Palomar Adaptive Optics Test Plan

Title	LGS Target Acquisition
Version	3.2
Date released	4/3/2007
Lead	A. Bouchez
Time requested	30 min.
Required conditions	N/A

Purpose
Acquire science target, lock all loops and be ready to perform science at this end of this procedure.

Test procedure
1. Focus telescope and update flatmap on a nearby bright NGS.
    1.1. Slew telescope to a V=7 star near the LGS target.
    1.2. Setup AO system for NGS.
        1.2.1. Set TAO mode to NGS.
        1.2.2. Move LGS_Z to NGS position.
        1.2.3. Move ACQ_Z to NGS position.
        1.2.4. Move WFS_Z to NGS position.
        1.2.5. Turn Acq video ON (installs fold mirror).
    1.3. Acquire star on the HOWFS.
    1.4. Close TT loop and register DM.
    1.5. Close DM and allow focus offload to telescope.
    1.6. Make a new telescope flat map and load.
    1.7. Optional: Record a 30 second PHARO exposure with only TT loop closed to measure seeing.
2. Slew telescope to coordinates of LGS target and center target on PHARO field.
    2.1. Center target in Acq (PHARO center pixel position) or...
    2.2. Blind offset from a nearby SAO star or...
    2.3. Blind offset from the tip-tilt star.
3. Acquire the LGS.
    3.1. Setup AO system for LGS.
        3.1.1. Set TAO mode to LGS.
        3.1.2. Load co_zero centroid offsets.
        3.1.3. Set HOWFS frame rate to 100 Hz (or previous optimized value).
        3.1.4. Set llt_integral gain 1.6 (or previous optimized value).
        3.1.5. Set dm_proportional_gain 0.02
        3.1.6. Set dm_integral_gain 0.15
        3.1.7. Leave LGS_X in NGS position.
        3.1.8. Move WFS_Z to LGS position (90km or best estimate).
        3.1.9. Move ACQ_Z to LGS position (best estimate from focus runs).
        3.1.10. Set chopper delay and gate on generator using PC
            3.1.10.1.1. Delay value = 58400
            3.1.10.1.2. Gate value = 3998
            3.1.10.1.3. Start chopper
    3.2. Take a HOWFS background (no telescope move).

3.3. Project laser.
3.4. Center laser on HOWFS reflective spot.
(Offset llt_a +x moves LGS up, llt_b +x moves LGS left)
4. Close the DM loop on the laser.
    4.1. Move LGS_X to LGS position.
    4.2. Close UTT loop.
    4.3. Verify HOWFS framerate. If necessary:
        4.3.1. Open UTT loop.
        4.3.2. Change HOWFS framerate.
        4.3.3. Offset UTT mirror 30" and take a new HOWFS background.
        4.3.4. Return UTT mirror to center and close UTT loop.
    4.4. Close DM loop.
5. Acquire the NGS and close TT loop.
    5.1. Setup LOWFS
        5.1.1. Set ttm_integral_gain 0.15
        5.1.2. Set LOWFS framerate to expected value for NGS.
    5.2. Take a long-exposure Acq. image to identify NGS.
    5.3. Send LOWFS to NGS using ACQVIEW button.
    5.4. Offset telescope and take a LOWFS background, then return to target.
    5.5. If LOWFS resduals are >0.2, zero LOWFS centroids.
    5.6. Close TTM loop.
    5.7. Verify LOWFS framerate. If necessary:
        5.7.1. Open TTM loop.
        5.7.2. Change LOWFS framerate.
        5.7.3. Offset telescope and take a new LOWFS background.
        5.7.4. Return telescope to center and close TTM loop.
6. Close focus loop (pulldown on LGSFOC).
    6.1. Close focus loop on LGSFOC tool.
    6.2. Wait for focus to converge to <0.5 mm.
7. Acquisition complete!

Results and conclusions