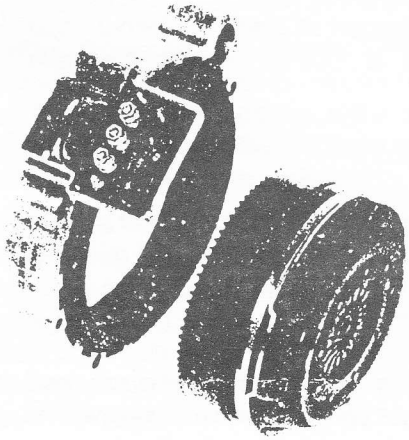
ELECTRIC AUTO ASSOCIATION NEWS

January 1991 Vol. XXIV No. 1

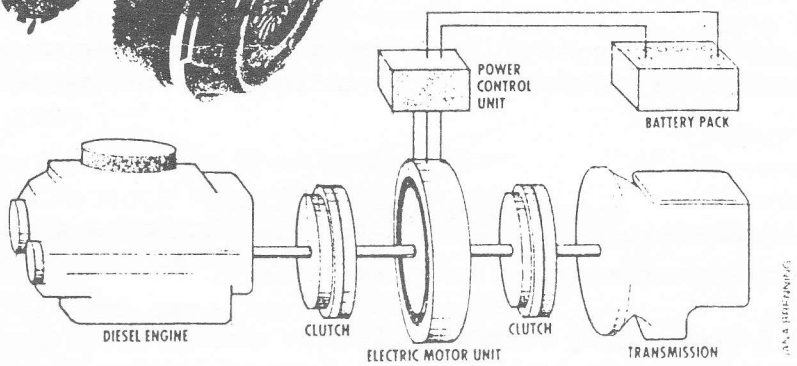
WE'RE PART OF THE FUTURE! WE'RE RECYCLING!

Electric car owners are recycling! Not just the parts, but most often, it's the whole car. The current electric car market now has several "first hand" cars available, but the majority of electric cars are "recycled". Here's what two car manufacturers are doing. Our thanks to the Denver EV Council Newsletter, December 1990 for both these articles.

VOLVO'S PROTOTYPE LCP2000 weighs just 1,555 lbs. (707kg) and gets 56 miles per gallon city and 81 miles per gallon on the highway (24 and 34 km/liter respectively). Even at its light weight the LCP is engineered to Volvo's safety standards. LCP stands for light component project. There is a hollow bulkhead between the rear facing back seats and the front seats which protects the gasoline tank and helps give side protection. Extensive use of magnesium contributes to the reduced weight and the seawater derived metal is obtained in a process which is far less destructive than mining. When the car is finally worn out or meets a less gentle end, it is designed for easy recycling. Incidentally, Mercedes Benz is also working toward making their cars so that they can be completely and easily salvaged by a disassembly line at end of life. Mercedes has said that from now on, the environment and its protection will play a central part in its vehicles from the design and development stage onward. From **ECO-CARS** pages 32-33 **Whole Earth Review,** Fall 1990, and **Automotive Engineering's Global Viewpoints** for October 1990, pages 140 and 143. Our thanks to **John Browne** for the Review article.



DIESEL-ELECTRIC VW is the heading on an item on page 30 of **Popular Science** for December 1990 page 30. We have reported on this development in the past but we show the latest version of this hybrid with its 2.3-inch-wide, eight horsepower electric motor. This ingenuous device replaces the engine flywheel, the starter and serves as an alternator for regenerative braking. There is a clutch on either side of the motor so that either the motor or the diesel engine can propel the car.



This hybrid drive design packs a slim 2.3-inch-wide electric motor (top) into the area normally occupied by the clutch and flywheel of the Volkswagen Golf's diesel engine.

For good acceleration, the vehicle starts in the diesel mode and switches automatically to the electric mode when the foot is lifted off the accelerator. If better speed or performance than the electric motor can give is desired, simply depressing the pedal quickly starts the diesel instantly and full vehicle performance is available.

When the vehicle is braked to a stop, the engine shuts down. In normal city driving, the mileage on a gallon of fuel is about 95 (152 km) because of little need for use of the engine. Top speed is 94 mph (150 kph) and electric power comes from a 72 lb (33 kg), suitcase sized battery. After three years of refinement, the system developed by **Robert Bosch GmbH** in Germany, is in limited production for environmental research in Switzerland and ready for immediate volume manufacture.

SOLAR & ELECTRIC 500
APRIL 5-6-7, 1991
PHOENIX INTERNATIONAL RACEWAY'S
ONE MILE OVAL

*The **Solar & Electric 500** SM is the exciting focal point of a three-day event conceived to showcase the development and advancement of alternative transportation technologies. There is an obvious growing need for alternative energy for vehicles, and we are committed to providing an arena for the encouragement and growth of solar and electric technologies.*

*Looking back 80 years, the fledgling auto industry used the Indianapolis 500 as a highly visible stage to present their new products, and a competitive arena to prove their performance. Industry leaders met there, exchanged ideas and the industry grew rapidly. Today, the 1991 **Solar & Electric** SM plans to provide the same format and catalyst for the growth of solar and electric-powered vehicles.*

The Solar 300
Exotic, lightweight experimental racers, powered only by the sun, race 150 kilometers Saturday, April 6th, and the final 150k Sunday, April 7th. Entries, including some from major automakers, are expected from all over the world. Held on the one-mile oval. Qualifying and world-record runs are Saturday.

The Electric 200
This Electric Stock Car race, covering 200 kilometers, or 124 miles with a two-hour time limit, features street-registered stock automobiles with electric powerplants, and prototype electric stocks from automakers around the world. Held on the one-mile oval. Qualifying and world-record runs are Saturday.

Exhibitor Trade Show
A manufacturers' midway of exhibits by companies who make, market or support all kinds of clean-air and alternate fuel products, technologies and services. The exhibit area is located outside the main grandstand.

Ride & Drive
Fans, members of the media and everyone interested in new clean-air, alternative-energy vehicles can go "car shopping" -- ride in or test drive -- these exciting new vehicles. Held on the separate 2 1/4 mile test track outside turn two of the one-mile oval.

We invite you to participate in this exciting, positive event. Let's go racing - to encourage industry and science to develop positive and renewable energy alternatives for us, for our children, and for generations to come.

Solar & Electric Racing Association

Tickets available from SERA and at Ticketmaster locations throughout the U.S.

Solar & Electric Racing Association (SERA)
11811 N. Tatum Boulevard, Suite 3031
Phoenix, Arizona 85028

Phone: (602) 953-6672 FAX: (602) 953-7733

For a copy of either the Electric Stock Car 200 or Solar 300 rules, please enclose check for $5.00 made payable to SERA.

FOR THOSE OF YOU WHO NEED BASIC BATTERY INFORMATION: HERES'S ELECTRICA'S OWNER'S MANUAL VERSION:

Batteries — The Electrica's batteries need more attention than the batteries in a gasoline-powered vehicle because the load on the Electrica's batteries is much greater. Proper maintenance and understanding of the batteries in your Electrica is very important.

If the Auxiliary Battery is completely discharged, these systems will not function. It is recharged when the Battery Power Pack is recharged.

If the batteries in the Electrica appear to be discharged but the Percent of Charge meter reports an adequate charge, it is possible only the Auxiliary Battery is discharged. In this case, a qualified owner or mechanic should perform a hydrometer check on the Auxiliary Battery to determine if it is discharged.

If the Auxiliary Battery is discharged it may be recharged alone without removing it from the vehicle. Connect a separate 12 volt battery charger to the battery. Always connect the positive lead from the charger to the positive terminal on the battery, and the negative lead from the charger to the negative terminal on the battery. Separate recharging of the Auxiliary Battery SHOULD NOT be done when the Electrica's Charger is operating.

Battery Water — It is very important that the water level in the batteries be maintained at about one inch below the filler cap. Water level should never fall below the plates visible in each cell.

A description and discussion of the batteries follows:

Battery Power Pack — Sixteen 6 volt lead/acid batteries supply the power to the Electrica's Drive Motor. The batteries are connected in series to supply 96 volts. They are located in three enclosed battery boxes: front, middle, and rear.

The lids on the front and middle battery boxes may be removed by unfastening the latches. The lid to the rear battery box may be opened by turning the fasteners along the edge of the carpeted panel. Push down on each fastener and twist ¼ turn clockwise to lock or counterclockwise to unlock. Always replace lids and secure latches and fasteners before driving.

Auxiliary Battery — One 12 volt lead/acid battery, located in the middle battery box, supplies power for the auxiliary electrical system. This is a separate power system from the Battery Power Pack.

The lights, radio, blower fan, windshield wiper/washer, rear window defroster, Key Switch, and other accessories operate with power from the Auxiliary Battery.

When filling the battery cells, use DISTILLED WATER ONLY. Each cap should be removed and filled if necessary. Never fill a cell so high that water is forced out when replacing a cap. See Battery Water Maintenance Log, pages 63-64.

Do not fill with water just before charging unless water level is below plates. If water level is below the plates before charging, add only enough water to cover the plates. This is because the water level will rise during charging and can overflow.

Battery Break-In — During the first five driving cycles on a new battery pack, check battery water and fill if necessary twice a week.

During the next ten cycles, check battery water and fill if necessary once a week.

Thereafter, check and fill as often as needed, but never longer than once every two weeks.

Equalization Charge — About once a week or every seven cycles, the batteries should be given an equalization charge. After every seventh battery charge, simply reactivate the charger by pushing the RESET button after the charging cycle has completed and several hours have elapsed to allow the batteries to cool.

This second charge can be performed on a day the Electrica is not in use. The charge is to provide for a possible single low battery. If one battery is not as well-charged as the others, it will be brought to the level of the entire battery pack.

Battery Maintenance Check — During battery break in, a qualified mechanic or owner should perform a Battery Maintenance Check according to this schedule:

- after two weeks or 15 cycles
- after one month or 25 cycles
- every two months thereafter

A Battery Maintenance Check will consist of measuring specific gravity, checking for corrosion, checking battery cable connections, and other service as necessary.

Battery Service — Contact your Electrica Service Representative if you suspect serious problems with the batteries. The following are some conditions that indicate a need for service:

- If one battery or one battery cell continually uses much more water than the others.
- If one battery or battery cell continues to operate significantly hotter than the others.
- If batteries must be filled every one or two cycles.
- If the driving range drops significantly from original driving range.

LAST MONTH A SCHEMATIC WITH A CONTROLLER, THIS MONTH HOW TO DO IT WITHOUT A CONTROLLER.

Honda 600 Sedan Conversion

by Lloyd Gano

In converting the Honda, the same concept was used as that which I conceived for my first electric car. For this car, which was built in 1968, I used a single high voltage pack along with a clutch and multi-speed transmission. Incidentally, this car (the Gano-Ford "T" Electric) is still being used and has been located in the state of Michigan for the last seven or eight years.

High efficiency and simplicity are the main features of my electrified Honda 600 Sedan. It has been driven almost daily since September 1979, and close to 10,000 miles have been logged on it as an electric. Other than adding water to the batteries, very little maintenance has been required.

Total weight of the car is 1,920 pounds, and it uses a minimum amount of energy. During a twenty-two mile commute between Los Altos and Stanford University Hospital, it uses approximately 3 KWH or 15 to 20 cents' worth of electric power.

On a level stretch of road, after the initial acceleration, the motor required only 22 amps to maintain 30 MPH and 36 amps to maintain 38 MPH (top speed on the level).

During the last EAA Rally, my Honda (#35) covered a distance of eighty miles and still had 1.83 volts per cell left at the end. I completed three additional laps after the official end and got the total from my odometer.

Getting back to the Honda, the battery pack consists of ten Trojan EV-30's. They are 12 volt, 100 A.H., and weight 68 pounds each. The batteries are all connected in series for a total of 126 volts and 680 pounds.

The motor is a Baldor 3.2 H.P., 115 V.D.C., compensated, and series wound. I bought it new, surplus from C & H Sales for $99.50. It is physically larger than the surplus generators being used, but it is very efficient (89% at full load). Let's face it — the motor needs a specific amount of iron for efficiency at a given output. Also, a high voltage motor has a lot less brush and commutator loss than a low voltage motor.

When you consider the weight of the batteries, a 50% increase in the weight of the larger, more efficient motor doesn't add much to the total weight of the car. However, it can make the difference between good performance and poor performance. A light weight, inefficient motor is a poor investment.

In addition, a larger motor does not overheat or need a blower. In my opinion, when a blower is required to keep a motor from burning up, this should tell you something! The energy wasted in heat is coming directly from your batteries, along with the power required to drive the blower.

The Honda utilizes a front wheel drive that is well designed. I removed the cylinders and crankshaft, but used the original clutch and four-speed syncro-mesh transmission. My electric motor drives the light flywheel through a dual roller chain.

I found that a Solid State Controller is not necessary. A simple knife switch, of my own design, attached to the emergency brake handle is used for the motor control.

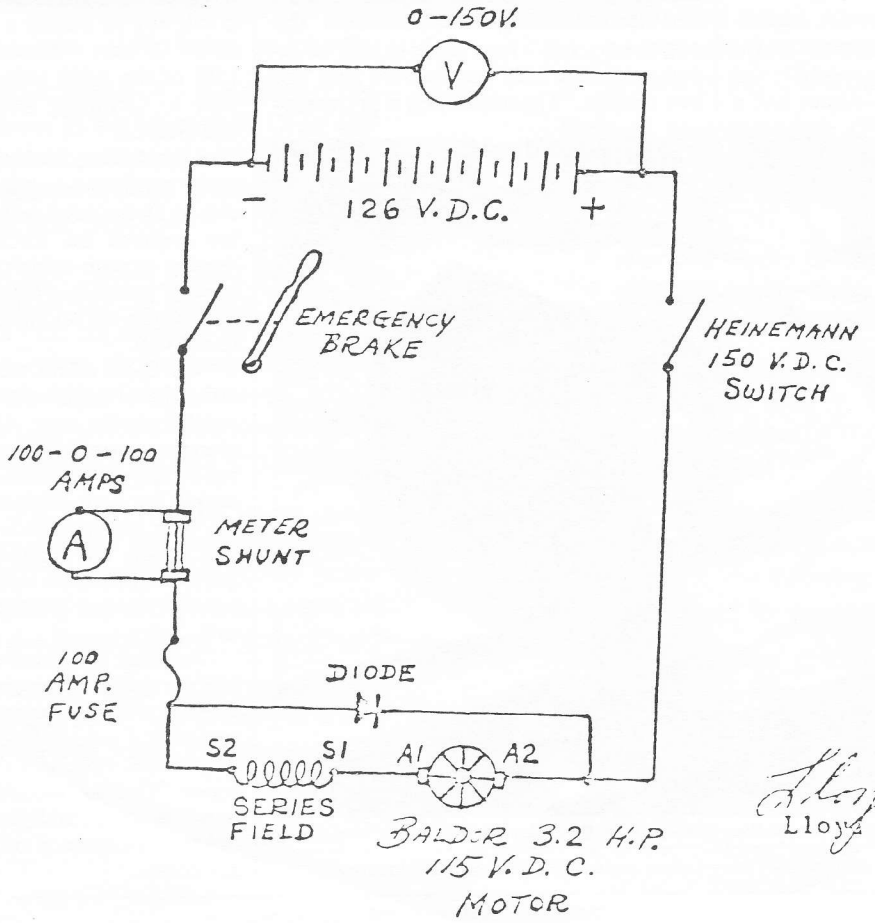
Since the brake handle is located alongside the driver's seat, it is very convenient to use. The switch is closed only when the emergency brake is completely "OFF" so it prevents starting the car with the brake "ON".

Acceleration through the gears is quite smooth using the clutch and the motor has no tendency to "run away" between the shifts, even though there is no real load on it. All of the power from the batteries goes directly to the motor with a minimum of loss.

I do have a second switch and 100 amp fuse in the circuit as a safety precaution. I also have a .4 ohm resistor shunted by relay contacts that I can use if I want to go slow without slipping the clutch. I do not use this very much, so it is not shown on the schematic diagram.

A great advantage of the high voltage system is that the conductors can be relatively small in size. I used a #6 gauge wire. My average current draw is 30 amps. Ten feet of #6 wire with 30 amps flowing only produces one-tenth of a volt drop. Since my system uses 126 volts, it isn't even noticeable. In twenty-six months of operation, I have never blown the 100 amp fuse!

In May 1981, I completed a second Honda Electric using a 5 H.P. Baldor 20% compounded, shunt wound, 120 volt motor. After gaining experience with both types of motors, I have come to the conclusion that a 5 H.P. motor is close to ideal for all around performance. It provides good acceleration with a practical range for a car of this size and weight.



Lloyd D. Gano 11/19/81

Time for the Teeny Tinies?

Microcars are taking the hassle out of French city driving

By EDWARD M. GOMEZ PARIS

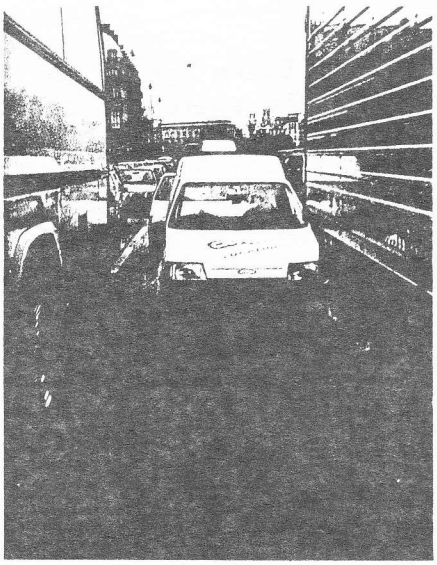
Small cars are nothing new. But how about one so tiny you can park it perpendicular to the curb, even in a parallel-parking zone? Try to imagine a car so simple that a 14-year-old may drive it without a permit, that requires no license plates because it need not be registered, that can be insured at less than a quarter of the rate for regular automobiles, and that is durable and so efficient it can travel 60 miles on one-half to three-quarters of a gallon of diesel fuel.

Voilà, the microcar. For about a decade, this urban motorist's dream has been available to thousands of car owners in rural France. In the late 1970s, another era of spiraling oil costs and Middle East tension, a handful of automakers developed midget *voitures sans permis* (no-license cars) to meet the needs of older consumers in a countryside poorly served by public transportation. Now, as metropolitan streets clog with traffic, savvy businessmen, fashion models and young professionals have seized upon the VSP as a practical, low-hassle alternative to conventional cars for darting around France's major cities.

In a sure sign of trendiness, the mini-autos are turning up in advertisements for yuppie-conscious institutions like the Banque Nationale de Paris. About half a dozen firms in the Paris region rent the vehicles for roughly $75 to $85 a day, unlimited mileage included.

Weighing in at no more than 770 lbs. and usually measuring 4.6 ft. wide by 8.2 ft. long, a VSP can carry two passengers and reach a speed of just under 30 m.p.h. "VSP design and marketing are a direct result of French laws that define a category of vehicles for which no driver's license is required," says Philippe de la Jousselinière, head of City Car, a Paris-based dealership. Like motorbikes, VSPs are barred from French highways and expressway bypasses. "On paper, VSP specs are those of a motorbike," says Christian Malet, whose Liberty Car service in Paris rents out Marden S.A.'s Alizé model. "But on the road, make no mistake about it, it's a car."

Well, sort of. The VSP is a cozy, even comfortable box on wheels with few frills but normal options like a radio and rear windshield wipers. Generally made of sturdy molded plastic, the body is reinforced by a steel tube frame. The upholstered interior typically features only a few elements, including a dashboard with speedometer, fuel gauge and controls. Adjustable seats and interior heating are still standard. The engines are 1 to 5 h.p., made in Italy or Japan, and have only one forward gear and one reverse. "The technology is pretty simple," says Patrick Escalier, Paris regional director for Marden, "but what more do you need for city driving?"



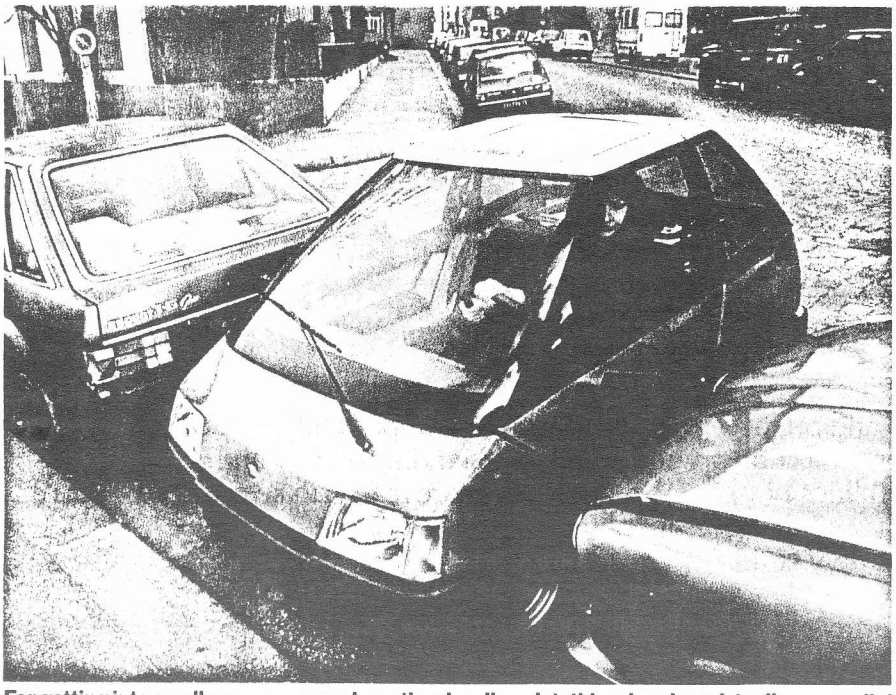
An efficient pygmy among giants

With the gulf crisis adding to anxiety over gasoline prices, the little cars may become more attractive than ever. This year a dozen French VSP manufacturers expect to sell as many as 15,000 of them. Martial Howa of Aixam Automobiles, a manufacturer in the southeastern French town of Aix-les-Bains, estimates that the market will grow 40% in the next two years. "Soon it will not be mostly a French phenomenon," he says. "Already we're exporting 15% of the 5,000 units we produce each year to Germany, Belgium, Switzerland and Greece."

Like Aixam, Société Jeanneau, maker of the VSP known as Microcar, sells its vehicles to Switzerland without engines: Swiss law requires the installation of electric motors in such vehicles even though the motors' design is still primitive. At the moment there are no plans to export the cars to the U.S.

VSP users admit that because of their noisy diesel engines, the tiny cars can be painful to the ears. Quieter and better electric motors would solve that problem, but so far, no practical, inexpensive power supply for such engines has been invented. In a bid to reduce exhaust pollution and lessen oil dependency, the French government has set up a committee to encourage further development of electric cars.

Another VSP disadvantage is the price tag. A typical microcar starts at around $10,500 without options. Still, Paris businessman François-Régis Correard, who owns three VSPs, says they're worth every franc: "Getting around is easy, maintenance is cheap, and you don't get parking tickets." In short, a tidy idea whose time has come. ■

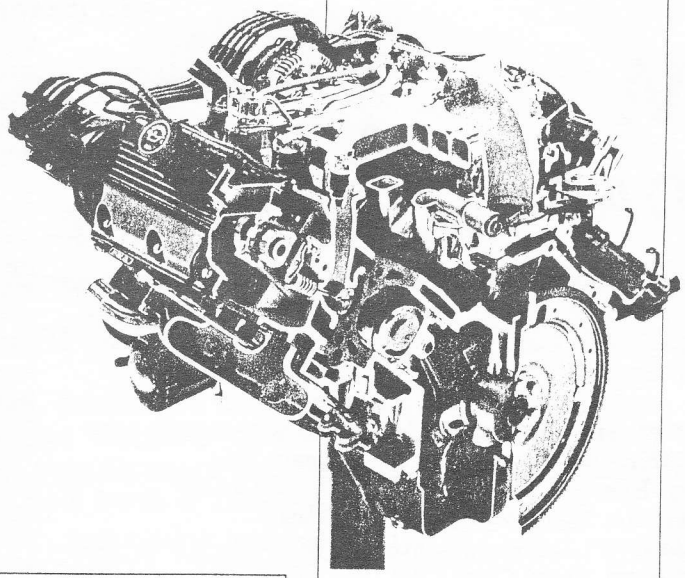


J.C. N'DIAYE—IMAPRESS

For getting into small spaces, even where they hardly exist, this micro has virtually no parallel

Businessmen, fashion models and yuppies have seized upon it as a practical alternative.

BEST OF WHAT'S NEW



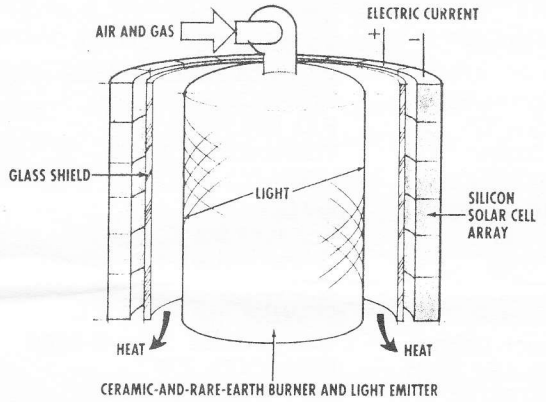
GREAT EIGHT

Ford's new overhead-cam V8 is destined to be the foundation of a future generation of fuel-efficient engines. Careful attention to reducing friction, increasing durability, and simplifying the accessories should result in an engine that burns fuel more efficiently, reduces emissions, and that sees the service bay less often.

HOT WATER WITH JUICE

Quantum Group capitalized on an overlooked energy source: gaslight. Their imaginative pursuit of lower energy consumption led to a thermophotovoltaic process that generates electric current as well as heat. A completely autonomous high-efficiency gas water heater is its first application.

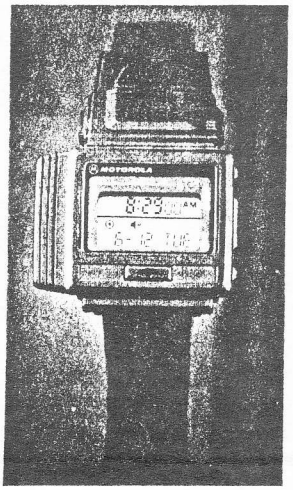
THERMOPHOTOVOLTAIC COGENERATIVE BURNER



JANA BRENNING

WRISTWATCH PAGER

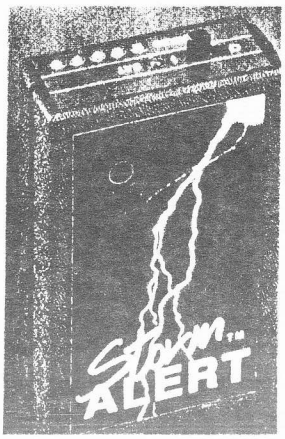
Staying in touch is easier than ever with Motorola's wristwatch pager, which operates using the existing nationwide network of radio paging companies. It may presage a new breed of miniaturized personal communication devices. Calling Dick Tracy?



GRAND AWARD SCIENCE & TECHNOLOGY

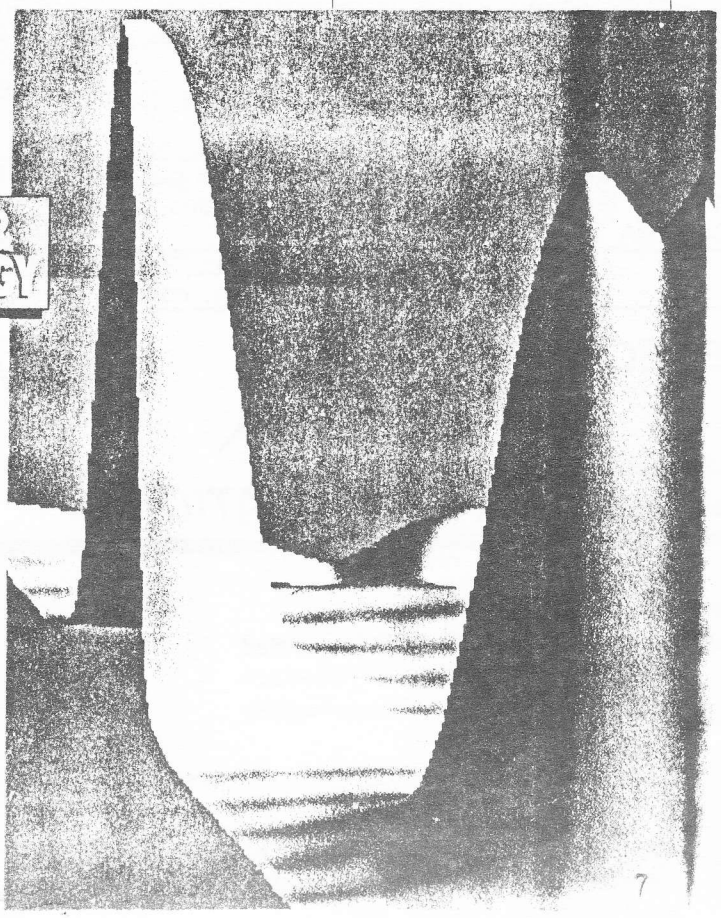
LIGHTNING ALARM

With Storm Alert, boaters and others in exposed areas shouldn't be surprised by sudden electrical storms. The $90 battery-powered device detects radio frequency signals produced by ground strikes; when it counts six strikes within three minutes, it sounds an alarm.



ATOM BY ATOM

Fulfilling the prophecy of physicist Calvin Quate that it might some day be possible to manipulate individual atoms, IBM Almaden Laboratories physicists Donald M. Eigler and Erhard K. Schweizer have constructed a cluster of xenon atoms by dragging the atoms—one at a time—with the fine tip of a scanning tunneling microscope. This image is magnified some 40 million times.



CALENDAR

January 20-4, 1991 Energy Sources Technology Conference/Exhibition, Houston, TX 214/746-4901
March 17-22, 1991 Int'l Solar Energy Conference, Reno, NV 212/705-7037
April 15+, 1991 4th Energy Forum, sponsored by BC Hydro, Victoria, B.C., Canada 604/987-8582
August 3-9, 1991 Intersociety Energy Conversion Engineering Conference, Boston, MA 708/352-6611
August 18-22, 1991 1991 ASME Int'l Computers in Engineering Conference, Marriott Hotel, Santa Clara CA

E2CM77 Motors Three total for sale. Like New! Two without adaptor flange, $400 each. One with adaptor flange, $500. 408/867-5930

I got my Rabbit for EV conversion at: THE BEETLE CLINIC, 1109 So. Railroad Ave. San Mateo, CA 94402 415/574-0408

Batteries: Group purchases are possible. Contract Don Gillis of the San Jose Chapter, 408/225-5446

Caveat Emptor: The EAA takes no responsibility for the accuracy of ads.

Advertisement Rates: 5 lines for $5.00 1/4 page for $15.00. Full Page for $50.00 Submissions to be "CAMERA READY"

EAA CHAPERS

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

CALIFORNIA

East Bay
Mil Stults 415/582-9713
2270 Minnie St.
Hayward, CA 94541

North Bay
G. Schaeffer 415/456-9653
211 Ballan Blvd.
San Rafael, CA 94901

Peninsula
Jean Bardon 415/355-3060
540 Moana Way
Pacifica, CA 94044

Santa Clara
Lee Hemstreet 415/493-5892
787 Florales Dr.
Palo Alto, CA 94306

San Jose
Don Gillis 408/225-5446
5820 Herma
San Jose, CA 95123

Los Angeles
I.L. Weiss 818/841-5994
2034 N. Brighton "C"
Burbank, CA 91504

So.Calif. EVA of S.C.
Ken Koch 714-639-9799
12531 Breezy Way
Orange, CA 92669

NEVADA
Jim Cullen
Desert Research Institute
2505 Chandler Ave. Ste. 1
Las Vegas, NV 89120

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

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

NEW JERSEY Hackensack
Kasimir Wysocki
201/342-3684
293 Hudson St.
Hackensack, NJ 07601

NEW ENGLAND
Bob Batson 508-897-8288
1 Fletcher St.
Maynard, MA 01754

SOUTH FLORIDA
Steve McCrea 305/463-0158
101 S.E. 15th Ave, #5
Ft. Lauderdale, FL 33301

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

American Solar Car Assn.
Robert Cotter
P.O. Box 158
Waldoboro, ME 04572

NON-AFFILIATED GROUPS

EVCO
Box 4044 Sta "E"
Ottawa, Ontario CANADA
K1S 5B1

DEVC
George Gless 303/442-6566
Denver, CO

FOX VALLEY EVA
John Stockberger
312/879-0207
2S 643 Nelson Lake Rd.
Batavia, IL 60510

For information on forming a chapter in your area, write to the address below or phone 415/591-6698 BETWEEN 10AM-5PM PACIFIC TIME

EDITORS: JOHN NEWELL, BILL PALMER, PAUL BRASCH, E.W. AMES
Send your chapter news, coming events, articles to the address below

ELECTRIC AUTO NEWS

EAA

1249 Lane Street
Belmont, Ca. 94002 **ASSOCIATION**

Jan. 1991

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

Forwarding and Return Postage
Guaranteed, Address Corection Requested

TIME DATED MATERIAL-PLEASE DO NOT HOLD