

## Palomar Adaptive Optics Test Plan

<b>Title</b>	<b>LGS Target Acquisition</b>
Version	3.2
Date released	4/3/2007
Lead	M. Troy
Time requested	45 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 residuals 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