Palomar Adaptive Optics Test Plan

Title	Laser, BTO, and safety system checkout
Version	2.3
Date released	6/7/07
Lead	A. Bouchez
Time requested	30 min.
Required conditions	Dome closed

Purpose

1. Align 589nm laser to BTO bench in Coude lab.
2. Verify that 589nm laser is aligned to BTO in dome.
3. Measure transmission of BTO, optimize laser focus (first night of run only).
4. Test BTO servo loop and Q3 safety interlock

Test procedure

Personnel required: Data room coordinator (lead), laser engineer, BTO operator, 2x dome personnel (first night only)

Setup:

1. Dome closed.
2. LLT primary mirror cover removed and LLT ready for high power laser (visually check diagnostics bench, cables).
3. Remove Coude block.
4. BTO interlock jumpered out for in-dome propagation.
5. Set BTO trigger to “Laser” in BTO GUI.
6. Lock BTO servo on the stimulus laser:
   6.1. Set Laser to “Stimulus” in BTO GUI.
   6.2. Set all quad cells enabled and High-Speed to Q3 in BTO GUI.
   6.3. “Track On” in BTO GUI.
   6.4. Wait for “Track: completed.” message in BTO GUI message window.
   6.5. “Servo On” in BTO GUI.
   6.6. Verify BTO servo locked with high-speed on Q3.
7. “Set Zenith and Save DEFAULT” in BTO GUI.
8. Servo Off in BTO GUI.
9. Set laser to 589nm in BTO GUI.
10. Close Coude block.

In Coude lab:

11. Adjust laser for **Very low power** (~50 mw)
    11.1. Frequency lock off.
    11.2. Phase lock off.
    11.3. Dephase IR lasers using “phase control” knobs.
12. Partially close both polar axis alignment irises.
13. Remove power meter from beam.
14. Cautiously open shutter.
15. Adjust final laser mirror to center beam on first iris.

16. Adjust M1a to center beam on second iris.
17. Set laser to stimulus in BTO GUI.
18. Verify that alignment to irises appears identical. Repeat previous steps if necessary.
19. Close shutter.
20. Open both irises.
21. Put in power meter.
22. Adjust laser for **Moderate power** (~500 mw).
23. Remove power meter.

In dome:

24. Remove Coude block.
25. Prepare BTO for in-dome propagation at low power:
    - 25.1. Set 589 power to low in BTO GUI.
    - 25.2. Set High-Speed to Q1 in BTO GUI.
    - 25.3. Disable Q2 and Q3 in BTO GUI.
26. At low laser power with personnel in dome, open shutter and verify that laser is coming through LLT (check pattern on the ceiling).
27. Lock BTO on low-power 589nm laser:
    - 27.1. Record Flux in BTO GUI.
    - 27.2. Servo On in BTO GUI.
    - 27.3. Verify BTO servo locked on Q1.
    - 27.4. Record Flux in BTO GUI.
    - 27.5. Enable Q3 in BTO GUI.
    - 27.6. Verify BTO servo locked on Q3.
28. If still not aligned, restart procedure at step 11.
29. Set Zenith in BTO GUI
30. Turn servo off in BTO GUI.
31. Shutter beam.
32. Adjust laser to **High power** (>5W). Record laser power below.
33. Open the shutter. If laser does not fall on Q3, block beam immediately!
34. Lock BTO servo on high-power 589nm laser:
    - 34.1. Set 589 Power to High in BTO GUI.
    - 34.2. Enable Q2 in BTO GUI.
    - 34.3. Record flux in BTO GUI.
    - 34.4. Servo On in BTO GUI.
    - 34.5. Verify BTO Servo locked. If counts decrease on Q3, block beam immediately!
    - 34.6. Record flux in BTO GUI.
    - 34.7. Set High-Speed to Q3 in BTO GUI.
35. Set Zenith and save DEFAULT in BTO GUI.
36. Shutter beam and bring personnel back into data room.
37. Enable BTO Interlock.
38. Alarm Reset in BTO GUI.
39. Test-fire laser at zenith in dome.
40. Shutter laser.
41. Disarm and install Coude block.
42. Test-fire laser to demonstrate BTO interlock functionality.
43. Reset alarm on BTO.