

# A "Fuel Gauge" for lithium battery packs

by Rex Geivett

My curiosity regarding lithium batteries led me to do some research. I discovered that the open circuit (no load) voltage is an accurate measurement of the capacity remaining in a partially discharged pack (as after a flight). This is a unique characteristic of lithium technology and will not work with NiCd and NiMH cells. I developed the chart shown below for Li-Poly batteries after testing several packs at various states of charge and believe it to be accurate for its intended use, that is act as a "fuel gauge" to determine if sufficient capacity remains to safely fly another flight.

The chart below can be used directly for 2S, 3S and 4S packs. For five or more series packs, simply add the appropriate columns. For example, a 5S pack would read about 19.2 V at ½ full (7.7 + 11.5).

An accurate digital voltmeter will result in a close approximation of remaining capacity. As an example, your 3S pack reads 11.4 volts. The chart shows you have a little less than one half capacity remaining.

<b>2S</b>	<b>3S</b>	<b>4S</b>	<b>Capacity</b>
<u>Volts</u>	<u>Volts</u>	<u>Volts</u>	<u>Remaining</u>
8.1	12.2	16.3	FULL
7.9	11.8	15.7	3/4
7.7	11.5	15.3	1/2
7.5	11.25	15.0	1/4
7.3	11.0	14.7	EMPTY

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Notes:

- 1) Chargers normally stop charging at 4.2 volts per series cell.
- 2) ESCs normally shut motor off at 3 volts per series cell.