

 LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY ALIGO INSTALLATION INSTANCE ACCEPTANCE DOCUMENT	E1400202 -v3
	Document No Rev.
	Date: 23 Apr 2014
Sheet 1 of 6	
Title: aLIGO Installation Acceptance Document for LHAM6	

This document covers the technical content for acceptance review of a subset of the Advanced LIGO (aLIGO) installation. See document [M1300468](#) for an overview of the aLIGO acceptance process. Acceptance by Systems Engineering is to be indicated in the metadata for this document in the LIGO Document Control Center (DCC).

1 Installation Instance/Subset Definition

Insert a brief description of the subset of the aLIGO equipment which is covered under this installation acceptance document. Complete the entries in the following table. If elements of the table are not applicable, enter "not applicable".

This installation covers the HAM chamber LHAM5 and all of the equipment within and attached plus associated electronics racks.

Interferometer [<i>L1 or H1</i>]:	L1
Building(s)/Room(s) : [<i>e.g. corner/LVEA</i>]	LVEA
Vacuum Chamber(s) :	LHAM6
Electronics Rack Designation(s) :	L1-ISC-C1, L1-ISC-C2, L1-ISC-C3, L1-ISC-C4, L1-ISC-R3, L1-ISC-R5, L1-SUS-C7, L1-SUS-C8, L1-SEI-C1. Note that the Capacitive Position Sensor readout boxes, which sit on the cable trays do not have an official designation.
Optics Table(s)/Enclosure(s) Designation(s) , and other equipment/assemblies related to this installation:	L1-ISCHT6R drawing at D1201210

2 Procedures

If there are any caveats or explanatory notes regarding the procedure documentation cited in the table below, then add these notes to the table entries.

Baseline or initial Installation Procedure(s) : <i>[enter linked DCC document #(s); found under E1200023]</i>	E080012 was the initial procedure to install the ISI. E070341 was the hazard analysis for the ISI Install.
As-Built/Installed Procedure(s) , either: a) Enter hyperlinked DCC number for revised or red-lined baseline install procedure, and/or b) Enter hyperlinked DCC number for separate document with installation notes on deviations, changes in procedure, changes in tooling, etc., and/or	No as-built notes were recorded in document. The installation of The HAM-ISI was recorded in aLOG #3784 . The OMC Installation in aLOG #7486 , cabling in aLOG #7494 .

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c) Enter a list of hyperlinked electronic log entries detailing the experience in applying the baseline installation procedure	Installation of tip-tilts is in aLOG #7505
Baseline or initial Alignment Procedure(s): <i>[enter linked DCC document #(s); found under E1100734]</i>	#E1101072 was the initial procedure. This is just an empty file card since there are no suspensions on this table to align. Tip-tilt mirrors and the OMC are aligned using interferometer beams.
As-Built/Aligned Procedure(s), either: a) Enter hyperlinked DCC number for revised or red-lined baseline alignment procedure, and/or b) Enter hyperlinked DCC number for separate document with alignment notes on deviations, changes in procedure, changes in tooling, etc., and/or c) Enter a list of hyperlinked electronic log entries detailing the experience in applying the baseline alignment procedure	Optics on the table were aligned using interferometer beams.

3 Drawings

Enter hyperlinked DCC document number(s) for each drawing in the table below. If elements of the table are not applicable, enter "not applicable". All chamber-level, assembly drawings can be found listed at [E1200562](#) and found linked under [D0901491](#).

Applicable Building/Room Top-Level Drawing(s):	D0901466 aLIGO Systems Layout LLO Corner Station
Top-Level Chamber Assembly Drawing(s):	D0901811 aLIGO Systems, LHAM6-L1 Top Level Chamber Assembly
Electronics Rack Drawing(s):	All drawings for the racks can be found by navigating through G1001032 .
Optics Table/Enclosure Drawing(s):	L1-ISCHT6R drawing at D1201210

4 Serial Number Records

Serial numbers are used to track a subset of the parts, particularly active elements (see [M1000051](#)) and electronics (with S-numbered documents; see [T0900520](#)). Enter the hyperlinked DCC document number(s), and name(s) for the highest level assembly(ies) covered by this installation acceptance document in the table below. Also enter the hyperlink to the ICS entry for the instance of this assembly in the Inventory Control System (ICS). If elements of the table are not applicable, enter "not applicable". If elements of the table are not available/missing, then enter "not available".

Assembly DCC D-Number	Assembly Name	ICS entry.
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D0900421	aLIGO Systems, LHAM6-L1 Top Level Chamber Assembly	ICS entry click here D1000342 . Note that this ICS entry seems to have no entries for ISC. The ISI table was constructed to eLIGO and predates ICS.
D1000513	HEPI	The aLIGO HEPI assembly is at D1000514 . Note that in contrast to most other LLO chambers HAM6 (which used to be HAM5) did not previously have HEPI installed.

5 Testing

All post-installation, stand-alone, in situ, checkout/testing (phases 2 and 3 per [M1000211](#)) must be completed, be successful and be documented:

- phase 2: pre-installed, post-storage, test results for the assembly (testable item)
- phase 3: stand-alone, in situ test results for the assembly (testable item)

Note that integrated testing (phase 4 testing per [M1000211](#)) is covered under the system acceptance review, not this installation acceptance review. In the table below, enter hyperlinked DCC document number(s) for all of the relevant testing for the major subassemblies/subsystems covered within this installation instance/subset. If elements of the table are not applicable, enter "not applicable". If elements of the table are not available/missing, then enter "not available".

Subsystem	Testable Item	DCC document numbers	
		Phase 2	Phase 3
SEI	HAM-ISI	E1200107	
SEI	HEPI	N/A	E1300927 Note: LHAM6 HEPI has yet to be commissioned so this record is empty.
SUS	OMC Suspension Tip-Tilt Mirrors	# E1400034 (under <i>Test Results</i>) E1300878 (under <i>Other Files</i>)	
AOS/SLC/ Viewports	Leak and pressure testing.	E1200445 . Leak and pressure testing was completed, refer to above link. All viewports were tagged at time of inspection and testing.	Visual inspection in-situ not completed, refer to bug list.

6 Installation Completeness

If/as applicable, provide a hyperlink reference to a list of remaining tasks to be completed before the installation is finished (i.e. a 'punch' list).

Installation tasks remaining to be	All items are installed.
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completed:	
ICS Assembly Record needs to be updated	The ICS records for HAM6 appear to be incomplete; There is no top level assembly record, the ISC information is sorely lacking, the ISI table precedes aLIGO and has no ICS entry.

7 Installation/Integration Issues and ECRs

If/as applicable, provide a hyperlinked list of integration issues and Engineering Change Requests (ECRs) encountered during installation and which are relevant to the installation subset/instance covered by this acceptance document. See [M1300323](#) for a description of the Integration Issue and ECR Tracker.

The format of the url for the bug tracker is as follows e.g.

*https://services.ligo-wa.caltech.edu/integrationissues/show_bug.cgi?id=826

Tracker # [hyperlinked]	Title/description
#3 closed	Unintentional ground connection at GS-13 pods
#24 closed	Increase series resistors on HAM-A and TT coil drivers
#73 closed	The RF photodetectors self destruct on loss of a single DC power rail
#78 closed	SUS Electronics Missing/Incomplete/Out-of-date Drawings
#118 closed	ECR: HEPI medm screen update
#140 closed	ECR HAM-ISI model and MEDM screen update
#182 closed	ECR: BSC-ISI and HEPI MEDM (Duplicate of #500)
#183 closed	Change the CPS biases from the local basis to the calibrated cartesian basis (Duplicate of #205)
#186 closed	ECR: Topology Changes to SUS models as a result of ISC Informed Interaction
#205 closed	ECR: Add Cartesian bias monitoring and offsets to the ISI models
#207 closed	ECR: Model and screens update to allow sensor correction to the ISI using Ground seismometers (STS-2)
#214	beam hit OM1 ~2" to the right (east) of the center of the optic
#216 closed	QPD OMC_A/B electronics chain missing

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#283	CPS Circuit Modification to eliminate a high frequency oscillation
#332	RF phase shifts when cables moved
#355 closed	ECR: Modify HAM-ISI and BSC-ISI simulink control filters to monitor gain for ODC
#360 closed	Ground loop fix in interface to all GS-13
#375 closed	ECR: Migrate the ISI Checker Script functions to the frontend code
#385 closed	ECR: create science frame channels for the SEI models
#441 closed	Cable plan for 5-way coax cables
#443 closed	RF splitter for BBPDs need to be documented (Duplicate of #465)
#445 closed	ECR: Update the SAFE level for the BSC and HEPI model watchdog
#459 closed	Add XTerm window pop-up for BSC-ISI and HAM-ISI transition command buttons (Duplicate of #650)
#465 closed	Need for additional amplification on the 135MHz signal chain
#469	ECR: New naming scheme for OMC channels
#482	ECR: ODC changes in SUS, SEI, HPI and PSL
#487 closed	ECR: Remove ISI IPC links which come from SUS offload
#500 closed	ECR: HEPI MEDM Update
#502	ECR to reposition the Fast Shutter and Beam Dump in HAM6
#530 closed	update to the HEPI master model and related MEDM screens
#551 closed	HEPI script update
#561 closed	Update ISI command scripts to match HEPI
#577	LHAM6 table weights are missing viton damping pads
#593 closed	LHAM6 flange layout discrepancy
#629	CPS Racks Grounding Schemes
#650	ISI model update - Jan 2014
#668	DC Switch Breaker Box Install in Pier Pod and TCS ISS Power cords.
#741	ISC tables: Lights and fan status readback
#742	L1 SUS OM3 LL OSEM Coil Non-functional
#761	In Situ, Visual Inspections of All Viewport Windows



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#827	LHAM6 Issue Tracker
#836	Glitches in ISI drives from the Blend switching algorithm
#837	HEPI L4C watchdog trips