Pop-Up Major Lessons Learned   
from Gen 3

* **PAY ATTENTION TO TIME TO FIRST FIX**\*\*Main draw on power budget was searching for GPS fix (~60% of total power budget in worst case scenario)\*\* Software changed to search for a single GPS satellite instead of a full fix (requires only a few seconds vs. several minutes)\*\* …From “Major Lessons Learned from Gen 2”

LESSON LEARNED:

<https://www.lifewire.com/time-to-first-fix-ttff-1683313>

“If a GPS device is new, has been turned off for a long period of time, or has been transported for a long distance since it was last turned on, it will take longer to acquire these data sets and get a Time to First Fix. This is because the GPS data is outdated and needs to download up-to date information.”

For Gen 3 buoys (SN 101-105) the software was changed to search for a single fix, and the timeframe to find a fix before going back to sleep mode was set for 20 seconds. We found that buoy XXX had errors sending back surface drifter GPS coordinates at the time of sampling because the buoy was never able to acquire its first fix… we still recovered Iridium coordinates (albeit less accurate than the onboard GPS), and the drifter function of the float is seen as accessory. All data was transmitted successfully. However, for Gen 4 buoys the software was changed to look for a single satellite for 2 minutes, after which, if unsuccessful, the unit would return to its sleep mode.

* **STILL LOOKING FOR BEST MECHANICAL RELEASE SOLUTION** (Another!) new burn wire developed by DBV Technology : Release Block. New design houses circuit board controller and battery pack for burn wire inside the trawl float housing. A brass 7/16-20 bulkhead penetrator provides through-hull connection from battery pack and release board to the release wire.

LESSON LEARNED:

DBV tech was extremely difficult to work with, there was poor communication from Bud Vincent throughout the design and purchasing process. Originally he told me that the new design would result in a $250-$275 per unit cost, final price was $585 per unit (still a reduction from the self-contained cylinder, which cost $750 each). Furthermore, at sea the potting that bound to the penetrator on pop-up SN 211 or 215 separated. Would not recommend using DBV tech for partnerships in the future.

* **CIRCUIT BOARD QUIESCENCE, ADDED REGULATOR**

-Temperature Probe changed to thinner style to reduce ‘temperature lag’ when profiling. Small hole also drilled in side of end cap to improve water flow past probe tip when profiling

-Sea Surface Temperature (SST) could be very desirable and allow for possible funding from NWS because buoys surface at times and locations with very few SST reporting stations. Buoys also worked remarkably well in moderate to high sea state (25-30 kts, 5-8 ft seas)

-SST Probe added to bottom of float

\*\*SST reporting requirements should be investigated and collaboration with NWS should take place to acquire possible funding

-Large number of machined parts (17) added undesirable costs to production

-Number of machined parts reduced from 17 to 8 in favor of off the shelf components and simpler components (such as PCB Mount)

-Temp, Depth, and PAR Data looked great, but more sensors needed for science purposes

-Integrated optional fluorometer

-Integrated small camera for situational awareness

\*\*Cost of fluorometer is still quite high (~$1,500). Opportunities should be explored in the future for developing a low-cost fluorometer

-GPS time comparison showed very little drift in buoys internal clocks (<<1 minute in 6 months).