

# **Battery Calculations for CaberLight LED Display Lights**

**Rev. 1.4 June 2018**

Battery voltage: **12 VDC** (*Volts Direct Current*)

Current draw per light:

*LadyBug* (older design; now out of production) 600mA (0.6 Amp)

*Super LadyBug, LadyBug II, or DragonFly* 1200 mA (1.2 Amp)

Battery charge life is the length of time the battery can run (hours) based on the amount of Battery Charge (in Amp-hours) and the current draw (Amps.)

Current Draw = (Number of lights x current draw per light)

(This is how much juice is needed to run the lights.)

Battery Charge Life = (Battery Charge)/(Current Draw)

(This is the most important number: It's how long the battery can run the lights hooked up to it.)

## **Lithium-ion Rechargeable battery**

This is the best and most economical lithium-ion battery we've been able to find. Several customers are using these batteries now to run their CaberLight lights at shows. Each TalentCell rechargeable battery referred to here comes with its own charger and the wiring needed for running 2 lights.

<https://www.amazon.com/TalentCell-Rechargeable-11000mAh-14500mAh-26400mAh/dp/B016BJCRUO>

### **Example 1**

1 *Ladybug*

Current draw =  $1 \times 0.6A = 0.6A$

Battery Charge = 11 Amp-hour (*11000 mAmp-hour*) Talentcell Lithium-ion battery (from Amazon)

Battery Charge Life = (Battery Charge)/(Current Draw) =  $11 \text{ Amp-hour} / 0.6\text{Amp} = \mathbf{18.3 \text{ hours.}}$

### **Example 2**

1 *Super LadyBug, LadyBug II, or DragonFly* (or 2 old *LadyBugs*)

Current Draw = **1.2 Amps**

Battery Charge = 11 Amp-hour (*11000 mAmp-hour*) Talentcell Lithium-ion battery (from Amazon)

Battery Charge Life = (Battery Charge)/(Current Draw) =  $11 \text{ Amp-hour} / 1.2 \text{ Amp} = \mathbf{9.2 \text{ hours.}}$

## **Flying with Lithium-ion batteries:**

Here's a link from the FAA discussing carrying lithium batteries on airliners:

[https://www.faa.gov/about/initiatives/hazmat\\_safety/more\\_info/?hazmat=7](https://www.faa.gov/about/initiatives/hazmat_safety/more_info/?hazmat=7)

Batteries must be carried in carry-on and *not* in checked baggage. At this time, the largest capacity battery allowed in your carryon is 160 Watt-hours. The lithium-ion battery in the earlier link from Amazon has 132 Watt-hours capacity.

## **Multiple Batteries:**

If you have more lights or longer shows than the charge of a single battery can provide, multiple batteries can be used, changing the battery when the light starts to dim. Having a charged-up backup battery at the show is a good idea in case one of yours didn't get a full charge the previous night.

## **The Future**

As higher capacity and lower cost lithium-ion batteries become available and we are able to test them, we will update this information sheet.

## Lead-acid car/marine batteries

A 50 Amp-hour is a *small* car battery and is used here in the examples. Bigger batteries usually have between 80 and 120 Amp-hour capacities. *Lead-acid batteries are prohibited from being carried on airlines.*

If you're using your battery for just a few shows each year, a car battery should be fine. But if you're doing a show every week or two, a *marine deep discharge* battery is a better fit since it's designed to be fully discharged and recharged without wearing out.

### Example 3

2 Super LadyBugs (1.2 Amps each)

Current Draw = (2x 1.2 Amps) = **2.4 Amps**

Battery Charge = 50 Amp-hour\* (*A small car battery*)

Battery Charge Life = (Battery Charge)/(Current Draw) = 50 Amp-hour/2.4 Amps = **20.8 hours**

### Example 4

4 Ladybugs (0.6 Amps each)

1 Super LadyBug (1.2 Amps)

Current Draw = (4 x 0.6 Amps) + 1.2 Amps = **3.6 Amps**

Battery Charge = 50 Amp-hour\* (*A small car battery*)

Battery Charge Life = (Battery Charge)/(Current Draw) = 50 Amp-hour/3.6 Amp = **13.9 hours**

### Example 5

4 Super LadyBugs (1.2 Amps)

Current Draw = (4 x 1.2 Amps) = **4.8 Amps**

Battery Charge = 50 Amp-hour\*

Battery Charge Life = (Battery Charge)/(Current Draw) = 50 Amp-hour/4.8 Amp = **10.4 hours**

\*Finding the **Amp-hour capacity** of the battery is important. It's not "**Cold Cranking Amps**" (CCA.) CCA is kind of like how fast a car can go 0 – 60mph. Amp-hour capacity is like the range of the car on one tank of gas.

For best results if you are doing many shows per year is to invest in a "deep discharge" battery, like a marine or golf-cart battery that is designed to be discharged thoroughly and recharged very often.

Regarding battery chargers, luckily they're smaller (and safer) than they used to be. The number of lights you're using and the number of hours they're run will make a difference in the size charger you'll need. If it's just 2 – 3 lights for an 8 hour show, a 2 Amp charger should work fine for an overnight charge. If you're running 6 Super LadyBugs for a 10 hour show, something like a 6 Amp charger would be needed for an overnight charge.

Here's an example of a typical charger that would work fine for either case. You can get them from Walmart, Amazon, or any auto parts store. Schumacher is a good brand, but there are many others, too.

[http://www.amazon.com/Schumacher-SE-82-6-Dual-Rate-Battery-Charger/dp/B00091BJBM/ref=sr\\_1\\_4?ie=UTF8&qid=1463520485&sr=8-4&keywords=battery+charger&refinements=p\\_89%3ABattery+Chargers|Schumacher](http://www.amazon.com/Schumacher-SE-82-6-Dual-Rate-Battery-Charger/dp/B00091BJBM/ref=sr_1_4?ie=UTF8&qid=1463520485&sr=8-4&keywords=battery+charger&refinements=p_89%3ABattery+Chargers|Schumacher)