

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
-LIGO-
CALIFORNIA INSTITUTE OF TECHNOLOGY
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Procedure	LIGO-E070271-v2 23 February 2009 Revised (-v2) 21 March 2014
Output Mode Cleaner Suspension Installation Procedures	
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1 PURPOSE AND SCOPE

This document is the standard guideline for properly handling and installing the Output Mode Cleaner (OMC) suspension (SUS) into HAM6.

This procedure picks up at the point where the ISC optical bench is suspended in the OMC suspension structure. The OMC should be staged in a cleanroom near HAM6.

This document is to be used in conjunction with the OMC HAM6 SYS Drawing ([D1300077](#) for L1, [D13000240](#) for H1 and TBD for the 3rd IFO.)

2 BACKGROUND

The output mode cleaner suspension is a double pendulum suspension. Two blades suspend a top mass which incorporates four smaller blades from which hang the bottom mass. The bottom mass is not a single optic but a fused silica optical bench, designed and fabricated by the ISC group, that has small optics and optical mounts UV bonded to it. The bench also has electronic components and counterweights. The nominal weight of the bench is around 7kg. The ISC group is responsible for the bench. The SUS group is responsible for the suspension design for the bench.

The optics are bonded on the underside of the bench, while counterweights are mounted on the topside.

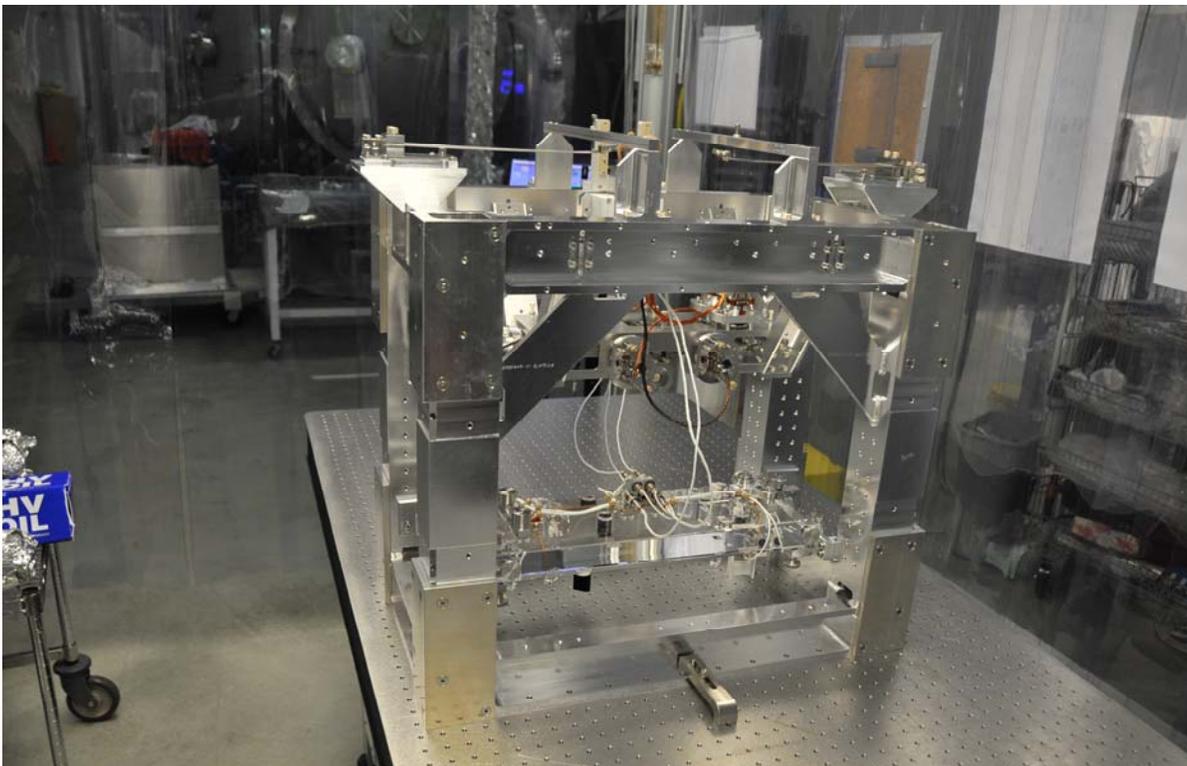


Figure 1. OMCS with OMC fused silica optics bench installed.

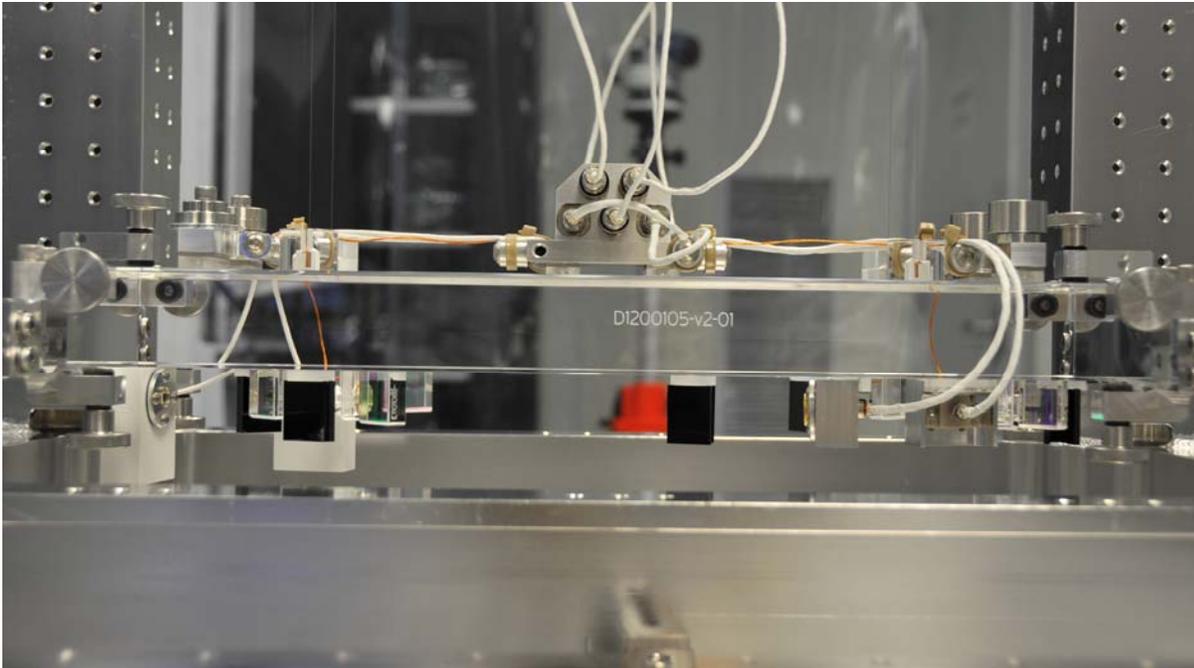


Figure 2. The D1201439 OMC optics bench, viewed from the front.

3 HAZARDS

Each member of the installation team must review and adhere to the guidance given in the relevant OMC Installation Hazard Analyses:

- [E0900042 aLIGO OMC Hazard Analysis](#)
- [E1300537 Addendum to E0900042 aLIGO OMC Hazard Analysis](#)

The installation procedure in this document is based on using the methods described in the addendum (E1300537).

4 CONTAMINATION CONTROL

The installation team must follow the protocols given in the following documents:

- [E1201035 aLIGO Chamber Entry and Exit Procedures](#)
- [E0900047 LIGO Contamination Control Plan](#) – Review sections 6 and 7 in particular

6 INSTALLATION PROCEDURES

- 1) Verify with ISC personnel that the optics have been sufficiently cleaned.

- 2) Verify that the BOSEMS were centered and aligned to the flag. Verify that the BOSEMS are set to 50% light/voltage (before the EQ stops were engaged).
- 3) Engage the EQ Stops to secure the OMC optics bench during transport.
- 4) Engage all the SUS EQ Stops. Also secure the two ¼-20 nuts on the top of the Tablecloth.
- 5) Note: do not install the vibration absorbers onto the welded structure prior to installation into the chamber. They will be installed after the initial B&K hammer testing.
- 6) Wipe the structure and suspension components with IPA to remove contaminants. Be very careful when working around the small diameter lower stage suspension wires. Also be very careful not to splash any IPA on the optics. IPA should be poured onto clean wipes far away from the OMC.
- 7) Following the guidance of [E1300537 Addendum to E0900042 aLIGO OMC Hazard Analysis](#), clean the cargo surface of the Genie lift (or equivalent) and cover with Ameristat and UHV foil. The cargo surface can also be covered with C3.
- 8) One person should hold the Genie lift to prevent it from moving. Following the guidance of [E1300537 Addendum to E0900042 aLIGO OMC Hazard Analysis](#), the second and third persons should grip the OMC structure in a comfortable, balanced position and lift the OMC structure onto the Genie lift.
- 9) Secure the structure to the Genie lift with dog clamps if that option is available.
- 10) Cover the OMCS with an appropriately sized C3 cover or two layers of UHV foil.



Figure 3. Covering the OMCS with a C3 cover.

- 11) With two people attending to the OMCS on the Genie lift, roll the Genie lift to the cleanroom in front of HAM6.
- 12) Verify that the SEI team has locked the ISI table.
- 13) Wipe the ISI table with IPA and then install the [D1300120 HAM6 OMC Installation Plate](#) (aka cookie cutter) onto the ISI table per the OMC HAM6 SYS Drawing ([D1300077](#) for L1, [D13000240](#) for H1 and TBD for the 3rd IFO.)

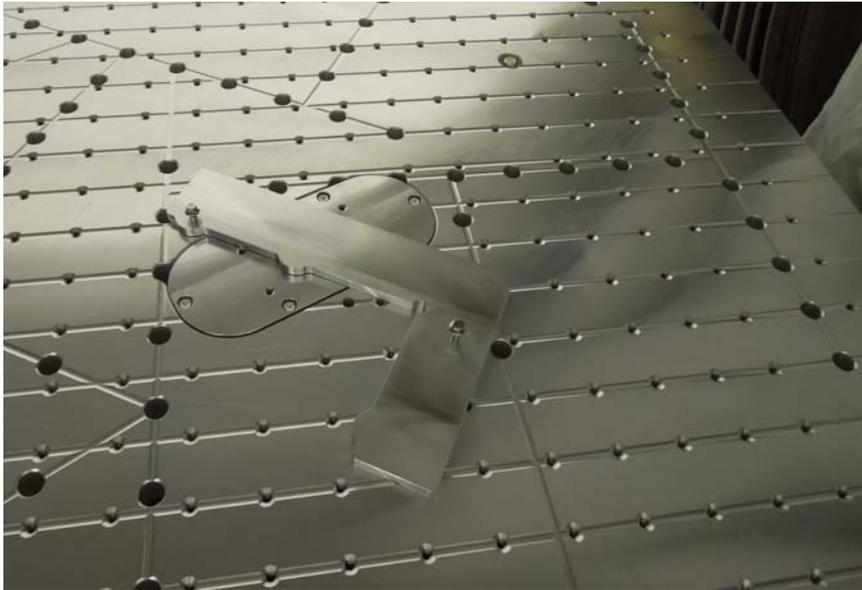


Figure 4. The D1300077 “Cookie Cutter” installed.

- 14) Wipe the ISI table with IPA.
- 15) Uncover the OMCS and blow off any dust with a Top-Gun ionizer set to 15 psi. Be careful not to blow dust towards the OMC optics. Also do not blow dust into the chamber, if uncovered at this time.
- 16) Remove any dog clamps securing the OMCS to the Genie lift and raise the Genie lift up to the elevation of the ISI table.
- 17) One person should hold the Genie lift to prevent it from moving. Following the guidance of [E1300537 Addendum to E0900042 aLIGO OMC Hazard Analysis](#), the second and third persons should grip the OMC structure in a comfortable, balanced position and lift the OMC structure onto the ISI table.



Figure 5. The OMCS on the Genie lift just before moving into HAM6. Note: the vibration absorbers should not be installed at this point.

- 18) Either by lifting or sliding on a “Teflon highway”, bring the OMC into final position against the cookie cutter. Note the orientation of the OMCS by carefully reviewing the OMC HAM6 SYS Drawing ([D1300077](#) for L1, [D13000240](#) for H1 and TBD for the 3rd IFO) in advance. Note that no vertical spacer is needed for the OMCS.
- 19) Secure the OMCS with dog clamps per the OMC HAM6 SYS Drawing ([D1300077](#) for L1, [D13000240](#) for H1 and TBD for the 3rd IFO.)
- 20) Connect the cabling to the connector blocks located at the top of the OMCS structure.
- 21) Back off the SUS EQ stops to leave a 0.75 mm gap and snug any screws so they are not loose.
- 22) Back off the OMC optics bench EQ stops by fully unscrewing the EQ stops. The stops should be lightly snugged in their unscrewed position but do not apply too much torque.
- 23) Check that the wires/cables from the structure to the vacuum feedthrough are directed so as not to obscure the laser beam path. Secure as necessary with cable clamps.
- 24) Wipe the ISI table with IPA before exiting the chamber.
- 25) Follow the procedure in [G1200070](#) for the subsequent SUS in-chamber testing.