SOLO II Deployment Instructions

SOLOs contain lithium batteries that require a class D fire extinguisher in the unlikely event that they catch fire. A fire extinguisher should be located in a space adjacent to where the SOLOs are stored. Become familiar with the location and operation of the fire extinguisher. Appendix 4 contains the Emergency Response Instructions/ Material Safety Data Sheet.

All the SOLOs have already been activated and passed the self-tests so they only need to be put in the water at the assigned locations. It is only necessary to perform the self-test again if an instrument has received a shocking impact, such as a fall to the deck, or if there is any reason to suspect that it may have sustained damage. If in doubt, perform the self-test as described in appendix 1 at the end of these instructions at least 1.5 hours before deployment, preferably earlier so the test could be repeated.

The SOLOs are deployed over the side with a lowering line and water release harness inside a bio-degradable cardboard box held together with two bands of soluble PVA tape. The box protects the delicate parts of the float from impact during deployment. Once in the water, the tape dissolves, the box unfurls and the float is released.

Locate the float with the correct serial number. Each float is clearly marked with its serial number on the outside of the box. If the serial number is assigned a specific location for deployment, make sure to deploy the right serial number at the specified location. Never stand the box on its light end, or the antenna could be damaged. Keep the floats horizontal until deploying.

Remove the plastic bag, taking care not to cut the two PVA tape bands around the box. If the PVA tape has inadvertently released, remove the dangling strands and re-tape it with spare tape from the toolbox. The tape is applied by moistening the top side of the box with a sponge and starting the tape on the damp spot. Wind the tape around the box, stretching it slightly as you go. Make at least 5 wraps with the tape. Damp tape adheres to itself, so affix the end of the tape by moistening the underside of the end of the last wrap and press it against the wrapped layers.

Remove plastic wrap from the water release. The water release is a metal cylinder on the heavy end of the box, it is wrapped in plastic to prevent the starch tab inside from prematurely dissolving from atmospheric moisture. Remove this plastic wrap. If the water release was activated and released its line, follow the instructions in Appendix 2 at the end of this manual.

Cut the backup line from the harness as indicated by the tag. On the heavy end of the box, the water release line holds the harness together. In case the water release is triggered accidentally during storage, a second line secures the harness (We try to use a red line for this purpose). **The backup line must be cut before deploying or the harness won't release.**

Heavy end of box showing the water release with the plastic wrap removed, backup line cut and ready to deploy.

Rig the deployment line. Slip one end of the provided deployment line through each of the 4 trailing loops on the light end of the box and secure it with a bowline knot. The other end of the deployment line should be wrapped a couple of times around a capstan, railing or use a block and tackle to help take the strain of the heavy package as it is lowered over the side.

Lower the box over the side into the water. With the ship underway at ~1-2 knots, deploy the instrument over the side at the aft port or starboard quarter of ship, preferably the leeward side. Do not deploy when stationary or drifting to avoid a collision with the instrument. If possible, open the railing gate or safety lines so the box can be lowered from deck level. While one person keeps tension on the deployment line at the light end of the box, two others assist in sliding the heavy end of the box over the side. Gently lower the box to water level being careful not to hit the box against the side of the ship or impact the water too hard. Continue lowering smoothly until the bottom of the box is in contact with the water. You can dunk the box like a tea bag to help keep the box upright. Within a minute of the bottom of the box touching the water, the water release will activate and the box will fall into the water. All parts of the harness and water release will be retrieved with the lowering line.

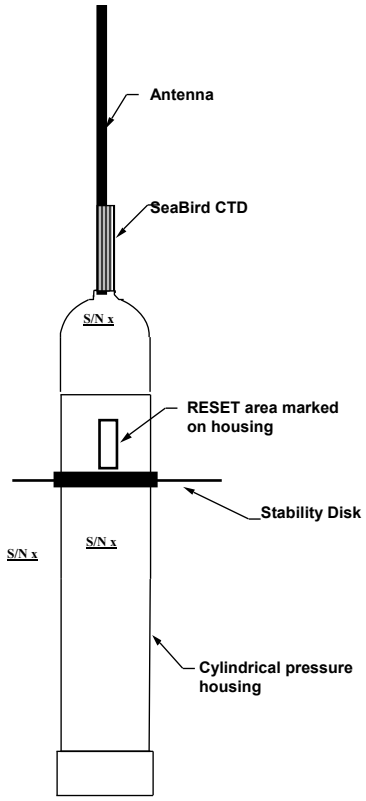
Complete the SOLO Log Sheet. On the included log sheet with the appropriate serial number, record the deployment information together with any notes about deployment problems, bad weather or any other pertinent observations (see log sheet example Appendix 3). Return all the log sheets to Scripps after completion of the voyage. Email the deployment latitude, longitude, UTC date, time and serial number periodically to jgilson@ucsd.edu.

Save Deployment Supplies. Rinse water releases and save them along with harnesses, deployment line and the toolbox for return to Scripps. These supplies are custom made and we appreciate having them back for re-use.

Appendix 1: Performing the Self-Test

The self-test can be done at any time up to 2 months before deployment**.** There is no point in waiting until the last minute. For this reason, personnel should test the whole batch of SOLOs upon loading the ship and then store them securely for deployment. One self-test MUST be performed prior to deployment and a re-test only be performed if there is any reason to suspect that the SOLO has been damaged in any way since the previous successful self-test or BEFORE the elapse of 120 days since last self-test.

Each SOLO has one log sheet to follow along the self-test instructions and record the results**.** Each sheet has space to record up to 4 attempts at the self-test on the instrument. The sheet also contains space for later recording of the deployment information. All the sheets should be returned to Scripps at the end of the cruise. Appendix 3 contains an example log sheet.



When activated with the magnet, the SOLO performs a self-test to check its readiness for deployment. The self test procedure takes about 40 minutes to complete. In most cases, SOLO will check out OK on the first attempt, but it may take more than one attempt before the self-test is successfully performed. Attempt up to 4 self-tests before deeming the SOLO unacceptable for deployment. The maximum time required to fail 3 test attempts and pass on the fourth attempt is 6 hours. If a self-test is started at least 6 hours before deployment, there will be sufficient time to deploy on schedule.

The self-test is performed inside the box with the box leaning against a support with access to the cutout hole and to the bottom of the box. Ideally the float should be placed outside with a clear view of the sky. As part of the test the SOLO will try to get a GPS fix and send the results of the self test via satellite.

Carefully make two slices the plastic bag. One over the access hole in the side of the box and the other over the hole in the heavy end of the box. **Don't cut into the box or the instrument may be damaged.** Refer to the diagram. The access hole is over the RESET switch. The RESET area is marked on the pressure housing and should be visible through the opening at the upper end of the box. If the RESET is not visible, slowly and carefully rotate the instrument inside the box. In addition to the hole cut in the side of the box, there is a hole at the bottom on the box which allows access to the external bladder.

Make sure the serial number of SOLO is written on the log sheet in the space provided. Each log sheet is dedicated to a single SOLO. Do not record the results for more than one SOLO on a log sheet. It is a good idea to check the external bladder before the test to get a sense of what an empty bladder feels like. You will need to reach up about 8 inches from the outside of the box to reach the bottom of the empty bladder.

Slide a magnet along the long axis of the pressure case over the "RESET" area while listening carefully. At the start the pump runs for 1 second, but this may be barely audible. Listen carefully as this is your indication that the SOLO has been started. After twenty seconds there should be another short pump run.

If no sound was heard, the test probably did not initiate. Try again, varying the magnet's position with respect to the RESET mark. If the self-test fails to start after many attempts, store it for return to SIO.

Listen for the pump to run. After a delay of 60 seconds, the hydraulic pump will start and run for 6-7.5 minutes.

Check the external bladder after the pump has stopped to see that it is full. The external bladder is checked by reaching into the hole in the bottom of the box. If the bladder is full, you will feel the soft rubber bladder about 4 inches up from the outside of the box. **Then return at any time between 10 and 20 minutes after starting the self-test.** The bladder should still be full. This indicates that all tests have passed successfully.

Check the bladder more than 35 minutes after starting the self-test. The bladder should be empty. Record the result and time. Now the SOLO is ready for deployment.

If the self-test fails any step, try retesting the SOLO as directed on the log sheet. Record all self test results on the log sheet.

Appendix 2: Assembling the Water Release

See the photos below for an illustration of how to assemble the water release. To hold the harness around the box, a length of line with loops on each end is provided. The line is threaded through each of the four looped ends of the harness straps at the heavy end of the box. The loops on the water release line are captured over the shear pin of the water release as it is screwed up into the housing. See another rigged box for an example of how the harness is rigged with the water release.

To properly assemble release, insert starch tablet top side UP into bobbin carrier. Insert pointed end of shear pin into spring. Place opposite end of shear pin into the top of the starch tablet. Thread on housing to complete assembly.