LICHTENKNECKER FLAT FIELD CAMERAS

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Lichtenknecker Flat Field Cameras (FFC) are basically Schmidt Cameras. It consists of a tube, a primary mirror, a secondary mirror, an aperture diaphragm, and a Schmidt correction plate. On the back of the FFC there is a T2 adaptor (M42 X 0.75 mm) for connecting a camera (DSLR or CCD/CMOS cameras).

The light enters the system from the left through the correction plate, passes an aperture diaphragm and, after being reflected by the main and secondary mirrors, is focussed in the focal plane forming a perfect a Flat field image (Figure 1).

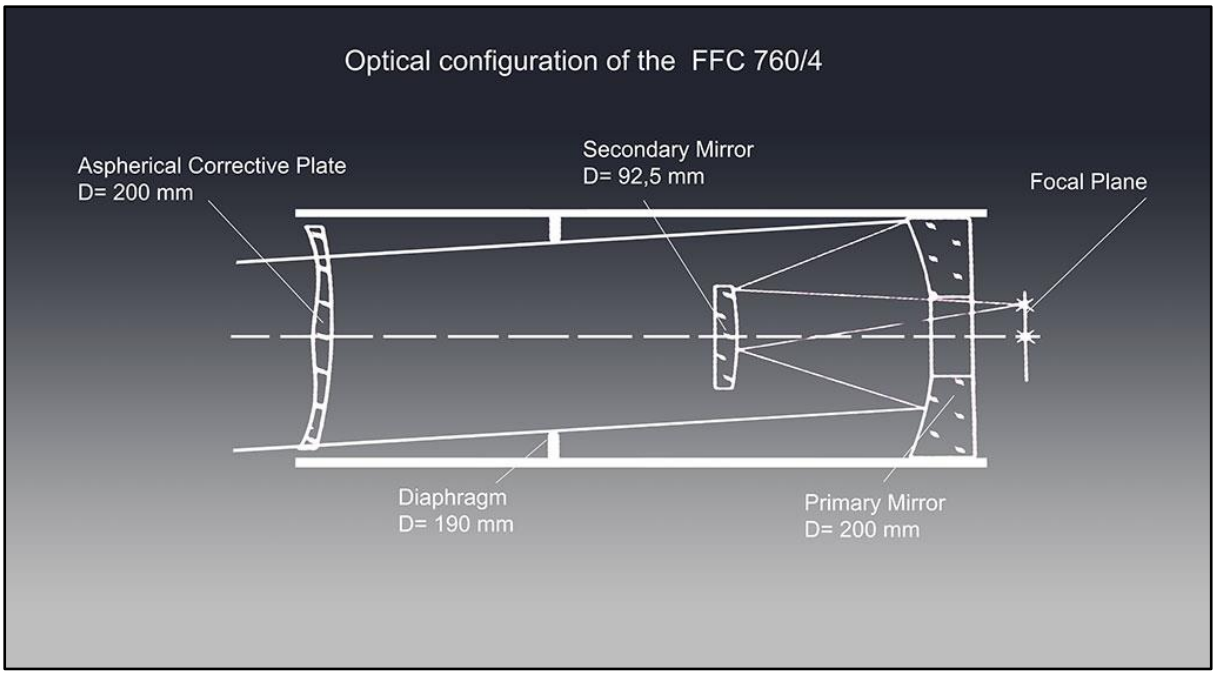

Figure 1- Lichtenknecker 500/3.5 Flat Field Camera.

The FFC is a photographic instrument and cannot be used for visual observations. Due to the large field sizes that can be photographed at the focal plane, the size of the secondary mirror (obstruction) is quite large. For example, the 4.0 / 760 mm version has a full 99mm (including secondary mirror holder).

Lichtenknecker Optics[1] offered five different FFC (Figure 2 and 3):

1. 500 mm f / 3.5 (150 mm aperture);
2. 760 mm f / 4.0 (200 mm aperture);
3. 540 mm f / 2.7 (200 mm aperture);
4. 940 mm f / 3.2 (300 mm aperture);
5. 1350 mm f / 7.0 (200 mm aperture).

[1] http://www.astrotech-hannover.de/amateurteleskope/downloads/lichtenknecker.pdf

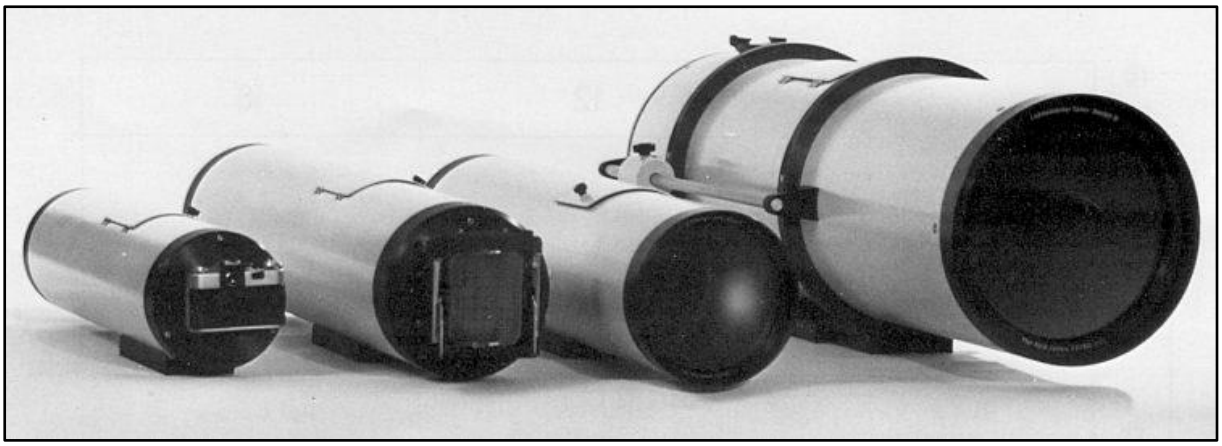

Figure 2- Lichtenknecker Optics FFCameras.

Technische Daten:	3,5/500	4,0/760	7,0/1350	3,2/940
Freie Oeffnung				
der SCL-Korrektionsplatte	150 mm	200 mm	200 mm	300 mm
des Hauptspiegels	151 mm	200 mm	200 mm	300 mm
des Fangspiegels	71,5 mm	92,5 mm	92,5 mm	141,5 mm
der Aperturblende	142,8 mm	190 mm	193 mm	294,5 mm
Brennweite	500 mm	760 mm	1350 mm	940 mm
Geometrisches Oeffnungsverhältnis	1 : 3,5	1 : 4,0	1 : 7,0	1 : 3,2
Totaler Bildwinkel über die Diagonale des Kleinbildformates	4° 57'	3° 16'	1° 50'	2° 39'
Spiegelmaterial	Duran	Duran	Zerodur	Zerodur
Fokussierweg bei Drehung der Fangspiegelfokussierung um 1 Teilstrich	0,34 mm	0,33 mm	0,30 mm	0,34 mm
Teilstrichabstand	17 mm	21 mm	21 mm	30 mm
Aussendurchmesser des Tubes	188 mm	234 mm	234 mm	368 mm
Länge (ohne Gewindestutzen für T-Adapter)	669 mm	1011 mm	1011 mm	1253 mm
Gewicht (ohne Montageschuh bzw. Rohrschellen)	5,9 kg	11,7 kg	12,6 kg	ca. 40 kg

Figure 3- Technical data FFCs (in German).
http://www.astrotech-hannover.de/download/ffc.pdf

Focusing in the FFC is achieved by changing the distance between the secondary mirror and the main mirror. Turning the focus ring counterclockwise pushes the secondary mirror towards the main mirror and thus places the image plane further outwards (away from the back plate). Turning clockwise (to the right) increases the distance and the image plane moves closer to the back plate.

The optical system is calculated in such a way that the best imaging performance is achieved when the focus position is exactly 55mm behind the T2 thread, which functions as a camera connection (55mm corresponds exactly to the distance between the film plane of a 35mm camera and the front of a camera T2 camera ring) (Figure 4).

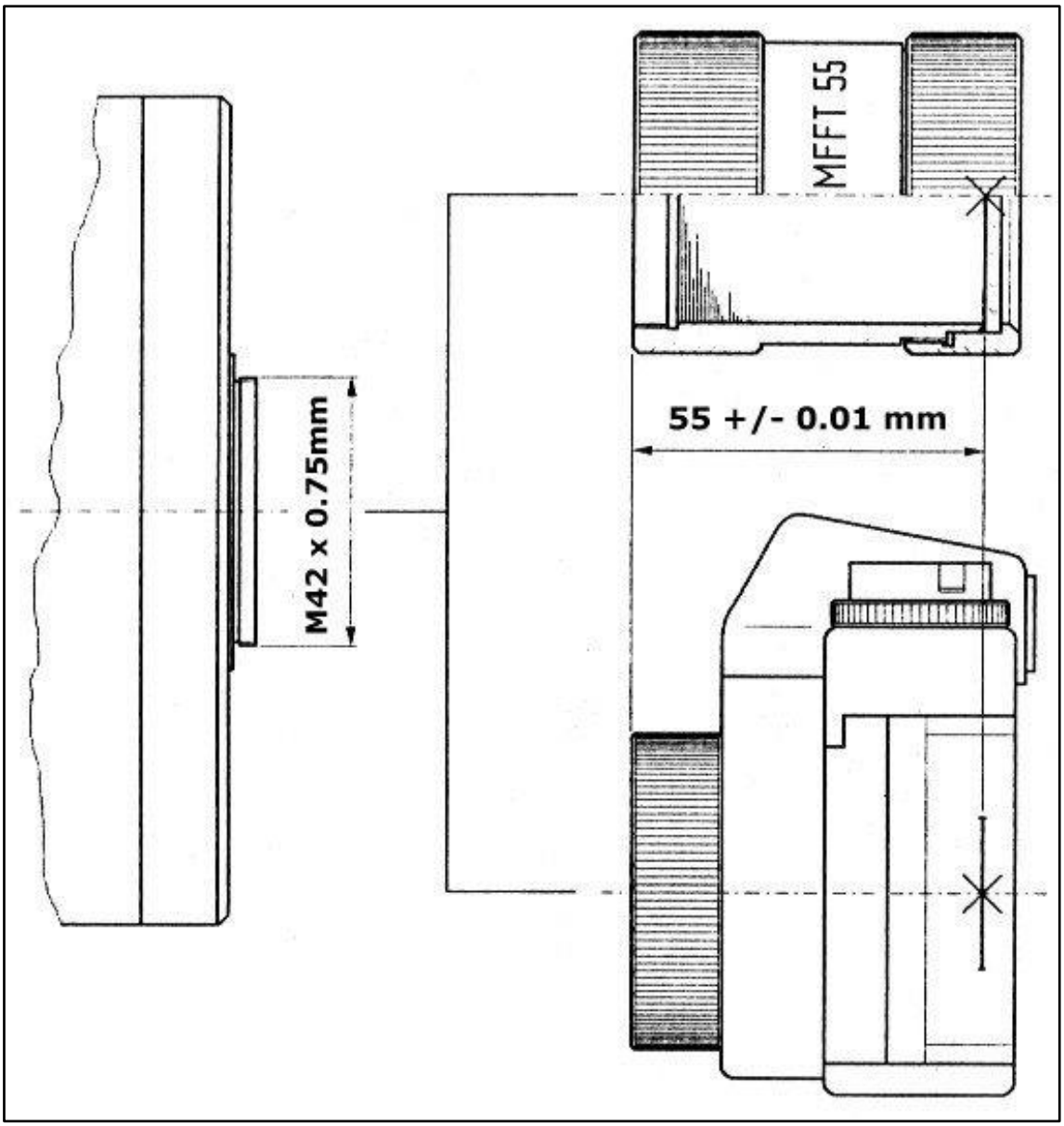

Figure 4- Optimal back focus distance (55 mm).

The fine thread between the focus button and the secondary mirror holder only has a limited travel range. If you turn counterclockwise (left) long enough, both parts fall apart. If the tube is inclined towards the main mirror, the secondary mirror falls onto the main mirror. The temperature response with the FFCs is high. It may be necessary to refocus several times during the night.

FFCs are relatively insensitive as far as misalignment is concerned. However, if the FFC is regularly transported and vibrated or after it has been dismantled, adjustment is essential.

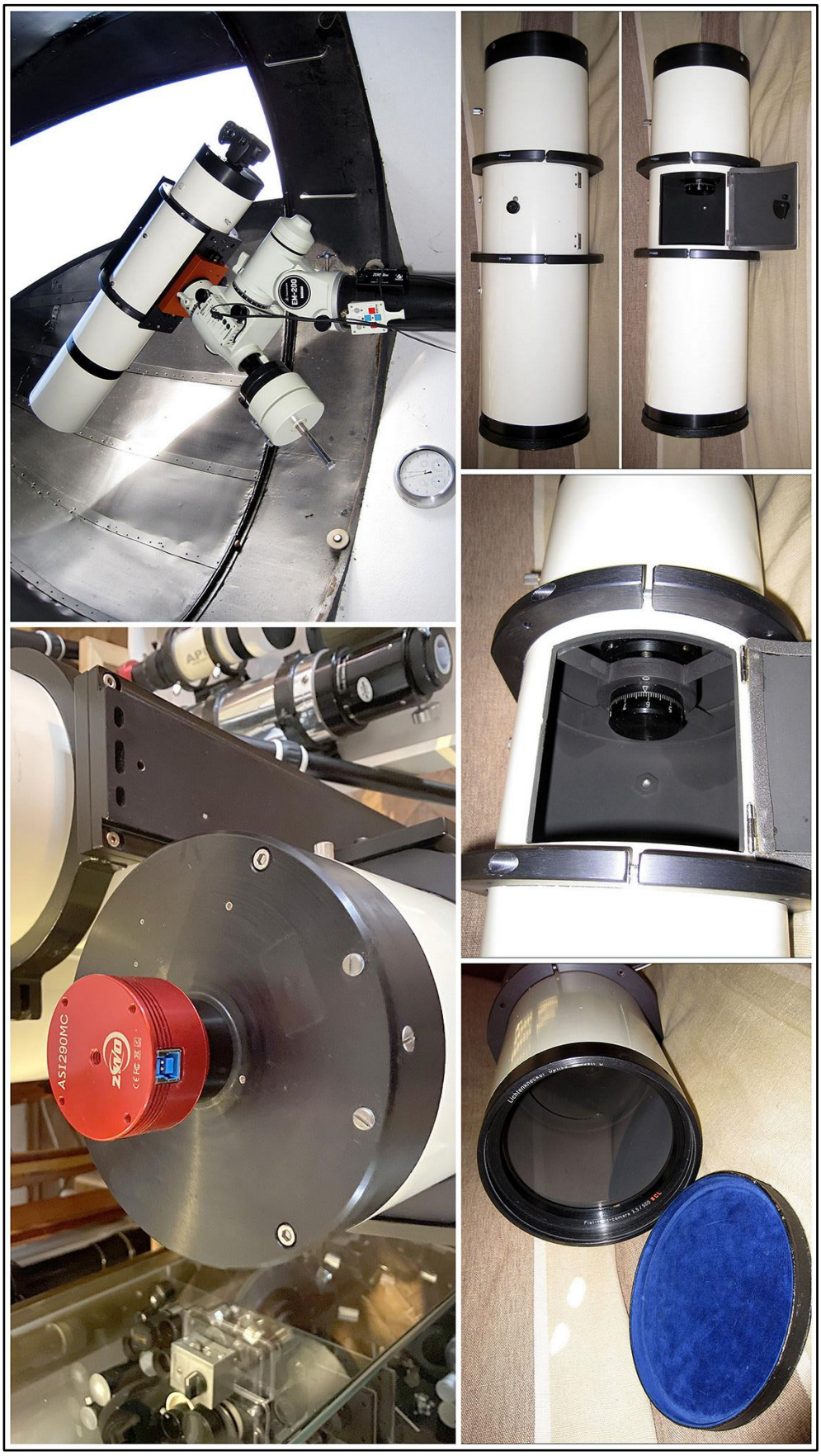

Figure 5 – Author's Lichtenknecker 500mm f / 3.5 (150mm aperture) Flat Field Camera.

Figure 6- MOON (20200930). Lichtenknecker 500mm F/3.5 Flat Field Camera, Baader 35nm H-alpha filter, PGR GRASSHOPPER 3 GS3-U3-28S4M.

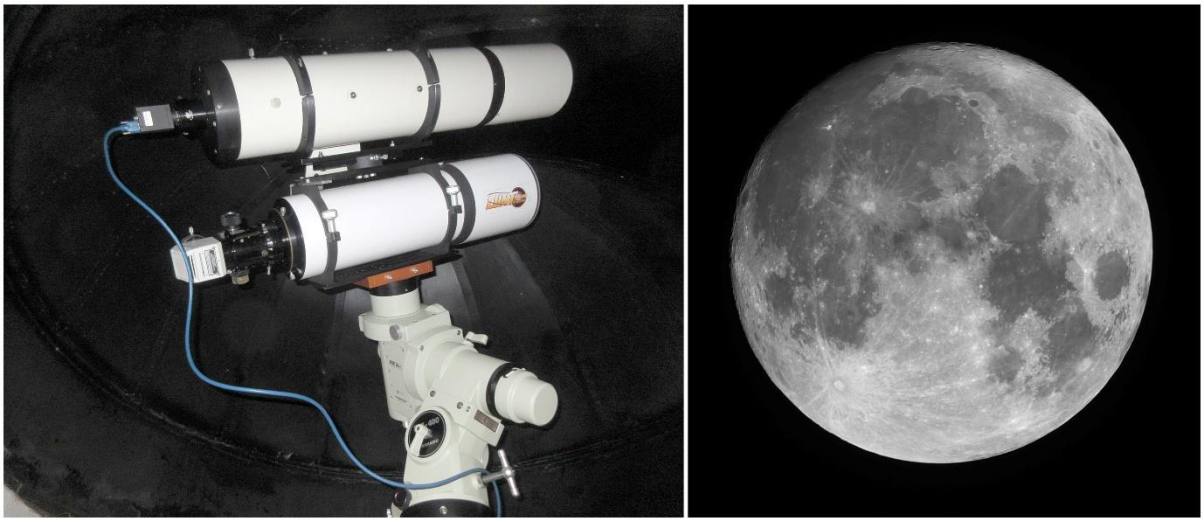

Figure 7- Lichtenknecker 500mm F/3.5 Flat Field Camera.