WATCH THE SKY!

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1. Introduction

Watch the Sky! is a program oriented toward education about basic astronomic observations, as they can be made by anyone from his or her backyard and with naked eyes.

With this focus, Watch the Sky! shows and animates some behaviors of the sky and the objects which live and thrive in the sky: stars, constellations, planets, and other objects. Watch the Sky! also supports some "predefined lessons" to show interesting things about our skies: these lessons come in form of disk files which can be read and interpreted by the program.

The program also can be run as a screen saver program. Here the basic idea behind this is the casual learning from the screen, as the screen saver runs and creates new situations.

It's distributed as a fully-functional shareware program. You can freely download, install and test it (you are encouraged to do so), and all the options of the program are available even to the unregistered version. But if you find it interesting and useful to you, your contribution of $5 will be appreciated, and you'll receive a key which you can use to make your name appear in the caption bar. Please, go to chapter 11 in this documentation to know how you can register your copy of Watch the Sky!

What can be seen with Watch the Sky!? It shows stars (up to 1500 stars) visible both from the northern or the southern hemisphere; shows Messier objects (galaxies, nebulae, and globular and open clusters cataloged by Messier in the 18th century, and which are normally readily visible in a clear, quiet night); shows planets (from Mercury to Neptune) picturing its position against the sky background; and shows Sun and Moon, the later with its current phase. It also allows you to follow the trace of the planets movements.

The user can choose parameters as the observation point, or the date and time of observation, so as to simulate any night at any place at any time. National Language Support is provided for the customization frames.

The program animates the picture, depending on user parameters which state both the frequency of animation in seconds and the time gap to introduce between cycles.

A word of caution about accuracy: This program is intended as an informative and educating tool, and is not useful for astronomical calculation. In fact, the accuracy yielded is pretty good, and in most cases is enough for visual, nonproffesional observation. Should you need accuracy, whether related to the position of objects or to the conditions of

events like occultations or eclipses, there are a number of programs which are intended for these uses and are available from commercial sources.

Note: the Sun is also shown in its real position, but the sky remains a dark, full-of-stars night-sky disregarding whether the Sun is up and shining or not.

2. This release... what's new?

This is the version 1 of Watch the Sky! This version runs under Windows 3.1, Windows 3.11 and Windows 95 (although running on Windows 95, this is not a 32-bit program... yet)

If you find bugs in the program, or you have recommendations related to presentation, development, features, etc., please contact the author and let him know about it. Author's e-mail address is jcatala@compuserve.com

Modifications introduced in this particular version are:

Version 980414
-new controls: forward and backward
-new format of the main frame

Version 980320
-new name: Watch the Sky! replaces Starry Night
-support for education files
-shareware support
-fixes some bugs of the previous release

Version 1.0 980208
-bitmap of the moon
-fixes some bugs of the previous release

Version 1.0 980201
- planet tracking: you can "follow" a planet as it changes its position in the sky
- planet paths: you can visually track the path of the planets
- glint effect: trying to simulate what you'll see when looking at a Watch the Sky!!
- new parameter panel, with parameters reorganized in tabs

This section will be updated with the new features included in future versions.

3. Setup

Watch the Sky! comes packaged with an installation wizard called SETUP.EXE. The following files are needed for installation and should be present in the installation package:

SETUP.EXE : The installation wizard

SETUP1.EX_ : Files needed only for installation purposes
SETUP.LST
SETUPKIT.DL_

WTSKY.SC_ : Watch the Sky! screen saver bootstrap module
WTSKY.EX_ : Watch the Sky! main program
WTSKY.BD_ : Watch the Sky! objects database
WTSKY@01.ED_: Education file
WTSKY.DO_ : This file

VBRUN300.DL_: DLL needed by Watch the Sky!

The installation process should be straightforward. Simply execute SETUP.EXE. It will ask you for the directory under which Watch the Sky! files will be copied.

This release of Watch the Sky! does not install itself as the current Windows screen saver program, and this process has to be done manually after installation. Simply choose the program "Watch the Sky!" as the current screen saver program:

With Windows 3.x: Choose Watch the Sky! as your screen saver under Control Panel

With Windows95: Access your screen properties with a mouse right-click on your desktop. Then click on the screen saver parameters tab and choose Watch the Sky!.

4. The main screen

You access the program main screen when executing the file wtsky.exe in your Watch the Sky! folder.
When this screen is displayed, depending on the education parameters selected, you see:

- a screen showing the sky based on the parameters you chose (that's date and time, place of observation, etc.)
- or a screen showing the first lesson of the education file selected under the "Language and Education" Tab

In both cases, tha program begins with its automatic mode off, so you control the behavior using the several buttons on the top of the screen. These buttons are:

 The step-forward button, which advances the sreen one step. That is, increments the time of observation depending on the interval parameter, or advances the lesson if you have selected the education mode

 The step-backward button, which retraces the screen one step

 The automatic mode button, which begins the automatic simulation, the same way as if you were executing the screen saver program. You leave the automatic mode pressing the stop button.

 The stop button, which is used to stop automatic mode and regain manual control.

 The options button, which shows the parameters panel. You then can configure all the parameters of Watch the Sky!

 The end button, which terminates Watch the Sky!

5. User parameters description

Watch the Sky! can be customized by using a set of parameters which are recorded in the INI file under the Windows directory. Although those can be accessed directly just editing the INI file, no support is provided for this mechanism, there are no checking processes, and a program Abend might occur in case of a syntax error.

To access safely the customization parameters, please use:

- the button  in the main program

- or the Windows standard interface which appears when you select the current screen saver program, under the button "Parameters":

Windows95: Access your screen properties with a mouse right-click on your desktop. Then click on the screen saver parameters tab and choose parameters

Windows 3.x:

A full list of parameters, together with description and valid values, follows:

Date and Hour TAB

Initial Date (mm-dd-yyyy) : The date of the observation. This works as the date for the initial observation, and changes as the animation cycle goes on depending upon the *Time increment* and *Refresh every* parameters. Any valid date is also good to this parameter. It also accepts the value 0, which states for the current date.
Please, note that for languages other than English, the date format in dd-mm-yyyy.

Initial Time (hh:mm): The time of observation. As with Initial Date, setting it to 0 directs Watch the Sky! to get the current time.

Time increment (sec.) : This is the time increment which will be added to the previous time at every new animation cycle. For example, setting this parameter to 86400 and parameter *Refresh every* to 10 will show screens at every 10 seconds, each screen representing the sky a day after the previous one.
User can choose any number between 1 and 31536000 seconds (the later being the number of seconds in a year).

Refresh every (sec.) : The interval of the animation cycle. This parameter works in conjunction with *Time increment* to create the animation effects. Valid values go from 0,25 to 300 seconds (remember this is a screen saver program, so we don't want this parameter to be too high!)
Depending on the power of your computer,

Vision Direction TAB

Vision direction (deg.) : This field indicates which direction the observer is looking at, in degrees. Valid values range from 0 to 360 degrees, being 0 north direction, and 180 south direction in the northern hemisphere. If you're in the southern hemisphere, please keep in mind that value 0 will be south and 180 north. You may interpret it as 0 indicating the direction of your pole.

Vision width (deg.) : The observer field of vision, ranging from 45 to 120 degrees. As this number increases, the object density in the screen also increases.
This parameters has been kept down 120 degrees so as to avoid severe deformations caused by the stereographic projection used by Watch the Sky!.

Place of observation TAB

City: The observer place of observation. This list includes up to 181 cities from around the world. Choosing one of them automatically sets other parameters as latitude and longitude. If your place of observation is not in the list, you can either select a city nearby which is in the list (even with cities some hundreds of kilometers apart errors will be few and generally acceptable), or you may want to select the value "<>" in the list.
This special value, "<>", gives the user the ability to manually set latitude and longitude, this way being able to accurately define his or her place of observation.

Latitude (deg.) : The observer latitude, from 0 (equator) to 90(noth pole) to -90(south pole). If the user has selected a city as the place of observation, latitude should have been automatically set by Watch the Sky!. Please choose the city as "<>" to manually enter latitude.

Longitude (deg,) : The observer longitude. Begins with 0 (Greenwich), and increases eastward up to 180 degrees. From Greenwich to the west, it decreases up to -180 degrees. As with latitude, a value for longitude will be selected by Watch the Sky! depending on the city of observation, unless city "<>" is chosen, in which case the user will be able to manually set longitude.

UT hours difference : OK, this is tough! Every event has to be related to a specific time, and the world needs a reference time which is not dependent on geographic locations nor legal, country-specific times. This is the Universal Time (UT).
In theory, UT can be computed from the local time of an specific place knowing the place geographic longitude (as you may already know, this is the basis of the time zones of the world). But real world is a bit more difficult, and countries sometimes adapt their legal times for a number of reasons, leading this way to a difference between the local time and the theoretical time given by the place geographic time zone. This difference is what "UT hours difference" is about. Fortunately, selecting the city of observation sets this parameter automatically, so you have not to worry about it anymore.

Presentation TAB

Dimmest magnitude : In astronomy, the brightness of a star (its visual magnitude) is represented by a number. The highest the number (its magnitude), the faintest the star. So, for example, a star of magnitude -1 is extraordinary bright, and a star of magnitude 5 is in the limit of what can be seen with naked eyes in a clear night. As in the real world, the faintest star you can see with your naked eyes in a specific night depends upon many things (is it cloudy? what about pollution this night? ...)
With this parameter, you can control the faintest star which can be seen. Setting this parameter to its highest value yields to a populated screen full of stars. On the contrary, with low values you are actually filtering and producing low-density screens showing only the most powerful stars in the sky.
Valid values go from 0 to 5.

Sun size factor : Representing the sun and the moon with their actual sizes may be deceiving! One expects them to be represented as big figures, but in fact their actual size is about 0.5 degrees, which is very small indeed (although huge when compared with the sizes of other astronomical objects). For this reason, this parameter is intended to add more spectacularity to the sun, multiplying its actual visual size by an integer to make it bigger. So, setting to 1 simply leaves the sun as it is in reality, and setting to 6 makes it six times bigger.

Moon size factor : As with the previous parameter, set this one to increase the moon visual diameter, yielding this way more spectacular screens. In addition, you can chose "BMP", which will draw a bitmap of the moon.

Constellation lines : Set it to draw lines depicting the constellations. Remember that constellations are aggregations of stars, actually not linked by any real force and in many cases years light apart one from another, which, when viewed from the Earth, appear as if they formed figures. Many of the constellations received their name in ancient times, specially in the northern hemisphere.

Constellation names : Set it to show constellation names on your screen.

Messier objects : Setting it shows Messier objects in the sky. Messier objects are galaxies, nebulae, and other objects first catalogued by Messier in 1771. They are known as the "M" objects, as their name under Messier's catalog have the form Mxxx, where xxx is a sequential number.

Show information line : Setting it, produces a line of information at the bottom of the screen, moving from right to left, which gives some data, as date and time of observation. As you could expect, the date and time change between animation cycles.

Glint effect : Have you ever noticed the glinting of the stars? This phenomena is the demonstration of a physics law which predicts that behavior when the source of light is very far away from the point of observation. And this is just the case! Light coming from the stars travels a long, long way 'till it gets here! With this parameter, Watch the Sky! tries to more or less simulate this visual behavior.
By the way, in the real world, as you'll see in Watch the Sky!, you can use this effect to tell planets appart from stars, as planets never glint (they are much closer than stars).
As explained somewhere else in this document, setting this effect increases a lot the CPU utilization: this is not a issue of concern when talking about screen savers, but if Watch the Sky! runs in "slow" machines the program will probably collapse as it won't have time to refresh calculations between cycles and at the same time ramdomly glint the stars.

Language and Education TAB

Language : This parameter provides National Language Support for Watch the Sky!. It affects the text in the information line, and also all the messages and labels for the parameter setting screen.

Education : Watch the Sky! recognizes some files as education files, which the program read and interpret. This feature can be used as an education tool. You can activate it by choosing one of the files in the combo list. Setting it to N/A swicths off this option.
Please, read chapter 6 to get more information about education files.

Planet tracking TAB

Tracking planet : To activate the tracking of a planet, simply choose it from the list. Watch the Sky! will try to mantain the planet on the screen, changing the observer view direction if necessary (or, what is the same, "turning" the observer). The information line at the bottom of the screen will change also to indicate tracking is active. Moreover, should the planet cannot be mantained on the screen (maybe because it's under the horizon), the information line will indicate that.

Planets paths : This will draw the visual path of the planets. As each new animation cycle is displayed, the position of the planet in previous cycles (specified in parameter "Number of positions") is also shown along with a line linking all of them. This is useful not only to create more attractive screens, but also to show the characteristic dance of the planets in the sky (as seen from the Earth), with sudden changes of direction, then remaining almost motionless, and finally returning to their original paths.

Number of positions : Use this parameter to control the number of old positions shown. For example, setting this parameter to 10 makes Watch the Sky! to keep the last 10 positions of the planets choosen in "Planets paths". Valid values range from 0 to 50.

6. Some interesting parameter combinations

Some combinations of parameters related to the animation cycle and date and time yield to some spectacular or interesting screens. Here are some ideas and examples:

The south view: Planets (including sun and moon) move close to the "ecliptic", an imaginary line in the sky which actually represents the sun visual path. Because of the Earth inclination, the ecliptic in the northern hemisphere can be found always in a somewhat south direction in the sky (now you now the reason why a south-oriented house is warmer and receives more sunlight than a north-oriented one).
For that reason, if you set the parameter *View direction* to 0 (north) you have little chances of seen any planet (sun and moon included) on your screen. Setting to 180 (looking southward) will let you see the movement of the planets (provided that are visible at the specific dates).
In general, south views are more spectacular in that sense.

The north view: This kind of views are interesting to show the rotation of the Earth, as you can see how stars circle a point in the sky. This point is right up over one's head in the North pole (latitude 90 degrees) , and moves down to the north horizon when decreasing latitude.

Same time as yesterday, but stars aren't in the same place!: This is very interesting, and shows the slight differences between days. Simply set the time increment to a full day, that is to 86400 seconds. You will see how stars don't occupy the same position as the day before. This is because the Earth rotation period (which roughly is 23 hours and 56 minutes) is different from our standard day (which is 24 hours). So every day, Earth arrives 4 minutes later to the same place it was the day before at the same time.

Yeah! Now they don't move at all!: Now lets set the time increment to 86163 seconds which is known as the sideral day. Look at the stars from interval to interval: they don't move at all. As explained before, now we are synchronizing with the Earth rotation period and are returning to the same position at every cycle. This view is also useful to show planet

motions: stars keep still while planets move (as they are much closer than stars, we can see their own movements along their orbit. Of course, the closer the planet is, the biggest the movement is).
A word of caution: don't distract yourself and leave time increment to 86163! Remember: this is a screen saver program, and we want to be sure that nothing remains still in the screen for a long time!

Rising and setting: If you look eastward or westward, you'll see how objects rise or set.

The Sun always rises from the east?: Test by yourself. Simply point to the east, set time increment to ten full days (864000) and select time to 9:00 in the morning. You'll see the Sun moving from the right (or left) of your screen to the left (or right). In fact, although we're looking toward the east, the Sun seldom appears in the middle position of the screen (the east!). Due to the Earth inclination over its axis, the Sun (and any other object) only rises from the real east (and sets on the real west) two days a year (the so-called equinoxes of summer and fall).

The midnight sun: Want to see the Sun at midnight? Well, that's easy: chose to be in the pole (north or south, just setting latitude to 90 or -90), activate tracking of the Sun (under the "Language and Advanced" tab), chose a date like "01-06-1998" (if you are in the north pole. If in the south one, chose "01-12-1998") and select a time increment of one hour (86400 seconds)... and set time to 00:00 (that's midnight!). Look at the Sun, well over the horizon at midnight, simply gaining or loosing altitude but not setting at all.

The dance of the planets: Watch as Mars or Venus suddenly chang their directions, move backward, stay almost motionless, and finally return to their previous direction! This behavior, observed since ancient times, is the visual effect of the Earth reaching and passing the position of a planet in its orbit around the Sun. Although this effect is valid for all planets, Mars and Venus are the ones which provide more spectacular movements.
To be able to view this in your screen, first of all select "number of paths" in the Planet Tracking Tab to a high number (say 40), select Mars or Venus as a candidate in the check box, and finally choose a time interval high enough to make planetary movements against the star background noticeable (for example 15 days), and .... wait! (Mars movements, for example, repeat every two years more or less). You may want, of course, to chack also other planets at the same time, which will create very interesting screens.
But if you don't want to wait, just set this:

- time interval: 1292400 (this is 15 sideral days minus 15 seconds. Notice that: choosing sideral days as a basis, we are "fixing" the sky in its position, showing clearly this way Mars movements. We substract 15 seconds to maintain a slow sky movement as we want Starry Night to be a screen saver program!

The moon phases: If you activate the Moon's path, and choose a time increment of a day or two, you'll see the trace of the Moon in your screen (showing its phases all along the path!). Remember that the Moon's cycle is about 28 days.

7. Education files

Education files contain instructions which can be understood by Watch the Sky!. This files are used to run lessons, explaining some interesting behaviors of the sky and the celestial objects.

When you select one of these files, using the "Language and Education" Tab in the parameters panel, Watch the Sky! behaves this way:

- if it's running as a screen saver, Watch the Sky! "plays" the education session instructed by the file. When the lesson finishes, then Watch the Sky! begins the regular sky simulation specified by you in the parameters panel.

Please, note that the parameters you select don't take action until the education session ends.

- if you run Watch the Sky! as a regular program, it first loads the first screen of the lesson, and then waits for you to press either the step forward key, to manually advance screen by screen, or the run key, to run the lesson automatically. As before, when the lesson ends, Watch the Sky! activates the normal parametres.

At least one education file is provided with the program package. As the author creates new education files and releases them, all you'll have to do is copy the new file to the directory where you installed the program and then select this file in the combo list under the "Language and Education" Tab.

8. A word on precission

As explained somewhere else in this document, Watch the Sky! doesn't focuses on precission, and for that reason Watch the Sky! shouldn't be used, in general, to plan real and serious observations.

Nevertheless, this is not to say that Watch the Sky! uses primitive, non-elaborated math calculations. On the contrary, the program is using complicated calculations which provide enough precission for the main porpose of Watch the Sky!.

How is Watch the Sky! different from other "precission-oriented" programs?

- some heavy math calculations (as those used with planetary positions) have been simplificated in a slightly way, in order to yield comfortable calculation times (you don't need a Pentium processor to run Watch the Sky!). This modifications, which aren't noticeable when computing planetary positions close to our epoch, introduce more serious errors as we move forward in the future or backward to the past. So, I wouldn't use Watch the Sky! to see where the moon was 2,000 years ago!

- there are a number of corrections that a proffessional program has to take into account and that Watch the Sky! doesn't. To name a few, there is the atmospheric refraction (our atmosphere introduces a visual modification on the positions of celestial objects), or the nutation effect (produced by the spinning of the Earth and the Moon-Earth interaction).

- the stars data base contains about 1,500 stars. Professional programs usually provide about 250,000 objects. Also, Watch the Sky! doen't show real colors of stars.

- some specific events, as the eclipses, can't be predicted by Watch the Sky!. Predicting the conditions of an eclipse (times of contact, wheter they are complete or parcial, etc.) needs a lot of complicated calculations which are definetly out the scope of Watch the Sky!.

9. Reducing the system's resources needed to run Watch the Sky!

Watch the Sky! has to perform long and complicated math in each cycle, as explained before. As a result, a lot of CPU cycles are consumed, being this resource (CPU) the main limiting factor for speed.

For that reason, the different CPU power clearly marks the behavior of Watch the Sky!. As an extreme example, it might happen that Watch the Sky! couldn't execute properly in a low-powered machine, not having time to re-calculate the new positions in each animation cycle. Of course, modern machines, with Pentium processors, shouldn't have any problem with Watch the Sky!!

In general, machines withouth math co-processor will have a bad time with Watch the Sky!. So, math co-processors should be considered requisites of the program, 'though it still runs without one of them. Math co-processors were bundled together with the main CPU begining with the Intel 486 DX/33.

As I will explain, there are a number of things one can do to save CPU cycles. But first, let me give some clues which may indicate CPU problems:

- the information line at the bottom of the screen moves very slow, or simply it doesn't appear at all (and of course "show information line" is active in the parameters screen).

- the time shown in the information line in each animation cycle doesn't match the expected time increment as set in the parameters screen. For example, if you chose 300 seconds as the time increment between cycles (that's 3 minutes), and you see changes of more than that in each new screen (as appears in the information line).

- perhaps the clearest indication of CPU speed may be this one: in this version of Watch the Sky!, the information line freezes and stop moving while a new computational cycle begins. So this indicates how long a new calculation takes in your computer.

Well, let's see how you can save CPU cycles. They are ordered considering their expected effect, being the first two of them the most important to save CPU. As a rule of thumb, try one and test the results: if you still have problems, go for the next one!

- don't activate the glittering efect. This is definetly a very CPU-consuming process,and it should be the first one to deactivate in case of CPU problems.

- use "dimest magnitude" in the parameters screen. Setting this acts as a filter to show more or less stars. Obviously, the more stars you show, the more time your machine will need to compute the positions. Remember that to reduce the number of stars considered you have to reduce the value of dimest magnitude.

- don't show the information line at all. You'll save some time (the one spent scrolling leftward the info line)

- if constellation lines have not to be draw, you'll save some CPU. Try also this.

- don't activate "planet tracking" nor "planet paths" and you'll save a little more.

- for a desperate case, try reducing your viewing angle (vision width), as this will lead to less populated screens.

10. Some technical questions and definitions

Facts relating Watch the Sky!: First of all, Watch the Sky! is a program oriented toward a general audience, with the purposes of giving you some information about your backyard night-sky. In doing so, Watch the Sky! focuses on education and trying to gain the user attention and interest toward general astronomy or, more simply, toward the every day night-sky.

Watch the Sky! is not, consequently, a tool to be used by the serious amateur observer to plan the observation session: it is not comprehensive, not focused on precision, and lacks capabilities which other software programs provide to help the astronomer.

Nevertheless, Watch the Sky! can be perfectly used to identify constellations and planets, or to know about the Moon's phases and how they change, to name a few simple uses of it.

Now, let's talk about the technical issues embedded in the program... this is only for people interested in these kind of issues, so please skip this section if you feel bored after reading the first lines.

Time: what's time? where? This is really tough! As you could expect, every event in our universe is related to the time when it happened. So, we (and here WE should be considered "we, organisms who live in and thrive through the universe") need an unique, standardized time scale and time "origin".
Let's think now in a very small, though very beautiful, corner of our big universe: planet Earth. If somebody says something has happened ... say at 1:00 AM, do the rest of us, people living in the same small piece of the universe, understand and interpret the same? The answer is NO (Oh God! How can we pretend organizing the entire universe if we can't sort out the whole thing here in our planet!)
The point is that time is a very difficult and complicated thing to describe and precisely define and, at the same time (here you have it again!), we need something very easy to use and understand in our quotidian lives.Considering that, we

humans, have agreed in standardizing a unique measure of time (a second of time has the same meaning regardless who uses it), we have:

the calendars: did you know it? the calendar we are using today is based in the tropical year, or the translation period of the Earth around the Sun (which is 365.24219 days). In fact, in the year 46 B.C. it was stated that a year had 365 days, and that one of every four years should have 366, to compensate for the duration of the tropical year (really good, yielding to a mean year of 365.25).
OK, fine, it's enough! Or at least that what they thought... until some centuries passed by and the slight error accumulated to about ten days! In other words, that calendar could drive to a situation where Christmas in the northern hemisphere might be synonymous of hot, sunny days!
Then, in the year 1582 somebody decided that enough was enough, and Pope Gregorius XIII established a reformed, tropical-year-based calendar (known as Gregorian), which take care of the differences stating that years ending with 00 had 366 days if, and only if, they where divisible by 400. And that's the calendar we use today (good job, guys! With it, we don't have to worry about slight differences and errors. At least not us, nor our children, nor our children's children... 'cause the mistake accounts for one day after 4,000 years!)

the legal civil hour: it makes sense that not everybody in our planet synchronize their watches signaling the same hour everywhere (after all, night is always night no matter the place you are). Now, the problem is how do we manage a situation where everyone has his/her own personal time?
Let's organize: first of all, let's choose a reference or origin (Greenwich, close to London, U.K.). Then, let's divide the world up into 24 slices, the way you would slice an orange. As you move eastward from Greenwich, add one hour when you cross a slice (or substract one hour if you move westward). And that's it! Pretty, isn't it? That way noon in, say Paris (France), and noon in Sidney (Australia) will have a 12-hour gap, and that agrees with the fact that when sun is shining up in the sky in Paris, stars are shining and crickets singing in Sidney.
But life isn't so easy at all! Humans don't like this orange-like, somewhat dictatorial way or organizing the world. So every country has adapted this elemental model to its own interest.

the Universal Time (UT): Here it is: a time which is conceived as "universal". It's, simply, the Greenwich time, and it's the basis for every astronomical ephemerides or calculation (because it's unique). So, as you may expect, Watch the Sky! uses UT as it's time reference. Of course, UT has to be converted to local civil times in order to make sense to the casual observer. This conversion uses the geographic longitude of the place (as explained before) and has to be corrected to account for the deviations introduced by every country (as commented before).

the Sideral Time: Take a look at your backyard night sky on a given day at a given hour. Then, repeat this experience after, say, a month. You'll easily notice that stars don't occupy the same positions as they did a month before (even at the same hour). Indeed, you can use also Watch the Sky! (as explained in chapter 4) to simulate this behavior and accelerate it on your screen).
This phenomena is caused by the difference between our day scheme and the Earth rotation period. Yes, our day is build of 24 hours, each of them measuring 3,600 seconds. And the Earth rotation completes in about 4 minutes less than that (it takes approx. 23 hours and 56 minutes). So, every day, Earth returns to the same position it occupied the day before "four minutes earlier".

Messier objects: This objects are basically celestial objects (about 300), some of them known from ancient times, and first catalogued by Messier in 1771. They are galaxies, nebulae and star cumuli, all of them bright enough to be discovered at that time.

Their name under Messier's catalog begins with an "M", and follows a sequential number. In fact, many of them have common names also, denoting their shape or characteristics. For example, M27 is known as the Veil Nebulae, M57 as Dumbbell, M32 as Andromeda Nebulae (which is actually a galaxy!), or M42 as the Orion Nebulae.

Some of these objects can be observed with just a binocular, or even with naked eye. Interesting examples are the Orion Nebulae, which can be viewed with naked eye under Orion belt. Or the Pleyades, which appear as a dim, but clearly noticed, little cloud close to Aldebaran (alfa Tauro).

Constellations: Constellations may be considered as "visual groups of stars". As we look at the sky, we see the stars from the Earth perspective and, with a lot of imagination in some cases, we may draw lines linking some of the stars together to form figures of animals, objects, etc. These unions form the constellations.

From this explanation it is clear that any real relationship between the stars forming a constellation is pure coincidence, and it's only a matter of vision perspective!

Many of the northern hemisphere constellations were given a name in ancient times (many by Greeks). Those constellations "living" in the southern hemisphere received their name in more modern times, and this fact is shown in the names chosen to name them: telescope, compass, etc.

Stars in a constellation are given individual names. This way, the more brilliant of them use the greek alphabet: for example, alpha Centauri (the more powerful star of the Centaurus constellation). Other stars, not as lucky, simply receive a number: for example, 40 Eridani.

Constellations play an important role in helping people to get oriented when looking at the sky, and as a basis to recognize stars and find other objects as galaxies and nebulae. If you keep in your mind the figure of some constellations, you'll enjoy more when looking at your backyard night-sky. So, I recommend you to learn and practice identifying constellations like Cygnus, Lyra, Ursa Major, Crux, Scorpius, etc. Use Watch the Sky! if you wish for that purpose!

11. Shareware. How to register.

Watch the Sky! is distributed as a fully-functional program. This is because it is oriented toward education about basic astronomic issues, and for that reason it is directed to everybody.

Nevertheless, the program do include a registration key. This key does not activate any hidden function of the program, and it is only designed to make your name appear in the caption bar on the screen, that's it!

You can freely download, test the program. If you find it useful to you and like it, your contribution of $5 will be appreciated. You can send it by mail to the following address:

Joan A. Catala
c/Domenech 6, 4-6
Sant Cugat del Valles
08190-Barcelona (SPAIN)

Please, include your name (which will be used in the registration process) and an e-mail address. Upon receiving your contribution, the author will send by e-mail you the registration key, which you can enter in the "Registration" Tab in the parameters panel.

12. Contact the author

You can contact the author via e-mail at jcatala@compuserve.com.

Author's name and address are:

Joan A. Catala
c/Domenech 6, 4-6
Sant Cugat del Valles
08190-Barcelona (Spain)

Please, feel free to send comments, found mistakes, recommendations, or simply a message to say hello. I'll appreciate it!

Thanks for using Watch the Sky!!