

FVEAA NEWSLETTER

FEBRUARY 1995

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NEXT MEETING - February 17 at 7:30 PM

Has been changed to Room 137 In Building K at the College of DuPage.

Building K is on the Southwest corner of 22nd Street & Lambert Road. Use the west entrance

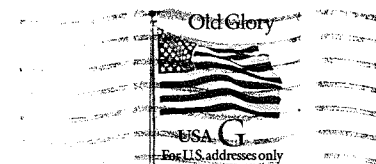
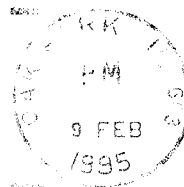
DISCUSSION TOPICS - Consideration of the Coop Project tasks. Arrange in logical order and assign expected manhours. We will also examine car procurement alternatives.

MEMBERSHIP INFORMATION

Any person interested in electric cars is welcome to join the FVEAA. Members receive our monthly Newsletter that contains useful information about electric car components, conversion techniques, policies, and events. Dues for new members joining in February is \$11.25

FOX VALLEY ELECTRIC AUTO ASSOCIATION
308 South East Avenue
Oak Park, IL 60302-3512

FIRST CLASS



John Emde
6542 Fairmount Avenue
Downers Grove IL 60516 -2919

ADDRESS CORRECTION REQUESTED

PRESEZ

The first meeting of the new year started our three-month drive to provide "front money" for the COOPERATIVE CONSTRUCTION PROJECT proposed by Member Bob Munroe. The project will give FVEAA members an opportunity to gain experience with the conversion process.

ONE THOUSAND DOLLARS was raised and certificates of participation will be sent to the initial contributors. I thank them for their support.

Please note the location of the February meeting has been changed to Room K-137 in the building West of Lambert Road. At the meeting we will zero in on a car selection, arrange the conversion tasks in logical order and assign expected time required for each. part.

Ken

MINUTES OF JAN. 20 MEETING

The meeting at the College of DuPage was called to order at 7:33 PM. Nineteen members and two guests attended.

Two videos were played; one from the Discovery Channel on EV technology and mandates and the second from Intercell company illustrating their development of a lead acid battery interconnection system at the bottom of each cell and the assembly.

Treasurer Corel's reported \$ 989.84 in the checking account and \$2186.70 in the savings account. This was accepted and approved. He announced that EV calendars from Clarence Ellers are available for \$ 5 at the meeting.

Member Dana Mock announced he had semiconductor catalogs from Motorola and Hitachi. These are available at no charge.

President Woods announced no bids were received for the Club Fiat. It was noted the last newsletter had an incorrect telephone number for Member Tohurs Alcon who has custody of the vehicle. Member Clark reported that a firm (Aaron's) in Chicago would be able to supply glass to replace the broken rear window. Several members expressed an interest in the vehicle. It was decided to postpone the disposition until the next meeting. The Newsletter will contain the correct address and phone number of Member Alcon. Price for the car will be listed as "best offer".

Treasurer Corel stated that \$1000 has been raised for the cooperative construction project. He will issue a certificate to each contributor.

The next Newsletter will contain a listing and assigned value of items from Member Newton's estate. Anyone interested in purchasing an item may contact Member Alan Potyten at 2 S 211 Park Blvd in Glen Ellen (where the inventory is stored) or call Member Munroe at (708) 858-7066.

A list of all tasks required to accomplish a conversion was developed and appears elsewhere in this Newsletter. During the discussion the type of car was repeatedly raised. This item will be discussed in detail at the February Meeting.

The meeting was adjourned at 10:30 PM.

Dave Aarvold
Secretary

RECENT EV ARTICLES

Shocker at GM: People Like the Impact. Business Week, January 23, 1995, Page 47.

Although GM has pulled the plug on production of the Impact, 7500 of the cars may be produced in the next 18 months. Persons in three cities who have test-driven prototype models were entranced. Some offered to buy the vehicle for twice the expected \$25,000 expected price tag. "The biggest problem we've had is getting people to give back the car" according to Kenneth Baker, VP of GM's R&D Center. Rival companies may have to move ahead fast or risk being left in the dust.

It's The Battery, Stupid! Industry Week, October 3, 1994, Page 22. (Editor's Note - This is the same title as an article in the February, 1995 issue of Popular Science that was included in the January Newsletter). The article covers EV's being developed by GM, Chrysler, Ford, Toyota, Nissan, and Mazda. All have lead-acid batteries that limit range. The article notes that the energy content of gasoline is 20 times greater than batteries on a weight or volume basis. A challenge to the zero emission mandate in California is expected in 95-96. The product planning manager for A.O. Smith noted there is no market driving the EV. The mandate supports public policy because neither the market or the technology is now available for the vehicle the public would buy. Market data indicates an EV must have a 100 mile range, have all the comforts of present cars, and sell for the same price as a gasoline car. The article also notes there is an EV cottage industry including converters and start-up companies.

Sunrise For Solectria. Popular Science, January 1995, Page 32. Solectria has designed a 4-passenger, 2-door car weighing 1000 lbs (without batteries). It is expected to have a top speed of 70 mph, go 0-60 in 14 seconds, and have a 100 mile range with an 800-pound lead acid battery pack. They hope to have a 10,000 vehicle production run and sell the car for \$ 17,000 in 1998. (A mock-up version was exhibited at EVS-12 in December).

EV Maker Gets Commerce Funds. WARD'S Auto World, December 1994, Page 10. U. S. Electricar a \$10.5-million grant for a 5-year program to develop composites for body and chassis applications in EVs. This material, a patented sandwich composite, has the potential for reducing the weight and up-front costs involved in EV tooling. The firm now converts GEO Prizm's and Chevy S-10 pickups.

Transportation Notes. Tribune, Date and Page unknown. Ford Motor Company and U S Electricar are drafting guidelines that would allow firms to install electric drive components in motorless "gliders". These are factory assembled vehicles that omit engine, fuel systems, and transmission components.

GM Demands Major EV Subsidies. Chicago Sun-Times 12/25/94, page unknown. GM wants a \$10,000 per-vehicle subsidy, government purchase of half the production output, and government-established charging stations. before it markets an electric car.

RECENT EV ARTICLES (CONTINUED)

Toyota and Nissan Will Use Lead-Acid Batteries. Chicago Sun-Times 12/28/94, Page unknown. Toyota and Nissan will use lead-acid batteries in their EV's. Toyota's EV-50 weighs 3190 pounds. Nissan's Cedric, a conversion of their gasoline vehicle weighs 4225 pounds, about 400 pounds more than the gasoline version.

Alternative Cars In The 21st Century This is a new book available from the SAE for \$39 for non-members. Topics include a survey of private cars, personal transportation vehicles for the 21st century, Alternative fuels, EV and hybrid vehicles, three-wheel cars, and alternative cars in Europe.

FROM OTHER EV NEWSLETTERS

EVCO (The Ottawa Group) is getting a new editor. We have benefitted from the information included in their newsletters by the retiring editor, Fred Green. This issue contains a listing of EV considerations and comments from users of the ELF (Electric Fiero). Two 20HP brushless electric motors and matching controllers are offered for sale @ \$7500.

Electric Grand Prix Corp reviewed an EV article appearing in Electronic Engineering Times and an article in EPRI's quarterly Newsletter in the Summer of '94 and development of electric school busses. There will be an EV program at the Rochester Institute of Technology on April 11, 1995 aimed at middle school students. The issue also extensively covers EVS-12 attendance, including their an evaluation of nineteen model cars exhibited. They report that ROAD & TRACK magazine has published several articles about EV's.

EEVC (The Cleveland Club) also reported on EVS-12 with photos and technical data on products exhibited. They also published a list of papers given at the S/EV October 1994 meeting. They report the Nov/Dec issue of Technology published by the Engineering Society of Detroit was devoted to hybrid vehicles. A book review of the new SAE offering (See Recent EV Articles - above) recommends the offering for anyone interested in the transportation future.

GLEAA (the Great Lakes Group) announced their EV Expo 95 on March 9 at the Indianapolis Convention Center.

The Michigan High School Electrathon Competition announced the Sports Car Club of America will conduct a road race for EV's at the Grattan Track on Memorial Day weekend. The SLINGSHOT Electrathon vehicle will be exhibited at Michigan High Schools to arouse interest in the event that is expected to draw 35 entrants from all over Michigan.

VEVA (The Vancouver Association) will also have a new editor, Rob Cameron, beginning in February. Their treasurer's report shows that \$ \$18,000 has been expended on their sponsorship of an Electrathon with \$ \$5,100 recovered from school entry fees. They also note that, according to Ford, use of gliders may be the best was to bring EV's to market in large numbers.

WE STILL HAVE THE FIAT

The Editor made a mistake in the January Newsletter and this may be responsible for the failure of anyone to submit a bid over \$300 for the Club Fiat. The telephone number for Tohurs Alcon should have been listed as (708) 963-5379. His address is 4903 Canterbury Street in Downers Grove. The FIAT is presently parked in the rear of his garage and may be inspected by making arrangements with Tohurs.

Member Clarke found a Chicago Glass Company (Aaron's) that can fabricate a replacement curved rear window for the car. Member Stockberger thought that Elgin Spring Company would be able to make a replacement rear spring. These two items could restore the car to a usable condition.

The members decided to delay disposal of the car until the February meeting for the best bid.

THE NEWTON INVENTORY

This is a listing of material salvaged from the Newton Estate. If you are interested in buying an article, call Bob Munroe (708) 858-7066 or Alan Potyen where the material is stored.

790 - 9247

Item Description	Value	Item Description	Value
Motors & Generators		Miscellaneous Items	
Motor-generator, variable voltage	75	Floor jack	20
1 1/2 HP engine and alternator	35	5 HP 5-gang riding mower	65
2-cylinder generator (dual output)	30	Single reel riding mower	40
Automotive alternator	10	2 pumps (1 with motor)	7
5 small motors	4	2 small gas engines	10
6 single phase motors 6 @ 1	6	Small gas engine	10
400-amp aircraft starter-generator	0	Gear Drive	10
200-amp " " "	0	Vertical drive	15
20 small motors @ 1.50	30	CB radio booster antenna	3
3 electric motors @ 2	6	Timer	2
Fan & motor	3	Small Rheostat	2
3 automotive starters @ 3	9	4 Power rheostats	5
3/4 HP single-phase motor	15	Briggs & Stratton engine	10
5 small generators @ 4	20	Power converter	25
Meters & Instruments		2 Solenoids @ 5	10
8 meters @ 5	40	Transformer	3
Lab voltmeter in wooden box	25	20 lamp bulb sockets	2
3 voltmeters in boxes @ 10	30	Machinist's shaper	10
2 dual scale meters in boxes @ 5	10	Small motor controllers	3
VOM + 15 other meters	55	Scrap wire, 40# @ .30	12
Lab thermometer	5	Wire on reel, 300 ft	3
Auto timing light	20	Terminals & connectors	10
Winding tester for armatures	25	8 tires & tubes	8
Large thermometer	10		
2 pressure gages @ 1	2		

MAZDA RX-7 CONVERSION IN 1992

This is a listing of the steps in a Mazda RX-7 conversion. Although I recorded the costs (Col 4), I did not log the time spent on each task. The figures in Col 3 are my recollection of the approximate time spent. Where contract labor was employed, the list shows personal time spent, except when the contractor's time was known. Contract costs appear the first time the contractor's work appears on the list, ie "Towbar", even though much of the work relates to later items.

W H Shafer

Task Description	Order	Time	Cost (RX-7)
Selection of car for conversion	1	8.00	0.00
Car Procurement	2	5.00	361.00
Preliminary design	3	30.00	0.00
Measurement of the as-is car, front weight	4	0.30	0.00
" , rear weight	5	0.30	0.00
" , ride height	6	0.10	0.00
Remove radiator	7	3.00	0.00
Remove engine	8	25.00	0.00
Remove exhaust	9	6.00	0.00
Remove gasoline tank & lines	10	4.00	0.00
Other removals	11	10.00	0.00
Clean engine compartment	12	5.00	4.32
Paint engine compartment	13	1.00	2.75
Install tow bar attachment *	14	5.00	561.49
Repair body rust	15	40.00	38.41
Paint body, if required *	16	6.00	200.00
Select motor	17	0.50	0.00
Select controller	18	2.00	0.00
Select battery	19	1.00	0.00
Select charger	20	1.00	0.00
Modify suspension components *	21	20.00	7.35
Fabricate adapter plate *	22	150.00	584.50
Refurbish transmission *	23	4.00	13.44
Connect motor & transmission *	24	6.00	0.00
Balance assembly *	25	3.00	0.00
Adapt engine mounts for new motor	26	6.00	7.35
Determine battery placement	27	3.00	0.00
Design & fabricate battery racks *	28	5.00	180.37
Paint racks	29	1.00	3.44
Install racks	30	7.00	0.00
Determine power cable placement	31	2.00	0.00
Install power contactor	32	1.00	134.21
Install conduit & power cable	33	15.00	123.99
Install power fuse or circuit breaker	34	0.00	0.00
Install and wire controller *	35	7.00	700.00
Install potbox & connect to accelerator	36	2.00	0.00
Buy and install auxiliary battery	37	3.00	46.30
Buy and install motor cooling fan	38	7.00	59.95
Test auxiliary systems	39	10.00	15.77
Power brake design & components	40	15.00	17.00
Install brake vacuum pump	41	3.00	0.00
Install charger *	42	2.00	0.00
Install AC charging plug	43	3.00	6.78
Connect plug to charger(s)	44	2.00	5.08
Install DC-DC converter	45	5.00	5.00
Install power voltmeter	46	7.00	108.00
Install power ammeter & shunt	47	8.00	0.00
Install auxiliary voltmeter	48	1.00	0.00
Rebuild brakes *	49	3.00	390.97
Heater & defroster modifications *	50	10.00	34.99
Install batteries	51	4.00	606.41
Install battery interconnections *	52	6.00	0.00
Test power system	53	10.00	0.00
Check tires	54	1.00	0.00
Prepare as-built electrical schematic	55	6.00	0.00
Prepare owner's manual	56	6.00	0.00
Obtain electrical title & license	57	8.00	7.00
Test drive car	58	1.00	0.00
Total		506.20	4,225.87

Note - Time shown is personal manhours except for * which refers to tasks on which contract labor was utilized. Contract labor time is shown, if known.

STEPS REQUIRED TO CONVERT A GASOLINE CAR TO ELECTRIC DRIVE

The following list of tasks involved with converting a car to electric power was developed by the FVEAA members at the January meeting. The final order of these steps and the estimated manhours required for each task will be discussed during the February meeting.

Task Description	1	2	Time
Selection of car for conversion			
Car procurement			
Preliminary design			
Measurements of the as-is car, weight on front rear ride height			
Remove all engine-related components, radiator engine exhaust gasoline tank & lines other			
Clean engine compartment & paint, if required			
Install tow bar attachment			
Repair body rust			
Paint, if necessary			
Select major electrical components, motor controller battery charger			
Modify suspension components			
Fabricate motor adapter plate, keep clutch			
Balance motor-transmission assembly			
Adapt engine mounts for new motor			
Determine battery placement using battery mock-up Weight distribution & frame limits			
Fabricate battery racks			
Install battery racks			
Determine routing and install power cabling			
Install disconnecting contactor			

Events

Society of Automotive Engineers (SAE) 1995 Meeting February 27-March 2 at Cobo Center in Detroit MI. EV technical papers. For information call (412) 776-4920.

Arizona Public Service (APS) race for electric cars at the Firebird International Raceway in Phoenix, AZ March 2-5. Races for electric-powered race cars over a 1-mile course and 1/4-mile distance for speed dashes. For information, EV Technology Competitions, PO Box 11088, Glendale AZ 85318-1088 or call (602) 978-1373.

Indiana Electric Auto Association Expo sponsored by Electricore at the Indiana Convention Center in Indianapolis March 9. Car and electrotechnology exhibits, and seminars. For information, contact Gene Donaghy, phone (219) 425-2256. No fees charged for exhibitors.

E-3 Fair directed to middle school students At Rochester (NY) Institute of Technology on April 11. Phone (716) 477-1893 for information.

Earth Day Anniversary on April 22. There may be a locally-sponsored event of interest.

American Tour de Sol 1995 Event May 20-29. The race begins in Waterbury CT and ends in Portland ME. Sponsored by Northeast Sustainable Energy Association (NESEA). Five categories for cars: Production, Commuter, Solar, Racing, Mass Transit, and Open. Registration \$ 400 for car entry. For information write NESEA at 50 Miles Street Greenfield MA 01301, phone (413) 774-6051, FAX (413) 774-6053.

EV Road Race at Grattan track on May 27. The event will be supervised by the Sports Car Club of America. Entry fee \$30. For information call Paul Zellar at (616) 887-2744 or FAX at (616) 887-7755.

Cleveland Electric Formula Classic at Cleveland's Lakefront Burke Airport July 21-23. For information call Kevon Makall (216) 447-3352.

The Dangers of Prediction - From Product Engineering, November 1978, Page 11

Marketing perspective

Oil scarcity makes electric vehicles the cars of the future

One-third of the vehicles plying the streets of major cities will be electrics by the year 2000, V. A. Rydbeck, manager of electric utility development for General Electric predicts. Energy conservation is bound to intensify with rising oil prices and a worsening supply situation. Inasmuch as electrical vehicles give about 50% more miles than their gasoline-powered counterparts for a given amount of basic fuel, he says, their day is nearly inevitable. Some of the electrics will provide personal transportation; others will be used by the Postal Service, urban delivery firms, school buses and by other special services.

South Wind

IN THE EARLY 1930S A TALL, THIN CANADIAN-BORN Chicagoan named Harry J. McCollum invented a car heater that burned raw gasoline. Two things made it amazing. First, it didn't blow up. Second, it made the interior of his old Chrysler toasty warm in just ninety seconds.

McCollum took a direct approach to marketing his product. One blustery winter day in 1934, he pulled up to the Stewart-Warner plant on Chicago's Diversey Parkway and talked the guard into letting him see Arden LeFevre, the company's chief engineer. McCollum explained how the heater worked; LeFevre called his staff over, and they discussed it for several hours. Finally McCollum suggested they go out to his car and see the heater in action.

"It was one of those cold, raw days such as only Chicago can come up with," a later Stewart-Warner employee recalls being told by McCollum. "The car was thoroughly chilled when they got into it, but the heater worked like a dream, and within seconds plenty of heat was pouring out, making it quite comfortable in a couple of minutes. The demonstration . . . resulted in a contract." Or, as McCollum wrote in his shop diary that evening: "Today I demonstrated the heater to Stewart-Warner. It worked better than it ever had before and probably better than it ever will again."

Here's how it worked: Gasoline drawn from the carburetor float bowl by engine vacuum was piped through a thin copper tube into a firing chamber, where it was atomized and ignited by a glow plug. The resulting horizontal flame could be adjusted with a knob that controlled the fuel orifice. The flame warmed a finned oven section inside the heater, and an electric fan blew air over the oven and into the car. Combustion gases were drawn back into the engine intake manifold, again by vacuum. Thermostats made sure that the glow plug turned off after ignition and that the fan didn't come on too soon.

In the 1930s, as now, most car heaters worked by circulating water from the engine's cooling system. In cold weather you often had to run the engine for ten or fifteen minutes before the passenger compartment warmed up. The South Wind heater (as Stewart-Warner called it) cost a

little more to buy and operate, but even on the chilliest mornings you would be warm in ninety seconds. It was like driving with a fireplace in your car; in fact, if you didn't turn down the flame, you'd roast.

Stewart-Warner built two hundred South Wind heaters in 1935 but had to recall them because the glow plugs sometimes didn't light and the flame tended to scorch the fan. An improved version arrived in 1936; by 1948 more than three million had been sold, and daily production was more than forty-five hundred units. The heaters fitted beneath the dashboard, where drivers could kick them on and off with their feet. Ads of that era showed young women sitting in South Wind-equipped cars saying, "C'mon in here . . . get warm with me."

During World War II large South Wind heaters kept military fliers warm; they were also installed in many ground vehicles. In the Korean War they warmed everything from tanks to jeeps to light planes. They saw civilian duty in school buses, motor homes, and ambulances and as preheaters for large diesel engines. You could buy them for Volkswagen Beetles well into the

1970s. South Winds are still being made for military applications and as diesel preheaters, but not for automobiles, where they have been superseded by improved systems using engine heat.

Harry McCollum remained an unsalaried inventor for Stewart-Warner and came into the labs every day for years. Royalties on the South Wind made him wealthy, but he continued to live and dress modestly and drive an old car. On one of his rare vacations, McCollum and his father found themselves in Miami, where Harry got an idea for a new type of fuel pump. The two men went to a Sears store, bought a lathe, a drill press, and some other tools, and set up shop in their hotel room. This hasty prototype worked, so Harry and his father cut their vacation short, hurried back to Chicago, and finished developing it.

In 1944 McCollum found out he had a heart condition. He was developing an artificial heart when he died suddenly later that year. ★

SOME WARM THOUGHTS FOR EV OWNERS ON A COLD WINTER DAY

This article appeared in the Spring '95 issue of **INVENTION & TECHNOLOGY** on Page 64. The photo will not Xerox copy.

The original 1936 heater and the golden 1950s beehive version.

Michael Lamm is a freelance writer in Stockton, California.