Palomar Adaptive Optics Test Plan

Title	Low-order servo loop optimization
Version	1.0
Date released	4/3/2007
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Time requested	2 hours
Required conditions	Photometric, >90deg. from moon.

Purpose

1. Determine optimal low-order servo loop parameters as a function of NGS magnitude.
2. Practice acquisition procedure with faint NGS.

Previous analysis

Starting estimates (please note optimized values):

NGS V magnitude	Acq integ. (s)		Framerate (Hz)		Integral gain	
10	0.03		1000		0.5	
12	0.5		500		0.5	
14	1.0		200		0.5	
15	5.0		150		0.5	
16	10.0		100		0.5	
17	20.0		50		0.5	
18	30.0		30		0.5	

Test procedure

Targets for this test: isolated V=14, 15, 16, 17 stars near zenith. Use red stars (B-V = 1.0-2.5) to maximize PHARO sensitivity.

1. Follow *LGS Target Acquisition* testplan for star.
   1.1. Only perform NGS tune-up on the first target.
   1.2. Use LOWFS framerates from the table above.
   1.3. DO perform "zero LOWFS centroids" step!
   1.4. Record acquisition camera image before offsetting LOWFS.
2. Determine PHARO integration time for decent SNR images. Goal is 10-15k peak counts, but keep integration time <30s.
3. Take a PHARO sky
   3.1. Open TT loop from TAO command line (TAO button? / PHARO button??)
   3.2. Offset telescope from PHARO buttons (or TAO)
   3.3. Take a PHARO sky.
   3.4. Offset back to target.
   3.5. Close TT loop (same way as opened).
4. Record average Strehl of 3 frames in table below.
5. Adjust framerate
   5.1. Open TT loop.
   5.2. Set framerate to one "level" higher
   5.3. Take new LOWFS background (offset 60" to sky).
   5.4. Close TT loop.

5.5. Record average Strehl of 3 frames.
5.6. Repeat for one level lower.
6. Set to optimal framerate and take a new sky. Record value in table above.
7. Adjust integral gain:
7.1. set ttm_integral_gain to 0.25, 0.5, 1.0, 1.5
7.2. Record average Strehl of 3 frames.
7.3. If loop goes unstable, open TT loop and manually set TTM to (0,0).
8. Record optimal gain in table above.
9. Move on to next fainter star.

Results and conclusions

V mag.	Star name	framerate	gain	PHARO frames	Average Strehl
10.0					

Note PHARO filter, integration, and sky frames: