

TEST PLAN

Summary

Dates: December 18th-19th, 2017

Project: 901101 Ocean Imaging

Points of Contact: Hans Thomas (x1976) and Eric Martin (x1862)

Location: MBARI Test Tank Area

Activities: Tank trial of newly obtained lidar system with vendor for system functionality and integration.

Objective

A new wide-swath sub-sea lidar system has been delivered to MBARI and as part of field trials, this system needs to be tested in the tank to verify a number of design criteria. This is a two-day test involving a software engineer from the providing vendor, 3D@Depth.

Participants

- **MBARI:** David Caress (PI), Hans Thomas, Eric Martin, Andrew Hamilton, Larry Bird, Monica Schwehr
- **3D@Depth:** Brett Nickerson
- **Collaborators:** Giancarlo Troni

Safety

The lidar employs a Class 3B pulsed laser:

- Wavelength: 532 nm
- Pulse Width < 10ns AVG
- Power < 100 mW

This type of laser can cause permanent damage upon direct and indirect (reflected) exposure to the human eye. The manual dictates minimum safety operations as such:

Class 3B lasers are potentially hazardous if a direct beam or specular reflection is viewed by the unprotected eye (intrabeam viewing). The following precautions should be taken to avoid direct beam viewing and to control specular reflections.

a) The laser should only be operated in a controlled area

b) Care should be exercised to prevent unintentional specular reflections

c) Conditions for safe viewing of a diffuse reflection for Class 3B visible lasers are: minimum viewing distance of 13cm between the target and the cornea (eye) and a maximum viewing time of 10 s.

d) Eye protection is required if there is any possibility of viewing either the direct or specularly reflected beam, or of viewing a diffuse reflection not complying with the conditions of item (c).

e) The entrances to areas should be posted with a standard laser warning sign." The WiSSL pulses at approximately 40,000 pulses per second.

In order to comply with these guidelines for operations in the test tank, the following will be done during operations:

- Signs posted on all egress points to the upper tank area.
- All windows to the test tank (total 10) at the ground level will be covered from the outside with opaque black materials and taped in place, with safety signs attached to all.
- The laser will not be turned on uncovered outside of the tank or above the windows to avoid reflections from the window guards.
- The laser will be operated in safe mode.
- All test participant will wear appropriate laser safety glasses.
- No divers will be allowed in the tank.
- No other operations can occur in the tank during this testing.
- The lidar will always be covered when out of the water.

- The lidar will not be operated out of eye-safe mode without consultation first from the laser safety officer.
- All-hands emails to notify people of the hazard zones and time.
- Independent communications with personnel in the offices adjacent to the test tank.

Also, the laser has been mounted on a large rigid structure which forces the emission field of the sensor to always orient downward. Further protections can be added to this frame for later testing.

Test Plan

For the two days the following tests are requested for conduction in the test under the conditions above:

- Final qualification of the the full swath width of the lidar system.
- Software integration with MBARI sensors
- Non-reflective flat target (checkerboard plate) imaging.
- Long-duration running in the test tank with lasers covered.