

THE REFRACTOR TELESCOPE



Meade® 60mm refractor

If you are new to the world of astronomy you may well find the array of instruments and accessories rather daunting. While we at Telescope House have a well-earned reputation for putting even the most novice astronomer at ease, we thought it useful to describe briefly here the different types of telescopes and what to look for.

Refractors provide sharp views with good contrast and require no real maintenance. However, their images can be affected by false colour, that is, coloured fringes around objects. *Achromatic Refractors* have a compound two-lens objective, an *achromat*, that form the image and greatly reduces false colour by bringing both ends of the spectrum to almost the same focus. *Achromatic* means colour-free, but some colour contamination can still be evident. Better quality refractors have optics to counter the problem. They are *Apochromatic Refractors*, and use Fluorite or ED glass. (ED is extra-low dispersion) for their objectives. All apochromatics minimise dispersion of light by bringing all wavelengths to the same focus so that no extraneous colour is seen.

They employ an objective of two, or sometimes three elements made from the special glasses. While they perform superbly, they are also comparatively expensive.

The **REFLECTOR TELESCOPE** (also known as a Newtonian) collects light using a mirror referred to as a primary. It is concave and, capturing the light, brings it to a focus. Because the light is reflected and does not pass through the glass, it is effectively free from false colour. To bring the image to a position for the observer to view, a flat mirror is placed in the light path to deflect it. This slightly degrades the quality of the image in comparison to the Refractor. Primary mirrors are cheaper to produce than objective lenses and a 6"(150mm) reflector is about ten times cheaper to buy than a 6"(150mm) Apochromatic Refractor.

Newtonian Reflectors offer the best ratio of aperture-to-the-£ than any other telescope and are effective for deep sky observation where light gathering power is needed. All large professional telescopes are reflectors of one type or other.

Reflectors are generally quite bulky so are not used as portable instruments in apertures above 8" (200mm) and do require some looking after.

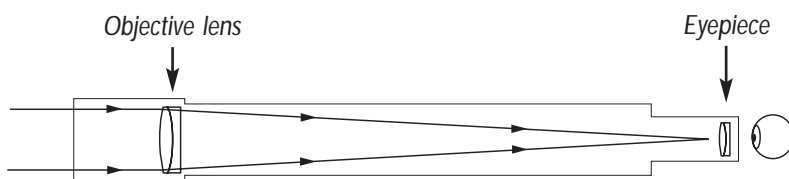


Diagram to show the lightpath in the Refractor Telescope

THE REFLECTOR TELESCOPE



Meade® 114mm reflector

The **REFRACTOR TELESCOPE** is what everyone recognises as a telescope. It has a lens, called the *Objective lens* at the front and an *eyepiece* at the eye end. The Refractor performs well even under adverse atmospheric and light-polluted conditions. Although the smallest are of little use for astronomy, a good 60mm (or 2.4 inch) telescope can offer quite good introductory image quality for Lunar and Planetary observation. The dimensions refer to the diameter of the objective lens: the larger the diameter the more light is transmitted and more detail is observed.

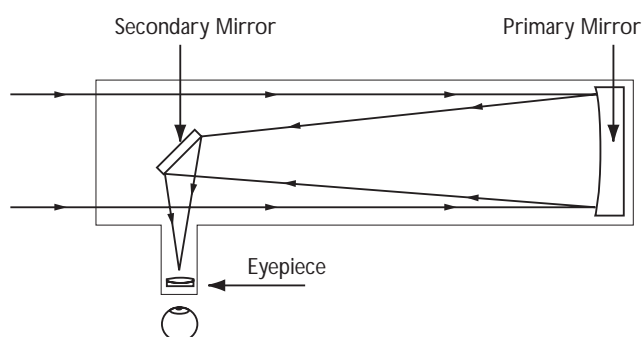


Diagram to show the lightpath in the Reflector Telescope

A third design of telescope is a hybrid of the two described above, and called *Catadioptrics*. The design overcomes the disadvantage of size of *Reflectors* and the cost of *Refractors*.

The most popular type, particularly among amateur astronomers, is the **SCHMIDT-CASSEGRAIN**, which offer large apertures in a compact and portable package.

Sophisticated systems now available keep these versatile instruments compatible with the latest computerised telescope technology for amateur and professional astronomers alike. NASA has used examples of this optical system on board the Space Shuttles.

There is a huge range of accessories available for these instruments, and although more expensive than *Newtonians*, the Schmidt-Cassegrains

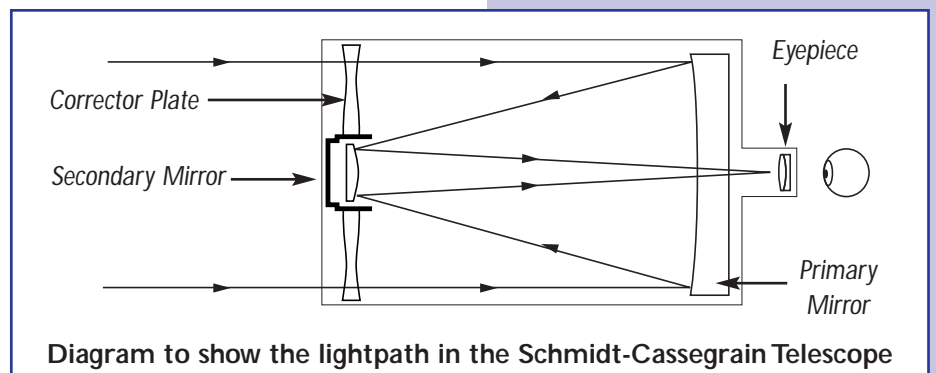
perform especially well for CCD imaging and photography.

The **MAKSUTOV-CASSEGRAIN** is also a hybrid mirror-lens system and was developed before the Schmidt - Cassegrain. In the recent past it was available, but at a high cost. However, with vastly improved production techniques now available, its cost has been significantly reduced. Maksutov-Cassegrains offer superb Apochromatic Refractor-like images in extremely portable instruments and have been a huge success with astronomers.

THE SCHMIDT-CASSEGRAIN TELESCOPE



Meade® LX90 Schmidt-Cassegrain



A bit about Mirror Images

Astronomical telescopes, but not usually binoculars or prismatic spotting scopes, provide images upside-down, mirror reversed or rotated left or right from the vertical. For most astronomical observing it makes little difference if the moon is seen upside down or reversed as in a mirror, but for careful examination of a star field with a star atlas, a wrongly orientated image can be annoying. While some star atlases are printed with south to the top to match the inverted image produced in Newtonians, for mirror reversed images produced by refractors and catadioptric instruments sky atlases have to be imagined in mirror image. Erecting prisms and lenses are available to correct this problem.

Finally, by buying from Telescope House you will be able to draw on the knowledge of our sales staff, all of whom are seasoned observers and who can give you first hand experience of the performance and capabilities of each instrument type we sell.



Moon – Meade® LX200 Schmidt-Cassegrain

THE MAKSUTOV-CASSEGRAIN TELESCOPE



Meade® ETX90-EC Maksutov-Cassegrain

