ASTRO-PHYSICS

Adjustments to remove worm gear backlash on 1200GTO mounts equipped with spring-loaded action brackets.

These instructions are for 1200GTO German Equatorial mounts shipped after 5-26-04 (serial number 1200432 or later) or any 1200GTO mount that has these upgrades: 1200GTO RA Motor bracket with Spring - Loaded Action (purchased as part number 12SLBR or M12270-B) or 1200GTO Declination Motor Bracket with Spring -Loaded Action (purchased as part number 12SLBD or M12560-B).

Tools needed: 1) 5/32 inch long arm hex key. 1) 5/64 inch long arm hex key. 1) Paper towel for greasy fingers.
The 1200GTO should be firmly mounted, shut off and with hand clutch knobs engaged. If the telescope is on the mount it should be in balance, or if not, set off balance to minimize rotation as in the Park 3 position.


Fig. 1

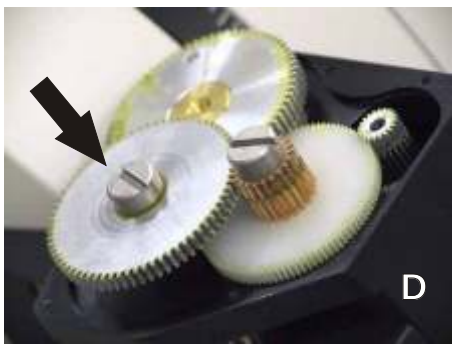
Test for Right Ascension (R.A.) backlash and correction.

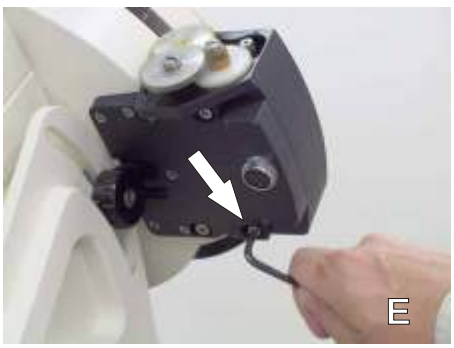
Do not loosen or adjust the two shoulder bolts on the mounting bracket. (Marked by arrows in figure 1) Although they are attached to the worm housing that you will be adjusting, they are not in contact with the mounting bracket. Their roll is of a safety or supportive nature for the bracket. They should be left at the tightened factory setting.


A


B


C


D


E

Step 1-Place your hand near the end of the counterweight shaft and move the shaft back and forth as if to rotate the RA axis. This test can be done with the mount alone on its pier or with the telescope and counterweights attached. (A)
If no play is felt, then you do not have an RA backlash problem. If play is felt, proceed with the following adjustments.

Step 2 - Using a 5/64 inch long-arm hex key, loosen and remove all six 2-56x3/4 SHCS retaining the cover. (B)

Step 3 - Remove the cover to expose the reduction gear set. Take note of the aluminum gear that is in the front. (C and D) (See arrow on D)

Step 4 - Using a 5/32 inch long arm hex key, completely loosen only the one socket head cap screw shown. (E)

Step 5 - Place one hand firmly upon the gear housing. Apply pressure on the housing in the direction of the main body of the mount. Maintaining pressure, use your 5/32 hex key to slowly loosen the second socket head cap screw shown. Retighten the second screw after movement is felt or it becomes loose, maintaining pressure as you do. (F)

Step 6 - Continuing to apply some pressure, retighten the first screw. (G)

Step 7 - Repeat step #1 to see if backlash has been removed. If backlash remains go back to step #4 and give it another try. (H, I)

Step 8 - If the backlash is gone, verify that the worm gear is not too tightly meshed by rotating the aluminum gear shown in photo (J). If the gear can be turned and no backlash is felt, using step #1, you are finished. If the gear is too tight to turn by hand, move to step #11. (J)

Step 9 - Make a final check of the tightness of the two screws. Rotate the aluminum gear one more time. (K, L, J)

Step 10 - If the adjustment is correct, return the cover to the gear housing and reinstall the six 2-56 SHCS. (M, N)

Step 11 - If the worm gear is too tight, and it is difficult to rotate the aluminum spur gear, try the following solution. Loosen the first screw again. (O) With no hand pressure applied to the housing, attempt to rotate the aluminum spur gear again. (P) The rotation of the spur gear should release the excess pressure between the worm and worm wheel. If it does, retighten the screw and check for backlash play as in step #1. (Q)

If the aluminum spur gear cannot be rotated with the actions in step 11, return to step #4 and apply less pressure through steps #5 and #6. Repeat until correct mesh is achieved.

Test for Declination backlash and correction.

Do not loosen or adjust the two shoulder bolts on the mounting bracket. Marked by arrows in Figure 2. Although they are attached to the worm housing that you will be adjusting they are not in contact with the mounting bracket. Their role is to protect the bracket and should be left tightened.

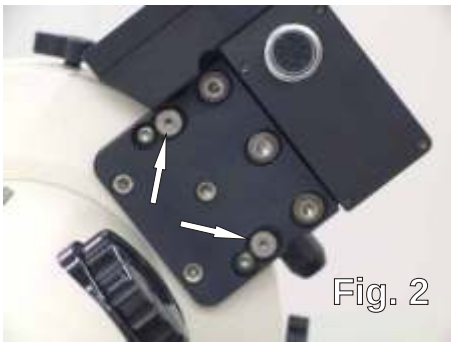
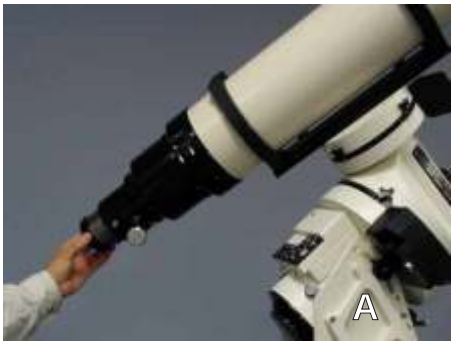


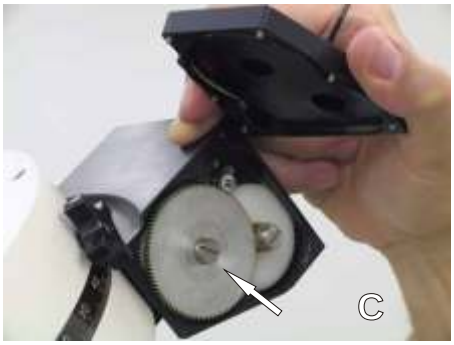
Fig. 2

Step 1 - Place your hand near the end of the telescope focuser or cradle plate and move the scope back and forth as if to rotate the Declination axis. This test can be done with the mount on its pier or with the telescope and counterweights in place. (A)
If no play is felt then you do not have a Dec. Backlash problem. If play is felt, proceed with the following adjustments.


A


B

Step 2 - Using a 5/64 inch long arm hex key, loosen and remove all six 2-56x5/16 socket head cap screws (SHCS) that attach the cover. (B)


C


D

Step 3 - Remove the cover to expose the reduction gear set. Take note of the large aluminum gear. (C)

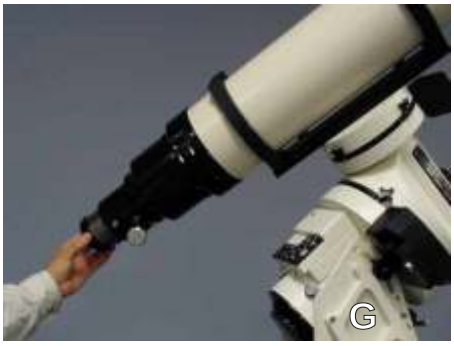
Step 4 - Using a 5/32 inch long arm hex key, completely loosen only the two socket head cap screws shown. (D)

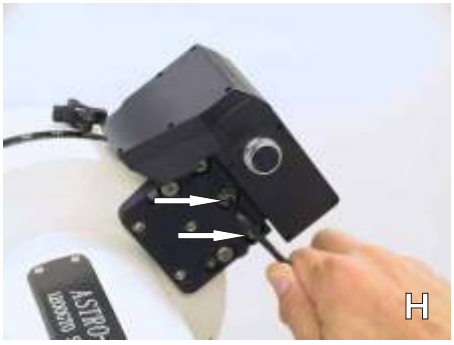

E


F

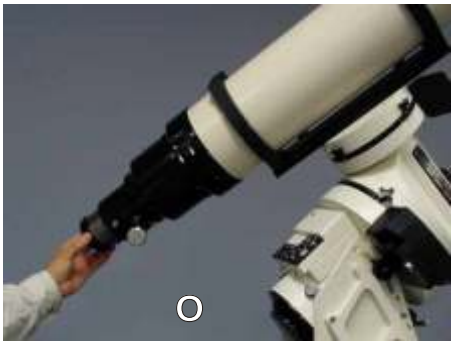
Step 5 - Place one hand firmly upon the gear housing. Apply pressure on the housing in the direction of the main body of the mount. Maintain pressure while using your 5/32 hex key to slowly loosen the third socket head cap screw shown. As the screw is loosened you may or may not feel a slight movement of the housing. Retighten the third screw after movement is felt or it has become loose, maintain pressure as you do. (E)

Step 6 - Continue to apply some pressure while tightening the first two screws loosened earlier. (F)


G


H

Step 7 - Repeat step #1 to see if backlash has been removed. If backlash remains go back to step #4 and give it another try. (G, H)



Step 8 - If the backlash is gone verify that the worm gear is not too tightly meshed by rotating the aluminum gear shown in photo (I). If the gear can be turned and no backlash is felt using the procedure in step #1 you are finished. If the gear is too tight to turn by hand, move to step #11.

Step 9 - Make a final check of the tightness of the three mounting screws. Rotate the aluminum gear one more time. (J, I)

Step 10 - If the adjustment is correct, return the cover to the gear housing and reinstall the six 2-56 SHCS. (K, L)

Step 11 - If the worm gear is too tight, it will be difficult to rotate the aluminum spur gear. Try the following solution. Loosen the first two screws as in step #4 (M). With no hand pressure applied to the housing, attempt to rotate the aluminum spur gear again. The rotation of the spur gear should release the excess pressure between the worm and worm wheel. If it does, retighten the two screws and check for backlash play as in step #1. (M, N, O)

If the aluminum spur gear cannot be rotated with the actions in step #11, return to step #4 and apply less pressure through steps #5 and #6. Repeat until correct mesh is achieved.