

Hydraulic Inspection Vehicle Explorer (HIVE) Minnesota Department of Transportation – District 6



General Information:

Waterproof; 4x4 Drive

Wi-Fi transmission

\$1200 vehicle/camera + \$300 tablet

Transported in 11"x17" Box

1/32" SS Recovery Cable

Observed Range

24" Diameter = ~250ft

18" Diameter = ~150ft

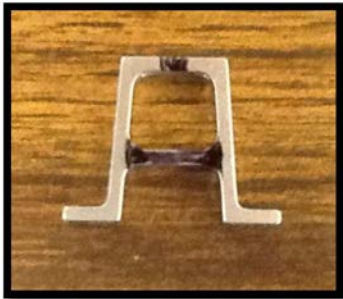
12" Diameter = ~50ft



Off-the-shelf standard servo mount.

Vendor: www.servocity.com

Part # : SVM275-115



Remove shaded material.



One becomes two. These two pieces will be the front mount for the gimbal.



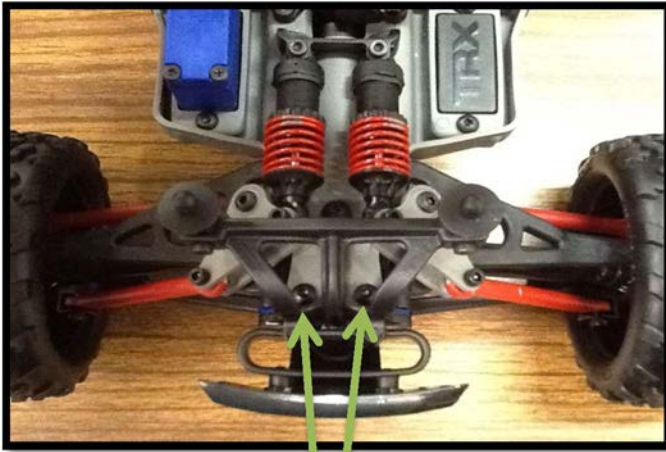
Custom fabricated aluminum rear mount for the gimbal, will be mounted with the stock rear shock screws (shown in the following images).



All the hardware necessary for mounting the first servo:

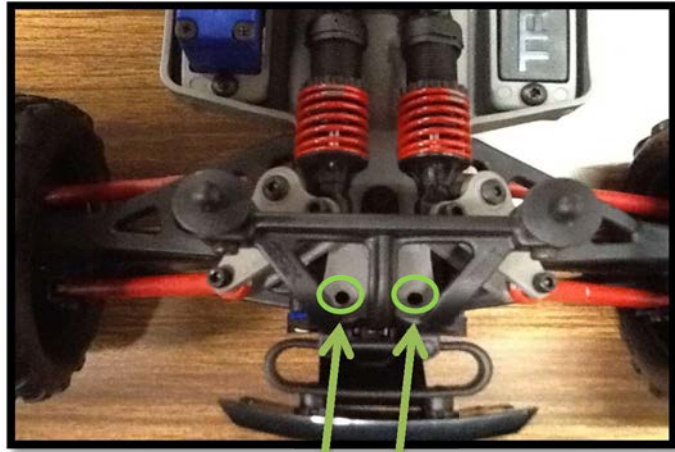
- Front mounts
- Rear mount
- Longer screws for front mount for use with nylon bushings
- 4x screws, nuts, washers for mounting the servo.

Installation: Front Gimbal Servo Mount



Step 1

Remove these screws.



Step 2

Screws removed.



Step 3

Assemble front mount.



Step 4

Install front mount from step 3 where the screws were removed in step 1.



Front mount orientation (reference images only).

Installation: Rear Gimbal Servo Mount

Remove these screws and the plastic shock support.

Step 1

Screws and shock support removed.

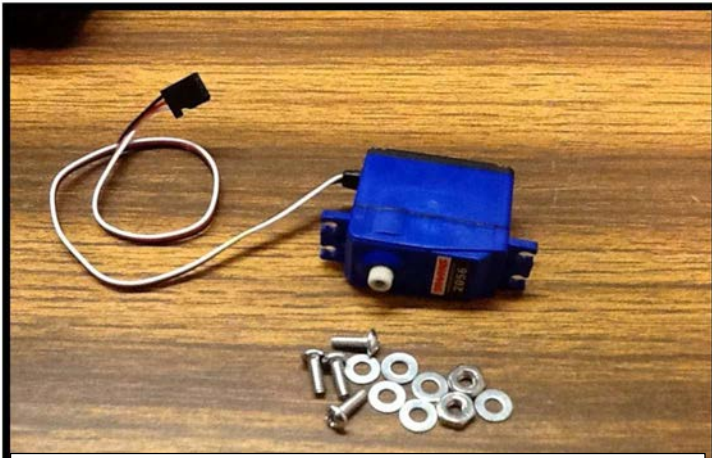
Rear mount & screws for lower gimbal servo.

Install rear servo mount and shocks using existing screws with the supplied Allen wrench.

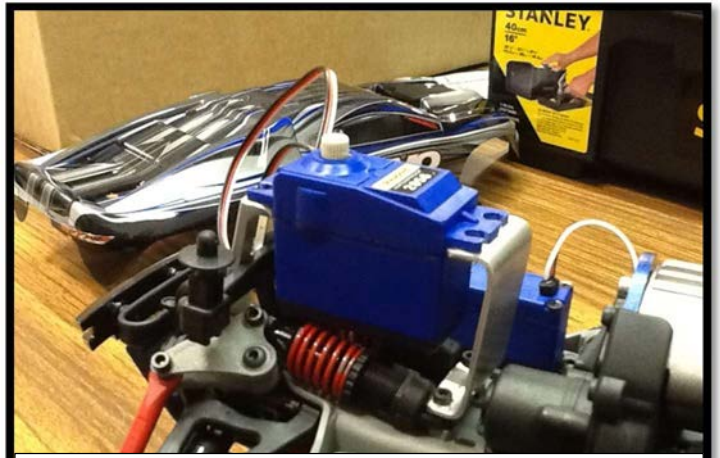
Step 2



Installation: Lower Gimbal Servo



Lower gimbal servo, screws, nuts and washers.



Set servo in place & attach with hardware.

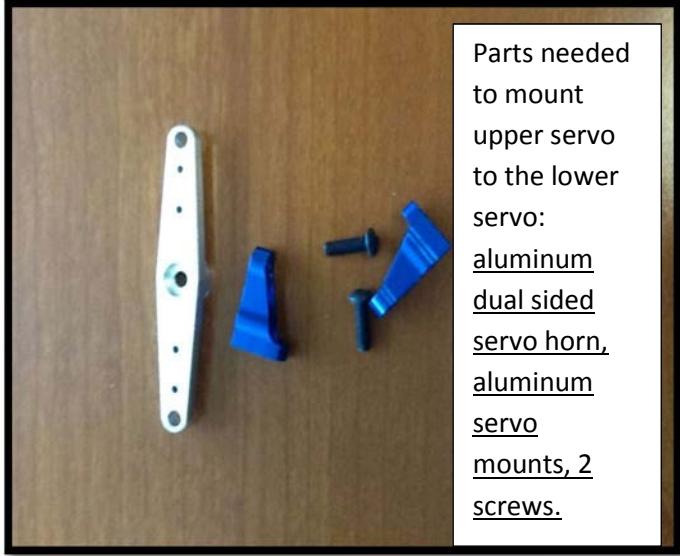
Front view of mounted servo



Side view of mounted servo.



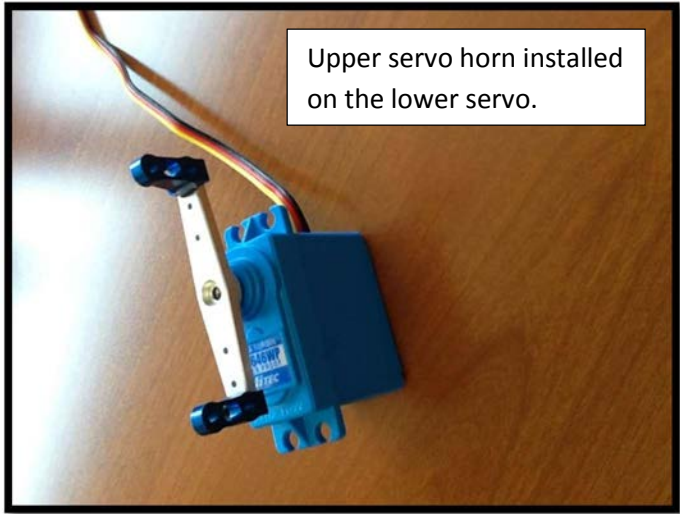
Installation: Upper Gimbal Servo:




Parts needed
to mount
upper servo
to the lower
servo:
aluminum
dual sided
servo horn,
aluminum
servo
mounts, 2
screws.



Assembled



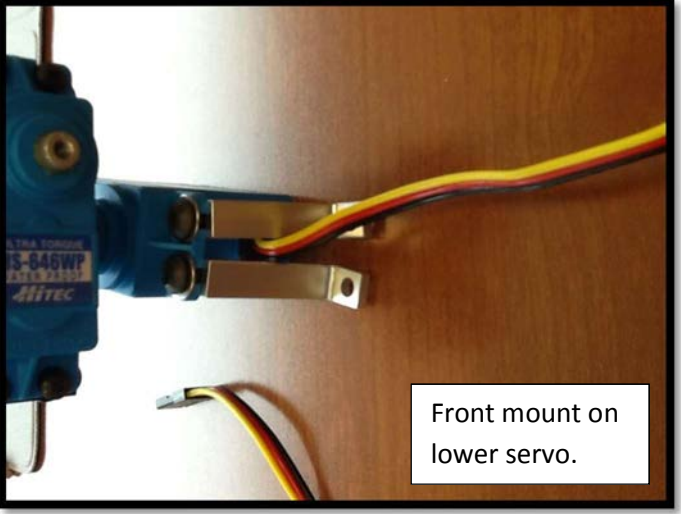
Upper servo horn installed
on the lower servo.



Upper servo
mounted to upper
servo horn. View 1.



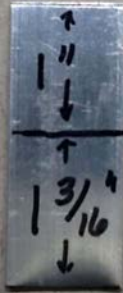
View 2



Front mount on
lower servo.

Camera mount to the Upper Gimbal Servo:

Flat stock aluminum (1" wide) to be bent 90° at the marker line. This will be what mounts to the camera case.



Remove raised portion to flush mount the camera case.



...another view of the portion to be removed



...material removed



...90° aluminum bracket mounted to round servo horn. (view 1)



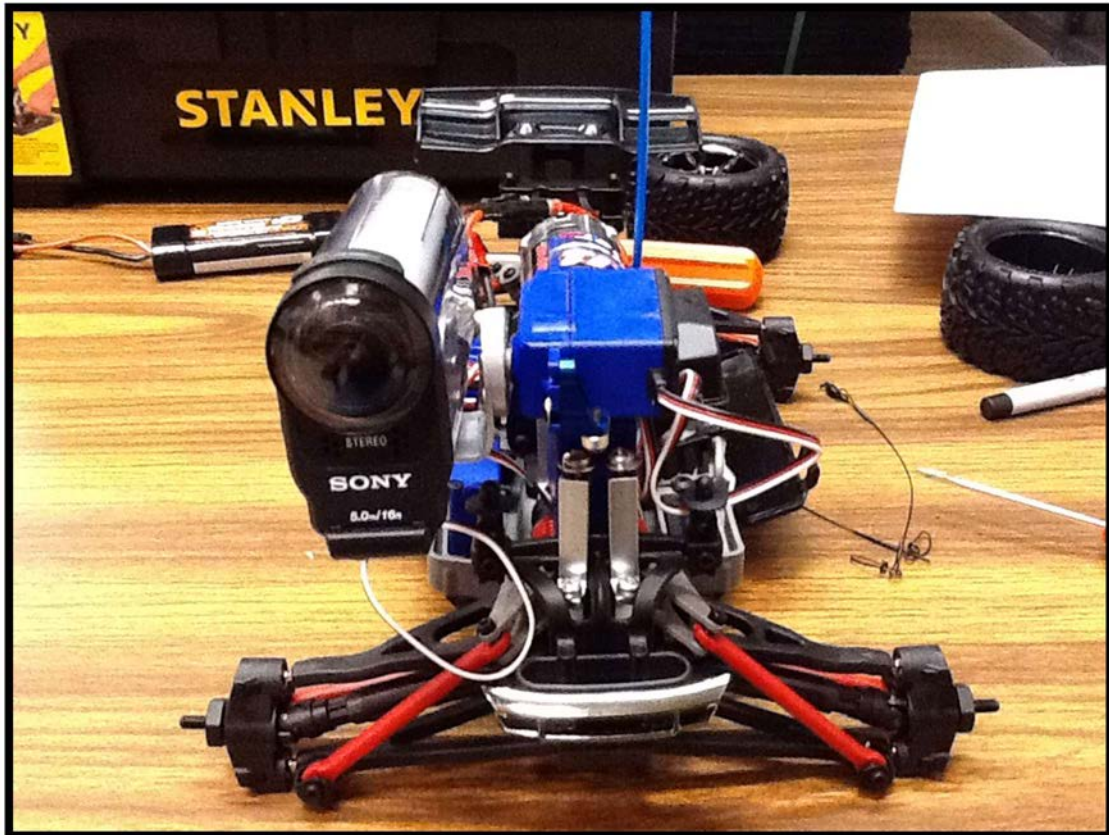
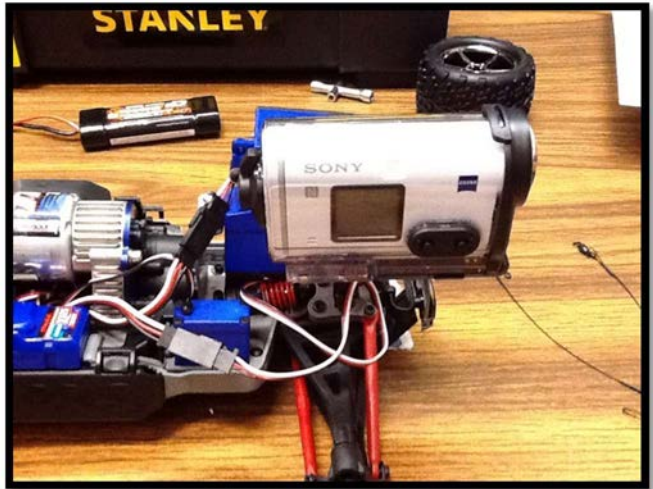
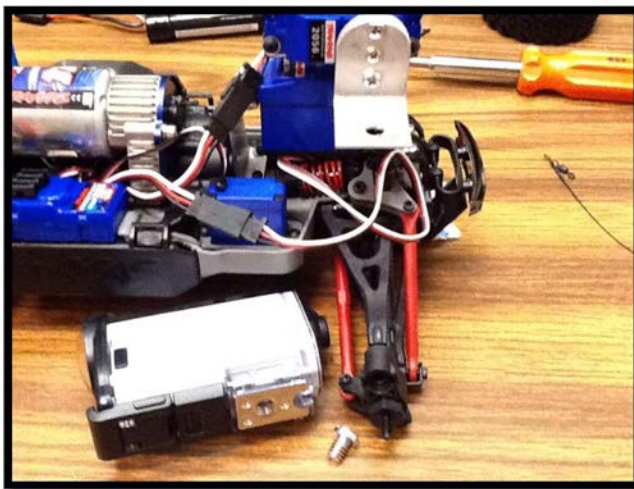
...view 2



Camera mount continued...

The camera will come mounted to a plate in the box with a screw in the bottom where you would mount the camera to a tripod, **retain the screw**, you will need it to mount the bracket from the previous page to the bottom of the camera case, you can discard the packing bracket material from the package.



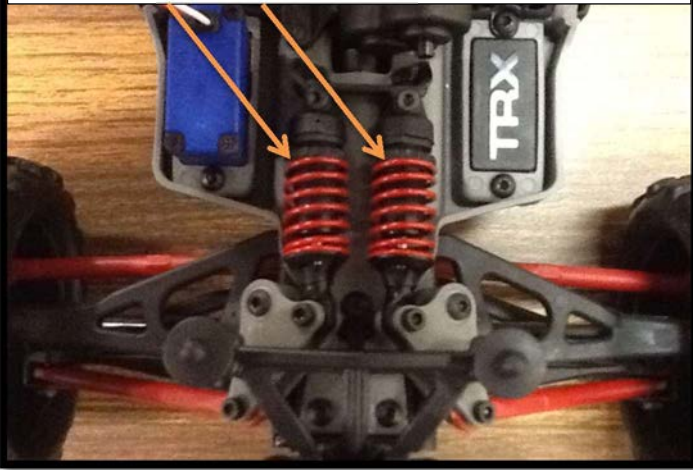




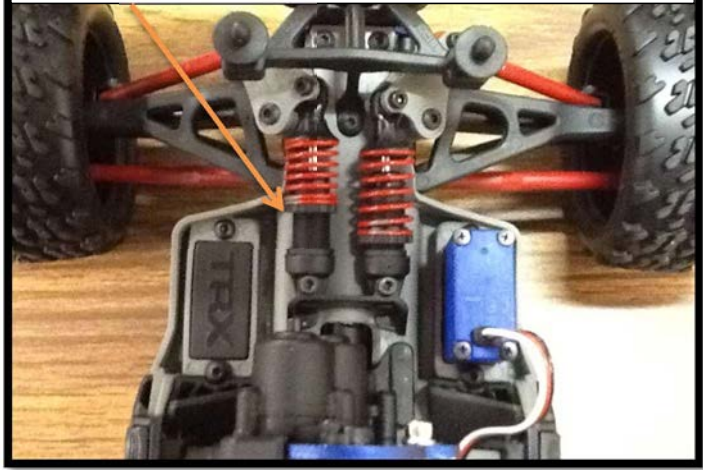
Suspension Adjustment

Prior to the installation of the gimbal and servos the suspension will need to be adjusted to carry the extra weight of the added items. The following pictures will detail the adjustment procedure. Access to the adjusting nuts will still be available with the gimbal installed it's just a little trickier. By compressing the springs they will be pre-loaded to carry more weight.

Adjusting nuts at maximum travel.



One adjusting nut adjusted halfway.



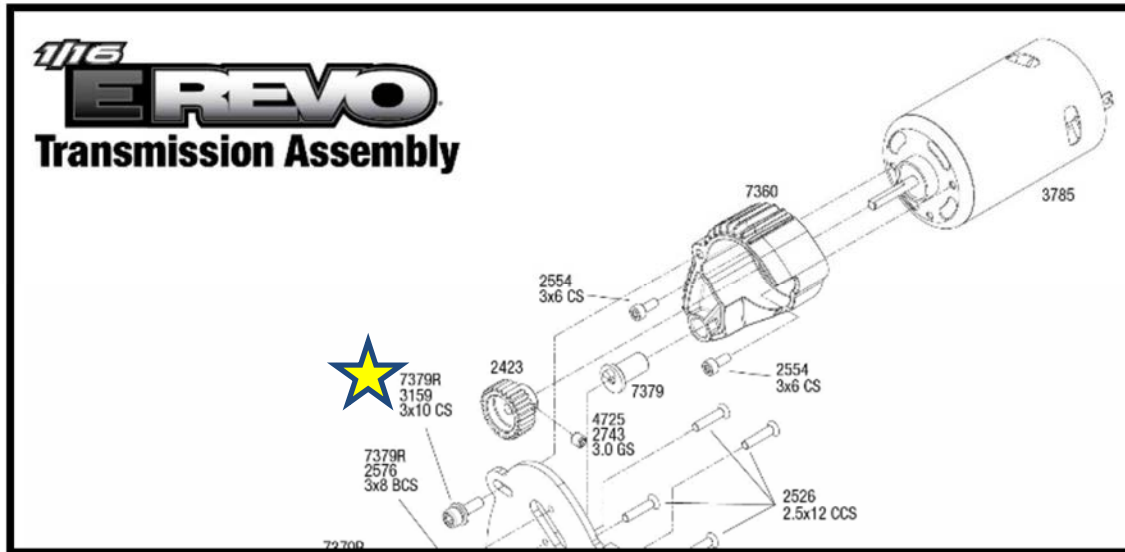
Both adjusting nuts adjusted to halfway.



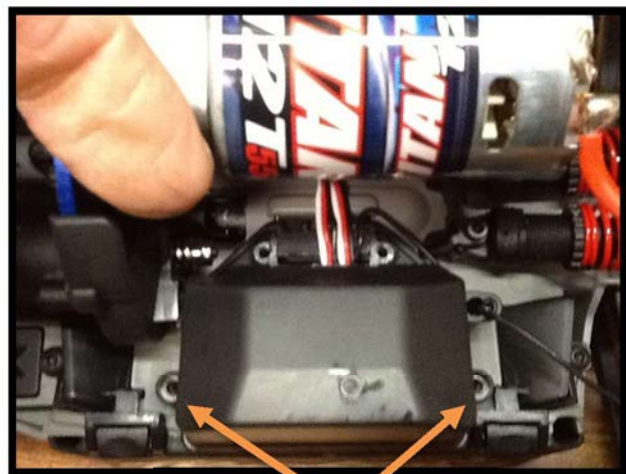
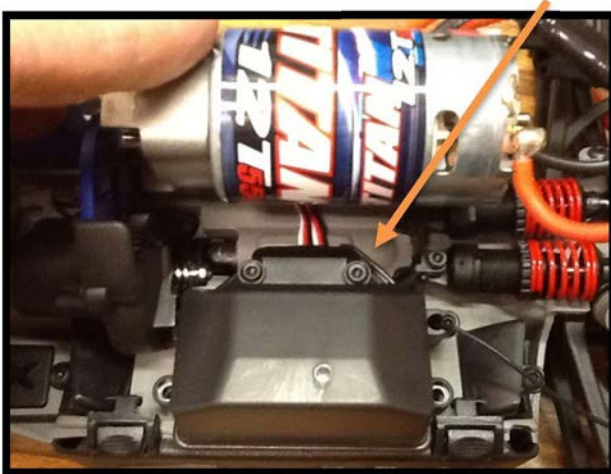
Swapping the electronics:

The original transmitter and receiver do not have enough channels to operate the extra servos in the gimbal so an aftermarket radio system is needed to maintain a single transmitter that will be able to operate the vehicle functions (forward/reverse & left/right) and the camera gimbal functions (up/down & left/right).

- Step 1: Remove the motor to gain easier access to the receiver box and the electronic speed control (ESC). The screw with the star next to it will allow for removal of the motor and motor mount as a unit, also unplug the wires.



- Step 2: Remove the receiver cover and the stock TQ receiver, to achieve this you must first remove the screws that hold the cover on where the wires exit the receiver box.



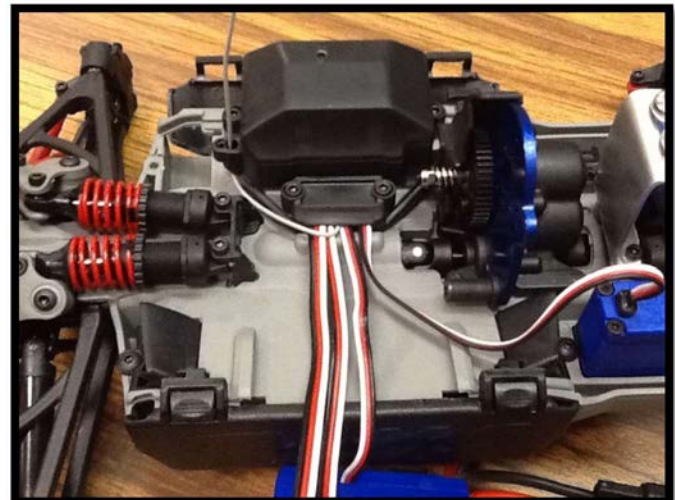
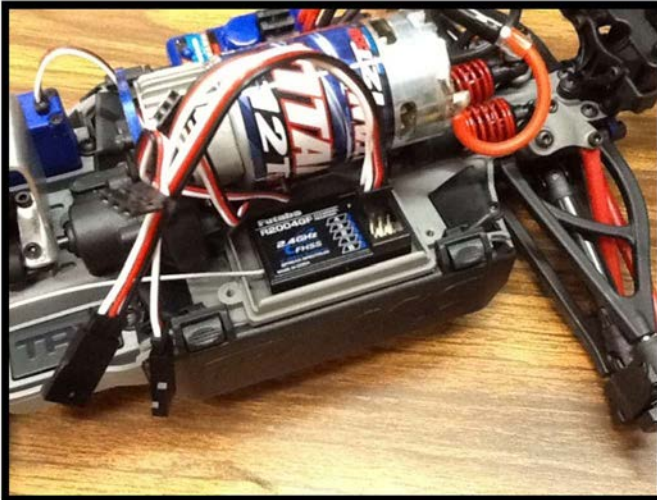
- Step 3: Remove the two screws that hold down the receiver box to the chassis.
- Step 4: Now gently lift the cover to expose the receiver and unplug the wire connectors from the receiver and feed the wires and the antenna wire through the slot on the cover to free the receiver box and set it aside.



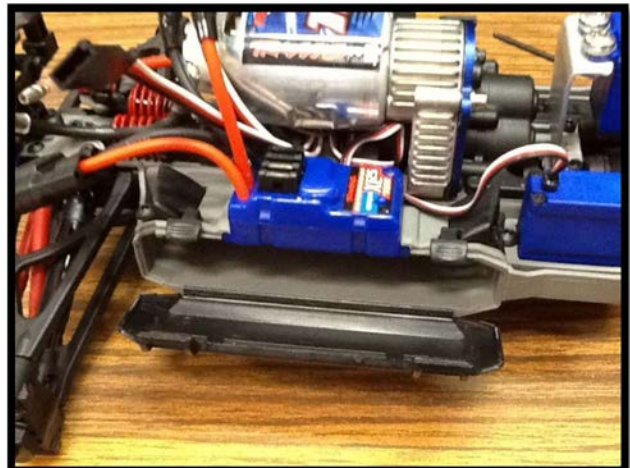
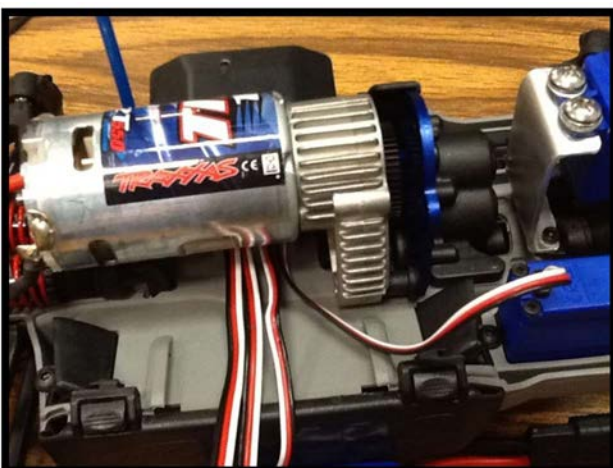
- Step 5: Now that you have the cover off and set aside you'll need to remove the receiver which is held down by two-sided tape. A small flat screw driver gently slipped between the receiver and chassis will allow for safe removal of the receiver. **NOTE: The motor should be removed prior to this step to allow easier access**



-
- Step 6: Install the new receiver with two-sided servo tape in the same orientation as the original receiver.

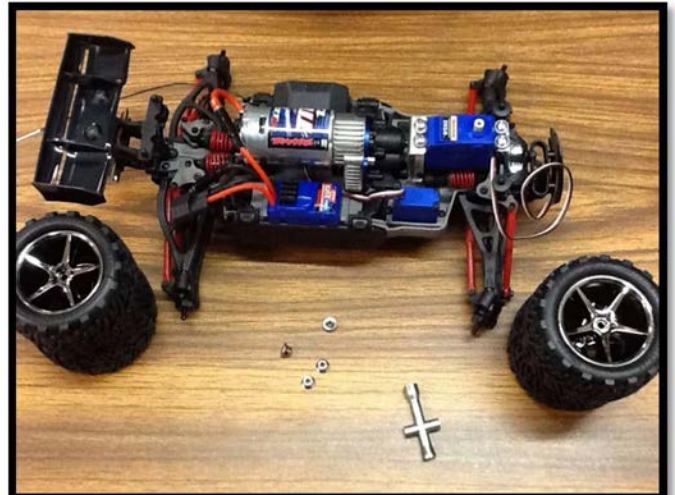


-
- Step 7: With the Gimbal and ESC installed so you have all necessary wires to plug in to the receiver feed all wires through the receiver box cover (including the antenna) and, per the instruction manual included with the receiver, plug in the wire connectors to the proper channel on the receiver.
- Step 8: Tuck extra wire in to the receiver box and install the box cover with the screws that were removed earlier.
- Step 9: Install the small cover over the wires where they exit the box.
- Step 10: Install the motor and set gear mesh



Tire/Wheel Sealing:

- The wheels come from the manufacturer with holes drilled on the inside circumference of the wheel to allow air to pass in and out when the vehicle is in use so that during normal use it won't bounce as much by allowing the air to escape. As much as this is a good feature it really isn't for our use as we will be primarily be in a wet environment and the tires have foam in them to help maintain tire integrity, this foam will soak in water and get very heavy and cause premature wear and sluggish performance. By applying a small amount of Permatex black gasket maker to the holes this will keep the air in and the water out. We aren't worried about bounce due to the low speed we will be operating at, so plugging the holes is a non-issue. A little dab on each hole and the problem is solved.



...continued on the next page.

