Telescope Service

Meade LX200 “Classic” Telescopes

Procedures for Removal and Installation of Printed Circuit Board
And Motor Assemblies

STATIC ELECTRICITY HAZARD AND PREVENTION

Static electricity can easily damage the electronics of your telescope. Great care should be observed in the handling of the electronics to prevent damage. Note that it is very easy to generate several thousand volts of static electricity on plastic surfaces just by handling them. This includes plastic bags, bubble wrap, styrafoam packing materials, as well as indoor carpet. Take the following precautions:

- Work on metal or wooden surfaces.
- DO NOT work in an area with a rug on the floor.
- Be sure to discharge yourself by touching the metal of the telescope BEFORE handling the electronics.
- DO NOT put the printed circuit board in a plastic bag unless you have the type designed for holding electronics (conductive plastic bags).
- DO wrap the printed circuit board in aluminum foil before packing it in a box if you don’t have a conductive plastic bag.

Tools Needed

- Phillips head screwdriver (medium size)
- 1/16 hex wrench (Allen head)
- 5/64 hex wrench (Allen head)
- Putty knife or other thin bladed tool
- Solvent (Alcohol)

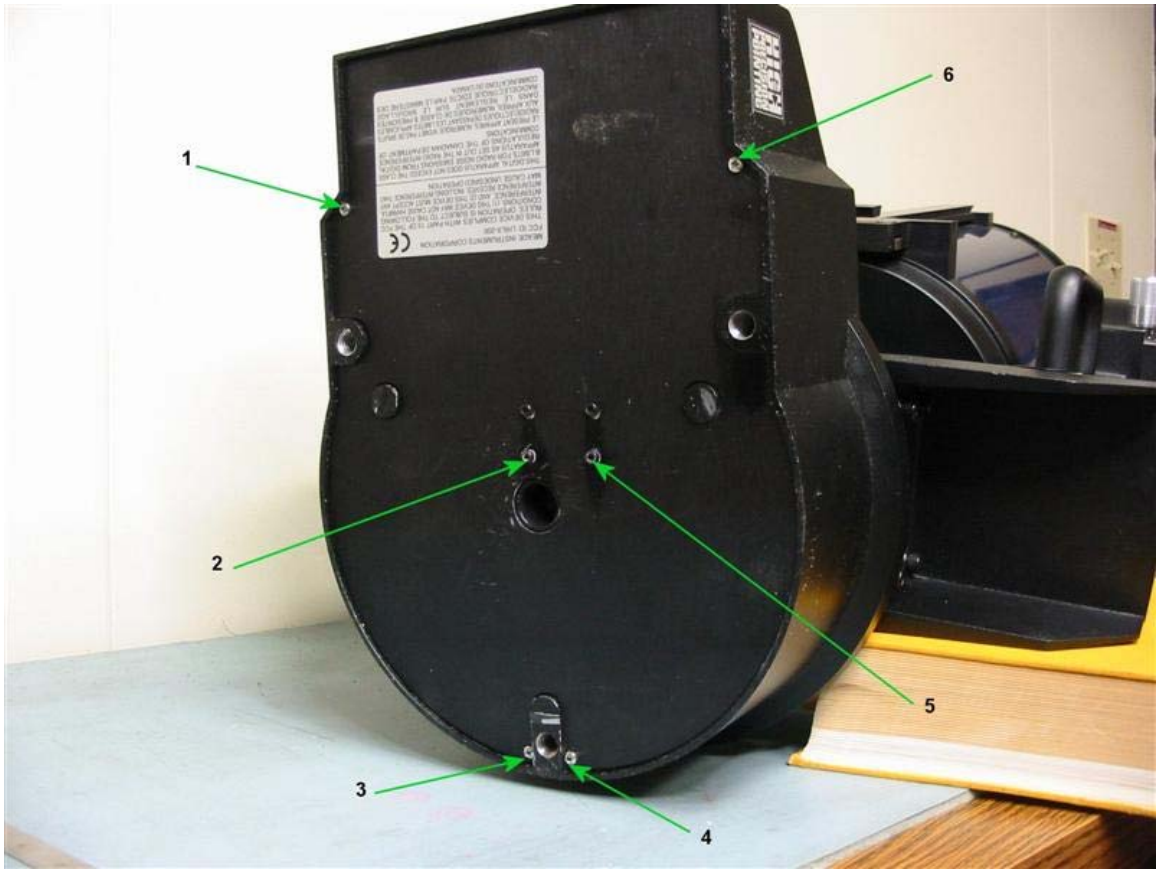
Printed Circuit Board (PCB) Removal

WARNING

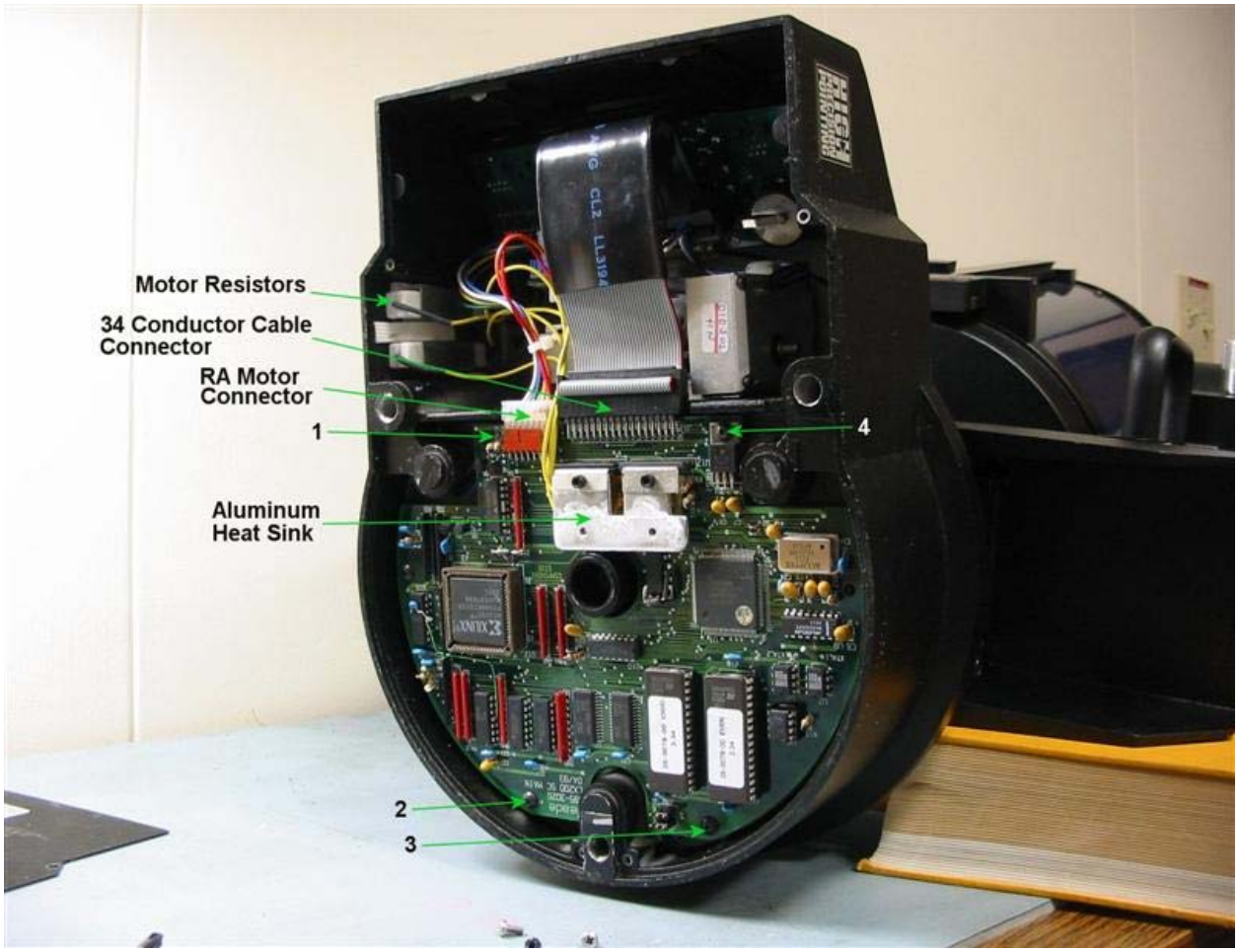
Static Electricity can damage the electronics of your telescope. Review the section on Static Electricity prevention and electronics handling before proceeding.

1. Ensure the power to the telescope Front Panel is OFF.
2. Remove the power plug (+18V) from the Front Panel.
3. Remove the telescope from the tripod mount and/or wedge. Be very careful when moving the telescope with the R.A. and DEC knobs locked as the motor assemblies are engaged to their respective worm gears.
4. Carefully lay the telescope on its side on a suitable work surface.
5. Unlock the R.A. and DEC knobs, orient the base as shown in Pic 1 and brace the telescope so it cannot move.
6. Remove the drive base cover
   - Remove the Phillips head screws.
   - Some telescope have 4 hex screws in the middle of the cover, some have two.
   - For those bases with 4 screws, the two lager screws have clearance holes in the cover.
   - Remove the smaller 1/16" button head hex (Allen) screws.
7. Disconnect the 7 conductor motor cable from the PCB connector.
8. Disconnect the 34 conductor ribbon cable from the PCB connector. Be careful you don't pull too hard on the cable as you could loosen the wires where they attach to the connector.
9. If your LX200 model has two resistors mounted to the drive base wall it is necessary to remove the resistor mount clip from the drive base. Insert a thin bladed tool between the drive base and the mount clip and gently pry it loose. Leave the resistors attached.
10. Remove the PCB
    - There are six possible mounting screws holding the PCB into the base. Most PCBs are held by four, but some use all six.
    - Use a marking pen to indicate the mounting holes used by your telescope as a reference for reinstallation.
    - Remove the mounting screws and carefully pull the PCB from the base.

Pic 1



Pic 2


Motor Resistors
34 Conductor Cable Connector
RA Motor Connector
1
4
Aluminum Heat Sink
2
3

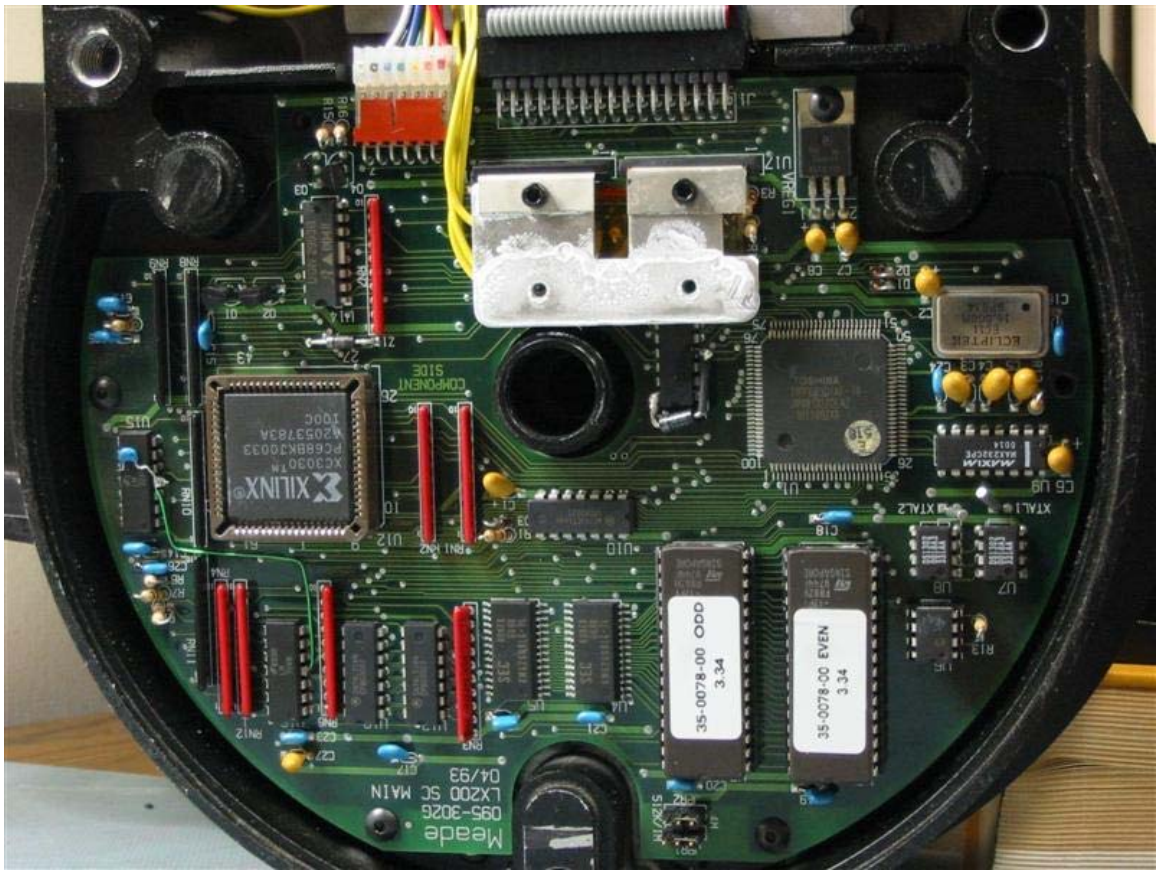
Printed Circuit Board (PCB) Installation

WARNING

Static Electricity can damage the electronics of your telescope. Review the section on Static Electricity prevention and electronics handling before proceeding.

1. Check the back of the circuit board for nylon standoff washers which are glued over the mounting holes to insulate the PCB from the base. If the washers are missing the electrical circuits on the board will contact the metal base and short circuit the board.
2. Align the PCB with the mounting holes in the drive base.
   - Install the grounded mounting screw (to the left of the 34 pin connector).
   - Install the rest of the mounting screws.
3. Resistor Assembly mounting.
   - Clean the surface of the sidewall of the base where the resistor assembly was formally mounted with solvent. Remove all traces of tape and grease.
   - Place each of the resistors into a channel of the mounting clip and center the mount on the resistor so there is equal overhang.
   - Open the bag of Thermal Joint Compound (Thermal Grease) and apply a bead to each ceramic resistor on the surface which mounts to the base.
   - Peel the backing off the double-sided tape on the mounting clip and press the clip assembly onto the wall of the base. Make sure the clip assembly is down far enough tat the wires from the resistors have clearance with the cover plate.
   - If the double sided tape won't hold the clip mount in place apply a bead of Silicone Adhesive between the clip and the drive base wall.
4. Gather the wires of the resistor assembly together and slide them under the aluminum heat sink and through the gap between the two cable connectors on the PCB.
5. Install the 34 Conductor Front Panel Ribbon cable. DOUBLE CHECK this connector for correct placement as it is easy to misalign this connection. YOU CAN DAMAGE the PCB if this connection is INCORRECT.
6. Install the 7 pin R.A. motor connector.
7. Spread a thin coat of Thermal Joint Compound over the surface of the Aluminum Heat Sink.
8. Replace the drive base cover, including the two 1/16" button head hex (Allen) screws which secure the heat sink to the base plate.

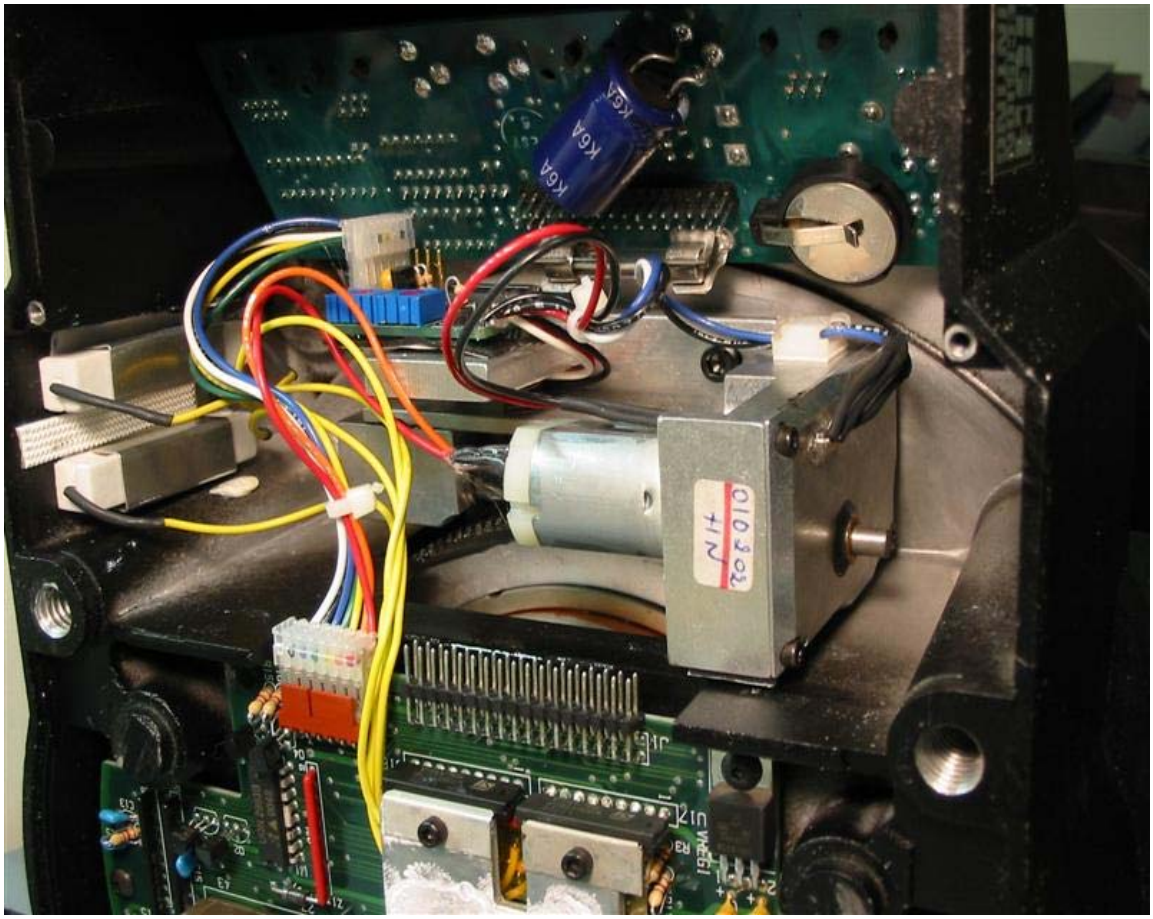
Pic 3


Meade
09S-3026
LX200 SC MAIN
04/93
35-0078-00 ODD
3.34
35-0078-00 EVEN
3.34
XILINX

R.A. Motor Removal

1. Disconnect the R.A. Motor cable (7 Pin connector) from the Printed Circuit Board.
2. Remove the 2 hex (Allen) screws holding the RA Motor assembly to the drive base. Be very careful you don't drop the hex screws down into the base as it's very difficult to retrieve them, and you could jam the worm gear.
3. Remove the drive assembly. Note there is a spring located between the two sides of the motor assembly that ensures proper meshing of the worm with the worm wheel. Keep pressure on the motor assembly hinge while removing it so the spring doesn't fall out when pressure is released.

Pic 4



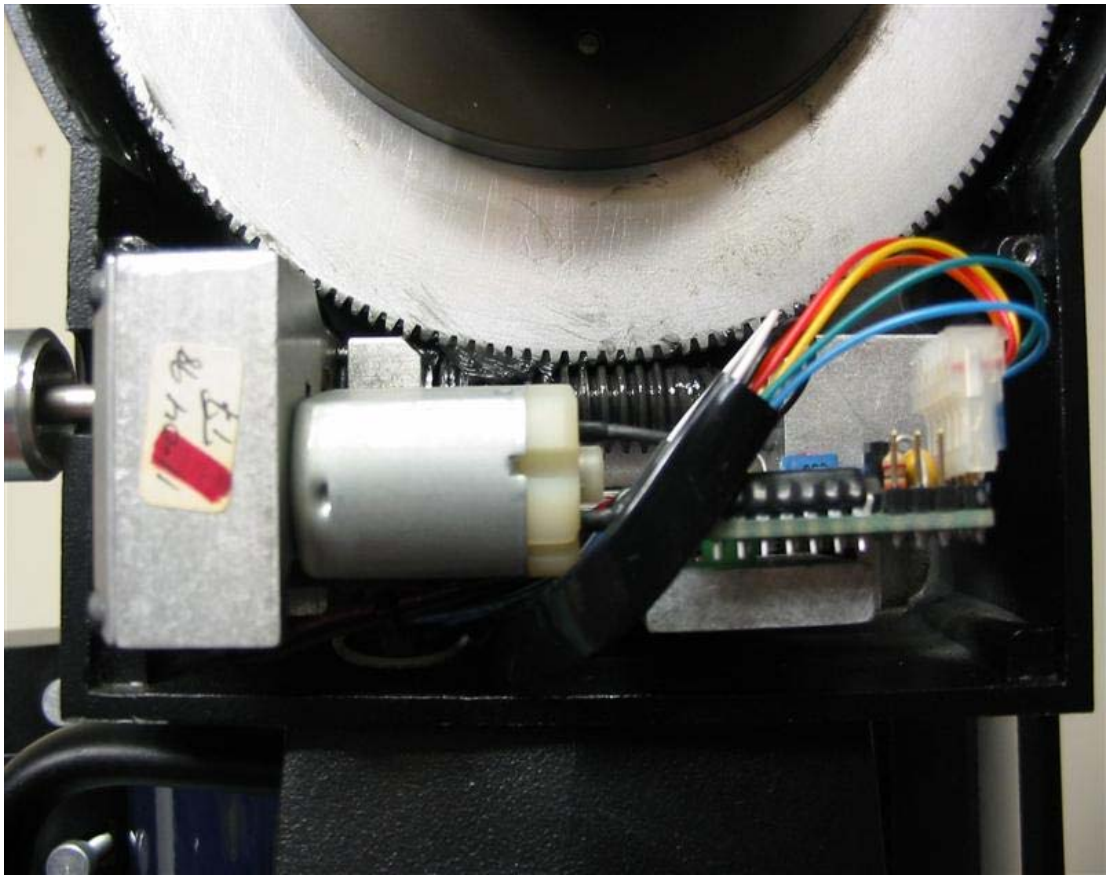
R.A. Motor Assembly Installation

1. Align the RA motor assembly with the two threaded mounting holes. Note that some motor assemblies have a step in the base of the mount which requires a special mounting plate. We recommend you smear some grease on the base and mounting plate to hold them together while installing the motor assembly.
2. Compress the spring-loaded hinge and align the teeth of the worm wheel with the worm gear.
3. Loosely thread in the left mounting screw, line up the right mounting hole, thread in the right screw.
4. Semi-tighten the left screw. While tightening the right screw, push up on the bottom of the motor base to level the assembly.
5. Firmly tighten the left and right mounting screws.
6. Make sure the spring is in place in the motor assembly. The tension screw should be adjusted to allow for 1/16" of movement when moving the drive motor. The spring tension movement allows the motor to compensate for high and low spots in the worm gear drive. There should be enough movement so the worm gear doesn't disengage or bind over its full travel.
7. Plug the 7 pin connector on the drive cable into the PCB.

DEC Motor Removal

1. Remove the declination lock knob (unthread)
2. Remove the plastic cover that is attached by three mounting screws
3. At this point it is a good idea to see how the motor assembly lines up with the fork arm mounting holes.
    - Loosen (don't remove) the two worm block screws holding the motor assembly to the mount.
    - Replace the Declination lock knob.
    - Gently rock the optical tube assembly back and forth and see how the motor assembly flexes. Take note as this procedure is followed on assembly to seat the worm wheel and to find the holes for the mounting screws.
4. Remove the declination lock knob.
5. Remove the motor assembly mounting screws.
6. Unplug the motor power cable from the inside fork arm connector.
7. Remove the declination slow motion knob if your telescope doesn't have a slot in the fork arm for the slow motion shaft.
8. Pull the motor assembly out of the fork arm. Note there is a spring located between the two sides of the motor assembly that ensures the proper meshing of the worm gear with the worm wheel. Keep pressure on the motor assembly hinge while pulling it out of the fork so the spring doesn't fall out when pressure is released.

Pic 5



Declination Motor Installation

1. Pass the power cable of the motor assembly through the opening I the fork arm and plug it into the RJ-45 jack inside the fork arm.
2. Center the motor assembly over the two threaded mounting holes in the fork arm housing. Note that some motor assemblies have a step in the base of mount which requires a special mounting plate. We recommend you smear some grease on the base and mounting plate to hold them together while installing the motor assembly.
3. Keep pressure on the spring in the hinge of the motor assembly and carefully align the teeth of the worm wheel with the worm gear.
4. Center the left mounting hole in the motor assembly with the threaded hole in the fork arm base. Loosely thread in the left mounting screw, center the right mounting hole and thread in the right mounting screw.
5. Adjust the tube assembly so the motor assembly is shifted left. This allows the worm wheel to clear the reduction gear box and for proper meshing of the worm gear and worm wheel.

6. Semi-tighten the left mounting screw, push up on the motor block to level the assembly and tighten the right mounting screw. Tighten the left mounting screw. Check the worm gear and worm wheel meshing to ensure a good fit.
7. Make sure the spring is in place in the motor assembly. The tension screw should be adjusted to allow for 1/16" of movement when moving the drive motor. The spring tension movement allows the motor to compensate for high and low spots in the worm gear drive. There should be enough movement so the worm gear doesn't disengage or bind over its full travel.
8. Install the Declination lock knob and check the gear action by turning the Declination slow motion knob. If the gear action is not smooth enough apply some lithium grease to the worm gear.
9. Remove the Declination lock knob.
10. Replace the plastic cover plate.
11. Replace the Declination lock knob.