

Title: aLIGO Installation Acceptance Document for WBSC1 (Y)

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 BSC chamber LBSC1 and all of the equipment within and attached plus associated electronics racks.

Interferometer [<i>L1 or H1</i>]:	H1
Building(s)/Room(s) : [<i>e.g. corner/LVEA</i>]	LVEA
Vacuum Chamber(s) :	WBSC1
Electronics Rack Designation(s) :	H1-SEL-C4 H1-SUS-C5 H1-SUS-C6 H1-SUS-R5 TCS rack layouts in D1200259 (H1-TCS-R2) 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:	ITMY Cryo-Pump Baffle , Optical Lever , TCS Table , STS-2 Ground Seismometer

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>	E1200915 was the initial procedure
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	See notes and changes section of E1200915 for comments. The cartridge installation event (including cartridge weight measurement) occurred on 15 Nov 2012 and is recorded in elog 4708 . This installation was with a

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<p>tooling, etc., and/or</p> <p>c) Enter a list of hyperlinked electronic log entries detailing the experience in applying the baseline installation procedure</p>	<p>pilot optic.</p> <p>The installation of the final optic on its monolithic silica suspension took place on 12 June 2014 and is recorded in elog 12341.</p>
<p>Baseline or initial Alignment Procedure(s): <i>[enter linked DCC document #(s); found under E1100734]</i></p>	<p>E1200884 was the initial procedure</p>
<p>As-Built/Aligned Procedure(s), 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>E1200884-v5 is the as-built alignment procedure. The WBSC1 alignment including ACB was recorded and reported as completed in LHO elog 13080</p> <p>The CMB installation was recorded in LHO elog #13113</p> <p>The CO2P relay optics alignment was recorded in LHO elog #8459</p> <p>OptLev install and alignment is reported in elog 6400</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](#).

<p>Applicable Building/Room Top-Level Drawing(s):</p>	<p>D0901469 aLIGO Systems Layout LHO Corner Station</p>
<p>Top-Level Chamber Assembly Drawing(s):</p>	<p>D0901137 aLIGO Systems, BSC1-H1 Top Level Chamber Assembly</p>
<p>Electronics Rack Drawing(s):</p>	<p>D1100022 SUS wiring diagrams for ITM and BS</p> <p>See also links in Section 1.</p>
<p>Optics Table/Enclosure Drawing(s):</p>	<p>LIGO-D1000634 TCS CO2P Table Assembly, H1/L1</p>
<p>ITM Optical Lever Drawing(s):</p>	<p>G1000740 Floor Occupancy, Optical Levers, LHO Corner Station</p>
<p>Cryopump Manifold Baffle Dwg(s):</p>	<p>LIGO-D0902617 aLIGO_Manifold_Cryo_Baffle_Assembly, ITM</p>



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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
D0901137	aLIGO Systems, BSC1-H1 Top Level Chamber Assembly	https://ics-redux.ligo-la.caltech.edu/JIRA/browse/ASSY-D0901137-NA
D1000513	HEPI	HEPI assemblies are available in the hierarchy of the Top Level Chamber Assembly. For example D1100241-056

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	BSC-ISI	E1100296 has Phase 1 testing info.	
SEI	HEPI	N/A	E1300840
SUS	BSC1 Suspension (under Test Results)	E1400147	
AOS/SLC/Viewports	Leak and pressure testing.	E1300447 gives a link to the ICS record for LHO viewport testing	
OptLev	Impulse Hammer	T1100152 has the summary	



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	Modal Testing	of all OpLev Modal data.	
AOS/CMB	Impulse Hammer Modal Testing	None see punchlist	
AOS/TCS/RHy	Collection, refer to link.	N/R	???
AOS/TCS/CO2Py	Collection, refer to link.	N/R	aLOG #13927
ESD	ESD install/testing for the quads	elog #12815 and #12674 detail problems with an install and a CP plate short.	
AOS/ACB	Photodiode continuity testing. In-situ operation.	elog #13029	
AOS/ACB	Impulse Hammer Modal Testing	One instance of testing completed, refer to LHO e-log entry 8656 . This is for H1-ITMX	

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.

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.

All integration issues are tracked in issue [#990](#)