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AGES 10+

80-10171

70/350MM GOTO

Automatic Tracking Telescope
Instruction Manual

Specifications

Optical design	Achromatic refractor
Magnification	18x-88x
Front lens (clear aperture)	60 mm
Focal length, focal ratio	700 mm
Standard eyepieces	Kellner 20 mm and 10 mm
Accepts eyepiece barrel	31.7 mm (1.25")
Mounting	Slow motion alt-azimuth
Total weight (without packaging)	2.45 kg / 5.39 lbs

AA 1.5V x6
NOT INCLUDED
Do not mix old and new batteries.
Do not mix alkaline, standard (carbon-zinc), or rechargeable (ni-cad, ni-mh, etc.) batteries.

⚠ **WARNING:**
SUN HAZARD – Never look directly at the sun with this device.

⚠ **WARNING:**
CHOKING HAZARD – Small parts. Not for children under 3 years.

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National Geographic's net proceeds support vital exploration, conservation, research, and education programs.

SUN WARNING

WARNING: NEVER ATTEMPT TO OBSERVE THE SUN WITH THIS DEVICE! OBSERVING THE SUN – EVEN FOR A MOMENT – WILL CAUSE INSTANT AND IRREVERSIBLE DAMAGE TO YOUR EYE OR EVEN BLINDNESS. Eye damage is often painless, so there is no warning to the observer that the damage has occurred until it is too late. Do not point the device at or near the Sun. Do not look through the device as it is moving. Children should always have adult supervision while observing.

SAFETY WARNINGS

Read and follow the instructions, safety rules, and first aid information.

- Respect privacy: When using this device, respect the privacy of other people. For example, do not use them to look into people's homes.
- Choking hazard: Children should only use device under adult supervision. Keep packaging materials like plastic bags and rubber bands out of the reach of children as these materials pose a choking hazard.
- Risk of blindness: Never use this device to look directly at the Sun or in the direct proximity of the Sun. Doing so may result in a permanent loss of vision.
- Risk of fire: Do not place device, particularly the lenses, in direct sunlight. The concentration of light rays could cause a fire.
- Do not disassemble this device. In the event of a defect, please contact your dealer. The dealer will contact the Customer Service Department and can send the device in to be repaired if necessary.
- Do not subject the device to temperatures exceeding 60° C (140° F).

- Disposal: Keep packaging materials, like plastic bags and rubber bands, away from children as they a pose a risk of suffocation. Dispose of packaging materials as legally required. Consult the local authority on the matter if necessary and recycle materials when possible.

Instruction Manual, &
Downloadable Planisphere Visit:

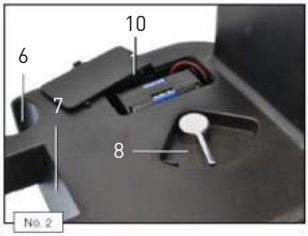
www.exploreone.com/pages/product-manuals

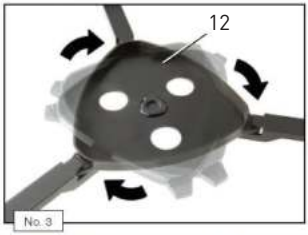
Customer Service: Call 1-866-252-3811

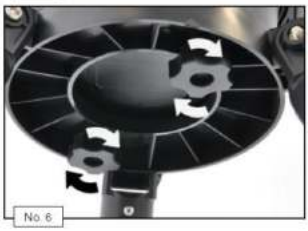
Note: We recommend assembling your telescope for the first time in the daylight or in a lit room so that you can familiarize yourself with assembly steps and all components.

Parts Overview

1. Telescope tube
2. Tube opening
3. Eyepiece connection
4. Focus wheel
5. Handbox
6. Eyepiece holder
7. Handbox tray
8. Azimuthal lock
9. Tripod
10. Battery compartment (6 AA Batteries)
11. Locking screw
12. Accessory tray
13. Altitude locking knob
14. Dust cover
15. Eyepieces
16. Moon filter
17. Compass







Controller Overview

18. Red light source
19. Handbox display
20. Plus/minus key
21. Illumination
22. Center key
23. Arrow keys
24. Number pad
25. Mini-USB port
26. RJ-45 port
27. RJ-22 port

Telescope Terms To Know:

Diagonal: A mirror that deflects the ray of light 90 degrees.
With a horizontal telescope tube, this device deflects the light upwards so that you can comfortably observe by looking downwards into the eyepiece. The image in a diagonal mirror appears upright, but rotated around its vertical axis (mirror image).

Focal length: Everything that magnifies an object via an optic lens has a certain focal length. The focal length is the length of the path the light travels from the surface of the lens to its focal point. The focal point is also referred to as the focus. In focus, the image is clear. In the case of a telescope, the focal length of the telescope tube and the eyepieces are used to determine magnification.

Lens: The lens turns the light that falls on it around in such a way so that the light gives a clear image in the focal point after it has traveled a certain distance (focal length).

Part I: Assembly

Before you begin assembly, choose a suitable location for your telescope. It is best to build the telescope in a place where you have a clear view of the skies, a stable footing and sufficient space around you. Remove all the parts from the packaging, and, using the diagram, check to make sure no parts are missing.

1. Tripod
Take the tripod (9) out of the box. Carefully open the legs and place the tripod on a level surface.
To secure the legs, place the accessory tray (12) in the center of the leg supports and rotate it until it locks into position (No. 3).

Note: Please do not forget to remove the accessory tray before collapsing the tripod.

2. Telescope
Loosen the screw (12) in the dovetail mount so that it is completely retract-ed (No. 4). Place the telescope with the dovetail in the mount and tighten the screw. Make sure that the National Geographic logo is upright.

3. Altitude knob
Loosen the vertical knob by rotating it anticlockwise, align the optical telescope tube (1) horizontally and re-tighten the knob (No. 5).

4. Mount
Place the mount base's mounting holes on the tripod's mounting screws and tighten them (No. 6).

5. Dust cover
Remove the dust cover (14) that protects the objective lens of the optical tube opening (2).

6. Eyepiece
Remove one eyepiece from its eyepiece holder (6) and slide it into the eyepiece connection (3). Tighten the holding screws (No. 5). Start with the lowest magnification eyepiece, which has the highest focal length printed on it (e.g. 20 mm or 25 mm, depending on your model) to locate objects and find the correct focus. If you have the object you want to view centered in the field of view, switch to a higher magnification by using an eyepiece with shorter focal length. After changing the eyepiece, it might be necessary to adjust the focus again (see section 8).

7. Focus wheel
To get objects into focus, your telescope is equipped with a precise focus control. When you use the telescope for the first time, you might need to turn the focus wheel (4) multiple times to achieve a focused image. To try it out, pick a landmark or a building far away in daylight or bright twilight, and turn the focus wheel until the object comes into focus. Remember, objects to be observed cannot be closer than 20 meters away.

Part II: Handbox

1. Batteries
Remove the cover of the battery compartment (10), located on the top side of the mount's base, and insert the batteries in the battery holder (No. 2). Use 6 AA batteries and make sure the polarities are aligned correctly. Place the holder into the compartment and cover it. Do not use rechargeable batteries.

2. Handbox
Ensure that the on/off switch is in the off position (No. 8). Remove the handbox from the handbox tray (7), and plug one end of the cable into the port labeled with "HBX" and the other one into the RJ-45 port of the hand-box. Flip the switch to the on position. The handbox display should light up, accompanied by a sound.

3. Setup

Time and Date
After turning on the handbox, you will be prompted to enter the date and time. Do so by navigating with the arrow keys and entering the numbers with the number pad (7) on the handbox. When done, press the center key (5), located between the arrow keys.

Daylight saving time
If the daylight saving time is in effect, select status:on. If daylight saving time is not in effect, select status:off.

Location
When asked for your location, you can either choose a city near you by selecting the 'Country & City' option or enter your GPS coordinates by selecting 'Custom Site'.

a) Country & City
Select the country where you are by using the up and down arrow keys. Then select the city by using the left and right arrow keys. When done, use the center key (22) to select the location.

b) Custom Site
Enter the details of your location as follows:
Name: Enter a custom name for your location.
Lon: Enter the longitudinal coordinate of your location.
Lat: Enter the latitudinal coordinate of your location.
Zone: Enter the time zone of your location.

OTA (Optical Tube Assembly) Zero
Here you will be asked to provide the orientation of the telescope.

In the 'Azi:' field, enter '000'.
In the 'Alt:' field, enter '00'.

Open the Altitude and Azimuthal locking knobs. Adjust the telescope so that the tube opening (2) is pointing directly north and is level. It is recommended that you use the included compass (17) and bubble level to make sure the device is positioned accurately. You can put the compass into the eyepiece connection (3). Then retighten the locking knobs.

4. Alignment

In order to use your telescope's Go To mode, you must align the telescope properly so it knows where it is pointing when it is turned on. There are three ways to align your telescope: one-, two- and three-star alignment.

Step 1: To start the alignment, press the center key (22) on the handbox and select the first menu option, 'Telescope Align'. There you will be able to choose between one-, two- and three-star alignment.

The more stars you use for the alignment the higher the slewing precision of your telescope will be.

One-Star Alignment:

Step 2: After you select this option, you will be prompted to select a target star. The software will select a star that is very visible in the night sky. If you happen to know of a star you can see with the naked eye, you can choose it by pressing the up and down arrow keys and then selecting it with the center key (22). In most cases, you will want to select the first option presented to you. Do so by pressing the center key (22).

Step 3: The telescope will now slew to that star and will prompt you to center it in the field of view, which you can do by using the arrow keys. The star you're focusing on is the brightest star in the region your telescope is pointing at. When the star is centered, confirm the position with the center key (22). The telescope is now aligned.

Two- and Three-Star Alignment:
The procedure is similar to one-star alignment. The only difference is that you'll have to repeat steps 2 and 3 twice or thrice depending on the type of alignment you've chosen.

Note: If you have aligned the telescope, don't move it manually. Use the arrow keys on the handbox to make adjustments. If you do move it manually or change the tripod orientation, the telescope has to be realigned.

5. Further Adjustment:

Target Sync:
With this method, you can further improve the alignment of the telescope. After slewing to a star target you know, you can center the object precisely in the field of view. Press the center key (22) and select 'Telescope Align', then 'Target Sync'. The telescope will align to that target and have more precise positioning for further targets you want to observe.

Backlash Correction:
You can improve the precision of the telescope by training the backlash correction of the axis. This must be done separately for each axis and is not necessary for most cases.
Simply go to the main menu by pressing the center key (5) and select 'Telescope Align' and then 'RA BKlash Corr.' to adjust the right ascension axis (horizontal axis) or 'DEC BKlash Corr.' to adjust the declination axis (vertical axis). Then follow the on-screen instructions.

Part III: Menus

Initial Start:

- Welcome screen
- Date and Time
- Daylight saving
  - Status: off
  - Status: on
- Custom site
  - Name:
  - Lon:
  - Lat:
  - Zone:
- Country & City
  - Country: up and down
  - City: left and right
- OTA Zero

Main Menu Overview

1. Telescope Align

One Star Align	Align the telescope with a single star
Two Star Align	Align the telescope with a two stars
Three Star Align	Align the telescope with a three stars
Target Sync	Further improves the alignment of the telescope
RA BKlash Corr.	Calibrate RA axis backlash
DEC BKlash Corr.	Calibrate DEC axis backlash

2. Navigation

Solar system	Object catalog of the solar system
Constellation	Catalog with the stellar constellations
Famous Star	Famous star catalog
Messier Catal.	Catalog with bright deep-sky objects
NGC Catalog.	Extensive catalog with broad variety
IC Catalogue	Catalog with faint objects
Sh2 Catalog.	Catalog with faint objects
Bright Star Cat	Catalog with bright stars
SAO Star Catal.	Extensive star catalog
Customer Objects	Allows you to store your own objects
Input RA and DEC	Insert a custom point in the sky
Custom Land Goal	Insert a custom land target

3. Utilities

Current Objects	Currently visible objects
Object Rise/Set	Rising and setting time of an object
Curr. Lunar Phase	The current lunar phase
Timer	Timer function
Alarm	Set up an alarm
Eyepiece FOV	Field of view of the eyepiece
Eyepiece Magn.	Magnification of the eyepiece
Display Illumin.	Display brightness
Parkposition	Slew to park position

4. Setup

Time and Date	Enter time and date
Daylight Saving	Enable/disable daylight saving
Site Setting	Set the current location
Country & City	Set the current location according to a city
Custom Site	Set the current location by using GPS coordinates
Sky/Land	Switch between sky and land targets
Sky Target	Setting for sky observation
Land Target	Setting for land target observation
AZ / EQ	Switch between Azimuthal and equatorial mounting
Alt Telescope	Alt./AZ mount type
Equ Telescope	EQ mount type
Telescope Mount	Configure telescope mount settings
Tracking Rate	Set the tracking rate
Star Speed	
Solar Speed	
Moon Speed	
Customize Speed	
Language	Change the language
Telescope Model	
Reset	Reset to factory settings

Part IV – Observation

After aligning the telescope, the motors in the mount will begin to move the telescope so that the Earth's rotation is compensated for and the objects stay in the field of view of the telescope.

Note: If you have aligned the telescope, don't move it manually. Use the arrow keys on the handbox to make adjustments. If you do move it manually or change the tripod position, the telescope has to be realigned.

Once you have aligned the telescope, you can slew to every object in the night sky. This is done by pressing the center key (22) on the handbox and selecting the 'Navigation' option from the menu.

Select the object catalog you prefer from the menu by using the arrow keys. Press the center key (22) to confirm your selection.

When you select an object catalog, the first object of the catalog will be displayed. You can change the currently displayed object by pressing the up and down arrow keys.

Select the object you want to view with the telescope by pressing the center key (22). The telescope will then slew to that position.

Example: Let's observe Jupiter.

Jupiter is visible in different parts of the world at different times depending on location, time of year and local conditions.

If it is visible from your location and the telescope is aligned, you can navigate to Jupiter by following these steps. Press the center key (22) on your handbox and select the **'Navigation'** option. Move the selection bar with the arrow keys, then press the center key (22) for confirmation.

Next, select the **'Solar System'** menu option and scroll with the arrow keys to find Jupiter. Select **Jupiter** by pressing the center key (22).

Once you select Jupiter, your telescope will automatically slew towards Jupiter. When the telescope reaches Jupiter's position, a loud beeping noise will let you know that the telescope is done moving. You may then begin your observation.

Formula for calculating magnification:

Focal length (Telescope) ÷ Focal length (Eyepiece) = Magnification

Examples:				
350 mm	÷	20 mm	=	17.5x
350 mm	÷	10 mm	=	35x
1250 mm	÷	25 mm	=	50x
1250 mm	÷	12.5 mm	=	100x

Possible Objects for Observation:

Terrestrial objects
Take note of the examples below, including Mount Rushmore and the golf course. Start with the 20 mm eyepiece and focus until the image is clear. After mastering the 20 mm eyepiece, switch to the 10 mm eyepiece and practice scanning and focusing until the image is clear. Choose several terrestrial objects to practice focusing on, but never point your telescope at or near the sun, or you risk blindness.

Terrestrial Images

f=20 mm f=10 mm

The Moon
Diameter: 3,476 km
Distance: Approximately 384,401 km
The Moon is the Earth's only natural satellite, and it is the second brightest object in the sky (after the Sun). Although it is our closest neighbor, a lot of people have never really taken a good long like at the Moon. With your telescope, you should be able to see several interesting lunar features. These include lunar maria, which appear as vast plains, and some of the larger craters. The best views will be found along the terminator, which is the edge where the visible and cloaked portions of the Moon meet.

The Moon

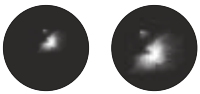
f=20 mm f=10 mm

Orion Nebula (M 42)
M 42 in the Orion constellation
Right ascension: 05:35 (Hours: Minutes)
Declination: -5:22 (Degrees: Minutes)
Distance from Earth: 1,500 light years

Located about 1,500 light years from Earth, the Orion Nebula (Messier 42, abbreviation: M 42) is the brightest diffuse nebula in the sky – visible with the naked eye, and a worthwhile object for telescopes of all types and sizes, from the smallest field glass to the largest earthbound observatories and the Hubble Space Telescope. When talking about Orion, we're actually referring to the main part of a much larger cloud of hydrogen gas and dust, which spreads out over half of the Orion constellation. The expanse of this enormous cloud stretches several hundred light years.

Orion Nebula M 42

f=20 mm f=10 mm



Ring Nebula (M 57)
M 57 in the Lyra constellation
R**ight ascension:** 18:53 (Hours: Minutes)
Declination: -33:02 (Degrees: Minutes)
Distance from Earth: 2,400 light years

The famous Ring Nebula M 57 in the constellation of Lyra is often viewed as the prototype of a planetary nebula; it is one of the magnificent features of the Northern Hemisphere's summer sky. Recent studies have shown that it is probably comprised of a ring (torus) of brightly shining material that surrounds the central star (only visible with larger telescopes), and not of a gas structure in the form of a sphere or an ellipsis. If you were to look at the Ring Nebula from the side, it would look like the Dumbbell Nebula (M27). When viewed from Earth, we are looking directly at the pole of the nebula.

Ring Nebula in Lyra Constellation M 57

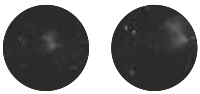
f=20 mm f=10 mm

Dumbbell Nebula (M 27)
M 27 in the Fox constellation
Right ascension: 19:59.6 (Hours: Minutes)
Declination: -+22:43 (Degrees: Minutes)
Distance from Earth: 1,360 light years

The Dumbbell Nebula (M 27) in Fox was the first planetary nebula ever discovered. On July 12, 1764, Charles Messier discovered this new and fascinating class of objects. We see this nebula almost directly from its equatorial plane. If we could see the Dumbbell Nebula from one of its poles, we would see the shape of a ring, and we would see something very similar to what we know as the Ring Nebula (M 57). In reasonably good weather, we can see this object well even with low magnifications.

Dumbbell Nebula in Fox Constellation M 27

f=20 mm f=10 mm



Cleaning:

Before cleaning the device, disconnect it from the power supply by removing the plug or batteries.

Clean the eyepieces and lenses only with a soft, lint-free cloth, like a micro-fibre cloth. Do not apply excess pressure to the cloth to avoid scratching the lenses.

Protect the device from dust and moisture. Store it in the supplied bag or transportation packaging. The batteries should be removed from the unit if it has not been used for a long time.

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