

# AWB Star Charts (Deep Sky) Help

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## 2 Introduction

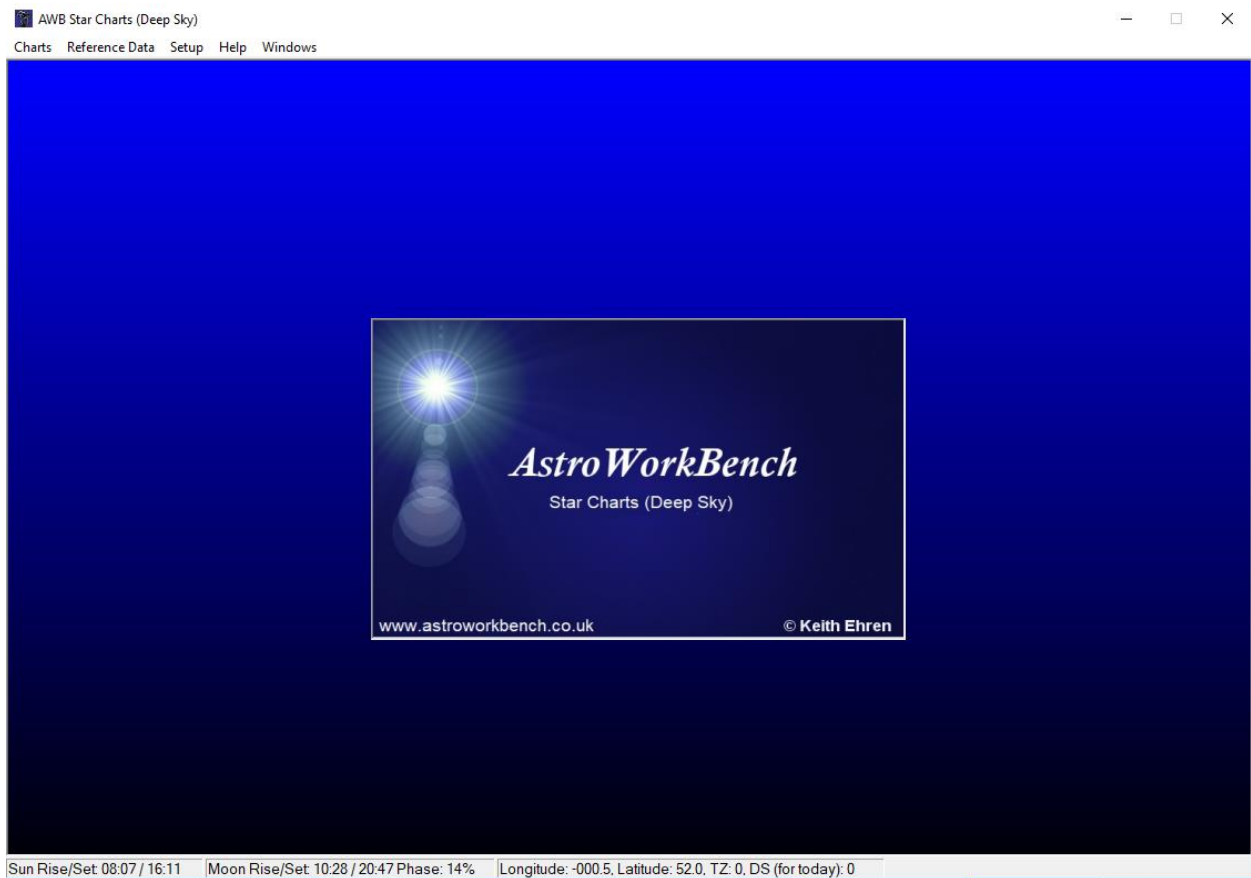
AWB Star Charts is one of a set of applications under my AstroWorkBench (AWB) collection that I use during my observational sessions.

I wrote this application with the primary purpose of displaying deep sky objects (DSO's) in such a manner to make it quick and easy to see which DSO's are viewable for at any date, time and location.

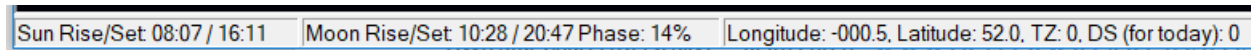
This application is therefore not designed to be one of the plethora of 'beautiful' sky rendering applications, it is designed to be primarily of use during (or before) an observational session to easily identify candidate deep sky objects for observing.

### 3 Startup

Upon running the AWB Star Charts you will be presented with the following start-up screen.



The status bar at the bottom of the screen shows today's rise and set times for the Sun and Moon (along with the lunar phase) and the current settings for your Longitude, latitude, Time Zone and Daylight Saving.



#### **IMPORTANT**

It is **very important** that the first thing you do is to set your longitude, latitude and time zone via the *Setup->Preferences* main menu option.

**Without setting these values correctly the application will not show you a correct representation of your sky.**

The preferences screen is shown below:

Preferences

Your Location and Time Zone

Longitude: 1 30 0 West -001.5 Specify latitude and longitude by city

Latitude: 52 0 0 North 52.0

(UTC+00:00) Dublin, Edinburgh, Lisbon, London

Startup | Star Charts | Stars | Deep Sky | Solar System | Colours & Fonts | NGC & IC Filter | NGC Best Filter | UCAC4 Stars | ASCOM

MDI Background (applied next time you run the application)

Default Gradient Colour

Solid Colour:            click to change colour

Maximise MDI screen.

Maximise Planisphere screen when invoked from menu.

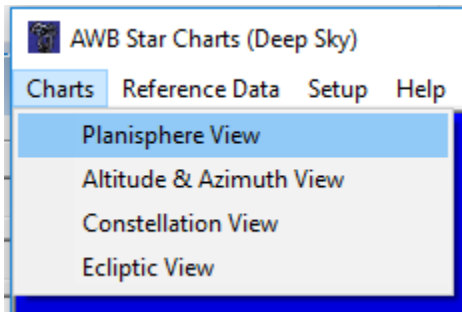
Maximise Altitude & Azimuth screen when invoked from menu.

Maximise Constellation View screen when invoked from menu.

Change the Longitude, Latitude and Time Zone values for your location. The values will be saved when you close the form and will be used for all applicable calculations in AWB Star Charts.

## 4 Main Charts

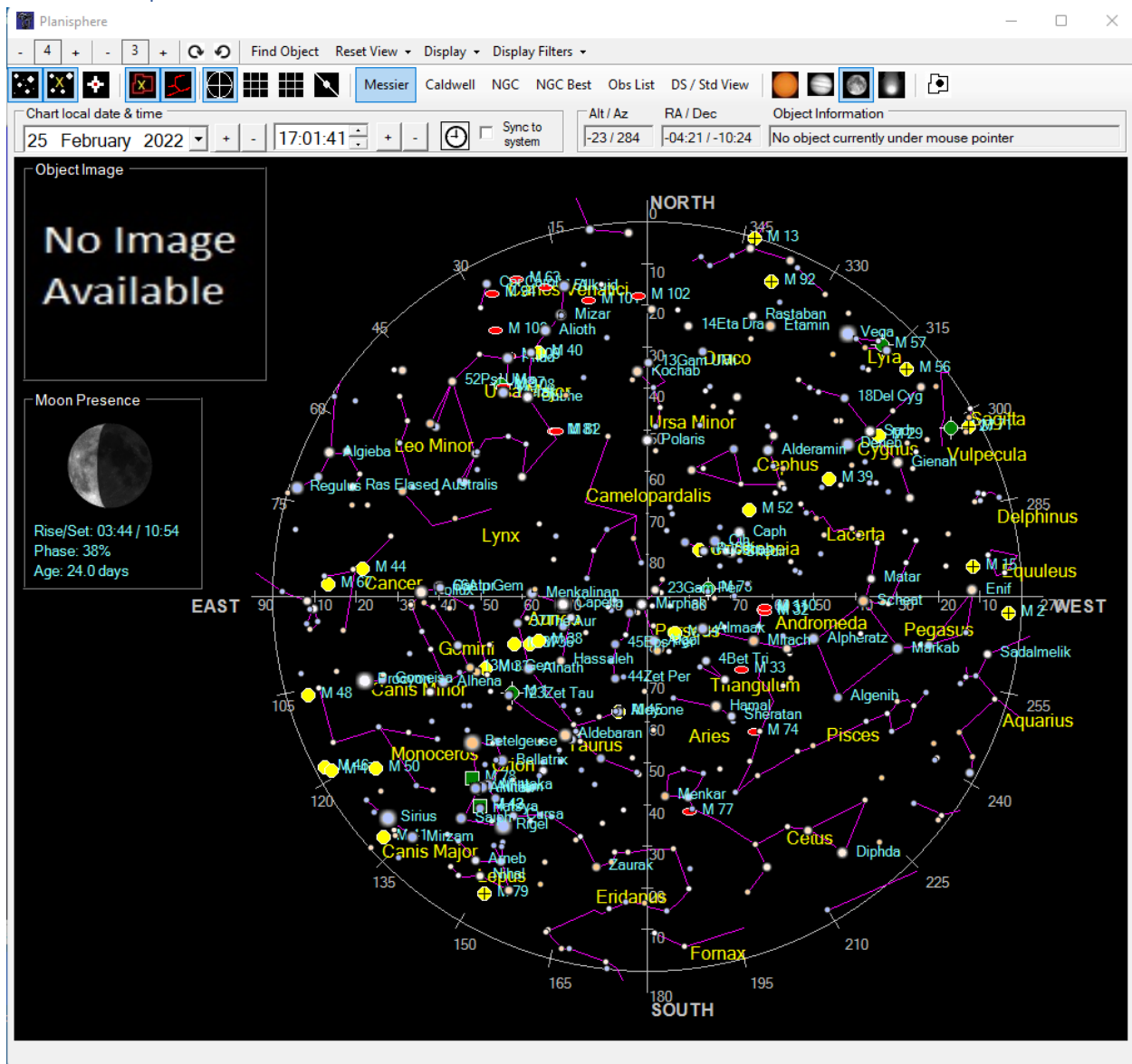
This application centers around four main screens accessible via the *Charts* main menu as shown below.



These screens each give a different view on the same data for the specified date, time and location.

Each of these screens are explained in the sections below.

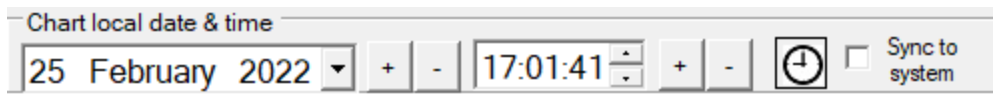
## 4.1 Planisphere View



The default Planisphere view shows degrees of altitude (0-90) on the vertical and horizontal axis (North-South and East-West). The outer circle shown degrees of azimuth (0-360), which always start at 0 degrees north and increment moving east.

For northern observers, Polaris (the pole star) will always appear at an altitude equal to your latitude. In the example above the Latitude has been set to 52 degrees (via the *Setup-Preferences* menu option) and hence Polaris can be seen due North at 52 degrees Altitude.

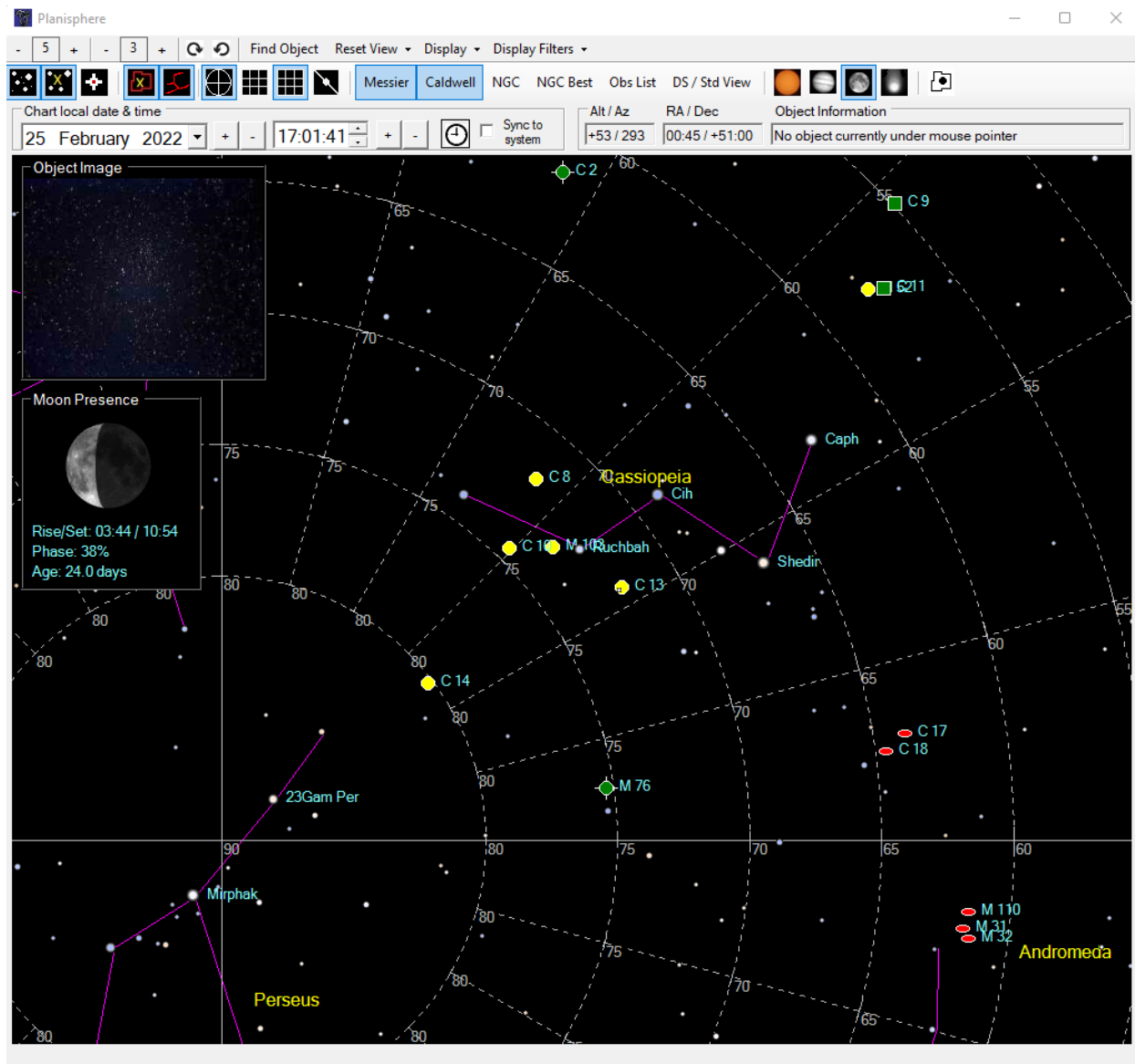
The screen will default to your current (PC) date and time. Any date any time may be entered via the controls shown below.



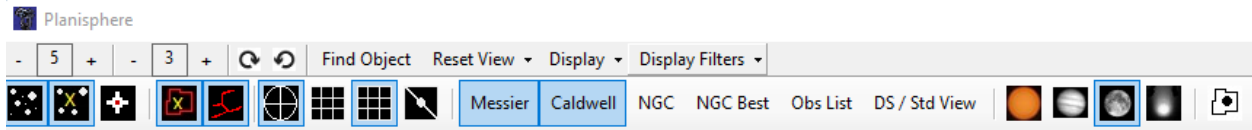
If you wish the application to keep track with the current date and time tick the *Sync to system* checkbox. The Planisphere will then automatically redraw to keep in time with your PC clock.

The Reset button with the clock icon sets the date and time back to your current (PC) date and time.

Use the mouse wheel to zoom in and out. The chart may also be moved via left mouse button click and drag. The screen snippet below shows the results of some zoom In and drag.

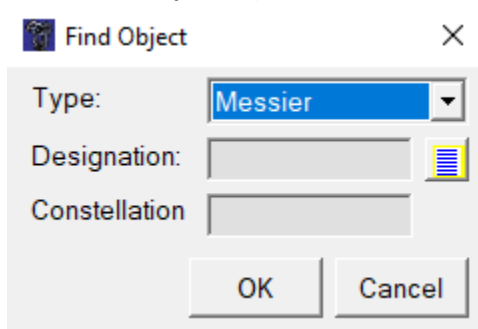


### 4.1.1 Menu Bar

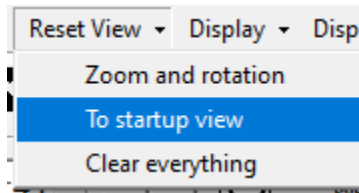


The menu bar provides the following facilities:

- **Stars to Mag:** These -/+ buttons allow you to set the magnitude level for displaying stars.
- **Star Names to Mag:** These -/+ buttons allows you to set the magnitude level for displaying star names.
- **Rotate Clockwise and Anti-clockwise:** So that the chart may be presented on screen to suite your personal orientation the Planisphere image can be rotated using these two buttons.
- **Find Object:** This presents the following screen which allows you to select a type of Messier, Caldwell, NGC or Star Name from the drop list and the objects designation number via the List of Values button next to the designation field. Upon clicking OK the application will then show you where that object is (if above the horizon) via a flashing bullseye target.

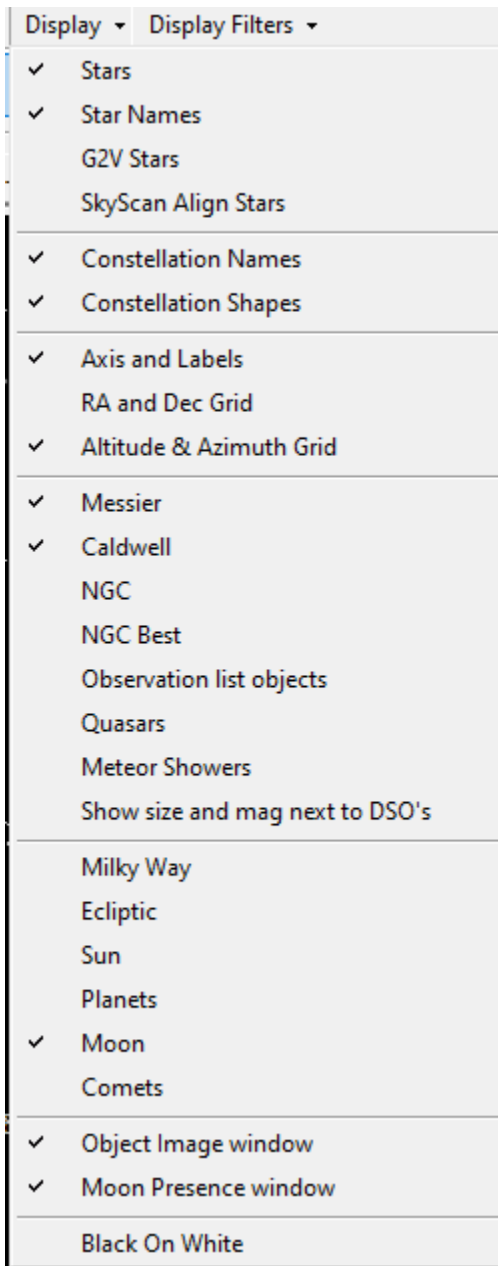


- **Reset View:** Allows you to tidy up and reset the view.

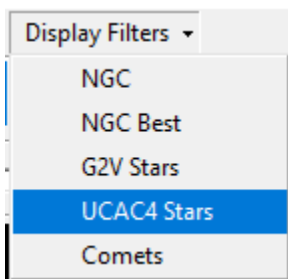


- **Display:** Provides options to display a variety of objects (some are duplicated via buttons on the menu bar).

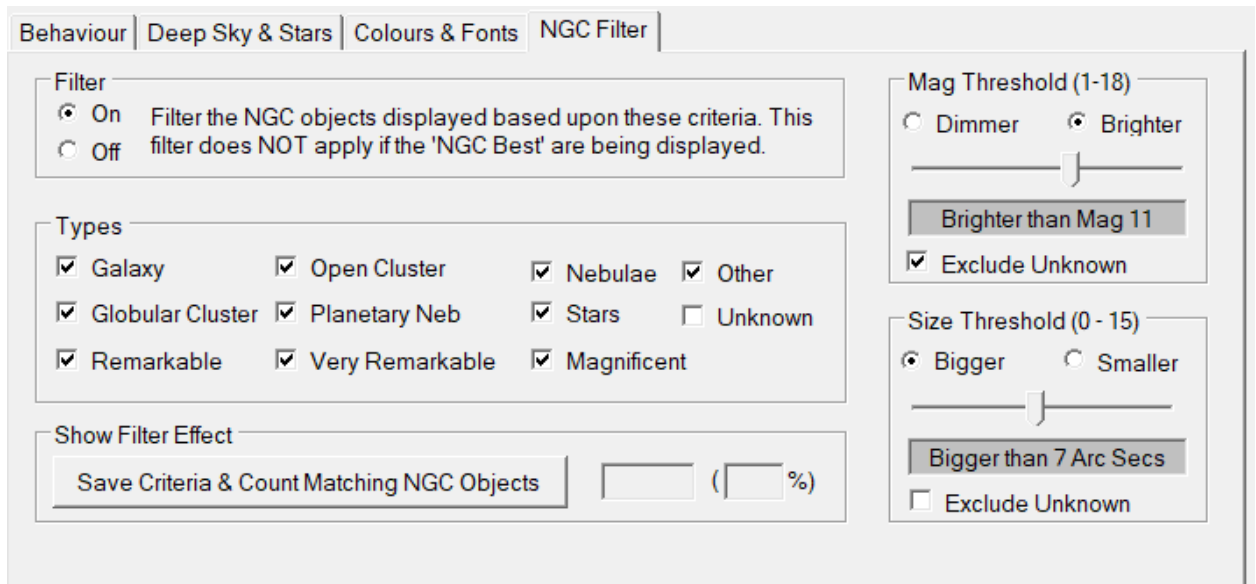




- **Display filters:** This button provides filter settings for some of the objects so as to prevent an overload of objects being displayed.

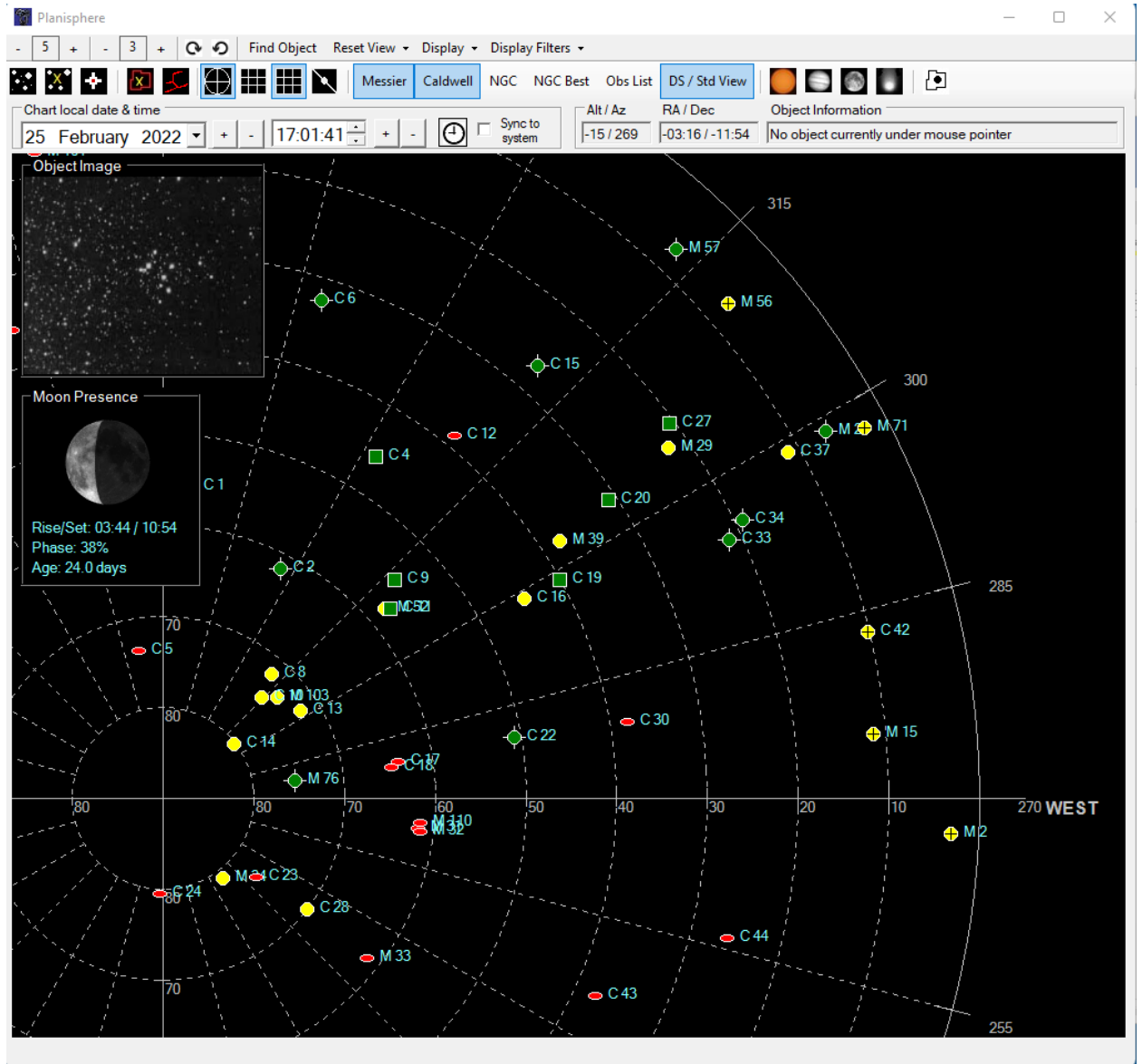


For example, the NGC filter screen is as follows:

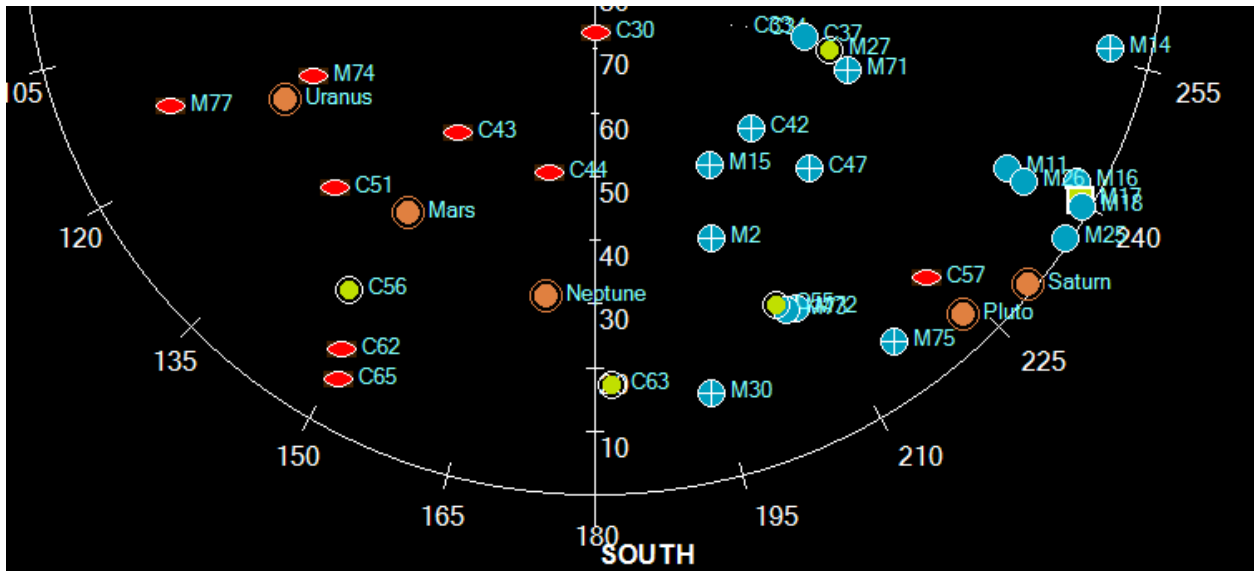


- **Stars icon button:** This button switches on/off the display of stars.
- **Star names icon button:** This button switches on/off the display of star names.
- **Sky Scan align stars icon button:** This button switches on/off the display of star names that are as designated ALIGN stars in the Sky-Watchers sky scan controllers.
- **Constellation Names icon button:** This button switches on/off the display of constellation names.
- **Constellation shapes icon button:** This button switches on/off the display of constellation shapes.
- **Show Axis, RA / Dec and Alt /Az grid buttons:** Allows you to display various grids.
- **Messier, Caldwell, NGC, NGC Best and Observation List (Obs List) buttons:** These buttons switch on/off the display of the associated deep sky objects (NGC Best is a subjective list of the best NGC objects).
- **DS / Std View button:** If you are primarily interested in Deep Sky (DS) Objects (which is the primary purpose of this application) then to declutter the screen click this button and only the selected DS objects will be shown (Messier, Caldwell, NGC, NGC Best, My Objects). This makes it very quick and easy to see which Deep Sky objects are currently viewable. Click the button again and the view will return to the default start-up.

An example is shown below when the **DS Only** button has been clicked when just the **Messier** and **Caldwell** buttons are toggled on (and hence only Messier and Caldwell objects are displayed).



- **Sun, Planets, Moon and Comets icon buttons:** These button switches on/off the display of their respective objects. An example of the planets being displayed is shown below:



#### 4.1.2 Position and Object Information

When moving your mouse the chart will show the RA / Dec and Altitude / Azimuth of the mouse cursor's position. When moved over an object on the chart a brief description is also shown as in the example below (when the mouse was over Caldwell 2).

Alt / Az	RA / Dec	Object Information
+36 / 010	00:13 / +72:31	C2: A planetary nebula described as very small (35"), bright in the center, with a mag. 12 central star. Also known as NGC40, in Cephus (CEP)

If you right mouse click on an object then a separate menu appears. The example below shows a right click on Caldwell 2.

- Show Caldwell 2 details
- Add Caldwell 2 to observation list

---

- Slew scope to Caldwell 2 (no scope connection)
- Sync scope position with Caldwell 2 (no scope connection)

---

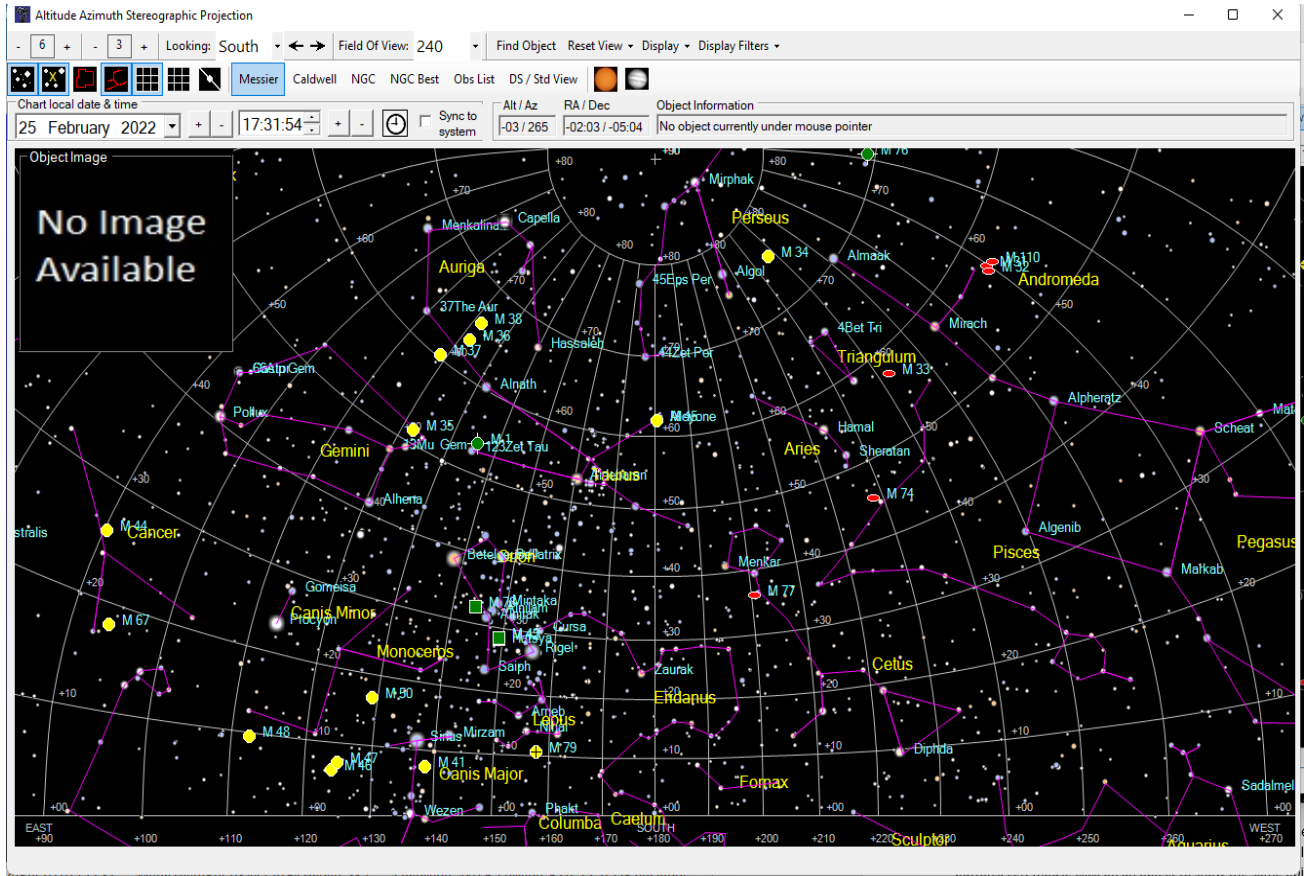
- Show UCAC4 mag 18 stars here

---

- Reset View ▶
- Display ▶

## 4.2 Altitude and Azimuth View

This chart presents the same data as the other chart screens but as an Altitude / Azimuth view using a common stereographic projection algorithm. The default view is the vertical axis being 0 to 90 degrees Altitude and Horizontal axis showing Azimuth degrees. An example is shown below.

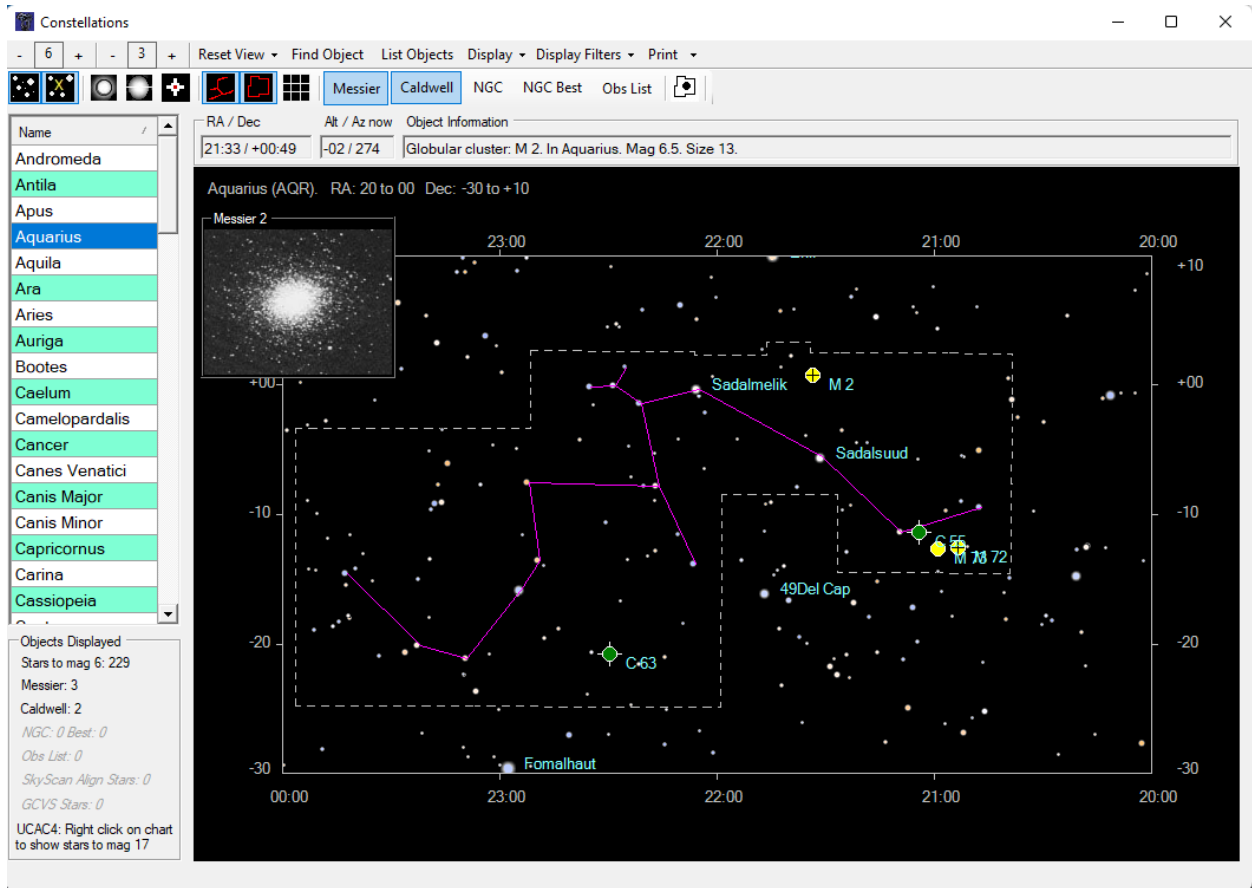


The controls for this screen are broadly the same as the other charts with the ability to zoom In and out via the mouse wheel, drag using left mouse click drag and select objects to display. A right mouse click on an object shows the same menu as described above.

The view (Looking North, South, East, West) can be changed via the drop list or the left / right arrow keys in the toolbar.

### 4.3 Constellation View

This chart presents the same data as the other chart screens but as a constellation specific view.

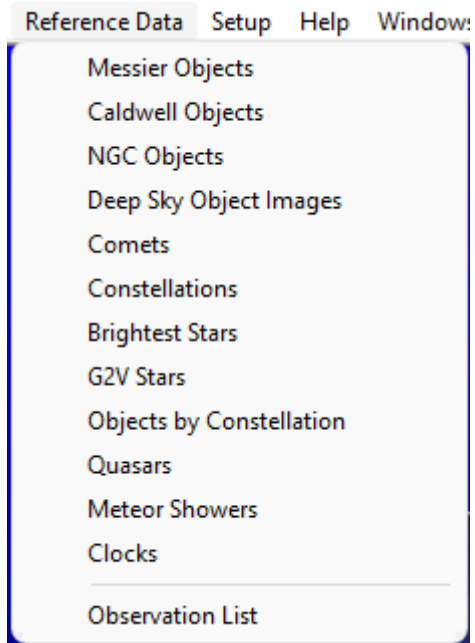


The grid on the left of the screen lists all of the constellations, to see what objects are located within any constellation just click on the applicable row.

The controls for this screen are broadly the same as the other charts with the ability to zoom In and out via the mouse wheel, drag using left mouse click drag and select objects to display. A right mouse click on an object shows the same menu as described above.

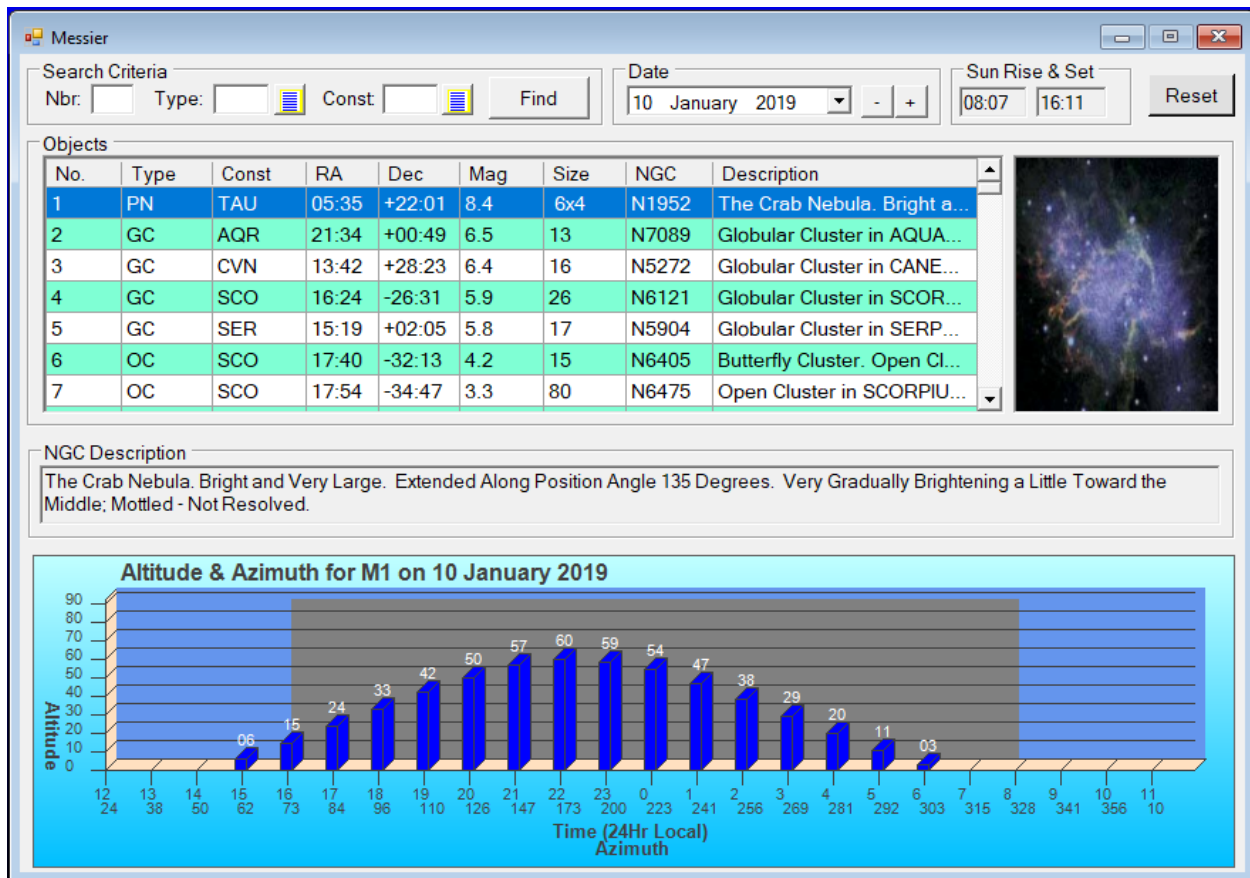
## 5 Reference Data

The reference data used by AWB Star Charts may be perused and queried via a set of screens under the Reference Data main menu:



Some examples are shown below.

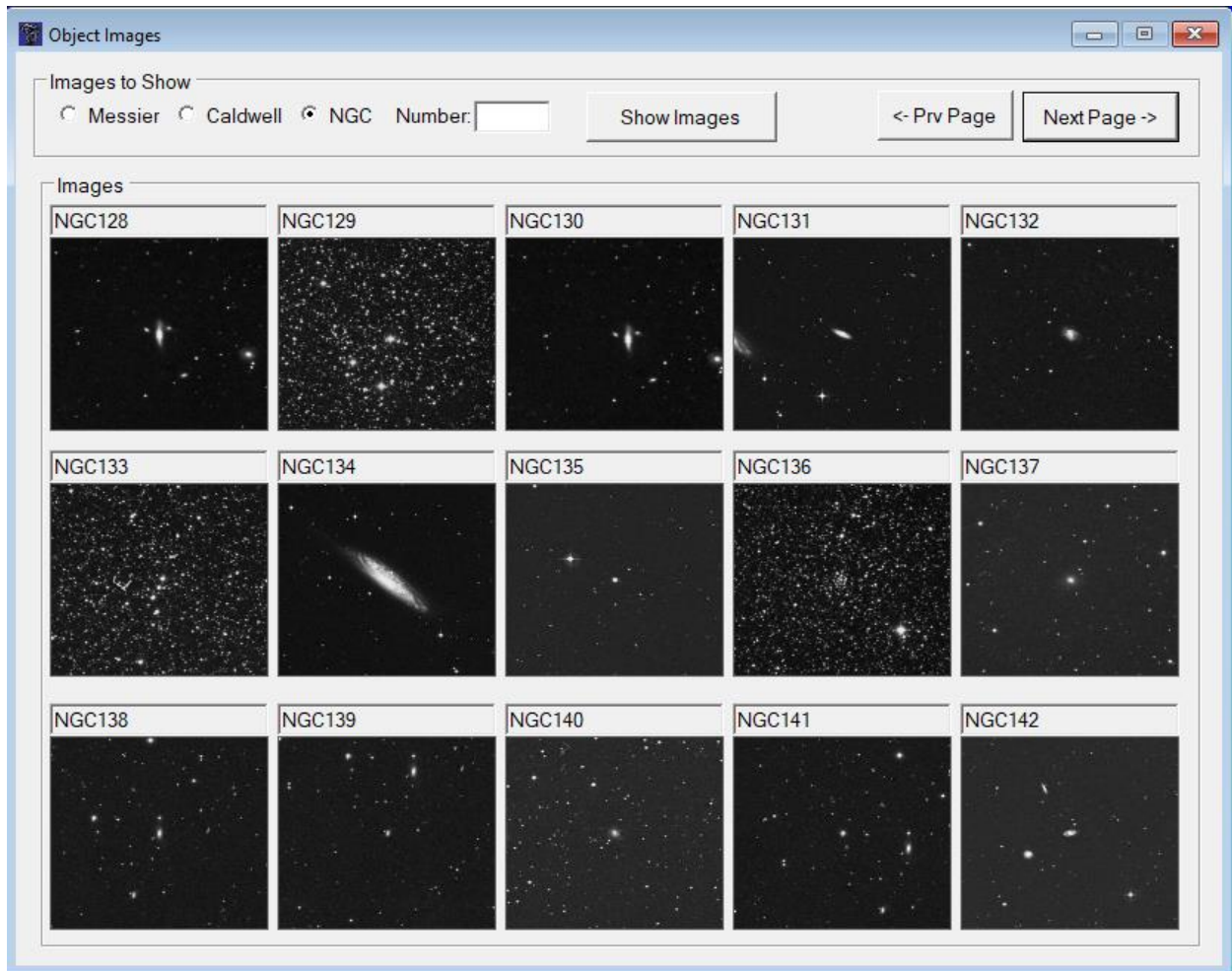
The example shown below is the *Messier Objects* screen. The *Caldwell* and *NGC* objects screens are very similar.



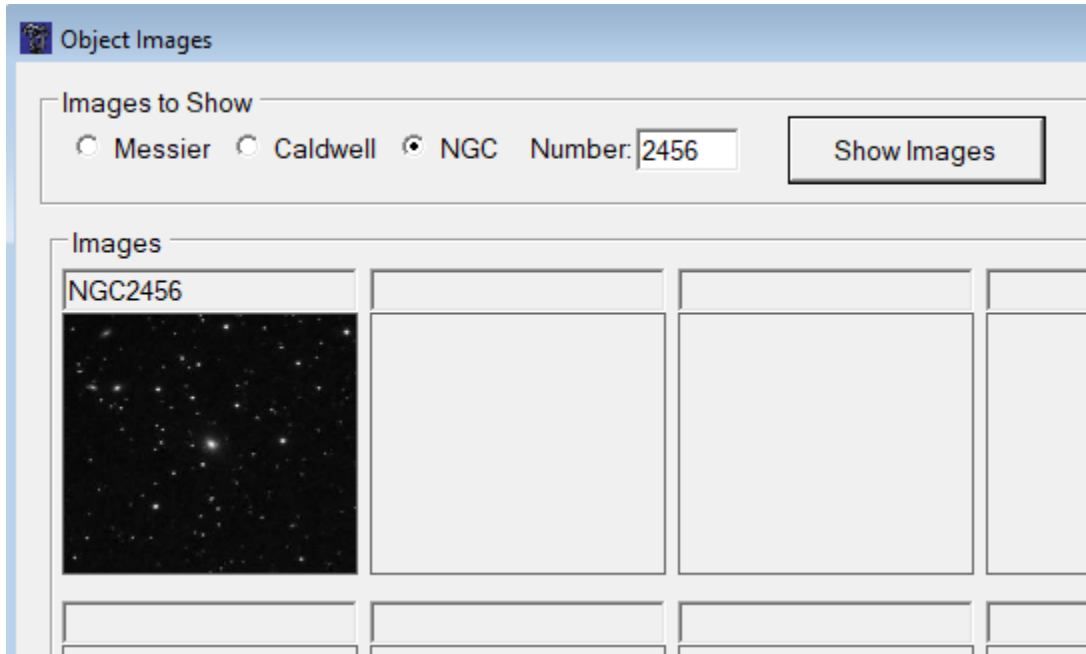
These screens allow you query and view objects (and their images) and for each selected object an Altitude / Azimuth graph is presented that allows you very quickly to see if an objects apparition is favorable for viewing for the specified date.

The Deep Sky Object Images screen shows images for Messier, Caldwell and NGC. An example is shown below.

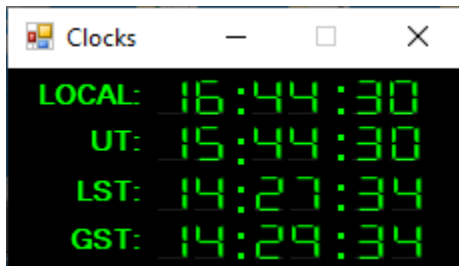




An image for a specific object may also be viewed by entering its type and number as shown for NGC 2456 below.



The clocks screen shows local (based upon your devices date and time), Universal, Local Sidereal and Greenwich Sidereal time.



The Observation List screen (shown below) allows you to create a personalized list of any objects with RA and Dec co-ordinates. Existing DSO objects (e.g. Messier, Caldwell and NGC objects) can be added from their respective reference data screens or via the right mouse click menu on the charts. These objects can then be shown on any of the chart screens via the 'Obs List' button.

Observation List
— □ ×

	Designation	Constellation	Type	RA Hrs	Mins	Secs	Dec Sign	Degs	Mins	Secs	Mag	Size	Distance	Imaging Notes
	M 6 Butterfly ...	SCO	OC	17	39	60	-	32	13	0	4.2	15		
▶	NGC 4058	VIR	GAL	12	3	0	+	3	31	60	13.1	1.2 b...		
	Quasar 3C273	VIR	GAL	12	29	7	+	2	3	9	12.9	1"	2.5 B ly	One of the furthe:
	Quasar HS 0...	CAM	GAL	6	30	2	+	69	5	3	14	1"	4.5 B ly	One of the furthe:

Enter the designation of the object

Imaging notes:

Observation notes:

Add New Record

Edit Current Record

Delete Current Record

Save All Changes

Refresh

Export List

Import List

Objects may also be added via a right mouse click on any of the star charts and directly from some reference data screens

**Alt & Az for NGC 4058 on 25/02/2022**

The chart displays Altitude (0 to 90 degrees) on the y-axis and Time (24Hr Local) / Azimuth (12 to 13) on the x-axis. The data points are as follows:

Time (24Hr Local)	Azimuth	Altitude
12	32	05
13	34	14
14	42	23
15	53	31
16	66	36
17	79	40
18	91	41
19	103	39
20	118	34
21	130	27
22	144	19
23	160	10
24	176	01

### 5.1 A Note for the technically curious

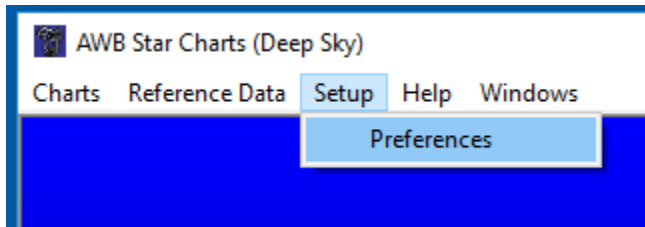
For the technically curious amongst you, I have persisted all of the reference data in XML files and the images in a Base64 encoded XML file. I could have used a checksum to ensure integrity (or encrypted them to stop viewing) but I thought you may enjoy pursuing them. I perform limited runtime integrity checks on them; well XML formed and compliant to an internal XSD (XML Schema Definition).

Therefore, please view them if you wish (with your preferred XML viewer) but do not change any of these files unless you are happy that you may break the application by causing runtime XML read errors! If you do accidentally break the application with badly formed XML files, just re-install the application.

This approach also means that the application just uses core Microsoft .Net framework objects with no additional 3<sup>rd</sup> party files (e.g. no need for anything such as a SQL Lite database etc.). You can therefore be assured that only Microsoft .Net runtime elements are installed for this application.

## 6 Preferences Screen

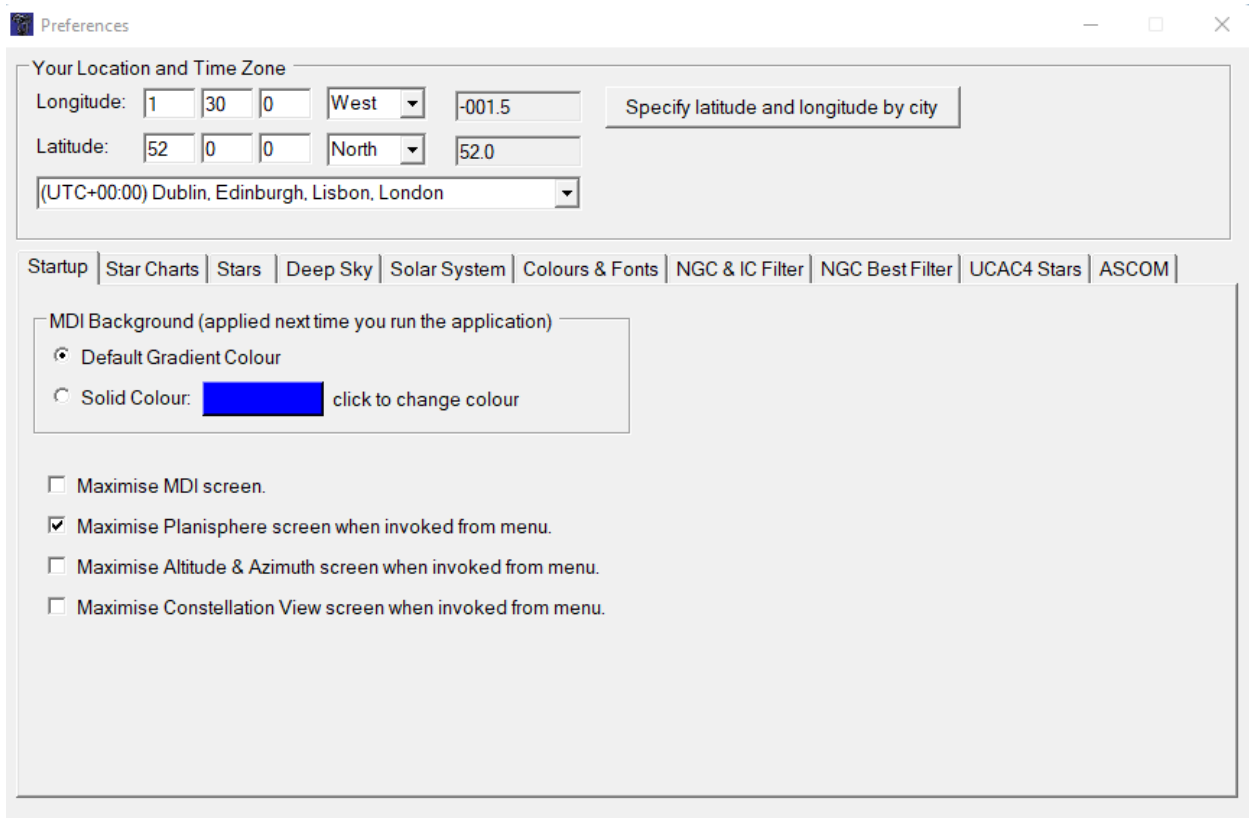
Many aspects of the application run time behavior is controlled via preferences. This is accessed via the *Setup* menu as shown below.



### 6.1 Setting your Location and Time Zone

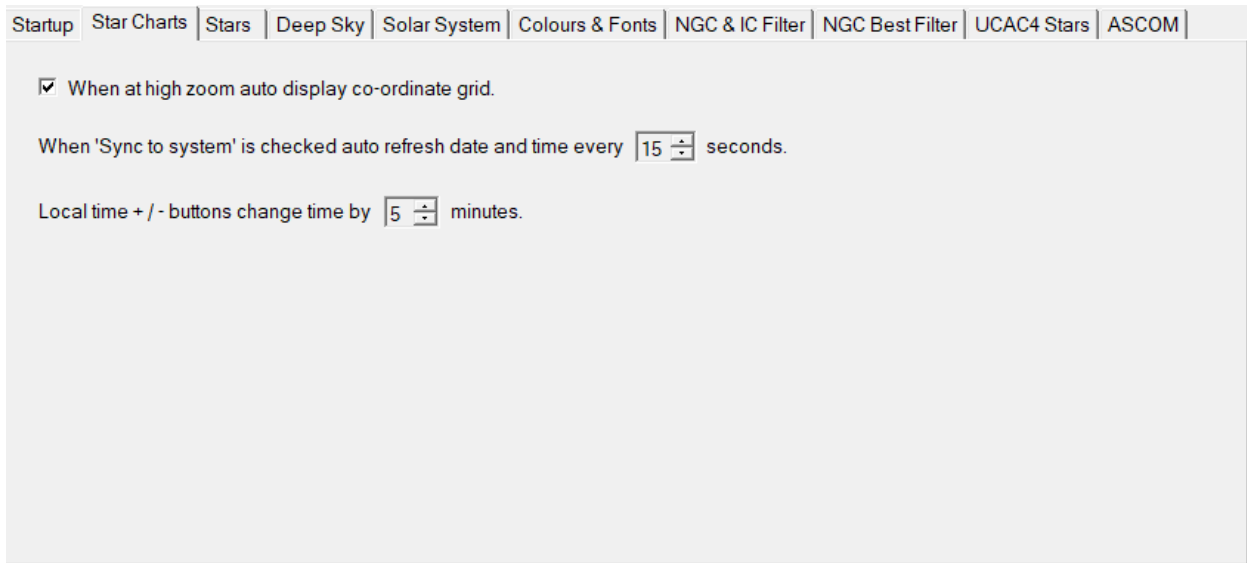
**Before using AWB Star Charts ensure that your Geographic Location and Time Zone Parameters have been set and saved.**

**Without setting these values correctly the application will not show you a correct representation of your sky.**



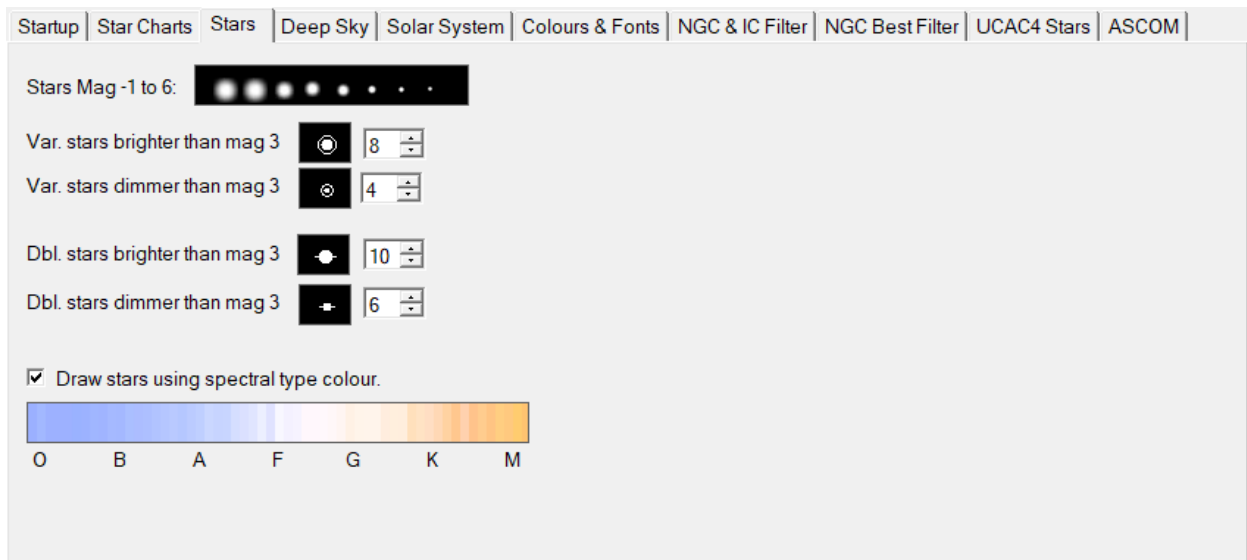
## 6.2 Star Charts

Aspects of the star charts are controlled via preferences on this tab.



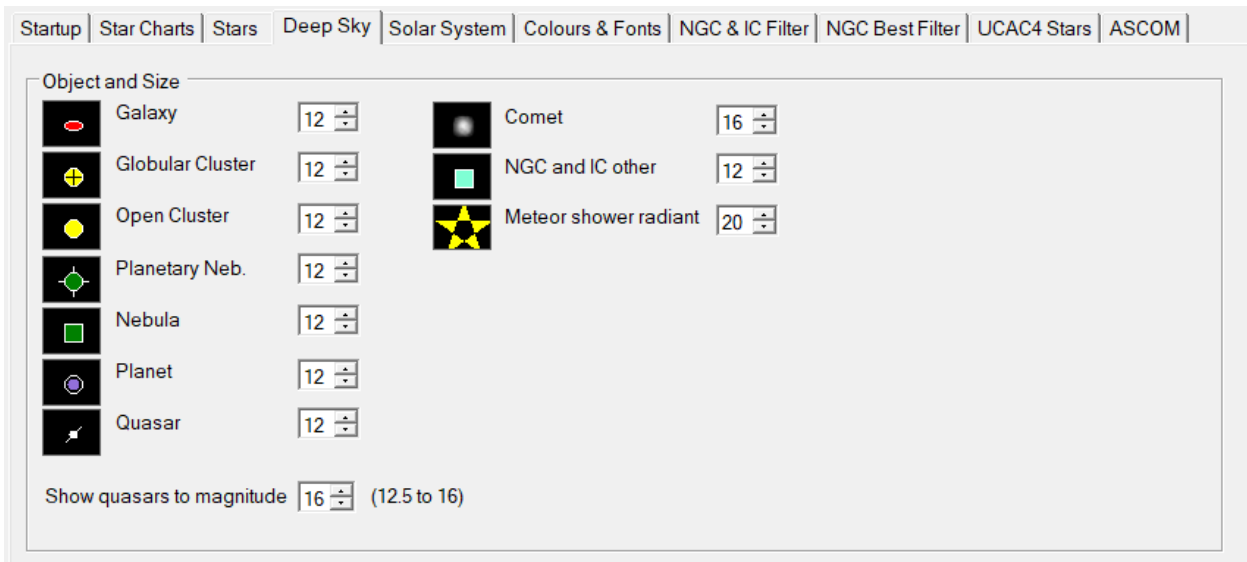
## 6.3 Stars

Aspects of star display are controlled via preferences on this tab. The spin boxes allow you to configure their size.



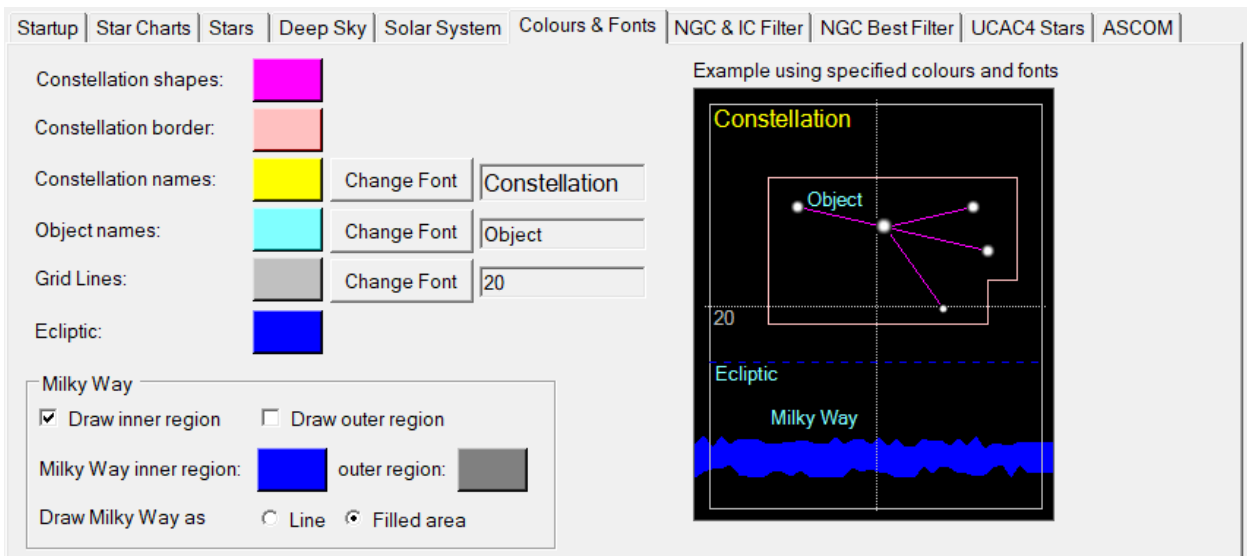
## 6.4 Deep Sky

Aspects of DSO display are controlled via preferences on this tab. The spin boxes allow you to configure their size.



## 6.5 Colour and Fonts

Aspects of colour and fonts used on the charts are controlled via preferences on this tab



## 6.6 NGC Filter

This tab contains the NGC filter which controls how many of the NGC/IC objects are displayed on the Chart screens.

Startup | Star Charts | Stars | Deep Sky | Solar System | Colours & Fonts | **NGC & IC Filter** | NGC Best Filter | UCAC4 Stars | ASCOM

**Filter**

On Filter the NGC and IC objects based upon these criteria. This filter does NOT apply to the 'NGC Best' objects.

Off

**Show NGC or IC or Both**

NGC  IC  Both

**Show object types**

Galaxy  Open Cluster  Nebulae  Other

Globular Cluster  Planetary Neb  Stars

**Calculate filter effect**

Save criteria and count matching objects |  (  %)

**Mag threshold (1-18)**

Exclude if dimmer than mag

Dimmer than Mag 11

Exclude if unknown mag

**Size threshold (0 - 15)**

Exclude if smaller than

Smaller than 4 Arc Secs

Exclude if unknown size

## 6.7 NGC Best Filter

This tab contains the NGC Best (an eclectic mix of NGC objects) filter which controls the nature of the NGC objects displayed on the Chart screens.

Startup | Star Charts | Stars | Deep Sky | Solar System | Colours & Fonts | NGC & IC Filter | NGC Best Filter | UCAC4 Stars | ASCOM

The 'NGC Best' objects is a subjective list of the best NGC objects. This list contains approx 300 entries that also includes all Messier (110 objects) and Caldwell (109 objects).

When displaying these objects on the star charts the options below allow you to include or exclude the Messier and / or Caldwell objects as these can also be displayed via their own dedicated lists via their respective star chart buttons.

Include (display) Messier objects in the NGC Best list

Include (display) Caldwell objects in the NGC Best list

## 6.8 UCAC4 Stars

This tab controls access to the fourth U.S. Naval Observatory CCD Astrograph Catalog (UCAC4) star catalog. The data for this may be downloaded from my website and unzipped to a folder of your choice. This tab then allows you to set parameters for its usage including specifying the location of the folder into which you unzipped the data.

Startup | Star Charts | Stars | Deep Sky | Solar System | Colours & Fonts | NGC & IC Filter | NGC Best Filter | UCAC4 Stars | ASCOM

The fourth U.S. Naval Observatory CCD Astrograph Catalog (UCAC4) contains approximately 113 million stars in the 8 to 16 magnitude range. These may be displayed from the star charts via a right mouse within a Field Of View as defined below. A second FOV may also be displayed to match your CCD, Camera or Eyepiece FOV.

The 900 data files (z000 to z900) and the one index file (u4index.asc) must have been installed into the folder specified in the parameters below. These files can be downloaded in a zip file from my website.

Access UCAC4 stars in the star charts (via right mouse click).

Parameters

FOV X by Y (degrees):  by  (0.5 to 1.5 degrees)

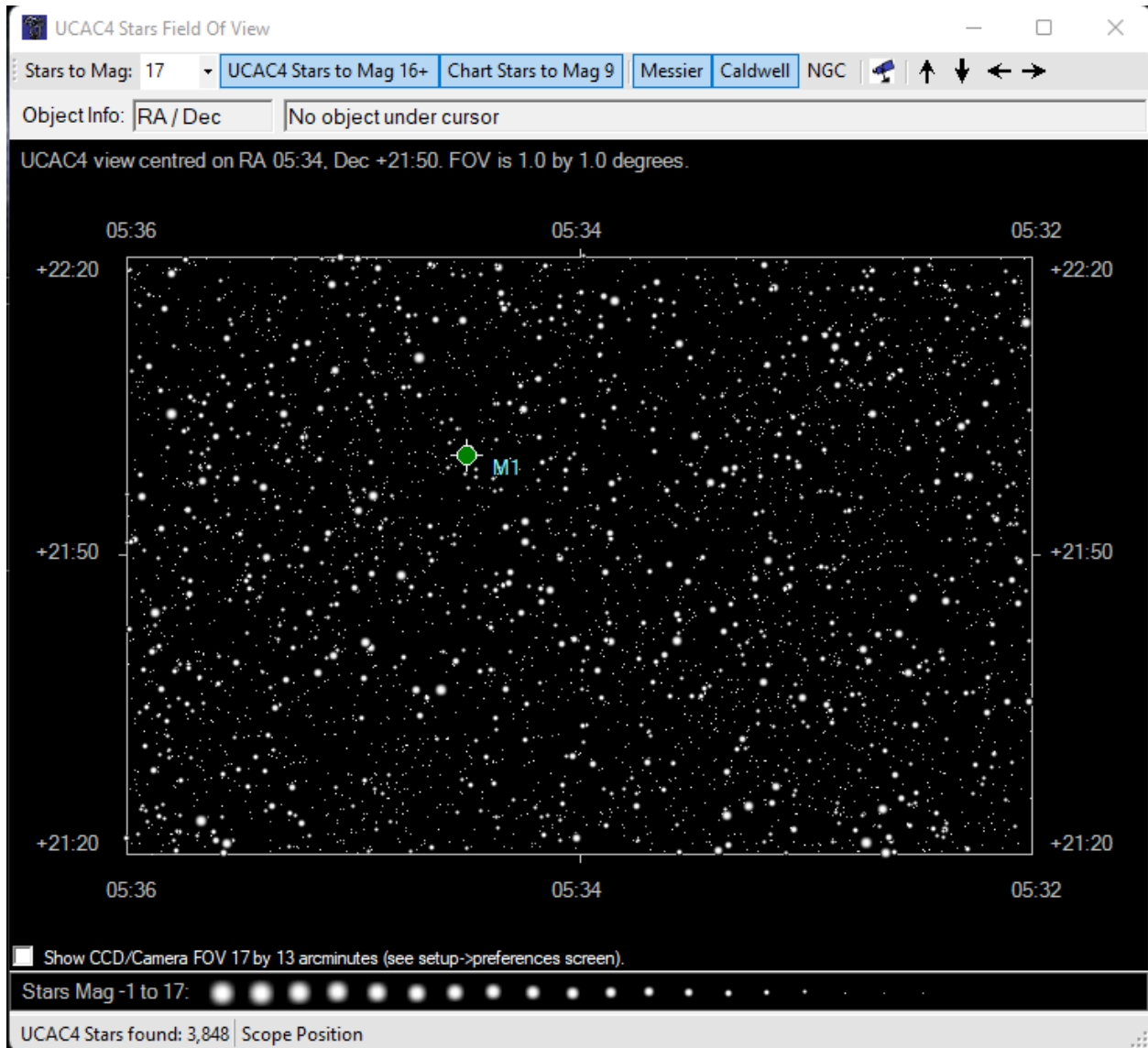
Data and Index File Path:

Also show second FOV outline  by  arc minutes

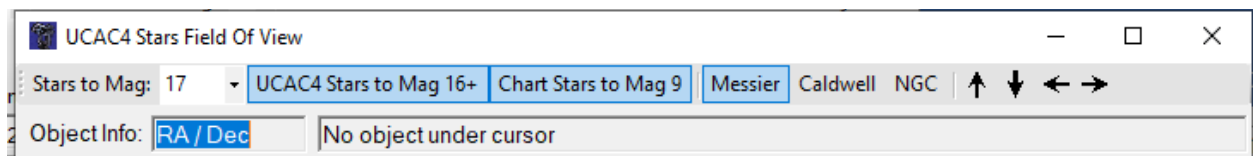
To display the stars from this catalogue, perform a right mouse click while in any of the star charts (Planisphere View, Altitude & Azimuth View and Constellation view). A separate window will be displayed centered on the RA and Dec position of the mouse cursor when you right clicked.



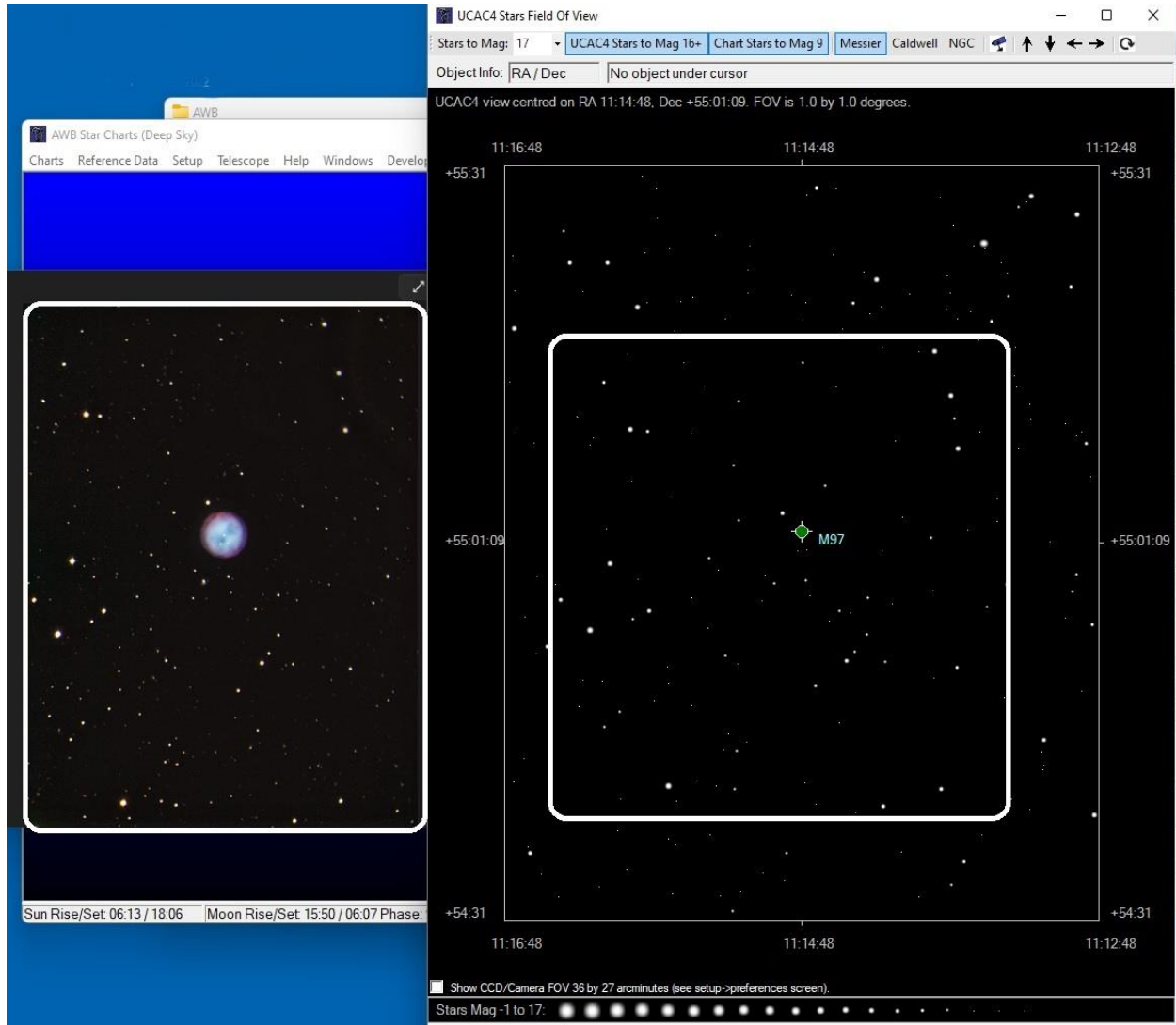
The example below shows the result of a right mouse click menu access on M1 while on the planisphere chart.



The toolbar of the UCAC4 screen (shown below) allows you to select the limiting star magnitude to display along with which Deep Sky objects to show. The chart may also be nudged in RA and / or Dec by the arrow keys.

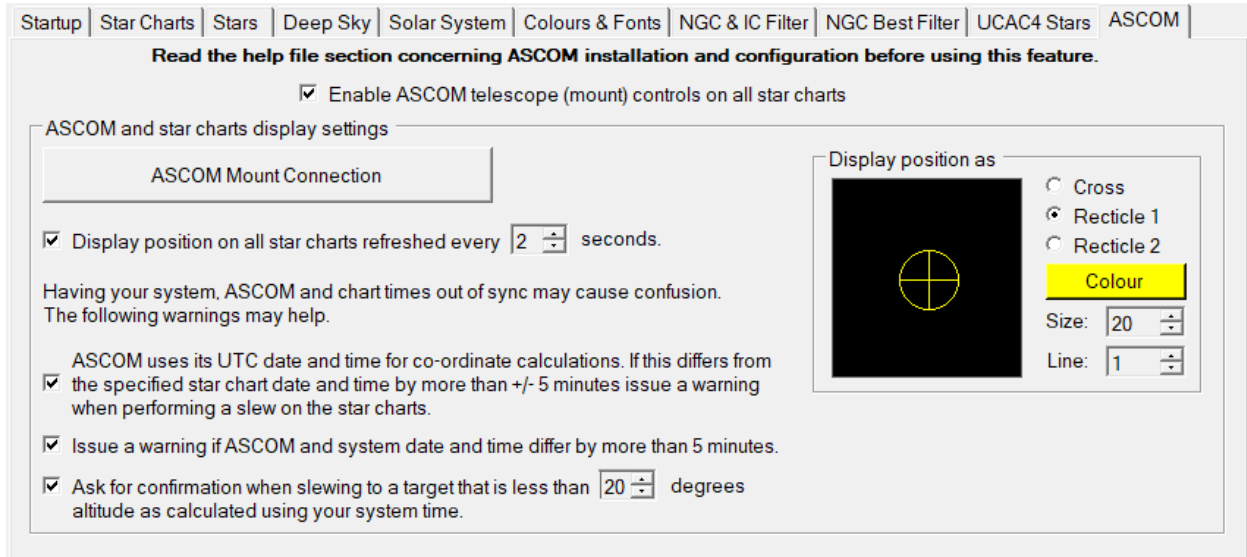


The example below shows an Image I acquired of M97 (the Owl nebula) on the left and the UCAC4 screen centered on M97. I have added a white box to mirror the image Field of View and you can easily see the correlation between the stars on the image and the UCAC4 chart. The image stars go deeper than the limit of mag 17 shown on the chart.



## 6.9 ASCOM connectivity and use

This tab allows you to enable ASCOM control features for an ASCOM compliant mount.



To use the ASCOM connectivity functionality for mount control on the star charts you must have previously installed:

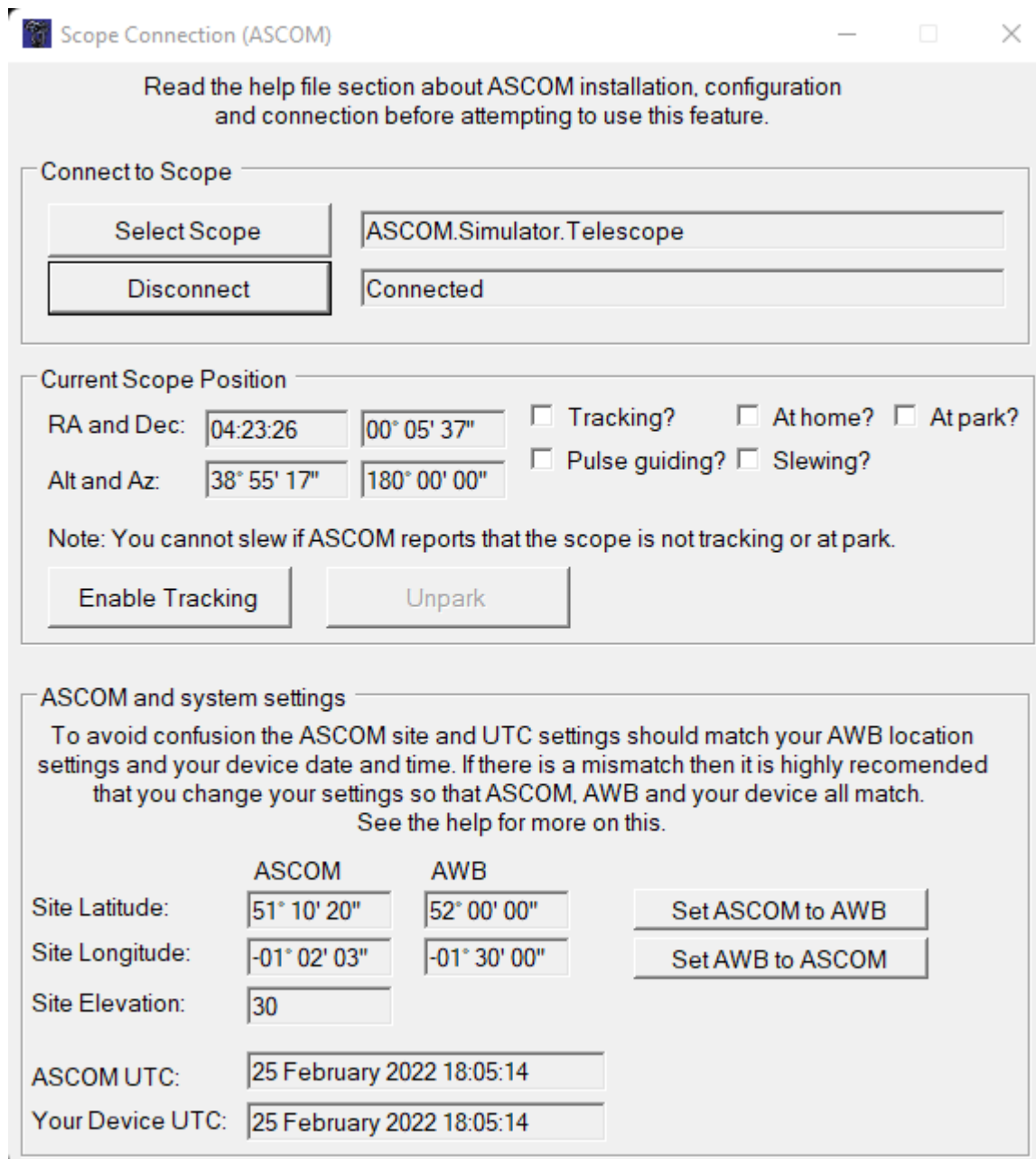
- The ASCOM platform from <https://ascom-standards.org/>
- The applicable ASCOM driver for your mount. This may be supplied with your mount, or be downloadable from your mounts manufacturers website or from the ASCOM site at <https://ascom-standards.org/>
- Have an applicable cable attached from your PC to your mount.

Once downloaded and installed use the ASCOM diagnostic tools that come with the ASCOM platform installation to ensure that you can connect to your mount.

Once you have ascertained that the ASCOM connectivity to you mount is working you may enable the ASCOM functionality by checking the "Enable ASCOM..." checkbox shown above which will then enable the following three toolbar menu buttons and ASCOM related right mouse click menu options on the charts.



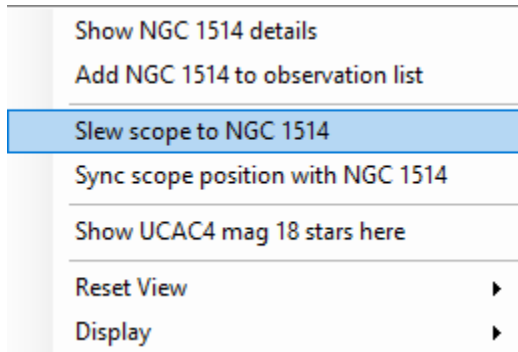
The first button presents the following screen that allows you establish an ASCOM connection to your mount. The other buttons are for slewing to an object and syncing co-ordinates.



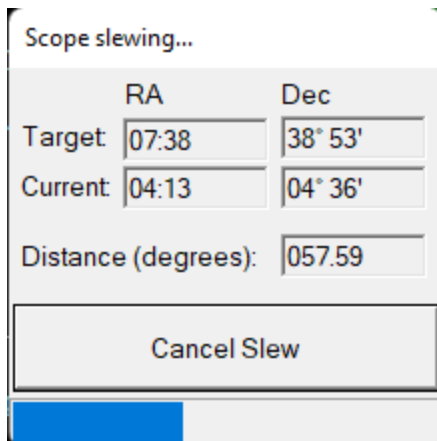
As a minimum, the selected ASCOM driver must support the following properties otherwise connection will be denied:

- Declination;
- RightAscension;
- Altitude;
- Azimuth;
- CanSetTracking;
- CanUnpark;
- UTCDate;
- CanSync;
- CanSlewAsync.

If the compatibility checks pass and a connection is established the right mouse click menu on the three charts will now have the Slew and Sync options enabled (slew and sync on this menu are the same functionality as the slew and sync toolbar menu buttons).



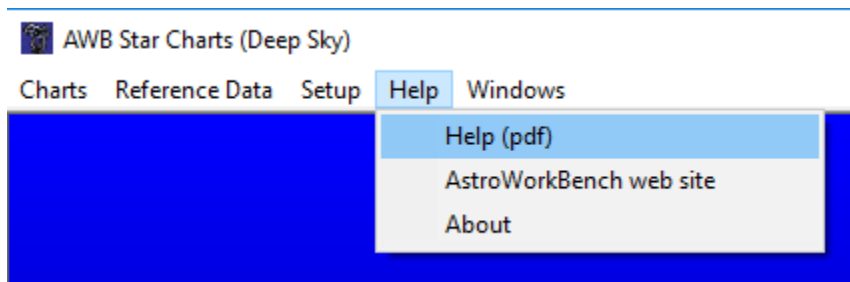
When you initiate a slew the following screen appears until the slew is completed. A warning screen may appear before this one which is controlled by the various checkboxes on the ASCOM preferences tab as shown above.



## 7 Help

The Help menu allows you to:

- Display this help file;
- Visit my web site (AstroWorkBench);
- Check the Microsoft .Net assembly name and version.



## 8 Further Information

Please visit my website [www.astroworkbench.co.uk](http://www.astroworkbench.co.uk) for further applications, documents and articles.

If you find this application helpful then please consider donating a beer token of £1 via my PayPal account – please see my website [www.astroworkbench.co.uk](http://www.astroworkbench.co.uk) for details.

Thanks.

Keith.