The CAL-CS Time Delays and High Freq. Approximations – O2

Sensing Function: 1.3 [us] "true" delay

Inverse Sensing Function: - 1.3 [us] advance

Actuation Function: 183.1 [us] "true" delay

Inv. Sensing and Actuation have a 184.4 [us] relative delay between "true" computer delays when summed

The actuation and sensing functions both have high-frequency frequency response for which the front-end can't compensate, but we can approximate with more delay to get the phase right near the DARM UGF

| 40 | 44 | 32 |

OMC DCPDs   AA(D) AA(A)

| 32 | 44 | +61 |
| | | +45 |

AI(A) AI(D)

Unknown Systematic (H1, L1)

117.6[us]   259.1 [us]   320.1 [us]   304.1 [us]

376.7 [us]   437.7 [us]   421.7 [us]

For a casual reconstruction, one can delay one path the whole relative delay, and suffer an overall latency of 117.6 [us]

H1 = 437.7 [us]

L1 = 421.7 [us]

And we're limited to integer numbers of 16 [kHz] clock cycles, or discrete 61 [us] delays

| 61 [us] | 61 [us] | 61 [us] | 61 [us] | 61 [us] | 61 [us] | 61 [us] |

7 * 61 [us] = 427.3 [us]

Time [us]

H1: 437.7 − 7 * 61 = 10.5 [us]
L1: 421.7 - 7 * 61 = -5.5 [us]

So CAL-CS gets CTRL and ERR crossover wrong by 5.5 [us] or 0.12 [deg] at L1 DARM UGF of 60 [Hz]
And CAL-CS gets the CTRL and ERR crossover wrong by 10.5 [us] or 0.25 [deg] at H1's DARM UGF of 65 [Hz]

t = 0