INSTRUCTION MANUAL

Orion® TeleTrack™ Altazimuth Tracking Mount

#9441

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Figure 1. The TeleTrack Altazimuth Tracking Mount

Congratulations on your purchase of a quality Orion product. Your new TeleTrack Altazimuth Tracking Mount allows high performance support for terrestrial or astronomical observations. The TeleTrack is an “altazimuth” type of mount which can move in altitude (up and down) and azimuth (left and right) with respect to the ground. Designed for use during day or night, your TeleTrack mount features a smooth altazimuth fork arm, adjustable tripod, and multi-function hand controller for convenient operation.

The TeleTrack Altazimuth Tracking Mount is designed for small telescopes, spotting scopes and cameras. The weight of the instrument supported by the mount should not exceed 9 lbs. The mount will also work best with short tube optical systems no longer than 15" (380mm).

These instructions will help you set up and properly use your TeleTrack mount. Please read them over thoroughly before getting started. It may take a few observing sessions to become familiar with all the features of the TeleTrack mount, so keep this manual handy until you have mastered your mount’s operation.

1. Parts List

Qty.	Description
1	Hand controller
1	Adjustable tripod
1	Fork arm
1	L-bracket with 1⁄4"-20 adapter
1	Snap cable

2. Assembly

The TeleTrack Mount comes partially assembled and can become operational in a matter of minutes. It is packaged in one reusable shipping carton. Remove all parts from the box. Make sure all the parts listed In Section 1 are present. Remember to save all the shipping containers so that they can be used to transport the mount. In the unlikely event that you need to return the mount, you must use the original packaging.

Refer to Figures 1, 2, and 3 during assembly.

1. Remove the tripod from its box. Note that each leg has two telescoping sections. To extend each leg, loosen the leg lock lever by rotating it counterclockwise, then extend the leg. When it has been extended to the desired length, rotate the leg lock lever clockwise until tight. Before placing an instrument on the mount, it is a good idea to press down on the tripod to make sure the legs are locked securely and will not give way under the instrument’s weight.
2. The TeleTrack’s tripod has a wide stance for enhanced stability. The widest stance is achieved when the leg brace is as far down as it will go on the elevator shaft housing. The leg brace lock knob should be tightened to secure the stance.

   If you are using the tripod in a confined space, the stance can be narrowed by loosening the leg brace lock knob and pushing the legs closer together. Re-tighten the lock knob to secure the legs in the new position. Be aware that the tripod will become more prone to tipping as its stance is narrowed. Be very careful when mounting an instrument with an offset, or unwieldy, center of gravity on the tripod, especially if it begins to approach the 9 lb. weight limit.
3. With the tripod secure, the fork arm can be easily attached using the 3/8"-16 threaded post on top of the tripod mounting platform. Hold the fork arm so its circular base is facing downward and place it on the 3/8"-16 threaded post gently. Rotate the entire fork arm assembly clockwise until it threads completely onto the tripod’s 3/8"-16 threaded post, and rests securely on the tripod’s mounting platform.

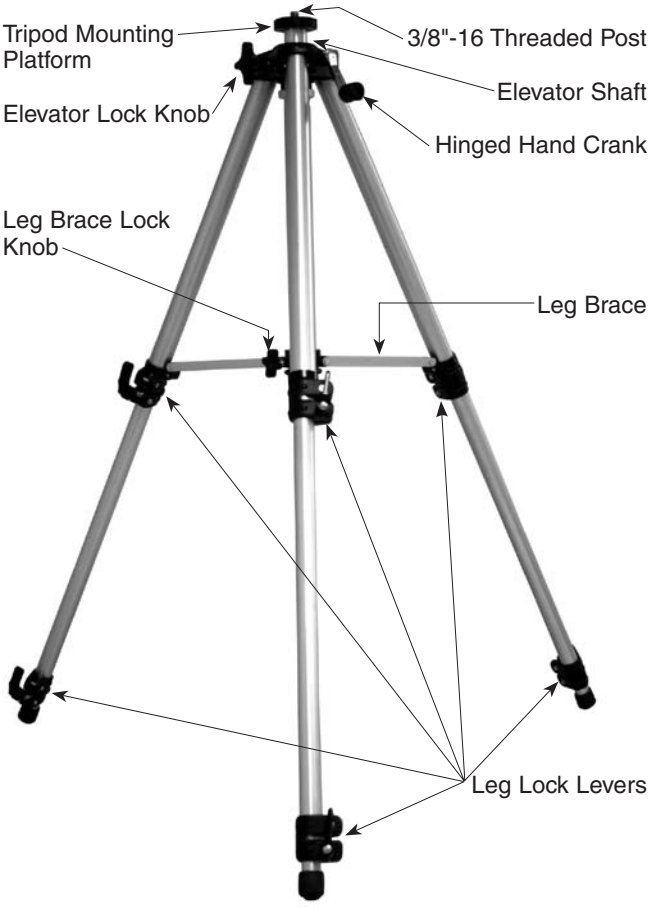

Figure 2. The TeleTrack Tripod

Figure 3. The TeleTrack Mount Fork Arm Head

4. There is a bubble level at the base of the fork arm. To make the fork arm level, simply adjust each tripod leg up or down, one at a time, until the bubble rests in the central black circle of the level. It is not critical that the mount be precisely level, but if the mount is significantly unlevel, it may compromise the stablity of the setup.
5. To raise or lower the TeleTrack Mount's fork arm to a comfortable height, first loosen the elevator lock knob on the tripod, then use the hinged hand crank to move the elevator shaft up or down. Re-tighten the elevator lock knob to secure the instrument at the new height. The mount will be most stable when the elevator shaft is not extended.
6. The TeleTrack's hand controller has a modular plug at the end of its cord. To attach the hand controller to the TeleTrack, plug the connector into the "HC" jack at the base of the mount's fork arm (see Figure 4). Push the plug into the jack until it clicks into place. Make sure not to confuse the "HC" jack with the "AUX" jack. The "AUX" jack is not used for normal operation of the mount.

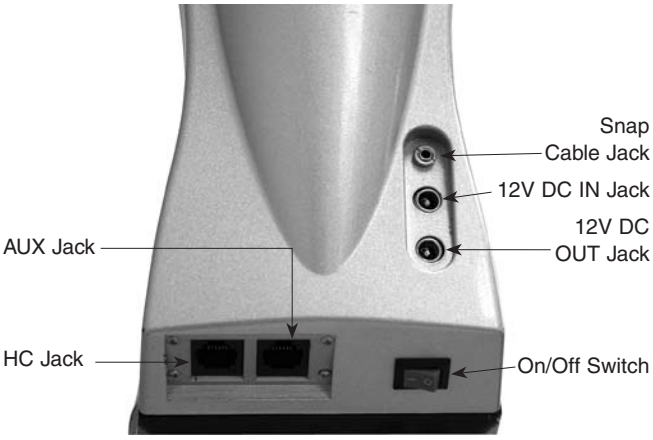

Figure 4. The TeleTrack Mount Control Panel

Note: ***Do not attempt to reposition the altitude or azimuth of the mount by hand!*** *Doing so can damage the gears and motors within the mount.*

3. Powering the TeleTrack Mount

The TeleTrack mount can be powered by 8 AA batteries, an optional 12V DC power supply, or an optional AC adapter. The mount's power requirement is 12 volts DC nominal with a maximum voltage of 16 volts and a minimum of 8 volts.

Powering by AA Batteries

For maximum portability, the TeleTrack mount features a battery compartment that holds eight (8) AA batteries (user supplied). To open the compartment, press down on the black battery compartment latch gently and lift the cover off. You will find two separate battery holders that hold 4 AA batteries each. For easiest installation, detach each battery holder and insert your AA batteries until each holder is full. Be sure to orient the batteries as indicated on the battery holder. Reattach the filled battery holders securely using the snap connectors and close the battery compartment by pressing its cover down gently until its latch clicks. Power the TeleTrack on by pressing the red on/off switch to the "on" position.

Powering by Rechargeable Battery

For optimal results, we recommend using a portable rechargeable battery like the Dynamo or Dynamo Pro available from Orion. These DC batteries will power the mount far longer than standard AA batteries. Make sure your rechargeable battery is tip positive and capable of producing continuous current with a minimum of 2 amps.

If you are using a portable battery like the Orion Dynamo, use the Dynamo's supplied 12V DC power cable (cigarette lighter plug on one end, standard 12V DC power plug on the other end) to connect the battery to the "12V DC IN" power jack on the side of the mount. Make sure the Dynamo's power switch is in the "on" position after connecting. Power the TeleTrack on by pressing the red on/off switch to the "on" position.

Powering by AC Adapter

In addition, the mount can be powered by an AC adapter rated at 12V DC, 750mA, tip positive. Plug the adapter cord into the DC power jack for operation. Power the TeleTrack on by pressing the red on/off switch to the "on" position.

Note: ***Never plug an external power supply cord into the "12V DC OUT" jack accidentally.*** *This may damage the AA batteries inside the battery compartment, and possibly damage the mount itself.*

Power Output

Unlike many mounts in its class, the TeleTrack Mount will provide power output for accessories like digital cameras or camcorders. It accepts a DC power plug (tip positive) and provides 12V DC power output. To power a 12V accessory with the TeleTrack, simply plug the accessory's 12V DC power cable into the "12V DC OUT" jack on the side of the mount.

4. Attaching a Telescope or Camera to the TeleTrack Mount

A. USING THE L-BRACKET

Your TeleTrack Mount comes with a convenient L-bracket (see Figure 5) that provides coupling to the mount with the standard 1⁄4"-20 threaded hole found on most cameras, camcorders, and many telescopes.

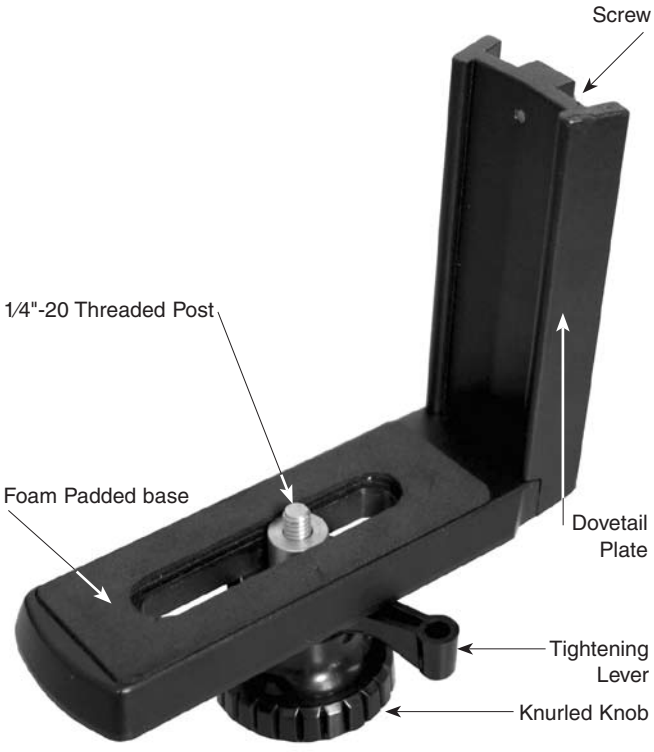

Figure 4. The TeleTrack Mount 1⁄4"-20 L-bracket

Attaching the L-bracket to the Mount

The L-bracket has a short dovetail plate that slides into the corresponding dovetail mount on the fork arm. The other section of the L-bracket has a foam-padded base for your telescope or camera. Attaching your instrument to the L-bracket is accomplished with the 1⁄4"-20 threaded post.

Inserting the L-bracket

Insert the dovetail plate of the L-bracket into the dovetail mount, making sure that it is oriented as shown in Figure 3. Then tighten the dovetail lock knob until snug. Now you are ready to attach your small telescope, camera, or camcorder directly to the 1⁄4"-20 threaded post of the L-bracket.

Attaching an Instrument to the L-bracket

With the foam-padded base of the L-bracket facing upward, gently place the 1⁄4"-20 threaded hole in your optical instrument onto the 1⁄4"-20 threads on the L-bracket. Turn the black knurled knob so the 1⁄4"-20 threaded post completely engages the 1⁄4"-20 threaded hole in your telescope, spotting scope, or camera. Tighten by rotating the tightening lever on the underside of the L-bracket until secure.

B. USING A TELESCOPE'S DOVETAIL MOUNTING PLATE

If your telescope is equipped with a standard dovetail mounting plate, you do not need to use the L-bracket to attach it to the mount. The dovetail plate fits directly into the TeleTrack's dovetail mount, providing a very stable and direct connection.

Simply insert the telescope's dovetail mounting plate directly into the dovetail mount, then tighten the dovetail lock knob until snug.

C. INSTRUMENT ORIENTATION

In order to utilize the astronomical tracking and "cruise" features of your TeleTrack mount (described later in this manual), be sure to attach your telescope so the front end of the instrument is on the side of the fork arm **without** the graduated latitude scale (see Figure 6).

Figure 6. Instrument Orientation

5. Using the Hand Controller

This section describes the basic hand controller procedures needed to operate the TeleTrack mount. These procedures are grouped into three categories: 1) directional movement, 2) astronomical tracking, and 3) "cruise" modes (see Figure 7). The directional movement section deals with simple movement of the mount for browsing terrestrial or astronomical targets. The astronomical tracking section discusses how to set up the mount for tracking objects in the night sky as the Earth rotates. The cruise modes section describes the process of selecting up to 6 set positions and the various modes of "cruising" between them.

Figure 7. The TeleTrack Mount Hand Controller

The buttons of the TeleTrack hand controller will illuminate when pressed to indicate operation. If a button combination is entered, all the pressed buttons will illuminate to indicate a successful operation entry. If there is any type of communication error between the hand controller and the TeleTrack, all the LEDs will flash.

Speed Buttons

The three buttons located near the top of the hand controller ("GUIDE", "SLOW", AND "FAST") are used to set the slewing speed of the mount.

Directional Buttons

The directional buttons allow complete control of the mounted optical instrument's position during slewing or tracking. The "LEFT" and "RIGHT" directional buttons control movements about the azimuth axis. The "UP" and "DOWN" directional buttons control movements about the altitude axis.

Numerical Buttons

The speed and directional buttons are also numbered 1-6 (the "7" button is not used as a numerical button). These buttons are used to store user-defined positions in cruise mode, which is discussed later in this manual.

Cruise Buttons

The two buttons near the bottom of the hand controller ("SET" and "GO") will move the mount to preselected targets, the selection of which is discussed in the "Cruising Modes" section of this manual.

A. DIRECTIONAL MOVEMENT (SLEWING)

Your TeleTrack mount can make sweeping motions across land and sky, or minute adjustments to center your target. The directional buttons on the hand controller control the movement of the mount in two axes, altitude (up/down) and azimuth (left/right).

The relative speed of directional movement can be controlled using the three speed buttons near the top of the hand controller. Each speed button sets the slewing rate of the instrument based on multiples of sidereal rate (the speed in which objects appear to migrate across the night sky). The "GUIDE" button sets the slewing rate to 32x sidereal rate. The "SLOW" button sets the slewing rate to 64x sidereal rate. The "FAST" button sets the slewing rate to 800x sidereal rate.

The button of the selected slew speed will illuminate once it is pressed. Once you have selected your preferred slewing speed, use the directional buttons to move the mount.

Note: ***Never slew a telescope when another person is looking in the eyepiece.*** *The mount can move at fast slew speeds and may hit the observer in the eye.*

B. ASTRONOMICAL TRACKING

In addition to being able to slew the telescope with the hand controller's directional buttons, the TeleTrack mount can also track a celestial object as it appears to move across the night sky.

Setting the Latitude

In order to track celestial objects accurately, your TeleTrack mount requires a simple procedure to set the geographical latitude of your observing location. This procedure can be performed indoors, before taking the TeleTrack out under the night sky. To set your latitude for astronomical tracking, follow these steps:

1. Determine the latitude of your observing location. You may need to consult a geographical atlas to do this.
2. Power on the TeleTrack mount.

3. Press the “FAST” speed button then the “UP” or “DOWN” directional buttons to roughly level the telescope.
4. There is a latitude scale near the top of the TeleTrack fork arm with a value range from 0° to 90°. One of the three latitude indicator arrows should be pointing close to the “0” mark on the latitude scale (see Figure 8). If not, remove the L-bracket or dovetail plate from the mount, and use the “UP” or “DOWN” buttons to rotate the mount 180° in altitude, then reattach the telescope. (When reattaching the telescope, keep in mind that the objective lens of the telescope should be on the side of the mount without the latitude scale, see Figure 6).

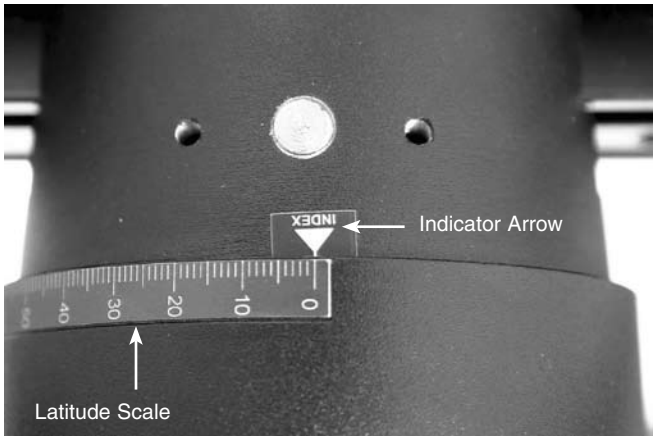

Figure 8. Setting the Latitude

5. Now that the indicator arrow is close to the 0 on the latitude scale, press the “SLOW” speed button and slew the mount slightly using the “UP” and “DOWN” buttons until the latitude indicator arrow is precisely lined up with the 0 mark on the latitude scale.

Note: To reduce the chances of motor backlash error, make your final directional adjustment here with the “UP” directional button.

6. Turn off the TeleTrack mount, wait a few seconds, then turn the mount back on.
7. Use the speed buttons and “UP” and “DOWN” directional buttons on the hand controller to move the telescope until the latitude indicator arrow is lined up with the value on the latitude scale corresponding to the latitude of your observing location. For example, if you are at 37° North latitude, slew the mount so the indicator arrow lines up with the 37 mark on the latitude scale.

Note: To reduce the chances of motor backlash error, make your final directional adjustment here with the “UP” directional button.

8. Finally, press the “FAST” and “SLOW” buttons simultaneously to store your latitude into the TeleTrack system.

Now you are ready to observe celestial objects and track their apparent migration across the night sky. The TeleTrack will remember your latitude setting even after it is powered off.

Note: For Southern Hemisphere operation, the procedure to set your latitude is similar to the above, but with the 0 mark and latitude value reversed. First slew the mount so the indicator arrow points to the value of your latitude on the scale, then power off the mount. Now, power on the mount and slew it until the indicator arrow lines up with the 0 mark on the latitude scale, then press the “FAST” and “SLOW” buttons simultaneously.

Initial Positioning

Now that the TrueTrack knows the latitude of your observing site, you are ready to use it for astronomical observation. But first, the mount must be set so it is powered on in its initial “home” position.

1. Power the mount on, and slew the mount using the “UP” and “DOWN” buttons so the telescope is roughly level. One of the two latitude indicator arrows should be close to the 0 mark of the latitude scale.
2. Use the “UP” and “DOWN” buttons to precisely level the telescope. Use a carpenter’s level along the telescope’s tube for best precision.

Note: To reduce the chances of motor backlash error, make your final directional adjustments here with the “UP” directional button.

3. Now, use the “LEFT” and “RIGHT” buttons to slew the telescope so that it is pointing North. Use Polaris (the North Star) as a reference, if possible. If Polaris is not visible from your observing site, then consult a compass.

Note: To reduce the chances of motor backlash error, make your final directional adjustments here with the “RIGHT” directional button.

4. Power the TeleTrack mount off.

The TeleTrack is now in its home position. For astronomical tracking to function properly, the mount must be powered on in its home position.

Finding and Tracking a Celestial Object

Once your TeleTrack mount has been aligned for astronomical tracking, you can pick a celestial object to observe and track.

1. Power the TeleTrack mount on. Make sure it is in its home position before doing this.
2. Choose a celestial object from a star map, planetarium software, or planisphere. Note the constellation in which the object resides. Set your TeleTrack mount slew speed to “FAST” and slew your telescope in the general direction of the constellation.
3. Once you are close to the target, set your slew speed to “SLOW” or “GUIDE” and carefully adjust the position of your telescope while looking through the telescope’s finder scope until the target object is centered in the finder scope’s field of view.
4. If your finder scope is properly aligned with your telescope, you should now be able to magnify the object by inserting a wide-field eyepiece (25mm or greater) into

your telescope and viewing through it. If the object is not centered in the eyepiece, make careful adjustments using the "GUIDE" slew speed and directional buttons until the object is centered.

5. Once you have centered the target object in your eyepiece, you can track it's apparent migration across the night sky. To activate tracking press the "GUIDE" and "SLOW" speed buttons simultaneously. The mount will now track the centered object at sidereal rate. One of the three speed buttons will begin to blink, indicating that tracking is activated.

Making Directional Adjustments While Tracking

Your TeleTrack mount features tracking slew speeds which allow you to make fine adjustments to the position of the mount while tracking. These speeds are much slower than the speeds when tracking is not activated.

With tracking activated:

- Press the "GUIDE" speed button to set the directional buttons to slew the mount at 1x sidereal rate. The "GUIDE" button will blink to indicate operation.
- Press the "SLOW" speed button to set the directional buttons to slew the mount at 4x sidereal rate. The "SLOW" button will blink to indicate operation.
- Press the "FAST" speed button to set the directional buttons to slew the mount at 8x sidereal rate. The "FAST" speed button will blink to indicate operation.

Canceling Astronomical Tracking

To stop tracking a celestial object, simply press the "GUIDE" and "SLOW" speed buttons simultaneously. The speed button with which you have set the slew speed will stop blinking and remain steadily illuminated to indicate that tracking has been canceled. The speed buttons will now operate at their regular (i.e. non-tracking) speed rates.

Speed Button	Guide	Slow	Fast
Slew Speed without Tracking	32x sidereal rate	64x sidereal rate	800x sidereal rate
Slew Speed with Tracking Activated	1x sidereal rate	4x sidereal rate	8x sidereal rate

C. CRUISE MODES

There are three "cruise" modes which enable your TeleTrack mount to automatically slew to up to 6 pre-set positions. Cruise modes are for use on stationary terrestrial targets. Cruise modes are not recommended for celestial objects, as they change position over time due to the rotation of the Earth.

The three different cruise modes are: "GoTo", "Cruise and Shoot" and "Cruise and Record". "GoTo" cruise mode allows you to automatically slew the mount to any of the 6 positions you have set. "Cruise and Shoot" mode is designed for use with a digital camera; this mode will automatically slew the mount to all of your pre-set positions and trigger a camera shutter release at each position. "Cruise and Record" mode is designed for use with a camcorder device. The "Cruise and Shoot" and "Cruise and Record" modes are especially useful for surveillance applications.

NOTE: Be sure to cancel astronomical tracking prior to setting cruise mode positions or using cruise modes.

Initial Positioning

In order for the TeleTrack to remember the Cruise mode positions you set after the mount is powered off, it is necessary to power on the mount when it is in its "home cruise" position. To position the mount in its home cruise position:

1. Power the mount on, and slew the mount using the "UP" and "DOWN" buttons so the telescope is roughly level. One of the two latitude indicator arrows should be close to the 0 mark of the latitude scale.
2. Use the "UP" and "DOWN" buttons to precisely center the indicator arrow on the 0 mark of the latitude scale.
6. Now, use the "LEFT" and "RIGHT" buttons to slew the telescope so that it is pointing at a stationary reference point.
7. Power the TeleTrack mount off.

The TeleTrack is now in its home cruise position. For the mount to successfully return to any pre-set cruise positions, the mount must be powered on in the home cruise position. The tripod must also be in the same location as when the cruise mode positions were set.

Setting Mount Positions for Cruise Modes

1. Set the mount to its home cruise position, and power the mount on.
2. Use the directional buttons to slew the mount to the desired position.
3. Press and hold the "SET" button, then one of the numerical buttons from 1-6 (the "7" button is not to be used for storing positions).
4. Repeat steps 1 and 2 for up to five additional pre-set positions.

Using "GoTo" Cruise Mode

Press and hold the "GO" button and press the numerical button which corresponds with the pre-set mount position you wish to go to. All of the hand controller buttons will illuminate to indicate a successful operation choice. While the mount is slewing to the pre-set position, the "GO" button will remain illuminated and the numerical button will blink. Once the pre-set position has been reached, both buttons will dim, and the current slew speed button will illuminate.

Erasing a Set Mount Position for Cruise Modes

If you want to permanently erase a cruise mode position that has already been set:

1. Return the mount to its home cruise position.
2. Turn the power off and then turn it back on again.
3. Hold down the "SET" button and press the numeric key corresponding to the position you want to erase.

The mount will recognize that you have erased the previously set position, and will bypass this position during subsequent cruise mode operation.

Using "Cruise and Shoot" Mode

If you attach a digital camera with a shutter release jack to your telescope, or directly to the TeleTrack mount, you can utilize the shutter release feature of the "cruise and shoot" mode. To electronically connect your camera to the TeleTrack, plug one end of the included snap cable into the snap cable jack on the TeleTrack mount (see Figure 4), then plug the other end of the cable into your camera's shutter release jack (see Figure 9).

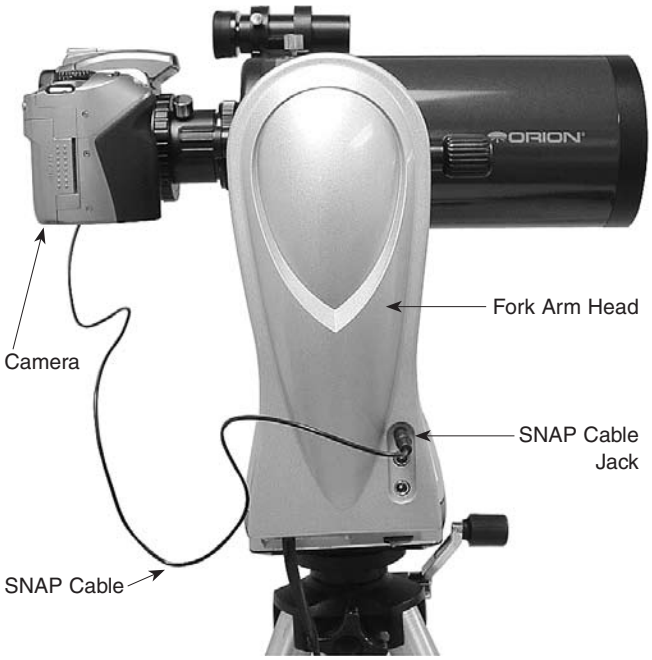

Figure 9. Connecting a Camera to the TeleTrack Mount

Once you have connected your camera to the mount's SNAP cable jack, press the "SET" and "GO" buttons simultaneously to initiate "cruise and shoot" mode. The TeleTrack mount will automatically slew to all of the pre-set positions (starting with position 1) pausing briefly (approximately 15 seconds) at each position to trigger the shutter release of your camera.

While in "cruise and shoot" mode, the "SET" and "GO" buttons will remain illuminated as the mount slews to your pre-set positions. The numerical button of the pre-set position will blink as the mount slews to it. "Cruise and shoot" mode will repeat its cycle after approximately 3 minutes. You can bypass this waiting period by pressing the "FAST" speed button.

Using "Cruise and Record" Mode

If you attach a camcorder to your telescope, or directly to the TeleTrack mount, you can utilize the "cruise and record" mode.

Press both the "GO" and "DOWN" buttons simultaneously to initiate "cruise and record" mode. The TeleTrack mount will automatically slew to all of the pre-set positions (starting with position 1) and pause very briefly (approximately 3 seconds) at each position. The "GO" and "DOWN" buttons will remain illuminated while in "cruise and record" mode and the numerical button of the pre-set position will blink as the mount slews to it. "Cruise and record" mode will repeat its cycle until stopped with the hand controller.

Cancelling Cruise Modes

To cancel any of the cruise modes or to stop movement of the mount during cruise modes, press both the "RIGHT" and "DOWN" directional buttons simultaneously. The mount will stop all movement and the current slew speed button will illuminate steadily.

6. Care and Cleaning of the TeleTrack Mount

If your TeleTrack mount accumulates dew while operating, dry it completely with a soft cloth after use. Clean the mount with mild household detergent and a soft cloth. The jacks can be kept free of dust using a blower bulb or a canister of compressed air.

Keep the mount in a clean and dry environment when not in use. Do not store the mount outdoors.

To prevent damage, we recommend removing your telescope or optical instrument from the mount when transporting.

7. Technical Specifications

Mount:	Altazimuth, electronic slewing for both axes of motion, sidereal tracking
Tripod:	Aluminum, minimum height 20.5", maximum height 54.5"
Weight (fully assembled):	9 lbs.
Power requirements:	12 volts DC nominal, 750mA maximum current draw, tip positive, can run off of 8x internal AA batteries
Slew speeds:	800x/64x/32x sidereal rate, 8x/4x/1x sidereal rate with sidereal tracking activated
Sidereal tracking operation:	Northern or Southern Hemisphere

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes of modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will no occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an output on a circuit different from that to which the receiver in connected.

Consult the dealer or an experienced radio/TV technician for help.

A shielded cable must be used when connecting a peripheral to the serial ports.

One-Year Limited Warranty

This Orion TeleTrack Altazimuth Tracking Mount is warranted against defects in materials or workmanship for a period of one year from the date of purchase. This warranty is for the benefit of the original retail purchaser only. During this warranty period Orion Telescopes & Binoculars will repair or replace, at Orion's option, any warranted instrument that proves to be defective, provided it is returned postage paid to: Orion Warranty Repair, 89 Hangar Way, Watsonville, CA 95076. If the product is not registered, proof of purchase (such as a copy of the original invoice) is required.

This warranty does not apply if, in Orion's judgment, the instrument has been abused, mishandled, or modified, nor does it apply to normal wear and tear. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. For further warranty service information, contact: Customer Service Department, Orion Telescopes & Binoculars, 89 Hangar Way, Watsonville, CA 95076; (800)-676-1343.

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