

Pressure Test Report, OI Tilt Sensor 10221154rA

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Test Plan

Introduction

This pressure test was meant to recertify the OI Tilt Sensor Board (10221154rA) for operation on Doc Ricketts in 2019 and beyond. This is a small 3/4" diameter board that operates on ROV science ports (12VDC, RS232) and has been in operation on Ventana for 3 years.

Pressure Profile

This test will perform 5 cycles to 6,000-PSI, with an overnight hold at the end. Pressure increase decrease rates were 500-PSI/min, dwelling 5-minutes at either end.

Monitoring

This device was powered and recording its hall-effect sensors for the duration of the test, to monitor any breakdown in communication.

Results

Resultant Test Profile

```
In [126]: 1 import pandas as pd
          2 import datetime
          3 %matplotlib notebook
          4 import matplotlib.pyplot as plt
          5 import numpy as np
          6 plt.style.use('seaborn-darkgrid')
          7
```

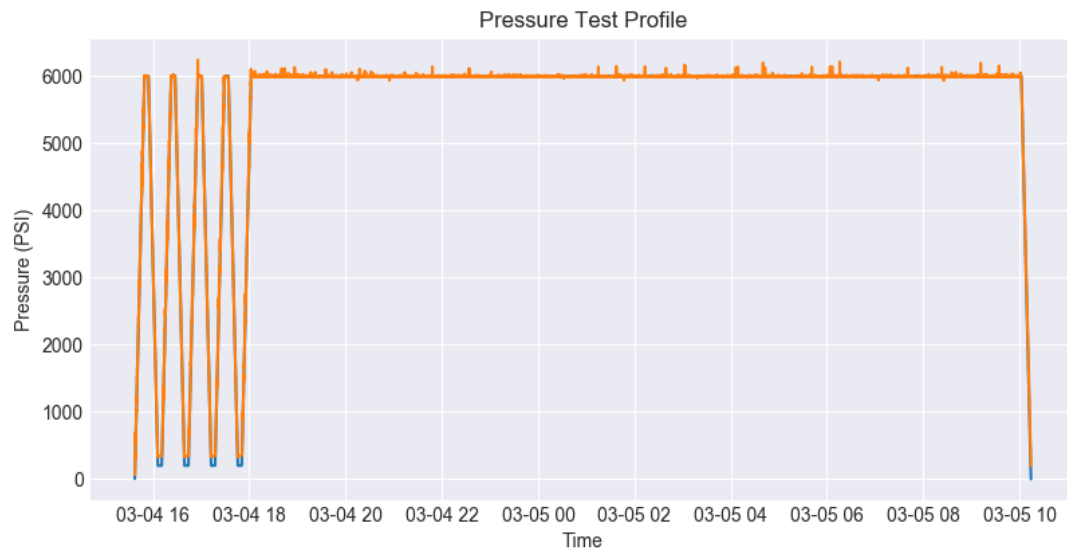
```
In [83]: 1 press_df = pd.read_csv('3_4_2019_3_23.txt', skiprows=6, header=None,
          2 press_time = pd.to_timedelta(press_df['time']))
```

In [84]:

```
1 #FIX Rollover in time
2 day4 = pd.Timestamp(datetime.datetime(2019,3,4,0,0))
3 day5 = pd.Timestamp(datetime.datetime(2019,3,5,0,0))
4 init = press_time[0]
5
6 for i in range(len(press_time)):
7     if press_time[i] < init:
8         press_time[i] = press_time[i] + day5
9     else:
10        press_time[i] = press_time[i] + day4
11
12 elap_press_time = press_time
```

In [129]:

```
1 fig1 = plt.figure()
2 ax1 = fig1.add_subplot(111)
3 ax1.plot(elap_press_time, press_df['goal'],elap_press_time, press_df
4 ax1.set(title="Pressure Test Profile",ylabel='Pressure (PSI)',xlabel
5 print()
```



Sensor Data Analysis

The sensor was powered during pressure cycling. During the 18-hour test, the sensor did reset two times, but this is likely an issue with the firmware more than a pressure issue, because the sensor immediately recovers and there is no change in readings from the hall sensor A/D.

In [93]:

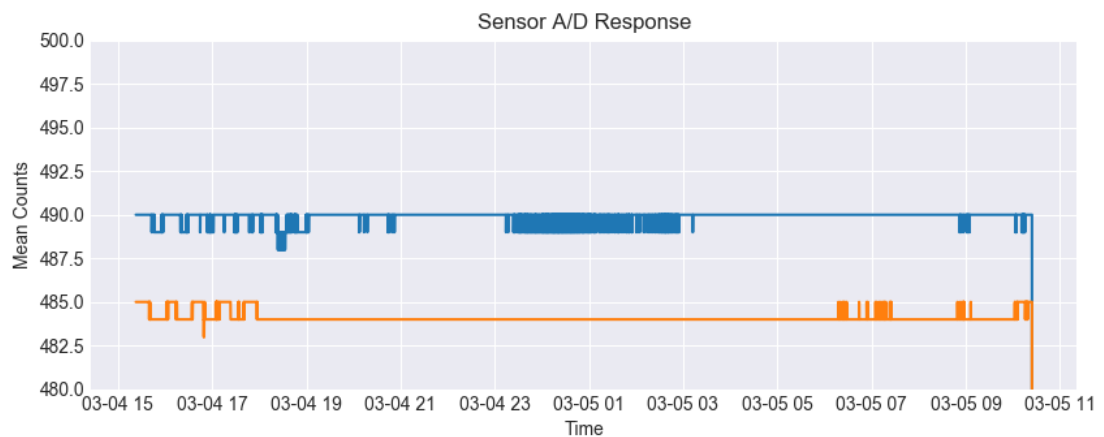
```
1 data = pd.read_csv('pressure_test_20190304_cleaned.cap',delimiter=',
2                      header=None, names=['hall_a','hall_b'],
3                      parse_dates=True)
```

```
In [107]: 1 data_1hz = data.resample('1S').mean().apply(np.round)
          2 data_1hz.head()
```

```
Out[107]:
```

	hall_a	hall_b
2019-03-04 15:22:45	490.0	485.0
2019-03-04 15:22:46	490.0	485.0
2019-03-04 15:22:47	490.0	485.0
2019-03-04 15:22:48	490.0	485.0
2019-03-04 15:22:49	490.0	485.0

```
In [121]: 1 fig2 = plt.figure()
          2 ax2 = fig2.add_subplot(111)
          3 ax2.plot(data_1hz)
          4 ax2.set_ylim(480, 500)
          5 ax2.set(title="Sensor A/D Response",ylabel='Mean Counts',xlabel='Time')
          6 print()
```



Results

There does seem to be higher variability during pressure cycles, but they represent 2-LSB of max change over pressure, which is 0.002% error, or $\pm 0.352^\circ$ over 180° . Max error when integrating measurements from both sensors will be $\pm 1.4^\circ$ over depth. However, at depth measurements are stable, so while accuracy suffers, precision may remain within 2-LSB.