BathyNav Autopilot Quick Start

This BathyNav kit will turn your RC bathyCat into a autonomous survey boat.

Equipment Supplied

- Autopilot Control Box
- Radio Telemetry USB module

Please Read: Buyers that have used "Mission Planner" software will be ready to go. Those who have not will realize the Autopilot system is complex, it requires time to learn, setup surveys and run test missions. Be prepared to task someone to initially learn the system. We have made a pretty thorough video manual that should cover all the steps of turning your RC BathyCat into a Autonomous unit.

Features:

1. External GPS RS232 input
2. Waterproof USB input for connecting to Mission planner over USB cable
3. Left & Right thruster control cable

4. 915 mhz Telemetry antenna
5. Clear Lid for easy Diagnosis

The BathyNav has a TTL converter system so you can bring an auxiliary NMEA GPS string out of your GPS receiver. All survey GPS have this capability. Simply choose GGA and RMC in the NMEA output setup and bring it to the autopilot via a RS232 cable. Now the Autopilot has the same accuracy as your Survey.

First things First: Please watch the BathyNav video user manual in full at least once. Everything is covered in greater detail in the video.

Futaba T6K Basic Operation With the AutoPilot on the BathyCat we use only the right stick to control all the Vessel movements - forward /reverse/right/left.

Note: An RC BathyCat is synced to the Receiver in the BathyCat. The Futaba Transmitter and the Receiver in autopilot need to be synced first before you go through the steps below. If this was not performed do it now.

Load Mission Planner on Laptop

The First task will be to load the mission planner software on the Survey laptop you will be using.

http://firmware.ardupilot.org/Tools/MissionPlanner/

Note: all versions should work fine- 1.63.61msi is verified to work and is under the **archive** section.

Performing a Autonomous Survey

Important: Run through all steps below at your office or a test location before going in the field. "practice makes perfect."

1. When I Arrive at a survey location I place the BathyCat in a open area parallel to something I can easily determine if the heading is correct while looking at it in Mission Planner. Install the Lipoly batteries in the BathyCat.

2. Next in this order I Turn on my Laptop and insert the radio Telemetry Antenna. I open Mission Planner software. I then insert power cable in the Autopilot box in the BathyCat. I next turn on the GPS and make sure all cables are hooked up to the Autopilot box including the Steering right and Left Cables to the Thruster Speed Controllers.

3. After checking the port in Device Manager, I Connect the Autopilot in Mission Planner,select the com port and Baud Rate 57600 when using radio telemtry. Mission Planner should load the params, progress will show with a green line.

4. On the screen I will see a display on the left side with some gauges below. I should see GPS Fix in this small display and also a boat shape on the main screen showing my position of the Bathy Cat. Zoom into a comfortable range. Is the actual Boat headed in the same direction as the red line and boat on the screen? If not you can give it some time to fix itself or you can add some + /- to the x,y compass offsets to adjust. Your GPS must be fixed and the heading must be correct to complete a autonomous survey in Mission Planner.

5. I next turn On my Futaba Controller, clear warning beep, move sticks to center, channel 5 (on top left) is in "M" manualposition, Channel 7 (RTL) is up. I then turn on the Switch on the BathyCat. You should hear a 3 beep sync. Test that the props are moving in sync by standing behind Bathycat and give on click forward , then one click backward. Center Sticks and leave for now. (Prop specs are covered in the BathyCat Video manual)

5. Click on Flight Plan at the top. I like to first click "home location" on the right side. This will bring my home location to this spot. The Survey is already made in the saved Waypoint file in the . Load Waypoint file. I like to write waypoint file. then read waypoint file, the write waypoint file again. This clears out any old missions. Note the parameter "MIS Restart is set to "1" this will restart mission anytime you go to manual mode. Setting this to "0" will allow you to resume mission.

6. In manual Mode Drive the Bathycat to a position near the first waypoint, face it in that direction and flip channel 5 - 2 clicks to the "A" Autonomous position. The BathyCat should not start its mission.

7. Note the BathyCat is set to achieve .9 m/s , if you do increase I would not go past 1m/s , this speed may seem slow, but it will get the best survey results and the battery life will be very long.

8. When the Mission is over, Flip to Manual and drive it back or flip Channel 7 for Auto RTL "Return to Launch"

If you have any Questions please email info@bathylogger.com or Call 530-387-7556. Also visit our BathyCat FAQ on the Support page of the Website.

Bathymetric Surveying 101

Typically survey speed on a boat is 2-4 mph and you would work in a back and forth pattern , line spacing will be determined by how large the area is and how much detail you need. I usually survey line in the perpendicular direction to form a grid. This ties the lines together and creates a more accurate finished product. Ping rate is also a factor you can adjust that with our Bathylogger software.

As the surveyor you control the amount of points you log. For us in the Hydrograpghic community using Hypack or Hydromagic we are used to collecting a lot of points. The Land Surveyors are not typically used to this and space soundings out quite a bit. River crossings may not require a lot of points, but pre and post dredging and bridge scouring surveys it would be beneficial to have dense data to create an accurate map of the bottom.

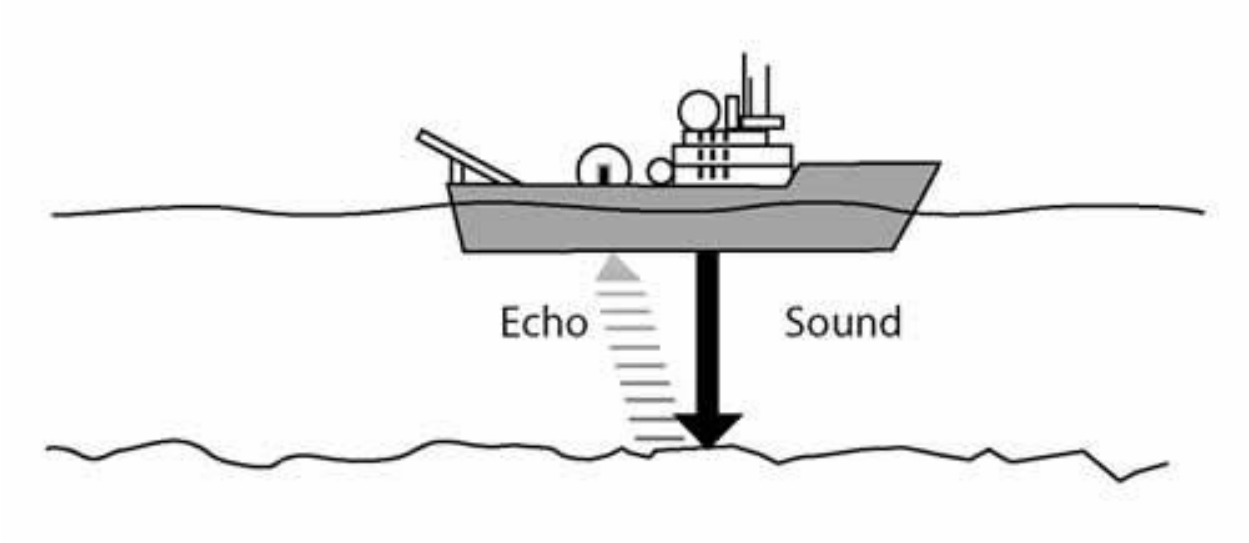
When you get around 1.3 feet (.39m) of water depth you may experience what's called double or triple returns. The sounding will appear deeper. All 200Khz transducers will do this, just keep that in mind.

Vegetation can give echo sounders problems. If its thick enough it will give false readings or zero depth readings. Despite popular belief A dual beam is not the answer as you will also get bottom penetration readings and not actual seabed with a low 30Khz transducer. Options are use a rod in these areas or wait until after winter while the vegetation is dead.

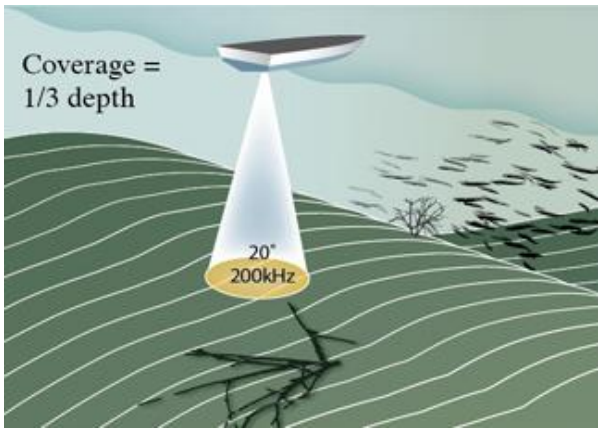
The sonar cone is 9 degrees and would look like a upside down ice cream cone. If the transducer is close to a seawall , piling , dock etc. it will take the first and nearest return which may not be the seafloor.

Sonar FYI

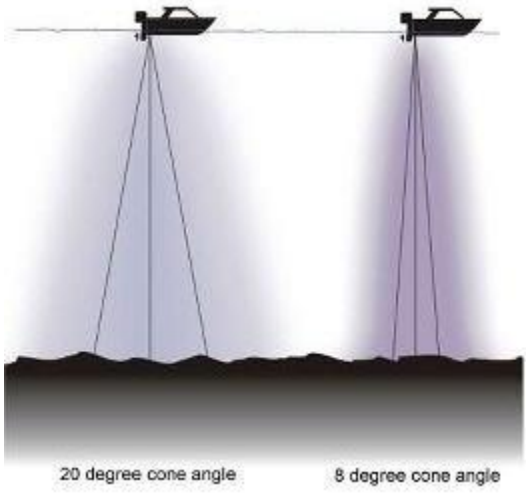
Echo Sounding Sonar uses the time interval between a series of soundings and echos (pic one) for several purposes like range finding (survey) , fish finding or imaging. The bathy logger is a singlebeam , single frequency echosounder made for conducting survey grade bathymetric surveys. Over 90% of bathymetric surveys in the world are still done with single beam echosounders. Survey Echosounders have a narrower beam (cone) and can not see fish in the water column. We just want to track the bottom and interpret the returns differently then a fishfinder. In pic two you can see the difference of the beam angle.



The sonar cone is similar to a upside down ice cream cone. An echo sounder will take the first return it gets within this cone, so slight movement of the cone wont affect getting the first return directly below the boat. Typically survey's are conducted as slow as possible 2-4 mph and working the survey back and forth similar to the lines on a football field. Also going in the perpendicular direction will form a grid and really tie the survey in nicely.



Example Sonar Cone



Example of beam width