THE CLEANING OF A CLASSIC *(Part Two of Two)*

Article by F. Jack Eastman
Photos courtesy of Chris Ray and Dr. Robert Stencel

This article is continued from the April 2011 Observer.

Once the glass was cleaned we marveled at the beauty of the polished surfaces—nary a blemish of any kind, no sleeks or other evidence of mistreatment in its 116 years of existence. There were a number of small bubbles in the glass, the largest being 2mm across; most of the rest were less than a millimeter.

After we were all done with the cleaning and measurements, the lenses were replaced in the cells, making very sure they went in the right way! There was no doubt about the flint, but we re-measured the radius on the front of the crown to be doubly sure we didn't get it backwards. The cells were replaced on the telescope, the telescope released from the tie-down and aimed at Venus. The image was very good, even in spite of marginal seeing. The collimation was checked with a Cheshire eyepiece and deemed good enough for the moment. The telescope was checked further that evening and pronounced in excellent condition. The collimation was further tweaked by Chris and deemed perfect.

FINDERS:

In a way, we goofed. Only after the telescope was secured to the pier in preparation for removal of the objective did we decide to clean the finders. Alas, their lenses were out of reach, now near the top of the dome! (At this point, I took advantage of some down time while Aaron was scraping rust out of the front cell to bring in my 6-inch Clark and give it "the treatment").

After we were done with the 20-inch, we removed the lens from the 6-inch Grubb, disassembled it and gave it a thorough cleaning. Although there was some confusion about how the elements were assembled, it made no difference, as the curvatures on the crown element were the same. We did find several arrows on the edges of the lenses (one with my initials from 30 years ago)! The flint was plano-concave, a true Littrow configuration, and there were very faint remnants of some pencil marks on the edges of the elements. I had disassembled this lens in the 1970s and noticed, on the edges of the lenses, "Spencer Lens Works 1926" (on the crown) and "Spencer Lens Works 1936" on the flint. Sometime later the lens was again cleaned, I think by Mike Ditto, who said he didn't see any notations on the glass. Ivan Geisler, Pat Ryan and I disassembled the lens (I think this was in 1980—my initials were on one of the arrows) with a view to documenting any notations that might be present. Sure enough, there was little left of those notes from before.

Jack carefully (very carefully) sets the spherometer on the lens surface to measure the radius of curvature of the Crown lens element.

As with the main lens, we measured all the parameters for the Grubb lens, and as mentioned before, it was a Littrow design. The crown is equi-convex (a good thing, as it cannot be assembled backwards) and the flint, plano-concave. It is interesting that this lens has a very large spacing between the elements, on the order of a centimeter.

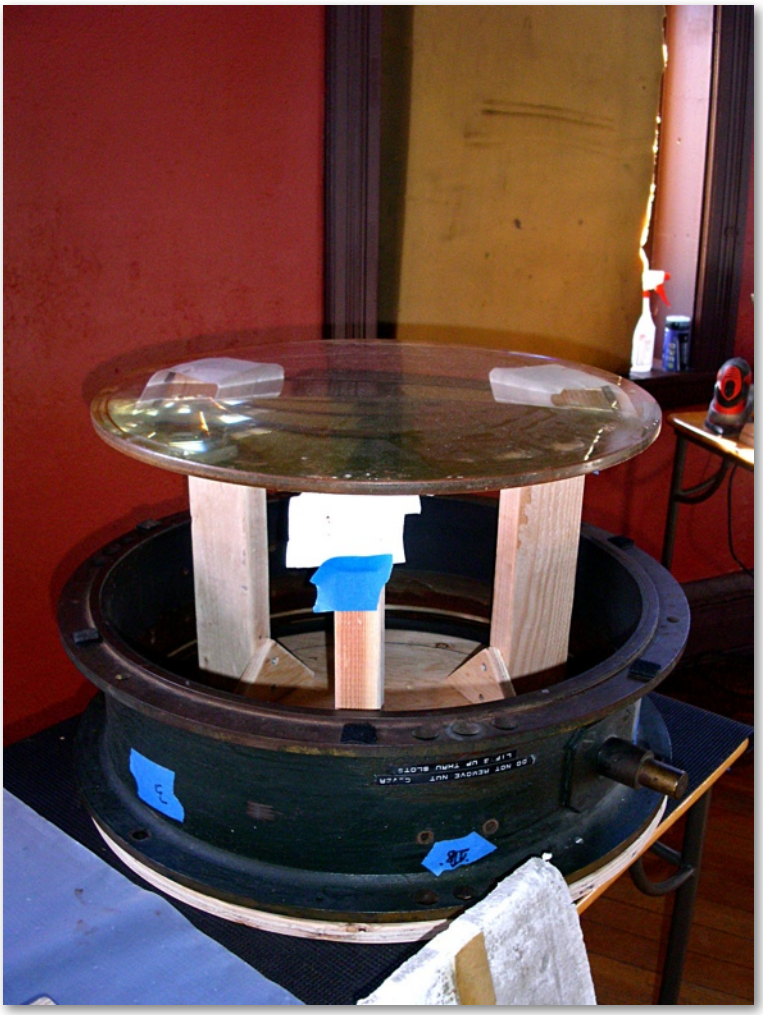
Table 3) 6-inch Grubb Lens Prescription

Surface	Radius(mm)	TH(mm)	Material	Nd	Vd
1	1251.	TBD	Glass	UNK	UNK
2	-1251.	9.4	Air		
3	-1206.	TBD	Glass	UNK	UNK
4	Inf. (flat)		Air		

The 5-inch Clark finder (1882) resisted all attempts to remove the front cell from the tube. This lens really looked awful, and probably was in the most need of a good cleaning (note: Aaron is coming up with some special tooling to attempt to remove the lens so it can be given the good cleaning it so badly needs).

While we were at it, we also disassembled the periscope-eye end from the system for reading the Hour Angle Circle. All the optical surfaces were cleaned except the rear of its objective, due to it being stuck; again,

Crown (convex) lens element removed from cell, preparatory to the cleaning operation.



proper tooling will be needed to remove this lens. After reassembly and subsequent realignment, the numbers on the hour circle could once again be read.

After these operations were completed, I escaped to Oklahoma for a week of observing under truly dark skies. The reports from the users/operators at Chamberlin indicated much improved performance of the 20-inch and the 6-inch Grubb. I can testify my 6-inch Clark showed significant improvement as well; clearly, it had been time for this operation.

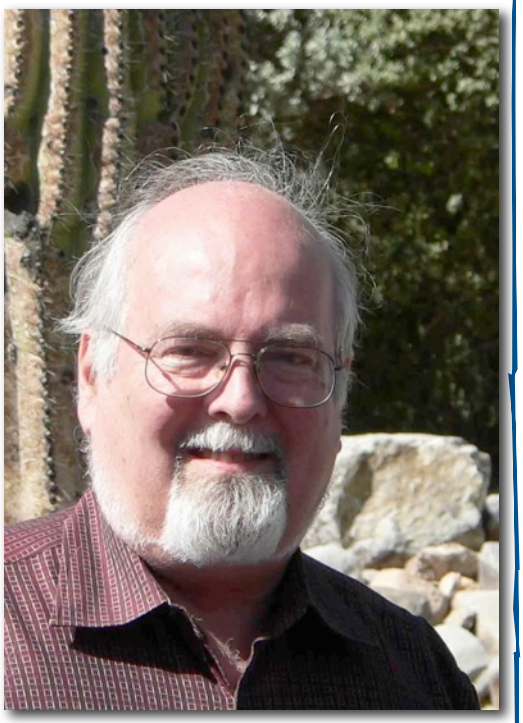
We should establish a realistic schedule for future maintenance of the optics of this fine telescope. I found it much easier than I had expected. The lens assembly was much lighter than I thought, and it can be safely removed and disassembled by four or five people. The cleaning procedure was straightforward, and required only about an hour and a half of actual handling of the lenses. The rest of the time was needed for securing the telescope, removal and cleaning of the cells and reassembly of the system.

All in all, it was a very successful and educational experience. I feel honored to have been included in this operation, and as mentioned, the telescope's performance is much improved.

NOTE: By differentiating (1), y^2/2s, above (See Part One, April 2011 Observer), with respect to y and s, we can get an estimate of the probable error in these measurements. The uncertainty in y, (dy) the radius of the spherometer feet (due also in part to the tiny flat points of contact of radius 0.3mm), is the order of 0.5mm leading to an uncertainty in the lens radii of the order of 1%. The uncertainty due to the accuracy of the dial probe, uncertainty in s, (differentiate (1) with respect to s, ds-.0005mm) is small compared to that in y, the order of 0.08%. We feel the thicknesses and spacing is good to the order of one millimeter.

MAY SPEAKER IS DR. CLARK R. CHAPMAN

by Lisa Judd



Our May speaker is Dr. Clark R. Chapman, Senior Scientist of Southwest Research Institute and Adjunct Professor in planetary science at the University of Colorado, Boulder. He will be speaking to us about the early science results from the orbital phase of JHU/APL's Messenger Mission to Mercury, which has recently completed successfully the orbit insertion burn to begin its primary mission orbiting the planet. Dr. Chapman comes to us fresh from the first science team working session post-orbit insertion. To read more about Dr. Chapman, visit his website at *http://www.boulder.swri.edu/~cchapman/#BIO*.