

**PRESIDENT**  
 William Shafer  
 308 S. East Ave  
 Oak Park Il 60302  
 708/383-0186

**F. V. E. A. A. NEWSLETTER**

**FEBRUARY 1990**

**VICE PRES.**  
 Kenneth Woods  
 1264 Harvest Ct.  
 Naperville Il 60565  
 708/420-1118

**TREASURER**  
 Vladimir Vana  
 5558 Franklin  
 LaGrange Il 60525  
 708/246-3046

**MEETING NOTICE**

The next FVEAA meeting will be  
**FEBRUARY 16th** at  
 Cragin Federal Savings & Loan  
 333 W. Wesley st. Wheaton, Il  
 Time - 7:30 P.M. sharp. Guests  
 are welcome and need not be  
 members to attend the meeting.

**SECRETARY**  
 Paul Harris  
 9421 N. Kildare  
 Skokie Il 60076  
 708/674-6632

**NEWSLETTER EDITOR**  
 John Emde  
 6542 Fairmount  
 Downers Grove Il 60516  
 708/968-2692

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

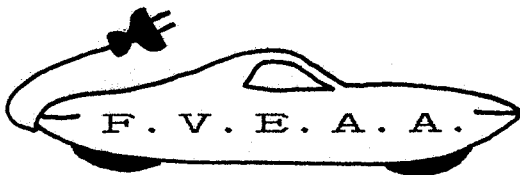
**THE PREZSEZ**

At the January meeting the FVEAA acquired a new member. Bill Wilcox finally found our meeting place after driving up from his home in Coal City. He has started conversion of a 1980 Dodge Omni. I am particularly pleased to have a gasoline station owner as a new member.

Most FVEAA members have renewed for 1990 according to Treasurer Vana. This will be the last Newsletter issue for those not renewing.

At the February meeting we will continue work on our 1990 exhibit schedule. We have a committment for space to exhibit 4 cars in Lincoln Park on Earth Day. Member Ahern has been asked to contact Cragin Federal, the institution who has generously provided us with our monthly meeting space, to see if our participation in the Wheaton 4th of July event can be arranged under their sponsorship.

**BILL**



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

**FIRST CLASS**

ADDRESS CORRECTION  
 REQUESTED

MINUTES OF THE FOX VALLEY ELECTRIC AUTO ASSOCIATION MEETING  
19 January, 1990

The meeting was called to order by President Shafer at 7:41 PM. Ten members and one guest, Bill Wilcox from Coal City, were present.

Treasurer Vana reported \$ 1434.31 in the checking account and \$ 880.17 in the savings account.

Guest Wilcox described his conversion of a 1980 OMNI. The project is underway with the assistance of John Stockberger.

The 1990 exhibit schedule was discussed. Member Woods reported there are no Arts and Craft Shows scheduled for either Fox Valley or Orland Shopping Centers at which experimental aircraft, speciality autos and other similar groups would participate. Member Emde reported the Downers Grove Heritage Days would be June 22-24 and the FVEAA would be welcome to display cars on June 23. Member Woods reported two possible days at Yorktown Shopping Center; April 19-22 an Earth Day event, and June 14-17 featuring Toys For Dads in connection with Father's Day. Member Shafer reported contacting Paul Miller who is in charge of Chicago Earth Day activities - no response yet.

The group decided on the following tentative display schedule:

April 22	(Earth Day)	Chicago - Lincoln Park
June 14-17	(Toys For Dads)	Yorktown Shopping Center
June 23	(Heritage Days)	Downers Grove
July 4	(Independence)	Wheaton
Open	(1990 Rally)	Fermi or Triton

Member Stockberger reported on his discussion with a Chicago Area kit car club. Members Krajnovic, Corel, and Kaminski plan to attend the next meeting of this organization on January 26th.

Member Emde reported on a questionnaire to collect information about individually-built electric cars for a national data base.

The meeting was adjourned at 9:20 PM.

Submitted by

*W.H. Shafer*

William H Shafer  
Secretary Pro-Tem

ELECTRIC  
AUTO



ASSOCIATION

\*\*\*\* NEW ENGLAND CHAPTER \*\*\*\*

The New England chapter of EAA has requested that we distribute the attached questionnaire (PINK COPY) to our club members. Please fill out and return them to our club first (either bring to meeting or send to editor). We will send them to EAA after we compile some of the info for our files. Once the returned questionnaires are entered into a data base, the results will be made available to the contributing clubs. It may be most beneficial to see the results regarding: most frequently converted vehicles - most frequently used conversion components - comparison of conversion and operating costs.

Thanks from EAA New England Chapter

ELECTRIC AUTO ASSOCIATION  
NEW ENGLAND CHAPTER  
\*\*\*\*\*

ELECTRIC VEHICLE QUESTIONNAIRE  
(PLEASE FEEL FREE TO SUPPLEMENT ANY ANSWERS)

1.0 BACKGROUND

Name \_\_\_\_\_  
Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Years of Experience with EVs \_\_\_\_\_  
Association with an EV Club \_\_\_\_\_

2.0 APPLICATION OF EV

Reasons for converting \_\_\_\_\_  
or buying EV \_\_\_\_\_

Estimated Hours for Project \_\_\_\_\_  
Planning \_\_\_\_\_  
Installation \_\_\_\_\_  
Total duration in months \_\_\_\_\_

Frequency of Use (Please check as applicable)  
 Daily  Few times per month  
 Few Times per week  Once per month or less

Purposes (Please check as applicable)  
 Commuting  Rallies and Exhibitions  
 Errands  Pleasure  
 Other \_\_\_\_\_

3.0 DESCRIPTION OF VEHICLE

Year & Make of Vehicle \_\_\_\_\_  
Model \_\_\_\_\_  
Weight before Conversion \_\_\_\_\_  
Weight after Conversion \_\_\_\_\_  
No. of forward Speeds \_\_\_\_\_  
Unique features \_\_\_\_\_  
\_\_\_\_\_

4.0 COMPONENTS

Motor  
Manufacturer \_\_\_\_\_  
Horsepower \_\_\_\_\_  
Voltage \_\_\_\_\_  
Controller  
Manufacturer \_\_\_\_\_  
Type \_\_\_\_\_  
Batteries  
Manufacturer \_\_\_\_\_  
Type \_\_\_\_\_  
Charger  
Manufacturer \_\_\_\_\_  
Voltage (Input/ output) \_\_\_\_\_  
 Auto Shutoff  On-board

5.0 ACCESSORIES ( Put check mark where applicable)

- heater (gas)  Power Brakes
- heater (electric)  Other \_\_\_\_\_

6.0 FABRICATION AND INSTALLATION

Power Cable Size \_\_\_\_\_  
 Type of End Connection \_\_\_\_\_  
 Mechanical     Hydraulically pressed     Soldered

Mounting of Motor  
 Base Plate     "C" Face

Location of Batteries  
 Engine Compartment     Other-Provide Description  
 Passenger Compartment  
 Trunk  
 \_\_\_\_\_  
 \_\_\_\_\_

7.0 PERFORMANCE

Maximum Range @ Speed \_\_\_\_\_ miles @ \_\_\_\_\_ mph  
 Energy Consumption (kW/mile) \_\_\_\_\_  
 Top Speed \_\_\_\_\_

8.0 PROBLEMS (please check as appropriate)

- Motor  
 Lack of power     Reliability  
 Overheating     Other \_\_\_\_\_
- Controller  
 Reliability  
 Other \_\_\_\_\_
- Batteries  
 Short life \_\_\_\_\_ years  
 Other \_\_\_\_\_
- Power Cables  
 Overheating  
 Burnt Terminals  
 Other \_\_\_\_\_

9.0 COSTS

Estimated cost of conversion \$ \_\_\_\_\_  
 (Exclude cost of vehicle)  
 Extras after conversion \$ \_\_\_\_\_

Estimated annual operating cost \$ \_\_\_\_\_  
 Estimated annual maintenance cost \$ \_\_\_\_\_  
 Estimated annual expenditure \$ \_\_\_\_\_

10.0 RECOMMENDED IMPROVEMENTS (Changes that you have made or would like to make)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

THANK YOU FOR YOUR TIME. PLEASE RETURN TO:  
 EAA-New England Chapter, One Fletcher Street, Maynard, MA 01754

# New energy system seen for electric cars

Toronto Globe and Mail

**KINGSTON, Ontario**—An electric vehicle powered by aluminum and air and capable of traveling up to 240 miles cleanly and inexpensively is possible early this decade, researchers say.

Engineers at Alupower Canada Ltd. said the use of aluminum-air fuel cells will nearly quadruple the range of electric cars and make them a reasonable form of transportation, especially in metropolitan areas where air pollution is high.

"The electric vehicle has not been acceptable in the marketplace," James Jackson, president of Alupower, told a news conference Monday. "Our job is to turn that perception around."

The new system uses a combination of conventional lead-acid batteries and the new aluminum-air fuel cells. The technology extends the range of a vehicle powered by lead-acid batteries—currently about 45 miles—to at least 240 miles without being recharged.

Jackson said the aluminum-air fuel cell is energy dense, light, non-polluting, safe and recyclable. A 2½-inch-thick sheet of aluminum alloy is immersed in an alkaline solution and then interacts with oxygen to free its stored energy as electricity. The aluminum must periodically be replaced.

The company, a division of Alcan Aluminum Ltd., is already starting to produce the batteries as "backup" power systems to act as emergency generators in areas such as telecommunications and is supplying them to British Telecom. There are also marine applications to propel submersibles and other vessels.

The first of the fuel cells—about the size of a standard engine—is to be installed in a Chrysler minivan in a year.

Electric vehicles date back to the late 1800s. Energy shortages in the late 1970s brought the concept back to the drawing board but since then, the easy availability and low cost of oil have dampened enthusiasm.

Now, fueled by environmental concerns about car emissions and frenzied competition from different battery technologies using a range of electrochemicals, the race to produce a viable electric vehicle is on again.

One of the main drawbacks of the vehicles has been the means of storing energy. Researchers are looking for a replacement of the lead-acid battery, which is bulky, has a limited range, is charged with electricity that is most often generated by the burning of fossil fuels and requires at least six hours to recharge.

The high electrochemical properties of aluminum combined with its low weight give it a high-energy density, but it is an expensive fuel if used continuously.

In the "hybrid" system car to be built by Alupower, the aluminum-air cells can be used to extend the range of the conventional battery if the driver wants to go beyond about 45 miles. If the driver goes only a short distance, the conventional batteries are used and recharged at an electrical outlet.

Nigel Fitzpatrick, vice president of Alupower, who has been working on the battery project since 1981, figures the average driver would use electricity 95 percent and aluminum power 5 percent of the time, bringing the cost of the hybrid system equal to or less than gasoline.

He said he would like to produce eventually a vehicle that would use only aluminum-air cells and could travel as far as 1,200 miles without servicing.



## Cartalk

By Jim Mateja

# GM trying to be more electric

Some name for a car—Impact.

Why not Crunch, Crash, Bend, Spindle or Mutilate?

Impact is the battery-powered electric car under development by General Motors Corp. in preparation for tougher emissions laws on the West Coast, which will force automakers to market vehicles that run on alternate fuels.

Either GM is terribly naive when it comes to names, or it has a better sense of humor than the carmaking giant has been given credit for.

Impact will attempt to make an impact on those attending the Chicago Auto Show Feb. 10-18 in McCormick Place, when the subcompact (95-inch wheelbase, 163-inch length) two-seater is displayed at the Chevrolet exhibit.

Even if Impact never makes it into production, it will have an "impact" on future GM cars, according to Donald Runkle, vice president of advanced engineering for GM's technical staff, which is developing the machine.

"Any efficiencies we learn from the electric car, we can apply to other cars," Runkle added. "We're going to pay more attention to the effects of design on fuel economy and where all the energy goes, in order to get more fuel-efficient cars."

"After our experience with the Sunraycer program, the one thing that hit us the hardest was how important efficiency in design really was," Runkle said in an interview.

Sunraycer was the GM battery-powered project car built to race in a cross-country solar competition in Australia in 1987.

The Sunraycer held one occupant in a near-prone position. The car body was covered with thousands of solar-absorbing chips to harness the sun's power and convert it to energy to power the craft. Those chips were the opposite of the solar reflecting panels on spacecraft, which are used to deflect the sun's heat.

Sunraycer won the competition without breakdown and while obtaining surprising speeds.

"Sunraycer only had a hair dryer's worth of energy on board, yet it still managed to get up to 65 m.p.h.," Runkle said.

Many thought Sunraycer would be retired and GM would move on to less pie-in-the-sky projects. After all, GM has been involved with electric cars before. In the late 1970s, the automaker was promoting electric power as a certainty, but nothing came of it. The electric car went the way of the Wankel rotary engine at GM. Little faith was put in Sunraycer reviving interest in electric cars.

Continued

# Cartalk

"But after our experience with Sunraycer, we decided to go back to battery-powered car development with more conviction, because we were able to get that kind of performance with only 1 horsepower of energy on board," Runkle said.

"We went back to electric cars with a fanatical aim to increase efficiencies—from bearings to tires to braking, anything to help increase driving range."

The problem with an electric like the Impact is its limitations—120 miles of driving before the need to plug into an electric outlet for a 2-hour recharge using a 220-volt current, or an overnight boost using a 110-volt outlet. And after 25,000 miles of driving, all 32 10-volt batteries need to be replaced.

Relying on solar power, Sunraycer was only mobile during the day, when the sun cooperated. Electric cars are only mobile as long as the batteries cooperate for a limited number of miles.

So despite how good the two-seater Impact looks and how much faster it can travel than Sunraycer (100 m.p.h. top speed versus 65), its practicality comes into question.

"But now we have talk about global warming and a stricter focus on emissions. That makes electric car development more interesting," Runkle said.

"A lot more people are a lot more interested in the car now," he said.

Now that the word is out that GM is toying with a battery-powered car again, what interest is there from the car buying public?

"After Impact was displayed at the Los Angeles Auto Show last month, one guy said he'd like to invest \$1 million in our program, and another asked us about setting up a dealership.

"We probably should have taken that guy up on the \$1 million, because we could have used the money," Runkle quipped of the

multimillion-dollar program at GM.

To recoup the investment, of course, will require buyers.

Runkle doubts that those who champion the cause of battery-powered cars as a means of cleaning the air will put up their money when an Impact is fully developed.

"Lots of people talked about air bags and antilock brakes, but when it came time to spend the money to buy cars with those features, they became silent," he said. "Those who talk about electric cars, the guy who says, 'I'd buy one at any price,' you won't find [them] when the car comes out, unless it makes economic sense.

"But the buyers probably wouldn't be traveling salesmen who drive a lot or people who live in remote areas, where everything is spread out, because of the limited driving range," he said. "Driving range and the cost of battery replacement are still two negatives."

The Impact today would cost twice as much as a gas-powered car to operate, because you eventually need to replace those batteries, he said.

Battery life, and therefore ownership cost, would depend on driving patterns.

"To get 25,000 miles would be heavily dependent on the duty cycle. The 25,000 miles isn't a bad number if you drive 30 miles a day. If you drove 60 miles a day, you could lose half that life, and if you only drove 10 miles a day you could add more than 25,000 miles. There still hasn't been a breakthrough in the range of lead acid batteries," he said.

To make an electric auto economically appealing, Runkle said GM might choose to lease or rent batter-

ies to customers to cut down on the replacement cost.

"We're investing several hundred million dollars on this program and need more rational business research on it now," Runkle said. Plus, GM must determine if demand will justify the expense.

That's one reason the car was at the Los Angeles auto show last month and will be at the Chicago Auto Show this month.

"In L.A., we were able to tune into the environmentalists to get their reaction to such a car," he said. "In Chicago, we want the reaction of Midwesterners, who are less environmentally active but have to drive in cold, snowy, bad weather.

"In Chicago, we're looking for reaction among the more pragmatic. What we may find is that interest in an electric car turns out to be regional."

Runkle said Impact would be priced "in the \$20,000 range."

"It wouldn't be a \$10,000 car, because if we knew how to do that, we'd do it on all our existing cars now. But we know people wouldn't buy it at \$30,000 to \$35,000, either," he said. "The price has to make it a good alternative to a gasoline-powered car. But our \$20,000 price estimate is strictly a back-of-the-envelope type number for now."

Though high on the concept, Runkle said GM doesn't want to make the mistake of "getting caught up in the electric car enthusiasm."

"We don't want to end up investing \$1 billion in the car and find people really don't want to buy it," he said.

"That's why we're looking at building some to get out there in the real world for people to test in order to learn more about the car, the systems, the batteries and, most important, if people will accept the car," he said.

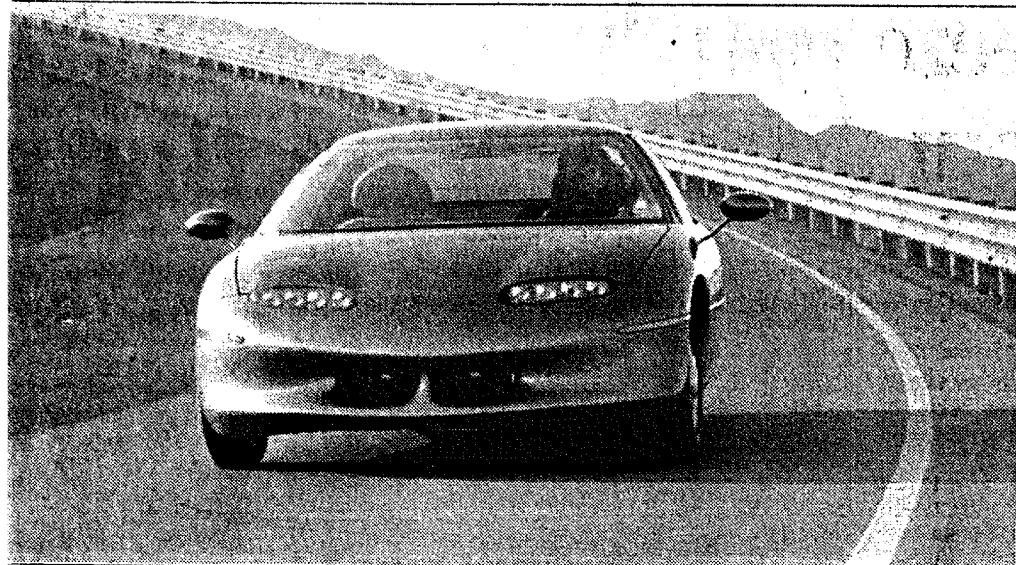
Chrysler did that in 1962 with gas turbine engines, giving 50 consumers cars to test. The gas turbine proved unacceptable to motorists, and the project was dropped.

For now, Impact is a development of the GM technical staff, and no division has been given responsibility to carry the program further.

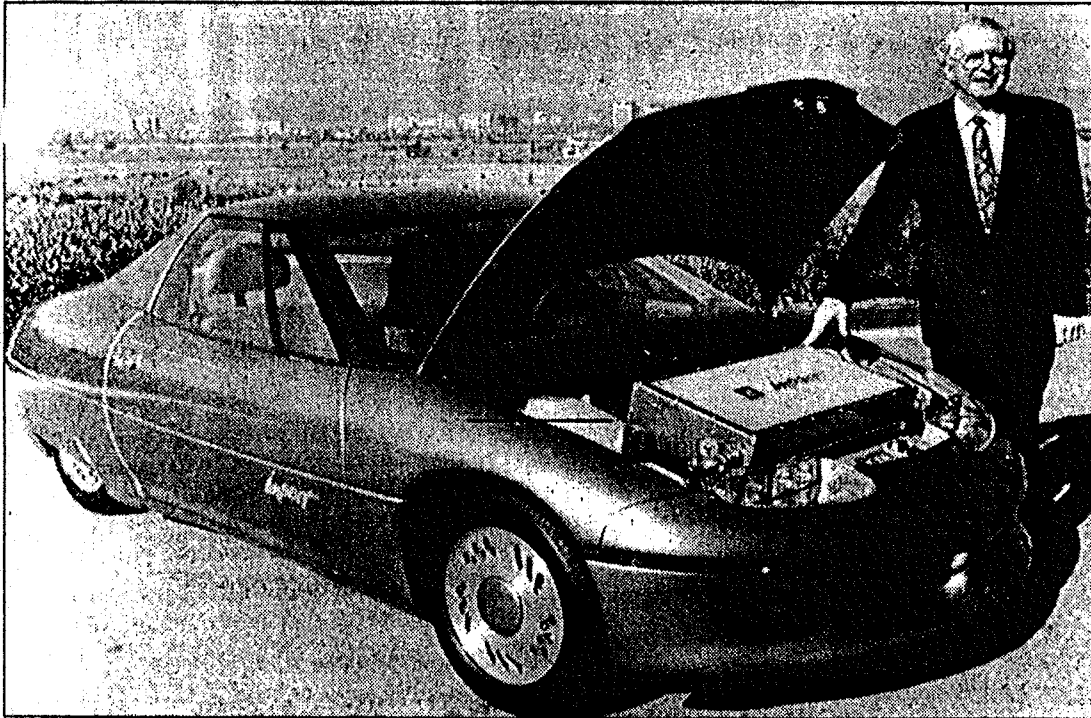
"We could turn it over to a division in 6 to 12 months," Runkle said. "The tech staff still has a lot to iron out before turning it over to a division to consider manufacture."

The ayes or nays from the auto show crowd will help determine whether Impact makes an impact.

The Chevrolet exhibit will house Impact here, though GM officials said you shouldn't read anything into that association. When the car was displayed at the L.A. show last month, Oldsmobile was the designated division.



Impact, a battery-powered electric car under development by General Motors Corp. The subcompact (95-inch wheelbase, 163-inch length) two-seater will be at the Chicago Auto Show.



AP Laserphoto

General Motors Corp. Chairman Roger Smith, with the Impact concept car.

# GM nears decision point on producing electric car

By Jim Mateja  
Auto writer

General Motors Corp. will decide in 60 to 90 days whether to produce a battery-powered electric car, which would be available to consumers in about two years.

GM Chairman Roger Smith, in town for the opening of the Chicago Auto Show at McCormick Place, said the automaker has four alternatives to choose from on electric cars:

- Produce the recently unveiled Impact concept car, powered by 32 10-volt batteries.

- Build a hybrid of the Impact, powered by batteries but with a gas engine in reserve to ensure a longer travel range.

- Convert an existing GM car—a Chevy Geo Prizm or Chevy Geo Storm, to electric power.

- Shelve plans for an electric car until a battery breakthrough is made that would increase driving range.

Impact was unveiled last month at the Los Angeles Auto Show and will be on display at the Chevrolet exhibit at the Chicago show through Feb. 18. The two-seater Impact is built on a 95-inch wheelbase and is

163 inches long, or smaller than the former Chevrolet Chevette mini-car.

With the 32 batteries powering an electric motor, GM claims Impact has a top speed of 100 m.p.h. and a 0-to-60-m.p.h. acceleration time of 6.8 seconds (quicker than many gas-powered cars). However, the cruising range is only 125 miles before the battery pack must be plugged into a socket for a 2-hour recharge. After 25,000 miles of driving, the 32 batteries have to be replaced.

"We'll make up our minds

on what to do in 60 to 90 days," Smith said in an interview. "I would hope to have an electric, and the ideal car would be the hybrid gas and electric."

Smith said GM has only one electric Impact undergoing testing.

"We need to build more for testing and to evaluate with consumers," Smith said.

"The curse of the lead acid battery is still upon us in terms of driving range, and maybe we should just wait until we have a battery breakthrough for greater range," Smith said. "But we don't have the luxury of being able to wait."

An electric car's two strongest features are energy conservation, because it doesn't rely directly on fossil fuels, and near-zero emissions.

The federal government is considering stricter fuel economy and emissions legislation that would force alternate-fuel vehicles to be built.

California, with the nation's worst pollution problem, is pushing clean-air laws so strict they would ban cooking on an outdoor grill.

"Probably the smartest and most sensible way to do this would be to come up with a low-volume electric to sell on a regional basis in those areas with the greatest existing pollution problems, such as Los Angeles," Smith said.

Smith said one obstacle GM has to overcome with an electric car, and one reason it plans to build more vehicles for testing, is the consumer perception of a battery car as a golf cart with a trunk.

"I wouldn't go out on the highways in a golf cart, I'd get run over," Smith said. "But Impact's performance is better than a lot of gas-powered cars already on the market. We have the acceleration and passing power in our Impact."

"Fiat just announced it has come up with an electric by converting one of its gas cars [the Panda sold in Europe] to batteries. Its top speed is only 43 m.p.h., and I certainly don't want to go out on the highway at 43 m.p.h."

Smith said that in the long term, electrics should become more appealing as people realize that fossil fuel is a finite source.

"There's only so much petroleum out there," he said. "It's bad enough we're going to leave our grandchildren with a bankrupt nation, we don't want to leave them with a bankrupt environment."

In a separate interview, GM President Robert Stempel said GM's cautious pace on Impact was intended.

"Remember four or five years ago, when there was all the excitement over the Saturn and we didn't even have a bird in the hand at the time? We don't want to have unbridled enthusiasm like that again," he said.

"We want to sample consumer opinions about the car at the auto show, to learn if it makes sense to them, and then if it makes sense to us as a business decision, in terms of volume and price and where do we build it and who builds it."

LOCAL EVENTS 1990

- |      |                                                                                                  |      |                                                                                                      |          |                                                                                                   |
|------|--------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------------------|
| 2/16 | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free             | 5/18 | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free                 | 9/15-16  | Hamfest & Computer<br>Exposition Gardens<br>Northmoor & Univ-ty<br>Peoria, Ill.<br>9:00 AM \$5.00 |
| 2/24 | Hamfest<br>Sabre Lanes<br>1330 Midway Rd.<br>Menasha, Wisc.<br>7:30 AM \$2.00                    | 5/19 | Hamfest<br>National Grd Armory<br>West on Elvira Rd.<br>Clinton, Iowa<br>8:00 AM \$4.00              | 9/21     | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free              |
| 2/25 | Hamfest<br>Masonic Temple<br>Davenport, Iowa<br>8:00 AM \$3.00                                   | 5/20 | Hamfest<br>Will County Fgnds<br>I-57 exit 327<br>Peotone, Ill.<br>8:00 AM \$3.00                     | 9/22-23  | Radio Expo & Fest<br>Lake County Fgnds<br>Rts 45 & 120<br>Grayslake, Ill.<br>6:00 AM \$5.00       |
| 3/4  | Computer Show<br>Lake County Fgnds<br>Rts 45 & 120<br>Grayslake, Ill.<br>9:00 AM \$5.00          | 5/27 | Hamfest<br>DeVry Inst. of Tech.<br>3300 N. Campbell<br>Chicago, Ill.<br>8:00 AM \$3.00               | 10/19    | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free              |
| 3/11 | Hamfest<br>High School Fld Hs<br>1608 4th Ave.<br>Sterling, Ill.<br>7:30 AM \$4.00               | 6/15 | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free                 | 11/16    | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free              |
| 3/16 | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free             | 7/8  | Hamfest & Computer<br>American Legion Post<br>4000 Saratoga<br>Downers Grove, Ill.<br>8:00 AM \$3.00 | 11/17-18 | Hamfest<br>Allen County Coliseum<br>Exposition Ctr.<br>Fort Wayne, Ind.<br>10:00 AM \$5.50        |
| 3/25 | Hamfest<br>Lake County Fgnds<br>Rts 45 & 120<br>Grayslake, Ill.<br>8:00 AM \$4.00                | 7/20 | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free                 | 12/21    | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free              |
| 4/8  | Swapfest & Computer<br>Dane County Expo Ctr.<br>Rts 151 & 14<br>Madison, Wisc.<br>8:00 AM \$4.00 | 8/17 | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free                 |          |                                                                                                   |
| 4/20 | FVEAA Meeting<br>Cragin Fed S & L<br>333 Wesley St.<br>Wheaton, Ill.<br>7:30 PM Free             | 9/9  | Hamfest & Computer<br>Inwood Rec. Ctr.<br>3000 W. Jefferson St.<br>Joliet, Ill.<br>8:00 AM \$4.00    |          |                                                                                                   |

FOR SALE

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that you know of.

Call: Jack Nikolich  
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Would you be willing to  
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Call: Frank Delmonico  
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Business Week January 22, 1990

**GIVING ELECTRIC CAR BATTERIES  
A JOLT IN A JIFFY**

**A**s General Motors Corp. demonstrated on Jan. 4, the chief polluter of urban air—the internal combustion engine—may someday yield to electric powerplants that provide spiffy performance for the daily commute: GM's latest prototype car can do 0 to 60 mph in 8 seconds and travel 120 miles between charges. But recharging those batteries is still an overnight job. Suppose, though, that you could pull into a service station for a quick recharging—in 30 minutes or less. Then electric cars might be practical even for long trips.

That's the vision of Yury Y. Podrazhansky, chief executive of Electronic Power Devices Corp. His Atlanta startup has patented a way of rapidly reinvigorating any size rechargeable battery. And, he says, the technique doesn't damage the battery, which is what usually happens when recharging is speeded up simply by pumping in more electricity.

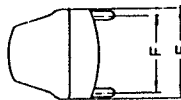
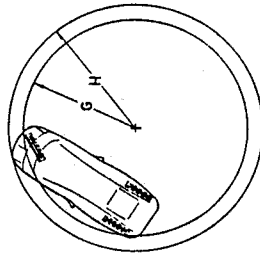
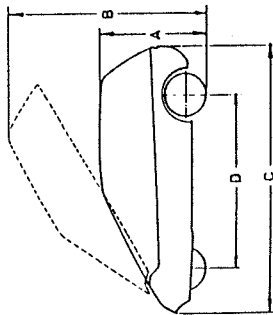
The trick is a special electronic controller that jolts the battery with high current for a few hundred milliseconds, then discharges it for two or three milliseconds. After a brief respite, so the battery can adjust, the cycle repeats. Podrazhansky perfected his method to recharge the batteries in the video cameras at Turner Broadcasting System Inc., where he went to work shortly after emigrating from the Soviet Union in 1978. He is now working on a commercial prototype.



## MÅL & VÆGT

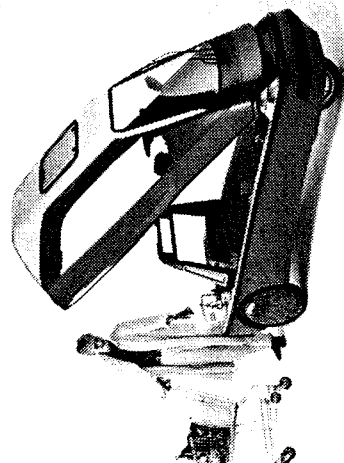
Egenvægt \*) ..... 285 kg.  
 Nyttelast ..... 115 kg.  
 Max. totalvægt ..... 400 kg.

Frontareal ..... 0.99 m<sup>2</sup>  
 Cw (luftmodstandstal) ..... 0.32  
 \*) Inkl. ca. 95 kg. batterier.



A (Højde, cockpit lukket) . 1220 mm  
 B (Højde, cockpit åbent) . 2200 mm  
 C (Total længde) ..... 2730 mm  
 D (Akselafstand) ..... 1810 mm  
 E (Største bredde) ..... 1060 mm

F (Sporvidde) ..... 930 mm  
 G (Venderadius - yderste dækkant) ..... 3930 mm  
 H (Venderadius - yderste karrossedel) ..... 4330 mm



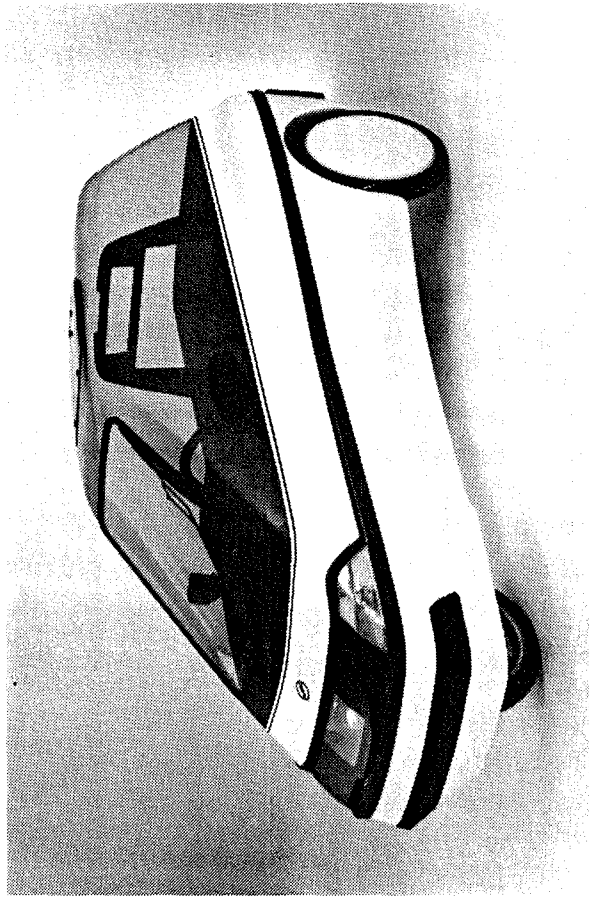
En undersøgelse viste, at langt de fleste mini-el ville blive brugt til kørsel til/fra arbejdsplads, tæt fulgt af "Let varetransport/korte byture". Ca. 15% ville bruge den til transport af mindre børn til/fra skole, børnehave m.v.



**El-Trans A/S**

Haraldsvej 66  
 DK-8900 Randers  
 Tlf.: 06 43 47 11  
 Tlx.: 65 147 miniel dk  
 Telefax: 06 41 88 71  
 Giro: 3 44 56 23  
 A/S-REG. NR. 102.555

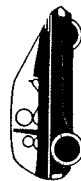
# SPØRGSMÅL & SVAR



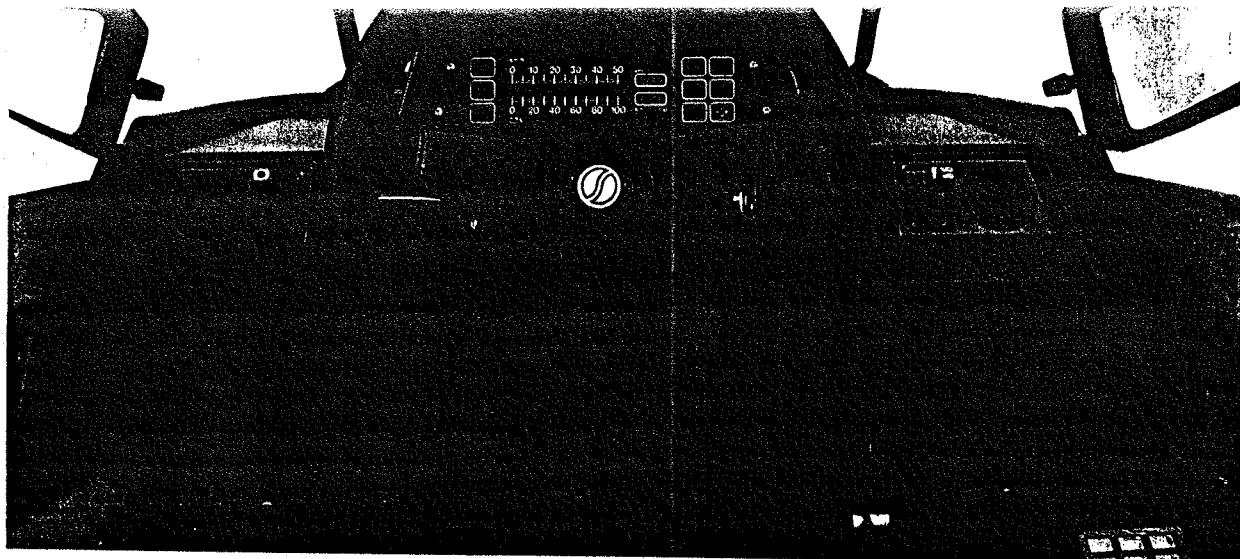
**- det nye køretøj til nærtrafikken**



mini-el sønderjylland  
 Håndværkersvinget 12  
 6340 Tinglev  
 Tlf. 04 54 33 83



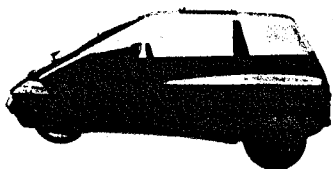
December 1987



**mini-el / instrumentering**

Foruden speedometer, km tæller, triptæller, indikering af fjernlys og afviserblink, indeholder mini-el's instrumentpanel også en »restenergimåler«, advarsel

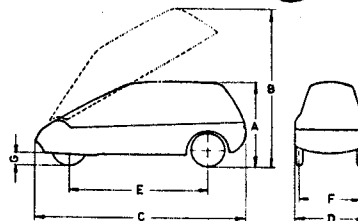
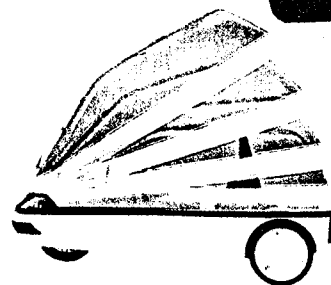
om begyndende overbelastning af motoren og indikator for »Lader tilsluttet«. Energimåleren giver signal i god tid, inden al strømmen er brugt, og man skal søge nærmeste stikkontakt.



**Mål og Vægt**

- Egenvægt \*) ..... 285 kg
- Nyttelast ..... 115 kg
- Tilladt totalvægt ..... 400 kg
- Frontareal ..... 0,99 m<sup>2</sup>
- Cw (luftmodstandstal) ..... 0,32
- \*) Incl. ca. 95 kg batterier

- Højde, cockpit lukket .. A 1.220 mm
- Højde, cockpit åbent .. B 2.200 mm
- Længde ..... C 2.730 mm
- Bredde ..... D 1.060 mm
- Akselafstand ..... E 1.810 mm
- Sporvidde ..... F 930 mm
- Frihøjde ..... G 150 mm
- Venderadius ..... 4.330 mm



**Hoveddata:**

Hastighed ..... ca. 40 km/t  
Rækkevidde pr. opladning ..... 40-70 km

**Opladning:**

Ladeapparat med aut. regulering indbygget under førersædet. Tilsluttes alm. stikkontakt.  
Ladetid 0% til 100% opladning ..... 10-12 timer  
Max. optagen ladeeffekt ..... ca. 650 Watt  
Hvileeffekt når 100% opladning er nået ..... ca. 20 Watt

**Motor:**

Permanent magnet DC motor, 880/3 250 Watt (1,2 - 4,4 HK) styret gennem hydraulisk betjent fartregulator og med direkte træk til bagakslen

**Batterier:**

3 stk. 12 Volt/90 Ah (C5) specialbatterier (Blysyre/plade) i serie. Driftsspænding 36 Volt.

**Varme/Blæser:**

Kabinevarme ..... 200 Watt  
Af-isning (kun under stilstand) ..... 1200 Watt

**Hjul/Bremser/Transmission:**

Specielt lavprofildæk 80/70 x 16 på alle tre hjul. Hydraulisk, 2-kreds bremsesystem med tromlebremser på alle hjul. Fodbetjent, mekanisk parkeringsbremse på forhjulet. Stiv bagaksel med friktionskobling til højre hjul (Differentialvirkning).

**Udstyr:**

Soltag, sprinkler, kabinebelys, triptæller, aflåseligt cockpit, beslag for sikkerhedssele og 12 Volts udtag til radio. Som ekstraudstyr kan leveres sikkerhedssele, letvægtsovertræk, gulvmåtter, stofbetræk til sæde og ryglæn samt diverse rens- og plejemidler til cockpit og karosse.

**BEMÆRK:** Illustrationer og specifikationer med forbehold for ændringer.

**WEIGHT**

FRONT 285 kg x 2.2 = 627 LB  
REAR 115 kg " 253 "  
TOTAL 400 kg " = 880 LB.  
BATTERY WT. 95 kg. 209 LB.

FRONTAL AREA 0.99 M<sup>2</sup>

**DIMENSION.**

HATCH CLOSED HT. 1.22 M  
" OPEN " 2.20 M  
TOTAL LENGTH 2.73 M  
WIDTH/WHEELBASE 1.81 M  
TOTAL WIDTH 1.06 M  
TREAD WIDTH REAR 0.93 M  
GROUND CLEARANCE 0.15 M  
TURNING RADIUS 4.33 M  
RANGE 40-70 KM @ 40 KM/HR.

MOTOR 880W. CONTINUOUS 3250N/PEAK PERM. MAGNET  
BATTERY 3x12VOLT/90A.H.  
TIRES 80/70x16  
HYDRAULIC<sup>FOOT</sup> BRAKES / 2 WHEELS  
MECHANICAL PARKING BRAKE

SPEEDOMETER 0-50 KM/HR.  
TOTAL KM.  
TRIP KM.  
% OF CHARGE 0-100

WINDSHIELD WIPER  
" WASHER.  
" DEFROSTER.

OPTIONAL AM-FM RADIO