



WBSC6

AUTHOR(S)	DATE	Document Change Notice, Release or Approval
Dennis Coyne	9 Jan 2012	see LIGO DCC record Status

Instructions on the use of this document:

1) Use, and complete, this document on a cleanroom compatible computer while the work is proceeding. This procedure, and all of the applicable documents, must be available at all times during the procedure.

2) Use this procedure as a check list for preparation and during the installation; As each step is completed, enter the name of the person completing the work (or approving or checking the step), as well as the date and any comments or notes. In particular, note any discrepancies or deviations and augment with any missing definition. ALL NOTES MUST BE RECORDED IN THE COMPLETED VERSION OF THIS DOCUMENT (NOT IN OTHER NOTEBOOKS OR FILES). If the additional notes are too cumbersome to include within the body of this completed procedure, then electronically attach them to the completed procedure.

3) Once completed, file the document in the LIGO Document Control Center (DCC) as the next highest version of the procedure and add a note that this is a completed/finished procedure.

4) File any significant notes or data from the completed procedure in the electronic logbook (such as any deviations); as a minimum note in the electronic logbook that the installation was completed in accordance with this procedure (cite document number and revision).

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1 SCOPE

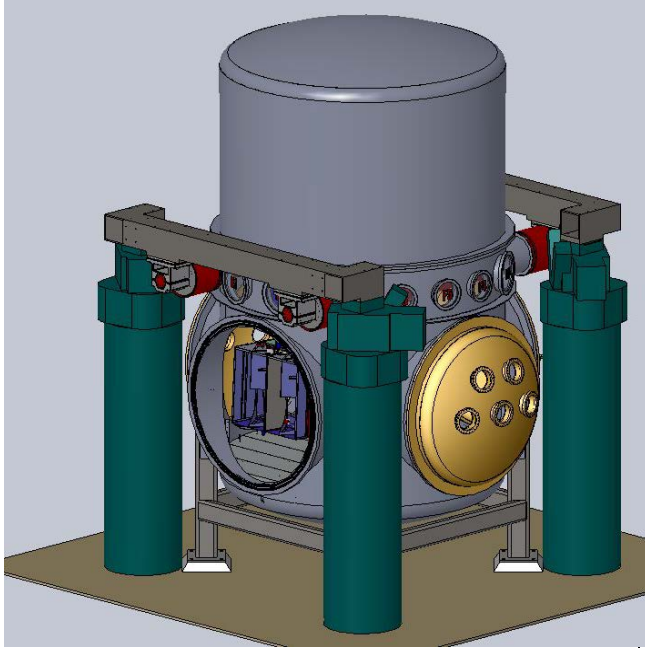
The scope of this procedure is installation of interferometer components and assemblies in the WBSC6 chamber (see Figure 1), which are defined in the following documents:

- LIGO-D0900512: [AdvLIGO Systems, BSC6-H2 Top Level Chamber Assembly](#)
- LIGO-E1100813: [BSC6-H2 Top Level Chamber Assembly BOM](#)
- LIGO-D0900514: [AdvLIGO SEI BSC6-H2, XYZ Local CS for ISI Table](#)
- LIGO-D0900515: [aLIGO SUS BSC6-H2, XYZ Local CS for ETMY](#)
- LIGO-D0900419: [AdvLIGO SUS BSC6-H2, XYZ Local CS for TMS ETM Tel Assy](#)
- LIGO-D1001921: [AdvLIGO SUS BSC6-H2, XYZ Local CS for SLC Arm Cavity Baffle](#)
- LIGO-D1000897: [AdvLIGO BSC6-H2 ISI Table, Balance Masses Assembly](#)
- LIGO-D1101429: [ALIGO, AOS, BSC FLOORING ORIENTATION DETAILS, BSC-6 & BSC-8](#)
- LIGO-D1101478: [CABLE HARNESS ROUTING CONFIGURATION BSC-6](#)
- LIGO-D1101310: [aLIGO, SUS, OPTIC TABLE .38-16 BSC8-H2 FIDUCIAL KIT](#)
- LIGO-E1000202: [AdvLIGO Detailed Mass Properties-CG Report BSC Tables LHO](#)
- LIGO-D1101675: [WBSC6 and WBSC8 additional \(secondary\) related documents](#)
- LIGO-D1003085: [Flange Layout – H2 Beam Splitter Chamber 6 \(BSC6\) ETMY](#)

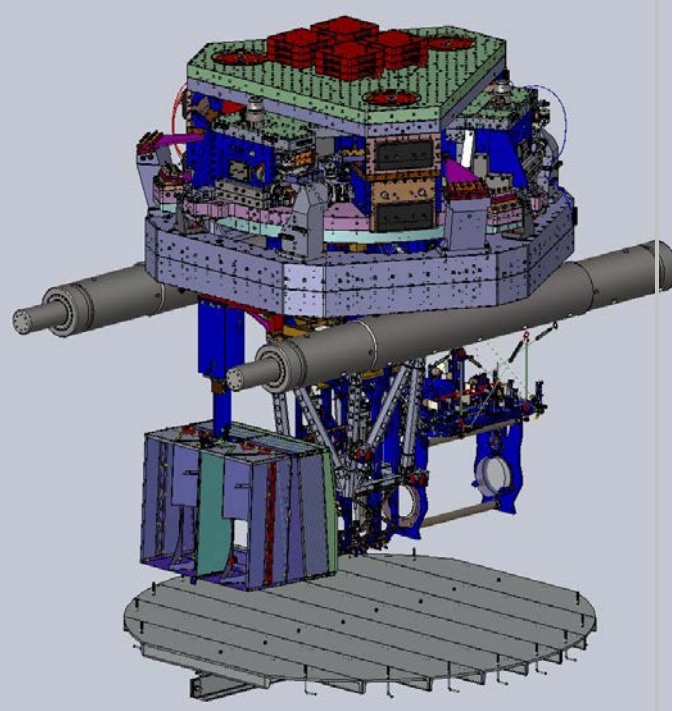
All of these documents are provided as “related document” links in the Document Control Center (DCC) entry for the top level chamber assembly drawing, [D0900512](#).

This installation document does not cover installation of out-of-the-chamber associated elements/systems such as the Optical Levers (OptLevs), electronics racks and cable trays associated with the in-chamber installed systems.

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a) with vacuum equipment, HEPI (shown in simplified, envelope configuration)



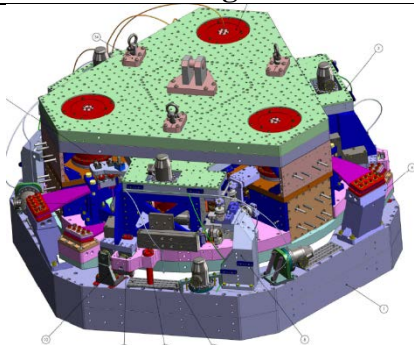
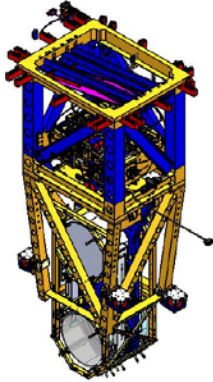
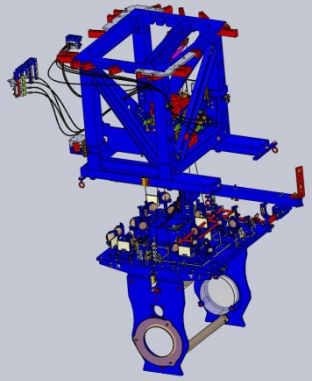
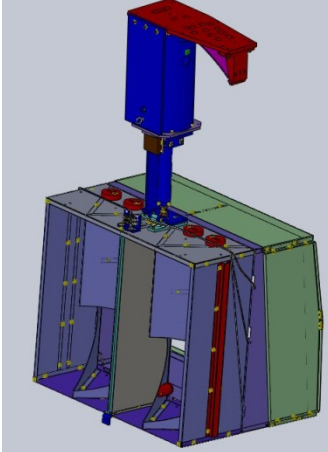
b) without vacuum equipment, HEPI

Figure 1 WBSC6 Chamber Installation

This installation includes the following principal, sub-system major assemblies:



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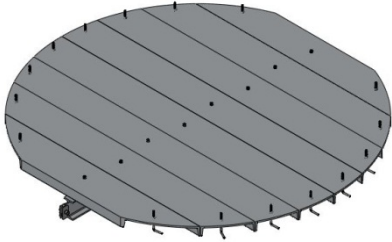
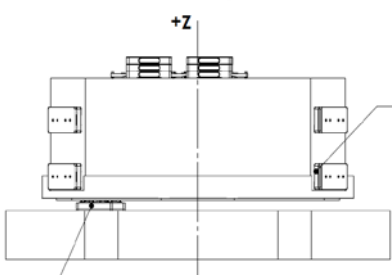
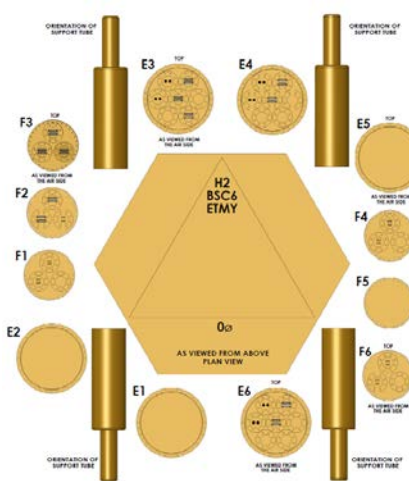
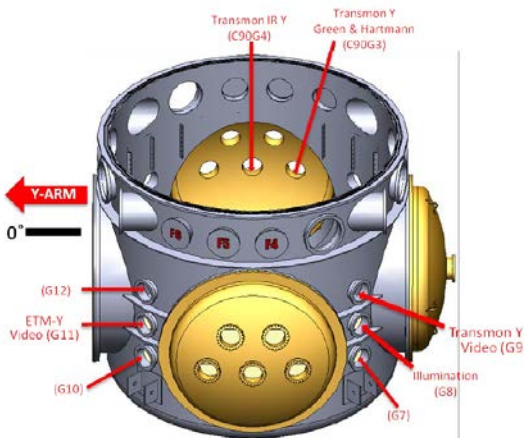
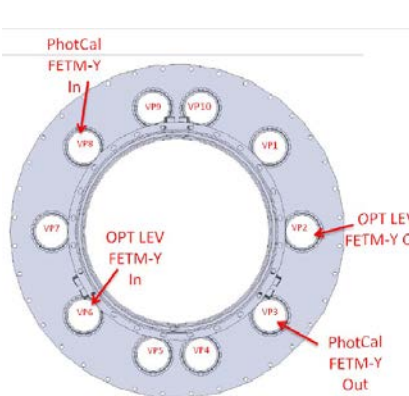

Subsys.	Assy Dwg	Sub-Assembly Name	Image
SEI	D0900514	WBSC6 BSC-ISI assembly including: BSC-ISI assembly (D0901182) Balance masses Bolts to attach to support tubes	
SUS	D0900515	H2 ETMy including: quad suspension assembly (D0901346) TCS Ring Heater (RH) assy (D1001838+D1001895) Vibration Absorbers (D1002424) ITM/ETM Optics Cap (D1100052) Dog clamps	
AOS	D0900419	Transmission Monitor Suspension (TMS) Assembly, including: Vibration Absorbers (D1002424) Dog clamps	
AOS/SLC	D1001921	Arm Cavity Baffle assembly (ACB) for H2- ETMy <i>N.B.: The ACB will not be installed initially for the H2 One Arm Test (H2OAT) since it will not be available in time.</i>	



LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
ALIGO INSTALLATION PROCEDURE

E1200024 -v1-
 Document No Rev.
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Subsys.	Assy Dwg	Sub-Assembly Name	Image
FMP	D961115 D1101429	BSC Floor Assy BSC Flooring orientation, WBSC6 & WBSC8	
SYS	D1000897	WBSC6 ISI Table Balance Masses	
SEI/SYS	D1003085 D11014778	Electrical Feedthroughs Layout, WBSC6 Cable Routing, WBSC6	
AOS/SLC	T1100292 Viewport Source List		 

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Subsys.	Assy Dwg	Sub-Assembly Name				Image	
1	A	B	C	D	E	F	G
IFO	CHAMBER	VIEWPOF	FUNCTION	DESCRIPTION	VIEWPORT P/N	SOURC	
106	H2	A-17B	VP2	OPTLEV	FETMY-OUT	7.8 DIA, ISI 9722012-AR635	iLIGO
107	H2	A-17B	VP3	PHOTCAL	FETMY-OUT	6.0 in-AR1064/532_nonwedge	CUSTOM
108	H2	A-17B	VP5	VIDEO	FETMY1	5.4 DIA VP800/450009	CATALOG
109	H2	A-17B	VP6	OPTLEV	FETMY-IN	7.8 DIA, ISI 9722012-AR635	iLIGO
110	H2	A-17B	VP8	PHOTCAL	FETMY-IN	6.0 in-AR1064/532_nonwedge	CUSTOM
111	H2	A-17B	VP9	VIDEO	FETMY2	5.4 DIA VP800/450009	CATALOG
128	H2	BSC6	C90G3	DIAGNOSTIC	TRANSMON GREEN & HARTMANN	6.0 in-AR1064/532_nonwedge	CUSTOM
129	H2	BSC6	C90G4	DIAGNOSTIC	TRANSMON IR	6.0 in-AR1064/532_nonwedge	CUSTOM
130	H2	BSC6	G8	ILLUMINATION		5.4 DIA VP800/450009	iLIGO
131	H2	BSC6	G9	VIDEO	TRANSMONY-IR	5.4 DIA VP800/450009	CATALOG
Cable tray	D1100430	BSC Cable Tray Overall Assy <i>(shown without the chamber)</i> needs revision to as-built design					
HEPI	D1000514	Hydraulic External Pre-Isolator (HEPI) Assy <i>(shown without the chamber)</i>					

This procedure starts with the integration of the payload elements of the WBSC6 chamber in the “cartridge assembly” on the BSC Mechanical Test Stand (D1002124) and then proceeds to the integration of the cartridge assembly within the WBSC6 chamber. The “cartridge assembly” is comprised of the BSC-ISI system with as many of the payload elements integrated onto the optics table and the stage 0 structure of the BSC-ISI as possible. The cartridge assembly is integrated and aligned while on the BSC mechanical test stand. The cartridge is then lifted, flown to the chamber and lowered into position onto the BSC support tubes. The entire cartridge assembly is then aligned in situ, as a rigid body, based on the alignment of the ETMy optic. Those elements which could not be integrated on the test stand are added in situ and aligned in situ, if needed.

1.1 Scope for the Initial Installation

For the initial installation into WBSC6 in support of the H2 One Arm Test (H2OAT):

- the ETMy optic will be a temporary optic that will eventually need to be replaced
- the Arm Cavity Baffle (ACB) will not be installed into WBSC6 (because it is not available in time).

However in this document we address the alignment of all elements of a complete WBSC6 installation for completeness (and for the eventual installation of all elements).

**WBSC6**

Note: Some early documentation refers to wide angle panels or baffles. These baffles have been made obsolete by revising the design of the ACB (extending the solid angle subtended by the ACB).

2 Required Equipment List

Each of the procedures referenced within this overall procedure call out required equipment and parts/assemblies. Below is listed only those parts or assemblies not covered in the subsidiary procedures.

- See the Bill Of Materials (BOM) for the WBSC6 assembly, E1100813: [BSC6-H2 Top Level Chamber Assembly BOM](#)
- Genie lift for transport of the quad to the test stand
- Lift cart and 5-axis table ([D1101674](#)) for transport/mating of the upper quad to the test stand
- Genie lift for transport of the TMS to the test stand
- For custom assembly/installation tooling, see [D1101674-v3](#) which covers various usages of then tooling.
 - Sheet 3 is configuration used for ETMy upper structure
 - Sheet 8 is configuration used for ETMy lower structure

completed, approved or checked by:

date:

comments (optional):

WBSC6

3 PROCEDURE FOR CARTRIDGE ASSEMBLY

The WBSC6 cartridge assembly is depicted in Figure 2. The major optics assemblies integrated into the WBSC6 cartridge are the following:

- Y End Test Mass (ETMy) and End Reaction Mass (ERMy), both parts of the suspension assembly (D0900363)
- Transmission Monitor (TransMon) including the end transmission telescope, both parts of the Transmission Monitor Suspension (TMS)
- Arm Cavity Baffle (ACB) Suspension, which is not part of the cartridge assembly because of interference with the test stand (it is installed in the chamber).

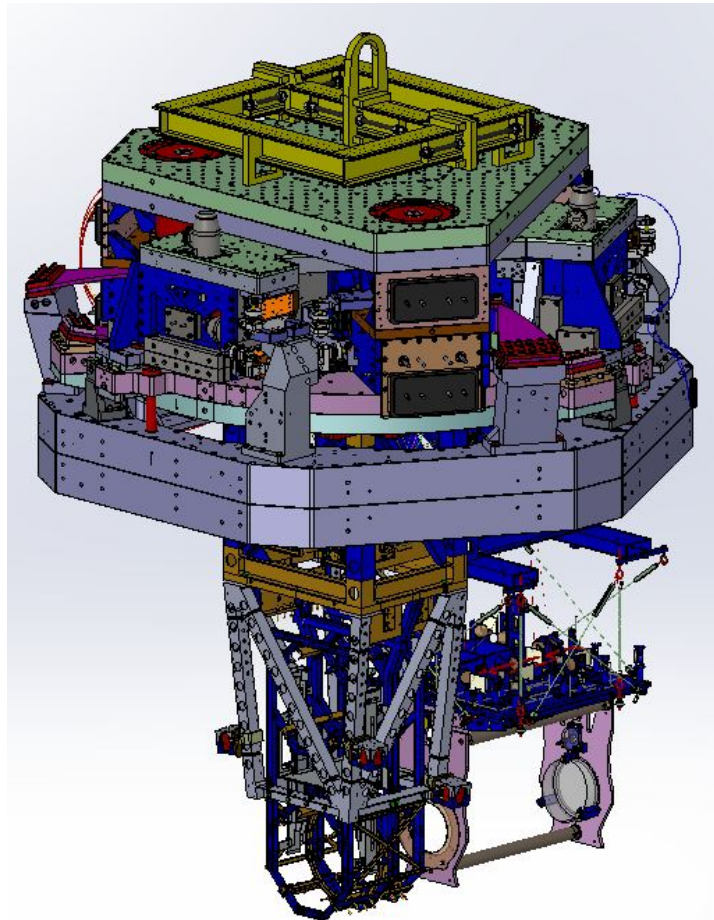


Figure 2: The WBSC6 cartridge assembly (D0900512)

The WBSC6 Cartridge Assembly (“full cartridge” configuration of the D0900512 SolidWorks model version X-101). Not shown is the BSC Mechanical Test Stand (D1002124)

**WBSC6****3.1 Prerequisites for Cartridge Integration**

- The BSC mechanical test stand must be set so that the interface plane with the BSC-ISI stage 0 is horizontal.
- The features of the BSC mechanical test stand which interface to the BSC-ISI platform shall be used to establish a centerline and two offset lines with alignment monuments/references in the floor, as depicted in the [D1200076](#)
- An appropriate clean room should be installed over the test stand.
- All payload assemblies must be acceptance tested (to the extent possible and planned) prior to integration into the cartridge assembly.

completed, approved or checked by:

date:

comments (optional):

3.2 Applicable Documents

Listed below are all of the applicable and referenced documents for this installation procedure. This list gives the latest revisions of the documents; within the installation steps, only the document number (and not the revision) is quoted.

Only documents actually required to perform the installation should be included in this list and not background or reference material. It is essential that all of the procedures and all of the drawings listed below are available with this procedure during the installation/integration work.

Document	Version	Document Title
General Documents		
E0900047		LIGO Contamination Control Plan
Install/Align Procedures		
E1101071		Initial Alignment Procedure: WBSC6
T1100406		Quad Cartridge installation procedure check list (e.g. quad lock down)
E#?????		TMS Installation Procedure
E1100841		TMS Transportation-Installation Restraint Procedure
E1101037		aLIGO BSC-ISI Cartridge Installation Procedure
E1100278		WBSC6-H2, Requirements and Procedure: Cartridge Flight and Insertion into BSC Chamber
Test Procedures		
E1000487		“BSC-ISI Testing Procedure, Phase II : Integration process”
E1000495		“SUS Quad Suspension Testing and Commissioning Documentation” <i>(this should be a pointer to the specific phase 2 test procedure(s) and not this top level link)</i>



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E???????,		TMS Phase II Test Procedure
E???????,		ACB Phase II Test Procedure
Safety		
E1100814		Cartridge Assembly Hazard Analysis
E1101017		Cartridge Lifting Hardware Loading Analysis
E#???????		Critical Lift Plan for the aLIGO WBSC6 Cartridge Installation
E1100976		BSC Cartridge Installation Hazard Analysis
E1000890		SLC Arm Cavity Baffle Install Hazard Analysis
E#?????		TMS Install Hazard Analysis
Drawings		
D0900512		AdvLIGO Systems, BSC6-H2 Top Level Chamber Assembly
E1100813		BSC6-H2 Top Level Chamber Assembly BOM
D0900514		AdvLIGO SEI BSC6-H2, XYZ Local CS for ISI Table
D0900515		aLIGO SUS BSC6-H2, XYZ Local CS for ETMY
D0900419		AdvLIGO SUS BSC6-H2, XYZ Local CS for TMS ETM Tel Assy
D1001921		AdvLIGO SUS BSC6-H2, XYZ Local CS for SLC Arm Cavity Baffle
D1000897		AdvLIGO BSC6-H2 ISI Table, Balance Masses Assembly
D1101429		ALIGO, AOS, BSC FLOORING ORIENTATION DETAILS, BSC-6 & BSC-8
D1101478		CABLE HARNESS ROUTING CONFIGURATION BSC-6
D1101271		ALIGO BSC ISI OPTICAL TABLE HOLE TABULATION
D1101310		aLIGO, SUS, OPTIC TABLE .38-16 BSC8-H2 FIDUCIAL KIT
E1000202		AdvLIGO Detailed Mass Properties-CG Report BSC Tables LHO
D1101675		WBSC6 and WBSC8 additional (secondary) related documents
D1003085		Flange Layout – H2 Beam Splitter Chamber 6 (BSC6) ETMY
D1101260		ALIGO, BEAM SPLITTER CHAMBER, ROUGH ALIGNMENT TOOL LAYOUT, BSC-6
E1100405		Interface Control Document - BSC Dog clamps and cable clamps
D1003140		Lifting Bar, 3 Point, BSC Cartridge, aLIGO
G1000125		Advanced LIGO BSC and HAM ISI Basis and Naming Conventions
D1101674		LIGO-: aLIGO, SUS, BSC/HAM INSTALLATION TOOLING , in particular: sh 3 for ETMy upper assembly sh 8 for ETMy lower assembly

3.3 Install the BSC-ISI onto the Test Stand

Using [D1000744](#), Lift Hook Receiver assembly

- The BSC-ISI must be oriented in the same direction as it will be in chamber WBSC6 (as defined in [G1000125](#)).
- Remove the LIGO-[D1000744](#): Lift Hook Receiver assembly.

completed, approved or checked by:

date:

comments (optional):



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3.4 Perform final BSC-ISI testing/characterization prior to payload integration

completed, approved or checked by:
date:
comments (optional):

3.5 Attach the alignment templates for the TMSy and ETMy suspensions

- Attach one alignment template per suspension structure in accordance with LIGO-D1101260: ALIGO, ROUGH ALIGNMENT TOOL LAYOUT , WBSC6. The hole numbering system is defined in LIGO-D1101271: [ALIGO BSC ISI OPTICAL TABLE HOLE TABULATION](#).

completed, approved or checked by:
date:
comments (optional):

3.6 Weigh the full suspension payloads

- Weigh the full ETMy quad suspension, record below
- Weigh the full TMSy suspension, record below
- Systems to confirm, or revise, the mass balancing plan/drawing ([E1000202](#))

Payload	Mass (Kg)	Comments/caveats
ETMy Suspension		
TMSy Suspension		

completed, approved or checked by:
date:
comments (optional):

3.7 Install the balance masses onto the optics table

- Install the balance masses in accordance with LIGO-D1000897: [AdvLIGO BSC6-H2 ISI Table, Payload & Suspended Mass Assembly](#)

3.8 Install the ETMy suspension upper assembly

- Check Dog clamps are installed and tightened as per [E1100405](#), remove TFE stops.



WBSC6

- Cable as per [D1101478](#) (routing) and [D1003085](#) (flanges)
- Set BOSEMs, accounting for buoyancy

completed, approved or checked by:
date:
comments (optional):

3.9 Install the TMSy suspension

- Check Dog clamps are installed and tightened as per E1100405, remove TFE stops.
- Suspend TMSy as per **E#??????**
- Cable as per [D1101478](#) (routing) and [D1003085](#) (flanges)
- Set BOSEMs, accounting for buoyancy

completed, approved or checked by:
date:
comments (optional):

3.10 Rebalance the ISI Table

3.11 Test the TMSy suspension

3.12 Install the ETMy lower suspension (monolithic)

- Utilize Optic Cap and shields
- Re-cable
- Suspend QUAD masses as per [T1100406](#)
- Install Sleeve and Wedges as per [T1000369](#)

completed, approved or checked by:
date:
comments (optional):

3.13 Add Vibration Absorbers to the ETMy Suspension

- Per [D0900515](#)

**WBSC6****3.14 Rebalance the ISI Table****3.15 Align the Optics**

- Align the optical elements on the cartridge in accordance with [E1101071](#): Initial Alignment Procedure: WBSC6

- completed, approved or checked by:
date:
comments (optional):

3.16 Post-Integration, Cartridge Testing

Testing of each of the major, actively controlled, assembly must be performed after integration into the Cartridge Assembly and prior to installation into the Chamber (i.e. Phase II testing per [M1000211](#)):

- [E1000487](#), “BSC-ISI Testing Procedure, Phase II : Integration process”
- [E1000495](#), “SUS Quad Suspension Testing and Commissioning Documentation” (*this should be a pointer to the specific phase 2 test procedure(s) and not this top level link*)
- [E???????](#), TMS Phase II Test Procedure
- [E#???????](#), ACB Phase II Test Procedure

**WBSC6****4 PROCEDURE FOR INSTALLATION INTO THE CHAMBER**

The completed installation of all of the interferometer assemblies and components associated with the WBSC6 chamber is depicted in Figure 3 and Figure 4.

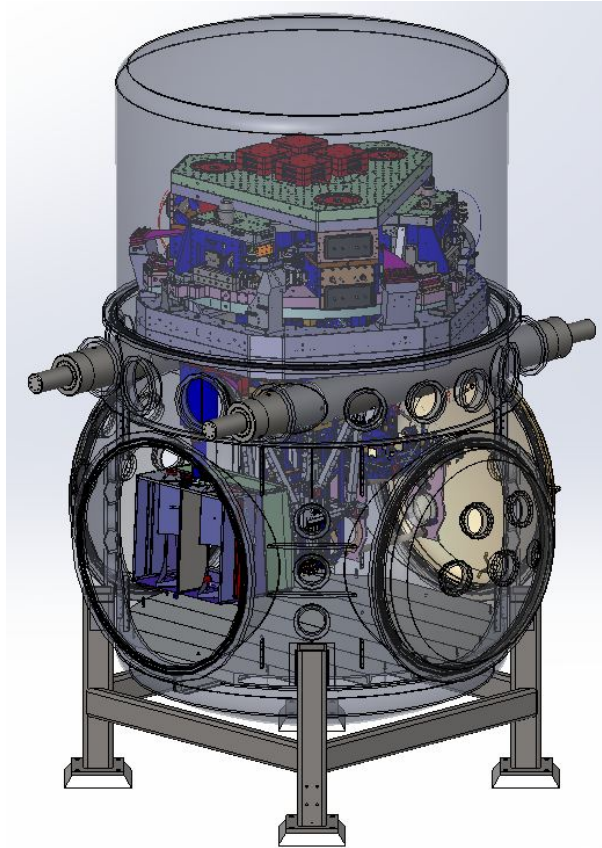


Figure 3: Image of WBSC6 installation (from SolidWorks assembly model for D0900512, with chamber transparent for clarity)

WBSC6

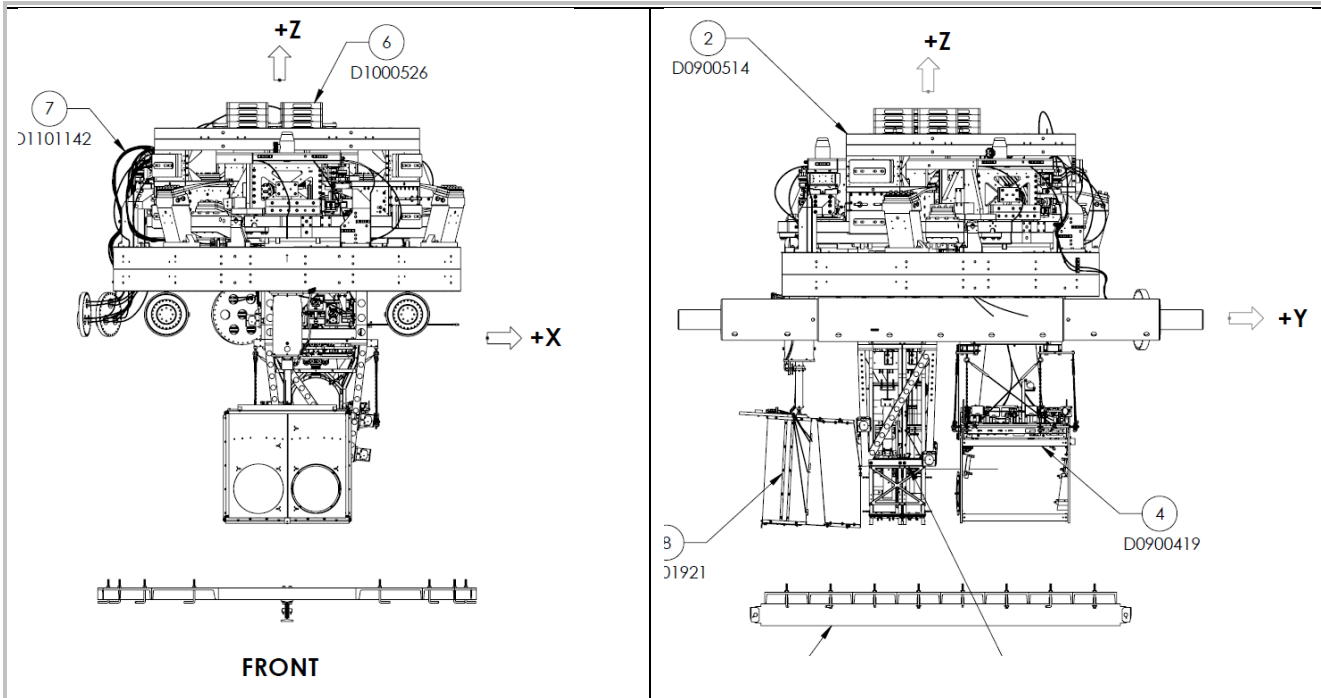


Figure 4: Image of WBSC6 installation (from D0900512, with chamber missing for clarity)

4.1 Prerequisites for Chamber Installation

- The oxide layer removed from the interior of the lower shell of the BSC vacuum chamber, and the BSC chamber certified as “clean”
- All subsystem assembly and testing completed successfully

4.2 Applicable Documents

NOTE: When completing this document indicate the version of each of the applicable documents used.

Document	Version	Title
General Documents		
E0900047		LIGO Contamination Control Plan
M990190		Lockout-Tagout Procedure
Installation, Removal, Alignment Procedures		
E1101051		aLIGO BSC Work Platform Assembly Instructions
E1101071		Initial Alignment Procedure: WBSC6
T1100406		Quad cartridge installation procedure checklist includes quad lock down procedure
E#?????		TMS installation procedure
E1101037		aLIGO BSC Cartridge Installation Procedure includes BSC-ISI lock down procedure includes BSC cartridge flight path?



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Document	Version	Title
E1100278		WBSC6 Cartridge Flight Path and Lift Parameters [BSC6 H2, Requirements and Procedure, Cartridge Flight and Insertion into BSC Chamber, aLIGO]
E040011		Installation Specification - HEPI Assembly and Installation Procedures (includes the HEPI static positioning adjustment procedure as well)
E1100810		Arm Cavity Baffle Installation Procedure
M990173		Conflat Flange Assembly Procedure
E1100484		Assembly & Installation Specification for the aLIGO, High Quality, Viewports
M1100068		BSC Door Removal and Installation Procedure
E1101162		BSC Dome Removal Procedure
E000121		Spool Removal Procedure
M1000360		Vent Isolatable Volumes Procedure
E1100439		General Optics Cleaning Procedure
E1000079		First Contact™ Procedure
Test Procedures		
E1000488		aLIGO BSC-ISI Testing Procedure, Phase III: In Chamber [aLIGO BSC-ISI Testing Procedure, Phase III: Control Commissioning]
DOC#?		Quad Phase III Test Procedure
DOC#?		TMS Phase III Test Procedure
DOC#?		ACB Phase III Test Procedure
Safety		
E#????		Critical Lift Plan for the aLIGO WBSC6 Cartridge Installation
E1100976		BSC Cartridge Installation Hazard Analysis
E1000890		SLC Arm Cavity Baffle Install Hazard Analysis
T1000311		TMS Install Hazard Analysis (not yet reviewed & approved)
Drawings		
D0900512		LIGO-: AdvLIGO Systems, BSC6-H2 Top Level Chamber Assembly
E1100813		LIGO-: BSC6-H2 Top Level Chamber Assembly BOM
D0900514		LIGO-: AdvLIGO SEI BSC6-H2, XYZ Local CS for ISI Table
D0900515		LIGO-: aLIGO SUS BSC6-H2, XYZ Local CS for ETMY
D0900419		LIGO-: AdvLIGO SUS BSC6-H2, XYZ Local CS for TMS ETM Tel Assy
D1001921		LIGO-: AdvLIGO SUS BSC6-H2, XYZ Local CS for SLC Arm Cavity Baffle
D1000897		AdvLIGO BSC6-H2 ISI Table, Balance Masses Assembly
D1101429		ALIGO, AOS, BSC FLOORING ORIENTATION DETAILS, BSC-6 & BSC-8
D1101478		CABLE HARNESS ROUTING CONFIGURATION BSC-6
D1101271		ALIGO BSC ISI OPTICAL TABLE HOLE TABULATION
D1101310		aLIGO, SUS, OPTIC TABLE .38-16 BSC8-H2 FIDUCIAL KIT
E1000202		AdvLIGO Detailed Mass Properties-CG Report BSC Tables LHO
D1101675		WBSC6 and WBSC8 additional (secondary) related documents
D1003085		Flange Layout – H2 Beam Splitter Chamber 6 (BSC6) ETMY
D1101260		ALIGO, BEAM SPLITTER CHAMBER, ROUGH ALIGNMENT TOOL LAYOUT, BSC-6
E1100405		Interface Control Document - BSC Dog clamps and cable clamps



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Document	Version	Title
D1003140		Lifting Bar, 3 Point, BSC Cartridge, aLIGO
G1000125		Advanced LIGO BSC and HAM ISI Basis and Naming Conventions
D1101674		aLIGO, SUS, BSC/HAM INSTALLATION TOOLING

4.3 Prepare the Chamber for Cartridge Installation

- Install HEPI per [E040011](#)
- Install the cable tray ([D1100430](#)) around the WBSC6 chamber. (*Note: The wire tray support brackets will be different than shown in the drawing, but similar in overall concept/layout; Drawing to be revised.*)
- Install the Platforms ([D1001990](#)) and Module E (D1002926) around the chamber, per procedure [E1101051](#)
- Install a BSC Chamber Cleanroom around the WBSC6 chamber and clean the chamber exterior and the region around the chamber. Install the leg lifting/lowering devices on all 4 legs.
- Vent the Y-Manifold vacuum volume and set the purge gas flowing per procedure [M1000360](#). Follow the Lockout-Tagout procedure [M990190](#)
- Install the dial indicators on the BSC support tube ends
- Remove the BSC Dome per procedure [E1101162](#)
- Install the Walking Plates ([D1002410](#), without railings).
- Remove the WBSC6 Chamber Door per procedure [M1100068](#)
- Install the electrical feed-throughs listed in [D1003085](#), per procedure [M990173](#)
Note: The electrical feed-throughs can be installed later in the sequence.
- Install the field cabling from the electrical feed-throughs to the electronics racks, per **D#s?**
Note: The field cabling can be installed later, but must be done after the cable trays are in place, yet before the cartridge is installed.
- Install the viewports listed in [T1100292](#) for WBSC6 and Adapter WA-17B, per procedures [E1100484](#) and [M990173](#)
Note: The viewports can be installed later in the sequence.
- Install the BSC Chamber Flooring ([D961115](#)) in accordance with the orientation noted in [D1101429](#)
- Insure that the support tubes are level (to within 0.4 mrad) with a precision bubble level and HEPI static adjustment (per procedure [E040011](#))
- Transport the Arm Cavity Baffle (ACB, [D0901376](#)) subassemblies, and associated installation equipment, into the manifold spool adjacent to WBSC6, per procedure [E1100810](#). *Note: The ACB will not be installed initially in WBSC6 for the H2OAT.*

**WBSC6**

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date:

Version numbers of all subsidiary documents followed:

comments (optional, e.g. deviations, exceptions, problems, "punch-list"):

4.4 Prepare the Cartridge Assembly for installation into the chamber

See also the generic preparation steps defined in the beginning of the Cartridge Installation Procedure, [E1101037](#)

- Lock down the BSC-ISI stages per [E1101037](#)
- Lock down ETMy per [T1100406](#)
- Lock down the TMSy per [E1100841](#)
- Install tooling/guards to protect the optics (e.g. the "optics caps", tooling to prevent the CP face stops from contacting the AR face of the ETM) and place the optics on their mechanical/earthquake stops
- Disconnect all cabling/wiring and temporarily tie down to the BSC-ISI assembly with class B cable ties
- Wrap each suspension in appropriate C3 fabric bags

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comments (optional, e.g. deviations, problems):

4.5 Install the Cartridge Assembly into the Chamber

- Insure that all personnel involved have read and understood the general cartridge installation procedure ([E1101037](#)), the specifics of the WBSC6 cartridge installation (CG location, flight path, close approach regions, etc. in [E1100278](#)), the hazard analysis ([E1100976](#)) and the critical lift plan ([E#?????](#))

**WBSC6**

- Follow [E1101037](#) to install the Cartridge into the Chamber and attach to the SEI Support Tubes.
- Install the railings around the Walking Plates ([D1002410](#)) after landing the Cartridge onto the support tubes
- Remove all temporary cable ties and connect all cabling to the appropriate electrical feed-throughs according to [D1003085](#)
- Unlock the ISI stages
- Unlock the TMS per [E1100841](#)
- Remove the protective face shield and lens cap for the ETMy
- Unlock the ETMy suspension per [T1100406](#)

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comments (optional, e.g. deviations, problems):

4.6 Align the Cartridge Assembly

- Remove the WBSC6 Chamber End Door per procedure [M1100068](#)
- Set up the Initial Alignment System (IAS) equipment in the region of the Spool Adapter WA-1F, per procedure [E1101071](#)
- Follow alignment procedure [E1101071](#) to align the Cartridge within the Chamber.

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comments (optional, e.g. deviations, problems):



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4.7 Install the Arm Cavity Baffle

Note: The ACB will not be initially installed for the H2OAT.

- Lock down the BSC-ISI stages per [E1101037](#)
- Lock down ETMy per [T1100406](#)
- Lock down the TMSy per [E1100841](#)
- Install protective shields on the ETMy suspension
- Install the Arm Cavity Baffle (ACB) per [E1100810](#)
- Align the Arm Cavity Baffle (ACB) per [E1101071](#)

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comments (optional, e.g. deviations, problems):

4.8 Clean the Optics

- Inspect the optical surfaces. If cleaning is required, then complete the following steps.
- Lock down the BSC-ISI stages per [E1101037](#)
- Lock down ETMy per [T1100406](#)
- Lock down the TMSy per [E1100841](#)
- Clean the optics if needed. First Contact™ cleaning (per procedure [E1000079](#)) is the preferred method.

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comments (optional, e.g. deviations, problems):



WBSC6

5 Testing

Prior to pumping the Y-manifold down to vacuum all active components must pass stand-alone, in-situ testing to see that the assembly behaves properly after the installation procedure and with the field-installed cabling, etc (i.e. phase 3 testing per [M1000211](#)):

- [E1000488](#), “BSC-ISI Testing Procedure, Phase III: Control Commissioning”
- [E1000495](#), “SUS Quad Suspension Testing and Commissioning Documentation” (*this should be a pointer to the specific phase 3 test procedure(s) and not this top level link*)
- [E#?????](#), TMS Phase III Testing Procedure
- [E#?????](#), ACB Phase III Testing Procedure

completed, approved or checked by:
date:

Version numbers of all subsidiary documents followed:

comments (optional, e.g. deviations, problems):