

Orion® TD-1 and TD-2

Electronic DC Tracking Drives

#55030 TD-1

#55031 TD-2

These single-axis motor drives are designed to provide electronic, hands-free tracking of celestial objects when installed on select Orion equatorial mounts. Electronic tracking of a polar aligned equatorial mount makes objects appear to stand still in the telescope's field of view, rather than drifting due to the Earth's rotation. You won't have to reposition the telescope to re-center an object in the eyepiece as the object moves across the sky—a welcome convenience!

The TD-1 Tracking Drive is compatible with the equatorial mount included with the #9250 Orion StarBlast II 4.5 EQ Reflector telescope. The TD-2 Tracking Drive is compatible with the Orion EQ-13 Equatorial Mount and telescopes that come with that mount, such as the #9007 Orion SpaceProbe 130ST EQ Reflector, the #55027 Orion AstroView 6 EQ Reflector, and the #55028 Orion AstroView 102mm EQ Refractor telescopes. Neither tracking drive is cross-compatible with the mount/telescope(s) recommended for the other.

The installation instructions and operation procedures are exactly the same for both the TD-1 and TD-2 drives.



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1. Included Parts

- Motor drive
- Battery holder with cable
- Hand controller with cable
- Holder for hand controller
- 2mm and 4mm Allen keys

Refer to **Figure 1** and the parts list above to make sure all the parts are present. If anything is missing or damaged contact Orion Technical Support at www.OrionTelescopes.com/contactus.

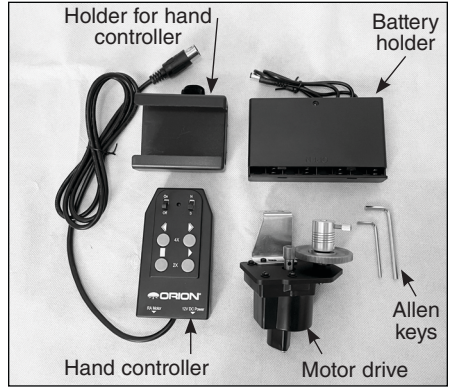


Figure 1. Components of the TD-1 and TD-2 electronic tracking drives.

2. Assembly

1. First, locate the two socket head cap screws on the equatorial mount, as shown in **Figure 2**. Use the 4mm hex key to remove these screws.
2. Next, line up the two holes in the motor bracket with the exposed holes in the mount, while also centering the motor's coupling cylinder with the right ascension (R.A.) worm gear shaft (**Figure 3**). Be sure to back out the thumbscrew on the coupling cylinder a few turns so that the screw is not blocking the hole in the cylinder. Then slide the coupling cylinder onto the worm gear shaft.
3. Attach the motor bracket to the mount with the two cap screws you removed in step 1, using the 4mm hex key (**Figure 4**).
4. Now tighten the thumbscrew on the coupling cylinder (**Figure 5**).
5. Next, insert the hand controller cable's plug into the socket of the tracking drive (**Figure 6**).
6. Slide the battery holder's cover off and install eight (8) 1.5V AA alkaline batteries, making sure to orient the batteries such that the + and - ends of each battery match the + and - designations in each battery slot (**Figure 7**). Then slide the cover back onto the battery holder.

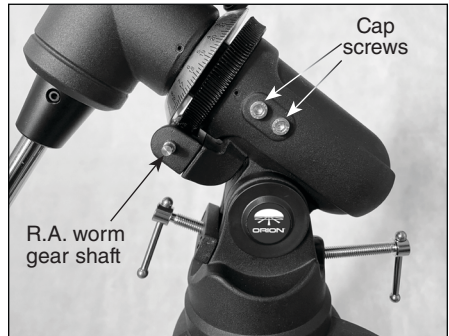


Figure 2. The two socket head cap screws for attaching the motor can be found on the equatorial mount's housing.

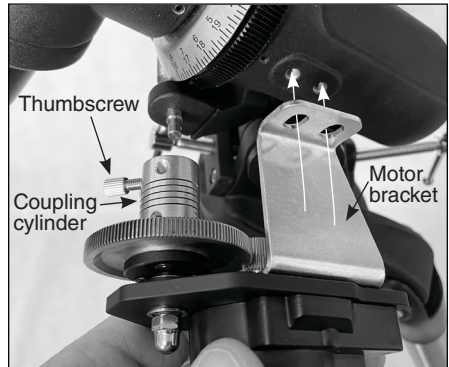


Figure 3. Align the holes in the motor bracket with those on the mount while placing the coupling cylinder over the worm gear shaft.



Figure 4. Use the 4mm Allen key to tighten the two socket head cap screws that attach the motor bracket to the mount.



Figure 6. Plug the hand controller into the tracking drive's socket.

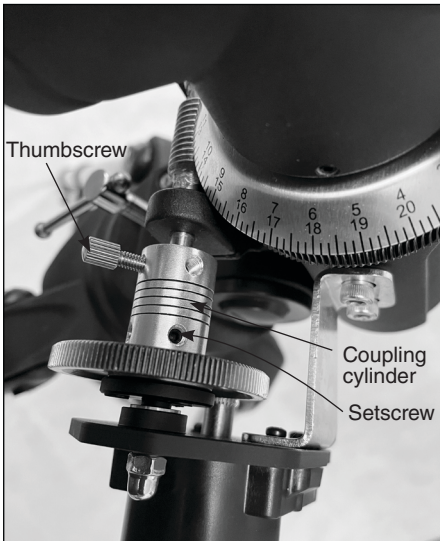


Figure 5. Tighten the thumbscrew on the coupling cylinder to engage the tracking drive. Loosen it to disengage the drive (in order to use the mount's manual slow-motion knob).

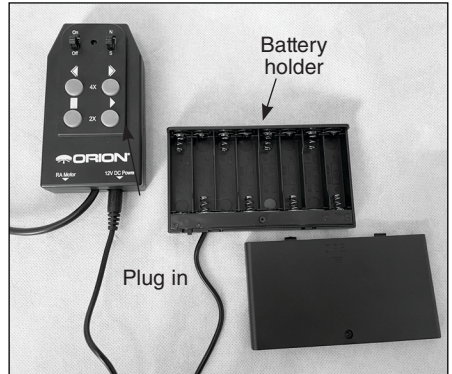


Figure 7. Install eight 1.5V AA batteries in the battery holder, then plug the battery holder cable into the Power port of the hand controller.

7. Insert the plug of the battery holder into the port on the hand controller labeled "12V DC Power" (**Figure 7**).
8. Install the hand controller holder on a tripod leg (**Figure 8**). It is best to install it above where the leg support (which the accessory tray attaches to) is attached to the tripod leg. This way the holder cannot slide down very far on the tripod leg. Tighten the hook-and-

loop strap on the back of the holder around the tripod leg.

Assembly of the TD-1/TD-2 tracking drive system is now complete!

Note that the 2mm Allen key is only needed for the small setscrews in the coupling cylinder (see **Figure 5**). For instance, if one or both of those setscrews becomes loosened, use the 2mm Allen key to tighten them.

3. Operation

For the TD-1 and TD-2 Tracking Drives to work properly, the equatorial mount must



Figure 8. Strap the hand controller holder to a tripod leg with the hook-and-loop band on the back. Slide the hand controller into the top of the holder.



Figure 9. To use the tracking drive you must slide the power switch on the battery holder (and on the hand controller itself) to ON.

be polar-aligned. This involves aligning the R.A. axis of the mount so it is parallel to the Earth's axis of rotation (polar axis). Consult the manual that came with your equatorial mount or telescope for details on how to polar-align it.

Turning the Electronic Tracking Drive On and OFF

To power the TD-1 or TD-2 Tracking Drive, first make sure you have loaded eight 1.5V AA batteries into the battery holder. Then locate the power switch on the side of the battery holder (**Figure 9**). To turn the power



Figure 10. The hand controller features a power switch, and N/S Hemisphere switch, and four speed buttons – forward and reverse - for centering objects in your telescope's field of view.

on, slide the switch from the “OFF” position to “ON”. Be sure to return the switch to OFF when you are finished using the telescope for the evening.

You will also need to slide the power switch on the hand controller to “ON”. It is located near the top, to the left of the LED light.

Once the power is turned on, if the mount is properly polar-aligned, it will track the motion of the night sky, and the telescope should hold any astronomical object in its eyepiece steady over time. The LED near the top of the hand controller will light up to indicate the power is on and the motor is tracking.

Using the Hand Controller

The TD-1 and TD-2 Tracking Drives can be used in either the Northern Hemisphere or the Southern Hemisphere. Set the switch at top left to “N” for use in the Northern Hemisphere, or “S” for use in the Southern Hemisphere (see **Figure 10**).

There are four round buttons on the hand controller (**Figure 10**). If no buttons are pressed, when the power switch is turned on the motor will turn the right ascension (R.A.) axis of the mount westward at sidereal rate – the same rate at which the stars are moving from east to west in the sky. If the bottom right button is pressed, the motor will turn westward at 2x sidereal rate, which will cause objects viewed in the

telescope's eyepiece to move slowly eastward. If the bottom left button is pressed, the motor will pause the tracking function, which will cause objects in the eyepiece to drift slowly westward. Releasing the button will cause tracking to resume.

If the top right button is pressed, the motor will turn westward at 4x sidereal rate. If the top left button is pressed, the motor reverses direction at 4x sidereal rate, causing objects in the telescope's field of view to move westward.

The hand controller buttons are useful for centering objects in the telescope's field of view. To slew the telescope farther or more quickly than is possible with the tracking drive, you can use the mount's manual R.A. and Dec. slow-motion cables. (Refer to your equatorial mount's or telescope's manual for more about the slow-motion cables). However, to use the R.A. slow-motion control you must first disengage the tracking drive from the R.A. worm gear. This is easily done by simply loosening the thumbscrew on the coupling cylinder (see **Figure 5**). Once it is loosened, you can turn the R.A. slow-motion cable via its hand knob. When you're finished slewing with the slow-motion cables, just re-tighten the thumbscrew on the coupling cylinder to re-engage the tracking drive.

When the tracking drive is engaged – no matter whether the power is on or off – you should not attempt to use the mount's R.A. slow-motion control. Doing so could permanently damage the motor.

If you want to slew the telescope even faster or across a wider swath of sky than you can conveniently do using the tracking drive or the slow-motion cables, you can do so by loosening the mount's R.A. and Dec axis lock knobs by a half turn or so, then freely rotate the tube to point to any location in the sky. Then when you are at or near your target, just re-tighten the R.A. and Dec. lock knobs. You can move the telescope in this way whether or not the tracking drive motor is engaged.

So let's say you've observed a celestial object with your telescope and now want to move to a new object in a different part of the sky. First, loosen both the R.A. and Dec. lock knobs and move the telescope by hand until it is pointed in the general direction of the object. Retighten the R.A. and Dec. lock knobs. Now, disengage the tracking drive by loosening the thumbscrew on the coupling cylinder. Then use the R.A. and Dec. slow-motion control cables to roughly center the object in the telescope eyepiece. Re-engage the tracking drive by re-tightening the thumbscrew, and the motor drive system will keep the object centered over time. If the object does drift, maybe because your polar alignment wasn't very accurate, or you need to better center the object, you can use the buttons on the hand control to center it electronically.

4. Specifications

- Motor type: DC stepper motor
- Tracking rate: Sidereal
- Centering rates: 2x and 4x sidereal
- Power requirement: 12V DC
- Battery type: Eight AA alkaline (1.5V), user supplied
- Operating location: Works in Northern or Southern Hemisphere
- Clutch: Thumbscrew on coupling cylinder engages and disengages tracking motor

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.



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