Sensor Test Plan Proposal

Introduction

In order to accommodate the current timeline for sensor selection and maintain a rigorous testing schedule the existing test plan needs to be modified. The initial test plan was based on duplicate testing of all sensors at the University of Washington and the University of Colorado. In the revised plan the majority of the tests will be performed at CU with the possibility of a small sample of devices tested at UW for comparison.

Tests for each device will be divided into two categories:

1. Basic functionality and precision
2. Long term stability

Prior to long term testing, each device will be powered and operated at atmospheric pressure and 3 water depths, 5cm, 100 cm, and 200 cm to obtain a measurement, with uncertainty, at that depth. Once sensors have passed the first phase of testing they will be connected to the same readout electronics, including power supply, and operated in a fixed depth of water for a period of a few days to 4 weeks. The long term test of a sample of sensors can be accomplished using an array of PVC tubes and a full complement of readout electronics, including a MUX board. Sensors not tested for the 4 week period will be tested over a significantly shorter period such that all sensors can be tested before July 12th, when sensors will need to be shipped to JPARC.

It is critical that all sensors are stability tested with the full readout chain to ensure that unforeseen electronics-related issues, including noise, are addressed at the test stage. The readout should include the new power supplies as the old versions are suspected of “sagging”. The photo of the care package sent to CU last week did not have a brick in it.

For prescription described so far pertains to the pressure sensors but would essentially apply to the acoustic sensors as well. In the case of the acoustic sensors failing to pass the selection process another sensor type would require selection. One possibility would be a level sensor, either binary or continuous. The testing method for these sensors would require modification to accommodate testing for undesired “switching” and “sticking”. Long term tests may not be as important to these devices.

To provide an important cross-check of the testing performed at CU, a sample of devices will be sent to UW for comparative testing following the CU tests. Results of the two tests will be compared following the UW testing and prior to any devices being shipped to JPARC. Any significant differences in the test results will need to be understood so the comparative tests will need to be performed early enough in the process to allow understanding of potential differences.
**Timeline**

The timeline for testing will be quite tight, regardless of the revised test plan. In order to ensure testing can get started quickly a full test system will need to be assembled and evaluated at CU as soon as possible. The assembly should be achievable by June 4th with evaluation of the system during the following week.

Two of the depth sensors have been ordered and should be at CU this week. These sensors can be used to construct/debug the test system and then become part of the long term test devices. Additional devices can be ordered or shipped from UW by June 9th to allow the full set of devices to be on hand for the long term test.

About 10 devices should be short-term tested at CU by the 18th of June to allow them to be sent to UW for comparative tests with enough time to evaluate and address the results of the comparison. Shipping more than 10 devices back to UW is not desirable as we want to minimize the amount handling of the sensors. In the case of 10 shipped for comparison, the added knowledge outweighs the concern of additional handling.

All testing and evaluation of both sensor types needs to be wrapped up by July 12th in order that the sensors can be shipped to JPARC and be on hand for post-shipping evaluation in advance of installation. Any issues arising from testing will require very rapid action and decisions and we need to be prepared for this.

**Questions to be addressed**

There are several issues that need to be discussed and addressed.

1. What plans do we have in place for addressing issues arising in the testing – i.e. slow long term drift. Presumably gross issues are being dealt with during the selection phase, but we are testing for a reason.
2. How is the sensor packaging being handled? Should the sensor packaging into tubes be handled at CU? This would have the tubes fabricated at UW and sent to CU for assembly with tubes.
3. What is being done to ensure system scaling doesn’t introduce difficulties – or worse?
4. Personnel. CU may need some help in June. CK mentioned the possibility of James helping and I have adjusted my travel schedule to be in Colorado for June to help as well.