	LBT PROJECT 2x8,4m TELESCOPE	
	Doc.No. : 640a012 Issue : A Date : 3 November 2005	

LBT PROJECT
2 X 8,4 OPTICAL TELESCOPE

Procedure

**f/15 ADAPTIVE SECONDARY
MECHANICAL TEST PLAN**

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CHANGES RECORD			
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1 APPLICABLE & REFERENCE DOCUMENTS

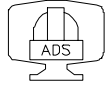
- [AD1] 640s002, Issue B, 8-09-2005, "LBT ADAPTIVE OPTICS SYSTEM AIT MANAGEMENT PLAN"
- [RD1] 640a005, Issue E, 14-03-2004, "ADAPTIVE SECONDARY MECHANICAL DESIGN REPORT"
- [RD2] 610a047, Issue B, 30-11-2001, "DATA PACKAGE OF M2-f15 HEXAPODS"
- [RD3] 610a003, Issue D, 10-01-2003, "GENERAL ASSEMBLY LBT 672"
- [RD4] 642a149, Issue A, 13/10/2005, "TEST BENCH ASSEMBLY"

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2 INTRODUCTION

The Adaptive Secondary Infrared Gregorian F/15 is composed by three subsystems, namely the adaptive optics unit dubbed LBT672 [\[RD1\]](#), the pointing hexapod [\[RD2\]](#) and the hub structure [\[RD3\]](#).

This document addresses the test plan and procedure for the mechanical shop proof test of the units at ADS premises before moving them to Microgate for electronics integration. This corresponds the test planned at the end of Phase 1 as reported in [\[AD1\]](#).



3 TEST PRE-REQUIREMENTS

The hexapod and its controller shall be already tested and accepted before being installed into the M2 hub and being part of the present test.

Hexapod interfaces to both hub mounting flange and LBT672 adaptive secondary one shall be checked before mounting the complete unit in view of the present test.

The complete M2 unit made of hub + hexapod + LBT672 adaptive secondary subsystems shall be mounted before starting this test.

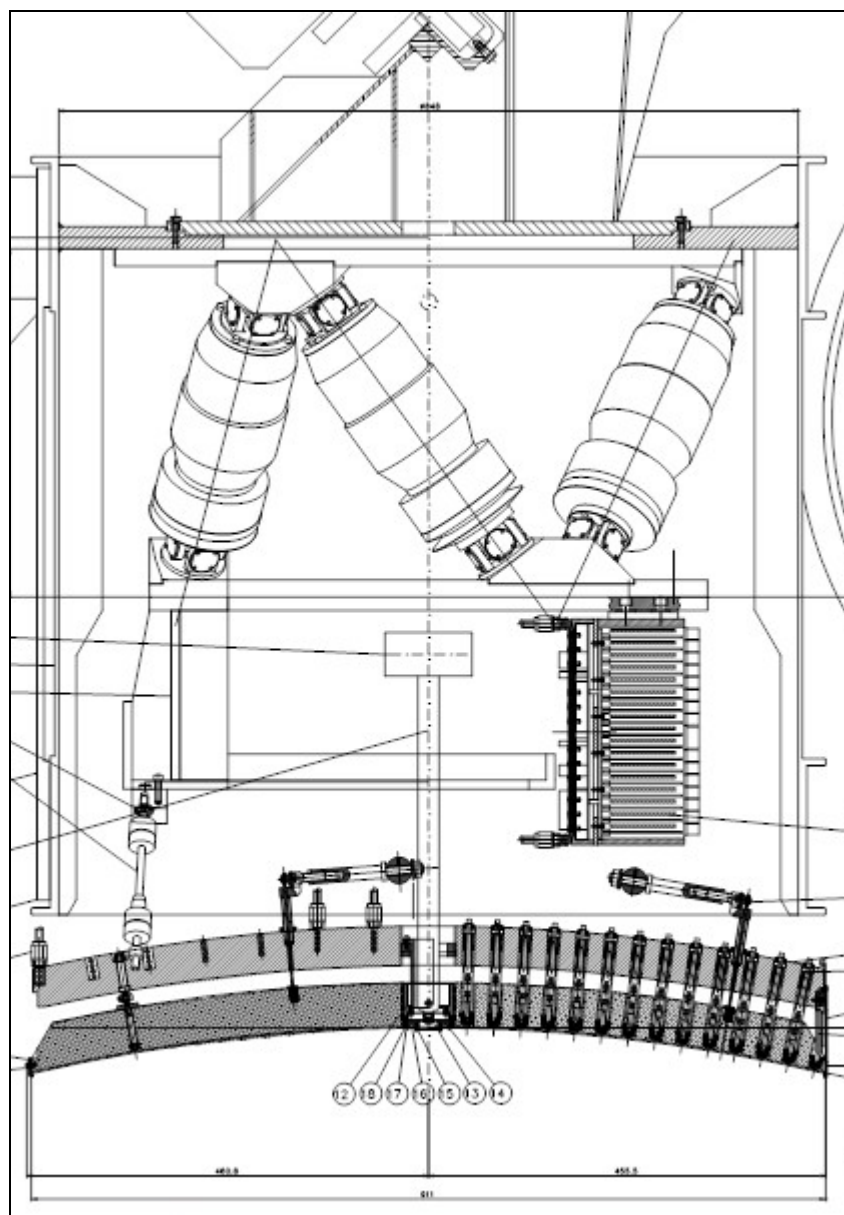
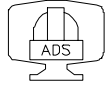


Figure 1 – Complete M2 unit [\[RD3\]](#).



4 TEST SETUP

The test will be performed by mounting the M2 unit on the integration and test stand (ref. [\[RD4\]](#)).

Such a test bench allows mounting the whole M2 hub on a tilting support which allows testing the whole M2 unit at different telescope elevations. The elevation can be varied continuously.

The interfaces between the hub and the test bench are the same four bolted flanges of the swing arm ones.

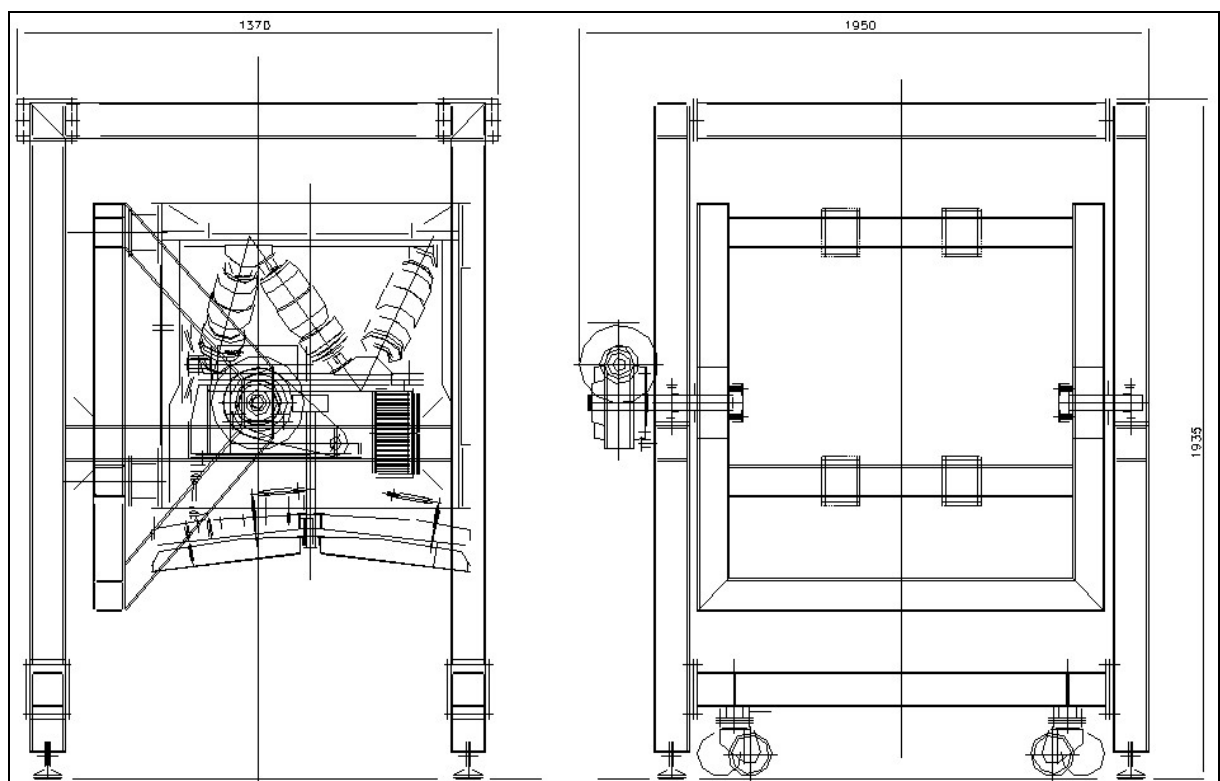


Figure 2 – M2 unit integration and test stand [\[RD4\]](#).

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5 TEST PROCEDURES

5.1 Interface to hub

1. Check the bolted interfaces between the LBT672 and hexapod and between hexapod and hub mounting flange. For reference see [\[RD3\]](#) and related detail drawings.
2. Check the hub is sealed, that is proper covers are applied to the hand-pass openings.

5.2 Hexapod movement range in hub

1. Position the test bench with the integrated M2 hub at Zenith pointing.
2. Plug the hexapod harness to its controller rack and power the unit.
3. Command the homing procedure of the hexapod.
4. Command the following hexapod position:
 - a. full stroke focus = + 5 mm;
 - b. full lateral motion = + 5 mm along X and Y directions;
 - c. tilt = 900 arcsec.
5. Check that in this position there is still clearance between LBT672 moving part and hub.
6. Command a full 360 deg sweep in AZ and check that the clearance is assured during all motion.
7. Command the following hexapod position:
 - a. full stroke focus = - 5 mm;
 - b. full lateral motion = + 5 mm along X and Y directions;
 - c. tilt = 900 arcsec.
8. Check that in this position there is still clearance between LBT672 moving part and hub.
9. Command a full 360 deg sweep in AZ and check that the clearance is assured during all motion.
10. Command the hexapod back to its home position and switch it off.

5.3 Interface to swing arm

1. Check the four bolted interfaces to the swing arm are in accordance to relevant drawing ([\[RD3\]](#) and related ones).
2. Check harness interface at swing are all implemented by proper connectors.
3. Check cooling pipes interface at swing arm are implemented by proper fittings.

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5.4 Inspection of dust protection

This test is aimed to check that the gap between the shell and the reference plate is sealed against dust contamination.

The following items shall be checked:

1. external skirt all around the backplate, which shall extend around the thin shell;
2. remove the shell and insert one actuator mounting the gasket all around the coil head to seal the gap with the backplate hole; verify the effectiveness of the gasket seal;
3. verify cleanliness level of all the mechanical components integrated into the LBT672, apart actuators which will be eventually integrated at Microgate premises.

5.5 Weight

The whole hub with both hexapod and LBT672 mounted on it shall be weighted. A load cell with a capacity of 10 kN shall be used to this purpose.

Test procedure:

1. verify load cell calibration by lifting a sequence of known ballast masses;
2. attach the load cell to the hub by means of four slings;
3. lift the hub by the forklift until the slings are in tension;
4. unbolt the hub from the test bench interfaces;
5. read the load cell measure;
6. bolt again the hub onto the test bench;
7. lower the forklift and remove the lifting slings.

By design the grand total mass of the M2 unit (hub + hexapod + LBT672) shall be equal to 570 Kg (TBC).

5.6 Flexure testing

1. Position the test bench with the integrated M2 hub at Zenith pointing.
2. Mount two dial gauges as shown in Figure 3 to measure LBT672 lateral deflection with respect to M2 hub as function of telescope EL.
3. Reset dial gauges reading
4. Change test bench EL by 15 deg and record dial gauges readings.
5. Repeat point 4. until EL=90 deg, that is hub is horizon pointing.

Compare the test results to analysis ones, which are reported in [\[RD1\]](#) Sect. 17.1 table 14.

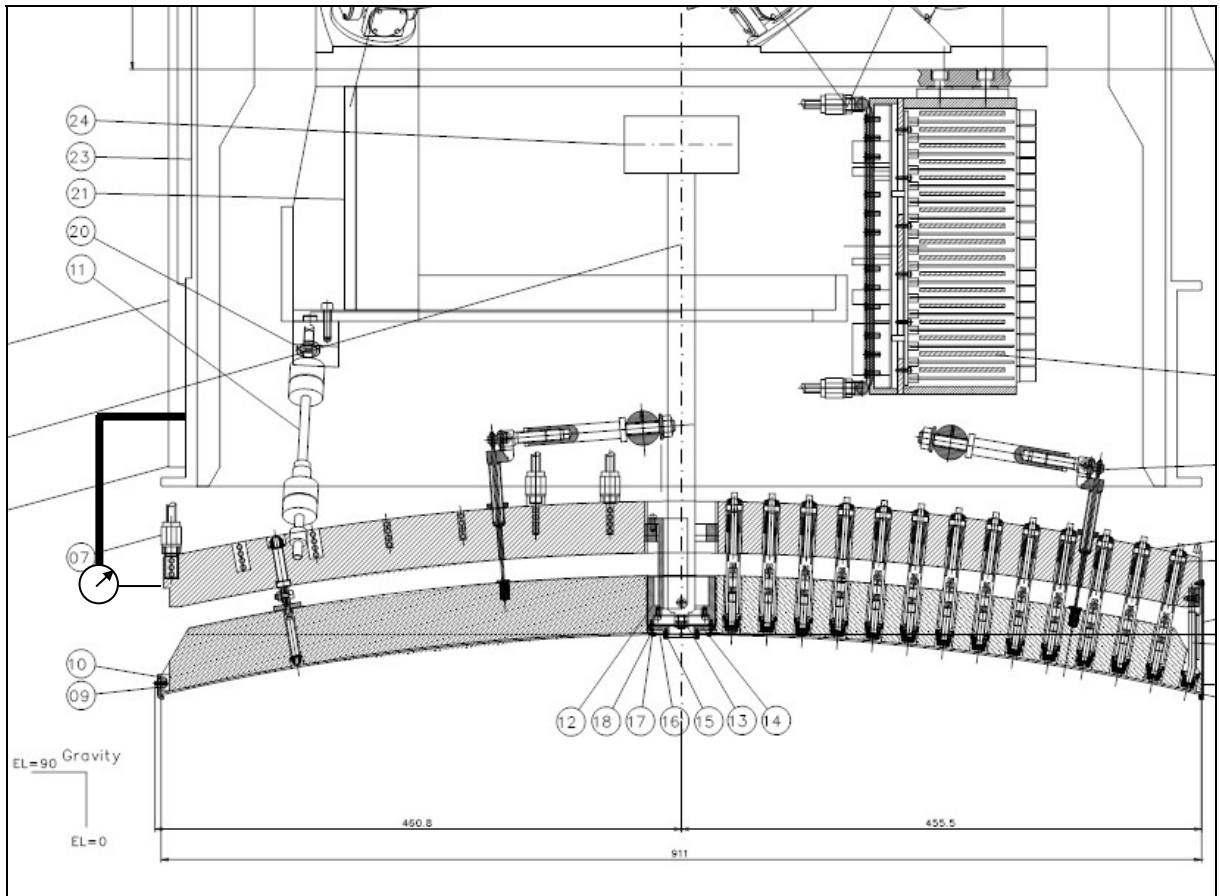
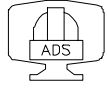


Figure 3 – Flexure test setup. Two dial gauges shall be attached to the hub near the swing arm interface flanges to measure the relative motion of the LBT672 coldplate.

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