

## **Problems Encountered and Solutions**

Problem - Dirty connection on tether caused intermittent video loss on Blue Team's sub (day 1).

Solution - Switched to back up tether.

Down time - 15 minutes.

Maintenance required to fix, time and cost. Cleaned contacts with electrical contact cleaner, 30 minutes, less than \$5.00 (cost of cleaner).

Problem - Red Team's ROV hung tether was hung up on the third piling from the stern of the vessel (day 1).

Solution - With coordination with tether handler Pilot was able to disentangle tether and continue the mission.

Downtime - 26 minutes.

Problem - Failure to take individual pictures of all targeted/marked mines by Red Team.

Solution - Since video was taken during the entire time, post mission inspectors could go back and capture individual video frame as pictures.

Downtime - N/A

Time to capture pictures from video. Less than 1 hour using time stamp from mission log.

Problem - Vertical Thruster on Blue Team's Primary sub (day 1).

Solution - Switched over to back up sub.

Down time - less than 20 minutes.

Maintenance - On-site diagnostics inconclusive.

Problem - Ship Hull tracking system "flipped and inverted" images during tracking.

Problem was later duplicated and found to be that when you were attempting to either zoom in or out on a side that wasn't actively being scanned (i.e. your scanning and tracking on the port side, but you attempt to zoom in on the bottom view), the visuals would on the screen became flipped and inverted. Though the system still tracked and marked targets successfully, it was a nuisance.

Solution - Ship Hull Tracking company (Desert Star), notified and is going to make software solutions.

Downtime - N/A

Problem - Blue Team entangled itself on the ocean bottom. Team leaders failed to check tidal currents and underestimated it.

Solution - Reinstated importance to tether handlers to not let too much slack out. Tidal speeds and direction were added to future briefings.

Downtime - Less than 20 minutes

Problem - After initial briefing, an inventory of all gear should have been conducted, but was not (pre-deployment inspection).

Solution - Added pre-deployment inventory check to checklist.

Problem - Record keeping/reporting was handled for both teams by the Red Team Sensor operator. This caused the team to miss recording one of the "mines."

Solution - If two teams are deployed simultaneously each team will keep track of its own records and report to a central person who will keep an "overall" view of the whole operation.

Problem - Radio communications failures. Radios were a last minute addition to each team. It was presumed that everyone would know how to use them (and they didn't).

Solution - When introducing new gear to a team, make sure each member knows how to use it.

Problem - Loss of electrical power supplied from on dock.

Solution - Ran system off of an 800 Watt inverter connected to vendor's vehicle.

Downtime - 9 minutes

Problem - Electronic copy of annotation file from Ship Hull Tracking not copied to data set given to evaluators.

Solution - Added delivery of electronic files to post op check list.

Problem - Computer video failure. When connecting Blue Team's laptop to the large monitor using VGA cables, the computer encountered the "blue screen of death."

Solution - Switched to back up computer. Further analysis revealed that the affected computer was not set up for use with an external monitor. Again, when trying new things for evaluation it pays to test the gear in the same mode as you intend to use it (we never tested the computer with an external monitor, assuming it would work).