OCAL H-2 ASTROPHOTOGRAPHY TELESCOPE

User Manual V1.0

2025.05

H-2

Anhui Chaoxing Education Technology Co., Ltd.

Table of Contents

Thank you for choosing the OCAL H-2 astrophotography telescope. This product integrates multiple innovative technologies. To ensure you enjoy the best experience, please read this manual carefully before use. For updates, please visit the official website:www.ocalworld.com/en/

1. Product Introduction

The OCAL H-2 Astrophotography Telescope is a Newtonian reflecting astronomical telescope specifically developed for astrophotography. Its model is H-206, and the diameter of the primary mirror is 206mm. It has an excellent shooting speed with a focal ratio of F2.72. A focal length of approximately 560mm can not only meet the shooting requirements of most celestial bodies but also ensure a certain level of celestial body detail presentation.

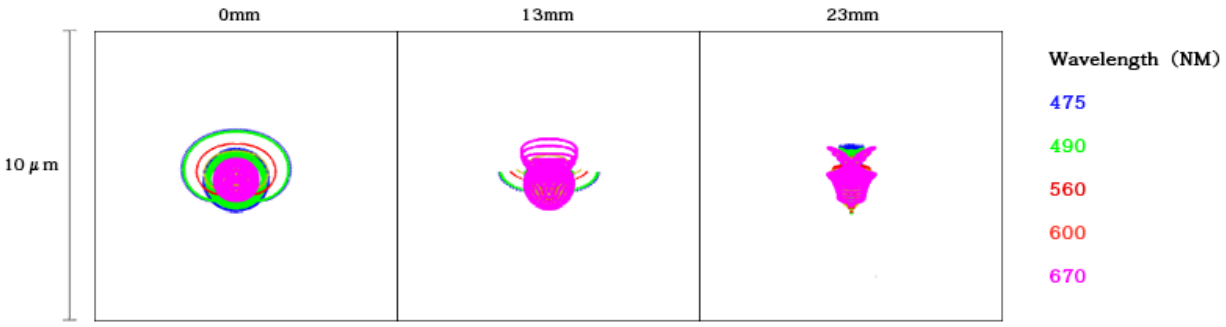
To adapt to such a small focal ratio, we have made many elaborate designs in optics and mechanics. These include: a carefully crafted optical system; strict inspections using professional optical equipment such as interferometers and centering instruments; the design of a primary mirror mechanical positioning structure, a secondary mirror precise fine - tuning device, a focuser, and a micro - heating dew removal function for the optical system. These designs aim to ensure that the OCAL H-2 fully demonstrates its excellent optical performance during the shooting process.

2. Product Contents

One complete telescope optical tube assembly(OTA), including mounting rings, losmandy type dovetail plate, focuser, corrector lens, and other components.
Quick-start guide.
OCAL anti-condensation system.
A set of screwdrivers and hex wrenches for telescope adjustment.
Data cables and DC power cables.
One wheeled aluminum carrying case.

3. Product Specifications

3.1 Spot diagram



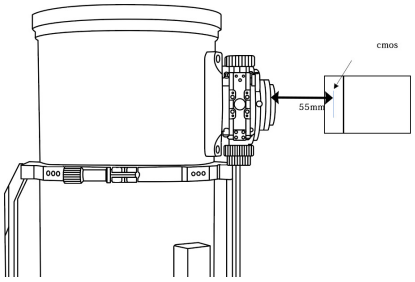
3.2 Technical specification

Item	Parameter
Model	OCAL H - 2
Focal Length	560mm
Aperture - Focal Ratio	D: 206mm F2.72
Minor Axis of Secondary Mirror	80mm
Good Image Area	44mm full - frame
Substrate Material of Primary and Secondary Mirrors	Fused silica glass
Shapes of Primary and Secondary Mirrors	Hyperboloid, Plane
Correcting Lens	4 - element apochromatic lenses, one of which is super ED glass.
Focuser	2.5 - inch dual - speed focusing base, connected to the correcting lens by threads, integrated with a dedicated bearing rotator (CAA) and an angle scale. It rotates smoothly without resistance and is equipped with a focal - plane adjustment device
Telescope Body Material	4mm thick carbon fiber
Inner Wall of Telescope Tube	German noctutec
Clamping Hoop	Made of aluminum alloy by CNC cutting, 10mm thick, 22mm wide, with an inner diameter of 254mm and 10 groups of M6 threaded assembly holes
Dimension of tube	Length 630mm, tube diameter 254mm, maximum distance between the two dovetail plates 340mm
Weight	12.7 Kg with mount rings
Visual Accessories	Not include, and not recommend for visual.

4. Telescope Assembly Diagrams

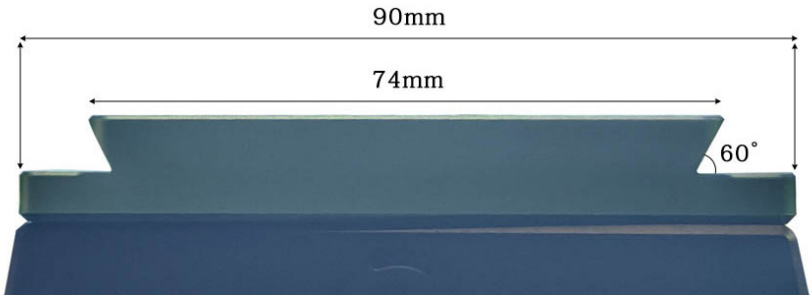
4.1Connection with Camera

Ensure that the back focus distance from the last element of the corrector lens (M48 or M54 adapter) to the camera's CMOS sensor is exactly 55mm. Please refer to the diagram below for specific assembly instructions.



4.2 Mounting with Equatorial Mount

The dovetail plate is compatible with most mainstream medium to large equatorial mounts and has a length of 260mm. For more detailed specifications, refer to the diagram below.



5. Demisting-Integral-Box

5.1 System Overview

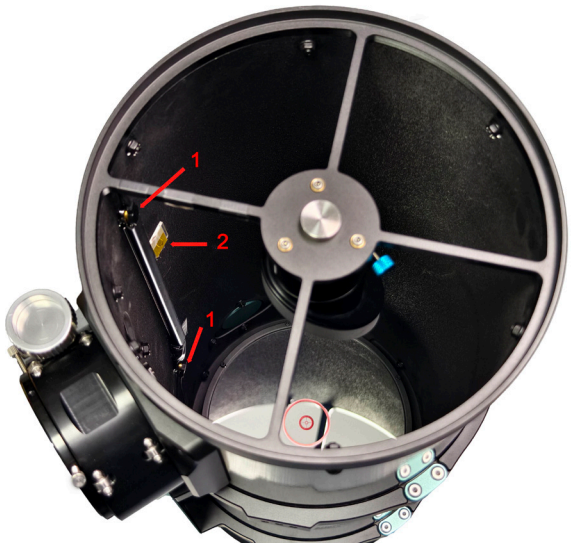
Condensation on lenses during astrophotography is an annoy problem. To solve this problem, we developed an anti-condensation system. The system automatically activates heating elements for the primary and secondary mirrors when ambient temperature and humidity reach the dew point.

This system includes a built-in temperature and humidity sensor, and a microcontroller. It operates on a standard 12V DC power supply using a DC 5.5 × 2.1 plug. Once connected, the heater activates automatically when the dew point is detected. When connected to a computer, users can also manually control its operation and adjust the heating intensity.

Note: Heating may cause slight mirror deformation. Therefore, in automatic mode, the default power output is limited to only 3% of the maximum, raising the mirror temperature slightly above the dew point without overheating. Avoid setting excessive power manually, as this may overheat the mirrors. Low-power heating will not permanently deform fused quartz glass. If deformation is noticeable even at 3%, reduce the power further or turn the device off.

5.2 Disassembly Instructions

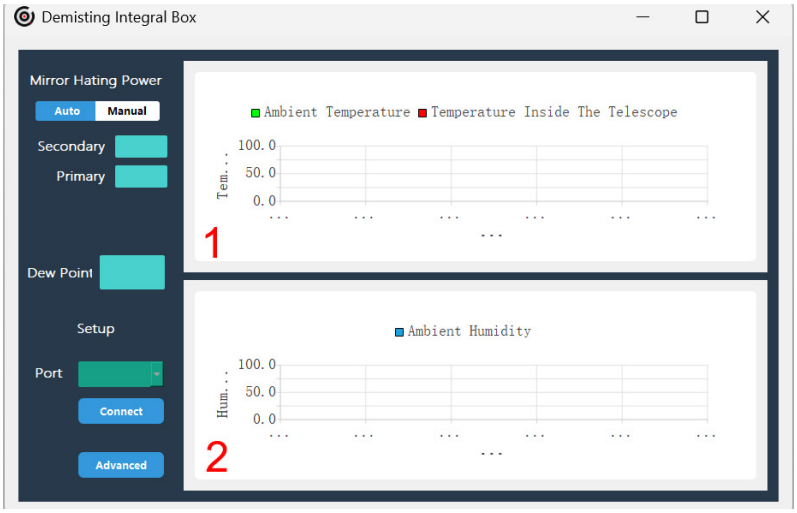
The telescope tube includes two internal wires leading to the primary and secondary mirrors for dew control. Disassembly is as follows:



Interface Design: A magnetic quick-release connector (see Figure 1) allows easy disconnection from the power supply. Simply lift the magnetic connectors vertically to cut off power.

Built-in Sensor: A high-precision temperature sensor (see Figure 2) monitors internal tube conditions in real time. When the dew point is approached, the intelligent anti-dew system automatically adjusts heating power to keep optical components dry.

5.3 PC Software Overview (Windows only)



The software interface is divided into four sections: Data Info, Settings, Environmental & Mirror Temperature, and Humidity.

Operating instructions:
In the “Settings” section, select the correct port and click “Connect Device.” The anti-dew system will now be linked to the computer.

In the “Data Info” section:
If “Auto” is selected, the device will function automatically—just monitor the data readings.
If “Manual” is selected, “Heating Power 1” controls the secondary mirror, and “Heating Power 2” controls the primary mirror. Input the desired power percentages accordingly.

6. Telescope Assembly

The primary mirror mount of the OCAL H-2 is relatively complex. The following images and steps are provided to help you understand the assembly process. Once get used to these steps, you can easily disassemble and reassemble the primary mirror mount easily.

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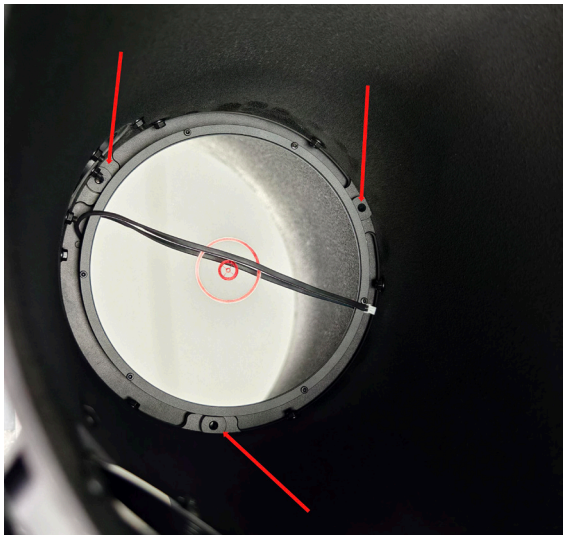

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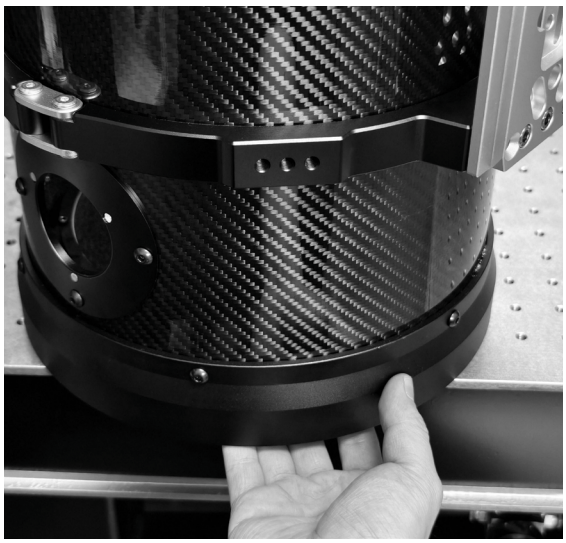

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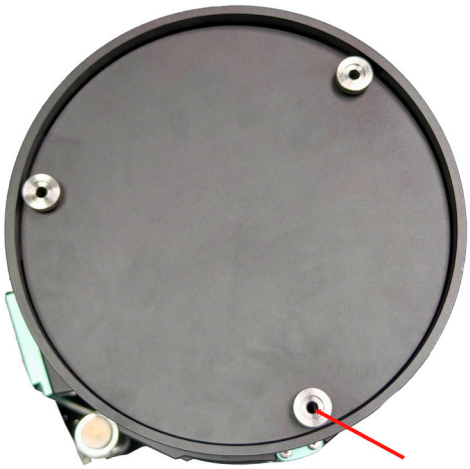

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Figure 1: Place the primary mirror mount on a flat surface. Lay the power cable for the primary mirror heater across the top of the mirror, ensuring it stays within the bounds of the mount. Insert three springs into the designated spring slots.

Figure 2: From above, align the telescope tube with the three spring slots and gently lower it onto the springs. Ensure the power cable outlet is on the side closest to the anti-condensation device.

Figure 3: While supporting the mirror mount by hand, flip the entire telescope 180 degrees and make the tube upside down.

Figure 4: Align the three holes on the mirror retaining nuts with the spring slot holes inside the tube.

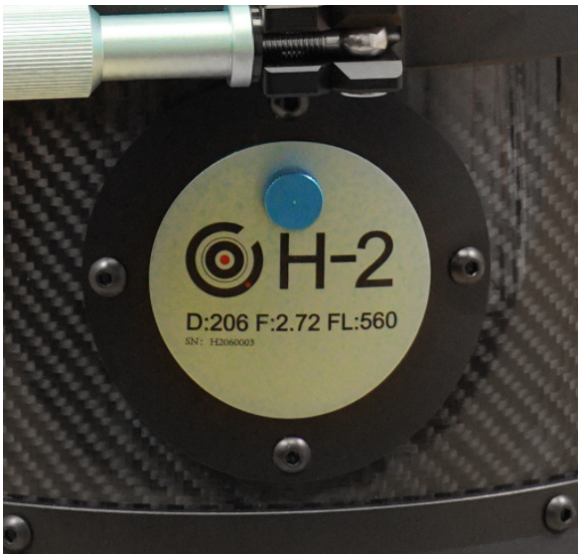
Figure 5: Tighten the mirror locking screws to secure the assembly.

Figure 6: The final position of the mirror retaining screws should be lower than the edge of the mirror base, allowing the three exposed rubber limit strips to be clearly visible.

6.1Purpose of the OCAL H-2 Primary Mirror Inspection Port:

Allows inspection for dust or foreign objects on the primary mirror, enabling timely cleaning using a blower, air nozzle, or vacuum.

The inspection port uses a magnetic attachment system and can be opened by pinching and pulling the blue screw.

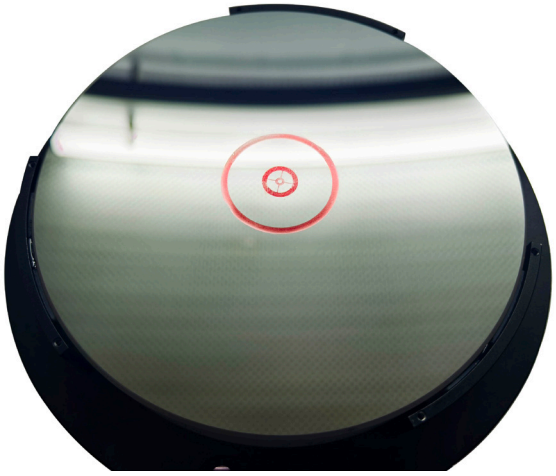


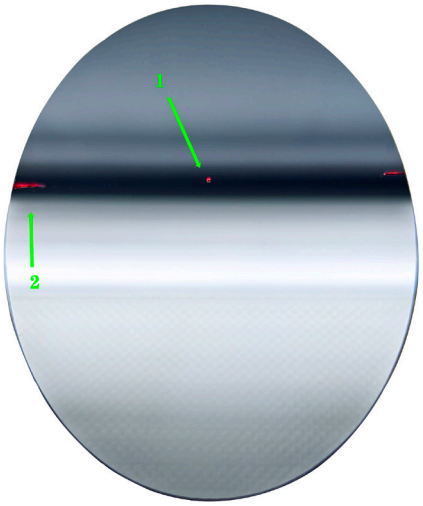
7. Collimation

7.1Primary and Secondary Mirror Marks

The OCAL H-2 features clear marks on both the center of the primary mirror and the offset point of the secondary mirror to assist in collimation. They were precisely marked. The primary mirror was marked with a large circle containing a small circle and a cross; the secondary mirror was marked an offset dot and a vertical line.

Note: These marks on primary mirror are water-insoluble but not resistant to alcohol or organic solvents; the marks on secondary mirror are both water-insoluble and alcohol-resistant.

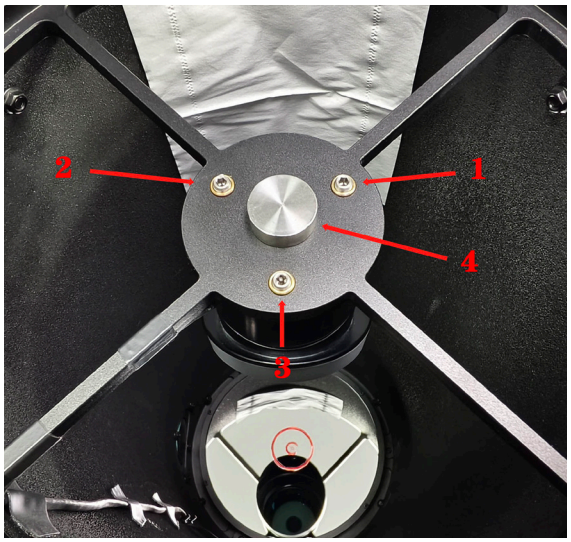




7.2Secondary Mirror Adjustment

This section explains how to collimate telescope by using the OCAL Electronic Collimator. Please refer to the official tutorial on the website for the detail operation. The following instructions focus on the unique features of the OCAL H-2:

1.Design of the Secondary Mirror



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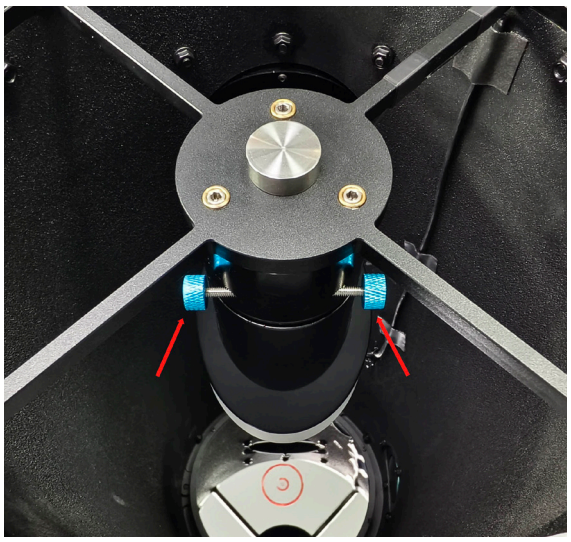

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The secondary mirror adjustment screws are high-precision optical-grade fine-thread screws with ball bearings at the bottom. When tightened, the ball bearing fits into a spherical socket, preventing damage and slippage.
Screws 1 and 2: Adjust the tilt(yaw) of secondary mirror
Screw 3: Adjust the vertical tilt(lift)
Screw 4: Adjust the height

Additionally, the H-2 features a rotating secondary mirror structure. You can adjust the rotation angle by loosening or tightening the two blue screws.

2.Adjusting Secondary Mirror Height

1

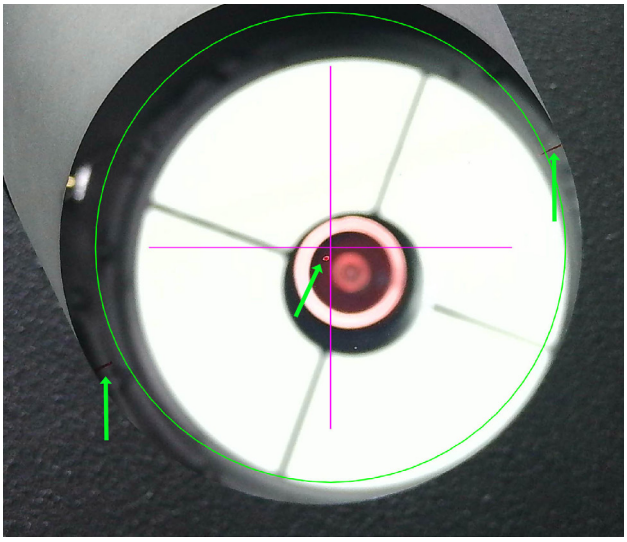

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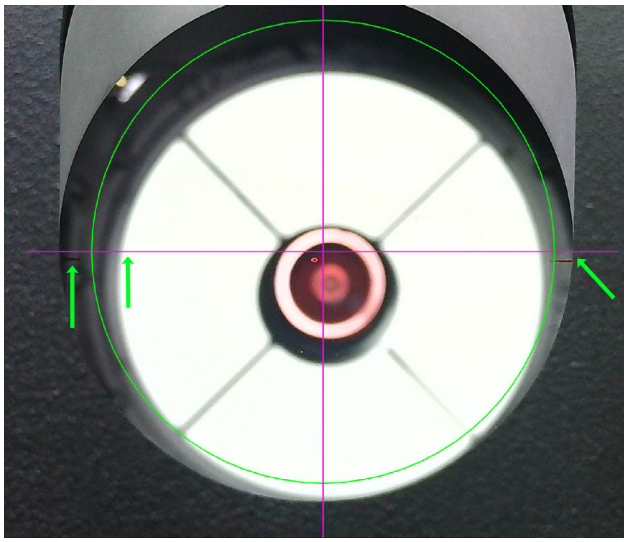
Figure 1
Launch the collimator software (it is not recommended to use the software offset function).

Figure 2
Zoom in and focus until the eccentric dot and auxiliary line on the secondary mirror become visible (green arrow). Rotate the cross in the software to a vertical orientation.



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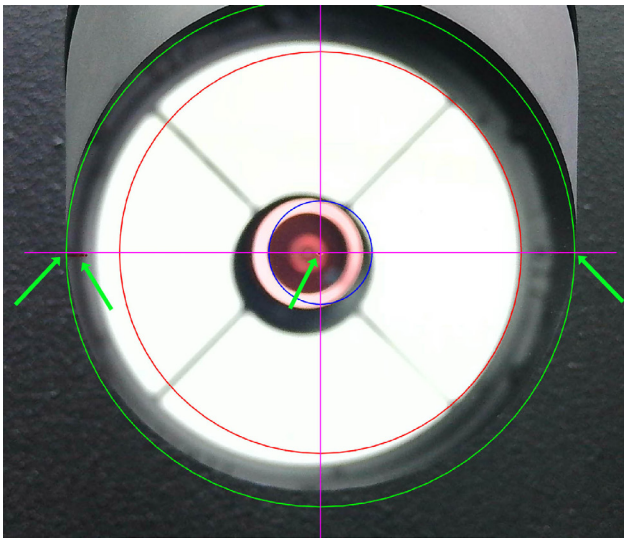

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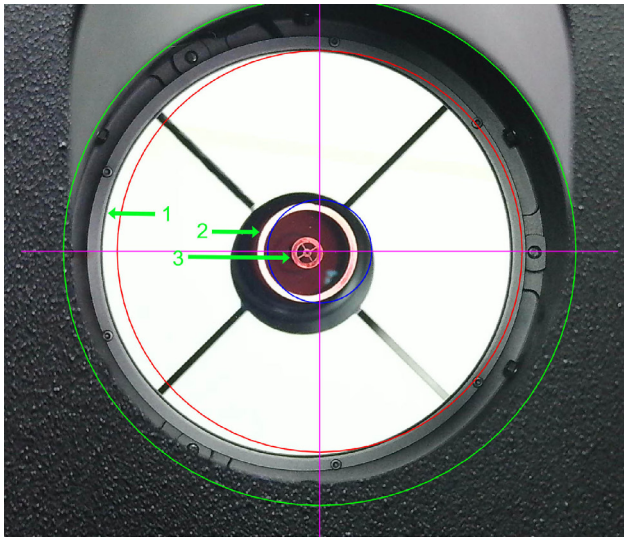
Figure3
Rotate the CAA on the focuser until the auxiliary line on the secondary mirror aligns parallel to the software cross.

Figure4
Then use screw #4 to align the eccentric mark and auxiliary line with the cross in the software. If the eccentric mark appears below the baseline, the mirror is too low; tighten screw #4 to raise it. Conversely, loosen it if it is too high. Also check the symmetry between the green circle and the secondary mirror edge.

3.Adjusting the Secondary Mirror Rotation



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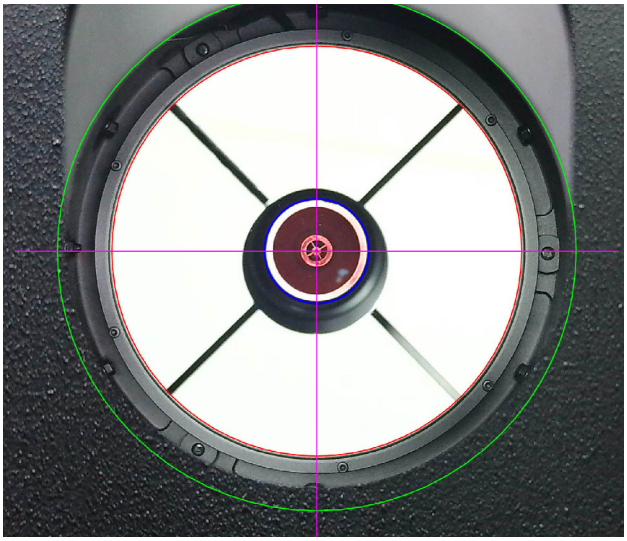

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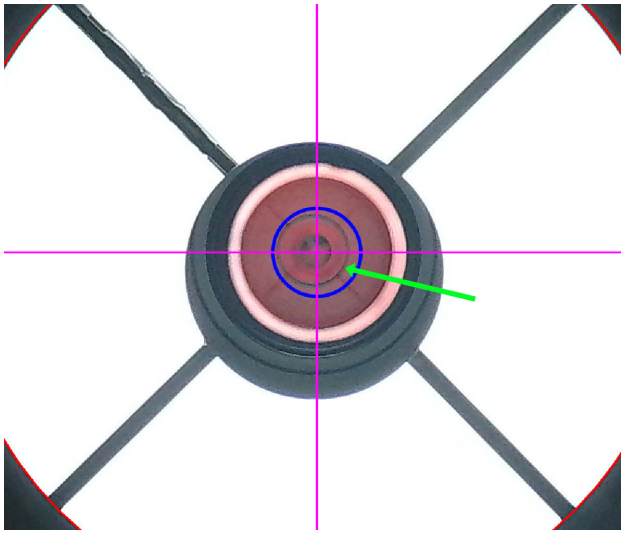
Figure5
Focus on the reflection of the primary mirror and align reference circles 1, 2, and 3 to be concentric with the red or blue circles. This is a quick but crucial step in achieving proper collimation.

We have produced relevant videos to demonstrate this adjustment process for your reference. Video link::https://youtu.be/YPpEwidp99s?si=7asEMal3khLZPgrD

The secondary mirror **collimation** is completed as shown in Figure 6.

7.3Primary Mirror Adjustment



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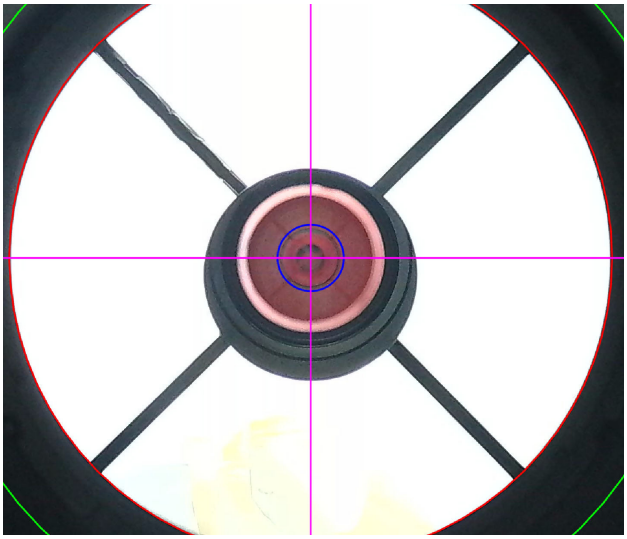

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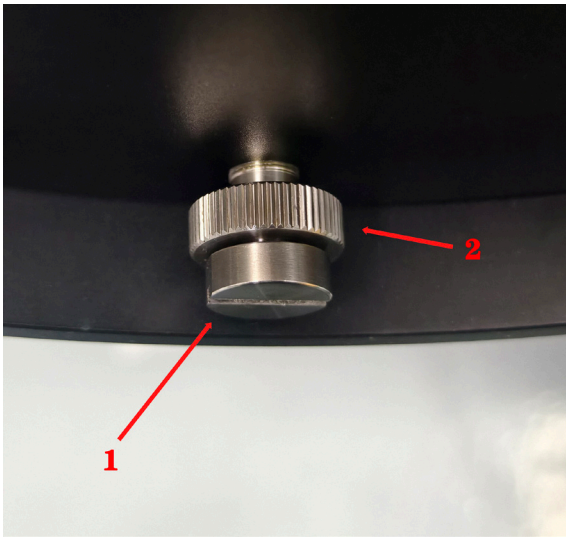
Figure7
Once the secondary mirror is aligned, focus the collimator display until the collimator's black ring (green arrow) is visible. Adjust this black ring to align concentrically with the blue ring to complete primary mirror alignment (see Figure 8).



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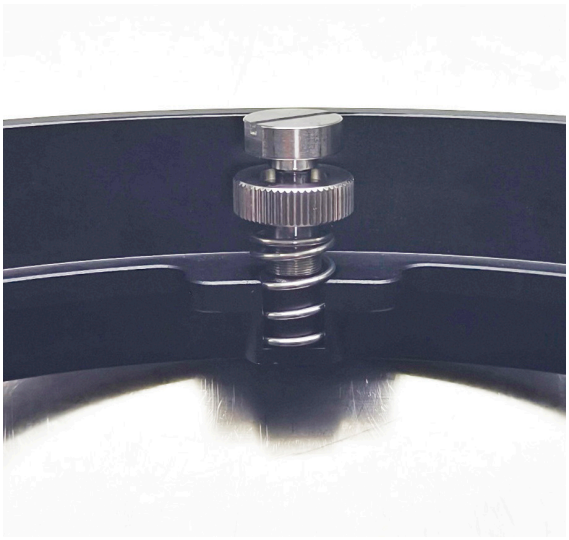

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Figure9
The adjustment principle for the OCAL H-2’s primary mirror screws is based on “push” and “pull” mechanisms.
Screw 1 is the locking screw; Screw 2 is the limiting screw (see the spring structure in Figure)

List two options for adjustment

Option 1. Before adjustment, all three locking screws are in a locked state. Loosen the locking screws one by one and observe the change in collimation. If the optical axis gets better or worse after loosening a locking screw, continue to adjust this set of screws; if the situation does not change, tighten the screw and adjust the next one. If the optical axis still does not improve after loosening the three locking screws, you may need to rotate each limit screw clockwise or counterclockwise.

When you find that the situation gets better after loosening one locking screw, you will face a problem here. Shouldn't the locking screw be locked? What's the point of loosening it to get better? At this time, you can tighten the limit screw by hand, raise or lower the limit screw and then tighten it, or rotate the limit screw and the locking screw simultaneously. The specific implementation depends on the actual situation, and you can achieve the ideal result.An instructional video is also available:
Video link: https://youtu.be/r2um9OdPZQs?si=qgtS04a-5AHrZ_sb

Option 2: You can lower a certain limit screw. When the lowered depth exceeds the thickness of the base, it is equivalent to raising the base at this angle. You can adjust the collimation based on this principle.

8.Support

Thank you for purchasing and supporting our product. The OCAL-H2 is a precision instrument. If you encounter any issues during use or adjustment, feel free to contact our support team. We are here to assist you.

(a) Contact Information:
Official Website: www.ocalworld.com/en/
Email: huogo558@gmail.com

(b) Warranty and Repair:
The OCAL-H2 comes with a one-year limited warranty from the date of purchase. During the warranty period, if the product malfunctions result from manufacturing issues or faulty materials, we offer free repair services (shipping fees should pay by customer).
The warranty does not cover:
Accidental damage resulting from falls, impacts, spills, or general product misuse.
Malfunctions resulting from disassembly or modification.
Damage due to improper use not in accordance with the manual.
Expired warranty period

(c) Product Upgrades & Feedback:
We are constantly improving our products and user experience. Your feedback and suggestions are always welcome. Announcements regarding new features and updates will be posted on our official website .
Thank you for your continued support!