

# Popular Science

The **What's New** magazine

## TWO LITTLE ELECTRICS

you can buy right now... and drive for pennies per mile

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how the new automatic checkout systems work

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# Battery-powered cars

you can buy now



Electric cars and trucks are trickling back. What's it like to drive one? Is an electric a real alternative to a standard car?

By HERBERT SHULDINER

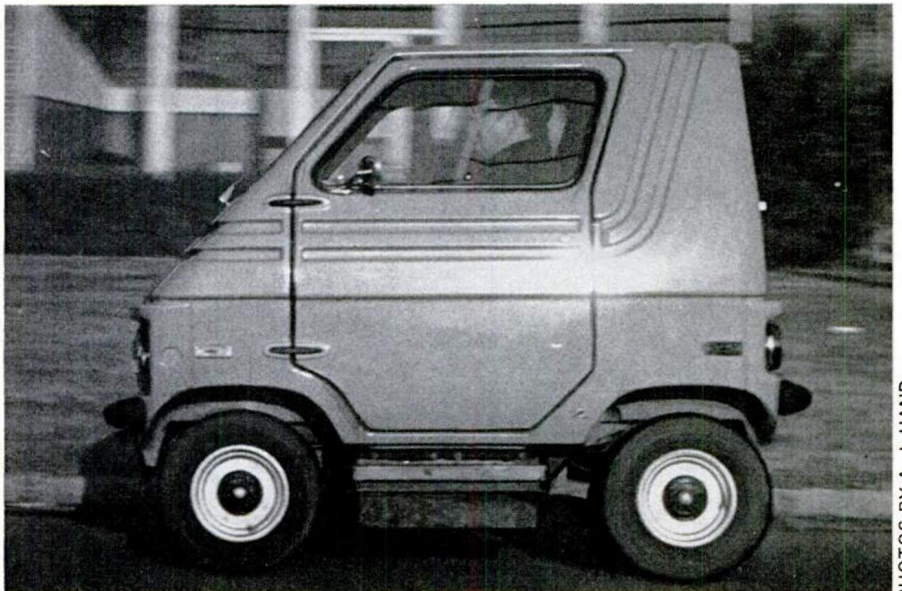
I shoe-horned myself into the little car and turned the key—and there wasn't a sound. No surprise; this wasn't a gasoline-powered car with conventional ignition. I had just flipped the switch of the CitiCar, a new Florida-made, battery-powered vehicle.

The CitiCar is one of two electric autos currently available in the U.S. The other is an Italian import, called the Elcar. Unlike the frequent one-of-a-kind conversions from gasoline-powered vehicles produced lately, or prototypes such as Voltair [PS, Feb. '71] that never got into production, these are the first "ground-up" battery-powered cars to reach the market in appreciable numbers since the late '20's. As we go to press, a third company, Electric Vehicle Engineering of Bedford, Mass., has announced a new four-passenger electric car called the Islander. The \$5000 vehicle, powered by a 78V battery and eight-hp motor, weighs 2200 pounds.

Does this mean that the electric car is staging a comeback? If it is, it's an extremely modest one. Robert Beaumont, president of Sebring-Vanguard, Inc., maker of the CitiCar, says his company produced about 800 cars from May '74 through February of this year. His sales goal for '75 is 2000 cars.



Wedge-shaped CitiCar needs only one wiper to clean its small windshield.



PHOTOS BY A. J. HAND

*Continued* Italian-made Elcar has battery container visible between the wheels.



Guy Stancati, controller of Elcar Corp., predicts that sales of his company's car will also reach about 2000 units this year. The Elcar is made by Zagato in Milan, Italy. The first one, a 1000 model, arrived here last June, and the newer 2000 series began arriving in August.

Battery-powered parcel-delivery vans have begun a resurgence, too. Several hundred of these will be made this year by the Batronic Truck Corp. and the special vehicle division of the Otis Elevator Company.

However, no one in the electric-vehicle industry expects big-time sales soon. The batteries are still too heavy, their energy density too limited, and recharging takes too long. These factors limit vehicle size, range, and speed.

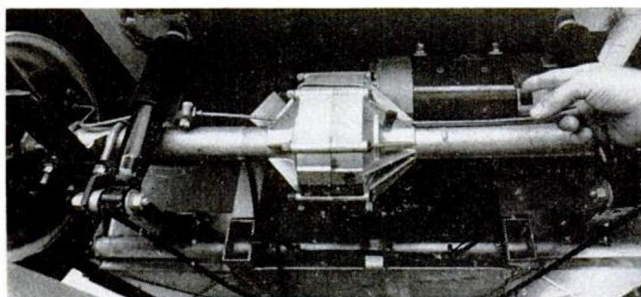
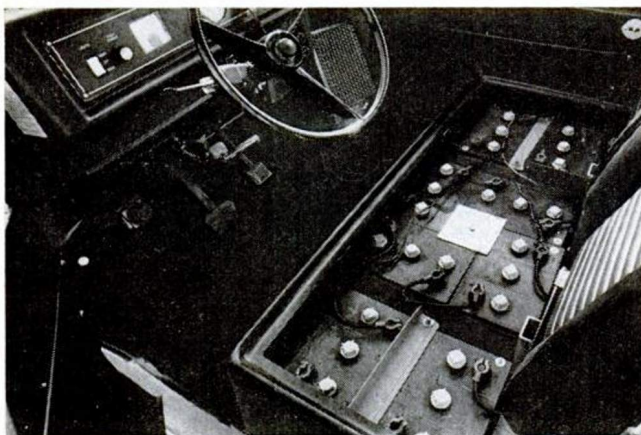
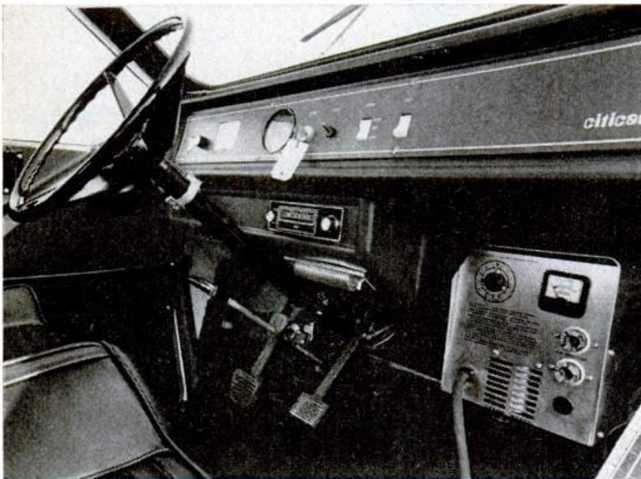
Even for someone accustomed to driving a subcompact, as I am, the electric cars felt cramped (the CitiCar's rear-view mirror was inches from my right ear). Both cars are two-seaters, however, and even six-foot-four-inch photographer A. J. Hand, my passenger, managed to get comfortable—more or less.

Accelerator response is instantaneous in these cars, and so is the whine that develops as you pick up speed. Brake to a stop, however, and there is complete silence. Unlike a gasoline engine, an electric doesn't idle at stops.

From standstill, I accelerated both cars to 30 mph, and clocked them. Here are the results (in seconds) of four runs:

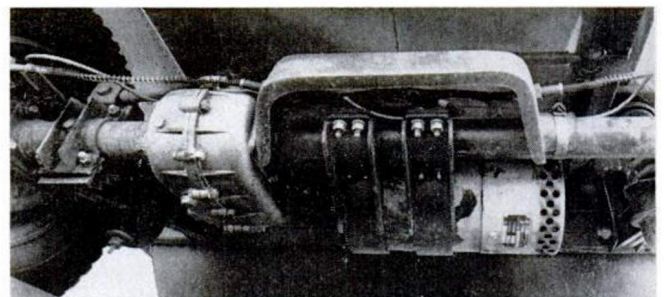
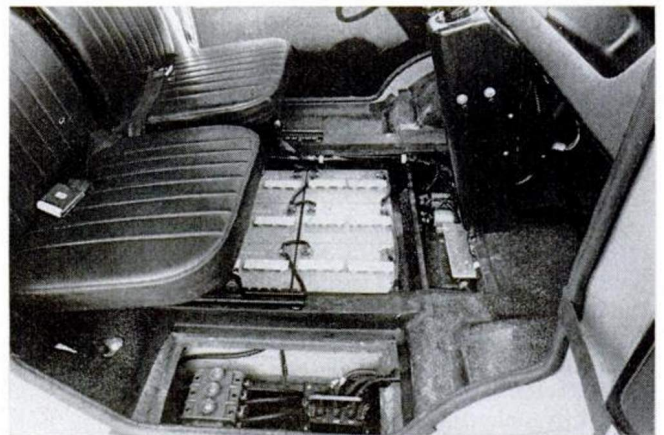
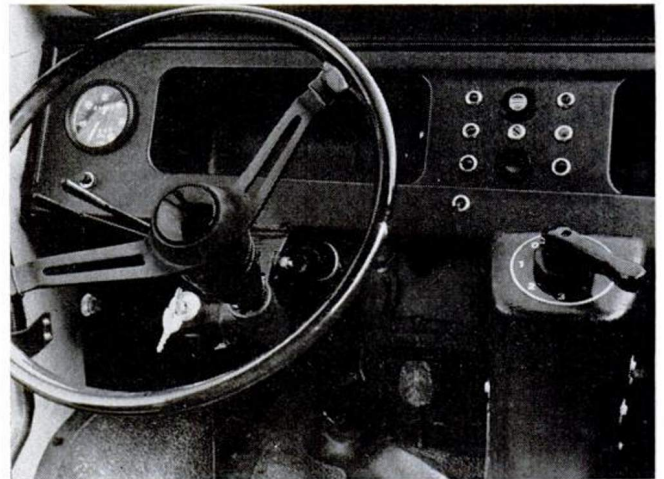
CitiCar	Elcar
13.6	25.0
16.1	43.1
14.8	23.6
16.8	42.2

### Inside look at the CitiCar



Uncluttered cockpit of CitiCar (top) has one item ordinary cars don't—a battery charger (lower right). Batteries (center) are located under seat. The eight six-volt lead-acid batteries weigh 524 pounds. Transmission and motor (bottom) are in rear, under the car. New version has shocks to help soak up bumps; original didn't.

### Inside look at the Elcar

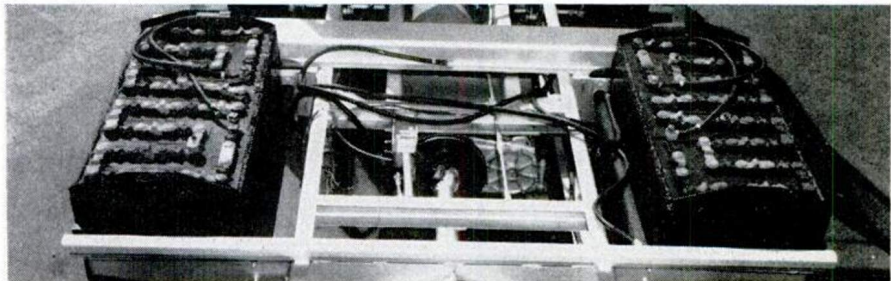
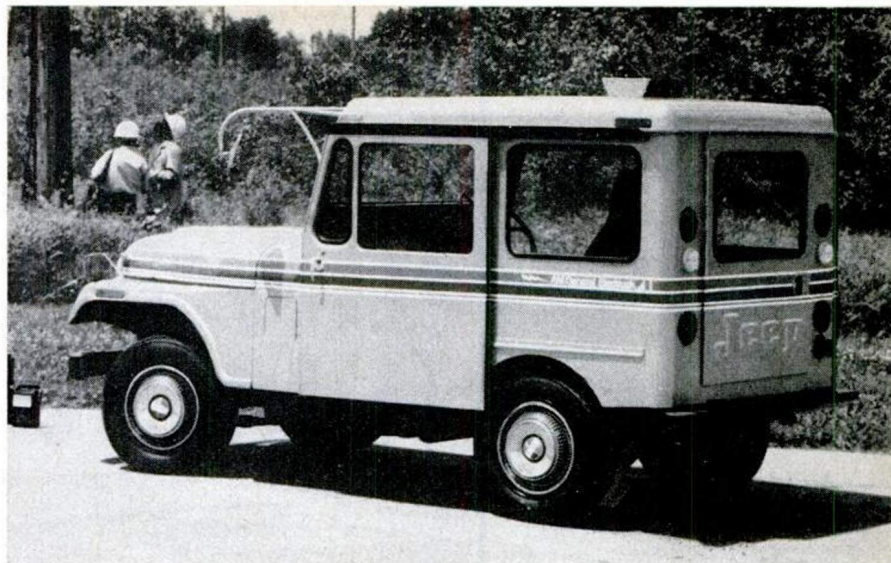


Manual gear selector is handle at right (in top photo). In combination with automatic transmission, it provides torque when needed for acceleration and climbing. Elcar has eight 12-volt batteries, also under the seat (center); batteries can be slid out in their drawer container. The motor and transmission of the Elcar are at the rear axle (bottom).



**Battery-powered Jeep** has steering wheel on right to meet Postal Service needs. Some 350 will be delivered this year to form largest electric fleet in U.S.

**New Otis electric delivery van** (below) was originally developed for Postal Service, too. Otis says energy cost for running this van is 1½ cents per mile.



**Batronic minivan** is built on a 6400-lb. GVW chassis, and powered by two 48V

battery packs. Newer Batronic trucks use 9500-lb. chassis, here, with two

56V battery packs—total weight 2400 lb. Minivan can hit astonishing 70 mph.

The first and third runs were down a very slight grade, and thus were faster than the upgrade second and fourth runs. Steep grades are a problem for the little electrics.

The CitiCar is powered by eight six-volt batteries. It has a 3.5-hp GE motor that runs at 3200 rpm. CitiCar's Robert Beaumont says the vehicle has a cruise speed of 36-38 mph, but I wasn't able to get the car much above 30 mph. Range is "up to 50 miles."

The CitiCar has a double-reduction direct-drive fixed 7:1-ratio Terrell transmission, and a variable voltage controller. As you depress the accelerator, you activate micro-switches that create a 24V resistor stage. Then you enter a second stage and switch to 24V parallel voltage. The third stage is a 48V series stage for cruising at maximum speed.

The Elcar has a combination automatic and manual transmission to provide six forward speeds and two reverse speeds. The manual gear selector takes some getting used to, and may have prevented me from matching acceleration speeds of the CitiCar, which has no such device. Elcar's range is also about 50 miles, according to the distributor.

The Elcar people put the daily running cost at an average of two cents a mile, figuring a half-cent for recharging, and 1½ cents for battery depreciation. The CitiCar makers figure a cent a mile for recharging, with rising electric rates.

Batteries, properly maintained, should last about 15,000 miles, or for 400 to 600 recyclings. They can be plugged into any 110V outlet. Recharging takes seven or eight hours.

#### How much?

Prices for the Elcar 1000 series start at \$2995 (f.o.b. port of embarkation) and at \$3395 for the 2000 series that we tested. The CitiCar is \$2690 (f.o.b. Sebring, Fla.).

The Elcar is the prettier of the two. Its fiberglass body has a more finished look. Its doors open easily and its windows can be rolled up.

The CitiCar is cruder looking. Its body is made of Cylolac panels riveted together. Door closing is difficult and there are no rollup windows.

Although fewer battery-powered trucks than cars will be sold this year, there's probably a greater potential in the U.S. market for them. In fact, says the Lead Industries Assn., up to two million light lo-

cal-delivery trucks could be battery operated.

Batronic Corp. of Boyertown, Pa., has been most active in building battery-powered vans. That company's minivans have a 500-1000 pound payload, while larger delivery vans can carry up to 3500 pounds.

Otis, a newer entry in the electric-van business, is marketing a delivery vehicle originally developed for the Postal Service. It uses a 30-hp motor with 16 six-volt batteries, has 70 cubic feet of cargo space, and a 750-pound payload.

The AM General Corp., a subsidiary of American Motors, is delivering 350 electric-powered Jeeps to the Postal Service this year. That will form the largest fleet of such vehicles in the country.

So the electric vehicle is coming back. But the pace, like the vehicle, is slow. E 3

#### Electric-car specifications

	CitiCar	Elcar 2000
Length	95 in.	84 in.
Width	55 in.	53 in.
Wheelbase	63 in.	51 in.
Height	58 in.	63.5 in.
Clearance	5.5 in.	5 in.
Weight	1250 lb.	1091 lb.
Tires	4.80 x 12	145SR10ZX