so.

- Pb editor

Articles

If you would like to submit an article for the Current Events Newsletter, please send your article on a floppy disk formatted for DOS (Ascii Format) along with a printed copy of the article. Also send camera-ready photos or graphics or include TIF formatted files with your copy. Please send to Paul Brasch, Editor (see address below.)

Advertisements

If you would like to submit an ad, please contact Paul Brasch at (408) 371-5969 or Susan Hollis/PCTEK at (408) 374-8605 between 10-5pm PST for additional information and rate sheet.

New Members

If you know someone interested in becoming a new EAA member, they may call EAA @ 800-537-2882 for a brochure and membership application.

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MORE ON INDY CAR

(Continued from Page 1)

Still at a sensitive point in the project, Burton is reluctant to reveal details as to who has expressed an interest in his project, but there is speculation that the United States Government may be among those who will have a hand in the project.

In that vein, Burton is currently talking with Truesports' Steve Horn and hopes to use an American-built Truesports chassis. He plans to obtain a 1991 model in the near future for testing and "we'll order at least three 1992 cars," he said.

Since announcing his project in September, Burton said there have been additional advances in battery technology which will benefit the effort.

"This stuff changes so fast," Burton said. "When we first announced the project we thought we were three or four laps short of being able to match the other cars before pitting. Now we are sure we can match them on the number of laps before a fuel stop."

Burton would not reveal how the electric cars would be "refueled," but did say it would be a matter of changing the battery electrolyte during a pit stop and he is confident the change can be made in the same time it takes to fill a present car with methanol.

Plans currently call for the first motor to be in an Indy Car chassis and running in six to eight weeks. Burton plans to demonstrate the car at the Indianapolis Motor Speedway in January. He is currently demonstrating the motor technology to potential investors.

Indianapolis Motor Speedway President Tony George recently met with Burton and Burton said, "He's very interested in what we're doing."

FOUR CARS?

Burton says he plans to field at least two electric-powered cars at Indianapolis and perhaps as many as four, "and all four will be driven by former Indy winners."

On the CART side of the ledger, Burton reports he has talked with CART's Kirk Russell and CART is reportedly interested in the project.

Interestingly, Burton points out the electric motors have a unique property which would be a benefit on road and street courses. "When you are on the power all the time like we would be at Indianapolis, the electric motor is constantly consuming energy. But any time you back off, an electric motor becomes a generator, thus helping to replenish the power supply. That could give us an advantage on a road course."

Many people think of batteries as being quite heavy, but Burton says after all the components needed for an internal combustion engine, such as radiators, oil tanks, and the fuel cell, are removed, he will actually have to add ballast to his cars to meet USAC's minimum weight requirement.

Burton said his motors will produce power equivalent to the fuel-fed engines currently running at the Indianapolis Motor Speedway. He says they can be equipped with circuit breakers which will cut the motor once it reaches a certain level of power output, exactly as the current pop-off valves do on turbocharged engines.

Burton first became interested in electric-powered cars when he attended Ernie Holden's Solar and Electric 500 last year at Phoenix Int'l Raceway.

Being a veteran Indy Car mechanic, Burton began investigating the electric technology and when he decided to get into the electric car racing end of the sport, he decided to go all the way.

"I worked for a lot of guys who were innovators, such as Smokey Yunick and Mickey Thompson," Burton said. "I loved the sounds of those Offies and Novis, but this is 1991 and electric is the only sensible option."

Burton says when his cars first appear at Indianapolis, "It will wipe any doubt about the future of electric cars off the earth." 🏁

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INDY'S FIRST EV

(Continued from Page 1)

In describing his electric car concept, Burton points out that an internal combustion engine is only 45 percent efficient whereas an electric motor is 94 to 96 percent efficient. In other words only 360 horses of today's 800-horse Indy engines winds up at the rear wheels, whereas 750 of an electric car would.

Burton said no driver has been chosen, noting, "There's a lot of good drivers standing around."

The last non-traditional powerplant at Indy arrived in 1967 when Andy Granatelli introduced his famous STP turbine car powered by a helicopter engine. Parnelli Jones dominated the race, but dropped out while leading with only four laps remaining.

Granatelli returned with four turbines in 1968. Mike Spence was killed during practice in one while Joe Leonard and Graham Hill put theirs in the front row and Art Pollard lined up 11th. Hill was eliminated in a lap 110 accident while Leonard and Pollard fell out in the closing laps among the leaders, both suffering the same problem which eliminated Jones in 1967—a broken fuel shaft.

Prior to the 1969 race, new USAC regulations sharply reduced the size of the turbine's air intake, making it uncompetitive.

Earlier this year, Ernie Holden hosted this country's first race for electric-powered cars at Phoenix Int'l Raceway in Arizona and electric cars have also caught the fancy of the powers in Detroit as General Motors has plans to produce an electric-powered car in the near future.

Stationary electric motors have been creating huge amounts of power for many years, but recent advances in batteries and mobil power supplies have resulted in increased activity in the electric car arena.

If Burton's electric-powered Indy Car project comes to fruition, it could well be a "shocking" experience to Indy car fans used to the old ways. 🏁

I wonder about some of Larry's numbers, but I certainly wish him success for all our sakes - Ed

EAA XA-100 HYBRID ELECTRIC VEHICLE PROJECT

Bill Palmer, John Reuyl, Kathleen Fletcher and Zev Pressman

This is the first of several articles about the Hybrid Electric Vehicle Project. The project is significant because it is the first time a large number of EAA members have worked together on an electric car design and construction project funded by outside sources. The project was sponsored by EAA as contractor to the California Energy Commission (CEC). Design and construction was by EAA members and Stanford University students and faculty.

BACKGROUND

Back in 1986 Dr. John Reuyl, then a Resident Fellow at Stanford and member of EAA, inspired a group of students to get some hands-on, real world experience by building an electric car. In their search for a car to convert, EAA came to the rescue with a Chevette which had been donated to EAA. John and several other EAA members guided the students through the conversion. The Chevette attracted plenty of interest during a 1987 Stanford/EAA Rally by charging its batteries from a solar photovoltaic array, donated by ARCO-Solar, and driving around the campus on this solar generated electricity.

The California Energy Commission has issued annual requests for proposals for research projects to advance cost-effective, energy-efficient technologies that could enhance California's energy self-sufficiency. With some urging by John Newell, then Chairman of EAA, Reuyl wrote a proposal in 1987 describing his design for a hybrid electric car that could travel short distances as a pure EV and long distances with energy from an on-board engine/alternator.

His first proposal failed to qualify, but Newell remained confident. He wanted Reuyl to resubmit the proposal the following year. Reuyl found Newell's "arm twisting" was hard to resist: "Isn't the proposal in the computer? Can't we just change the date? Often Government agencies will understand a proposal better the second time around."

Newell was right; the second proposal was judged the second best of all proposals in terms of its relevance to the CEC's mandate. As required by the CEC, a Work Statement with separate detailed tasks was

negotiated, complete with a budget, schedule, monthly progress reports and a separate report for each completed task.

As Director of the project, Reuyl was responsible for compliance with all terms of the contract, for completing the work on schedule and within budget and for submitting all the reports on time. Reuyl negotiated a license agreement with Stanford University wherein Stanford students and faculty could have academic and research opportunities on the project.

GETTING STARTED

Work started in January 1989 with the first of several brainstorming meetings on campus to collect constructive ideas. The contract required 4500 hours of volunteer labor. In fact, by contract completion, more than 50 EAA members, plus Stanford faculty and students supported this project in one way or another, donating over 13,000 hours. Reuyl himself volunteered over 5,000 hours.

The project members formed subsystem teams. Based on Reuyl's original design and modifications by the team, each subsystem was defined and component functions were identified. Alternative components (some commercially available and others still prototypes) were evaluated for such factors as availability, cost, weight, size, performance, complexity etc.

CONSTRUCTION

The team decided to convert a production vehicle rather than building a vehicle from the ground-up so that performance of the finished hybrid could be compared with the established performance of the original car.

A 1988 Chevrolet Corsica was chosen and bought. The engine was removed and a 25 HP. GE series motor mounted in its place. A PMC solid-state controller, normally rated 400 amps, but experimentally modified for a short-time rating of 525 amps, regulates the motor.

Twenty Delco RV/marine batteries were mounted in the trunk in two parallel strings.

The auxiliary power unit is a Norton rotary engine (weighing 30 lbs.) and a Unique Mobility brushless dc motor weighing 50

lbs.) operating as an alternator. The engine-alternator assembly and controllers, including timing belt, pulleys, and mounting bracket weigh about 135 lbs.

ENGINE-ALTERNATOR CONTROLLER

A team of Stanford students designed and built a microprocessor controller for the engine/alternator. It has been used in the manual mode and for data logging. When the main bus voltage falls below a preset value the alternator is used as a motor to start the engine. After engine start, engine speed is brought to a preset constant rpm and the alternator controller regulates alternator power to the bus at a preselected constant value. That power either propels the car or charges the battery or both.

EMISSION CONTROL

The original exhaust catalytic converter was replaced with a smaller one. Ahead of it an electrically heated catalytic converter (EHC) was added with an air pump and air control valves.

In the engine-alternator starting sequence, the EHC is first heated and then the engine started after the EHC is up to operating temperature. This minimizes the emission of non-oxidized exhaust gases which conventional cars emit while the hot exhaust gases are heating the catalytic converter up to "light-off" temperature.

PERFORMANCE

The XA-100 has been tested extensively on roads and highways and on dynamometers at Chevron Research, Richmond, CA and at the Automotive Testing and Development Services Inc. (ATDS) in Huntington Beach, CA. It has met all the quantitative objectives of the contract.

The Chevron and ATDS tests were for vehicle speed and acceleration capability compared to the EPA's Federal Urban Driving Schedule (FUDS, FTP-75) and EPA's Highway Driving Cycle as well as for emissions when running on the engine-alternator.

The car successfully followed both cycles on battery power alone until battery depletion near the end of the highway cycle.

Continued on page 12

BMW E1-- BMW'S NEW PURPOSE BUILT ELECTRIC CONCEPT CAR

by Bill Siuru

BMW, best known for its expensive, high performance luxury cars, has also had a very active electric vehicle program for years. Two of its 1600 sedans converted to electric power were used during the 1972 Olympic Games held in Munich. In the past few years, an electric powered 325iX was developed and demonstrated extensively. Now BMW in Munich, Germany has unveiled a new concept car that has been designed from the start to be an electric vehicle.

The BMW E1 is much smaller than your typical BMW sedans, a mere 134 inches long. However, by using optimum packaging, plus a rather wide stance (63 inches) and a tall profile (59 inches), the

BMW E1 is a four passenger vehicle. Indeed, the new EV is as wide as BMW's newest 3-series conventionally powered sedans.

The BMW E1 uses a sodium-sulphur high-energy battery that is rated with a 19 kilowatt-hour capacity delivered at 120 volts. The battery weighs 441 pounds (200 kilograms) and is about 34 inches long, 18.5 inches wide, and 13.5 inches high. The battery is located beneath the rear seats, which according to BMW is the safest location in either head on or tail end collisions. The battery is designed to be recharged from ordinary household power requiring a 6-8 hour recharging time.

The battery supplies power to a 32kW/45 horsepower electric motor mounted over the rear axle. The powerplant is able

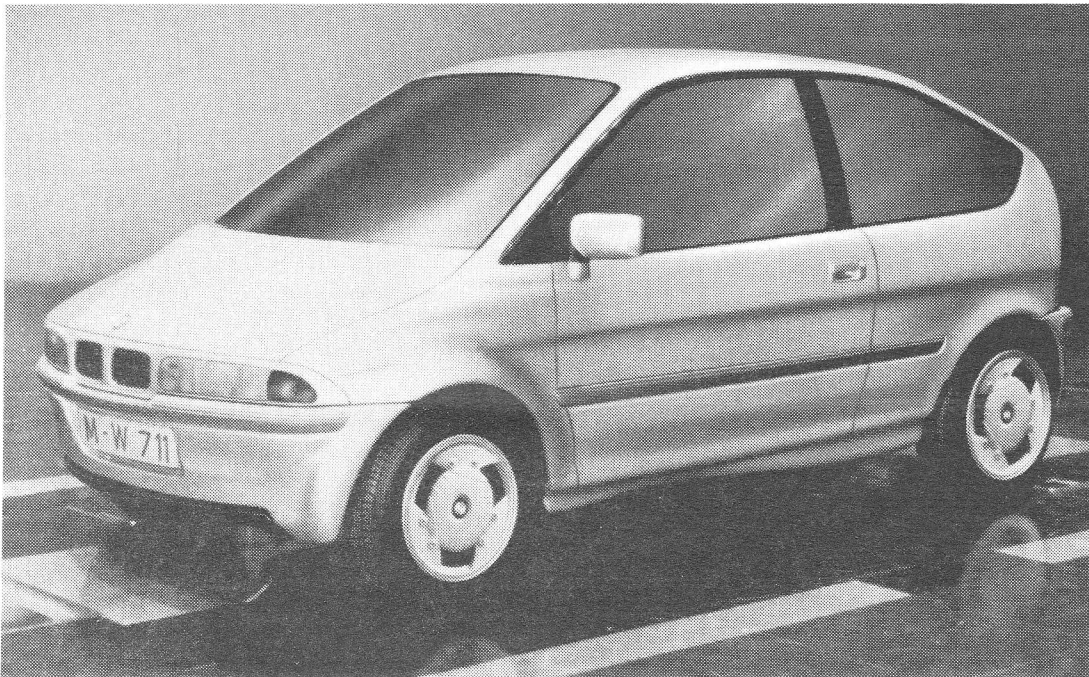
to accelerate the 1985 pound (900 kilogram) BMW E1 from 0 to 32 mph (0 to 50 km/hr) in 6 seconds and from 0 to 50 mph (0 to 80 km/hr) in 18 seconds. The EV has a top speed of 75 mph (120 km/hr) and an estimated range of more than 155 miles (250 km). Incidentally, Unique Mobility of Englewood, Colorado was heavily involved in developing the BMW E1's drivetrain.

Starting with a fresh piece of paper, or

not only recyclable, but have already been recycled, the first time recycled plastics have been used for an outer skin of a car.

While being quite small, the BMW E1 has been designed with safety in mind. There are special "knee bars" underneath the instrument panel plus crossbars and reinforcement members in the doors and body shell for protection in side collisions.

Both driver and front seat passengers have airbags. The front seats use integral safety belts that transmit forces directly to the car's floor, a feature borrowed from BMW's new megabuck 850i, V-12 powered coupe. The car features anti-lock braking (ABS) on the drum brakes which use regeneration during



more appropriately, a clean computer CRT, the design is a purpose-built EV. However, BMW's characteristic kidney shaped grill, large window area, "kick" in the rear side window and round headlights, though now behind glass covers, are incorporated into the new design. Optimum packaging has resulted in very little overhang. The wheelbase is a quite long 91.5 inches for a car that is only 134 inches in total length. The car has a very good drag coefficient of 0.32.

The car's construction is quite unique and can be considered revolutionary. Its design was partially borrowed from BMW's Z1 limited production two-seat sports car. The E1's inner structure is made of aluminum with a plastic outer skin. BMW uses recyclable plastics for the body skin. Indeed, the plastics on the E1 concept car are

ing braking to recapture energy for battery charging.

Finally, this is a "luxury" EV and quite fitting to wear the BMW marque. Amenities include a sliding glass sunroof, telephone, air conditioning, and a premium sound system. The custom made aluminum wheels (14 inches up front, 16 inches in the rear) are fitted with special tires that are designed to provide minimum rolling resistance.

BMW began developing the E1 in October 1990 and unveiled the car to the general public at the 1991 Frankfurt Motor Show in the fall. No production plans have been stated.

Thanks to Bill Siuru for permission to reprint from The Battery Man / Nov. '91. -Ed.

BUSH SHOWS ENTHUSIASM FOR ELECTRIC CAR PROJECT

San Francisco Chronicle
10/24/91AP-Washington

President Bush endorsed a \$260 million public-private venture yesterday to develop batteries for electric cars, saying the project would save more energy than proposed tougher fuel-economy standards.

"The development of a competitive electronic auto industry will do more to reduce oil imports than rigid fuel-efficiency standards that risk jobs and public safety," Bush said. The president attended a White House ceremony at which Energy Secretary James Watkins and representatives of the nation's Big Three automakers signed an agreement to launch the four-year project. Bush said the goal is "to make electric vehicles competitive by the year 2000."

The Bush administration opposes Senator Richard Bryan's, D-Nev., plan, that would require new-car fleets to average about 40 miles per gallon, up from the current 27.5-miles-per-gallon minimum, supporting the automakers' contention that it would force them to stop making family-size cars, hurt sales, and eliminate jobs. "Senseless over-regulation is always a one-way dead end," Bush said.

The United States Advanced Battery Consortium is one of several joint research projects recently initiated by Chrysler Corp., General Motors Corp., and Ford Motor Co. The Electric Power Research Institute, a Palo Alto-based research arm for the utility industry, also is a member of the consortium.

The companies and the Energy Department will split evenly the cost of the project, the first in which the government and the automakers have cooperated on research. They will share research facilities and people as well as money.

"It is a major domestic economic initiative—akin to the close cooperation between Japanese government and industry—as well as an energy and environment initiative," Chrysler President Robert Lutz said.

Only recently have the fiercely competitive Big Three cooperated on research or product development, an indication of how slumping sales and foreign competition have eroded their strength.

But Lutz said the government also has changed its attitude. "In the old days, if we were even seen close to each other, there was an assumption of collusion," he said.

Development of an efficient, lightweight battery to power a vehicle is important to automakers because of California law requiring that by 1998, 2 percent of an automaker's sales in that state must emit no pollutants. By 2003 that sales level rises to 10 percent.

Work on electric cars is going on worldwide, in large part because of California law. The major hurdle facing electric cars is range. GM has shown off its Impact electric vehicle powered by conventional lead-acid batteries. The car will travel at 55 miles per hour for about 120 miles before needing a recharge.

At the White House ceremony, an Impact was parked beside a Ford electrically powered delivery truck and a Chrysler minivan. Afterward, the automakers flipped a coin to determine which Bush would sample. Chrysler won, and the president climbed inside with two senators and other officials for a quick test drive along the walkway. ☺

[The President commented that it was a nice smooth and quiet ride.]

FIRST "CERTIFIED PURE" CALIFORNIA ELECTRIC VEHICLE CONVERSION KIT

California State Assemblyman Sam Farr, Santa Cruz-Monterey, attached the first California state "Certified Pure Electric Vehicle" kit label under the hood of an ELECTRO AUTOMOTIVE VOLTSRABBIT (TM) diesel-to-electric car conversion December 5th at Lighthouse Point in Santa Cruz.

The certification allows EV builders or buyers to claim a "\$1,000 CREDIT on their state taxes, sheltering around \$10,000 of California income.

Builders can Pass the one-time-per-car credit along to buyers, providing incentive for professional mechanics to convert several cars for sale, each car with a one-time "\$1,000 CREDIT" available to the buyers up to the total fund limit of \$750,000 per year until 1995.

Certified kits, as well as certified cars, are also exempt from sales and use tax including local millrates.

Assemblyman Farr, who helped electric vehicle pioneer Mike Brown and his Felton, CA., company over the bumps that occur in any new regulatory trail, said, "I'm very proud to have played a role in helping a Santa Cruz constituent become the first Certified Kit supplier in the nation. . . . This gives consumers the incentive to try another option: Recycling their cars into electrics, rather than sending them to the landfill and waiting for Detroit or Tokyo to build new electrics a few more smog-filled years from now."

California's leading-edge legislation, SB 2600 (1990), creates the first tax incentives which benefit professional mechanics, new

conversion shops and the end-user of an electric car, the beleaguered taxpayer/commuter. Previous EV incentives have gone to established EV producers and researchers.

ELECTRO AUTOMOTIVE, a supplier of EV components and consulting for 12 years, received Executive Orders from the California Air Resources Board on October 31, 1991 stating that EA's Basic Kit and Deluxe Kit were now "Certified Pure Electric Vehicle" kits. These kits allow certification of any conversion of a 1991 or older vehicle originally weighing 2,800 lbs. or less.

For further information contact Shari Prange, (408) 429-1989, or Richard Rahders, (408) 426-3783 (see ad on page 13). ☺

TAX CREDIT BAD NEWS, GOOD NEWS

On November 22, 1991 this reporter attended the California Energy Commission (CEC) "workshop" on the new EV tax credits. I came prepared to argue technical details on behalf of all California EAA members. The bad news was that the CEC only handles the money and forms. They gave the "workshop" to determine the contents of the needed forms to receive the tax credit.

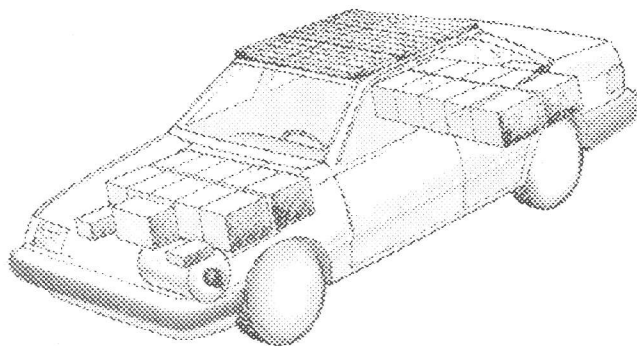
The California Air Resources Board (CARB) which does set the technical details had already determined that parts for an EV conversion would not be certifiable, and that only a kit or completed car using an approved kit would be. They evidently did

not want to deal with all of the details for all of the potential parts and decided that certifying a few kits would be much easier. In CARB's favor, this is understandable, but they refused the CEC's request to provide a spokesperson to answer our technical questions. This was a big disappointment.

However, the good news is that there are 2 companies that are now certified and a third in-process of being certified. Electro Automotive has 2 certified kits (see article page 6) and Solar Electric Engineering sells certified cars using their own in-house kits (see ad for 800 number for their details).

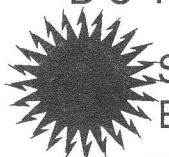
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FORD HEV CHALLENGE A New Student Competition

The Ford Hybrid Electric Vehicle (HEV) Challenge is a student engineering research competition sponsored by the Department of Energy, the Ford Motor Company, and the Society of Automotive Engineers. Thirty schools will be selected via a proposal review process to build hybrid vehicles that will compete in 1993 in the Detroit area. Schools will either convert a Ford Escort wagon or build a vehicle from the ground up. These vehicles will compete in two classes in ten events involving written and oral presentations, fuel economy, emissions, and performance.

The hybrid vehicle can use any type of heat engine (diesel, two- or four-strokes, gas turbine, Sterling rotary), any of three fuels (gasoline, methanol, or ethanol), and any reasonable battery system. Once the 30 schools are selected, engine manufacturers, fuel suppliers, and battery manufacturers might find it in their interest to sponsor schools that will use their technology.

The Office of Technology Transfer may want to encourage the use of a gas turbine engine running on fuel attained from ethanol from biomass, or a certain battery type. This student competition offers a very good setting for the display and testing of new DOE-developed technology.

For more information contact:

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POWER BOOST TRAILERS FOR ELECTRIC CARS

by Robert E. May

For years the major deficiency in electric cars has been the short range. The world has been waiting for a magic breakthrough in energy storage technology. It has not come. The best batteries today, with electrolyte circulation, are only about 30 percent better than those of the last century.

However, there have been significant improvements in propulsion technology and friction reduction. These have greatly increased electric car ranges. Today's cars go farther because it takes less power to attain and maintain highway speeds. The result is that a hybrid concept has become more realistic.

This article advances the concept that the hybrid car need not be self-contained. If all but a few trips are within range, then why not hook up the full hybrid only when it is needed. A pure electric car with a natural range of 90 miles can be made range-unlimited simply by attaching a small swivel-wheel trailer to the back bumper, one with a motor generator capable of supplying propulsion-size amperage to the drive system. For normal trips around town you have an efficient pure electric car. For extended trips, clamp on the trailer and you have a hybrid.

Let us look at the technical details for a theoretical set. (Field tests will be needed to prove feasibility.) Assume an efficient electric car with characteristics shown in Figure 1. Assume you plan a trip of 140 miles. As a pure electric car you can make the trip if you restrict speed to 35 MPH and avoid stop and go. Now try the car as the hybrid with motor generator capable of supplying 42 amps to the propulsion bus. (See Fig. 2.) Assume that the battery is fully charged at the start of the trip, and fully discharged at the end. Extrapolating Fig. 2, if you drive the car at a steady 35 amps load on the battery, and 42 amps load on the MG set, the total power available to the propulsion system is 77 amps, high enough to make the trip at 60 MPH. Gone is the need for a back-up car.

For several years I drove an electric car (written up in *Why Wait For Detroit*) which was capable normally of only 45 miles range, probably because a significant part of my trips was stop and go driving at 55 MPH. When a trip was out of range I used my back-up car. I found that I was using my back-up car for only about 10 trips a year. Unfortunately, the hybrid concept would not have been feasible because my car was a real amps-hog. That is why I am now looking for a more efficient car, and a power boost trailer.

There is a bonus. If the electric company has a long power outage, you can hook up your trailer to the house and save the food in your freezer. ☺

Pure Electric Car Characteristics				
Auto		Battery		
Range (Miles)	@ Speed (MPH)	Discharge Rate (Amps)	Time to Discharge (Hrs.)	
60	60	74	1	
92	46	43	2	
140	35	25	4	
180	30	18	6	
184	23	14	8	

Figure 1

Hybrid Car Characteristics					
Auto		Battery			
Range (Miles)	@ Speed (MPH)	Total Amps. Needed	M/G Supplied	Rate (Amps)	Time to Discharge (Hrs.)
75	75	116	42	74	1
126	63	85	42	43	2
228	57	67	42	25	4
324	54	60	42	18	6
416	52	56	42	14	8
Unlimited	45	42	42	0	Float

Figure 2

Dr. Richard Post

Lawrence Livermore National Labs

One of the most-asked questions concerning the proposed use of flywheel energy storage systems in vehicles has to do with gyroscopic forces and their possible consequences. How these forces are handled has everything to do with how practical the whole idea is. The modular electro-mechanical battery concept provides a direct answer to this issue, making an otherwise intractable problem into a solvable one. By adopting the idea of using, battery-wise, many small modules—perhaps 20-30 at a crack—to power the vehicle, gyroscopic effects are greatly reduced, for two reasons. The first is that, since they vary as the *fourth power* of the diameter of the rotor, gyroscopic effects for a rotor a few inches in diameter are much less than for a similarly proportioned one even 2 or 3 times as large. In fact the gyroscopic moment of one of the 1 kWhr E-M modules proposed is about the same as that of the flywheel on a gasoline-powered car at its running speed. Second, the assembly of rotors would be operated, pair-wise, in counter-rotating directions. What this implies is that the net gyroscopic moment would be near-zero for the assembly. Furthermore, the fact that only modest gyroscopically induced bearing forces would be encountered during typical angular accelerations of the vehicle (the most extreme of which might be running over a curb at running speeds) means that mechanically augmented magnetic bearings could deal with those forces (do the numbers!). Alternatively, a limited-excursion gimbaling system could be employed, using flexible leads (not slip rings) to pick up the power.

Lest these remarks be misinterpreted, no one should be misled into thinking that the design problems of producing a practical modular E-M battery are trivial. They are demanding ones, but so have been the design problems of any of our new "high tech" electromechanical gadgets—cam-corders and CD players to name two examples. Nevertheless, the rewards for putting in the effort would be great—a practical, efficient, high-performance electric auto, one with a battery pack that could last the life of the vehicle. ☺

LETTERS TO THE EDITOR

Dear Editor:

Please, EAA, let's have some credibility! First we start a big EAA-backed project for an electric car with an I.C. engine in it. Now in your Aug/Sept issue you include an article on flywheel propulsion which was grossly incomplete.

Do you know what another word for flywheel is? Gyroscope. Do you know what tremendous bearing forces occur when you try to change the axial direction of a restrained flywheel/gyroscope—particularly one storing the large amount of energy of your article design? To say nothing of the strange driving forces involved.

Yes, you can store large amounts of energy in a flywheel. But you have two choices: 1) develop superstrong bearing supports which will not break or create unacceptably large friction as the cartwists or turns, or 2) mount the flywheel in free-axis gimbals with very expensive slip rings for extracting electricity. Author Loomis (and EAA) chose to ignore this fact of nature entirely.

How about the bright side of the news? 251 miles on a charge with zinc-air batteries? Or the horizon battery, claimed to double the energy per weight of a lead-acid battery through new design/manufacturing techniques?

For the electric car of the future: no I.C. engine in it, but if you want to take it on a trip, attach a one-wheel trailer with an RV motor generator to float the battery.

I built a VW dune buggy electric car and drove it 7,000 miles to/from work on a road requiring 55 mph.

The electric car will not come (in volume production) through choice, but will be here soon because of necessity.

We are the ELECTRIC Auto Association.

Robert May
Phoenix, AZ

Dear Mr. May; author Loomis assumed that the technical details would be solved in the future in his fine story. I passed your comments on to Dr. Post himself for a reply as I am not the world expert on this as he is. (see reply on Page 8.) As for the good news about batteries; I was at the SERA 500 race in April and the fumes given off by the highly touted zinc-air batteries during charging were truly obnoxious and when I last spoke to the VP for the Horizon battery he informed me that they had no funds to continue the development or start production.

Hopefully both facts may change in the future. Thanks so very much for the fine article on power trailers, they may be a more acceptable alternative than hybrids. -Ed.

Dear Paul:

Your editorial on December 1990, solicits comments on how to reach more people, so that electric cars can become popular. Let me make a few.

To get more people interested I will suggest, if your budget allows it, to advertise in "do-it-yourself" magazines. These are the people that, more likely, will jump onto the bandwagon. The enthusiasm with which a person will embrace the idea of building an electric car will be dampened by the fear of the unknown, and that is the area where the EAA can be a main contributor.

I am not going to expend thousands of dollars in an electric car without having the knowledge and familiarity that enables me to choose the best available parts at the time.

The Association should guide the "do-it-yourselfer", so they do not fail and give a bad name to the electric car. If that support is not given, the inertia of the ones that want to try will be increased. Then the electric car will become popular only when one of the Big Three, or the Japanese, decide to build them.

Know-how is the reason I joined your association. If I am not mistaken, the basic building blocks of an electric car are: motor, battery, electronic control, and battery recharger.

My questions are: What books or publications are the best to cover these subjects? Which are the companies that put out the best products? Complementing this information could be articles written by experimenters on what type of cars are easier to convert to electric.

The Home Power magazine is dedicated to photovoltaic power generation. The publisher gets the money mainly from the advertisers. They have a section called THINGS THAT WORK! where they actually rate power converters, DC refrigerators, etc. The advertisers bring a lot of information, not only with the ad itself, but by giving the opportunity to the future user to write or call them for complementary information.

Maybe the Newsletter should be transformed into a nation-wide magazine, with the support of US and foreign manufacturers involved in making parts for electric cars.

Sorry! I have taken too much of your time, so I quit. Best of luck to you and the EAA.

Hector L. Gasquet - El Paso, TX

Thanks Hector for all the great ideas. As you can see, we are encouraging more advertisers in the new Current Events. We have also started to advertise CE in HomePower and other periodicals. I hope to start a technical advice column soon.

-Ed.

Dear Paul:

Today was the first time I've attended an EAA chapter meeting—even though I've been a member since last August.

When you asked for new member names and goals, I responded without much goal info. Here's the whole story: I currently drive a 14-year-old Volvo—my only car. I want to buy an Impact to replace that Volvo. If I need to drive farther, say for a vacation, I'll rent a gasoline powered car. I'm not interested in building or purchasing a kit car. Trouble is, the Impact still isn't on public sale. GM must need more of a push. That's why I joined the EAA—to help build public demand for electric cars in general and major manufacturer produced cars in particular.

I did enjoy the meeting. The EDTA information will be quite useful. At the USGS, where I work, we've got about 250 solarpowered seismic sensors—spread over northern California—all using 12v lead acid batteries.

P.S. If the LBL lithium battery does prove to be a commercial success, will you be looking for a Chinese-American named Li to edit the newsletter?

Fred Fischer - Palo Alto, CA

How about having your Volvo converted by professionals? You can now get a \$1,000 State tax credit for this. Congratulations on being the first to comment on my use of my initials Pb (as in the chemical symbol for lead). Readers note that Li is the shorthand for lithium. -Ed.

More Letters . . .

Paul:

Last week, I received the March and April issues of the *EAA News*. I was intrigued by your article about quantifying the behavior of cars for potential conversion. I'm no expert in this area, but it seems to me one of the most useful and easy figures to obtain would be rolling resistance. Even if the vehicle is dead, it should be possible to make some sort of measurement. How about a tow rope with a scale in it? I'm not sure how you would be able to see the scale while towing a car, but I'm sure that is fixable.

As a new member, there are undoubtedly many facets of EAA I'm not yet aware of. Has anyone undertaken to maintain a list of members' cars? If this included information such as make, year, range, technical features such as voltage, motor, etc., and other miscellaneous stuff, perhaps some patterns would emerge which would yield information for possible conversions. I'm collecting information now about conversions, so if you know of any library of information such as that, I'd sure appreciate a pointer.

Well, that's my 2 cents worth for now. I'm looking forward to seeing more of the Newsletter. As the lone EVer on this part of the state (as far as I know), I'm sure the newsletter will be an important part of my learning process.

Gerry Wheeler - Naples, Florida

Dear Paul:

Let me start by saying I appreciate all your effort. In response to your continuing series of front page editorials asking for my input, here it is:

1. Please, no more front page editorials!
2. Quit your bellyaching.
3. Give me more hard news, e.g.
 - A. Bills pending, passed, etc. What we can do to lobby. It is clear that legislation mandating/encouraging electric vehicles are very helpful. How about a report on New York, Massachusetts, and other New England states passing California-type legislation?

B. How about a survey of our membership. (Thanks for the financial report, but how many members do we have? Big increase, our treasurer reported, but how much of an increase? Let's hear the good news.) The survey would find out:

1. How many electric cars our members have?
2. How many electric cars are running and how many are not running and WHY.
3. Success stories our members can report. Max mileage on one charge. Troubles eliminated and how.
4. Which motors, controllers, batteries are working the best.
5. Total miles logged.
6. Press coverage they have received. Mayors, public figures they have driven to work.
7. School/college classes, environmental groups they have visited/lectured.

Even if they haven't filled in all the questionnaire, it will be an encouragement to do more of these things. Put the survey on a pull-out with a business reply stamp!

C. Chapter news from chapters other than Santa Clara. If they don't report in, call them and interview them. Ask them what they are doing with all that money.

D. Major press coverage we are getting, like Business Week, April 6, 1991. Very favorable coverage. Reporting on press hits like this is very encouraging to those who may feel they are laboring in the vineyard alone.

E. Profiles of EAA members in action. Car of the month! Personal features are always a hit in newsletters of voluntary associations.

AGAIN, your volunteer efforts are helping our country. KEEP SLUGGING!

Charles Garlow - Takoma Park, MD

Thanks Charles and Gary for a lot of helpful thoughts. The bellyaching editorials evidently worked. All of your thoughts are being considered and a survey has been 'in the works' for some time. This is just another reason for my belief that we now need a central office to initiate, co-ordinate, maintain and disseminate information on and for our more than 1,000 current members. -Ed.

Dear Paul:

Since I am monkey number one here in central west Missouri and many surrounding counties, I depend on the *EAA News* to keep in touch with the outside world.

I have long since given up on the Big 3 producing an EV for the market in my time (I am 76). I have been reading lots of printed matter about the progress since 1968 when *Mother Earth* published David Arthur's "Plans". I ordered Kaylor's "Hybrid Plans" which I never received. I also have Michael Hackleman's, Sheldon R. Shacket's, Robert J. Traister's and Flight Systems Conversion and Parts catalogue. I am sure glad Henry Ford didn't wait 20+ years to put his car on the market or Missouri might still be riding donkeys.

EV's definitely have a place in this world. I have had very satisfactory service from my S.V.48 Vanguard which is an over priced toy and leaves much to be desired as an all-weather car. It is too lightweight for an older rheumatic person, so I am in the process of putting together 3 VW conversions even though the Vanguard takes care of my local driving - averaging around 80 miles per month for less than \$1 per month for charging.

I am in need of a wiring diagram for a Bradley GTE 1981 conversion. Can EAA inform me where to find one? Keep up the good work, as it is creating more interest.

R.B. Stockstill - Eldorado Springs, Mo.

Sounds like you have gathered quite a library, but you could really use Mike Brown's Convert It manual. See ad from Electro Automotive. They and others have better parts catalogues than the ones you have now. Can anyone help him with the Bradley plans? -Ed.

More Letters . . .

To the Editor:

Owning and operating an electric vehicle can be a significant challenge. Pressing products into a service they were never designed for continually keeps me on my toes. To help those of us who may be sharing my problems, I have a suggestion for the *EAA Current Events Newsletter*. First some background

I am a moderately technical person. I have a BSEE and am an active amateur radio builder and operator. I understand battery theory and operation well. I bought, many years ago, a U.S. Electricar "Lectric Leopard." It is a commercial conversion based on a Renault LeCar. It uses 16 6v batteries connected through a relay system in packs of 24 or 48 volts into a custom built Prestolite 48v traction motor. Cruise current ranges from about 150 to 250 amps with peaks of 500 amps. I'm using it to commute about 40 miles round trip in the San Jose, CA area. Sound OK? Well, here is the problem. There are a fair number of things that could be significantly better about this car. While there are a number of very experienced and talented people in this association, I can't get to the meeting to talk to them. In order to bring some down-to-earth, practical, today's technology advice to those of us struggling with conversions and lead-acid batteries, I would like to recommend that the Newsletter add a "Technical Advice" column.

Two immediate topics come to mind:

1. My car is very discharged at the end of 40 miles. Seems to me that its range should be substantially higher (like 55-60 miles). What could be wrong? I think my driving habits are pretty good (lots of coasting, little braking, etc.). The car is in excellent mechanical shape. Tires are properly inflated. Batteries are almost new and properly charged. All cabling is large (size 0) and clean. Is the two-step relay system getting me in trouble? How much of an increase can I expect with a chopper system? Is it practical for someone like me to build a chopper? How much is the 48v system hurting me? How much better would a 96v system be?

2. A few years ago I had need to replace the brushes and springs on the Prestolite motor. However, calling Prestolite revealed that there was a 6-9 month backlog for ordering parts due to the bankruptcy proceedings. They were able to provide me with the names of their top 10 distributors

and I was able (with many phone calls) to find the parts. Perhaps we could share that kind of information.

In any case, I hope you will excuse this long and rambling narrative, but information of this sort would prove invaluable for those of us in the trenches that cannot take advantage of all of the cutting-edge technology. I certainly want to hear and read about it, but some practical advice would make "Current Events" even more valuable to me. Keep up the excellent work.

Greg Bassett - Fremont, CA

Ok Greg, I agree that we need a technical advice column, and I plan to start one. For now I agree that you should be doing better. Look at the '91 Rally results. 55-60 miles is common for about 16 batteries, but no one was using less than a 72 volt system and most were 96 volts. Using a lower voltage system leads to more (I squared r) losses in both the motor and the batteries. A new 19 horse Advanced DC motor, or even the 10 h. unit with the batteries wired for 96 volts or more (by adding 2) coupled with a new 15khz PMC controller would make a world of difference. Don't forget to look for the lowest rolling resistance tires you can get. Sorry, all this costs a bundle but it will make a major difference. Good luck! -Ed.

Paul:

I am a conservationist to some degree. It doesn't take an Einstein to see what is happening (and what will happen) to this planet by the exhaust of internal combustion automobiles. However, I am more of an inventor, do-it-yourselfer, and fixer of almost anything. I joined EAA over a year ago with the intention of gaining some knowledge in certain areas to be able to build my own electric vehicle. I have not yet found what I was looking for. Although your letter in the December 1990 issue of *EAA News* gave me a glimmer of hope.

My first concern is locating a suitable motor. I don't want to find a one-of-a-kind motor that would be hard to replace if the need would ever arise. I see ads on the back of the Newsletter like 2CM77 motors and 2CM76 motors for sale but this doesn't mean anything to me. I would like to know things like this: is the motor series, shunt, or compound wound - horsepower, voltage, and current ratings - direction of rotation - type of bearings - dimensions, weight, and availability. This type of information would let me determine the type of motor I would

like to use. A motor I could design a vehicle around.

The thirteen points that you brought out in the December Newsletter would be a big help to a lot of people. But I live in an area that does not have an EAA chapter anywhere close. Therefore most of these points would not apply to me, and also many other interested (and potentially interested) people throughout the country. The people that benefit the most are the people that need help the least. People like myself rely solely on publications like *EAA News*. This is why *EAA News* should provide (in written form in your newsletter) things like the topics you talked about in the December 1990 *EAA News*. Things like handouts of parts sources, tabulation of popular conversions, and equipment and car reviews. A letters column in the Newsletter would be a great idea. I am really glad that you wrote the article for the December Newsletter. It shows me that you are trying to go in a positive direction.

The following is a list of ideas that I had on the subject of improving relations between EAA and today's society, which includes your readers. Have your readers write articles about their electric vehicle. Have it include problems they encountered and how they solved them. Exciting or unusual circumstances concerning the building and driving of their electric vehicle. Things they might have done differently if they had to build the EV all over again. This would give your readers (especially the beginners) an inside look at building and owning an EV. *EAA News* could publish one letter a month for your other readers absorption. You could make available (at least to your readers) EAA T-shirts, bumper stickers, and window decals. You could also have contests to design these items. This would get people personally involved. I feel that there are many talented and concerned people in this world. They just need to be pointed in a direction. You have the direction. Now let's get these people pointed toward a cleaner environment through electric vehicles. These people, like myself, want and need to help. They just need a little positive reinforcement and the support of people like you.

Michael A. Westphal - Huntertown, Indiana

As you can see from the changes to the former EAA News (now Current Events), we are trying to put into practice your suggestions. Please keep them coming! -Ed.

EAA POLICY AND PROCEDURES IN SUPPORT OF TECHNICAL PROJECTS

I. Background

One of the corporate purposes of the Electric Auto Association is "to encourage experimentation in the building of electric autos." In furtherance of this corporate purpose, the EAA has in the past and expects in the future to serve, at the request of one or more EAA members, as the legally designated contractor on behalf of research, development and demonstration projects, hereinafter referred to as projects, conceived and proposed by members of the EAA to various funding agencies. The policy, requirements and procedures outlined in this statement will govern the EAA's acceptance of a contractor role for member-initiated projects.

II. Policy

The EAA will serve as contractor for projects proposed by EAA members if the EAA, through its Board of Directors, determines that such projects are likely to benefit the public and further the aims of the EAA in encouraging experimentation in the building of electric autos. The EAA's role will be limited to that of facilitating the project in two ways: identifying the project as EAA-approved and providing a legal entity to serve as contractor. In this way, the EAA will be able to spread and maximize its impact on the broadest possible range of projects. Any project proposed for acceptance under this Policy must comply with the Requirements and Procedures in Section III below.

III. Requirements and Procedures

1. The project must be directed by the originator of the project or by another EAA member mutually acceptable to both the project originator and the EAA board.
2. The preparation of proposals, related documentation and any and all other such requirements is the sole responsibility of the project director. EAA has no obligations of any kind regarding the preparation of proposals and project plans. EAA makes no commitments whatsoever regarding the support of the project other than those contained in this document. (Individual EAA members are free to volunteer their own time and resources as they so chose).
3. Before submission to the funding agency, the proposal must be reviewed and approved by the EAA board. To receive approval, the proposal must be:
 - a. generally responsive to the requirements of the funding agency,
 - b. compatible with the aims of the EAA, and
 - c. of sufficient technical merit and of such professional quality as to reflect favorably on the EAA and the project director.
4. If a proposal is successful and an award is made, the project will open and maintain a bank account for the project, separate from other EAA bank accounts.
5. The project will institute and maintain a financial accounting system that meets the approval of the EAA Board.
6. Total time required by the EAA Board or its representative to administer its financial obligations under the contract will be no more than 2 hours per month. The project will pay for the time of the Board member who administers the project unless the Board member personally volunteers to provide the time at no cost.
7. The EAA incurs no obligations and asserts no rights regarding the technical conduct of the project. Technical conduct must be in compliance with the requirements of the contract as determined by the project director and the funding agency.
8. All cost, if any, incurred by the EAA on behalf of the project must first be approved by the project director and then promptly reimbursed to the EAA by the project.
9. As a facilitator of projects, the EAA does not intend or expect to have any proprietary rights to technology or other assets of the project. In fact, EAA recognizes that the prospect of proprietary rights usually will be a necessary incentive to interest talented researchers in projects of the type the EAA wishes to support. Therefore, the EAA will not seek any proprietary rights in project assets, and will assign or quitclaim any such rights to the project director. ☺

EAA XA-100 HYBRID EV

(Continued from Page 4)

This is better than other electrics tested and better than some IC engine-powered cars, especially some diesels.

With the engine running, the emissions are within California standards for ultra low emission vehicles (ULEV) for carbon monoxide (CO). Hydrocarbons (HC) were within the California Air Resources Board standards for 1998. NOx emissions were too high but planned adjustments to the engine and air flow to the catalytic converters should bring both HC and NOx within ULEV standards.

EPILOGUE

This project shows that EAA can sponsor members' development projects successfully when the program is well planned and separately funded. Hopefully, more members will be inspired to create development programs and find sources of funding.

The "EAA Policy and Procedure in Support of Technical Projects" is included in this newsletter for the guidance of members.

The project has been very successful in advancing EAA's objective at no cost to EAA. Using funds from the CEC and other sources, the project has advanced HEV technology and created a lot of interest in hybrids as an interim alternative to battery-only EVs while long-range batteries are being developed. We members who worked on it expected only the satisfaction of accomplishment as compensation for our volunteer efforts and we have a lot of that.

Now that all of the work required by the contract has been completed, the EAA is no longer involved. The EAA objective of promoting EV development has taken a giant step ahead.

Further development of this hybrid concept will be done by NEVCOR Inc., a corporation which has just been formed by Dr. Reuyl to continue development of the unlimited range EV. NEVCOR plans to develop and build improved versions of the XA-100, sell them for evaluation and eventually hopes to have them produced commercially in quantity.

Look for more details of the XA-100 design and performance in future issues of CURRENT EVENTS. ☺

NEW EAA HEADQUARTERS ORGANIZATION

The new board held its first meeting on October 16th. The new EAA officers are: Sandy Ames - Chairman, John Newell - Secretary and Bill Palmer - Treasurer.

The following committees were formed: Membership and Chapter Relations: Bob Wing, Chair and John Newell, Vice Chair; Communication and Activities: Paul Brasch, Chair, and Sandy Ames, Vice Chair; Finance: Bill Palmer, Chair and Paul Brasch, Vice Chair.

The new Board is operating under the new EAA Bylaws which were sent to all members in the August/September 1991 newsletter and approved by all members who voted: The board recognizes the need to:

1. Increase the "how-to-do-it" type technical information in the newsletter.
2. Get environmental groups to support electric transportation to reduce air pollution.
3. Increase the public's awareness of EAA and its objectives and make us easier to find for those who are interested in electric cars.
4. Publish more reports of significant chapter activities in the newsletter.

You, as a member of EAA, are urged to tell the new board what you think it should be doing, how it should be done and how you are willing to help. Members make the Association work. Send your suggestions to: EAA Board of Directors, 1249 Lane Street, Belmont, CA 94002-3756.

RULES FOR THE PHOENIX 500 ARE OUT

Electric car rules have been set for Phoenix. Rule books and entry forms are available for the Second Annual Electric Car 500 at Phoenix International Raceway April 24-26. The Solar Electric Racing Association has published rulebooks for 4 classes:

- 1) Electric stock cars
- 2) Hybrid electric cars
- 3) Open class competition
- 4) Solar cars

Cost for each rule book is \$12.00. For more information call Oscar Kobeleski at 717-346-7495.

CERTIFIED PURE ELECTRIC VEHICLE KIT DELUXE KIT #K13

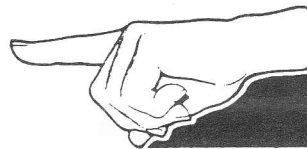
Per State of California Air Resources Board Executive Order Number "ARB E.O. B-22-1" [Electro Automotive, Felton, CA (408) 429-1989], this electric vehicle conversion kit [hereinafter "device", per CA Stats. Health & Safety Code Section 43802(c)] is hereby certified in a pure electric vehicle, which pure electric vehicle qualifies as a "low emission vehicle".

Certification in an "hybrid electric vehicle" is not included in this Executive Order.

This device, when installed in a pure electric vehicle, qualifies the vehicle for a credit against "net tax" [as defined in CA Stats. Revenue & Taxation Code Section 17039] as set forth in R&T Code Section 17052.11, and furthermore, purchase of the "device is exempt from sales and use tax pursuant to Subdivision (b) of Section 6356.5 of Revenue & Taxation Code" [CA Stats. H&S Code Section 43802(b)].

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ELECTRO AUTOMOTIVE
POB 1113
FELTON, CA 95018
(408) 429-1989



This New Component, Worth More Than \$1,000, Is Included Free In Each Voltsrabbit™, Deluxe, Or Basic Kit. Available Only From Electro Automotive.

The sticker at left is one of the most valuable items you can put under the hood of your conversion. It qualifies your car for tax incentives as a "pure electric vehicle".

The state of California quietly approved a tax credit for electric vehicles, but neglected to outline how to implement the program. Electro Automotive applied persistent pressure and guidance and helped make the tax credit a reality.

Conversion kits (not individual parts) that are certified under this program are now exempt from sales tax, and qualify for a credit of up to \$1,000 on state income tax. Electro Automotive, always a leader, has the first such certified kits. Catalogue \$5.00

ELECTRO AUTOMOTIVE
THE SYMBOL OF EXCELLENCE
IN ELECTRIC VEHICLES.



P.O. BOX 1113-EAA FELTON, CA 95018
(408) 429-1989

NEW EAA CHAPTERS FORMING

With new EV groups forming in New Mexico, Oregon, Washington DC, North San Francisco Bay and San Diego, and other areas I may not know about, it is time to look at the EAA membership list and see if there is a concentration of members who might be interested in sharing information.

Some possibilities are Tucson, Honolulu, St. Louis, San Luis Obispo, Ventura-Santa Barbara, North San Fernando Valley, Upstate New York, Conn. Valley, Ohio, Tennessee, Wisconsin-Minnesota.

Give me a call and I can provide assistance in providing names in your area, extra copies of the newsletter and membership forms, suggestions on publicity, speakers and organizing committees. ☺

Bob Wing, Chair
Membership & Chapter
Relations Committee.
P.O. Box 277
Inverness, CA 94937
(415) 669-7402

ELECTRIC VEHICLE INDUSTRY ASSOCIATION FORMS OCTOBER 27, 1991

A group of independent electric vehicle manufacturers, parts suppliers and related services has joined together today at S/EV '91—the Solar and Electric Vehicle Association Symposium, Car and Trade Show in Boxborough, Mas.—to form the nucleus of a new trade association to meet the growing demand for electric vehicles, services, and information in the coming years.

The Association, to be called the Electric Vehicle Industry Association (EVIA), will devote its efforts to the establishment of standards, development of infrastructure, dissemination of information, and marketing assistance. An organizational committee is being formed with volunteers from independent EV companies, including:

Electric Car Journal (Vero Beach, FL)
Electric Vehicles of America, Inc. (Maynard, MA)
Electro-Automotive (Santa Cruz, CA)
Program Development Associates (Gaithersburg, MD)
Solar Car Corporation (Melbourne, FL)
Solectria Corporation (Arlington, MA)

We invite interested parties to contact us and become involved as either members or associate members, through Acting Executive Director Richard Richmond, P.O. Box 6854, Vero Beach, FL; tel. 407-562-9052, fax 407-778-9686. ☺

'91 EAA Symposium Reprints

We have available a limited number of reprints of 3 of the talks given at the '91 EAA Symposium. Those available are: Dr. Richard Post on Flywheel Energy Storage, Chuck Lemme on "Team Tucson" Land Speed Record Plans, and Ambrose Manikowski on Dr. Billing's hydrogen fuel cell (handout). Please send a \$5.00 donation (check payable to EAA) for each copy ordered to: EAA, 1968 Elden Dr., San Jose, CA, 95124-1313. ☺

KTA SERVICES

12531 BREEZY WAY ORANGE, CA 92669
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Established in 1984, KTA SERVICES caters to electric vehicle hobbyists and manufacturers by supplying EV components, publications, and design/consulting services. We are, at last, a complete supplier of EV components....everything you need except for the batteries. All components we recommend and sell have been selected with safety and reliability foremost in mind. All components have been proof-tested in electric vehicles. All components are new, competitively-priced, and come with full manufacturer's warranties. We proudly stock the following:

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SEARCH FOR A NEW LOGO AND MOTTO

The EAA is looking for a new logo. Our present one is too visually confusing and "busy". It has served us well for these past years, especially considering that it reportedly was put together in only about 5 minutes near the start of the organization. But now we need something less visually cluttered that represents electric vehicles and the EAA at a glance.

We would also like to develop a motto for the association. For example, "Clean, Quiet, Cordless", "Drive Better Electrically". I am sure that we can do better than these. So we would like all of our members to give this some thought and please submit a rough sketch or a finished copy of your idea(s). The Board of Directors will then either select one or put a few up to a vote by the membership.

One example of a new logo created by John Broenen who created the new look and name of "Current EVents". ☺

Please send your logo and motto ideas to:

EAA Logo

1249 Lane St.

Belmont CA, 94002-3756.



ELECTRIC AUTO ASSOCIATION

NEW DATE AND PLACE NORTH BAY CHAPTER

We will meet on the second Saturday of each month at 10am to 12 noon at the Santa Rosa PG&E conference room, 111 Stony Circle. Use the entrance at the south side of the building. Stony Circle is an extension of W. Ninth Street where they intersect Stony Point Road at a traffic signal. Stony Circle is two traffic signals north of Highway 12, the main highway between Sebastopol and Santa Rosa.

If you have questions: call Bob Wing, Chapter President at (415) 669-7402. ☺

Want Ads

Willie controllers tested and repaired. Used controllers bought and sold. For additional information call or write Vandy Enterprises, Inc., 515 S. Esquire Way Mesa, AZ 85202. After 4pm, MST weekdays, (602) 967-6901

4 Govt. Surplus Electric Vehicles: 2 cars, 2 trucks; outstanding value. Also, new PMC parts, incl. controllers. Beyond Oil. (415) 338-0838

Wanted 48V Motor Controller: Working or Repairable cond. accept. Please call/write for details. Greg Bassett, 141 Sobrante Ct., Fremont, CA 94536. (408) 496-3474

Lectric Leopard Car. New Curtis controller, new wiring, new batteries. Runs great! 3,000 mi.. \$6,800 Call for info. (916) 292-3134

VW Electric, Viking fiberglass body, Prestolite motor, Wasyline adapter, 16 batteries. \$1,600. Scott Davis, 16250 Brook Acre Drive, Los Gatos, CA (408) 356-3251

FOR SALE: Electric Pinto, all new components; 84 volt 235 amp/hr batteries, 20 HP Advanced DC motor, Curtis PMC controller, on board charger. \$6,500. EV Products (602) 636-2201

\$5 for 5 line Want Ad

The EAA is not responsible for the accuracy of ads

Calendar

1st Tuesday of Each Month The Electric Vehicle Assoc. of San Diego (EVAOSD) meets. Call Ron Larrea at (619) 443-3017 for more info.

2nd Saturday of Each Month The North Bay Chapter meets 10am to 12 noon at the Santa Rosa PG&E Conference Room. Call Bob Wing (415) 669-7402 for more info.

January 11 Bruce Wood on some experiences on EV conversions and the best batteries to use. An EV will be on display plus a GM Impact video. (North Bay Chapter)

January 16 Tom Turrentine of the Institute of Transportation Studies, U.C. Davis, will tell about the Pasadena Alternative Car Test wherein over 100 people tested and commented on alternative vehicles. He will also update us on the DMV EV registration hunt. (Silicon Valley Chapt.)

February 8 Mark Bramfitt on the PG&E clean air vehicle program. (North Bay Chapter)

March 14 Dr. John Reuyl on the successful XA-100 EV hybrid sponsored by the California Energy Commission. (North Bay Chapter)

April 25-26 Solar & Electric 500 2nd Annual Competition. Saturday and Sunday. Phoenix Int'l Raceway. Call 953-6672

May 4th Annual American Tour de Sol, Solar and Electric Car Championship. Contact NESEA, Northeast Sustainable Energy Association. (413) 774-6051.

August ENER-RUN Transcontinental Rally. Washington DC to Los Angeles in alternative powered vehicles. Call Les Adam (501) 856-3877 for details.

September 27-30th The 11th International Electric Vehicle Symposium.

EAA Chapters

ARIZONA

- Phoenix
Lee Clouse (602) 943-7950
P.O. Box 11371, Phoenix, AZ 85061
Meetings: 4th Saturday/month 9am – Noon
Even months: Chapman Chev., Baseline Av.
at McClintock. Odd months: Lou Grubb
Chev., 27th at Camelback, Phoenix

CALIFORNIA

- East Bay
Jim Danaher (415) 339-1984
1986 Gouldin Rd., Oakland, CA 94611
Meetings: 2nd Saturday/month 9:30 – Noon
PG&E Service Center, 4801 Oakport St. (880
frontage road south of High St.), Oakland
- North Bay
Bob Wing (415) 669-7402
P.O. Box 277, Inverness, CA 94937
Organizing meeting Sept. 21, 1991
Location to be announced. (See inside)
- Peninsula
Jean Bardon (415) 355-3060
540 Moana Way, Pacifica, CA 94044
Meetings: 1st Saturday/month 10am – Noon
San Bruno Public Library (downstairs), San
Bruno.
- Silicon Valley
Paul Brasch (408) 371-5969
1968 Elden Dr., San Jose, CA 95124-1313
Meetings: 3rd Saturday/month 10am – 1pm
Hewlett Packard Santa Clara facility, Stevens
Creek Blvd. at Lawrence Expwy., Santa Clara

- San Jose
Don Gillis (408) 225-5446
5820 Herma, San Jose, CA 95123
Meetings: 2nd Saturday/month 10am – Noon
1592 Jacob Ave. (near Meridian), San Jose
- Los Angeles
Irv L. Wiess (818) 841-5994
2034 N. Brighton "C", Burbank, CA 91504
Meetings: 1st Saturday/month 11am – 1pm
Pasadena City College, 1570 E. Colorado
Blvd., Rm. E220, Pasadena

NEVADA

- Las Vegas
Gail Lucas (702) 736-1910
Desert Research Institute
2505 Chandler Ave., Ste. 1
Las Vegas, NV 89120 EXAS

TEXAS

- Houston
Ken Bancroft (713) 729-8668
4301 Kingfisher, Houston, TX 77035

WASHINGTON

- Seattle
Ray Nadreau (206) 542-5612
19547 23rd N.W., Seattle, WA 98177

NEW JERSEY

- Hackensack
Kasimir Wysocki (201) 342-3684
293 Hudson St., Hackensack, NJ 07601

NEW ENGLAND

- Maynard
Bob Batson (508) 897-8288
1 Fletcher St., Maynard, MA 01754

SOUTH FLORIDA

- Ft. Lauderdale
Steve McCrea (305) 463-0158
101 SE 15th Av., #5, Ft. Lauderdale, FL 33301
- VANCOUVER, B. C.
- Vancouver
VEVA (604) 987-6188
543 Powell St., Vancouver, BC V6A 1G8
- American Solar Car Ass'n.
Robert Cotter
P.O. Box 158, Waldoboro, ME 04572

NON-AFFILIATED GROUPS

- EVAOSC
Ken Koch (714) 639-9799
12531 Breezy Way, Orange, CA 92669
- EVCO (604) 987-6188
Box 4044 Sta "E"
Ottawa, Ontario CANADA K1S 5B1
- DEVC
George Gless (303) 442-6566
Denver, CO
- Fox Valley EVA
John Stockberger (708) 879-0207
2S 643 Nelson Lake Rd., Batavia, IL 60510

For info on the EAA, send SASE to the
address below or call (415) 591-6698, (415)
685-7580 or (408) 371-5969. Please call
weekdays 10am – 5pm Pacific Time.



December/January 1992

ELECTRIC AUTO ASSOCIATION

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