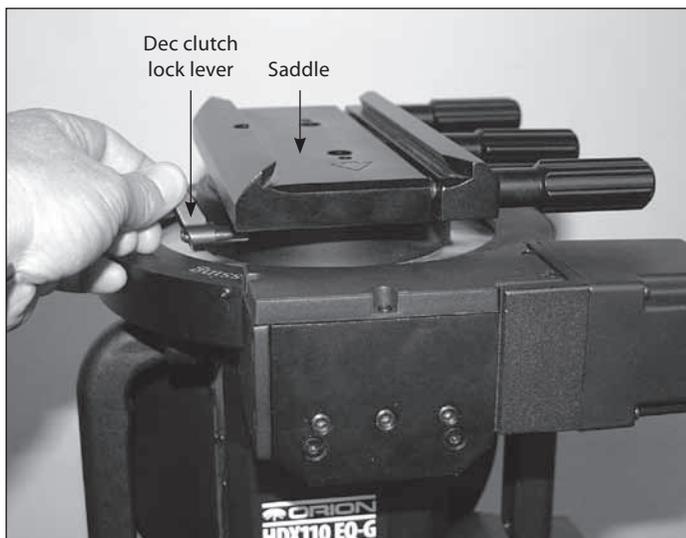




## Adjusting the Declination Axis Backlash, Orion<sup>®</sup> HDX110 EQ-G Mount

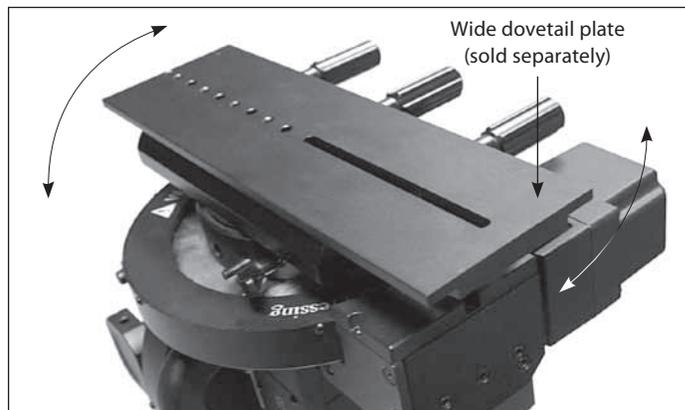
If you believe that the declination axis (DEC) of your HDX110 EQ-G mount has unwanted backlash, or on the contrary that the DEC worm and ring gear are binding due to being too tightly meshed, follow this procedure for adjusting the gear mesh.

You will need a Philips screwdriver and a set of metric Allen keys to perform this adjustment.



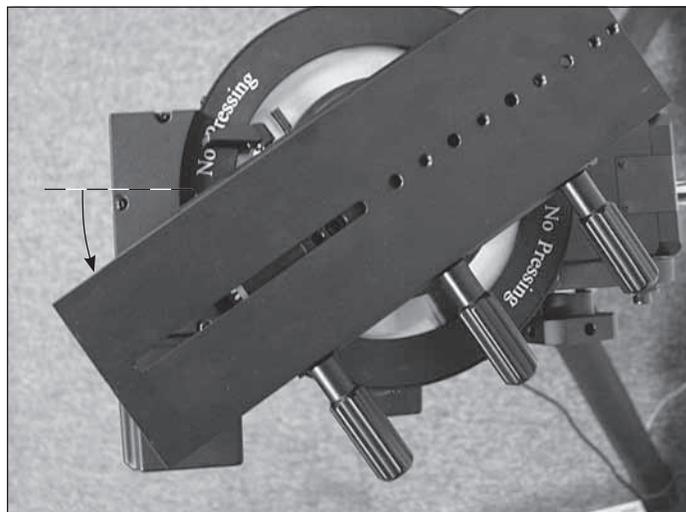
**Fig. 1:** Start with the dovetail saddle in the “default” position, pointing straight ahead.

1. Rotate the saddle of the mount head to its default position and then lock the DEC clutch lock lever as shown in **Fig. 1**. Rotate the saddle back and forth to feel how much “play” there is (**Fig. 2**, see Note below). This is an indication of how tightly the worm is meshed to the ring gear. It is normal to feel a tiny bit of play. If you don’t feel any movement, not even the slightest jog, the DEC gear mesh may be too tight. If you feel a lot of play, the gears may be too loosely meshed.



**Fig. 2:** It’s best to install a wide dovetail plate in the saddle to test for DEC backlash, as it provides a longer lever arm. With the DEC clutch lock lever tightened, grasp the plate firmly with both hands – one hand on each end – and jog it rotationally back and forth and feel for “play” (backlash).

**NOTE:** It may help to install a long dovetail plate in the saddle, as shown in **Fig. 2**, to give you a longer moment arm for rotating the saddle back and forth. In our tests it was easier to feel the amount of backlash when we rotated the DEC axis via an installed dovetail plate.



**Fig. 3:** Slew the saddle using the hand controller a few degrees, then jog it again as in step 2 and note the amount of backlash. Repeat this step several times until the saddle has rotated 360 degrees.

2. Now connect the hand controller to the mount and turn on the power. Use the hand controller to slew the saddle several degrees left (**Fig. 3**). Rotate the saddle back and forth by hand again to feel the amount of play, as you did in Step 1. Can you feel even the slightest jog?
3. Slew a few more degrees in the same direction as in Step 2, and again rotate the saddle back and forth to feel the amount of DEC play.

4. Repeat the previous step, going a few degrees at a time, until the DEC axis has completed a 360° rotation, to find the position of the saddle where you feel the smallest amount of play. That's where the gap between the worm and ring gear is smallest. Slew several degrees left and right of this position to pinpoint the exact position where the smallest gap of gear mesh is found. In the following steps, you will carefully adjust the gear mesh to the proper setting.

**NOTE:** When locating the position of the least amount of play, or tightest gear mesh, the smaller the angle the saddle is rotated, the more precise the position can be pinpointed.

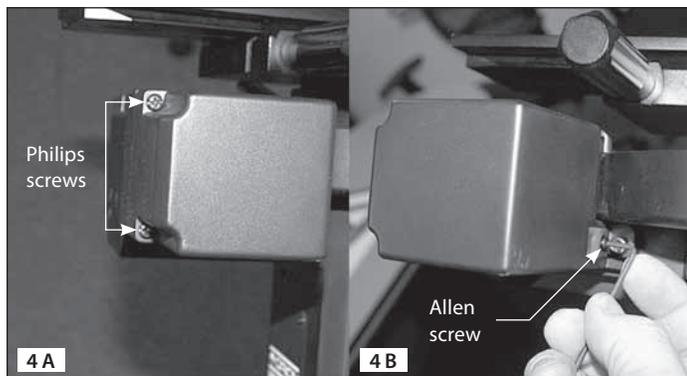


Fig. 4: Removing the Dec motor housing is done by unthreading two Philips screws (A) and one Allen screw (B).

5. Remove the plastic DEC motor housing by unscrewing the three screws shown in Fig 4, using a Philips screwdriver and a 2mm Allen key.

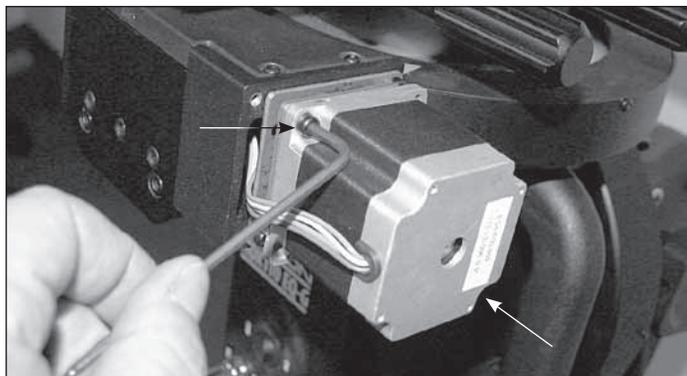


Fig. 5: Loosen by a quarter turn the two diagonally opposed screws that fasten the motor to the seat plate.

6. Now with a 3mm Allen key loosen by a quarter turn only the two screws that connect the DEC motor to the seat plate as shown in Fig. 5. These two screws are located diagonally across the motor; only one is visible in the figure. (For a very small DEC adjustment, you can skip this step.)

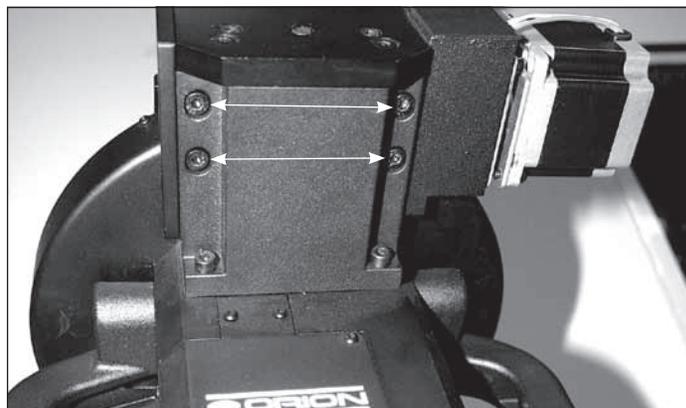


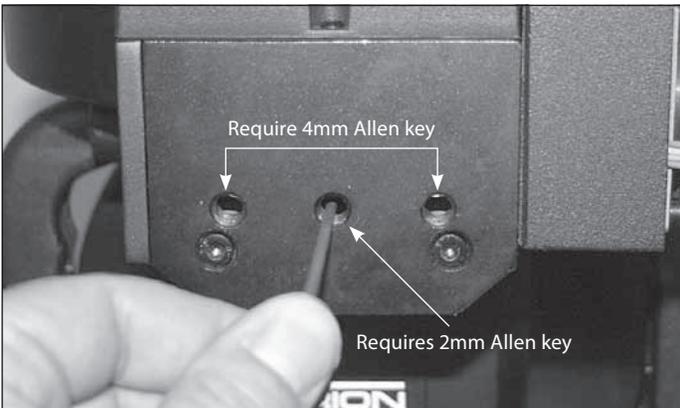
Fig. 6: Loosen the four Allen screws underneath the DEC worm gear housing by no more than ½ turn, to allow the worm block to move during the adjustment process.

7. With a 4mm Allen key, unscrew the four screws at the bottom of the worm gear housing a quarter or half turn only, as shown in Fig. 6. Do not over-loosen these screws!



Fig. 7: Completely remove the three cosmetic cover screws on the front plate and set them aside.

8. Now with the same Allen key completely remove the three cover screws on the front of the DEC housing (Fig. 7). These screws are cosmetic only. Once they are removed you will be able to get to the Allen screws inside the housing, which are the ones used to actually adjust the gear mesh.



*Fig. 8: The three backlash adjustment screws are set deep inside the housing. The outer two are adjusted with a 4mm Allen key while the center screw requires a 2.5mm key. Be sure to follow the proper procedure in the text! Do not over-tighten any of the screws or you could damage the gears!*

9. Adjust the three screws as shown in **Fig. 8** to change the gear mesh of the DEC worm and ring gear:
  - To TIGHTEN the mesh (REDUCE the backlash), first loosen the center screw just a little bit by turning it counterclockwise. Then tighten the outer two screws evenly by turning them clockwise.**
  - To LOOSEN the mesh (INCREASE the backlash), first loosen the outer two screws a little bit by turning them counterclockwise the same amount, then tighten the center screw by turning it clockwise.**
  - Loosen/Tighten the three screws only in small increments to avoid over-adjustment or possible damage to the worm or ring gear!**
10. Now, with the DEC clutch lock lever tightened, jog the saddle rotationally back and forth again by hand and see if the backlash has decreased to a more desirable level.
11. After the gear mesh has been adjusted to your satisfaction, re-install the three cover screws removed in Step 8, and then re-tighten the four screws on the bottom of the worm gear housing loosened in Step 7.
12. Before retightening the two screws loosened in Step 6, use the hand controller's up or down directional button to drive the DEC motor and the worm gear for a few seconds. This will allow the motor to auto-center and align the drive shaft with the worm rod. After this is done, the two screws can be fully tightened.
13. Now use the hand controller to slew the DEC axis at least 2 complete cycles (720 degrees) to check if there is any stalling or binding as a result of your mesh adjustment. If there is, be sure to repeat this procedure from the top and make the necessary adjustments. If there isn't, re-attach the DEC motor housing with the three screws removed in Step 5.