Electric Auto Association NEWS

NOVEMBER 1988 Vol. XX No. 11

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!

New technologies seeking the road to cleaner air

A look at alternatives to the internal combustion engine

SACRAMENTO — Within a few years, Californians may be driving cars that run on alcohol, or natural gas, or propane, or hydrogen, or even batteries that are recharged at night.

All of these technologies are under study at present, and though each has many drawbacks, cars using some of these "alternative fuels" may begin to appear on the state's streets and highways as early as next year — part of the ceaseless effort to clean up the state's air.

On Friday, the state Air Resources Board held a daylong hearing on the state of alternative fuels research. The board is especially interested in the new technologies because they hold the promise of reducing the chronic smog that affects much of the state.

"Around the turn of the century, the improvement (in the state's air quality) will bottom out" unless widespread fuel-switching occurs, said Dave Cole of the board's mobile source division.

Closest to becoming reality are electric cars, which are well-suited for use by urban delivery services that don't use the freeways and cover less than 60 miles per day. Once the battery-powered cars are paid for, they are cheaper to fuel and maintain than gasoline-fueled cars, industry officials said.

Already the Electric Vehicle Development Corp. has distributed 32 of the converted passenger vans and mini-vans in the United States, mainly to its member electrical utilities for demonstrations. Commercial sales, mainly to fleet owners, are envisioned by late 1989.

"Electric vehicles are a reality," said Jerry Mader, the corporation's president. "They are here today. By the end of next year they will be available on a commercial basis."

But even Mader admits that at most, electric cars will fill a specialized niche in the automotive world. Their use is limited by the need to recharge them every 60 miles, a process that takes as much as 12 hours.

Even when better batteries are devised, the range of electric cars is unlikely to reach more than 150 miles, industry officials said.

By contrast, cars that run on methanol — commonly known as wood alcohol — are limited mainly by the availability of their fuel, said Chuck Risch, an engineer for the Ford Motor Co.

Cars running on methanol, which fuels Indy racers, run cleaner and more efficiently. The fuel produces more power than gasoline and has the potential to produce less smog. Unburned methanol is less susceptible than gasoline to the atmospheric chemical reactions that produce ozone and other smog components.

Risch expressed confidence that the remaining technical hurdles for methanol — such as its tendency to put high levels of formaldehyde into the air — can be overcome with research.

More of a problem, however, is how to convert a nation of drivers and service stations from gasoline to methanol in an orderly manner. Risch said one possibility would be to market an intermediate car that could run on either fuel or a blend of the two.

One major concern over the use of methanol remains unresolved, however. It has to do with the fuel's implications for the greenhouse effect, the predicted global warming caused by carbon dioxide in the atmosphere.

Bruce Bayeart of the Western Oil and Gas Association, an oil industry lobbying group, said that if methanol is produced from coal, it creates twice the carbon dioxide of gasoline for the

 Cont't from Pg. 1

same amount of power. At present, most methanol is made from natural gas, but Bayeart said there is too little natural gas to meet the demand if a widespread switch to methanol occurs.

Methanol or dual-fueled cars are at least four to five years away from the market, even if a decision to switch is made immediately, Risch said.

Other alternative fuels that were discussed include natural gas and propane, both of which present technical problems because the fuel is a vapor rather than a liquid. Some fleets of cars have been altered to run on these fuels, but Risch said Ford offered the fuels as an option on its Granada model from 1982 to 1984 and found little consumer acceptance.

Ethanol, the type of alcohol found in liquor, has been blended with gasoline and sold in much of the United States for use in cars, but it has not been sold in California because the blend tends to create even more smog than gasoline. The price of ethanol, which is made from corn and other plant material, is about twice that of methanol made from natural gas.

On the distant horizon is another fuel, hydrogen. It has the advantage of burning cleanly — it combines with oxygen to produce pure water vapor — but is highly explosive and must be handled carefully.

At present, there is no sign that the Air Resources Board plans to require the use of alternative fuels, although it is studying methanol closely.

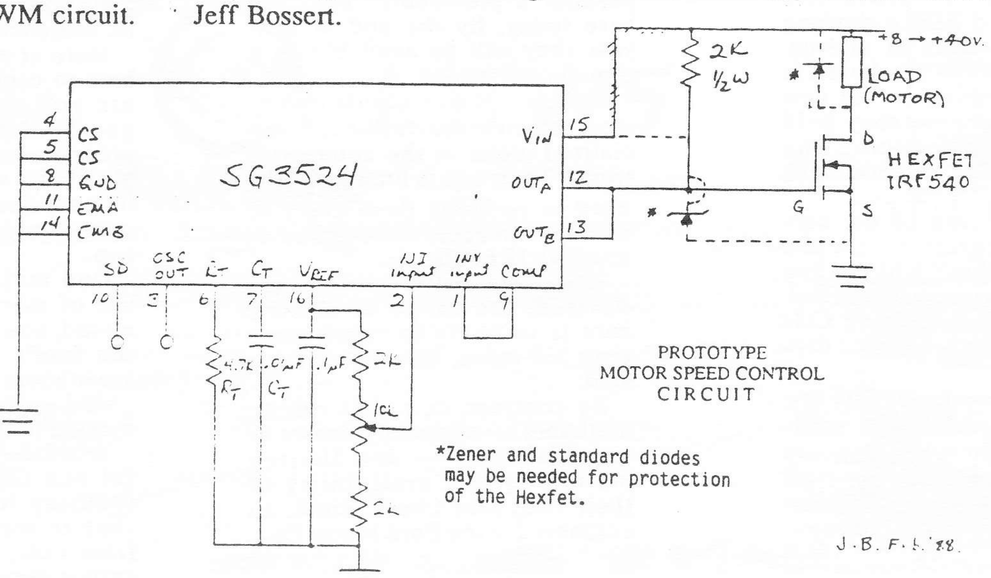
Nevertheless, the shift may be about to begin in the Los Angeles basin, where the local air pollution district is drawing up a new clean-air plan. The present draft of that plan calls for the use of cleaner alternative fuels for fleets of cars owned by public agencies and private businesses in that smog-choked region.

McClatchy News Service

JEFF BOSSERT of the **Electric Vehicle Club of Ottawa,** Canada, assembled this prototype motor speed control circuit. The SG3524 is an integrated circuit pulse width modulator (PWM) with a built-in oscillator that can function up to 300 kHz and output driver circuitry ideally suited for driving HEXFET loads. The SG3524 can accommodate power supplies between 8 and 40 Vdc and has an on-circuit 5 Vdc regulator which is used as a reference for the PWM control.

The oscillator frequency of the SG3524 is controlled by RT and CT and these component values can be chosen using Figures 1 and 2 of the SG3524 data sheets. For the circuit provided, an oscillator frequency of approximately 30 kHz (to avoid the audio range) or a period of 30 uS, has been chosen. Choosing a value of 0.01 uF for CT, from Figure 2, RT should be approximately 4.7 K ohms.

Pins 12 and 13 (collectors A and B) are connected together to achieve an effective 0-90% duty cycle from the PWM. The 2 K ohm resistor connected between the power supply and pins 12 and 13 is used to "pull up" the output voltage to ensure adequate voltage swing to the gate of the HEXFET. Pins 4 and 5 are the current sense inputs and can be used to sense a system current at which the PWM is automatically shut down (when this function is not used, these pins should be connected to ground). Applying a 5 Vdc level at pin 10 can also be used to manually shut down the PWM (leave unconnected if not used). The 10 K ohm potentiometer and the 2 K ohm resistors form a voltage divider circuit whose reference voltage is that from pin 16 (5 Vdc) and applies a voltage to the non-inverting input of an op-amp which drives an internal comparator which controls the pulse width. The 10 K ohm potentiometer is then the speed control input device. This input could optionally be driven from another source such as a digital to analog converter which would allow computer control of the PWM circuit. Jeff Bossert.



PROTOTYPE
MOTOR SPEED CONTROL
CIRCUIT

*Zener and standard diodes may be needed for protection of the Hexfet.

THE FUTURE OF HYDROGEN BEGINS IN BAVARIA

Pilot Facility for Solar Production of Hydrogen

Technological Research Ranges From Production to Application

(grs) A project that is unique worldwide will begin shortly with the construction of a solar-hydrogen testing plant in Neunburg vorm Wald, a town in the Upper Palatinate (Bavaria). Energy researchers from all over the world will be working at this site searching for the best possible ways to turn a new carrier of energy into what may in the future be an everyday energy source.

The company involved in constructing the research plant is a subsidiary of *Bayernwerk AG* in Munich, which is the largest energy production company in southern Germany that also operates several nuclear power plants. The initiator of this project, however, is Dr. *Ludwig Bölkow*, who has made a name for himself as an aircraft designer and the founder of the aerospace concern *Messerschmitt-Bölkow-Blohm, MBB*. For many years Bölkow has been one of the most untiring advocates of a radical change of course in energy production, namely a turn toward the use of solar energy.

This concept involves the development of a comprehensive system, in which the first step consists of transforming solar radiation to electrical energy via solar cells. The second step calls for producing hydrogen by using this electricity to split up water electronically. The hydrogen is then stored loss-free in tanks and can also be easily transported in pressurized containers or via pipelines. The gas which forms water again when burnt can be used in many different ways, for instance in combustion engines or in chemical processes. If used in connection with fuel cells it can also serve to produce electricity again, or it can be turned into heat energy by flameless catalytic combustion.

What makes the Neunburg test site unique worldwide is the fact that it will be used to study and optimize all aspects of these processes. During the ground-breaking ceremony for the facility on May 16, 1988, the deputy director of the board of Bayernwerk AG, Dr. *Jochen Holzer*, said that while the technologies known today have been well researched in principle the technical equipment is not available in many cases, nor can it be purchased as a "mass-produced" item.

The research to be carried out in Neunburg will begin by looking into the production of electricity. A surface of 20,000 square meters will be equipped with a total of 5,000 square meters of solar cells, which together have a maximum output of up to 500 kilowatts (kW). The experts expect to be able to produce about half a million kilowatts per hour per year, which would take care of the electricity needs of approximately 150 households. In the initial phase the photovoltaic converters will consist of mono and polycrystalline solar cells. Later, once the facility has been expanded, crystalline silicon may be used, which today is not totally satisfactory with respect to its efficiency and longevity. A small number of converters will be tracking the sun. Light-weight foil mirrors which will be installed on the side are supposed to concentrate additional amounts of light into the solar cell modules.

The water is split up into hydrogen and oxygen in chambers which are partitioned by a wall allowing electricity to pass through and are supplied with solar electricity via large-surface electrodes. This set-up will be used to examine different systems of electrolysis. Since no advanced systems of this kind are available today the researchers will be called upon to perform pioneering work. They hope to increase efficiency to 80 percent or more.

The department of applied techniques will have the job of studying the possible uses of hydrogen, which will be stored in tube tanks having a total volume of 5,500 cubic meters. These possible uses include gas engines, fuel cells for producing electricity, traditional heating kettles, and catalytic heat generators. Fuel cells and catalytic heaters, in particular, are far from technical perfection. Yet another series of experiments is meant to study whether solar-hydrogen plants can be hooked up to existing electricity and gas networks, so that during a possible transitional phase mixtures of hydrogen and natural gas can be used.

The experts hope to be able to inaugurate the plant in 1990 and, following a two-year trial and measuring run, to begin with their actual research work in 1992. The first phase of the project will require D-Mark 65 million, half of which will be born by the partners (Bayernwerk, Bayerische Motorenwerke, BMW, Linde, MBB und Siemens). The *Bundesministerium für Forschung und Technologie* (Federal Ministry of Research and Technology) will finance 35 percent of the costs, and the *State of Bavaria* the remaining 15 percent.

Dietrich Zimmermann

Contact: Deutscher Forschungsdienst, Ahrstraße 45, D-5300 Bonn 2

New Solar Chip Made of Pyrite
Inexpensive and Ecological

(grs) It is a green-yellowish lump with a metallic shine: pyrite, also known as Golden Mica, looks like the ideal solution to many problems, at least as far as Professor *Helmut Tributsch* of the Department for Radiation Chemistry at the *Hahn-Meitner-Institut für Kernforschung* (Hahn Meitner Institute for Nuclear Research) in Berlin is concerned. Pyrite has so far exhibited so many positive characteristics that it can possibly be used to produce inexpensive solar cells. This would mean that at long last solar energy could successfully compete with coal or nuclear energy.

The basic products for solar cells have to fulfill two conditions: they have to be available in large supply in nature, and they must not pose any hazards to the environment. Pyrite meets both of these demands. Its individual components iron and sulfur, which react to form the crystal iron sulfide, are among the elements that are found in the crust of the earth in great abundance. The resources of pyrite known today are in and of themselves large enough to provide all of mankind with solar energy. In addition, pyrite is formed in natural ecosystems such as lakes or oceans. By contrast, other materials used for solar cells, such as gallium arsenide or cadmium sulfide, are both toxic and scarce.

Users of solar cells are primarily interested in both the cost and the efficiency of the cells, because it is their goal to get as much electrical energy as possible out of any given irradiated surface. In this area, solar cells made of crystalline silicon compete with those made of amorphous silicon. While crystalline cells, which have been worked on for 35 years, have achieved the highest efficiency rates to date in practical application, amorphous cells, which have been known for a mere twelve years, are much less expensive. "Using pyrite," says Tributsch, "we have every chance to solve this conflict." Pyrite's theoretical efficiency of 18 percent may be lower than that achieved by the two variants of silicone, but this shortcoming will be made up for by the fact that pyrite solar cells can be produced at a much lower cost than even amorphous silicon cells.

Light absorption plays a decisive role. The incident sunlight is supposed to be used as completely as possible and is employed to activate the electrons tied up in the crystalline grid in such a manner that they turn into free-moving carriers of electrical charges. To do this pyrite cells merely require an extremely fine layer of one tenthousandth of a millimeter. This means that they can be one thousand times thinner than crystalline and even ten times thinner than amorphous silicon cells. Due to the charge carriers' thin layer and high mobility as many as eight or nine out of ten activated electrons reach the attached electric circuit. This is an excellent achievement in solar cell technology. Because of the thin layer required pyrite cells can be produced with less material and energy and at an unusually high speed. A sufficient pyrite layer can be cut in a mere ten seconds, whereas it takes half an hour to do the same job with amorphous silicon. The latter is also sensitive to heat and strong solar radiation. Its practical efficiency, which is not very high to begin with, decreases by ten to 30 percent even after short periods of application. Pyrite, by comparison, can resist not only photon and heat energy but also mechanical stress.

However, the goal has not yet been fully reached. For the time being the efficiency of pyrite solar chips registers a mere three percent, because unexpected problems have arisen with respect to the material. The molecules do not to arrange themselves within the crystal in the same manner as the experts' textbooks indicate. Nevertheless, the group of researchers working under Tributsch are satisfied, as they have been able to develop a previously unknown material within just five years to a point at which the efficiency rate is as high as in the solar cells used for pocket calculators or watches.

What has yet to be done is basic research which even if it should fail to produce positive results in the immediate field of solar technology, should register a more useful spin-off in other areas. One example of this cited by Tributsch is the desulfurization of coal: "The major portion of sulfur found in coal is in the form of pyrite. As you know sulfur becomes the sulfur dioxide contained in the fumes. How would we be able to make any progress in that field if we don't know anything about pyrite? Instead of pouring all our resources into running after the smallest particle of matter, we had better try to solve the most urgent environmental problems."

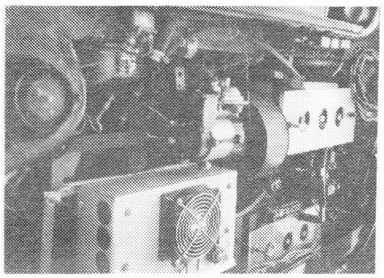
Jörg Göpfert

Contact: Professor Helmut Tributsch, Hahn-Meitner-Institut Berlin GmbH, Bereich Strahlenchemie, Glienicker Straße 1000, D-1000 Berlin 39

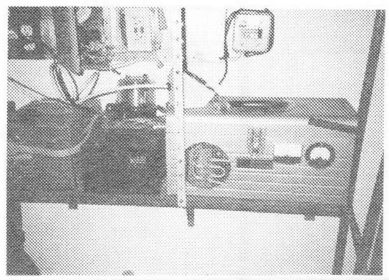
EV Marketplace

1973 Honda CVCC Electric--$1700

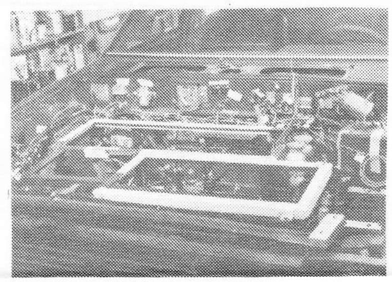
1980 Datsun 310 Electric--$1800



Honda Electric
Engine layout



Honda Charger



Datsun Engine
No Batts. or Control

THIS IS AN IS TILLIN ESTATE SALE ALMA & EAA WILL GREATLY APPRECIATE YOUR HELP
CALL: ALMA TILLIN (415) 524-2242, 1326 Portland Ave. Albany,CA 94706.

FOR SALE

"I HAVE TO SELL TED'S BABY 1963 VW BUG $1200. 27 HP SHUNT MOTOR, 120 VOLT SYSTEM, REGENERATION, ON BOARD CHARGER. ALSO ALL KINDS OF TOOLS, INCLUDING TABLE BENCH SAW AND RED ACCORDION." CALL MAE BENSEN (415) 992-5453.

* * * * * * * * * *

WANTED

23 HP GE motor for my JET-007. Model 5BT1344B51, 99.4 Volts, 201 Amps.,3285 RPM. Or Shunt motor with close specs. and shaft (1"X 1").
ALSO NEED; shaft only for 2CM77 Aircraft Generator. CALL: Clarence (408) 248-2588

* * * * * * * * * *

WANTED

INFO ON POWEREX MOSBIP? SUBPOSE TO BE A DUAL 100 AMP 450 Volt PACKAGE WITH FET INPUT WITH OPERATION TO 20 KHZ MAIL OR CALL HQS.

FOR SALE By EAA

Complete conversion system:

1970 Toyota Trans. W/Adaptor	$150
Prestolite 4001 96 V. Motor	700
Willie @ Controller	400
72/12V Lester Charger 120/220	350

HELP US WITH OUR CEC PROJECT!
This system will be sold to the highest bidder, COMPLETE ONLY, funds will be used for the CEC project.

CALL: Clarence (408) 248-2588

* * * * * * * * * *

CALENDAR

EVS9

EVS9, Toronto, November 13th--16th 1988. For information contact:

The 9th International
Electric Vehicle Symposium
(416) 890-1846

EAA Chapters

ARIZONA: Phoenix
Lee Clouse 602 943 7950
P.O.Box 11371
Phoenix, AZ 85061

CALIFORNIA:

Burbank
Irv Weiss 818 841-5994
2034 N. Brighton #C
Burbank, CA 91504

East Bay
SCott Cornell 415 798-0909
60 Alan Dr.
Pleasant Hill, CA 94523

North Bay
Gordon Schaeffer 415 456-9653
211 Bellan Blvd.
San Rafael, CA 94901

Peninsula
Mae Bensen 415 992-5453
8 San Juan Ave.
Daly City, CA 94015

Sacramento
Max Higley 916 783-4012
2103 Lee Way
Roseville, CA 95661

San Jose
Don Gillis 408 225-5446
5820 Herma St. #3410
San Jose, CA 95123

Santa Clara
Lee Henstreet
787 Florales Dr.
Palo Alto, CA 94306

OREGON; Willanette
Leslie Brundidge 503 390-3871
4040 Gary St. NE
Salem, OR 97303

TEXAS: Houston
Ken Bancroft 713 729-8668
4301 Kingfisher
Houston, TX 77035

WASHINGTON: Seattle
Bryan Lowe 206 632-4496
5011 9th NE
Seattle, WA 98105

WISCONSIN: Milwaukee
Dave Pares 414 481-9655
3251 S. Illinois
Miwaukee, WI 53207

NEW JERSEY: Hackensack
Kasmir Wysocki 201 342-3684
293 Hudson St.
Hackensack, NJ 07601

Vancouver, B.C.
VEVA 604 987-6188
543 Powell St.
Vancouver, B.C. V6A 1G8

NON-AFFILIATED GROUPS

CANADA
Ottawa, Ontario
Fred Green
Box 4044 Sta. "E"K1S 5B1
Ottawa, Ontario, Canada

NEW MEXICO: Albuquerque
Mike Lechner 505 848-2331
PNM Alarado Square
Albuquerque, NM 87158

Southern Cal-EVA of SC
Ken Koch 714 639-9799
12531 Breezy Wy.
Orange,CA 92669

DENVER CO DEVC
Genny Clark 303 451-5051

Fox Valley IL 312 879-0207
John Stockberger
2S 643 Nelson Lake Rd.
Batavia, IL 60510

Eastern-EEVC
P.O.Box 717 215 696-5615
Valley Forge, PA 19482

For information on forming a chapter in your area write Electric Auto Association, 1249 Lane St. Belmont, CA 94002. For a sample copy of the newsletter send SAE #10 envelope.
PHONE: 10AM-5PM (415)591-6698-5PM-12AM (408)248-2588

EDITORS:Clarence Ellers - John Newell - Bill Palmer - Paul Brasch - COMPILED AND PUBLISHED by Clarence Ellers. SEND IN YOUR PERSONAL AND CHAPTER NEWS AND COMING EVENTS. ARTICLES-Comments etc. all correspondence to address below

Electric Auto Association NEWS

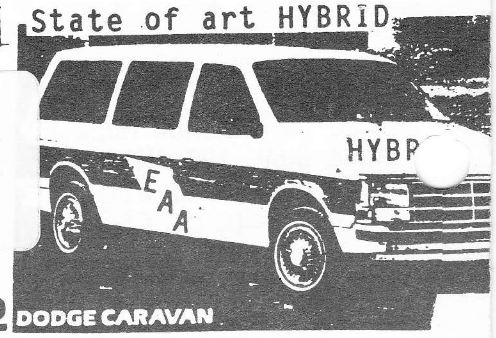
NOVEMBER 1988

1249 Lane St.
Belmont, CA
94002

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

Address Correction Requested

HELP!! PROJECT-X
State of art HYBRID



TIME DATED MATERIAL - DO NOT HOLD