



# EEVC NEWSLETTER

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## THE FORD RANGER PICKUP RIDES AGAIN Corey Rideout

*(In March of this Year Club member Corey Rideout bought this factory-built 2000 Ford Ranger pick-up on ebay. While it was running when he bought it, as a true EVer he just had to make some improvements. This is his story – ed.)*

I've been doing some work on the



Corey Rideout is the current owner of this 2000 Ford Ranger pickup EV.

low connections and such but it's all functional. I'll clean up the wires a bit later.

The first thing that I added was a main disconnect switch for the pack battery. It's in the back of the truck and

*(below): Accessory batteries in Tupperware container.*



Ford Ranger that has been in this club's lineage for some time. I am nothing like Denny in his ability to make for easy to fol-

*(l): Battery Disconnect switch.*



when I know that I am not going to use it for a couple of days, there won't be any danger of folks tampering with the vehicle. It also allows me to work on it without disconnecting the heavy 350amp Anderson cables in the front. It breaks B+.

The 12 V battery died, so I was looking at almost \$100 to replace it. Nah. Why do that when you can be creative? It doesn't need to crank a starter, so really any 12 V battery of sufficient amp hour capacity will do. I wired two extra power supply batteries that I had in parallel for a 12 V 15 Ah pack. I then threw it in a tupperware container with battery post adapters... because... sure. Why the heck not? It also allowed for me to add Anderson connections for some of my other wiring. Works like a charm. I added a solaebay r charger to the cigarette lighter outlet so that it never goes flat. Now if I need a new battery for any reason, it'll set me back maybe \$20, not \$100.



I also wanted to be able to get a read on the pack voltage digitally, and without closing the main contactor and making the vehicle live. I had an extra high current cycle analyst around (left, below meter shunt) that I wasn't using, and I wired that

up to read voltage any time that the main power is on. It also serves as a reminder to shut off the power if you're working on it and the meter is on. If that meter is getting readings, that voltage is HOT! Disconnect the power! I ordered a shunt for it that's 450 amps, so in the future it'll be able to give me descriptive statistics on how many amp hours were used, average amps and so forth.

Finally, I added a "window switch" The music system was removed from this system; that left me wires that ran from the cab to the front of the truck. GOLDEN. I did not have to go through a firewall to run wires. This



window switch produces a 12 V ground when within its normal RPM range. I repurposed this to open up a contactor when it's out of range.

NICE. That was exactly what I needed. So I wired this across the potentiometer so that the throttle only works in the 0-4300 rpm range. It's got a microcontroller on that switch that I could program pretty easily. Good deal. I guess that the Warp 9 redlines at 5000 rpm, so I left a margin of error in case it was going down a hill or something.

And then I cut up a notebook and tried to mount it reasonably, because — reasons. not elegant to be sure, but ebafunctional. That switch can turn the tach on and off so it doesn't draw 12 V power continuously. It can also serve as a throttle disable in case there's a runaway throttle for some reason.

So, I'll clean up the wires later when I am done with it, but I really like what this thing can do. I can now see system voltage while it's charging, prevent the motor from over-spinning, replace the battery with any battery available, and most importantly work on it safely.

I still want to add orange wire loom for the wires on the bottom and maybe a heater/music system, but I love this truck to death. And yes, yes I do call it "The Power Ranger."



### EV ON CAMELBACK MOUNTAIN Alan Arrison

Here is a picture of my truck at the top of Camelback mountain in Mt. Pocono State Park. Most likely not the first EV there, but certainly one of very few.

I had to go there for a Ham Radio event so I figured I'd give it go. No problems on the 260 mile round trip. I was able to charge on the mountain (which normally would not be possible). I charged in Allentown at a fellow EVer's on the way up and at a BMW dealership on the way back.

My current EV is a 1994 Chevy S-10 pick-up truck. It was one of a few hundred built by GM and US Electricar. GM supplied the truck and the 50 kW 3 phase AC electric motor and controller. US Electricar integrated the motor, controller, battery system and other components into the truck.

It originally had a 1500 lb pack of sealed AGM lead acid batteries. The nameplate capacity was 312 V x 80 Ah = 25 kWh. When I got the truck the lead acid pack was not in very good shape. Since I didn't want another "lead sled," I took the plunge with 100 CALB 100 Ah lithium cells that I managed to fit into the original battery box.

The lithium pack weighs half that of the lead acid pack at 750 lb and has a capacity of 320 V x 100 Ah = 32 kWh. When the pack was new my range was easily 100 miles.

Now that the pack is three years old, my range is more like 80 miles. (though I did 100 miles on the highway this year at the 21st CAC).

I drove to the Poconos from South Jersey, all highways, 133 miles one way. I stopped at a Tesla owners house in Allentown (82 mi) on the way up and charged at 208 V, 40 A (8.3 kW) for 3.5 hrs. I then drove the remaining 50 miles to Camelback mountain and arrived with

plenty of juice to spare. I charged on the mountain overnight at 120 V, 15A (1.4 kW). This would not normally be available. The Amateur Radio group I was with had special permission to stay on the mountain overnight and hook up to mains power.

The next day I had to go down the mountain in neutral and use the friction brakes(!) so as not to overcharge my fully charged pack with regenerative braking energy. The 50 mile trip back to a BMW dealer in Allentown must be all downhill as I was able to run at 60-65 mph verses the usual 50-55 mph.

I took a walk to a nearby eatery for lunch while my truck charged at the BMW dealer for 2.5 hours at 230 V, 32 A (7.2 kW). The final 82 mile leg home was uneventful and I made it through Philly just ahead of rush hour.

I'm sure my truck wasn't the first EV on the mountain, but I bet it is one of very few.

So ends another EV adventure just for the heck of it.

### EEVC PRESIDENT IS NO LONGER EV-FREE



*EEVC president Oliver Perry's wife Dottie casts some doubtful looks at the a car lot in North Jersey, where the white 91 Chrysler LeBaron convertible brought her. Behind the convertible is parked a Nissan Leaf that had been advertised on E-Bay.*

Ever since he left the converted 1986 Ford Escort in the hands of the Medford Burlington County Institute of Technology, about six years ago, EEVC President Oliver Perry seemed too contented to simply drive the 2006 Ford 150 V-8 van that he purchased originally to tow the Escort. That van, along with six other ICE vehicles, the EEVC president has been happily driving everywhere, claiming that it is far more economical to burn gasoline than subsidized electric cars.



*Dottie Perry seated in her new (used 2013) Leaf, parked in the Perry driveway.*

This attitude has clearly been an impeachable offense, for which Mr. Perry has seemed to all too comfortable to live with. But, his good wife Dottie got tired of sleeping next to a big hypocrite and demanded that something sensible be done. She was obviously tired of the collection of gas burners that her husband continued to expand in her driveway. Wasn't her electric drier outlet already connected to a 240 volt line that had been extended to the garage for electric car use? Why this waste of money to run that line if it was not ever going to be used?

### **So What Happened?**

Dan Monore and his wife took a vacation in June and asked Mr. Perry to take his Nissan Leaf for the week. Mr. Perry, reluctantly drove the lovely white LeBaron convertible down to Dan's home and swapped it for the Nissan Leaf. Those attending the last EEVC meeting in Deptford saw Mr. Perry drive up in Dan's black Leaf. For once he arrived to a meeting in a dignified manner, worthy of the title he holds. Mr. and Mrs. Perry also drove the Leaf on a lengthy trip which involved stopping at Ken Barbour's parents home for a recharge. Ken and his wife stopped over. There, a friendly chatting and charging event took place. The ride home was easy with air conditioning and all the comforts of an ICE. Mrs. Perry began to feel comfortable in a Leaf.

During that week one of our EEVC members posted an E-Bay ad for an electric Leaf on our chat line. The vehicle was a 2013 which only had a little over 1000 original miles on it. To acquire the car all one had to do was win the bid. Since Mrs. Perry showed great interest in driving Dan's Leaf, and felt

that it really was a suitable car for her, she was willing to place a bid on E-Bay for the car advertised. After all it was her favorite color.

### **In Mr. Perry's Words**

We won the bid. We paid the required down payment and arranged for the final signing of the papers and car pick up. We were very surprised by the over-all appearance of the used car lot when we pulled in. The car was not charged up enough to drive it back home so we had to arrange for a delivery of the car to the Bordertown Auto Auction, much closer to our home.

There is quite a story to tell about what happened next. Ken Barbour, Dan Monroe, Ed Kreibick, and Jim Natale were consulted. They advised us and remained a great help to us while we tried to untangle the web of mystery that wrapped our car. We had purchased, unknown to us, a lemon law buy back from the state of California with a branded title. What a mess! Nissan told us it had zero warranty. The car dealer that sold us the car told us that it was still under warranty.

This issue has been finally resolved, we think. There are always surprises in life around the corner. In this case we feel the surprises are over and the web has been untangled to our benefit. The details will make for an interesting followup story later. Meanwhile the car is running fine. Dottie and I really love it. There is good reason to believe that in the end we have made a good purchase from a dealer who, although he was a fast talker, did sell us an excellent vehicle with full warranty.

Thanks to all of you who made it easy for us to decide what kind of purchase to make by sharing your personal knowledge and experiences, and for those who have been posting available cars on line. The decision to purchase a Leaf was not a last minute decision, although it may have appeared to be one.

### **GREEN GRID EXPERIMENTS Oliver Perry**

The *Wall Street Journal* for June 29, page B 1 "Hawaii Wrestles with Vagaries of a Green Grid." If you are interested in the trials and tribulations of developing a solar and wind grid, this article might be of interest.

Reminded me of the experiment that Paul Kydd is involved with at the Philadelphia Navy Yard. Hawaii has lots of islands and therefore does not have one single grid, (like in the case of the US where we have three) but rather many small isolated grids. I found the article informative with a number of interesting facts.

Right now Hawaiians have placed too many solar panels on their roof tops for the grids to handle. They want to have a totally carbon free grid by 2045. Right now they use oil to power 70 % of their electricity. Their electricity is the most expensive in the whole US, 34 cents per kWh.

They lead the nation in the most electricity from solar panels per capita by FAR. California is second followed by Arizona and then New Jersey, with Colorado close behind, then Vermont.

**COMMENTS MADE TO EASTERN  
ELECTRIC VEHICLE CLUB  
Andrew Daga, CEO, Momentum  
Dynamics Corporation**

22 June 2015

The following comments were offered in response to an email distributed to the EEVC forum regarding a recent article in *Kiplinger's*. The subject of the email was: Fuel Cells are coming per *The Kiplinger Letter* 6-12-15.

Thanks for this note Tullio.

But let me comment. Fuel Cell Vehicles (FCVs) may be catching on experimentally in distribution centers, but one should not jump to the conclusion that they have broad application in passenger vehicles. I get this sort of question frequently from investors in my company, and we have an electrochemist on my staff that has contributed to our response. There are a mix of reasons based on thermodynamics, economics, and other factors that pose enormous hurdles to hydrogen as a fuel.

It is my sense that the forklift industry is dominated by lead acid battery suppliers, and it is the charging of these massive slow rate batteries which provides the pain point for the material handling industry and forklift OEMs. This industry is also moving to lithium batteries (in Europe), the lighter lithium battery being offset and made heavier by cast

iron ballast to give the forklift its needed counterbalance. These batteries can be more rapidly charged, will last much longer, and if opportunistically charged, offer a superior alternative to FCV forklifts.

Many people believe, wrongly, that hydrogen is almost free because we can derive it from seawater. (Ironically, many of these people seem to live in CA, which is suffering from years of drought while in full view of one of the longest coastlines in the country). The fact is the vast majority of hydrogen is sourced from natural gas — methane. Methane is CH<sub>4</sub>. To split the four hydrogen atoms off from the carbon requires energy. Before all is said and done, more energy goes into the separation and concentration of the hydrogen than results in the potential energy of the four harvested hydrogen atoms. So you begin with an energy deficit.

The biggest problems, however, are distribution and storage. There is no existing hydrogen distribution infrastructure, other than trucks that carry tanks of compressed hydrogen around. Today those trucks use diesel fuel to move the hydrogen fuel around. They may be okay doing this by taking the hydrogen to the comparatively few forklift users at distribution centers, but doing so on a scale necessary to reach the nation's (let alone the world's) cars is daunting at best. Financially it cannot be made to work. Gasoline is far more energy dense, so it does work economically. And most of the distribution for gasoline is from refinery to distributed terminals via pipeline with short end-runs by tanker truck.

By comparison, we do have a substantial natural gas distribution infrastructure in place. And there are a few interesting things to note about this. One is that even this system of pipes is not extensive enough to reach the required number of cars, and it requires an end-of-line compressor system to fill the vehicles with compressed natural gas (CNG). That is financially daunting and, experience shows, filled with non-obvious costs, like building code and zoning requirements that push costs way up. This point was driven home earlier this week when Honda announced that it was going to discontinue the Honda Civic CNG version — the reason, primarily, was the lack of infrastructure. If this is a problem for natural gas, it is a far

more difficult for hydrogen.

Because there are fewer municipal bus fueling centers to distribute to (and heavy federal subsidies), municipal city buses have made ground using CNG and CNG hybrids, but they have not been dramatically successful and the bus operators uniformly detest having to switch to a second more complex fueling system. Those that have succeeded, like at Penn State University, coincidentally sit next to (or nearly on top of) high pressure natural gas mains. If a user is not near such a main, the cost of laying new pipeline needs to be considered. A municipal bus can carry perhaps 15 kg of hydrogen, which is far less than the amount of CNG it can carry. So you get to carry far less energy on board and have to pay far more to get it onto the vehicle.

Nevertheless, on a thermodynamic basis it would make more sense to pipe the much more energy dense methane to the market and burn it as a fuel using the infrastructure that now exists, than to strip off the carbon and distribute the less energy dense hydrogen using an even more expensive infrastructure that does not yet exist.

There are also understated problems with hydrogen leakage and containment, and also, how much compressed H<sub>2</sub> gas you can actually put on a car (and let's not even think about liquefied hydrogen).

FCVs do not throttle well, so they require a substantial battery or super-capacitor as the prime source of power for the traction motor, and the recipient of high rate charging from regenerative braking. So FCVs are really overpriced two-stage electric vehicles where the FC is a range extender.

Clearly, Toyota and other companies have made frequent and strong announcements of their intent to move into FCVs. They may do so in limited markets. Toyota is very tied to their heavy investment in nickel metal hydride batteries and has yet to move into lithium ion batteries commercially. It is my guess that they are hedging their bet and you will see a non-FCV electric lineup from Toyota and, frankly, everyone else who is proposing FCVs in passenger vehicles.

### **ACTUAL LEAF TOWING RANGE**

**Ken Barbour**

My wife Aimee bought a Seadoo Spark from

Beesley's Point Seadoo near Ocean City last year. Shortly afterwards the dealer was bugging me to bring it in for a handlebar recall. I put it off for the longest while as I didn't feel like driving all the way to Ocean City to drop it off. And we've had no problems with the watercraft at all.



The only vehicle that we have with a hitch is my 2015 Leaf S. That's how we get the jet-skies to the lake every weekend in the summer. The lake is close by, the dealer is not. So the morning of July 12 we left with a full charge from my parents house (where we keep the jet-skies) en route to Beesley's Point. Round trip would be 76 miles. There were three people in the car as my dad came along with Aimee and me. Aimee's Seadoo Spark weighs 405 pounds and the trailer weighs 200 pounds. We took Tuckahoe Rd to Rt 50 to Tuckahoe Rd to Rt 9. We arrived at Beesley's point Seadoo in about 45 minutes with 58 percent battery left. Our original plan was to tow the empty trailer home, but we enjoy Aimee's pink Spark so much, I picked up an orange one for myself while we were there. Seadoo Sparks are only \$4999 and really good on gas compared to other skis. It's not electric but only uses 2.5 gallons per hour compared to 7.5 to 20 gallons per hour for the biggest models at full throttle. It will probably be the last gas powered vehicle I buy, as when these are ready for replacement I expect electric ones to be available.



The trip home was uneventful, traveling at the posted speed limit (50 mph) for 95% of

the trip. So, before today I wasn't quite sure what my range was with a loaded trailer on a longer journey. Now I can confidently say that the Leaf can tow my Seadoo Spark 76.2 miles without charging and with three people in the car. I even had 12% battery left when I arrived at my parents house. This would be enough to make it to the lake for a test ride but I'll charge here for a little bit while we enjoy some lunch. I also have an extra 2011-2012 Leaf hitch for sale if anyone needs to tow with their Leaf as I do.

### **NON-RICH NEED NOT APPLY** **By California Pete**



California in general, and the Bay Area in particular, are in the midst of a housing bubble, but nobody in these parts wants to call it that.

The median price for a home in San Francisco reached \$1 million at the end of May, a 32 percent increase from a year earlier. And rentals? Forget it: "San Francisco landlords wanted a record average rent of \$3,458 in the first quarter, up 1.9 percent from the fourth quarter and 13.2 percent from the first quarter of last year, according to a report from Real Answers," wrote business columnist Kathleen Pender in the *San Francisco Chronicle* for April 29.

As a result, entire classes of people have been driven out. Families with children, for one — although much of that has to do with the strange way San Francisco decides which school you can send your kids to — and don't think it has anything to do with which school is closest to your home. The middle class has been essentially priced out, leaving the very rich, the very poor (including the homeless) and those lucky enough to live in rent-controlled apartments or houses — except that landlords are finding more ways to either raise rent or evict existing tenants. Any attempts to build additional housing are met with organized resistance by folks who don't want San Francisco to change, ever, and the only way to get builders to include below-market-rate units in what they do build

is by essentially holding a gun to their heads.

Oh, and I might mention that efforts are under way to drive the last legitimate gun dealer in SF out of business. I haven't heard anybody dumb enough to suggest that the illegal alien who shot a woman to death on Pier 14 a few weeks ago would have been deterred by shutting that gun store (the pistol he used had been stolen from a federal agent's car), but it is amusing to watch the various officials here point fingers at each other over the fact that, despite the guy's having five felonies, he was brought here from federal custody, then let go without informing the feds.

### **Hey, dude, where's my car?**

When I moved to California I left behind the project car I'd been working on, and have been wondering what ever became of it.

The car was a two-door hatchback; the frame was made of 3x4 inch 1/8-inch wall A400 steel rectangular tubing, cut, gusseted and welded together. The floor and firewall were made of 1/2-in exterior plywood, covered in fiberglass. The body was made of polyisocyanurate (Thermax) foam insulation panels, cut and fitted together and covered with fiberglass and polyester resin. The doors were gull-wings, with sliding acrylic windows from an old Sebring Vanguard Citi-Car (Courtesy of Ed Kreibick, from whom I also bought the motor). The main interior roll bar was 2x2 inch, 1/8-inch wall square steel tubing, cut and gusseted like the frame, and mounted to the frame using rubber engine mounting doughnuts and 1/2-inch grade 8 bolts. The rest of the roll cage was made of welded industrial rack rail.

The suspension, axles and other running gear were from a 1971 Toyota Corona. I used the original Toyota flywheel, clutch and four-speed transmission, with an adapter that Guy and I built out of 1/4-inch steel plate.

The brakes were stock Toyota, with power assist provided by a vane-type vacuum pump driven by a small 12-V motor and connected via a check valve to a reservoir that had been part of the Toyota's original emission control system. A vacuum switch turned off the pump as soon as the reservoir was pumped down far enough (I think I had it set at about 15 inches of vacuum).

Inquiries on the EEVC chat group led to Dan Carlin and Dave Patterson; Dave reported that Dan told him that he thought that I had given the car to a club member, rather than leave it in the EV work area of the Boyertown museum. If so, I don't recall, but perhaps someone else knows. If so, please email me at the club address (Easternev@aol.com) or via the chat group.

I certainly am not asking for the car back, but there was a lot of good equipment in it that someone should make use of. Even with just 120 V of golf cart batteries on board (the system was set up for 144 V), putting the transmission in first gear and stamping on the accelerator would smoke the tires. Also parts of the vacuum system for the power brakes would be useful in a conversion.

## NEWS UPDATE

### Push for FCVs in Japan

An AP story dated July 2 reports that "Toyota, Nissan and Honda are working together to get more fuel cell vehicles on roads in what they call Japan's big push toward 'a hydrogen society'" by pledging money towards the building of hydrogen refueling stations, at up to 11 million yen (\$90,000) per station per year. "The total value of support the automakers plan for the stations is estimated at about 5 billion yen (\$40 million)," says the article, "or 6 billion yen (\$50 million)." It appears that they believe that if you throw enough money at a bad idea it will become a good one. Pretty much like some government programs.

### Get paid to use electricity?

A June 14 story by Rachel Morison of *Bloomberg News* reports that as alternate energy spreads, in parts of the United Kingdom there may be times when incremental power prices become negative (they pay you to take the power) — as has already happened in other some other areas like Germany.

### 100,000 wireless EVs?

A July 15 story by Andy Szal on *Manufacturing.net* reports that "The first electric vehicles equipped with wireless charging capabilities could debut next year, according

to a recent analysis by IHS Automotive."

"And by 2022," the article continues, "the Colorado-based research firm said, automakers could roll out 100,000 vehicles that would not need to be plugged into charging stations."

### UAL to invest in biofuels

United Airlines has that AltAir Fuels will begin regularly scheduled deliveries of sustainable biojet fuel to LAX in 2015. AltAir's Paramount, California-based refinery converts sustainable feedstocks, like non-edible natural oils and agricultural wastes, into low-carbon, renewable jet fuel. This biofuel is price-competitive with traditional, petroleum-based jet fuel, but achieves a 50 percent reduction in carbon dioxide emissions on a life cycle basis when compared to traditional jet fuel.

United plans to purchase up to 15 million gallons of sustainable aviation biofuel from AltAir over a three-year period, with the option to purchase more.

## NOTICE ON DUES

Annual dues are \$20 with electronic delivery of the Newsletter, or \$25 for a printed copy. Checks should be made payable to EEVC and mailed to James Natale, 3307 Concord Dr, Cinnaminson NJ 08077, or paid via PayPal to [jnatalemicro@comcast.net](mailto:jnatalemicro@comcast.net).

## MEETING SCHEDULE

Meetings are held in Room 49, Plymouth-Whitemarsh High School, 201 East Germantown Pike in Plymouth Meeting, PA, and begin at 7:00 p.m. Note there are no official meetings in July or August, although members often arrange informal ones.

Sept 9

Oct 14

Nov 11

Dec 9

Jan 13