

# The Great Melbourne Telescope Project

A Joint Venture by Museum Victoria, The Royal Botanic Gardens and the Astronomical Society of Victoria

## 9. The Great Melbourne Telescope's Optical Specifications

Thomas and Howard Grubb constructed the Great Melbourne Telescope (GMT) in Dublin, Ireland. A detailed description of the GMT appeared in the *Philosophical Transactions of the Royal Society of London* in 1869 based on the presentation given by Dr Romney Robinson in 1868.

### Telescope Optical Specifications

The GMT design is a classic type Cassegrain with a paraboloidal shape on the primary mirror and a hyperboloidal shape on the secondary mirror.

Primary mirror diameter	48 inches (1.2 m)
Secondary mirror diameter	8 inches (203 mm)
Focal length of primary	360 inches (9.1 m)
Focal length of secondary	74.7 inches (1.9 m)
Focal length	1994 inches (51 m)
Primary focal ratio	f/7.6
Effective focal ratio	f/41
Eyepiece set, magnification	
	1 - 234x, 2 - 280x, 3 - 330x, 4 - 420x, 5 - 520x, 6 - 881x, 7 - 1000x
Eyepiece type	Huygenian
Finder scope aperture	4 inch (102 mm)

Shown in Figure 1 is a cross section of the Cassegrain design illustrating the path of the light rays passing down the telescope tube, reflecting off the concave primary mirror up to the convex secondary. A magnified image is then reflected off the secondary back down through a central hole in the primary mirror and into the eyepiece or instrument.

The advantages of the Cassegrain design are twofold. Firstly it produces a compact telescope for a required focal length. Secondly it is not necessary for the observer to sit in the high and exposed location up near the secondary mirror as is the case for the conventional Newtonian reflecting telescope. If the GMT were configured as a Newtonian telescope the observer would need to be located up to 30 feet (9 m) above the ground.

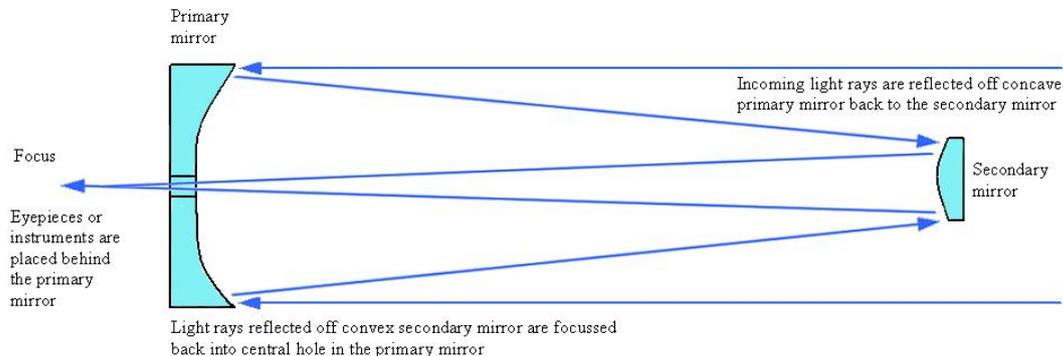


Figure 1 Cassegrain telescope design

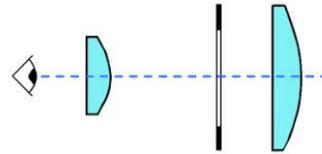
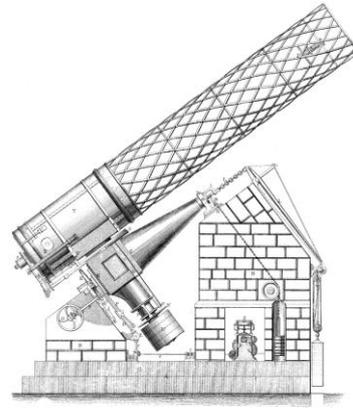


Figure 2. Huygenian Eyepiece

Shown in Figure 2 is the configuration of the Huygenian eyepieces supplied with the GMT. Each eyepiece uses two plano-convex lenses with the plane side facing the eye. A field stop is placed between the lenses. This simple eyepiece is suited to the long focal length of the GMT. The disadvantages are a narrow field of view and a short eye relief.



The original design drawing of the GMT by Robinson and Grubb

The GMT was also supplied with a number of accessories.

- Position micrometer with 3 eyepieces with magnifications of 207x, 315x and 542x. The micrometer included illuminated reticules.
- Grubb prism spectroscope.
- Photographic camera and plate holder.

## The Great Melbourne Telescope Project Information Fact Sheet

This fact sheet is one of a series providing information on the GMT historical background, technical details of the instrument and the efforts to reconstruct this magnificent telescope for use by the public.