

Tucson Amateur Astronomy Association

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STEPS TO CLEANING OPTICS

General Notes

- Note 1- Always follow manufacturer's directions for cleaning optics, especially when they differ from what is given here. Some special coatings can be damaged by this process. Use these directions at your own risk. TAAA assumes no responsibility for damage to optics when following these directions.
- Note 2- Clean your optics only when necessary. A few particles of dust do little harm. A lot of dust will scatter light reducing the contrast of your images. Oils should be removed promptly to avoid damage to the coatings.
- Note 3- Since cleaning of optics requires their removal from the tube assembly, the optics will need to be realigned to perform correctly. This is true for all optical designs. Understand how to realign your optics before cleaning them. Good amateur astronomy books include instructions for realignment, or collimation, but be forewarned that it takes practice and some patience. Do not expect the optics to go back into the tube in perfect alignment, even if you carefully mark everything. It may look close, but close inspection with an out of focus star will show misalignments.
- Note 4- Prevent dust from settling on your optics. Keep all openings plugged when not in use. When possible, store telescopes horizontally. Newtonians can be stored vertically with the mirror aimed at the ground. Keep the focuser racked in to reduce the chances of getting dust through the space usually present between the focuser and the outside of the tube. Place a loose fitting plastic bag over the diagonal. Store refractors with the lens pointed up so dust inside the tube will not settle on the inside lens surface.
- Note 5- The most important thing to remember when cleaning optical surfaces is that particles can scratch and oils can stain or destroy coatings. Air and running water should be used to remove most particles before any patting or wiping is done. Use ABSOLUTELY NO PRESSURE at first!
- Note 6- Cleaning optics requires patting or wiping with Kimwipes or lens tissue. Use low-lint wipers which contain no perfumes, coloring, or lotions. Kimwipes come in various sizes and are available from some scientific stores in Tucson. Do not use silicon based lens wipes that are intended for eyeglasses.
- Note 7- Be very careful not to touch the optics with the part of the Kimwipe that you have touched as oils from your skin will be transferred to the mirror/lens, resulting in oil on your clean optics.
- Note 8- Mirrors and lenses should have beveled edges which help to reduce the risk of chipping the edge. **Always** use some padding under the mirror/lens when standing lens/mirror upright to avoid chipping the edge.
- Note 9- While you have the optics out, vacuum out the tube to remove any dust. Also check that all surfaces are painted flat black. All screws and nuts, even if they are out of the optical path, should be painted flat black.

Additional Notes for lenses

- Note 10- These instructions are for cemented lenses. For uncemented lenses, consult an expert. Rotation of the optics is a concern when working the uncemented lenses. Some lenses have oil between them which will need to be replaced with the correct type. Some uncemented lenses are air spaced, requiring no oil. Know what you are dealing with before attempting to clean lenses.
- Note 11- Never allow a solvent to come into contact with the edge of cemented lenses. The cement between the lenses can dissolve resulting in the separation of the lenses.
- Note 12- A Schmidt-Cassegrain corrector lens is thin and very fragile. Remove from the tube only if it is really necessary! Orientation of the lens is important. Both sides look flat, so be sure to reinstall the lens in the proper orientation. Rotation may be critical, before removing the corrector plate mark the edge of the glass and side of the telescope tube for reference. Line up your rotation marks when reinstalling the lens. It is best to consult an expert for cleaning the inside surface of a Schmidt corrector lens.
- Note 13- The steps given here for lens cleaning can be used on eyepieces, but **DO NOT REMOVE THE LENSES FROM THE EYEPIECE**. Some chromed barrels are designed to be removed making it easier to reach the inside lens.

Instructions for Mirrors

Materials Needed:

Lens blower

Mild Detergent (*Liquinox or Ivory/Joy, non-phosphate soap*)

Kimwipes/Kleenex

Distilled Water (or Deionized Water)

Basin large enough for mirror

Mat to fit basin bottom

1. Read all the notes on page 1.
2. Mark the orientation of the tube and the mirror cell to make reassembly easier later.
3. Carefully remove the mirror in its cell from the tube assembly. Be sure to watch for places where the mirror can become caught. Watch out for pieces which will seem to fall out from nowhere! Save any spacers and note where they are and how many there are. It is possible that more spacers will be required at a particular position.
4. Use a lens blower to remove most of the large particles of dust from the surface of the mirror. Work from the center outward.
5. Remove the mirror from the cell or holder. Scrap off any glue that may be present on the back or sides using a razor blade.
6. Place a mat in the basin to cushion the mirror. Wash your hands before starting the next step.
7. Run warm tap water over the surface. Hold on firmly to your optics. When wet they are slippery, especially when soaped. This is the way most mirrors become chipped.
8. Fill the basin with clean warm tap water and a small amount of detergent. Allow the mirror to soak for a few minutes.
9. Drain out the water and rinse the mirror with clean warm tap water.
10. Using a Kimwipe with a small amount of detergent, gently pat the surface to remove remaining dust. Don't use a rubbing action until you know all the dust has been removed. Assume all dust is grit which can scratch the coating or glass. Rinse and repeat until you're certain all the dust has been removed. Use clean Kimwipes for every step. With another Kimwipe and detergent, wipe the mirror using **ABSOLUTELY NO PRESSURE**. Keep the tap water running over the surface to wash away particles as soon as they are lifted off the surface.
11. Repeat this step two or three times until the mirror appears clean. When the mirror is clean, water will not adhere to its surface. In bad cases of dirty optics, oils may remain after repeated washes. If this happens, gently pat and then wipe the oily area with a diluted solution of rubbing alcohol (10% alcohol, 90% water). Wipe with detergent again after using the alcohol.
12. Once all dirt and oil is removed, use plenty of tap water to rinse the mirror making sure all detergent has been washed away. Remember to rinse the backside of the mirror.
13. Rinse the mirror a final time using Distilled Water. Remove the mirror from the basin and stand it on its edge on a padded surface so that the distilled water runs off and few water droplets remain.
14. Using Kimwipes, dab (**DO NOT RUB!**) the remaining water droplets with the corner of the Kimwipe until the mirror is fully dry. Be careful not to let oils from your hands come into contact with the mirror.
15. Be sure that the back and sides of the mirror are clean and dry. Place the mirror into the mirror cell. Gently replace the clips that hold the mirror in its cell. Be sure to not pinch the optics---its easy to do and results in poor images.
16. (Optional) Secure the mirror with silicon glue to prevent it from rotating in the mirror cell. Place a Kimwipe over the mirror during the 24 hour glue drying period. This step prevents the mirror from rotating in the mirror cell and scratched by mirror clips.
17. Use a lens blower to remove any dust on the mirror and then carefully place the mirror and cell into the tube

and secure with the mounting screws. You'll need to collimate the optics.

Instructions for Lenses

Materials Needed

Lens blower

Lens cleaner (alcohol based)

Oil Remover, such as Residual Oil Remover (ROR) available at camera stores (Optional)

Kimwipes or lens tissue

1. Read all the notes on page 1.
2. Mark the orientation of the tube and the lens cell to make reassembly easier later.
3. Carefully remove the lens from the tube assembly. Be sure to watch for places where the lens can become caught. Watch out for pieces which will seem to fall out from nowhere! Save any spacers and note where they are and how many there are. It is possible that more spacers will be required at a particular position. Important! If you are only cleaning the first surface, it may not be necessary to remove the lens from the tube assembly.
4. Use a lens blower to remove most of the large particles of dust from the surface of the lens. Work from the center outward.
5. If it is necessary, remove the lens from its cell. Be sure to mark the orientation of the lens in its cell. This is important for cemented lenses as well as uncemented ones (See note 11 above).
6. Wash your hands.
7. Using some lens cleaning solution made for camera lenses and a Kimwipe, gently pat the surface of the lens. Do not wipe the lens until all dust has been removed, then wipe in only one direction. **USE NO PRESSURE ON THE FIRST WIPE.** Depending on the size of the lens it may be necessary to use more than one Kimwipe.
8. Repeat the wiping with lens cleaner until the lens looks clean. Use a clean Kimwipe and wipe in a different direction each time.
9. If oils remain, wipe the lens with an oil remover (ROR). Repeat until all traces of oils are removed.
10. Finish with a final cleaning with lens cleaner making sure all the liquid is dried under the Kimwipe. Do not allow it to evaporate off the surface as this will cause streaks. Stubborn streaks may be removed by fogging the lens with your breath and wiping this moisture off. Do not accidentally spit on the lens! If necessary, wipe again with the lens cleaner.
11. Place the lens back into its cell using the marks you made earlier as a guide. For uncemented lenses, be sure to use a lens blower to remove any dust before reassembling the two lenses.
12. Place the cell back into the tube assembly. Do not overtighten any screws. You'll probably need to collimate the optics.