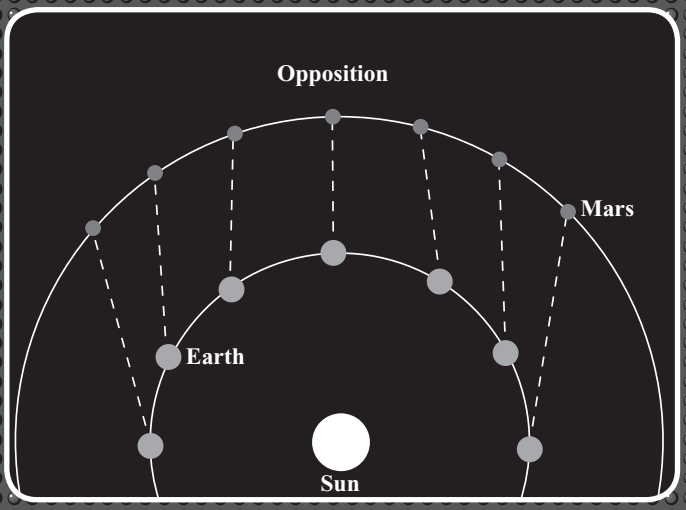
PRACTICAL OBSERVING

Observing The Planet Mars

REQUIREMENTS - You will need a telescope for this observation programme. A 75mm refractor or 150mm reflector are the minimum apertures with 2-300mm recommended. As with all planetary work a long focal length is preferable.



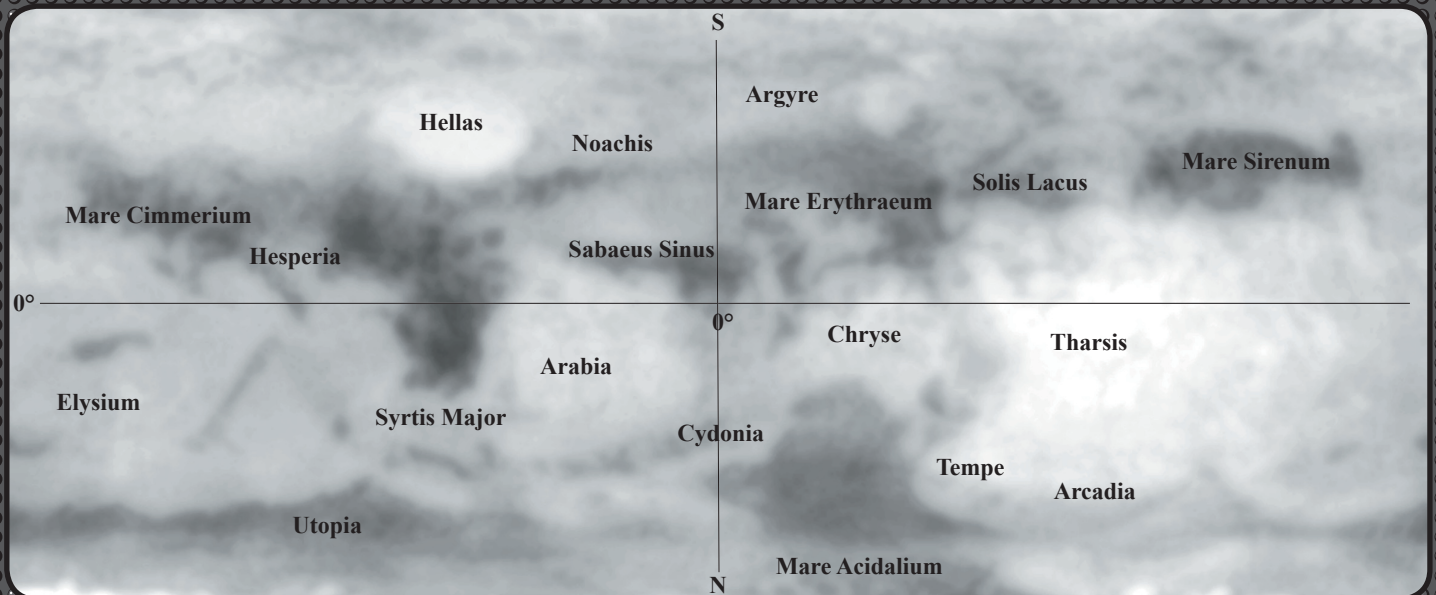
APPARITIONS - The best views of Mars will be gained when it is closest to Earth. Oppositions occur every 780 days on average, but due to the eccentricity of Mars' orbit, the closest approach can vary between 50 and 100 million km, giving an apparent angular diameter of between 25" (perihelic opposition) and 14" (aphelic opposition).The magnitude can likewise vary between -2.8 and -0.8 respectively. The perihelic opposition occurs when Mars is in *Aquarius* (late Summer, early Autumn) and recur at intervals of 15 and 17 years. Forthcoming oppositions are

2003	Aug 28	22h 38m	-15° 48'	25.1"
2005	Nov 7	02h 51m	+15° 53'	19.8"
2007	Dec 28	06h 12m	+26° 46'	15.5"
2010	Jan 29	08h 54m	+22° 09'	14.0"

SURFACE FEATURES - Obviously the most exciting area since this is the only accessible planetary body on which features may be seen. The dark regions have been standardised by the IAU into a reference map (see below) so that amateurs can detect changes in the 'normal' appearance easily (and novices can identify them). An observing programme should concentrate on any changes in shape and tone of such features, especially for regions known to be subject to seasonal or irregular variations (Araxas, Hellas, Thaumasia etc.). Any new features are of importance too.

ATMOSPHERIC PHENOMENA - Both yellow dust clouds and high level white cirrus are visible and may be distinguished using a red and yellow filters for dust clouds and blue filters to emphasise the white. High level cloud may be seen as a polar hood and duly noted. From time to time severe dust storms can obscure large areas of the surface and are fascinating to follow.

POLAR CAPS - The growth and retreat may be followed for a limited time during the season. particular attention should be paid to irregularities in outline, detached portons and general changes in size and shape.



RECORDING OBSERVATIONS - For visual observations prepare a suitable blank in your logbook or on a DTP/Drawing package. This may be chosen according to the view that your instrument will allow, but for observations submitted to the BAA there is a standard recording size of 50mm.

First observe with low power (X80 to X160). Look for any slight terminator. Note the size and shape of the polar cap and whether it seems raised above the planet's surface. Carefully scrutinise the darker ring around the cap and look for fissures and discontinuities. Note the colour of the disc, especially below the cap. Colorimetric estimates are facilitated by using the 15 yellow and 25 red Wratten filters in conjunction with large apertures. These will accentuate the surface features.

Are there any features visible or are they obscured by dust storms? (don't confuse this with poor seeing!)

Switch to a higher power (X200 to X400) according to seeing conditions to examine the disc in more detail. In particular look for subttle changes in surface markings - *Pandora Fraetum* and *Hellespontus* seem to have sesonal darkenings, whereas other featuires may have long term changes due to dust deposition. The giant volcanoes of the *Tharsis* region are often capped by cirrus clouds and the *Hellas* basin plays host to frequent clouds. Wratten blue (44A), violet (47) and green (58) will all increase the contrast of the white clouds against the disc, although these are dark filters and need large telescopes.

With a fine pencil, mark in the terminator, polar cap and outline of any surface detail. Either shade inside these features using a soft pencil to show their relative intensities (be careful to preserve their delicacy, it is all too easy to render them too dark), or allocate a number on a 10 point scale (introduced by de Vaucouleurs) where 0 is the mean surface brightness of the polar cap, 2 the mean brightness of the 'desert' areas, 6-7 reperesents the darkest markings near the centre of the disc and 10 is the apparent shade of the night sky adjacent to the disc.

If you wish to add colour to the drawing, chalks and pencil crayons give a good effect and subtleties can be achieved by smudging. At all costs, avoid the temptation to 'finish up' the drawing away from the telescope unless for artistic purposes.

PHOTOGRAPHY - If you are planning to photograph Mars, eyepiece projection will give the largest image on the film. For an f80 system a typical exposure time should be about 0.5 sec using 200 ASA film. For a 150mm aperture this gives an image size of 0.2 - 1.5 mm on the film. A 300mm instrument will double this. The fine grained TP 2415 will give good results with a telescope of 300mm + aperture.

Obviously, placing a small image on one complete frame is wasteful and various film winding systems have been devised to put as many as 100 images on a standard film roll. As with all planetary photography, increased aperture leads to better results, although the recorded detail will always be inferior to visual observations.

AUXILIARY DATA - The following details should be added to the drawing or photograph:

- Date (written year, month, day)
- Time (UT) when outlines were completed
- Longitude of central meridian (CM) at this time
- Latitude of centre of disc
- Aperture and magnification of the telescope, together with any details of accessories
- Seeing conditions (Antoniadi)
- Location of observer
- Name of observer

Since Mars rotates once every 24h 37m 22.7s any feature seen on successive nights will appear 37.4min later, or put another way, if a feature is observed at the same time each night, it will apppear to have moved 14.6° in a westerly direction. Any line of longitude passes the CM at the rate of 14.6° per hour. The longitude of the CM and latitude of the disc centre may be found from tables published by the BAA or on the Web at: