



**ALIGO INSTALLATION INSTANCE
ACCEPTANCE DOCUMENT**

Title: aLIGO Installation Acceptance Document for WHAM4

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 WHAM5 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):	WHAM4
Electronics Rack Designation(s):	H1-SUS-R3 . H1-TCS-R1 . H1-SUS-C2 . H1-SEI-C3 . 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:	STS-2 Ground Seismometer. H1-TCSHT4R.

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>	Refer to LHO WHAM4 specific documents referenced in E1300204-v0 . There is no LHO-specific document, instead the LLO proceure is referred to, and E1300204-V0 but contains LHO-specific notes.
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 c) Enter a list of hyperlinked electronic log	No as-built notes were recorded in document. The installation of MC2 A and B baffles is logged in LHO alog #3950 . Installation of the WHAM4 ISI is described in LHO alog #6453 . ISI loading: LHO alog #9337 ; Installation video .



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entries detailing the experience in applying the baseline installation procedure	Brief SUS INS report: LHO alog#9765 . WHAM4 HEPI actuator install, LHO alog #10593 .
Baseline or initial Alignment Procedure(s): <i>[enter linked DCC document #(s); found under E1100734]</i>	E1200594-v3 was the initial procedure
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	As-built/as-aligned: E1200594-v4 WHAM4 coarse alignment: LHO alog #10683 . WHAM4 HWS optics alignment: LHO alog #12615 . Combined SR2/3 alignment work: LHO alog #12717 .

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):	D0901469 aLIGO Systems Layout LHO Corner Station
Top-Level Chamber Assembly Drawing(s):	D0901125-v8 aLIGO Systems, WHAM5-H1 Top Level Chamber Assembly
Electronics Rack Drawing(s):	All drawings for the racks can be found by navigating through the links given in Section 1 and in the rack and cable tray layout drawing.
Optics Table/Enclosure Drawing(s):	D1001227-v5 TCS Layout.
ITM Optical Lever Drawing(s):	LIGO-G1000740 Floor Occupancy, Optical Levers, LLO Corner Station.

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".



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Assembly DCC D-Number	Assembly Name	ICS entry
D0900421	aLIGO Systems, WHAM4-H1 Top Level Chamber Assembly	https://ics-redux.ligo-la.caltech.edu/JIRA/browse/ASSY-D0901125-NA
D1000513	HEPI	Has some entries in above ICS record.

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	E1200508	
SEI	HEPI	N/A	E1300830
SUS	SR2 Suspension	E1400124 (under <i>Test Results</i>) B&K aLOG 12089	
AOS/SLC/ Viewports	Leak and pressure testing.	E1300447 . 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.
AOS/SLC/ Baffles	Modal Testing H1 SR2 Baffles	N/A	N/A
AOS/TCS/ HWS	HWS alignment and measurement.	Alignment is documented in the following aLOG entries: #14123 #14135 #14158 #14171 #14180 #14172 #14698 #14648 #14683	

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).



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Installation tasks remaining to be completed:	HWSY has an incorrect in-vacuum lens. There is a temporary fix in place. Added to punchlist as #36.
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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.

WHAM4 issues will be kept in the WHAM4 Issue Tracker listed as bug# 982 in the Bugzilla list.