

**ALIGO INSTALLATION INSTANCE  
ACCEPTANCE DOCUMENT****Title: aLIGO Installation Acceptance Document for WHAM2**

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 WHAM2 and all of the equipment within and attached plus associated electronics racks.

<b>Interferometer</b> [ <i>L1 or H1</i> ]:	<b>H1</b>
<b>Building(s)/Room(s):</b> [ <i>e.g. corner/LVEA</i> ]	<b>LVEA</b>
<b>Vacuum Chamber(s):</b>	<b>WHAM2</b> Top Level Chamber Assembly drawing <a href="#">D0901083</a> includes the following major assemblies: <ul style="list-style-type: none"> <li>• HEPI</li> <li>• HAM ISI</li> <li>• One HLTS: PR3</li> <li>• Three HSTS: MC1, MC3, PRM</li> <li>• Four HAUX: SM1, SM2, PMMT1, PMMT2</li> <li>• Faraday Isolator Assy</li> <li>• Three IO Periscope Assy (2 types)</li> <li>• PSL Photodiode Assy</li> <li>• Plus fixed mirror assemblies, baffles and balance masses.</li> </ul>
<b>Electronics Rack Designation(s):</b>	<a href="#">D1100909</a> , Input Optics Electronics Layout <a href="#">D1200666</a> , Vertex ISC Electronics Cable Layout  Note that the Capacitive Position Sensor readout boxes which sit on the cable trays do not have an official designation
<b>Optics Table(s)/Enclosure(s) Designation(s), and other equipment/assemblies related to this installation:</b>	Two IO Tables: IOT2L and IOT2R Ground Seismometer SEI-GND-STS-A Mode Cleaner Tube Baffle Assys for the IMC Optical Levers for PR3 & HAM2 table



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**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.

<p><b>Baseline or initial Installation Procedure(s):</b> <i>[enter linked DCC document #(s); found under <a href="#">E1200023</a>]</i></p>	<p><a href="#">E1200566</a> was the initial procedure for the WHAM2 chamber. This procedure lists the major sub-assemblies.</p> <p><a href="#">E1100718</a> was the procedure used to install the MC Tube Baffles</p> <p><a href="#">E1200063</a>, was the procedure used to install the Optical Levers</p>
<p><b>As-Built/Installed Procedure(s),</b> either:</p> <ul style="list-style-type: none"> <li>a) Enter hyperlinked DCC number for revised or red-lined baseline install procedure, and/or</li> <li>b) Enter hyperlinked DCC number for separate document with installation notes on deviations, changes in procedure, changes in tooling, etc., and/or</li> <li>c) Enter a list of hyperlinked electronic log entries detailing the experience in applying the baseline installation procedure</li> </ul>	<p>Redlines on <a href="#">E1200566</a> (i.e. top-level WHAM2 installation procedure) from Kate G are included under “other files” on that filecard.</p> <p>The WHAM2 ISI installation was covered in the following elog: <a href="#">3052</a>, <a href="#">3059</a>, <a href="#">3062</a>, <a href="#">3075</a></p> <p>elog #<a href="#">3182</a>: MCA1 Baffle installation          elog #<a href="#">3059</a>: WHAM2 ISI          elog #<a href="#">3980</a>: MCA2 Baffle installation          elog #<a href="#">5554</a>: PR3 suspension installation          elog #<a href="#">4529</a>: MC1 suspension installation          elog #<a href="#">4645</a>: MC3 suspension installation          elog #<a href="#">12971</a>: optics table balanced, and as-built drawing issued D1000906-v3          elog #<a href="#">4714</a>: viewports installed between HAM1 and 2 (there may be more such entries for other viewports on HAM2)          elog #<a href="#">2052</a> and <a href="#">4465</a>: HEPI install          elog #<a href="#">8037</a>: HEPI controller working          elog #<a href="#">4948</a>: IO baffles installed          (This entry reports IO install complete. There may be specific baffle entries as well.)          closeout WHAM2 : <a href="#">12995</a>          elog #<a href="#">14785</a>: PR3 oplev working.          elog #<a href="#">15079</a>: HAM2 oplev current, good status</p>



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<p><b>Baseline or initial Alignment Procedure(s):</b> [enter linked DCC document #(s); found under <a href="#">E1100734</a>]</p>	<p><a href="#">E1200470-v5</a> is the initial alignment procedure for WHAMs 2 and 3.</p> <p>.</p> <p><a href="#">E1200037</a> is the alignment procedure for optical levers</p>
<p><b>As-Built/Aligned Procedure(s)</b>, either:</p> <p>a) Enter hyperlinked DCC number for revised or red-lined baseline alignment procedure, and/or</p> <p>b) Enter hyperlinked DCC number for separate document with alignment notes on deviations, changes in procedure, changes in tooling, etc., and/or</p> <p>c) Enter a list of hyperlinked electronic log entries detailing the experience in applying the baseline alignment procedure</p>	<p><a href="#">E1200470-v5</a> is the as-built alignment procedure</p> <p>Progress on the PR3 alignment, <a href="#">alog #5821</a>.</p> <p>PR alignment walked, <a href="#">alog #5841</a></p>

### 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):	<a href="#">D0901469</a> , aLIGO Systems Layout LHO Corner Station
Top-Level Chamber Assembly Drawing(s):	<a href="#">D0901083</a> , aLIGO Systems, HAM2-H1 Top Level Chamber Assembly
Electronics Rack Drawing(s):	Cf. punchlist E1400459, tbd
Optics Table/Enclosure Drawing(s):	<a href="#">D1300357</a> , As Built Layouts for ALIGO H1 IOT2L and IOT2R
Optical Lever Drawing(s):	<p><a href="#">G1000740</a>, Floor Occupancy, Optical Levers, LHO Corner Station</p> <p><a href="#">D1001291</a>, aLIGO AOS OpLev TX Pier Assembly (PR3, SR3 - LHO)</p> <p><a href="#">D1001166</a>, PR3 OptLev Receiver (Rx) Assy (D1001166 is the parent of D1002207 which is a related doc of D1001166 and has drawings with detail.)</p> <p><a href="#">D1001851</a>, HAM2 OptLev (Tx/Rx) Assy</p>
Mode Cleaner Tube Baffle Dwg(s):	<a href="#">D1000774</a> , Mode Cleaner Tube Baffle Assy (specifically MCA1 and MCA2)

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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
<a href="#">D0901083</a>	aLIGO Systems, HAM2-H1 Top Level Chamber Assembly	<a href="#">ICS link</a>
<a href="#">D1000514</a>	HEPI	<a href="#">D1100144-028</a> ; <a href="#">D1100144-038</a> ; <a href="#">D1100146-025</a> ; <a href="#">D1100146-037</a> .

**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	<a href="#">E1200506</a>	
SEI	HEPI	N/A	<a href="#">E1300828</a>
SUS (under Test Results)	PR3 Suspension	<a href="#">E1300844</a>	
	PRM Suspension	<a href="#">E1400121</a>	
	MC1 Suspension	<a href="#">E1400118</a>	
	MC3 Suspension	<a href="#">E1400120</a>	
IO	HAM AUXiliary Suspensions (4 reports linked to DCC entry)	<a href="#">T1300397</a>	



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AOS/SLC/Vi ewports	Leak and pressure testing.	Cf. punchlist E1400459, document LHO VP status as per LLO E1200445	Visual inspection in-situ not completed, refer to bug list
AOS/OptLev	PR3 OptLev	<a href="#">E1200992</a> : Completed test reports for OptLev QPD Amplifiers  <a href="#">E1200214</a> : In-situ optical-lever testing and acceptance. See buglist for testing tracking.	
IO	Faraday Isolator	<a href="#">E1300485</a>	
PSL	ISS outer loop PD Array	<a href="#">T1300594</a>	

## 6 Installation Completeness

If/as applicable, provide a hyperlinked 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:	<b>All items are installed.</b>
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## 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 issue tracker is as follows.

[https://services.ligo-wa.caltech.edu/integrationissues/show\\_bug.cgi?id=\\*](https://services.ligo-wa.caltech.edu/integrationissues/show_bug.cgi?id=*)

*id	status	resolution	Title/description
984	Accepted	WhenVent	WHAM2 Issue Tracker