



AMOS Assembly Instructions

Revisions

1. January 20, 2022: Initial version.

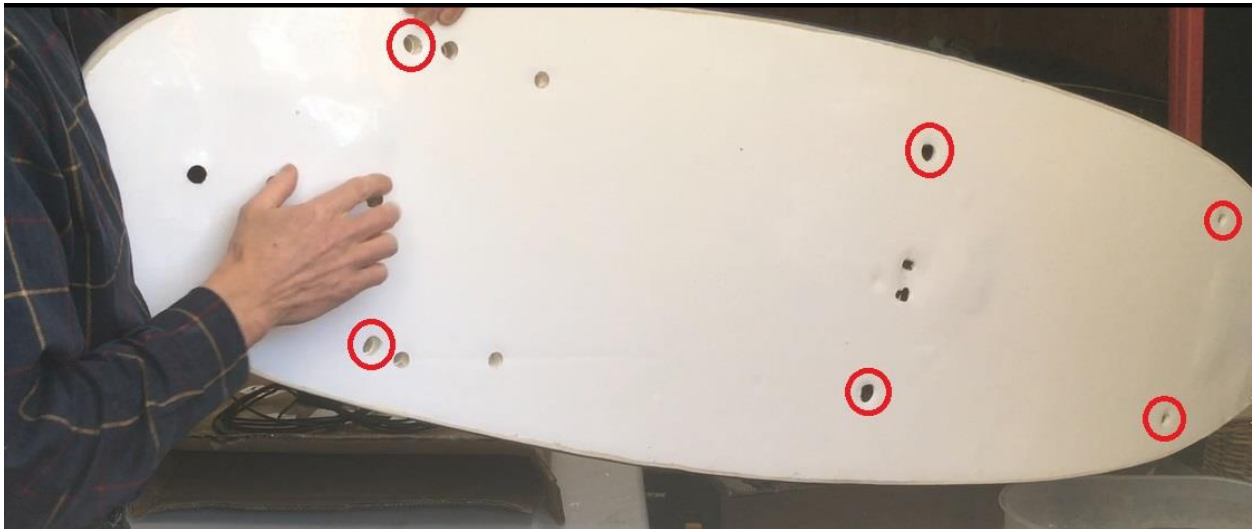
These step-by-step instructions should be followed for assembling an AMOS robot. YouTube videos of the assembly process can also be found [here](#).

1. Unpack the surfboard and attach required hardware

Remove the AMOS surfboard from its box. Also included in the surfboard box is a bag of connection hardware (bolts, mounting brackets, etc.) and a bag of surfboard fins which can optionally be attached to the back end of the surfboard.

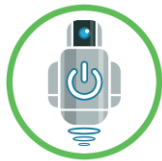
If a solar panel was purchased with the AMOS robot:

- a) Remove the six 16 cm long plastic brackets, four short plastic caps, and two long plastic caps, and six 6.5 cm long stainless-steel bolts from the bag.
- b) Use the bolts and end caps to attach the brackets to the top of the surfboard using the holes shown below:



Use the two long plastic caps for the holes in the middle portion, where the foam of the boat is a bit thicker. Do not over-tighten the bolts; they should be just tight enough so that it is possible to swing the brackets back and forth with a bit of resistance from the foam of the surfboard.

- c) Once finished attaching the brackets to the top of the surfboard, it should look like this:



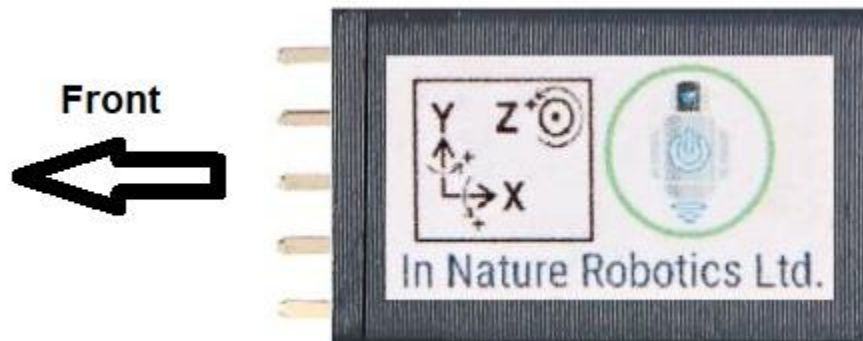
- d) Take the black, plastic square Humminbird bracket for holding the sonar transducer and place it “legs-down” through the two close-together holes near the middle of the boat.
- e) Take the black sonar transducer out of the AMOS Board Kit box. (It’s a wedge-shaped object, about the size of a hockey puck, with a long cable attached.) Thread the cable of the sonar transducer up through the larger of the two holes where the Humminbird bracket was inserted. It may be necessary to temporarily remove the Humminbird bracket to do this. Thread all the cable, except the part close to the transducer, through the hole. The pointed end of the transducer should be facing forward.
- f) Take out the two 2 cm diameter, 4 mm thick, black plastic spacers for use with the Humminbird bracket:



Position the spacers between the bracket and the transducer, making sure that the locking teeth of the spacers are appropriately matched to both the bracket and transducer. While together, slide the stainless-steel bolt with the hex hole in its top in through the hole made by the bracket, spacers, and transducer. Tighten one end of the bolt with the Allan key, and the other end of the bolt with the stainless-steel nut that has a small, white, plastic insert. Leave the sonar transducer cable on the top of the surfboard for now.

2. Insert the AMOS Board Kit boxes

Remove the two plastic AMOS Board Kit boxes and insert them into the cut-outs in the surfboard. The electronics box with the propeller attached to it should be placed in the cut-out at the back of the boat, with the propeller end of the box closest to the back end. The other electronics box is placed in the cut-out at the front of the boat, with the LiDAR module and / or camera module (if equipped with those) facing forward. The orientation sensor (AMOS-IMU) inside the front electronics box should be aligned so that the contact pins are pointing towards the front of the boat:



Push the boxes down as far as they can go. They will fit snugly in place. The cable junction box and the fish finder unit (if included) can also be inserted into their respective cut-outs at this time. When handling the electronics boxes, be careful not to damage any sensor probes that might be wired into them.

3. Bolt down the back servo motor

Open the back electronics box and take out the 4 M3 bolts and nuts and use them to secure the servo motor to the T-shaped holder (with 4 mounting holes) on top of the back electronics box. (NOTE: the hinges of the electronics boxes may come off during opening and closing of the lid. This



is normal, just be sure to snap the lid back onto the hinges before closing it.) Be sure that the air propeller cables are untwisted before securing the servo motor in place. The cables coming out of the servo motor should be facing toward the back of the boat.



4. Fishfinder units only: attach fish finder cables

For an AMOS system equipped with a fish finder for depth monitoring, the fish finder cables can be plugged in now.



Plug the power cable (two-contact cable) from the junction box to the two-pin socket on the back of the fish finder. Plug the serial cable from the front electronics box into the middle socket on the back of the fish finder and plug the transducer cable into the remaining socket.

5. Install the GPS Antenna

Take the GPS antenna out of the AMOS Board Kit box.



Take the aluminum GPS antenna mounting post, o-ring, and plastic locking nut out of the back electronics box. Insert the o-ring over the end of the mounting post with finer threads and insert that end into its corresponding hole in the back electronics box. Use the plastic locking nut on the inside of the box to tighten the mounting post in place. Once tightened, secure the GPS antenna to



the top of the post. Plug the GPS cable from the front electronics box into the BNC connector on the GPS antenna. There will typically be some extra length of GPS cable; this length can be wrapped around the GPS post a few times to take up the slack but ensure that it is well away from the arc of the air propeller.

6. Install the battery

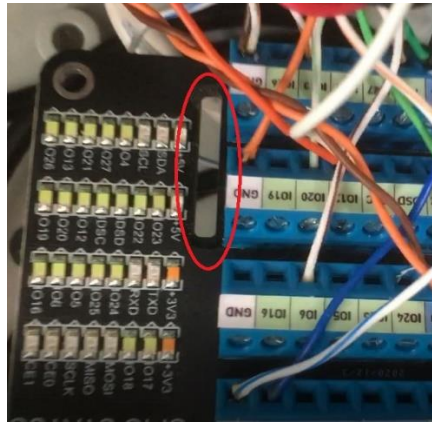
A 12 V 10 AH Dakota Lithium LiFePO₄ battery is recommended for use with AMOS. If you wish to use a different battery, please contact In Nature Robotics first. Velcro strips are provided with AMOS as an option for helping to secure the battery in place within the back electronics box. There are two wires with battery tab connectors inside the back electronics box that are connected to the solar charge controller. These wires are colored red and black and are labeled “+” and “-” respectively. They should be connected to the corresponding tabs of the battery. Once the battery is connected, a digital voltage (e.g. 13.0 V) should be displayed on the solar charge controller. (IMPORTANT: Ensure that the battery is connected to the solar charge controller first, before connecting the solar panel wires.)

7. Underwater camera units only: connect the underwater camera

For AMOS robots equipped with an underwater camera, take the camera housing and ribbon cable tubing attached to it out of the shipping box. Make sure that the camera enclosure is still securely tightened after shipping, but do not over-tighten; a moderate amount of hand-torque is sufficient. The camera enclosure can be tested for watertightness by immersing it in a bucket of water. If bubbles rise repeatedly from the enclosure, then that means there is a leak somewhere, possibly the acrylic window is not properly aligned, or the outer ring is not screwed on tight enough. One or two small bubbles rising from the enclosure is normal; these could come from small pockets of air trapped on the surface of the enclosure.

Within a small, plastic bag in the front electronics box are a rubber gasket, a plastic locking nut, and 4 small screws. Take out the rubber gasket and slide it over the end of the cable gland at the top of the ribbon cable tube. The rubber gasket helps to form a watertight seal against the bottom of the front electronics box. Pry off the wiring terminal board from the main Raspberry Pi board. It is usually easier to remove the USB cables from the main Raspberry Pi board first, before doing this. The USB cables can be re-connected later, after the underwater camera module is completely installed. The USB cables are permitted to occupy any of the 4 available USB sockets.

Push the black cable gland at the top of the ribbon cable tube up through the bottom hole of the front electronics box. On the inside of the electronics box, slide the plastic locking nut over the end of the ribbon cable, and tighten it over the threaded end of the cable gland. Do not overtighten; it should be possible to make it secure by hand tightening it. Ensure that the camera module is facing forward before final tightening. Slide the end of the ribbon cable through the slot in the wiring terminal board:



Pull up the locking tabs on the HDMI connector of the Raspberry Pi main board and insert the end of the ribbon cable into the HDMI connector (silvered contact tabs facing toward the back) before pushing down the locking tabs. Replace the wiring terminal board, and screw it down at the corners with the 4 small screws provided. Replace the USB cables if they were removed earlier.

8. Connect the wireless antennas

Connect one black wireless antenna to the front electronics box, and the other to the AMOSRemote transceiver box.

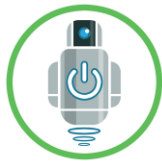
9. Solar units only: connect the solar panel

Remove the solar panel from its box and position it over top of the brackets installed in 1 above. Insert the hex bolts through the solar panel mounting holes. It may be necessary to clamp the edge of the grommet around each hole with a small pair of pliers, while using a small socket wrench to “screw in” the bolt. Once the bolts are in the holes, position the bolts into the available holes in the plastic brackets on the surfboard. Slide the brackets toward the back or front as necessary. It is OK to bend the solar panel a bit at this stage to get it into place over the brackets; it is quite flexible. Once in place, tighten the nuts over the bolts. If using a fish finder for depth sensing under the solar panel, you might want to leave the two front bolts un-connected, as it allows you to lift the front half of the solar panel for turning on the fish finder after the AMOS robot has been turned on. On some fish finders, it is only necessary to press the On/Off button to turn it on and enable depth readings. On other units, it is necessary to press the On/Off button, wait for a beep noise, and then press the ‘Exit’ button twice to clear two introductory screens before depth readings are sent to the AMOS robot.

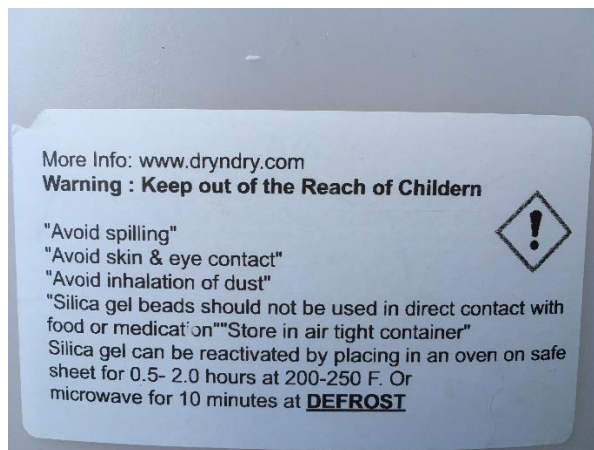
Once the solar panel is in place, connect the + and – solar panel leads to the red and black wires coming from the front of the back electronics box. Be sure not to connect the + and – solar panel leads to each other, as this will short out the solar panel. Also, make sure that the battery has been connected in 6 prior to plugging in the solar panel leads.

10. Desiccant

Inside the front and back electronics boxes are two porous bags full of silica gel beads that act as a desiccant material for managing humidity levels within the enclosures. Over time, especially if the boat is being used in a humid environment, the color of these beads will change from orange to



green. Once this happens, the beads can be reactivated by placing them in an oven on a safe sheet for 0.5 to 2.0 hours at 200-250 degrees Fahrenheit. They can also be microwaved for 10 minutes at the DEFROST setting in a microwave. The following is the manufacturer's label for this product:



11. Support / Questions?

For additional support or questions about the AMOS robot, please consult the In Nature Robotics [support page](#), or email us at info@innaturerobotics.com.