

Seafloor™

EchoBoat 160™

Model # ASV/RCV

Uncrewed Survey Vessel



Horseshoe Bay, San Francisco, CA, USA

Table of Contents

Model # ASV/RCV

Introduction.....	4
➤ Overview.....	4
➤ Safety and Specifications.....	5
➤ Warranty Information.....	6
Battery Safety.....	7
➤ Charging.....	9
Operation.....	10
➤ Remote Control.....	10
➤ Testing Thrusters.....	12
➤ Launching and Retrieving.....	13
Quickstarts.....	14
➤ Prelaunch.....	14
➤ Connection.....	16
➤ Mission Planning.....	19
➤ Hypack.....	25
➤ SmartCast.....	29
Troubleshooting.....	36
➤ Remote Pairing.....	36
➤ Remote Calibration.....	38
➤ AutoNav Calibration.....	39
➤ ESC Programing Card Information.....	42
➤ Speed Controller Calibration.....	44
➤ Thruster Maintenance.....	46
Change of Record.....	51

Table of Contents

Model # ASV/RCV

Manufacturer's Declaration of Conformity

This certificate of conformity is based on an evaluation of the following mentioned products; and technical reports and documentation are at the manufacturer's offices. They meet all relevant requirements of all product safety directives applicable to that product. All equipment sold is new.



John Tamplin (Seafloor Systems President)

Handwritten signature of John M. Tamplin in black ink.



Uncrewed Survey Vessel

Thank you for your recent purchase of the Seafloor EchoBoat Uncrewed Surface Vessel or “USV”. It was designed specifically to allow the hydrographic surveyor to tackle hydrographic surveys reliably and effectively in shallow waters or difficult to reach areas when conventional survey boats are not an option. The EchoBoat features corrosive resistant materials and dual thruster motors for ease of control and operation. It has an integral transducer well and allows for multi-sensor payload capability. The EchoBoat’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 vehicle can be monitored while underway, in both Auto and Manual modes. The mission planner application runs on board the EchoBoat, controlled with remote desktop connection and displays the vehicle’s positioning and progress against a background map of the survey area. Battery voltage remaining may be monitored via remote desktop connection.

Parts List



Number	Description	QTY
1	EchoBoat 160	1
2	QX7 Transmitter with USB Charging Cable	1
3	Fins	2
4	Long Range Battery	1
5	Long Range Battery Charger	1
6	EchoBoat 160 Battery Charger	1
7	Shore Side Antenna	1
8	Shore Side POE with 10' Ethernet	1

EchoBoat Safety and Cautions

Always practice caution when working with electricity in water and with the spinning blades of the propeller. Keep body parts away from the thruster inlet and outlet to avoid injury.

Prior to use, please read the included battery instructions. Failure to observe the included precautions can result in fire, explosion and cause personal injury/property damage. Do not operate the thrusters for an extended period outside of the water. The bearings 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 plastic.

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 EchoBoat is unattended. Always disconnect all batteries immediately after use.

- Even with the power switch in the off position the batteries may discharge below the recommended safe levels of discharge.

When powering up the EchoBoat, 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.

Conversely, when shutting down, always power down the boat using the rear thruster switches switch on the rear of the boat before shutting down the remote control.

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

EchoBoat Specifications

Typical Survey Speed.....	1.9 kts (1 m/s)
Top Speed	4 kts (2 m/s)
Hull Width	0.8 m
Hull Length	1.6 m
Battery Endurance – Survey Speed	8 hours
Payload.....	34 kg / 75 lbs
Power	4x 22.2V (6S) 22Ah LiPo battery
Motor	2x brushless thruster
Hull Material	UV resistant HDPE
Steering	Differential
Weight	31 kg / 69 lbs empty
Hardware	Stainless steel
Remote Control Unit	2.4 GHz
Remote Antenna	Directional
Remote Range	Up to 2km
GPS	Customer specified
Communications	5Ghz
Depth Sounder Transducer	Through hull mount

EchoBoat 160 G5 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 EchoBoat be free from defects in materials or workmanship for a period of one year from date of shipment.

Warranty does not apply to defects of misuse, negligence or accidents. Warranty also does not cover repairs or alterations outside of our facilities, use of the EchoBoat for purposes other than water measurements, or use with instruments weighing more than 75 pounds.

Seafloor is not responsible for loss of boat, instruments, damage to property, or injury/death associated with the use of any of its products or 3rd party 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

Sonar:

- Multibeam EchoSounder
- Singlebeam EchoSounder
- Dual Frequency EchoSounder
- Side Scan Sonar
- ADCP

GPS:

- RTK/GNSS
- Differential GPS

Auxiliary:

- Sound Velocimeter
- Sound Velocity Profiler
- CTD Instrument
- Wi-Fi remote desktop
- AutoNav Control System
- PC
- SmartCast

Battery Warning

1. Before and after every use of a LiPo battery, carefully inspect the pack to ensure no physical damage, swelling or “ballooning” is visible.
2. If at any time you have an accident with your model, or if the battery swells, “balloons”, or feels too hot to the touch, immediately stop use and carefully follow these safety steps:
 - a. Using electrical protective gloves, remove the battery pack from your model or charger.
 - b. Place the battery in a LiPo safety sack or other fireproof container, away from flammable materials and in a well-ventilated area.
 - c. Observe the battery from a safe distance for at least 30 minutes.
 - d. If after 30 minutes the pack appears stable, follow the battery disposal instructions below.
 - e. Under no circumstances should you return a battery to service that has “ballooned” or been damaged in any way.
3. Always handle LiPo batteries with extreme care and take all necessary precautions to avoid battery packs and cells being dinged, dented, punctured, or otherwise damaged.
4. Keep battery packs out of the reach of children and pets.
5. Do not disassemble, modify, or attempt any form of repair of a LiPo battery.
6. Do not allow exposed battery wires to touch each other.
7. Always disconnect your battery from any device when not in use. All devices continue to draw power even when turned off.
8. Store your batteries in a cool, dry place between 40-80 F° / 4-26C°. All battery packs should be stored away from any flammable materials in a LiPo safety sack or other fireproof container (not included) with the plugs/connectors covered.
9. Batteries should be stored at 3.75-3.80 volts per cell. Failure to maintain these levels could result in a loss of battery capacity. Do not store batteries with voltage above or below this range for longer than one week. Check cell voltage with a LiPo Checker, following the included instructions.
10. LiPo batteries must be fully charged and returned to the recommended storage voltage range (3.75-3.85 volts per cell) at least once a month.
11. Always take precautions to cover the battery plugs/connectors while not in use.
12. Always transport LiPo batteries in LiPo safety sack or other fireproof container with the battery plugs/connectors covered.
13. Never leave LiPo battery packs in an automobile. Temperatures within a vehicle can quickly reach unsafe levels.
14. Always keep a class D chemical fire extinguisher nearby, in case of fire when storing, handling, charging, or using LiPo battery packs.

Safety

10. Make sure the battery connections are connected in the proper polarity.
11. Battery packs should be properly secured within the vehicle to prevent movement and damage to the battery while in use.
12. If the battery exceeds temperatures of 140 F° / 60C° immediately discontinue charging and isolate the battery pack. Refer to point number two above from the Safety Warnings for further instruction.
13. Do not, under any circumstances, heat up a battery pack in an attempt to increase pack performance. Doing so greatly increases the risk of fire.
14. Never allow your model to discharge a LiPo battery pack at more than the recommended continuous discharge rate. Refer to the label of your specific battery to determine the proper continuous discharge rate. You must also refer to your specific vehicle user manual to ensure your batteries continuous discharge rate is not exceeded.
15. Damaged or ruptured battery packs or cells may leak electrolytes which can cause moderate to severe irritation including burning and dryness of the skin and eyes. For contact with the skin, thoroughly wash the affected area with soap and warm water. For contact with the eyes, rinse thoroughly with cool water. Seek immediate medical attention for any burns.

Failure to observe any of the following precautions can result in fire, explosion and cause personal injury.

Before Charging

1. Due to international shipping regulations, LiPo batteries are not shipped fully charged. All LiPo battery packs should be fully charged prior to the first use.
2. Always use a charger specifically designed for LiPo batteries. Never use NiCD or NiMH chargers to charge LiPo batteries.

Important Information Regarding Charging & Safety Warnings

1. For the longest lifecycle and most thorough charging of your LiPo battery we recommend a 1C charge rate. Batteries that are properly maintained have an average lifespan of 150-250 charge cycles. Many batteries are capable of higher charge rates to reduce charge times. While your charge time will be greatly reduced, the lifespan of your pack will also be reduced with repeated charging above 1C. Always confirm and follow your specific packs maximum charge rate as shown on the battery label.
2. Do not charge LiPo batteries to more than 4.2 Volts per cell for normal voltage batteries, or 4.35 Volts per cell for High Voltage (LiHV) LiPo batteries. Refer to the label of your specific battery for maximum cell and pack voltage.
3. Always charge batteries in a LiPo safety sack or other fireproof container (not included). Do not charge any type of battery on or near any flammable materials including in or near your model.

Charging

1. **Never leave batteries unattended while charging, even when using a LiPo safety sack or other fireproof container. Batteries on charge MUST remain under constant observation so that you may react quickly should any problems arise.**
2. LiPo batteries, 2S and greater, feature a separate balancing plug that isolates each cell in a pack and allows each to be charged and monitored independently. This ensures that all cells charge equally and discharge at the same rate during use. Never charge a 2S or greater LiPo battery without connecting the balance lead to the charger. Always balance charge a 2S or greater LiPo batter.
3. Charge each battery pack individually. Never charge battery packs in series. Charging packs in series may result in improper charger cell recognition, improper charging rate, and over charging that may lead to a fire. We recommend using a LiPo balance charger when charging your LiPo batteries.
4. Always check to make sure that your LiPo charger settings match those listed on the battery pack label. Refer to the battery label for the proper cell count and 1C charging amperage setting.

Battery Disposal Instructions & Safety Warnings

1. Any battery that has been subjected to conditions outside of normal use, shows signs of swelling, “ballooning”, damage or has been retired from use should be disposed of properly. We recommend transporting these battery packs to an approved disposal facility while observing the applicable safety warnings above.
2. Check with your local waste facility to determine if they can handle disposal of lithium batteries and if they are permitted. Many stores also offer free recycling of rechargeable batteries. To find a drop-off location near you please visit: <http://www.call2recycle.org/locator>

Failure to follow any of the instructions and safety warnings contained within this document may cause irreversible damage to the battery pack or to your model.

Batteries

Before using your vessel in the field, it is important to conduct a systems check to ensure the job is successful. The first check for operation is checking battery voltage. Due to regulations, LiPo batteries must be discharged for shipping, and it is important for their health and longevity that they are charged fully before being used.

*******ALL BATTERIES MUST HAVE SAME LEVEL OF CHARGE, EACH CELL IN EACH BATTERY MUST BE WITHIN 10%, AND THEY SHOULD REMAIN ABOVE 3.2V AND BELOW 4.2V PER CELL*******

ECHOBOAT-160™

AutoNav

Up: Manual Mode
Down: Auto Mode

Loiter

Up: On
Down/Center: Off

SmartCast Control

Clockwise: Deploy
Counterclockwise: Recover

Arming Safety Switch

AutoNav

Up: Arm
Down: Disarm

Alarm Volume

Clockwise: Up
Counterclockwise: Down

Power ON/OFF

Forward
Left ↔ Right
Reverse



Start Up

- 1 Center all switches and joysticks.
- 2 Hold Power button until all four loading process dots appear on the screen.
- 3 If “Switch Warning” appears, ensure all switches are turned off or centered (Winch Knob center), auto switch is set to Manual and arming is set to Disarm.

Arm EchoBoat

- 1 To arm EchoBoat’s AutoNav, move arming switch to arming position then hold arming toggle switch up for 3 seconds. You will hear the EchoBoat AutoNav chime when arming is complete.
- 2 To Disarm, switch the Arm switch to Disarm and hold arming safety switch for 3 seconds. The AutoNav will chime when disarmed.

Calibrating Speed Controls for Motors

More in depth instructions on page 46

- Start with the AutoNav on and armed. Keep thrusters turned off.
- Press and hold Speed Controller settings button on motor you want to calibrate.
- While still holding the Speed Controller setting button, turn on the thruster switch you want to calibrate. When the LED starts blinking red you can release the settings button.
- Tap the settings button to enter calibration mode.
- Push the throttle joystick up all the way for full throttle and tap the settings button. You will hear a chime.
- Pull the throttle joystick back all the way for full reverse and tap the settings button. You will hear a chime.
- Put joystick back to Center. You will hear a final chime, and the LED on the speed control will change to green.
- You should have control of the throttle motors now.

Optional Long Range Module

- Install R9M with antenna on the back side of the remote.
- Plug in external 2s battery to the R9M.

Testing Thruster

- Before launching the EchoBoat check the thruster motors for proper operation. Before testing thrusters, it is important to note that these thrusters are lubricated by water. The thrusters should be wet for the following steps. Do not run the thrusters for more than a few seconds at a time 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 thruster test below.
- Note: the thruster motors 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.
- Forward Thrust Test: While holding a piece of paper approximately 6 inches aft of each thruster motor, slowly push throttle joystick on remote control unit straight forward. The paper should be pushed away from the thruster motors, that is, thruster motor will blow air aft of the boat. This indicates forward thrust of the boat.
- Reverse Thrust Test: While holding a piece of paper approximately 6 inches aft of each thruster motor, slowly pull throttle joystick on remote control unit straight backwards. The paper should be pulled toward the thruster motors, that is, thruster motor will blow air toward bow of boat. This indicates reverse thrust of the boat.
- Turning Thrust Test: The propulsion systems uses differential thrust to turn the boat, that is, as one motor provides forward thrust the other motor provides reverse thrust.
- Use the paper technique to test forward and reverse thrust of each motor while turning port and starboard.
- Turn to port:
Slowly push throttle joystick on remote control unit forward and to the left. The port motor will provide reverse thrust and the starboard motor will provide forward thrust.
- Turn to starboard:
Slowly push throttle joystick on remote control unit forward and to the right. The starboard motor will provide reverse thrust and the port motor will provide forward thrust.

Launching and Retrieving the EchoBoat

- Power up the EchoBoat and test thrusters before launching.
- Before launching the EchoBoat, ensure the drain plug is tight and hull lid is secure.
- Check that the remote-control joysticks are in the center position prior to launching the EchoBoat
- The EchoBoat should be launched stern first. This will protect the thrusters from accidental grounding and possible damage. Please be mindful of your sonar and payload
- Thoroughly familiarize yourself with the way the EchoBoat responds to the controls before deploying in moving water. When the EchoBoat is traveling away from you it will respond to control signals as expected. When the EchoBoat 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 EchoBoat is traveling towards you and away from you.

Power Off

- Turn off Sonar and auxiliary equipment using installed software programs, save files, then close software programs.
 - **Never turn off PC using main EchoBoat power switch.**
Always turn off PC using Windows Start menu power button shut down, only then turn off the main EchoBoat power switch.
 - Lastly turn off remote-control.
 - Disconnect the 4 - 22.2V (6S) batteries at the XT90 connectors.
 - Allow the batteries to fully cool and perform a storage charge if the EchoBoat will not be used the following day otherwise fully charge the batteries.
- NOTE – Leaving the LiPo batteries at too high or too low of a state of charge for extended periods of time will cause irreversible damage to the batteries.

Prelaunch Checklist

Before heading into the field

- Make sure the batteries you are bringing are fully charged!
- The ESCs have a low voltage cutoff of (3.2 per cell)
- The 6s LiPo batteries charge up to 25.2v (4.2 per cell)
- Qx7 remote charges up to 8.5v
- USV - Shoreside & Cables for Shoreside

For RCV

- Center throttle sticks and turn on the QX7 remote
- Turn EchoBoat power switch on and wait for ESC tones to finish
- Check if motors are responsive
- Launch

For ASV

- The Autonav requires NMEA GPS strings.
 - GGA, RMC, HDT at 5hz with GP talker ID(Prefix) at 57600 baud rate
- Turn the Qx7 remote on
- Turn EchoBoat power switch on and wait for ESC tones to finish
- Power on the GPS or INS
- Flip the Arm/Disarm switch (SA) to the up position and hold safety switch (SH) towards the operator for about 5-10 seconds until the AutoNav makes an arming tone, it is now ARMED
- Using the right throttle stick to check if both thrusters are responsive in all directions (forward, reverse, left, right)
- Open Mission Planner
- Connect to the AutoNav using the correct Com port and 115200 baud rate
- Verify the AutoNav has GPS
- Launch

Items to Keep in Kit

These items are not provided by Seafloor as they vary based upon the user's smart antenna specifications.



1. Null Modem



2. Serial Gender Changer

Operation

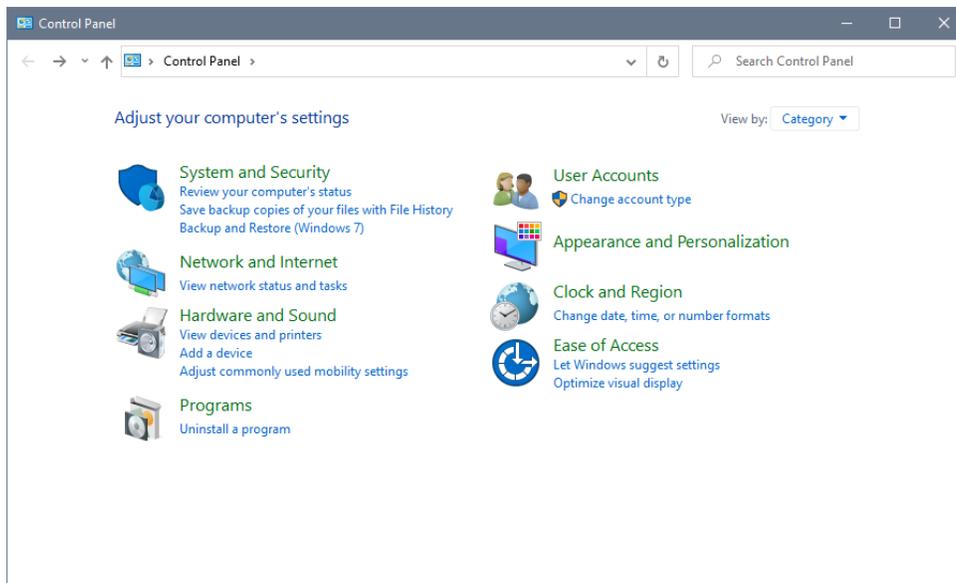
Shoreside Setup

To setup the shoreside Wi-Fi Bridge plug in an ethernet to the MicroTik shoreside, and plug the other end of the ethernet into the POE adapter. Attach the bullet connector to the POE and plug it into a power source. Then, plug the POE ethernet adapter into the computer being used to remote into the AutoNav Plus.

Now, setup the base computers network settings following the steps below:

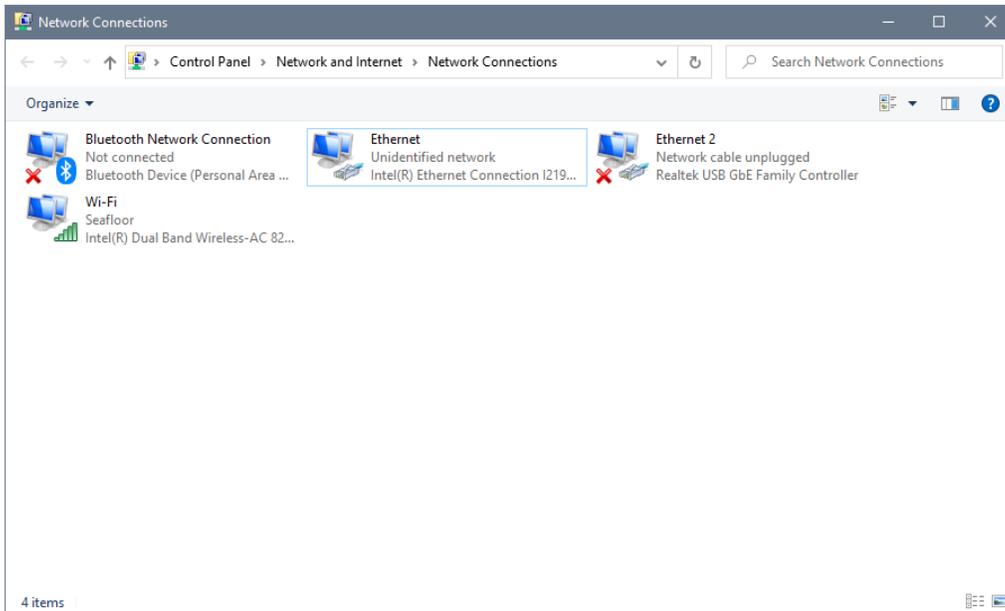
1. Open Control Panel (Figure 2).

Figure 2



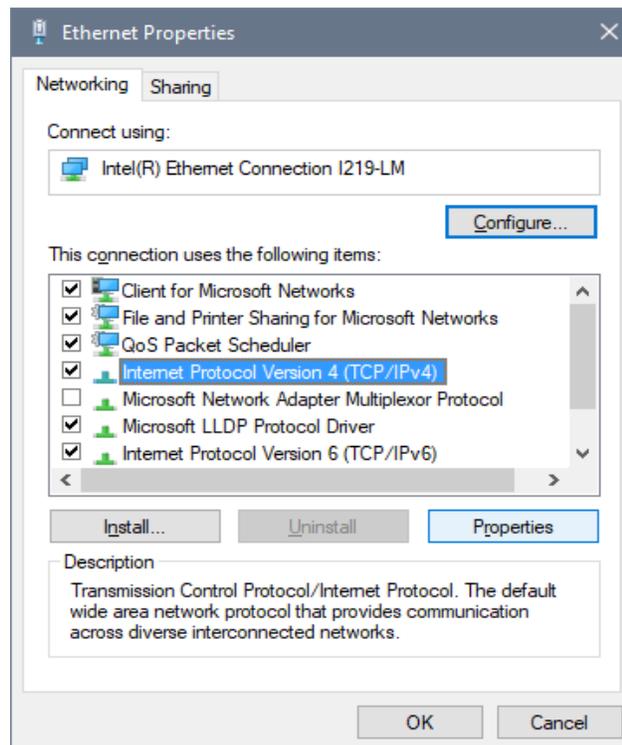
2. Open “Network and Internet” (Figure 3).

Figure 3



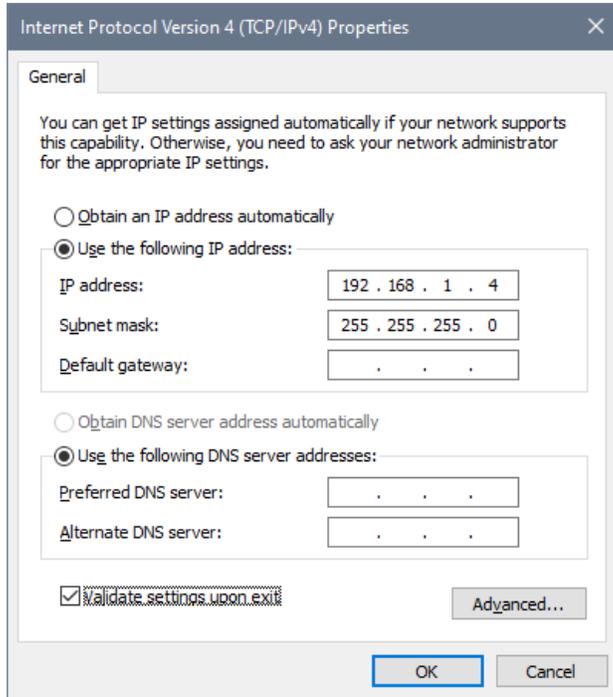
3. Right Click on the ethernet port with the description “Unidentified network” and select “properties” (Figure 3).

Figure 4



4. Highlight “Internet Protocol Version 4 (TCP/IPv4)” and click “Properties” (Figure 4).

Figure 5



5. Set the IP address and Subnet mask as shown in Figure 5.
6. Select “OK” and close all windows.
7. Using the Windows search bar type “Remote Desktop” and hit enter.
8. Type in the IP address: 192.168.1.8 as shown in Figure 6

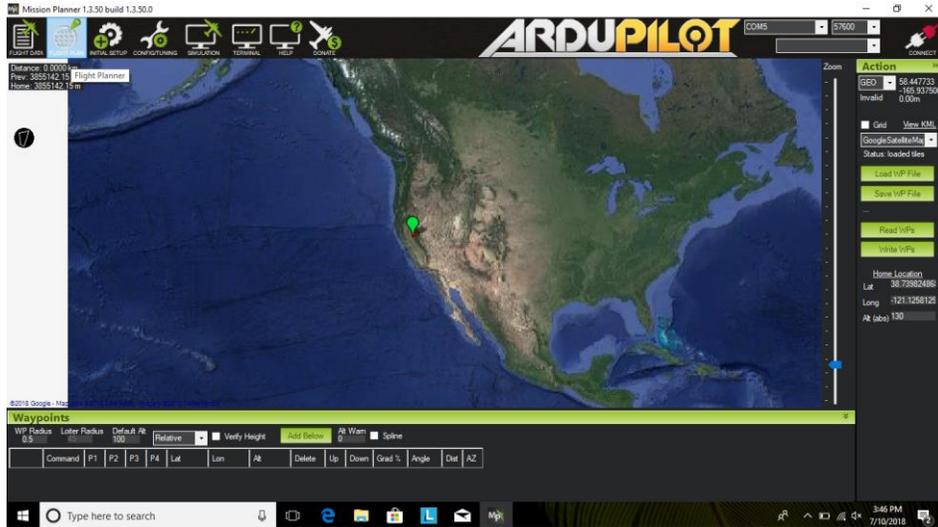
Figure 6



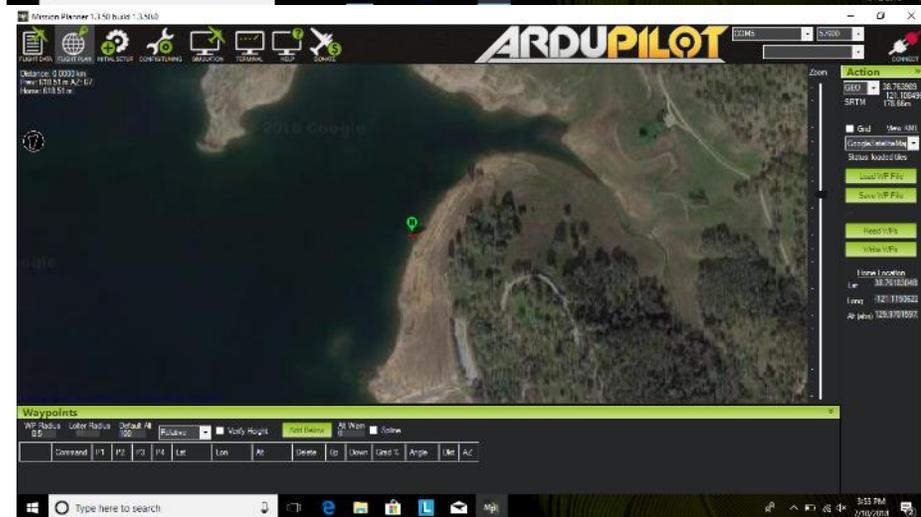
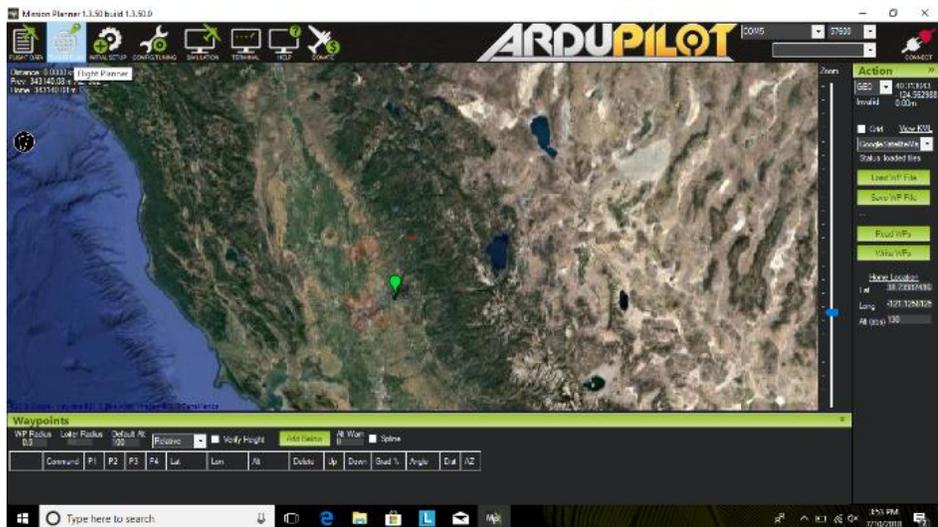
9. Make sure the Username to log in is “EchoBoat”
10. The password is “Seafloor” with a capital S.

Flight Plan

1. Click FLIGHT PLAN in Mission Planner on the control bar.



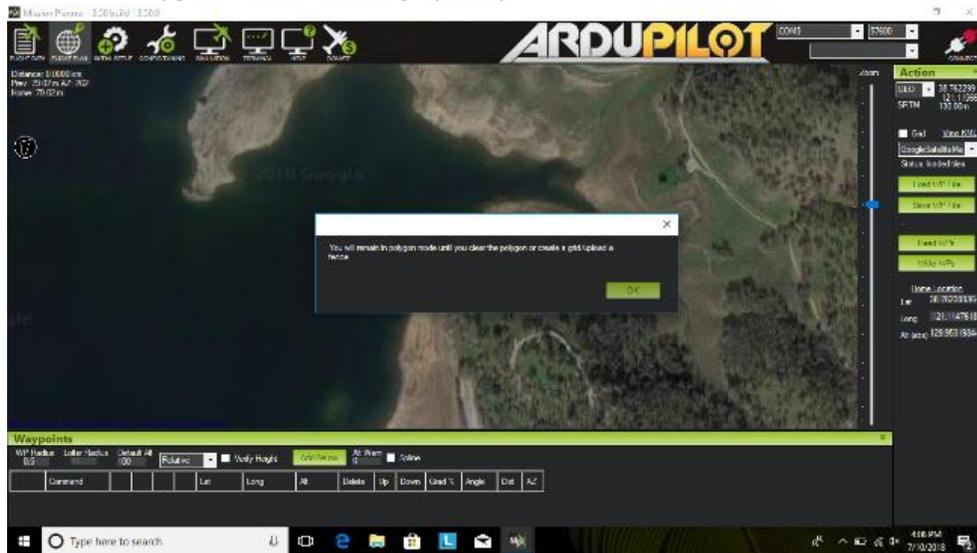
2. Find your survey area on the satellite map.



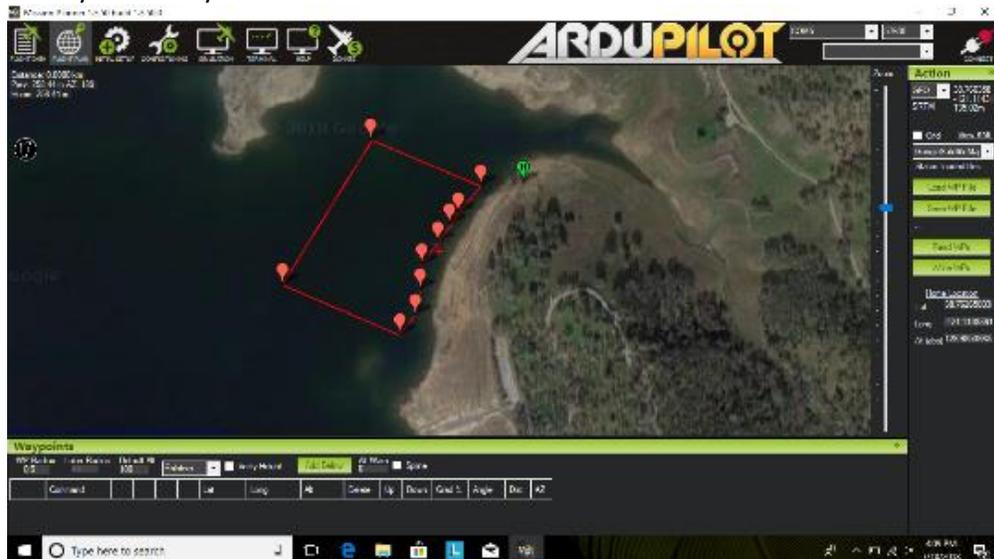
- Right click Draw Polygon (Newer versions of Mission Planner have removed it and is now the Polygon that is circled on the top far left. Click to enable, click again to disable)



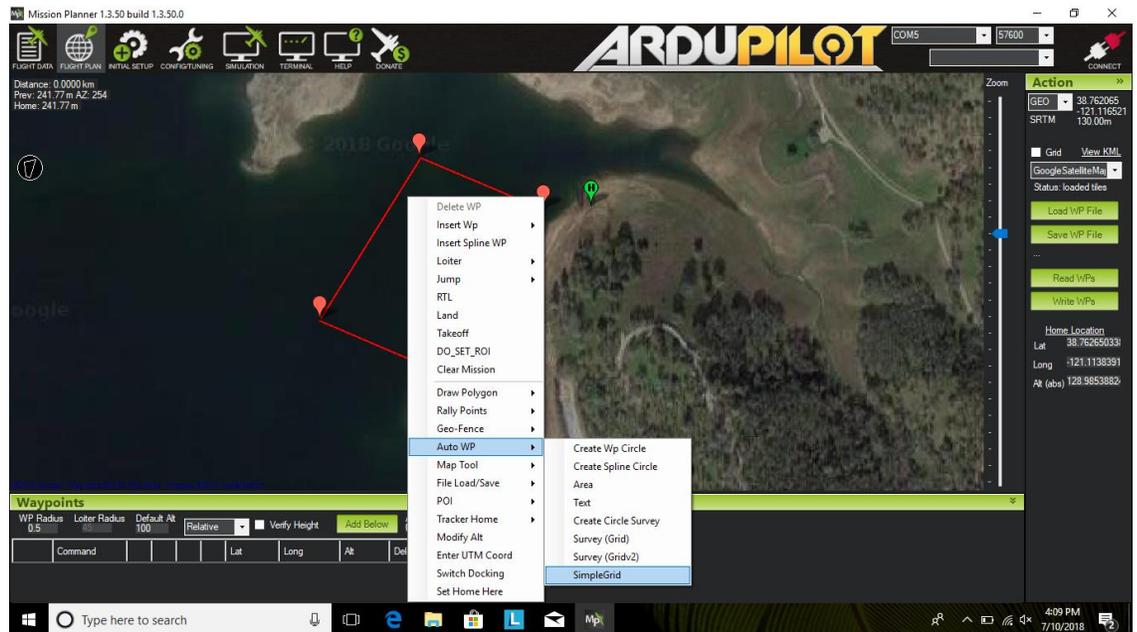
- Click Add Polygon (click OK through prompt)



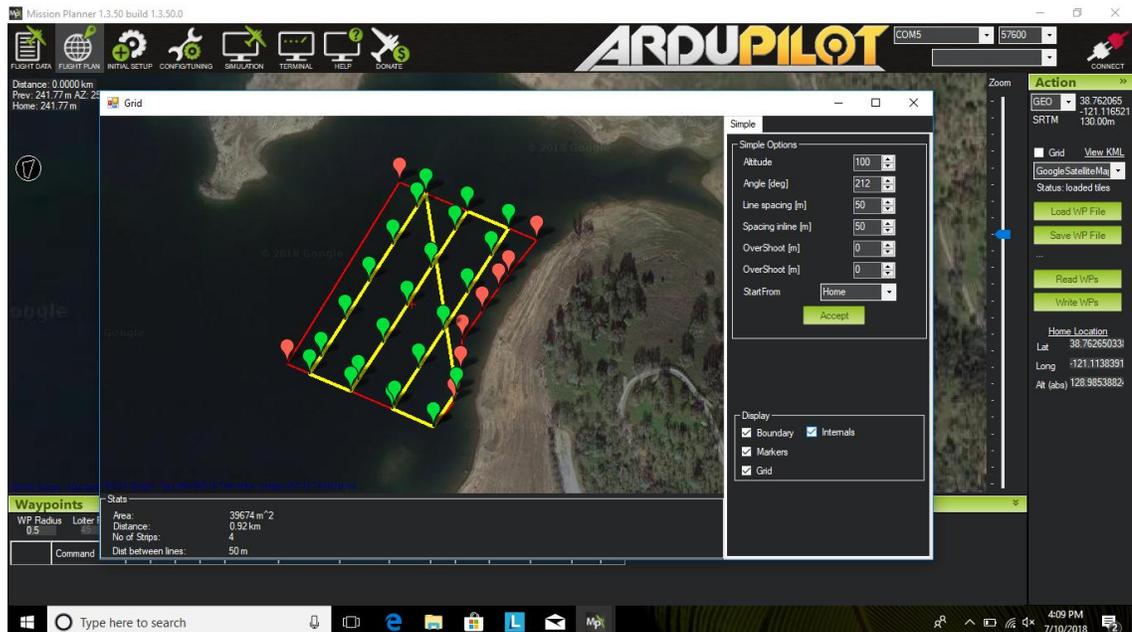
- Draw your survey area



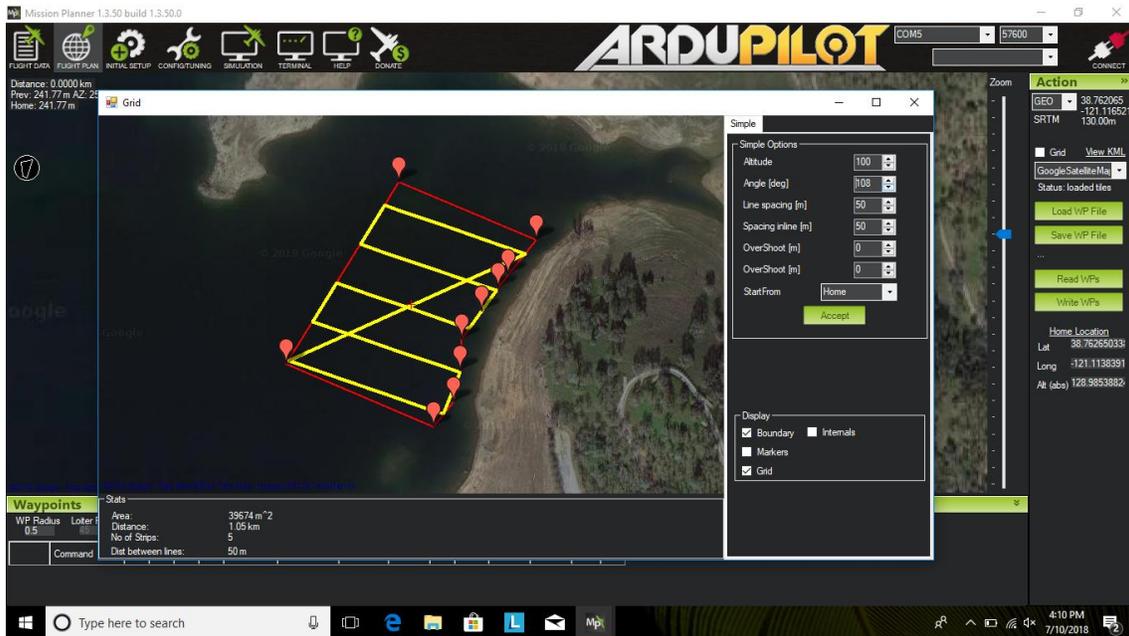
4. Right click
 - a. Click Auto WP
 - b. Click SimpleGrid



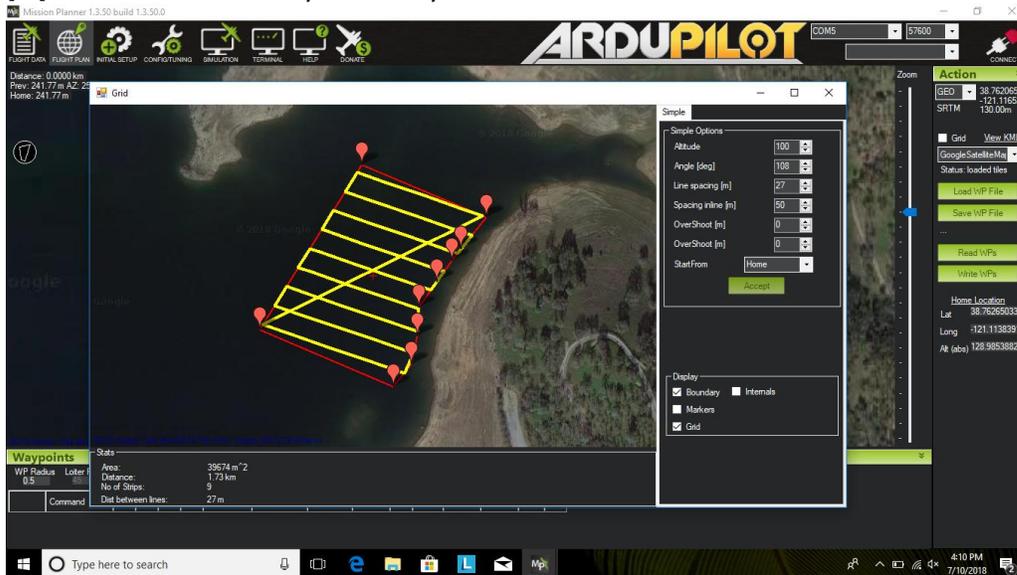
- c. Under subcategory “Display”, **uncheck** boxes for Internals and Markers (while this is not a necessary step, it helps to keep the grid space visuals cleaner).



- d. Under subcategory “Simple Options”, adjust the parameters for “Angle [deg]” that you wish to survey.



- e. Under subcategory “Simple Options”, adjust the parameters for “Distance Between Lines [m]” to suit the needs of your survey.

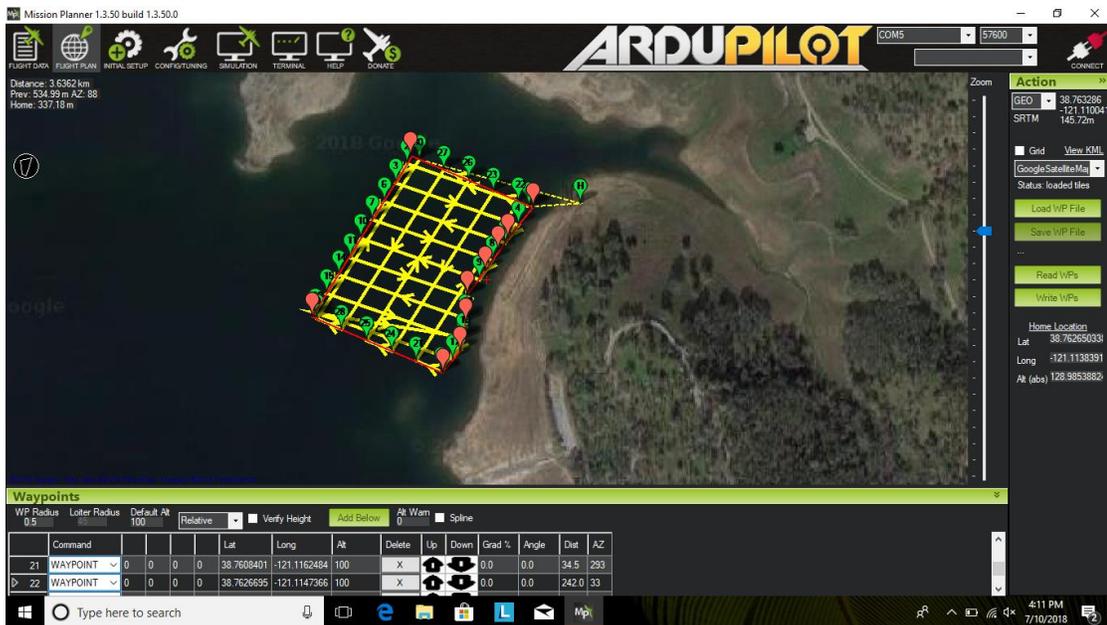


f. Click accept.



5. Creating a grid:

a. Repeat steps 4a through 4c.



6. Write WP file to AutoNav. (You may save WP file for future surveys)

a. This function will save the mission to the AutoNav topside control box.

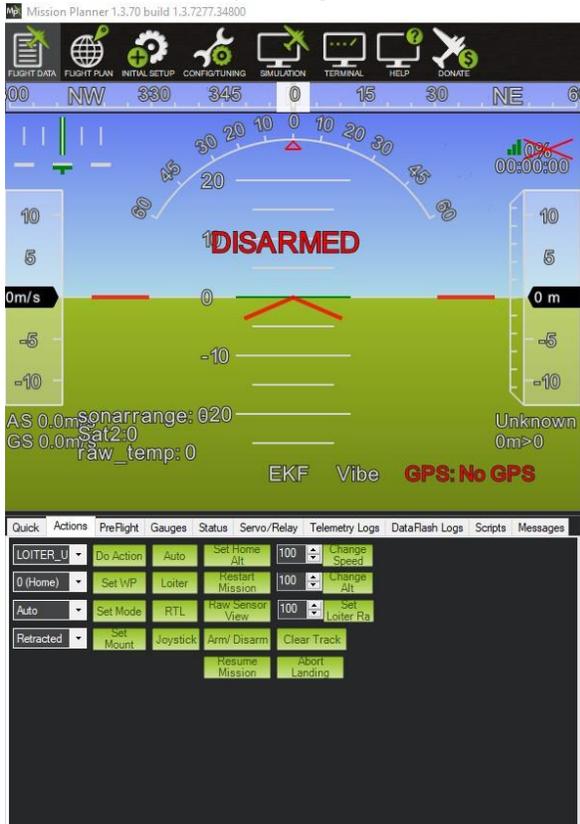
i. To initiate the mission, flip the Auto switch on the Taranis.

ii. EchoBoat will start on its mission shortly after switching from Manual to Auto mode on the Taranis remote. "Write WPs" alone will NOT start the mission.

More Notes for AutoNav Best Practices

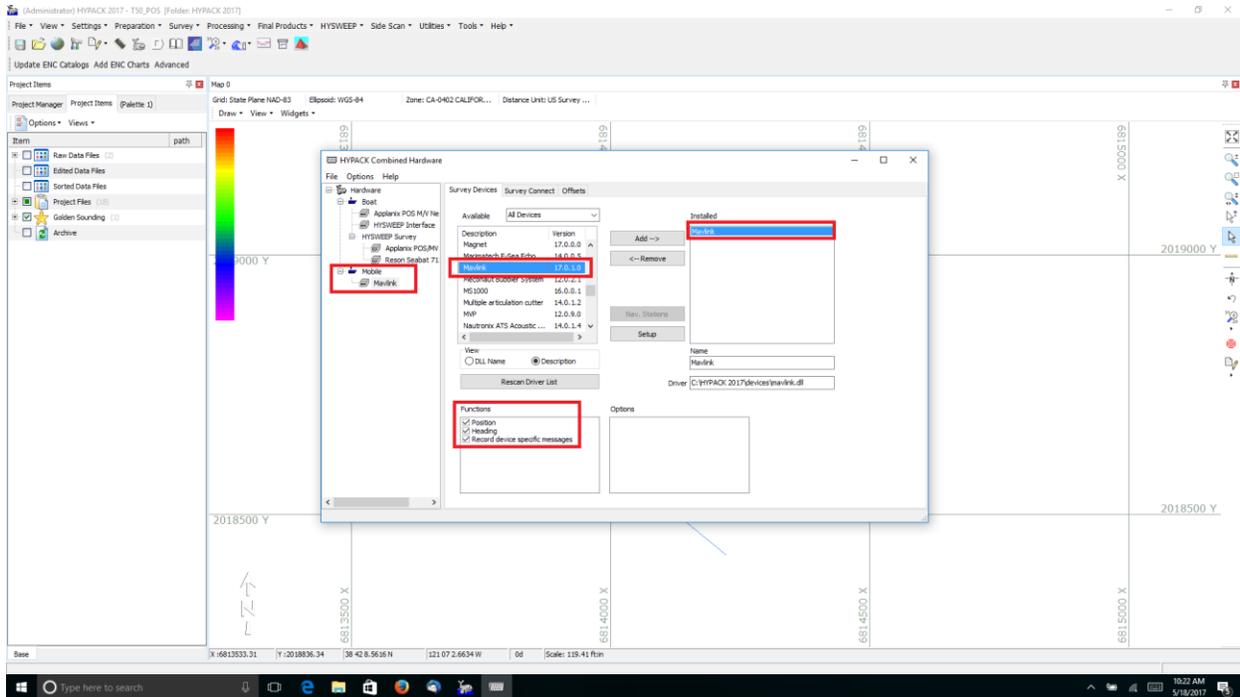
Important: The AutoNav navigates using GPS waypoints. User should flip to manual mode to avoid objects and always maintain line of sight on the USVs.

AutoNav does have a return to home function. It is not enabled on the transmitter. To activate, click back onto Flight Data. Below the HUD, click on Action Tab. Click RTL (Return to Launch) **Be AWARE, it WILL head directly to the location where it was first armed. If there are objects in the way or it was armed on shore, the boat may run aground.**

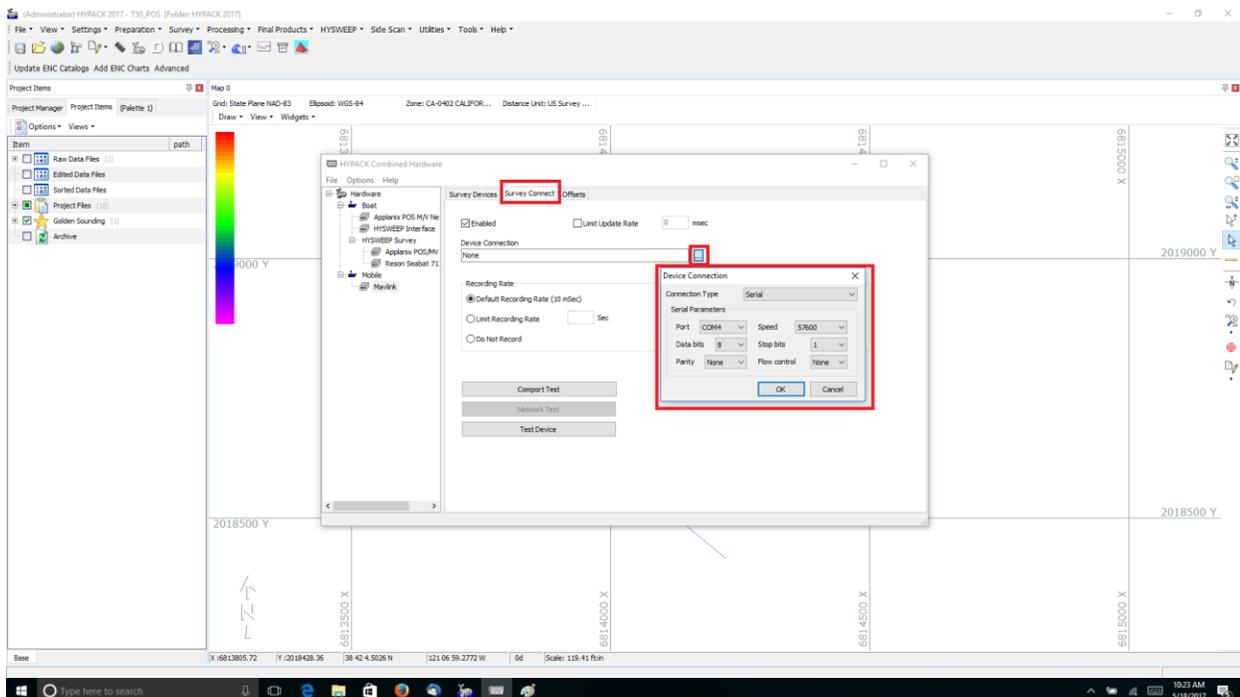


HYPACK Setup for EchoBoat 160

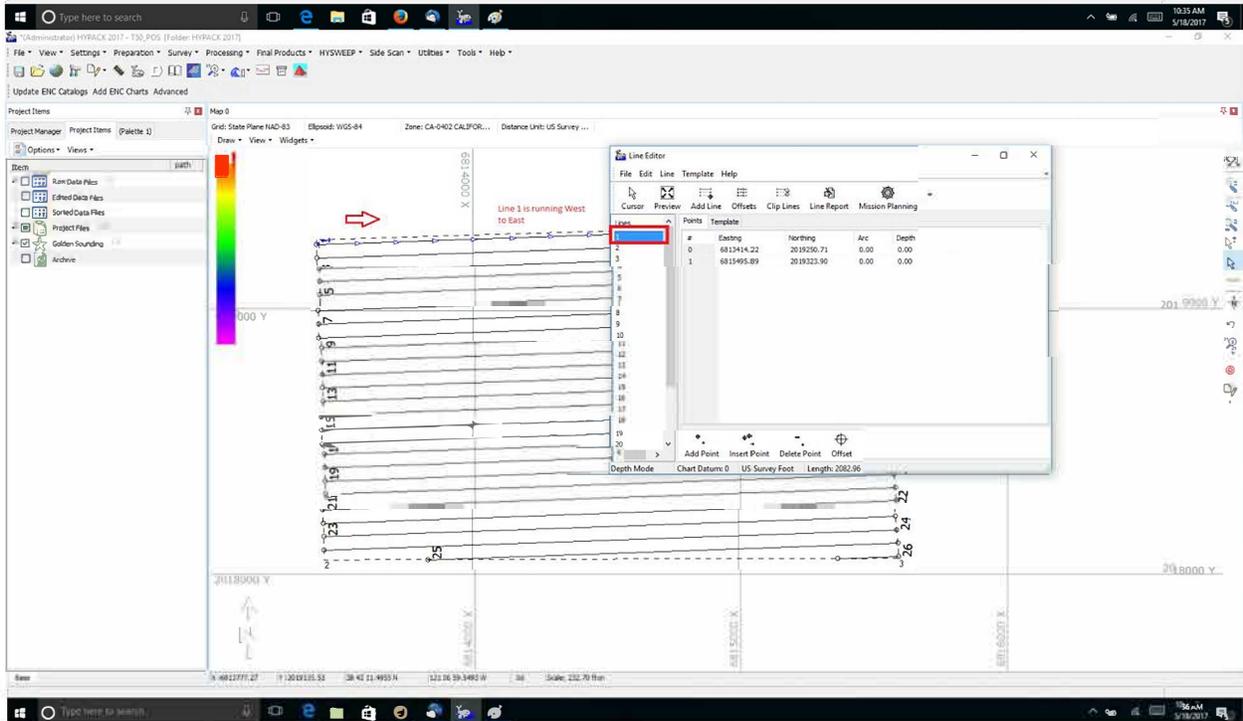
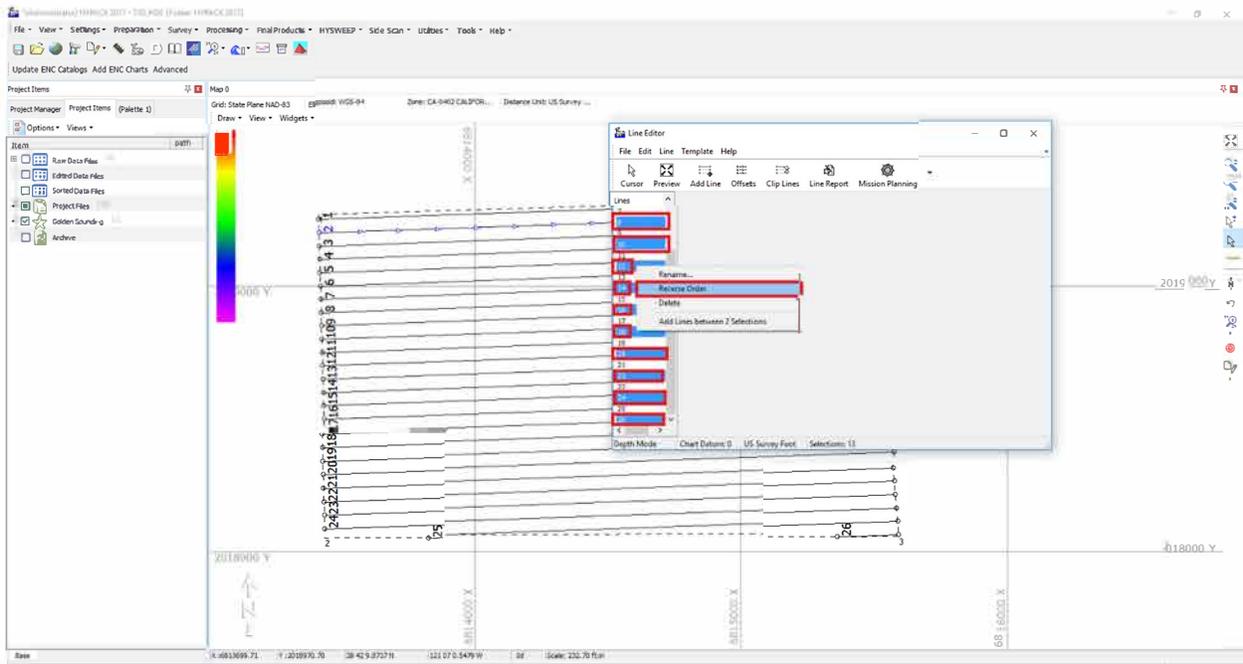
- Open Device Manager to find COM number
- Open Hypack Hardware Setup and add MavLink driver on a new Mobile

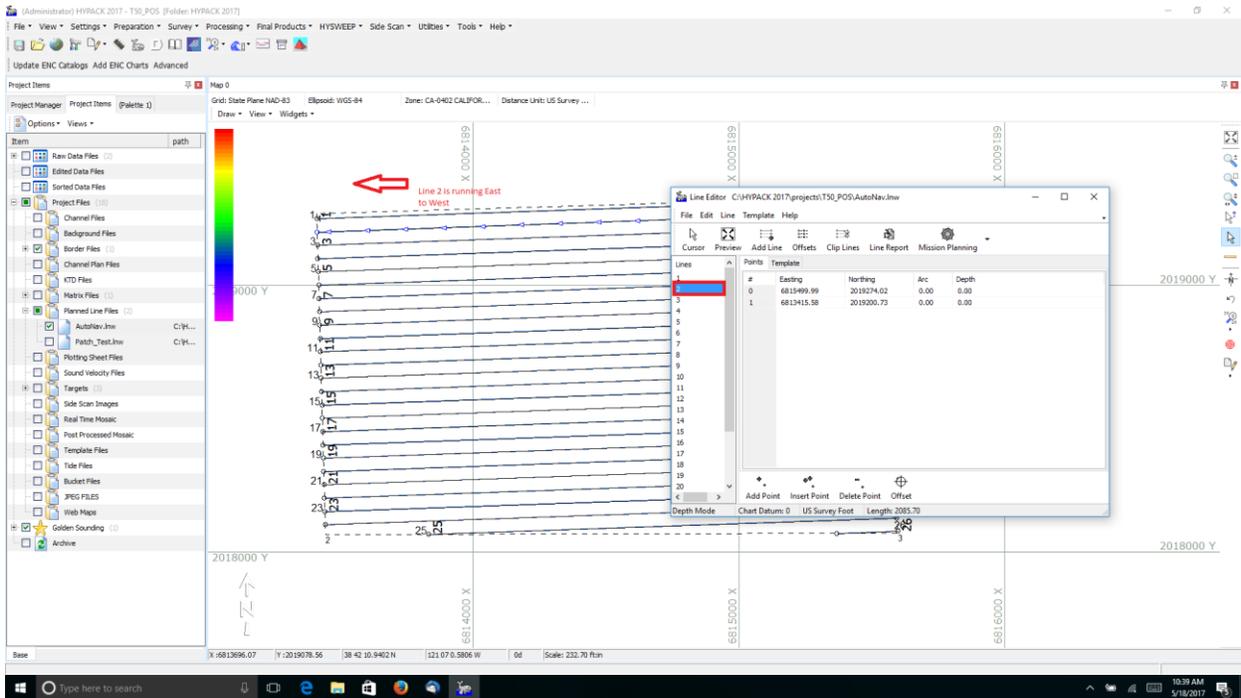


- Set MavLink connection to COM number in Device Manager and 115200 Baud Rate

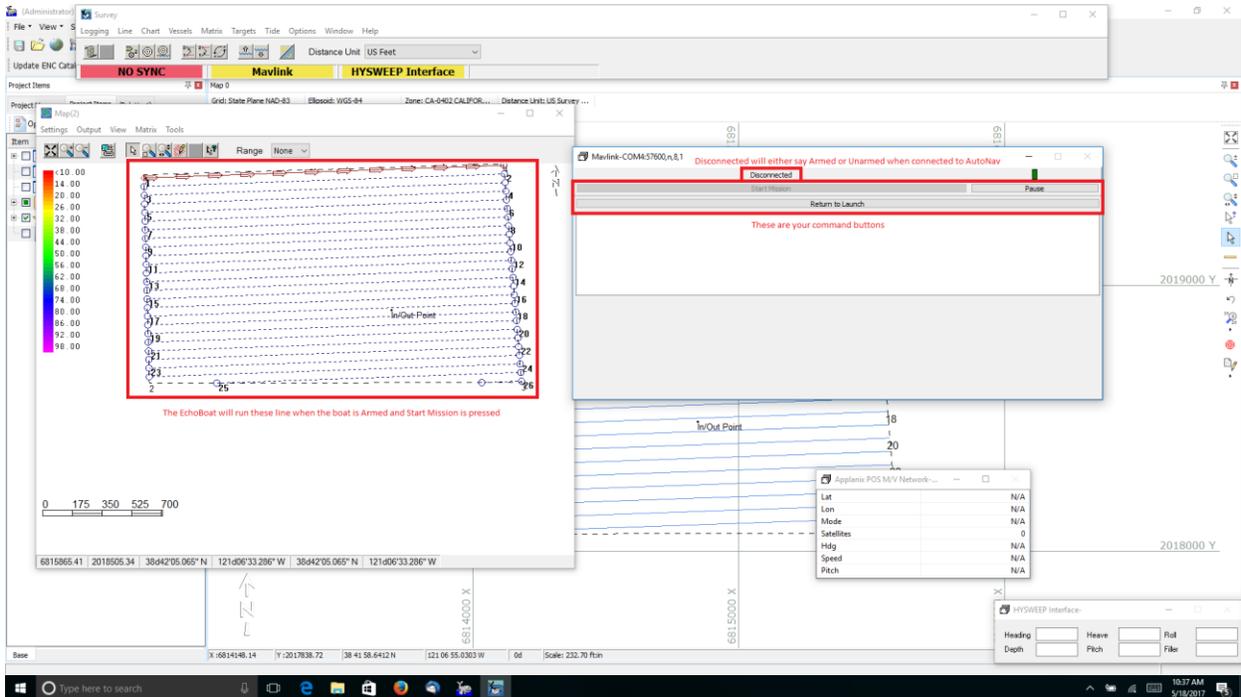


- Create your line plan using Hypack's standard Line Plane Editor
- Select every other line and reverse the direction





- Start Hypack/Hysweep Survey
- MavLink Driver will say Armed

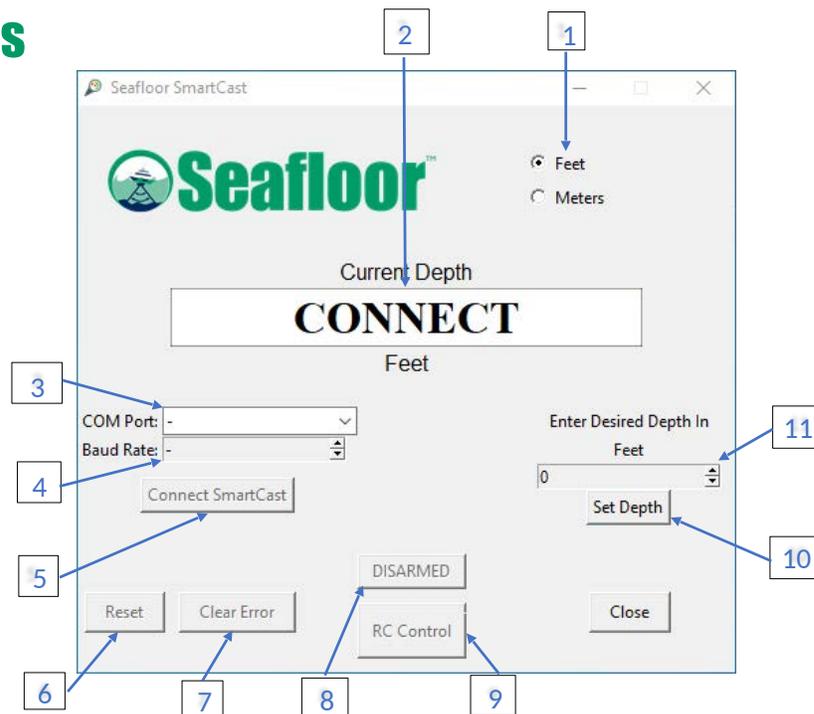


Mavlink driver button functionality:

- Start Mission
 - The boat will navigate the current line file
 - Once “Start Mission” is selected, it will turn to “Stop Mission”
 - Click “Stop Mission” once the boat is finished running all lines
- Pause
 - Once the Mission is started, use “Pause” to regain manual control of the boat
 - Use this to avoid obstacles
 - When “Pause” is selected, the button label will change to “Resume”
 - Use “Resume” to continue the mission after obstacle is avoided
- Return to Launch
 - The boat will take a straight line back to where the AutoNav was last armed
 - Make sure the boat has an unobstructed path if using this function
 - The bottom of the MavLink driver window should say “Flight mode set successfully” whenever one of the buttons is clicked

Smartcast Quickstart

Button Labels



1	Units: Selects the units the system will use; feet or meters.
2	Screen: Displays the current position of the sensor.
3	COM Port: Used to choose the COM associated with the SmartCast.
4	Baud Rate: Used to select the baud rate between the app and the SmartCast. Automatically fills to 57600.
5	Connect SmartCast: Connects the application to the SmartCast hardware.
6	Reset: Used when the system is armed to bring the sensor to the mast and reset the current position shown on the screen to zero.
7	Clear Error: Used to clear the continuous error caused by the sensor getting stuck on something underwater.
8	ARM: Used to arm/disarm the device for automated casting.
9	RC Control/Cast: Displays "RC control" when the system is not armed and is used to send a cast when the system is armed.
10	Set Depth: Used to confirm the value set in Desired Depth (11).
11	Desired Depth: Arrows are used to choose a depth for the sensor to go to.

Setting up the SmartCast

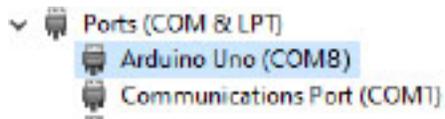
Step 1

Double click on the SmartCast icon on the desktop



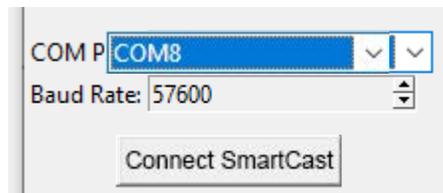
Step 2

If not known, find the COM port labeled "Arduino Uno". This can be done by typing "Device Manager" in the search bar in the bottom left corner of the screen. Once there find "Ports (COM & LPT)" such as the example below and record the COM port number (in this case COM8)



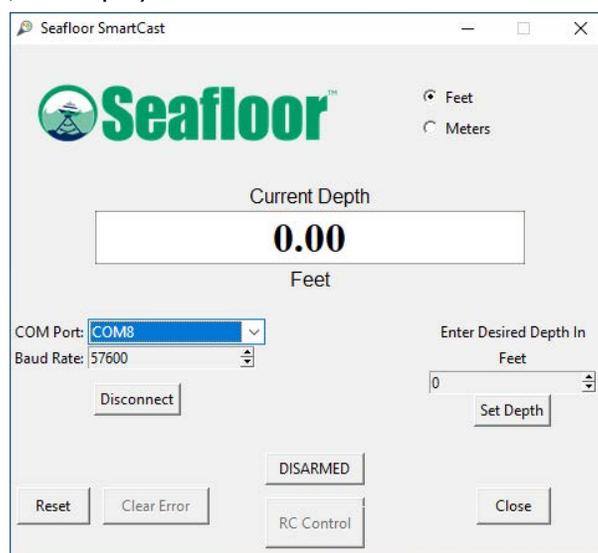
Step 3

Set the COM port from the drop-down menu and set the baud rate using the arrows, only the value 57600 is available.



Step 4

Click "Connect SmartCast", the display should look like the one below if everything was done right.



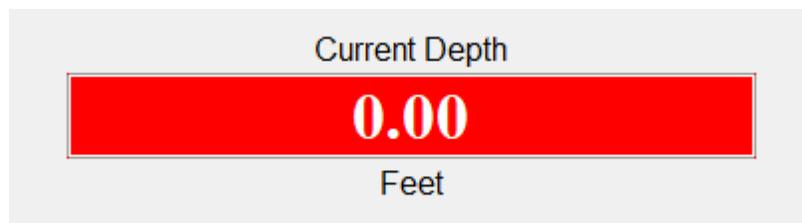
Casting with RC

Use the RC controller to drop the sensor to the desired depth, the current depth of the sensor can be read on the screen.



Be careful to not run the sensor into the ground as it can get stuck, the recommended maximum depth is 90% the distance to the bottom of the body of water.

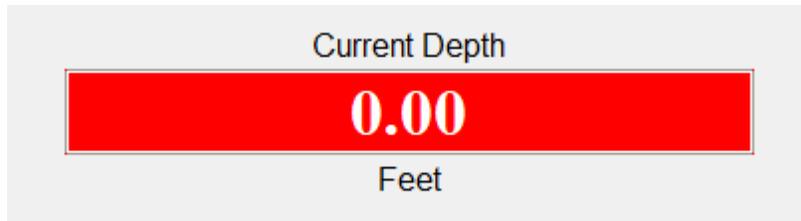
If the sensor is at the home position but the on-screen display shows something different than 0.00, the device can be armed to reset that value to 0.00 for more accurate and measurable casts. The system can be disarmed by again clicking on the arming button.



Making an Automated Cast

Step 1

Arm the device by pressing the DISARMED button, the system will run the motor up to the home position and reset the position value at that point to 0.

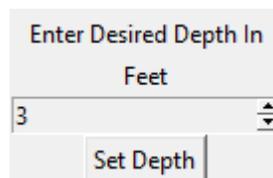


Step 2

Choose whether the cast will be set in feet or meters.

Step 3

Choose the depth the sensor will be cast to and confirm the value by clicking the “Set Depth” button.



Step 4

Click the “CAST” button to begin the cast.

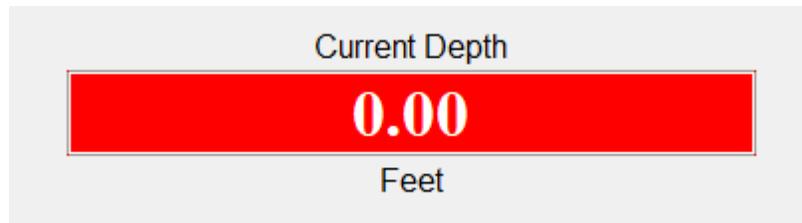


Once the cast has begun the system will again reset the “Current Depth” to zero. Next it will descend to the desired depth, pause for two seconds, and then come back up and reset “Current Depth” a third time. After this the system will disarm itself.

If the sensor hits the bottom of the body of water before the desired depth is reached the cast will stop prematurely and return to the home position.

Stuck Underwater

If the system cannot pull the sensor up out of the water it will go into a continuous error, stopping casts from being made but still allowing RC control and motor control.



Use a combination of RC control and maneuvering the boat to try and free the sensor. Once the sensor is free the "Clear Error" button can be used to clear the continuous error and allow the system to be armed again.

Important Tips

1

-Do not run the SmartCast while the boat is moving quickly, or in a heavy current.

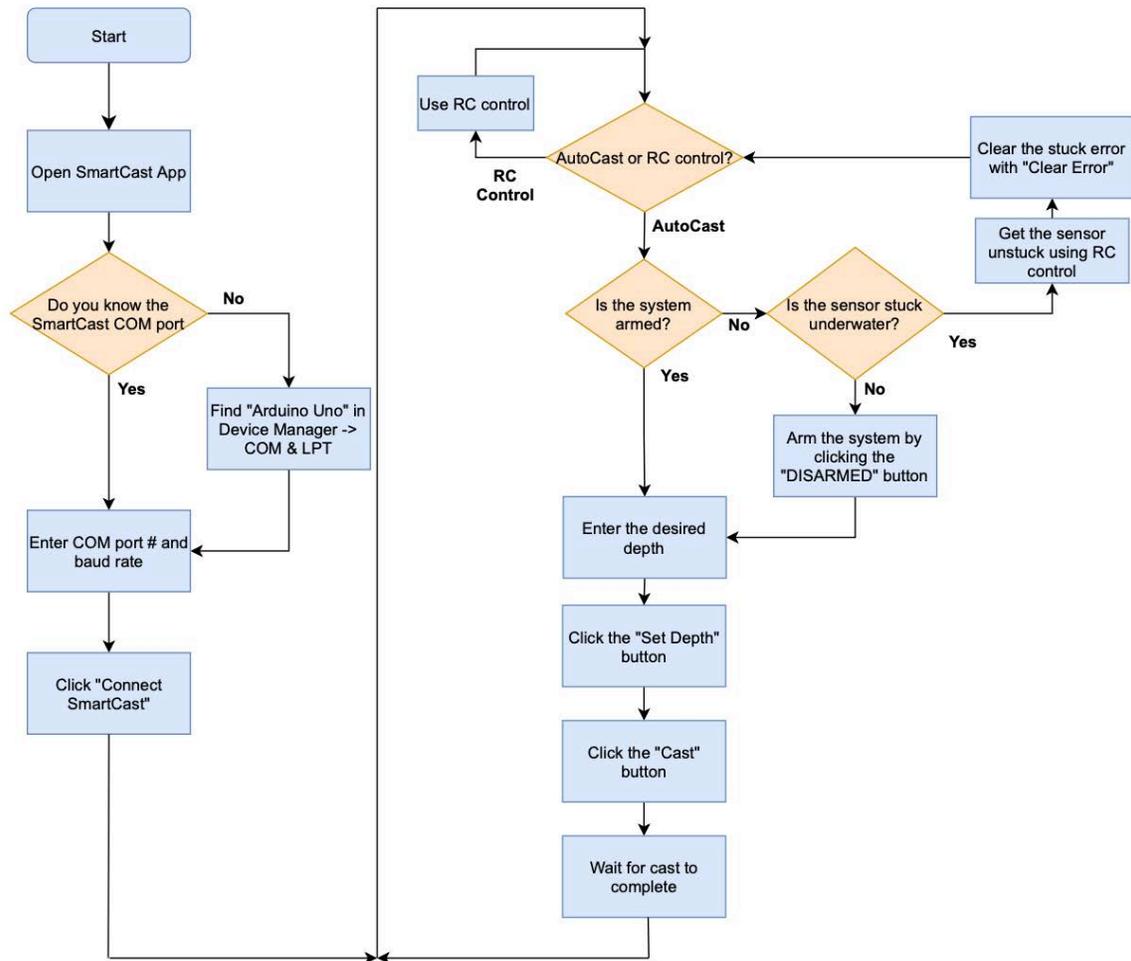
2

-If a depth is set but the “set depth” button is not set, when the cast button is clicked the last cast value will be used. A new depth does not need to be set if the same depth is desired.

3

-It would be good practice to unspool and respool the line before every mission to ensure the line does not become tangled. Tangled lines can result in the direction of motion to be reversed or large amounts of line being released at once, both of which can stop the SmartCast from functioning properly.

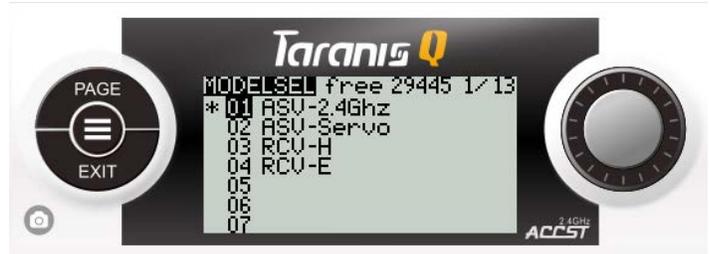
User Flow Chart



Remote Pairing Instructions - ASV

Taranis Q X7 Remote

- If your remote won't connect to the boat, follow these steps to pair the remote to the receivers:
- With the remote on, tap the button with the 3 lines to get into the main menu. (NOTE: do not hold the button or you will be in another menu)
- This page is the model select screen. Verify that you are on the correct model for your boat.
- Press the page button until you are on "Setup" (2/12). Scroll down (using the knob on the right) look for "Internal RF Page". If it is "off", set to "access", set "failsafe" to "custom". Continue to scroll until you see the "Reg" option.
- Once there, press on the center of the knob one time and a new menu will pop up.



Find the RX8R and R9 receiver in the boat (top of mast in white box).



- On the RX8R and R9 there is a small switch next to the LEDs. Use a small object to press this switch down and turn the EchoBoat. After a few seconds you will see this screen on the remote.



- After selecting enter a success screen will pop up and the receiver will also show a light sequence once registered

- Select the enter option and turn off the EchoBoat. Next go down to the “BND” option for “Receiver1” on the remote and select it using the knob.



- Turn the EchoBoat on and the page will change, when prompted select the RX8R or R9 option.

- With that done the pairing is now complete and there will be a solid green light on the receiver.



EchoBoat-160 RCV / ASV Remote Calibration

Perform these steps if your vessel appears to not respond promptly to commands send via remote:

1. Hold down button on left side with three horizontal lines



2. Navigate to the 6th page where you should see this screen



3. Using the silver button on the right select [CALIBRATION]
4. Press the silver button once more to begin the calibration
5. Move sticks and points to midpoint and press the silver button to confirm



6. Move the sticks and points along each extreme top, bottom, left, and right. During this step the knobs should be turned to their extremes as well. Finally press the silver button to confirm



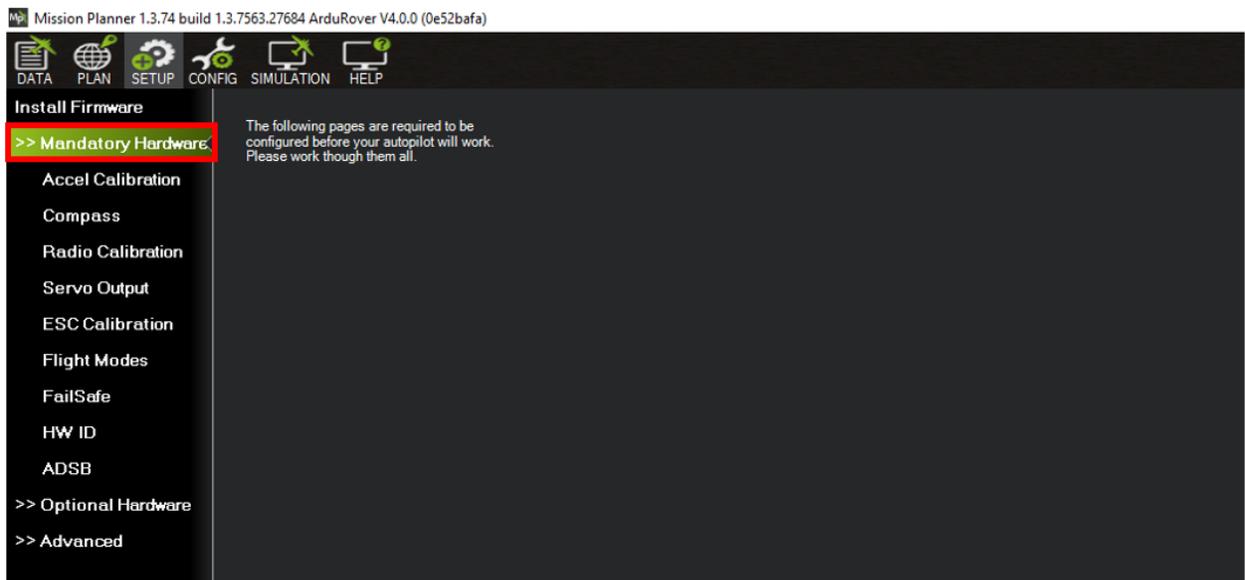
7. Your transmitter should now be properly calibrated

AutoNav Radio Calibration Instructions

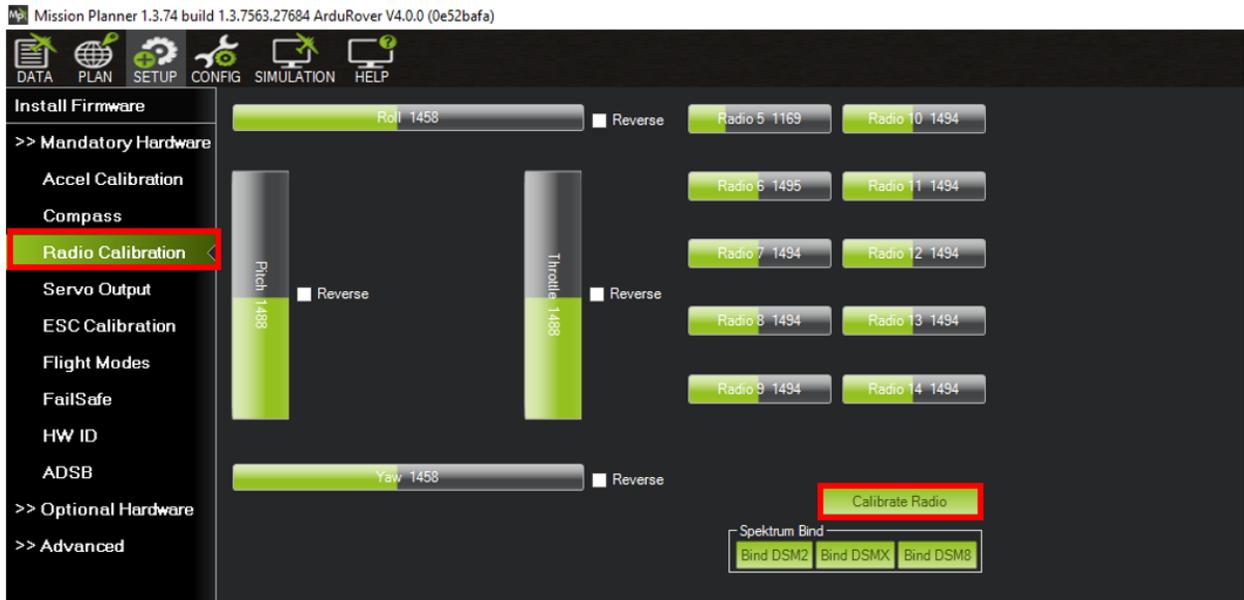
1. Turn on your transmitter and AutoNav, and connect to Mission Planner.
2. Press the button in the top left of the program labeled "SETUP"



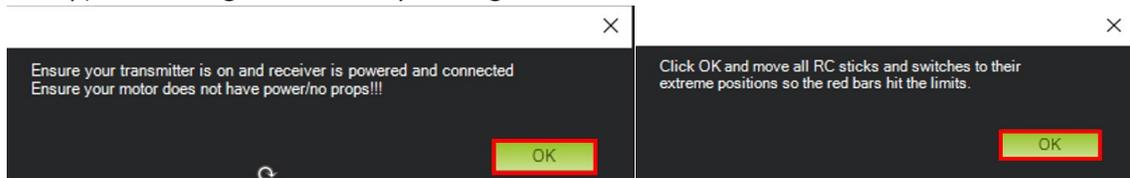
3. Next press "Mandatory Hardware"



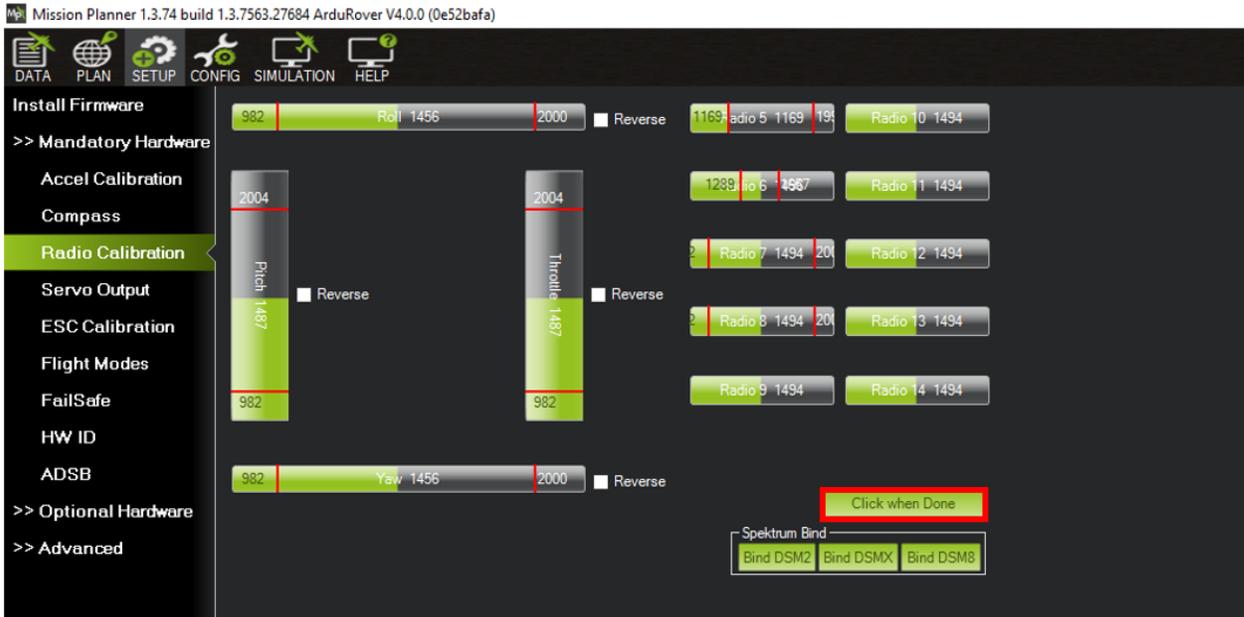
4. Next click "Radio Calibration", once on the page click the button labeled "Calibrate Radio"



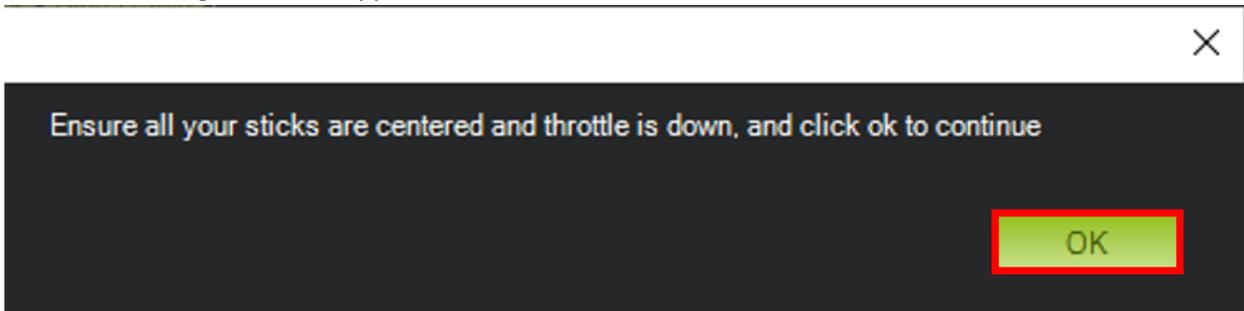
- Two dialogue boxes will appear. The first is a warning that the boat should be unpowered, if this is not possible then make sure the ESCs that control the motors are switched off or disconnected. The second box gives directions on what to do during the calibration (see next step). Get through the boxes by clicking "OK".



- Move every stick, dial, and switch on the RC transmitter to its' extremes, including full arm and disarm procedure. Generally, each channel will range from around 1000 at the low end to around 2000 at the high end, but this is not always the case. The extreme positions will be marked with red lines on each of the indicator bars. When confident that all sticks have been moved, finish by clicking "Click when Done"



7. A final dialogue box will appear, center all the sticks and switches, and then click "OK".



8. You are now done with radio calibration.

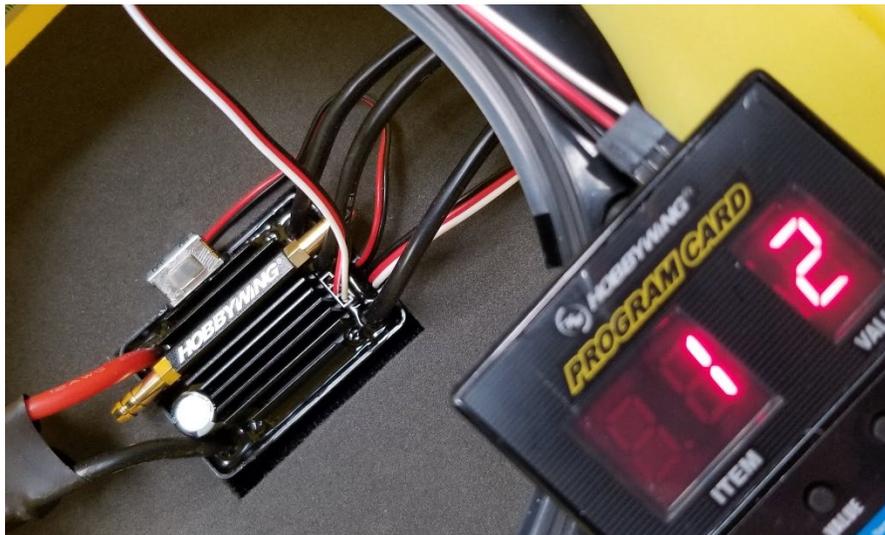
EchoBoat-160 120A ESC Program Card Instructions

Perform these steps if your vessel doesn't appear to give thrusters full power when the throttle is pushed completely forward:

Plug the included wire into the programming slot on the programming card. The wire should match what is shown below.



Ensure the boat has power and plug the programming card into the port on the ESC. The programming card will start up as soon as you turn the boat on.



EchoBoat 120A ESC Program Card Instructions

Next, program the ESC using the charts below. This is a chart of the ESCs settings, highlighted are the ones we use.

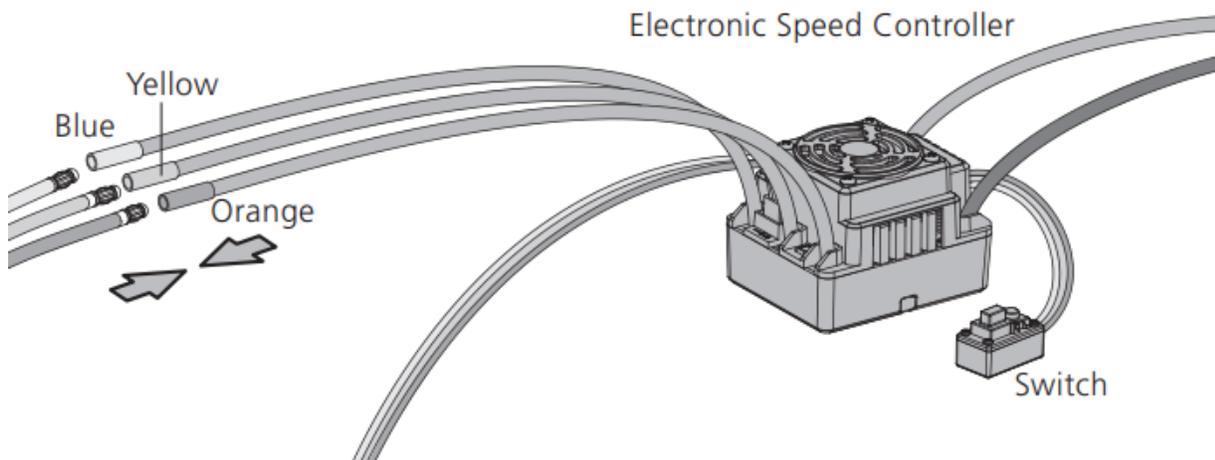
Programming for ESC (highlighted are default)

Programmable Items	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
1. Running Mode <i>Note 1</i>	Fwd/Br	Fwd/Rev/Br	Fwd/Rev						
2. Drag Brake Force	0%	5%	10%	20%	40%	60%	80%	100%	
3. Low Voltage Cutoff	Disable	2.6V/Cell	2.8V/Cell	3.0V/Cell	3.2V/Cell	3.4V/Cell			
4. Start Mode (Punch)	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9
5. Max. Brake Force	25%	50%	75%	100%	Disable				
6. Max. Reverse Force	25%	50%	75%	100%					
7. Initial Brake Force	drag brake force 6%	0%	20%	40%					
8. Throttle Range	(Narrow)	(Normal)	12%(Wide)						
9. Timing	0.00 deg	3.75 deg	7.50 deg	11.25 deg	15.00 deg	18.75 deg	22.50 deg	26.25 deg	
10. Overheat Protection	Enable	Disable							
11. Motor Rotation	CCW	CW							
12. Cell Count <i>Note 2</i>	Auto-identification	2S LiPo	3S LiPo	4S LiPo	5S LiPo	6S LiPo			

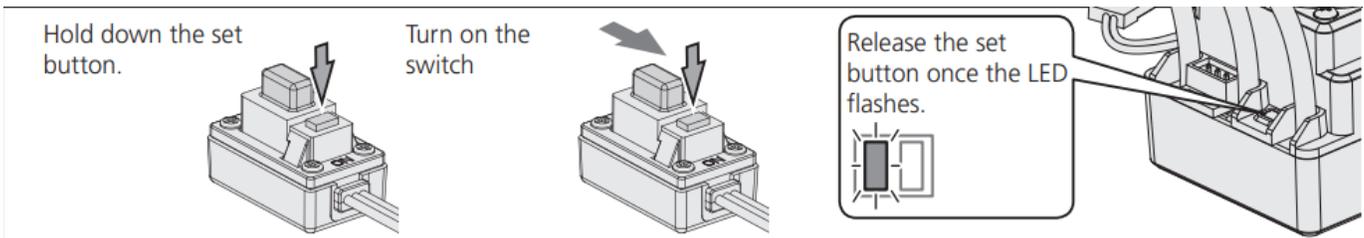
EchoBoat Default settings:

- 1:3
- 2:1
- 3:4
- 4:5
- 5:5
- 6:4
- 7:2
- 8:1
- 9:1
- 10:1
- 11:1
- 12:1

ESC Calibration Procedures

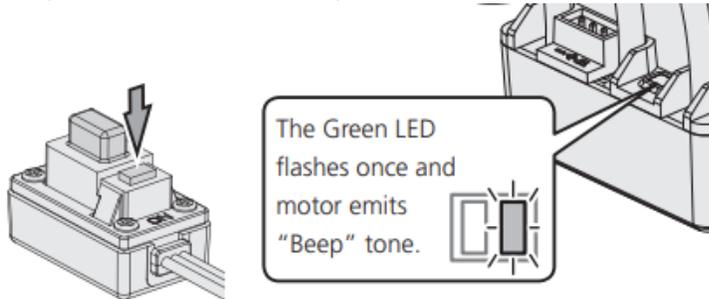


Calibrate one Thruster at a time. Turn off both Electronic Speed Controllers (ESC).
AutoNav must be armed.

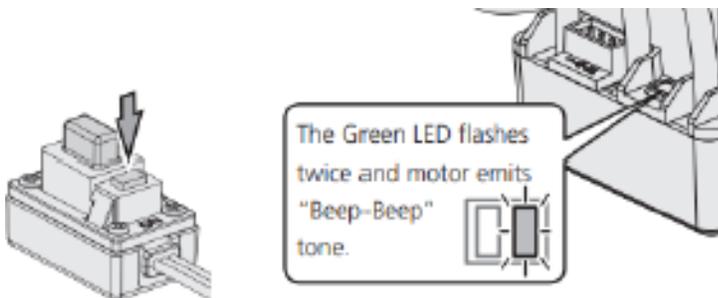


Must not hold the set button longer than 3 seconds, otherwise it will go into programming mode.
Turn off the ESC and try again.

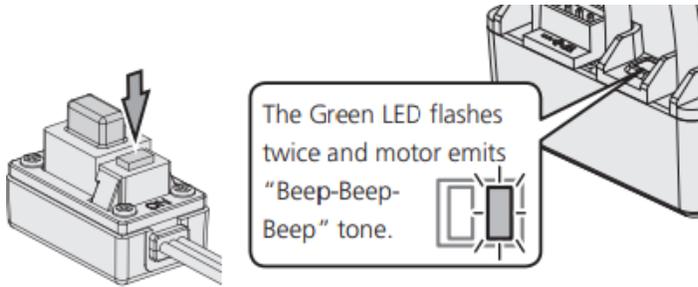
Keep throttle in the neutral position. Push set button.



Push throttle into full forward position. Push set button.



Push throttle into full reverse position. Push set button.



Once the tones finish, turn off the ESC and repeat for the other side.

Maintenance

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

- To prolong the life of the HDPE hull and finish, wash with mild soap and water after each use.
- **IMPORTANT** Rinse EchoBoat after use in saltwater and clean out biofouling and debris as needed.
- Do not run the thrusters at high speeds for for an extended period out of the water to minimize noise and wear.
- Check the access hatch gasket for cuts, cracks or deformation. This gasket seals the internal hull area from water intrusion and should be checked frequently.
- Lube gaskets yearly with silicon or silicon based lubricants.
- 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.
- Check to make sure all EchoBoat hardware is tight.

CLEANING AND REPLACING THRUSTERS

Step 1



Clean thrusters periodically to prolonging thruster life.

Step 2



With $\frac{3}{8}$ th 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 the motor shaft while pushing the propeller off of the 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 with a non-abrasive brush.

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. Alternatively, you can remove the set screw and pull the two pieces apart for better access.

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 unplug the white, blue, and green wires one at a time from the HyDrone. 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, down the wire from inside the hull. Plug wires back into wiring harness and tighten compression fitting.

Step 11

Reverse these steps to reassemble thruster. Apply loctite to the bolts.

Warranty



GUARANTEE

All products sold by Seafloor Systems Inc are inspected and adjusted individually before leaving the manufacturer and are guaranteed to be free of material defects and manufacturing faults when new.

General Warranty Policies

Seafloor Systems Inc warrants all products to be free of material and workmanship defects for a period of 365 days from date of purchase for all electronic components and 365 days for all non-electronic components. If a component is defective or was not correctly made, Seafloor Systems Inc will, at its sole discretion, repair or replace the item free of charge. This is a non-transferable warranty and does not cover normal wear and tear, crash or water damage, modifications, failure to perform routine maintenance, or any damages arising as a result of improper use.

EchoBoat-160 Warranty

Seafloor Systems, Inc. makes every effort to ensure its products meet the highest quality, reliability and durability standards and warrants to the original purchaser or purchasing agency that each EchoBoat-160 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 EchoBoat-240 for purposes other than water measurements.

Seafloor is not responsible for loss of boat, instruments, damage to property, and 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.

John Tamplin (Seafloor Systems President)



Change of Record

11-9-2022 Creation Date (v1.0)