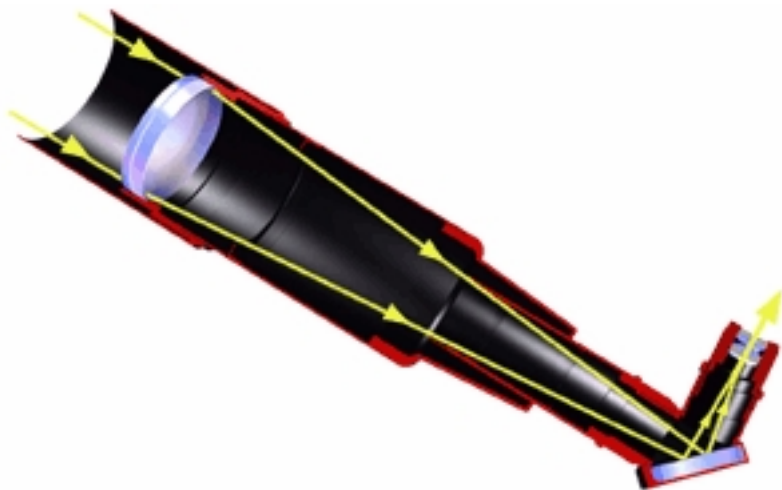
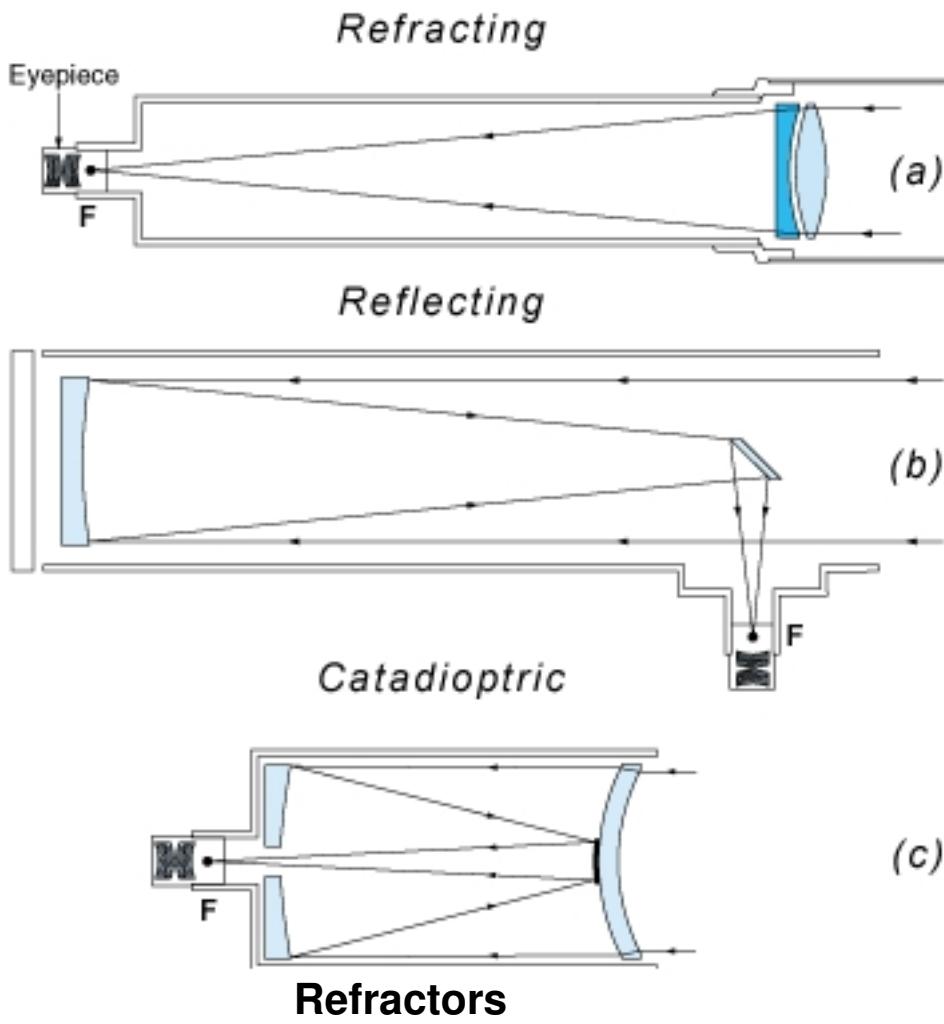


There are three types of telescopes for the Amateur Astronomer, refractor, reflector and catadioptric. All these designs have the same purpose, to collect light and bring it to a point of focus so it can be magnified and examined with an eyepiece, but each design does it differently. All designs can perform satisfactorily if properly and responsibly manufactured and all have their own special virtues.

Choosing a particular telescope depends on your individual needs including cost,

portability, versatility, usability, appearance, etc. You should also contemplate what you plan to do with the instrument both now and in the future. Many amateurs own two or more telescopes to satisfy their varied interests. Some amateur astronomers build their own telescopes but this market has rapidly declined due to the abundance of affordable commercial telescopes available and the time, materials and equipment needed to hand-construct an instrument. Below is a brief discussion the most popular types of telescopes and a description of the advantages and disadvantages of each.



A typical refractor with 45° diagonal and eyepiece

Refractors (also known as dioptrics) are what the average person identifies with the word "telescope", a

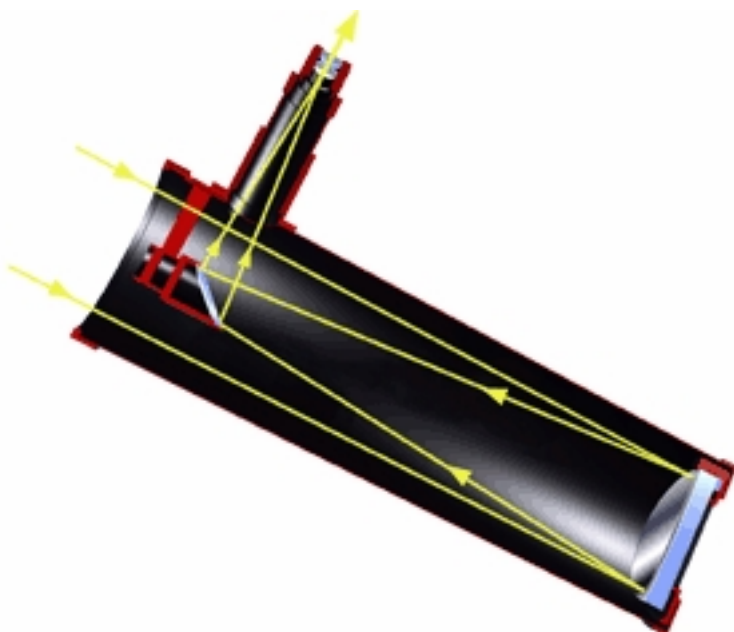
Advantages

- Easy to use and reliable due to its simplicity of design
- Little or no maintenance
- Excellent for lunar, planetary and binary star observing especially in larger apertures
- Good for distant terrestrial viewing
- High contrast images with no secondary mirror or diagonal obstruction
- Colour correction is good in achromatic designs and excellent in apochromatic, fluorite, and ed designs
- Sealed optical tube reduces image degrading air currents and protects optics
- Objective lens is permanently mounted and aligned

Disadvantages

- More expensive per inch (25.4mm) of aperture than Newtonians or Catadioptrics
- Heavier, longer and bulkier than equivalent aperture Newtonians and Catadioptrics
- The cost and bulk factors limit the practical useful maximum size objective to small apertures
- Less suited for viewing small and faint deep sky objects such as distant galaxies and nebulae because
- Light has to travel through glass rather than being reflected and so is prone to light loss, colour aberration
- Focal ratios are usually long making photography of deep sky objects more difficult
- Some colour aberration in achromatic designs (doublet)
- Poor reputation due to low quality imported toy telescopes; a reputation unjustified when

Reflectors



A typical reflector with an eyepiece

Reflectors (also known as catoptrics) usually use a concave parabolic primary mirror to collect and focus

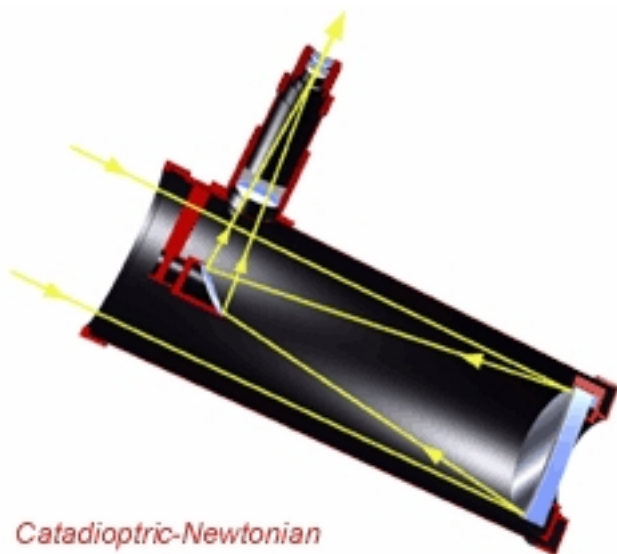
Advantages

- Lower costs per inch (25.4mm) of aperture compared to refractors and Catadioptrics since mirrors
- Reasonably compact and portable up to focal lengths of 1000mm
- The best design for observing faint deep sky objects such as remote galaxies, nebulae and star cl
- Very good for lunar and planetary observing
- Good for deep sky astrophotography (but not as convenient and more difficult to use than Catadi
- Low in optical aberrations and deliver very bright objects
- Very little light loss due to reflected design

Disadvantages

- Open optical tube design can allow image-degrading air currents and air contaminants
- More fragile than Refractors or Catadioptrics and thus require more maintenance (such as collimation)
- Suffer from off-axis coma
- Large apertures (over 8" (203.2mm)) are bulky and heavy
- Generally not suited for terrestrial applications

Catadioptrics



A Catadioptric-Newtonian with an eyepiece

Catadioptrics use a combination of mirrors and lenses to fold the optics and form an image. There are two

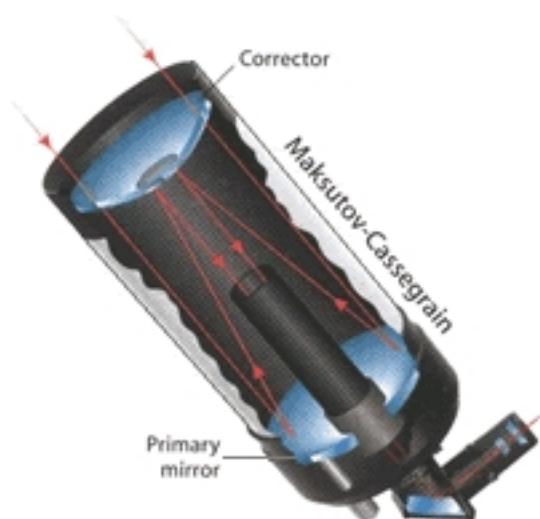
Advantages

- Combines the optical advantages of both Lenses and mirrors while cancelling their disadvantages
- Excellent optics with a sharp image over a wide field
- Good for astrophotography with fast film or CCDs
- Excellent for lunar, planetary and binary star observing or photography
- Excellent for terrestrial viewing or photography
- Focal ratio generally around f10. Useful for all types of photography. Avoid faster f/ratio Telescopes
- For faster astrophotography Use a focal reducing lens
- Close tube design reduces image degrading air currents
- Most are extremely compact and portable
- Easy to use. Durable and virtually maintenance free
- Large apertures at reasonable prices and less expensive than equivalent aperture refractors
- Best near focus capability of any type telescope useful for astrophotography

Disadvantages

- Much more expensive than Newtonians of equal aperture
- Slight light loss due to secondary mirror obstruction
- Less contrast compared to refractors and reflectors
- Heavy for the size
- Takes a long time to cool down and achieve thermal equilibrium
- More prone to dewing up compared with dobsonians

Maksutov-Cassegrain



A Maksutov-Cassegrain with 45 degree diagonal and eyepiece

The Maksutov design is similar to the Schmidt with basically the same advantages and disadvantages. I

The Maksutov is heavier than the Schmidt and because of the thick correcting lens takes a long time to

Advantages

Disadvantages

- The Maksutov design is similar to the Schmidt with basically the same advantages and disadvantages. It uses a thick Meniscus connecting lens with a heavy curvature and secondary mirror.
 - Well regarded as the best for high focal ratio lunar, planetary and binary star observing or photography
 - Excellent for terrestrial viewing or photography
 - Close tube design reduces image degrading air currents
 - Most are extremely compact and portable
 - Easy to use. Durable and virtually maintenance free
-
- The Maksutov is heavier than the Schmidt and because of the thick correcting lens can take a long time to cool down.
 - Larger-aperture models are difficult to manufacture (and thus are very expensive)
 - More expensive than Newtonians of equal aperture
 - Slight light loss due to secondary mirror obstruction

Never believe all the hype you see and read in brochures or magazines about how good a particular telescope manufacturer's products are, always check out these claims on the net or join a astronomical club and ask the members which telescope they use and which ones they would like to own.

Look through as many different members scopes as you can to gain experience of viewing, handling, storage cost of each telescope.

Think long and hard before parting with your cash and always check out the second-hand/used market, you will be greatly surprised at what you can save over new prices and remember there are additional costs to be taken into account for essential additional equipment, like eyepieces, diagonals, finder scopes, mounts etc.

Another very good point about buying second-hand/used telescopes the additional essential equipment usually comes with the scope.

Local Astronomy Suppliers

The following is a listing of astronomical "stuff" providers who have agreed to supply their goods to EAAS members at 5% discount. Please quote EAAS discount when ordering. EAAS does not warrant any of the products or companies displayed below but provides the link and discount facility to members at their own risk.

North Down Telescopes

Phone: 02891 273584 (UK)
04891 273584 (EIRE)

Or visit the [North Down Telescopes website](#)

2nd Hand Markets

[UK Astronomy Buy and Sell Forum](#)

[US based Astro-Mart](#)