RAV4 EV Range Testing

I wish I didn't have to say this, BUT, there is a significant number of RAV4 EV owners who have sold their car because the Distance to Empty (DTE) or Guess-O-Meter (GOM) value went down. I had another one of those calls recently. The caller told me that he just sold his car because, "it lost a lot of range".

Naturally, I asked him if that was based on the value from the GOM when fully charged, and whether he had actually reset the GOM or completed the Tony-Test. "No", he said... he had no idea. No matter what, if you have temperature changes in your local area, the ACTUAL range will go down in the cold weather, and increase in warm weather. That's because the battery heater is working, as well as the cabin heater. But, that is different than permanent degradation that never comes back. It's just like humans… they get old, and they're never physically the same as when they were new, and they have decreased performance.

If your RAV4 EV is not exposed to prolonged extreme heat (California deserts areas like Palm Springs, Phoenix, Las Vegas, Middle East, etc), and you don't cycle the battery regularly from 100% to 0% (20-80% is good, 30-70% is better, 40-60% is best), your battery will last well over 100,000 miles of normal use. There are currently cars approaching 150,000 miles (August 2019).

The expected degradation while using the above battery care metrics is:

DEGRADATION PERCENT	**DISTANCE TRAVELED**
5% to 10%	0 to 50,000 miles (80,000 km)
10-20%	50,000 miles (80,000 km) to 100,000 miles (160,000 km)
15-30%	100,000 miles (160,000 km) to 150,000 miles (240,000 km)
20% to "end of life"	about 200,000 miles (320,000 km)

TONY-TEST: How to reset the RAV4 EV's Distance to Empty (DTE) or Guess-O-Meter (GOM) to the battery default "Rated Range" for the purpose of determining battery capacity and degradation.

When new, the Tesla battery had a rated capacity of 41.8kWh, with about 40kWh usable when new. Three major factors affect how quickly the battery will degrade:

1) Time
2) Heat
3) Cycles

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TONY-TEST:

1) Fully charge the vehicle using "Extended" mode with the J1772 port (do not use CHAdeMO)

2) The battery must be at room temperature, however it's ok to be slightly warm. When you charge the RAV4 EV to 100% on extended charge, it will be warm. If you park in an enclosed garage with outside temps in the 50F-60F (10-15C), the battery will likely still be warm enough in 4-8 hours

3) MAKE SURE THE CAR IS TURNED OFF !!! The car can and will stay on, even if you disconnect the 12 volt battery

4) Disconnect all 3 of the 12 volt battery negative black cables, and leave it that way overnight. This will require removal of the M8 wing nut for JdeMO equipped vehicles, or a 12mm or 13mm socket to remove the M8 hex nut. The cabin climate control will automatically go to OFF with any battery disconnect

5) Unplug any charging cables. Then, let the vehicle sit for 8 hours, usually overnight

6) ***** the next day ****** Reconnect 12 volt battery. You should hear a spark when it is reconnected

7) Hold foot on brake and press START button with key fob nearby

8) Energy "fuel" gauge will show Full (16 illuminated segments) and "LO" on the GOM. You GOM should be reset.

9) Wait for the navigation unit to complete its start-up (about 20 seconds)

10) Press the START with brake pedal depressed a second time. You will hear a clunk of the main battery contactors under the front passenger seat and the dash should indicate "READY". The cabin climate control must remain off. If it was not off, there was some issue prior to this step (likely the 12 volt battery wasn't properly disconnected).

11) The displayed range is "RATED RANGE" at 3.75 miles (6 km) per kWh

12) Divide this Rated Range by 150 miles (240 km) to get usable battery capacity compared to new

    Example: 120 default rated range divided into 150 equals 80% battery capacity from when new

    Math: 120 / 150 = 0.80

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ADDITIONAL RANGE TEST - DRIVING:

If you drive the RAV4 EV at my standard test speed of 100km / 62mph ground speed, it will go almost EXACTLY the rated range.

TEST DRIVING PROTOCOL –

a. use a dry, hard surface level road
b. with no significant elevation changes, using an “out-and-back" or loop course to compensate for any wind
c. must start and stop at the same elevation
d. no significant winds
e. no cabin climate control
f. the main traction High Voltage battery at about 77F / 25C, however slightly warmer is ok.
g. drive at 62mph / 100km/h GROUND speed as measured by GPS using the cruise control
h. DO NOT USE “B” mode, since the cruise control won’t work, and no attempt is made to measure regeneration. This is a range test

When the car was new, it would complete about 150 miles (240 km) and the rated range will be about 150 (240) under the prescribed conditions.

If the TONY-TEST rated range is 135 (216 km), it will go about 135 miles (216 km) in the same prescribed parameters.

ADJUSTMENTS REQUIRED AFTER 12 VOLT DISCONNECT:

1) Cabin climate control is OFF. Make any appropriate settings

2) Stored radio / SiriusXM stations will remain, however your last station listened to will likely be gone

3) Cell phone pairings are not 100%. You may have to delete your phone (and the RAV4 from your phone) and re-pair them

4) Map display mode may need changes

5) Volume of navigation voice notifications goes to the default setting

6) Random play modes is eliminated, if it was selected

7) The programmed charging schedule will be retained, but it won't work without pressing the "SAVE" button on the previous screen. Check the programmed settings first, then go back to the previous page to press SAVE. It won't save the data any other way, and the car will default to “CHARGE IMMEDIATELY” without pressing SAVE.

8) Select the proper US State or Canadian Province selection from Destination address page

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