



## CosmicOne SCT Cooler

a.k.a. THE CAT COOLER

Filtered air ventilation system for SCTs  
by David Knisely

*\$129.95 from Lymax's Earth, Sky, and Astronomy  
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One of the problems which owners of a Schmidt-Cassegrain telescope must face is the issue of cooldown, where the telescope and the air inside it must reach ambient temperature before use. With its closed tube, the SCT will sometimes require from 45 minutes to as much as two hours to come to temperature. Using simple primary mirror fan-driven cooling is simply not feasible due to the closed tube and limited ventilation openings. With this in mind Bob Haler (a.k.a. "Cosmic One") came up with "The Cat Cooler", a device designed to move filtered outside air directly into the very core of the SCT in

a way that maximizes ventilation of the optics to reduce the cooldown time significantly.

## Product Description

The SCT Cooler is a fan-driven filtered ventilation system for a number of different commercial SCT's from 8 inches to 14 inches in aperture. The unit basically is a fan attached to a roughly conical blower body which is then mated to a long tube. The cooler sends filtered air directly into the center of the telescope's tube between the secondary mirror and the end of the SCT main baffle tube, while at the same time allowing air from inside the telescope to flow out along the inside of the it's baffle tube and exit through air holes near the end of the visual back of the instrument. Overall, the SCT Cooler appears to be well designed with fairly robust construction.



The fan is a good quality 2.25" square fan which is polarity protected and will operate from 9 to 12 volts DC (230mA current draw). The fan is firmly attached to its 10 foot electrical cord terminating in a fused cigarette lighter plug. The plug is also equipped with a small red LED which is lit when powered. The fan is bolted onto the conical blower body made of what appears to be thick high-impact plastic and which contains a single layer filter about 2.25 inches in width and less than 1/8th inch thick. This filter is a compromise between air throughput for proper fast cooling and filtering efficiency. It will *\*not\** filter out very fine particles such as cigarette smoke, but will filter out most particles larger than 0.25 microns.

The filter is changed by removing four screws from the base of the fan and pulling the fan off (an extra replacement filter is provided). The conical blower body has indentations along its sides which become air vent holes when the Cat Cooler is mounted in the telescope's visual back and operating. The forward end of the blower body will accommodate being mounted in either a 1.25" visual back or a 2" visual back, although a 2" visual back is recommended for 10 inch and larger apertures to get good cooling efficiency.

Attached to the front end of the blower body is a long hard Nylon tube which is the Air Delivery Duct. This duct is about one inch in diameter and has a length which will depend on which instrument the Cat Cooler is ordered for. For my Celestron NexStar 9.25" SCT, the tube was about 19 inches long, making the whole Cat Cooler about 22 inches in total length with a weight of about one pound. The Air Delivery Duct can be changed out with a simple Allen screw located on the side of the blower body, so if you wish to use the Cat Cooler on a different size or model of SCT, all you need to get is a different length Air Delivery Duct and put it in. One note on this procedure is after changing the duct, be *\*very\** careful inserting the Cat Cooler into the telescope to make certain that the tube isn't too long (ie: the wrong duct is being used) which might cause it to strike the secondary mirror.

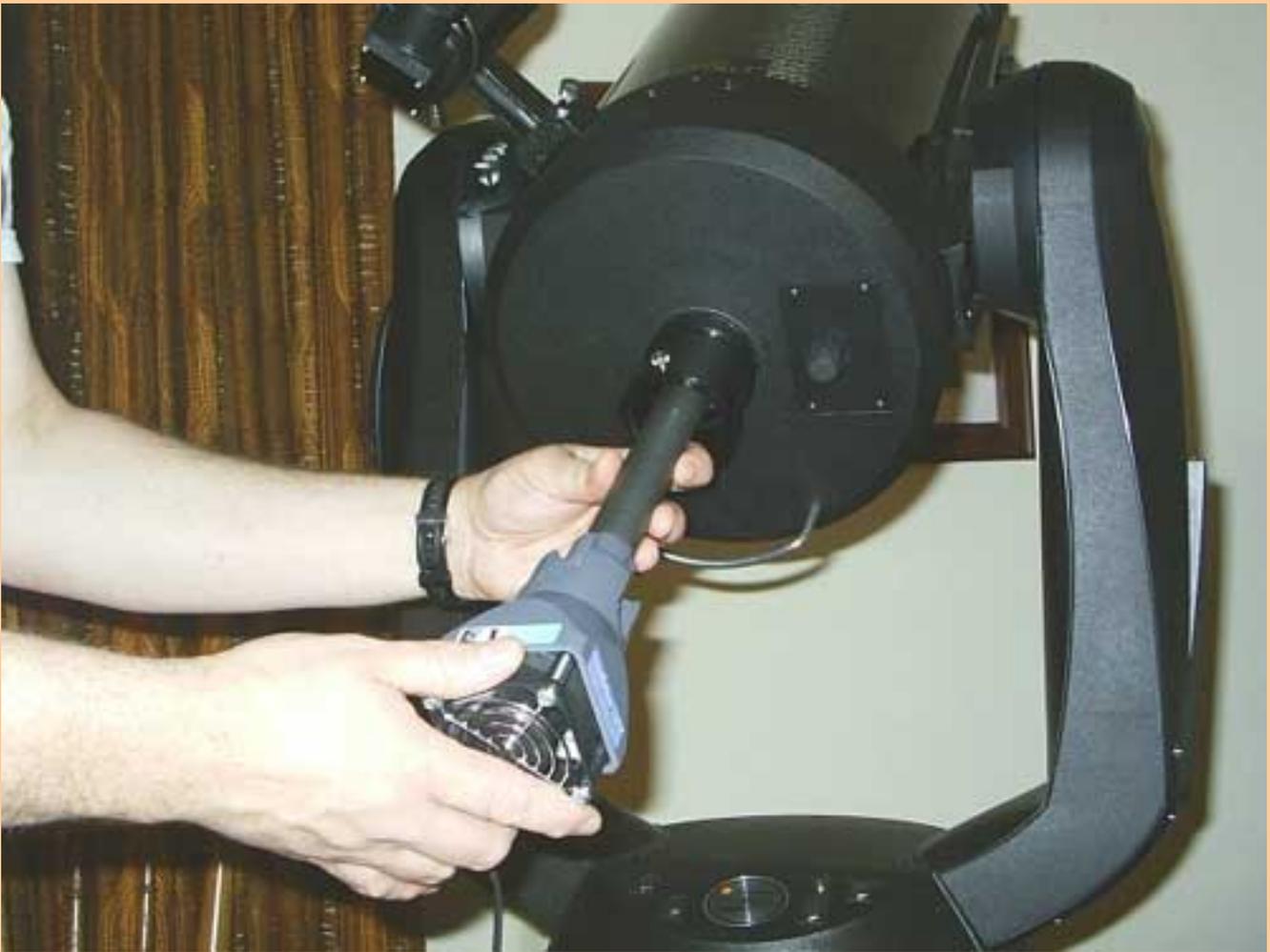


At the far end of the Air Delivery Duct are four small angled holes in the *\*sides\** of the tube which allow air to flow radially outward from the tube and slightly backward to prevent any air from directly

hitting the secondary mirror. This air flow will mix with the internal air as well as gently forcing air to flow past the optics and eventually back into the baffle tube of the SCT and out to the outside. The direction of the initial air flow from the Duct holes is such that it will first impact the sides of the telescope tube rather than directly on the optics. This, plus the initial filtration, will help minimize potential contamination of the optical surfaces. However, it is recommended that the SCT cooler *\*not\** be used under extremely humid conditions (ie: very heavy dewing), as that could introduce moisture into the interior of the telescope.

## Testing Things Out

I tested the Cat Cooler on my Celestron NexStar 9.25GPS SCT using an Astrophysics 2 inch visual back. The instructions in the manual need to be followed *\*to the letter\**, as there are numerous things which can get you (and your instrument) into trouble. The first thing is to make certain the cooler is clean and to run it for a few minutes in case there is any fine debris lurking around the vent holes or in the duct. Since it is going into the telescope tube, it is best if the cooler is kept as clean as possible and stored in either its original container or in some sort of clean plastic bag to keep dust out. This may seem a bit of a hassle, but most of us see similar requirements for how we treat eyepieces, so it shouldn't be a major problem. The recommended voltage for the Cat Cooler is 12V, and I had no trouble running it off my 17 amp-hr battery supply I use for the NexStar in the field. The fan is fairly quiet, but still manages to move a lot of air. The long cord also was helpful in allowing me to put the battery wherever I wanted. I first tested things inside my house to watch for potential problems. The documentation recommends that the SCT tube be horizontal for proper ventilation, and that the set screw for the Air Delivery Duct be *\*firmly\** tightened (otherwise, if it comes off, you might have the duct fall into the inside of the telescope tube, causing potential damage).



After running the cooler outside the scope for a few minutes, I pulled the plug and (with teeth clenched) gently inserted the Air Delivery Duct end of the cooler into the visual back. I had inserted it nearly halfway before I heard the scraping sound of nylon against the baffle tube as they momentarily touched. This was somewhat unnerving, but nothing seemed to get knocked loose. I stopped and looked into the front of my NexStar to see where the tip of the Air Duct was. It had not yet emerged from the baffle tube, so I once again slowly moved the cooler into the telescope.



Eventually, I saw the tip emerge and clear the end of the primary's baffle, but now I was wondering if the end of the duct might end up being too long. My fears were groundless, as the Cooler finally seated properly in the visual back with between one and two inches of clearance between the end of the Air Delivery Duct and the secondary mirror's cylindrical baffle. With a 1.25" visual back, the Cat Cooler would be seated even farther back, so again, there would have been no potential for striking the secondary with this unit. Heaving a sigh of relief, I tightened the screws of the visual back to secure the Cat Cooler. These screws need to not be over the depressions in the back of the blower housing, as they would not seat well and might partially block the return air flow.

Once secured in place, I fired up the cooler. All seemed well, so I shut off the room lights and, in the near total darkness, pulled out my laser pointer to check for any dust exiting the Air Duct's holes. Looking almost along the beam, I could see a few tiny faint dust particles illuminated in the beam as they came flying out of each hole, but the number was not extremely high and not quite as many as I see looking along the beam in room air. In regular room light, these particles were not seen at all. It was clear that the filter was working at least to some extent. The dust particles trajectories did show that the initial airflow was indeed mainly radial to the axis of the Air Duct with a slight tilt toward the rear of the telescope. At the back of the Cat Cooler, I could feel the air exiting the air ports created by the wide slots in the blower housing, so the air was indeed "making the trip" from the outside of the scope to the inside and back to the outside again. I ran things for about 25 minutes and then shut it down to look the mirrors over. No signs of visible dust accumulation were noted on the mirrors or the corrector plate, so at least in

the house, the issue of dust would not be a major one. Still, I might not want to use the Cat Cooler under fairly dusty observing conditions.

## **The Next Step: Outside Performance**

As luck would have it, the weather over the next few months was good and bad. It was good as it was clear on more than one occasion, but it was bad in that every time I wanted to test things, there wasn't a huge difference between the inside and outside temperatures! The NexStar cools fairly easily by itself under those conditions, so I had to wait and wait until FINALLY we got a cold snap. The outside air temperature was only 37 degrees F. so from a 66 degree inside temperature, I would get a chance to see how the Cat Cooler performed its designed function.

I was given two sets of temperature sensors by our CloudyNights staff to watch the drop in temperature with time. One was an infrared non-contact thermometer which allowed me to see the temperature of the corrector plate and the secondary mirror, and the other was the remote element of an indoor/outdoor thermometer which I placed in the central primary baffle tube of the NexStar SCT once the Cat Cooler had been removed. I set the scope up and got the Cat Cooler running, watching the temperature go down with time. After only 15 minutes, the temperature of the corrector plate had dropped to 41F, so I let the cooler run a little longer. After 30 minutes, the interior temperature sensor showed 38.5F, which I deemed to be close enough to ambient to take a look through the scope. Sure enough, the high power star images were fairly stable with no signs of a significant thermal plume (caused by vertical tube current). A few weak tube currents were noted in the out of focus image which is fairly typical of an SCT in the final stages of cooling. An additional 15 minutes of running the cooler did not seem to reduce the interior temperature any further, so I was satisfied that things had indeed been at ambient temperature. Probably, the 15 minute point would have been enough to at least use the telescope to some degree, although some additional improvement would probably have been noted by increasing to 20 to 30 minutes of total Cat Cooler run time.

I ran another test with the scope not being actively cooled, and it took a little over an hour for it to come to ambient temperature by itself. Thus, the SCT Cooler provided at least a factor of two (and possibly as much as a factor of three) improvement in the cooldown time of the NexStar 9.25GPS. For large temperature differences (30 degrees or more), longer running times of around 30 minutes would probably be needed for full equilibrium, but for smaller ones, a 15 minute run time might be enough. Larger instruments also would probably need slightly longer cooling times than smaller ones.

## **Overall Assessment**

The SCT Cooler appears to work pretty much as advertised, noticeably reducing the cool down time for an SCT. The issue of possible contamination of the interior of the telescope remains a bit of an open question here. Thus, the decision to get and use the cooler will have to be a rather personal one. Very small dust particles from interior room air (illuminated in laser light) were seen making it into the interior of the telescope when the cooler was in use, so at least some material is getting through the

filter. With enough additional filtering, one might reach a point of blocking most of the particulate matter in the air. However, this would reduce the airflow through the system to the point that the cooldown time savings when using such a heavily filtered cooler would be minimal. In short, the Cat Cooler is a bit of a compromise, but one which I feel Lymax has executed fairly well.

Short term use of the Cat Cooler under fairly "normal" conditions does not seem to result in significant visible contamination, although again, increases in environmental dust (a gust of wind on a dry dirt observing field) or major increases in humidity will be major determining factors for when or even if the cooler can be successfully used. Some major star parties see both of these adverse environmental conditions occur almost without warning, so the user might occasionally have to make a difficult judgement here. Some SCT owners may feel that \*any\* risk of contamination is too much to bear, so for them, the regular longer passive cooldown might be a better option. However, as for the dust issue, I have found that a little dust makes less of a difference in telescope performance than many people make it out to be (certainly less degrading sometimes than tube currents end up being). From a merely personal standpoint, I might be inclined to purchase the Cat Cooler. The dust contamination from merely removing a visual back or star diagonal or attaching a CCD camera is also a non-zero risk which I might find somewhat comparable to that of a quick cooldown session with the cooler.

### **Summary:**

The Lymax SCT Cooler is a well-designed and potentially very useful device for decreasing the cool down time in some commercial Schmidt-Cassegrain telescopes. It is well-built and its price is reasonable, although care does need to be taken when deciding to use the unit under certain adverse conditions.

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