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CGE Cable Replacement Kit – New Board-less Design
Drill-less Adapter Block Option (NO Hole Drilling Required)

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CGE Cable Replacement Kit
Drill-less Option - New Board-Less Design

What Does This Kit Do?

This kit eliminates the factory CAT5E Ethernet cables (and the circuit boards that they connected to) and replaces them with 8-pin (plus ground) “military style” circular cable connectors. These connectors have threaded locking rings that cannot be pulled out by accident (or even with brute force for that matter).

Since you are no longer going to be using those silly shielded patch cables you won’t be needing the circuit boards where the old cables plugged into. Instead, you will replace the boards with the wiring harnesses included with the kit

The benefits of this cable solution are astonishing. The new connectors cannot be pulled out of their sockets and the larger surface area of the plug pins make good, solid contact. Relocation the cable connection to the rear of the motor housings avoids sharp bends in the cables.

Preface

If you are like me, it only took 2 months before my brand new CGE mount began giving me heartbreak. I made many wrong assumptions about what the problem might be but in the end it was the cables and their failure to make proper electrical contacts that was the real cause of my misery.

Celestron’s design choice to use Ethernet patch cables is bad enough, but to place the connection points where they need to make a 90° bend is just plain bad design (especially on the DEC cable that rubs against the RA shaft housing). I subscribe to several astronomy web forums and the CGE cable problem is, by my estimation, the most commonly reported problem in search of a solution.

Like many others, I tried different brands of cables as well as other remedies such as bending of the metal shield, paper clips, bubble gum, etc., but ultimately all solutions failed to offer a permanent fix. Those cables (of any brand) are stiff and simply do not want to bend (especially in cold temperatures) and the result is that they will not maintain a good connection in the RJ45 socket.

For me, the solution was to use an entirely different type of cable connector and to relocate the cable connectors to an orientation that did not require them to bend at sharp angles. I chose to use the same connectors that I have used in many of my electrical projects. In this case I would use the 8-pin version of what I call a “military style” connector.

Disclaimer

Installing the Cable Kit will void your Celestron Warranty, but consider this:

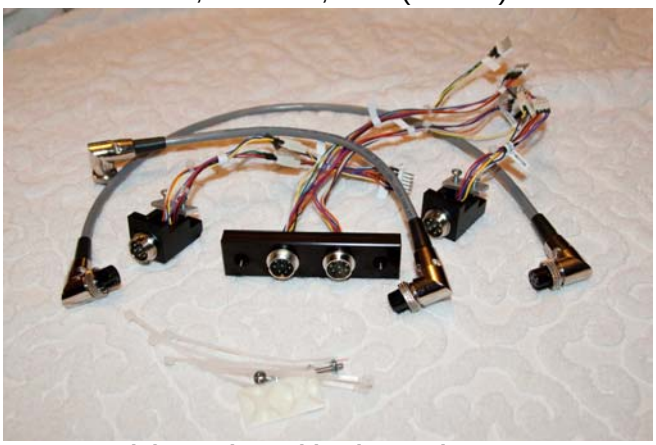
> *If your mount is more or less inoperable, because of the dreaded "cable problem", then having a warranty is not very helpful because Celestron CANNOT fix it. Some kit buyers have reported that Celesron is rarely able to replicate the problem from the climate controlled warmth of the California repair shop. At best you will be without a mount for several months and sent new CAT5E cables and the problem will return. The cable itself is NOT the problem. It's the connectors and RJ45 sockets, and a new CAT5E cable won't help. The only way to permanently fix the problem is to eliminate those connectors altogether.*

The kit is offered as a service by a private individual, not a company. As such, I (Gary Bennett) cannot assume any liability. Each kit is tested on my own mount prior to shipping, but I cannot offer any guarantees other than it will work on your mount if installed correctly.

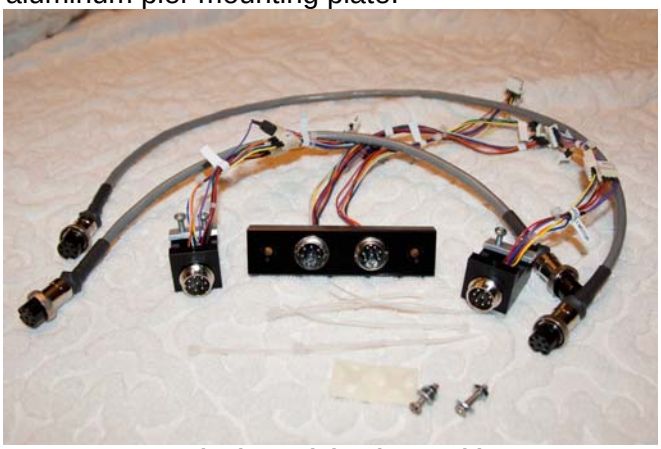
I have provided some troubleshooting tips at the end of this installation guide. Problems are usually something really simple such as reversing RA/DEC. I have made plenty of mistakes while developing this kit and can tell you that it is very unlikely that any harm will be done by simple mistakes.

Kit Components

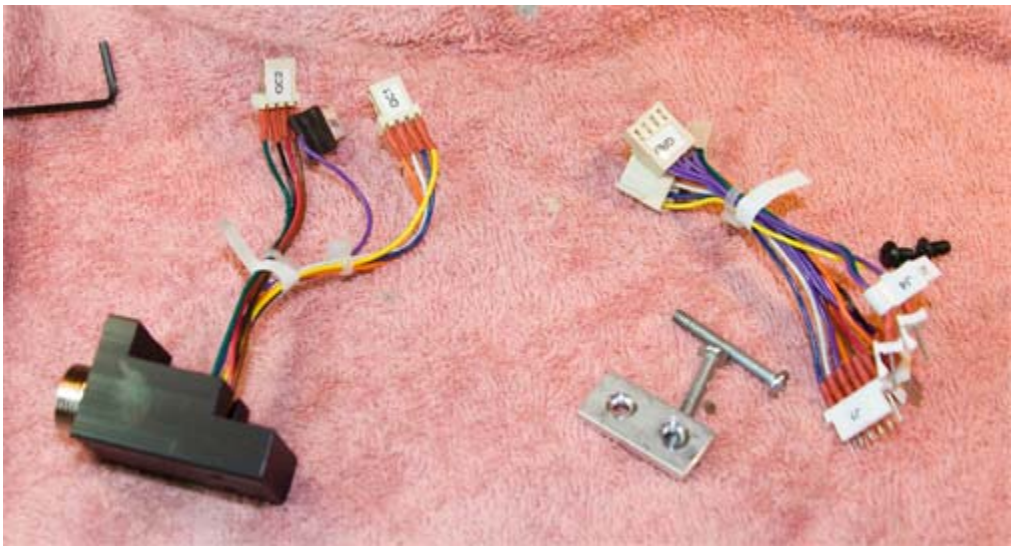
- Drill-less Adapter Blocks and mounting hardware.
- Wiring Harnesses:
  - Motor housing (2)
    - DEC/ALT Motor
    - RA/AZM Motor
  - Electronics pier (1)
    - DEC/ALT
    - RA/AZM
- External cables (RA and DEC) with 8-pin circular connector plugs and locking rings.
- Aluminum pier chassis connector mounting plate with hardware
- Cable ties (6)
- Adhesive cable tie mounting pads (4)
- Screws, washers, nuts (2 each) for attaching the aluminum pier mounting plate.



"Right-Angle" Cable Plug Option



Standard "Straight Plug" Cables



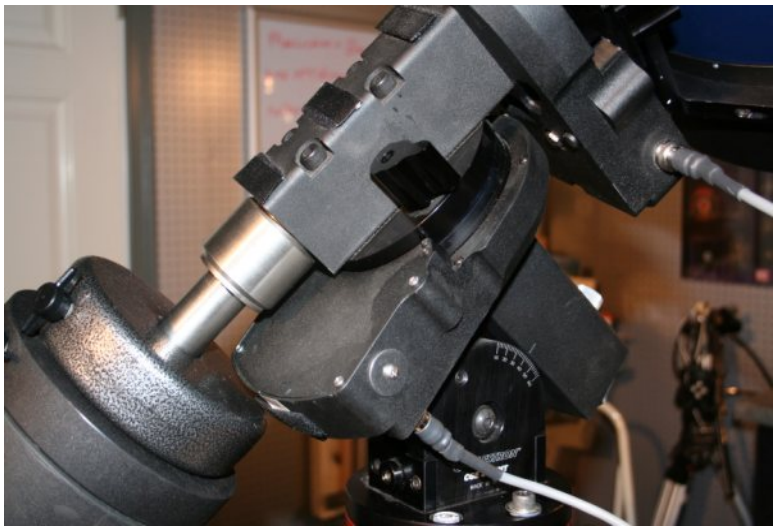
Optional Components

Optional Right Angle Plugs

The right-angle plugs option was originally designed for the “basic kit” where the chassis connectors are located at the side of the motors housings. For users of side-by-side/tandem systems, their lower profile (they don’t stick straight out like the straight plugs) eliminates snagging of the cable by accessories mounted under the dove-tail.

Since the “Drill-less” Option places the cable connection point at the rear of the motor housing, the right-angle plug option is less important in terms of functionality. However, they are significantly more attractive in (aesthetics) appearance.

This is an extreme example, but this customer elected to use an alternate mounting location for his RA chassis connector to avoid the counter weight snagging the RA cable that would normally exit the side of the RA motor housing. In most cases, a right-angle plug would be sufficient.



Brief Overview

Installation of the CGE Cable Replacement Kit will cure the problem with mount failure due to poor or misaligned connection of the factory original CAT5E Patch cables.

This installation guide provides a step-by-step instruction on how to install the cable replacement kit. Here is a brief rundown of what you are about to do:

- Remove motor housing cover plates
- Lift the lid off of the electronics pier
- Label the cables (use the labels at the end of this install guide and tape to the cables) connecting to the factory circuit boards that you are about to remove:
    - Electronics Pier
        - DEC/ALT Motor
        - DEC/ALT Sense
        - RA/AZM Motor
        - RA/AZM Sense
    - DEC/ALT Motor : **J1** (6 pin) **J3** (2 pin)
    - RA/AZM: **J1** (6 pin) **J2** (4 pin) **J3** (2 pin) **J4** (2 pin)
- Remove factory original circuit boards inside each motor housing and electronics pier
- Mount the chassis connectors (wiring harnesses)
    - Motor housings using the Drill-Less Adapter Blocks.
    - Electronics Pier: Fasten the aluminum chassis connector mounting plate (the plate and mounting screws/nuts are included in the kit).
- Plug in the cables into the ends of the new wiring harnesses.
- Reinstall the motor housing cover plates
- Reinstall the lid on the electronics pier
- DONE !

Tools Required:

- Screwdriver (Philips)
- Alan (hex) wrenches (SAE): 5/64” (motor housing cover plate) and ¼” (saddle plate)
- Thin bladed knife
- Paint can opener (the simple one you get free when you buy a can of paint @ Home Depot)

Materials Required:

- Double sided foam (1/8”) tape. Approx 6”
- Optional – Adhesive Velcro. Using adhesive Velcro will make it easier to remove the lid next time you need to replace the Real Time Clock battery. Suggestion:
    - Use Double Sided Foam Tape OR 5-minute Epoxy to affix the aluminum brackets to the side of the electronics pier.
    - Use adhesive Velcro to affix the lid to the top of the brackets.

OPTIONAL – Replace the Real Time Clock Battery

Since you will be inside the Electronics Pier, now would be a good time to pput in a fresh battery for the Real Time Clock.

Battery Type: CR-2032

You can also use a CR-2025 but the CR-2032 has a larger capacity and will last longer.

Time for Surgery

The first step is to remove the lid from the electronics pier and the motor housing covers.

Motor Housings:

Remove the 4 screws on the housing cover using a 5/64" hex wrench (Allen Key). On the DEC housing you will also need to remove the saddle plate by removing the 2 bolts with a ¼" hex wrench.

You will be removing the original factory circuit boards.

FYI, the wiring harnesses for RA and DEC are installed the same way except the RA has an extra sensor (slew limit) switch and therefore it has 2 additional cables (J2 & J4).

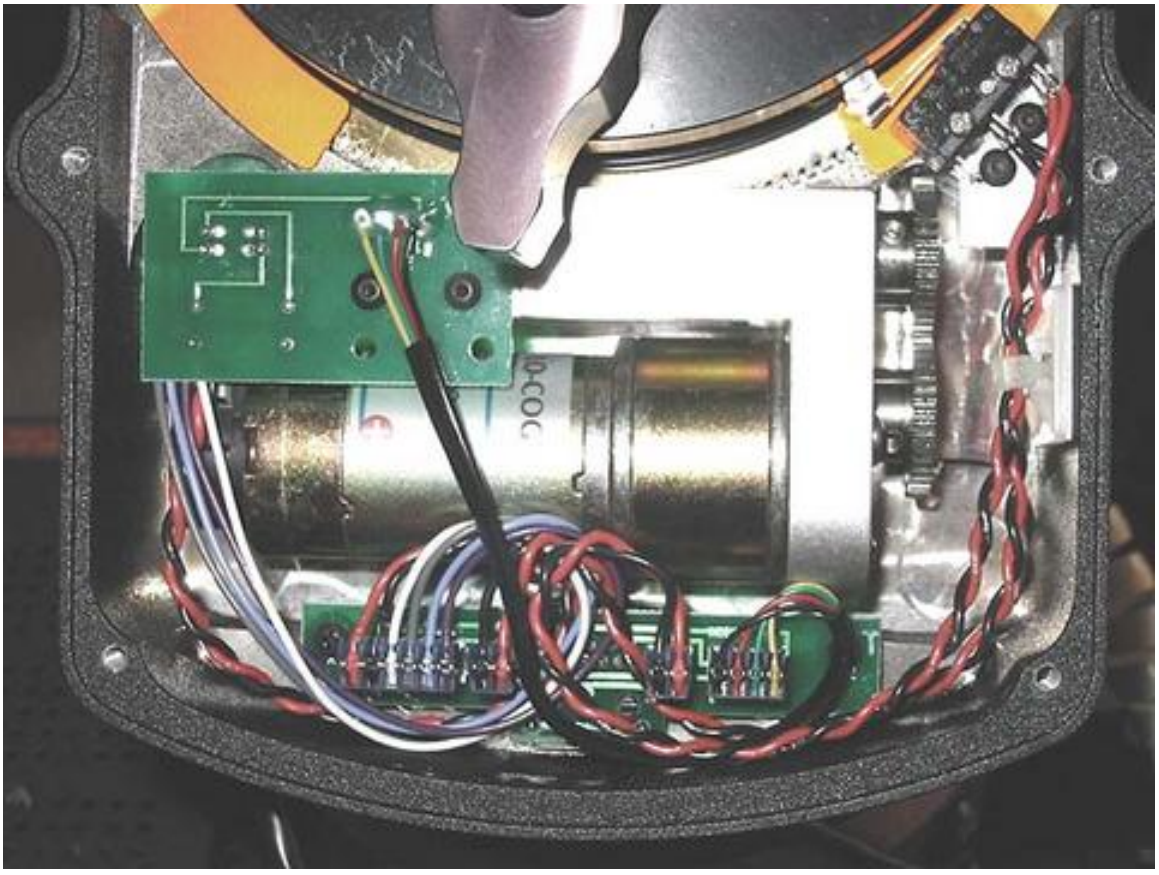
Before detaching the cables, label each cable (J1/J2/J3/J4) so that you will know which is which. The original circuit board is labeled (J1, J2,J3, J4) and the new wiring harness is labeled the same way. Use the "labels" at the end of this guide for this. Just print the page, cut off the label, and tape it to the cable.

RA/AZM has 4 cables: **J1** (6 pins) / **J2** (4 pins) / **J3** (2 pins) / **J4** (2 pins).

DEC/ALT has 2 cables: **J1** (6 pins) / **J3** (2 pins)

Bother circuit boards are identical but you will see that the DEC motor does NOT have cables for J2 & J4.

Now detach the cables and remove the board by removing the 2 screws. Underneath the board you will see plastic a "stand-off" at each end. The boards, screws, and plastic "stand-offs" will not be used so pack them away.



Electronics Pier

You will be removing the RJ45 connector circuit board (where those nasty Ethernet cables plug in).

First, remove the pier lid. Before removing the lid make some reference marks so that it will be easy to reinstall the lid later on:

- Make a mark on the inside of the pier for the depth of the lid. I just ran a pencil around the top of the lid.
- Make a mark or 2 for orientation/alignment. I used the mount bolt holes as my reference point.

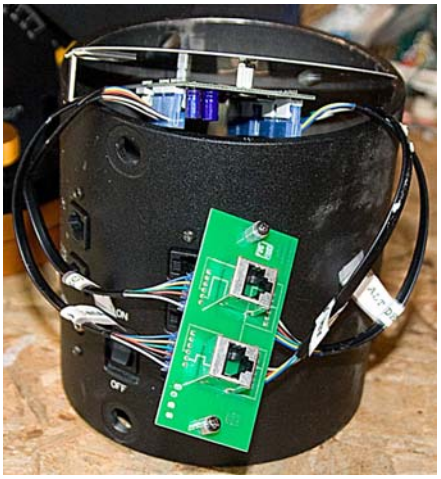
The pier lid is held in place with 2-sided foam tape in 3 places around the lid. I used a thin bladed knife (a table knife) to persuade the tape to un-stick itself from the side of the pier. Then I used a paint can opener (the kind you get free @ Home Depot when you buy a can of paint) and pulled up on the aluminum disk.

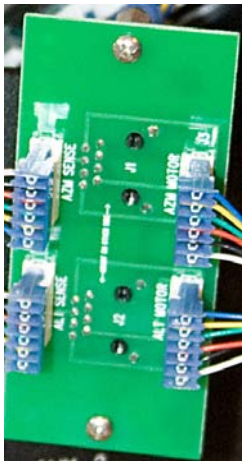
Now remove the 2 screws that hold the RJ45 connector boards.

The 4 cables that attach to the back of the board will be detached ***but first label each cable*****:** (***RA/AZM Motor, RA/AZM Sense***, ***DEC/ALT Motor, DEC/ALT Sense***). Use the "labels" at the end of this guide for this. Just print the page, cut off the label, and tape it to the wire.

You can now disconnect the cables from the circuit board.

You will not need the circuit boards or the 2 screws (or the stand-offs underneath) so reattach the screws to the board for safe keeping.





Mount the Chassis (Male) Connectors

Motor Housings

For the “Drill-less” option, the chassis connectors have already been pre-mounted to the adapter block.

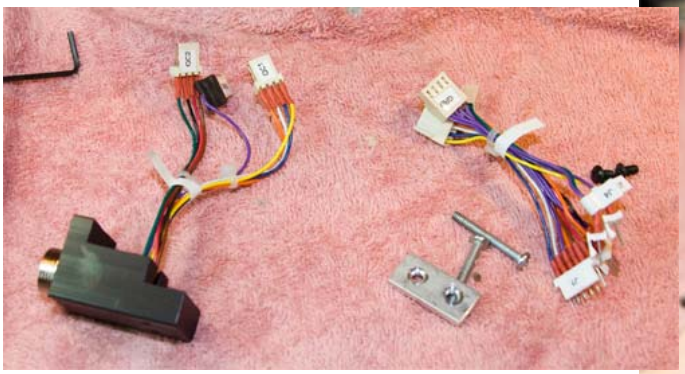
The adapter block will be located at the rear of each motor housing. The wiring harness will enter the motor housing using the existing square hole where the original RJ45 connector used to be located.

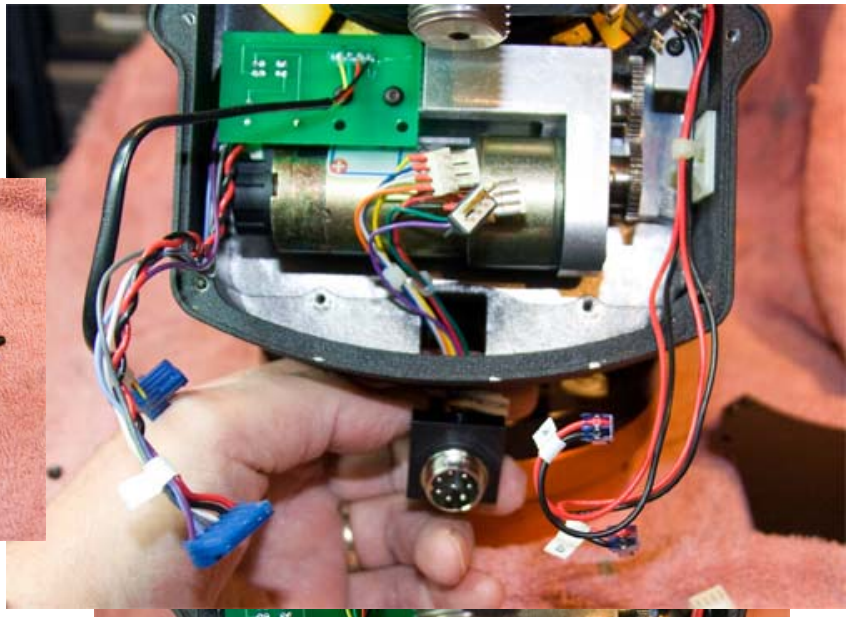
Installation of the RA and DEC adapter blocks are identical with 2 exceptions:

1. The RA motor wiring has a “Ground Wire” (GRD) that is NOT used for the DEC motor.
2. The RA harness has 4 cable connections (J1/J2/J3/J4) but the DEC harness has only 2 (J1/J3)

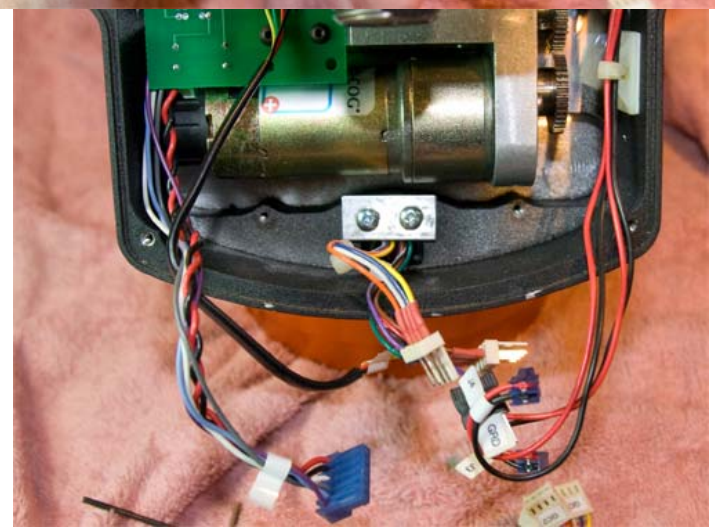
To install the adapter block:

1. Temporarily disconnect the “QC1, QC2, GRD (RA only)” harness connectors as shown in the photo below



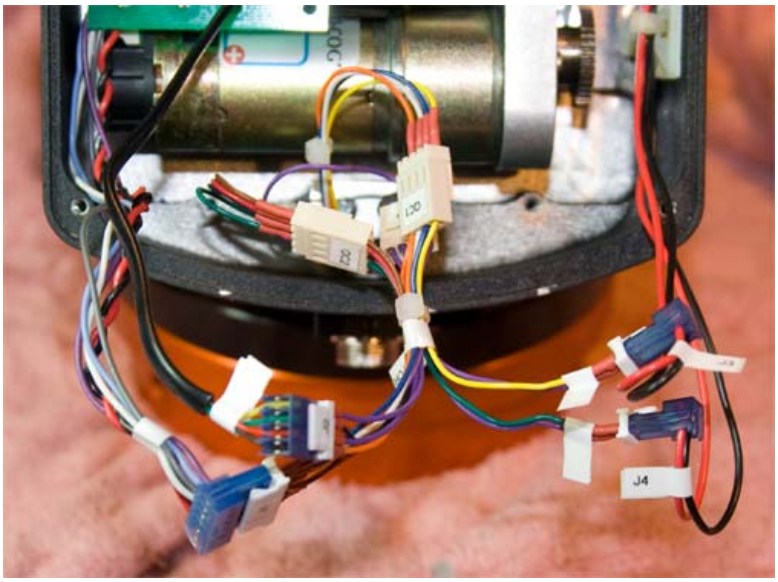


2. Then insert the harness connectors through the square hole is shown in the photo on the right
3. You can now install the mounting screws and bracket as shown in the photo on the right.



TIP: Turn the mount onto its side*… Getting the drill-less adapter block mounting screws to align with the threaded holes will be MUCH easier when you can see what you’re doing. If you turn the mount onto its side you will be able to see better. Start with the “top” screw and only thread it a few turns. The extra gap will let you see better when you try and put on the 2nd screw.*

4. Now reconnect the QC1 / QC2 / GRD harness connectors (DEC does NOT have the “GRD” connector).



5. Next, connect the motor and switch sensor cables to the ends of the wiring harness. The wiring harness is labeled as follows:

   For the ***RA Motor*** there are 4 cables (plus the ground wire):

   - **J1** 6-pin
   - **J2** 4-pin
   - **J3** 2-pin
   - **J4** 2-Pin

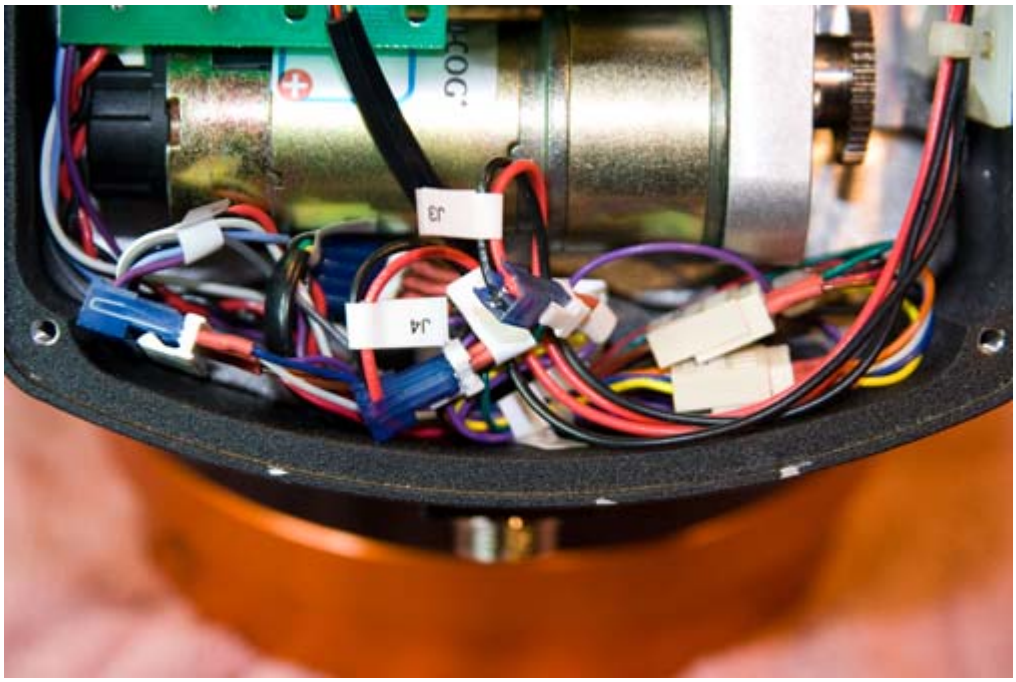
   For the ***DEC Motor*** there are only 2 cables:

   - **J1** 6-pin
   - **J3** 2-pin

Take note of the plug orientation:

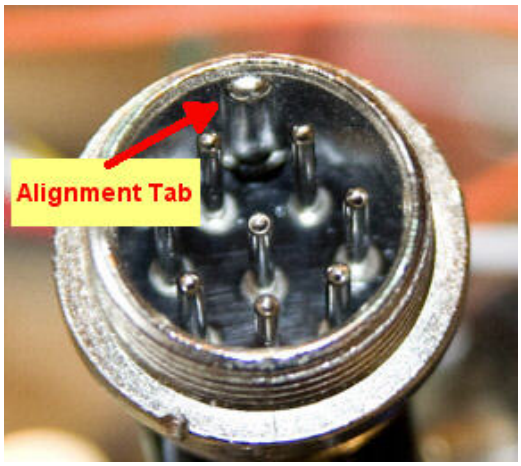
6. Now you can “stuff” the wires back inside the motor housing. Use the adhesive pads and cable ties where need to keep the wires away from the vital bits.

   NOTE: I did NOT feel that the adhesive pads were necessary.



Plug Orientation

The chassis connector has an “alignment tab” which ensures that the pins are correctly aligned. The orientation was pre-set prior to shipping but can be changed easily by loosening the set screw (5/64” allen key) and rotating the connector to the desired position.



WARNING: The RA Chassis Connectors on the electronics pier AND drill-less adapter blocks have a “spoon connector” that is held in place with the set-screw. This is the Ground connection. If you alter the plug orientation make sure the spoon connector is put back into place.

Mount the Pier Chassis Connectors

The chassis connectors were already mounted to the aluminum chassis connector mounting plate so all that remains is to insert the wiring harness into the pier hole and use the supplied screws to mount the plate to the pier.

The back of the plate is labeled with RA and DEC and the wiring harness is also labeled. Just orient the plate so the DEC is at the top.

The screws will go into the same holes that were used to mount the factory original RJ45 connector board.

The supplied screws are #6-32 and my pier was already tapped with #6-32 threads. I have worked on 2 other mounts that had larger diameter holes. If your pier has the larger dia. hole then you will also use the washer and nut that was also supplied with the kit.

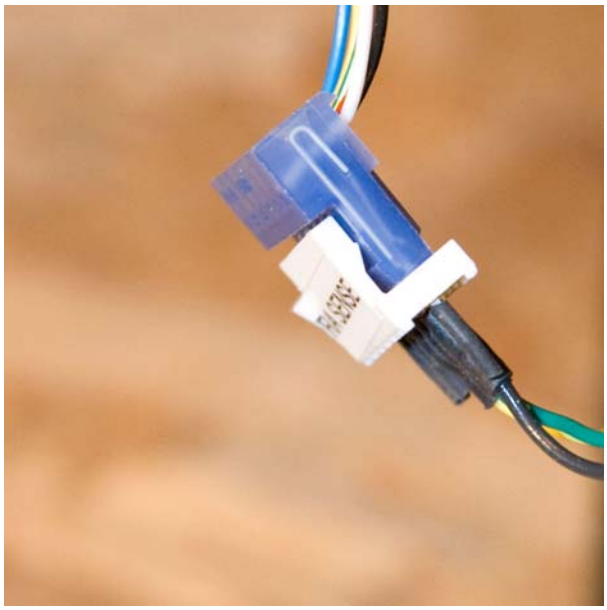
Connecting the Electronics Pier Wiring Harnesses

The cables that you disconnected from the circuit board earlier can now be connected to the pier chassis connector wiring harnesses.

Pier connectors:

1. DEC/ALT Sense
2. RA/AZM Sense
3. DEC/ALT Motor
4. RA/AZM Motor

Take note of the plug orientation:



Bench Testing

Before replacing the motor housing covers and the pier lid, it would be a good idea to test the mount.

You can do this on your work bench by simply plugging in your new external cables, hand controller, and power cord.

Inserting the 8-Pin Main Cables

These cables are the reason you installed the Cable Replacement Kit. The cable can plug in only one way. There is an alignment tab on the inside of the chassis connector. The external plug (female) has a slot and it needs to align with the tab on the chassis (male) connector.

For best performance, make sure that you push the plug all the way in. Then thread on the locking ring. Take care not the strip the threads. If you find that it is not threading on properly just reverse direction and start the thread at a different place. After time, the sharp edges on the threads will smooth out and you will find it much easier to thread on the locking ring.

A firmly connected cable is your insurance that you will have years of trouble free star gazing. The metal casing and the locking ring are your “ground” wire so it is important that it be fully threaded onto the chassis connector.

Power It Up

First test the motor slewing functions using the direction controls. If everything seems in order you can go ahead and try a “dummy alignment” which will begin with “Set Switch Position”.

Chose a Two Star Alignment and let it do its thing.

If things don’t seem to be working properly, refer to the Trouble Shooting section of this guide.

Once you are satisfied, you can now reinstall the motor housing covers and the pier lid.

Reinstall the Motor Housing Cover and the Pier Lid

Reinstall the Motor Housing Covers

This is easy. Just replace the cover and 4 screws.

Reinstall the Pier Lid

The lid is “fastened” with 2-sided foam tape. I found it easiest to remove the 3 aluminum right angle brackets from the underside of the lid and use a new piece of foam tape to affix the angle brackets (adhere to the sides of the pier interior) and then place the lid on top of the brackets.

Use the reference line you made earlier to determine the proper depth for the bracket placements. The brackets will need to be placed lower than this mark as you need to compensate for the thickness of the bracket, foam tape, and the lid itself. Find something such as a piece of cardboard that is approximately as thick as needed and use it to align with your reference mark and the bracket underneath.

I left the foam tape wax backing on the top of the bracket so that it would not stick to the cardboard.

Once the brackets are adhered to the side you can now remove the wax backing and place the lid on top of the brackets. Remember to align the lid with the reference marks you made earlier. Check to see if there are any cables that will get caught on the brackets as you lower the lid in place.

Congratulations, You’re Done!

Clear Skies!

Trouble Shooting Guide

There are only a few things that could have caused any problems you may be experiencing.

- The new cables are a tight fit and might not be fully inserted (they will loosen up after a while). Make sure that the new RA/DEC cables are fully inserted into the chassis connector (male plug) and the threaded locking ring is tight. This is especially important for the RA cable as the metal shell is the ground connection. After threading on the locking ring, push in on the cable and in and see if the locking ring can be tightened more.
- Make sure that the connector plugs are pushed all the way onto the wiring harnesses.
- Some of the wires that you did not unplug may have been pulled out of their circuit boards. Push them in to make sure they are well seated.
- Recheck where things are plugged in. I goofed on this a bunch of times. The wiring harnesses and are labeled so double check.
- The “Quick Connect” plugs have metal inserts. Sometimes they get “pushed out” by the “header pins”. If this happens, just push on the wires to urge the metal inserts back into place.
- The most common mistakes are:
    - QC1 & QC2 connectors reversed
    - J3 & J4 motor housing cables are reversed
    - The connectors are misaligned. If you see a “header pin” with nothing covering it then you need to remove the connector and move it over a notch (I’ve done this a bunch of times).
    - External cables are reversed. Ie: The DEC cable is plugged into the RA Pier connector. I have done this blooper countless times.
- If the DEC motor runs and does not stop (finding switch position), check to see if your DEC clutch knobs are tightened down. This can also happen if you have reversed the DEC/RA cable.
- It is normal that the RA slews all the way to one side and then slowly moves to switch position. You can speed this up by loosening the clutches, moving RA closer (but not all the way) to switch position. Let the mount complete the slow movement to switch position.
- If you use a GPS unit and have tested the mount without connecting the GPS unit (or are indoors) you may need to use the Utilities Menu to turn “GPS ON”.

Cable Harness Labels

Make sure you label the cables before unplugging them from the factory original circuit boards.

Print this page, cut out the labels, and tape them to the cables.

Motor Housing Labels

RA/AZM
J1 J2 J3 J4

DEC/ALT
J1 J3

Electronics Pier Labels

ALT (DEC) Sense

ALT (DEC) Motor

AZM (RA) Sense

AZM (RA) Motor