ASTRONOMY EXPERT R.E.E.G.O. COLLIMATOR INSTRUCTION MANUAL

USER GUIDE FOR NEWTONIAN TELESCOPES

Dear Customer, thank you for purchasing the Astronomy Expert R.E.E.G.O. (R.E.E.G.O = Recognition of Elements Extraxiality through Glows Observation; R.E.E.G.O = Recognisation of Elements Extraxiality by Glance Observation), universal collimator, compatible with refracting OTAs, Newtons, RC, Cassegrain-derivatives, catadioptrators. Using this instrument is very simple and intuitive, but we suggest you to follow this step-by-step guide, always acting with no haste, taking all of the time required to perform a proper and accurate operation!

This collimator is supplied with a pre-installed CR2032 battery. Please make sure that it is functional and correctly inserted before proceeding.

All of the collimation processes with R.E.E.G.O. they can be executed in the day time. We therefore suggest you to start placing your OTA on a flat table, removing all of the caps and covers.

Step 1: preliminary setup

To perform a correct alignment, please insert the R.E.E.G.O. collimator in the eyepiece holder of your refractor, being sure to maintain it in perfectly coaxial position compared to the focuser and the OTA. If you do not have a concentric eyepiece holder you can also simply place the collimator in your standard eyepiece holder, preventing to tighten the locking screws: the R.E.E.G.O. is very light-weight yet very robust, so you will not have to worry about potential disastrous falls.

Keeping the tube in a HORIZONTAL position, proceed step-by-step, as follows:

- Withdraw your telescope's focuser in full, bringing the draw tube to the minimum possible extraction.

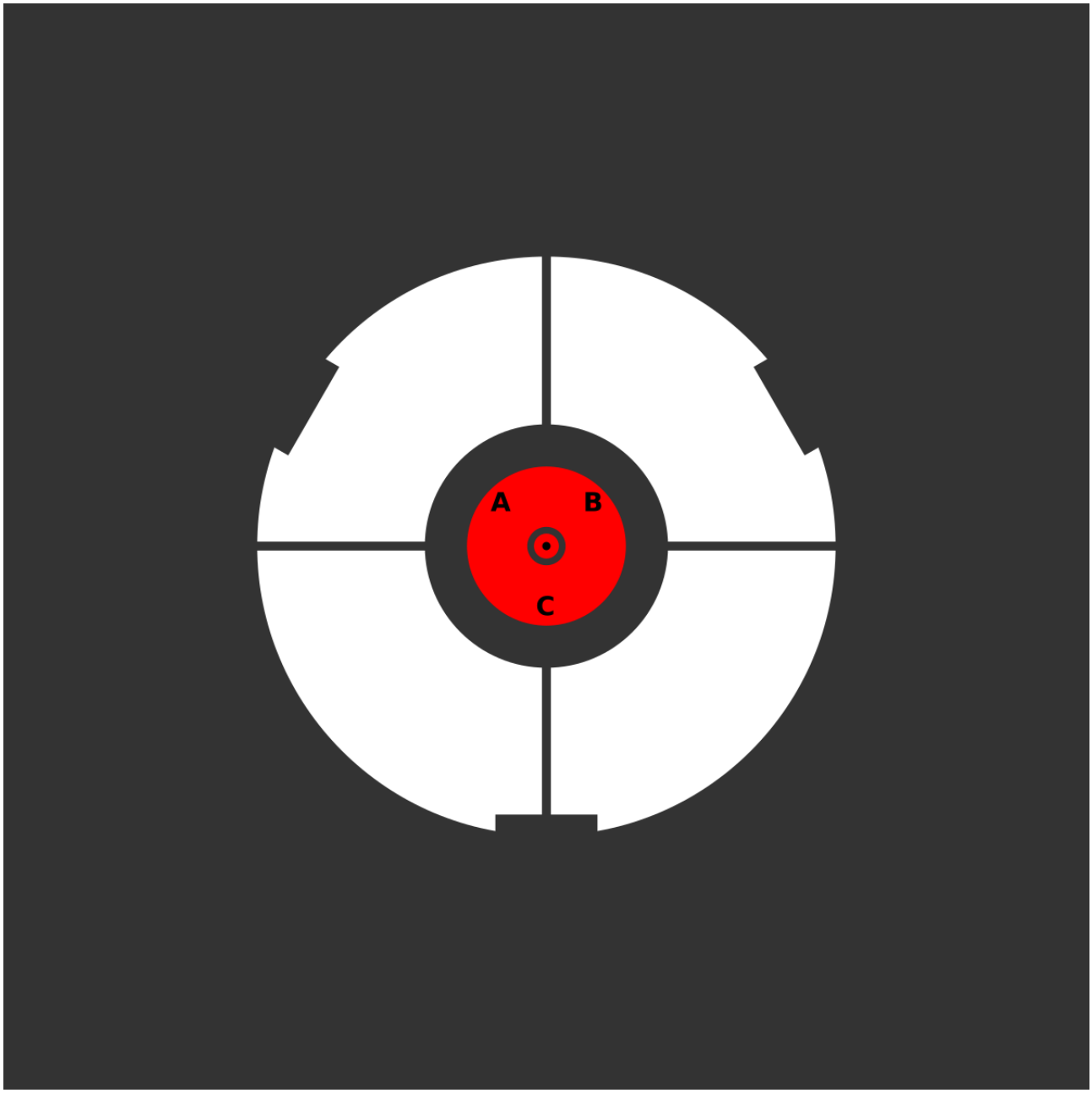
- Insert the R.E.E.G.O. collimator in your eyepiece holder, paying attention to concentricity, as described above.

- Rotate the collimator until the letters present on the inner surface of the R.E.E.G.O., as they can be seen reflected by the telescope's mirrors, do match primary mirror adjustment screws. This will help you to handle the screws correctly. To help you identify the correct position to reach, you can spot the position of one of the the screws with a finger or a stick, in front of your telescope, and then observe it through the hole on R.E.E.G.O.

- Point the telescope towards a flat white surface, like an empty painted wall or a white cardboard sheet.

- Turn on the R.E.E.G.O. in "Newton" mode. You will see four white LEDs light up.

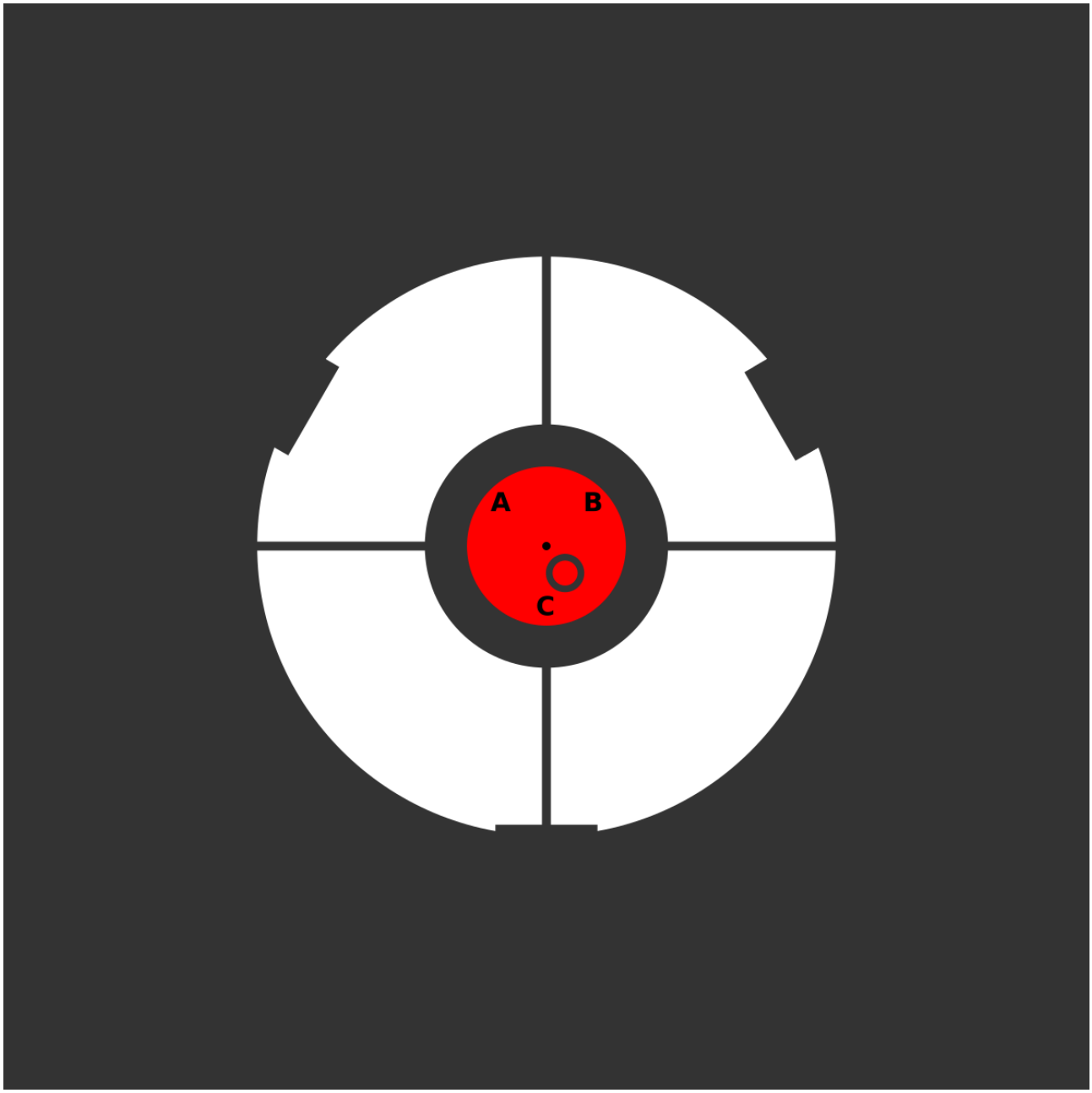
Now, looking through the collimator's front hole, if your OTA is perfectly collimated you should see someting like this:



Depiction of a properly collimated newtonian.

If what you see corresponds to what is depicted here above, simply stop here: your OTA is already perfectly collimated!!

More probably, you should see something like that:



Depiction of a mis-collimated newtonian.

If your telescope shows a pattern similar to the one above, then collimation is required.

Let's start!

Step 2: collimation of the secondary mirror

First af all, you do need to reach a proper secondary mirror collimation.

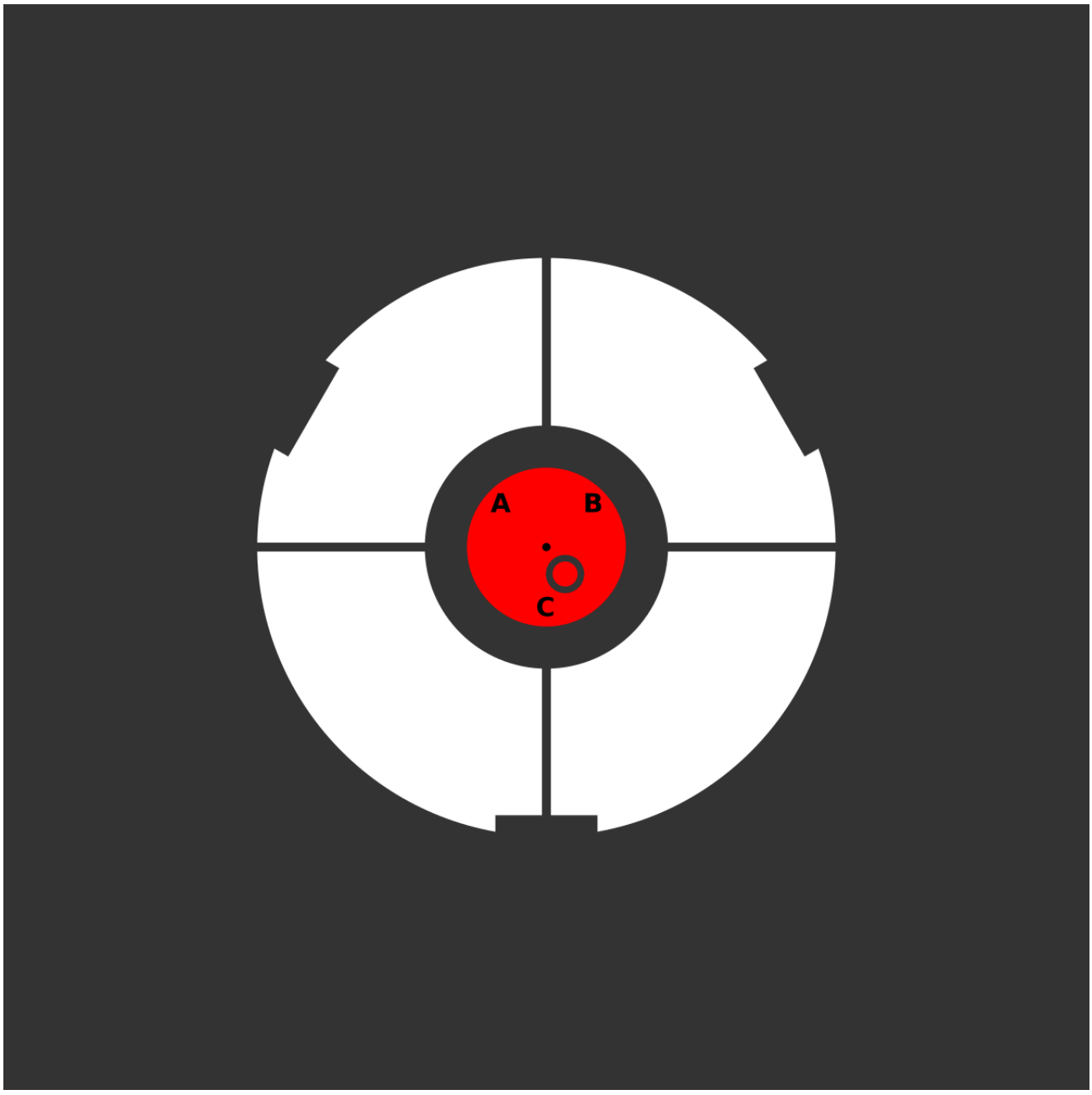
This is quite simple to achieve: you simply need to move the three frontal adjustment screws on the secondary cell, until the reflection of the entire primary mirror diameter si clearly visible within the reflective surface of the secondary mirror, you are directly looking to.

To help you in this simple operation you can take advantage of the primary mirror support clips, which correspond to the three dark notches present along the edge of the illuminated circle that you are observing through your R.E.E.G.O. If the secondary mirror fully contains the reflection of the primary mirror, and if the two mirrors are concentric, the staples should look identical in size.

The operation can be completed successfully without an excess of zeal, for all telescopes from F5 upwards: in most of the newtonian OTAs on the market the secondary mirror is in fact almost always slightly oversized, to prevent light and resolution losses. Only for primary mirrors from F4.5 downwards, the offset of the secondary mirror becomes relevant. We will deal with this at the end of the manual, in a dedicated section.

Please, always remember to respect the correct mechanical tensioning of the secondary cell by avoiding excessive tractions or backlashes that could affect quality and stability of the collimation. Time and practice are your the best allies.

If everything has been accomplished properly, you should see something similar to this:



Depiction of a collimated secondary mirror and a mis-collimated primary mirror.

If what you see through the collimator corresponds to what has been depicted above, let’s proceed to the primary mirror collimation.

Step 3: collimation of the primary mirror

To collimate the primary mirror, you normally require skills and a good practice to act firmly on the collimation screws, as they normally are six, they operate in couples of opposites, and it is not always obvious to understand which screw your should loosen o tighten, to get the results you are expecting.

The R.E.E.G.O. collimator however, allows you to manage this operations perfectly, in a clear and very simple manner. First of all, if you have complied with the instructions given in step 2, now the letters A, B, C printed on the inner surface of the R.E.E.G.O. collimator, will each be perfectly corresponding to a pair of movement / block screws.

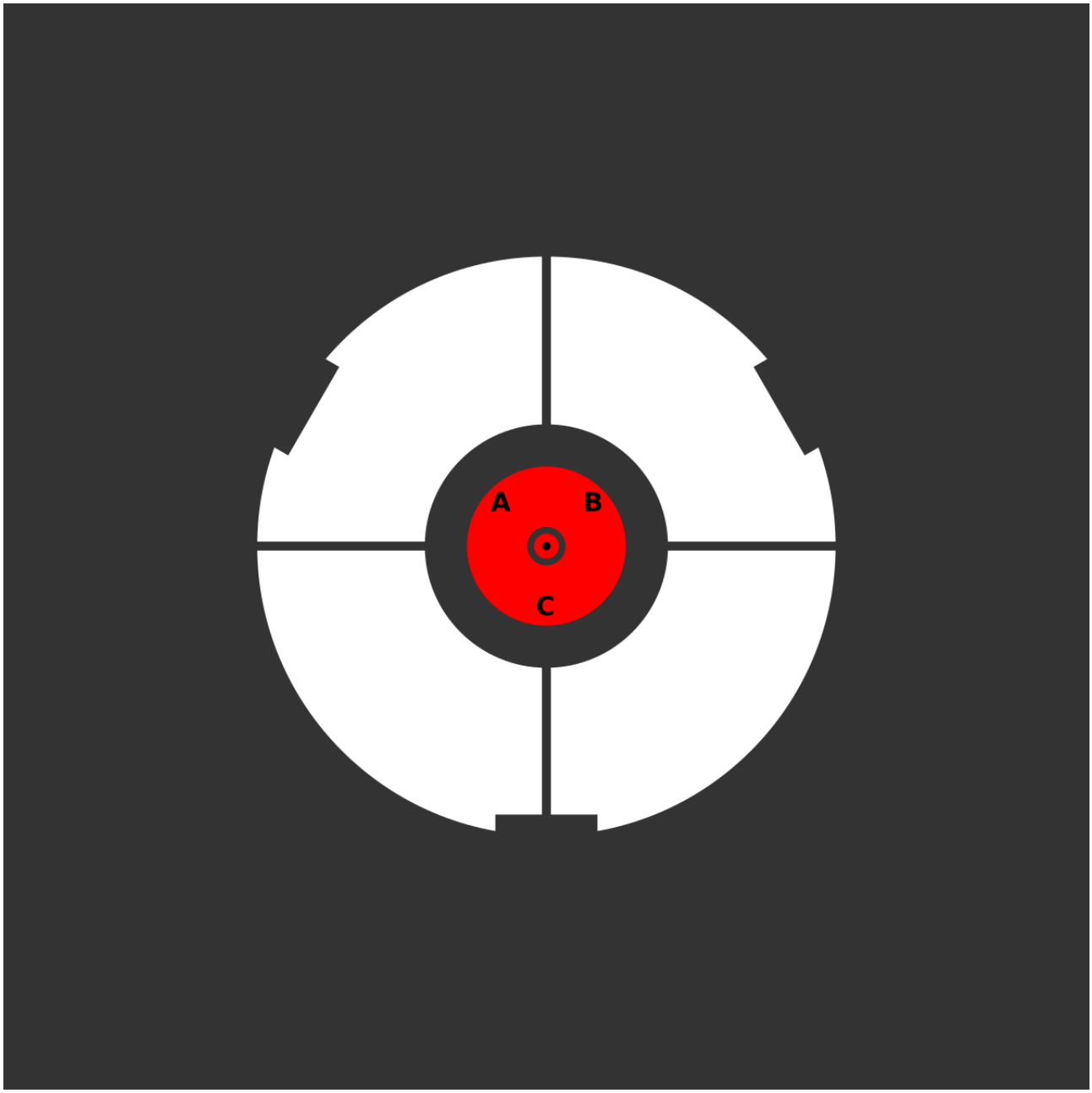
Start by slightly loosening all of the locking screws, then observe the decentring direction of the round marker on the primary mirror compared to the center of the collimator. You can now act on the primary mirror's movement screw corresponding to the letter in the direction of which the primary marker is off-center. Do act on screws until the marker comes in a perfectly concentric position to the center of R.E.E.G.O.

In the example shown above, you will have to act by slightly loosing the A-screw and slightly tightening the B and C screws. The latters should be half operated each, respect to the first. For example, unscrewing A half a turn, you will have to screw B and C both of a quarter turn.

Once the collimation has been completed, proceed to tighten the locking screws progressively, at the same time checking not to introduce unwanted variations in the collimation previously reached. Please always remember not to leave the locking screws fully loose, otherwise you will get a loss of collimation in a very small time. At the same time, however, also please do not exceed cell tension limit, as this could compromise the optical quality of your telescope. The optimum is to proceed with a progressive tightening, until a stable and lasting result is achieved.

If the off-center is very few, you can also directly act on a single handling screw, without caring too much about the others. Tensioning is always lurking around the corner, it's true, but please also consider that primary mirror cells are made of aluminum, a metal which is elastic enough to allow that. Furthermore, a bad collimation often causes a much haevier degradation of the optical performance than a very slight tensioning.

If you did a good job, what you will see will look like this:



Depiction of a properly collimated newtonian.

Step 4: more on newtonians collimation

If necessary, you can repeat the collimation of the secondary and primary mirror iteratively, to compensate any further unwanted variation in the optical alignment.

It is particularly recommendable to repeat Step 2 and Step 3 in case you own an OTA equipped with triple adjustments (secondary mirror, primary mirror, focuser) or if you have a dedicated tilter.

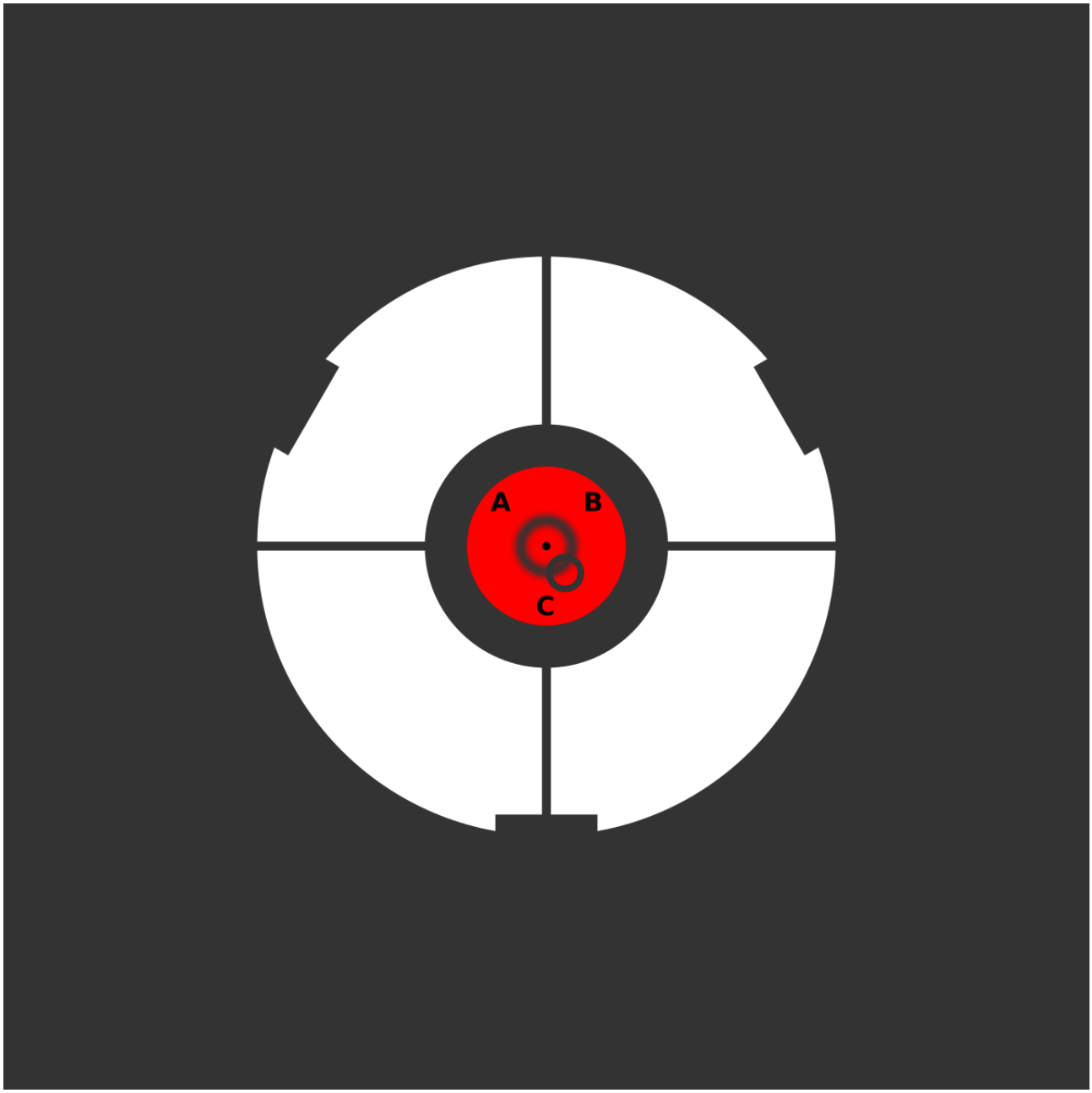
If the round marker in the center of the primary mirror is missing, you should disassemble the primary mirror cell and, using a permanent marker or a small round sticker, mark the center of the mirror.

Step 5: secondary mirror offset

Regarding the most open newtonians (from F4.5 downwards), the offset of the secondary mirror is absolutely relevant. Normally that parameter is pre-calibrated by the manufacturer and does not require any specific consideration by you, at least unless you proceed to disassemble the secondary mirror's cell.

In high-end newtonian telescopes the offset is often marked on the secondary, similarly to what is usually made on primary mirrors.

If you wish to disassemble the secondary mirror for any extraordinary maintenance, our advise is to calculate the exact offset required and to mark it on the secondary mirror, drawing an ellipse in the correct position with a permanent marker or a sticker. If there is a marker on the secondary, use that as a further reference for collimation to be accomplished. Looking at it through the R.E.E.G.O. you will see it rather blurry.



Depiction of a collimated secondary mirror with offset marker and a mis-collimated primary mirror.