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### William Optics 2-speed 1:10 Microfocuser Retrofit

The quality of a telescope is often first judged by its optics, but other parts of the telescope play an important role in the user's satisfaction with the scope. The focuser is a critical part of the overall experience. Who hasn't tried to view through a scope where the focuser is so rough, and sticky, that it becomes nearly impossible to get the object in clean focus? It makes the entire viewing process completely frustrating, especially at high power where even the slightest movement seems to overcorrect the last adjustment! And for photographic work, the ability to precisely focus (and stay focused) is essential for even the most basic work. When I got my William Optics Megrez 80 II SD, one of the first things I noticed was the high quality 2" fully rotatable focuser; how nicely it focused, how smooth it felt, and how solid it was. But with every mechanical item, there is nearly always room for improvement. This brings us to the WO 2-speed Microfocuser Retrofit, which is a user installable upgrade attachment, with a dual speed, two knob assembly that is custom designed to fit and match the existing WO focuser.

#### Initial Inspection



The product came well packaged, in 3 bags inside a nicely protected foam lined box. The first bag had the focuser assembly, which was fully assembled and ready to attach. A second bag contained a rubber washer, and two attachment screw pieces, which are used to secure the microfocuser to the main focuser assembly. The third bag contained 3 Allen wrenches, which are the correct sizes needed to fit all of the Allen head screws that are used in the process. The instructions were available online at <http://www.william-optics.com/wowebs/support/manuals.htm> as a PDF

file, and included all of the pictures and steps needed to complete the installation. Basically, everything that is needed to install the product is provided.

My first impression was very good after I opened all the bags and examined everything. The focuser build quality is as good as my other William Optics products, with a very high quality finish, and nicely machined all metal appearance. There are no plastic parts, and there were no visible imperfections. The focuser has a machined satin black finish to it, which differs from the high gloss black finish on the focuser, yet looks nice, if you ever bother to look at the bottom of the scope once it's installed. The unit has a larger silver knob which turns the focuser at the normal speed, and a smaller black knob, towards the outside, that functions as the slow speed focuser knob. For every 10 rotations of the slow speed knob, the main focuser knob turns one revolution. Mine spins closer to 11 turns for 1 turn, but who's counting? It turned very smoothly in my hand, and it had a very solid, well made feel to it.

Since I have a WO Megrez II SD, my retrofit was black with silver and black knobs, which matched the existing color design of the scope. William Optics makes a retrofit model for their various other focusers, including a gold colored one that matches their Zenithstar focuser. It looks like William Optics has made a strong commitment to this product, since more and more of their current telescope models are being

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offered with the 2-speed focuser as standard.



### Installation

The installation was done by me, all alone, and while it did not appear to be difficult, I took my time, and read through the instructions first to make sure I knew what I was getting into. Start to finish takes between 5 minutes and 15 minutes depending on how familiar you are with the product, and your scope.

In my mind the installation breaks down into 3 basic steps, but the actual instructions go into much more detail, with many more steps, and since they are available online, they won't be repeated here.



1. Remove the existing focuser knob from either side ? you can choose which side you want it on, I chose the left side since that makes the most sense for my existing mount, but it's easy enough to switch if you change your mind later on.



1. Attach the focuser retrofit in place of the removed original focuser knob, by sliding it onto the shaft, aligning things and tightening it all up.

1. Adjust the focuser tension until it's smooth, but not too tight, yet doesn't slip under the weight of heavy eyepieces or photography gear.

The original focuser itself is not disassembled, and the retrofit simply replaces one of the original focuser knobs. This retrofit is a bolt-on retrofit providing the original focuser with a way to turn the shaft at 1/10<sup>th</sup> of the original speed, that's all it is. I would say it doesn't sound like much from that description, but it's an ingeniously engineered product, that works exactly like you would expect it to. I discovered several important things in the installation process, which I am happy to share with all who choose to install the retrofit themselves. I think that most people can do this installation themselves. This installation does not require you to do anything complex, do any sort of strange balancing, nor does it even require an extra pair of hands, or even an extremely small pair of hands. Many of these tips are actually already in the instructions, but I hope to emphasize the things that I feel are particularly important, and add a few tips of my own that I think will help anyone who is interested in buying this or is already installing it.

Tip 1: Make sure you have a soft clean surface to work on, and that you have plenty of light or a small flashlight on hand so that you can easily see the small set screws you have to work with. You might want your reading glasses too, if you use them.

Tip 2: Removing the existing focuser knob is easy, but it might require a bit more "oomph" than you would think to loosen the Allen screw, so be careful holding everything. Mine was quite tight.

Tip 3: You will need to place the rubber washer in the inset of the microfocuser housing, and while it appears as though the washer is too big, that is the way it's supposed to work (as the instructions point out), and is needed to allow the microfocuser to tighten to the focuser without scratching or marring the finish, after it has been slid onto the shaft. I only dropped the washer twice before I realized I could get it

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stay stuck inside the inset if I compressed it slightly with my fingers, and then carefully slid the microfocuser in place on the focuser shaft.

Tip 4: You also need to make sure you line up the flat edge of the steel focuser shaft with the Allen head tightening screw, when you slide on the microfocuser onto the steel focuser shaft. It's easy to tell when the flat side is up, since the remaining focuser knob has its set screw facing up when it's on top. It took me a bit of fidgeting to get it slid on, and I have since removed mine and replaced it for picture taking and to write these tips, and it's easy to do this now that I am used to it, but the first time I remember thinking it just wouldn't slide together. It is a very snug fit, so just be patient. The instructions tell you all this and if they are followed, it should fit together exactly as pictured.

Tip 5: The Allen set screw holding the retrofit to the shaft needs to be tightened very securely as well, once you have everything in place. If this critical step is ignored, you will end up with a poorly behaved focuser, which exhibits backlash. I was afraid to over tighten it, and on my first attempt I didn't have it tight enough and I could feel one side move slightly while the other didn't. I tightened it further, and the backlash went away, but care should be taken to not over tighten these tiny set screws. Again, it's the flat part of the shaft that should be what you are tightening it against.

Tip 6: THE MOST CRITICAL STEP - The hardest part of this installation is adjusting the focuser tension. The instructions clearly show how everything gets assembled, but you need to be willing to experiment a little with the different types of screws that affect the adjustment of the focuser. If you have a tripod or mount to put it on for this part you might find it helpful, since it will let you tilt the scope upright to determine if you need more tension to prevent the smoothly sliding focuser tube from sliding on its own due to the weight of accessories.

There are three things that now work together to adjust the focuser.

First, the large silver knob is used to lock the focuser, and is a nylon tipped screw that goes all the way through to the focuser tube, and makes contact with the tube when tightened. This screw locks the focuser from moving, and does NOT do anything to adjust the tension of the focuser. CRITICAL STEP: It should be completely loose during all focuser adjustments, or you will NOT be able to adjust your focuser tension correctly.

Second, the original small silver tension screw was replaced during the installation with a longer black tension screw. This is the screw that tightens down onto the pressure plate that puts tension on the shaft that turns the focuser. If it's too loose, the shaft won't turn the focuser at all, or it may not put enough tension on the shaft to keep the focuser from sliding out on its own when you have the scope pointed upward.

Third, the black thumb screw that tightens the microfocuser to the base of the focuser screws onto the new longer black tension screw mentioned above. This serves only to securely hold the microfocuser in place.

HERES THE MOST IMPORTANT PART ? the black thumb screw must be tight! How tight? VERY TIGHT! In order for my focuser to work smoothly, it has to be as tight as I can get it by hand, which is very tight. If it's not tight, the microfocuser will not operate smoothly, and will seem to have easy and hard feeling zones as you turn it. If the focuser feels this way, you have to get the black thumb screw tighter. Part of the difficulty however, is that because the black thumb screw threads onto the black tension adjustment screw, whenever you loosen the tension screw, you also might be accidentally loosening the black thumb screw. Are you confused yet? Well don't feel bad, once you have it in your hand you will see how it works. TIP ? put on some leather gloves to help grip the machined black thumb screw, since its edges are nicely machined, and you might find that it hurts your fingers to get it really tight, and avoid any sort of pliers that might ruin its finish.

So the easy way to adjust it, in my opinion is to start with the silver locking thumb screw completely loose, and the black tension screw only slightly tight. With it loose, or removed, the focuser slides smoothly (and quickly out if the focuser is pointed down). Mine slid out so quickly it caught me a bit off guard. It won't come out completely, but will stop with a loud clunk when it reaches the end of its travel. The focuser rides on a set of bearing like wheels, so it rolls very smoothly. Now thread on the black thumb screw as tight as you can get it. Don't even attempt to judge how the focuser feels without the black thumb screw tight ? it will feel awful with it loose!

Now, you will need to carefully tighten or loosen the black adjusting screw, in tiny amounts, making sure the black thumb screw is tight, after every adjustment. Remember, this black thumb screw MUST be VERY tight at the conclusion of the adjustment process, or your microfocuser will end up feeling like

there are hard and easy zones of travel on it, that match up with each revolution of the larger 1:1 knobs.

Take your time here. Testing with the extra weight of the diagonal and eyepiece is easy to do, and worth the time to avoid having it too loose or too tight when you actually plan to use it. With the microfocuser in place, the adjustment needed to go from too tight/loose to perfect might only be a fraction of a turn of the tension focuser screw. And remember, things change with temperature, they can expand and contract. Don't be afraid to carry the allen wrench with you in the field (if you lose it, a whole set will only cost you a couple of dollars), in case the tension needs readjusting to keep it perfectly working at different temperatures, especially if you live in a very cold climate like I do. I have found it to work extremely well, even at 10 degrees F in winter.

Tip 7: **IMPORTANT** - When my focuser was completely assembled, and properly adjusted, there was a noticeable increase in resistance while turning the single speed knob over the way the focuser felt originally. This is due to the fact that the single speed focuser now not only moves the focuser shaft, but ALSO spins the slow speed knob 10 revolutions for every one revolution. So it's simply going to take more effort to turn the regular speed knob, and therefore feel stiffer, and harder to turn that what you were used. Don't worry, you will get used to it, and it's a worthwhile trade off.

Tip 8: If you have it setup on a tripod, don't forget that you can rotate the focuser! This allows you to bring the adjustment screws to the top, making it much easier to work on. If you plan on doing photography, now would be a good time to also test it with the weight of the camera gear attached. Once you have the tension set correctly, make sure that the silver locking knob will lock the focuser when tightened for use with a camera to prevent the focuser from moving while taking pictures.

### **My Impressions so far after using it inside (in the basement focusing on the wall) and outside several times (temperatures have been cold, below freezing the entire time outside)**

First, I will say that I have to admit that the original William Optics crayford style focuser is very nice, and remember, you aren't changing the mechanics of the focuser, simply replacing one of the 1:1 focusing knobs, with a 1:10 focusing knob. For many people, especially visual observers, this upgrade might seem like a luxury. It has taken me a few observing sessions to get use to it, but now that I am comfortable with it, I love it. You have the ability to get that last little bit of perfect focus if you are trying to squeeze the details out of the moon, or a planet, or even a double star or globular cluster. Its wonderful to be almost in focus, and then smoothly turn the slow speed knob back and forth, finding the perfect focus point, especially for high power viewing or photographic use. It works well in even very cold weather (8 degrees F is the coldest I have braved so far) and seems to be another good product from William Optics.

**For visual observers:** Where it really seems to be the most benefit is on Lunar and planetary observing, or other high power observing. I think it's a worthwhile upgrade for visual use, and really helps the most at high powers.

**For photographic users:** Focusing my DSLR is challenging. The microfocuser provides a huge improvement in precise focusing that really helps. As long as the focuser has been adjusted correctly (see the tips on adjusting it above) the focuser will not move around with the silver locking knob tightened. This makes getting that critical focusing easier, and I would say that once you try photography with this microfocuser you will not want to be without it.

### **Are there any negatives aspects of the product?**

The cost of the product, while its reasonable priced at \$148 US (at least its reasonable compared to some of the other microfocuser products on the market) might place it lower on the list of needed accessories for some users.

There is one other thing that I became aware of when I got all done with the installation. When I went to put the scope back in its custom foam lined backpack bag, I realized that the foam would no longer fit the new larger and longer focuser. But I can certainly live with that! I was able to rotate the scope in the bag for now, but I think I will cut the foam for a better fit, which is fine, since I can't imagine ever not having the microfocuser now that I have it.

**One Final Reminder:** If the focuser ever feels like its tension is too tight, or it has hard and easy zones as you rotate it, you will likely need to tighten the black thumb screw, or perhaps start over and do the adjustment process again. Don't be afraid to try adjusting the tension until you have it working perfectly.