Palomar Adaptive Optics Test Plan

Title	Internal Focusing for LGS operations
Date	9/21/2007 V5
Lead	J. Roberts
Time requested	1.5 hr
Required conditions	-

Purpose

We outline here the procedure to co-focus the LOWFS, HOWFS and PHARO for night time operation. All work is done with the white light.

Test procedure

1. Setup
    1.1. Go to NGS mode
    1.2. lgs_x should be in the LGS position (92000)
    1.3. LOWFS
        1.3.1. load zero offsets
        1.3.2. Set rate to 500Hz
    1.4. HOWFS
        1.4.1. load zero offsets
        1.4.2. Set rate to 100 Hz
        1.4.3. Load pixel_gains_lse_sep03
        1.4.4. Take HOWFS background
    1.5. Acquire white light in HOWFS with power at 35, Lock TT and DM loops
    1.6. Adjust wfs_z so that there is no focus in the HOWFS
        1.6.1. With both loops locked, adjust the wfs_z so that the desired motion (shown in Mitch's WFS plots, DM Positions) is close to zero
    1.7. Take and load a white light flat map
        1.7.1. *IDL> ao_make_dm_flat_map,'filename'*
        1.7.2. With just the TT loop locked, verify that there is no focus in the flatmap by looking at the DM positions data (in Mitch's WFS plots). If there is focus, go back to step 1.6
    1.8. It is more important to get the focus zero in the flatmap than in the locked DM loop.
2. Co-focus LOWFS and HOWFS to white light
    2.1. Lock in dual mode
        2.1.1. Go to DNGS mode
        2.1.2. Acquire LOWFS using acqview
            2.1.2.1. Click ACQ
            2.1.2.2. Click on spot when it appears
            2.1.2.3. Click "Send LOWFS"
        2.1.3. Take LOWFS background
        2.1.4. From lgstools, click "zero cent"
        2.1.5. Lock TT on LOWFS
        2.1.6. If HO residuals are close, lock DM on HOWFS
    2.2. zero LOWFS focus using manual z-stage

2.2.1. start lgsfoc, set the LOWFS zero point to zero, set gain to 0.5

2.2.2. Adjust the measured LOWFS focus using the z-stage micrometer

2.2.2.1.   Unlock the stage using a 3/32 allen key

2.2.2.2.   + means move toward focus, move half as much as measured

2.2.3. Lock stage and note new position

3. Re-focus acquisition camera

3.1.   In acqview, click ACQ

3.2.   Set the video camera to integrate at 1Hz, saving 1 frame a second

3.3.   Set white light power to 20

3.4.   Check to make sure the peak counts are less then ~100. If necessary decrease the white light power

3.5.   Shut off white light and take and save a background using ao_plot_vid_image in IDL, call it acq_wl_bkgd

3.6.   Turn the white light back on and focus using

3.6.1. ao_focus_loop, 'current acq_z position' -600, 300, 5, 'acq' ,'acq_wl_', sky='acq_wl_bkgd', time_to_avg=2

3.6.2. move acq_z to optimal position and note new position

4. Save new AO config files

4.1.   Save as LGS_date

4.2.   Make sure:

4.2.1. acquisition camera is off

4.2.2. lowfs_y is at 0

4.3.   Copy LGS_date to LGS

4.4.   NGS config

4.4.1. Shift lgs_x to the NGS position

4.4.2. Go to NGS mode

4.4.3. Lock on white light and adjust wfs_z focus to get zero desired motion

4.4.4. Save as NGS_date

4.5.   Copy NGS_date to DEFAULT

5. Sweet spot

5.1.   Lock the loops on the NGS position

5.2.   Move lgs_x to the LGS position

5.3.   Take note of the spot location in the acquisition camera

5.4.   Send the LOWFS to the spot

5.5.   Take a LOWFS background

5.6.   Use the zero_cent button to reduce the residuals

5.7.   Take note of the LOWFS X and Y positions

6.   PHARO alignment

6.1.   re-focus PHARO

6.1.1. lock HOWFS on zero offsets

6.1.2. focus PHARO to maximize Strehl/minimize FWHM.

6.2.   re-tune centroid offsets in HOWFS

Results and conclusions
9/21/07
wfs_z: starting position 18000, ending position 18800 (LGS)
wfs_z: starting position 17200, ending position 18000 (NGS)
lowfs_z: 16.55
acq_z(NGS): 12500
white_z: ending position 25248
LGS sweet spot: 265.6, 232.4
LOWFS: X=75213, Y=23284

8/23/07
wfs_z: starting position 17700, ending position 18000 (LGS)
wfs_z: starting position 16800, ending position 17200 (NGS)
lowfs_z: 17.25
acq_z(LGS): 12500
acq_z(NGS): 12500
white_z: starting position 25748, ending position 25248
LGS sweet spot: 276.89, 238.14
LOWFS: X=75288, Y=23201

7/23/07
wfs_z: starting position 16800, ending position 17700
lowfs_z: starting position 16.75, ending position 17.25
acq_z: 12500
white_z: 25748
10" NGS: 322.22, 238.63
10" LGS: 340.75, 238.79
LGS sweet spot: 276.13, 238.88

5/24/07
wfs_z: starting position 18700, ending position 17700
lowfs_z: starting position 15.108, ending position 15.176
acq_z: 12500
white_z: 25748
10" NGS: 318.3, 257.7
10" LGS: 337.9, 256.32
LGS sweet spot: 273.3, 257.9

4/23/07
wfs_z: starting position 17200, ending position 19200
lowfs_z: starting position 15.43, ending position 15.31
acq_z: starting position 12600, ending position, 12500
white_z: 25748

4/2/07 (v4)
wfs_z: starting position: 17200, ending position: 18172
white_z: starting position: 25750, ending position: 25750
acq_z: starting position: 12700, ending position: 12500

1/5/07 (V3.1)
wfs_z: starting position: 10800, ending position: 10540
white_z: starting position: 29790, ending position: 33256
acq_z: starting position: 14600, ending position: 14600

12/6/06
wfs_z: starting position: 10400, ending position: 10800
white_z: starting position: 29792, ending position 29792
acq_z: starting position: 14600, ending position: 14600
Did tune up on PHARO, no refocus req'd

10/11/2006
wfs_z: starting position:10650 um, ending position: 7260 um
white_z: starting position: 27500 um, ending position: 29792 um
acq_z: starting position: 14600 um, ending position: 14740 um
did re-focus and tune up PHARO

9/7/2006
wfs_z: starting position:10659 um, ending position: 7150 um
white_z: starting position: 27500 um, ending position: 30917 um
saved as 060908a
did not re-focus acq camera, procedure above was not written
did re-focus and tune up PHARO