

# PANTERA

## *Electric Prop Jet ARF*



**SPEED FREAK**

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**Greetings and congratulations on your purchase of the SPEED FREAK PANTERA! The PANTERA is the second release from SPEED FREAK and is built around the Xpwr T3520, the same motor that powers the Outlaw to ballistic speeds!**

**The Pantera is rock solid and tracks like a pattern plane. It is capable of performing graceful big sky aerobatics and is very easy to fly and land. It is NOT a model for performing 3D aerobatics and has been designed with small control surfaces to minimize the potential for flutter during maximum speed flight. Close attention must be paid during linkage setup to maximize mechanical advantage and minimize throws. Sealing the control surface gaps is a must! We are pushing the airframe, power system and guidance components hard and must make sure they are properly utilized and looked after to achieve and maintain maximum performance. Please pay close attention to the steps in this assembly manual, especially those steps regarding linkage and power system setup.**

**The Ultracote/Oracover color used on these models are as follows:**

**Red/White/Blue scheme-Midnight Blue HANU885 (Oracover Dark Blue #52), True Red HANU866 (Oracover Ferrari Red #23), White HANU870 (Oracover White #10), Black HANU874 (Oracover Black #71) and Silver HANU881 (Oracover Silver #91)**

**Blue/Yellow scheme-Midnight Blue HANU885 (Oracover Dark Blue #52), Bright Yellow HANU872 (Oracover Cadmium Yellow #33).**

**Tips for Success:**

- 1. Before starting assembly, take a few minutes to read the entire instruction manual to familiarize yourself with the assembly process.**
- 2. Please take a few minutes and go over all the seams on the aircraft with a covering iron on a medium heat setting.**
- 3. Use a fresh bottle of thin CA with a fine glue tip when attaching the CA hinges. This will ensure that the proper amount of CA wicks into the hinge and surrounding balsa wood and creates a proper bond between the wood and hinges.**
- 4. Apply a couple drops of CA to high stress areas such as anti-rotation pins, landing gear mounts, servo trays and motor box joints .**
- 5. When applying decals, first clean the area where the decal will be applied with alcohol. Mist the area lightly with Windex before applying the decal which will allow you to properly position it, then use a rubber squeegee to push all of the liquid from under the decal. This will result in very few air pockets trapped under the decal.**
- 6. Take the time to properly balance and trim your aircraft and set up rates and exponential values. Your flying experience will be greatly enhanced by doing this.**
- 7. While we supply the best quality CA hinge that is available to us on the Asian market, we highly recommend an upgrade to the Radio South CA hinges. For less than \$3.00 you can put the best CA hinges available in your model, certainly a worthy upgrade! Be sure to add a set to your next order!**



## Control horn identification



**Elevator horn**



**Aileron horns**



**Rudder horn**

## Pushrod Identification

The 3 shorter pushrods are for the aileron and elevator linkages



The long pushrod is for the rudder linkage

### **Items needed for completion**

- Masking tape**
  
- Hobby knife with #11 blades**
  
- Fresh bottle of thin and medium CA and tube of Goop contact cement.**
  
- Blue Loctite.**
  
- Electric drill with an assortment of small drill bits.**
  
- Small flat head and Phillips head screw drivers.**
  
- Standard and needle nose pliers.**
  
- Metric balldriver or allen key set.**
  
- 4 micro metal geared servos. All flight testing was performed with Hitec HS-70MG servos.**
  
- Xpwr T3520 Brushless Outrunner motor.**
  
- Castle Creations Talon 90 ESC**
  
- 6S 3300-4000 mah high C rated LiPo battery.**
  
- APC-E 9x9 propeller.**
  
- 52mm Extreme Flight spinner.**
  
- 2 Extreme Flight 28awg 18"extensions for the 2 rear servos and 2 6"extensions to go between the receiver and the aileron servo leads.**
  
- Adhesive backed Velcro and Velcro strap.**
  
- Blenderm tape for sealing the hinge line gaps. Also sold as Dubro Hinge Tape part #916.**

**Let's begin!**

**1. Locate the 2 wing panels with ailerons as well as the 2 G10 aileron control horns and base plates. Make sure the hinges are centered between the wing and aileron and secure with thin CA. Make sure the hinges are secure by tugging on the aileron once dry.**

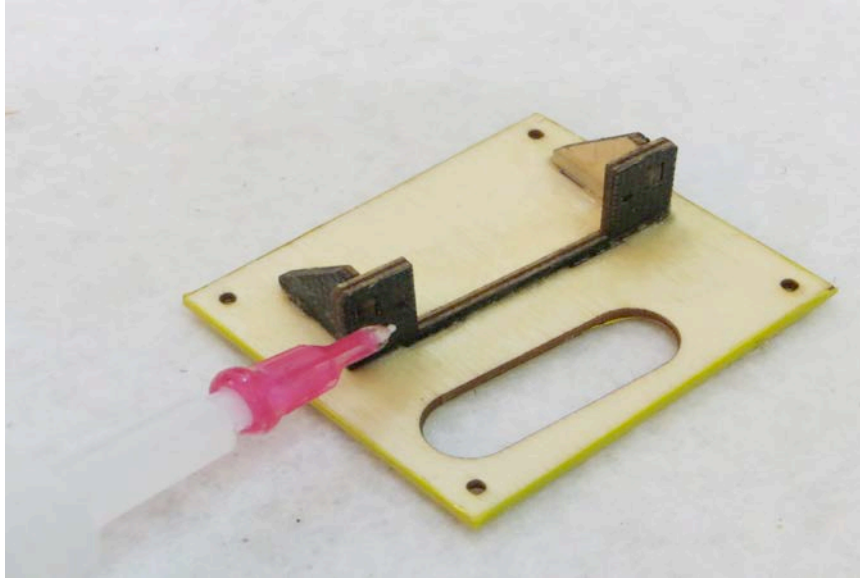


**2. Scuff the portion of the control horn that will be glued into the aileron with sandpaper. Use a glue tip on your bottle of medium CA and apply glue to the slot as well as to both sides of the control horn. Insert the control horn into the baseplate and then into the slot and make sure it seats properly against the surface of the aileron. Wipe away any excess glue with a soft cloth or paper towel soaked in Acetone.**

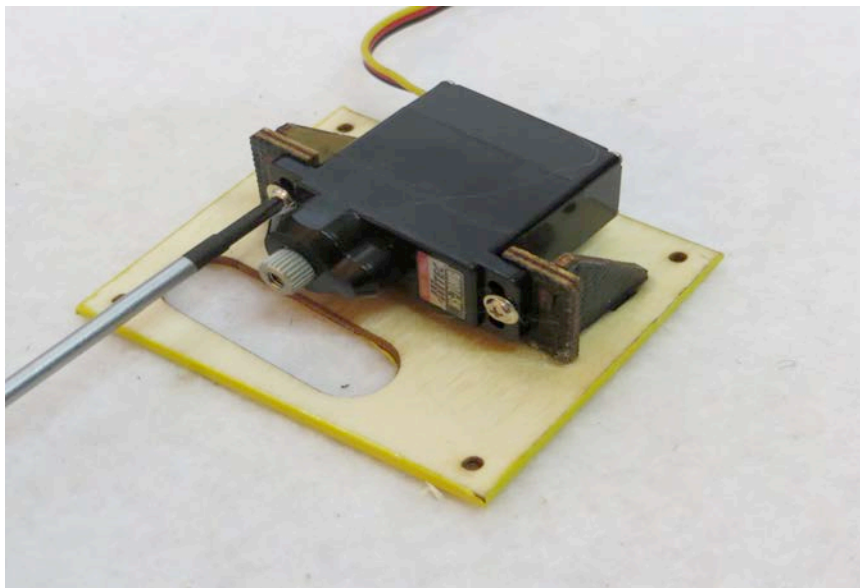


**3. Seal the hinge line gap using Blendederm tape. Flex the aileron to maximum deflection and apply a strip of tape the length of the aileron to the hinge line, making sure it adheres to the bevel and still allows the aileron to deflect properly. DO NOT OMIT THIS STEP!**

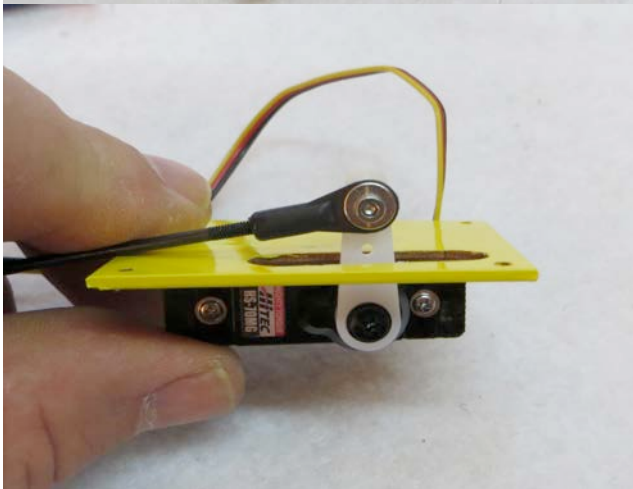
**4. Remove the aileron servo hatch. Apply a few drops of thin CA to the servo mount.**



**5. Install the servo as shown with the output spline centered in the slot.**

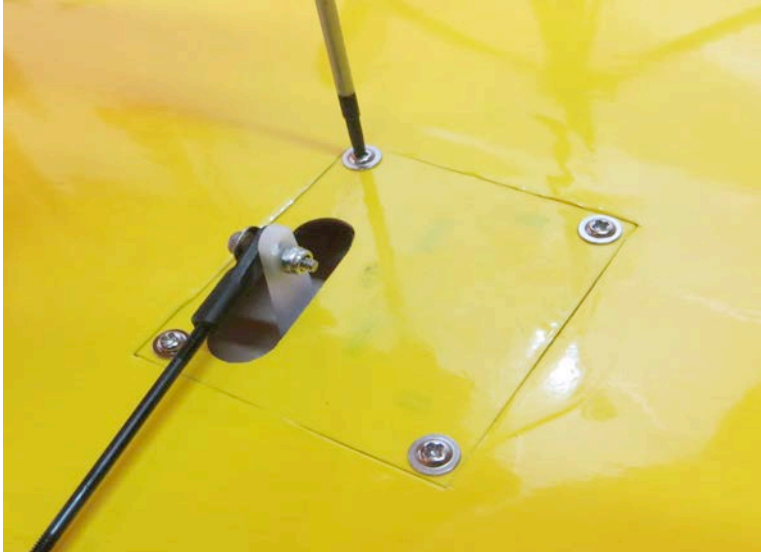


**6. Electronically center the servo and install the servo arm. Locate the aileron pushrods, ball links and linkage hardware. Assemble the linkage as shown and connect it to the servo arm with the supplied 2mm bolts, washers and nuts. An electric drill make installation of the ball links onto the pushrod much easier, just be careful not to go too far and damage the ball link. Notice we are using the 2nd hole in from the end of the servo arm. Again we are striving for maximum mechanical advantage.**





**7. Feed the servo lead through the wing and secure the aileron servo hatch with 4 wood screws. Run the screws into their holes and then remove them and the hatch and apply a couple drops of thin CA to each hole. Once dry reinstall the hatch and screws.**



**8. Attach the pushrod to the G10 control horn using a 2mm bolt, washer and nut. Be sure to adjust the length of the pushrod so that the aileron is in the neutral position when the servo is centered.**



**Repeat this process for the other wing half.**

**8. Locate the 2 piece carbon fiber main landing gear legs, 2 axles, 2 locking nuts, 2 wheels, 2 wheel collars, 2 wheel pants and 2 landing gear mounting bolts and washers from the hardware package. Place the threaded portion of the axle through the hole in the carbon gear and screw the lock nut onto the axle, but do not tighten completely. Place the wheel onto the axle and secure with a wheel collar. There is a slot pre-cut in the wheel pant to allow it to fit over the axle. Before installing the wheel pant place a drop of silicon based glue onto the wheel pant just above the pre-cut slot. This will prevent the wheel pant from rotating, but allow it to move in the case of a mishap which may help to prevent damage. Slide the wheel pant into position over the axle and tighten the nut on the axle, taking care to make sure the wheel pant is positioned properly. Repeat this process for the remaining wheel pant. Again this is probably better explained in the following series of pictures.**





**9. Insert the gear leg into the slot on the side of the fuselage and secure with 2 3mm bolts and washers, making sure to put a drop of blue Loctite on the bolt before installing. Repeat for the other gear leg.**



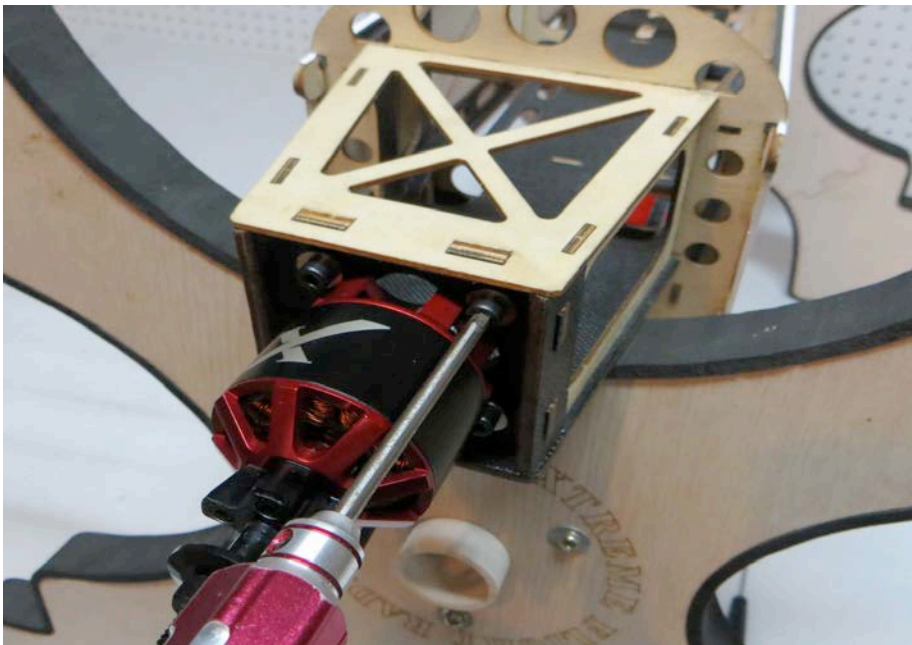
**10. Prepare the Xpwr T3520 for installation. Install the radial mount using the provided tapered Philips head screws. Apply a drop of blue Loctite to each screw. You will also need to solder on the larger bullet connectors provided with the Talon 90 ESC.**



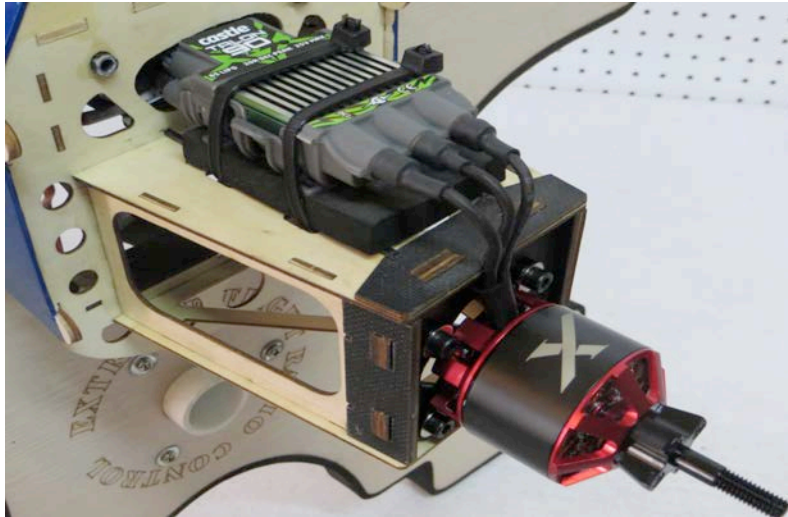
**11. Install the prop adapter using the provided socket head cap bolts, again using blue Loctite on each bolt.**



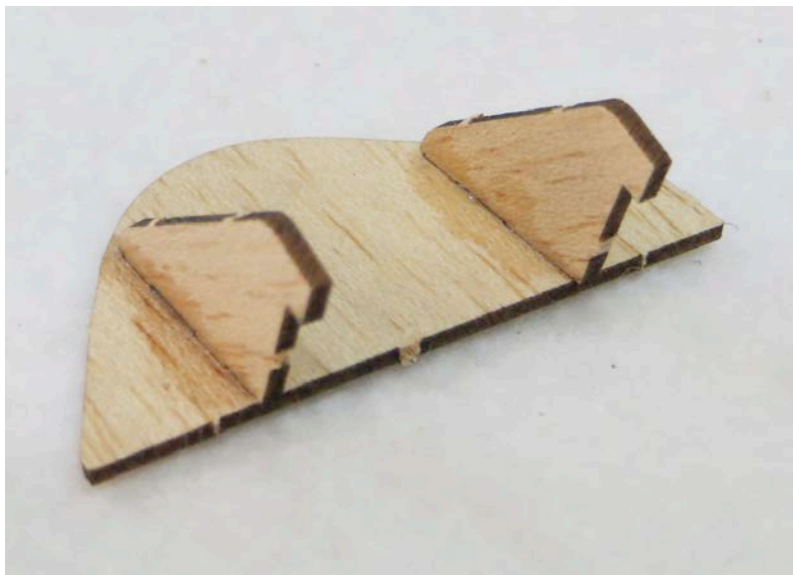
**12. Install the motor on the front of the motor box using the provided 4mm socket head cap bolts and washers inserted through the radial mount and into the pre-installed blind nuts in the firewall. Don't forget the blue Loctite!**



**13. Mount the Castle Creations Talon 90 ESC to the bottom of the motor box with nylon zip ties or a Velcro strap. I like to place a piece of dense foam under the ESC to dampen any vibration. Insert the bullet connectors into the receptacles on the ESC.**

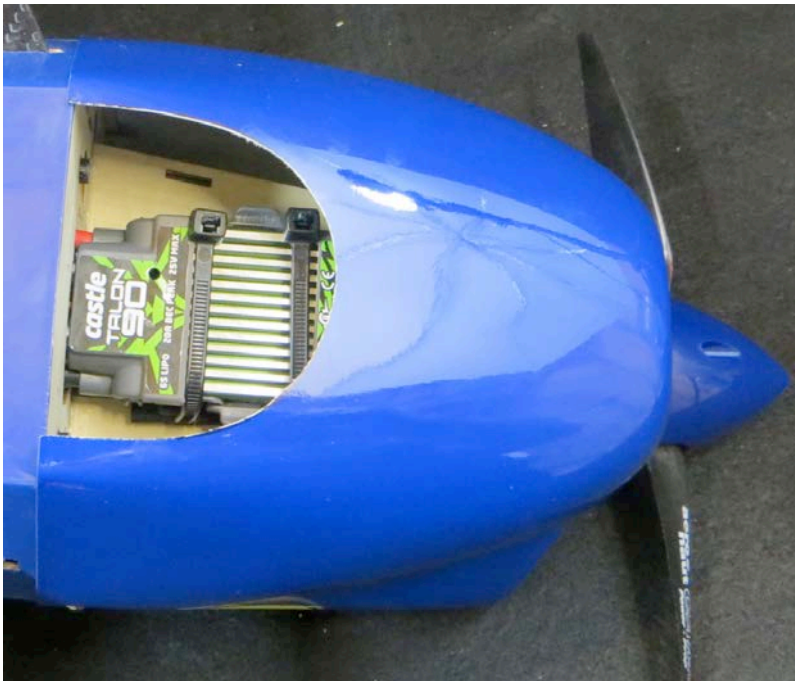


**14. Assemble the provided balsa baffles and install them on the sides of the motor box as shown with medium CA. You may have to trim the baffles slightly for proper fit. DO NOT OMIT THIS STEP! We will be pushing this power system hard and need to provide adequate ducting for cooling air to reach the motor as well as for the heated air to exit.**

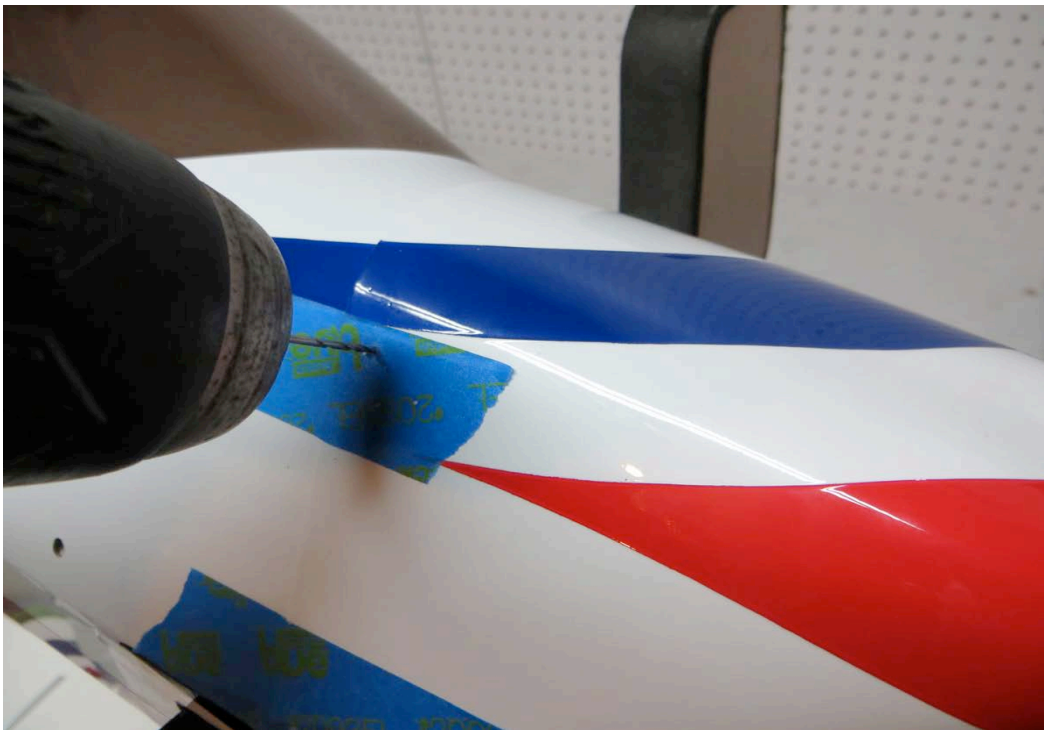




**15. Open an exit hole in the bottom of the cowl before installing it to allow air to exit after cooling the motor and ESC. THIS IS VERY IMPORTANT!**

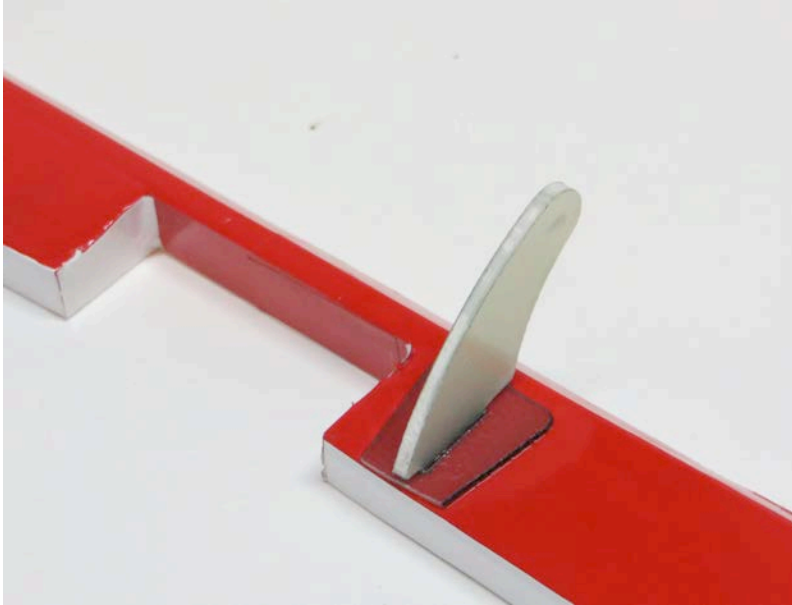


**16. For quick, easy and accurate mounting of the cowl we recommend the following method. Tear 4 short pieces of masking tape from a roll. Place each piece of tape on the side of the fuselage so that each piece corresponds with one of the 4 cowl mounting tabs. Use a fine tipped marker to mark the location of the center of each mounting tab. Roll the tape back and slide the cowl into position. Install an Extreme Flight 52mm spinner onto the motor shaft for reference and once satisfied with the cowl position roll the tape back into place and secure the cowl. Use a 1/16" drill bit to drill a hole at the location of the dot on each piece of tape. Remove the tape and secure the cowl with 4 of the included small wood screws that have integrated washers. Very simple! Now install the prop and spinner.**





**17. Remove the covering over the right slot on the bottom of the elevator. Scuff the portion of the control horn that will insert into the elevator with sandpaper. You may also need to trim the rear of the baseplate to match the elevator as shown. Slide the horn into the baseplate and secure the control horn with medium CA.**



**18. Slide the elevator onto the hinges in the stabilizer and secure with fresh thin CA. Be sure to leave as small a gap as possible between the elevator and stabilizer. Once dry tug on the elevator to make sure it is secure. At this time seal the hinge line gap as you did for the ailerons with Blendederm tape. Once again, DO NOT OMIT THIS STEP!**



**19. Insert the stabilizer into its slot and the carbon fiber wing tube into the its sleeve. Use a ruler to insure that the stabilizer is centered in its slot and compare the stabilizer to the wing tube to make sure it is properly aligned. Sand or shim the slot if necessary to ensure proper alignment. Secure the stabilizer with CA.**

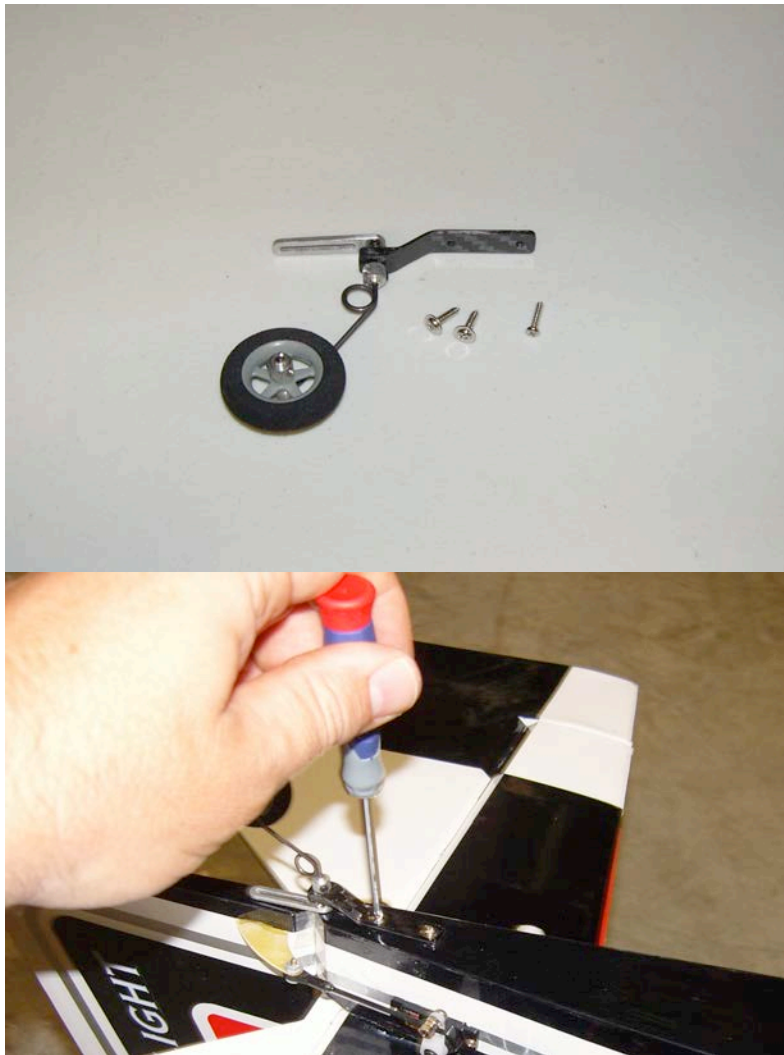


**20. Remove the covering over the slot in the lower right side of the rudder where the rudder control horn will be installed. Scuff the portion of the control horn that will glue into the surface and slide it through the baseplate. Secure the rudder control horn with medium CA.**

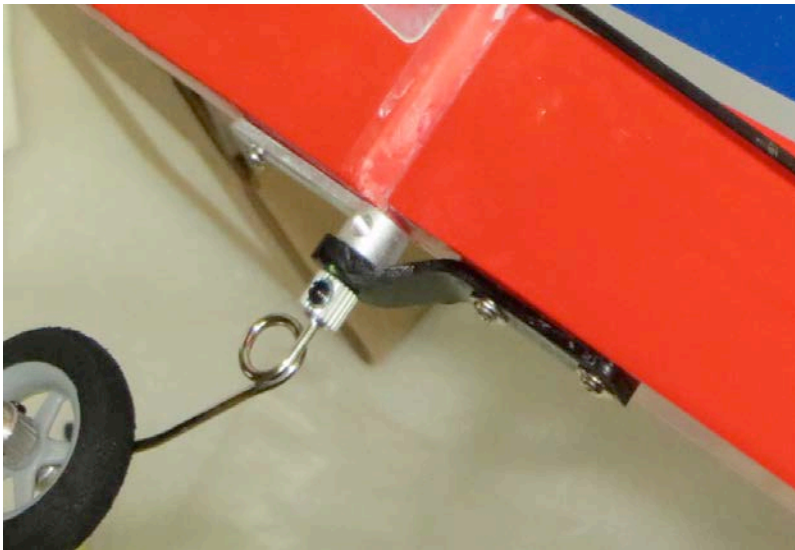


**21. Using the same process as with the ailerons and elevator, slide the rudder onto the hinges and secure to the vertical stabilizer with thin CA. Seal the hinge line gap with Blendederm tape.**

**22. Locate the carbon fiber tailwheel assembly in the hardware package. Remove all of the set screws, apply blue Loctite, re-install and tighten. Secure the tailwheel bracket to the bottom rear of the fuselage with the provided wood screws. Make sure the pivot point of the assembly is over the hinge line of the rudder for best results.**



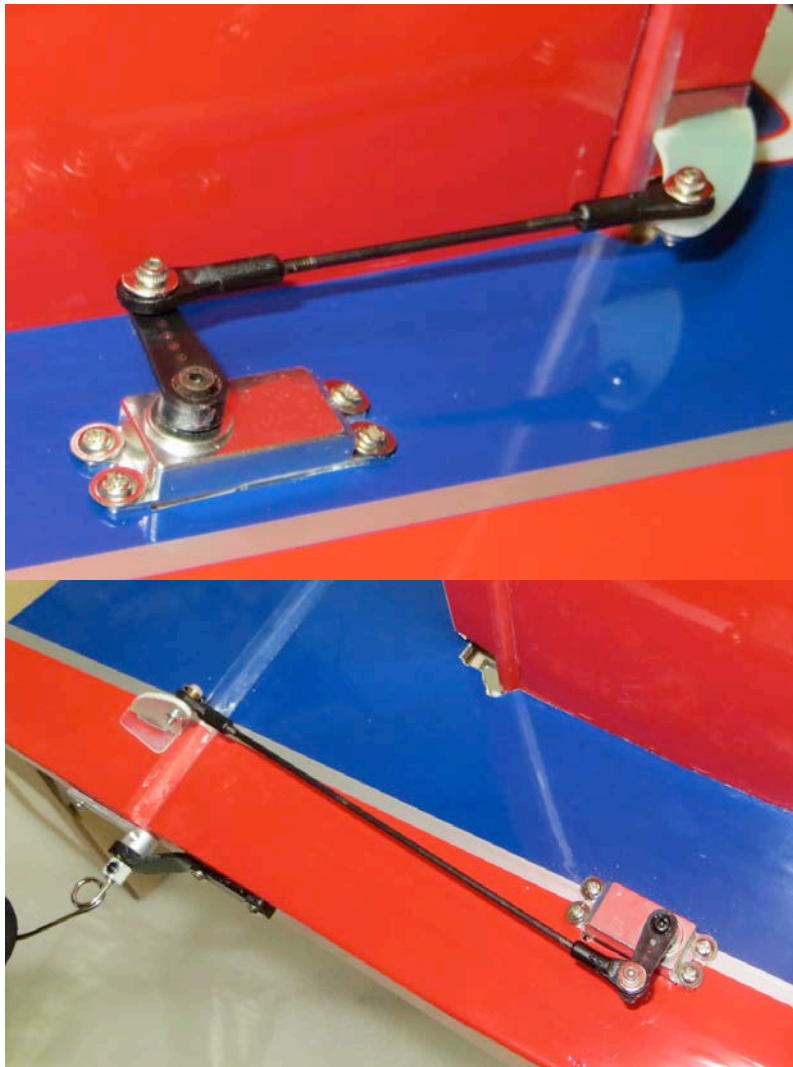
**23. Secure the tiller using the provided screw, but do not over tighten as the tiller should be able to move on the screw as the rudder is deflected.**



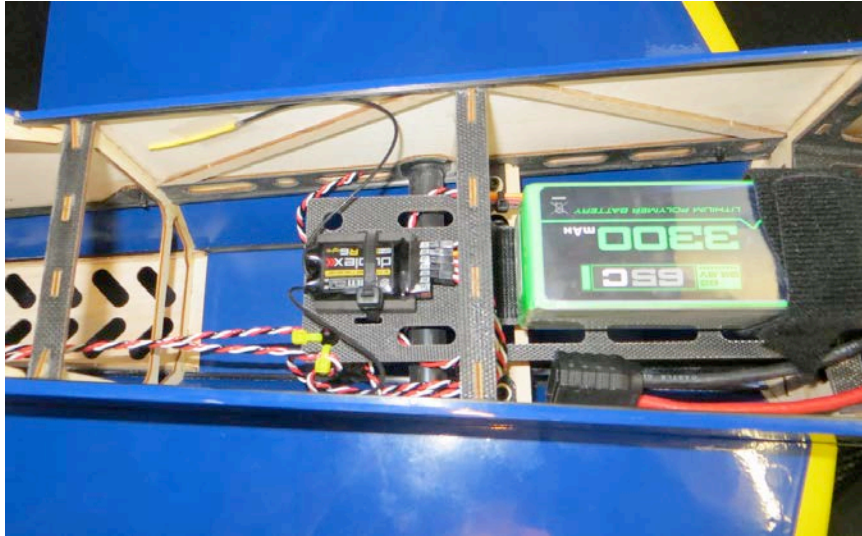
**24. Place the tailwheel wire in the proper position, aligned with the rudder and lock into place with the set screws.**

**25. Attach two Extreme Flight 18" 28 AWG servo extensions to the elevator and rudder servo leads and secure with heat shrink tubing or tape. Use the hardware provided with the servos to install the rudder and elevator servos in their respective location in the rear of the aircraft. From the pilot's perspective the rudder servo mounts on the right side of the fuselage and the elevator servo mounts on the left side. Both servos should have the output shaft oriented toward the front of the aircraft.**

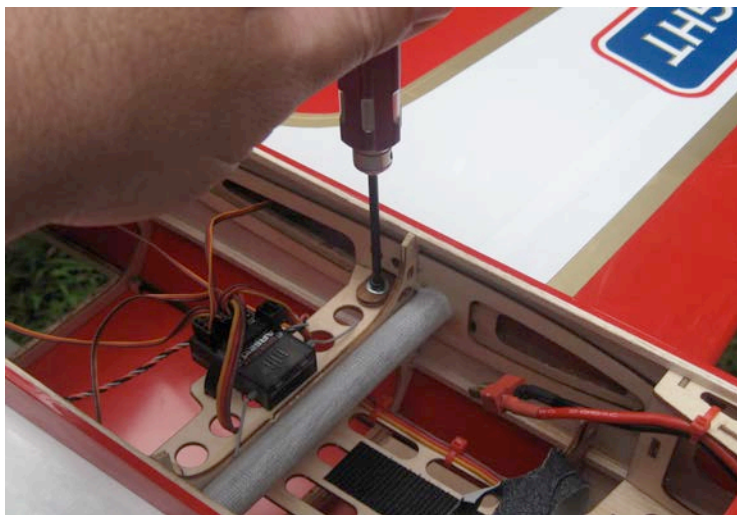
**26. The rudder and elevator servo linkages assemble and are installed just like the aileron linkage. As previously stated we are looking for maximum mechanical advantage. Use the 2nd hole from the end on the arm provided with the HS-70 for both the elevator and rudder linkage. Use the provided hardware to assemble the linkages as shown. Routinely inspect the linkages for slop and replace if they become worn.**



**27. Place a strip of Velcro onto the battery tray and onto your battery and use a Velcro strap around the battery and tray to prevent the battery from being ejected during high G maneuvers. Mount your receiver and secure all wires with nylon cable ties.**



**28. Slide the carbon fiber wing tube into the fuselage and the wings onto the tube. Secure the wings to the fuselage using the 2 3mm bolts and washers inserted through the tabs and into the pre-installed blind nuts. Plug the aileron leads into the receiver.**



## Set-up and flying tips

The CG range for the PANTERA starts at the front of the wing tube and extends to the rear of the wing tube. There is plenty of room on the battery tray to move your battery to achieve this CG location. A slightly forward CG will allow the Pantera to fly on rails.

Control throws on a model built for speed are quite different than those on a 3D model. We are looking for the model to feel locked in at high speed without being twitchy. We want maximum mechanical advantage, maximum servo resolution and minimal throws. At high speeds a little bit of throw goes a long way and too much throw combined with abrupt inputs could have catastrophic results. Use the low rate settings for high speeds and switch the elevator to high rate for landing as it will become less effective when the Pantera slows down for on final approach.

**Elevator: Low rate-8-10 degrees; 15-20% Exponential**

**High rate rate-20 degrees, 35% Exponential**

**Rudder: Low rate-15 degrees; 30-40% Exponential**

**High rate- 25 degrees; 40-50% Exponential**

**Aileron: Low rate-10-15 degrees; 40-45% Exponential**

**High rate- 25 degrees; 50-60% Exponential**

**A note about the Castle Creations Talon 90 setup:** The Talon 90 will require programming to operate at maximum potential with the Xpwr T3520 motor. It is highly recommended that you purchase the Castle Link dongle and download the software to your computer. It is important that you install firmware v4.22 on your Talon 90. We use the following settings as well:

**Motor Start Power: MED 59**

**Throttle Response: Med 5**

**Motor Timing: High**

**Current limiting: Disabled**

**PWM Rate: Outrunner Mode      Brake: Off**

**The Pantera is a very high performance model and as such routine inspection and maintenance is required. Close attention to setup is a must and all guidelines and warnings in the assembly manual must be followed. I wish you many seasons of high speed excitement with your Pantera!**

**See you at the flying field!**

**Chris Hinson**

**Extreme Flight**

