

Electric
Auto



NEWS

MAY 1986

Association

VOL. XVIII NO. 5

CANADIAN ELECTRIC VEHICLE EXPOSITION 1986

Dear Inthusist,

The Vancouver area EV rally and exposition of EVs at EXpo '86 will proceed despite the loss of the Canadian Electric Association sponsorship. Now I know why there is scepticism of the "utility establishment" amongst the amateur Evers!! The Electric Vehicle Association of Canada is prusuing other sponsorships and we may get lucky. Particularly I would like to offer some transport subsidy to private EVs. Meanwhile we must get organized!

Present plans are to arrive at B.C. Hydro's Research facility at 124th St. on 88th Ave. in Surrey on Tuesday, 12th of August. On Wedensday we will rally to downtown New Westminster's SKYTRAIN mass transit terminal in a 15 mile loop. This will be a demonstration of commuter capability, not an endurance contest--but you may drive additional loops as you wish. The loop involves city traffic and moderate hill climbing, with certain zones requiring 40 mph capability. On Thursday, 14th August, we will rally to EXPO '86 in Vancouver arriving in convoy at noon for a grandstand ceremony. The distance is 24 miles, mostly city streets.

EXPO '86 will provide up to four Exhibitor passes per EV while the vehicle is on the site. EVs will be on display up until Sunday and we plan to have demonstrations on a site perimeter roadway. With an estimated attendance of 100,000 per day, you can expect at least 20,000 visitors to see your EV each day. Presently we expect about 25 EVs and EV hybrids, including some corporate sponsored vehicles and state-of-the-art technology.

A symposium is being planned for Friday and we are working on a social event for one evening.

We plan to issue formal invitations in mid-May and would appreciate an expression of interest, particularly if you have not already been contacted by Clarence Ellers, or Ray Nadreau of SEVA, or Ray Harchand of EVAC]

Locally we have had good response from EV enthusiasts and electric industry personnel in response to our request for Bed and Breakfast hospitalit. So we want to hear from you, find out what help you need, etc. Please drop a line or call!

George McCrae (604)663-3347 Days
1322 Hope Rd. 987-7792 Eve.
North Vancouver B.C.
V7P1W7 CANADA

PROJECT TEAM

Project Manager: Doug Turland Vancouver (604)987-8582; Rally
Co-ordinator: Ray Marchand Ottawa (613)745-8475; American Co-ordinator:
Clarence Ellers Santa Clara (408)248-2588.

WASHINGTON D.C.

The following report is taken from the "9th Annual Report to Congress for Fiscal Year 1985 ELECTRIC and HYBRID VEHICLES PROGRAM"

The aqueous battery Pb/A and Ni/Fe R&D activities are managed for DOE by Argonne National Laboratory (ANL). These activities include battery technology R&D, performance verification testing of developmental batteries, and battery application tests and studies.

As shown in Table 1, significant progress in battery technology has been achieved. Substantial improvements in specific energy and cycle life were achieved in lead-acid batteries while retaining low costs; however, additional reductions in battery weight are needed. To achieve the project goals for lead-acid battery technology, technical issues being addressed include methods for increasing the active material utilization and improving cycle life. Improved nickel-iron batteries have achieved good performance and long cycle life, but further reductions in battery cost and weight are needed to achieve the project goals. Technical issues being addressed include optimization of the thickness of nickel electrodes and electrolyte and gas management systems. The results of ANL National Battery Test Laboratory (NBTL) tests using simulated vehicle driving profiles show that the projected EV range has been increased by over 45 and 114 percent, respectively, for those improved lead-acid and nickel-iron batteries. In addition, the combination of improved specific energy and cycle life indicates that the expected battery life (in terms of vehicle miles) in the vehicle has been increased by a factor of three for the improved lead-acid and eight for the improved nickel-iron batteries as compared to previously available batteries. At the NBTL, 1050 charge/discharge cycles in simulated electric van driving, equivalent to over 55,000 miles of operation, were obtained for an Eagle-Picher Industries (EPI) nickel-iron module.

During FY 1985, Johnson Controls, Inc. (JCI, formerly named Globe Battery Co.) continued R&D of an advanced lead-acid battery based on the forced flow of electrolyte through porous lead and lead dioxide electrodes. A schematic drawing which illustrates the flow-through concept is shown in Figure 1. A full-sized experimental flow-through cell was

fabricated and delivered to the NBTL for evaluation. This first-of-a-kind experimental cell demonstrated the viability of the concept by achieving very high levels of active material utilization (51% improvement); this dramatic increase in utilization provides an opportunity for a major increase in the specific energy of lead-acid batteries over that shown in Table 1.

EPI continued R&D on advanced nickel-iron batteries, research was focussed on development of nickel electrodes of up to twice as thick as prior technology and having the desired porosity and strength. Cell designs based upon thick electrode technology are projected to significantly reduce battery cost while simultaneously improving battery specific energy. The latest nickel-iron technology developed during FY 1985 demonstrated an improved specific energy of 53 Wh/kg (13% greater than prior work).

A multi-year effort for the development of advanced nickel-cadmium (Ni/Cd) batteries for EV propulsion was initiated at the Energy Research Corporation (ERC). The development is based on ERC's roll-bonded electrode fabrication process which utilizes less inert metallic nickel than sintered-plate batteries and has the potential of providing higher specific energy and lower cost. Activities in FY 1985 were focussed on increasing the utilization of the active materials and eliminating the gradual decrease in performance which is seen during long-term cycling of such batteries. Work also started on a novel "pseudo-bipolar" battery assembly technique in which the electrode grids from one cell continue, uninterrupted, through the wall into the adjacent cell. This concept would increase the power capability of the cell by eliminating some of the vertical posts and associated resistance.

Westinghouse Electric Corporation continued iron-air battery development previously supported by the DOE's Office of Energy Storage and Distribution. During FY 1985 Westinghouse scaled-up the electrode fabrication process and successfully cycled experimental full-sized cells with 400 cm² air electrodes. Cell performance through the 100-cycle proof-of-concept testing was stable and reproducible. These are believed to be the first full-sized electrically rechargeable iron-air cells

3
Table 1

Performance Objectives and Accomplishments of EV Aqueous Battery Technology

Objective	Pre-Project Lead-Acid Status (1977)	Lead-Acid Accomplishments*	Nickel-Iron Accomplishments	Project Goals
Specific Energy (Wh/kg at C/3 rate)	30	41	53	56
Projected EV Range **	51	74	109	104
Cycle Life (Cycles)***	250	578	NA 1/	800
OEM Cost (\$/kWh)****	50 2/	69	181	70

* Accomplishments are based on verified results demonstrated at the National Battery Test Laboratory for multi-cell modules.

** Projected range of the IETV-1 electric car on the SAE J227a/D urban driving schedule with a 1076 lbs battery.

*** Cycling at 80 % depth-of-discharge; life to 75 % retained.

**** Projected cost in 1982 dollars to an OEM based on a production volume of 10,000 batteries per year.

1/ Life cycle tests of nickel-iron modules in process but not completed; similar hardware exceeded 1,100 cycles.

2/ Estimated cost.

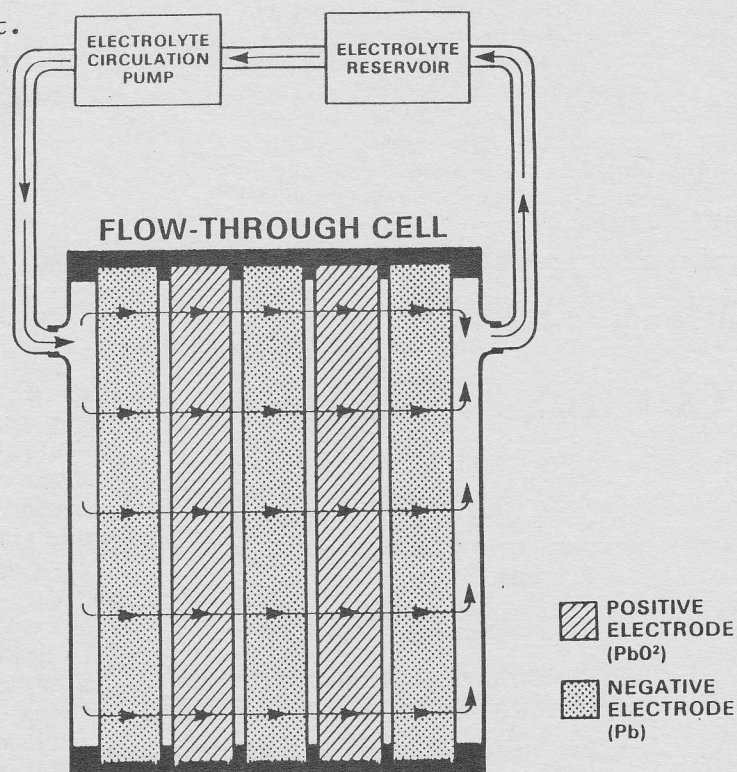
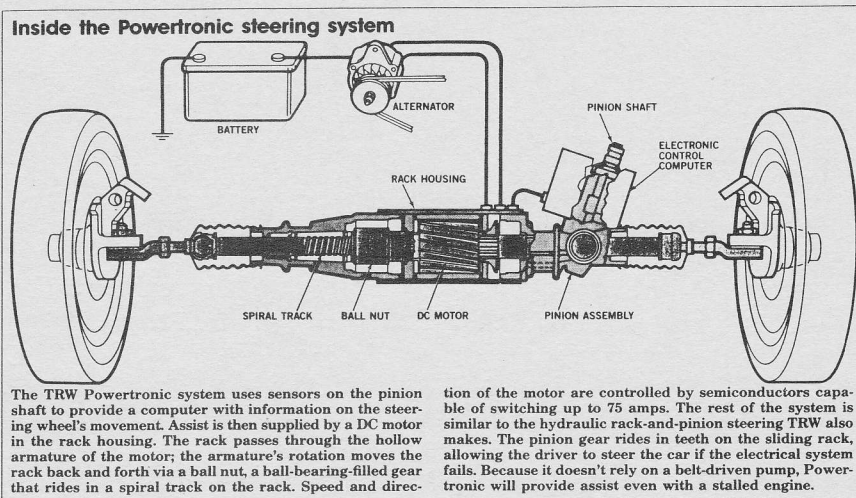


Figure 1. Advanced Lead-Acid Battery Technology
Electrolyte Flow-Through Concept

So long, hydraulics— the electronic revolution in power steering

Power steering in which the power assist is provided by an electric motor rather than the standard hydraulic actuator is on the way. TRW's version, scheduled for production in 1988, promises better performance, less weight, improved reliability, and the ability to program steering assist to suit the driver. Other companies will follow suit quickly.



The TRW Powertronic system uses sensors on the pinion shaft to provide a computer with information on the steering wheel's movement. Assist is then supplied by a DC motor in the rack housing. The rack passes through the hollow armature of the motor; the armature's rotation moves the rack back and forth via a ball nut, a ball-bearing-filled gear that rides in a spiral track on the rack. Speed and direc-

tion of the motor are controlled by semiconductors capable of switching up to 75 amps. The rest of the system is similar to the hydraulic rack-and-pinion steering TRW also makes. The pinion gear rides in teeth on the sliding rack, allowing the driver to steer the car if the electrical system fails. Because it doesn't rely on a belt-driven pump, Powertronic will provide assist even with a stalled engine.

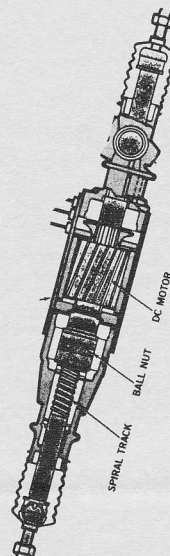
By JACK KEEBLER

When it's a race between electrons and hydraulic fluid, the electrons always win," says John Colletti, engineering director of TRW's steering and suspension division.

I'm convinced. After test driving a Chrysler New Yorker with conventional hydraulically assisted steering, then switching to a car with one of TRW's new electronically controlled

power-steering units, I concluded that electrons are not only faster, they're also smooth and precise. The electronic system had excellent feel, with none of the hydraulic lag sometimes encountered when you turn a power-assisted steering wheel quickly.

Electronic power steering promises many advantages, TRW engineers say. It is lighter, more compact, and more reliable than hydraulic steering. Its control computer can be programmed to provide varying levels of steering



assist and can interact with other computers in the car. It may help make four-wheel steering practical and may lead to future developments in suspension systems.

Although TRW's new Powertronic system uses some of the latest electronic and aerospace technology, it is far from an engineer's pipe dream. TRW plans to produce the system in volume by 1988, and General Motors' Saginaw Division appears to be close behind with plans for its own electronic steering system.

The future

The technology developed for Powertronic could lead to other advanced products. Late at night, after TRW's presentation and dinner, several journalists and Michael J. Ryan, TRW's program director for electronically controlled steering, gathered near the steering display to discuss some last-minute questions and take a final look at the chromed Powertronic unit.

Staring at the steering rack, I suddenly noticed how much it resembled a MacPherson strut. I picked it up and stood it on end. I realized I was looking at something that might be part of what car makers call active suspension systems. These use electric motors or hydraulic cylinders instead of springs and shocks to support the vehicle and provide damping control.

Ryan looked around nervously to see whether anybody else was watching when I asked if the technology that made the steering work could also be applied to the suspension. "It could be and it has been," he replied. Then he became tight-lipped and declined to discuss active suspension any further.

MAY 1986 Popular Science

Two ways to cut the cost of foreign oil

Almost a billion dollars every week. That's how much America spends on foreign oil.

Can we beat this costly energy dependence? Here's how nuclear energy and coal are helping.

America's costliest import is *not* Japanese cars, or West German steel, or shirts made in Taiwan.

America's costliest import is oil. Last year, imported oil cost the country over \$50 billion—about a

third of the entire trade deficit. The U.S. has to import this much oil, because we still consume a lot more than we can produce here at home.

Foreign oil cutoff?

No one knows how much the price of oil will jump if supplies in the Middle East are cut off from the United States and our allies.

To guard against this threat, we're using more energy that is "made in America." Such as electricity from coal and nuclear energy. And we're using our energy more efficiently, too.

Plenty of nuclear energy and coal

Together, coal and nuclear fuel (uranium) now generate 72% of the country's electricity.

These are secure, abundant energy sources. The U.S. has 40% of the world's uranium and 30% of its coal—enough to last us hundreds of years.

But we have only 4% of the world's oil. The Middle East has *more than half* of the world's proved oil reserves.

Every nuclear plant here helps stem the flow of U.S. dollars for foreign oil. Safe, efficient use of homegrown resources will continue to bolster our economy—and strengthen U.S. energy security as well.

EV Marketplace

FOR SALE

Willey Electronic Controllers all w/shunt field control option: Mod 9 demo unit w/plexiglas cover 450A@72V \$495. Mod 8 demo unit w/plexiglas cover 360A@72V \$395. Mod 9 300A@60V \$445. F. Willey (602) 972-4838.

+++++

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Prestolite 20HP-96V motor with custom cast adapter for VW trans-axel and PMC 96V Controller W/fan, all brand new for \$1450.00. Call Peter eves. 5-8PM at 1-(916) 482-0248.

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April 1, 1986

Electric Auto Assoc.
C/O Charles Olson
3087 Taper Ave
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President of Santa Clara Chapter

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By Walter Laski

ELECTRIC CAR CONVERSION MANUAL

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ADS must be received with payment by the 10th of the month, for the following month's issue. AD rate is min. 1 to 5 lines \$5.00. 1/4 Pg. \$15, Full Pg. \$50.00, Full Pg. 2 sides \$80.00, Wanted Trade, For Sale, etc. Mail to EAA 1249 Lane St. Belmont, CA 94002

WHAT'S HAP'N

EXPO 86 VANCOUVER

OPENS MAY 2ND.

Evers wait till AUG. 11 To 17th.

PENINSULA

May 3: San Bruno Library 10AM:
Is Tillen on where do we go from here?

EAST BAY

May 10: PG&E Service Center
4801 Oakport St. Oakland
Tentative: Pete Perini of Dow Chemical will
speak on the research and development of
the Sodium Sulfide Battery at Dow Chemical.

EXIDE EV BATTERY FACTS

WATERING: Lead-acid batteries consume water during charging and require "topping up" periodically. The frequency of this service depends on use and temperature. Only deionized or distilled water should be used and topping up should be performed immediately after a full charge while gas bubbles are still trapped between plates and separators. As a battery ages, the frequency of watering increases. Never, under any circumstances, allow the electrolyte level to fall below the tops of the plates, and never add acid—just water. As a general rule for heavy, daily use, EV batteries should be checked every two weeks for proper levels of electrolyte.

EAA CHAPTERS

Call the contact person for meeting times and places.

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ARKANSAS: Little Rock Chapter

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