

# 1. Getting Ready for Spring RC Laser Sailing - Electronics

Don Barker

[dbarker@calce.umd.edu](mailto:dbarker@calce.umd.edu)

(301)807-4489 cell

The spring sailing season is just around the corner. Now is the time to start thinking about getting ready, rather than the night before the first practice race. There is still plenty of time to order, or acquire new parts if you discover they are needed. You need to make sure that your boat, sails, and electronics are ready to go. This brief article will review some of the things you should do to insure that you don't get frustrated at the last minute. This is the first of two articles and deals with the electronics. The next article will deal with getting the boat itself ready for the season. I have tried to insert hyperlinks into the article so that you can go the source of what I am talking about or recommending.

## **RX & TX**

The weakest link in our boats is the electronics, particularly when they have been sitting unused for the last several months. The scourge of all rc sailors is corrosion of electronic connections. This corrosion is generally first noticed after periods of non-use. Now is the time to unplug all connections going into the receiver (RX) and the switch, if one is being used, and look for corrosion. Copper corrosion is typically green in color, but sometimes the negative bright copper wire can turn black – “black wire” corrosion. Black referring to the color of the corrosion as well as the black color of the insulation typically used for the negative wire in a dc circuit. If you see the green corrosion, you need to clean your connectors with a toothbrush or fine wire brush and something like [Corrosion-X](#). This applies to the connectors as well as the RX terminal pins. If you see signs of black wire corrosion or if the green corrosion is extensive, the servo plugs will need to be cut off and new plugs soldered in their place. This is not a big deal if you know how to do it. If you don't know how to do it, find someone who can do it for you. Don't forget to open up your transmitter (TX) and look carefully at the battery connections as well. For those using alkaline cells, take a pencil eraser to the terminals in the TX and RX battery holder.

When removing servo plugs from the RX, just remember which plug goes where and how the plug goes back together, i.e. the polarity of the plug. I plan to write a future article that will discuss this topic so that you can easily figure it out yourself. For now, most sailors will plug the sail servo into the first position on the RX (typically labeled THRO – throttle) and the rudder servo into the second position (typically labeled AILE – aileron). The battery can be plugged into any of the remaining locations. It does not have to be plugged into the BATT – battery position since all the RX positive pins are common as are all the negative pins.

## **Batteries and Chargers**

If you have not read my write-up on batteries, let me know and I will email you a copy. Briefly my recommendation to most sailors is to use AA alkaline batteries to power your RX and your TX. There is no performance advantage or disadvantage to using AA alkaline cells, but there is a tremendous convenience advantage to not have to worry about charging your batteries before sailing. Pay attention to Radio Shack sales. They regularly put their EnerCell® alkaline batteries on at half price. I commonly buy a 36 cell AA pack for around \$12 on sale. This is \$0.33 per cell, or \$1.33 for a 4 cell RX or TX pack. This is actually very economical when you realize that the cells easily last 2-3 or more sailing sessions. Note, don't waste your money on nationally advertised brands. All alkaline cells are basically the same. None have a performance advantage. Just pay attention to the battery expiration date. If you really want to keep batteries a long time when you find a great deal, store them in the freezer.

If you are using rechargeable battery packs. You need to periodically check their capacity. All rechargeable batteries have a finite life. As the batteries age, they loose capacity. They still charge up to the same voltage, but they cannot support a current draw as long as when they are new. This capacity is measured in units of current for a given period of time or milli-amp-hour (mAh). My personal rule of thumb is to discard packs after about two years. After two years I have found that packs can suddenly go bad and dramatically loose their capacity. You cannot measure this loss of capacity with a simple battery tester. A simple battery tester measures the battery voltage under a load. A simple battery tester that is testing an old battery pack may tell you that the battery pack is charged, but it will not tell you if it has the capacity to last through several races.

The only way to measure a pack capacity is with a battery charger with the function to cycle the battery (discharge to its minimum voltage and then charge it back up again) while monitoring the mAh being taken out of the pack and measuring the capacity being put back into the pack. To properly check a pack's capacity this discharge/charge cycle should be done about 3 times. After 3 cycles a pack will stabilize and you will get an accurate measure of its capacity. I typically cycle my packs a couple of times during a year and write down the date and capacity on a piece of tape attached to the pack. This way it is very easy to watch the pack slowly loosing its capacity and then you know when to stop using it as a "good" pack.

FYI, AA cells typically have a usable capacity of around 1800 mAh. Don't believe the advertising hype of cells having anything over 2000 mAh. (Battery manufacturers are well know to stretch the truth and commonly get their high capacities by taking their measurements with much smaller current levels than are seen in normal use.

During a typical evening of sailing, or a half-day of sailing, it is rare to use more than 500-800 mAh of capacity out of your battery pack. Thus you need to watch when

you recharge your pack that you are only putting back in about 500-800 mAh. If the numbers are different, you are being alerted to a potential problem.

I am buying my 5 cell NiMh battery packs from [Hobby King](#) for \$7.49 per pack, but the shipping costs almost as much as the pack. Thus I generally buy 3 or more packs at a time. For 4 packs the shipping is \$15, which works out, to be about \$12 total per pack. The only down side is that the shipping takes about 2 weeks to get here. Compare this for instance to [Cheap Battery Packs](#) , or [Tower Hobbies](#) where a 5 cell AA pack is going to cost you about \$25 not including shipping.

For a reasonably priced battery charger which has the capability to cycle (discharge/charge) your pack and that always monitors the capacity being put back in, I recommend the [Hobby King Turnigy Accucel -6 charger](#) bought from the USA warehouse for \$24.07 Buying from the US warehouse saves you on shipping as well as shipping being much faster. This charger can charge any type of battery (NiCd, NiMh, LiPo, LiFe, and Li-ion) that you may use, though with the current RC Laser rules we are currently limited to NiMh batteries for the RX. The only disadvantage of this charger is that it requires a 12v power supply when it is used on the bench or in the house. The charger actually accepts any voltage from 11 to 17v. If you don't have a 12v power supply, a good cheap source for a 12v power supply is the power supply in an old desktop or tower computer that is ready to be thrown out. If you are not a do-it-yourselfer and don't feel comfortable in tearing apart a computer you can buy relatively cheap power supplies. 12v power supplies are commonly sold to power automotive electronics that are not being used in the auto. Don't worry if it says 13.8v, that is the voltage of a car's electrical system when the engine is running. [Hobby King](#) has a power supply that will work with this charger for \$13.99, but it is only available from the Hong Kong warehouse where the shipping will be about \$15 additional. It is cheaper to go onto eBay where you can find 12v 5-10A power supplies ranging from about \$9 to \$20. With some of these power supplies from eBay you will need to do some wiring to attach a power cord to the wall outlet as well as to the charger. Don't worry, I can guide you and help you. Don't go to Radio Shack for a power supply, they will charge you \$50-100. If you want a charger that is capable of using either house hold a/c current as well as 12v d/c current I recommend the [NeuEnergy X6 charger](#) for \$69.95. This is the charger that several of us use while traveling to regattas so we can charge in the car and in the motel room.

I have helped Oxford fleet mates Roger V, Roger B, and Dave B set up these chargers. I have had them cut off the male end of the [Radio Shack 12v power extension cord](#) and wire it to the power cord going to the charger. This way they can use the battery charger while in the car on the way or at the sailing site. At home the female end of the extension cord is hooked up to the 12V power supply so they can use the charger on the bench.

The charger also does not come with the proper cords that have the end plugs we want to charge our battery packs. Don't worry; it is simple to make the proper cords. I can help you and will be writing another article on the best plugs to use on battery

packs. CAUTION, the servo plugs that come on the battery packs and the plugs that come default on the RC Laser are not designed for many cycles of plug/unplug. After time the gold plating is scraped off and the plugs become very susceptible to corrosion, particularly around brackish water. There are better and more reliable plugs that are also very inexpensive.

## **Conclusion**

Remember the only dumb question is the one not asked. I am here to help you. Just email me or ask me when you see me.

Here are my ideas for upcoming articles. Let me know what you think.

1. Getting ready for spring sailing – the boat itself
2. Placement of RX in boat and how to optimize signal strength, or don't be the one to need to be rescued by the crash boat
3. RX, which plug goes where and why
4. Upgrading your TX and new cheap alternatives to Spektrum RX's
  - a. There are new & cheap options for sophisticated TX's & RX's
  - b. Why do you want one of these sophisticated computer TX's for RC Laser racing, or why I have an advantage on the course and you don't.
5. Upgrading your battery connection plugs for reliability
6. Racing Rules of Sailing (RRS) and strategy.