

## OA-Seriesä Telescopes Use and Care Manual

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DGM Optics™ OA-Series™ instruments offer some of the finest optics and innovative mechanical design utilized by any telescope available to the amateur astronomer today. Outlined here are basic procedures to help you attain optimal performance from your OA-Series™ telescope.

### After your Scope Arrives

Once you have received your OA-Series™ telescope carefully unpack all components and inspect for any damage that may have occurred during shipping. Although it is rare for damage to have occurred during shipping, it is very important to contact DGM Optics™ so a claim can be filed as soon as possible with the shipping company.

### The Basics: Pre-Alignment

Depending on your model, all the OA-Series™ telescopes require some assembly. The **OA-4.0ä** is easiest of all the OA- Series™ telescopes as far as assembly and requires only that the primary mirror is installed in the tube assembly and the split yoke is secured around the circumference of the tube assembly. To install the primary mirror, carefully unpack the primary mirror and remove the (3) machine screws that are attached to the large platter. Then, with the small orientation hole in the large platter aligned with the focuser, gently slide the entire assembly into the tube and, using the predrilled holes in the tube attach the mirror cell and primary to the tube assembly. Next set the tube assembly in the "Split Yoke". Placing the split yoke assembly around the tube assembly and securing it by clamping the adjustable draw latch on the split yoke does this. **Caution:** Adjust the draw latch only as tight as is needed to hold the tube

assembly securely. Then place the split yoke and tube assembly onto the mount struts. You can now proceed to the alignment step.

If you have purchased the **OA-5.1 ATSä**, the **OA-5.5ä**, the **OA-6.5 ATSä**, or the **OA-7.0ä**, you will need to attach the large base plate to the small base plate and strut assembly. To do this, find the (2) 3/8" nuts and 3/8" fender washer attached to the 3/8 machine screw and bushing assembly. Then, remove the 3/8" nuts and 3/8" fender washer attached to the machine screw. Next, carefully insert the bearing/machine screw assembly on the bottom of the small base plate and strut assembly into the bushing on the large base plate assembly. Now, place the fender washer through the 3/8" machine screw and thread the (2) 3/8" nuts onto the machine screw. Tighten the first 3/8" nut "finger tight" against fender washer, then with an adjustable wrench hold the first 3/8" nut in place and tighten the second 3/8" nut down to "lock" the assembly in position. If you find that the mount has excessive play, repeat the procedure described above to attain the desired motion and "free play" in the bushing/bearing assembly. Also, note that this procedure may have to be repeated several times until your mount has been "broken in", or with seasonal changes in relative humidity and temperature. You can now follow the basic primary mirror installation as described for the **OA-4.0ä** and proceed to the align step.

Because of the size and shipping weight of the **OA-9.0ä** the scope and mount are shipped in a disassembled state. All necessary hardware is included for assembly of the mount, and all wood screw holes are predrilled for easy assembly. Also, the fiberglass tube for the **OA-9.0ä** is a "cut tube" which can be disassembled for transport. Once you have assembled the mount and tube assembly you can continue on to the alignment step.



**Alignment Part A: The Secondary**

The OA-Series™ telescopes secondary mirrors are permanently mounted and aligned prior to shipment and rarely require anything more than to be checked prior to aligning the primary. Here is the procedure. First, you will notice that a small indelible ink mark has been placed in the center of the primary mirror. This mark provides a visual reference to the center of the primary when aligning the secondary mirror. Using an empty film can, with a ¼ inch hole drilled in the center and placed in the barrel of the focuser, the mark on the primary mirror should be centered when viewed with your eye on top of the film can. Next remove the film can and with your eye remaining centered over the barrel of the focuser move your eye back to approximately 6 inches away. Repeat this step at distances of 12, then 18, then 24 inches. At each step the secondary should appear concentric and centered with regard to the barrel of the focuser with your eye remaining centered on the optical axis as you move farther from the focuser barrel. If it appears that the secondary is not in correct alignment you can manipulate the secondary by carefully bending the secondary on the brass rod that attaches the secondary to the "L" stalk the supports the whole assembly to the interior of the tube. If you cannot achieve a satisfactory alignment contact DGM Optics™ and I will be happy to assist you. If your secondary mirror appears to be in correct alignment you can proceed to "part B" of the alignment.

### **Alignment Part B: The Primary**

Next comes the easy part: the primary. To provide a constant reference, the primary mirror alignment should be done with the scope pointing on the horizontal looking at a white background. Looking into barrel of the focuser, with no eyepiece, and your eye centered over the barrel of the focuser, you should see only the primary with no image of the secondary visible. Next, if you have a standard OA-Series™ scope (**OA-4.0ä**, **OA-5.5ä**, or **OA-7.0ä**), move your eye slightly towards the rear of the scope, (the six o'clock position if the front of your scope is twelve o'clock). If the instrument is correct in alignment you should see a small "sliver" of the secondary mirror at the twelve o'clock position on the primary mirror. The key to aligning an off-axis Newtonian telescope is in the fact that primary is actually a segment taken from a larger "parent mirror" and it is beneficial to think of it in that way. When looking into the focuser barrel, think of an imaginary "center line" running through the primary from twelve o'clock to the six o'clock position on the primary. This imaginary line runs from the thickest to the thinnest part of the primary and it also points back to the center (apex) of the old "parent mirror". If the alignment appears incorrect, use any needed combination of the primary mirror cell adjusters to bring the image of the secondary mirror to the correct position on the "center line". The procedure for the ATS scopes (**OA-5.1 ATSä**, **OA-6.5 ATSä**, and **OA-9.0ä**) is different only in that the "sliver" of the secondary will be at the six o'clock position, instead of the twelve o'clock position. Other than that the procedure is the same.

## Alignment Part C: Star Testing

The star test is the final confirmation of the correct alignment of your OA-Series™ telescope. The test consists of centering a bright star, beginning at low power, and observing the in and out of focus star images, then repeating the test with progressively higher power eyepieces. In all cases, with the star centered in the field of view, the image should be round and concentric with no trace of astigmatism or coma, (elongation of the star image), both inside and outside of focus. If you find that the image is not concentric when centered in the field of view it is usually only a matter of using the "center line" adjuster on the primary mirror cell and moving the image to the center of the field of view until it is correct. The "center line" adjuster is the adjuster that is marked with the small hole in the large plate of the primary mirror cell. Once you have established the correct alignment by star testing you can note the visual position of the secondary "sliver" and quickly perform accurate alignments. Also, be sure that your scope has reached complete thermal equalization before performing the star test(s). If you are confident that all alignment steps have been completed correctly and still are not sure if the alignment is optimal please feel free to contact DGM Optics™ for technical support.

## Routine Maintenance: Cleaning the Optics

Cleaning the optics should be performed whenever the primary or secondary mirrors have an excessive amount of foreign material on the optics, or when the optical performance is obviously degraded due to surface contaminants. DGM Optics uses the technique described™, but other methods may be used if preferred.

### The Primary

Start by removing the primary mirror and cell from the tube assembly. Do not remove the primary itself from the mirror cell as the method described can be done with the mirror in place. The (3) machine screws used to secure the mirror cell in the tube can be removed during the cleaning process.

1. Prepare a solution consisting of 20 parts distilled water and 1 part mild dish washing soap.
2. Using, **unscented, plain white**, bathroom tissue, take 10-12 two-ply sheets and fold into a square pad, then fold the square pad in half and set on a clean oil-free surface.
3. Then, set aside 6-8 cotton balls on a clean oil-free surface.

4. Next, with the mirror facing up, place the mirror cell assembly under running, room temperature water for about (1) minute.
5. Turn the water off and pour a generous amount of the premixed distilled water solution over the surface of the primary mirror.
6. Then take the cotton balls and saturate them with the premixed distilled water solution and **lightly** swirl them on the surface of the mirror. You don't have to swirl the mixture so as to create a lot of bubbles on the surface, agitate it only enough to see a hint of the soap in the solution. That will usually be sufficient to remove most stubborn dirt or stains on the surface.
7. Next, with the mirror facing up, place the mirror cell assembly under running, room temperature water for (1) minute, except after one minute turn off the water and quickly flush the surface with a generous amount of distilled water.
8. After the surface has been flushed with distilled water quickly turn the mirror cell assembly on its side to drain off excess water. Then take the bathroom tissue pad and **lightly** and **gently** blot the remaining water from the surface.
9. Next, using a paper towel, carefully wipe up the water on the large and small platters of the primary mirror cell. Avoid turning the assembly upside down, and also, avoid touching the freshly cleaned mirror surface. Inspect and repeat procedure if necessary. Reinstall mirror cell assembly in tube assembly.

### **The Secondary**

Because of the crucial nature of the secondary mirror alignment, it is advisable to remove and/or clean it only if there is an excessive amount of contaminants on the surface. To remove the secondary, loosen the hex nut/threaded rod assembly that secures the mirror itself to the "L" shaped stalk. If you need remove the secondary for cleaning be sure to measure the exact distance that the second hex nut is threaded into the brass rod. That will mark the position when the secondary is reinstalled. If possible, use cleaning methods that allow the secondary mirror to remain in place. Try blowing the surface off with low pressure air or wiping the surface with a soft camel hair brush and then gently rake the surface with a bathroom tissue pad dampened with a small quantity of alcohol or methanol. And as always, DGM Optics™ will be glad to give technical support if needed.

## Routine Maintenance: The Mount

DGM Optics™ OA- Series™ Dobsonian style mount offer some of the smoothest tracking and most comfortable viewing possible with a Dobsonian mounted telescope. The optical tube assembly is set in DGM Optics™ Split Yoke™. The Split Yoke™ allows the tube to be balanced and rotated for comfortable viewing of any portion of the sky.

All bushing, bearing and trunion parts are custom made using Teflon (TFE) and Ultra-High Molecular Weight Polyethylene (UHMW). These materials feature excellent friction coefficients with high chemical and temperature resistance. The wood is a beautiful, high grade, Atlantic Birch triple coated with a clear polyurethane finish that will last for years. The finish can be cleaned and polished with any commercial wood preserving products any time you want to bring back the "new finish" shine.

As for Teflon (TFE) and Ultra-High Molecular Weight Polyethylene (UHMW) components, they need only to be kept free of abrasive materials, which may inhibit the Alt-Azimuth motion(s) of the mount. Cleaning these components by wiping the surfaces with a clean cloth that has been lightly dampened with acetone or alcohol. **Note:** It is recommended that chemical resistant gloves be worn when using such solvents. Also, the vertical bushing/bearing assembly should be periodically treated with machine oil such as WD-40, or similar products, to inhibit corrosion of the machine screw and double nut locking assembly.

The OA-Series™ mount utilizes a black anti-static Ultra-High Molecular Weight Polyethylene (UHMW) disc on the large base plate with the small base plate/strut assembly riding on Teflon (TFE) pads. Periodically the base plates can be disassembled and cleaned of any debris, and then treated with WD-40 to increase the smoothness of azimuth motion. The **OA-4.0ä** mount features, believe it or not, vinyl LP records as the surface the Teflon pads ride on.

The **OA-4.0ä** is now offered with a "Teflon strap clutch". This simple, inexpensive, device is built in to one of the struts and applies controlled friction to the trunion bearing and prevents the tube assembly from "falling down" when various eyepieces are used. This device requires no special maintenance. However, a thin coat of WD-40, or machine oil, can be applied to the assembly where the components contact, the trunion bearing, and the Teflon strap. When additional clamping is applied, the smoothness of the altitude motion is enhanced. Also, the "Teflon strap clutch" is available with any of the OA- Series™ telescopes, and can be easily retrofitted to your scope if you need more friction with the altitude bearing motion. Contact DGM Optics™ for more details.

### A Few No-No's

1. Do not loosen the "split yoke" draw latch with tube pointing up. Doing this can result in the tube sliding down on the small mount platter and damaging the tube assembly or the mount.
2. Do not store the Standard **OA-4.0** for long periods (2+ hours) at temperatures greater than 140 degrees Fahrenheit. The Standard **OA-4.0** uses PVC (Polyvinyl Chloride) tubing for the optical tube assembly and is rated for that temperature.
3. If possible try to bring your OA-Series™ telescope into an intermediate temperature area after observing in cold weather. This will help inhibit "sweating" on the optics that can be harmful to thin film mirror coating.
4. **And, Finally, Do Not Look Directly at the Sun with your OA-Series, or ANY Telescope. DOING SO WILL RESULT IN INSTANT BLINDNESS.**

Clear Skies!