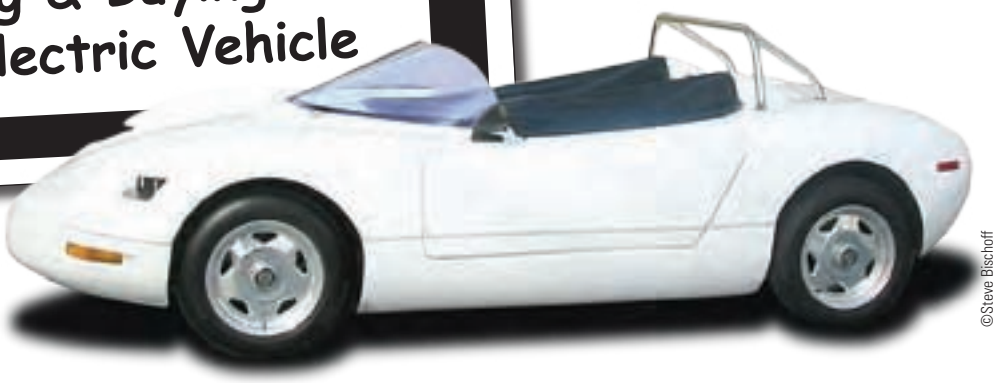
EV FOR SALE

Finding & Buying a Used Electric Vehicle

by Shari Prange



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In the market for a more efficient, emissions-free car? Electric vehicles can offer pollution-free driving at half the fuel costs of a typical gas-engine car. Here's how to find an all-electric rig that suits your needs.

While hybrid-electric gasoline vehicles get better fuel economy than their standard gasoline counterparts, they still produce tailpipe emissions and keep you tied to the pump. All-electric vehicles (EVs) offer a cleaner transportation option with no tailpipe emissions. And, if their batteries are recharged with renewable energy (RE), you can drive pollution-free.

EVs can also offer some economic savings. Depending on the drive system, they use about 0.17 to 0.4 kilowatt-hours (KWH) per mile. Multiply this by your local electricity rate to get the cost per mile. At $0.10 per KWH, an EV will cost $0.02 to $0.04 per mile for fuel. At $2.50 per gallon of gas and 25 mpg, that same vehicle using a gas-engine will cost you $0.10 per mile for fuel.

A typical EV can travel about 50 miles on a charge, and high-range EVs can go more than 100 miles. Recharging an EV while you're at work during the day can extend its daily commute range by 50 percent or more. In the worst cases, a very heavy EV, or one used in severe conditions, might only achieve 20 miles on a charge. But for many people, even that is enough to get to work or run errands.

"Driving an EV is as simple as turning the key and going down the road. There's no start-up, no warm-up, no fumes, no gas stations, and no engine noise to contend with," says EV owner Kevin Johnson, who commutes to and from work each day in his 1984 converted Volkswagen "Voltsrabbit."

Despite these benefits, there's a catch: All the major auto manufacturers crushed their electric vehicle programs—and physically crushed a slew of EVs—in the late '90s. If you're not game for converting a gasoline-engine car to an EV, that leaves one option—buying a used EV.

Where to Shop

EVs generally don't show up on your local used car lot, so you will have to search a little harder. The Internet is the place to look. Used EVs regularly appear on sites like eBay and craigslist. A few dedicated EV sales Web sites exist, and EV club and forum Web sites often list EVs for sale (see Access).

Before you buy, check out the Web site galleries of EV clubs and EV owners' groups that give details about their vehicles. Scanning some of these can help you clarify what type of vehicle would best suit your needs, and also give you an idea of the brands and models of components that are most common.

EV clubs and forums serve another useful function by allowing you to tap sources of expertise. Get to know some experienced EV owners—they tend to be very willing to help newcomers. Explain what your driving needs are and which cars seem interesting to you, and solicit their feedback. Finding and chatting with local EV owners—and scoping out their cars—can be an invaluable exercise for finding your own EV too.

Factory-Built Rides

Used EVs produced by the mainstream auto manufacturers—General Motors, Honda, Ford, and Toyota—are at one end of the EV spectrum. The only factory cars you're likely to find are Chevy S10s, Ford Rangers, and Toyota RAV4s, and possibly Th!nk Citys. These were the only models actually sold—not just leased—and only a few are in circulation. These models were manufactured during the mid-'90s through 2003, when the California zero emissions vehicle mandate was overturned due to heavy lobbying from auto manufacturers.

While these are reliable and well-made vehicles, beware of some pitfalls. Besides the RAV4 EV, which is still supported by Toyota, factory-built EVs and their parts and pieces are "orphans." The vehicles are no longer in production, and neither are their various model-specific components. If something goes wrong, you're on your own for finding a defunct twin vehicle you can harvest parts from.

In addition to the EV, you'll need its charging station too. Unfortunately, General Motors (GM) and Toyota used stand-alone, "paddle" chargers that were not on board the vehicle. Many of these chargers were originally installed in parking lots and businesses, but with the death of GM's EV program, have fallen into disrepair, been disconnected from power, or removed. The Ford Ranger had an onboard charger, but used a specialized connector called the Avcon instead of a standard plug. This situation can be resolved with an adaptor to allow use of normal electrical receptacles.

The Costs of Our Addiction to Oil

Our addiction to the internal combustion engine comes at a hefty price. Each year, American car owners shell out an average of $1,600 for auto fuel costs alone. This past year, most of us felt the pinch at the pump even more, with gasoline prices climbing an average of 208 percent above 2005 prices.

Besides taking a bite out of our budgets, gasoline cars have a mean streak when it comes to our environment and health. Scooting around town and across the country in our cars is one of the most environmentally damaging practices we do as individuals. Driving gas- and diesel-engine vehicles adds to local smog, which contributes to respiratory diseases among city dwellers, and creates a large portion of the greenhouse gases that cause global warming. In 2004, according to the Environmental Defense Fund, Americans' personal vehicles spewed out more than 300 million tons of carbon dioxide (CO_2), a greenhouse gas that contributes to climate change.

If you find one of these vehicles that interests you, see if you can locate an owner's group Internet forum for that EV model. Survey what kind of problems other owners have faced, and how they solved them. Some cars have dedicated enthusiasts who serve as a very useful support network.

Factory-built EVs are highly valued by the people who own them—and people who want them. Even models not in working condition can fetch a few thousand dollars. Vehicles in good working order can command prices between $30,000 and $40,000—or more.

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Above: The Chevy S10 is a commonly available electric pickup.

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Right: Used RAV4 EVs, still supported by Toyota, are highly sought after—and this is often reflected in their prices.

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Solectria Force EVs were built on the engineless bodies of brand-new Geo Metros.

Small Company Production Cars

Several small companies produced electric vehicles from the 1970s through the early 2000s, usually in response to fossil-fuel distribution and supply issues. Some vehicles, like the CitiCar, Comuta-Car, and Tropica, were built from scratch as EVs. Others, like the Lectric Leopard or the Solectria Force, were factory conversions, where new gas-engine models were commercially converted on an assembly line and retitled as new cars "manufactured" by the company that converted them. The Leopard and Force were formerly the Renault LeCar and the Geo Metro, respectively. Because they are no longer in production, like the factory built-from-scratch models, these vehicles are orphans. Some can be dependable cars, but a little background research is necessary before you buy.

The Lectric Leopard, built in 1979 and 1980, should be singled out, as there are quite a few of them still around. They can make a decent, basic-level conversion, as long as you reconfigure the rear battery pack. The batteries in this design were inadequately secured, and could be lethally dangerous even in low-speed collisions.

During the same gasoline crisis period, Jet Industries performed several hundred conversions of Ford Escorts and Couriers. These were well done for their time, and can easily be upgraded with newer controllers and chargers to make decent modern vehicles. An electric Escort or Courier in good running condition might sell for $5,000 to $10,000.

An event like an oil crisis will always bring out some unsavory characters to exploit it, and EVs in this category were vulnerable. Some companies were very good at getting publicity and selling stock, but turned out mediocre cars with no standardization or documentation. In some cases, their vehicles were just warmed-over conversions actually done by someone else. If you're considering a car in this category, be sure to solicit opinions from electric vehicle club or forum members first, as they can warn you about some of these operations with bad reputations.

Kit-Built Conversion Cars

The most common electric vehicles you will find are gas-engine vehicles converted by individuals using kits. Two levels of conversion kits exist—universal kits and custom kits. Universal kits, which contain all the essential drive-system components but rely on the builder to create custom parts like battery racks or boxes, are most common. A vehicle built with a universal kit probably has decent-quality components, but buyers should pay particular attention to inspect the quality of workmanship on the wiring and battery containment.

Custom kits, which include the entire drive system, plus battery racks and boxes, are designed for specific vehicle models. If you find a vehicle built with one of these kits, you can be assured that the design has some track record, and the companies are still in business to offer support if needed. Canadian Electric Vehicles supplies custom kits to convert Chevy S10 trucks, Geo Metros, and Dodge Neons. My company, Electro Automotive, provides kits to convert Volkswagen Rabbits into "Voltsrabbits" and Porsche 914 models into "Voltsporsches."

These vehicles will range in price from a few hundred dollars for those in non-operating condition to $10,000 or more for ones in good running condition.

Know Your Needs

Before you go electric, first define what you want and need from a vehicle. Here's a checklist of considerations:

- How many miles do you need to cover on a daily basis, and what's the maximum range you need to cover before you can realistically recharge the EV's batteries?
- What speed do you need to attain? Is 65 mph fast enough, or do you need to go 85 mph to keep from getting run over on busy expressways?
- Do you encounter any severe-duty conditions, such as very cold weather, potholed roads, or steep hills, in your daily travel routine?
- Are you meticulous enough to faithfully check the electrolyte level in the batteries and top it off with distilled water, or should you look for a vehicle with sealed, maintenance-free batteries?
- Do you have reliable access to an electric outlet where you normally park?

Car-Shopping Checklist...

Car Credentials

Ask the seller to provide documentation for the EV you're considering. The more information they have, and the more understandable it is, the better. Owner's manuals, service manuals, receipts with part numbers, and wiring diagrams and notes will be useful if you need to do any repairs or maintenance on the vehicle. Wiring diagrams are particularly important if you ever need to troubleshoot or modify the vehicle. The less "mainstream"—and more customized—the vehicle, the more important the documentation is.

Batteries & Other Parts

Most used EVs are sold with dead or dying battery packs. If someone has been considering selling the car and moving on to something else (often another EV), the imminent need to spend $1,000 or so on new batteries, and do the heavy lifting, tends to tip the balance, and often motivates the sale.

Unfortunately, dying battery packs make it difficult to test-drive the vehicle, so you may have to take the seller's word on the EV's performance. Here's where consulting an experienced EV user can pay off, since he or she can most likely tell you whether the claimed performance seems realistic.

Beyond batteries, realize that the longer the car has sat unused, the more likely that there will be some hidden issues. For example, rubber or hydraulic parts may have deteriorated. If the car has sat unused for more than a few months, proceed with extreme caution.

General Condition

Besides inspecting the EV's battery and electrical systems, don't overlook the non-EV aspects of the vehicle. Is the body undamaged and rust free? Body damage can affect performance and indicate safety issues. Is the interior in reasonable shape? Convertible top in good condition? Fixing an EV's aesthetic issues, such as paint and upholstery, can get costly in a hurry.

Like orphan EVs and components, there also are orphan car makes. Beware of obscure car models or brands that have no dealer presence in your area. It could be difficult and costly to find basic parts for these cars.

Performance

Take the car for a test drive. Listen for odd noises, which will be very apparent in a silent EV. How does the steering and braking feel? Is it sloppy, does the car pull to one side, or take too long to stop? Test acceleration and handling on curves and hills. Will it be able to perform at safe speeds for the type of driving you will do? Can you climb hills and merge as needed? Does it feel tippy or want to wallow in corners? Overall, are you comfortable with the vehicle's performance?

Get a Pro's Opinion

If the EV passes your initial inspection with flying colors, take the car to an auto repair shop and have the basic running gear (brakes, suspension, wheel bearings, etc.) checked out. If the car isn't running, see if you can find a mobile mechanic who will inspect it on site. Getting a professional's opinion is well worth the $100 (or less) you'll pay for the inspection. If the owner has records or receipts for things like brakes and clutches, check these out too, noting how recently repairs and maintenance were done.

Custom-Built EVs

As a class of owner-built EVs in which components are typically mixed and matched, these vehicles have the most potential for problems and are difficult for EV newbies to adequately assess. You'll need to educate yourself about the EV's specific components to gauge their quality, or have an experienced EV advisor help you look them over.

Orphan or low-quality components may be mixed in with good ones. These vehicles may have an older- model speed controller or charger that was OK in its day, and it's not that difficult or costly to upgrade to a newer model. But upgrading an older motor will also mean getting a new adaptor to mate to the transmission. If the motor was an aircraft starter or generator, the vehicle would almost certainly need a major overhaul, including motor, adaptor, controller, and probably charger and other components, as these aircraft motors ran on lower voltage than is commonly used today. It would be easier to do a conversion from scratch than to upgrade one of these cars.

Beyond that, some simple advice will help cull custom EVs most prone to problems. First, avoid EVs powered by forklift motors, or aircraft starters or generators. These are inappropriate, and will only bring you grief. They will suck

The Voltsporsche is a custom-kit conversion of a Porsche 914.

©Shari Prange (2)

a lot of amps, which reduces range and stresses components, and they will not be compatible with most mainstream conversion components. Other obsolete technologies include speed control by series–parallel switching of the batteries, or SCR speed controllers, neither of which are very efficient.

Although orphan components are fine as long as they are working, be aware that if they fail, there's no support for them. This is most critical with controllers, chargers, and DC–DC converters. Avoid homebuilt controllers and chargers, which are usually invitations to trouble. Even if you find a well-built controller from a skilled and knowledgeable person, ask yourself whether she or he will be around to help you troubleshoot it if you have problems—or whether anyone else will be able to diagnose the creation.

Patience Pays Off

Used EVs span a wide range of prices—from basic owner-built conversions that cost a few thousand dollars to a mint-condition factory EV that may fetch tens of thousands. An EV's price generally reflects the running condition and aesthetics of the vehicle, its performance capabilities and pedigree (if it is a well-known and valued model, or uses well-known and valued components), and what the owner thinks it's worth.

You can probably get a sense of a factory car's value by doing a little Internet research. At any given time, you will probably find a few of each model for sale somewhere, and you can also get an idea of reasonable prices from owner's groups. To get a rough idea if a homebuilt conversion is "worth" the price, check out the current prices for a similar collection of components, and a similar donor car with a dead gas engine. Although installation labor is typically valued at $5,000, the previous owner has also benefited from several years' use of the vehicle, so those two items probably cancel each other out when figuring the value.

Buying a used EV takes more effort than buying an ordinary used car. Even if it seems like a great deal, don't feel pressured to grab the first EV you find, unless you know what to look for and it passes muster. Take the time to learn about the components, so you can make an informed choice to enjoy plenty of years of performance from your new-to-you EV.

Access

Shari Prange, Electro Automotive • 831-429-1989 • www.electroauto.com • Custom & universal kits, components

Randy Holmquist, Canadian Electric Vehicles • 250-954-2230 • www.canev.com • Custom kits, components

Roderick Wilde, EV Parts • 360-385-7082 • www.evparts.com • Custom kits & components

Used EVs for Sale:
Craigslist • www.craigslist.com • Listings of vehicles for sale

eBay • www.motors.ebay.com • Listings of vehicles for sale

Electric Auto Association (EAA) • www.eaaev.org • EV enthusiasts' club with chapters across the United States and Canada; Web links to EV sale sites

EV Finder • www.evfinder.com • Listings of vehicles for sale

EV Tradin' Post • www.austinev.org/evtradinpost • Listings of vehicles and components for sale

Online Discussion Lists:
Solectria Discussion Group • www.groups.yahoo.com/group/solectria_ev

RAV4 EV Owners Discussion Group • www.five.pairlist.net/mailman/listinfo/rav4-ev

Electric Vehicle Discussion List • www.madkatz.com/ev/evlist.html