

# INSTRUCTION MANUAL

**StarGate 18 - 458mm (18'') / 1900mm**



  
**Sky-Watcher®**  
*Be amazed.*

DOB18R-F-141020V1-EN

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# Part I: Introduction

Because deep sky observing often requires travel to dark locations away from city lights, the StarGate 18 design benefits from being more compact, light and portable than standard large Newtonian telescopes.



Instead of a heavy mirror blank at the standard 1:6 thickness ratios (1 cm thick for every 6 cm in diameter - so they won't flex and sag out of shape under their own weight), the StarGate 18 uses a thin composite mirror with sagittal reinforcements. This specific construction retains the same sturdiness as a standard 1:6 thickness ratio but is far less massive and will reach rapidly thermal equilibrium. The secondary flat mirror uses a cellular structure for the same purposes.

The primary and secondary mirrors are made of Low Expansion Borosilicate Glass, for near zero thermal expansion.

The StarGate 18 open tube design allows the optical tube assembly, the largest component, to be broken down. As the name implies, the "tube" of this design is actually composed of an upper 'cage assembly', which contains the secondary mirror, and focuser, held in place by several rigid poles. The poles are held in place by quick-disconnecting clamps which allow the entire telescope to be easily broken down into its smaller components, facilitating their transport by vehicle or other means to an observing site.



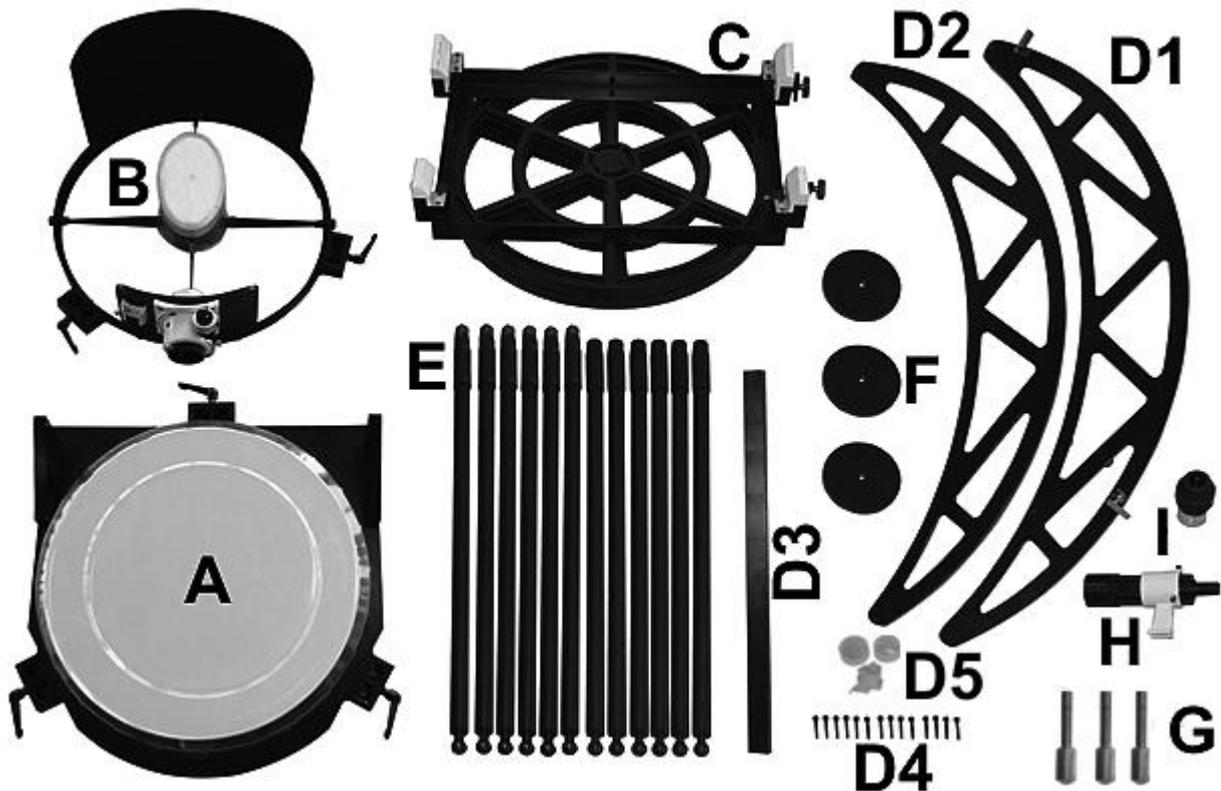
*A view of the cellular structure of the secondary flat mirror*



- **NEVER USE YOUR TELESCOPE IN BRIGHT DAYLIGHT. DUE TO THE OPEN TUBE SYSTEM, ANY SOLAR STRAY LIGHT MAY BE REFLECTED TO THE FOCAL POINT. EVEN UNFOCALISED, ANY SOLAR STRAY LIGHT MAY PERMANENTLY IMPAIR YOUR VISION.**
- **NEVER USE ANY TYPE OF SOLAR FILTER, EVEN FULL APERTURE FILTER.**

# Part II: Assembling Instructions

## Parts description

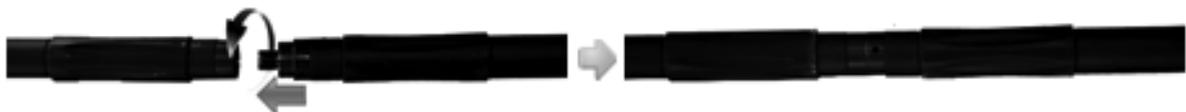


- A. Rear cell assembly with the primary mirror (with cover) and the primary mirror cell.
- B. The secondary (flat) mirror (with cover), the focuser, finder base and light shield on the secondary assembly.
- C. The rocker base.
- D. The rocker assembly composed of D1 and D2 left and right side, D3 reinforcement bar, D4 14pcs M6x25mm Allen screws and D5 grease pot.
- E. 6x top and 6x bottom separable truss tubes, with number markings.
- F. 3x counterweights.
- G. 3x collimation locking screws.
- H. 8x50 finder scope.
- I. 28mm LET 2" eyepiece.

## Assembly Instructions



**Step 1:** Each ends of the upper and lower bar has a number marking, from 1 to 6. Prepare the bars by matching pairs of numbers. Thread on the support bars (6x) together as shown in the picture below.



## Part II: Assembling Instructions

**Step 2:** Put the handle grip onto the support bar which has the marking **1 ↑**.



**Step 3:** The base assembly.



**3.1** Locate the three clamps on the rear cell assembly.



The mirror cover must remain in place.



Please refer to note on the right side regarding position 1.



**3.2** Loosen the three clamps on the rear cell to pull the cover plate open.



**3.3** Loosen the clamp until there is space enough to insert the support bar's ball ends.



Please insert the bars on positions with same number.



**3.4** Insert two support bars' ball ends into the groove (with corresponding #) and secure the clamp.

Redo the same operation twice with the remaining bars.

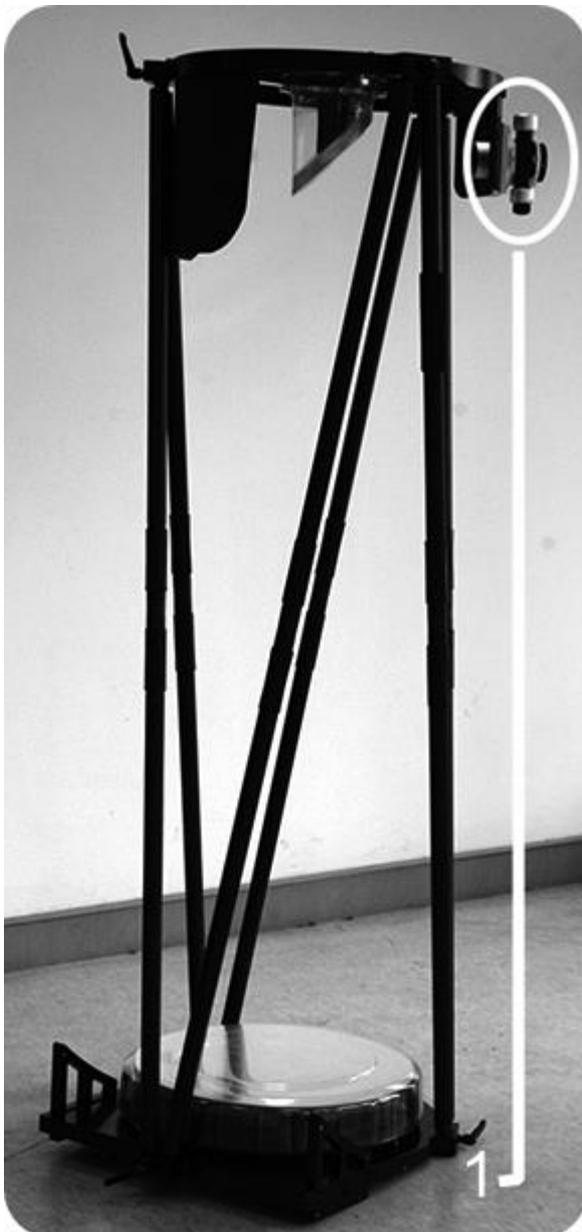


**Please note** that the bar with the handle grip, marked "1" should be positioned in the corresponding groove marked "1".

If correctly placed the handle should be in correct position for observations, as shown in picture above.

## Part II: Assembling Instructions

**Step 4:** The upper ring assembly.



**4.1** Locate the three clamps on the front cell assembly (upper left figure).



**The mirror cover must remain in place.**

**4.2** Loosen the three clamps on the front cell to pull the cover plate open.

**4.3** Loosen the clamp until there is space enough to insert the support bar's ball ends (upper right figure).



**Please insert the bars on positions with same marking numbers on the front cell clamps.**

**4.4** Insert two support bars' ball ends into the groove and secure the clamp.

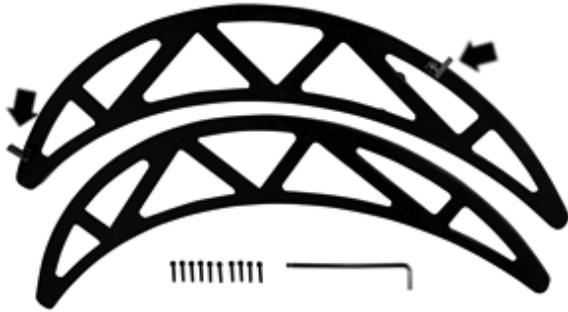
Redo the same operation twice with the remaining bars.



**Please note** that the focuser should be placed as shown in picture on the left, above the position noted "1" if the corresponding marking numbers were correctly set in place.

## Part II: Assembling Instructions

**Step 5:** The rocker set assembly.



**5.1** Prepare the two sides of the rocker assembly, 10pcs M6x25mm Allen screw and the 5mm Allen wrench.

Locate the left side bearing; the bearing has two stop blocks on its internal side as shown in the left picture.



**5.2** Mount the left side bearing as shown in the picture, then secured it with 5pcs M6x25mm Allen screws, as shown in pictures.

 **Please note:** don't secure the screws too tightly.



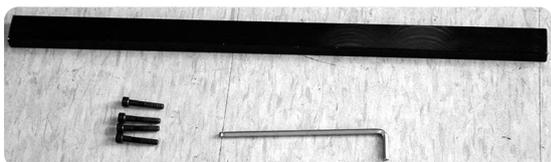
 **The mirror covers must remain in place.**



**5.3** Mount the right side bearing the same way as the left side bearing (as explained in 5.2).



**5.4** Please apply the grease shown in the picture to the smooth surface of side bearings.



**5.5** Prepare the reinforcing bar and 4pcs M6x25mm Allen screws, and the 5mm Allen wrench.

## Part II: Assembling Instructions



**5.6** Mount the reinforcing bar as shown in picture (2 screws per side).

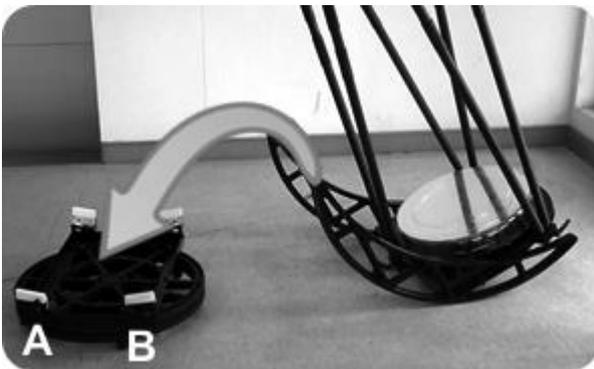


**Please note:** don't secure the screws too tightly.

**Step 6:** Installing the tube on the base.



**6.1** Prepare the rocker base. On the base there is a side with two handles (A and B on the picture)



**6.2** Slide the side bearings into the grooves on the base along the direction of Teflon guides. Please note that the left side rocker assembly, with stop blocks, should be on the base side with adjusting handles A and B.



The mirror covers must remain in place.



**6.3** Tighten the M6x25mm Allen screws on both side of the rocker support and reinforcement bar

Finally use the handles to remove the gap between the Teflon guides and the rocker assembly.

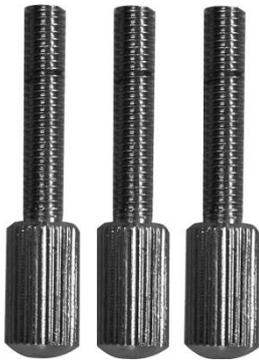
## Part II: Assembling Instructions

### **Step 7:** Installing the counterweights.



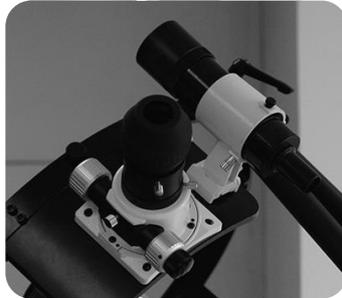
- 7.1** Thread the counterweight onto the M10 bolt, and then thread this bolt into the M10 hole on the back plate of rear cell.

### **Step 8:** Installing the 3 collimation locking screws.



- 8.1** Locate the 3 collimation locking screws (noted **G** on picture page 3).
- 8.2** Secure the 3 locking screws on the rear cell assembly.

### **Step 9:** Installing the eyepiece and the finder scope.



- 9.1** Mount the eyepiece and the finder scope as shown in the pictures.

### Aligning the finder scope

The 8x50 finder scope is a small fixed magnification scope mounted on the optical tube. When it is correctly aligned with the telescope, objects can be quickly located and brought to the center of the field.

The alignment should be done at first use and over time if the alignment is no more accurate.



Alignment is best done outdoors in day light when it's easier to locate objects

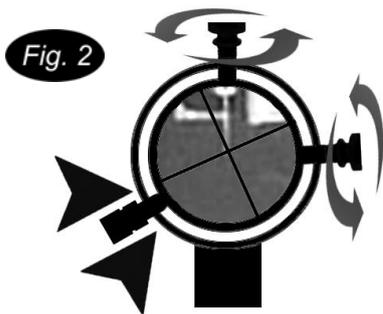


If it is necessary to refocus your finder scope, look at an object that is at least 500 meters (or yards) away. Loosen the knurled ring by unscrewing it back towards the bracket. The front lens holder can now be turned in and out of focus. When focus is reached, lock it in position with the knurled ring (**Fig. 1**).



**NEVER LOOK DIRECTLY AT THE SUN WITH THE FINDER SCOPE. IT COULD IMPAIR DEFINITELY YOUR VISION.**

When the finder scope is in focus, choose a distant object that is at least 500 meters (or yards) away and point the main telescope at the object. Center the object in the eyepiece of the telescope by aiming precisely at the distant object.



Now, check in the finder scope to see if that distant object is exactly positioned behind the crosshairs of the finder scope's eyepiece. If not, adjust the alignment of the finder scope with the two black adjusting screws on the bracket of the finder scope (**Fig. 2**).

Do not over tighten the screws when aligning the finder scope.



The image in the finder scope is upside-down. This is normal and has no incidence on observations.

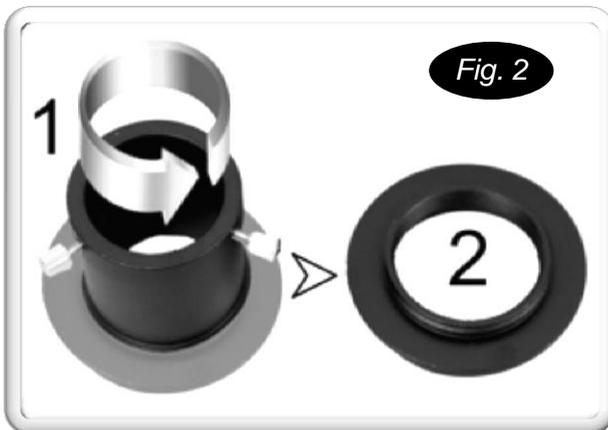
# Part III: Basic Operations

## Using an eyepiece



1. Loosen the thumbscrew on the focuser's drawtube [Fig 1.1].
2. Insert the 2 inches eyepiece [Fig 1.2a], or the 1<sup>1/4</sup> inches adapter [Fig 1.2b], inside the focuser's drawtube. Tighten the screw at the end of the focuser's drawtube [Fig 1.1]. For the 1<sup>1/4</sup> inches adapter: unscrew the two thumbscrews on the adapter [Fig 1.2b].
3. For the 1<sup>1/4</sup> inches adapter: insert the eyepiece into the adapter [Fig 1.3b] and tighten the adapter's thumbscrews [Fig 1.3b]

## Using the 42x0.75mm ring (T2 ring)



The 1<sup>1/4</sup> inches adapter is composed of two parts: an 1<sup>1/4</sup> inches tube [Fig 2.1] screwed on a T2 (42x0.75mm) plate [Fig 2.2].

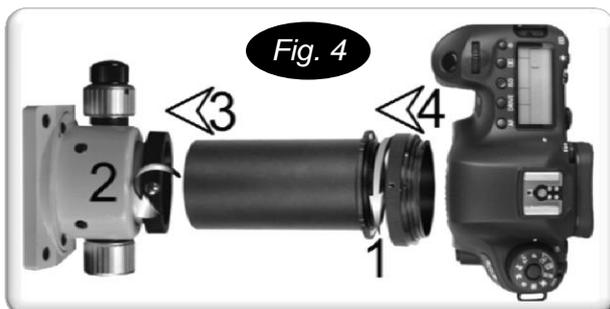
To access the T2 (42x0.75mm) plate [Fig 2.2] simply unscrew the 1<sup>1/4</sup> inches tube [Fig 2.1] from the 1<sup>1/4</sup> inches adapter.

Reassembling the 1<sup>1/4</sup> inches adapter can easily be done by following the preceding steps in reverse order.



1. Assemble the T2 plate with your T2 accessory adapter [Fig 3.1].
2. Loosen the thumbscrew on the focuser's drawtube [Fig 3.2].
3. Insert the T2 plate with your T2 accessory adapter inside the focuser's drawtube [Fig 3.3]. Tighten the screw at the end of the focuser's drawtube [Fig 3.2].
4. Assemble your accessory onto the T2 accessory adapter [Fig 3.4].

## Using an accessory with specific connections



[Fig. 4] > Some accessories don't need a standard adapter to be connected to the telescope, like the Sky-Watcher F4 Coma Corrector.

In this case please follow indications given with the accessory for proper and secure connection.



Fig. 5

## Focusing

1. Make sure the locking screw [Fig 5.1] is loose.
2. Slowly turn the focus knobs [Fig 5.2] one way or the other, until the image in the eyepiece is nearly sharp.
3. To finely focus the image turn the 1:10 knob one way or the other until the image is perfectly sharp [Fig 5.3].
4. Tighten the locking screw [Fig 5.1] if a heavy load is attached.

The image usually has to be finely refocused over time, due to small variations caused by temperature changes. This often happens when the telescope has not yet reached outside temperature.

Refocusing is almost always necessary when you change an eyepiece or accessory.

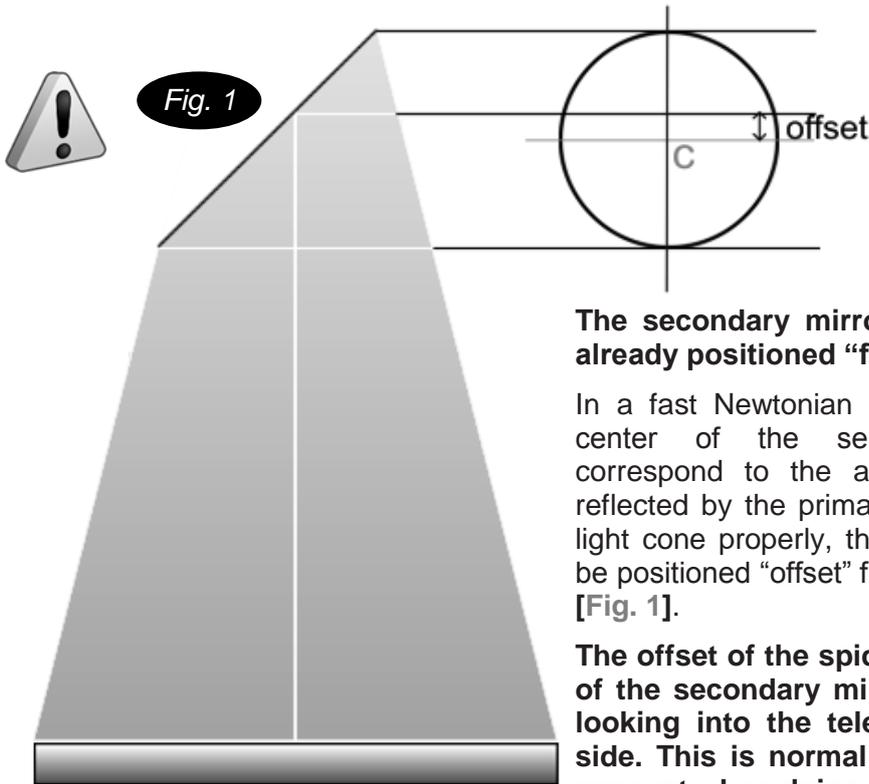


**Please note:** with a manual dobsonian mount only very bright objects can be pictured, like the moon or bright planets. Taking long exposure deep-sky pictures is not possible in this configuration.



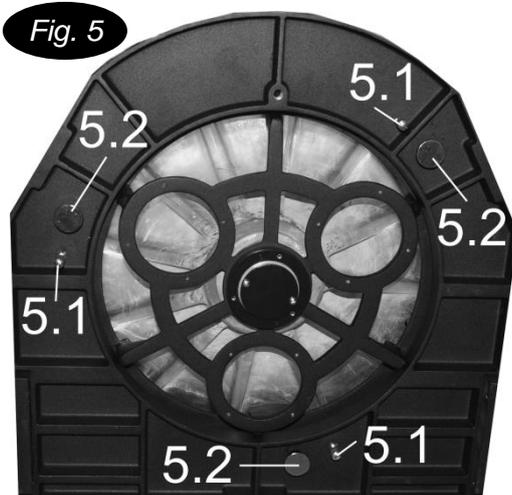
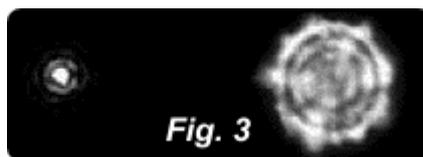
# Part IV: Advanced Operations

## Offset and collimation



Mirrors inside the telescope have been carefully aligned to each other in the factory. When using the telescope, this alignment should be checked to ensure optimal image quality.

When looking at a bright star, the star image given by your telescope should be symmetrical, a central dot with diffraction rings centered on this white dot (see Fig 2). Be patient to consider the average shape of the star image while the image is slowly moving due to air turbulence (see Fig 3).



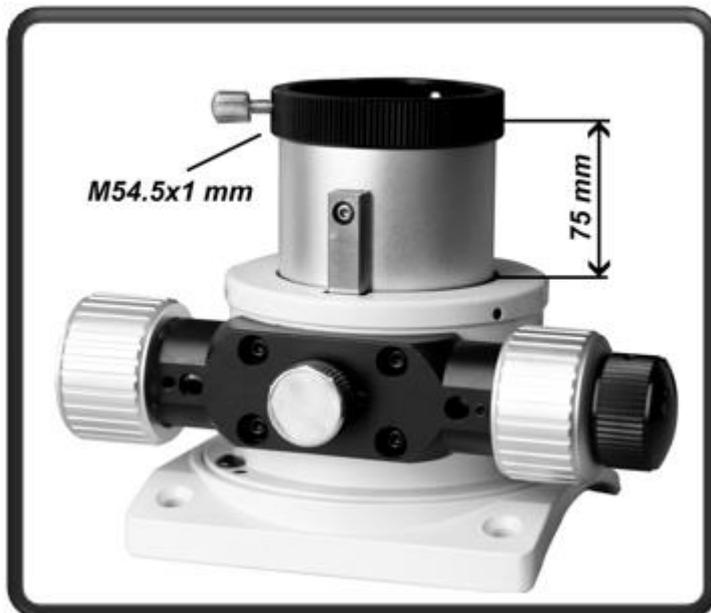
If the star image appears to be unsymmetrical (see Fig 4) a recollimation is needed. Therefore, the blocking screws of the primary mirror on the back of the telescope should be loosened [Fig. 5.1] and the big adjustment knobs will then allow realigning the primary mirror to obtain a symmetric star image again [Fig. 5.2]. These adjustments should be small. After adjusting, by tightening the blocking screws, you can lock the primary mirror in its aligned position.

When misalignment is heavy, an alignment of the secondary mirror should be done also. In that case, it is recommended to use an optional laser collimator. This laser collimator greatly helps in determining the misalignment of each mirror.

# Part V: Specifications

## Telescope specifications

<i>Optical Design</i>	Newtonian Reflector
<i>Aperture (mm)</i>	458 mm (18 in)
<i>Focal Length</i>	1900 mm (74.8 in)
<i>Focal Ratio</i>	4
<i>Primary Mirror</i>	Parabolic, Low Expansion Borosilicate Glass
<i>Secondary Mirror</i>	Flat, Low Expansion Borosilicate Glass
<i>Central Obstruction</i>	120mm, 26%
<i>Highest Useful Magnification</i>	914 x
<i>Lowest Useful Magnification</i>	65 x
<i>Limiting Stellar Magnitude</i>	16
<i>Resolution (Rayleigh)</i>	0.28 arc seconds
<i>Resolution (Dawes)</i>	0.25 arc seconds
<i>Light Gathering Power (Compared to Human Eye)</i>	4266 x
<i>Fully Illuminated Field</i>	44 mm (1.7 in)
<i>Optical Tube Length</i>	1940 mm (76.4 in)
<i>Optical Assembly Weight</i>	50 kg (110 lbs)



The focuser's drawtube has a maximum extension of 75mm from the base. For specific applications, requiring more than the standard 55mm back focus, it is possible to machine a custom ring (thread M54.5x1mm) to replace the 2 inch accessory support and use it as a base to affix specific accessories.

**Please do note that the 75mm drawtube course doesn't mean there is 75mm of free back focus. Please do test there is enough back focus for your configuration before requesting a custom made adaptation ring**



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