



LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

RECORD OF DECISION/AGREEMENT (RODA)

Document	LIGO-M 040279-03 -K	
Date:	25 August 2004	
Title:	RODA: Design work at RAL in parallel with the quad controls prototype	
To the Attention of:	Dennis Coyne Janeen Romie David Shoemaker	
cc:	Calum Torrie Caroline Cantley Ken Strain Ian Wilmut Tim Hayler Norna Robertson Carol Wilkinson	
From/ signatories:	Name/Title: Dennis Coyne	Signature: _____
	Name/Title: Justin Greenhalgh	Signature: _____
	Name/Title: Janeen Romie	Signature: _____
System(s) affected:	<input type="checkbox"/> Initial LIGO <input checked="" type="checkbox"/> Advanced LIGO <input type="checkbox"/> Other: _____	
Nature/ Scope:	<input type="checkbox"/> Design Decision <input type="checkbox"/> Requirements Decision <input type="checkbox"/> Work Scope Decision <input checked="" type="checkbox"/> Working Agreement between Groups <input type="checkbox"/> Other _____	
Subsystem(s) affected	<input type="checkbox"/> Relevant Subsystem(s)/Component(s): UK Suspension team US Suspension team	
Primary Contacts	Group or Affiliation and Contact UK Suspension team: Justin Greenhalgh	
Reference Documents:	Dennis' optical layout (for the BS and FM footprints and chain locations) DRD documents generic and SUS specific (works in progress) OSEM DRD ("ICD") from Birmingham (work in progress)	

DECISION/AGREEMENT STATEMENT:

It is agreed that the UK team shall begin work in the following areas of quadruple (quad) noise prototype design even though the quadruple (quad) control prototype quad is not yet complete:

- (1) ITM penultimate reaction mass design. This differs from the quad ETM controls prototype because it needs to have a much higher mass to offset the low mass of the compensator plate.
- (2) Layout of ITM vs ETM; consider effects of making the structure configurable
- (3) BS structure design. The design of the beam splitter structure is not directly impacted by the quad ETM controls prototype structure design although it would make sense to exploit similar concepts where relevant.
- (4) ITM/FM structure design.
- (5) Mass catcher cam design. The cam is the mechanism by which the two lower masses in the main and the reaction chains are held rigidly in the correct relative locations during suspension fiber (or ribbon) welding. – This design is not immediately required and depends upon work currently in hand, but concepts may be developed in parallel.
- (6) Ear fixture design. The "ears" are the elements bonded to the masses to which the fiber (or ribbon) is welded. The "ear fixture" is used to position the ear in the proper location on the mass during bonding. This design is not immediately required, but concepts may be developed in parallel.
- (7) 3D FEA work on blade clamps to establish stress levels and feed into discussion on possible noise from the clamps. Similar work on wire clamps.
- (8) "Tablecloth" design/OSEM alignment. To study a scheme in which the OSEMs and ECDs are fixed to the "tablecloth" with few or no adjustments and the tablecloth is then aligned to the top mass, thus aligning all OSEMs and ECDs through suitable tolerancing of locations.
- (9) Lab work on 40kg masses and ergo arm: Familiarization with 40 kg mass handling by trying the Ergonomic ("ergo"), articulated arm in the lab at Caltech.
- (10) Modelling work (matlab etc): Familiarization with the dynamics modeling tools and current models for the quad suspension.
- (11) "3 and 1" assembly concepts ("the implementation ring"): Design work on the implementation of a separable suspension design with the 3 lower masses of the main and reaction chains capable of being separated from the upper masses of each chain. In particular, design of a ring to join the upper and lower suspension structures with a ring.
- (12) Work on the quad controls structure (upper and lower sections) will also inform the noise prototype design.