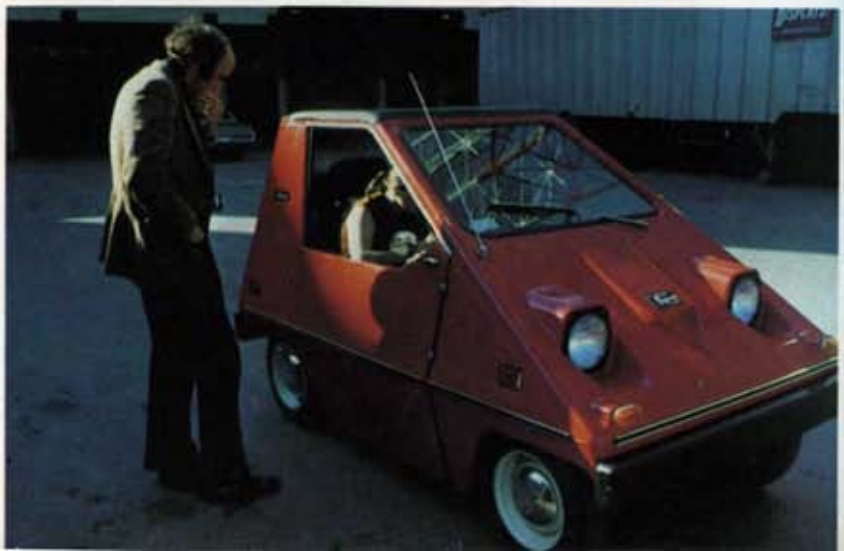
Electric vehicle industry sounds a 'Charge!'

Are electric vehicles coming? Energy usage in comparison with gasoline-driven or diesel counterparts is less than one-half for an electric fork lift, less than one-third for a bus, and less than one-fourth for a delivery van. They're not coming; they're here.

By JAMES E. OVERBEKE

The electrics are coming . . . again. The Sebring-Vanguard "City Car" (right) is a modern rendition of an old theme, the electric car. The Millburn Electric (above) carried our grandparents in style and silence way back in 1914.



THE THIRD ANNUAL Electric Vehicle Symposium had an urgency about it which set it apart from the two previous gatherings sponsored by the Electric Vehicle Council, a coordinating group made up of representatives of investor-owned utilities and manufacturers of electric hardware.

While past meetings might have smacked of "pie-in-the-sky prophecy," the energy crisis coupled with pollution deadlines forced those attending into the spotlight, ready or not.

For years they have been apologists, arguing that low operating costs and clean running justified electric vehicles in the face of their limited operating range. In defense, they would also point out that high-density batteries are surely just around the corner, which they believed would swing all logic to electrics.

This year, however, the builders of electric vehicles have taken this position: "This is what we have; here is how it works; try it." However, there is still a great deal of talk and much hope surrounding superbatteries.

We're misunderstood

Of course, the real glamor item is the battery-powered urban automobile. Now, about 30 companies are trying to build and sell them, even though the best available can rarely go 100 miles at 50 mph. Also, they require 5- to 7-hour periods

on the recharger—which delights the electric utilities; electric vehicle battery recharging is generally done at night when power is plentiful and wholesaled to large users.

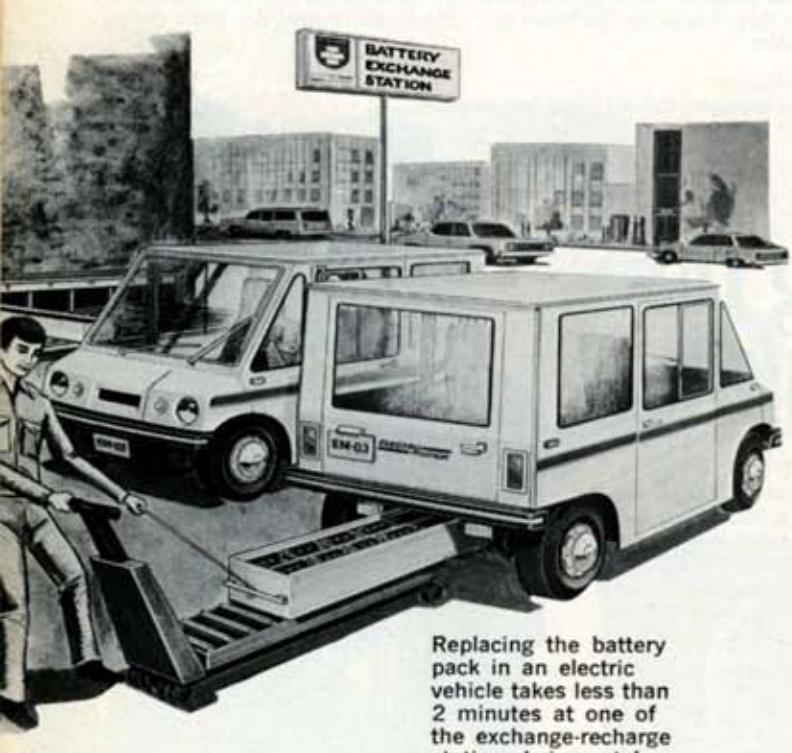
But there were some at the symposium who warned that overenthusiasm about battery-powered passenger cars could stifle an industry for which growth could be "phenomenal."

H. J. Young, executive secretary of the Electric Vehicle Council, warns that "the public misunderstands to a surprising degree" just what the capabilities of electric vehicles are.

He is joined by J. M. Warrington, managing director, Harbilt Electric Vehicles, Market Harborough, England, who warns that overemphasis of electric passenger cars could tend to waste developmental funds.

"I believe that a lot of the money spent on development programs is sheer waste," he says, "because they [designers of electric cars] are not going to produce anything new." Mr. Warrington says that the electric cars produced in 1910 were not far behind those of today, except for more technical switching gears and some small weight savings.

"The only real effect [electric car publicity] is having," he says, "is to obscure the real value of electric vehicles to society today." Mr. Waller warned the symposium that electric cars are not "the commercial enterprise that we should be talking about at this symposium."



Replacing the battery pack in an electric vehicle takes less than 2 minutes at one of the exchange-recharge stations being established in the Boston area. The van illustrated is from a line of electric road vehicles manufactured by Electromotion Inc.

Where They Work

What Mr. Warrington thinks is more realistic is to talk about the industrial and commercial applications for electric vehicles, both on and off the road. Basically, electric vehicles have proved themselves in such applications as lift trucks and golf carts. Manufacturers of lift trucks report that electrics now account for 30% of all such vehicles in use, up from 20% ten years ago.

What Mr. Warrington and his colleagues have in mind now is to get the electric vehicles out of the plants and onto the roads. They envision electrics used for such unglamorous purposes as short-trip delivery vans, buses, taxis, mail, and refuse trucks—all of which may travel less than 100 miles per day at speeds of less than 30 mph. This is not a new concept to the Britisher, says Mr. Warrington, whose homeland has not been on the energy binge this country has. In England today there are approximately 70,000 registered electric vehicles, most of them used for short-haul delivery.

Orders from both government and industry in this country for electric on-the-road vehicles go far beyond simple prototype testing.

A five-city, 30-vehicle evaluation by the U. S. Postal Service has produced such satisfactory early results that a $2 million contract for 350 quarter-ton vans was awarded in April.

American Motors General Corp., Detroit, a subsidiary of American Motors Corp., says a pilot model will be completed by August with deliveries scheduled to begin late this year. The vehicles will be powered by Gould Inc. systems.

One of the test cities is Cupertino, Calif., where six electrics have been in service since 1969. These six vehicles have cost about 2.5¢ per mile to operate, compared with about 5.4¢ per mile for a comparable gas-powered delivery van. The Cupertino test van, built by Harbilt, can operate for at

least two days without a charge of its two 36-volt lead-acid batteries, and has a top speed of 40 mph on a 2% upgrade.

Manufacturers of other vehicles for the Postal Service's evaluation are Battronic Truck Corp., Boyertown, Pa.; Otis Elevator Co., Cleveland; and Electromotion Inc., Bedford, Mass.

The Otis Electric Delivery Van can travel about 40 miles on a single charge, has a maximum speed of 43 mph, and is powered by 16 six-volt lead-acid batteries. The vehicle from Electromotion has a top speed of 45 mph and can travel about 35 miles before its 14 six-volt batteries need recharging. The Battronic vehicle is powered by one 96-volt lead-acid battery and can attain speeds of up to 47 mph.

(Battronic is also producing 100 vans for testing by 55 electric utility companies under a multimillion-dollar program sponsored by the Electric Vehicle Council.)

The average cost of each of the vans being tested is about $6,000, and although they are twice as expensive as the gas-powered vehicles they are replacing, they are expected to last 15 years compared with the six-year life expectancy of the currently used vehicle.

The Postal Service's fleet of more than 140,000 mail delivery trucks could eventually be replaced at a rate of 5,000 per year with electrics, says Don P. Crane, director, Office of Fleet Management, Washington.

Till now, the electric van testing by the Postal Service has been restricted to warm and relatively flat areas, but the postal official hints at superbatteries on the way.

Two of the new superbatteries being discussed for use on future electric vehicles neither are here, nor will be cheap. Dr. Edward E. David, executive vice president-research and development, Gould Inc., Chicago, foresees commercial availability of nickel-iron and nickel-zinc batteries by 1977, followed by the zinc-chlorine hydrate battery by 1980.

Although the new batteries will be of lighter weight and have a higher storage density, allowing less time between charges, Dr. David believes that, because they will charge no quicker than current batteries, the filling-station concept of quick battery change must be adopted to make electrics competitive with gas engines.

With funds of $700,000 this year, the Atomic Energy Commission's Argonne National Laboratory in Chicago is working on a high-energy battery which it hopes to make available to manufacturers by 1976. The metal container of the Argonne battery would hold lithium-aluminum, a light alloy, as the negative pole; sulfur, containing an additive such as iron sulfide, as the positive pole; and molten salt as the electrolyte, or charge transfer medium.

To be economically feasible in an automotive application, the AEC says the superbattery should have a useful lifetime of three years, be capable of up to 1,000 complete charge-discharge cycles, and have a capital cost of not more than about $12 per kw-hr of electrical energy capacity. The operating cost is expected to be low—probably less than 5¢ per kw-hr.

Although the prospects for superbatteries by the end of this decade are brighter than ever before, there is still no great camaraderie between the battery makers and the electric vehicle manufacturers.

"We look to the battery industry for a technology breakthrough."

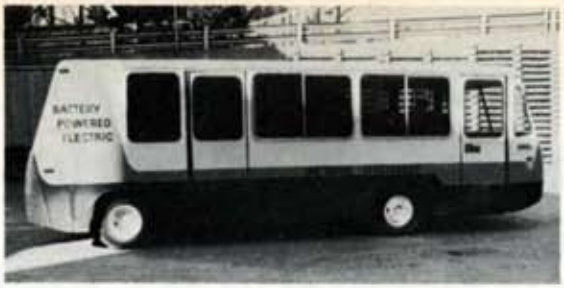
Gould's Dr. David points out that the power-weight ratio of the lead-acid battery will not allow electric vehicles "adequate performance to compete with internal combustion engines in on-road applications."

Then, almost in the same breath, Dr. David scores the vehicle manufacturers for what he terms their failure to "optimize electric vehicles from a total systems standpoint. In addition to careful design of the power system, the vehicle itself must be designed for electric application," he says.

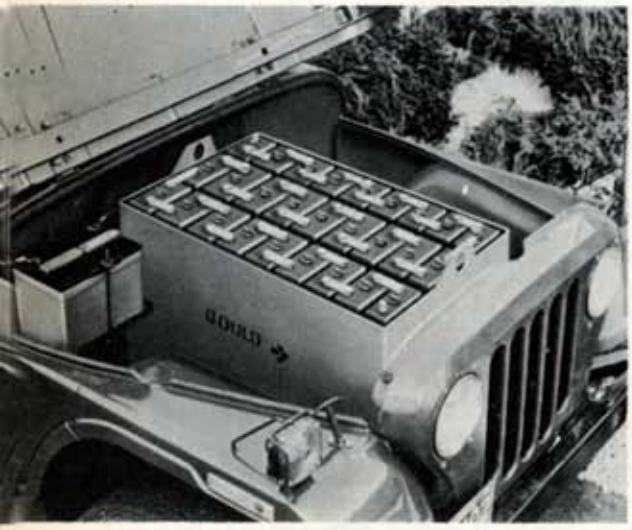
From the same podium, Ralph Weller, president, Otis Elevator Co., stated: "We look to the battery industry for a technology breakthrough which will provide mobile DC power at reasonable cost and lighter weight."

What we have is a situation in which both battery maker and vehicle builder agree that the present batteries are inadequate. The battery people say that they will have superbatteries in a few years and that they may be costly, but add that in the meantime the vehicle builders should concen-

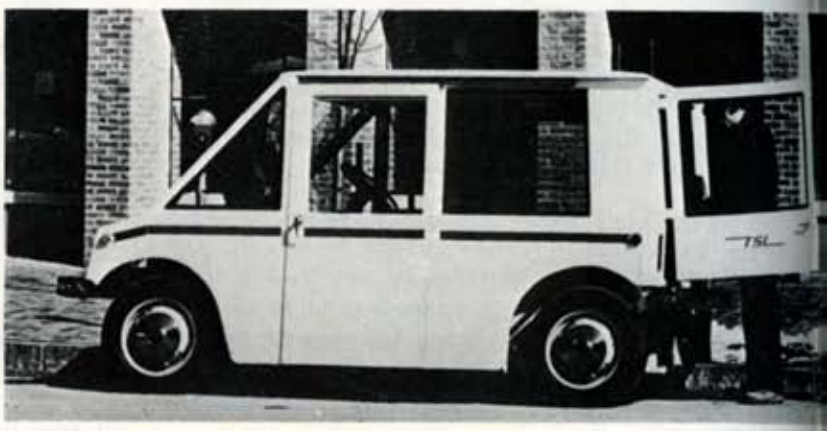
WHO NEEDS A GAS PUMP?



Electrobus, recently purchased by Otis Elevator Co., is another possible answer to the growing need of the cities for cleaner urban mass transit.



Fill 'er up? One large battery is the key feature of this total electrical propulsion system. Gould Inc. designed and produced this system for an electric vehicle to be built by American Motors General Corp.



Transportation Systems Laboratory developed this prototype for testing in the U. S. Postal Service electric van test program.

trate on better vehicle design.

On the other hand, the vehicle builders claim that they will keep on plugging, but it is up to the battery people to develop the technology at a cost that will allow the electric vehicles to be competitive.

A standoff? No, says Harbilt's Mr. Warrington—who thinks they are both wrong:

"Let's stop playing the old game of blaming the battery men for our lack of progress and success."

He believes that the lead-acid battery of today makes the commercial electric vehicle a viable proposition, and he exhorts the vehicle makers to get out and sell it.

"In fact," he says, "I am really extremely selfish. I don't want to see a sudden and dramatic breakthrough in the power/weight ratio of a battery. Should there be one, types like myself would be out of business very quickly indeed. . . . You would be seeing halfway down the conveyor belt in Detroit, one vehicle going off one way to have an internal combustion engine put into it, and the next would go off another way to have an electric motor fitted. Those of us who have maintained, promoted, and developed the art of electric vehicles would not just be edged out; we'd be booted out very firmly."

Mr. Warrington contends that every fleet operator has about 15% of his vehicles tied up in runs that could be handled by electric vehicles of today with lead-acid batteries at a lower cost than comparable internal combustion types. "That in itself," he says, "is quite a market."

What about Detroit?

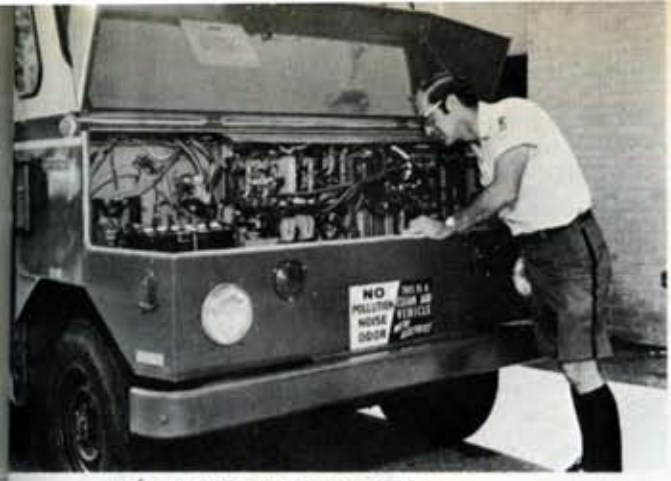
But what of Detroit? Are the automakers a threatening spectre to the relatively small manufacturers now involved in electric vehicles?

Ford, General Motors, and Chrysler are all known to have experimental electrics for both passenger and cargo applications, but generally, when automotive executives speak about electrics, it is in a negative vein.

At the recent Society of Automotive Engineers' Congress & Exposition in Detroit, D. M. Teague, chief research assistant at Chrysler, said that his company made an exhaustive study of electric cars and determined that a Simca adapted to run on conventional lead-acid batteries was not too impressive.

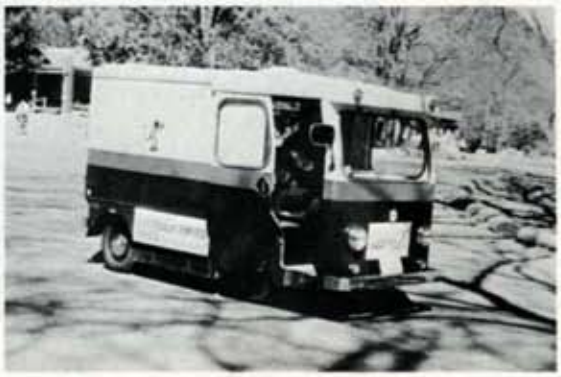
Proponents "assume the development of a battery with less weight and greater energy and range, and they assume smaller cars. But gasoline cars are also getting smaller," Mr. Teague said.

Perhaps the unkindest cut of all came from one

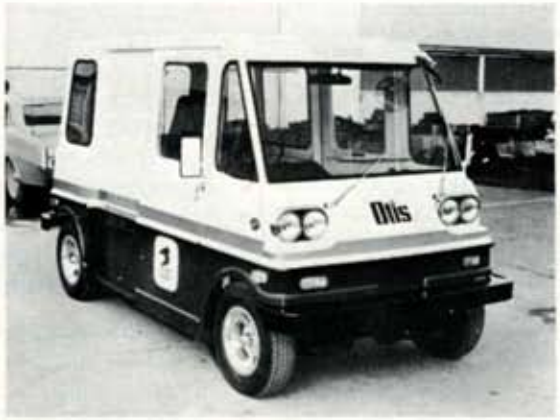


A look under the hood of an electric postal truck manufactured by Battronic Truck Corp.

Battery-powered and capable of speeds in excess of 25 mph, this three-wheeler prototype was built by EVI Inc.



Lead-acid batteries provide the power for this van built by Electric Vehicles Inc.



Otis Elevator Co. produced this van, now testing the feasibility of electric mail service vans at Santa Ana, Calif.

top executive at GM, who stated that electric cars merely transfer the pollution problem "from the exhaust pipe to the smokestack," intimating that as of now, most electrical energy is derived from coal-fired generating stations.

The utility people obviously get upset by such observations. One spokesman from Chicago's Commonwealth Edison Co. estimates that even without nuclear reactors, his company could recharge about 500,000 electrical vehicles at the low-load night period without any change in smokestack emissions.

This conclusion seems to be borne out by Neville Mapham of Energy Development Associates, Madison Heights, Mich., who estimates that electric vehicles can get as much as 48% more mileage out of a barrel of crude oil than internal combustion-powered vehicles can. His calculations started with one barrel of crude oil and followed the differences—in refining, distribution, storage, and conversion to mechanical energy—between gas in the car and oil at the generating station.

Need still sells

As far as the future of electric vehicles is concerned, they will have to make it on their own and will have to meet and exceed the gas engine on less than their own terms. It is for this reason that the serious manufacturers of electrics have set their sights on the attainable markets: the delivery route.

Of course, electric cars would be nice to have, and electric buses would not smell quite as bad. However, electric cars are still "dogs," and although some electric buses are being tested around the country, the diesel engine is still difficult to beat.

However, Mr. Warrington's study for the British milk industry points out that for 2,500-lb milk wagons, when the electric is given a total purchase and operating cost figure of 100, the gas engine registers 150, and the diesel falls in at around 141.

That should be easy to sell anywhere. As far as the cars are concerned, one representative from Otis Elevator at the symposium pointed to an old Baker Electric used for display purposes.

"See that old job," he said. "She'll outperform any of the new stuff on the floor, and we even removed some of the batteries." □
