

Rock King Crawler Project

Phase 2 Wheelie King Crawler Conversion

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Last month we explained some rock crawling basics and even completed a Phase 1 Wheelie King crawler conversion that put us out on the rocks in a hurry. Facing the facts, the stock Wheelie King's wheelbase and high rearward CG (center of gravity) isn't the best for a crawler, we need a longer & wider chassis, a different CG, more power, more articulation and better traction like real rock crawlers. Since last month, I have spent my time morphing our Phase 1 HPI Wheelie King into a sloth-like competition level rock crawler through a lot of trail and error, but it was not easy.

Previously Completed Phase 1 Conversion

1. Remove the rear sway bar
 2. Reverse the tread pattern on the wheels for better traction
 3. Remove the wheelie bar
 4. Installed RCGUY.com diff lockers
 5. Kimbrough 66T 32P Spur for Associated trucks #249
 6. Robinson Racing 9T 32P pinion #0090.
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Build Research

Knowing I would cook up some custom fabricated crawler, Stephen made things rough by mandating a zero fabrication build that anyone could complete – OK, so not a bad idea. Though minor Dremel tool modifications were allowed, I could not so much as drill a hole in the chassis.

Attempting to consolidate down all the great crawler ideas into one easy build took some time. I canvassed forums and looked at hundreds of crawler-winning designs, played around with a plethora of shock placements, shock-tuning changes, and nominal weight & CG changes on the Wheelie King. My efforts identified a combination that drastically increased articulation by nearly double of other standard conversions and significantly improved crawling capabilities. As you can see from the scrapes on my crawler, this process took a lot of trial and error. Without cutting, drilling, or fabricating, the result was an innovative, durable, and easy build that transformed a Wheelie King into a competitive Rock King with almost 90 degrees of un-forced competition level articulation with a mind twisting CG that was oh-so-fun to drive.

Stripping Parts

Before we get into stretching the stance of our Wheelie King, I am going to make a few odd changes - just stay with me. The steering linkage side of the chassis was removed and allowed the removal of the servo and all the steering linkage except the front steering carrier links. The receiver was removed and retained for the build but the ESC, motor, and servo mount/brace will be swapped for upgraded parts.

More Power

The stock ESC would work just fine to power our low turn motor, but... since I received a pre-shipment Tekin FX-R-Pro, I couldn't wait to play around with Tekin's new feature rich 12-turn limit reversing ESC. The Tekin ESC delivers a full 6V 3Amps BEC output to make our high torque servo move with authority and pushed more power to an upgraded super torquey Axiom 85T V10 crawler motor. The FX-R-Pro also has a handy on-board temperature indicator and eleven drag brake settings to limit backward rolls during crawling.

Before installing our new Axiom motor, the motor's brushes were pulled, the end bell screws loosened and the can end was rotated 180 degrees to allow the motor to run in reverse for an upgrade step later. I used my lithium powered Dremel with one of the new Plastic EZ-Lock cutoff bits to remove the ESC tabs on top of the battery compartment. This provided a flat mounting surface for both the stock receiver and new Tekin ESC to be safely Velcro'ed on top of the battery compartment. The motor was connected up with Trinity Golden No Solder motor leads, but the bullet connectors were removed and the wires soldered directly to the Tekin ESC and the battery wires were tipped with Dean's Ultra-Plugs. For non-fading, super durable, lightweight and high current power, a slim A123 Racing 6.6V 2200Mh Lithium-Ion pack replaced the old school NiCd 1500Mh stock pack.

Phase 2 – Wheelie King Crawler Parts List

- ? 2 sets (4 total) Traxxas T-Maxx Turnbuckles 116-118mm #5139
 - ? 1 set (2 total) Traxxas Half Shaft Drive Shafts #4951X OR HPI E-Savage Drive Shafts #82008
 - ? RCGUY.com WK diff lockers
 - ? 1 RCGUY.com WK Servo relocation plate
 - ? Axiom 85T Crawler Motor
 - ? RPM Narrow Crawler Wheels with ½” offsets
 - ? Pro Line Moab Tires
 - ? 1 Cup Airsoft BBs
 - ? 1000wt Silicon Diff Fluid
 - ? Tekin FXR-PRO ESC
 - ? Trinity Golden No Solder motor leads
 - ? Deans Ultra-Plug Connectors
 - ? A123 Racing 6.6V 2200Mh Lithium-Ion Pack
 - ? High Torque Steering Servo
 - ? StampedeProject.com Decals
 - ? Fuel Tubing for shock limiting
 - ? 12 – 3mm locknuts
 - ? 4 – 3mm x 15 machine screws
 - ? 8 – 3mm X 30 machine screws
 - ? 24 or so – 3mm Flat washers
 - ? 4+ - Shock limiters or pistons for spacers
 - ? 2 – Traxxas grub screws #3962
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Locking and Stretching

We already installed the RCGUY.com diff lockers last month in Phase 1, however if this step was not completed this would be the point where you would dis-assemble and lock the differentials to guarantee traction. The short and narrow stance of a stock Wheelie King is definitely way under USRCCA 2.2 Class 12.5” wheelbase and overall width limits. Stretching and widening that stance will deliver a much more competitive and capable crawler and it’s easy by recycling some stock parts and using a few E-Maxx links and axels.

Link Stretch

There are several ways to stretch the top link on the chassis, however the best option is to retain the existing single point top link connection. A very simple solution is to unscrew the top link from the axel pivot and lengthen it using the stock lower link cross brace and the grub screws. The pivot balls were trimmed off of each end of the braces then those braces were used as top link extensions and then screwed back on like the stock upper link. It’s good to trim these on the longer side and then trim back material later on – I made that mistake and had to add a few shock pistons spacers at one end to point the axels upward correctly.

The lower links were swapped out with the longer Traxxas 116mm replacements and connected in the stock location. To connect up to the axels, I rotated the stock suspension stays 90 degrees with the top of the stays now facing away from the vehicle and positioned them so the inside of the stays lined up with the inside of the chassis. This change provides better clearance, a smoother snag free under carriage and an extra stretch to the chassis.

Shock Tuning

On any crawler you want a slow responding suspension and 1000wt diff fluid is becoming popular. Ideally, I would have been able to tweak the front and rear shock placement, however since this is a no drill build, I elected for a hybrid solution where the front shocks were attached in an inverted “droop” setup and the rear were sprung to maintain chassis clearance. A “droop” suspension allows a very low center of gravity and maintains articulation, but allows the suspension to extend/”droop” to gain traction when you high-center on an obstacle. Although I even tested 5000wt fluid, the front shocks were simply filled with a “lighter” 1000wt fluid, ½” of fuel tubing added as shock limiters, inverted and mounted as shown. The rear shocks received the same treatment, but the stock springs were installed with a large pre-load spacer added on the right shock. This setup took the bounce out of the suspension, prevented rapid chassis movements and torque twist in all but the worst climbs – it added up to a ton of stability on the rocks.

All shocks were mounted at the axel inside the suspension stays with the lower links mounted to the inside. The front and rear shocks were mounted up top as shown into existing holes with the help of some spacers. There

mounting locations were different from the stock location and greatly increased overall articulation. For the new longer wheelbase, the drive shafts were extended with the E-Maxx replacements with about 3/8" trimmed from each male and female shaft end to allow for full articulation.

-----Call Out-----

Rock King Build Tips

- ? Moving shock placement inward at the top softens the suspension and increases articulation.
- ? Heavier weight shock oil or even diff fluid in the shocks improves performance.
- ? Cut tire foams in an eight-pointed star pattern greatly increases traction.
- ? Cut front tire foams in a V pattern and add ½ cup airsoft BBs per tire improves traction and lowers CG.
- ? A 55T motor may be a little fast in the WK – the 85T Axiom worked great and allows for faster gearing.
- ? Adding a large spacer to each shock on the right side to combat torque lean.
- ? RCGuy.com diff lockers and servo mount plate make things easy.
- ? RPM's crawler wheels & Pro-Line Moabs greatly improve traction

Center of Gravity

We have corrected a number of issues, but CG is still painfully rear biased. To change this we are going to make the front of the truck the back and the back the front to move the battery and motor weight over the front of our crawler. This requires moving the rear steering linkage lockout to the old front of the Wheelie King and mounting a RCGUY.com Wheelie King Steering Servo Plate on the old back axle. Situating the upgraded 160oz hi torque servo over the axle with this simple plate lowers and improves CG further and the extra servo torque makes maneuvering much easier. The only modification is a simple trim with a Dremel tool to allow the plate to sit flush at the end of the axle. The truck is now running backward, however earlier we rotated the end bell of the motor 180 degrees so that the motor and transmission will now run in reverse. All this turning and swapping exponentially improved the crawling ability of the Wheelie King. Now instead of popping a wheelie and flipping on anything over a 45 degree incline, our Phase 2 crawler will stay stuck to the rocks at near vertical climbs.

Tire Tweaking

From last month's article we know that thinner wheels balloon up the tires and increase traction. RPM's new 2.2" narrowed and wide ½" offset crawler specific wheels do just that when paired with a set of sticky Pro Line Moab tires. Before we glued the Moab's on the narrow RPM crawler wheels, I performed some foam and wheel tuning tweaks top crawler competitors use. The front foams were cut into a wedge pattern to allow the 4oz. (about ½ a cup) of 6mm airsoft BBs added to each tire to move freely and greatly lower CG. With this trick, a lot of weight is always at the bottom of the tire. The rear foams were cut in a standard star pattern to improve traction and grip. With those tweaks and the reversing the tread trick, the front and rear tires now deform easily and can find grip on almost any surface.

Leaks & Tweaks

You may notice one leaky shock received a Traxxas aluminum shock cap and new seals the others were not leaking so I left them alone. Final changes include screwing the antenna mount to the new rear shock mount and tucking the antenna under the front body mount for protection. The body was also trimmed to provide room for all the new articulation and the lower side body panels were bent inward to limit snagging on rocks...and you will notice we also added "a few" decals to the body.

-----Call Out-----

Rock King Specs

Wheelbase: 12.4"
Overall Width: 12.25"
Weight:
Height (at rest):
Weight Bias: 80% Front
Motor: Axiom 85T V10
Gearing: 9/66 32P
Battery: A123 6.6V Lithium-Ion
ESC: Tekin FX-R-Pro
Wheels: RPM Crawler ½" Offset
Tires: Pro-Line Moabs

Final Testing & Conclusion

Although a ton of testing lead up to our final testing, it was all worth it. The Phase 2 conversion transformed the Wheelie King into a competitive rock crawler with surprising capabilities with almost 90 degrees of free articulation and proved versatile enough to tackle almost any terrain. The Rock King performed very well on the variety of rock piles I tackled and cleared all but the most challenging courses – this chassis would be very competitive in the right hands. There a couple changes I would have liked to make such as swap out the flexible plastic steering links with metal, and a custom shock mount would have been appreciated from a tuning perspective, but those would have required fabrication – maybe in a future article.

The more experience I have with rock crawling the more I love it. Playing around with tons of different ideas really brought back feelings that I have not had since I re-entered RC. Watching something I created clear an impossible obstacle is a great feeling, a feeling I think is almost lost in today's spectacular quality RTR RC world. Transforming a humble Wheelie King into a truly competitive Rock King crawler with amazing articulation... well, it was just cool. You really can't explain what it is like to watch and recover from a perfect vertical balance or picking a line and watching your crawler perform mind-blowing maneuvers. Building a crawler is almost as fun as driving one and I had a great time engineering and completing this build. Although I used widely available bolt on parts in the two conversions, a little homemade part fabrication will deliver a truly custom pro class rig with tons of tuning capability. Want to see how to make custom chassis, let Stephen know and I'll whip one up in a future article. If you are looking for an inexpensive way to get into crawling, the HPI Wheelie King is becoming one of the hottest crawler build platforms and with the exception of the crawler motor and diff lockers, you might already have parts sitting around to complete most of the build. See you on the rocks...

Sources: HPI – www.HPIRacing.com, Axiom Motors – www.AxiomMotors.com, RC Guy – www.RCGUY.com, Tekin – www.TeamTekin.com, RPM Racing – www.RPMRCProducts.com, Traxxas - www.Traxxas.com, Pro Line – www.Pro-LineRacing.com, Deans – www.deansplugs.com, MaxAmps – www.MaxAmps.com, Custom Decals - SupersportUSA.com