Batteries MAY 2018

This is a guide only, it is your responsibility to research all information and determine what you do.

There is no sense writing anything when so much info is available on line, so one link for each type of battery is provided below, have a look, also find and look at the many websites that offer information, there are many that provide all sorts of info and handy hints. A lot of what you find will most likely read slightly differently so exercise some caution.

A selection which I would pick as the common batteries we would use are;

Alkaline - Zinc metal and Manganese Dioxide, AA size.
1.5Volt/cell, capacity may depend on the load, throw away, not rechargeable.
https://en.wikipedia.org/wiki/Alkaline_battery

NiCad - Nickel Cadmium, AA size.
1.2 Volt/cell, varying capacity, rechargeable.
https://en.wikipedia.org/wiki/Nickel%E2%80%93cadmium_battery.

NiMH - Nickel Metal hydride, AA size.
1.2 Volt, varying capacity, rechargeable.
https://en.wikipedia.org/wiki/Nickel%E2%80%93metal_hydride_battery

LiPo - Lithium Polymer, various sizes. (voltage drops with discharge.)
Nominal 3.7 Volt/cell, multiple cells give varying capacity packs, rechargeable.
https://en.wikipedia.org/wiki/Lithium_polymer_battery

LiFePO or LiFe or LFP - Lithium Ferrophosphate, various sizes. (voltage does not drop with discharge.)
Nominal 3.2 Volt/Cell, multiple cells give varying capacity packs, rechargeable.
https://en.wikipedia.org/wiki/Lithium_iron_phosphate_battery

NiMH, NiCad, Alkaline.
A 5 cell 7.2V Alkaline pack may weigh about 130 grams plus. These cannot be recharged and are single use.
A 5 cell 6.0V pack of NiMH or NiCads may weigh 150 to 160 grams and are at their best using a specialized automated charger.
NiCad and NiMH don't need much TLC but do need some to get optimum performance, i.e. power and life.
A bit of an issue is many may have boat and or transmitter batteries (NiCad or NiMH) arranged in a welded heat-shrunk pack, this brings up the issue of a cell failure within the pack. When that happens, the whole pack will be compromised and any automated charging system will probably be dictated to by the bad cell(s).
Those that charge individual cells or have single cells in various sized pack holders don't have this problem.
Commercially made packs off the shelf or packs made for you are readily available, sometimes not cheap, have a good look around, prices vary and sometimes overseas offer good prices. (The recycling places often have good salvaged ones for sale). You can assemble your own battery packs but the heat from soldering will most likely cause damage.
Choose the NiCad – NiMH capacity carefully, a high capacity battery will take longer to charge compared to a lower capacity battery but may not give you a real benefit, what do you need and what to choose?

LiPo, LiFePo.

For (roughly) the equivalent voltage these batteries are generally lighter than NiCads, NiMH or Alkaline's.
They have numerous options available of voltage, capacity and size.
They do need TLC, are susceptible to damage or lack of care and when they go poof, they go poof good!!
They need a specialized charger.
They should have safe storage and charging containers.
Cells should be kept balanced, this does give better performance and hopefully a longer life. Balancing means keeping each of the cells at as close to the same voltage as possible. The cells do become unbalanced and left in this state may compromise the battery. This is not as critical for our use in boating as it is with other RC hobbies requiring consistency and high performance but still, don't under estimate its importance).

Summary.

I think you will find the specs for winches, servos and transmitters will show their current drain that will assist but not dictate in your choice. Some transmitters can have a substantial drain, others not so. Get a higher capacity than you need, it's possibly the availability that will dictate the capacity you get anyway.
Do a bit of work before you commit to buying and make sure the plugs and sockets you use and may get, will handle what you intend to do and you can support you in the future, also think what others are using and the option to swap and help should something go wrong.

Charging.

Your charger is more important than your battery(s), I suggest you buy prudently, skimping or buying cheap on this device may not be wise. If you get a 12V charger don't skimp on the power supply either.

Some chargers are for;
Lithium based batteries, LiPo's & LiFe.
OR NiCad and or NiMH only.
OR will do all the above as well as PB's, (Lead Acid) so if you're using a LiPo or LiFe in the boat and NiCad's or NiMH's in your transmitter, this type of charger has to be very handy.

Types chargers are available for LiPos and LiFe's;

1 - One that will charge through the main lead and balances the cells separately via "balancing leads". This is the most common type, programmable, automated, self contained, fast and efficient and more often than not have built in safety features.

2 - One that will charge solely through the balance lead, balancing and charging in one. They are automated and reasonably common. Generally a little slower as the balancing leads may not have the capacity to take a high charge rate, many are non programmable and charge at a predetermined rate. Only a few of these have all the safety features like the top group, (1)

3 – One that just delivers a straight charge through the main lead and does not balance the cells They are generally automated, non programmable and not all that common. It would be advisable to have an additional balancing device if you use this type. They may lack safety factors other charger have.

Types chargers are available for NiCad and NiMH

1 - There are many, that do single or multiple single cells and various multi cell configurations. They are very common and I have not heard of any major issues.

The majority of modern chargers in the modelling world will do NiCads, NiMH, LiPo, LiFe and PB's.
They are most often automated and importantly most would have built in safety features.

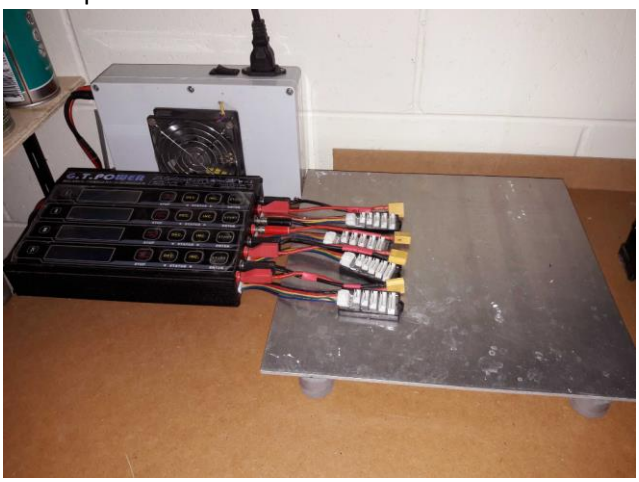
If you're looking for a charger maybe consider a bit of luxury, look at dual charger so you can charge both the model and transmitter packs at the same time, many or all dual (multi port) chargers will charge cells of different chemistries in each ports at the same time, maybe even two chargers is an option. (also see note at the end)
If you get a multipurpose charger, I suggest you choose one that will;
For NicCads and NiMH, charge, discharge and cycle, has a heat sensor and time out function.
For LiPo & LiFe, charge, balance charge, discharge, store, has a heat sensor and time out function.

Chargers are available either 240V or 12V, some do 240V and 12V. Some of the multi volt ones may come with a power pack others may not. (12V may means 11 – 18V).
The 240V ones may need to be adapted to NZ plugs if you buy overseas, make sure you get what can be used here.

I prefer to charge LiPo's at the same rating as the battery, i.e. an 1800mAh battery gets charged at 1800mAh, A 1300mAh battery gets charged at 1300mAh etc, the common term for this is 1C. Some can be charged at 2C or greater, you need to research the battery details. I am happy to charge at 1C where it takes as long as it does and that's less than an hour anyway. You can also charge at less than 1C quite safely, it just takes longer.
I prefer to charge NiCads and NiMH at 500 to 600 mAh, they don't get too warm.

Safety.

Charging.
For whatever reason you have the battery connected to the charger, do the best you can to ensure you can contain the results of a catastrophic failure if one happens.
Avoid charging in confined places, i.e. in the model or in the transmitter, this is my opinion only and goes for all batteries.
When a battery is charging, always check the progress, do not leave them on the charger (working or not). If you vacate the premises, TURN EVERYTHING OFF AND PUT THE BATTERIES AWAY.
Next to my charger, I have a 4mm aluminium plate isolated from the work bench and this is what batteries of any type rest on when charging, discharging, cycling or storing. I have an old cut down electric frypan lid covering the whole platform.




For your own safety I can only strongly suggest you use the time out and heat sensor features. Time out should come in the charger firmware and cost nothing, a heat sensor, I think less than $NZ20.

Storage.
Store them in a container that can withstand a failure, the more batteries you have the more sturdy the container you may want.
I store all batteries in an ammunition box, the majority of the time this box is in a cool place and has the lid shut tight (but confess I am not perfect).

Disposal
Alkaline batteries can be recycled. Do some homework and find where you can take them rather than throw them in the bin, please deal with them responsibly. Consider going to rechargeable ones.
NiCads or NiMH can be recycled. There are various recycling places. Do some homework and find a place that is local where they can be safely disposed of, I have discharged them fully before recycling.
LiPo and LiFe batteries need discharging back to zero volts first, preferably by using something that will drain them as much as possible, (maybe an LED, small electric motor?), check the voltage and if zero, strip the positive and negative wires and twist them together to short circuit the battery and prevent any charge build up. While doing all this keep them in a bucket of dirt or sand. Leave them for a few days even after you've twisted the wires together and find a disposal / recycling place that can take them, again, please deal with them responsibly.
The other method I have used is to discharge the battery on the charger, drop the battery in salt water (sea water is cheap!), watch it fizz and bubble, leave it for a good few weeks, check the voltage and if zero, strip the positive and negative wires and twist them together to short circuit the battery and prevent any charge build up and find a disposal / recycling place that can take them, yet again, please deal with them responsibly.

General battery recycling

https://www.good.net.nz/article/how-dispose-your-batteries
Research your local area on line, **PLEASE don't just bin them**

Ministry of the Environment website
http://www.mfe.govt.nz/publications/waste/waste-electrical-and-electronic-equipment-guidance-collection-reuse-and-recycli-5
Don't laugh, it is about recycling **"WEEE".** (The full term **Waste, Electrical and Electronic Equipment)**

Conclusion

Whatever batteries you have and use, look after them, treat them with respect and when at the end of their life, dispose of them properly.

Handy hint.

The need for you to be limited to a "low voltage or matching voltage" power pack for the model (boat) has gone, there are ways to allow you to use a power supply greater than what your electronics can take very, i.e. with a 12V liPo, there are simple ways that allow you to use it in your boat and safe guard your electronics and perhaps even improve the boat.
I use a 7.2V (2S) 1300mAh 20C LiPo battery in the boat and a 3.7V 4000mAh LiPo or 2600MAh NiMH in the transmitter and all last me comfortably.

We all have different power supplies and available voltage & use them in different ways in our boats. Regardless of how you power the receiver, winch and rudder servo you may not be aware of just what voltage is going to them. Even with components powered from the receiver, same situation applies, some receivers pass the voltage straight through, others may reduce it.

You may be over supplying your components, affecting their life span or under powering them and not getting the best performance.

Check what voltage your receiver can take.
Check what voltage all your components can take.
Check what voltage your receiver puts out.
Check what voltage your components get.

The receiver is the most important part but doesn't necessarily contribute to the boats performance, both winch and rudder servo can make or break the boat and should operate at their best, most will consider their winch performance but the rudder servo is most often overlooked, it's just a servo! The servo is a pretty important factor for the Canterbury J Class where the rudder pivots at the leading edge and one that lacks torque and speed due to low voltage might be letting you down, (similar story with the winch). Most servos develop their maximum performance at 6.0 volts (some at 7.2 volts and a few even higher, but nearly all will **not** do their best at less than 5.0 volts. The speed may not be all that important or vary between servos but may help, but the torque is, that is the indication of the servo's ability to push the rudder out and or hold it out.

A FUTABA S3003 servo,
L 39mm – H 36mm – W 20mm, weight 37 grams.
At 4.8V gives 3.17KG/CM torque & rotates 60 degrees in 0.23 seconds.
At 6.0V gives 4.10KG/CM torque & rotates 60 degrees in 0.19 seconds.
An example of another brand of standard servo,
L 32mm – H 31mm – W 16mm, weight 29 grams.
At 4.8V gives 5.5KG/CM torque & rotates 60 degrees in 0.22 seconds.
At 6.0V gives 6.5KG/CM torque & rotates 60 degrees in 0.18 seconds.
An example of a metal gear mini servo,
L 27mm – H 37mm – W 13mm, weight 16.5 grams.
At 4.8V gives 4.2KG/CM torque (no load) rotates 60 degrees in 0.15 seconds
At 6.0V gives 4.7KG/CM torque (no load) rotates 60 degrees in 0.13 seconds

These examples might give you an indication of some of the servos that are available and these are only a few of them. Check the details of your servo & compare it with these.
Use this site for checking your servo specifications.
https://servodatabase.com/

If you want some help, just ask, happy to help. (I usually carry with me a voltage indicator that will plug into receivers and Futaba/JR type servo sockets & plugs).

For those of you who like a spare lipo boat battery, an alternative is to use a parallel charge board which work off the single port chargers, not something I have tried but have seen working OK, research and decide for yourself first. Many RC supply shops have them both NZ and overseas. (I prefer the a multi port charger to this idea).
Have a look here
https://www.rcgroups.com/forums/showthread.php?932319-On-the-topic-of-parallel-charging-of-Lixx-PB-packs

Parallel charge board picture
Leon