

# How long will my battery last?

Calculating how long your HT battery pack will run during an event is a question that comes up frequently. The calculations are linear with available data. However, how to estimate the data is the puzzle.

The three conditions of battery drain to consider are: radio squelched; with received audio; and transmitting. These values are usually found in the radio user's manual.

Here is an example using a Yaesu VX-150 running for eight hours set at two watts transmit power:

Function	Duty cycle	Hours			Drain		Total
Squelched <sup>1</sup>	50%	*	8	*	.052A	=	0.208 Ahr
Receive	40%	*	8	*	.130A	=	0.416 Ahr
Transmit	10%	*	8	*	.800A	=	0.640 Ahr
<sup>1</sup> with battery saver mode on 1:1							1.264 Ahr

Now where did those duty cycle percentages come from? An estimate based on a typical event time line. During set up, stations are checking in and there is some reporting going on, but at a low level. Once the event gets underway and more stations have items to report, the receive time increases. The transmit time is low because other than checking in and giving status reports you are not transmitting. If your station does have a lot of activity, you will be transmitting more. But 10% of eight hours is talking continuously for 48 minutes! Hey, other people need water. Or six minutes out of every hour. Additionally if you are at a station with much activity, others will be with you, using their radios to transmit, reducing your duty cycle. Now in order to be conservative, you want to double this estimate. For an eight hour event at two watts, you need 2.5 Ahr of battery capacity. The standard battery that came with the radio plus an extra high capacity pack will get you close to this number. Above this, consider gelled battery packs, or a manufactured assembly.

Capacity measurements are based on a ten or twenty hour rate also termed C/10 or C/20. Going above that rate will cause some loss in apparent capacity due to internal IR drops. Typically at the 1C rate, a loss of 40% is experienced. So, a one Ampere Hour battery will only appear to give .60 Ampere Hour.

Other considerations include - do you need to run other power levels? Which type of cells are you using? If you run alkaline cells your radio will receive long after there is enough current to transmit with. This is due to the higher internal resistance compared to NiCds. Nickel Cadmiums and Nickel Metal Hydride rechargeable cells have a flat voltage discharge curve, but then drop off real fast. One transmission may be fine, but next will not happen. Lead Acid cells have a very linear slope that the user can check the voltage to determine remaining capacity. As cells age, capacity is also lost.

Newer radios have a battery saver mode that allows lower average receive current. But if you get carried away with a high ratio, you may miss the first part of transmissions. The use of headphones will allow less current drain instead of powering the speaker.

See <<http://cpsg.amateur-radio.net/>> for a multi level list of recommended items for Public Service Events.

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