WITH SKY TOUR™

INSTRUCTION MANUAL

789961 700x60mm REFRACTOR
789971 800x70mm REFRACTOR

789931 700x76mm REFLECTOR
789946 900x114mm REFLECTOR

Lit.#: 98-0822
Congratulations on the purchase of your Bushnell Voyager Telescope with Sky Tour! This telescope truly is the ultimate first telescope. The Sky Tour handset will actually speak, giving you a personal real-time tour of the night sky each and every night. Each tour object will include directions associated with it to allow you to quickly find the object with your telescope.

After reading through this manual and preparing for your observing session as outlined in these pages, you can start enjoying the Sky Tour feature by doing the following:

- After inserting 3 AA batteries, push and hold the “Constellation” button (the upper left hand button in the four button section) until the Sky Tour handset starts speaking and prompting you for set up.

- To find your latitude and longitude, please check a map of your area or visit the "Telescopes" page on the Bushnell website, enter your address (street #, city and state) in the "Find Your Latitude and Longitude" box and click "Get Coordinates".

- Once the setup is complete, and handset confirms that your settings are saved you should then power off. To begin using the handset, press and hold the Constellation button until the unit powers on again.

Your settings will be retained for an extended period of time provided that you do not remove the batteries. This will allow you to immediately enjoy the Sky Tour each and every time that you use the same viewing location. If you have moved to a different viewing location, you can change your settings by powering up the handset with the “Mythology” button depressed (instead of the “Constellation” button) and simply following the spoken directions.

We hope you enjoy this telescope for years to come.

NEVER LOOK DIRECTLY AT THE SUN WITH YOUR TELESCOPE
PERMANENT DAMAGE TO YOUR EYES MAY OCCUR
SKY TOUR HANDSET INTERFACE KEY

1. **Constellation** Mode Button (also turns unit **ON** by depressing and holding)

2. **Mythology** Mode Button (also places unit into **SETUP** mode from the off position when depressed and held)

3. **Amazing Facts** Mode Button

4. **Planets** Mode Button

5. **Back** Button

6. **Next** Button

7. **LCD Display** shows names and coordinates of tour objects

8. **Volume Dial** controls audio level of voice

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**BUTTON FUNCTIONS**

*ALL BUTTONS ARE ILLUMINATED FOR NIGHTTIME USE.*

The **Constellation** Mode Button will allow you to tour many well-known constellations, and will give you basic information about each, including tips for finding and navigating by them, as well as specific information about special stars or other objects located within them.

The **Mythology** Mode Button will allow you to hear about ancient stories and myths revealing why the constellations are depicted and named as they are.

The **Amazing Facts** Mode Button provides mind-boggling information related to each constellation, including distance to stars, size, and other other interesting information.

The **Planets** Mode Button will give you a guided tour of the planets.

**Note:** To get the most out of the Sky Tour (for example the Constellation tour), listen to the entire set of information, and then change over to another mode. Anytime that you switch to another mode, you will hear more information, but may miss some from the previous mode unless you continue selecting next to hear more until the information begins to be repeated.

Pressing any mode button more than once sequentially will advance you to the next tour object in that mode.

The handset will power itself off after a certain length of time to conserve battery life. However, the illuminated mount and red dot finderscope must be turned off manually.
• Red Dot Finderscope
• 1.25” Format Eyepieces
• Illuminated Telescope Mount with attached Adjustable Aluminum Tripod
• Diagonal Mirror (Refractors Only)
• 1.5x Erecting Eyepiece (Select Models Only)
• Sky Tour Handset
• Main Telescope Tube
• Compass
• Barlow Lens (Select Models Only)

Telescope Mount Parts Key

1. Illuminated Altitude Dial
2. Altitude Lock Knob (Backside)
3. Altitude Dial Light Switch
4. Illuminated Azimuth Dial
5. Azimuth Lock Knob
6. Azimuth Dial Light Switch
7. Azimuth Fine Adjustment Knob (Used only when Azimuth Lock Knob is engaged)
**Telescope Components Key**

1. Red Dot Finderscope
2. 1.25" Format Eyepiece
3. Rack and Pinion Focusing
4. Accessory Tray Brace
5. Tripod Leg Adjust
6. Quick-Release Accessory Tray
7. Main Telescope Tube
8. Adjustable Aluminum Tripod
No tools are required for assembly of your telescope.

Remove all components from the carton and identify all parts. It is a good idea to lay all the parts out in front of you before assembly. Since your telescope is a precision optical system, the components require careful handling—particularly the Sky Tour Handset, Telescope, Eyepieces and various accessories.

**Set Up Tripod and Accessory Tray**
1. Stand the Voyager Illuminated Mount Assembly with pre-attached tripod legs on a level surface. Spread the tripod legs to their fullest position.
2. Fold down the accessory tray braces and place the Quick Release Accessory Tray on top of the braces.
3. Insert accessory tray bolt through the center of the accessory tray braces and tighten accessory tray bolt into the accessory tray brace.
4. Adjust the tripod height to suit by loosening the tripod leg adjustment bolts and extending the tripod legs to the desired height. Tighten the tripod leg adjustment bolts.

**Attach Telescope Tube**
1. Locate Main Telescope Tube.
2. Remove the two telescope tube bolt nuts from the bolts extending from the under side of the telescope tube.
3. Position main telescope tube with the attachment bolts facing down through the two holes in the illuminated telescope mount top.
4. Reattach the telescope tube bolt nuts and tighten.

**Attach Final Telescope Accessories**
1. Locate Red Dot Finderscope
2. Place finderscope over the corresponding attachment lug on the top of the telescope tube near the focusing mechanism.
3. Slide forward until the finderscope is seated securely. The large end of the finderscope should face the open end of the telescope tube.
4. Attach low power eyepiece.
   • For Reflector Telescopes, insert eyepiece directly into the focusing tube mechanism.
   • For Refractor Telescopes, insert eyepiece into the diagonal mirror, then insert the diagonal mirror into the focusing tube mechanism.
5. Tighten all set screws to secure accessories.

**LENS ACCESSORIES**

**Barlow Lens (Select Models)**
Some Voyager with Sky Tour units come with a Barlow lens. This accessory will allow you to now have dual use of any eyepiece. Simply put the Barlow lens between the focusing mechanism and the eyepiece for reflector style telescopes, or the focusing mechanism and the diagonal mirror on refractor style telescopes. Depending on the specification written on the Barlow lens, these accessories can double or even triple the magnification of the eyepiece when used with it. Remember, low power is always recommended, but higher powers are good especially on bigger and brighter objects such as the moon and planets.

**Erecting Lens 1.5X (Select Models Only)**
This accessory allows the user to view objects on land as you would naturally see them with your unaided eye. To use this accessory, simply place the erecting lens in between your eyepiece and the focusing mechanism on your telescope.
FOCUSING THE TELESCOPE

1. After selecting the desired Eyepiece, aim Main Telescope Tube at a land-based target at least 200 yards away (e.g. A telephone pole or building). Fully extend focusing tube by turning Rack and Pinion Focusing Mechanism.

2. While looking through selected Eyepiece, slowly retract focusing tube by turning Rack and Pinion Focusing Mechanism until object comes into focus.

ALIGNING THE FINDERSCOPE

1. Look through Main Telescope Tube and establish a well-defined target. (see focusing telescope section).

2. Looking through finderscope, alternate tightening each Finderscope Adjustment Screw until center of finderscope is precisely centered on the same object already centered in main telescope tube’s field of view.

3. Now, objects located first with the Finderscope will also be centered in the field of view of the Main Telescope Tube.

BATTERY INSTALLATION

Your Sky Tour Handset is powered by 3 AA batteries (user supplied), installed with positive tip "up" on the middle battery, positive down on the two side batteries as shown below. The two white micro-switches under the middle battery allow you to select a language for the handset voice and display. For English, set both switches up (or both down). For Spanish, set the left switch up and the right switch down. For French, set the left switch down and the right switch up.

Your Illuminated Voyager Mount is powered by two CR1620 watch batteries (included). These batteries are installed by removing the battery cap located next to the illuminated dial power switches.

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SETUP

1. Set up your assembled telescope on a stable level surface. Your back yard is preferred to your back deck.

2. Turn on the altitude and azimuth dial light switches to illuminate your telescope mount.

3. Refer to the direction indicated by "0" on the included compass to align your telescope properly (Zero degrees=North). To orient your telescope to the same "0" reference, follow these steps (refer to the "Telescope Mount Parts Key" on the parts illustration page):
   - Find the black arrow index mark, located just below the azimuth dial on the mount.
   - Move the tripod (or entire telescope) until this arrow index mark is aimed in the direction indicated by "0" on the compass.
   - Loosen the azimuth lock knob and rotate the telescope tube until it is lined up in the same direction as the arrow index mark (and "0" on the compass). On refractor style telescopes, the large objective lens should be pointed in the same direction as the arrow index mark. On reflector style telescopes, the "open" end of the telescope tube should be pointed in this direction.
   - Finally, with the azimuth lock knob still loosened, rotate the illuminated azimuth dial so that "0" on the dial is lined up with the arrow index mark, telescope tube, and "0" compass heading.

4. Make sure batteries are inserted in the Sky Tour handset and the language is set to your preference (see "Battery Installation" on the previous page). Push and hold the "Constellation" mode button until the display comes on. Be sure the volume dial on the right side of the handset is turned up so the voice can be easily understood. The voice and display will guide you through the setup process, as you make your settings using the Arrow keys (Next/Back).

5. You will first set the year, month and date. Once you've finished making the setting for the year, simply wait for a few seconds. The handset will automatically accept your setting and prompt you to make the next setting. Finally, set the correct latitude and longitude for your location. To find these, check a map of your area or visit the "Telescopes" page on the Bushnell website, enter your address (street #, city and state) in the "Find Your Latitude and Longitude" box and click "Get Coordinates". If you are uncertain about how to enter your location on the handset as a latitude and longitude, see "About Latitude/Longitude Coordinates" on the next page.

6. Once the setup is complete, the handset will confirm that your settings are saved. The handset will retain that information until the batteries are replaced. If you want to use your telescope in a different location at a later date, and therefore need to change the latitude/longitude, time, or other settings, see "Re-Initialization" in the Troubleshooting section.

BASIC OPERATION

After (A) completing the setup as described above, or (B) turning on the handset the next time you're ready to use the telescope (by holding the Constellation mode button):

1. The handset will speak the current time and date, then the four tour mode buttons (Constellation, Mythology, Amazing Facts, and Planets) will flash. Choose your desired mode of operation by pressing the corresponding button: Constellations, Mythology, Amazing Facts, or Planets. The tour for that mode will start, with the voice and display informing and guiding you.

2. The Sky Tour handset will provide an altitude number (this corresponds to the top dial) and an azimuth number (this corresponds to the bottom dial) for the first tour object. These coordinates will be both spoken and displayed on the LCD. Don’t worry if you miss the numbers, you can repeat them by pressing the Back button.

3. Move the telescope in altitude and azimuth to the corresponding numbers on the dials and the telescope will be pointed at your tour object!
Basic Operation / About Latitude/Longitude Coordinates

4. Continue pressing the Next button to hear more information for that tour mode until the facts are starting to repeat, then select a different mode.

5. You don’t have to listen to all items in each mode, you can jump from mode to mode if you choose.

6. Each time you choose a new mode, directions are given for the first object in each mode. Simply move your telescope to view them and enjoy the information as it is spoken.

7. The Planets mode is a unique mode that allows you to hear basic information about the five brightest planets and the moon.

8. Once you’ve finished the tour of each mode, you can advance to the next tour object by pressing the mode button a second time. This will advance the handset to the next item in the tour.

9. There is no "power off" button—the handset will automatically power off after a few minutes of inactivity (no buttons pressed, voice not speaking).

About Latitude/Longitude Coordinates

When using an internet source or map to look up the latitude and longitude coordinates for your location, you may find them listed in one of several different possible formats. For example:

- As a string of three 2 digit numbers followed by a letter, e.g. 38°96′18″ N. This is shorthand for "Latitude 38 degrees, 96 minutes, 18 seconds North".

- As a two digit number, extended out to four (or more) decimal places. The two numerals before the decimal point are the latitude or longitude in degrees, and numerals after the decimal point are the minutes and seconds, e.g. 38.9618, which is another way to notate "Latitude 38 degrees, 96 minutes, 18 seconds North". In this format, positive numbers for Latitude=North, negative numbers=South. For Longitude numbers, positive values=East, negative values=West.

- As a simple two digit number followed by the direction (North or South for Latitude, East or West for Longitude). The number represents only the degrees, with the finer increments of minutes and seconds "rounded up" to the nearest degree. This provides enough accuracy for many applications, such as setting up the Voyage telescope. This is the format you will use to enter your location into the Voyager handset. See the examples below if you need help "converting" another location coordinate format.

Equivalent Coordinates

<table>
<thead>
<tr>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>38°96′18″ N</td>
<td>38.9618</td>
</tr>
<tr>
<td>39° North</td>
<td>-94.7219</td>
</tr>
<tr>
<td>94°72′19″ W</td>
<td>56°54′25″ S</td>
</tr>
<tr>
<td>56 South</td>
<td>-56.5425</td>
</tr>
<tr>
<td>43°31′47″ E</td>
<td>43 East</td>
</tr>
<tr>
<td>43.3147</td>
<td>95 West</td>
</tr>
</tbody>
</table>
1. First choose a target to view. Any bright object in the night sky is a good starting point. One of the favorite starting points in astronomy is the moon. This is an object sure to please any budding astronomer or experienced veteran. When you have developed proficiency at this level, other objects become good targets. Saturn, Mars, Jupiter, and Venus are good second steps to take.

- **The Moon**—a wonderful view of our lunar neighbor can be enjoyed with any magnification. Try viewing at different phases of the moon. Lunar highlands, lunar maria (lowlands called “seas” for their dark coloration), craters, ridges and mountains will astound you.
- **Saturn**—even at the lowest power you should be able to see Saturn’s rings and moons. This is one of the most satisfying objects in the sky to see simply because it looks like it does in pictures. Imagine seeing what you’ve seen in textbooks or NASA images from your backyard!
- **Jupiter**—the largest planet in our solar system is spectacular. Most noted features are its dark stripes or bands both above and below its equator. These are the north and south equatorial belts. Also interesting are Jupiter’s four major moons. Pay close attention to their positions from night to night. They appear to be lined up on either side of Jupiter.
- **Mars**—The Great Red planet appears as a reddish-orange disk. Look at different times of the year and try to catch a glimpse of the white polar ice caps.
- **Venus**—just like the moon, Venus changed phases from month to month. Some views of brilliant Venus appear as if you were looking at a distant crescent moon.
- **Nebulae**—The Great Orion Nebula is a very well known night sky object. This and many others are brought to you by this telescope.
- **Star Clusters**—View millions of stars densely packed in a cluster that resembles a ball.
- **Galaxies**—One of the greatest and most interesting galaxies is our neighbor the Andromeda Galaxy. Enjoy this and many others.

And much, much, more!

While this manual is intended to assist you in the set-up and basic use of this instrument, it does not cover everything you might like to know about astronomy. For objects other than stars and constellations, a basic guide to astronomy is a must. The telescope instruction manuals page on our website has a list of links to helpful websites that can point you in the right direction.

2. After setting up the telescope and selecting something to view, center the desired object in the finderscope. Provided you did a reasonable job aligning the finderscope, a quick look through the main telescope tube at low power should reveal the same image. With the lowest power eyepiece (the one with the largest number printed on it) you should be able to focus the same image that you saw through the finderscope. Avoid the temptation to move directly to the highest power. The low power eyepiece will give you a wider field of view, and brighter image—thus making it very easy to find your target object. At this point with a focused image in both scopes, you’ve passed the first obstacle. If you don’t see an image after attempting to focus it in, you might consider aligning your finderscope again. Once you pass this step, you’ll will enjoy the time spent ensuring a good alignment. Every object you center in the finderscope will be easily found in the main telescope tube, which is important for continuing your exploration of the night sky.

3. The low power eyepieces are perfect for viewing the full moon, planets, star clusters, nebulae, and even constellations. These should build your foundation. However, for more detail, try bumping up in magnification to higher power eyepieces on some of these objects. During calm and crisp nights, the light/dark separation line on the moon (called the “Terminator”) is marvelous at high power. You can see mountains, ridges and craters jump out at you due to the highlights. Similarly, you can move up to higher magnifications on the planets and nebulae. Star clusters and stars are best viewed through the low power no matter what.
4. The recurring astronomical theater we call the night sky is an ever-changing billboard. In other words, not the same movie plays all the time. Rather, the positions of the stars change not only hourly as they seem to rise and set, but also throughout the year. As the earth orbits the sun our perspective on the stars changes on a yearly cycle about that orbit. The reason the sky seems to move daily just as the sun and the moon “move” across our sky, is that the earth is rotating about its axis. As a result you may notice that after a few minutes or a few seconds depending on what power you are viewing at, the objects in your telescope will move. At higher magnifications especially, you will notice that the moon or Jupiter will “race” right out of the field of view. To compensate, just move the fine adjustment controls on your telescope to “track” it in the necessary path.

HELPFUL HINTS

• Your telescope is a very sensitive instrument. For best results and fewer vibrations, set your telescope up on a level location on the ground rather than your concrete driveway or your wooden deck. This will provide a more stable foundation for viewing, especially if you’ve drawn a crowd with your new telescope.

• If possible, view from a location that has relatively few lights. This will allow you to see much fainter objects. You’d be surprised how much more you’ll see from your local lake or park when compared to a backyard in the city.

• Using your telescope out a window is NEVER recommended.

• View objects that are high in the sky if possible. Waiting until the object rises well above the horizon will provide a brighter and crisper image. Objects on the horizon are viewed through several layers of earth’s atmosphere. Ever wonder why the moon appears orange as it sets on the horizon? It’s because you are looking through a considerably greater amount of atmosphere than you would directly overhead. (Note: If objects high in the sky are distorted or wavy, you are probably viewing on a very humid night.) During nights of unstable atmosphere, viewing through a telescope can be frustrating if not impossible. Astronomers refer to crisp, clear nights as nights of “good seeing.”

• If desired, your telescope and handset may also be used independently. You can view any object of interest through the telescope without turning on the handset, and you can listen to the handset’s tours when you are indoors, away from the telescope.
TROUBLESHOOTING

Power Up Problems:
The handset uses a special low power consumption circuit designed to maximize battery life. Because of this, the handset may have difficulty powering up especially if the batteries are low, or if the batteries are removed and replaced immediately. To solve this issue, simply remove the batteries, wait 10 minutes, and replace with fresh batteries. This allows the circuitry to reset and should restore all handset functions. You will need to set the date, time and your location when you start using the telescope, just as you did the first time.

Power Shuts Off:
The handset will normally automatically power off after a few minutes of inactivity (no buttons pressed, no tour in progress), to conserve battery power. Press the constellation button to power back up.

Unresponsive Buttons:
If the LED lights under the buttons come on, stay on, and the buttons do not function properly, this is another issue related to the low power circuit design which can be fixed by a reset. Remove the batteries, wait 10 minutes, and replace with fresh batteries. This allows the circuitry to reset and should restore all handset functions. You will need to set the date, time and your location when you start using the telescope, just as you did the first time.

Re-Initialization:
If you move (temporarily or permanently) to another city or any significant distance after you initially setup the Voyager Sky Tour handset, you will need to change the latitude and longitude coordinates, and possibly the time as well. You can always do a reset as described above and start over, but there’s a quicker way, instead of removing batteries and waiting 10 minutes. Starting with the power off, press and hold the Mythology mode button to power up the unit (instead of the usual Constellation button). You will then be able to start the initialization (setup) process over-the handset will not use any of your previously stored settings.