

Orion EQ-3M Dual-Axis DC Motor Drive System

#7828

Welcome to a new world of adventure. The Orion EQ-3M Dual-Axis DC Motor Drive System allows convenient hands-free sidereal tracking of the night sky for telescopes, like the SkyWatcher 120, that utilize the Orion EQ-3 Equatorial Mount. The motor drive system is also a necessary component for doing long-exposure astrophotography. The electronic hand controller allows positional corrections to be made to both the right ascension (R.A.) and declination (Dec.) axes of the mount during an astrophotographic exposure.

1. Parts List

- 1 R.A. motor assembly
- 1 Dec. motor assembly (with white nylon gear wheel)
- 1 Dec. clutch assembly
- 1 Hand controller
- 1 Battery pack
- 1 Socket-head cap screw
- 1 Washer
- 1 5mm Allen wrench
- 1 4mm Allen wrench
- 1 2mm Allen wrench

2. Installing the R.A. Motor Assembly

1. When facing the front of the mount, the R.A. slow-motion control cable should be mounted to the right end of the R.A. worm gear shaft (**Figure 1**). If it is mounted on the left end, remove it, and reinstall it on the right end of the shaft.
2. The R.A. motor is the one with the chrome-colored bracket and black cylindrical coupling, pictured in **Figure 2**. Using the provided 2mm Allen wrench, loosen the socket-head setscrew on the end of the coupling).

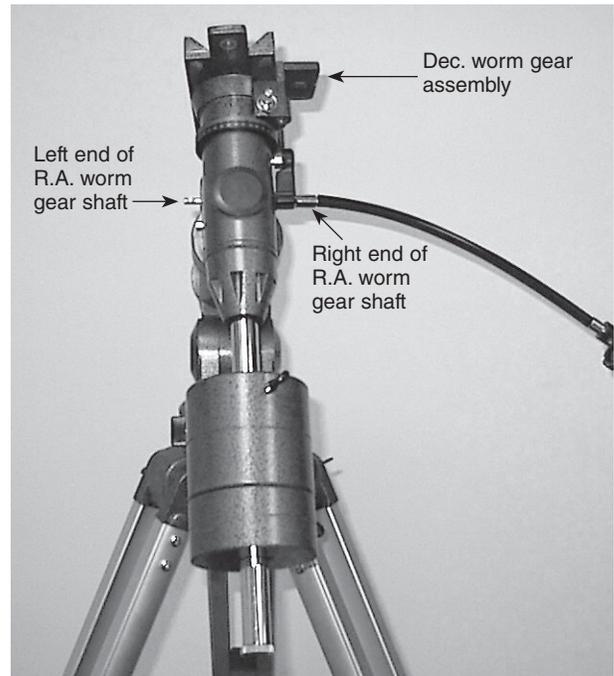


Figure 1

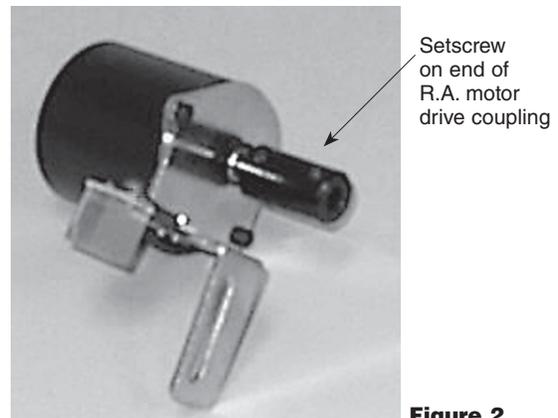


Figure 2



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3. Use the provided 4mm Allen wrench to remove the socket-head bolt on the left side of the mount (**Figure 3**).

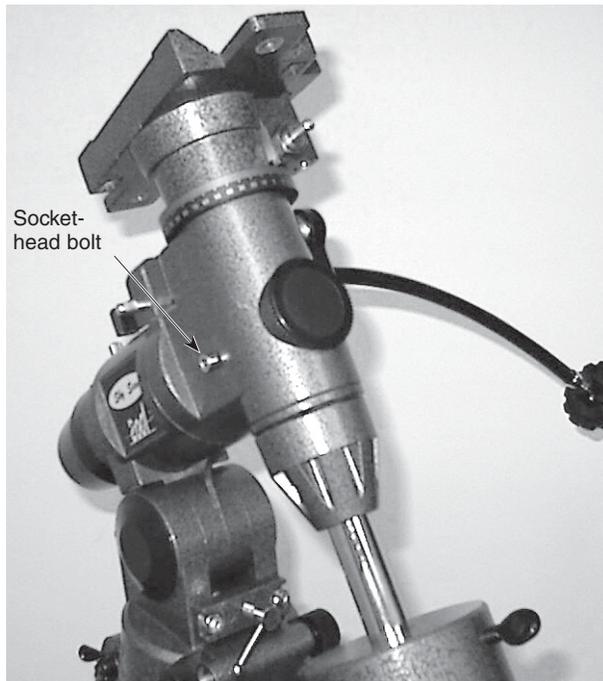


Figure 3

4. Orient the motor so that the drive coupling slips over the left end of the R.A. worm gear shaft. Now, attach the motor to the mount by inserting the socket-head bolt through the slot in the motor's bracket, and rethreading it into the mount.
5. Tighten the socket-head setscrew on the end of the motor's drive coupling. The setscrew should seat into the groove on the end of the worm gear shaft. You may need to rotate the worm gear, using the R.A. slow-motion control cable, for the setscrew and the groove to line up. You may also need to adjust the drive coupling to position the setscrew over the groove; this is done by loosening the setscrew on the drive coupling that is closest to the motor. Once both setscrews are tightened, the R.A. motor is engaged. When the motor is engaged, never, under any circumstances, should you use the R.A. slow-motion control cable! If you want to use it, first loosen the socket-head setscrew on the end of the coupling to disengage the motor drive.

The motor is now properly installed on the EQ-3 mount, and should appear as in **Figure 4**.

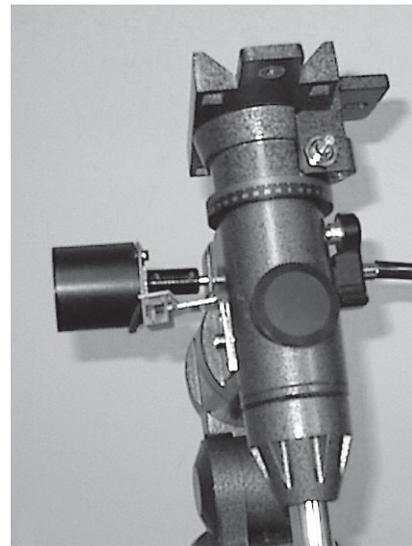


Figure 4

3. Installing the Declination Motor Assembly

1. Release the Dec. lock lever, and rotate the mount about the Dec. axis until the Dec. worm gear assembly is on the right side when facing the mount, as in **Figure 1**. Retighten the Dec. lock lever. If the Dec. slow-motion control cable is attached to the front end of the Dec. worm gear shaft, it will need to be removed, for now.
2. Attach the Dec. clutch assembly to the front end of the Dec. worm gear shaft. This is done by first loosening the setscrew on the brass portion of the clutch assembly with the 2mm Allen wrench. Now, slide the clutch assembly over the front end of the Dec. worm gear (**Figure 5**). Position the clutch assembly so that the setscrew lines up with the groove on the end of the worm gear. Tighten

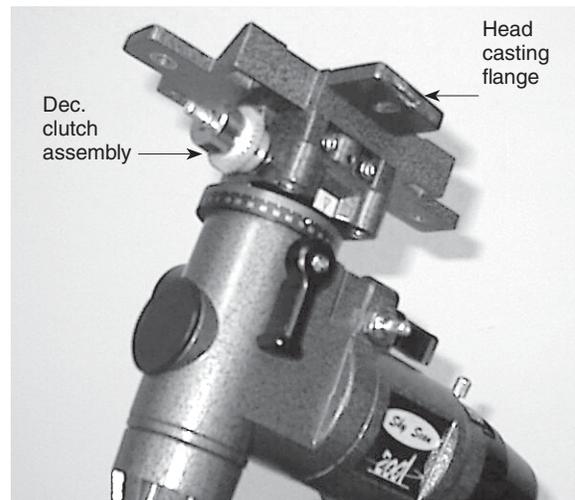


Figure 5

the setscrew so it seats into the groove and makes a firm connection.

3. Attach the Dec. motor assembly to the flange on the head casting of the mount (refer to **Figure 5**) with the socket-head cap screw and washer. First, position the motor underneath the flange so that the gear on the motor and the gear on the clutch assembly mesh. Next, insert the cap screw with washer attached down through the slot in the head casting flange and thread it into the insert on the Dec. motor housing. Use the 5mm Allen wrench to do this. While threading the cap screw into the housing, hold the

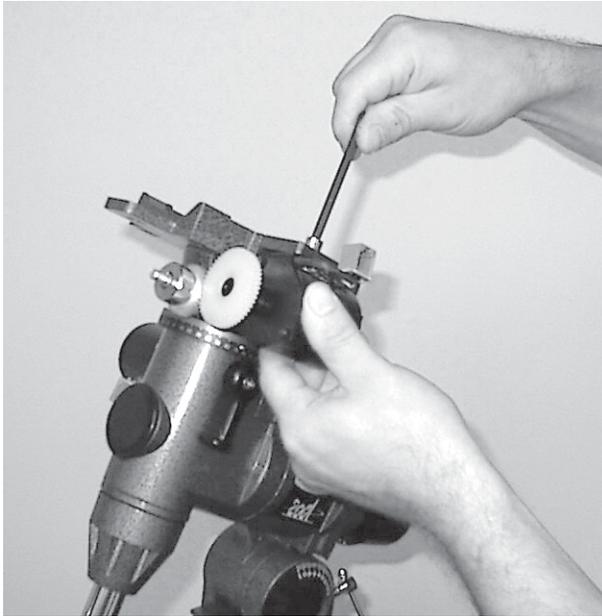


Figure 6

Dec. motor assembly in position, so that when the screw is fully tightened, the gears make a good connection (**Figure 6**).

4. If you have removed the Dec. slow-motion control cable, it can now be replaced on either the front shaft of the clutch assembly or the rear end of the Dec. worm gear shaft.
5. When the knurled chrome section of the clutch assembly is rotated clockwise until tight, the Dec. motor is engaged. Never use the Dec. slow-motion control cable when the Dec. motor is engaged or you may damage the motor. To use the Dec. slow-motion control cable, first rotate the chrome bushing of the clutch assembly counter-clockwise by a turn.

The Dec. motor is now properly installed on the EQ-3 mount, and should appear as in **Figure 7**.

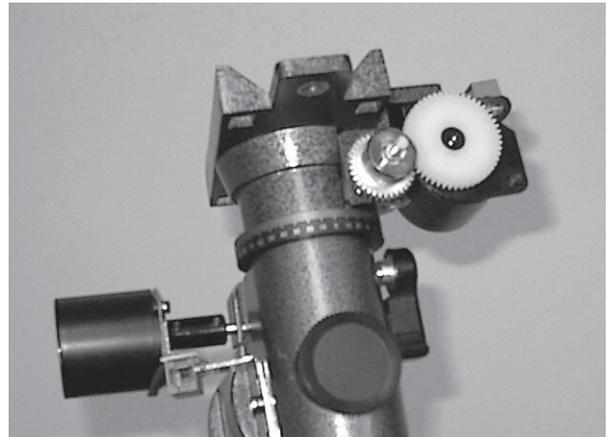


Figure 7

4. Operation

Insert four D-cell batteries into the battery pack. Orient the batteries as indicated on the white plastic battery holder. Connect the end of the battery pack's power cord to the DC power input on the hand controller.

There are two white cords that are permanently connected to the hand controller. The printing on the bottom of the hand controller's front panel indicates the R.A. cord and the Dec. cord. Connect the modular connector on the end of the R.A. cord to the receptacle on the R.A. motor assembly, and connect the end of the Dec. cord to the receptacle on the Dec. motor assembly.

For the motor drive system to track the motion of the night sky properly, the equatorial mount must 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 for details on how to polar align it.

When observing in the Northern Hemisphere, the N/S switch on the hand controller should be in the "N" position. For the Southern Hemisphere, it should be in the "S" position.

Make sure the motors are engaged, and turn the power switch on the hand controller to the "ON" position. The LED in the center of the hand controller should be shining green. If properly polar aligned, the mount will now be tracking the motion of the night sky, and the telescope should hold any astronomical object in its eyepiece steady over time.

To move your telescope to a new object, loosen both the R.A. and Dec. lock levers and move the telescope until it is pointed in the general direction of the object you wish to view. Retighten the R.A. and Dec. lock levers. Now, disengage both motors and use the R.A. and Dec. slow-motion control cables to center the object in the eyepiece's field of view. Re-engage the motors, and the motor drive system will keep the object centered over time. Remember, never use the slow-motion control cables when the motors are engaged or you could permanently damage the motors.

There are four pushbuttons on the hand controller. When the motors are engaged the left and right buttons move the mount about its R.A. axis, and the up and down buttons move the mount about its Dec. axis. The rate of speed the mount moves at is determined by the rate switch at the top right of the hand controller. If the switch is at the 2x position, the mount will move at two times the sidereal rate when any of the buttons are pushed. Similarly, if the switch is at the 4x or 8x position, the mount will move at four times or eight times sidereal when a button is pushed. If no buttons are pushed, the R.A. motor will turn the R.A. axis at sidereal rate to track the motion of the night sky.

The 2x sidereal rate is the best setting for making guiding corrections during long-exposure astrophotography. The 4x and 8x rates are best for centering an object within the telescope's eyepiece.

Note that whenever any of the four buttons on the hand controller are pressed, the LED in the center of the controller will shine red; when the button is released, the LED will be green again. Also, when the LED starts to blink at a constant rate, it's time to change the batteries in the battery pack.

6. Specifications

EQ-3M

Guiding rate: $\pm 100\%$ sidereal

Centering rates: $\pm 400\%$ sidereal , $\pm 800\%$ sidereal

Power requirement: 6V DC

Battery type: four D-cells

Northern or Southern Hemisphere operation

DC stepper motors

Externally clutched

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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