



## 85cc to 120cc Ultimate ARF Instruction Manual



Congratulations and thank you for purchasing the Performance Aircraft Unlimited 85 to 120cc Ultimate. In the day when the all American Pitts special was the choice of many, two guys set out to make the Pitts better. Kermit Weeks and Canadian Gordon Price wanted more from the Pitts and rolled up their sleeves and went to work. Weeks modified and tweaked the Pitts and transformed into models like the Weeks Special and Weeks Solution. Price on the other hand no fully satisfied decided to build a new airframe from the ground up now known as the Ultimate. Both men gave their aircraft swept wings and powerful engines but Price's Ultimate is what is most remembered and revered.

In R/C, two planes really live the test of time, the Piper Cub and the Ultimate. You can't go to a flying field anywhere without seeing ether. The Ultimate is a natural when scaled down for R/C and among the best. 2317 sq inches of wing area while keeping the total weight down has made this aircraft a true performer. All wood construction and top quality hardware make it hard to beat. Just like the previous Ultimate, it's a 3ding monster. Hands off hovering and torque rolling are still there with more style and grace thanks to lighter wing loads.

We believe you will find this to be one of the finest flying aircraft on the market. Most modelers will find assembly of this aircraft simple and straightforward. We recommend the builder follow the step-by-step instructions to achieve the best performance and to ensure nothing was over looked. This manual also includes tip sections throughout that may help you in key areas during assembly. Please familiarize yourself with this manual before assembly.

**This manual is broken down into ten chapters for simplicity:**

**Chapter 1** - Parts Inventory

**Chapter 2** - Preparation for Assembly

**Chapter 3** - Landing Gear and Tail Wheel Assemblies

**Chapter 4** - Canopy and Fuselage Hatches

**Chapter 5** - Engine Installation

**Chapter 6** - Cowling installation

**Chapter 7** - Rudder Installation

**Chapter 8** - Hardware Installation

**Chapter 9** – Wing mounting and setup

**Chapter 10** - Radio and Control Surface Setup

**Chapter 11** - Final Inspection and Pre-Flight

**Additional items needed to complete this aircraft, which are not included:**

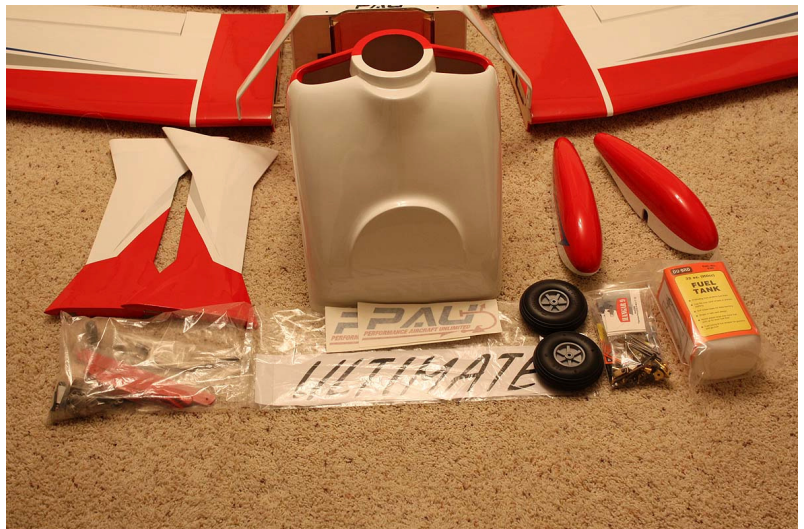
- An engine, within the recommend range, and propeller
- 8 channel computer radio and receiver recommended
- Batteries and switches (with regulators if using Ion batteries)
- Four aileron servos rated at least at 150oz of torque
- Two elevator servos rated at least at 200oz of torque each!
- One or two rudder servo rated at least at 400oz of torque
- One throttle servo with push rod and links
- Optional choke servo with push rod and links
- One fueling dot or fueling device
- 3 to 4 feet of fuel tubing
- Foam rubber
- 4-½ inch Ultimate spinner
- 30 to 45 minute epoxy
- A bottle of thin CA
- Covering iron
- Various modeling tools for assembly
- ½ inch low tack masking tape

# Chapter 1

## Parts inventory

Place an “X” to ensure your kit is complete:

- 1 Fuselage
- 2 Fuselage access hatches
- 4 Wing panels (2 right and 2 left)
- 2 Horizontal stabilizers (1 right and 1 left)
- 1 Rudder
- 1 Fiberglass Cowl
- 1 Pair of fiberglass wheel pants
- 1 Carbon fiber landing gear
- 1 Pair of Sullivan Light wheels
- 1 Tail wheel and tiller assembly
- 1 Canopy
- 2 Carbon fiber wing tubes
- 2 Carbon fiber stabilizer tubes
- 2 Nylon wing retention bolts
- 6 H9 titanium pushrods/turnbuckles
- 1 set of Dubro wheel collars
- 1 pair of Dubro wheel axels
- 1 HD Dubro pull-pull system
- 1 Set of aluminum control horn assemblies
- 1 32oz Dubro fuel tank
- 8 HD 4/40 Dubro ball links
- 1 Set of additional various marked hardware
- 1 Vinyl graphics package



If any of these parts are missing immediately contact PAU.

If you need more information you can visit our support forum at: [www.flyinggiants.com](http://www.flyinggiants.com)

## Chapter 2

# Preparation for Assembly

Professionals utilizing premium Ultracote covering carefully covered your model. Due to climate changes during shipping, the models covering may have loosened and/or wrinkled. It's a good habit to go over your model with a covering iron to ensure all joints, seams, and edges are properly sealed.

Ultracote is a lower temperature film that seals and shrinks at lower temperatures. Make sure you set your iron on a low temperature initially to get a feel for the correct temperature setting and adjust accordingly. Higher temperatures will cause your covering to over shrink and distort. Also, use a sock over your iron to ensure a scratch free finish.

### Place an "X" to ensure task completion:

- Go over you model as necessary with a covering iron to insure all joints, seams, and corners are sealed properly.
- Use your iron to ensure the areas where cutouts are needed for your hardware are located and sealed down, such as servos; tubes, and control horn mounting locations.



Next, we'll need to cut out the covering at the locations for hardware and final assembly. Make sure you use a sharp hobby knife so your cuts will be clean and straight.

- Start with the fuselage, Locate and cut out the servo and stabilizer and wing tube locations.
- Locate and cut the location for the anti-rotation pins and mounting holes for the stabilizers and wings.
- Locate and cut the two mounting bolt locations for the canopy and the two pull-pull exits.
- Locate and cut the servo mounting locations for each wing half.



## Chapter 3

# Landing Gear and Tail Wheel Assemblies

Now that we're ready for assembly, we are going to start with the main landing gear first. You will need to locate the following parts to begin assembly.

### Place an "X" to ensure task completion:

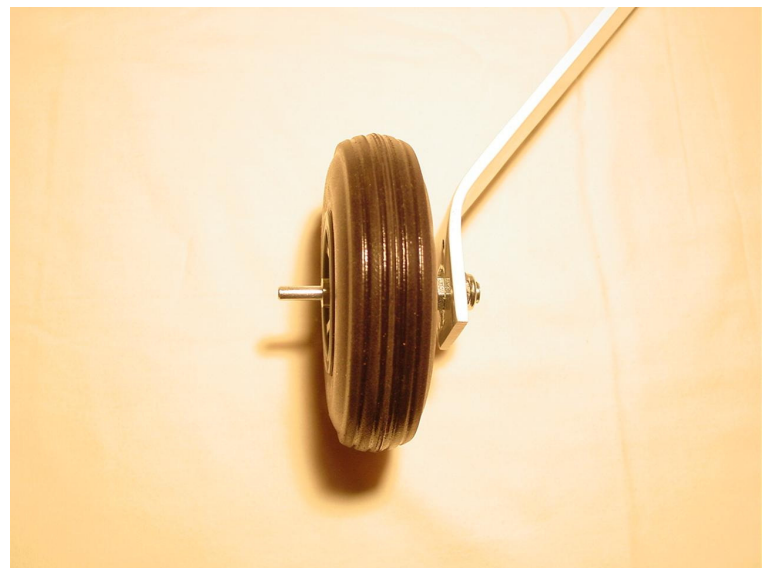
- ❑ What you will need in this chapter for the main gear:
  - ✓ Carbon Fiber main gear
  - ✓ One pair of 4.5 inch wheels
  - ✓ One pair of wheel pants
  - ✓ One pair of Dubro axles
  - ✓ Four wheel collars
  - ✓ Hardware pack marked "wheels"
  - ✓ Fuselage
  - ✓ Rudder
  - ✓ Tail wheel assembly

### Not Provided:

- ✓ 1/2" and a 9/16" inch wrench
- ✓ Blue loc-tite
- ✓ Allen wrench for wheel collars
- ✓ White wood glue such as Elmer's or Epoxy



- ❑ Fasten the axles to the main landing gear with the lock nuts.
- ❑ Using your four wheel collars and wheels, center your wheels on the axles. Place the collars as close to the wheels as possible but ensure the wheels still rotate freely. Again, we don't want the wheel to move from side to side and contact the wheel pants. Also, we recommend the use of loc-tite on the setscrews of the wheel collars to prevent them from vibrating loose.

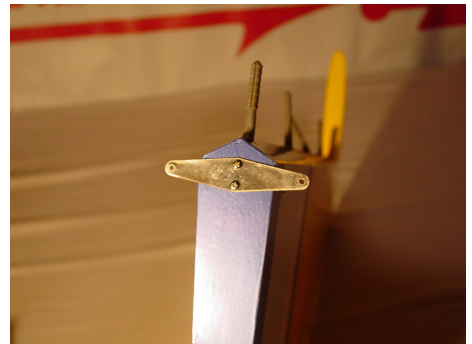




- ❑ Install the landing gear to the fuselage using the four 8/32 bolts, spring washers, and flat washers, and compression nuts.

Now lets get the tail wheel assembly installed.

- ❑ Once the mains are on, find the pre-drilled hole for the tail wheel assembly. Insert the tail wheel assembly and lightly tap in flush with a small hammer.
- ❑ Next, mark the hold down locations, drill and mount them with the four wood screws securing the tail wheel assembly. Remove the wood screws and coat the holes with thin CA, let dry, reinstall.
- ❑ Install the steel tiller horn just behind the hinge line on the bottom of the rudder using the two small wood screws. (36% Edge shown below, Ultimate assembly is identical).

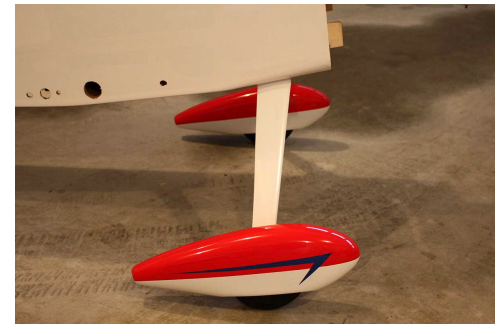
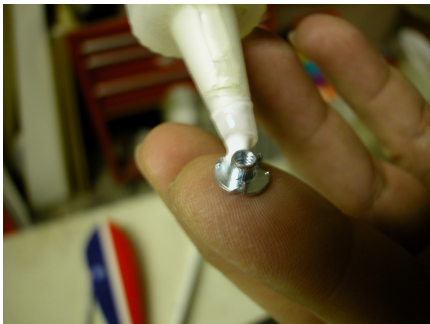


*Tip#2 Set aside your two tiller springs, we will install those later after the rudder is mounted.*

- ❑ With the aircraft resting on the landing gear, we are going to need to set the right angle for the wheel pants. With the plane sitting on the gear on all three points naturally, the bottom rear portion of the pant should nearly be parallel with the ground.
- ❑ Trial fit the pant to the gear, mark and drill holes for 4/40 blind nuts.
- ❑ Drill the holes for the 4/40 bolts in the wheel pants at the locations you've marked.



- ❑ Apply some white wood or epoxy glue to the inner side of the four 4/40 blind nuts and install the blind nuts to the inside of the wheel pants.
- ❑ Now you can install the wheel pants with the 4/40 bolts and washers. Don't forget to use loc-tite here again. Wheel pants tend to take the most vibration.



# Chapter 4

## Canopy and Center Cabane setup

Place an “X” to ensure task completion:

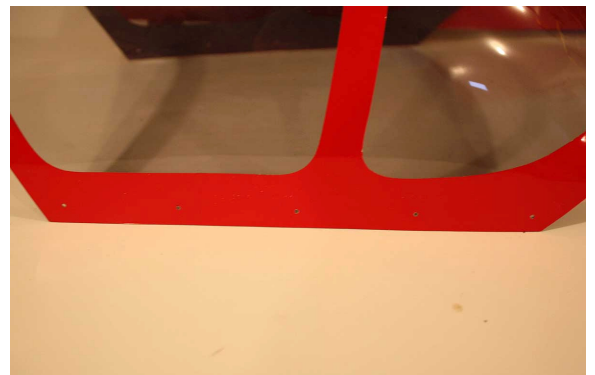
- ❑ Gather the following for canopy and hatch installation:
  - ✓ Canopy
  - ✓ Fuselage and Access Hatch
  - ✓ 10 small wood screws

Not Provided:

- ✓ Drill and small drill bit for wood screws
- ✓ Canopy glue (optional)
- ✓ Thin CA
- ✓ Ruler



- ❑ Install the hatch on the fuselage using two 6/32 bolts with the self-sealing washers.
- ❑ Trial fit the canopy to the fuselage access hatch to determine screw locations.
- ❑ Mark four or five evenly spaced locations for the screws on each side. Double check to ensure all the marked screw locations will go into the hatch rail.
- ❑ Remove canopy from the access hatch and drill the marked locations for the canopy screws.
- ❑ Install the canopy using the small wood screws. If satisfied with the fit, remove the canopy and hatch and wick a small amount of thin CA into each of the screws holes on the hatch. Once dried, reinstall canopy with optional canopy glue if desired. **Caution!** CA will fog the canopy if installed before completely drying.





## Cabane setup

Place an “X” to ensure task completion:

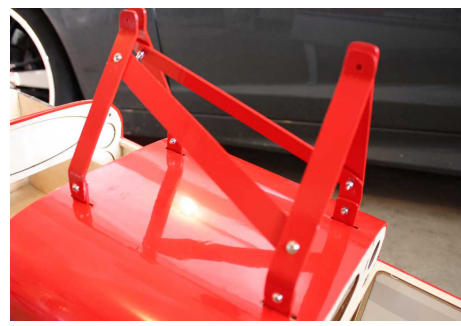
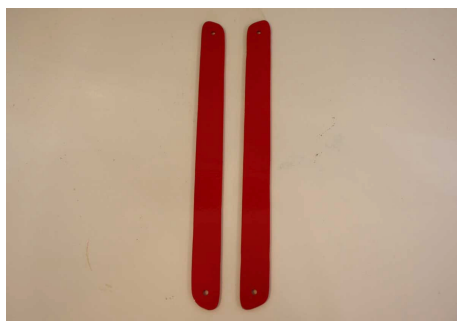
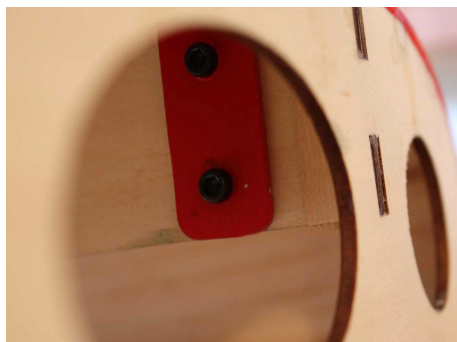
- ❑ Gather the following for canopy and hatch installation:
  - ✓ Cabanes
  - ✓ Small bag of screws labeled “wing strut”
  - ✓ Fuselage

Not Provided:

- ✓ Xacto knife
- ✓ Cross tip screwdriver
- ✓ Allen wrench for 4/40 screws
- ✓ Small wrench for 4/40 lock nuts



- ❑ Using your Xacto knife, open the slots for the four aluminum tabs and mount the tabs in the fuse using the 4/40 socket head screws. **Use loc-tite during this process.**
- ❑ Compare all four cabane uprights and mount the longer ones to the rear tabs and the shorter ones to the front using the 4/40 lock nuts and Phillip head screws.
- ❑ Finally, mount the two cross braces. When finished, the assembly should be higher in the rear than the front. This is due to the wing incidence that is needed during final assembly.



# Chapter 5

## Engine Installation

Your firewall is pre-mounted but our customers can select from a wide variety of engine choices. It is nearly impossible to cover every engine installation choice in this manual but we'll cover a few. Your aircraft was designed around the 100cc twin gas motors. Also, we have provided a canister tunnel on our Ultimate for those desire quieter operation. Please consult the manufacturer for the installation of optional canister.

Your Ultimate will also accept lighter motors like the DA-85. If using the DA-85, attention should be paid to your hardware installation as it may need to be mounted towards the front of the aircraft for proper CG.

We will cover the installation of two popular engine choices in this manual, the DA-85 and the DA-100 motors. Follow your engine manufactures instructions for any additional guidance. Lets get started!

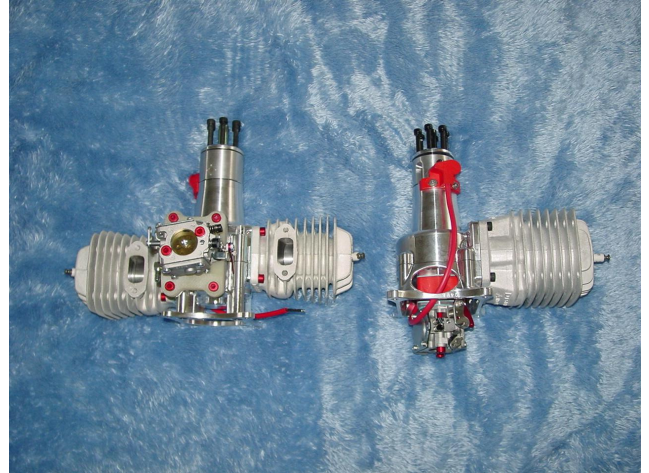
### Place an "X" to ensure task completion:

What you will need in this chapter:

A DA-100 mounting template found in the back of this manual or a DA-85 mounting template found in the back of the DA-85 manual.

#### Not Provided:

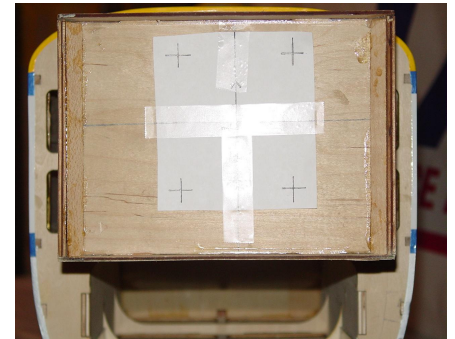
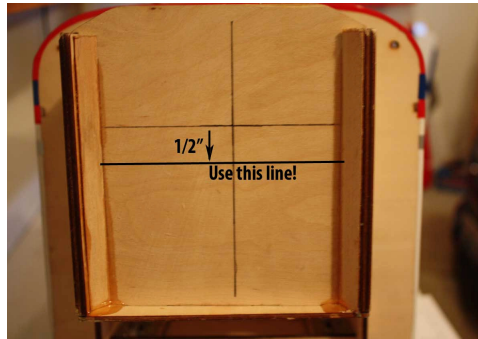
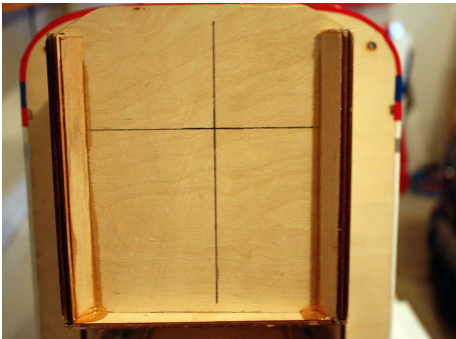
- ✓ **1-3/16" standoffs for the DA-100**
- ✓ *1-13/16" mount for the DA-85*
- ✓ **Four 1/4-20 bolts 2-1/2" long for the DA-100**
- ✓ *Four 1/4-20 bolts 3" long for the DA-85*
- ✓ Four lock or compression nut with fender washers
- ✓ An engine in the recommend size range
- ✓ 4 1/2 inch spinner
- ✓ Propeller
- ✓ A drill and drill bits
- ✓ Center punch
- ✓ A 12" square or incidence meter
- ✓ Scotch tape for template



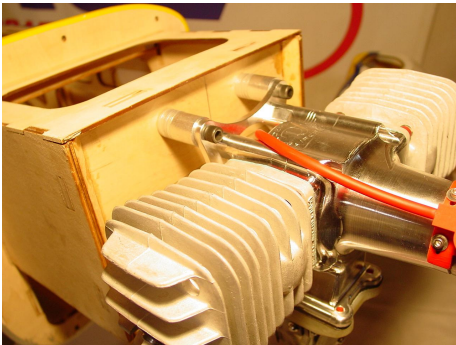
*Also with the engine is installed, you will want 7-11/16 inches from the firewall to the spinner back plate for proper cowl placement.*

## DA-100 installation

- ❑ The firewall is pre-marked so you'll just need to center your motor in the "+". Take a ruler and draw a line across the entire firewall for the thrust line and offset centerline. **The horizontal thrust line is incorrectly marked on the firewall from the factory, it should be 1/2" below the laser inscribed line.** From the horizontal line, draw another line 1/2" below the thrust line.
- ❑ **DA-100 users only.** If using the DA template provided on the last page of this manual, check the measurements on the template and ensure the holes are correct. Cut the paper template to the size needed to tape it to the firewall using your thrust line and offset centerline as a guide. Mark the drilling locations and drill holes for 1/4-20 bolts.



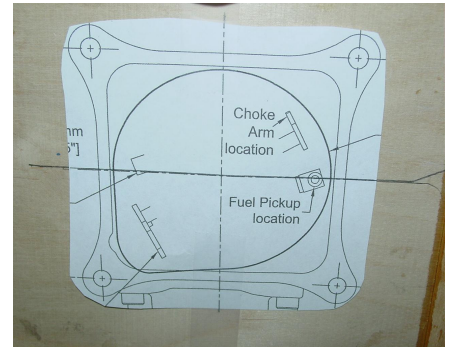
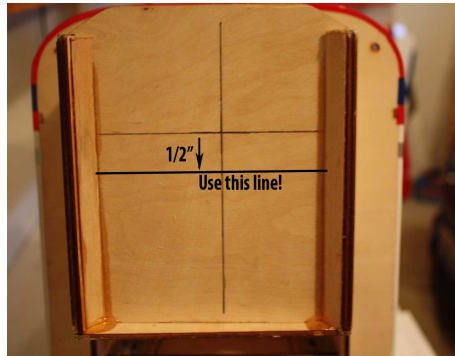
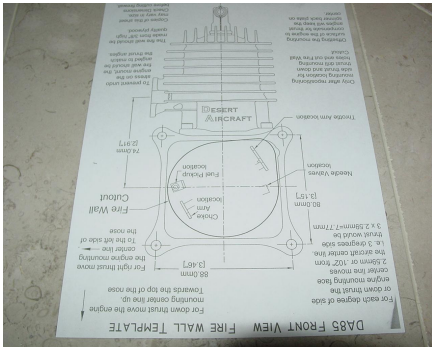
- ❑ Mount the motor using 1-3/16" standoffs for the DA-100, and four 1/4-20 x 2-1/2" long bolts.
- ❑ Now that you have the motor mounted, mark the locations for the fuel line and throttle push rod remove motor and drill those locations and reinstall motor.



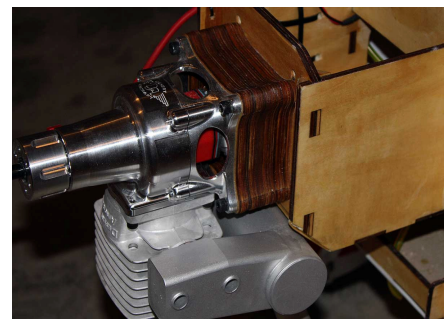
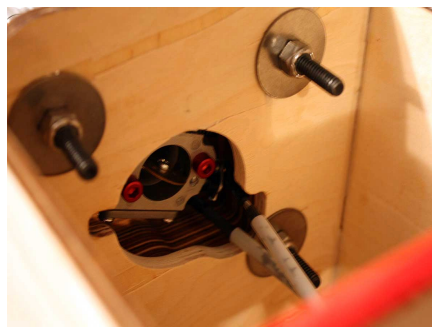
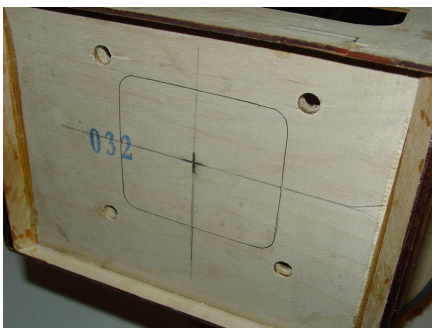
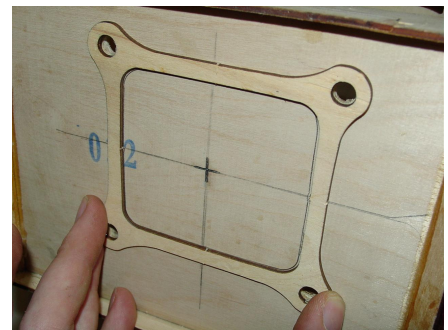
*We recommend 4/40 push rods for throttle and/or optional choke servo. Also ensure there is no metal-to-metal contact from the throttle/choke to the servos. 2/56 Ball links for 4/40 rod (not included) will prevent the aforementioned metal-to-metal contact and will bolt to nicely to your motors carburetor.*

## DA-85 installation

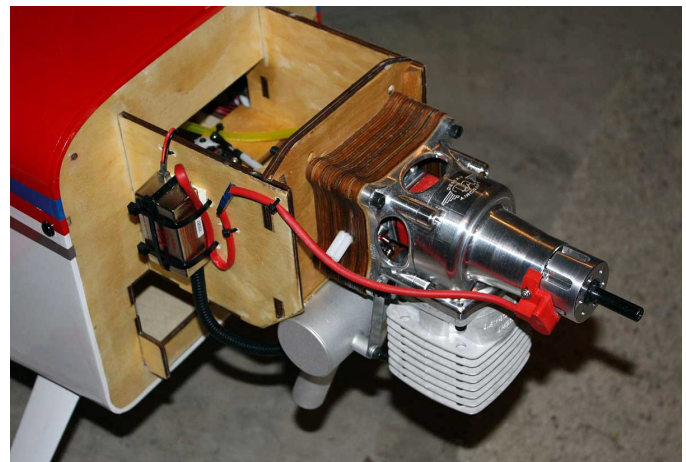
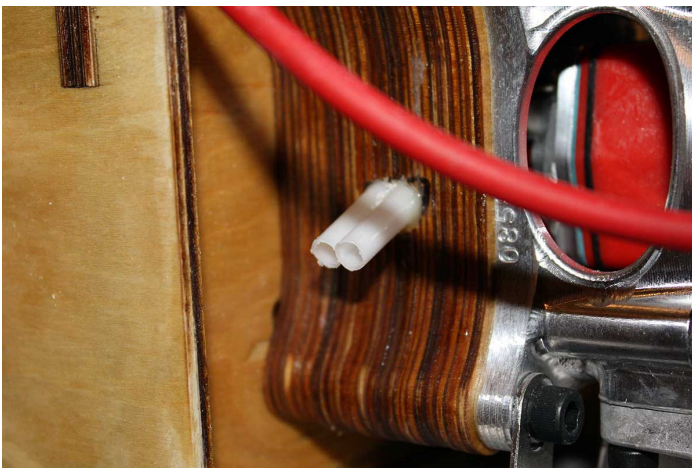
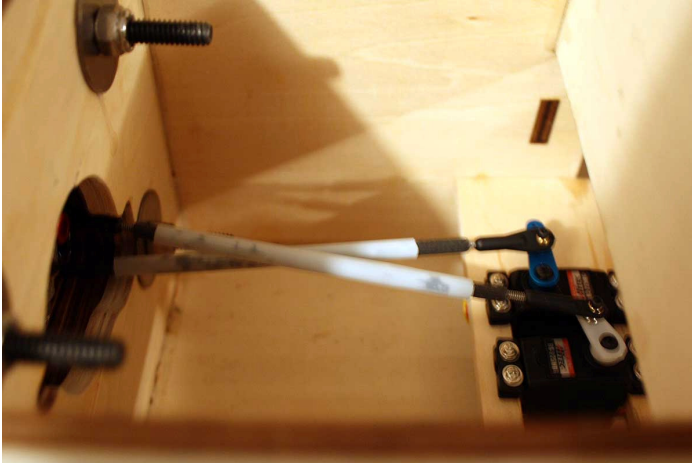
- ❑ You will just need to center your motor in the "+". Take a ruler and draw a line across the entire firewall for the thrust line and offset centerline. **The horizontal thrust line is incorrectly marked on the firewall from the factory, it should be 1/2" below the laser inscribed line. From the horizontal line, draw another line 1/2" below the thrust line.**
- ❑ **DA-85 users only.** If using the DA template provided on the last page of your **DA manual**, check the measurements on the template and ensure the holes are correct. Cut the paper template to the size needed to tape it to the firewall using your thrust line and offset centerline as a guide. Mark the drilling locations and drill holes for 1/4-20 bolts.



- ❑ Desert aircraft recommends not using standoffs with the DA-85. You will need to make a mount to properly install this motor. PAU used the template provided by DA and made a motor mount system made of several light plywood rings stacked to achieve the correct standoff, which is approximately 1-11/16" off the firewall. You can purchase the DA-85 standoff mount at [flypau.com](http://flypau.com).
- ❑ Mount the motor using 1-13/16" solid mount for the 85, and four 1/4-20 x 3" long bolts.
- ❑ Now that the motor is mounted, mark the locations for the fuel line and throttle push rod remove motor and drill those locations and reinstall motor. Another recommended option is to use the template and cut a hole in the firewall for the carburetor, which will make installing push rods and fuel lines easier.



- ❑ You will need to make a servo and or choke tray for your DA-85 or any rear intake motor. Here we've built one at the first former just after the firewall.
- ❑ After you have laminated your motor mount together, drill holes for you engine needle adjustments. Here we've use some push rod casing to act as a screwdriver guide making engine adjustments very simple with this style of motor.



*We recommend 4/40 push rods for throttle and/or optional choke servo. Also ensure there is no metal-to-metal contact from the throttle/choke to the servos. 2/56 Ball links for 4/40 rod (not included) will prevent the aforementioned metal-to-metal contact and will bolt to nicely to your motors carburetor.*

# Chapter 6

## Cowling installation

Place an “X” to ensure task completion:

- ❑ What you will need in this chapter:
  - ✓ Fuselage and cowling
  - ✓ Two 6/32 bolts with spring and lock washers

**Not Provided:**

- ✓ A 4-½ inch spinner
- ✓ A Dremel tool
- ✓ A facemask and eye protection
- ✓ Pencil or dry erase marker



Always wear a mask and eye protection while cutting fiberglass. Take your time while installing the cowl. With care you will end up with a professional installation that will make an impression at the field. The cowl mounts by interlocking the bottom of the cowl ring into the first former. So only the two top mounting bolts are needed.

Close the choke and place a piece of tape over the carburetor inlet and exhaust outlet to keep out any dust while setting up your cowl. Since the cowl is preset and uses a ring to mount, there will not be much to do here.



- ❑ First cut out the bottom opening for cooling. **For the DA-100 or DA-120 using canisters**, you will only need to open the bottom of the cowl to exit the air from the cowl. If your using stock exhaust stacks, it maybe necessary to cut away an area for those to clear.

- ❑ If using stock mufflers for the DA-100/120, we recommend the compact style.

- ❑ **For the DA-85**, measure and cut an opening for the cylinder head and muffler just enough to get the cowl mounted.



- ❑ Now we are ready to do some fine trimming for the DA-85. We will want to cut at least an extra 1/4 inch cut around any of the engine components that protrude. Mark any additional areas that may require trimming.

- ❑ Remove the cowling and cut out the remaining areas to be trimmed.



# Chapter 7

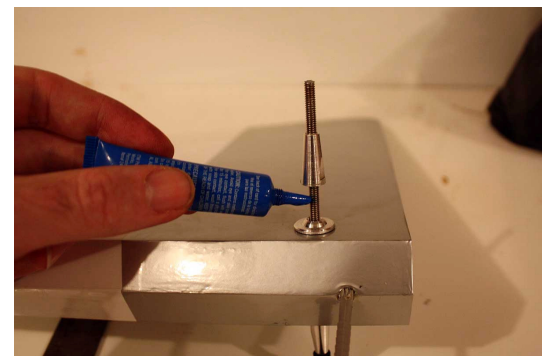
## Rudder Installation

Place an “X” to ensure task completion:

- ❑ What you will need in this chapter:
  - ✓ Rudder and fuse
  - ✓ Pull-pull hardware

Not Provided:

- ✓ 30 to 45 minute epoxy
  - ✓ Two cycle oil
- ❑ Next, we will install the hardware on the rudder before installing it. Find the pre-drilled hard point, remove the covering and insert the longer 4-1/2” stainless threaded rod provided.
  - ❑ Install the Dubro fasteners to the rod. Use loc-tite as shown if you are not planning on using the lock nuts. Discard the Dubro bolts because they are not needed.
  - ❑ Now add the control horns placing them at 2” from the hinge line.
  - ❑ Now were going to prep the hinges for installation. Take a small drop of oil and place it in each of the pivot points of your hinges. The oil prevents excess epoxy from bonding the joint.
  - ❑ Apply epoxy into the trailing edge holes of the vertical stabilizer. Now apply epoxy to the hinges.
  - ❑ Carefully insert the control surface into the stabilizer and butt the two surfaces together. Move the surface back and forth a couple of times to make sure all the hinges are aligned correctly and the desired throw is attained. You will want at least 45 degrees.
  - ❑ Use some masking tape to hold the surfaces together and let cure for at least eight hours.
  - ❑ Install the tiller springs you set aside in chapter 2 to the tiller horn and tiller.



**Tip#5 Optional step.** After your epoxy has cured, it would be a good time to seal all of your hinge gaps prior to installing the rest of the hardware. This can provide you with a better flying aircraft by increasing control surface performance and preventing possible flutter. Clear or matching covering material can be ironed in place to fill any gaps on the bottom of your control surfaces.

**Take approximately a one-inch strip of covering the length of your surface. Fold it in half while placing into the gap with the control surface fully deflected up and iron it in place. Check to make sure you still have full surface travel once you have completed.**

# Chapter 8

## Hardware Installation

We provide high quality aluminum control horn assemblies included with our latest generation of PAU aircraft kits. We believe these lightweight assemblies are the best available and can also be purchased separately from PAU.

### Place an “X” to ensure task completion:

- ❑ What you will need in this chapter:
  - ✓ The entire airframe
  - ✓ Six H9 titanium push rods
  - ✓ Six sets of aluminum control horn assemblies
  - ✓ **2 M4x70 steel posts (elevators) Important!**
  - ✓ 4 M4x70 aluminum post (ailerons)
  - ✓ Eight HD Dubro ball links
  - ✓ One 32oz Du-bro fuel tank

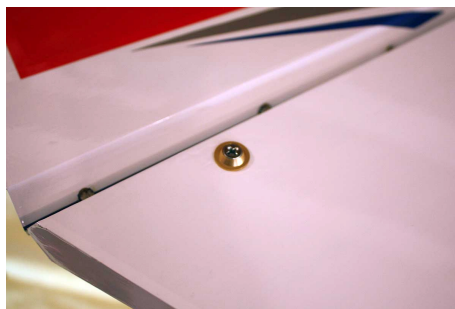
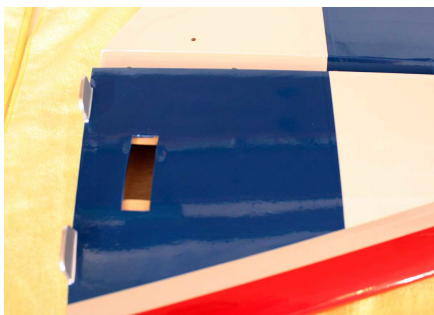
### Not Provided:

- ✓ Four 150oz or better servos for ailerons
- ✓ Two 200oz or better servos for elevators
- ✓ One or two servos for rudder equaling 400oz
- ✓ One throttle servo 70oz or better
- ✓ Six 1.5” aluminum servo arms
- ✓ One 4” offset rudder servo arm
- ✓ One Fuel dot or other fueling device
- ✓ Some foam rubber for mounting receiver, ignition module, and fuel tank



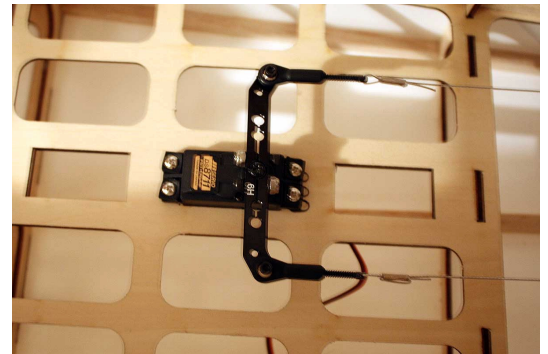
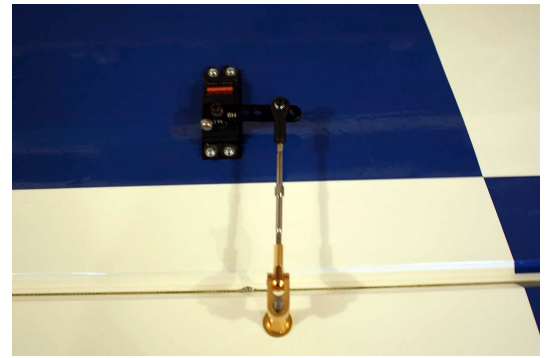
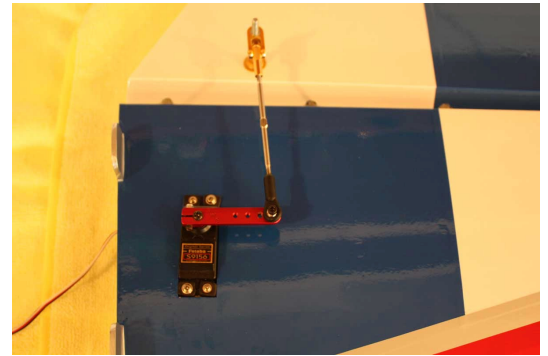
Install all your flight control servos with the output shaft closest to the control surface.

- ❑ Install 150oz or better servos for the ailerons in the servo trays located in the bottom of the wings.
- ❑ Install 200oz or better servos for the elevators in the servo trays located in the bottom of the horizontal stabilizers.
- ❑ Install one or two equaling 400oz or better servos for the rudder in the servo tray inside the fuselage.
- ❑ Install your throttle and or choke servos. If using a DA-85 or ZDZ you will need to make a servo mounting tray (see engine installation).
- ❑ First you need to find the pre-drilled holes for the **steel** posts in the elevators. Install the aluminum control horn assemblies to each surface with the M4 bolt in the down position. Use blue loc-tite on the aluminum base to ensure the bolt does not try to back out under vibration. Screw on the horns on to the posts. **Do not use loc-tite installing the horn.**

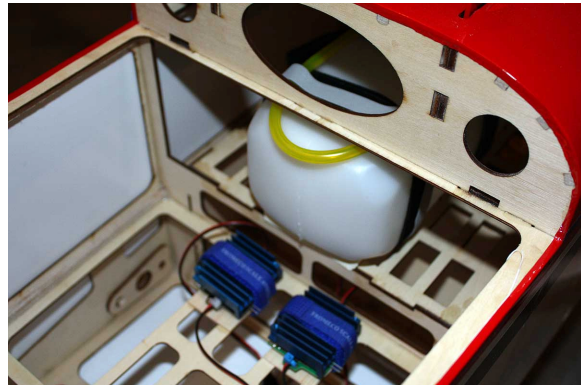




- ❑ Make sure your elevator servos are centered and mount your servo arms parallel to the hinge line.
- ❑ Take some masking tape and tape the elevator counter balances to the stabilizers so that they are in a center position.
- ❑ Screw in your two HD ball links onto the counterclockwise ends of the 2" H9 push rods and screw the other end into the control horn. Ensure everything is still centered. Don't forget to add locknuts to the 4/40 bolts attaching the ball link to the arm.
- ❑ Ensure aileron servos are centered and mount your arms parallel to the hinge line.
- ❑ Be sure that you install the horns at the same height from the hinge line (see attached). By doing so you will have very little servo matching to do afterwards.
- ❑ Screw in four HD ball links onto the counterclockwise ends of the 3" H9 push rods and screw the other end into the control horn. Ensure everything is still centered. Don't forget to add locknuts to the 4/40 bolts attaching the ball links to the arms.
- ❑ Ensure your rudder servo is centered and mount your rudder servo arm.
- ❑ A single JR 8711, Futaba 9157, or Hitec 7950 may be used. If your using two servos, you will need an additional servo arm to tie the two servo together as well as a servo matching devise.
- ❑ Install your pull-pull cable your remaining pull-pull hardware. Cables should **not be crossed** to avoid any rubbing on the exits. It is normal for the non-pulling side of the cable to slacken a little when the rudder is deflected.
- ❑ Install your tiller springs you set aside earlier.



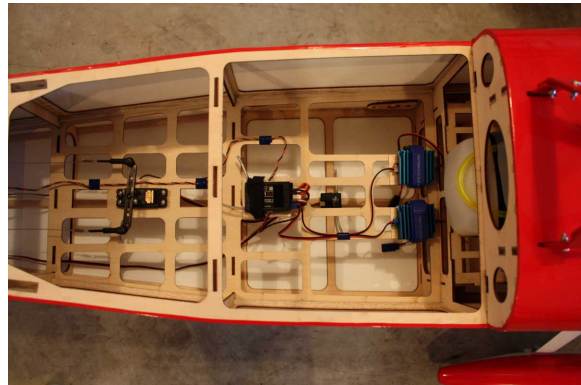
- ❑ Assemble the fuel tank according to the directions provided on the package. You will need to decide whether you want a two or three-line setup. With a two-line setup you will need an additional “T” fitting in the carburetor line that connects to your fuel dot or fueling device. Make sure you use Tygon fuel tubing inside the tank for the clunk as well.
- ❑ Install the fuel tank just in front of the wing tube using zip-ties or hook and latch (Velcro) straps. Place a loop in the vent line over the top of the tank to prevent fuel loss during flight and improve flight times. Take small zip-ties or fuel line clamps and fasten to all the points where the fuels lines connect.



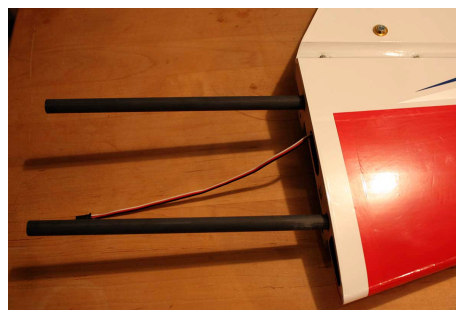
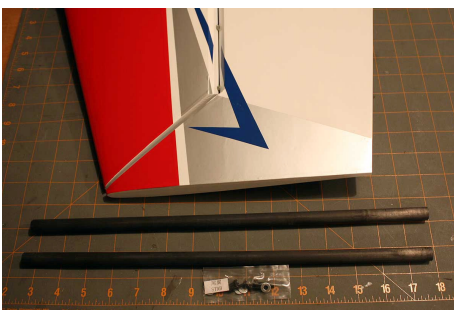
- ❑ Mount your switches at this time. The only really good place is in the Balsa area deck where the cabanes are located. If using a Wolverine switch, you will need to make a mount for it due to the switches larger size.

- ❑ Install the fuel-filling device in a location of your choice

- ❑ Install the horizontal stabilizers at this time. Install the carbon fiber stabilizer tube. Slide in each half and secure them with the four 6/32<sup>nd</sup> retention bolts.



- ❑ Install the horizontal stabilizers at this time. Install the carbon fiber stabilizer tube. Slide in each half and secure them with the four 6/32<sup>nd</sup> retention bolts.



# Chapter 9

## Wing mounting and setup

Place an “X” to ensure task completion:

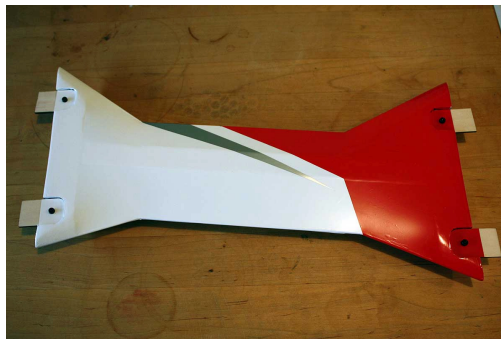
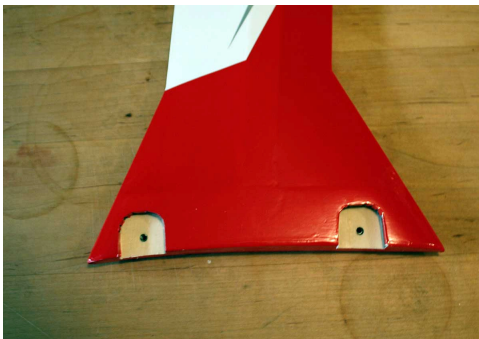
- ❑ What you will need in this chapter:
  - ✓ Fuselage, wing, and struts
  - ✓ 6/32 bolts with bonded washers
  - ✓ Wing mounting hardware
  - ✓ Flying wire hardware

Not Provided:

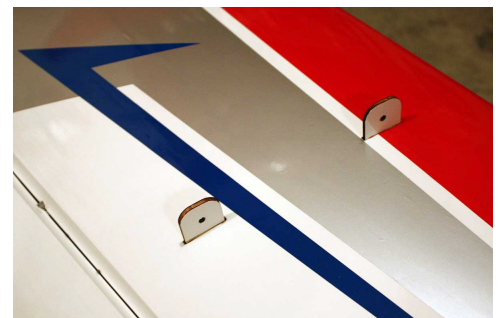
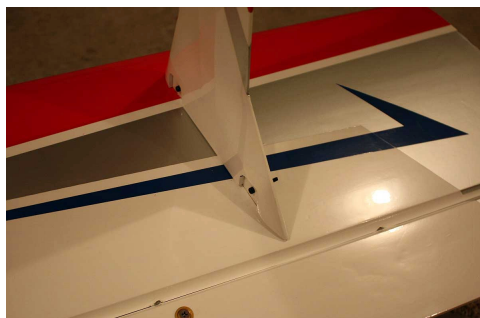
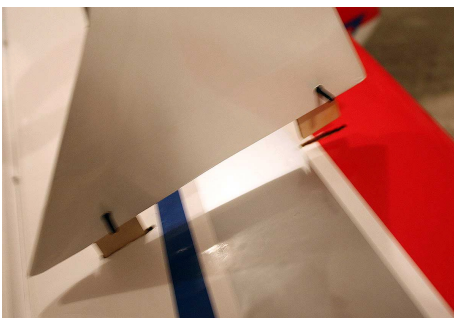
- ✓ Drill
- ✓ Incidence meter
- ✓ Masking tape



- ❑ Slide in each lower wing panel using the shorter CF wing tube and secure them with the two nylon wing retention bolts.
- ❑ Cut away the covering for the tabs. Since the mounting tabs are not covered, you can take some scrap covering and cover one side of each tab for a cleaner look. Install all the tabs using the 6/32 bolts supplied.



- ❑ Next, open the slots for the tabs in the lower wing. Trial fit the strut into the wings and make sure they seat all the way in leaving the strut with no gaps between it and the wing. **Make sure the struts are facing the correct direction!** The red covered section goes up and the tabs face the inside towards the fuse.
- ❑ Apply epoxy into the slot and re-insert the tabs with strut attached. **Make sure the tabs or bolts heads are facing of the fuse.** Once satisfied, remove the strut and let cure. Clean up any epoxy that may have oozed out with rubbing alcohol.

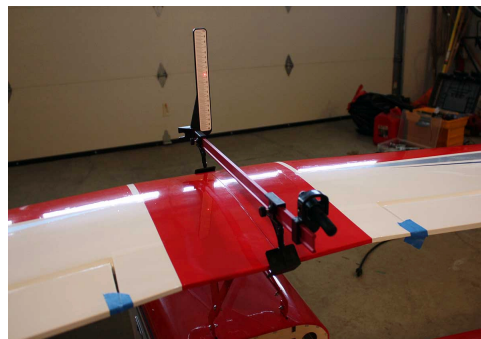
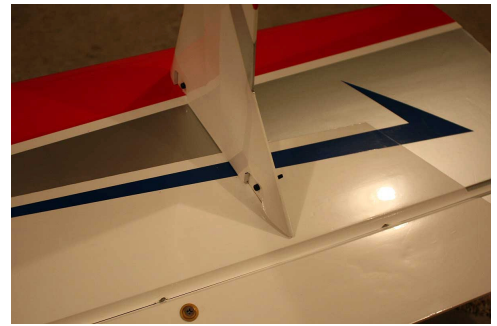


❑ Now for the top wing. Before you glue in anything you are going to want to check wing incidence. The incidence for this aircraft is 0 degrees for the motor, 0 for the stabs and lower wing. The upper wing needs to be at negative -1.5 degrees. These aircraft are built on jigs and the incidence is preset but it's still a good idea to check it so there will be no surprises during your maiden.

❑ Re-install the struts to the lower wing. Open up the covering to expose the slots for the tabs on the upper wing half's. Slide the upper two wing half's together using the longer carbon fiber tube.

❑ Fit the upper wing by sliding in the tabs, which should still be attached to your struts. Make sure you fully seat the struts to the upper wing. You also want to make sure the wing is seated between the cabane-mounting bracket.

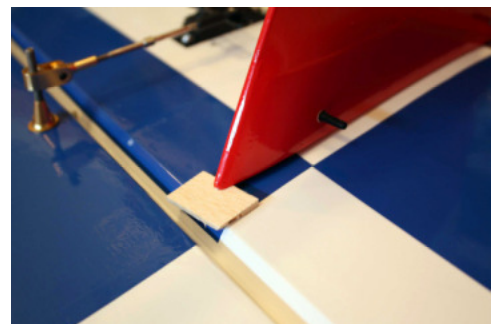
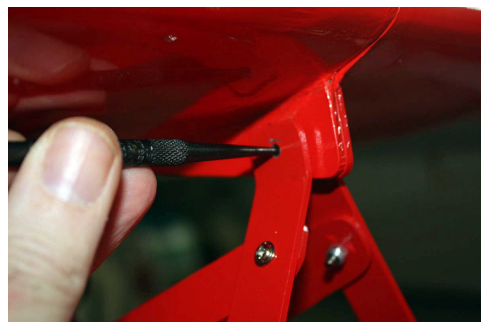
❑ Raise the rear of the fuse until the lower wing is at 0 degrees. Now check the incidence of the top wing, it should be at -1.5 degrees. Use some tape to hold the ailerons in place while doing this. If you need to add or remove incidence, adjust the top wing slightly using shims between the strut and wing. By using the shims, once the wing is removed you'll know where to put the shims before gluing in the tabs.



❑ If satisfied with the incidence, remove the top wing and struts and epoxy in the tabs with the struts attached the same way you did the lower wing. Remove the struts before the epoxy has set and clean up any epoxy that may have oozed out.

❑ Once the epoxy has cured, re-install the top wing and struts and bolt everything in. Re-check your incidence and mark the two mounting locations at the cabanes. Check it at the center and at the strut locations, you do not want to put any washout or wash in into the wing. Drill and install the 6/32 bolts provided.

**Tip#8** *If the wing is tight you can coat the tube with a little baby powder to aid the insertion of the wing panels.*



## Setting up the flying wires.

❑ Take the mounting tabs and put a 30 to 45 degree bend in all (See first picture below).

❑ Make eight sets using the Sullivan clevises, 4/40 cable connectors with nuts, and mounting tabs (see first four in second picture below). You will want to screw your wire connectors in just until they start showing on the inside of the clevis. This will leave us room for adjusting the wires during final setup.

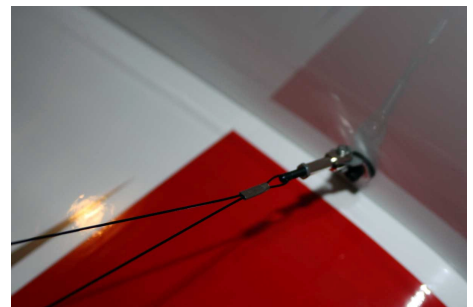
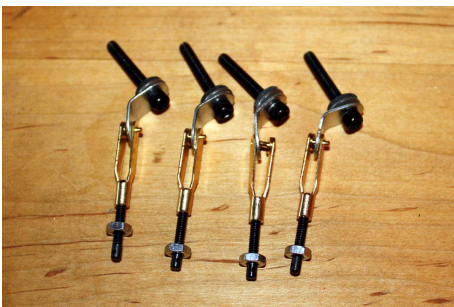
❑ Now make up four sets using the 4/40 Dubro Steel Threaded Rod ends by screwing in the cable connectors all the way in and locking them in with nuts. Use loc-tite on everything here, we wont need to make any adjustments here (see last two in second picture). Mount the assembly to fuse and the upper rear cabane wing mount using the 6/32 bolts.



❑ Take the eight set you make up for the struts and insert eight 6/32 bolts and put a bonded washer on last (see first picture below). This keeps the bolts locked in and all together when removing the wires during field setup and disassembly.

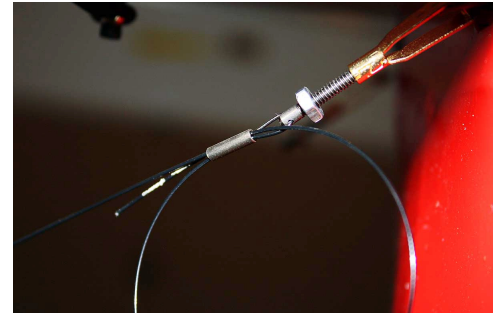
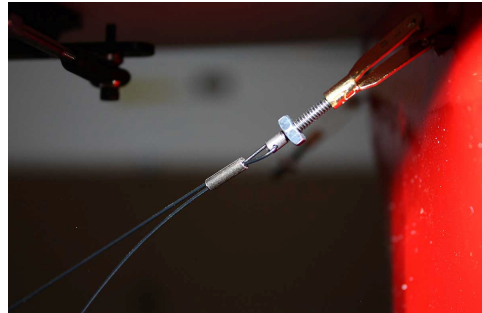
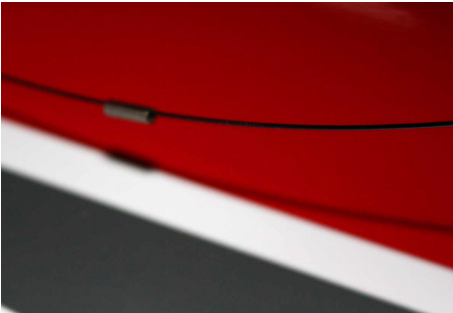
❑ Mount the wing struts like shown in the second picture below. Now were ready to install the wires.

❑ Now take a section of wire and run it through the eyelet mounted to the fuse ensuring you have enough wire to reach each side of the top of the strut. You will want about 12" of excess wire to work with at the struts. Take one swag and crimp the two wires together at the eyelet (see picture three below).



❑ Now with each loose wire end, slide on a crimping swag (see first picture below). Now run the wire through the eyelet and back through the crimping swag and push the swag up to the eyelet at the top of the strut (see second picture below). You will have just a little slack in the wire at this time.

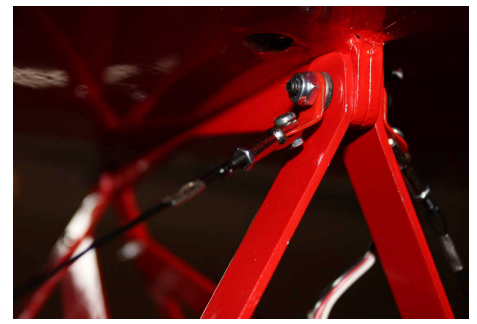
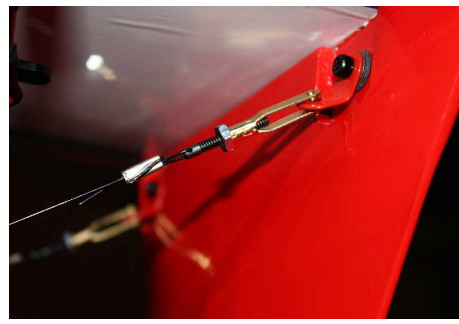
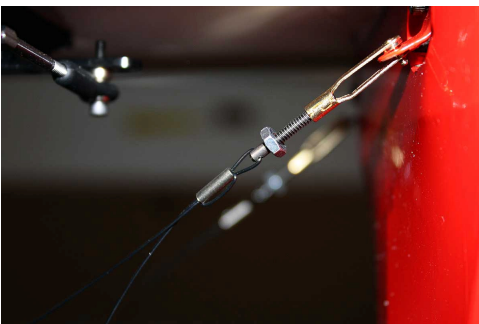
❑ Take the wire and loop it back through the swag one more time (see picture three below) and pull it tight keeping the wire from going too slack.



❑ If satisfied that you will have enough adjustment to tighten the wires, crimp the swags and cut off the excess wire.

❑ Adjust the wires now so they are just snug. They should be snug but if they sound like a guitar string, there too tight! Wires that too tight could put twist into the wings that would affect flight performance.

❑ Once the fuse mounted wires have been completed, repeat the entire process for the cabane-mounted wires. Once satisfied with the tension of all your wires, tighten the 4/40 nuts with loc-tite and fasten the clevis keepers.



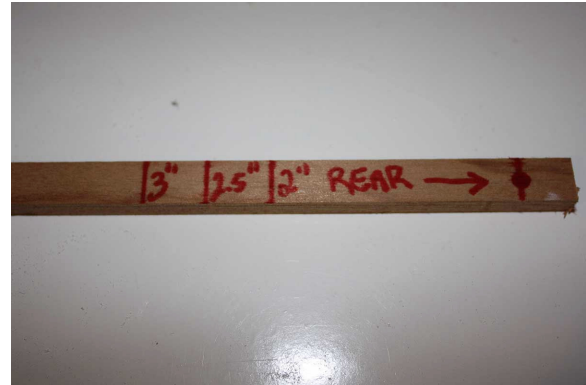
During assembly and disassembly, the flying wires always remain attached to the fuse and cabane. Just tuck the flying wire ends into the lower wing tube socket using a piece of foam to keep the wires from falling out during transport. The bolts and tabs should all still be attached, this will greatly cut down on assembly time at the field.

❑ It's time to check the CG and get our batteries mounted. Make sure you have the prop and spinner mounted. You will not need the top wing for this process.



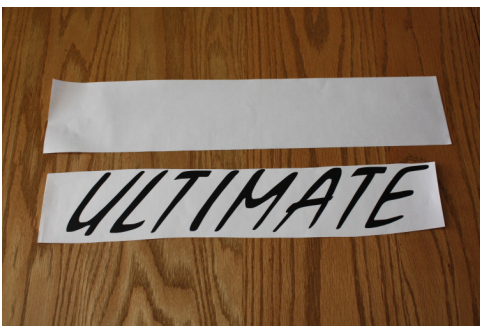
❑ First, find or make a piece of wood or some type of straight edge strong enough to support the weight of your model. From one end, mark a line at 2", 2.5", and 3" from the rear mounting location of the cabane.

❑ Mount it on the cabane with your measured area at the rear. **The CG is measured 2" to 3" from the rear cabanes going forward!** With the bottom wings and struts mounted, measure your CG and finish mounting your batteries to achieve your desired CG. We find overall that 2-1/2" is a great place to start for your first flights.



❑ Special Note: When mounting the top wing, do not over tighten your mounting bolts. Over tightening could cause crushing of the wood-mounting base of the upper wing resulting in a possible failure. By using bonded washers (provided) on each side of the mounting bolts, greatly reduces the chance of over tightening.

❑ Lets now install the vinyl graphics that were included in your kit.



# Chapter 10

## Radio and Control Surface Setup

Now we are ready to setup your aircraft for flying. Included in this manual are templates for measuring surface throw you may use if desired. We recommend that you setup your aircraft on low rates for initial flights until you become familiar with the aircraft and its capabilities.

### The recommended low rates for this aircraft are:

25 degrees for ailerons with 0 to 20% expo  
12 degrees for elevators with 0 to 20% expo  
30 degrees for rudder with 0 to 20% expo

### The recommended high rates for this aircraft are:

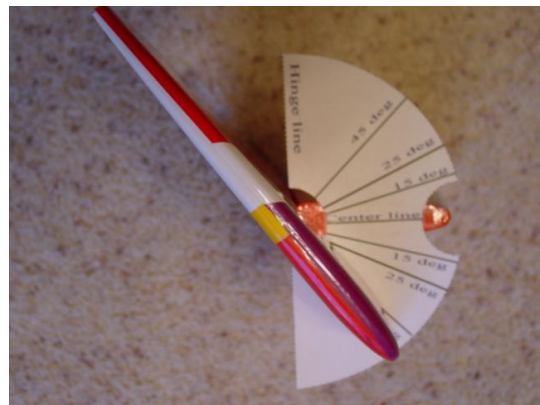
35 degrees for ailerons with 40 to 70% expo  
45 degrees for elevators with 40 to 70% expo  
45 degrees for rudder with 30 to 70% expo

**or as much as you can stand for hardcore flyers.**

CG Range is 2 to 3 inches measured from the rear cabane going forward.

### Place an “X” to ensure task completion:

- What you will need in this chapter:
  - ✓ Completed airframe
  - ✓ Radio
  - ✓ Throw templates or meter
- Cut out the templates for surface throw. These should be located on the last page of this manual.
- Tape each one in place using the horizontal line as a reference point to each stabilizer at the counter balance and at the inside of the wings where the ailerons meet.
- Set your throws accordingly. Double check to make sure nothing is binding to include the throttle and or choke servos and their linkages. Also, ensure all surfaces and controls are moving in the proper directions.





# Chapter 11

## Final Inspection and Pre-Flight

Welcome to the final chapter prior to your maiden flight. We hope you have enjoyed building your Ultimate.

**Lets go over the airframe and perform a pre-flight to make sure everything is in order.**

- Inspect the airframe for any visible damage and loose covering that may have occurred during the build.
- Inspect the main landing gear and tail wheel assembly. Ensure all mounting hardware and collars are fastened properly.
- Inspect your motor installation and cowl to ensure all bolts are tight and the muffler is firmly mounted in place. Check the motor and muffler for possible contact with the cowl. Inspect ignition module and spark plug wire for proper mounting. Check propeller and spinner to ensure they are both secure.
- Inspect the inside of the fuselage to ensure your batteries, switches, regulators (if equipped), fuel tank and lines are securely fastened. Check nylon wing bolts to ensure they are in place and secured.
- Inspect all control surfaces and control surface hardware. Gently tug on each surface to make sure the hinges are properly bonded. Check the four 4/40 horizontal stabilizer fasteners and ensure they're in place and secured.
- Check all servos for mounting screws. Check servo arm mounting screws and inspect that the 4/40 links have been secured with lock nuts.
- Fill fuel tank and inspect for any leaks.
- Check your batteries in both your aircraft and radio to ensure they are fully charged
- Turn on radio to inspect all controls for binding, proper direction and throw while on high rates.
- Re-check CG. It should be anywhere from 2 to 2-1/2" inches depending on your flying style (see page 23).
- Secure aircraft using a buddy or hold down and start motor according to manufacturers guidelines. Don't forget to lower your throttle prior to ignition.
- Perform a proper range check with the motor running using your radio manufacturers instructions.
- Make sure you go back to low rates for your maiden takeoff and enjoy!

This concludes your pre-flight checks. After your maiden flight, repeat these steps to perform a post flight to ensure nothing has loosened. It's always a good habit to use a checklist like this one to go over your aircraft prior to the first flight of the day.

## Flying!

We believe you will find this aircraft finest aircraft you've ever flown. High-alpha stability gives you solid control and confidence to bring it right down on the deck! The Ultimate is a rock star and is will please and answer all desired inputs with confidence. Crowds tend gather around these big bipes and with PAU performance you can put on the show.



**Every airplane has structural limits**, and the larger the plane is, the more critical it is to understand and respect these limits. This is particularly true for 3D aerobatic planes, since by design, these planes are light weight, are over powered, and have oversized control surfaces.

Pilots need to use proper throttle management, and avoid high speed when executing high stress maneuvers such as Walls, Parachutes and Blenders. As a general rule, the throttle must be at idle position whenever the nose is pointed down (whether at vertical or 45 degrees down line).

Planes must be inspected frequently, looking for any loosening screws, bolts and glue joints. Servos and linkages must be free of play or "slop", as this is a major cause of flutter (and crashes).

Understanding and applying these few safety and maintenance guidelines will help you get many enjoyable and rewarding flights with your Giant Scale Plane.

=====

We hope this aircraft offers you many years of enjoyment. Thank you again for choosing PAU and look for exciting future products.

### **Additional products from PAU:**

100 and 150cc Extra 300sp's

43% Edge 540

36% Edge 540.

35% Extra 300SP

30% Extra 300SP

30% Edge 540

27% Pitts Challenger.

27% Pitts Bulldog

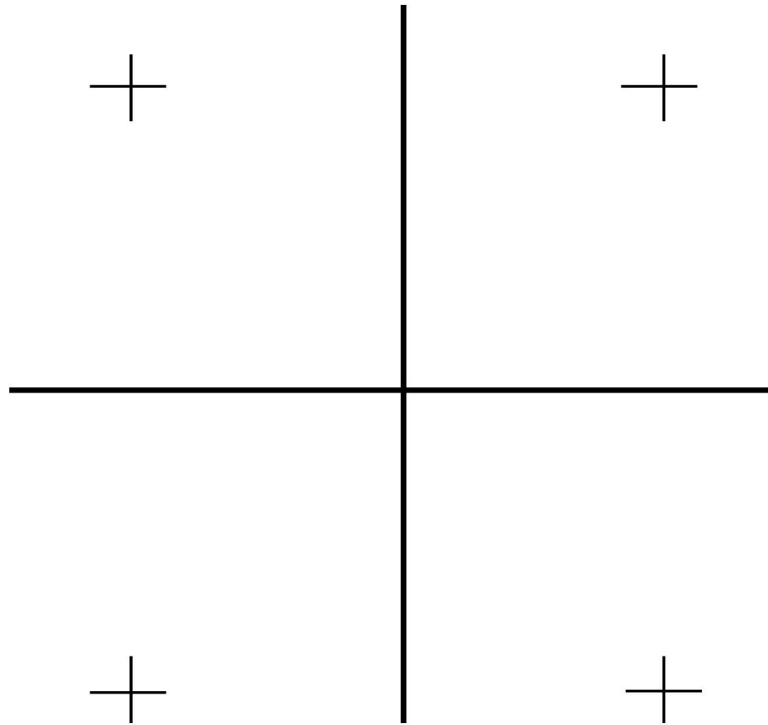
37% Ultimate Biplane.

Additionally, PAU carries a complete line of high performance laminated props, lightweight spinners, and more!

New! Aluminum Hardware sets that weighs next to nothing. Time to chuck your old stuff it's now obsolete!  
Something bigger this way comes! Stay tuned.

# DA-100 Template

If printing from Adobe, turn off page scaling.



# Throw Template

If printing from Adobe, turn off page scaling.  
Cut out around all the dotted lines.

