September 1987

MEETING NOTICE

The next meeting will be Sept 18th, at *CRAGIN FEDERAL SAVINGS & LOAN* 333 W. Wesley St. Wheaton, Ill. -Time - 7:30 P.M. *sharp.* Guests are welcome and need not be members to attend the meeting.

THE PRES SEZ

On September 18th we will have our annual meeting as required by the FVEAA bylaws. It promises to be unusually busy because we have a number of matters to consider. The first order of business will be the election of officers for the coming year.

After election, we will have reports on the display of the Club Car at the State Fair and the status of our Video project.

Member Irv Freidan will present a possible grant request for FVEAA consideration.

Member Ken Meyers will present a tutorial on the subject of battery charger design as our technical discussion.

Member John Stockberger will have a new video on electric vehicles and we will also see the EPRI video on electric van development and testing.

BILL

fold . . . . . .

F. V. E. A. A.

FOX VALLEY ELECTRIC
AUTO ASSOCIATION
624 Pershing St. Wheaton, Il 60187

FIRST CLASS

ADDRESS CORRECTION
REQUESTED

Minutes of FVEAA August 21, 1987 Meeting

Secretary Woods was vacationing. In his absence, President Shafer agreed to perform his duties.

Treasurer Vana gave the following Treasurer's Report:

Checking Account $ 767.89
Savings " 784.53
No Expenditures for the month.

President Shafer noted that the FVEAA Bylaws require the annual meeting to be held in September with election of officers. After a discussion, the members present decided to dispense with the appointement of a nominating committtee and recommend the slate of officers, who have all agreed to serve, as follows:

President	- Bill Shafer (Incumbent)
Vice President	- Ken Woods (Current Secretary)
Secretary	- Paul Harris (New)
Treasurer	- Vladimir Vana (Incumbent)
Property Manager	- Dana Mok (Incumbent)
Director At Large & Newsletter Editor	- John Emde (Incumbent)

Additional nominations may be made from the floor at the September meeting.

A general discussion on the status of their individual electric car projects indicated the following:

Member Ahern's FIAT has a burned-out motor that needs replacing

Member Harris has all the parts necessary but needs to find time to install a controller and finish his project.

Member DelMonico continues work on his 65 Opel which will use a belt converter. He hopes to finish it this fall.

Member Mok reports he blew a power transistor in his new converter and hasn't found time to make repairs.

Member Vana reported on the operating difficulties he experienced with his car.

Member Stockberger would like to sell his sport FIAT so he will have the space to finish his other car which is about 90% complete.

Member Emde reported his Subarau needs a new set of batteries.

Member Shafer stated his DAF is still out of service with the conversion to a 48-volt system proceeding slowly due to a lack of time.

It appears that most of the member's cars have troubles. A measure of mutual support to solve their problems would be helpful to restore these to operating condition.

Continued on page 3

Continued

Minutes of FVEAA August 21, 1987 Meeting

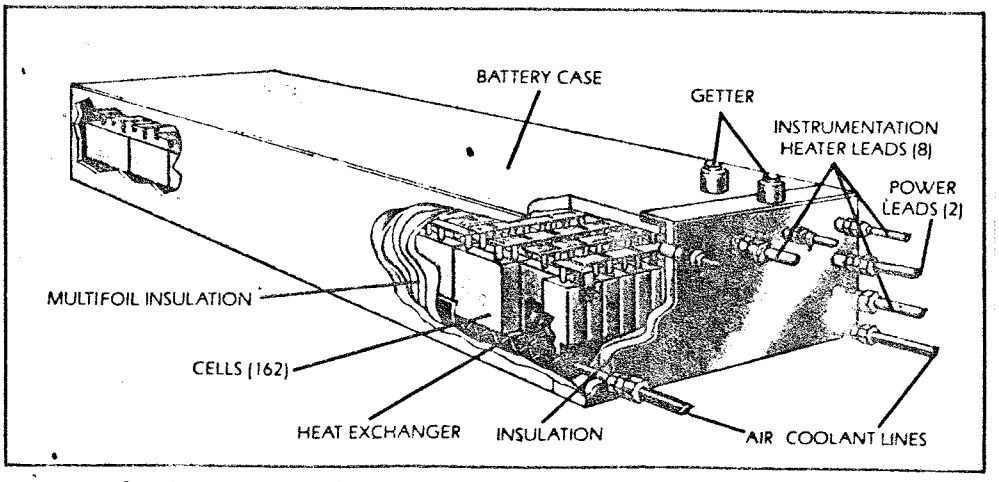
Member Pollard gave a presentation on the Mother Earth mechanical chopper which utilized a modified 6-volt starter. He stated the arrangement produces severe sparking and had been superseeded by power transistor technology.

Two suggestion regarding future programs were made. Member Mok asked for Member Meyers presentation on battery charger design. This will be at the September meeting. Member Palmer asked that we continue the petro-electric design. This will be resumed in the fall.

Member Harris donated 1/2" clear plastic "boards" about 20X24" in size for sale to club members at $2 each. He also brought along a car-top advertising sign of a type used on taxi roofs that had been donated to FVEAA for use on the club car.

Assault On Battery Design

It's been the dream of automobile designers for generations—a practical electric vehicle that can travel up to 300 miles at highway speeds. Scientists at Argonne National Laboratory in Chicago may have placed us one step closer with the recent introduction of a large lithium-iron-sulfide battery intended for installation in a van. The 216-volt battery (illustration) is equipped with air-coolant lines and a unique heat exchanger that moderates internal temperatures.

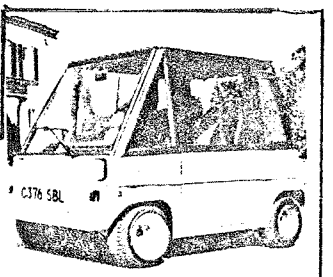


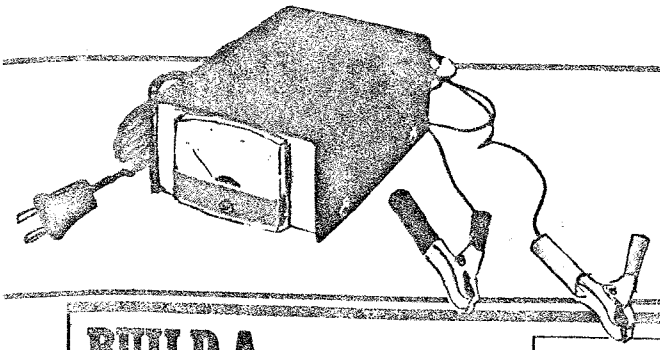
PM ILLUSTRATION BY LYNDA RICHARDS

Sophisticated cooling is at the heart of Argonne's lithium-iron-sulfide battery.

U-drive-it

Sweep a credit card through the magnetic reader on this electric taxi, and get 15 min. around town for about $2.25. Monte Carlo now has a fleet of 12 battery-powered two-seaters and three recharging stations. Made by City Wheels, 16 Berkeley St., London W1X 5AE, England.





BUILD A TRICKLE CHARGER

Whether you use it to keep your car battery from freezing overnight or just to maintain a charge in a little-used boat battery, a trickle charger is mighty handy to have around. It's also simple in design and makes a perfect afternoon project for even an inexperienced tinkerer. Why not build one yourself?

How It Works

A trickle charger consists of nothing more than a 12-volt transformer and a DC rectifier. The transformer is a standard step-down device commonly found in solid-state appliances, such as clock radios. It reduces the 117-volt AC line voltage to 12-volt AC.

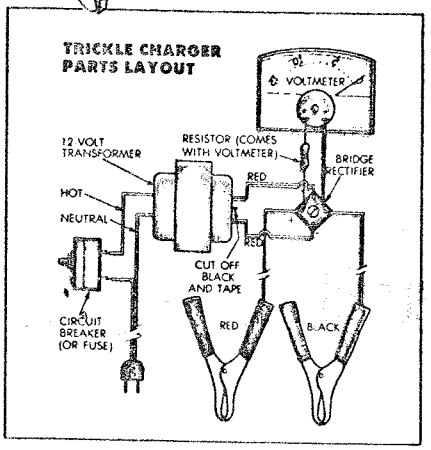
The 12-volt AC output converts to 12-volt DC (the form of electricity produced by batteries) via a bridge rectifier. That DC voltage, placed across a lead-acid battery, puts charge into the cells. Because the charger applies such a small current (about 3 amps), it's virtually impossible to overcharge or damage cells. Thus the charger may be left connected to a battery for extended periods—even overnight.

Construction

The least costly way to build a trickle charger is to salvage a 12-volt transformer from an old appliance and add a bridge rectifier. The bridge rectifier is an inexpensive item you can get from Radio Shack or other electronic parts outlets. Add a homemade or salvaged cabinet, a fuse, and a line cord from an old appliance, and you can have a battery charger for under $5. About all you'll have to buy besides the rectifier is the fuse (or a circuit breaker), which prevents the unit from catching fire in the event of a failure.

If you'd rather save time than money, you can buy it all at Radio Shack. While you're there, though, you might want to pick up a few fancy accessories. A more sophisticated version, like the one shown in the photo, has the transformer and rectifier housed in a custom metal box and includes a voltmeter.

Position and mount the transformer, circuit breaker, power cords, and bridge rectifier in the case. The illustration above shows how the parts are connected. Apply a thin layer of silicone grease between the bottom metal tab of the rectifier and the metal chassis before mounting it with a bolt through its center hole. Don't overtighten the bolt, or you'll crack the plastic case.



Beginning with the transformer's primary (black) leads, connect one wire to the AC line cord and the other to the tab on the circuit breaker. Solder the other leg of the line cord to the remaining circuit breaker tab. Use a wire nut or some electrical tape to protect the exposed transformer-to-line-cord splice, and fit a strain reliever to the cord where it passes through the case.

The transformer secondary has three wires: two red and one black. Remove the black wire by cutting it close to the body of the transformer, and tape over the end to prevent shorting. Now solder each red wire to one of the two bridge rectifier terminals identified by a small sine (~) symbol. They're located catty-cornered from each other; don't mistake them for the minus (–) symbol.

The minus (–) terminal connects to the minus (–) side of the voltmeter and to one of the leads going to the battery. The battery lead has a black battery clip on its end. The remaining bridge rectifier terminal—identified by a plus (+) sign and located at the truncated corner of the package—connects to the second lead going to the battery and has a red battery clip on its end.

The plus (+) bridge rectifier terminal also connects to the voltmeter through a resistor that comes with the meter. Solder it between the rectifier's plus (+) output and the meter's plus (+) input. You could follow the assembly sequence above but leave out the voltmeter, which would save almost $8.

Using the Battery Charger

Check the performance of your battery charger by plugging it in and noting the reading on the voltmeter. It should be 12 volts. (Caution: NEVER spark the battery clips together to test for the presence of voltage. This will burn out the bridge rectifier.)

The voltmeter does more than tell you whether the charger is working, though. When the voltmeter is connected to a battery, the reading changes with the state of charge. The following tables summarize battery conditions at room temperature (68°F). You may wish to make a copy of these tables and paste them to the cover of your battery charger for easy reference.—*TJ Byers*

NO CHARGING CURRENT APPLIED TO BATTERY

Voltage	Battery Condition
10.5–11.0	Battery exhausted
11.0–11.5	Under 10% of charge left
11.5–12.0	Under 40% of charge left
12.0–12.5	Charge 50% to 90%
12.5–13.0	Charged 100%

CHARGING CURRENT APPLIED TO BATTERY

Voltage	Battery Condition
12.5–13.5	Charging; may be low
13.5–14.0	Charging ok
14.0–14.5	Charging ok
14.5–15.0	Charging on the high side
15.0–15.5	Abnormal charging voltage

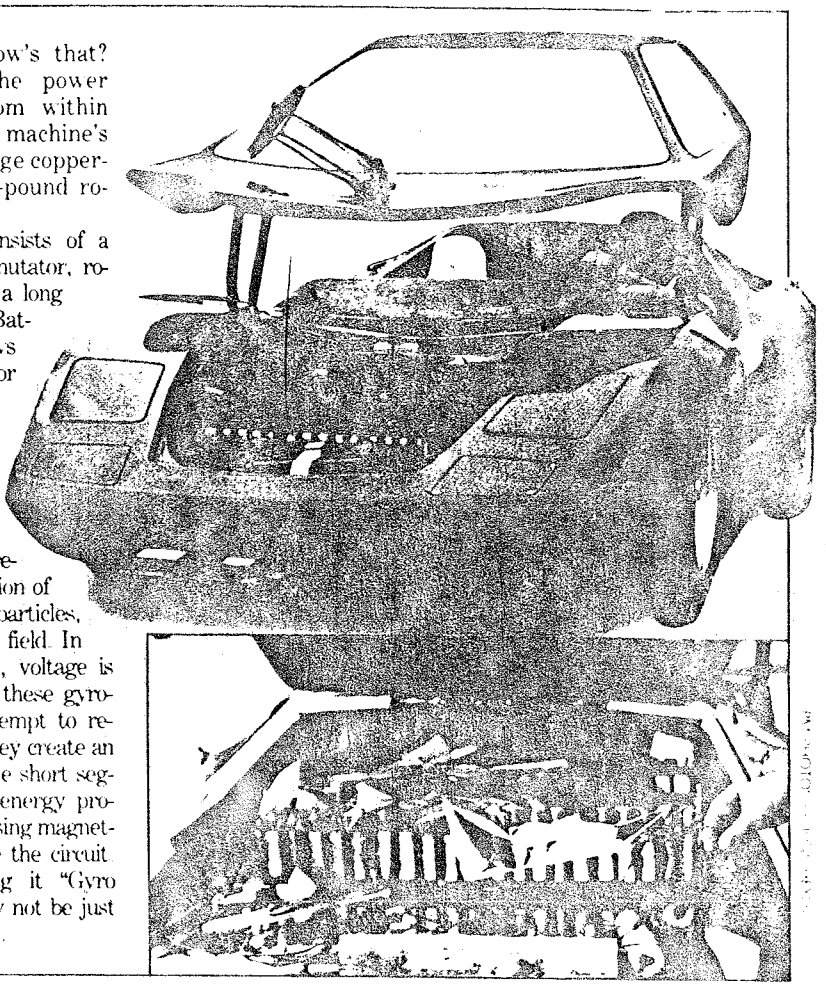
PARTS LIST

Radio Shack No.	Description
273-1511	12-Volt Transformer
270-1754	0-15 Voltmeter
276-1180	6-Amp Bridge Rectifier
270-1310	Circuit Breaker
270-343	Battery Clips
278-1255	AC Line Cord
278-1636	Strain Relief
270-252	Metal Cabinet

Is Newman's Car For Real?

The United States Patent Office doesn't think so, and neither do some disbelievers scattered across America. But Joseph Newman of Lucedale, Mississippi, backed by some topflight scientific opinionmakers, may have tapped the fundamental energy of the smallest particles of matter. At recent demonstrations, the "backwoods" inventor powered an 1800-pound fiberglass car at a speed of 8 mph for more than 34 hours. A faulty transmission and a bent rotor shaft foiled a faster speed for the vehicle, which, Newman predicts, will travel 60 mph and cost under $5000. Newman's vehicle uses a 200-pound battery pack made up of 9-volt transistor batteries connected in series. The pack supplies 17,000 volts, but the energy machine under the cowl draws only 18 milliamps of current. The machine, on the other hand, produces 125 milliamps of current and more than 100,000 volts. How's that? Newman says the power source comes from within the atoms of the machine's 240-pound, 30-gauge copper-wire coil and 200-pound rotating magnet.

The machine consists of a battery pack, commutator, rotating magnet and a long coil of copper wire. Battery current flows into the commutator in three segments: fire, blank and short. In the fire position, current flows into the copper coil causing atoms to align and release a minute portion of their gyroscopic particles, creating a magnetic field. In the blank segment, voltage is broken, and when these gyroscopic particles attempt to return to the wire, they create an electric current. The short segment permits the energy produced by the collapsing magnetic field to complete the circuit. Newman is calling it "Gyro Power," and it may not be just the stuff of dreams.



POPULAR MECHANICS, • JULY 1987

HAMFESTS 1987

Sept 19 & 20 Two days $4.00
Expo Gardens W. Northmoor rd
off 6300 block Peoria, Ill.

Sept 26 & 27 6:00 a.m. $5.00
Lake County Fairgrounds
Rts. 45 & 120 Grayslake Ill.

Oct. 25 Sun. 8:00 a.m. $3.00
Waukesha Expo Ctr. Hwys. J &
FT off I-94 Waukesha Wisc.

Oct. 31 & Nov. 1st Two days
Norris Sports Ctr. Rt. 64 &
Dunham Rd. St. Charles, Ill.

Nov. 1st Sun. 7:00 a.m. $3.00
Lake County Fairgrounds
Rts. 45 & 120 Grayslake Ill.

Placing Betas

It's a solid. It's a liquid. It glows. It can sense changes in light and heat. It's called beta alumina, and researchers at the University of Pennsylvania believe it will revolutionize battery technology and may lead to the creation of tiny, but powerful, lasers.

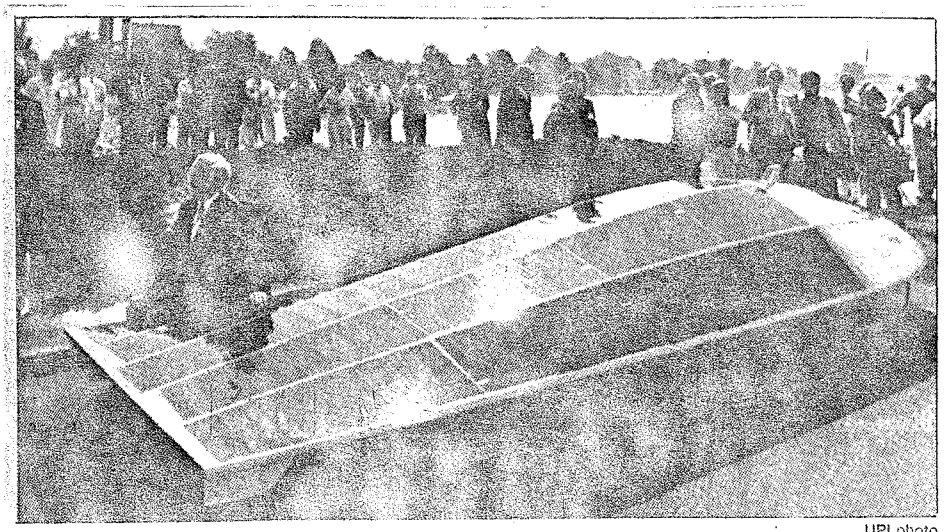
Beta alumina is a solid electrolyte, meaning it is a nonmetallic electric conductor whose ions flow, creating current. Most solid electrolytes have to be cooled to be good conductors, but Ford Motor Co. researchers discovered in the 1960s that substances like it could conduct current at room temperature, which puts beta alumina in the liquid electrolyte category from a chemist's point of view.

The U. of Penn. researchers have been toying with beta alumina as the possible conducting medium for batteries.

If their theories hold up, the beta alumina may store hundreds of times more energy than lead acid systems.

The implications are great for those who envision an all-electric car. And for those physicists who are searching for the perfect laser material, the beta alumina holds out promise of big breakthroughs in the next decade.

GM shows off prototype that can run with the Sun



UPI photo

General Motors Corp. Chairman Roger Smith introduces the Sunraycer, GM's solar-powered experimental car.

By Jim Mateja
Auto writer

Chicago Tribune

WARREN, Mich.—It holds one passenger and offers neither a radio nor a rear window. When the key is turned on, the motor sounds like a Weed Eater at work.

Yet Roger Smith says the car is "a labor of love."

The vehicle that the General Motors Corp. chairman refers to is the Sunraycer, a solar-powered machine developed by GM. The car is entered in an international, 1,900-mile, cross-country race in November in Australia. In the race, the only fuel allowed will be pumped from the Sun and the sky.

Though almost 20 feet long, or about the size of a full-size station wagon, the Sunraycer stands only 3.3 feet high and holds its single occupant reclined in a hammocklike seat.

The purpose of the car and the race is to learn how to harness the Sun's energy in order to lessen dependence on fossil fuels, Smith said at an unveiling of the 65-mile-an-hour racer here for reporters. An immediate goal, Smith said, is to use the vehicle as a test for fuel-economy gains that can be made soon and "to move closer to hybrid-type cars" that could use a variety of power sources.

Thousands of rectangular cells cover the top of the teardrop-shaped Sunraycer, similar to those used to shield U.S. space shuttles from the heat of re-entry into the Earth's atmosphere. The cells attract energy from the Sun.

While Smith said it's unlikely that solar-powered cars would dot the nation's highways, it is highly possible that solar power could be used to run the accessories on gasoline-powered cars, such as, ironically, air conditioning.

"There are short-term applications to propel accessories because when you offload the accessories, there is a savings in fuel economy," Smith said.

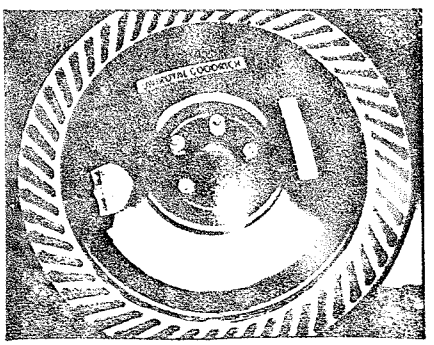
"In a symbolic way, the race Sunraycer and the other [25] solar-powered cars will be running is just one lap in the race to create the future; to help us make advances in aerodynamics, lightweight structures and materials, and lightweight suspensions and steering.

"Events like this race may even lead to important practical applications in the future," he said. "The price of energy, for example, is highly unpredictible, and we have to be prepared for any turn that market might take."

"You don't get anything for winning the race," said GM Vice Chairman Donald Atwood. "A prize isn't important. This is like the [spaceship] Voyager, to inspire interest and stimulate the development of new technology."

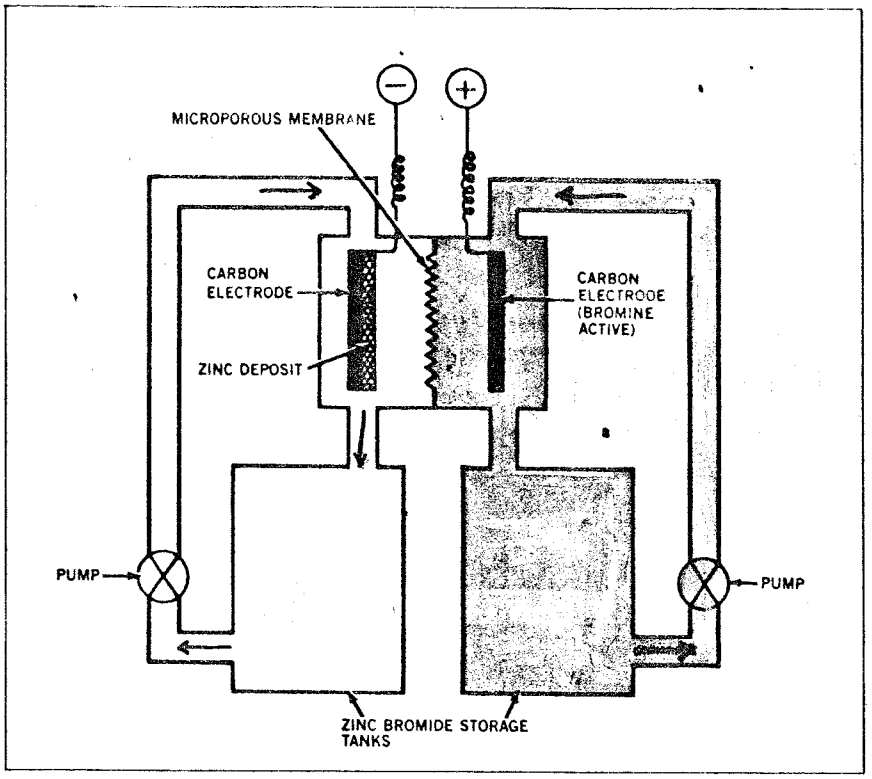
A Plastic Spare Tire?

The Uniroyal/Goodrich Tire Co. innovation was recently tested on a Chevrolet Cavalier Z-24. The non-pneumatic tire is made of an elastomeric-polyurethane ring that has been bonded to a center steel wheel drilled for standard bolt holes. Polyurethane baffles comprise the space between the steel wheel and the tire tread. The baffles are patterned like the vanes of a turbine wheel. The unit weighs less than 6 pounds. Tread life is from 2000 to 3000 miles. Designers call it completely flatproof, and it may appear in the next decade.



Steel wheel drilled for standard bolt holes is surrounded by spare's polyurethane vanes

High-energy battery



PERTH, AUSTRALIA

"It doesn't look a bit like a battery," says Professor Ian Ritchie, showing me two gallon-size cylindrical tanks topped by an upended box in his laboratory. This strange rig is a new type of high-energy zinc-bromine battery being researched here at Murdoch University in Western Australia, and sponsored by Exxon Research and Engineering Co. and Energy Research Corp.

"It's a breakthrough in electrochemistry," claims Ritchie. "For a given output, this battery has twice the energy density of the usual lead-acid type, is far lighter, and uses cheap abundant materials. Most important, it has a virtually unlimited charge-discharge cycle life, so a battery could last almost indefinitely." Researchers hope the battery will evolve into tennis-court-size systems. These could save millions of dollars in power-station construction by storing energy from present plants during off-peak hours. The batteries could also store energy from wind and solar plants.

In conventional lead-acid batteries, Ritchie explains, energy is stored in the electrode plates. Chemical reactions slowly degrade the metallic plates until they fail, and the entire battery is usually junked. But with the zinc-bromine battery, energy is stored in the electrolyte fluid, which, like water in lead-acid batteries, carries electric current between the plates.

Both plates in Ritchie's experimental battery are carbon and serve as a source of electrons. The plates are chemically inert and won't fail because of deterioration. A cell (see diagram) is split into two sections by a plastic membrane. A zinc bromide solution is pumped into both sections from separate storage tanks.

During charging, zinc ions are drawn from one solution and deposited on the negative plate as zinc metal. On the positive side, bromide ions are converted to bromine. One solution is deficient in zinc ions, and the other is deficient in bromide ions but rich in bromine. The porous separator membrane permits current flow between the plates.

The electrochemical process is reversed as current is drawn from a battery. Each square foot of 1.8-volt cell area delivers some 30 amperes. Fresh solution is pumped continuously from the supply tanks, whose size determines the energy capacity of a battery system.—*David Scott*

Pumped-up batteries

On a quiet street in San Jose, Calif., a black 1974 Fiat stands parked in a tree-shaded driveway. Under its hood is an array of red-and-white batteries with interconnecting cables. A large yellow sign across the car's rear end reads ELECTRIC.

Inventor Saied Motaei opens the filler-cap door on the side of the car; inside there's a 220-volt receptacle. "This is where I hook it up to household current to charge the batteries," he explains. Motaei has driven the car over a measured distance of 230 miles—a record for regular cars converted to electric power.

A simple improvement he built into the electric Fiat promises to make quiet-running electric vehicles more practical for city use or commuting. The system works by recirculating the electrolytic fluid in the batteries to keep them working longer. Small electric pumps draw fluid off at the bottom of each battery and then pump it back in at the top.

Standard batteries, by comparison, only make effective use of the part of the fluid that is close to their lead plates. Motaei's recirculation system allows the batteries to use all their fluid, and cuts recharging time from nine hours to five.

I ride shotgun as he takes his creation out for a spin. A low whine emanates from the 20-horsepower electric motor. The car accelerates briskly on city streets, then joins the freeway traffic. "It goes up to 75 miles per hour," Motaei says. Driving up a short, steep hill, the car slows noticeably. He explains that a punchier 40-horsepower motor could easily be installed, with only a slight reduction in driving range.

The experimental car also has a regenerative braking system that turns the motor into a generator that pumps electricity back into the batteries. Earlier inventors had made such brakes work only above 30 mph; Motaei's is effective down to 5 mph. Using this system, he set a 165-mile record in 1984. In 1985, by recirculating the battery acid and going to a larger battery pack, he covered 213 miles. After further refinements, he set the current record of 230 miles. The nearest competitor went only 127 miles.

Motaei uses his car for commuting to his job some 20 miles away. The cost of operating it? "One and a half to two cents a mile," he replies. "The batteries occasionally will need replacing, but the motor will last for years."—*T. A. Heppenheimer*

FVEAA CLUB ITEMS FOR SALE

QTY.	DESCRIPTION OF ITEM	PRICE EACH
456	SOLID BRASS BATTERY CONNECTORS 00 & 000 POS. OR NEG.	.75
18	STEEL LAMINATED CHOKE CORE FOR SHUNT MOTORS	5.00
10'	HEAT SHRINK TUBING 3/4" SHRINKS TO APPROX 1/2" PER FOOT	.50
2	200 AMP RELAY 24-28 VOLT COIL	15.00
6	400 AMP RELAY 12 VOLT COIL	45.00
1	2/0 BATTERY CABLE 5'	4.00
1	6 VOLT BATTERY WET 7" X 16"	5.00
1	6 VOLT BATTERY WET (NEW) 7" X 12"	10.00
3	25 AMP CONTACTOR	3.00
1	400 AMP 28 VOLT CONTACTOR	10.00
1	200 AMP CONTACTOR	5.00
2	200 AMP 28 VOLT CONTACTOR	5.00
1	3AG CHASSIS MOUNT FUSE HOLDER	.50
2	IN-LINE 40 AMP FUSE HOLDER	1.00
2	IN-LINE 20 AMP FUSE HOLDER	.50
1	MJ10021 MOTOROLA TRANSISTOR	1.00
1	2N3791 TRANSISTOR	1.00
1	MR862(7620) MOTOROLA DIODE	1.00
1	1N3934B DIODE	1.00
1	Y10 OR 80063-SM-A-749148 DIODE	5.00
2	JOY MFG MOD. AV-3.5-2.75-120D 28 VOLT 60 CFM BLOWER	5.00
6	HEINEMAN CB279 28 VOLT TOGGLE RESET 3HP	1.00
3	CONVENTIONAL SIZE BATTERY HYDRACAP	3.00
2	LARGE (ABOUT 5000 WATTS) RESISTORS	15.00
2	0/0 BATTERY CABLE W/TERMINALS	1.00
2	2/0 BATTERY CABLE W/TERMINALS 12'	10.00
1	30 VOLT SERIES GE 400 AMP 3-8000 RPM MOTOR	150.00
12'	#12 STRANDED WIRE	1.00
2	1/0 BATTERY CABLE W/TERMINALS 2'9"	3.00
1	1/0 BATTERY CABLE W/TERMINALS 3'6"	3.50
1	1/0 BATTERY CABLE W/TERMINALS 4'	4.00
1	1/0 BATTERY CABLE W/TERMINALS 5'	5.00
1	1/0 BATTERY CABLE W/TERMINALS 6'	6.00
1	30 VOLT COMPOUND GE 2CM77 400 AMP MOTOR	150.00
1	VOLTMETER WESTON DC MODEL 622	20.00
1	VOLTMETER WESTON DC	25.00
1	FAN ROTON 115V MODEL BT2A-1 BISCUIT	5.00
1	DEMONSTRATOR MOTOR & CONTROLLER W/METERS & FOOT PEDAL	.00
1	COMPUTER POWER SUPPLY 5A. W/MANY VOLTAGES	10.00
100'	TUBING FLEXITE	5.00
1	MOTOR G23 JACK & HEINTZ 400A (FOR PARTS ONLY)	.00
9	RELAY 12V. 3PDT 3A. P&B KNP14D21	1.00
5	SOCKETS FOR ABOVE RELAYS	1.00
	NEW ITEMS	
1	PHENOLIC FLAT STOCK 37X48X3/4 CAN BE CUT	10.00
1	METER 0-50 VAC SIMPSON 2"	4.00
1	METER 0-30 AMP AC TRIPPLET 4"	4.00
1	METER 0-50 AMP AC TRIPPLET 4"	4.00
1	METER DIGITAL PANEL 2V ANALOGIC AN2532	10.00
1	METER DIGITAL PANEL 2V ANALOGIC AN2510-1B	10.00
2	METER DIGITAL PANEL 100MV WESTON M2460	10.00
1	METER DIGITAL PANEL 2V M-2865 WESTON	10.00
1	METER 0-500 MICROAMP SIMPSON 4"	4.00
1	METER 0-100V OR 0-1MA (CAL IN GAL) WESTO 4" DC2401	4.00
1	METER 0-1 MV DC 3"	4.00
1	METER 0-7.5 OR 0-30 AMP DC 2.5"	4.00
1	METER 0-1MA DC WESTON 4"	4.00
1	METER 37.85MV DC FS GE 4.5" 0-1600;0-800 DEG W/METER RELAY	4.00
1	METER RELAY CONTROL GE D-125K16-704	5.00
1	CHAIN 13/32" X 6FT RED VINYL CLAD	3.00

Above items are available from Dana Mock 759-8033

Q. There is a new type of shock called a gas shock. What advantages does it have over the old-type shocks?

A. When fluid passes through an orifice, heat is generated which causes the fluid to foam. When the shock's hydraulic fluid foams, the shock loses its effectiveness. By putting a gas charge on top of the fluid, the hydraulic fluid does not foam resulting in quicker and more responsive road holding.

* * *

Something we didn't know: Pumping your own gas is still illegal in two states—New Jersey and Oregon. So says Amoco Oil Co., which notes that 78 percent of motorists now do their own pouring at the gas station.

* * *

THIRTY YEARS AGO

QUESTION:

In the January issue of Popular Scien magazine I saw an advertisement of a battery that is new to me, the Waterless battery. It says in the ad, "Never Uses water, Never overheats, Never freezes, Never needs attention." I noticed a couple of other statements that sound sort of fishy to me. One is "The Silicon Waterless Battery is powerful enough to start your engine 50,000 times a year for at least ten years!" Anything you can tell me about the battery would be appreciated.

ANSWER:

For example, 50,000 starts per year would be 137 per day, 365 days per year, or 13 per hour for a ten hour day. Can you conceive any cranking battery that you know of doing that for ten years? We can't either. Jack Morgan Watt is the owner of the Waterless Battery Company and is said to hold a Ph. D degree from the Searchlight University, Searchlight, Nevada. Watt was president of Gulf of California (no connection with Gulf Oil Company). This venture was discontinued in 1950 and Watt entered Erdmore Enterprises, Inc., which operated a cafe and cocktail bar in Los Angeles.

EDITOR COMMENTS:

One time I bought a "Magic TV" antenna that used the "Power of your home wiring" through a "Unique electronic circuit." dog bit it in half and there was nothing inside but plastic. We all like to believe in something marvelous and money saving.