

How to photograph the Heavens

The urge to capture on film what is seen through the telescope's eyepiece comes to all of us sooner rather than later.

In the next few pages of the catalogue we have a range of recommended accessories to further and enhance your astronomical observing. Astrophotography, like the equipment needed to achieve it, can be as simple or as involved as you and your budget wish it to be.

Different astronomical objects will require different techniques and equipment – from a camera alone, to a telescope fully fitted with all the high-tech accessories. But to start – and do start simply, all you will need is a 35mm single-lens reflex camera, fast film, a cable release and a tripod.

The basic rule is – start simple and learn by your experience, with perseverance you can achieve remarkably high standards and produce some stunning images.

Some basic techniques

Star Trail Photography



The simplest method for taking astrophotographs involves mounting a 35mm camera on a standard camera tripod for wide-field "star trail" shots. The camera should have a "B" or "T" shutter setting for time exposures and a cable release to lock the shutter open. Exposures can range from 30 seconds to 6 hours, depending on the length of trails desired and the darkness of the sky. Lens settings are usually wide open with the focus set at infinity. With a 50mm focal-length camera lens, the stars become elongated after about 30 seconds of exposure because of the Earth's rotation. Film with an ISO (speed) rating of 200 or 400 is ideal for short exposures; slower films (lower ISO ratings) can be used for star trails of an hour or more.

Piggybacking Your Camera



If you have a telescope on an equatorial mount equipped with a motor (or clock) drive, you can try piggyback photography. The camera rides "piggyback" on top of the scope

(coupled by a special adapter) and the picture is taken through the camera's own lens. The motor drive counteracts the Earth's rotation so that the stars will appear as pinpoints on the film instead of streaks, as with a statically mounted camera. Such long exposure will reveal very faint objects, including nebulae that are too faint to see with your eyes. Piggyback photography offers the amateur an opportunity to capture constellations, the Milky Way, and large deep-sky objects on film. The telescope or guide scope can still be used to check the accuracy of the tracking during the exposure.

Prime-Focus Photography



The Moon is one of the first objects people observe with their telescope. It is also one of the easiest and most rewarding to photograph. All that is needed is a telescope, a 35mm SLR camera without a lens, a cable release, and a T-adaptor and T-ring for your type of camera. These two adapters allow the camera to be coupled to the telescope where the eyepiece would normally go. Using your telescope as a telephoto lens in this way is called prime-focus photography.

Photographing the Moon requires short exposures - a fraction of a second, so a motor driven mount is not usually needed, though one is required if exposure times exceed half a second. For example, using an 8" Schmidt-Cassegrain telescope and ISO 400 film

on a half-phase Moon, the exposure time would be about 1/125 second. The amount of magnification you get will depend on the focal length of your telescope.

Deep-Sky Photography

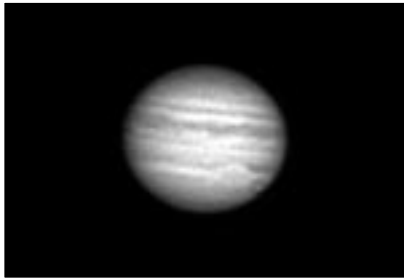


Prime-focus photography of deep-space objects like galaxies and nebulas requires much more skill. These objects are very faint, so long exposures and guiding are necessary. It is best to gain experience with piggyback and lunar photography before attempting this more challenging technique.

The basic equipment you will need is a telescope with a sturdy equatorial mount and accurate drive motor, a drive controller (also called a drive corrector) to make small corrections to the tracking speed during the exposure and a 35mm camera with a "B" or "T" setting. The camera will need an adapter and T-ring for coupling it, without its lens, to the telescope. Another important piece of equipment is a guide scope or off-axis guider (See Page 58), which allows you to follow a guide star during the exposure. You will need to make guiding corrections, using the hand controller, to keep the telescope tracking accurately. (This is also true when piggybacking with long telephoto lenses.)

More overleaf...

Eyepiece Projection Photography



Getting good pictures of the planets is a challenge. Extremely high magnifications are needed to obtain an acceptable image size of these small objects on film. High powers result in a dramatic loss of light and make focusing difficult. Also, getting sharp planetary images depends on steady atmospheric conditions. Experienced planetary photographers make dozens of attempts to get just one good picture.

The most common method of photographing the planets is called eyepiece projection. Unlike prime-focus photography, an eyepiece is used in the telescope to project a magnified image onto the camera's film plane. An adapter tube called a tele-extender fits over the eyepiece and couples the camera body (without lens) to the telescope. The resulting focal length and f-ratio are three to ten times those of the telescope by itself.

Cameras for Astrophotography



For astrophotography, you need a camera that provides SLR focusing, interchangeable lenses, and full manual control of exposure, including the ability to make long exposures without running down the batteries. Some digital cameras and camcorders can be coupled to telescopes to take pictures of the moon and possibly the planets. However, digital cameras designed for terrestrial use cannot take long exposures of nebulae and galaxies; they suffer too much electrical noise. Instead, digital imaging is done with astronomical CCD cameras that include special cooling elements.

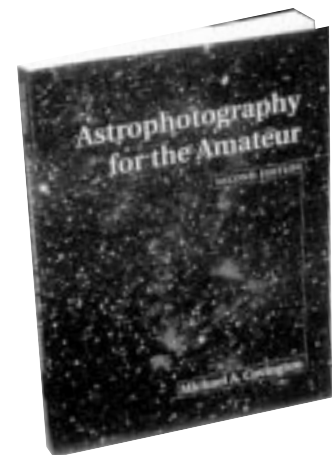
If you are interested in trying astrophotography, we recommend the book,

Astrophotography for the Amateur, 2nd Edition, by Michael Covington.

About Film



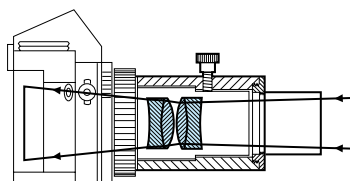
Film selection is critical to astrophotography. There is a wide variety of films available, but some are better for astrophotography than others. Many astrophotographers prefer to work with colour slide film rather than print film, so that they are not at the mercy of the print-makers - film covers a greater brightness range than paper can, so to improve a print the brightness has to be adjusted. With slides, you can see exactly what the camera recorded, and you can get quality prints from them.



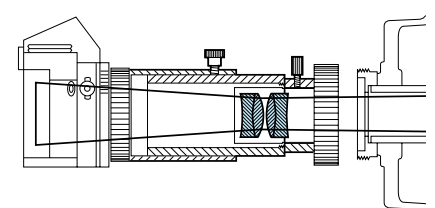
Photographic Adaptors

To take astronomical photographs through the telescope you will need an adaptor. There are several sorts from which to choose depending on the type of astro-photography you are attempting.

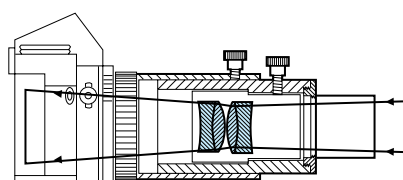
You will also need a T-ring which will enable you to connect your SLR camera to the adaptor. We stock most popular brand T-rings or you can contact your local camera stockist.



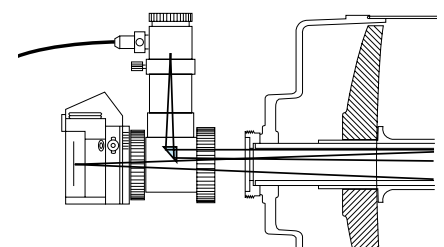
Basic Camera adaptor
Used for Prime Focus photography of the Moon and Deep-Sky object



Projection Camera adaptor (SCT)
For Lunar and Planetary photography



Projection Camera adaptor
For Lunar and Planetary photography



Off-Axis Guider (SCT)