LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO

ALIGO INSTALLATION INSTANCE ACCEPTANCE DOCUMENT

E1400201	-v1
Document No	**Rev.**

Date:	23 Apr 2014

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Title: aLIGO Installation Acceptance Document for LHAM1

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 [*L1 or H1*]:	**L1**
Building(s)/**Room**(s): [*e.g. corner/LVEA*]	**LVEA**
Vacuum Chamber(s):	**LHAM1**
Electronics Rack Designation(s):	L1-ISC-C1, L1-ISC-C2, L1-ISC-C3, L1-ISC-C4, L1-SEI-C1, L1-ISC-R1, L1-ISC-R2, L1-ISC-R4. Note that the Capacitive Position Sensor readout boxes, which sit on shelves near the HAM chambers do not have an official designation.
Optics Table(s)/Enclosure(s) Designation(s), and other equipment/assemblies related to this installation:	L1-ISCHT1L drawing at D1201103

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): *[enter linked DCC document #(s); found under E1200023]*	E1200088 was the procedure to re-install the passive stack. E1200092 was the hazard analysis for the passive stack re-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	The installation of the passive stack was recorded in aLOG #6369. E1200088 has redlines accruing from this

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document with installation 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 installation procedure	installation. D1200428 and D0901809
Baseline or initial Alignment Procedure(s): *[enter linked DCC document #(s); found under E1100734]*	E1100782 was the initial procedure. This is just an empty file card since there are no suspensions on this table to align.
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	Components 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):	D0901809 aLIGO Systems, LHAM1-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-ISCHT1L drawing at D1201103

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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.
D0900421	aLIGO Systems, LHAM6-L1 Top Level Chamber Assembly	ICS entry click here D0901809. This record exists but is misplaced in the hierarchial layout. You can find it by expanding the "BSC-ISI Unit1" assembly record at the bottom of the tree, and then looking for the boldfaced record (in this case 3rd from the bottom). I am unable to verify how much of the installed equipment is in the record since it keeps closing when I try to examine it.
D1000513	HEPI	The aLIGO HEPI assembly is at D1000514. Note that LHAM1 used to be LHAM2 on initial/enhanced LIGO.

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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	HEPI	N/A	E1300922 **Note: LHAM1 HEPI has yet to be commissioned so this record is empty.**
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.

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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 completed:	**All items are installed.**
ICS Assembly Record needs to be updated	**The ICS records for HAM1 may be incomplete; There is a top level assembly record but it has some problems.** **The passive stack isolation 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
#73 closed	The RF photodetectors self destruct on loss of a single DC power rail
#87 closed	Difficulty with covering viewports on HAM1 side of HAM1-HAM2 septum.
#89 closed	Ag-SS 5/16-24 screws in double stack viewports require change to plain SS
#95 closed	Quick look at contamination on PSL main double stack viewport
#96 closed	ALS COMM/DIFF signals missing
#100 closed	Add a half-wave plate to the REFL beam path in HAM1
#118 closed	ECR: HEPI medm screen update
#182 closed	ECR: BSC-ISI and HEPI MEDM (Duplicate of #500)
#196 closed	Cleanliness of input viewport and septum viewport that high power from PSL passes through

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#332	RF phase shifts when cables moved	
#373 closed	Extraction of PSL beam in HAM1 through central viewport	
#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	
#465 closed	Need for additional amplification on the 135MHz signal chain	
#482	ECR: ODC changes in SUS, SEI, HPI and PSL	
#500 closed	ECR: HEPI MEDM Update	
#530 closed	update to the HEPI master model and related MEDM screens	
#534 closed	Dual 5 way coax feedthrus installed on HAM 1 and 2 are not of the latest version.	
#551 closed	HEPI script update	
#570	LHAM1 Issue Tracker	
#577	LHAM6 table weights are missing viton damping pads	
#668	DC Switch Breaker Box Install in Pier Pod and TCS ISS Power cords.	
#741	ISC tables: Lights and fan status readback	
#761	In Situ, Visual Inspections of All Viewport Windows	
#771	Missing 4 stage 0 to support tubes screws for LHAM1	
#837	HEPI L4C watchdog trips	