

## **CERBERUS SYSTEM#22**

### **FieldTest#3 01/17/2014**

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- **Weather conditions:**

Weather good, low wind, current in shore SW, 0.2knts, 0 wind waves, swell W 1-2ft at 13secs.

- **Sky state during data collection:** Hazy, 1/8

- **Boat Platform used:** Fish 2

- **Physical setup & Profile parameters:**

Pre-test battery voltage at terminals 26.74vdc, Voltage under thruster 26.65v  
End voltage measured at terminals 26.71vdc.

Surface Reference mounted on Stbd side of boat house.

4lb drop weight attached under boat. Same position as Fieldtest#2.

Profile parameters:

Target depth: 15m,  
Ascent depth: initially 0.3m  
Thruster Ascent power: 50%  
Ascent ramp down depth: 0.5m  
Ascent Ramp down speed: 0.5

- **Schedule & # of profiles recorded:**

3 profiles, 1 Shadowband and then 1 short wait period of approx 6 mins.  
12 profiles recorded continuously. Other small numbers of profiles recorded as tests were made.

- **Tests Performed:**

Lithium batteries for complete system power supply tested. Not charged after Field test #2, trying to log hours of use to monitor overall Voltage drain.

New Panasonic Toughbook 'Leviathan' tested.

All tests completed over Buoy wireless system.

Darks and Pressure Tare performed on boat and then pressure Tare performed again on surface in water.

System on-deck ambient light test performed, unit rotated so all sensors exposed to sun.

System tested in 'Auto schedule' mode and 'Manual schedule' mode. Attempting to keep parameters as much the same as previous field test for comparison.

Adjusted Thruster to be as Horizontal to the backplane as possible.

Removal of the single weight from the backplane, located opposite end of the unit than the thruster.

Test of thrusted ascent from 40m 'Parked' depth versus 15m "Target depth"

- **Results observed:**

Batteries functioned well, no significant load issues with thruster powered or off.

Panasonic Toughbook worked well, battery life excellent.

Wireless takes 5 complete mins to come up properly but works fine under Windows 7.

The system started in Manual Schedule mode as per Fieldtest #2 and only did 1-2 profiles before errors (21 errors) appeared in the Sample indicator bar of the buoycomp software. Recovered system and checked for any mechanical or connection issues, saw no problems.

Restarted Buoycomp software and errors disappeared. **\*Note: The log files should be looked out to observe the errors and be passed on to Vi at Biospherical along with our software questions\***

Due to low current when we redeployed the system we observed some loops in the cable that did not come out even after the system did a couple of profiles. When redeploying this doesn't happen again if care is taken to let the cable out slowly and 'drive' the unit away under thruster power.

At this point the system was running in 'Manual Schedule' mode but appeared to still be ascending at too steep an angle and was having difficulty getting the pressure sensor to

hit the target 0.3m and accept this in software. This causes the profile to abort and restart.

We recovered the system adjusted the thruster as per Biospherical's reply to be as horizontal as possible.

Software also froze up on us at this point when we were changing schedule parameters and moving from Manual to Auto mode. Needed a hard restart on the Buoycomp again. Also **\*Note: the schedule restarted whilst on deck and powered up the Thruster!**  
**More questions for VI\***

Restarted Buoycomp again and Buoycomp froze up another time. We waited to observe any lag from wireless etc but no response. This necessitated yet another hard restart.  
**\*Note: send logs to VI\***

The system was restarted in 'Auto schedule' mode to see if the target ascent depth is reached or accepted differently running in that mode. Deployed the system and achieved some profiles but it still had a lot of time on the surface trying to reach the 0.3m target.

So now with the thruster already adjusted as far horizontal as possible we removed the single weight from the system that was mounted on the opposite end of the unit than the thruster. We observed that the buoyancy was not adversely affected and the unit appeared to still be slightly negatively buoyant.

Restarted the system now in 'Manual schedule' mode at AGAIN the software froze and needed a hard restart of the Buoycomp. **\*Note: Send Logs to VI\***

Due to the software issues delaying the first profile the unit had to ascend from 28m deep. It completed this at an angle of 60deg near the surface but still had some issues hitting the 0.3m target. It did however achieve this and then when descending to only the 15m target depth it subsequently ascended at a shallower angle and started to hit the 0.3m target reliably. The average profile took approx 4mins 45 secs.

The then System ran solidly for approx 1hr 40mins, recording 22 profiles in 'manual schedule' mode. It steadily achieved all the profile parameters finally.

After Profile#22 however the system failed to achieve its ascent target depth by a large margin and aborted and tried to restart the profile. We could see no good reason for this to have occurred. Again **Note: check logs and Q for VI\***

Due to very low current we allowed the unit to fall completely slack to a depth of 40m and observed its ascent compared to driving the unit away with the thruster and allowing the unit to then sink only to its target depth of 15m. This was to simulate a start of profile after being 'parked' overnight versus a regular profile start from target depth. The unit ascended with no problems but the ascent angle was steeper and caused the unit more difficulties in reaching the target ascent depth of 0.3m. Once this was achieved however the system had no issues reaching that depth from 15m depth.

- **Conclusions/Questions:**

We adjusted the orientation of the thruster and this helped reduce the ascent angle marginally. Removing some weight from the opposite side of the unit helped with this angle a lot more and allowed us to eventually reach the target depth of 0.3m. Also the freefall pitch and roll angle seemed a lot better after the removal of this weight. Need to confirm in the data though.

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Overall we recorded twice the amount of data than fieldtest #2. The hardware appears to be functioning well.

The Buoycomp software issues are costing us a large amount of time in the field before we can let the system run for any period of time. We have observed the software 'freezing' when going from Auto to manual and visa-versa now.

We need to get up and running and let it run for as long a period as possible.

Q1) How do we slow the unit descent and allow more loitering at good Pitch and Roll angles?

A: Removing the weight opposite from the thruster end of the unit appears to have helped this, must confirm in the latest data though.

Q2) The Buoycomp software really slowed us down and we had multiple differing episodes of failure and freezing. How can we analyze and narrow down the software issues?

A: Submit a series of questions to Vi and Randy at Biospherical and send them the log of our issues including when we have seen data telemetry errors.

Q3) will the system turn on after being 'asleep'? can we adjust the schedule to simulate a night time break and observe the system 'wake up'?