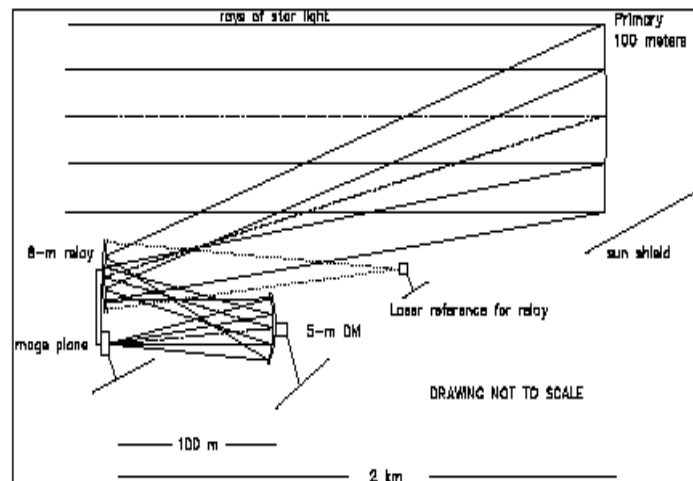


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***"Very Large Optics for the Study of Extrasolar Terrestrial Planets"***

To evaluate habitability and to search for primitive life on Earth-like planets of other stars, telescopes in space with collecting areas of  $10 \text{ m}^2$  to  $1,000,000 \text{ m}^2$  are needed. We propose to study revolutionary solutions for reflecting telescopes in this size range, going beyond technologies we are developing for adaptive secondary mirrors and for ultra lightweight panels for the NGST. Ways will be explored to build very large lightweight mirrors and to correct their surface errors. As a specific example, we will study a 100 m reflector with a concave NGST-size secondary relay that images the primary onto an 5-m deformable tertiary. The primary, free-flying 2 km from the secondary would be assembled from 5-m flat segments made as reflecting membranes stretched across triangular frames. A  $1/20$  scale (5 m) image of the primary is formed on the deformable mirror, itself segmented, where panel deformation would be corrected. Scalloping of the segments would compensate the missing curvature of primary segments. The



A second example for study will be a 30 m telescope made up from accurately figured 4 m segments. This would represent the limit of emerging technology being developed for NGST. The panel density would be  $5 \text{ kg/m}^2$ , light enough to launch in a single vehicle all the rigid, 10 cm thick panels needed for the 30-m aperture. The six-month proposal is for analysis and evaluation of different mirror technologies in the broad context of studying exo-planets in the space environment. The 2-year continuing study would follow up on one or two most promising technologies.