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

Technical Note	LIGO-T2400163-v4	2024/07/01

Pcal End Station Beam Location Displacement: Procedures and Log

Pcal Team

California Institute of Technology
LIGO Project

Massachusetts Institute of Technology
LIGO Project

LIGO Hanford Observatory

LIGO Livingston Observatory

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

End Station: ......X-End...................... Date: ...24-07-02.............

Beam Movement Performed By: ......F. Llamas, D. Bhattacharjee....................

1 Checklist before departure to EX

Check all the following items before heading to the end station.

Coordination with operator

☑ Notify the operator on shift about the procedure. Include who is going and for how long (tentatively) you plan to be there.

☑ Make sure that the IFO's ISC LOCK Gaurdian is in a down or idle state, and that it will not try to auto lock. (sitemap / GRD / ISC OVERVIEW) DO NOT CHANGE STATE OF GUARDIAN UNLESS APPROVED BY THE ON-SHIFT OPERATOR

☑ Close the ALS laser shutter via the MEDM screen (sitemap/LSC/Shutters/ISCTX(Y) green beam.)

☑ Check that SEI ENV is set to Maintenance Mode to Shut Off Sensor correction (The Operator should have done this for Tuesday Maintenance but check anyways.) (sitemap/SEI/ISI SENSOR CONFIG)

Items needed for the procedure

☑ Target cover for integrating sphere input port with the corresponding - metric - allen key. Both should be in the same bag.

☑ Beam height gauge to use as a square

☑ Fluke handheld digital voltmeter (take a spare 9V battery)

☑ 6 ft. BNC male to BNC male

☑ BNC female to banana male double plug

☑ Two IR viewing cards: high and low power

☑ IR laser glasses

2 At end station

Before starting Pcal work in VEA

☑ Transition VEA to LASER HAZARD status.

☑ Call the Control Room (ext. 202) to notify them of the laser status change.

Before starting procedure

☑ Turn PCAL Interlock bypass to the ON position.

☑ Set shutter to local.

☑ Connect the Fluke voltmeter to the 'Rx PD Mon' output on the pcal interface module (D1400153) via the BNC cable using the adapter.

- Note the polarization on the adapter.

- The tab on the adapter should be at the negative input on the FLUKE meter.

- Signal from the Rx sensor should be around 3.3 V.

Time (local): *0840* .. Rx. voltage signal (V): *3.382*

☑ Remove cover from Rx enclosure and evaluate position of the pcal beams relative to the last change.

☑ ~~Record setting~~ *Block* ~~inner~~ *outer* *beam, record voltage value*

☑ Placing the target on integrating sphere:

1. Switch laser shutter to 'Close'.

2. Place target on Rx input port.

3. Orient target with alignment tool. such that the line on the target is perpendicular to plane of the table (vertical).

4. Switch laser shutter to 'Open'

☑ Grab one of the allen wrenches for the actuators on the mirror mounts from the pcal bag on top of the pylon.

☑ Remove the small cover from the top of Tx enclosure.

Beam movement

Fill in the table at the end of the document while following the list. Include the voltage value recorded before doing any movements (above), write 'pre' for the step.

1. ☐ Record voltage value.

2. Block the outer beam with a beam dump. Note, the beam dump should be at an angle from the incident beam such that the portion of light reflected from it propagates away from the inner beam.

   ☐ Record voltage value.

3. Move the inner beam to the desired position by carefully rotating the pitch and yaw screws of the inner beam mirror. The voltage from the voltmeter should reach a maximum when the beam is optimally centered. Note, the beam will move horizontally by adjusting the lower (yaw) screw, and vertically by adjusting the upper (pitch) screw.

☐ Record voltage value.

4. Remove the beam dump when done moving the inner beam.

    ☐ Record voltage value.

5. Place cover on Tx module.

6. Switch laser shutter to 'Close'.

7. Remove the target and any other components that do not belong to the pcal Rx module.

8. Turn the laser shutter to 'Open'.

    ☐ Record voltage value.

9. Place covers on the Rx module.

Before leaving VEA

☐ Set the shutter control to **Remote** on interface module.

☐ Make sure **ALL** covers are well placed and screwed.

☐ Turn the interlock bypass to **OFF**.

☐ Transition VEA back **LASER SAFE** status.

☐ Call the Control Room (ext. 202) to notify them of the laser status change.

End Station: ...X-End...................

Date: ...24-07-02...................

Beam Movement Performed By: ...F.Clumus, D.Bhattacharjee...................

Beam moved: (Inner) ~~Outer~~

Previous state: ...Up...................

Current move: ...Center...................

Rx voltage values between steps		
Step	Local time	Voltage (V)
Both beams, target off	0840	3.382
Inner beam, target off	0855	1.683
Target on	0900	1.485 ↳±2
moved beam	0905	1.523 ↳±2
Target off	0912	1.684
Both beams	0913	3.382

Notes:

Beam required adjustments in yaw ~~altho~~ (horizontal)
after ~~#~~ the beam movement from up to center.