OCTOBER 1988

MEETING NOTICE

The next meeting will be Oct. 21st, 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 SAYS

Commonwealth Edison has responded to our request for additional electric meters to be used by club members who have completed their electric cars and wish to keep track of the energy consumption. The meters are single-phase, 125-volt, 5-amperes, suitable for the usual battery charging loads on electric cars. These meters can determine the amount of energy required by the owner's electric car. Meters will be furnished to those members who have completed their conversion project. Those qualifying for a meter should give me a call (383-8005 - Days) or my home phone (383-0186 -Evenings). I wish to recognize COMMED for their response.

Dues will again payable for next year in November. Also, that is the month when officer's for next year will be nominated. Please give some thought to this matter and express you opinions at the October meeting.

The October 21st meeting will be conducted by Vice President Ken Woods since I will be out of town that day. He plans to discuss our November 12th event at Moraine Valley Community College.

Bill

F. V. E. A. A.

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

FIRST CLASS

ADDRESS CORRECTION REQUESTED

FOX VALLEY ELECTRIC AUTO ASSOCIATION

Rev. April 15, 1988

MEMBERSHIP

A membership in the FOX VALLEY ELECTRIC AUTO ASSOCIATION (FVEAA) is open to everyone. Currently there is only one grade of membership regardless of the members degree of participation in association activities. Membership in the FVEAA is contingent upon payment of the annual membership fee. The membership fee can only be waived by special vote of the board of directors. Each member in the FVEAA receives a copy of the FVEAA NEWSLETTER each month. They are also entitled to attend and vote at all association meetings.

All memberships in the FVEAA run from November 1st to October 31st of the following year. The dues are $15.00 per year.

The following form may be used to apply for membership or to renew your membership.

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APPLICATION FOR MEMBERSHIP OR RENEWAL

Date _____

Name _____

Address _____

City _____ State _____ Zip _____

Phone # _____

- ☐ Just interested in electric vehicles
- ☐ I have an electric vehicle (describe)_____
- ☐ I wish to build an electric vehicle

Make checks payable to: FOX VALLEY E. A. A.

Mail to: MR. VLADIMIR VANA, FVEAA TRES.
5558 FRANKLIN
LA GRANGE, ILL. 60525

SPECIAL NOTICE

The November meeting will **NOT** be held on 11/18/88.

Instead, we will have a special meeting on Sat. **Nov. 12th** at the Moraine Valley Community College 10900 S. 88th Ave., Palos Hills, Il 60465

This will be a daytime meeting and alternate energy conference. We will have some of our electric cars on display. If you have an electric car (running or not) and would like to show it off, contact Ken Woods for more info. (420-1118)

MVCC is located 8800 west and 111th street south (between route 45 (LaGrange rd.) - and west of Harlem ave. (7200 w.). It can be reached from I-55 Stevenson Hwy (exit Rt 45 - south), or Interstate 80 (exit Rt 45 - north). If using Tri-State - south I-294, Exit 95th street and travel south on Harlem to 111th street and turn 16 blocks west to 88th ave. If lost, call 974-4300, MVCC operator, for detailed directions.

Next month's newsletter will have more information and will include these directions and a **MAP**.

Minutes of the Fox Valley Electric Auto Association; September 16, 1988

The meeting was called to order by Pres. William Shaffer at 7:45 P.M. Treasurer V. Vana gave the following report; Checking Now acct.$788.68, Regular savings acct.$823.10 making a grand total of $1611.78. Mr. Vana then reported on his trip to California and his meeting with our counterparts there who visited us at our last ralley at Argonne.

President Willaim Shaffer reported that Ken Myers would not be present due to the death of his youngest brother in Texas. The entire membership wishes to offer their condolences to Ken and family.

Ken Woods has two tapes of the Argonne Ralley provided by professor Bill Becker who will be able to duplicate them for any member interested. The club voted to order two sets of tapes for the club use. Pres. Bill sez his video guru sez to try to use JVC tapes for any video use. Ken Woods also reported on an Alcohol Fuels seminar at Morraine Valley College on Nov. 12. More specific info to follow. Ken to make arrangements with Dr. Klima. We are planning to cancel our November 18th meeting because of aour membership is planning on attending the Morraine Valley College Seminar on Nov. 12. Maybe we will have a combo meeting and seminar is the thought.

Dick Ness reported talking to the owner of National Battery Company in Bensenville who says he would meet and beat any competition on the batteries we need. They come with a guarantee of free replacement for the first 11 months.

Pres. Bill Shaffer says that Jerry Mitchell needs to field test his car before he buys a new set of batteries. Pres. Bill suggested he contact E-Z Go to see about a used set of traded in batteries cheap to field test before buying the new ones....good idea.

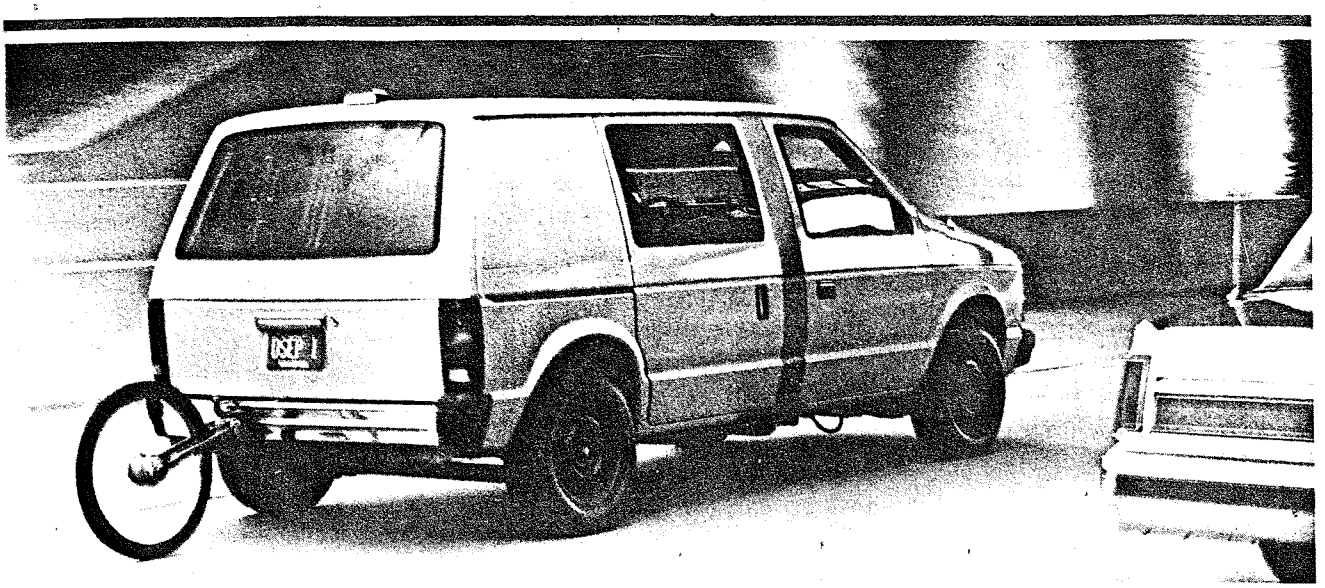
Pres. Bill is to try to get Mr. Crouch, the video guru, to come out to the Nov. 12 seminar to do some taping of our members and their cars..more to follow.
Ken Myers was not available to continue his previous months discussion on the construction of the battery charger. Hopefully to continue next month.

Pres. Bill reported that Texaco Oil is going to have to come up with a lot of money (just as Exxon did) to States to distribute, so he suggested that we get the jump on a video presentation and/or a paper on getting a grant. In this regard V. Vana reported that the Calif. group got a grant of $180M to develope a hybrid but that the members are hot that they had to pay a finders fee of $80M (doesn't sound right). Pres. Shaffer would not want a grant gotten on that basis and "If we can't make it on the merits, we should not take a grant and give back dollars as a finders fee". The consensus of the membership was to agree.

The club helped 'Octogenarian' John Newton celebrate his birthday (which will be on September 21) with a sort of a cake. P.S. He blew out ALL the candle (s). John says he attributes his good health to swimming. (maybe like swimming in the pool in the Movie Cocoon ?).
Pres. led a review of progress on the hybrid project and a discussion followed. The motor needed is a mootorcyclye, water-cooled, 125/175 cc unit.
The meeting was adjourned at 9:43 P.M.

Respectfully submitted,

Paul P. Harris, Secretary



A light van with a dual-shaft propulsion system is the first in a new generation of electric vehicles.

The Vanguard of Electric Vehicles

Currently, developers are concentrating not on family cars but on commercial light vans intended to cover fewer than 60 miles a day.

WILLIAM D. SIURU, JR.
COLORADO SPRINGS, COLO.

Electric vehicles have had a checkered history. Their popularity over the years has depended upon economic, political, and social factors. Electrically powered vehicles actually held the world land-speed records in the 19th century; Jenatzy, of Belgium, set a record of almost 106 km/hr in an electric racer, and proved that human lungs do not burst at speeds above 100 km/hr. In the early 1900s, electric cars accounted for about 40 percent of the automobile industry's output. But the invention of the self-starter stalled their development for decades.

The production of electric vehicles has been sporadic over the years, picking up when gasoline was scarce, as it was in occupied France during World War II and during the oil crisis of the 1970s. The EVs that appeared during the '70s generally had individually modified internal-combustion engines (ICEs), or they were produced in limited numbers by entrepreneurial companies. EVs have always had their hard-core enthusiasts, but current developments in electrically powered vehicles may make them something more than a curiosity by the 21st century.

FOCUS ON FLEETS

Recent advances in batteries, electric motors, transmissions, and electronics may enable EVs to compete with ICE vehicles in some markets. Currently, developers are focusing not on a "family car" for the average motorist, but on fleet vehicles such as those used by utility companies and businesses. Commercial fleets operate some 2.7 million light trucks and

vans, each of which is driven fewer than 60 miles a day. Even today's EVs can handle these distances and be economically competitive as well. The high speeds, long distances, and rapid acceleration for which ICE vehicles are prized make them overqualified for the job.

The government, public utility companies, and automakers both here and abroad have undertaken programs to develop electrically powered vehicles, and companies such as GE, Eaton, Eagle-Picher, Lucas, and Gould are involved as well. The Department of Energy, for example, is sponsoring an Electric and Hybrid Vehicles Program, which receives about $13 million a year from manufacturers, utility companies, universities, and governments that are together conducting research, development, testing, and evaluation of components and entire vehicles.

BETTER BATTERIES

Batteries are the major focus of attention in these programs. EVs are unlikely to have a serious impact on the consumer car market until their range is similar to that of ICE cars; they must be able to travel 100 to 150 miles between charges. In addition to being more powerful, batteries must weigh less. General Motors' G-Van, which represents the state of the art in battery technology for EVs, weighs almost 3000 pounds more than its ICE counterpart, and the battery pack accounts for most of the difference.

Although EVs will probably never be as light and agile as the cars of today, a certain amount of weight reduction is essential. Battery capacity is usually expressed in terms of watt-hours per kilogram, and acceleration and top speed are determined by the battery's specific power output in watts per kilogram.

Low energy costs are the most important benefit of electrically powered vehicles, but these are offset by both a higher initial cost and the future cost of replacing the battery. The life of a battery is usually measured in terms of the number of times it can be discharged to 80 percent of its capacity and then recharged. Obviously, extending battery life is an important area of research.

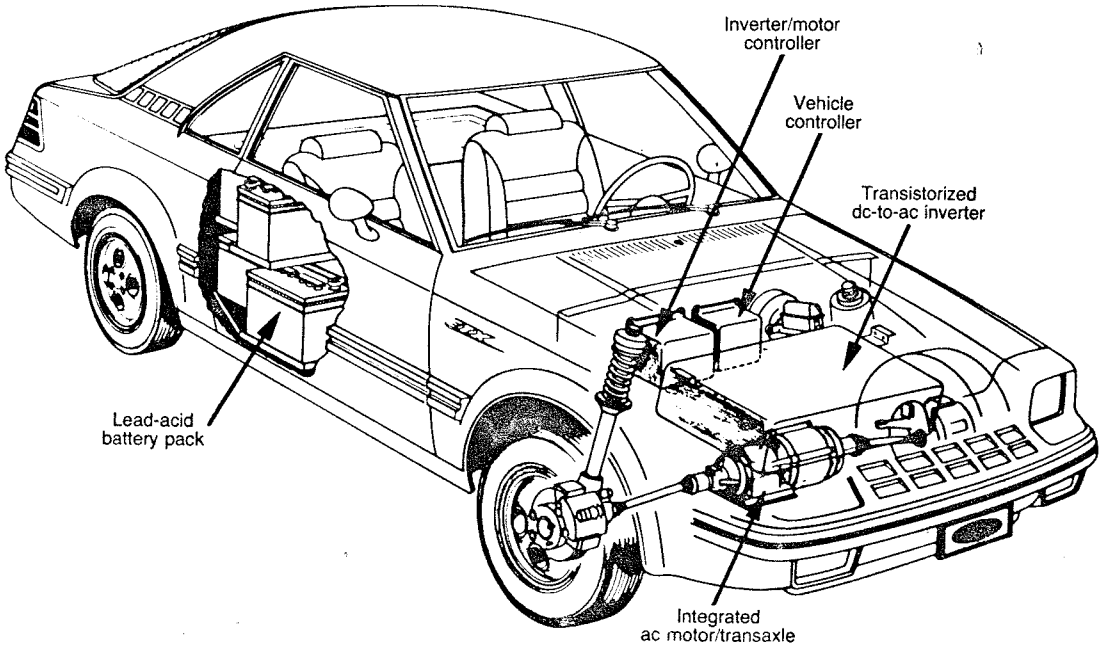
The lead-acid battery traditionally used in EVs is still a subject of research, but new types, such as nickel-iron batteries, are being developed as well. Improvements to lead-acid batteries include gelled-electrolyte, tubular-plate, and forced-electrolyte flow systems. Sealed-cell systems, which would eliminate the need for watering and electrolyte stirring, would be easier to handle and less costly to maintain than conventional batteries. Research is also directed toward reducing the cost of manufacturing batteries, extending their lifetime, and making them more reliable.

More-advanced systems under study include zinc-bromine, lithium-aluminum-iron-sulfide, sodium-sulfur, and iron-air batteries. Lithium-aluminum-iron-sulfide and sodium-sulfur batteries, however, are among those that operate only at elevated temperatures—about 500° and 350° C, respectively. This means that difficulties with insulation, cooling, and thermal management will have to be overcome.

MEANS OF PROPULSION

Motors in EVs can be either dc or ac. Propulsion systems with dc motors will be in production within a year or so; ac systems will take a little longer to develop. However, a comparatively conventional, dual-shaft electric propulsion system, based on existing technology, is already close to commercial production. Eaton Corp. is the prime contractor for the system, and the battery is being developed by Eagle-Picher. The ac motor and two-speed automatic transaxle are arranged on two parallel axes. A nickel-iron battery will be used, which should speed up development of the system and help ensure its success.

Ford is working with GE to develop a single-shaft electric propulsion sys-



The ETX-I demonstrated the feasibility of using an ac motor and a two-speed automatic transaxle contained in the same housing and operating on the same axis.

Table 1
Electric Vehicle Battery Technology

Battery	Company	Type/model 6 volt module	Status	Specific energy (Wh/kg)	Specific peak power at 50% (DoD) (W/kg)	Projected OEM cost (1987 $/kWh)	Cycle life (cycles to 80% DoD)	Cost per cycle per kWh (1987$)
Gel/cell lead-acid	JCI, Globe Battery	GC-6V-200 traction	M	22	80	124	500	0 32
Nickel/iron	Eagle-Picher	NIF 225	M	53	110		500	
			BG	56	79	125	1125	0 13
Nickel/cadmium	Energy Research	EV 180	M	44	110		243	
			BG	53	79	125	500	0 12

OEM = original equipment manufacturer
DoD = depth of discharge
BG = battery goals
M = battery modules

tem for the Department of Energy. The ETX-II employs more advanced technology than the dual-shaft system, making the eventual success of the project both more problematic and potentially more rewarding. An ac induction motor is mated directly to a two-speed automatic transaxle; the whole package is contained in the same housing with a common axis, hence the single-shaft designation. In the initial ETX-I program also sponsored by the Energy Department, Ford experimented with three types of advanced batteries: a sodium-sulfur, a zinc-bromine, and a tubular-plate, lead-acid battery. The ETX-I system was installed and tested in a small LN-7 passenger car whose controls, ac motor, and transistorized power inverter were designed by GE.

The car achieved a top speed of 60 mph with a motor speed of 9000 rpm and was able to accelerate from 0 to 50 mph in under 20 seconds. It could climb a 30 percent grade, and was quite drivable. The project, which ran from 1983 to 1985, succeeded in developing a low-cost, lightweight, practical power-train system.

In a follow-up to the original program, the ETX-II system will be used in a Ford Aerostar van with such advanced components as an interior permanent-magnet ac motor. The motor and inverter controls will be integrated with a microcomputer. Power will be supplied by an advanced sodium-sulfur battery.

One of the organizations most actively involved in EV research is the Electric Power Research Institute, whose Electric Transportation Program is supporting work in a number of areas. The program's Electric Vehicle Test Facility in Chattanooga, Tenn., is operated by the Tennessee Valley Authority. There, EVs are tested under realistic, controlled conditions.

EPRI's sealed lead-acid battery is expected to be ready for use in EVs within the next couple of years; a lithium-iron-sulfide battery is being developed for use in the 1990s. EPRI is also sponsoring a dc system, developed by Brown, Boveri, & Cie of West Germany, that has been installed in the Citysromer, a Volkswagen modified for electric power. Finally, the institute is participating in the Jet Propulsion Laboratory's work on an all-electric ac power train, with advanced power transistors and integrated circuits.

GRIFFONS, G-VANS, AND TEVANS

In fact, it is in the areas of testing and promotion that the EPRI program is making its major contribution. In the fall of 1985, for example, the Electric Vehicle Development Corp. began marketing the Griffon, primarily to utility companies for their service fleets. The Griffon project had several advantages over previous attempts to market EVs. Built in England by General Motors' Bedford Commercial Vehicle Division, about 500 Griffons had accumulated some five million miles in Great Britain before the van was brought to the United States. It arrived here backed up by manufacturer's warranties, service representatives and manuals, and a spare-parts distribution system. The van's 60-mile range was compatible with the needs of the typical service fleet.

From 1985 to 1987, 11 utility companies in this country operated 31 Griffons over 320,000 miles and used over 290,000 kWh of electrical power. The initial purchase price for a Griffon, which includes shipping and import fees, is about $25,000. This brings its average lifetime cost to about 38 cents a mile, about seven cents a mile higher than that of a gasoline-powered van. However, the cost should shrink once the electric vans are produced in greater volume.

Based on its success with the Griffon, the Electric Vehicle Development Corp. plans to market another GM adaptation, the G-Van. This is the first modern, fully warranted electric vehicle to be backed by a major U.S. automaker. The G-Van will be available for test drives in some areas by the fall, and will go on the market next year.

Table 2
Electric Vehicle Battery R&D

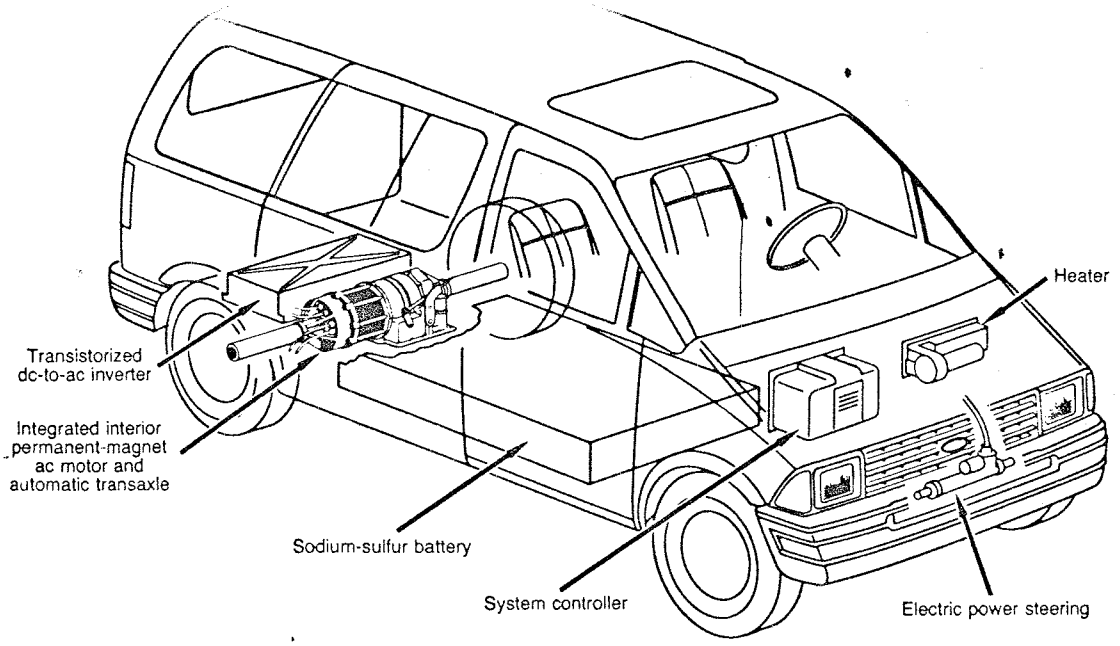
Battery	Developer	Designation	Status*	Specific energy (Wh/kg)	Specific peak power at 50% DoD (W/kg)	Projected OEM cost (1987 $/kWh)	Cycle life (cycles to 80% DoD)**	Cost per cycle per kWh (1987$)
Flow-Thru lead-acid (Pb/A)	JCI		C	47	104		> 80	
			BG	56	79	72	460	0.16
Zinc/bromine (Zn/Br_2)	JCI	Z30	B	55	88		> 36***	
			BG	75	79	75	800	0.12
Lithium aluminum/ n sulfide Al/FoS)	ANL/Gould	9 cells 12V	M	100	90		> 150	
			BG	100	106	91	800	0.15
Sodium/sulfur (Na/S)	CSPL	PB (10 0 Ah)	C	165	210		>1000	
			BG	100	106	91	800	0.15
Iron/air (Fe/air)	Westinghouse		C	70	50		> 120	
			BG	100	106	91	800	0.15

*status: C, cells; M, modules; B, battery
**depth of discharge
***current R&D core program is aimed at improving cycle life while maintaining specific energy and power.
BG: mission directed goals for EV battery R&D based on IDSEP van and tested under simplified federal urban driving schedule

Table 3
Propulsion Programs

	DSEP	ETX-II (SSEP)
Participants		
prime contractor	Eaton Corporation	Ford Motor Company
subcontractors	Eagle-Picher ASC, Inc.	GE
Battery	nickel-iron	sodium-sulfur
Range[1]	80 km	> 160 km
Acceleration (0–80 km/hr)	20 sec	< 20 sec
Top speed	96 km/hr	96 km/hr
Gradability		
percent grade/speed	3%/88 km/hr	7%/48 km/hr
at grade limit	30%	30%
Payload	545 kg	227–454 kg
Energy consumption	280 wh/km	250 wh/km
Status		
program completion	December 1988	March 1989

[1]based on federal urban driving schedule



The ETX-II propulsion system will be installed in a Ford Aerostar van.

The body of the G-Van is a modified version of the familiar GMC full-sized van, and will come in both cargo and eight-passenger models. An outside contractor will install the power plant; electrical power steering, power brakes, and air conditioning will be available.

The Chrysler Tevan, another EPRI project, is based on the Plymouth Voyager and Dodge Caravan minivans. The Tevan is scheduled to go into production late next year or early in 1990, and will be available to both business and private customers. The minivan, which will be equipped with power steering and brakes, will have improved performance and range.

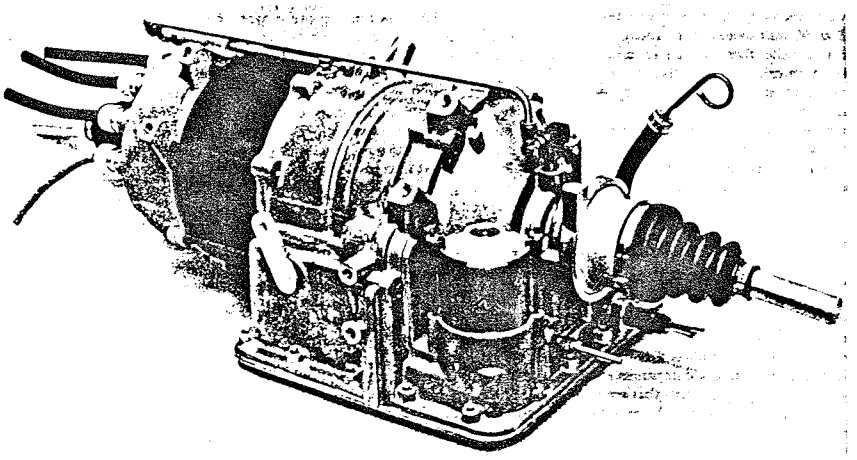
These EVs will all use dc motors, but future electrically powered vehicles will have ac induction motors that are 50 percent lighter and 75 percent less expensive. Small, lightweight, inexpensive inverters, made possible by breakthroughs in transistor technology, will transform the battery's dc output to ac power. In the future, fuel cells may replace gasoline engines.

Many experts believe that if electrically powered vehicles are to compete successfully with gasoline-powered automobiles they will require a hybrid propulsion system that combines the features of both. EPRI is working on an extended-range electric vehicle (the XREV), whose battery, during long trips, would be augmented by a generator powered by a small gasoline engine. Even a successful hybrid, though, is unlikely to replace the internal-combustion engine altogether.

Commercial fleets are an ideal market for EVs. They operate over comparatively short runs; they are generally idle at night, at which time they can easily be recharged; and, although their initial cost is higher than that of ICE vehicles, their operating costs are competitive. Buyers looking for performance, handling, and prestige will continue to choose ICE cars, regardless of the price of fuel. In addition to their economic benefits, however, EVs could help solve the pollution problems caused by ICE vehicles. If all commercial vehicles were electrically powered, pollution could be drastically reduced. And owners of EVs could face fossil-fuel shortages with equanimity. ■

Table 4
Commercial Electric Vans

	Griffon	G-Van	Tevan
Base vehicle	GM Bedford Van	GM Vandura	Chrysler T-115 Minivan
Battery type	lead-acid	lead-acid	nickel-iron
Power plant		42 kW dc	39 kW dc
Top speed	85 km/hr	85 km/hr	105 km/hr
Acceleration (0–48 km/hr)	11 sec	12.8 sec	7 sec
Range	97 km	97 km	177+ km
Payload capacity	1900 lb	1800 lb	1200 lb
Cargo space	208 cu ft	256 cu ft	120 cu ft



The permanent magnet ac motor and transmission for the ETX-II.