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# Introduction

*IMAGINE ..... a voice-activated, computer-controlled mount slewing from one end of the sky to the other with simple commands like "M1" or "Find Neptune."*

DigitalSky Voice™ software ushers in a new era in telescope control systems. You can now establish two-way verbal communication with your mount, slewing with ease from one object to another. Or, if you prefer, you can direct the movement of your scope with a few mouse clicks at the computer. Couple this revolutionary software with a computerized Go-To mount and enjoy a view of the universe from your own starship.

## **DigitalSky Voice is:**

- An observing companion who guides you through the universe offering suggestions of objects that are fun and interesting to observe.
- An educational tutor providing you with information on the objects you observe.
- A terrific planning tool for your next observing, photographic or CCD imaging session.
- A powerful search engine which organizes information so that you can maximize your viewing session.

## **Advantages of using voice commands**

- Remain at the eyepiece while you direct your telescope with verbal commands
- Telescope slews to the object that you specify from extensive object databases. As easy as saying "M1" or "Find the Cocoon Nebula"
- Retain your dark adaptation - eliminates the need to look at your laptop, you can close the cover
- Protect your computer from cold weather - leave your computer in a warm location and control the telescope by microphone
- Hands-free operation of the telescope
- Eliminate flashlight mouth - no need to put a flashlight in your mouth to see the keyboard, you have total control with your voice and/or mouse

## **Advantages of computer voice output**

- Will make recommendations of objects to observe
- Guides you through all functions of the program
- Provides information about the object you are viewing
- Will notify you if an object you requested is below the horizon
- Lets you know the amount of time remaining in your photographic exposure and notifies you when the time has elapsed
- Notifies you when the objects that you selected at beginning of the session have reached the desired position in the sky

## **Catalogs**

- Messier (110), NGC (7840), IC (5,386), ADS double stars (16,959), Hershel (2468), Abell Galaxies (2,712), Upsalla Galaxies (UGC) (12,921) , General Catalog of Variable Stars (31,220) , Common star names (200), Greek star names by Constellation (1,012), Common object names(100), Planets (8), Moon, Sun

## **Features**

- **Intuitive computer interface:** Extremely easy, yet powerful, to use.

- **Simple command structure that goes right to the point:** Simply state the catalog and number. No need to go through a series of questions.
- **Ask "What's Up DigitalSky?":** DigitalSky will suggest objects for you to view that are currently visible in the night sky and within the magnitude limit that you specified.
- **Constellation Ticker:** You always know which constellations are up by looking at the DigitalSky screen. Select one of these constellations for a search or tour.
- **Cool Objects window:** This window will display a list of interesting and fun objects within the constellation that your scope is pointing. Have you ever wondered "What else should I look at?" This will give you lots of observing ideas. You can also add your own favorites.
- **Whole number:** Say the commands "M fifty three" and "NGC four thousand three hundred sixty one" or you can say each number separately.
- **Objects can be requested by their common name:** What can be easier than "Find the Ring Nebula?"
- **Object data:** Request the data on any object by stating "Object data." DigitalSky Voice will report the type size, magnitude, and characteristics. Planetary information will even state the current distance from the earth. This data will also display on the screen for your reference.
- **Bright common stars:** Major bright stars can be requested by their proper names.
- **Constellation stars:** Constellation Stars Mode permits access to over 1000 constellation bright stars requested by their Greek letter designation.
- **Identify Mode:** If you are looking at an unfamiliar object, center it in your eyepiece and say "Identify." DigitalSky will match the coordinates of the object with its databases and state the best match. The Cool Objects window will display this object as well as other nearby objects within the field. You can specify the size of the field in the preferences menu.
- **Go to any location by entering the RA and Dec coordinates:** When you enter this mode, the current RA and Dec coordinates will display. If you wish to move the telescope to a new location, perhaps a comet, state the coordinates verbally or enter them with your mouse or keyboard. When you use this feature in emulation mode, the J2000 numbers will be used.
- **Watch notification:** This unique feature informs you when objects that you wish to view or image have reached a user-specified altitude (number of hours above the horizon).
- **Set Magnitude limit for non-stellar objects:** If you are using a 4" telescope, you may not want the program to display objects that are fainter than you can view. Customize your magnitude limit and only the objects below this limit will be suggested in the Cool Objects window. The magnitude limit will not affect verbal commands, you can go to any object.
- **Customize ADS double star displays:** You can set a double star angular separation limit and a magnitude limit for both stars. Only the double stars that fit your criterion will display in your Cool Objects window.
- **Customize variable star displays:** You can limit the type of variable you want to display and magnitude variances (minimum & maximum). Only the variable stars that fit your specifications will display in the Cool Objects window. When you request "Object Data," information regarding the spectral type, variable duration period as well as minimum and maximum magnitudes will be provided verbally and will display on the screen.
- **Search for objects based on criterion you select:** Narrow your search to the current constellation or across the entire sky and set the magnitude limit. Select the database and object type (galaxy, globular cluster, open cluster, planetary nebula, and nebula). Searches can be accomplished with verbal commands while you are at the eyepiece (just say "next") or with the mouse at the keyboard.
- **Constellation tours:** These are predefined object constellation tours for all 88 constellations, all user-modifiable with the included Tour Builder Utility. The telescope will automatically move from one object to another at your request. You simply state "next" or "previous." You can skip ahead to any object on the tour by clicking the object name on the screen.

- **User defined tours:** Prepare tours of your favorite objects or plan your CCD imaging session in the comfort of your home. Tours you might create: messier marathon, favorite galaxies or globular clusters, interesting planetary nebula or supernova search areas.
- **Voice output:** There are several voices from which to choose. Some of them are for fun (extra echoes, etc). The voice output feature can be turned on or off to suit your preference.
- **Voice or keyboard commands:** DigitalSky Voice will allow voice, or keyboard and mouse (or touchpad) commands, as you wish. If you do not have a microphone or would prefer to turn the voice recognition off, you can do so. Since the keyboard is not easily visible at night, all inputs can be accomplished with your mouse or touchpad. We discovered this was a tremendous advantage.
- **Actual position:** DigitalSky Voice correctly displays and reports the coordinates of the position your scope is pointed when you request "actual position." The mount continually updates this information to the program, even as it tracks. If you use this feature in emulation mode, the J2000 numbers will be used.
- **Recalibration:** You can recalibrate on any object by simply stating "recalibrate."
- **Stop command:** Your telescope will stop slewing when you state "stop", "stop now", "halt" or "quit". A stop button is also available on the screen. This feature is not available for the ETX due to limitations in its command language.
- **Safe Zone:** You can specify a zenith slewing limit range to prevent your telescope from hitting your tripod or pier.
- **Object Centering:** Center objects in your eyepiece with full voice control. This feature is not available for the ETX.
- **Focusing:** Control your telescope eyepiece focus motor with voice commands. This feature is not available for the ETX.
- **N-S-E-W buttons:** You can control incremental movement of your scope from the keyboard.
- **Location:** You can enter 9 locations in permanent memory. The program will remember your last location as you start up. The current location selection will display on the screen.
- **Park positions:** Three park positions are available for permanent installations or if you are set up at a star party for several days. When you park, the telescope will slew to the position you have selected (the options will depend on your mount). When you resume from park at the beginning of the next observing session, you can begin observing immediately without recalibrating.
- **Night vision screen:** You can select either day or night screen
- **Phrases button:** Are you worried that you won't remember what to say? No problem. Select this button and the phrases for your current command mode will display in the Cool Objects window for your review. When you press the button again, your original screen will appear.
- **Help button:** This feature will provide detailed information about each of the command modes. When you select this button, the windows will display a description of the mode that is selected. You can press the speak button to hear the help description, if you wish.
- **Microphone wizard and VU test:** These routines will check the function of your microphone as you speak.
- **High coolness factor!**

*Have you talked to your telescope today?*

# Voice Recognition - A Dream Realized

The possibility of verbal communication with computers and common machines has captured man's imagination for many years. Science fiction and futuristic views of life in the next millenium and beyond have explored the potential benefits of harnessing the tremendous retrieval and analytical capabilities of the computer.

Early examples of Voice Recognition required large amounts of computing power and were almost always found in large computer labs in universities, and/or large corporations that needed this new technology for specific tasks. The capabilities of these machines, even when considered by the standard of the day were somewhat limited. Voice recognition did not support multiple voice types, required hours of training and did not always perform as desired. Industry and scientific studies were prepared to accept 60% recognition after training as acceptable.

Voice Recognition technology has come along way since its early beginnings. Today we see many common household appliances and cellular phones that employ one form or another of Voice Recognition technology in their functions. Increasing numbers of application designers are taking advantage of this brave new method of communicating with machines that we work and live with today.

Enter DigitalSky Voice, the latest attempt at using one of the most advanced methods of Voice Recognition to control and enjoy the use of your telescope system.

From its inception, DigitalSky Voice was written to be a voice-control application, rather than an overlay of a graphic-based program. As a result, the command structure is tighter without layers of simulated button clicks and menu choices. Voice commands are simple, yet powerful to handle complex tasks. Coupled with today's modern telescope mountings, endless hours of enjoyment under the stars await you.

Come with me now, on the beginning of a new and wondrous journey, the power to do what was only dreamed about in science fiction some 20 years ago, is now science-fact.

Enjoy

Charles Sinsofsky

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Web Page: [www.digitalskyvoice.com](http://www.digitalskyvoice.com)

# Computer Hardware and Software Setup

## ***Minimum Computer System Requirements***

The DigitalSky Voice CD-ROM contains the installation files, speech engine, program and database files. The program must be installed on an IBM compatible personal computer with the following system requirements. The program is installed complete. You do not need the CD-ROM to operate the program.

Microsoft Windows™ 95/98/NT Operating System  
Pentium™ 100MHz (can be a clone of the Intel™ chip)  
32 MB RAM  
70 Megabytes of available disk space  
1 Serial Port available for use  
Sound Blaster™ or compatible sound card (16 bit or higher)  
Mouse Input Device (mouse, touchpad, eraser head, etc)  
Microphone Input  
Serial Cable with connector on one end for your mount and the other end for the serial port of your computer  
External microphone with an on-off switch (if you plan to use voice control)  
Display Screen Resolution MUST be set for at least 800x600 or greater.  
Speaker Output (optional, if amplification of voice output is desired)

Higher CPU speeds will provide for better recognition accuracy and faster response time. DigitalSky Voice cannot be installed on a network server. The voice engine must reside on a local drive.

## ***Microphones and Sound Cards***

Your success with voice recognition, i.e. the ability of the DigitalSky Voice recognition engine to understand your commands, will depend on the quality of the signal that you give it. These are some of the important variables:

**Sound cards:** A Sound Blaster™ compatible card (16 bit or higher) is recommended. It is possible that a card, which claims compatibility, may not be *fully* compatible and yield poor results.

**Microphones:** There are many different types of microphones on the market with varying response characteristics. Some of them are suitable for voice recognition and others are not. The performance of the microphone may also vary with the sound card used. We recommend that you test your microphone before your first session with DigitalSky Voice using the procedures outlined below. We have had success with these microphones used with a variety of sound cards.

*Radio Shack PRO-302 Unidirectional Dynamic Microphone #33-3002.*

This microphone passes our VU test very well and voice recognition is very good. We paid about \$27 for ours at our local Radio Shack store. It has an on-off switch and comes with a 16' cable. You will need an adapter (Radio Shack Mono-to-Stereo Headphone Plug Adapter to fit 1/8" mono jack) to plug into your computer or substitute cable with the correct connector. Purchase from your local Radio Shack.

*Shure 16AM Microphone with 15cable*

This microphone has the best response of those we have tested. Shure is recommending it specifically for voice recognition based on its performance with Sound Blaster sound cards. We will supply it with a 15' cable that has the correct mono-mini plug for direct connection into your computer. This microphone has an on-off switch. Purchase from Astro-Physics, part # MS16AM15

## **Software Installation and Setup**

1. Close down other Windows programs prior to the installation process.
2. Insert the CD-ROM into the CD-ROM drive of your computer. The installation process will begin automatically.
  - If the CD-ROM does not install automatically, choose the RUN command found on the Start Menu, and request the "Setup.EXE" command found on the CD-ROM directory. (Usually drive letter D).
3. Follow all instructions on the screen. In most cases, simply take the defaults. The serial number can be found on the back of your CD-ROM jewel case.
4. At the end of the installation, you may be required to reboot your system, Please follow all instructions.
5. We recommend that you test your microphone with the Microphone Setup Wizard on page 12 and VU Microphone Test on page 14 *before* you launch DigitalSky Voice for the first time.
6. After the microphone tests, run the program for the first time using the instructions on page 16. You will need to know your observing site location data, COM port choice and mount type to run the initial program startup.

## **Registering Your Software**

We encourage you to register your software at this time. Please send in the Registration Form included with this manual or register on-line at our web site at <http://www.digitalskyvoice.com>. Registration will entitle you to support, free upgrades of the DigitalSky Voice software (within your version number) from our web site and other special features on our site.

## **Upgrades and Bug Fixes**

Beta testing of DigitalSky was very extensive and you are unlikely to find any bugs. However, some users will undoubtedly use the program in new and unexpected ways and cause an error. It is also possible that we overlooked something.

If you find a bug, we would like to know about it so that we can correct the problem pronto. Please visit our web site and review the list of bugs already reported to see if we have already posted a fix that you can download. If not, please fill out the bug report form and we will get to work right away.

We also welcome your suggestions on how we can improve the program and have a form on our web site for you to submit your ideas.

### **Transporter Room**

As bug fixes and program updates become available, we will post them on our web site in an a special section that we call "Transporter Room." This area is only accessible to DigitalSky Voice users and you will be asked to enter your password which can be found on the inside cover of your manual. Please do not distribute your password.

## **Support**

We have endeavored to provide as much information in this manual as possible and arrange it so that you can find what you need easily. Please take a few minutes to familiarize yourself with the contents and the program before you go out in the field. If you have a question, please review the manual first before calling us. If you truly can't find the answer, we'll be happy to help you. Please contact us one of the following ways:

E-mail: strfire@ibm.net  
Mail: Astro-Physics Inc  
11250 Forest Hills Road  
Rockford, IL 61115  
Phone: 815-282-1513  
Fax: 815-282-9847

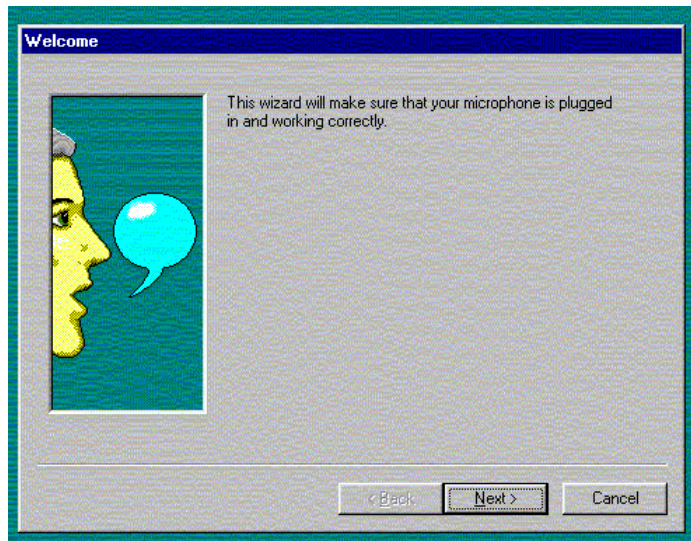
Please have the following information ready:

- The version number. This is displayed in the upper left corner of your DigitalSky screen.
- Your serial number. The number is on a label affixed to the back of your jewel case.
- Your operating system. Windows 95/98 or NT.
- Your hardware configuration. Includes the make and model of the computer, processor type and speed. Also includes the manufacturer and model number of your sound card, graphics card and microphone.
- Description of the problem including the exact wording of an error message, if any.
- A complete description of what you were doing when the problem occurred. In order to fix the problem, we will have to re-create it.

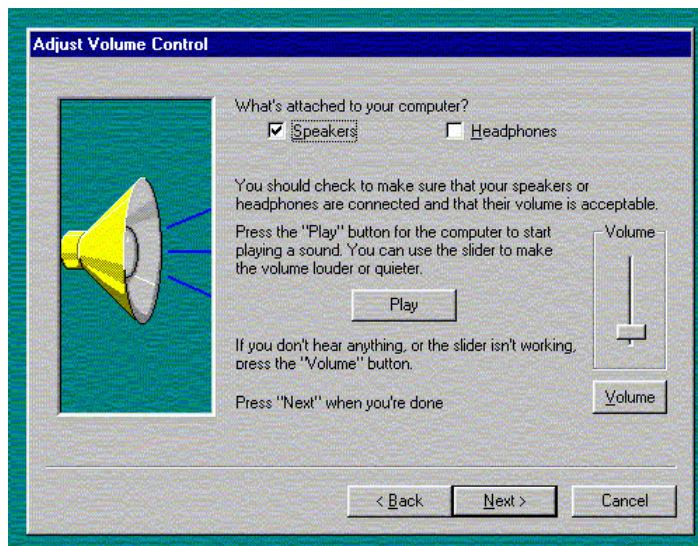
## The Microphone Setup Wizard

The Microphone Setup Wizard will take you through a series of steps to ensure the most accurate settings on your computer, which will result in the BEST, possible recognition accuracy when using DigitalSky.

1. To use the Microphone Setup Wizard, find the icon for the Microphone Wizard in the DigitalSky program group. You can find this by pressing the Start button, and following through the Programs area and then onto DigitalSky Voice folder (icon holder).
2. Click on the Microphone Setup Wizard icon, this will start the wizard, and present you with the following screen:

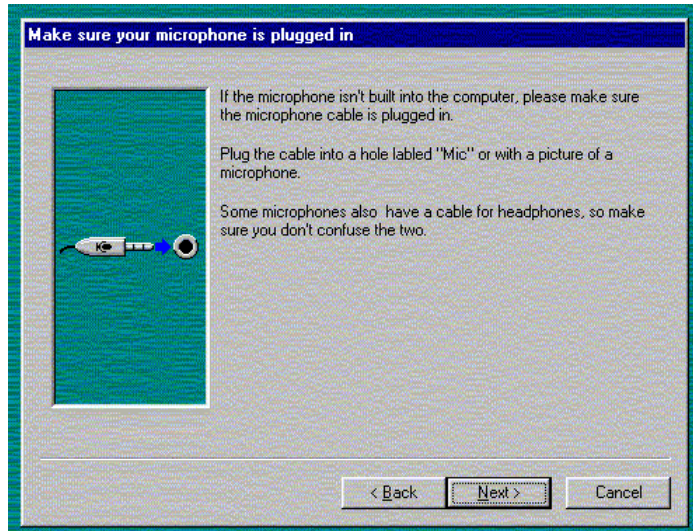


3. To start using the Microphone Wizard, press the Next> button.
4. This step will check to ensure your sound system is connected correctly. Follow all directions. It will

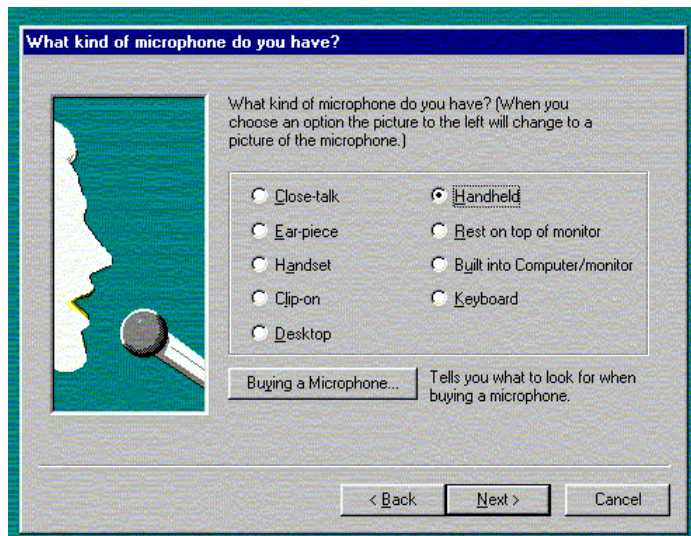


check output volume levels, and ensure that your computer's sound system is working correctly. Press Next>.

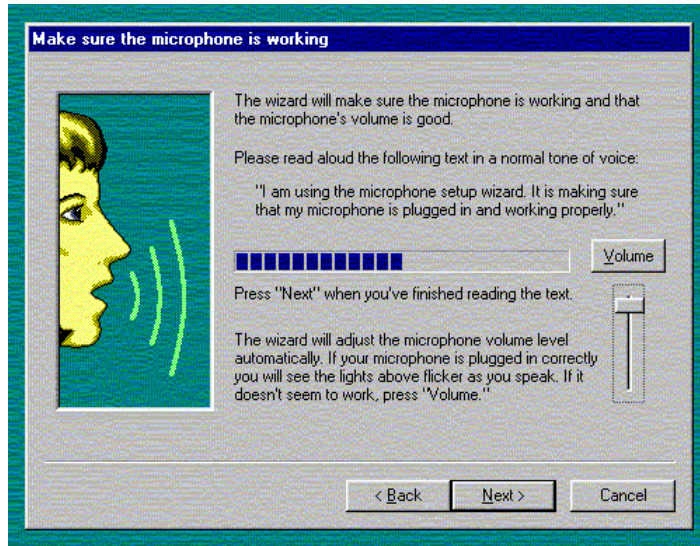
5. This window ensures that you have correctly installed your microphone cables. Press Next>.



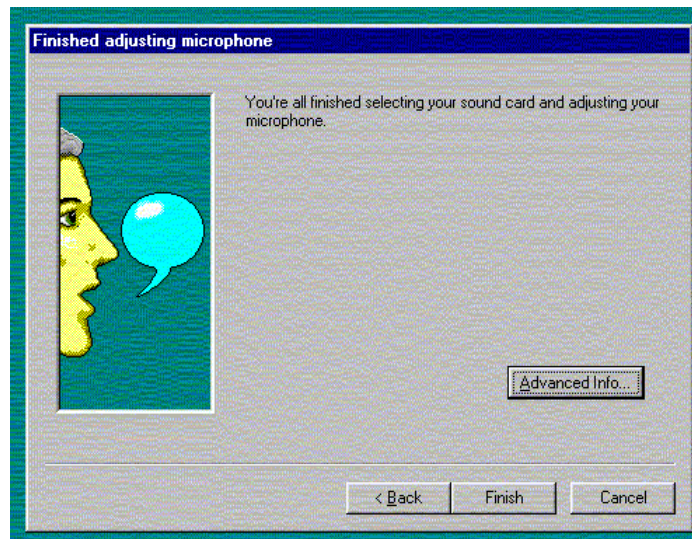
6. This window requests your microphone type. Please select the microphone type that most closely matches the one you have plugged into your computer. The wizard will present a small graphic depicting the type of microphone selected.



7. This phase will test the levels of your microphone input. Follow the directions and read the required sentence out loud. The wizard will automatically detect the correct settings for maximum quality. Press Next>.



8. You will be notified if your microphone passes or fails this test. Press the Finish button to complete the wizard process. If your microphone passes, proceed to the VU Microphone test below for further testing. If your microphone fails, do not use it with DigitalSky Voice since voice recognition results will be poor.



## ***VU Microphone Test***

Sometimes a microphone will pass the Microphone Wizard test, yet fail this test. We have found that the VU test is more reliable and provides more concrete test results. The Microphone Wizard is a pass/fail test. In repeated trials, we have found that microphones with poor output results in the VU test may pass the Microphone Wizard, sometimes. These microphones perform poorly for voice recognition.

1. Plug in the microphone you wish to test.

2. From the Startup Menu, follow through the Programs area and then onto the DigitalSky Voice folder and choose Microphone VU Meter.
3. The VU dialog box will appear.
4. As you speak into your microphone, note the numbers that appear in the local peak display line. Adjust your volume control as needed.
5. An excellent response is from -3 to -15 dB. If your numbers are significantly larger (ignoring the minus sign), then the output of your microphone is not strong enough. As a result, the signal into the computer will not be strong enough for consistent voice recognition. The number of failures will be higher.

# Running DigitalSky Voice Software the First Time

When you use DigitalSky Voice software the first time, you will enter basic information so that the program can operate properly. We suggest that you do this at home so that you can familiarize yourself with the program before going out in the field. Please have this information handy:

- Date and time
- Location (latitude and longitude of your observing site)
- Communication (serial) port
- Mount type

If you don't know the exact location coordinates, enter an approximate latitude and longitude. All of the information can be adjusted within the program at any time, so you can make changes later.

## Setting the Time and Date

DigitalSky will use the computer's clock to determine the current time. Please follow the procedures of your Microsoft Windows™ operating system to be sure that it is set to the correct time and date. Computer clocks may gain or lose many seconds a day. This is not important to most observers.

## Setting the Initial Location, Communication Port and Mount Type

The first time you run DigitalSky Voice, you will enter basic information, which will allow the program to know the serial port you are using, the telescope mount type, and the location of your observing site.

1. Launch DigitalSky Voice with the icon on your desktop, if you have installed one, or through the Startup Menu. The program will begin and a series of screens will display.



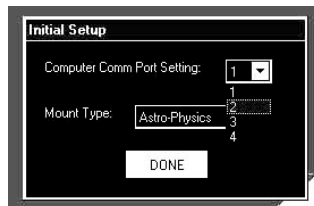
Initial No-Location Defined Screen:

2. Simply press OK to begin the initial setup.



Initial Location Setup Screen:

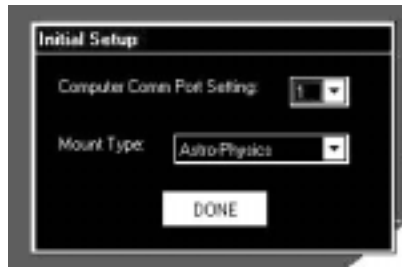
3. You must enter location data so that DigitalSky can correctly determine the objects that can be seen from your observing site, i.e. the objects that are above the horizon.
4. Location 1, is only the default name, and can be changed to any user-defined word by simply typing a descriptive word in the location-input box. Once changed, the user-defined name will be saved to the DigitalSky database.
5. Enter the longitude and latitude of your location. Include the degrees, minutes, and seconds. All numbers are entered with a POSITIVE value.
6. Please select West or East of Greenwich. For example, if you live in North America, you will select WEST. Use the drop-down box to select the value desired.
7. Use the drop-down box to select North or South to indicate the hemisphere in which your site is located.
8. Set the standard time zone for your area as determined from Greenwich. These are the zones for North America:  
 Eastern Standard Time = time zone 5  
 Central Standard Time = time zone 6  
 Mountain Time = time zone 7  
 Pacific Time = time zone 8
9. Indicate if daylight savings time is in effect. If daylight savings is recognized at your location (occurs in the summer months), you will need to change this setting when you move the clocks forward in the spring (yes) and back in the fall (no).
10. When you have completed your entries, press the Apply button, which saves the changes to the database.
11. Select the communication (Com or serial) port your personal computer or laptop will use to communicate with your telescope mount. Select the port using the drop-down box. Valid values are port 1 through port 4.



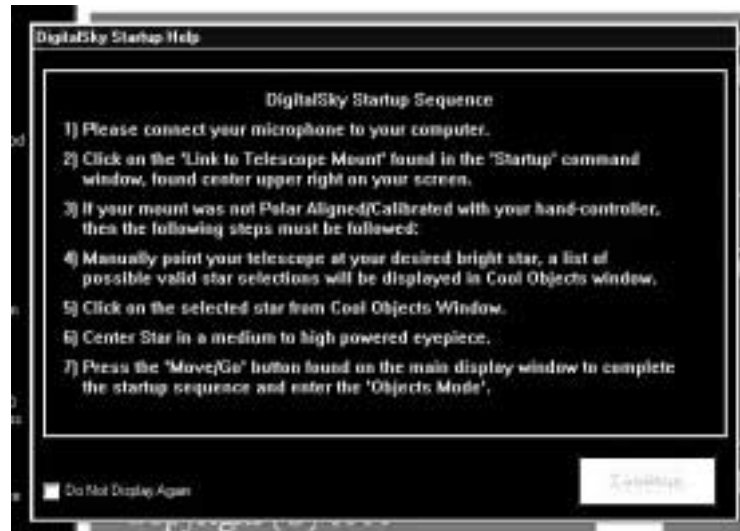
**Initial Setup Screen:**

12. Select your mount with the drop-down box. Choose Astro-Physics (GTO models), Meade Systems, LX200, ETX-90/125 (models using Autostar only) or Vixen SkySensor 2000-PC.

Note: If your computerized mount is not listed above, but the command language is said to be compatible with Meade's, select either the Meade LX200 or LX200 (if it is a German Equatorial). If in doubt, contact Astro-Physics.



**Communications Port Selection**



**Startup Help Screen**

13. The DigitalSky Startup Help reminder screen is set to display each time you load the program. The instructions will guide you through the steps required to set up and link your telescope to DigitalSky.
14. This screen can be suppressed from further use, by either checking the Do Not Display Again checkbox, or setting the Help Display Window to NO in the Preferences window. Unless you use this program frequently, we suggest that you allow this screen to display each time you start up.

## ***Completion of Setup Phase***

After completing the initial setup phases, the DigitalSky program will be displayed. At this point, you have many choices. These are a few:

- You can setup additional observing location sites as explained on page 64.
- Use the program in Emulation Mode to simulate operation of the program without a mount. This will allow you to become familiar with the layout of the program and learn about its features. Click on the button labeled Emul:Off so that it displays Emul:ON. Then follow the calibration procedure on page 63 since you are simulating all operations as if you had a mount attached.

# Using DigitalSky Voice with Your Telescope Mount

DigitalSky Voice communicates with your mount via the command protocol (also called command set or language) established by the mount manufacturer. The protocol consists of a command issued by an external program (like keystrokes on your mount's keypad or DigitalSky Voice software program) and the response returned by the mount. It is important to select the correct mount type in the DigitalSky Voice program so that it communicates with the mount in the command language that it understands.

It is very important that you assemble and align your mount according to the instruction manual that came with it. Be sure to follow all directions carefully.

When you bring up DigitalSky Voice, the LED next to Startup will be green indicating this is the active mode. You must go through the linking procedure before you can issue any slewing commands, even if you are using the program in Emulation Mode. When you click on Link to Telescope Mount, DigitalSky will inform you verbally that it is attempting to link to your mount. The program will send a message to your mount asking it for position data. If you completed the alignment routine with your keypad hand controller as described in the instruction manual for your mount, the coordinates of the alignment star (or other object if you have been slewing) will be sent to DigitalSky. When DigitalSky receives this data, it recognizes that the mount has been calibrated. Objects Mode will be activated. Note that when the linking process is completed, the Link Status display toward the bottom of the screen will read "established."



**Startup Sequence from the Command Window**



**Calibration Star List in Cool Objects Window**

If you have a German Equatorial mount that is polar aligned, but not previously parked or calibrated on a known star, you have two choices for calibration. The first is the alignment routine of your keypad controller. Alternatively, you can click on Link to Telescope Mount. Since your mount is not calibrated, DigitalSky will ask you to choose a star from the list of calibration stars in the Cool Objects window, point your telescope to that star and center it in your eyepiece. You will be instructed to click on the star name, then click on the Move/Go button (the telescope will not move since this is simply a sync command). At this point, the calibration routine is complete and the green LED will light up next to Objects Mode. At this point, the voice recognition engine is activated and you can access any function of DigitalSky. You are ready to have some fun.

If your mount was parked at the end of the previous session, DigitalSky will remember and will calibrate on the park position. You will be notified that the park position has been deactivated. The Objects Mode LED will turn green indicating that the mount is ready for the first command.

Please read the specific information below pertaining to your mount.

# Astro-Physics GTO German Equatorial Mounts

## Normal Setup

1. Set up your GTO mount in accordance with the Astro-Physics instruction manual.
  - a) If you are not polar aligned, complete the calibration and polar alignment functions (Startup routine) using the keypad controller.
  - b) If you are polar aligned, proceed to the next step.
2. Plug one end of the serial cable into one of the 9 pin female connectors on the control panel of the Servo Box. These connectors may be marked COM 1 or COM 2 (earlier models) or RS-232 on later models. The designations COM 1 and COM 2 do NOT have to correspond with the serial port. It does not matter which one you use. Connect the other end of the cable to an unused serial port on your computer. Standard serial cables can be purchased at your favorite computer supply store.
3. Set up your computer and insert your microphone into the microphone input (if you have a desktop computer, the sound card is often located in the back of the computer). Turn the computer on and bring up DigitalSky Voice.
4. Be sure that the correct serial port and mount type have been selected in DigitalSky.
  - a) Click on the Preferences button and choose Hardware Setup.
  - b) Select the correct COM port and use the drop down menu to select the mount.
  - c) Select Apply and Done to close out of the Preferences menu.
5. Be sure that Astro-Physics is displayed in the box on the bottom of the DigitalSky screen.
6. On the computer screen, click Link to Telescope Mount, which is displayed in the Command window in the top and middle of the screen.
  - a) If you completed the polar align/calibration procedure using the keypad controller, the mount is already calibrated. DigitalSky will inform you that the link has been established and you are ready to use Objects Mode. The coordinates of the final star in your calibration sequence will display in the large window on the upper left of the screen.
  - b) If your mount is polar aligned, but you did not complete the alignment procedure on the keypad, DigitalSky Voice will link to your mount, then ask you to complete a simple calibration sequence.
    - i) Point your telescope to one of the calibration stars listed in the Cool Objects window on the far right of the computer screen. Center the star in the eyepiece.
    - ii) Select the star name on the list, then click the Move/Go button. The mount will not actually slew to the star (you are already there). This synchronizes your mount and lets DigitalSky know where your telescope is pointed. Since you are already polar aligned, DigitalSky knows where you are.
    - iii) The calibration procedure is complete and you are now at Objects Mode.
    - iv) You can tweak your calibration at any time by using Center Mode, described on page 61 or refer to the section on the Recalibrate button on page 34
7. Proceed to the section describing Objects Mode beginning on page 44 or you can go to any other mode you wish.
8. The Astro-Physics GTO mounts utilize all functions of DigitalSky in their entirety.

## Resume from Park

1. If you parked your mount at the end of your previous observing session and the mount has not been moved or disturbed, the startup routine is a snap.
2. Turn on the power to the mount.
3. Attach cable to the serial ports, turn on the computer, plug in microphone and bring up DigitalSky Voice.
4. Click on Link to Telescope Mount. DigitalSky will inform you that the telescope is calibrated (it remembers the position where you parked) and that the park state has been deactivated.
5. You are now in Objects Mode and all functions of the program are available to you.

# Meade ETX with Autostar

DigitalSky Voice software is a lot of fun to use with the ETX. If you set the magnitude limit to suit the aperture and your observing conditions (light pollution), DigitalSky will suggest lots of wonderful astronomical objects for you to view. The following instructions and comments are based on the first version of the Autostar firmware and version 1.1.

## Normal Setup

1. Set up the ETX per the instructions for basic operation in the manual included with the telescope.
2. Follow the “easy align” telescope alignment instructions in the Autostar manual. This procedure will locate two stars and calibrate your telescope.
3. Connect one end of the Meade serial cable (from the #505 Connector Cable Set purchased from a Meade dealer) directly into the base of ETX Autostar keypad and the other end into an unused serial port of your computer.
4. Set up your computer and insert your microphone into the microphone input (if you have a desktop computer, the sound card is often located in the back of the computer). Turn the computer on and bring up DigitalSky Voice.
5. Be sure that the correct serial port and mount type have been selected in DigitalSky.
  - a) Click on the Preferences button and choose Hardware Setup.
  - b) Select the correct COM port and use the drop-down menu to select the Meade ETX.
  - c) Select Apply and Done to close out of the Preferences menu.
6. Look at the box on the bottom of the DigitalSky screen where the mount type is displayed. Be sure that it reads “Meade ETX-90/125.” This is very important since the ETX command language is NOT the same as the LX200 (despite what Meade representatives have told us).
  - a) *Caution:* If you accidentally set the mount type incorrectly, then link DigitalSky with the ETX, DigitalSky will send extra information to the ETX which will cause the location you have setup in the ETX keypad to erase. If the location is erased, you will have to set up the ETX again and re-enter the location data in the keypad (latitude, longitude and time zone). Follow the instructions in your Meade ETX manual. You will not have any difficulties as long as you check to be sure that the mount setting is correct.
7. In the Command window in the top and middle of the screen, click Link to Telescope Mount.
8. Since the telescope alignment procedure was already accomplished in the setup above, the mount is already calibrated. DigitalSky will inform you that the link has been established and you are ready to use objects mode. The coordinates of the 2<sup>nd</sup> calibration star that was used for the ETX calibration sequence will display in the large window on the upper left of the screen.
9. Proceed to the section on using Objects Mode beginning on page 44 or you can go to any other mode you wish.
10. The Meade ETX can use all of the functions and features of DigitalSky Voice, except the following:
  - **Stop command** – The ETX will NOT stop when you give any of the verbal commands or click on the Stop button on the DigitalSky screen. The ETX will pause for a split second, then continue.
  - **N-S-E-W Directional buttons on the screen display** - When you click on the directional buttons, the ETX will move in the desired direction for about 2 seconds, then stop. You can move incrementally in short bursts, however it would be more effective to use the buttons on the Autostar keypad.
  - **Center Mode** - For all practical purposes this is not a useful function for the Meade ETX since it does not have a command for “stop.” We recommend that you use the Autostar keypad to center your objects.
  - **Focus Mode** – Since the ETX does not respond to “stop”, this not a useful function either.
  - **Changing the Slew, Track and Directional Button rates** – Use your Autostar keypad to change these rates.
  - **Park Function** – The ETX command language does not have any park functions.

11. The following is a slight difference that does not affect functionality:

- DigitalSky Voice will not say “object acquired” when the slew is completed. Listen for the audible beep from the ETX to signify that it has reached its destination.

## **Meade LX200**

### **Normal Setup**

1. Set up your Meade LX200 mount and follow the alignment procedure in accordance with the Meade instruction manual.
2. Plug the serial cable into the RS-232 connector on your mount and an unused serial port of your computer. You will need the LX200 Interface Cable (stock number 07047) purchased from a Meade dealer.
3. Set up your computer and insert your microphone into the microphone input (if you have a desktop computer, the sound card is often located in the back of the computer). Turn the computer on and bring up DigitalSky Voice.
4. Be sure that the correct serial port and mount type have been selected in DigitalSky.
  - a) Click on the Preferences button and choose Hardware Setup.
  - b) Select the correct COM port and use the drop-down menu to select the mount.
  - c) Select Apply and Done to close out of the Preferences menu.
5. Be sure that the correct mount type is displayed in the box on the bottom of the DigitalSky screen.
6. In the Command window in the top and middle of the screen, click Link to Telescope Mount.”
7. Since you completed the polar alignment or alt-azimuth alignment procedure using the Meade keypad hand controller, the mount is already calibrated. DigitalSky will inform you that the link has been established and you are ready to use Objects Mode. The coordinates of the final star in your calibration sequence will display in the large window on the upper left of the screen.
8. Proceed to the section describing Objects Mode beginning on page 44 or you can go to any other mode you wish.
9. The Meade LX200 can use any of the functions and features of DigitalSky Voice, except the following:
  - a) **Changing the slew rate** – Use your LX200 keypad to change this rate.

### **Resume from Park**

1. If you parked your mount at the end of your previous observing session and the mount has not been moved or disturbed, the startup routine is a snap.
2. Plug in the keypad hand controller and turn on the power to the mount. Wait until the light on the top of the keypad illuminates and the keypad beeps.
3. Attach cable to the serial ports, turn on the computer, plug in microphone and bring up DigitalSky Voice.
4. Click on Link to Telescope Mount. DigitalSky will inform you that the telescope is calibrated (it remembers the position where you parked) and the park state has been deactivated.
5. You are now in Objects Mode and all functions of the program are available to you.

## **Meade LXD650 and LXD750**

DigitalSky Voice is fully functional with these Meade German Equatorial mounts.

### **Normal Setup**

1. Set up your Meade LXD650 or LXD750 mount in accordance with the Meade instruction manual.
  - a) If you are not polar aligned, complete the polar alignment routine with the Meade keypad.

- b) If you are polar aligned, turn on the power to the mount and wait until the light on top of the keypad illuminates and the keypad beeps.
2. Connect one end of the serial cable into the RS 232 port on Power Panel of your mount and the other end of the cable into an unused serial port of your computer. The Meade manual includes instructions to make a computer interface cable for these mounts.
3. Set up your computer and insert your microphone into the microphone input (if you have a desktop computer, the sound card is often located in the back of the computer). Turn the computer on and bring up DigitalSky Voice.
4. Be sure that the correct serial port and mount type have been selected in DigitalSky.
  - a) Click on the Preferences button and choose Hardware Setup.
  - b) Select the correct COM port and use the drop-down menu to select the mount.
  - c) Select Apply and Done to close out of the Preferences menu.
5. Be sure that the correct mount type is displayed in the box on the bottom of the DigitalSky screen.
6. In the Command window in the top and middle of the screen, click Link to Telescope Mount.
  - a) If you completed the polar alignment procedure using the Meade keypad hand controller, the mount is already calibrated. DigitalSky will inform you that the link has been established and you are ready to use Objects Mode. The coordinates of the final star in your calibration sequence will display in the large window on the upper left of the screen.
  - b) If your mount is polar aligned, but you did not complete the alignment procedure on the Meade keypad, DigitalSky Voice will link to your mount, then ask you to complete a simple calibration sequence.
    - i) Point your telescope to one of the calibration stars listed in the Cool Objects window on the far right of the computer screen. Center the star in the eyepiece.
    - ii) Select the star name on the list, then click the Move/Go button. The mount will not actually slew to the star (you are already there). This synchronizes your mount and lets DigitalSky know where your telescope is pointed. Since you are already polar aligned, DigitalSky knows where you are.
    - iii) The calibration procedure is complete and you are now at Objects Mode.
    - iv) You can tweak your calibration at any time by using Center Mode, described on page 61 or refer to the section on the Recalibrate button on page 34
7. Proceed to the section describing Objects Mode beginning on page 44 or you can go to any other mode you wish.
8. The Meade LX200 can use any of the functions and features of DigitalSky Voice, except the following:
  - **Changing the slew rate** – Use your LX200 keypad to change this rate.

## Resume from Park

1. If you parked your mount at the end of your previous observing session and the mount has not been moved or disturbed, the startup routine is a snap.
2. Plug in the keypad hand controller and turn on the power to the mount. Wait until the light on the top of the keypad illuminates and the keypad beeps.
3. Attach the cable to the serial port, turn on the computer, plug in microphone and bring up DigitalSky Voice.
4. Click on Link to Telescope Mount. DigitalSky will inform you that the telescope is calibrated (it remembers the position where you parked) and the park state has been deactivated.
5. You are now in Objects Mode and all functions of the program are available to you.

## Vixen SkySensor 2000-PC

DigitalSky Voice is fully functional with the Vixen SkySensor 2000-PC German equatorial mount.

## Normal Setup

1. Set up your SkySensor 2000-PC mount in accordance with the Vixen instruction manual and complete the alignment routine.
2. Connect one end of the serial cable into the RS 232 port on your mount and the other end of the cable into an unused serial port of your computer. The SkySensor 2000-PC comes with an 8' cable.
3. Set up your computer and insert your microphone into the microphone input (if you have a desktop computer, the sound card is often located in the back of the computer). Turn the computer on and bring up DigitalSky Voice.
4. Be sure that the correct serial port and mount type have been selected in DigitalSky.
  - a) Click on the Preferences button and choose Hardware Setup.
  - b) Select the correct COM port and use the drop down menu to select the mount.
  - c) Select Apply and Done to close out of the Preferences menu.
5. Be sure that the correct mount type is displayed in the box on the bottom of the DigitalSky screen.
6. In the Command window in the top and middle of the screen, click Link to Telescope Mount.
  - a) Since you completed the proper alignment procedure using the Vixen keypad hand controller, the mount is already calibrated. DigitalSky will inform you that the link has been established and you are ready to use Objects Mode. The coordinates of the final star in your calibration sequence will display in the large window on the upper left of the screen.
7. Proceed to the section describing Objects Mode or you can go to any other mode you wish.
8. The Vixen SkySensor 2000-PC can use any of the functions and features of DigitalSky Voice, except the following:
  - **Changing the slew rate** – Use your SkySensor keypad to change this rate.

## Resume from Park

1. If you parked your mount at the end of your previous observing session and the mount has not been moved or disturbed, the startup routine is a snap.
2. Plug in the keypad hand controller and turn on the power to the mount.
3. Attach cable to the serial ports, turn on the computer, plug in microphone and bring up DigitalSky Voice.
4. Click on Link to Telescope Mount. DigitalSky will inform you that the telescope is calibrated (it remembers the position where you parked) and the park state has been deactivated.
5. You are now in Objects Mode and all functions of the program are available to you.

## Celestron Ultima® 2000

Use DigitalSky Voice™ to guide your Ultima® 2000 on a tour of the universe.

### Normal Setup

1. Set up the Ultima® 2000 per the instructions in your Celestron manual included with your telescope.
2. Plug in the hand controller, turn on the power switch on the Ultima® 2000 and follow the alignment procedure in the Celestron manual.
3. Set the Cord Wrap Control feature to off in the hand controller.
4. Press the Menu button on your Ultima® 2000 hand controller to put it in Menu mode (the word Menu should appear at the top of the display screen).
5. Plug in the computer interface cable- attach the telephone connector into the top of the hand controller and the 9-pin connector into an available serial port on your computer.
6. Set up your computer and insert your microphone into the microphone input (if you have a desktop computer, the sound card is often located in the back of the computer). Turn the computer on and bring up DigitalSky Voice.

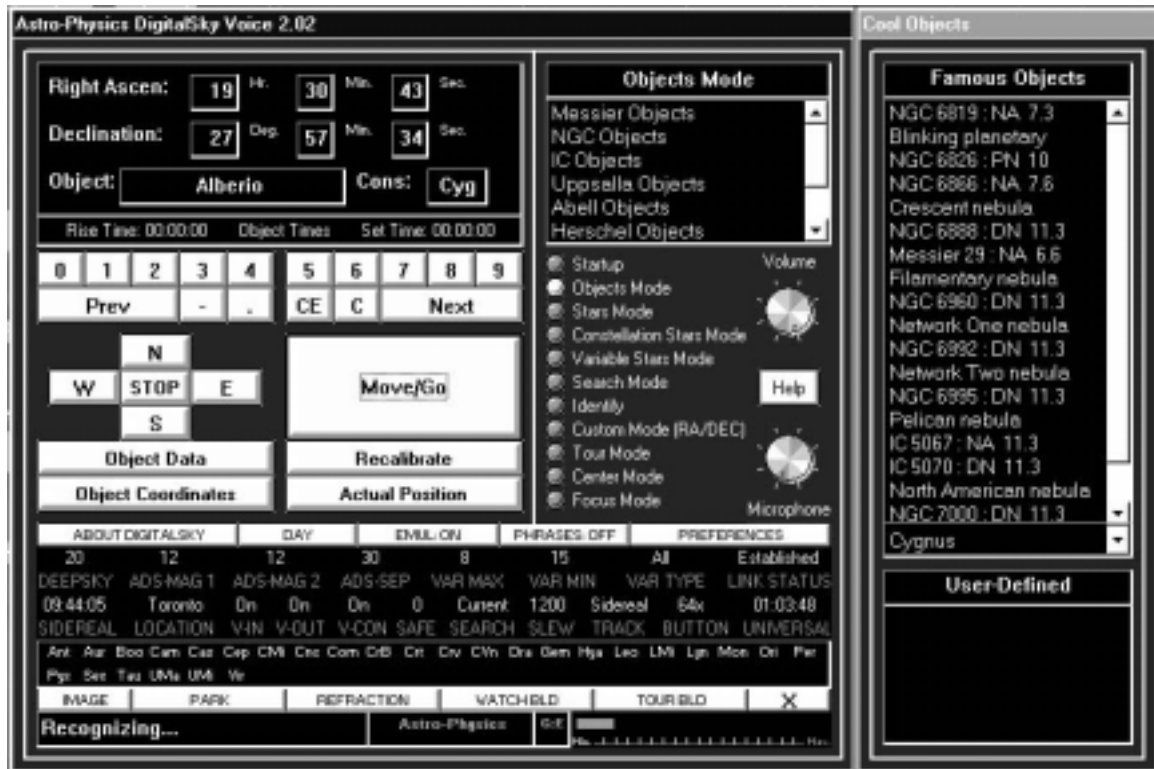
9. Be sure that the correct serial port and mount type have been selected in DigitalSky.
  - a) Click on the Preferences button and choose Hardware Setup.
  - b) Select the correct COM port and use the drop down menu to select the mount.
  - c) Select Apply and Done to close out of the Preferences menu.
10. Be sure that the correct mount type is displayed in the box on the bottom of the DigitalSky screen and that the Emulation button is set to "off".
11. In the Command window in the top and middle of the computer screen, click Link to Telescope Mount.
  - a) Since you completed the proper alignment procedure using the Celestron keypad hand controller, the mount is already calibrated. DigitalSky will inform you that the link has been established and you are ready to use Objects Mode. The coordinates of the last star you used in your calibration sequence will display in the large window on the upper left of the screen.
12. Proceed to the section describing Objects Mode or you can go to any other mode you wish.
13. The Celestron Ultima® 2000 can use any of the functions and features of DigitalSky Voice™, except the following:
  - **N-S-E-W Directional buttons on the screen display** – The command protocol of the Ultima® 2000 does not include commands for directional movement.
  - **Center Mode** – This mode cannot be used since there are no commands for directional movement.
  - **Focus Mode** – This mode cannot be used since there is no command protocol for this movement.
  - **Changing the Slew, Track and Directional Button rates** – Use your Celestron Ultima® hand controller to change these rates.
  - **Park Function** – The Ultima 2000® command language does not have a park function.

## ***Tips for Using Your Personal Computer at Your Observing Site***

We are all concerned about dew and various other environmental conditions when we are outside with our telescopes. Using expensive computers in the field only intensifies these concerns. We offer these suggestions:

- DigitalSky is designed to be voice-centric, so you do not *need* to see your screen during most of your observing session after the telescope is linked. If dewing or even dark adaptation are primary concerns, we suggest you close down the laptop lid/screen. The screen LCD and keyboard will be protected. DigitalSky voice was designed so that you can remain at the telescope eyepiece with your microphone.
- If you want to take advantage of the information displayed on the computer screen or use the program with a mouse, you may want to construct a box with an open front that fits over your computer. This will protect it from dew. We have constructed ours from Plexiglas. It also allows you to view your computer screen in the daylight if you put a black cloth over your head.
- Long serial cables, up to 200 feet, will not degrade the signal. You can leave the laptop in your house, car or in a box to protect it from the outside conditions.
- Long microphone extensions or a simple set of speakers or headphones for the audio feedback may be used

# Using DigitalSky Voice 2.02.



## Main Display Windows

When DigitalSky Voice comes up on your screen, it will look similar to the screen above. While this may look confusing to you at first glance, each display has its purpose to assist you. Please review the descriptions below and all the features will become old friends.

## Object Catalogs

Messier	All 110 objects
NGC (New General Catalog)	All 7,840 objects
IC (Index Catalog)	All 5,386 objects
Uppsalla	All 12,921 objects
Abell	All 2,712 objects
Herschel	All 2,468 objects
ADS (Aitken's Double Star)	All 16,959 objects
GCVS (General Catalog of Variable Stars)	All 31,220 stars
Greek Star Names by Constellation	1,012
Common Star Names	200
Common Object Names	100
Solar System Objects -	10

## DigitalSky: The Coolest Features

DigitalSky was designed to be an informative observing companion, an “expert in a box.” We wanted to bring the observer a new level of information about the night sky as quickly and easily as possible.

How many times have you asked “What’s up now?” or “What should we observe next?” If you are like most of us, this question comes up all the time. DigitalSky has many suggestions for you. These are some of the features of the program you don’t want to miss.

### What’s Up DigitalSky?

If you would like a suggestion for the next observing object, ask “What’s up DigitalSky?” DigitalSky will search its databases and suggest a famous object that is below the magnitude limit you set for your telescope and within your observing range. A typical response is “I recommend the galaxy Messier 60 in the constellation Virgo. Would you like to observe this object?” You can either say “yes” or “ok” and the mount will begin to slew, say “choose another” to obtain another suggestion or say “cancel or “no.” Isn’t that cool?

### Constellation Ticker

The main screen of DigitalSky displays a list of all the constellations (abbreviations) that are within the observing range that you specify (refer to the customize feature below). These are ways the constellation ticker can be used:

- Informs you which constellations are visible. This is particularly handy during the day when you can’t see them yourself or when you are just learning the night sky.
- Click on one of the constellations and the Cool Objects window will display a list of objects within that constellation. This will give you observing ideas. For example, if you click on Tau (Taurus), a list will appear that includes NGC 1554 with the description: diffuse nebula (DN), magnitude 11.3. The list also includes the Crab Nebula, the Hinds Planetary Nebula and other Messier and NGC objects. Take your choice. You can either click on one of the objects or just say the name into the microphone. DigitalSky will find it for you.
- If you are in Search Mode, use the constellation ticker to determine which one you want to search. Click on it to activate. The same is true of Tour Mode.
- If you are in Emulation Mode and are indoors, you can’t see which constellations are up. Since the program will function as if you had a mount, you will be notified when an object is below the horizon (based on your time and location). Use the ticker to help you choose objects that are up in your imaginary sky.

### Cool Objects Window

When you slew to an object, DigitalSky will display a list of other objects that you may want to consider within that same constellation. You can either click on the object name or give a verbal command such as “Messier thirteen.” This window is also used to display results of your object searches and objects within each tour. Ideas, ideas and more ideas.

### Search Mode

Say you want to observe planetary nebulas tonight. Request DigitalSky to search its databases for all NGC planetary nebulas that are visible. Or maybe you want to observe the Hershel galaxies in Perseus. Search Mode allows you to create a tour on the fly. Incidentally, your search results will be limited to objects that are below the magnitude limit you set. After all, if you have a small scope, you want the search results to be something within the capabilities of your scope. Refer to page [56](#) for more information on this fun feature.

### Tour Mode

Use the Tour Builder Utility before your observing session to create sequential lists of objects to observe. We have provided tours for all constellations and several seasonal tours to get you started. You can even share your tours with your friends, import tours that other people have created from our web site or send us *your* tour to post. Further information begins on pages [58](#) and [74](#).

## Customize for your Telescope, Mount and Observing Site

DigitalSky aims to please. It allows you to set your preferences for many parameters, if you wish, or you can use the default values that are already programmed. Refer to the Preference section on page 66 for all of the possibilities. This is one of the coolest settings you can make:

- **Magnitude limits** – If you have a large telescope, you want DigitalSky to display and suggest objects that are faint as well as brighter ones. However, if you have a smaller scope and do not have enough light grasp to observe faint fuzzies, specify a lower magnitude range. The displays and responses to the “What’s up DigitalSky?” queries as well as the Cool Objects window display and other features will be limited to objects that are equal to or lower than the magnitude you set.

## Watch Object List

Let’s say that you plan to photograph several objects during your session, but some of them are not up high enough yet. Tonight is the night you will capture definitive photos of those objects and you don’t want to forget to take them! You’ve been waiting all summer and your equipment is working flawlessly.

Just let DigitalSky, your observing buddy, know which objects they are. It will check their positions every 15 minutes and report verbally to you. When the objects have risen above a specified point in the sky, DigitalSky will let you know. You define this point as a certain number of hours above the horizon.

Objects are added and removed from the Watch Object List with the Watch Object Builder as described on page 79.

## Photographic Countdown Timer

DigitalSky is also a photographic timer. Simply state, “countdown <digit> minutes” or for longer times say, “countdown <digit> hours <digit> minutes.” DigitalSky will confirm your request and inform you when the time has elapsed. To inquire about the time remaining, ask DigitalSky “countdown status.” You can also use this timer to remind you when to go home or when dinner will be ready.

## Emulation Mode

DigitalSky is a blast to use even without a telescope. All of the functions are active so that you can simulate an observing session. Use Emulation Mode to become familiar with the program and practice voice commands. We also think that observers will find it very useful even if they don’t have a go-to mount. DigitalSky can provide lots of observing ideas as discussed in the features above. The user can manually move his telescope to the suggested object. DigitalSky is a very powerful search engine and knows the objects that are visible and within the magnitude range of your telescope.

## Hyperlinks

If you move the pointer of your mouse (or other input device) around your computer screen, you will see a hand appear in specific locations, primarily in the Control/Status Panel (the area of the screen that has two rows of red words with green words or numbers above them). The pointing finger of the hand will indicate the field that has a hyperlink. If you click on the field when the hand is present, you will either initiate an action, display a Preferences window or you can toggle between settings. These hyperlinks provide a much faster way to change settings than searching through a menu bar. We hope you like them.

## ***Should I Use the Keyboard/Mouse, or Voice Control?***

DigitalSky Voice was designed to conform to a voice-centric programming model. This means the system will take advantage of Voice Recognition and Voice Output abilities to their full advantage and does not require cumbersome or lengthy prompting from the system to achieve desired results from voice-activation. The real advantage is that you can be sitting at the eyepiece and have total control over your telescope with just a few words. Your dark adaptation will be preserved so you can detect fainter objects and more subtle detail.

At the same time, DigitalSky can also be used fully with your computer mouse, touchpad or other input device. Even complex actions and requests can be simply achieved with the GUI-interface. A few number entry screens will allow you to input from the keyboard if you wish, but all functions can be accomplished with the mouse. When we discuss the command modes later in the manual, we will describe both the voice and mouse/button commands.

We have found that if we are sitting at the computer, we will use a mixture of mouse clicks and voice control. If we are at the eyepiece, voice control is natural and very effective.

## ***Voice Recognition and Voice Output***

The voice-engine of DigitalSky contains two components – voice recognition and voice output. These can be controlled separately.

### **What is Voice Recognition?**

Voice recognition is the ability of the program to recognize your verbal commands. DigitalSky was developed as a set of “grammars” within various modes. You select the mode you wish to activate, i.e. Objects Mode or Tour Mode, and the grammar associated with that mode is activated. That means that DigitalSky will understand a certain set of phrases that allow you to function in each mode. If you give a command that is not within the grammar of that mode, DigitalSky will not understand it.

This requires a certain amount of familiarity with each grammar, however the phrases chosen for each mode and their content are quite natural, so you probably won't be confused. Many of the same phrases are included in all modes, so there is considerable overlap.

The voice recognition function can be on or it can be turned off, as you wish. There may be some times that you do not wish to use voice control, e.g. if you are enjoying the quiet of the night or if there is a lot of distracting noise in your immediate area. If that is the case, find V-IN on the Control/Status Panel on the screen. Point your mouse above the word and you will see a hand symbol indicating a hyperlink. If you click at that spot, the words will toggle “on” and “off.” You can change it as often as you wish. Alternatively, you can make the change through Preferences, however this is a more cumbersome method.

### **What Are the Commands?**

The commands for each mode are discussed in the section of the manual dealing with that mode. In addition, all of the phrases are listed by mode in the Appendices for your review.

If you forget what to say while you are using the program, simply click on the Phrases button toward the bottom of your screen. A list of all possible voice recognition phrases that DigitalSky understands for the current active mode will display in the Cool Objects Window. There is no voice command to activate this button since it is assumed you will be at the keyboard to view the phrase listing.

If you click on any of these words or phrases, DigitalSky will speak the phrase. This option is useful if you want to determine how it should sound to DigitalSky, such as the pronunciation of a particular star name or common name.

Almost all functions of the program, with the exception of the countdown timer and a few others, can be accomplished at your computer. If you forget what to say, use your mouse to initiate the commands.

### **How Can I Tell if DigitalSky Understood My Commands?**

If you are sitting at your computer screen, you can observe various settings on the bottom of the screen. As you speak, watch the VU meter rise and fall. You will also see that your microphone switch probably introduces a burst of noise as you switch it on and off. It is best to wait a second or so after you activate your microphone before you initiate your voice request so that the command does not get lost in the microphone noise.

After DigitalSky has processed your request, the voice command will be displayed in the “Recognizing...” window at the bottom of the screen. If you have requested a catalog number, only the number will display, not the catalog name. However, the vocal confirmation will state both the catalog and number.

In response to many of your commands, DigitalSky will repeat what you have said. This provides some feedback if you are standing at the eyepiece. In some cases, your confirmation or response to a prompt will be required.

When you are issuing voice commands, speak naturally and at a normal rate of speech. You do not need to speak slowly. As long as you speak clearly and enunciate well, DigitalSky will recognize what you say. If your spouse normally has trouble understanding you because you don't speak clearly or you speak very fast, a computerized voice recognition engine will not be able to understand you either. In this case, you will have to be more aware of your pronunciation and speak clearly.

If you are not a native speaker of English (American), DigitalSky may have difficulty understanding all of your commands. We suggest that you try the Recognition Practice Utility as discussed on page 82 to determine which commands can be used successfully. You may have to use mouse commands for some functions.

We strongly recommend using a microphone with an on-of switch. This will allow DigitalSky to process your verbal commands without allowing other confusing noises and speech to interfere. Although DigitalSky will try to process whatever input signal it is given, this voice recognition engine is not prone to guessing. However, if people in the vicinity are discussing which object to view next and say an object name loud enough to be detected by an open microphone, DigitalSky may respond.

## What is Voice Output?

Voice output is the verbal response that DigitalSky gives in response to your commands. These are some examples:

- Direct responses to your questions or queries. You ask “what's up DigitalSky?” The response is “I recommend the galaxy NGC1087 in the constellation Cetus, would you like to observe this object?” Or, you request “object data” and DigitalSky provides the information pertaining to the object that you are presently viewing.
- Repeating what you have said so that you know that your command was understood. When you give the verbal command to slew to an object, DigitalSky will repeat the name of the object.
- Repeating what you have said and requesting a confirmation prior to slewing. If you have set the voice confirmation to “on,” the V-CON indicator in the Control/Status Panel will be set to “on.” This means that each time you give a verbal command to slew to an object, DigitalSky will repeat the name of the object as in the previous example, however it will also say “confirm?” You must say “yes” or “ok” before DigitalSky will commence the slew. Alternatively, you can say “no” or “cancel” to cancel the slewing request.
- Guiding you through a process. If you go to Search Mode, DigitalSky will prompt you to provide the object catalog and object type on which to base the search.
- Status information. DigitalSky will provide periodic updates of information. For instance, if you set up a watch list, DigitalSky will inform you of the status of these objects every fifteen minutes.

You can turn voice output off if you wish with the hyperlink at the indicator V-OUT on the Status/Control Panel as discussed with voice recognition. If you turn it off, you will not be able to use the watch builder or countdown timer.

## Voice Output Choices

DigitalSky Voice contains two different families of voices to provide you with a number of choices. Each of these families has an underlying lex file that governs pronunciation, so you may notice some differences.

- Keith Bell and Kerry Watson. The Keith Bell voice is the most pleasing to us, so we specified it as the default voice. The Kerry Watson voice is the female counterpart. The pronunciation files are loaded with the program.
- Mike, Mary, Sam and the fun variations of these (in space, in hall, in stadium); and the Robosoft voices with varying degrees of echo, also just for fun. These voices have a different pronunciation (lex) file. In order for this file to load properly you must have a Windows™ logon name. Please refer to the discussion below.

### *Your Windows Logon Name and Lex File*

As mentioned above, you must use a Windows logon to obtain the corrected pronunciation (lex) file for the second family of voices. Unfortunately, this is a Microsoft issue that we have been unable to work around. Follow this procedure:

#### **Determine if you have a Windows logon (user) name**

1. Starting your computer. If a logon name was set up for your computer, you will see a Welcome to Windows dialog box when you start your computer. You will be asked to enter your user name (the name of the last user will appear in the box) and password (you can leave this blank if you have not set up a password), then click OK. This will activate a set of Windows preferences and desktop setting for that user, including the pronunciation (lex) file. If you choose “cancel” or click on the “X” in the upper right corner, the pronunciation file will not be activated, though Windows will continue to load.
2. If Windows has already been loaded, click on the Start button to display your choices. Look at the bottom of the column above the word “Suspend.” It should say “Log off <name>”. The name shown is your log on name, take note of it. If it says “Log off ...,” then a logon name does exist, but the user bypassed it when he chose cancel or the “X” in the Welcome to Windows box when he started the computer this session. If the Log OFF field does not exist, you do not have a user name and must create one if you wish to access the pronunciation files.

## Setup a Windows logon

1. Consult your Microsoft Windows manual or Help to set up a user logon if you don't have one.

## Rename the Lex file

When DigitalSky is installed, a lex file is created with the name "administrator". You need to change the name of this file to be the same as your user name. In this example, we will assume that your user name is "Paul."

1. Be sure that DigitalSky Voice is not loaded. The lex file will not be effective until the program goes through its startup and searches for the voice engines to load.
2. Open Windows Explorer.
3. If you installed DigitalSky to the default directory, follow this directory path: Program files ⇒ Common Files ⇒ Microsoft Shared ⇒ Speech Engines ⇒ Tts ⇒ Lex ⇒ Administrator.lex.
4. Right click on Administrator.lex and choose Copy.
5. Paste this copy in the same directory. The new file will be created as "Copy of Administrator.lex."
6. Right click on this file and choose Rename.
7. In this example, the file is renamed "Paul.lex" since the logon name of the user is "Paul." Insert your own logon name. If you have multiple users with multiple logons, make multiple copies of Administrator.lex and rename them.
8. Close Windows Explorer. That's all there is to it.

## Safeguards

There are many safeguard built into DigitalSky Voice that works in conjunction with the command language of your mount.

### Horizon Checks

Each time you issue a slewing command (verbal or button), DigitalSky will calculate the position of that object relative to your location and time to determine if the object is visible. If not, DigitalSky will inform you verbally that the object is below the horizon and display a message in the Object Information Window in the upper left corner of the screen. It will not attempt to slew to this object.

### Slewing Restriction Zone

You can set a slewing restriction zone (also called "safe zone") to prevent your telescope from striking your mount or pier during a slew. A wide variety of telescopes, piers, tripods and accessories can be used on the mounts. You may determine that if your telescope attempts to point to certain areas of the sky near the zenith, the accessories or even the scope itself may hit the pier or tripod.

DigitalSky provides a means to set up a restriction zone so that your telescope will not slew to a particular section of the sky. If you request an object that lies within this zone, DigitalSky will inform you and will cancel the slew. Refer to page 71 for complete details.

To prevent this, set your safe zone from 1-30 degrees as measured from the zenith (position directly overhead). This zone describes a circle around the zenith. To determine the setting you need, hold on to the back of the telescope and manually move it to point at the zenith. Estimate the number of degrees from the zenith that is safe.

Click on the hyperlink above the word SAFE on the Control/Status Panel. This will bring up an entry window. Set the value by clicking the up or down buttons to set the restriction zone value. Then press the OK button

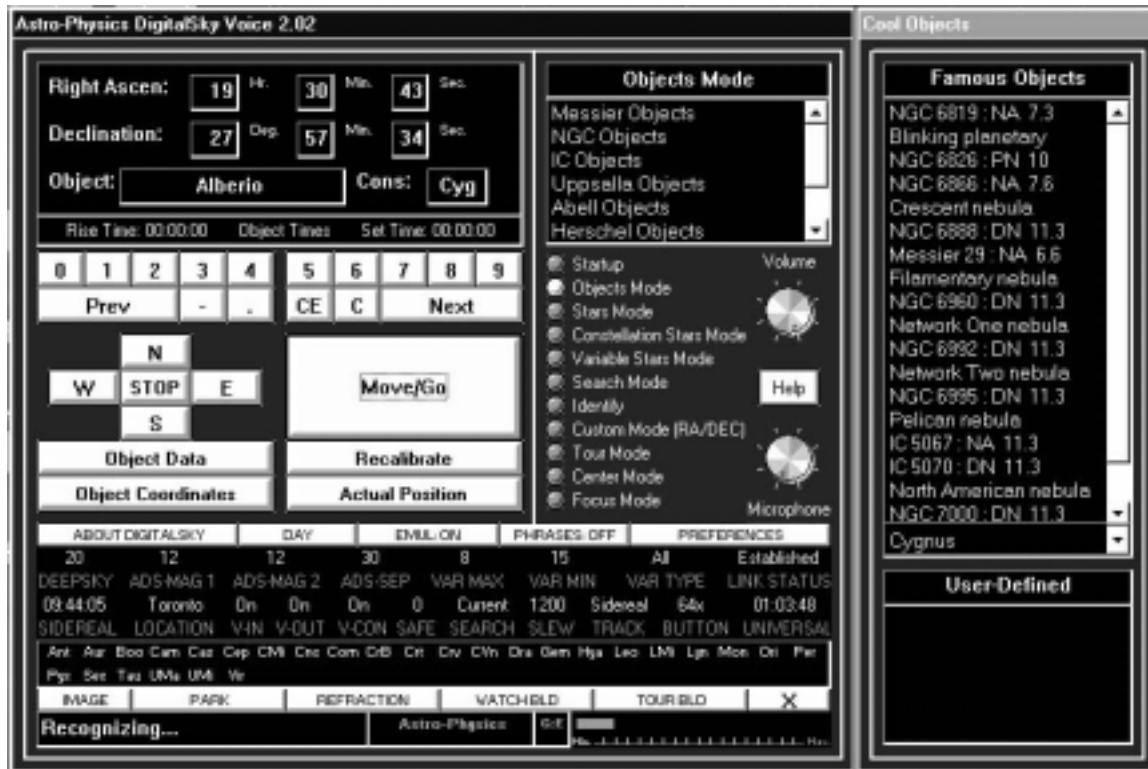
### Stop Command

You can stop the movement of your telescope while it is slewing by saying, "stop," "stop now," "halt," or "quit." You can also use the stop button on the computer display. Note: This command does NOT work with the Meade ETX mounts due to its internal command language.

## **Disclaimer**

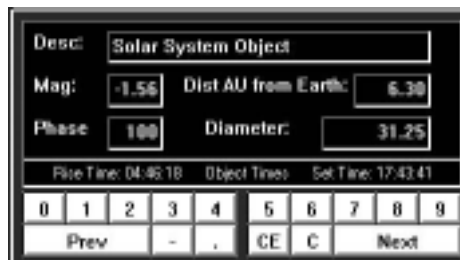
In order for the above safeguards to work effectively, the user must take responsibility for setting up his mount and telescope in accordance with the instructions provided by the manufacturer. Be aware that any telescope or its accessories (if not set up properly) can strike the pier (or tripod) or surrounding objects (closed observatory roof). The user must be aware of people looking in the eyepiece or standing near the telescope when slew commands are given. Astro-Physics cannot be responsible for any damage to your equipment or injury to people when the telescope is slewing or at any time when DigitalSky Voice is used to control your mount. You are ultimately in control of your equipment.

## Understanding the DigitalSky Voice Screen Layout



The main window display is broken up into several important areas. Each area controls and/or displays a different aspect of the DigitalSky Voice Telescope Control System functions. These will be described in detail below.

### Object Information/ Entry Window



Object Information/Entry Window

The Object Information/Entry Window plays a large role within the DigitalSky Voice System. This window will display many different faces throughout the usage of the system. The following is a brief outline of the areas that are displayed or entered in this window:

- Object catalog number entry (M, NGC, IC, Abell, Herschel, Uppsalla, ADS)
- Object J2000 coordinates display
- Telescope *actual* sky position
- Object detail Information (object data)
- Informational displays: such as object below horizon, object does not rise from this geographical location, etc.
- Custom RA/DEC entry value screen (used in conjunction with the numeric entry buttons)

- Object rise and set times for current active geographical location
- Atmospheric refraction entry (temp in Celsius, and barometric pressure in millibars)



**Command Buttons Main Window**

## Command Buttons Main Window

The command buttons on the main window under the Object Entry/ Information window control telescope movement as well as provide object information, i.e. coordinates, telescope actual position, etc plus the main Move / Go control. A break down of the buttons follows:

### N –S-E-W Directional Buttons

The telescope will continue to move in the direction indicated on the button as long as the button is pressed down. Releasing the button will stop the slewing action. The movement directional buttons are tied to the BUTTON speed setting found on the Control Panel / Settings window in the lower part of the main DigitalSky window.

NOTE: The Meade ETX will move a maximum of two seconds, then stop in response to a command issued by the mount. This feature is not available for the Celestron Ultima® 2000

### STOP Button

Stops a slewing movement request in an emergency. The mount will remember where it is. Issue your next command and proceed. You can initiate the command by clicking on the button or saying, “stop,” “stop now,” “halt” or “quit.” If you give the command verbally, say the word(s) in your normal tone of voice. If you panic and shout them into the microphone, your voice signal may be too loud to be understood.

NOTE: The Meade ETX will pause in its movement, however it will not stop.

### MOVE / GO Button

The central command button to initiate all telescope movement requests when the number entry screens are used. If you look closely, you will see this button depress on its own in response to your verbal command to slew to an object or when you click on an object from the Cool Objects window to initiate slewing. When you are in Custom Mode (to enter RA and Dec coordinates) you can state either “find object” or “make it so” to activate the button.

### OBJECT DATA Button

Provides a detailed description of the current object in the Information window. DigitalSky also states this information verbally. You can click on this button or say “Object Data” to activate.

### OBJECT COORDINATES Button

The right ascension and declination values of the current object are provided in the Information window. DigitalSky will state these coordinates verbally. These numbers are the J2000 catalog values. Note that if you move your telescope with the N-S-E-W buttons, the numbers on this screen will remain the same since they are related to the catalog values of the most recent object selected. You can click on the button to activate or request “object coordinates.”

### ACTUAL POSITION Button

Displays and verbally states the true right ascension and declination values for a given object taking atmospheric refraction into account (if you have entered any). When you move the telescope with the N-S-E-W buttons, then request “actual position,” the coordinates will reflect this new position. Activate by clicking on the button or stating the verbal command.

### RECALIBRATE Button

Use this button when you want to recalibrate your mount on the current object. Recalibrate if you find that your object is not in the center of the eyepiece when you slew to it. Recalibration can be accomplished in several ways:

- Center the object manually with the buttons on your mount keypad or with the N-S-E-W buttons on the DigitalSky screen as described above (this is practical only if you are centering objects during a CCD imaging session and the images display on the screen). Either state “recalibrate” or click on the Recalibrate button. DigitalSky will respond verbally “Recalibrated on <name of the object>”.
- Use the Center Mode described on page 61 to verbally center the object. When you exit this mode, the Recalibrate button will be activated automatically and DigitalSky will confirm “Recalibrated on <name of the object>”.

## Control / Status Panel



Control / Status Panel

- The Control / Status Panel is used by DigitalSky to setup and display various states and settings.
- Many areas within the Control / Status Panel are hyperlinked to various preferences and other settings. Anytime the mouse pointer is in the shape of a hand, a hyperlink is present that can be triggered by clicking at that spot on the Control Panel. When you do so, the display will either toggle between several choices or a preferences window will display.

### Control / Status Panel push button overview:

#### ABOUT DIGITALSKY Button

If the button is selected, a brief vocal output will relate information about the program including version number, author’s name and trademark. You can also obtain this information by asking “about DigitalSky.”

#### DAY / NIGHT Button

When you press this button, DigitalSky will switch from Day to Night Screen mode or vice-versa. You can also activate the button by saying “day screen” or “night screen.” Refer to page 63 for additional information.

#### EMUL: ON / OFF Button

Emulation Mode permits usage of DigitalSky without a telescope mount present. When set to ON, all DigitalSky functions will work as if a virtual telescope mount is present, however the serial port is not activated. The button should be in the OFF position for normal system usage with a telescope mount.

Even when emulation mode is On, you *must* first “link” to the telescope mount and choose a calibration star as if you had a real mount. The voice recognition function is active when you reach Objects Mode at the end of the calibration routine. Refer to page 63 for further discussion and an example of an Emulation Mode session.

#### PHRASES Button

When you click the Phrases button, a list of the voice recognition phrases that DigitalSky understands for the current active mode will display in the Cool Objects Window. Use this feature when you can’t remember all the commands. There is no voice command to activate this button since it is assumed you will be at the keyboard to view the phrase listing.

If you click on any of these words or phrases, DigitalSky will speak the phrase. This option is useful if you want to determine how it should sound to DigitalSky, such as the pronunciation of a particular star name or common name.

Refer to the Command Modes chapter beginning on page 41 for further information on each of the command modes. A list of possible phrases for each is included in Appendix A beginning on page 84

### **PREFERENCES Button**

Click on this button to display the preference selection window. An in-depth discussion begins on page 66. Note that using the hyperlinks on the Status Display, as discussed below, can also change many of these preferences. This button cannot be activated verbally.

### **IMAGE Button**

This button is reserved for the future addition of the DigitalSky Image program. A brief list of anticipated features will display when you click on it.

### **PARK Button**

Park your telescope at the end of your observing session by clicking this button. Depending on your mount type and preference setting, one of three park positions will be activated. A confirmation box will appear to ensure that you will not accidentally activate the parking sequence. Refer to the Preferences section beginning on page 70 for additional information regarding park positions.

### **REFRACTION Button**

Atmospheric refraction compensation values can be adjusted to suit your observing conditions. When you click on this button an entry screen will appear in the Object Information / Entry window near the top of the screen. The value for Celsius Temp and barometric pressure is requested.

### **WATCH BLD Button**

Launches the Watch Builder Utility. Refer to page 79 for complete discussion.

### **TOUR BLD Button**

Launches the Tour Builder Utility. Further information is available on page 74.

### **X Button**

Exits the DigitalSky Voice program to Windows. If you are in night screen mode, your Windows screen defaults will restore to normal settings.

### *Control Panel Status Display Overview:*

#### **DEEPSKY**

Displays the Non-Stellar Object Magnitude Limit that is set for the Command Window and Cool Objects Windows. It is also used to limit object selection when you are in Search Mode and when you ask, "What's up DigitalSky?" The default setting is "20." This option is hyperlinked to the Object Limits Preferences window so that you can easily change it at any time.

#### **ADS-MAG 1**

Displays the currently set Aitken Double Star (ADS) Magnitude limit for double star one. This option is hyperlinked to the Object Display Limits Preferences window. The default is set to "12."

#### **ADS-MAG 2**

Displays the currently set Aitken Double Star Magnitude limit for double star two. This option is hyperlinked to the Object Limits Display Preferences window. The default is set to "12."

#### **ADS-SEP**

Displays the currently set Aitken Double Star Separation Limit Restriction. This option is hyperlinked to the Object Limits Preferences window. The default is "30."

#### **VAR MAX**

Displays the currently set Variable Star Maximum magnitude limit. This option is hyperlinked to the Object Display Limits Preferences window.

#### **VAR MIN**

Displays the currently set Variable Star Minimum magnitude limit. This option is hyperlinked to the Object Limits Preferences window.

**VAR TYPE**

Displays the currently set Variable Star Type display restriction. This option is hyperlinked to the Object Limits Preferences window. The default is set to "All."

**LINK STATUS**

Indicates the current link status of DigitalSky Voice to the mount. This will display either "Established" or "Terminated".

**SIDEREAL**

Indicates the current sidereal time at your location.

**LOCATION**

Indicates current selected / activated location. This option is hyperlinked to the Location Selection window.

**V-IN**

Indicates if Voice Input (recognition) is "On" or "Off." This option operates like a toggle, when you click on it, the "on" will switch to "off" or vice versa.

**V-OUT**

Indicates if Voice Output is On or Off. This option will toggle "On" or "Off."

**V-CON**

Indicates if Voice Confirmation is On or Off. This option will toggle "On" or "Off."

**SAFE**

Indicates the Slewing Restriction Safe-Zone set for your telescope mount. This option is hyperlinked to the Slewing Limits window. You can select a zone from 0-30 degrees. The default is "0."

Mounts can be used with a wide variety of telescopes, piers and accessories. You may determine that if the telescope attempts to point to some areas of the sky, it may hit the pier or tripod. This feature allows you to restrict the telescope from slewing to a specified zone directly overhead so that it will not hit your tripod. Refer to page 71 for further information.

**SEARCH**

Indicates the current search mode. This can be "Current" or "All Sky." You can toggle from one to the other.

**SLEW**

Indicates the current slewing rate. This option is hyperlinked, and when clicked will change the slewing rate values depending on the currently defined mount type. The slewing rate for some mounts must be changed with the hand controller and cannot be changed here. Refer the section that discusses your mount.

**TRACK**

Indicates the current telescope-tracking rate. You can toggle between "Sidereal," "Solar" or "Lunar." The slewing rate for some mounts must be changed with the hand controller and cannot be changed here. Refer the section that discusses your mount.

**BUTTON**

Indicates the current button movement rate. Toggle between the rate choices by clicking on the hyperlink. The possible rate selections correspond to the rates on the hand controller of the selected mount. The slewing rate for some mounts must be changed with the hand controller and cannot be changed here. Refer the section that discusses your mount.

**UNIVERSAL**

Indicates the current universal time of the current location.

## Constellation Ticker



The Constellation Ticker was designed to help answer the questions that astronomers always ask, “What’s up now?” and “What can I look at next?” All of the constellations within your viewing range (as defined in the User Settings of Preferences) will display. The constellation abbreviations are hyperlinked, so that when you click on one of them, the Cool Objects window will change to show the object list for that constellation.

Example: If you are in Objects Mode and you click on Aquarius, the Cool Objects window displays Saturn Nebula, Helix Nebula, a couple of planetary nebulas (one magnitude 8 and the other magnitude 11.3), and a dozen galaxies of varying magnitudes. These results assume that your DEEPSKY magnitude limiter is set to at least 13). If any of these objects tickle your fancy, click on the name or give the verbal command, like “Find the Helix Nebula,” or “NGC 7722.” If you are not inspired, select another constellation and review the list of recommended objects.

The display can be customized to suit your viewing location. Refer to page 66 for more information regarding the User Settings of Preferences. These are the parameters you can customize:

- Constellation Ticker Display Refresh Rate – how often the display updates. The default is 20 minutes.
- Constellation Ticker Display Min-Altitude Limit – Since you don’t want to view constellations that have just risen or are about to set, you can specify a minimum altitude. This is also handy if a tree line or observatory wall restrict your viewing range. The default is 0 degrees.
- Constellation Ticker Start Inclusion Zone – If your home or other obstacle prevents you from viewing a certain area of the sky, you can set an observing range. This start and end inclusion range is calculated in degrees from 0 to 360 with the Pole as your reference point (azimuth value). Picture a circle with you in the center and the pole at 0 degrees. If you can’t view an area from the 260 degree to 20 degrees (including the Pole) of the circle, you can set the Start Inclusion Zone to 21 and End Inclusion Zone to 259. Your viewing range will include all objects within this zone. Note that this zone extends all the way up to the zenith (directly overhead).

All constellations that are not within the zone you specified will be excluded from the constellation ticker. However, you can access any position that is above the horizon by requesting the object verbally.

- Constellation Ticker End Inclusion Zone – Please refer to the above.

### *Cool Objects Display When Constellation is Selected From Constellation Ticker*

<u>DigitalSky Active Mode:</u>	Display on Cool Objects Window:
Objects Mode	Will display Cool Objects for the requested constellation
Stars Mode	Same as Objects mode.
Constellation Mode	Will change the current constellation stars valid for the requested constellation.
Variable Stars Mode	Will display valid variable stars for the requested constellation.
Tour Mode	Will display constellation tour objects for the requested constellation.

## Status Indicator Line



### **Recognizing...**

This area will display the phrase spoken to DigitalSky Voice. When Voice Recognition is activated, the words “Recognizing... state” will be displayed until a command is issued.

### **Mount Type Display Window**

This area indicates the mount type you have chosen. This display area is hyperlinked to the Hardware Preferences window.

### Active Grammar Display Window

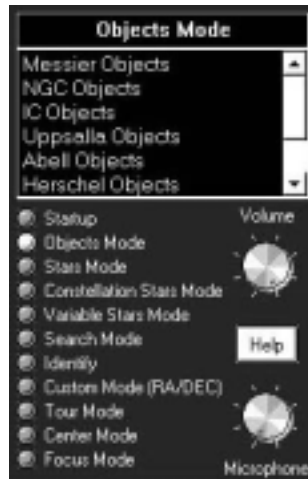
An abbreviation for the current active grammar will display here. The choices are:

- G:E – objects mode
- G:N – stars mode
- G:B – constellation stars mode
- G.V – variable stars mode
- G:S – search mode
- G:T – tour mode
- G:C – custom RA/DEC mode
- G:R – center mode
- G:F – focus mode

### VU Meter

When Voice Recognition is active (display shows “ON”), a thin red line will be visible on the left of the VU meter. As you speak into the microphone, a red bar will fluctuate from Min to Max according to the sound input level.

### Command Window



**Command Window**

This is the main control area for all major functions of the DigitalSky Voice commands.

### LED Command Mode Indicator

The green active LED indicates the current active mode. Simple mouse clicks can be used to switch command modes or use voice commands such as “Search Mode” (with the exception of Startup).

### Command Selection Box

The display in the Selection Box will vary according to the mode. It is often used to display choices. Refer to sections describing the individual modes to discover the information that will be displayed.

### Volume Dial

Adjust the output volume with this dial. Your setting is saved to the database so they do not require re-setting each time. Simply move the small dot with your mouse to the setting you find suitable. Of course, you can adjust the volume on your computer or speakers if a control is available.

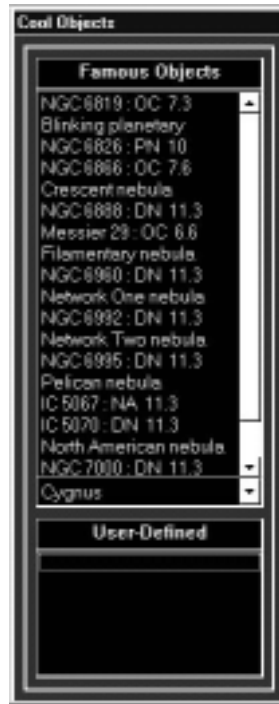
### Microphone Dial

When you use the Microphone Setup Wizard, which is described on page 12, this level will be set. You can override the setting by using this control. We strongly recommend the Microphone Setup Wizard for best recognition accuracy.

## HELP button

Refer to the detailed description on page 73.

## Cool Objects Window



### Cool Objects Window

The information displayed in the Cool Objects window will vary according to the mode that is active. The following descriptions will give you an idea of what you will see:

- **Objects Mode:** Famous objects within the current constellation, i.e. the constellation that contains the last object that you slewed to. We have chose these objects, however you can add to (or remove from) the list yourself by using the Tour Builder Utility described on page 74. This display is the same one that appears in the predefined constellation tours. Please note that the display will be limited by the DEEPSKY magnitude limit as displayed in the Control/Status Panel. In addition to the common name or catalog number, the display also shows the magnitude and an abbreviation for the type of object. These are the abbreviations:  
OC = Open Cluster  
PN = Planetary Nebula  
GX = Galaxy  
DN = Diffuse Nebula  
NB = Nebula  
GC = Globular Cluster  
NA = information not available
- **Stars Mode:** Same display as in Objects Mode. The list of common star names appears in the Command Selection Box above the Command buttons. We did this so that both lists are available to you.
- **Constellation Stars Mode:** Same display as in Objects Mode. The list of Greek letter names appears in the Command Selection Box above the Command buttons. This enables you to access both lists.
- **Variable Stars Mode:** List of variable stars that meet your criterion as specified in Preferences.
- **Tour Mode:** Display the name of the constellation tour that is active and the list of objects in that tour. The user-defined tours are listed in the lower section of the window. If you select one of these, the Cool Objects window will display the objects in that tour.
- **Search Mode:** Display all objects that meet the criterion of your search.
- **Identify Mode:** Display objects that are within the Identify range you specified in Preferences. The most like match for the object in the center of your eyepiece is shown first.

# The Command Modes

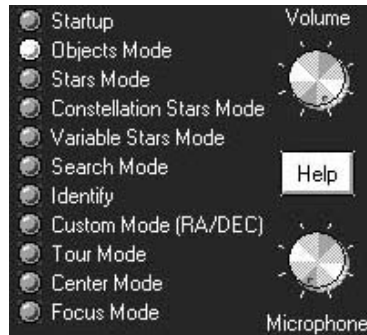
There are ten major command modes in DigitalSky Voice. Each of the nine command modes has a different set of phrases (also called a “grammar”) used for voice-recognition. The various display windows will change depending on the mode you have activated. You can switch between modes by either voice or button command.

The instructions below assume that voice recognition (V-IN) and voice output (V-OUT) are set to ON. If one or both are set to off, then the corresponding voice function will be absent from the instructions.

DigitalSky can be used with equal facility by voice or button control. In a few cases like the startup routine and the Tour or Watch Builder Utilities, the functions can only be accomplished with your mouse (or other input device). Other functions can only be accessed by voice, for instance the “What’s Up DigitalSky?” request, and the photographic timer. Either voice or button, whichever is handiest at the moment, can issue the vast majority of commands.

The ten command modes are:

- Objects mode
- Stars mode
- Constellation Stars mode
- Variable Stars Mode
- Custom Mode (RA / DEC)
- Search Mode
- Tour Mode
- Center Mode
- Focus Mode
- Identify (not really a full-mode, as this does not introduce a new phrase grammar)



## Changing Modes

**Voice command:** A simple voice command will activate a new mode. It’s as easy as this:

Example:     User speaks:                 “Stars mode”  
              DigitalSky confirms:         “Stars mode”

**Button command:** Click on the RED LED next to the command mode you wish to use. The current command mode will be switched off at this point and the newly selected one will be activated. The LED will turn green. If voice recognition is set to ON, all phrases for the current active mode will be available for you to use.

## Requesting Confirmation of the Current Mode

**Voice command:** If you are at the eyepiece and forget the mode you are in, ask DigitalSky.

Example:     User requests:                “ Active mode.”  
              DigitalSky responds:         “Objects mode” or whatever is active.

## Voice Commands Common to all Object-related DigitalSky Modes

With the exception of the Center Mode, Focus Mode and Identify, the following voice commands are available for all the DigitalSky system modes. A few other exceptions are noted below.

**Voice Command:****Response:**

WHAT'S UP DIGITAL SKY?	Will verbally recommend an object to view. Chooses an object randomly from a large list of famous objects based on your preferences regarding the magnitude limit and position in the sky (only suggests objects above your minimum altitude setting and azimuth inclusion zone, see Preferences). This is one of the coolest features of the program, in my humble opinion. This command is not available in the Search and Tour Modes since you are viewing an organized list of objects and don't need any new ideas anyway.
LOCAL TIME	Will verbally report the current local time.
CURRENT OBJECT	Will verbally and visually report the name or catalog designation of the most recent object that the telescope slewed to.
OBJECT COORDINATES	Will verbally and visually report the RA/DEC J2000 coordinates of the last object that the telescope slewed to (current object). DigitalSky refers to the database catalog for this value. It does not poll the mount for its actual position. See next command.
ACTUAL POSITION	Will verbally and visually report the true RA/DEC position with atmospheric refraction taken into account. DigitalSky will poll (ask) the mount for this position, so if you use your buttons (on your mount keypad or the keypad displayed on the screen) or use verbal movement commands in Center Mode, these coordinates will change.
OBJECT DATA	Will verbally and visually report information pertaining to the current object. The data for planets and variable stars can be quite extensive.
RECALIBRATE	Will verbally inform you that a re-calibration on the current object has taken place.
ACTIVE MODE	Will verbally inform you of the current active command mode.
STOP	Stops the telescope movement phase immediately. Note: the Meade ETX mounts do not respond to this command (it may pause momentarily).
STOP NOW	Same as STOP voice command. Note: the Meade ETX mounts do not respond to this command (it may pause momentarily).
HALT	Same as STOP voice command. Note: the Meade ETX mounts do not respond to this command (it may pause momentarily).
QUIT	Same as STOP voice command. Note: the Meade ETX mounts do not respond to this command (it may pause momentarily).
OBJECTS MODE	Changes to Objects Mode.
STARS MODE	Changes to Stars Mode.
CONSTELLATION STARS MODE	Changes to Constellation Stars Mode.
VARIABLE STARS MODE	Changes to Variable Stars Mode.
TOUR MODE	Changes to Tour Mode.
SEARCH MODE	Changes to Search Mode. DigitalSky will ask for your search parameters.
CUSTOM MODE	Changes to Custom Mode. DigitalSky will request RA and DEC coordinates
CENTER MODE	Enables the center mode functions.
FOCUS MODE	Enables the focus mode functions.

## Just for Fun Commands

The following voice recognition commands are available in all modes except Identify, Center or Focus Modes. DigitalSky's responses to these phrases have several amusing alternatives. Can you guess the inspiration for some of these? Please try them all . . . more than once! Share them with your friends.

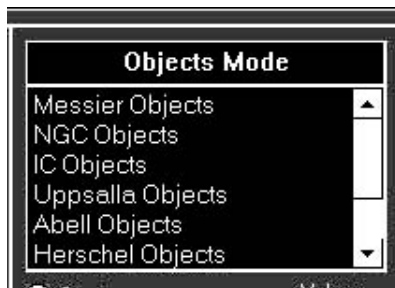
<b><u>Voice Command:</u></b>	<b><u>Response:</u></b>
THANK YOU	Try it !!
COMPUTER	Try it !!
WHERE ARE WE?	Try It !!
HOW ARE YOU TODAY?	Try It !!

## Using Objects Mode

Objects Mode will undoubtedly be the most popular and frequently used mode. You can access more than 48,000 objects with very simple voice commands like "M13" or "Find Jupiter." You don't have to go through a multi-layered command structure or complicated sequences. Just say it, right to the point.

This mode has special features and functions that are not available in the other modes. These will be described below.

Upon completion of the Startup sequence, which linked DigitalSky to your mount, you will enter Objects mode. At this point, the voice-recognition engine is activated. Voice recognition is NOT available until you reach Objects Mode.



**Objects Mode Window Display**

### Objects Mode features and functions:

- Request objects by catalog name and number.
- Request solar system objects by name
- Request many stars and deep-sky objects by their common names.
- Activate the photographic countdown timer (set using voice-commands)
- Identify object request (you actually switch to Identify briefly, then switch back)
- Request the local time
- Obtain Watch Object list information and status (see Watch Builder Utility for more information)
- Obtain information about the object you are viewing, i.e. data and coordinates
- Access all other DigitalSky modes

## Slewing to an Object

### Voice Commands

The voice recognition capabilities of DigitalSky are very powerful, yet easy to use at the eyepiece. Enjoy your observing session without looking at your computer screen. You must use a microphone with an on-off switch.

#### Numbered Objects:

Example: User speaks: "M thirteen"

DigitalSky responds: "M thirteen"

If the Voice Confirm preference is set to OFF, the slew will start right away.

If the Voice Confirm preference is set to ON, DigitalSky will also say "confirm."

User responds: "OK" or "Yes" to initiate slew or "No" or "Cancel" to cancel slew.

DigitalSky will recognize numbers in the following formats:

Example: NGC1746

“NGC one seven four six” – each number said individually

“NGC one thousand seven hundred forty six”

It will not recognize “NGC seventeen forty-six” since this will be interpreted as two numbers, causing confusion. Voice recognition engines are as not smart as people are, thank heavens!

#### Common Object Names:

In addition to catalog names, many objects have common names which can be more readily remembered and invoke pictures in our mind or imaginations when we hear them. If you are unfamiliar with some of these objects, the poetry of their names may entice you to view them. Have you ever wondered what the Sombrero Galaxy or Tarantula Nebula look like? Can you make out the shape of the North American Nebula? A list of possible common names can be found in [Appendix E: Common Object Names](#).

Voice commands for common object names require the phrase “Find the <object name>”.

Example: User speaks: “find the Ring Nebula”

DigitalSky responds: “Ring Nebula”

If the Voice Confirm preference is set to OFF, the slew will start right away.

If the Voice Confirm preference is set to ON, DigitalSky will also say “confirm.”

User responds: “OK” or “Yes” to initiate slew or “No” or “Cancel” to cancel slew.

#### Solar System Objects

The same natural commands are used here. For the planets say “Find <planet name.>” for the Sun and Moon we have added “the” as in “find the Moon” since it is more natural to phrase our request this way.

**WARNING:** We have included the Sun in our database, however special caution must be exercised when slewing to or viewing this object. Whenever you request a slew to the sun or calibration on the sun, verbal and written warnings will be issued. In order to proceed, you must click “OK” or state it verbally. For advanced users, please bear with us. We can all use reminders to respect the sun and of our responsibilities for our own safety and the protection of others observing through our scopes.

DO NOT look at or near the sun, which will cause irreversible damage to your eyes. You must use a proper solar filter installed securely on the front aperture of the telescope. Do not use eyepiece filters since they may crack.

DO NOT look into the eyepiece as the telescope slews. DO NOT attempt to view any object e.g. Venus when it is near the sun.

Carefully supervise all persons using the telescope during the day.

Example: User speaks: “find Jupiter” or “find the Moon”

DigitalSky responds: “Jupiter” or “Moon”

If the Voice Confirm preference is set to OFF, the slew will start right away.

If the Voice Confirm preference is set to ON, DigitalSky will also say “confirm.”

User responds: “OK” or “Yes” to initiate slew or “No” or “Cancel” to cancel slew.

#### **Button Commands:**

##### Numbered Objects:

Click on the database desired in the Command Window. This will display the Object Number Entry window. Enter your catalog number by clicking on the numbers shown under the entry window or by using your computer keyboard. Use the C and CE buttons (located under the number row) to clear entries.

The following example shows the entry for a Messier object. This assumes the user manually selected the Messier Object Catalog from the Command Window.



To initiate the slewing movement, press the Move/Go button. The telescope will slew to the desired object, then DigitalSky will report audibly “object acquired” (except the ETX, listen for the beep signal from the ETX mount).

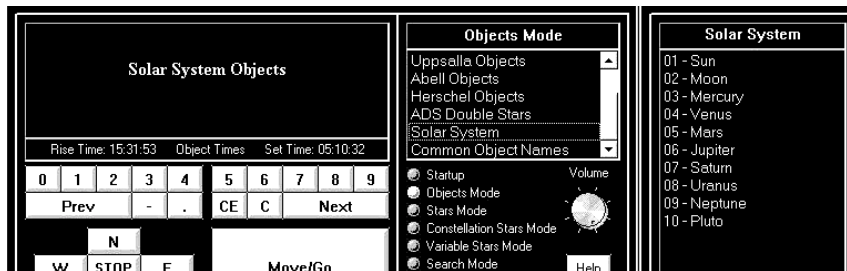
Common Object Names:



Go to the catalog list in the Command Window. Click Common Object Names (scroll down to see it). At this point, the command window will display the common object names that DigitalSky recognizes. Scroll through the list until you find the object you want to see and click on that name. DigitalSky will state the name and send the slewing command to the mount to initiate movement.

Once the telescope completes the slewing operation, DigitalSky will state “object aquired.”

Solar System Objects:



Return to the object catalog list in the Command window. Click Solar System Objects (you will have to scroll down to see it). At this point the planets, Sun and Moon will display in the Cool Objects Window. Click the object you want to see. DigitalSky will state the name and send the slewing command to the mount to initiate movement.

Once the telescope completes the slewing operation, DigitalSky will state “object aquired.”

**WARNING:** We have included the Sun in our database, however special caution must be exercised when slewing to or viewing this object. Whenever you request a slew to the sun or calibration on the sun, verbal and written warnings will be issued. In order to proceed, you must click “OK” or state it verbally. For advanced users, please bear with us. We can all use reminders to respect the sun and of our responsibilities for our own safety and the protection of others observing through our scopes.

DO NOT look at or near the sun, which will cause irreversible damage to your eyes. You must use a proper solar filter installed securely on the front aperture of the telescope. Do not use eyepiece filters since they may crack.

DO NOT look into the eyepiece as the telescope slews. DO NOT attempt to view any object e.g. Venus when it is near the sun.

Carefully supervise all persons using the telescope during the day.

## Summary of Voice Commands to Initiate Object Slewing:

<u>Catalog:</u>	<u>Voice Command used to Request Objects from Catalog</u>	<u>Valid numbers</u>
Messier	"M <object number>"	1 through 110
	"Messier <object number>"	same
NGC	"N G C <object number>"	1 through 7,840
IC	"I C <object number>"	1 through 5,396
Uppsalla	"Uppsalla <object number>"	1 through 12,921
Abell Galaxies	"Abell <object number>"	1 through 2,712
Herschel	"Herschel <object number part1> DASH <object number part2>"	1-x through 984-x
ADS (Aitken Double Star)	"A D S <object number>"	1 through 16,959
Common Names	"Find the <object name>"	see Appendix
Solar System	"Find <planet>" or "Find the <Sun or Moon>."	Solar system obj.

## Information Displays

### *Upon Completion of the Slew – All Objects*

When DigitalSky completes the slew to an object, the Object Information Entry Box will display the object name, the constellation in which it is located, right ascension (RA) and declination (Dec.) coordinates.



### *Object Data Request*

You can obtain additional information by verbally requesting "object data" or clicking on the button of the same name. These are the displays that you can expect to see:

#### Numbered Objects and Common Object Names



#### Solar System Objects



## Additional Voice Commands

Refer to [Voice Commands Common to all Object-related DigitalSky Modes](#) on page 41 for additional voice commands. The section below describes additional commands. A complete list of phrases for Objects Mode is presented in [Appendix A: Phrases By M, Objects Mode Phrases](#).

### Objects Mode Commands That Are Issued By Voice ONLY

There are several VOICE-ONLY Object mode commands that perform special functions.

**Voice Command:**

**Response:**

WATCH LIST	Reports the objects currently on the watch list.
WATCH STATUS	Generates an immediate check of the watch objects currently on the watch list. DigitalSky will report the objects as being either below or above the watch point set with the Watch Builder Utility, see page 79.
CONTROL SETTINGS	Verbally reports current system status of most Control/Status Panel settings.
ABOUT DIGITALSKY	Presents info on the author and copyright of DigitalSky Voice.
HELLO DIGITALSKY	Repeats DigitalSky's opening vocal greeting.
COUNTDOWN <nn> MINUTES	Sets countdown timer to number of minutes.
COUNTDOWN <nn> HOURS	Sets countdown timer to number of hours.
COUNTDOWN <nn> HOURS <nn> MINUTES	Sets countdown timer to number of hours, and number of minutes.
COUNTDOWN STATUS	Reports amount of time left since starting the countdown timer.
CANCEL COUNTDOWN	Cancel the countdown timer setting.

## Using Stars Mode

Stars mode permits access to the major bright stars or common name stars found in the 88 constellations of the night sky. Note that these are the same stars you used during the initial calibration routine.



Stars Mode Window

## Slewing to Stars by Their Common Names

### Voice Commands:

To activate, state "stars mode." A list of common star names will appear in the Command Window along with the constellation in which the star is found and the magnitude of the star. Ask for the star by speaking the simple phrase "find <star name.>" into your microphone. The star name spoken alone is not sufficient for recognition.

Example: User speaks: "find Alberio"

DigitalSky responds: "Alberio"

If the Voice Confirm preference is set to OFF, the slew will start right away.

If the Voice Confirm preference is set to ON, DigitalSky will also say "confirm."

User responds: "OK" or "Yes" to initiate slew or "No" or "Cancel" to cancel slew.

DigitalSky confirms: "object acquired" at the end of the slew (except the ETX, listen for the beep signal from the mount).

### Button Commands:

Click on the LED adjacent to Stars Mode to activate. The list of common star names will appear in the Command Window along with the constellation in which the star is located and the magnitude of the star. Find the star you want to see and click on the name. DigitalSky will state the name and slew to the star. When the slew is complete, you will hear "object acquired" (except the ETX, listen for the beep signal from the mount).

Note that the list of Famous Objects for the current constellation is displayed in the Cool Objects Window. You can also click on these and the mount will slew automatically.

## Information Displays

### Upon Completion of Slew

When DigitalSky completes the slew to an object, the Object Information Entry Box will display the object name, the constellation in which it is located, right ascension (RA) and declination (Dec.) coordinates.



## Object Data Request

You can obtain additional information by verbally requesting “object data” or clicking on the button of the same name. This is the display that you can expect to see:



## Additional Voice Commands

Refer to [Voice Commands Common to all Object-related DigitalSky Modes](#) on page 41 for additional voice commands. A complete list of phrases is presented in [Appendix A: Phrases By M](#), Stars Mode Phrases on page 86.

## Using Constellation Stars Mode:

Constellation Stars mode permits access to the Greek named stars of a given constellation. When enabled, the mode will display the star list available for the current constellation.

The available Greek name choices will be presented in the Command Window. These are the major bright stars of the current constellation (where your scope is pointing). However, you can select another constellation by using the Constellations drop-down box in the Cool Objects Window or select one from the Constellation Ticker toward the bottom of your screen. If another constellation is selected, the Command Window will re-display the bright stars of the newly selected constellation.

## Slewing to Constellation Stars

### Voice Commands:

Request “Constellation Stars Mode” to activate. The Greek stars for the current constellation will appear in the Command Window, shown with the magnitude of the star. Speak into your microphone and request the Greek letter name.

Example: User speaks: “beta”

DigitalSky responds: “beta”

If the Voice Confirm preference is set to OFF, the slew will start right away.

If the Voice Confirm preference is set to ON, DigitalSky will also say “confirm.”

User responds: “OK” or “Yes” to initiate slew or “No” or “Cancel” to cancel slew.

DigitalSky confirms: “object acquired” at the end of the slew (except the ETX, listen for the beep signal from the mount).

Some of the Greek letter names may be difficult for DigitalSky to distinguish, the pronunciations are extremely close, i.e. “beta,” “eta” and “theta.” This is, frankly, the weakest area of voice recognition for DigitalSky and you may have an increased number of error responses. You may wish to consider button commands when requesting the Greek letter names.



**Constellation Stars Mode Window**

**Button Commands:**

Click on the Constellation Stars Mode LED to engage it. The Greek stars for the current constellation will appear in the Command Window, shown with the magnitude of the star. Chose the desired star with your mouse. DigitalSky will state the star name and initiate slewing.

**Information Displays**

*Upon Completion of Slew*

When DigitalSky completes the slew to an object, the Object Information Entry Box will display the Greek letter name, the constellation in which it is located, right ascension (RA) and declination (Dec.) coordinates.



*Object Data Request*

You can obtain additional information by verbally requesting “object data” or clicking on the button of the same name. This is the display that you can expect to see:



**Additional Voice Commands**

Refer to [Voice Commands Common to all Object-related DigitalSky Modes](#) on page 41 for additional voice commands. A complete list of phrases is presented in [Appendix A: Phrases By M, Constellation Stars Mode Phrases](#) on page 88.

## Using Variable Stars Mode

Variable star mode permits access to all 31,220 known variable stars of the General Catalog of Variable Stars (GCVS). All variable stars are designated with the prefix letter V. The actual catalog number for the first 335 variable stars of the current constellation is not used, rather they are replaced with the V prefix. Refer to page 112 to find [Appendix G: Variable Stars Real-Name Cross-Reference Chart](#), which shows these conversions.

When you enter the variable star mode, all of the variables within the current constellation will display in the Cool Objects Window based on the preferences you have set. If you wish to limit the display lists, you can specify the minimum and maximum magnitude ranges and variable star type. Refer to the Preferences section entitled [Object Display Limits](#) on page 69 for a complete discussion of these settings.

DigitalSky will notify you that the star list is loading and the constellation you are in. You cannot use any functions of this mode until the list is completely loaded. If you specified "all types," the list loading time may be a number of seconds depending on the speed of your computer (could be up to 20 seconds with a 100MHz for Sagittarius). Some constellations have many variable stars! The magnitude range ML:xx (magnitude low) and MH:xx (magnitude high) will also display.

Note that the V numbers are specific for that constellation and the display will look similar even if you change to a different constellation. For instance, Aquarius, Draco, Hydra and others all include a variable star designated as "V20," however they represent different stars.

### Slewing to Variable Stars

#### Voice Commands:

State "variable stars mode" when you wish to study these objects. The variable star list will load as discussed above. Although the star display is limited by your preferences, you can slew to *any* variable star within that constellation with a verbal command, however you will not be able to select it with your mouse.

To select a variable star, state "V <number>."

Example:     User speaks:                 "V164" either as single numbers or "one hundred sixty four"  
              DigitalSky responds:        "Variable V164"  
              If the Voice Confirm preference is set to OFF, the slew will start right away.  
              If the Voice Confirm preference is set to ON, DigitalSky will also say "confirm."  
              User responds:                "OK" or "Yes" to initiate slew or "No" or "Cancel" to cancel slew.  
              DigitalSky confirms:         "object acquired" at the end of the slew (except the ETX, listen for the beep signal from the mount).

To change constellations by voice command, simply request the constellation name by stating "constellation <name of constellation>".

Example: User speaks:                 "constellation Ursa Major"  
              DigitalSky will respond with by rebuilding the Cool Objects window with the new list.  
              Proceed as above.



Variable Stars Mode

### Button Commands:

After you select the Variable Stars mode, all stars for the current constellation will be displayed in the Cool Objects Window. If you want to change to a different constellation, use the constellation drop-down box in the Cool Objects Window or click on one of the constellations displayed in the Constellation Ticker toward the bottom of the screen.

To select a given variable star, simply click on the star desired in the Cool Objects Window. Alternatively, you can enter the variable star number directly in the Object Enter/Information window. Press the Move / Go button to initiate the telescope movement phase.

When the slew is complete, the Object Information Entry Box will display data for the variable star. If you want to return to the number entry window, click on "Display Number Entry Window" (this may not be shown on the above screen illustration since it was a late addition to the program, but it is there, honest.)

## Information Displays

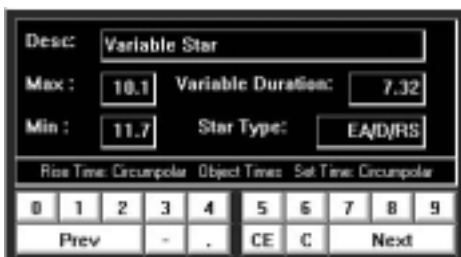
### *Upon Completion of Slew*

When DigitalSky completes the slew to an object, the Object Information Entry Box will display the variable star number, the constellation in which it is located, right ascension (RA) and declination (Dec.) coordinates.



### *Object Data Request*

You can obtain additional information by verbally requesting "object data" or clicking on the button of the same name. This is the display that you can expect to see:



## Additional Voice Commands

Refer to [Voice Commands Common to all Object-related DigitalSky Modes](#) on page 41 for additional voice commands. A complete list of phrases is presented in [Appendix A: Phrases By M, Variable Stars Mode Phrases](#) on page 90.

## Using Custom Mode: Specifying the Right Ascension and Declination Coordinates

Custom mode permits the user to specify right ascension and declination coordinates for any valid position in the night sky. Use this feature to locate known comets, asteroids or some other object that is not in one of our databases.



### Entering Right Ascension and Declination Coordinates

When you select Custom Mode, the RA / DEC entry screen will appear in the Object Information Entry Window. DigitalSky will poll (query) your mount for its current RA and declination coordinates. These numbers will display and be stated as well. This tells you where your telescope is pointed now.

DigitalSky will prompt you for the numbers you wish to change. You can elect to alter just the right ascension or declination coordinates or both.

As in all modes, DigitalSky will calculate the position you have selected to determine if it is above the horizon and within your safe slewing zone. If not, you will be notified and the slewing request will be cancelled.

#### Voice Commands:

Activate by stating "Custom Mode." If you are changing both coordinates, state the RA coordinate first, including with the words "hours," "minutes," and "degrees." You may find this easier to accomplish if you read the numbers rather than saying them from the top of your head. If you pause during your recitation or stumble over the numbers, DigitalSky will have difficulty recognizing the coordinate.

DigitalSky will repeat the coordinates and ask for the declination numbers. State "minus" if appropriate. These numbers will also be repeated. If the numbers are correct, say "find object" or "make it so." This will initiate the telescope movement.

If you only want to change just the RA or declination numbers, but not both, simply state the one that you want. DigitalSky can distinguish these by the words "hours" and "degrees."

If DigitalSky does not repeat the correct numbers, restate them. Use a microphone with an on-off switch.

Example:	User speaks:	"five hours twenty three minutes ten seconds"
	DigitalSky	Repeats the coordinates, then requests the declination values.
	User speaks:	"forty-seven degrees twenty six minutes seven seconds"
	DigitalSky responds:	Repeats declination numbers.
	User speaks:	"find object" or "make it so" to initiate the movement or states new coordinates

## Button Commands:

Using the number entry keys on the DigitalSky main window or your keyboard, complete the right ascension and declination coordinates in the Object Information Box.

Press the Move / Go button to send the slewing command to your mount.

## Additional Voice Commands

A complete list of phrases is presented in [Appendix A: Phrases By M, Custom Mode Phrases](#) on page 92.

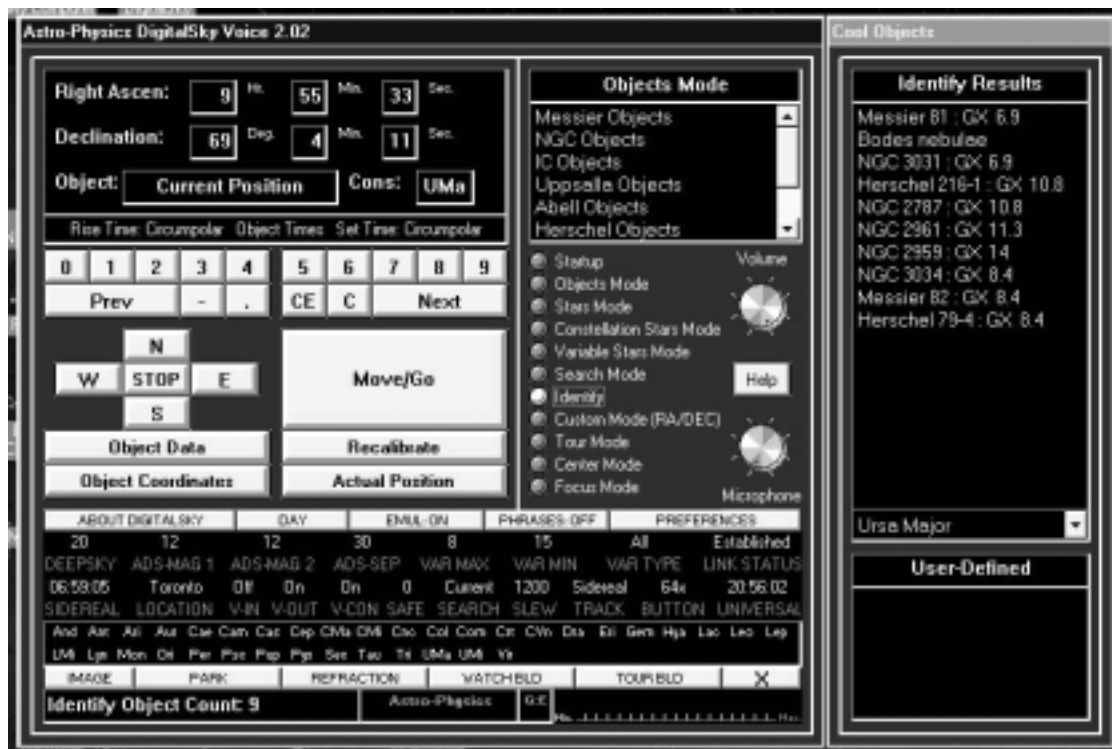
## Using Identify

This feature will help you identify a "faint fuzzy" that is in the center of your eyepiece. Please note that the star databases are not included, so you will *not* be able to identify stars. When you ask DigitalSky to identify an object, these databases will be searched for likely matches based on RA and Declination coordinates: Messier, NGC, IC, Uppsalla, Abell, Herschel, solar system, and common object names.

DigitalSky will inform you of the most likely object match. The common name will be stated first, if there is one, then the other catalog names by which the object is known. The Cool Objects Window will list these and other nearby objects. Refer to the screen display below. Also note that the number of results appear in the box on the bottom left of the screen.

The objects that are shown fall within the range that is specified in Preferences ⇒ Identify Ranges. The right ascension and declination identify ranges describe a rectangular section of sky around the center point where your telescope is currently positioned. Refer to the section entitled [Identify Ranges](#) on page 69 for information on these settings.

When the identification process is complete, DigitalSky will return you automatically to the command mode that you were in when the "identify" command was issued. The Identify Objects list will remain in the Cool Objects Window until you issue your next slew command.



DigitalSky Identify Results Example

## Voice Commands:

Identify can only be used when you are in Objects Mode. Verbally request “identify mode.” There are no other commands to issue since it launches the database search process, displays the results and then exits the mode.

#### Button Commands:

To start the Identify procedures simply click the Identify mode found in the Command Window. The identification routine will start and when completed, DigitalSky exits back to Objects Mode.

## Using the Search Mode

Search mode will assist you to find objects that match certain search criteria that you specify. It is another approach to answering “What should I look at next?” or “I wonder how many NGC galaxies are in Gemini? I’d like to see them.” You can think of “search” as creation of a tour “on the fly.” While the tour mode is more powerful, search allows for spontaneous searches of specified object types.

### What is the Search Based On?

Once you activate the Search Mode, DigitalSky will prompt you (verbally and with a message on the screen) to provide the objects catalog you wish to search and the type of object. After you provide this information, DigitalSky will search its database for objects that meet these search parameters:

**Catalog** – Choose Messier, NGC, IC, Herschel, Abell, or Uppsalla. Each search is limited to one catalog. If you wish to construct a more complicated search of the databases, consider creating a tour. Refer to [Using the Tour Builder Utility](#) on page 74 for information.

**Object Type** – Choose open cluster, globular cluster, galaxy, planetary (nebula), nebula or all object types.

**Current Constellation or All Sky Searches** – You can base your search on one constellation or DigitalSky can search the entire visible sky. Note that if you specify “all sky,” the results of the search may be quite large and not very useful (for instance, an all sky search of all types of NGC objects would yield thousands of matches). We suggest that you search within a single constellation. To select “current” or “all sky,” locate SEARCH in the Control/Status Panel toward the bottom of the screen. Click on the hyperlink above this word to toggle between the settings.

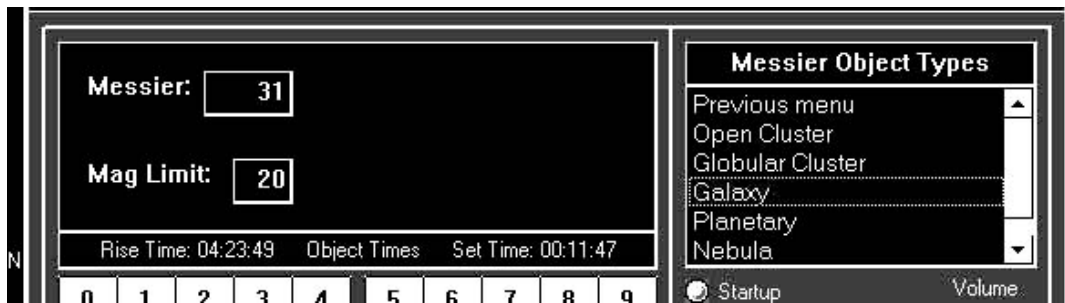
By default, the constellation choice will be the one that your telescope is currently pointing to. You can change the target constellation by choosing an alternate from the constellation drop down box in the Cool Objects Window or by choosing one from the Constellation Ticker (this is a good idea since you know these constellations are above the horizon and within your desired observing range).

**Magnitude limit** – Will be based on the number shown above the words DEEPSKY in the Control/Status Panel at the bottom of the screen. If you wish to change the limit, click on the hyperlink located at the magnitude number. Make your change in the Object Display Limits window that appears. Alternatively, you can access this same window by selecting the Preferences button, then Object Display Limits.

**Horizon checks** – The search results will be based only on those objects that are above the horizon.



Search Mode Catalog Selection



**Search Mode Magnitude and Object Type Window**

**Voice and Button Commands:**

As always, you can use a combination of voice and button cues.

1. Activate search mode.
  - a) Voice: State "Search Mode."
  - b) Button: Click on the LED adjacent to Search Mode in Command Window.
2. DigitalSky responds "please state object catalog and object type" and displays a corresponding message on the screen.
3. User replies with the requested information.
  - a) Voice: State the catalog name first, then one of the object types (both the catalogs and types are displayed in the command box for your convenience if you forget). Give your response smoothly. If you pause a long time between the two parts of your response, DigitalSky will become confused. It will think you have stopped talking. For example, "Messier globular clusters."
  - b) Button: Click on one of the object catalogs displayed in the Command Window. Then choose one of the object types that display. If you change your mind and want to search another catalog, click on "previous menu" to return to the first screen.

Note that when the catalog name is selected, the Object Information Entry Box displays the current magnitude setting. If you wish to change it, do so before the object type is selected.

4. When the search is complete, DigitalSky will display the results in the Cool Objects Window and state "Search results yielded <number> object matches."
5. At this point, you decide if you want to slew to these objects one by one (like taking a tour) or start a new search.
6. Slew to object matches.
  - a) Voice: Say "start search." DigitalSky will state the name of the first object, slew to it and say "object acquired" (except the ETX, listen for the beep signal from the mount). Continue to say "next" to move forward and "previous" to go back to the object you just viewed.
  - b) Button: Select any object displayed in the Cool Objects Window. DigitalSky will state the name of the object, slew to it and say "object acquired" (except the ETX, listen for the beep signal from the mount). Proceed by clicking on the Next or Previous buttons. Alternatively, select any object in any order from the display.
7. Start a new search.
  - a) Voice: Say "new search." DigitalSky will request the object catalog and object type as before.
  - b) Button: Select Previous Menu from the Command Window and you will be returned to the window that lists object catalog choices. DigitalSky will ask you to select the object catalog and object type.

**Information Displays**

*Object Data Request*

You can obtain additional information by verbally requesting "object data" or clicking on the button of the same name. This is the display that you can expect to see:



## Additional Voice Commands

Refer to [Voice Commands Common to all Object-related DigitalSky Modes](#) on page 41 for additional voice commands. A complete list of phrases for Search Mode is presented in the Appendix on page 93.

## Using Tour Mode

Tour Mode allows you to view a pre-defined sequence of objects. Since the tours are planned prior to your observing session, you can maximize the number of objects you view, image with your CCD camera or photograph. We all know that observing nights are few and far between due to the capriciousness of the weather, our busy schedules and numerous responsibilities, the phase of the moon, the distance from our observing site, etc, etc. Planning a tour ahead of time will allow you to maximize your time.

### Types of Tours

#### *Constellation Tours*

Pre-defined tours for all 88 constellations are provided. Each tour already contains famous and favorite objects for you to enjoy. Best of all, you can customize these tours by adding your own personal favorites or deleting objects you don't want to include. We'll discuss the Tour Builder Utility on page 74.

#### *User-defined Tours*

We have provided several tours based on a seasonal theme: Winter Wonders, Spring Sensations, Summer Sizzlers and Fall Favorites. Try them out, and then modify them to suit your observing style! Create your own tours whether you want to use them just once or save them forever. Use your imagination! Do you want to create separate tours of planetary nebula, edge on galaxies, a tour of the Virgo cluster, a Messier marathon (we know this is probably sacrilegious) or create a marathon with your own name. You are the master of the universe.

If you put together a really cool tour that you think others might enjoy, submit it to our website <http://www.digitalsky.com>. Create your tour, try it out to verify its coolness, create an export file (follow the directions in the Tour Builder Utility section), and follow the instructions at our website to share it with us – *and, perhaps, the world*. While you are at the site, check out the tours that are already posted and import any that you would like to try.

Tours will display with all the objects that are included. They are not controlled by the magnitude limit during tour mode, however you can set magnitude limits when you build the tour. If you have a small scope, you may want to delete some of the fainter objects in the constellation or user-defined tours that we provided, however if you have a large aperture scope, you may want to add more faint fuzzies or obscure objects that you enjoy viewing.

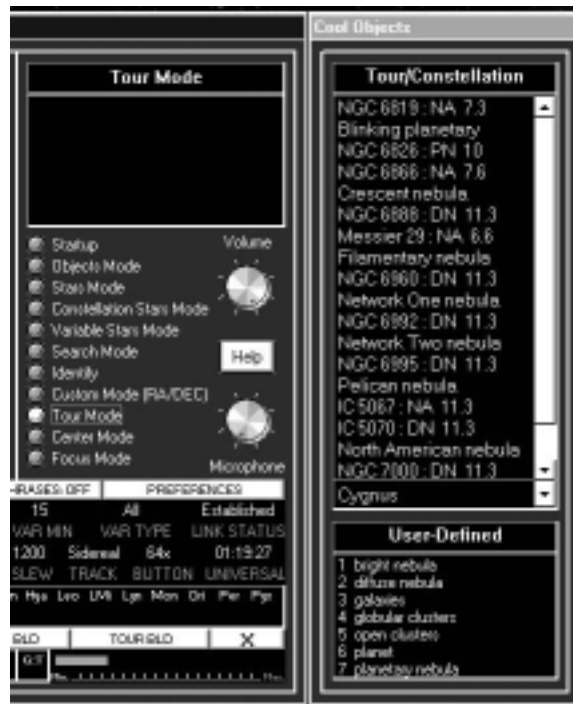
The Cool Objects tour list will also display all objects whether they are above the horizon or not. If they are below the horizon, DigitalSky will inform you and will refuse to slew. Your safe zone is active, as always, so your mount will not slew to a forbidden area.

#### **Voice and Button Commands:**

As in all other command modes, you can use a combination of voice and button cues.

1. Engage tour mode.
  - a) Voice: State "Tour Mode."
  - b) Button: Click on the LED adjacent to Tour Mode in the Command Window.

2. DigitalSky will respond “tour <constellation> or state new tour.” It will state the name of the constellation that your telescope is currently pointing to, inviting you to tour that one first. The Cool Objects Window will display the objects in this tour.
3. Start the tour. You have several choices:
  - a) Start the tour of the current constellation.
    - i) Voice: Instruct DigitalSky to “start tour.” DigitalSky will state the name of the object, slew to it and inform you “object acquired” (except the ETX, listen for the beep signal from the mount).
    - ii) Button: Select the object that you wish to see first. It can be the first object on the list or an object further down. DigitalSky will begin the slew and notify you “object acquired” when the destination is reached (except the ETX, listen for the beep signal from the mount).
  - b) Select a different constellation tour:
    - i) Voice: Say “tour <constellation>” inserting the name you prefer. The new tour list will load. Instruct DigitalSky to “start tour.” DigitalSky will state the name of the object, slew to it and inform you “object acquired” (except the ETX, listen for the beep signal from the mount).
    - ii) Button: Choose a constellation from the constellation drop-down box or click on one of those listed on the Constellation Ticker. We prefer the Constellation Ticker method since we know these are above the horizon. Select the object that you wish to see first. It can be the first object on the list or an object further down. DigitalSky will begin the slew and notify you “object acquired” when the destination is reached (except the ETX, listen for the beep signal from the mount).
  - c) Select a user-defined tour:
    - i) Voice: Say “tour <tour number>.” You must first view the screen to see the number that corresponds to the tour you want. User-defined tours are *not* called by their name. Since the user enters them, they will not be in the voice recognition grammar engine. If you add new tours, the number assigned to existing tours may change since they are ordered alphabetically.  
  
The objects for the new tour will load into the Cool Objects Window. Request “start tour” as indicated in the previous voice example.
    - ii) Button: Select a tour from the drop-down box and proceed as in the previous button example.
4. Continuing the tour.  
The tour objects will continue in the order they are presented in the Cool Objects Window. Keep in mind that one object can have a common name as well as another catalog name associated with it, so a single object can be listed two or more times in the same tour (this would only occur in constellation tours). When the tour is complete, DigitalSky will inform you that you have seen all the objects. Request a new tour, if you wish.
  - a) Voice: When you are ready to view the next object, state “next” or you can review a previous object by requesting “previous.”
  - b) Button: You can view the objects in any order you like by clicking them. If you wish to progress in order, click on the “next” and “previous” buttons.
5. You may exit Tour Mode at any time. State “exit” (this will take you back to the last mode you were in) or state the name of the mode you want to use next.



Display of Tour Objects in Cygnus

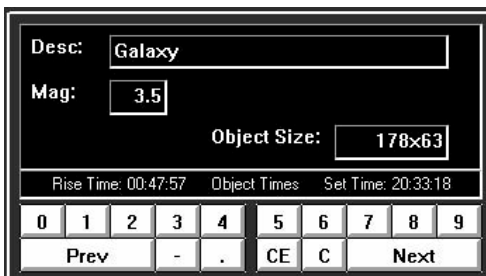
## Information Displays

### Upon Completion of the Slew



DigitalSky will display the object name and the name of the tour. This is especially handy for the user-defined tours.

### Object Data Request



You can obtain additional information by verbally requesting "object data" or clicking on the button of the same name. These are the displays that you can expect to see:

## Additional Voice Commands

Refer to [Voice Commands Common to all Object-related DigitalSky Modes](#) on page 41 for additional voice commands. A complete list of phrases for Tour Mode is presented in the Appendix on page 95.

# Using Center Mode

Center Mode is used to place an object in the center of an eyepiece in order to recalibrate on that object. This mode is most useful when using voice commands since it allows you to remain at the eyepiece – the most sensible place to be when you are making minute adjustments to the position of an object.

The directional buttons are active even when you are using voice commands. In fact, as you give your verbal command, the button on the screen will visibly depress and release as you direct. This is especially fun in emulation mode since you can judge the effectiveness of your command by watching the screen.

If you are imaging with your CCD camera and need to center the image on your chip, you will be sitting at the sitting at the keyboard, observing your monitor. You can use either voice or the directional buttons (or the keyboard controller of your mount, whichever is handier).

Due to differences in command languages for the individual mounts, some of the functions may not be available. Refer to the notes below regarding limitations.

## Centering Procedure

Adjust the centering speed by changing the button rate as shown above the word “button” in the Control/ Status Panel. These rates are the same as the ones available on the hand controller that comes with your mount. Toggle to find the rate that you want to use.

This procedure is effective for most of the mounts. Refer to the section below for exceptions. As always, use your microphone for these commands. You may want to leave your microphone on rather than turning it on and off since the time will be short between commands. Also, you don't want your “stop” command to be prompt and not delayed since you have to turn the microphone on and off.

### Voice Commands:

Example:	User speaks:	“center mode”
	DigitalSky responds:	“object centering activated”
	User speaks:	“move up”, “move down,” “move right,” or “move left”
	User speaks:	“stop”
	User speaks:	repeats commands as needed
	User speaks:	”exit”
	DigitalSky responds:	“recalibrated on <name of object>”

If you change your mind and decide not to recalibrate, say “cancel” and you will exit from Center Mode *without* calibrating.

### Button Commands:

To initiate movement, click on the desired directional button and hold it as long as you want the movement to continue. When you release the button, the movement will stop. To change the button rate, click on the hyperlink at the word “Button” in the Control/Status Panel. Toggle to find the rate that you want. These rates correspond to the rates available on your hand controller and are customized for each mount.

## Special Notes Regarding Mount Type

### *Astro-Physics GTO -*

- Use the voice and button procedures described above.
- Can also adjust center speed by voice
  - “Center speed slow” results in 1x sidereal
  - “Center speed medium” results in 12x sidereal
  - “Center speed fast” results in 64x sidereal

### *Meade LXD650, LDX750*

- Use the voice and button procedures described above.
- Can also adjust center speed by voice
  - “Center speed slow” results in Meade's Guide rate = 2x sidereal rate
  - “Center speed medium” results in Meade's Center rate = 32x sidereal rate

“Center speed fast” results in Meade’s Find rate = 2 degrees per second

### *Meade LX200*

- Use the voice and button procedures described above.
- Can also adjust center speed by voice
  - “Center speed slow” results in Meade’s Guide rate = 2x sidereal rate
  - “Center speed medium” results in Meade’s Center rate = 32x sidereal rate
  - “Center speed fast” results in Meade’s Find rate = 2 degrees per second

### *Meade ETX-90/EC and 125/ED with Autostar*

The following comments are based on the first version of the Autostar firmware and version 1.1. Center mode functions are severely limited due to the command protocol for this mount. Meade representatives insist that the command protocol is the same as the LX200, however the directional and stop command code is certainly different or non-existent.

If you click on one of the directional buttons or give a voice command, the mount will move in the desired direction for approximately two seconds, then resume the normal tracking rate. If you release the button in less than two seconds, the movement will stop. You can repeat this process several times. The Stop button does NOT work at all.

For all practical purposes this is not a useful function for the Meade ETX.

### *Vixen SkySensor 2000-PC*

- Use the voice and button procedures described above.
- Can also adjust center speed by voice
  - “Center speed slow” results in Vixen’s Guide rate = 2x sidereal rate
  - “Center speed medium” results in Vixen’s Center rate = 32x sidereal rate
  - “Center speed fast” results in Vixen’s Find rate = 2 degrees per second

## **Using Focus Mode**

Focus Mode allows you to stand at your telescope eyepiece and focus your image with verbal commands. You must have an electronic focusing motor (like a JMI Motofocus) attached to your focuser and plugged into the control panel of your mount for this to be used. The following commands are spoken into your microphone:

Example:    User speaks:            “focus mode”  
              DigitalSky responds:    “focus mode activated”  
              User speaks:            “focus in” or “focus out”  
              User speaks:            “ stop”  
              Repeat above sequence as needed.  
              Adjust focusing speed:    “focus speed fast” and “focus speed slow”  
              User speaks:            “exit”  
              DigitalSky responds:    “focusing deactivated”

As mentioned in the Center Mode discussion above, the Meade ETX does not recognize the stop command. We recommend that you use the manual controls of the focus motor control box.

## ***Day and Night Screen Displays***

DigitalSky Voice can be placed into a Night-Screen display that will significantly reduce the screen glare from your personal computer or laptop. It was designed to provide as little excessive brightness as possible. Therefore large amounts of red, green and black are used throughout the displays.

The Night Screen mode will first drop a black background behind the program. Next all of the Windows screen attributes will be changed to red and DigitalSky itself will also change its own background and button colors.

While in Night Screen mode, Windows operations will not be affected. However, all other programs launched when DigitalSky is in the Night-Screen mode will change to red since the Windows display, on an operating-system level, is affected as well. Upon exiting DigitalSky Voice, your Windows environment will change back to its normal settings.

### **How to change between Day and Night Screen Modes**

- **Button command** – Click the DAY / NIGHT button in the Control/Status Panel window. The button will toggle back and forth as you click it.
- **Voice command** - This command is available only in Objects Mode (more on this later). By saying “night screen” into your microphone, DigitalSky will switch from Day Screen to Night Screen. The reverse is true if you state “day screen.”

## ***Emulation Mode – if you are not connected to a mount***

When Emulation Mode is enabled, all DigitalSky system functions, with the exception of the park sequence, will be available. Since all modes and voice-commands are available, users can practice using DigitalSky without the need to setup their telescope systems. We suggest that you familiarize yourself with the program in the comfort of your home before heading out in the field.

It is even possible to use DigitalSky Voice during your observing sessions even if you don't have a computerized go-to mount. You can set up in Emulation Mode and simulate the movements that you make to your telescope manually or with your keypad controller. You will not have the advantage of automatically slewing to the object, however you can utilize all the information displays about the objects that are available to observe and their coordinates.

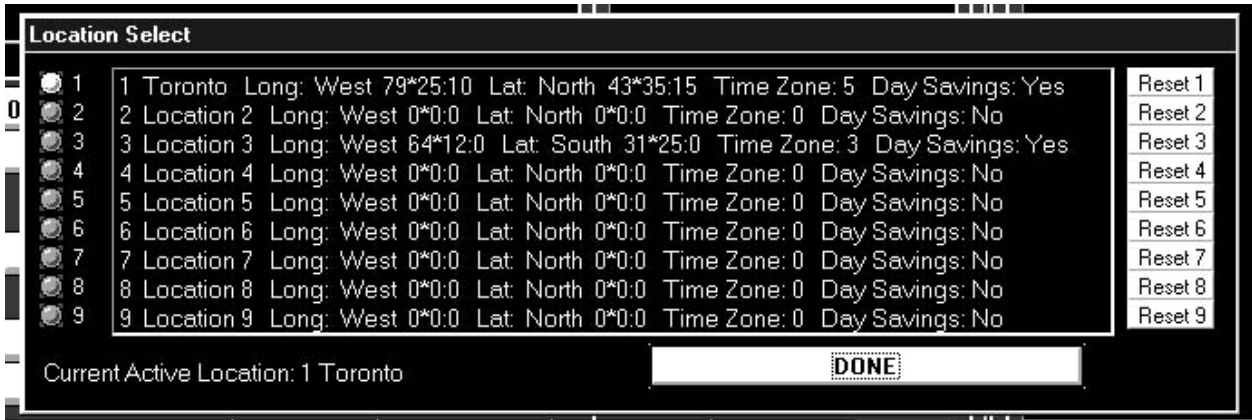
When emulation is “ON”, the serial port I/O is not performed. That means that DigitalSky will not look for the connection to your mount.

### **Example Emulation Mode Scenario**

1. Startup the DigitalSky program. Wait till you hear the vocal greeting message.
2. At this point, click the EMUL:OFF button to enable the emulation mode. The caption on the button will change to EMUL: ON and DigitalSky will vocally state the emulation mode is activated.
3. You must now simulate the process of connecting to the telescope mount. Emulation mode requires the exact same startup procedure as if you had a real mount. Voice recognition is NOT available at this point.
4. Click Link to Telescope Mount found in the Command Window.
5. DigitalSky will respond verbally “Link established, please manually point the telescope to a star selected from the Cool Objects window and click on the star sighted.” Instructions are also displayed in the Information window.
6. Select any given star on the Cool Objects Window by clicking on that star. Choose Alberio for example. It doesn't really matter if the star can be seen at that time of day from that location. Emulation Mode is very forgiving.
7. DigitalSky will request that you to press the Move/Go button once you have centered the requested star in a medium to high powered eyepiece. Of course since this is emulation mode, you can assume that the star is centered. Again, instructions are provided in the Information window.
8. Click on the Move/Go button and DigitalSky inform you that Objects Mode is now activated.
9. At this point FULL VOICE RECOGNITION will be available to you. Remember that Voice recognition is ONLY available after you reach the Objects Mode. At this point, all other modes are accessible and fully voice enabled.

## Setting up Additional Locations

To setup additional location sites, press the LOCATION button on the main DigitalSky Window. This will present the screen shown below.

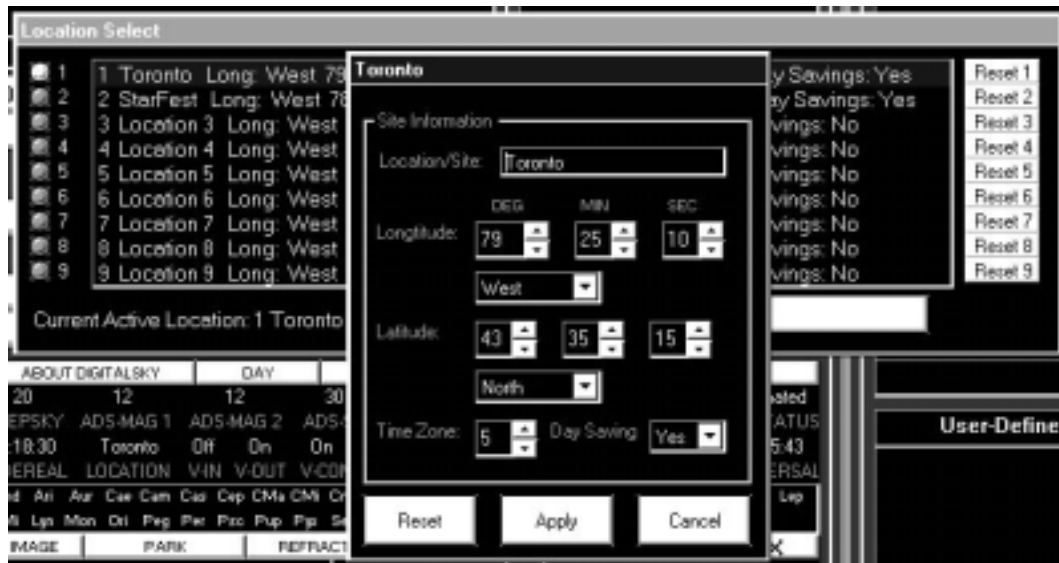


Location Selection Screen

DigitalSky was designed so that any time a new location is created a new set of preferences is also created (refer to the Preferences section). This allows the user to specify *unique* profiles for each location. When the new location is entered, the default settings will automatically apply. Changes are made by clicking on the Preference button and setting the desired values or by using the hyperlinks in the Control/Status Panel. These Preferences values become activate whenever a particular location is selected. For example:

Location 1: Defined as "Toronto." The user will define the magnitude limits for various object types (non-stellar, ADS double star, variable stars), Min-Altitude (horizon) limit and Azimuth Inclusion zone to reflect the normal expectations and limitations for viewing at this site. For instance, his house is in the way and he cannot view the NE sky.

Location 2: Defined as "StarFest." This is the user's favorite star party site outside the city. The conditions here are ideal so he can set his preferences for higher magnitude limits and the sky is unobstructed so his Azimuth Inclusion zone is set from 0 to 360 degrees.



Location Editing Screen

## Set up new locations

1. Click on the Location button to bring up the screen as shown above.
2. Click on the location detail that you wish to enter or edit. The editing screen will appear. Do not click on the LED since that simply selects the location to activate.
3. Using your keyboard (this is one of the few functions that keyboard entry is required), type the name or description of your location.
4. Enter the longitude and latitude of your location by clicking on the up/down arrow keys or by highlighting the number field and typing new numbers. Include the degrees, minutes, and seconds. All numbers are entered with a positive value.

To determine your longitude and latitude, consult your atlas, topographical or automotive maps. You may need to interpolate between the major longitude and latitude lines on the map. The closer you get the better, however it is not necessary to be exact to the seconds (last two number fields) since the purpose of these entries is to calculate which objects are above your local horizon. If you are fortunate enough to have a GPS (Global Positioning System), it will be easy to determine your exact location.

5. Select "West" or "East" of Greenwich and "North" or "South" of the equator from the drop-down boxes. For example, if you live in North America, you will select "West" and "North."
6. Set the time zone for your area. Again, Greenwich is your reference.
7. Indicate if you are currently under daylight savings time, which includes the summer months. You may need to change this setting in the Spring (yes) and Fall (no) when you set your clock forward and back.
8. When you have completed your entries, select the APPLY button to save the changes to the database.
9. When all locations are defined, exit by click the DONE button on the Location Selection window.
10. To reset the location setting to the default values, use one of these methods:
  - Bring up the Location Selection window and select the Reset button on the right side of the screen that corresponds to the location you want to set back to the default values. The display information will change.
  - Bring up Location Editing Screen and select Reset.

## Choosing a location

1. Click on LOCATION hyperlink in Control/Status Panel.
2. Click on the LED next to your observing location. This will highlight the LED in green.
3. DigitalSky will load all of the preferences that you have set for this location.
4. A confirmation window will appear. Click "OK."
5. Select DONE to exit Location Selection window.

## Setting DigitalSky Options with the Preferences Screens

The Preference settings allow you to customize DigitalSky to suit your telescope, mount, computer hardware, observing location and voice preferences.

Remember that each location can have its own set of preferences. When a new location is set up, the default preferences will be active. If you modify any preferences while a particular location is active, these changes will be saved and linked to that location. Each time you select that location, your preferences for that location will become active also.

The preferences area is broken-down into six major areas, each dealing with a different part of the DigitalSky Voice System.

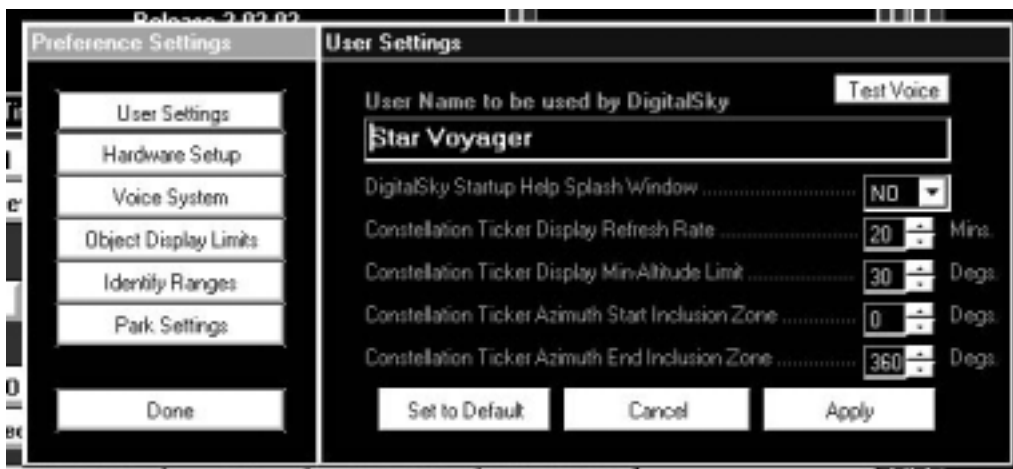


DigitalSky Preferences Choice Screen

All Preferences windows have three pushbuttons. These are described as follows:

- Set to Default** – resets all preferences to factory default values.
- Cancel** – exits from the Preferences window and restores all values if changed.
- Apply** – saves changes made to preferences to the DigitalSky database.

### User Settings



DigitalSky User Preferences Window

**User Name** – This is the name that will be used when DigitalSky greets you as you start the program. It is also used for the watch notifications and when giving a farewell greeting as the program is exiting. This feature is lots of fun since you can type in your name or some real or imagined title, for example “Your Excellency” or “Star Fleet Commander.” The default is “Star Voyager.” Highlight the words in the input box and enter the name you wish to use. Try a few to see how they sound.

**Test Voice** – Click on this button to hear the user name.

**DigitalSky Startup Help Splash Window** - The initial Startup Help screen can be toggled On and Off from this window. If you do not observe frequently, we suggest that you display the message each time you start up.

**Constellation Ticker Display Refresh Rate** – This setting defines the length of time DigitalSky will wait until it recalculates the positions of the constellations and determines which ones are above your horizon as defined in the next preference. The default refresh rate is 20 minutes.

**Constellation Ticker Display Minimum Altitude Limit** – You probably do not want to observe constellations when they are near the horizon or you may have observatory walls that block a portion of the sky. In this case, you may wish to set the altitude limit so that the obscured constellations do not display on the constellation ticker. The default value is 30 degrees.

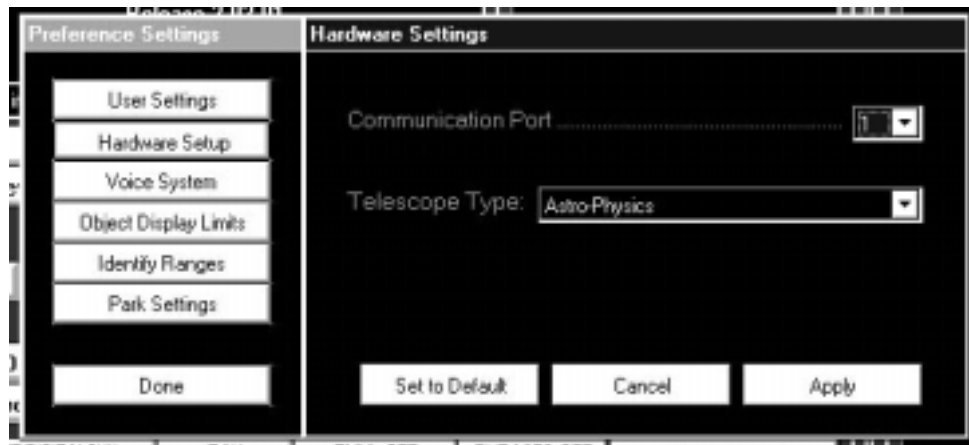
**Constellation Ticker Azimuth Start Inclusion Zone** - If part of your observing site is obstructed by trees, buildings, observatory roofs or domes, you can limit your constellation ticker so that the constellations that you can't see won't be displayed. This zone is defined by an azimuth setting. The range will start at zero degrees (at the pole) and will be defined in a clockwise direction ending where you began with 360 degrees. Imagine a large circle at the horizon around your observing site. Now, estimate those portions of the sky that you *can see* and set the start and end points accordingly. Enter one value here and the other in the next item. Remember that you are specifying an *inclusion* zone.

For instance, if you can't view an area from the 260 degree to 20 degrees (including the Pole) of the circle, you can set the Start Inclusion Zone to 21 and End Inclusion Zone to 259. Your viewing range will include all objects within this zone. Note that this zone extends all the way up to the zenith (directly overhead).

All constellations that are not within the zone you specified will be excluded from the constellation ticker. However, you can access any position that is above the horizon by requesting the object verbally.

**Constellation Ticker Azimuth End Inclusion Zone** – Refer to the above explanation.

## Hardware Setup



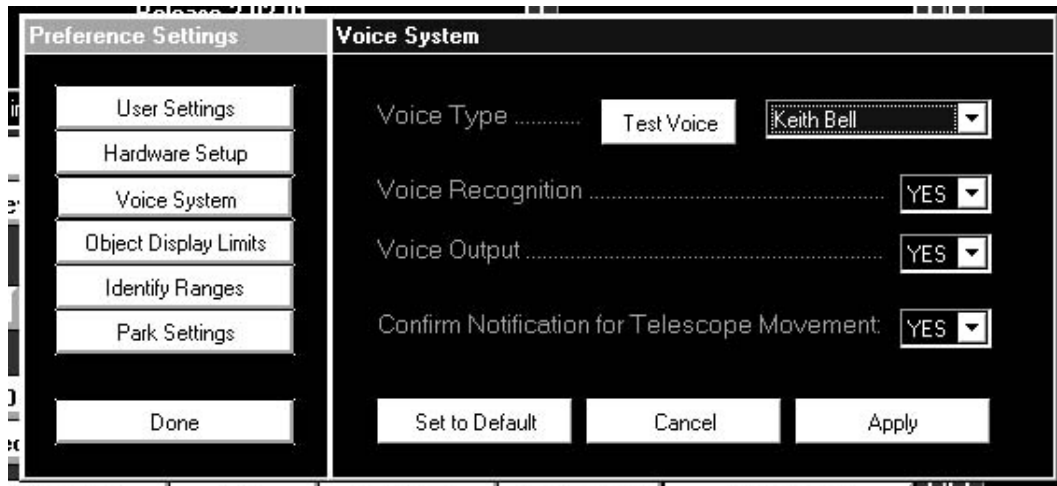
**DigitalSky Hardware Preferences Window**

**Communication Port** - Select the Com (serial) port to use with DigitalSky. Use the drop-down box to select 1 through 4.

**Telescope Type.** Select your mount with the drop down box. Choose Astro-Physics (GTO models), Meade Systems, LX D650/750, LX200, ETX-90/125 (models using Autostar only) or Vixen SkySensor 2000-PC. It is important that you select the correct mount type since the data that is sent to the mount from DigitalSky is tailored to the specific command language (protocol) specified for each mount.

Note: If your computerized mount is not listed above, but the command language is said to be compatible with Meade's, select either the Meade LX200 or LX D650/750 (if it is a German Equatorial). If in doubt, contact Astro-Physics.

## Voice System



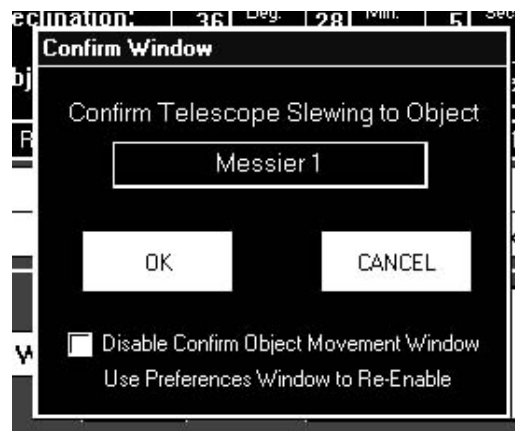
DigitalSky Voice System Preferences Window

**Voice Type** – Select various output voices from drop down box. Some are just for fun, so listen to them for a laugh. Try each one to determine which you prefer. We have set our favorite one to be the default (Keith Bell).

**Voice Recognition and Voice Output** - You could elect to have the voice output and voice recognition systems suppressed or active when using DigitalSky. Selecting YES (Default condition) or NO will enable or disable these options. You can also change these settings very easily by clicking above the V-IN and V-OUT words on the Control/Status Panel (near the bottom left of the screen). “On” (yes) and “Off” (no) will toggle back and forth.

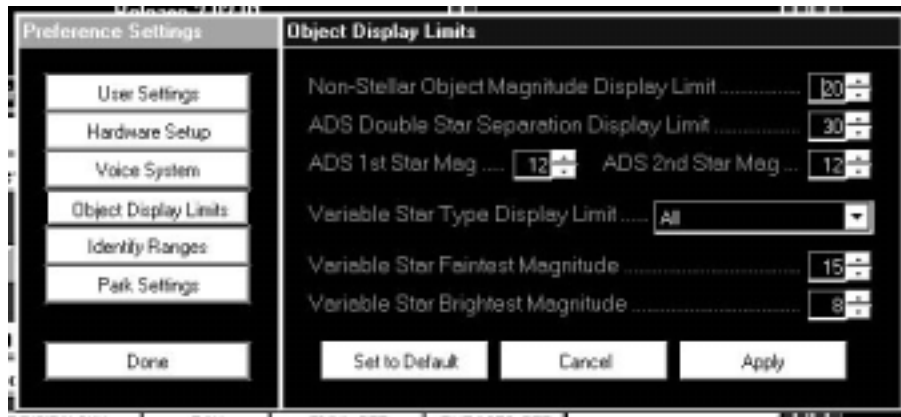
**Confirm Notification for Telescope Movement** - If this confirmation box is set to “yes” and you give a verbal command to slew to an object, DigitalSky will repeat the object name and request confirmation. If you wish to continue the slew, respond “Yes,” “OK,” or “Find Object” or click the “OK” buttons. The telescope will slew to the object. You can cancel the slew by stating “cancel” or “no” to this prompting or clicking the button.

If you want to disable the confirmations, you can choose “no” on this preference screen or select the Disable Confirm box in the Confirm window itself. Confirm can be reactivated in the preference screen.



Confirm Movement/Slewing Prompting Window

## Object Display Limits



DigitalSky Object Display Limits Window

**Non-Stellar Object Magnitude Display Limit** – If you have a telescope with a large aperture, you will want DigitalSky to display all objects regardless of brightness. However, if you have a smaller telescope, you can customize DigitalSky to guide you to objects suitable for your instrument. Adjust the magnitude here to limit possible object matches and display only those objects that are less than or equal to the specified value. These will be impacted:

- Cool Objects window displays
- Command Objects window displays
- Search Mode object matches
- “What’s up DigitalSky?” When you ask this question, the responses will be filtered to suit your magnitude.

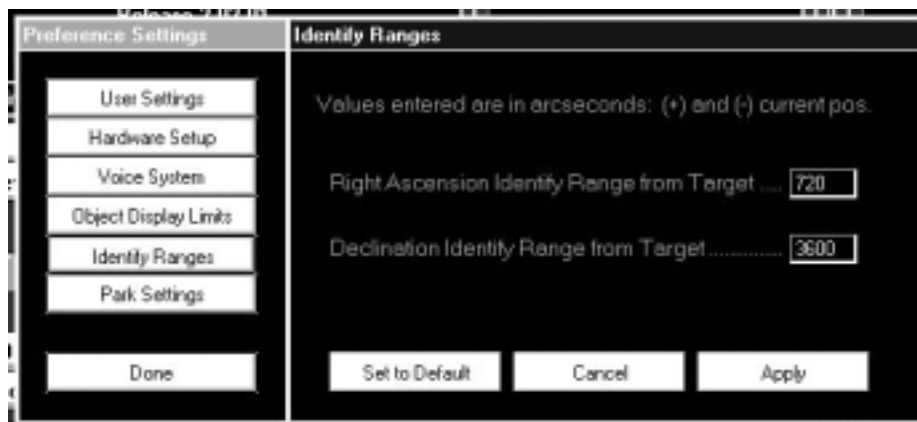
**ADS Double Star Separation Display Limit** – Can be set to permit only those double stars that are less than the specified separation in arc seconds to be listed in the Command window when the ADS catalog is selected.

**ADS 1<sup>st</sup> Star Mag and ADS 2<sup>nd</sup> Star Mag** – The magnitudes of the double stars displayed in the command window can be individually set for double star one and double star two. The values set will force the display to show double stars that fall within the allowable magnitude maximums

**Variable Star Type Display Limit** – Use the drop-down box to select the type of variable stars you want to display in the Cool Objects window when Variable Stars Mode is activated. Set to “All” to permit all types.

**Variable Star Faintest Magnitude and Variable Star Brightest Magnitude** – The variable star must fall between these values in order for it to appear on the variable star display in the Cool Objects window.

## Identify Ranges

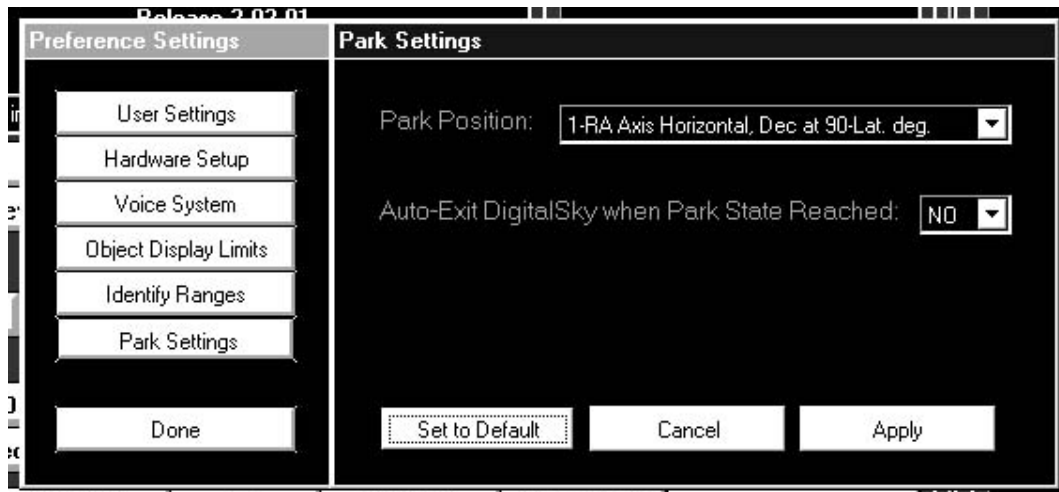


DigitalSky Identify Ranges Window

**Right Ascension Identify Range from Target and Declination Identify Range from Target** – When you ask DigitalSky to Identify an object in your eyepiece (Identify Mode, see page 55), the databases will be searched for likely matches based on RA and Declination coordinates. Use this preference window to set a range of values that describe a rectangular section of sky around the center point where your telescope is currently positioned. Based on these values, DigitalSky will search its databases for objects that fall within this coordinate range. The most likely match will be on the top of the list displayed in the Cool Objects window and will be verbally identified by DigitalSky.

The default values are 720 arcseconds in Right Ascension and 3600 arcseconds in Declination. You can change these values by simply typing in another number to either lower or increase the search range values. Remember larger range values will include more possible object matches, smaller range values will, of course, do the opposite. We have found that the default values provide sufficient match range values for most circumstances.

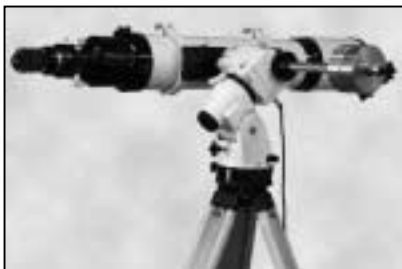
## Park Settings



**DigitalSky Park Settings Window**

The park position options available to you will depend on the mount you have selected. Be sure that the hardware setup is correct, and then click on the arrow next to the Park Position drop-down box. One, two or three of the options shown below will be offered as possibilities:

*Scope is level and pointing north.*



RA axis horizontal, Dec. at 90-Lat. degrees

This park position will place the right ascension axis parallel with the ground. The telescope will be on one side of the mount and the counterweights on the other. The declination axis will be placed at 90 degrees minus your latitude, so that the telescope will be in position parallel with the ground.

*Scope is level and pointing East.*



RA axis vertical, Dec=0

This position will place the right ascension axis vertical with the telescope oriented above the saddle plate and the weights point down. The declination axis will be placed at 0 degrees.

### *Scope is pointing to the pole*



RA axis is vertical, Dec=90

This position will place the right ascension axis vertical with the telescope oriented above the saddle plate and the weights point down. The declination axis will be placed at 90 degrees. This is the classic refractor pose.

**Auto-Exit DigitalSky when Park State Reached** - The next drop-down box selects what action DigitalSky Voice takes after Park State is achieved (after you click on the Park button). If you choose "Yes," DigitalSky will automatically close down and exit when park is activated. If you choose "No," DigitalSky will de-link from the telescope mount itself and place itself in the startup mode.

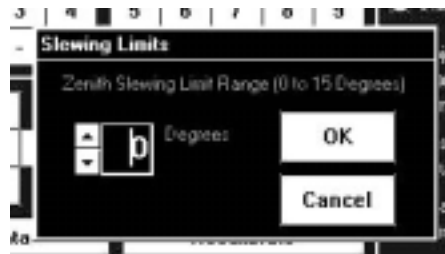
## ***Setting the Telescope Slewing Restriction (Safe) Zone***

You can set a slewing restriction zone (also called "safe zone") to prevent your telescope from striking your mount or pier during a slew. A wide variety of telescopes, piers, tripods and accessories are used on the mounts. You may determine that if your telescope attempts to point to certain areas of the sky near the zenith, the accessories or even the scope itself may hit the pier or tripod.

To prevent this, set your safe zone from 1-30 degrees as measured from the zenith (position directly overhead). This zone describes a circle around the zenith. To determine the setting you need, hold on to the back of the telescope and manually move it to point at the zenith. Estimate the number of degrees from the zenith that is safe.

Click on the hyperlink above the word SAFE on the Control/Status Panel. This will bring up an entry window. Set the value by clicking the up or down buttons to set the restriction zone value. Then press the OK button.

If you request an object that lies within this zone, DigitalSky will inform you and will cancel the slew.

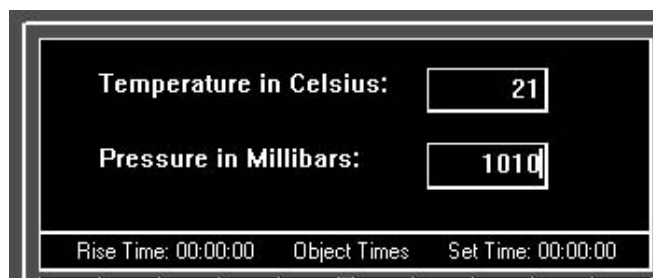


**Slewing Limit Restriction Window**

## Setting for Atmospheric Refraction

Objects found very close to the horizon can be affected significantly by the phenomenon of atmospheric refraction. As a result, the actual telescopic positioning to a particular object can be affected. Use this setting to compensate for these changes.

Compensation for atmospheric refraction is achieved by supplying the temperature and barometric pressure of your location.



The screenshot shows a black window with white text. At the top, it says "Temperature in Celsius:" followed by a text box containing the number "21". Below that, it says "Pressure in Millibars:" followed by a text box containing the number "1010". At the bottom of the window, there are three labels: "Rise Time: 00:00:00", "Object Times", and "Set Time: 00:00:00".

**Atmospheric Refraction Window**

To enter the temperature and pressure, press the Refraction button found on the Control Panel Window.

The temperature must be entered in Celsius degrees and pressure in millibars. A good reference value for the average day would be 21 degree Celsius, and 1010 millibars pressure.

Press the Move / Go button to exit this window and activate the atmospheric refraction values you have set.

## Parking Your Mount at the End of Your Observing Session

The Park sequence moves your telescope to a pre-defined position at the end of your observing session. DigitalSky Voice will save the position information so that you will *not* have to re-calibrate when you start the next time. If you have parked, the mount, DigitalSky will synchronize immediately when you click on "Resume from Park" in the Startup Window.

In order for Park to be effective, the telescope must remain in the same position until the next session. If the telescope is moved, the position information remembered by DigitalSky will be incorrect. You can remove the power to the mount, disconnect your keypad or computer. In fact, we recommend that you do so, so that if you have a lightning strike at your observatory, all of your electronics will be safe.

There are three possible park positions, however some of the mounts cannot utilize all positions. Refer to the illustrations in the [Park Settings](#) section on page 70 to see the options. Then, set your park position according to the instructions. The Park Settings preference window is customized for your mount. For instance, if you have the Meade LX200 mount, you have only one of the park position options available to you, while the Meade LXD650 and LXD750 have two options. The Astro-Physics mounts can utilize all three. The Meade ETX-90/EC command language does not allow Park at this time.

When the Park button is selected, DigitalSky will present a window requesting a confirmation that you wish to activate the park sequence. Select "yes" and DigitalSky will slew to the position you have specified in the Park Settings Preferences.

Upon completion of the Park Sequence, DigitalSky will either exit automatically from the program (if you selected this option from the Park Settings) or simply terminate the link with the telescope and return to the startup mode. In this case, you exit the program in the normal fashion by clicking on the "X" button.

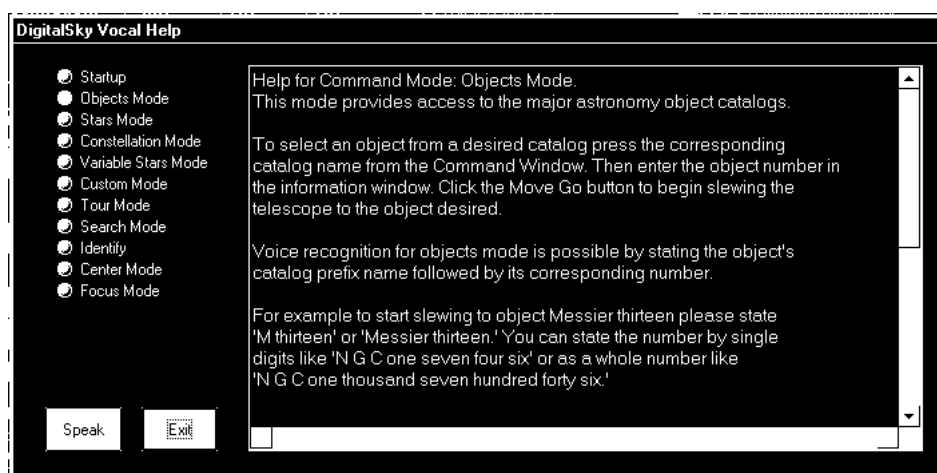
## Exiting DigitalSky Voice

To exit DigitalSky, press the X button found on the control panel window. A window will appear for your confirmation to prevent accidental exiting.

If the night screen had been activated, the window defaults will return and the program will exit.

## Help Button

If you forget how to use one of the command modes, click on the Help button in the Command Window. The following screen will appear. Select the LED next to the mode you need to review. The instructions will display in the large window. If you wish to listen to them, click on the speak button. While the help facility is quite extensive in its output and content, it is not a replacement for the manual. You can interrupt the vocal help output at any time by selecting any other command mode or clicking on the Exit button.



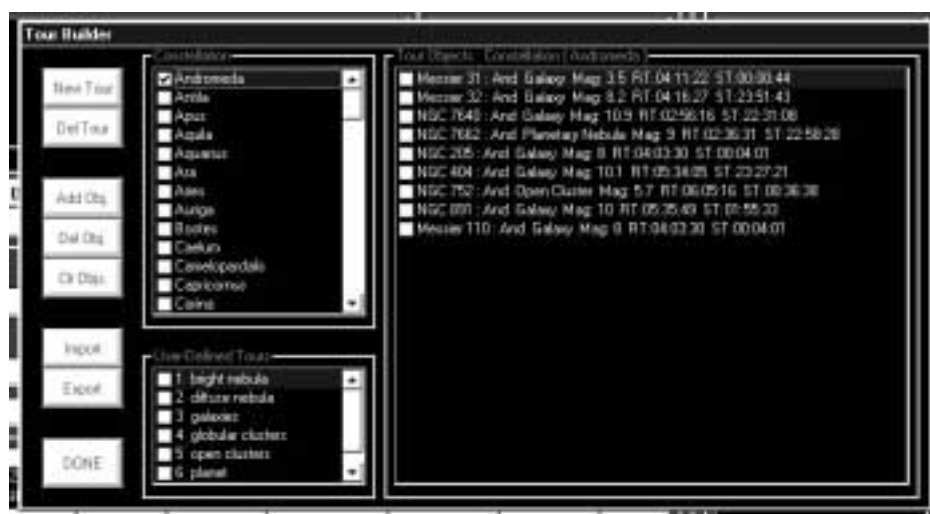
Vocal Help Screen

# Using the Tour Builder Utility

Modify existing tours or create new tours! DigitalSky provides a powerful utility to pre-plan your observing sessions. Spend your rainy nights creating tours to use just once or many times. Share these tours with other DigitalSky users by submitting them to our web site via the export feature of the program. Download other tours that you would like to try and import them. Perhaps you would like to create a tour of objects at the very edge of your telescope's magnitude limit to challenge your observing skills, or a tour based on humorous common object names, or a tour of beautiful wide-field objects and another of tiny galaxies. Use your imagination!

The Tour Builder Utility can be accessed two ways.

- External Tour Builder Utility. Create your tours without loading up the entire DigitalSky program and going through the linking sequence. It's a quick and easy way to access the Tour Builder. Click on your Windows Start button ⇒ Programs ⇒ Astro-Physics ⇒ Tour Builder. If you loaded the program into a different subdirectory at installation, look there.
- DigitalSky Voice program loaded for normal use. Look near bottom of screen. Click on the Tour Bld button.



Tour Builder Main Display Window

The Tour Builder window permits access to all of the Constellation tours, as well as the User-Defined tours. When you click in the box next to the tour names, a check mark will appear and the objects in that tour will display. You must select a tour before you can use any of the tour object buttons: add, delete or clear. There are no voice commands for the tour builder.

## Tour Builder Buttons

### *New Tour button*

Permits you to create a new User-Defined tour. Refer to the procedures below for a complete discussion.

### *Del Tour button*

Deletes the User-defined tours that have been checked. All objects will be deleted in addition to the tour name. A confirmation box will appear to ensure that you really want to delete the tour. You can not delete any constellation tours, however you can add or delete individual items as described below.

### *Ins Obj (Add Obj) button*

Opens the Insert Tour Object window so that you can add objects to the tour you checked in the first screen. There are several ways to add objects. Please read the section below.

### *Del Obj button*

Deletes objects that you have selected individually by checking the box next to each name. A confirmation box will appear to prevent accidental deletions.

### *Clr Objs button*

Clears (deletes) *all* objects from any Tour checked in the Constellation Tour or User-Defined Tours. This is a handy way to delete all objects without checking on each item individually. A confirmation box will appear to ensure that you do not clear them by accident. The tour name will *not* be deleted so that you can recreate a new version of the tour.

### *Import button*

Allows you to import tours that were created in an external file. You can use this to download tours created by a friend or one of the special tours at our web site.

### *Export*

Creates the external file to exchange or backup your constellation and user-defined tours. The external file is date-time stamped. A new file is created each time the export facility is used. There can be many exported files.

## **Creating a New Tour Name**

1. To create a new tour, open the Tour Builder and select the New button. A "Create New Tour" window will appear.



**Insert New Tour Window**

2. Enter the name you have chosen for your tour. Please use only alphanumeric characters. Digital Sky will actually "read" this tour name if you request it from the user-defined list in tour mode. Select Visual. The CCD selection will be useful with the Image program that is currently under development. Select Create (or Cancel if you change your mind). The system will not permit creation of new constellation tours, however you can modify existing tours as discussed below.

## **Adding Objects to Tours**

We suggest that you give some thought to your tour prior to its creation. You may wish to consider these factors:

- The objects in the tours should be visible during the course of one evening – or you must be willing to accept that a certain portion of the objects will lie below the horizon.
- You may want to view the objects in a logical order them from east to west to minimize meridian swapping if you have a German Equatorial.
- If you have a long tour planned, consider when each object rises and sets.

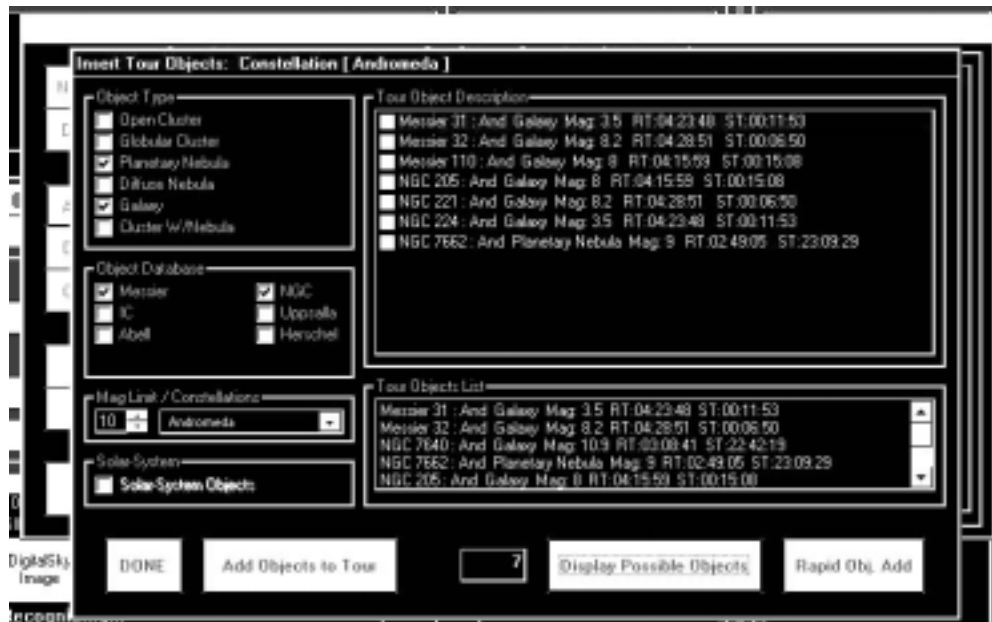
### **Procedure**

1. Click in the box next to the Constellation or User-Defined tour you wish to modify.
2. Select Add Obj (or Ins Obj as it is labeled in the External Tour Builder, oops). The New Object Insert window will appear.
3. At this point, you choose your method of entry:
  - a) Search engine: Use the search engine to aid in selection of objects by object type, catalog (database) and magnitude.
  - b) Rapid Object Addition: Use this if you already know which objects you plan to add.

## Search Engine

The Insert Tour Objects window is designed around a search engine to help you identify new objects to add to any given constellation or user-defined tour. To utilize the search engine, do the following:

1. Select the object types you want in your tour. You may select as many as desired.
2. Select the object catalog to search. You may select as many catalogs as desired.



**Insert Tour Objects Window**

3. Reset the magnitude limit, if desired. The default value is 10.
4. Select the constellation to search. If objects are being added to a constellation tour, only the current constellation will be searchable, user-defined tours permit all or any particular constellation.
5. You can select the solar-system objects to add to a User-Defined tour ONLY. Constellation tours cannot have solar-system objects added to them, since their position varies from night to night and they will not remain in that constellation.
6. When ready, press the Display Possible Objects button to begin the search. When the search is completed, all objects that match the search criteria will be displayed in the Objects Description list box. The total count of possible object matches will be displayed in the count box to the left of the Display Possible Objects button. DigitalSky provides information to aid you in selection of your tour objects:
  - Constellation that object is in
  - Type of Object
  - Magnitude
  - Rise and set times
7. Review the objects listed and choose the ones that you wish to add to the tour. The object display is ordered alphanumerically. We recommend that you click in the box next to the object you want to be first in the tour, then select the Add Objects to Tour button on the bottom of the screen. You will see this object appear in the Tour Objects List.
8. Select the remainder of the objects in the same manner. You can also click numerous objects at one time, then select Add Objects to Tour rather than adding them one at a time, however, they will appear alphanumerically in the tour.
9. When your tour is complete, press the Done button to return to the main Tour Builder window.

## Rapid Object Addition

If you have already prepared a list of objects that you wish to enter, you do not need the search engine described above. The Rapid Object Addition window will allow you to build the tour very quickly.

1. Select the tour that you wish to modify from the Tour Builder main window or the new tour you created.
2. Select Add Obj (or Ins Obj). This will take you to the Insert Tour Objects window discussed above.
3. Select the Rapid Obj Add button. Depending on the tour you selected, the Constellation / User-Def data field at the top of the window will contain "TC: <constellation name>" for constellation tours, or "TU: <tour name>" for user-defined tours.
4. Select the catalog of the first object from the object catalogs drop down box.
5. Enter the object number and click on Add Object to Tour. It is not necessary to add the abbreviation for the catalog name. For instance, if you have selected Messier, simply add "101", do not enter "M101." If you do, DigitalSky will prompt you to revise your entry. If you have already entered an object, DigitalSky will inform you to prevent a double entry. If you are adding to a constellation tour, DigitalSky will verify that the object is within that constellation. If an object number is invalid for the selected catalog, you will be informed.



**Rapid Objects Addition Window**

6. Repeat these steps for each object you wish to enter.
7. When all objects are entered, click on the Done button to return to the object entry search engine window.
8. Press Done again to exit.

## ***Modifying Existing Tour***

1. Open Tour Builder and select the existing constellation you wish to modify from the Constellation or User-Defined Tours list.
2. Click on that tour name. Note that although DigitalSky will allow you to display check marks next to more than one tour, the last one clicked is the active tour. The objects that are presently in the tour will display in the large window on the right side.
3. To delete selected objects from the tour, click on the box next to the object name to display a check mark and select the Del Objs button on the left side. A confirmation box will appear.
4. To clear all objects from the tour (i.e. delete them), select the Clr Objs button. A confirmation box will appear.
5. To add objects to the tour, follow the Search or Rapid Object Addition instructions in the previous sections.
6. Press Done when your tour is complete.

## ***Importing and Exporting***

This feature allows you to share your tours with others and import tours from a friend or from our web site [www.digitalskyvoice.com](http://www.digitalskyvoice.com). A special section of our site features user-submitted DigitalSky tours. We invite you to check out the tours that are already there and post one of your creations. Follow the instruction on the site.

When you installed DigitalSky Voice a folder entitled "export" was added to your directory structure (Program Files ⇒ Astro-Physics ⇒ DigitalSky Voice ⇒ Export). We included a file that contains the user-defined seasonal tours that were provided with the program in case you need to restore it someday. The files that you export and import will reside in the Export folder.

When a file is exported, a file name will be created automatically based on a date-time stamp. An example is "uexport\_9-5-1999\_20-57-26.lst". This means that it was exported on September 4, 1999 at 20 hours 57 minutes 26 seconds. You can rename the tour however, you must retain these parts of the file name: "uexport\_" and the file extension ".lst". We suggest that you add the name of the tour and keep the date for your reference, you probably can remove the time stamp since you will not create two tours with the same name. So, for example, a file name for a galaxy tour may be changed to: "uexport\_galaxies\_9-5-1999.lst."

## **Importing Tours**

1. From the Tour Builder Main Display window, select Import. The Auto Tour Export Files window will appear. This will display the export directory and the files within the directory.
2. Click on the file that you wish to import. The name of the file will appear in the File Name box near the bottom of the screen.
3. Select open. The file will copy into the tour builder.
4. Open tour builder (or if your mount is linked, go to Tour Mode). The file should be listed under user-defined. It is ready to use.

## **Exporting Tours**

1. Open the Tour Builder to view the Main Display window.
2. Select the tour you wish to export by clicking on the box next to the tour name.
3. Click on Export. This will create an export file with a date-time stamp as discussed above. The file will contain the name of the tour and all of the objects within the tour. You can rename the file as discussed above.

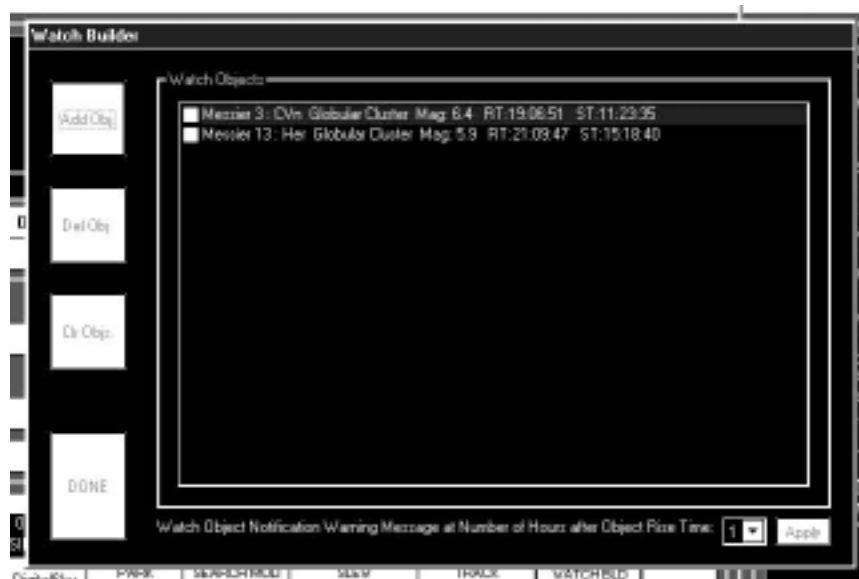
# Using the Watch Builder Utility

How many times have you planned to view or photograph an object, which was too low at the beginning of your session, then forgotten about it later? Then after the session was over, you realized that you completely forgot it. Watch Builder is for you. DigitalSky, as your observing companion, will remind you about objects that you want to see that evening.

The Watch Builder Utility is used to add objects to your watch notification list. DigitalSky will notify you every 15 minutes regarding the status of all of your watch objects. You will be notified if the object is above or below the watch point that you have defined. You must have the voice output (V-Out) set to "on" in order to hear it. This is a verbal reminder only.

The Watch Builder Utility can be accessed two ways.

- External Watch Builder Utility. Create your watch list without loading up the entire DigitalSky program and going through the linking sequence. It's a quick and easy way to access the Watch Builder prior to your observing session. Click on your Windows Start button ⇒ Programs ⇒ Astro-Physics ⇒ Watch Builder. If you installed the program in a different subdirectory, look there.
- DigitalSky Voice program loaded for normal use. Look near bottom of screen. Click on the Watch Bld button.



Watch Builder Main Screen

## Watch Builder Buttons

On the main screen, the Watch Builder utility has four major buttons along with the watch object notification setting and the watch object list box.

### *Add Obj button*

Add object button launches the Insert Object window.

### *Del Obj button*

Use to delete selected objects on your watch list. To delete an object on your watch list, click on the box next to the object name to insert a check into the box. Select Delete. A confirmation box will appear to prevent accidental deletion.

### *Clr Obs button*

Removes all objects from the Watch Object list.

## Done button

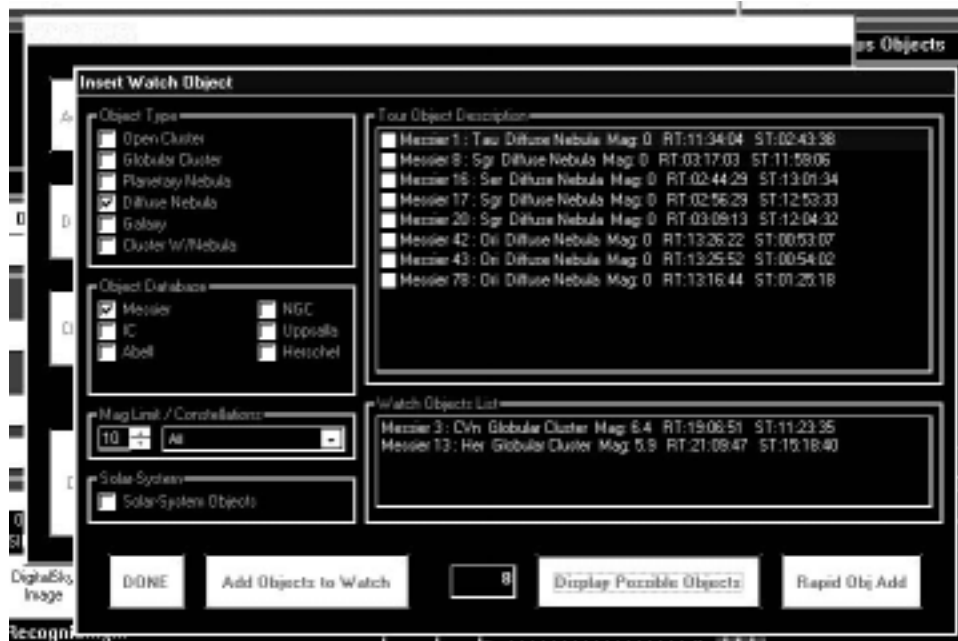
Exits the Watch Builder Utility.

## The Watch Object Notification Warning Message at Number of Hours after Object Rise Time setting

Click on the down arrow to display hour intervals. If you want to view the object 3 hours after it has risen above the horizon, set it to 3 and click on Apply. DigitalSky will inform you when the object has reached this point.

## Adding Objects to the Watch List

1. Open the Watch Builder and click on the Add Obj button. The Insert Watch Object window will display.



2. At this point, you choose your method of entry:
  - a) Search engine: Use the search engine to aid in selection of objects by object type, catalog (database) and magnitude.
  - b) Rapid Object Addition: Use this if you already know which objects you plan to add.

## Search Engine

The new object insert window is designed around a search engine to help you identify objects to add to the watch list. To utilize the search engine, do the following:

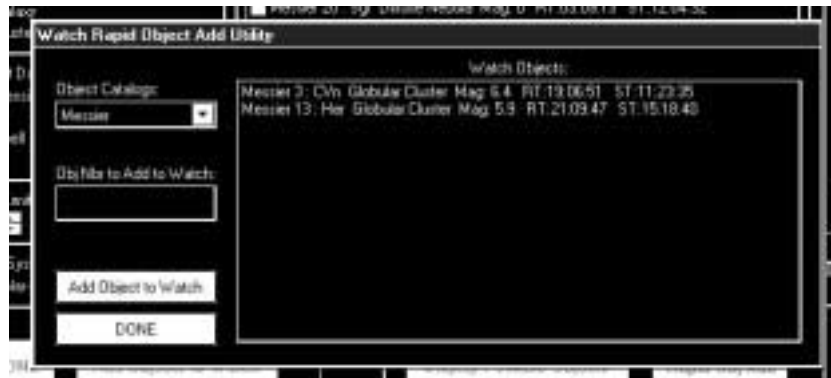
1. Select the object types that you want to add. You may select as many as desired.
2. Select the object catalog to search. You may select as many catalogs as you want.
3. Reset the magnitude limit, if desired. The default value is 10.
4. Select the constellation to search in or select "All."
5. Select solar system objects if you wish.
6. When ready, press the Display Possible Objects button to begin the search. When the search is completed, all objects that match the search criteria will be displayed in the Objects Description list box. The total count of possible object matches will be displayed in the count box to the left of the Display Possible Objects button. DigitalSky provides information to aid you in selection of your watch objects:

- Constellation that object is in
  - Type of Object
  - Magnitude
  - Rise and set times
7. Review the objects listed and choose the ones that you wish to add to the watch. Click on Add Objects to Watch button on the bottom of the screen. You will see this object appear in the Watch Objects List.
  8. Select the remainder of the objects in the same manner. You can also click numerous objects at one time, then select Add Objects to Watch rather than adding them one at a time. They will appear in the watch list in alphanumeric order.
  9. When your watch list is complete, press the DONE button to return to the main Watch Builder window.

## Rapid Object Addition

If you have already prepared a list of objects that you wish to enter, you do not need the search engine described above. The Rapid Object Addition window will allow you to build the watch list very quickly. This is the method that you probably will use.

1. Open the Watch Builder.
2. Select Add Obj. This will take you to the Insert Tour Objects window discussed above.
3. Select the Rapid Obj Add button. The Watch Rapid Object Add Utility will display.



**Rapid Object Addition Window**

4. Select the catalog of the first object from the object catalogs drop-down box.
5. Enter the object number and click on Add Object to Watch. It is not necessary to add the abbreviation for the catalog name. For instance, if you have selected Messier, simply add "101", do not enter "M101." If you do DigitalSky will prompt you to revise your entry. If you try to enter an object twice, DigitalSky will inform you to prevent a double entry. If an object number is invalid for the selected catalog, you will be informed.
6. Repeat these steps for each object you wish to enter.
7. When all objects are entered, click on the Done button to return to the Object Entry Search Engine window.
8. Press Done again to exit.

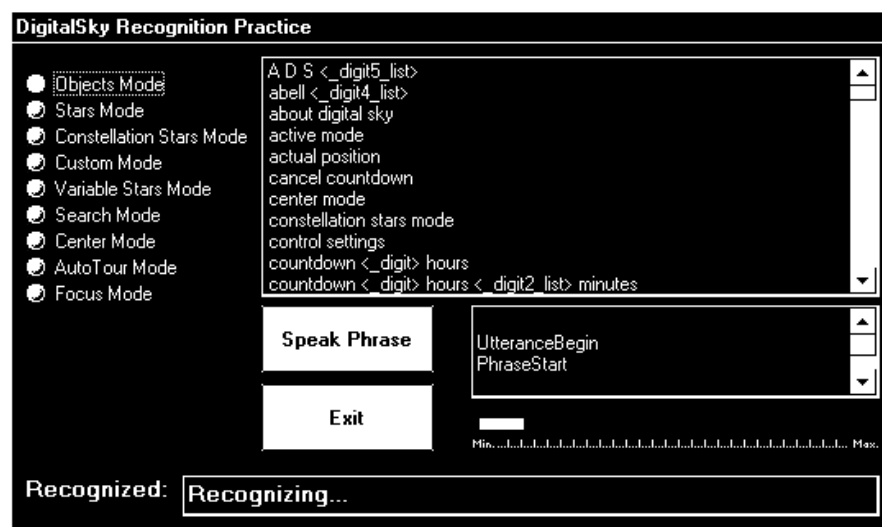
## Modifying Existing Watch List

1. Open Watch Builder.
2. To delete selected objects, click on the box next to the object name to display a check mark and select the Del Objs button on the left side. A confirmation box will appear.
3. To clear all objects from the watch list (i.e. delete them all), select the Clr Objs button. A confirmation box will appear.
4. To add objects to the watch list, follow the instructions in the previous section.
5. Press Done when your list is complete.

# Recognition Practice Utility

This feature allows you to practice using the voice recognition system outside of the program itself. You can listen to the way DigitalSky speaks or you can speak into the microphone to see if DigitalSky can recognize what you say.

Turn on your speakers and plug in your microphone before you begin. You should have already completed the two microphone tests discussed earlier in the manual. If not, please refer to [The Microphone Setup Wizard](#) on page 12 and the [VU Microphone Test](#) on page 14.



To activate the Recognition Practice Utility, click on Start ⇒ Programs⇒ Astro-Physics ⇒ Voice Recognition Utility. If you installed the program into a different subdirectory, look there. This will open up the practice screen as shown below.

All phrases of all the command modes are available to the utility.

Select the Command Mode that you wish to practice. The LED will change from red to green. Notice that all of the phrases for that mode display in the upper right window. Scroll to view additional phrases. The commands that contain numbers are displayed to show that digits are required between the < and > brackets. When you practice these items, say actual numbers in place of the word “digit” or “digit 2.”

## Listen to DigitalSky Voice Speak

Click on any of the phrases that are listed.

Select the Speak Phrase button. DigitalSky will state the phrase. By listening to the way DigitalSky pronounces words and phrases, you will know how it should sound to DigitalSky.

Practice sessions may be particularly helpful to persons who are not native speakers of English (American style English that is).

## Practice Speaking to DigitalSky Voice

Remember DigitalSky Voice is designed to be used as a Voice-Controlled system, so speak naturally and at a normal rate of speech. You do not need to speak slowly. As long as you speak clearly and enunciate well, DigitalSky will recognize what you say. If your spouse normally has trouble understanding you because you don't speak clearly or you speak very fast, a computerized voice recognition engine will not be able to understand you either. In this case, you will have to be more aware of your pronunciation and speak clearly.

Verbally state one of the commands that you see on the screen.

Watch the VU meter. It is provided to show graphically the input level. Notice that when you click your microphone on and off the mechanical click will cause the VU meter to jump. It is best to avoid speaking during these times since the signal from the microphone will interfere with voice recognition. Wait a moment when you use the

microphone switch. If the VU meter does not move very much as you speak, the microphone input to the computer is not strong enough. DigitalSky will not understand since it cannot hear you.

When recognition is successful, DigitalSky will repeat what you say and the Recognized display box at the bottom of the screen will display the phrase.

Click on the Exit button to leave the program.

# Appendix A: Phrases By Mode

## *Objects Mode Phrases*

A D S <\_digit5\_list>  
Abell <\_digit4\_list>  
about DigitalSky  
active mode  
actual position  
cancel countdown  
center mode  
computer  
constellation stars mode  
control settings  
countdown <\_digit> hours  
countdown <\_digit> hours <\_digit2\_list> minutes  
countdown <\_digit2\_list> minutes  
countdown status  
current object  
custom mode  
day screen  
find Jupiter  
find Mars  
find Mercury  
find Neptune  
find Pluto  
find Saturn  
find the Andromeda Galaxy  
find the Antennae  
find the Barnard's Galaxy  
find the Baxendell Nebula  
find the Bear Paw Galaxy  
find the Beehive Cluster  
find the Black-eye Galaxy  
find the Blinking Planetary  
find the Blue Planetary  
find the Blue Snowball  
find the Bode's Nebulae  
find the Box  
find the Box Nebula  
find the Bubble Nebula  
find the Bug Nebula  
find the Butterfly Cluster  
find the Butterfly Nebula  
find the California Nebula  
find the Christmas Tree Cluster  
find the Cocoon Nebula  
find the Cone Nebula  
find the Copeland's Septet  
find the Crab Nebula  
find the Crescent Nebula  
find the Double Cluster  
find the Dumbbell Nebula  
find the Eagle Nebula  
find the Eight burst Planetary  
find the Eskimo Nebula  
find the Eta Carina Nebula  
find the Eyes  
find the Filamentary Nebula  
find the Flaming Star Nebula  
find the forty-seven Tucanae  
find the gamma Cassiopeia Nebula  
find the gamma Cygnus Nebula  
find the Ghost of Jupiter  
find the Great Nebula in Andromeda  
find the Helix Galaxy  
find the Helix Nebula  
find the Hercules Cluster  
find the Hind's variable Nebula  
find the Horse-head Nebula  
find the Hourglass Nebula  
find the Hubble's variable Nebula  
find the Jewel Box  
find the kappa Crux Cluster  
find the Lace work Nebula  
find the Lagoon Nebula  
find the lambda Centarus Nebula  
find the Little Dumbbell  
find the Little Gem  
find the Maia Nebula  
find the Merope Nebula  
find the Mice  
find the Moon  
find the Network One Nebula  
find the Network Two Nebula  
find the North American Nebula  
find the omega Centaurus  
find the Omega Nebula  
find the Orion Nebula  
find the Owl Nebula  
find the Papillon  
find the Pelican Nebula  
find the Pin-wheel Nebula  
find the Polarissima Australis

find the Polaris Borealis  
find the Praesepe  
find the Rho Ophiuchus Nebula  
find the Ring Nebula  
find the Rosette Nebula  
find the Saturn Nebula  
find the Sculptor Galaxy  
find the Siamese Twins  
find the Sombrero Galaxy  
find the Southern Pleiades  
find the Spindle Galaxy  
find the Star Queen Nebula  
find the Stephan's Quintet  
find the Struve's Lost Nebula  
find the Sun  
find the Sunflower Galaxy  
find the Tarantula Nebula  
find the Toby Jug Nebula  
find the Triangulum Galaxy  
find the Trifid Nebula  
find the Veil Nebula  
find the Whirlpool Galaxy  
find the Wild Duck Cluster  
find the Witch Head Nebula  
find Uranus  
find Venus  
focus mode

halt  
hello DigitalSky  
Herschel <\_digit3\_list> dash <\_digit>  
How are you today?  
I C <\_digit4\_list>  
identify  
local time  
M <\_digit3\_list>  
Messier <\_digit3\_list>  
N G C <\_digit4\_list>  
night screen  
object coordinates  
object data  
quit  
recalibrate  
search mode  
stars mode  
stop  
stop now  
thank you  
tour mode  
Uppsalla <\_digit5\_list>  
variable stars mode  
watch list  
watch status  
What's up DigitalSky?  
Where are we?

## Stars Mode Phrases

active mode  
actual position  
center mode  
computer  
constellation stars mode  
current object  
custom mode  
exit  
find Acamar  
find Achernar  
find Acrux  
find Acubens  
find Adhafera  
find Adhara  
find Albali  
find Alberio  
find Alchiba  
find Alcor  
find Alcyone  
find Aldebaran  
find Alderamin  
find Alfirk  
find Algedi  
find Algenib  
find Algieba  
find Algol  
find Algorab  
find Alhena  
find Alioth  
find Alkaid  
find Alkalurops  
find Alkes  
find Almach  
find AlNair  
find Alnasl  
find Alnilam  
find Alnitak  
find Alpha Centauri  
find Alphard  
find Alphecca  
find Alpheratz  
find Alrakis  
find Alrescha  
find Alshain  
find Altair  
find Altais  
find Alterf  
find Aludra  
find Alula Australis  
find Alula Borealis  
find Alya  
find Ankaa  
find Antares  
find Arcturus  
find Arkab  
find Arneb  
find Ascella  
find Asellus Australis  
find Asellus Borealis  
find Aspidiske  
find Atik  
find Atlas  
find Atria  
find Avior  
find Azha  
find Baten Kaitos  
find Beid  
find Bellatrix  
find Betelgeuse  
find Biham  
find Canopus  
find Capella  
find Caph  
find Castor  
find Cebalrai  
find Celaeno  
find Chara  
find Chertan  
find Cor Caroli  
find Cursa  
find Dabih  
find Deneb  
find Deneb Algedi  
find Denebola  
find Diphda  
find Double Double  
find Dubhe  
find Edasich  
find Electra  
find Elnath  
find Eltanin  
find Enif  
find Errai  
find Formalhaut  
find Furud  
find Gacrux  
find Giasar  
find Gienah  
find Gomeisa  
find Graffias  
find Grumium  
find Hadar  
find Hamal  
find Hinds Crimson Star  
find Homam  
find Izar  
find Kaffaljidhma  
find Kaus Australis  
find Kaus Borealis  
find Kaus Media  
find Keid  
find Kitalpha  
find Kochab  
find Kornephoros  
find Kurhah  
find Lesath  
find Maia  
find Marfik  
find Markab  
find Matar  
find Mabsuta  
find Megrez  
find Meissa  
find Mekbuda  
find Menkalinan  
find Menkar  
find Menkent  
find Menkib  
find Merak  
find Merope  
find Mesarthim  
find Miaplacidus  
find Mimosa  
find Mintaka  
find Mira  
find Mirach  
find Mirfak  
find Mirzam  
find Mizar  
find Muphrid  
find Muscida  
find Nashira  
find Navi  
find Nekkar

find Nihal  
find Nunki  
find Nusakan  
find Peacock  
find Phact  
find Phecda  
find Pherkad  
find Pleione  
find Polaris  
find Pollux  
find Porrima  
find Procyon  
find Propus  
find Rasalas  
find Rasalgethi  
find Rasalhague  
find Rastaban  
find Regor  
find Regulus  
find Rigel  
find Ruchbah  
find Rukbat  
find Sabik  
find Sadalmelik  
find Sadalsuud  
find Sadr

find Saiph  
find Scheat  
find Schedar  
find Seginus  
find Shaula  
find Sheliak  
find Sheratan  
find Sirius  
find Skat  
find Spica  
find Sterope  
find Suhail  
find Sulafat  
find Syrma  
find Talitha  
find Tania Australis  
find Tanis Borealis  
find Tarazed  
find Taygeta  
find Thuban  
find Trapezium  
find Unukalhai  
find UU  
find Vega  
find Vindemiatrix  
find Wasat

find Wazn  
find Wezen  
find Yed Posterior  
find Yed Prior  
find Zaniah  
find Zaurak  
find Zavijava  
find Zosma  
find Zubenelgenubi  
find Zubeneshamali  
focus mode  
halt  
How are you today?  
local time  
object coordinates  
object data  
objects mode  
quit  
recalibrate  
search mode  
stop  
stop now  
thank you  
tour mode  
What's up DigitalSky?  
Where are we?

## **Constellation Stars Mode Phrases**

active mode  
actual position  
alpha  
beta  
center mode  
chi  
computer  
constellation Andromeda  
constellation Antlia  
constellation Apus  
constellation Aquarius  
constellation Aquila  
constellation Ara  
constellation Aries  
constellation Auriga  
constellation Boötes  
constellation Caelum  
constellation Camelopardalis  
constellation Cancer  
constellation Canes Venatici  
constellation Canis Major  
constellation Canis Minor  
constellation Capricornus  
constellation Carina  
constellation Cassiopeia  
constellation Centaurus  
constellation Cepheus  
constellation Cetus  
constellation Chamaeleon  
constellation Circinus  
constellation Columba  
constellation Coma Berenices  
constellation Corona Australis  
constellation Corona Borealis  
constellation Corvus  
constellation Crater  
constellation Crux  
constellation Cygnus  
constellation Delphinus  
constellation Dorado  
constellation Draco  
constellation Equuleus  
constellation Eridanus  
constellation Fornax  
constellation Gemini  
constellation Grus  
constellation Hercules  
constellation Horologium  
constellation Hydra  
constellation Hydrus  
constellation Indus  
constellation Lacerta  
constellation Leo  
constellation Leo Minor  
constellation Lepus  
constellation Libra  
constellation Lupus  
constellation Lynx  
constellation Lyra  
constellation Mensa  
constellation Microscopium  
constellation Monoceros  
constellation Musca  
constellation Norma  
constellation Octans  
constellation Ophiuchus  
constellation Orion  
constellation Pavo  
constellation Pegasus  
constellation Perseus  
constellation Phoenix  
constellation Pictor  
constellation Pisces  
constellation Pisces Austrinus  
constellation Puppis  
constellation Pyxis  
constellation Reticulum  
constellation Sagitta  
constellation Sagittarius  
constellation Scorpius  
constellation Sculptor  
constellation Scutum  
constellation Serpens  
constellation Sextans  
constellation Taurus  
constellation Telescopium  
constellation Triangulum  
constellation Triangulum Australe  
constellation Tucana  
constellation Ursa Major  
constellation Ursa Minor  
constellation Vela  
constellation Virgo  
constellation Volans  
constellation Vulpecula  
current object

custom mode  
epsilon  
eta  
exit  
focus mode  
gamma  
halt  
How are you today?  
iota  
kappa  
lambda  
local time  
mu  
nu  
object coordinates  
object data  
objects mode  
omega  
omicron  
phi  
pi

delta  
psi  
quit  
recalibrate  
rho  
search mode  
sigma  
stars mode  
stop  
stop now  
tau  
thank you  
theta  
tour mode  
upsilon  
variable stars mode  
What's up DigitalSky?  
Where are we?  
xi  
zeta

## **Variable Stars Mode Phrases**

active mode  
actual position  
center mode  
computer  
constellation Andromeda  
constellation Antlia  
constellation Apus  
constellation Aquarius  
constellation Aquila  
constellation Ara  
constellation Aries  
constellation Auriga  
constellation Boötes  
constellation Caelum  
constellation Camelopardalis  
constellation Cancer  
constellation Canes Venatici  
constellation Canis Major  
constellation Canis Minor  
constellation Capricornus  
constellation Carina  
constellation Cassiopeia  
constellation Centaurus  
constellation Cepheus  
constellation Cetus  
constellation Chamaeleon  
constellation Circinus  
constellation Columba  
constellation Coma Berenices  
constellation Corona Australis  
constellation Corona Borealis  
constellation Corvus  
constellation Crater  
constellation Crux  
constellation Cygnus  
constellation Delphinus  
constellation Dorado  
constellation Draco  
constellation Equuleus  
constellation Eridanus  
constellation Fornax  
constellation Gemini  
constellation Grus  
constellation Hercules  
constellation Horologium  
constellation Hydra  
constellation Hydrus  
constellation Indus  
constellation Lacerta  
constellation Leo  
constellation Leo Minor  
constellation Lepus  
constellation Libra  
constellation Lupus  
constellation Lynx  
constellation Lyra  
constellation Mensa  
constellation Microscopium  
constellation Monoceros  
constellation Musca  
constellation Norma  
constellation Octans  
constellation Ophiuchus  
constellation Orion  
constellation Pavo  
constellation Pegasus  
constellation Perseus  
constellation Phoenix  
constellation Pictor  
constellation Pisces  
constellation Pisces Austrinus  
constellation Puppis  
constellation Pyxis  
constellation Reticulum  
constellation Sagitta  
constellation Sagittarius  
constellation Scorpius  
constellation Sculptor  
constellation Scutum  
constellation Serpens  
constellation Sextans  
constellation stars mode  
constellation Taurus  
constellation Telescopium  
constellation Triangulum  
constellation Triangulum Australe  
constellation Tucana  
constellation Ursa Major  
constellation Ursa Minor  
constellation Vela  
constellation Virgo  
constellation Volans  
constellation Vulpecula  
current object

custom mode  
exit  
focus mode  
halt  
How are you today?  
local time  
object coordinates  
object data  
objects mode  
quit

recalibrate  
search mode  
stars mode  
stop  
stop now  
thank you  
tour mode  
V <star number>  
What's up DigitalSky?  
Where are we?

## ***Custom Mode Phrases***

<\_digit2\_list> degrees <\_digit2\_list> minutes <\_digit2\_list> seconds  
<\_digit2\_list> hours <\_digit2\_list> minutes <\_digit2\_list> seconds  
active mode  
center mode  
computer  
constellation stars mode  
exit  
find object  
focus mode  
halt  
How are you today?  
local time  
make it so  
minus <\_digit2\_list> degrees <\_digit2\_list> minutes <\_digit2\_list> seconds  
objects mode  
quit  
search mode  
stars mode  
stop  
stop now  
thank you  
tour mode  
variable stars mode  
Where are we?

## Search Mode Phrases

Abell galaxies  
Abell galaxy  
active mode  
actual position  
actual position  
center mode  
computer  
constellation Eridanus  
constellation stars mode  
current object  
current search constellation  
custom mode  
custom mode  
exit  
focus mode  
halt  
Herschel all object types  
Herschel galaxies  
Herschel galaxy  
Herschel globular cluster  
Herschel globular clusters  
Herschel nebula  
Herschel nebulas  
Herschel open cluster  
Herschel open clusters  
Herschel planetaries  
Herschel planetary  
How are you today?  
I C all object types  
I C galaxies  
I C galaxy  
I C globular cluster  
I C globular clusters  
I C nebula  
I C nebulas  
I C open cluster  
I C open clusters  
I C planetaries  
I C planetary  
local time  
Messier all object types  
Messier galaxies  
Messier galaxy  
Messier globular cluster  
Messier globular clusters  
Messier nebula  
Messier nebulas  
Messier open cluster  
Messier open clusters  
Messier planetaries  
Messier planetary  
N G C all object types  
N G C galaxies  
N G C galaxy  
N G C globular cluster  
N G C globular clusters  
N G C nebula  
N G C nebulas  
N G C open cluster  
N G C open clusters  
N G C planetaries  
N G C planetary  
new search  
next  
object coordinates  
object data  
objects mode  
previous  
quit  
recalibrate  
search constellation Andromeda  
search constellation Antlia  
search constellation Apus  
search constellation Aquarius  
search constellation Aquila  
search constellation Ara  
search constellation Aries  
search constellation Auriga  
search constellation Boötes  
search constellation Caelum  
search constellation Camelopardalis  
search constellation Cancer  
search constellation Canes Venatici  
search constellation Canis Major  
search constellation Canis Minor  
search constellation Capricornus  
search constellation Carina  
search constellation Cassiopeia  
search constellation Centaurus  
search constellation Cepheus  
search constellation Cetus  
search constellation Chamaeleon  
search constellation Circinus  
search constellation Columba

search constellation Coma Berenices  
search constellation Corona Australis  
search constellation Corona Borealis  
search constellation Corvus  
search constellation Crux  
search constellation Cygnus  
search constellation Delphinus  
search constellation Dorado  
search constellation Draco  
search constellation Equuleus  
search constellation Fornax  
search constellation Gemini  
search constellation Grus  
search constellation Hercules  
search constellation Horologium  
search constellation Hydra  
search constellation Hydrus  
search constellation Indus  
search constellation Lacerta  
search constellation Leo  
search constellation Leo Minor  
search constellation Lepus  
search constellation Libra  
search constellation Lupus  
search constellation Lynx  
search constellation Lyra  
search constellation Mensa  
search constellation Microscopium  
search constellation Monoceros  
search constellation Musca  
search constellation Norma  
search constellation Octans  
search constellation Ophiuchus  
search constellation Orion  
search constellation Pavo  
search constellation Pegasus  
search constellation Perseus

search constellation Phoenix  
search constellation Pictor  
search constellation Pisces  
search constellation Pisces Austrinus  
search constellation Puppis  
search constellation Pyxis  
search constellation Reticulum  
search constellation Sagitta  
search constellation Sagittarius  
search constellation Scorpius  
search constellation Sculptor  
search constellation Scutum  
search constellation Serpens  
search constellation Sextans  
search constellation Taurus  
search constellation Telescopium  
search constellation Triangulum  
search constellation Triangulum Australe  
search constellation Tucana  
search constellation Ursa Major  
search constellation Ursa Minor  
search constellation Vela  
search constellation Virgo  
search constellation Volans  
search constellation Vulpecula  
stars mode  
start search  
stop  
stop now  
thank you  
Uppsalla galaxies  
Uppsalla galaxy  
variable stars mode  
Where are we?

## **Tour Mode Phrases**

active mode  
actual position  
center mode  
computer  
constellation stars mode  
current object  
custom mode  
exit  
focus mode  
halt  
How are you today?  
list user defined  
local time  
next  
object coordinates  
object data  
objects mode  
previous  
quit  
recalibrate  
stars mode  
start tour  
stop  
stop now  
thank you  
tour <\_digit3\_list>  
tour Andromeda  
tour Antila  
tour Apus  
tour Aquarius  
tour Aquila  
tour Ara  
tour Aries  
tour Auriga  
tour Boötes  
tour Caelum  
tour Camelopardalis  
tour Cancer  
tour Canes Venatici  
tour Canis Major  
tour Canis Minor  
tour Capricornus  
tour Carina  
tour Cassiopeia  
tour Centaurus  
tour Cepheus  
tour Cetus  
tour Chamaeleon  
tour Circinus  
tour Columba  
tour Coma Berenices  
tour Corona Australis  
tour Corona Borealis  
tour Corvus  
tour Crater  
tour Crux  
tour Cygnus  
tour Delphinus  
tour Dorado  
tour Draco  
tour Equuleus  
tour Eridanus  
tour Fornax  
tour Gemini  
tour Grus  
tour Hercules  
tour Horologium  
tour Hydra  
tour Hydrus  
tour Indus  
tour Lacerta  
tour Leo  
tour Leo Minor  
tour Lepus  
tour Libra  
tour Lupus  
tour Lynx  
tour Lyra  
tour Mensa  
tour Microscopium  
tour Monoceros  
tour Musca  
tour Norma  
tour Octans  
tour Ophiuchus  
tour Orion  
tour Pavo  
tour Pegasus  
tour Perseus  
tour Phoenix  
tour Pictor  
tour Pisces  
tour Pisces Austrinus  
tour Puppis  
tour Pyxis  
tour Reticulum  
tour Sagitta  
tour Sagittarius  
tour Scorpius  
tour Sculptor  
tour Scutum  
tour Serpens  
tour Sextans  
tour Taurus  
tour Telescopium  
tour Triangulum  
tour Triangulum Australe  
tour Tucana  
tour Ursa Major  
tour Ursa Minor  
tour Vela  
tour Virgo  
tour Volans  
tour Vulpecula  
variable stars mode  
Where are we?

## ***Center Mode Phrases***

active mode  
cancel  
center speed fast  
center speed medium  
center speed slow  
exit  
halt  
local time  
move down  
move left  
move right  
move up  
quit  
recalibrate  
reverse  
stop  
stop now

## ***Focus Mode Phrases***

active mode  
exit  
focus in  
focus out  
focus speed fast  
focus speed slow  
halt  
local time  
quit  
stop  
stop now

## **Phrases Legend Meanings**

### **Numbers**

All catalog object numbers can either be sounded out number by number or can be stated with whole number word equivalents.

For Example:           NGC1234→ user can say:

                          “NGC one two three four” - each number sounded individually

                          “NGC one thousand two hundred thirty four” – whole number

DigitalSky will not recognize “NGC twelve thirty four.” This would be interpreted as two separate numbers and be confusing.

### **Brackets that enclose text “<” and “>”**

You will see these brackets occasionally in the manual and in the phrase lists. The brackets indicate that a particular type of word is inserted into the command. The word in the bracket tells you the type of word it should be.

<\_digit> = means only one digit possible here

          example: M one

<\_digit2\_list> = means one or two digits possible here (sounded out as two separate numbers or whole word)

          example: “M one two” or “M twelve”

<\_digit3\_list> = means one or two or three digits possible here (sounded out as three separate numbers or whole word)

          example: “M one two three” or “M one hundred twenty three”

<\_digit4\_list> = means one or two or three or four digits possible here (sounded out as four separate numbers or whole word)

          example: “N G C one two three four” or “N G C one thousand two hundred thirty four”

<\_digit5\_list> = means one or two or three or four or five digits possible here (sounded out as four separate numbers or whole word)

          example: “Uppsalla one two three four five” or “Uppsalla twelve thousand three hundred forty five”

### **Catalog Names**

Also note that catalogs are sounded out like: N G C each letter said separately. In the case of Uppsalla and Abell they are spoken as words.

## Appendix B: Constellation Abbreviations

And	Andromeda	Lac	Lacerta
Ant	Antlia	Leo	Leo
Aps	Apus	LMi	Leo Minor
Aqr	Aquarius	Lep	Lepus
Aql	Aquila	Lib	Libra
Ara	Ara	Lup	Lupus
Ari	Aries	Lyn	Lynx
Aur	Auriga	Lyr	Lyra
Boo	Boötes	Men	Mensa
Cae	Caelum	Mic	Microscopium
Cam	Camelopardalis	Mon	Monoceros
Cnc	Cancer	Mus	Musca
CVn	Canes Venatici	Nor	Norma
CMA	Canis Major	Oct	Octans
CMi	Canis Minor	Oph	Ophiuchus
Cap	Capricornus	Ori	Orion
Car	Carina	Pav	Pavo
Cas	Cassiopeia	Peg	Pegasus
Cen	Centaurus	Per	Perseus
Cep	Cepheus	Phe	Phoenix
Cet	Cetus	Pic	Pictor
Cha	Chamaeleon	Psc	Pisces
Cir	Circinus	PsA	Piscis Austrinus
Col	Columba	Pup	Puppis
Com	Coma Berenices	Pyx	Pyxis
CrA	Corona Australis	Ret	Reticulum
CrB	Corona Borealis	Sge	Sagitta
Crv	Corvus	Sgr	Sagittarius
Crt	Crater	Sco	Scorpius
Cru	Crux	Sci	Sculptor
Cyg	Cygnus	Sct	Scutum
Del	Delphinus	Ser	Serpens
Dor	Dorado	Sex	Sextans
Dra	Draco	Tau	Taurus
Equ	Equuleus	Tel	Telescopium
Eri	Eridanus	Tri	Triangulum
For	Fornax	TrA	Triangulum Australe
Gem	Gemini	Tuc	Tucana
Gru	Grus	UMa	Ursa Major
Her	Hercules	UMi	Ursa Minor
Hor	Horologium	Vel	Vela
Hya	Hydra	Vir	Virgo
Hyi	Hydrus	Vol	Volans
Ind	Indus	Vul	Vulpecula

## Appendix C: Star List – Alphabetical by Common Name

<b>Common Name</b>	<b>Flamsteed-Bayer Designation</b>	<b>Abbrev.</b>	<b>Magnitude (SAO)</b>
Acamar	Theta Eridani	Tet Eri	3.2
Achernar	Alpha Eridani	Alf Eri	0.6
Acrux	Alpha2 Crucis	Alf Cru	1.6
Acubens	65-Alpha Cancri	Alf Cnc	4.3
Adhafera	36-Zeta Leonis	Zet Leo	3.6
Adhara	21-Epsilon Canis Majoris	Eps CMa	1.6
Albali	2-Epsilon Aquarii	Eps Aqr	3.8
Albireo	6-Beta1 Cygni	Bet Cyg	3.2
Alchiba	1-Alpha Corvi	Alf Crv	4.2
Alcor	80 Ursae Majoris	80 UMa	4.0
Alcyone	25-Eta Tauri	Eta Tau	3.0
Aldebaran	87-Alpha Tauri	Alf Tau	1.1
Alderamin	5-Alpha Cephei	Alf Cep	2.6
Alfirk	8-Beta Cephei	Bet Cep	3.3
Algedi	6-Alpha2 Capricorni	Alf Cap	3.8
Algenib	88-Gamma Pegasi	Gam Peg	2.9
Algieba	41-Gamma2 Leonis	Gam Leo	2.6
Algol	26-Beta Persei	Bet Per	2.9
Algorab	7-Delta Corvi	Del Crv	3.1
Alhena	24-Gamma Geminorum	Gam Gem	1.9
Alioth	77-Epsilon Ursae Majoris	Eps UMa	1.7
Alkaid	85-Eta Ursae Majoris	Eta UMa	1.9
Alkalurops	51-Mu1 Boötis	Mu Boo	4.5
Alkes	7-Alpha Crateris	Alf Crt	4.2
Almach	57-Gamma1 Andromedae	Gam And	2.3
AlNair	Alpha Gruis	Alf Gru	2.2
Alnasi	10-Gamma2 Sagittarii	Gam Sgr	3.1
Alnilam	46-Epsilon Orionis	Eps Ori	1.8
Alnitak	50-Zeta Orionis	Zet Ori	2.0
Alpha Centauri	Alpha1 Centauri	Alf Cen	0.1
Alphard	30-Alpha Hydrae	Alf Hya	2.2
Alphecca	5-Alpha Coronae Borealis	Alf CrB	2.3
Alpheratz	21-Alpha Andromedae	Alf And	2.1
Alrakis	21-Mu Draconis	Mu Dra	5.1
Alrescha	113-Alpha Piscium	Alf Psc	4.3
Alshain	60-Beta Aquilae	Bet Aql	3.9
Altair	53-Alpha Aquilae	Alf Aql	0.9

Altais	57-Delta Draconis	Del Dra	3.2
Alterf	4-Lambda Leonis	Lam Leo	4.5
Aludra	31-Eta Canis Majoris	Eta CMa	2.4
Alula Australis	53-Xi Ursae Majoris	Xi UMa	3.9
Alula Borealis	54-Nu Ursae Majoris	Nu UMa	3.7
Alya	63-Theta Serpentis	Tet Ser	4.5
Ankaa	Alpha Phoenicis	Alf Phe	2.4
Antares	21-Alpha Scorpii	Alf Sco	1.1
Arcturus	16-Alpha Boötis	Alf Boo	0.2
Arkab	Beta1 Sagittarii	Bet Sgr	4.3
Arneb	11-Alpha Leporis	Alf Lep	2.7
Ascella	38-Zeta Sagittarii	Zet Sgr	2.7
Asellus Australis	47-Delta Cancri	Del Cnc	4.2
Asellus Borealis	43-Gamma Cancri	Gam Cnc	4.7
Aspidiske	Iota Carinae	Iot Car	2.3
Atik	44-Zeta Persei	Zet Per	2.9
Atlas	27 Tauri	27 Tau	3.8
Atria	Alpha Trianguli Australis	Alf TrA	1.9
Avior	Epsilon Carinae	Eps Car	1.7
Azha	3-Eta Eridani	Eta Eri	4.0
Baten Kaitos	55-Zeta Ceti	Zet Cet	3.9
Beid	38-Omicron Eridani	Omi Eri	4.1
Bellatrix	24-Gamma Orionis	Gam Ori	1.7
Betelgeuse	58-Alpha Orionis	Alf Ori	0.6
Biham	26-Theta Pegasi	Tet Peg	3.7
Canopus	Alpha Carinae	Alf Car	-0.9
Capella	Alpha Aurigae	Alf Aur	0.1
Caph	Beta Cassiopeiae	Bet Cas	2.3
Castor	66-Alpha Germinorum	Alf Gem	1.6
Cebalrai	60-Beta Ophiuchi	Bet Oph	2.9
Celaeno	16 Tauri	16 Tau	5.4
Chara	8-Beta Canum Venaticorum	Bet CVn	4.3
Chertan	70-Theta Leonis	Tet Leo	3.4
Cor Caroli	12-Alpha2 Canum Venaticorum	Alf CVn	2.9
Cursa	67-Beta Eridani	Bet Eri	2.9
Dabih	9-Beta1 Capricorni	Bet Cap	3.3
Deneb	50-Alpha Cygni	Alf Cyg	1.3
Deneb Algedi	49-Delta Capricorni	Del Cap	3.0
Denebola	94-Beta Leonis	Bet Leo	2.2
Diphda	16-Beta Ceti	Bet Cet	2.2
Double Double			6.0
Dubhe	50-Alpha Ursae Majoris	Alf UMa	2.0

Edasich	12-Iota Draconis	lot Dra	3.5
Electra	17 Tauri	17 Tau	3.8
Elnath	112-Beta Tauri	Bet Tau	1.8
Eltanin	33-Gamma Draconis	Gam Dra	2.4
Enif	8-Epsilon Pegasi	Eps Peg	2.5
Errai	35-Gamma Cephei	Gam Cep	3.4
Fomalhaut	24-Alpha Piscis Austrini	Alf PsA	1.3
Furud	1-Zeta Canis Majoris	Zet CMA	3.1
Gacrux	Gamma Crucis	Gam Cru	1.6
Giasar	1-Lambda Draconis	Lam Dra	4.1
Gienah	4-Gamma Corvi	Gam Crv	2.8
Gomeisa	3-Beta Canis Minoris	Bet CMi	3.1
Graffias	8-Beta Scorpii	Bet Sco	2.9
Grumium	32-Xi Draconis	Xi Dra	3.9
Hadar	Beta Centauri	Bet Cen	0.9
Hamal	13-Alpha Arietis	Alf Ari	2.2
Hinds Crimson Star			6.0
Homam	42-Zeta Pegasi	Zet Peg	3.6
Izar	36-Epsilon Boötis	Eps Boo	2.7
Kaffaljdhma	86-Gamma Ceti	Gam Cet	3.6
Kaus Australis	20-Epsilon Sagittarii	Eps Sgr	2.0
Kaus Borealis	22-Lambda Sagittarii	Lam Sgr	2.9
Kaus Media	19-Delta Sagittarii	Del Sgr	2.8
Keid	40-Omicron2 Eridani	Omi Eri	4.5
Kitalpha	8-Alpha Equulei	Alf Equ	4.1
Kochab	7-Beta Ursae Minoris	Bet UMi	2.2
Kornephoros	27-Beta Herculis	Bet Her	2.8
Kurhah	17-Xi Cephei	Xi Cep	4.6
Lesath	34-Upsilon Scorpii	Ups Sco	2.8
Maia	20 Tauri	20 Tau	3.9
Marfik	10-Lambda Ophiuchi	Lam Oph	3.9
Markab	54-Alpha Pegasi	Alf Peg	2.6
Matar	44-Eta Pegasi	Eta Peg	3.1
Mabsuta	27-Epsilon Geminorum	Eps Gem	3.2
Megrez	69-Delta Ursae Majoris	Del UMa	3.4
Meissa	39-Lambda Orionis	Lam Ori	3.7
Mekbuda	43-Zeta Geminorum	Zet Gem	3.9
Menkalinan	34-Beta Aurigae	Bet Aur	2.1
Menkar	92-Alpha Ceti	Alf Cet	2.8
Menkent	5-Theta Centauri	Tet Cen	2.3
Menkib	46-Xi Persei	Xi Per	4.0
Merak	48-Beta Ursae Majoris	Bet UMa	2.4

Merope	23 Tauri	23 Tau	4.3
Mesarthim	5-Gamma1 Arietis	Gam Ari	4.8
Miaplacidus	Beta Carinae	Bet Car	1.8
Mimosa	Beta Crucis	Bet Cru	1.5
Mintaka	34-Delta Orionis	Del Ori	2.5
Mira	Omicron Ceti	Omi Cet	2.1
Mirach	43-Beta Andromedae	Bet And	2.4
Mirfak	33-Alpha Persei	Alf Per	1.9
Mirzam	2-Beta Canis Majoris	Bet CMa	2.0
Mizar	79-Zeta Ursae Majoris	Zet UMa	2.4
Muphrid	8-Eta Boötis	Eta Boo	2.8
Muscida	1-Omicron Ursae Majoris	Omi UMa	3.5
Nashira	40-Gamma Capricorni	Gam Cap	3.8
Navi	27-Gamma Cassiopeiae	Gam Cas	2.8
Nekkar	42-Beta Boötis	Bet Boo	3.6
Nihal	9-Beta Leporis	Bet Lep	3.0
Nunki	34-Sigma Sagittarii	Sig Sgr	2.1
Nusakan	3-Beta Coronae Borealis	Bet CrB	3.7
Peacock	Alpha Pavonis	Alf Pav	2.1
Phact	Alpha Columbae	Alf Col	2.8
Phecda	64-Gamma Ursae Majoris	Gam UMa	2.5
Pherkad	13-Gamma Ursae Minoris	Gam UMi	3.1
Pleione	28 Tauri	28 Tau	5.2
Polaris	1-Alpha Ursae Minoris	Alf UMi	2.1
Pollux	78-Beta Geminorum	Bet Gem	1.2
Porrima	29-Gamma Virginis	Gam Vir	2.9
Procyon	10-Alpha Canis Minoris	Alf CMi	0.5
Propus	Eta Geminorum	Eta Gem	3.3
Rasalas	24-Mu Leonis	Mu Leo	4.1
Rasalgethi	64-Alpha Herculis	Alf Her	3.5
Rasalhague	55-Alpha Ophiuchi	Alf Oph	2.1
Rastaban	23-Beta Draconis	Bet Dra	3.0
Regor	Gamma2 Velorum	Gam Vel	1.9
Regulus	32-Alpha Leonis	Alf Leo	1.3
Rigel	19-Beta Orionis	Bet Ori	0.3
Ruchbah	37-Delta Cassiopeiae	Del Cas	2.7
Rukbat	Alpha Sagittarii	Alf Sgr	4.1
Sabik	35-Eta Ophiuchi	Eta Oph	2.6
Sadalmelik	34-Alpha Aquarii	Alf Aqr	3.2
Sadalsuud	22-Beta Aquarii	Bet Aqr	3.1
Sadr	37-Gamma Cygni	Gam Cyg	2.3
Saiph	53-Kappa Orionis	Kap Ori	2.2

Scheat	53-Beta Pegasi	Bet Peg	2.6
Schedar	18-Alpha Cassiopeiae	Alf Cas	2.5
Seginus	27-Gamma Boötis	Gam Boo	3.0
Shaula	35-Lambda Scorpii	Lam Sco	1.7
Sheliak	10-Beta Lyrae	Bet Lyr	3.9
Sheratan	6-Beta Arietis	Bet Ari	2.7
Sirius	9-Alpha Canis Majoris	Alf CMa	-1.6
Skat	76-Delta Aquarii	Del Aqr	3.5
Spica	67-Alpha Virginis	Alf Vir	1.2
Sterope	21 Tauri	21 Tau	5.9
Suhail	Lambda Velorum	Lam Vel	2.2
Sulafat	14-Gamma Lyrae	Gam Lyr	3.3
Syrma	99-Iota Virginis	lot Vir	4.2
Talitha	9-Iota Ursae Majoris	lot UMa	3.1
Tania Australis	34-Mu Ursae Majoris	Mu UMa	3.2
Tania Borealis	33-Lambda Ursae Majoris	Lam UMa	3.5
Tarazed	50-Gamma Aquilae	Gam Aql	2.8
Taygeta	19 Tauri	19 Tau	4.4
Thuban	11-Alpha Draconis	Alf Dra	3.6
Trapezium	41-Theta1 Orionis	Tet Ori	5.4
Unukalhai	24-Alpha Serpentis	Alf Ser	2.8
UU	none	none	5.1
Vega	3-Alpha Lyrae	Alf Lyr	0.1
Vindemiatrix	47-Epsilon Virginis	Eps Vir	3.0
Wasat	55-Delta Geminorum	Del Gem	3.5
Wazn	Beta Columbae	Bet Col	3.2
Wezen	25-Delta Canis Majoris	Del CMa	2.0
Yed Posterior	2-Epsilon Ophiuchi	Eps Oph	3.3
Yed Prior	1-Delta Ophiuchi	Del Oph	3.0
Zaniah	15-Eta Virginis	Eta Vir	4.0
Zaurak	34-Gamma Eridani	Gam Eri	3.2
Zavijava	5-Beta Virginis	Bet Vir	3.8
Zosma	68-Delta Leonis	Del Leo	2.6
Zubenelgenubi	9-Alpha2 Librae	Alf Lib	2.9
Zubeneschamali	27-Beta Librae	Bet Lib	2.7

## Appendix D: Common Stars – By Constellation

Constellation	Star Name	Flamsteed-Bayer Designation	Abbrev	Magnitude(SAO)
<b>Andromeda</b>				
	Alpheratz	21-Alpha Andromedae	Alf And	2.1
	Mirach	43-Beta Andromedae	Bet And	2.4
	Almach	57-Gamma1 Andromedae	Gam And	2.3
<b>Aquarius</b>				
	Sadalmelik	34-Alpha Aquarii	Alf Aqr	3.2
	Sadalsuud	22-Beta Aquarii	Bet Aqr	3.1
	Skat	76-Delta Aquarii	Del Aqr	3.5
	Albali	2-Epsilon Aquarii	Eps Aqr	3.8
<b>Aquila</b>				
	Altair	53-Alpha Aquilae	Alf Aql	0.9
	Alshain	60-Beta Aquilae	Bet Aql	3.9
	Tarazed	50-Gamma Aquilae	Gam Aql	2.8
<b>Aries</b>				
	Hamal	13-Alpha Arietis	Alf Ari	2.2
	Sheratan	6-Beta Arietis	Bet Ari	2.7
	Mesarthim	5-Gamma2 Arietis	Gam Ari	4.8
<b>Auriga</b>				
	Capella	Alpha Aurigae	Alf Aur	0.1
	Menkalinan	34-Beta Aurigae	Bet Aur	2.1
<b>Boötes</b>				
	Arcturus	16-Alpha Boötis	Alf Boo	0.2
	Nekkar	42-Beta Boötis	Bet Boo	3.6
	Seginus	27-Gamma Boötis	Gam Boo	3.0
	Izar	36-Epsilon Boötis	Eps Boo	2.7
	Muphrid	8-Eta Boötis	Eta Boo	2.8
	Alkalurops	51-Mu1 Boötis	Mu Boo	4.5
<b>Cancer</b>				
	Acubens	65-Alpha Cancri	Alf Cnc	4.3
	Asellus Borealis	43-Gamma Cancri	Gam Cnc	4.7
	Asellus Australis	47-Delta Cancri	Del Cnc	4.2
<b>Canis Major</b>				
	Sirius	9-Alpha Canis Majoris	Alf CMa	-1.6
	Mirzam	2-Beta Canis Majoris	Bet CMa	2.0
	Wezen	25-Delta Canis Majoris	Del CMa	2.0
	Adhara	21-Epsilon Canis Majoris	Eps CMa	1.6
	Furud	1-Zeta Canis Majoris	Zet CMa	3.1
	Aludra	31-Eta Canis Majoris	Eta CMa	2.4

<b>Canis Minor</b>				
	Procyon	10-Alpha Canis Minoris	Alf CMi	0.5
	Gomeisa	3-Beta Canis Minoris	Bet CMi	3.1
<b>Canis Venatici</b>				
	Cor Caroli	12-Alpha Canum Venaticorum	Alf CVn	2.9
	Chara	8-Beta Canum Venaticorum	Bet CVn	4.3
<b>Capricornus</b>				
	Algedi	6-Alpha2 Capricorni	Alf Cap	3.8
	Dabih	9-Beta1 Capricorni	Bet Cap	3.3
	Nashira	40-Gamma Capricorni	Gam Cap	3.8
	Deneb Algedi	49-Delta Capricorni	Del Cap	3.0
<b>Carina</b>				
	Canopus	Alpha Carinae	Alf Car	-0.9
	Miaplacidus	Beta Carinae	Bet Car	1.8
	Avior	Epsilon Carinae	Eps Car	1.7
	Aspidiske	Iota Carinae	Iot Car	2.3
<b>Cassiopeia</b>				
	Schedar	18-Alpha Cassiopeiae	Alf Cas	2.5
	Caph	Beta Cassiopeia	Bet Cas	2.3
	Navi	27-Gamma Cassiopeiae	Gam Cas	2.8
	Ruchbah	37-Delta Cassiopeiae	Del Cas	2.7
<b>Centaurus</b>				
	Alpha Centauri	Alpha1 Centauri	Alf Cen	0.1
	Hadar	Beta Centauri	Bet Cen	0.9
	Menkent	5-Theta Centauri	Tet Cen	2.3
<b>Cepheus</b>				
	Alderamin	5-Alpha Cephei	Alf Cep	2.6
	Alfirk	8-Beta Cephei	Bet Cep	3.3
	Erral	35-Gamma Cephei	Gam Cep	3.4
	Kurhah	17-Xi Cephei	Xi Cep	4.6
<b>Cetus</b>				
	Menkar	92-Alpha Ceti	Alf Cet	2.8
	Diphda	16-Beta Ceti	Bet Cet	2.2
	Kaffaljidhma	86-Gamma Ceti	Gam Cet	3.6
	Baten Kaitos	55-Zeta Ceti	Zet Cet	3.9
	Mira	Omicron Ceti	Omi Cet	2.1
<b>Columba</b>				
	Phact	Alpha Columbae	Alf Col	2.8
	Wazn	Beta Columbae	Bet Col	3.2
<b>Corona Borealis</b>				
	Alphecca	5-Alpha Coronae Borealis	Alf CrB	2.3
	Nusakan	3-Beta Coronae Borealis	Bet CrB	3.7

<b>Corvus</b>				
	Alchiba	1-Alpha Corvi	Alf Crv	4.2
	Gienah	4-Gamma Corvi	Gam Crv	2.8
	Algorab	7-Delta Corvi	Del Crv	3.1
<b>Crater</b>				
	Alkes	7-Alpha Crateris	Alf Crt	4.2
<b>Crux</b>				
	Acrux	Alpha2 Crucis	Alf Cru	1.6
	Mimosa	Beta Crucis	Bet Cru	1.5
	Gacrux	Gamma Crucis	Gam Cru	1.6
<b>Cygnus</b>				
	Deneb	50-Alpha Cygni	Alf Cyg	1.3
	Albireo	6-Beta1 Cygni	Bet Cyg	3.2
	Sadr	37-Gamma Cygni	Gam Cyg	2.3
<b>Draco</b>				
	Thuban	11-Alpha Draconis	Alf Dra	3.6
	Rastaban	23-Beta Draconis	Bet Dra	3.0
	Eltanin	33-Gamma Draconis	Gam Dra	2.4
	Altais	57-Delta Draconis	Del Dra	3.2
	Edasich	12-Iota Draconis	Iot Dra	3.5
	Giasar	1-Lambda Draconis	Lam Dra	4.1
	Alrakis	21-Mu Draconis	Mu Dra	5.1
	Grumium	32-Xi Draconis	Xi Dra	3.9
<b>Equuleus</b>				
	Kitelpha	8-Alpha Equulei	Alf Equ	4.1
<b>Eridanus</b>				
	Achernar	Alpha Eridani	Alf Eri	0.6
	Cursa	67-Beta Eridani	Bet Eri	2.9
	Zaurak	34-Gamma Eridani	Gam Eri	3.2
	Azha	3-Eta Eridani	Eta Eri	4.0
	Acamar	Theta Eridani	Tet Eri	3.2
	Beid	38-Omicron Eridani	Omi Eri	4.1
	Keid	40-Omicron2 Eridani	Omi Eri	4.5
<b>Gemini</b>				
	Castor	66-Alpha Geminorum	Alf Gem	1.6
	Pollux	78-Beta Geminorum	Bet Gem	1.2
	Alhena	24-Gamma Geminorum	Gam Gem	1.9
	Wasat	55-Delta Geminorum	Del Gem	3.5
	Mebstuta	27-Epsilon Geminorum	Eps Gem	3.2
	Mekbuda	43-Zeta Geminorum	Zet Gem	3.9
	Propus	Eta Geminorum	Eta Gem	3.3

<b>Grus</b>	AlNair	Alpha Gruis	Alf Gru	2.2
<b>Hercules</b>	Rasalgethi	64-Alpha Herculis	Alf Her	3.5
	Kornephoros	27-Beta Herculis	Bet Her	2.8
<b>Hydra</b>	Alphard	30-Alpha Hydrae	Alf Hya	2.2
<b>Leo</b>	Regulus	32-Alpha Leonis	Alf Leo	1.3
	Denebola	94-Beta Leonis	Bet Leo	2.2
	Algieba	41-Gamma2 Leonis	Gam Leo	2.6
	Zosma	68-Delta Leonis	Del Leo	2.6
	Adhafera	36-Zeta Leonis	Zet Leo	3.6
	Alterf	4-Lambda Leonis	Lam Leo	4.5
	Chertan	70-Theta Leonis	Tet Leo	3.4
	Rasalas	24-Mu Leonis	Mu Leo	4.1
	Arneb	11-Alpha Leporis	Alf Lep	2.7
	Nihal	9-Beta Leporis	Bet Lep	3.0
<b>Libra</b>	Zubenelgenubi	9-Alpha2 Librae	Alf Lib	2.9
	Zubeneschamali	27-Beta Librae	Bet Lib	2.7
<b>Lyra</b>	Vega	3-Alpha Lyrae	Alf Lyr	0.1
	Sheliak	10-Beta Lyrae	Bet Lyr	3.9
	Sulafat	14-Gamma Lyrae	Gam Lyr	3.3
<b>Ophiuchus</b>	Rasalhague	55-Alpha Ophiuchi	Alf Oph	2.1
	Cebalrai	60-Beta Ophiuchi	Bet Oph	2.9
	Yed Prior	1-Delta Ophiuchi	Del Oph	3.0
	Yed Posterior	2-Epsilon Ophiuchi	Eps Oph	3.3
	Sabik	35-Eta Ophiuchi	Eta Oph	2.6
	Marfik	10-Lambda Ophiuchi	Lam Oph	3.9
<b>Orion</b>	Betelgeuse	58-Alpha Orionis	Alf Ori	0.6
	Rigel	19-Beta Orionis	Bet Ori	0.3
	Bellatrix	24-Gamma Orionis	Gam Ori	1.7
	Alnilam	46-Epsilon Orionis	Eps Ori	1.8
	Mintaka	34-Delta Orionis	Del Ori	2.5
	Alnitak	50-Zeta Orionis	Zet Ori	2.0
	Trapezium	41-Theta1 Orionis	Tet Ori	5.4
	Saiph	53-Kappa Orionis	Kap Ori	2.2
	Meissa	39-Lambda Orionis	Lam Ori	3.7

<b>Pavo</b>	Peacock	Alpha Pavonis	Alf Pav	2.1
<b>Pegasus</b>	Markab	54-Alpha Pegasi	Alf Peg	2.6
	Scheat	53-Beta Pegasi	Bet Peg	2.6
	Algenib	88-Gamma Pegasi	Gam Peg	2.9
	Enif	8-Epsilon Pegasi	Eps Peg	2.5
	Homam	42-Zeta Pegasi	Zet Peg	3.6
	Matar	44-Eta Pegasi	Eta Peg	3.1
	Biham	26-Theta Pegasi	Tet Peg	3.7
<b>Perseus</b>	Mirfak	33-Alpha Persei	Alf Per	1.9
	Algol	26-Beta Persei	Bet Per	2.9
	Atik	44-Zeta Persei	Zet Per	2.9
	Menkib	46-Xi Persei	Xi Per	4.0
<b>Phoenix</b>	Ankaa	Alpha Phoenicis	Alf Phe	2.4
<b>Pisces</b>	Alrescha	113-Alpha Piscium	Alf Psc	4.3
<b>Piscis Austrinus</b>	Fomalhaut	24-Alpha Piscis Austrini	Alf PsA	1.3
<b>Sagittarius</b>	Rukbat	Alpha Sagittarii	Alf Sgr	4.1
	Arkab	Beta1 Sagittarii	Bet Sgr	4.3
	Alnasi	10-Gamma2 Sagittarii	Gam Sgr	3.1
	Kaus Media	19-Delta Sagittarii	Del Sgr	2.8
	Kaus Australis	20-Epsilon Sagittarii	Eps Sgr	2.0
	Ascella	38-Zeta Sagittarii	Zet Sgr	2.7
	Kaus Borealis	22-Lambda Sagittarii	Lam Sgr	2.9
	Nunki	34-Sigma Sagittarii	Sig Sgr	2.1
<b>Scorpius</b>	Antares	21-Alpha Scorpii	Alf Sco	1.1
	Graffias	8-Beta Scorpii	Bet Sco	2.9
	Shaula	35-Lambda Scorpii	Lam Sco	1.7
	Lesath	34-Upsilon Scorpii	Ups Sco	2.8
<b>Serpens</b>	Unukalhai	24-Alpha Serpentis	Alf Ser	2.8
	Alya	63-Theta Serpentis	Tet Ser	4.5
<b>Taurus</b>	Aldebaran	87-Alpha Tauri	Alf Tau	1.1
	Elnath	112-Beta Tauri	Bet Tau	1.8
	Alcyone	25-Eta Tauri	Eta Tau	3.0

	Celaeno	16 Tauri	16 Tau	5.4
	Electra	17 Tauri	17 Tau	3.8
	Taygeta	19 Tauri	19 Tau	4.4
	Maia	20 Tauri	20 Tau	3.9
	Sterope	21 Tauri	21 Tau	5.9
	Merope	23 Tauri	23 Tau	4.3
	Atlas	27 Tauri	27 Tau	3.8
	Pleione	28 Tauri	28 Tau	5.2
<b>Triangulum Australe</b>				
	Atria	Alpha Trianguli Australis	Alf TrA	1.9
<b>Ursa Major</b>				
	Dubhe	50-Alpha Ursae Majoris	Alf UMa	2.0
	Merak	48-Beta Ursae Majoris	Bet UMa	2.4
	Phecda	64-Gamma Ursae Majoris	Gam UMa	2.5
	Alioth	77-Delta Ursae Majoris	Eps UMa	1.7
	Megrez	69-Delta Ursae Majoris	Del UMa	3.4
	Mizar	79-Zeta Ursae Majoris	Zet UMa	2.4
	Alkaid	85-Eta Ursae Majoris	Eta UMa	1.9
	Talitha	9-Iota Ursae Majoris	Iot UMa	3.0
	Tania Borealis	33-Lambda Ursae Majoris	Lam UMa	3.5
	Tania Australis	34-Mu Ursae Majoris	Mu UMa	3.2
	Alula Borealis	54-Nu Ursae Majoris	Nu UMa	3.7
	Alula Australis	53-Xi Ursae Majoris	Xi UMa	3.9
	Muscida	1-Omicron Ursae Majoris	Omi UMa	3.5
	Alcor	80 Ursae Majoris	80 UMa	4.0
<b>Ursa Minor</b>				
	Polaris	1-Alpha Ursae Minoris	Alf UMi	2.1
	Kochab	7-Beta Ursae Minoris	Bet UMi	2.2
	Pherkad	13-Gamma Ursae Minoris	Gam UMi	3.1
<b>Vela</b>				
	Regor	Gamma2 Velorum	Gam Vel	1.9
	Suhail	Lambda Velorum	Lam Vel	2.2
<b>Virgo</b>				
	Spica	67-Alpha Virginis	Alf Vir	1.2
	Zavijava	5-Beta Virginis	Bet Vir	3.8
	Porrina	29-Gamma Virginis	Gam Vir	2.9
	Vindematrix	47-Epsilon Virginis	Eps Vir	3.0
	Zaniah	15-Eta Virginis	Eta Vir	4.0
	Syrma	99-Iota Virginis	Iot Vir	4.2

# Appendix E: Common Object Names

47 Tucanae	Filamentary Nebula	Papillon
Andromeda Galaxy	Flaming Star Nebula	Pelican Nebula
Antennae	Gamma Cassiopeia Nebula	Pin-wheel Nebula
Barnard's Galaxy	Gamma Cygnus Nebula	Polarissima Australis
Baxendell's Nebula	Ghost of Jupiter	Polarissima Borealis
Bear Paw Galaxy	Great Cluster in Hercules	Praesepe
Beehive Cluster	Great Nebula in Andromeda	Rho Ophiuchus Nebula
Black-eye Galaxy	Great Nebula in Orion	Ring Nebula in Lyra
Blinking Planetary	Helix Galaxy	Rosette Nebula
Blue Planetary	Helix Nebula	Saturn Nebula
Blue Snowball	Hercules Cluster	Sculptor Galaxy
Bode's Nebula	Hind's Variable Nebula	Siamese Twins
Box	Horsehead Nebula	Sombrero Galaxy
Box Nebula	Hourglass Nebula	Southern Pleiades
Bubble Nebula	Hubble's Variable Nebula	Spindle Galaxy
Bug Nebula	Jewel Box	Star Queen Nebula
Butterfly Cluster	Kappa Crux Cluster	Stephan's Quintet
Butterfly Nebula	Lacework Nebula	Struve's Lost Nebula
California Nebula	Lagoon Nebula	Sunflower Galaxy
Christmas Tree Cluster	Lambda Centarus Nebula	Tarantula Nebula
Cocoon Nebula	Little Dumbell	The Eyes
Cone Nebula	Little Gem	The Mice
Copeland's Septet	Maia Nebula	Toby Jug Nebula
Crab Nebula	Merope Nebula	Triangulum Galaxy
Crescent Nebula	Network-1 Nebula	Trifid Nebula
Double Cluster	Network-2 Nebula	Veil Nebula
Dumbell Nebula	North American Nebula	Whirlpool Galaxy
Eagle Nebula	Omega Centaurus	Wild Duck Cluster
Eight-burst Planetary	Omega Nebula	Witch Head Nebula
Eskimo Nebula	Orion Nebula	
Eta Carina Nebula	Owl Nebula	

## Appendix F: The Greek Alphabet

We have included this list for your reference to help you translate Greek letter designations that may be used in your star atlas or other reference.

### Symbol   Translation   Abbreviation

A	$\alpha$	Alpha	Alf
B	$\beta$	Beta	Bet
$\Gamma$	$\gamma$	Gamma	Gam
$\Delta$	$\delta$	Delta	Del
E	$\epsilon$	Epsilon	Eps
Z	$\zeta$	Zeta	Zet
H	$\eta$	Eta	Eta
$\Theta$	$\theta$	Theta	Tet
I	$\iota$	Iota	Iot
K	$\kappa$	Kappa	Kap
$\Lambda$	$\lambda$	Lambda	Lam
M	$\mu$	Mu	Mu
N	$\nu$	Nu	Nu
$\Xi$	$\xi$	Xi	Xi
O	$\omicron$	Omicron	Omi
$\Pi$	$\pi$	Pi	Pi
P	$\rho$	Rho	Rho
$\Sigma$	$\sigma$	Sigma	Sig
T	$\tau$	Tau	Tau
Y	$\upsilon$	Upsilon	Ups
$\Phi$	$\phi$	Phi	Phi
X	$\chi$	Chi	Chi
$\Psi$	$\psi$	Psi	Psi
$\Omega$	$\omega$	Omega	Ome

# Appendix G: Variable Stars Real-Name Cross-Reference Chart

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
A	55	56	57	58	59	60	61	62	63		64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	A
B		80	81	82	83	84	85	86	87		88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	B
C			104	105	106	107	108	109	110		111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	C
D				127	128	129	130	131	132		133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	D
E					149	150	151	152	153		154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	E
F						170	171	172	173		174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	F
G							190	191	192		193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	G
H								209	210		211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	H
I									227		228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	I
J																											J
K											244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	K
L												260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	L
M													275	276	277	278	279	280	281	282	283	284	285	286	287	288	M
N						R	1							289	290	291	292	293	294	295	296	297	298	299	300	301	N
O						S	2								302	303	304	305	306	307	308	309	310	311	312	313	O
P						T	3									314	315	316	317	318	319	320	321	322	323	324	P
Q						U	4										325	326	327	328	329	330	331	332	333	334	Q
R						V	5											10	11	12	13	14	15	16	17	18	R
S						W	6												19	20	21	22	23	24	25	26	S
T						X	7													27	28	29	30	31	32	33	T
U						Y	8														34	35	36	37	38	39	U
V						Z	9															40	41	42	43	44	V
W																							45	46	47	48	W
X																								49	50	51	X
Y																									52	53	Y
Z																										54	Z
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	

Row gives the 1st letter  
Column gives the 2nd letter

**Example:**  
SV is the 22nd variable  
star in a constellation

# Appendix H: Trouble Shooting Possible Problems

## ***Software Installation***

**I am unable to bring up DigitalSky Voice after installing the CD-ROM. The error message states that there is a problem with OCX registration.**

One of the OCX files is missing from your Windows platform. Send e-mail to Charles at [strfire@ibm.net](mailto:strfire@ibm.net) or contact Astro-Physics.

**I installed the CD-ROM and tried to load the program, however I got the following error message "Couldn't open the mixer." I clicked OK and part of the DigitalSky Voice screen displayed, but it doesn't work.**

Your computer does not have a sound card. As a result, the voice engine of the program is unable to load. You will be able to use the program after you install a sound card. Be sure that it is Sound Blaster™ compatible.

# Appendix I: Contacting The Author (My Email-Address)

Thank you for purchasing and using DigitalSky Voice. I hope that DigitalSky has provided excellent companionship and service to you as you observed the heavens.

Developing this program has been a labor of love and will continue to be an evolutionary process. I have a few ideas of my own and I know that many users will have great suggestions as well. Check out our web site now and then to see what's new and download the latest and greatest upgrades.

I would like to hear from the user-community. The [www.digitalskyvoice.com](http://www.digitalskyvoice.com) web site has a special area to report bugs and another to make suggestions. You are also welcome to send e-mail to the following address:

Email: [dskyvoice@home.com](mailto:dskyvoice@home.com)

Please make the subject: DSKY Related

Use these words exactly in the subject line, as I will route all the messages related to DigitalSky that way.

Thank you,  
Charles Sinsofsky