

LIGO Laboratory / LIGO Scientific Collaboration

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LIGO

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Installation procedure for components in HAM1

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1. Overview

For the most part, the installation procedure for HAM1 consists of simply installing the components on the HAM-ISI optics table according to the assembly drawing [LIGO-D1000313](#). There are a few aspects to the installation not reflected in the assembly drawing, and these are covered here.

2. Waveplate setup

The REFL beam delivered into HAM1 from HAM2 is vertically polarized, and it is rotated to horizontal polarization by the $\frac{1}{2}$ -waveplate shown on the HAM1 drawing. The waveplate is mounted in a rotation stage that is adjusted to achieve the 90-degree rotation. To ease the work in HAM1, the waveplate angle setting should be made ahead of time, for example in the optics lab. Then no rotation adjustment should be needed when installing the unit in HAM1.

3. ALS and POP beam alignment

These three beams (2 ALS green beams, 1 POP beam) come into HAM1 from HAM3, and the alignment procedure for them involves work in both HAM3 and HAM1. The alignment procedure is found in [LIGO-T1300161](#).

4. WFS sled preparation

The WFS sled is prepared ahead of time following the procedure in [LIGO-T1200555](#).

5. In-situ WFS telescope tuning

The nominal optic positions given in the HAM1 assembly drawing typically do not yield the best beam parameters on the WFS for the actual REFL beam. Thus, using the REFL beam, adjustments are made to the optic positions to get good Gouy phase separation and beam sizes on the WFS. A procedure for doing this is described in LHO log entry 8932:

<https://alog.ligo-wa.caltech.edu/aLOG/index.php?callRep=8932>

6. Log entries

For additional information on the HAM1 installation process at LHO and LLO, the following log entries should be helpful.

From LHO:

Entry number	Topic
4425	Initial partial installation: only what was needed for HIFO
4928	Alignment of REFL beam onto first steering mirror in HAM1
6004	Alignment of PSL sample beam (for doubling) through HAM1
6136	REFL beam dump installation
6679	Getting ALS green beams to come into HAM1
6683	Alignment of ALS green beams and POP beam on HAM1

6755	Alignment of REFL path to get in-air beam out
7851	Alignment of REFL path on HAM1
7863	Angle adjustment of waveplate in optics lab
7883	Adjustment of tip-tilt mounts (RM1, RM2)
8932	WFS telescope tuning

From LLO:

Entry number	Topic
2829	REFL WFS sled assembly & installation
6418	Initial installation of most of the HAM1 components
6447	Installation of REFL tip-tilts mounts in HAM1
10087	Installation and alignment on ALS and POP beam paths
10105	REFL path beam profile and Gouy phase measurements
12281	Alignment changes to ALS/PSL and POP paths