



1989 Calendar 1989

THE THEME FOR THE EAA 1989 CALENDAR WILL BE "THE FUTURE" WHERE WILL WE BE IN THE YEAR 2000.

WE NEED 14 CAMERA READY PAGES BY NOVEMBER 15TH!! EAA IS OFFERING A PRIZE OF \$100 FOR THE BEST PAGE. PLEASE USE BLACK & WHITE PHOTOS AND HAVE THEM SCREENED (HALF TONE) IF POSSIBLE. THANKS FOR YOUR HELP!

Santa Clara Rally

SANTA CLARA CHAPTER, Held it's 16th Annual EV Rally at Mtn. View's Shoreline Park this year. We had people from four states, cars from three. Our new 10 section, 10 point system (see pg. 2 Sept.) was very successful with Bob Steinfeld winning with 80.5 points. Bob reached 50 MPH in 14 seconds in the acceleration test. Best looking car was Scott Cornell's Beautiful red Carman Ghia

Bill Williams and Ken Koch did yoeman duty setting up and operating the tenth mile acceleration course. Average speed was 35 MPH in 20 seconds.

PG&E's GM Griffen electric van ferried visitors to the boat house snack bar and back. Several visitors had an opportunity to test drive the Griffen.

A good variety of vehicles were registered, from Jet Industries 007, JMJ Omni, three Hybrids, the red Ghia by Scott Cornel and John Wasylina's beautiful Renault.

The Sunday Symposium was outstanding with over 50 people present. Jim Brunner of Electric Vehicle Development Corp. (EVDC) presented their plans for the production and distribution of the G-Van (GM 1-ton) and the Chrysler TEVan (Voyager). Jonathan Tennyson Project Chairman/Driver of the MANA LA Solar Wind Racer. MANA LA was the Hawaiian entry in the Australian Solar race. Jonathan presented his plans for a single passenger three wheel EV with optional vertical arch shaped wing which will add forward thrust with any wind

except a direct headwind. Clarence Ellers showed a drawing of the projected conversion of a Voyager Van to an automatic hybrid. Bill Williams discussed his 500 cycle battery test in his commute EV.

KEITH CROCK Award for TECHNICAL ACHIEVEMENT; Two awards were presented, the write in award went to Jonathan Tennyson for his work on the MANA LA. The on site award was presented to George Gless for his leadership on the DEVC hybrid, which was built as a club project. George towed the hybrid to our rally from Boulder CO.

Reported by Lee Hemstreet

NOTICE!!

Don Gillis of our San Jose Chapter has compiled a complete Index for the EAA Newsletters for 1987. With the Index you can quickly find articles on subjects of interrest to you. If you would like a copy send \$1 to EAA Newsletter, 2892 Mesquite Dr. Santa Clara, CA 95051.

Don is working on the Index for 1988 we will let you know when it is available.

EAA NEEDS YOUR HELP!!

EAA needs your support and input for our State Hybrid project.

The Newsletter needs technical articles, events one month lead time and clippings of interrest to clean air transportation.

The Newsletter needs your comments, criticism and questions.

Thanks for your cooperation Clarence.

Save money with low-maintenance charger!

'On the seventh day only shalt thou allow the battery to gas freely. And on the eighth day shalt thou count the financial savings'. That could and should be the result of using a new charger and charging routine introduced by Chloride. It is centred around the use of a new charger called the low-maintenance or Spegel LM charger.

According to Mr Keith Heyes, the Applications Manager of Chloride, the company tried promoting the LM concept around the trade last year, but met with a lukewarm response.

So what was wrong? Did fleet managers have their deaf aids turned off, or did you see practical problems which Chloride failed to see? Perhaps it was just that Chloride did not spell out the savings strongly enough. So here goes.

The secret of Spegel LM is not that the charger needs low-maintenance, but that the battery used with it does.

The concept is this. On six days a week you recharge the battery only to 85% using a voltage cut-off, so that it hardly gasses at all. Then on the seventh day (usually the weekend), you recharge it fully with a charger that gives the battery a full equalising charge, which means that the battery gasses freely and evens up the cells.

Does the system work? Definitely so, says Keith Heyes. Chloride ran a 12-truck trial with an industrial user over an 18-month period and the LM system achieved everything claimed for it.

What was the central claim? It was that the frequency of topping up could be reduced to one-quarter of the usual, namely from once every 2 weeks to once every 2 months.

Think about that one! To you, the customer, the main cost of maintaining a battery is the cost of labour and topping-up water. Typically the time involved would be about 15 minutes once every 2 weeks i.e. 6 hours per year. Add to this the cost of purified water, and a forklift battery would cost about £100 per year to maintain. Spegel LM offers you the chance to reduce this to only one-quarter, namely, to £25 per year, a saving of £75 per battery per year.

That's just a start. In reality, the advantages are much more numerous. Spegel LM cuts down maintenance because it cuts down the amount of overall gassing. Thus, on six days a week there is virtually no gassing, but on the seventh day there may be twice the normal gassing charge. This leads you by simple arithmetic to the

claimed reduction in gassing on average to 25% of the norm. From this too, you can spell out other gains with clarity and certainty. For example, you will see:

- One quarter of the usual amount of water consumed.
- Approx. 10% saving in electricity used for charging.
- Charging completed within a shorter time because you forego the slowest (gassing) part of the charge cycle.
- Longer battery life because life is so often dictated by the corrosion of the plate spines, and corrosion is directly proportional to the cumulative amount of gassing charge.

These advantages are more difficult to quantify in terms of money saving, but they are likely to dwarf the savings in maintenance alone. In other words you could expect the savings of £75 per year to be multiplied by 2 or 3 times. That begins to sound like useful money and a fast payback. So perhaps, now, you are more excited by the prospects.

How does the LM system work? At the heart of the charger is a 24-hour 7-day programmable timer, just like the ones used by the more clued-up fleets for optimising use of cheap electricity. One of these is built into the LM charger. One other device is needed: a voltage-sensing circuit which can drop out the main isolator when the battery has come up to a pre-set voltage of about 2.5V/cell.

In action, the programmer selects the voltage cut-off mode for six days a week, but selects the full-charge/equalisation mode for the seventh. That's all. Not very difficult. Indeed, it does not appear that there is anything proprietary in the system. Customers who wish to make use of cheap night tariffs can use the programmer to kill two birds with one stone.

If this all sounds too good to be true, there is one basic limitation to the system, but in a minute we'll suggest how to overcome that one too.

The limitation is that the LM system can only be applied where the battery would otherwise only be discharged to 65% of its label capacity. The reason is that the LM charger only normally brings the battery up to 85% full recharge, so if you work downwards from there you can only go down a further 65% before hitting the bottom limit of 80% discharge.

Why has the LM concept so far met with a lukewarm response? Keith Heyes says that he believes that fleet managers are wary about altering maintenance disciplines.

There is an amusing story going round the trade of a service electrician who was so convinced that all lead-acid batteries needed topping up every two weeks that he took a chisel to open up a Sonnenschein Dryfit sealed traction battery given to him for evaluation! With people like that, what hope is there for innovations? Anyway, to be more serious, it could be a real cause of confusion for some batteries to need topping up once every two weeks, some at six weeks, and some not at all.

So, from a practical point of view, the LM system tends to define its natural area of application. It should be practical and a great money spinner for the following:

- (i) Fleets which will go wholly LM and thus avoid the confusion of topping up intervals, or
- (ii) Fleets with determined management, prepared to label batteries and insist on the observance of different routines for different batteries.

In addition, the limitation on usable capacity means that the LM charger and routine are best applied to:

- (a) Fleets in which the batteries are lightly discharged, or
- (b) Fleets in which the trucks are fitted with large optional batteries.

If you, the customer, react to the LM concept with enthusiasm, it could encourage Chloride to do yet another piece of arithmetic. How about purposely sizing the OE battery bigger than normal or fitting Classic 15 cells if you are normally using standard traction cells? Then your 80% discharge turns into 65% and allows you to use the new LM routine. Are you with me? What you then need to do is to find whether the extra battery amp-hours are paid for by all the many money-saving features already spelt out.

Turning now to battery and charger buffs, there is a fundamental change in battery 'lore' being propounded here by Chloride,

which is that today's batteries made with lower antimony plates than previously do not need 15% overcharge every time. Chloride seem to be saying that it can be much lower than this figure.

If other battery companies agree, there is no reason why the whole industry cannot move in this direction. Indeed, thoughtful battery men may see a likeness between the LM routine and the type of opportunity charging regime used so successfully by British Airways at Heathrow. Here, the battery goes the equivalent of several cycles without gassing (on opportunity charge) and is fully re-

charged only once every fourth day or less because of the availability of overnight chargers.

Remember that batteries can be made to yield more than their label capacity each day by opportunity charging. So if you combine the LM routine with a mid-day opportunity charge...! What do you think of that idea?

Without doubt, all these things can be made to work and will undoubtedly save money for anyone bold enough to try them. But many fleet managers will want to move towards greater flexibility and will shrink from the idea of more discipline. For everyone who takes that quite

justifiable view, Chloride's LM charger and routine will be destined either to be forgotten, or to be applied only where conditions pre-exist to make it a success.

Hopefully, ETV World has spelt out the very real potential cost savings of the low-maintenance charger and charging routine. If you would like to try it out, or cost it out as applied to your fleet, please telephone Keith Heyes. Without question, he would like to see other customers try out the system and learn more about the true rewards.

Chloride Industrial Batteries Ltd., Over Hulton, Bolton BL5 1DD.

☎ 0204 64111



- ✓ Save topping up
- ✓ Save electricity
- ✓ Charge more quickly
- ✓ Make batteries last longer

Too good to be true?

Not so, according to Keith Heyes of Chloride who has carried out trials for the last 18 months.

FROM THE PAST, THRU THE PRESENT, AND INTO THE FUTURE

We in the EAA are undertaking a Research Project which will bring us closer to the future. This Project might be better understood and the significance appreciated if we were to review a little history of the accomplishments of one particular man. You may see how our work and ambitions are somewhat similar to his. At least you may find the comparisons interesting and amusing. In fact it might well shed some light on how "American Industrial Supremacy" of the past century can be carried over into the next century. Let's look at a famous inventor who helped in a very significant way to create this industrial supremacy.

The inventor was Charles Kettering, later of General Motors fame. His first achievement was an improved automobile ignition system. He also greatly extended the life of dry cell batteries then used in automobiles. General Motors immediately bought 8,000 of his early components for their cars.

In 1910 a woman's Cadillac stalled on a bridge in Detroit. A passing man gallantly offered to restart the car for her. Now days, how many of you know what is required to hand crank an automobile to start the engine. On this occasion the crank snapped back breaking the man's jaw. Complications set in and he died.

This death greatly troubled the then President of General Motors. He approached Mr. Kettering again hoping he could develop a safe alternative for getting cars started. Kettering assumed an electric motor could crank an engine and more importantly serve as a generator of electricity as well. Then the addition of a storage battery would complete a system that would start the car, generate electricity for lighting and ignition as well as store excess electricity for future starting. In short a system we still use today but can improve on for tomorrow with our present knowledge.

In the begining, in an old barn Kettering's men did much like we must do with our EAA members in the Bay Area. They designed, drafted, machined, wired and wound each component required for Kettering's new starting/lighting/ignition systems. EAA members must now design, draft, machine, wire and wind similar components for our research project, intended to extend the range and marketability of electric vehicles.

Kettering and his Delco company was bought by General Motors. His next experiment was with air-cooled engines. He, like us electric car drivers, could see the advantages of eliminating all the fuss and troubles with radiators that boil over in the summer and freeze in the winter. His project failed and was a \$31 million tax write off for GM in 1923. It was up to the German VW to do this successfully much later.

Kettering hoped to find an alternative to fossil fuels. He established and financed an independent investigative effort into the workings of photosynthesis that lasted fifty years. With today's space age technology, we are extremely close to his ambition, an economical substitution of photovoltaic electricity for fossil fuels.

The EAA for 20 years has been endeavoring with some risk to do what Mr. Kettering did. He often referred to his approach as this quality of "intelligent ignorance". The EAA has been fortunate with this "intelligent ignorance" method. Not knowing that it was impossible, EAA members have gone ahead establishing electric vehicle records and finding devices to improve performances. By such means as this approach electric vehicles have been advanced toward marketable electric cars and trucks.

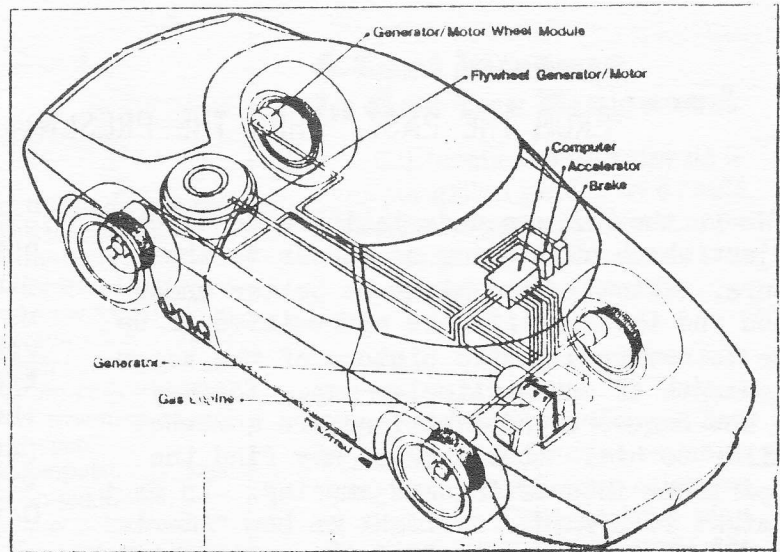
The EAA would like to help the public better understand these rather simple, trouble free systems which are similar to those that start their present cars everyday. It is possible for the United States to again lead in marketing better automobiles in a better world.

If you remember Kettering started by selling 8,000 electric ignition units. Today Los Angeles is considering a Request for Proposal (RFP) for the production of 10,000 units of electric vehicles. Both the Los Angeles Department of Water and Power and the Southern California Edison have agreed to support and assist in the development of this proposal. Perhaps "intelligent ignorance" will again emerge to benefit us all, in the Twenty First Century.

By John Newell
EAA Int'l Chairmar

4 **UNIQUE MOBILITY HAS RECEIVED \$4 MILLION** for a 3.5 year research & development project to further develop electric drive systems. The concept depicted in the figure has a motor-generator in each wheel, a flywheel to store energy for acceleration and hill climbing and a small engine driving a generator to supply the average energy needed to propel the car.

Our thanks to John Burnham and Roy Tiff for the article from the Denver Post.



Special to The Denver Post/Unique Mobility Inc.

ELECTRIC DRIVE: Unique Mobility's design for an electric drive system that eliminates virtually all the heavy components common to conventional vehicles.

From Small Projects to Large, Solar Shines



Science students at Robert Louis Stevenson Middle School in St. Helena learned about solar power and energy conservation—and built their own model solar homes. PG&E helped judge the models based on their innovation, energy conservation and landscaping.

Enthusiastic sixth graders in St. Helena transform foil, cardboard, tape and glue into 44 miniature solar homes.

Meanwhile, on 80 sunny acres near Davis, bulldozers and construction workers begin work on one of the nation's largest solar research projects.

From the smallest to the largest projects, from the dreams of students and

researchers to gleaming new power plants, PG&E is helping to make solar power a reality.

It all begins, as most things do, with education.

At Robert Louis Stevenson Middle School in St. Helena, 82 students recently learned about conservation and solar energy, then made their own solar home models.

Working in pairs, the stu-

dents first laid out house plans on cardboard bases—facing south, as good solar homes should. Then they made windows from sheets of plastic, insulated tiny attics with wads of cotton and made solar "collectors" from foil and plastic.

"It was a big mess for a while, but we loved it," says science teacher Jay Senter.

Solar Power

He asked a local PG&E representative, a school board member, a realtor and a student to judge the children's work and award ribbons.

"These kids are pretty creative, and they're looking to the future," says Senter. "The project helped them learn about energy use in their own homes and discover how efficient a house can be if it's well designed."

But sometimes what's creative and what's practical can be two different things. Today, solar heating panels and solar-electric systems are often too complex and costly for homes.

Solar electric (photovoltaic) cells have been used for years on NASA space vehicles and in remote areas not served by utilities, but they're still too expensive for most uses. Costs are coming down, however, and researchers have boosted the amount of power each cell can produce.

PG&E is involved in this research. Over the next few years, the company will manage the largest photovoltaic research project in the U.S., known as PVUSA (Photovoltaics for Utility Scale Applications).

PVUSA's centerpiece is a site near Davis, where various photovoltaic systems will be tested. Computers will gather data on different systems as they almost magically turn the sun's rays into electricity.

"Photovoltaics are promising

because their power output matches our customers' peak electric demand so closely," says Joe Iannucci, PG&E's program manager for photovoltaics. "The solar output is highest on sunny days when people use a lot of electricity for air conditioning."

The U.S. Department of Energy, the California Energy Commission, the Electric Power

on solar ventures — from technical development to plant construction — that could be profitable. For instance, the two companies may team up with Chronar Corporation and the Sheet Metal Workers Union to build a large plant that will make photovoltaic panels.

And PG&E is host to the world's largest photovoltaic power plant. On 160 lonely

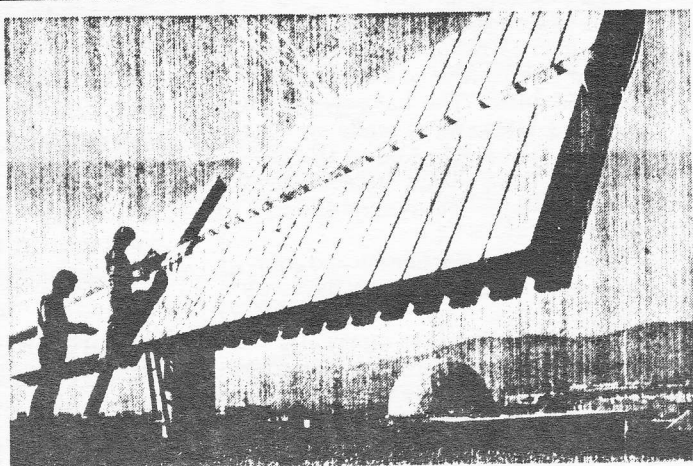
acres of PG&E-owned land in eastern San Luis Obispo County, Arco Solar has built hundreds of large solar panels mounted on pedestals.

Like enormous sunflowers, the panels tilt during the day to follow the sun. The plant can produce enough daytime power for 6,500 homes, and PG&E buys all the

electricity it produces.

"I can see the day," predicts Iannucci, "when PG&E will have many solar power plants of various types to help supply our customers' peak power needs."

—Amy Pinkerton



This photovoltaic panel, at PG&E's San Ramon research center, concentrates the sun's rays to boost power output.

Research Institute and PG&E will provide much of PVUSA's funding. Other utilities, from Virginia Power to San Diego Gas and Electric, have been invited to participate.

"PVUSA is critical to proving that utility-sized photovoltaic systems can be built economically and run efficiently," Iannucci says.

But PG&E isn't just looking to the future; the company is using solar energy now.

Already, PG&E uses solar cells with batteries to provide economical power to a signal beacon atop a tall transmission tower and to remote gas pipeline measurement and control systems, among others.

PG&E and Bechtel Group have agreed to work together

Volume 65 August 1988 Number 8

PG&E Progress

Editor: Steven B. Wright

□ This publication is intended to provide helpful information to our customers. It is not printed at customer expense. The cost is borne by company stockholders out of earnings. □ PG&E's rates are determined by the California Public Utilities Commission based on the cost of fuel, power plants, pipelines and other costs necessary for providing utility service. The cost of this publication is not included in this computation, thus rates are just what they would be if this message had not been printed. □ Pacific Gas and Electric Company, Room 1416, 215 Market Street, San Francisco, CA 94106.

Dick Hoorn

Nickel-hydrogen: a better battery?

After more than a decade of use as an energy source in space vehicles, nickel-hydrogen batteries are ready to come down to earthly uses in photovoltaic arrays, battery-powered vehicles, flashlights, and a broad range of other applications. Scientists at Sandia National Laboratories, in Albuquerque, N. M., and Johnson Controls Inc. in Milwaukee have been developing the battery for terrestrial use since the early '80s. If they're successful in reducing the cost of assembly, the batteries may soon find commercial applications.

The reason is that the nickel-hydrogen system has many advantages over other battery systems. Sandia is currently testing one with a photovoltaic array. Many photovoltaic systems use lead-acid batteries, which require frequent maintenance and periodic replacement. Neither is needed with the nickel-hydrogen system. Because the battery is completely sealed, electrolyte content remains constant regardless of the number of charge-discharge cycles. "In fact," says Sandia's Donald Bush, "if you have proper electrolyte management, you would need no maintenance at all."

Being sealed also affords the battery a feature unique to the nickel-hydrogen system: Since hydrogen gas is formed on charge and consumed on discharge, gas pressure becomes a direct indication of charge; you know exactly how much energy the battery has left. "Essentially, you could build a fuel gauge out of a pressure gauge," says Bush.

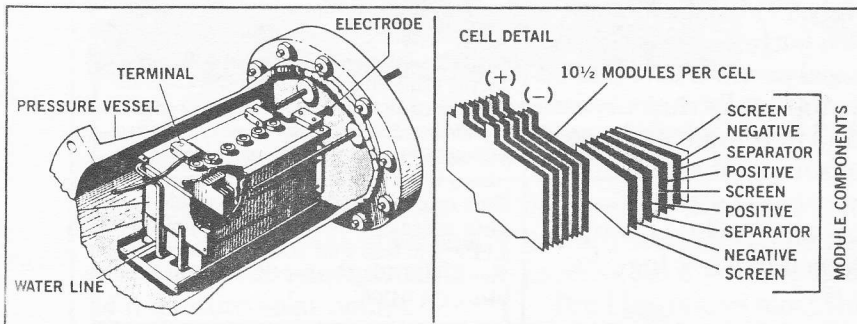
Although it is primarily envisioned as storing energy generated by photovoltaic systems, the nickel-hydrogen battery has several other qualities that may make it the battery of choice in the future. Johnson Controls

is looking at using it with power facilities, aircraft, and electric vehicles. The battery can be continuously and greatly overcharged and overdischarged without much adverse effect. "You have internal recombination of gases on overcharge," Bush says. "You have this to a limited extent with other systems, but they don't recombine as well as with nickel-hydrogen."

This chemical compatibility also makes grid corrosion negligible, says Richard Beauchamp of Johnson Controls. He adds: "The battery system is very scalable. We've made systems as small as the AA. And in the testing we've done so far, it looks as if it has the same features as the full-size cell."

To reduce cost, the Sandia and Johnson teams redesigned the battery's original configuration. Unlike its space counterpart, which uses separate pressure vessels for each cell, Sandia's nickel-hydrogen battery has a common pressure vessel (see drawing). Beauchamp says Johnson Controls is looking at using thicker positive (nickel) electrodes and reducing the amount of catalyst in the negative (hydrogen) electrodes to minimize cost.

The nickel-hydrogen battery is not without its problems, however. "The ultimate failure mechanism is the nickel electrode," says Beauchamp. "As the battery cycles [discharges and charges], it tends to swell and push against the separator and drive out the electrolyte." But Bush assures that this problem "would manifest itself only after some significant length of time." Nickel-hydrogen batteries are capable of undergoing 10,000 to 20,000 charge-discharge cycles over a period of 20 to 30 years, which is about the life span of a photovoltaic array. — Eduardo R. C. Capulong



H₂ gas forms on the negative electrode on charge. O₂ begins forming on the positive electrode on overcharge. The

two combine to stabilize the pressure and form water. This process is reversed during discharge.

6-Cent Increase In Gas Tax Proposed

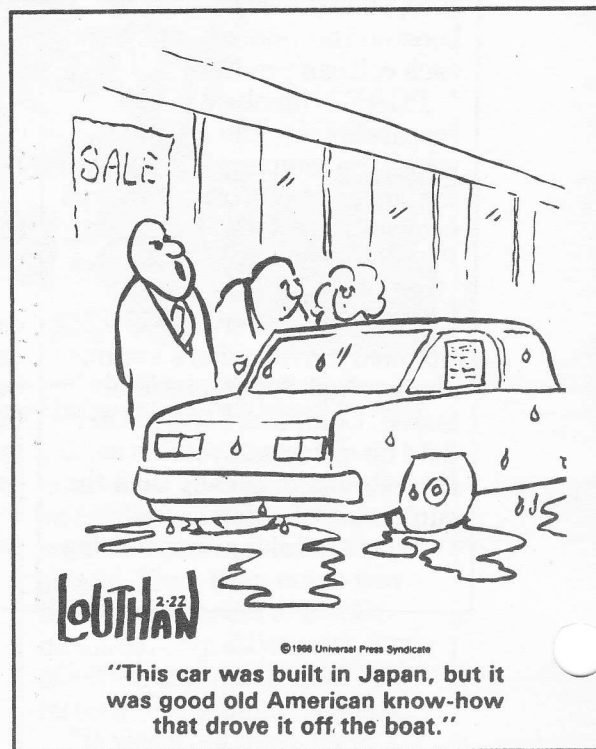
California should raise its 9-cent-per-gallon gas tax by 6 cents a gallon to get money to cope with the state's traffic mess, two state senators said yesterday.

The proposal by Senators John Garamendi, D-Walnut Creek, and Quentin Kopp, a San Francisco independent, came in the aftermath of voter rejection of Governor Deukmejian's plan for a \$1 billion bond issue for transportation programs.

The two senators said they will try to place the issue of increasing the gas tax and the fees charged the trucking industry before the voters in the November general election.

They said their proposal would raise \$4 billion for transportation programs over a four-year period starting in the 1989-90 fiscal year.

Briefcase



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"This car was built in Japan, but it was good old American know-how that drove it off the boat."

(grs) Research done by Professor *Borislav Bogdanović*, *Max-Planck-Institut für Kohleforschung* (Max Planck Institute for Coal Research) in Mülheim und *Ruhr-Universität Bochum*, has created new possibilities for hydrogen storage techniques which could be used in environmentally sound hydrogen-operated automobiles, to give just one example. Professor Bogdanović was honored for his work with the 1987 "Ruhr-Preis für Kunst und Wissenschaft" (Ruhr Prize for the Arts and Sciences), awarded by the city of Mülheim. Bogdanović succeeded in using catalysts to induce the metal magnesium to react with the gas hydrogen under "moderate" conditions, i.e., at temperatures of between 20 and 50 degrees Celsius and under low pressure. This reaction produces magnesium hydride, a compound in which hydrogen can be stored and from which it can be isolated again in an equally uncomplicated manner. Since the processes of producing and splitting up this compound can be repeated *ad libitum* in both directions, Bogdanović's method provides an excellent way to store hydrogen. In addition, it is conceivable on the basis of these findings that a thermal system designed to store solar energy in magnesium hydride can be developed. A system of this kind would be superior to the photovoltaic methods traditionally used.

Contact: Pressestelle der Ruhr-Universität Bochum, Postfach 10 21 48, D-4630 Bochum 1

GATES ENERGY PRODUCTS has acquired **GENERAL ELECTRIC'S** Battery Business Department which makes Gates the world's largest source of sealed rechargeable batteries. The battery line now includes nickel cadmium, nickel hydrogen and sealed lead acid with capacities from 0.065 Ah to 300 Ah. As a matter of interest, John Devitt's name is on the original Gates patent for the sealed lead acid cell. Taken from a Gates ad in *Electronics* for November 26, 1987, page 108.

THE AUTOMOTIVE HANDBOOK by **Robert Bosch** (GMBH) is available from **SAE**. The new Second English Edition has been expanded by over 200 pages with 18 new subject areas. Two new areas covered are electric and hybrid drives. It has 708 pages in a handy size (4.75 X 7.25 inches). The price is \$15.95 for SAE members (18.95 list). Call SAE Customer Service at (412) 776-4970 or send ordering information to Dept. 856, 400 Commonwealth Dr., Warrendale, PA 15096. Include your membership number.

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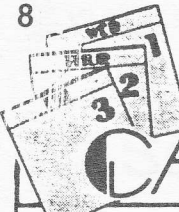
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Renault Conversion, 72V system, Jack & Hines G29 Shunt-wound Motor (new bearing) \$200. Willy Model 8 Controller \$400. 12 US Energy 6V Batteries \$20/ea. Misc parts-best offer. CALL: Mike Kernaghan (408) 371-5225.

* * * * *



CALENDAR

OCT.4-6: AUTOTESTCOM '88 Hyatt
Regency/Holiday Inn Minneapolis, MN (612)
542-4841.

OCT.8: COMMUNITY FESTIVAL-WEST
VALLEY COLLEGE! 9:00AM-4:00PM
14000 FRUITVALE AVE. SARATOGA,
CA. EAA WILL HAVE AN EXHIBIT<>

OCT.11-13: Fall Design Engineering Show New
York, NY, Call 1-800-255-7798.

OCT.15: Santa Clara Chapter, Mike Hughs of
GM-Hughs will present a program on
Magnaquench and other super magnet motor
technology.

OCT.17-19: Convergence '88 Int'l Congress
on Transportation Electronics, Dearborn, MI
(313) 986-8048.

NOV.13-16: EVS-9-9th International Electric
Vehicle Symposium-Toronto, Harbour Castle
Westin Hotel-CALL: (416) 746-7360.

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Albuquerque, NM 87158

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Genny Clark 303 451-5051

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Batavia, IL 60510

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Lane St. Belmont, CA 94002. For a sample copy
of the newsletter send SAE #10 envelope.
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EVENTS. ARTICLES-Comments etc. all correspondence to address below

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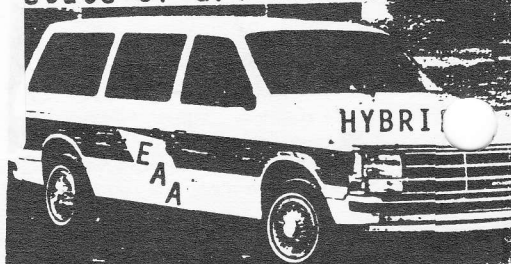
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Address Correction
Requested

NON-PROFIT
ORGANIZATION
U.S. POSTAGE
PAID
SUNNYVALE, CA
PERMIT NO. 420

HELP!! PROJECT-X
State of art HYBRID



PLEASE
TIME DATED MATERIAL - DO NOT HOLD DODGE CARAVAN