



LBT PROJECT 2x8,4m TELESCOPE

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LBT PROJECT 2 X 8,4m OPTICAL TELESCOPE

LBT Adaptive Optics System Acceptance Test Software test plan

	Signature	Date
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Released	Douglas Miller	18 Dec 2009

1. Revision History

Issue	Date	Changes	Responsible
a	8-Nov-09	Issue a	JB
b	16-Nov-09	Issue b Updated with input from NC and DM.	JB, NC, DM
c	17-Nov-09	Updated section 4.8, 5.5 and 5.6 test cases.	RG,DM,JB,TE
d	22-Nov-09	Changed document title Updated/expanded 4.1, 4.2, 4.3, 4.7, 5.1, 5.2, 6.2	MD, LF
e	8-Dec-09	Changed section 4 so each individual AO command available with the IRC is exercised. Fixed incorrect terminology several places	LF, MD, CB, NC, JB, DM
f	11-Dec-09	Revised sections 5, 6 and 7 to more clearly state the procedure, goals and items to note for each test. This issue also contains the first day's set of note, in very rough form.	DM
g	14-Dec-09	All SW acceptance tests have been completed with the exception of AOS GUI Inspection and sending a "PresetTelescope AO Sequence from IDL"	DM
h	15-Dec-09	All SW acceptance tests completed. Discussions of all actions items completed and priorities assigned.	DM, LF, JB, RG, AP, MX, AR, SE
i	17-Dec-09	All actions items gathered into tables at the beginning of the documents. Two new action items added.	DM
j	18-Dec-09	Final discussion of SW Action Items. Two new AI (P1) tasks and one new AI (P4) task.	DM, LF, JB, RG, RD, AP, SE, AR, MX

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2.2. Table of Priority Numbers

- AI (P1) – Complete before removed of AO System Unit #1 from the Solar Tower
- AI (P2) – Complete before installation of AO System on the telescope
- AI (P3) – Complete before the start of AO Commissioning
- AI (P4) – Verify in Solar Tower with AO System Unit #2

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2.8. Table of Abbreviations

AOS	Adaptive Optics Subsystem of the TCS
AOS GUI	Adaptive Optics Subsystem Graphical Interface
DX	Right Side of the Large Binocular Telescope
IIF	Instrument InterFace Subsystem of the TCS
MCS	Mount Control Subsystem of the TCS
OSS	Optical Structure Subsystem of the TCS
RIP	Rest In Peace: Adaptive Secondary coils are disabled and the shell is pulled against the reference body
PCS	Point Control Subsystem of the TCS
PSF	Point Spread Function of the TCS
SX	Left Side of the Large Binocular Telescope
TCS	Telescope Control System
TSS	Thin Shell Suction (Safety System)
TV	Technical Viewer (CCD47)
WFS Image	Pyramid Wave Front Sensor Image (CCD39)

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3. About this document

3.1. Purpose

This document is a test plan for acceptance testing of the AOS software package required for operation of the LBT adaptive optics system. This acceptance testing will take place at OAA in Florence after system integration and testing. Based on the test results, LBTO will make an executive decision regarding system readiness for shipping to the telescope.

3.2. Scope

Test cases for testing of AOS SW are contained in this document. Note that system performance verification and hardware testing are described in other documents.

3.3. Reference Documents

- [RD1] 640s009 LBT AOS GUI requirements, D Miller
- [RD2] nnnfnnn Adaptive Secondary Mirror Telemetry, A. Riccardi
- [RD3] 481s009 LBT Control GUI Specification, M. De La Pena
- [RD4] 481s010 LBT TCS GUI Guidelines, M. De La Pena
- [RD5] 481f301 AOS – The complete guide
- [RD6] 486f009 AO Supervisor – Functional description

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4. High Level Software Functionality

In the following section, the locations of the mentioned logs are:

- AO log: aoserver /tmp/AOS00.log
- TCS event log: tcstest /lbt/log/events

Comments:

Currently each AO Supervisor process has its own log file. They all have the same format and can be merged via a graphical log viewer. Plan is to remain with multiple files for convenience of copying. Doug requested that a “high level” log file is available with important info for non-expert AO user. This could be the message daemon log.

- 1 – Before test tower removal
- 2 – Before installed on telescope
- 3 – Berore start of AO commissioning
- 4 – Verifying in Solar Tower with Unit #2

AI (P2) 1: **Log File for Display**

Create or write an AO log file with just the highest level of event (command started and stopped, values determined, errors, etc)

AI (P1) 1: **12 Hour SeeingLmtd Test**

Set Adaptive Secondary in flat “SeeingLmtd” mode for 12 hours continuously without user interaction. Check that the flat does not change by more than 200 nm RMS during these 12 hours.

In the following section, the initial and final state of the AO Systems in described. The possible states are:

- “SeeingLmtd”
- “ReadyToAcquire”
- “RefAcquired”
- “LoopClosed”
- “LoopSuspended”

4.1. AO System Startup and Shutdown

Test case: Go through full startup and shutdown of the AO system.

4.1.1. Startup

This test will start with the AO System hardware fully powered off. AO computers and network hardware will be powered and ready for use.

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1. The AOS GUI should display that the AO System is not ready for operation.
2. The startup should be semi-automatic such that:
 - a. Only one Graphical User Interface is needed to startup the AO System.
 - b. After startup is complete, the AO System should be in a “SeeingLmtd” state.
 - c. No more than six (6) mouse-clicks are needed to startup.
 - d. No manual setting of parameters needed for startup.
3. After startup is complete, the AOS GUI should display that the AO is ready for operation and in a “SeeingLmtd” state.
4. Information about the startup (systems started, configuration files used, errors, etc) should be written in an AO log and the TCS event log.
5. Measure the time required for startup sequence to be completed.
6. Observe any irregularities.

Results/Comments:

Start in the control room at 10:00. Clear all AO logs and TCS logs and /lbt/logs/events, AOS.log, etc

OSS failed to start because hexapod power is off. Will start OSS after power on of AO system. Should separate Hexapod power from Adsec power. Roberto will do this when requested.

AI LBTO (P2) 1: OSS Fails to Start

OSS subsystem startup should not fail if UMAC is not powered. Should display an error and show on OSSGUI that not connected.

Need to start a daemon on the two machines: login to aospare and aoserver and run scripts to start all needed processes (msgdaemon, mirror control, Wcontrol, etc). This script will be the same at the telescope. How to run it may change (icon or cron, etc). Script does not check for success of all processes. Alfio will create this. When start engineering GUI's see if started.

AI (P3) 1: Process Startup on Adpot Control GUI

Create Icon or automatic script to start up all the processes (AdSec and WFS) needed for AO operation (should not have to login to two different machines and run script). Included in Adopt Control GUI.

AI (P2) 2: Process Startup Check

Startup script should check that all processes started properly. If not, then inform user.

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Click engineering GUI icon (adsceng command line). “System processes” button: see all green with the exception of Hexapod Ctrl (Red). Housekeeping (yellow) SS:Process_Startup.png.

AI (P2) 3: Remove Hex Ctrl from GUI

Remove Hexapod Ctrl from “System processes” GUI (not needed at Telescope)

Click Icon Adopt Control GUI: Adsec and WFS setup light should both be green. Click “System Process” buttons to see list of processes for Adsec or WFS.

System starts in StandAlone: rejects all requests from AOS and visa-versa. No hardware is powered

Adopt Control GUI

FSM: Adsec: Startup **Only one request executed at a time: all buttons grayed out.

Click on “Adsec Software”: AdSec Arbitrator for GUI to see how startup is going on AdSec Control Gui

AI (P2) 4: Display and Log Process Startup Info AdSec

List startup information for AdSec in the appropriate log so the user has feedback that startup is proceeding. Display on AdoptControl GUI in the lower “Log View” section. Do not need to display full startup command but maybe just “Started Msg Daemon”, “Started mVar Daemon”, etc

Result: All Secondary power is on, and Secondary is Flat (with default flat). Time require 2’50” to complete. AdSec Hardware Status: Green and “Operating”

----- Startup of Adaptive Secondary and AdSec Arbitrator processes complete

FSM: WFS: Startup **Only one request executed at a time: all buttons grayed out.

Click on “WFSC Software”: “WFS Arbitrator” to start GUI to see how startup is going on WFSC Control GUI. Extra startup items for Solar Tower (reference source, cube positioning, etc) will be removed from script for mountain.

AI (P2) 5: Display and Log Process Startup Info for WFS

List startup information for WFS in the appropriate log so the user has feedback that startup is proceeding. Display on AdoptControl GUI in the lower “Log View” section.

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Result: All WFS power is on, and stages/filter wheels are homed and put in default location. Time require 3'50" to complete. WFS Hardware Status: Green and "Operating"

HouseKeeping GUI froze when X on window clicked. "Exit" button works.

AI (P2) 6: HouseKeeping "X" Button to Exit

Fix "X" button on HouseKeeping GUI to act as "Exit" button.

AI (P2) 7: TSS Activation On GUI

Display when TSS has been activated on highest level GUIs (AOS Gui and or AdoptControl GUI). Implement code in high level AO Supervisor SW.

AI (P2) 8: Coil Activation Status on GUI

Display when Coils are disabled on highest level GUIs (AOS Gui and or AdoptControl GUI). Implement code in high level AO Supervisor SW.

AI LBTO (P2) 2: 3D Anemometer info into DD

Put 3D AO Anemometer wind speed into Date Dictionary.

AI (P2) 9: Automatic Management of TSS Operation

Implement Wind Speed and TSS management in the AO Supervisor HouseKeeping process. Related to AI LBTO 2 above. This includes the logic to activate TSS when shell is Ripped in medium and high winds (but not high enough to close).

AI (P4) 1: Determination of Safe Operation of TSS

Automatic procedure to determine if it is safe to use TSS (eg no dust in gap).

AdSec Mirror Gui (icon or Adsec Control GUI): Screen Shot: MirrorGUI_Flat.png

WFS Control GUI: click CCD39 and CCD47 for live displays

AI (P3) 2: Camera Button Labels

Change camera buttons from "CCD39" and "CCD47" to "WFS Camera" and "Acquisition Camera" on WFS Control GUI

System in now powered up and initialized

----- Startup of WFS and WFC Arbitrator processes complete

Start OSS, OSSGUI and home the hexapod.

On PSFGUI have to input global offsets: Should be loaded by default

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AI LBTO (P2) 3: **DX M2 Hexapod Global Defaults**

Understand how to get these global loaded. IssueTrak #?? created.

Start AOS, AOSGUI.

AI (P2) 10: **AOS Connection Status Display on GUI**

AOSGUI should CLEARLY display if AOS is not connected to the AO Supervisor (related to earlier AI about AOS automatically reconnect to AO Supervisor (msgd), not have to be restarted).

TV: runs at 1 frame each 3 seconds. AOS GUI updated once per 10 seconds.

AI (P2) 11: **TV Update Rate on GUI**

AOSGUI display should refresh as fast as TV images are read, up to 1 Hz

AOSGUI: Upper right: State displayed (Disconnected, Waiting, Connected, etc)

4) Change of state written in TCS events log and displayed on AOS GUI

Start IRTC, narrow fov, H filter. Source not seen, but presetAO and acquireRefA should have put the Target star on IRTC. (?)

AI (P2) 12: **mVar Process Not Updatin AOSGUI**

Had to restart mVar client to get info onto AOSGUI (Adsec Status). Startup sequencing problem?

AOSGUI display Status and Shape (flat name.sav)

List of flats not available on AOSGUI. Must know name, but this may not be used by AO Operator. If name is incorrect, the error returned: on AOSGUI, fixable errors are yellow, fatal errors are red.

Adopt Control GUI: Set Service Mode: "Observation" and Apply. Will accept request from AOS. All buttons on Adopt Control GUI are disabled (eg cannot shutdown system when in Observation mode). AO Status change to "SeeingLmtd".

PresetAO on AOSGUI: Fields x,y of Ref star are updated with values from PCS when an IRC presetAO is requested. Instrument and Focal Station are fields are empty, but should be read from "IIF" call. If new instrument is authorized while AOS is running, then AOS retrieves Instrument and Focal station form TCS, and then automatically calls PresetFlatAO with the appropriated default flat for that Instrument.

AI (P2) 13: **AOS Display Instrument on Startup**

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AOS, on startup, should request current Instrument and Focal Station from IIF and display on GUI, but not call PresetFlatAO.

From AOSGUI presetAO command, AO Mode and Instrument are used to create correct filename.

Entered Ref Star, x,y:-19, 2 , mag, 8 (range 6<mag<17) set all AO parameters.

Click presetAO: Running...moving stages and setting AO Parameters. These values are placed in AO Configuration Parameter fields on AOSGUI.

AI (P2) 14: Display Gain on AOSGUI

Gain field empty on AOSGUI

Technical Viewer: Out of focus and refraction from Thorlab filter used to change Ref star magnitude.

Use OSSGUI to set focus to reasonable value.

AI (P2) 15: Correct TV Orientation on AOSGUI

Make TV displays the same orientation. 90 rotation between TV engineering GUI and AOSGUI.

AI (P2) 16: Add North/East Vane on AOSGUI

Add North/East vane on AOSGUI (Info from LBTO)

If magnitude measured is different from given values (>2mags) then parameters are adjusted. If too large, then error returned (Yellow because fixable with different parameters)

presetAO: Measure darks for CCD39 and CCD47

PresetAO failed 12:15 (ERR) in log. AOSGUI display "Command Timeout" (this is set by Luca to 120 sec), but AdoptControl showed "Executing". It finally timed out. Critical failure puts system in "StandAlone" state. To recover had to change back to "Observation" mode, send presetAO and then AcquireRefAO.

Tried AcquireRefAO again and successful this time. Display new Estimated Mag and new AO parameters.

AI (P2) 17: TV Image Not Always Updating

AOSGUI: Field viewer not updating and acquisition image not available.

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Have to set pupil position manually in solar tower (may have to at telescope with star or with reference source). Centering by eye is usually not good enough: must be within 1/10 pixel or loop will not close, or some modes will oscillate. Run centering procedure from WFS Control GUI to get CX~0.0 and CY~1.0. Had to change loop parameters on WFS Control GUI (and back when done).

AI (P3) 3: Automate Pupil Centering Procedure

Automatic procedure to center the pupil, first to get the loop closed, and once the loop is closed then more accurate centering of pupil. The AOS should not return from the StartAO call requested by IIF till loop is closed and optimized (pupil centered). A return to IIF, and then it returns to the Instrument, signals the Instrument (Astronomer) that the Telescope is (including AO System) ready for science data to be collected. Should never have to move stages manually (see previous AI)

LoopClosed: See oscillation on Pyramid images so move WFS stage by hand to minimize oscillation.

Search for Spot on IRTC. Use OffsetXY. Moved several times, but then Execution of offset froze. Finally the command timed out. 1 of 10 times the stage moves but reply is lost.

AI (P1) 2: WFS Stage Communication Problem

Fix communication problem of stage moving but does not reply to AO Supervisor that it is in position (loosen position accuracy for stage?)

4.1.2. Shutdown

This test will start with the AO System in a “SeeingLmtd” state. The shutdown will leave all AO System hardware fully powered off. AO Computers and network hardware will remain powered on and ready for use.

1. The AOS GUI should display that the AO System is ready for operation and in a “SeeingLmtd” state.
2. The shutdown should be semi-automatic such that:
 - a. Only one Graphical User Interface is needed to shutdown the AO System.
 - b. No more than six (6) mouse-clicks are needed to shutdown.
3. After shutdown is complete, the AO System hardware should be powered off. AO Computers and network hardware will remain powered on and ready for use.
4. Information about the shutdown (systems stopped, errors, etc) should be written in an AO log and the TCS event log.
5. Measure the time required for shutdown sequence to be completed.
6. Observe any irregularities.

Results/Comments:

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1. StopAO. Must be in “SeeingLmtd” mode to shutdown
2. Adopt Control: Change to StandAlone state (to enable buttons)
3. Adopt Control: WFS Shutdown
 - a. 20 seconds
 - b. Hardware status off
4. Adopt Control: AdSec Shutdown
 - a. 3 seconds
 - b. Hardware Status off
 - c. Turns off Power to Hexapod too.
5. Click W_Stop to stop all WFS processes (but not GUI’s)
6. Click ADSEC_stop stop all AdSec processes (but not GUI’s)

AI (P1) 3: Timeout for WFS Shutdown

Timeout for WFS Shutdown is too short

AI (P2) 18: Increase Number of Scrollback Lines

Status output on the bottom of WFSControl GUI (I think) scroll back lines too small. Cannot scroll back to see all of shutdown information (log).

AI (P2) 19: Shutdown Also Kills WFS and AdSec GUIs

Add GUI kill to WFS_stop and ADSEC_stop

4.2. Test of Individual AO Commands

The tests in these sections will be performed with both a successful and an unsuccessful completion. We may have to manufacture an unsuccessful request by manually setting a parameter or system setup such that each request fails.

4.2.1. PresetFlatAO

AOS GUI Interface

- **Initial State of AO System:** “SeeingLmtd”
- **Test case:** Request PresetFlatAO using the AOS GUI.
- **AOS GUI Input Parameters:** “Flat_Filename”
- **Expected Result:** The AO System is in a “SeeingLmtd” state with the requested “Flat” applied to the Adaptive Secondary

1. Check that for a successful PresetFlatAO request:
 - a. The AO System is left in a “SeeingLmtd” state.
 - b. The appropriate “Default” flat is applied for the current authorized instrument and focal station.

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- c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. The applied flat name is displayed on the AOS GUI and written to an AO log and the TCS event log.
2. Check that for an unsuccessful PresetFlatAO request:
 - a. The AO System is left in a “known” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the PresetFlatAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
3. Measure the time for either a successful or unsuccessful PresetFlatAO request to be displayed on the AOS GUI.

Results/Comments:

1. Yes
 - a. Startup of AdSec will flatten with “generic” flat. If PresetFlatAO is pressed with an empty flat name field, then the default flat for the current authorized instrument is applied
 - b. ~3 to 5 seconds.
 - i. When an instrument is Authorized at IIF GUI, the AOS calles SetNewInstrument() and then presetFlatAO with appropriate name (default for now).
 - ii. What if instrument is authorized on IIF before AOS is running?
 - iii. IIF sends stopAO to AOS before authorizing new instrument.
 - iv. Did not exercise different instrument (ie different flats, flatnames) because currently only one flat available
 - c. PresetFlatAO is not logged by AOS (does not show on AOS GUI, but see that it was applied). AOS writes events and more to AOSLlogdir (/tmp/AOS00.log). SetNewInstrument start and stop are there.
 - d. Remained in SeeingLmtd and displayed on AOSGUI
2. Failure
 - a. If incorrect filename:Flat then error “File not Found: name”. If filename is a directory then IDL File error returned
 - b. Remained in SeeingLmtd and displayed on AOSGUI
3. ~15 seconds to apply flat

AI (P2) 20: AOS Display Flat on Startup

On startup of the AOSGUI, the name of the flat currently on the Adaptive Secondary should be displayed.

AI (P2) 21: Correct Flat Applied on New Instrument Authorization

Demonstrate that different default flats (or at least files with different names) are applied to AdSec when various instruments are authorized.

AI (P3) 4: Document How to Change Default Flat

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Document the name and location of the default flat for each instrument, and how to change these.

IRC Interface Tool

- **Initial State of AO System:** “SeeingLmtd”
 - **Test case:** Request PresetFlatAO using the IRC interface tool.
 - **Input Parameters:** “Flat_Filename”, “left”
 - **Expected Result:** The AO System is in a “SeeingLmtd” state with the requested “Flat” applied to the Adaptive Secondary
1. Check that for a successful PresetFlatAO request:
 - a. The AO System is left in a “SeeingLmtd” state.
 - b. The appropriate “Default” is applied for the current authorized instrument and focal station.
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. The applied flat name is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - e. A success flag is returned to the IIF and is noted in the TCS event log.
 - f. A success flag is returned to the IRC interface tool.
 2. Check that for an unsuccessful PresetFlatAO request:
 - a. The AO System is left in a “known” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the PresetFlatAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the PresetFlatAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the PresetFlatAO request failed.
 3. Measure the time for information about either a successful or unsuccessful PresetFlatAO request to be returned to the IRC interface tool.

Results/Comments:

1. Success returned Ok
2. Failure returned error with message (flat not found)

4.2.2. SetReference

This command must be executed, with an appropriate file with the reference star coordinates, before a PresetAO only for the IRC Interface Tool section below. The reference star coordinates passed to the IIF are passed to the AOS when a PresetAO request is made.

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IRC Interface Tool

- **Initial State of AO System:**
 - “SeeingLmtd” state
 - All TCS subsystems and simulators needed are running
 - TCS “servers” are running
 - IIF, MCS, PCS subsystems are running
 - mcsSimulator is running in the appropriate setup (set az, el and rot to holding at the mcsDisplay GUI)
 - Simulated “telescope” is tracking at an appropriate target star. This is achieved via the psclient routine, selection 1.
 - **Test case:** Request SetReference using the IRC interface tool.
 - **Input Parameters:** None (a default file is used) or “filename.dat”
 - **Expected Result:**
 - The AO System is in a “SeeingLmtd” state
 - The AO System ready to accept a PresetAO request.
 - The IIF contains in memory the reference star coordinates. **Note**, it may not be possible to determine it this is the case until these coordinates are passed to the AOS.
1. Check that for a successful SetReference request:
 - a. The AO System is left in a “SeeingLmtd” state.
 - b. The AO System is ready to accept a PresetAO request.
 - c. A success flag is returned to the IIF and is noted in the TCS event log.
 - d. A success flag is returned to the IRC interface tool.
 2. Check that for an unsuccessful SetReference request:
 - a. The AO System is left in a “SeeingLmtd” state.
 - b. A fail flag is returned to the IIF and is noted in the TCS event log.
 - c. A fail flag is returned to the IRC interface tool along with the reason the SetReference request failed.
 3. Measure the time for information about either a successful or unsuccessful SetReference request to be returned to the IRC interface tool.

Results/Comments:

1. Success
 - a. OK
 - b. OK
 - c. Yes
 - d. Status OK
2. Fail
 - a. Yes
 - b. Error in events file
 - c. Failed flag return with message

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3. < 1sec

Note: This command does not exercise any AO software, only IIF.

4.2.3. PresetAO

AOS GUI Interface

- **Initial State of AO System:** “SeeingLmtd”
 - **Test case:** Request PresetAO using the AOS GUI.
 - **AOS GUI Input Parameters:** x,y position of reference star, Instrument “string”, Focal Station (not used yet), magnitude, color id (not used yet)
 - **Expected Result:**
 - The AO System is in a “ReadyToAcquire” state
 - The AO System ready to accept a CheckRefAO or AcquireRefAO request.
 - The WFSC stages are positioned at the requested x,y position.
1. Check that for a successful PresetAO request:
 - a. The AO System is left in a “ReadyToAcquire” state.
 - b. All stages and filter wheels are in the correct position.
 - c. The AO System is ready to accept a CheckRefAO or AcquireRefAO request.
 - d. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful PresetAO request:
 - a. The AO System is left in a “SeeingLmtd” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the PresetAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful PresetAO request to be displayed on the AOS GUI.

Results/Comments:

1.
 - a. Yes, “ReadyToAcquire”
 - b. WFSC stage moves to requested position. Filter wheels set to send light to Tech Viewer
 - c. Does accept CheckRefAO and AcquireRefAO
 - d. PresetAO with parameters sent to TCS event log and to AOS log
 - e. “Ready to Acquire” on AOSGUI and AO config parameters displayed.
2. Failure
 - a. Remains in “ReadyToAcquire” mode.
 - b. Set mag 19: Event log gives error “Star too faint”

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- c. Set ref star to 200mm. Events log gives error “Star Position outside limits”
- d. If error in presetAO then must do a StopAO and then can PresetFlatAO
- e. GUI show “Retry: Star position”
3. From 6 second (no change in binning) up to 30 seconds (change binning). Maybe up to a minute if stages move long distance
 - a. AI CDD39 viewer dies when binning is changed

AI (P2) 22: **Failed PresetAO Returns to SeeingLmtD Mode**

If PresetAO fails then should go back to “SeeingLmtD” even if previous presetAO was successful.

IRC Interface Tool

- **Initial State of AO System:**
 - “SeeingLmtD” state
 - All TCS subsystems and simulators needed are running
 - TCS “servers” are running
 - IIF, MCS, PCS subsystems are running
 - mcsSimulator is running in the appropriate setup (set az, el and rot to holding at the mcsDisplay GUI)
 - Simulated “telescope” is tracking at an appropriate target star. This is achieved via the pcsclient routine, selection 1.
 - Coordinates for an appropriate reference star have been passed to the AOS with the IRC SetReference command.
 - **Test case:** Request PresetAO using the IRC interface tool.
 - **Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in a “ReadyToAcquire” state
 - The AO System ready to accept a CheckRefAO or AcquireRefAO request.
 - The WFSC stages are positioned at the correct x,y position by comparing:
 - AO Engineering GUIs
 - PCS logging of x,y values sent to AOS in /var/log/messages
 - Request guide star x,y position using the pcsclient routine, selection 14.
1. Check that for a successful PresetAO request:
 - a. The AO System is left in a “ReadyToAcquire” state.
 - b. The WFSC stages are in the correct position (see above).
 - c. The AO System is ready to accept a CheckRefAO or AcquireRefAO request.
 - d. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - e. A success flag is returned to the IIF and is noted in the TCS event log.
 - f. A success flag is returned to the IRC interface tool.

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2. Check that for an unsuccessful PresetAO request:
 - a. The AO System is left in a “SeeingLmtd” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the PresetAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the PresetAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the PresetAO request failed.
3. Measure the time for information about either a successful or unsuccessful PresetAO request to be returned to the IRC interface tool.

Results/Comments:

1. Success
 - a. Yes
 - b. Yes, at values given by PCS, AOS and AOSGUI
 - c. Yes
 - d. Yes, values and info put in AOS log and in the TCS event log.
 - e. Yes
 - f. Yes
2. Set mag to 20 and large offset
 - a. Didn’t change state
 - b. Yes, with new incorrect values on GUI
 - c. Yes, Star position outside stage range... or mag to low
 - d. Yes, same error as displayed on AOSGUI
 - e. Yes, “”
 - f. Yes, “”
3. 15 to 30 seconds

4.2.4. AcquireRefAO

AOS GUI Interface

- **Initial State of AO System:**
 - “ReadyToAcquire”
 - PresetAO has already been successfully executed
- **Test case:** Request AcquireRefAO using the AOS GUI.
- **AOS GUI Input Parameters:**
- **Expected Result:**
 - The AO System is in a “RefAcquired” state
 - The AO System ready to accept a StartAO request.
 - The WFSC stages are positioned so the reference star is placed on the peak of the Pyramid WFSC, or at least with its capture range.

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1. Check that for a successful AcquireRefAO request:
 - a. The AO System is left in a “RefAcquire” state.
 - b. The WFSC stages are positioned so the reference star is placed on the peak of the Pyramid WFSC, or at least with its capture range by checking:
 - i. The reference star is on, or very near, the “Hotspot” of the Technical Viewer camera.
 - ii. The Pyramid WFSC is reporting Tip and Tilt values that are within its capture range.
 - c. The AO System is ready to accept a StartAO request.
 - d. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
2. Check that for an unsuccessful AcquireRefAO request:
 - a. The AO System is left in a “ReadyToAcquire” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the AcquireRefAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
3. Measure the time for either a successful or unsuccessful AcquireRefAO request to be displayed on the AOS GUI.

Results/Comments:

1. Success
 - a. “RefAcquired”
 - b. Stage is move to the correct place. See light on Pyramid (out of focus). If no light will complain about no light. AO parameters are fill on AOS GUI, including amount stage was moved.
 - c. Yes
 - d. AO log and TCS event log Yes.
2. Failure: turn off reference source
 - a. Failed with error: mag 12 found, mag 8 expected. Even with no light, the source finding routine found a star in the noise. Uses IDL routine gause2dfit. Need to tune parameters.
 - b. Yes, AOS GUI display “Retry: mag 12 found...”
 - c. Yes, in TCS log
3. ~70 seconds

After AcquireRefAO completed successfully, the Fast Diagnostic died (Adsec: System processes “Open” and red) and shell was ripped. Found call to soundcard caused the fastdiag. To seg fault. Alfio removed call to soundcard. The Fastdiag pulled shell to ref body because did not receive several frame form Adaptive Secondary.

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AI (P1) 4: Fast Diagnostic Death

Understand, fix and CONFIRM the problem that caused the Fast Diagnostics to die (which then caused the shell to be Ripped). Understood and fixed (see above) but not confirmed?

AI (P2) 23: Write in Logs the Reason for Ripped Shell

AdoptControl GUI, AOSGUI, AOS logs and the TCS log should have a clear description of why the shell was Ripped (ie Fast Diagnostic failure..died).

On AdSec control gui clicked “Recover Fail”: clean state by against Ref body.
Set mode to “Standalone” (this should be automatically set when failure)
FSM state startup for AdSec: Flat

AI (P2) 24: Improved Recovery Procedure for Ripped Shell

The recover procedure after a Ripped shell should be one (maybe two) buttons on the AdoptControl GUI (lower lever engineering GUIs should not be used)

AI (P3) 5: Reduce AcquireRefAO Execution Time

For every AcquireRefAO, the background acquisition procedure is always executed. This is fairly time consuming (~1 miinute). Can a library of backgrounds for various exposure times be acquired and the correct one chosen for the current system parameters? Can then Alfio’s “Drift Correction” routine then keep the subtracted background at the needed level?

AI (P3) 6: Modify AcquireRefAO to Also Re-Point Telescope

Modify AcquireRefAO to perform, if requested (flag), to first a re-pointing to place Reference star on the Pyramid, and then the usual move the XY stages acquisition.

IRC Interface Tool

- **Initial State of AO System:**
 - “ReadyToAcquire” state
 - PresetAO has already been successfully executed
 - **Test case:** Request AcquireRefAO using the IRC interface tool.
 - **Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in a “RefAcquired” state
 - The AO System ready to accept a StartAO request.
 - The WFSC stages are positioned so the reference star is placed on the peak of the Pyramid WFSC, or at least with its capture range.
1. Check that for a successful AcquireRefAO request:
 - a. The AO System is left in a “RefAcquired” state.

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- b. The WFSC stages are positioned so the reference star is placed on the peak of the Pyramid WFSC, or at least with its capture range by checking:
 - i. The reference star is on, or very near, the “Hotspot” of the Technical Viewer camera.
 - ii. The Pyramid WFSC is reporting Tip and Tilt values that are within its capture range.
- c. The AO System is ready to accept a StartAO request.
- d. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
- e. A success flag is returned to the IIF and is noted in the TCS event log.
- f. A success flag is returned to the IRC interface tool.
2. Check that for an unsuccessful AcquireRefAO request:
 - a. The AO System is left in a “ReadyToAcquire” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the AcquireRefAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the AcquireRefAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the AcquireRefAO request failed.
3. Measure the time for information about either a successful or unsuccessful AcquireRefAO request to be returned to the IRC interface tool.

Results/Comments:

1. Success
 - a. Yes
 - b. Yes
 - c. Yes
 - d. Yes, however only start and stop are entered. Do we want to see how much stages were moved, etc in the TCS event log?
 - e. Yes
 - f. Yes
2. Fail
3. 70 seconds

AI (P2) 25: Write More AcquireRefAO Info to Log

Write to the TCS log important information about the AcquireRefAO procedure, specifically the amount the WFS stages were moved to put the reference star on the peak of the pyramid.

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4.2.5. CheckRefAO

AOS GUI Interface

- **Initial State of AO System:**
 - “ReadyToAcquire”
 - PresetAO has already been successfully executed
 - **Test case:** Request CheckRefAO using the AOS GUI.
 - **AOS GUI Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in a “ReadyToAcquire” state
 - The AO System ready to accept an AcquireRefAO request.
 - The telescope is re-pointed so the reference star is placed on the peak of the Pyramid WFSC, or at least with its capture range.
1. Check that for a successful CheckRefAO request:
 - a. The AO System is left in a “ReadyToAcquire” state.
 - b. The telescope has been re-pointed, if needed, via a request to the PCS to changing the guide star origin. This is checked by comparing:
 - i. The size of the guide star origin change request sent by AOS to the PCS, written in the AO log and the TCS event log.
 - ii. The size of the actual guide star origin change applied by the PCS, written in the TCS event log.
 - c. The re-pointing of the telescope successfully places the reference star on the peak of the Pyramid WFSC, or at least with its capture range by checking:
 - i. The reference star is on, or very near, the “Hotspot” of the Technical Viewer camera.
 - ii. The Pyramid WFSC is reporting Tip and Tilt values that are within its capture range.
 - d. The AO System is ready to accept an AcquireRefAO request.
 - e. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful CheckRefAO request:
 - a. The AO System is left in a “ReadyToAcquire” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the CheckRefAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful CheckRefAO request to be displayed on the AOS GUI.

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Results/Comments:

1. Success
 - a. Calculates X,Y offsets and displays on AOSGUI
 - b. Does not make call to PCS for re-pointing. Only put information into DD.
 - c. TBD
 - d. Yes.
 - e. Yes, displayed "ReadyToAcquire" mode
2. Failed: can only request CheckRefAO in "ReadyToAcquire" state. Could change.
3. ~35 seconds

XY values are not written in the TCS event log (See AI for AcquireRefAO above)

For every CheckRefAO, the background acquisition procedure is always executed. See AI for AcquireRefAO above.

IRC Interface Tool

- **Initial State of AO System:**
 - "ReadyToAcquire" state
 - PresetAO has already been successfully executed
 - **Test case:** Request CheckRefAO using the IRC interface tool.
 - **Input Parameters:** "left"
 - **Expected Result:**
 - The AO System is in a "ReadyToAcquire" state.
 - The AO System ready to accept a AcquireRefAO request.
 - The telescope is re-pointed so the reference star is placed on the peak of the Pyramid WFSC, or at least with its capture range.
1. Check that for a successful CheckRefAO request:
 - a. The AO System is left in a "ReadyToAcquire" state.
 - b. The telescope has been re-pointed, if needed, via a request to the PCS to changing the guide star origin. This is checked by comparing:
 - i. The size of the guide star origin change request sent by AOS to the PCS, written in the AO log and the TCS event log.
 - ii. The size of the actual guide star origin change applied by the PCS, written in the TCS event log.
 - c. The re-pointing of the telescope successfully places the reference star on the peak of the Pyramid WFSC, or at least with its capture range by checking:
 - i. The reference star is on, or very near, the "Hotspot" of the Technical Viewer camera.

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- ii. The Pyramid WFSC is reporting Tip and Tilt values that are within its capture range.
- d. The AO System is ready to accept an AcquireRefAO request.
- e. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
- f. A success flag is returned to the IIF and is noted in the TCS event log.
- g. A success flag is returned to the IRC interface tool.
- 2. Check that for an unsuccessful CheckRefAO request:
 - a. The AO System is left in a “ReadyToAcquire” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the CheckRefAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the CheckRefAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the CheckRefAO request failed.
- 3. Measure the time for information about either a successful or unsuccessful CheckRefAO request to be returned to the IRC interface tool.

Results/Comments:

- 1. Success
 - a. Yes
 - b. X,Y values are calculated, but no call to PCS for re-pointing
 - c. Cannot check in Solar Tower
 - d. Yes
 - e. Yes
 - f. Yes
 - g. Yes
- 2. Set mag to 16 in setref. Turn up lamp so mag is too bright
 - a. Yes
 - b. Yes source acquire=9, expected 13 (should have been 16: Alfio says error in conversion from mags to count and back to mags)
 - c. Yes
 - d. Yes
 - e. Yes
 - f. yes
- 3. 25 seconds

AI (P2) 26: Incorrect Ref Star Magnitude in Log

Correct error output it the star magnitude is incorrect as in 2b) above. In 2b), irc SetReference had 16 mag, but error output said 13.

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4.2.6. StartAO

AOS GUI Interface

- **Initial State of AO System:**
 - “RefAcquired”
 - PresetAO and AcquireRefAO have already been successfully executed
 - **Test case:** Request StartAO using the AOS GUI.
 - **AOS GUI Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in “LoopClosed” state.
1. Check that for a successful StartAO request:
 - a. The AO System is in “LoopClosed” state.
 - b. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful StartAO request:
 - a. The AO System is left in a “RefAcquired” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the StartAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful StartAO request to be displayed on the AOS GUI.

Results/Comments:

1. Success
 - a. “LoopClosed” state
 - b. Yes
2. Failure: OK
3. <1sec to few seconds (if new dark is needed: checks that pixels out of the pupil are close to 0).

Offload mode: Started automatically at 1Hz in the AO Supervisor. These values are sent to AOS. Most requests have small values so AOS decides not to send them to Hexapod.

While PSF is having OSS move the hexapod (~10 seconds) the AO Supervisor still sends amounts to AOS at 1Hz. AOS knows PSF is busy and does not send. Get “Mode offload request too fast” warning.

AI (P2) 27: **Change Offload Message in Log**

The “Mode offload request too fast” warning in log should be “Offloading progress: request not send to PSF” (or something like this). However, should still send the Mode offload zernike values to Telemetry.

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AI LBTO (P2) 4: Speed Up Hexapod Exec Time: IssueTrak #1984

Relax accuracy of hexapod position to speed up hexapod motion execution time.
Paul, IssueTrak #1984

AI (P3) 7: Add Flag to Offload Mode Telemetry Stream

Add field to adsc.sx.Offload_Mode_Vector stream with a flag (0/1/2) to indicate that these values (were/were not) sent to PSF either because below threshold or hexapod is busy.

AI (P3) 8: Write Offload Mode Info in TCS Event Log

Write “Mode offload requested” in the TCS event log (and in SysLog, please) whenever AOS makes an offload request, along with the zernike values sent.

Before StartAO, we turned off Reference lamp. The background gave a tip that was too much for shell to move, so command was skipped. However, the tilt on the shell was enough that tilt was sent to PSF. The same amount again and again and the star was moved off 30” or more in 2 minutes.

AI (P2) 28: Stop Offloading Modes When in SkipFrame Mode

When AdSec is skipping frame, then should stop sending offload of modes to PSF.

IRC Interface Tool

- **Initial State of AO System:**
 - “RefAcquired” state
 - PresetAO and AcquireRefAO have already been successfully executed
 - **Test case:** Request StartAO using the IRC interface tool.
 - **Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in “LoopClosed” state.
1. Check that for a successful StartAO request:
 - a. The AO System is left in “LoopClosed” state.
 - b. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - c. A success flag is returned to the IIF and is noted in the TCS event log.
 - d. A success flag is returned to the IRC interface tool.
 2. Check that for an unsuccessful StartAO request:
 - a. The AO System is left in a “RefAcquired” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the StartAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.

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- e. The reason the StartAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the StartAO request failed.
3. Measure the time for information about either a successful or unsuccessful StartAO request to be returned to the IRC interface tool.

Results/Comments:

1. Success
 - a. Yes
 - b. Yes
 - c. Yes
 - d. Yes
2. Failure: OK
3. 100 milliseconds

4.2.7. StopAO

AOS GUI Interface

- **Initial State of AO System:**
 - The AO system is in “LoopClosed” state.
 - **Test case:** Request StopAO using the AOS GUI.
 - **AOS GUI Input Parameters:**
 - **Expected Result:**
 - The AO System is in a “SeeingLmtd” state.
1. Check that for a successful StopAO request:
 - a. The AO System is in a “SeeingLmtd” state.
 - b. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful StopAO request:
 - a. The AO System is left in a known state. This could be either a “SeeingLmtd” state or remain in “LoopClosed” state, depending on the reason for the failure.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the StopAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful StopAO request to be displayed on the AOS GUI.

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Results/Comments:

1. Success
 - a. "SeeingLmtd" state
 - b. On AOSGUI and AdoptControl GUI and in TCS event log.
2. Not easy to do...Could have flat fail, but they have never seen this.
3. ~5 to 10 seconds, depending on the flat.

StopAO stops and reloads the last loaded flat.

Last loaded flat is used, rather than the "default" flat after Loop is opened.

AI (P1) 5: **Confirm Flat is Applied by StopAO**

Confirm the last applied flat is reloaded during StopAO. This requires the removal of a patch in the Adsec(?)code and then check optically. Currently the AO logs say that the flat is applied, but optically Guido and Rick found this was not the case.

AI (P1) 6: **Confirm Two AdSec Buffers Are Cleared on StopAO**

Confirm the Integrated Modal buffer and ??? buffer are cleared when StopAO occurs. More info from Guido.

IRC Interface Tool

- **Initial State of AO System:**
 - The AO system is in "LoopClosed" state.
 - **Test case:** Request StopAO using the IRC interface tool.
 - **Input Parameters:** "left"
 - **Expected Result:**
 - The AO System is in a "SeeingLmtd" state.
1. Check that for a successful StopAO request:
 - a. The AO System is left in a "SeeingLmtd" state.
 - b. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - c. A success flag is returned to the IIF and is noted in the TCS event log.
 - d. A success flag is returned to the IRC interface tool.
 2. Check that for an unsuccessful StopAO request:
 - a. The AO System is left in a known state. This could be either a "SeeingLmtd" state or remain in "LoopClosed" state, depending on the reason for the failure.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the StopAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.

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- e. The reason the StopAO request failed is returned to the IIF and is written in the TCS event log.
- f. A fail flag is returned to the IRC interface tool along with the reason the StopAO request failed.
3. Measure the time for information about either a successful or unsuccessful StopAO request to be returned to the IRC interface tool.

Results/Comments:

1. Success
 - a. Yes
 - b. Logging yes
 - c. "message" is not return to IRC command. Of course, the IRC StopAO command sent this message to the IIF.

4.2.8. PauseAO

AOS GUI Interface

- **Initial State of AO System:**
 - The AO system is in "LoopClosed" state.
 - **Test case:** Request PauseAO using the AOS GUI.
 - **AOS GUI Input Parameters:**
 - **Expected Result:**
 - The AO System is in a "LoopSuspended" state.
 - The AO Loop can be Closed by a ResumeAO request.
1. Check that for a successful PauseAO request:
 - a. The AO System is in a "LoopSuspended" state.
 - b. The AO System Closed AO Loop can be resumed by a ResumeAO request.
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful PauseAO request:
 - a. The AO System is left in a "known" state. This could be either a "LoopSuspended" state or remain in "LoopClosed" state, depending on the reason for the failure.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the PauseAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful PauseAO request to be displayed on the AOS GUI.

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Results/Comments:

1. Successful
 - a. Yes. Mode offloading stopped
 - b. Yes, on AOSGUI and AdoptControl and in TCS event log
2. Failure: OK
3. 100 milliseconds

IRC Interface Tool

- **Initial State of AO System:**
 - The AO system is in “LoopClosed” state.
 - **Test case:** Request PauseAO using the IRC interface tool.
 - **Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in a “LoopSuspended” state.
 - The AO Loop can be Closed by a ResumeAO request.
1. Check that for a successful PauseAO request:
 - a. The AO System is left in a “LoopSuspended” state.
 - b. The AO System Closed AO Loop can be resumed by a ResumeAO request.
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A success flag is returned to the IIF and is noted in the TCS event log.
 - e. A success flag is returned to the IRC interface tool.
 2. Check that for an unsuccessful PauseAO request:
 - a. The AO System is left in a “known” state. This could be either a “LoopSuspended” state or remain in “LoopClosed” state, depending on the reason for the failure.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the PauseAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the PauseAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the PauseAO request failed.
 3. Measure the time for information about either a successful or unsuccessful PauseAO request to be returned to the IRC interface tool.

Results/Comments:

1. Success

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- a. Yes. Offload modes suspended
 - b. Yes
 - c. Yes
 - d. Yes
 - e. Yes
2. Fail
 3. 150 milliseconds

4.2.9. ResumeAO

AOS GUI Interface

- **Initial State of AO System:**
 - “LoopSuspended”
 - The AO system was in Closed AO Loop and then a PauseAO request was successfully executed
 - **Test case:** Request ResumeAO using the AOS GUI.
 - **AOS GUI Input Parameters:**
 - **Expected Result:**
 - The AO System is in “LoopClosed” state.
1. Check that for a successful ResumeAO request:
 - a. The AO System is in “LoopClosed” state.
 - b. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful ResumeAO request:
 - a. The AO System is left in a “LoopSuspendd” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the ResumeAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful ResumeAO request to be displayed on the AOS GUI.

Results/Comments:

1. Successful
 - a. Yes. Mode offloading restarted
 - b. Yes
2. Failure: Pause and then turn off Reference lamp
 - a. Failed because “Star mag wrong flux...”
 - i. Should say star not found. Finding star in noise
 - b. When lamp turned on, ResumeAO successful
3. 100 milliseconds

AI (P3) 9: Tune Reference Star Finding Routine

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Fix star finding routine (IDL, parameters?) so that when star is lost, a bump in the noise is not detected at a star.

IRC Interface Tool

- **Initial State of AO System:**
 - “LoopSuspended” state
 - The AO system was in Closed AO Loop and then a PauseAO request was successfully executed
 - **Test case:** Request ResumeAO using the IRC interface tool.
 - **Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in “LoopClosed” state.
1. Check that for a successful ResumeAO request:
 - a. The AO System is left in “LoopClosed” state.
 - b. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - c. A success flag is returned to the IIF and is noted in the TCS event log.
 - d. A success flag is returned to the IRC interface tool.
 2. Check that for an unsuccessful ResumeAO request:
 - a. The AO System is left in a “LoopSuspended” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the ResumeAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the ResumeAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the ResumeAO request failed.
 3. Measure the time for information about either a successful or unsuccessful ResumeAO request to be returned to the IRC interface tool.

Results/Comments:

1. Success
 - a. Yes, Offload modes restarted
 - b. Yes
 - c. Yes
 - d. Yes
2. Fail
3. 150 milliseconds

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4.2.10. OffsetXYAO

AOS GUI Interface

Can offset in open or closed loop.

Closed Loop: have a max move, which

- **Initial State of AO System:**
 - “LoopSuspended”
 - The AO system was in Closed AO Loop and then a PauseAO request was successfully executed
 - **Test case:** Request OffsetXYAO using the AOS GUI.
 - **AOS GUI Input Parameters:** delta_x (mm), delta_y (mm), “left”
 - **Expected Result:**
 - The AO System is in a “LoopSu” state.
 - The Pyramid WFSC stages have been moved by the requested delta x and y distances from their previous positions.
 - The AO Loop can be Closed by a ResumeAO request.
1. Check that for a successful OffsetXYAO request:
 - a. The AO System is in a “LoopSuspended” state.
 - b. The Pyramid WFSC stages have been moved by the requested delta x and y distances from their previous positions by:
 - i. Note the positions of the stages prior to the OffsetXYAO request:
 1. On the appropriate AO System Engineering GUI
 2. In an AO log
 3. In the TCS event log
 - ii. Note the new positions of the stages after the OffsetXYAO request (find this information in the same location as above in i).
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful OffsetXYAO request:
 - a. The AO System is left in a “LoopSuspended” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the OffsetXYAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful OffsetXYAO request to be displayed on the AOS GUI.

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Results/Comments:

1. Closed loop
 - a. Move 0.5 in X.
 - b. ~1 sec to move stage, Offload to hexapod take longer
2. Paused
 - a. Move 5.0 mm
 - b. Stage move: Cannot move star so end of test
 - c. ~3mm/sec (1 to 20sec)
 - d. Request 100mm: Return error because out of FOV
 - e.

AI (P2) 29: **PauseAO Timeout in AOS Too Short**

For 20mm in Paused mode, the AOS timeout is too short for long moves so error returned before move is complete. Move, however is successful.

AI (P2) 30: **Clear Failure and Success Field on AOSGUI**

All old failures and success in status fields for individual AO commands should be cleared on AOS Command GUI when any command new is executed.

3. Closed Loop failure
 - a. Move 20 mm
 - b. OffsetXYAO fail because time to move stage longer than timeout time

AI (P2) 31: **DONE AP (09/12/13) OffsetZYAO Timeout Too Short**

OffsetXYAO failed in closed loop because the AOS timeout is too short. This will be fixed when Alfio puts in offsetXYAO in LoopClosed limit of around 0.6". This is needed to keep from breaking the loop with large moves in Closed Loop anyway.

IRC Interface Tool

- **Initial State of AO System:**
 - "LoopSuspended" state
 - The AO system was in Closed AO Loop and then a PauseAO request was successfully executed
- **Test case:** Request OffsetXYAO using the IRC interface tool.
- **Input Parameters:** delta_x (mm), delta_y (mm), "left"
- **Expected Result:**
 - The AO System is in a "LoopSuspended" state.
 - The Pyramid WFSC stages have been moved by the requested delta x and y distances from their previous positions.
 - The AO Loop can be Closed by a ResumeAO request.

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1. Check that for a successful OffsetXYAO request:
 - a. The AO System is left in a “LoopSuspended” state.
 - b. The Pyramid WFSC stages have been moved by the requested delta x and y distances from their previous positions by:
 - i. Note the positions of the stages prior to the OffsetXYAO request:
 1. On the appropriate AO System Engineering GUI
 2. In an AO log
 3. In the TCS event log
 - ii. Note the new positions of the stages after the OffsetXYAO request (find this information in the same location as above in i).
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A success flag is returned to the IIF and is noted in the TCS event log.
 - e. A success flag is returned to the IRC interface tool.
2. Check that for an unsuccessful OffsetXYAO request:
 - a. The AO System is left in a “LoopSuspended” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the OffsetXYAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the OffsetXYAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the OffsetXYAO request failed.
3. Measure the time for information about either a successful or unsuccessful OffsetXYAO request to be returned to the IRC interface tool.

Results/Comments:

1. LoopClosed
 - a. Tried 1.0 in X,Y. rejected because larger than LoopClosed limit of 0.6.
 - b. Tried 0.1 in X,Y success
2. LoopSuspended
 - a. Stage moves
 - b. In TCS event log
3. ~2sec for 1” move, 5 sec for 10” move

AI (P2) 32: DONE AP (09/12/15) Check R Limit for OffsetXYAO

Now check X and Y separately. Should check R rather than x,y

AI (P1) 7: Determine Maximum OffsetXYAO in Closed Loop

Determine and confirm a maximum R that can offset in Closed Loop and not break the loop (too large of tilt on shell). Currently 1”.

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4.2.11. OffsetZAO

AOS GUI Interface

- **Initial State of AO System:**
 - “LoopSuspended”
 - The AO system was in Closed AO Loop and then a PauseAO request was successfully executed
 - **Test case:** Request OffsetZAO using the AOS GUI.
 - **AOS GUI Input Parameters:** delta_z (mm), “left”
 - **Expected Result:**
 - The AO System is in a “LoopSuspended” state.
 - The Pyramid WFSC focus stage has been moved by the requested distance from its previous position.
 - The AO Loop can be Closed by a ResumeAO request.
1. Check that for a successful OffsetZAO request:
 - a. The AO System is in a “LoopSuspended” state.
 - b. The Pyramid WFSC focus stage has been moved by the requested delta z distance from its previous position by:
 - i. Noting the position of the focus stage prior to the OffsetZAO request:
 1. On the appropriate AO System Engineering GUI
 2. In an AO log
 3. In the TCS event log
 - ii. Note the new position of the focus stage after the OffsetZAO request (find this information in the same location as above in i).
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful OffsetZAO request:
 - a. The AO System is left in a “LoopSuspended” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the OffsetZAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful OffsetZAO request to be displayed on the AOS GUI.

Results/Comments:

1. Closed Loop
 - a. Request moves stage
 - b. Remains in “LoopClosed” state

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- c. Offload modes routine requests PSF/OSS moves to remove focus from shell.
2. Open Loop
 - a. Requests moves stages
 - b. Remains in “LoopSuspended” state

Send large 20mm Z offset (in “LoopClosed” or “LoopSuspended” state) get command timeout on AOS GUI, and on AdSec GUI. The AdoptControl GUI showed that the AO System when to “StandAlone” mode, but the AO loop was still closed. Had to Open loop at the engineering GUI, put into Obs move

AI (P1) 8: Lengthen WFS Supervisor Timeout for Open Loop OffsetZAO

Lengthen WFS Supervisor timeout for large Z offsets. CONFIRM that the timeout problem in WFS Sup was fixed: Decrease required accuracy for Z positioning.

AI (P1) 9: AO System put into StandAlone on successful OffsetZAO

AdoptControl GUI displays that OffsetZAO command was not successful so put AO system in StandAlone mode. However, loop was still closed.

IRC Interface Tool

- **Initial State of AO System:**
 - “LoopSuspended” state
 - The AO system was in Closed AO Loop and then a PauseAO request was successfully executed
 - **Test case:** Request OffsetZAO using the IRC interface tool.
 - **Input Parameters:** delta_z (mm), “left”
 - **Expected Result:**
 - The AO System is in a “LoopSuspended” state.
 - The Pyramid WFSC focus stage has been moved by the requested delta z distance from its previous position.
 - The AO Loop can be Closed by a ResumeAO request.
1. Check that for a successful OffsetZAO request:
 - a. The AO System is left in a “LoopSuspended” state.
 - b. The Pyramid WFSC focus stage has been moved by the requested delta z distance from its previous position by:
 - i. Noting the position of the focus stage prior to the OffsetZAO request:
 1. On the appropriate AO System Engineering GUI
 2. In an AO log
 3. In the TCS event log
 - ii. Note the new position of the focus stage after the OffsetZAO request (find this information in the same location as above in i).

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- c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
- d. A success flag is returned to the IIF and is noted in the TCS event log.
- e. A success flag is returned to the IRC interface tool.
2. Check that for an unsuccessful OffsetZAO request:
 - a. The AO System is left in a “LoopSuspended” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the OffsetZAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the OffsetZAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the OffsetZAO request failed.
3. Measure the time for information about either a successful or unsuccessful OffsetZAO request to be returned to the IRC interface tool.

Results/Comments:

1. LoopSuspended
 - a. Send 1 mm, success
 - b. Send 1000 mm, refused
 - c. Send -30 mm. AOS timeout.

AI (P1) 10: **Correct AOS Timeout for Large OffsetZAO**

Set timeout in AOS longer.

4.2.12. RefineAO

AOS GUI Interface

- **Initial State of AO System:**
 - “SeeingLmtd”
 - PresetAO and AcquireRefAO have already been successfully executed
 - **Test case:** Request RefineAO using the AOS GUI.
 - **AOS GUI Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in a “SeeingLmtd” state.
 - The AO Closed Loop parameters should be optimized.
1. Check that for a successful RefineAO request:
 - a. The AO System is in a “SeeingLmtd” state.

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- b. The AO Closed Loop parameters should be optimized. This will be checked by noting that the loop parameters change from the default values.
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful RefineAO request:
 - a. The AO System is left in a “SeeingLmtd” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the RefineAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful RefineAO request to be displayed on the AOS GUI.

Results/Comments:

Not yet implemented. Thus, no tests.

AI (P4) 2: Implement RefineAO Command

Implement RefineAO command

IRC Interface Tool

- **Initial State of AO System:**
 - “SeeingLmtd” state
 - PresetAO and AcquireRefAO have already been successfully executed
 - **Test case:** Request RefineAO using the IRC interface tool.
 - **Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in a “SeeingLmtd” state.
 - The AO Closed Loop parameters should be optimized.
1. Check that for a successful RefineAO request:
 - a. The AO System is in a “SeeingLmtd” state.
 - b. The AO Closed Loop parameters should be optimized. This will be checked by noting that the loop parameters change from the default values.
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A success flag is returned to the IIF and is noted in the TCS event log.
 - e. A success flag is returned to the IRC interface tool.
 2. Check that for an unsuccessful RefineAO request:
 - a. The AO System is left in a “SeeingLmtd” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the RefineAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.

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- d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the RefineAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the RefineAO request failed.
3. Measure the time for information about either a successful or unsuccessful RefineAO request to be returned to the IRC interface tool.

Results/Comments:

4.2.13. CorrectModesAO

AOS GUI Interface

- **Initial State of AO System:**
 - The AO system is in Closed AO Loop.
 - **Test case:** Request CorrectModesAO using the AOS GUI.
 - **AOS GUI Input Parameters:** One Zernike mode amplitude (nm), “left”
 - **Expected Result:**
 - The AO System is in Closed AO Loop.
 - The requested static modes are applied to the Adaptive Secondary.
1. Check that for a successful CorrectModesAO request:
 - a. The AO System is in Closed AO Loop.
 - b. The requested static modes are applied to the Adaptive Secondary. Check this by viewing the position graph on the Adaptive Secondary Engineering GUI to confirm that this mode, with the correct amplitude, has been statically applied to the shape of the secondary shell.
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful CorrectModesAO request:
 - a. The AO System is left in Closed AO Loop.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the CorrectModesAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful CorrectModesAO request to be displayed on the AOS GUI.

Results/Comments:

SeeingLmtd mode only.

SeeingLmtd procedure is already used in Solar Tower via the engineering gui, but not AOS settable, yet.

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Requested correction is relative to current position.

AI (P4) 3: **Implement CorrectModesAO command in AOS**

Implement CorrectModesAO command in AOS

IRC Interface Tool

- **Initial State of AO System:**
 - The AO system is in Closed AO Loop.
 - **Test case:** Request CorrectModesAO using the IRC interface tool.
 - **Input Parameters:** One Zernike mode amplitude (nm), “left”
 - **Expected Result:**
 - The AO System is in Closed AO Loop.
 - The requested static modes are applied to the Adaptive Secondary.
1. Check that for a successful PauseAO request:
 - a. The AO System is in Closed AO Loop.
 - b. The requested static modes are applied to the Adaptive Secondary. Check this by viewing the position graph on the Adaptive Secondary Engineering GUI to confirm that this mode, with the correct amplitude, has been statically applied to the shape of the secondary shell.
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A success flag is returned to the IIF and is noted in the TCS event log.
 - e. A success flag is returned to the IRC interface tool.
 2. Check that for an unsuccessful CorrectModesAO request:
 - a. The AO System is left in Closed AO Loop.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the CorrectModesAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the CorrectModesAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the CorrectModesAO request failed.
 3. Measure the time for information about either a successful or unsuccessful CorrectModesAO request to be returned to the IRC interface tool.

Results/Comments:

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4.2.14. ModifyAO

AOS GUI Interface

- **Initial State of AO System:**
 - “RefAcquired”
 - PresetAO and AcquireRefAO have already been successfully executed
 - **Test case:** Request ModifyAO using the AOS GUI.
 - **AOS GUI Input Parameters:** nmodes, itime, nbins, tmod, f1spec, f2spec, “left”
 - **Expected Result:**
 - The AO System is in a “RefAcquired” state.
 - The AO Loop parameters will be set to the requested values.
1. Check that for a successful ModifyAO request:
 - a. The AO System is in a “SeeingLmtd” state.
 - b. The AO Loop parameters are set to the requested values. This will be checked by looking at the AOS GUI.
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 2. Check that for an unsuccessful ModifyAO request:
 - a. The AO System is left in a “SeeingLmtd” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the ModifyAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 3. Measure the time for either a successful or unsuccessful ModifyAO request to be displayed on the AOS GUI.

Results/Comments:

Works properly

Error return when TT Mod out of range. Logged: OK

AI (P2) 33: Remove “No Error” from ModifyAO Return String

In TCS event log, when a ModifyAO failed with TT mod out of range, the message was “Retry: TT Mod....No Error”. Should remove No Error, or change to Error

IRC Interface Tool

- **Initial State of AO System:**
 - “SeeingLmtd” state
 - PresetAO and AcquireRefAO have already been successfully executed
- **Test case:** Request RefineAO using the IRC interface tool.

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- **Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in a “SeeingLmtd” state.
 - The AO Closed Loop parameters should be optimized.
1. Check that for a successful RefineAO request:
 - a. The AO System is in a “SeeingLmtd” state.
 - b. The AO Loop parameters are set to the requested values. This will be checked by looking at the AOS GUI.
 - c. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A success flag is returned to the IIF and is noted in the TCS event log.
 - e. A success flag is returned to the IRC interface tool.
 2. Check that for an unsuccessful ModifyAO request:
 - a. The AO System is left in a “SeeingLmtd” state.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason the ModifyAO request failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason the ModifyAO request failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason the ModifyAO request failed.
 3. Measure the time for information about either a successful or unsuccessful ModifyAO request to be returned to the IRC interface tool.

Results/Comments:

1. Successful
2. Fail
3. ~35 seconds

AI (P2) 34: Change AO Command Document

Change the Argument label for irc ModifyAO from Itime to Freq in document 481f301 and make change request to LBTO to modify the IRC ModifyAO command to mirror this argument name change.

AI LBTO (P2) 5: Change Description of ModifyAO Argument to Freq

Argument label for irc ModifyAO is Itime and should be Freq.

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4.3. PresetTelescope: Test The AO Sequence

This test will string together all the AO commands that will be called by the IIF to put the AO System into Closed AO Loop when a PresetTelescope in ACTIVE mode is received. This sequence will be an script (IDL in this case) that will call each of the following AO commands serially:

1. StopAO
2. PresetAO
3. CheckRefAO
4. AcquireRefAO
5. StartAO

- **Initial State of AO System:**
 - The AO system is in a “SeeingLmtd” state.
 - **Test case:** Request the “PresetTelescope: AO sequence” commands listed above using the IRC interface tool.
 - **Input Parameters:** “left”
 - **Expected Result:**
 - The AO System is in Closed AO Loop.
1. Check that for a successful “PresetTelescope AO sequence” request:
 - a. The AO System is in a “LoopClosed” state.
 - b. The resulting state is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - c. A success flag is returned to the IIF and is noted in the TCS event log.
 - d. A success flag is returned to the IRC interface tool.
 2. Check that for an unsuccessful “PresetTelescope AO sequence” request:
 - a. The AO System is in the final state of the last successful individual AO command.
 - b. The resulting state information is displayed on the AOS GUI.
 - c. The reason that one of the individual “PresetTelescope AO sequence” requests failed is displayed on the AOS GUI and written to an AO log and the TCS event log.
 - d. A fail flag is returned to the IIF and is noted in the TCS event log.
 - e. The reason that one of the individual “PresetTelescope AO sequence” requests failed is returned to the IIF and is written in the TCS event log.
 - f. A fail flag is returned to the IRC interface tool along with the reason that one of the individual “PresetTelescope AO sequence” requests failed.
 3. Measure the time for information about either a successful or unsuccessful “PresetTelescope AO sequence” requests to be returned to the IRC interface tool.

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Results/Comments:

Used Doug's IDL script /home/adopt/idl/wfsc/ao/ao_full_list.pro to Open and then Close the loop.

Note: had to start the mcsSimulator and MCS subsystem. No problems.

1. StopAO, PresetAO, CheckRefAO, AcquireRefAO, StartAO
 - a. 2'10" from StopAO to StartAO
 - b. 2'30" from StopAO to StartAO
 - c. 2'13" from StopAO to StartAO
2. StopAO, PresetAO, AcquireRefAO, StartAO
 - a. 1'20" from StopAO to StartAO
3. Change ref mag to 11.5 to force bin=2 (from bin=1), without CheckRefAO
 - a. 2'45" from StopAO to StartAO

Verified that the current command requested from IRC interface is displayed on AOSGUI on Command window. Resulting state is correctly displayed on Main AOSGUI.

4.4. Telemetry

Verify that AOS is able to write data to Telemetry according to [RD2]. The provided data extraction tool, teleporter, can generate a human-readable file containing all of the data in table format. This data file should be created as part of the test.

4.4.1. AOS Connection, Communication and Disconnect.

- **Initial State of AO System:** AOS is not running
 - **Test case:** Start the AOS to invoke a connection the Telemetry, send data to Telemetry and shutdown the AOS to cause the connection to Telemetry to close.
 - **Input Parameters:** None
 - **Expected Result:**
 - The AOS will properly connect to Telemetry, without errors.
 - AOS data will be sent and accepted by Telemetry without error.
 - AOS will disconnect from Telemetry, without errors, when the AOS is shutdown.
1. Check an appropriate AO log and the TCS event log that the AOS connects to, writes to and disconnects from Telemetry, without errors
 1. On startup, AOS connect to telemetry with no errors. Write to TCS event log
 2. On shutdown, AOS disconnect from telemetry with no errors. Write to TCS event log

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3. Do not write event when write to telemetry

4.4.2. AOS Data Integrity

- **Initial State of AO System:** Test 4.4.1 must have been successful.
 - **Test case:** Use the telexporter tool to check the integrity of the AOS data in the Telemetry database
 - **Input Parameters:** None
 - **Expected Result:** The data written to Telemetry by the AOS will correct and can be extracted with the telexporter tool.
4. Inspect the list of sample streams in telexporter. There should a sample stream resulting from the test. It should identify the telemetry system to be "adsc" and the subsystem to be "sx.
 5. Using telexporter, export the sample stream and inspect the data file.
 - a. There should be one column for each data item described in the specification
 - b. The first column contains the sample times. These times should all be during the time of testing. If the data is collected periodically, the difference between two subsequent times should be approximately the sample period.

***** check above :** Add "Sent to PSF" field (0/1/2) for each offload request written in Telemetry

AI LBTO (P2) 6: Change Name of OSS Telemetry Stream for Hexapod

The OSS should not write a telemetry stream with the name adsc.sx.oss for hexapod moves. Should be maybe be oss.sx.m2.hex (or something like this)

AI LBTO (P2) 7: Change Default Directory and Filename in Telexporter

Telexporter should use pwd where the process is started for default location to save file. Also, if change location, then the next save should use that same location. A default filename should be placed in File Name field (eg adsc.sx.adsec_offload_vector.txt).

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4.4.3. AOS Loss of Connection

- **Initial State of AO System:** AOS is running and connected to Telemetry.
 - **Test case:** Stop Telemetry.
 - **Input Parameters:** None
 - **Expected Result:**
 - The AOS will sense Telemetry has stop and properly close its connections, without errors.
2. Check an appropriate AO log and the TCS event log that the AOS closes the old Telemetry connection, without errors.

Results/Comments:

Yes, AOS continues running even if Telemetry process is stopped. Send an event to TCS event log that Telemetry recording for offload modes: the sample buffer is full.

AI LBTO (P2) 8: **OSS Dies when Telemetry is stopped**

OSS dies after 60 seconds if the Telemetry process is stopped

5. Error handling

5.1. Operator error

IRC Interface Tool

- **Test case:** Request an individual AO command via the IRC interface tool when the AO System in not the appropriate state.
 - **AOS GUI Input Parameters:** Those appropriate for the command
 - **Expected Result:** The AO System should return an error with a description of why the request failed (eg command not allowed), plus write this information in the AO log and in the TCS event log.
1. While AO System is in a “SeeingLmtd” state, request:
 - a. CheckRefAO
 - b. AcquireRefAO
 - c. StartAO
 - d. PauseAO
 - e. ResumeAO
 - f. OffsetXYAO
 - g. OffsetZAO
 2. While AO System is in a “ReadyToAcquire” state, request:
 - a. StartAO

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- b. PauseAO
- c. ResumeAO
- d. OffsetXYAO
- e. OffsetZAO
- 3. While AO System is in a “RefAcquired” state, request:
 - a. PauseAO
 - b. ResumeAO
 - c. OffsetXYAO
 - d. OffsetZAO
- 4. While AO System is in a “LoopClosed” state, request:
 - a. PresetFlatAO
 - b. PresetAO
 - c. CheckRefAO
 - d. AcquireRefAO
 - e. StartAO
 - f. ResumeAO
 - g. ModifyAO

Result/Comments:

- 1. 1 SeeingLmtd
 - a. OK
 - b. OK
 - c. OK
 - d. OK
 - e. OK
 - f. OK
 - g. OK
 - h. StopAO accepted: OK
- 2. ReadyToAquire
 - a. OK
 - b. OK
 - c. OK
 - d. OK
 - e. OK
- 3. RefAcquired
 - a. OK
 - b. OK
 - c. OK
 - d. OK
- 4. LoopClosed
 - a. OK
 - b. OK (Had to have PCS running)
 - c. OK
 - d. OK

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- e. OK
- f. OK
- g. OK

AI LBTO (P2) 9: **Check Use of IIF GUI for Authorization**

Must pull down focal station to apply(?). It is not clear if this was a user error or an error in the IIF/IIFGUI. This AI is for Doug to check logs and check use of IIFGUI

14:14:55 Closed loop. First Mode offload, the hexapod was sent to 0,0,0,0,0,0.
Caused by authorizing IRTC and global offsets are set to new values from file, but error reading globals so all set to 0.

5.2. Parameter checking

AOS GUI Interface and IRC Interface Tool

- **Test case:** Request an individual AO command from the AOS GUI and using the IRC interface tool with parameter errors
 - **Input Parameters:** Those appropriate for the command
 - **Expected Result:** The AO System should return an error with a description of why the request failed (eg parameter error, which parameter and why), plus write this information in the AO log and in the TCS event log.
1. Send several individual AO commands from the AOS GUI with
 - a. Incorrect number of parameters
 - b. Incorrect type of parameter (eg send string in place of an integer)
 - c. Parameter out of range (eg nbins = 10)
 2. Send several individual AO commands from the IRC Interface Tool with
 - a. Incorrect number of parameters
 - b. Incorrect type of parameter (eg send string in place of an integer)
 - c. Parameter out of range (eg nbins = 10)

Result/Comments:

1. irc PresetAO AAA_AO bob caught by IIF
2. irc ModifyAO 153 bob 2 3 0 0 left
 - a. did not fail
 - b. bob converted to 0 an 0 means do not change parameter
3. irc ModifyAO 153 600 bob 3 0 0 left
 - a. did not fail
 - b. TT Mod converter to 0, which is valid
4. Irc ModifyAO 153 600 -10 3 0 0 left
 - a. Did not fail
 - b. TT Mode sent from AOS to AO sup at -10, but somewhere converted to 0
5. Irc OffsetXYAO 0 bob left

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- a. Does on fail
- b. Bob set to 0, no movement and return success
6. Irc OffsetZAO bob left
 - a. Fail
7. Irc OffsetZao 500 left
 - a. Fails
 - b. Out of range: correct behavior
8. Irc SetReference with mag=bob.
 - a. Did not fail
 - b. Bob converted to 0 by IRC or IIF. Should return error

AI (P2) 35: Parameter Conversion from String to Integer

Incorrect parameter type should return error not convert to 0 (see list above). The AOSGUI exhibited the same conversion of strings to 0 as listed above for the IIF.

AI LBTO (P2) 10: Parameter Conversion from String to Integer

Incorrect parameter type should return error not convert to 0 (see list above)

AI (P2) 36: Out of Range Parameter Set to 0

Instead of cutting out of range value to 0, should return out of range error.

AI LBTO (P2) 11: SetReference Parameter Conversion from String to Integer

SetReference converted bob to 0

5.3. Network failure recovery

- **Test case:** Verify the behavior, detection and recovery of loss of network connection between AO System components by unplugging network cables or fiber optic cables.
 - **Expected Result:** The AO System should write error information in the AO log and in the TCS event log with description of the error and displayed on the AOS GUI.
1. Unplug network connections between:
 - a. The AO Supervisor computer and the AOS computer
 - b. The AO Supervisor computer and the W-Unit
 - c. The AO Supervisor computer and the Adaptive Secondary computer
 - d. The W-Unit BCU and the WFSC switch BCU, while in closed loop
 2. Each test should be performed with the following communication loss times:
 - a. 5 seconds
 - b. 30 seconds
 - c. 5 minutes
 3. Note the system's behavior and the procedure needed to re-establish connection after the network communication has resumed.
 4. Information about loss of communication should be reported by the AOS Gui and is logged properly.

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5. The time required for the AO system to become aware of a loss of communication between components should be noted (ie in almost all cases timeouts for communication should be a few seconds rather than a few minutes).

Result/Comments:

“LoopClosed”

1. Unplug tcstest from network
 - a. 5 second
 - i. AOS GUI restart
 - ii. Reconnect to msgdaemon
 - iii. All ok
 - b. 1 minute
 - i. AOS GUI restart
 - ii. MsgDaemon disconnected: timeout
 - iii. MsgDaemon on aoserver is now in a funny state: will not pass messages to anyone
 - iv. Had to kill all WFS processes to open loop
 - v. Could no easily open the loop because a disturbance was being placed on the secondary.
 - c. Netconfig stop AOS left, unplug for 1 minute
 - i. No failures
 - ii. Restart AOS and all is correct
2. Unplug aospare from network
 - a. 5 seconds
 - i. All resumes properly
 - b. 1 minute
 - i. Most interfaces came back to life ater 20 seconds or so
 - ii. CCD39 Viewer died: restated from GUI, OK
 - iii. Msgdaemons on aoserver and aospare are not able to reconnect
 - iv. AdoptControl GUI display WFS Setup: Down
 - v. Send Open loop from WFS engineering GUI will cause mgsd to allow reconnection of aoserver Adec Sup. Recovered with loop open.
3. Unplug aoserver from network
 - a. 5 seconds
 - i. AdoptControl say Red:Down for few seconds the back to Green:Up
 - ii. All resumes proper
 - b. 1 minute
 - i. Same as 2.b. above
4. Unplug aoserver from aopare
 - a. 5 seconds
 - i. WFSC display freeze

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- ii. Restart when connection resumed
- b. 1 minute
 - i. WFSC display freeze
 - ii. Restart when connection resumed
 - iii. Error sending StopAO from AOS GUI because disturbance was on
- 5. Unplug W-Unit from aoserver
 - a. 5 seconds
 - i. Loop Open
 - ii. Routine to open loop fail
 - iii. Could not open loop manually
 - iv. Flower pot process appear to be off, the reference source is still on
- 6. Unplug Adsec from
 - a. 5 seconds
 - i. Live view of CCD39 freeze (no Adsec data from closed loop)
 - ii. Loop Opened
 - iii. Fast diagnostic process died
 - iv. Had to restart several thing
 - v. AOS GUI not displaying proper information: Send StopAO and get proper information on display
 - vi. Adaptive Secondary get a stuck flag. Could not restart/flatten

A whole slew of problems described above!!

AI (P2) 37: Fix Message Daemon

Fix msgd. See 1b above

AI (P2) 38: AdSec Safety When W-Unit Communication Lost

Implement automatic procedure to place Adsec in a safe state if a network connection to W Unit is lost for more than 5 seconds.

5.4. Process failure

- **Test case:** Verify the behavior, detection of and recovery from the death of an AO process.
 - **Expected Result:** The AO System should write error information in the AO log for the case of AO Supervisor processes. For the death of the AOS, information should be written in the TCS even and the AOS GUI background turn red.
6. Kill an AO process, such as the message daemon, Adsec supervisor, WFSC supervisor, AO Supervisor, etc and check that:
 - e. Information about the lost process is written to the AO log
 - f. The AO Startup GUI displays the death of the process
 - g. Note the procedure and time required to get the AO system operational.
 7. Kill the AOS and check:

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- d. Information about the death of the AO is written in the TCS event log
- e. The AOS GUI changes its background color to red to indicate the AOS is not running.
- f. Note the procedure and time required to get the AOS running and the AO System operational.

Result/Comments:

“LoopClosed”

1. Kill filter wheel process: loop remain closed. DO NOT restart process because will home filter wheel and cause loop to open.
2. Turn off CCD47. Loop remain closed.
3. StopAO then PresetAO.
 - a. Failed
 - b. Wfsctrl47 in wrong state

AI (P2) 39: Low Level AO System Errors in TCS Event Log

Make low level errors that arrive to TCS event log and IRC interface are clear what system to check

“LoopClosed”

1. Netconfig stop AOSL. GUI had correct status of AO System: “LoopClosed”
2. Netconfig Start AOSL
 - a. AOS GUI turns gray
 - b. Mode and status are updated

5.5. Maximum force exceeded

- **Test case:** Verify the behavior, detection and recovery when one or more of the Adaptive Secondary actuators exerts more than the maximum allowed force.
- **Expected Results:** The AO loop will open, the Adaptive Secondary shell will be placed in a safe configuration and a quick restart of closed loop operation can be performed easily.
 1. While in a “LoopClosed” state, cause one or more actuator to exhibit higher than the maximum allowed force. (This could possibly be achieved by moving the WFS stage in Z causing a large focus to be bent into the shell)
 2. The AO System should open the loop and leave the shell in a safe position
 3. The AOSGUI should change to show the new state of the AO System (“SeeingLmtd”).
 4. Error information should be displayed on the AOSGUI to inform the user of reason the loop opened

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5. Error information should be written to the AO log and to the TCS event log
6. Detailed information about which actuators caused the error, what the values of the forces and the full state of the AO system when the high forces occurred so post processing can occur to understand the cause of the error.
7. Note the procedure to resume AO closed loop and the time required to get the AO loop closed again.

Result/Comments:

Startup System:

1. PresetAO OK
2. AcquireRefAO Failed: Thorlab filter was on pos=1. High ND
3. Set pos=3: Light
4. Hexapod out of position: Use IRTC in wide FOV to center star
5. Star seen on TV
6. AcquireRefAO Fail: Took too long to acquire dark frames
7. Second AcquireRefAO OK: However, had TTM-AO set on AOSGUI
8. AcquireRefAO with ACE-AO: OK
9. LoopClosed
10. OffsetXYAO on AOSGUI to put Reference star on IRTC

High Global Force (Skipframes):

1. Turn off TTF offloading
2. OffsetXYAO by -1.5mm (2.5") to add enough extra force due to crosstalk from higher order modes caused skipped frame because of high forces
3. OffsetXYAO by +1.5 mm (2.5"). Still skip frames. Adsec "Stuck" in high force mode.
4. StopAO: Clears all problems on AdSec, but must

AI (P2) 40: AcquireRefAO Sometimes Times Out

AcquireRefAO should not timeout if procedure is still running (Why does it sometimes timeout, ie dark acquisition takes much longer) See 6 and 7 above.

AI (P2) 41: Display SkipFrame Percentage on AOSGUI

Display % of skipped frame on AOSGUI and "Warning"

AI (P4) 4: "Quick Restart" After SkipFrames

Have a "Quick Restart" button that does not require a full PresetAO, AcquireRefAO after Skipframe.

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High Local Force (Total current high)

1. Turn off TTF offload
2. Turn lamp to dimmer and dimmer (23-13, 12 is off)
3. Skipframes take over rather than RIP. Background subtraction is not good, so slopes remain small.
4. New background
5. Low mode Reconstructuor (36)
6. Lower light, high current, RIP
7. Must restart Adsec ~4-5 minutes

AI (P4) 5: Recovery From Ripped Shell Button on AdoptCtrl GUI

Button on AdoptControl GUI to recover from failure (ie Ripped) .

AI (P2) 42: Display Ripped Shell Status on AOS GUI

Show RIPPed on AOS GUI

5.6. Maximum stroke exceeded

- **Test case:** Verify the behavior, detection and recovery when one or more of the Adaptive Secondary actuators exceeds the maximum allowed position.
- **Expected Results:** The AO loop will open, the Adaptive Secondary shell will be placed in a safe configuration and a quick restart of closed loop operation can be performed easily.
 1. While in a “LoopClosed” state, cause one or more actuator to exceed the maximum allowed position. (This could possibly be achieved by moving the WFS stage in X or Y direction and causing a large tip to be placed on the shell)
 2. The AO System should open the loop and leave the shell in a safe position
 3. The AOSGUI should change to show the new state of the AO System (“SeeingLmtd”).
 4. Error information should be displayed on the AOSGUI to inform the user of reason the loop opened
 5. Error information should be written to the AO log and to the TCS event log
 6. Detailed information about which actuators caused the error, what the position values were and the full state of the AO system when the position error occurred so post processing can occur to understand the cause of the error.
 7. Note the procedure to resume AO closed loop and the time required to get the AO loop closed again.

Result/Comments:

Same as “Maximum Force Exceeded” error. Did not repeat for position error.

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5.7. Lost guide star

- **Test case:** Verify the behavior, during closed loop, of the loss of reference star (cloud conditions).
- **Expected Result:** The AO system should remain in closed loop but automatically refrain from sending corrections to the Adaptive Secondary.
 1. While the AO System is in a “LoopClosed” state, remove the reference star by gradually lowering its brightness until no light is entering the WFS
 2. Note the behavior (goodness) of the AO correction as the reference star gets dimmer.
 3. For no reference star, the AO system should remain in closed loop but automatically refrain from sending corrections to the Adaptive Secondary when there is no longer enough light on the WFS to determine a valid correction.
 4. The offloading of modes from the Adaptive Secondary shell should automatically stop while no corrections are being sent to the secondary.
 5. If the light level increases to a level to where a valid correction can be determined, these corrections should be sent to the Adaptive secondary.
 6. Display on the AOS GUI when no corrections are being sent to the Adaptive Secondary because of the loss of reference star.
 7. Write a flag at a set interval (1 Hz?) into the AO log and into the TCS event log to indicate that corrections are not being sent to the Adaptive Secondary.

Result/Comments:

LoopClosed, 500 modes, plenty of light, no turbulence, bin=1 1kHz

1. 8.6mag 200ph/sub(55)
2. 9.5mag 100ph/sub(31) OK
3. 10.5 35 ph/sub(19) OK Still see Airy Ring
4. 11.0 17ph/sub (15) Skipframe

LoopClosed, 500 modes, turbulence (0.8” seeing), bin=1, 1kHz

1. 8.5man 200 ph/sub (55)
2. 9.5 82 ph/sub (31) Airy Ring gets bumps
3. 10.5 30 ph/sub (19) Loss Airy ring and then skipframe (no correction)

LoopClosed, 153 modes, turbulence (0.8” seeing), bin=2, 800 Hz

4. 10.5man 170 ph/sub (19) See good Airy ring
5. 12 mag 55 ph/sub (14) Dim Airy ring, peak brightness decrease
6. Throlab to pos=1
7. 12.0 55 ph/sub (35) Dim Airy ring: after 30 seconds then skipframe

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LoopClosed, 66 modes, turbulence (0.8" seeing), bin=3, 200 Hz

8. 14.0 mag 50 ph/sub (40) Barely see Airy ring
9. 14.5 mag 35 ph/sub (32) Dim Airy ring, peak brightness decrease
10. 15.5 mag 14 ph/sub (21) Dim Airy ring gone, Spot becomes larger than Airy ring
11. 15.7 mag 10 ph/sub (28) RIP

LoopClosed, 36 modes, turbulence (0.8" seeing), bin=4, 200 Hz

12. 15.5 mag 30 ph/sub (40) See no Airy ring
13. 16.0 mag 19 ph/sub (19) Peak decrease by two
14. 16.5 mag 14 ph/sub (21) Barely see peak
15. 17.0 mag 7.5 ph/sub (28) RIP

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6. GUI's

6.1. GUI inspection

Test case: Inspect AOS and Engineering GUI's for completeness and logical structure. Verify compliance with [RD1], [RD3] and [RD4].

Result/Comments:

6.2. Event and Error display to operator

- **Test case:** Verify that Events and Exceptions are adequately displayed to operator. Those shall also be sent to TCS event log, syslog (i.e., TCS.log), and other similar logs as appropriate for the software executable.
1. Information messages, warning messages and error messages should be displayed on the AOS GUI with the prescribed LBTO color scheme (green, yellow and red respectively).
 2. Errors/Events recorded in the Event Log should include the telescope side (none, left, right, both), as well as a severity (1-5, where 1 = Failed, 2 = Warning and 5 = OK) code. In this way, the events can be displayed on the AOSGUI (and the LSSGUI which is displaying events from all subsystems) in a manner (i.e., color) which reflects the event severity, and the side needs to be clearly indicated.

Result/Comments:

AI (P3) 10: **Red Blocks Remain on AOS GUI**

After AOSGUI is red for AOS off, and then AOS is started, there are a few blocks of red left. If cover with another window and uncover, the red is gone. Window Manager problem?

AI (P3) 11: **Scroll Bar on Message Log Window**

Scroll bar for vertical motion on Message log window (mouse button works)

AI (P3) 12: **Display Current Values of AO System when AOS Starts**

Fill AOS Command GUI fields with current value when AOS starts up, if AO Supervisor is running.

AI (P3) 13: **“Enter” Button Closes AOS Command GUI**

Pressing “Enter” while AOSGUI window is active pressed the “Close” button. Should not close until “Close”

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AI (P3) 14: Display of TV on AOS GUI Stopped

We shutoff the CCD47 at the engineering GUI. Image display stopped on AOSGUI. OK. However, when CCD47 was turned on, and sending images, but AOS GUI not displaying new images.

AI (P3) 15: Units of the Display of T/T/F on AOS GUI

AOS GUI T/T/F values are displayed in meters rather than nm so not seen. Display zernikes with no decimal points (integer). Replaced by Bar Chart.

AI (P3) 16: Display of AdSec Status on AOS GUI

AOS GUI Adsec status entry fields not filled with current values (sometimes). mVar daemon?

AI (P3) 17: N. Modes Field Not Used

N. Modes field not used. Should be removed, or used TBD (gray entry field for now. May use later)

AI (P3) 18: Placement of Freq in TT Modul Field

When "Modify" clicked, the Freq. number is placed in TT Modul field

AI (P3) 19: QT Errors from AOS GUI

QT errors from AOSGUI: X Error: BadPixmap (??) displayed in terminal where AOS GUI was started.

AI (P3) 20: AOS GUI Sometime Freezes Displaying TV Images

Fix AOS GUI bug that froze while trying to display TV image. This occurred during performance tests on Tuesday, Dec 15th.

AI (P3) 21: Update of Modes on Main AOS GUI

Modes not updated on main screen

AI (P3) 22: Photon/Sub Label in Graph on AOS GUI

Change Counts to Photon/sub in the graph on the main AOS GUI

AI (P3) 23: Performance Parameter in Graph on AOS GUI

Change Strehl to "Performance Parameter" in the graph on the main AOS GUI

AI (P3) 24: AOS GUI Graph Vectors into DD

Put time history of Counts/sub -vs- time and Perf. Para -vs- time in DD vector so when an AOS GUI is restarted previous time history information is available. (maybe this is a file not DD?)

AI (P3) 25 AOS GUI Graph Vectors into Telemetry

Put Counts/sub -vs- time and Perf. Para -vs- time into telemetry stream

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AI (P3) 26: Red Background in AOS Command GUI

Main AOSGUI turns red, but Command GUI remains gray. Should be Red

AI (P2) 43: ACE-AO Default Mode on AOSGUI

Make ACE-AO default AO Mode on AOS GUI

CCD47 and CCD39 are mount on their sides. Thus

Engineering Gui CCD47 Move stage +Y then star move up. Move +X then moves right on the display.

Re-Rotator setting is 173.1

CCD37 Move +Y Down and left a bit. +X Right and down a bit. The bit is about 30 degrees.

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7. Configuration

7.1. Computer inventory

Test case: Inspect computers used for system operation during acceptance test. Note type and form factor.¹

Result/Comments:

Adsec_dx and wfs_dx machines were purchased by LBTO and currently in Tucson. Sx versions are on order.

7.2. Version check

Test case: Note version number for all SW modules used during test.

Result/Comments:

TCS version from SVN AO Branch: 7385

AOSGUI: AOS Version=3.7, AOS GUI Version=1.10 (From AOS GUI: Help)

Luca made a CVS Tag at the beginning of AO Acceptance test: AO_3_00

AI (P1) 11: CVS Tag at the End of Acceptance Test

Luca will make a CVS Tag at the end of AO Acceptance test.

AI (P1) 12: Archive AdSec Firmware Used at During Acceptance Test

Marco will download from AdSec the firmware and archive it.

AI (P1) 13: Archive Recon Matrices Used at During Acceptance Test

The Reconstructor Matrices used during the acceptance tests, along with system parameters and configuration files, should be archived, saved on a CDROM and copies sent to Tucson (Doug)

AI (P1) 14: Archive AO and TCS Log from the Acceptance Test

¹ The LBT SW group is buying 4 computers (2 now for AO #1 and 2 later for AO #2). The 2 for a given side will be used for the WFS and Arbitrator, and the other for the AdSec. Thus what will be used in Arcetri for acceptance testing is not these computers therefore things will change once the software is migrated to Tucson. A good test would be to demonstrate the installation and migration of all Arcetri software onto different computers and then to exercise the acceptance test sequence as this will have to be done immediately once everything arrives in Tucson.

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All AO logs, the TCS event Log, TCS /var/log/messages and the Telemetry database should be archived, saved on a CDROM and copies sent to Tucson (Doug)

7.3. Network configuration

Test case: Examine network configuration used during test. Note network equipment and connection types.²

Result/Comments:

Solar Tower Configuration:

AI (P1) 15: Solar Tower Network Configuration Diagram

Luca gave me a printout of Solar Tower configuration. Will send me a pdf for insertion in this document.

LBTO Configuration:

485f004d: LBT AO System Topology currently in CAN

AI (P2) 44: AO Network Configuration Diagram at LBTO

Luca will update this document with assigned IP numbers and submit version e to CAN

7.4. IP configuration

Test case: Examine IP configuration used during test³.

Result/Comments:

AO System has been assigned, by LBTO, the IP numbers: 192.168.12.1 through 192.168.15.254. LBTO has reserved use of numbers 1 through 9 for all address.

AI (P1) 16: Test Mountain IP Address in the Solar Tower

Change all IP address in AO System to LBTO addresses from those currently used in Solar Tower and test.

² The test assumes the the new Cisco switch for AO unit #1 is installed in the AdSec rack. Another switch (the original D-link) is currently being used and is connected to the Cisco for AO unit #1. This D-link switch is functionally acting as the equivalent to the LBTO Cisco 4506. The second switch for unit #2 is in Arcetri but it is not needed for the tests for AO unit #1.

³ The Arcetri configuration will not be the same as what will be used in Tucson. Particularly the VLAN that is being used in Arcetri does not match what will be needed in Tucson. Arcetri is not using the Tucson arrangement because it is not compatible with the current configuration setup in the D-link switch.

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AI LBTO (P1) 12: Send Arcetri the DX M2 UMAC Mountain IP Address

Send Luca the IP address for DX M2 UMAC address needed at the LBT. Luca will change and test communication in the Solar Tower before shipping. This is under discussion and this AI may be removed (DLM 09/12/15)

Arcetri says AO Supervisor: has been run as left and as right. All works properly and and ClosedLoop achieved.

AI (P1) 17: Test Sided Operation of Full AO System

Set the entire AO system to Right (from the current Left), close the loop, offload modes and check that all logs and telemetry are now DX. This includes checking all processes, GUIs, log entries, telemetry, etc

7.5. Configuration control 1

Test case: Verify that software and firmware is under configuration control for AOS, WFS SW, AdSec, BCU code and WFS low-level SW.

Result/Comments:

Arcetri will continue to use their repository (currently CVS but will probably be changed to SVN soon) as the master repository and the LBTO SVN repository of AO software will be the slave (ie updated from Arcetri repository as needed).

MicroGate software and firmware will come from MicroGate rather than Arcetri.

AI (P2) 45: AO System in LBTO SVN Repository

Arcetri will put all AO software used at the LBTO into the LBTO svn repository. This should be completed before the AO System is installed on the telescope.

7.6. Configuration control 2

Test case: Verify (by test) the ability to rollback to a prior version of the software. Note required procedures and steps to roll back AOS, WFS, AdSec software. Low level FW is not part of test.

Result/Comments:

Must Coordinate Release version of AO software will SVN version of AO Branch of TCS (7385)

Arceti's CVS is not easy to roll back to any date or version, except with a CVS Release.

See above: Luca will make a CVS Release with AO software used for the Acceptance Test.

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