

## Palomar Adaptive Optics Test Plan

<b>Title</b>	<b>LGS Target Acquisition</b>
Version	3.4
Date released	4/3/2007
Lead	A. Bouchez
Time requested	30 min.
Required conditions	N/A

### Purpose

Acquire science target, lock all loops and hand over system to observer.

### Test procedure

1. Tune up AO system 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. load cent\_offsets=aocp:/tables/default/co\_default2
    - 1.2.3. Move LGS\_Z to NGS position.
    - 1.2.4. Move ACQ\_Z to NGS position.
    - 1.2.5. Move WFS\_Z to NGS position.
    - 1.2.6. Verify that focus offload is enabled.
    - 1.2.7. Set Acq to video (installs fold mirror).
    - 1.2.8. Stop chopper if running.
  - 1.3. Acquire star on the HOWFS.
  - 1.4. Take a HOWFS sky (offset telescope 60")
  - 1.5. Close TT loop.
  - 1.6. Align SSMs.
    - 1.6.1. Have observer center the star at the desired location on PHARO in the platescale to be used for science. Mark with crosshairs A.
    - 1.6.2. Switch to 40mas platescale and mark star location with crosshairs B.
  - 1.7. Register DM (coarse and fine).
  - 1.8. Close DM loop.
  - 1.9. Make a new telescope flat map and load.
  - 1.10. TX telescope.
2. Move to LGS target and center target on PHARO field.
  - 2.1. Offset to coordinates of LGS target.
  - 2.2. Center target on PHARO cross-hairs.
  - 2.3. Request spotter permission to project laser.
3. Acquire the LGS.
  - 3.1. Setup AO system for LGS.
    - 3.1.1. Set TAO mode to LGS.
    - 3.1.2. Set HOWFS frame rate to 150 Hz (or previous optimized value).
    - 3.1.3. Set llt\_integral gain 1.6 (or previous optimized value).
    - 3.1.4. Set dm\_proportional\_gain 0.02
    - 3.1.5. Set dm\_integral\_gain 0.15
    - 3.1.6. Leave LGS\_X in NGS position.
    - 3.1.7. Move WFS\_Z to LGS position (90km or best estimate).

- 3.1.8. Move ACQ\_Z to LGS position (best estimate from focus runs).
    - 3.1.9. Verify LLT FSM positions.
    - 3.1.10. Set Acq to integrate 2s.
    - 3.1.11. Start chopper.
  - 3.2. Project laser.
  - 3.3. Center laser on HOWFS reflective spot.  
(Offset ll\_t\_a +x moves LGS *up*, ll\_t\_b +x moves LGS *left*)
  - 3.4. Record centered position of LLT FSM.
4. Close the DM loop on the laser.
  - 4.1. Move LGS\_X to LGS position.
  - 4.2. Take a HOWFS background (offset ll\_t\_a 20").  
log wfp=ho, interval=5 immediately after starting bkg.  
log wfp=ho, interval=5 when done  
wfs\_cam on, id=ho
  - 4.3. Close UTT loop.
  - 4.4. Verify HOWFS framerate is correct. If necessary:
    - 4.4.1. Open UTT loop.
    - 4.4.2. Change HOWFS framerate.
    - 4.4.3. Take a new HOWFS background (offset ll\_t\_a 20").
    - 4.4.4. Return UTT mirror to center and close UTT loop.
  - 4.5. 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.
    - 5.1.3. Move ACQ\_Z to NGS position.
    - 5.1.4. Set Acq to integration time appropriate for NGS.
  - 5.2. Identify NGS in Acq field and send LOWFS using ACQVIEW button.
  - 5.3. Take a LOWFS background (offset telescope 60").  
log wfp=lo, interval=5 immediately after starting bkg.  
log wfp=lo, interval=5 again when done  
wfs\_cam on, id=lo
  - 5.4. If LOWFS residuals are >0.2, zero LOWFS centroids.
  - 5.5. Close TTM loop.
  - 5.6. Verify that LOWFS framerate is correct. If necessary:
    - 5.6.1. Open TTM loop.
    - 5.6.2. Change LOWFS framerate.
    - 5.6.3. Take a new LOWFS background (offset telescope 60").
    - 5.6.4. 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 is complete!

## Results and conclusions