



LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
ADVANCED LIGO RECORD OF DECISION/AGREEMENT (RODA)

Document	LIGO-M0900087-v1
Date:	27 March 2009
Title:	RODA: All in vacuum cabling will be shielded
To the Attention of:	Peter Fritschel, Calum Torrie, Carl Adams, Norna Robertson, Janeen Romie, Justin Greenhalgh, Jay Heefner, Mark Barton, Stuart Aston, Alberto Vecchio, Ken Mason, Brian Lantz, Ben Abbott, Mike Smith, Phil Willems, Mohana Mageswaran, Dave Reitze, David Tanner, Luke Williams, Rich Abbott
cc:	aligo_sys, aligo_sus, aligo_sei, aligo_aos, aligo_io, aligo-isc
From/signatories:	Name/Title: Dennis Coyne, Adv. LIGO System Engineer <i>See the LIGO Document Control Center (DCC) for electronic approvals</i>
System(s) affected:	<input type="checkbox"/> Initial LIGO <input type="checkbox"/> Enhanced LIGO <input checked="" type="checkbox"/> Advanced LIGO <input type="checkbox"/> Other: _____
Nature/Scope:	<input checked="" type="checkbox"/> Design Decision <input type="checkbox"/> Requirements Decision <input type="checkbox"/> Work Scope Decision <input type="checkbox"/> Working Agreement between Groups <input type="checkbox"/> Other _____
Subsystem(s) affected	<input checked="" type="checkbox"/> Relevant Subsystem(s)/Component(s): This decision effects SUS, SEI, IO, AOS and ISC
Primary Contacts	Group or Affiliation and Contact: Dennis Coyne, Systems
Reference Documents:	<ol style="list-style-type: none"> 1) M060307-00, "Advanced LIGO UK Project management meeting number 32, Telecon", Oct 6th 2006; section 4.5 2) M060041-00, "RRR Readiness Review", item #19 3) T060142-00, "Quad Noise prototype PDR-3 Overview", section 6.9 4) T070096-00, "Noise Prototype Outline Test Plan, OJEU Timing and Associated Risk", item #7 5) T070114-00, "Analysis and Optimization of LIGO In-vacuum Shielded Cables" 6) E070029-00, "In-vacuum 25 Pin Cable Harness" 7) D070159-A, "2 Ended OSEM Cable Assembly"

DECISION/AGREEMENT STATEMENT:

All cables in the LIGO vacuum will have an electrical shield. Any exceptions must be approved in writing from the Systems Engineer or Systems Scientist.

Background: Most signals in the LIGO vacuum system are to be carried on D-25 connectors through twisted pairs with an overall shield. There are a few notable exceptions such as the modulated drive signal for the electro-static actuator which is carried on a shielded coax cable.

For quite some time the need or desirability of shielding for the "pigtail" cables, or cable harnesses, which connect to the OSEMs and BOSEMs has been in question, due to concerns about the stiffness of shielding cabling (and perhaps due to cost and assembly effort). The plan was to test

shielded and unshielded cabling on the quadruple pendulum suspension at LASTI. For various reasons this testing has not been accomplished to date.

Based on input from Rich Abbott, Jay Heefner and Peter Fritschel, I have made a decision that we shall have shielded cabling in the vacuum system for all applications, including all OSEM & BOSEM cabling for all suspensions (quads, triples, doubles, singles). It is prudent to include a shield on our cabling to mitigate cross-coupling. The added stiffness should not be a problem for alignment or isolation shorting on the reaction suspension chains of the quad.

With regard to specifically the OSEM & BOSEM cable harnesses:

- 1) The production of most of the OSEM & BOSEM cable harnesses for the suspensions is a UK team responsibility. The UK team is asked to revise their plans accordingly. Unshielded BOSEM/OSEM cables will not be installed (or only as an interim measure if pressed by schedule). If the UK can not accommodate this request, then they should deliver the parts (unassembled) and the US will take care of the fabrication of shielded cables.
- 2) Rich Abbott has developed a shielded BOSEM cable harness design which can be UHV cleaned after assembly, is relatively flexible and can be manufactured by vendors (does not require in-lab assembly).