Response Time Test Plan

Objective:

The objective is to measure the response time of the data acquisition, processing, correction generation, and execution of correction. The response time will be tested from the data being collected from the sensor, until the correction is sent to the steering module.

Equipment:

2 Channel Oscilloscopes

Correction Module

NST Module

1 photo diode

1 operational amplifier

Procedure:

The response time will be measured to a high degree of accuracy by two oscilloscope probes which will be attached to the gyroscope output to mark the start time, and at the output of an operational amplifier which will be used to turn a current signal of a photodiode into a voltage. The photo diode will be placed in the initial path of the laser diode output. This in turn will produce a current which will be translated into a voltage. The delay of the operational amplifier will be negligible to the response time of the full system, but can be calculated from the RC components of the photo diode (~10-20pF) and the feedback resistance (~1 MΩ). This is approximately 20us added delay.

Once the circuit is built and the oscilloscopes properly attached, the oscilloscope on the output of the amplifier will be used as a trigger. The time from the trigger back to the initial change on the gyroscope is the total delay with a small addition of the amplifier delay. The gyroscope will be triggered independently of the entire system by giving a rotational input either by hand or on the test bench. The module and photo diode positions will be fixed. This is critical as the laser cannot move in the same fashion as the gyroscope, or the correction could keep the light on the photo diode and no detection will take place. The mirrors will deflect the light away from the photo diode causing current to stop flowing and a voltage change to occur at the output of the amplifier.