

Instruction for Upgrading a ZEQ25 Mount to a CEM25 Mount

September 2015

This instruction only provides a technical reference. It is at your own risk to perform the upgrading yourself.

iOptron assumes no liability on any equipment damage or personal injury.

To upgrade a ZEQ25 mount to a CEM25 mount, you need do three things:

1. Replace the motor/worm system with electronics control system;
2. Upgrade hand controller and boards firmware;
3. Upgrade hand controller star catalog.

- 2X Belt
- 1X main control board
- 1X R.A. board with GPS
- 1X DEC board
- 1X RA/main board cover
- 1X DEC unit cover

There are two options for the upgrading:

The **Option 1** is upgrade the mount with both R.A. and DEC worms replaced. The parts needed are listed as following:

- 2X Stepper motor X2
- 2X Worm assembly with worm and worm pulley
- 2X Worm pulley
- 2X Belt
- 1X main control board
- 1X R.A. board with GPS
- 1X DEC board
- 1X RA/main board cover
- 1X DEC unit cover



This instruction will demonstrate how to replace the R.A. unit only when upgrading a ZEQ25 mount to a CEM25 one with the old worm (Option 2). The procedure for replacing the DEC unit is similar. Replace the unit with new worm installed (Option 1) will be straight forward.

Hardware Upgrade

4. Put a mount at a flat surface, or you may install the mount on tripod. **Turn the Gear Switch to OPEN position to disengage the worm from the gear.** Make sure the R.A. worm/gear does not slip during the replacement, especially when the Tension Adjuster is released or removed. Remove Tension Adjuster. **Keep the spring and steel ball in a box/tray and do not lose them.** Unscrew four (4) screws with a hex key that hold R.A. unit plastic cover (2 on each side).



The other option (**Option 2**) is that customer will keep the old worms. The parts are:

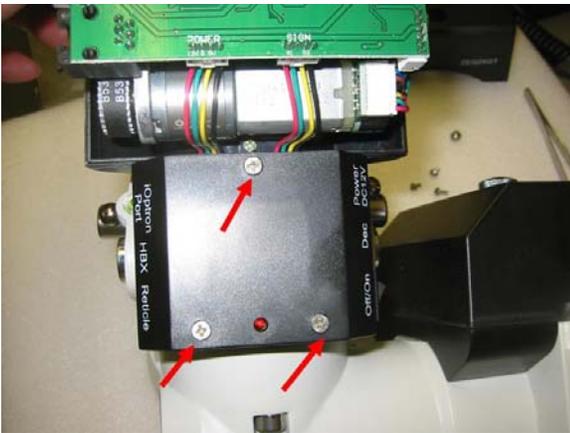
- 2X Stepper motor X2
- 2X Worm assembly w/o worm
- 2X Worm pulley



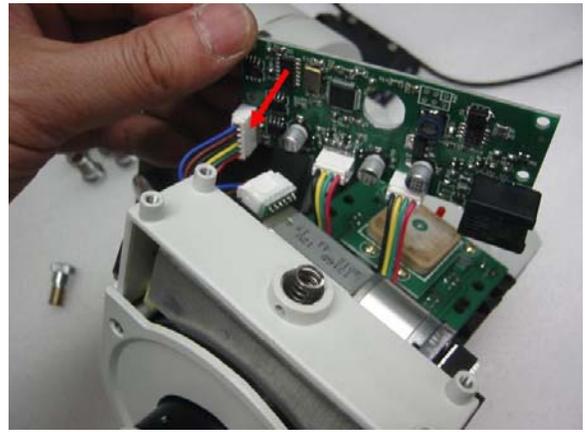
5. Remove R.A. unit cover. If the Guiding port socket prevents a easy pull-off the cover, use a small flat screwdriver to lift the edge a little bit while pull the R.A. cover off, as indicated in the following photo.



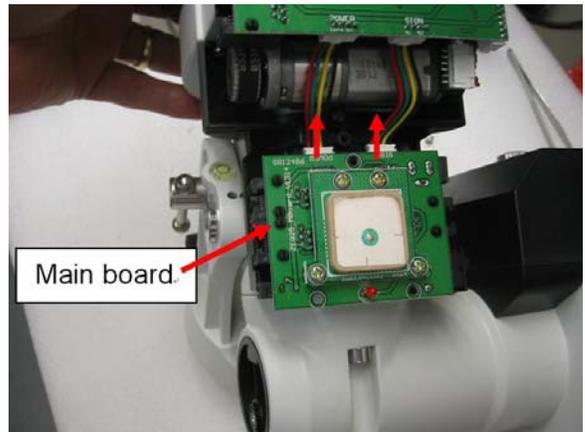
6. Remove three Phillips screws that hold the main board cover.



7. Remove four screws that secure the R.A. control board on R.A. assembly. Disconnect the 6-wire cable that connected to the R.A. motor.



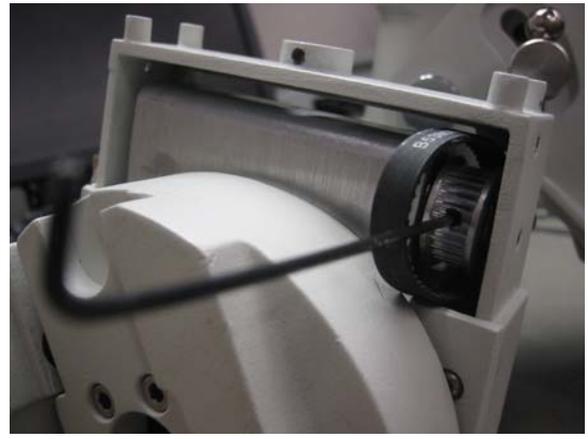
8. Lift the main control board. Disconnect two 4-wire cables connected to R.A. motor control board.



9. Carefully pull the belt off the pulley

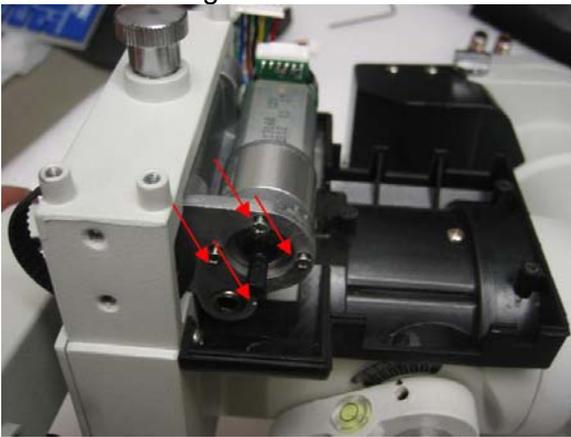


10. Using a 1.5mm hex wrench to loosen the set screw a little on the wheel and remove the wheel from the motor shaft.



11. Remove the motor by unscrew 4 small screws from the R.A. cage.

14. Wipe off the grease on the RA worm. Inspect the RA worm carefully while rotating the RA worm.



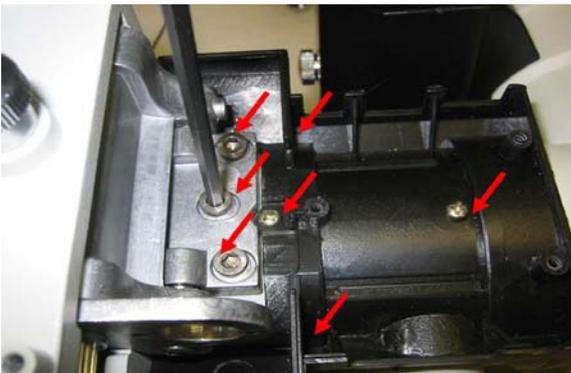
15. If the old worm stays in the upgraded version, please follow the following procedures to take the worm out of the old mounting bracket and assemble it into the new mounting bracket.

(1) Loosen the set screw on the worm pulley and remove the worm pulley;

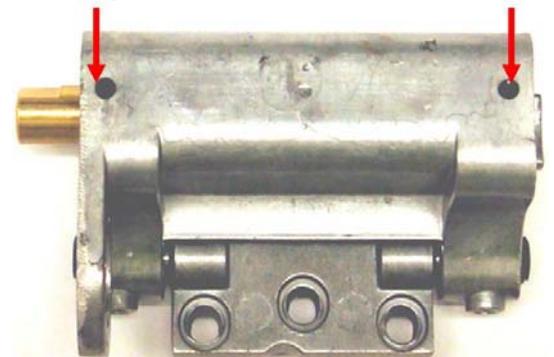
12. Remove the R.A. black plastic fixtures from the mount by removing 4 Phillips screws. Unscrew 3 hex head screw that hold RA worm mounting bracket in place. **The mount head may swing when 3 three screws are unscrewed.** Carefully pull the RA worm mounting bracket out of the R.A. ring gear house.



(2) Loosen the two set screws on the old mounting bracket and remove the two brass end caps;



13. If the mounting bracket is stuck inside the ring gear housing, you may release worm pulley set screw to make some room by moving the worm pulley toward the worm.



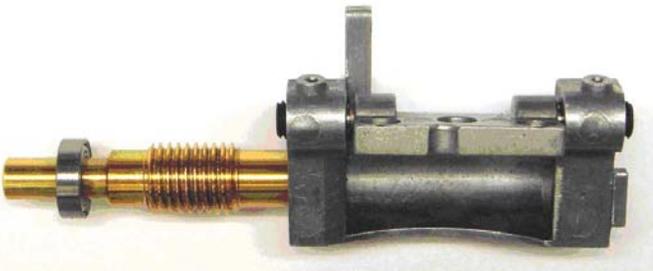
(3) Take the old worm out of the old mounting bracket;



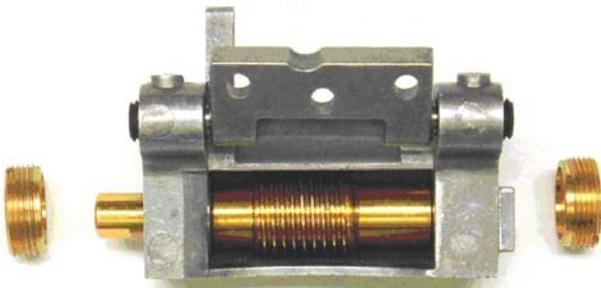
(4) Take the new worm mounting bracket and loose the two set screws on it;



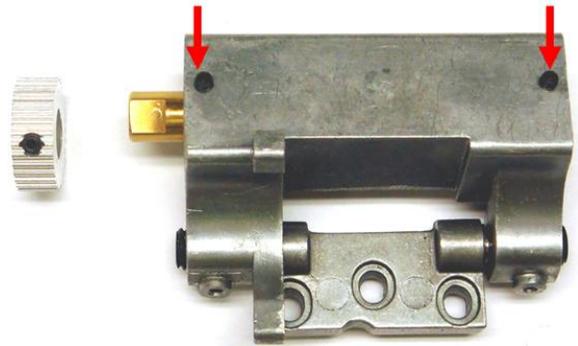
(5) Put the old worm into the new worm mounting bracket;



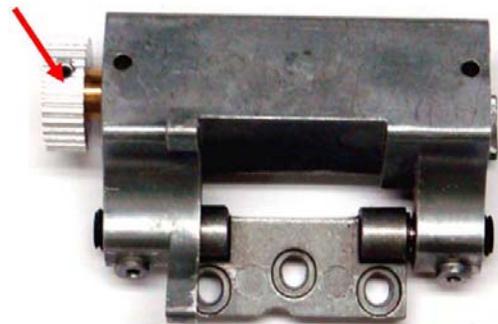
(6) Put the two old brass end caps at the end of the worm. Properly tighten the brass end caps. Use nose pliers (or similar tool) to tighten the brass end caps, then retreat 1/16 to 1/8 turns to make sure the end caps tightened enough but not jam the worm. ***If the end cap is not tightened enough, it will introduce lateral play;***



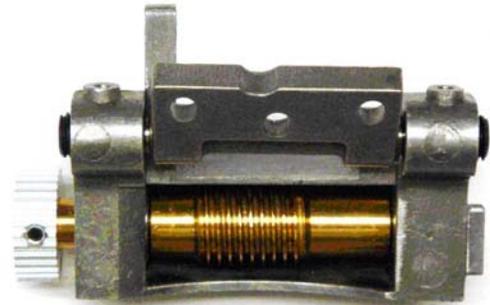
(7). Tighten the two set screws on the mounting bracket to fix the two brass end caps. Put the new worm pulley onto the old worm;



(8). Tighten the set screw on the new worm pulley to fix it.

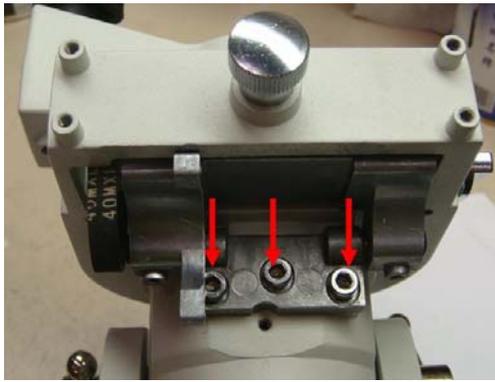


16. Take the assembly of the old RA worm and the new mounting bracket or a new RA worm and its mounting bracket and put some grease on the RA worm by a toothbrush.

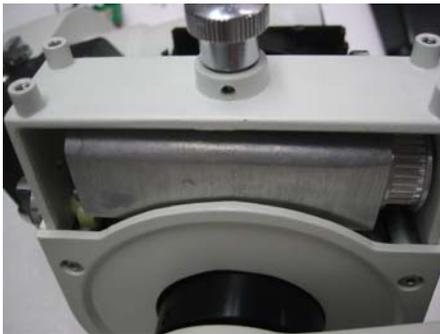


17. Wrap the new belt onto the worm pulley. Slide the new R.A. worm mounting bracket into the RA wheel housing. You may need to tilt the bracket in order to get it in place.

18. Loosely tighten the new R.A. worm mounting bracket using three hex screws.

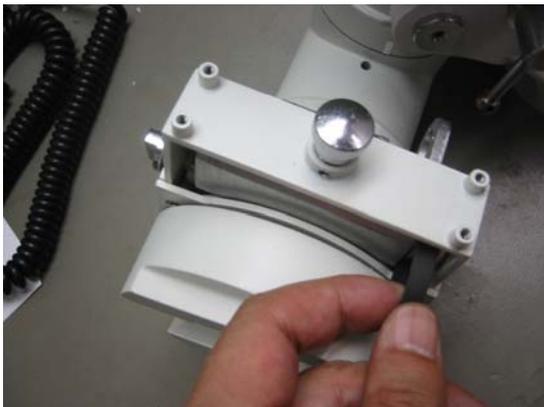


19. Insert the ball, spring and Tension Adjuster. Tighten it while aligning the worm to the wheel. **Make sure the worm is evenly sitting on top the ring gear.** Double check the spacing between the worm mounting bracket and the front cover of ring gear housing to make sure they are evenly spaced form end to end.

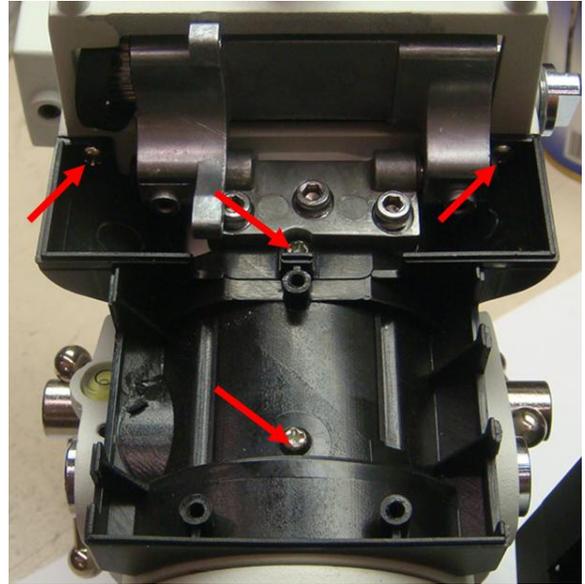


Tighten the three hex head screws to secure the R.A. bracket. Release Tension Adjuster by two turns, make sure the worm is engaged with the wheel securely when turn the Gear Switch.

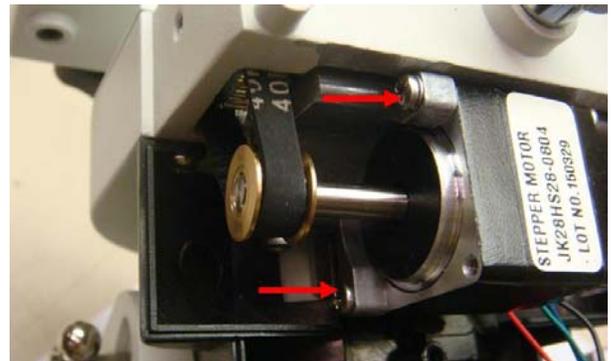
20. Pull the belt in both directions when the worm/gear is engaged. It should be felt smooth and no resistance. Tightening the Tension Adjuster one more turn and test the belt again. If there is uneven when pulling, release three hex head screws and adjust the R.A. bracket again.



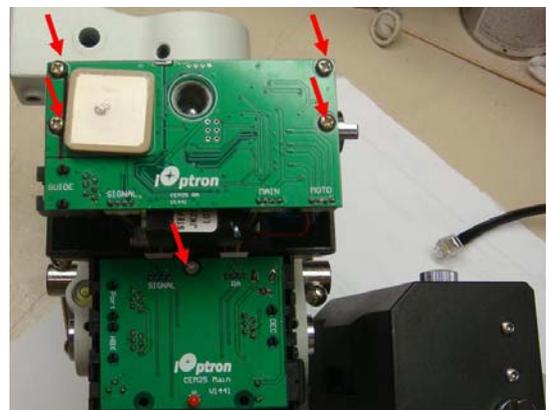
21. Install the old R.A. black plastic fixture and secure it with the four screws.



22. Install the new motor to the R.A. cage and the belt is fully pulled over the wheel by fastening two small screws. Adjust the motor position while tightening the screws to make sure the belt is properly tensioned.



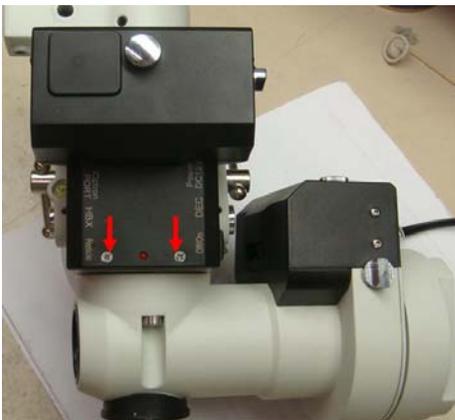
23. Connect the motor control cable to the new R.A. board and secure it. Connect the SIGNAL sockets and POWER sockets between the new R.A. and the main boards, respectively. Install the new R.A. board and new main board and secure them.



24. Install the new cover by secure the four screws (two on the left side and two on the right side). Install the Tension Adjuster. Do not over tighten the Tension Adjuster. It should be tightened in a way that there is no R.A. backlash occurred when you lightly rock the R.A. unit.



25. Install and tighten the last two screws on the main/R.A. board cover.



26. **Upgrade the firmware** of hand controller and R.A. and DEC control boards. **Upgrade the hand controller star catalog.** Power the mount on and press the hand controller to test the mount. It will be very helpful if you have a way to measure the current while either motor is slewing.