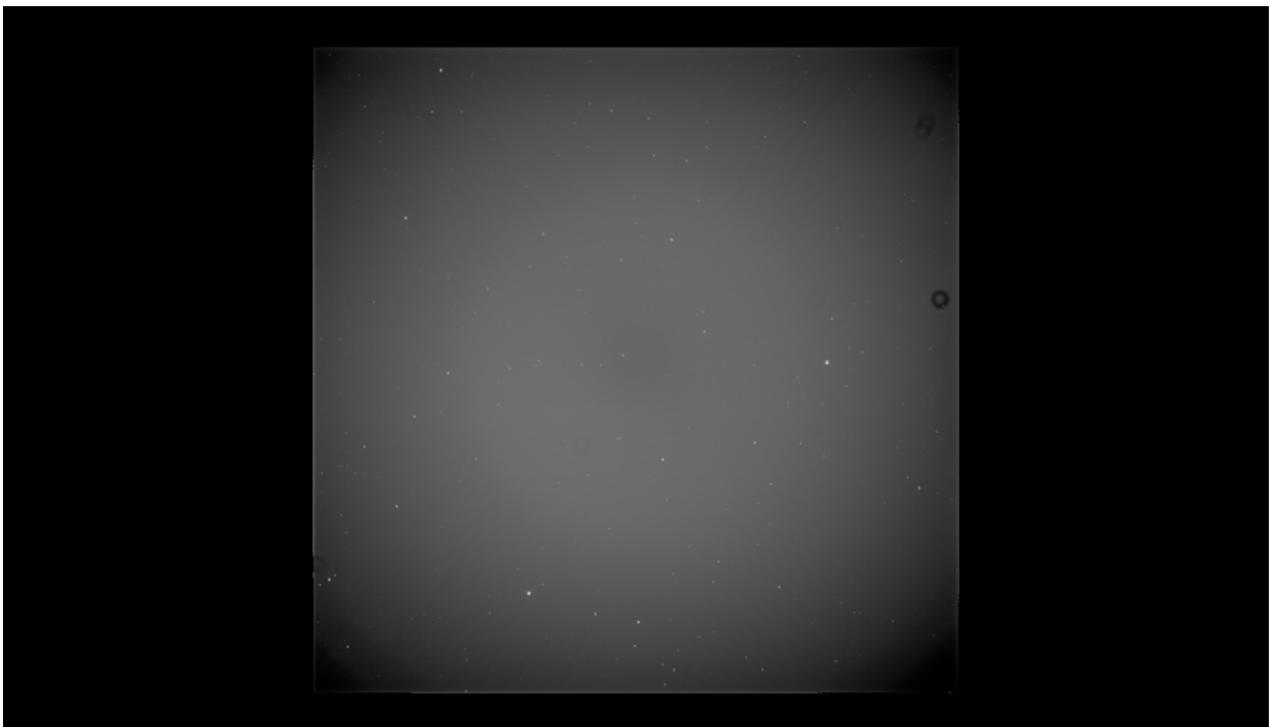


Taming reflections with the large format CCD



This image was taken with a U9000 with BBAR coated window and the two aperture masks installed. It is a single 900 second exposure of M63. Notice the arc ring textured reflection on the upper part of the frame. Also notice the “smear” type reflection from the bright star on the left. There is also a “sky concentration” hot spot in the center. Notice in the picture below that this doughnut hot spot shows up in the flat and does seem to flat out.

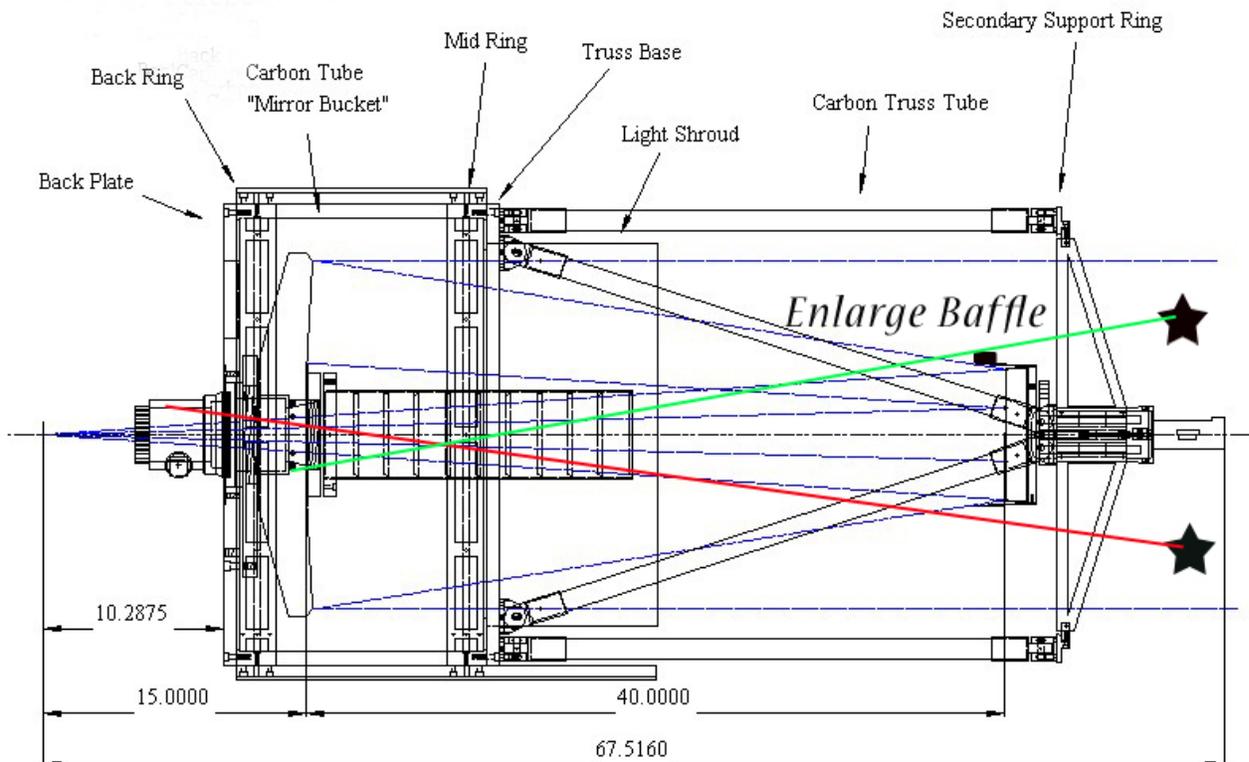


Step One: Aggressive Baffling

With the large CCD (KAF 09000 or KAF16803) scattered light can become a real issue. One step that should be done is make sure any stray light that can get past the secondary baffle and scatter off of something in the image train and hit the chip. In my case, stray light was scattering around the field corrector causing most of my problems. I applied 4 layers of 1/8" black foam insulation tape around the secondary baffle tube to make the off axis light get caught farther up the primary baffle tube away from my field corrector. This alone helped but did NOT eliminate the problems.

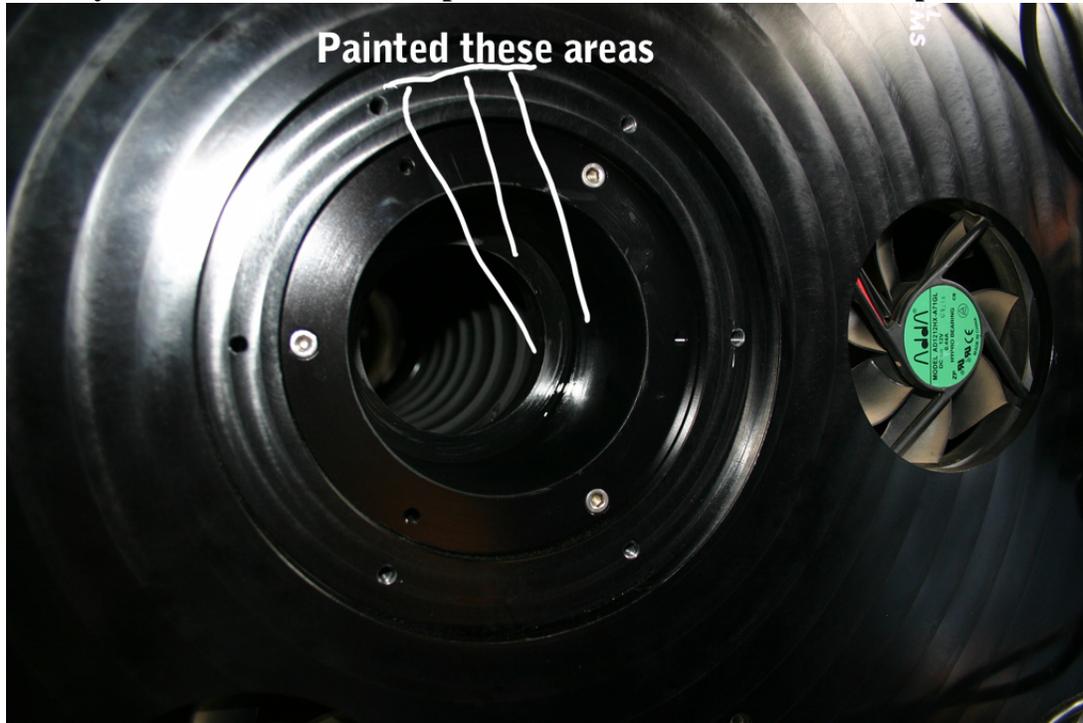


20RC Truss Telescope



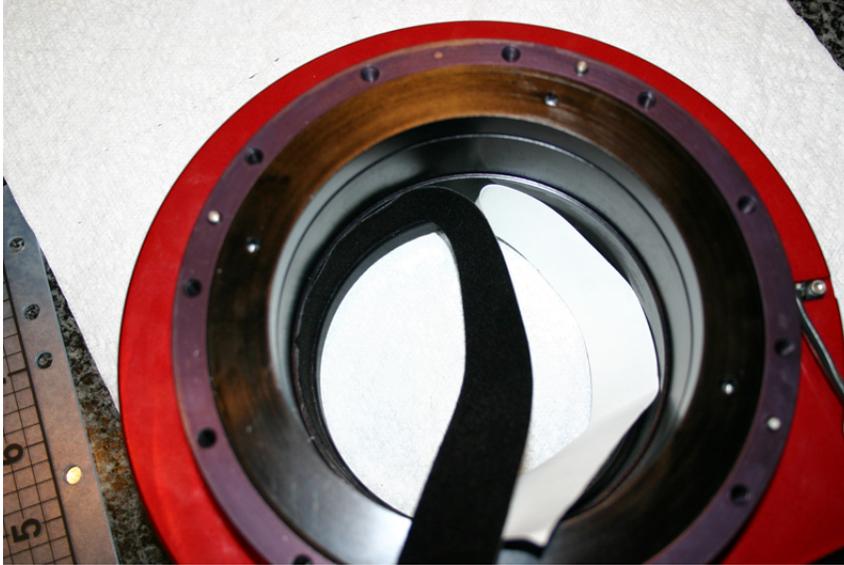
Step Two: Paint anodized surfaces

As we all know, anodized surfaces are highly IR reflective and the scattered light seems to be hitting these surfaces. Removing the PIR you will notice a chamber in the back plate and the neck through to the primary baffle tube. The neck area contains the set screws that hold the mirror spacers in place. These areas are smooth anodized surfaces with a ring area pointing directly at the field corrector. I painted these areas with flat black paint.



Step Three: Paint and Flock the 100mm PIR and the Field Corrector

The PIR is beautiful and it houses the field corrector if you have one. Again there are very reflective surfaces there that can scatter into the field corrector and reflect off the edge of the glass. I flocked the area that is visible in front of the FFC.



Inside the field corrector is very shiny black anodized material. The edges of the glass sits right up against this and are not masked.



I believe this is a huge portion of the problem as the reflections have a textured look. This is the 100mm Field Corrector which is like a 4" refractor! I believe this should be build like a refractor objective cell with very dull black insides with a small edge mask. As you can see there is a large amount of reflection possible here.

First I painted the retaining ring with flat black paint and then flocked where I could on the inside of the tube.

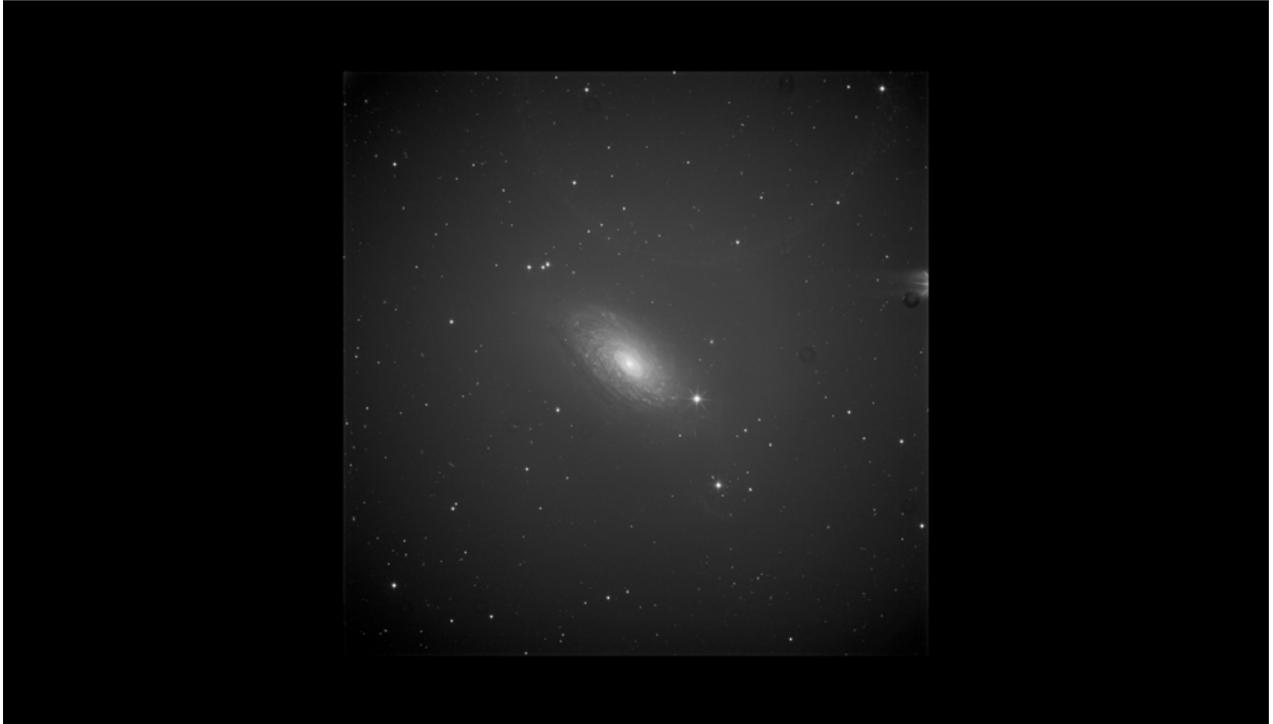


After Flocking this area I placed it back into its cell. Note below that I also flocked inside the retaining ring (could be overkill). These pictures show the top and bottom completed.

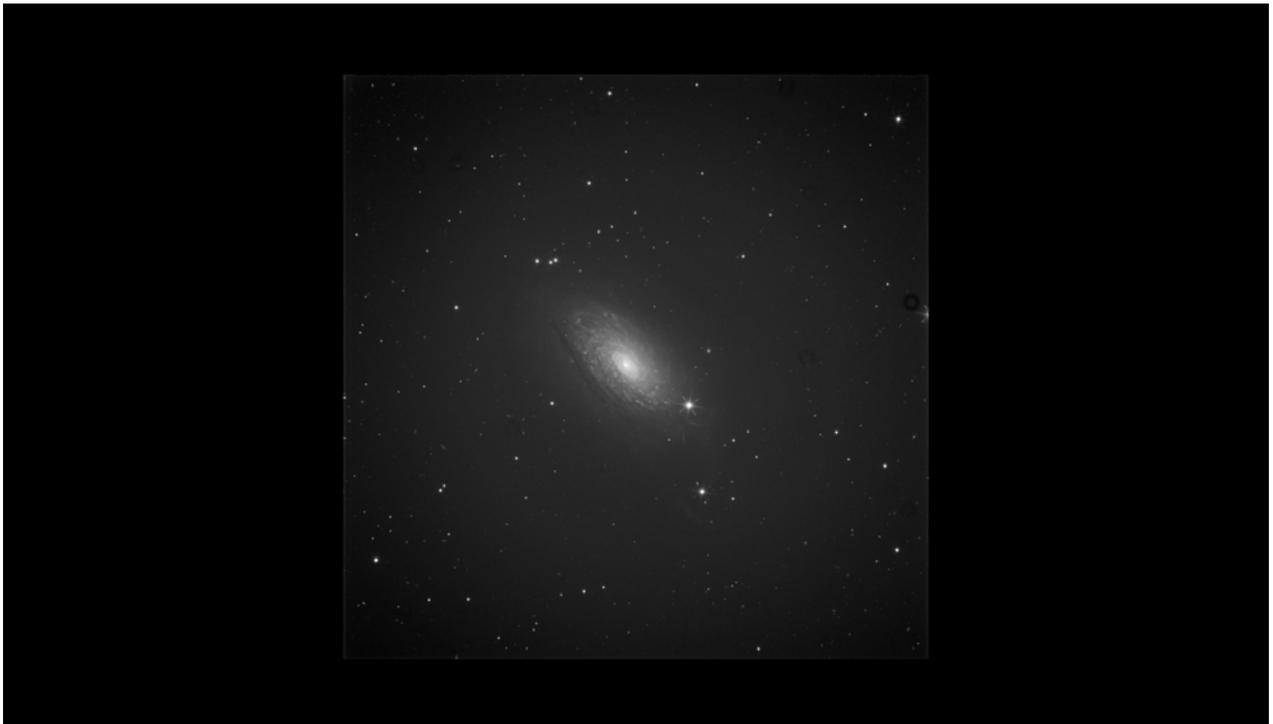


Final Results

Once I completed these steps I wanted to test the results with the field corrector removed and not in the image path. This is the image with the Field Corrector (FFC) in place.



This is the image after removing the Field Corrector – no reflections and normal hot spot.



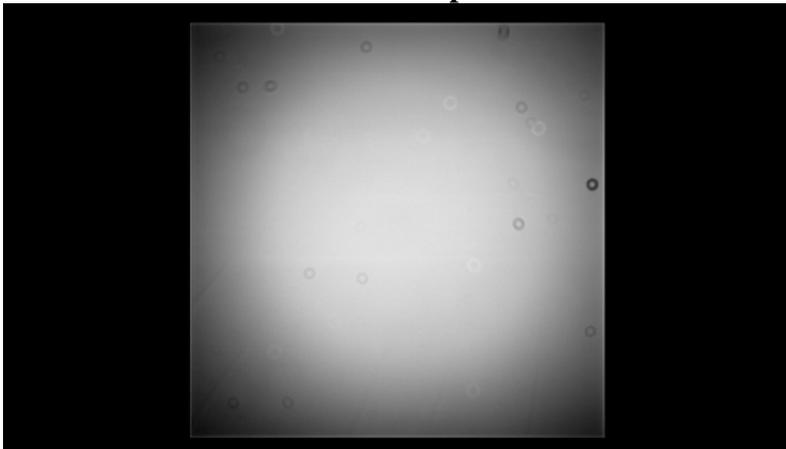
This is a picture of the 100mm PIR and Field Corrector ready to go.



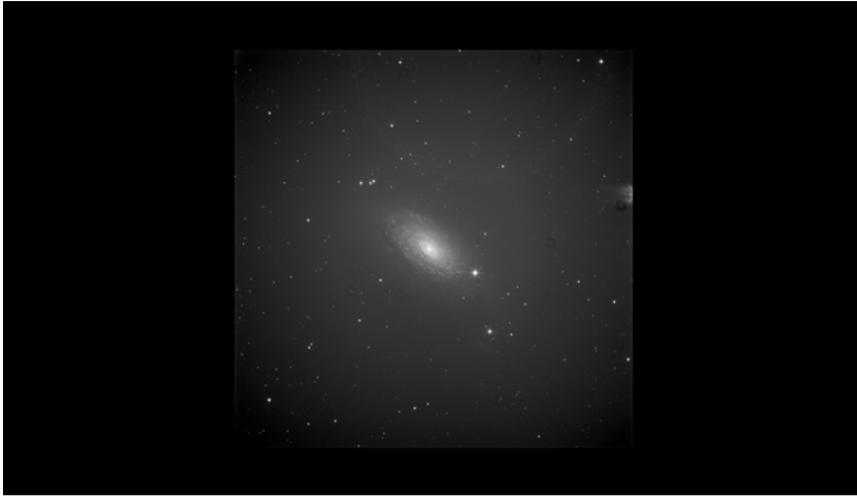
Clear Flat result with all the modifications



Clear Flat result with no FFC in place.



M63 with FFC before modifications



M63 with FFC after Modifications (3/4 moon)



This test was done with a $\frac{3}{4}$ moon but the hot spot doughnut (sky concentration) is now much wider and more diffuse. The “sky concentration” has been improved and the reflections tamed doing these simple mods.

Ken Crawford

www.imagingdeepsky.com