



**Federation of Model
Engineering Societies**

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Batteries, Motor Size, Access and deck design

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Sundowner – 7

I spent a little time thinking about what else should be thought of 'under the deck' as after I fitted this, I will have only 'keyhole' access via the hatches and cabin/wheelhouse holes. These are quite large in some respects, but another 'sleep on it' activity was required. I thought therefore I had better plan out a few things including how will the motor, the battery and the RC gear be mounted in the hull and how easy will it be to install, remove and maintain these afterwards?

In order of easiest first, the battery I had already decided would be forward of the motor as I suspected that I needed weight/ballast in the bow half of the hull. I thought that the battery would probably be a 12v, 7 or 10amp/hour lead acid battery and these are generally standard sizes, so I needed a platform to place it on, with access later to add some sort of hold down strap. To assist this, I had added some wood thickeners to the relevant frames during the hull build, but it was no use gluing the platform in place as I just know that if I did this, I will need access under it to add more ballast later, so the platform had to be easily removable after everything was built. This platform therefore comprised a plywood board that is pushed into place under a fixed attachment in the bow (where I will not be able to get at it later) and bolted at the rear end (under the forward hatch) with M4 studs epoxied into the frames. I also spent a little time with a cardboard battery of the right size to make sure I could get it in and out through the hatch. It goes in with a reasonable clearance, and maybe even go up a size in battery if required.

The RC gear I anticipate mounting inside a water-resistant box (in my youth, I used plastic food boxes for this) with only wires coming out of it. This is possible because the motor controller is via wires, and the rudder servo is mounted in the stern, and will probably be a water resistant one in case. My sandwich box goes in OK through the cabin opening, although I may make a purpose box for it in due course (and modern equipment is much smaller than 40 years ago!). Another platform is required, and that needs to be removeable as for the battery one, this time mounted under the rear hatch. A similar arrangement was made for this.

The most thought-provoking item is of course the motor. This is the first time I have made an electric boat and had no real idea of how to size the motor for this model. I spent some time looking at options and forums and made a few conclusions: I needed a 20 to 35W motor running quite slowly with a lot of torque to swing a large prop. Most motors seem to work most efficiently at upwards of 6000 RPM and this is a lot for a 60mm propeller. The '500' size motor (around 20W) can be bought with a gearbox and I was tending towards this until I read that around 3 Watts per kg was required for this sort of displacement hull. My best guess of the weight of this boat (based on an estimate of the water displaced to get it to the waterline) meant a motor of 20w was at the low end and I reluctantly decided

to use a larger motor. I have acquired a slower running '800' series motor (MFA 'Torpedo' 800, photo but not mounted where it is required!) which, it appears, has an efficient load speed of around 4000 RPM and a maximum power of 38W, but cannot be bought with an integral gearbox. It rather looks like I am going to have to make a 2:1 reduction gear set (more on this later) as I think around 2000RPM would be appropriate at the propeller. The rub is that if the motor is not operating at an efficient speed, it will run hot with a corresponding impact on battery run time and motor life. The need to get the motor now was to measure it up and decide where and how it is to be mounted, plus of course an allowance for a gearbox. The larger motor is a bigger size and since my plan for the removeable cabin that is mounted over the motor is to make it a scale 'box' with furnishing as the prototype (it has big windows!), I need to get the motor overall height down enough to allow this space...this one seems to just fit, and making a gearbox may allow me to move it forwards to avoid the bottleneck. I have also ordered a set of gears, some rubber mounts to try to quieten it when mounted in the hull and a universal joint to connect it to the prop shaft (all part of measuring up).



There was more thought (and fewer pictures) this time, mainly because during this time I was waiting for the epoxy resin coat inside the hull to dry. Although I added more catalyst (I measured it more accurately this time!), it is still sluggish drying and this restricts what I can do to the hull. To illustrate this part, I cut out the front decking since it could be done without interfering with the hull insides! Note that it is not clamped except midships so it looks flat rather than match the slight compound curves of the deck. It is 1.5mm ply which I think will be enough and this does bend OK. The rear decking will follow and the 'keyhole' access is then via two hatches like the one in the picture, plus the wheelhouse opening, seen as a square at the bottom of the picture. It looks like a compact tunnel to do stuff inside!

