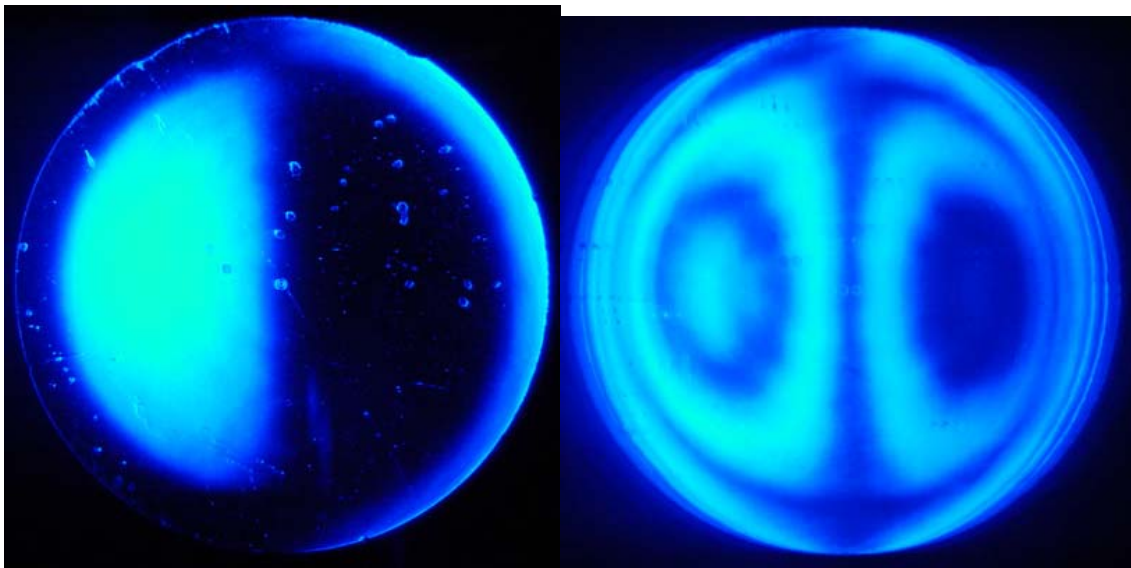


Final Report – 28” F/4.5 primary mirror #0049R, FL=126.5” Refigured for Dan Gray, 12/18/06, by Michael E. Lockwood

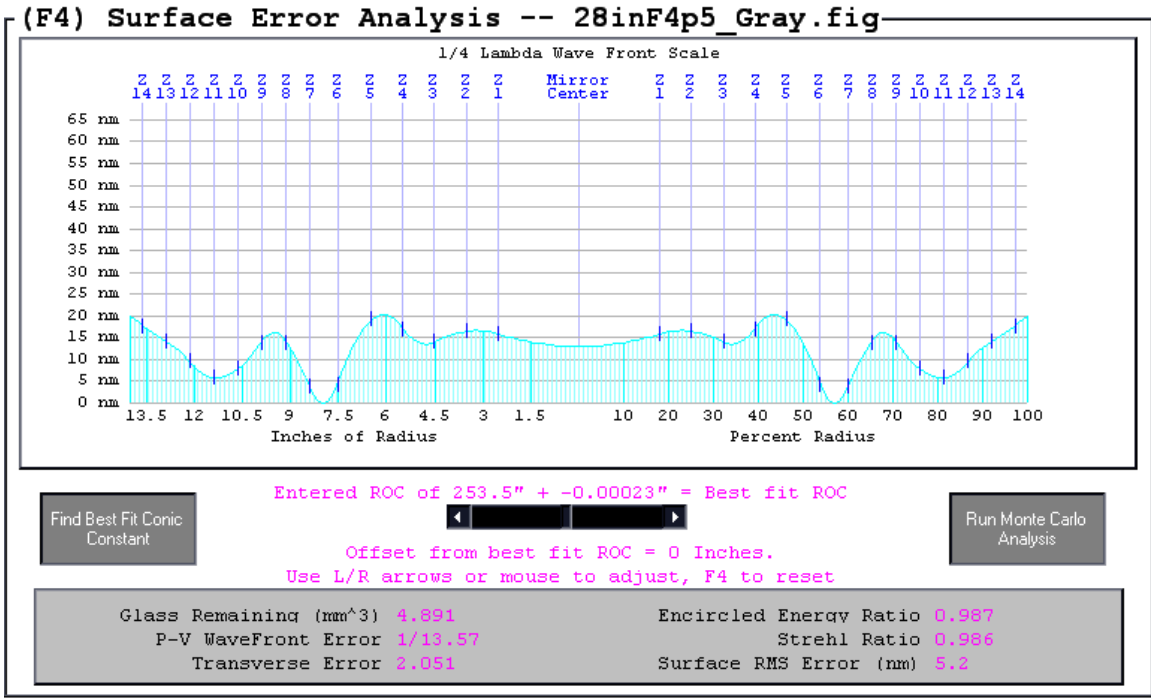
The 28” Pyrex primary mirror arrived in a wooden crate packed in closed cell foam. The blank had nicely ground sides. The optical surface showed some blemishes on the surface and one long fairly light scratch across the center of the mirror that remained after the coating was stripped. The back of the mirror had been partially ground, and was reasonably flat, but still about 1/32” concave. It was deemed to be flat enough.

The primary was Foucault tested before the coating was stripped. Initial testing revealed a fairly zoney central region. More careful testing showed significant astigmatism in the outer regions of the mirror, enough to significantly distort the ronchi lines. Images of the coated mirror under Foucault and Ronchi testing are shown below. Note the asymmetry of the Foucault shadows (dark shadow bends to the left at the bottom of the image) and the Ronchi lines (circular line does not meet at the top center as it does at the bottom center). These are indicators of significant astigmatism. This confirmed the owner’s description of astigmatism in the images that rotated with the primary mirror.



The primary was strain tested and the results indicated that the blank was very well annealed. No strain was observed with the “crossed polarizer” test, so the astigmatism must have been ground or polished into the 2”-thick blank.

The results of initial Foucault testing are shown below. Ignoring the significant astigmatism, the mirror did not meet the Rayleigh criterion. The P-V wavefront error was 1/2.45 waves, the Strehl ratio was 0.451, and the transverse error was 6.0. These indicate significant errors of slope and on the wavefront. As it was, even neglecting the astigmatism this mirror would not perform to my standards, and an improved figure would result in circular, much tighter star images and greatly improved planetary images and performance at high power.



Units are in Inches, Light source is Moving.
 Mirror Diameter = 28 Best fit Radius of Curvature = 253.5 Desired deformation = -1

Dan, this mirror has been (for lack of a better word) massively improved in term of both the accuracy of the figure and the reduction in astigmatism. In combination with the greatly improved 8" flat (#0050RF), I hope it provides many years of outstanding images for you and your friends/guests. The improvement over the previous optical system should be obvious and dramatic.

A couple of (unaltered) images of the Foucault shadows are shown on the last page as a final illustration of the smoothness and quality of the mirror. Note the excellent symmetry of the Foucault shadows. The diffraction ring (indicating a good edge) was lost due to shrinking the photos, but it is there. The uneven outline of the mirror at the top of the images is actually the silhouette of the carpet on which its bottom edge rests during testing. Some very slight roughness can be seen near the 70% zone in the images, and this was the result of working down a high zone. It is made to look worse due to the digital images and jpeg encoding, and it barely visible visually. It will not affect the images produced by the telescope.

You are really going to have fun with your new optics, and I can't wait to hear about your first observing session with them.

Michael E. Lockwood, 12/18/06

