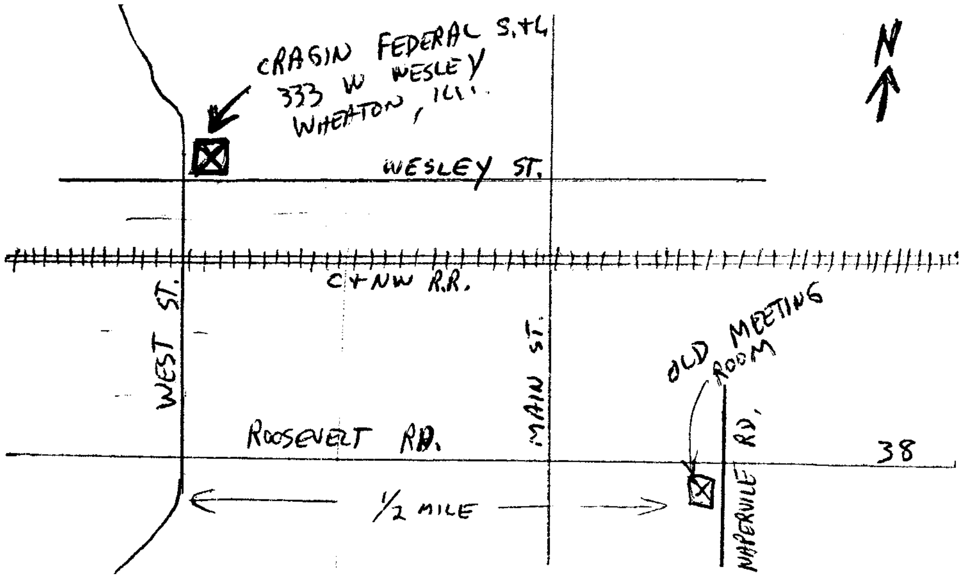
F.V.E.A.A. NEWSLETTER

JUNE 1986

MEETING NOTICE

The next meeting will be friday **JUNE 20th**, at *CRAGIN FEDERAL SAVINGS & LOAN* 333 W. Wesley St. Wheaton, Illinois. (see map) - Time - 7:30 P.M. *sharp.* Guests are welcome and need not be members to attend the meeting.

NOTE:
NEW MEETING PLACE
PARK IN LOT IN BACK OF BUILDING



F.V.E.A.A.

FOX VALLEY ELECTRIC AUTO ASSOCIATION
624 PERSHING ST. WHEATON, ILL. 60187

FIRST CLASS

ADDRESS CORRECTION REQUESTED

THE PRES SAYS

EXXON FUNDS

Gov Thompson has been invited to the June 20th meeting to become acquainted with the FVEAA and our proposal. As of Newsletter time, it was indicated he will be unable to attend, but will send a representative. We need to have several cars at the meeting for inspection and test riding to help out our funds request.

NEXT MEETING

The June meeting will be back on our regular third Friday schedule, but at at different location. We will be at the WHEATON BRANCH OF CRAGIN FEDERAL SAVINGS & LOAN which is at Willow and West Streets in beautiful downtown Wheaton. See the map for location. Thanks to John Ahern for securing this location for our use.

The technical discussion will cover the energy efficiency of EV components. We will also discuss the work presented in the first two "PERFORMANCE" papers as they relate to a 2500-lb car using data provided by members and meeting discussions.

RAFFLE CAR

John Stockberger is trying to get a duplicate title because we have been unable to locate the original papers. Len Fisher in Ohio is helping with some long-distance advice.

Bill H

Recharging Batteries Chemically

Iron/air electrochemical cells might be regenerated with little electric power.

NASA's Jet Propulsion Laboratory, Pasadena, California

Iron/air batteries can be partly recharged chemically by a solution of a strong base in an alcohol or by a basic alcohol solution of a reducing agent. Although the chemical recharging method is still experimental, it has potential for batteries in electric automobiles, or it may be used as an energy storage system in remote applications. It may also be used in "quiet" operations where the noise or infrared signature of a diesel engine is not desired. Instead of relying on relatively slow electrical recharging, a recharging solution might be circulated through the battery in somewhat less time.

A discharged iron electrode — that is, one that has changed to ferrous hydroxide in the process of producing electric current — can be partly reconverted to iron by immersion in a 4-molar solution of potassium hydroxide in methanol at 60° to 80° C. With the addition of a platinized nickel counterelectrode at a small dc bias, the iron electrode is more completely reconstituted: At 80° C, the degree of recharge ranges from 10 to 20 percent at zero bias to nearly 100 percent at 0.5 V bias.

The recharging system works best at temperatures of 35° to 40° C. Precise temperature control is not needed, however, since the reaction tolerates a wide temperature range. Below 25° C, the reaction is sluggish, and the reactants should be heated. One important safety feature of the basic alcohol solution is that it not only serves as a reducing agent but also protects against the evolution of hydrogen during the recharging reaction.

This work was done by Roger M. Williams, John Rowlette, and James Graf of Caltech for **NASA's Jet Propulsion Laboratory.**

NPO-16024

NOTE This is an 8 page NASA report. I will bring it to the next meeting for those interested. It will then become a part of the FVEAA club library. Editor

PUTTING PERFORMANCE IN YOUR ELECTRIC CAR-PART II

In Part I, we determined that 33 Kw is required to accelerate a 3200-pound car from 0-30 Mph in 4 seconds, neglecting system losses. In this part, the analysis of this car will continue to consider loss-producing elements.

Road Load

The first element is rolling resistance, sometimes called road load. This is the retarding effect of tire, bearings, and gears with the car in neutral, which eliminates transmission and motor components. Road load is primarily caused by the flexing of tires. It is independent of velocity and directly proportional to weight. It typically ranges from 0.5-2% of a car's weight.

There are several ways to determine road load. A car with 1% loss would coast down a 1% grade with no change in velocity. Coasting on a steeper grade would cause velocity to increase. If you can find a road where your car will coast down without a speed change, you can measure and determine the grade, which equals the rolling resistance coefficient (Kr).

A second method is to tow the car at low speed on a smooth, level surface and measure the tow line force with a spring scale. Make several runs in both directions to cancel out wind and grade effects. The road load coefficient can then be calculated by:

$$Kr = \frac{\text{Average Force in lbs.}}{\text{Car Weight in lbs.}}$$

A third method is called coast down. In this, the car is allowed to coast in neutral at low speeds on a smooth, level surface. Observe the initial speed, final speed, and elapsed time of the coast down test. The principal inaccuracy of this method will come from speedometer readings at low speeds. The road load coefficient can be calculated by:

$$Kr = \frac{\text{Initial Speed - Final Speed in Feet Per Second}}{\text{(Gravity Acceleration) (Elapsed Time-Sec.)}}$$

For our assumed 3200 lb. car, lets say it costs from 20 to 10 Mph. (29.3 to 14.7 feet per second) in an elapsed time of 30 seconds.

$$Kr = \frac{29.3 - 14.7}{(32)\,(30)} = \frac{14.6}{96}$$
$$= 0.015$$

The road load force is then:

$$Fr = (Kr)\ (\text{car weight})$$
$$=(0.015)\ (3200) = 48 \text{ lbs.}$$

Note that this is only a small fraction of the accelerating force of Part I.

Aerodynamic Drag

The next factor is aerodynamic drag. It is caused by pushing the car thru the air. It increases as frontal area becomes larger and as velocity increases. It is influenced by car shape. The drag force is determined by:

$$Fd = (\text{Drag Coefficient})\ (\text{Frontal Area})\ (\text{Velocity})^2\ (\text{Air Density})$$

There are several ways to determine drag force, even if you don't have access to a wind tunnel. The first is to find the drag coefficient in manufactures' literature or car-test data in various magazines. You can then calculate the drag force from the equation above.

The second way is to measure drag force utilizing the towline method. With this, the car is towed at various speeds, as described in the road load paragraph. The total force is noted for various tow speeds. The drag force is determined at each test speed by subtracting the road load force, previously determined, from the total towline force at a given speed.

You can also use coast down to determine drag force at higher speeds. As in the tow test, the drag force equals the total minus road load at a given speed range. Those who wish to pursue this further should refer to SAE Paper 720099.

Representative values for a 3280-lb. Vega with 20 square feet of frontal area were given by Bill Palmer as:

Speed in Mph	20	30	40	50	60
Drag force in Lbs.	12	27	48	75	180

We will use these since the Vega is pretty close to our assumed 3200 lb. car. Drag force isn't much of a factor at the usual urban speeds up to about 30 Mph, but become very important at expressway speeds.

Hill Climbing

The final force we need to consider is that required for hill climbing. Around Chicago, this may not be much of a factor, but there are occasions where it may be important. Let's look at our assumed car on a parking garage ramp with a 30^{o} slope. The force needed to move the car up the ramp is:

Fh = Car Weight lbs. x Sine of the Inclination Angle

= 3200 Sin 30^{o} = 3200 x 0.5

= 1600 lbs.

For a 2% maximum grade on the Interstate, hill climbing force is 112 lbs for our assumed car.

The sum of all forces at wheel surfaces for our assumed car, accelerating flat out on a 2% grade at 50 Mph would be:

Ft = Fa + Fr + Fd + Fh

= 1100 + 48 + 75 + 112

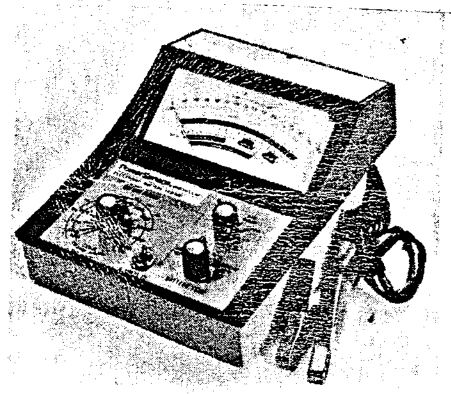
= 1335 lbs.

If we did not accelerate, the force would be only 235 lbs. You can see from this how important is the acceleration factor.

Next month, we will continue our analysis and translate these factors into the electrical quantities required by the motor, controller, and batteries.

W. H. Shafer
5/12/1986

ELECTRONIC BATTERY TESTER



An electronic battery tester which is portable, durable and, they claim, surpasses the capabilities of standard load testers has been introduced by Midtronics, Inc. Using advanced technology developed by Motorola, Inc., the lightweight PowerSensor is said to quickly and easily indicate the condition of the batteries, and measure power and charge capabilities for 6 and 12-volt batteries rated from 150 to 1,500 cold-cranking amps. Midtronics also says it eliminates the risks of additional battery deterioration, sometimes caused by heavy current loads placed on the battery by conventional load testers.

For more information contact Midtronics, Inc., 3450 W. 127th St., Blue Island, ILL. 60406.

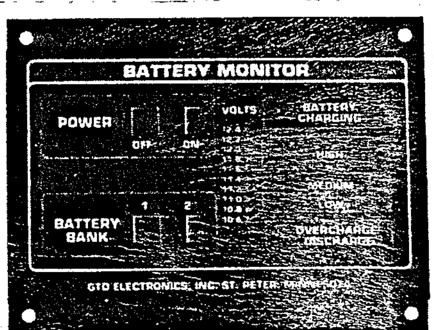
Contracts Awarded for Electric Van Design

Bedford Commercial Vehicles (a subsidiary of General Motors Corporation's Overseas Division) and Chrysler Motors Corporation are preparing preliminary design and development plans for improved, cost-effective electric vans under contracts awarded by EPRI and the U.S. Department of Energy (DOE). General Motors will configure a large van with a 2000-lb payload and 60-mile range; Chrysler will focus on a vehicle with a 1000-lb payload and 120-mile range. Both vans will have commercial fleet applications.

These two contracts represent the initial phase of an EPRI/DOE project, undertaken in 1985, to develop an electric van with performance and life-cycle costs competitive with conventional internal-combustion-engine vans.

Results of this first phase, due in the spring of 1986, will determine the scheduling for subsequent project tasks — including prototype fabrication, field evaluation, final design, and production engineering.

ELECTRONIC BATTERY MONITOR



The electronic voltage monitor provides a continuous readout of battery condition for one or two separate banks of batteries. It features an easy to read, ten-position LED-colored bar graph which includes green, yellow and red highly visible LEDs. In addition, there are two other LEDs, one indicating when the battery is being recharged, and the other alerting of a potential battery discharge or overcharge.

For more information contact GTO Electronics, Inc., 430 Ritt Street, St. Peter, MN 56082

New AC Drive Improves Electric Van Range and Cost

A new lightweight, computer-controlled ac powertrain currently under development at NASA's Jet Propulsion Laboratory (JPL) could increase the range of electric fleet vans by 12 to 21% — without increasing life-cycle costs — by making more efficient use of the vehicle's storage batteries. Alternatively, if range were held constant — by limiting battery size — the powertrain could reduce vehicle life-cycle costs by 10 to 12%, and cut capital costs by six percent.

These conclusions arise from a new study on ac powertrains for electric vehicles conducted by EPRI's Electric Transportation Program. The study compares cost, weight, size, and performance of ac and dc powertrains developed for the U.S. Department of Energy since 1979.

The ac induction motor, the heart of the ac power train, is 75% less expensive and 50% lighter than comparable dc traction motors. The weight and cost of the inverter, required to convert dc power from the battery to ac power for the motor, have heretofore overshadowed these advantages. According to the EPRI study, recent improvements in inverter components have overcome these weight and cost problems. The JPL ac system should cost \$83/kW and weigh 4.6 kg/kW. In contrast, cost and weight estimates for the best available dc system are \$101/kW and 5.7 kg/kW.

The study also identifies opportunities for further development — for example, adapting the JPL ac powertrain for use in an advanced fleet van that could become a lower-cost, high-performance successor to the GM Griffon electric van. Griffon vans are now used in several utility fleets, as part of a project supported by EPRI and the Electric Vehicle Development Corporation.

June 1986 FVEAA Membership List

Phone #	Member	Address	City	St - Zip
312 668-1426	John Ahern	624 Pershing Ave.	Wheaton	Il 60187
312 968-7052	Alfred Brinkmeyer	4323 Devon St.	Lisle	Il 60532
312 629-3989	Jack Cahill	1 S 736 Vista Ave.	Lombard	Il 60148
312 859-2578	Rick Cartwright	347 Woodlawn	Aurora	Il 60506
312 448-7676	Thomas Cheever	12319 S. 90th Ave.	Palos Park	Il 60464
312 228-5952	Dale Corel	595 Gates Head North	ElkGrove Vil.	Il 60007
312 968-5426	David Cosgrove	637 Maywood Ln.	Lisle	Il 60532
312 544-6312	Frank DelMonico	5629 Bohlander Ave.	Berkeley	Il 60163
312 832-1675	Donald Drake	445 Riverside Dr.	Villa Park	Il 60181
312 968-2692	John Emde	6542 Fairmount Ave.	Downers Grove	Il 60516
904 384-7945	Charles Fetzer	2810 Algonquin Ave.	Jacksonville	Fl 32210
614 764-9733	Leonard Fisher	6351 Amston Dr.	Dublin	Oh 43017
301 992-0621	Wm. T. Forde	9257 Grapewine Ct.	Columbia	Md 21045
312 841-0180	John Foster	14318 University Ave.	Dolton	Il 60419
312 968-2486	Alexander Glowiak	101 Rumsey Rd.	Westmont	Il 60559
312 877-7290	Hendly Hall	530 Lawn Drive	Loves Park	Il 61111
312 232-0344	Everett Harris	214 Nebraska St.	Geneva	Il 60134
312 674-6632	Paul Harris	9421 N. Kildare	Skokie	Il 60076
312 282-4828	Thomas Kaminski	4828 W. Warwick	Chicago	Il 60641
312 530-1736	Robert Kapheim	253 Grace St.	Elmhurst	Il 60126
312 834-0370	George Krajnovick	17 W 381 Eisenhower Rd.	Oakbrook Ter.	Il 60181
312 437-0453	Donald Kubick	249 Arlington Hts. Rd.	ElkGrove Vil.	Il 60007
312 850-7246	Lad Kucera	8 Arthur Ave.	Clarendon Hil	Il 60514
312 983-8236	Mark Melnicoff	65 Finch Ct.	Naperville	Il 60565
312 742-2052	Charles Miller	156 S. Weston	Elgin	Il 60120
312 299-3497	Jerry Mitchell	4517 Lilac	Glenview	Il 60025
312 759-8033	Dana Mock	154 Denver Dr.	Bolingbrook	Il 60439
312 584-6057	Kenneth Myers	1303 Indiana	St. Charles	Il 60174
312 889-7757	Richard Ness	2129 N. Narragansett	Chicago	Il 60639
312 469-3434	John Newton	22 W 450 Ahlstrand Dr.	Glen Ellyn	Il 60137
219 874-3171	Harold Paschack	1400 Elston St.	Michigan City	In 46360
312 255-1665	Frk Pietrolonardo	1122 E. Thomas St.	Arlington Hts	Il 60004
312 969-1176	Bill Palmer	5237 Fairmount Ave.	Downers Grove	Il 60515
312 231-8160	Joseph Pollard	29 W. Childs St.	West Chicago	Il 60185
xxx xxx-xxxx	Bob Randerson	25 S. Spring	LaGrange	Il 60525
312 255-4672	Robert Reek	108 N. Russel St.	Mt.Prospect	Il 60056
312 383-0186	William Shafer	308 S. East Ave.	Oak Park	Il 60302
312 879-0207	John Stockberger	2S643 Nelson Lake Rd.	Batavia	Il 60510
312 349-8816	Carl Swick	7550 Wildwood Ct.	Orland Park	Il 60462
312 971-2325	Garrett Swierenga	322 N. Cass Ave.	Westmont	Il 60559
312 246-3046	Vladimir Vana	5558 Franklin	LaGrange	Il 60525
312 668-5809	Horace Wetherbe	918 Howard St.	Wheaton	Il 60187
312 584-8364	Andrew Wohlert	219 S. 6th St.	St.Charles	Il 60174
312 420-1118	Ken Woods	1264 Harvest Ct.	Naperville	Il 60565
312 682-1214	George Zarins	1454 W. Glenhill Dr.	Glendale Hts.	Il 60137

45 RECORDS PRINTED

F.V.E.A.A.

FVEAA CLUB ITEMS FOR SALE

BATTERIES

2	6 volt	7" x 12"	wet	$5.00 ea.	
1	6 volt	7" x 12"	dry	$10.00	(new)
1	6 volt	7" x 16"	wet	$5.00	
1	12 volt	7" x 10"	wet	$5.00	
1	12 volt	6" x 10"	wet	$10.00 ea.	(new)
~~2~~	~~12 volt~~	~~9" x 20"~~	~~wet~~	~~$10.00 ea.~~	~~(heavy)~~

Unless otherwise stated, these batteries are slightly used (if at all) and are not E.V. (golf cart) type. These are what is left. If you want one or more, let me know before the meeting and I will bring your order to the meeting. Those who have picked up their batteries, should make payment to the club treasurer.

OTHER STUFF

Solid brass battery connectors #00 & 000 pos. or neg.	$ .75 ea.
Steel laminated choke core for shunt motors.	$5.00 ea
Black heat shrink tubing 3/4" shrinks to approx. 1/2"	$ .50 foot
200 Amp relay 24-28 volt coil Only 2 left.	$15.00 ea.
400 Amp relay 12 volt coil Limited supply.	$45.00 ea.

Above items may be purchased at the meetings or place your order with me to ship U.P.S.

John Emde 968-2692
Temporary keeper of the club stuff

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FOR SALE Old oscilliscope Heavy tube type. It works $25.00
Bill Palmer
969-1176

****

FOR SALE Elcar parts or whole. 10 Trojan batteries.
Lester 12 & 48 volt charger. Lambert 48 volt transistor controller.
6 H.P. GE series motor. Best offer.
Don Kubick
437-0453