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An Open-Source Plate reader

**OPTICAL  
TRAIN  
ASSEMBLY  
GUIDE**

# **Bottom optical train assembly**

#’s refer to Parts List.

You will need hex keys or ball drivers, and preferably a Spanner wrench.

For more details on assembling lens cage components see the Thorlabs website.



## **Part 1: LED Socket Preparation**

- 1) [This step is the same as “Frame Assembly Guide” step 23] Use the JST-Connector kit (#E12) to assemble 2-wire cables with each attached to a LED socket (#O10), if not done already.

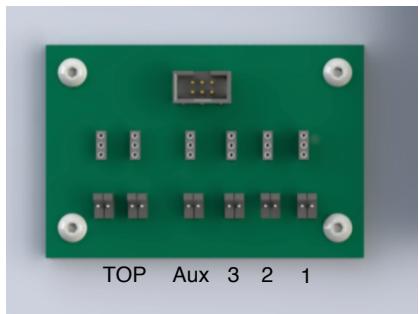
## **Part 2: Optomechanics**

- 1) Drop the aspheric lens (#O5) (wide-end down) into the top of 0.5" lens tube (#O6) (with tube male threading down), and then lock the lens into place with the lens tube retaining ring.
- 2) Screw the lens tube into the lens cage plate adapter (#O7), and then the adapter into the lens cage plate (#O4). Screw the fiber adapter into the other side of the cage plate, leaving the SMA-terminated end exposed.
- 3) Attach the 4" cage rods (#O2) to the universal base plate (#O1) with the set screws of the rods.
- 4) Feed the rods through the lens cage plate. Use the set screws on the side to lock the cage plate 7.5 mm from the top of the rods.

## **Part 3: Excitation Holder**

- 1) Use a soldering iron to fit the M3x4mm Threaded Inserts (from Hilitichi Kit (#F35)) into the side holes of the 3D-printed Excitation LED Mount (#P5). These are to set the LED sockets in place. You could also tap the holes for M3 threading.
- 2) Solder wire to the LED Sockets (#O10). Terminate the wires with 2-pin JST connectors (#E12).
- 3) For each socket, feed the terminated wire through the top of their angled seat of the Excitation LED Mount, and press-fit the socket firmly into the seat.
- 4) Push the external stimulation collimating lens (#O16) into the holder, and fix it in place with screws in the threaded inserts.
- 5) Sit the excitation holder on top of the cage plate and around the lens tube. Lock the excitation mount into place using a screw (#F34) on the side.

Board



#### **Part 4: Electronics connections**

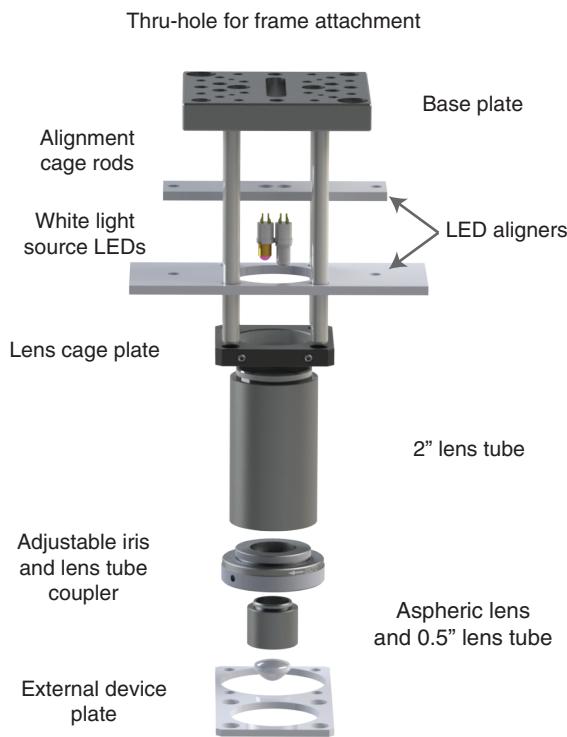
- 1) Attach each JST female header to one of the male headers on the shown LED connection board. Make note of the socket/terminal pairs, as they will define the mapping between GUI programming and the LED socket positions (1,2, 3, and Aux).
- 2) Plug the LEDs into the sockets. The LED cathode should be attached to the ground pin.
- 3) Define the LED wavelengths using the GUI settings window.

# Top optical train assembly

#'s refer to Parts List.

You will need hex keys or ball drivers, and preferably a Spanner wrench.

For more details on assembling lens cage components see the Thorlabs website.



## Part 1: Initial component assembly

1) [This step is the same as the “Frame Assembly Guide” step 8] Attach the base plate (#O1) to the 8020 top frame bar (#F2) using bolts and T-nuts (#O17, O18). The bolts should be fed through the center line of the plate.

2) Attach the 3“ cage rods (#O3) to the base plate using the rod set screws (come with rods).

3) Screw the threaded male end of the iris (#O8) into a 2" lens tube (#O9). Screw the 0.5“ lens tube coupler (#O7) to the iris.

4) Drop the aspheric lens (#O5) into the 0.5" lens tube (#O6), and lock the lens into place with the lens tube retaining ring. The wide end of the aspheric should face the male threaded end of the tube. Screw the 0.5" lens tube into the coupler.

5) Press fit the LED sockets (#O10) into their slots on the top piece of the laser cut LED aligner (#L16). The lip of the socket should touch the plate, and the body should fit tightly. The socket can be set into place with adhesive if needed.

6) Combine the two aligner pieces (#L16, L17) using screws and nuts (#F13, F19). The lip of the socket should be the middle of the sandwich.

## Part 2: Train assembly

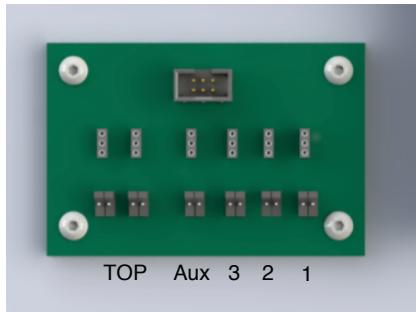
1) Feed the alignment rods through the LED aligners with the LED sockets pointing away from the base plate, and then the lens cage plate. Fix the lens cage plate at 36mm from the base plate using the side set screws of the cage plate. The LED aligner plate (#L17) sits directly on top of the cage plate.

2) Screw the 2“ lens tube (including iris and aspheric) into the cage plate.

3) Feed screws (#F32) through the thru-holes of the external device plate (#L15), and fasten the plate to bores of the rods.

## Part 3: Optical train alignment. [See “Frame Assembly Guide” step 30]

Board



#### **Part 4: Electronics connections**

- 1) Use the JST-Connector kit (#E12) to assemble 2-wire cables (it is recommended to use threaded wire) with each attached to a LED socket (#O10), if not done already.
- 2) Connect one jumper set per LED socket. Plug the LEDs into the sockets with cathode attached to the ground pin.
- 3) Connect the LED sockets to the LED board (#E28) TOP terminals. Make note of the socket/terminal pairings, as they will define the mapping between GUI programming and the LED socket positions.