

Seafloor™

HyDrone™

Model # ASV/RCV

Unmanned Survey Vessel



Unmanned Survey Vessel

Congratulations on your recent purchase of the Seafloor HyDrone Unmanned Surface Vessel or “USV”. It was designed specifically to allow the hydrographic surveyor to reliably and effectively tackle hydrographic surveys in shallow waters or difficult to reach areas when conventional survey boats are not an option. The HyDrone features all non-corrosive materials and dual thruster motors for ease of control and operation.

The HyDrone's multi-payload remotely controlled surveying function combined with its portability makes owning and operating this remote control survey vessel affordable to all in the Hydrographic Community. If you are adding the optional AutoNav™ Auto-Pilot Module:

The survey vessel can be monitored while underway, in both Auto and Manual modes. The mission planner application runs on board the HyDrone controlled with remote desktop connection and displays the vessel's positioning and progress against a background map of the survey area. Battery voltage remaining may be monitored via the remote control unit.

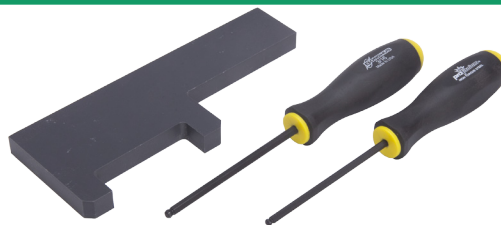
Switching from autonomous operation to manual control is as easy as flipping a switch on the long range remote control unit. Featuring an optional 2km range upgrade, combined with a survey endurance of over eight hours, the HyDrone is a viable survey vessel.

Parts List



Number	Description	QTY
1	HyDrone frame + Hardware	1
2	Port HyDrone pontoon	1
3	Starboard HyDrone pontoon	1
4	Skeg	2
5	EV-Peak battery charger	1
6	Venom volt meter	1

Tools List



1	Deck plate cover removal tool	1
2	$\frac{5}{32}$ allen tool	1
3	$\frac{3}{16}$ allen tool	1

HyDrone Safety and Cautions

Always practice caution when working with electricity in water and with the spinning blades of the propeller. The propellers can rotate up to 3,800 RPM and draw 350W producing a max thrust of 11.2 lbs. each. Keep body parts away from the thruster inlet and outlet to avoid injury.

Do not operate the thrusters for an extended period outside of the water. The motors are lubricated by the water, therefore vibration and noise will be greater when dry. A slight clicking noise is normal, especially when operated dry. This is caused by slight movement of the shaft in the motors.

The thrusters can handle saltwater and sandy environments however, to avoid damage, refrain from sucking debris into the thruster.

NEVER leave batteries connected while the HyDrone is unattended. Always disconnect all batteries immediately after use.

- Even with an on/off switch, power will still be bleed off the batteries and they may become over-discharged and even catch fire.

When powering up the HyDrone, always turn on the remote control unit before powering the boat. If, when powered up, the receiver on the boat does not detect a controller signal, the remote control unit may unexpectedly enter the fail-safe mode. This could be extremely dangerous.

Conversely, when shutting down, always power down the boat using the thruster switches on the boat before shutting down the remote control. Again, if the remote control unit is shut off before the boat, unexpected and possibly very dangerous maneuvers may occur.

Improperly installed instruments can cause the boat to fill with water. Never try to operate the HyDrone without properly installed instruments.

HyDrone Specifications

- Unloaded weight 20lbs
- Case weight 80-100lbs (Depending on model)
- Cruise speed 1m/s (2knots)
- 8 hours of battery life at cruise speed
- Max speed 4m/s (8knots)
- 22lbs of thrust
- 40lbs of cargo capacity
- impact resistant HDPE construction
- Pontoon width 8 ³/₈ in (21.28cm) length 45 ¹/₂ (115.57cm)
- Assembled width 29 ¹/₄ (74.3cm) length 45 ¹/₂ (115.57cm)

HyDrone Warranty

Seafloor Systems, Inc. makes every effort to assure its products meet the highest quality, reliability and durability standards and warrants to the original purchaser or purchasing agency that each HyDrone be free from defects in materials or workmanship for a period of one year from date of shipment.

Warranty does not apply to defects due directly or indirectly to misuse, negligence or accidents, repairs or alterations outside of our facilities, use of the HyDrone for purposes other than water measurements, or use with instruments weighing more than 75 lbs.

Seafloor is not responsible for loss of boat, instruments, and damage to property, injury or death associated with the use of any of its products or products that may be included or used with Seafloor products. Seafloor does not warranty third-party products sold by Seafloor. These may include GPS, depth sounders and other ancillary equipment.

All warranty services are FOB Seafloor's facility in Shingle Springs, California, U.S.A.

Optional Equipment

AutoNav system

HyFi system

AutoNav w/ integrated HyFi

900MHz Long range kit Servo Steering

HydroLite TM

HydroLite DFX

Assembling your HyDrone

Step 1

Open the HyDrone case. The top section of foam including the frame, fins and other components can be removed and set aside.



Step 2



Prepare a raised surface to set the HyDrone pontoons on top of so all the pontoons sit level and the thrusters do not hit the ground. Raised surface should allow the HyDrone pontoons to sit off of the ground roughly 4 inches (150mm) and allow the two pontoons to be roughly one foot (475mm) apart. Remove the Port and Starboard pontoons from the case and set on top of prepared surface.

Step 3



Place the HyDrone frame across the top of both pontoons. Loosely attach the pontoons to the frame with the $\frac{1}{4}$ - 20x1 stainless steel hardware. Once the four bolts are installed tighten them with the provided $\frac{5}{32}$ allen key.

Step 4

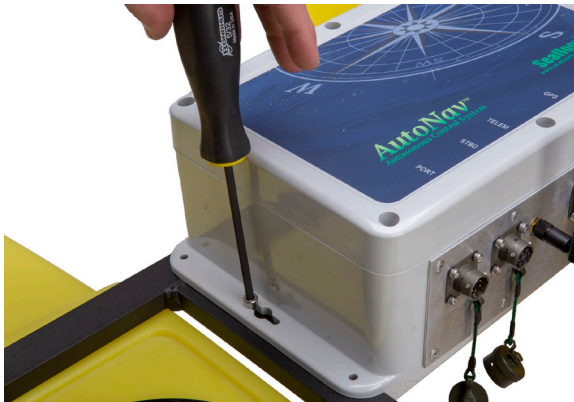


Turn the HyDrone upside down or leaned onto one side gain access to the bottom of the HyDrone. Then slide the fins into the fin mount channel that are in front of the thrusters. Make sure to slide the fin locking pin into the side of the fin mount to secure the fins in place.

Your HyDrone is now assembled and ready for optional equipment to be installed.

INSTALLING AUTONAV

Step 1



The HyDrone frame is pre-drilled and tapped for the AutoNav. Use the $10/32 \times 11/4$ stainless steel hardware and the provided $5/32$ allen key to secure the AutoNav to HyDrone frame.

Step 2



Plug the PORT and STBD power cords into the AutoNav.

Step 3



Plug the corresponding PORT and STBD cords from the AutoNav into each of the pontoons.

Step 4



The AutoNav is now wired into the HyDrone and ready for optional equipment.

Step 5



Plug the GPS into the GPS port on the AutoNav.

CHARGING 14.8 (4S) BATTERIES

Maintaining proper charging practices is important to prolong your battery life. The HyDrone includes an EV-Peak charger with necessary cords to charge the 14.8 (4S) batteries.

It is important to ensure each battery is fully charged before deployment. Operating endurance of the thruster batteries between charges is up to 8 hours, depending on operating speed and payload.

BATTERIES SHOULD BE SUPERVISED WHILE CHARGING AND SHOULD NOT BE LEFT UNATTENDED. ENSURE THAT THE BATTERIES ARE DISCONNECTED AS SOON AS CHARGING IS COMPLETE.

The 14.8V 4S batteries powers the HyDrone thrusters and the AutoNav, if installed.

****IMPORTANT****

- Do NOT overcharge the batteries! It is up to the end user to monitor the batteries to prevent explosion or fire.

Step 1



Install balance cords on the batteries that will be charged.

Step 2



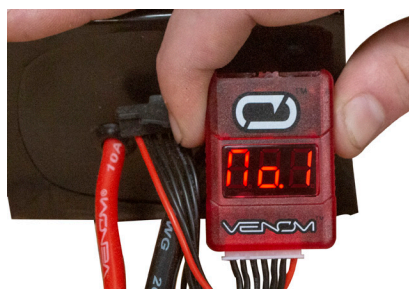
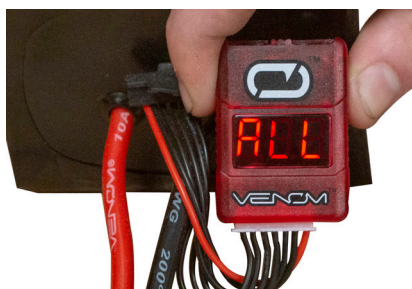
Plug balance cord into the right most port on the EV-Peak charge labeled, OUTPUT [4S|3S|2S|1S|-]

Step 3

Plug the EV-Peak charger into 110v outlet and the charging lights will illuminate. Remove battery when 100% light is illuminated.



Step 4



After the battery is fully charged use the supplied voltage meter to check that each cell in the battery is within 0.1 volts of each other. At full charge each cell will be around 4.2 volts. If the cells have a difference in voltage greater than 0.1 volts, that battery should be taken out of service. The voltage meter display will cycle through the cell number, then cell voltage. After cycling through each cell it will display ALL then the total voltage.

- NOTE - Never allow batteries to drop below 3.3 volts per cell this will permanently damage the battery. It is a good practice to check the batteries after each use to become familiar with the batteries and their power consumption.

INSTALLING THE BATTERIES

Step 1



Remove the forward hull deck plate cover. If it is too tight to remove by hand Seafloor includes a deck plate cover removal tool to loosen it.

Step 2



Slide the 14.8 (4S) battery into the hull of the HyDrone with the cords toward stern. Make sure the battery is fully seated into the battery slot.

Step 3



Plug the 14.8 (4S) battery in to the Hy-Drone with the XT90 plug.

Repeat for both Port and Starboard pontoons.

POWERING UP HYDRONE

- ① Ensure the remote-control battery is fully charged. See the remote control manual for instructions.
- ② Review the remote control manual if you are not familiar with it.
- ③ Power on remote-control.
- ④ Power on thruster motors with the two on/off switches in the middle of each pontoon. If AutoNav is installed and the AutoNav power switch is in the ON position, this will turn AutoNav on.
- ⑤ Wait approximately 15 seconds for speed controllers to pair. They will go through a series of tones and LED flashes.
- ⑥ If using AutoNav - Arm AutoNav from remote control. AutoNav will chime when armed.

Testing Thruster

Before launching the HyDrone check the thrusters for proper operation. These thrusters are lubricated by water and should be wet for the following test. Do not run thrusters for more than a few seconds out of the water.

Refer to propulsion system calibration procedures if you notice the thrusters are not spinning evenly, or if the propulsion system does not operate as outlined in the test below.

NOTE: The thrusters are designed to be counter rotating. With forward thrust both propellers should rotate inboard, that is, port propeller rotates clockwise and starboard propeller rotates count-clockwise (as viewed from standing behind boat). With reverse thrust the propellers should rotate outboard.

- HyDrone (RCV) without an AutoNav unit installed is operated remote control only and can't operate in autonomous mode. HyDrone (RCV) is operated with left and right throttle joysticks on remote control unit. Left joystick controls port thruster and right joystick controls starboard thruster.
- HyDrone (ASV) with AutoNav unit installed is operated with right throttle joystick only, that is, right joystick controls both port and starboard thrusters.
- With HyDrone (RCV) both joysticks are pushed straight forward for forward thrust and pulled straight backwards for reverse thrust. Slow turns are accomplished by applying more thrust to one thruster than the other. Rapid turns are accomplished by applying forward thrust to one thruster while applying reverse thrust to the other thruster.
- With HyDrone (ASV) the right joystick is pushed straight forward for forward thrust and straight backwards for reverse thrust. Slow turns are accomplished by moving the right joystick forward and slightly right or forward and slightly left. Rapid turns are accomplished by moving the right joystick to the right or left without moving the joystick forward.

The following test applies to HyDrone RCV and ASV.

- ① Forward Thrust Test: While holding a piece of paper approximately 6 inches aft of each thruster, slowly push joystick(s) straight forward. The paper should be pushed away from the thrusters, that is, the thrusters blow air aft of the boat. This indicates forward thrust of the boat.

Testing Thruster Continued

② Reverse Thrust Test: While holding a piece of paper approximately 6 inches aft of each thruster, slowly pull joystick(s) straight backwards. The paper should be pulled toward the thrusters, that is, thrusters blow air toward bow of boat. This indicates reverse thrust of the boat.

This concludes the test for HyDrone (RCV). Continue to perform remainder of test for HyDrone (ASV).

The following test is for HyDrone (ASV) with AutoNav unit installed.

① Turning Thrust Test: The propulsion systems uses' differential thrust to turn the boat, that is, one motor provides forward thrust while the other motor provides no thrust or reverse thrust.

② Turn to port:
Slowly push right throttle joystick forward and to the left. The starboard thruster will provide forward thrust while the port thruster will provide reverse thrust.

③ Turn to starboard:
Slowly push right throttle joystick forward and to the right. The port thruster will provide forward thrust and the starboard thruster will provide reverse thrust.

Launching and Retrieving the HyDrone

- ① Before launching the HyDrone, ensure the hull lids are secure.
- ② Power up the HyDrone and test thrusters before launching.
- ③ Check that the remote-control joysticks are in the center position prior to launching the HyDrone
- ④ The HyDrone should be launched stern first. This will protect the thrusters from accidental grounding and possible damage.
- ⑤ Thoroughly familiarize yourself with the way the HyDrone responds to the controls before deploying in moving water. When the HyDrone is traveling away from you it will respond to control signals as expected. When the HyDrone is inbound (traveling toward you) the controls will be the same but can cause confusion. Please practice in calm water, close to shore until you are familiar with how the controls respond when the HyDrone is traveling towards you and away from you.

MAINTENANCE

The HyDrone is designed for easy maintenance. The following tips will help to prolong the life of the HyDrone and its components.

- ① To prolong the life of the HDPE hull and finish, wash with mild soap and water after each use.
- ② **IMPORTANT** Rinse HyDrone after use in saltwater and clean out biofouling and debris as needed.
- ③ Do not run the thrusters at high speeds or for an extended period out of the water to minimize noise and wear.
- ④ Check the access hatch gasket for cuts, cracks or deformation. This gasket seals the instrumentation area from water intrusion and should be checked frequently.
- ⑤ Lube gaskets where needed.
- ⑥ Carefully inspect all batteries prior to and following each use per the instructions provided for the batteries. Should any physical damage, swelling or “ballooning” be evident please refer to the disposal steps covered in the battery instructions.
- ⑦ Check to make sure all HyDrone hardware is tight.

CLEANING AND REPLACING THRUSTERS

Step 1



Cleaning thrusters periodically is important to prolonging thruster life.

Step 2



With $\frac{3}{8}$ th or 10mm socket or end wrench remove the nuts on thruster plate that are on either side of the thruster.

Step 3



Once nuts are removed, the thruster plate and thruster will lift off the boat and expose the m3x6 allen screws that hold the thruster plate to the thruster. Remove the thruster plate from the thruster by removing those four screws with 2mm allen key. If you are replacing the thruster skip to step 10.

Step 4



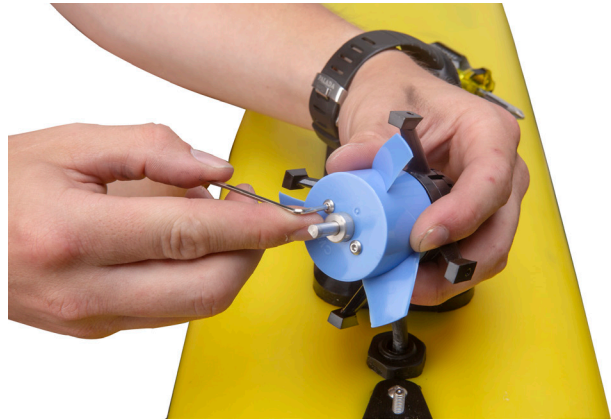
Remove the four #2 Phillips screws along the outer edge of the thruster.

Step 5



Pull the base and propeller out of the nozzle and tail cone.

Step 6



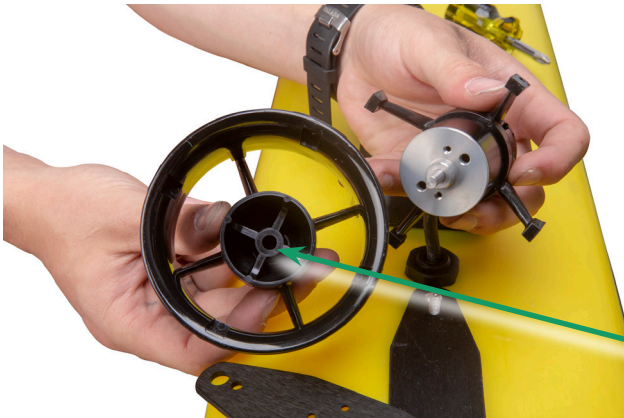
Remove the 2mm allen screw that holds the propeller to the motor assembly.

Step 7



Remove the propeller from motor assembly by putting pressure on motor shaft while pushing the propeller off of the motor assembly. Be careful not to put too much pressure on the propeller fins. No further disassembly is required.

Step 8



Make sure to clean inside of the nozzle and tail cone.

Step 9



Most importantly clean the area between the motor assembly and the thruster base as well as the gap, as long grass, fishing line, anything thin and long will end up in there. A paperclip or small Allen key works for cleaning it out..

Step 10



To completely remove and replace the thruster; from inside the hull of the HyDrone, remove the compression-fitting nut with $\frac{3}{4}$ end wrench. Then remove the white, blue, and green wires from the HyDrone wiring harness. From the outside of the HyDrone, use a small allen key or punch to press the black gasket out of the compression fitting. The thruster wire will now pull through the HyDrone hull. Install new thruster by putting new wire through hull then slide grey gasket followed by the nut, up the wire from inside the hull. Plug wires back into wiring harness and tighten compression fitting.

Step 11

Reverse these steps to reassemble thruster.