PCAL USER MODEL (16 kHz) — 61 us
IOP MODEL (65 kHz)

45 us
7.5 us ZOH
7.5 us clock

Witness GPS

1 PPS

61 us — PCAL_EXC — AI — DAC — AI — LASER

DuoTone

PCAL_RX_PD — AA — ADC — AA

13 us — Light travel time

12 us — Single pole correction

AA — ADC — AA — **IOP MODEL (65 kHz)**

61 us — DARM_EXC — DARM_IN2 — **OMC USER MODEL (16 kHz)**

DARM_IN1 — DARM_ERR_WHITEN

D — 61 us — **CAL-CS USER MODEL (16 kHz)**

DARM_OUT

DARM_CTRL_WHITEN

61 us — 61 us — L3_TEST_L_OUT

Actuation Filters

45 us
7.5 us
7.5 us

AI — DAC — AI — L3_LOCK_L_IN2

L3_LOCK_L_EXC

61 us — L3_LOCK_L_IN1

IOP MODEL (65 kHz) — **SUS USER MODEL (16 kHz)**

Sources for values
Design from Rolf Bork (G1501195):
    No delays on ADC path, 122 usec delay on DAC path (user model to DAC output), 61 usec
    IPC delay
Absolute delay measured with respect to GPS 1 PPS:
    61 usec from excitation to AI output (looks like 122 usec from user model channel to AI output)
    122 usec from DuoTone to AI output
Pcal/DuoTone measurement (LHO aLOG 29259, 29999, LLO aLOG):
    No delay on ADC path, 61 usec from user model to IOP model, 61 usec (3 65k cycles + ZOH + clock
    offset) through DAC
Kiwamu Izumi's code investigation and theory shows no delay from ADC input to USER model
(T1600453)
Izumi's theoretical single pole correction adding 11.7 usec advance (G1501316)

Light green "actuationUmodelDelay"
Magenta "actuationIOPdelay"
Orange "sensingIOPdelay"
Blue "IPCdelay"

Predicted time delays (values seem incorrect, need to confirm):
OLG delay = 13 - 12 + 61+ 61 + 61 = 184 us
ETM motion to DARM_IN1 = 13 - 12 = 1 us
ETM motion to DARM_ERR_WHITEN = 13 - 12 + 61 = 62 us
DARM_OUT to ETM motion = 61 + 61 + 61 = 183 us
DARM_CTRL_WHITEN to ETM motion = -61 + 61 + 61 + 61 = 122 us
L3_TEST_L_OUT to DARM_IN1 = 61 + 61 + 13 - 12 = 123 us
PCAL_RX_PD to DARM_IN1 = 13 - 12 = 1 us