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Imaging with the Baader MPCC Mark III and a TPO 10-inch Imaging Newt

By Austin Grant

If you've read any of my previous articles, you'll know that I'm a gearhead. Astronomy and astrophotography are my main hobbies, and switching up the equipment is just as fun to me as gathering those precious photons. This dovetails perfectly with *ATT*, as it allows me to share my experiences and, hopefully, help readers to make informed equipment purchases.

The Baader MPCC Mark III

One of the most anticipated pieces of equipment on my wish list has been the Mark III version of the Baader Multi-Purpose Coma Corrector. I recently picked one up from Alpine Astronomical along with a couple of necessary accessories.

As a bonus, getting a new coma corrector meant I also needed a new imaging scope. OK, needed might be a bit strong, but new accessories deserve new scopes, right? I was eager to try out a new Imaging Newtonian from Third Planet Optics (TPO), so I called up Oceanside Photo and Telescope and ordered the 10-inch version. The arrival of my new gear brought six weeks of clouds with it. I've never waited so long for first light on new astronomy gear!

Even with a focal ratio of f/4, at 29-pounds this scope is pretty big. And because of the fast optical system, a properly spaced coma corrector is mandatory. I decided to upgrade to the Baader MPCC Mark III because it offered some significant improvements to the previous version, while still providing arguably the best performance of any coma corrector in its price range. The MPCC Mark III has an updated optical formula that leaves it optimized for f/3.5-f/6 scopes. It also has a removable T2 thread, making the clear aperture a full 44-millimeters when used with a M48 connection (**Image 1**).

This works perfectly with my Teleskop Service TSOAG9 off-axis guider, which has the M48 thread on the scope side. Vignetting with the MPCC is minimized because of the larger aperture and also due to a shift in the position of the field lens, which is now closer to the focal plane than in the previous version.

Finally, unlike many coma correctors, there is no magnification increase with the MPCC, and it doesn't require any additional back-focus. If an eyepiece or camera will come to focus in an existing set-up, it will also work with the MPCC.

I don't always use the off-axis guider, so

Image 1 - Baader MPCC Mark III at Full Aperture

Image 2 - Baader MPCC Mark III in hand; Protective T-Ring with UV/IR Filter on the Canon 60Da.

Image 3 - Baader Protective T-Ring and MPCC mounted on the Canon 60Da, ready for imaging.

I decided to get the Baader Protective Wide T-Ring for situations when I needed a way to attach the MPCC to the camera (**Image 2**). It has turned out to be a really great set-up, and it's quite versatile. The T-ring has a wide aperture that fits nicely with the M48 thread of the MPCC, but it also includes a T-thread adapter for threading on T-threaded equipment and a wide-aperture 2-inch nosepiece if you just want to slip it into a standard 2-inch focuser.

Best of all, the protective T-ring has an internal filter compartment that holds Baader 2-inch mounted filters or any 50.4-mm diameter un-mounted filters. I chose a Baader UV/IR-cut filter (Image 2), which works perfectly with my full-spectrum modified Canon T2i DSLR and doesn't filter any additional wavelengths on my Canon 60Da DSLR. It gets its protection moniker from the fact that, once installed, there's no way for dust or foreign particles to get into the camera (**Image 3**).

Another significant feature that I discovered is that the tolerances on this T-ring make it quite snug. I've used cheaper ones in the past that allowed the camera to wobble and left much to be desired, but this one solves that issue. One thing to note is that, if you get the protective T-ring to use with the MPCC at its widest 48-mm, you'll also need to get the T-ring spacer (#2458405) to maintain the proper 55-mm spacing to the sensor.

The TPO f/4 Imaging Newtonian

At this point, I've got my Baader Wide Protective T-Ring with the MPCC Mark III installed. It's time to take a look at the scope I'll be using with it. TPO is a new product line from Oceanside Photo and Telescope, or OPT. The line consists of Imaging Newtonians and Ritchey-Chretien astrographs. The Imaging Newtonians share a focal ratio of f/4 and are offered in 6-inch through 12-inch models with rolled steel tubes. The 8-inch version is also available in carbon fiber. The Ritchey-Chretien astrographs start at 6-inches and go all the way to 16-inches. The smaller versions are offered in rolled steel or carbon fiber, while the larger set-ups are also available as a really cool truss tube. Look for a future article on one of the RC scopes, but for now let's get back to the Imaging Newtonian.

I decided on the 10-inch model because it gave me a nice medium focal length of 1016-mm and fitted nicely on my Celestron CGE mount. I opened the box to discover that the fit and finish of the scope was excellent. The optical tube is a simple white, with no logos or markings (**Image 4**). In fact, the only logo on the entire scope is a small one at the top of the focuser (**Image 5**). It's a nice departure from some of the garish branding seen on some astronomy gear.

The scope arrived with dual split-hinge rings, a straight-through 50-mm finderscope, and a 2-inch extension for the focuser. The mirror cell is a push-pull type, with three knobs for each. It also has a low-vibration fan mounted beneath the mirror to expedite thermal stabilization, and includes a battery

Image 4 - TPO f/4 Imaging Newt mounted. No logos – just a pristine white tube.

Image 5 - The only logo on the scope is located discretely on the focuser housing.

pack to power it. The optical tube interior is painted a flat black, so stray light reflections are minimized (**Image 6**).

As a first impression, the coolest feature has to be the 3.3-inch Crayford-style focuser. It's a dual-speed version, with a 10:1 micro-focusing dial to make perfect focus a breeze (**Image 7**). The 3.3-inch opening steps down to a 2-inch compression ring, and it also includes a 1.25-inch adapter with its own compression ring. Best of all, the focuser features a steel drive rail (**Image 8**). This keeps focusing smooth and precise, and all but eliminates flexure due to heavy equipment loads. Tightening the lock knob has no impact on the focus, a feat I haven't seen in similar Crayford-style focusers in this class.

I installed an ADM D-series dovetail

Image 6 - The inside of the TPO tube is nice and dark.

Image 7 - The 10-inch TPO Imaging Newt sports a 3.3-inch Crayford-style focuser. It's a dual-speed version, with a 10:1 micro-focusing dial to make perfect focus a breeze.

from ADM Accessories, and mounted the scope to prepare for first light. Before any such endeavor, I knew I'd have to collimate the scope first. This is a serious point of fear and frustration for some, but with the right tools it's no big deal. I've used a set of AstroSystems tools, specifically the LightPipe / SightTube and Autocollimator, with great success. But for this scope I decided to try something new. When I ordered the Baader MPCC, Wide Protective T-Ring and accessories, I stumbled across the Baader "Laser Colli III" (**Image 9**). It has a precision aligned laser with an easy-to-see etched viewing plate (**Image 10**). The passive tools are great, but in a permanent set-up such as mine, a quick check with a laser should be all I need.

I quickly used the AstroSystems tools to confirm correct position of the secondary, then switched to the Baader laser. The mirror of the TPO Imaging Newtonian is center spotted for you, so using a laser is quick and easy. The secondary is secured with a four-vane spider, and, though thin, it is quite rigid (Image 6). Adjusting the secondary tilt requires a screwdriver, so in the interest of mirror preservation, I recommend replacing the screws with knobs. You won't drop your thumb and forefinger down the optical tube, but you just may fumble a screwdriver!

After centering the laser on the spot and then aligning the primary by converging the departing and returning beams, the scope appeared to be collimated. A quick check with the autocollimator confirmed, to my surprise, that the scope was very close to perfectly collimated. It's not that I don't trust laser collimators, it's just that they themselves sometimes need to be collimated. This one is spot-on.

Imaging with the MPCC Mark III-TPO f/4 Newt Combination

The scope was mounted, collimated and the coma corrector was in place on the Canon 60Da. This is where I stopped for more than 40-days as I waited for the clouds to subside. When I finally got first light, it was a one-off weather event, and immediately led to a couple more weeks of bad skies.

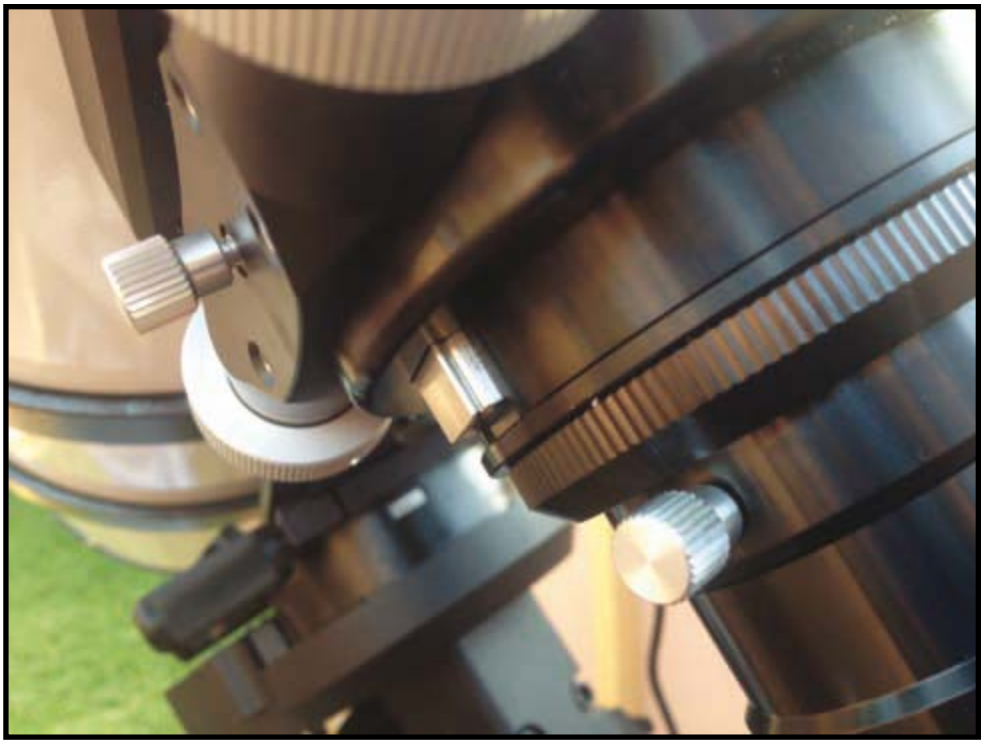

Image 8 - The TPO's 3.3-inch focuser features a steel drive rail to ensure smooth, precise focus.

Image 9 - The Baader “Laser Colli III.”

Image 10 - Etched screen of the Baader Laser Colli III.

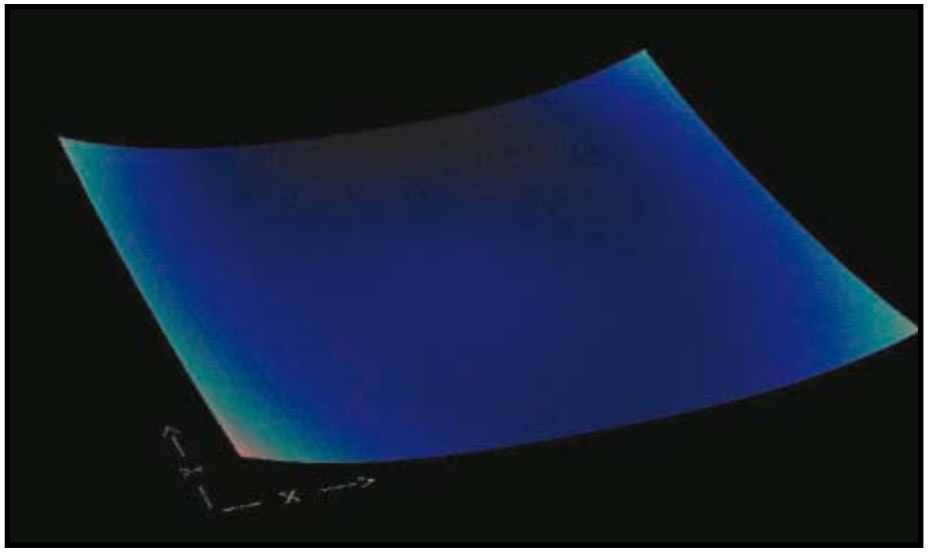

Image 11 - Despite its rather exaggerated form, this field-curvature map created in CCDInspector's 3-D viewer demonstrates that collimation is good and the field is incredibly flat and nearly coma free.

But boy, when I did get to image, the setup did not disappoint.

I started by snapping some quick exposures of dense star fields, with the intent of checking collimation to the sensor plane and seeing how well the MPCC works. Using software called *CCDInspector*, I verified that collimation was good and the field was incredibly flat and nearly coma free.

The software has tons of analytical capabilities, but for this purpose I used the 3-D viewer to create a field-curvature map (**Image 11**). Not until the very corners of an APS-C sensor does the curvature even noticeably appear. The MPCC is clearly a great match for this f/4 scope, and better yet, with the correct components the system is rather plug and play.

Image 12 - M13, the Hercules Cluster. Ten 90-second exposures at ISO 400. The image is a tight crop of the cluster, with tons of detail.

Image 13 - M20, the Trifid Nebula. 20 two-minute exposures at ISO 800.

Image 14: A crop of the extreme lower-left corner of Image 13.

As I mentioned earlier, spacing is critical, so if you don't get the protective T-ring from Baader with the spacer for the MPCC, you'll need to be sure that whatever components you utilize get you to that magical 55-mm distance from flange to sensor. Deviations from this distance cause the image to degrade in a hurry.

After checking the system out, I wanted to get to some real-world imaging. I started with globular cluster M13 (**Image 12**). In my experience, globulars seem to be much harder to image with Newtonians than refractors. Perhaps it's collimation woes, the central obstruction or just all in my head. In any case, the TPO didn't have any trouble resolving some fine stars. I stacked ten 90-second exposures at ISO 400 and was immediately impressed with the scope. The image pictured is a tight crop of the cluster, with tons of detail.

When I finished M13, it was late enough that I decided to stay up and shoot a Milky Way object. M20, the Trifid Nebula, was in a good spot so I slewed over and spent some time shooting south. This time, I captured 20 two-minute exposures at ISO 800. It's amazing how much light-gathering ability this scope has! Fast optics, when well corrected, are just a joy to use. The Trifid came out quite well for such a short amount of time spent on it, and it clearly shows how nice the corrected field is. **Image 13** shows the entire frame, while **Image 14** is a crop of the extreme lower-left corner of that image. As I said, the stars are nearly perfect all the way to the edge of the sensor.

The last night I used the scope before writing the article was spent on some galaxies. First, I captured 10 three-minute exposures of M51, the Whirlpool. **Image 15** is a center crop, showing the detail you can get with just a half-hour at f/4. I then spent two hours gathering three-minute exposures of M101, the Pinwheel (**Image 16**). Again, I know it sounds repetitive, but I just can't believe what this scope can gather in such short time. The wispy outer spiral arms are quite visible, and there are some hydrogen-alpha

Image 15 - 10 three-minute exposures of M51, the Whirlpool. Shown is a center crop.

Image 16 - Two hours of three-minute exposures of M101, the Pinwheel.

regions that are already beginning to stand out.

At the end of the day, this combination is simply superb. The Baader MPCC Mark III is a perfect match for the 10-inch TPO Imaging Newtonian. Given that the MPCC Mark III is optimized for fast scopes from f/3.5 to f/6, it's likely that if you are in the market for a coma corrector this one will do the job. Also, since the focal ratio is the same on all TPO Imaging Newtonian models, you'll have just as much success with any of the other sizes.

I've struggled with properly integrating imaging systems dozens of times, but this one was simple. The addition of the Baader Wide Protective T-ring made and spacer made everything a breeze. The robust focuser on the TPO allowed me to get some really tight stars, with zero image-shift during lock-down or collimation. The light gathering ability is just superb, and it's priced ridiculously low for what you get. As a gear junkie, it pains me to say that I may just stick with this setup for quite some time!

Don't Forget Visual!

Although I don't do a lot of visual work, I should note in closing that the MPCC Mark III-TPO Imaging Newt combination is also quite capable for visual observing. Baader Planetarium is renowned for its comprehensive line of connection components, and its ASTRO T-2 System offers a perfect solution for accommodating any of your favorite eyepieces. As for the fast TPO f/4 Imaging Newt, the same factors that make for excellent imaging also provide breathtaking rich-field view when combined with eyepieces that are specifically corrected for such fast scopes. ATT