LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO Laboratory / LIGO Scientific Collaboration

LIGO-T1000192-v1 *LIGO* 4/8/10

Output Faraday Isolator Test Plan

Michael Smith

Distribution of this document:
LIGO Scientific Collaboration

This is an internal working note
of the LIGO Laboratory.

California Institute of Technology
LIGO Project – MS 18-34
1200 E. California Blvd.
Pasadena, CA 91125
Phone (626) 395-2129
Fax (626) 304-9834
E-mail: info@ligo.caltech.edu

Massachusetts Institute of Technology
LIGO Project – NW22-295
185 Albany St
Cambridge, MA 02139
Phone (617) 253-4824
Fax (617) 253-7014
E-mail: info@ligo.mit.edu

LIGO Hanford Observatory
P.O. Box 159
Richland WA 99352
Phone 509-372-8106
Fax 509-372-8137

LIGO Livingston Observatory
P.O. Box 940
Livingston, LA 70754
Phone 225-686-3100
Fax 225-686-7189

http://www.ligo.caltech.edu/

Abstract

This document describes the plan for acceptance testing of the OFI subassemblies, and for aligning and testing the final assembly before installing in the aLIGO chambers.

1 Introduction

This document describes the plan for acceptance testing of the OFI subassemblies, and for aligning and testing the final assembly before installing in the aLIGO chambers.

2 Tests

2.1 Vendor Tests

The vendors of optical components for the OFI will certify that the components meet the as-purchased specifications.

EOT is required to make certain tests to verify the specification of the Faraday Rotator component.

2.1.1 Faraday Rotator Test

2.1.1.1 Visual Surface Inspection Test

Both faces of the TGG crystal shall be free of visible stains and surface defects when the window is illuminated with a high-intensity light source and viewed in a darkened environment with the unaided eye.

2.1.1.2 Extinction Ratio Test

Extinction ratio between crossed polarizers for orthogonal polarizations shall be measured, using the test light source.

2.1.1.3 Optical Transmissivity Test

Optical transmissivity through the clear aperture shall be measured with the test light source.

2.1.1.4 Test Light Source

A collimated laser beam of 1064 nm wavelength and > 9.0 mm Gaussian beam waist diameter measured at the 1/e^2 power diameter shall fill the clear aperture when making transmissivity and extinction ratio measurements.

2.1.1.5 Wavefront Distortion Test

The transmitted wavefront distortion over the clear aperture shall be measured at 632.8 nm wavelength with an appropriate interferometer.

2.2 LIGO Tests

AOS will conduct final performance tests of the assembled OFI to verify that the OFI meets the LIGO requirements.

2.2.1 Output Faraday Isolator Pre-alignment Procedure

The OFI will be pre-aligned to the LIGO requirements by using the procedure described in T000083-01 COS Faraday Isolator Pre-alignment Procedure.

The optical transmissivity in the forward and backward direction will be measured.

2.2.2 Final Assembly Suspension Test

The OFI and suspension assembly will be impulse-tested and a ring-down performed to confirm that the Q of the suspended OFI meets the damping requirements.