

Title: aLIGO Installation Acceptance Document for WBSC3 (X)

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 LBSC3 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) :	WBSC3
Electronics Rack Designation(s) :	H1-SEL-C6 , H1-SUS-C5 , H1-SUS-C6 , H1-SUS-R6 , H1-TCS-R1 Note that the Capacitive Position Sensor readout boxes which sit adjacent to the chamber do not have an official designation.
Optics Table(s)/Enclosure(s) Designation(s) , and other equipment/assemblies related to this installation:	TCS-X Table , STS-2 Ground Seismometer, Cryopump Manifold Baffle (CMBx) , Optical Lever

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>	E1300605 was the initial procedure. Note there is no specific procedure for WBSC3. The Abstract for the above document details how to use the WBSC1 procedure and other documents, in particular D0901146 .
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 cartridge installation occurred on 14 th Oct 2013 and is recorded in elogs 8105 and 8100 . This installation was with a pilot optic.

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<p>document with installation 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 installation procedure</p>	<p>The installation of the final optic on its monolithic silica suspension took place on 11th June 2014 and is recorded in elog 12292. The broken ESD cable connection referred to in that elog was subsequently fixed – see elog 12313.</p>
<p>Baseline or initial Alignment Procedure(s): <i>[enter linked DCC document #(s); found under E1100734]</i></p>	<p>E1200951 is the as-built reference document for IAS.</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>E1200951-v4 is the as-built alignment procedure.</p> <p>The ITMX final alignment in chamber was recorded in LHO elog 12562. The ITMX ACB final alignment is reported in LHO elog 12542. The CMBx installation is reported in LHO elog 8398. Optical Lever alignment is referred to in alogs #13208 and #13246, but there is no entry specific to the alignment work.</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>D0901146 aLIGO Systems, BSC3-H1 Top Level Chamber Assembly</p>
<p>Electronics Rack Drawing(s):</p>	<p>D1100022 SUS wiring diagrams for ITM and BS 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
D0901146	aLIGO Systems, BSC3-H1 Top Level Chamber Assembly	D0901146 entry
D1000513	HEPI	HEPI assemblies are available in the hierarchy of the Top Level Chamber Assembly. For example D1100241-064

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	E1100848	
SEI	HEPI	N/A	E1300838
SUS	BSC3 Suspension (under Test Results)	E1400146	
AOS/SLC/Viewports	Leak and pressure testing.	E1300447 gives a link to the ICS record for LHO viewport testing	
AOS/OptLev	ITMx OptLev Impulse Hammer Modal Testing	T1100152 has the summary of all OpLev Modal Data	



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AOS/CMB	Impulse Hammer Modal Testing	None available see punchlist.	
AOS/TCS/RHx	Collection, refer to link.	N/R	
AOS/TCS/CO2Px	Collection, refer to link.	N/R	aLog #13995 , #14714 , #14736 , #14722 , #14742 and #14744
AOS/ACB	Photodiode continuity testing. In-situ operation.	alog #8587	
AOS/ACB	Impulse Hammer Modal Testing	See LHO e-log entry 8656 .	
ESD	ESD install/testing for the quads	See alog #8561 and #12313	

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.
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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 Installation/Integration issues for WBSC3 are tracked in issue [#988](#)