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F. V. E. A. A. NEWSLETTER

JUNE 1990

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MEETING NOTICE

The next FVEAA meeting will be
JUNE 15th at
College of DuPage Building K
22nd & Lambert Rd. Glen Ellyn
Time Meeting 7:30 P.M. sharp.
We can arrive at 7:00. Guests
are welcome and need not be
members to attend the meeting.
NOTE: Park at WEST end of lot
and enter at WEST entrance.

DEADLINE for newsletter *STUFF* - in my hands
the Friday before the next meeting. Editor

THE PREZSEZ

The first meeting in our new facilities at the College of DuPage last month was pleasant. The June 15th meeting will be the day preceeding our appearance at the Yorktown Shopping Center during their Toys for Dads event. We will make the final preparations for this as well as the Downers Grove Heritage Days display on June 23.

I propose to revive the video which we discussed last year. A revised script will be provided and reviewed. We need to proceed with this project before more of our member's cars end up in California (Setton's and Stockberger's are already there).

Bill



**FOX VALLEY ELECTRIC
AUTO ASSOCIATION**
6542 Fairmount Downers Grove Il 60516

FIRST CLASS

ADDRESS CORRECTION
REQUESTED

Commission readies for Heritage Festival events

by Sandra K. Friedrich

The biggest event of the summer in Downers Grove is less than a month away and everything is running on schedule.

The Community Events Commission, whose sole job is to put on the Heritage Festival, is busy working out last minute details, according to Lynn Saladino, head of the commission.

DOWNERS GROVE REPORTER • FRIDAY, MAY 25, 1990

Another new entry this year is the electronic car display, sponsored by the Electronic Car Club. Several cars owners converted themselves from gasoline to electricity powered will be displayed to promote the use of the electric car for vehicle transportation, Saladino explained.

Suburb firm touts fuel cells

By Frank Burgos

A new suburban Burr Ridge company Friday became one of three U.S. manufacturers of fuel cells, which produce electricity while minimizing pollution.

The electrochemical fuel cells are being hailed by the company as an effective, non-polluting way to produce electricity.

M-C Power Corp. officially began manufacturing and testing the cells Friday.

Officials of M-C Power claim 250 of their fuel cells, when stacked together, will generate enough electricity to power a hotel or shopping mall without creating ozone-depleting toxic waste.

Fuel cells are like car batteries. They convert chemical energy into electricity and

heat. The cells are filled with a fuel, such as hydrogen, which generates electricity when exposed to air.

"We produce less carbon dioxide than any other device that burns fossil fuel," said company President Frank C. Schora.

Commonwealth Edison Co. has not ruled out using fuel cells, but company officials say the technology currently is too expensive.

"There is some truth in the pollution-free claim," said Clarence Slack, senior electrical engineer for Edison. But it is a "very high maintenance-cost device," he added.

A generator using 250 fuel cells would cost roughly \$250,000 and last five years, Schora said.

SUN TIME
SAT. APR. 28, 1990

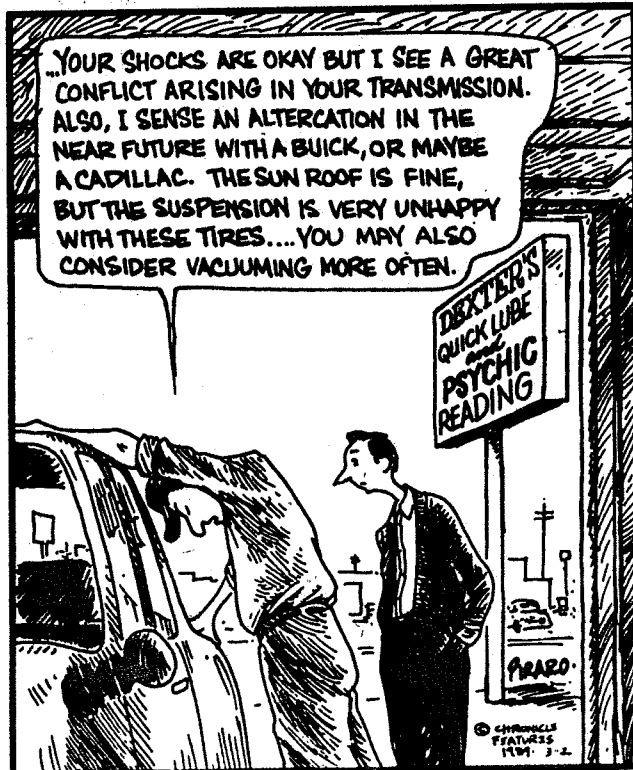


Electric car waiting

James Worden with Lightspeed, a solar-assisted electric car to be made by his firm, Solec-tria, in Waltham, Mass. The car can travel up to 150 miles on a single battery charge.

BIZARRO

By DAN PIRARO



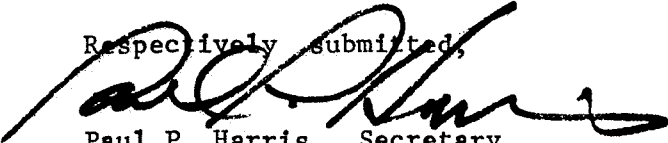
MINUTES OF THE Fox Valley Electric Auto Association May 18, 1990

The Meeting was called to order by Pres. Shafer promptly at 7:43 P.M. Present were a total of 18 members. No guests were present at this meeting. Treas. V. Vana reported we had \$1,338.51 in the checking account and \$896.23 in the savings account for a total of \$2,234.74.

Member John Newton arranged for our facilities at the College of DuPage. Great room and we can have it as long as we want and need space....also they like our electric car subject matter...Next year July '91 there will be a big party and we are invited to participate. The room is available for us from 6:00 P.M. to 10:00 P.M. For any early birds there is big room close by for snacks and soft drinks etc.. Earth Day exhibition was a good success. Ken Woods had his Solar exhibition and we had about 5 vehicles including John Emde and his subaru, after all, he and his car are now T.V. CELEBRITIES...John Stockberger had his world famous BRADLEY, and you know what an attention getter it is...Dick Ness had his electrified bike.... Some comments from our members....Pres. Shafer/....Most people celebrated the first good day in Chicago out of the Hi Rises, but we happened to be there amongst the Capitalism, Ecology and Rock Music. We had some phone calls but none serious... Ken Woods' Solar exhibit ...had lots of interest...cooking hot dogs etc...John Stockberger....Lots of people and exposure but the bulk of the people not interested, they just happened to be there....Dick Ness...holiday atmosphere...lots of questions. There was an annual meeting of Edison Co. the following Monday and we reported we had exhibited our vehicles in Lincoln Park and was worthwhile. George Krajnovich had his futuristic URBA front bumper slightly dented by John Emde., accidentally of course. John Emde has a Video of the Earth Day Special for the use of our members. Ken Woods reported on Toys for Dads indoor display in Yorktown Shopping Center, Thurs. thru Sunday June 14th ...June 17th is still on...we are hoping to have about 3 to 5 cars...we are planning on being there early Sat. A.M. thru Sun. Nite. We will be represented by our stallworths who are always there...Pres. Bill Shafer, John Emde, Vladimir Vana, George Krajnovich, and Ray Oviyach.. John Emde reported that Heritage Days in Downers Grove is still on for June 23rd on a Saturday. There will be a stationary display and we are hoping the same 5 cars will again be represented, as previously. The 4th of July in Wheaton is still a prospect...more to come at next meeting, Henry Setton to contact Brookfield people and let them know of our inability to participate in their July 4th celebration, because of a previous committment. Henry Setton reported that Ed Begley Jr. bought a bunch of solar cells from Lewandowski and he also bought Henrys' car thru his ad in our news letter. Ed is a very serious environmentalist...and then he also bought John Stockbergers'... BRADLEY...well goodby to the gull wing we are sorry to say..it did attract a lot of attention any time John had it on exhibit. Carl Swick and Ken Woods reported on the Unitarian Church event in South Holland, Carl displayed his car and Ken gave his talk on the environment. After the main business meeting a round table discussion was held by the membership to ferret out their problems and see what progress is being made on their vehicles. Pres. Shafer to call Dana Mock about some parts and equipment that he has been storing for the club.

The meeting was adjourned by pres. Shafer at 9:46 P.M. and the feeling was voiced by the membership that this atmosphere here at the college will be very good for the foreseeable future.

Respectively submitted,


Paul P. Harris, Secretary

Duo Quattro

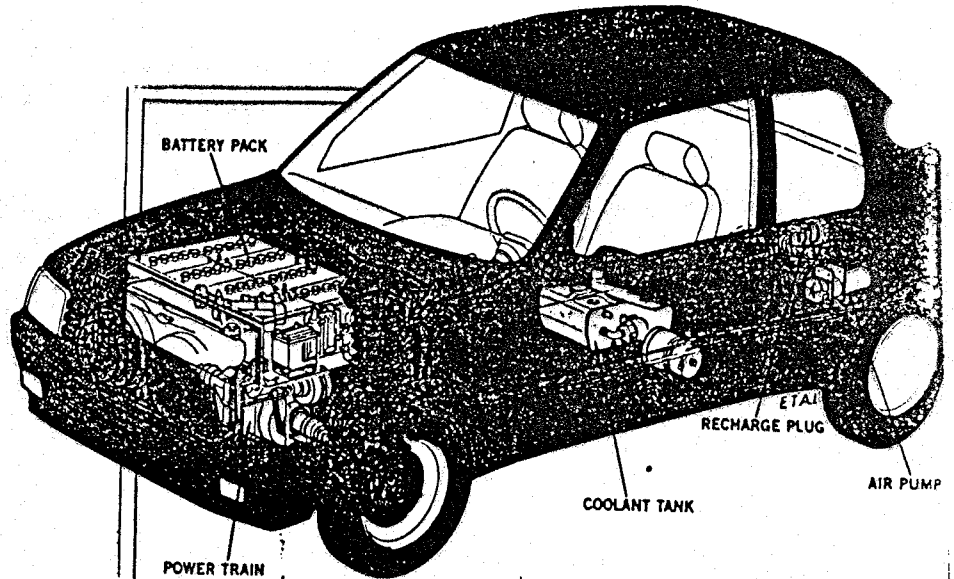
As you motor down a freeway exit ramp onto the city streets, a reverse twist of the ignition key effectively silences the engine and halts the output of exhaust fumes, but the car continues on at 30 mph. This scenario describes Audi's Duo Hybrid system, which combines a front-drive gasoline engine for fast cruising and peak performance with an electric motor powering the rear wheels for pollution-free driving in urban areas. It's fitted to an Audi Avant Quattro wagon, where existing four-wheel drive simplified the prototype's conversion.

Removing the rear axle's drive shaft left room in the transmission tunnel

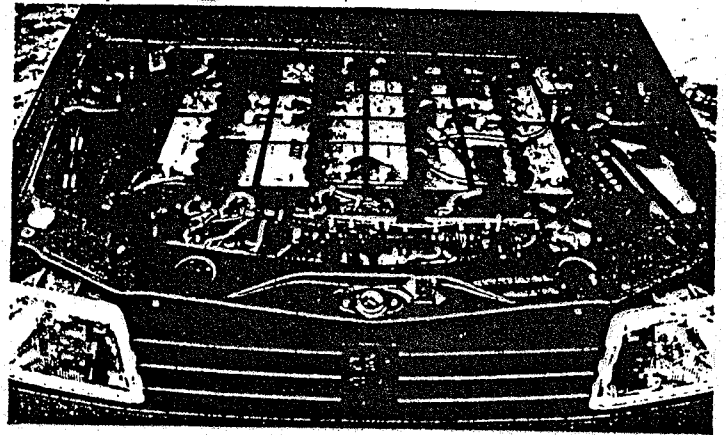
to fit a slim 12.8-hp electric motor coupled to the rear differential by an electrically actuated clutch. A pack of nickel-cadmium batteries weighing 400 pounds fits in the spare-tire well, together with the electronics for the complex switching and speed-control functions.

While hybrid propulsion is not new, the Audi system is unusual—the two power units are dedicated to different axles and the car has the ability to quickly change between them. For city driving in the electric mode, the car is virtually silent and produces no exhaust emissions. In full electric mode, the wagon can accelerate to 20 mph in eight seconds, has a top speed of 30 mph, but has only a 20-mile range. The engine's more powerful alternator continually charges the batteries, and a full recharge takes only 45 minutes.

A small auxiliary electric motor powers the hydraulic system so the steering, servo-assisted brakes, and ABS are unaffected by the choice of propulsion. Extra weight over the back wheels from the battery pack and 130-pound motor is handled by upgraded suspension and tires. Audi says the system is suitable for any of its Quattro models, and figures the additional cost at around \$1,400. The company is now demonstrating the Duo concept to local authorities and delivery services in Germany.—D. Scott



POWER TRAIN



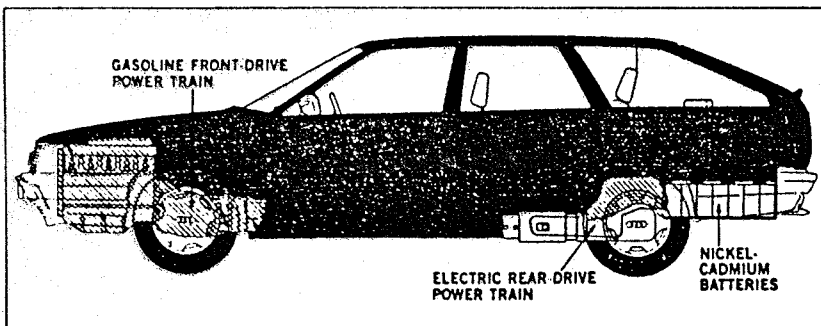
Electric minicar

The Peugeot 205 minicar uses water-cooled nickel-cadmium batteries (photo) to power its electric drive train. An air pump disperses battery gases on recharging.

Peugeot at present has some 250 electric delivery vans operating in France and is expected to give the General Motors Impact ("ANF," Apr.) a run for its money in a race to be the first major auto company with a commercially available electric car. The French car maker is now negotiating with Los Angeles city fathers over the possible delivery of 3,000 "green" versions of the Peugeot 205 supermini. Peugeot is pressing the government for tax incentives to offset the higher initial cost of the nonpolluting vehicles.

Conversion of the little hatchback to electric power is eased by housing the batteries and all drive components in the 205's engine bay, leaving the passenger and luggage compartments unchanged. A 72-volt pack of nickel-cadmium batteries powers the 205's 16-hp direct-current motor, driving the front wheels through a fixed-ratio step-down transmission. Speed is controlled by a solid-state thyristor that pulses the current at variable rates to maximize efficiency. Releasing the accelerator pedal instantly engages the traction motor as a generator to recharge the batteries on braking. This regenerative braking predominates during initial brake-pedal travel, after which the hydraulic brakes take over.

Peugeot's electric mini bristles with practical refinements. For example, the microprocessor and batteries sit in water-cooled carriers to boost their efficiency and battery gases released during charging are diluted by an air pump. A "fuel" gauge shows the battery pack's level of usable charge remaining, and an alarm sounds a warning when it drops below 10 percent. Though no great performer on the open road, in urban traffic the car reaches 30 mph in 11.6 seconds, and can cover 60 miles between charges.—D. Scott



Audi's unique experimental Duo-Hybrid Quattro wagon gives the driver a choice between powerful gas-powered front drive and quiet nonpolluting electric rear drive.

VW, Audi Show Different Hybrid Car Techs

GENEVA, Switzerland — Volkswagen's hybrid electro-diesel Golf, first revealed in 1987 as a research project, is now entering a pilot build phase for customer trials.

The vehicle uses a compact new electric motor developed by Bosch in place of the standard diesel engine flywheel. The 2.25-inch-wide, 6-kW motor replaces the conventional starter and alternator. It is connected to the engine crank by a second clutch and drives through the conventional manual transmission.

Volkswagen is building 50 hybrid Golfs for trials by an unidentified customer in Zurich during the summer of 1991. Two other trials also are expected — one with 50 hybrid Polos in Berlin and another with a single Golf in Saxony, West Germany — but Volkswagen did not make the dates of those evaluations available by press time.

Below speeds of 30 mph, the hybrid Golf's electric motor automatically takes over from the diesel, reducing exhaust emissions on the European city drive cycle by between 40 and 60 percent.

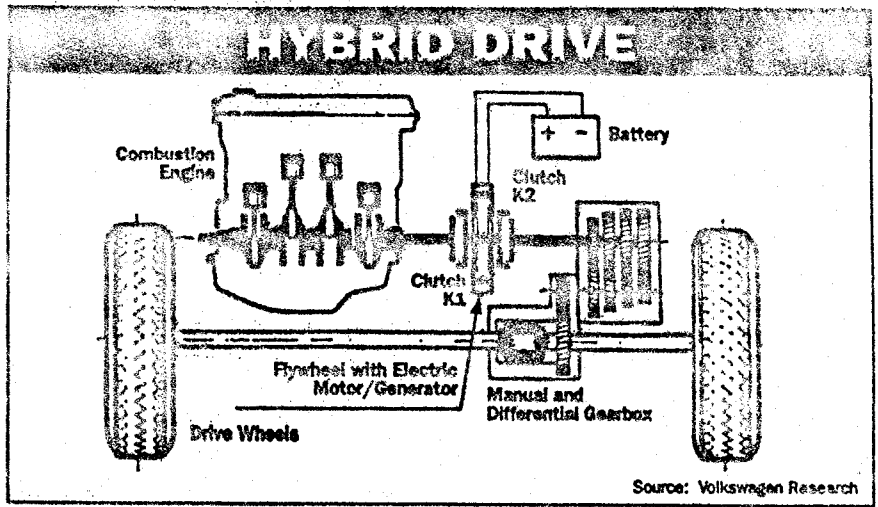
Above 30 mph, the diesel cuts in to increase perfor-

mance and provide out-of-town range beyond the 18 miles permitted by the vehicle's 330-lb. battery pack. Road trials have shown that fuel efficiency using the hybrid power system in mixed city driving is at least twice that of the standard diesel Golf.

When the charge in the 60-volt battery pack drops below 25 percent of its full level, the engine automatically cuts in. Whenever engine power is not required, the engine stops and the motor regenerates electric power to the batteries.

The vehicle's automatic sequence can be overridden by the use of three driver-selectable operating modes that are accessed by a fascia switch. The driver-selectable modes are meant for special circumstances such as when the battery pack is removed for long journeys or when the vehicle is used in inner-city zones where fume-emitting cars may be prohibited.

In hybrid drive (H), the electric motor handles all driving loads up to 6 kW while the engine takes all additional power requirements. In electric drive (E), the engine is inhibited from starting. In engine drive (S), the electric motor is switched off.



ELECTRIFYING: Volkswagen's hybrid electro-diesel Golf uses a new Bosch motor to convert to electric operation speeds below 30 mph.

The vehicle's electric motor uses a squirrel-cage rotor and fits between the crankshaft and the conventional five-speed transmission. A drive-by-wire module controls the engine fueling and two integrated clutches, one on the input side of the motor and one on the output.

The K1 input clutch is operated by a vacuum cylinder under the control of a contact switch on the shift lever. This system is similar to several previous semi-automatic transmissions, including the Porsche Sportomatic system that was popular in the 1970s.

The K2 output clutch, meanwhile, is also vacuum-operated, but from signals generated in the drive-by-wire ECM.

Driving current is transformed from 60 volts dc into a three-phase current for the asynchronous motor by a pulse converter. Six transistors operate as the power switch with a common current quenching device. A single current transducer and a pulse frequency sensor provide the mechanical rotational frequen-

cy, which is correlated with the stator current for every operating point to provide maximum torque at maximum current and maximum efficiency at part load.

Separately, Volkswagen's Audi subsidiary has taken a different approach to the hybrid vehicle. The Audi Duo system, prototyped in a 100 Quattro, uses electrical power to drive the rear wheels and a standard five-cylinder, 2.3-L internal combustion engine to deliver power to the front wheels.

Audi engineers said that electricity delivers one-tenth the power of the 2.3-L gasoline engine, but the motor's high torque enables the car to reach top speeds of 50 kilometers per hour. Under electric power alone, the car can accelerate to 30 kilometers per hour in 8 seconds.

While Audi officials conceded that the acceleration under electric power is hardly neck-snapping, they noted that it is adequate for urban areas, where the motor is designed to be used alone. The Duo's

range is 30 km, and it can be recharged by the combustion engine or offboard.

When the Duo is running in electric drive, an auxiliary electric motor powers the hydraulic systems so that all controls — including power steering and ABS — work normally. A gasoline-fired water heater maintains coolant temperatures when the combustion engine is not operating.

The driver can switch to the combustion engine at any time. When the engine is started, a controller shuts down the electric power.

The Duo uses a set of 400-lb. nickel cadmium batteries that deliver about 60 volts. The battery set, according to Audi, will last at least 10 years with little or no maintenance.

Audi has not released pricing on the Duo or any plans for production. The vehicle is currently being demonstrated for local government officials in West Germany. □

Geoffrey P. Howard and Michael G. Sheldrick



DUO QUATTRO: Audi's Duo hybrid vehicle system, prototyped in a 100 Quattro, uses electrical power to drive the rear wheels and a standard internal combustion engine to deliver power to the front wheels.

Power failure

MEDINAH—Surrounded by shiny, four-wheeled images of status, power and personal indulgence, I had gone to the Auto Show looking for the Impact.

When I couldn't find it I went to the information booth. "Where's the Impact, GM's experimental electric car? The Tribune article said it goes 125 miles between two-hour recharges and has a top speed of 100 m.p.h."

"Oh, it was here for a day or two. But the batteries ran down and it was taken out of the

show. They go only 40 miles and then you have to recharge them."

"I had hoped to come here to encourage the company to continue working on electrics," I said. "I read that they'll decide whether or not to produce the car in the next two or three months."

"Well, they're just not practical."

Feeling frustrated and disappointed, I said: "Everything at this show will put out carbon monoxide and foul the air." I walked away.

Jean B. Jenkins

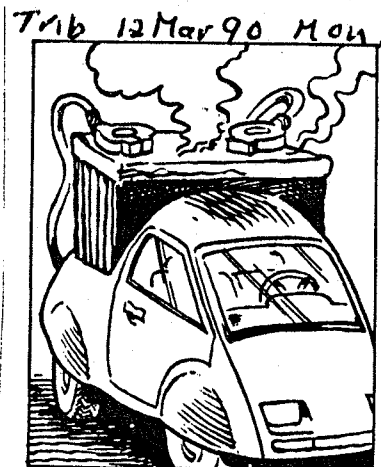


Illustration by Rick Tuma

Tinkerer finds a place in the sun for hybrid car

By Richard Truett
Orlando Sentinel

MELBOURNE, Fla.—You can just imagine the shock a gas station attendant would get opening the fuel filler door on Doug Cobb's 1984 Honda Civic.

He would find two regular electrical plug receptacles—and no place to put the gasoline.

Cobb, owner of Solar Car Corp., and his band of associates yanked the engine out of the Honda and replaced it with a high-performance electric motor that gets part of its energy from the sun.

A special battery charger developed by Cobb and his engi-

neers allows the Honda to be plugged into a standard wall socket and quickly recharged. There are also two ways to generate electricity while the vehicle is in motion.

There's still a Honda engine under the hood, but it is a tiny, eight-horsepower, one-cylinder unit. That flea-sized motor can be used to power the car for longer distances at relatively high speed, such as cruising on interstates, or it can run a generator and charge the vehicle's batteries.

Cobb designed what he calls a "two-stage" brake pedal. Touch it and you hear a click; the car

begins to slow slightly. However, before the brakes are actually engaged, the momentum of the car is used to drive a generator that puts back into the battery pack some of the energy used to accelerate the car.

It's all in the name of efficiency that four ways are used to get power to the batteries, Cobb says. That's central to making electric and hybrid vehicles practical, usable forms of transportation.

Because Cobb's Honda can run on either gasoline or electricity, it is called a hybrid car.

Auto industry officials think that hybrid cars—those that are

driven by two power sources such as a combination of fossil fuel or hydrogen and electric power—may be one of the best future alternatives to traditional gasoline-powered cars blamed for harming the environment.

For Cobb, the future is now.

He and a few engineers created the hybrid car in a short time, for little money.

In just two months and for only \$20,000, using easily acquired parts and technology, they've built a hybrid car that accelerates as well as most gasoline-powered four-cylinder vehicles and has a projected cruising range of 100 miles, longer if you

park it in the sun.

The outside of the white Honda is covered with solar cells that use the sun to generate electricity, which is stored in a special battery pack located where the gas tank—now removed—used to be. Solar power provides most of the car's energy.

The car's spritely acceleration comes from an electric motor that is connected to the original Honda five-speed manual transmission.

It gets complicated when Cobb explains how all the various mechanical parts of the Honda hybrid car function.

"We have a gasoline motor in there that is hooked up to the cruise control. You can engage the hybrid system as an electrical hybrid that will generate electricity and charge the batteries as you are driving.

"We also have a mechanical hybrid that we can engage that takes the torque of the [electric] motor and puts it directly in parallel with the gas engine," he said.

"That way we are not wasting conversion factors of taking mechanical torque and going into electricity. We are just taking me-

chanical torque and putting it directly to the wheels."

No wonder Cobb sometimes sounds like Dr. Emmett Brown, the fast-talking whiz from the "Back to the Future" movies who turned a DeLorean into a time machine.

Cobb is a master electrician, an electrical contractor and a devoted tinkerer who believes that by assembling existing technology, he can help put the brakes on automotive pollution.

Such vehicles as GM's Impact electric car and Fiat's Panda Elettra—which is already on sale in Europe—have proven that electric cars are closing the performance gap. Cobb thinks he can build and sell hybrid cars similar to his for about \$15,000. A kit, he said, would cost a little more than half that.

"One thing we have in our favor, in addition to the pollution and political and economic factors, is that we are using a lot of off-the-shelf technology, to provide a practical here-and-now vehicle that the average person can use."

A brief test drive was impressive. Performance from standstill was excellent. The electric motor was strong enough to cause the front tires to break traction under hard acceleration.

After Cobb is satisfied that his hybrid vehicle is reliable enough to handle everyday traffic, he said he plans to start producing cars and selling kits. He has founded a company, Solar Car Corp., and he says the sun's the limit.

Chicago Tribune, Sunday, June 10, 1990

HOW I LEARNED TO LOVE THE (ELECTRIC) CAR

For years I have hated cars. Oh, sure, I'm as big a fool as anyone for all the subtle suggestions of sex and power that are packed into television representations of long, sleekly curved vehicles promising to carry one off somewhere, anywhere other than the life of "quiet desperation" Thoreau said most people lead. I have my fantasies involving cars. But my actual relationship with cars is a dependent one at best, a kind of need-hate affair.

I need a car to get to the SunWorld editorial office; even though there is a rapid transit stop two blocks from the office, getting to the transit station from where I live is complex, time-consuming, and at certain hours, dangerous without a car. In recent months I have needed a car to commute roughly 150 km one way from Oakland to Sacramento at all hours to help my mother with pain management as she was dying of cancer in Sacramento.

I hate cars because they are noisy, dirty, smelly and they pollute the atmosphere. Automobiles are one of the single largest contributors to the problem of global warming — gasoline-driven, internal combustion

engine autos, that is. I also have resented all the money I have poured over the years into auto insurance, licensing, maintenance and petroleum products to assuage the great Car Deva worshipped by our culture. This is money on which I'll never see any return, what is called a diminishing investment.

When I was fourteen years old I had a rather heated argument with my father — a real "car man" (he built his first car from two wrecked cars at the age of twelve) — about cars. I said they should be eradicated because they were poisoning our biosphere and depleting irreplaceable resources, and he said I was crazy, we couldn't go back to horses and carriages. In retrospect I can see we were both right. Gasoline powered automobiles do pose a threat to the environment (which means to us), and industrialized society is too dependent on them now to end its addiction "cold turkey".

Enter the solar electric hybrid vehicle, the means to transport us safely through the hard times ahead into the age of photovoltaic, wind and water powered transportation. In this

issue of SunWorld author Michael Hackleman writes eloquently about the reasons for, design and operation of electric cars. He helps us see the possibilities for the future inherent in electric powered transportation, as well as why hybrid vehicles offer a practical way to make the transition from a petroleum-centered support system (e.g., gasoline service stations) to an electric support system.

Two years ago I returned from the ISES World Solar Congress in Hamburg raving about hybridization of technologies — PV and internal combustion engines, decentralized and centralized utility power generation — working hand in hand like partners in a good marriage. At that time, like Hackleman, I saw hybrids as an interim solution to the myriad environmental challenges we face. Now I'm curious to see whether renewable and non-renewable technological hybrids my lead us in a direction we cannot even imagine, into the discovery of something that makes cars as obsolete as horse drawn carriages.

— Debra Carroll

Science & Technology

METHANOL MAY BE CLEAN BUT IT'S A DIRTY WORD TO BIG OIL

Placed with the growing momentum of the clean-air movement, Big Oil is scrambling to head off drastic proposals that would replace gasoline with alcohol fuels, such as methanol. On Aug. 14, Atlantic Richfield Co. announced a cleaner-burning gasoline for sale in California that is supposed to reduce some emissions by 20% in older cars now using leaded gas. Other majors are also racing to develop "reformulated" gasolines so they can compete with alternative fuels—and protect their \$100 billion-a-year U.S. gasoline market.

In addition, the major oil companies are launching a scorched-earth public relations attack on the alcohol fuels. "They don't want to have methanol crammed down their throats," says John R. Doshier, managing director at Pace Consultants Inc., an industry adviser. "DIETARIAN" That might happen anyway. Because methanol produces 50% less smog or ozone than gasoline, it is favored by top Administration officials. By 1997, 30% of all new cars sold in the nine dirtiest U.S. cities would have to burn cleaner fuels, such as methanol, under the

Administration's proposed revisions to the Clean Air Act. "We're just trying to get the oil companies to help clean up the air," says William G. Rosenberg, assistant administrator of the Environmental Protection Agency.

Oil companies are hot for reformulated gasoline because they can produce it in existing refineries. But it can't match methanol as a smog-reducer. In fact, removing lead from gasoline resulted in fuels that produce more smog. To get the boost in octane that lead had given, refiners substituted aromatic compounds. Unfortunately, the compounds include carcinogens, such



as benzene, and other smog-producing chemicals. Today, aromatics make up 35% to 45% of high-octane fuels. "While cars have been getting cleaner, gasoline has been getting dirtier," claims Ben G. Henneke Jr., president of Energy Fuels Development Corp., a New Mexico-based alcohol fuel maker.

Although Arco's reformulated gasoline reduces evaporative emissions by 21%, it lowers unburned hydrocarbons—the main culprits in smog—by only 4%. Arco says that future gains will be even tougher. It would cost \$17 billion to cut aromatics just 10 percentage points, says Information Resources Inc. in Washington, D.C.

But refiners say that's only a fraction of the investment needed to switch to methanol—which is produced mainly from natural gas and would require new production facilities. They also argue that methanol has half the energy of gasoline and produces formaldehyde, a respiratory irritant.

The companies claim they can perfect a better gasoline within five years. But they may not have that much time. Despite fierce oil industry opposition, Colorado passed new clean-air laws two years ago. The result: Carbon monoxide levels fell 12% last winter. California wants 40% of all new cars to burn methanol by the year 2000. And eight Northeastern states are studying stringent clean-air proposals. The real movement, says White House Counsel C. Boyden Gray, is "at the grass roots." With such widespread sentiment, Big Oil will have to move quickly to clean up its act.

By Mark Ivey in Houston

Efficient air-conditioners warm to alternative sources of power

ENERGY SENSE

By James Dulley

Alternative types of air-conditioners use energy sources other than electricity.

Gas, oil, liquid petroleum, solar or wood-powered air-conditioning systems can cut cooling costs substantially. They can heat your house in the winter, too.

These integrated heating and cooling units use desiccant-type air-conditioning. Solar power is an ideal energy source for air-conditioning because the energy output from a solar collector is greatest on hot, sunny days when cooling needs are greatest.

Desiccant cooling is not a new or complicated process. A desiccant is a material that absorbs moisture from the air. Not only is the air cooled, but it's also highly dehumidified for maximum comfort. Desiccant systems use existing furnaces and air-conditioning ducts.

One system combines very energy-efficient fresh air ventilation with the cooling. Fresh outdoor air is circulated past a large desiccant wheel. The wheel absorbs moisture from this incoming air. During the winter, the desiccant wheel is bypassed.

Water evaporates into the outgoing stale

room air. This causes the outgoing air to cool, like when you sweat. In a special heat exchanger, the fresh dry incoming air gives off heat to the stale outgoing air. As a result, the incoming air is cooled and dehumidified.

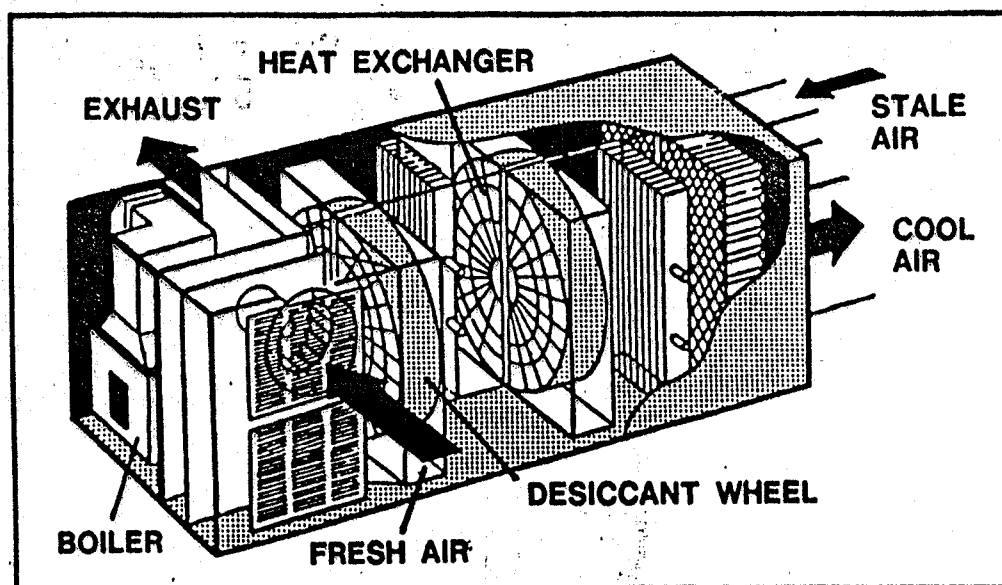
In addition to very comfortable cool and dry air, the air inside your house is changed about five times each hour. This filtered air reduces the problems of indoor air pollution from cooking, chemicals, aerosols, etc.

The energy source, whether gas, oil, solar, or wood, is used to dry out, or recharge, the desiccant wheel. Then as it rotates, it can dehumidify more air. Because it rotates very slowly, it's very quiet.

The actual percentage savings you realize from a desiccant system depend on the cost of electricity relative to the cost of gas, oil, etc., in your area. The small motors in the unit use only 1,250 watts of electricity, about as much as a small handheld hair dryer.

If you use solar collectors or have a cheap source of firewood, your air-conditioning costs can be minimal. It's also possible to use solar cells (photovoltaic panels) to produce free electricity to power the motors.

Utility Bills Update 375 shows information and specifications on a desiccant air-conditioning and heating system and an operating-cost comparison with conventional electric systems at various utility rates. Send your request with \$1 and a self-addressed, unstamped envelope to James Dulley, Chicago Sun-Times, 6906 Royalgreen Dr., Cincinnati, Ohio 45244.



Alternative fuels power a desiccant air conditioner, which dehumidifies fresh air in the desiccant wheel and cools the air in the heat exchanger.