

Legacy Aviation

85" Muscle Bipe



EXTREME FLIGHT ✖

Please read the following paragraph before beginning assembly of your aircraft!

THIS IS NOT A TOY! Serious injury, destruction of property, or even death may result from the misuse of this product. Extreme Flight RC is providing you, the consumer with a very high quality model aircraft component kit, from which you, the consumer, will assemble a flying model. It is beyond our control to monitor the finished aircraft you produce. Extreme Flight RC will in no way accept or assume responsibility or liability for damages resulting from the use of this user assembled product. This aircraft should be flown in accordance to the AMA safety code. It is highly recommended that you join the Academy of Model Aeronautics in order to be properly insured, and to operate your model at AMA sanctioned flying fields only. If you are not willing to accept ALL liability for the use of this product, please return it to the place of purchase immediately.

Extreme Flight RC, Ltd. guarantees this kit to be free of defects in materials and workmanship for a period of 30 DAYS from the date of purchase. All warranty claims must be accompanied by the original dated receipt. This warranty is extended to the original purchaser of the aircraft kit only.

Extreme Flight RC in no way warranties its aircraft against flutter. We have put these aircraft through the most grueling flight tests imaginable and have not experienced any control surface flutter. Proper servo selection and linkage set-up is absolutely essential. **Inadequate servos or improper linkage set up may result in flutter and possibly the complete destruction of your aircraft.** If you are not experienced in this type of linkage set-up or have questions regarding servo choices, please contact us at info@extremeflightrc.com or 770-887-1794. It is your responsibility to ensure the airworthiness of your model.

Please read over the manual completely before beginning. This will give you an overall understand of the assembly process and familiarize you with the tools and supplies you will need.

Extreme Flight constantly upgrades and improves its products. Hardware and details may change, but the basic process remains the same. If you are confused about a step, please call or email us at the contact information on our website, we will be glad to help.

1. Unpacking and Sealing Covering

Your aircraft has been on a journey around the world since it left our factory. Although the covering material was perfectly smooth when it was boxed up, changes in weather and humidity may have wrinkled the covering material. For certain, wrinkles will appear in the covering once you have unpacked your aircraft and it adjusts to the atmospheric conditions in your region. Learning to remove wrinkles from covering is a necessary skill to maintain your wood aircraft.

Your Extreme-Flight produced aircraft is covered in Ultracote covering material (US market name), also called Oracover in global markets. If you need replacement covering to repair damage, Ultracote/Oracover is widely available from retail hobby suppliers. Also, each roll of Ultracote/Oracover includes excellent instructions which are also available online. Please refer to them for details about working with and/or repairing your covering.

The basic tools are a covering iron and a hobby heat gun. Start by using the iron at 220F (104C) to seal all of the edges on the covering scheme. This is CRITICAL on the leading edges of wings and stabilizers. Then use the iron at 300F (149C) or a heat gun to shrink out any wrinkles in the covering. Remove the plastic canopy from the aircraft when using a heat gun to protect it from heat damage. GO SLOWLY AND CAREFULLY to avoid over-shrinking or burning the covering. This is a skill which takes a bit of practice. There are many tutorial videos online demonstrating shrinking wrinkles from Ultracote. IF YOU ARE INEXPERIENCED WITH COVERING, WE RECOMMEND TO USE ONLY THE IRON AT FIRST. THE HEAT GUN WORKS VERY FAST AND YOU MAY NOT BE ABLE TO REACT QUICKLY ENOUGH.

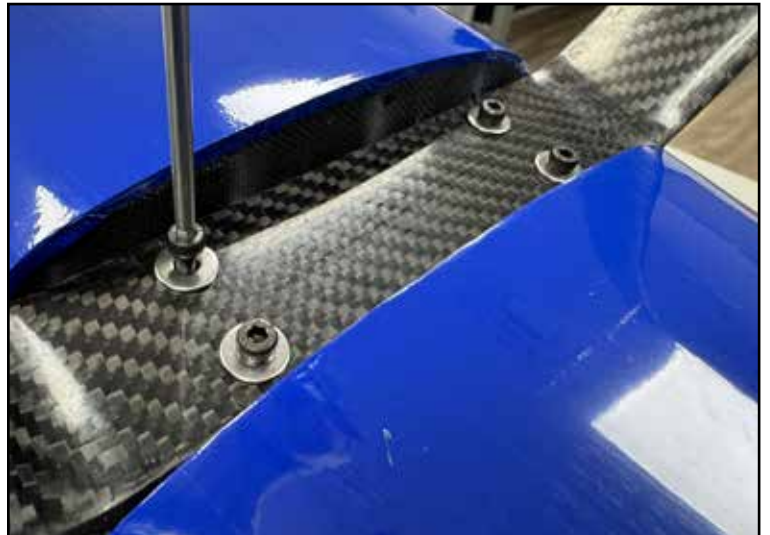


2.Landing Gear

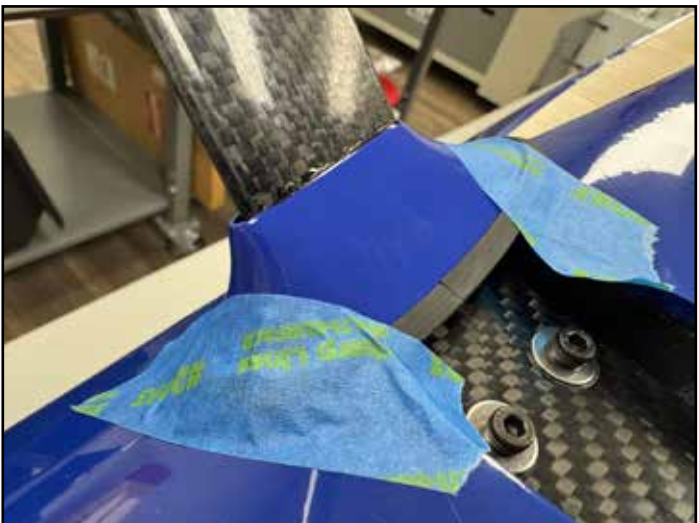
The Muscle Bipe uses a carbon one-piece landing gear which sweeps *slightly forward* when installed properly.



The gear attaches to the fuselage with four screws and washers as shown. Use blue threadlocker here.



Your kit includes fiberglass landing gear fairings. Test fit them onto the landing gear. Open the slot in the fairing as necessary to fit the gear leg. Test the fairings on both sides to find the best fit. Mark the end of the fairing with a marker as shown. Lightly sand and clean this area with solvent. Add a large dollop of rubberized glue. We prefer Gorilla Clear Grip adhesive. GOOP adhesive is a good substitute. Tape the fairings in place and allow to cure.



The wheel axles are attached to the landing gear with washers and locknuts. When tightening, make sure the flat spot machined into the axle tip points **DOWN**, toward the runway. If you wish to run **BARE WHEELS** (no wheel pants) use the conventional wheel collars.



If you wish to run wheel pants, assemble and install the wheel-pant-mounts/wheel collars as shown. Two wood screws attach the wooden wedges to the aluminum body as shown. Scuff the face of the wood wedge. Assemble onto the axle and use blue threadlocker on the set screw. Apply adhesive (we recommend Gorilla Clear Grip or Epoxy) to the face of the wheel pant mount as shown.



Install the wheel pant over the wheel and axle, tighten to the landing gear with screws as shown, using blue loctite. The wheel pant support should sit against the pant as shown. By stabilizing the pant, this design lengthens the life of your wheels pants. Just like on full-size aerobatic aircraft, however, wheel pants take a lot of abuse and over its life your aircraft will probably need a replacement set.



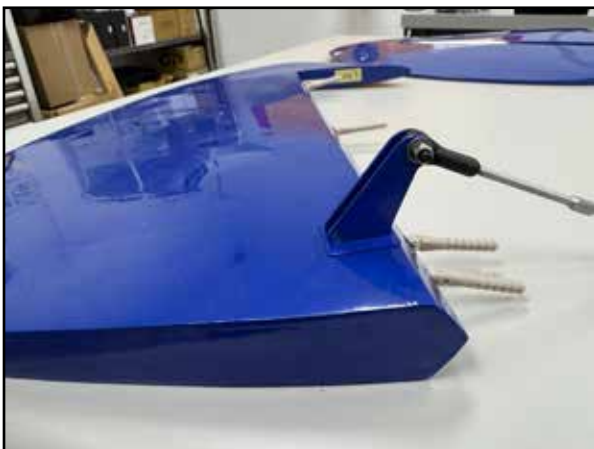
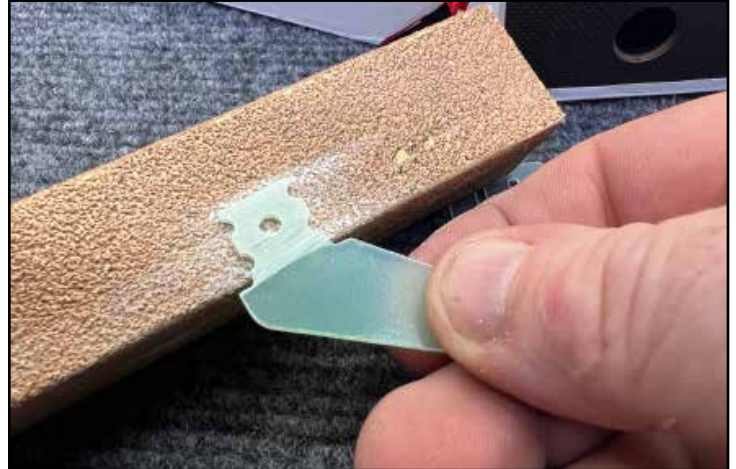
Install the tailwheel onto the fuselage with blue threadlocker. Remove the covering over the mounting hole in the bottom of the rudder and install the tiller holder (a plastic ball joint) with epoxy as shown.



3.Installing Control Horns

All of the control horns on your aircraft install in the same way. The horns insert into slots in the control surface, where epoxy glue forms a strong shear joint. They also have trim plates which go on top and help to hold correct geometry during installation.

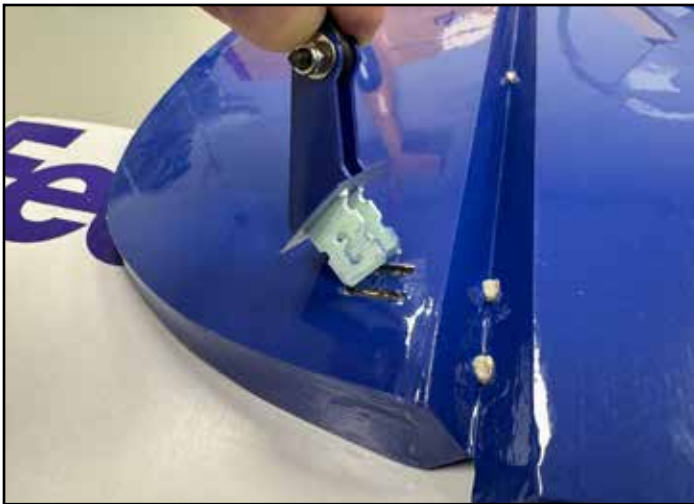
Begin by scuffing the area of the control horn which will be inserted into the control surface with sandpaper (any grit 120-280 is fine) as shown. This cleans the horn and provides a rough surface for the epoxy glue to grab on to. Then, assemble the horns with the trim plates and correct pushrod assembly as shown, using washers and locking nuts. Test-fit each of the horns into their slots without glue to make sure they insert all the way in. Clean out the slots as necessary,



Apply good quality 15 or 30 minute epoxy into the slots and to the scuffed area of the horn. Using excess epoxy is a good idea here, as we want complete coverage and can easily clean up any excess which squeezes out with denatured alcohol on a paper towel. Press the horn firmly into the slot and make sure it seats all the way. Allow to cure.

NOTE: It is optional to remove the covering in-between the slots. We have shown both ways. The actual strength of this joint is provided by the glue on the two horn protrusions into the control surface. What happens on the surface, whether the covering is removed or not, doesn't supply meaningful additional strength.

NOTE: The design of the slot and horn will place the screw approximately over the center of the hinge line. It is not necessary that the screw be precisely over the center, during radio setup we will correct for any slight error using the endpoints function.



We use an epoxy gun to apply epoxy precisely into the horn slots. While the epoxy gun is a great tool, it is not necessary. If you hand mix your epoxy, be sure to get plenty of glue down into the slots.



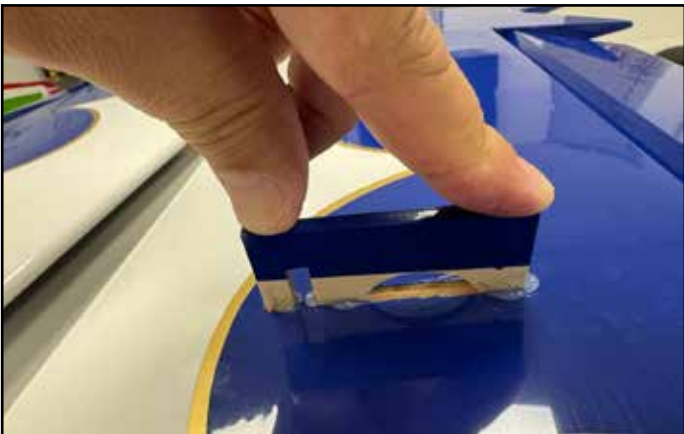
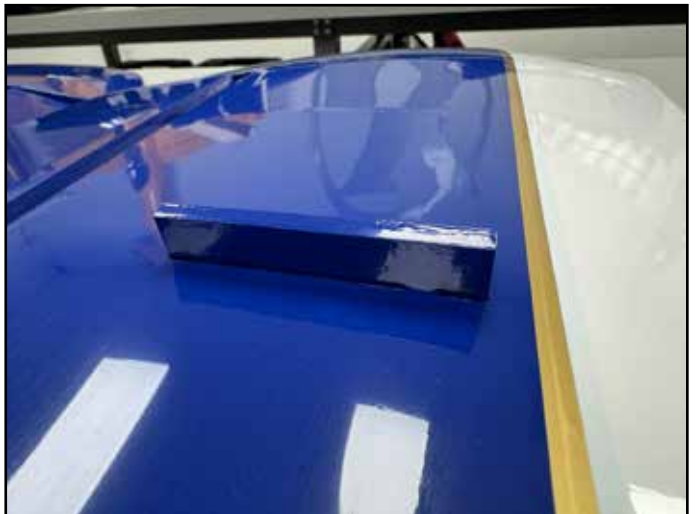
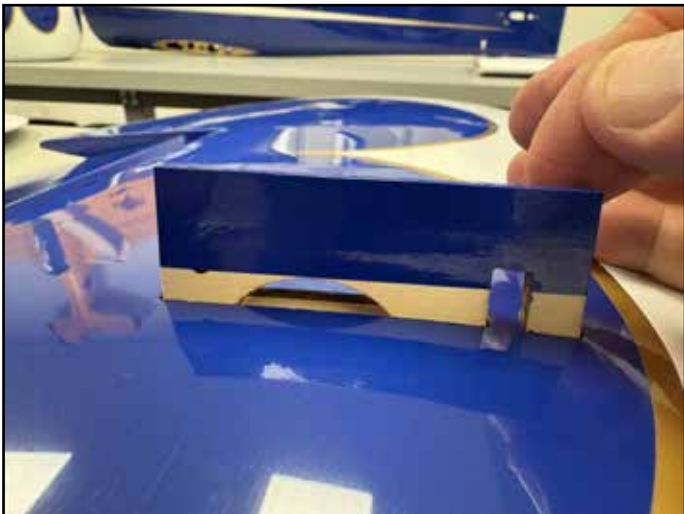
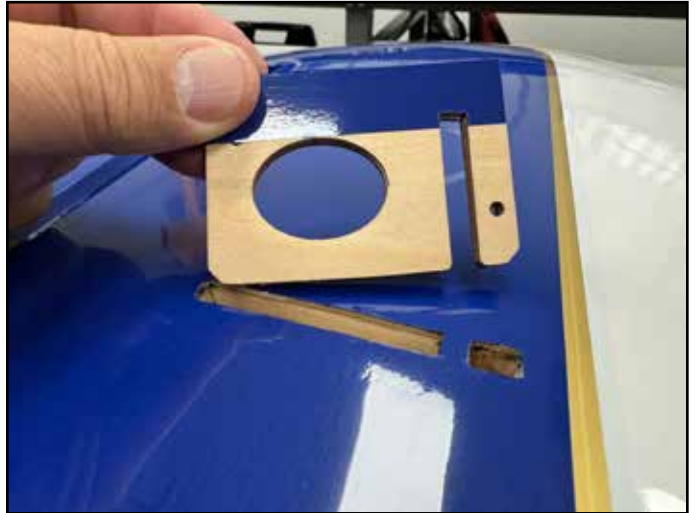
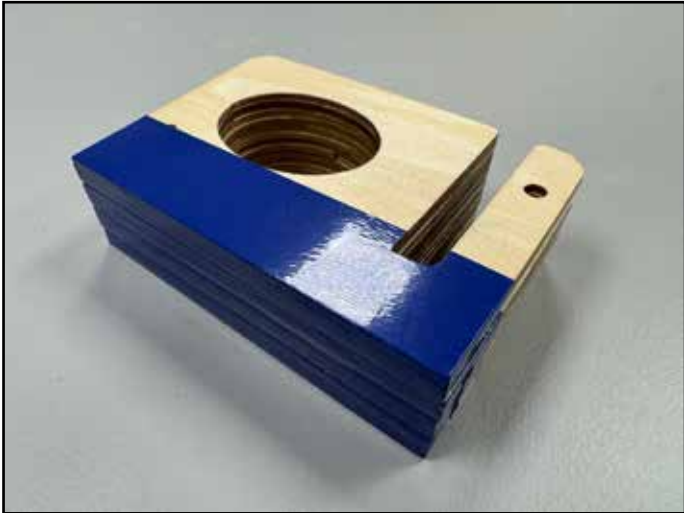
4. Rudder installation

The 85" Muscle Bipe arrives with the wings and stabilizers pre-hinged and gap sealed. The only hinges you need to attach are the fuselage-side of the rudder hinges. Place a small amount of petroleum jelly on the center area of each hinge to protect the hinge from glue. Place epoxy into the hinge holes on the fin as shown (again, we are using an epoxy gun for the cleanest, easiest application of epoxy). As you insert the rudder hinges, make sure to guide the tailwheel tiller wire into the tiller keeper you glued into the rudder. Once the rudder hinges are fully inserted, clean up any epoxy which squeezes out. Swing the rudder back and forth several times during the curing process.



5. Strut Mounts

The 85" Muscle Bipe includes interplane (between the wings) struts and the mounts for these struts are installed with epoxy glue into the wing panels. It's important to get a good fit for these mounts so that they sit all the way down onto the wing when glued. Install each mount without glue and check the fit. Clean and trim as necessary. Then install with epoxy, and clean up any excess with alcohol.



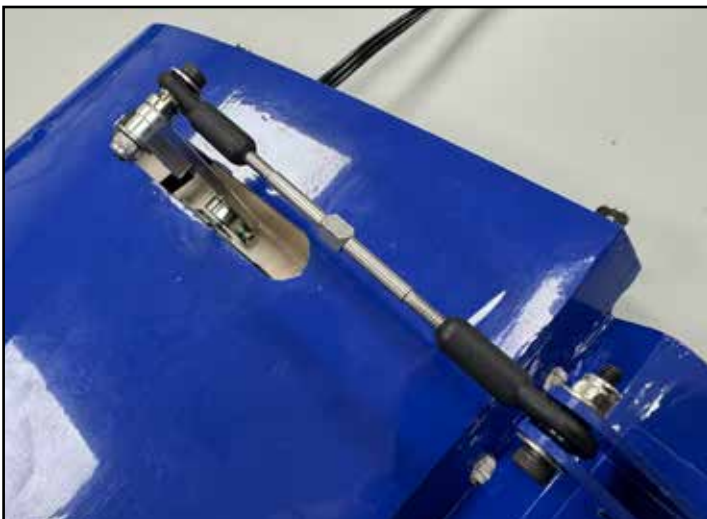
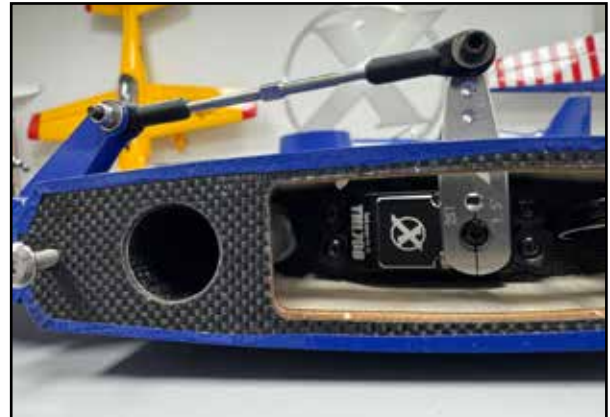
6.Servos and Control Linkages

Check the spec sheet for your aircraft, available on the webpage of the aircraft on the ExtremeFlightRC.com website, for servo arms sizes and extension lengths required. Use a locking clip or masking tape to prevent the servo wire from disconnecting from the extension in flight. Your kit includes a pre-installed plastic tube in the rear of the fuselage to provide a path for the extensions to run to the tail.

Elevator:

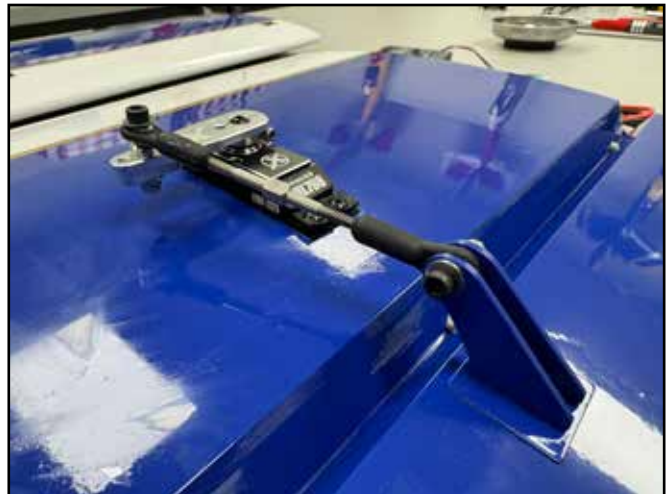
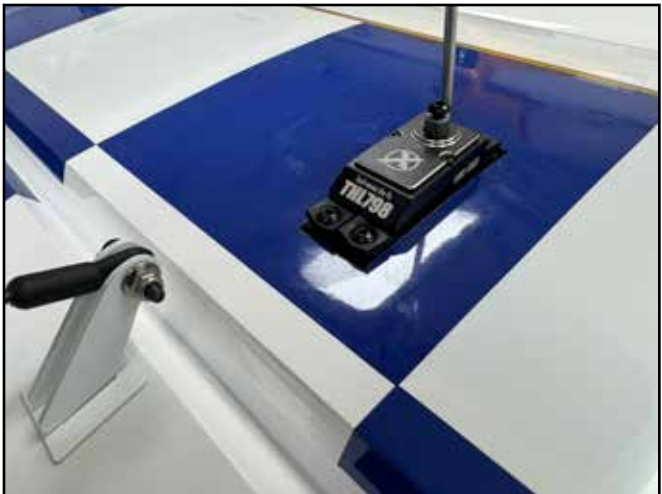
We prefer to add a single drop of thin CA glue to each of the servo screw mounting holes. Begin to install the servo by threading the wire through as shown. The first time you install an elevator servo into an interior mount like this, it can be a challenge. Be patient and you'll succeed. Note that if your servo has an oversized case, you may need to sand or file the opening to match.

Install the servo arm, and install the pushrod, using bolts, washers, locknuts, and tapered spacers on the servo-arm end as shown.



Ailerons:

First, note that different servos have different length wire leads. Your servo may, or may not need an extension on the lower wing. Check as shown. Again, we prefer to add a single drop of thin CA to each servo mounting screw location. Mount the servo as shown, and install the arm and pushrod. Use the cone-shaped spacer between the ball joint and servo arm, as shown. See the photo for the CORRECT orientation of these parts once installed. The servo linkage is "crooked" at the neutral/center position. This is correct, so that the linkage will be aligned within specs when fully deflected. At full deflection is when stresses are highest, that's the important position.



Rudder:

Install the rudder servo, arm and pushrod as shown, using the same techniques as on the other servos. Install the cone spacer between the ball joint and servo arm.



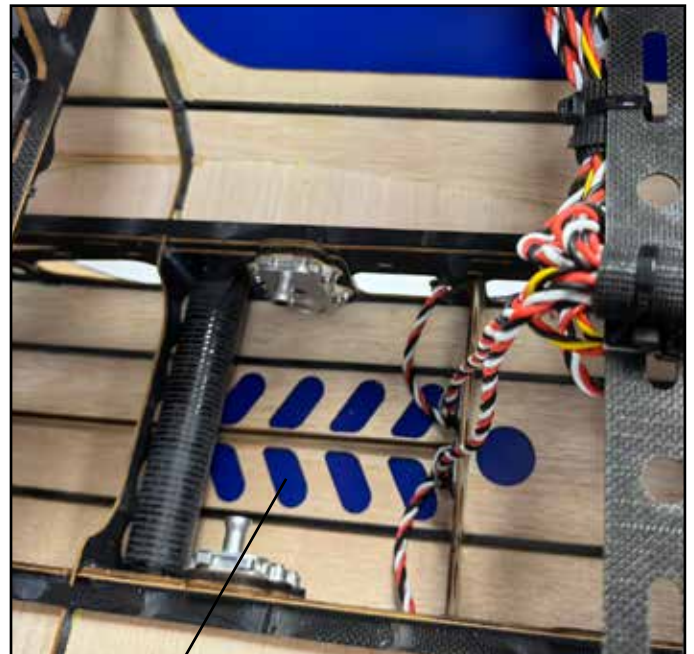
7. Electric power

85" Muscle Bipes are excellent candidates for electric power with the XPWR60CC brushless motor and 12S 6000mah lipo batteries. Use our BlazingStar X-Large standoff set. The XPWR60CC motor has the same mounting bolt pattern as the DA-60/DA-70 gas engines. Drill the holes in the firewall on the pre-marked locations, first with a small drill bit such as 2mm or 1/16", then finish with the final size bit. Use blue loctite on all of the motor mounting screws.

Our favorite ESC for this application is the Castle Creations Edge HV 160. When we introduced the XPWR35-60CC motors, we worked with Castle technicians to create a compatible firmware for Castle ESCs which was lab tested on these motors. This is Firmware 4.22. We recommend that you backdate your Castle ESC to firmware release 4.22 using your Castle Link and a computer. This will ensure smooth operation. All other settings remain at default. We prefer to mount our ESC on the bottom of the motor box.

For motor cooling, we recommend to cut an opening in the bottom of your cowl, similar to the cooling outlet recommended in the gas engines section. To cool batteries, we recommend leaving the motor-box top-plate OFF, creating a large airflow path into the top of the motor box and into the battery area. Remove the covering over the cooling holes in the bottom of the fuselage to create an outlet for the battery-cooling air.

We prefer a carbon 24x12 or 25.5x13 electric prop for this application.



Remove covering over these vents for cooling outlet.

8. Gas Twin 70-76CC Power

A GP76CC, DA70CC or other twin-cylinder engine in the 70-76CC range makes an excellent choice for your Muscle Bipe. Here we show the installation of the GP76CC.

We recommend the use of our BlazingStar engine mounts. The firewall of your Muscle Bipe already has the correct amount of right-thrust and up/down thrust built in, so there is no need to adjust or shim this in the installation. Drill the firewall on the provided marks. Use large washers and nylon locking nuts on your engine-mounting screws to prevent anything coming loose from vibration.

NOTE: The 85" Muscle Bipe is built in two kit versions, one for twin cylinder engines and one for radial engines. The only critical difference between the two versions is the motor box, which is 2" longer on the twin-cylinder version. The throttle-servo location is also different as are the accessories included. Yes, it is possible to use the radial-engine version kit for a twin, you will need to provide an additional 2" of spacers for engine mounting, and you will need to add an appropriate throttle-servo location.

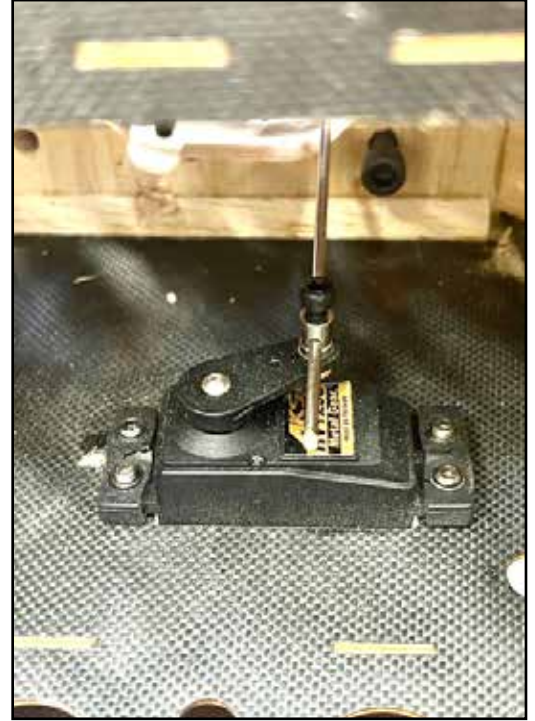
Also, the 85" Muscle Bipe is designed to take these very different power systems, and the radial engine is several pounds heavier than a twin. This means two things: 1. It is usually necessary to add some ballast to a twin cylinder (or electric) installation for perfect CG, and 2. even with ballast, the installation of the twin is extremely light and results in a very light-feeling aircraft. To assist with balance as much as possible, the mounting location of the twin is farther forward than some of our other round-cowl aircraft, and there is more clearance between the prop and cowl. This is correct and by-design. We will discuss this more in the manual section on CG.



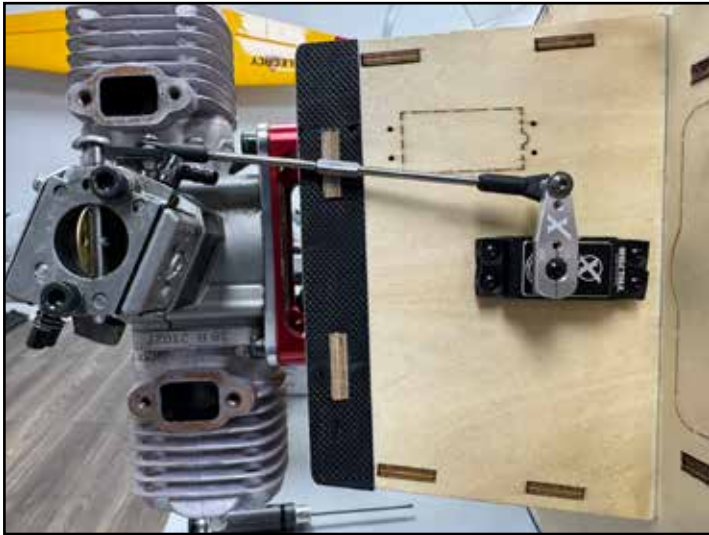
Twin Cylinder Throttle Linkage

As of this writing (early 2025) we are including a universal/adjustable type throttle linkage in our "twin cylinder" Muscle Bipe kits. It consists of a barrel connector which is mounted onto the servo arm, we use medium CA glue to lock the round nut in place, so that the barrel connector remains *free to rotate* on the arm. Attach the ball link to the throttle arm on the engine.

This type of linkage has been used for years on thousands of models, and it's adequate. However, a true ball-link-to-ball-link throttle pushrod is an upgrade, and we are changing our 60-70CC aircraft lineup over to that style. This changeover will not be complete for all aircraft until probably 2026. So, during this time, we will include instructions for both types.



Below is the upgrade throttle pushrod. If you wish to add this to your kit yourself, the length is 135mm total, this is made from a 120mm turnbuckle and two 3mm ball links.

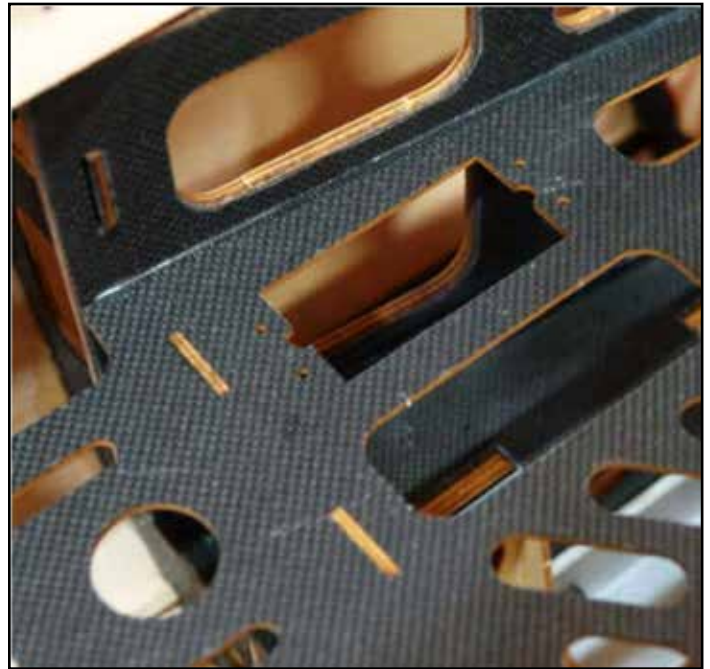
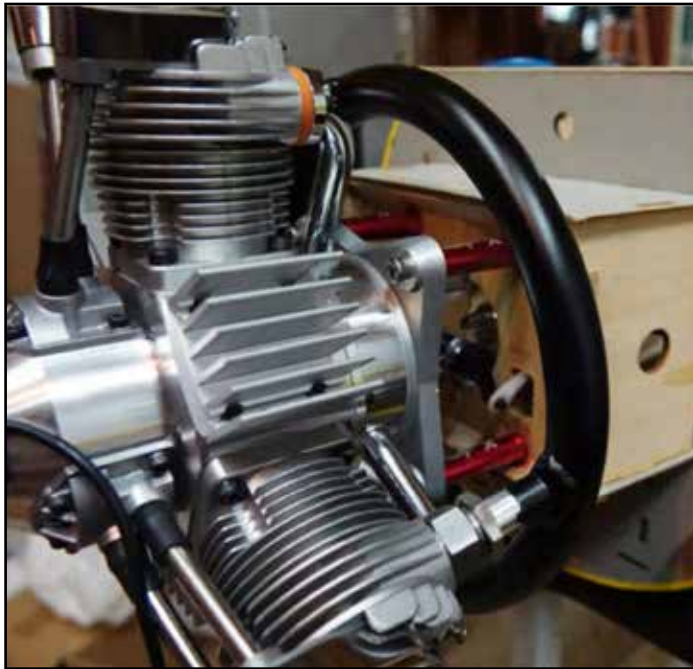


9.Radial Engine Power

The 85" Muscle Bipe can be purchased in a "Radial Engine" version. This version has a motor box 2" shorter than the "twin" version and includes unique accessories for radial installation. Although other radials are also applicable, the most common is the Saito 90CC three-cylinder and the installation accessories we include are in custom-fit to it.

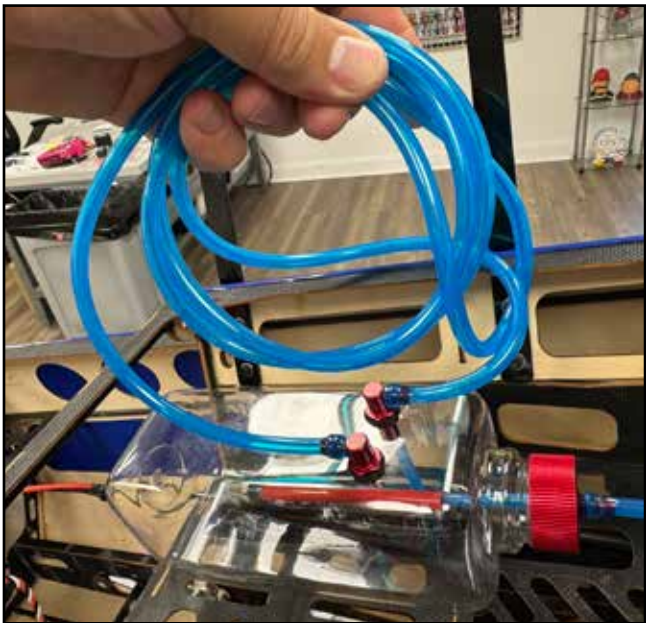
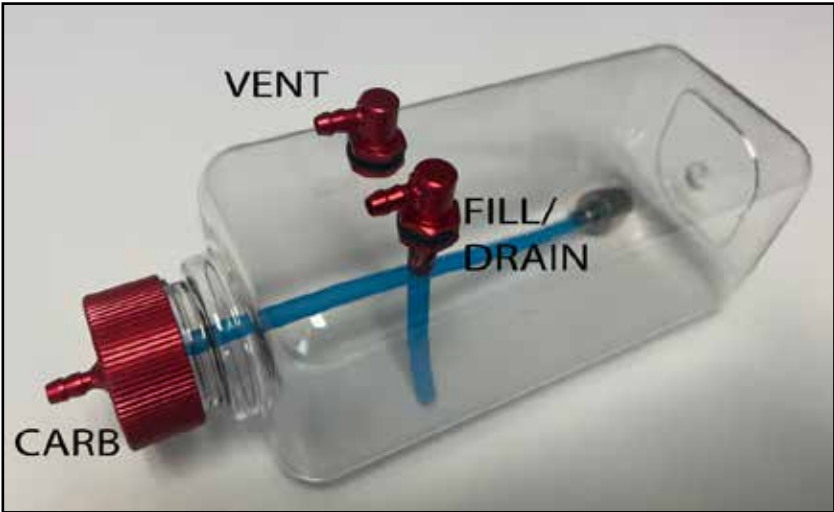
Mount the Saito radial using our Blazing Star standard Standoff kit. Only the base 2" sections are used. We recomend the Keleo brand exhaust ring exhaust system for best fit. For the Saito, the throttle servo mounts inside the fuselage and is connected with an included nylon tube pushrod system.

We prefer a Falcon gas 24x10 or 25x10 prop for this installation.

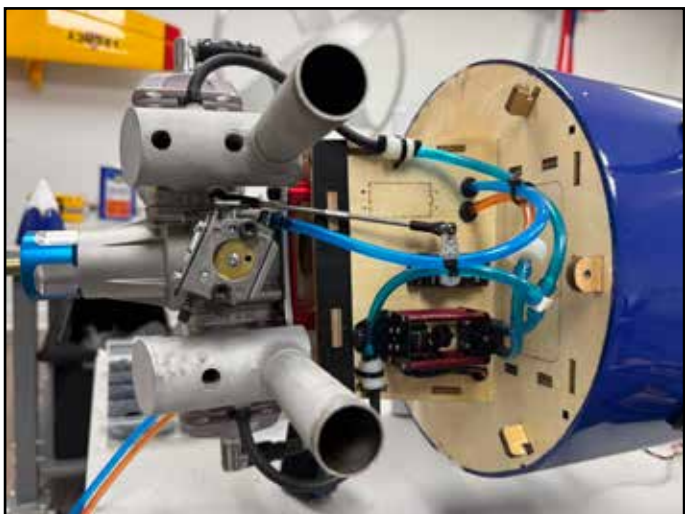
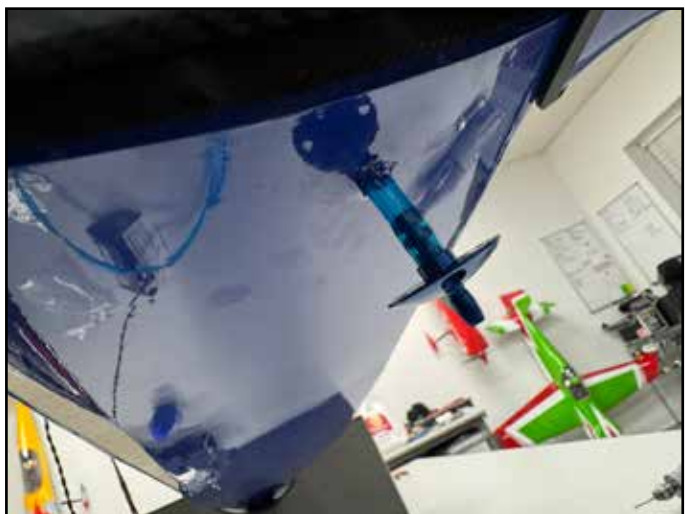


10. Fuel/Smoke Systems

The 85" Muscle Bipe typically uses one 24oz. Extreme Flight Flowmaster fuel tank for fuel, and a second 24oz. Flowmaster for smoke if desired. The tanks are secured with a self-adhesive velcro strip on the bottom and 2-3 strong velcro straps around the tank. Note that the "vent" line is looped, this is to prevent fuel siphoning out during aerobatic maneuvers. Also note that it is generally a good idea to have a stiffened section in the internal fuel "clunk" line inside the tank. The tank kit includes a brass tubing section for this purpose; an even easier want to provide this stiff section is to slip a piece of a large drinks straw over the clunk line, see photo. For gasoline only, mount the tank on the centerline of the aircraft. If also using smoke, mount side-by-side as shown.

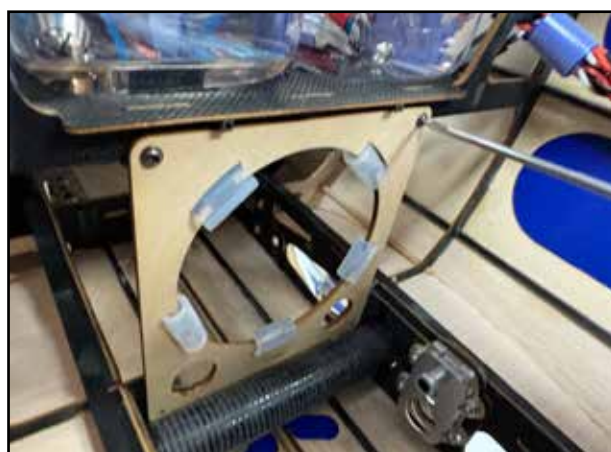


Install your fuel dot/filler as shown. For smoke, add a second dot on the opposite side. We recommend using different color dots for clarity as well, to avoid accidentally filling your fuel tank with smoke fluid. On this build, we are also using an Extreme Flight aluminum fuel vent dot on the bottom of the fuselage. Our preferred location for mounting a smoke pump is shown on the bottom of the motor box.



11. Canister exhaust

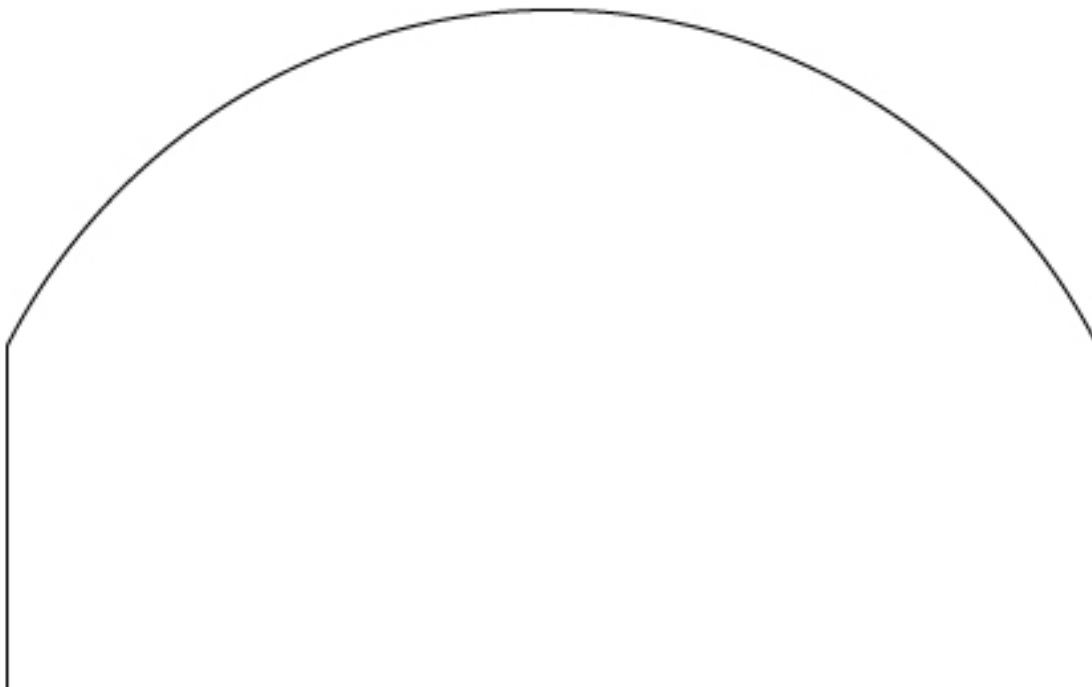
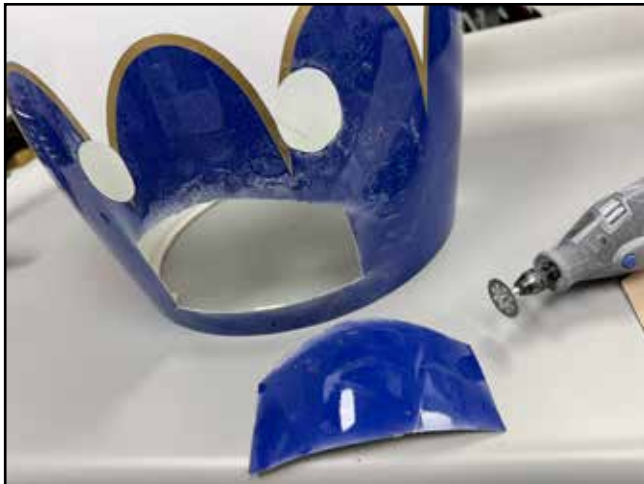
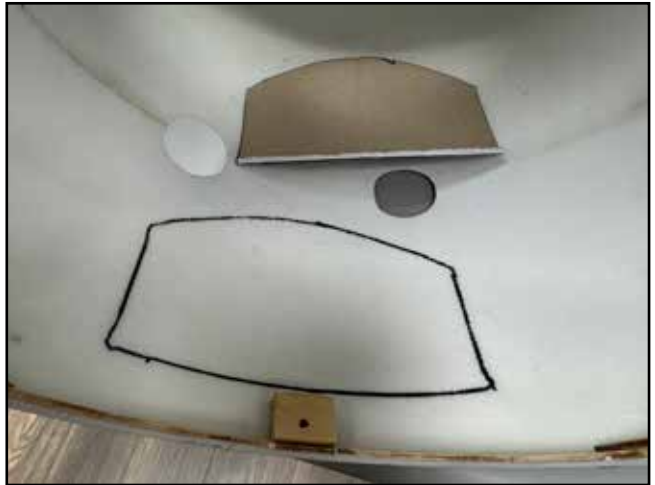
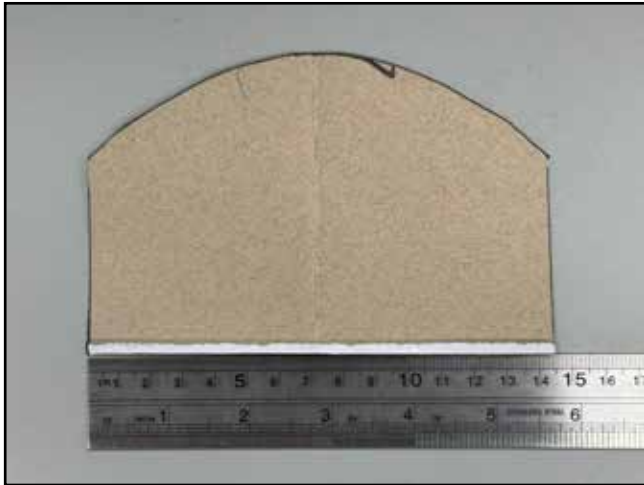
The fuselage of the Muscle Bipe, since it is fabricated around a lower biplane wing attachment, is more crowded in the lower half than a typical monoplane fuselage. For this reason, installation of a canister exhaust is possible, but it is a project for an experienced modeler. Included in your kit are a few different universal canister exhaust mounts for a single or dual canister system. Our preferred system for use on DA or GP engines is the MTW Y-header for DA70, 60mm drop, with the MTW TD-110H rear exit canister. The canister mount is attached with four screws, the top two are accessed from the rear and the bottom from the front. Because space is so tight, alternately consider using epoxy glue for the bottom mounting location. Remove the covering over the vent holes on the bottom of the fuselage to vent hot air from inside the fuselage.



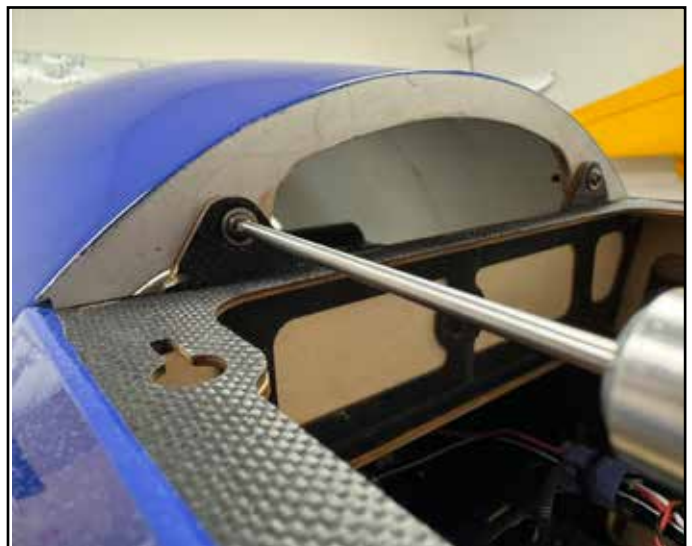
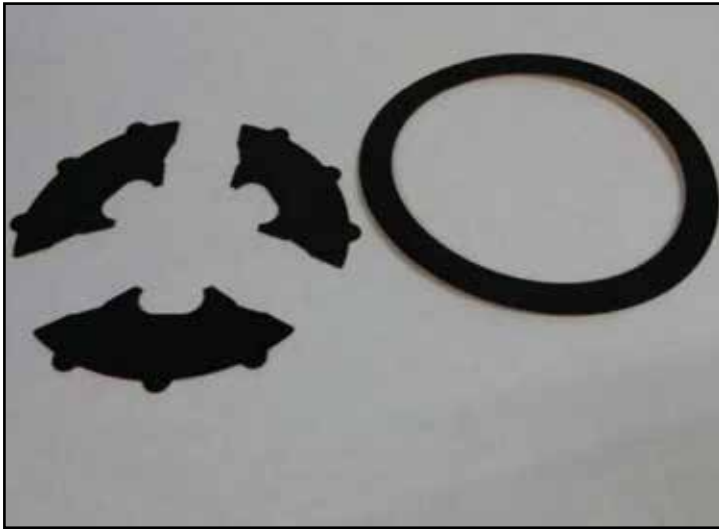
12.Cowl and Cooling

Any of the power systems you might install in your Muscle Bipe require cooling airflow. We'll take each system one at a time.

For any system, we recommend making a large cut in the bottom of the cowl as shown. You can print this page in letter size (8.5x11) and use it as a template to cut out.



For a Saito radial engine, the radial kit includes a cooling baffle system for the cowl. Mount the cowl over the engine, and mark the cowl in several places approx 1/4" behind the front edge of the cylinders. This is how deep into the cowl you will install the baffles. We like to glue several small pieces of balsa into the cowl on this mark. Remove the cowl, and squeeze the circular ring part of the baffles into the cowl and let it drop down onto these balsa pieces. Tack in place with a little medium or thick CA. Re-install the cowl over the engine and test fit the screw-in pieces as shown. If all fits well, remove the cowl again and glue the ring in with a fillet of epoxy. See photos for how the cowl attaches to the airplane.



For a gas twin, there are a couple of different options.

First off, we have flown the Muscle Bipe with GP76CC gas twin with no cooling baffles, to prove that it can be done successfully if the engine is properly tuned. Cooling can be improved with ducts/baffles, but it is not strictly necessary in this application. To keep your engine cool, run your mixture sufficiently rich and avoid prolonged hovering, especially on hot days.

If you want to bulletproof your cooling for hot days and abusive flying, direct airflow directly onto the engine cylinders. The simplest method is to block airflow above and below the cylinders, as shown in the first image. This can be done with wood or foam, or you can utilize the plastic radial engine plate included in your kit, and cut it to suit.

If you want to do a more sophisticated job, you can download a 3D printing file for a custom high-flow duct system from our Extreme Flight account on Thingiverse at: www.thingiverse.com/thing:6763352

While you can print in nearly any material, higher-temperature materials have become inexpensive enough so that there is no reason not to use one.

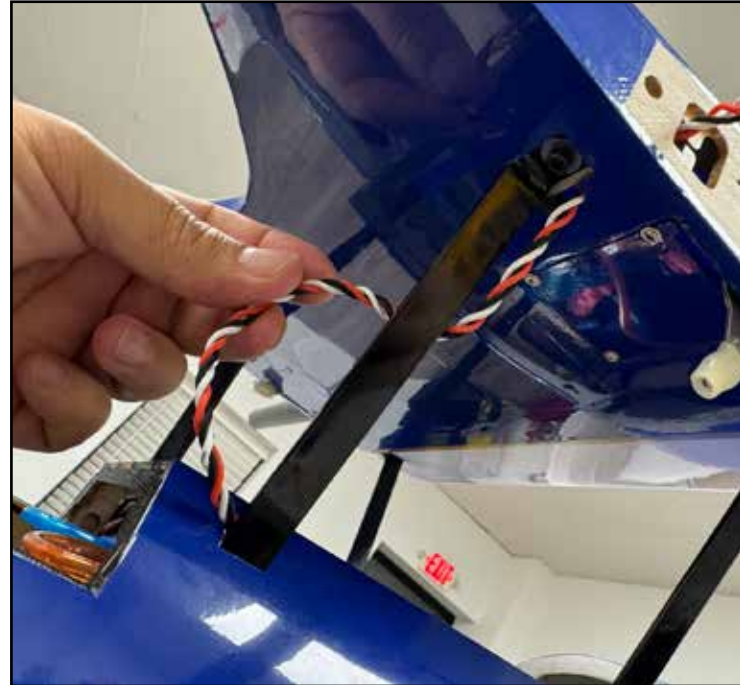
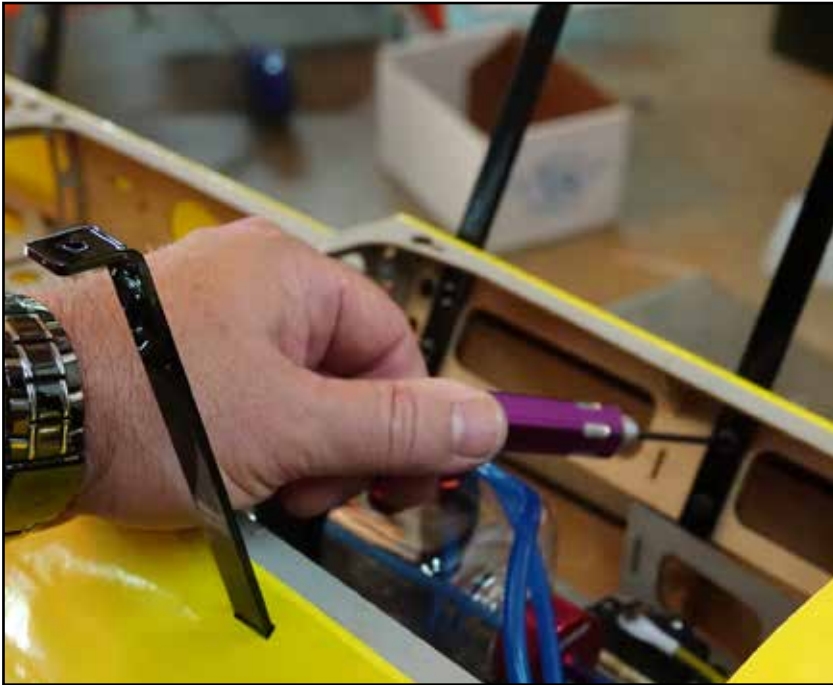
Note that if you run "stock" mufflers on your twin, you will also need to make exhaust pipe cutouts in the bottom of the cowl as shown.

For electric power, we recommend to use the plastic radial engine plate, and cut the center hole large enough for your motor to cool, and cut out the material between several of the false "cylinders" to allow more airflow. The plate is best attached to the inside of the cowl lip with Gorilla Clear Grip glue or another rubberized glue.



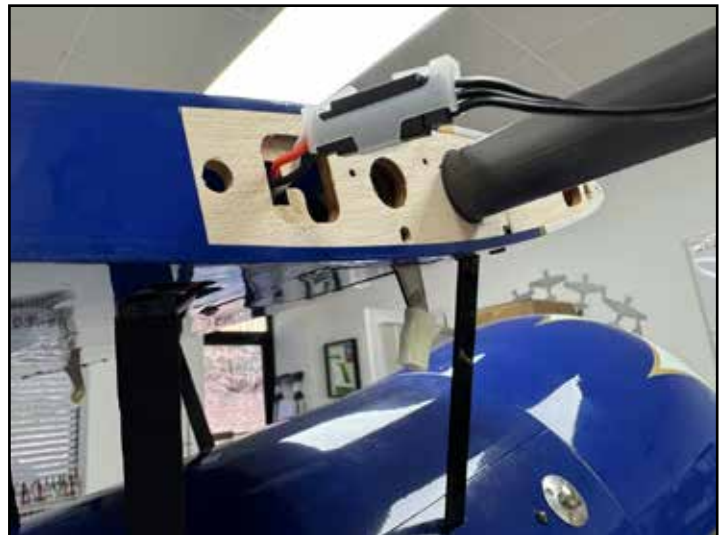
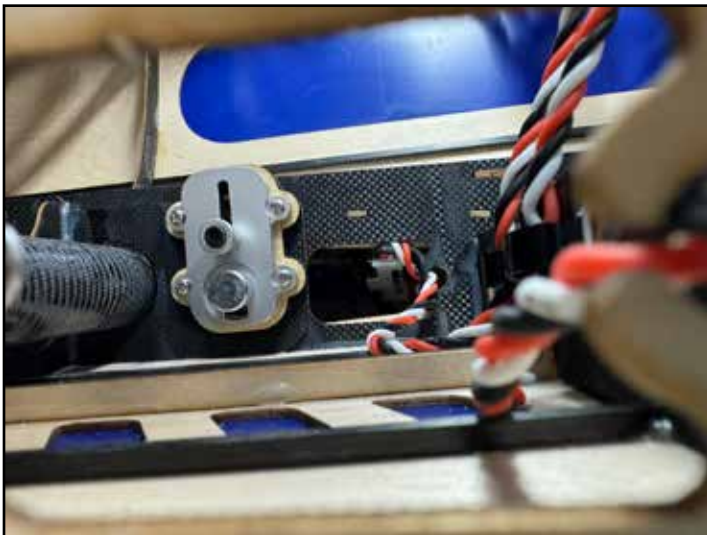
13.Cabane Struts

The upper wing center section is permanently connected to the fuselage via four metal “cabane struts”. Install these struts into the fuselage as shown using 3mm bolts, washers, and blue threadlocker. Then attach the center wing section to the struts with screws, washers and blue threadlocker. The wires for the upper wing aileron servos run along the front two cabane struts, we like to hide/retain them with a wrap of black tape around the strut as shown..



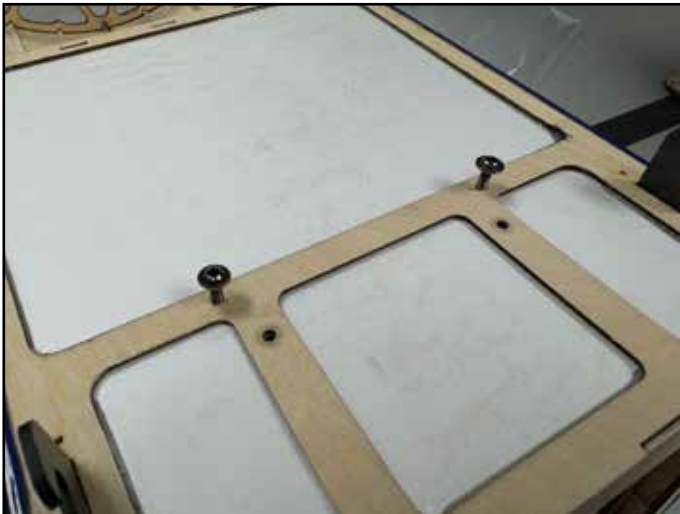
14.Wiring

Because it uses 4 aileron servos, and because the wires need to run throught the forward fuselage out these servos, wiring the Muscle Bipe is more complex than a typical monoplane. We use many wire retainers to keep everything organized and stationary in-flight. Please see pics.



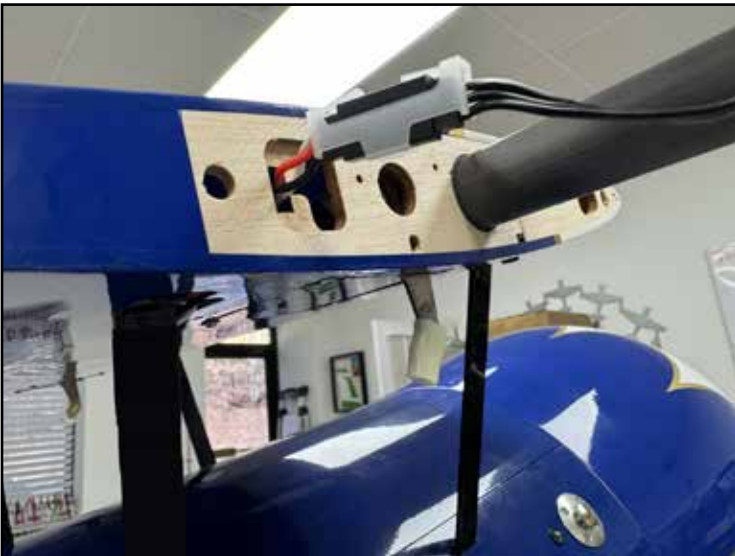
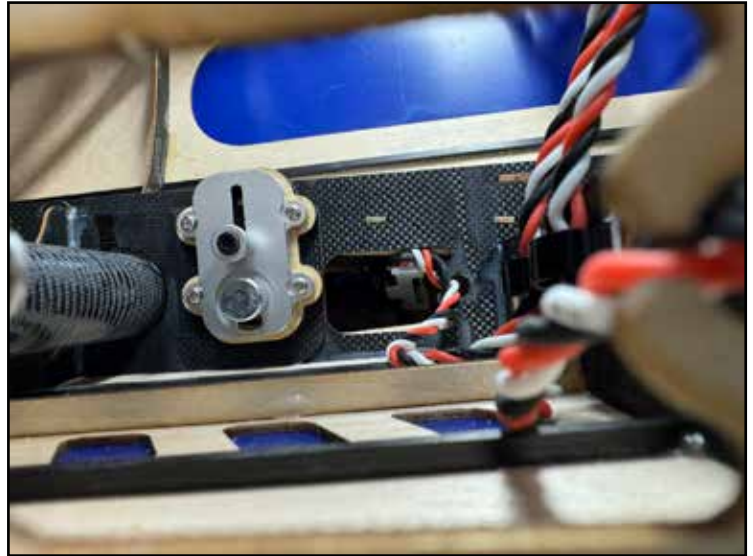
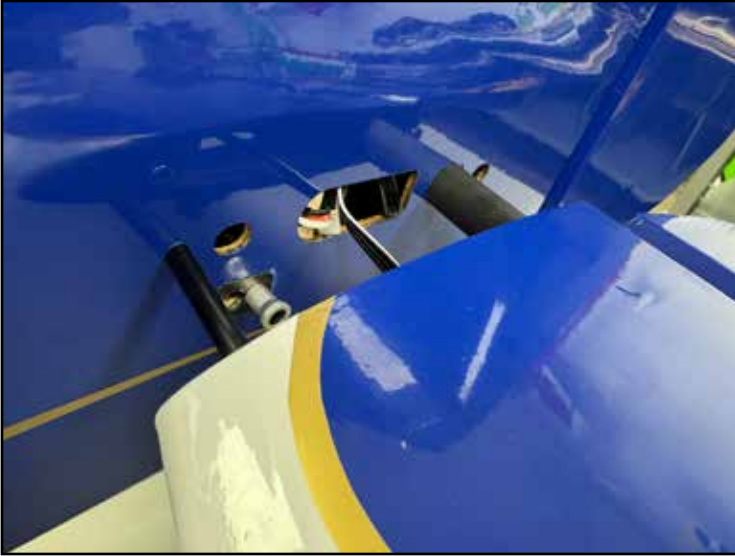
15.Pilot

There are a few different types of pilot figures appropriate to your Muscle Bipe. The molded rubber style pilot, left, has been included with the Muscle Bipe kit. In the future, this spec may change or you may wish to equip your plane with a fiberglass pilot bust from Extreme Flight. If so, you may need to drill new holes in the hatch wood frame as shown.

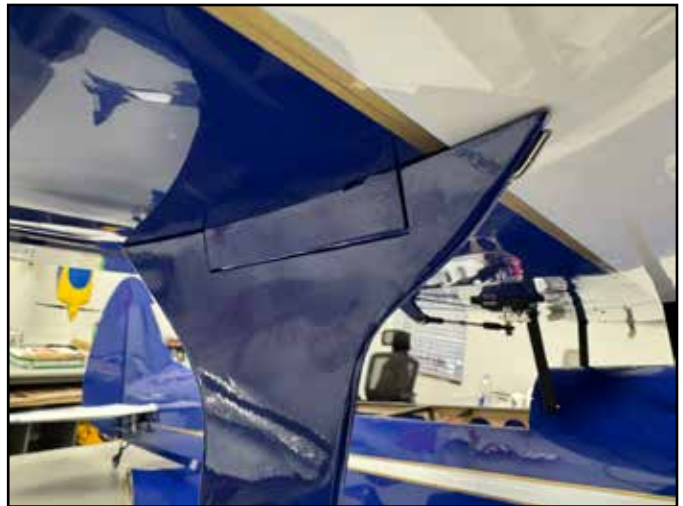


16. Final Assembly

Here are several photos detailing the assembled aircraft. Before flight, make sure all latches are fully engaged.



The interplane struts are retained with wire pins. At first, these pins may be very tight, requiring pliers to install/remove. If you ever need to add additional friction to these pins, we recommend a wipe of Gorilla Clear Grip glue or a little thin CA to the pin and allow to fully cure before inserting.



17. Balancing

NOTE: Balancing the Muscle Bipe is different from balancing our monoplane aircraft. Please read through this section.

1. The 85" Muscle Bipe is a unique aircraft. It is capable of using both extremely heavy radial engines AND very light, high-performance twins. For this reason, a lightweight power assembly will often require ballast in the nose area. It is vital that you properly balance your aircraft for good flight performance. With its tremendous wing area, the Muscle Bipe remains extremely light on the wing, and having a proper CG point is much more important to flight performance than total weight.

2. If you use a radial engine, your aircraft will be slightly nose-heavy. We recommend to place your batteries on the rear tray with your receiver. Fly and shift equipment or add rear ballast if needed. In the vast majority of applications, no ballast is needed with a radial.

3. With an electric setup, you can use larger lipo batteries than you typically would in a monoplane application, the Muscle Bipe does very well with a 12s6000mah+ setup.

4. Modern 70-76CC twins are extreme light for their power output. To balance them in the Muscle Bipe with a light setup (light exhaust, no smoke) requires some ballast. Also note that the DA70cc is several ounces lighter than the GP76cc.

5. See the diagram for CG range. The forward end of the range is good for sport flying and mild aerobatics/3D. The rear of the range is appropriate for hardcore 3D.

6. Check CG by supporting your fully-assembled aircraft under the top wing. The CG location is where it hangs level. If you check with full tank, that is how the aircraft will balance at the beginning of your flight. If you check with empty tank, that is how it will balance at the end of your flight. The most popular method is to check with half-full tank(s).

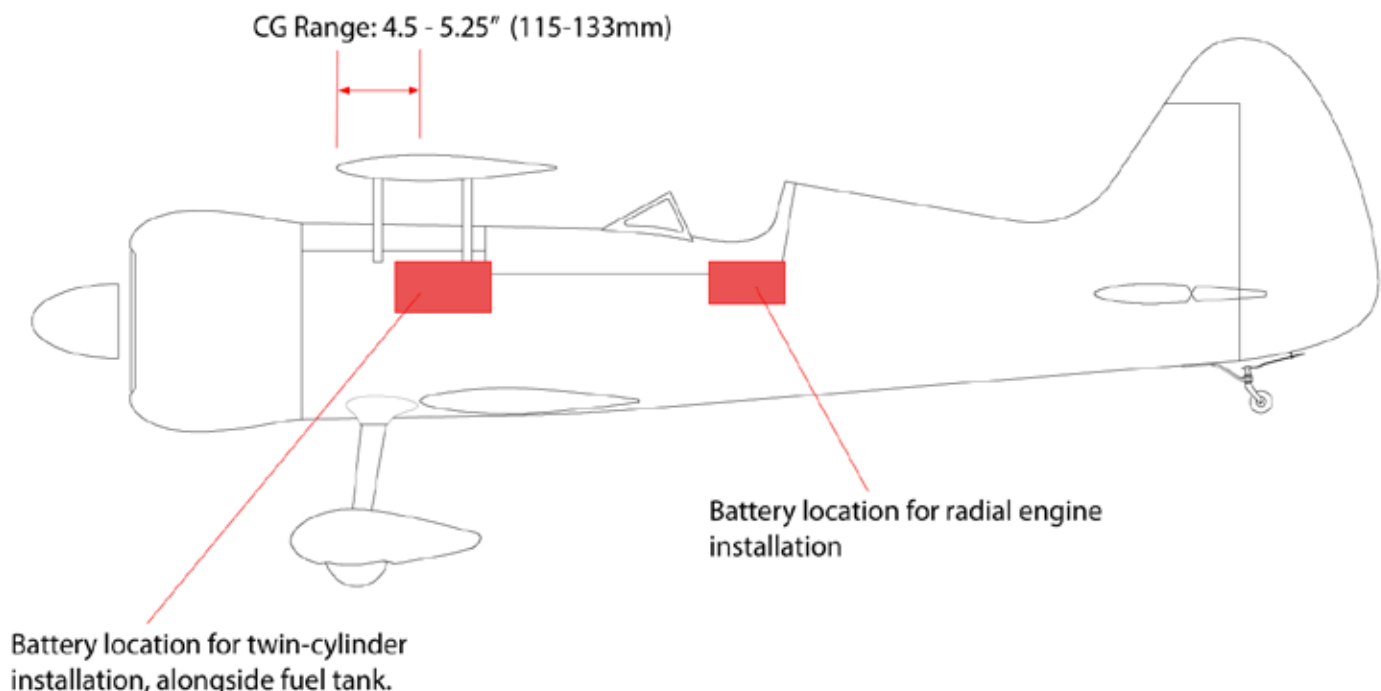
7. Some example setups:

GP76cc + smoke system, batteries on forward end of rear tray = 5.25" a 3D center of gravity

Saito FG90 radial, batteries in rear under pilot = 4.5", excellent for sport/precision

DA70cc + canister exhaust+ batteries alongside fuel tank + 8oz ballast in nose = 4.75" an aerobatic CG

Our preferred material for ballast is modeling clay, applied into the interior corners of the motor box.



18.Control Throws

Set the control throws. Be sure to add adequate EXPO and be sure each surface is moving in the correct direction. There are various kinds of throw-meters available for this purpose, but our favorite is the smart phone most of us carry every day. Use a "level" app (most phones come equipped with one) and hold the phone against the control surface to measure deflection.

Aileron Low: 15 deg up, 15 deg down 18-20% exponential
High: 33 deg up, 32 deg down 50-60% exponential

Elevator Low: 10-12 deg 18-20% exponential
High/3D: 45-50 deg 50-60% exponential

Rudder Low: 20 deg 50-60% exponential
High: 45+ deg 60-80% exponential

Note that the aileron high rate is lower than on our typical monoplanes. Having four large ailerons makes them very effective.



19.Repairs

If you need to make repairs, every component of the Muscle Bipe is available as a replacement part.

If you need to repair the covering, here are the color codes for the material in both the Oracover and Ultracote naming systems:

Red/White/Gold color scheme:

Oracover colors

Ferrari Red #23

White #10

Gold #92

Ultracote colors

True Red-#HANU866

White-# HANU870

Gold-#HANU879

Yellow/Black/Silver color scheme:

Cadmium Yellow #33

Silver # 91

Black #71

Bright Yellow-#HANU872

Silver-#HANU881

Black-#HANU874

Blue/White/Gold color scheme:

Dark Blue #52

White #10

Gold #92

Midnight Blue-#HANU885

White-# HANU870

Gold-#HANU879

Check the "Tech Tips" section of the Extreme Flight website for the latest information on matching paint availability.

We recomment to clean your aircraft after flight with a good quality glass cleaner to remove all oils and grease, and to preiodically wax your aircraft with a good quality spray wax/detailer.

