Quick Analysis of Battery Types for Portable Radio Operation
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http://www.charlespreston.net/batteryop/Quick-Analysis-of-Battery-Types.pdf

Comparing battery types as different as LiFePO4 (A123 battery packs from HF Projects) and lead acid AGM batteries from Odyssey or Power-Sonic seems like comparing apples and oranges. They differ enough in cost, weight, capacity and lifespan that I was having difficulty deciding where to spend any battery money that was available to spend.

The lead acid AGM batteries by Odyssey are only somewhat like the car or marine batteries of the past 40 years. They still weigh about one pound per Ampere hour (Ah). They don't leak, they can be shipped by air or mail, they can be deep discharged to 80% of their capacity 400 times, they retain a charge for months, and they can be recharged in 0.5 - 3.0 hours, depending on size. They aren't ruined by leaving them in a discharged state.

Power-Sonic PSH or other high discharge rate lead acid AGM batteries do not have all the advantages of the Odyssey series, but are much less expensive than Odyssey or LiFePO4.

If you have a radio like the Yaesu FT-817ND, or Icom IC-703 Plus, that will work with lead acid battery voltages down to about 11 VDC, you can avoid the cost and weight penalty of a DC-DC converter to produce 13.8 VDC. If not, the additional cost and power inefficiency of a converter with lead acid batteries make LiFePO4 battery packs more competitive. For information transceiver efficiency and on how some HF transceivers behave on battery power, see http://www.charlespreston.net/batteryop/HF-Transceivers-and-Battery-Operation.pdf . I'm not considering the option of adding a single lead acid cell in series to get about 13 VDC because of extra weight, and inability to match cell types to the high discharge cells in Power-Sonic and Odyssey batteries.

Since the initial cost of an LiFePO4 battery pack is very high, does its long cycle life of 1000 (about 2.5 times longer than lead acid under deep discharge conditions) help the cost issue? If money were not a factor, its weight of about 1/3 that of lead acid, and some other characteristics would make it an easy top choice.

One possible disadvantage of LiFePO4 and other Li-ion batteries for emergency use is that they use integrated circuits for balancing, and charge and discharge control, to make them work better and improve safety. This probably makes them more susceptible to large electromagnetic pulses. There are rumors of hand grenade size EMP generators, and there has been a lot of military, and perhaps terrorist, interest in producing EMP without nuclear weapons, to disable computers and communications. Regional emergency communications centers could be targeted. If EMP is a consideration, standby Li-ion/LiFePO4 batteries as well as radios and computers would need to be disconnected and shielded.

Here are several comparison points I'm using. The figures after the decimal points are used for uniformity, and because omitting the .5 in the 3.5 Ah for the PSH-1280F2-FR would make the results less accurate. In other words, the figures are approximate, and intended to be accurate enough for a useful comparison.

Effective capacity in Ampere hours (Ah) or Watt hours (Wh)
This assumes that normal use of the battery will require deep discharge either because you will always have less battery capacity than you need, or because you have to make the most of each pound carried. Deep discharge for Odyssey batteries like the PC1750 or PC310P is 80%, for a life of 400 charge/discharge cycles. For Power-Sonic high discharge, like a PSH-1280F2-FR, deep discharge must be limited to 50% to get 400 cycles. When you carry the 6 pounds of this battery, you really have only about 3.5 Ah to use at a 2 A rate, not the 8.5 Ah listed on the battery. A drawback to over-discharging cheap batteries, and replacing them, is they may fail at a time when you can't replace them.

Odyssey PC1750	52.0 Ah	598.0 Wh
Odyssey PC310P	5.0 Ah	57.5 Wh
PSH-1280F2-FR	3.5 Ah	40.3 Wh
HFP 12 LiFePO4	6.0 Ah	75.0 Wh

Ah or Wh per dollar of initial cost
This is the cost of using the battery by taking the total effective Ah or Wh available throughout the expected lifespan divided by the cost.

Odyssey PC1750	69 Ah/$	797 Wh/$
Odyssey PC310P	12 Ah/$	134 Wh/$
PSH-1280F2-FR	49 Ah/$	564 Wh/$
HFP 12 LiFePO4	22 Ah/$	274 Wh/$

Wh per pound of battery
This is the effective capacity available for a single discharge cycle divided by the weight.

Odyssey PC1750	10 Wh/lb
Odyssey PC310P	10 Wh/lb
PSH-1280F2-FR	7 Wh/lb
HFP 12 LiFePO4	25 Wh/lb

These figures seem to confirm what might be intuitively obvious to some people.

1. For extended use where weight isn't a factor, there is an overwhelming cost advantage for the Odyssey PC1750, while retaining fast recharge and other excellent specifications.

2. For use with a low power radio or short operating time where weight is important, the LiFePO4 isn't nearly as expensive as it seems at first, if you consider the cost of available Wh over its extended lifespan. For example, it is less expensive to operate than the heavier Odyssey PC310P.

3. If low initial cost or operating cost is the most important, in the small battery class, the PSH-1280F2-FR is the winner.

There are many factors to consider in choosing the right battery for a set of conditions. For example, both lead acid AGM and LiFePO4 batteries require more than a cheap car battery charger to avoid ruining them. For large AGM batteries, prices range from an Odyssey 25 A charger for around $150, to a Deltran 20 A plus 20 A charger for around $500. An advantage of the Deltran is that it can be used with a single Odyssey battery to charge at 40 A. If there is a limited generator fuel supply in an extended emergency, short charging times are important.

If you can afford to get the benefit of a high initial battery cost spread over months of use you can get a much better portable battery than even one year ago.

Perhaps these or other measurements that people suggest will help to clarify how battery money can be spent for the best results.

http://www.odysseyfactory.com/batteries.html
http://www.hfprojectsyahoo.com/powerpack.html
http://www.powersonic.com/index.php?id=31&gr_id=3
http://batterytender.com/default.php?cPath=11_8