LBT Adaptive Secondary Mirror. Functional Description

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ABSTRACT

This document is a detailed description of the functionalities of the LBT adaptive secondary mirror sub-system. It defines the possible statuses of the unit and the procedures and rules to switch among them in interaction with the AO-Supervisor.

Modification Record

Version	Date	Author	Section/Paragraph affected	Reason/Remarks
1.0	10 Giu 2005	A. Riccardi	All	First release of the document
2.0	15 Gen 2006	L. Busoni, M. Xompero	All	Added description of states, events and actions
2.2	02 Feb 2006	D. Zanotti	IDL procedures	Added description of IDL routines
2.3	23 May 2006	L.Busoni	All	Introduction reviewed and minor changes

Abbreviations, acronyms and symbols

Symbol	Description
AdSecArb	Adaptive Secondary Arbitrator
AOA	Adaptive Optics Arbitrator
AO-System	The hardware and software components of the LBT first light Adaptive Optics System. Includes the Wave-Front Sensor, the Adaptive Secondary Mirror, the AO Computer and some auxiliary devices (such as networking hardware).
AO-Supervisor	The software system which manages all the components of the AO-System
AOS	Adaptive Optics Subsystem, a part of TCS devoted to interaction with the AO-Supervisor
APS	Auxiliary Power Supply
ASM	Adaptive Secondary Mirror
BCU	Basic Communication/computational Unit (board)
DSP	Digital Signal Processor
FSM	Finite State Machine
FST	ASM fast diagnostic. It is a module of AO-Supervisor
GUI	Graphical User Interface
HSK	ASM housekeeper diagnostic. It is a module of AO-Supervisor
LBT	Large Binocular Telescope
LBT672	LBT Adaptive Secondary Mirror Unit
MCB	Manual Circuit Breaker
MPS	Adaptive Secondary Main Power Supplies
SIGGEN	Signal Generation (board)
TBD	To Be Defined / To Do
TCS	Telescope Control System
WFS	Wave Front Sensor
WFSArb	Wave Front Sensor Arbitrator

Contents

1 Introduction

This document is a detailed description of the functionalities of the LBT adaptive secondary mirror sub-system (LBT672). It defines the possible statuses of the unit and the procedures and rules to switch among them in interaction with the AO-Supervisor. The system excludes the hexapod, which is under direct control of the TCS.
For what concerns this document, the system is composed of the following logical components (see Figure 1):

Adaptive Secondary Arbitrator (AdSecArb): This is the server process that listens for the requests of change of state and calls the appropriate routines on IDLcontroller, Housekeeper and FastDiagn.

IDLController: This process executes the IDL procedures described in section 3 on request of AdSecArbitrator,

Housekeeper (HSK) This is a diagnostic process that monitors the status of the on-board electronic devices. It has access to data like voltages and currents of the power supplies, temperatures, air pressure and humidity.

FastDiagn (FST) This is a diagnostic process that monitors the status of the shell. It has access to data like actuators position and forces.

Adaptive Optic Arbitrator (AOA): An AO-Supervisor module that routes requests from the TCS (via AOS) to AdSecArb and WFSArbitrator and vice versa. The AOA interprets the commands issued by the TCS and requests the necessary actions to both the WFSArbitrator and the AdSecArb. AOA also acts as communication path between WFSArb and AdsecArb. Finally, AOA routes the messages directed from LBT672 to AOS.

Adaptive Optic Subsystem (AOS): A TCS subsystem that acts as a bridge between TCS and the AO-Supervisor; it listens to the commands from the other TCS subsystems and send the appropriate request to AOA.

Wave-Front Sensor Arbitrator (WFSArb): The counterpart of AdSecArb for the Wave-Front Sensor unit.

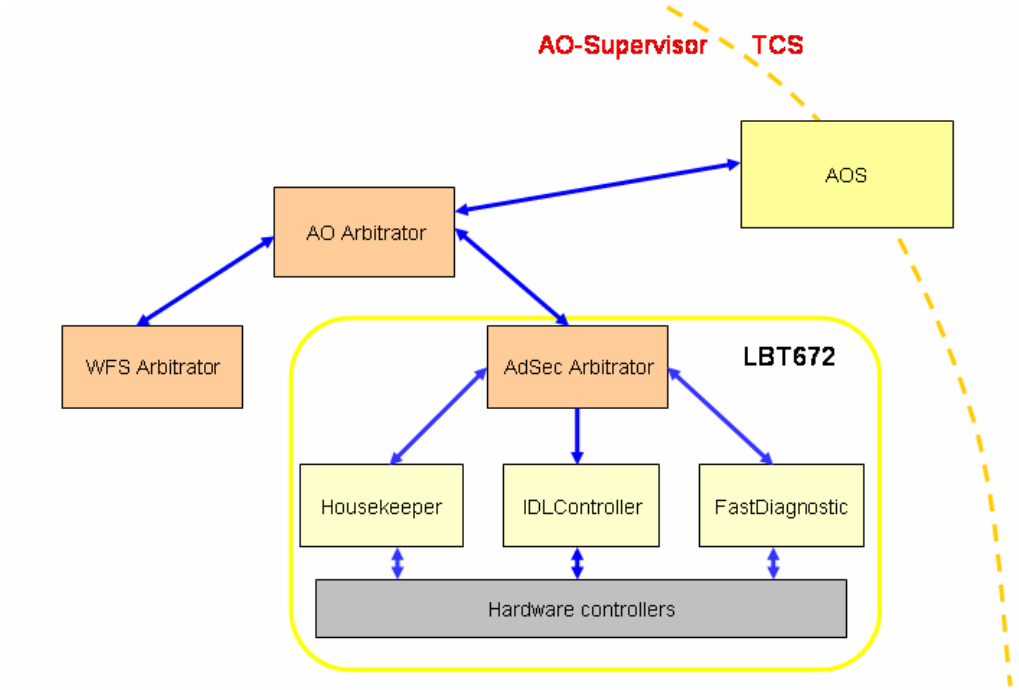

Figure 1 Adaptive Optic Arbitrators hierarchy

1.1 Events

The following events are notified to AdSecArb through AOA by external components (AOS, engineering GUIs, AOA itself):

Switch-State: Request a change of status. Power-On, Power-Off, Load-Program, Reset, Set&Flat, Rest, Run/Stop-AO/Chop, Switch-State, Fault-Recovery belong to this class.

Calibrate: Trigger a calibration procedure.
Apply-Modes: Request an update of the shape of the mirror.
Set-Gain: Request an update of the gain of the optical loop.
Emergency-shutdown: Sent by AOA in case of emergency caused by something external to LBT672. Hence the system does not go in Error state.

The following pathological events are generated internally at LBT672:
Housekeeping-Warning Sent by HSK in case of values of temperature, currents, voltages and the like outside of normal ranges but not immediately dangerous for the system.
Housekeeping-Alarm Sent by HSK in case of dangerous values of temperature, currents, voltages and the like requiring immediate reaction.
FastDiagnostic-Warning Sent by FST in case of values of actuator position, forces and shell stress outside of normal ranges but not immediately dangerous for the system.
FastDiagnostic-Alarm Sent by FST in case of dangerous values of actuator position, forces and shell stress requiring immediate reaction.

2 LBT672 States

The complete Finite State Machine (FSM) diagram of LBT672 is shown in Figure 2. Table 1 lists the events caught in a given state. In the following each state is described in detail together with the transition events and actions that bring the system out of a given state.

	Power-Off	Power-On	Operating	Set-SL	Set-AO	Set-Chop	Running-AO	Running-Chop	Recoverable-Fault
Switch-State	x	x	x	x	x	x	x	x	x
Calibrate			x						
Apply-Modes				x	x	x			
Set-Gain							x		
Emergency-Shutdown		x	x	x	x	x	x	x	x
Housekeeping-Warn/Alarm		x	x	x	x	x	x	x	x
FastDiagnostic-Warn/Alarm			x	x	x	x	x	x	

Table 1 State-Events table

2.1 Manual-Breaker-off state

In this status the Manual Circuit Breaker (MCB) [Ref 1, par13] is off. No power is supplied to the Ethernet switch, so there is no way to switch on the power supplies of LBT672 (remotely managed through the Ethernet controlled digital I/O).

2.1.1 Transition events from Manual-Breaker-off state

Breaker-on event: [**Breaker-on** action] The Breaker is manually switched on by the operator. The event triggers the Manual-Breaker-on action for the transition to the Power-off state.

2.2 Power-off state

In this status the MCB is on. The Auxiliary Power Supply (APS) is switched on. The Ethernet switch and the Ethernet controlled digital I/O are powered by APS and are correctly working. Adaptive secondary Main Power Supplies (MPSs) are switched off.

2.2.1 Transition events from Power-off state

Power-on event: [**Power-on** action] AO-Supervisor switch on the ethernet power controller. Check that firmware has correctly bootstrapped. ASM housekeeping diagnostic (HSK) is started. Prerequisites: AO software is running.

Breaker-off event: [**Breaker-off** action] The Breaker is manually switched off by the operator. The system goes in the Manual-Breaker-off state.

2.3 Power-on state

In this status the MPSs are switched on. The LBT672 crates have power. The BCU, SIGGEN, DSP boards and Power Backplane (PBP) firmware has correctly bootstrapped. Diagnostic communication is properly working. DSPs are in idle waiting for program uploading. Housekeeping diagnostic (HSK) is running and the related GUI is available. The shell is pushed against the reference plate by the bias magnets. Coils are disabled.

2.3.1 Transition events from Power-on state

Load-Program event: [**Load-Program** action] Communication with DSP memories is tested. DSP program is uploaded. DSP memories are initialized. The default configuration is loaded. DSP program is started. Communication with DSP memories is tested again. ASM fast diagnostic (FST) is started. The functionality of coils, current drivers and capacitive sensors is checked. Dust contamination is checked. On successful completion of this action the system is in the Operating state.

Power-off event: [**Power-off** action] AO-Supervisor switch off the ethernet power controller. HSK is stopped. The system goes in Power-off state.

Housekeeping-Warning event: [**Housekeeping-Warning** action]: Notify the anomaly to the AOS. The system remains in the present state.

Housekeeping-Alarm event: [**Housekeeping-Alarm** action]: If needed, push back the shell against the reference plate + see [**Power-off** action] + dump diagnostic status in the TCS log system + notify the AOS an emergency shutdown. The system goes in Unrecoverable Error state (2.10).

Emergency-shutdown event: [**Emergency-shutdown** action]: If needed, push back the shell against the reference plate + [**Power-off** action]

2.4 Operating state

In this state the DSP program is uploaded and running. The configuration for the default shell-to-refplate gap is loaded. Coils and current driver have been tested. Capacitive sensors have been tested. No significant dust contamination has been detected. ASM fast diagnostic (FST) and HSK are running and the related GUIs are available. The shell is pushed against the reference plate by the bias magnets. Coils are disabled. The LBT672 unit is ready for running calibration and engineering test procedures on AO-Supervisor request and it is ready for loading the configuration related to the operative mode that will be selected by the TCS through the AOS. This is the end-state of a successful default start-up procedure.

2.4.1 Transition events from Operating state

Calibrate event: [**Calibration** action]: The required calibration procedure is run. During this action the mirror shell can be floating and a command can be send to the AOS to prevent fast motions of the telescope.

Reset event**:** [**Reset** action]: Firmware is reset and checked. The system goes in Power-On state**.**

Housekeeping-Warning event:	[**Housekeeping-Warning** action] (2.3.1)
Housekeeping-Alarm event:	[**Housekeeping-Alarm** action] (2.3.1)
FastDiagnostic-Warning event:	[**FastDiagnostic-Warning** action]: Notify the anomaly to the AOS. The system remains in the present state.
FastDiagnostic-Alarm event:	[**FastDiagnostic-Alarm** action]: If needed, push back the shell against the reference plate + dump diagnostic status in the TCS log system + notify the AOS a service break. The system goes in Recoverable Error state (2.11).
Emergency-shutdown event:	[**Emergency-shutdown** action] (2.3.1)
Set&Flat event:	[**Set&Flat** action]: Clear history of currents, commands, modes and the like on DSP memory. The configuration parameters corresponding to the operating mode selected by the AOS are loaded (feed-forward matrices, shell-to-reference-plate gap, flattening positions, reconstructor parameters and the like). Parameters and thresholds of FST are updated. Coils are enabled. The mirror shell is set as floating and flattened. During this action, TCS must prevent fast motion of the telescope and of the hexapod. The system goes in one of the Set states.

2.5 Set/SL state

In this state the LBT672 unit has loaded successfully the configuration parameters corresponding to the Seeing Limited operating mode (Set/SL).
The mirror shell is set as floating. ASM fast and housekeeping diagnostics are running and the related GUIs are available. The internal integrator of control forces is active and triggered by an internal clock (period no shorter then 10ms). The telescope and hexapod can be safely moved for re-pointing in this state. ASM doesn't require WFS services to run in this state.

2.5.1 Transition events from the Set/SL state

Rest event:	[**Rest** action]: The shell is sucked back against the reference plate in a smooth way. Parameters and thresholds of FST are updated. The system goes to the Operating state.
Switch-State event:	[**Switch-State** action]: Delete configuration of previous state (feed-forward and reconstructor matrices, filters history and the like). Upload configuration of the new Set state. Parameters and thresholds of FST are updated. The shell is set to the required shell-to-reference-plate gap. The shell is flattened. During this action, TCS must prevent fast motion of the telescope and of the hexapod and no external commands can be given to the ASM. The system goes in one of the Set states.
Apply-Modes event:	[**Apply-Modes** action]: The internal diagnostic trigger is disabled. The new commands are written in the DSP memory. The internal diagnostic trigger is enabled. Note that for a short while the diagnostic dump is frozen.
Housekeeping-Warning event:	see [**Housekeeping-Warning** action] (2.3.1)
Housekeeping-Alarm event:	see [**Housekeeping-Alarm** action] 2.3.1)
FastDiagnostic-Warning event:	see [**FastDiagnostic-Warning** action] (2.4.1)
FastDiagnostic-Alarm event:	see [**FastDiagnostic-Alarm** action] (2.4.1)
Emergency-shutdown event:	see [**Emergency-shutdown** action] (2.3.1)

2.6 Set/AO state

In this state the LBT672 unit has loaded successfully the configuration parameters corresponding to the Adaptive Optic operating mode (Set/AO).
The mirror shell is set in its flattened shape. ASM fast and housekeeping diagnostics are running and the related GUIs are available. The internal integrator of control forces is active and triggered by an internal clock (period no shorter then 10ms). The telescope and hexapod can be safely moved for re-pointing in this state.

2.6.1 Transition events from the Set/AO state

Run/AO event:	[**Run/AO** action]: Parameters and thresholds of FST are updated. The fast link between WFS and ASM is enabled by the WFS. The update of internal integrator of control forces, and slopes, modes and feed-forward-forces calculation are triggered by the WFS. The system goes to the Running/AO state.
Rest event:	see [**Rest** action] (2.5.1)
Switch-State event:	see [**Switch-State** action] (2.5.1)
Apply-Modes event:	see [**Apply-Modes** action] (2.5.1)
Housekeeping-Warning event:	see [**Housekeeping-Warning** action] (2.3.1)
Housekeeping-Alarm event:	see [**Housekeeping-Alarm** action] 2.3.1)
FastDiagnostic-Warning event:	see [**FastDiagnostic-Warning** action] (2.4.1)
FastDiagnostic-Alarm event:	see [**FastDiagnostic-Alarm** action] (2.4.1)
Emergency-shutdown event:	see [**Emergency-shutdown** action] (2.3.1)

2.7 Set/Chop state

In this state the LBT672 unit has loaded successfully the configuration parameters corresponding to the Chopping operating mode (Set/Chop).
The mirror shell is set in its flattened shape. ASM fast and housekeeping diagnostics are running and the related GUIs are available. The internal integrator of control forces is active and triggered by an internal clock (period no shorter then 10ms). The telescope and hexapod can be safely moved for re-pointing in this state. ASM doesn't require WFS services to run in this state.

2.7.1 Transition events from the Set/Chop state

Run/Chop event:	[**Run/Chop** action]: The fast link between WFS and ASM is enabled by the external instrument. The update of internal integrator of control forces, and slopes, modes and feed-forward-forces calculation are triggered by the external instrument. The system goes to the Running/Chop state.

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Rest event:	see [**Rest** action] (2.5.1)
Switch-State event:	see [**Switch-State** action] (2.5.1)
Apply-Modes event:	see [**Apply-Modes** action] (2.5.1)
Housekeeping-Warning event:	see [**Housekeeping-Warning** action] (2.3.1)
Housekeeping-Alarm event:	see [**Housekeeping-Alarm** action] 2.3.1)
FastDiagnostic-Warning event:	see [**FastDiagnostic-Warning** action] (2.4.1)
FastDiagnostic-Alarm event:	see [**FastDiagnostic-Alarm** action] (2.4.1)

Emergency-shutdown event: see [**Emergency-shutdown** action] (2.3.1)

2.8 Running/AO state

In this state the LBT672 unit is accepting commands to modify the shell shape while the system is monitored via fast and housekeeping diagnostics. Optical loop with WFS is closed and ASM accepts commands only from the WFS. In case of CCD failure or long exposition time the diagnostic loop is triggered by the internal clock.

2.8.1 Transition events in Running/AO state

Stop/AO event: [**Stop/AO** action]: The system goes back to the Set/AO state.

Set-Gain event: [**Set-Gain** action]: Change the gain of the optical loop.

Housekeeping-Warning event: see [**Housekeeping-Warning** action] (2.3.1)

Housekeeping-Alarm event: see [**Housekeeping-Alarm** action] 2.3.1)

FastDiagnostic-Warning event: see [**FastDiagnostic-Warning** action] (2.4.1)

FastDiagnostic-Alarm event: see [**FastDiagnostic-Alarm** action] (2.4.1)

Emergency-shutdown event: see [**Emergency-shutdown** action] (2.3.1)

2.9 Running/Chop state

In this state the LBT672 unit is accepting commands to modify the shell shape while the system is monitored via fast and housekeeping diagnostics. The mirror is chopping driven by an external synchronization signal. In case of failure of the external instrument, the diagnostic loop is triggered by the internal clock.

2.9.1 Transition events in Running/Chop state

Stop/Chop event: [**Stop/Chop** action]: The system goes back to the Set/Chop state.

Housekeeping-Warning event: see [**Housekeeping-Warning** action] (2.3.1)

Housekeeping-Alarm event: see [**Housekeeping-Alarm** action] 2.3.1)

FastDiagnostic-Warning event: see [**FastDiagnostic-Warning** action] (2.4.1)

FastDiagnostic-Alarm event: see [**FastDiagnostic-Alarm** action] (2.4.1)

Emergency-shutdown event: see [**Emergency-shutdown** action] (2.3.1)

2.10 Unrecoverable error state

LBT672 unit is in this state when an unrecoverable error occurred. The shell is pushed against the reference plate by the bias magnets. The system is no more able to bootstrap correctly. External intervention is required.

2.11 Recoverable Error state

LBT672 unit is in this state when a recoverable error occurred. The shell is pushed against the reference plate by the bias magnets. No external intervention is required to continue. Typical causes of this error can be a wrong command or a bad configuration that brought the shell in a dangerous state or in oscillation.

2.11.1 Transition events in Recoverable Error state

Fault Recovery event:	[**Fault Recovery** action]: DACs, delay lines and filters in the secondary unit are reset. The system goes back to the Operating state.
Housekeeping-Warning event:	see [**Housekeeping-Warning** action] (2.3.1)
Housekeeping-Alarm event:	see [**Housekeeping-Alarm** action] 2.3.1)
Emergency-shutdown event:	see [**Emergency-shutdown** action] (2.3.1)

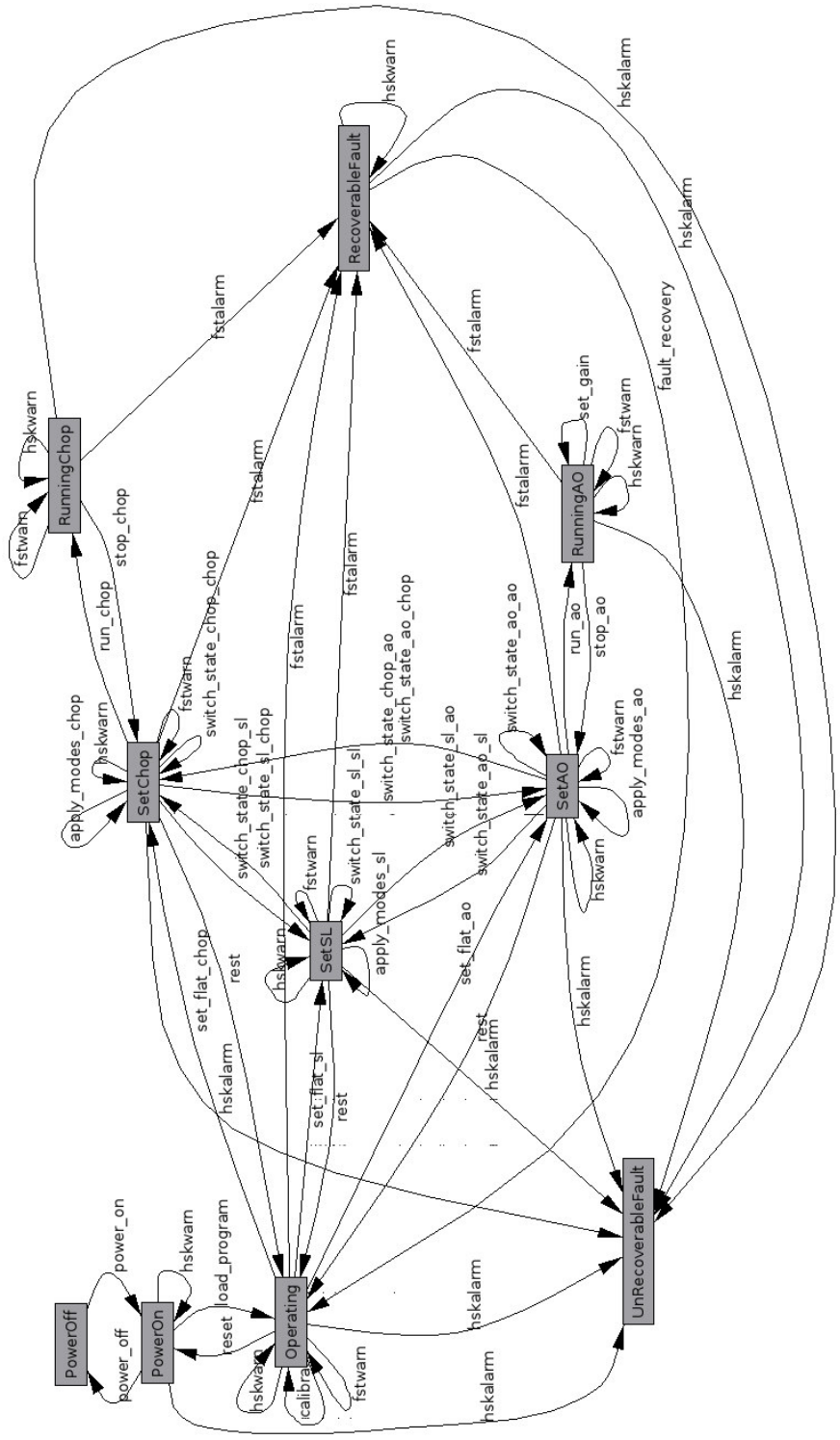

Figure 2 - lbt672 Finite State Machine

3 IDL procedure interface for actions

In this section the IDL interface procedures for actions are described. All the procedures are in the directory "/adsec_lib/adsec_scripts". These procedures describe the communications between AO-Supervisor and the on-board software (BCU, DSP) that are needed to fulfill a required action.

3.1 lbt_power_on

Function for the passage from the Power off state to Power on state.

Power-on-Program event: [**Power-on-Program** action]

- Adaptive Secondary Main Power Supplies (MPSs) are switched on.

Category:	Supervisor IDL function.
Calling Sequence:	err = lbt_power_on()
Inputs:	None.
Keyword parameters:	AUTO: if set no verbose is shown.
Outputs:	err: Error code.

3.2 lbt_load_program

Function for the passage from the Power-on state to the Operating state. In the Power-on state the LBT672 crates have power. The BCU, SIGGEN, DSP boards and Power Backplane firmware has correctly bootstrapped. HSK diagnostic is running. The shell is pushed against the reference plate by the bias magnets.

Load-Program event: [**Load-Program** action]

- Communications with DSP is tested;
- DSP program is uploaded;
- DSP memories are initialized;
- The default configuration is loaded;
- DSP program is started;
- Communications with DSP is tested again;
- ASM FST is started;
- The functionality of coils, current drives and capacitive sensor is checked;
- Dust contamination is tested;

Category:	Supervisor IDL function.
Calling Sequence:	err = lbt_load_program()
Inputs:	None.
Keyword parameters:	AUTO: if set the load program is done automatically.
Outputs:	err: Error code.

3.3 lbt_reset

Function for the passage from the Operating state to Power on state. During the reset procedure a timeout error is returned.

Reset-Program event: [**Reset-Program** action]

- Reset all crates.

Category:	Supervisor IDL function.
Calling Sequence:	err = lbt_reset()
Inputs:	None.
Keyword parameters:	AUTO: if set no verbose is showed.
Outputs:	err: Error code.

3.4 lbt_power_off

Function for the passage from the Power on state to Power off state.

Power-off-Program event: [**Power-off-Program** action]

- Adaptive Secondary Main Power Supplies (MPSs) are switched off.

Category:	Supervisor IDL function.
Calling Sequence:	err = lbt_power_off()
Inputs:	None.
Keyword parameters:	AUTO: if set no verbose is showed.
Outputs:	err: Error code.

3.5 lbt_set_flat

Function for the passage from the Operating state to one of the Set State: Set/AO (4), Set/SL (5), Set/Chop (6). In the Operating state the DSP program is uploaded and running, diagnostic tests have been made, ASM FST and HSK are running. The shell is pushed against reference plate by the bias magnet and coils are disabled (see 2.4.1 for details). At the end of this procedure the ASM is in one of the Set state.

Set&Flat event: [**Set&Flat** action]

- Clears history of currents, command, modes, and the like on DSP;
- Enables coils;
- Reads the final Set state;
- Reload the feed forward matrix.
- Sets the mirror to the relative set configuration;
- Applies the relative flattening position;
- Ramps the derivative and proportional gain for the chosen set;
- Initializes the optical loop;
- Sets the last parameters for a RTR test.
- Update the new state.

Category:	Supervisor IDL function.
Calling Sequence:	err = lbt_set_flat()
Inputs:	None.
Keyword parameters:	AUTO : If set the setting and flattening position are made automatically.

SET_STATE : Set the final state at the end of the procedure:
4: Set/A0 Adapting Optics operating mode, 68 um.
5: Set/SL Seeing Limited operating mode, 68um.
6: Set/Chop Chopping operating mode, 100um.

FLAT_TOL : Tolerance on mirror flat position in [m]. Default is 0.0.
N_SLOPE : if config_rtr is set, it forces a number of slopes to be configured.
N_SL_DL : if config_rtr is set, it forces a length of slope delay line to be configured.
N_DP_DL : if config_rtr is set, it forces a length of mode delay line to be configured.
REC_MAT_A_FILE : File name of the .fits reconstructor matrix block memory A.
REC_MAT_B_FILE : File name of the .fits reconstructor matrix block memory B.
A_DELAY_FILE : File name of the .fits mode delay matrix.
B_DELAY_A_FILE : File name of the .fits slope delay matrix block memory A.
B_DELAY_B_FILE : File name of the .fits slope delay matrix block memory B.
M2C_FILE : File name of the .fits modes to command matrix.
G_GAIN_A_FILE : File name of the .fits loop optical gain matrix block memory A.
G_GAIN_B_FILE : File name of the .fits loop optical gain matrix block memory B.

Outputs: err : Error code.

3.6 lbt_switch_state

Function for the passage from a Set State to another Set State. The reconfiguration of a state is considered as a switch of states with same start and final state.

Switch-State event: [**Switch-State** action]

- Clears history of currents, command, modes, and the like on DSP if needed.;
- Reads the final Set state;
- Sets the mirror to the relative set configuration;
- Applies the relative flattening position
- Ramps the derivative and proportional gain for the chosen set;
- Initializes the optical loop;
- Sets the last parameters for a RTR test.
- Update the new current state.

Category: Supervisor IDL function.

Calling Sequence: err = lbt_switch_state()

Inputs: None.

Keyword parameters: AUTO : If set the setting and flattening position are made automatically.

SET_STATE : Set the final state at the end of the procedure:
4: Set/A0 Adaptive Optic operating mode, 68 um.
5: Set/SL Seeing Limited operating mode, 68um.

6: Set/Chop Chopping operating mode, 100um.

N_SLOPE	: if config_rtr is set, it forces a number of slope to be configured.
N_SL_DL	: if config_rtr is set, it forces a length of slope delay line to be configured.
N_DP_DL	: if config_rtr is set, it forces a length of mode delay line to be configured.
UPDATE_RTR	: If set it is possible to change any rtr_matrix, and the gain of closed optical loop, otherwise the default setting is used.
FLAT_TOL	: Tolerance on mirror flat position in [m]. Default is 0.0.
REC_MAT_A_FILE	: File name of the .fits reconstructor matrix block memory A.
REC_MAT_B_FILE	: File name of the .fits reconstructor matrix block memory B.
A_DELAY_FILE	: File name of the .fits mode delay matrix.
B_DELAY_A_FILE	: File name of the .fits slope delay matrix block memory A.
B_DELAY_B_FILE	: File name of the .fits slope delay matrix block memory B.
M2C_FILE	: File name of the .fits modes to command matrix.
G_GAIN_A_FILE	: File name of the .fits loop optical gain matrix block memory A.
G_GAIN_B_FILE	: File name of the .fits loop optical gain matrix block memory B.
DEFAULT	: setting standard configuration: g_gain to 0, a_delay identity matrix, b_delay zero matrix. (to be removed).
RELOAD	: force to reload the configuration pre-loaded in both A and B blocks.

Outputs: err : Error code.

3.7 lbt_rest

Function for the passage from one of the Set state to the Operating state. In the Set state the mirror shell is set as floating. ASM FST and HSK diagnostic are running. The internal integrator of control forces is active and triggered by an internal clock. In the Operating state the shell is pushed against the reference plate by the bias magnets. Coils are disabled.

Rest event: [**Rest** action]

- The shell is sucked against reference plate ;
- Coils are disabled;
- Parameters and thresholds of FST are updated;
- Tests that all is in rip.

Category: **S**upervisor IDL function.

Calling Sequence: err = lbt_rest()

Inputs: None.

Keyword parameters: AUTO : if set there are no interactive window and less information displayed.

Outputs: err : Error code.

3.8 lbt_fault_recovery

Script to recover the ASM from a fault event. Clear DACs, filters, delay lines and disable the coils.

Category: Supervisor IDL function.

Calling Sequence: err = lbt_fault_recovery()

Inputs: None.

Keyword parameters: AUTO : if set there are no interactive window and less information displayed.

Outputs: err : Error code.

3.9 lbt_set_gain

Script to set a new optical loop gain in the running AO state.

Category: Supervisor IDL function.

Calling Sequence: err = lbt_set_gain(G_GAIN_A_FILE = g_gain_a_file, G_GAIN_B_FILE = g_gain_b_file)

Inputs: None.

Keyword parameters:

G_GAIN_A_FILE : File name of the .fits loop optical gain matrix to write in the A memory block.

G_GAIN_B_FILE : File name of the .fits loop optical gain matrix to write in the B memory block.

AUTO : if set no information is displayed.

Outputs: err : Error code.

4 References

[Ref 1] Biasi R, Andrighettoni M, Veronese D, *Adaptive Secondary Control System – Design Report*, CAN 640a006b, 2003