

HOW TO CLEAN MIRRORS AND LENSES

by

Lenny Abbey, FRAS
(Labbey@mindspring.com)

The cleaning of optical surfaces, especially those of first-surface mirrors, is the most delicate and exacting task which the astronomer is called upon to perform. At the time of cleaning, a lens is most vulnerable to damage; damage which cannot be repaired. Yet if a telescope is to perform a telescope's greatest potential, cleaning must be done time to time.

I have used the following method for over thirty years without adding a single scratch to the surface of a mirror or lens. It has the advantage of requiring only materials which are readily available at the neighborhood pharmacy or grocery store. The cost is less than twenty-five cents per cleaning.

First you must realize that usually the best advice on cleaning mirrors and lenses is.....DON'T DO IT. Dirt and grease which are adhering to the surface of mirrors and lenses may degrade image quality slightly, but they will not damage the delicate optical surface until they are moved against it. The need to remove dirt without allowing it to move against the underlying optical surface is what makes cleaning such a tricky task.

However, if your mirror or lenses so dirty that it must be cleaned, then this is the way to do it:

FOR MIRRORS

1. Blow all loose dirt off with "Dust Off" or another canned, filtered, clean air product. (Available in camera stores.) Take care not to shake the can while you are using it, and be sure to release a little air before using it on the optical surface. This will assure that no liquid is dispensed to make things worse! You can use a rubber bulb for this purpose, but it is not nearly as effective.
2. Prepare a VERY dilute solution of mild liquid detergent (e.g., Dawn). It is very important that the detergent not contain any form of hand lotion or lanolin. This product usually comes in a plastic bottle with a dispenser spout. Dispense the tiniest amount possible into a clean cup. (One drop, if possible.) Fill the cup with water. Stir. Throw almost all of this water away, and refill the cup. Now you have a VERY dilute solution.
3. Rinse the mirror off under a moderate stream of lukewarm water for two or three minutes. Test the temperature of the water with your wrist, just as you would when warming a baby's bottle. Leave the water running.
4. Make a number of cotton balls from a newly

opened package of Johnson & Johnson sterile surgical cotton, U.S.P. (The "U.S.P." is important. It means that you have REAL cotton instead of a polyester substitute.) Soak 2 or 3 balls in the detergent solution. The cotton balls should be fully saturated with the detergent solution. Do not squeeze any of the liquid out. Wipe the surface of the wet mirror with a circular motion, going first around the circumference, and then working your way towards the center. The only pressure on the cotton should be its own weight. For this first "wipe" you should use several fresh sets of cotton balls. As you move the cotton balls around the mirror's surface, rotate them slightly so that the dirt they pick up is moved away from the mirror's surface, and toward the top of the balls.

5. Throw the cotton balls away.
6. Repeat the process with new cotton balls, using a LITTLE more pressure.
7. Rinse mirror thoroughly under tap, which has been kept running for this step.
8. Rinse mirror with copious amounts of distilled water (do this no matter how clean or "hard" your tap water is).
9. Set mirror on edge to dry, using paper towels to absorb the water which will all run to bottom of mirror. Keep replacing the paper towels as the mirror dries.
10. If any beads of water do not run to bottom, blow them off with Dust Off, or the rubber bulb. Any stubborn drops which remain on the aluminum surface can be picked up with the corner of a paper towel. The paper towel doesn't even need to touch the mirror's surface.
11. Replace the mirror in its cell, being careful to keep all clips and supports so loose that the mirror can rattle in the cell if it is shook. (Perhaps .5 to 1 mm clearance).
12. Spend the next months realigning your scope.
13. If you do anything more than this, you will risk damaging the coating. But remember, if you follow these instructions any damage will almost certainly be to the coating, not the glass. When the mirror is re-aluminized it will look new in all respects.
14. You should not have to clean an aluminized mirror more often than once per year. Do NOT over clean your optics.

FOR OBJECTIVE LENSES

DO NOT UNDER ANY CIRCUMSTANCES REMOVE
A LENS FROM ITS CELL, OR THE CELL
FROM THE TELESCOPE.

This restriction means that the above procedure must be modified. Only the front surface of the objective can be cleaned. If you remove the cell from the telescope, you will be in big trouble. There are very few people who can collimate a refractor. If you are reading these instructions, you are not one of them!

1. Blow loose dirt off with Dust-Off or a rubber bulb, using the above precautions.
2. Soak the cotton balls in a 50:50 solution of Windex (commercial glass cleaner containing ammonia) and distilled water. Squeeze slightly so that the balls are not dripping wet.
3. Wipe front lens surfaces with the wet cotton, using only the pressure of the weight of the cotton balls. Follow immediately with dry cotton, using little or no pressure.
4. Repeat procedure, using slightly more pressure.
5. If some cotton lint remains on surface, blow off with Dust-Off or rubber bulb.
6. Repeat this procedure if the lens is not clean, but if one "repeat" does not do it give up and leave it as is.
7. Inspect the lens to make sure that no cleaning solution has found its way into the lens cell, or between the elements. If this has happened, leave the telescope with the lens uncovered in a warm room until it is dry.

FOR EYEPIECES AND BARLOWS

Follow the procedure given for objective lenses, but use Q-Tips (U.S.P. cotton on plastic sticks) instead of cotton balls. You may, of course, clean both surfaces. The eyebrow juice on the eye lens of eyepieces may require repeated applications. I think that this is OK in this case.

FOR SCHMIDT-CASSEGRAIN AND MAKSUTOV TELESCOPES

The only optical surface you should attempt to clean is the front of the corrector plate. Use the instructions for cleaning refractor lenses. If your SCT needs more cleaning than this, send it back to the factory for cleaning.

SOME DONT'S

1. Do not use any aerosol spray product, no matter who sells it, or what their claims are.
2. Do not use lens tissue or paper. It DOES scratch.
3. Do not use pre-packaged cotton balls, they frequently are not cotton.
4. Do not use any kind of alcohol, especially on aluminized surfaces.
5. Do not use plain water for the final rinse.
6. Do not use any lens cleaning solution marketed by funny companies, like Focal, Jason, or Swift. Dawn and Windex (or their equivalents in other countries) are inexpensive and commonly available.