# Structures

The structure is built around a surplus two-hatch fiberglass kayak obtained from Craigslist.

## Dimensions

## Initial Condition

## Structural Additions

## Panel Mounting

## Keel

## Hatches

Deck over each cockpit and install this:

<http://www.jmsonline.net/boat-hardware/ventilation/hatches-and-accessories/bomar-inspection-hatch-4fw1326.htm>

## Accessory Mounting Arrangements

# Propulsion

Propulsion is provided by a Minn Kota Endura C2-30 12V electric trolling motor. See <https://docs.google.com/spreadsheets/d/1InIYZVhCP4nxBoPUhnIeGG7QbtK-sMKTjdIkPkHh7EY> for wiring information and <http://tufox.com/hobie/TrollingPerformance.html> for performance data on a similar motor.

Speed control is provided by a nine-position switch arrangement. This can be duplicated with a set of relays (schematic forthcoming) or through stepper/servo drive connected to the existing switch. I like the relays better; acceptable sized automotive-style relays are typically cheap on eBay.

# Steering

The Minn Kota is designed to be steered by rotating the shaft. The steering drag is adjustable, but defaults to very low. There not much plane area to it, so I suspect that wave loads will be correspondingly low.

Steering shall be through a cable arrangement. Cables will be attached from the quadrant driven by the steering motor to the quadrant or arm attached to the top of the motor steering shaft. Each side of the cable will have a turnbuckle to adjust tension. Both turnbuckles will be safety wired once set to prevent movement.

The top of the motor shaft has a bolt hole designed for bolting the head onto the shaft. This hole will be used to secure the aft steering quadrant.

Steering motion will be provided by a standard-size servo that’s IP67 rated (<http://www.servocity.com/html/hs-5646wp_servo.html>). This will be mated to a gear reduction unit designed to mount onto a flat plate (<http://www.servocity.com/html/spg400a-bm-cr_continuous_rotat.html>). Actobotics sells a 6” aluminum arm cut from beefy plate to round out the mechanism.

# Controls

The control system will consist of two elements -- a real time element that does low-level steering and power control and a high-level element that handles higher level navigation, ship to shore communications, and similar operations. These two elements will be mounted to a single motherboard that aggregates all computing functions on board.

## Real Time Element

This part will handle the following tasks:

* Steering a given magnetic heading
* Selecting the power setting that provides greatest range for the current charge conditions.
* Monitoring motor and steering gear health
* Monitoring battery & solar panel status
* Monitoring IMU & compass output

Intended hardware for this element is an Arduino Uno or equivalent board. It connects to the high level element via a 3.3V TTL serial link over the motherboard. All necessary interface electronics will be part of the motherboard.

## High Level Element

This part will handle the following tasks:

* Waypoint navigation
* Coordinating ship to shore communications
* Data logging
* GPS interface

## Motherboard

The motherboard provides the following functions:

* Mechanical support of real time and high level elements.
* Interconnect between real time and high level elements.
* IMU interface -- Adafruit 10-DoF IMU (https://www.adafruit.com/products/1604)
* GPS interface -- Adafruit GPS Breakout (<https://www.adafruit.com/products/746>)
* Steering servo interface
* Controls & accessory power supply

# Navigation

# Power

The power for the boat comes from a pair of 120W (rated) solar panels mounted on the top of the hull.[[1]](#footnote-0) These panels charge a pair of 12V (\*\*)Ah deep-cycle lead-acid batteries mounted in the forward compartment, via a (\*\*Myles, please fill this in\*\*) charger. The two batteries are wired in parallel to provide a single 12V bank of (\*\*)Ah.

## Motor Power

Power for the motor is drawn directly from the batteries via a 50A[[2]](#footnote-1) resettable fuse. The motor wiring from the battery is 12ga and goes from the battery to the fuse and then through the center bulkhead to the motor speed control.

## Controls Power

## Accessory Power

# Communications

## Onboard

## Main Network

## Emergency Backup/Locator

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1. Kindly loaned, along with the batteries and charger, by Myles Conley [↑](#footnote-ref-0)
2. Well, if I can find one --- the biggest I have found available so far is a 40A, which is probably good enough for our intended draw. Digikey lists a 50A in its catalog, but it is not in stock. [↑](#footnote-ref-1)