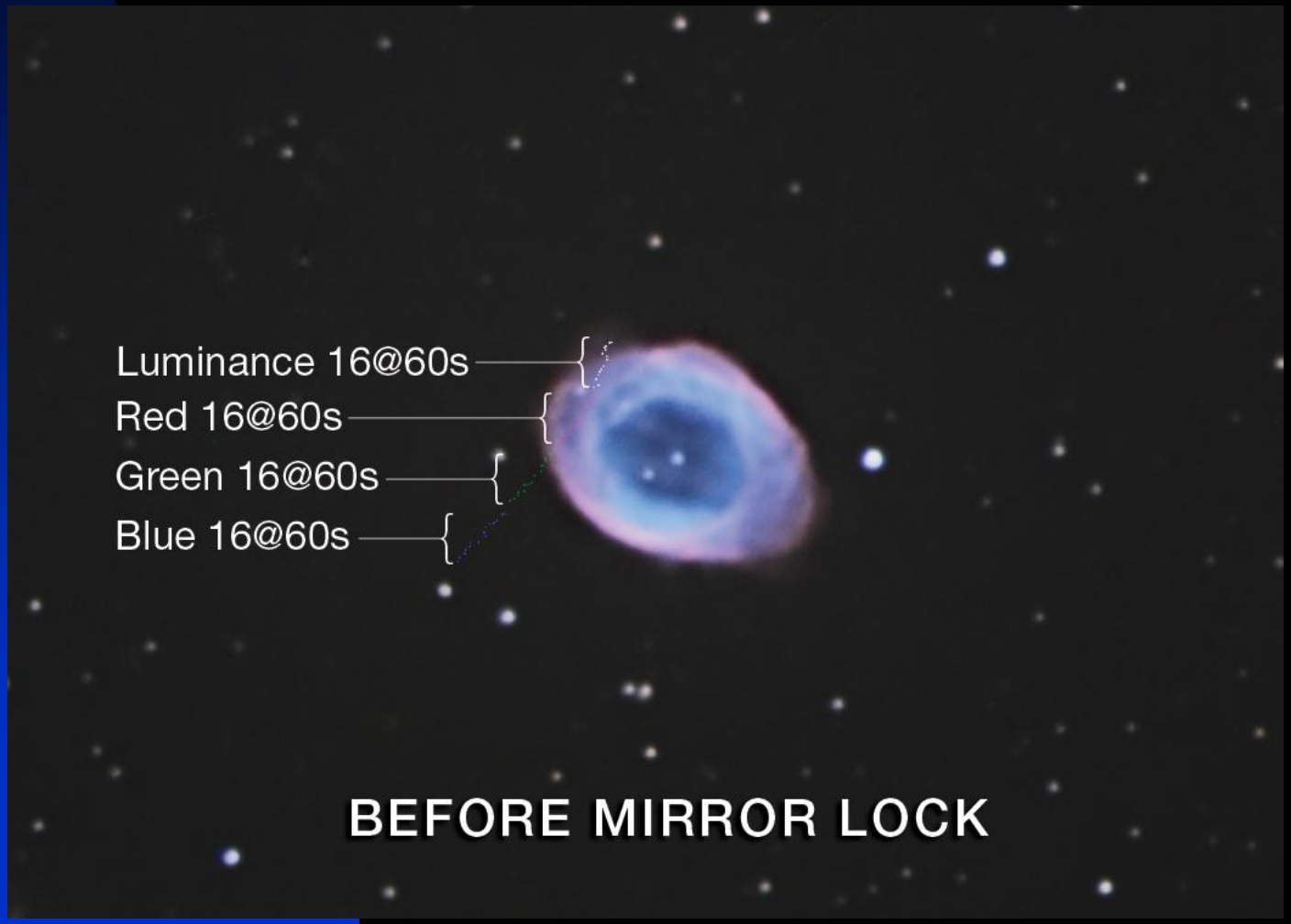
A Totally New Mirror Lock Design for a C11 SCT

The Problem!

Mirror Flop, or more accurately, Mirror Drift. Over time most Telescope that achieves focus by moving their primary mirror will experience it.



I tried to solve the problem by tying the two cameras together

- Flexure between two scopes can introduce unwanted image drift
- But after tying the two imaging trains together I saw no improvement.
- At that point, I felt sure my drifting issue was in the mirror system, and not in the mountings between the two scopes.

Now What?

- I began to research how other people had solved this fairly common astro imaging issue.
- Mirror locks, for the most part came in two flavors before I introduced my fairly unique design.
- #1 Involved locking the focusing mechanism, Meade and Celestron both offer this solution on some of their higher end scopes. and a retrofit focuser lock is available for most SCT's. It is my opinion that they do not work. They do lock the focuser, but not the mirror.
- #2 Involves actually locking the mirror, a set of one, two or three jack screws come up from behind the mirror and jam lock the mirror against the focusing mechanism. It does lock the mirror, but it also knocks it out of collimation. Not ideal.

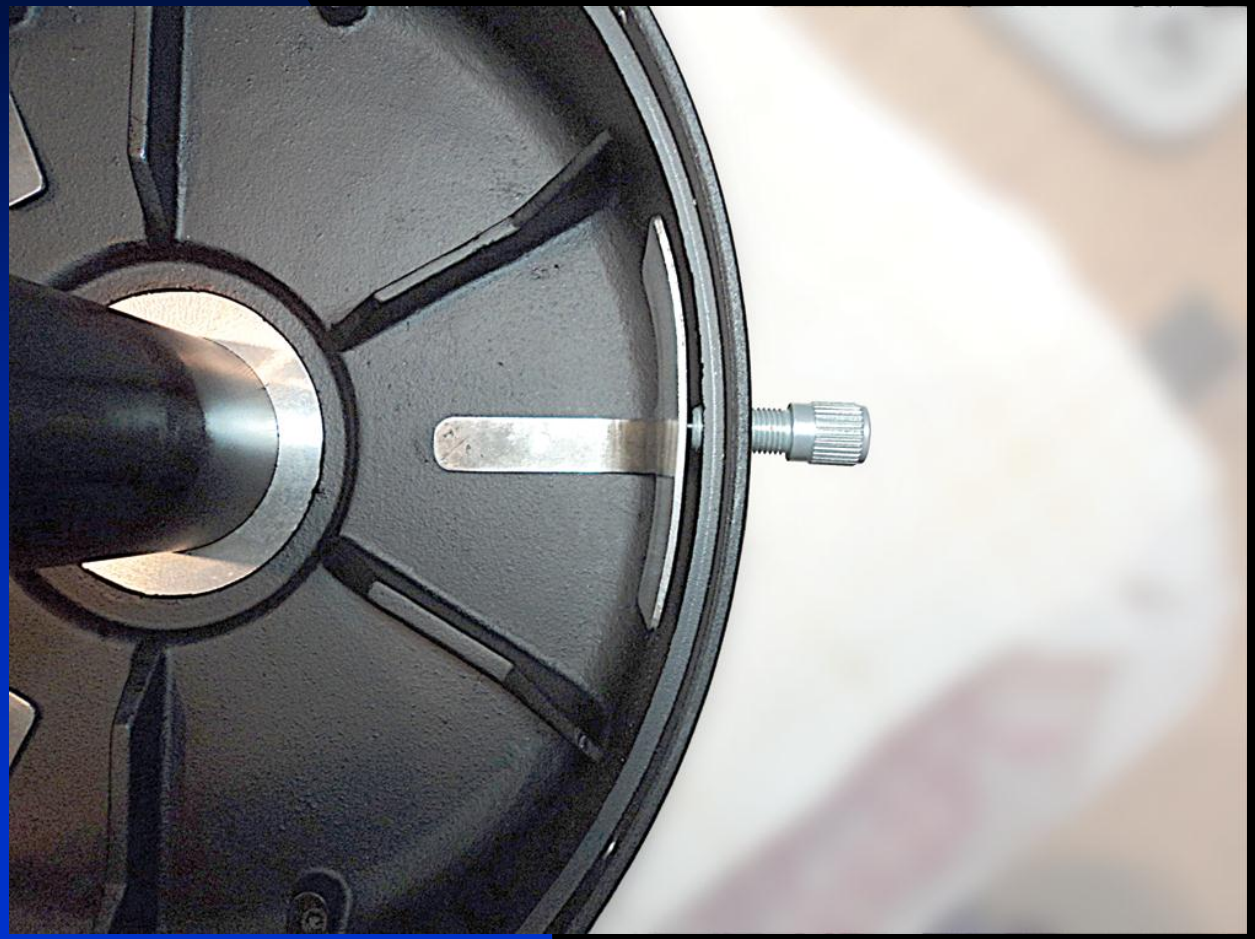
The Heart of my Mirror Lock Design

- 3 Contact Pads at 120 degrees to each other, making contact with the mirror along it's outside edge.
- This is the most mechanically advantageous approach to locking out mirror movement and collimation is maintained.

Improving the Friction Coefficient

- By coating each contact pad with a spray-on rubberized coating, only light contact pressure is needed to effectively lock the mirror.

Close Up of the Set Screw passing through the case and engaging the Contact Pad

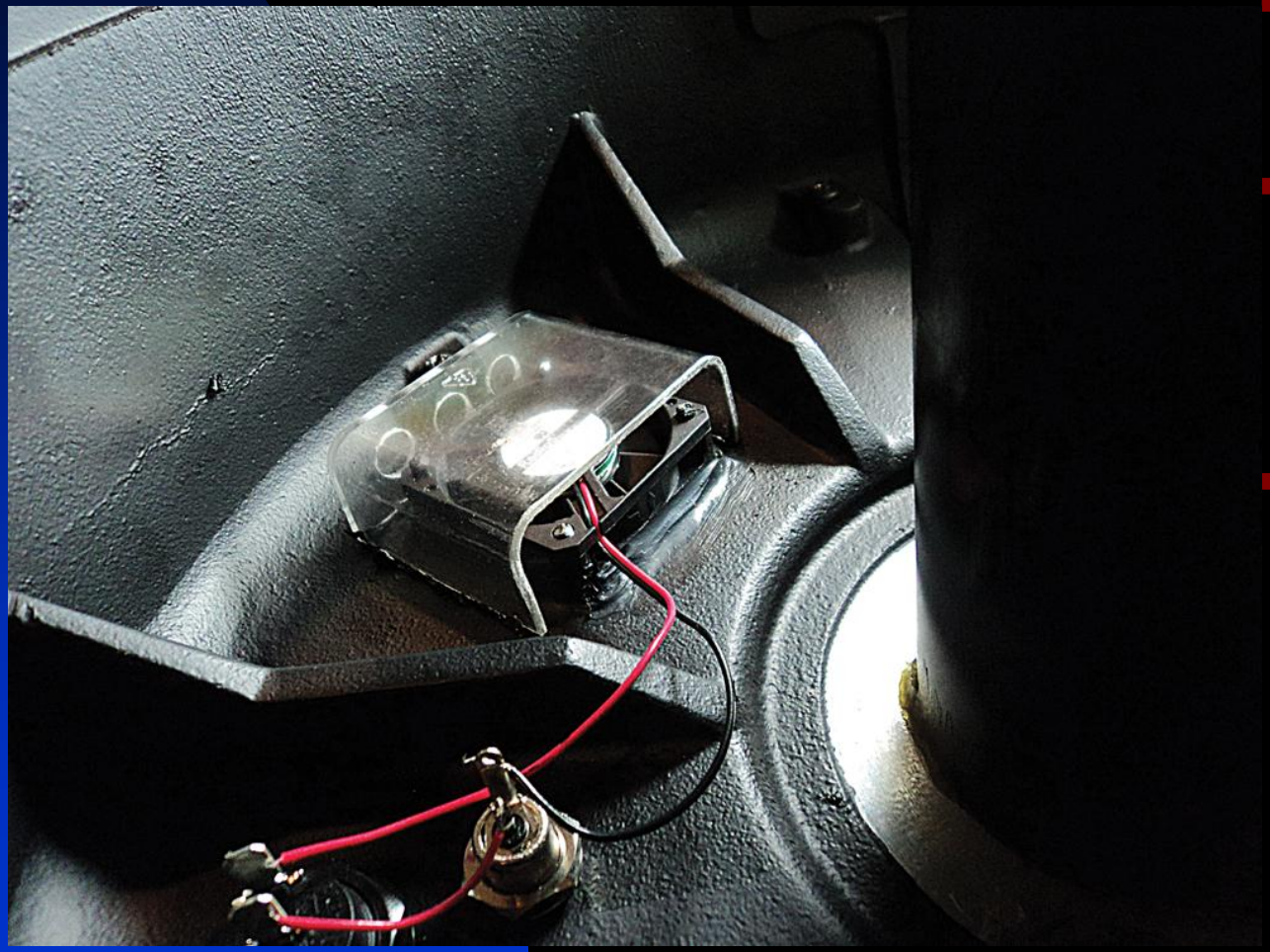


- The contact pads move into contact with the mirrors edge by way of 3 mounting ring screws.
- ADM makes a nice set, Delrin tipped and with a large head.

Detail of the Fan Wiring and one of the Contact Pads Epoxied in place

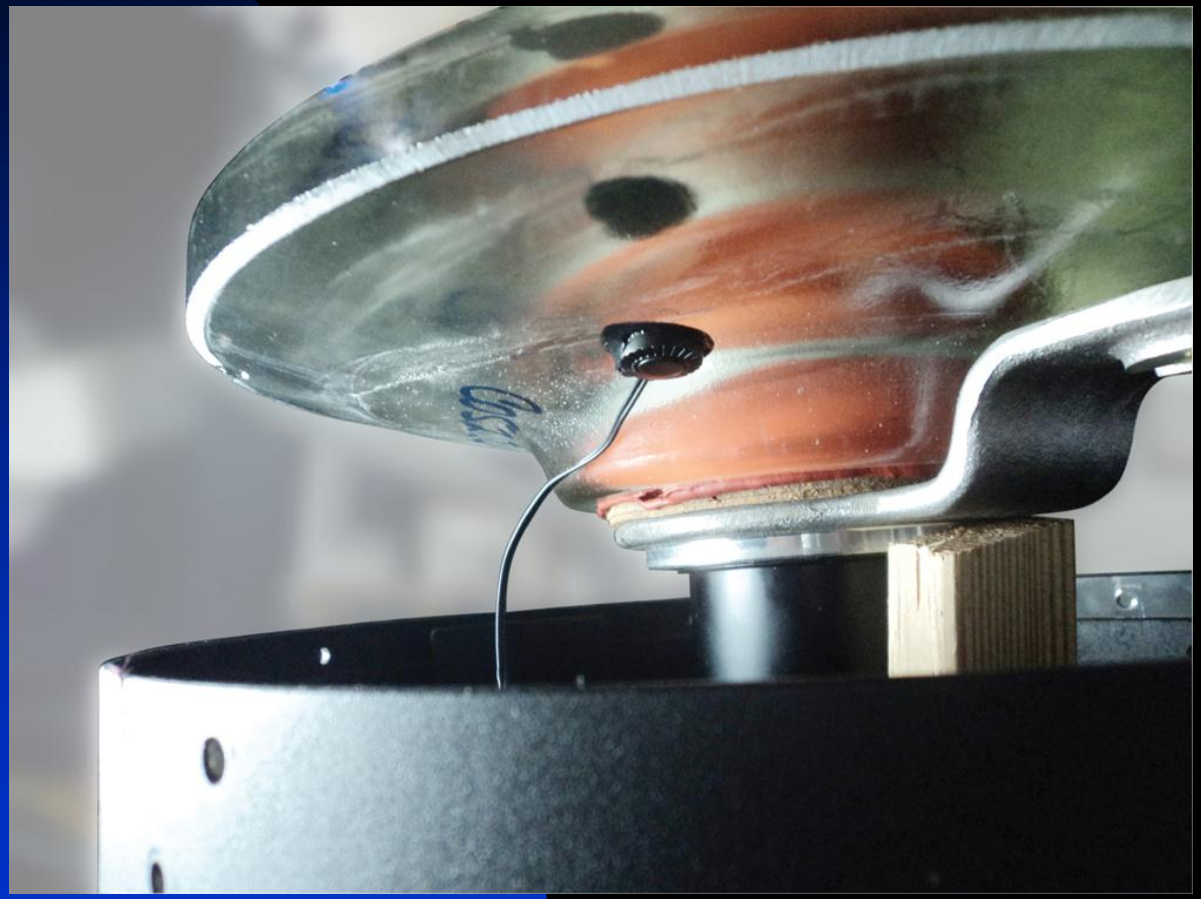
- JB Weld, the only epoxy to use for this sort of thing.

Detail of the fan and its baffle

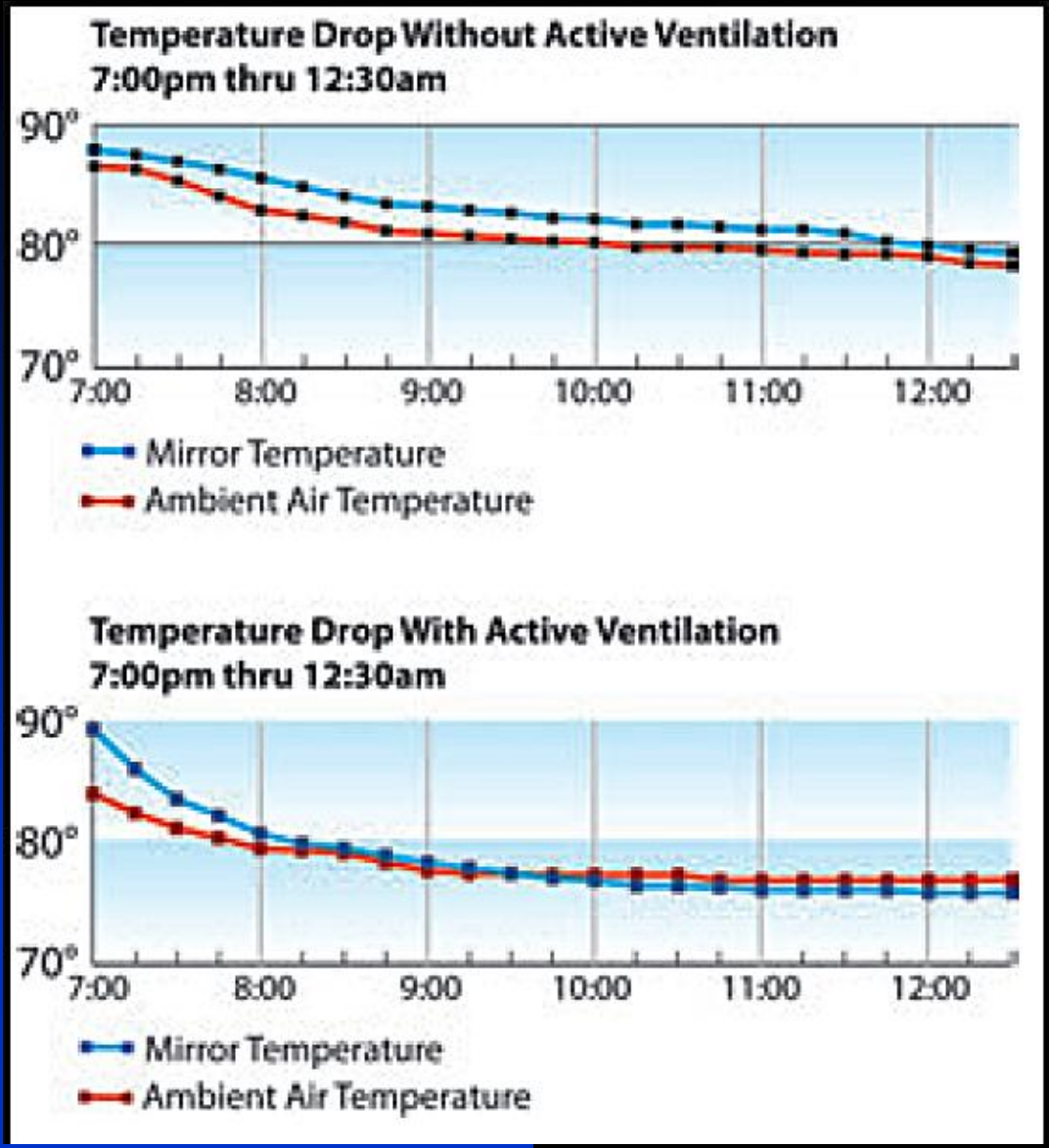


- SCTs can take a while for their mirrors to cool.
- I added a ventilation fan to speed up the cooling of the mirror to ambient air temperature.
- I added a baffle to force the incoming air across the floor of the scopes base to more evenly distribute it.

Detail of the temperature probe attached to the underside of the mirror



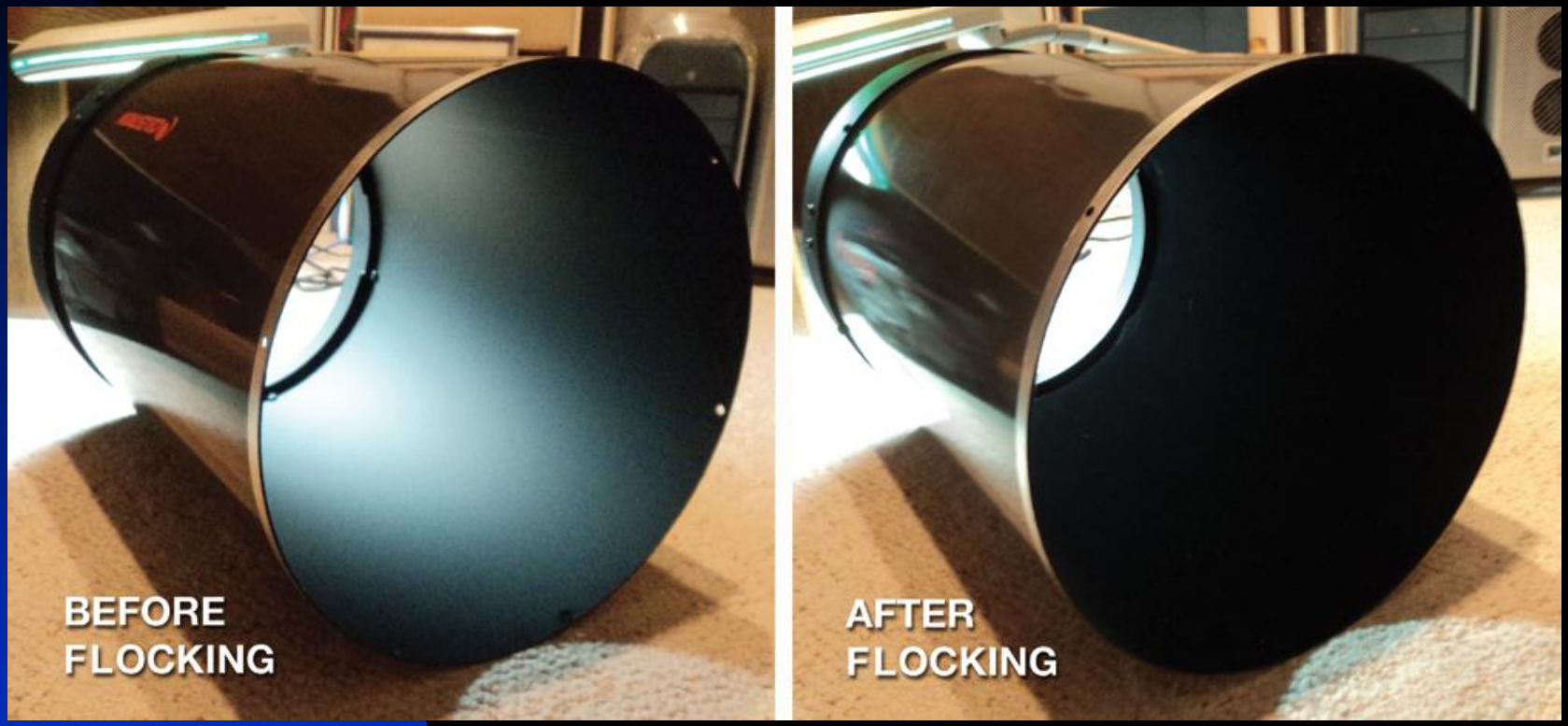
- The idea struck me, why guess at the temperature of the mirror in respect to the ambient air temperature?
- A cheap digital indoor/outdoor thermometer did the trick.
- I simply stuck the outside probe on the mirror with a dab of black silicone, and threaded the wire out of the case.



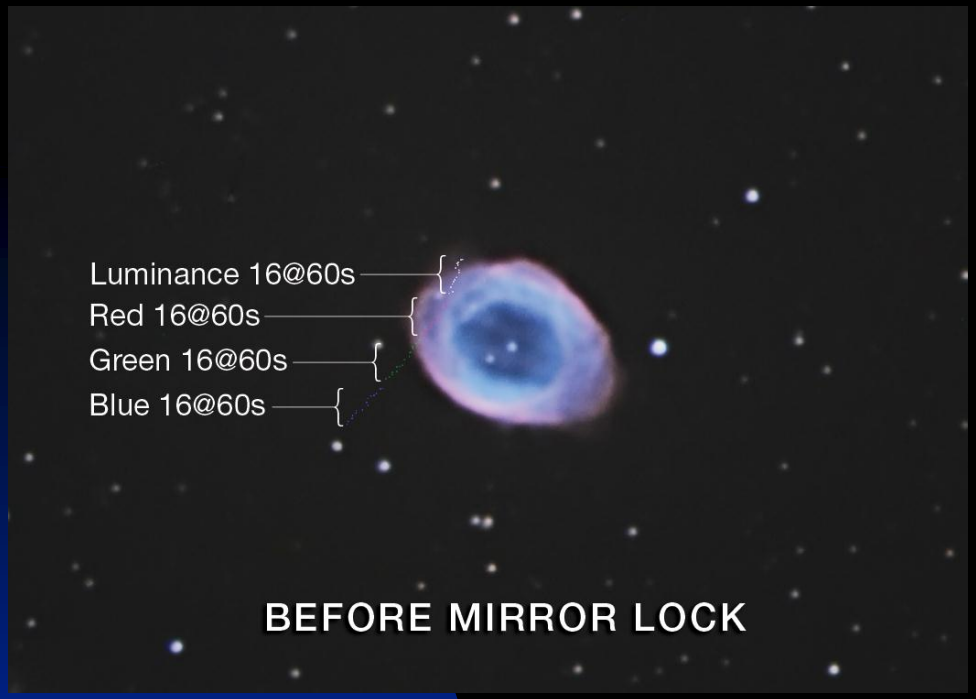
Testing the cooling fans efficiency

- I only documented two nights by recording the temp every 15 minutes, but the effectiveness of positive case ventilation is apparent.
- One odd thing… the temp of the mirror actually fell below the temp of the air by almost a full degree on the active ventilation night.

To flock or not to flock?



- I flocked my C11.
- I don’t think I would have done it if that was all I was going to do, but after having it completely disassembled, it seemed like a good idea.



The Proof is in the Pudding!

- Here are before and after images of M57.
- I was experiencing hot pixel drift across my stacked image at around one pixel per minute before my mirror lock installation.
- I am now getting around 10 pixels worth of movement over 70+ minutes of exposure time.
- I believe I have achieved a 7 to 10 fold improvement in my mirror drift issue.