

GEAR MESH PROCEDURE FOR MACH1GTO (SERIAL # M10670 AND LATER)

Test for Right Ascension (R.A.) and Declination (Dec.) Backlash and Correction

The mount should be firmly fixed on a pier, powered off and with clutch knobs engaged. The mount / telescope should be put into a Park 3 position so that proper centering and meshing of the gears will take place without undue stress or pressure.

Adjustment to Remove Worm Gear Backlash

The *Mach1GTO* mount represents a new era in the ease of worm gear mesh adjustment. Our new design simplifies the process and improves the accuracy of the adjustment. It has become as close to automatic as possible while maintaining a robust and rigid structure. All mounts will eventually require a gear mesh adjustment. Whereas a mount permanently housed in an observatory requires less maintenance, there are still circumstances which require attention.

Factors contributing to gear mesh problems from greater to lesser:

- **Transporting mounts.** Carrying or shipping mounts to local and distant observing sites causes mounts to experience vibration and jostling which can put pressure on the gear boxes and change meshing.
- **Seasonal temperature changes.** Mounts located in geographical areas that experience extreme temperature differences between summers and winters will change gear mesh. A properly gear meshed mount in the summer may show a loose meshing in the winter and vice-versa.
- **Time and wear.** Over time, gear wear will cause a small change in the gear mesh.

Tools needed:

- 5/32" hex key
- 5/64" hex key
- Paper towel for greasy fingers

Adjusting Gear Mesh in Dec. and R.A.

Thanks to the simplicity of the gear mesh procedure this is a very simple and quick process. First verify that there is a gear mesh issue. To check for a loose gear mesh in the Dec. axis, take hold of the end of the telescope or saddle plate and attempt to rotate it back and forth. Similarly, the R.A. axis is checked for looseness by taking hold of the end of the Counterweight Shaft and attempting to rotate it back and forth. Do you feel a slight "thudding" looseness or is it solid? Gripping with your fingers, rather than hand, will give more sensitivity.

If a problem is found, do the following:

1. **Put the mount into Park 3 position.** This is very important to ensure that there is not uneven pressure on the gears due to an out of balance load when gear meshing.
2. **Loosen the gearbox lock-down screws appropriate to the mount.** Loosen the screws (5/32" hex key) from left to right, starting with the left screw. (See photo at right.) You may wish to tap the gearbox firmly with your fingers to ensure that it properly seats itself via the internal springs.
3. **Re-tighten the lock-down screws.** Snug the screws from left to right. Once all are snug, return to the left screw and finish tightening. Check to see if the looseness is gone.



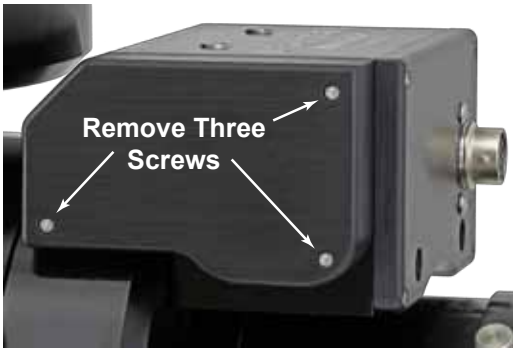
Note that Dec. and R.A. gearboxes are identical and the instructions are the same for tightening the mesh.

It is a good idea to check to be sure that the gear mesh is not too tight, as a result of shipping or transporting the mount. Excess tightness can cause a motor stall (yellow control box light). To do so, it will be necessary to remove the spur gear cover and check that the foremost spur gear turns freely with your fingers. (Cover located on left side in photo above.)

Important: The following instructions for the Dec. and R.A. axes differ due to the need to preserve any installed Periodic Error Correction of the R.A. axis. If you are a visual observer, then the PE Curve is not important and you can check both gearboxes identically without concern for gear angle. However, if the R.A. gear angle is changed, it will be necessary to install a new PE Curve using PEMPro™ OR to turn off PE correction in the Keypad or computer software.

Instructions to Check for Excess Tightness in the Dec. Gearbox:

1. **Put the mount into a Park 3 position.** This is very important to ensure that there is not uneven pressure on the gears due to an out of balance load when gear meshing. Be sure that the mount is powered off.



2. **Remove the Gearbox Cover.** Please see the photo at left to locate the screws to be removed. Use a 5/64" hex key.

3. **Rotate the Foremost Spur Gear.** The gear should turn freely with your fingers in both directions. If not, proceed to numbers 4 and 5 in these instructions. If the gear turns freely, then you are finished.

4. **Loosen the gearbox lock-down screws appropriate to the mount.** Referring to the photos on the previous page and below, loosen the lock-down screws (5/32" hex key), starting with the left screw (always work left to right). Rotate the foremost spur gear 3/4 of a turn in each direction to ensure that it turns freely. This should relieve the excess pressure.

5. **Re-tighten the lock-down screws.** Snug the screws from left to right. Once all are snug, return to the left screw and finish tightening. Again rotate the spur gear in both directions to ensure that the spur gears still turn freely. Make a quick check for gear mesh looseness, as described on the previous page, and you are done.



Instructions to Check for Excess Tightness in the R.A. Gearbox:

The instructions to check for excessive tightness in the R.A. axis are similar to those for the Dec. axis with one very important exception. The spur gears need to return to the original gear angle following rotation so that the stored PE Curve is not lost. It will be necessary to mark both gears shown since the the lower gear turns more rapidly and will make several complete turns while rotating the top gear 3/4 of a turn in each direction. Use a pencil so that the marks can be removed for a future mesh check. (See photo below at right.)

1. **Put the mount into a Park 3 position.** This is very important to ensure that there is not uneven pressure on the gears due to an out of balance load when gear meshing. Be sure that the mount is powered off.
2. **Remove the Gearbox Cover.** Please see the photo above to locate the screws to be removed. Use a 5/64" hex key.
3. **Make pencil marks as shown in the photo at the right.** Place marks on both spur gears so that they can be returned to the same gear angle following the test.
4. **Rotate the Foremost Spur Gear.** The gear should turn freely with your fingers in both directions. If not, proceed to numbers 4 and 5 in these instructions. If the gear turns freely, re-establish the gear angle via the pencil marks and then you are finished.
5. **Loosen the gearbox lock-down screws appropriate to the mount.** Referring to the photo on the previous page and at right, loosen the lock-down screws (5/32" hex key), starting with the left screw (always work left to right). Rotate the foremost spur gear 3/4 of a turn in each direction to ensure that it turns freely. This will relieve the excess pressure. Re-establish the gear angle via the pencil marks so that the stored PE curve is not lost.

6. **Re-tighten the lock-down screws.** Snug the screws from left to right. Once all are snug, return to the left screw and finish tightening. Again rotate the spur gear in both directions to ensure that the spur gears still turn freely. Re-establish the gear angle via the pencil marks. Make a quick check for gear mesh looseness, as described on the previous page, and you are done.

