Shipping note UNC / ONTC / CT

Because of its size, the Newtonian has been partially disassembled for shipping security.

Your should have received the following parts:

1. Telescope tube without optics
2. Accessories (finder, eyepieces - depending on standard equipment)
3. Primary mirror cell with installed mirror
4. Secondary mirror with holder

The optical components are secured with wadding and cardboard. The secondary mirror has two latches at the ends of the adhesive tape so it can be removed easily. Same for the primary mirror. Please take care that the mirror surfaces are not being damaged if you remove their protections.

Primary mirror installation at ONTC telescopes (3 screwed connections with the tube):

To connect the tube with the primary mirror cell, lay the tube flat on the floor or a solid table with a soft cloth. Secure it with cushions against rolling.

Lay the supplied screws ready to grab.

Tube and mirror cell are marked with tape in order to maintain the correct orientation.

Place the mirror cell so that it aligns with the tube markings. Do not touch the mirror surface.

After the cell has been aligned with the corresponding tube bores (three focus positions are possible), push the screws in the bores and tighten them with a screwdriver.

If the tube is turned while installation please take care that the mirror cell does not tilt inside the tube.

After all screws are in place, fix them with the supplied washers and nuts to the tube.

Primary mirror installation at UNC telescopes (6 screwed connections to the tube):

Place the tube upright on the floor on a suitable mat. Lay the supplied screws ready to grab.

Tube and primary mirror cell are marked with tape in order to maintain the correct orientation.

Place the mirror cell on the tube's end according to the tape alignment marks. Take care not to touch the mirror surface. Also take care that your fingers are outside the closing gap between cell and tube!

Tube and cell fit into each other firmly. Turning the cell is afterwards normally not possible; you have to remove it out of the tube before. Screw in the supplied screws with your fingers. After all screws are in place, tighten them with a screwdriver.

Installing the secondary mirror:

Secondaries having a central threaded rod are removed before shipping in a way that keeps the lower nut in its position. So the secondary has only to be pushed from the lower side into the spider vane. The correct position of the secondary relatively to the focuser is kept. Please take care that the secondary's surface is neither touched nor scratched during installation. Finally, fix the mirror holder with the second nut.

Secondaries having a central threaded bore (normally M6) are packed together with a locking screw, big washer and eventually a spring. The locking screw is pushed through the middle hole of the spider vane. Then, the spring is placed on it and finally the washer. The three collimation screws are secured with tape: After the secondary is secured with the screw, it has reached its correct position.

Just in case you have to unmount the whole secondary spider or the collimation screws lost the preset position, there is a small ring mark on the secondary mirror, just like the one on the primary. It is not exactly in the center of the secondary, but shows the correct position with the necessary offset. Since this mark is that small, it is completely covered by the shadow of secondary, so it might not be visible or disturb your image.
No matter of you are using a laser collimator, a Cheshire or a Concenter collimation tool, you only have to place the secondary that way to the focuser that your laser or the center mark of your collimation tool hits the center of the small circle.
After this, you may just need to collimate the secondary as you would normally do.

For the final collimation, please consult the following collimation manual and have suitable aids (Laser, Cheshire) ready.

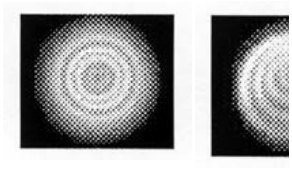
If you have questions regarding the assembly or collimation, please feel free to contact us!

Your TS-Team

Collimating a Newtonian Telescope

Point the telescope at a star with medium brightness (Polaris is a good idea) and use an eyepiece with approx. 100x - 150x power. Defocus the star slightly. If you see a pattern like shown in picture A), everything is okay and a collimation is not necessary.

If you see a pattern similar to picture B), a collimation should be performed.

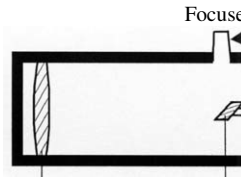


A) Good collimation

B) Bad collimation

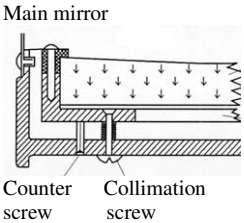
Tipp: If you defocus stronger, the secondary mirror can be seen as a dark shadow inside the defocused star. If this disc is concentric, everything is okay (coarse test). For a precise collimation, choose a night with steady air with good seeing conditions. The stars may not flicker.

The design of a Newtonian telescope is simple. In its front end, secondary mirror and focuser are placed; at the back end, the main mirror with cell is located. Both mirrors are mounted in adjustable cells; with these two cells, the whole telescope is collimated.



The secondary mirror has three collimation screws; the central screw holds the mirror cell.

The primary mirror has three pairs of collimation and counter screws. Some Newtonians have a protective plate behind their mirror; this plate has to be removed before collimation.



The optical performance of a Newtonian depends directly on its collimation quality. This is even more important for fast systems, e.g. f/4.

We examine the collimation

Newtonians are often suspected to be badly collimated. In many cases, a bad seeing is the true cause for a bad image. If you think your telescope is nevertheless misaligned, you may perform the following test:

Laser collimator

For a quick and precise collimation, a Laser is a good recommendation. In a few minutes, you have an aligned system. This is especially valuable if you have a bigger system that is transported often.

Cheshire collimation eyepiece

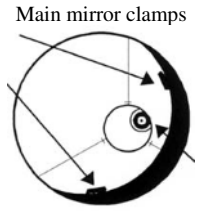
The Cheshire is not that comfortable but the result has the same precision. It is more versatile than a laser because it can also be used for refractors.

Before you begin, make sure you look centrally into the focuser. A film can or Cheshire eyepiece will do. First, check that the secondary is centered. Ignore reflected images. The rim of the secondary must have the same distance from the draw tube's rim around the full circle. Normally, this adjustment is done with the assembly in our optical workshop. If a telescope has been disassembled, the test has to be done indeed.

Secondary adjustment

Point the telescope to an evenly lit surface (NEVER at the sun!) and look through the focuser without eyepiece. Ignore internal reflections and the spider vanes.

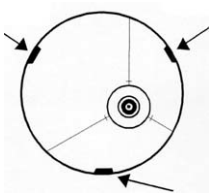
By turning the collimation screws carefully, the secondary mirror is brought exactly in the middle. This is seen best by the three holding clamps of the main mirror.



Ignore internal reflections

The picture on the right shows the situation with collimated secondary mirror.

The three primary mirror clamps can bee seen at the same time. The secondary is now pointing at the primary mirror directly. The spider vanes seem to be off-axis; this will be corrected in the following step.

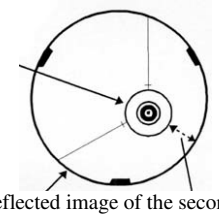

Situation with adjusted secondary

Primary mirror adjustment

After the secondary has been adjusted, we now collimate the primary mirror with its three collimation screws.

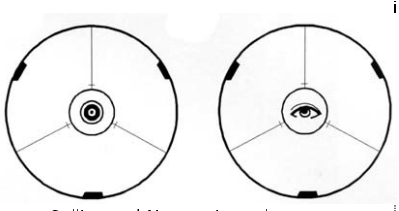
First, loosen the counter screws. By turning the collimation screws slowly, you see which side has to be worked at.

This process is easier if someone helps you, even with bigger Newtonians. Then you only have to observe and comment the appearing changes.


The reflected image of the secondary is brought into the middle

After the reflected image of the secondary has been centered, carefully thighten the counter screws. Turning them by hand is sufficient; if too much tension is applied, the mirror cell might be bended.

Now the collimation is done. In steady air, the maximum performance of your telescope can be used!


Collimated Newtonian telescope.

Left side: with collimating aid

Right side: view with your eye

Useful collimation tools:

Laser collimator Quick and precise collimation aid. With its straightforward manual, even a beginner can adjust his / her Newtonian within minutes.

Cheshire With a reflected light beam, a precise collimation is possible for Newtonians and refractors also.

Clear skies!

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