# 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.

Sun Rise/Set: 08:07 / 16:11 Moon Rise/Set: 10:28 / 20:47 Phase: 14% Longitude: -000.5, Latitude: 52.0, TZ: 0, DS (for today): 0

#### **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 —		$\times$
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   ASC	:ом	
MDI Background (applied next time you run the application)  C Default Gradient Colour  C Solid Colour: C Solid Colour:		
Maximise MDI screen.		
Maximise Planisphere screen when invoked from menu.		
Maximise Altitude & Azimuth screen when invoked from menu.		
I 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.



# 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.

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Cha	rt local date &	time 🦳					1
25	February	2022	•	+	-	17:01:41 + - 🕑 🗆 sync to system	

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.



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#### 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.

👕 Find Object		×
Type:	Messier	•
Designation:		
Constellation		
	ОК	Cancel

• **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).

Disp	olay 🝷 Display Filters 👻								
~	Stars								
~	Star Names								
	G2V Stars								
	SkyScan Align Stars								
~	<ul> <li>Constellation Names</li> </ul>								
~	Constellation Shapes								
~	Axis and Labels								
	RA and Dec Grid								
~	Altitude & Azimuth Grid								
~	Messier								
~	Caldwell								
	NGC								
	NGC Best								
	Observation list objects								
	Quasars								
	Meteor Showers								
	Show size and mag next to DSO's								
	Milky Way								
	Ecliptic								
	Sun								
	Planets								
~	Moon								
	Comets								
~	Object Image window								
~	Moon Presence window								
	Black On White								

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

	Display Filters 👻
ĺ	NGC
ļ	NGC Best
	G2V Stars
	UCAC4 Stars
	Comets

For example, the NGC filter screen is as follows:

Filter On Filter the NGC objects displayed based upon these criteria. This Off filter does NOT apply if the 'NGC Best' are being displayed.	Mag Threshold (1-18) O Dimmer O Brighter
Types         Image: Galaxy       Image: Open Cluster       Image: Nebulae       Image: Other         Image: Globular Cluster       Image: Planetary Neb       Image: Stars       Image: Unknown         Image: Remarkable       Image: Very Remarkable       Image: Magnificent	Brighter than Mag 11 Exclude Unknown Size Threshold (0 - 15) Bigger Smaller
Show Filter Effect Save Criteria & Count Matching NGC Objects ( %)	Bigger than 7 Arc Secs

- 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	n)
Show UCAC4 mag 18 stars here	
Reset View	
Display	

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# 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 date 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.

Images to Show	
C Messier C Caldwell C NGC Number: 2456 Show Images	
Images         NGC2456         Images	

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.

👸 Ob	servation List														_	
	Designation	Constellation		Туре		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		
Þ	NGC 4058	VIR		GAL		12	3	0	+	3	31	60	13.1	1.2 b		
	Quasar 3C27	3 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
Image: A large state of the	e designation	of the object							1							
lmagin Observ	g notes: /ation notes:	Galaxy, type S0-a Mpc	a, maį	g 13.1, size 1	1.2	by 0.6	, distanc	e 81.72	Altitude	90 80 70 50 40 10 12 13 323	<b>It &amp; Az</b>	tor NC	3 23 14 25 14 25 14 25 14 21 22 23 21 22 23 21 22 23 23 23 23 23 23 23 23 23 23 23 23	8 on 28 36 40 41 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3 <sup>9</sup> 3 <sup>4</sup> 27 19 10 3 4 5 6 7 8 4022 2 325255	01 9 10 11 27 42 8 2 9 3 1 3
	Add N	New Record	Edi	t Current Re	cor	rd	Delete	Current	Record	Sav	re All Ch	anges	Ref	resh	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									ce data :	screens					

# 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 accidently 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.

AWB Star Charts (Deep Sky)							
Charts	Reference Data	Setup	Help	Windows			
		P	referend	:es			

# 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.

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)       Image: Colour       Image
Maximise Plainspirete screen when invoked from menu.  Maximise Constellation View screen when invoked from menu.

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# 6.2 Star Charts

Star	tup	Star Ch	arts	Stars	Deep Sky	Solar System	Colours & Fonts	NGC & IC Filter	NGC Best Filter	UCAC4 Stars	ASCOM
R	W	hen at h	gh z	oom au	to display co	-ordinate grid.					
v	Vhen	'Sync to	sys	stem' is	checked aut	o refresh date a	nd time every 15	÷ seconds.			
L	ocal	time + /	- but	tons cha	ange time by	5 🛨 minute	S.				

#### 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.

Startup	Star Cha	rts Star	s Deep	Sky   S	Solar Syste	n   C	olours & Fonts	NGC & IC Filter	NGC Best Filter	UCAC4 Stars	ASCOM
Stars N	lag -1 to 6			••	• •						
Var. sta	irs brighte	er than ma	ag 3 🛛 🖉	8	÷						
Var. sta	ırs dimme	er than ma	ag 3	4	÷						
Dbl. sta	irs brighte	er than ma	ag 3 📃	10	÷						
Dbl. sta	ırs dimme	er than ma	ag 3	6	÷						
🔽 Dra	w stars us	ing spec	tral type o	colour.							
0	В	А	F	G	к	М					

# 6.4 Deep Sky

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

Startup Star Charts Stars	Deep Sky Solar Syste	m Colours & Fonts	NGC & IC Filter	NGC Best Filter	UCAC4 Stars	ASCOM
Object and Size						
Galaxy	12 🛨	Comet	16 ÷			
Globular Cluster	12 🛨	NGC and IC other	12 ÷			
Open Cluster	12 🗄 💽	Meteor shower rad	iant 20 🛨			
Planetary Neb.	12 🛨					
Nebula	12 🔅					
Planet	12 🕂					
Quasar	12 ÷					
Show quasars to magnitud	le 16 🛨 (12.5 to 16)					

# 6.5 Colour and Fonts

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

Startup   Star Charts   Stars	B Deep Sky Solar System Colours & Fonts NGC & IC Filter NGC Best Filter UCAC4 Stars ASCOM
Constellation shapes:	Example using specified colours and fonts
Constellation border:	Constellation
Constellation names:	Change Font Constellation Object
Object names:	Change Font Object
Grid Lines:	Change Font 20
Ecliptic:	
Milky Way	Ecliptic
Draw inner region	Draw outer region Milky Way
Milky Way inner region:	outer region:
Draw Milky Way as	C Line © Filled area

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#### 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   N	GC & IC Filter NGC Best Filter UCAC4 Stars ASCOM
Filter       Image: Construction of the second	Mag threshold (1-18)         Exclude if dimmer than mag         Dimmer than Mag 11         Image: The shold (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' ob	ojects is a su	bjective list of th all Messier	e best NGC objec (110 objects) and	ts. This list contai Caldwell (109 obje	ns approx 300 ent ects).	tries that also in	cludes
	When di Caldwo	splaying ell object	these objec is as these c	ts on the star ch an also be disp	arts the options be layed via their ow	elow allow you to i n dedicated lists v	nclude or exclude ria their respective	e the Messier ar e star chart butto	id / or ons.
				Include (display	/) Messier objects	in the NGC Best li	ist.		
				Include (display	r) 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 Bes	t Filter UCAC4 Stars ASCOM
The fourth U.S. Naval Observatory CCD Astrograph Catalog (UCAC4) contains aproximately 113 millio range. These may be displayed from the star charts via a right mouse within a Field Of View as defined be displayed to match your CCD, Camera or Eyepiece FOV.	n stars in the 8 to 16 magnitude I below. A second FOV may also
The 900 data files (z000 to z900) and the one index file (u4index.asc) must have been installed into the t below. These files can be downloaded in a zip file from my website.	older specified in the parameters
C Access UCAC4 stars in the star charts (via right mouse click).	
Parameters	
FOV X by Y (degrees): 1.0 + by 1.0 + (0.5 to 1.5 degrees)	
Data and Index File Path:	Browse
Also show second FOV outline 17 📩 by 13 📩 arc minutes Validate Parameter	ers and Installation

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.

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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.

	👸 UCAC4 Sta	ars Field	I Of	View		_	×
r	Stars to Mag:	17	•	UCAC4 Stars to Mag 16+ Chart Stars to Mag 9 Messier Caldwell NGC	[ ↑ ¥	$\leftrightarrow \rightarrow$	
2	Object Info:	RA/D	ec	No object under cursor			 

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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.

Startup	Star Charts	Stars	Deep Sky	Solar System	Colours & Fonts	NGC & IC Filter	NGC Best Filter	UCAC4 Stars	ASCOM
	Read	the hel	p file sectio	n concerning <i>I</i> e ASCOM teles	ASCOM installation	on and configuration on all star ch	ation before usir	ng this feature.	
Havir The fo	ASCOM and star charts display settings ASCOM Mount Connection Display position on all star charts refreshed every 2 ÷ seconds. Having your system, ASCOM and chart times out of sync may cause confusion. The following warnings may help. Display position as C Cross Recticle 1 C Recticle 2 Colour Size: 20 ÷								
As the wh	SCOM uses it e specified st nen performin	ts UTC d tar chart ig a slew	late and time date and tim v on the star o	for co-ordinate e by more than charts.	calculations. If this +/- 5 minutes issue	a differs from a warning		Line:	1 🗄
🔽 Is	✓ Issue a warning if ASCOM and system date and time differ by more than 5 minutes.								
I As alt	✓ Ask for confirmation when slewing to a target that is less than 20 ÷ degrees altitude as calculated using your system time.								

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

- The ASCOM platform from <a href="https://ascom-standards.org/">https://ascom-standards.org/</a>
- 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 <u>https://ascom-standards.org/</u>
- 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.

Scope Connection (ASCO	M)	- 🗆 X
Read the help and con	file section about AS nection before attem	COM installation, configuration pting to use this feature.
Connect to Scope		
Select Scope	ASCOM.Simul	ator.Telescope
Disconnect	Connected	
Current Scope Position		
RA and Dec: 04:23:26	00° 05' 37"	□ Tracking? □ At home? □ At park?
Alt and Az: 38° 55' 1	7" 180° 00' 00"	Pulse guiding? Slewing?
Note: You cannot slew it	ASCOM reports that	the scope is not tracking or at park.
Enable Tracking	Unpark	
☐ASCOM and system sett	ings	
To avoid confusion the settings and your device that you change you	ASCOM site and UT date and time. If ther Ir settings so that AS See the help fo	C settings should match your AWB location e is a mismatch then it is highly recomended COM, AWB and your device all match. r more on this.
ASC	OM AWB	
Site Latitude: 51° 1	0' 20" 52° 00' 0	0" Set ASCOM to AWB
Site Longitude: -01°	02' 03"  -01° 30' (	00" Set AWB to ASCOM
Site Elevation: 30		
ASCOMUTC: 25 F	ebruary 2022 18:05:1	4
Your Device UTC: 25 F	ebruary 2022 18:05:1	4

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.

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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).

Show NGC 1514 details	
Add NGC 1514 to observation list	
Slew scope to NGC 1514	
Sync scope position with NGC 1514	
Show UCAC4 mag 18 stars here	
Reset View	►
Display	•
	Show NGC 1514 details Add NGC 1514 to observation list Slew scope to NGC 1514 Sync scope position with NGC 1514 Show UCAC4 mag 18 stars here Reset View Display

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.

Scope sle	wing	
Target Current	RA 07:38 04:13	Dec 38° 53' 04° 36'
Distance	e (degrees):	057.59
	Cancel Sl	ew

# 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.

MWB Star Charts (Deep Sky)				
Charts	Reference Data	Setup	Help	Windows
			Help (pdf)	
		AstroWorkBench web site		
			1	About

# 8 Further Information

Please visit my website <u>www.astroworkbench.co.uk</u> 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 <u>www.astroworkbench.co.uk</u> for details.

Thanks.

Keith.