Planetarium Applications

Beginners 17th February 2021

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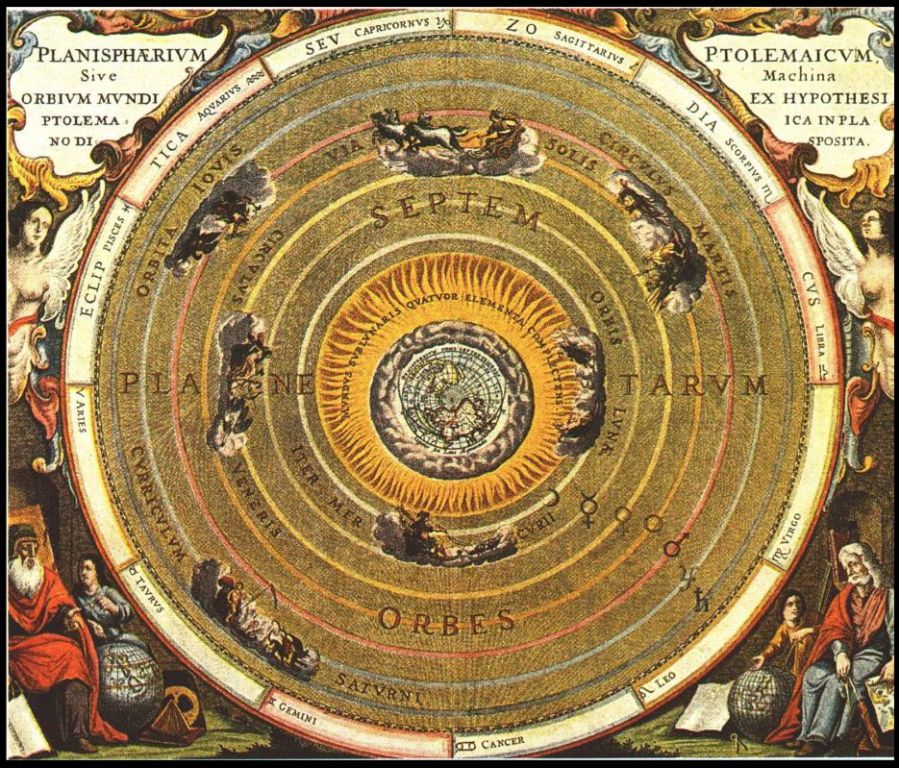
Modern astronomers are very fortunate that we now have access to electronic star charts and planetarium applications to use on our personal computers and even mobile phones and pads. In the past astronomers had to refer to star chart books or charts of the night sky. These could be difficult use in the dark, outdoors and in the damp night air. Our modern electronic charts are self illuminating and can be zoomed to obtain a closer view of the area of sky that is of interest.

Ancient star charts were based on the Geocentric belief

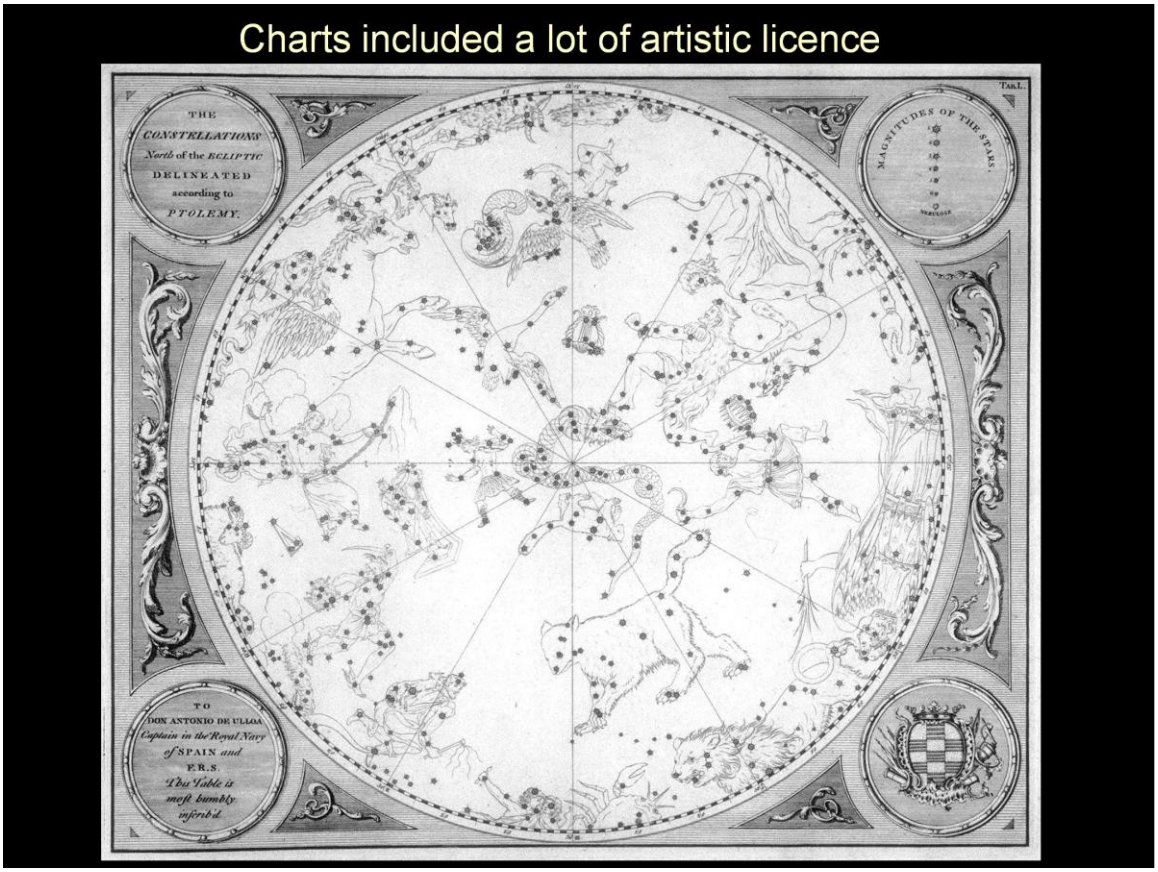


Ancient star charts were very artistic but not very scientific compared to what we would expect today. Astronomy was not a 'stand alone' science like it is today, it was inextricably linked to nearly all other sciences. Things like medicine, chemistry, Geography and alchemy were based on ancient astrological and astronomical beliefs.

The early charts were very beautiful but not accurate

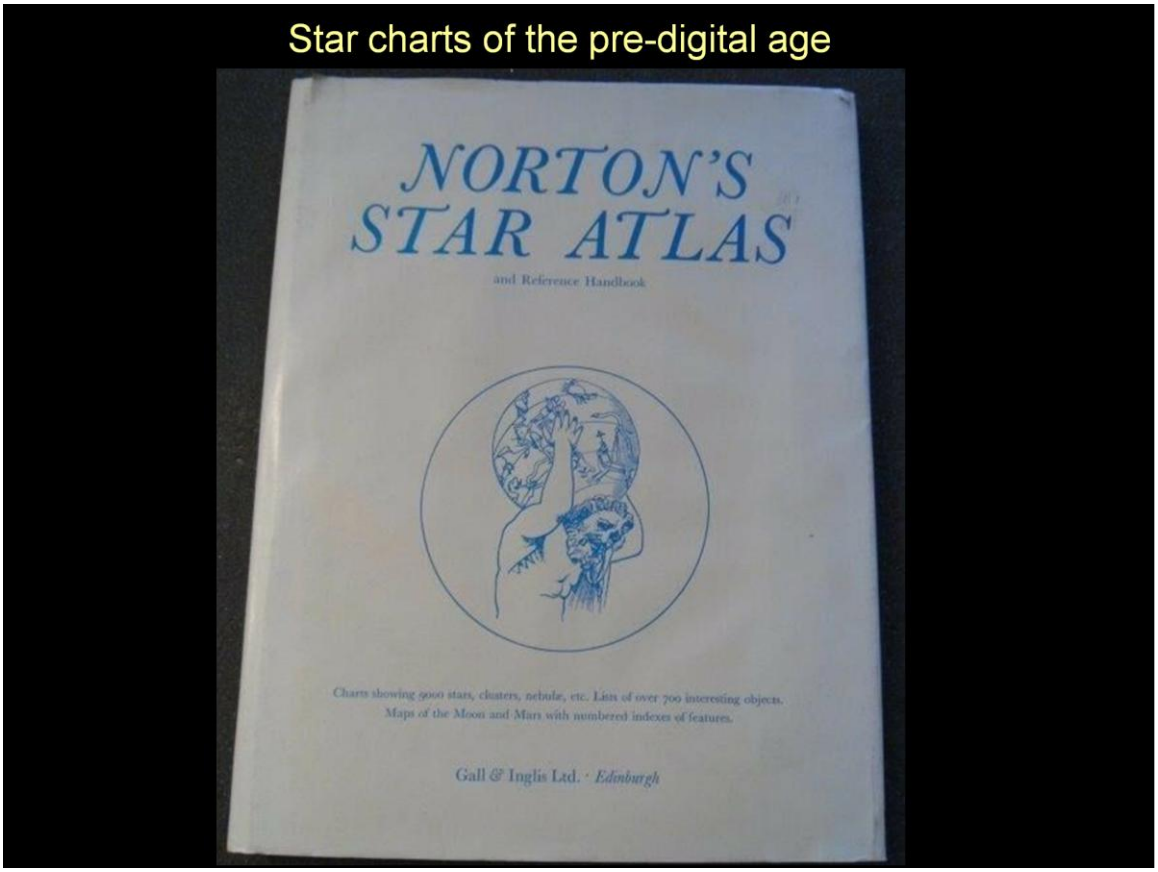
The first modern star charts were true representations of the sky but with artistic representations of the constellations. However some artists would reposition the stars on the chart to match the artistic representations of the constellations. This was not good for the scientific study of the sky.

Charts included a lot of artistic licence

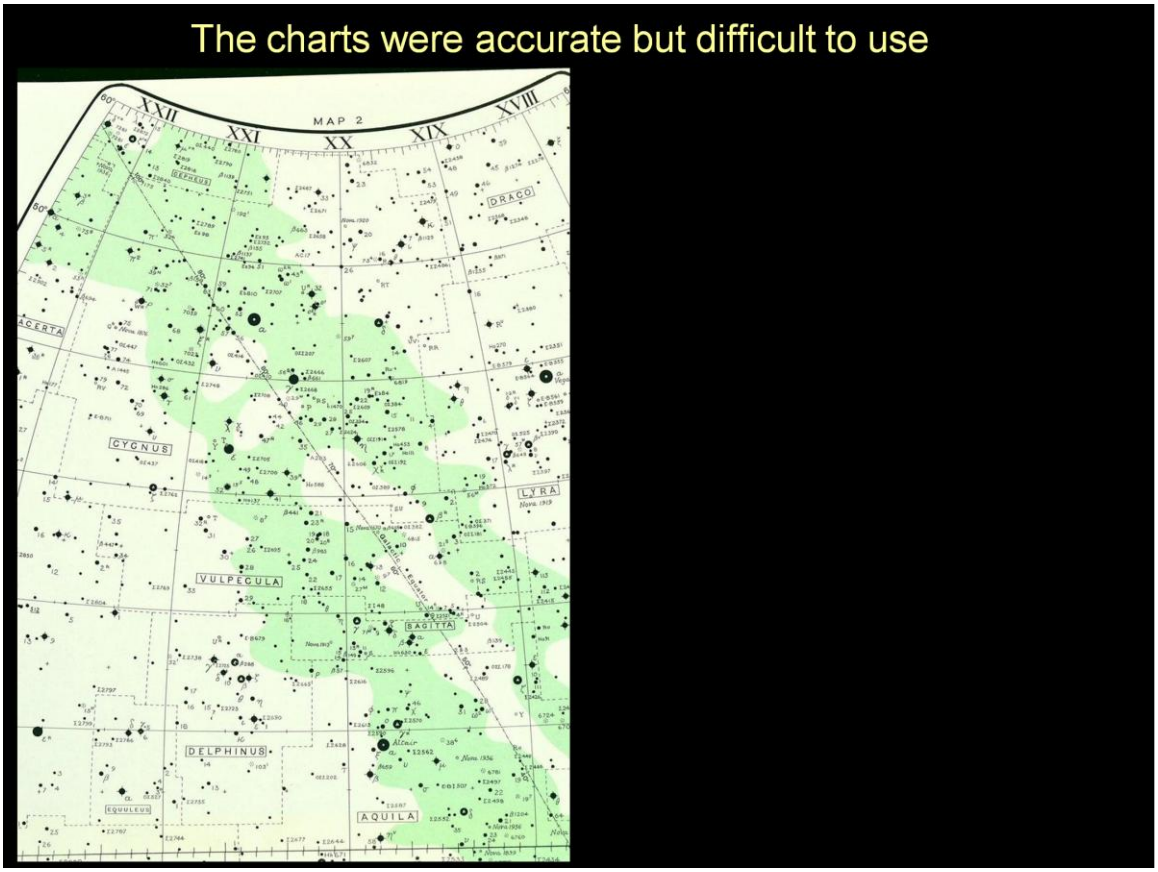


Gradually the charts became less artistic and more scientific.

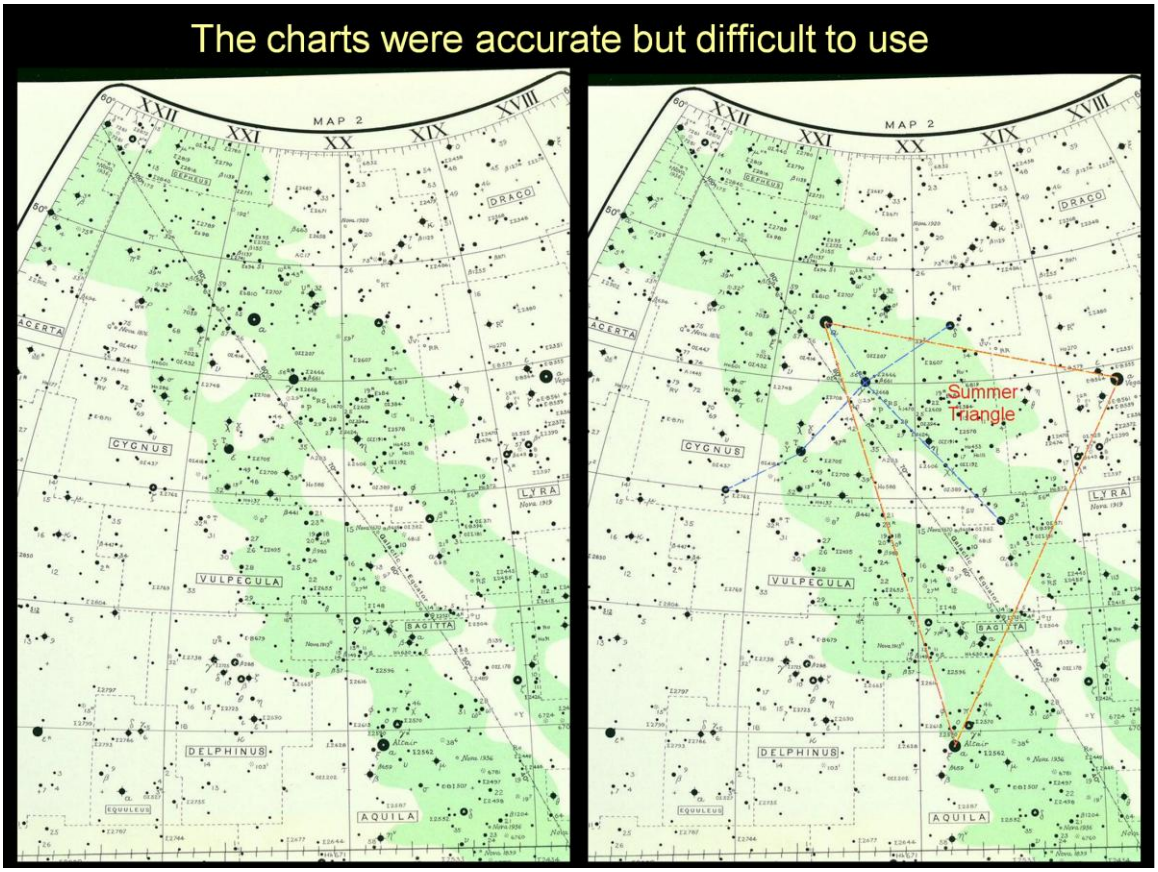
Star charts of the pre-digital age



Until the 1990's the charts mainly used by amateur astronomers was Norton's Star Atlas. Interestingly the picture on the front shows the Greek and Roman adopted vision of the god Atlas supporting the World on his shoulders. Notice the world is shown spherical not flat from 600BC until 400AD.



Norton's Star Atlas was very accurate and useful but a bit complicated to use especially outside using a torch in the dark. It was quite difficult to recognise the star formations.



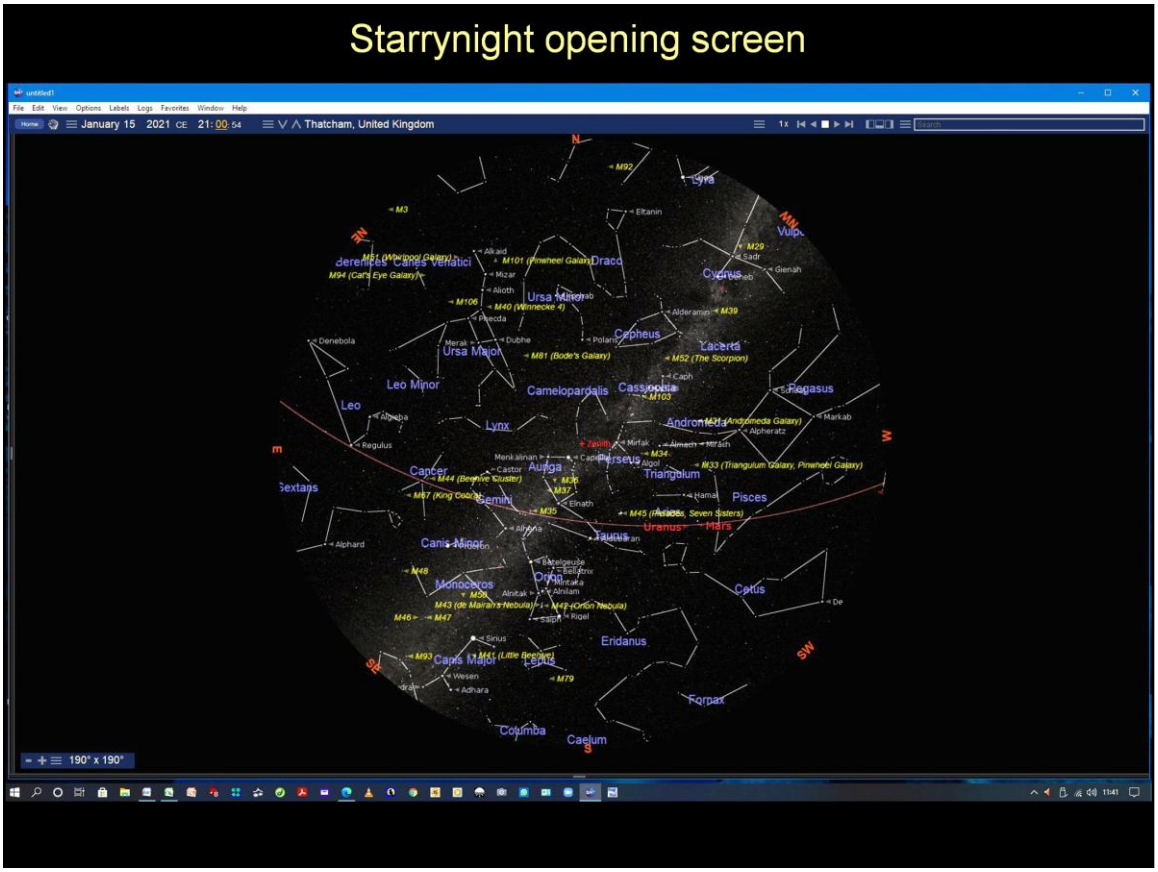
If we add a few lines we can recognise this very familiar part of the sky. Cygnus (the Swan) and the Summer Triangle.

Today we have Planetarium Applications that we can use on our computers

I use an application called STARRY NIGHT PRO Version 7

Starrynight - versions cost between $50 and $250

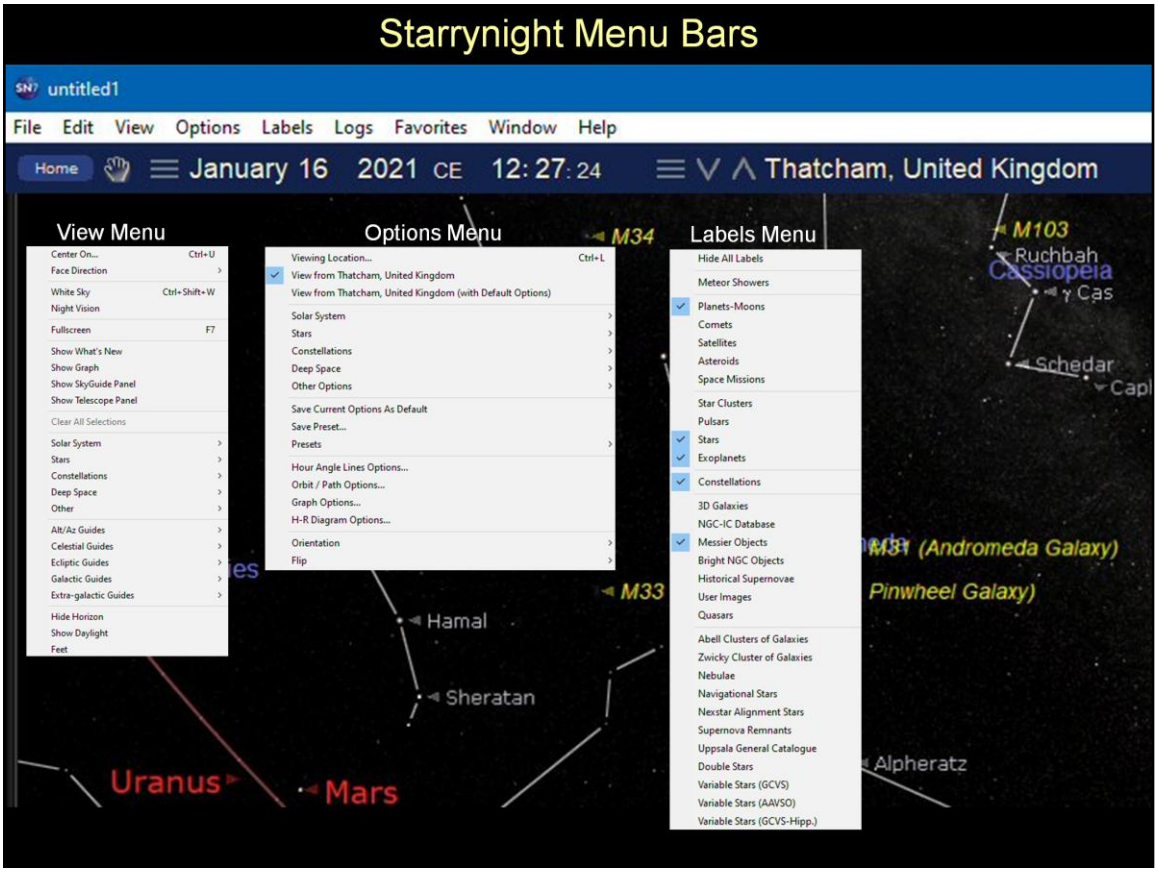
Starrynight opening screen



The chart shown above is a ‘screen shot’ of a typical PC Planetarium Application called Starrynight. This is one of the most popular astronomy applications that can be purchased for use on a PC or Laptop computer. They are supplied as four levels of advancing packages costing between $50 and $250. There are other similar packages from different suppliers. This application is used to produce all the charts for the Society magazine.

This is the opening sky view from Thatcham and showing the options of the view that I have selected and saved as the default view.

The information to be displayed on the screen can be selected or removed to show the type of view required. Labels for stars, constellations and the planets can be added, formatted or removed as required. Daylight can be switched on or off to make it easier to find and see object that is in the sky during daylight. The view of the sky shown above is the full sky view using maximum ‘zoom out’ and shows 190º x 190º as indicated at the bottom left of the screen. The screen can be ‘zoomed in’ by clicking on the + and - at the bottom left of the screen. Individual objects can be ‘zoomed’ by clicking on that object then selecting ‘magnify’ from the displayed ‘drop down’ menu. This menu also contains many other functions that can be applied to that selected object.



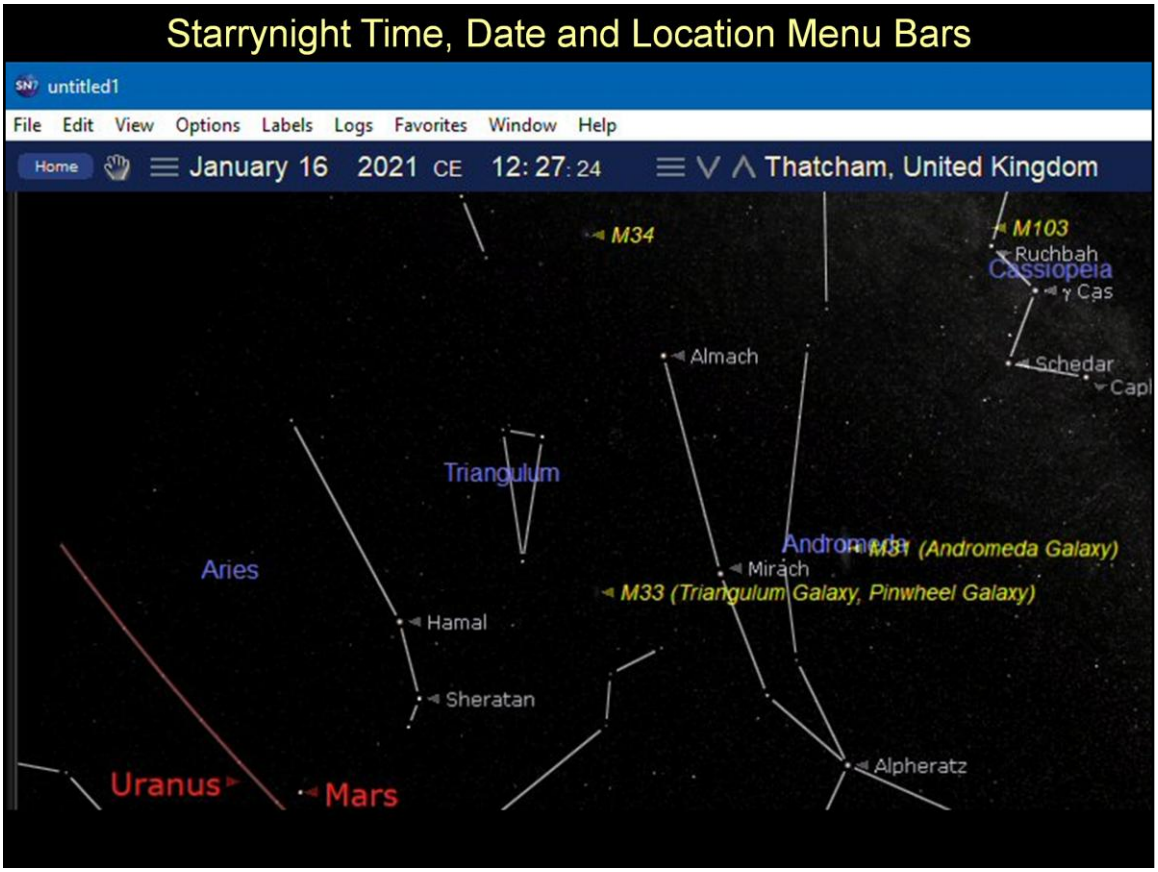
The white menu bar at the top uses ‘drop down’ menus to build the chart view required by the user. The following ‘drop-down’ menus are shown above.

VIEW MENU is used to select what will be displayed on the chart – Type of Screen, what panels are shown, and what is shown on the chart.

OPTIONS MENU controls how the objects in the sky are displayed.

LABELS MENU selects which labels are displayed on the screen. Allows the labels to formatted, by the user.

The blue menu bar controls the current view time and date. Also the ‘viewing location, can be selected.



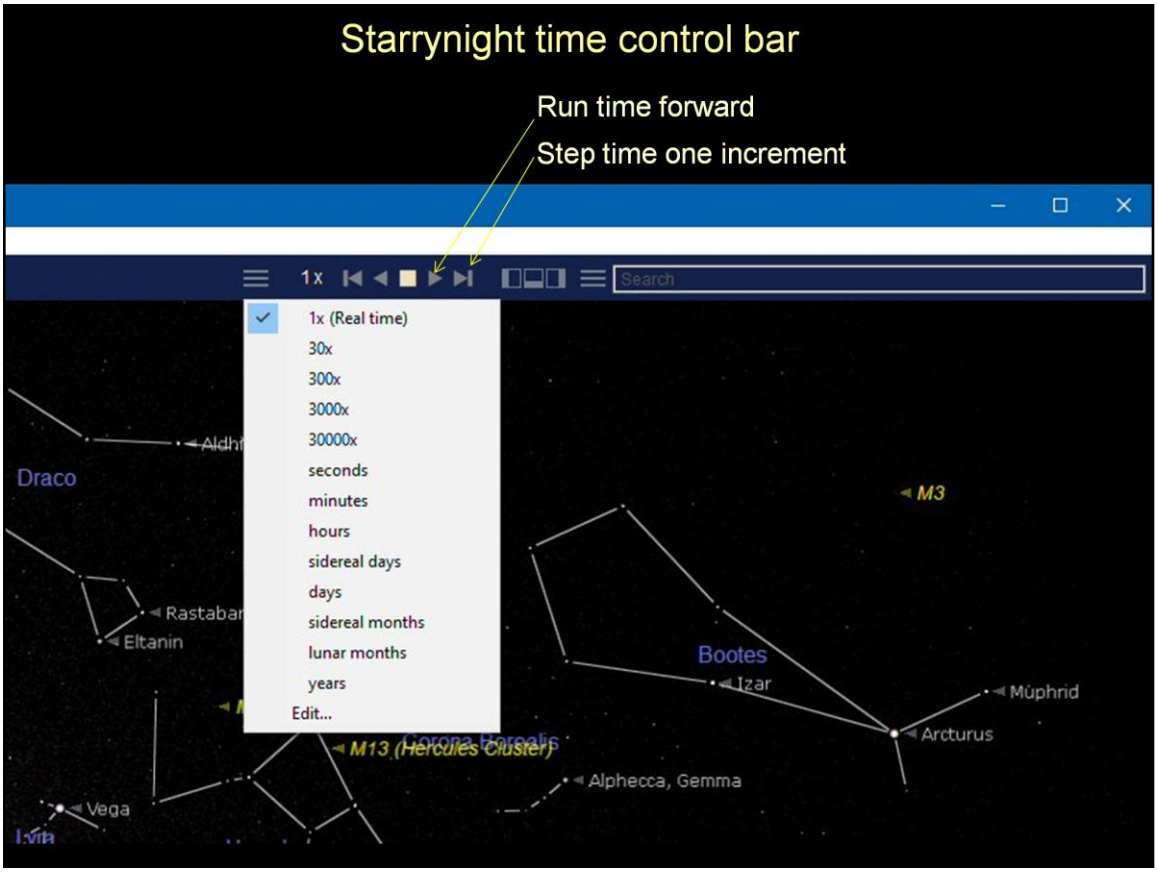
To the left of the Time/Date icons is a HOME button that returns the programme to the default screen.

The hand icon is for the mouse pointer options. On the Time/Date menu clicking on the ≡ icon displays time and date format options.

To change the time or date click on the time or date item then press the keyboard up or down key to change or type in the required time or date.

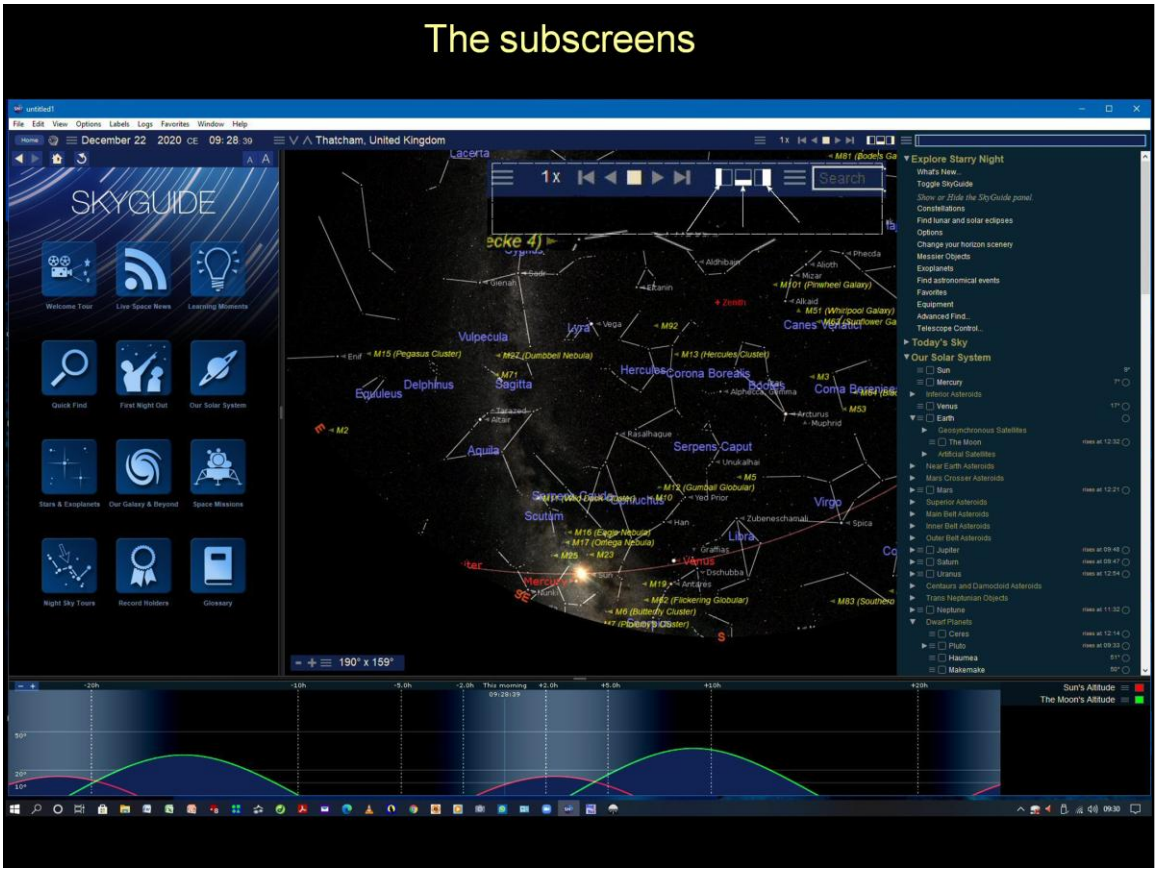
This can be the time and date up to 40,000 years ago or 40,000 years into the future.

The viewing location is selected from this menu as shown above. clicking on the ≡ icon displays location options. The an accurate location for the observer can be set by entering the Latitude and Longitude of the usual observing site that can be saved and used as the default location.



Time can be controlled by using the icons at top right of the screen. See the image above. Time can be stopped or run faster using these icons. The ☐ starts or stops time when coloured white this shows that time has been stopped. Clicking on the ≡ icon allows the unit of time to be selected. Clicking on the 1x icon allows the 1 to be changed to any number and the speed of time to be adjusted (normal time or increments of time). The arrows ►◄ start time forward or backwards. The ►▌ or ▐◄ moves time one selected increment forward or back.

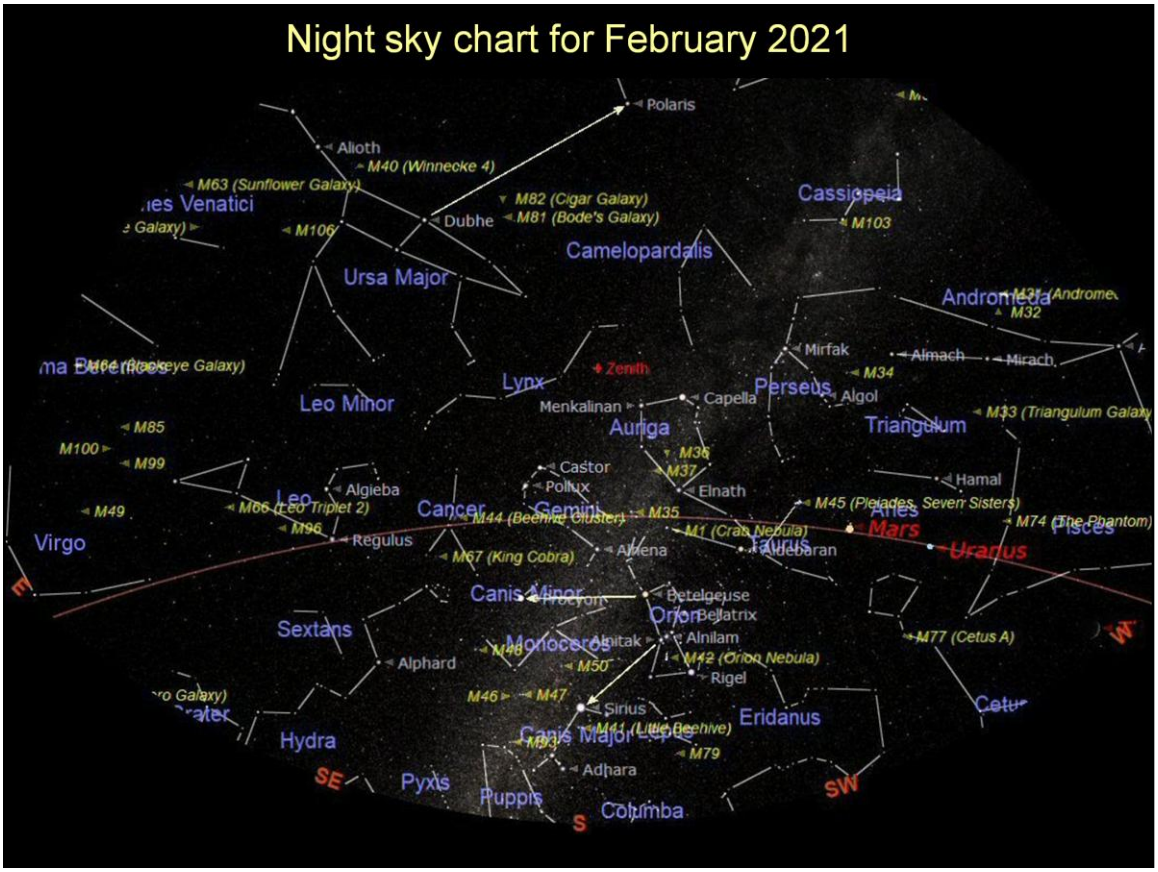
The subscreens



Starry night has three sub-screens that can be activated any time by clicking on the three screen icons at the top right of the screen. See the image above with the menu enlarged. The left sub-screen accesses the information panel shown on the left of the main screen. This is SKYGUIDE and provides guidance and information about the night sky in the form of presentations and guides.

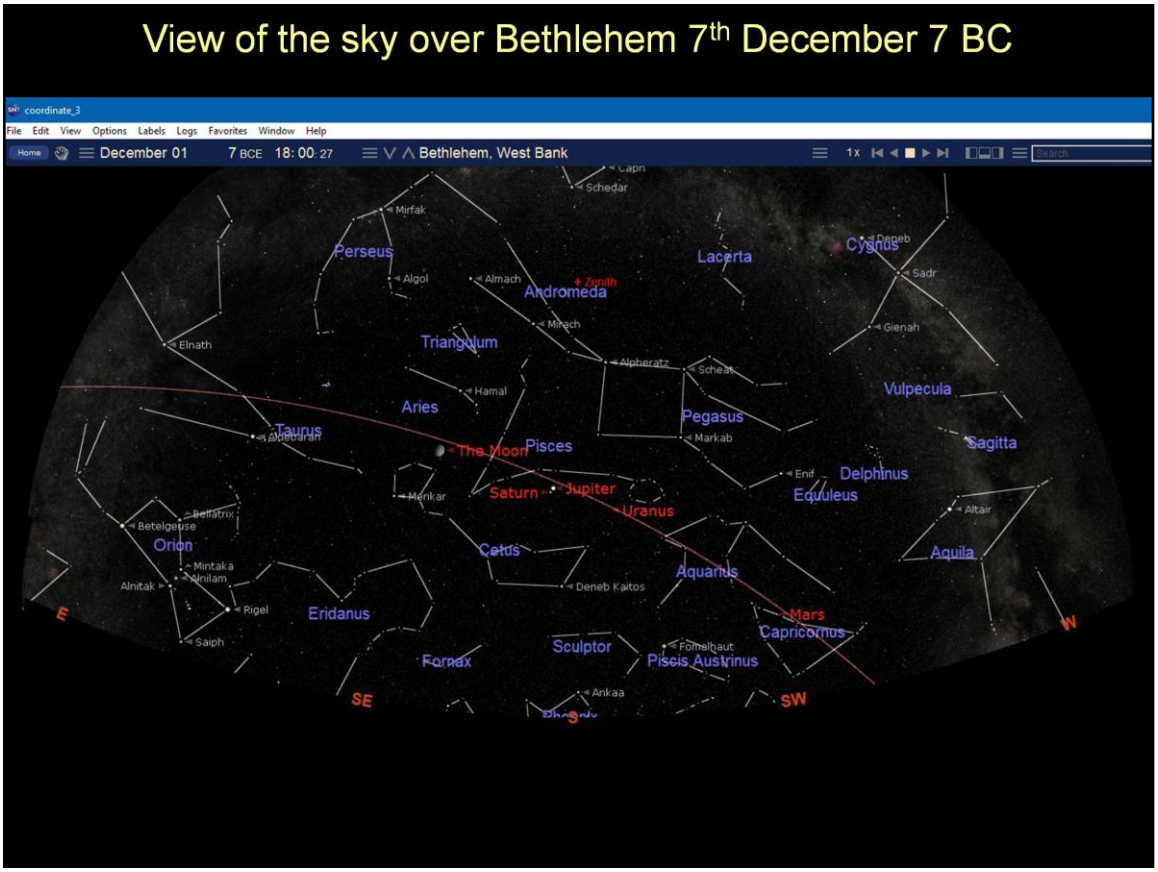
On the right of the main screen is the search and display panel. This is used to search for objects in the night sky that can then be selected and information about the object displayed on the main chart. So a planet can be selected and then be displayed and the chart may be re-orientated to a different time or direction to display it. This can be applied to stars, comets and deep sky objects. Orbits of selected objects can also be displayed. Items found by using the SEARCH box will be displayed in this information panel. More later.

The lower panel can show information in a graphical representation. The example shown on the chart above shows the altitude obtained by the Sun (red line) and the Moon (green line) at the time required (default now).



This chart shows the southern night sky in the middle on the month.

This chart was used in the February Beginners Magazine in the ‘Guide to the Night Sky’ article. A screen dump was taken of the chart and arrows added using Paintshop and the chart saved as a jpeg image for use in the Society Magazine.

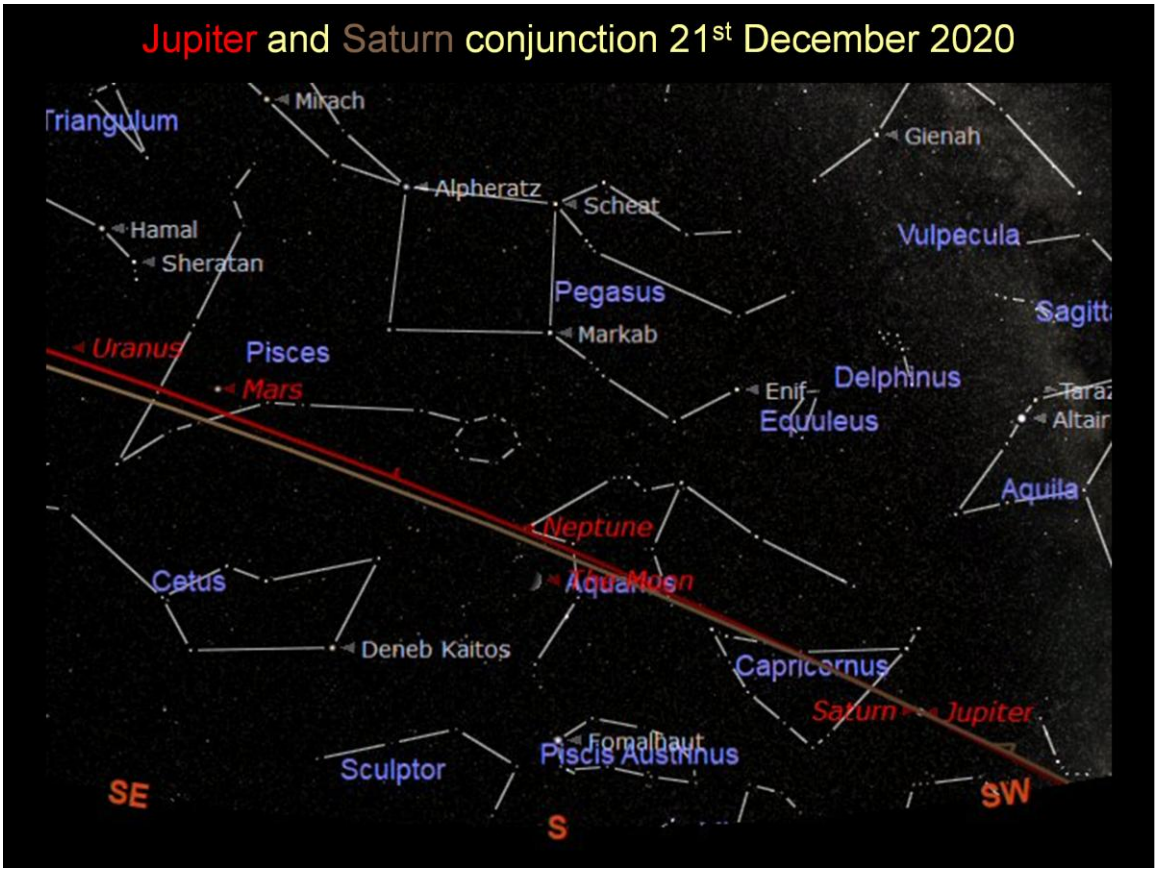


To the left of the Time/Date icons is a HOME button that returns the programme to the default screen. The hand icon is for changing the mouse pointer options. On the Time/Date menu clicking on the ≡ icon displays time and date information. To change the time or date click on the time or date item then press the keyboard up or down key to change or type in the required time or date. This can be the time or date up to 40,000 years ago or into the future.

Using the TIME, DATE and LOCATION selections this chart shows the view of the sky over Bethlehem in the year 7BC looking South over the town.

It was used for the Wise Men presentation at the beginners Zoom meeting in December.

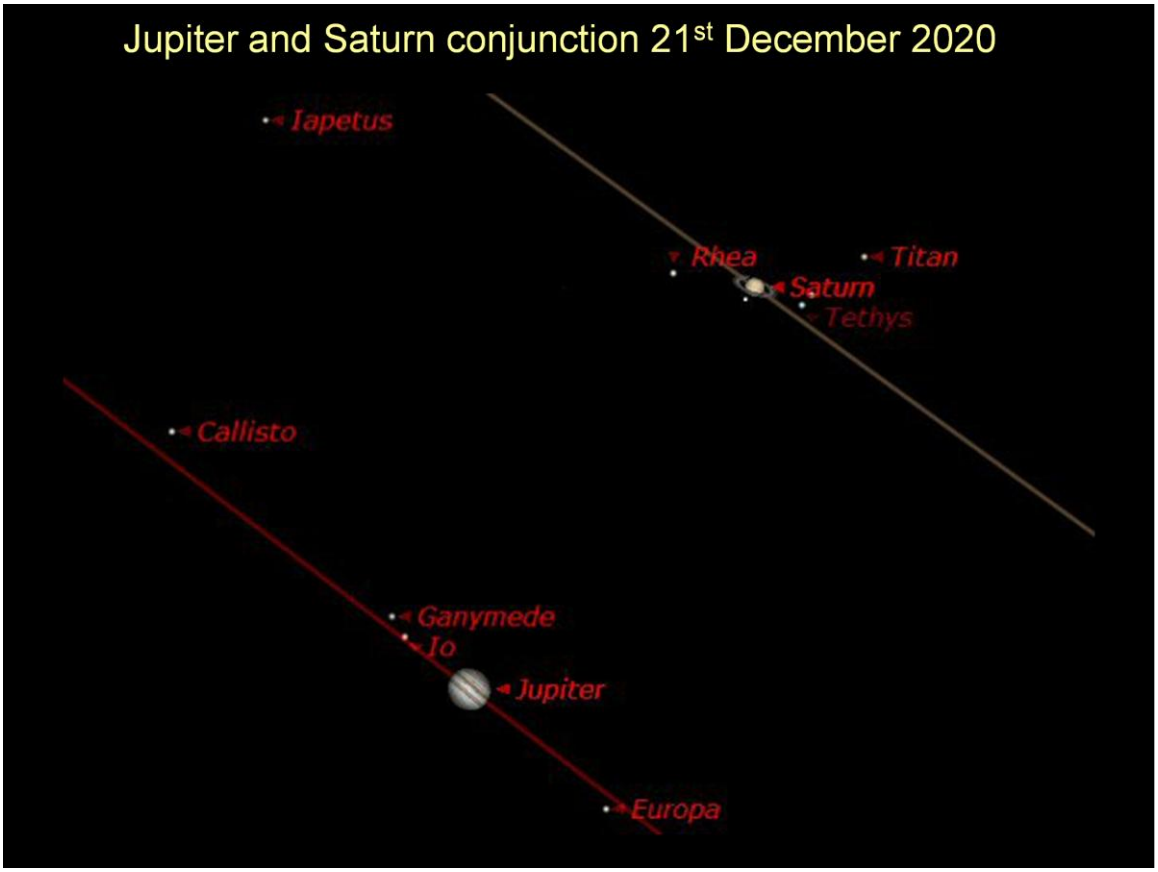
This shows the view the Three Wise Men may have seen as they arrived at Bethlehem from Jerusalem in the north.



It is also easy to add the orbital paths of the two planets as they converged through the autumn of 7BC. The chart above shows, for example, the orbital paths added to a chart showing the converging orbits leading up to the Great Conjunction of Jupiter and Saturn last year 2020.

This chart was produced to show how the orbits of Jupiter (red) and Saturn (brown) converged for the Great Conjunction on 21st December 2020.

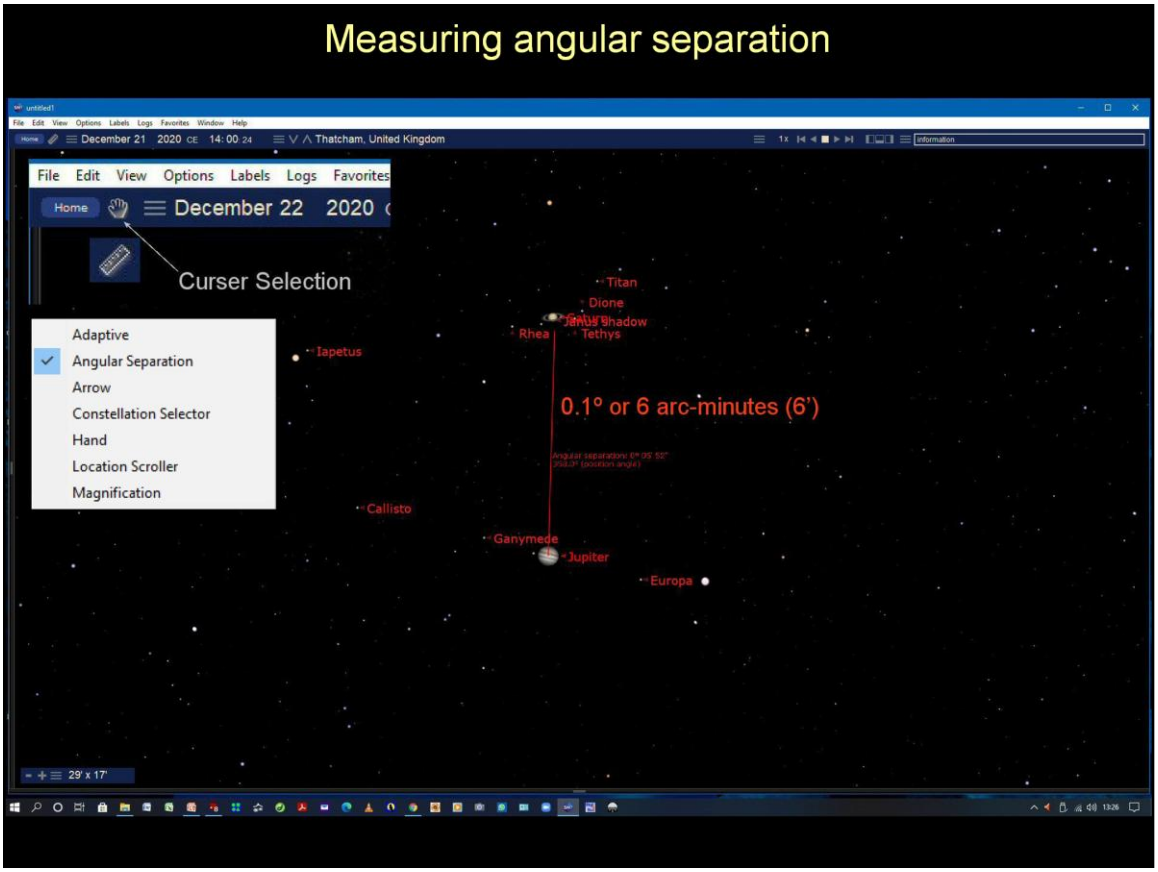
The chart was used in a presentation at the December Beginners Zoom Meeting.



There are many uses for the Planetarium Applications but the primary purpose for astronomers is to provide information about the sky for observations. Charts produced by the application can show us the current sky with stars and constellations labelled. They can also show the position of planets and their moons that can also be labelled for identification. The chart above was produced to show a detailed view of Saturn and Jupiter at their closest point in the 2020 Great Conjunction on 21st December 2020.

The applications are regularly updated so there are many other uses for the Planetarium Applications. The appearance of new comets will be shown as they move across the sky night after night so their paths can be plotted. Other events like Eclipses and Occultations (when one object appears to pass in front of another) can be predicted and displayed. This chart was also used in a presentation at the December Beginners Zoom Meeting.

Measuring angular separation



The Curser can be changed by clicking the second icon from the left on the blue Menu Bar at the top of the screen.

Curser selections are: Adaptive, Angular Separation, Arrow, Constellation Selector, Hand, Location Scroller and Magnification.

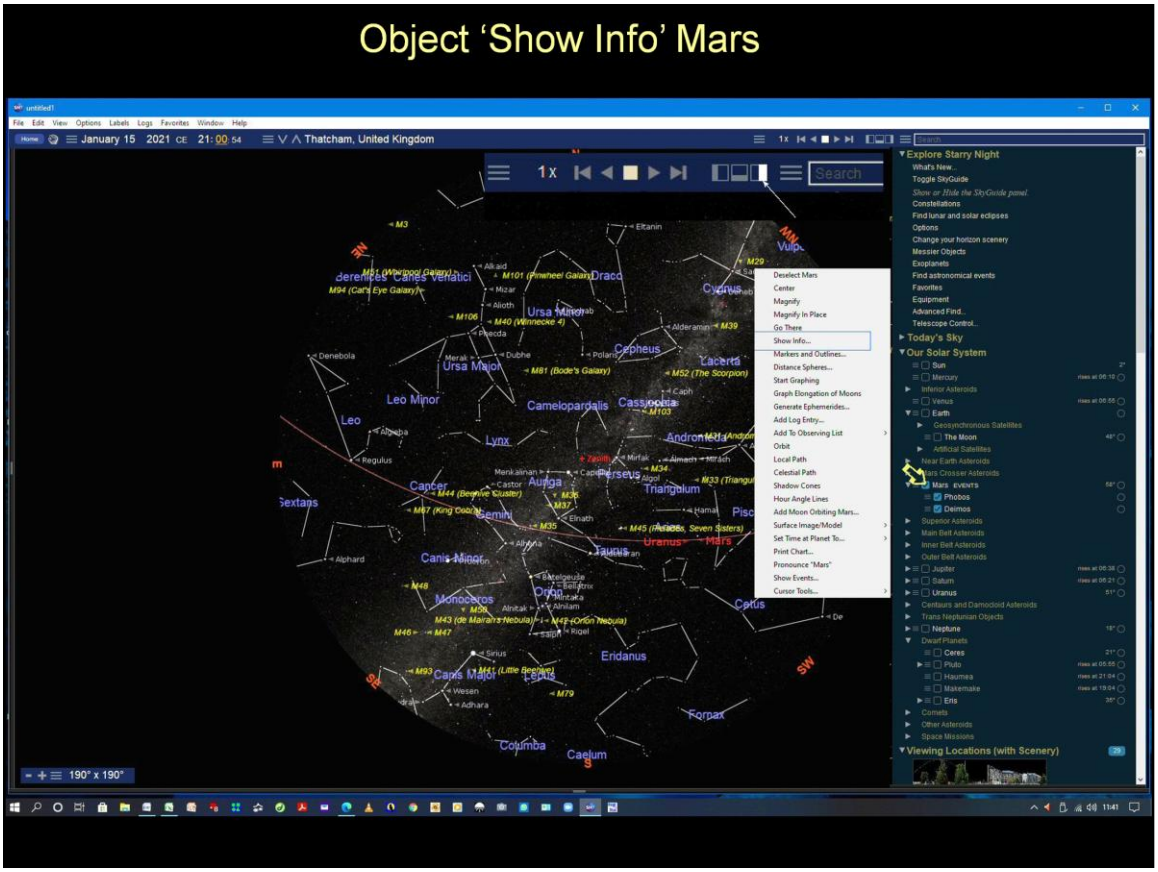
The 'Ruler' curser has been selected to measure the angular distance between Jupiter and Saturn on the Great Conjunction on 21st December 2020.

The planets were just 0.1º or 6 arc-minutes (6') apart in the sky.

To put this in prospective the Full Moon is ½ of 1º (one degree) ~30 arc-minutes in diameter.

The distance between Jupiter and Saturn was 1/5 of the Moon diameter.

Object ‘Show Info’ Mars



On the right of the main screen, the search and display panel can be displayed. Information about items found using the SEARCH menu will be displayed in this information panel.

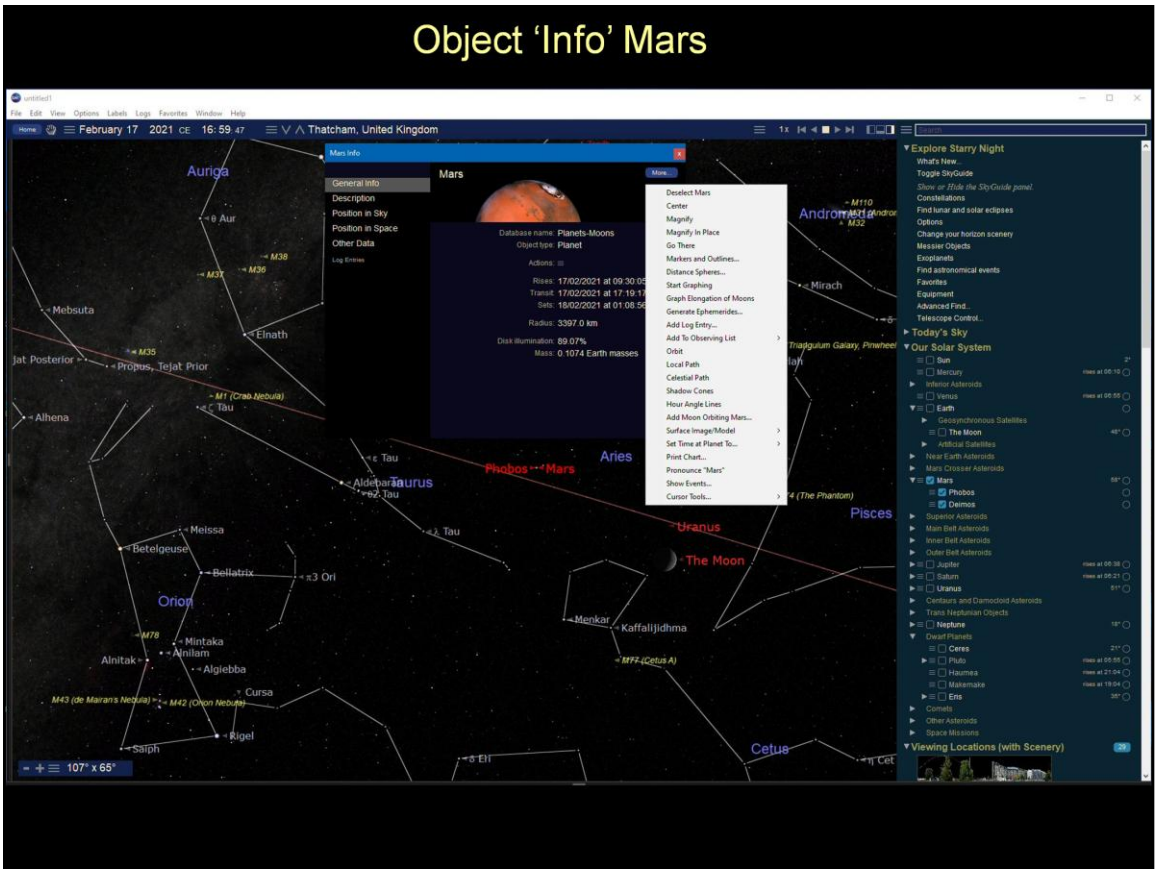
This is used to search for objects in the night sky that can then be selected and information about the object displayed by clicking on the ≡ icon.

So a planet (Mars for example) can be selected and then selecting ‘Show Info’ from the pop-out menu will present an Information Window about Mars. See the next slide.

Other selections from the pop-out menu can be used to carry out different display options. The chart may then be re-orientated by centralising it or magnifying it. This can be applied to stars, comets and deep sky objects.

Orbits of selected planets and moons can also be displayed. So lots of useful options are available.

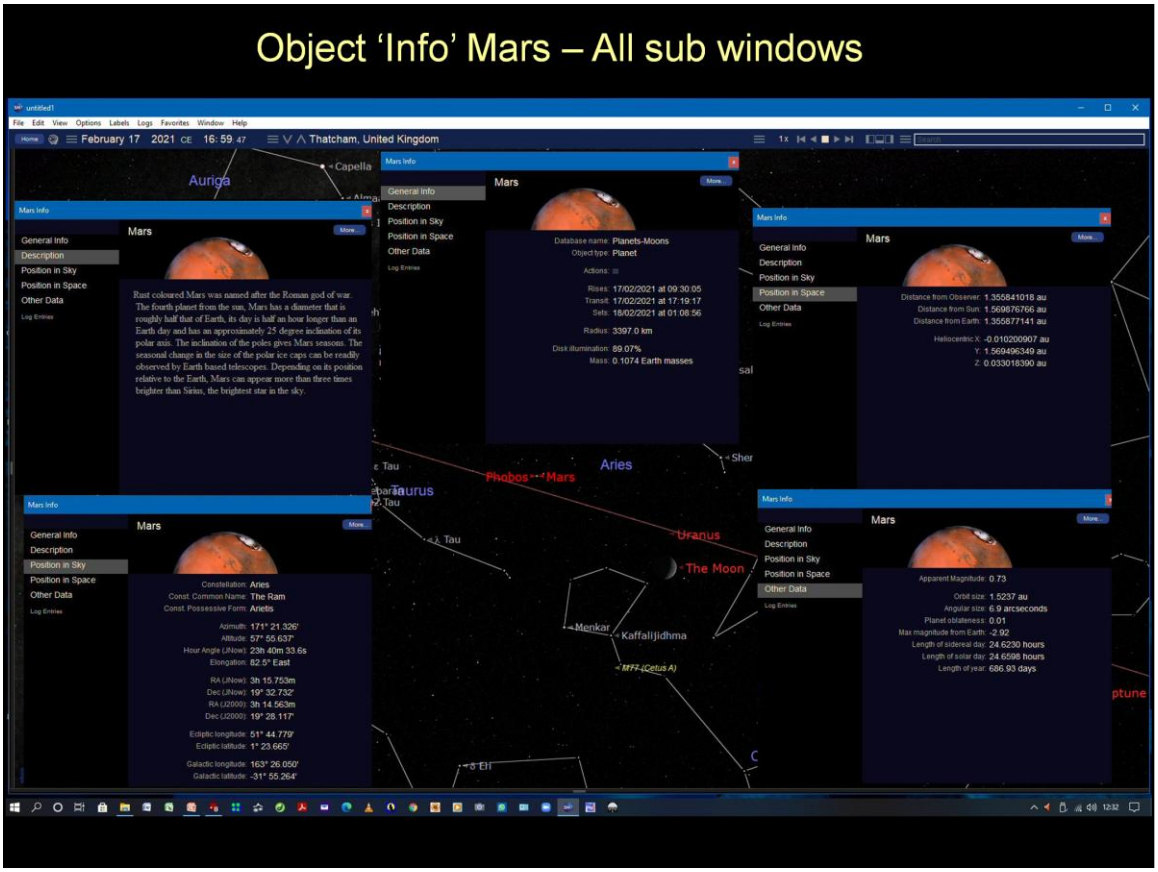
Object ‘Info’ Mars



The Mars Information Window provides lots of information about Mars. The previous drop down menu can be re-accessed by clicking on the ‘more’ button.

On the left of the Mars Information Window is a list of secondary information windows that will show more information.

Object ‘Info’ Mars – All sub windows



This slide shows the five secondary information windows that can be accessed by clicking on the information list, on the left, to flip between five the windows.

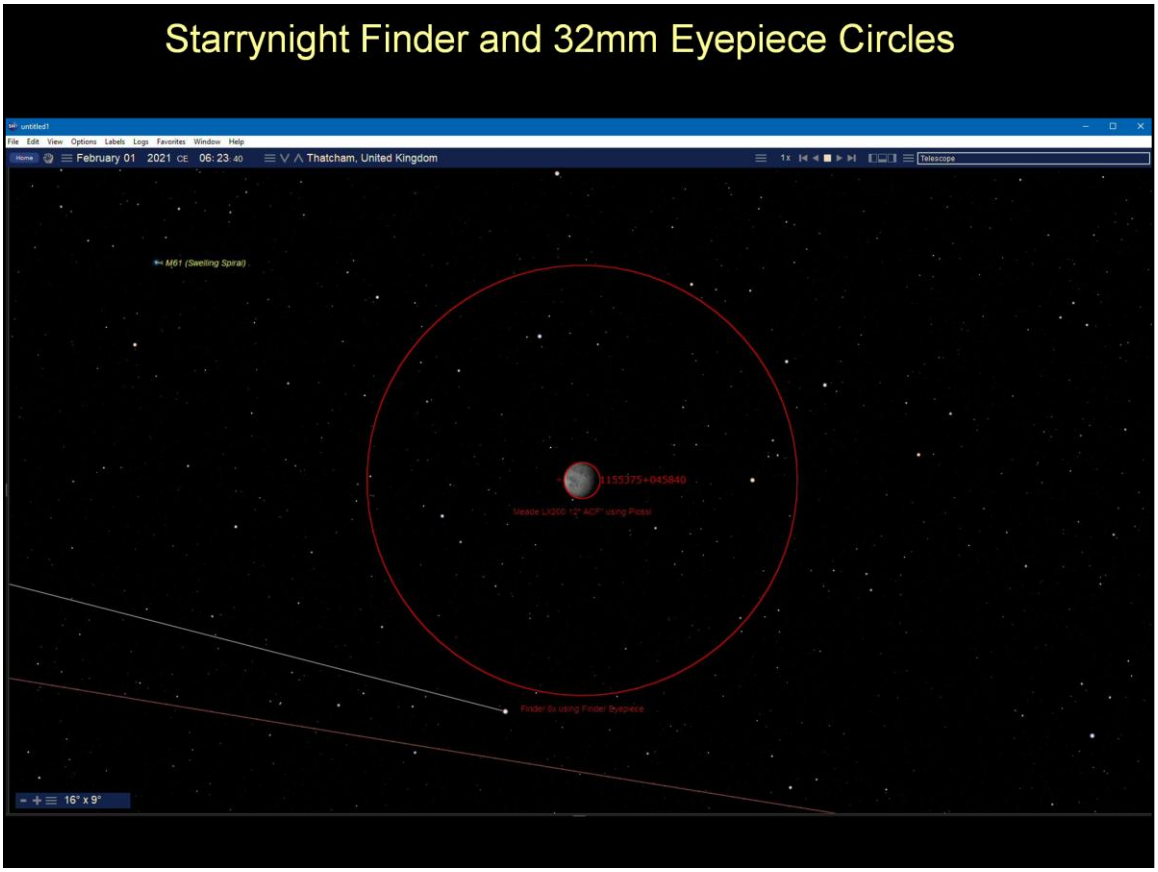
All five windows are shown together on the screen above but the windows are selected and displayed individually by selecting from the list on the left.

The ‘Position in Sky’ window is very useful and provides positional coordinates of the object selected.

These coordinates (Alt/Az and RA/Dec) can be used to set the Setting Circles on a telescope to help find the object in the real sky.

The other windows provide physical information about the object selected.

Starrynight Finder and 32mm Eyepiece Circles



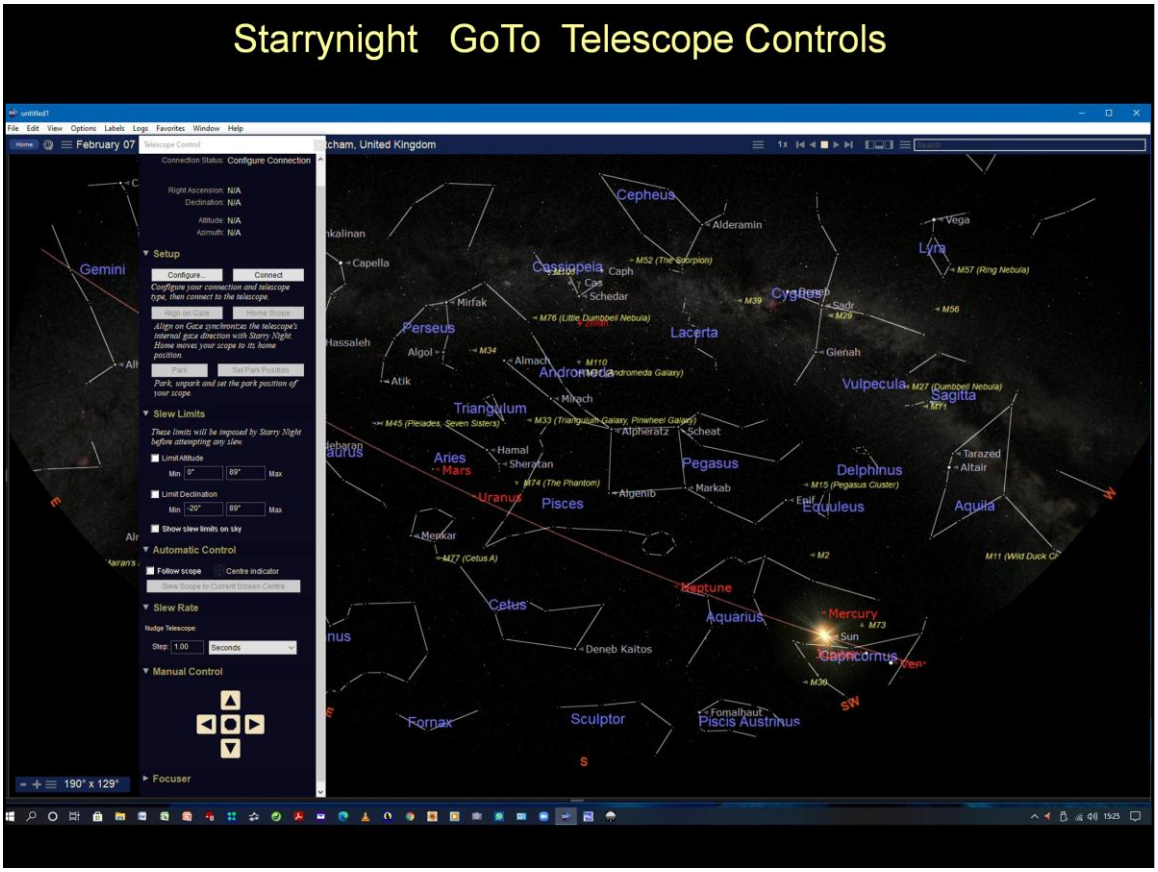
If this Planetarium Applications is going to be used to find objects with a telescope, a very useful option can be used to help recognise the view of the object in the sky.

The field of view of the telescope can be shown by superimposing a circle representing the field of view when using a selected eyepiece.

The chart above shows the field of view circles for the main telescope and its finder when looking at the Moon. The large circle is the finder scope and the small circle is the main telescope.

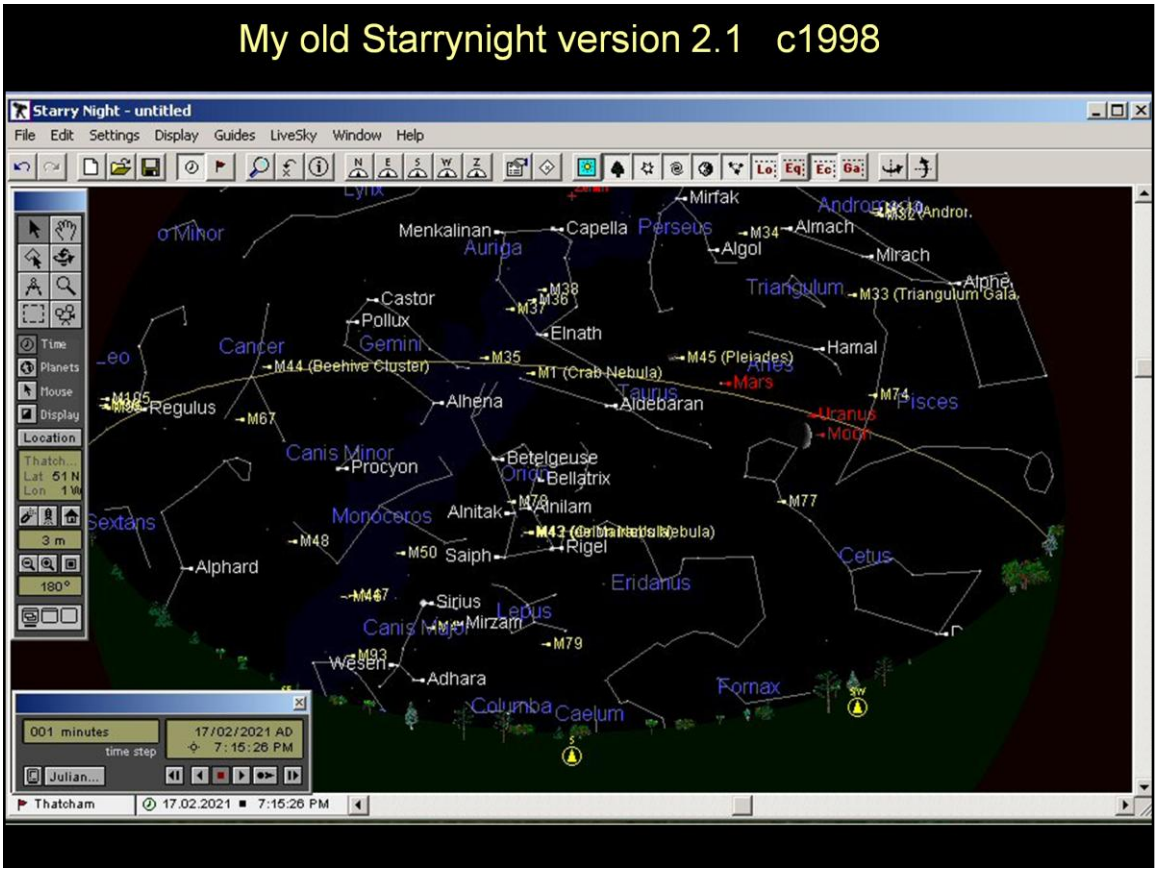
The type of telescope and eyepiece can be selected from the Search Menu Panel by entering ‘Telescope’.

Starrynight GoTo Telescope Controls



For those who have a goto telescope, the telescope can be guided by connecting the computer to the telescope. The telescope can then be directed to slew to the selected object by the Starrynight application.

My old Starrynight version 2.1 c1998



From 1999 I used an old version 2.2. of Starrynight. This was very good at the time but has been replaced by the latest version 7.

STELLARIUM - free planetarium application

Other Planetarium Applications are available including free download applications such as Stellarium. This is a screenshot of the opening screen of Stellarium. To try this application just download it on the internet (free).

This presentation is available on the

Beginner's Website: naasbeginners.co.uk