The ASO Fine Optics Cleaning System for Precision-Coated Optical Lenses, Corrector Plates & Other Refractive Glass

Note: This edited version of Dr. Clay Sherrod's Arkansas Sky Observatory Fine Optics Cleaning System is intended for use by telescope owners who have purchased Doc Clay's Cleaning Kit, supplied exclusively by Oceanside Photo & Telescope. This article, in its entirety, can be found under the sub-section "Guides" on the Arkansas Sky Observatory (ASO) web site at http://www.arksky.org.

The ASO Fine Optics Cleaning System is devoted to the cleaning of large astronomical reflective optics such as lenses, corrector plates, and other optical glass. The techniques discussed here, as well as the new ASO SuperPlus Solution, however, are excellent for the cleaning of eyepieces, eyeglasses, binoculars, camera lenses and all other fine-coated refractive glass. This cleaning system and the cleaning solutions discussed, however, are NOT recommended for mirrors!

*****Read this entire instruction sheet before you begin! Understanding the process from start to finish is a big part of any successful cleaning job!*****

WHEN TO CLEAN OPTICS:

Although we are attempting to obtain the best possible light transmission efficiency from our optics by cleaning them free of deposits, film and debris, lock firmly in your memory that ***cleaning coated optical surfaces is the single-most damaging action that will be done to them***, short of actual physical damage or breakage. No matter how careful you are or what cleaning solution is used, each time you clean you will microscopically reduce the optical performance when compared to the optics' performance prior to cleaning. Note that the coatings themselves – regardless of who makes them and from what they are made - are nothing more than molecule-thick deposits of a very delicate film left on the optical surface from a vacuum process. During this process, the air is evacuated and the gases of the coating materials are gently and uniformly distributed across the glass surface after the vacuum container is void of air.

So, the ground rule here is: ***CLEAN ONLY WHEN ABSOLUTELY NECESSARY.*** In most cases, dusting alone will lead to tremendous improvement in performance and overall light transmission.

PREPARATION PRIOR TO COMPLETE CLEANING

When you decide to clean your optics, choose a good time and place to do so by following these important tips:

1) CLEAN OPTICS ONLY IN THE DAYTIME WITH THE OPTICAL SURFACE "LOOKING" OUT OF A WINDOW OR TOWARD A BRIGHT OPEN SKY

2) NEVER, NEVER ATTEMPT TO SURFACE CLEAN LARGE OPTICS WHEN THE HUMIDITY IS ABOVE 65%!! Streaking will result. If you attempt to clean your optics when the humidity is high, you will be very disappointed in the results.

3) Turn your telescope so that you are FACING the corrector plate or lens head-on; you are NOT going to use so much liquid that you need to be worried about cleaning solution getting away from you and down inside the retaining rings of the optics. Make yourself comfortable, since you may be there a while! Some prefer placing the telescope in a position where they can sit down to clean. You must have a small table or area nearby where you will have the items in your cleaning kit within easy reach.

DUST, DUST, DUST

Large area optical surfaces are frequently plagued by dust, pollen, grit, debris, and even human skin and airborne hair. If the surface of the glass is exposed to a temperature *below the dew point*, these particulates will stick to the glass and will be stubborn to remove. However, for optimum performance, it is essential to remove debris from the optical surface.

Your optical glass MUST be dusted when:

1) …a flashlight held obliquely against the glass reveals a uniform and fairly thick layer of dust, etc.

2) …pollen is on the glass. Leaving pollen on your optics will result in "pollen sap", which is a very difficult-to-remove stain on the surface.

3) …you are getting ready to clean the glass. **Never clean optical glass without gently dusting first!**

In 3 out of 5 cases you will find that merely dusting off the glass is sufficient to return your performance back to an optimum level, and that further physical cleaning is NOT necessary after dust removal. There can be a lot of smudges, stains, flecks and streaks on the glass before it actually begins to degrade your optical performance for all but the most exacting (i.e., high resolution planetary imaging, CCD spectrography and photometry, etc.) demands put upon your telescope.

To dust, use a *square cut* (not a tip-cut) very soft brush that is about 2" (50mm) wide with tapered bristles. I have found several excellent such brushes at Lowe's and Home Depot and other stores where quality painting supplies are sold. Look for the very soft and flexible "touch up" and/or "delicate trim" brushes....most of these are short-handled and have the bristles as an angled radius cut. Make sure that the bristles are incredibly soft; I use the "cheek method" for testing softness. To use the “cheek method”, take the brush out of its package and push the tiny ends of the bristles hard against your cheek. If the bristles do not "prick" your skin, then they are fine for optical use. Another tip on selecting a brush is the number of bristles: The more bristles a brush has, the more likely it is to be soft and of high quality.

Before you begin dusting the optics, dust the metal surfaces that surround the optics, ridding them of all debris. Then start at the top of your optics and gently swipe the surface in one direction only. *Do not move back-and-forth with the brush, stroke in only one direction*. Do not rub...merely "pull" the brush across the surface and apply no pressure; let the brush do the work for you.

The object of your dusting is to essential "move" all the particles to the bottom of the surface you are working on...once there you can brush them off the area and actually assist their removal by blowing gently against the areas being brushed. Any particles that do not come off with the brush will be removed when you clean with liquid, if you find that step necessary.

What about using compressed air? Don’t do it. Period. Dusting is easy, although it may take a little more time, and it is more effective. I have found that compressed air is virtually worthless for attempting to gently remove embedded particles on a glass surface and the chances of the liquid propellants within the can being expelled in liquid droplets against the glass is quite great.

The ASO SuperPlus Cleaning Technique –

You CAN do it right! The FIRST time!

Here's a tip right up front: ***Plan to use at least one tissue per inch of telescope aperture being cleaned! Always keep a dry tissue to the surface for best results!***

There is no solution that will result in satisfactory cleaning if your technique is sub-standard. When cleaning large glass surfaces, you must normally move quickly but gently in order to obtain a streak-free and spot-free result. However, if you follow this technique, you can move a bit more slowly and deliberately AND achieve the same results.

**** MAKE SURE YOU HAVE DUSTED OFF THE PARTICLES FROM THE GLASS PRIOR TO FURTHER CLEANING! ****

STEP ONE - Turn your telescope so that you are FACING the corrector plate or lens head-on; you are NOT going to use so much liquid that you need to be worried about cleaning solution getting away from you and down inside the retaining rings of the optics. Make yourself comfortable...you may be here a while. If possible, place the telescope in a position where you can sit down to clean. You must have a small table or area within reach where you will have your Synthetic Cotton Replacement Pads, solutions and Kleenex waiting.

STEP TWO - Imagine your corrector plate or lens in QUADRANTS or quarters, like large sections of pie. You are going to begin at the TOP left and work your way down to the BOTTOM left piece of pie.

STEP THREE - Gently shake the bottle that contains the cleaning solution (Solution 1) for just a brief moment and then spray a generous amount of liquid onto a Synthetic Cotton Replacement Pad, NOT the glass surface. You want the Synthetic Cotton Replacement Pad WET, but not dripping; make sure you hold the pad only on ONE side and do not TURN to use the side where your fingers have been.

STEP FOUR - Begin in your upper left "quadrant" and gently daub (do NOT rub) this section until you have generously smeared the cleaning solution across the surface of ONLY that area. Never "push" the Synthetic Cotton Replacement Pad, only pull. Do NOT rub. The idea here is to ONLY move the liquid across the surface to break the adhesion of film and dirt deposits against the glass. ***MOVE QUICKLY TO STEP 5.....***

STEP FIVE - Before the liquid begins to collect into large areas and before any drying takes place, immediately begin wiping the quadrant just soaked with Kleenex tissue to dry it. To do this, you want to gently PULL the Kleenex across the surface in ONE DIRECTION ONLY...do NOT go back and forth as this will cause streaking and will transform the tissue into endless clumps of material that will have to be removed from the surface. You will see the liquid rapidly drying behind you. Follow each swipe IMMEDIATELY with a DRY Kleenex tissue. ***Remember, as soon as your Kleenex tissue starts to get wet, change to a dry one. When in doubt, get a dry tissue!***

STEP SIX - When the entire quadrant is reasonably dry, buff gently with a totally dry Kleenex; repeat a second time with another Kleenex while gently "puffing" a bit of your breath against the corrector plate or lens to expose possible areas of streaking.

STEP SEVEN - Repeat steps THREE through SIX on the remaining three quadrants with a bit of overlap on each. ***Remember, as soon as your Kleenex tissue starts to get wet, change to a dry one. When in doubt, get a dry tissue!***

STEP EIGHT - Check each point where areas overlapped during cleaning and "touch up" using a fresh Synthetic Cotton Replacement Pad sprayed with a VERY SMALL amount of cleaner....you want this swab nearly dry, but just enough moisture to touch up defects in cleaning.

STEP NINE - Using your breath as a guide, gently "puff' against the glass while using a Synthetic Cotton Replacement Pad to buff the final cleaned surface to a high luster with no streaking!

STEP TEN [OPTIONAL] - Using the Rinse Solution. This step is likely NOT necessary and should ONLY be used if there is any streaking left after the careful cleaning procedure outlined above. If there are problem areas, you should rinse your cleaned corrector/lens as follows:

A. Spray a VERY SMALL amount of rinse solution onto the glass OR spray some on a fresh Synthetic Cotton Replacement Pad. You want only a tiny amount of liquid present to break the surface tension of the glass. Remember, the glass is already cleaned from the CLEANING PROCEDURE. All you are attempting to do is to remove any streaks at this point.

B. Gently rub the Synthetic Cotton Replacement Pad across the entire glass area quickly but very lightly and follow with a fresh dry Kleenex tissue *in your other hand* to absorb any moisture remaining from the first pass. This should take care of streaking very quickly.

C. Finally, buff the entire surface with a fresh dry Synthetic Cotton Replacement Pad to finish.

Best of luck and remember to take your time! This solution and technique will work on all coated glass surfaces (NOT MIRRORS) and the solution is ideal as well for your binoculars, eyepieces and camera lenses.

The key to success is:

1) take your time;

2) work in small areas;

3) use LOTS of dry Kleenex; and,

4) use ONLY the materials and techniques described.

Best of luck and enjoy your telescope...may the stars always shine their brightest through them.

WARNING

LIQUIDS CONTAINED IN THIS KIT ARE NOT FOR HUMAN CONSUMPTION. AVOID CONTACT WITH SKIN AND CLOTHING. SEEK MEDICAL HELP IMMEDIATELY IF SOLUTIONS ARE INGESTED. IF SOLUTIONS COME INTO CONTACT WITH EYES, FLUSH WITH WATER FOR AT LEAST FIFTEEN MINUTES, AND THEN CALL A PHYSICIAN.

STORE SOLUTIONS IN A COOL, DRY PLACE, AWAY FROM FLAME OR HEAT SOURCE, AND OF COURSE, KEEP OUT OF REACH OF CHILDREN & PETS.