

48) CELESTRON SCHMIDT CAMERAS

When Tom Johnson began making commercial Schmidt-Cassegrain telescopes, he had overcome what seemed to be an insurmountable problem in the production of these units, namely in how to produce Schmidt corrector plates easily and of high quality. Schmidt's original design was NOT of a visual, Cassegrain-type scope, but rather that of a high-speed, wide-field camera. Since Celestron had perfected the corrector-plate manufacturing process and was making successful telescopes with them, it was only a matter of time before they began to produce Schmidt cameras. They did just that, starting in about 1971, shortly after the orange-tube telescopes were introduced. They produced three sizes: a 5-1/2, an 8, and a 14. It is of interest that at least a couple of the 14s were painted the old bluewhite

color scheme, and shipped as accessory items for C22s. (See Figs. 34-12 and 34-46)

The Schmidt camera is just that: a camera. It cannot be used visually. The corrector lens is placed at the (spherical) primary's center of curvature, and a CURVED film holder is mounted inside the camera about halfway between them. Film must be cut into small squares and placed over the curved filmholder, then secured with a clamp ring which forces the film to conform to the holder's radiused shape. The holder is then inserted into the camera through an access door (all of this being done in the dark), the camera placed on a suitable tracking mount, and the exposure begun by removing the cap from the corrector.

A Schmidt camera is capable of very fast photographic

speed (compared to a telescope) and can produce pinpoint star images over a field of up to several degrees wide, depending on the model. Many of the spectacular, wide

Chapter 48: Celestron Schmidt Cameras 2

field shots of comets, diffuse nebulae, or open star clusters seen in astronomy books, are taken with Schmidt cameras. Schmidt cameras require a bit of finesse to operate correctly. I already described the procedure of loading the film into them. The other very important aspect of using a Schmidt camera successfully is that it must be very precisely focused. All of Celestron's telescopes focused images for the observer by moving the primary mirror back and forth in the tube and / or with a rack-and-pinion focuser out the back. The C10S, which could be converted to a Schmidt camera, was SUPPOSED to be focused in essentially the same way, by moving the mirror to and from the filmholder while looking at a test image or target on the filmholder through a small spotting scope placed in the eyepiece tube. The problem was that in order for a Schmidt Camera to deliver their best images (stars can be points less than .01 inches in diameter at the focus), the primary has to be positioned to WITHIN A TINY FRACTION OF A THOUSANTH OF AN INCH. There was no way the average user could get this consistently correct if they were faced with moving the mirror into focus every time they wanted to use their C10S as a Schmidt camera. (The first few 5½-inch Schmidt cameras were also built with movingmirror focusing!) Celestron solved this problem by mounting the primary mirror and the filmholder on a support frame made of Invar® rods, which were adjusted

and prefocused at the factory. The Invar® rods have almost no temperature expansion problems, so the camera would stay focused with reasonable care.

One other trick to Schmidt camera performance is that the filmholder must be precisely figured to a shape that is needed for the exact set of optics in the camera. In other words, it is hand-matched to the optics like the secondary mirror of an SCT. When a customer ordered a Schmidt

Chapter 48: Celestron Schmidt Cameras 3

camera, they were encouraged to buy extra filmholders at the time of purchase. These were available for several sizes of film, depending on the camera. If a customer wanted more later, they had to send the whole camera back to have additional filmholders figured for that specific unit.

Aside from the particulars mentioned above, the Celestron Schmidt cameras performed superbly. Their eventual lack of continuation was probably caused by the hassle of having to cut and load one piece of film at a time, and having to develop these small pieces by yourself. Quite a problem for those without darkroom facilities.

Of the three models made, the 5½-inch unit was designed to be piggybacked on the orange-tube C8 or C14. The large scope served as the guidescope during photography. The 8-inch model could be interchanged with the orange C8 OTA in the fork mount, or piggybacked on the C14. If it was mounted in an 8-inch fork mount, a C5 guidescope was attached to it via the Celestron tangentcoupler.

If mounted on the back of the C14, the big scope was used for guiding. The 14-inch Schmidt camera was designed to interchange with the C14 OTA in the fork

mount, and then required a C5 or C8 guidescope attached to it, or the unit could piggyback on a C22.

While the two smaller models were fairly affordable (a few hundred to a couple thousand dollars), the large 14-inch camera was many thousands of dollars, and needed such a large mount besides, that it wasn't a big seller. Only about a dozen were made. The smaller ones were turned out in much higher numbers.





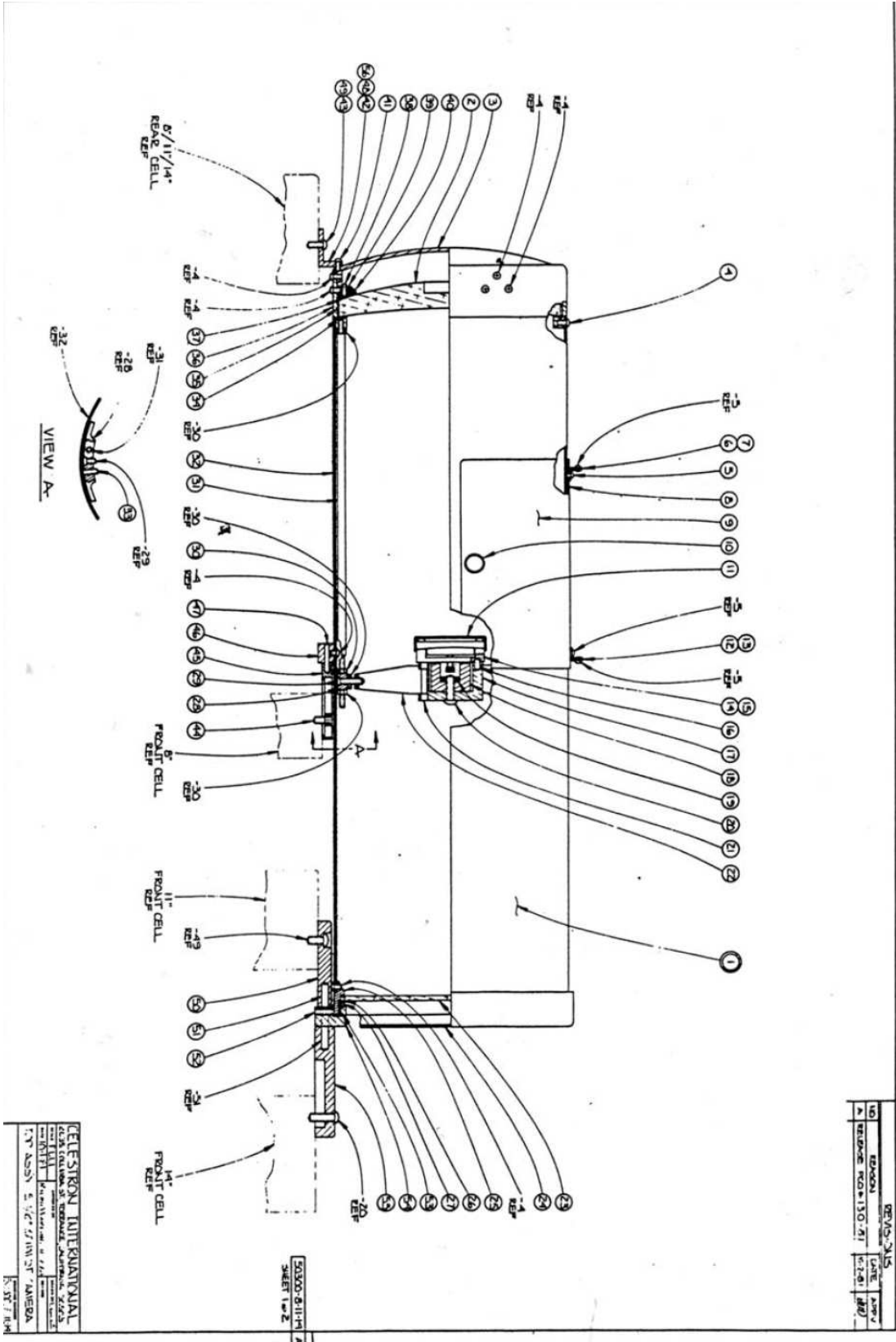
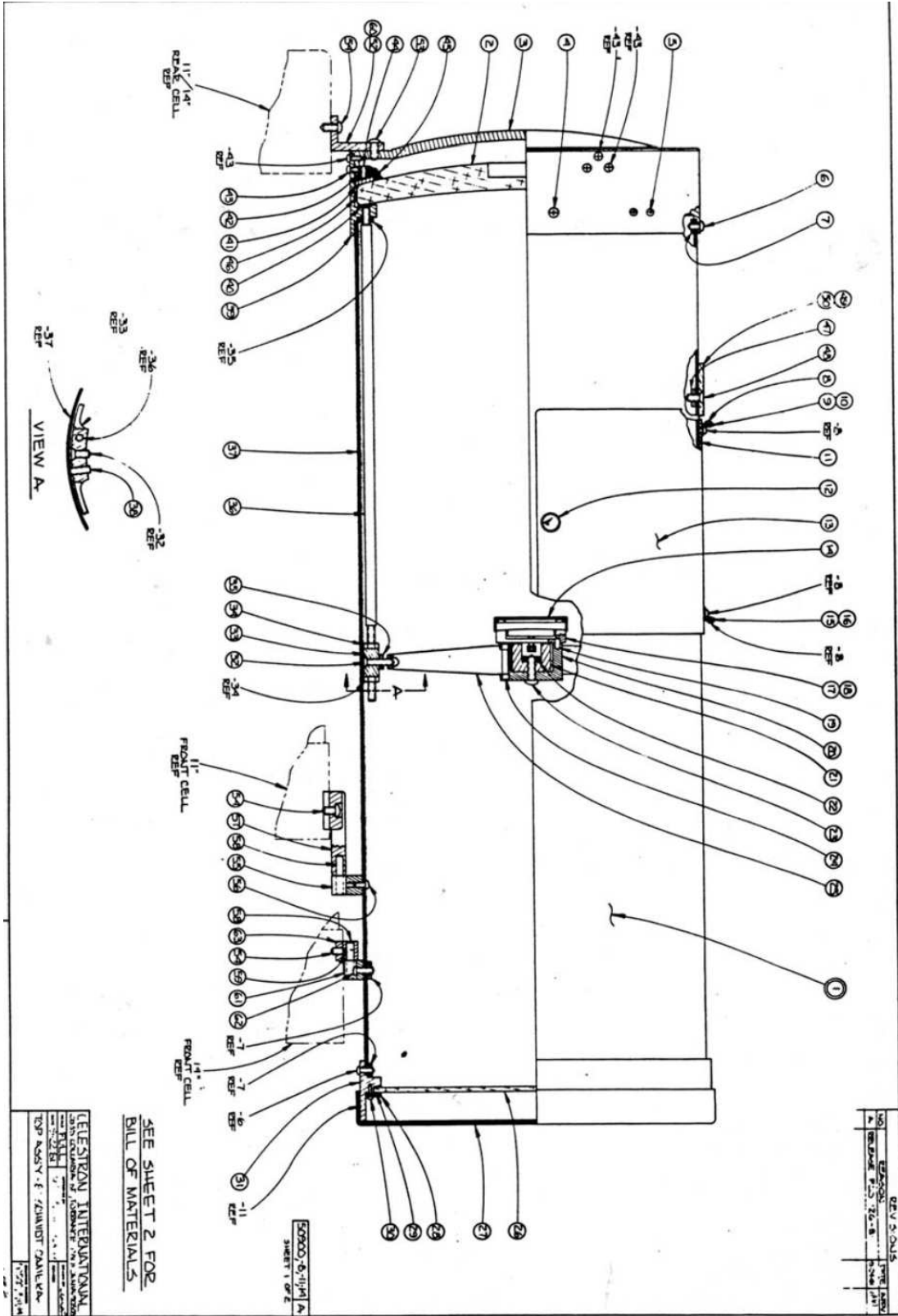


Fig. 48-24 5 1/2-inch Schmidt camera shop print.



509000-5-1141 A
 SHEET 1 OF 2

SEE SHEET 2 FOR
 BILL OF MATERIALS

CELESTRON INTERNATIONAL
 10000 W. 15th Ave.
 Boulder, CO 80501
 TEL: 303-440-7300
 FAX: 303-440-7301

TOP ASSY - E - ZHAWDT CAN/USA
 1997/01/01

REV	DATE	BY	APP
1	01/20/97
2	02/15/97
3	03/10/97
4	04/05/97

Fig. 48-26 8-inch Schmidt camera shop print.



Fig. 48-28 A shop-print of the 14-inch Schmidt camera was not available for inclusion in this text, so the

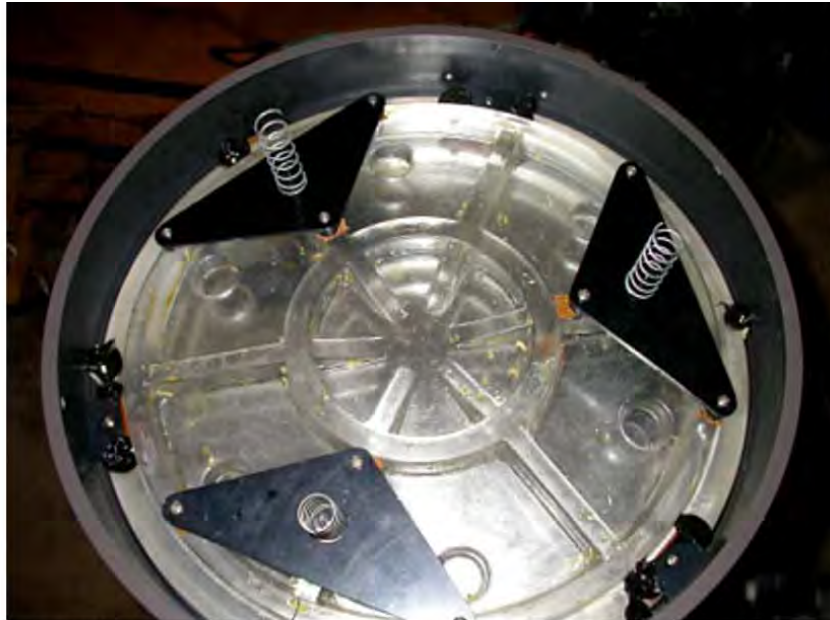


Fig. 48-29 A view of the 14-inch SC with the rear cover removed. The 14.4-inch primary is held in place by clamps, shims, RTV, and spring-loaded triangle pads. The rear cover presses against the springs and supports the primary mirror from the back.

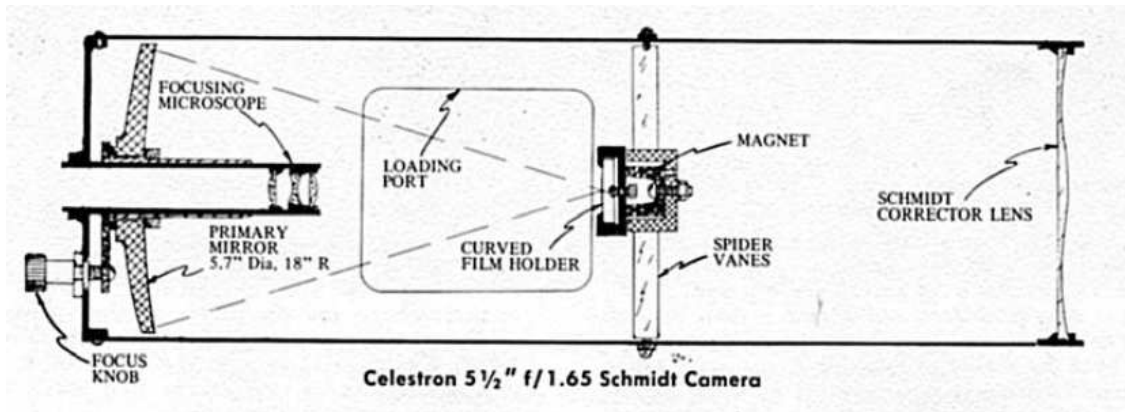


Fig. 48-34 This rare diagram is one of the earliest 5 1/2-inch Schmidt cameras, which featured a moving-mirror focusing system like the C10S and all Celestron's visual telescopes. A magnifying "microscope" was inserted into a hole in the back of the unit (where an eyepiece would go if this had been a visual telescope) and used to look at a target or image on the filmholder. When the operator adjusted the focus so the image looked sharp, the unit was supposed to be properly set.

Celestron Schmidt cameras are still sought today by Vintage enthusiasts. California Telescope maker Kevin Medlock bought out the Schmidt camera business from Celestron, redesigned them and sold them as Epoch Instruments. Both models sometimes turn up for sale at swap meets, or show up listed on internet sites that post astronomical equipment for sale. The Celestron Schmidt cameras were furnished with footlocker type storage and shipping trunks, and getting one with the original trunk is probably a sign that the unit was well-cared for.

While they take a bit of skill to use, there is no direct substitute for what a Schmidt camera can do, and many of the famous star atlases in print today can trace their origins to one of these instruments, Celestron, Epoch, or otherwise.



Fig. 48-36
This beautiful 14-inch Schmidt camera is equipped with an orange-tube C8 guidescope, mounted to the camera with the LARGE-SIZE Celestron tangent coupler. (Courtesy of Peter Fassler)

As mentioned earlier, the 14-inch Schmidt camera could use either 35mm filmholders or 120-size filmholders. These are shown in Fig. 48-38. If a Wratten filter was to be used on either of the filmholders (to help eliminate sky fog), the filmholders had to be made of a slightly different shape to accommodate the focus shift introduced by the filter. A “filter” filmholder could NOT have the filter

removed and used for straight, un-filtered photography. The filters that were used on these holders were of the flexible-film or gelatin type, NOT conventional, solid glass filters. They were simply taped (!) over the filmholder and could easily be taken off and misplaced or disposed of, if the owner didn't realize that the nearly transparent plastic sheet was indeed a filter. Such a filter is barely visible in Fig. 48-38, attached to the 120 holder.

A side note: Several SC owners have modified their filmholders with "ears" to accommodate reels of film,

Chapter 48: Celestron Schmidt Cameras 35

which could simply be spooled through for advancement to the next frame, eliminating the nuisance of cutting the film.



Fig. 48-38 35mm and 120 filmholders for the 14-inch Schmidt camera. The 120 holder has a thin Wratten filter taped over it, barely visible in this photo.

How does the Celestron Schmidt camera fit into in the present? In today's technologies of CCD imagers and Fastar-compatible Celestrons, Schmidt cameras, using film, might seem a bit outdated, but they still hold a unique place in history. Many of them are still in use by amateurs, often turning out photos that appear in gallery sections of astronomy publications.



The Schmidt cameras did not usually come with finderscopes, but one can be a big help when wanting to point the unit accurately and quickly. Remember that a Schmidt camera covers a relatively wide field, and therefore pointing the unit with a standard finder is an easy way to make sure you're really "on target." It is a simple matter to attach a finder to any of the Schmidt cameras, such as shown in Fig. 49-41. Just be certain that if you have to drill and tap the rear cell, not to damage the primary mirror, or get metal shavings inside the tube.

Filename: Camera.doc
Directory: C:\Documents and Settings\DACUSER38\My Documents\confos
Template: C:\Documents and Settings\DACUSER38\Application Data\Microsoft\Templates\Normal.dotm
Title:
Subject:
Author: dacuser38
Keywords:
Comments:
Creation Date: 18/12/2013 1:04:00 μμ
Change Number: 1
Last Saved On: 18/12/2013 1:10:00 μμ
Last Saved By: dacuser38
Total Editing Time: 6 Minutes
Last Printed On: 18/12/2013 1:12:00 μμ
As of Last Complete Printing
Number of Pages: 15
Number of Words: 1.293 (approx.)
Number of Characters: 6.986 (approx.)