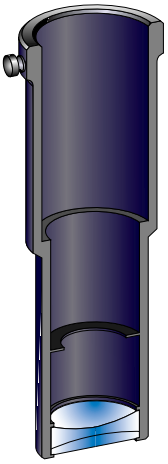
Orion Barlow Lenses



An Orion barlow lens is a simple concave (negative) lens that amplifies the magnifying power of any telescope eyepiece it's used with. It works by reducing the convergence of the light cone heading into the eyepiece. In this way it increases the focal length of the telescope. Since magnification is determined by dividing the telescope's focal length by the eyepiece's focal length, you can see that by doubling the telescope's focal length, a 2x barlow lens doubles the magnification of the system for a given eyepiece.

In this way, a 2x barlow can effectively double the number of magnifications available to you from a set of eyepieces. For example, if you have eyepieces with focal lengths of 26mm, 18mm, and 10mm, using a 2x barlow will give you the equivalent of 13mm, 9mm, and 5mm eyepieces—like getting three more eyepieces for the price of one barlow!

An Orion barlow lens is an effective means of obtaining higher powers from short-focal-length telescopes. It also allows use of longer focal-length eyepieces to achieve a given power. Longer-focal-length eyepieces usually have longer eye relief than shorter focal-length eyepieces, making viewing more comfortable. This can be a real benefit for eyeglass wearers, especially, enabling them to see the whole field of view at higher powers, when normally they cannot.

And there's another benefit of using a barlow lens: it can actually improve eyepiece performance, providing sharper images and reducing edge-of-field optical aberrations.

Use of Orion Barlow Lenses

The barlow lens is typically inserted between the diagonal and the eyepiece, for refractors and Schmidt-Cassegrain telescopes (Figure A). For reflectors, the barlow inserts directly into the eyepiece holder of the focuser drawtube (Figure B). In the position shown in both A and B, a 2x barlow provides a magnification factor of two, a 3x barlow, a magnification factor of three, etc.

Alternatively, a barlow lens can be placed before the diagonal, that is, between the telescope and the diagonal (Figure C). In this case the barlow's magnification factor is increased by about 50%. So a 2x barlow placed between the telescope and the diagonal provides about a 3x magnification boost. Some barlows will not properly fit after the diagonal, so this alternate placement is desirable. (Our Shorty barlow, which has a shorter barrel, fits nicely in most diagonals.) However, be advised that for some barlow and eyepiece combinations, focus cannot be achieved with the barlow placed before the diagonal.

Power Limitations

While a barlow lens will increase the magnification of a telescope, there is a limit to how much magnification is useful. It depends on the telescope's aperture, the quality of the optics, and on the outdoor "seeing" conditions, which vary from night to night. Generally, the maximum practical magnification a telescope can deliver is about 50x per inch of aperture (diameter of the main lens or mirror). Any higher and the images seen will just be blurry and dim. Seeing conditions (i.e., steadiness of the atmosphere) often limit the useful magnification to much less than 50x per inch of aperture.

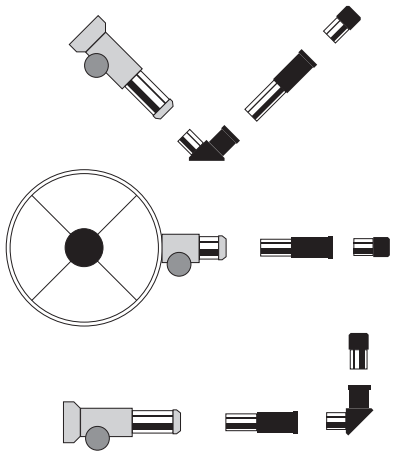


Figure A: Barlow placed after diagonal

Figure B: Barlow in typical reflector

Figure C: Barlow placed before diagonal (typical refractor)

So, for example, if you have a 3" reflector, the maximum useful magnification will be about 150x under very steady sky conditions. Say the scope has a focal length of 700mm; a 10mm eyepiece will provide 70 power. Using a 2x barlow with that eyepiece would yield 140 power, which is very close to the scope's magnification limit under excellent seeing conditions, and on most nights may simply be too much. Using a 3x barlow would not be recommended because that would yield 210 power—way too much for this scope—resulting in a degraded image. You'll have to experiment on any given night to see how much power your scope and the prevailing seeing conditions will permit.

Care of Your Barlow Lens

Care should be exercised when using all optical and mechanical telescope accessories. Keep your barlow in a protected environment when you're not using it. Avoid touching the lenses and coatings. If the outside of the lens should become dirty, you may want to clean it. Blow off all loose dirt with a blower bulb. Use only optical lens tissue and good-quality lens fluid. Wet a folded tissue and gently wipe the surface of the lens. Immediately use a second piece of lens tissue to gently dry the lens off. Do not rub or apply pressure, as this may scratch the lens if dust or grit is present.

One-Year Limited Warranty

Orion Barlow Lenses are warranted against defects in materials or workmanship for a period of one year from the date of purchase. This warranty is for the benefit of the original retail purchaser only. During this warranty period Orion Telescopes & Binoculars will repair or replace, at Orion's option, any warranted instrument that proves to be defective, provided it is returned postage paid to: Orion Warranty Repair, 89 Hangar Way, Watsonville, CA 95076. If the product is not registered, proof of purchase (such as a copy of the original invoice) is required.

This warranty does not apply if, in Orion's judgment, the instrument has been abused, mishandled, or modified, nor does it apply to normal wear and tear. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. For further warranty service information, contact: Customer Service Department, Orion Telescopes & Binoculars, P. O. Box 1815, Santa Cruz, CA 95061; (800) 676-1343.

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