

## Solution to lens erecting telescope

### -A-

1. Erector used for  $2f/2f$  configuration. Distance 240mm between objective and erector lens, 120mm between erector lens and eyepiece. Object at infinity, image in  $F'_o$  at 150mm from objective, image by erector lens at 90mm to the right of the erector lens ( $F_{er}$  and  $F'_{er}$  at 45mm on each side of the erector lens), final image by eyepiece at infinity.
- 2.
3.  $G = +5$
4. Aperture stop and entrance pupil = objective lens. Exit pupil: diameter 5mm, distance 26mm to the right of  $F'_{ey}$  (ie 56mm from the eyepiece lens). Intermediate pupil in the space between erector and eyepiece: 55,38mm to the right of erector, dia 5,77mm.
5. Diameter of bright field (limited by erector lens): 3,12mm in intermediate space,  $1,2^\circ$  in object space,  $6^\circ$  in image space.
6. Diameter of total field (limited by eyepiece): 10,7mm in intermediate space,  $4,1^\circ$  in object space,  $20,5^\circ$  in image space.

### -B-

7. Field lens in  $F'_o$ . Other positions unchanged.
8. No difference from previous drawing (these rays undeviated through the center of field lens)
9. New exit pupil of the telescope: same diameter 5mm, position 41mm to the right of eyepiece (closer than without field lens). Intermediate pupil in the space between erector and eyepiece: dia 13,6mm, position 8,2mm to the right of erector lens.
10. Image of field lens in the space between erector and eyepiece: in the intermediate image plane ( $F_{ey}$ ), dia=10mm.  
Diameter of bright field (limited by eyepiece): 7,3mm in the space between erector and eyepiece,  $2,8^\circ$  in object space,  $14^\circ$  in image space (more than twice larger than without field lens)
11. Diameter of the total field (limited by field lens): 10mm in the space between erector and eyepiece,  $3,8^\circ$  in object space,  $19^\circ$  in image space
12. Diameter of field lens to suppress the vignetted field=7,3mm