Minutes from LBT672 progress meeting

Meeting: LBT672 monthly progress meeting  
Date: Apr 3, 2008  
Location: Telecon – LBTPo, Arcetri, Microgate, ADS

Participants: Brynnel, Miller, Green, Salinari, Esposito, Riccardi (partial), Biasi, Gallieni

Agenda Item 1: Status of Action Items

#34: Guido to investigate alternatives for mousehole cover.
Update: No progress.

#52: Simone to distribute sub-schedule for LBT672a Acceptance test, coordinate with OAA, ADS, MG and PO. The schedule shall include planning for transport of LBT672a to Arcetri.
Update: A schedule with manpower planning was submitted, last version dated March 17 [Appendix 1]. AI closed.

#53: Armando to distribute sub-schedule for TS#3 silvering, including official inspection of TS#3.
Update: Silvering sub-schedule was submitted by Armando on April 2 [Appendix 2].

#54: Joar to contact Potsdam regarding AGw #1 contamination
Update: On 20 March Jesper Storm wrote: "My understanding is that the contamination is 'normal' contamination and we will have to clean the unit on the mountain when it arrives there anyway, and also re-install the CCD cameras and realign the optics. So I believe we do not have to undertake any action now. This should be part of the re-integration on the mountain." AI closed.

#55: Simone to identify and propose possible schedule for repeat of W#1 acceptance test.
Update: Simone proposes 12 May for test. AI closed.
#56: Joar to contact Potsdam regarding one additional AGw trolley

Update: It was proposed that Arcetri will pay for main parts for building one additional AGw trolley, and that Potsdam will provide labor and small parts to build the additional trolley. On March 10 Jesper Storm wrote: "Svend Bauer has contacted the companies which provide the bigger parts (wheels and profiles) and they have agreed to send their offers to Arcetri with delivery here at the AIP. This will not cover the full cost as there are a number of special parts which has to be made on measure. We will try to produce them in house as capacity allows." AI closed.

#57: Guido to consolidate Acceptance Test Action Items #44 and #47.

Update: Done, AI closed.

#58: Piero to inspect new central cover design at ADS.

Update: Inspection done, Piero has no objections to the cover design.

#59: Guido to consolidate official documentation list

Update: Done, updated list uploaded to the Arcetri repository, AI closed.

#60: Joar to provide data on telescope cooling system typical temperature performance.

Update: Request forwarded to the LBT SW group to provide logging of relevant data. Unclear as to when request can be met.
Agenda Item 2: Official Schedule

Simone submitted an updated schedule V15, dated 28 March 2008 [Appendix 10].

2.1 Acceptance test

Simone reports that the Acceptance test is progressing according to the (revised) schedule. Unit #1 is scheduled to arrive in Arcetri on April 12.

AI: Simone to update schedule line #13 “electro-mechanical acceptance test at ADS”, new completion date April 12.

2.2 RB#3 coating

It was noted that Piero Ranfagni is needed in Arcetri for supporting the silvering activity of TS#3, and he can only travel to ADS after this activity is completed. This means that schedule line #37 start date will be delayed until Piero R arrives in Lecco.

AI: Simone to update start date of task #37 “BP#3 coating” with new start date April 21.

2.3 W#2 Acceptance test

Simone reports that W#1 is currently being upgraded/rebuilt, and this means that the Acceptance test of W#2 (schedule line #49) will be delayed to 7 July. Unit #1 re-acceptance test is scheduled for May 12.

AI: Simone to extend schedule line #48 “W unit installation in AGw#2” to new end date 6 July.

2.4 Chopping test

Armando stated that the allocated time for line #20 “LBT672a chopping test” is inadequate, and duration of activity shall be extended to 10 days.

AI: Simone to update schedule line #20 “LBT672a chopping test” to a duration of 10 days.

2.5 TS#5 delivery

Richard reports that the Mirror Lab has released a revised schedule for delivery of thin shell TS#5 to LBTO. New date: 10 Dec 2008.

AI: Simone to update schedule line #52 “TS#5 de-blocking”
**Agenda Item 3: Status update – progress since last meeting**

**Microgate**

See separate progress report [Appendix 5]. Roberto reports that the work on improving the Swing Arm Rack cooling system is progressing. Optimization of spring force of LBT672b contacts is on-going.

**ADS**

See separate progress report [Appendix 9].

**Arcetri**

See separate progress reports:
[Appendix 4]: LBT672 related work by Arcetri.
[Appendix 7]: Progress report on “W” sensor and Arcetri SW.
[Appendix 8]: February 08 W units activity.

**Tucson**

See [Appendix 6]: Status of anemometer installation.
Agenda Item 4: Hot topics of the month

4.1 Chopping requirements and test

Armando says chopping test is described in document 640f007. Joar states that this document is not in the CAN.

AI: Armando to submit chopping test document to CAN archive.

4.2 Anemometers

Doug reports that the installation of the anemometer has been delayed to end of April, one month later than expected, see also report in [Appendix 6]. Data will collected in three separate files.

4.3 AO units Interface Control Document

A new version Rev. C, dated 3 April 2008, was submitted [Appendix 3].

4.4 AO Program Manager

Piero reports that it is very unlikely that a Program Manager will be emplaced. Reasons stated are financial issues and difficulty in identifying a suitable candidate.
Agenda Item 5: Planned activities for the next month

Microgate:
- Completion of documentation
- Support transport and unpacking activities in OAA, if required
- Close the pending actions, in particular the 1000Hz command pending problem (Action #44 and #47), the current spike problem (Action #41)
- Continue with the attempts to improve the swing arm cabinet cooling (external insulation NOT welcome by LBTC)
- Continue modular testing of LBT672b parts

ADS:
- BP3 re-coating
- Support transport of LBT672a to OAA and following activity for the installation on the solar tower
- Complete the activities on the retro-reflector support integration before 30 April.
- LBT672a Action Items
- Documentation

Arcetri:
- W#1 refurbishment and test
- Solar tower test
- Test of the long optical path including phase screen.
- Shell silvering
- TS1 installation on LBT672a unit
- Chopping tests (see 640f007a)
- LBT672a unit installation

Tucson:
- TS#4 back side coating
- Anemometer installation
Action Item List

#34: Guido to investigate alternatives for mousehole cover.
#60: Joar to provide data on telescope cooling system typical temperature performance.
#61: Armando to submit chopping test document 640f007 to CAN archive.

Appendices

Appendix 1: Planning for Unit #1 acceptance test @ ADS (Esposito)
Appendix 2: Sub-schedule for TS#3 silvering in Arcetri (Riccardi)
Appendix 3: FLAO Interface Control Document, Rev C (Esposito)
Appendix 4: LBT672 Monthly Report (Riccardi)
Appendix 5: Microgate Monthly Report (Biasi)
Appendix 6: Anemometer status (Miller)
Appendix 7: W units activity report (Esposito, Fini)
Appendix 8: W units photos (Esposito)
Appendix 9: ADS monthly report (Gallieni)
Appendix 10: LBT672 master schedule, V15, dated 28 March 2008
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### Legenda

**Arcetri**

AR Armando Riccardi  
MX marco Xompero  
PS Piero Salinari

**MG**

RB RobertoBiasi  
MA Mario Andrighettoni  
AM Alberto Merler  
DO David Olberz

**LBTO**

GB Guido brusa  
JH James Howard
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FLAO Interface Control Document

Prepared by

S. Esposito, A. Tozzi, A. Riccardi, D. Gallieni, R Biasi

Approved by

Released by

INAF – Osservatorio Astrofisico di Arcetri
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http://adopt.arcetri.astro.it
ABSTRACT

The document is reporting the interfaces of the First Light Adaptive Optics System for LBT called FLAO. The two main parts of the AO system are the W unit and the adaptive secondary. The interfaces of the two units are described separately in two different sections of the document. The interfaces have been divided in: mechanical, optical, electrical, thermal, network, and real time data.
## Modification Record

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<td>S. Esposito, A. Tozzi</td>
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<td>S. Esposito, A. Tozzi, A. Riccardi, D. Gallieni</td>
<td>all</td>
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<td>3 Apr 2008</td>
<td>R. Biasi</td>
<td>Sec. 4.3 / Sec 4.4</td>
<td>Electrical and electronic part expanded and detailed. Expanded and moved in Sec. 4.3</td>
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### Abbreviations, acronyms and symbols

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<td>LBT</td>
<td>Large Binocular Telescope</td>
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<td>FLAO</td>
<td>First Light Adaptive Optics System</td>
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<td>W unit</td>
<td>Wavefront sensor of the FLAO system</td>
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<td>LBT672</td>
<td>Adaptive secondary mirror of LBT</td>
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1 ICD document scope

The Arcetri Observatory is providing two units of First Light Adaptive Optics System (FLAO) to be integrated at the LBT telescope. The AO system will be installed at the front bent Gregorian focal stations.

The Scope of this document is to describe the requirements and to establish the specifications for the optical, mechanical, electrical and thermal interfaces of FLAO with the LBT telescope. The software interfaces are described in other document.
2 ICD summary

The document reports the FLAO system interfaces. The main parts of the system are the adaptive secondary mirror called LBT672 and the pyramid wavefront sensor called W unit. The document will describe the interfaces of these two objects in two separate sections.

3 W unit

In this chapter, we report the interfaces with the other parts of the LBT telescope for the W unit. The unit's main components are: the WFS board, the XYZ stages assembly, the auxiliary unit bench, and the three boxes containing the W unit control electronic.

3.1 Mechanical interfaces

The mechanical interfaces of the W unit are positioned on the AGW structure. In particular, 12 screws are required to bolt the supporting structure for the WFS hardware to the AGW frame. The AGW frame is colored red in the picture. The positions of the 12 screws are reported in Figure 1.

Figure 1 A 3D view of the W unit bolted to the AGW structure (red structure). The arrows show the connecting holes to bolt the W unit to the mentioned structure.
The boxes containing the control electronic of the W unit have some other supporting structure. In particular the two boxes (called box39 and box47) are supported through flat metal parts. Each one of these components is bolted to the beams structure of the AGW unit with 6 M10 screws and to the AGW structure with 2 M6 screws as showed in Figure 2 where the supporting structure has been removed for clarity.

![Figure 2 A 3D view of the flat metal parts supporting the two electronic boxes. Connection holes are showed by the arrows.](image)

The third electronic box containing the control electronic of the XYZ WFS board translation stages, called the XYZbox, is supported internally in the W unit structure.

### 3.2 Optical Interfaces

The optical interface of the W unit with the LBT telescope is the LUCIFER dummy window that reflects the incoming light from the tertiary mirror to the WFS unit. The LUCIFER window is also the optical interface for the WFS internal reference source. This means that the reference source uses the reflection on the LUCIFER window to be propagated up to the secondary mirror when AO system calibration is required. The position of LUCIFER window with respect to the W unit is showed in Figure 3.
Figure 3. A section through a plane perpendicular to the AGW flange passing from the center of the LUCIFER window. The nominal distance between the window center and the vertex of lens L1 is 289m.

3.3 **Electrical Interfaces**

The electrical interfaces of W unit to the LBT telescope is a single connection to the telescope 110V AC. The total power used by the unit has been measured during the acceptance test to be 385W. This value is under check at the moment.

3.4 **Thermal Interfaces**

The connection of the cooling circuits of the W units to the cooling of the LBT telescope is done using two connections (input and output of the cooling line) supported by the AGW structure. Pipes used are produced by Legris and pipes type is (TBC). A photo of the cooling lines in and out on the AGW structure is reported below.
Figure 4 A 3D drawings showing the position of the input and output cooling lines for the W unit. The photo on the right side of the picture is showing the pipes as realized on the unit.

The flux of cooling fluid required is 3.5 L/s. Input and output pressure measured during acceptance test were 1.4 and 1.0 Bar respectively.

3.5 Network Interface

The W unit network interface is a standard Ethernet fiber with SC type connectors. The W unit in principle allows to have a copper Ethernet interface. This connection is not used at present.

3.6 Real Time Data Interface

The W unit has a real-time data interface to communicate WFS slopes to the secondary mirror. This connection uses one fiber pair with xxx type connectors. An additional fiber pair is planned for future upgrade. In Figure 5 we report all the interfaces of the W unit already addressed in sections 3.3,3.4,3.5,3.6.
Figure 5 The figure resumes the interfaces described in sections 3.3, 3.4, 3.5, 3.6.
4 LBT672 unit

The LBT672 unit is made of two parts: the Deformable Mirror (DM) Unit and the Spider-Arm Cabinet, as shown in Figure 6. The DM Unit is located in the hub and is bolted on the mobile flange of the Hexapod. The Spider-Arm Cabinet is located on the spider-arm. The electrical, communication and cooling connections between the two parts are sectioned at the level of the interface between the Swing Arm and the Hub. In general we identify three levels of interfaces, namely:

1. spider-arm electronics Cabinet to telescope interface (hereafter Cabinet Interface)
2. Swing arm to hub interface (hereafter Hub Interface)
3. Hexapod to the DM interface (hereafter DM interface)

The harness between Telescope Interface and Hub Interface is meant to be permanently installed.

Figure 6 – Interfaces schematics: Cabinet Interface is defined BEFORE the spider arm cabinet; Spider Interface is defined BETWEEN the spider and the hub, DM interface is put BETWEEN the DM and the hub.

4.1 Mechanical interface

**Cabinet interface**
Mechanical interface of the electronic Cabinet to the telescope structure (spider arm): TO BE WRITTEN. Add drawing of interface

**Hub interface**
The hub is fixed on the swing arm interface by xxx bolts. Alignment pins are provided in place (TBC). Add drawing of interface

**DM interface**
The interface is made of 18 M8 screws with pass through holes into the hexapod aluminum flange and threaded ones in the adaptive secondary flange. These screws are mounted and tightened from the hexapod side.
4.2 Optical interfaces

The optical interface of the DM unit with respect to the telescope can be represented by the coupling in the Gregorian configuration of primary and secondary. The nominal optical coupling is achieved positioning the secondary mirror so that the primary focus is placed 1063.7mm from the secondary vertex.

4.3 Electrical and Data Interfaces

This chapter describes the external electrical and communication interfaces. The external interfaces comprehend the interfaces between Spider Arm cabinet and Telescope Control and Supply Systems and the interfaces between spider arm cabinet and Adaptive Secondary unit.

4.3.1 Interfaces between spider arm cabinet and telescope control and supply system

4.3.1.1 Electrical

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<th>Interface description</th>
<th>Voltage and power rating</th>
<th>Connector</th>
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<td>Main supply</td>
<td>3P 208 VAC, 4.5 kW max</td>
<td>Screw terminals inside the cabinet. Accepts up to AWG5. See SWING ARM CABINET - 3ph Power Distribution.pdf</td>
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<td>TSS supply</td>
<td>1P 120 VAC, 1.5kW max, UPS assisted</td>
<td>Screw terminals inside the cabinet. Accepts up to AWG5. See SWING ARM CABINET - MONOph Power Distribution.pdf</td>
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4.3.1.2 Communication

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<td>Dual LC-type connector</td>
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<td>Fast Communication Link (real time communication – connection between W-unit and Switch BCU installed in the Spider Arm Cabinet)</td>
<td>Fiber optic link, 2 multimode fibers 62.5-125µm (2x2.125 Gbit/s, TX/RX)</td>
<td>Dual LC-type connector</td>
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4.3.2 Interfaces between spider arm cabinet and adaptive secondary unit

4.3.2.1 Electrical

The electrical connection between the Spider Arm Cabinet and the Adaptive Secondary Unit is split in two sections:

- Section 1: from Spider Arm Cabinet to the interface panel installed at the end of the Swing Arm
- Section 2: from the interface panel installed at the end of the Swing Arm to the interface flange between Hexapod and Adaptive secondary unit

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<th>Voltage and power rating</th>
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<tr>
<td>Main supply, TSS supply and diagnostic signals</td>
<td>Main supply: 48V, 90A max, 42A typ. TSS supply: 48V, 60A max, 10A typ. Diagnostic lines: 48V, &lt;100mA</td>
<td>On Spider Arm Cabinet – Main supply unit: ITT CANNON CA3102E32-6S-B-A232, 23 ways, female, panel mount On Swing Arm Interface flange: ITT CANNON CA3102E32-6P-B-A232, 23 ways, male, panel mount On Adsec Interface flange: ITT CANNON CA3102E32-6P-B-A232, 23 ways, male, panel mount</td>
<td>Section 1: see CAA049 - Cable LBT DigiPwr Rack 6U to Spider.pdf Section 2: see CAA048 - Cable LBT DigiPwr Spider to M2.pdf Cable pinout is reported in SWING ARM CABINET - Main Power Supply 1_2.pdf</td>
</tr>
</tbody>
</table>

4.3.2.2 Communication

<table>
<thead>
<tr>
<th>Interface description</th>
<th>Type of interface</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gigabit Ethernet communication (diagnostic)</td>
<td>Fiber optic link, 6x2 multimode fibers 62.5-125µm (1.25 Gbit/s TX/RX)</td>
<td>Inside Spider Arm Cabinet: Ethernet: 6x Dual LC-type connector (on Ethernet switch) Real time communication: 2x Dual LC-type connector (on Switch BCU) On Swing Arm Interface flange: Multifiber connector (18 fibers) type FRBOF3RT24-22PT39-F125-1.6-G1-PG016 See CAB-07-002-18-14LC.pdf On Adsec Interface flange: Multifiber connector (18 fibers) type FRBOF3RT24-22PT39-F125-1.6-G1 See CAB-07-002-18-1LC.pdf</td>
</tr>
<tr>
<td>Fast Communication Link (real time communication)</td>
<td>Fiber optic link, 2x2 multimode fibers 62.5-125µm (2x2.125 Gbit/s, TX/RX)</td>
<td></td>
</tr>
</tbody>
</table>
4.4 Thermal interfaces

From the telescope ½ inch pipe cooling lines (inlet+outlet) at Cabinet level. The cooling fluid is a 50/50 ethylene glycol and water mixture, flow rate is 11 lit/min with 2bar pressure drop at 20°C. Cooling fluid temperature XXX°C below ambient. Two lines are driven in parallel from the telescope cooling line: 1 line (inlet+outlet) for the Cabinet, 1 line (inlet+outlet) toward the Hub interface. Both lines have Swagelok male Quick Connectors (add picture and drawings). From the Hub to the DM interface an extension line is present (female Swagelok connector on Hub interface panel, male Swagelok connector at DM interface).
References


1 LBT672 related work by Arcetri – LBT AO meeting 03 Apr 2008
A. Riccardi, M. Xompero, D. Zanotti, C. Del Vecchio, P. Ranfagni, P. Salinari

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    1.3.2 FEA of dust contamination (w TSS) .............................................................................................. 1
  1.4 Planned activities for the next month ................................................................................................. 1

1.1 Action Items
#53: see “TS3_silvering_v02.mpp” file

1.2 Schedule

1.2.1 TS3 Silvering
From 02 Apr (procedure consolidation meeting) to 11 Apr (shell back in its box). See “T3_silvering_v02.mpp” file for details.

1.2.2 LBT672a + TS1 box + cables + cooling distribution box + stands transfer to Arcetri
Currently scheduled on Saturday 12 Apr (TBC by Gallieni).

1.2.3 LBT672a work in Arcetri clean room
Initially scheduled 5 working days for chopping. Because electrical/signal cabling and cooling pipes and distribution box will arrive with the unit (no in advance, TBC), we require 2 more working days for installation: from 14 Apr (working day following the LBT672a unit arrival in Arcetri) to 22 Apr.
Any activity different from chopping that has to be performed in Arcetri clean room before installing the unit in the optical tower test (shroud/miniskirt installation (TBC), firmware test or similar work for closing acceptance action-items, etc) cannot be considered without allocating extra-time in the schedule.

1.3 Status update

1.3.1 LBT672a Acceptance Test, silvering and handling procedures
See deliverable documentation of the acceptance test.

1.3.2 FEA of dust contamination (w TSS)
see 646f020 issue A (by Ciro Del Vecchio)

1.4 Planned activities for the next month
shell silvering (see “TS3_silvering_v02.mpp”)
LBT672a unit installation
TS1 installation on LBT672a unit
Chopping tests (see 640f007a)
Appendix 5 Page 1 of 9

LBT PROJECT
2x8.4m TELESCOPE

LBT PROJECT

LBT672 ADAPTIVE SECONDARIES

Microgate monthly report

March 2008

Date : 03.04.2008

MICROGATE S.r.l.
Via Stradivari, 4
I 39100 BOLZANO
www.microgate.it
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1 Actions completed before shipping of LBT672a from Microgate to ADS

We report here only the actions that have progressed or changes status w.r.t. the February report.

1.1 Action #30 – Unit dust contaminated, needs cleaning.

Accurate cleaning has been performed just before packing the unit, i.e. on Fri March 7th and Mon March 10th. The unit has been first cleaned using a vacuum cleaner with the reference body facing down, then with the RB facing up.

After the vacuum cleaning, and with the reference body facing up, we injected dry nitrogen into all actuator holes.

- After the completion of cleaning we have performed once more the following tests:
  - Coils functional test
  - Capacitive sensors functional test
  - TSS test
  - Safety tests, including HW watchdog, global current overcurrent protection, local current overcurrent protection, safety logic board test.

The action is CLOSED.
2 Shipping of LBT672a from Microgate to ADS

The packing of the unit occurred on Tue March 11th, and the unit has been successfully transported the day after (March 12th).

Together with the unit we shipped also TS#1 in its container.

Figure 1 – LBT672a with its integration stand (background) and TS#1 container (foreground) inside the special transport truck.
3 Support actions performed during the acceptance tests at ADS premises.

3.1 Final cabling

We installed the final connection flange at the level of the Hexapod flange. This flange comprehends the power connector, the fiber connector and the connectors for the hub temperature and fluxmeter.

![Final cabling and interface flange](image)

Figure 2 – Final cabling and interface flange.

3.2 Installation of accelerometer conditioning box and connection of all accelerometers
3.3 Installation of final fluxmeter

Two final fluxmeter units have been completed and calibrated. In this frame we performed also an accurate calibration of the fluxmeter in use at Micorgate during the acceptance test and discovered a small error w.r.t. the nominal value assumed during the tests. The data referring to the removed heat by water cooling shall be multiplied by a factor 1.064 to take into account the wrong fluxmeter calibration.

3.4 Creating clearance around the cable to allow for HP full range motion

The position of the flat cables connecting DSP boards and distribution boards has been optimized to allow the full stroke motion (up to the mechanical limits of the Hexapod).

3.5 Preliminary test of membrane cover on TS#1
The prototype of the proposed membrane cover (see February 2008 report) has been installed on the system while TS#1 was in closed loop.

The operation went fluently so we decided to leave the cover installed for few days.

It has been necessary to untighten slightly the foxing screw to increase the distance from the shell by ~0.8mm. This is due to the wrong mounting of TS#1 on the membrane.

So we decided to keep the current design for the final implementation, introducing the following modifications:

- increase the radius of the gasket by 1mm, to make sure that the contact occurs always on the shell
- make the gasket 0.5mm higher to reduce furthermore its stiffness, while keeping the nominal distance of the lip from the membrane

Moreover, it is very important to verify that the silicon used for the gasket does not contaminate in any way the zerdur shell surface or its coating.

Figure 4 – Membrane cover on TS#1
4 Other activities performed at Microgate

Besides the support to the acceptance tests at ADS, we have focused on the following activities:

- completion of our internal documentation and input of all items in our quality assurance and stock management system
- progressing on documents. The documents delivery dates have been recently discussed. Excluding the Maintenance manual, for which we have asked until end of April, all other documents will be delivered before April 11
- initial programming and screening tests of DSP boards for LBT672b
5 Program for April activity

We will focus also on the following tasks:

- completion of documentation
- support transport and unpacking activities in OAA, if required
- close the pending actions, in particular the 1000Hz command pending problem (Action #44 and #47), the current spike problem (Action #41)
- continue with the attempts to improve the swing arm cabinet cooling (external insulation NOT welcome by LBTC)
- continue modular testing of LBT672b parts
AO Anemometer Status
Douglas Miller
2 April 08

Since the last AO Monthly Meeting, the TCS Acquisition software was completed and deployed on the mountain by Joe Kraus (see attached document for details).

Progress has been made on the Anemometer Acquisition software by Doug, but is not yet completed nor fully tested. Bent-Gregorian commissioning work had taken all of Doug's time the last 1.5 weeks, and will continue to take all his time for the next week. Thus, the Anemometer software will not be completed until the week of April 14-18.

The delay in the Anemometer Acquisition software will delay the deployment of the entire Anemometer System to the mountain until the week of April 21-25.

Completed Tasks:

1) The Anemometer arrived in Arcetri in early December
2) Alfio setup the Anemometer and used the Gill Windows software provided by the manufacturer to confirm the Anemometer still functioned.
3) The Anemometer was mailed to Tucson before the Holidays
4) The Anemometer arrive in Tucson immediately after the New Year
5) The Anemometer was in good condition, but one of two brackets that secure the 110 V AC to 12 V DC converter was broken in transit. The undamaged bracket seem to be strong enough to hold the converter.
6) Doug and Joe setup the Anemometer and confirmed its functionality with the Gill software.
7) Doug has communicated to the Anemometer via the unix program mimicom. Extending this communication to C will be straight forward.
8) Software to acquire, evaluate, serve and archive the Anemometer data has been designed. C and TclTk programming languages will be used to build the acquisition software.
9) Mounting bracket has been built, test fit to the Anemometer and has been mounted on DX M2
10) A Moxa Media Converter was purchased and has arrived. This will allow the Anemometer Acquisition software to run on a computer in the control room rather than a rack mounted computer in the lower tree house.
11) The weather stations software is archiving weather data
14) Build, debug and test the TCS acquisition software (Joe).

Items yet to be done:
12) The weather station will be moved from ground level to (possibly) the roof near or connected to the roof access ladder in the next few weeks (Joe and Mountain Staff).

13) Build, debug and test the Anemometer acquisition software (Doug).
   - Data acquisition (**Done**)
   - Data archiving (**Work in Progress**)
   - The operating system setup is TBD to start and monitor the operation of the Anemometer acquisition software.

15) Rebuild the power and communication unit (PCU) for the Anemometer (Richard Sosa)
   - Replace the RS422 to RS232 converter in the PCU with the new Moxa Media Converter (RS422 to ethernet)
   - Replace the 110 V AC-to-12 V DC converter with a 110 VAC-to-24 VDC converter
   - Modify the length of the power and communication cable that connects the PCU to the Anemometer.

16) Mount Anemometer and equipment on the telescope (Mountain Staff?)
   - Mount Anemometer on its mount on DX M2
   - Mount Power and Communication Unit in the DX M2 Junction box at the top front edge of the C-Ring extension
   - Run power and communication cable from the PCU to the Anemometer
   - Run ethernet fiber from the PCU to the SX upper tree house, install fiber to copper media converter and connect to Cisco Switch.

17) Install and test Anemometer and TCS Acquisition software on computers in the control room (Doug and Joe)
   - The TCS Acquisition software is running on the mountain. (**DONE**)
UNIT W#1

New motors and drivers for W#1 have been ordered. The complete set of HW is estimated to arrive in Arcetri by end of April.

-Teckna has been contacted to produce a second unit of the XYZ stage driver box. This box will substitute the old one containing the Bayside driver. The estimated time is 3/4 weeks for now. Together with the box Teckna will provide a new cabling with the needed modifications to provide the correct power supply to the new drivers and motors.

-Test of the Phase screen unit and phase screen optical path. All the components needed for the phase screen test has been installed in the auxiliary unit of W#1. The system has been aligned without encountering major problems. After this the system pupil has been seen on the CCD39 after reflection on the phase screen. The short optical path is reported in the ppt presentation annex.

UNIT W#2

Short summary of activity

In summary the during March activity the integration of unit W#2 has progressed. Electronic boxes has been tested before installation in the AGW successfully at ambient temperature. The XYZ stages have been integrated in the AGW frame. The stages with the new motors and drivers has been tested after installation successfully. The WFS board is now assembled apart form the ADC and the rerotator. The ADC should be mounted in the first two weeks of April. The rerotator should be received in Arcetri the snd week of April. A first prealignment of the WFS board has been done receiving the light at the final pupil image on the WFS optical path. The next step is to obtain pupil images using the CCD39.

Activity in detail

Optics

- The polishing of the back pyramid has been finished, the two units has been mounted together and optical test are ongoing.

- Tip tilt unit head has been installed on the WFS board

- The optical parts of the WFS board has been mounted with the exception of ADC and pupil rerotator. A first alignment of the WFS board has been done without encountering any major problem. No images of the pupils has been obtained yet.

Electronics

1) A device functional test (power on/off, serial communication, movement) for the W#2 has been done. This has been done connecting the 3 electronic boxes with the WFS board and XYZ stages. Almost all the devices where mounted on the board for this test. The ADC and pupil rotator were not mounted but ADC and rerotator motors has
been tested without their optics. A measure of the ccd39 readout noise has been done. All tested units are working correctly. In a few cases some SW adjustments are needed to solve some inversions in the cabling pin-out.

A detailed list of the test done is reported as appendix 1 below.

2) The Parker/Bayside stages have been mounted and completely cabled into the AGW#2. 3) Test of the new motors and drivers after stage installation has been done. The measured FOV is the following: 3.15 X 2.30 arcmin (electric switch) 3.35 X 2.43 arcmin (mechanical limits). Nominal/required FoV [X,Y] is 3.2x3.3. So the achieved values are compliant with requirements. The stages has been moved against the gravity rotating the AGW on its trolley. No problem in the motion of the stages has been detected for various orientations of the stages.

4) Measured the RON of the CC39 having the LittleJoe39 and the other electronic devices powered on has been done. The CCD39 was not installed in the WFS board. Results are:
   - 2500 kpixel/sec: 20.0 (counts) 11.0 (e-)
   - 890 kpixel/sec: 13.9 (counts)  7.6 (e-)
   - 400 kpixel/sec: 10.2 (counts)  5.6 (e-)
   - 150 kpixel/sec:  9.5 (counts)  5.2 (e-)

The results are slightly out of specs. Some additional work is needed to achieve the required values. A final measurement with the CCD39 installed an the WFS board placed in the AGW#2 is still to be done.

5) The humidity and temperature sensors on the W board #2 has been installed and connectorized.

Mechanics
----------

1) Cooling plates from DAU have been painted again by a local coachbuilder because the original paint was not well attached to the aluminium.

2) The electronic boxes support structure have been mounted into the AGW#2 successfully: minor adjustment necessary. Inventor design has been updated.

3) Stainless stell rails have been mounted on the W#2 and the board itself has been preallineated on the optical bench in laboratory.

4) The new ADC units has been tested in the cold succesfully.

5) The new unit of pupil rerotator has been completed and is now ready to be sent to anodization.

6) the mechanical mount to attach the 4D interferometer to the tower optical bench without using the AGW ring are ready and should arrive in a few days here in Arcetri.

Low level Control SW for W units devices
----------------------------------------

W#2
----

- implemented the program to control the new Copley XYZ stage, main functionality (movement and homing) ok, some details missing.
- starting to adapt the W#1 software to the second unit. Things already working:
- power on/off of all the devices
- ccd39 control & frame download
- cube stage and rotator control
no major difficulties found and nothing major expected for the future,

W#1
----
- support to the various test activities (phase screen etc.)
- fixed many performance and stability bugs on the W software - no big changes visible from outside, but things are (should be) more stable.
- started implementing the definitive star acquisition algorithm, including the calibration procedures.

SW activity from L. Fini
------------------------
Software Progress Report March 2008

AdOpt Software

March activity is essentially a continuation of work on global stability and reliability of the AdOpt software.

* The logging functions have been completed and file rotation support added.
* The support for network communication with external devices (TcpConnection) has been revised.
* More work on the arbitrator (AdSecArbitrator), including:
  o Interface library completed
  o Test program completed
* Software support to lab activity in Arcetri and at Microgate premises
* Various enhancements to the WFS software
* Started the final version of the star acquisition procedure
* Some updates to adapt WFS software to double side operations
* Remote support to LBTI related software activity in Tucson

AOS
* A few further tests on the Hexapod section of the OSS

Activity for the next month
---------------------------

W#1 & solar tower test
----
Test of the long (see ppt file for definition) optical path including phase screen.

W#2
----

???????????????/
## APPENDIX 1: W#2 Device functional test detailed list (March08)

### W#2 Electronic boxes functional test.

- **n.a.** = not available
- **-** = not applicable

<table>
<thead>
<tr>
<th>Device</th>
<th>Power on/off</th>
<th>Functional test</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS8 left</td>
<td>PASS</td>
<td>PASS</td>
<td></td>
</tr>
<tr>
<td>TS8 right</td>
<td>PASS</td>
<td>PASS</td>
<td></td>
</tr>
<tr>
<td>Ethernet switch</td>
<td>PASS</td>
<td>PASS</td>
<td></td>
</tr>
<tr>
<td>Fiber/ethernet</td>
<td>PASS</td>
<td>n.a.</td>
<td>not tested with fiber connection yet.</td>
</tr>
<tr>
<td>Power supply #1</td>
<td>PASS</td>
<td>-</td>
<td>power on command</td>
</tr>
<tr>
<td>Power supply #2</td>
<td>PASS</td>
<td>-</td>
<td>is inverted, will be fixed in software</td>
</tr>
<tr>
<td>Power supply #3</td>
<td>PASS</td>
<td>-</td>
<td>default state is &quot;on&quot; instead of &quot;off&quot;.</td>
</tr>
<tr>
<td>Power command is inverted, will be fixed in software</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Box fans</td>
<td>PASS</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>BCU39</td>
<td>PASS</td>
<td>PASS</td>
<td></td>
</tr>
<tr>
<td>BCU47</td>
<td>PASS</td>
<td>PASS</td>
<td></td>
</tr>
<tr>
<td>Temperature sensors</td>
<td>-</td>
<td>#2-8 OK, #1 not working, #9-10 not connected at the moment</td>
<td></td>
</tr>
<tr>
<td>Scimeasure CCD39</td>
<td>PASS</td>
<td>PASS</td>
<td></td>
</tr>
<tr>
<td>Scimeasure CCD47</td>
<td>n.a.</td>
<td>n.a.</td>
<td>not integrated yet</td>
</tr>
<tr>
<td>Fans for CCDs</td>
<td>PASS</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Filter wheel #1</td>
<td>PASS</td>
<td>PASS</td>
<td>homing switch has inverted polarity, will be fixed in software</td>
</tr>
<tr>
<td>Filter wheel #2</td>
<td>PASS</td>
<td>PASS</td>
<td>homing switch has inverted polarity, will be fixed in software</td>
</tr>
<tr>
<td>ADC motor #1</td>
<td>PASS</td>
<td>PASS</td>
<td>homing switch has inverted polarity, will be fixed in software</td>
</tr>
<tr>
<td>ADC motor #2</td>
<td>PASS</td>
<td>PASS</td>
<td>homing switch has inverted polarity, will be fixed in software</td>
</tr>
<tr>
<td>Bayside stage XYZ</td>
<td>PASS</td>
<td>-</td>
<td>Needs manual brake control in software.</td>
</tr>
<tr>
<td>Movement</td>
<td>PASS</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Limit switches</td>
<td>PASS</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Brake</td>
<td>Automatic brake performance not quick enough.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auxiliary unit bench PIC</td>
<td>PASS</td>
<td>PASS</td>
<td></td>
</tr>
<tr>
<td>Pollux cube stage</td>
<td>PASS</td>
<td>n.a.</td>
<td>motor not yet connected.</td>
</tr>
<tr>
<td></td>
<td>Wreport_mar08v1.txt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mercury cube rot:</td>
<td>PASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calibration lamp:</td>
<td>PASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tip-tilt mirror:</td>
<td>n.a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camera lens XY stage:</td>
<td>n.a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Device not connected</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Electronic boxes view

AGW#@ and WFS board for functional test
Electronic boxes details

Electronic boxes cabled during the functional tests

CCDs installation

CCD39 attached to the BOX39
During the test

A particular of the Box 47 cooling
Phase screen optical paths

Light from ref. source of auxiliary unit.

Light to WFS board

Image of system pupil

BS cube of W auxiliary unit

Light sent B/F to LBT672

Long optical path (through LBT672)

Light from ref. source of auxiliary unit.

Light to WFS board

Phase screen

Lens f=150mm

Short optical path

Cube beam splitter

Image of system pupil
ADS contribution to LBT672a progress meeting on 3 April 2008-03-29

2. Schedule
   -- LBT672a Acceptance Test
     ■ RB#3 coating
     ADS will be ready to start this activity starting after LBT672a delivery to OAA (week 15), pending conclusion of BP#3 cleaning to be performed by LBT - OAA personnel (P.Ranfagni) with our support at our place. Current schedule does not show yet such recovery activity, so a delay on all connected activities shall be expected
     -- W#2 installation in AGw #2
     -- Other schedule issues.

3. Status update - progress since last meeting

- Microgate
  -- Preparation for shipping of Unit #1 to ADS
  -- Complete accelerometer boxes
  -- Support activities at ADS
  -- Complete documentation
  -- Proceed with LBT672b activities
  -- Other

- ADS
  -- Receiving Unit #1 from MG
  Done on 12 March
  -- Integration of complete unit #1
  Completed by 25 March

   --- Other

Some (minor) components were still missing due to manufacturing delay by external suppliers:
1) **bracket to mount the connectors on top of the hub**; this prevented having the final routing of the harness and finishing the top (temporary) cover; a provisional cover has been made to run thermal testing of the unit. This will be replaced by a aluminium one as soon as the bracket will be available (expected time to fix this issue 1 month altogether)
2) shell retention ring, it was manufactured on time but it resulted wrong. We installed the miniskirt only to run the acceptance tests; anyhow the retention ring installation and alignment could have been tested only with TS3 when it will be installed at Arcetri. New retention ring (sectors to provide almost full circumference cover) will be made available for such test by April 30 and relevant installation and removal procedure will be finalized at that time.

3) mirror cover 3rd support frame modification to make easier installation & removal

4) after successful test of the shroud we will have it manufactured on the same design by the same material. We will add Velcro straps at the three hoisting and mirror cover interface frames

5) BP interface points gluing reinforcement

6) make on the M2cover the attach points for the telescope installation at 71 deg
- Also retro-reflector supports manufacturing ran late: we have received the CFRP tubes and some mechanical components but the machining of the large Al ad steel rings are still ongoing.

5. Planned activities for the next month

- ADS
During weeks 14 and 15 we will address tasks 2) and 5) listed above as well as the following points of the AIL after Acceptance:

<table>
<thead>
<tr>
<th>#</th>
<th>Owner</th>
<th>Description</th>
<th>Due date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>ADS</td>
<td>Provide data about the coil distance from back-plate surface as function of elevation.</td>
<td>Mar 31</td>
<td>PENDING</td>
</tr>
<tr>
<td>31</td>
<td>ADS</td>
<td>Some astatic lever weights are constrained by cabling.</td>
<td>Apr 30</td>
<td>PENDING comment by ADS (see Ref. 3).</td>
</tr>
<tr>
<td>32</td>
<td>ADS</td>
<td>Some astatic lever weights bottom out on connectors, glue creep?</td>
<td>Apr 30</td>
<td>PENDING, comment by ADS (see Ref. 3): Not clear, can MIC confirm this changed in time? The next chance to monitor this position is during the first set of tests with TS1 in Arcetri.</td>
</tr>
<tr>
<td>33</td>
<td>ADS</td>
<td>Install central membrane cover</td>
<td>Mar 01</td>
<td>PENDING, current installation (by MG) does not provide a seal (too far from shell), revision of cover has to be provided by MG.</td>
</tr>
</tbody>
</table>
50 | ADS | Modify the cooling hoses connectors so that the inlet connector is female and outlet is male. | Mar 28 | PENDING

Then our next task is to proceed with BP3 re-coating. We plan also to support transport of LBT672a to OAA and following activity for the installation on the solar tower. In parallel we will complete the activities on the retro-reflector support integration before 30 April.