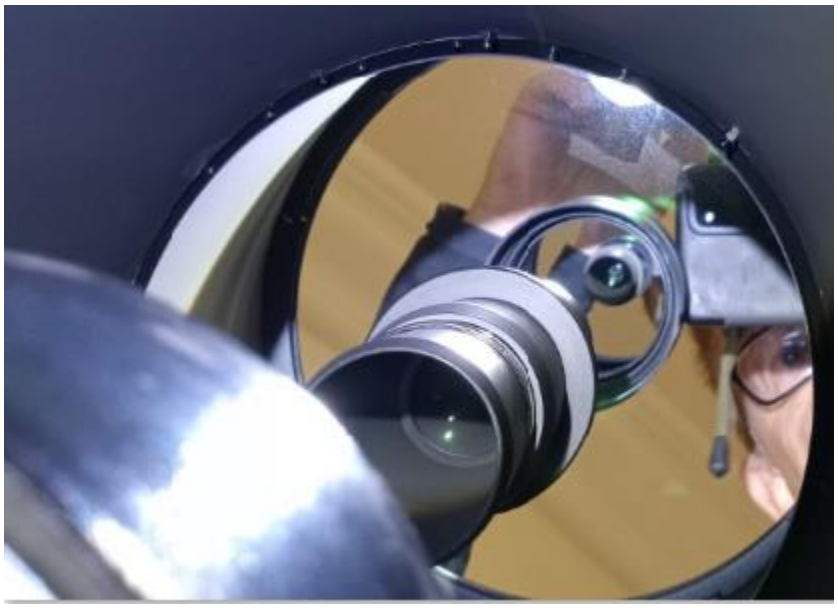
Celestron C11 Edge HD Notes

Contents

Quality Control Issues Found

Mirror Surface Issues

I was appalled after receiving my Celestron C11 EDGEHD telescope to find that the primary mirror was covered with massive defects – see image below.



After having spent almost $5K on the telescope, I expected to receive a high-quality tool in perfect shape. Not only was the entire primary mirror covered with something that looked like a sprinkling of snow, but an "L" section of the mirror was covered with something that looked like 6" of snow!

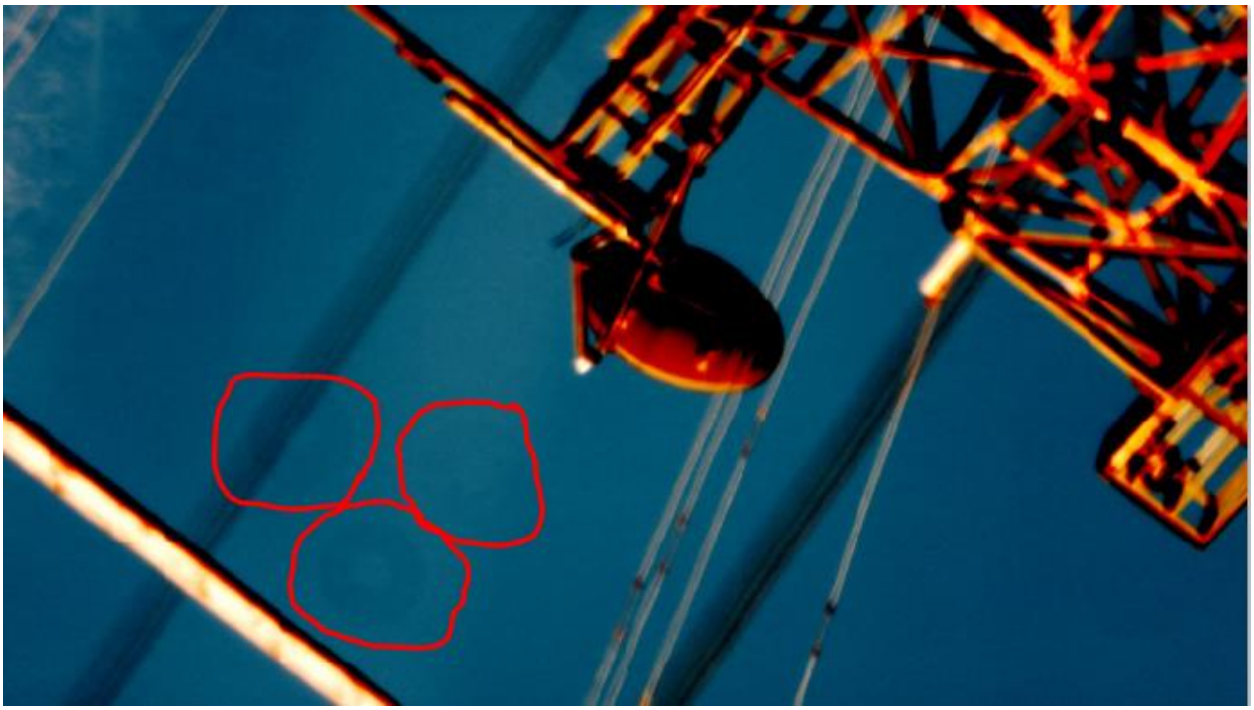
I called Celestron tech support to complain and spoke with 2 different people, both of which said that this wouldn't make any difference and that they had seen **way** worse complaints from other people. The second person explained that this was the aluminum finish on the mirror and not actual dirt.

Additionally the second person, and many astronomy threads (ex: Cloudy Nights) tell you that ANY mirror, when you shine a flashlight on it, will show lots of defects so it is probably best not to get too worked up about this.

If you think about it, one of the reasons this is not so critical, is that the light coming from each square inch of primary mirror gets focused down to only a handful of pixels on the actual camera sensor. Naturally, everyone would like a perfect mirror, but very few are willing to pay for that level of quality so we all have to accept some level of compromise.

Ghost Circles in your SCT Images

Sometimes you will see the following “ghost” circles in your image on an SCT. Sometimes it is 3 circles, sometimes just 1 or 2.



This is very perplexing at first, and since I had first observed it immediately (literally the first picture I took) after receiving my new C11 EDGEHD (after having used a C8 XLT for years and never seeing this) I assumed this was something wrong with the new telescope and complained to Celestron.

While I was waiting for Celestron’s reply I ran another set of tests. It was about 70F inside and 40F outside. I put the telescope outside and started taking images every 15 minutes. What I noticed was that there were no ghost circles on the images for about the first hour, then I noticed them for a few minutes and they went away again. Surprisingly, they came back again briefly about another hour later, but they were very faint this time.

What I figured out was they were due to the three SCT secondary mirror collimation screws which alter the secondary mirror’s thermal expansion characteristics because the glass is thinner in front of the screws. This causes the mirror to expand and contract differently around the screws – producing the ghost circles.

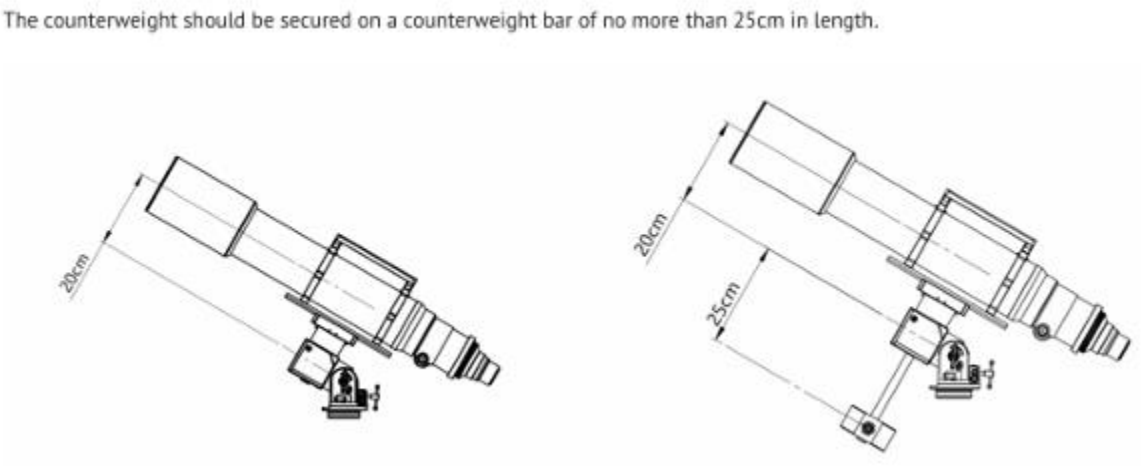
The solution, of course, is simple – allow the telescope to achieve thermal equilibrium with the outside air before you start taking pictures. As you can see this can take an hour or two depending on the outside temperature. There are tube cooling fans that you can add to your telescope to speed up this process.

Mount Issues

Because of the large 11” tube size on the C11, this presents a special problem using it with the AM5 mount. As can be seen below the AM5 mount is spec’d to hold 44lbs of load with 11lbs of counterweight – however that 44lbs “must” have a center of gravity no more than 20cm from the center of the AM5.

The C11 center of gravity is approximately 10.5” (5” center of AM5 to bottom of tube + 5.5” half of tube diameter) or 26.67cm – 6.67cm over spec. So even though my loaded (optical train, cables, ASIAir, etc.) C11 weighs only about 36lbs (well below the 44lb limit) the mount failed to operate properly in some positions using only 7.5lbs of counterweight.

I had borrowed the 7.5lb weight from my CG4 mount and had to add the extra 4.1lb CG4 weight to get the AM5 to move properly in all positions. This 11.6lbs is slightly over the AM5 recommended 11.0 counterweight, but I am not seeing any problems so far.



As a side issue, I wasted lots of time trying to use the 10lb counterbalance weights and bar from my AstroMaster mount which was too short, thin, and light. This does not work, even though it will screw into the AM5. Don’t mess around – buy the recommended AM5 bar.

I’m glad I got the C11, and not the C14, now as I suspect that the C14 would not work using the AM5 mount due to its increased weight and higher center of gravity.

Focuser Notes

Here is a cut away illustrating how the focus mechanism works.

Interesting Link about C11 focus issues: C11 EDGE - Focus and focuser data - Cats & Casses - Cloudy Nights.

The thread pitch of C11 Edge HD's focus shaft is 0.75 millimeter. 1 complete turn of the focus knob moves the mirror 0.75mm. So, end-to-end mirror travel is 2.7675cm given the approximate 36.9 turn travel.

Mirror Flop Issue – Due to Focuser Knob Position

Prefer to have the focuser knob ABOVE the mirror so that it is pushing/pulling the TOP of the mirror. This allows gravity to automatically move the bottom of the mirror to hang in the correct place.

If the focuser knob is below the mirror, it will push/pull the bottom of the mirror and the top of the mirror 'may' (not always) 'flop' around causing the mirror to be tilted, and not perpendicular to the light path. This tilt will cause the image on the sensor to be offset and, with a small sensor camera, make the camera image appear to be all black.

If you are looking through the eye piece, you might not even notice the 'flop'. This is because you are seeing the entire light path, and not just a small piece like the camera sensor.

EAF Limits Setup

The C11 focuser knob moves through approximately 36.9 complete turns.

I setup the EAF 'zero' position to be one focuser knob turn away from 100% clockwise (closest focus.)

I setup the EAF 'limit' position to be approximately two focuser knob turns away from 100% counter-clockwise (farthest focus.) It was actually set at 34 complete turns above the 'zero' position – or 34 * 5,760 = 195,840 (5,760 = #of EAF steps for one full rotation.)

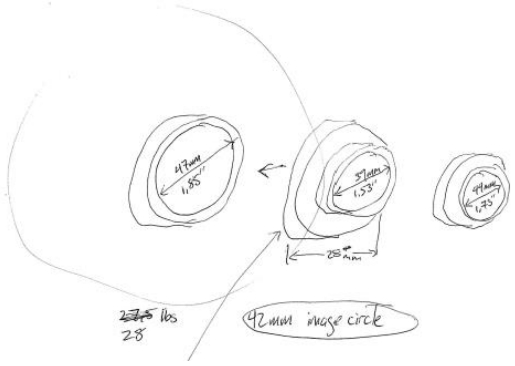
ZWO EAF Settings for Various Targets

- Flip Mirror Optical Train – 25mm Reticulated & ZWO ASI533MC Pro.
  - 97,576 – **Stars** (via auto-focus)
  - 97,765 – **Jupiter** (at perigee – closest to earth) ??? – should be < Stars focus
  - 97,000 - **Radio Towers Behind my House**
- Tele Vue Power Mate Optical Train – Tele Vue Power Mate 2.5x & ZWO ASI533MC Pro
  - 97,523 – **Stars**
  - 80,973 – **Jupiter** (at perigee)

Flip Mirror eye piece 'star' focus was 102,934 (+9,284) **before** I fixed the back focus from ~160mm to 146mm (factory spec) – see Cloudy Nights discussion.

Visual Back Options

I was surprised to find that the visual back supplied with my C11 only had a **39mm aperture** while the telescope claims a 42mm image circle. This visual back appears to be shaving at least 3mm off the image circle.



I was able to find two other options that provide larger apertures. The Baader aperture is 2" (50.8mm) and the Celestron is 63mm. Reviews of the Baader show that it fits my C11 EdgeHD.

[Baader 2" SCT Click-Lock 2956233 $118] [Celestron Large SCT and EdgeHD Adapter 93666 $39.95]

The FlipMirror II has a measured maximum optical pathway of about 52x31mm because of the mirror obstructing the top, and the OAG the bottom, of the pathway. This would still accommodate the large sensor size of the ASI2600 23.5x15.7mm or the ASI62000 30.6x30.6mm.

So, the image circle reduction doesn't seem to matter for most practical matters.

Back Focus

Cloudy Nights Discussion – Important Notes

From: How Critical is the C11 Edge HD Backfocus - Cats & Casses - Cloudy Nights

The C11 Edge is corrected for a back working distance of **146.05 mm (5.750") measured from the rear-most surface of the what is called the baffle nut**. If you unscrew everything from the back of your telescope, the baffle nut is the part that has a male 3.290"-16 "SCT" thread.

> Nitpick (that's my job): Isn't an SCT thread 2", not 3.29"? My EdgeHD 8" has a 2" "SCT" thread on the rear baffle nut. My EdgeHD 11" has a 3.25" thread on the rear baffle nut and came with a 3.25" to 2" "SCT adaptor"
>
> Ok...that's a good question. I have to admit that I'm not 100% certain of which part has the official "SCT" thread. Most of the references that I've seen point back to the thread on the baffle nut so maybe there's a "small" SCT thread for the C8 and C9.25 and a "large" SCT thread for the C11 and the C14. The thread size that I gave is for the C11/C14. Don't ask me how, but I've seen the actual Synta part drawing for the C14 Edge baffle nut and it shows a male 3.290"-16 UNC thread. The drawing is in Chinese so I couldn't read the date. The spec may be out of date, it may be a goof, or there may be some reasons for it. All of the other Celestron references to the "large" SCT thread on their site show a 3.25"-16 thread for the female side. 0.040" is not insignificant so I don't quite understand the difference. I'll try to find out and let you know. In the meantime, I agree that the "real" value should be 3.25"-16.
>
> Precise Parts lists the baffle nut thread as 3.3"-16 and I just went and measured my 14" Edge and it is 3.285"-16. Therefore, I think that the part drawing is correct and the design spec shows a **3.290"-16 UNC thread** on the baffle nut.

The Celestron tolerance spec for the image plane is +/-0.5 mm. For most visual applications (i.e. just looking through the scope,) you can relax that spec to around +/- 10 mm. I've found that if you get the image plane to within about +/- 2 mm, it works pretty well--even for imaging.

If you get the image plane too far out of spec, you'll see a LOT of astigmatism. (Remember that astigmatism grows as the square of the field angle so check the edges of the image.) If you want the best performance, you need to actually measure the performance on your particular scope and adjust the distance to the minimum aberration distance and that's a bit involved. So, start off at 146 mm and see how it works. My guess is that you'll be happy with the result.

My original back focus was closer to 160mm because I measured from the back of the 3” -> 2” SCT adapter on the back of the telescope.

Baader Flip Mirror Specs

Technical Data

SKU #	2458055
Connections	S52, M48, T-2
Material	Aluminium, stainless steel
Mirror Material	Multilayer aluminium coating with dielectric protective layer
Optical Pathway	55 mm with S52 59 mm with M48/T-2
Weight	195 g
Dimensions (with all adapters)	63 x 77 x 69 mm

BFM II with DADOS-spectrograph and CCD-camera – no other flip mirror can carry such a heavy load (with such a lever) without bending, which would ruin the precise measurements.

 3

Using the FlipMirror II

The FlipMirror II allows a variety of permanent adaptations to your telescope 1. Use the rotary knob 2 to switch between the rear port 3 and the top port 4; you can use an optional toothed belt to operate it with a motor (not included). An autoguider or a calibration lamp can be connected to the bottom port 5.

General Function of the FlipMirror II

The BFM II lets you switch between a straight light path (**Position A**) for a camera or other measuring instruments and an angled light path (**Position B**), e.g. for an eyepiece. The following figure shows how it works. In addition, a calibration lamp for spectrographs or an Off-Axis-Guider pickoff-prism (that is not affected by the mirror position) can be connected at the **AUX-port** on the bottom.

ZWO ASI533 Camera Specs

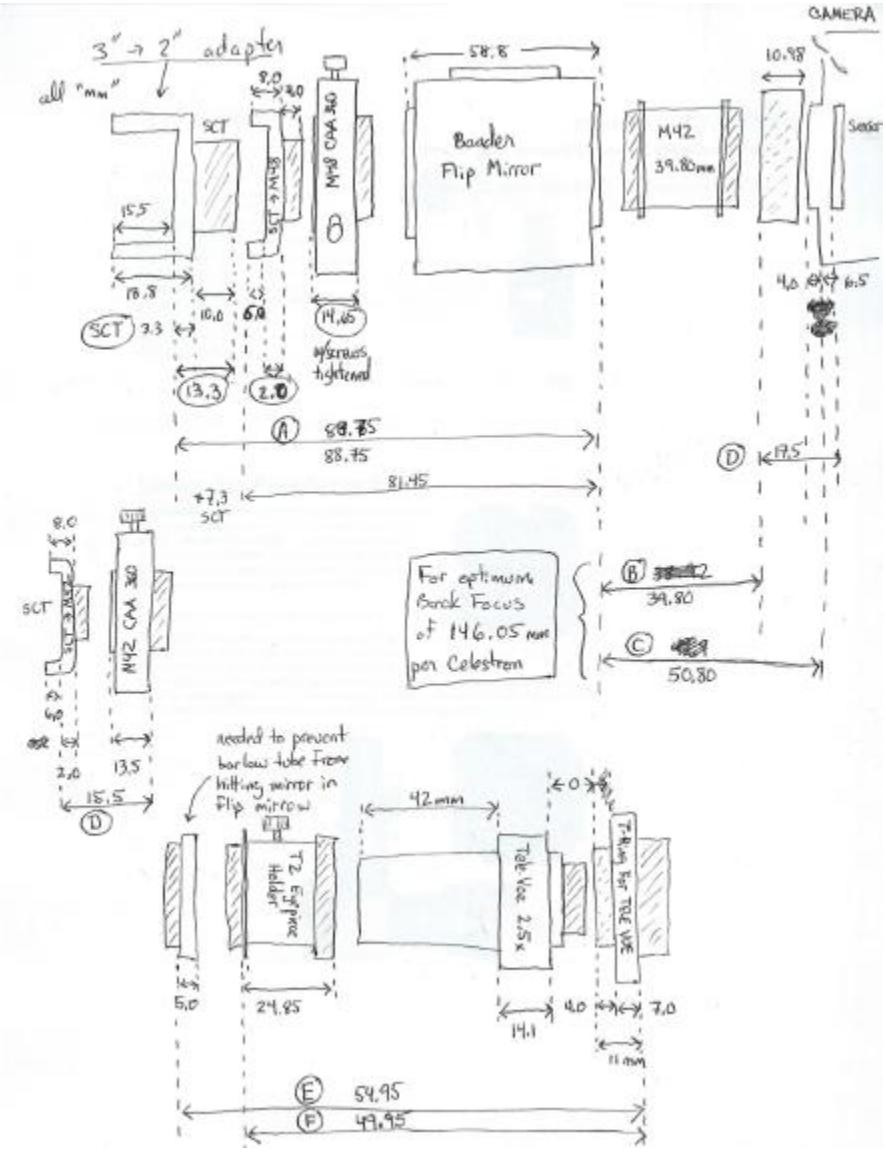
Back focus distance (without T2 Extender Ring): 6.5mm

Back focus distance (with T2 Extender Ring): 17.5mm

Visual Train Mechanical Setup for Baader Flip Mirror

The upper section of the following diagram illustrates the mechanical spacing required to use the Baader Flip Mirror with the C11 telescope giving the most room BEHIND the flip mirror to place a Barlow lens. The lower section shows the minimum spacing needed for the Tele Vue Power Mate 2.5 Barlow.

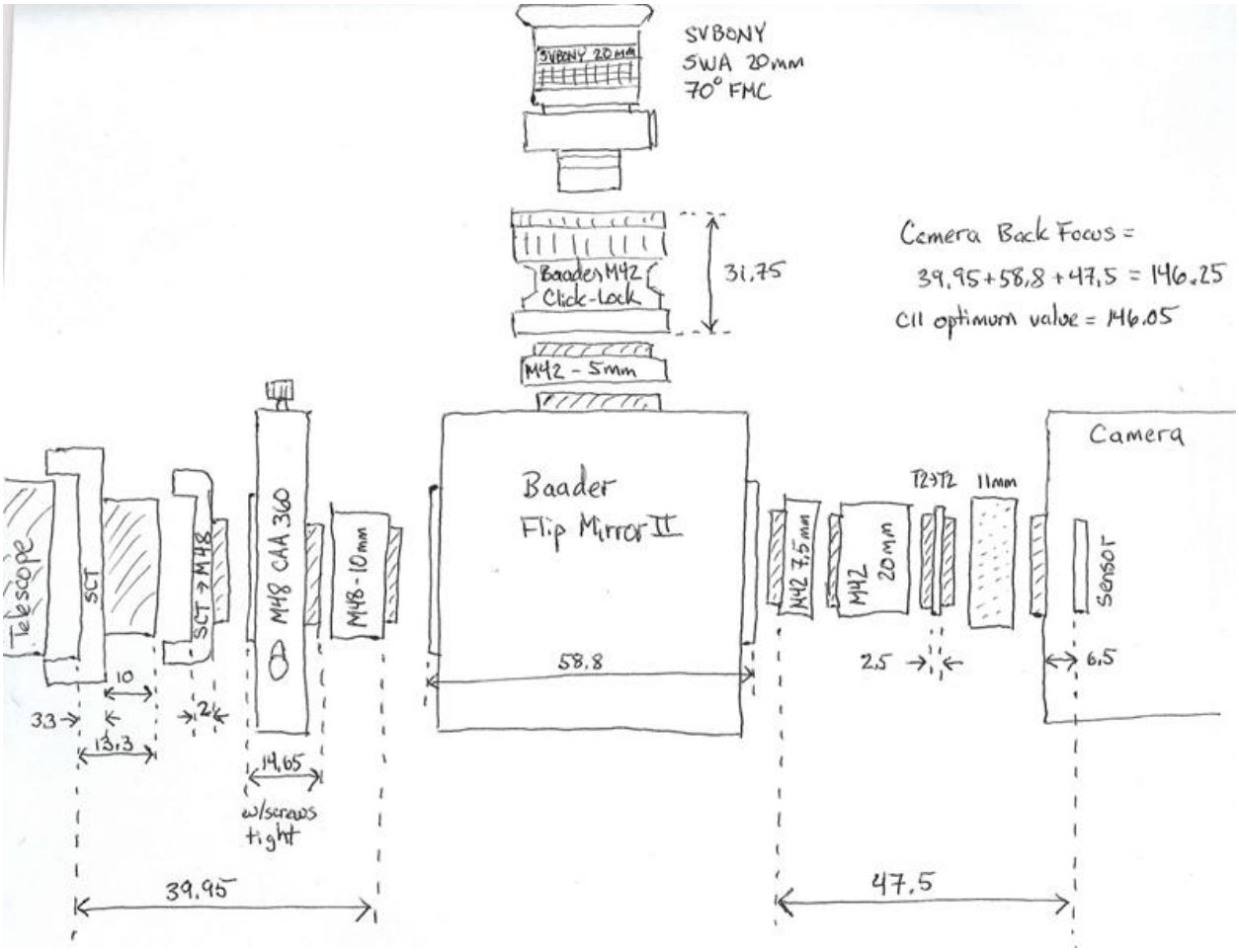
This setup has a measured focal difference between using the eye piece and camera of about -2,820.
Stars = 93,650 w/Eye Piece, 90,830 w/Camera | **Radio Towers** 92,080 w/Eye Piece, 89,260 w/Camera



As can be seen in (B) the available space is 39.8mm. Unfortunately, as can be seen in (E), the space needed to insert the Tele Vue Power Mate lens is 54.95mm – so it is NOT possible to use the two in the same setup. See following page for the actual 'balanced' setup to use.

Due to the limitation (see previous page) of not being able to get 'both' the flip mirror 'and' the Barlow in the optical train, the optical train is better off being re-configured a little bit to balance the camera and eyepiece focal points.

You can see how to do this by moving 10mm of spacer from the back to the front of the flip mirror, and adding 5mm underneath the eye piece click lock holder – see below:

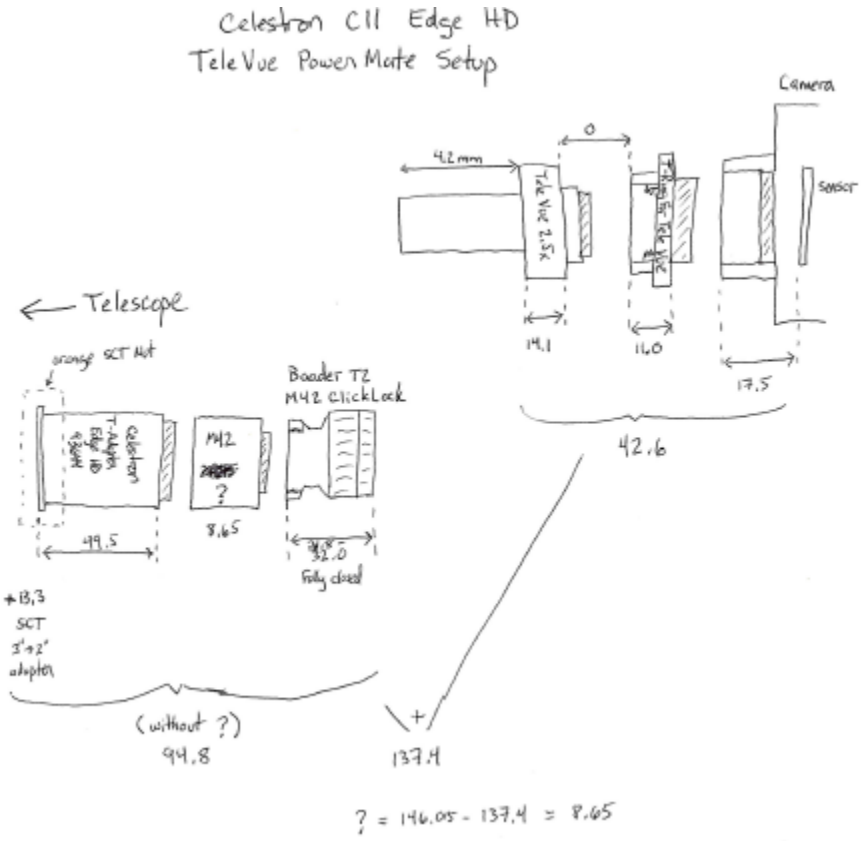


Using this setup you only have to focus the telescope once and 'both' the eyepiece and camera will be in (or very close to) focus.

The focus setting for this is 97,000 on the EAF.

Visual Train Mechanical Setup for Tele Vue Power Mate 2.5x

The following diagram illustrates the mechanical spacing required to use the Tele Vue Power Mate 2.x Barlow with the C11 telescope



Note that most M42 adapters have a limited depth female thread, which is typically about 1mm shorter than the male threads on the Celestron T-Adapter, so you need to add this in too.

I only had a 10mm M2 adapter (not 8.65mm), so (with the extra 1mm above) I am about 2.35mm too long. From reading forum posts you should be OK as long as you are about 1-2mm from perfect, so this is probably OK.

Barlows

Suggested Barlow Workflow

Because the Barlow (especially when combined with a small sensor camera) reduces the number of stars visible to the camera, it will often make it extremely difficult (if not impossible) to focus, polar align and move to your target using the ASIAir app.

By following the steps below, you should be able to do all this, and then switch to the Barlow and start taking pictures.

1. Setup equipment using the Flip Mirror Optical Train so that you can easily focus and polar align without the Barlow.
    a. Important
        i. Remember to do a visual focus with the eye piece first to get the stars looking 'pretty good' – auto focus only works if the focus is already 'close'.
            1. When focusing the camera:
                a. Use the ASIAir 'focus' feature (rather than 'preview') - it is much easier as you get a continuous set of images without having to constantly refresh the screen.
                b. Remember to focus on the polar star to avoid blur in auto focus due to star movement as tracking is not yet enabled. If you forget, this is incredibly annoying because your auto focus keeps mysteriously failing no matter what you do.
        ii. Remember to wait until it is really dark (1+ hour after sunset) or auto focus will fail.
2. Using Goto, move the mount to your target. Wait until the Goto function is completed and has verified that the target is centered.
3. Using the ASIAir app, disable the camera.
4. Unplug the cables from the camera.
5. Remove the camera from the Flip Mirror Optical Train.
6. Remove the Flip Mirror Optical Train from the telescope.
7. Install the Barlow Optical Train on the telescope.
8. Attach the camera to the Barlow Optical Train.
9. Re-connect the cables to the camera.
10. Using the ASIAir app, enable the camera.
    a. You will likely also have to enable the ZWO EAF.
11. Re-adjust the focus (see notes in step 1.)

You should now have the Barlow setup pointing to your target and reasonably close to in focus.

Barlow Notes

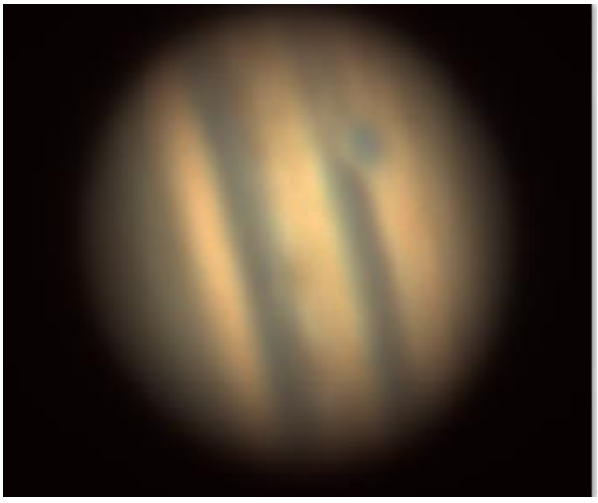
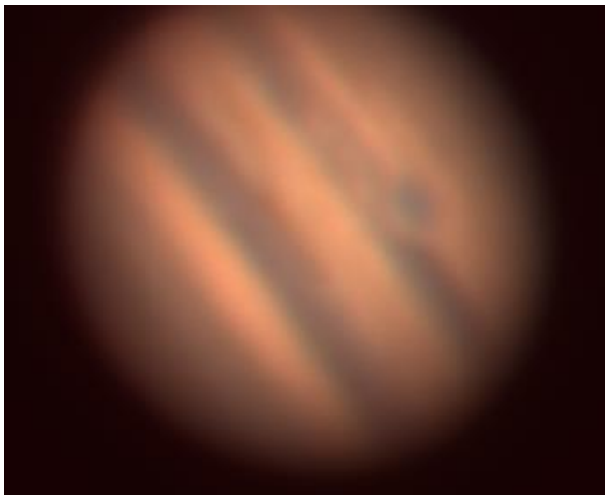
Clean the Barlow! Every tiny speck of dust is magnified to look like a drop of water on the image due to the magnification.

Barlow Example of Jupiter

The following images were all taken on 11/27/2024 (5 days before perigee) – you can click on the images to download the full high-res version so you can see more detail.

These are the native (out of the camera, no zoom) images: left no Barlow, right Tele Vue 2.5 Power Mate.


These are both of the images zoomed in to fill the computer screen so that they both appear the same size: left no Barlow 520x zoom, right Tele Vue 2.5 Power Mate 240x zoom.

If you click on the no-Barlow left image above, you can see that it is highly pixilated, whereas the Barlow image on the right is smooth. However it is a little disappointing that the right Barlow image only shows a little more detail and is still 'fuzzy'. These images were produced with only 10-20 quality frames, doubtless if I spent the time capture more frames I would be able to get better images. On astronomy threads I see people capturing thousands of image to get one good image.