by Rod Mollise *04/16/03* | Email Author

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Crayford focusers, those no-gear super-smooth wonders so favored by the Big Dob folks, have finally started to make their presence known in the SCT community. Now, why would a Schmidt Cassegrain owner want a Crayford focuser? SCTs have built-in focusers that focus the telescope by moving the primary mirror. Why the H - E Double Ell would anybody bolt an additional focus unit onto the back of the SCT rear cell?

That was what Old Rod was thinking as he read an email from Anacortes Telescope and Wild Bird's Herb York. Herb, known to many of you from his AstroMart web site (a real service to the amateur community, if I may say so), wanted to know if I'd like the loan of one of his new William Optics (WO)/ Yang SCT Crayfords. I hesitated for a moment• mean, what would I do with this thing? I knew that Crayfords were popular among SCT-using CCD imagers. Mainly, accomplished imagers who can't stand the slightest amount of image shift during focusing. The Crayford eliminates this entirely. BUT•'m hardly what you'd call an "accomplished" CCD imager, having only gotten my feet wet in that demanding field in the last few months. And yet•nd yet•he lure of getting my hands on a new piece of telescope gear was just too strong to resist. I wrote Herb back agreeing to do an evaluation of the focuser, and he told me he'd get it on its way to me as soon as possible.

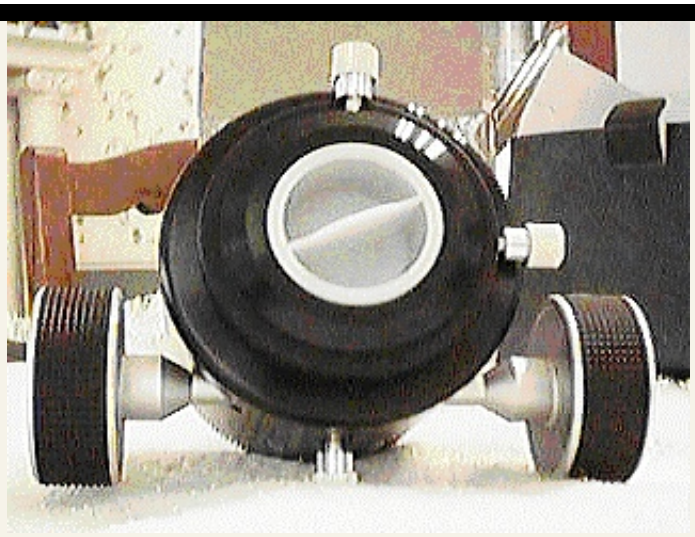


Figure 1: The WO SCT Crayford

In due course, there was a package at my door. As always, I exercised due restraint-aw, c'mon, who am I kidding? I tore the box open just as soon as I got it into my hot little hands! They say that initial impressions are important. And my first impression of the WO focuser was certainly a positive one! This is an undeniably good-looking piece of equipment (see figure 1) despite its surprisingly low price of $135.00, considerably lower than comparable units I've seen. A combination of anodized black and bare aluminum, I had no doubt that this sucker would look pretty darned impressive hanging off the rear cell of my Celestron Ultima C8. Despite an appearance of solidity, the most surprising thing about the WO focuser was its weight. It's solid, but not overly heavy. It was amazingly light in my hands, and I was very relieved. I had assumed that this was going to be one heavy mother, necessitating removal of guidescopes, piggyback brackets, and other accumulated goodies from the SCT. Maybe I'd even have to go on a counterweight hunt. Not the case at all. The focuser was just right, requiring only minor adjustments to my sliding counterweight (you will need a counterweight to achieve balance with the WO in place). Beautiful construction and machining are great. But if an accessory is so heavy that it causes constant balance problems, you just won't use it-take if from me.

But how did the WO work, indoors anyway (just as you'd expect, those nasty old clouds had moved in with a vengeance)? Very well. The unit sports two large focus knobs with rubber coverings that provide a sure and comfortable grip. I played with the WO extensively inside the house on the first evening. Like the Crayfords on my Newtonians, the WO has a buttery smooth focus feel. I did note, though, that the action wasn't as positive as I like. Any Crayford, due to the gearless, roller-style mechanism, will slip if you exert too much pressure on the drawtube or come to the end of the focus travel. The WO seemed to slip with very little pressure applied, though. Just turning the knobs a little too fast seemed to bring on some mushy-feeling slippage. I tried the knurled screw used to lock the focuser drawtube in place. Uh-uh, no dice. You can either have the focuser locked or unlocked via this setscrew-that's it. Tightening or loosening it doesn't adjust focusing tension at all. A quick email to Herb verified my suspicions that the three, small allen screws (see figure 2) on the focuser underside could be used to adjust tension. I found a small allen wrench in my scope tool box and soon had the focus tension set more to my liking.

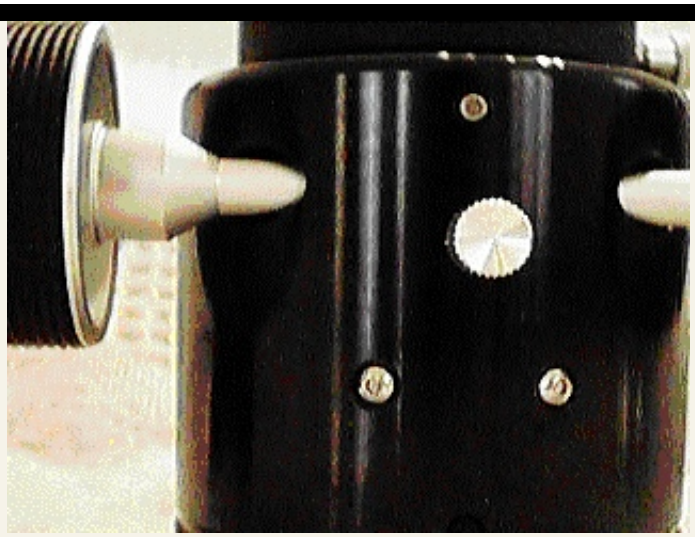


Figure 2

Turning the WO in my hands revealed a couple of very nice features. One that I liked very much was the rotating base. Unlock a nice, large set-screw and you can adjust the angle of a camera or diagonal without loosening said camera or diagonal's set screw or adapter. Reflections and stray light are the bane of every observer, so I made it a point to take a flashlight and peer down the scope end of the focuser's drawtube. What I saw was a well-blackened and threaded tube that will definitely minimize stray-light problems. It is attention to seemingly small things like this that make a piece of gear stand out from the pack. Oh, the setscrews for the focuser drawtube and the 1.25" adapter included with the focuser don't touch your lovely eyepieces•hey compress brass rings that hold your accessories securely without scoring them.

All I needed was a clear night. And down here in the Deep South that can be one of the most difficult things for an astronomer to get. Finally, though, I got some good weather. Unfortunately, it coincided with a past-first-quarter Moon. But that was actually alright. Imaging and viewing the Moon would make it easy for me to see just how well the focuser did its thing. At the high magnifications I'd use during lunar observing and imaging any flexure or stickiness would show up immediately.

My setup on this evening was my Ultima 8 and Starlight Xpress MX-516 CCD cam at f/20 (via barlow projection with a TeleVue Big Barlow) for imaging. For visual work, I'd use my Intes 2" diagonal and a variety of eyepieces. The minute I screwed the WO onto my rear cell (it threads onto your rear port just like any other accessory), a big smile covered my face-I just couldn't help it! Now that looked cool! Nothing's perfect however, least of all astronomy equipment, and I ran into my first small hangup when I tried to insert my Intes diagonal into the drawtube. The fit was tight. Not just for the diagonal, but for my TeleVue barlow and any other 2" accessories I tried. A William Optics diagonal (more on this later) I also received from Herb for review purposes was an even tighter fit than my other stuff. I know that high-end manufacturers like to machine equipment to very close tolerances, but, hey, that's the last thing most observers need out in the dark. If you have to jerk a diagonal or a barlow out of a focuser with enough force to move the scope, you're going to get tired of using the focuser real quick. This was not a fatal flaw, however, and the diagonal did loosen up over the course of the evening.

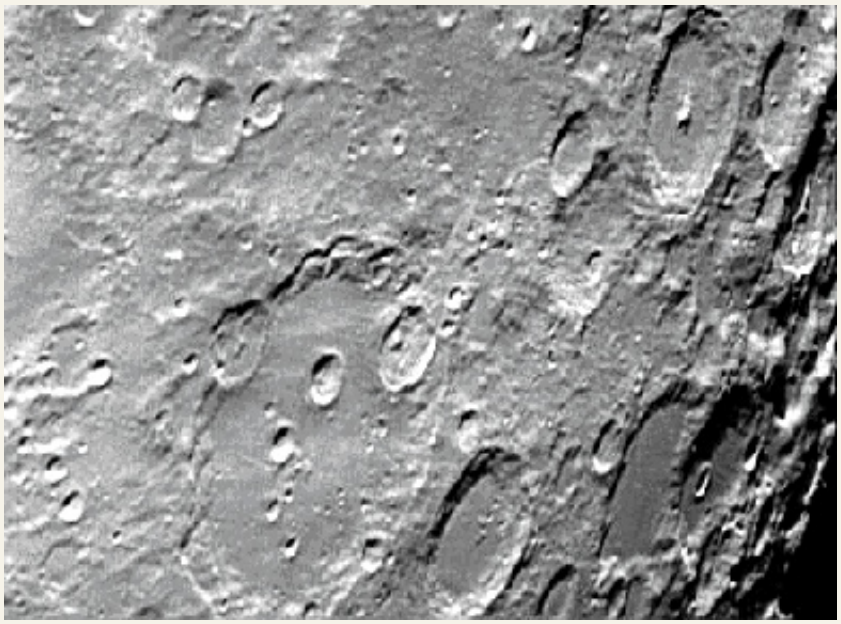
Working with my diagonal revealed another minor irritation. In an effort to get the Intes in and out of the focuser with the least hassle, I tended to back the focuser's setscrew off a lot, and I'd occasionally turn too far, causing it to drop to the ground. Now, William Optics is certainly not the only offender here, but when are manufacturers going to get the message that we need captive setscrews on everything? Nothing is more frustrating than having a small screw drop to the ground and hide in the grass at 2 am! Also, please be aware that the WO is a big piece of equipment. It extends quite a distance back from your rear cell. This is really only a problem (focus issues aside, see below) during polar alignment. I could not leave the Intes diagonal in place with the scope pointed at a declination of 90 degrees. The focuser is just about a ?inch too long to allow the diagonal body to clear the base of the fork. In practice, this is not a huge difficulty. Just insert a 1.25" diagonal if you want to look through the main scope at this point. I use a polar alignment finder for this initial pointing at the pole, so I have no real need to look through the main scope, anyway.

Yeah, sure, we all know that SCT Crayfords are mostly used by imagers, but I thought I'd see how the WO worked for visual observing while waiting for the scope to acclimate and the Moon to rise a little

higher. What I discovered astounded me! I'll say it right now: if you're a serious Lunar or planetary observer, the WO Crayford is a godsend. Not only could I focus at very high power without any image shift, the focus is incredibly smooth and fine. Focusing an SCT by moving the eyepiece rather than the primary mirror just naturally results in very slow, fine focus action. It allowed me to obtain precise, and I mean precise, focus at magnifications of 350x and above. The easy action of the WO also meant that the act of focusing imparted very little vibration to the scope. My Ultima 8 has little focus shift, but I still felt that the WO gave me quite an advantage over standard focusing at high powers and long focal lengths.

How about focus travel and compatibility with various eyepieces? At f/10 I had no problems at all. Any 2" or 1.25" eyepiece came to focus easily. As I'd expected, on the other hand, I couldn't reach focus with any eyepiece when I screwed my f/6.3 reducer - corrector onto the rear cell. I didn't really expect this to work, mind you. The extra spacing added by the WO was just too much. I didn't have the opportunity to check the WO on the deep sky before it had to return to Anacortes, but I believe that it should reach focus with a camera at prime focus with the Celestron/Meade f/6.3 r/c or the Meade f/3.3 r/c.

How about imaging? Again, that's the reason most people will invest real money in a Crayford. In short, it made Lunar Imaging a JOY! As I said earlier, my Ultima 8 doesn't have much focus shift to begin with. But at f/20 - f/30, the focal lengths I usually use to "shoot the Moon," even its small amount of shift means the Lunar feature of interest may move off the edge of my relatively small CCD chip. None of that with the WO. Focusing was quick and precise, and I think my results on the grand crater Clavius speak for themselves. During my Lunar imaging run, I didn't notice any flexure or other problems. I do advise users to be sure to lock the focuser securely once precise focus is achieved. Bumping the camera will definitely change the focus on the WO, and you'll get to start the focusing process all over again.



Clavius the Great!

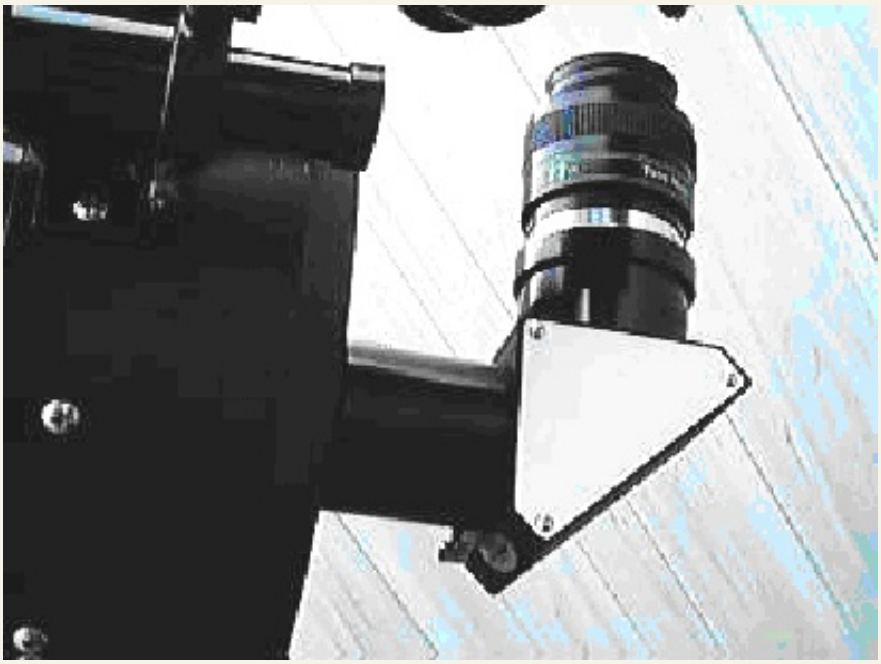
Will this be a good tool for the deep sky imager? I'd have to say "yes," if you're bothered by focus shift or find it difficult to focus precisely using your scope's normal control. However, please be aware that you'll have to forego using a flip mirror when you put the WO in place. Assuming you could rig the adapters to attach the focuser to your flip mirror or vice-versa, a setup like this would place your camera too far back to achieve focus I'd guess.

I should also outline the method you use when focusing with a Crayford like the WO. The focus travel with one of these units is very short-this goes for any Crayford attached to an SCT. The upshot of this is that you cannot use the Crayford all the time. When initially setting things up, you'll first find rough focus with the scope's normal focus control. When you're in the "neighborhood," you can begin using the Crayford. When you change eyepieces or cameras you'll often find you have to use the scope's "normal" focuser to get back into the focus range of the Crayford. This is not a big deal, but some people seem to think that a Crayford can completely replace the normal SCT focusing method. This is only true if you intend to only use a set of parfocal eyepiece in your telescope. In that case, the moving-mirror focuser can indeed be left alone.

Final thoughts?

I was skeptical about the "need" for the William Optics SCT Crayford, but swiftly became a convert. Make no mistake, this is something of a luxury for the average sct-using amateur-though this focuser, priced at $135.00 US$ represents a price breakthrough in an item like this, for sure. But a very useful luxury. I was already aware that a focuser like this one can take a lot of the pain out of CCDing. But what surprised me was what a nice tool this is for planetary-or other high magnification--work. This is a quality piece of gear. And should hold up well under years and years of heavy use. Plus, as I said, this thing makes even your pedestrian Celestar or LX-10 look really cool!

A word about diagonals?BR>
In the course of our emails concerning the William Optics Crayford, Herb York asked me if I'd also like to try his WO 2" diagonal. "Sure," sez I, "why not?" I wasn't expecting anything special when I opened the box from Anacortes. A diagonal is a diagonal right? Wrong! In appearance, anyway, the WO diagonal is different, man! Instead of being all black like my Intes, it features bare aluminum sides and a gold "William Optics" nameplate on the eyepiece end of the mirror housing. My Intes reminds me of a good, solid T72 Tank, while the WO looks more like a Lexus! Like my Intes 2", this is a "refractor style" diagonal. You'll need a separate 2" visual back (AKA '2" adapter') to use this on your SCT. Luckily, I had the chance to try the WO diagonal on Mars, as severe a test as you can make, I suppose. Nice. Very nice.



These things are subjective, of course. And, truly, a refractor or SCT diagonal is much less critical to optical performance than a Newtonian's diagonal. And yet•nd yet•aybe it was my imagination, but I did think Mars looked slightly sharper, and that there was less light scatter in the WO than in my Intes. The difference was subtle, and it may indeed have been my imagination, but this is, no doubt about it, a very nice piece of gear.

Criticisms?

The diagonal was a very tight fit in any accessory I tried. It did go into my Intes 2" visual back, but it took some twisting. I was never able to get it fully seated in the (already tight) WO Crayford. On the other hand, it would no doubt loosen up with a little use. It did fit nicely into an old Celestron 2" visual back I had lying around. Verdict? Stylish to the point of being eye-popping and a very good performer optically.