

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
- LIGO -
CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Document Type LIGO-E970080-00 - D July 1997
SMALL OPTICS SUSPENSION ASSEMBLY QUALITY CONFORMANCE WORKSHEET
Janeen Hazel and Seiji Kawamura

Distribution of this draft:
detector

This is an internal working note
of the LIGO Project.

California Institute of Technology
LIGO Project - MS 51-33
Pasadena CA 91125
Phone (818) 395-2129
Fax (818) 304-9834
E-mail: info@ligo.caltech.edu

Massachusetts Institute of Technology
LIGO Project - MS 20B-145
Cambridge, MA 01239
Phone (617) 253-4824
Fax (617) 253-7014
E-mail: info@ligo.mit.edu

WWW: <http://www.ligo.caltech.edu/>

1 SCOPE

This Quality Conformance Worksheet is to be completed during the preparation and assembly of all Small Optics Suspensions, D960001, and kept with the traveler record for the assembly.

2 PURPOSE

This QCW details the processes that LIGO personnel will use to ensure compliance with LIGO Project Quality requirements for the acceptance/qualification of small optics suspensions. Trained/qualified personnel will follow the instructions outlined in the Small Optics Suspension Assembly Specification, LIGO-E970037-00-D for the detection and recording of deficiencies that could indicate failure to meet specifications. Completed worksheets will also be used in the future to streamline these processes and increase reliability and repeatability.

Suspension Serial Number _____

Suspension Name _____

Date _____

3 COMPONENTS

3.1. MAGNETS

Quantity _____

Manufacturer's name _____

Purchase Order No. _____

Serial No./Lot No. _____

Magnet Strengths:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

Within +/- 5% of strength values: _____yes _____no

3.2. Mechanical Parts of the Suspension Assembly

D960002 Sensor/Actuator Plate Serial No. _____ Date _____				
zone	dimension (in)	inspected value	within spec	out of spec
C1	2X,.375			
C1	2X,1.25			
D2	1.715			
D2/3	3.66			
C3	2X,1.028			
check for all vent holes				

D960003 Suspension Block Serial No. _____ Date _____				
zone	dimension (in)	inspection value	within spec	out of spec
A1	2X,1.080			
B1	2X,.360			
B1	4X,.375			
B2	(2X) .348			
C/D2	(2X).219			
C/D3	(2X).406			
C/D3	(2X)2.062+/- .002			
check for all vent holes				

D960004 Tower Base				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection value	within spec	out of spec
B2	2X,1.313			
B2	2X,.812			
C2	2X,1.624			
C2	6X,.562			
C1	4.125+/-0.002			
D2	.375			

D960005 Right Side Plate				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection value	within spec	out of spec
A2	6.750			
A3	5.875			
A3	4.375			
A3	3.500			
A4	4X,.312			
B4	5X,.438			
B/C4	1.125			
C4	1.250			
C4	5X,2.062			
C1	1.420			
C1	2.140			
C1	15.280			
check for all vent holes				

D960006 Left Side Plate				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection value	within spec	out of spec
D3	6.750			
D3	5.875			
D3	4.375			
D3	3.500			
C4	4X,.312			
B4	5X,.438			
B4	1.125			
B4	1.250			
B4	5X,2.062			
B1	1.420			
B1	2.140			
A/B2	15.280			
check for all vent holes				

3.3. Mechanical Parts of the Fixtures for the Suspension Assembly

D970074 Magnet-to-Dumbbell Standoff Fixture				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection value	within spec	out of spec
B3	25X,DIA.077+.002/-.000			

D960020 Magnet/Standoff Assembly Fixture, Sheet 2, Positioning Ring Detail				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection value	within spec	out of spec
A1	3.500 DIA BOLT CIRCLE			
B1	1.945 +/- .001			
C2	1.945 +/- .001			
A3	90 DEG. APART			
A4	.077 DIA +.004/-.000,4PL			
B4	3.000 DIA +.005/-.000			

D960020 Magnet/Standoff Assembly Fixture, Sheet 3, Holding Ring Detail				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection value	within spec	out of spec
A2	3.500 DIA BOLT CIRCLE			
A3	90 DEG. APART			

D960017 Base Plate				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection value	within spec	out of spec
D1	.105			
D2	2X,.094 DIA			
C2/3	.885 +.000/-.001			
D3	1.500			
D6	1.500			
D/E6	.885 +.000/-.001			

D960017 Base Plate				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection value	within spec	out of spec
D6	2X,.094 DIA			
D7	.105			

D970066 Right Block, Top				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection value	within spec	out of spec
B1	2X, 60 DEG			
B1	1.500			
C2	.125			
C1	2X,.094 DIA			
C1	.518 +.001/-.000			
A/B2	.750			
B3	.112			
B3	.075			
A4	.095			
A4	.108			
C4	.047			

D960018 Left Block, Top				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection values	within spec	out of spec
C1	1.500			
C2	2X,.094 DIA			

D960018 Left Block, Top				
Serial No. _____				
Date: _____				
zone	dimension (in)	inspection values	within spec	out of spec
C2	.518 +.001/-.000			
D1	.125			
B3	.750			
B4	.068			
B4	2X,.054			
B4	.143			
A4	.065			
C4	.025 +/- .002			

4 SUSPENSION STRUCTURE ASSEMBLY

Torque 16 screws of the suspension structure to 100 in lb.

Comments _____

5 OPTIC PREPARATION

5.1. Magnet-to-Dumbbell Standoff Fixture

Check the fixture for residual glue in each of the holes. Inspect the holes. Occasionally, when removing the assemblies from the fixture, the blunt instrument used to break the adhesive from the insides of the holes will deform the soft Delrin of the fixture. If any of the holes are deformed in shape and out of tolerance, mark the fixture so as not to use that hole in the future. Clean each of the holes thoroughly to remove residual glue.

Adhesive cure start date/time _____

Adhesive cure end date/time _____

Mark magnet polarities in fixture

Adhesive cure start date/time _____

Adhesive cure end date/time _____

Mark magnet polarities on holding plate

5.2. Magnet/Standoff Assembly Fixture

Name of optic _____

Serial No. _____

Wedge _____

Sketch of wedge orientation:

Check the fixture for residual glue in each of the holes. Inspect the holes. Be sure to clean each of the holes thoroughly to remove any residual glue.

Adhesive cure start date/time _____

Adhesive cure end date/time _____

Mark up the figure below with the magnet polarities

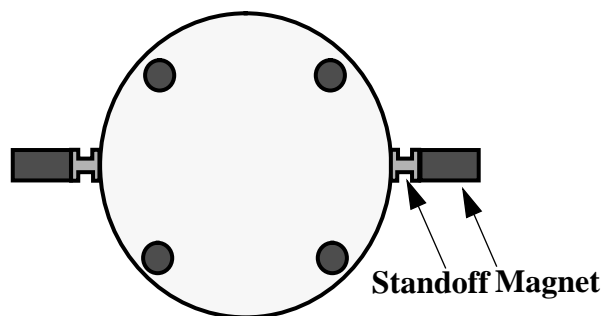


Figure 1

5.3. Guide Rod Fixture

Check to make sure the optic has not moved from its orientation on the base plate.

Mark up Figure 1 with the polarities of the magnet/standoff assemblies used.

Adhesive cure start date/time _____

Adhesive cure end date/time _____

6 OPTIC HANGING AND BALANCING

Relative to the top of the optical table -

Record the level in horizontal position: _____ one end _____ other end.

Record the level in vertical position: _____ one end _____ other end.

Length of lever arm _____

Optic unbalance _____

Adhesive cure start date/time _____

Adhesive cure end date/time _____

Optic unbalance after adhesive curing _____, date/time _____

optic cleaned. time/date _____ initials _____

optic baked. time/date _____ initials _____

7 SENSOR/ACTUATOR HEAD INSTALLATION

Sensor/Actuator Head Positioning

<i>Sensor/Actuator Head</i>	<i>unblocked voltage</i>	<i>positioned head voltage value</i>

Safety stops all have a gap of 1mm to the optic