

Advanced LIGO Engineering Change Request (ECR)

ECR Title: ECR: Add black glass panels to the OMC Suspension Assembly to mitigate stray light noise

DCC No: E1500042-v1

Date: 30 Jan 2015

Requester: D. Coyne

Impacted Subsystem(s): ISC,
SUS

Description of Proposed Change(s): Attach AR-coated black glass panels to the OMC suspension structure (and to the optics table beneath the OMC suspension) in order to surround and isolate the OMC from scattering paths to/from the vacuum enclosure and the reflective metallic surfaces of the optics table and the OMC.

See the attached design concept drawing.

Reason for Change(s): DARM noise has been shown to increase when acoustic noise is increased/generated around the HAM6 chamber, implying a path for scattered light noise to/from the OMC involving the HAM6 vacuum enclosure surfaces (chamber walls, viewports and/or septum plate). It is reported in LLO elog #16255 that our current DARM noise (in the frequency range 70 to 400 Hz) might be limited by scattering from HAM6:

<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16255>

<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=15863>

Estimated Cost: We have very little to base an estimate upon until we get quotes (in process). The largest uncertainty is for the AR coating costs for these large panels. Worst case might be about \$35k per OMC, or ~\$100k for 3 IFOs. If the coating costs are prohibitive, then we might consider non-AR coated panels and/or vibration isolation mounts for the black glass panels.

Schedule Impact Estimate: No known schedule impact. However needed soon to support on-going noise hunting studies during aLIGO commissioning.

Nature of Change (check all that apply):

- Safety
- Correct Hardware
- Correct Documentation

- Improve Hardware
- Improve/Clarify Documentation
- Change Interface
- Change Requirement

Importance:

- Desirable for ease of use, maintenance, safety
- Desirable for improved performance, reliability
- Essential for performance, reliability
- Essential for function
- Essential for safety

Urgency:

- No urgency
- Desirable by date/event: _____
- Essential by date/event: _____
- Immediately (ASAP)

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Impacted Hardware (select all that apply):

Repair/Modify. List part & SNs: _____

Scrap & Replace. List part & SNs: _____

Installed units? List IFO, part & SNs: _retrofit to installed L1 & H1 OMCs. Either store parts for 3rd IFO OMC, or install.

Future units to be built

Impacted Documentation (list all dwgs, design reports, test reports, specifications, etc.):

See list below

New D#s for new parts and for new OMC suspension black glass assembly

D0901811-v9, aLIGO Systems, HAM6-L1 Top Level Chamber Assembly

D1300077-v3, AdvLIGO SUS HAM6-L1, XYZ Local CS for Output Mode Cleaner Suspension (OMC)

Disposition of the proposed change(s):

The disposition of this proposed engineering change request is to be completed by Systems Engineering and indicated in the “Notes and Changes” metadata field in the DCC entry for this ECR. The typical dispositions are as follows:

- **Additional Information Required**: in which case the additional information requested is defined. The ECR requester then re-submits the ECR with the new information using the same DCC number for the ECR but with the next version number.
- **Rejected**: in which case the reason(s) for the rejection are to be given
- **Approved**
- **Approved with Caveat(s)**: in which case the caveat(s) are listed
- **TRB**: the ECR is referred to an ad-hoc Technical Review Board for further evaluation and recommendation. It is the System Engineer’s (or designee’s) responsibility to organize the TRB. The System Engineer (or designee) then makes a technical decision based on the TRB’s recommendation. Links to the TRB’s documentation (charge, memos, final report, etc.) are to be added to the “Related Documents” field for this ECR.
- **CCB**: a change request for approval of additional funds or schedule impact is to be submitted to the Configuration Control Board. Links to the CCB’s documentation (CR, etc.) are to be added to the “Related Documents” field for this ECR.

Concurrence by Project Management:

Acknowledgement/acceptance/approval of the disposition is to be indicated by the electronic “signature” feature in the DCC entry for this ECR, by one the following personnel:

- Systems Scientist
- Systems Engineer
- Deputy Systems Engineer

