

**SUS QUAD Reaction Chain Glass Build**

AUTHOR(S)	DATE	Document Change Notice, Release or Approval
Betsy Bland	Oct 10, 2012	see LIGO DCC record Status

**SCOPE**

This document lists the steps to install and align the QUAD reaction chain glass masses. This procedure can take place simultaneous to the monolithic welding of the main chain. This procedure starts at the point where the QUAD Lower Structure has been dropped from the Upper Structure on the cartridge ISI and the main chain moved into the welding cleanroom. The lower portion of the reaction chain is then available for this rebuild work.

**PROCEDURE**

1. Assemble the Reaction Loop as per the Wire Assembly drawing D060516 page 7.
2. Weigh the TCP/ERM glass mass, record in a log and also compare the weights to their metal counterpart in the all-metal QUAD build. If the weights are different by more than ~50g some reweighting of the suspension may be needed.
3. Remove Dummy TCP/ERM suspension structure.
4. Rework/install any outdated components such as the wire harness brackets, the UIM flag mounts, and the UIM pitch adjustment turrets.
5. Install the new wire loop, clamping it to the PenRe.
6. Level the PenRe.
7. Level the UIM mass.
8. Set the UIM Blade Tips to the same height (somewhat arbitrary height, but at the same height is important).
9. Using the Ergo arm, install the glass TCP/ERM into the structure.
10. Clamp the ESD Cable Connector to the bracket on the underside of the PenRe.
11. Suspend the TCP/ERM as a single from the PenRe.
12. Measure the TCP/ERM pitch (IAS equipment) and record. If the pitch error is larger than ~5mRad, the wire loop has probably been drawn incorrectly or has slipped. Remake a new loop and restart if so.
13. Suspend the PenRe and the TCP/ERM into a double suspension from the UIM.
14. Measure the TCP/ERM pitch and record. If the pitch error is larger than ~2mRad, correct it via the PenRe Pitch adjuster mass.

**SUS QUAD Reaction Chain Glass Build**

15. Note, at this point you could use the Triple Hang Tooling to suspend the UIM and adjust its pitch, however it was determined that the tooling wire segments do not clamp into the UIM in a repeatable position thus introducing a pitch error to the suspension. There is also some dropping risk associated with installing this tooling above the glass mass. As well, the UIM mass was recently refit with pitch adjusters that are easy to use. Due to these 3 factors, the Triple Hang Tooling has not been necessary to use to troubleshoot the UIM pitch error during this stage of the build.
16. Measure the separation of the PenRe and the TCP/ERM.
17. Connect up the ESD cable connector from the D1101478 to the connector already mounted in the clamp under the PenRe.
18. Lace the ESD cable:
  - Up the side of the PenRe
  - Through the top PenRe wire harness clamp
  - Out the outside of the LS cross bar
  - Back in, and through the wire harness clamp on the bottom of the UIM
  - Up the front middle of the UIM
  - Through the top UIM wire harness
  - Secure the rest of the bundle to the LS somewhere in such a way that it is secure during transport back into the full chain yet also not in the way for the remating.
19. Reclamp the masses and remating with the main chain and then the full QUAD.