

INSTRUCTION MANUAL

Orion AutoTracker Mount

#8975 Mount only
#21189 (Package with Synscan Wifi Adapter)



- Astronomical mount automatically tracks celestial objects
- Dual Axis Encoders allow you to move the mount by hand without losing alignment
- Mounting brackets included for your Spotting scope, DSLR, camcorder & cell phone camera.
- Photo and video cruising with support for capturing time lapse video
- Six user definable GoTo positions for viewing or imaging
- Automated Panoramic imaging
- Upgradable to full Goto system controlled via your iOS or Android Smartphone/Tablet when used with #7961 Synscan Wifi Adapter (included with packaged #21189) or with #7942 hand controller (*sold separately*)
- Lightweight and portable
- Built in Keypad Controller
- Powered by internal batteries or DC mains

 **ORION**
TELESCOPES & BINOCULARS
AN EMPLOYEE-OWNED COMPANY

Corporate Offices: 89 Hangar Way, Watsonville CA 95076 - USA
Toll Free USA & Canada: (800) 447-1001
International: +1(831) 763-7000
Customer Support: support@telescope.com

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Figure 1. Included items.



Figure 2. AutoTracker mount with telescope attached.



Figure 3. AutoTracker mount with camera mounting bracket attached to DSLR and shutter release cable.

Included Items

- Orion AutoTracker motorized mount
- Camera mounting bracket (L-bracket) for digital cameras or camcorders
- Second platform bracket & screws
- Mounting clamp for cell phone cameras
- Shutter release cable for Canon Rebel EOS DSLR cameras
- Compass

Attaching Optical And Recording Devices

Telescope

Attach telescope with dovetail bar directly into dovetail saddle on mount (**Figure 2**).

DSLR, Video Camera or Spotting Scope

Attach your DSLR, video camera or spotting scope to your mount using the 1/4-20 bolt on the camera mounting bracket (**Figure 3**).

WARNING: *Never look directly at the Sun with the naked eye or with a telescope – unless you have a proper solar filter installed over the front of the telescope! Otherwise, permanent, irreversible eye damage may result.*

Cell Phones

A cell phone mounting clamp is also included that will attach to the camera mounting bracket (**Figure 4**).

The camera bracket included with the AutoTracker has a removable second platform bracket (**Figure 5**) held in place by two 2.5 mm hex-head setscrews. This additional bracket is included so you can attach a video and still camera at the same time. Make sure to put the lighter camera on the upper platform.

Mount Setup

Place the mount on a flat surface.

Use the built in bubble level as your guide to raise or lower the two adjustable feet in order to level the mount (**Figure 6**). The purpose of this is to not only make for a more stable platform but also to aid in astronomical purposes when aligning, tracking or slewing to targets.

Tripod

The Autotracker can be used with an optional tripod for use when a table is not accessible. The bottom of the mount contains a 3/8-16" threaded hole, into which many standard tripods can attach. It's best to use a tripod without a photographic head attached, as that will provide the most secure and stable platform (**Figure 7**).

Powering the Mount

The Orion AutoTracker mount can be powered by internal batteries (8x AA) or by an optional external DC power supply. The



Figure 4. AutoTracker mount with cell phone attached using camera mounting bracket and cell phone mounting clamp.



Figure 5. Second platform bracket attached to camera mounting bracket.



Figure 6. Adjustable foot.



Figure 7. Orion AutoTracker mount and tripod.

battery compartment holds eight (8) AA batteries (not included). An external power supply can be attached to the jack plug under the keypad (**Figure 8**).

An optional external power supply should have an output of 12V DC Nominal and be able to supply at least 2000mA of DC current. The cord plug should have a female connector measuring 2.1 mm I.D. x 5.5 mm O.D. x 12 mm and have a positive center pin.

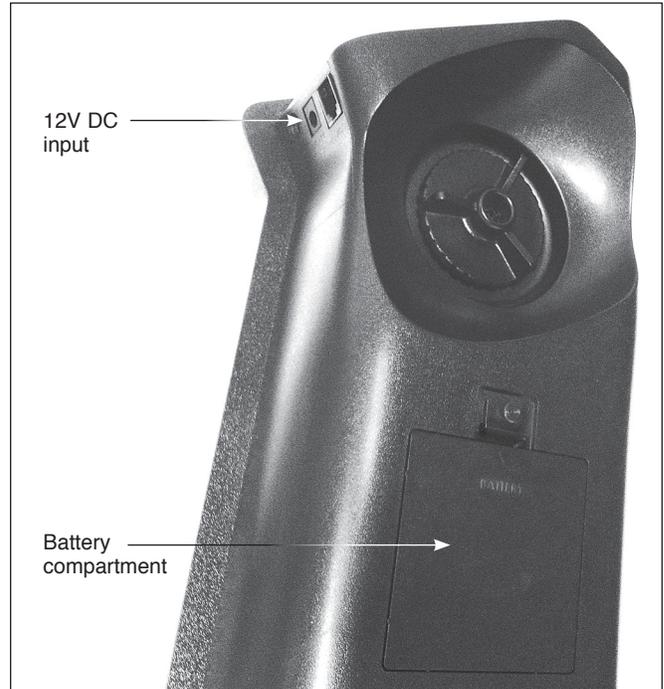


Figure 8. Battery compartment and 12V DC input jack plug.

The minimum voltage should be 11.5V and should not exceed 14V.

Warning: Some inexpensive transformer style AC-DC power adapters are unregulated and can have output voltage considerably higher than what their labels claim. Using this type of adapter can damage the electronics in the mount. Please use regulated power adapters only.

Moving the Mount

There are two ways to move the mount: Manually or via the motor drive.

Manual

You can manually position the telescope at any time by loosening the Altitude and Azimuth clutch knobs (**Figure 9**) and mov-

ing the mount by hand until the telescope (or camera) is pointed at the desired object and then relock the clutch knobs.

Be careful to not over tighten the clutch knobs to avoid damage to the knobs or functionality of the mount. Only use your hand to tighten.

Motor Drive

To move the mount using the control keypad, press any one of the four directional buttons to move the telescope up, down, left, or right.

Adjust the speed of the motors by pressing the buttons labeled 1-5 (**Figure 10**)

- Speeds 1 and 2 are the slowest speeds, used to center an object in the eyepiece of the telescope.
- Speeds 3 and 4 are for centering an object in the red dot finder of the telescope.
- Speed 5 is for slewing the mount at its fastest speed.

(To conserve battery, we recommend moving the mount manually instead).

Synscan Wifi Adapter (available separately or with package #21189) or SynScan Hand Controller

If using the Synscan Wifi Adapter or hand controller, use the directional keys or the GoTo capability in order to move and control the mount. See the instructions included with either accessory for full details on setup and use.

Using the AutoTracker Mount for Terrestrial Viewing

When the AutoTracker is turned on the mount will automatically default to astronomical tracking mode. For terrestrial use, you will need to turn off astronomical tracking by pressing the "1/a" and "2/b" buttons simultaneously. The mount can now be moved manually to any terrestrial target by either loosening the altitude and azimuth clutches or by using the motor drive.

Preset Positions

The Orion AutoTracker mount can store up to six preset terrestrial positions, allowing you to repeatedly return to these targets whenever you want to see them.

To save a preset position, point the mount to a location of interest manually or by using the motor drive, then press the "SET" button plus one of the six position buttons marked "a" through "f" simultaneously. The current position is now saved in memory.

Tip: To ensure the greatest accuracy when saving your preset position, it is important that you finish centering your target by using the "UP" and "RIGHT" direction buttons last. This will assure that you remove any mechanical backlash in the gears.

To move the mount back to any one of the saved preset positions, press the "GO" button and one of the six position buttons marked "a" through "f" that corresponds to the position you want to observe.



Figure 9. Altitude and Azimuth Clutch knobs.



Figure 10. The control keypad.

Note: The preset positions are not permanently saved in memory. They are automatically deleted when the power to the mount is turned off or the batteries are removed.

Camera Cruising Function

The AutoTracker Mount has a camera cruising feature that can control a camera and take images using from two to six preset locations ("a" through "f"). The camera used for this application must have an external shutter control port that can connect to the Auto Image port on the mount. The Auto Image port uses a



Figure 11. Cruise Control.

2.5 mm, three segment stereo jack connector; the trigger signal connects to the tip and base segments.

Note: The Orion AutoTracker mount comes with a shutter release cable that works with most Canon Rebel EOS cameras. If you want the camera to trigger automatically, attach the shutter release camera cable to the camera and the Auto Image port of the mount (**Figure 3**).

To use the camera cruising function:

1. Define your preset positions. Point your camera at the first target you want to image and press the “SET” button plus the button marked “a.”

Repeat for the second target using the “SET” and button marked “b.” Continue this pattern until you are finished or all six preset positions have been entered.

Note: *The mount will always move through your preset positions in alphabetical order. If an assigned preset position has not been assigned, the mount will skip it and move to the next saved position. If two consecutive positions are identical, the second saved point will be skipped.*

2. Press one of the buttons marked “1” through “5” to choose the speed of the motors when the camera is moving between preset positions. (“1” is the slowest speed and “5” is the fastest.)
3. Press the buttons marked “GO” and “SET” simultaneously to start the camera cruising. (The two buttons marked as “CRUISE” – **Figure 11**).
4. The mount will slew to and stop at the first preset position, then proceed one by one from “a” to “f.” When the mount stops, it will send a signal to trigger the attached camera to take a picture. The mount will then repeat this process for each of the assigned points.
5. To stop the camera cruising feature at any time, press the “DOWN” and “RIGHT” directional buttons at the same time.
6. To pause the camera cruising feature, press and hold the “SET” button. When you let go of the button, the cruising will continue.

The mount will stop at the last position for a few seconds and then automatically resume cruising at preset position “a.” Press the “GO” button at any time to turn off this function.

By default, the mount stops at each preset position for approximately 10 seconds. During this pause, the mount will send a shutter release trigger signal for three seconds. Different cameras may require different times to finish the exposure measurement, auto focus and snap the image. You can adjust this trigger time from 1-10 seconds by simultaneously pressing the “DOWN” directional button and one of the buttons marked “a” through “f” as listed below.

- a = 1 second**
- b = 2 seconds**
- c = 3 seconds**
- d = 4 seconds**
- e = 7 seconds**
- f = 10 seconds**

Video Cruising and Time Lapse Video Functions

The Orion AutoTracker mount can also cruise through up to six preset positions without making a full stop at these positions. This is useful for the videographer to capture continuous multi-directional panning shots using a camcorder or for a taking time lapse videos using a still camera.

To use the video cruising function:

1. Setup your preset positions in the same way as described in the previous section for camera cruising.
2. Press one of the buttons marked “1” through “5” to choose the speed of the motors when the camera is moving between preset positions.

Speeds 1-3 are for time lapse imaging. Speeds 4 and 5 are for normal videography.

- **Speed 1: 1x 360° rotation per 24 hours**
- **Speed 2: 1x 360° rotation per six hours**
- **Speed 3: 1x 360° rotation per three hours**
- **Speed 4: Approximate 1.2°/second**
- **Speed 5: Approximate 2.5°/second**

3. Press the “GO” button and the “DOWN” directional button to begin video cruising.
4. The mount will slew to the first stored position one by one from “a” to “f”, but instead of stopping at the preset positions, the mount will continue through each point until it reaches the sixth and final preset. The mount will then return to the first preset position and start over.

Note: *The mount will always move through your preset positions in alphabetical order. If an assigned preset position has not been assigned, the mount will skip it and move to the next saved position. If two consecutive positions are identical, the second saved point will be skipped.*

If the mount is moving between points using both the altitude and azimuth axes, the axis with the shorter distance to travel

will move at a slower speed so that both axes will reach their destination at approximately the same time.

5. To stop the video cruising/time lapse feature at any time, press the “DOWN” and “RIGHT” directional buttons at the same time.
6. To pause the camera cruising feature, press and hold the “SET” button. When you let go of the button, the cruising will continue.

Note: To capture a time-lapse video, your still camera must have its own intervalometer that allows you to repeatedly take pictures at a specified interval. The Orion AutoTracker mount’s camera shutter trigger will not do this. Some DSLRs have intervalometers built-in or available as a separate option. Check with your camera’s manufacturer to see if they offer this.

Panoramic Photography

The Orion AutoTracker can also be used with a camera or cell phone camera to capture panoramic images. If you want the mount to trigger the shutter of the camera, the camera used for this application must have an external shutter control port that can connect to the Auto Image port on the mount. Otherwise, you can trigger the shutter manually when the mount comes to a stop. The Auto Image port uses a 2.5 mm, three segment stereo jack connector; the trigger signal connects to the tip and base segments.

To attach a camera to the mount:

1. Insert the dovetail of the camera mounting bracket into the dovetail clamp on the altitude axis of the mount and tighten the locking knob to hold it in place.
2. Attach your camera to the mounting bracket by inserting the ¼-20 hand bolt into the camera’s tripod socket.
3. If you want the camera to trigger automatically, attach the shutter release camera cable to the camera and the Auto Image port of the mount.

To attach a cell phone to the mount:

1. Attach the cell phone clamp to the camera mounting bracket. It can be attached to hold the phone in portrait or landscape mode.
2. Loosen the knob on the side of the bracket to open the clamp.
3. Insert your cell phone into the clamp, making sure to have the camera pointing in the correct direction.
4. Tighten the knob to close the clamp until your phone is secured (do not over tighten).

To use the panoramic photography mode:

1. Set the field of view (FOV) of the camera lens
 - a. Level the camera by hand or by using the motor drive.
 - b. Turn the power off and then turn it on again.

- c. Look through the viewfinder (or the live view LCD display) of the camera and find an object at the corner of the image. Remember this object.
- d. Move the mount so that the object that was in the corner of the viewfinder is now in the center of the field of view. Press the buttons “SET” and “1/a” simultaneously to record this movement.

The mount will now be able to calculate the field of view of your camera’s lens. The mount will use this information to apply a 30% overlap between the images.

2. Set the upper limit of the panorama that you want to take:
 - a. Look through the viewfinder (or the live view LCD display) of the camera and use the “UP” and “DOWN” directional buttons to move the mount to the lowest angle you want included in your panorama.
 - b. Press the buttons “SET” and “2/b” simultaneously to record this setting.
3. Set the lower limit of the panorama that you want to take:
 - a. Look through the viewfinder (or the live view LCD display) of the camera and use the “UP” and “DOWN” directional buttons to move the mount to the highest angle you want included in your panorama.
 - b. Press the buttons “SET” and “3/c” to record this setting.
4. Set the left limit of the panorama that you want to take:
 - a. Look through the viewfinder (or the live view LCD display) of the camera and use the “LEFT” and “RIGHT” directional buttons to move the mount to the desired left-most point of the panorama you want to take.
 - b. Press the “SET” and “LEFT” buttons to record this setting.
5. Set the right limit of the panorama that you want to take:
 - a. Look through the viewfinder (or the live view LCD display) of the camera and use the “LEFT” and “RIGHT” directional buttons to move the mount to the desired leftmost point of the panorama you want to take.
 - b. Press the “SET” and “RIGHT” buttons to record this setting.

Note: If you want to take a 360° panorama, save the same position for the left and right limits.

6. To start capturing the panoramic photograph:

Press buttons “1/a” and “3/c” simultaneously.

The mount will take images in a serpentine path starting at the lowest altitude angle and moving left to right. At the end of the first sweep, the mount will raise the camera in altitude and reverse directions in azimuth to take the next series of shots. It will keep doing this until the highest point in the panorama is reached. After all the images are taken, the mount will return to the position the mount was in when it was powered on.

7. To stop the camera cruising feature at any time:



Figure 12. The latitude scale at zero position.



Figure 13. The Set Latitude Buttons.

Press the “**DOWN**” and “**RIGHT**” directional buttons at the same time.

8. To pause the camera cruising feature:

Press and hold the “**SET**” button. When you let go of the button, cruising will continue.

By default, the AutoTracker stops at each preset position for approximately 10 seconds. During this pause, the mount will send a shutter release trigger signal for three seconds. Different cameras may require different times to finish the exposure measurement, auto focus function and snap the image. You can adjust this trigger time from 1-10 seconds by simultaneously pressing the “**DOWN**” directional button and one of the buttons marked “**a**” through “**f**”

a = 1 second

b = 2 seconds

c = 3 seconds

d = 4 seconds

e = 7 seconds

f = 10 seconds

The field of view setting for your camera and the upper, lower, left, and right limits are saved in the AutoTracker mount’s memory even after the power is turned off. If you consistently use the same camera and lens combination to capture panoramas, you will not need to reenter this information during your next ses-

sion. Simply level the tripod and camera, turn on the power and press “**1/a**” and “**3/c**” simultaneously to start capturing panoramic issues.

Assembling Your Panoramic Images

Once you have captured all your images, you can import them into your favorite image processing software to assemble them. Some programs, such as Microsoft Image Composite Editor (ICE), are available for free online and automatically align your images. For panoramas taken with smartphones, apps such as Photosynth help capture and assemble your panoramas directly on your device.

Using the Orion AutoTracker for Astronomy

If you have the 7961 SynScan Wifi Adapter, plug it in to the HC port, turn the mount on, and proceed with the setup in the SynScan Pro app. If you do not have the 7961 Adapter, proceed below

Setting Your Local Latitude

The Orion AutoTracker mount needs to know your local latitude in order for the celestial object tracking function to work properly. The latitude setting is a one-time operation if your normal observing sites do not change by more than a degree in geographic latitude.

Find your local latitude by using a GPS, map, smartphone application, or the internet.

For observers in the **Northern Hemisphere**:

Rotate the altitude axis of the mount until the scale reads **0°** (Figure 12).

9. Turn the power off, then on again.

10. Move the altitude axis of the mount until the scale reads your local latitude

11. Press the buttons marked “**2/b**” and “**3/c**” at the same time to record your latitude setting (The two buttons marked as “**SETLAT**” – Figure 13).

For observers in the **Southern Hemisphere**:

1. Rotate the altitude axis of the mount until the scale reads your local latitude.

2. Turn the power off, then on again.

3. Move the altitude axis of the mount until the scale reads **0°**.

4. Press the buttons marked “**2/b**” and “**3/c**” at the same time to record your latitude setting (The two buttons marked as “**SETLAT**” – Figure 13).

Tip: When rotating the altitude axis using the motor drive, always finish your movement using the **UP** key, setting the scale to 0, and setting the scale to show your latitude. This will help eliminate errors caused by mechanical backlash in the gears.

Note: Setting the latitude is only necessary the first time you set up the mount. If you travel more than 75 miles due

north or south, your latitude will change by approximately 1° and you should perform the procedure again.

To Set Up the Orion AutoTracker Mount for Astronomical Use

1. Attach Telescope

Loosen the locking knob on the mounting platform. Slide the dovetail bar on the telescope tube into the slot of the mounting platform and tighten the locking knob. The fork arm should be at the right side of the telescope tube when the telescope tube points forward (**Figure 14**).

Note: You must be careful not to use an optical tube that is too heavy or too big as the motor assembly will not be able to operate properly and may damage the mount. As a guideline, do not use tubes that exceed 4.5 lbs. (2 kg).

2. Level the mount

Use the built in bubble level as your guide to raise or lower the two adjustable feet in order to level the mount (**Figure 6**).

3. Align the finder scope with the main optical tube

First loosen the altitude and azimuth clutches and move the telescope to locate a distant stationary object. It should be at least a quarter mile away for best results. Once centered in the telescopes eyepiece tighten both clutches. Adjust the finder scope until it is also centered on the same distant object.

4. Align the mount to North or South Pole

For observers in the Northern Hemisphere, loosen the azimuth and altitude clutch knobs and move the telescope to center Polaris (the North Star) in the field of view. When it is centered, lock both of the clutches.

For observers in the Southern Hemisphere, center the scope on Sigma Octanis (near the South Celestial Pole).

Verify that the clutches are locked and the power to the mount is switched **OFF**.

Note: After completing step 4, the mount is now in its proper “Power-On” position. Always place the telescope in this position before you turn on the power.

5. Turn on the power

The Orion AutoTracker mount is now ready for astronomical observing and will track any celestial object in its field of view.

Tracking Celestial Objects

When you turn on the mount, the tracking feature is automatically activated so you can track celestial objects immediately. To let you know that the feature is operating, the keypad lights will blink twice and the mount will give two short beeps every few seconds.

The tracking function can be turned off by simultaneously pressing the buttons “1/a” and “2/b.”



Figure 14. Correct tube orientation.

If tracking is off, the button’s backlight will flash only once and the beeps will be turned off.

Note: While the mount is tracking, you can turn off the beeping by pressing and holding “1/a” button for more than five seconds. Pressing and holding the “2/b” button for more than five seconds will switch the button backlight on/off.

If no keypad buttons are pressed after 30 minutes, the mount will automatically shut itself off.

Performance Limitation and Options

The accuracy of tracking celestial objects depends on multiple factors, such as:

- Leveling of the base
- Accuracy of aligning to Polaris or the South Celestial Pole before turning the power on
- Accuracy of setting local latitude
- The type of the celestial object being observed (the Sun, Moon and planets appear to move at a different rate than stars)
- The position of the celestial object in the sky

It is normal to find that celestial targets still drift slowly in the eyepiece of the telescope while the mount is tracking an object,

but the drift will be considerably slower than a telescope without the tracking function.

You'll need to locate celestial objects and point the telescope to them manually.

If you wish to locate celestial objects automatically, you may consider purchasing an optional SynScan GoTo hand controller or SynScan Wifi Adapter (included in package #21189).

Keypad Shortcuts:

Basic Commands

Turn tracking on/off	"1a" + "2b"
Turn tracking beep on/off	Press and hold "1a" for 5 seconds
Turn keypad backlight on/off	Press and hold "2b" for 5 seconds
Set latitude ("SETLAT")	"2b" + "3c"

Preset Commands

Set preset positions	"SET" + "a" through "f"
Go to preset positions	"GO" + "a" through "f"

Cruising Commands

Start camera cruising ("CRUISE")	Choose rate then press "GO" + "SET"
Start video cruising	Choose rate then press "GO" + "DOWN"
Pause camera/video cruising	"SET"
Stop camera/video cruising	"RIGHT" + "DOWN"

Panorama Commands

Measuring FOV	"SET" + "1A"
Lowest point of image	"SET" + "DOWN"
Highest point of image	"SET" + "UP"
Left limit of image	"SET" + "LEFT"
Right limit of image	"SET" + "RIGHT"
Start panorama	"1a" + "3c"
Pause panorama	"SET"
Stop panorama	"RIGHT" + "DOWN"
Adjust camera trigger timer	"DOWN" + "a" through "f" (a=3 seconds; f=15 seconds)

Note: For 360° panorama, save the same position for left and right limits.

Specifications

Mount Type	Altitude/Azimuth
Slow Motion Control	Motorized
Motor Drive	DC Servomotor
GoTo	Optional (AZ SynScan controller is compatible)
Power Supply	12VDC/2A
Payload Capacity	4kg
Tracking Rates	Altitude/Azimuth
Tracking Rates	Sidereal Rate
Slewing Speed	12 Degree/Second @ 12V Power Supply

One-Year Limited Warranty

This Orion product 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. Proof of purchase (such as a copy of the original receipt) is required. This warranty is only valid in the country of purchase.

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. It is not intended to remove or restrict your other legal rights under applicable local consumer law; your state or national statutory consumer rights governing the sale of consumer goods remain fully applicable.

For further warranty information, please visit www.OrionTelescopes.com/warranty.



Corporate Offices: 89 Hangar Way, Watsonville CA 95076 - USA
Toll Free USA & Canada: (800) 447-1001
International: +1(831) 763-7000
Customer Support: support@telescope.com

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